PART 2, CHAPTER 17

HIGHWAY TRAFFIC NOISE

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PART 2, CHAPTER 17
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17.1 OVERVIEW

17.1.1 Purpose

This chapter is the official Florida Department of Transportation (FDOT) noise policy and procedure for the purpose of meeting the requirements of *Title 23 of the Code of Federal Regulations (CFR) Part 772* and applicable state laws. FDOT shall apply these policies and procedures uniformly and consistently statewide.

Roadway traffic is one of the more dominant sources of noise in urban and rural areas of Florida. In an effort to encourage the control of noise, Congress passed the ***Noise Control Act of 1972***. Congress further directed the Federal Highway Administration (FHWA) to develop noise standards associated with traffic. However, effective control of traffic noise requires both the control of land use planning next to highways, and reasonable and feasible abatement associated with highway projects.

The control of land use is a local government responsibility. The control of traffic noise associated with specific highway projects is the responsibility of the transportation agency (or agencies) planning, designing, and constructing a project.

The noise impact and abatement analysis policy and procedures provided in this chapter are based largely on the regulatory material found in ***23 CFR Part 772: Procedures for Abatement of Highway Traffic Noise and Construction Noise*** dated July 13, 2010, and the FHWA guidance document ***Highway Traffic Noise: Analysis and Abatement Guidance*** dated December 2011. These two documents are incorporated into this chapter by reference. In addition, ***Section 335.17, Florida Statutes (F.S.),*** requires FDOT to develop a project in conformity with federal standards contained in ***23 CFR Part 772*** regardless of funding source and include the noise standards mandated by ***23 United States Code (U.S.C.) § 109(1)***. Collectively, FHWA and FDOT consider that all highway projects developed in conformance with this regulation shall be deemed to be in accordance with FHWA noise standards.

17.1.2 Definitions

Approach Criteria - Approaching the criteria means within 1 decibel (dB) of the appropriate FHWA Noise Abatement Criteria (NAC) provided in ***Figure 17-1***.

Benefited Receptor - The recipient of an abatement measure that receives a noise reduction at or above the minimum threshold of 5 dB(A).

Common Noise Environment - A group of receptors within the same activity category found in ***Figure 17-1*** that are exposed to similar noise sources and levels; traffic volumes, traffic mix, speed and topographic features. Generally, common noise environments occur between two secondary noise sources, such as interchanges, intersections and/or cross-roads. A common noise environment involves a group of impacted receptors that would benefit from the same noise barrier or noise barrier system (i.e., overlapping/continuous noise barriers).

Date of Public Knowledge - The approval date of the Categorical Exclusion (CE), the Finding of No Significant Impact (FONSI), the Record of Decision (ROD), State Environmental Impact Report (SEIR) or Non-Major State Action (NMSA). For a Type 1 CE and NMSA, this is the date of the Type 1 CE or ***Non-Major State Action (NMSA) Checklist***.

Decibel - A logarithmic expression of a sound level. For traffic noise analysis purposes and as specified by ***23 CFR Part 772*** the A-weighted scale, which closely approximates the range of frequencies a human ear can hear, is used. The A-weighted decibel is abbreviated dB(A).

Design Year - The future year used to estimate the forecast traffic volume for which a highway is designed.

Existing Noise Levels - The noise levels that occur during the worst noise hour resulting from the combination of natural and mechanical sources and human activity usually present in a particular area.

Feasibility - A combination of acoustical and engineering factors considered in the evaluation of a noise abatement measure.

Impacted Receptor - A receptor with a future design year, build alternative traffic noise level that is predicted to approach, meet, or exceed the Noise Abatement Criterion (NAC) for its respective activity category, or will experience an increase in noise levels of 15 dB(A) or more in the design year over the existing noise levels.

Insertion Loss - The reduction in traffic noise levels as a direct result of a specific type of abatement measure.

Leq - The equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with Leq(h) being the hourly value of Leq.

Multifamily Dwelling - A residential structure containing more than one residence.

Noise Abatement Criterion (NAC) - The noise level, depending upon activity category, at which FDOT must consider noise abatement for an impacted receptor. The NAC can be found in ***Figure 17-1***.

Noise Barrier - A physical obstruction that is constructed between the highway noise source and the noise sensitive receptor(s) for the purpose of lowering the noise level, including stand-alone barrier structures, berms (earth or other materials), and combination berm/barrier structure systems.

Noise Reduction Design Goal - The optimum desired dB(A) noise reduction (insertion loss) determined from calculating the difference between future build noise levels with abatement to future build noise levels without abatement.

Permitted - Development will be deemed to be permitted if the local agency with jurisdiction has granted a building permit for a specific structure associated with a noise sensitive land use such as residential, school, place of worship, medical facility, institutional, prior to the project's Date of Public Knowledge.

For mobile/manufactured homes, individual building permits may not be issued. In this case, the noise analyst should look for evidence of an occupancy permit, new mobile home permit, or something similar in lieu of a building permit. These types of permits should be treated in the same manner as a building permit as stated above. Contact the District Noise Specialist regarding the application of building permit equivalency.

Predicted Existing Traffic Noise Level - The traffic noise level that is determined through the use of the Traffic Noise Model for existing roadway conditions.

Predicted Future Traffic Noise Level - The traffic noise level that is determined through the use of the Traffic Noise Model for the future design year traffic and roadway geometry, including build and no-build alternatives.

Property Owner - An individual or group of individuals that hold a title, deed, or other form of legal documentation showing ownership of a commercial or residential property.

Reasonableness - The combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure.

Receptor - A discrete or representative location of a noise sensitive area(s) for any of the land use categories listed in ***Figure 17-1***.

Residence - A dwelling unit. Either a single family residence or each individual dwelling unit in a multifamily dwelling.

Statement of Likelihood - A statement provided in both the ***Noise Study Report (NSR)*** and Environmental Document based on the feasibility and reasonableness analysis completed at the time the Environmental Document is being approved.

Substantial Noise Increase - For a Type I project, an increase in noise levels of 15 dB(A) or more in the design year over the existing noise level (measured or predicted) as a direct result of the transportation improvement project in question. A substantial increase will normally occur only on new alignment projects.

Traffic Noise Impacts - Design year build condition noise levels that approach, meet or exceed the Noise Abatement Criteria listed in ***Figure 17-1*** for the future build condition; or design year build condition noise levels that create a substantial noise increase over existing noise levels.

Type I Projects - A highway construction project (new location or physical alteration of existing highway) which substantially changes horizontal and vertical alignment, profile or adds number of through lanes. Specific project definitions according to ***23 CFR Part 772*** are listed in ***Section 17.1.3.1***.

Type II Projects - A federal, federal-aid, or state funded highway project for noise abatement on an existing highway. Type II projects are commonly referred to as retrofit projects and are allowed (but not mandatory) under ***23 CFR Part 772***. The development and implementation of Type II projects are not mandatory requirements of ***23 U.S.C. § 109(i)***.

Type III Projects - A project that does not meet the classifications of a Type I or Type II. Type III projects do not require a noise analysis.

17.1.3 Applicability

17.1.3.1 Type I Projects

The requirements of **this policy** apply to all Type I projects authorized under ***Title 23, United States Code (U.S.C.) and Section 335.17, Florida Statutes***. Regardless of funding source all FDOT highway projects shall be developed in conformance with federal standards for noise abatement as contained in ***23 CFR Part 772***. This policy applies to any Type I highway project that:

1. Requires FHWA approval regardless of funding sources;

2. Is funded with federal-aid highway funds; or

3. Is funded for all implementation phases solely with Florida state funds.

The effective date of the revisions to ***23 CFR Part 772*** is July 13, 2011. FHWA has determined that the following types of projects are “grandfathered” and will not have to meet the ***23 CFR Part 772*** final rule (dated July 13, 2010):

1. Federal-aid highway projects for which the Categorical Exclusion (CE), Finding of No Significant Impact (FONSI), or Record of Decision (ROD) has been signed by the effective date of the final rule, which is July 13, 2011.

2. Design phase reevaluations for which approval has been received prior to July 13, 2011.

If approval of the Environmental Document or the design phase reevaluation has not been received prior to July 13, 2011, the noise study must follow the requirements of ***23 CFR Part 772*** dated July 13, 2010. Projects for which the Environmental Document has not been approved after July 13, 2011 shall have their noise studies performed in conformance with ***23 CFR Part 772*** and this chapter as they exist on that date. The original Date of Public Knowledge remains valid unless a reevaluation identifying a substantial vertical or horizontal change is completed. State funded highway projects shall be "grandfathered" and will not have to meet the ***23 CFR Part 772*** final rule if the State Environmental Impact Report (SEIR) document or ***Non-Major State Action (NMSA) Checklist*** has been signed by July 13, 2011.

FDOT shall apply these policies and procedures uniformly and consistently statewide. ***Title 23 CFR Part 772*** applies to all Type I projects unless the regulation specifically indicates that a section only applies to Type II or Type III projects.

It should be noted that the project type (Defined here as "Type I, Type II or Type III") is independent of the Class of Action (COA) determination for the overall project.

Title 23 CFR Part 772 defines Type I projects as:

1. The construction of a highway on new location;

2. The physical alteration of an existing highway where there is either;

    i. Substantial Horizontal Alteration – A project that halves the distance between the traffic noise source (edge of the nearest travel lanes) and the closest receptor between the existing condition to the future build condition; or,

    ii. Substantial Vertical Alteration – A project that removes shielding, [not to include vegetation removal by FDOT within FDOT Right of Way (ROW)] therefore exposing the line-of-sight between the receptor and the traffic noise source. This is done by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise source and the receptor, such as reducing the back slopes of a cut section so that the line of sight is no longer blocked.

3. The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a High-Occupancy Vehicle (HOV) lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane;

4. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane;

5. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange;

6. Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane;

7. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza. (Note: Reconstruction of an existing rest stop/service plaza in the median of an existing highway that does not cause substantial alteration and does not affect existing traffic patterns on the roadway along with the conversion of a conventional toll plaza to an all-electronic toll plaza do not qualify as Type I projects).

8. If a project is determined to be a Type I project under this definition, then the entire project area as defined in the Environmental Document is a Type I project and would require a noise analysis.

For more detailed descriptions of Type I projects, please refer to the Type I Project Matrix in ***Figure 17-2***.

17.1.3.2 Type II Projects

A federal, federal-aid, or state funded highway project for noise abatement on an existing highway. Type II projects are commonly referred to as retrofit projects and are allowed (but not mandatory) under ***23 CFR Part 772***. The development and implementation of Type II projects are not mandatory requirements of ***23 U.S.C. § 109(i)***. **FDOT does not have or fund a Type II program**.

17.1.3.3 Type III Projects

A federal, federal-aid, or state funded highway project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis or consideration abatement measures.

Examples of Type III projects include:

1. Construction of bicycle and pedestrian lanes, paths, and facilities;

2. Activities included in the FDOT highway safety plan under ***23 U.S.C § 402***;

3. Landscaping (including the removal of existing vegetation by FDOT within FDOT ROW);

4. Installation of fencing, signs, pavement markings, small passenger shelters, traffic signals, and railroad warning devices where no substantial land acquisition or traffic disruption will occur;

5. Deployment of electronics, photonics, communications, or information processing used singly or in combination, or as components of a fully integrated system, to improve the efficiency or safety of a surface transportation system or to enhance security or passenger convenience;

6. Modernization of a highway by surfacing, restoration, rehabilitation, or reconstruction; or

7. Placement of overhead gantries on a highway to collect tolls electronically that do not disrupt existing traffic patterns.

17.2 PROCEDURE

During the Efficient Transportation Decision-Making (ETDM) screening and prior to Project Development and Environment (PD&E), a preliminary review of potential noise impacts associated with a project is conducted for cost estimating and scoping purposes. This review should determine if noise sensitive receptors are or may be located within the project area and if there is a possibility that noise sensitive receptors will be impacted because predicted traffic noise levels with a build alternative approach or exceed the Noise Abatement Criterion (NAC). The review will include the assessment of land use plans, aerial photographs, field reviews, modeling, and/or similar efforts. This will allow the reviewer and the Project Manager to determine whether noise impacts are likely to occur based on the types of land uses present and their proximity to the proposed project.

The procedure for performing a highway traffic noise study during PD&E is described in the following sections.

17.2.1 Traffic Noise

17.2.1.1 Noise Abatement Criteria Activity Categories

Figure 17-1 contains seven categories of activity/land use used to assess the impact of noise on these activities. The following is a description of each activity category and the traffic noise impact level at which abatement measures must be considered.

17.2.1.1.1 Activity Category A

Activity Category A focuses on the exterior impact criteria for 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 for the area to continue to serve its intended purpose. The approach NAC level for this activity category is 56 dB(A). An example of this activity category would be the Tomb of the Unknown Soldier. FDOT shall submit justification to FHWA, on a case by case basis, for approval to apply this activity category to a noise sensitive receptor.

17.2.1.1.2 Activity Category B

Activity Category B includes the exterior impact criteria for single-family (including mobile home parks) and multifamily residences. This may include units above ground level. The approach NAC level for this activity category is 66 dB(A). No NAC criteria exist for the interior areas of residential land uses.

17.2.1.1.3 Activity Category C

Activity Category C includes the exterior impact criteria for a variety of land use facilities. The approach NAC level for this activity category is 66 dB(A). Examples of this activity category include active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, golf courses, ***Section 4(f)*** sites, schools, television studios, trails, and trail crossings. Note that these criteria apply only to the exterior areas of Activity Category C. Impact assessments will involve the identification of the land use through a field review and determination of whether exterior areas of frequent or potentially frequent human use occur that might be impacted by future traffic noise levels for the build condition that approach or exceed the NAC. If exterior areas of frequent human use for this NAC category are noted during the field review, detailed modeling of the receptor will occur to determine if an exterior noise level impact will occur in the future with the construction of the project.

Where applicable, FDOT research publication ***A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations*** (***FL-ER-65-97***, updated 2009) shall be used to assess whether noise abatement is feasible and/or reasonable at Activity Category C locations.

17.2.1.1.4 Activity Category D

Activity Category D includes the interior impact criteria for a variety of land use facilities listed in Activity Category C that may have interior uses. The approach NAC level for this activity category is 51 dB(A). Examples of this activity category include 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. Note that these criteria apply only to the interior areas of this activity category, and will only be analyzed when no exterior activities are impacted by traffic noise or if exterior areas are determined to be impacted but exterior abatement measures are not feasible and reasonable. An interior analysis will only be performed after exhausting all outdoor analysis options. This will involve:

1. The identification of the building envelope for expected noise reduction based on the information found in ***Table 6*** of the ***FHWA Guidance Document*** and shown in ***Figure 17-3***;

2. Determination of the open window/closed window condition; and

3. If deemed appropriate, physical measurements of the amount of noise reduction provided by the building envelope will be conducted consistent with methodology found in the FHWA publication ***FHWA-PD-046, Measurement of Highway-Related Noise Final Report (1996)***.

Where applicable, the FDOT research publication ***A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations*** shall be used to assess whether noise abatement is feasible and/or reasonable at Activity Category D locations.

17.2.1.1.5 Activity Category E

Activity Category E includes the exterior impact criteria for developed lands that are less sensitive to highway traffic noise. The approach NAC level for this activity category is 71 dB(A) in exterior areas of frequent human use. Examples of this activity category include hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in Activity Category A-D or F. Since these land uses are specifically excluded from Activity Category D, no analysis of interior noise levels is required. Where applicable, the FDOT research publication ***A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations*** shall be used to assess whether noise abatement is feasible and/or reasonable at Activity Category E locations.

17.2.1.1.6 Activity Category F

Activity Category F includes developed lands that are not sensitive to highway traffic noise such as 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. There is no NAC level for this activity category since FHWA considers these land uses as not sensitive to highway traffic noise and therefore no noise analysis is required for these locations.

17.2.1.1.7 Activity Category G

Activity Category G includes undeveloped lands that are not permitted. There is no NAC level for this activity category. Although consideration of mitigation is not required, FDOT must determine and document highway traffic noise levels and provide this information to local governments. Details on what will be required are found in ***Section 17.2.6.2***.

17.2.1.2 Traffic Noise Impacts

The FHWA has established NAC that are used to determine whether a highway traffic noise impact occurs. A traffic noise impact occurs when the modeled future highway traffic noise levels for the worst case noise condition [usually Level of Service (LOS) “C”] approach or exceed the NAC. A traffic noise impact also occurs when modeled future highway traffic noise levels substantially exceed the existing highway traffic noise level, even though the modeled levels may not exceed the NAC. FDOT has determined that the NAC is approached when it is within 1 dB(A) of the appropriate NAC and that a substantial increase occurs when the increase over existing conditions (measured or predicted) is 15 dB(A) or greater. To assess the highway traffic noise impact of a project, FDOT must evaluate both criteria (approach and substantial increase).

Design year traffic noise impacts are based on the modeled future build noise levels or the difference between the future build and existing measured or predicted traffic noise levels. If one or more noise sensitive receptors are impacted by project related traffic noise levels which approach or exceed the NAC or substantially increase when compared to existing (measured or predicted) noise levels, then abatement measures must be considered. If the abatement criteria are not approached or exceeded or if projected traffic noise levels do not substantially exceed existing noise levels, abatement measures will not be considered.

For example, if, assuming a Category B receptor, the difference between the future build and existing condition predictions shows an increase of 1 dB(A), from 66 dB(A) to 67 dB(A), then the project can be stated to have no substantial increase on highway traffic noise. However, since the predicted level approaches or exceeds the FHWA NAC noise abatement must be considered. If the predicted increase went from 42 dB(A) (existing) to 63 dB(A) (build), the project would be considered to have a substantial increase and would require abatement consideration. For an Activity Category B receptor site with a predicted future noise level of 66 dB(A), the approach criterion would be met and abatement must be considered. However, a level of 65.9 dB(A) would not be considered to have approached or exceeded the abatement criterion and abatement consideration would not be required.

17.2.1.3 Traffic Noise Prediction

During a project's PD&E phase, a traffic noise analysis shall be completed for the alternative(s) under detailed study and for each Activity Category (AC) of the NAC shown in ***Figure 17-1*** that is present in the study area. Noise level predictions will be required for the following project alternatives and study years:

ALTERNATIVE	YEAR
No-build	Existing and design year
Build	Design year only

17.2.1.4 Noise Model Requirements

FDOT will conduct any predictive analysis required by ***23 CFR § 772.9*** using the FHWA Traffic Noise Model (TNM) as described in FHWA's ***Traffic Noise Model (FHWA TNM©), User's Guide (Version 2.5 Addendum)***.

Consistent with ***23 CFR § 772.9(b)***, average pavement type shall be used in the FHWA TNM for future noise level predictions. However, in the assessment of existing conditions (including the validation of field measurements); the actual pavement type may be used at the discretion of the District Noise Specialist.

The FHWA allows the use of noise contour lines for project alternative screening or for land use planning to comply with ***23 CFR § 772.17***, but noise contours shall not be used for determining highway traffic noise impacts or the determination of the feasibility and

reasonableness of providing noise abatement. Additional information on the development and use of noise contours can be found in ***Section 17.2.6.2***.

17.2.1.5 Traffic Requirements

In predicting traffic noise levels and assessing impacts, traffic characteristics that would yield the highest traffic noise impact for the design year shall be used. Experience has shown that the highest traffic volume and the highest average speed usually create the noisiest conditions. Maximum peak-hourly traffic representing LOS "C" will be used, unless traffic analysis shows that LOS "C" will not be reached. If LOS "C" will not be reached, demand volumes shall be used. If demand volumes are used in place of LOS "C" volumes, the directional peak traffic should be worst-case for receptors on each side of the roadway.

For ramps, use the following:

1. For interchange ramp traffic, demand traffic volumes shall be used, even if they are higher than the LOS "C" volumes.

2. The vehicle speed to be used in the TNM is the posted speed for existing/no-build alternatives, and the proposed posted speed for the future build alternative. If the proposed posted speed is unknown, then the design speed is to be used. The motor vehicle speed used for ramps will be the posted speed and that speed is applied along the entire ramp unless modified by the flow condition (using TNM flow control if applicable).

Section 1.2 of the ***Traffic Noise Modeling and Analysis Practitioners Handbook*** contains additional guidance on the application of traffic data for noise studies.

17.2.1.6 Receptor Data

In determining traffic noise impacts for properties with Activity Category A, B, C or E, areas of frequent exterior human use should be identified. For those properties with Activity Category D, interior areas of frequent human use should be identified. Interior predictions for Activity Category D (See ***Section 17.2.1.2.4***) should be coordinated with the District Noise Specialist to ensure proper application. Unless the area of exterior frequent human use is identified elsewhere, residential receptor sites should be placed at the edge of the dwelling unit closest to the major traffic noise source or as dictated by professional judgment.

When more than one unit is clustered together, a single receptor can be analyzed as representative of a group of noise sensitive sites. Each residence in a multifamily dwelling is counted as one receptor when determining impacted and benefited receptors. Noise sensitive receptors may also consist of parks, schools, hospitals, and other sites where quiet is important for normal activities. The location of the receptor in these cases will be dictated by the location of the noise source and the exterior activity that may be impacted, if any.

Receptor heights for first (ground) floor receptors are always assumed to be 5 feet above ground elevation. Analysts shall increase the height above ground by 10 feet for each additional floor above ground level (i.e., 15 feet for a second floor receptor, 25 feet for a third floor receptor, etc.). The maximum horizontal distance from the edge of pavement that a receptor site will be modeled will vary based on topography and traffic conditions and will be determined on a case by case basis. At a minimum, the horizontal distance should be sufficient to identify all potential impacts consistent with the requirements of ***23 CFR Part 772***. If there is any question concerning the modeling of a receptor location, contact the District Noise Specialists for guidance.

17.2.1.7 Noise Descriptor

The noise level descriptor used by FDOT will be Level Equivalent (Leq). Leq is the equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with Leq(h) being the hourly value of Leq. ***Title 23 CFR Part 772*** specifies that either the Leq(h) or L10(h) metric, but not both, may be used on a project. Consistent with this requirement, the FDOT elects to use the Leq(h) metric.

17.2.2 Analysis of Traffic Noise Impacts

Title 23 CFR § 772.11(a) requires that FDOT shall determine and analyze expected traffic noise impacts:

1. For projects on new alignments, determine existing noise levels by field measurements.

2. For projects on existing alignments, predict existing and design year traffic noise levels using the latest version of TNM.

Subsection (b) states that in determining traffic noise impacts, a primary consideration should be given to exterior areas where frequent human use occurs.

17.2.2.1 Field Measurements for Establishment of Ambient Noise Conditions

Field measurements are required along a new alignment to determine the existing noise levels as noted in ***23 CFR § 772.11(a)(1)***. This also applies where traffic noise does not exist or is only a minor element in the overall noise. Noise monitoring is to be conducted following the basic FHWA procedures found in ***Measurement of Highway-Related Noise*** publication. Measurements should be taken 5 feet above ground level and at locations representative of noise sensitive receptors adjacent to the proposed roadway alignment. If possible, a location along the alignment should be chosen that represents a noise sensitive receptor and that has a noise environment similar to most areas along this section of the alignment. At each measurement location, a minimum of 30 minutes of readings (3 repetitions of 10 minutes each) shall be taken. Use an integrating Sound Level

Mete, ANSI Type 1 or 2 as described in ***23 CFR § 772.11(d)(3),*** and note the pertinent field conditions. At least two sets of readings (if practical) should be taken at each location. While it may not always be practical, it is recommended that one set of readings be taken during the morning hours and a second set taken during the afternoon hours. If doing so would provide more reliable measurements, it is further recommended that these readings be taken over a period of two or more days. The resultant noise level for each reading shall be noted and an average ambient reading for each site shall be determined. The average ambient reading (from all sources) shall be compared to the predicted future project traffic noise level to determine the increase (if any) in the noise level that can be expected in the area as a result of the proposed project. The entire project corridor should be reviewed under these conditions to determine if any unusual noise sources (e.g., aircraft, industrial, electrical generators, insects or other animals) exist that may influence the ambient readings. If any unusual noise sources are noted during the study, they must be identified in the field documentation. Specific questions regarding ambient noise field measurements should be directed to the District Noise Specialist.

17.2.2.2 Field Measurements for Model Validation

The primary purpose of field measuring existing traffic noise levels along an existing roadway alignment is to ensure that:

1. Traffic noise is the primary source of noise; and

2. To validate the TNM input values and verify that the model accurately predicts the existing traffic noise based on the current conditions.

Traffic noise monitoring is conducted in accordance with the FHWA's measurement procedures found in the FHWA document ***Measurement of Highway-Related Noise*** and supplemented with accepted professional judgment.

Perform monitoring for a minimum of 30 minutes (3 repetitions of 10 minutes each) using an integrating Sound Level Meter, ANSI Type 1 or 2 as described in ***23 CFR § 772.11(d)(3)***, noting the following:

1. Average vehicle speed for all classes of vehicles (using a radar unit or equivalent method for measuring speeds, such as electronic portable traffic speed and traffic counters);

2. Vehicle counts and class identification (automobiles, motorcycles, buses, medium trucks, heavy trucks);

3. Unusual noises (e.g., aircraft flyovers, trains, barking dogs, insects or other animals);

4. All input parameters necessary to run the computer model, including:

    a. Distance from the edge of the nearest travel lane of each roadway to the noise monitoring location;

b. Width of roadway lanes and paved shoulders;

c. Height of the sound level meter;

d. Barrier/buffer information including trees, berms, structures;

e. Type of propagation path (hard versus soft);

f. Variations in terrain between the sound level meter and the source;

g. Grade, if any; and

h. The existing pavement type and condition.

If the field data was gathered without background noise that would influence the overall reading (e.g., a dog that barks continuously throughout the measurement period), the field measurements will be considered complete. If not, and a logical explanation for any unusual readings cannot be made, the field measurements at that location(s) should be repeated in accordance with the FHWA's current measurement procedures. Field measurements may also require repetition if the application of the TNM modeling process does not result in an acceptable level of accuracy as required by ***23 CFR § 772.11(d)(2)***. As noted in the FHWA guidance document ***Highway Traffic Noise: Analysis and Abatement Guidance***, the model is validated if existing field measured highway traffic noise levels and predicted highway traffic noise levels for the existing condition are within +/- 3.0 dB(A). The application of a pavement type other than "average pavement" in the TNM may be used to validate existing traffic noise conditions.

17.2.2.3 Computer Prediction of Existing and Future Traffic Noise Levels

Using the latest version of TNM, traffic noise levels are predicted for the existing and design year using the appropriate traffic data and roadway configurations. This prediction applies to those receptors selected as specified in ***Section 17.2.1.6***. When non-highway transportation noise sources (e.g., airport operations, transit lines, light commuter rail) may impact the feasibility and reasonableness of noise abatement evaluated during the design phase, it is recommended that data from studies conducted in accordance with the respective regulations below be utilized in lieu of separate studies and the outcome should be noted in the ***NSR***. Assessment of the magnitude of noise from airport operation must comply with ***Airport Noise Compatibility Planning***, ***14 CFR Part 150***. Assessment of the magnitude of noise impacts from rail and transit facilities must comply with ***Railroad Noise Emissions Compliance Regulations, 49 CFR Part 210*** and Federal Transit Administration (FTA) ***Transit Noise and Vibration Impact Assessment*** guidance.

17.2.3 Noise Abatement Evaluation

When traffic noise impacts are identified as part of the analysis conducted consistent with ***Section 17.2.2***, noise abatement shall be considered and evaluated for feasibility and

reasonableness. FDOT shall determine and analyze alternative noise abatement measures to abate identified impacts by giving weight to the benefits and costs of abatement and the overall social, economic, and environmental effects by using feasible and reasonable noise abatement measures for decision-making. In abating traffic noise impacts, FDOT shall give primary consideration to exterior areas where frequent human use occurs.

The abatement measures listed on ***23 CFR § 772.15(c)*** are eligible for federal funding. Those measures are listed in ***Section 17.2.3.1***.

At a minimum, FDOT shall consider noise abatement in the form of a noise barrier when a traffic noise impact is identified.

Noise barriers will not include absorptive treatments unless one of two conditions exists:

1. The potential of reflective noise from a noise barrier will create a traffic noise level on the opposite side of the highway that would approach or exceed the NAC for the existing AC that would not be impacted without the reflective noise;

   Or

2. The potential of reflective noise from the parallel noise barriers will degrade the overall noise reduction from one or both sides of the roadway such that the minimum noise reduction provided by the noise barrier falls below 5 dB(A).

If the use of absorptive noise barrier treatments is desired as a functional enhancement, the FDOT shall adopt a standard practice for using such absorptive treatments that is consistent and uniformly applied statewide. Contact the State Environmental Management Office (SEMO) prior to the application of absorptive surface treatment under either of the two conditions detailed above.

17.2.3.1 Traffic Noise Abatement Techniques

The most common type of traffic noise abatement measure is the construction of a noise barrier. As noted in ***23 CFR § 772.13(c)(1)***, FHWA requires that, at a minimum, FDOT consider noise abatement in the form of a noise barrier. Therefore, all impacted receptors will require analysis for traffic noise reduction using a noise barrier. The exception to this is for “isolated impacts” where there is only one impacted receptor that could benefit from a noise barrier, and as such, would not meet minimum feasibility requirements. In these cases, a generalized statement of this nature can be made in the NSR stating that noise barriers will not be evaluated for isolated impacted receptors. FHWA considers traffic management, alteration of horizontal and vertical alignments, acquisition of real property to create a buffer zone, and noise insulation of Activity Category D land use to also be acceptable noise abatement measures.

Federal funds may be used for noise abatement on Type I projects when traffic noise impacts have been identified and abatement measures have been determined to be feasible and reasonable pursuant to ***23 CFR § 772.13(d)***. The primary noise abatement

measure to be considered by FDOT for incorporation into a Type I project to reduce traffic noise impacts will be the construction of a noise barrier (including acquisition of property rights) that is either within or outside the highway ROW. **Landscaping is not a viable noise abatement measure.**

Traffic noise abatement is considered only if the predicted future build traffic noise level approaches or exceeds abatement levels in the NAC, or if build traffic noise levels substantially increase from existing noise levels (either measured or predicted) as determined in ***Section 17.2.2*** above. If no impacts are identified, see ***Section 17.2.6***.

When considering noise barriers for noise abatement, the feasibility and reasonableness factors discussed in ***Sections 17.2.3.2 and 17.2.3.3*** must be evaluated for each viable alternative under detailed analysis.

Noise abatement will not be required for Activity Category F or Activity Category G uses (See ***Sections 17.2.1.2.6*** and ***17.2.1.2.7***).

The document ***A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations*** should be used to ensure the reasonableness of abatement for Activity Category C, D and E land uses.

17.2.3.2 Feasibility Factors

Feasibility factors for noise abatement measures involve both acoustic (noise reduction) and engineering considerations when considering a potential abatement measure.

17.2.3.2.1 Noise Reduction Factor

The feasibility of providing noise abatement is focused on the ability of the noise barrier to provide a reduction of at least 5 dB(A) to impacted receptors. The more reduction that can be achieved, the better the barrier, as long as the cost, visual impact, and other factors of the barrier are not unreasonable. If a minimum of 5 dB(A) reduction cannot be achieved at a particular receptor, that receptor is not considered benefited. The number of impacted receptors required to achieve a 5 dB(A) reduction or greater in order for a noise barrier to be considered feasible will be two (2) or greater.

17.2.3.2.2 Design and Construction Factors

Consideration should be given to whether a noise barrier can be constructed using standard construction methods and techniques. Factors to be considered include terrain changes, utilities, safety (e.g., lane closures, sight distance), bridges, overpasses, and similar difficulties. The proposed plan should be reviewed by appropriate personnel to determine if alternative construction methods and techniques will increase the construction costs or time, impact roadway safety, or result in other impacts. Additional costs solely to accommodate construction of a noise barrier should be included in the cost reasonableness evaluation of the noise barrier.

If a noise barrier is expected to be placed on an existing structure, such as a bridge or a Mechanically Stabilized Earth (MSE) wall, because of effectiveness or cost reasons, the ability of this structure to support the additional wind and dead loads safely must be established before a final commitment to build the noise barrier is made. If a new bridge is being designed and a noise barrier is contemplated for placement on the bridge, the ability of the bridge to support the load of the noise barrier should be considered during the design phase. Issues related to crash worthiness of a proposed noise barrier within the clear recovery zone must also be addressed.

17.2.3.2.3 Safety Factors

Safety is a critical factor in determining whether a particular abatement measure is feasible. Noise barriers should be designed in accordance with ***Volume 1, Chapter 32 of the Plans Preparation Manual (PPM), Topic No. 625-000-007***. If a conflict between a noise barrier and safety exists, primary consideration should be given to safety. An example of such a conflict would be the loss of a safe sight distance (line of sight) at an intersection or driveway as a result of the placement of a noise barrier. Conflicts are considered during the feasibility assessment of the noise barrier and may result in a determination that a noise barrier is not feasible. Noise barriers cannot exceed the following heights:

1. For ground mounted noise barriers the maximum height will be 22 feet.

2. For noise barriers on bridge and retaining wall structures the maximum height will be 8 feet unless a taller noise barrier is specifically approved in writing by the State Structures Design Engineer.

3. For ground mounted Traffic Railing/Noise Barrier combinations the maximum height will be 14 feet.

Non-crash tested noise barriers within the clear zone require shielding.

17.2.3.2.4 Access Factors

Accessibility to adjacent properties on non-limited access roadways must be given consideration since the placement of a noise barrier may block ingress and egress to these properties. Other access issues to be considered include access to a local sidewalk or normal routes of travel.

17.2.3.2.5 Right of Way (ROW) Factors

ROW needs, including access rights, easements for construction and/or maintenance, and additional land must be considered as part of the feasibility of noise barrier construction. ROW needs will be determined as early in the process as possible.

17.2.3.2.6 Maintenance Factors

Maintenance of a noise barrier must be considered to ensure that the barrier can be maintained using standard practices. Maintenance crews must have reasonable access on both sides of the barrier for both personnel and equipment. Since graffiti can be a serious problem, consideration should be given as to how it can be reduced.

17.2.3.2.7 Drainage Factors

Drainage is an important element that must be considered in the location and design of a noise barrier. Directing stormwater along, under, or away from a noise barrier can cause construction and maintenance problems and therefore, must be given adequate consideration.

17.2.3.2.8 Utility Factors

Utility issues, including the impact of noise barriers on utilities and the reverse must be assessed early in the process. Both overhead and underground utilities can have a significant impact on design and construction options.

17.2.3.3 Reasonableness Factors

Once a noise abatement measure is determined to be feasible, the reasonableness of noise abatement will then be determined. The following reasonableness factors must collectively be achieved in order for the noise abatement measure to be deemed reasonable:

1. Consideration of the viewpoints of the benefited property owners and residents;
2. Cost effectiveness of the highway traffic noise abatement measure;
3. Achievement of the FDOT noise reduction design goal; and

In addition to the above reasonable factors as listed in ***23 CFR 772.13(d)(2)(i)(ii)(iii)***, FDOT has the option to consider additional reasonableness factors as listed in ***23 CFR 772.13(d)(2)(v)***. See ***Section 17.2.3.3.4***.

17.2.3.3.1 Viewpoint of the Benefited Receptors

Through the FDOT ETDM screening process, the District Noise Specialist will have an opportunity to input into the project screening any traffic noise related concerns received from communities adjacent to the project.

During the PD&E phase, the viewpoints of potentially benefited receptors will be gathered during workshops, public hearing or through other public information mediums, such as project websites.

A more detailed process to solicit the viewpoint of the benefited receptors is invoked during the design phase of the project. Each benefited receptor (owner or resident) will be given the opportunity to provide input to FDOT regarding their desire to have the proposed noise abatement measure constructed. They may also be given the opportunity (at the discretion of the District) to provide input regarding their aesthetic preferences from a list of pre-selected options.

During the design phase of the project, FDOT will use either a noise abatement workshop and/or a public survey to determine the wishes of the benefited receptors. The survey effort may include a mailing of information related to the abatement measure along with a survey form to be signed and returned to FDOT. It is the desire of FDOT to obtain a response for or against the noise barrier from a numerical majority (greater than 50%) of the benefited receptors (owners and residents) that provide a response to the survey. Multiple techniques to solicit input may be used, including multiple mailings, door-to-door follow up, and even telephone solicitation (as needed) to provide adequate information to allow FDOT to make an informed decision on whether abatement is desired or not. If a numerical majority of the benefited residents and property owners that provide a response to the survey do not favor construction of a noise barrier, FDOT will not provide the noise barrier. It is important to note that the viewpoints of the property owner will be considered as having the greatest weight in the decision as to whether FDOT will provide noise abatement. While the viewpoint of the non-owner resident will be considered, their viewpoint will carry less weight, consistent with the formula shown in the ***Table 17-1***.

Table 17-1 Viewpoint Weighing Factors

Property Type	Owner Occupies Property	Owner Does not Occupy Property	
		Owner	Renter
Single Family	100%	90%	10%
Multi-family (duplex, apartments, condominiums)*	100%	90%	10%
Mobile Home Park	100%	80%	20%
Offices, Businesses	100%	80%	20%

* The weighting are for each unit (mobile home, apartments, condominiums), not for the entire mobile home park, apartment complex or condominium building.

For example, if a renter of a single family home wishes to have noise abatement but the owner does not, the opinion of the home owner would prevail. If the owner of the home did not respond for or against the noise abatement measure, then the renter's opinion would be used to be the equivalent of 10% of the vote of a home owner. This means that 10 renters in favor of the noise abatement would equal the vote of 1 owner occupied home.

The input of Homeowners Associations (HOA) should be considered during the survey process, especially if the HOA owns common land adjacent to FDOT ROW where the noise barrier would be located. However, no formal vote shall be made by the HOA and

the desires of the HOA cannot preclude those of the benefited receptors behind the noise barrier.

17.2.3.3.2 Cost Effectiveness

FDOT has established cost effectiveness criteria that have been in place for many years. The basis for the cost effectiveness criteria is that FDOT has provided approximately 1,400 square feet of noise barrier per benefited receptor at a reasonable cost. The lower the cost, the higher the economic benefit will be to the impacted area. Using the current unit cost of $30.00 per square foot, a reasonable cost of $42,000 per benefited receptor is looked upon as the upper limit. Only benefited receptors will be included in the calculation used to determine if a proposed noise abatement measure has a reasonable cost. Cost factor elements are reviewed annually by FDOT and adjusted every five (5) years. The relationship between unit costs and the upper limit for cost reasonableness will be based on maintaining a constant upper limit of 1,400 square feet of noise barrier per benefited receptor. FDOT considers the following elements as part of the overall calculation of cost effectiveness of a noise barrier:

1. The cost of materials and labor;

2. The cost of additional ROW (including the cost of construction and/or maintenance easements) needed exclusively to construct the noise barrier (if any);

3. The cost of new or upgraded drainage structures required by the construction of a noise barrier;

4. Relocation of utilities when they are outside of FDOT ROW (these costs are not included in the cost effectiveness calculations for the noise barrier); and

5. On projects where Florida Gas Transmission (FGT) facilities are present within FDOT ROW, the ***FGT Agreement and Global Settlement*** controls the responsibilities of both FDOT and FGT. Where a noise barrier is proposed to be located within the below clearances to FGT's facilities, FGT may at its sole discretion decide to move its facilities.

    a. Single Line:

        1. Nine (9) inch internal diameter or greater: 15 feet unencumbered from the outside edge of the line plus 25 feet additional temporary workspace on one side of the 15-foot unencumbered space.

        2. Less than nine (9) inch internal diameter: 5 feet unencumbered from the outside edge of the line plus 10 feet additional temporary workspace on one side of the 5-foot unencumbered space.

    b. Two Lines: 60 feet, measured from the center line of the pipelines, with no additional temporary workspace.

c. Three Lines: 75 feet, measured from the center line of the two outside pipelines, with no additional temporary workspace.

For pipelines at those locations where the width between two pipelines is greater than thirty (30) feet, and for three pipelines where the width between the centerline of the two outermost pipelines is greater than forty five (45) feet, such pipelines shall constitute single pipelines as identified in item number 1 (Single Line) above for the purposes of establishing the Specified Width; provided, however, pipelines that are equal to or less than thirty (30) feet apart measured from the center line of the two pipelines shall be treated as two pipelines consistent with item number 2 above (Two Lines).

If FGT decides to move its facilities, FGT and FDOT may split the cost of ROW acquisition, construction and other project costs in accordance with the FGT Global Agreement. Any additional costs incurred by FDOT shall be included in the cost reasonableness calculations for the proposed noise barrier. If FGT decides not to relocate its facilities, alternative locations for noise barrier placement shall be investigated. Any additional costs incurred as a result of the relocated noise barrier shall be included in the cost reasonableness calculations for that noise barrier.

Cost elements do not include the cost of designing the noise barrier, relocation of utilities (above or below ground) that are permitted within FDOT ROW, clearing and grubbing, mobilization, maintenance of traffic, construction engineering and inspection, and related activities that are considered as part of the total construction project. To be considered as a noise abatement cost, the costs must be incurred because of the installation of the noise barrier. An example would be when there is a need to extend a culvert that would not be necessary for roadway construction but is required to construct the noise barrier.

It is important that the cost effectiveness of abatement be determined during the PD&E Study, to the extent possible, to enable FDOT to make a statement of likelihood in the Environmental Document to pursue this mitigation effort in the design phase. The PD&E Noise Study should also note that the reasonableness of providing noise abatement in the form of a noise barrier is subject to a detailed review in design and subsequent reevaluations.

The primary method of determining the cost for noise abatement by FDOT will involve a review of the cost per benefited receptor for the construction of a noise barrier benefiting a single location (such as a subdivision or contiguous impacted areas) with each area being considered a common noise environment area. A common noise environment implies that a group of receptors of the same NAC activity category are exposed to similar noise sources and levels, traffic volumes, traffic mix, speed, and topographic features and are benefited by the same noise barrier or noise barrier system. Noise barriers may be provided for common noise environments that contain different Activity Categories of the NAC, provided that the noise barrier for each Activity Category is feasible and cost reasonable on its own. Contact the District Noise Specialist for questions related to the application of the common noise environment criteria.

In the case of RV parks that also serve as a mobile home site, noise abatement will be considered when fifty-one (51) percent of the noise impacted spaces are occupied fifty-one (51) percent of the year or more by "permanent" residents. A permanent resident would be one who occupies the dwelling unit at least fifty-one (51) percent of the calendar year. For these locations where usage is often seasonal and of short duration, the property owner will determine the occupancy rate of that portion of the facility that is impacted by traffic noise. If less than 51 percent of the impacted spaces are occupied less than 51 percent of the year, abatement measures will not be considered. As is true with all potential noise barrier locations, the noise abatement measure must be feasible and reasonable before it will be considered further.

Third-party funding will not be allowed to subsidize the cost of a noise barrier for the purpose of making the noise barrier feasible or reasonable. Third-party funding as noted in ***23 CFR § 772.13(j)*** is acceptable on a federal or federal-aid highway Type I project to make functional enhancements as long as the noise abatement measure already has been determined to be feasible and reasonable. **FDOT does not consider third party funding in the development of noise abatement measures**.

17.2.3.3.3 Noise Reduction Design Goal

FHWA states in ***23 CFR § 772.13(d)(2)(iv)*** that for an abatement measure to be considered reasonable, it must attain the FDOT noise reduction design goal. To ensure the provision of reasonable traffic noise abatement consideration at the greatest number of impacted locations, FDOT has selected a 7 dB(A) noise level reduction for one (1) or more impacted receptors as the noise reduction design goal. Failure to achieve the noise reduction design goal will result in the noise abatement measure being deemed not reasonable. In setting this goal, FDOT reviewed historic records of noise barrier reduction dating back to 1979. The average noise reduction for these noise barriers was 7.36 dB(A), which would indicate that the noise reduction design goal of 7 dB(A) would be reasonable.

17.2.3.3.4 Antiquity

Antiquity addresses the question of who was there first, the noise sensitive site or the roadway? How long has the noise sensitive site been there relative to elevated noise levels? The application of antiquity as a reasonableness factor is optional and by itself cannot determine noise barrier reasonableness.

17.2.4 Outdoor Advertising Sign Impacts

Although it is not to be considered as either a feasibility or reasonableness option, Florida Law requires consideration of the potential to construct a noise barrier that might block the motorist's view of an existing, conforming and legally permitted outdoor advertising sign. As early in the PD&E Study as possible, the District Outdoor Advertising section of the Office of Right of Way must be notified (consistent with the ***Right of Way Procedures Manual, Topic No. 575-000-000***) in order to identify outdoor advertising signs affected by any proposed noise barrier. At a minimum, the section number and milepost for each

noise barrier, along with an estimated construction date, will be given to the Outdoor Advertising Section so notice of the possible screening of a sign can be provided to the affected sign permit holder(s). (Note: If the latitude and longitude of the sign can be provided; this will assist the Outdoor Advertising section in locating the needed information).

Outdoor advertising signs that are legally permitted, conforming and erected may increase the height of the sign if visibility is blocked due to the construction of "noise attenuation" barriers consistent with ***Section 479.25, Florida Statutes***. This statute requires FDOT to notify a local government or local jurisdiction before erecting a noise barrier that will block a lawfully permitted sign. The local government or local jurisdiction is then required to notify FDOT if increasing the height of an outdoor advertising sign will violate any local ordinance or land development regulation of the local government. When the notice has been received from the local government or local jurisdiction, and prior to the erection of the noise barrier, FDOT shall inform all property owners identified as impacted by highway noise, and who may benefit from the proposed noise attenuation barrier, as part of a written survey, that:

1. Erection of a specific noise barrier may block the visibility of an existing outdoor advertising sign;

2. The local government or local jurisdiction may restrict or prohibit increasing the height of the existing outdoor advertising sign to make it visible over the noise barrier; and

3. If a majority of the impacted property owners vote for the construction of the noise barrier, the local government or local jurisdiction will be required to:

    a. Allow an increase in the height of the sign in violation of a local ordinance or land development regulation;

    b. Allow the sign to be relocated or reconstructed at another location if the sign owner agrees; or

    c. Pay the fair market value of the sign and its associated interest in the real property.

The statute also requires FDOT to hold a public hearing within the boundaries of the affected local government or local jurisdiction to receive input on proposed noise barriers that may conflict with the local ordinances or land development regulations, and to suggest or consider alternatives or modifications to the proposed noise barrier to alleviate or minimize the conflict with the local ordinances or land development regulations, or minimize any costs associated with relocation, reconstructing, or paying for the affected outdoor advertising sign. Alternatives or modifications to proposed noise barriers that will not provide the minimum 5 dB(A) reduction will not be considered.

The written survey materials shall inform the affected property owners of the location, date, and time of the public hearing. The public hearing may be held concurrently with

other public hearings scheduled for the project. A general notice of the public hearing shall also be published in a newspaper in accordance with the notice provision of ***Section 335.02(1), F.S.***, and contain the same information provided in the written survey materials. The notice shall not be placed in that portion of a newspaper in which legal notices or classified advertisements appear. Please refer to ***Part 1, Chapter 11, Public Involvement,*** for additional details about meeting notification requirements.

FDOT shall not construct a noise barrier that screens or blocks the visibility of a lawfully permitted outdoor advertising sign until after the public hearing is held and the numerical majority of the impacted property owners have approved the construction of the noise barrier. If the construction of the noise barrier is approved, FDOT shall notify the local governments or local jurisdictions. The local governments or local jurisdictions shall then exercise one of the options listed above.

FHWA has determined that the construction of business names/logos or building addresses on noise barriers would be in violation of ***23 CFR § 750.709***. For noise barriers in urban and suburban areas, imprinting of subdivision names or logos on the noise barrier may be considered only at the portion of the noise barrier at the legal entrance to the subdivision. FDOT allows consideration of noise barrier aesthetic enhancement that meets FHWA regulations related to this process. Each request for such an application will be handled on a case-by-case basis.

17.2.5 Community Coordination

17.2.5.1 Community Coordination in PD&E

The degree and type of community coordination and participation will vary from project to project. For projects requiring consideration of abatement, the community involvement activities should allow for presentation and discussion of noise impacts related to the project. Opportunities for such involvement should be provided, as appropriate, during the environmental evaluation and documentation phase as part of the public involvement and/or public hearing process.

17.2.5.2 Community Coordination in Final Design

When noise abatement is anticipated in the final design phase, community coordination will include a survey of benefited property owners and residents to determine their viewpoints regarding abatement. This can be done using any number or combination of techniques (e.g., door-to-door contact, telephone polls, mailed survey form, public workshop).

The viewpoint of the benefited receptors (property owners and residents) related to abatement should be analyzed in the decision-making process. Discussions at public meetings may also include a presentation of material options, physical dimensions, obtainable levels of reduction, and cost factors so the public can aid FDOT in making a decision.

In the event that some benefited property owners or residents' desire noise abatement and others do not, further assessment may be necessary in order to determine what impact, if any, this will have on the feasibility and reasonableness as well as the social consequences. Consultation with FHWA may be needed. When noise abatement measures are being developed during final design, such measures will not be approved without documentation (letters in the file, public hearing transcripts, survey results, etc.) that the benefited property owners or residents have been provided the opportunity to provide input into the final design. The benefited property owners or residents consist of those individuals directly affected by the project-related noise as well the abatement measure.

When noise barriers are proposed, primary emphasis is to be given to the input of the benefited property owners immediately adjacent to the noise barrier(s). If the majority of those responding to the survey do not favor abatement, FDOT will not provide the proposed abatement measure.

17.2.6 Noise Study Report

The results of the noise analyses shall be reported in a ***NSR*** and summarized in the appropriate section of the Environmental Document. All viable alternatives will be documented including the no-build alternative.

The ***NSR*** should have a logical sequence, which adequately describes the procedures used in developing the ***NSR***, performing the required analyses, and arriving at the appropriate conclusions. Data in the ***NSR*** should be well presented by utilizing graphics and references so the report is readily understandable by both technical and non-technical audiences. All noise levels (measured or predicted) should be reported to the nearest 1/10th of a decibel. The report should focus on relevant information. TNM input/output sheets should not be included. The ***NSR*** should also include: the existing (measured or predicted) as well as the predicted future build and no-build noise levels for each receptor; required field monitoring data and any necessary explanation of the results of this data; a complete set of aerials showing the full project limits and the location of receptor points used in the noise analysis; and the date of the last review of land use that was considered in the ***NSR***. ***Figure 17-4*** illustrates a recommended outline for the ***NSR***.

17.2.6.1 Methodology and Assumptions

Include the following information related to methodology and assumptions in the ***NSR***:

1. Noise model(s) and methodology used;
2. Alternatives and years considered;
3. Existing and design year vehicle volumes, speeds, and composition data;
4. Receptor locations and descriptions, including land use activity category;
5. Basis for determination of existing and future traffic noise levels; and

6. Noise descriptor used.

Include a comparison of the total traffic noise levels for each build and no-build alternative along with the appropriate NAC and existing (measured or predicted) noise levels. Also include in the ***NSR*** all abatement considerations and a statement of likelihood (See ***Section 17.2.6.3***).

Include an illustration similar to ***Figure 17-5*** in the ***NSR*** to assist the public in understanding how traffic noise levels relate to other sound sources.

17.2.6.2 Coordination Requirements and Documentation

Summarize in the ***NSR*** any coordination or communications that may have taken place with other agencies and the public and include in the public coordination section. Include comments and any responses to any comments. A statement should also be made that a copy of the final ***NSR*** will be circulated to the appropriate local planning/zoning officials for their use in land use control once the final approval occurs. The ***NSR*** should also include a representation of the best estimate of the distances from the proposed edge of the nearest travel lane at which traffic noise levels would approach or exceed the NAC for Activity Categories A through E for each project segment as shown in ***Figure 17-6***.

When the ***NSR*** is finalized and following the lead agency approval, send copies to the appropriate local government officials within whose jurisdiction the highway project is located (see ***Figure 17-8*** for a sample ***NSR*** transmittal cover letter). The following information should be transmitted along with the ***NSR*** consistent with ***23 CFR § 772.17(a)***:

1. Noise compatible planning concepts;

2. A representation of the estimated distances from the proposed edge of the nearest travel lane at which traffic noise levels would approach or exceed the NAC for Activity Categories A through E for each segment of the project; and

3. After the Date of Public Knowledge, FDOT is no longer responsible for providing noise abatement to new development which occurs adjacent to the proposed highway project. To encourage the local government(s) and private developers to accept responsibility for incorporating the control of traffic noise into future planning of noise sensitive activities, FDOT has established a process designed to inform these entities of the need for compatible land use control or for requiring proactive noise abatement measures.

The above items are intended solely to assist local officials and private developers in promoting compatibility between land development and highways. Upon request, FDOT may provide additional available material and technical guidance which may assist local officials and private developers in this respect. A sample cover letter template is provided in ***Figure 17-7***.

17.2.6.3 PD&E Phase Commitments

Before approval of a CE, FONSI, ROD, NMSA, or SEIR, FDOT shall identify:

1. A Statement of Likelihood for the noise abatement measures which are potentially feasible and reasonable, and which are likely to be incorporated in the project; and

2. Noise impacts for which no noise abatement measures are feasible and reasonable.

Title 23 CFR § 772.13(h) states that FHWA will not approve project plans and specifications unless feasible and reasonable noise abatement measures are incorporated into the plans and specifications to reduce the traffic noise impact on existing activities, developed lands, or undeveloped lands for which development is permitted.

Noise abatement will be analyzed two (2) times during the development of a project. The first time will be during the PD&E phase where the Environmental Document is prepared. By then, the noise studies will have progressed to the stage where noise-impacted areas have been identified. At this stage, it is unlikely that exact locations, abatement types, ROW requirements, design and construction feasibility factors, can be determined, although approximate noise barrier location and height information should be determined. The second time will be during final design prior to Plans, Specifications, and Estimates (PS&E) approval. Any noise sensitive receptor that is permitted between the completion of the ***NSR*** and the Date of Public Knowledge will be analyzed for traffic noise impacts and, if impacts are predicted, abatement considered during the design phase of the project.

For noise impacted areas requiring abatement consideration, in accordance with ***23 CFR Part 772***, the Environmental Document shall contain a Statement of Likelihood similar to the following:

> "The Florida Department of Transportation is committed to the construction of feasible and reasonable noise abatement measures at the noise-impacted locations identified in (table, figure, chart) contingent upon the following conditions." (Any or all of the items listed below may be selected, or, if appropriate, project specific contingencies may be created.):
>
> 1. Detailed noise analyses during the final design process support the need, feasibility and reasonableness of providing abatement;
>
> 2. Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion;
>
> 3. Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and

4. Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved.

17.2.6.4 Design Phase Commitments

As noted in ***Section 17.2.3.3.3*** the FDOT noise reduction design goal is 7 dB(A) for one or more impacted receptors. A minimum insertion loss of 5 dB(A) or more is required to be considered a benefited receptor. During the final design phase, the noise abatement locations, noise barrier types, lengths and heights will be determined. The final noise abatement commitments must be documented in the environmental reevaluation and the ***Noise Study Report Addendum (NSRA)*** prior to construction advertisement, regardless of project funding sources. It is the responsibility of the District Design Project Manager to collect from the environmental staff all PD&E noise abatement commitments and other noise study information such as copies of the ***NSR***, pertinent preliminary design-related information. The Design Project Manager must work with the environmental staff to ensure that the final noise abatement commitments are reflected in the reevaluation of the Environmental Document and concurrence from FHWA or the District Secretary (or designee) is obtained as appropriate before the project moves to construction phase.

If, during the final design phase, abatement is no longer considered feasible or reasonable for a given location(s), such determination(s) will be made prior to requesting approval for construction advertisement. Commitments regarding the exact abatement measure locations, heights, and type (or approved alternatives) will be made during the final design phase and recorded on the ***Project Commitments Record (PCR), Form 700-011-035*** as required by ***Procedure No. 700-011-035, Project Commitment Tracking***.

If abatement is not feasible or reasonable, the following statement (or variation thereof) shall be used: "Based on the noise analyses performed to date, there appears to be no apparent solutions available to mitigate the noise impacts at the locations identified in (table, figure, chart)."

17.2.6.5 Construction Noise and Vibration Impacts

The early identification of potential construction noise and/or vibration impacts that may result from the construction of the project is important. The level of consideration for construction noise and vibration is discussed in ***Highway Traffic Noise: Analysis and Abatement Guidance (FHWA, December 2011)***. Any potential construction noise or vibration impacts that are identified in the PD&E phase shall be documented in the ***NSR*** and in the Environmental Document, along with any identified abatement measures that are potentially feasible and reasonable. A list of example construction noise and vibration sensitive receptors has been developed and can be found in ***Figure 17-7***. This will allow avoidance and/or mitigation options to be developed during the final design phase. These options can then be placed in the construction plans and applied during the construction of the project by the Contractor.

A discussion of construction noise and vibration impacts must be included in the Environmental Document whether the NAC are exceeded or not. It is generally based on site specific conditions and should, at a minimum, include a general reference to the ***FDOT Standard Specifications for Road and Bridge Construction*** to control noise and/or vibration impacts.

Examples of standard specifications that may be applied to a project include:

1. ***Section 6-3.1*** related to the storage of materials to minimize noise impacts on sensitive receivers;

2. ***Section 100-2.1*** related to equipment approval requiring the use of factory recommended exhaust mufflers and to remove or repair any equipment that is disapproved by the Engineer;

3. ***Section 100-2.2*** requires adequate equipment maintenance to minimize noise pollution caused by construction equipment;

4. ***Section 100-2.3*** suggests that all stationary equipment be screened from noise sensitive receivers beyond normal working hours and, if feasible, screen this equipment during normal working hours to reduce noise impacts;

5. ***Section 120-6.4*** addresses the concept of establishing haul routes which will direct construction vehicles away from developed areas when feasible and keep noise from hauling operations to a minimum; and

6. ***Section 455-1.1*** requires that the Contractor take reasonable precautions to prevent structural damage to existing structures by monitoring settlement and vibrations in accordance with the requirements of the specifications.

FHWA's ***Highway Construction Noise Handbook*** provides excellent guidance for the prediction and mitigation of construction noise. The Roadway Construction Noise Model (RCNM), which is the FHWA's national model for the prediction of construction noise, may be used as needed. The RCNM provides a construction noise screening tool to predict construction noise levels and determine compliance with noise limits for a variety of construction noise projects of varying complexity. The use of the RCNM should be coordinated with FHWA's Division Office prior to application (as appropriate).

Any recommended special construction noise and/or vibration mitigation measures identified during the review of potential construction and/or vibration impacts will be described in the ***NSR*** and in the Environmental Document, as appropriate. In considering construction noise and/or vibration mitigation, it should be noted that special provisions may be added as appropriate to the project's construction specifications. Any unique noise and/or vibration control efforts to be considered during construction shall be coordinated with the District Noise Specialist and Project Manager prior to inclusion in the ***NSR***.

The following is a sample construction noise and vibration statement for inclusion in the appropriate ***NSR/NSRA*** and Environmental Document:

> Based on the existing land use within the limits of this project, construction of the proposed roadway improvements will (will not) have any noise or vibration impact. Those construction noise and/or vibration impacts that have been identified and for which abatement measures appear to be feasible and reasonable (if any) are noted in the Statement of Likelihood of the ***NSR*** and in the Environmental Document. If noise-sensitive land uses develop adjacent to the roadway prior to construction, additional impacts could result. It is anticipated that the application of the ***FDOT Standard Specifications for Road and Bridge Construction*** 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 Project Manager, in concert with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

17.2.7 Noise Study Report Review

Once the ***NSR*** is completed, it will be reviewed by the Project Manager, District Noise Specialist and/or Environmental Administrator where the technical adequacy of the report will be determined. If necessary, a meeting and/or field review may be held to verify information and/or resolve conflicts. The ***NSR*** is to be considered complete at this point for purposes of proceeding with the preparation of the Environmental Document. It may ultimately be revised during the final design phase and subsequent reevaluations to reflect details regarding exact abatement measures, their location, and types.

When the District review of the ***NSR*** is complete, the ***NSR*** is forwarded to FHWA (as applicable) for review along with the Environmental Document, or maintained in the project file for a Type 1 CE, NMSA or SEIR.

17.2.8 Environmental Document

The type of Environmental Document produced for the project will determine the level and type of information provided relative to the noise study. The expected level of noise impacts discussion for each type of Environmental Document is provided in the sections below.

Excerpts and summaries from the ***NSR*** should be included in the Environmental Document. The Noise section of the Environmental Document should contain enough detail to convey the degree of noise impact attributed to the proposed project, along with certain required statements. The Environmental Document must reference the ***NSR*** for additional details using a statement similar to the following:

> "The Noise Study Report for this project is available from the District Office, located at _____."

The Environmental Document will also include information regarding the consideration of noise abatement measures that have or have not been determined to be feasible and reasonable based on the information available at the time the ***NSR*** was completed.

After Location and Design Concept Acceptance (LDCA) has been received for FHWA funded projects or a SEIR has been approved, a copy of the ***NSR*** is sent to the appropriate local government officials who have jurisdiction where the highway project is located. Other information that will aid these officials in their planning and land use decisions to minimize highway noise impacts in the future may be sent along with the ***NSR***. See ***Figure 17-8*** for a sample ***NSR*** transmittal cover letter to a local planning agency

17.2.8.1 Type 2 Categorical Exclusion

For a Type 2 CE, include the following documentation in the ***Type 2 Categorical Exclusion Determination Form, Form No. 650-050-11***:

1. If "**None**" is to be marked for noise, then a very brief summary of the ***NSR*** should be attached. Projects marked "None" relative to traffic noise indicate that no traffic noise impacts are predicted for any of the land uses adjacent to the project corridor.

2. If "**Not Significant**" is to be marked for noise, then a brief summary of the ***NSR*** should be attached with noise values presented in written form, including any noise abatement commitments.

3. If "**No Involvement"** is to be marked for noise, this would indicate that there are no noise sensitive land uses of any kind located adjacent to the project corridor.

If noise impacts occur, include noise abatement commitments in Commitments and Recommendations (Block 7) of the ***Type 2 Categorical Exclusion Determination Form, Form No. 650-050-11***. These commitments should be the same as those recorded in the ***Project Commitments Record (PCR), Form No. 700-011-35.***

17.2.8.2 Environmental Assessment (EA) with Finding of No Significant Impact (FONSI)

The Impacts section of the EA must reference and summarize the ***NSR.*** Specific references to the items discussed in ***Section 17.2.2 and 17.2.3*** are included as appropriate. Coordination which occurred during the noise study must be documented. The Comments and Coordination section shall discuss the history of the coordination that occurred and include letters from agencies expressing comments on the ***NSR***. Resolution of comments shall also be documented in this section. In the FONSI, provide a summary of all noise impacts resulting from the project. If abatement measures are being recommended for further consideration, identify the sites for which the abatement is proposed. For those locations with impacts where abatement is not feasible and/or

reasonable, provide those locations and an explanation as to why the abatement measure(s) considered was determined to not be feasible and/or reasonable.

17.2.8.3 Environmental Impact Statement (EIS)

The Environmental Consequences section of an EIS should summarize the ***NSR*** and include the following information:

1. A brief description of noise sensitive areas, including information on the numbers and types of activities which may be impacted. The availability of the ***NSR*** at the District Office will be noted.

2. The extent of the impact (in decibels). This will include a comparison of the future predicted noise levels with both FHWA NAC and the existing predicted noise levels.

3. Noise abatement measures which have been considered and those measures that would likely be incorporated into the proposed project.

4. Noise impacts for which no feasible and reasonable abatement is available and the reasons why.

17.2.8.4 State Environmental Impact Report

The Environmental Analysis section of a SEIR should identify the anticipated traffic noise impacts and appropriately reference the basis for decision. The Commitments section should include noise abatement commitments (if any) for the impacts identified in the Environmental Analysis section.

17.2.9 Reevaluations

The reevaluation of any Environmental Document that included a ***NSR*** shall also include an update of the traffic noise analysis. Assumptions made and data used during the original noise analysis and documented in the ***NSR*** shall be reviewed and updated to ensure the assumptions and any preliminary commitments are still valid. This may include, but not necessarily be limited to, current and future traffic data (volumes, speeds, composition), roadway alignment (horizontal and vertical), land use, propagation path, barriers/buffers (including trees, berms, structures), variation in terrain between noise source and receptors. Changes to the horizontal and vertical roadway alignment should follow the guidance provided in the Type I Projects Matrix provided in ***Figure 17-2***. The reevaluation may result in no change to the ***NSR*** or in a completely new ***NSR*** being required. At a minimum, it must be documented that the original noise study and analysis was reviewed and that the assumptions, project conditions and results are still valid. Computer modeling efforts will be conducted using the latest version of TNM, for any required subsequent noise reevaluation as a result of a major design change.

Major changes to the noise regulations were made on July 13, 2010, with an effective date of July 13, 2011. Therefore, all noise reevaluations conducted after July 13, 2011

will be done in accordance with ***23 CFR Part 772*** dated July 13, 2010. Coordination with FHWA's Division Office during the reevaluation process on federal projects is required (See ***Part 1, Chapter 13, Reevaluations***).

The final noise abatement commitments must be documented in the environmental reevaluation and the ***NSRA*** prior to construction advertisement, regardless of project funding sources. If the ***NSRA*** is substantially modified from the version previously distributed to the affected local governments, a revised version should be sent out to them.

17.2.10 Design-Build Projects

When a Design-Build firm proposes an alternative technical concept to the concept included in the Request for Proposal for the Design-Build project, the District must reevaluate the noise study in conformance with the provisions of ***40 CFR § 1506.5*** and ***23 CFR § 636.109***. The design-build noise study reevaluation must follow the analysis procedures outlined in this Chapter.

17.2.11 Accelerated State Process

FDOT has developed a Statewide Acceleration and Transformation (SWAT) process to improve how projects are delivered. The SWAT process allows for an overlap of PD&E activities and design activities to streamline delivery of projects. Additionally, the SWAT process requires increased coordination between all parties involved in project development to ensure that environmental analysis and issues are properly addressed and documented.

Noise studies for projects delivered through the SWAT process are still required to follow the requirements of ***23 CFR Part 772*** and this chapter. When design activities overlap PD&E activities, only the PD&E phase ***NSR*** may be prepared because the roadway plans may have enough detail (Phase II design plans) to allow noise abatement commitments to be made at that time. It is important that subsequent plan sets be reviewed for changes in roadway geometry that could necessitate a change to the noise analysis. Projects developed under the SWAT process will still utilize a Date of Public Knowledge (DPK) based on the date of the approval of the Environmental Document for the project.

Once the final design of the project is completed, the review of the design plans must verify that no changes have occurred relative to what was previously evaluated and documented in the ***NSR***. If significant changes have occurred that may alter the results of the original noise study and any noise abatement commitments (if applicable), a reevaluation is warranted and documented in the ***NSRA*** before the project is advertised for construction.

17.2.12 Abatement Measure Reporting

Title 23 CFR § 772.13(f) requires that each highway agency maintain an inventory of all constructed noise abatement measures. To comply with the inventory requirement, FDOT

maintains an inventory of all noise abatement barriers constructed on the State Highway System (SHS) in a GIS layer housed in the University of Florida's GeoPlan Center Florida Geographic Data Library (FGDL). Each District Noise Specialist must annually gather and provide inventory data to the University of Florida's GeoPlan Center.

This inventory data shall include at least the following parameters:

1. Type of abatement;
2. Cost (overall cost, unit cost per/sq. ft.);
3. Average height;
4. Length;
5. Area;
6. Location (state, county, city, route);
7. Year of construction;
8. Average insertion loss/noise reduction as reported by the model in the noise analysis;
9. NAC category(s) protected;
10. Material(s) used (precast concrete, berm, block, cast in place concrete, brick, metal, wood, fiberglass, combination, plastic [transparent, opaque, other]);
11. Features (absorptive, reflective, surface texture);
12. Foundation (ground mounted, on structure); and
13. Project type (Type I, Type II) and optional project types such as state funded, county funded, tollway/turnpike funded, other, unknown. The FHWA will collect this information, in accordance with Office of Management and Budget's Information Collection requirements.

For a complete list of items to be reported by the District Noise Specialists, see the FGDL attributes metadata website (***Section 17.3***). Federal submission requirement fields are prefaced with FED in the FGDL database.

The noise abatement barriers data is reported tri-annually to FHWA once a request is received to submit the report. At the request of SEMO, the GeoPlan Center will prepare the tri-annual report that submitted by the State Noise Program Coordinator to the FHWA Florida Division Office in the format required by ***23 CFR § 772.13(f)***.

17.3 REFERENCES

14 Code of Federal Regulations (CFR) Part 150, Airport Noise Compatibility Planning. December 13, 1984 (as updated). http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgFAR.nsf/Frameset?OpenPage

23 CFR § 636.109, How does the NEPA process relate to the design-build procurement process, April 1, 2009. https://www.gpo.gov/fdsys/pkg/CFR-2009-title23-vol1/xml/CFR-2009-title23-vol1-sec636-109.xml

23 CFR § 750.709; On-property or on premise advertising. Federal Highway Administration; December 9, 1991. http://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0750g.htm

23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, Tuesday, July 13, 2010. http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title23/23cfr772_main_02.tpl

40 CFR § 1506.5(c), Environmental Impact Statements, Nov. 29, 1978. http://www.ecfr.gov/cgi-bin/text-idx?SID=bbdf2357d9d42328f1467b91ac5f1076&mc=true&node=se40.33.1506_15&rgn=div8

49 CFR Part 210, Railroad Noise Emission Compliance Regulations. Federal Railroad Administration; Dec. 23, 1983, unless otherwise noted. http://www.ecfr.gov/cgi-bin/textidx?SID=3d877285a1ab8843291df7cfc4bb9c71&mc=true&node=pt49.4.210&rgn=div5#sp49.4.210.a

Federal Highway Administration (FHWA) Report FHWA-HEP-06-015, FHWA Highway Construction Noise Handbook: Final Report," August 2006. http://ntl.bts.gov/lib/34000/34300/34369/DOT-VNTSC-FHWA-06-02.pdf

FHWA Report FHWA-HEP-05-054, FHWA Roadway Construction Noise Model User's Guide: Final Report," January 2006. http://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf

FHWA Report FHWA-HEP-10-025, Highway Traffic Noise: Analysis and Abatement Guidance, December 2011; https://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf

FHWA Report Number FHWA-PD-96-009, FHWA Traffic Noise Model User's Guide (Version 2.5 Addendum). April 2004. http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v25/users_manual/index.cfm

FHWA Report Number FHWA-PD-96-046, Measurement of Highway-Related Noise. Cynthia S.Y. Lee and Gregg Fleming; May, 1996. http://www.fhwa.dot.gov/environment/noise/measurement/mhrn00.cfm

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FDOT, Project Commitment Tracking, Procedure No. 700-011-035. http://fdotwp1.dot.state.fl.us/ProceduresInformationManagementSystemInternet/FormsAndProcedures/ViewDocument?topicNum=700-011-035

FDOT, Right of Way Procedures Manual (Topic No. 575-000-000), Section 7.14, Outdoor Advertising Signs. http://www.dot.state.fl.us/rightofway/documents/ROWmanual/ch07s14.pdf

FDOT, Standard Specifications for Road and Bridge Construction. January 2016. http://www.dot.state.fl.us/programmanagement/Implemented/SpecBooks/January2016/Files/116eBook.pdf

FDOT, Traffic Noise Modeling and Analysis Practitioners Handbook, January 2016. http://www.dot.state.fl.us/emo/pubs/Traffic%20Noise%20Modeling%20and%20Analysis%20Practitioners%20Handbook%20-%20January%202016%20Version.pdf

Florida Statutes (F.S), Section 335.02, Authority to designate transportation facilities and rights-of-way and establish lanes; procedures for re-designation and relocation; application of local regulations. 20012. http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0300-0399/0335/Sections/0335.02.html

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F.S., Section 335.17, State highway construction; means of noise abatement. 2012. http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0300-0399/0335/Sections/0335.17.html

University of Central Florida, 2009. A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations. Roger L. Wayson and John M. MacDonald. July 22, 2009 Update http://www.dot.state.fl.us/emo/pubs/Reasonableness%20and%20feasibility%20of

%20Abatements%20at%20Special%20Use%20Locations%20%20Report%20Update%20-%207-22-09%20(2).pdf

University of Florida, GeoPlan Center. Florida Geographic Data Library (FGDL) Metadata Explorer. http://fgdl.org/metadataexplorer/explorer.jsp

17.4 HISTORY

10/6/2003, 4/18/2007, 5/24/2011

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

(Based on Table 1 of 23 CFR Part 772)

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

2 Includes undeveloped lands permitted for this activity category.

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

Figure 17-1 Noise Abatement Criteria

Type I Project Activities (Noise Study Required)		Not Type I (No Noise Study Required)
1	Construction of highway on new location	
2	New or relocated interchanges	
3	Addition of new interchange ramps (add a ramp where no ramps existed). Viewed as a new location.	
4	Relocation of an interchange ramp where the edge of the outside lane on any segment of the ramp reduces the distance to the closest receptor by one-half. (See #6 for realignment of ramps)	
5	Increasing capacity to an existing on or off interchange ramp (by adding lanes) including associated merge lanes. Viewed as a new location.	
6	Lengthening an existing interchange ramp's acceleration or deceleration lane and associated merging into the mainline to a total of more than 2500 feet (from the gore to the end of the lane), or re-aligning where any segment of the ramp reduces the distance to the closest receptor by one-half.	Lengthening an existing interchange ramp's acceleration or deceleration lane and associated merging into the mainline (total length less than 2500 feet), or re-aligning where any segment of the ramp DOES NOT REDUCE the distance to the closest receptor by one-half.
7	Alteration of the horizontal alignment of an existing highway such that the edge of the outside lane reduces the distance to the closest receptor by one-half.	Alteration of the horizontal alignment of an existing highway such that the edge of the outside lanes DOES NOT REDUCE the distance to the closest receptor by one-half.
8	Alteration of the vertical alignment, or the surrounding topography, where existing shielding is removed and the line of sight between the noise source and the receptor is now direct. (Activity does not include removal of vegetation).	
9	Addition of new through-lanes that increase capacity to an existing highway. (Noise analysis required on both sides of the highway whether the lanes are all in one direction or both directions of travel.)	
10	Restriping existing pavement to add a through-lane or auxiliary lane (See #13, #14 and #15 for auxiliary lanes).	
11	Addition of new or substantially altered weight station, rest stop, ride share lot or toll plaza.	
12	Addition of ramps or new lanes serving as climbing lanes for buses and trucks.	
13	Addition of auxiliary lanes used as through lanes on local roads.	
14	Auxiliary lanes on freeways and expressways connecting two or more interchanges (continuous lanes longer than 2500 feet from gore to gore).	Auxiliary lanes on freeways and expressways connecting two closely spaced interchanges (less than 2500 feet from gore to gore) to accommodate weaving traffic.
15		Turn lanes at intersections associated with arterial highways
16		Bicycle and Pedestrian paths
17		Safety activities (23 USC §402)
18		Landscaping
19		Installation of fencing, signs, pavement marking, small passenger shelters, traffic signals, railroad warning signals (that don't disrupt traffic patterns)
20		Deployment of electronics, photonics, communications, information processing to improve safety and security
21		Re-surfacing, restoration, rehabilitation or reconstruction of an existing facility (unless there is a change in horizontal or vertical alignment per 7 & 8 above).
22		Electronic toll collection facilities that do not disrupt traffic patterns.

Figure 17-2 Type I Project Matrix

Building Type	Window Condition*	Noise Reduction Due to Exterior of the Structure
All	Open	10 dB
Light Frame	Ordinary Sash (closed)	20 dB
	Storm Windows	25 dB
Masonry	Single Glazed	25 dB
	Double Glazed	35 dB

*The windows shall be considered open unless there is firm knowledge that the windows are in fact kept closed almost every day of the year.

Source: FHWA Highway Traffic Noise: Analysis and Abatement Guidance. August 11, 2010.

Figure 17-3 Building Noise Reduction Factors

EXAMPLE PD&E NOISE STUDY REPORT (NSR) TABLE OF OUTLINE

EXECUTIVE SUMMARY

TABLE OF CONTENTS
- List of Tables
- List of Figures
- List of Appendices

1.0 INTRODUCTION
- 1.1 Project Description (includes Project Location Map)
- 1.2 Proposed Improvements (includes conceptual typical section(s))

2.0 METHODOLOGY (opening paragraph references regulation, policy and TNM version)
- 2.1 Noise Metrics
- 2.2 Traffic Data
- 2.3 Noise Abatement Criteria (includes general discussion and application specific to the project)
- 2.4 Noise Abatement Measures (General Discussion)
  - 2.4.1 Traffic Management
  - 2.4.2 Alignment Modifications
  - 2.4.3 Buffer Zones (includes noise contours and intended application of contours
  - 2.4.4 Noise Barriers (includes discussion of minimum reduction requirements and cost reasonable limit)

3.0 TRAFFIC NOISE ANALYSIS
- 3.1 Model Validation
- 3.2 Existing Noise Levels (documents noise monitoring to establish existing noise levels; usually only included for new alignment projects)
- 3.3 Predicted Noise Levels and Abatement Analysis (includes discussion of impacts and noise barrier analysis with each noise sensitive area addressed as a separate report section)

4.0 CONCLUSIONS (includes Statement of Likelihood)

5.0 CONSTRUCTION NOISE AND VIBRATION

6.0 COMMUNITY COORDINATION (documents any public comments specific to traffic noise, transmittal of the Noise Study Report to local officials and references noise contours discussed above)

7.0 REFERENCES

APPENDICES
- **Appendix A** **Traffic Data**
- **Appendix B** **Predicted Noise Levels**
- **Appendix C** **Aerials** (showing receptor points)
- **Appendix D** **TNM Modeling Files and PDF of the NSR** (on disc, including “Read Me” file)

Figure 17-4 Example PD&E Noise Study Report (NSR) Outline

EXAMPLE DESIGN NOISE STUDY REPORT (NSR) ADDENDUM OUTLINE

EXECUTIVE SUMMARY

TABLE OF CONTENTS
List of Tables
List of Figures
List of Appendices

1.0 INTRODUCTION
1.1 Project Description (includes Project Location Map)
1.2 Summary of PD&E Results and Commitments
1.3 Design Improvements (includes comparison to PD&E conceptual design and design typical section(s))

2.0 METHODOLOGY (opening paragraph references regulation, policy and TNM version)
2.1 Noise Metrics
2.1.1.1 Traffic Data
2.2 Noise Abatement Criteria (includes general discussion and application specific to the project; includes discussion that the PD&E noise analysis determined no substantial increase)
2.3 Noise Abatement Measures (General discussion identifying noise barriers as only viable abatement measure based on PD&E noise study; includes discussion of minimum reduction requirements and cost reasonable limit)

3.0 TRAFFIC NOISE ANALYSIS
3.1 Model Validation (Only if validation update from PD&E noise study is needed)
3.2 Predicted Noise Levels and Abatement Analysis (includes discussion of impacts and noise barrier analysis with each noise sensitive area addressed as a separate report section; includes selection of recommended noise barrier length and height)
3.3 Engineering Feasibility Review (includes discussion on noise barrier modifications to resolve construction conflicts

4.0 Outdoor Advertising (if applicable, discusses conflicts with outdoor advertising, resolution of conflicts and fulfillment of FDOT responsibilities in accordance with F.S. 479.25)

5.0 CONCLUSIONS (includes discussion on fulfillment of PD&E commitments and tabulates specifics for each recommended noise barrier to be included in the design plans and constructed with the project)

6.0 CONSTRUCTION NOISE AND VIBRATION

7.0 COMMUNITY COORDINATION (includes results of noise barrier survey specific to each noise barrier or noise barrier system)

8.0 REFERENCES

APPENDICES
Appendix A **Traffic Data**
Appendix B **Predicted Noise Levels**
Appendix C **Aerials** (showing receptor points and noise barriers to be included in design plans)
Appendix D **Noise Barrier Survey Package**
Appendix E **TNM Modeling Files and PDF of the NSR Addendum** (on disc, including "Read Me" file)

Figure 17–5 Example Design Noise Study Report Addendum (NSRA) Outline

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

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

Figure 17–6 Typical Noise Levels

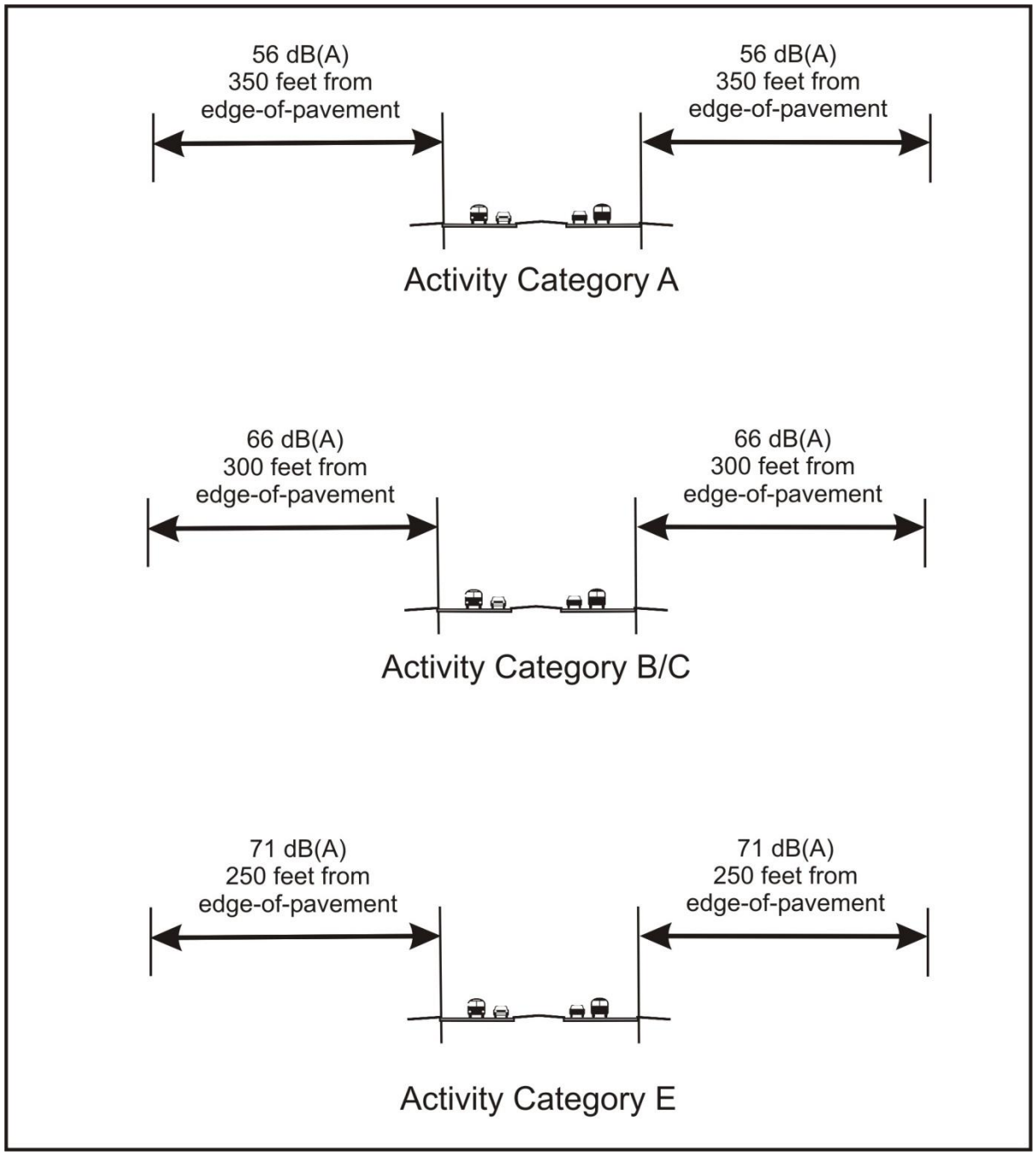

Figure 17–7 Sample Noise Contours

Date

Addressee
Appropriate Growth Management Office
Local Government
City, Florida Zip Code

The Florida Department of Transportation (FDOT) has received approval of (**INSERT LDCA or SEIR APPROVAL HERE**) for the Project Development and Environment (PD&E) Study for **(INSERT PROJECT NAME HERE**). As part of the PD&E Study, a traffic noise study was performed. Consistent with applicable federal regulations and state policies, attached is a copy of the Final Noise Study Report/Noise Study Report Addendum (Choose one as appropriate). (**INSERT APPROPIATE SECTION/TABLE/FIGURE HERE**) contains information related to the estimated distance from the edge of the nearest travel lane for the improved roadway where traffic noise impacts are predicted to occur in the future design year for the project for the different land use categories contained in the Federal Highway Administration (FHWA) and FDOT Noise Abatement Criteria (NAC).

This information is being provided to assist the local planning agency and developers in the prevention of future traffic noise impacts on lands which are currently undeveloped. The Date of Public Knowledge, or DPK, for the project is the date of approval of the Environmental Document for the project. The FDOT is not responsible for providing noise abatement for noise sensitive land uses that are permitted for construction after that date. Upon request, the FDOT may provide additional available materials and technical guidance related to noise compatible land use planning to assist the local agencies and developers in this regard.

Sincerely,

(INSERT DISTRICT NOISE SPECIALIST/FDOT PM NAME HERE)

Figure 17–8 Sample Noise Study Report Transmittal Cover Letter

Noise	Vibration
Eye Centers/Clinics	Eye Centers/Clinics
Medical Centers	Medical Centers
Hospitals	Hospitals
Geriatric Centers	Geriatric Centers
Sound Recording Studios	Sound Recording Studios
TV/Radio Stations	TV/Radio Stations
Residences	Residences
Technical Laboratories	Technical Laboratories
Hearing Testing Centers	Antiques Shops
Theaters	Museums
Schools	Historic Buildings
Motels/Hotels	
Funeral Homes	
Libraries	
Meditation Centers	
Churches/Shrines	
Parks	
Day Care Centers	
Outdoor Theaters	
Note: This list is not meant to be all inclusive or exclusive, but rather an indication of the type of sites likely to be sensitive to construction noise and/or vibration.	
Source: FDOT Noise and Vibration Task Team; August 17, 1999.	

Figure 17-9 Construction Noise and Vibration Sensitive Sites (a partial listing of potential sites)