

New York State Noise Related Statutes and Policies

STATUTES

§ 44. Noise levels on pleasure vessels.

1. The provisions of this section shall apply to the navigable waters of the state including all tidewaters bordering on and lying within the boundaries of Nassau and Suffolk counties.

2.

(a) No person shall operate or give permission for the operation of any pleasure vessel in or upon the waters of this state in such a manner as to exceed a noise level of 90dB(A) when subjected to a stationary sound level test as prescribed by SAE J2005.

(b) No person shall operate a pleasure vessel on the waters of this state in such a manner as to exceed a noise level of 75 dB(A) measured as specified in SAE J1970. Provided, that such measurement shall not preclude a stationary sound level test as prescribed by SAE J2005.

3. Sale or manufacture. No person shall manufacture or offer for sale any pleasure vessel or engine for use in a pleasure vessel for use on the waters of this state if such vessel or engine, at the time of manufacture or sale, cannot be operated in such a manner so as to comply with the sound level requirements provided in this section.

4. No person shall operate or give permission for the operation of any pleasure vessel in or upon the waters of this state that is equipped with an altered muffler or a muffler cutout, bypass or otherwise reduce or eliminate the effectiveness of any muffler or muffler system installed in accordance with this section.

5. No person shall remove, alter or otherwise modify in any way a muffler or muffler system in a manner which will prevent it from being operated in accordance with this section.

6. Exceptions. The provisions of this section shall not apply to pleasure vessels designed, manufactured and sold for the sole purpose of competing in racing events and for no other purpose. Any such exemption or exception shall be so documented in any and every sale agreement and shall be formally acknowledged by signature on the part of both the buyer and the seller and copies of said agreement shall be maintained by both parties. A copy shall be kept on board whenever the pleasure vessel is operated. Any pleasure vessel sold under this exemption may only be operated on the waters of this state in accordance with this section.

The provisions of this section shall also not apply to:

(a) Pleasure vessels which are competing in or participating for a definite race over a given course held under the auspices of any bona fide club or racing association between the hours of nine o'clock in the morning and sunset, which has been approved pursuant to the provisions of section thirty-four of this chapter, and all provisions of such section have been complied with or pursuant to authorization by the commandant of the United States Coast Guard.

(b) An authorized agent of the federal, state or municipal government when operating a pleasure vessel necessary to carry out his or her official duty of enforcement, search and rescue, firefighting or research programs.

(c) A pleasure vessel being operated by a boat or marine engine manufacturer for the purposes of testing and/or development.

- (d) A pleasure vessel manufactured prior to nineteen hundred sixty-five.
7. Any officer authorized to enforce the provisions of this section who has reason to believe that a pleasure vessel is not in compliance with the noise levels established in this section may direct the operator of such pleasure vessel to submit the pleasure vessel to an on-site test to measure noise level, with the officer on board if such officer chooses, and the operator shall comply with such request. If such pleasure vessel exceeds the decibel levels established in this section, the officer may direct the operator to take immediate and reasonable measures to correct the violation, including returning the pleasure vessel to a mooring and keeping the pleasure vessel at such mooring until the violation is corrected or ceases.
8. Any officer who conducts pleasure vessel sound level tests as provided in this section shall be qualified in pleasure vessel noise testing by the department of parks, recreation and historic preservation. Such qualifications shall include but may not be limited to the selection of the measurement site, and the calibration and use of noise testing equipment.
9. Penalties.
- (a) Any person who fails to comply with the provisions of this section shall be guilty of a violation punishable by a fine not to exceed fifty dollars for the first offense and not exceeding two hundred fifty dollars for a second or subsequent offense. However, the court shall waive any fine for which a person who violates the provisions of this section would be liable if such person supplies the court with proof within thirty days of the issuance of the summons that he purchased his pleasure vessel prior to the effective date of this section, that the pleasure vessel's muffler was not altered or made inoperable so as to result in a violation of the provisions of this section, and that the pleasure vessel has been repaired, altered or modified so as to be in compliance with the provisions of this section. Provided, however, that such waiver of fine shall not apply to a second or subsequent conviction under this section.
- (b) Any person who alters or makes inoperable an effective muffler system so that such system is no longer in compliance with this section shall be guilty of a violation punishable by a fine of not less than fifty dollars nor more than two hundred fifty dollars.
- (c) All fines and forfeitures collected pursuant to the provisions of this section by any court, judge, magistrate or other officer referred to in subdivision one of section thirty-nine of the judiciary law, establishing a unified court budget, shall be paid to the state commissioner of taxation and finance, within the first ten days of the month following collection to be deposited in a fund known as the boating noise level enforcement fund established pursuant to section ninety-one-b of the state finance law. The office of parks, recreation and historic preservation shall distribute the fines to local law enforcement officials according to the provisions of section seventy-nine-b of this chapter for the purpose of enforcing the provisions of this section.
10. All fines and forfeitures collected by any other court, judge or magistrate or other officer shall be paid to the state comptroller within the first ten days of the month following collection to be deposited in a fund known as the boating noise level enforcement fund established pursuant to section ninety-one-b of the state finance law. The office of parks, recreation and historic preservation shall distribute the fines to local law enforcement officials according to the provisions of section seventy-nine-b of this chapter for the purpose of enforcing the provisions of this section.

§ 45-aaaaaa. Special provisions relating to noise and speed on Lamoka Lake and Waneta Lake.

1. Notwithstanding any other provisions of this chapter or any inconsistent local laws, every pleasure vessel operated on Lamoka Lake, located in Schuyler county, or Waneta Lake, located in Schuyler and Steuben counties, shall be operated in a careful and prudent manner, in such a way as not to unreasonably interfere with or endanger any vessel or person, and no vessel shall be operated at a speed exceeding forty-five miles per hour. No pleasure vessel operated on Lamoka Lake or Waneta Lake shall be operated at a speed exceeding twenty-five miles per hour between one-half hour after sunset and one-half hour before sunrise.

2. No vessel shall be operated on Lamoka Lake or Waneta Lake within two hundred feet of the shore, a dock, pier, raft or float or an anchored or moored vessel in a manner or at such a speed that causes a wake that unreasonably interferes with or endangers such dock, pier, raft or float or an anchored or moored vessel but in no event at a speed exceeding five miles per hour, unless for the purpose of enabling a person engaged in water skiing to take off or land or such vessel is required to run at full throttle through an established course to measure the vessel's decibel level pursuant to the directions of a law enforcement officer.

3. The provisions of this section shall not apply to any vessel competing in or practicing for a regatta or boat race over a specified course held by a bona fide club or racing association, provided that due written notice of the date of the race has been given to the appropriate law enforcement agencies at least fifteen days prior to such race, pursuant to the provisions of section thirty-four of this chapter, and all provisions of this section have been complied with. The provisions of this section shall not apply to any Federal Aviation Agency licensed aircraft.

4. Any person who fails to comply with any of the provisions of this section shall be guilty of a violation punishable by a fine of not less than twenty-five dollars nor more than one hundred dollars for the first offense; by a fine of not less than fifty dollars nor more than two hundred dollars for conviction of the second offense committed within a period of twenty-four months; by a fine of not less than one hundred dollars nor more than two hundred dollars for conviction of the third offense or any subsequent offense committed within a period of twenty-four months.

§ 79-a. Definitions.

As used in this article:

1. "State aid" shall mean payments by the state to an eligible governmental entity in accordance with the provisions of this article.

2. "Program year" shall mean the calendar year.

2-a. "Eligible governmental entity" shall mean the Lake George park commission or a county enforcing the provisions of this chapter and having an accident reporting system and vessel and related equipment anti-theft program and/or an "I love NY waterways" boating safety program and/or boating noise level enforcement program approved by the commissioner. In a county which does not enforce the provisions of this chapter and has an approved accident reporting system and vessel and related equipment anti-theft program and/or an "I love NY waterways" boating safety program and/or a boating noise level enforcement program, the eligible governmental entity may be a city, town or village within the county. In addition, the commissioner shall promulgate regulations to provide for direct funding to any city, town or village in a county constituting an eligible governmental entity pursuant to this subdivision

which such city, town or village enforces the provisions of this chapter and has established an "I love NY waterways" boating safety program approved by the commissioner.

§ 84. Construction standards for the control of noise.

On or before January first, nineteen hundred sixty-nine, the department shall formulate, adopt, promulgate and thereafter from time to time amend standards of sound retardation for the walls, partitions and floors and ceilings between apartments and between apartments and public spaces situated therein based on the direct measurement of sound transmission loss determined in decibels for various frequencies or in accordance with the ASTM sound transmission class system or in accordance with such other recognized method or system for measuring reduction of sound transmission as the department may determine to be appropriate. Any construction of a multiple dwelling commenced after January first, nineteen hundred seventy shall comply with the standards promulgated pursuant to this section in effect at the time of commencement of such construction.

§ 91-b. Boating noise level enforcement fund.

1. There is hereby established in the joint custody of the state comptroller and the commissioner of taxation and finance a fund to be known as the boating noise level enforcement fund.
2. Such fund shall consist of all fines and forfeitures collected pursuant to section forty-four of the navigation law and required to be deposited to this fund, and all other moneys credited or transferred thereto from any other fund or source pursuant to law.
3. Moneys of the fund shall be available only for the payment of state aid pursuant to the provisions of section seventy-nine-b of the navigation law for the purpose of enforcing the provisions of section forty-four of such law.

§ 150. Shooting ranges.

1. In any action or proceeding commenced against an owner or user of a shooting range where one or more causes of action asserts a claim based on noise or noise pollution resulting from the inherent shooting activity on such shooting range, it shall be an affirmative defense that, at the time of the commencement of the action or proceeding, the shooting range is in compliance with any applicable noise control laws or ordinances, or, if the applicable noise control laws or ordinances have no legal force and effect against such owner or user or there are no applicable noise control laws or ordinances at the time of the effective date of this section, then the A-weighted sound level of small arms fire on the shooting range does not exceed 90 dB(A) for one hour out of a day, or does not exceed 85 dB(A) for eight hours out of a day measured at, or adjusted to, a distance of one hundred feet outside the real property boundary of the shooting range. An owner or user may move for judgment dismissing one or more causes of action asserted against him on the ground that a cause of action cannot be maintained because of such affirmative defense.
2. Nothing in this section shall in any way limit the rights or remedies which are otherwise available to a person under any other law.
3. Notwithstanding the provisions of subdivisions one and two of this section, no shooting range shall be operated during the period from 10:00 PM until 7:00 AM unless a local law or ordinance specifically authorizes the operation of a shooting range during all or any portion of such time period.

4. For the purposes of this section:

- (a) "Shooting range" shall mean an outdoor range equipped with targets for use with firearms and shall include, but not be limited to, all rifle, pistol and shotgun ranges.
- (b) "A-weighted sound level" shall mean the sound pressure level measured by the use of an instrument with the metering characteristics and A-weighting frequency response prescribed by sound level meters using the impulse response mode.
- (c) "Sound pressure level" shall mean twenty times the logarithm to the base ten of the ratio of the root mean squared pressure of a sound to a reference pressure of twenty micropascals. The unit applied to this measure shall be the decibel (dB).
- (d) "Small arms" shall mean projectile firearms of small caliber, including rifles, pistols, and shotguns.

§ 381. Motorcycle equipment.

1.

(a) Every motorcycle, driven upon the public highways of this state, shall be provided with adequate brakes in good working order and sufficient to control such motorcycle at all times, when the same is in use, a suitable and adequate **bell, horn** or other device for signaling, Every such motorcycle shall have a suitable **muffler** or device to prevent unnecessary **noise** from exhaust gases, and the use of so-called "cut-outs" is prohibited.

2,, The operator of every motorcycle shall permit any policeman, police officer or other person exercising police powers to inspect the equipment of such motorcycle and make such tests as may be necessary to determine whether the provisions of this section are being complied with.

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11. No person shall operate a motorcycle on any highway which is:

- (1) not equipped with a **muffler** to prevent excessive or unusual **noise**;
- (2) equipped with a muffler from which the baffle plates, screens or other original internal parts have been removed or altered;
- (3) equipped with an exhaust device without internal baffles, known as "straight pipes"; or
- (4) equipped with an exhaust system that has been modified in a manner that will amplify or increase the noise emitted by the motor of such vehicle above that emitted by the exhaust system originally installed on the vehicle.

12. No person shall operate a motorcycle on any highway which is equipped with an exhaust device that is intentionally designed to allow for the internal baffling to be fully or partially removed or interchangeable. This subdivision shall not apply to a motorcycle manufactured or assembled prior to nineteen hundred seventy-nine or a motorcycle registered as a limited use vehicle or an all terrain vehicle pursuant to article forty-eight-A or forty-eight-B of this chapter.

13. A violation of any of the provisions of this section shall be punishable by a fine not exceeding one hundred dollars or by imprisonment for not exceeding thirty days, or by both such fine and imprisonment.

§ 386. Motor vehicle sound level limits.

1. As used in this section;

- a. A-weighted sound level shall mean the sound pressure level measured by the use of an instrument with the metering characteristics and A-weighting frequency response prescribed for sound level meters.
 - b. Combination of vehicles shall mean any device consisting of a motor vehicle and one or more trailers drawn by such motor vehicle.
 - c. Sound pressure level shall mean twenty times the logarithm to the base ten of the ratio of the root mean squared pressure of a sound to a reference pressure of twenty micropascals. The unit applied to this measure shall be the decibel (dB).
2. This section shall apply to the total sound level emitted from a motor vehicle or a combination of vehicles.
3. Unlawful acts.
- a. It shall be unlawful for any person to operate or cause to be operated on a public highway any motor vehicle or combination of vehicles with a maximum gross weight in excess of ten thousand pounds, at any time, under any condition of grade, load, acceleration or deceleration in such a manner as to exceed the applicable A-weighted sound level set forth in table I. The maximum allowable sound levels in Table I are based on a sound level measured at, or adjusted to, a distance of fifty feet from the center of the lane in which the motor vehicle is traveling.

TABLE I

Maximum Speed Limit, mph	Maximum Allowable Sound Level
35 or less	86 dB(A)
Over 35	90 dB(A)

- b. In addition, it shall be unlawful for any person to operate or cause to be operated on a public highway any motor vehicle or combination of vehicles with a maximum gross weight in excess of ten thousand pounds and equipped with an engine speed governor, which generates an A-weighted sound level in excess of eighty-eight dB(A) measured at, or adjusted to, a distance of fifty feet from the longitudinal centerline of the vehicle, when the engine of such vehicle is accelerated from idle with a wide open throttle to governed speed with the vehicle stationary, transmission in neutral and clutch engaged.
- c. It shall be unlawful for any person to operate or cause to be operated on a public highway any motor vehicle or combination of vehicles, except motorcycles, with a maximum gross weight of ten thousand pounds or less, at any time, under any condition of grade, load, acceleration or deceleration in such a manner as to exceed the applicable A-weighted sound level set forth in Table II. The maximum allowable sound levels in table II are based on a sound level measured at, or adjusted to, a distance of fifty feet from the center of the lane in which the motor vehicle is traveling.

TABLE II

Maximum Speed Limit, mph	Maximum Allowable Sound Level
35 or less	76 dB(A)
Over 35	82 dB(A)

d. It shall be unlawful for any person to operate or cause to be operated on a public highway any motorcycle, at any time, under any condition of grade, load, acceleration or deceleration in such a manner as to exceed the applicable A-weighted sound level set forth in table III. The maximum allowable sound levels in Table III are based on a sound level measured at, or adjusted to, a distance of fifty feet from the center of the lane in which the motorcycle is traveling.

TABLE III

Maximum Speed Limit, mph	Maximum Allowable Sound Level
35 or less	82 dB(A)
Over 35	86 dB(A)

4. The commissioner of environmental conservation shall promulgate regulations establishing the measurement procedures and instrumentation to be utilized in the enforcement of this section.
 - a. These procedures shall allow, to the extent feasible, motor vehicle sound measurements to be accomplished in reasonably confined areas such as residential areas of urban cities, and may provide for sound measurement at distances other than fifty feet and in the vicinity of sound reflecting surfaces.
 - b. The regulations shall take into consideration recognized scientific and professional standards for the measurement of vehicular sound levels.
5. The provisions of this section shall not apply to vehicles and implements or combinations thereof used solely for farm purposes, nor to authorized emergency vehicles.
6. Nothing in this section shall be construed as limiting or precluding the enforcement of equipment requirements or any other provisions of law relating to motor vehicle noise.
7. At intervals of not more than two years, the commissioner of environmental conservation shall report to the governor and the legislature on the current state of the art of motor vehicle sound level limitations and recommend changes as necessary.

§ 1204-a. Rapid transit noise code.

1. As used in this section, unless another meaning is indicated by the context:
 - a. "Authority" means the New York City Transit Authority.
 - b. "Subways" means all rail rapid transit systems operated by the authority including but not limited to rolling stock, track and track beds, passenger stations, tunnels, elevated structures, yards, depots, and shops.
 - c. "New cars" means all those cars the purchase and/or construction of which is contracted for subsequent to the enactment of this section.
 - d. "Screech" means any noise generated by wheel-track interactions on curves or by brake application and which is a prominent discrete tone above 1000 Hertz as defined by the American National Standards Institute specifications (ANSI S1.13--1971).
 - e. "Sound pressure level" means twenty times the logarithm to the base ten of the ratio of the root mean squared pressure of a sound to a reference pressure of twenty micropascals. The unit applied to this measure shall be the decibel (dB).
 - f. "A-weighted sound level or (dBA)" means the sound pressure level measured by the use of an instrument with the metering characteristics and A-weighting frequency response prescribed for sound level meters.

The sound level measurement system must meet or exceed the requirements of the American National Standard Institute Specification for Sound Level Meters ANSI S1.4--1971, approved April twenty-seventh, nineteen hundred seventy-one, throughout the applicable frequency range for either:

- (a) A Type 1 sound level meter; or
- (b) A Type 2 sound level meter; or
- (c) A Type S sound level meter which has:
 - (1) an A-weighting frequency response; and
 - (2) a fast dynamic characteristic which complies with section 5.3 of ANSI S1.4--1971; and
 - (3) a relative response level tolerance consistent with that of either a Type 1 or Type 2 sound level meter, as specified in section 3.2 of ANSI S1.4--1971.

g. "Equivalent sound level" means the energy-average of the integrated A-weighted sound level over a specified observation time T and is identified by the symbol L_{eq} .

2. The authority shall undertake a rail rapid transit noise abatement study, incorporating a comprehensive review of the results of noise abatement studies and projects done for or by the Urban Mass Transportation Administration of the United States Department of Transportation and other mass transit systems. Such study shall evaluate the range of strategies available for meeting the sound levels set forth in the following sound level table, propose strategies and indicate the approximate time and necessary cost for meeting such sound levels, and indicate the expected dBA reduction of each proposed strategy. Such study shall be submitted to the governor and the legislature, and made available to the public, within one year of enactment of this section.

SOUND LEVEL TABLE

a.

Car Type	Equivalent Sound Level	Percent Compliance		
		Within 4 years	Within 8 years	Within 12 years
Car Interior				
New cars	80 dB(A)	100	100	100
Old cars	85 dB(A)	20	40	70
Curve and Brake Screech				
New cars	No screech	100	100	100
Old cars	No screech	20	60	100
Station Trains, entering, leaving or passing through				
	105 dB(A)	85	90	100
	90 dB(A)	70	80	95
	85 dB(A)	50	60	80
	80 dB(A)	5	15	60
Elevated Structure	*****	10	30	60

b. In all cases noise levels shall be measured so as to reflect accurately the worst case of noise exposure at a specific location where a noise abatement strategy has been implemented, to which a subway passenger, employee, or any person who is within range

of subway noise could reasonably be exposed under normal operating conditions. Noise measurements shall be made under the following conditions:

Car interior: when the car is in motion at a speed of forty miles per hour during normal operation with measurements in the center of the car and the microphone five feet above the floor.

Station: (express) when the train is in motion and passing in front of the on-platform measuring point.

Station: (local) when the train is in motion and any part of it is within the station.

Car exterior (elevated tracks) when the train is in motion and is passing in front of the point from which noise measurements are being made.

c. All measurements shall be taken with fast dynamic characteristic of the sound level measurement system. Energy equivalent measurements shall normally be used; provided, however, alternative measures may be proposed to incorporate new instrumentation or analyses that may become available.

3. Within six months of the completion of the study conducted pursuant to subdivision two of this section, the authority shall report to the governor and the legislature which strategies or portions of strategies proposed by such study it has chosen to implement, and the schedule for such implementation.

To the extent, if any, that the authority's plan fails to meet the standards specified in the sound table, the authority shall so state and provide the reasons for its inability to meet such standards.

4. Within twelve months of the completion of the study conducted pursuant to subdivision two of this section, and at twelve month intervals thereafter, the authority shall submit to the governor and the legislature comprehensive reports detailing the authority's progress to date in abating subway noise. The report shall include, but not be limited to an itemized summary of all monies spent, bids requested and received, contracts let, and actual work done on noise abatement programs during the previous period. Any and all subway noise measurements made during the previous period shall be included, with, whenever possible, analyses of such measurements.

Such report shall also include a detailed analysis of all noise abatement activities planned for the next twelve months. Following the first twelve month interval these reports shall also include comprehensive statements of progress made on all planned noise abatement activities included in the previous annual report.

Nothing herein shall preclude such report from being incorporated in the authority's annual capital report submitted pursuant to the "capital financing and services system act of nineteen hundred eighty-one," so long as it is maintained as a separate, distinct and identifiable component in such report.

POLICIES

I. BACKGROUND

A. The Federal Highway Administration (FHWA) issued a directive on June 12, 1995 stating that within one year from this date the Department must adopt a written statewide noise policy and have it approved by the FHWA. The policy must demonstrate substantial compliance with the Federal noise regulation, Procedures for Abatement of Highway Traffic and Construction Noise, 23 CFR 772 as well as with the reissued FHWA Policy and Guidance document dated

June 1995. This traffic and construction noise policy and procedures should be a guide for judgment in decision making on noise matters during the project development process.

B. A formal, written noise policy can assist in the management of the highway traffic noise analysis and abatement decision making process. It will allow for more uniform and equitable treatment of problems and issues and provide a rational basis for decision making.

It will help the traffic noise analyst by serving as a reminder and a guide for management decision making and by documenting the decision making process to aid in answering questions raised by the general public and elected officials.

II. PURPOSE

To provide specific policy and procedures for noise studies and noise abatement recommendations pursuant to 23 CFR 772 and to be in substantial conformance with the intent and provisions of the FHWA noise regulation.

III. APPLICABILITY

A. This policy applies to all Type I projects as defined by the regulation. A Type I project is a proposed Federal-aid highway project for the construction of a highway on new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes. In the absence of State legislation or regulation on this subject, the policy applies to all State funded projects which meet the Type I criteria.

B. The development and implementation of Type II projects will not be considered without separate additional funding provided by the Legislature for this specific purpose. A Type II project is a proposed highway project for noise abatement on an existing highway commonly called a "retrofit" noise abatement project. In any event, when Type II projects are proposed with or without Federal-aid highway participation, the provisions of Sections 772.9(c), 772.13, and 772.19 of 23 CFR 772 shall apply.

C. Type II noise abatement measures will be approved only for projects that were approved before November 28, 1995, or are proposed along land where substantial construction predated the existence of any highway. The granting of a building permit must have occurred prior to right-of-way acquisition for the original highway. Further, noise abatement measures will not be approved at locations where such measures were previously determined not to be reasonable and feasible for a Type I project.

IV. ANALYSIS

A. The traffic noise analysis shall include the following steps for each alternative under detailed study and the null alternative:

1. Identification of existing activities, developed lands, and undeveloped lands for which development is planned, designed, and programmed which may be affected by noise from the highway. Existing land use on both sides of the proposed highway project for its entire length must be assigned on an area (rather than a set of points or sites) basis to one of the Activity Categories listed in Table 1 of the Federal regulation. In addition, particularly sensitive individual noise receptors, such as schools, churches, hospitals, libraries, auditoriums, parks, and preserved natural areas shall be identified on a site-by-site basis within the areas delineated above. These identifications shall include not only the type (e.g., residential, nonresidential, other, etc.) but the number or extent of activities. The extent of the traffic noise impact on the people living near the highway project cannot be evaluated correctly without quantification of the existing activities.

The date when the public is officially notified of the adoption of the location of a NYSDOT proposed highway project is the "date of public knowledge." This date establishes when the Department is no longer responsible for providing noise abatement for new development which occurs adjacent to the proposed highway project. The "date of public knowledge" shall be the date of approval of the project's Categorical Exclusion (CE) determination, the Finding of No Significant Impact (FONSI), or the Environmental Impact Statement (EIS) Record of Decision (ROD). Undeveloped lands shall not be considered as planned, designed, and programmed until the date of issuance of a building permit.

2. Existing noise levels shall be determined throughout the project study area by field measuring noise levels using the procedures specified in the current edition of the Department's manual, "Field Measurement of Existing Noise Levels." In certain cases, calculated existing levels may be used on very minor projects where impacts and abatement are clearly not anticipated.

3. Future traffic noise levels shall be determined for each alternative under detailed study, including the null alternative. These calculated levels shall be consistent with the FHWA Highway Traffic Noise Prediction Model (Report No. FHWA-RD-77-108) and shall use the STAMINA 2.0 computer program or a replacement model and software issued subsequently by the FHWA. In predicting noise levels and assessing noise impacts, traffic characteristics which will yield the worst hourly traffic noise impact on a regular basis for the design year shall be used.

4. Traffic noise impacts shall be determined for each alternative. Impacts occur when the predicted future traffic noise levels approach within one decibel or exceed the Noise Abatement Criteria (NAC) or when the predicted future traffic noise levels substantially exceed the existing levels by six or more decibels. Note that there are two ways in which an impact may occur. Either way constitutes an impact after which no discrimination between the two is needed nor desired. As in item 1 above, these determinations shall be quantified and include the type and number (e.g., residential, nonresidential, other, etc.) of dwelling units and properties impacted.

This definition of traffic noise impact also applies to 100% State funded highway projects which meet the Type I criteria. The impact definition applies further to highway projects which are not Type I but are subject to NEPA or SEQRA requirements. In this latter case, however, it must be the project itself that creates the noise impact and not preexisting conditions. Note, however, that this application is intended to determine a traffic noise impact and should not be used for the purpose of determining a "significant" noise impact. For non-highway NEPA or SEQRA projects, a noise impact will not normally occur if the noise increase, as a result of the project, is less than three decibels.

5. Noise abatement measures must be examined and evaluated for all areas where traffic noise impacts are determined to occur. In determining and abating traffic noise impacts, primary consideration is to be given to exterior areas. Abatement will usually be necessary only where frequent human use occurs and a lowered noise level would be of benefit. In those situations where there are no exterior activities to be affected by the traffic noise or where exterior activities are far from or physically shielded from the roadway in a manner that presents an impact on exterior activities, the interior criterion shall be used as the basis of determining the traffic noise impacts.

B. If a traffic noise impact is identified, the abatement measures listed below must be considered:

1. Traffic management measures such as traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations.
2. Alteration of horizontal and vertical alignments.
3. Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers.
4. Construction of noise barriers (including landscaping for aesthetic purposes) within the highway right-of-way.
5. Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to pre-empt development which would be adversely impacted by traffic noise. This measure may be included in Type I projects only.
6. Noise insulation of publicly owned school buildings which are off the highway right-of-way in connection with a Department construction project undertaken with Federal-aid.

The Commissioner must determine that it is in the best interest of the State considering, among other factors, the cost and feasibility of other alternatives for this measure to be recommended.

C. When noise abatement measures are being considered, every reasonable effort shall be made to obtain substantial noise reductions. A substantial noise reduction should be of the order of ten decibels; however, abatement must provide a minimum reduction of at least seven decibels at the properties with the greatest reductions. The FHWA Noise Barrier Reduction Optimization Procedures (OPTIMA), FHWA-DF-82-001A, April, 1982, in conjunction with STAMINA 2.0 or a replacement model and software issued subsequently by the FHWA, shall be used to determine noise barrier heights and lengths.

D. Noise abatement measures which are determined to be feasible and reasonable must be incorporated into the plans and specifications for the project. Feasibility deals primarily with engineering considerations, e.g., can a barrier be built given the topography of the location; can a substantial noise reduction be achieved given certain access control, drainage, safety, or maintenance requirements; are noise sources other than from the project present in the area, etc. As a minimum, feasibility must include the practical capability of the measure being built as well as achieving a substantial reduction. Reasonableness should be based on a number of factors, not just one criterion. The overall noise abatement benefits must be determined to outweigh the overall adverse social, economic, and environmental effects and the costs of the noise abatement measures.

E. Reasonable cost shall be determined using a cost index based on total cost per dwelling unit benefitted, as well as the unit cost per square meter (m^2) of the noise barrier material installed for both walls and berms. In the case of a berm, the height and the length with the total cost should be used to obtain a surrogate surface area unit cost. For a unit cost of \$100 per m^2 or lower, a cost index of \$25,000 per benefitted dwelling unit should be used. For a unit cost of \$200 per m^2 or higher, a cost index of \$50,000 per benefitted unit should be used. For unit costs between \$100 and \$200 per m^2 , interpolate between \$25,000 and \$50,000 per dwelling unit, e.g., \$160 per m^2 would yield a \$40,000 per benefitted dwelling unit limit. All dwelling units whether owner occupied or rented; detached, duplex, or mobile homes; and multifamily apartment units should be counted if they are benefitted, regardless of whether or not they were identified as impacted. The threshold of noise reduction which establishes a "benefitted" property is at least five decibels determined at a point where frequent human use occurs and a lowered noise level would be of benefit.

F. The views of the impacted residents will be a major consideration in reaching a decision on the reasonableness of abatement measures to be provided. The residents should be contacted using one or more of these methods: informational meetings in the neighborhood, direct mailings with return envelopes, telephone surveys, or even door-to-door inquiries. A resolution passed by local government may supplement and document the views of the impacted residents, but it should not be the only determiner or a substitute for the methods mentioned above. Although the views should be determined and addressed during the preliminary design phase of project development, the residents' views on the desirability and acceptability of abatement need to be re-examined periodically during the final design phase prior to PS&E approval.

G. In summary, the criteria to determine feasibility and reasonableness of noise abatement must contain as a minimum the following items:

1. The amount of noise reduction provided. This must be a substantial reduction in the order of ten decibels with at least seven decibels insertion loss at the properties with the greatest reductions.
2. The number of dwelling units benefitted. The threshold of noise reduction which establishes a benefitted property is at least five decibels determined at a point where frequent human use occurs and a lowered noise level would be of benefit regardless of whether or not the property was identified as impacted.
3. The cost of the abatement. A cost index between \$25,000 and \$50,000 per benefitted dwelling unit depending on the unit cost of the barrier should be used (see Section IV. E. above).
4. The views of the impacted residents. The residents should be contacted during the preliminary design phase of project development and their views re-examined periodically during the final design phase prior to PS&E approval.
5. The absolute noise levels. As part of the impact determination, predicted future traffic noise levels without abatement are compared with the NAC.
6. The change in noise levels. As part of the impact determination, predicted future traffic noise levels without abatement are compared with existing levels.
7. The timing and consideration of development along the highway for Type II project eligibility (see Sections III.B. and III.C. above, as well as Section IV.H. below).

H. In the case of Type II noise abatement projects, all the procedures previously mentioned apply. In addition, noise abatement measures will be approved only for projects that were approved before November 28, 1995, or are proposed along land where substantial construction predated the existence of any highway. The granting of a building permit must have occurred prior to right-of-way acquisition for the original highway. Further, noise abatement measures will not be approved at locations where such measures were previously determined not to be reasonable and feasible for a Type I project.

It is the responsibility of the respective Regional Offices to be certain that appropriate local officials in their jurisdiction are aware of these requirements. The installation of noise barriers or alterations to existing publicly owned school buildings to provide for noise reduction meets the criteria for a CE and normally does not require any further NEPA approvals (23 CFR 771.117(c)(6)).

I. Before the adoption of a FEIS or a FONSI, the Department must identify the following:

1. Noise abatement measures which are feasible and reasonable and which are likely to be incorporated in the project, and

2. Noise impacts for which no apparent solution is available. This identification ties the FHWA noise regulation to the NEPA and SEQRA requirements for noise study approach and technical methods to be used only (see Note, Section IV.A.4.). An important point is that the requirements for the DEIS are the same as the Final. The choice of the word "likely" was deliberate. If a decision maker is to make an informed decision and if the public is to be made aware of the impacts, the Department must make its abatement intentions known. If the Department later decides that abatement is not recommended, this decision should have strong documented support.

J. A statement of "likelihood" for each barrier should be included in the environmental document. The following is an illustration of some appropriate words:

Based on the studies done so far, the Department recommends abatement in the form of a ___ meter high noise barrier along the _____ side of _____ between _____ and _____ for a length of ___ meters (for each barrier section). These initial indications of likely recommended barriers are based upon a preliminary design for a barrier cost of \$ _____ that will reduce the noise level of ___ decibels for ___ dwelling units (again, for each barrier section). If it subsequently develops during the final design phase that these conditions have changed substantially, the barriers may no longer be recommended and not included in the project's contract plans. A final decision on the recommendations will be made upon completion of the project design and the public involvement processes.

Decibel reduction levels and, if needed, cost per dwelling unit benefitted should also be shown for each barrier section that does not meet the feasible or reasonable criteria and will, therefore, not be recommended.

V. LOCAL OFFICIALS

A. Coordination with and providing information to local officials is an important part of noise control and the prevention of future impacts. Highway traffic noise should be reduced through a program of shared responsibility. Local government should use their power to regulate land development in such a way that particularly noise sensitive land uses are either prohibited from being located adjacent to a highway or that developments are planned, designed, and constructed so that traffic noise impacts are minimized. Thus, local government officials need to know what noise levels to expect from a highway and what techniques they can use to prevent future impacts. This Federal requirement is frequently neglected or overlooked.

B. The Department shall inform local officials within whose jurisdiction the highway project is located of the following:

1. The best estimation of future highway traffic noise levels for both developed and undeveloped lands in the immediate vicinity of the project. This can usually be done by providing local government with a copy of the environmental document containing the noise study. The future traffic noise levels may be provided in either tabular or contour form.

2. Information that may be useful to local communities to protect future land development from becoming incompatible with anticipated highway noise levels. A copy of "The Audible Landscape" generally provides more than enough information and may require some additional guidance as to applicable sections and techniques.

3. Eligibility for Type II projects as described by Federal law and regulation and by this policy (see sections 3.B, 3.C., and 4.H above). The critical importance of substantial construction predating the right-of-way acquisition for the original highway and the

availability of separate additional funding provided by the Legislature for this specific purpose must be communicated and emphasized.

VI. CONSTRUCTION NOISE

A. The following general steps are to be performed for all Type I and II projects:

1. Identification during the project development studies of land uses or activities which may be affected by noise from construction of the project.
2. Determine the abatement measures which are needed for the plans and specifications to minimize or eliminate adverse construction noise impacts to the community.
3. Incorporate the needed abatement measures in the contract plans and specifications FHWA Technical Advisory T6160.2, "Analysis of Highway Construction Noise" outlines acceptable procedures for the analysis of highway construction noise.

B. The following items should be considered to ensure that potential construction noise impacts NYSDOT Environmental Procedures Manual are given adequate treatment during highway project development.

1. Calculation of construction noise levels are not needed at all receptor locations. If a construction noise impact is anticipated at a particularly sensitive receptor, a noise level calculation for certain noisy construction or demolition operations may be done.
2. An indication of the noise levels associated with certain types of construction equipment can be obtained from existing literature and presented in the noise analysis. The temporary nature of the noisy operations should be noted.
3. Using a common sense approach, the noise analysis should identify measures to abate potential construction noise impacts. Low-cost, easy-to-implement measures should be incorporated into the project contract plans and specifications.
4. Major urban projects usually require more extensive analysis. Particularly sensitive receptors should be identified and construction noise impacts determined. A construction noise impact will not normally occur at levels under $Leq = 80$ dBA or $Leq = 85$ dBA in New York City. Abatement measures should be thoroughly discussed and, where appropriate, incorporated into the project's contract plans and specifications.
5. In some cases there may be local laws or ordinances which govern construction noise levels or hours. New York City has a local law that is quite restrictive in many areas. Although the State is not subject to local police power and, therefore, the Department is not generally subject to local noise control ordinances, nevertheless, the existence of those laws should be investigated during project development and every effort made to comply with their provisions during construction.

VII. REVISIONS

This policy shall be reviewed every three years. Appropriate revisions shall be considered and adopted.

DEPARTMENT OF TRANSPORTATION ENVIRONMENTAL PROCEDURES MANUAL, CHAPTER 3.1

I. SUMMARY

The following Chapter has been designed to follow The Federal Highway Administrations highway traffic noise regulations, 23 CFR 772, (See attachment 3.1.A.). The bold and italicized

sections below are taken directly from the regulation, the interpretation for each particular portion of the regulation is directly following. It is suggested that you review this guidance in conjunction with Attachment 3.1 .A.

§ 772.1 Purpose.

To provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to title 23 U.S. C.

The protection of the public's health and welfare is an important responsibility that FHWA and NYSDOT help to accomplish during the planning and design of a highway project. The U.S. Congress directed that this be done when the 1970 Federal-Aid Highway Act was passed. Concerned citizens and States encouraged Congress to provide this protection.

§ 772.3 Noise Standards.

The highway traffic noise prediction requirements, noise analyses, noise abatement criteria, and requirements for informing local officials in this regulation constitute the noise standards mandated by 23 U.S.C. 109(I). All highway projects deemed to be in conformance with the Federal Highway Administration (FHWA) noise standards.

This paragraph makes the entire 23 CFR 772 the FHWA noise standard. The standard is required by 23 U.S.C. 109(I). Some people mistake the noise abatement criteria (NAC) for the FHWA standard. Early on, FHWA did not want to be restricted to specific noise levels that may not be achieved in most highway projects. So, a standard was developed that would best serve the public in terms of protection and reasonable cost.

To clarify, the standard has four components:

1. noise prediction requirements
2. noise analyses
3. noise abatement criteria
4. requirements for informing local officials

Note that an NAC, e.g. Leq = 67dBA for Category B activities, is not a standard. It is a criterion. FHWA approval of a project's PS&E that includes a noise study constitutes approval of the study and its recommendations.

II. DEFINITIONS

§ 772.5 Definitions and Glossary.

Design year. The future year used to estimate the probable traffic volume for which a highway is designed. A time 20 years (30 years for bridge projects) from the completion of construction is usually used. This is expressed as ETC+20 (estimated time of completion).

Existing noise levels. The noise resulting from the natural and mechanical sources and human activity considered to be usually present in a particular area, i.e. representative of the area. For technical reasons, existing noise should not be referred to as ambient noise.

L10. The sound level that is exceeded 10 percent of the time (the 90th percentile) for the period under consideration.

L10(h). The hourly value of L10.

(e) 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.

Leq(h). The hourly value of Leq.

Traffic noise impacts. Impacts which occur when the predicted future traffic noise levels approach or exceed the noise abatement criteria (NAC - see Table 1), or when the predicted future traffic noise levels substantially exceed the existing noise levels.

Approach. One (1) decibel less than the NAC.

Substantially exceed or substantial increase. Six (6) or more decibels greater.

(h) Type I projects. A proposed Federal or Federal-Aid highway project for the construction of a highway on new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes.

New location. A new corridor or a totally new route on new right-of-way rather than a new alignment for an existing route.

Significantly changes.

Horizontal. Moves the alignment of the near traffic lane half the distance or closer to the nearest receptor.

Vertical. Changes the profile by a grade separation distance, say 6 to 9 meters.

3) Through-traffic lanes - the basic number of traffic lanes, e.g. 2, 4, 6, etc. including high occupancy vehicles (HOV) lanes, but not auxiliary or operational lanes such as turning, storage, parking, continuous left turn, acceleration or deceleration, collector-distributor, weaving, or climbing lanes, etc.

(i) Type II projects. A proposed Federal or Federal-Aid highway project for noise abatement on an existing highway commonly referred to as a "retrofit project."

(j) Noise Abatement Measures. Techniques used to substantially reduce or eliminate noise impacts.

Traffic management measures - traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, exclusive lane designations, etc.

Noise Barriers - walls or earth berms designed to interrupt the line-of-sight between the traffic noise source and the community receiver which will substantially reduce the traffic noise level at the receiver by diffraction over the top and transmission loss through the barrier.

3) Buffer zones - lands, properties, and parcels (or portions thereof) adjacent to a highway acquired either in fee or a lesser interest for the purpose of preempting development which would be adversely impacted by traffic noise and for other noise abatement purposes such as providing greater source-receptor distance.

4) Noise insulation - improved windows, doors, etc. designed to substantially increase the building transmission loss between exterior and interior levels.

Automobiles. All vehicles with two axles and four wheels including passenger cars and vans designed primarily for transportation of nine or fewer passengers, and panel and pick-up trucks with a gross vehicle weight of less than 4500 kilograms.

Benefitted. A dwelling unit or property receiving a noise reduction as a result of an abatement measure of five decibels or more.

CFR. Code of Federal Regulations.

Date of public knowledge. The date of approval of the projects Categorical Exclusion (CE) determination, the Environmental Assessment (EA) Finding of No Significant Impact (FONSI), or the Environmental Impact Statement (EIS) Record of Decision (ROD).

Developed lands. Lands which may be affected by noise from the highway where the structure or activity presently exists.

Existing activities. The predominant human use of developed land.

Exterior areas. Those areas where frequent human use occurs (not incidental or occasional) and noise level is a concern (not parking lots or farm fields and meadows).

Feasible. The practical capability of the abatement measure being built as well as achieving a substantial decibel reduction.

Future noise levels. The predicted or calculated levels that produce the worst hourly traffic noise impact using design year traffic volumes and speeds.

Heavy trucks. All vehicles with three or more axles and a gross vehicle weight greater than 12,000 kilograms.

Impacted residents. Those individuals in dwelling units or properties who as a result of the proposed project meet or exceed either or both of the traffic noise impact criteria.

Medium trucks. All vehicles with two axles and six wheels including trucks and a gross vehicle weight greater than 4500 kilograms but less than 12,000 kilograms as well as buses with two or three axles and motorcycles.

(w) NEPA. National Environmental Policy Act.

Noise Abatement Criteria. The noise level for a particular activity category that when approached or exceeded requires abatement measures to be considered. The level represents the upper limit of acceptable highway traffic noise and is a compromise between noise levels that are desirable and those that are achievable.

Operating speed. The highest overall speed at which a driver can travel on a given highway under favorable weather conditions and under prevailing traffic conditions without at any time exceeding the safe speed as determined by the design speed on a section-by-section basis.

(z) Planned, designed, and programmed. Undeveloped lands which may be affected by noise from the highway that currently have plat approval (planned), engineering design approval (designed), and have a building permit, funding, and an anticipated project initiation date (programmed) in advance of the date expected for the projects' record of decision. Undeveloped lands meeting these criteria will be considered as developed lands.

(aa) Pre-existing conditions. Noise levels from the existing highway that may approach or exceed the NAC, but do not constitute an impact under NEPA or SEQRA requirements. Applies to non-Type I highway projects only.

(bb) PS&E. Plans, Specifications and Estimates, i.e. Final Design Approval.

(cc) Reasonable. Generally, that the overall noise abatement benefits outweigh the overall adverse social, economic, and environmental effects. Specifically, that the cost of the noise abatement measure is less than a specified cost index based on total cost per dwelling unit benefitted, and that the impacted residents concur with the abatement recommendation.

(dd) Recommended. Those noise abatement measures that are feasible and reasonable and may be presented to the impacted residents for their concurrence.

(ee) SEQRA. State Environmental Quality Review Act.

(ff) Severe Impacts. Impacts which occur that are five decibels greater than the impact level when predicted future traffic noise levels approach or exceed the NAC, or when the predicted

future traffic noise levels exceed the existing noise levels by sixteen or more decibels.

(gg) Shielding. Rows of buildings, very thick and extensive vegetation, intervening high ground that reduces the traffic noise level at receivers.

(hh) Significant Impact. An Environmental Assessment term applied to a traffic or construction noise impact that is determined based on context and intensity to be sufficiently great as to require the processing of an EIS.

(ii) Substantial noise reductions. In noise abatement analysis and design, a reduction in the order of ten decibels. However, the abatement must provide a minimum reduction of at least seven decibels at the properties with the greatest reductions.

(jj) Undeveloped lands. Those tracts of land or portions thereof which do not contain improvements or activities devoted to frequent human habitation or use including low density recreational use.

(kk) U.S.C. United States Code.

(ll) Worst hourly traffic noise impact. The hour of the day that produces the highest traffic noise level on a regular basis usually when heavy truck volumes and vehicle speeds are the greatest.

III. APPLICABILITY

§ 772.7 Applicability.

Type I Projects. This regulation applies to all Type I projects unless it is specifically indicated that a section applies only to Type I projects.

In the absence of state legislation or regulation on this subject, the federal regulation and its procedures apply to all state funded projects which meet the Type I criteria. If a project is not a Type I project as defined by the regulation, a noise study is not required. However, a study may of course be done for informational or public relations purposes. For Type I projects, a study must be done.

Type II Projects. The development and implementation of Type I projects are not mandatory requirements of 23 U.S. C. 109 (I) and are, therefore, not required by this regulation. When Type II projects are proposed for Federal-aid highway participation at the option of the highway agency, the provisions of §§772.9© , 772.13, and 772.19 of this regulation shall apply.

The implementation of a Type II program is optional and not mandatory. The development and implementation of Type II projects will not be considered without separate additional funding provided by the legislature for this specific purpose. In addition, Type II noise abatement measures will be approved only for projects that were approved before November 28, 1995, or are proposed along land where substantial construction predated the existence of any highway. The granting of a building permit must have occurred prior to right-of-way acquisition for the original highway. Further, noise abatement measures will not be approved at locations where such measures were previously determined not to be reasonable and feasible for a Type I project.

IV. PROCEDURES

§ 772.9 Analysis of Traffic Noise Impacts and Abatement Measures.

(a) The highway agency shall determine and analyze expected traffic noise impacts and alternative noise abatement measures to mitigate these impacts, giving weight to the benefits and cost of abatement, and to the overall social, economic and environmental effects.

This is the major requirement for doing noise analysis on all Type I projects. However, the requirement includes the evaluation of noise reduction benefits, abatement costs, and social, economic, and environmental (SEE) effects. The evaluation requires a balancing of benefits versus dis-benefits. This can be a difficult task because very little guidance exists on the topic. The process of balancing noise abatement and the SEE effects of the mitigation is strongly influenced by the public involvement process. The people who live next to the highway project can best evaluate if the abatement benefits will outweigh the SEE effects. Thus, this should not be done without public involvement.

The level of analysis may vary from simple calculations for rural and low volume highways to extensive analysis for high volume controlled access highways in urban areas. If noise impacts as defined by the regulation are not identified, no further analysis is necessary regardless of whether the project is advanced as a CE, an EA, or an EIS. However, if noise impacts are identified, additional analysis must be done to determine the significance of the impacts. This determination of significance should be based on consideration of the context and intensity of the impacts as discussed in the Council on Environmental Quality CEQ regulation (40 CFR 1508.27). In analyzing highway traffic noise impacts, context should consider the extent of the noise impact while intensity should consider the noise levels associated with the impact.

Highway traffic noise is only one area to be considered in the environmental processing of a proposed highway project. The significance of identified traffic noise impacts should be used to help decide whether to process the project with a CE, a FONSI, or an EIS. If project impacts including noise impacts are deemed not to be significant, the project may be processed with a CE or a FONSI. However, if noise impacts are determined to be significant, the project must be processed with an EIS.

In documenting the increase in existing noise levels in the environmental processing of a project, care should be taken to avoid the use of the phrase "significant increase" due to the CEQ definition of significance. The phrase "substantial increase" should always be used to address this type of potential traffic noise impact.'

(b) The traffic noise analysis shall include the following for each alternative under

This lists the minimum requirements needed to adequately evaluate the impacts and abatement of each alternative under detailed study for the proposed highway project. The analysis should present the noise impacts and evaluation of alternative abatement measures in a comparative format. In this way, the potential noise impacts and likely abatement measures associated with the various alternatives including the no-build alternative are clearly defined.

(1) Identification of existing activities, developed lands, and undeveloped lands for which development is planned, designed and programmed, which may be affected by noise from the highway.

This requires the identification of existing activities. This identification includes not only the type (e.g. residential, nonresidential, other, etc.), but the number or extent of activities. This quantification is often overlooked in the analysis. The extent of the traffic noise impact on the people living near the highway project cannot be evaluated correctly without the quantification of the existing activities.

The location of existing activities in the vicinity of various study alternatives for a highway project should be identified by individual land uses, or by broad categories of land use for which a single NAC level may apply. Existing land used on both sides of the proposed highway project for its entire length must be assigned on an area (rather than a set of points or sites) basis to one of the activity categories listed in Table 1 of the federal regulation. In addition, particularly sensitive individual noise receptors such as schools, churches, hospitals, libraries, auditoriums, parks, and preserved natural areas shall be identified on a site-by-site basis within the areas delineated above.

The date when the public is officially notified of the location of a proposed highway project is the "date of public knowledge." This date establishes when the Department is no longer responsible for providing noise abatement for new development which occurs adjacent to the proposed highway project. The date of public knowledge shall be the date of approval of the project's CE determination, the FONSI, or the EIS Record of Decision (ROD). Undeveloped lands shall not be considered as planned, designed, and programmed until the date of issuance of a building permit.

(2) Prediction of traffic noise levels.

Future traffic noise levels shall be determined for each alternative under detailed study including the null alternative. These calculated levels shall be consistent with the FHWA Highway Traffic Noise Prediction Model (Report No. FHWA-RD-77-108) using the STAMINA 2.0 computer program, or the new FHWA Traffic Noise Model, Version 1.0 (FHWA TNM). The phase-in period for TNM will be until March 30, 2000, after which the FHWA Highway Traffic Noise Prediction should not be used.

During this interim time, a determination should be made as to which studies and projects will be analyzed using the FHWA Highway Traffic Noise Prediction Model (FHWA-RD77-108) and which ones will be analyzed using TNM. TNM should be used for more analyses as knowledge and experience is gained in its use, and for more complex projects where noise barriers are likely as soon as possible.

In predicting noise levels and assessing noise impacts, traffic characteristics which will yield the worst hourly traffic noise impact on a regular basis for the design year shall be used. Receptors closest to the highway where frequent human use occurs should be selected in order to ensure the maximum impact potential. If it is analytically determined that activities or developed land uses are not sufficiently close to the proposed highway improvement to be adversely affected by traffic noise, the remaining steps of the traffic noise analysis may be eliminated.

(3) Determination of existing noise levels.

Existing noise levels shall be determined throughout the project study area by field measuring noise levels using the procedures specified in the current edition of the Department's manual "Field Measurement of Existing Noise Levels." Measurements may not be necessary where it is clear that the existing levels are predominantly from the highway being improved and can be satisfactorily estimated using approved noise prediction methods. The purpose of this noise

level information is to quantify the existing acoustic environment and to provide a base for assessing the impact of noise level increases. Measurement systems shall, as a minimum, meet the requirements for Type 2 instruments as specified in ANSI Standard S1.4-1971. Actual field measurements are preferred because they include the effects of intervening ground, shielding, etc. Measurement sites should be selected from each of the existing activity areas as well as for each particularly sensitive receptor. In addition, geographic coverage, should be provided. Generally, four to six sites per mile of highway suffices. Some indoor-outdoor measurements may be needed with Category E or public school receptors.

(4) Determination of traffic noise impacts.

Traffic noise impacts shall be determined for each alternative. Impacts occur when the predicted future traffic noise levels approach within one decibel or exceed the NAC or when the predicted future traffic noise levels substantially exceed the existing levels by six or more decibels. Note that there are two ways in which an impact may occur. Either way constitutes an impact after which no discrimination between the two is needed nor desired. As discussed under Section 772.9(b)(1) above, these determinations shall be quantified and include the type and number (e.g. residential, nonresidential, other, etc.) of dwelling units and properties impacted. Thus, for Activity Category B with an NAC of 67dBA, an impact will occur at 66dBA. A future level of 65dBA would not constitute an impact. Likewise, a future level increase of six or more decibels over the existing level

would be an impact while an increase of five or less would not. This definition of traffic noise impact also applies to 100% State funded highway projects which meet the Type I criteria: The impact definition applies further to highway projects which are not Type I, but are subject to NEPA or SEQRA requirements. In this case, however, it must be the project itself that creates the noise impact and not preexisting conditions. In other words, the substantial increase criterion applies, but not the approach or exceed criterion. For non-highway NEPA or SEQRA projects, a noise impact will not normally occur if the noise increase is a result of the project, the substantial increase criterion, is less than three decibels.

(5) Examination and evaluation of alternative noise abatement measures for reducing or eliminating the noise impacts.

Noise abatement measures must be examined and evaluated for all areas where traffic noise impacts are determined to occur. When noise abatement measures are being considered, every reasonable effort shall be made to obtain substantial noise reductions. A substantial noise reduction should be of the order of ten decibels; however, abatement must provide a minimum reduction of at least seven decibels at the properties with the greatest reductions. Although the FHWA Noise Barrier Reduction Optimization Procedures (OPTIMA), FHWA-DF-82-001A, April 1982, in conjunction with STAMINA 2.0. may be used to determine noise barrier heights and lengths until March 30, 2000, it is strongly recommended that the new FHWA Traffic Noise Model, Version 1.0 (FHWA TNM) be used on all complex projects where noise barriers are likely as soon as possible. Receptors generally some distance away from the barrier, where frequent human use occurs, should be selected in order to ensure the most conservative diffraction results. These receptors will likely be in different locations from the impact and the measurement receptor sites.

(6) Highway agencies proposing to use Federal-aid highway funds for Type II projects shall perform a noise analysis of sufficient scope to provide information needed to make the determination required by section 772.13(a) of this chapter.

The noise analysis for Type II projects must support the following determinations:

- A traffic noise impact exists
- A substantial noise reduction is possible
- The project is cost-effective
- The impacted residents concur with the abatement recommendation
- Substantial construction of the development must have predated the existence of any highway

No previous Type I project found such measures not to be reasonable and feasible

While the current regulation does not require a priority ranking of Type II projects, most states that have a retrofit program have developed some method for determining relative priorities among projects. They realize that a priority rating system enables them to systematically and equitably handle noise impacts and complaints along existing highway, and to maximize the benefits of the program for the funds expended. Consequently, while a priority rating system is no longer a requirement of federal regulation, experience indicates that it is still a desirable management tool and therefore is encouraged for NYSDOT Type II projects. Abatement cost per benefitted dwelling unit should be used to establish priorities among potential locations after the six conditions listed above have been satisfied.

§ 772.11 Noise Abatement.

(a) In determining and abating traffic noise impacts, primary consideration is to be given to exterior areas. Abatement will usually be necessary only where frequent human use occurs and a lowered noise level would be of benefit.

In most situations, if the exterior area can be protected, the interior will also be protected. The selection of the exterior area where "frequent human use occurs" is very important. This requires a site visit to determine whether people are using the entire exterior area or only a small portion like a patio or porch. Areas which would not normally be included are: service stations, junkyards, industrial areas, railroad yards, parking lots, storage yards, etc., and the unused open space portions of other developments and facilities. The determination does not apply to an entire tract upon which an activity is based, but only to that portion on which such activity normally occurs.

The phrase "lowered noise level would be of benefit" is also important, and would not normally include parking lots, athletic fields, and perhaps, even certain playgrounds. Also, farms, with the exception of the house lot would be included in this listing. The site visit should look for indications of exterior use such as patio furniture and picnic equipment, children's play equipment, gardens, etc.

(b) In those situations where there are no exterior activities to be affected by the traffic noise, or where the exterior activities are far from or physically shielded from the roadway in a

manner that prevents an impact on exterior activities, the interior criterion shall be used as the basis of determining noise impacts.

Interior use applies mostly to schools, churches, and hospitals. Interior noise level predictions may be computed by subtracting from the predicted exterior levels the noise reduction factors for the building in question. If field measurements of these noise reduction factors are obtained or the factors are calculated from detailed acoustical analyses, the measured or calculated reduction factors should be used. In the absence of such calculations or field measurements, the noise reduction factors may be obtained from the following table:

Building Noise Reduction Factors

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

NOTE: 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.

(c) If a noise impact is identified, the abatement measures listed in Section 772.13© of this chapter must be considered.

This self-explanatory paragraph requires consideration of noise abatement when noise impacts occur. Noise impacts occur when predicted future noise levels approach or exceed the noise abatement criteria or when predicted future levels substantially exceed existing levels. Consequently, this paragraph requires consideration of noise abatement for both of these types of noise impacts.

Note, however, that the key word following an impact identification is "considered." This means that an abatement analysis is required and all abatement measures must be mentioned and discussed. It does not mean that abatement measures are required for the project. Only those measures found to be feasible and reasonable must be included in the projects plans and specifications.

(d) When noise abatement measures are being considered, every reasonable effort should be made to obtain substantial noise reductions.

A substantial noise reduction should be of the order to ten decibels; however, abatement must provide a minimum reduction of at least seven decibels at the properties with the greatest reductions. This paragraph does not say to reduce to the NAC; it says "substantial" noise reductions. Consequently, a future noise level of, say, Leq = 69dBA for a Category B activity should not be merely reduced to 65dBA, the highest level that is not an impact, but to about

59dBA or less with a maximum acceptable of 62dBA. A reduction of 10dBA will be perceived by the public as a halving of the loudness.

(e) Before adoption of a final environmental impact statement or finding of no significant impact, the highway agency shall identify:

(1) Noise abatement measures which are reasonable and feasible and which are likely to be incorporated in the project.

This identification ties the FHWA noise regulation to the NEPA and SEQRA requirement, but only for the noise study approach and technical methods to be used. The NEPA and SEQRA requirements are different in the area of impact determination and its significance. An important point is that the requirements for the DEIS are the same as for the Final. Therefore, this information should be included in the DEIS as well as the Final.

The choice of the word "likely" in the regulation was deliberate. If a decision maker is to make an informed decision and if the public is to be made aware of the impacts, the Department must make its abatement intentions known. If the Department later decides that abatement is not recommended, this decision should have strong documented support. A statement of "likelihood" for each barrier should be included in the environmental document. The following is an illustration of some appropriate words:

Based on the studies done so far, the Department recommends abatement in the form of a ___ meter high noise barrier along the _____ side of _____ between _____ and _____ for a length of _____ meters (for each barrier section). These initial indications of likely recommended barriers are based upon a preliminary design for a barrier cost of \$ _____ that will reduce the noise level for ___ dwelling units by up to ___ decibels (again, for each barrier section). If it subsequently develops during the final design phase that these conditions have changed substantially, the barriers may no longer be recommended and not included in the project's contract plans. A final decision on the recommendations will be made upon completion of the project design and the public involvement processes.

(2) Noise impacts for which no apparent solution is available.

The term "no apparent solution" means that noise abatement measures are not being recommended because they are either not feasible or not reasonable. Decibel reduction levels and, if needed, cost per dwelling unit benefitted should be shown for each barrier section that does not meet the feasible or reasonable criteria and will thus not be recommended. There is also a possible middle ground that should be used very infrequently when this identification is not clear or extremely marginal. In this case, additional final design details may be needed in order to resolve completely the question for one or more barrier locations. A statement to this effect is possible along with the definite recommendations.

(f) The views of the impacted residents will be a major consideration in reaching a decision on the reasonableness of abatement measures to be provided.

The residents should be contacted using one or more of these methods: informational meetings in the neighborhood, direct mailings with return envelopes, telephone surveys, or even door-to-door inquiries. A resolution passed by local government may supplement and document the views of the impacted residents, but it should not be the only determiner or a substitute for the methods mentioned above. Although the views should be determined and addressed during the preliminary design phase of project development, the residents' views on the desirability and acceptability of abatement need to be reexamined periodically during the final design phase prior to PS&E approval.

(g) The plans and specifications will not be approved by FHWA unless those noise abatement measures which are reasonable and feasible are incorporated into the plans and specifications to reduce or eliminate the noise impact on existing activities, developed lands, or undeveloped lands for which development is planned, designed, and programmed.

This is a summary statement of the noise study requirements in the 1970 Highway Act (23 U.S.C. 109(c)). Noise abatement measures which are determined to be feasible and reasonable must be incorporated into the plans and specifications for the project. The key words in this paragraph are "feasible" and "reasonable." Feasibility deals primarily with engineering considerations, e.g., can a barrier be built given the topography of the location; can a substantial noise reduction be achieved given certain access control, drainage, safety, or maintenance requirements; are noise sources other than from the project present in the area, etc. As a minimum, feasibility must include the practical capability of the measure being built as well as achieving a substantial reduction.

Reasonable cost shall be determined using a cost index based on total cost per dwelling unit benefitted, as well as the unit cost per square meter (m²) of the noise barrier material installed for both walls and berms. In the case of berm, the height and the length with the total cost should be used to obtain a surrogate surface area unit cost. For a unit cost of \$100 per m² or lower, a cost index of \$25,000 per benefitted dwelling unit should be used. For a unit cost of \$200 per m² or higher, a cost index of \$50,000 per benefitted unit should be used. For unit costs between \$100 and \$200 per m², interpolate between \$25,000 and \$50,000 per dwelling unit, e.g., \$160 per m² would yield a \$40,000 per benefitted dwelling unit limit. All dwelling units whether owner occupied or rented; detached, duplex, or mobile homes; and multi-family apartment units should be counted if they are benefitted, regardless of whether or not they were identified as impacted. The threshold of noise reduction which establishes a "benefitted" property is at least five decibels determined at a point where frequent human use occurs and a lowered noise level would be of benefit

BARRIER UNIT COST¹	COST INDEX²
\$100 or less	\$25,000
\$1 00-\$200	Interpolate ³
\$200 or more	\$50,000

Note: ¹ per m²

- 2 per benefitted dwelling unit
- 3 Interpolate between \$25,000 and \$50,000 (e.g., \$160 per m² would yield a \$40,000 per benefitted dwelling unit limit).

In summary, the criteria to determine feasibility and reasonableness of noise abatement must contain as a minimum the following items:

1. The amount of noise reduction provided. This must be a substantial reduction in the order of ten decibels with at least seven decibels insertion loss at the properties with the greatest reductions.
2. The number of dwelling units benefitted. The threshold of noise reduction which establishes a benefitted property is at least five decibels determined at a point where frequent human use occurs and a lowered noise level would be of benefit regardless of whether or not the property was identified as impacted.
3. The cost of the abatement. A cost index between \$25,000 and \$50,000 per benefitted dwelling unit depending on the unit cost of the barrier should be used.
4. The views of the imposed residents. The residents should be contacted during the preliminary design phase of project development and their views reexamined periodically during the final design phase prior to PS&E approval.

5.

§ 772.13 Federal Participation.

(a) Federal funds may be used for noise abatement measures where:

- (1) A traffic noise impact has been identified,***
- (2) The noise abatement measures will reduce the traffic noise impact, and***
- (3) The overall noise abatement benefits are determined to outweigh the overall adverse social, economic, and environmental effects and the costs of the noise abatement measures.***

This paragraph identifies the simple rules that guide the funding of noise abatement on highway projects. These rules apply to both Type I and Type II projects. Federal-aid highway funds may not be used as payment or compensation for a traffic noise impact through the purchase of a noise easement from a property owner. The FHWA noise regulation clearly indicates that Federal funds may only be used to reduce traffic noise impacts and provide noise abatement benefits. Monetary compensation accomplishes neither of these requirements.

Federal funds may be used in compensation paid during right-of-way negotiations for a partial taking of property.

Noise, air quality, access, visual quality, etc., are frequently considered jointly in determining this compensation, which is regarded as part of right-of-way acquisition, not environmental mitigation.

(b) For Type II projects, noise abatement measures will only be approved for projects that were approved before November 28, 1995, or are proposed along lands where land development or substantial construction predated the existence of any highway. The granting of a building permit, filing of a plot plan, or a similar action must have occurred prior to

right-of-way acquisition or construction approval for the original highway. Noise abatement measures will not be approved at locations where such measures were previously determined not to be reasonable and feasible for a Type I project.

This is a recent and significant change to the regulation resulting from Federal legislation. It further restricts the potential locations where Type II projects may be considered. For NYSDOT, the granting of a building permit must have occurred prior to right-of-way acquisition for the original highway. It also eliminates from consideration those locations where a Type I noise study had been done previously and noise abatement was not recommended.

(c) The noise abatement measures listed below may be incorporated in Type I and Type II projects to reduce traffic noise impacts. The costs of such measures may be included in Federal-aid participating project costs with the Federal share being the same as that for the system on which the project is located, except that Interstate construction funds may only participate in Type I projects.

Two important points about this paragraph are: 1) The participating Federal share is the same as that for the system on which the project is located, and 2) Buffer zones can only be used in Type I projects. Although most noise abatement has been implemented along Interstate highways, measures along other types of highways may be used if the traffic noise impacts exist and the criteria in the regulation are met. The most used measure is the noise barrier; however, all the abatement measures listed require consideration, analysis, and discussion. The purchase of a noise easement should not be considered as a noise abatement measure. It does not reduce noise levels or abate the impacts. It only provides monetary compensation and is, thus, not eligible for Federal-aid participation.

(1) Traffic management measures (e.g., traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive land designations).

Traffic management measures can sometimes reduce noise impacts. For example, if acceptable alternative truck routes are available, trucks might be prohibited from certain highways, or they can be permitted to use certain routes only during daylight or nighttime hours as appropriate. Traffic signals may be timed to smooth out the flow of traffic and to eliminate the need for frequent stops and starts, but the overall operating speed is likely to rise. Speed limits can be reduced; however, a reduction in speed of about 30 kph is needed for a noticeable decrease in noise levels. Further, although speed limits can be lowered, it is the actual operating speed that determines the traffic noise level. Lastly, confining large trucks and buses in the right most lanes often slightly increases rather than decreases the noise level at receptors. However, HOV lanes in the median may reduce noise levels if a sufficient number of buses are diverted.

(2) Alteration of horizontal and vertical alignments.

Another noise abatement measure that should always be considered is the possibility of altering the highway alignment to avoid those land use areas which have been determined to have a potential noise impact. Since sound intensity decays with the distance from the source, increased distance

between the noise source and receiver may reduce the noise impact. It may also be possible to obtain a reduction by depressing or elevating the roadway to produce a break in the line-of-sight from the source to the receiver. A depressed section is very effective while an elevated section is effective close in and less effective at a distance. Potential noise reduction should be considered with the many other factors that influence the selection of roadway alignment. Since there are very few new highways being built, the choice of alignment change is usually not available and changing the alignment for noise abatement only is very rarely considered. If alignment changes are proposed, however, they may be claimed as a benefit when appropriate.

(3) Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers.

This is just a technical right-of-way item that allows additional land to be acquired for noise barrier construction.

(4) Construction of noise barriers (including landscaping for esthetic purposes) whether within or outside the highway right-of-way. Interstate construction funds may not participate in landscaping.

This item covers the funding and construction of noise barriers as well as the landscaping necessary to improve the appearance of the barrier and the barrier site only, subject to the Interstate fund limitation. Noise barriers are solid obstructions built between the highway and the homes along the highway. Effective noise barriers can reduce noise levels by ten or more decibels. Barriers can be formed from earth mounds along the road called earth berms, from vertical walls or a combination of berm and wall. Earth berms have a very natural appearance and are usually fairly attractive.

However, an earth berm typically will require a good deal of space, and the higher the berm the more space will be used. Walls take less space. They are often limited to 7.5 meters or so in height because of aesthetic reasons. Noise walls can be built out of concrete, wood, masonry, metal as well as other recycled materials such as plastic, rubber, etc. Many attempts are being made to construct noise barriers that are more visually pleasing and that blend in with their surroundings. The material, color, surface treatment, and configuration of a noise barrier has much to do with how it blends with its surroundings. The Regional Landscape Architect should be consulted and involved with the aesthetic aspect of noise barrier design.

Noise barriers can be quite effective in reducing noise for receptors within about 100 meters of a highway. Barriers do have limitations. For a noise barrier to work, it must be high enough and long enough to block the view of a road. Noise barriers do very little good for homes on a hillside overlooking a road or for buildings which rise above the barrier. Openings in noise walls for driveway connections or intersecting streets destroy the effectiveness of barriers. In some areas, homes are spaced too far apart to permit noise barriers to be built at a reasonable cost.

Overall, public reaction to highway noise barriers appears to be positive. There is, however, a wide diversity of specific reactions to barriers. Residents adjacent to barriers have stated that

conversations in households and backyards are easier, sleeping conditions are better, a more relaxing environment is created, windows are opened more often, and yards are used more often in the summer. Perceived non-noise benefits include increased privacy, cleaner air, improved view and sense of ruralness, and healthier lawns and shrubs. Negative reactions have included a restriction of view, a feeling of confinement, as loss of air circulation, a loss of sunlight and lighting, and poor maintenance of the barrier. Most residents near a barrier seem to feel that barriers effectively reduce traffic noise and that the benefits of barriers outweigh the disadvantages.

Vegetation, if it is high enough, wide enough, and dense enough that it cannot be seen through, can decrease highway traffic noise. However, it is often impractical if not impossible, to plant enough vegetation along a road to achieve a substantial reduction. If dense vegetation already exists, it could be preserved. If it does not exist, roadside vegetation can be planted to create a psychological relief rather than as actual lessening of traffic noise levels. In summary, only existing wide stands of very dense, tall trees and brush provide any noise reduction. Normal plantings of trees, shrubs, or other vegetation on highway projects do not provide noticeable noise reductions and are thus not considered to be a noise abatement measure.

(5) Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise. This measure may be included in Type I projects only.

Buffer zones are undeveloped open spaces which border a highway. Buffer zones are created when the Department purchases land or development rights in addition to the normal right-of-way so that future dwellings cannot be constructed close to the highway. This prevents the possibility of constructing dwellings that would otherwise experience a noise impact from nearby highway traffic. An additional benefit of buffer zones is that they often improve the roadside appearance. However, because of the tremendous amount of land that must be purchased and because in many cases dwellings already border existing roads, creating buffer zones is often not possible.

It is preferred that buffer zone acquisition be performed in conjunction with local zoning, land use controls, or other local government controls imposed or exercised in accordance with a comprehensive plan. Buffer zones shall be obtained by acquisition of the least real property interest practicable that is sufficient to prevent incompatible uses of adversely impacted lands while permitting uses compatible with the highway environment (e.g., negative easements that restrict grantor's use). In certain cases it may be necessary to acquire additional right-of-way in fee simple with the intent to dispose of excess interests in a manner compatible with the highway environment. Note, however, that the noise regulation may not be used to acquire a buffer zone for a Type II abatement project.

(6) Noise insulation of public use or nonprofit institutional structures.

Insulating buildings can greatly reduce highway traffic noise inside, especially when windows are sealed and cracks and other openings are filled. Sometimes sound-absorbing material can

be placed in the walls of new buildings during construction. However, insulation can be costly because ventilation and air conditioning is usually necessary once the windows are sealed. Although the regulation allows Federal funding for noise insulation of certain institutional structures, the State Highway Law did not allow the expenditure of the State portion for this purpose beyond the right-of-way line. Thus noise insulation was not available as an abatement measure on our projects.

In 1985, the following paragraph was added by the Legislature to the Highway Law at the Department's request.

HIGHWAY LAW SECTION 10(41) as added by Chapter 264 of the Laws of 1985

41. [The commissioner shall] have power, in connection with a department construction project undertaken with federal aid, whenever the commissioner determines that it is the best interest of the state considering among other factors the cost and feasibility of other alternatives, to provide for the noise insulation of publicly owned school buildings which are off the highway right-of-way. The commissioner may provide for the noise insulation by entering into an agreement with the appropriate board of education or school district to provide the capital funds necessary for the design and construction of such noise insulation to abate highway generated noise within the school building. The expenses of such noise insulation shall be charged against funds available to the department for highway construction.

This means that noise insulation may now be used when these certain conditions are met:

- A public school building
- A Federal-aid project with federal funding participation
- The insulation must be cost-effective, i.e., it must be cheaper than a noise barrier ("other alternatives.")

(d) There may be situations where (1) severe traffic noise impacts exist or are expected, and (2) the abatement measures listed above are physically infeasible or economically unreasonable. In these instances, noise abatement measures other than those listed in Section 772.13© of this chapter may be proposed for Types I and II projects by the highway agency and approved by the Regional Federal Highway Administrator on a case-by-case basis when the conditions of Section 772.13(a) of this chapter have been met.

This paragraph allows the flexibility to propose innovative noise abatement measures when the commonly used measures are unacceptable. These other measures could include such things as the acquisition of a severely impacted property, the relocation of a dwelling, or structure, or the noise insulation of a private dwelling. The FHWA Regional Administrator is delegated the approval authority in these special situations. This section was written into the regulation to include the very rare possibility of providing noise insulation for private residences. It is written in a general manner such that possible new and innovative abatement measures might be tested under its provisions. However, the State's legal prohibition against an expenditure beyond the right-of-way line for this purpose (except for public schools) would still apply of course.

§ 772.15 Information for Local Officials.

In an effort to prevent future traffic noise impacts on currently undeveloped lands, highway agencies shall inform local officials within whose jurisdiction the highway project is located of the following.

Coordination with and providing information to local officials is an important part of noise control and the prevention of future impacts. Highway traffic noise should be reduced through a program of shared responsibility. Local government should use their power to regulate land development in such a way that particularly noise sensitive land uses are either prohibited from being located adjacent to a highway or that developments are planned, designed, and constructed so that traffic noise impacts are minimized. Thus, local government officials need to know what noise levels to expect from a highway and what techniques they can use to prevent future impacts.

This Federal requirement is frequently neglected or overlooked.

(a) The best estimation of future noise levels (for various distances from the highway improvement) for both developed and undeveloped lands or properties in the immediate vicinity of the project.

This can usually be done by providing local government with a copy of the environmental document containing the noise study. The future traffic noise levels may be provided in either tabular or contour form. Note that although undeveloped lands do not require a noise analysis for project purposes, some analysis is needed to meet this item.

(b) Information that may be useful to local communities to protect future land development from becoming incompatible with anticipated highway noise levels, and

A copy of "The Audible Landscape" found in the Attachments generally provides more than enough information and may require some additional guidance as to applicable sections and techniques.

(c) Eligibility for Federal-aid participation for Type II projects as described in Section 772.13(b) of this chapter.

The critical importance of substantial construction predating the right-of-way acquisition for the original highway and the availability of separate additional funding provided by the Legislature for this specific purpose must be communicated and emphasized.

§ 772.17 Traffic Noise Prediction.

(a) Any traffic noise prediction method is approved for use in any noise analysis required by this regulation if it generally meets the following two conditions:

The current FHWA model (FHWA-RD-77-108) and its software (STAMINA 2.0/OPTIMA) or the new FHWA Traffic Noise Model, Version 1.0 (FHWA TNM) may be currently used. The phase-in period for TNM will be 24 months from its March 30, 1998 date of issue. After the phase-in period, TNM will replace the existing FHWA prediction model and the existing model prediction software.

During this time a determination should be made in consultation with the FHWA Division Office as to which studies and projects will be analyzed using the existing FHWA model and which ones will be analyzed using TNM. TNM should be utilized for more analyses as knowledge and experience is gained in its use, and especially on all complex projects where noise barrier analysis is likely.

(1) The methodology is consistent with the methodology in the FHWA Highway Traffic Noise Prediction Model (Report No. FHWA-RD-77-108). *

****These documents are available for inspection and copying as prescribed in 49 CFR Part 7, appendix D.***

See comment above.

(2) The prediction method uses noise emission levels obtained from one of the following:

(I) National Reference Energy Mean Emission Levels as a Function of Speed (ii) Determination of reference energy mean emission levels in Sound Procedures for Measuring Highway Noise: Final Report DP-45-1R.

As part of the research project to develop the new prediction model, a large effort involving several thousand individual vehicle measurements in many geographic areas of the country was undertaken and completed. These up-to-date emission levels have been incorporated in TNM so that additional changes in the new reference noise emission levels should not be expected for several years.

(b) In predicting noise levels and assessing noise impacts, traffic characteristics which will yield the worst hourly traffic noise impact on a regular basis for the design year shall be used.

Traffic characteristics used in predicting future noise levels can make substantial differences in the results. Worst hourly traffic noise impact usually occurs at a time when truck volumes and vehicle speeds are the greatest, typically when traffic is free-flowing and at or near level of service C conditions. The volumes of medium and heavy trucks are very important and should not be guessed at nor based on an assumed or arbitrary percentage. If need be, truck classifications can be obtained manually while performing field noise measurements. If an assumed truck percentage is used in a noise prediction calculation, the resultant decibel noise levels must be considered assumed as well.

The operating speed (rather than the design speed or the posted speed) which is the highest overall speed at which a driver can travel on a given highway under favorable weather conditions and under prevailing traffic conditions should be used in noise calculations. The FHWA requires the use of the operating speed if it is determined to be consistently higher than the posted speed limit. In determining the operating speed along an existing highway, the first step is to identify the time period during which the worst traffic noise impacts are expected to occur. Then, the speed may be determined by actually driving a vehicle in the traffic stream and recording the average speed. This is called the "floating car" method and it involves driving the length of the highway section while passing as many vehicles as pass the test driver. The speed to be obtained is the average operating speed less the delays while stopped.

Speed may also be determined using radar meters (guns) or other devices to measure speeds at a point along the highway although frequently the use of the radar gun is detected by drivers resulting in lower than normal speeds. Such measured speeds are then arithmetically averaged to calculate a mean time speed. Either the traffic stream speed or the time mean speed can be used to represent the operating speed.

The best way to determine the worst or noise critical hour is to do a 24 hour field noise measurement. By analyzing the hourly or even the quarter-hourly noise levels obtained, the noise critical hour is easily determined. Following this, the appropriate traffic data may be requested; e.g. AM DHV, PM DHV, or some other off-peak hour. Even this method may not necessarily determine the worst noise impact in the future design year nor may it produce the largest noise increase in a neighborhood. Nevertheless, it is the best method possible and should be strongly considered for all large, complex, urban projects. Generally, only one or two 24 hour measurement sites are all that is needed. In recreational or resort areas it may be necessary to obtain a 48 or 72 hour weekend long term measurement to determine the noise critical hour which is often during the Friday afternoon arrival time or the Sunday evening departure period or sometime in between. In the vicinity of a major retail shopping area, the noise critical hour may well be a Saturday noontime hour. In this case the projected design hourly volumes may well be the best estimate rather than a long-term measurement. The term "on a regular basis" applies here such that the normal year-round traffic pattern should be used rather than certain holiday related weekends.

§ 772.19 Construction Noise.

The following general steps are to be performed for all Types I and II projects:

The impact of construction noise does not appear to be overly serious in most instances. FHWA Technical Advisory T 6160.2, "Analysis of Highway Construction Noise," outlines procedures for the analysis of highway construction noise. The following items should be considered to ensure that potential construction noise impacts are given adequate consideration during highway project development:

- Calculation of construction noise levels are not needed at all receptor locations. If a construction noise impact is anticipated at a particular sensitive receptor, use of the model contained in "Highway Construction Noise: Measurement, Prediction and Mitigation" to

predict construction noise levels should be more than sufficient. The computerized prediction model HICNOM is quite sophisticated and requires considerable input, and, therefore, should be used only on highly complex or controversial major urban projects.

- Potential impacts of highway construction noise should be addressed in a general manner for noise analyses. The temporary nature of the impacts should be noted. An indication of the types of construction activities that can be anticipated and the noise levels typically associated with these activities can be obtained from existing literature and presented in the noise analysis.
- Using a common-sense approach, noise analyses should identify measures to mitigate potential highway construction noise impacts. Low-cost, easy-to-implement measures should be incorporated into project plans and specifications (e.g., work-hour limits, equipment muffler requirements, location of haul roads, elimination of "tail gate banging," reduction of backing up for equipment with alarms, community information, complaint mechanisms).
- Major urban projects with unusually severe highway construction noise impacts require more extensive analyses. Particularly sensitive receptors should be identified, existing noise levels should be measured, construction noise levels should be predicted, and impacts should be discussed so as to properly indicate their severity. A construction noise impact will not normally occur at levels under Leg = 80dBA or Leg 85dBA in New York City. Abatement measures likely to be incorporated into these projects may be quite costly and should be thoroughly discussed and justified in the analyses. The use of portable noise barriers and special quieting devices on construction equipment have been used for construction noise abatement.
- In some cases there may be local laws or ordinances which govern construction noise levels or hours. New York City has a local law that is quite restrictive in many areas. Although the State is not subject to local police power and, therefore, the Department is not generally subject to local noise control ordinances, nevertheless, the existence of those laws should be investigated during project development and every effort made to comply with their provisions during construction.

Construction noise may thus be considered and analyzed with varying degrees of formality and precision. In any event, however, the analysis depends on several large assumptions as to how the construction (or demolition) might be done, what equipment might be used, how many pieces of equipment would be used at a time, how long the operation would continue, etc. In most cases, a general consideration of the possibility of particularly noisy operations, e.g. sheet or structural pile driving, rock drilling, jackhammers, etc. upon particularly sensitive receptors, e.g. schools, hospitals, libraries, etc. will suffice along with the general analysis of potential abatement measures.

(a) Identify land uses or activities which may be affected by noise from construction of the project. The identification is to be performed during the project development studies.

As mentioned above, consider potential land uses that may be affected by construction noise such as schools, hospitals, libraries, etc. as well as residential areas. The particular land uses and areas may well be different from those identified in the traffic noise impact determination because the construction noise levels are higher and can therefore penetrate farther into an area. Also, certain construction operations, e.g. storage or stockpile areas, haul roads, etc. may be at different locations. Use the suggested reference levels for particular construction equipment as source level. Next, propagate these levels for the receptors at the 6 decibels per doubling of distance point source rate. Then compare the resultant levels to the suggested impact thresholds given above.

(b) Determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction noise impacts to the community. This determination shall include a weighing of the benefits achieved and the overall adverse social, economic and environmental effects and the costs of the abatement measures.

For the impacts determined above, select the appropriate abatement measures that would have a practical benefit for the particular project. Although certain general techniques such as mufflers and maintenance will apply in virtually all cases, certain other techniques such as hours and day restrictions, and public information programs may only apply in specific instances. On rare occasions, speciality measures such as enclosures and curtains may also be considered and recommended as appropriate. The benefit/cost determination is usually done in a very general manner.

A number of measures may be used to abate highway construction noise. These measures may be grouped as follows:

- Community Relations - Early communication of potential construction noise impacts to the public is vital. Inform the public of the potential impacts and the measures that will be used to reduce these impacts. Establish and publicize a response complaint mechanism for the duration of the project. The establishment of good rapport with the community can provide high benefits for low cost. Instill an awareness of public attitudes and reactions in construction equipment operators so that unnecessary annoyances may be avoided.
- Design Considerations - Early coordination and communication with project designers can aid greatly in locating and sequencing construction operations to minimize potential impacts at potentially sensitive receptors. Noisy elements, e.g. compressors, haul roads, etc. can be located in less sensitive areas making use of any existing natural or artificial features that can shield the construction noise. Permanent noise barriers included in a project should be constructed as early as possible to reduce potential construction noise impacts. Alternative construction methods can also be employed to lessen potential impacts such as cast-in-place piles rather than driven piles, rubber-tired rather than steel-tired equipment, etc.
- Source Control - New construction equipment is generally quieter than older equipment. Special, very quiet types of new equipment are also available. However, specification of the exclusive use of new, quiet equipment on a project can be very costly and is usually justifiable only in cases

of extremely severe noise impacts. Control of noise from existing equipment is usually limited to muffler requirements and continued good maintenance on all equipment. Additional modifications to equipment for noise reduction are usually not reasonable due to a large increase in cost.

- Site Control - Measures to abate construction noise can modify the time, place, or method of operation for a particular noise source. The measure most often used is the limitation of work hours on a construction site. Careful project planning can aid in locating noise activities as far as possible from particularly sensitive receptors or in areas where natural shielding is possible. Building temporary noise barriers or special equipment enclosures is usually quite expensive and is limited to use only in instances of severe construction noise impacts.

(c) Incorporate the needed abatement measures in the plans and specifications.

After determining construction noise impacts and analyzing various abatement measures, appropriate, effective, and practical specific measures should be recommended. Do not merely provide a comprehensive list of all possible abatement techniques, but customize the list for the specific project conditions.

Table 1 - Noise Abatement Criteria

TABLE 1 - Noise Abatement Criteria			
Activity Category	Leq(h) ¹	L10 (h) ¹	Description of Activity Category
A	57 (Exterior)	60 (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
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above (e.g., commercial, industrial, other).
D	--	--	Undeveloped lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, auditoriums, offices, etc.

Source: Federal-Aid Highway Program Manual, Transmittal 348, August 9, 1982. 1 Hourly A - Weighted Sound level - decibels (dBA)

²Either Leq(h) or L10(h) (but not both) may be used on a project.

This table satisfies the requirement to supply noise abatement criteria under the Purpose (Section 772.1) of the regulation, and is thus titled Noise Abatement Criteria even though other information is provided. Note that the values provided are hourly A-weighted decibels which are abbreviated as dBA. The time varying aspect of the metric is the Leq or the L10. Also note that these latter metrics should not be mixed on a particular project. Nowadays, the Leq will be used on an almost universal basis. The Leq descriptor is more statistically reliable for low-volume roadways, is simpler in most instances for highway designers to work with, and is more flexible in terms of permitting noise levels from different sources (rail, air, construction, etc.) to be combined in the analysis of noise impact.

The NACs represent a balancing of that which may be desirable and that which may be achievable. Consequently, noise impacts can occur even though the NACs are achieved. The NACs should be viewed as maximum values recognizing that in many cases the achievement of lower noise levels would result in even greater benefits to the community. The NACs should not be viewed as Federal standards or desirable noise levels. They should not be used as design goals for noise barrier construction.

The NAC should only be used as absolute values which, when approached or exceeded, require the consideration of traffic noise abatement measures.

Category A is very rarely used if at all. The strength and frequency of words such as "serenity," "extraordinary," "important," and "essential" make for an extremely difficult test. Thus, this Category is to be used only in very special cases. The key determinant is the "intended purpose" of the land or activity. This means that the application is to such uses as outdoor amphitheaters or natural areas where the actual use of the land requires quiet in order to function at all. This NAC should be applied to those nature parks and recreational areas (or portions thereof) where the serenity and quite are considered essential even though such areas may not be subject to frequent human use.

Category B is the most frequently analyzed land use. It is the one that requires and generates virtually all the abatement recommendations and noise barriers. Note that it includes hotels and motels which are commercial uses such that the division between residential and commercial should not be used. Also, note that it includes active sports areas and playgrounds which are often much more appropriate uses in noisier areas, and where abatement may not necessarily be a benefit. Further, note that very often schools, churches, and hospitals as well as hotels and motels do not have exterior areas of frequent human use and thus may be more appropriately classed as Category E. Finally, cemeteries and the house lots of farms should normally be classified as Category B.

Category C as mentioned above is not to be termed commercial land per se. It is much better described as developed exterior uses or activities which are not Category B (or A). In most cases this activity does include retail commercial, professional office and industrial uses. Frequently, however, these uses have very little or no exterior activity such that Category E may well be the more appropriate classification.

Category D lands do not have an NAC because they are undeveloped and thus could not be impacted. However, Category D is needed in order to; 1) complete the area-wide geographic land use determination along both sides of the proposed highway project, and 2) provide information for local officials that can prevent future incompatible development. Lands in this Category include, of course, raw, undeveloped land by definition. Also included are farm lands less the house lot which would be Category B, and the barns and outbuildings which would be Category C.

Category E is to be used only if there are no exterior activities where frequent human use occurs and a lowered noise level would be of benefit. Given no exterior activity, this Category is an indoor version of Category B. In general, with an open window situation, an impact will occur under Category E at a lower exterior noise level while with a closed window condition, a higher exterior noise level will be needed for an impact to occur.