

# CONCEPTUAL NOISE BARRIER FEASIBILITY STUDY

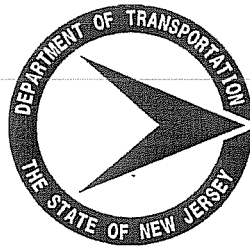
I-80 WESTBOUND

VICINITY OF EXIT 35

ROCKAWAY TOWNSHIP  
MORRIS COUNTY

Agreement No. 99PM05

*Submitted to*  
New Jersey Department of Transportation



*Prepared by*



Hammonton, New Jersey

April 2, 2003

## PROJECT DESCRIPTION

This study considers the feasibility of noise barrier installation along the westbound lanes of I-80 (MP 35.4 to MP 36.2), near Exit 35 in Rockaway Township in Morris County New Jersey. I-80 is a heavily traveled urban interstate highway, with the project area located approximately 30 miles west of New York City. The roadway has four lanes in each direction, with a posted speed limit of 55 mph. There are existing noise barriers along the eastbound lanes of I-80 in the project area. There were no residences along the westbound lanes until recently due to the construction of a large condominium complex near Exit 35. Under the Departments current noise policy these residences would not be eligible for Type II noise barrier construction since the highway pre-dated the homes. Figure 1 is an aerial photograph of the project area from 1995, showing the existing barrier on the eastbound side and the vacant land on the westbound side. The location and extent of the condominium complex has been added to this aerial photograph.

The condominium complex currently under construction is a large age-restricted development called Fox Hills. The development contains six 3-story buildings that borders I-80 along approximately 3000 feet of frontage with I-80. When completed, the overall Fox Hills site will have 14 buildings containing 684 living units along with a clubhouse and other amenities.

## NOISE BARRIER FEASIBILITY

For noise barriers to be feasible they must be positioned between the generator of the sound (vehicles) and the receptors of the sound (residents). For mitigation to be effective the line of sight between the noise generators and the noise receptors must be completely blocked. (See Figure 2) There are other criteria generally applied to proposed noise barrier projects to decide if noise barriers are warranted. These criteria are that the existing noise levels approach or exceed 67 decibels, and that the achievable noise level reduction is at least 5 decibels. In addition, the cost to construct the barrier must not exceed \$50,000 per sound mitigated residence to be considered cost effective.

The first step in this study was to determine a line of sight between the sound generators and sound receptors along this section of I-80 to see if the noise barriers are feasible. Along this section of I-80 the new residences are located on a hill high above the highway, creating a significant possibility that a reasonably sized wall would not block the line of sight. The Fox Hills site plans were used to produce cross sections at the six buildings that front along I-80 and a line of sight established between the noise generator (traffic) and the buildings.

## FINDINGS

In general, the Fox Hills development sits substantially higher than I-80. This elevation difference is accentuated by the height of the three-story condominium buildings. At the east end of the site the third floor units are about 50 feet higher than the roadway, whereas at the western end of the site they are over 120 feet higher than I-80. In addition, the six condominium buildings sit substantially back from the highway. These units sit approximately 240 to 500 feet from the highway. See the Appendix for photos and a plan view of the site taken from the site plan for Fox Hills.

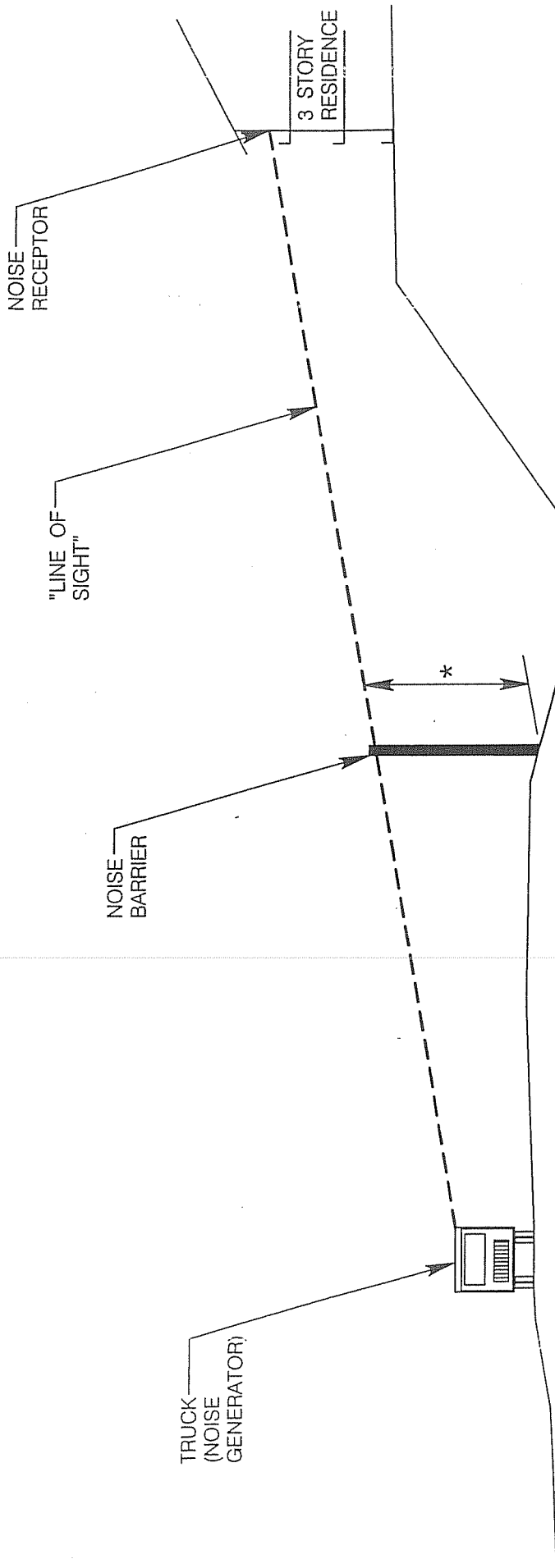
This combination of the height and the distance that the buildings are from I-80 makes it very difficult for a reasonably sized barrier to break the line of sight. The distance from the line of sight to ground is over 30 feet for three of the condominium units, 23 and 26 feet for two units and 18 feet for one unit. As noted earlier, for a barrier to be effective, the line of sight must be completely blocked, both horizontally and vertically. This means that the barriers would have to be long enough to block all angles, between the buildings and I-80, and that the barriers would need to be about 5 to 10 feet higher than the line of sight. Figure 3 shows the estimated height of the noise wall needed to be effective in front of each of the six units bordered by I-80. All of the areas, except for the area in front of the Grant building, have a very high distance before the line of sight is intercepted. This translates to a barrier whose height exceeds 30 feet, which will not be feasible due to excessive cost and engineering complications. To be effective, noise barrier height generally needs to be limited to approximately 20 feet. Figure 4 & 5 depicts two representative cross sections showing the line of sight, one in front of the Wilson building and one in front of the Reagan building.

The Grant building sits approximately 240 feet off the highway and has an 18-foot distance from the line of sight to the ground. The reason the line of sight height in this area is so much less, is because there is an existing 14-foot high berm just off of the roadway border in front of the Grant building. However, this berm is only about 300 feet long, which means that the wall is not nearly long enough to block all horizontal paths of the noise to the building, see Figure 6. This length is insufficient to adequately mitigate noise, because the noise would go around the barrier that is placed on the top of the berm, especially since the building sits back so far off the roadway.

Another item that diminishes the effectiveness of noise barriers in this area is the distance that the buildings are behind the wall. In general barriers work best in mitigating noise in the first 100 to 200 feet past the wall. The noise barriers would be constructed within NJDOT's right of way, which results in the dwelling units in the buildings being located well past this area, with most being more than 300 feet away.

## RECOMMENDATION

It is clear from the "line of sight" portion of the noise study that it is not possible for barriers to be constructed feasibly and cost effectively to protect the Fox Hills Development. To continue on with the rest of the acoustical engineering and feasibility assessment of a study at this location would cost about \$150,000. Since there is not prospect for a favorable outcome, our recommendation is to discontinue the project.



\* WALL MUST BE HIGH ENOUGH TO INTERCEPT THE LINE OF SIGHT

FIGURE 2

Building Name	Elevation Difference (See Note 1)	Distance from Route 80 Edge of Pavement (See Note 2)	Height From Ground to Sight Line at Probable Noise Wall Location (See Note 3)	Remarks
Jefferson	129 feet	520 feet	33 feet	Building sits back very far and is very high off highway.
Reagan	81 feet	350 feet	32 feet	Building sits back far and is high off highway. Wetlands throughout right-of-way area.
Eisenhower	76 feet	300 feet	34 feet	Building sits back far and is high off highway. Wetlands throughout right-of-way area.
Wilson	50 feet	290 feet	26 feet	Wetlands in right-of-way area.
Grant	46 feet	240 feet	18 feet	Berm in front of building (only 300 feet long). In front of berm, height from ground to sight line is 26 feet.
Roosevelt	52 feet	400 feet	23 feet	Wetlands throughout area between building and Route 80.

Notes:

- 1) Elevation difference from Route 80 to the 3rd floor balcony (25 feet from first floor elevation).
- 2) Distances to building taken from face of building closest to Route 80. Most individual condo units in the building would sit further back off highway.
- 3) Sight line take from exhaust of truck (13 feet high) in Eastbound lanes of Route 80, to 5 feet off 3rd floor balcony of building.

**Figure 3**

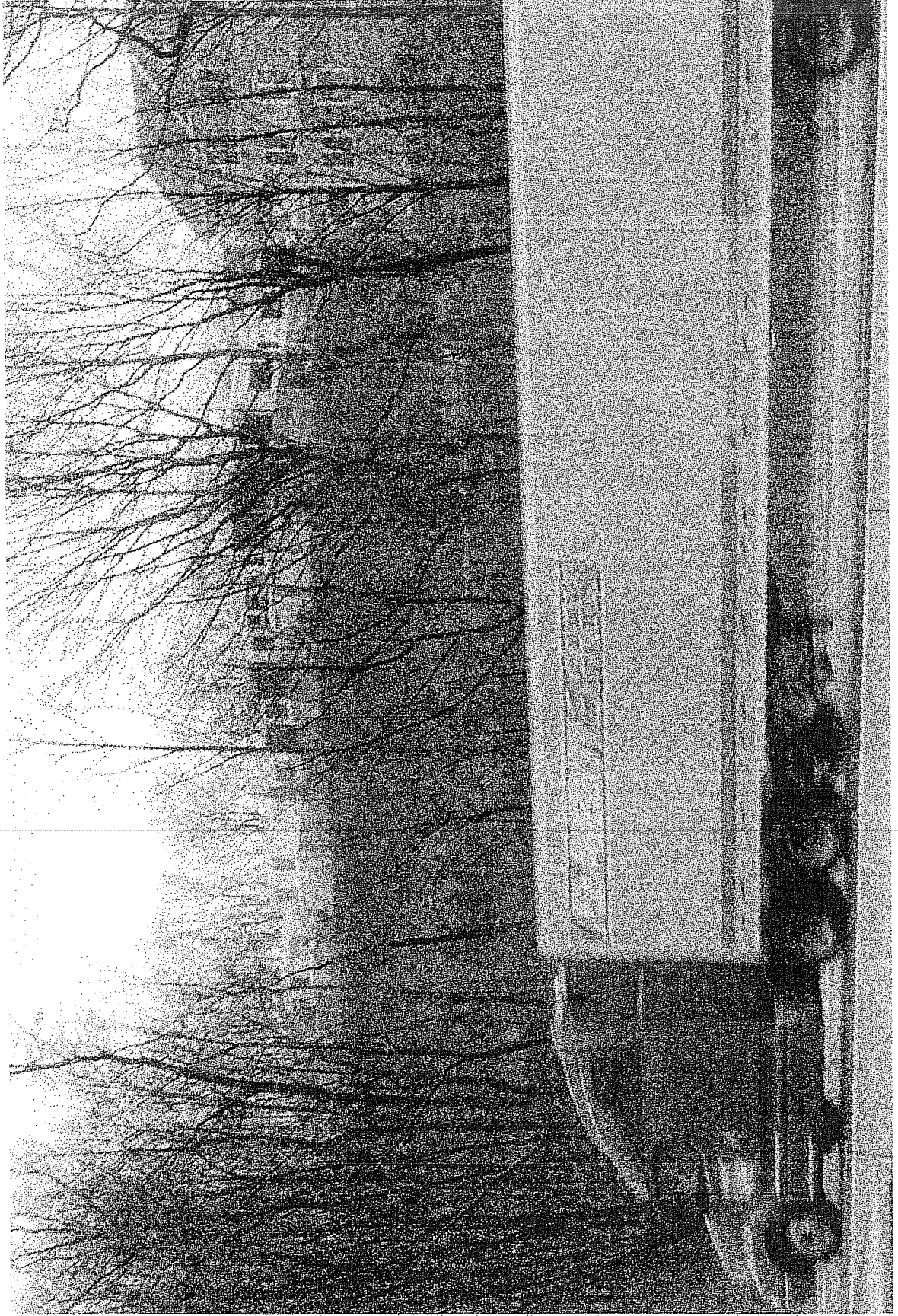
# APPENDIX

PHOTOS  
AND  
COPY OF PORTION OF FOX HILLS SITE PLANS

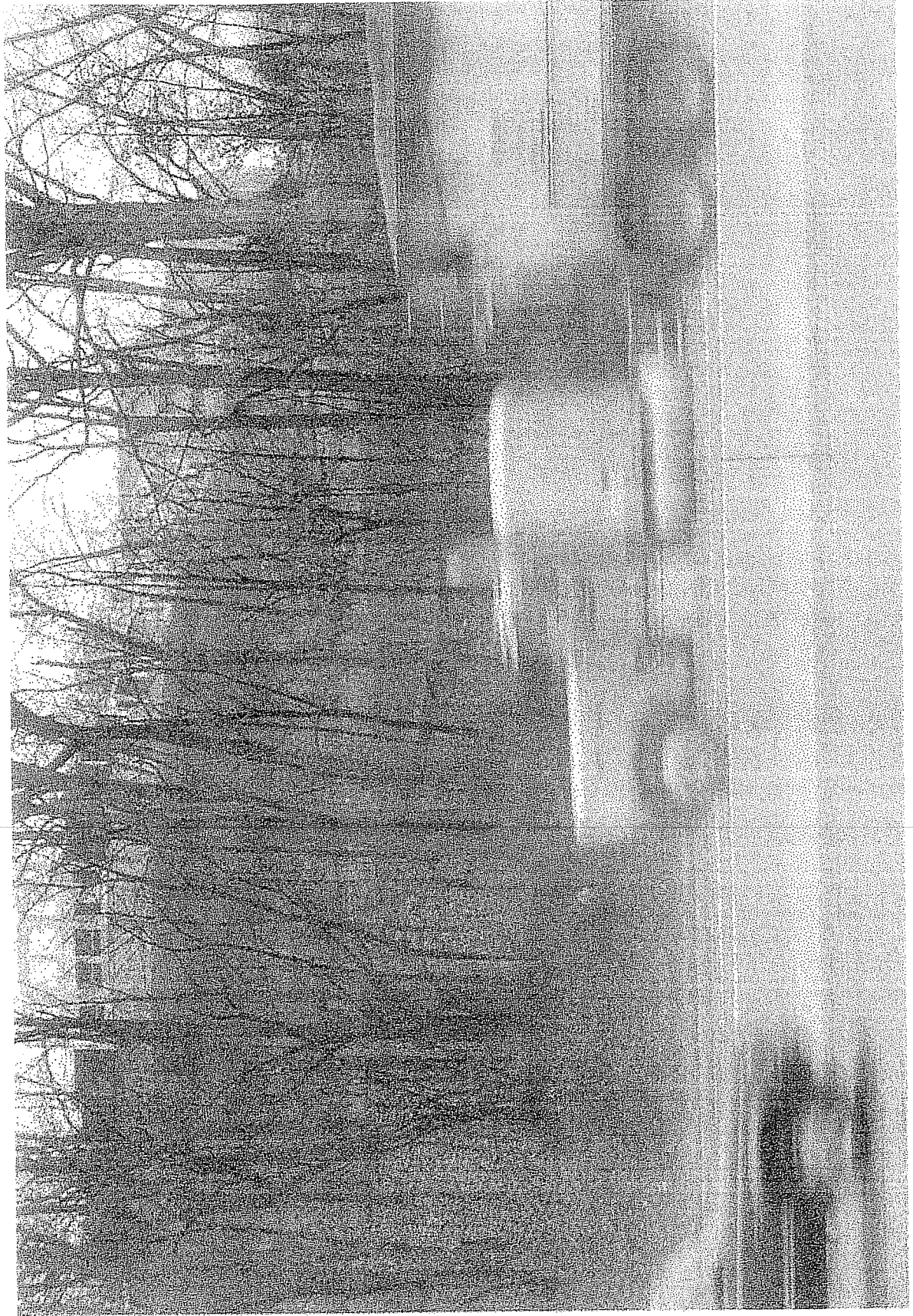


View of Reagan Building





**View of Jefferson Building (Partially Built) and Reagan**



View of Jefferson Building (Partially Built) from Route 80 - West end of site



View of Wilson Building in foreground and Grant Building in background.



**View of Jefferson Building – from vicinity of top of retaining wall  
Between Route 80 and Fox Hills**