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**Noise**  
**Technical Environmental Study**

**October 2007**

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**US Department of Transportation**  
**Federal Highway Administration**  
**New Jersey Department of Transportation**



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## EXECUTIVE SUMMARY

This study quantifies 2000 existing, 2030 “No-Build” and 2030 “Build” noise levels and addresses mitigation for the five I-295/I-76/Route 42 Direct Connection project alternatives. The Federal Highway Administration’s (FHWA) noise criteria, included in 23 CFR 772, has been utilized to determine project-related impacts within the study area. Noise calculations were performed utilizing the approved FHWA Traffic Noise Model (TNM) Version 2.5, which is capable of predicting noise levels in the vicinity of highways.

Conservatively, receptors are considered impacted if noise levels approach or exceed the Noise Abatement Criteria (NAC) or substantially increase (10 dBA  $L_{eq}$  or more) projected “Build” noise levels over existing conditions. The FHWA has established noise guidelines for several land-use activities. The I-295/I-76/Route 42 Direct Connection project involves Category B (residences, recreational areas and cemeteries), Category E (schools and churches) and Category C (commercial/industrial establishments) land-use activities.

A Noise Measurement Study was conducted by NJDOT in August of 2000 and March/April of 2001. To document existing noise levels, digital noise level meters were placed throughout the I-295/I-76/Route 42 Direct Connection study area. In addition, building attenuation studies at two schools were performed for several first and second floor classrooms. Based on monitored results, roadway geometry, and existing traffic volumes, the FHWA TNM2.5 noise level prediction model was validated. To predict peak noise levels as a result of future “No-Build” and “Build” conditions, Level of Service (LOS) C traffic conditions were utilized. In addition, all future modeling assumed completion of the **NJDOT Missing Moves** project. Since LOS C traffic conditions were modeled, the impacts associated with each alternative would remain unchanged with, or without the **Missing Moves** project.

Under **2000 existing** conditions, computer modeling documented a total of 177 residential (single, dual and multi-family) units, a cemetery and two recreational areas which currently possess noise levels that approach or exceed the Category B NAC. Two schools and two church buildings currently possess interior noise levels that approach or exceed the Category E NAC. There are seven commercial/industrial establishments that currently approach or exceed the Category C NAC.

Predicted **2030 “No-Build”** noise levels were modeled and include 269 residential (single, dual and multi-family) units, a cemetery and two recreational areas which are predicted to incur noise levels that approach or exceed the Category B NAC. Two schools and two church buildings are predicted to possess interior noise levels that approach or exceed the Category E NAC. Eleven commercial/industrial establishments are also predicted to incur noise levels that approach or exceed the NAC established for Category C.

The **Alternative D** alignment requires one commercial and seven residential structure acquisitions as well as removal of four existing noise wall segments. Predicted impacts under the 2030 “Build” condition include 340 residential (single, dual and multi-family) units, two cemeteries and three recreational areas. Three schools and two church buildings are predicted to possess interior noise levels that approach or exceed the Category E NAC. Eleven commercial/industrial establishments are also predicted to incur noise levels that approach or exceed the Category C NAC.

One commercial and seven residential structure acquisitions as well as removal of four noise wall segments are necessary to accommodate the **Alternative D1** alignment. Predicted impacts under the 2030 “Build” condition include 342 residential (single, dual and multi-family) units, two cemeteries and

five recreational areas. Three schools and two church buildings are predicted to possess interior noise levels that approach or exceed the Category E NAC. Eleven commercial/industrial establishments are also predicted to incur noise levels that approach or exceed the Category C NAC.

The **Alternative G2** alignment requires three residential structure acquisitions as well as removal of four noise wall segments. Predicted impacts under the 2030 “Build” condition include 378 residential (single, dual and multi-family) units, two cemeteries and three recreational areas. Three schools and two church buildings are predicted to possess interior noise levels that approach or exceed the Category E NAC. Fifteen commercial/industrial establishments are also predicted to incur noise levels that approach or exceed the Category C NAC.

Three residential structure acquisitions as well as removal of four noise wall segments are necessary to accommodate the **Alternative H1** alignment. Predicted impacts under the 2030 “Build” condition include 380 residential (single, dual and multi-family) units, two cemeteries and five recreational areas. Three schools and two church buildings are predicted to possess interior noise levels that approach or exceed the Category E NAC. Fifteen commercial/industrial establishments are also predicted to incur noise levels that approach or exceed the Category C NAC.

Due to the **Alternative K** alignment, necessary acquisitions include one commercial and seven residential structures. In addition, four existing noise wall segments require removal. Predicted impacts under the 2030 “Build” condition include 327 residential (single, dual and multi-family) units, two cemeteries and three recreational areas. Three schools and two church buildings are predicted to possess interior noise levels that approach or exceed the Category E NAC. Ten commercial/industrial establishments are also predicted to incur noise levels that approach or exceed the Category C NAC.

Utilizing the existing NJDOT Noise Policy for new noise walls and a project-specific policy for replacement noise wall segments, the total cost of noise walls and remaining impacts for each alternative are listed in the table below. Based on allowable mitigation measures, more impacts remain under the double-decker alternatives (G2 and H1) than under the other alternatives (D, D1, and K). Additional mitigation (air conditioning) is necessary for two schools under Alternatives D, D1, and K and three schools under Alternatives G2 and H1.

#### COMPARISON OF NOISE WALLS BY ALTERNATIVE

Alternative	Total Costs	Remaining Impacts After Construction of New and Replacement Walls (Category B; residential)
D	\$11.2M	155 total units; 84 single, 32 dual-family, 39 multi-family
D1	\$11.5M	156 total units; 85 single, 32 dual-family, 39 multi-family
G2	\$12.7M	215 total units; 116 single, 52 dual-family, 47 multi-family
H1	\$13.0M	216 total units; 117 single, 52 dual-family, 47 multi-family
K	\$8.0M	145 total units; 84 single, 26 dual-family, 35 multi-family

## **1.0 INTRODUCTION**

The I-295/I-76/Route 42 Direct Connection project study area is located within the Boroughs of Bellmawr and Mount Ephraim, and Gloucester City; Camden County. Five design alternatives, which are intended to improve traffic flow throughout the interchange, were advanced through the Environmental Impact Statement (EIS) process. A noise analysis was performed to evaluate the impact of each “Build” alternative (D, D1, G2, H1, K), as well as the “No-Build” scenario. In addition, based on predicted impacts with each design, noise mitigation measures were investigated.

This analysis is one of several environmental studies, which together weigh the costs, benefits and consequences of the proposed project. These studies are available through the Division of Environmental Resources, New Jersey Department of Transportation, 1035 Parkway Avenue, CN 600, Trenton, New Jersey 08625.

This noise study has been prepared in accordance with the provisions set forth in the 23 CFR Section 772 (23 CFR 772) of the Federal Code of Regulations pursuant to legislation regarding federally funded Type I projects. The findings are presented in the following sections of this report, prepared by Paul Carpenter Associates, Inc., in association with Dewberry-Goodkind, Inc. on behalf of the New Jersey Department of Transportation (NJDOT).

## **2.0 PROJECT DESCRIPTION**

### **2.1 Project Area Overview**

The I-295/I-76/Route 42 Direct Connection project involves the reconstruction of Interstate 295 (I-295), Interstate 76 (I-76), and New Jersey State Route 42 (Route 42) and affected roadway segments traversing the Boroughs of Bellmawr and Mount Ephraim, and Gloucester City, Camden County. The existing interchange, which was constructed between 1958 and 1961, is insufficient to accommodate current traffic volumes and travel speeds safely, resulting in an accident rate that is more than seven times the statewide average. Additionally, failing levels of service on the interchange ramps, combined with the congestion of local streets, adversely affects the quality of life in the surrounding communities.

A Project Location Map is provided in Figure 1. The study area for the I-295/I-76/Route 42 Direct Connection project includes several residential, commercial, industrial, and public/recreational areas in Bellmawr, Mount Ephraim, and Gloucester City. The project limits for the I-295/I-76/Route 42 Direct Connection are as follows:

Along the Route 42/I-76 corridor, the study area extends from the southerly limit of Route 42 at Leaf Avenue, Mile Post (M.P.) 13.82, north to where Route 42 ends at M.P. 14.28 and merges with I-295 at M.P. 26.79. The I-295 corridor includes only a short section of I-295 roadway from M.P. 26.79 to M.P. 26.96 before I-295 continues north following Ramp A. Additionally, the I-76 section of the project begins at M.P. 0.00 and continues to the northerly limit just south of Crescent Boulevard (Route 130) over I-76 at M.P. 1.15. Along I-295, the study area extends from the southerly limit of Creek Road (CR 753) over I-295 (M.P. 26.03), to the merge with Route 42 (M.P. 26.79), and continues north to M.P. 28.16, where Black Horse Pike (Route 168) crosses over I-295.

### **2.2 Description of Existing Facilities**

The following is a description of the existing roadways. Figure 2 is an excerpt from the NJDOT Straight Line Diagram which provides an overview of the interchange configuration.

#### **2.2.1 Ramps**

##### *Ramp A*

Ramp A connects northbound Route 42 with northbound I-295.

##### *Ramp B*

Ramp B connects southbound I-295 with northbound I-76.

##### *Ramp C*

Ramp C connects southbound I-295 with southbound Route 42.

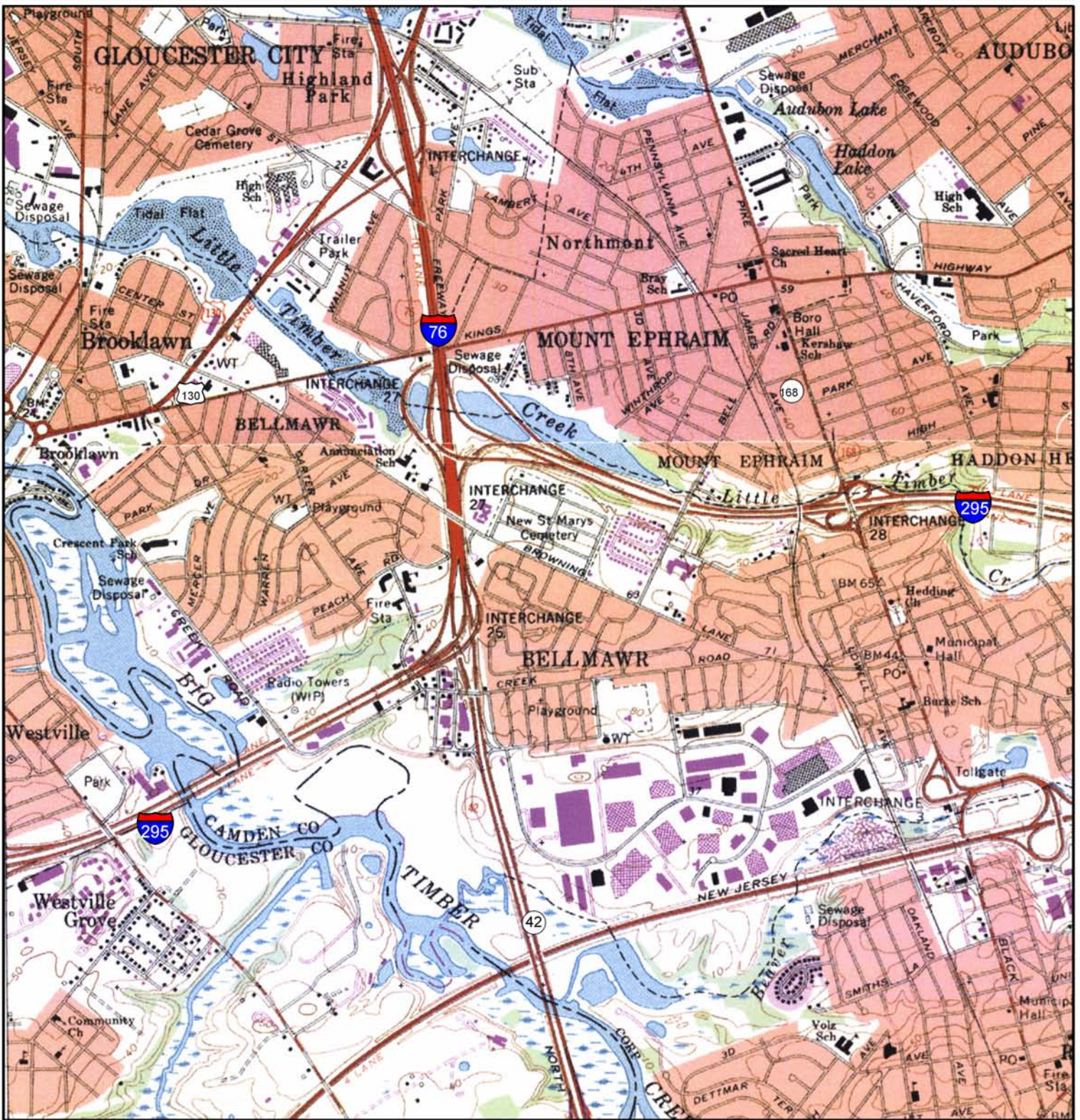
##### *Ramp D*

Ramp D connects southbound I-76 with northbound I-295.

##### *Ramp E*

Ramp E connects northbound I-295 with northbound I-76.





**SOURCE:**

- Camden, NJ-PA  
USGS 7.5 Minute Quadrangle  
1967, Revised 1994
- Runnemede, NJ  
USGS 7.5 Minute Quadrangle  
1964, Revised 1994

0 1,000 2,000 4,000  
Feet

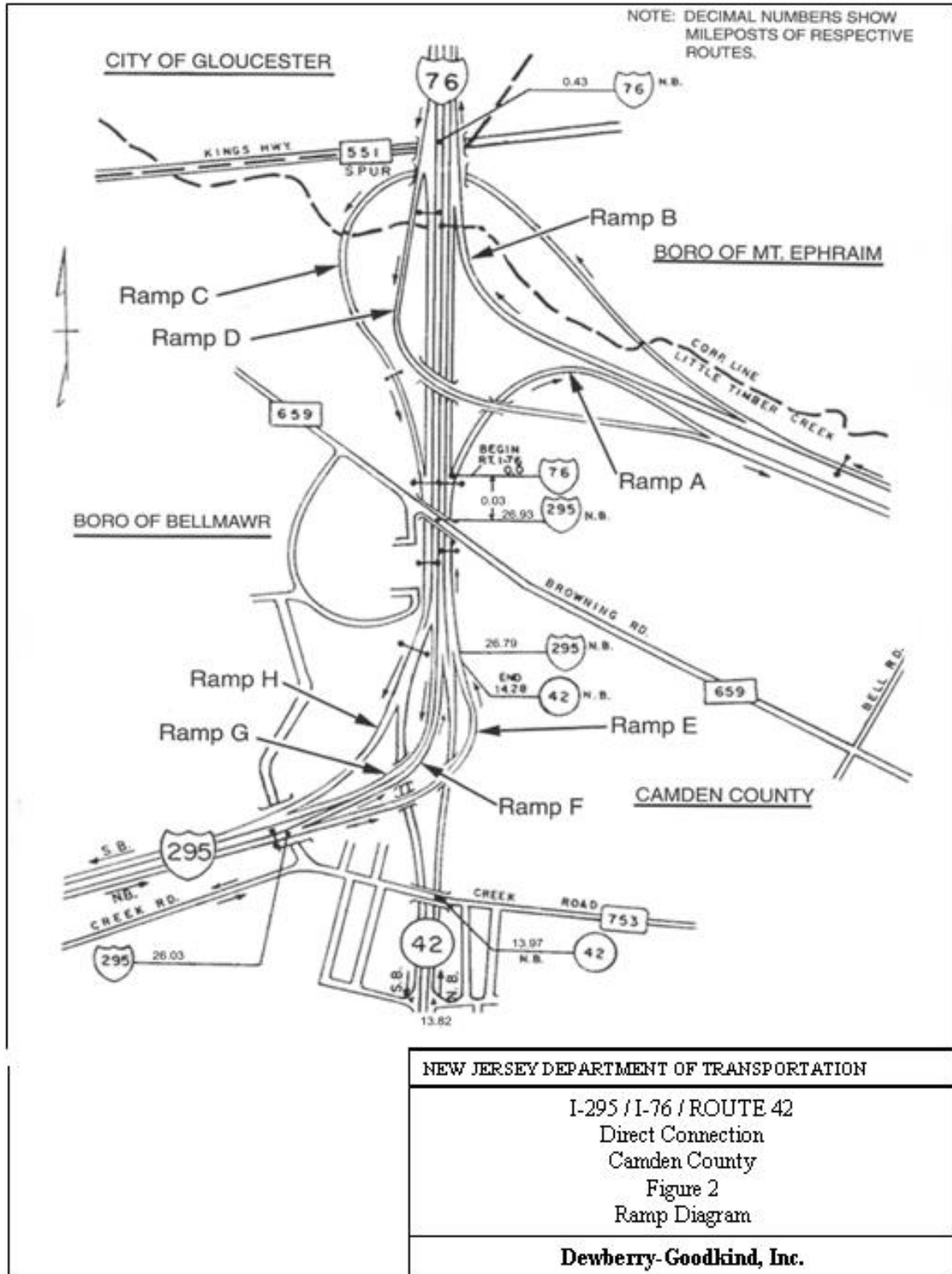


Q:\2652\technical\GIS\Alternatives-2005\PROJECT LOCATION MAP

NEW JERSEY DEPARTMENT OF TRANSPORTATION

I-295 / I-76/ ROUTE 42  
Direct Connection  
Camden County  
Figure 1  
Project Location Map

**Figure 2 Ramp Diagram**



### *Ramp F*

Ramp F connects northbound I-295 with the I-76 northbound express lanes.

### *Ramp G*

Ramp G connects the I-76 southbound express traffic with southbound I-295.

### *Ramp H*

Ramp H connects southbound I-76 with southbound I-295.

## ***2.2.2 I-295, I-76, Route 42 from the Southern Project Limit***

I-295 northbound consists of three 12' lanes with a 12' right shoulder. There is a 50' wide grass median separating the northbound and southbound lanes. The three lane section terminates in the vicinity of the bridge over Essex Avenue in Bellmawr, and forms Ramps E and F, which lead traffic to I-76 northbound local and express lanes, respectively. Ramp E becomes Ramp A, which is considered a continuation of I-295 northbound, and carries I-295 through-traffic northbound. Ramp A merges with Ramp D, carrying I-76 northbound traffic onto I-295, and together re-form the three lane section of I-295 northbound.

Route 42 northbound consists of four 12' lanes with a 12' right shoulder and a concrete median barrier curb. Route 42 ends at the merge of Ramp E carrying traffic from I-295 northbound. At this point, Route 42 becomes I-295 northbound which continues to the Ramp A gore. At the gore, I-76 northbound begins for through-traffic while traffic heading to I-295 must exit onto Ramp A. Traffic traveling from Route 42 northbound to I-295 northbound must merge across the lanes created by Ramp E to exit onto Ramp A to continue onto I-295, as the lanes of Ramp E form part of the express and local lanes of I-76 northbound.

## ***2.2.3 I-295, I-76, Route 42 from the Northern Project Limit***

I-295 southbound consists of three 12' lanes with a 12' right shoulder. Approximately 1,000' south of the Bell Road overpass in Mt. Ephraim, the travel lanes diverge into Ramps B and C. Ramp B carries traffic to I-76 northbound lanes. Ramp C, also known as "Al-Jo's Curve," carries I-295 southbound through-traffic via Ramp H, while traffic to Route 42 exits from the left lane. Ramp G, carrying I-76 and Route 42 southbound traffic merges with Ramp H, re-forming the 3-lane southbound section of I-295.

I-76 southbound consists of four 12' lanes with a 12' shoulder. Ramp D carries traffic from I-76 to I-295 northbound. At the Ramp C merge, I-76 ends, becoming I-295 southbound. Traffic continuing on I-295 southbound exits at Ramp G, while through-traffic continues onto Route 42 southbound past the Ramp G exit. Traffic traveling on I-76 to Route 42 must stay in the right lane after the Ramp C merge, then move to the left lane across merging traffic from I-295 southbound to continue onto Route 42. Traffic continuing to I-295 southbound exits right onto Ramp H.

## **2.3 Purpose and Need**

### **2.3.1 Purpose**

The purpose of this project is to improve traffic safety, reduce traffic congestion and meet driver's expectations by improving the direct connection of the I-295 mainline and the interchange of I-295/I-76/Route 42.

### **2.3.2 Need**

There is a significant accident history at the interchange. The interchange's existing roadways include a number of geometric deficiencies that can be considered contributing factors to the high number of accidents. The deficiencies were identified from NJDOT record construction drawings and Structural Inventory and Appraisal (SI&A) Sheets.

#### *Improve Safety*

Accident data for the years 1995 through 2000 were reviewed. Since statewide accident rates were available for 1995, 1996, and 1999, a comparison of the accident rates on I-295, I-76 and Route 42 for these years was made with the statewide average.

During the 1995 to 1999 period, the I-295 roadway segments from M.P. 26.4 to M.P. 28.2 had accident rates over seven times the statewide average. Of these segments, M.P. 26.4 and 27.6 and M.P. 28 to 28.2, lengths that encompass the area of the interchange with Route 42 and I-76, had a substantially higher number of accidents than sections of I-295 immediately north and south of the interchange. For example, in 1995, M.P. 26.4 to 27.0 had almost seven times more accidents than the statewide average, while M.P. 26.8 to M.P. 27.1 had the most accidents in each of the analyzed years.

All six segments of Route 42 (from M.P. 13.2 to M.P. 14.28) had accident rates in excess of the statewide average. In 1996, four segments (from M.P. 13.45 to M.P. 14.28) had accident rates, per million vehicle miles, greater than the statewide average. In 1999, four segments (from M.P. 13.44 to M.P. 14.28) had accident rates, per million vehicle miles, greater than the statewide average. In the years 1995, 1996 and 1999, one segment had an accident rate four times the statewide average.

I-76 accident rates were similar to those of I-295 and Route 42 in the 1995-1999 time frame. For 1995, four segments (from M.P. 0.0 to M.P. 0.8) had accident rates which exceeded the statewide average. One segment had an accident rate twice the statewide average. In 1996 five segments (from M.P. 0.0 to M.P. 0.8) had accident rates greater than the statewide average, with one segment being three times the statewide average. On I-76 in 1999, three segments (from M.P. 0.0 to M.P. 0.53) had accident rates in excess of the statewide average. In 1999, one segment had an accident history four times greater than the statewide average. Segments that were over-represented, in all three years that were compared with statewide averages, were M.P. 0.0 to 0.3 and 0.3 to 0.5. These segments mainly encompass the area in which I-76 is combined with I-295.

#### *Geometric and Structural Deficiencies*

The existing interchange has numerous substandard geometric design elements. These include horizontal curvature, stopping sight distance, superelevation, shoulder widths and acceleration and deceleration lane lengths. These are present along I-295, I-76, Route 42 and ramps at various locations. Since a majority of the improvements will be on new alignments, these substandard features will be addressed as part of the project.

In addition to the geometric deficiencies noted above, several bridges within the interchange have been identified as structurally deficient or functionally obsolete due to substandard vertical and horizontal clearances. Once again, since a majority of the improvements will be on new alignments, these structures will be replaced as part of the project.

#### *Driver Expectations*

While there is a definite need to correct the geometric deficiencies in existing ramps and structures, driver expectations also play a large role in the high accident rates at the interchange and necessitate improved safety. The posted speed limits on the existing ramps that serve the through-traffic on I-295 are inconsistent with typical operating speeds on an interstate highway. The posted speed limit on all of the highway approaches to the interchange is 55 miles per hour (MPH). The 20 MPH discrepancy between the posted speed limits (and higher operating speeds) on the approach highways and the 35 MPH speed on the ramps can be considered as a contributing factor in the interchange's overall poor accident record.

#### *Operational Deficiencies*

The lack of a direct connection for through movement on I-295, significant weaving problems, deficient connecting ramps, and high volumes of traffic all result in operational deficiencies (or congestion) within and near the interchange. The operational deficiencies on I-295, I-76 and Route 42, particularly the queuing of traffic and poor Levels of Service (LOS) that cause excessive delays, impact not only regional traffic and commuters using the highways, but local arterials and neighborhood streets as well. Excessive delays at the interchange result in highway traffic exiting onto surrounding local arterials, thereby further adding to congestion in the region. The diverted traffic, in turn, causes congestion on local roads, compromises traffic and pedestrian safety, increases noise levels, and lowers air quality in the community, which disproportionately tax the capacity and life of local roadways.

The effective operation of any roadway network, be it highway, local arterial or street intersection, is measured by the LOS categories ranging from A to F. LOS A represents the most favorable operating conditions with little or no delay. LOS F is the worst operating condition occurring when demand volume exceeds the capacity of the roadway resulting in severe congestion. Specific sections of the interchange that experience a poor LOS (LOS E or F) are highlighted in Table 1. Of the eight ramps studied in detail, five operate at a LOS E or worse for at least one of the two peak hours (AM and PM).

In addition, a weaving condition exists on I-76/Route 42 between Ramp E and Ramp A. Traffic on Ramp E wishing to proceed north on I-76 must weave with traffic from northbound Route 42 proceeding north on I-295. Due to the volumes of traffic involved in this section of the interchange (specifically the high volume of traffic from Ramp E proceeding to Ramp A) this section of the roadway experiences failure. It should be noted that the traffic exiting Ramp E and proceeding on Ramp A is "through" traffic that could be expected to stay on mainline I-295 if a mainline section of the highway were available.

**Table 1 – Existing Level of Service**

Roadway/Ramp	Peak Hour Level of Service	
	AM	PM
<b>I-295 - Northbound</b>		
South of Interchange	D	C
North of Interchange	D	E
<b>I-295 - Southbound</b>		
South of Interchange	E	E
North of Interchange	C	C
<b>I-76 - Northbound</b>		
South of Interchange	n/a <sup>1</sup>	n/a <sup>1</sup>
North of Interchange	E	C
Express Lanes	D	B
<b>I-76 - Southbound</b>		
South of Interchange	n/a <sup>1</sup>	n/a <sup>1</sup>
North of Interchange	C	E
<b>Route 42 - Northbound</b>		
South of Interchange	D	C
North of Interchange	n/a <sup>1</sup>	n/a <sup>1</sup>
<b>Route 42 - Southbound</b>		
South of Interchange	B	D
North of Interchange	n/a <sup>1</sup>	n/a <sup>1</sup>
<b>Ramp A</b>	F	F
<b>Ramp B</b>	E	B
<b>Ramp C</b>	F	F
<b>Ramp D</b>	B	C
<b>Ramp E</b>	E	E
<b>Ramp F</b>	E	E
<b>Ramp G</b>	B	C
<b>Ramp H</b>	C	B

<sup>1</sup>Section of roadway does not exist (see Figure 1).

### 2.3.3 Goals and Objectives

A set of project goals and objectives has been developed based on the project’s purpose and needs described above, findings from previous studies, and goals developed during the partnering meetings on December 11-12, 2001. The goals and objectives are a compendium of statements made by the NJDOT, Federal Highway Administration (FHWA), agencies, local elected officials, residents, and other stakeholders in the project. As such, the goals and objectives are wide-ranging and represent different levels of priority for each stakeholder.

While the project may not be able to satisfy all goals and objectives listed herein, the preferred alternative seeks to address as many as possible. The project’s goals and objectives are as follows:

- Improve safety by constructing a roadway system that meets interstate standards for geometric design.
- Provide a direct connection for through-traffic on I-295 with a design speed consistent with that of the interchange's approach roadways.
- Reduce congestion on local arterials such as Route 168 and US 130 and decrease commuter traffic on neighborhood streets, thereby improving local traffic mobility, pedestrian safety, and the level of service on I-295. In addition, noise levels would decrease and air quality would improve.
- Enhance regional economic development by increasing overall mobility. In addition, the improved roadway network conforms to State and local development plans.
- Reduce the financial burden on State and local police and emergency services by decreasing the number of vehicle accidents.
- Avoid, minimize or mitigate environmental and cultural resource impacts.
- Preserve the quality of life of communities by minimizing relocations and acquisitions of private and public property.
- Enhance opportunities for other modes of transportation, including bicycle and pedestrian, within the project area.
- Provide opportunities for intermodal use within the project area.

## **2.4 Description of Alternatives**

The following section provides a description of the alternatives selected for further study. The alternatives were developed through a collaborative effort between stakeholder groups and were based on the objectives set forth in the project Purpose and Need statement. Graphics illustrating each alternative follow the narrative.

### **2.4.1 Alternative D**

Alternative D, shown in Figure 3, begins in the vicinity of the Grenloch Secondary Railroad Bridge over I-295. Mainline I-295 shifts slightly south and elevates to a third level viaduct over Browning Road and Route 42 and a second level viaduct over Ramp C. The roadway meets existing I-295 pavement north of the Creek Road overpass. The I-295 Alternative D alignment crosses I-76/Route 42 at a skew through an unused area of New St. Mary's Cemetery.

Vehicles on northbound Route 42, whose destination is I-295 northbound, exit on Ramp A. This ramp configuration, in conjunction with the new I-295 mainline alignment, eliminates the current substandard weaving condition with Ramp E at this location. Ramp A crosses under Ramp E and then crosses over Route 42 northbound before joining the elevated I-295 northbound alignment just north of Browning Road.

Ramp B provides the movement from southbound I-295 to northbound I-76. Ramp C provides the movement from southbound I-295 to southbound I-76/Route 42. Ramp B and Ramp C exit I-295 from the right. Ramp B follows a similar alignment to its existing one to meet I-76 northbound. Ramp C splits from Ramp B and crosses under Ramp D, I-76, Browning Road, and I-295 to connect with Route 42 north of the Creek Road Bridge.



- Ramp Designation
- Roadway
- Bridge
- Ramps for Missing Moves
- Roadway to be Removed



0 750 1,500 3,000 Feet

NEW JERSEY DEPARTMENT OF TRANSPORTATION

I-295 / I-76/ ROUTE 42  
 Direct Connection  
 Camden County  
 Figure 3  
 Alternative D



Ramp D is the move from I-76 southbound to I-295 northbound. Ramp D exits I-76 in much the same way that it does now. The Ramp D alignment crosses over I-76, over Ramp C, and under I-295 before merging with I-295 northbound south of Bell Road.

Northbound I-295 traffic heading north to I-76 utilizes Ramp E which follows essentially the same alignment as it does now.

Southbound I-76 traffic heading to I-295 southbound utilizes Ramp F. Ramp F diverts from I-76 from the right (existing exit is from the left), and then passes under Browning Road. Ramp F first runs parallel to Ramp C and then runs adjacent to I-295 southbound. Ramp F rises from a depressed section at Browning Road to an elevated section as it ties into I-295 southbound prior to Essex Avenue.

A summary of design features of this alternative are:

- Northbound and Southbound I-295 are side-by-side
- I-295 crosses over Route 42/I-76 on a viaduct on a skew
- I-295 on viaduct over Ramp C and Browning Road
- Ramp D on viaduct over I-76/Route 42, Ramp C and under I-295
- Two lane ramps except for Ramp F
- Removes express/local lanes on I-76 Westbound
- I-295 Posted Speed Limit: 55 mph (Design Speed: 60 mph)
- Ramp Speed Limits: 40 mph (Design Speed: 45 mph)

#### **2.4.2 Alternative D1**

Alternative D1, shown in Figure 4, is almost identical to Alternative D. The primary difference is the configuration of Ramps B and C. Ramp C exits I-295 southbound from the tangent section of I-295 southbound. Ramp B exits from the right approximately 1,000' later. Ramp B is on a new alignment south of its present location, but ties into I-76 at a similar location. Ramp C generally follows (within 150'±) the existing Ramp C alignment (Al Jo's curve) and passes under I-76 and Ramp F before merging with Route 42 southbound. The substandard radius on the existing Ramp C is replaced with a larger radius. Ramp D follows the same alignment as in Alternative D.

A summary of design features of this alternative are:

- Northbound and Southbound I-295 are side-by-side
- I-295 crosses over Route 42/I-76 on a viaduct on a skew
- I-295 on viaduct over Ramp C and Browning Road
- Ramp D on viaduct over I-76/Route 42 and under I-295
- Two lane ramps except for Ramp F
- Removes express/local lanes on I-76 Westbound
- I-295 Posted Speed Limit: 55 mph (Design Speed: 60 mph)
- Ramp Speed Limits: 40 mph (Design Speed: 45 mph)



-  - Ramp Designation
-  - Roadway
-  - Bridge
-  - Ramps for Missing Moves
-  - Roadway to be Removed



0 750 1,500 3,000 Feet

NEW JERSEY DEPARTMENT OF TRANSPORTATION

I-295 / I-76/ ROUTE 42  
 Direct Connection  
 Camden County  
 Figure 4  
 Alternative D1

### 2.4.3 *Alternative G2*

Alternative G2, shown in Figure 5, also begins in the vicinity of the Grenloch Secondary Railroad Bridge over I-295. The southbound and northbound lanes of I-295 align over top of each other as an over-and-under viaduct and shift south. The I-295 viaduct alignment is elevated to cross over all of the ramps as well as I-76 and Browning Road. I-295 crosses over I-76 on a skewed alignment and then diverges and lowers in elevation to meet the existing I-295 pavement following the same alignment as in Alternative D to a point just north of the Creek Road Bridge. I-295 southbound is a fourth level viaduct and northbound is a third level viaduct at the Route 42 and Browning Road crossings. I-295 southbound passes over Bell Road, whereas, I-295 northbound passes under Bell Road.

Vehicles on Route 42 whose destination is I-295 northbound, exit on Ramp A. Ramp A crosses under Ramp E and then crosses over Route 42 northbound before joining the elevated I-295 northbound alignment just north of Browning Road, similar to Alternative D.

Ramp B provides the movement from southbound I-295 to northbound I-76. Ramp C provides the movement from southbound I-295 to southbound Route 42. Ramps B and C exit I-295 from the right. Ramp B follows a similar alignment to its existing alignment to meet I-76 northbound. Ramp C crosses under Ramp D, I-76, Browning Road, and I-295 to connect with Route 42 north of the Creek Road Bridge.

Ramp D is the move from I-76 southbound to I-295 northbound. Ramp D exits I-76 in much the same way that it does now. The Ramp D alignment crosses over I-76, over Ramp C, and under I-295 before merging with I-295 northbound south of Bell Road.

Northbound I-295 traffic heading north on I-76 utilizes Ramp E which follows essentially the same alignment as it does now.

Southbound I-76 traffic heading to I-295 southbound utilizes Ramp F. Ramp F diverts from I-76 from the right (existing exit is from the left), and then passes under Browning Road. Ramp F first runs parallel to Ramp C and then runs adjacent to I-295 southbound. Ramp F rises from a depressed section at Browning Road to an elevated structure as it ties into I-295 southbound prior to Essex Avenue.

A summary of design features of this alternative are:

- Southbound I-295 placed above Northbound I-295 using a double-decker configuration
- I-295 crosses over Route 42/I-76 on a viaduct on a skew
- I-295 on viaduct over Ramp C and Browning Road
- I-295 on viaduct over Ramp D
- Ramp D on viaduct over I-76/Route 42 and Ramp C
- Two lane ramps except for Ramp F
- Removes express/local lanes on I-76 Westbound
- I-295 Posted Speed Limit: 55 mph (Design Speed: 60 mph)
- Ramp Speed Limits: 40 mph (Design Speed: 45 mph)



NEW JERSEY DEPARTMENT OF TRANSPORTATION

I-295 / I-76/ ROUTE 42  
 Direct Connection  
 Camden County  
 Figure 5  
 Alternative G2

#### **2.4.4 Alternative H1**

Alternative H1, shown in Figure 6, is almost identical to Alternative G2. The primary difference is the configuration of Ramps B and C. Ramps B and C exit from I-295 from the right. Ramp C generally follows (within 150'±) the existing Ramp C alignment (Al Jo's curve) and passes under I-76 and Ramp F before merging with Route 42 southbound. The substandard radius on the existing Ramp C is replaced with a larger radius. Ramp B splits from Ramp C to meet I-76 northbound.

A summary of design features of this alternative are:

- Southbound I-295 placed above Northbound I-295 using a double-decker configuration
- I-295 crosses over Route 42/I-76 on a viaduct on a skew
- I-295 on viaduct over Ramp C and Browning Road
- I-295 on viaduct over Ramp D
- Ramp D on viaduct over I-76/Route 42
- Two lane ramps except for Ramp F
- Removes express/local lanes on I-76 Westbound
- I-295 Posted Speed Limit: 55 mph (Design Speed: 60 mph)
- Ramp Speed Limits: 40 mph (Design Speed: 45 mph)

#### **2.4.5 Alternative K**

Alternative K makes I-295 a continuous direct-through alignment in the form of a tunnel beneath I-76/Route 42, as shown in Figure 7. Alternative K begins in the vicinity of the Grenloch Secondary Railroad Bridge over I-295. Mainline I-295 shifts slightly south and begins to descend at a 3.5%± grade close to New St. Mary's Cemetery. The road reaches a depth of 60' in the northwestern corner of New St. Mary's Cemetery, and a depth of 35' below the I-76/Route 42 pavement. The roadway begins to ascend at a 4% grade beside the baseball fields and is at grade to meet the I-295 pavement north of the Creek Road overpass.

Vehicles on northbound Route 42 whose destination is I-295 northbound, exit on Ramp A, which would be separated from, but parallel with, Route 42. This ramp configuration, in conjunction with the new I-295 mainline alignment, eliminates the current substandard weaving condition with Ramp E at this location. Ramp A then crosses under Ramp E before joining the depressed I-295 alignment north of Browning Road.

Ramp B provides the movement from southbound I-295 to northbound I-76. Ramp C provides the movement from southbound I-295 to southbound Route 42. Ramp C exits I-295 from the right and Ramp B exits from the right approximately 1,000' further. Ramp B follows a similar path but to the south of its existing location to meet I-76 northbound. Ramp C crosses over Ramps B and D, and I-76. Then Ramp C passes over Browning Road and I-295 to connect with Route 42 north of the Creek Road Bridge.

Ramp D is the move from I-76 southbound to I-295 northbound. Ramp D exits I-76 in much the same way that it does now. The Ramp D alignment crosses over I-76, under Ramp C, and over I-295 before merging with I-295 northbound south of Bell Road.



-  - Ramp Designation
-  - Roadway
-  - Bridge
-  - Ramps for Missing Moves
-  - Roadway to be Removed



0 750 1,500 3,000 Feet

NEW JERSEY DEPARTMENT OF TRANSPORTATION

I-295 / I-76/ ROUTE 42  
 Direct Connection  
 Camden County  
 Figure 6  
 Alternative H1



- Ramp Designation
- Roadway
- Bridge
- Ramps for Missing Moves
- Roadway to be Removed



0 750 1,500 3,000 Feet

NEW JERSEY DEPARTMENT OF TRANSPORTATION

I-295 / I-76 / ROUTE 42  
 Direct Connection  
 Camden County  
 Figure 7  
 Alternative K

Northbound I-295 traffic heading north on I-76 utilizes Ramp E which follows essentially the same alignment as it does now.

Southbound I-76 traffic heading to I-295 southbound utilizes Ramp F. Ramp F diverts from I-76 from the right (existing exit is from the left) and then passes under Browning Road. Ramp F first runs parallel to Ramp C and then runs adjacent to I-295 southbound. Ramp F rises from a depressed section at Browning Road to tie into I-295 southbound prior to Essex Avenue.

A summary of design features of this alternative are:

- Northbound and Southbound I-295 are side-by-side
- Mainline I-295 is a tunnel under I-76/Route 42 on a skew
- Ramp C on viaduct over Ramps B and D and I-76/Route 42
- Two lane ramps except for Ramp F
- Removes express/local lanes on I-76 Westbound
- I-295 Posted Speed Limit: 55 mph, (Design Speed: 60 mph)
- Ramp Speed Limits: 40 mph, (Design Speed: 45 mph)

Three local bridges are impacted by each of the alternatives. The Bell Road, Browning Road, and Creek Road bridges will be raised to provide proper vertical clearance and lengthened to accommodate the wider typical section of I-295 or I-76/Route 42. In addition, King's Highway will be lowered by approximately one foot under each alternative and Alternative K may require Essex Avenue to be lowered by approximately two feet.

#### **2.4.6 No Build Alternative**

This alternative proposes no changes to the existing interchange. Impacts to the project area will be evaluated in the same way as the other proposed alternatives, with the assessment of current conditions projected to the design year serving as the impact assessment for the no-build alternative. The no-build alternative serves as the benchmark to measure the costs and benefits of each build alternative evaluated.



### 3.0 CRITERIA FOR DETERMINING IMPACTS

#### 3.1 Overview

Certain critical factors affect noise and the way it is perceived by the human ear. Such factors include the acoustical level (noise), frequency and the length of the exposure period. The sound or noise level is measured in units of decibels (dB). Due to the complex manner in which the human ear functions, measurement of different noise sources does not always correspond to relative loudness or annoyances. Therefore, different scales have been developed to furnish guidance in evaluating the importance of different noise sources. The “A” weighted scale (units expressed as dBA) has been widely accepted for noise to compare well with human reactions.

A decrease in 10 decibels is perceived by the average listener as a reduction of noise by one-half, while an increase in 10 decibels is discerned as a doubling of noise levels. Under normal circumstances, a 3 decibel change is required for the average person to detect a difference without the use of instruments. A change in 5 decibels is considered to be a noticeable change.

The dBA descriptor can be applicable for noise levels at one single moment. Since very few noise sources are constant, an alternative way of describing noise over a period of time was needed. One way of describing fluctuating sound is to address it as if the noise occurred at a steady, unchanging level over a specific time period. For this condition, the widely used descriptor accepted to express noise levels has become the dBA  $L_{eq}$  or an A-weighted equivalent noise level. The dBA  $L_{eq}$  is the equivalent steady-state sound level, which in a specific period of time contains the same acoustic energy as the time-varying sound level during that same period. The  $L_{10}$  descriptor is used to describe the noise level exceeded 10% of the time. The Noise Abatement Criteria (NAC) has been established for both noise level descriptors (dBA  $L_{eq}$  and  $L_{10}$ ). Table 1 includes the threshold of noise interference levels and the NAC.

For purposes of the I-295/I-76/Route 42 Direct Connection project, the maximum A-weighted, one-hour equivalent sound level (dBA  $L_{eq}$ ) was selected as the appropriate descriptor to evaluate noise impacts.

#### 3.2 Explanation of Noise Impact Criteria

According to FHWA Guidance and current NJDOT Policy, a project-related noise impact occurs if either of the following conditions is met.

1. Predicted dBA  $L_{eq}$  noise levels approach or exceed the Noise Abatement Criteria (NAC) given in Table 1. Noise levels that approach the criteria are defined as occurring 1 dBA  $L_{eq}$  less than the NAC. As a result, impacts are quantified based on the following noise levels; Category B - 66 dBA  $L_{eq}$ , Category C – 71 dBA  $L_{eq}$  and Category E – 51 dBA  $L_{eq}$ .
2. A substantial increase in predicted noise levels over existing conditions, even though the impact criterion level is not reached. This increase is considered to be 10 dBA  $L_{eq}$  or greater, which is roughly a doubling or more of the perceived noise levels.

**TABLE 1  
THRESHOLD FOR NOISE INTERFERENCE AND  
NOISE ABATEMENT CRITERIA (dBA L<sub>eq</sub>)**

Activity Category	Threshold of Noise Interference		Noise Abatement Criteria		Description of Activity Category
	L <sub>10</sub>	dBA L <sub>eq</sub>	L <sub>10</sub>	dBA L <sub>eq</sub>	
A	48	45	60	57	Tracts of land which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, open spaces, or historic districts which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	58	55	70	67	Picnic areas, recreation areas, playgrounds, active sports areas, and (exterior) parks which are not included in Category A and residences, motels, public meeting rooms, schools, churches, libraries, and hospitals.
C	63	60	75	72	Developed lands, properties or activities not included in Categories A (exterior) or B above.
D	--	--	--	--	For requirements on undeveloped lands see paragraphs 11a and c of Federal Aid Highway Program Manual Volume 7, Chapter 7, Section 3.
E	43	40	55	52	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums (interior).

As detailed in Table 1, impacts are assessed based on land-use activity categories. Within this study area, Category B includes a wide range of land-use including residences, recreational areas (playgrounds, active sports areas, parks) and cemeteries. Due to the complexity of quantifying Category B impacts, residences are grouped separately based on single, dual and multi-family categories. The recreational areas (Shining Star Park, Mount Ephraim Girl's Softball League fields, Annunciation Regional School playground, Bellmawr Park Elementary School playground and baseball field, Bellmawr Baseball League fields and Scott E. Mueller Park) are grouped separately as Category B special-use properties. The cemeteries (New St. Mary's and Resurrection) are also quantified as Category B special-use properties. The commercial/industrial establishments are simply considered Category C land-use.

Schools and churches can be classified in Table 1 as either Category B or E land-use. For purposes of this study, impacts related to schools and churches were evaluated based on the interior Category E NAC (51 dBA  $L_{eq}$ ), since it is more conservative than the exterior Category B NAC (66 dBA  $L_{eq}$ ). As described within Appendix A (Preliminary and Final Noise Measurement Studies), building attenuation studies were performed at the Annunciation Regional School and Bellmawr Park Elementary School in several first and second floor classrooms. The building attenuation is calculated through numerical differences between interior (with windows open) and exterior measurements. Based on measurement data as well as building age, material and window coverage, the following building attenuation values were assumed for this project; Annunciation Regional School and Bellmawr Park Elementary School - 7 dBA  $L_{eq}$ , Annunciation B.V.M. Church Hall - 9 dBA  $L_{eq}$ , Bell Oaks School and Annunciation B.V.M. Church - 10 dBA  $L_{eq}$ .

In accordance with 23 CFR 772, noise levels were calculated for developed and proposed land-use that are planned, designed and programmed. Within the study area, proposed sensitive land-use includes one recreational area and one residential development. The recreational area includes a proposed field associated with the Mount Ephraim Girl's Softball League (located between Kings Highway and Linden Avenue), which has been approved and will be built. Therefore, three softball fields (one proposed, two existing) are assumed under 2030 future conditions. The proposed residential development, Bell Court, has been approved by Mount Ephraim but has yet to be constructed. The 24 lot sub-division is located along the southbound side of I-295 between the railroad bridge and Bell Road.

#### 4.0 MODELING METHODOLOGY

Information utilized for noise level prediction related to the I-295/I-76/Route 42 Direct Connection project includes:

1. electronic design plans, profiles and topographic maps,
2. existing and projected traffic volumes, vehicular classification percentages,
3. directional vehicular distributions and speeds,
4. information on land-use obtained from scaled plans, tax maps & on-site observations,
5. existing noise wall heights obtained from “as-built” drawings and,
6. noise measurement study and modeling analysis to describe existing noise levels.

Existing 2000 traffic data was obtained from the “**Traffic Report I-295/I-76/Route 42 Direct Connection**” document, prepared by Dewberry and Urbitran, dated March 2006. Existing traffic data included volumes and percentages that reflect the vehicular classifications on roadways within the study area. Vehicular classifications include cars and light trucks, medium trucks, heavy-duty trucks, commuter buses and motorcycles. Noise calculations were performed utilizing the approved FHWA Traffic Noise Model (TNM) Version 2.5, which is capable of predicting noise levels in the vicinity of highways. Other TNM2.5 model inputs include site specific information such as elevation of significant changes in topography as well as location and heights of building rows and tree zones.

Typically, noise levels drop during peak hour congestion, due to stop-and-go traffic conditions. Peak noise generally occurs when the roadways are operating at, or near Level of Service (LOS) C conditions. During this traffic condition, the roadways experience a maximum number of vehicles traveling at the speed limit. Therefore all future 2030 noise analyses were performed utilizing LOS C traffic (volume/speed) conditions and assumed construction of the **Missing Moves** project. Since LOS C traffic conditions (volumes/speeds) were utilized, the results of this noise analysis remain the same, with or without implementation of the **Missing Moves** project.

The approved noise prediction model, FWHA TNM2.5, is capable of accurately predicting noise levels under most conditions. Complex noise issues related to noise at the tunnel portals, as well as multiple reflections and deck penetration in areas of the double-decker viaduct, are conditions in which modeling techniques to-date are incapable of predicting. Noise wall degradation may be caused by multiple reflections within areas of parallel noise walls. It is assumed that modeling for these issues would be addressed under Final Design, should that particular alternative be chosen.

## 5.0 SUMMARY OF FINDINGS

### 5.1 Overview

This section includes a concise description of 2000 existing conditions within the I-295/I-76/Route 42 Direct Connection project study area. Detailed descriptions of 2030 “No-Build” and “Build” conditions for each alternative follow.

Under each alternative sub-section, residential Category B impacts are quantified based upon the number of structures as well as the total number of residential units (single, dual and multi-family). Total multi-family residential units were calculated based on 75 residential units within the Mount Ephraim Senior Housing building and four residential units within each Bellmawr Park Mutual Housing quad. In addition, there is one row of housing along Browning Road that consists of 23 individual residential units.

Several alternatives impact Category B special-use properties. For simplicity, a reference to the Bellmawr Baseball League fields infers that two (2) baseball fields possess noise levels that approach or exceed the Category B NAC. Any reference to the Scott E. Mueller Park infers that three hockey rinks and one baseball field approach or exceed the Category B NAC. In addition, the playground and baseball field associated with the Bellmawr Park Elementary School is quantified as being one recreational area.

The Annunciation B.V.M. Church grounds include the Annunciation B.V.M. Church and Church Hall, the Annunciation Regional School, a convent, rectory and playground. The Church, Church Hall and School are classified as Category E land-use, while the rectory, convent and playground are Category B. Since impacts differ between each alternative within this area, each land-use associated with the Annunciation B.V.M. Church is discussed separately.

### 5.2 2000 Existing Condition

To determine current peak noise levels, noise measurements were documented during summer and non-summer periods by NJDOT. Summer noise monitoring was performed at two locations on a Friday (8/11/00) and Sunday (8/13/00) in August of 2000. In addition, building attenuation studies were performed at two schools (Annunciation Regional and Bellmawr Park Elementary) during summer weekdays (8/15/00 and 8/16/00). Non-summer noise monitoring was performed during March and April of 2001 at ten sites within the project study area, including the two locations previously monitored during the summer. Twenty-four hour noise measurements were performed at four locations while commuting hour noise measurements were performed at the remaining five locations. Noise monitoring locations were generally focused in areas adjacent to proposed improvements. The “**Noise Measurement Study**” is included within Appendix A. Figures 8.1, 8.2 and 8.3 within Appendix A detail noise monitoring locations and peak hour noise levels. Several noise monitoring locations documented peak noise levels above the Category B NAC. The entire study area was field-verified for identification of sensitive receptors. After validation of the noise level prediction model, additional receptors representing sensitive land-use within the project study area were modeled.

Under the 2000 existing condition, 52 single-family, 11 dual-family (22 total units) and 8 multi-family (103 total units) residential structures possess noise levels that approach or exceed the Category B NAC. This yields a total of 177 residential units with unacceptable noise levels,

including the Mount Ephraim Senior Housing building. In addition, three Category B special-use properties, including one cemetery (New St. Mary's) and two recreational areas, incur noise levels that approach or exceed the NAC. The recreational areas include baseball fields associated with both the Bellmawr Park Elementary School and the Bellmawr Baseball League. Interior noise levels approach or exceed the Category E NAC within two schools (Annunciation Regional and Bellmawr Park Elementary) and two public-use buildings (Church and Church Hall), associated with the Annunciation B.V.M. Church. There are seven commercial/industrial establishments which possess existing noise levels that approach or exceed the Category C NAC.

### **5.3 Projected 2030 “No-Build” Condition**

For the 2030 “No-Build” condition, noise levels were modeled utilizing LOS C traffic conditions with existing site geometry, thus eliminating the **NJDOT Missing Moves** project has no bearing on results within. The analysis documented 101 single-family, 21 dual-family (42 total units) and 9 multi-family (126 total units) residential structures predicted to incur noise levels that approach or exceed the Category B NAC. Among the single-family residential structures is a rectory associated with the Annunciation B.V.M. Church as well as a portion of the approved Bell Court sub-division, which has yet to be constructed. Multi-family structure impacts include the Mount Ephraim Senior Housing building as well as several Bellmawr Park Mutual Housing quads. Thus, a total of 131 residential structures (269 total units) are predicted to possess noise levels that approach or exceed the Category B NAC under the 2030 “No-Build” condition. Special-use properties expected to possess noise levels that approach or exceed the Category B NAC include one cemetery (New St. Mary's) and two recreational areas (Bellmawr Park Elementary School baseball field and the Bellmawr Baseball League fields).

Four public-use buildings are predicted to possess interior noise levels above the Category E NAC, including two schools (Annunciation Regional and Bellmawr Park Elementary) and two Annunciation B.V.M. structures (Church and Church Hall). Eleven commercial/industrial establishments are predicted to possess noise levels that approach or exceed the Category C NAC. Generally, noise levels increased by 1 to 4 dBA  $L_{eq}$  over 2000 existing conditions. The resultant 66 dBA  $L_{eq}$  contour is shown in Figures 9.1, 9.2 and 9.3 in Appendix B.

### **5.4 Projected 2030 “Build” Condition**

Noise modeling was performed for the 2030 “Build” condition (all alternatives) utilizing LOS C traffic conditions, thus eliminating the **NJDOT Missing Moves** project has no bearing on results within. Several structure acquisitions, as well as removal of certain existing noise wall segments, are proposed under each alternative. The Harrison-Glover House (New St. Mary's Cemetery) would be considered a commercial structure and is acquired consistently throughout each alternative.

FHWA requires quantification of noise impacts based on the alternative as well as removed noise wall segments. The first FHWA impact criterion is based upon whether or not noise levels at specific land-use receptor locations approach or exceed the NAC. A substantial change in future “Build” noise levels over “existing” is the basis of the second criterion. Table 2 details the total number of impacts under each 2030 “Build” alternative. A description of impacts related to each alternative follows, along with a comparison of total impacts under 2000 Existing, 2030 “No-Build” and 2030 “Build” (Alternatives D, D1, G2, H1 and K) conditions (Table 3).

**TABLE 2  
SUMMARY OF IMPACTS  
2030 “BUILD” (ALTERNATIVES D, D1, G2, H1, K)**

FHWA Land-Use Category	Land-Use Descriptions	Number of Impacts				
		Alt. D	Alt. D1	Alt. G2	Alt. H1	Alt. K
B	Residential (Single-family)	145 (1)	147 (1)	151 (4)	153 (4)	147
B	Residential (Dual-family total units)	48	48	72 (1)	72 (1)	38
B	Residential (Multi-family total units)	146	146	150	150	142
B	Cemetery	New St. Mary’s and Resurrection				
B	Recreational Area	<ul style="list-style-type: none"> <li>• Bellmawr Park Elementary School Playground and Baseball Field</li> <li>• Bellmawr Baseball League Fields</li> <li>• Scott E. Mueller Park</li> </ul>	<ul style="list-style-type: none"> <li>• Bellmawr Park Elementary School Playground and Baseball Field</li> <li>• Bellmawr Baseball League Fields</li> <li>• Scott E. Mueller Park</li> <li>• Annunciation Regional School (playground)</li> <li>• Mount Ephraim Girl’s Softball Field</li> </ul>	<ul style="list-style-type: none"> <li>• Bellmawr Park Elementary School Playground and Baseball Field</li> <li>• Bellmawr Baseball League Fields</li> <li>• Scott E. Mueller Park</li> </ul>	<ul style="list-style-type: none"> <li>• Bellmawr Park Elementary School Playground and Baseball Field</li> <li>• Bellmawr Baseball League Fields</li> <li>• Scott E. Mueller Park</li> <li>• Annunciation Regional School (playground)</li> <li>• Mount Ephraim Girl’s Softball Field</li> </ul>	<ul style="list-style-type: none"> <li>• Bellmawr Park Elementary School Playground and Baseball Field</li> <li>• Bellmawr Baseball League Fields</li> <li>• Scott E. Mueller Park</li> </ul>
E	School	Bellmawr Park Elementary, Annunciation Regional and Bell Oaks				
E	Church	Annunciation B.V.M. (Church and Church Hall)				
C	Commercial/Industrial	11	11	15	15	10

Note: (#) Number of additional impacts due to noise level increase of at least 10 dBA L<sub>eq</sub> above “existing” condition

### **5.4.1 Alternative D**

The Alternative D alignment would require eight structure acquisitions, including six residential units (one single-family, one multi-family and four dual-family) and two commercial/industrial establishments, including the Harrison-Glover House. In addition, segments of four existing noise walls would require removal due to the proposed roadway alignment. Structure acquisitions and noise wall removal segments are detailed in Figures 10.1.1, 10.1.2 and 10.1.3 within Appendix B.

Based on the first FHWA criterion, noise modeling resulted in a total of 145 single-family, 24 dual-family (48 total units) and 14 multi-family (146 total units) residential structures predicted to possess noise levels that approach or exceed the Category B NAC. This yields a total of 183 residential structure (339 total units) impacts, including the Mount Ephraim Senior Housing building, a rectory associated with the Annunciation B.V.M. Church, and a portion of the approved Bell Court sub-division, which has yet to be constructed. Five Category B special-use properties are predicted to incur noise levels that approach or exceed the NAC, including two cemeteries (New St. Mary's and Resurrection) and three recreational areas. The recreational areas include the Bellmawr Park Elementary School (playground and baseball field), the Bellmawr Baseball League fields and the Scott E. Mueller Park. Predicted Category E NAC (interior) impacts include three schools (Bellmawr Park, Annunciation Regional and Bell Oaks) and two Annunciation B.V.M. buildings (Church and Church Hall). The impacts associated with the Resurrection Cemetery, Scott E. Mueller Park and the Bell Oaks School result from proposed removal of an existing noise wall segment along I-295 northbound between Bell Road and Route 168. There are 11 commercial/industrial establishments predicted to possess noise levels that approach or exceed the Category C NAC.

According to the second FHWA criterion, a total of 16 single-family homes and one recreational area (Scott E. Mueller Park) are predicted to incur noise levels 10 dBA  $L_{eq}$  above "existing" conditions. With the exception of one single-family residence (Block 80, Lot 10.01), these impacts have been previously quantified since overall noise levels approach or exceed the NAC. The 17 impacts are located within two separate neighborhoods, both of which are currently protected by noise wall segments that would require removal due to the alignment. One neighborhood is near Ramp E (Bellmawr Park Mutual Housing), while the other is located along I-295 northbound (between Bell Road and Route 168). The 2030 "Build" Alternative D 66 dBA  $L_{eq}$  noise contour is displayed within Figures 10.1.1, 10.1.2 and 10.1.3 in Appendix B.

### **5.4.2 Alternative D1**

Alternative D1 differs from the Alternative D alignment in that Ramp C (I-295 southbound to Route 42 southbound) follows an alignment similar to Al-Jo's curve. Therefore, the impacts remain the same as Alternative D, except within the area near Little Timber Creek. The alignment requires the same structure acquisitions as Alternative D; six residential units (one single-family, one multi-family and four dual-family) and two commercial/industrial establishments, including the Harrison-Glover House. Segments of four existing noise walls would require removal due to the proposed roadway alignment. The removal segments are the



same as Alternative D, with the exception of a segment along Ramp C, near the Mount Ephraim Girls Softball fields. Structure acquisitions and noise wall removal segments are detailed in Figures 10.2.1, 10.2.2 and 10.2.3 within Appendix B.

Analysis of the first FHWA criterion resulted in a total of 147 single-family, 24 dual-family (48 total units) and 14 multi-family (146 total units) residential structures predicted to possess noise levels that approach or exceed the Category B NAC. This yields a total of 185 residential structure (341 total units) impacts. Among these impacts include the Mount Ephraim Senior Housing building, a rectory and convent associated with the Annunciation B.V.M. Church and a portion of the approved Bell Court sub-division, which has yet to be constructed. Seven Category B special-use properties are expected to possess noise levels that approach or exceed the NAC. Among these are two cemeteries (New St. Mary's and Resurrection) and five recreational areas. The recreational areas include a proposed Mount Ephraim Girls Softball League field, the Annunciation Regional School playground, the Bellmawr Park Elementary School (playground and baseball field), Bellmawr Baseball League fields and the Scott E. Mueller Park. The proposed Mount Ephraim Girls Softball League field is predicted to incur noise levels above the Category B NAC due to a segment of an existing noise wall that requires removal along Ramp C. Predicted Category E NAC (interior) impacts include three schools (Bellmawr Park, Annunciation Regional and Bell Oaks) and two Annunciation B.V.M. buildings (Church and Church Hall). The impacts within Alternative D1 remain the same as with Alternative D, except for the area near Ramp C. Within this area, Alternative D1 creates four additional impacts; two residential and two recreational. The residential impacts include one single-family home along King's Highway and the convent associated with Annunciation B.V.M. Church. The recreational impacts include the proposed Mount Ephraim Girl's Softball field and the Annunciation Regional School playground. As within Alternative D, the impacts associated with the Resurrection Cemetery, Scott E. Mueller Park and the Bell Oaks School result from proposed removal of an existing noise wall segment along I-295 northbound between Bell Road and Route 168. There are 11 commercial/industrial establishments predicted to incur noise levels that approach or exceed the Category C NAC.

Similar to Alternative D, 16 single-family homes and one recreational area (Scott E. Mueller Park) are predicted to incur noise levels 10 dBA  $L_{eq}$  above "existing" conditions, based on the second FHWA criterion. These impacts have been previously quantified as NAC impacts, except for one single-family residence (Block 80, Lot 10.01). The 17 impacts are located within the same neighborhoods as in Alternative D; one near Ramp E (Bellmawr Park Mutual Housing), the other along I-295 northbound (between Bell Road and Route 168). Both of these neighborhoods are currently protected by noise wall segments that require removal due to the alignment. The 2030 "Build" Alternative D1 66 dBA  $L_{eq}$  noise contour is displayed within Figures 10.2.1, 10.2.2 and 10.2.3 in Appendix B.

### **5.4.3 Alternative G2**

The Alternative G2 alignment would require three structure acquisitions, including one single-family residential unit, one multi-family residential unit and the Harrison-Glover House (commercial). The four existing noise wall segments requiring removal are in the exact same locations as Alternatives D and K. The main difference with this alternative is the use of a

double-decker roadway. The alignment proposes I-295 southbound over I-295 northbound, resulting in additional impacts further into certain neighborhoods than documented with Alternatives D, D1 and K. Structure acquisitions and noise wall removal segments are detailed in Figures 10.3.1, 10.3.2 and 10.3.3 within Appendix B.

Based on the first FHWA criterion, noise modeling resulted in a total of 151 single-family, 36 dual-family (72 total units) and 15 multi-family (150 total units) residential structures predicted to possess noise levels that approach or exceed the Category B NAC. This yields a total of 202 residential structure (373 total units) impacts, including the Mount Ephraim Senior Housing building, a rectory associated with the Annunciation B.V.M. Church and a portion of the approved Bell Court sub-division, which has yet to be constructed. Five Category B special-use properties are predicted to possess noise levels that approach or exceed the NAC, including two cemeteries (New St. Mary's and Resurrection) and three recreational areas. The recreational areas include the playground and baseball field at the Bellmawr Park Elementary School, Bellmawr Baseball League fields and the Scott E. Mueller Park. Predicted Category E NAC (interior) impacts include three schools (Bellmawr Park, Annunciation Regional and Bell Oaks) and two Annunciation B.V.M. buildings (Church and Church Hall). The proposed removal of an existing noise wall segment along I-295 northbound between Bell Road and Route 168 causes the impacts associated with the Resurrection Cemetery, Scott E. Mueller Park and the Bell Oaks School. There are 15 commercial/industrial establishments predicted to possess noise levels that approach or exceed the Category C NAC.

According to the second FHWA criterion, a total of 23 single-family homes, three dual-family homes and one recreational area (Scott E. Mueller Park) are predicted to incur noise levels 10 dBA  $L_{eq}$  above "existing" conditions. With the exception of five residential structures, the remaining impacts have been previously quantified since overall noise levels approach or exceed the NAC. The five additional structures (four single-family and one dual-family) are located along I-295 northbound, within the Borough of Bellmawr. Four single-family homes are impacted due to removal of an existing noise wall segment along I-295 northbound between Bell Road and Route 168. The dual-family structure impact is located within the neighborhood along I-295 northbound (between New St. Mary's Cemetery and Bell Road) which would experience a significant impact under this alternative. Although the existing noise wall protecting this neighborhood does not require removal, the wall fails to provide adequate protection due to the proposed double-decker roadway alignment. The 2030 "Build" Alternative G2 66 dBA  $L_{eq}$  noise contour is displayed within Figures 10.3.1, 10.3.2 and 10.3.3 in Appendix B.

#### **5.4.4 Alternative H1**

The Alternative H1 design is essentially the same as G2, except that Ramp C (I-295 southbound to Route 42 southbound) follows an alignment similar to Al-Jo's curve. Therefore, the impacts remain similar to Alternative G2, except within the area near Little Timber Creek. This alignment would require the same three structure acquisitions as Alternative G2; one single-family residential unit, one multi-family residential unit and the Harrison-Glover House (commercial). Segments of four existing noise walls would require removal due to the proposed roadway alignment. The removal segments are the same as Alternative D1 which includes a segment along Ramp C (adjacent to the Mount Ephraim Girl's Softball fields). Structure

acquisitions and noise wall removal segments are detailed in Figures 10.4.1, 10.4.2, 10.4.3 within Appendix B.

Analysis of the first FHWA criterion resulted in a total of 153 single-family, 36 dual-family (72 total units) and 15 multi-family (150 total units) residential structures predicted to possess noise levels that approach or exceed the Category B NAC. This yields a total of 204 residential structure (375 total units) impacts, including the Mount Ephraim Senior Housing building, a rectory and convent associated with the Annunciation B.V.M. Church and a portion of the approved Bell Court sub-division, which has yet to be constructed. Seven Category B special-use properties are predicted to incur noise levels that approach or exceed the NAC. Among these are two cemeteries (New St. Mary's and Resurrection) and five recreational areas. The recreational areas include the proposed Mount Ephraim Girls Softball League field, a playground and baseball field at the Bellmawr Park Elementary School, the Bellmawr Baseball League fields, Annunciation Regional School playground and the Scott E. Mueller Park. The proposed Mount Ephraim Girls Softball League field is predicted to incur noise levels above the Category B NAC due to a segment of an existing noise wall that requires removal along Ramp C. Predicted Category E NAC (interior) impacts include three schools (Bellmawr Park, Annunciation Regional and Bell Oaks) and two Annunciation B.V.M. buildings (Church and Church Hall). The impacts within Alternative H1 remain the same as with Alternative G2, except for the area near Ramp C. Within this area, Alternative H1 has four additional impacts; two residential and two recreational. The residential impacts include one single-family home along King's Highway and the convent associated with Annunciation B.V.M. Church. The recreational impacts include the proposed Mount Ephraim Girl's Softball field and the Annunciation Regional School playground. The impacts associated with the Resurrection Cemetery, Scott E. Mueller Park and the Bell Oaks School result from proposed removal of an existing noise wall segment along I-295 northbound between Bell Road and Route 168. There are 15 commercial/industrial establishments predicted to possess noise levels that approach or exceed the Category C NAC.

Similar to Alternative G2, 23 single-family homes, three dual-family homes and one recreational area (Scott E. Mueller Park) are predicted to incur noise levels 10 dBA  $L_{eq}$  above "existing" conditions based on the second FHWA criterion. These impacts have been previously quantified since the overall predicted noise level approaches or exceeds the NAC, with the exception of five residential structures. These additional structures (four single-family and one dual-family) are located along I-295 northbound, within the Borough of Bellmawr. As mentioned within the Alternative G2 section, the four single-family homes are impacted due to removal of an existing noise wall segment along I-295 northbound between Bell Road and Route 168. The dual-family structure is located within the neighborhood along I-295 northbound (between New St. Mary's Cemetery and Bell Road) which would experience a significant impact under Alternatives G2 and H1. Although the existing noise wall protecting this neighborhood does not require removal, the wall fails to provide adequate protection due to the proposed double-decker roadway alignment. The 2030 "Build" Alternative H1 66 dBA  $L_{eq}$  noise contour is displayed within Figures 10.4.1, 10.4.2 and 10.4.3 in Appendix B.

#### 5.4.5 *Alternative K*

Under the Alternative K design, proposed I-295 north and southbound roadways are depressed in the form of a tunnel underneath I-76 and Route 42. The alignment would require eight structure acquisitions, including six residential units (one single-family, one multi-family and four dual-family) and two commercial/industrial establishments, including the Harrison-Glover House. In addition, segments of four existing noise walls (same segments as Alternative D and G2) would require removal due to the proposed roadway alignment. Structure acquisitions and noise wall removal segments are detailed in Figures 10.5.1, 10.5.2 and 10.5.2 within Appendix B.

Based on the first FHWA criterion, noise modeling resulted in a total of 147 single-family, 19 dual-family (38 total units) and 13 multi-family (142 total units) residential structures predicted to possess noise levels that approach or exceed the Category B NAC. This yields a total of 179 residential structure (327 total units) impacts, including the Mount Ephraim Senior Housing building, a rectory associated with the Annunciation B.V.M. Church and a portion of the approved Bell Court sub-division, which has yet to be constructed. Five Category B special-use properties are predicted to incur noise levels that approach or exceed the NAC, including two cemeteries (New St. Mary's and Resurrection) and three recreational areas. The recreational areas include the playground and baseball field at the Bellmawr Park Elementary School, Bellmawr Baseball League fields and the Scott E. Mueller Park. Predicted Category E NAC (interior) impacts include three schools (Bellmawr Park, Annunciation Regional and Bell Oaks) and two Annunciation B.V.M. buildings (Church and Church Hall). The impacts associated with the Resurrection Cemetery, Scott E. Mueller Park and the Bell Oaks School result from proposed removal of an existing noise wall segment along I-295 northbound between Bell Road and Route 168. There are 10 commercial/industrial establishments predicted to possess noise levels that approach or exceed the Category C NAC.

According to the second FHWA criterion, a total of 18 single-family homes and two recreational areas (Bellmawr Baseball League facility and the Scott E. Mueller Park) are predicted to incur noise levels 10 dBA  $L_{eq}$  above "existing" conditions. All of these impacts have been previously quantified since overall noise levels approach or exceed the NAC. The 18 impacted homes and one recreational area (Scott E. Mueller Park) are located within two separate neighborhoods, both of which are currently protected by noise wall segments that would require removal due to the alignment. One neighborhood is near Ramp E (Bellmawr Park Mutual Housing), while the other is located along I-295 northbound (between Bell Road and Route 168). The Bellmawr Baseball League facility is predicted to possess a noise level increase of 10 dBA  $L_{eq}$  above "existing" conditions due to acceleration noise associated with the significant upward slope of I-295 (vehicles exiting the tunnel). The 2030 "Build" Alternative K 66 dBA  $L_{eq}$  noise contour is displayed within Figures 10.5.1, 10.5.2 and 10.5.3 in Appendix B.

**TABLE 3  
SUMMARY OF IMPACTS  
2000 EXISTING, 2030 “NO-BUILD” AND 2030 “BUILD” (ALTERNATIVES D, D1, G2, H1, K)**

FHWA Land-Use Category	Land-Use Descriptions	Impact Criterion	Number of Impacts						
			2000 Existing	2030 “No-Build”	2030 “Build”				
					Alt. D	Alt. D1	Alt. G2	Alt. H1	Alt. K
B	Residential (Single-family)	NAC	52	101	145	147	151	153	147
		10 dBA Above “Existing”	-	-	1	1	4	4	0
B	Residential (Dual-family)	NAC	22	42	48	48	72	72	38
		10 dBA Above “Existing”	-	-	0	0	1	1	0
B	Residential (Multi-family)	NAC	103	126	146	146	150	150	142
B	Cemetery	NAC	1	1	2	2	2	2	2
B	Recreational Area	NAC	2	2	3	5	3	5	3
E	School	NAC	2	2	3	3	3	3	3
E	Church	NAC	2	2	2	2	2	2	2
C	Commercial/Industrial	NAC	7	11	11	11	15	15	10
TOTAL			191	287	361	365	403	407	347

## **6.0 TRAFFIC NOISE MITIGATION**

Noise mitigation measures must be considered when noise impacts have been predicted. The FHWA recognizes five (5) methods of mitigation, which need to be addressed. The abatement strategies for mitigating traffic noise impacts are listed within this section.

### **6.1 Traffic Management**

Alternate traffic routing schemes, prohibiting specific types of vehicles from using I-295, I-76 or Route 42, as well as limiting speeds would be considered a traffic management strategy. However, these roadways are necessary routes for vehicles (passenger and commercial). In addition, a reduction in travel speeds of 10 miles per hour (mi/hr) would result in an unrecognizable decrease in noise levels and reduce capacities. Applying these types of restrictions would be contradictory to the purpose of the proposed project and are not viable options for noise mitigation.

### **6.2 Roadway Alignment Alterations**

Changing vertical and horizontal alignments in the roadway by, either increasing or decreasing roadway elevations or shifting the roadway horizontal geometry, would help block noise in some situations. Several proposed designs include necessary vertical and horizontal alignment improvements along I-295 and associated ramps. Due to the complexity of roadway geometry, changing roadway alignment specifically for mitigation purposes is not feasible.

### **6.3 Property Acquisition**

Buffer zones (using unimproved property) can be created between sensitive receptors and the roadway to reduce noise levels. The areas adjacent to project-related residential impacts are not substantial enough to provide the necessary buffer zone required to reduce noise levels.

### **6.4 Sound Proofing**

Specific public-use buildings can be insulated to mitigate NAC Category E noise impacts. There are five Category E land-use facilities within this study area; the Annunciation B.V.M. Church and Church Hall, the Annunciation Regional School, the Bellmawr Park School and the Bell Oaks School. The Annunciation B.V.M Church and Church Hall are air conditioned, thus mitigation is not necessary. Since the three schools within the study area are not air conditioned, mitigation was investigated.

Under all alternatives, noise walls were designed to protect the Annunciation Regional School, the Bellmawr Park Elementary School and the Bell Oaks School. Since an adequate reduction in noise levels at the Annunciation Regional School could not be obtained, air conditioning is recommended at this school (all alternatives).

Although cost-effective noise walls in the areas of Bellmawr Park Elementary School and Bell Oaks School provide exterior mitigation, the walls do not provide the required interior protection. Therefore, air-conditioning is also recommended at the Bellmawr Park Elementary School (all alternatives) and Bell Oaks School (Alternatives G2 & H1 only). Under Final Design, the feasibility of air conditioning within these schools will be determined.

## 6.5 Noise Walls

Noise walls are effective means of mitigating noise impacts adjacent to roadways. Noise modeling for the 2030 “Build” condition under all alternatives has identified several areas of impact. Within each alternative, designs were investigated for new noise walls as well as replacement wall segments.

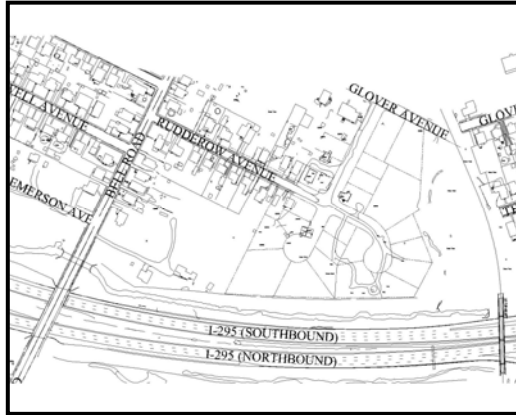
In areas of new noise walls, designs followed The NJDOT Highway Traffic Noise Policy, addressing “Eligibility Criteria for Consideration of Noise Abatement” (2003). Utilizing a construction cost of \$50/ft<sup>2</sup>, the Department will consider a cost of up to \$50,000 per benefited residence for a new noise wall. Severe noise impacts (“Build” noise levels over 76 dBA L<sub>eq</sub> or a 20 dBA L<sub>eq</sub> increase over existing level) are allowed \$55,000 per benefited residence. The maximum height allowable for a new noise wall is 18 feet.

A “benefited residence” (primary benefit) is a dwelling unit that results in at least a 5 dBA L<sub>eq</sub> noise level reduction with a noise wall, and is predicted to possess resultant noise levels below the NAC. A “supplemental benefit” is a dwelling unit that results in at least a 5 dBA L<sub>eq</sub> noise level reduction, however, is not predicted to possess “Build” noise levels above the NAC before mitigation. A one-half (1/2) weighting (\$25,000) can be utilized for supplemental benefits.

A project-specific methodology for quantifying benefits within cemeteries and recreational areas was utilized. Distance measurements within adjacent neighborhoods were divided by the number of homes within that area to gain an average lot frontage. Frontage lengths of cemeteries or recreational areas were individually divided by the average lot frontage to obtain the number of benefited residences within these special-use areas.

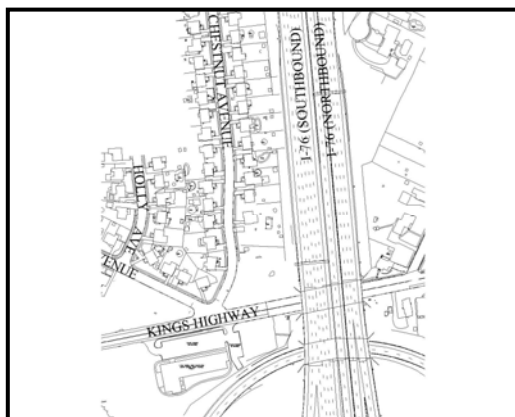
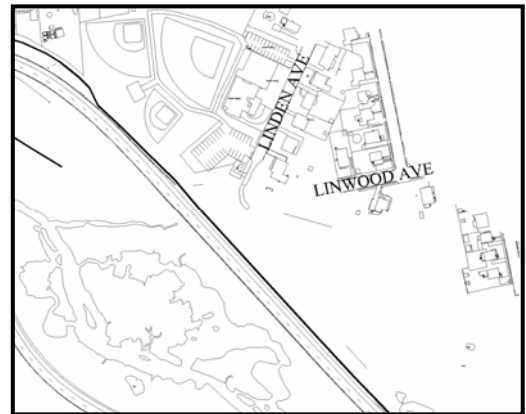
Several existing noise walls, designed under an earlier Noise Policy, exceed the current height limit of 18 feet. The earlier policy also allowed for a design criteria of 64 dBA L<sub>eq</sub>. The current noise walls provide considerable protection; therefore more effort is required to mitigate noise levels under each 2030 “Build” alternative. For areas where existing noise wall segments would require removal to accommodate the highway design, NJDOT will consider “in kind” replacement noise wall designs that exceed the current NJDOT Traffic Noise Policy. NJDOT will consider providing future 2030 “Build” noise levels that are comparable to “No-Build”. A cost per benefited residence for replacement noise wall segments was established at \$100,000 for these special cases.

In total, ten areas were investigated for noise wall mitigation. Some alternatives did not require noise wall designs in all areas. For simplicity, new noise walls and replacement noise wall segments were named relative to the mitigation area. Figure 11, within Appendix C details areas in which mitigation was investigated throughout the alternatives. The following is a brief description of the investigated noise mitigation areas:



*Area 1* is located along I-295 southbound and is bordered to the north by a railroad bridge and to the south by Bell Road. The proposed residential development (Bell Court) has gained sub-division approval by Mount Ephraim, however the exact locations of the structures within each lot are unknown. Under all alternatives, **new** noise wall(s) were investigated to protect the existing and future residential dwellings in this area.

*Area 2* is located along the existing I-295 Al-Jo's curve, adjacent to the Mount Ephraim Girls Softball League fields. In the future, an additional athletic field is proposed directly behind the existing noise wall. Under Alternatives D1 and H1 only, the ramp redesign requires removal of an existing noise wall segment directly adjacent to the proposed field. A **replacement** noise wall segment was investigated to protect the future baseball field within this area. In order to determine cost-effectiveness, an average lot frontage calculation was utilized. Although another segment of this noise wall to the north requires removal for wetlands mitigation under Alternatives D, G2 and K, replacement is not proposed since there are no anticipated impacts.



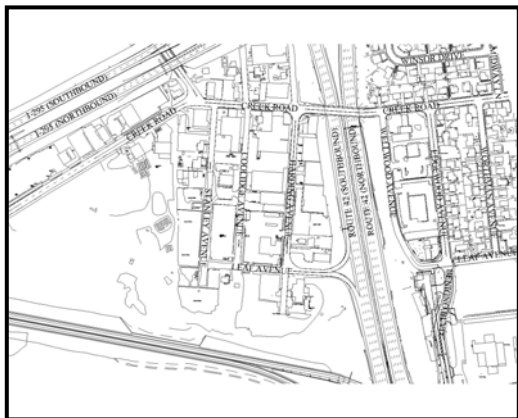
*Area 3* is located along I-76 southbound at Kings Highway. Under all alternatives, an existing noise wall segment would need to be removed to accommodate proposed roadway improvements. A **replacement** noise wall segment was investigated to protect the exterior common-use area of the Mount Ephraim Senior Housing building as well as several residences along Kings Highway. Although the exterior common-use area and lower level apartments within the Mount Ephraim Senior Housing building will experience a reduction in noise levels, upper level residential units may not.





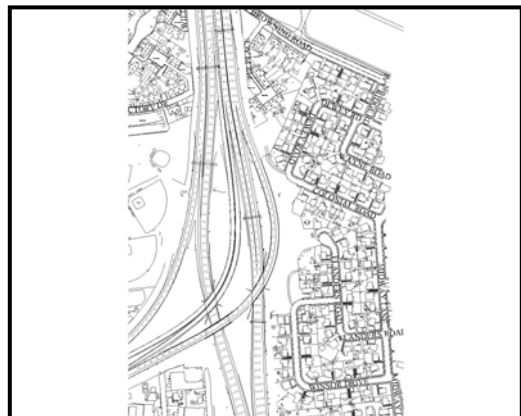
**Area 4** is located along I-76 southbound, just north of Browning Road. **New** noise walls were investigated to protect interior noise levels within the Annunciation B.V.M. Church and Church Hall as well as the Annunciation Regional School. The Church and Church Hall are air conditioned, however the School is not.

**Area 5** is located west of the I-295/I-76/Route 42 interchange from Browning Road to Essex Avenue. **New** noise walls were investigated to protect the Bellmawr Park Mutual Housing Development, the Bellmawr Park Elementary School (associated playground and baseball field) and the Bellmawr Baseball League fields. Depending on the alternative, one to three noise walls are proposed. To calculate cost-effectiveness of walls protecting the baseball fields, the number of benefited residences was based on an average lot frontage along the School and Little League baseball fields.



**Area 6** is bordered between I-295 to the west, I-76 to the east and the Missing Moves to the south. This area is mainly commercial/industrial establishments with few residential dwellings. Under each alternative, **new** noise walls were investigated in this area.

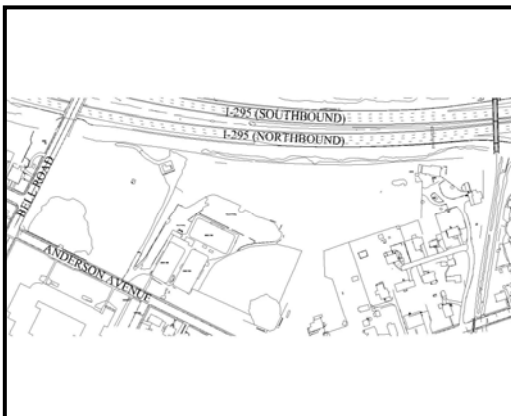
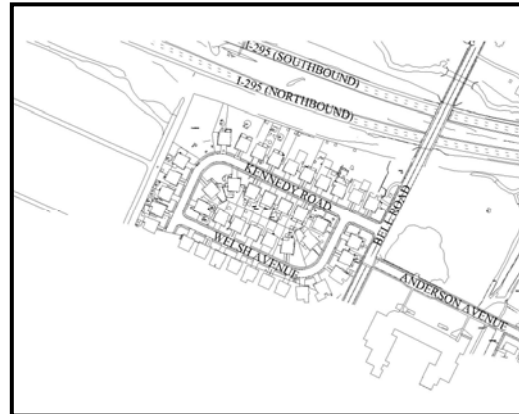
**Area 7** is located east of the I-295/I-76/Route 42 interchange from approximately Creek Road to Browning Road. An existing noise wall segment would be removed under all alternatives. Replacement noise wall segments were investigated to protect residential dwellings within this area. Three to five **replacement** noise walls are proposed, depending on the alternative evaluated.





**Area 8** includes the New St. Mary's Cemetery along I-295 northbound, north of Browning Road. Under all alternatives, the Harrison-Glover House would be acquired. **New** noise walls were investigated to protect this area. Depending on the alternative, one to three noise walls are proposed. An average lot frontage calculation was utilized to determine the cost-effectiveness of the walls.

**Area 9** includes a residential neighborhood off of Bell Road currently protected by an existing noise wall. Due to the stacked alternatives (G2 & H1), noise levels behind this existing noise wall increase. **Replacement** noise walls were investigated to enhance noise mitigation within this area under Alternative G2 and H1 only.



**Area 10** is located along I-295 northbound between Bell Road and the railroad bridge. Due to roadway improvements proposed under all alternatives, a large segment of the existing noise wall would be removed. **Replacement** noise walls were investigated under all alternatives. Depending on the alternative, one to two walls are proposed. In order to determine cost-effectiveness, an average lot frontage calculation within the Scott E. Mueller Park was utilized. The walls also mitigate noise levels within the Resurrection Cemetery and at several residences.

### 6.5.1 *Alternative D*

Under Alternative D, cost-effective mitigation is recommended in six areas. The recommended noise wall designs include new and replacement noise wall segments totaling \$11.2M. New walls comply with the current NJDOT noise wall policy, while replacement noise wall segments are designed to approach “in-kind” effectiveness of existing noise walls. Mitigation efforts for each area are described below. In addition, Table 4.1 (new walls) and Table 4.2 (replacement walls) summarize noise walls proposed under Alternative D.

**Area 1:** A ground-mounted noise wall is proposed along I-295 southbound from the railroad bridge to Bell Road. The **I-295 SB Ground Wall** ranges from 8 to 14 feet in height and is 1,468 feet long. The wall is designed to protect a proposed residential development (Bell Court) as well as several residential units along Rudderow Avenue and Bell Road. Utilizing a construction cost of \$50/ft<sup>2</sup>, this **new** noise wall totals \$896,250 and is expected to produce 22 residential benefits (primary), which equates to a cost of \$40,739 per benefit.

**Area 2:** Under Alternative D, there are no anticipated noise impacts due to the proposed removal segment within this area. Therefore, a **replacement** noise wall investigation was not necessary.

**Area 3:** A **replacement** noise wall segment that ties into an adjacent existing noise wall is proposed along Ramp D. This replacement segment, 678 feet long and 17 to 19 feet high, is designed to protect the exterior common-use at the Mount Ephraim Senior Housing building. Utilizing a construction cost of \$50/ft<sup>2</sup>, the **Ramp D Structure to Ground Wall** totals \$620,650. Based upon the occupancy (75 units), this wall equates to \$8,275 per benefited resident (75 primary benefits). In addition, this noise wall protects two single-family residential structures along King’s Highway.

**Area 4:** Although a **new** noise wall was investigated to protect interior noise levels within the Annunciation Regional School, this is not a feasible option. Due to the location of Ramp C under Alternative D, a 5 dBA L<sub>eq</sub> insertion loss could not be obtained. In addition, noise levels within the school could not be reduced below the interior Category E NAC standard. Therefore, a noise wall is not a recommended mitigation method for the Annunciation Regional School.

**Area 5:** Dual noise walls are proposed to protect Bellmawr Park Mutual Housing, the Bellmawr Park Elementary School grounds (playground and baseball field) and the Bellmawr Little League fields. The **Ramp F Ground Wall** is 1,977 feet long and 14 to 18 feet high, while the **I-295 SB Structure Wall** is 1,056 feet long and 10 to 13 feet high. The combined cost of both **new** noise walls total \$2,181,800, which equates to \$31,620 per benefit (64 primary, 10 supplemental benefits).

**Area 6:** Although a **new** noise wall is required to protect the homes within this predominantly commercial/industrial area, this is not a reasonable mitigation option. A noise wall was investigated along Ramp E, stretching 1,105 feet in length and 13 feet in height. Utilizing a construction cost of \$50/ft<sup>2</sup>, a wall in this area totals \$718,250. Only one benefited residence was obtained, therefore the cost per benefit (\$718,250) exceeds the \$50,000 allowable by NJDOT.

**Area 7:** Since Alternative D significantly impacts this neighborhood, four **replacement** noise walls are proposed. The **Ramp E Structure to Ground Wall** (958 feet long, 15-23 feet high) and the **Ramp E Ground Wall** (228 feet long and 18 feet high) essentially replace the removed existing noise wall segments and tie into adjacent existing noise walls. Since the Alternative D alignment proposes I-295 and Ramp A as viaducts over Browning Road, an effort beyond simply replacing the removed existing noise wall segments was necessary to approach an “in-kind” effectiveness of existing noise walls. The **Ramp A Structure Wall** (1,489 feet long and 19-23 feet high) and the **I-295 NB Structure Wall** (1,032 feet long and 13 feet high) combined with the segments along Ramp E yield all but three residential units predicted to experience noise levels comparable to “No-Build” conditions. The combined cost of the walls is \$3,555,500, which equates to \$74,073 per benefited residence (42 primary, 12 supplemental benefits).

**Area 8:** Dual noise walls are proposed to protect the New St. Mary’s Cemetery. The **I-295 NB Ground Wall**, located along the cemetery right-of-way, is 2,629 feet in length and ranges from 11 to 15 high. The **I-295 NB Structure Wall** is 747 feet long and 15 feet high. The ground-mounted wall ties into an adjacent existing noise wall, while the structure wall ties into the wall proposed for Area 8 (Ramp A Structure Wall). The combined costs of both **new** walls total \$2,286,850, which is \$41,579 based upon an estimated 55 benefits (primary) within the cemetery.

**Area 9:** Under Alternative D, additional mitigation is not necessary within this area since the existing wall continues to protect the homes.

**Area 10:** A ground-mounted **replacement** noise wall segment is proposed along I-295 northbound. This wall, which is 1,333 feet long and 18 to 25 high, ties into an adjacent existing noise wall segment. The **I-295 NB Ground Wall** protects several residences along Snyder Avenue, Collett Court, the Scott E. Mueller Park, Bell Oaks School (interior) and a portion of the Resurrection Cemetery. In addition, all receivers are expected to possess noise levels comparable to “No-Build” conditions. The total cost of the wall is \$1,650,100, equaling \$64,710 per benefit (22 primary, 7 supplemental benefits).

Proposed walls are detailed within Table 4.1 (new walls) and Table 4.2 (replacement walls). Noise wall locations, heights and the resultant 66 dBA  $L_{eq}$  noise contour are detailed within Figures 12.1.1, 12.1.2 and 12.1.3 within Appendix C.

**TABLE 4.1  
SUMMARY OF NEW NOISE WALLS-ALTERNATIVE D**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Benefits
1	I-295 SB Ground Wall	1,468	8-14	\$896,250	\$40,739	5-10	22 Primary
5	Ramp F Ground Wall	1,977	14-18	\$2,181,800	\$31,620	5-13	64 Primary 10 Supplemental
	I-295 SB Structure Wall	1,056	10-13				
8	I-295 NB Ground Wall	2,629	11-15	\$2,286,850	\$41,579	5-12	55 Primary
	I-295 NB Structure Wall	747	15				

**TABLE 4.2  
SUMMARY OF REPLACEMENT NOISE WALL SEGMENTS-ALTERNATIVE D**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Receivers Above "No-Build" <sup>1</sup>	Number of Benefits
3	Ramp D Structure to Ground Wall	678	17-19	\$620,650	\$8,275	5	N/A	75 Primary
7	Ramp E Structure to Ground Wall	958	15-23	\$3,555,500	\$74,073	5-13	3	42 Primary 12 Supplemental
	Ramp E Ground Wall	228	18					
	Ramp A Structure Wall	1,489	19-23					
	I-295 NB Structure Wall	1,032	13					
10	I-295 NB Ground Wall	1,333	18-25	\$1,650,100	\$64,710	5-11	0	22 Primary 7 Supplemental

1 – Number of receivers with predicted noise levels above “No-Build” conditions with mitigation

### 6.5.2 *Alternative D1*

Cost-effective mitigation is recommended in seven areas under Alternative D1. A total of \$11.5M of noise wall designs, including new and replacement noise wall segments, are proposed. New walls comply with the current NJDOT noise wall policy, while replacement noise wall segments are designed to approach “in-kind” effectiveness of existing noise walls. Mitigation efforts for each area are described below. In addition, Table 5.1 (new walls) and Table 5.2 (replacement walls) summarize noise walls proposed under Alternative D1.

**Area 1:** The design proposed within this area is similar to the noise wall recommended under Alternative D1. The **I-295 SB Ground Wall** ranges from 8 to 14 feet in height and is 1,468 feet long. The wall is designed to protect a proposed residential development (Bell Court) as well as several residential units along Rudderow Avenue and Bell Road. Utilizing a construction cost of \$50/ft<sup>2</sup>, this **new** noise wall totals \$896,250 and is expected to produce 21 residential benefits (primary), which equates to a cost of \$42,679 per benefit.

**Area 2:** Since removal of an existing noise wall segment along Ramp C under Alternative D1 would impact a proposed softball field associated with Mount Ephraim Girl’s Softball, a **replacement** noise wall segment is proposed. The required ground-mounted wall along Ramp C ties into adjacent existing noise wall segments. The **Ramp C Ground Wall** is 408 feet long and 13 to 18 feet high. Utilizing a construction cost of \$50/ft<sup>2</sup>, the wall totals \$324,000, which equates to \$54,000 per benefit (six total primary benefits), which was established based on an average lot frontage calculation along the removed segment.

**Area 3:** A **replacement** noise wall segment that ties into an adjacent existing noise wall is proposed along the Ramp D and Ramp C right-of-way. This replacement segment, 697 feet long and 17 to 18 feet high, is designed to protect the exterior common-use at the Mount Ephraim Senior Housing building and three single-family residential structures along King’s Highway. Utilizing a construction cost of \$50/ft<sup>2</sup>, the **Ramp D Structure to Ground Wall** totals \$624,900. Based upon the occupancy (75 units), this wall is \$8,332 per benefited resident (75 primary benefits).

**Area 4:** Although a **new** noise wall was investigated to reduce interior noise levels within the Annunciation Regional School, this is not a feasible option. With a noise wall designed along Ramp C, a 5 dBA L<sub>eq</sub> insertion loss was obtained, however interior noise levels within the school remained above the Category E NAC. Therefore, a noise wall is not a recommended mitigation method for the Annunciation Regional School.

**Area 5:** The design proposed within this area is similar to the walls proposed under Alternative D. Dual noise walls are required to protect Bellmawr Park Mutual Housing, the Bellmawr Park Elementary School grounds and the Bellmawr Little League fields. The **Ramp F Ground Wall** is 1,977 feet long and 14-18 feet high, while the **I-295 SB Structure Wall** is 1,056 feet long and 10-13 feet high. The combined cost of both **new** noise walls total \$2,181,750, which equates to \$33,565 per benefit (60 primary, 10 supplemental benefits).

**Area 6:** Although a **new** noise wall was investigated to protect the homes within this predominantly commercial/industrial area, this is not a reasonable mitigation option. A noise

wall was investigated along Ramp E, stretching 1,105 feet in length and 13 feet in height. Utilizing a construction cost of \$50/ft<sup>2</sup>, a wall in this area totals \$718,250. Since only one benefited residence was obtained, the cost per benefit (\$718,250) exceeds the \$50,000 allowable by NJDOT.

**Area 7:** The design proposed within this area is similar to the walls proposed under Alternative D (four **replacement** noise walls). The **Ramp E Structure to Ground Wall** (958 feet long, 15-23 feet high) and the **Ramp E Ground Wall** (228 feet long and 18 feet high) essentially replace the removed existing noise wall segments and tie into adjacent existing noise walls. Due to the proposed I-295 and Ramp A viaducts over Browning Road, additional noise walls are necessary to approach an “in-kind” replacement within this neighborhood. The **Ramp A Structure Wall** (1,489 feet long and 19-23 feet high) and the **I-295 NB Structure Wall** (1,032 feet long and 13 feet high) combined with the segments along Ramp E result in all but three residential units predicted to experience noise levels comparable to “No-Build” conditions. The combined cost of the walls is \$3,555,550, which equates to \$74,074 per benefited residence (42 primary, 12 supplemental benefits).

**Area 8:** The dual noise walls proposed to protect New St. Mary’s Cemetery under Alternative D1 are similar to the walls proposed under Alternative D. The **I-295 NB Ground Wall**, located along the right-of-way within the cemetery, is 2,629 feet in length and ranges from 11 to 15 high. The **I-295 NB Structure Wall** is 747 feet long and 15 feet high. The ground-mounted wall ties into an adjacent existing noise wall, while the structure wall ties into the wall proposed for Area 8 (Ramp A Structure Wall). The combined cost of both **new** walls total \$2,286,850, which is \$41,579 based upon an estimated 55 benefits (primary) within the cemetery.

**Area 9:** Under Alternative D1, additional mitigation is not necessary within this area since the existing wall continues to protect the homes.

**Area 10:** The design proposed within this area is similar to the wall proposed under Alternative D. The ground-mounted **replacement** noise wall segment along I-295 northbound, which ties into an adjacent existing noise wall, is 1,333 feet long and 18 to 25 high. The **I-295 NB Ground Wall** protects several residences along Snyder Avenue, Collett Court, the Scott E. Mueller Park, Bell Oaks School (interior) and a portion of the Resurrection Cemetery. In addition, all receivers are expected to possess noise levels comparable to “No-Build” conditions. The total cost of the wall is \$1,650,100, equaling \$64,710 per benefit (22 primary, 7 supplemental).

Proposed walls are detailed within Table 5.1 (new walls) and Table 5.2 (replacement walls). Noise wall locations, heights and the resultant 66 dBA L<sub>eq</sub> noise contour are detailed within Figures 12.2.1, 12.2.3 and 12.2.3 within Appendix C.

**TABLE 5.1  
SUMMARY OF NEW NOISE WALLS-ALTERNATIVE D1**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Benefits
1	I-295 SB Ground Wall	1,468	8-14	\$896,250	\$42,679	5-10	21 Primary
5	Ramp F Ground Wall	1,977	14-18	\$2,181,750	\$33,565	5-13	60 Primary 10 Supplemental
	I-295 SB Structure Wall	1,056	10-13				
8	I-295 NB Ground Wall	2,629	11-15	\$2,286,850	\$41,579	5-12	55 Primary
	I-295 NB Structure Wall	747	15				

**TABLE 5.2  
SUMMARY OF REPLACEMENT NOISE WALL SEGMENTS-ALTERNATIVE D1**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Receivers Above “No-Build” <sup>1</sup>	Number of Benefits
2	Ramp C Ground Wall	408	13-18	\$324,000	\$54,000	8	N/A	6 Primary
3	Ramp D Structure to Ground Wall	697	17-18	\$624,900	\$8,332	5-8	N/A	75 Primary
7	Ramp E Structure to Ground Wall	958	15-23	\$3,555,550	\$74,074	5-13	3	42 Primary 12 Supplemental
	Ramp E Ground Wall	228	18					
	Ramp A Structure Wall	1,489	19-23					
	I-295 NB Structure Wall	1,032	13					
10	I-295 NB Ground Wall	1,333	18-25	\$1,650,100	\$64,710	5-11	0	22 Primary 7 Supplemental

1 – Number of receivers with predicted noise levels above “No-Build” conditions with mitigation



### 6.5.3 *Alternative G2*

Under Alternative G2, cost-effective mitigation is recommended in five areas. The recommended noise wall designs include new and replacement noise wall segments totaling \$12.7M. New walls comply with the current NJDOT noise wall policy, while replacement noise wall segments are designed to approach “in-kind” effectiveness of existing noise walls. Mitigation efforts for each area are described below. In addition, Table 6.1 (new walls) and Table 6.2 (replacement walls) summarize noise walls proposed under Alternative G2.

**Area 1:** Two **new** noise walls were investigated to protect a proposed residential development (Bell Court) and several residential units along Rudderow Avenue and Bell Road, which were not cost-effective. The design included a ground wall (571 feet in length and 16 to 17 feet in height), and a structure wall (1,676 feet long and 11 to 14 feet high). Utilizing a construction cost of \$50/ft<sup>2</sup>, the walls total \$1,575,800, yielding \$55,291 per benefit (26 primary, 5 supplemental), which exceeds the \$50,000 allowable limit set forth by NJDOT.

**Area 2:** Under Alternative G2, there are no anticipated noise impacts due to the proposed segment removal and thus a **replacement** noise wall investigation was not necessary.

**Area 3:** The design in this area is similar to the wall designed under Alternative D. The recommended **replacement** noise wall segment ties into an adjacent existing noise wall along Ramp D. This replacement segment, 678 feet long and 17 to 19 feet high, is designed to protect the exterior common-use at the Mount Ephraim Senior Housing building and two single-family residential structures along King’s Highway. Utilizing a construction cost of \$50/ft<sup>2</sup>, the **Ramp D Structure to Ground Wall** totals \$620,650. Based upon the occupancy (75 units), this wall is \$8,275 per benefited resident (75 primary benefits).

**Area 4:** Although a **new** noise wall was investigated along Ramp C to protect the interior of the Annunciation Regional School, this is not a feasible option. A 5 dBA L<sub>eq</sub> insertion loss could not be obtained and interior noise levels could not be reduced below the Category E NAC.

**Area 5:** Three noise walls are proposed to protect several Bellmawr Park Mutual Housing residences, the Bellmawr Park Elementary School grounds and the Bellmawr Little League fields. The **Ramp F Ground to Structure Wall** is 1,911 feet long and 10 to 18 feet high, the **I-295 NB Ground to Structure Wall** is 1,179 and 13 to 18 feet high, and the **I-295 SB Structure Wall** is 1,288 feet long and 9 to 11 feet high, which totals \$3,116,950. Based upon an average lot frontage calculation within the baseball fields, the cost per benefit of these **new** walls is \$50,273 (62 total primary benefits). Since four “severe” noise impacts occur within this area (two dual-family homes), a \$50,323 cost per benefit was allowed. Four Bellmawr Park Mutual Housing residential impacts (one dual and three multi-family) remain, due to the double-decker roadway alignment.

**Area 6:** Although a **new** noise wall was investigated to protect the homes within this predominantly commercial/industrial area, this is not a reasonable mitigation option. A noise wall was investigated along Ramp E, stretching 1,105 feet in length and 13 feet in height. Utilizing a construction cost of \$50/ft<sup>2</sup>, a wall in this area totals \$718,250. Since only two

benefited residences were obtained, the cost per benefit (\$359,125) exceeds the \$50,000 allowable limit set forth by NJDOT.

**Area 7:** Since Alternative G2 significantly impacts this neighborhood, five **replacement** noise walls are proposed. The **Ramp E Structure to Ground Wall** (958 feet long, 13-23 feet high) and the **Ramp E Ground Wall** (228 feet long and 17-18 feet high) essentially replace the removed existing noise wall segments. Both of these walls tie into adjacent existing noise walls. Since both I-295 (double-decker) and Ramp A traverse over Browning Road, an effort beyond replacing the removed existing noise wall segments was necessary to approach an “in-kind” effectiveness of existing walls. The **Ramp A Structure Wall** (1,489 feet long and 19-23 feet high) as well as the **I-295 NB Structure Wall** (1,030 feet long and 12 feet high) and **I-295 SB Structure Wall** (1,186 feet long and 12 feet high) are proposed in addition. This design complies with the project-specific cost-effective guidelines for replacement walls, however a total 39 residential units are predicted to experience noise levels above “No-Build” conditions. The combined cost of the walls total \$4,197,800 which equates to \$99,948 per benefited residence (38 primary, 8 supplemental).

**Area 8:** Since Alternative G2 proposes I-295 southbound over I-295 northbound throughout the limits of the New St. Mary’s Cemetery, three **new** noise walls are proposed. The **I-295 NB Ground Wall**, located along the right-of-way within the cemetery, is 2,629 feet in length and ranges from 8 to 15 feet high. The **I-295 NB Structure Wall** is 555 feet long and 11 feet high, while the **I-295 SB Structure Wall** is 1,184 feet long and 10 feet high. The ground-mounted wall ties into an adjacent existing noise wall, while the structure walls tie into Area 8 walls (Ramp A Structure Wall and I-295 SB Structure Wall). The combined costs total \$2,494,350 which is \$49,887, based upon an estimated 50 benefits (primary) within the cemetery. Three mausoleums along Browning Road remain impacted after mitigation and there is one area within the Cemetery (just north of the mausoleums) that experiences noise levels approaching the NAC.

**Area 9:** The existing noise wall performs poorly under Alternative G2 and supplemental walls do not provide additional mitigation, due to the location of the homes relative to the double-decker roadway. A significant effort was made, however a design obtaining a 5 dBA  $L_{eq}$  reduction could not be obtained.

**Area 10:** In order to provide “in-kind” effectiveness of existing noise walls within this area, dual **replacement** noise walls are proposed. The **I-295 NB Ground Wall** is 1,333 feet long and 18 to 25 high, while the **I-295 SB Structure wall** is 702 feet long and 18 feet high. Together, these walls protect several residences along Snyder Avenue, Collett Court, the Scott E. Mueller Park, and a portion of the Resurrection Cemetery. The walls do not provide adequate protection to reduce interior noise levels at the Bell Oaks School to below the NAC. In addition, 17 residential structures are expected to possess noise levels above “No-Build” conditions. The total cost of the wall is \$2,281,950, which equates to \$97,104 per benefit (22 primary, 3 supplemental).

Proposed walls are detailed within Table 6.1 (new walls) and Table 6.2 (replacement walls). Noise wall locations, heights and the resultant 66 dBA  $L_{eq}$  noise contour are detailed within Figures 12.3.1, 12.3.2 and 12.3.3 within Appendix C.

**TABLE 6.1  
SUMMARY OF NEW NOISE WALLS-ALTERNATIVE G2**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Benefits
5	Ramp F Ground to Structure Wall	1,911	10-18	\$3,116,950	\$50,273*	5-13	62 Primary
	I-295 NB Ground to Structure Wall	1,179	13-18				
	I-295 SB Structure Wall	1,288	9-11				
8	I-295 NB Ground Wall	2,629	8-15	\$2,494,350	\$49,887	5-11	50 Primary
	I-295 SB Structure Wall	1,184	10				
	I-295 NB Structure Wall	555	11				

\*Cost effective under NJDOT Policy for receivers predicted to possess “Build” noise levels above 76 dBA (L<sub>eq</sub>)

**TABLE 6.2  
SUMMARY OF REPLACEMENT NOISE WALL SEGMENTS-ALTERNATIVE G2**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Receivers Above “No-Build” <sup>1</sup>	Number of Benefits
3	Ramp D Structure to Ground Wall	678	17-19	\$620,650	\$8,275	5	N/A	75 Primary
7	Ramp E Structure to Ground Wall	958	13-23	\$4,197,800	\$99,948	5-13	39	38 Primary 8 Supplemental
	Ramp E Ground Wall	228	17-18					
	Ramp A Structure Wall	1,489	19-23					
	I-295 NB Structure Wall	1,030	12					
	I-295 SB Structure Wall	1,186	12					
10	I-295 NB Ground Wall	1,333	18-25	\$2,281,950	\$97,104	5-8	17	22 Primary 3 Supplemental
	I-295 SB Structure Wall	702	18					

1 – Number of receivers with predicted noise levels above “No-Build” conditions with mitigation

#### 6.5.4 *Alternative H1*

Cost-effective mitigation is recommended in seven areas under Alternative H1. A total of \$13M of noise wall designs, including new and replacement noise wall segments, are proposed. New walls comply with the current NJDOT noise wall policy, while replacement noise wall segments are designed to approach “in-kind” effectiveness of existing noise walls. Mitigation efforts for each area are described below. In addition, Table 7.1 (new walls) and Table 7.2 (replacement walls) summarize noise walls proposed under Alternative H1.

**Area 1:** As with Alternative G2, a **new** noise wall in this area is not cost-effective. In order to mitigate residential impacts, both ground (571 feet long and 16 to 17 feet high) and structure (1,676 feet long and 11 to 14 feet high) walls along I-295 southbound are necessary, which total \$1,575,800. This cost yields \$55,291 per benefit, (26 primary, 5 supplemental), which exceeds the \$50,000 allowable limit set forth by NJDOT.

**Area 2:** As with Alternative D1, a **replacement** noise wall segment (**Ramp C Ground Wall**), ties into adjacent existing noise walls. The segment is 408 feet long and 13 to 18 feet high and protects the proposed softball field associated with Mount Ephraim Girl’s Softball League. Utilizing a construction cost of \$50/ft<sup>2</sup>, the segment totals \$324,000, which equates to \$54,000 per benefit (six total primary benefits), based on an average lot frontage calculation.

**Area 3:** The **replacement** noise wall segment in this area is similar to the segment proposed under Alternative D1. The **Ramp D Structure to Ground Wall** (697 feet long and 17 to 18 feet high) protects the exterior common-use at the Mount Ephraim Senior Housing building and three single-family residential structures along King’s Highway. Utilizing a construction cost of \$50/ft<sup>2</sup>, the replacement segment, which ties into an adjacent wall (Ramp D), totals \$624,900. Based upon the occupancy (75 units), this wall is \$8,332 per benefited resident (75 primary benefits).

**Area 4:** Although a **new** noise wall was investigated along Ramp C to protect the Annunciation Regional School interior, it is not recommended. A 5 dBA L<sub>eq</sub> insertion loss was obtained, however interior noise levels within the school remain above the Category E NAC.

**Area 5:** The **new** noise wall designs in this area are similar to the walls proposed Alternative G2. Three noise walls protect several Bellmawr Park Mutual Housing residences, the Bellmawr Park Elementary School grounds and the Bellmawr Little League fields. The **Ramp F Ground Wall** is 1,911 feet long and 10 to 18 feet high, the I-295 NB Ground to Structure Wall is 1,179 and 13 to 18 feet high, and the **I-295 SB Structure Wall** is 1,288 feet long and 9-11 feet high, which totals \$3,116,950. Based upon an average lot frontage calculation within the baseball fields, the cost per benefit is \$50,273 (62 total primary benefits). Since four “severe” noise impacts occur within this area (two dual-family homes), a \$50,323 cost per benefit was allowed. Four Bellmawr Park Mutual Housing residences (one dual and three multi-family), could not be mitigated due to the double-decker roadway alignment.

**Area 6:** Although a **new** noise wall design was investigated to protect the homes within this predominantly commercial/industrial area, this is not a reasonable mitigation option. A noise wall investigated along Ramp E (1,105 feet in length and 13 feet in height) was estimated at

\$718,250. Since only two benefited residences were obtained, the cost per benefit (\$359,125) exceeds the \$50,000 allowable limit set forth by NJDOT.

**Area 7:** The design proposed within this area is similar to the walls proposed under Alternative G2 (five **replacement** walls). The **Ramp E Structure to Ground Wall** (958 feet long, 13-23 feet high) and the **Ramp E Ground Wall** (228 feet long and 17-18 feet high) essentially replace the removed existing noise wall segments. Both of these walls tie into adjacent existing noise walls. Since both I-295 (double-decker) and Ramp A traverse over Browning Road, an effort beyond replacing the removed existing noise wall segments was necessary to approach an “in-kind” effectiveness of existing walls. The **Ramp A Structure Wall** (1,489 feet long and 19-23 feet high) as well as the **I-295 NB Structure Wall** (1,030 feet long and 12 feet high) and **I-295 SB Structure Wall** (1,186 feet long and 12 feet high) are proposed in addition to the segments along Ramp E. This design complies with the project-specific cost-effective guidelines for replacement walls, however a total of 38 residential units are predicted to experience noise levels above “No-Build” conditions. The combined cost of the walls is \$4,197,800 which equates to \$97,623 per benefited residence (40 primary, 6 supplemental).

**Area 8:** The **new** noise wall designs proposed for New St. Mary’s Cemetery are similar to the walls proposed under Alternative G2. The **I-295 NB Ground Wall**, located along the right-of-way within the cemetery, is 2,629 feet in length and ranges from 8 to 15 feet high. The **I-295 NB Structure Wall** is 555 feet long and 11 feet high, while the **I-295 SB Structure Wall** is 1,184 feet long and 10 feet high. The ground-mounted wall ties into an adjacent existing noise wall, while the structure walls ties into the Area 8 walls (Ramp A Structure Wall and I-295 SB Structure Wall). The combined costs of the three walls total \$2,494,350 which is \$49,887 based upon an estimated 50 primary benefits within the cemetery. Three mausoleums along Browning Road remain impacted after mitigation and there is one area within the Cemetery (just north of the mausoleums) that experiences noise levels approaching the NAC.

**Area 9:** The existing noise wall performs poorly under Alternative H1 and supplemental walls do not provide additional mitigation, due to the location of the homes relative to the double-decker roadway. A significant effort was made, however a design obtaining a 5 dBA  $L_{eq}$  reduction could not be obtained.

**Area 10:** The dual **replacement** noise walls proposed within this area are similar to the walls proposed under Alternative G2. The **I-295 NB Ground Wall** is 1,333 feet long and 18 to 25 feet high, while the **I-295 SB Structure wall** is 702 feet long and 18 feet high. Together, these walls protect several residences along Snyder Avenue, Collett Court, the Scott E. Mueller Park, and a portion of the Resurrection Cemetery. The walls do not provide adequate protection to reduce interior noise levels at the Bell Oaks School to below the NAC. In addition, 17 residential structures are expected to possess noise levels above “No-Build” conditions. The total cost of the wall is \$2,281,950, equaling \$97,104 per benefit (22 primary, 3 supplemental).

Proposed walls are detailed within Table 7.1 (new walls) and Table 7.2 (replacement walls). Noise wall locations, heights and the resultant 66 dBA  $L_{eq}$  noise contour are detailed within Figures 12.4.1, 12.4.2 and 12.4.3 within Appendix C.

**TABLE 7.1  
SUMMARY OF NEW NOISE WALLS-ALTERNATIVE H1**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Benefits
5	Ramp F Ground to Structure Wall	1,911	10-18	\$3,116,950	\$50,273*	5-13	62 Primary
	I-295 NB Ground to Structure Wall	1,179	13-18				
	I-295 SB Structure Wall	1,288	9-11				
8	I-295 NB Ground Wall	2,629	8-15	\$2,494,350	\$49,887	5-11	50 Primary
	I-295 SB Structure Wall	1,184	10				
	I-295 NB Structure Wall	555	11				

\*Cost effective under NJDOT Policy for receivers predicted to possess "Build" noise levels above 76 dBA (L<sub>eq</sub>)

**TABLE 7.2  
SUMMARY OF REPLACEMENT NOISE WALL SEGMENTS-ALTERNATIVE H1**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Receivers Above "No-Build" <sup>1</sup>	Number of Benefits
2	Ramp C Ground Wall	408	13-18	\$324,000	\$54,000	6	N/A	6 Primary
4	Ramp D Structure to Ground Wall	697	17-18	\$624,900	\$8,332	5-8	N/A	75 Primary
7	Ramp E Structure to Ground Wall	958	13-23	\$4,197,800	\$97,623	5-13	38	40 Primary 6 Supplemental
	Ramp E Ground Wall	228	17-18					
	Ramp A Structure Wall	1,489	19-23					
	I-295 NB Structure Wall	1,030	12					
	I-295 SB Structure Wall	1,186	12					
10	I-295 NB Ground Wall	1,333	18-25	\$2,281,950	\$97,104	5-8	17	22 Primary 3 Supplemental
	I-295 SB Structure Wall	702	18					

1 – Number of receivers with predicted noise levels above "No-Build" conditions with mitigation

### 6.5.5 *Alternative K*

Under Alternative K, cost-effective mitigation is recommended in six areas. The recommended noise wall designs include new and replacement noise wall segments totaling \$8M. New walls comply with the current NJDOT noise wall policy, while replacement noise wall segments are designed to approach “in-kind” effectiveness of existing noise walls. Mitigation efforts for each area are described below. In addition, Table 8.1 (new walls) and Table 8.2 (replacement walls) summarize noise walls proposed under Alternative K.

**Area 1:** The noise wall within this area is similar to the wall proposed under Alternatives D and D1. A ground-mounted noise wall is proposed along I-295 southbound from the railroad bridge to Bell Road. The **I-295 SB Ground Wall** ranges from 8 to 14 feet in height and is 1,468 feet long. The wall is designed to protect a proposed residential development (Bell Court) as well as several residential units along Rudderow Avenue and Bell Road. Utilizing a construction cost of \$50/ft<sup>2</sup>, this **new** noise wall totals \$896,250 and is expected to gain 19 residential primary benefits, which equates to a cost of \$47,171 per benefit.

**Area 2:** Under Alternative K, there are no anticipated noise impacts due to the proposed segment removal and thus a **replacement** noise wall investigation was not necessary.

**Area 3:** The noise wall within this area is similar to the wall proposed under Alternatives D and G2. A **replacement** noise wall segment that ties into an adjacent existing noise wall is proposed along Ramp D. This replacement segment, which is 678 feet long and 17 to 19 feet high, is designed to protect the exterior common-use at the Mount Ephraim Senior Housing building and two single-family residential structures along King’s Highway. Utilizing a construction cost of \$50/ft<sup>2</sup>, the **Ramp D Structure to Ground Wall** totals \$620,650. Based upon the expected occupancy (75 units), this wall equates to \$8,275 per benefited resident (75 primary benefits).

**Area 4:** Although a **new** noise wall was investigated to protect interior noise levels within the Annunciation Regional School, this is not a feasible option. Due to the location of Ramp C under Alternative K, a 5 dBA L<sub>eq</sub> insertion loss could not be obtained. In addition, noise levels within the school could not be reduced below the interior Category E NAC. Therefore, a noise wall is not a recommended mitigation method for the Annunciation Regional School.

**Area 5:** Dual noise walls are proposed to protect Bellmawr Park Mutual Housing, the Bellmawr Park Elementary School grounds and the Bellmawr Little League fields. The **Ramp F Ground Wall** is 2,169 feet long and 15-18 feet high, while the **Ramp C Structure Wall** is 722 feet long and 13 feet high. The combined cost of both **new** noise walls total \$2,189,600 which equates to \$26,067 per benefit (75 primary, 8 supplemental).

**Area 6:** Although a **new** noise wall is required to protect the homes within this predominantly commercial/industrial area, this is not a reasonable mitigation option. A noise wall was investigated along Ramp E, stretching 1,105 feet in length and 13 feet in height. Utilizing a construction cost of \$50/ft<sup>2</sup>, a wall in this area totals \$718,250. Since only one benefited residence was obtained, the cost per benefit (\$718,250) exceeds the \$50,000 allowable by NJDOT.

**Area 7:** Under Alternative K, three **replacement** noise wall segments are necessary to approach an “in-kind” effectiveness of existing noise walls. The **Ramp E Structure to Ground Wall** (603 feet long, 15-21 feet high), the **Ramp E Ground Wall 1** (354 feet long, 22-25 feet high) and the **Ramp E Ground Wall 2** (228 feet long and 15 feet high) essentially replace the removed existing noise wall segments and tie into adjacent existing noise walls. Since the Alternative K alignment proposes I-295 beneath the I-76/Route 42 roadways, the Ramp E replacement noise walls are sufficient in providing mitigation throughout this neighborhood. All residential structures are expected to possess noise levels comparable to “No-Build” conditions. The combined cost of the walls is \$1,182,650 which equates to \$21,309 per benefited residence (43 primary, 25 supplemental).

**Area 8:** A **new** ground-mounted noise wall located along the right-of-way within the New St. Mary’s Cemetery is proposed. The **I-295 NB Ground Wall**, which is 2,629 feet in length and 11 feet in height, ties into an adjacent existing noise wall. The cost of the wall totals \$1,495,750, which is \$27,195 based upon an estimated 55 primary benefits within the cemetery.

**Area 9:** Under Alternative K, additional mitigation is not necessary within this area since the existing wall continues to protect the homes.

**Area 10:** The noise wall within this area is similar to the wall proposed under Alternatives D and D1. A ground-mounted **replacement** noise wall segment is proposed along I-295 northbound. This wall, which is 1,333 feet long and 18 to 25 high, ties into an adjacent existing noise wall segment. The **I-295 NB Ground Wall** protects several residences along Snyder Avenue, Collett Court, the Scott E. Mueller Park, Bell Oaks School (interior) and a portion of the Resurrection Cemetery. In addition, all residential structures are expected to possess noise levels comparable to “No-Build” conditions. The total cost of the wall is \$1,650,100, equaling \$66,004 per benefit (21 primary, 8 supplemental).

Proposed walls are detailed within Table 8.1 (new walls) and Table 8.2 (replacement walls). Noise wall locations, heights and the resultant 66 dBA  $L_{eq}$  noise contour are detailed within Figures 12.5.1, 12.5.2 and 12.5.3 within Appendix C.



**TABLE 8.1  
SUMMARY OF NEW NOISE WALLS-ALTERNATIVE K**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Benefits
1	I-295 SB Ground Wall	1,468	8-14	\$896,250	\$47,171	5-9	19 Primary
5	Ramp F Ground Wall	2,169	15-18	\$2,189,600	\$26,067	5-15	75 Primary 8 Supplemental
	Ramp C Structure Wall	722	13				
8	I-295 NB Ground Wall	2,629	11	\$1,495,750	\$27,195	5-13	55 Primary

**TABLE 8.2  
SUMMARY OF REPLACEMENT NOISE WALL SEGMENTS-ALTERNATIVE K**

Area	Wall Name	Length (feet)	Height (feet)	Total Cost	Cost per Resident	Noise Reduction (dBA L <sub>eq</sub> )	Number of Receivers Above “No-Build” <sup>1</sup>	Number of Benefits
3	Ramp D Structure to Ground Wall	678	17-19	\$620,650	\$8,275	5	N/A	75 Primary
7	Ramp E Structure to Ground Wall	603	15-21	\$1,182,650	\$21,309	5-15	0	43 Primary 25 Supplemental
	Ramp E Ground Wall 1	355	22-25					
	Ramp E Ground Wall 2	228	15					
10	I-295 NB Ground Wall	1,333	18-25	\$1,650,100	\$66,004	5-11	0	21 Primary 8 Supplemental

1 – Number of receivers with predicted noise levels above “No-Build” conditions with mitigation

### 6.5.6 Noise Wall Comparison

Noise wall designs (new and replacement) were investigated for all alternatives to provide the maximum protection while following cost-effective procedures. However, the number of remaining impacts varies by design. Based on allowable mitigation measures, more impacts remain under the double-decker alternatives (G2 & H1) than under the other alternatives (D, D1 & K). Table 9 summarizes the total cost of noise walls and the number of Category B residential impacts that could not be mitigated by alternative.

**TABLE 9  
COMPARISON OF NOISE WALLS BY ALTERNATIVE**

Alternative	Total Costs	Remaining Impacts (Category B; residential)
D	\$11.2M	155 total units; 84 single, 32 dual-family, 39 multi-family
D1	\$11.5M	156 total units; 85 single, 32 dual-family, 39 multi-family
G2	\$12.7M	215 total units; 116 single, 52 dual-family, 47 multi-family
H1	\$13.0M	216 total units; 117 single, 52 dual-family, 47 multi-family
K	\$8.0M	145 total units; 84 single, 26 dual-family, 35 multi-family

Under Alternatives D, D1 and K, the remaining residential impacts are mainly along the local roadways. Since local roadways within the study area include driveways and intersections, noise mitigation along land service roadways is not feasible. Under Alternatives G2 and H1, the remaining residential impacts are along local roadways as well as within certain neighborhoods where mitigation for the double-decker roadway with cost-effective noise walls is not feasible.

## **7.0 CONSTRUCTION NOISE**

### **7.1 Construction Noise Analysis**

Regardless of the alternative selected, the area within the I-295/I-76/Route 42 Direct Connection project limits would experience an increase in noise levels during the construction phase. Specific actions such as clearing, grading, paving and bridge construction demolition are known to produce high noise levels. Equipment such as bulldozers, scrapers, backhoes, graders, loaders, cranes and trucks would be used in the construction but are subject to construction noise specifications. Construction noise levels for residences and commercial/industrial establishments can reach 90 to 95 dBA  $L_{eq}$  during some phases of construction. Example construction equipment and resultant noise levels are shown in Table 6.

### **7.2 Construction Noise Mitigation Measures**

This project would incorporate standard Construction Noise Specifications that are listed below.

1. All construction equipment powered by an internal combustion engine shall be equipped with a properly maintained muffler.
2. Air compressors shall meet current EPA noise emission exhaust standards.
3. Air powered equipment shall be fitted with pneumatic exhaust silencers.
4. Stationary equipment powered by an internal combustion engine shall not be operated within 150 feet of noise sensitive sites without portable noise walls placed between the equipment and the noise sensitive sites. Portable noise walls shall be constructed of plywood or tongue and groove boards with a noise absorbent treatment on the interior surface (facing the equipment).
5. Powered construction equipment shall not be operated wherever possible before 8 AM or after 8 PM within 150 feet of a noise sensitive site.

Whenever possible, the proposed noise walls should be constructed as early as feasible within the construction schedule of the project.

**TABLE 10****Noise Level (dBA L<sub>eq</sub>) at 50 feet From Various Construction Equipment**

Material Handling	Noise Level (dBA L <sub>eq</sub> )
Concrete Mixer	85
Concrete Pump	82
Crane	83
Derrick	88

Equipment (Earth Moving)	Noise Level (dBA L <sub>eq</sub> )
Front Loader	79
Back Hoes	85
Dozers	80
Tractors	80
Scrappers	88
Graders	85
Truck	91
Paver	89

Stationary Equipment	Noise Level (dBA L <sub>eq</sub> )
Pumps	76
Generators	78
Compressors	81
Impact Equipment	Noise Level (dBA L <sub>eq</sub> )
Pile Drivers	100
Jackhammers	88
Rock Drills	98
Other	Noise Level (dBA L <sub>eq</sub> )
Saw	78
Vibrators	76

## **8.0 COORDINATION WITH PUBLIC AGENCIES**

Five Public Information Center (PIC) meetings have been held to date: April 24, 2002; July 24, 2003; January 28, 2004; November 30, 2004; and June 13, 2005. The purpose of these meetings was to introduce the project to the public and to discuss the process that must be followed in order to select a preferred alternative and achieve environmental compliance for the project. PIC meeting attendees included the general public; local elected officials and/or their representatives; FHWA; state and county agencies such as NJ Transit, New Jersey Department of Environmental Protection (NJDEP), Camden County Department of Public Works (DPW), Port Authority Transit Corporations (PATCO)/Delaware River Port Authority (DRPA), and South Jersey Transit Authority; utilities representatives; and board members of Bellmawr Park Mutual Housing Corporation. The project need, alternatives, design, construction, and environmental constraints (including noise) were among the topics discussed during the meetings.

In addition to the PICs, nine Agency Coordination Meetings (ACMs) have been held to date on November 18, 2002; December 17, 2002, February 2, 2003; March 26, 2003; May 13, 2003; June 4, 2003; September 30, 2003; October 15, 2003; and June 7, 2005. Noise issues were also discussed at the ACMs.

To meet requirements established in 23 CFR 772, this study has been primarily designed and written for review by the Federal Highway Administration. After concurrence by FHWA, local governments and planning agencies will be provided this document for review. The noise analysis and impacts associated with this project will be incorporated into the I-295/I-76/Route 42 Direct Connection Environmental Impact Statement (EIS). For community involvement purposes, local governments and regional planning boards may want to utilize information obtained in this report to help establish ordinances, zoning and implement planning so that the community as a whole can benefit from a quieter environment.

## **9.0 LIST OF PREPARERS**

Sharon Paul Carpenter – Ms. Paul Carpenter is a senior project manager for Paul Carpenter Associates, Inc. She received a Bachelor of Science Degree from Rutgers University in 1985 and has been performing noise studies since 1986. In her career, she has designed over 200 miles of noise walls for clients such as the New Jersey Turnpike Authority/New Jersey Highway Authority, New York and Massachusetts Departments of Transportation. Ms. Paul Carpenter is a certified TNM user.

Jane Burns – Ms. Burns is a project manager for Paul Carpenter Associates, Inc. and a certified TNM user. She obtained a Bachelors of Science degree from Rutgers University in 2003 and is currently studying civil engineering at New Jersey Institute of Technology. Ms. Burns has four years experience performing noise studies for NJDOT. Ms. Burns performed noise modeling and project management duties throughout the project.

Sam Lin – Mr. Lin is an environmental scientist at Paul Carpenter Associates, Inc. with three years noise monitoring and modeling experience. He received a Bachelor of Arts degree from Rutgers University in 1998 and a Masters of Art from Texas A&M University in 2003. Mr. Lin is a certified TNM user.

Lynne O’Sullivan – Ms. O’Sullivan is an environmental scientist at Paul Carpenter Associates, Inc. with two years of noise monitoring and modeling experience. Ms. O’Sullivan obtained a Bachelor of Science degree in Environmental Science from Rutgers University and a Masters of Science degree in Environmental Science from Montclair State College.

## 10.0 REFERENCES

1. Environmental Protection Agency, *Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety*, Washington, D.C. (EPA 550/9-74-004), March 1974.
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3. *Report of 1977 Symposium on Highway Construction Noise*. Report No. FHWA-TS-77-211. Cranford, NJ: Dames & Moore, 1977.
4. Schomer, P.E. & B. Homans, *Construction Noise: Specification, Control, Measurement, and Mitigation Technical Report E-53*, Washington, D.C.; Construction Engineering Research Laboratory, 1975.
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8. U.S. Department of Transportation, Federal Highway Administration, *FHWA Highway Traffic Noise Prediction Model*. Report No. FHWA-RD-77-108. Washington, DC, December 1978.
9. U.S. Department of Transportation, Federal Highway Administration, *FHWA Highway Noise Barrier Design Handbook*, PB20000-105872, Washington, D.C., February 2000.
10. U.S. Department of Transportation, Federal Highway Administration, *FHWA Traffic Noise Model User's Guide*, Report No. FHWA-PD-96-009.
11. U.S. Department of Transportation, Federal Highway Administration, *Fundamentals and Abatement of Highway Traffic Noise*, Washington, D.C., 1973
12. U.S. Department of Transportation, Federal Highway Administration, *Highway Traffic Noise Analysis and Abatement Policy and Guidance*. Office of Environment and Planning Noise and Air Quality Branch, Washington D.C., 1995.
13. U.S. Department of Transportation, Federal Highway Administration, *Special Report - Highway Construction Noise: Measurement, Prediction and Mitigation.* May 2, 1977.

## 11.0 GLOSSARY

1. Acoustic Reflection – the process by which the general direction of sound waves is reversed by barriers.
2. Building Attenuation – the reduction in the energy of a sound field resulting from its passage through a building’s structural elements.
3. “A” Weighted Sound Level – a method of representing the human ear’s interpretations of the loudness of an equal sound level throughout the audible frequency range. The scale is normally referenced to the loudness at 1 kHz.
4. Car – vehicle having two axles and four tires and designated primarily for transportation of nine or fewer passengers.
5. Commuter Bus – Vehicle having two or three axles and designated for transportation of nine or more passengers.
6. Decibel (dB) – a unit of measure of sound pressure level used to describe the loudness of sound.  
$$\text{dB} = 10 \log (P/P_o)^2$$

Where:  $P_o = 0.00002$  microbar  
 $P =$  root mean square sound pressure  
(0.00002 microbar is the threshold of hearing for a normal, healthy human ear)
7. Noise Abatement Criteria – noise levels established by FHWA in 23 CFR 772 for various activities. When the predicted noise level approaches or exceeds the NAC as given in Table 1 of 23 CFR 772, an impact exists and mitigation must be considered.
8. Developed Land – those tracts of land or portions thereof which contain improvements or activities devoted to frequent human use or habitation.
9. DHV – Design Hourly Volume – the 30<sup>th</sup> highest hourly volume of vehicles with its associated speeds on a roadway. This relationship is generally used for highway design purposes and may also be the noisiest traffic condition.
10. Existing Noise – that noise which is characteristic of an area before the construction of the proposed project.
11. Heavy-duty truck – vehicle with three or more axles and more than six tires.
12. Hertz (Hz) – frequency in cycles per second
13.  $L_{10}$  Noise Level – that level of noise where the A-weighted sound pressure level in decibels is exceeded ten percent of the time.



14.  $L_{90}$  Noise Level – that level of noise where the A-weighted sound pressure level in decibels is exceeded 90 percent of the time.
15.  $L_{eq}$  Noise Level – that level of constant noise which contains the same amount of acoustic energy as time varying noise levels (e.g. traffic noise) during a given time interval.
16. Level of Service “C” – with respect to vehicle movements, represents stable flow; however, most of the drivers are restricted in their freedom to select their own speeds, change lanes or pass. This combination of speed and volume usually creates the worst noise condition.
17. Light Truck – vehicle having two axles and four tires and designated primarily for transportation of cargo.
18. Medium Truck – vehicle with two axles and six tires.
19. Motorcycle – vehicle having two or three tires with an open-air driver and/or passenger compartment.
20. Noise Contours – areas along a roadway within which noise levels would exceed a specified noise level. (Not to be interpreted as any single line.)
21. Noise Reduction Coefficient (NRC) – the ratio of the sound energy absorbed by the barrier surface and the sound energy striking the barrier surface.
22. Noise Sensitive Areas or Locations – general areas of land or specific locations having activities that are affected by excessive noise levels.
23. Receiver – a location at which noise levels are predicted and analyzed.
24. Transmission Loss – is the difference between the sound energy striking a barrier surface and the sound energy transmitted through a barrier.
25. Type I Project – A proposed project for the construction of a highway on a 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.
26. Type II Project – A proposed project of noise abatement on an existing highway.
27. Undeveloped Land – those tracks of land or portions thereof which contain no improvement or activities devoted to frequent human use or habitation.

**APPENDIX A**

**Noise Measurement Study**



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## **Noise Measurement Study**

**April 2006**

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**US Department of Transportation  
Federal Highway Administration  
New Jersey Department of Transportation**



## SUMMARY

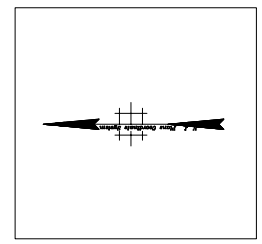
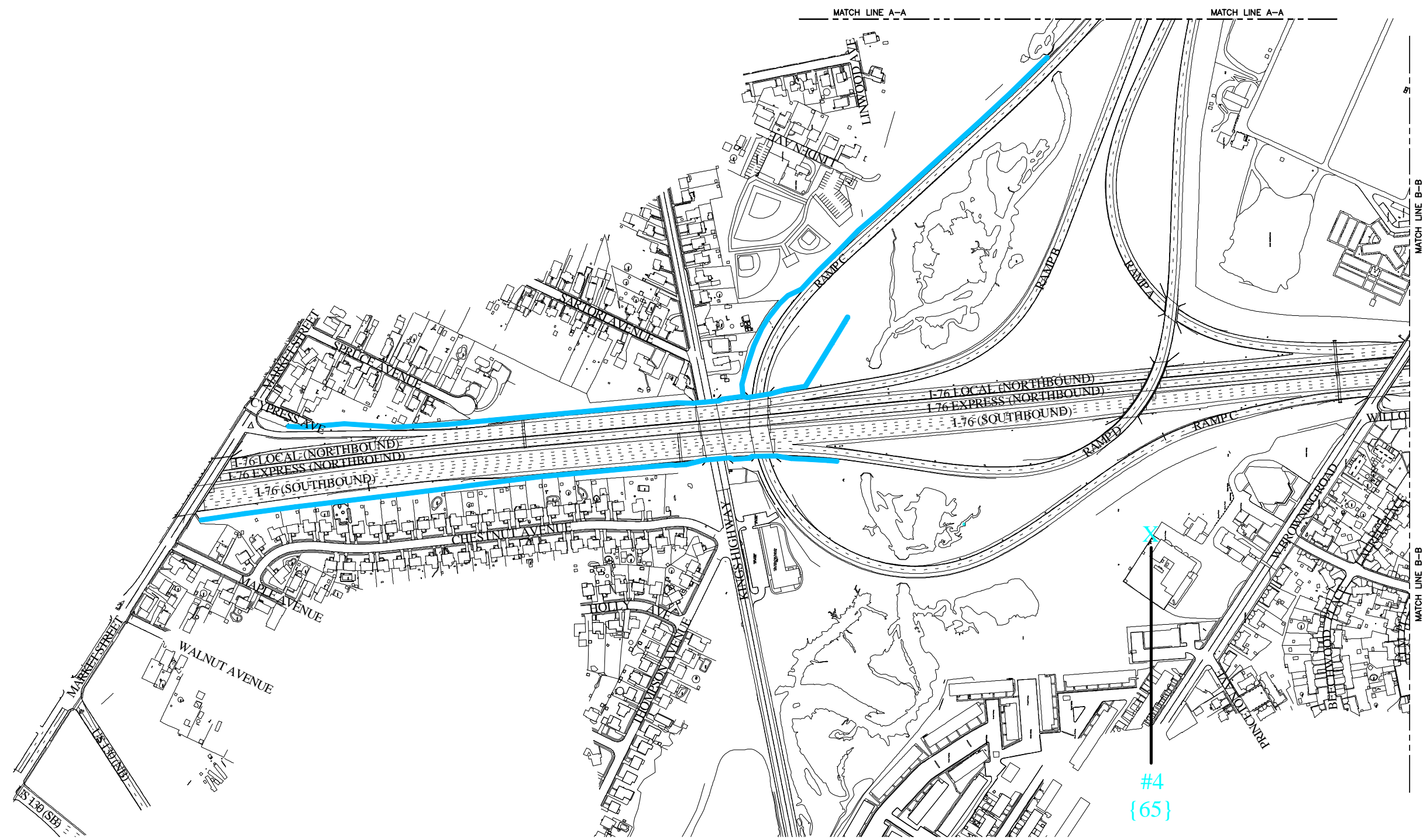
The Noise Technical Environmental Study utilized information obtained from the Preliminary Noise Measurement Study (August 2000) and the Final Noise Measurement Study (April 2001) performed by the New Jersey Department of Transportation (NJDOT), Bureau of Project Support and Engineering, Environmental Services and Support Unit. A detailed noise measurement study was performed to document summer and non-summer peak traffic noise levels. Noise monitoring locations were focused generally in areas adjacent to proposed improvements.

The information provided within the Preliminary Noise Measurement Study includes two noise monitoring locations during peak summer travel periods (Friday and Sunday). In addition, building attenuation studies with windows opened and closed were performed at two schools; Bellmawr Park Elementary School and the Annunciation Regional School. Interior noise measurements were documented within first and second floor classrooms of both schools.

The Final Noise Measurement Study provides documentation of peak non-summer noise levels at ten locations. The monitoring sites included two schools, three recreational areas, a cemetery and four residential properties. Noise monitoring was performed at most locations for either twenty-four hours or during peak travel periods. Documentation of exterior noise levels within the recreational area and school grounds were performed during typical recreational periods or school hours only. A peak noise level of 66 dBA  $L_{eq}$  documented at Location # 3B (Bellmawr Park Elementary School Baseball Field) is listed within Table #1 of the Final Noise Measurement Study. Review of the data details this peak was documented on a Monday (4/16/01). Traffic volumes on Mondays are not typical and therefore, the actual peak utilized for noise model validation at this site was 65 dBA  $L_{eq}$  documented the following Tuesday (4/17/01). Several noise monitoring locations documented peak noise levels above the Category B NAC.

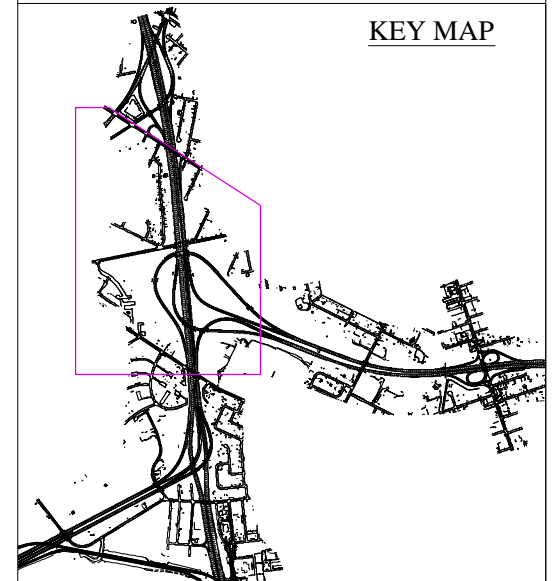
The Traffic Noise Model (TNM2.5) is considered “validated” when the modeled noise levels, are within + or – 3 dBA  $L_{eq}$  of monitored results. It is important to note that this reference value of + or – 3 dBA is the smallest change in noise levels an average human can discern. Once validation is achieved for a particular site, any scenario can be modeled and subsequent noise levels can be predicted with scientific confidence. Validation was performed for peak traffic periods in all locations except at the schools and recreational areas, for which validation was performed during recreational hours.

Figures 8.1, 8.2 and 8.3 detail the project study area, the noise monitoring locations and peak hour noise levels monitored by NJDOT.



PROJECT NORTH

KEY MAP



LEGEND

- Noise Figure Generated by Peak AM & PM Conditions
- X Location of Noise Monitor
  - # Noise Monitoring Location Number
  - [ ] Peak Non-Summer Hourly Noise Levels - dBA L<sub>eq</sub>
  - < > Peak Summer Hourly Noise Levels - dBA L<sub>eq</sub>
  - ( ) Peak Non-Summer Hourly Noise Levels, Typical School Hours - dBA L<sub>eq</sub>
  - Existing Noise Wall Locations



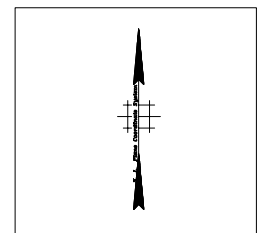
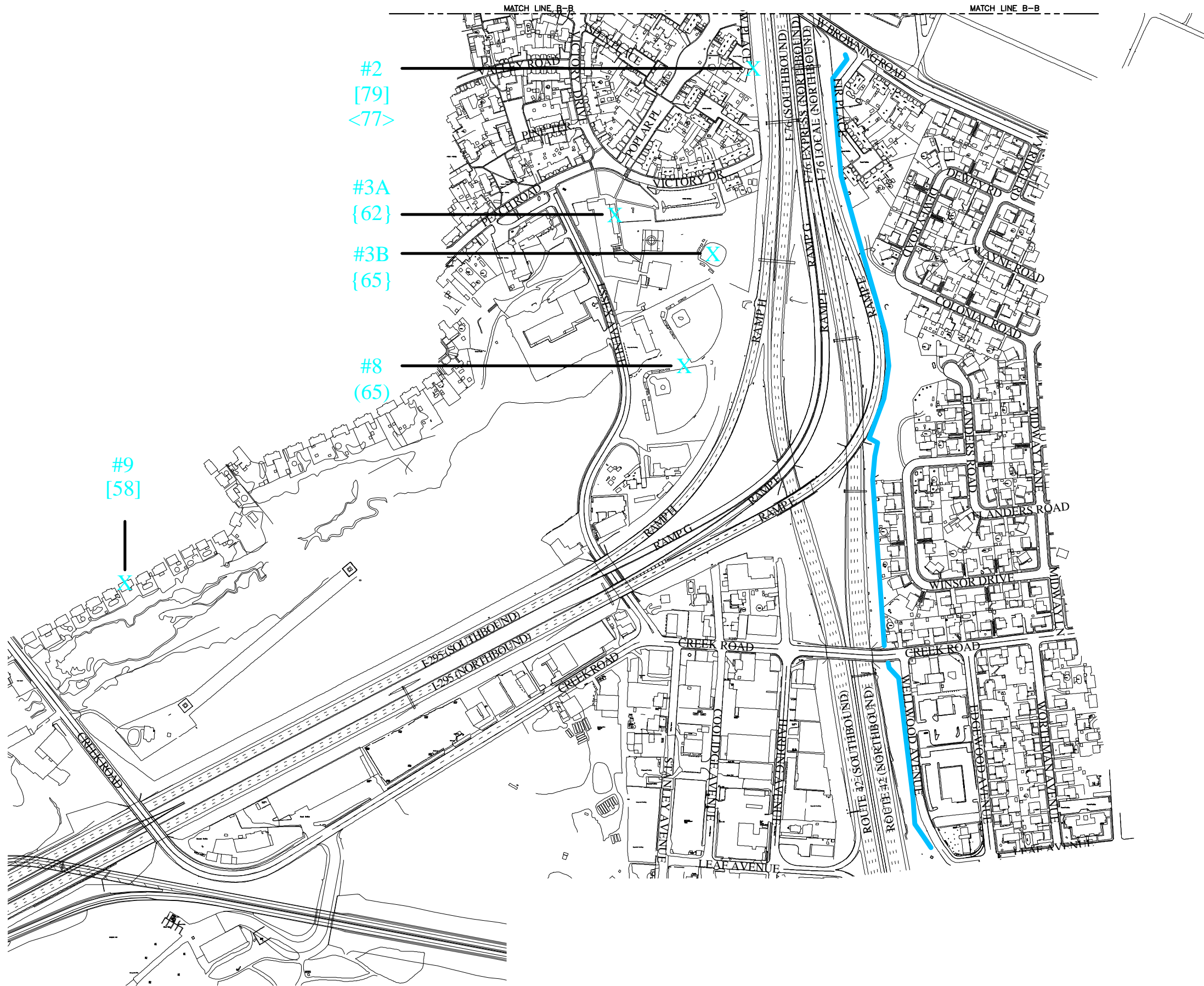
New Jersey Department of Transportation

I-295/I-76/Route 42  
Direct Connection  
Camden County

Figure 8.1

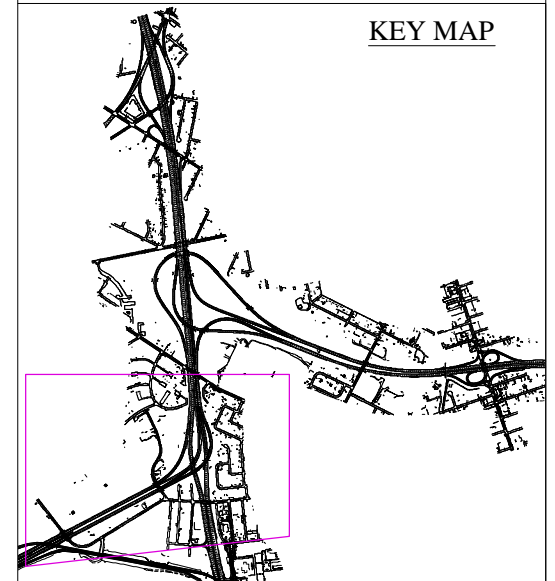
Noise Monitoring Locations and Peak Noise Levels

Date April 14, 2006



PROJECT NORTH

KEY MAP



LEGEND

- Noise Figure Generated by Peak AM & PM Conditions
- X Location of Noise Monitor
  - # Noise Monitoring Location Number
  - [ ] Peak Non-Summer Hourly Noise Levels - dBA L<sub>eq</sub>
  - < > Peak Summer Hourly Noise Levels - dBA L<sub>eq</sub>
  - ( ) Peak Non-Summer Hourly Noise Levels, Typical School Hours - dBA L<sub>eq</sub>
  - Existing Noise Wall Locations



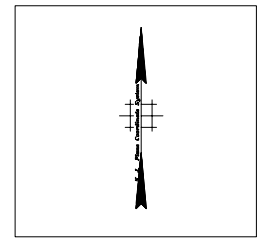
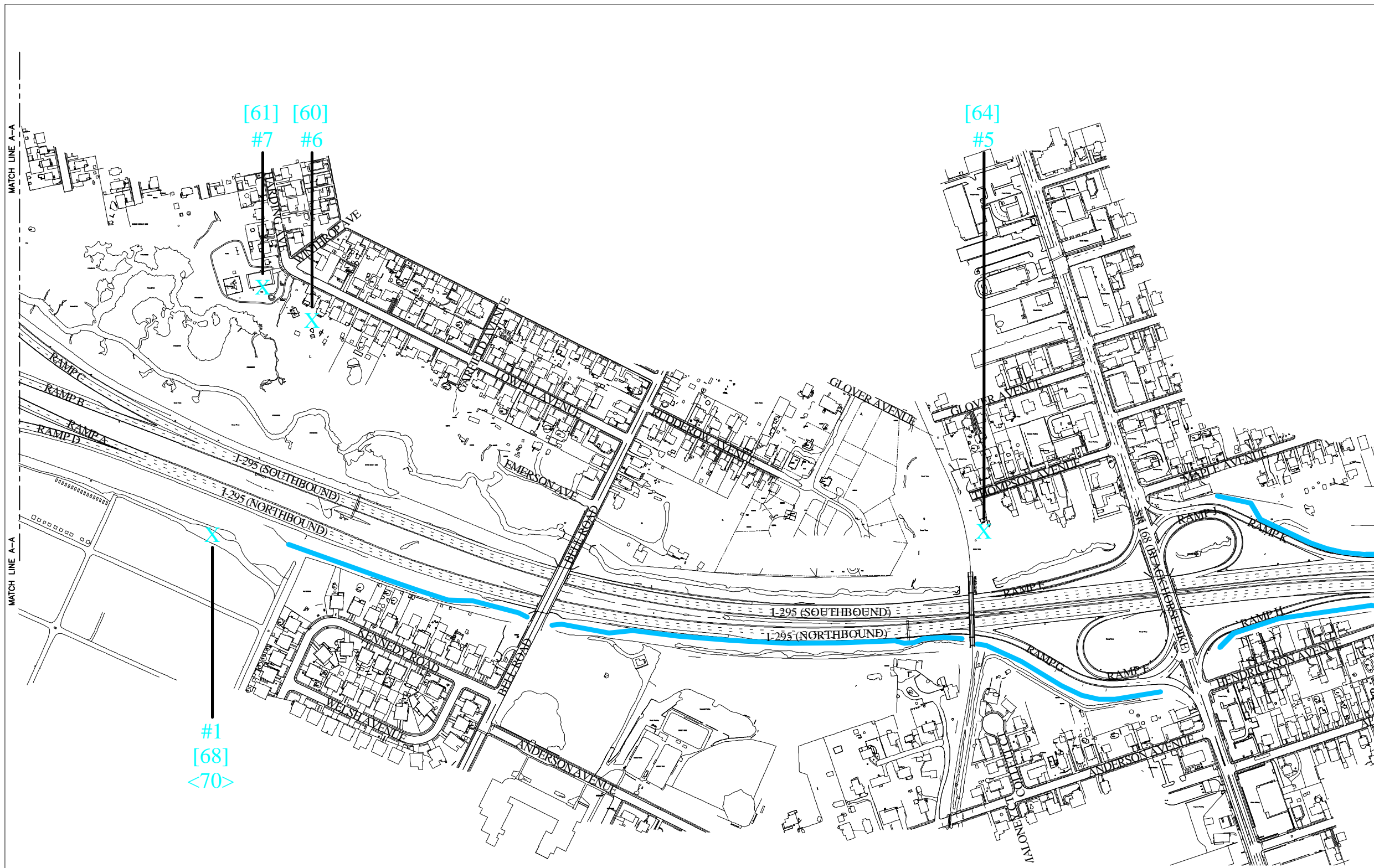
New Jersey Department of Transportation

I-295/I-76/Route 42  
Direct Connection  
Camden County

Figure 8.2

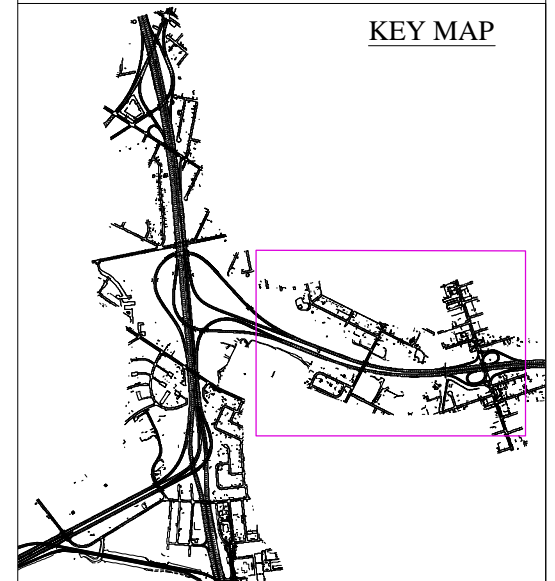
Noise Monitoring Locations and Peak Noise Levels

Date April 14, 2006



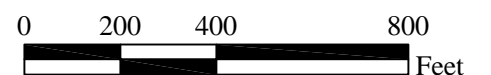
PROJECT NORTH

KEY MAP



LEGEND

- Noise Figure Generated by Peak AM & PM Conditions
- X Location of Noise Monitor
  - # Noise Monitoring Location Number
  - [ ] Peak Non-Summer Hourly Noise Levels - dBA L<sub>eq</sub>
  - < > Peak Summer Hourly Noise Levels - dBA L<sub>eq</sub>
  - ( ) Peak Non-Summer Hourly Noise Levels, Typical School Hours - dBA L<sub>eq</sub>
  - Existing Noise Wall Locations



New Jersey Department of Transportation

I-295/I-76/Route 42  
Direct Connection  
Camden County

Figure 8.3

Noise Monitoring Locations and Peak Noise Levels

Date April 14, 2006

PRELIMINARY  
NOISE MEASUREMENT STUDY

ROUTE I-295/76  
BELLMAWR AND MOUNT EPHRAIM  
CAMDEN COUNTY

CONDUCTED BY:

NEW JERSEY DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT SUPPORT & ENGINEERING  
ENVIRONMENTAL SERVICES & SUPPORT UNIT

AUGUST 2000



## I. Introduction

At the request of the Bureau of Environmental Services a preliminary noise measurement study for the Route I-295/76 Interchange in Bellmawr and Mount Ephraim in Camden County was conducted by the Bureau of Project Support and Engineering, Environmental Services and Support Unit. Noise measurements were taken during August of 2000, utilizing the portable noise equipment of the Bureau of Project Support and Engineering.

Two noise measurement locations were designated in order to determine whether these roadways had seasonal traffic volume fluctuations due to shore traffic. Each of these two sites was monitored on a Friday from 1500 to 2000 hours and also on a corresponding Sunday from 1400 to 1900 hours. Noise samples were taken in 15-minute durations at the request of the consulting firm in order to have the noise measurements correspond with the traffic data being taken simultaneously.

Wind speed, wind direction and traffic observations were all recorded during the noise measurements. This information is included in the appendix of this report.

Noise measurements for building attenuation were also conducted at the Annunciation School and at the Bellmawr Park School. Monitoring data is also included in the appendix of this report.

## II. Results

The peak Leq noise level was 77 dBA at Site #2 (9 Willow Place-Bellmawr) and 70 dBA at Site #1 (New St. Mary's Cemetary-Bellmawr). Table 1, page 3 shows the peak Leq noise levels for each site.

Table 2, page 4 indicates the number of Leq noise levels for each site that exceeded, equaled or approached the sixty-seven dBA design noise criteria for land use category "B" (See reference, page 12).

Table 3, page 5 indicates the primary and secondary noise sources for each site.

Table 4, page 6 indicates the building attenuation measured at the Annunciation School and the Bellmawr Park School.

It should be noted that at the time of the building attenuation measurements at the Bellmawr Park School, there was school maintenance activities (grass mowing) between the school and Route I-295/76. It should also be noted that for the interior measurements, there is an air circulation system which runs constantly and can not be turned off.

Table #1

Peak Leq Noise Levels  
Route I-295/76  
Preliminary  
Bellmawr & Mount Ephraim  
Camden County

<u>Site</u>	<u>Location</u>	<u>Municipality</u>	<u>Maximum Leq in dBA</u>
1	New St. Mary's Cemetary	Bellmawr	70
2	9 Willow Place	Bellmawr	77

Table #2

Comparison of Noise Levels  
 Route I-295/76  
 Preliminary  
 Bellmawr & Mount Ephraim  
 Camden County

Site	No. Of Noise Samples Taken	No. Of Noise Samples Exceeding Design Noise Level	No. Of Noise Samples Equal to Design Noise Level	No. Of Noise Samples Approaching Design Noise Level
1 Friday PM	12	12	0	0
1 Sunday PM	22	22	0	0
2 Friday PM	11	11	0	0
2 Sunday PM	21	21	0	0

Table #3

Primary and Secondary Noise Sources  
 Route I-295/76  
 Preliminary  
 Bellmawr & Mount Ephraim  
 Camden County

Site ----	Location -----	Primary Noise Source -----	Secondary Noise Source -----
1	New St. Mary's Cemetery	Traffic on Route I-295	Traffic on Browning Avenue and cemetery activities
2	9 Willow Place	Traffic on Route I-295 And Route I-76	Traffic on Browning Avenue and neighborhood activities

Table #4

Building Attenuation  
 Bellmawr Park School  
 and  
 Annunciation School  
 Bellmawr  
 Camden County

School	Description	Building Attenuation (in dBA)	
		Windows Closed	Windows Open
Bellmawr Park	Classroom #15 (First floor)	12	7
	Classroom #19 (Second floor)	13	7
Annunciation	Kindergarten (First floor)	13	9
	Classroom #16 (Second floor)	13	8
	Classroom #10 (Second floor)	13	7
	2nd Grade (First floor)	14	8

### III. NOISE MEASUREMENT INSTRUMENTATION

The noise measurement instrumentation used in this study consisted of units manufactured by the Bruel & Kjaer Corporation.

The B & K Outdoor Microphone Unit (Model# 4921) is mounted on a tripod such that the microphone is five feet above ground level. This microphone is a quartz-coated 1/2" condenser microphone (B & K Model# 4149) surrounded by a windscreen. The Outdoor Microphone Unit is interconnected by a cable to the B & K Community Noise Analyzer (Model# 4427). During each sample, a signal is obtained by the Outdoor Microphone Unit and is transferred to the Community Noise Analyzer which "weights" the incoming signal from the Outdoor Microphone Unit as the microcomputer in the Community Noise Analyzer's central control and processing unit classifies the data and performs  $L_{eq}$  and statistical calculations for print out.

The Outdoor Microphone Unit has a built-in internal calibration signal which is used to calibrate the instrumentation before and after each measurement period.

During the monitoring period, weather conditions are recorded using a Belfort Wind Measuring Instrument (Model #6052).

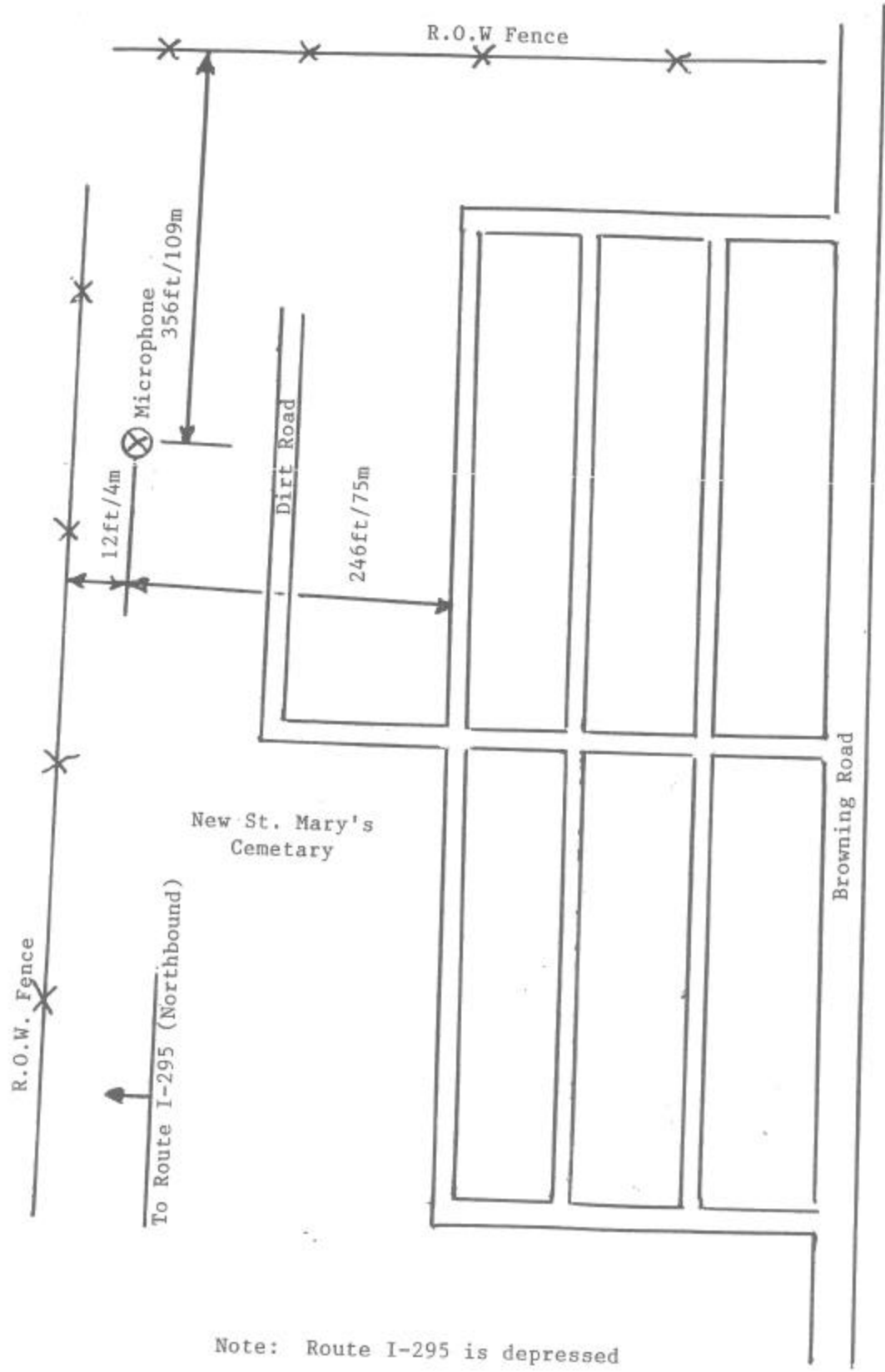
## APPENDIX







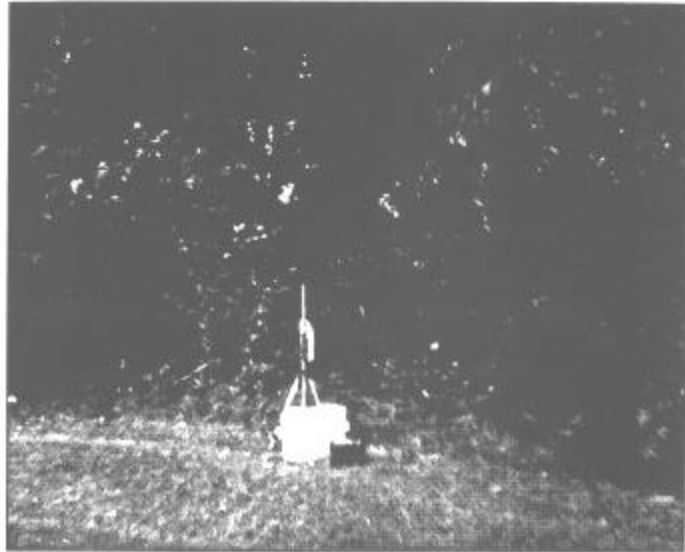
Site #1  
New St. Marys Cemetary  
Bellmawr



Note: Route I-295 is depressed

Site #1

New St. Mary's Cemetary  
Bellmawr





Site #2  
9 Willow Place  
Bellmawr

Wind and Traffic Data  
8/11/00

Time -----	Wind -----	Traffic -----
1606	<2mph/W	All lanes free flow
1520	<2mph/W	“ ”
1524	0	“ ”
1534	0	Near EB lanes heavy but moving
1543	0	Center EB lanes slowing- volume
1552	0	Center EB lanes-heavy but moving Near EB lanes- moving
1604	<2mph/W	Center EB lanes- heavy but moving Near EB lanes- moving
1609	0	Center EB lanes- near free flow Near EB lanes- free flow
1611	0	All lanes free flow
1614	0	Center EB lanes- heavy but moving Near EB lanes- free flow
1624	0	Center EB lanes- heavy but moving Near EB lanes- free flow
1633	0	Center EB lanes- heavy but moving Near EB lanes- free flow
1644	0	Center EB lanes- stop & go Near EB lanes- free flow
1645	0	Center EB lanes- heavy but moving Near EB Lanes- free flow
1650	0	Center EB lanes- stop & go Near EB lanes- free flow
1656	0	Center EB lanes- stop & go Near EB lanes- free flow
1706	0	Center EB lanes- stop & go Near EB lanes- free flow
1720	0	Center EB lanes- stop & go Near EB lanes- free flow
1732	0	Center EB lanes- stop & go Near EB lanes- free flow
1738	0	Center EB lanes- stop & go Near EB lanes- free flow
1740	Rain started	Center EB lanes- Stop & go Near EB lanes- free flow

Site #2  
 9 Willow Place  
 Bellmawr  
 8/11/00  
 (Cont.)

Time -----	Wind -----	Traffic -----
1742	Heavy thunderstorms	Center EB lanes- stop & go All other lanes- heavy but moving
1820	Thunderstorms ended	Center EB lanes- stop & go
	Light rain	All other lanes- heavy but moving
1825	Light rain	All WB lanes- stopped All EB lanes- light volume NJDOT notification that Route I-76 Was flooded at Market Street
1850	Rain stopped	All lanes- stop & go
	Roadways wet	Truck traffic lighter
1917	Roadways wet	All EB lanes- free flow Center WB lanes- stop & go Far WB lanes- free flow
1942	Roadways dry	All lanes free flow
1957	0	Center EB lanes- stop & go
1958	Rain started	Center EB lanes- stop & go
2005	Rain	Center EB lanes- stopped Other lanes- free flow



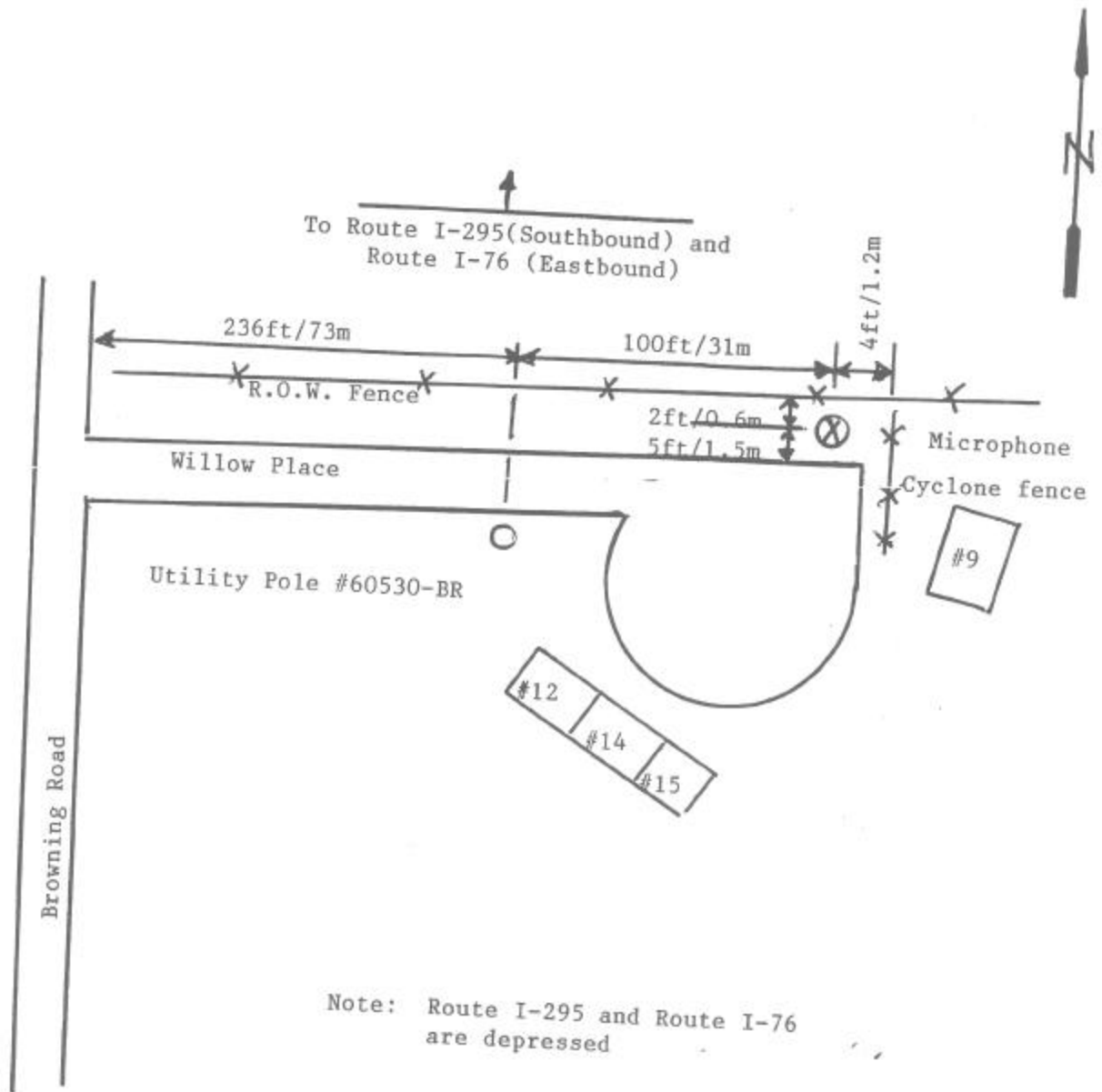


Site #2  
 9 Willow Place  
 Bellmawr

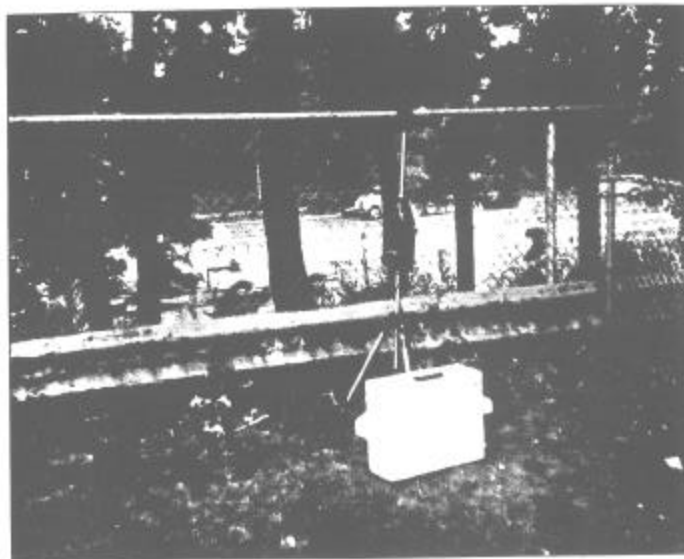
Wind and Traffic Data  
 8/13/00

Time	Wind	Traffic
1342	0	All lane free flow- few trucks
1353	0	" " "
1404	0	" " "
1420	0	" " "
1433	0	" " "
1448	0	" " "
1506	<2mph/SW	" " "
1520	<2mph/SW	" " "
1535	0	" " "
1547	0	" " "
1603	0	" " "
1621	0	" " "
1634	<2mph/W	" " "
1647	0	" " "
1707	0	" " "
1719	<2mph/SW	" " "
1736	<2mph/SW-gusts to 4mph	" " "
1749	<2mph/SW	" " "
1807	<2mph/SW	" " "
1821	0	" " "
1838	0	" " "
1850	0	" " "
1906	0	" " "

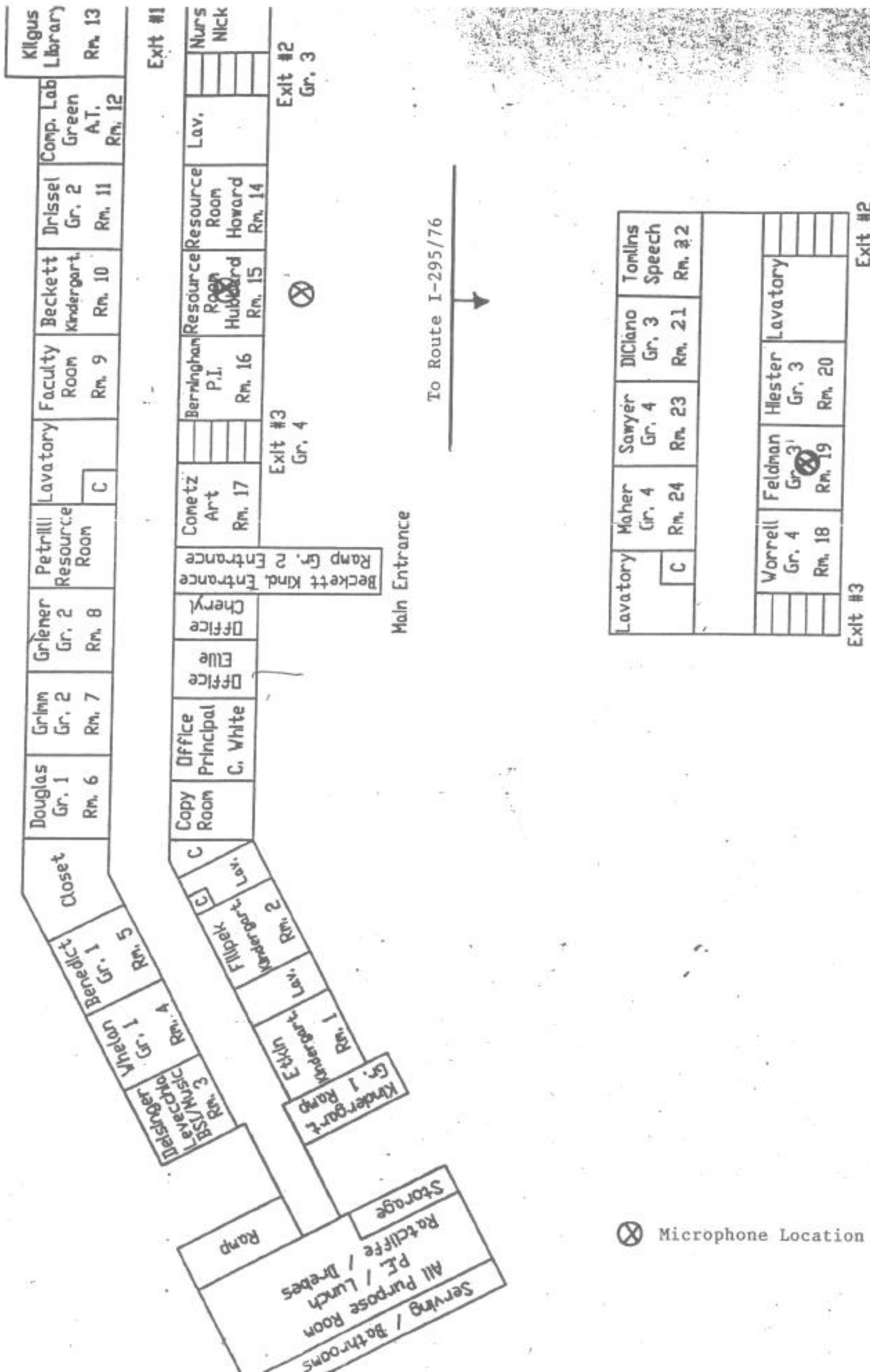
Site #2  
9 Willow Place  
Bellmawr



Site #2  
9 Willow Place  
Bellmawr

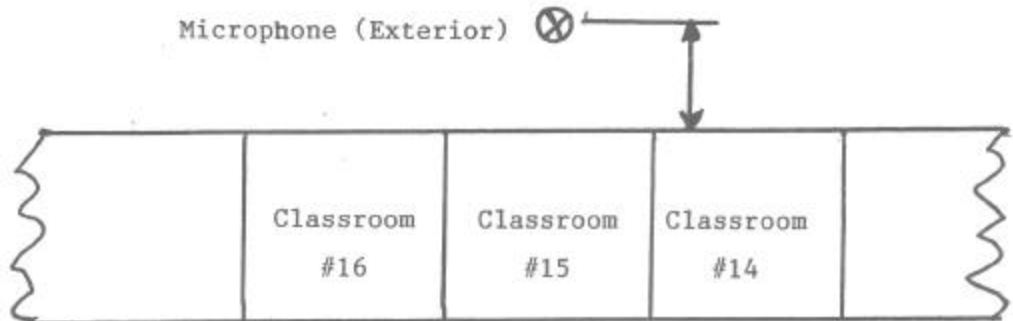




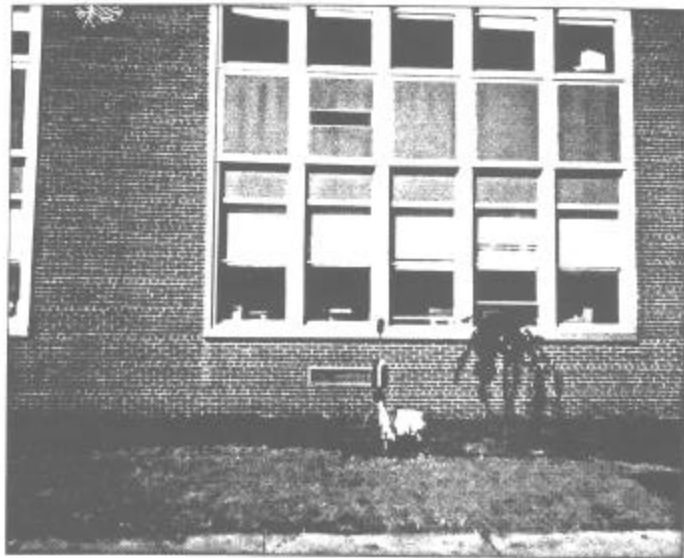


⊗ Microphone Location

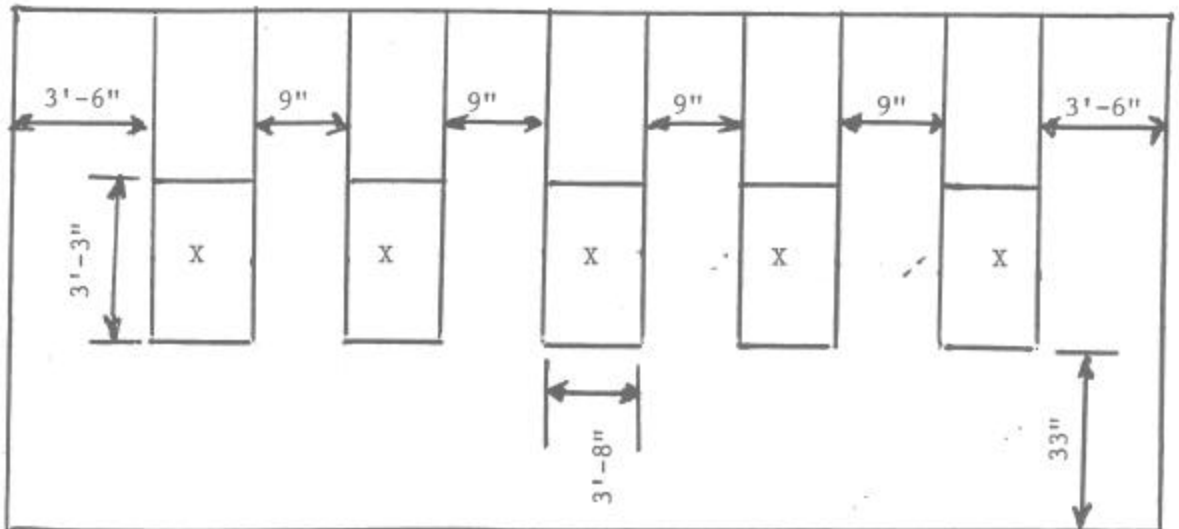
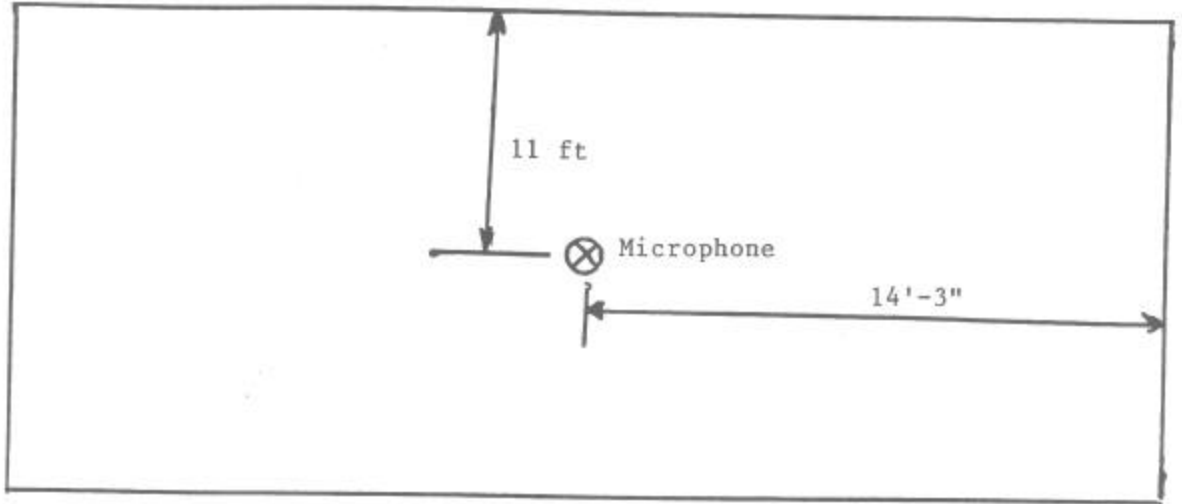
Site #3  
Bellmawr Park School  
Building Attenuation  
Exterior



Site #3  
Bellmawr Park School  
Building Attenuation  
Exterior



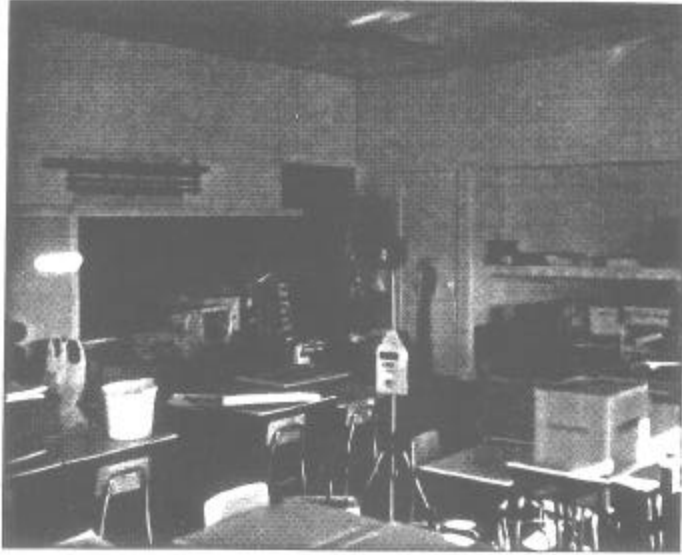
Site #3  
Bellmawr Park School  
Classroom #15 (first floor)  
Building Attenuation



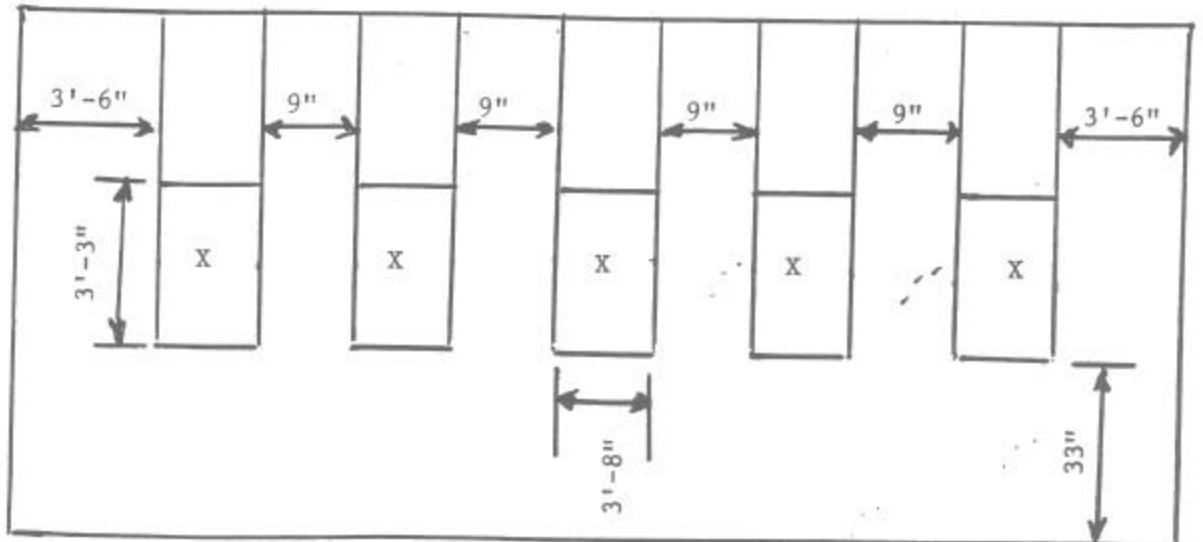
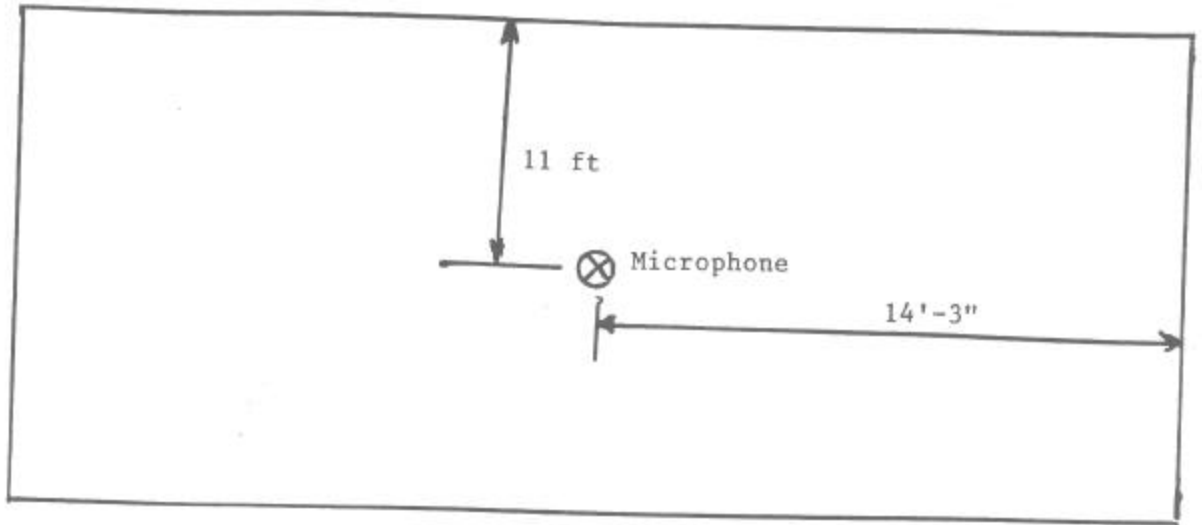
View is from inside looking out  
X= Window slies upward  
All windows are the same size



Site #3  
Bellmawr Park School  
Classroom #15

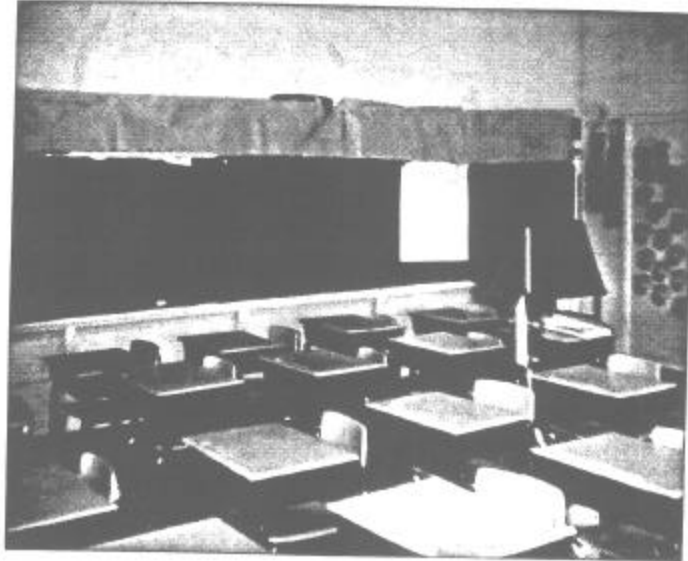


Site #3  
Bellmawr Park School  
Classroom #19 (second floor)  
Building Attenuation



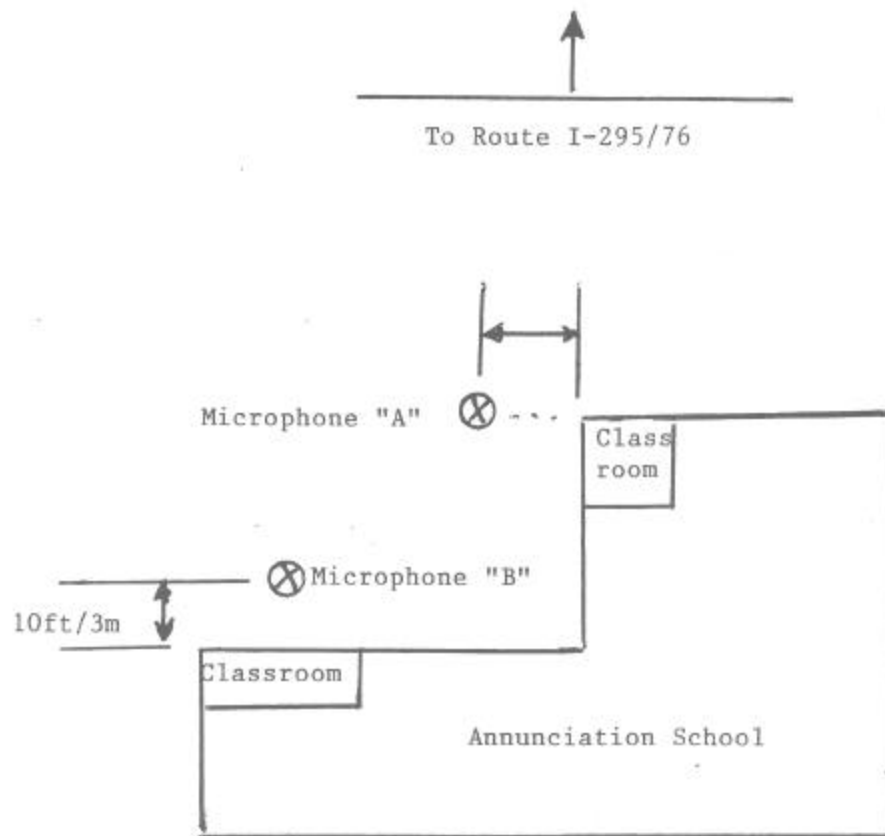
View is from inside looking out  
X= Window slies upward  
All windows are the same size

Site #3  
Bellmawr Park School  
Classroom #19

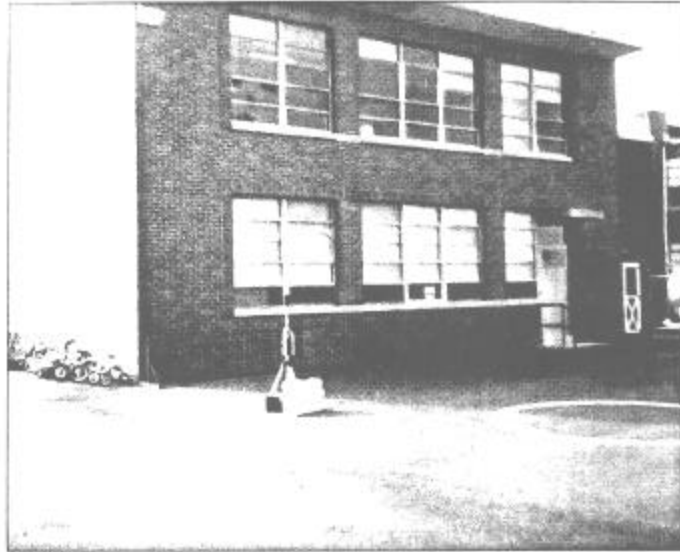




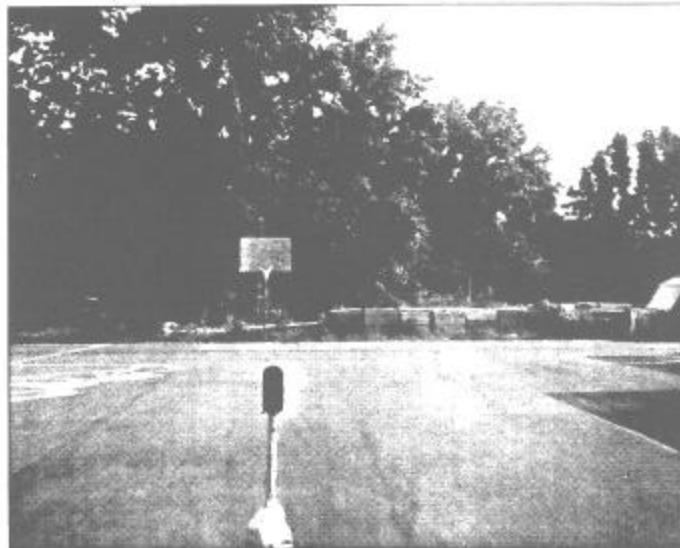
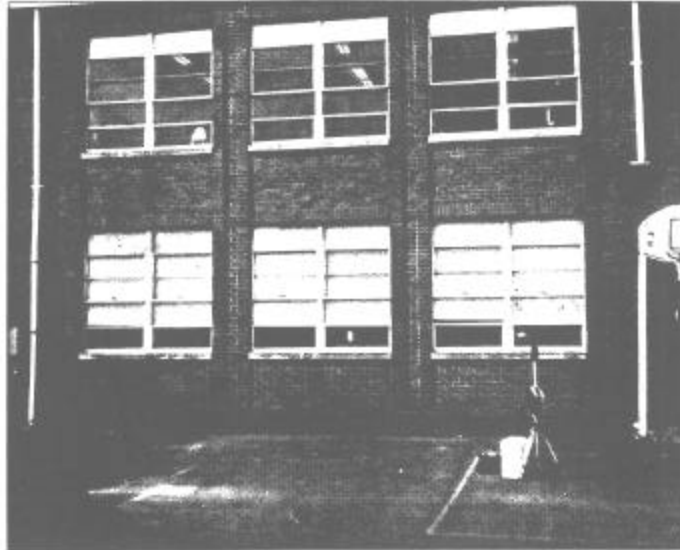
Site #4  
Annunciation School  
Building Attenuation  
Exterior



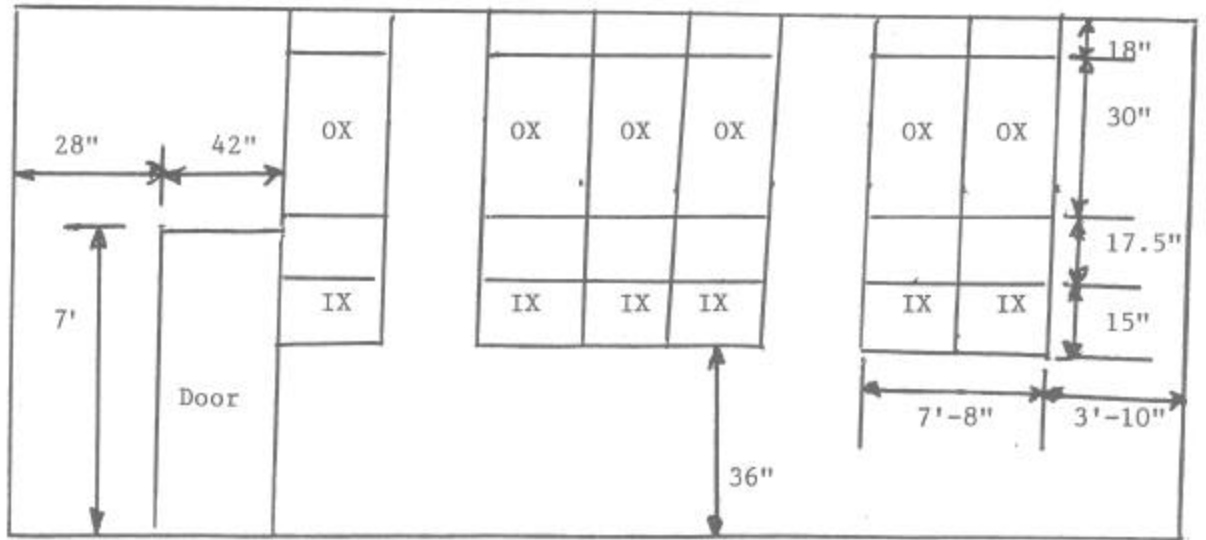
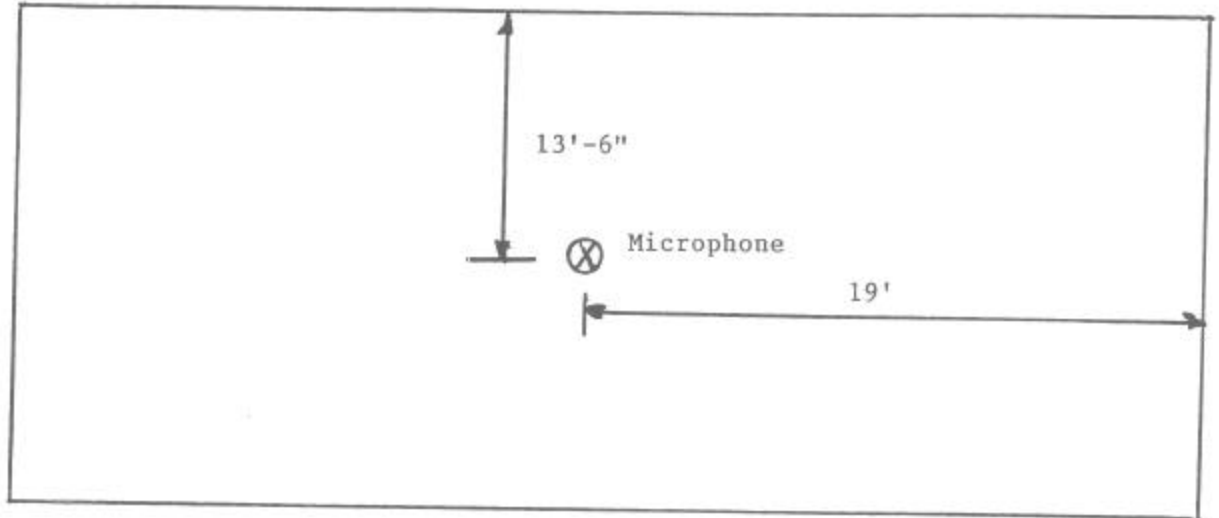
Site #4  
Annunciation School  
Exterior  
Microphone "A"



Site #4  
Annunciation School  
Exterior  
Microphone "B"



Site #4  
 Annunciation School  
 Kindergarten (first floor)  
 Building Attenuation



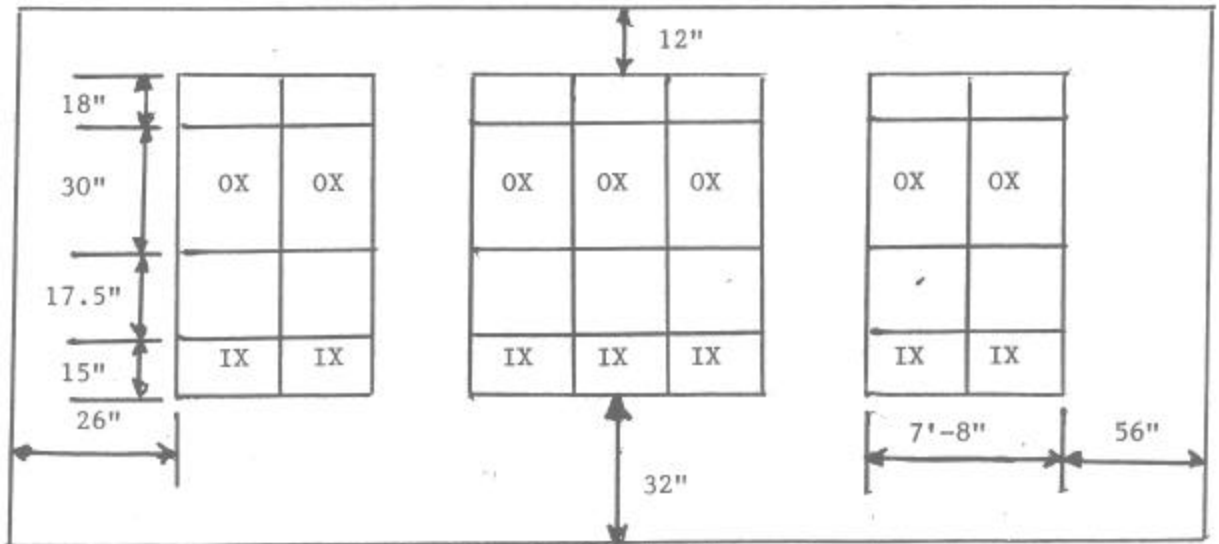
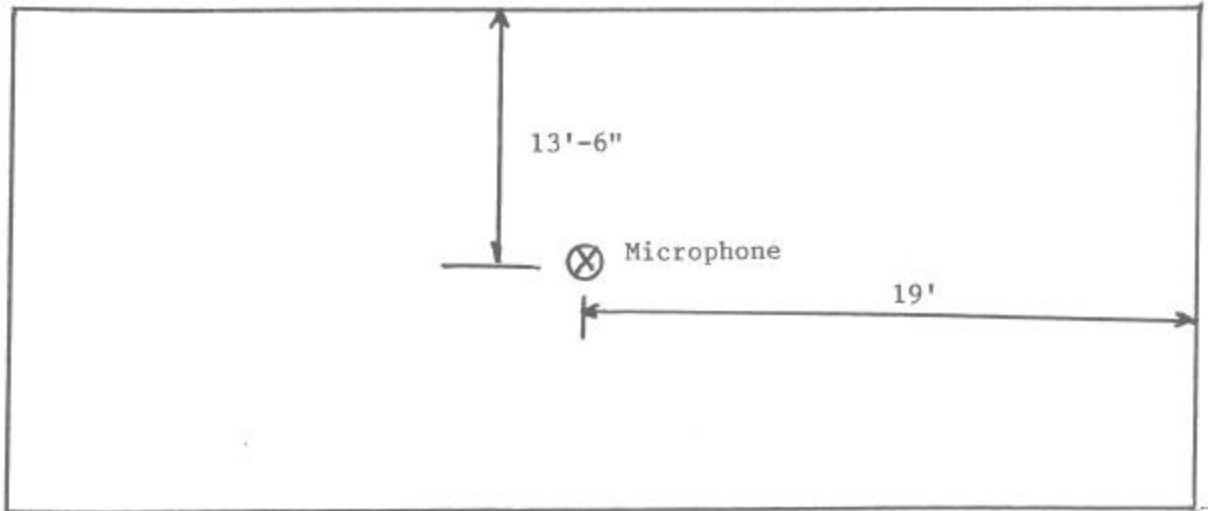
View is from inside looking outward  
 OX= window opens outward  
 IX= window opens inward  
 All windows are the same size



Site #4  
Annunciation School  
Kindergarten  
First Floor

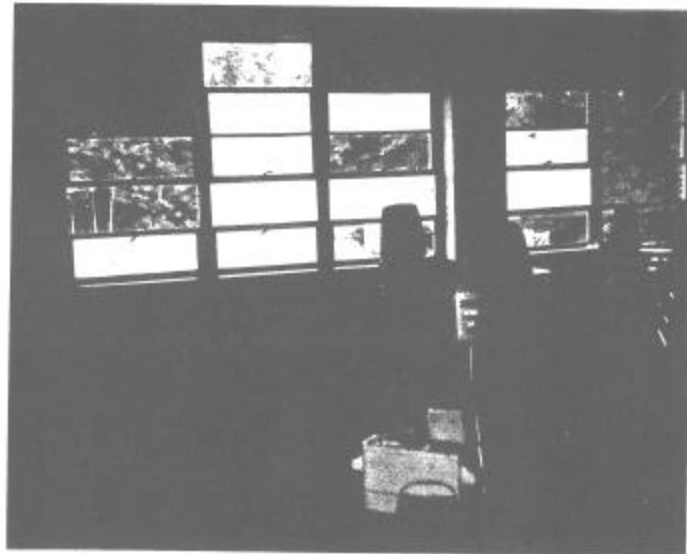
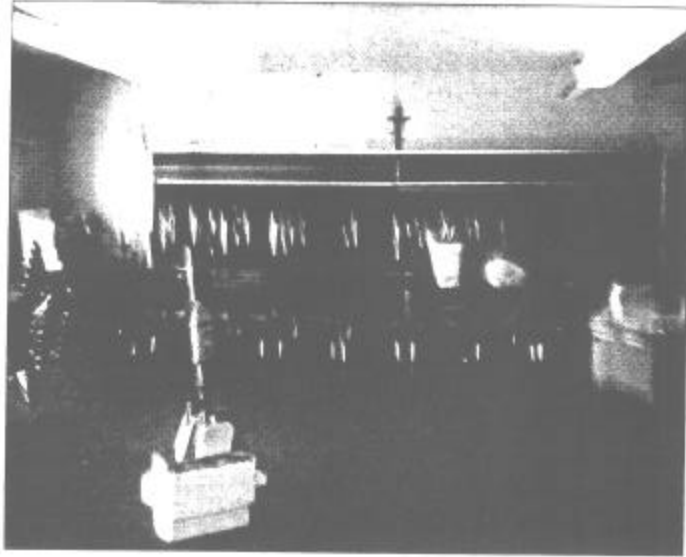


Site #4  
 Annunciation School  
 Classroom #16 (second floor)  
 Building Attenuation

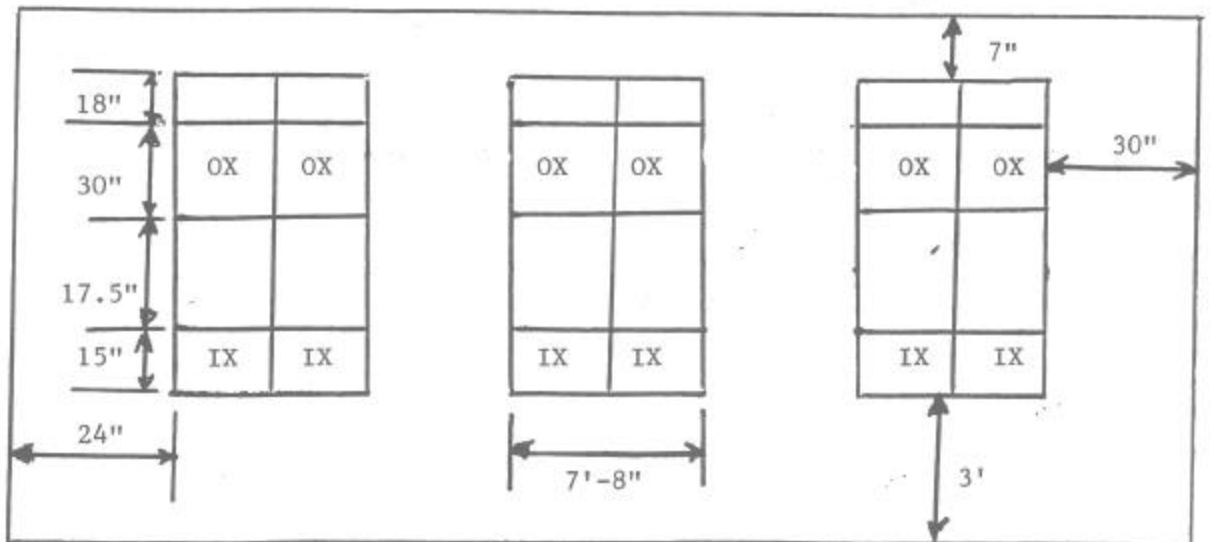
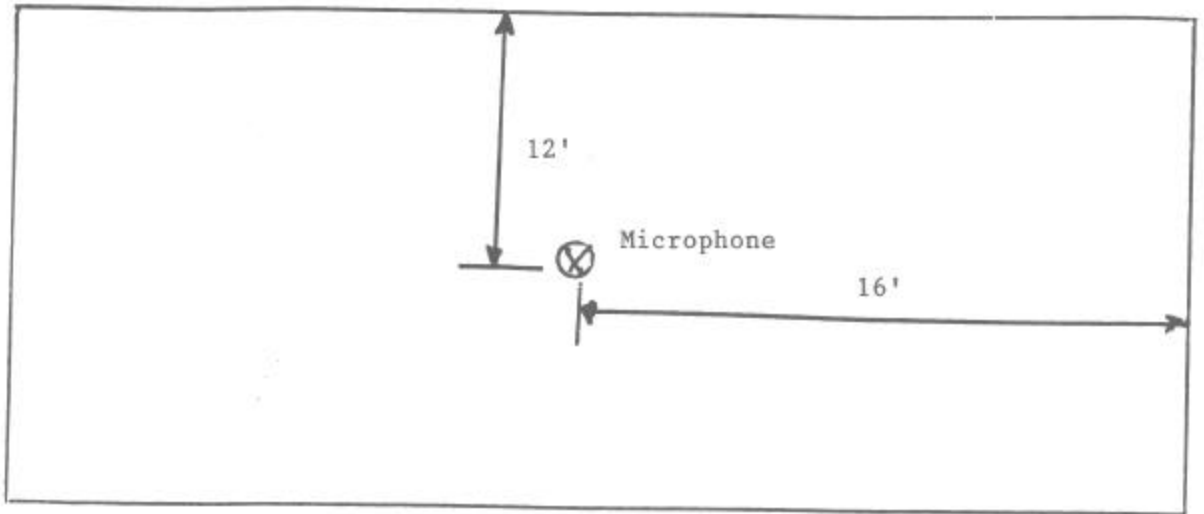


View is from inside looking outward  
 OX= window opens outward  
 IX= window opens inward  
 All windows are the same size

Site #4  
Annunciation School  
Classroom #16  
Second Floor

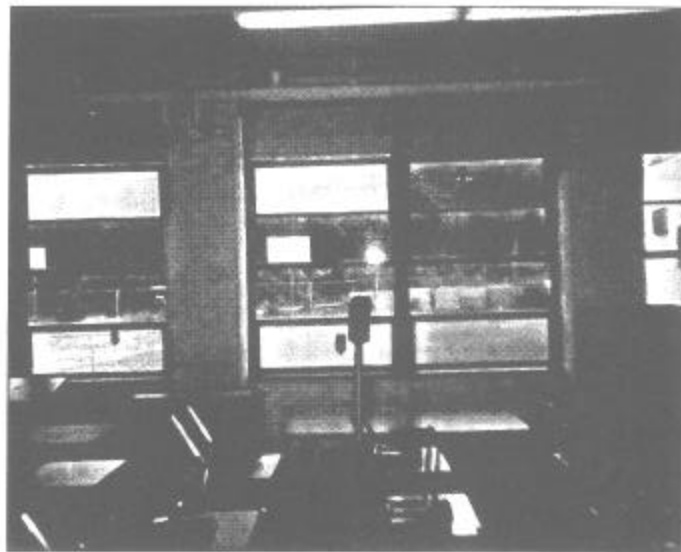
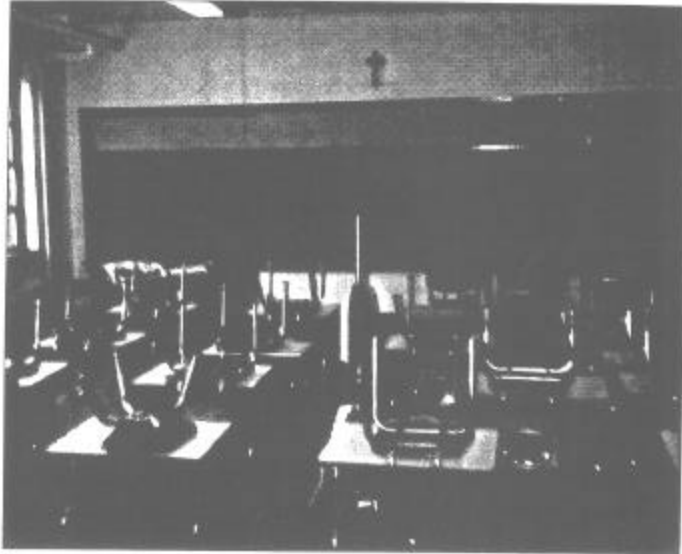


Site #4  
 Annunciation School  
 Second Grade (first floor)  
 Building Attenuation

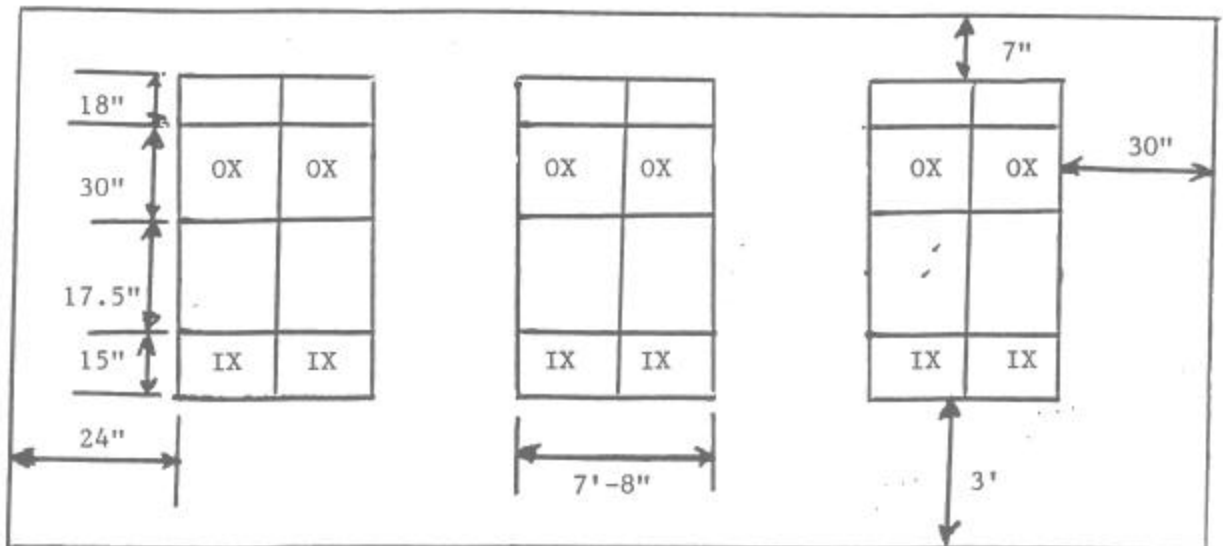
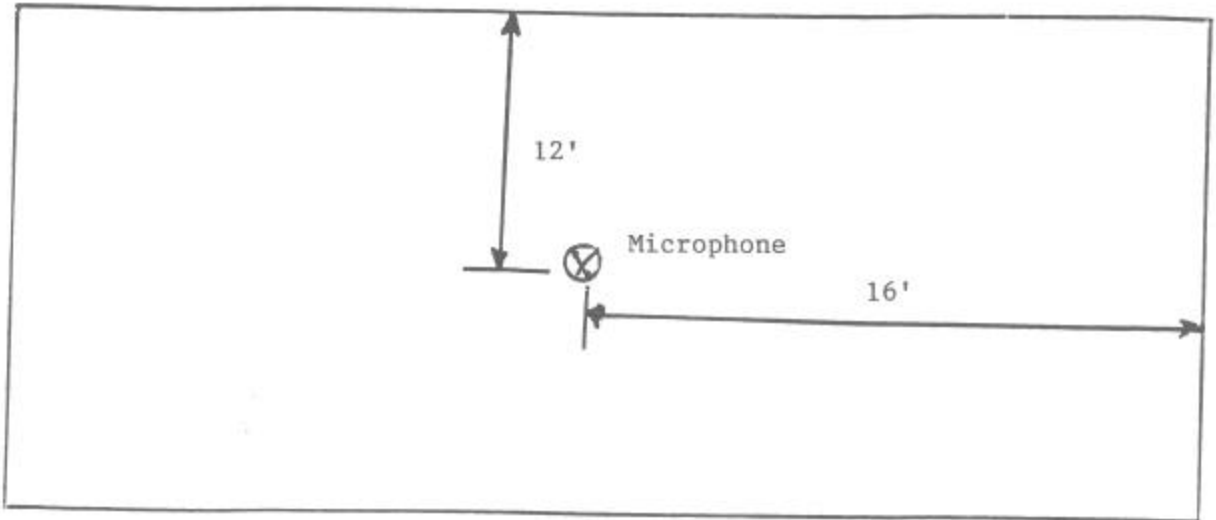


View is from inside looking outward  
 OX= window opens outward  
 IX= window open inward  
 All windows are the same size

Site #4  
Annunciation School  
Second Grade  
First Floor

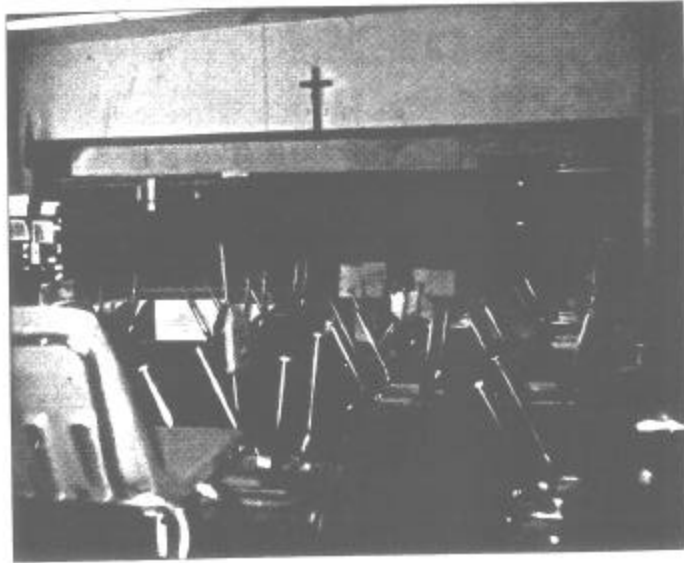


Site #4  
 Annunciation School  
 Classroom #10 (second floor)  
 Building Attenuation



View is from inside looking outward  
 OX= window opens outward  
 IX= window open inward  
 All windows are the same size

Site #4  
Annunciation School  
Classroom #10  
Second Floor



West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

## NOISE LEVEL ANALYZER

Manufactured by: BRUEL & KJAER

Model No: 4427

Serial No: 1218771

Calibration Recall No: 7926

Submitted By:

Customer: PAUL WYGOVSKY

Company: NJ DOT ENVIRONMENTAL SECTION

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4427 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25 and ISO 9002

Approved by:

Calibration Date: 31-Mar-00

Calibration Due: 31-Mar-01

Certificate No: 7926 - 9

  
Felix Christopher

uncompromised calibration

**West Caldwell  
Calibration  
Laboratories, Inc.**

1086 Bloomfield Avenue  
West Caldwell  
New Jersey  
07006

Telephone  
(973) 882-4900  
Fax  
(973) 808-9297



West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

## NOISE LEVEL ANALYZER

Manufactured by: BRUEL & KJAER

Model No: 4427

Serial No: 1381326

Calibration Recall No: 8338

Submitted By:

Customer: PAUL WYGOVSKY

Company: NEW JERSEY DOT PROJECT SUPPORT

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4427 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25 and ISO 9002

Calibration Date: 08-Aug-00

Calibration Due: 08-Aug-01

Certificate No: 8338 -5

Approved by:

  
Felix Christopher  
Quality Manager

 **West Caldwell  
Calibration  
Laboratories, Inc.**  
uncompromised calibration

1086 Bloomfield Avenue  
West Caldwell  
New Jersey  
07006

Telephone  
(973) 882-4900  
Fax  
(973) 808-9297

West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

## OUTDOOR MICROPHONE UNIT

Manufactured by: BRUEL & KJAER

Model No: 4921

Serial No: 546471

Calibration Recall No: 7926

Submitted By:

Customer: PAUL WYGOVSKY

Company: NJ DOT ENVIRONMENTAL SECTION

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4921 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25 and ISO 9002

Approved by:

Calibration Date: 07-Apr-00

Calibration Due: 07-Apr-01

Certificate No: 7926 - 5

  
Felix Christopher

 West Caldwell  
Calibration  
Laboratories, Inc.  
uncompromised calibration

1086 Bloomfield Avenue  
West Caldwell  
New Jersey  
07006

Telephone  
(973) 882-4900  
Fax  
(973) 808-9297

West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

## MICROPHONE

Manufactured by: BRUEL & KJAER

Model No: 4149

Serial No: 569364

Calibration Recall No: 7926

Submitted By:

Customer: PAUL WYGOVSKY

Company: NJ DOT ENVIRONMENTAL SECTION

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4149 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSS Z540-1, IEC Guide 25 and ISO 9002

Calibration Date: 17-Mar-00

Calibration Due: 17-Mar-01

Certificate No: 7926 - 10

Approved by:

Felix Christopher

West Caldwell  
Calibration  
Laboratories, Inc.  
uncompromised calibration

1088 Bloomfield Avenue Telephone  
West Caldwell (973) 862-4900  
New Jersey Fax  
07006 (973) 808-9297

West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

## OUTDOOR MICROPHONE

Manufactured by: BRUEL & KJAER

Model No: 4921

Serial No: 628564

Calibration Recall No: 7926

Submitted By:

Customer: PAUL WYGOVSKY

Company: NJ DOT ENVIRONMENTAL SECTION

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4921 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NC SL Z540-1, IEC Guide 25 and ISO 9002

Approved by:



Felix Christopher

Calibration Date: 11-Apr-00

Calibration Due: 11-Apr-01

Certificate No: 7926 -3

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Laboratories, Inc.  
uncompromised calibration

1086 Bloomfield Avenue  
West Caldwell  
New Jersey  
07008

Telephone  
(973) 862-4900  
Fax  
(973) 808-9297

West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

MIC ON 4921# 628564

Manufactured by: BRUEL & KJAER  
Model No: 4149  
Serial No: 642589  
Calibration Recall No: 7926

Submitted By:  
Customer: PAUL WYGOVSKY  
Company: NJ DOT ENVIRONMENTAL SECTION

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4149 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NC SL Z540-1, IEC Guide 25 and ISO 9002

Calibration Date: 17-Mar-00  
Calibration Due: 17-Mar-01  
Certificate No: 7926 -4

Approved by:

Felix Christopher

West Caldwell  
Calibration  
Laboratories, Inc.  
uncompromised calibration

1088 Bloomfield Avenue  
West Caldwell  
New Jersey  
07006  
Telephone  
(973) 882-4900  
Fax  
(973) 808-9297

FINAL  
NOISE MEASUREMENT STUDY

ROUTE I-295/76  
BELLMAWR AND MOUNT EPHRAIM  
CAMDEN COUNTY

CONDUCTED BY:

NEW JERSEY DEPARTMENT OF TRANSPORTATION  
BUREAU OF PROJECT SUPPORT & ENGINEERING  
ENVIRONMENTAL SERVICES & SUPPORT UNIT

APRIL 2001

## I. Introduction

At the request of the Bureau of Environmental Services a final noise measurement study for the Route I-295/76 Interchange in Bellmawr and Mount Ephraim in Camden County was conducted by the Bureau of Project Support and Engineering, Environmental Services and Support Unit. Noise measurements were taken during March and April of 2001, utilizing the portable noise equipment of the Bureau of Project Support and Engineering.

Nine noise measurement locations were designated thru Project Management in order to determine the existing noise environment. These nine locations consisted of three residences, two schools, two recreational areas and two seasonal locations. Hourly noise samples were taken at each noise measurement location. The three residences and one seasonal location (Site #1- New Saint Mary's Cemetery-Bellmawr) were monitored for 24-hours and the two schools were monitored during school hours. Sites #2 (9 Willow Place-Bellmawr) and Site #7 (Township Park-Mount Emphraim) were monitored from 0600AM to 0700PM. Site #8 (Bellmawr Little League) was monitored for PM rush hours, since baseball games were after school.

The building attenuation measurements at the Bellmawr Park School and the Annunciation School were conducted during the preliminary noise measurement study for this project.

Wind speed, wind direction and traffic observations were all recorded at the seasonal locations and the township park during the noise measurements. This information is included in the appendix of this report.

Representatives of Site #1 (New Saint Mary's Cemetery) wanted it noted in this noise report that the property has living quarters and the residents would like a noise barrier.

## II. Results

The peak Leq noise level for each site ranged from a high of 79 dBA at Site #2 (9 Willow Place-Bellmawr) to a low of 58 dBA at Site #9 (327 Booth Drive-Bellmawr). Table 1, page 3 shows the peak Leq noise levels for each site.

Table 2, page 4 indicates the number of Leq noise levels for each site that exceeded, equaled or approached the sixty-seven dBA design noise criteria for land use category "B" (See reference, page ).

Table 3, page 5 indicates the primary and secondary noise sources for each site.



Table #1  
 Peak Leq Noise Levels  
 Route 1-295/76  
 Final  
 Bellmawr & Mount Ephraim  
 Camden County

Site	Location	Municipality	Maximum Leq in dBA
1	New Saint Mary's Cemetery	Bellmawr	68
2	9 Willow Place	Bellmawr	79
3A	Bellmawr Park School (School Building)	Bellmawr	62
3B	Bellmawr Park School (Baseball Field)	Bellmawr	56
4	Annunciation School	Bellmawr	65
5	38 Thompson Avenue	Mount Ephraim	64
6	207 Lowell Avenue	Mount Ephraim	60
7	Township Park	Mount Ephraim	61
8	Bellmawr Little League	Bellmawr	65
9	327 Booth Drive	Bellmawr	58

Table #2

Comparison of Noise Levels  
 Route I-295/76  
 Final  
 Bellmawr & Mount Ephraim  
 Camden County

Site	No. Of Noise Samples Taken	No. Of Noise Samples Exceeding Design Noise Level	No. Of Noise Samples Equal to Design Noise Level	No. Of Noise Samples Approaching Design Noise Level
1	28	8	5	7
2	18	18	0	0
3A	12	0	0	0
3B	8	0	0	7
4	7	0	0	0
5	24	0	0	2
6	21	0	0	0
7	13	0	0	0
8	4	0	0	4
9	24	0	0	0

Table #3

Primary and Secondary Noise Sources  
 Route I-295/76  
 Final  
 Bellmawr & Mount Ephraim  
 Camden County

Site	Location	Primary Noise Source	Secondary Noise Source
1	New Saint Mary's Cemetery	Traffic on Route I-295	Traffic on Browning Road And neighborhood activities
2	9 Willow Place	Traffic on Route I-295	Traffic on Browning Road And neighborhood activities
3A & 3B	Belmawr Park School	Traffic on Route I-295	Traffic on local roadways and Neighborhood activities
4	Annunciation School	Traffic on Route I-295	Traffic on Browning Road And neighborhood activities
5	38 Thompson Avenue	Traffic on Route I-295	Neighborhood activities
6	207 Lowell Avenue	Traffic on Route I-295	Neighborhood activities
7	Township Park	Traffic on Route I-295	Traffic on local roadways and Neighborhood activities
8	Bellmawr Little League	Traffic on Route I-295	Traffic on Essex Road and Neighborhood activities
9	327 Booth Drive	Traffic on Route I-295	Neighborhood activities

### III. NOISE MEASUREMENT INSTRUMENTATION

The noise measurement instrumentation used in this study consisted of units manufactured by the Bruel & Kjaer Corporation.

The B & K Outdoor Microphone Unit (Model# 4921) is mounted on a tripod such that the microphone is five feet above ground level. This microphone is a quartz-coated 1/2" condenser microphone (B & K Model# 4149) surrounded by a windscreen. The Outdoor Microphone Unit is interconnected by a cable to the B & K Community Noise Analyzer (Model# 4427). During each sample, a signal is obtained by the Outdoor Microphone Unit and is transferred to the Community Noise Analyzer which "weights" the incoming signal from the Outdoor Microphone Unit as the microcomputer in the Community Noise Analyzer's central control and processing unit classifies the data and performs  $L_{eq}$  and statistical calculations for print out.

The Outdoor Microphone Unit has a built-in internal calibration signal which is used to calibrate the instrumentation before and after each measurement period.

During the monitoring period, weather conditions are recorded using a Belfort Wind Measuring Instrument (Model #6052).

#### IV. GLOSSARY OF BASIC HIGHWAY NOISE TERMINOLOGY

**L<sub>10</sub> Noise Level** - The L<sub>10</sub> noise level is the sound pressure level in decibels A-weighted (dBA) that is exceeded ten percent of a given time interval. For the existing measured levels, the time interval is the sampling time (60 minutes).

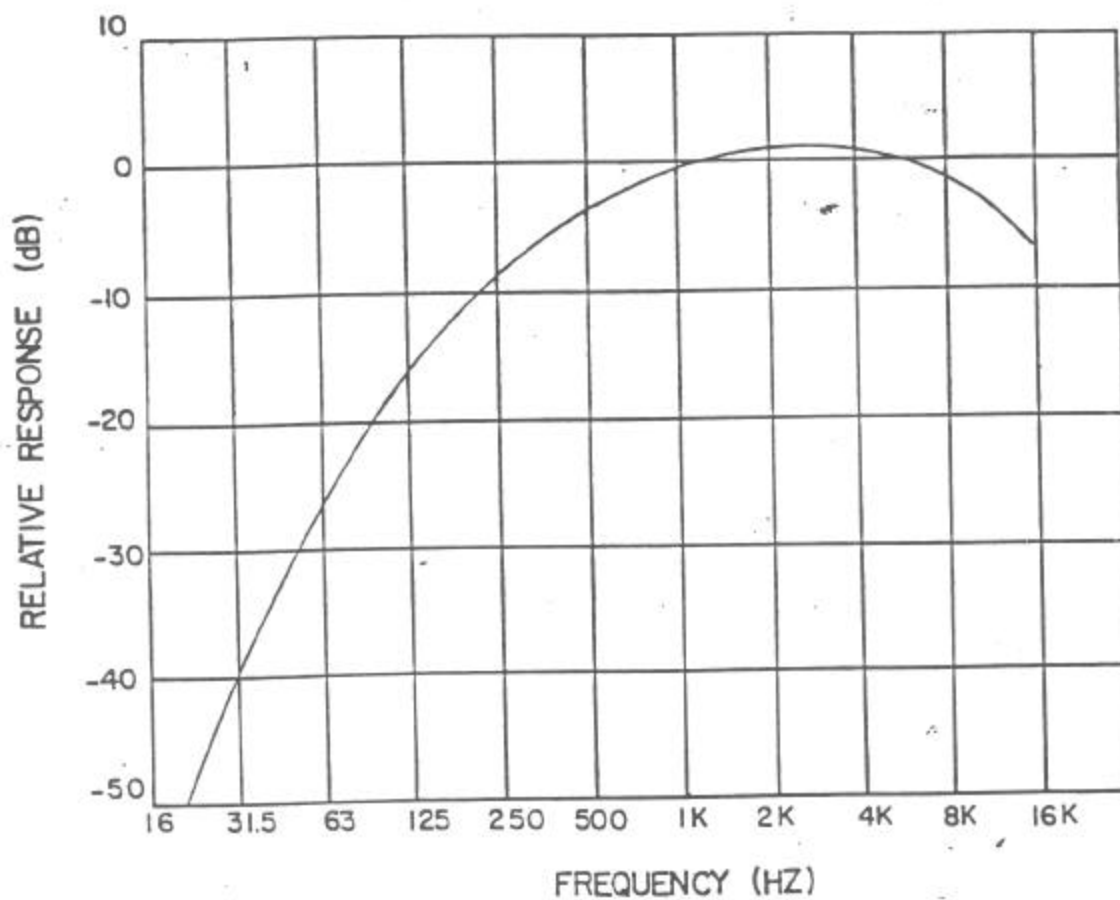
**L<sub>50</sub> Noise Level** - The L<sub>50</sub> noise level is the sound pressure level in decibels A-weighted (dBA) that is exceeded one-half of a given time interval.

**L<sub>90</sub> Noise Level** - The L<sub>90</sub> noise level is the sound pressure level in decibels (dBA) that is exceeded ninety percent of a given time interval. This noise level closely approximates the background noise level.

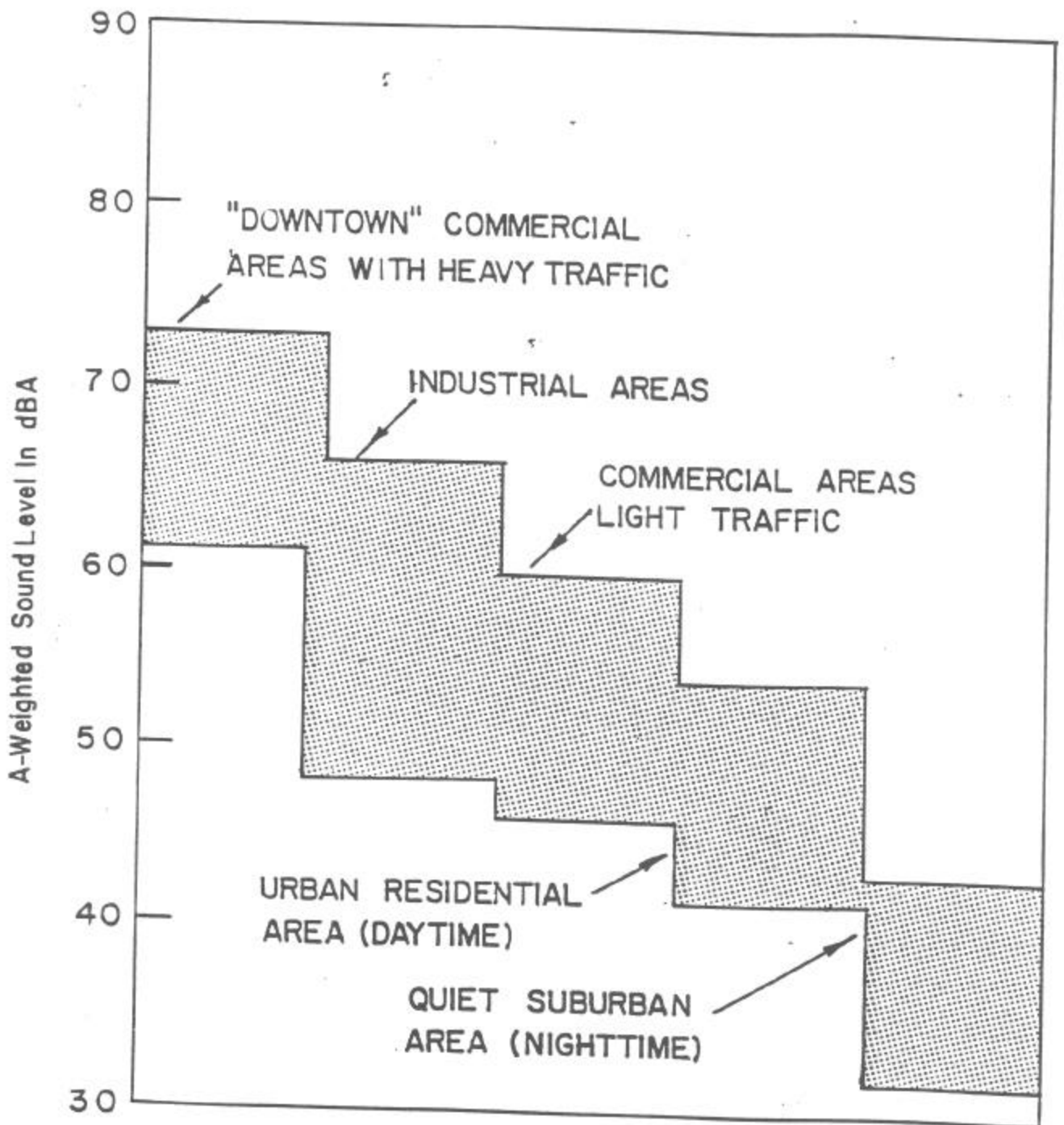
**L<sub>eq</sub> Noise Level** - The L<sub>eq</sub> noise level is the level of a constant noise source which has an amount of acoustic energy equivalent to that contained in the measured time varying noise level for a given time interval.

**Existing Noise** - The existing noise is that noise which is characteristic of a area.

# FREQUENCY RESPONSE OF THE A SCALE WEIGHTING



# TYPICAL COMMUNITY BACKGROUND NOISE LEVELS



# SOME COMMONLY ENCOUNTERED NOISE LEVELS

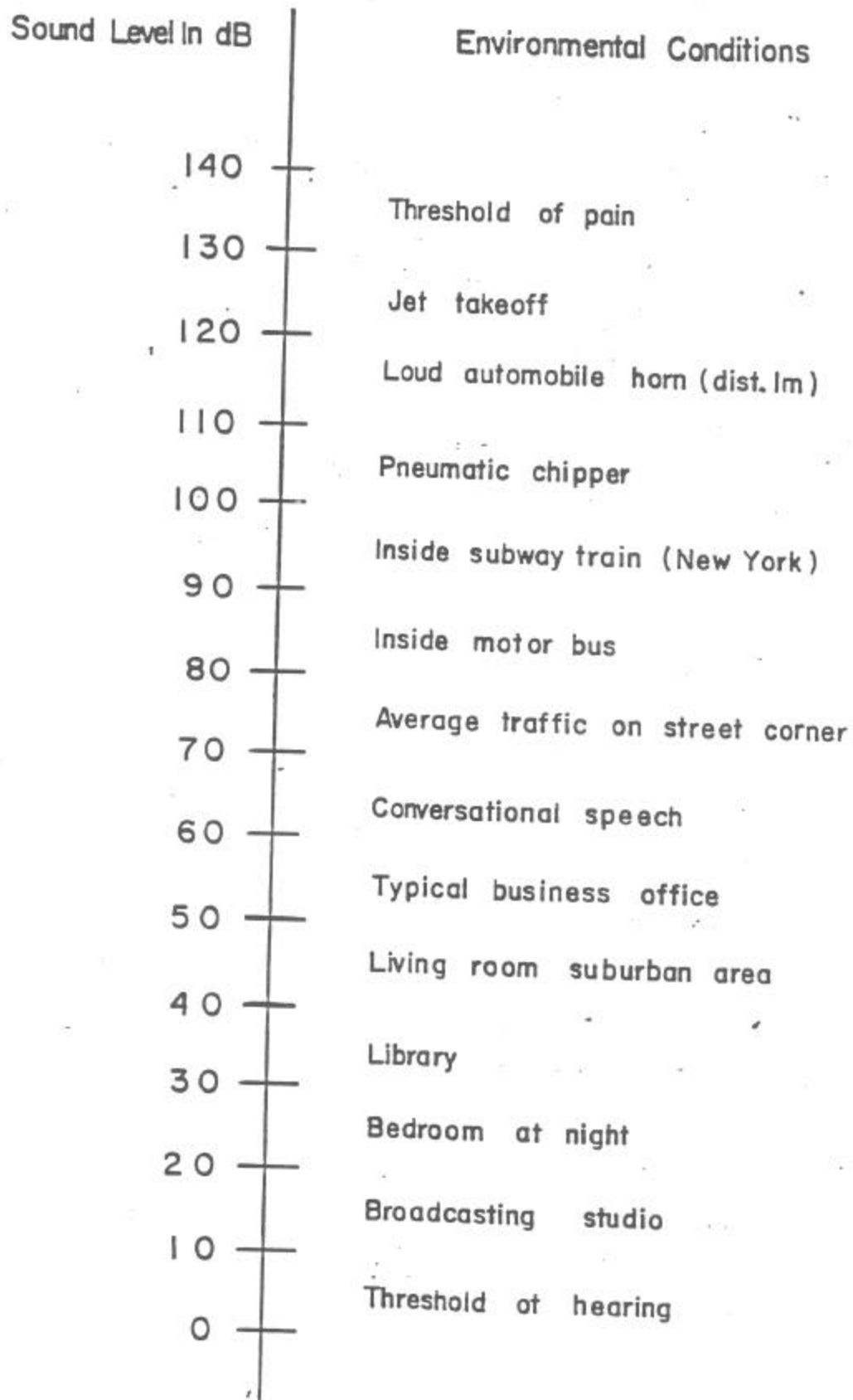




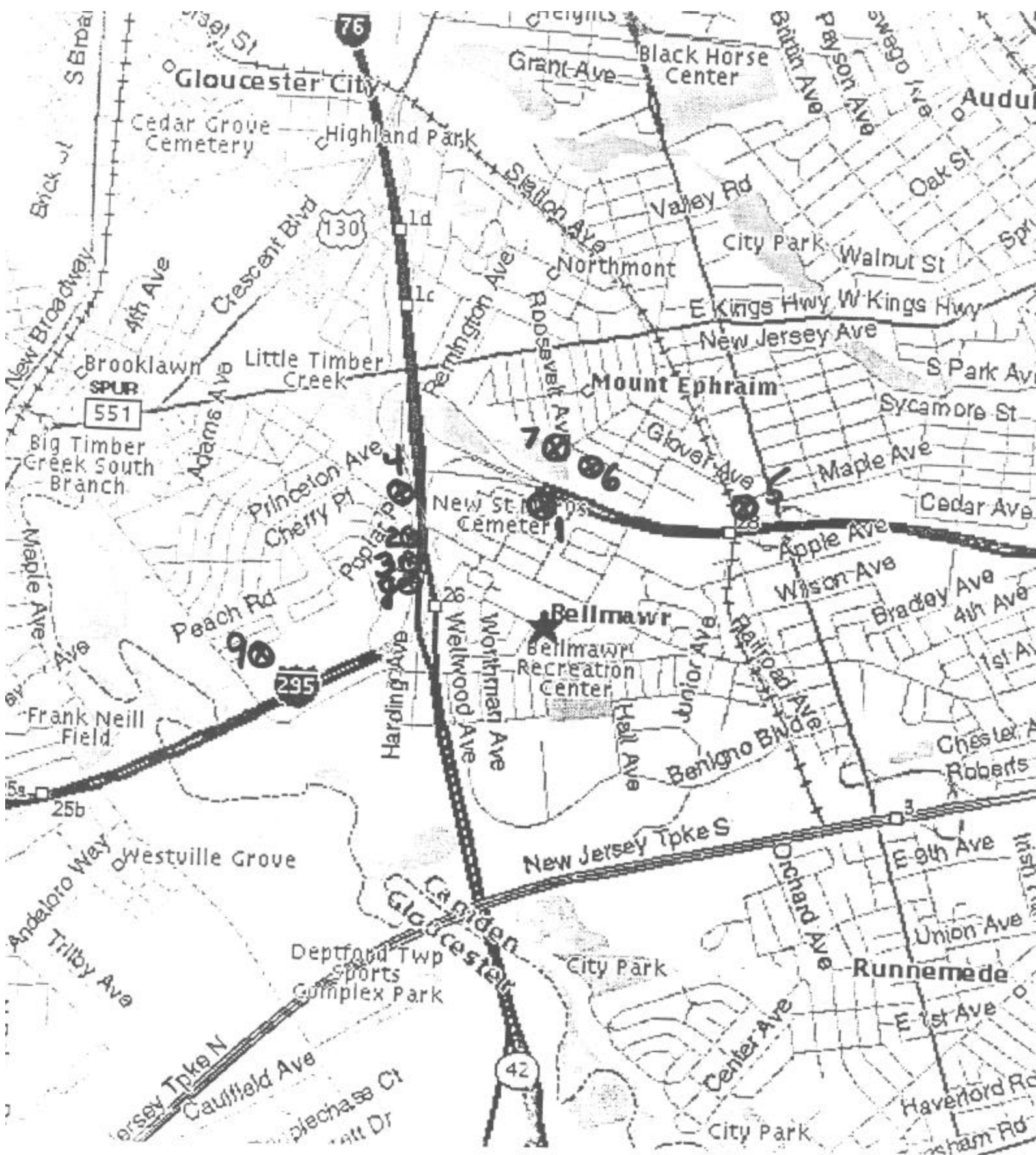
TABLE - Noise Abatement Criteria

Hourly A-Weighted Sound Level - decibels (dBA) <sup>1/</sup>

<u>Activity Category</u>	<u>Leq(h)</u>	<u>L10(h)</u>	<u>Description of Activity Category</u>
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 serve its intended purpose.
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.
D	--	--	Undeveloped lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

<sup>1/</sup>Either L<sub>10</sub>(h) or Leq(h) (but not both) may be used on a project.

## APPENDIX



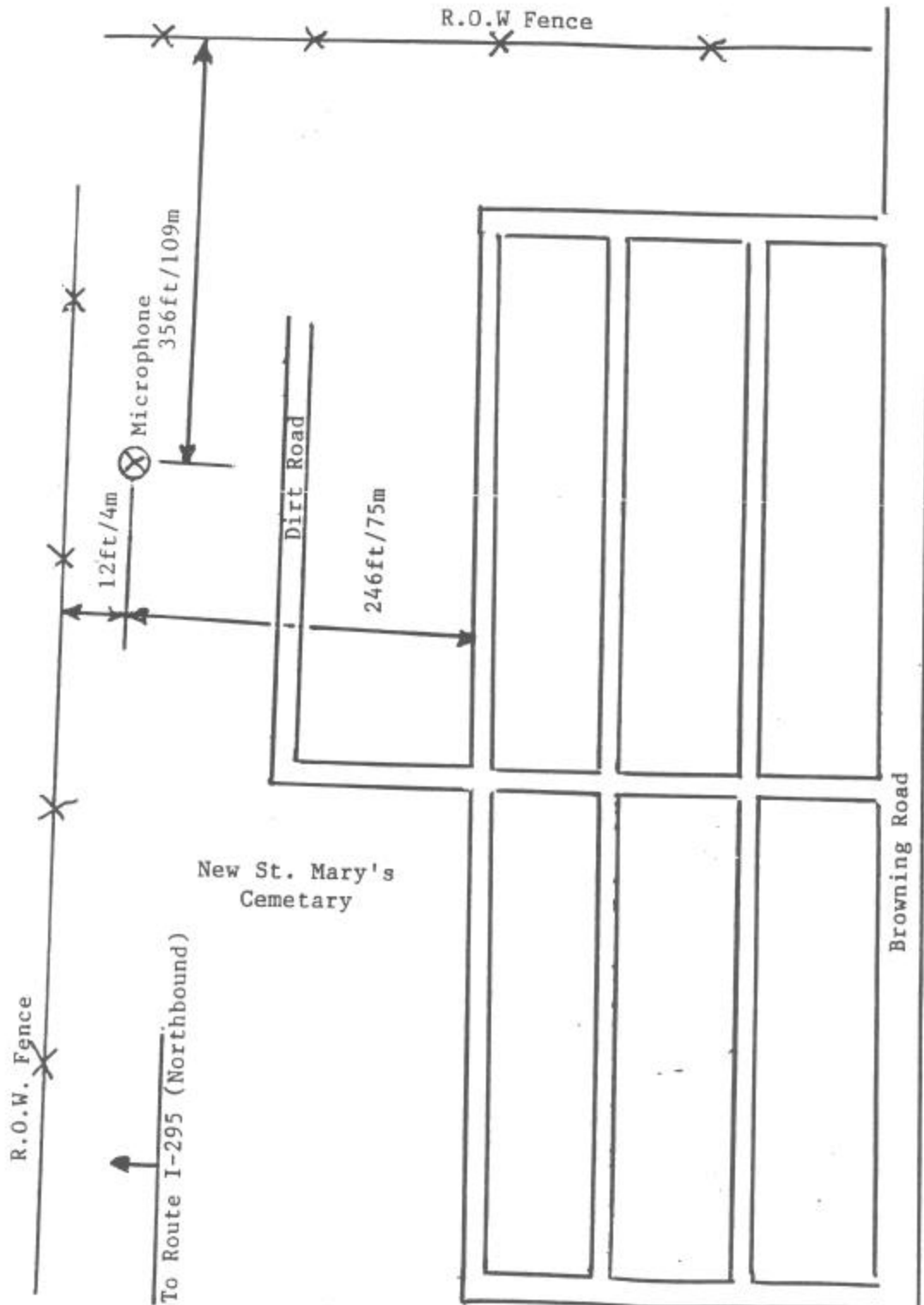
Final  
 Noise Measurement Study  
 Route I-295/76  
 Bellmawr & Mount Ephraim  
 Camden County  
 ● Noise Measurement Locations

Route I-295/76  
 Site #1- New Saint Mary's Cemetery (Bellmawr)

Date	Day of Week	Start of Sample Period	Existing Noise Levels (dBA)				Axle Counts	Data Inhibited % of Sample Period	Number of Inhibits	Remarks
			Leq	1.10	1.50	1.90				
3/26/01	Monday	1500	68	70	67	65				
		1600	68	70	68	66				
		1700	68	70	68	66				
		1800	68	70	68	66				
		1900	67	69	66	64				
		2000	65	67	65	62				
		2100	66	68	65	62				
		2200	64	67	64	59				
		2300	63	66	62	56				
		0000	63	66	61	54				
3/27/01	Tuesday	0100	62	66	59	50				
		0200	62	66	58	49				
		0300	63	67	60	51				
		0400	64	67	62	55				
		0500	66	69	65	60				
		0600	68	70	68	66				
		0700	67	69	67	63				
		0800	66	68	65	59				
		0900	67	69	66	61				
		1000	67	69	66	63				
		1100	66	69	65	60				
		1200	62	64	61	58				
		1300	62	64	62	59				
		1400	63	66	62	59				
		1500	67	69	66	64				
		1600	58.7	70	67	65				



Site #1  
New St. Marys Cemetary  
Bellmawr



Note: Route I-295 is depressed

Site #1

New St. Mary's Cemetary  
Bellmawr







Site #2  
9 Willow Place  
Bellmawr

Wind and Traffic Data  
3/26/01

Time -----	Wind -----	Traffic -----
1510	2-4mphN	Free flow
1530	2-4mphN	Free Flow
1550	<2mphN	Free flow
1602	2-4mphN	Free flow
1610	<2mphN	Free flow
1622	2-4mphN	Free flow
1640	2-4mphN	Free flow
1700	2-4mphN	Free flow
1720	<2mphN	Free flow
1724	<2mphN	Inner EB lanes-heavy moving slowly All other lanes- free flow
1731	2-4mphN	Inner EB lanes-heavy moving slowly All other lanes- free flow
1736	2-4mphN	Free flow
1748	2-4mphN	Free flow
1800	2-4mphN	Free flow
1820	2-4mphN	Free flow
1842	<2mphN	Free flow
1900	<2mphN	Free flow

Site #2  
9 Willow Place  
Bellmawr

Wind and Traffic Data  
3/27/01

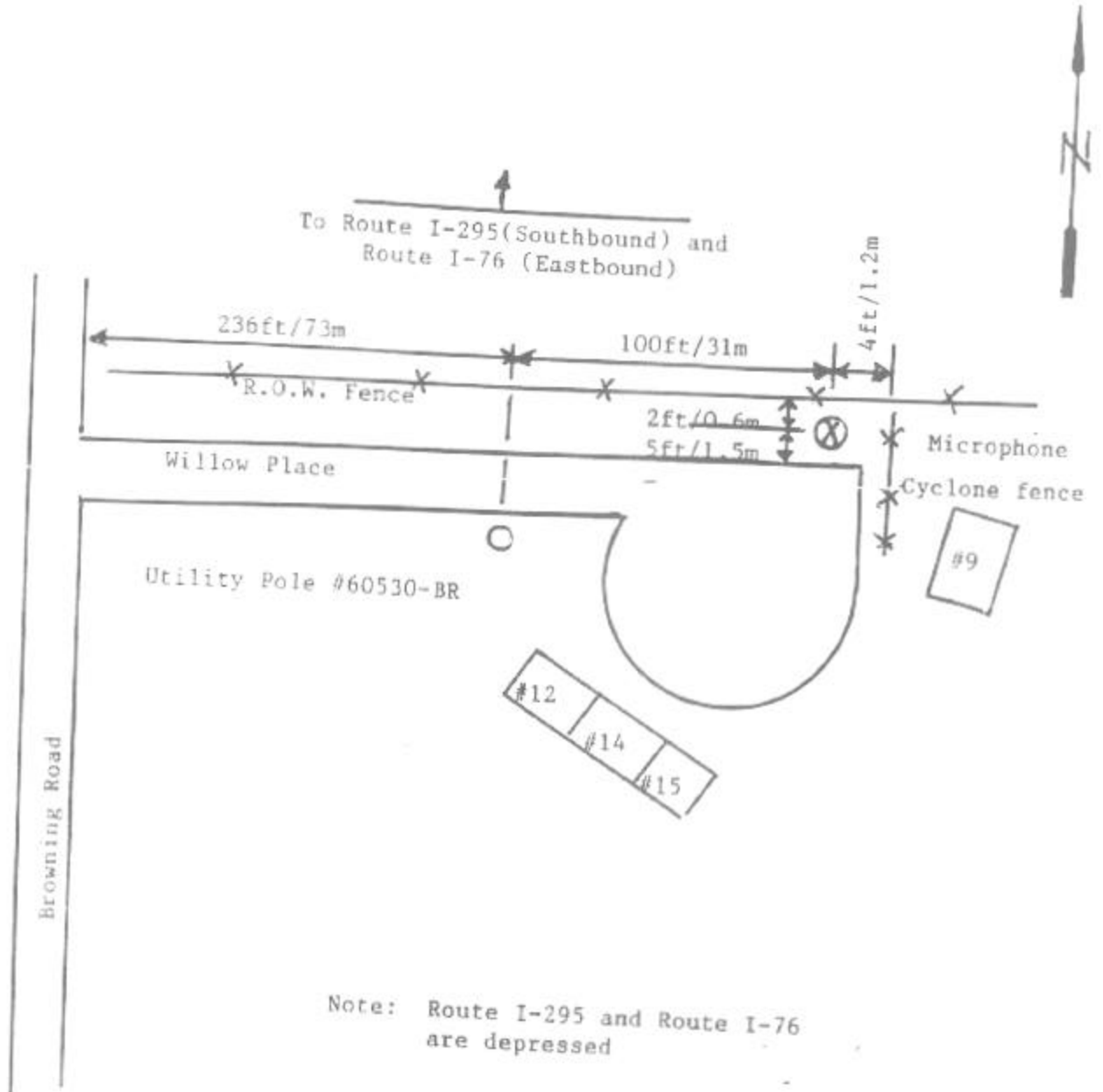
Time	Wind	Traffic
-----	-----	-----
0601	0	Free flow
0620	0	Free flow
0635	0	Free flow
0700	0	Free flow
0710	0	Outer WB lanes-heavy moving slowly All other lanes- free flow
0728	0	Outer WB lanes- heavy very slow All other lanes- free flow
0740	0	Outer WB lanes- stop & go All other lanes- free flow
0804	0	Outer WB lanes-heavy moving slowly All other lanes- free flow
0822	0	Outer WB lanes- stop & go All other lanes- free flow
0827	0	Outer WB lanes-heavy moving slowly All other lanes- free flow
0840	0	Free flow
0848	0	Outer WB lanes-heavy moving slowly All other lanes- free flow
0854	0	Free flow
0902	0	Free flow
0920	0	Free flow
1230	<2mphN	Free flow
1315	<2mphN	Free flow
1400	2-4mphN	Free flow
1500	2-4mphN	Free flow
1530	4-6mphN	Free flow
1550	4-6mphN	Free flow
1630	2-4mphN	Free flow
1650	2-4mphN	Free flow
1710	<2mphN	Free flow
1730	2-4mphN	Free flow
1740	2-4mphN	Inner EB lanes-heavy moving slowly All other lanes- free flow
1747	2-4mphN	Free flow
1800	4-6mphN	Free flow

Site #2  
9 Willow Place  
Bellmawr

Wind and Traffic Data  
3/27/01  
(Cont.)

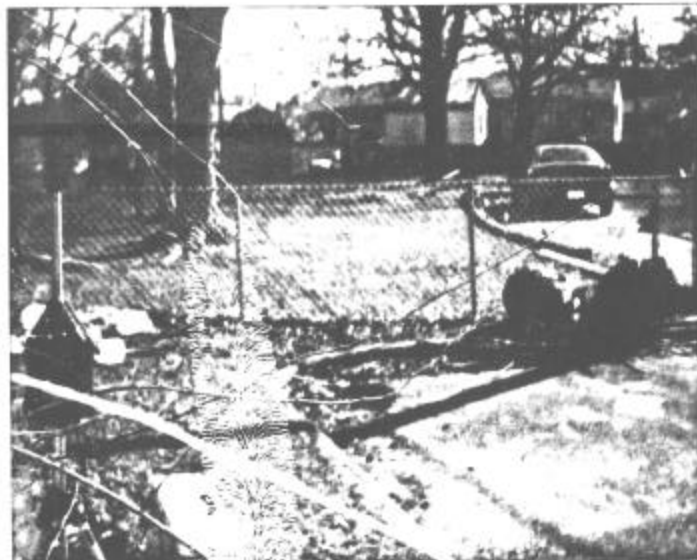
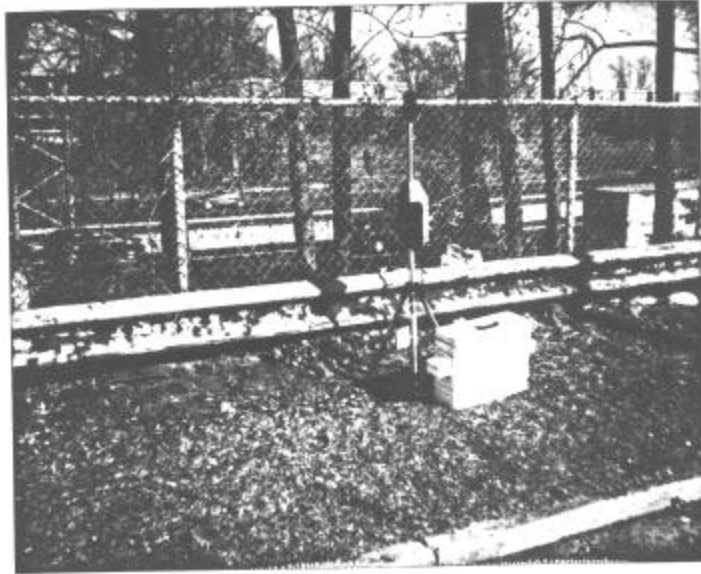
Time -----	Wind -----	Traffic -----
1820	2-4mphN	Free flow
1900	2-4mphN	Free flow

Site #2  
9 Willow Place  
Bellmawr



Note: Route I-295 and Route I-76  
are depressed

Site #2  
9 Willow Place  
Bellmawr







Site #3A & 3B  
Bellmawr Park School  
Bellmawr

Wind and Traffic Data

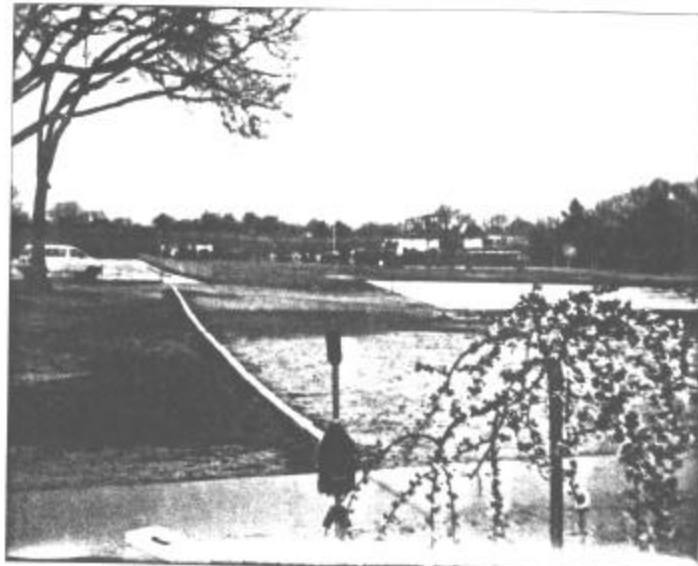
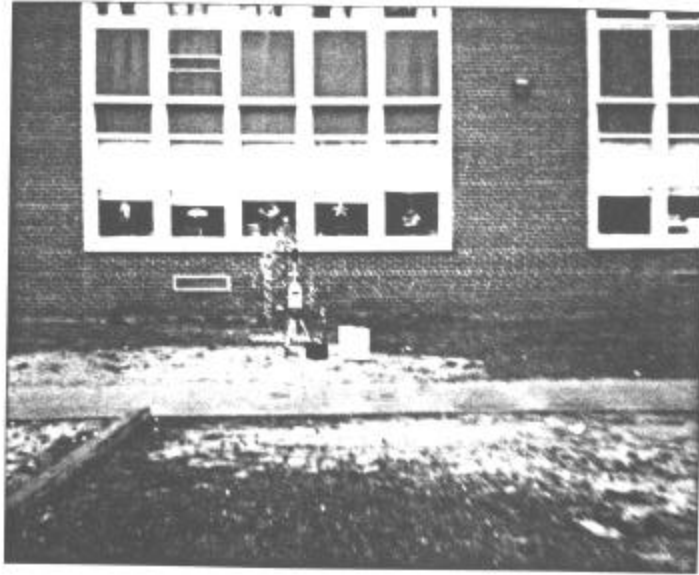
Date -----	Time -----	Wind -----	Traffic -----
4/13/01	0800	0	Free flow
	0810	0	Westbound lanes-heavy but moving
	0820	0	Westbound- stop & go
	0920	0	Free flow
	1000	0	Free flow
	1100	0	Free flow
	1200	0	Free flow
	1300	2-4mph East	Free flow
	1400	2-4mph East	Free flow
	1500	4-6mph East	Free flow
4/16/01	0750	0	Free flow
	0820	0	Westbound- heavy but moving
	0835	0	Westbound- Stop & go
	0910	0	Free flow
	1010	0 Light drizzle	Free flow
	1017	0 Drizzle stopped	Free flow
	1100	0	Free flow
	1200	0	Free flow
	1300	0	Free flow
	1400	<2mph East	Free flow
	1500	<2mph East	Free flow
	1536	<2mph East	Outer Eastbound lanes- heavy moving slowly
	4/17/01	0740	<2mph East
0800		<2mph East	Free flow
0820		0	Westbound- heavy moving slowly
0840		0	Free flow
0855		0	Westbound- heavy moving slowly
0915		0	Free flow
1000		0	Free flow
1040		2-4mph East	Free flow
1100		2-4mph East	Free flow
1200		2-4mph East	Free flow







Site # 3A  
Bellmawr Park School  
School Building



Site #3B  
Bellmawr Park School  
Baseball Field



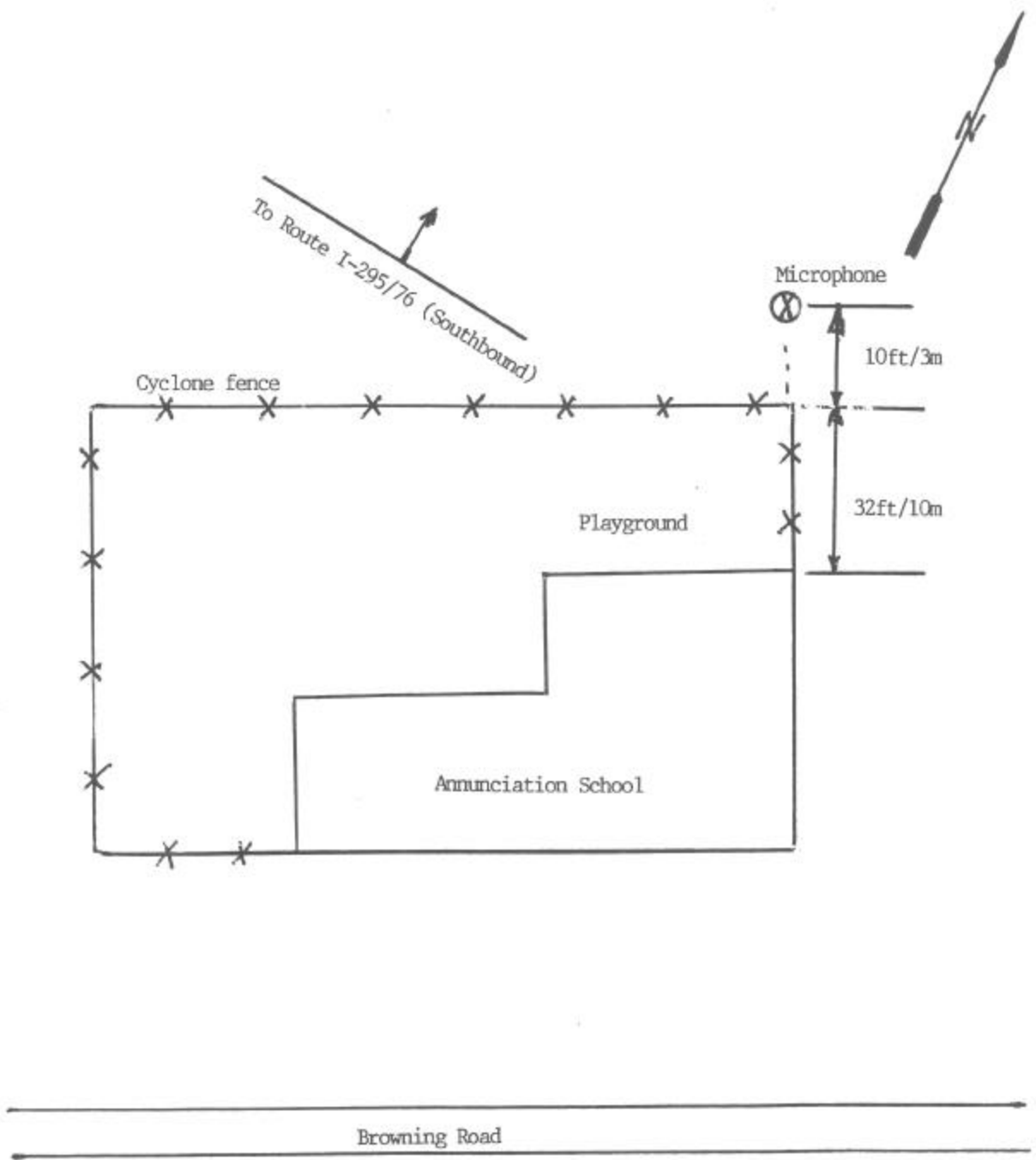


Site #4  
Annunciation School  
Bellmawr

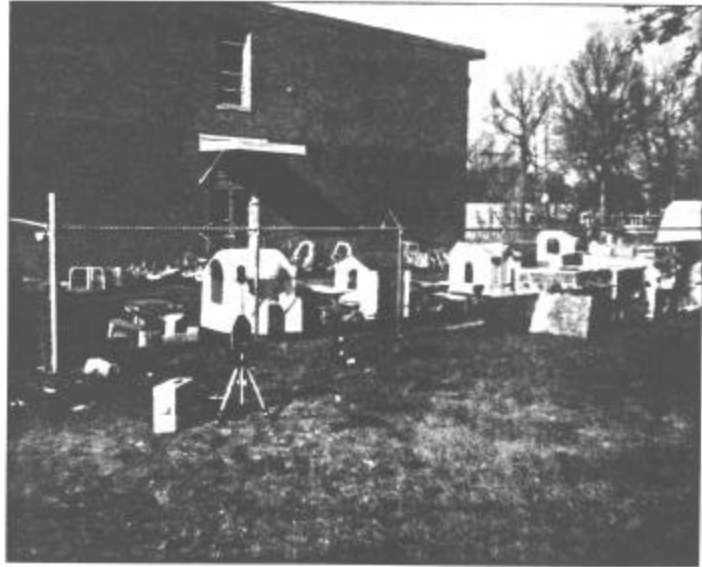
Wind and Traffic Data

Date	Time	Wind	Traffic
-----	-----	-----	-----
4/18/01	0740	0	Free flow
	0800	<2mph South	Free flow
	0900	2-4mph South	Free flow
	1000	4-6mph Southwest	Free flow
	1100	4-6mph West	Free flow
	1200	6-8mph West	Free flow
	1300	6-8mph West	Free flow
	1400	6-8mph Northwest	Free flow

Site #4  
Annunciation School  
Bellmawr



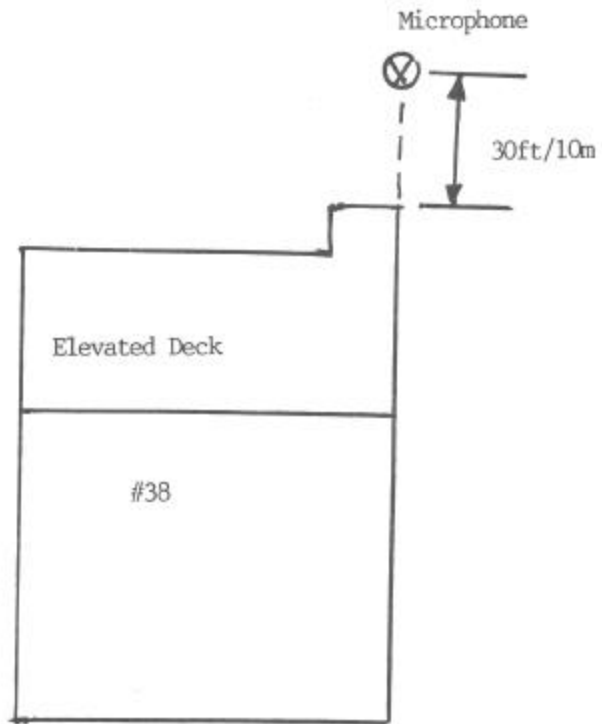
Site #4  
Annunciation School  
Bellmawr







Site #5  
38 Thompson Avenue  
Mount Enphraim

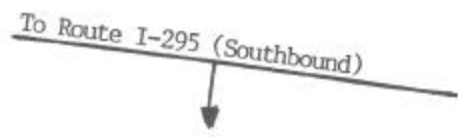
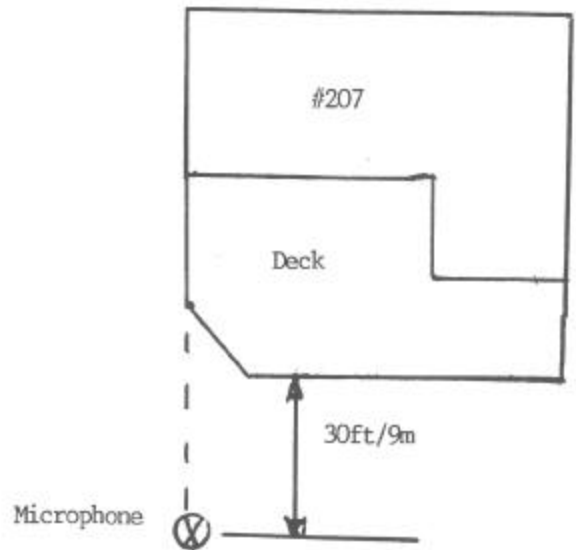
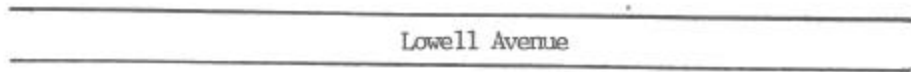


Site #5  
38 Thompson Avenue  
Mount Ephraim





Site #6  
207 Lowell Avenue  
Mount Ephraim



Site #6  
207 Lowell Avenue  
Mount Ephraim





Site #7  
Township Park  
Mount Emphraim

Wind and Traffic Data  
3/28/01

Time -----	Wind -----	Traffic -----
0550	0	Free flow
0620	0	Free flow
0700	0	Free flow
0716	0	Northbound-heavy moving slowly Southbound-free flow
0732	<2mphE	Northbound- heavy moving slowly Southbound-heavy moving slowly
0750	<2mphE	Northbound-stop & go Southbound-heavy moving slowly
0810	<2mphE	Northbound-stop & go Southbound-stop & go
0830	0	Northbound-stop & go Southbound-heavy moving slowly
0835	0	Northbound-stop & go Southbound-free flow
0846	0	Northbound-heavy moving slowly Southbound-free flow
0912	0	Free flow
1000	<2mphN	Free flow
1100	<2mphN	Free flow
1200	2-4mphNE	Free flow
1300	2-4mphE	Free flow
1400	<2mphE	Free flow
1500	2-4mphSE	Free flow
1540	<2mphS	Free flow
1551	<2mphS	Northbound-free flow Southbound-heavy moving slowly
1558	2-4mphS	Free flow
1630	<2mphS	Free flow
1634	<2mphS	Northbound-free flow Southbound-heavy moving slowly
1644	<2mphS	Free flow
1706	2-4mphS	Northbound-free flow Southbound-heavy moving slowly
1723	<2mphS	Northbound-free flow Southbound-stop & go



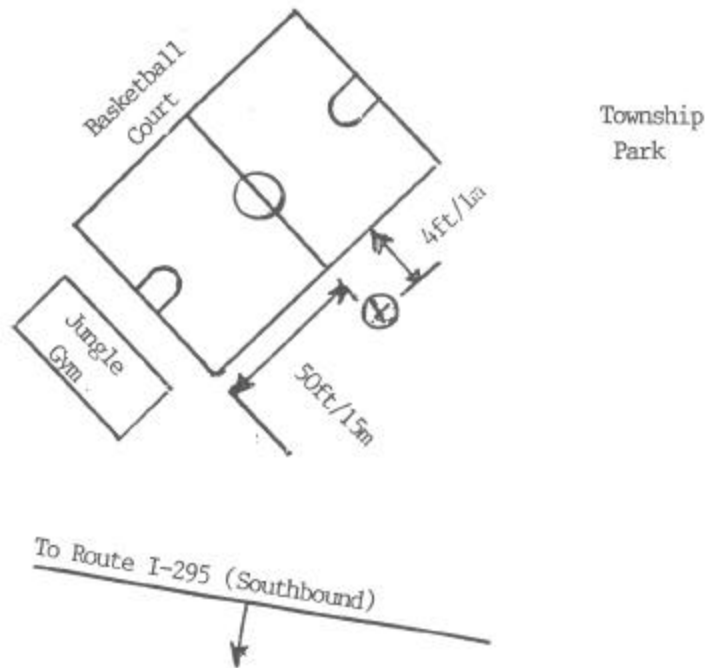
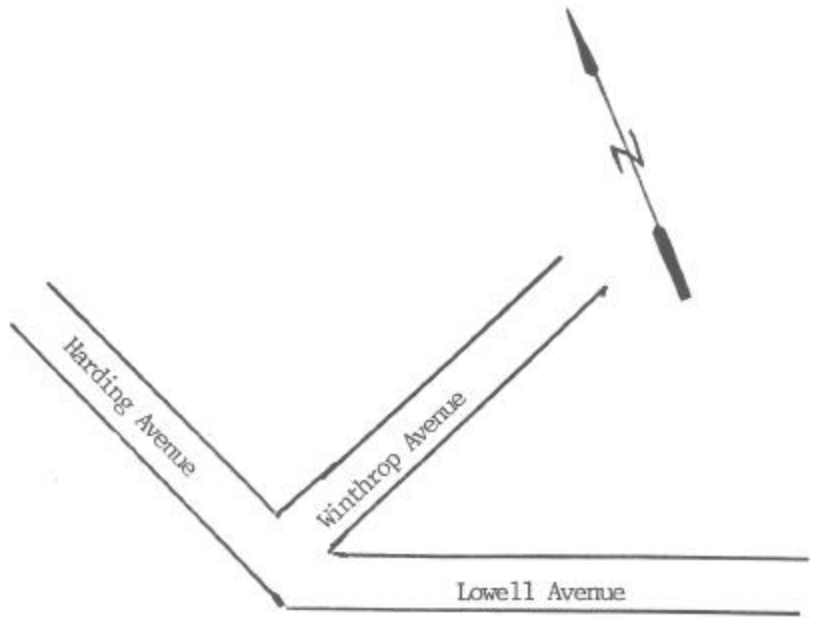
Site #7

Township Park  
Mount Emphraim

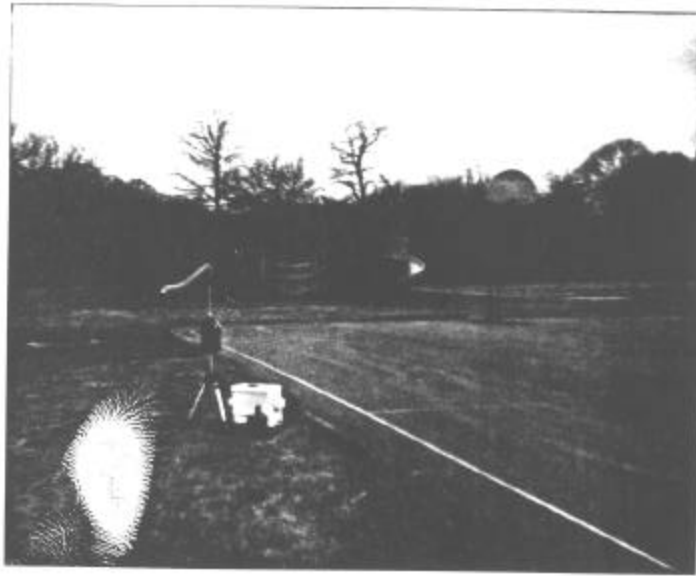
Wind and Traffic Data  
3/28/01  
(Cont.)

Time -----	Wind -----	Traffic -----
1752	2-4mphS	Northbound-free flow
1802	2-4mphS	Southbound-heavy moving slowly
1900	<2mphS	Free flow
		Freeflow

Site #7  
Township Park  
Mount Ephraim

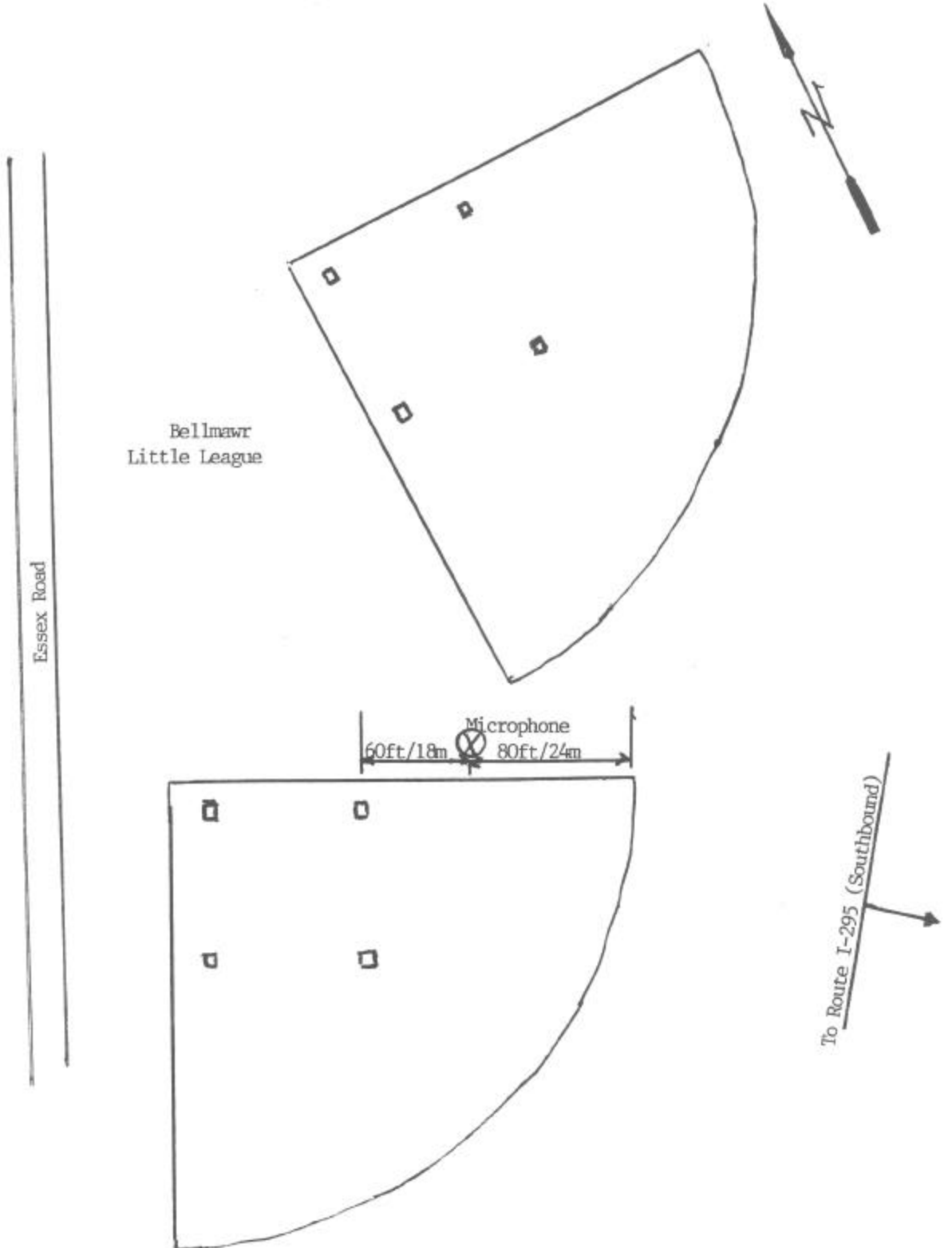


Site #7  
Township Park  
Mount Ephraim

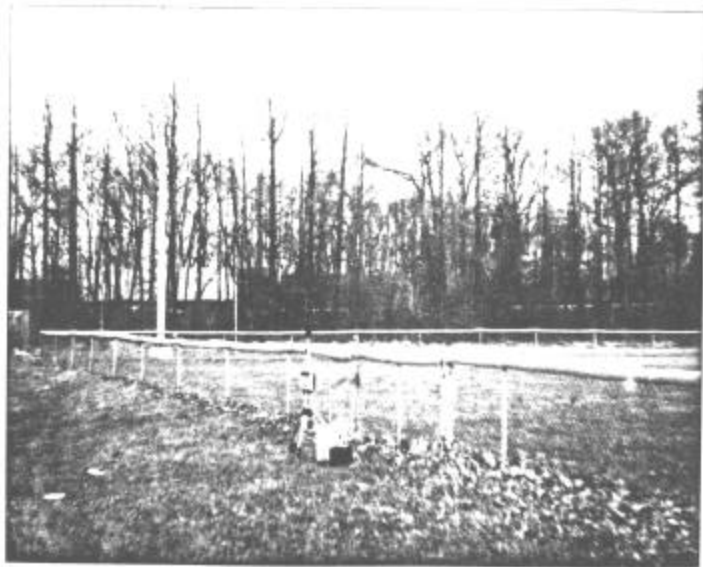




Site #8  
Bellmawr Little League  
Bellmawr



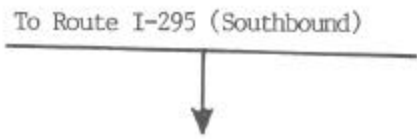
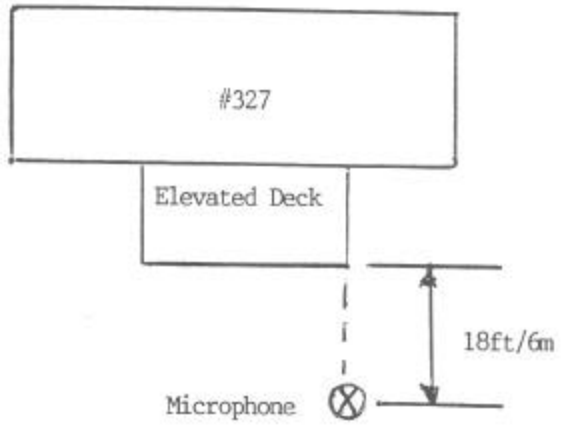
Site #8  
Bellmawr Little League  
Bellmawr



Route I-295/76  
 Site #9- 327 Booth Drive (Bellmawr)

Date	Day of Week	Start of Sample Period	Existing Noise Levels (dB(A))				Axle Counts	Data Inhibited % of Sample Period	Number of Inhibits	Remarks
			Leq	1.10	1.50	1.90				
3/19/01	Monday	1100	52	53	51	50				
		1200	51	52	50	49				
		1300	52	54	51	49				
		1400	54	56	52	50				
		1500	54	56	53	51				
		1600	54	56	53	51				
		1700	53	54	52	50				
		1800	53	54	52	50				
		1900	55	56	53	51				
		2000	53	55	52	49				
3/20/01	Tuesday	2100	51	52	49	47				
		2200	51	52	50	47				
		2300	51	52	49	47				
		0000	50	52	49	46				
		0100	52	55	50	46				
		0200	51	53	48	45				
		0300	53	55	52	49				
		0400	53	55	52	50				
		0500	57	59	56	52				
		0600	58	60	58	56				
		0700	56	57	55	52				
		0800	55	57	54	51				
		0900	56	58	55	53				
		1000	55	57	53	51				

Site #9  
327 Booth Avenue  
Bellmawr





Site #9  
327 Booth Drive  
Bellmawr



12 2100  
West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

## OUTDOOR MICROPHONE UNIT

Manufactured by: BRUEL & KJAER

Model No: 4921

Serial No: 628558

Calibration Recall No: 8338

Submitted By:

Customer: PAUL WYGOVSKY

Company: NEW JERSEY DOT PROJECT SUPPORT

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4921 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25 and ISO 9002

Calibration Date: 29-Mar-01

Calibration Due: 29-Mar-02

Certificate No: 8338 - 1

Approved by:



Felix Christopher  
Quality Manager

 West Caldwell  
Calibration  
Laboratories, Inc.  
uncompromised calibration

1575 Pittsford-Victor Rd.  
Victor  
New York  
14564

Telephone  
(716) 586 - 3900  
Fax  
(716) 586 - 4327

100 of 1001

West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

**MICROPHONE**

Manufactured by: **BRUEL & KJAER**

Model No: **4149**

Serial No: **660325**

Calibration Recall No: **8338**

Submitted By:

Customer: **PAUL WYGOVSKY**

Company: **NEW JERSEY DOT PROJECT SUPPORT**

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. **4149** **BRUE**

Upon receipt for Calibration, the instrument was found to be:

Within **( X )** see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25 and ISO 9002

Calibration Date: **29-Mar-01**

Calibration Due: **29-Mar-02**

Certificate No: **8338 - 2**

Approved by:



**Felix Christopher**  
Quality Manager

 **West Caldwell Calibration Laboratories, Inc.**  
uncompromised calibration

1575 Pittsford-Victor Rd.  
Victor  
New York  
14564

Telephone  
(716) 586 - 3900  
Fax  
(716) 586 - 4327

West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

## NOISE LEVEL ANALYZER

Manufactured by: BRUEL & KJAER

Model No: 4427

Serial No: 1381326

Calibration Recall No: 8338

Submitted By:

Customer: PAUL WYGOVSKY

Company: NEW JERSEY DOT PROJECT SUPPORT

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4427 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25 and ISO 9002

Calibration Date: 08-Aug-00

Calibration Due: 08-Aug-01

Certificate No: 8338 - 5

Approved by:

  
Felix Christopher  
Quality Manager

 **West Caldwell  
Calibration  
Laboratories, Inc.**  
uncompromised calibration

1086 Bloomfield Avenue  
West Caldwell  
New Jersey  
07006

Telephone  
(973) 882-4900  
Fax  
(973) 808-9297

West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

## NOISE LEVEL ANALYZER

Manufactured by: BRUEL & KJAER  
Model No: 4427  
Serial No: 1218771  
Calibration Recall No: 7926

Submitted By:  
Customer: PAUL WYGOVSKY  
Company: NJ DOT ENVIRONMENTAL SECTION

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4427 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25 and ISO 9002

Calibration Date: 31-Mar-00  
Calibration Due: 31-Mar-01  
Certificate No: 7926 - 9

Approved by:



Felix Christopher

 West Caldwell  
Calibration  
Laboratories, Inc.  
uncompromised calibration

1086 Bloomfield Avenue  
West Caldwell  
New Jersey  
07006

Telephone  
(973) 882-4900  
Fax  
(973) 808-9297

NJ# 33869

West Caldwell Calibration Laboratories Inc.

# Certificate of Calibration

for

## OUTDOOR MICROPHONE UNIT

Manufactured by: BRUEL & KJAER

Model No: 4921

Serial No: 628561

Calibration Recall No: 7926

Submitted By:

Customer: PAUL WYGOVSKY

Company: NJ DOT ENVIRONMENTAL SECTION

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Specification No. 4921 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within ( X ) see attached report.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSS Z540-1, IEC Guide 25 and ISO 9002

Calibration Date: 11-Apr-00

Calibration Due: 11-Apr-01

Certificate No: 7926 - 1

Approved by:



Felix Christopher

uncompromised calibration

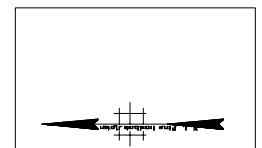
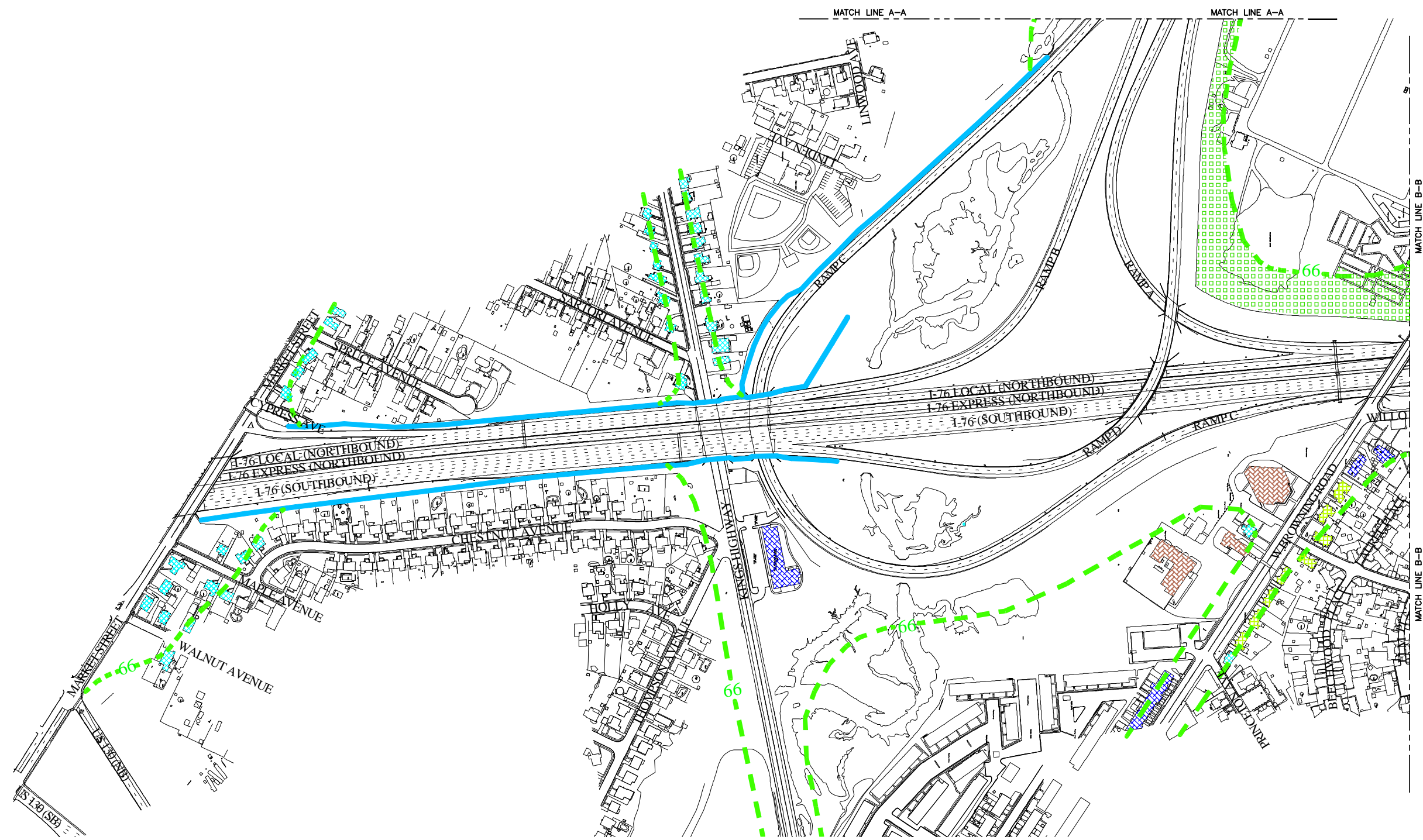
**West Caldwell  
Calibration  
Laboratories, Inc.**

1086 Bloomfield Avenue  
West Caldwell  
New Jersey  
07006

Telephone  
(973) 882-4900  
Fax  
(973) 808-9297

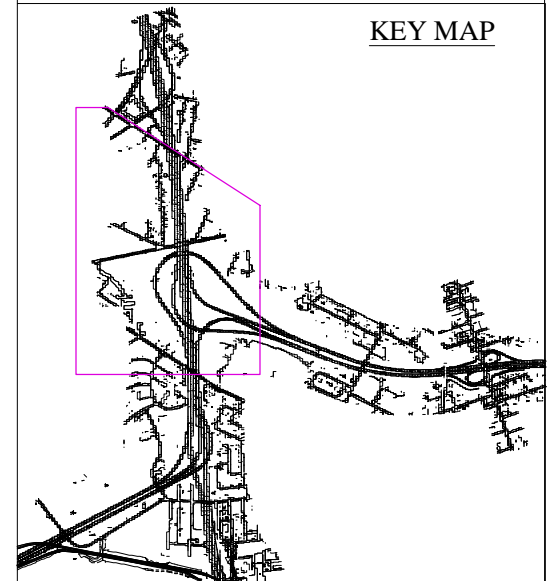
**APPENDIX B**

**Noise Contour Maps**



PROJECT NORTH

KEY MAP



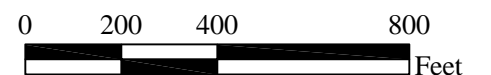
LEGEND

- 66 dBA L<sub>eq</sub> Noise Contour
- Existing Noise Wall Locations

LEGEND

Level of Service C Traffic Conditions

- |  |  |  |   |
|--|--|--|---|
|  | Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )                              |  | Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L <sub>eq</sub> )   |
|  | Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )                                |  | Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L <sub>eq</sub> ) |
|  | Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )                               |  |   |
|  | Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> ) |  |   |



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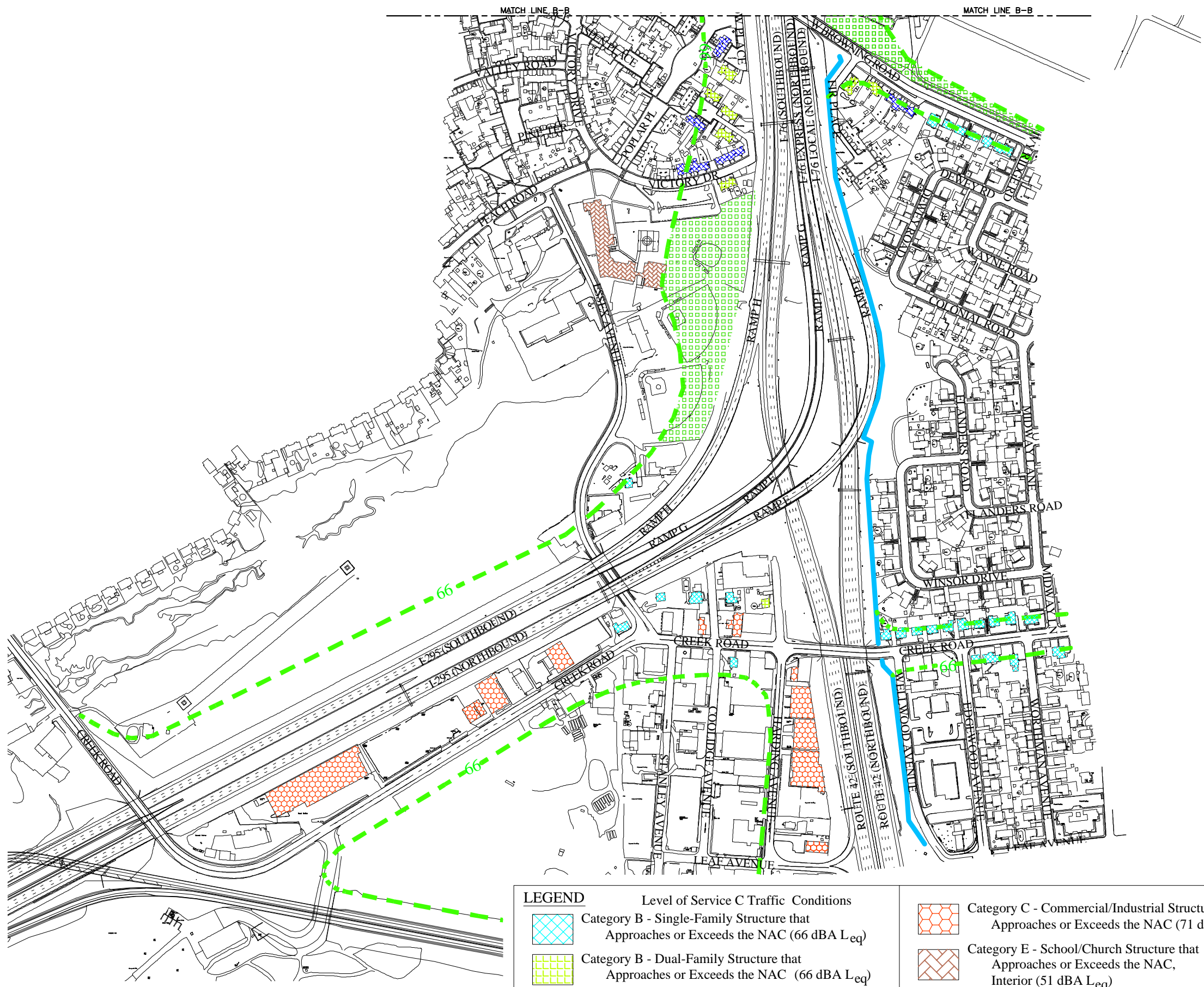
## I-295/I-76/Route 42 Direct Connection Camden County

### Figure 9.1

2030 "No-Build" 66 dBA Noise Contour

Date April 14, 2006

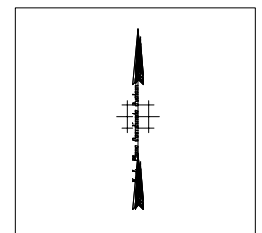




**LEGEND** Level of Service C Traffic Conditions

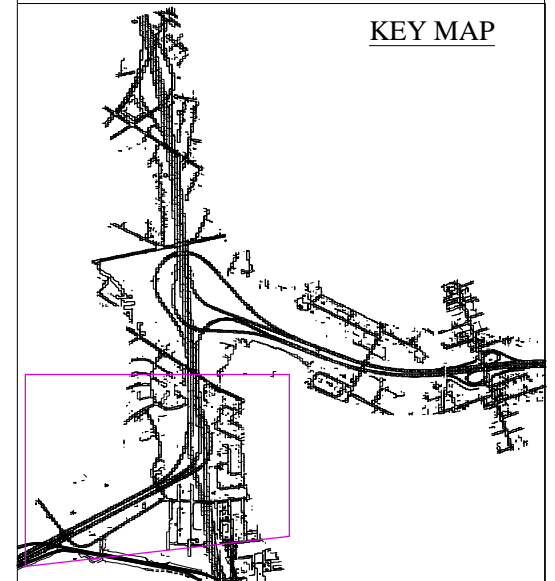
	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )

	Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L <sub>eq</sub> )
	Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L <sub>eq</sub> )



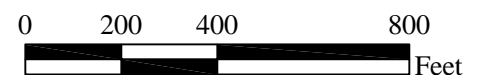
PROJECT NORTH

KEY MAP



LEGEND

- 66 dBA L<sub>eq</sub> Noise Contour
- Existing Noise Wall Locations

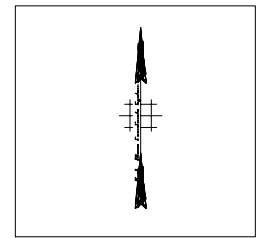


New Jersey Department of Transportation

## I-295/I-76/Route 42 Direct Connection Camden County Figure 9.2

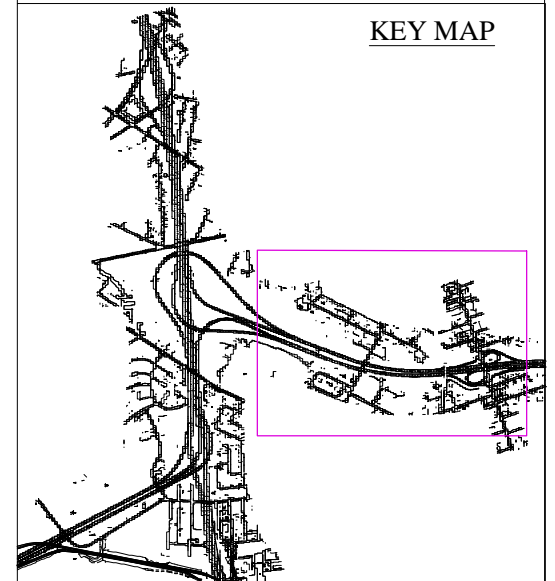
2030 "No-Build" 66 dBA Noise Contour

Date	April 14, 2006
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PROJECT NORTH

KEY MAP

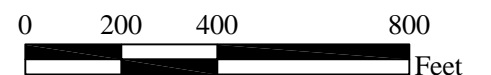


LEGEND

- - - 66 dBA  $L_{eq}$  Noise Contour
- Existing Noise Wall Locations

LEGEND

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li> Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> <li> Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> <li> Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> <li> Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> </ul> | <p>Level of Service C Traffic Conditions</p> <ul style="list-style-type: none"> <li> Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA <math>L_{eq}</math>)</li> <li> Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA <math>L_{eq}</math>)</li> </ul> |
|--|---|

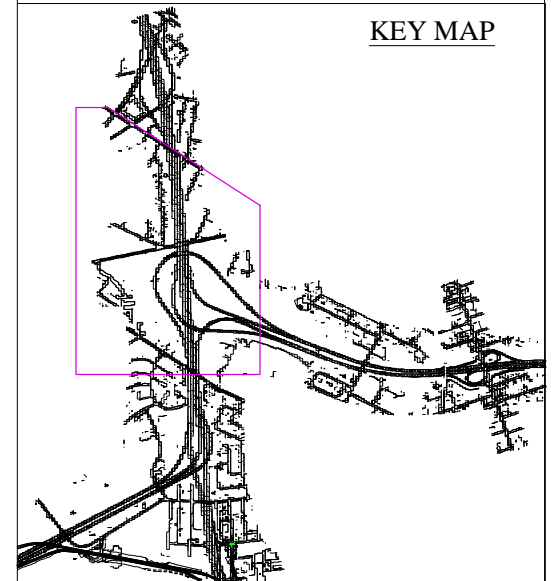
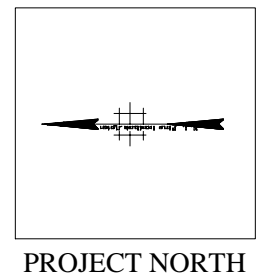
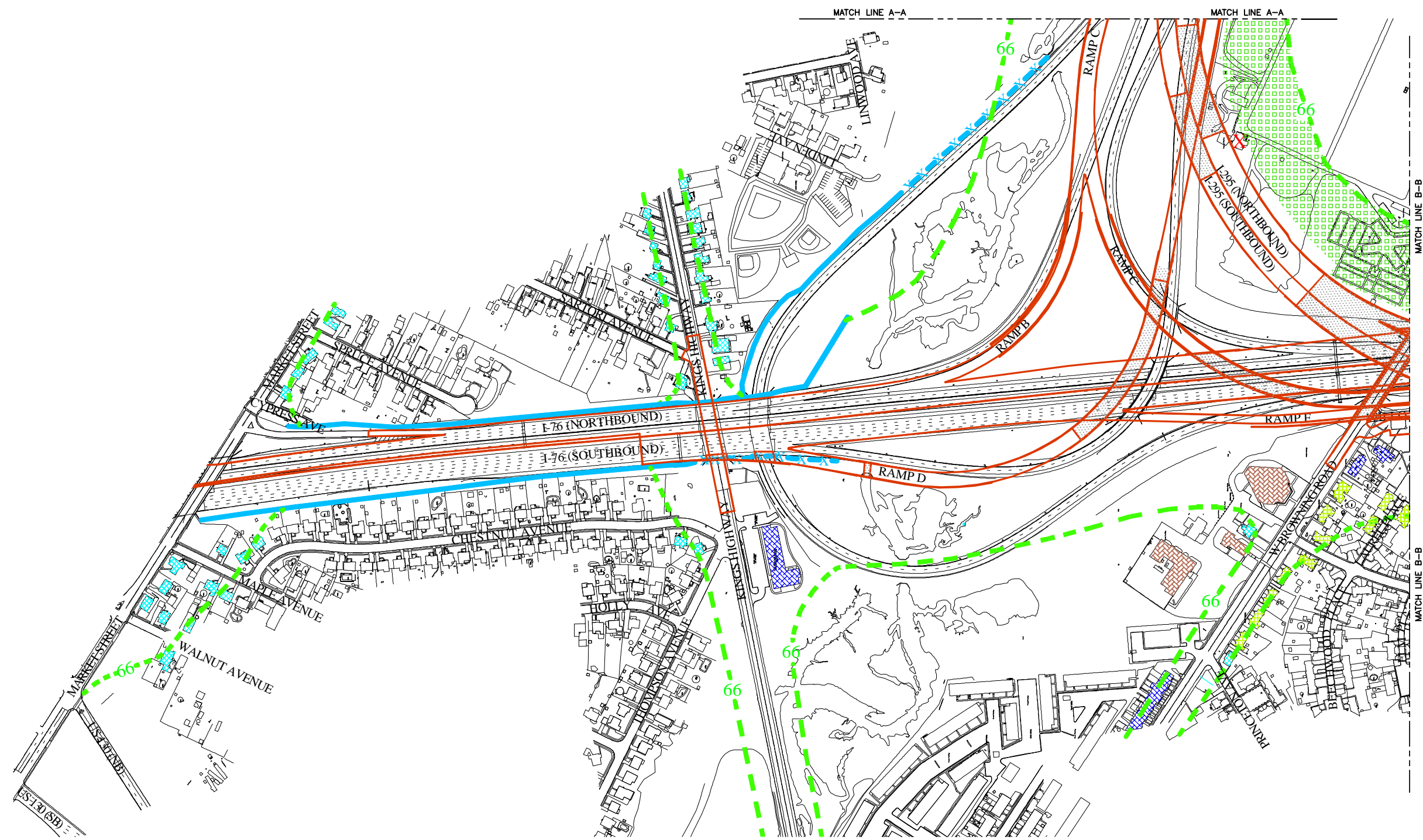


New Jersey Department of Transportation

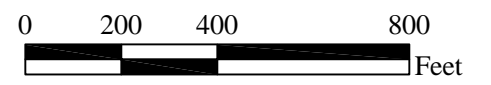
## I-295/I-76/Route 42 Direct Connection Camden County Figure 9.3

2030 "No-Build" 66 dBA  $L_{eq}$  Noise Contour

Date	April 14, 2006
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- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA  $L_{eq}$  Noise Contour
  - Existing Noise Wall Locations
  - X X Removed Existing Noise Wall Locations



New Jersey Department of Transportation

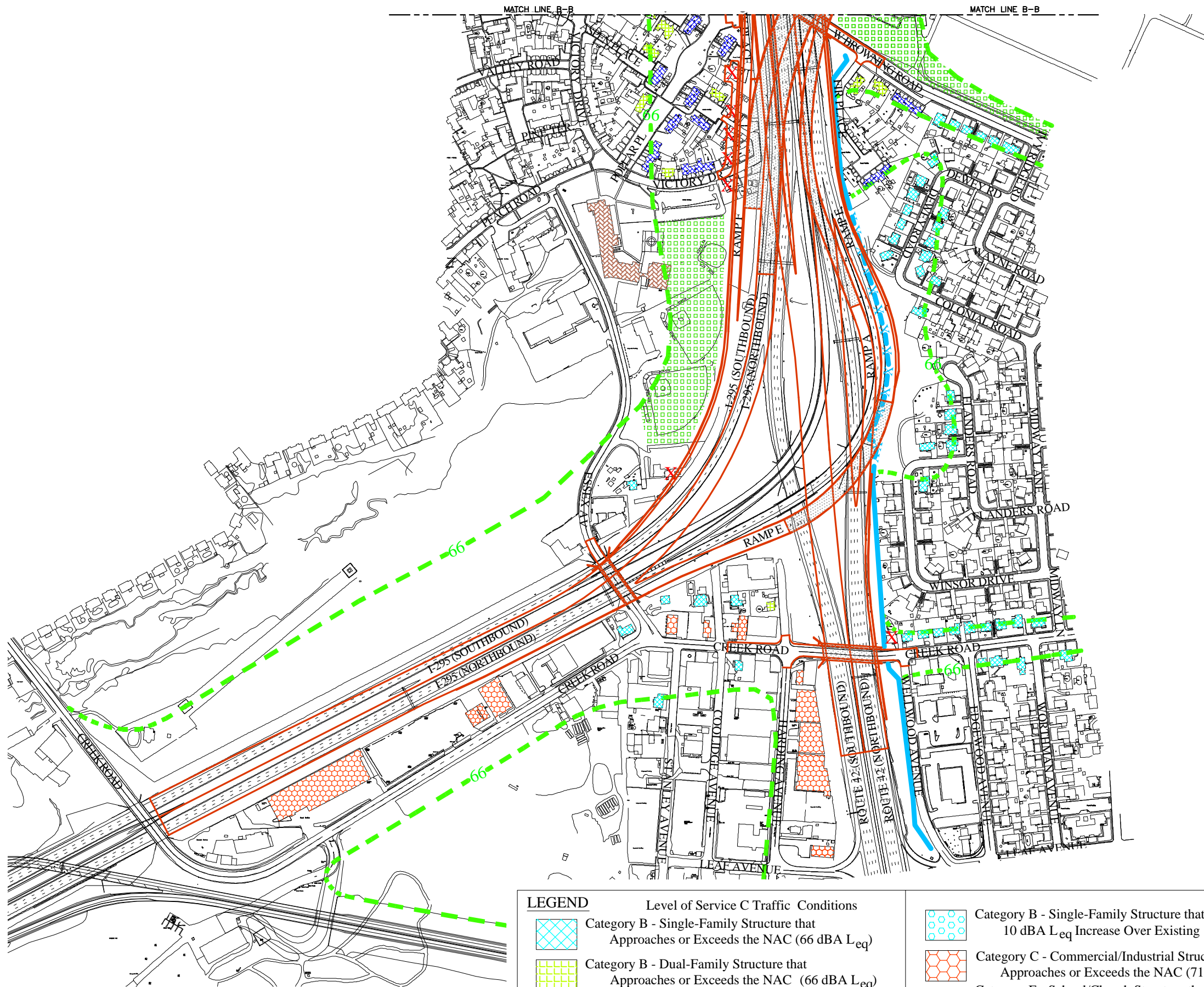
## I-295/I-76/Route 42 Direct Connection Camden County Figure 10.1.1

2030 "Alternative D" 66 dBA Noise Contour

Date April 14, 2006

- LEGEND** Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )

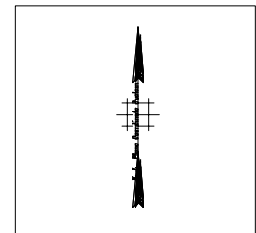
- Category B - Single-Family Structure that Possesses a 10 dBA  $L_{eq}$  Increase Over Existing
- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA  $L_{eq}$ )
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA  $L_{eq}$ )
- X Structure Acquisitions



**LEGEND**

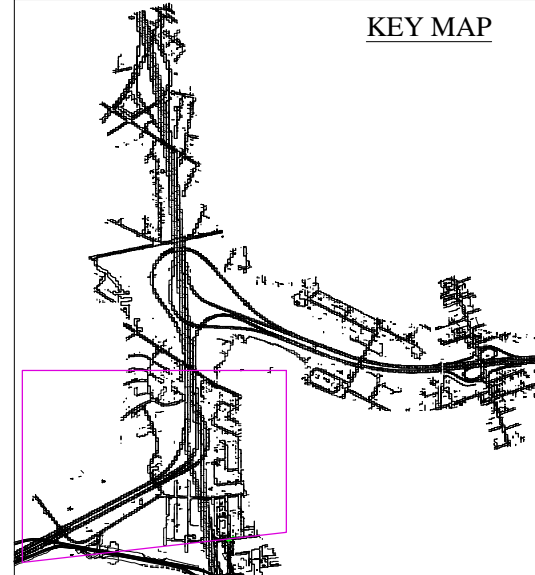
- Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA Leq)

- Category B - Single-Family Structure that Possesses a 10 dBA Leq Increase Over Existing
- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA Leq)
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA Leq)
- Structure Acquisitions



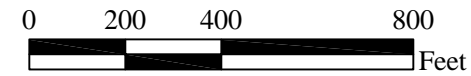
PROJECT NORTH

KEY MAP



LEGEND

- Proposed Improvements
- Structure Limits
- 66 dBA Leq Noise Contour
- Existing Noise Wall Locations
- Removed Existing Noise Wall Locations

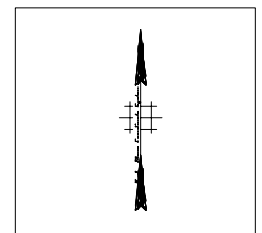


New Jersey Department of Transportation

**I-295/I-76/Route 42  
Direct Connection  
Camden County  
Figure 10.1.2**

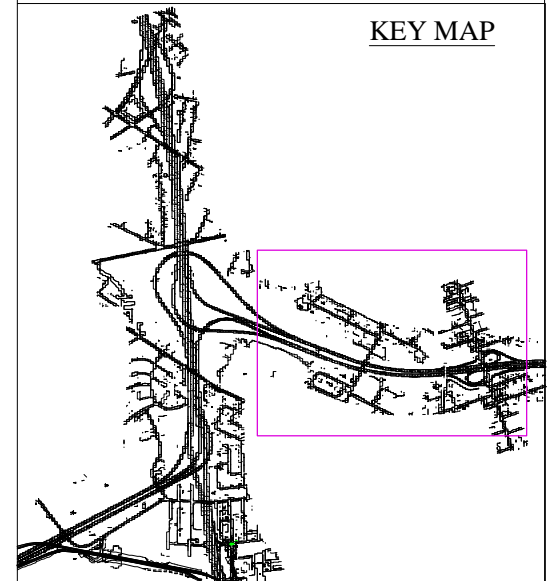
2030 "Alternative D" 66 dBA Noise Contour

Date April 14, 2006



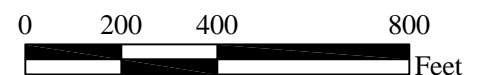
PROJECT NORTH

KEY MAP



LEGEND

- Proposed Improvements
- Structure Limits
- - - 66 dBA L<sub>eq</sub> Noise Contour
- Existing Noise Wall Locations
- X X Removed Existing Noise Wall Locations



New Jersey Department of Transportation

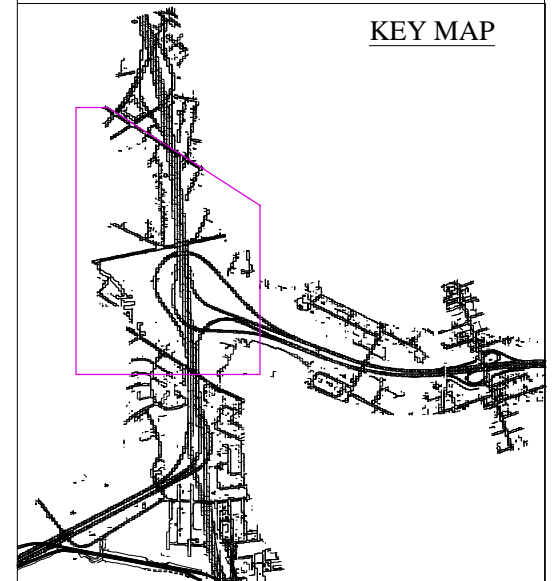
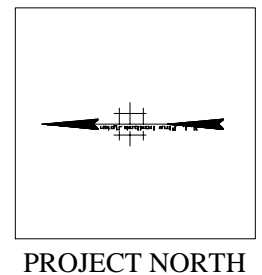
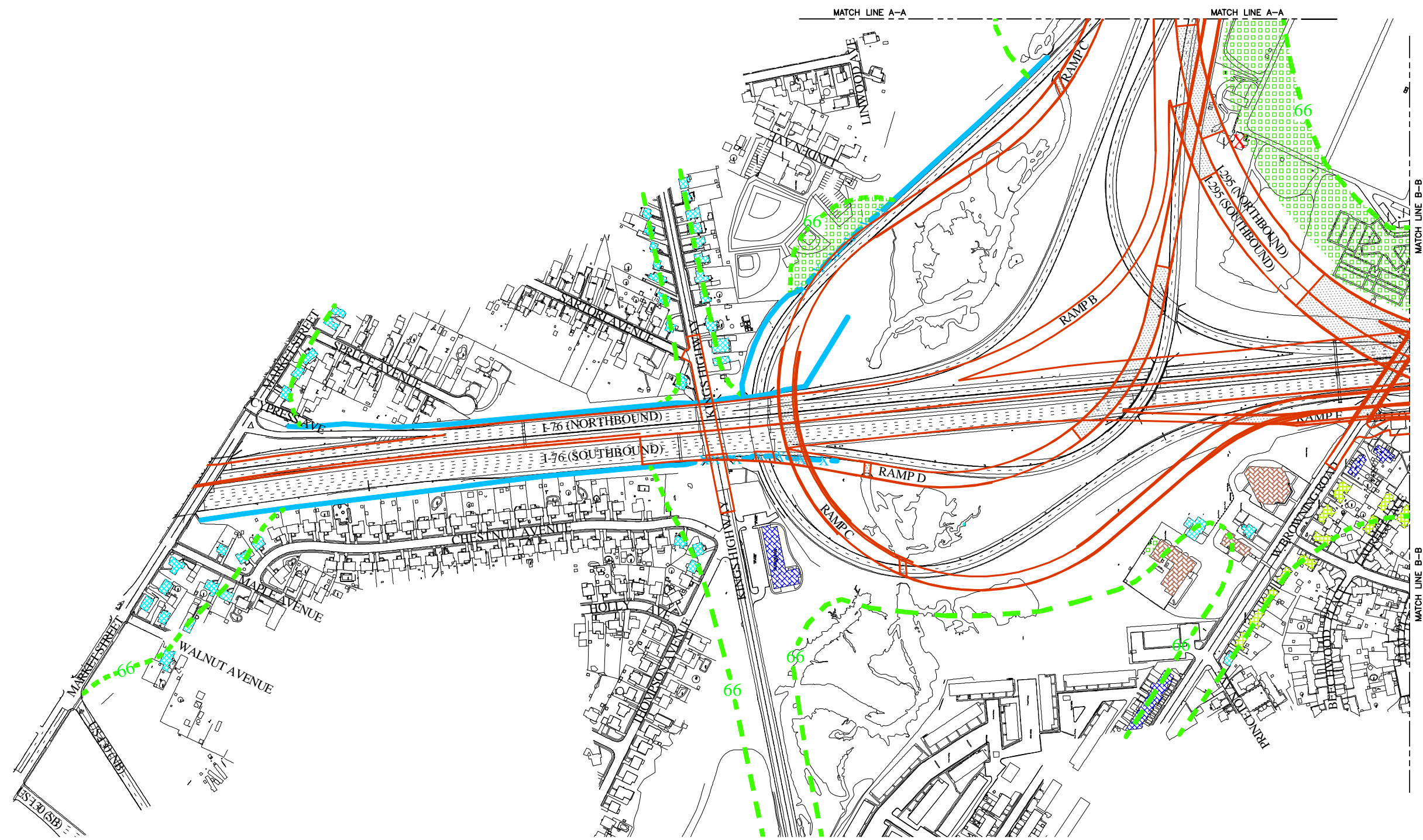
## I-295/I-76/Route 42 Direct Connection Camden County Figure 10.1.3

2030 "Alternative D" 66 dBA Noise Contour

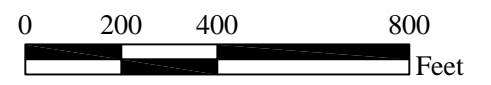
Date April 14, 2006

LEGEND

- |   |   |
|---|---|
| <p style="text-align: center;">Level of Service C Traffic Conditions</p> <ul style="list-style-type: none"> <li><span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 20px; height: 10px; border-style: dashed;"></span> Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)</li> <li><span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 20px; height: 10px; border-style: dashed;"></span> Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)</li> <li><span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 20px; height: 10px; border-style: dashed;"></span> Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)</li> <li><span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 20px; height: 10px; border-style: dashed;"></span> Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)</li> </ul> | <ul style="list-style-type: none"> <li><span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 20px; height: 10px; border-style: dashed;"></span> Category B - Single-Family Structure that Possesses a 10 dBA L<sub>eq</sub> Increase Over Existing</li> <li><span style="background-color: orange; border: 1px solid orange; display: inline-block; width: 20px; height: 10px; border-style: dashed;"></span> Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L<sub>eq</sub>)</li> <li><span style="background-color: orange; border: 1px solid orange; display: inline-block; width: 20px; height: 10px; border-style: dashed;"></span> Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L<sub>eq</sub>)</li> <li><span style="color: red; font-weight: bold; font-size: 2em;">X</span> Structure Acquisitions</li> </ul> |
|---|---|



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA  $L_{eq}$  Noise Contour
  - Existing Noise Wall Locations
  - X X Removed Existing Noise Wall Locations



New Jersey Department of Transportation

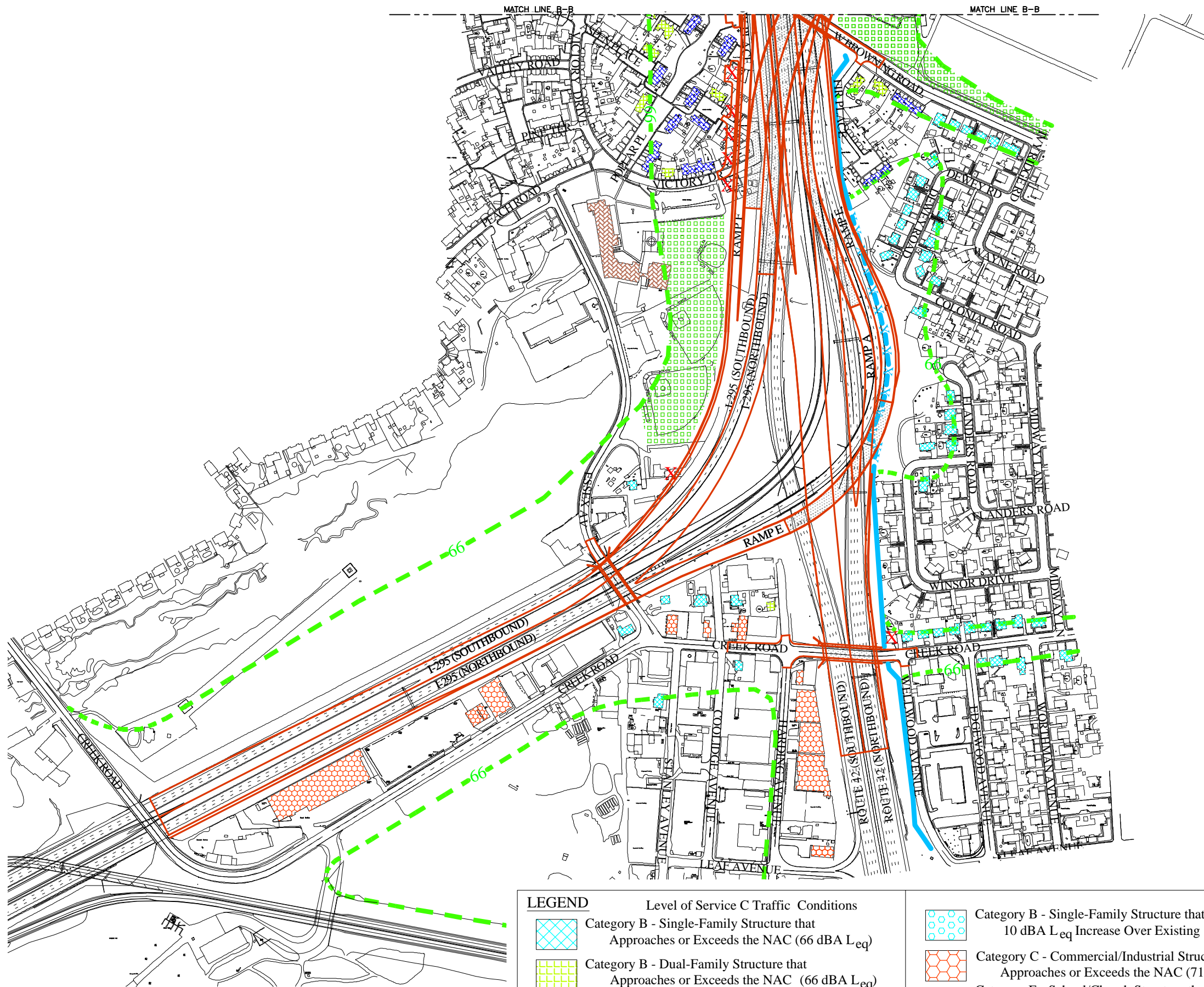
## I-295/I-76/Route 42 Direct Connection Camden County Figure 10.2.1

2030 "Alternative D1" 66 dBA Noise Contour

Date April 14, 2006

- LEGEND** Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )

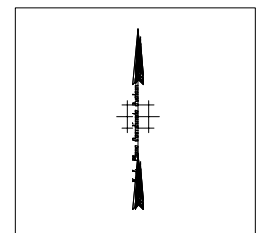
- Category B - Single-Family Structure that Possesses a 10 dBA  $L_{eq}$  Increase Over Existing
- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA  $L_{eq}$ )
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA  $L_{eq}$ )
- X Structure Acquisitions



**LEGEND** Level of Service C Traffic Conditions

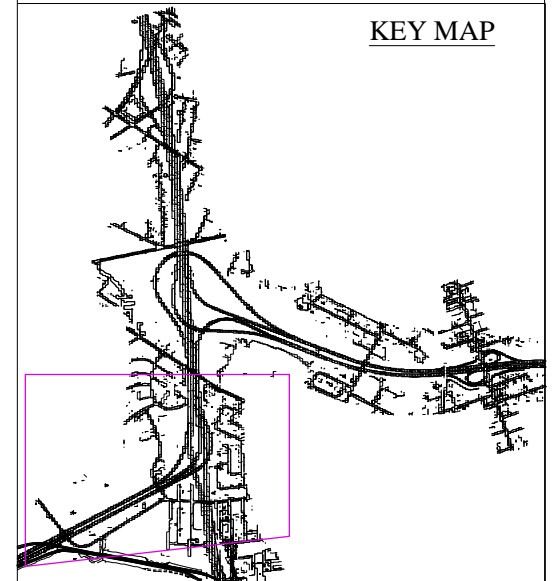
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
- Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
- Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
- Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA Leq)

- Category B - Single-Family Structure that Possesses a 10 dBA Leq Increase Over Existing
- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA Leq)
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA Leq)
- Structure Acquisitions



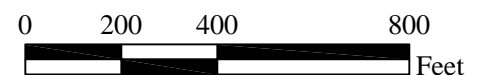
PROJECT NORTH

**KEY MAP**



**LEGEND**

- Proposed Improvements
- Structure Limits
- 66 dBA Leq Noise Contour
- Existing Noise Wall Locations
- Removed Existing Noise Wall Locations

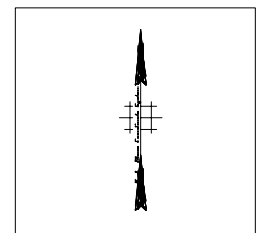


New Jersey Department of Transportation

**I-295/I-76/Route 42  
Direct Connection  
Camden County  
Figure 10.2.2**

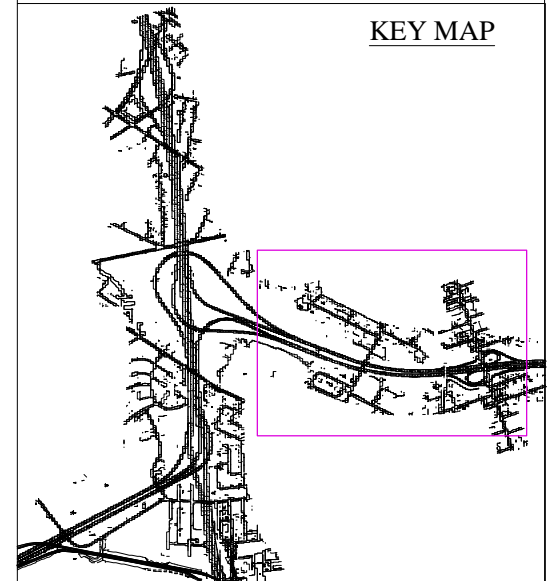
2030 "Alternative D1" 66 dBA Noise Contour

Date April 14, 2006








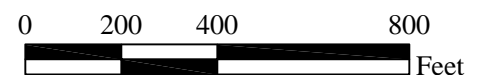
PROJECT NORTH

KEY MAP



LEGEND

-  Proposed Improvements
-  Structure Limits
-  66 dBA  $L_{eq}$  Noise Contour
-  Existing Noise Wall Locations
-  Removed Existing Noise Wall Locations











New Jersey Department of Transportation

### I-295/I-76/Route 42 Direct Connection Camden County Figure 10.2.3

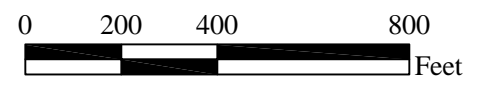
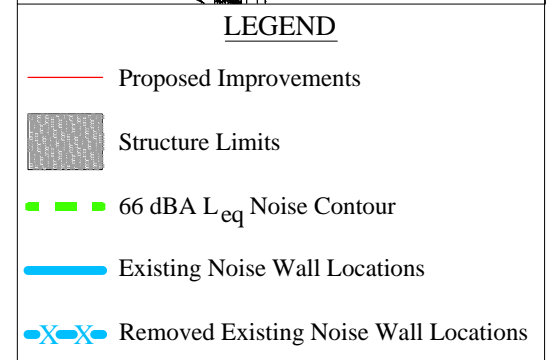
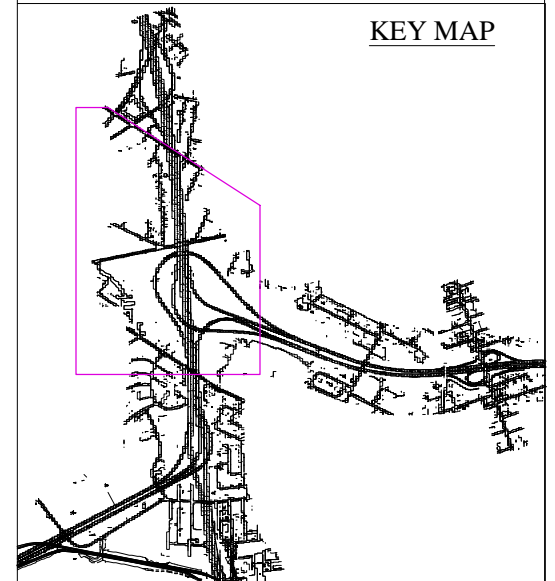
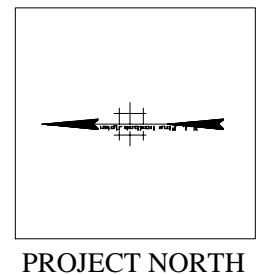
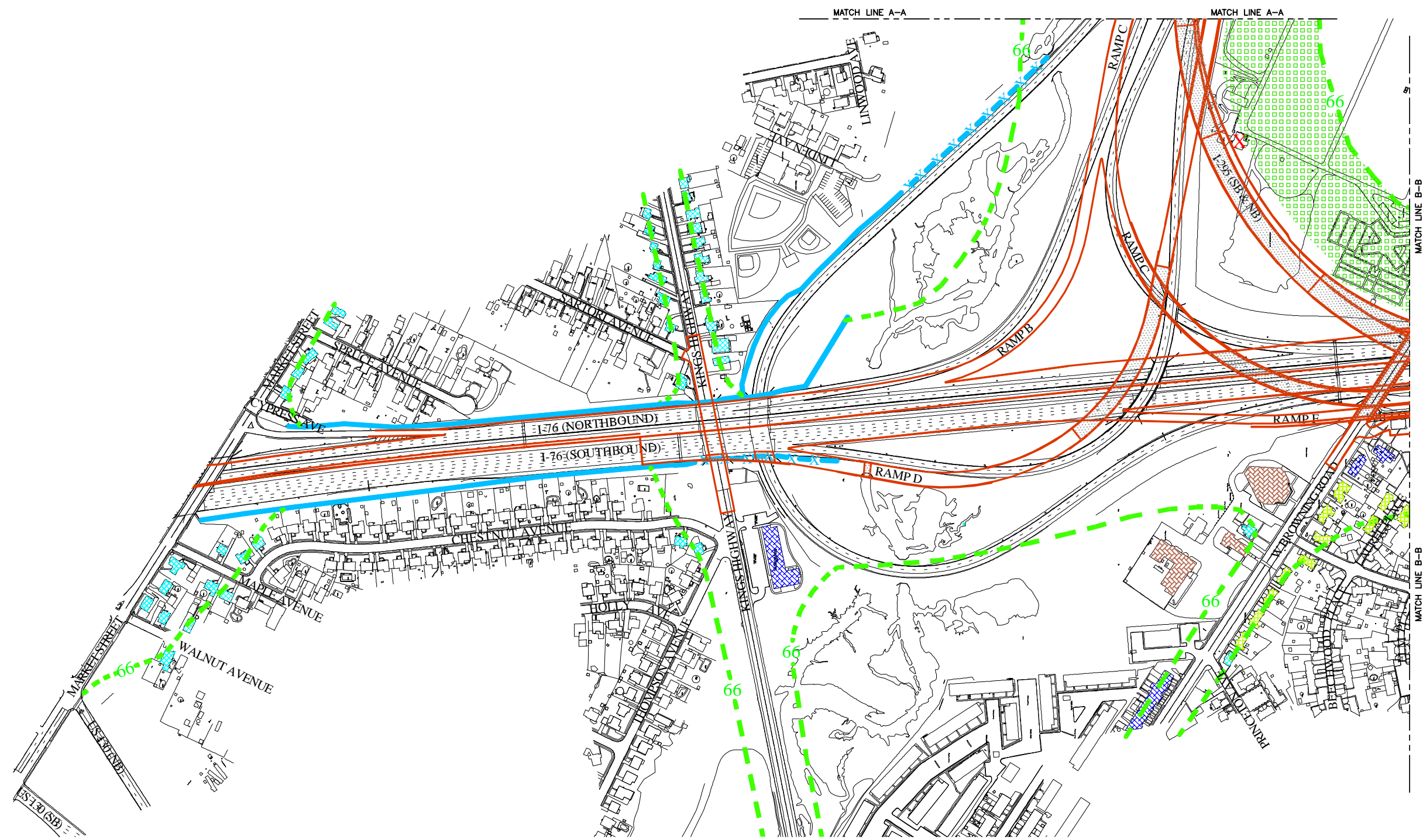
2030 "Alternative D1" 66 dBA Noise Contour

Date April 14, 2006

LEGEND

- |   |   |
|---|---|
| Level of Service C Traffic Conditions   |   |
|  | Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )                              |
|  | Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )                                |
|  | Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )                               |
|  | Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ ) |
|  | Category B - Single-Family Structure that Possesses a 10 dBA $L_{eq}$ Increase Over Existing                            |
|  | Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA $L_{eq}$ )                      |
|  | Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA $L_{eq}$ )                    |
|  | Structure Acquisitions  |





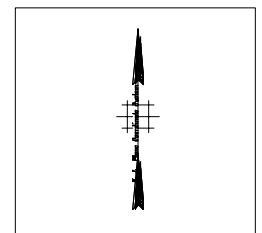
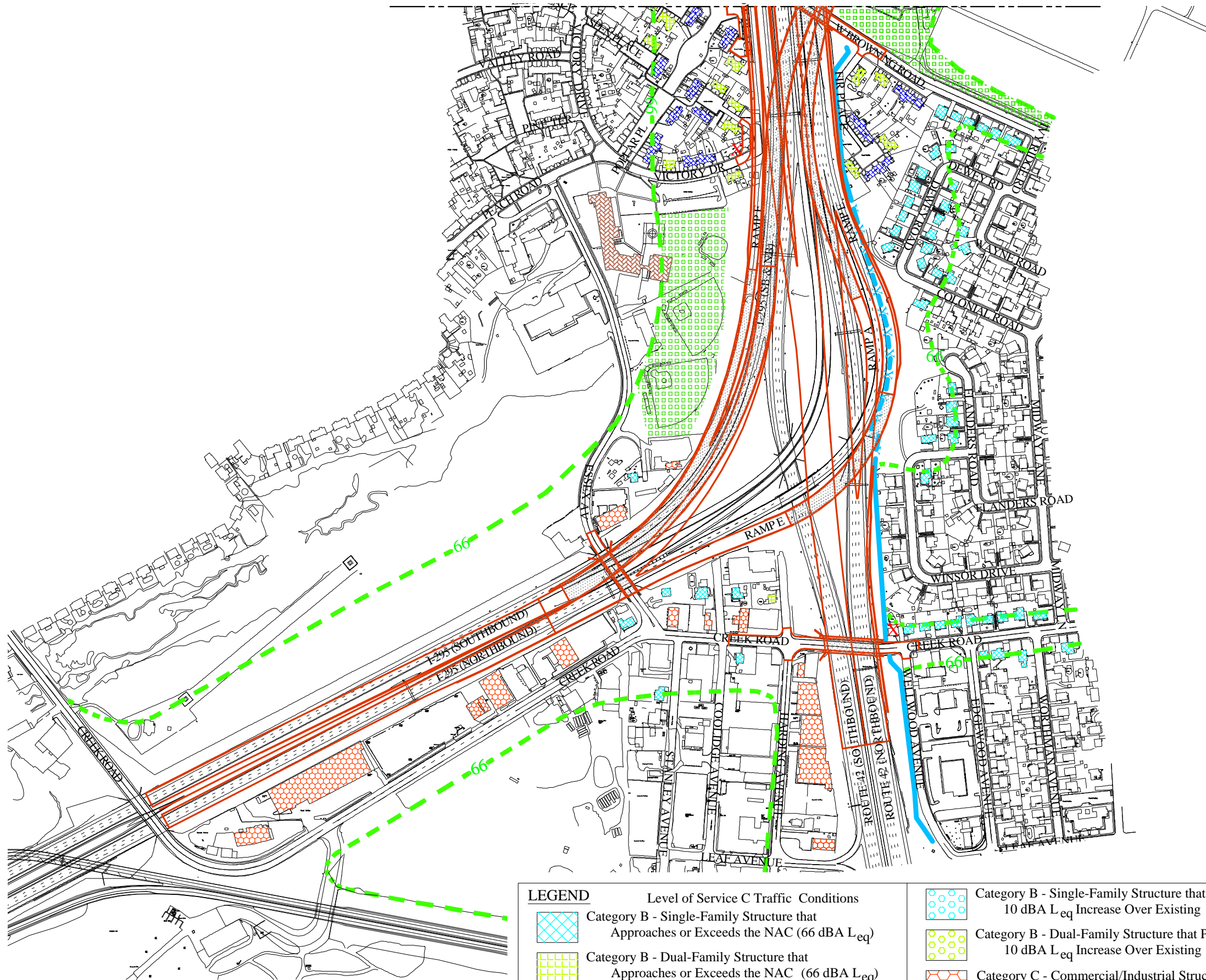
New Jersey Department of Transportation

**I-295/I-76/Route 42  
Direct Connection  
Camden County  
Figure 10.3.1**

2030 "Alternative G2" 66 dBA Noise Contour

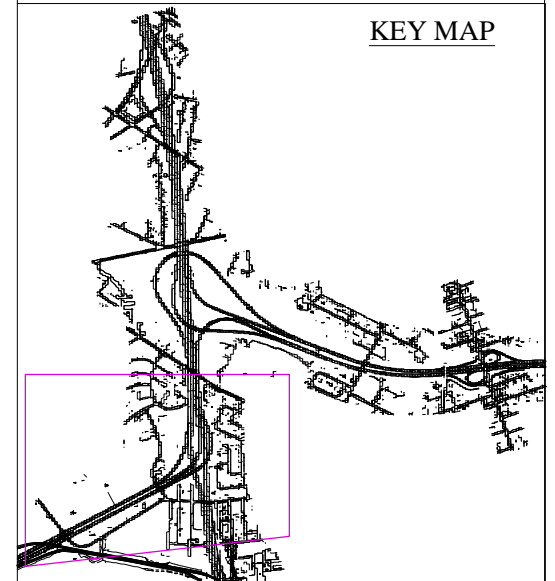
Date April 14, 2006

LEGEND		Level of Service C Traffic Conditions
<span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 20px; height: 10px;"></span>	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )	Category B - Single-Family Structure that Possesses a 10 dBA $L_{eq}$ Increase Over Existing
<span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 20px; height: 10px;"></span>	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )	Category B - Dual-Family Structure that Possesses a 10 dBA $L_{eq}$ Increase Over Existing
<span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 20px; height: 10px;"></span>	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )	Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA $L_{eq}$ )
<span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 20px; height: 10px;"></span>	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )	Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA $L_{eq}$ )
		Structure Acquisitions








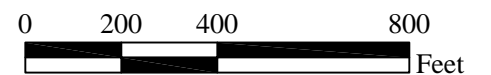
PROJECT NORTH

KEY MAP



LEGEND

-  Proposed Improvements
-  Structure Limits
-  66 dBA Leq Noise Contour
-  Existing Noise Wall Locations
-  Removed Existing Noise Wall Locations












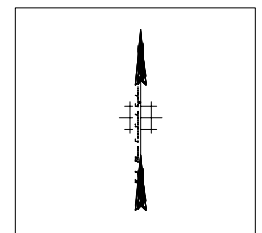
New Jersey Department of Transportation

### I-295/I-76/Route 42 Direct Connection Camden County Figure 10.3.2

2030 "Alternative G2" 66 dBA Noise Contour

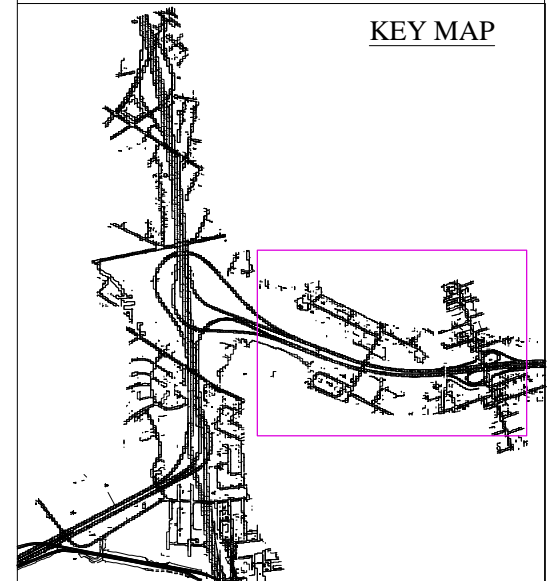
Date April 14, 2006

LEGEND		Level of Service C Traffic Conditions	
	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)		Category B - Single-Family Structure that Possesses a 10 dBA Leq Increase Over Existing
	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)		Category B - Dual-Family Structure that Possesses a 10 dBA Leq Increase Over Existing
	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)		Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA Leq)
	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA Leq)		Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA Leq)
			Structure Acquisitions








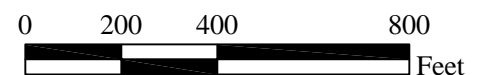
PROJECT NORTH

KEY MAP



LEGEND

-  Proposed Improvements
-  Structure Limits
-  66 dBA Leq Noise Contour
-  Existing Noise Wall Locations
-  Removed Existing Noise Wall Locations












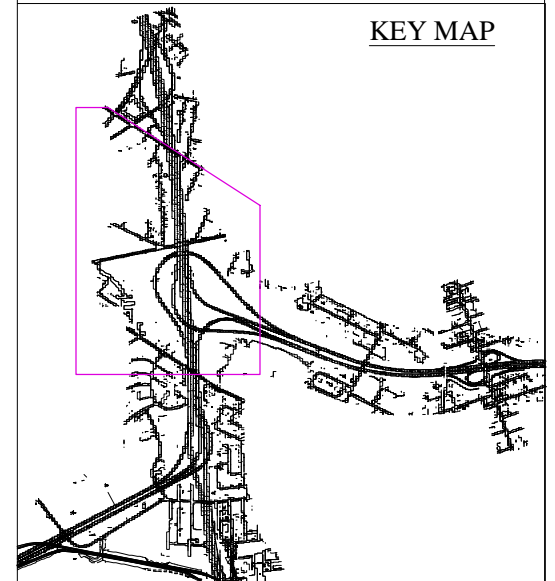
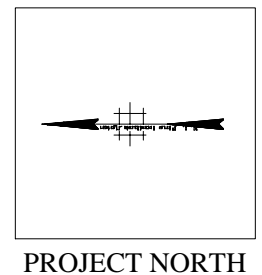
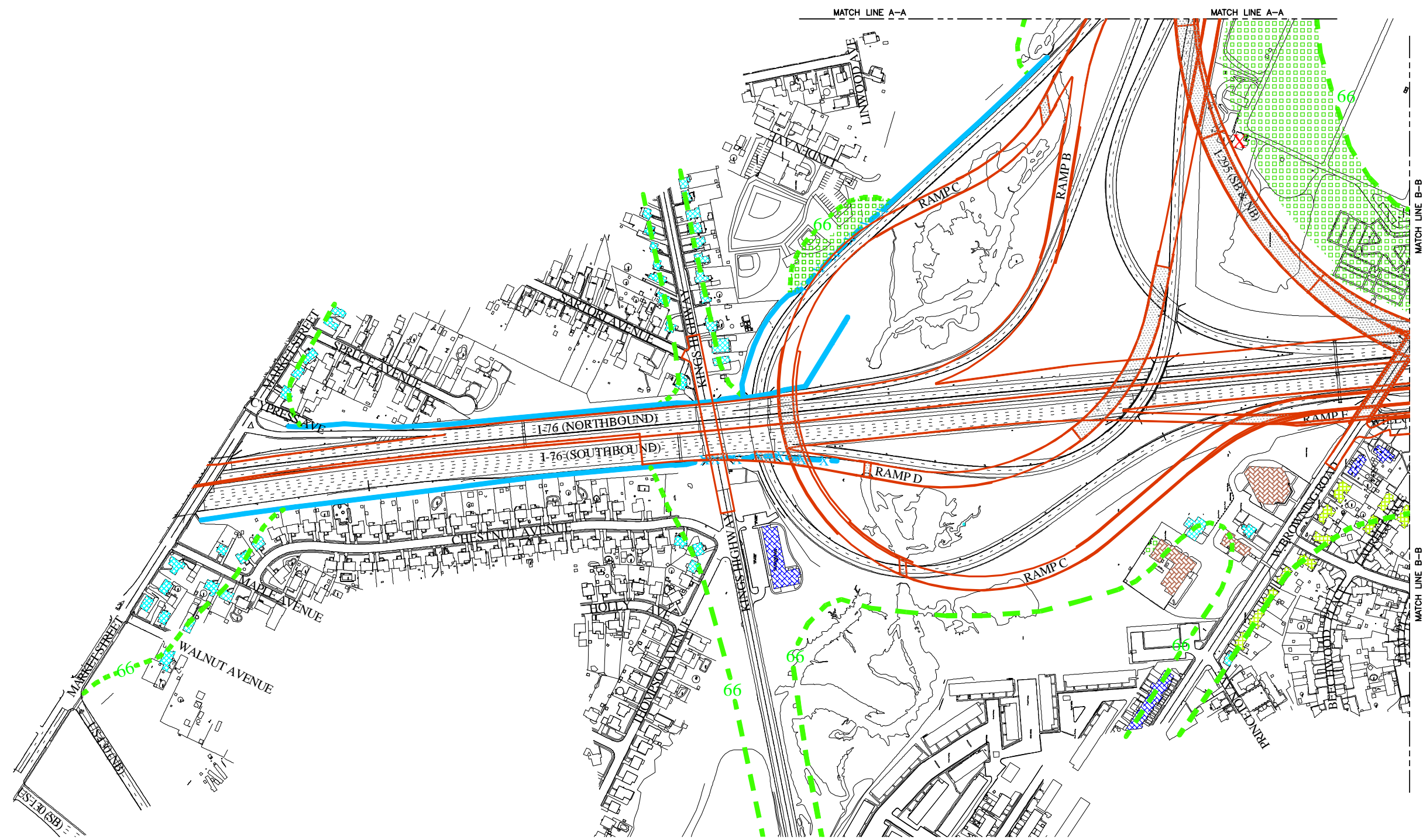
New Jersey Department of Transportation

I-295/I-76/Route 42  
Direct Connection  
Camden County  
Figure 10.3.3

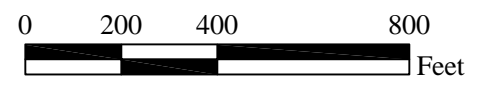
2030 "Alternative G2" 66 dBA Noise Contour

Date April 14, 2006

LEGEND		Level of Service C Traffic Conditions	
	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)		Category B - Single-Family Structure that Possesses a 10 dBA Leq Increase Over Existing
	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)		Category B - Dual-Family Structure that Possesses a 10 dBA Leq Increase Over Existing
	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)		Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA Leq)
	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA Leq)		Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA Leq)
			Structure Acquisitions



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA  $L_{eq}$  Noise Contour
  - Existing Noise Wall Locations
  - X-X- Removed Existing Noise Wall Locations



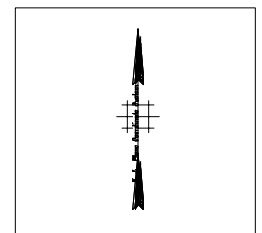
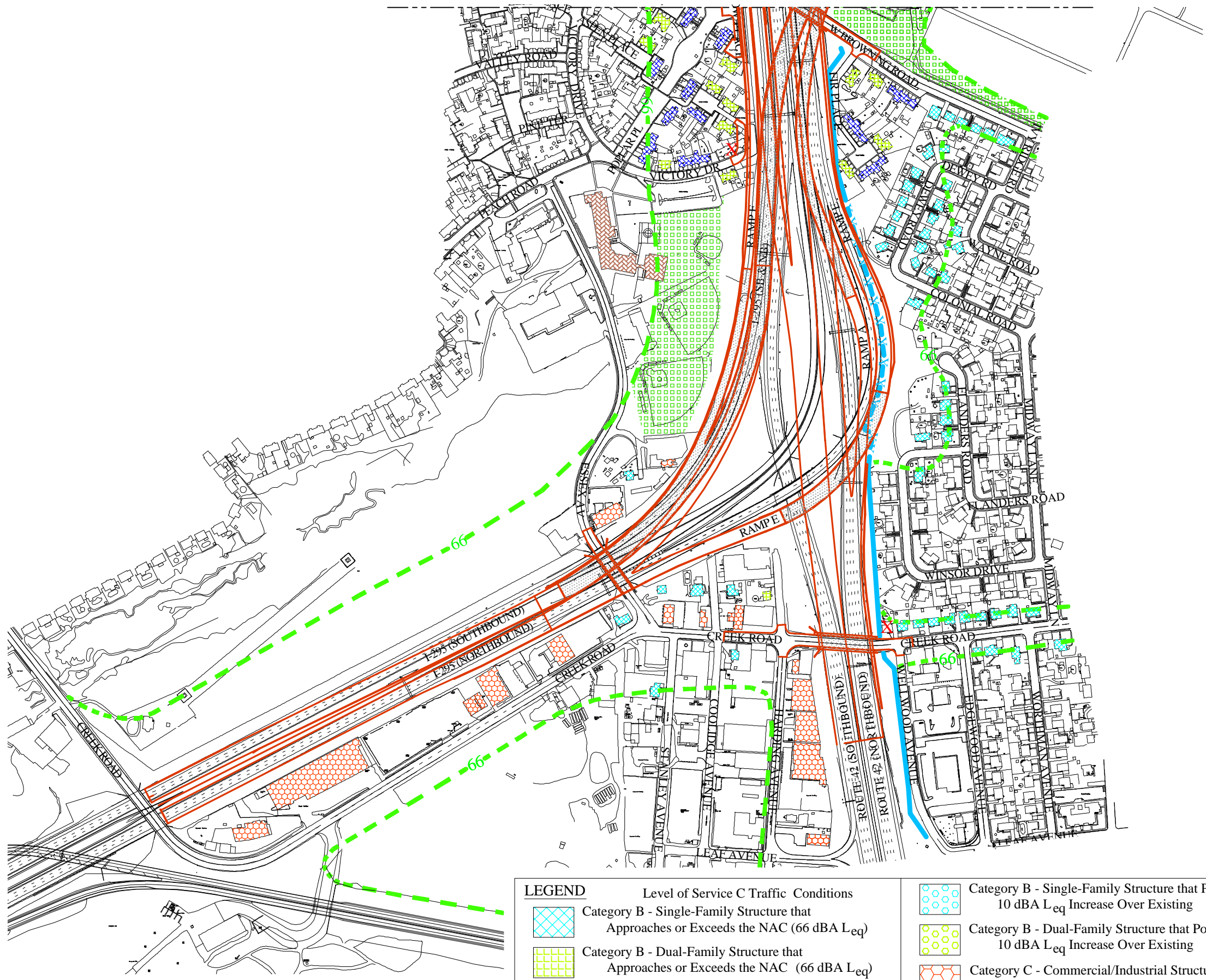
New Jersey Department of Transportation

**I-295/I-76/Route 42  
Direct Connection  
Camden County  
Figure 10.4.1**

2030 "Alternative H1" 66 dBA Noise Contour

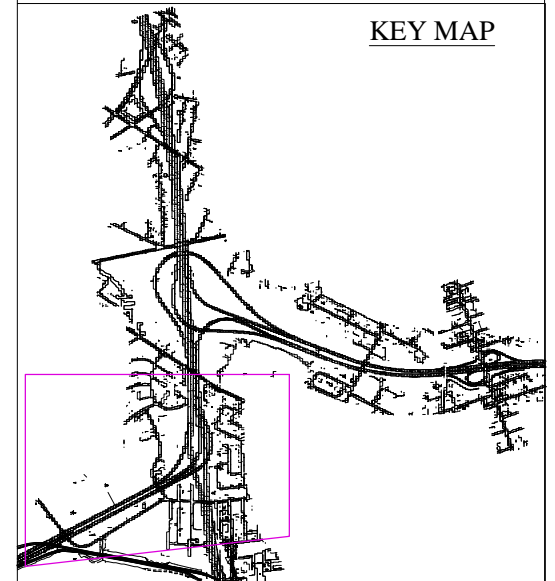
Date April 14, 2006

- LEGEND** Level of Service C Traffic Conditions
- |  |   |
|--|---|
| <span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 20px; height: 10px;"></span> Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )                                | <span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 15px; height: 10px;"></span> Category B - Single-Family Structure that Possesses a 10 dBA $L_{eq}$ Increase Over Existing             |
| <span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 20px; height: 10px;"></span> Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )                                | <span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 15px; height: 10px;"></span> Category B - Dual-Family Structure that Possesses a 10 dBA $L_{eq}$ Increase Over Existing             |
| <span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 20px; height: 10px;"></span> Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )                                 | <span style="background-color: lightorange; border: 1px solid orange; display: inline-block; width: 15px; height: 10px;"></span> Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA $L_{eq}$ )   |
| <span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 20px; height: 10px;"></span> Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ ) | <span style="background-color: lightorange; border: 1px solid orange; display: inline-block; width: 15px; height: 10px;"></span> Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA $L_{eq}$ ) |
|  | <span style="color: red; font-size: 2em;">X</span> Structure Acquisitions   |



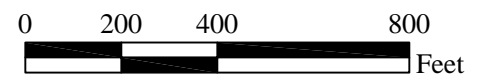
PROJECT NORTH

KEY MAP



LEGEND

- Proposed Improvements
- Structure Limits
- 66 dBA Leq Noise Contour
- Existing Noise Wall Locations
- Removed Existing Noise Wall Locations



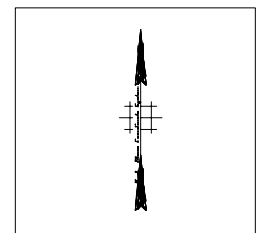
New Jersey Department of Transportation

### I-295/I-76/Route 42 Direct Connection Camden County Figure 10.4.2

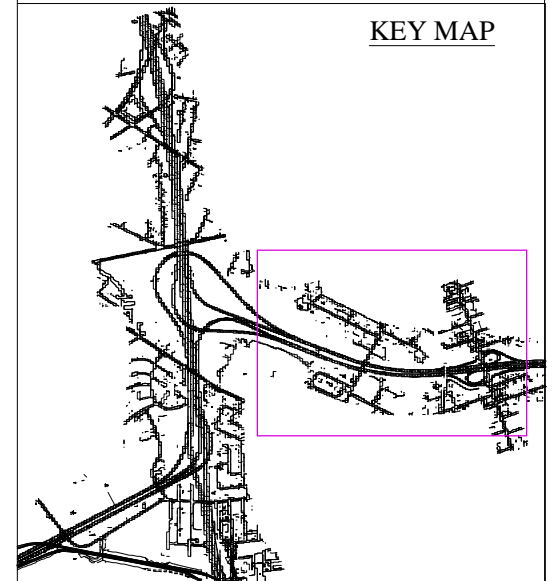
2030 "Alternative H1" 66 dBA Noise Contour

Date April 14, 2006

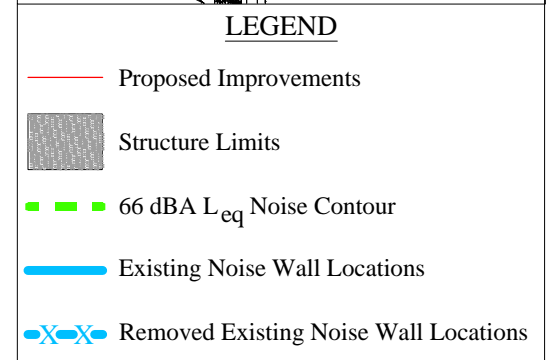
LEGEND		Level of Service C Traffic Conditions	
	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)		Category B - Single-Family Structure that Possesses a 10 dBA Leq Increase Over Existing
	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)		Category B - Dual-Family Structure that Possesses a 10 dBA Leq Increase Over Existing
	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)		Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA Leq)
	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA Leq)		Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA Leq)
			Structure Acquisitions



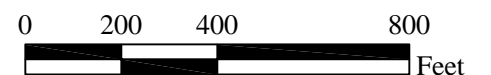
PROJECT NORTH



KEY MAP



LEGEND



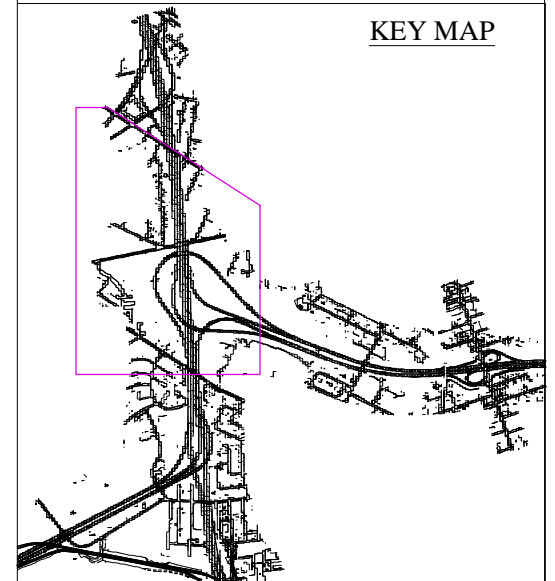
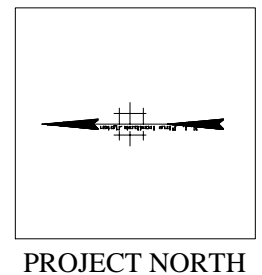
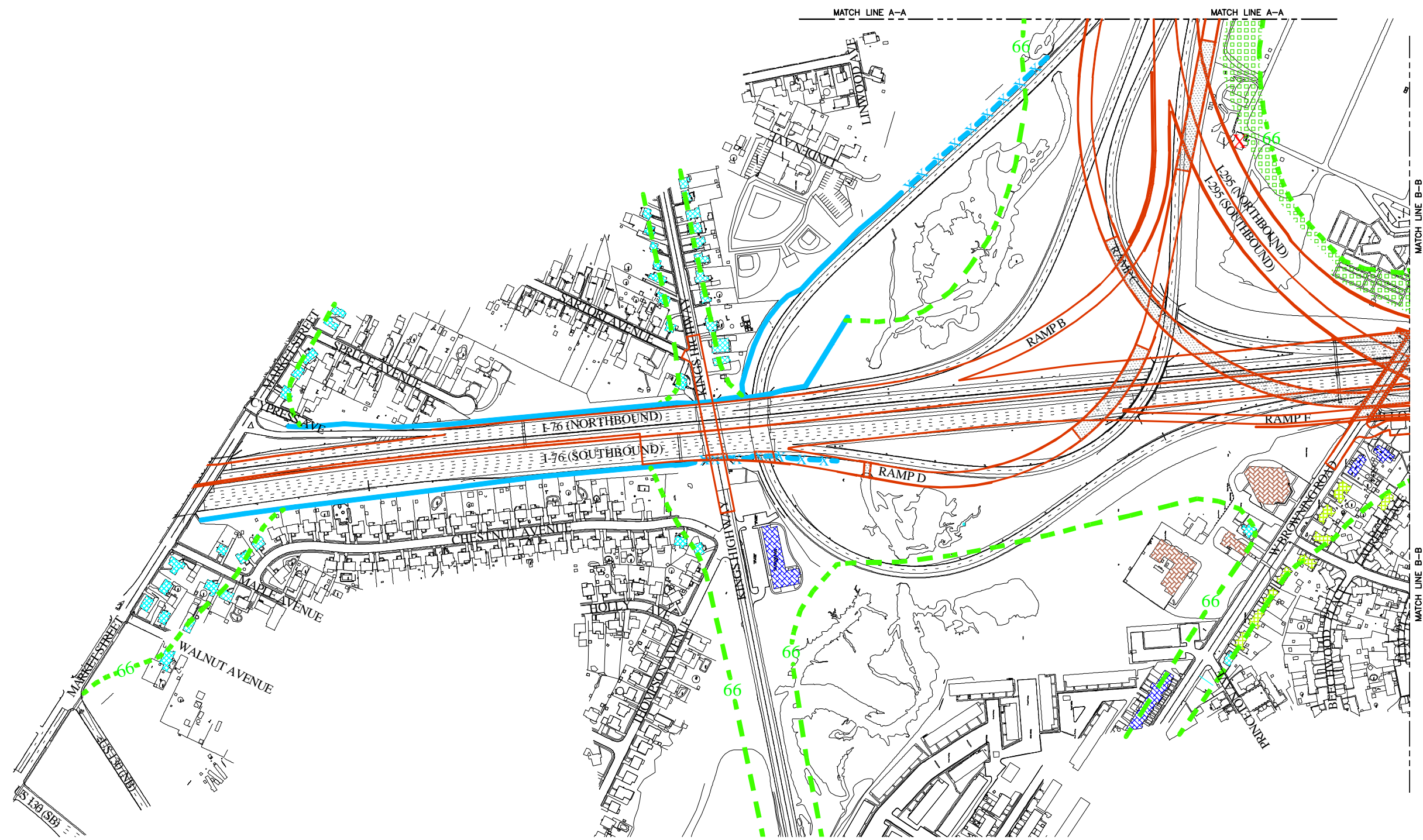
New Jersey Department of Transportation

I-295/I-76/Route 42  
Direct Connection  
Camden County  
Figure 10.4.3

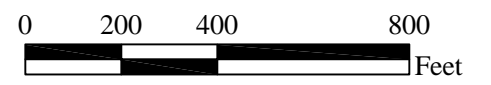
2030 "Alternative H1" 66 dBA Noise Contour

Date April 14, 2006

LEGEND		Level of Service C Traffic Conditions	
	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )		Category B - Single-Family Structure that Possesses a 10 dBA L <sub>eq</sub> Increase Over Existing
	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )		Category B - Dual-Family Structure that Possesses a 10 dBA L <sub>eq</sub> Increase Over Existing
	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )		Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L <sub>eq</sub> )
	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )		Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L <sub>eq</sub> )
			Structure Acquisitions



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA  $L_{eq}$  Noise Contour
  - Existing Noise Wall Locations
  - X X Removed Existing Noise Wall Locations



New Jersey Department of Transportation

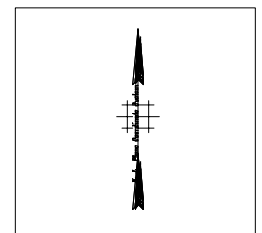
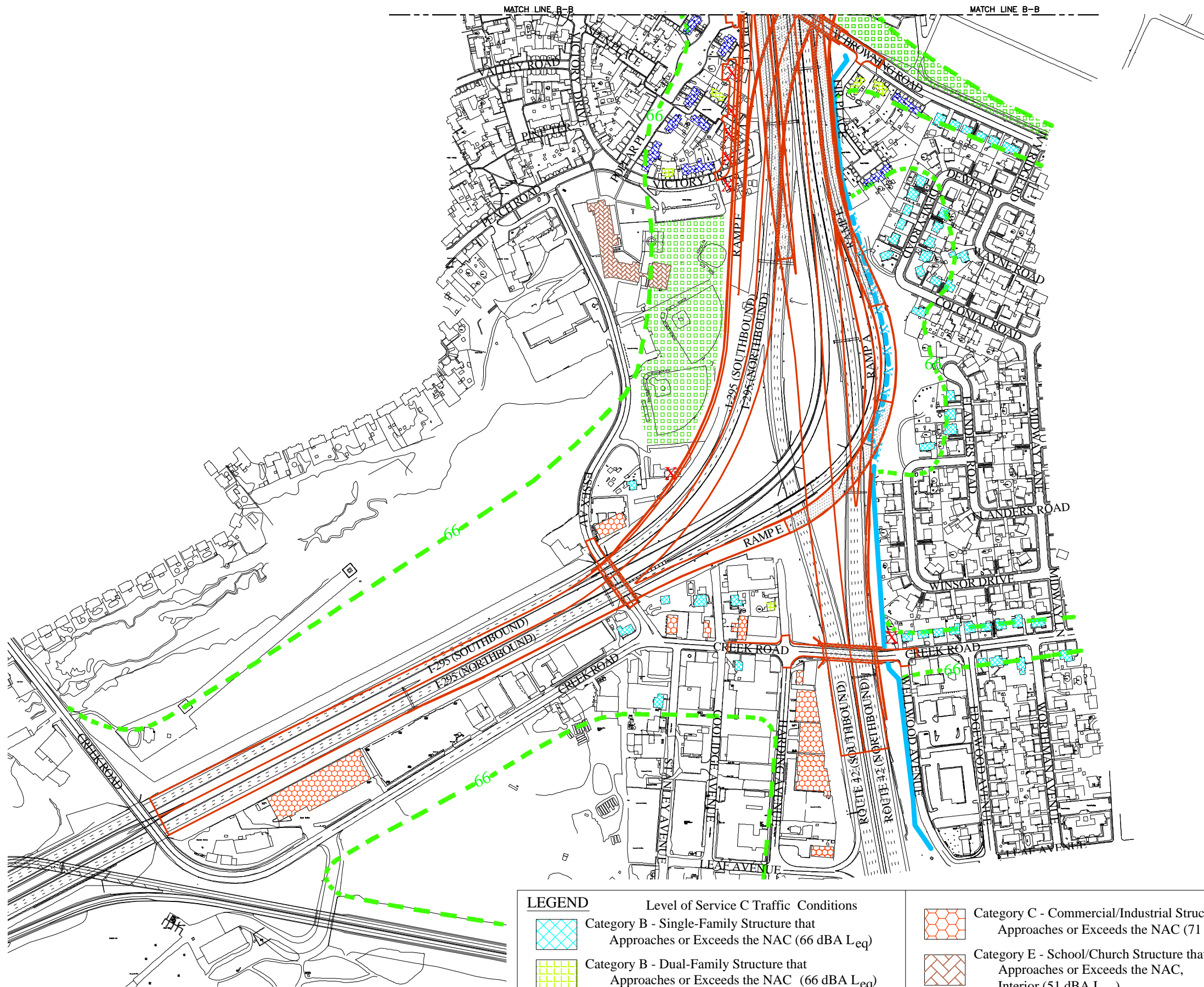
## I-295/I-76/Route 42 Direct Connection Camden County Figure 10.5.1

2030 "Alternative K" 66 dBA Noise Contour

Date April 14, 2006

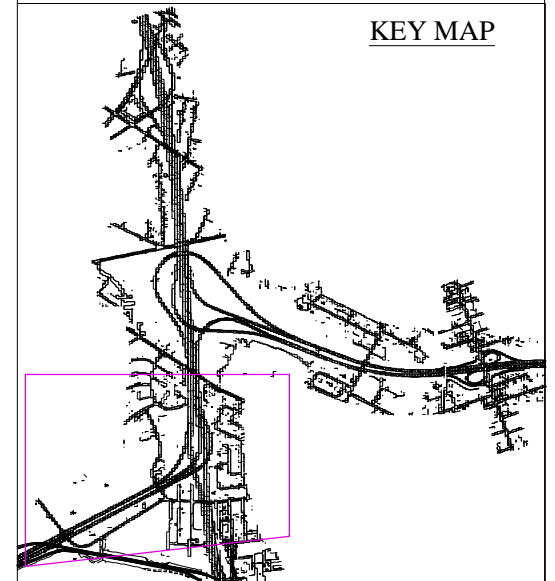
- LEGEND** Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )

- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA  $L_{eq}$ )
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA  $L_{eq}$ )
- X Structure Acquisitions



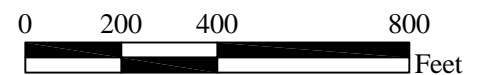
PROJECT NORTH

KEY MAP



LEGEND

- Proposed Improvements
- Structure Limits
- 66 dBA Leq Noise Contour
- Existing Noise Wall Locations
- Removed Existing Noise Wall Locations



New Jersey Department of Transportation

I-295/I-76/Route 42  
Direct Connection  
Camden County  
Figure 10.5.2

2030 "Alternative K" 66 dBA Noise Contour

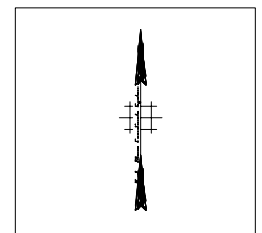
Date April 14, 2006

LEGEND

Level of Service C Traffic Conditions

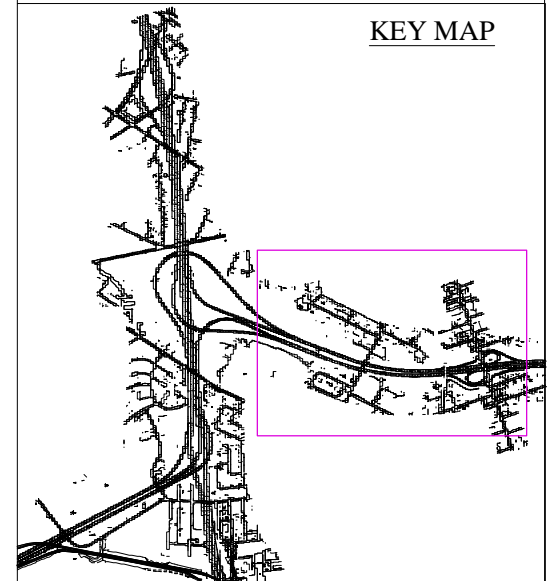
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
- Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
- Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
- Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA Leq)
- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA Leq)
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA Leq)
- Structure Acquisitions










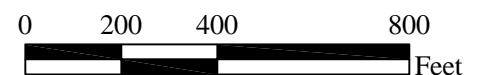
PROJECT NORTH

KEY MAP



LEGEND

-  Proposed Improvements
-  Structure Limits
-  66 dBA  $L_{eq}$  Noise Contour
-  Existing Noise Wall Locations
-  Removed Existing Noise Wall Locations



New Jersey Department of Transportation








I-295/I-76/Route 42  
Direct Connection  
Camden County  
Figure 10.5.3

2030 "Alternative K" 66 dBA Noise Contour

Date April 14, 2006

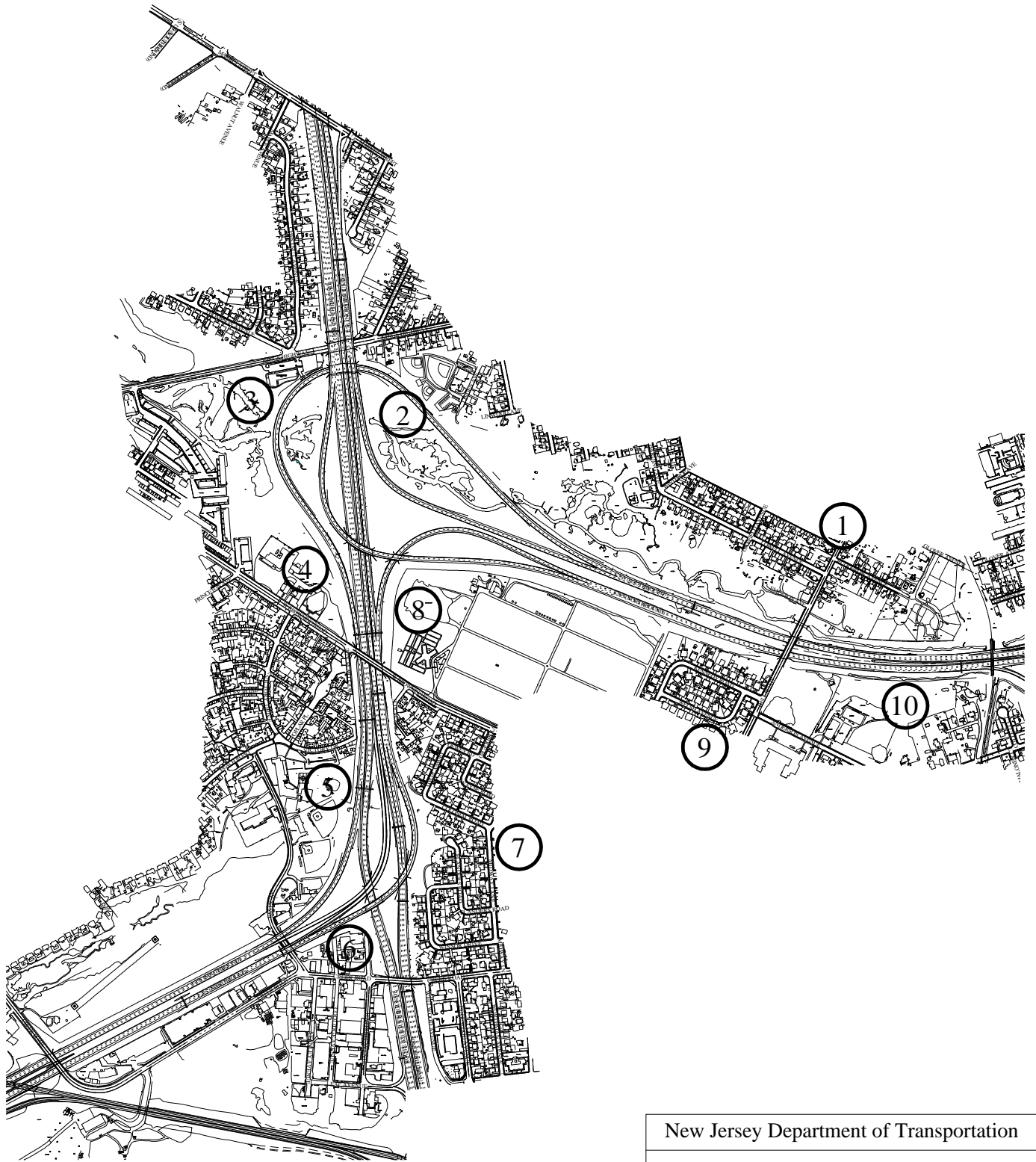
LEGEND

Level of Service C Traffic Conditions

-  Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
-  Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
-  Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
-  Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
-  Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA  $L_{eq}$ )
-  Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA  $L_{eq}$ )
-  Structure Acquisitions

**APPENDIX C**

**Location of Proposed Noise Walls**



LEGEND



Areas of Investigated Noise Mitigation



PROJECT  
NORTH

New Jersey Department of Transportation

I-295/I-76/Route 42  
Direct Connection  
Camden County

Figure 11

Areas of Investigated Noise Mitigation

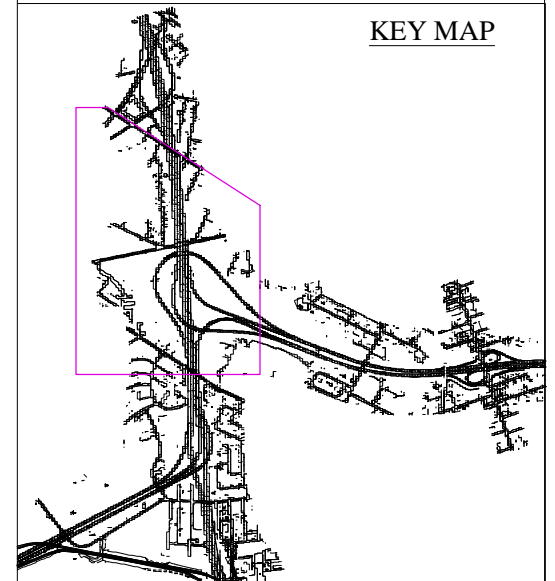
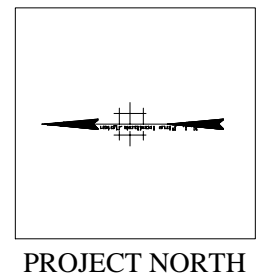
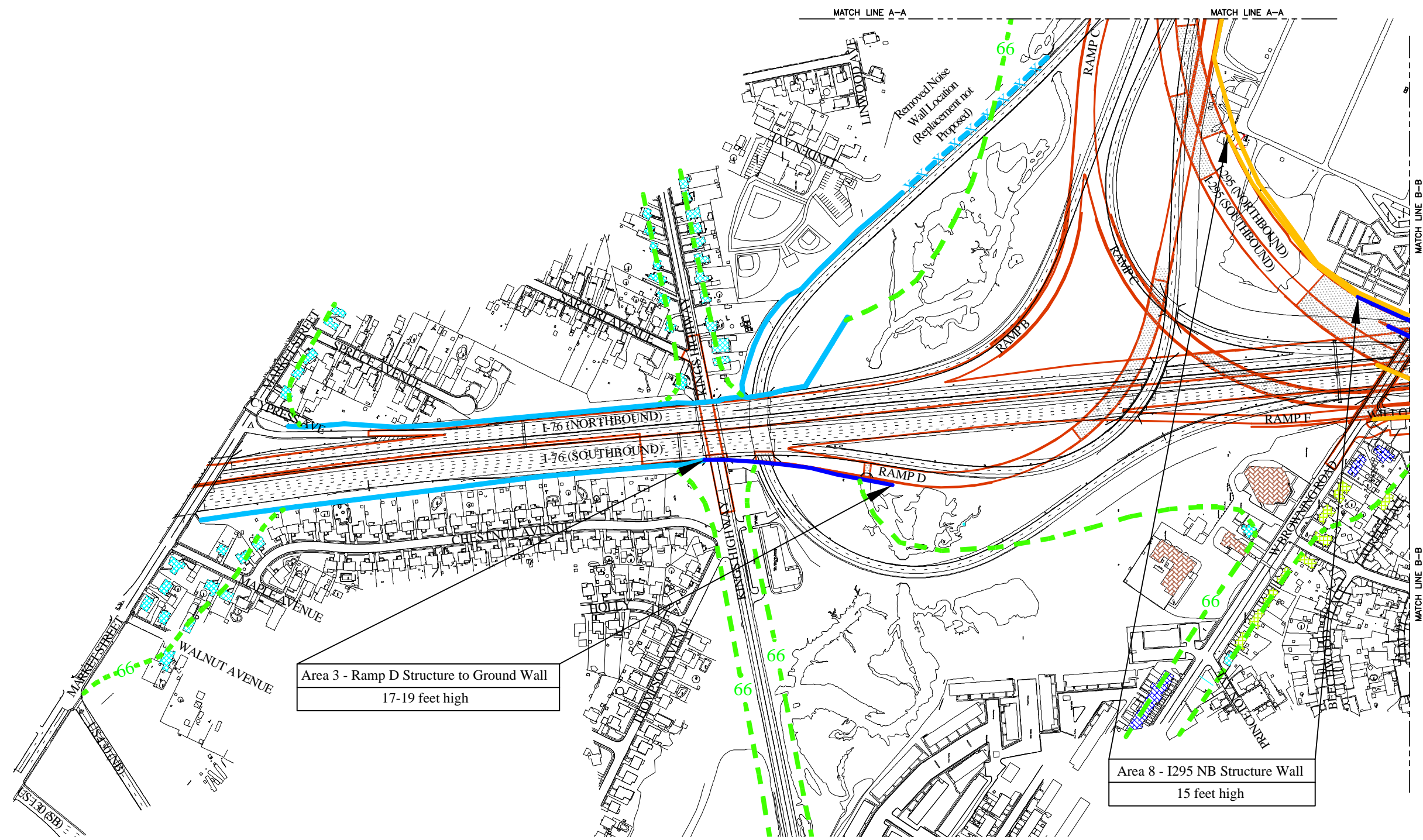
**Paul Carpenter Associates, Inc.**

In Association With:

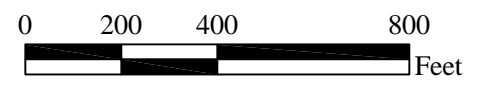
**Dewberry-Goodkind, Inc.**

Date

April 14, 2006



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA L<sub>eq</sub> Noise Contour
  - Existing Noise Wall Location
  - X X Removed Existing Noise Wall Locations
  - Replacement Noise Wall Location
  - New Noise Wall Location



New Jersey Department of Transportation

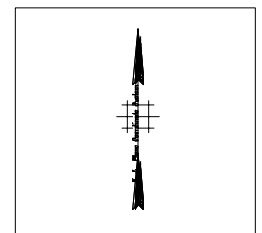
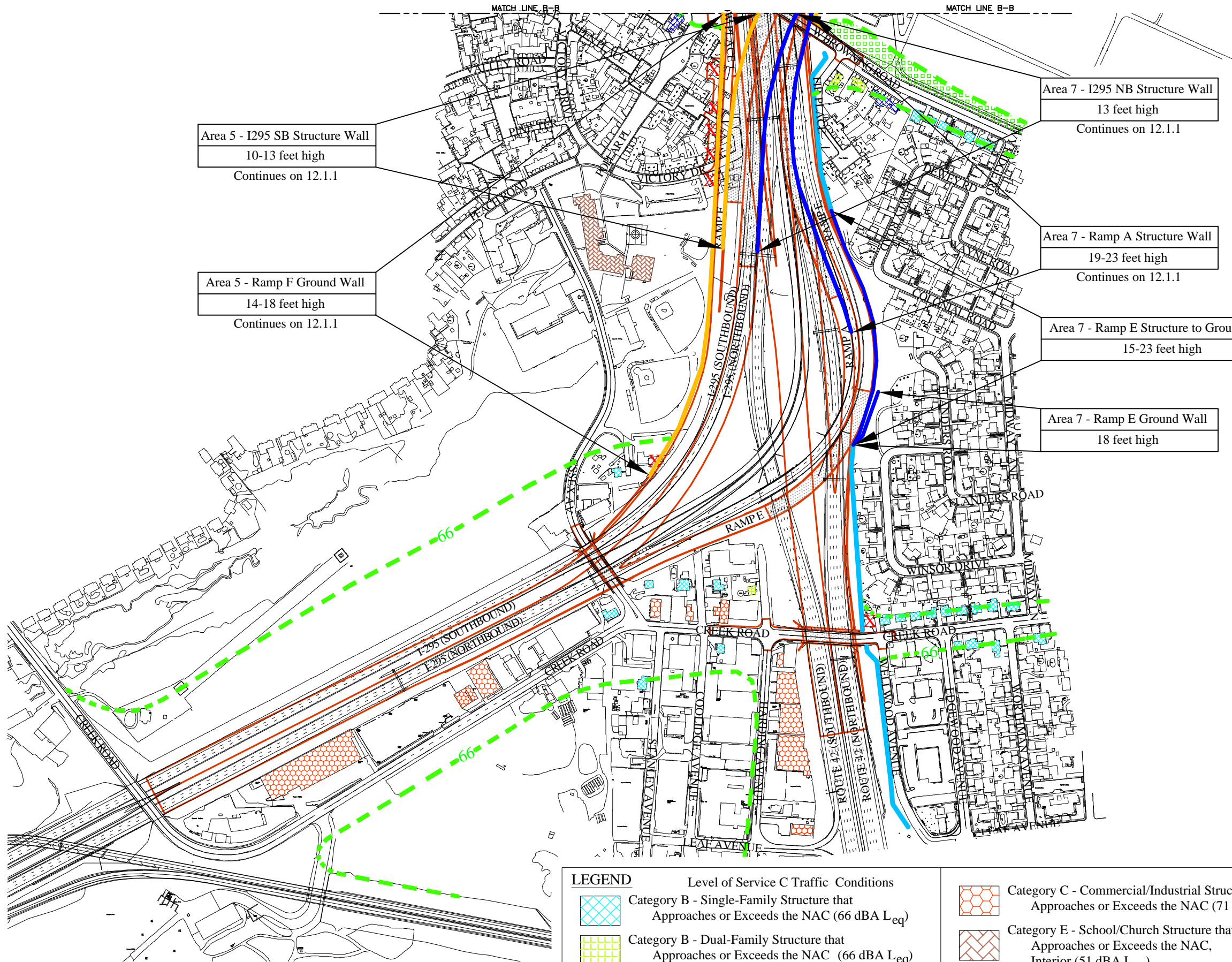
## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.1.1

2030 "Alternative D" Proposed Noise Walls

Date April 14, 2006

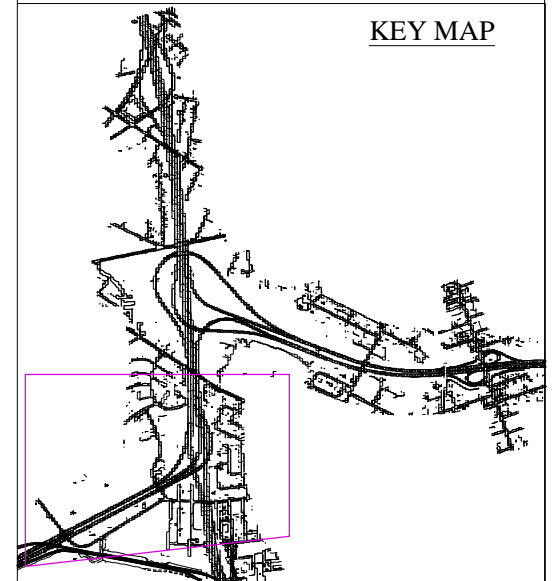
- LEGEND** Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)

- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L<sub>eq</sub>)
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L<sub>eq</sub>)
- X Structure Acquisitions



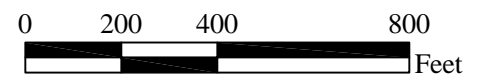
PROJECT NORTH

KEY MAP



LEGEND

- Proposed Improvements
- Structure Limits
- - - 66 dBA  $L_{eq}$  Noise Contour
- Existing Noise Wall Location
- X-X- Removed Existing Noise Wall Locations
- Replacement Noise Wall Location
- New Noise Wall Location



New Jersey Department of Transportation

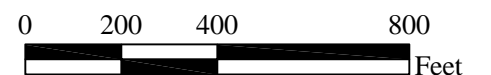
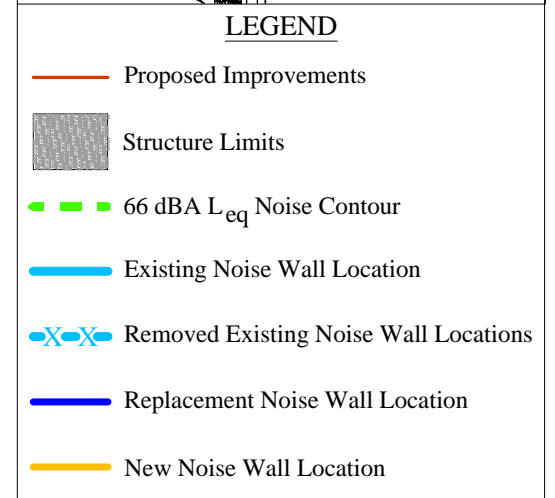
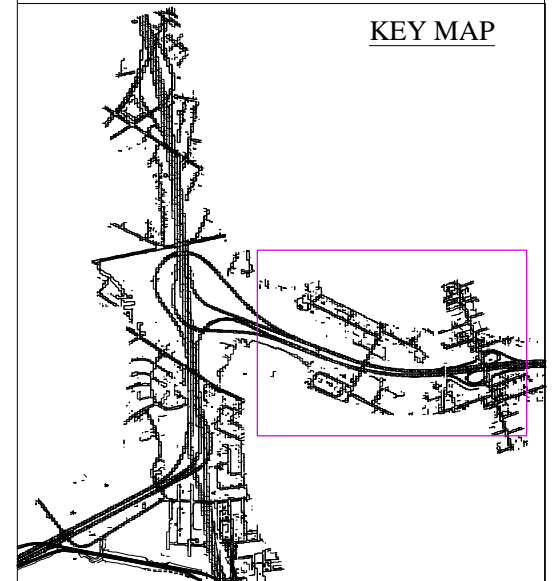
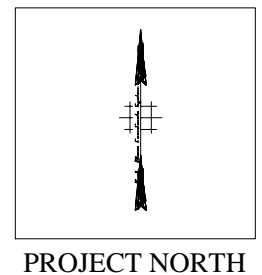
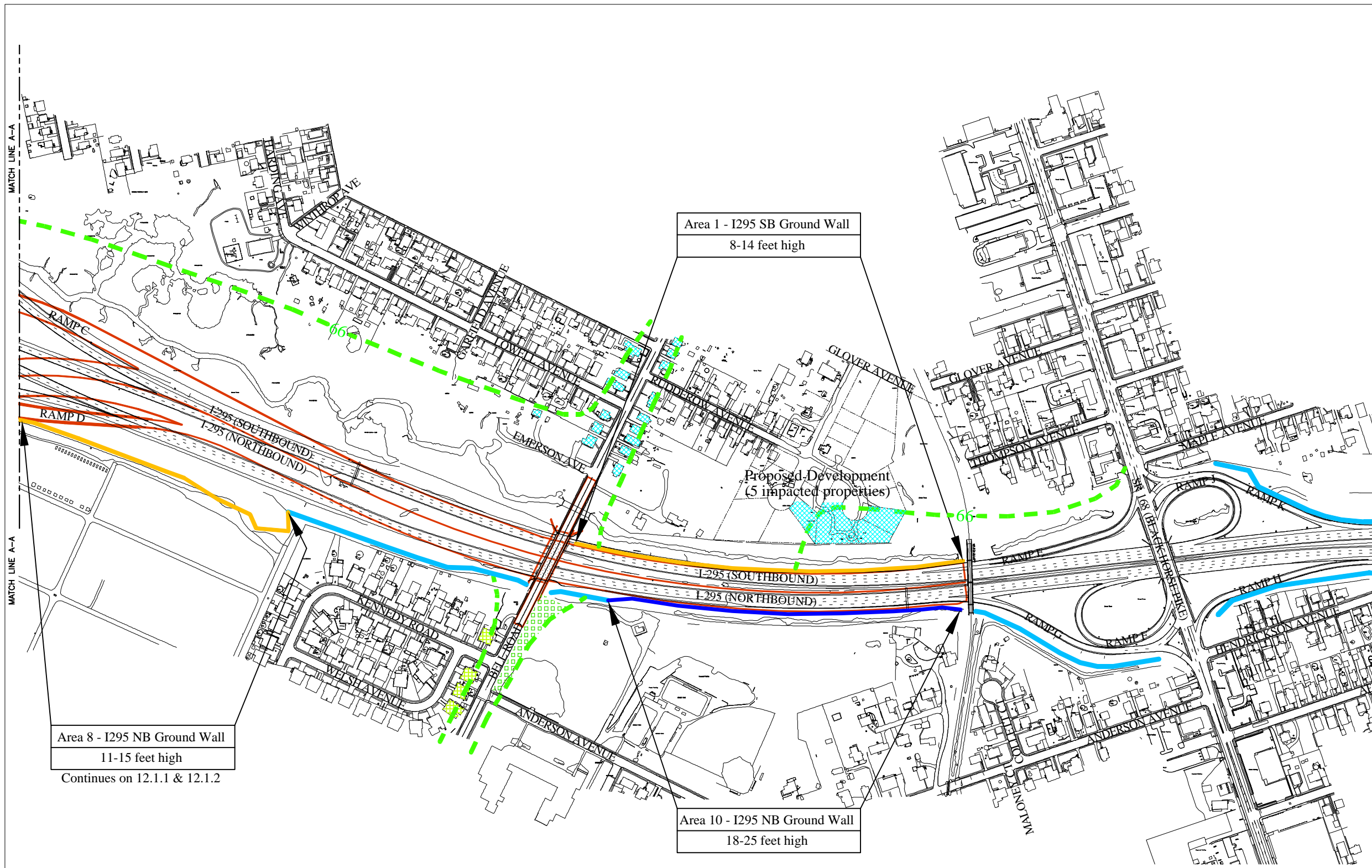
## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.1.2

2030 "Alternative D" Proposed Noise Walls

Date April 14, 2006

LEGEND

- |   |  |
|---|--|
| <p style="text-align: center;">Level of Service C Traffic Conditions</p> <ul style="list-style-type: none"> <li><span style="border: 1px solid blue; width: 15px; height: 10px; display: inline-block; background: repeating-linear-gradient(45deg, transparent, transparent 2px, blue 2px, blue 4px);"></span> Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> <li><span style="border: 1px solid green; width: 15px; height: 10px; display: inline-block; background: repeating-linear-gradient(45deg, transparent, transparent 2px, green 2px, green 4px);"></span> Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> <li><span style="border: 1px solid purple; width: 15px; height: 10px; display: inline-block; background: repeating-linear-gradient(45deg, transparent, transparent 2px, purple 2px, purple 4px);"></span> Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> <li><span style="border: 1px solid green; width: 15px; height: 10px; display: inline-block; background: repeating-linear-gradient(45deg, transparent, transparent 2px, green 2px, green 4px);"></span> Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> </ul> | <ul style="list-style-type: none"> <li><span style="border: 1px solid orange; width: 15px; height: 10px; display: inline-block; background: repeating-linear-gradient(45deg, transparent, transparent 2px, orange 2px, orange 4px);"></span> Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA <math>L_{eq}</math>)</li> <li><span style="border: 1px solid red; width: 15px; height: 10px; display: inline-block; background: repeating-linear-gradient(45deg, transparent, transparent 2px, red 2px, red 4px);"></span> Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA <math>L_{eq}</math>)</li> <li><span style="border: 1px solid red; width: 15px; height: 10px; display: inline-block; text-align: center; line-height: 10px;">X</span> Structure Acquisitions</li> </ul> |
|---|--|



New Jersey Department of Transportation

## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.1.3

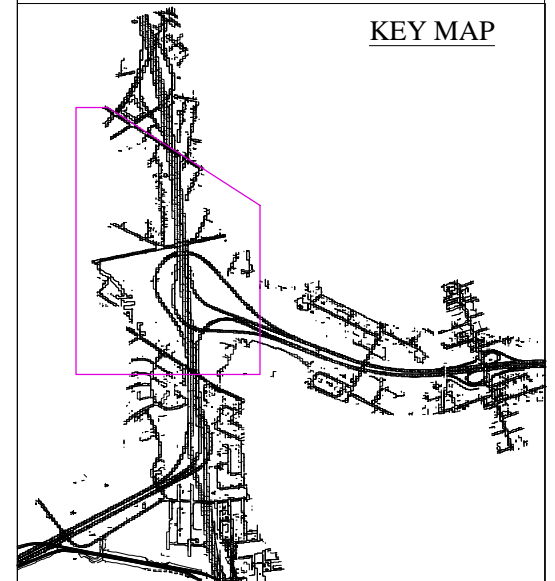
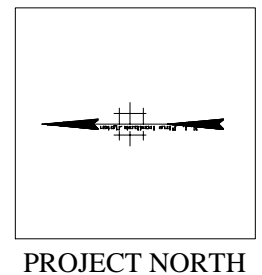
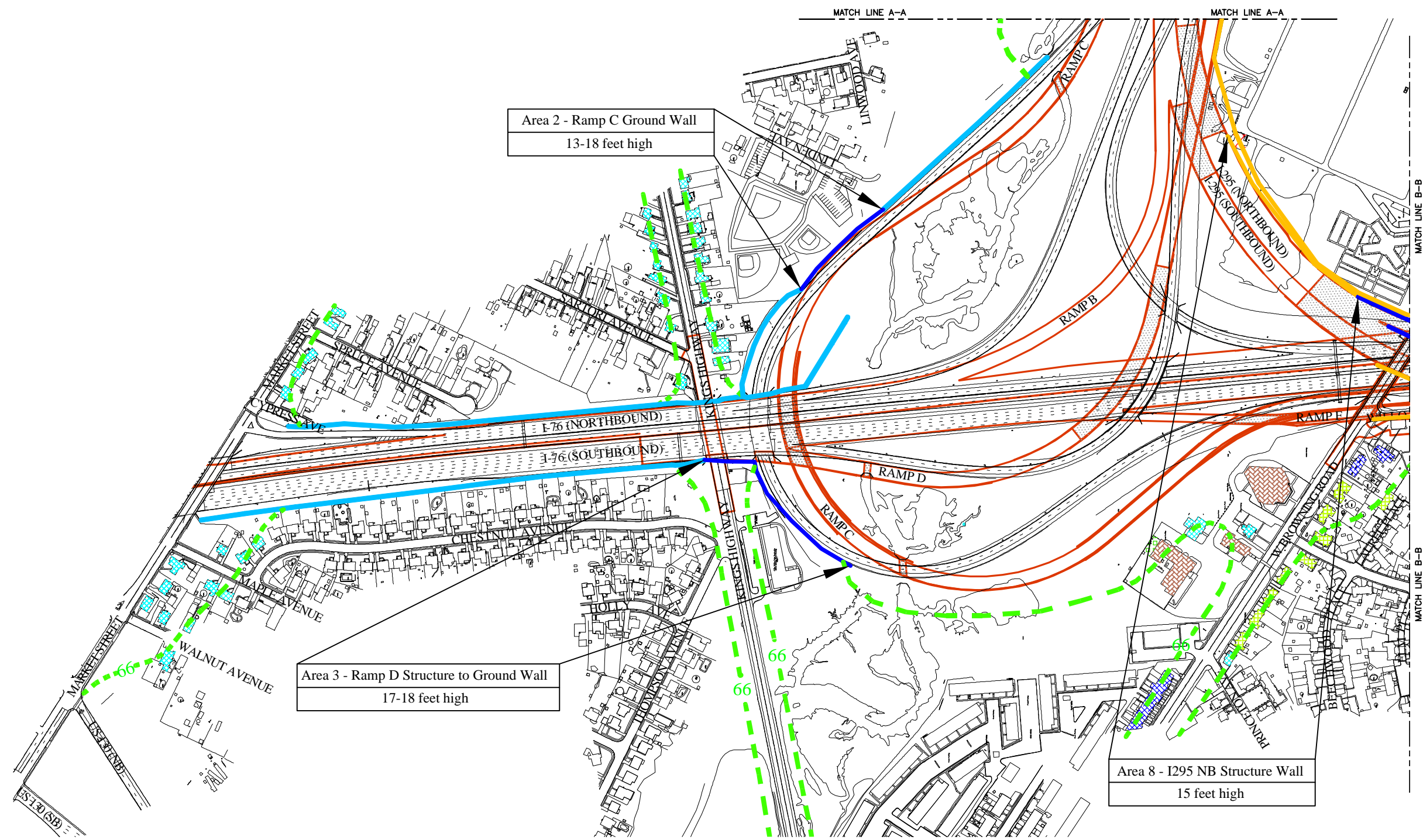
2030 "Alternative D" Proposed Noise Walls

Date April 14, 2006

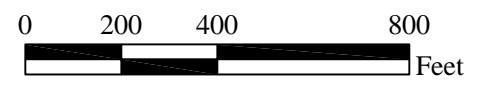
**LEGEND** Level of Service C Traffic Conditions

<span style="background-color: lightblue; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
<span style="background-color: lightgreen; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
<span style="background-color: lightblue; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
<span style="background-color: lightgreen; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )

<span style="background-color: orange; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L <sub>eq</sub> )
<span style="background-color: orange; border: 1px solid black; display: inline-block; width: 15px; height: 15px;"></span>	Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L <sub>eq</sub> )
<span style="color: red; font-weight: bold;">X</span>	Structure Acquisitions



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA  $L_{eq}$  Noise Contour
  - Existing Noise Wall Location
  - Replacement Noise Wall Location
  - New Noise Wall Location



New Jersey Department of Transportation

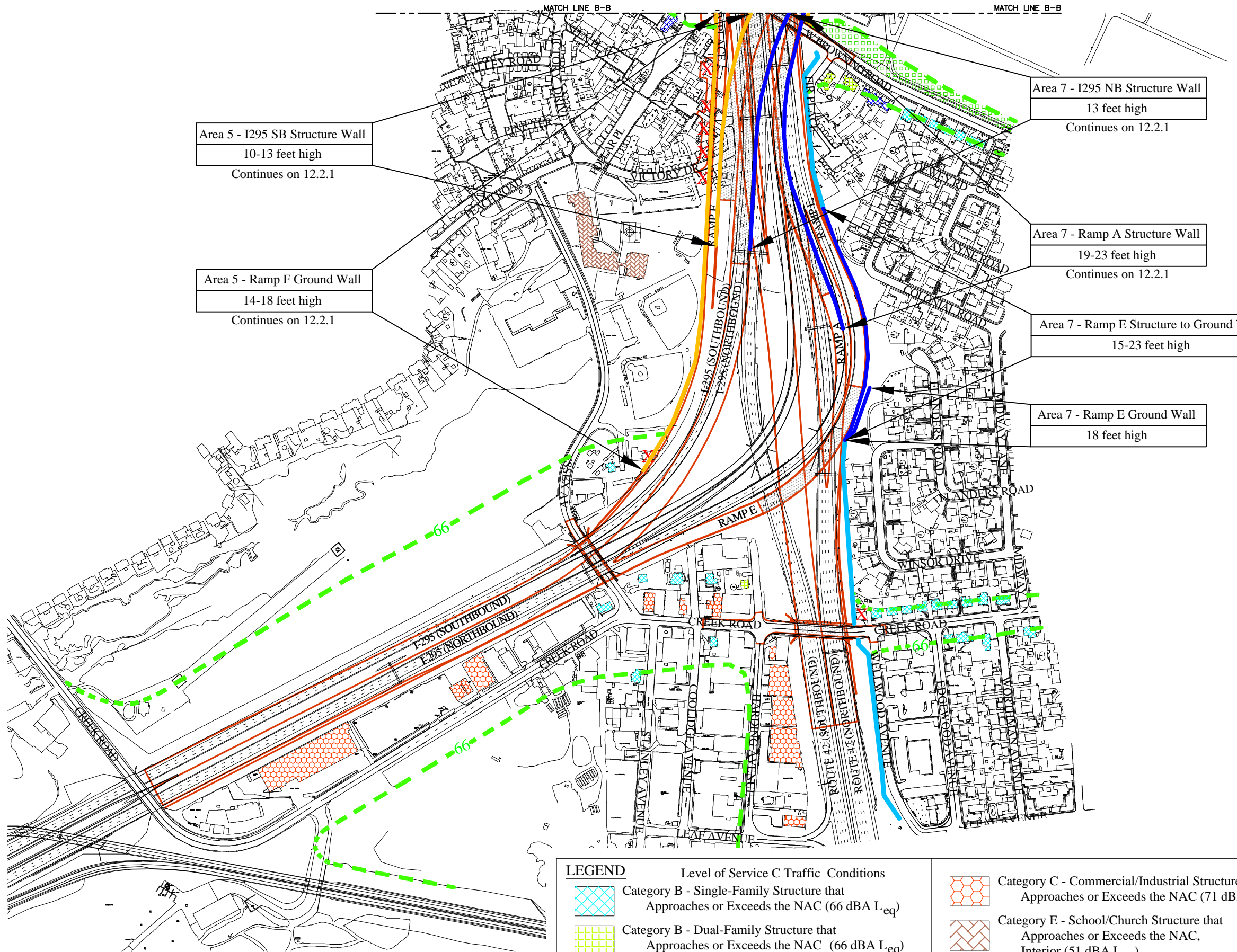
## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.2.1

2030 "Alternative D1" Proposed Noise Walls

Date April 14, 2006

- LEGEND** Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )

- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA  $L_{eq}$ )
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA  $L_{eq}$ )
- X Structure Acquisitions



Area 5 - I295 SB Structure Wall  
10-13 feet high  
Continues on 12.2.1

Area 5 - Ramp F Ground Wall  
14-18 feet high  
Continues on 12.2.1

Area 7 - I295 NB Structure Wall  
13 feet high  
Continues on 12.2.1

Area 7 - Ramp A Structure Wall  
19-23 feet high  
Continues on 12.2.1

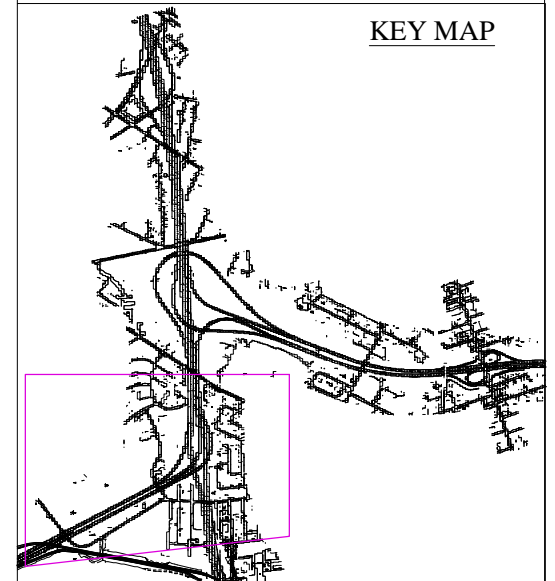
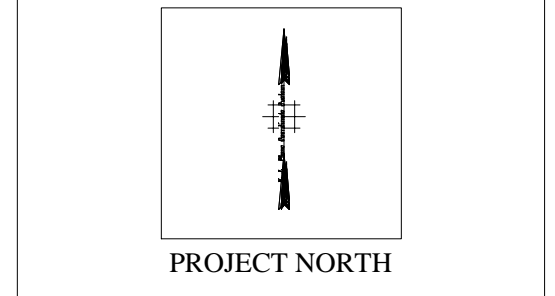
Area 7 - Ramp E Structure to Ground Wall  
15-23 feet high

Area 7 - Ramp E Ground Wall  
18 feet high

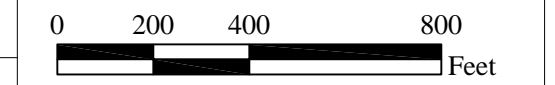
**LEGEND**

- Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)

- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L<sub>eq</sub>)
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L<sub>eq</sub>)
- Structure Acquisitions



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - 66 dBA L<sub>eq</sub> Noise Contour
  - Existing Noise Wall Location
  - Replacement Noise Wall Location
  - New Noise Wall Location



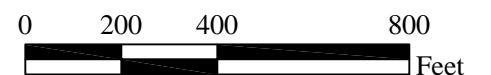
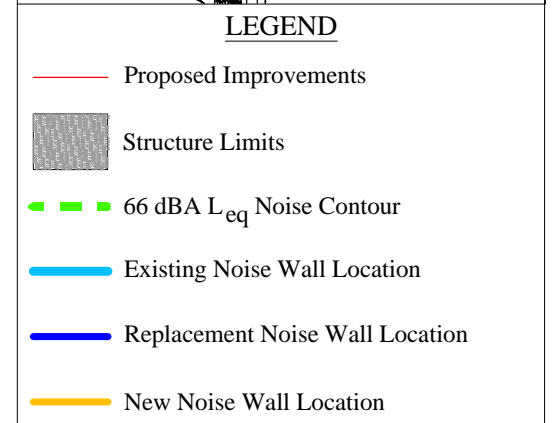
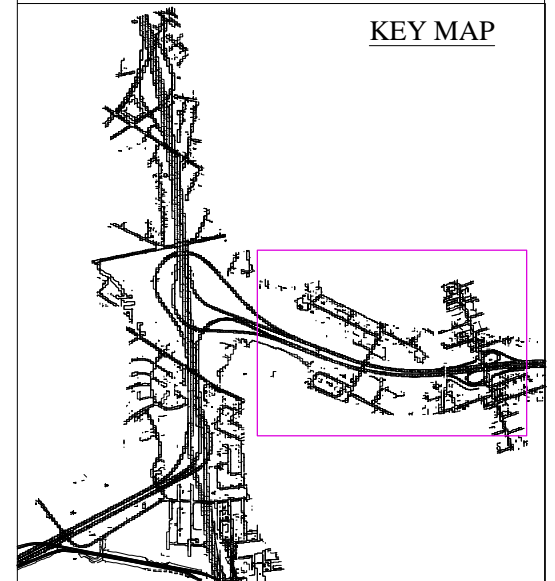
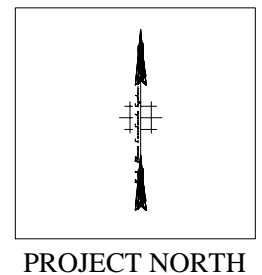
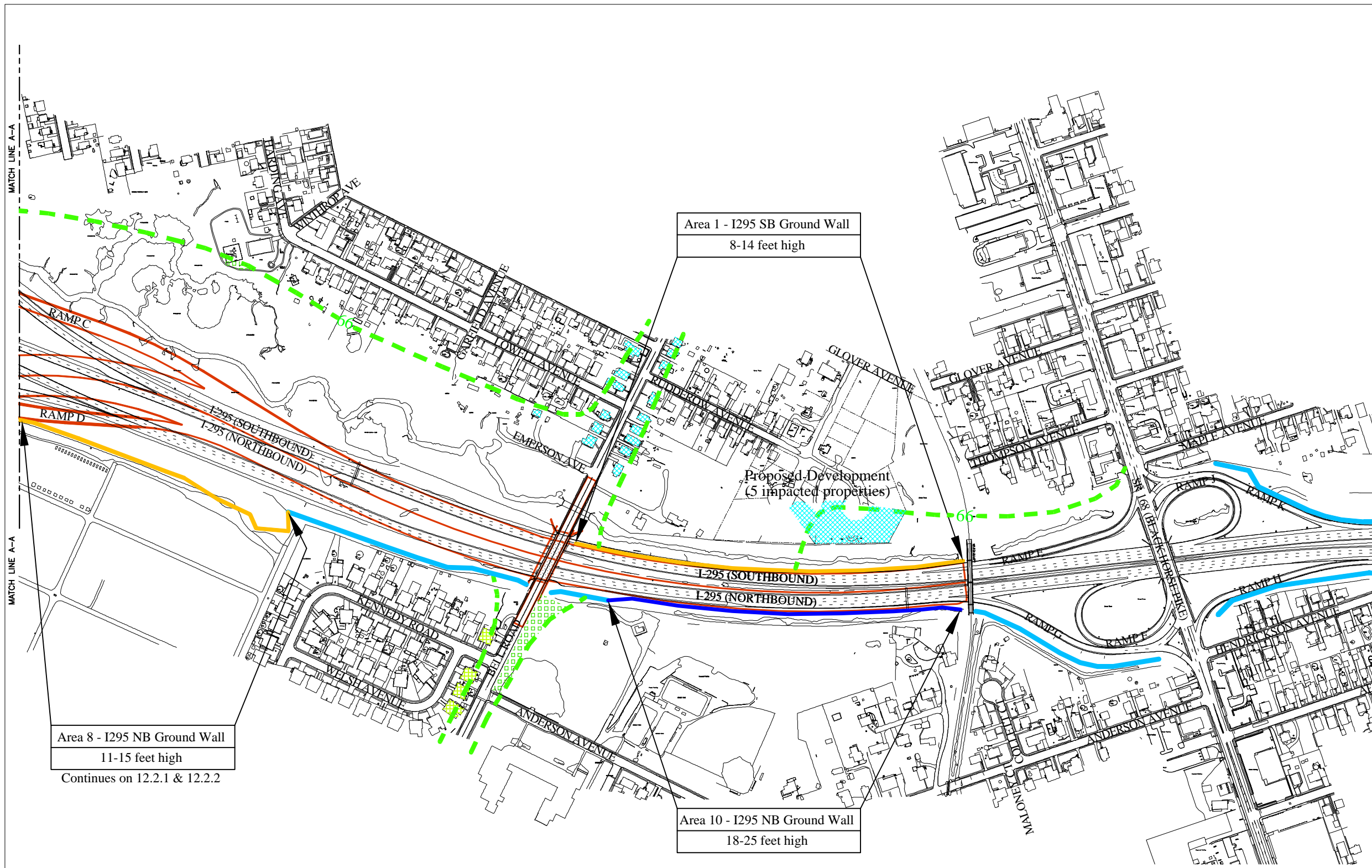
New Jersey Department of Transportation

I-295/I-76/Route 42  
Direct Connection  
Camden County  
**Figure 12.2.2**

2030 "Alternative D1" Proposed Noise Walls

Date April 14, 2006





New Jersey Department of Transportation

## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.2.3

2030 "Alternative D1" Proposed Noise Walls

Date April 14, 2006

**LEGEND** Level of Service C Traffic Conditions

	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )

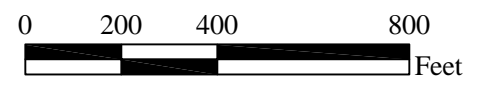
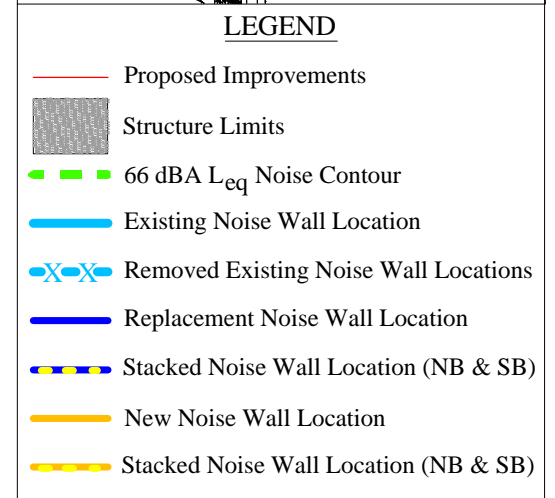
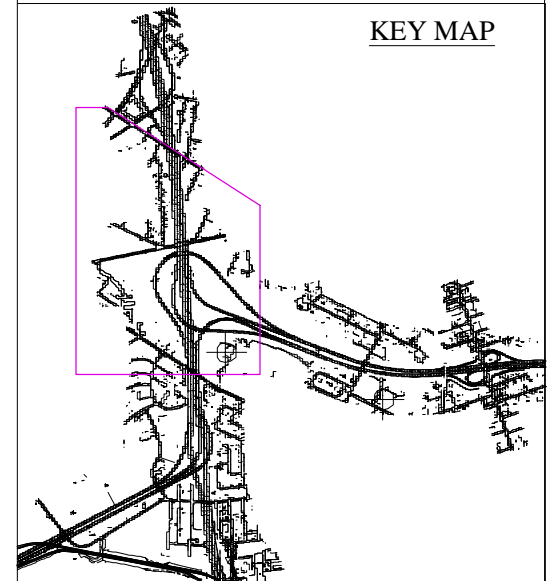
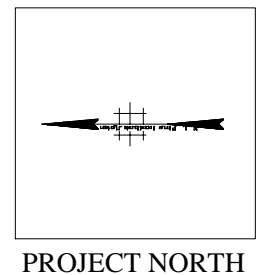
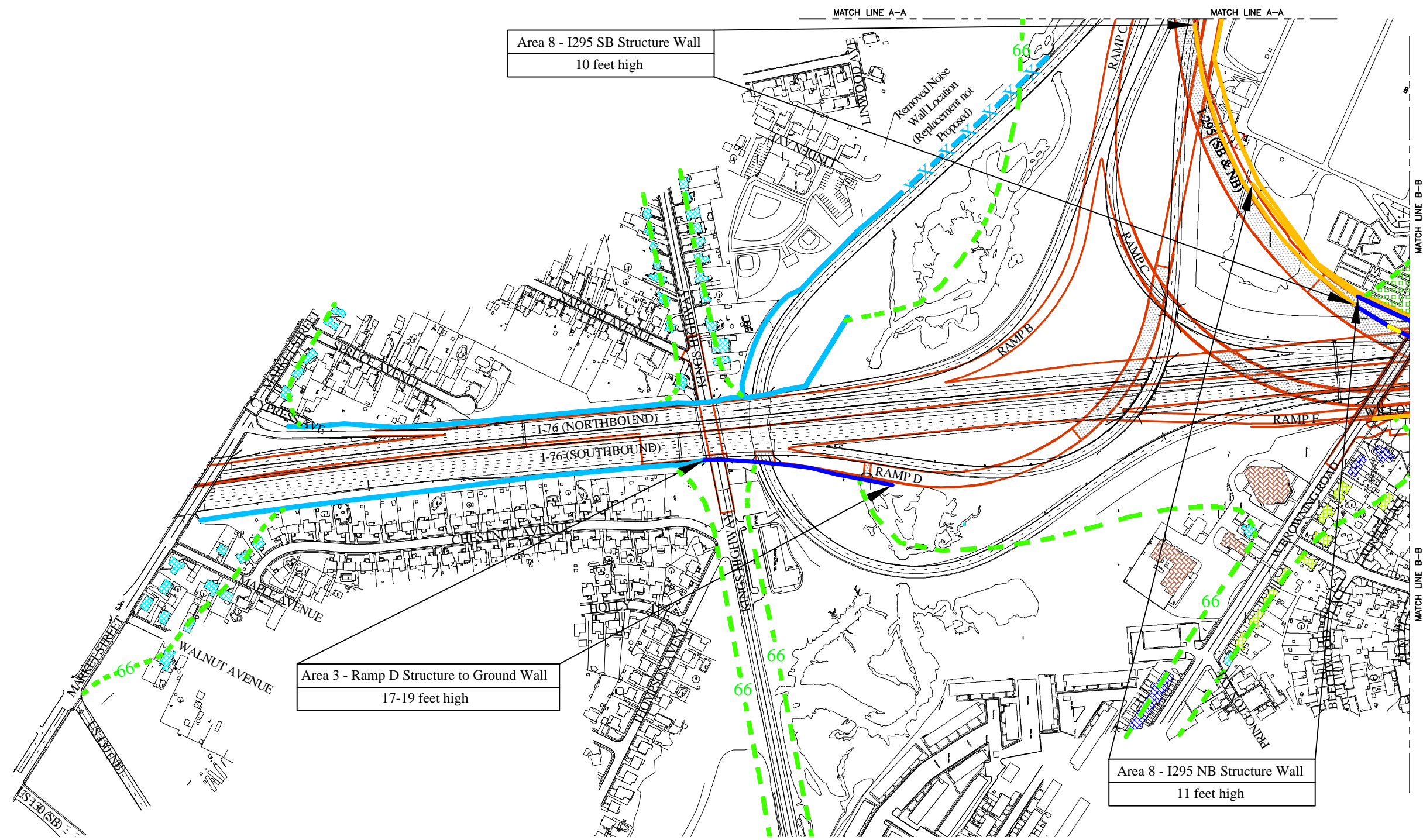
	Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L <sub>eq</sub> )
	Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L <sub>eq</sub> )
	Structure Acquisitions

Area 8 - I-295 NB Ground Wall  
11-15 feet high  
Continues on 12.2.1 & 12.2.2

Area 1 - I-295 SB Ground Wall  
8-14 feet high

Area 10 - I-295 NB Ground Wall  
18-25 feet high

Proposed Development  
(5 impacted properties)



New Jersey Department of Transportation

## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.3.1

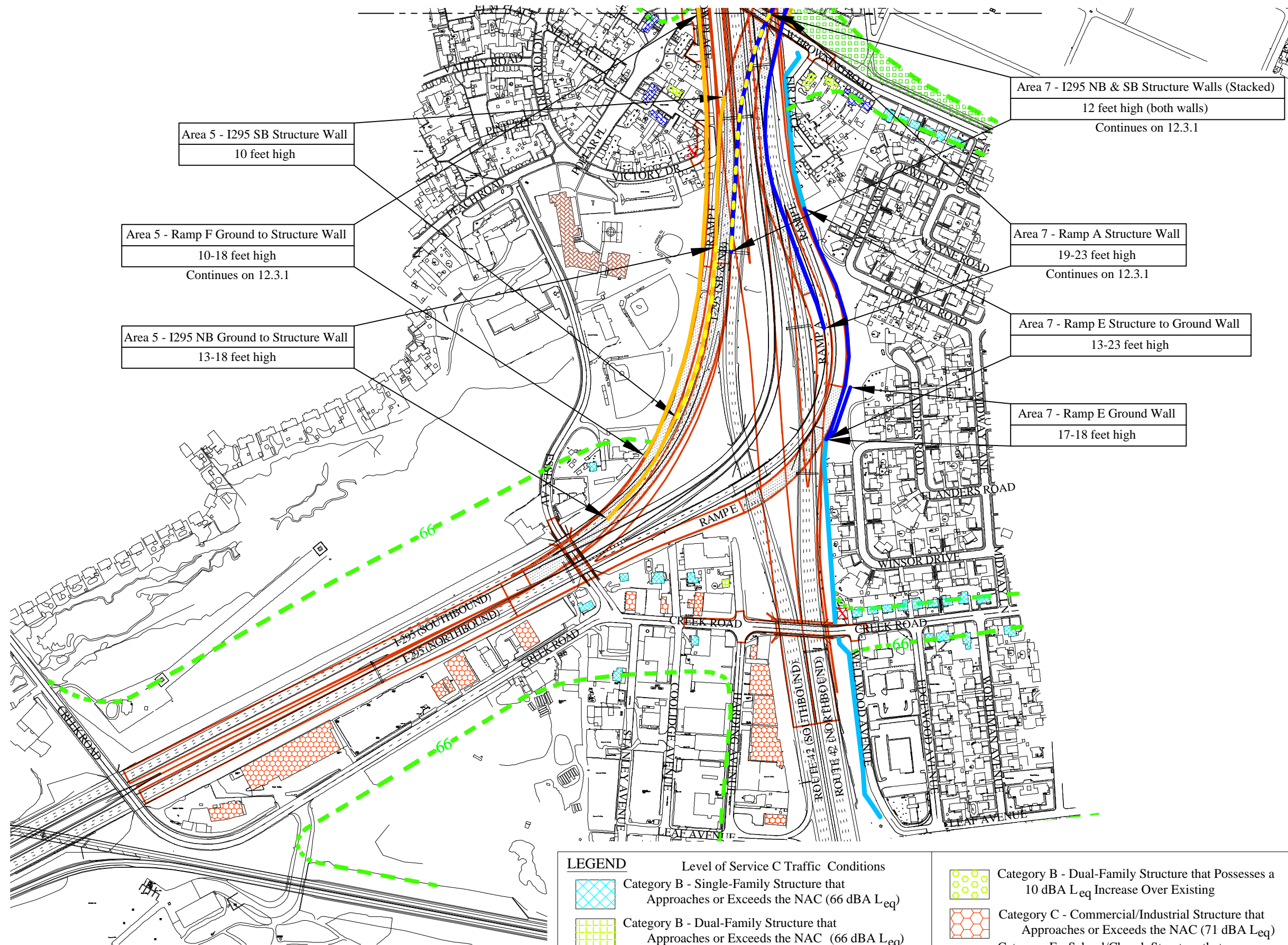
2030 "Alternative G2" Proposed Noise Walls

Date April 14, 2006

**LEGEND** Level of Service C Traffic Conditions

<span style="border: 1px solid blue; padding: 2px;"> </span>	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
<span style="border: 1px solid green; padding: 2px;"> </span>	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
<span style="border: 1px solid purple; padding: 2px;"> </span>	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )
<span style="border: 1px solid green; padding: 2px;"> </span>	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )

<span style="border: 1px dashed green; padding: 2px;"> </span>	Category B - Dual-Family Structure that Possesses a 10 dBA L <sub>eq</sub> Increase Over Existing
<span style="border: 1px dashed orange; padding: 2px;"> </span>	Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L <sub>eq</sub> )
<span style="border: 1px dashed red; padding: 2px;"> </span>	Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L <sub>eq</sub> )
<span style="color: red; font-weight: bold;">X</span>	Structure Acquisitions



Area 5 - I-295 SB Structure Wall  
10 feet high

Area 5 - Ramp F Ground to Structure Wall  
10-18 feet high  
Continues on 12.3.1

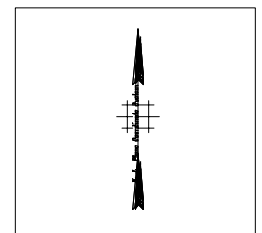
Area 5 - I-295 NB Ground to Structure Wall  
13-18 feet high

Area 7 - I-295 NB & SB Structure Walls (Stacked)  
12 feet high (both walls)  
Continues on 12.3.1

Area 7 - Ramp A Structure Wall  
19-23 feet high  
Continues on 12.3.1

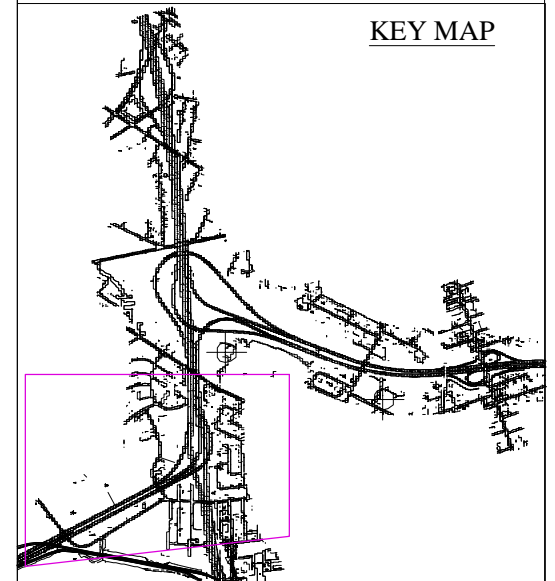
Area 7 - Ramp E Structure to Ground Wall  
13-23 feet high

Area 7 - Ramp E Ground Wall  
17-18 feet high



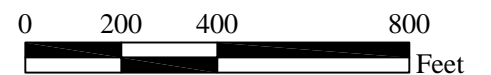
PROJECT NORTH

KEY MAP



LEGEND

- Proposed Improvements
- Structure Limits
- - - 66 dBA L<sub>eq</sub> Noise Contour
- Existing Noise Wall Location
- X-X Removed Existing Noise Wall Locations
- Replacement Noise Wall Location
- - - Stacked Noise Wall Location (NB & SB)
- New Noise Wall Location
- - - Stacked Noise Wall Location (NB & SB)



New Jersey Department of Transportation

## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.3.2

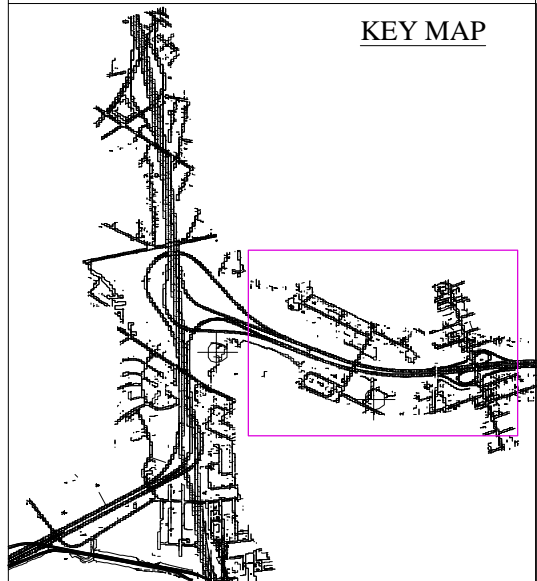
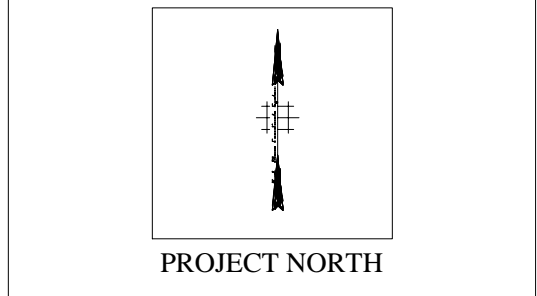
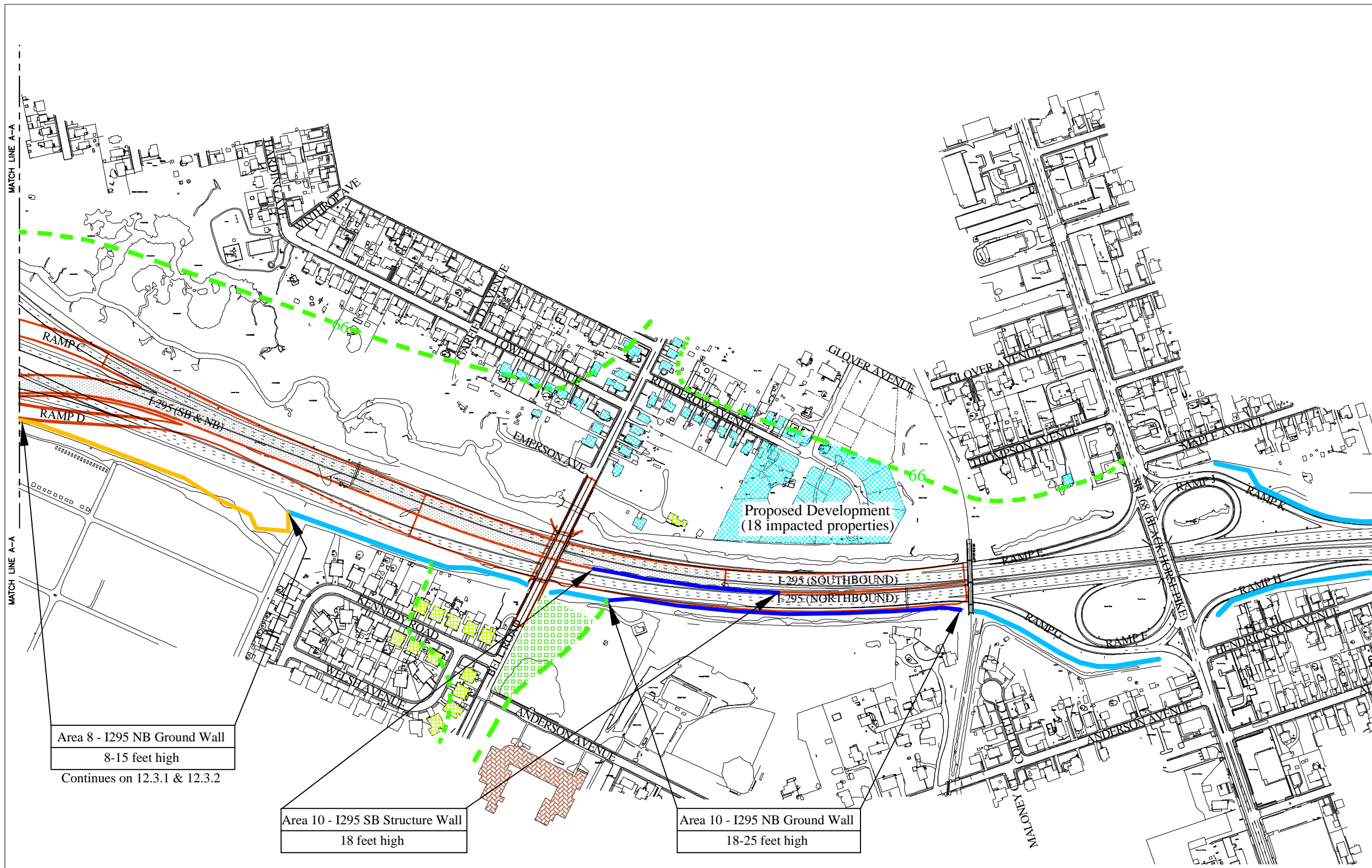
2030 "Alternative G2" Proposed Noise Walls

Date April 14, 2006

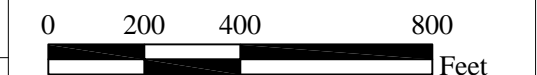
LEGEND

Level of Service C Traffic Conditions

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li><span style="border: 1px solid blue; width: 15px; height: 10px; display: inline-block;"></span> Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)</li> <li><span style="border: 1px solid green; width: 15px; height: 10px; display: inline-block;"></span> Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)</li> <li><span style="border: 1px solid purple; width: 15px; height: 10px; display: inline-block;"></span> Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)</li> <li><span style="border: 1px solid green; width: 15px; height: 10px; display: inline-block;"></span> Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)</li> </ul> | <ul style="list-style-type: none"> <li><span style="border: 1px solid green; width: 15px; height: 10px; display: inline-block;"></span> Category B - Dual-Family Structure that Possesses a 10 dBA L<sub>eq</sub> Increase Over Existing</li> <li><span style="border: 1px solid orange; width: 15px; height: 10px; display: inline-block;"></span> Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L<sub>eq</sub>)</li> <li><span style="border: 1px solid red; width: 15px; height: 10px; display: inline-block;"></span> Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L<sub>eq</sub>)</li> <li><span style="color: red; font-weight: bold; font-size: 2em;">X</span> Structure Acquisitions</li> </ul> |
|--|--|



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA Leq Noise Contour
  - Existing Noise Wall Location
  - X-X Removed Existing Noise Wall Locations
  - Replacement Noise Wall Location
  - - - Stacked Noise Wall Location (NB & SB)
  - New Noise Wall Location
  - - - Stacked Noise Wall Location (NB & SB)



New Jersey Department of Transportation

I-295/I-76/Route 42  
Direct Connection  
Camden County  
**Figure 12.3.3**

2030 "Alternative G2" Proposed Noise Walls

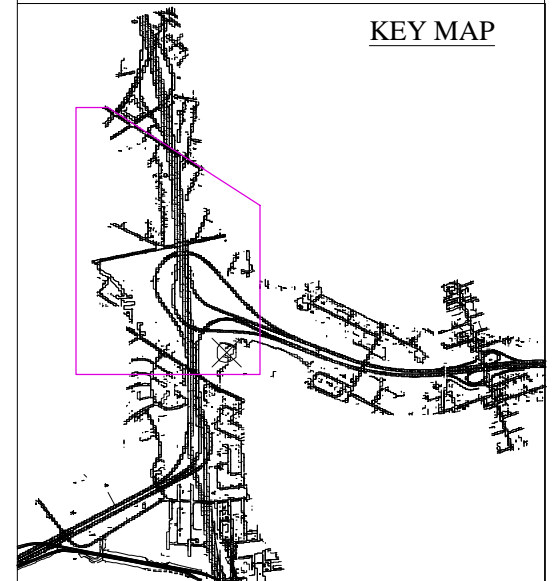
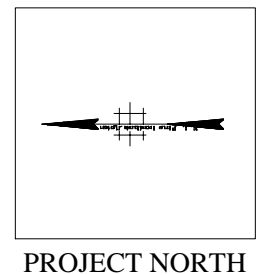
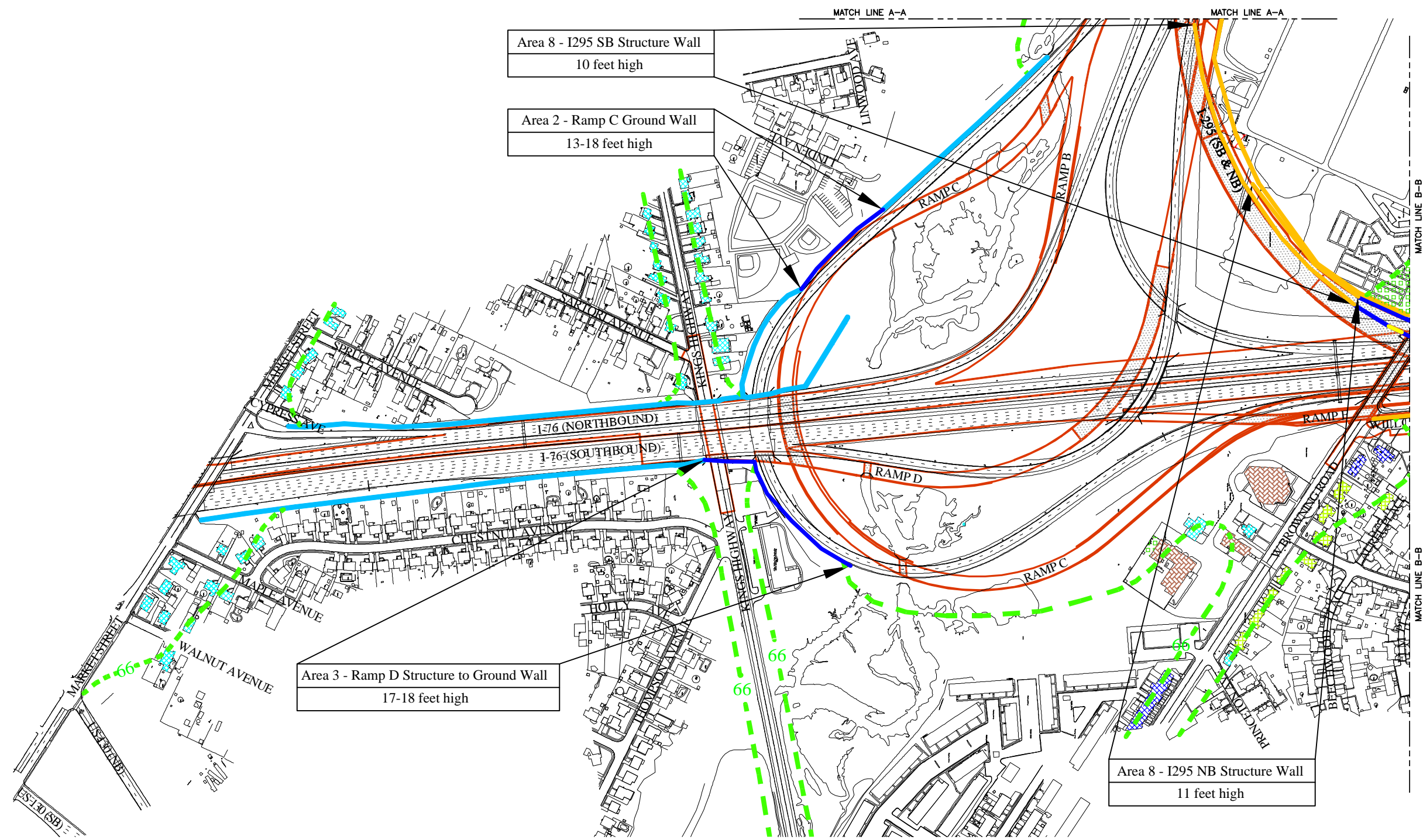
Date April 14, 2006

Area 8 - I-295 NB Ground Wall  
8-15 feet high  
Continues on 12.3.1 & 12.3.2

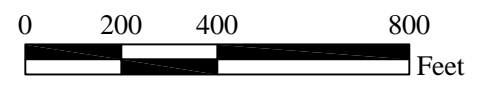
Area 10 - I-295 SB Structure Wall  
18 feet high

Area 10 - I-295 NB Ground Wall  
18-25 feet high

- LEGEND** Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA Leq)
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA Leq)
  - Category B - Dual-Family Structure that Possesses a 10 dBA Leq Increase Over Existing
  - Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA Leq)
  - Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA Leq)
  - X Structure Acquisitions



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA  $L_{eq}$  Noise Contour
  - Existing Noise Wall Location
  - Replacement Noise Wall Location
  - Stacked Noise Wall Location (NB & SB)
  - New Noise Wall Location
  - Stacked Noise Wall Location (NB & SB)



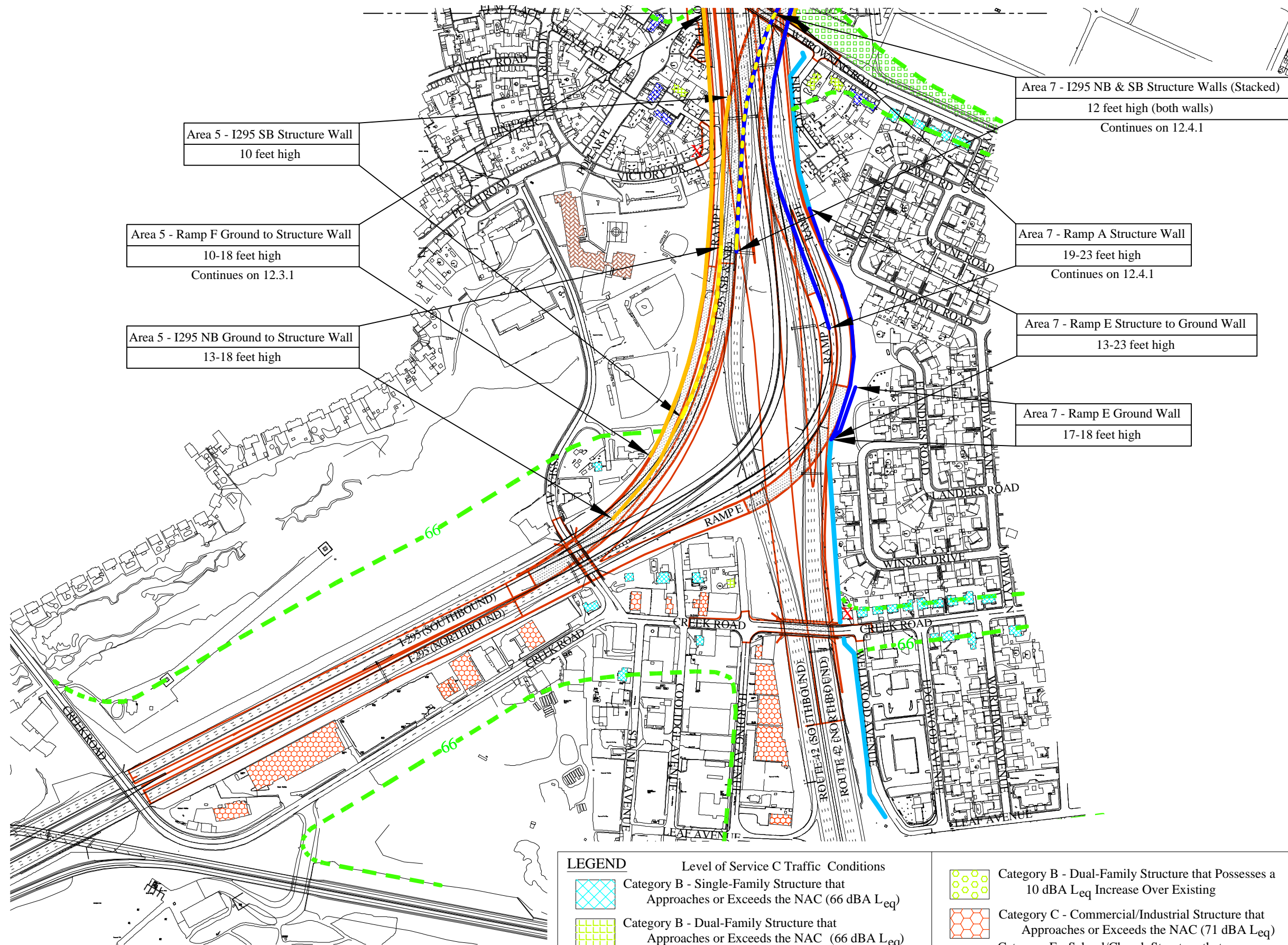
New Jersey Department of Transportation

## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.4.1

2030 "Alternative H1" Proposed Noise Walls

Date April 14, 2006

- LEGEND** Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA  $L_{eq}$ )
  - Category B - Dual-Family Structure that Possesses a 10 dBA  $L_{eq}$  Increase Over Existing
  - Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA  $L_{eq}$ )
  - Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA  $L_{eq}$ )
  - X Structure Acquisitions



Area 5 - I295 SB Structure Wall  
10 feet high

Area 5 - Ramp F Ground to Structure Wall  
10-18 feet high  
Continues on 12.3.1

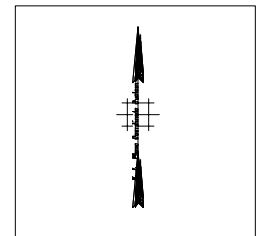
Area 5 - I295 NB Ground to Structure Wall  
13-18 feet high

Area 7 - I295 NB & SB Structure Walls (Stacked)  
12 feet high (both walls)  
Continues on 12.4.1

Area 7 - Ramp A Structure Wall  
19-23 feet high  
Continues on 12.4.1

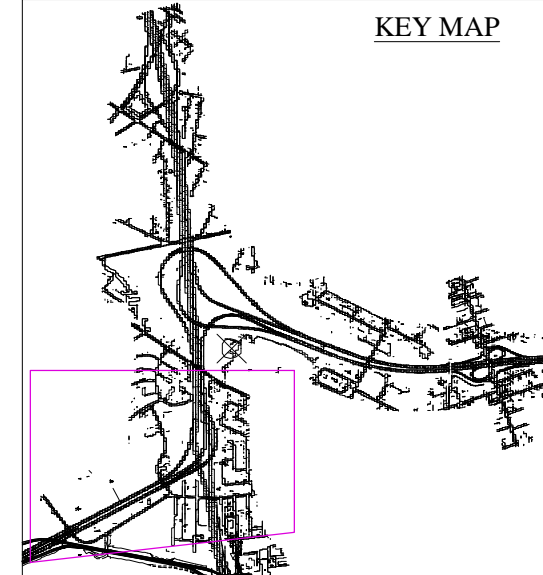
Area 7 - Ramp E Structure to Ground Wall  
13-23 feet high

Area 7 - Ramp E Ground Wall  
17-18 feet high



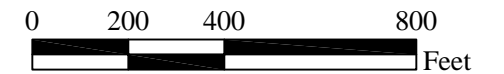
PROJECT NORTH

KEY MAP



LEGEND

- Proposed Improvements
- Structure Limits
- - - 66 dBA  $L_{eq}$  Noise Contour
- Existing Noise Wall Location
- Replacement Noise Wall Location
- Stacked Noise Wall Location (NB & SB)
- New Noise Wall Location
- Stacked Noise Wall Location (NB & SB)



New Jersey Department of Transportation

## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.4.2

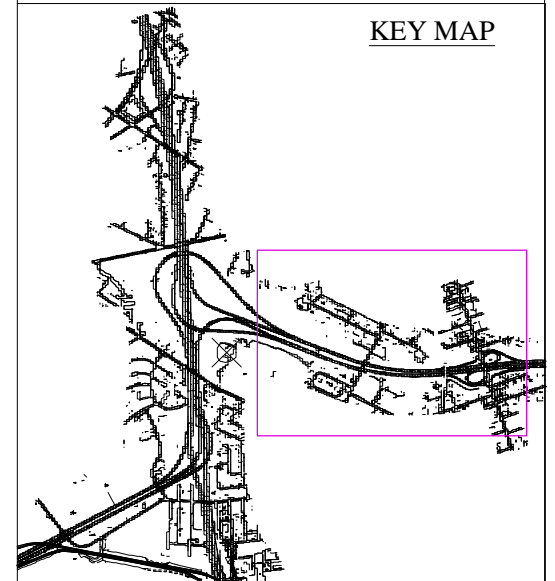
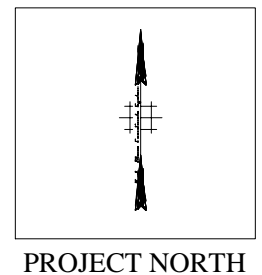
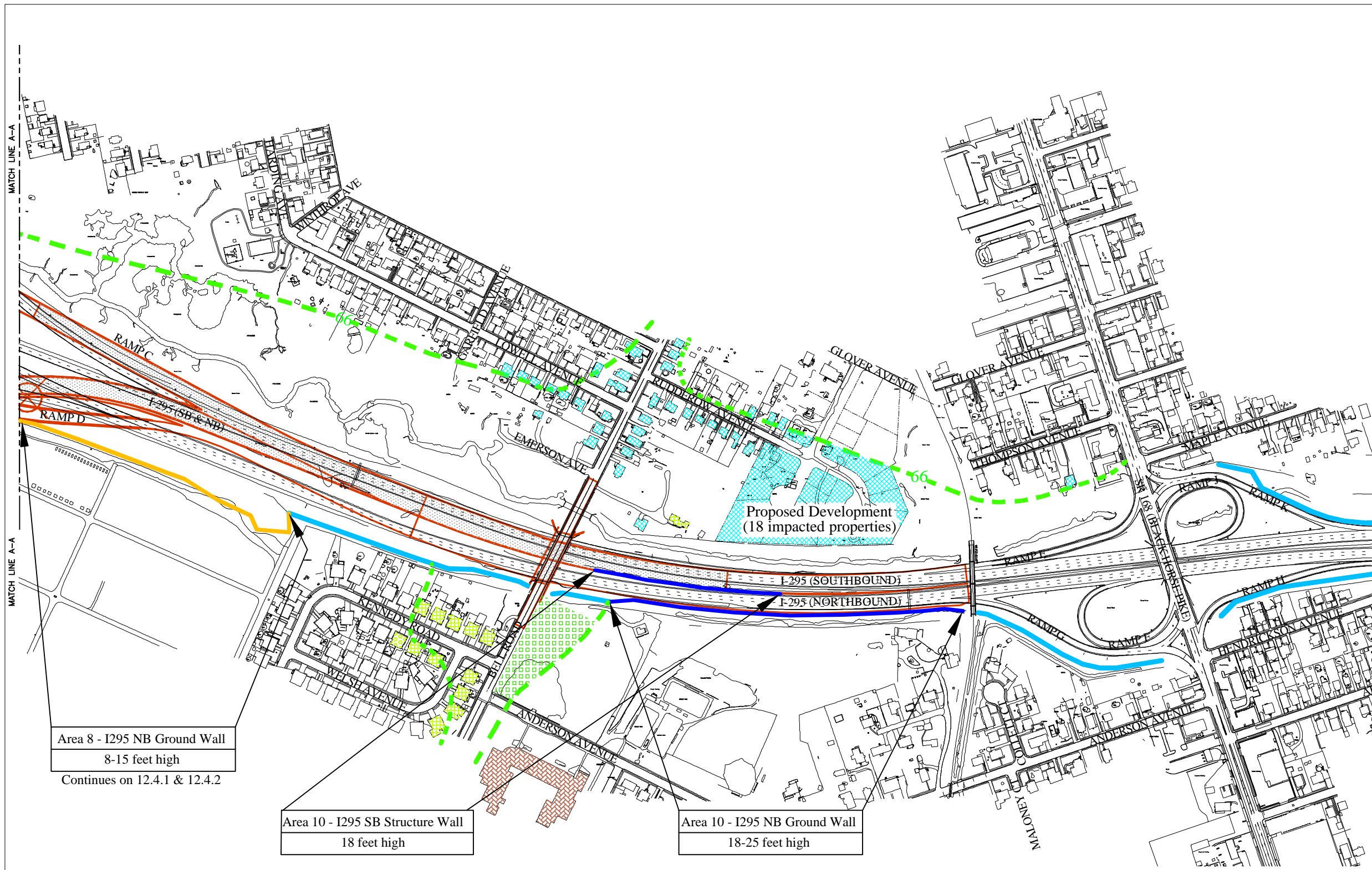
2030 "Alternative H1" Proposed Noise Walls

Date April 14, 2006

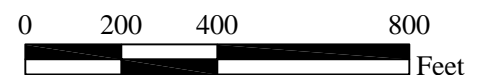
LEGEND

Level of Service C Traffic Conditions

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li><span style="border: 1px solid blue; width: 15px; height: 10px; display: inline-block;"></span> Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> <li><span style="border: 1px solid green; width: 15px; height: 10px; display: inline-block;"></span> Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> <li><span style="border: 1px solid purple; width: 15px; height: 10px; display: inline-block;"></span> Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> <li><span style="border: 1px solid green; width: 15px; height: 10px; display: inline-block;"></span> Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA <math>L_{eq}</math>)</li> </ul> | <ul style="list-style-type: none"> <li><span style="border: 1px solid green; width: 15px; height: 10px; display: inline-block;"></span> Category B - Dual-Family Structure that Possesses a 10 dBA <math>L_{eq}</math> Increase Over Existing</li> <li><span style="border: 1px solid orange; width: 15px; height: 10px; display: inline-block;"></span> Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA <math>L_{eq}</math>)</li> <li><span style="border: 1px solid red; width: 15px; height: 10px; display: inline-block;"></span> Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA <math>L_{eq}</math>)</li> <li><span style="color: red; font-size: 2em; font-weight: bold;">X</span> Structure Acquisitions</li> </ul> |
|--|---|



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA  $L_{eq}$  Noise Contour
  - Existing Noise Wall Location
  - Replacement Noise Wall Location
  - Stacked Noise Wall Location (NB & SB)
  - New Noise Wall Location
  - Stacked Noise Wall Location (NB & SB)



New Jersey Department of Transportation

### I-295/I-76/Route 42 Direct Connection Camden County Figure 12.4.3

2030 "Alternative H1" Proposed Noise Walls

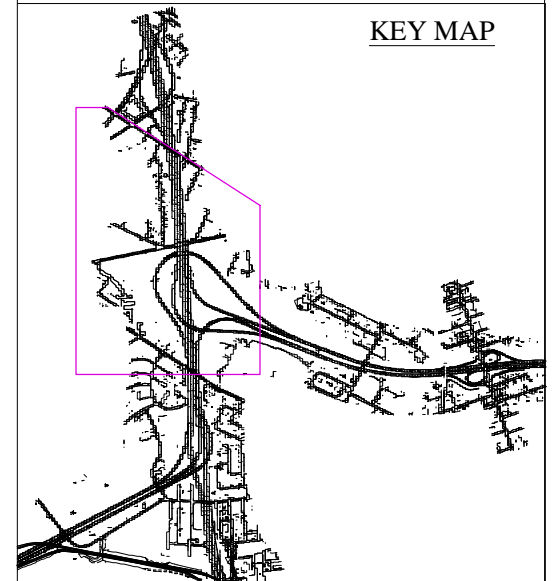
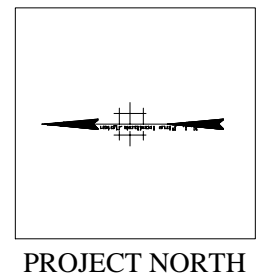
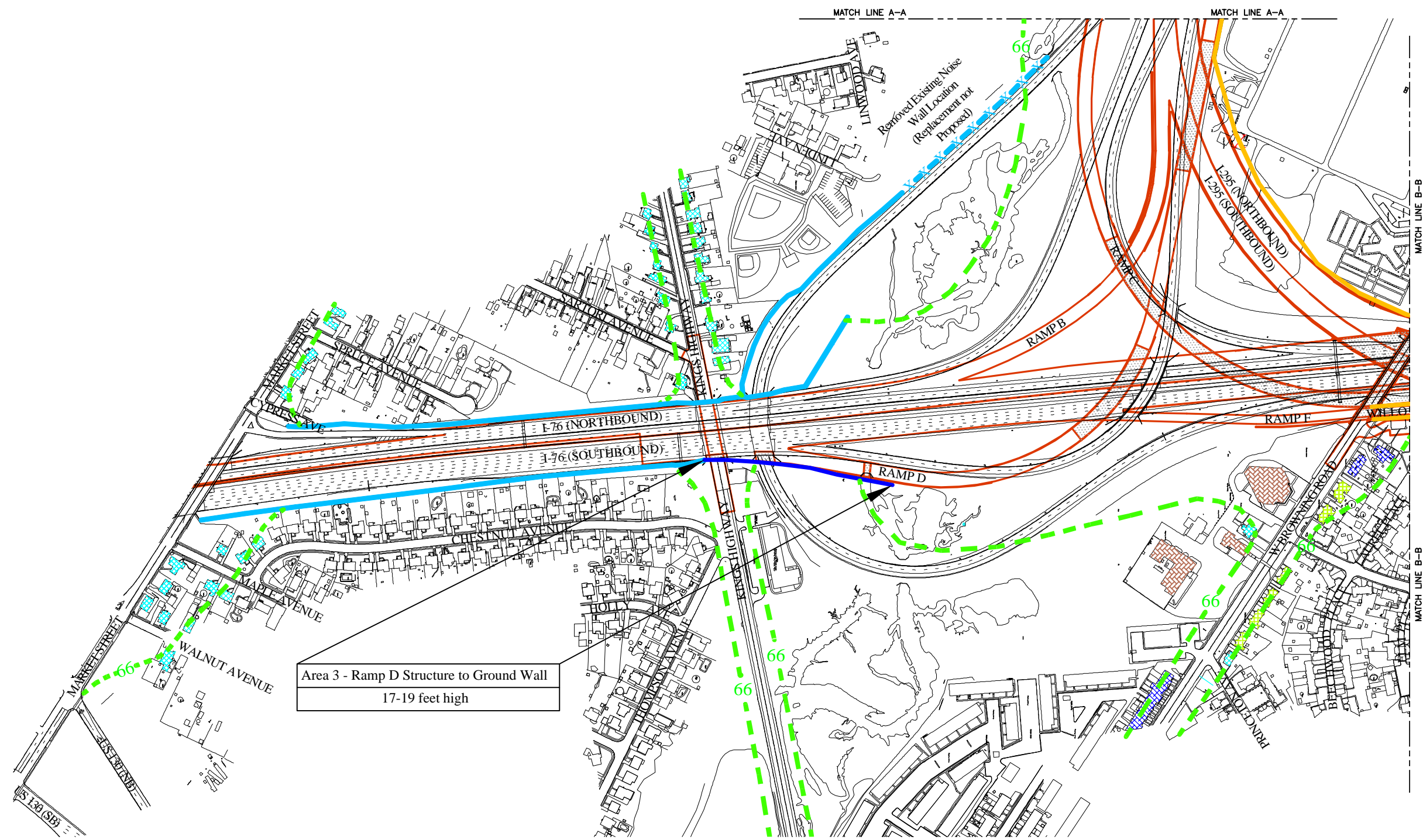
Date April 14, 2006

- LEGEND** Level of Service C Traffic Conditions
- |  |   |
|--|---|
| <span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 15px; height: 15px;"></span> Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )                                | <span style="background-color: yellow; border: 1px solid yellow; display: inline-block; width: 15px; height: 15px;"></span> Category B - Dual-Family Structure that Possesses a 10 dBA $L_{eq}$ Increase Over Existing                |
| <span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 15px; height: 15px;"></span> Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )                                | <span style="background-color: orange; border: 1px solid orange; display: inline-block; width: 15px; height: 15px;"></span> Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA $L_{eq}$ )        |
| <span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 15px; height: 15px;"></span> Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ )                                 | <span style="background-color: lightorange; border: 1px solid orange; display: inline-block; width: 15px; height: 15px;"></span> Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA $L_{eq}$ ) |
| <span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 15px; height: 15px;"></span> Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA $L_{eq}$ ) | <span style="color: red; font-size: 2em; border: 1px solid red; display: inline-block; width: 15px; height: 15px; text-align: center; vertical-align: middle;">X</span> Structure Acquisitions  |

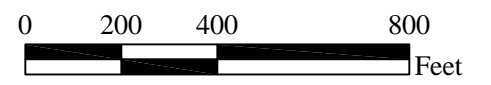
Area 8 - I-295 NB Ground Wall  
8-15 feet high  
Continues on 12.4.1 & 12.4.2

Area 10 - I-295 SB Structure Wall  
18 feet high

Area 10 - I-295 NB Ground Wall  
18-25 feet high



- LEGEND**
- Proposed Improvements
  - Structure Limits
  - - - 66 dBA L<sub>eq</sub> Noise Contour
  - Existing Noise Wall Location
  - X X Removed Existing Noise Wall Locations
  - Replacement Noise Wall Location
  - New Noise Wall Location



New Jersey Department of Transportation

## I-295/I-76/Route 42 Direct Connection Camden County Figure 12.5.1

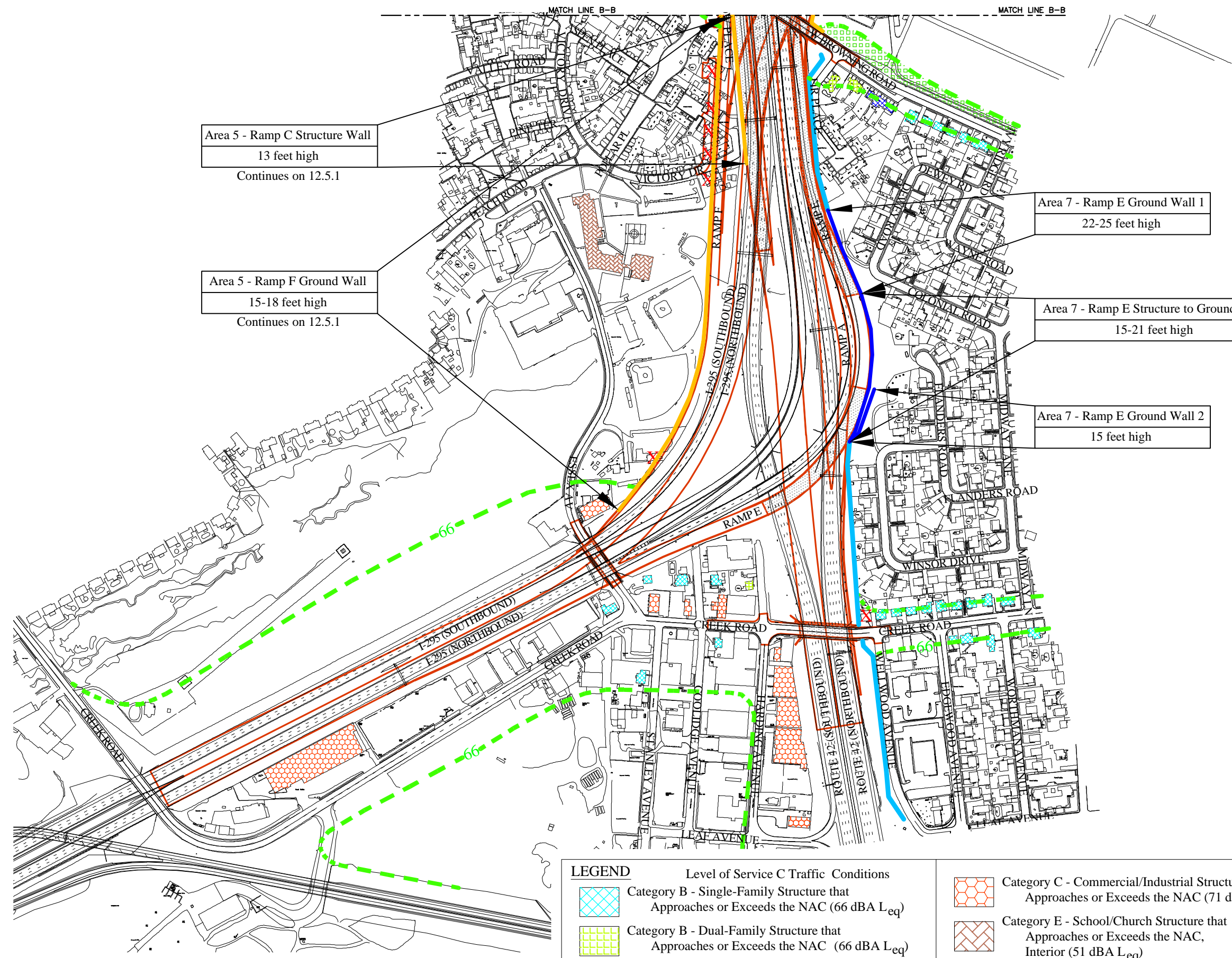
2030 "Alternative K" Proposed Noise Walls

Date April 14, 2006

- LEGEND** Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)

- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L<sub>eq</sub>)
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L<sub>eq</sub>)
- X Structure Acquisitions





Area 5 - Ramp C Structure Wall  
13 feet high  
Continues on 12.5.1

Area 5 - Ramp F Ground Wall  
15-18 feet high  
Continues on 12.5.1

Area 7 - Ramp E Ground Wall 1  
22-25 feet high

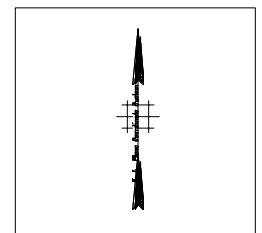
Area 7 - Ramp E Structure to Ground Wall  
15-21 feet high

Area 7 - Ramp E Ground Wall 2  
15 feet high

**LEGEND**

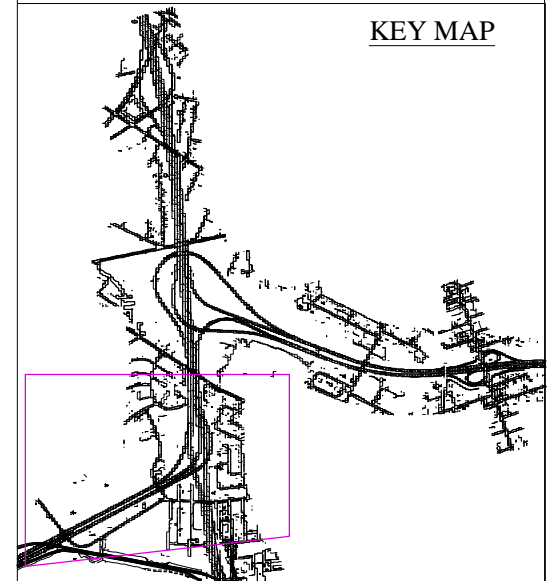
- Level of Service C Traffic Conditions
- Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)
  - Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L<sub>eq</sub>)

- Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L<sub>eq</sub>)
- Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L<sub>eq</sub>)
- Structure Acquisitions



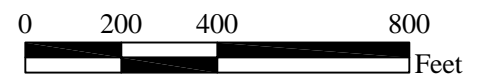
PROJECT NORTH

**KEY MAP**



**LEGEND**

- Proposed Improvements
- Structure Limits
- 66 dBA L<sub>eq</sub> Noise Contour
- Existing Noise Wall Location
- Removed Existing Noise Wall Locations
- Replacement Noise Wall Location
- New Noise Wall Location

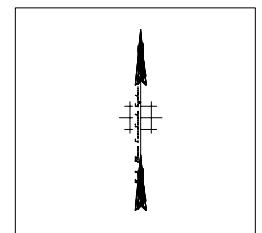
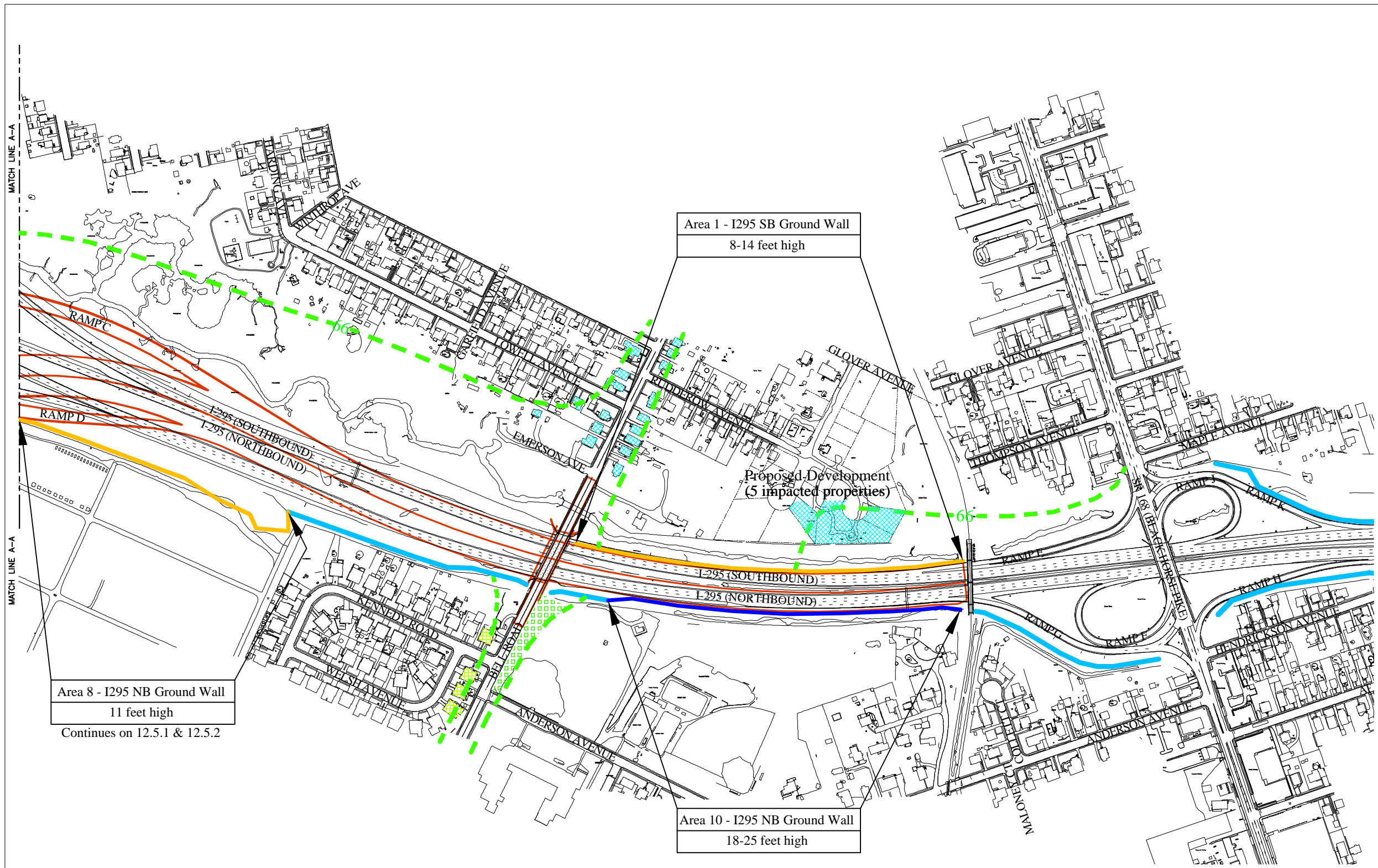


New Jersey Department of Transportation

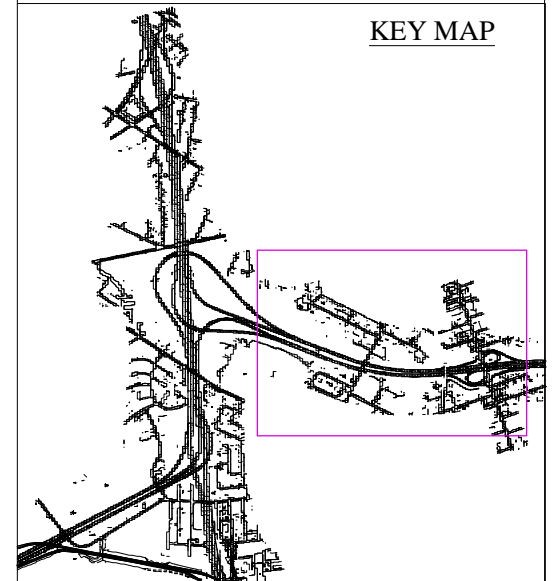
**I-295/I-76/Route 42  
Direct Connection  
Camden County  
Figure 12.5.2**

2030 "Alternative K" Proposed Noise Walls

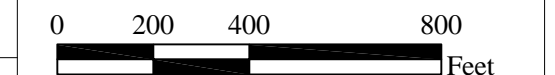
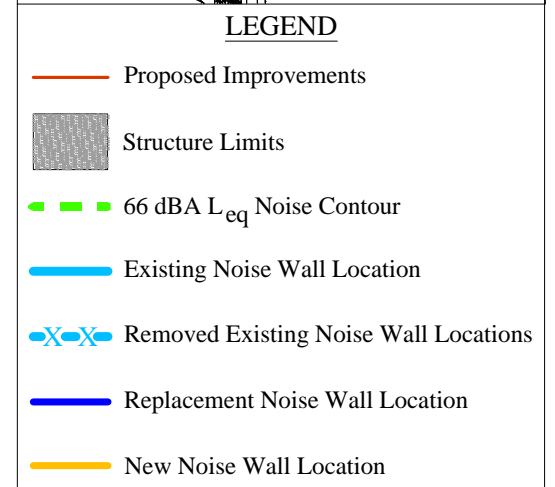
Date April 14, 2006



PROJECT NORTH



KEY MAP



New Jersey Department of Transportation

I-295/I-76/Route 42  
 Direct Connection  
 Camden County  
**Figure 12.5.3**  
 2030 "Alternative K" Proposed Noise Walls  
 Date April 14, 2006

LEGEND		Level of Service C Traffic Conditions	
	Category B - Single-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )		Category C - Commercial/Industrial Structure that Approaches or Exceeds the NAC (71 dBA L <sub>eq</sub> )
	Category B - Dual-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )		Category E - School/Church Structure that Approaches or Exceeds the NAC, Interior (51 dBA L <sub>eq</sub> )
	Category B - Multi-Family Structure that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )		Structure Acquisitions
	Category B - Special-Use Property (Cemetery or Recreational Area) that Approaches or Exceeds the NAC (66 dBA L <sub>eq</sub> )		

MATCH LINE A-A

MATCH LINE A-A

Area 8 - I295 NB Ground Wall  
 11 feet high  
 Continues on 12.5.1 & 12.5.2

Area 1 - I295 SB Ground Wall  
 8-14 feet high

Area 10 - I295 NB Ground Wall  
 18-25 feet high

Proposed Development  
 (5 impacted properties)

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**US Department of Transportation  
Federal Highway Administration  
New Jersey Department of Transportation**

