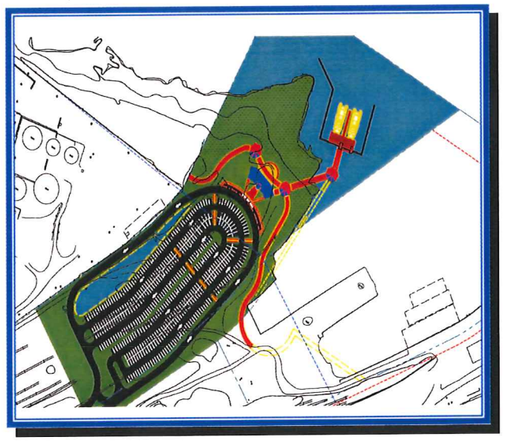
FHWA-NJ-EA-4(f)-03
Federal Highway Administration

TEA-21 Section 1601
High Priority Projects Program

Intermodal Ferry Transportation Center

City of South Amboy
Middlesex County, New Jersey



VOLUME II

TECHNICAL ENVIRONMENTAL STUDIES:

- **Traffic**
- **Air Quality**
- **Noise**
- **Sediments and Hazardous Materials**
- **Socioeconomic Analysis**
- **Natural Resources**

U.S. Department of Transportation
Federal Highway Administration
And
City of South Amboy

Submitted pursuant to 42 U.S.C. 4332 (2) (c)
16 U.S.C. 470 (f), 49 U.S.C. 303, and 23 U.S.C. 138

November 2003

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November 2003

TECHNICAL ENVIRONMENTAL STUDY

TRAFFIC

TRAFFIC IMPACT ANALYSIS

FOR

CITY OF SOUTH AMBOY

ACCESS ROAD & FERRY TERMINAL

Prepared by:

CME ASSOCIATES
3141 Bordentown Avenue
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Revised
December 2002

DRAFT

Michael J. McClelland, P.E.
N.J. Professional Engineer
N.J. LICENSE #32468

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CONSULTING AND MUNICIPAL ENGINEERS
3141 BORDENTOWN AVENUE, PARLIN, NEW JERSEY 08859 — 1460 ROUTE 9 SOUTH, HOWELL, NEW JERSEY 07731

Our File No. P-SY-00501-01

CME ASSOCIATES

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

INTRODUCTION

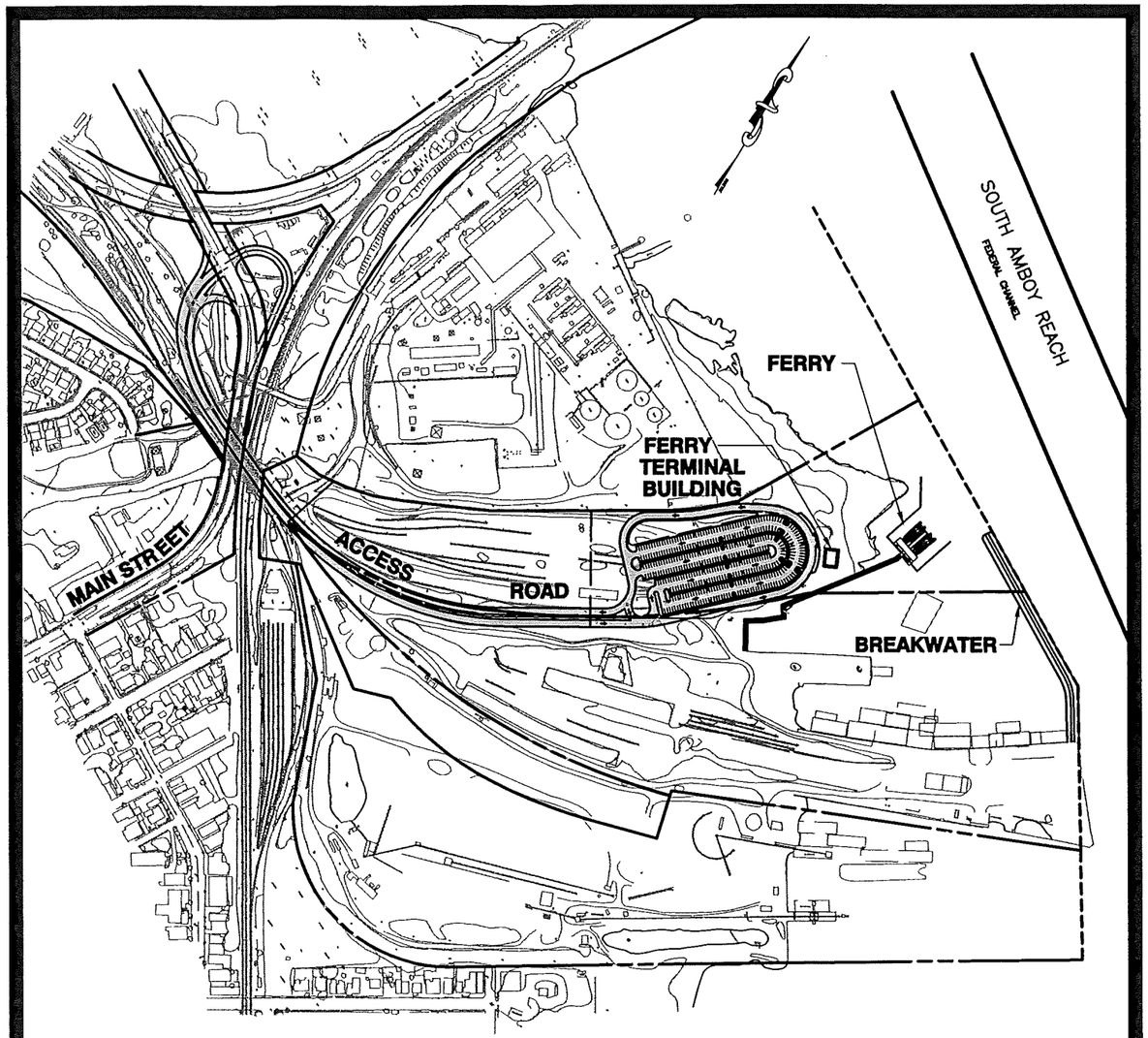
This traffic report has been prepared to augment previous studies conducted for the City of South Amboy concerning waterfront access to the proposed ferry terminal. Specifically, a Ferry Service Study prepared by Wallace Roberts & Todd for the City of South Amboy in 1997. Due to the passage of time and potential for varying traffic conditions in the area, this study serves to re-evaluate the projected conditions for the proposed ferry and to examine changes in the background traffic.

The project proposes a new ferry service to be located on the City's waterfront within a half mile of the existing commuter rail and bus service. The property in question (Exhibit 1) is situated on the Consolidated Rail Corporation (CONRAIL) tract east of Main Street. A jug handle and signalized intersection is proposed where the proposed Access Road and Main Street intersect (Exhibit 2). The Access Road will utilize a new bridge structure that follows the existing alignment of CONRAIL Bridge #1.98, which spans both Main Street and New Jersey Transit. The Access Road will continue in an easterly direction to the proposed ferry parking and terminal building at the waterfront.

As indicated in the "South Amboy Station Area Planning Project" prepared by Wallace, Roberts & Todd in April 1997, the City of South Amboy has plans for the waterfront redevelopment as well as New Jersey Transit's plans for the North Jersey Coast Line. These improvements coupled with the proposed Ferry Service comprise the major components of the Transportation Hub. New Jersey Transit improvements include the construction of a high level platform and new station building these improvements will be coupled with improved access and parking for the transportation hub.

This study serves to first update the baseline traffic conditions originally established for this project with new traffic counts along Main Street in the vicinity of the proposed Access Road. Secondly, this report identifies the projected new traffic increases along Main Street with the ferry terminal operational. This analysis includes the following information:

- A review of existing Main Street and traffic conditions in the vicinity of the Access Road, including roadway geometry, traffic volumes and intersection capacity (level of service).
- Estimation of the volume of traffic expected to be generated by the proposed Ferry service including intersection capacity (level of service) for existing and future capacity.
- Estimation of the volume of traffic expected to be generated by future development of the redevelopment area.
- Conclusion.



CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

EXHIBIT 1 (N.T.S.)

CME ASSOCIATES — CONSULTING AND MUNICIPAL ENGINEERS

CITY OF SOUTH AMBOY

MIDDLESEX COUNTY

MATCH LINE ℄ STA. 38+82.49

MATCH LINE ℄ STA. 19+00

MATCH LINE ℄ STA. 9+25

N.J. TRANSIT

TO FERRY

MAIN STREET

RAMP "A"

ACCESS ROAD

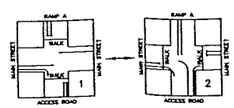
CONRAIL BRIDGE NO. 1998

PARKING

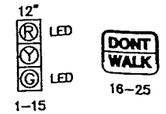
PILE

SIGNALIZED INTERSECTION PLAN
EXHIBIT 2

N.T.S.



SIGNAL PHASING



NO.	DESCRIPTION OF REVISION	DATE	DRAWN	CHECKED	RELEASED

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

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JAY B. CORNELL P.E., C.P.P. — NJ PE LIC NO. 39742
MICHAEL J. MICELI JR. P.E., C.P.P. — NJ PE LIC NO. 33442
GREGORY E. VALESI P.E., C.P.P. — NJ PE LIC NO. 34498

DAVID J. SAMUEL P.E.
PROFESSIONAL ENGINEER
LIC. 24004

DATE

SCALE: As Shown
DATE: December 2000
DESIGNED BY: PGB
DRAWN BY: BNS
CHECKED BY:
SHEET: 1 OF 2

PROJECT MANAGER: P.G.B.
DRAWING NO.: 4-D
FILE NO.: P-SY-00601-01

SECTION 2 – EXISTING CONDITIONS

2.1 EXISTING ROADWAY CONDITIONS

The proposed ferry terminal site is located east of Main Street, along the waterfront in the City of South Amboy, Middlesex County, New Jersey.

MAIN STREET

Main Street is a major collector roadway through South Amboy connecting Route 9 and the Garden State Parkway to the south with the main north/south roadways in South Amboy. Main Street also connects South Amboy with Route 9 and Route 35 to the north at the Victory Plaza Circle. Main Street is a 50' wide cartway in the vicinity of Stevens Avenue and Broadway with a 35 mph speed limit south of Broadway Avenue and a 50 mph speed limit north of Broadway Avenue. The land uses along Main Street vary between residential and commercial.

ACCESS ROAD

The Access Road currently provides a gravel drive from Main Street onto the existing CONRAIL Bridge over Main Street and the New Jersey Transit Commuter Line to the waterfront area. Tandem trucks utilize the gravel drive traveling to and from the aggregate plant operated by McCormack Sand just south of the proposed site.

2.2 EXISTING TRAFFIC VOLUMES

To examine the existing traffic conditions in the vicinity of the project area, manual turning movement counts were conducted during the weekday morning and evening peak hours that would be impacted mostly by the proposed ferry service. As mentioned, this analysis has also examined traffic counts previously conducted at several locations within the study area.

New turning movement counts were conducted along Main Street at the Access Road in September 2000. The traffic counts were conducted during the following time periods consistent with typical commuter "rush" hours:

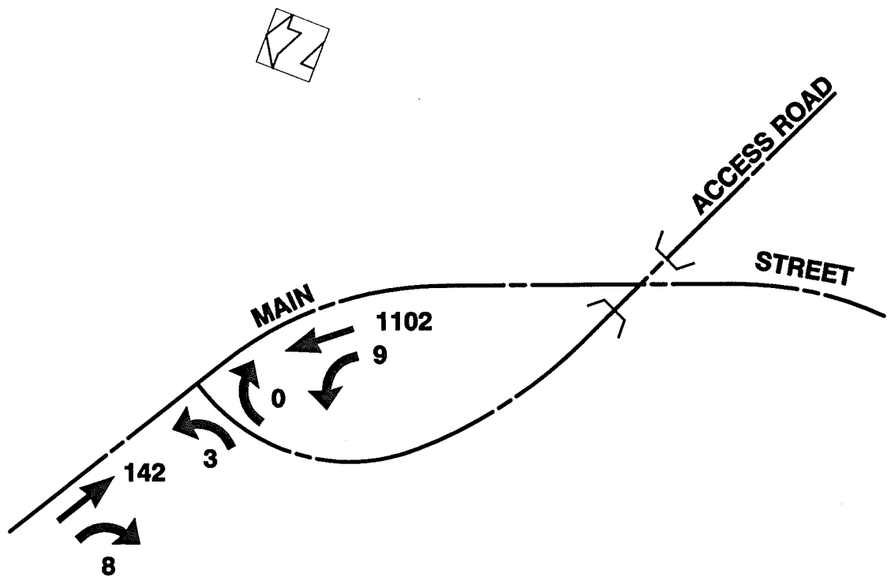
- Weekday 6:00 a.m. to 9:00 a.m.
- Weekday 4:00 p.m. to 7:00 p.m.

The results of these traffic counts indicated that there is a distinct one-hour period in each of these intervals when traffic volumes reached a maximum value. Specifically, a "peak hour" occurred during the morning (7:00 a.m. to 8:00 a.m.) and evening (4:30 p.m. to 5:30 p.m.) periods when traffic is its highest. It is interesting to note, that the morning peak hour volumes were found to be higher than the evening peak hour volumes. Also the northbound approach to the proposed intersection carried the larger percentage of the traffic volume during both morning and evening peak hours.

TABLE 1 – *AM & PM INTERSECTION PEAK HOUR VOLUMES*

STREET INTERSECTION	AM PEAK HOUR (7:00 AM TO 8:00 AM)	PM PEAK HOUR (4:30 PM TO 5:30 PM)
Site Access Road & Main Street	1264 VEHICLES (NB 87.4%, SB 11.2%)	898 VEHICLES (NB 54.3%, SB 45.2%)

Figures 1 and 2 depict the existing morning and evening peak hour traffic volume distributions for each turning movement respectively.



EXISTING TRAFFIC VOLUMES
MORNING PEAK HOURS 2000

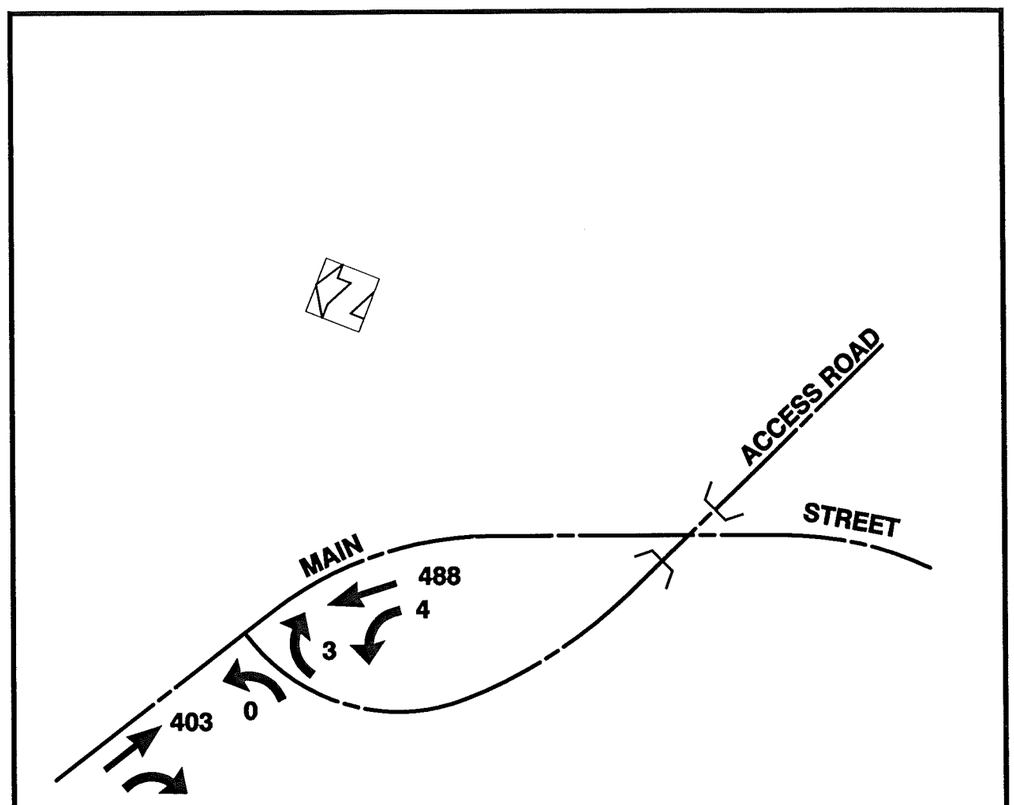
N.T.S.

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

FIGURE 1

CME ASSOCIATES
CONSULTING AND MUNICIPAL ENGINEERS



EXISTING TRAFFIC VOLUMES
EVENING PEAK HOURS 2000

N.T.S.

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

FIGURE 2

CME ASSOCIATES
CONSULTING AND MUNICIPAL ENGINEERS

2.3 EXISTING LEVELS OF SERVICE (NO BUILD)

A volume/capacity level of service analysis was conducted for the existing traffic volumes with the existing unsignalized intersection. The existing intersection (no build scenario) was found to operate at a favorable level of service (LOS A) in the morning and evening peak hours. We have estimated the average daily traffic (ADT) based upon the peak hour volumes obtained in the field at 10,500 vehicles.

SECTION 3 - FUTURE CONDITIONS

3.1 PROPOSED ROADWAY CONDITIONS

The City of South Amboy proposes an Access Road as a connection between Main Street and the proposed ferry parking area and terminal building along the waterfront. The alignment of the road starts at Main Street with a jug handle for the northbound Main Street traffic to a signalized intersection at the Access Road. Due to the traffic volumes in the northbound direction on Main Street the jug handle will be widened to accommodate two lanes at the signalized intersection and continue with two lanes over the CONRAIL bridge east towards the ferry site. East of the CONRAIL Bridge the Access Road will taper to one lane with shoulders, separated by a 16' median. The Access Road leaving the ferry site will be one lane. At the intersection with Main Street, the Access Road will have a signalized left and right turning lanes.

The City of South Amboy plans for waterfront redevelopment, which includes a new ferry service. New Jersey Transit also plans for improvements to the North Jersey Coast Line, which are centered on the construction of a high-level platform and new station building.

3.2 BACKGROUND GROWTH

Background growth refers to the increase in traffic volumes associated with the areas surrounding the downtown and waterfront areas within the City of South Amboy and surrounding communities. The background growth can be projected from published growth rates or by comparison of past and present traffic volumes. The Wallace, Roberts & Todd report, dated April 1997, has shown that traffic volumes as a whole have remained relatively stable, in the vicinity of the train station and central waterfront redevelopment area. This can be contributed to the lack of large-scale development in South Amboy and the immediate

surrounding areas. Comparing the counts conducted in 1996 with those conducted for our study, confirmed that there has been very little increase in traffic volumes within the study area.

In order to perform our analysis for Main Street and the proposed Access Road, a 2% per year growth rate was utilized in order to account for minimal background growth and future growth by development anticipated in the central waterfront redevelopment area and work associated with the train station. This rate was applied to the existing volumes servicing the Access Road, which is a major access component to the central waterfront redevelopment area and proposed ferry service.

3.3 2003 AND 2013 "NO BUILD" TRAFFIC VOLUMES WITH BACKGROUND GROWTH

Existing traffic volumes were projected with minimal background growth, as described in section 3.2 above, to develop "no build" traffic volumes for 2003 and 2013 during the morning and evening peak hours. The morning 2003 peak hour traffic volumes increased to a total of 1341 vehicles and the evening 2003 peak hour traffic volumes increased to a total of 953 vehicles. The morning 2013 peak hour traffic volumes increased to a total of 1,635 vehicles and the evening 2013 peak hour traffic volumes increased to a total of 1,162 vehicles.

The intersection for both the 2003 and 2013 "no build" morning and evening peak hours will continue to operate at acceptable levels of service (LOS A).

3.4 ANALYSIS OF PROJECTED TRAFFIC VOLUMES WITH OPERATIONAL FERRY

A volume/capacity Level of Service analysis was conducted for the projected traffic volumes (2003) with the proposed ferry service and signalized intersection at the Access Road and Main Street using SIGNAL97/TEAPAC computer software. This type of analysis is performed to assess intersection operation and to identify any areas of excess delay or congestion. Figures 3 and 4 depict the projected morning and evening peak hour traffic volume distributions for each turning movement respectively.

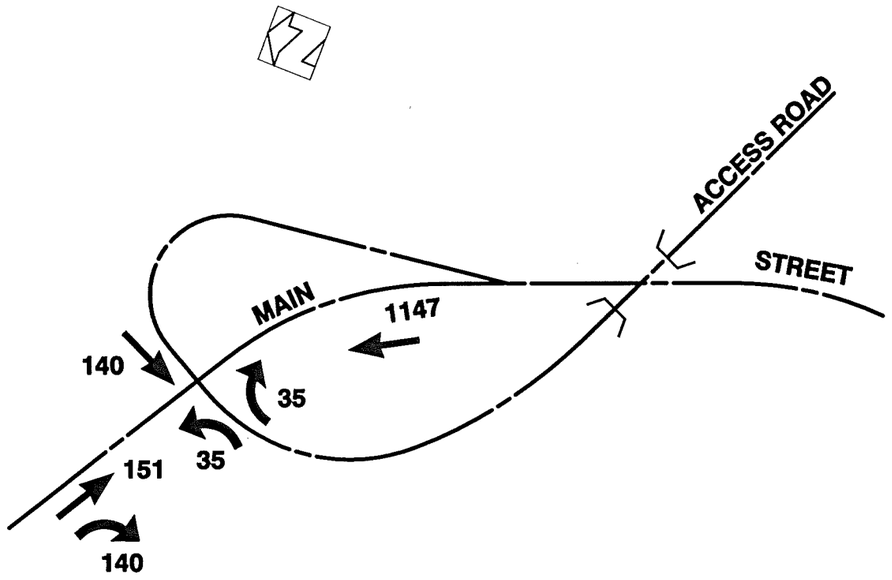
The projected traffic movements with a proposed ferry service were found to operate at a favorable level of service (LOS B) in the morning peak hour and (LOS B+) in the evening peak hour.

The various levels of service for each approach are noted in Figure 5.

3.5 ANALYSIS OF PROJECTED TRAFFIC VOLUMES - 2013

A traffic volume generation model was created using a 2% per year growth rate to the existing volumes servicing the Access Road. These volumes were compared to the projected traffic volumes in the Wallace, Roberts & Todd report, for the central waterfront redevelopment. The volumes in both reports were found to be comparable. The central waterfront redevelopment area as outlined in the Wallace, Roberts & Todd report consisted of the following:

- 110 units of mid-rise residential development
- 180,000 SF of Commercial development (commuter-oriented retail, supermarket, associated neighborhood retail and waterfront restaurant)
- 300 slip commercial marina with maintenance, repair and boat storage
- Ferry terminal with associated parking



PROJECTED TRAFFIC VOLUMES (2003)
(WITH OPERATIONAL FERRY SERVICE)
MORNING PEAK HOURS

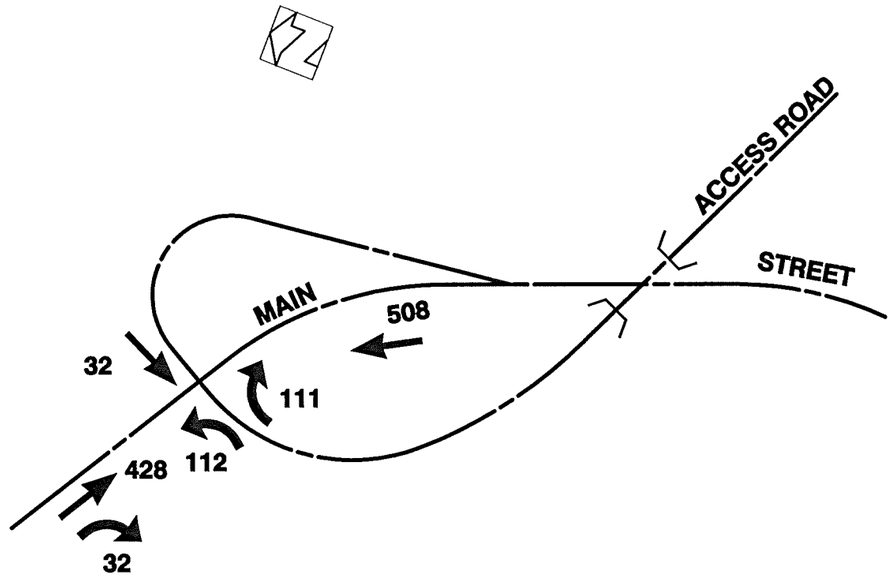
N.T.S.

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

FIGURE 3

CME ASSOCIATES — CONSULTING AND MUNICIPAL ENGINEERS



PROJECTED TRAFFIC VOLUMES (2003)
(WITH OPERATIONAL FERRY SERVICE)
EVENING PEAK HOURS

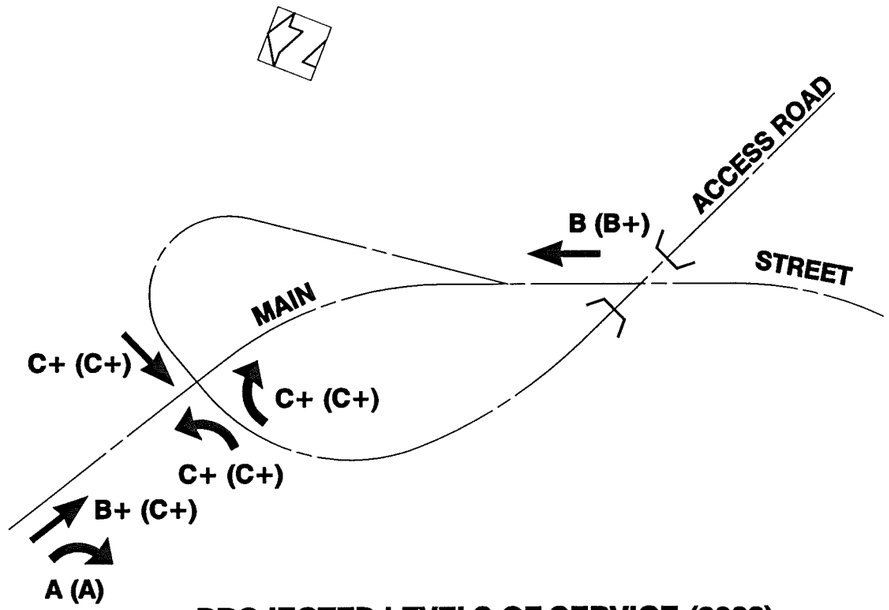
N.T.S.

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

FIGURE 4

CME ASSOCIATES
CONSULTING AND MUNICIPAL ENGINEERS



PROJECTED LEVELS OF SERVICE (2003)
(WITH OPERATIONAL FERRY SERVICE)
MORNING & EVENING PEAK HOURS

N.T.S.

LEGEND :
MORNING LOS (EVENING LOS)

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
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FIGURE 5

CME ASSOCIATES
CONSULTING AND MUNICIPAL ENGINEERS

Figures 6 and 7 depict the projected morning and evening peak hour traffic volume distributions for each turning movement respectively.

Levels of Service (LOS) analyses were conducted for the built-out traffic volumes at the study intersection utilizing a 2% growth rate. The proposed intersection is expected to continue to operate a favorable level of service during the study peak hours, although delays may slightly increase to a LOS B during the morning peak hour and LOS C+ during the evening peak hour.

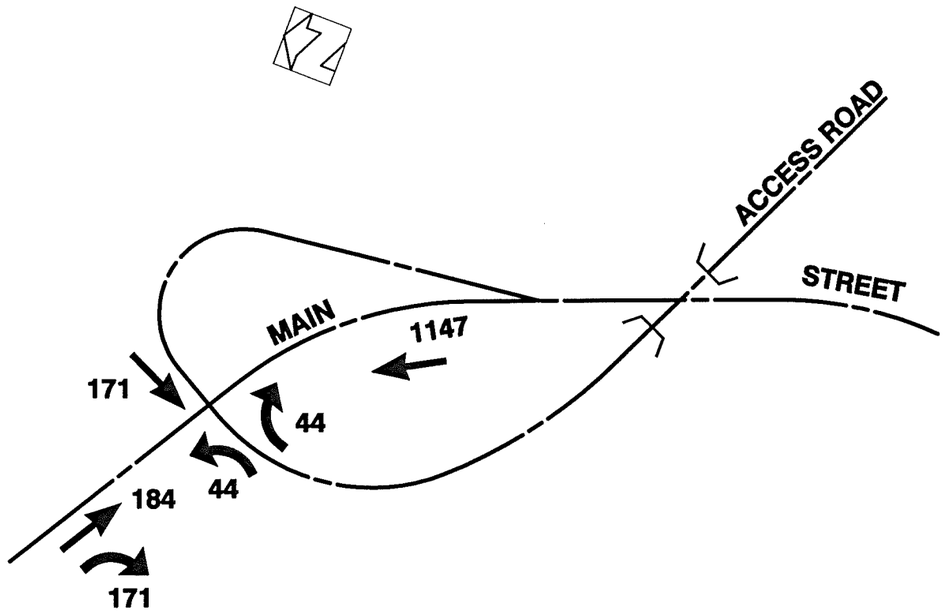
The various levels of service for each approach are noted in Figure 8.

3.6 ANALYSIS OF PROJECTED TRAFFIC VOLUMES - 2023

The traffic volumes were then increased again using a 2% per year growth rate for an additional 10 years (2023) to the traffic volumes servicing the Access Road. Figures 9 and 10 depict the projected morning and evening peak hour traffic volume distributions for each turning movement respectively.

The Levels of Service (LOS) were again analyzed for the increase traffic volumes at the study intersection. The proposed intersection is expected to operate at a favorable level of service (LOS B) for the morning peak hour and LOS D+ for the evening peak hour.

The various levels of service for each approach are noted in Figure 11.



PROJECTED TRAFFIC VOLUMES (2013)
(WITH OPERATIONAL FERRY SERVICE)
MORNING PEAK HOURS

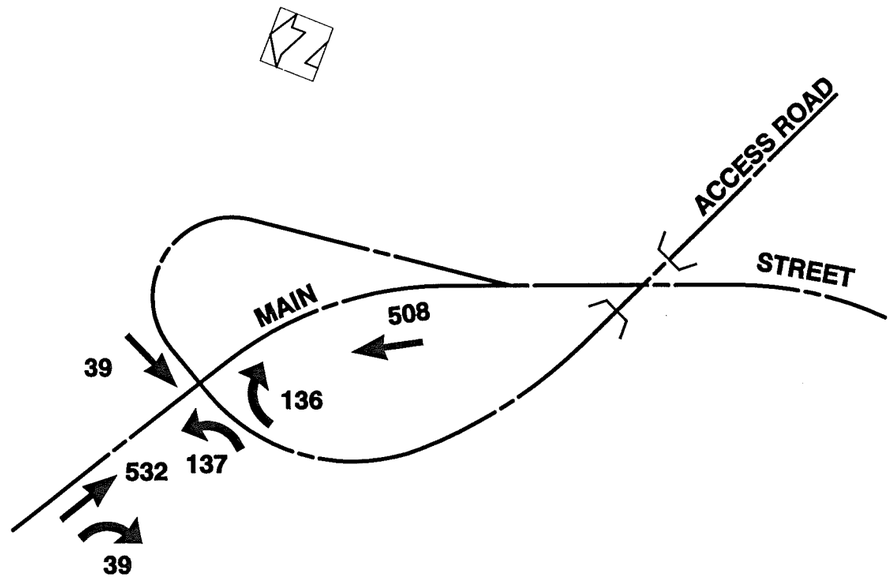
N.T.S.

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

FIGURE 6

CME ASSOCIATES
CONSULTING AND MUNICIPAL ENGINEERS



PROJECTED TRAFFIC VOLUMES (2013)
(WITH OPERATIONAL FERRY SERVICE)
EVENING PEAK HOURS

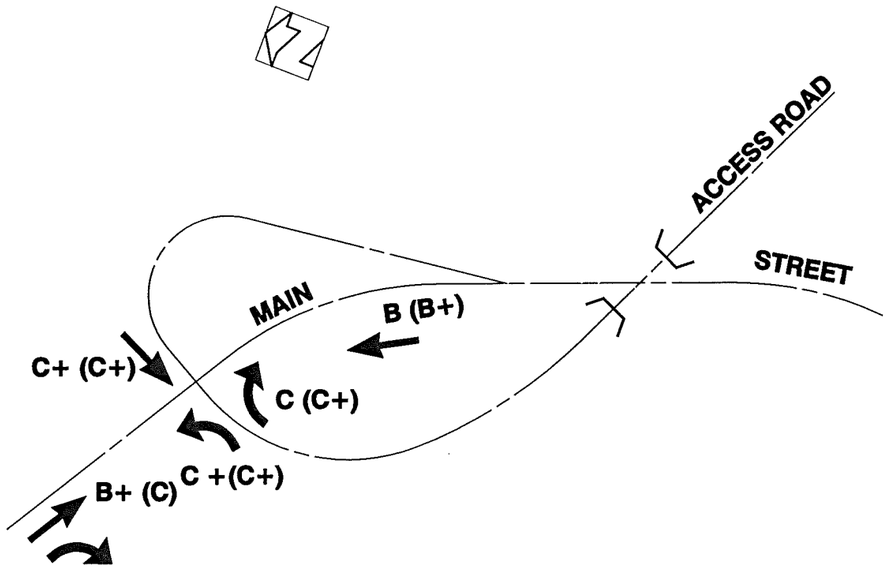
N.T.S.

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

FIGURE 7

CME ASSOCIATES
CONSULTING AND MUNICIPAL ENGINEERS



PROJECTED LEVELS OF SERVICE (2013)
(WITH OPERATIONAL FERRY SERVICE)
MORNING & EVENING PEAK HOURS

N.T.S.

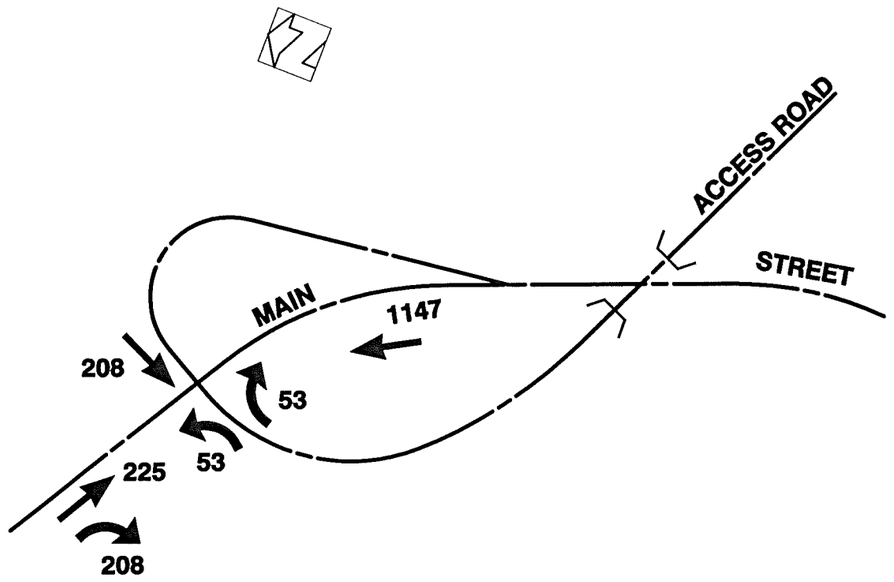
LEGEND :
MORNING LOS (EVENING LOS)

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

FIGURE 8

CME ASSOCIATES — CONSULTING AND MUNICIPAL ENGINEERS



PROJECTED TRAFFIC VOLUMES (2023)
(WITH OPERATIONAL FERRY SERVICE)
MORNING PEAK HOURS

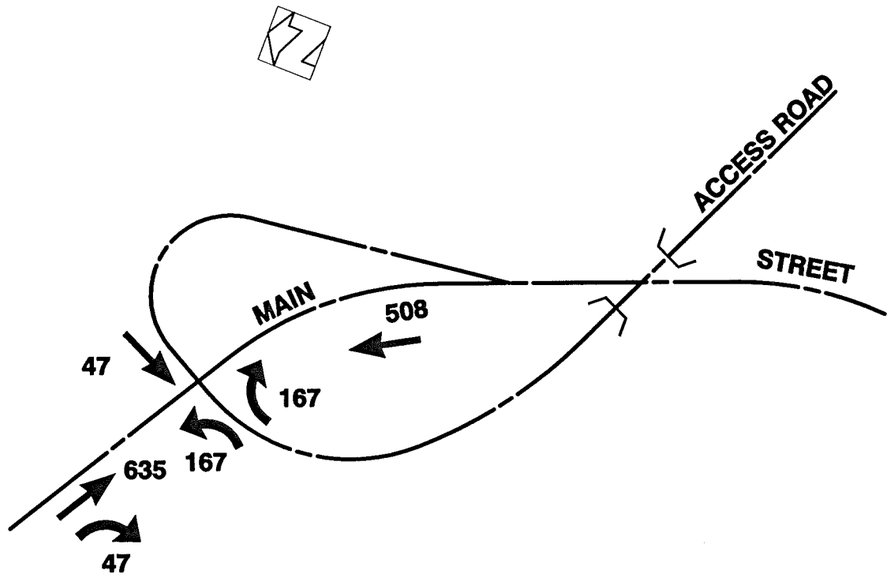
N.T.S.

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

FIGURE 9

CME ASSOCIATES
CONSULTING AND MUNICIPAL ENGINEERS



PROJECTED TRAFFIC VOLUMES (2023)
(WITH OPERATIONAL FERRY SERVICE)
EVENING PEAK HOURS

N.T.S.

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

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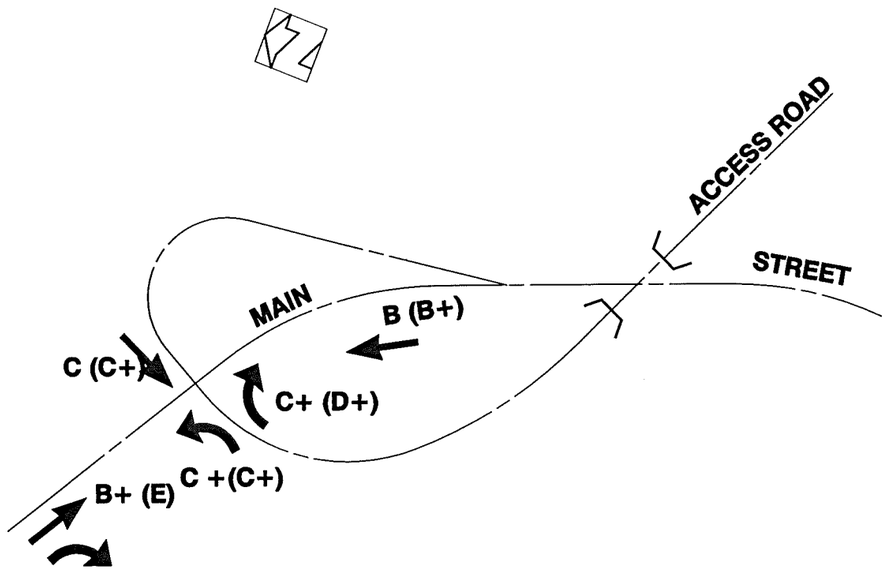
FIGURE 10

CME ASSOCIATES — CONSULTING AND MUNICIPAL ENGINEERS



PROJECTED LEVELS OF SERVICE (2023)
(WITH OPERATIONAL FERRY SERVICE)
MORNING & EVENING PEAK HOURS

N.T.S.

LEGEND :
MORNING LOS (EVENING LOS)

CITY OF SOUTH AMBOY
MIDDLESEX COUNTY, NEW JERSEY

SOUTH AMBOY
TRANSPORTATION PROJECT

FIGURE 11

CME ASSOCIATES — CONSULTING AND MUNICIPAL ENGINEERS

SECTION 4 - CONCLUSIONS

This analysis has shown that with the Access Road and Main Street improvements, sufficient roadway and intersection capacity will be available to accommodate traffic associated with the proposed South Amboy Ferry Terminal and parking. The level of service will continue to be acceptable for the initial phase of the redevelopment area, specifically for the Central Waterfront Redevelopment area. Once other areas of the waterfront are developed, it is anticipated that alternate means of access particularly at the south end of the redevelopment area will be constructed which should relieve the potential vehicle loadings at the proposed new Access Road.

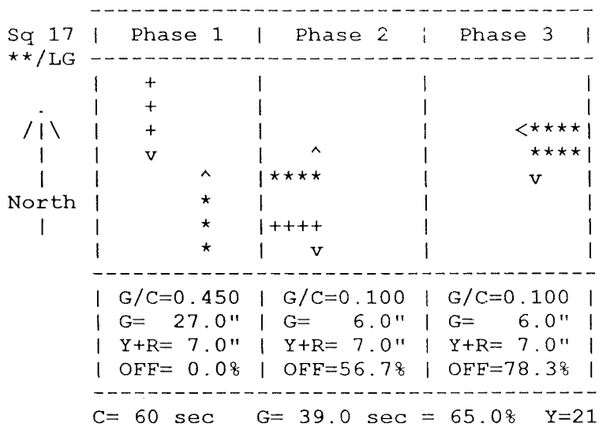
It should be noted that existing improvements to the Garden State Parkway and Victory Plaza Circle would improve the traffic conditions on Main Street, particularly during the AM peak hour. Main Street northbound is currently being used as a by-pass for the Garden State Parkway traffic. Once these improvements are complete the traffic demands on Main Street will be reduced which will improve the level of service at the Main Street Access Road intersection.

APPENDIX

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 03AM1010A 13:44:55
September 2003 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - N-S Main Street-E-W Jughandle/
Degree of Saturation (v/c) 0.67 Vehicle Delay 17.6 Level of Service B



C= 60 sec G= 39.0 sec = 65.0% Y=21.0 sec = 35.0% Ped= 0.0 sec = 0.0%

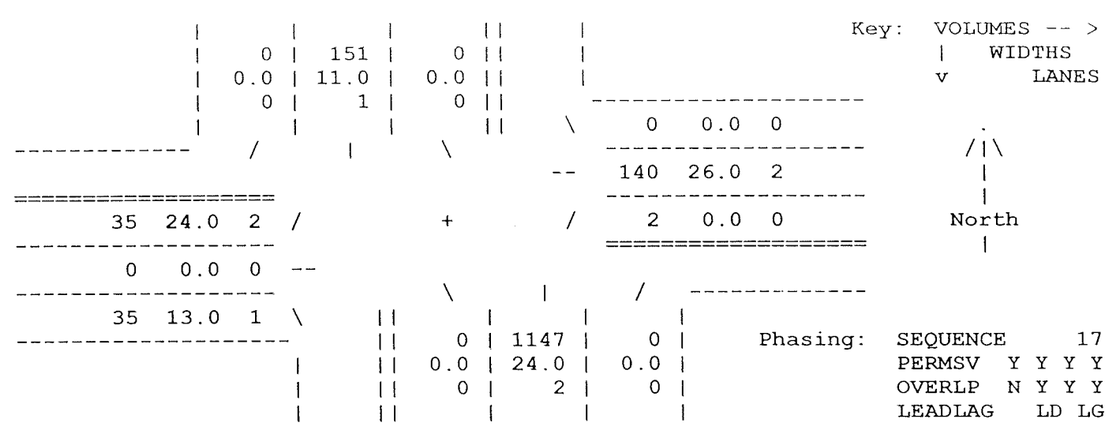
Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E (vph)	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								10.1	B+	
TH	11/1	0.130	0.450	769	814	168	0.206	10.1	B+	81 ft
NB Approach								17.0	B	
TH	24/2	0.372	0.450	1576	1601	1274	0.796	17.0	*B	492 ft
WB Approach								26.2	C+	
TH+LT	26/2	0.064	0.100	275	364	158	0.434	26.2	*C+	66 ft
EB Approach								25.3	C+	
RT	13/1	0.048	0.100	100	144	39	0.253	25.8	C+	30 ft
LT	24/2	0.022	0.100	263	350	39	0.111	24.7	*C+	15 ft

South Amboy Transportation Project
Intersection of Proposed Jughandle and Access Ramp 03AM1010A
September 2003 with Operational Ferry AM Peak

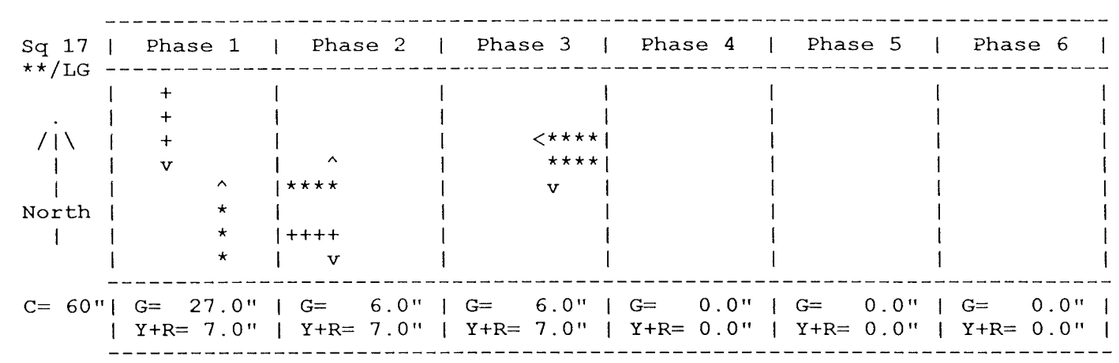
08/21/02
13:44:55

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Input Worksheet

Intersection # 0 - N-S Main Street-E-W Jughandle/ Area Location Type: NONCBD



	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		10			10			10			10	
Bike vol, vbic		2			2			2			2	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		-1.0			.5			-1.0			-4.0	



South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 03AM1010A 13:44:55
September 2003 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Volume Adjust & Satflow Worksheet

Volume	SB			WB			NB			EB		
Adjustment	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Volume, V	0	151	0	0	140	2	0	1147	0	35	0	35
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Adj mv flow, vp	0	168	0	0	156	2	0	1274	0	39	0	39
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj LG flow, v		168			158			1274		39		39
Prop LT, PLT		.000			.013			.000		.000		1.000
Prop RT, PRT		.000			.000			.000		1.000		.000

Saturation	SB			WB			NB			EB		
Flow Rate	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Base satflo, so		1900			1900			1900		1900		1900
Number lanes, N		1			2			2		1		2
Lane width, fW		.967			1.033			1.000		1.033		1.000
Heavy veh, fHV		.980			.980			.980		.980		.980
Grade, fg		1.005			.998			1.005		1.020		1.020
Parking, fp		1.000			1.000			1.000		1.000		1.000
Bus block, fbb		1.000			1.000			1.000		1.000		1.000
Area type, fa		1.000			1.000			1.000		1.000		1.000
Lane util, fLU		1.000			.950			.950		1.000		.970
Left-turn, fLT		1.000			.998			1.000		1.000		.950
Right-turn, fRT		1.000			1.000			1.000		.850		1.000
PedBike LT,fLpb		1.000			.999			1.000		1.000		1.000
PedBike RT,fRpb		1.000			1.000			1.000		.924		1.000
Local adjustmnt		1.000			1.000			1.000		1.000		1.000
Adj satflow, s		1810			3639			3557		1542		3502

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Ped-Bike LT Effects Worksheet

Input/Calculation	SB	WB	NB	EB
Effective ped green time, gp	.0	6.0	.0	6.0
Conflicting ped volume, Vped	0	10	0	10
Ped flow rate, Vpedg	.000	100.000	.000	100.000
Avg. ped occupancy, OCCpedg	.000	.050	.000	.050
Opposing queue clear time, gq	.000	.000	.000	.000
Opposing queue g ratio, gq/gp	.000	.000	.000	.000
Ped occ after queue, OCCpedu	.000	.050	.000	.050
Opposing flow rate, Vo	0	0	0	0
Relevant occupancy, OCCr	.000	.050	.000	.050
# receiving lanes, Nrec	0	1	0	2
# turning lanes, Nturn	0	1	0	2
Adjustment factor, ApbT	.000	.950	.000	.950
Proportion left turns, PLT	.000	.013	.000	1.000
Prop LT in prot phase, PLTA	.000	.000	.000	1.000
Ped-bike adjust factor, fLpb	.000	.999	.000	1.000

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 03AM1010A 13:44:55
September 2003 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Ped-Bike RT Effects Worksheet

Input/Calculation	SB	WB	NB	EB
Effective ped green time, gp	.0	.0	.0	6.0
Conflicting ped volume, Vped	0	0	0	10
Conflicting bike volume, Vbic	0	0	0	2
Ped flow rate, Vpedg	.000	.000	.000	100.000
Avg ped occupancy, OCCpedg	.000	.000	.000	.050
Effective bike green time, g	.0	.0	.0	6.0
Bike flow rate, Vbicg	.000	.000	.000	20.000
Avg bike occupancy, OCCbicg	.000	.000	.000	.027
Relevant occupancy, OCCr	.000	.000	.000	.076
# receiving lanes, Nrec	0	0	0	1
# turning lanes, Nturn	0	0	0	1
Adjustment factor, ApbT	.000	.000	.000	.924
Proportion right turns, PR	.000	.000	.000	1.000
Prop RT in prot phase, PRA	.000	.000	.000	.000
Ped-bike adjust factor, fRpb	.000	.000	.000	.924

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Capacity	SB			WB			NB			EB		
Analysis	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		168			158			1274		39		39
Satflow, s		1810			3639			3557		1542		3502
Lost time, tL		7.0			7.0			7.0		7.0		7.0
Effect green, g		27.0			6.0			27.0		6.0		6.0
Grn ratio, g/C		.450			.100			.450		.100		.100
LG capacity, c		814			364			1601		154		350
v/c ratio, X		.206			.434			.796		.253		.111
Flow ratio, v/s		.093			.043			.358		.025		.011
Crit lane group					*			*		*		
Sum crit v/s,Yc		0.427		Total lost, L				21.0				
Crit v/c, Xc		.657										

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 03AM1010A 13:44:55
September 2003 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Delay	SB			WB			NB			EB		
and LOS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH			RT	LT
Adj Flow, v		168			158			1274			39	39
LG capacity, c		814			364			1601			154	350
v/c ratio, X		.206			.434			.796			.253	.111
Grn ratio, g/C		.450			.100			.450			.100	.100
Unif delay, d1		10.0			25.4			14.1			24.9	24.6
Incr calib, k		.11			.11			.34			.11	.11
Incr delay, d2		.1			.8			2.9			.9	.1
Queue Delay, d3		.0			.0			.0			.0	.0
Unif delay, d1*		.0			.0			.0			.0	.0
Prog factor, PF		1.00			1.00			1.00			1.00	1.00
Contrl delay, d		10.1			26.2			17.0			25.8	24.7
Lane group LOS		B+			C+			B			C+	C+
Final Queue,Qbi		0			0			0			0	0
Appr delay, dA		10.1			26.2			17.0			25.3	
Approach LOS		B+			C+			B			C+	
Appr flow, vA		168			158			1274			78	
Intersection:	Delay	17.6		LOS		B						

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 03AM1010A 13:44:55
September 2003 with Operational Ferry AM Peak

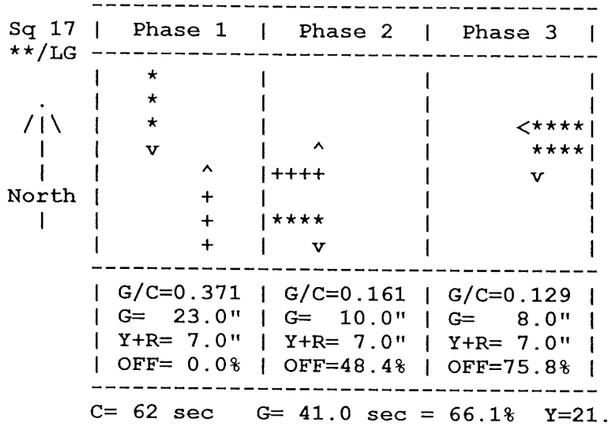
SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Back of Queue Worksheet

Queues in	SB			WB			NB			EB		
Worst Lanes	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Init queue, QbL		0			0			0		0		0
Ln flow, vL		168			83			671		39		20
Ln satflow, sL		1810			1819			1778		1542		1751
Ln capacity, cL		814			182			801		154		175
Flow ratio, yL		.093			.046			.377		.025		.011
v/c ratio, XL		.206			.457			.838		.253		.115
Effect green, g		27.0			6.0			27.0		6.0		6.0
Grn ratio, g/C		.450			.100			.450		.100		.100
Upstr filter, I		1.00			1.00			1.00		1.00		1.00
Grn arrivals, P		.45			.10			.45		.10		.10
Platn ratio, Rp		1.00			1.00			1.00		1.00		1.00
Prog factr, PF2		1.00			1.00			1.00		1.00		1.00
Queue (1st), Q1		1.7			1.3			9.9		.6		.3
Queue factr, kB		.48			.19			.47		.18		.19
Queue (2nd), Q2		.1			.2			2.2		.1		.0
Avg queue, Q		1.8			1.5			12.0		.7		.3
90% factor, fB		1.77			1.77			1.62		1.79		1.79
90% queue, Qp		3.2			2.6			19.5		1.2		.6
Avg spacing, Lh		25.3			25.3			25.3		25.3		25.3
Avail storg, La		0			0			0		0		0
Avg distance		46			37			304		17		8
Avg ratio, RQ		.00			.00			.00		.00		.00
90% distance		81			66			492		30		15
90% ratio, RQp		.00			.00			.00		.00		.00

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 03PM1010A 13:49:31
September 2003 with Operational Ferry PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - N-S Main Street-E-W Jughandle/
Degree of Saturation (v/c) 0.50 Vehicle Delay 18.7 Level of Service B



C= 62 sec G= 41.0 sec = 66.1% Y=21.0 sec = 33.9% Ped= 0.0 sec = 0.0%

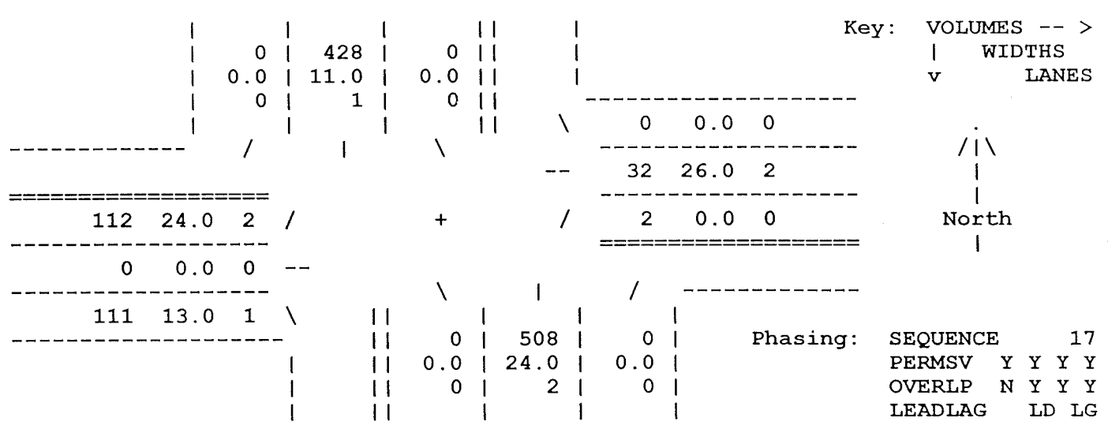
Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E (vph)	Adj Volume	Adj v/c	HCM Delay	HCM L S	HCM Queue Model 1
SB Approach								20.1	C+	
TH	11/1	0.301	0.371	611	671	476	0.709	20.1	*C+	338 ft
NB Approach								14.8	B+	
TH	24/2	0.186	0.371	1265	1319	564	0.428	14.8	B+	184 ft
WB Approach								23.8	C+	
TH+LT	26/2	0.021	0.129	368	466	38	0.082	23.8	*C+	15 ft
EB Approach								24.0	C+	
RT	13/1	0.117	0.161	186	252	123	0.484	25.1	*C+	96 ft
LT	24/2	0.056	0.161	468	565	124	0.219	22.8	C+	47 ft

South Amboy Transportation Project
Intersection of Proposed Jughandle and Access Ramp 03PM1010A
September 2003 with Operational Ferry PM Peak

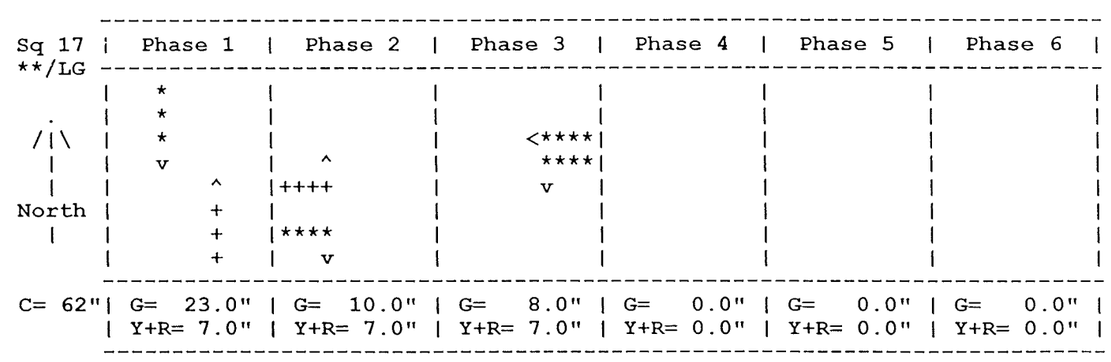
08/21/02
13:49:31

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Input Worksheet

Intersection # 0 - N-S Main Street-E-W Jughandle/ Area Location Type: NONCBD



	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		10			10			10			10	
Bike vol, vbic		2			2			2			2	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		-1.0			.5			-1.0			-4.0	



South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 03PM1010A 13:49:31
September 2003 with Operational Ferry PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Volume Adjust & Satflow Worksheet

Volume Adjustment	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Volume, V	0	428	0	0	32	2	0	508	0	111	0	112
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Adj mv flow, vp	0	476	0	0	36	2	0	564	0	123	0	124
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj LG flow, v		476			38			564		123		124
Prop LT, PLT		.000			.053			.000		.000		1.000
Prop RT, PRT		.000			.000			.000		1.000		.000

Saturation Flow Rate	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Base satflo, so		1900			1900			1900		1900		1900
Number lanes, N		1			2			2		1		2
Lane width, fW		.967			1.033			1.000		1.033		1.000
Heavy veh, fHV		.980			.980			.980		.980		.980
Grade, fg		1.005			.998			1.005		1.020		1.020
Parking, fp		1.000			1.000			1.000		1.000		1.000
Bus block, fbb		1.000			1.000			1.000		1.000		1.000
Area type, fa		1.000			1.000			1.000		1.000		1.000
Lane util, fLU		1.000			.950			.950		1.000		.970
Left-turn, fLT		1.000			.992			1.000		1.000		.950
Right-turn, fRT		1.000			1.000			1.000		.850		1.000
PedBike LT,fLpb		1.000			.998			1.000		1.000		1.000
PedBike RT,fRpb		1.000			1.000			1.000		.945		1.000
Local adjustmnt		1.000			1.000			1.000		1.000		1.000
Adj satflow, s		1810			3612			3557		1577		3502

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Capacity Analysis	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		476			38			564		123		124
Satflow, s		1810			3612			3557		1577		3502
Lost time, tL		7.0			7.0			7.0		7.0		7.0
Effect green, g		23.0			8.0			23.0		10.0		10.0
Grn ratio, g/C		.371			.129			.371		.161		.161
LG capacity, c		671			466			1319		254		565
v/c ratio, X		.709			.082			.428		.484		.219
Flow ratio, v/s		.263			.011			.159		.078		.035
Crit lane group		*			*					*		
Sum crit v/s,Yc		0.352		Total lost, L				21.0				
Crit v/c, Xc		.532										

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 03PM1010A 13:49:31
September 2003 with Operational Ferry PM Peak

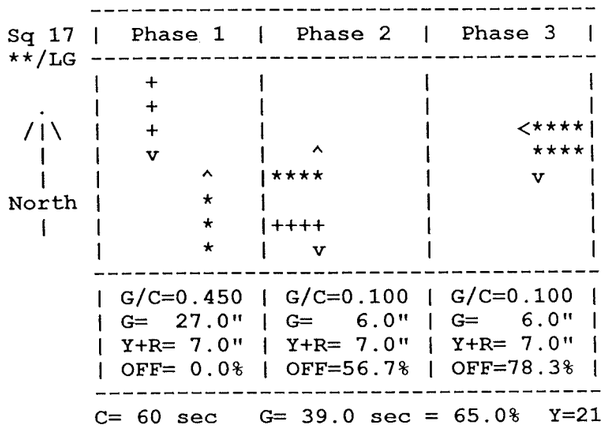
SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Delay	SB			WB			NB			EB		
and LOS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		476			38			564		123		124
LG capacity, c		671			466			1319		254		565
v/c ratio, X		.709			.082			.428		.484		.219
Grn ratio, g/C		.371			.129			.371		.161		.161
Unif delay, d1		16.6			23.8			14.6		23.7		22.6
Incr calib, k		.27			.11			.11		.11		.11
Incr delay, d2		3.5			.1			.2		1.5		.2
Queue Delay, d3		.0			.0			.0		.0		.0
Unif delay, d1*		.0			.0			.0		.0		.0
Prog factor, PF		1.00			1.00			1.00		1.00		1.00
Contrl delay, d		20.1			23.8			14.8		25.1		22.8
Lane group LOS		C+			C+			B+		C+		C+
Final Queue,Qbi		0			0			0		0		0
Appr delay, dA		20.1			23.8			14.8			24.0	
Approach LOS		C+			C+			B+			C+	
Appr flow, vA		476			38			564			247	
Intersection:	Delay	18.7		LOS		B						

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 13AM1010A 13:11:41
September 2013 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - N-S Main Street-E-W Jughandle/
Degree of Saturation (v/c) 0.67 Vehicle Delay 17.8 Level of Service B



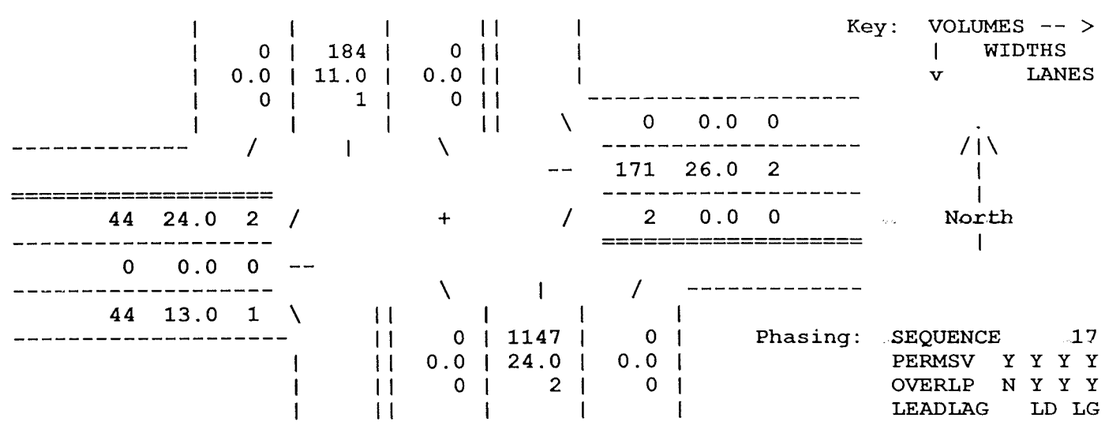
C= 60 sec G= 39.0 sec = 65.0% Y=21.0 sec = 35.0% Ped= 0.0 sec = 0.0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E (vph)	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								10.4	B+	
TH	11/1	0.151	0.450	769	814	204	0.251	10.4	B+	101 ft
NB Approach								17.0	B	
TH	24/2	0.372	0.450	1576	1601	1274	0.796	17.0	*B	492 ft
WB Approach								27.1	C+	
TH+LT	26/2	0.075	0.100	275	364	192	0.527	27.1	*C+	82 ft
EB Approach								25.6	C+	
RT	13/1	0.057	0.100	100	144	49	0.318	26.3	C+	38 ft
LT	24/2	0.026	0.100	263	350	49	0.140	24.8	*C+	19 ft

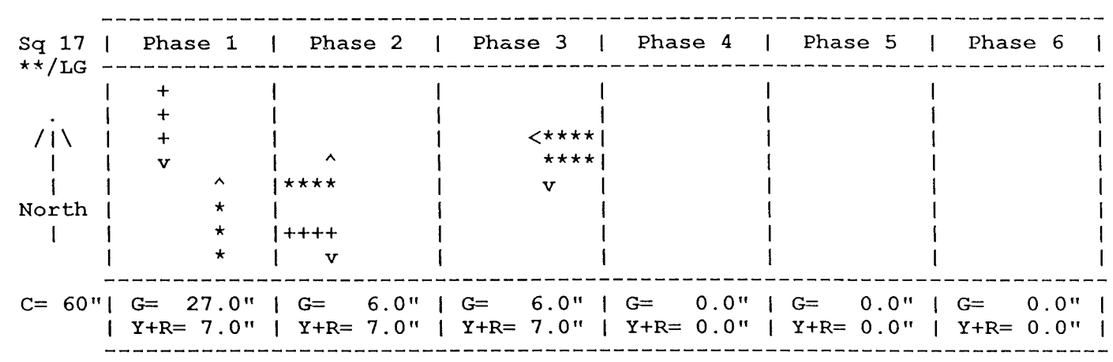
South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 13AM1010A 13:11:41
September 2013 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Input Worksheet

Intersection # 0 - N-S Main Street-E-W Jughandle/ Area Location Type: NONCBD



	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		10			10			10			10	
Bike vol, vbic		2			2			2			2	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		-1.0			.5			-1.0			-4.0	



South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 13AM1010A 13:11:41
September 2013 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Volume Adjust & Satflow Worksheet

Volume	SB			WB			NB			EB		
Adjustment	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Volume, V	0	184	0	0	171	2	0	1147	0	44	0	44
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Adj mv flow, vp	0	204	0	0	190	2	0	1274	0	49	0	49
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj LG flow, v		204			192			1274		49		49
Prop LT, PLT		.000			.010			.000		.000		1.000
Prop RT, PRT		.000			.000			.000		1.000		.000

Saturation	SB			WB			NB			EB		
Flow Rate	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Base satflo, so		1900			1900			1900		1900		1900
Number lanes, N		1			2			2		1		2
Lane width, fW		.967			1.033			1.000		1.033		1.000
Heavy veh, fHV		.980			.980			.980		.980		.980
Grade, fg		1.005			.998			1.005		1.020		1.020
Parking, fp		1.000			1.000			1.000		1.000		1.000
Bus block, fbb		1.000			1.000			1.000		1.000		1.000
Area type, fa		1.000			1.000			1.000		1.000		1.000
Lane util, fLU		1.000			.950			.950		1.000		.970
Left-turn, fLT		1.000			.998			1.000		1.000		.950
Right-turn, fRT		1.000			1.000			1.000		.850		1.000
PedBike LT,fLpb		1.000			.999			1.000		1.000		1.000
PedBike RT,fRpb		1.000			1.000			1.000		.924		1.000
Local adjustmnt		1.000			1.000			1.000		1.000		1.000
Adj satflow, s		1810			3640			3557		1542		3502

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Ped-Bike LT Effects Worksheet

Input/Calculation	SB	WB	NB	EB
Effective ped green time, gp	.0	6.0	.0	6.0
Conflicting ped volume, Vped	0	10	0	10
Ped flow rate, Vpedg	.000	100.000	.000	100.000
Avg. ped occupancy, OCCpedg	.000	.050	.000	.050
Opposing queue clear time, gq	.000	.000	.000	.000
Opposing queue g ratio, gq/gp	.000	.000	.000	.000
Ped occ after queue, OCCpedu	.000	.050	.000	.050
Opposing flow rate, Vo	0	0	0	0
Relevant occupancy, OCCr	.000	.050	.000	.050
# receiving lanes, Nrec	0	1	0	2
# turning lanes, Nturn	0	1	0	2
Adjustment factor, ApbT	.000	.950	.000	.950
Proportion left turns, PLT	.000	.010	.000	1.000
Prop LT in prot phase, PLTA	.000	.000	.000	1.000
Ped-bike adjust factor, fLpb	.000	.999	.000	1.000

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 13AM1010A 13:11:41
September 2013 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Ped-Bike RT Effects Worksheet

Input/Calculation	SB	WB	NB	EB
Effective ped green time, gp	.0	.0	.0	6.0
Conflicting ped volume, Vped	0	0	0	10
Conflicting bike volume, Vbic	0	0	0	2
Ped flow rate, Vpedg	.000	.000	.000	100.000
Avg ped occupancy, OCCpedg	.000	.000	.000	.050
Effective bike green time, g	.0	.0	.0	6.0
Bike flow rate, Vbicg	.000	.000	.000	20.000
Avg bike occupancy, OCCbicg	.000	.000	.000	.027
Relevant occupancy, OCCr	.000	.000	.000	.076
# receiving lanes, Nrec	0	0	0	1
# turning lanes, Nturn	0	0	0	1
Adjustment factor, ApbT	.000	.000	.000	.924
Proportion right turns, PR	.000	.000	.000	1.000
Prop RT in prot phase, PRA	.000	.000	.000	.000
Ped-bike adjust factor, fRpb	.000	.000	.000	.924

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Capacity Analysis	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Lane group, LG		TH			TH+LT			TH			RT	LT
Adj Flow, v		204			192			1274			49	49
Satflow, s		1810			3640			3557			1542	3502
Lost time, tL		7.0			7.0			7.0			7.0	7.0
Effect green, g		27.0			6.0			27.0			6.0	6.0
Grn ratio, g/C		.450			.100			.450			.100	.100
LG capacity, c		814			364			1601			154	350
v/c ratio, X		.251			.527			.796			.318	.140
Flow ratio, v/s		.113			.053			.358			.032	.014
Crit lane group					*			*			*	
Sum crit v/s,Yc		0.443		Total lost, L				21.0				
Crit v/c, Xc		.681										

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 13AM1010A 13:11:41
September 2013 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Delay	SB			WB			NB			EB		
and LOS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		204			192			1274		49		49
LG capacity, c		814			364			1601		154		350
v/c ratio, X		.251			.527			.796		.318		.140
Grn ratio, g/C		.450			.100			.450		.100		.100
Unif delay, d1		10.2			25.7			14.1		25.1		24.6
Incr calib, k		.11			.13			.34		.11		.11
Incr delay, d2		.2			1.4			2.9		1.2		.2
Queue Delay, d3		.0			.0			.0		.0		.0
Unif delay, d1*		.0			.0			.0		.0		.0
Prog factor, PF		1.00			1.00			1.00		1.00		1.00
Contrl delay, d		10.4			27.1			17.0		26.3		24.8
Lane group LOS		B+			C+			B		C+		C+
Final Queue,Qbi		0			0			0		0		0
Appr delay, dA		10.4			27.1			17.0			25.6	
Approach LOS		B+			C+			B			C+	
Appr flow, vA		204			192			1274			98	
Intersection:	Delay	17.8		LOS		B						

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 13AM1010A 13:11:41
September 2013 with Operational Ferry AM Peak

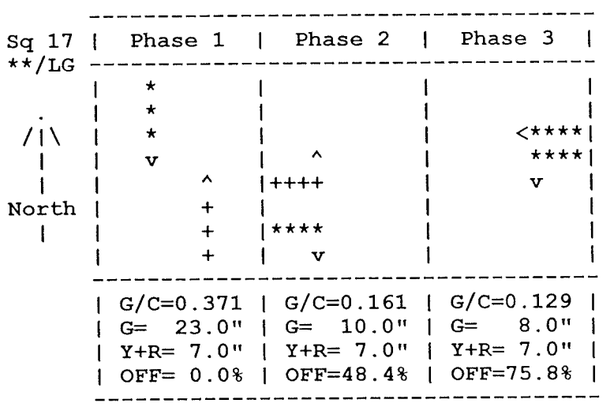
SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Back of Queue Worksheet

Queues in	SB			WB			NB			EB		
Worst Lanes	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Init queue, QbL		0			0			0		0		0
Ln flow, vL		204			101			671		49		25
Ln satflow, sL		1810			1820			1778		1542		1751
Ln capacity, cL		814			182			801		154		175
Flow ratio, yL		.113			.056			.377		.032		.014
v/c ratio, XL		.251			.555			.838		.318		.144
Effect green, g		27.0			6.0			27.0		6.0		6.0
Grn ratio, g/C		.450			.100			.450		.100		.100
Upstr filter, I		1.00			1.00			1.00		1.00		1.00
Grn arrivals, P		.45			.10			.45		.10		.10
Platn ratio, Rp		1.00			1.00			1.00		1.00		1.00
Prog factr, PF2		1.00			1.00			1.00		1.00		1.00
Queue (1st), Q1		2.1			1.6			9.9		.8		.4
Queue factr, kB		.48			.19			.47		.18		.19
Queue (2nd), Q2		.2			.2			2.2		.1		.0
Avg queue, Q		2.3			1.8			12.0		.8		.4
90% factor, fB		1.76			1.76			1.62		1.78		1.79
90% queue, Qp		4.0			3.3			19.5		1.5		.7
Avg spacing, Lh		25.3			25.3			25.3		25.3		25.3
Avail storg, La		0			0			0		0		0
Avg distance		57			47			304		21		11
Avg ratio, RQ		.00			.00			.00		.00		.00
90% distance		101			82			492		38		19
90% ratio, RQp		.00			.00			.00		.00		.00

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 13PM1010A 13:17:07
September 2013 with Operational Ferry PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - N-S Main Street-E-W Jughandle/
Degree of Saturation (v/c) 0.60 Vehicle Delay 23.7 Level of Service C+



C= 62 sec G= 41.0 sec = 66.1% Y=21.0 sec = 33.9% Ped= 0.0 sec = 0.0%

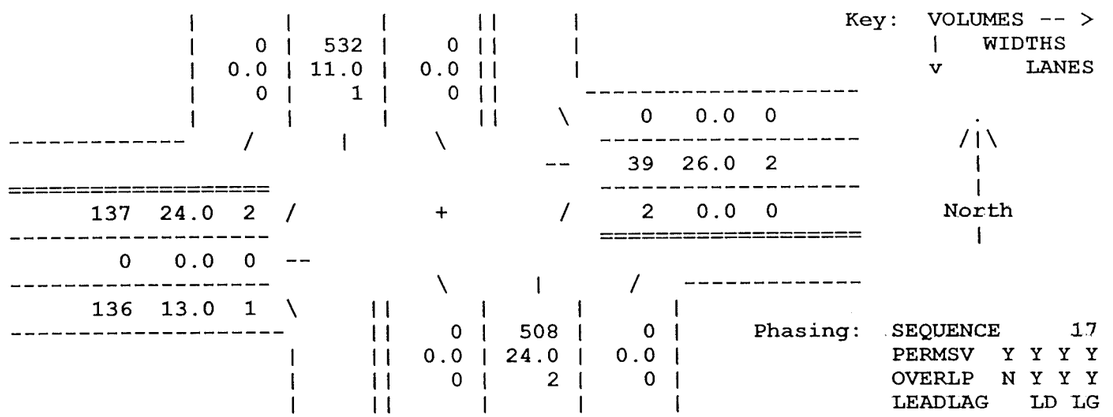
Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E (vph)	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								31.2	C	
TH	11/1	0.361	0.371	611	671	591	0.881	31.2	*C	494 ft
NB Approach								14.8	B+	
TH	24/2	0.186	0.371	1265	1319	564	0.428	14.8	B+	184 ft
WB Approach								23.9	C+	
TH+LT	26/2	0.024	0.129	369	467	45	0.096	23.9	*C+	18 ft
EB Approach								25.4	C+	
RT	13/1	0.137	0.161	186	252	151	0.594	27.9	*C	122 ft
LT	24/2	0.066	0.161	468	565	152	0.269	23.1	C+	58 ft

South Amboy Transportation Project
Intersection of Proposed Jughandle and Access Ramp 13PM1010A
September 2013 with Operational Ferry PM Peak

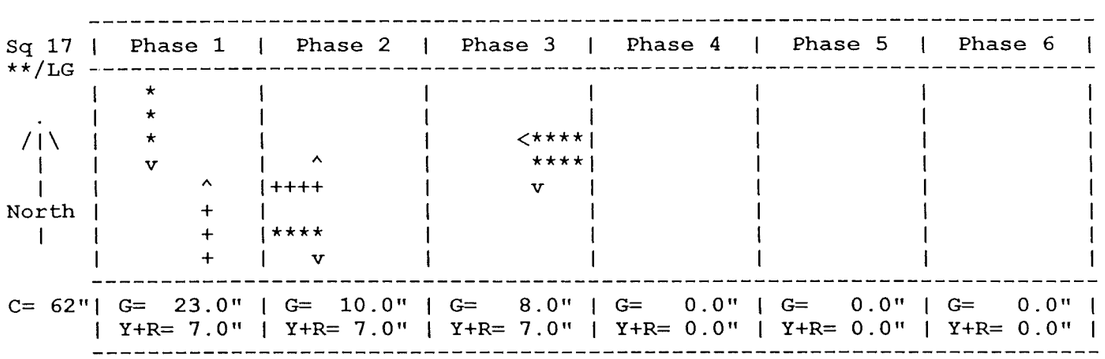
08/21/02
13:17:07

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Input Worksheet

Intersection # 0 - N-S Main Street-E-W Jughandle/ Area Location Type: NONCBD



	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		10			10			10			10	
Bike vol, vbic		2			2			2			2	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		-1.0			.5			-1.0			-4.0	



South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 13PM1010A 13:17:07
September 2013 with Operational Ferry PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Volume Adjust & Satflow Worksheet

Volume	SB			WB			NB			EB		
Adjustment	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Volume, V	0	532	0	0	39	2	0	508	0	136	0	137
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Adj mv flow, vp	0	591	0	0	43	2	0	564	0	151	0	152
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj LG flow, v		591			45			564		151		152
Prop LT, PLT		.000			.044			.000		.000		1.000
Prop RT, PRT		.000			.000			.000		1.000		.000

Saturation	SB			WB			NB			EB		
Flow Rate	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Base satflo, so		1900			1900			1900		1900		1900
Number lanes, N		1			2			2		1		2
Lane width, fW		.967			1.033			1.000		1.033		1.000
Heavy veh, fHV		.980			.980			.980		.980		.980
Grade, fg		1.005			.998			1.005		1.020		1.020
Parking, fp		1.000			1.000			1.000		1.000		1.000
Bus block, fbb		1.000			1.000			1.000		1.000		1.000
Area type, fa		1.000			1.000			1.000		1.000		1.000
Lane util, fLU		1.000			.950			.950		1.000		.970
Left-turn, fLT		1.000			.993			1.000		1.000		.950
Right-turn, fRT		1.000			1.000			1.000		.850		1.000
PedBike LT,fLpb		1.000			.998			1.000		1.000		1.000
PedBike RT,fRpb		1.000			1.000			1.000		.945		1.000
Local adjustmnt		1.000			1.000			1.000		1.000		1.000
Adj satflow, s		1810			3617			3557		1577		3502

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Capacity	SB			WB			NB			EB		
Analysis	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		591			45			564		151		152
Satflow, s		1810			3617			3557		1577		3502
Lost time, tL		7.0			7.0			7.0		7.0		7.0
Effect green, g		23.0			8.0			23.0		10.0		10.0
Grn ratio, g/C		.371			.129			.371		.161		.161
LG capacity, c		671			467			1319		254		565
v/c ratio, X		.881			.096			.428		.594		.269
Flow ratio, v/s		.327			.012			.159		.096		.043
Crit lane group		*			*					*		
Sum crit v/s,Yc		0.435		Total lost, L				21.0				
Crit v/c, Xc		.657										

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 13PM1010A 13:17:07
September 2013 with Operational Ferry PM Peak

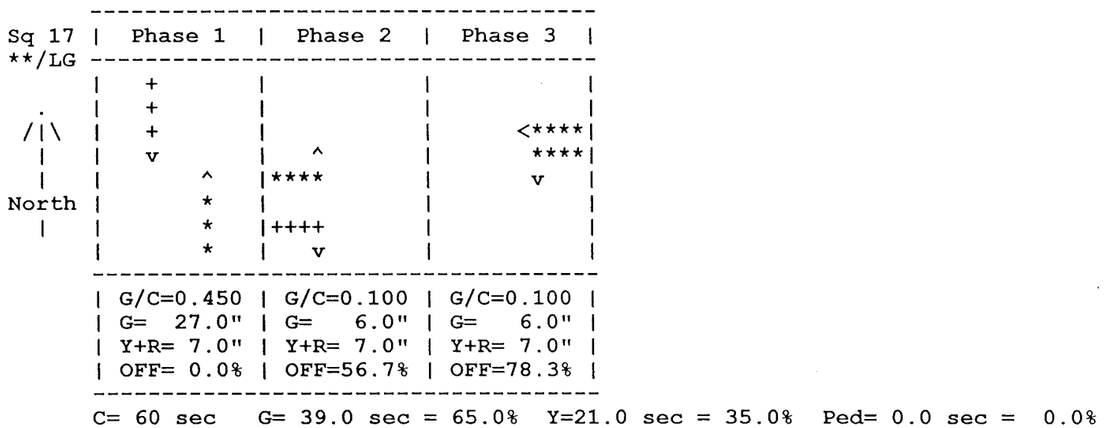
SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Delay	SB			WB			NB			EB		
and LOS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		591			45			564		151		152
LG capacity, c		671			467			1319		254		565
v/c ratio, X		.881			.096			.428		.594		.269
Grn ratio, g/C		.371			.129			.371		.161		.161
Unif delay, d1		18.2			23.8			14.6		24.1		22.8
Incr calib, k		.41			.11			.11		.18		.11
Incr delay, d2		13.0			.1			.2		3.7		.3
Queue Delay, d3		.0			.0			.0		.0		.0
Unif delay, d1*		.0			.0			.0		.0		.0
Prog factor, PF		1.00			1.00			1.00		1.00		1.00
Contrl delay, d		31.2			23.9			14.8		27.9		23.1
Lane group LOS		C			C+			B+		C		C+
Final Queue,Qbi		0			0			0		0		0
Appr delay, dA		31.2			23.9			14.8			25.4	
Approach LOS		C			C+			B+			C+	
Appr flow, vA		591			45			564			303	
Intersection:	Delay	23.7		LOS		C+						

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 23AM1010A 11:42:00
September 2023 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - N-S Main Street-E-W Jughandle/
Degree of Saturation (v/c) 0.68 Vehicle Delay 18.3 Level of Service B



C= 60 sec G= 39.0 sec = 65.0% Y=21.0 sec = 35.0% Ped= 0.0 sec = 0.0%

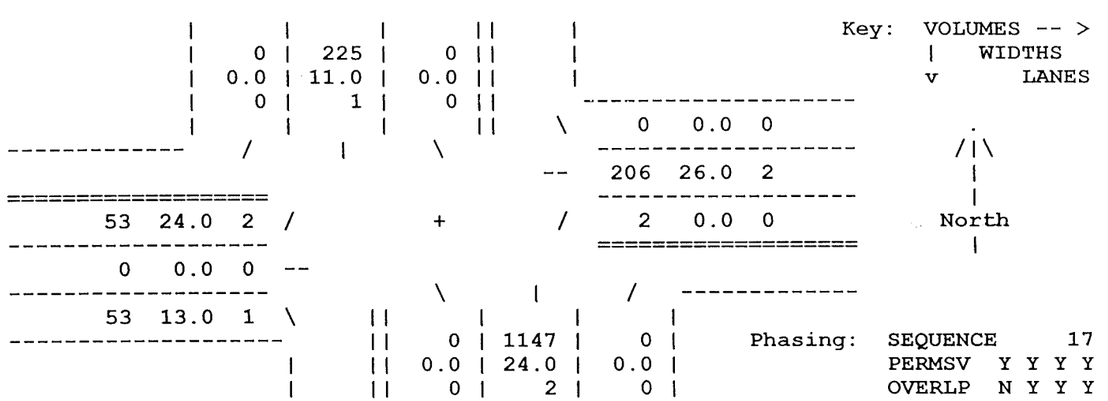
Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E (vph)	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								10.7	B+	
TH	11/1	0.178	0.450	769	814	250	0.307	10.7	B+	127 ft
NB Approach								17.0	B	
TH	24/2	0.372	0.450	1576	1601	1274	0.796	17.0	*B	492 ft
WB Approach								29.6	C	
TH+LT	26/2	0.087	0.100	275	364	231	0.635	29.6	*C	103 ft
EB Approach								25.9	C+	
RT	13/1	0.066	0.100	100	144	59	0.383	26.9	C+	46 ft
LT	24/2	0.030	0.100	263	350	59	0.169	24.9	*C+	23 ft

South Amboy Transportation Project
Intersection of Proposed Jughandle and Access Ramp 23AM1010A
September 2023 with Operational Ferry AM Peak

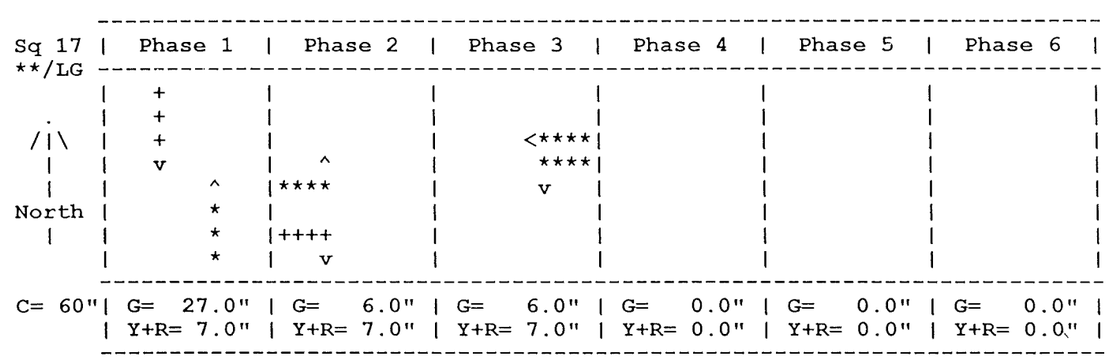
08/21/02
11:42:00

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Input Worksheet

Intersection # 0 - N-S Main Street-E-W Jughandle/ Area Location Type: NONCBD



	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		10			10			10			10	
Bike vol, vbic		2			2			2			2	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		-1.0			.5			-1.0			-4.0	



South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 23AM1010A 11:42:00
September 2023 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Volume Adjust & Satflow Worksheet

Volume	SB			WB			NB			EB		
Adjustment	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Volume, V	0	225	0	0	206	2	0	1147	0	53	0	53
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Adj mv flow, vp	0	250	0	0	229	2	0	1274	0	59	0	59
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj LG flow, v		250			231			1274		59		59
Prop LT, PLT		.000			.009			.000		.000		1.000
Prop RT, PRT		.000			.000			.000		1.000		.000

Saturation	SB			WB			NB			EB		
Flow Rate	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Base satflo, so		1900			1900			1900		1900		1900
Number lanes, N		1			2			2		1		2
Lane width, fW		.967			1.033			1.000		1.033		1.000
Heavy veh, fHV		.980			.980			.980		.980		.980
Grade, fg		1.005			.998			1.005		1.020		1.020
Parking, fp		1.000			1.000			1.000		1.000		1.000
Bus block, fbb		1.000			1.000			1.000		1.000		1.000
Area type, fa		1.000			1.000			1.000		1.000		1.000
Lane util, fLU		1.000			.950			.950		1.000		.970
Left-turn, fLT		1.000			.999			1.000		1.000		.950
Right-turn, fRT		1.000			1.000			1.000		.850		1.000
PedBike LT,fLpb		1.000			1.000			1.000		1.000		1.000
PedBike RT,fRpb		1.000			1.000			1.000		.924		1.000
Local adjustmnt		1.000			1.000			1.000		1.000		1.000
Adj satflow, s		1810			3642			3557		1542		3502

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Ped-Bike LT Effects Worksheet

Input/Calculation	SB	WB	NB	EB
Effective ped green time, gp	.0	6.0	.0	6.0
Conflicting ped volume, Vped	0	10	0	10
Ped flow rate, Vpedg	.000	100.000	.000	100.000
Avg. ped occupancy, OCCpedg	.000	.050	.000	.050
Opposing queue clear time, gq	.000	.000	.000	.000
Opposing queue g ratio, gq/gp	.000	.000	.000	.000
Ped occ after queue, OCCpedu	.000	.050	.000	.050
Opposing flow rate, Vo	0	0	0	0
Relevant occupancy, OCCr	.000	.050	.000	.050
# receiving lanes, Nrec	0	1	0	2
# turning lanes, Nturn	0	1	0	2
Adjustment factor, ApbT	.000	.950	.000	.950
Proportion left turns, PLT	.000	.009	.000	1.000
Prop LT in prot phase, PLTA	.000	.000	.000	1.000
Ped-bike adjust factor, fLpb	.000	1.000	.000	1.000

South Amboy Transportation Project 08/21/02
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SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Ped-Bike RT Effects Worksheet

Input/Calculation	SB	WB	NB	EB
Effective ped green time, gp	.0	.0	.0	6.0
Conflicting ped volume, Vped	0	0	0	10
Conflicting bike volume, Vbic	0	0	0	2
Ped flow rate, Vpedg	.000	.000	.000	100.000
Avg ped occupancy, OCCpedg	.000	.000	.000	.050
Effective bike green time, g	.0	.0	.0	6.0
Bike flow rate, Vbicg	.000	.000	.000	20.000
Avg bike occupancy, OCCbicg	.000	.000	.000	.027
Relevant occupancy, OCCr	.000	.000	.000	.076
# receiving lanes, Nrec	0	0	0	1
# turning lanes, Nturn	0	0	0	1
Adjustment factor, ApbT	.000	.000	.000	.924
Proportion right turns, PR	.000	.000	.000	1.000
Prop RT in prot phase, PRA	.000	.000	.000	.000
Ped-bike adjust factor, fRpb	.000	.000	.000	.924

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Capacity	SB			WB			NB			EB		
Analysis	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		250			231			1274		59		59
Satflow, s		1810			3642			3557		1542		3502
Lost time, tL		7.0			7.0			7.0		7.0		7.0
Effect green, g		27.0			6.0			27.0		6.0		6.0
Grn ratio, g/C		.450			.100			.450		.100		.100
LG capacity, c		814			364			1601		154		350
v/c ratio, X		.307			.635			.796		.383		.169
Flow ratio, v/s		.138			.063			.358		.038		.017
Crit lane group					*			*		*		
Sum crit v/s,Yc		0.460		Total lost, L				21.0				
Crit v/c, Xc		.707										

South Amboy Transportation Project 08/21/02
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September 2023 with Operational Ferry AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Delay and LOS	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		250			231			1274		59		59
LG capacity, c		814			364			1601		154		350
v/c ratio, X		.307			.635			.796		.383		.169
Grn ratio, g/C		.450			.100			.450		.100		.100
Unif delay, d1		10.5			25.9			14.1		25.3		24.7
Incr calib, k		.11			.21			.34		.11		.11
Incr delay, d2		.2			3.6			2.9		1.6		.2
Queue Delay, d3		.0			.0			.0		.0		.0
Unif delay, d1*		.0			.0			.0		.0		.0
Prog factor, PF		1.00			1.00			1.00		1.00		1.00
Contrl delay, d		10.7			29.6			17.0		26.9		24.9
Lane group LOS		B+			C			B		C+		C+
Final Queue,Qbi		0			0			0		0		0
Appr delay, dA		10.7			29.6			17.0			25.9	
Approach LOS		B+			C			B			C+	
Appr flow, vA		250			231			1274			118	
Intersection:	Delay	18.3		LOS		B						

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 23AM1010A 11:42:00
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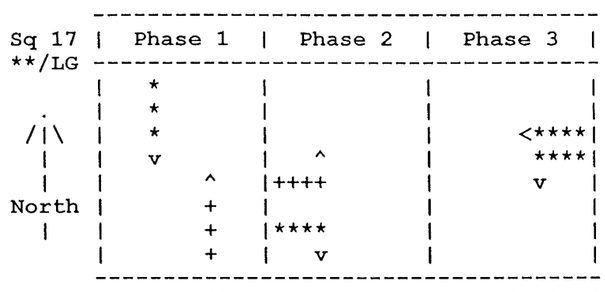
SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Back of Queue Worksheet

Queues in	SB			WB			NB			EB		
Worst Lanes	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Init queue, QbL		0			0			0		0		0
Ln flow, vL		250			122			671		59		30
Ln satflow, sL		1810			1821			1778		1542		1751
Ln capacity, cL		814			182			801		154		175
Flow ratio, yL		.138			.067			.377		.038		.017
v/c ratio, XL		.307			.668			.838		.383		.174
Effect green, g		27.0			6.0			27.0		6.0		6.0
Grn ratio, g/C		.450			.100			.450		.100		.100
Upstr filter, I		1.00			1.00			1.00		1.00		1.00
Grn arrivals, P		.45			.10			.45		.10		.10
Platn ratio, Rp		1.00			1.00			1.00		1.00		1.00
Prog factr, PF2		1.00			1.00			1.00		1.00		1.00
Queue (1st), Q1		2.7			2.0			9.9		.9		.5
Queue factr, kB		.48			.19			.47		.18		.19
Queue (2nd), Q2		.2			.4			2.2		.1		.0
Avg queue, Q		2.9			2.3			12.0		1.0		.5
90% factor, fB		1.75			1.76			1.62		1.78		1.79
90% queue, Qp		5.0			4.1			19.5		1.8		.9
Avg spacing, Lh		25.3			25.3			25.3		25.3		25.3
Avail storg, La		0			0			0		0		0
Avg distance		73			59			304		26		13
Avg ratio, RQ		.00			.00			.00		.00		.00
90% distance		127			103			492		46		23
90% ratio, RQp		.00			.00			.00		.00		.00

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 23PM1010A 11:48:10
September 2023 with Operational Ferry PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - N-S Main Street-E-W Jughandle/
Degree of Saturation (v/c) 0.70 Vehicle Delay 40.7 Level of Service D+



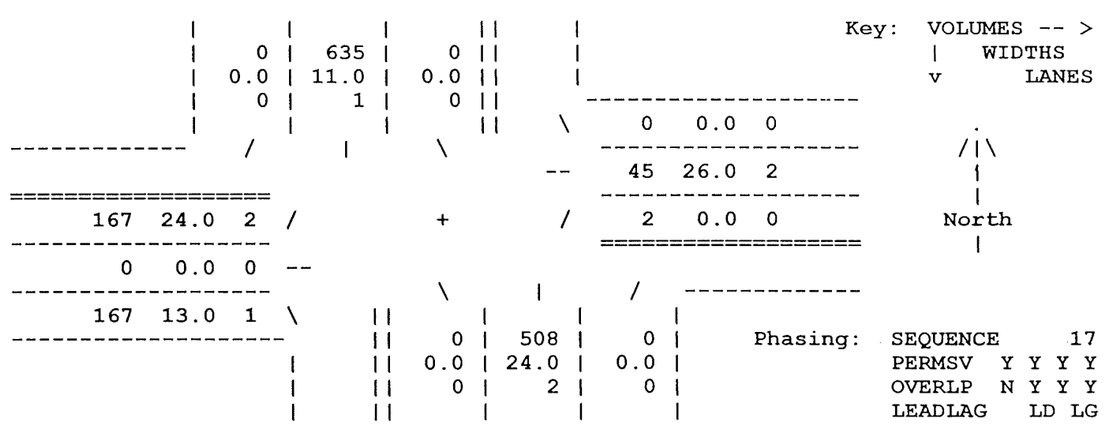
C= 62 sec G= 41.0 sec = 66.1% Y=21.0 sec = 33.9% Ped= 0.0 sec = 0.0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E (vph)	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								68.8	E	
TH	11/1	0.420	0.371	611	671	706	1.052	68.8	*E	815 ft
NB Approach								14.8	B+	
TH	24/2	0.186	0.371	1265	1319	564	0.428	14.8	B+	184 ft
WB Approach								24.0	C+	
TH+LT	26/2	0.027	0.129	369	467	52	0.111	24.0	*C+	20 ft
EB Approach								29.2	C	
RT	13/1	0.161	0.161	186	252	186	0.732	35.1	*D+	161 ft
LT	24/2	0.077	0.161	468	565	186	0.329	23.4	C+	71 ft

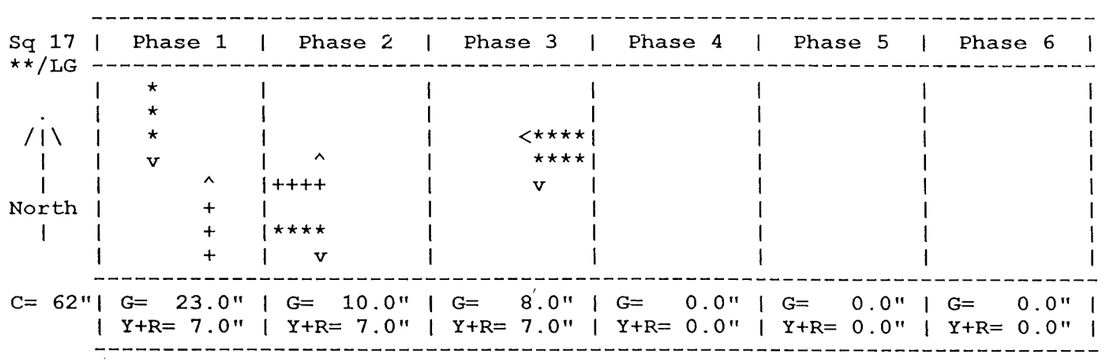
South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 23PM1010A 11:48:10
September 2023 with Operational Ferry PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Input Worksheet

Intersection # 0 - N-S Main Street-E-W Jughandle/ Area Location Type: NONCBD



	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		10			10			10			10	
Bike vol, vbic		2			2			2			2	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		-1.0			.5			-1.0			-4.0	



South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 23PM1010A 11:48:10
September 2023 with Operational Ferry PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Volume Adjust & Satflow Worksheet

Volume Adjustment	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Volume, V	0	635	0	0	45	2	0	508	0	167	0	167
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Adj mv flow, vp	0	706	0	0	50	2	0	564	0	186	0	186
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj LG flow, v		706			52			564		186		186
Prop LT, PLT		.000			.038			.000		.000		1.000
Prop RT, PRT		.000			.000			.000		1.000		.000

Saturation Flow Rate	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Base satflo, so		1900			1900			1900		1900		1900
Number lanes, N		1			2			2		1		2
Lane width, fW		.967			1.033			1.000		1.033		1.000
Heavy veh, fHV		.980			.980			.980		.980		.980
Grade, fg		1.005			.998			1.005		1.020		1.020
Parking, fp		1.000			1.000			1.000		1.000		1.000
Bus block, fbb		1.000			1.000			1.000		1.000		1.000
Area type, fa		1.000			1.000			1.000		1.000		1.000
Lane util, fLU		1.000			.950			.950		1.000		.970
Left-turn, fLT		1.000			.994			1.000		1.000		.950
Right-turn, fRT		1.000			1.000			1.000		.850		1.000
PedBike LT,fLpb		1.000			.999			1.000		1.000		1.000
PedBike RT,fRpb		1.000			1.000			1.000		.945		1.000
Local adjustmnt		1.000			1.000			1.000		1.000		1.000
Adj satflow, s		1810			3622			3557		1577		3502

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Capacity Analysis	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		706			52			564		186		186
Satflow, s		1810			3622			3557		1577		3502
Lost time, tL		7.0			7.0			7.0		7.0		7.0
Effect green, g		23.0			8.0			23.0		10.0		10.0
Grn ratio, g/C		.371			.129			.371		.161		.161
LG capacity, c		671			467			1319		254		565
v/c ratio, X		1.052			.111			.428		.732		.329
Flow ratio, v/s		.390			.014			.159		.118		.053
Crit lane group		*			*					*		
Sum crit v/s,Yc		0.522		Total lost, L				21.0				
Crit v/c, Xc		.790										

South Amboy Transportation Project 08/21/02
Intersection of Proposed Jughandle and Access Ramp 23PM1010A 11:48:10
September 2023 with Operational Ferry PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - HCM Capacity and LOS Worksheet

Delay	SB			WB			NB			EB		
and LOS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Lane group, LG		TH			TH+LT			TH		RT		LT
Adj Flow, v		706			52			564		186		186
LG capacity, c		671			467			1319		254		565
v/c ratio, X		1.052			.111			.428		.732		.329
Grn ratio, g/C		.371			.129			.371		.161		.161
Unif delay, d1		19.5			23.9			14.6		24.7		23.0
Incr calib, k		.50			.11			.11		.29		.11
Incr delay, d2		49.3			.1			.2		10.4		.3
Queue Delay, d3		.0			.0			.0		.0		.0
Unif delay, d1*		.0			.0			.0		.0		.0
Prog factor, PF		1.00			1.00			1.00		1.00		1.00
Contrl delay, d		68.8			24.0			14.8		35.1		23.4
Lane group LOS		E			C+			B+		D+		C+
Final Queue,Qbi		9			0			0		0		0
Appr delay, dA		68.8			24.0			14.8			29.2	
Approach LOS		E			C+			B+			C	
Appr flow, vA		706			52			564			372	
Intersection:	Delay	40.7	LOS		D+							

TECHNICAL ENVIRONMENTAL STUDY

AIR QUALITY

Technical Environmental Study

AIR QUALITY

1.0 Introduction

The following Technical Environmental Study (TES) describes the results of the air quality analysis conducted to determine potential environmental impacts associated with the proposed construction and operation of a ferry facility in South Amboy, New Jersey. The elements of the proposed action would include the provision of access to the site across Main Street; construction of an upland access roadway between Main Street and the ferry parking area, construction of a parking area and ferry terminal; and in-water marine improvements to accommodate the operation of ferry vessels. The marine improvements include dredging of the ferry basin, slips, and access channel, construction of a breakwater and associated slips for the ferry and support vessels, and installation of new replacement bulkhead.

A more detailed description of the proposed action is presented in Sections 1.0 and 3.0 of the Environmental Assessment (EA).

2.0 Background

An air quality analysis was undertaken to assess the potential air quality impacts anticipated to result from the proposed construction of the ferry terminal and associated parking lot and access road. The analysis included the effects of mobile source vehicular-related emissions and stationary source emissions from the heating, ventilation, and air conditioning (HVAC) system.

Potential changes in air pollution levels which could affect the community in and around the project area would be related to proposed changes in traffic patterns at the Main Street / New Access Road intersection and introduction of new pollution sources from proposed ferry activities close to sensitive receptors. The new mobile sources would be associated with employee and rider parking as well as the introduction of a new intersection. The sensitive receptors would be the residences located to the south of the project along Pupek Road and the new ferry terminal building. Sidewalk receptors were also analyzed for the quadrants surrounding the four legs of the new intersection. The stationary source would be associated with the operation of the HVAC system.

The mobile source air quality analysis focused on carbon monoxide (CO), the principal pollutant associated with vehicular emissions. Approximately 80% of atmospheric CO emissions are attributable to vehicular sources. These emissions, associated with the incomplete combustion of fossil fuel, tend to increase as vehicle speeds decrease and are maximized during idling and acceleration modes. CO emissions also increase as temperatures lower. Therefore, areas characterized by low-speed travel and idling during winter temperature regimes represent the area where vehicular CO emissions are highest.

3.0 Existing Air Quality

The New Jersey Department of Environmental Protection (NJDEP) maintains a network of continuous air quality monitoring stations located throughout the State. Several such stations are located within the County of Middlesex and additional stations surrounding the County. Based on air quality data recorded from these monitoring locations, areas within the State of New Jersey are designated attainment or non-attainment status depending upon whether they are in contravention of the State or National Ambient Air Quality Standards (NAAQS) for criteria pollutants. The six specific air pollutants, which are the indicators of overall air quality, are Sulfur Dioxide, Particulates, Carbon Monoxide, Ozone, Nitrogen Dioxide, and Lead. The NAAQS are based both on health effects (for the primary standards) and welfare effects (for the secondary standards). A copy of these standards is presented in Table 1.

The NJDEP 1999 Air Quality Report, the latest document as of this writing, indicated that in 1998, all pollutants except Ozone were well below the State and National Ambient Air Quality Standards. Even Carbon Monoxide (CO), which accounted for a number of exceedences is the past, has declined significantly in recent years and did not reach unhealthful levels in 1999. The primary 1-hour standard for Ozone was exceeded at nine of the fourteen monitoring stations in 1999. The secondary 1-hour standard for Ozone was exceeded at all of the State's monitoring locations in 1999 during the summer months. All monitoring stations experienced exceedences of the National 8-hour primary and secondary standard in 1999. Concentrations of priority pollutants have shown a general downward trend over the past decade.

Another measured parameter, known as the Air Quality Index (AQI), is used by the NJDEP to determine unhealthful air quality episodes. In 1999, the Suburban AQI Reporting Region, which contains the City of South Amboy, had 5 days with unhealthy air quality. These episodes were confined mainly to the summer season. This was down from 1998.

4.0 Build Alternative Analysis

Mobile Source

A microscale CO air quality study was undertaken to access the impacts of a new ferry terminal to be constructed on the waterfront in South Amboy. The proposed ferry terminal would bring vehicles off of Main Street into a parking lot via a new two-lane access roadway. Specifically, this study addressed the air quality impacts from all vehicle ingress/egress, parking, and loading onto local roadways. Traffic data was provided by CME Associates and is presented in the Traffic Technical Environmental Study.

Vehicular air quality modeling was conducted at five existing residential locations along Pupek Road, which lies just south of the proposed new access roadway. At each residential property, air quality modeling was conducted at the closest property line to the project. For these residential sensitive receptors, the air quality impacts would be primarily from the new access roadway. Air quality modeling was also conducted at the sidewalk locations of the four quadrants surrounding the proposed new intersection of Main Street and the new access roadway. To assess the impacts of the proposed new parking lot, a receptor was modeled at the

TABLE 1

AMBIENT AIR QUALITY STANDARDS

Pollutant	Standard	Averaging Period	New Jersey (a)	National (b)
Sulfer Dioxide	Primary	12-month arith. mean	80 ug/m^3 (.03 ppm)	.030 ppm
	Primary	24-hour average	365 ug/m^3 (.14 ppm)	.14 ppm[c]
	Secondary	12-month arith. mean	60 ug/m^3 (.02 ppm)	---
	Secondary	24-hour average	260 ug/m^3 (.10 ppm)	---
	Secondary	3-hour average	1300 ug/m^3 (0.5 ppm)	0.5 ppm[c]
Total Suspended Particulates	Primary	12-month geom. mean	75 ug/m^3	---
	Primary	24-hour average	260 ug/m^3	---
	Secondary	12 month geom. mean (d)	60 ug/m^3	---
	Secondary	24-hour average	150 ug/m^3	---
Inhalable Particulates (PM10)	Prim. & Sec.	Annual arith. mean	---	50 ug/m^3
	Prim. & Sec.	24-hour average	---	150 ug/m^3
Fine Particulates (PM2.5)	Prim. & Sec.	Annual arith. mean	---	15 ug/m^3
	Prim. & Sec.	24-hour average	---	65 ug/m^3
Carbon Monoxide	Prim. & Sec.	8-hour average	10 mg/m^3 (9 ppm)	9 ppm (10 mg/m^3) (e)
	Prim. & Sec.	1-hour average	40 mg/m^3 (35 ppm)	35 ppm (40 mg/m^3) (e)
Ozone	Primary	Max. Daily 1-Hr. Avg.	.12 ppm (235 ug/m^3)	.12 ppm (235 ug/m^3) (f)
	Secondary	1-hour average	.08 ppm (160 ug/m^3)	.12 ppm (235 ug/m^3) (f)
	Prim. & Sec.	8-hour average	---	.08 ppm (160 ug/m^3) (g)
Nitrogen Dioxide	Prim. & Sec.	12-month arith. mean	100 ug/m^3 (.05 ppm)	.053 ppm (100 ug/m^3)
Lead	Prim. & Sec.	3-month average	1.5 ug/m^3	---
		Quarterly Mean	---	1.5 ug/m^3

Source: Air Quality Report, NJDEP, Bureau of Air Monitoring.

a) New Jersey short-term standards are not to be exceeded more than once in any 12-month period.
b) National short-term standards are not to be exceeded more than once in a calendar year.
c) National standards are block averages rather than moving averages.
d) Intended as a guideline for achieving short-term standard.
e) National secondary standards for carbon monoxide have been dropped.
f) Maximum daily 1-hour averages: averaged over a three-year period the expected number of days above the standard must be less than or equal to one. This standard was replaced by an 8-hour average standard on September 18, 1997.
g) Standard is met when the 3-year average of the fourth highest daily maximum 8-hour average is less than or equal to .08 ppm. This new standard became effective September 18, 1997.

building setback location of the proposed ferry terminal. Modeling locations are shown on Figures 1 and 2. These modeling locations were chosen to represent highest expected impact levels from the proposed project.

The weekday AM and PM peak hour periods were determined to have the highest traffic impacts from the project. Therefore, both peak periods were analyzed. In addition, both the Estimated Time of Completion (ETC) year of 2003, ETC+10 year of 2013, and Design Year (ETC+20) of 2023 were analyzed for both the "No Build" and "Proposed Action" scenarios. The "No Build" scenario was analyzed for purposes of comparison. Procedures outlined in the New Jersey Department of Environmental Protection (NJDEP) Air Quality Analysis document (dated November 1996) were used for this air quality study.

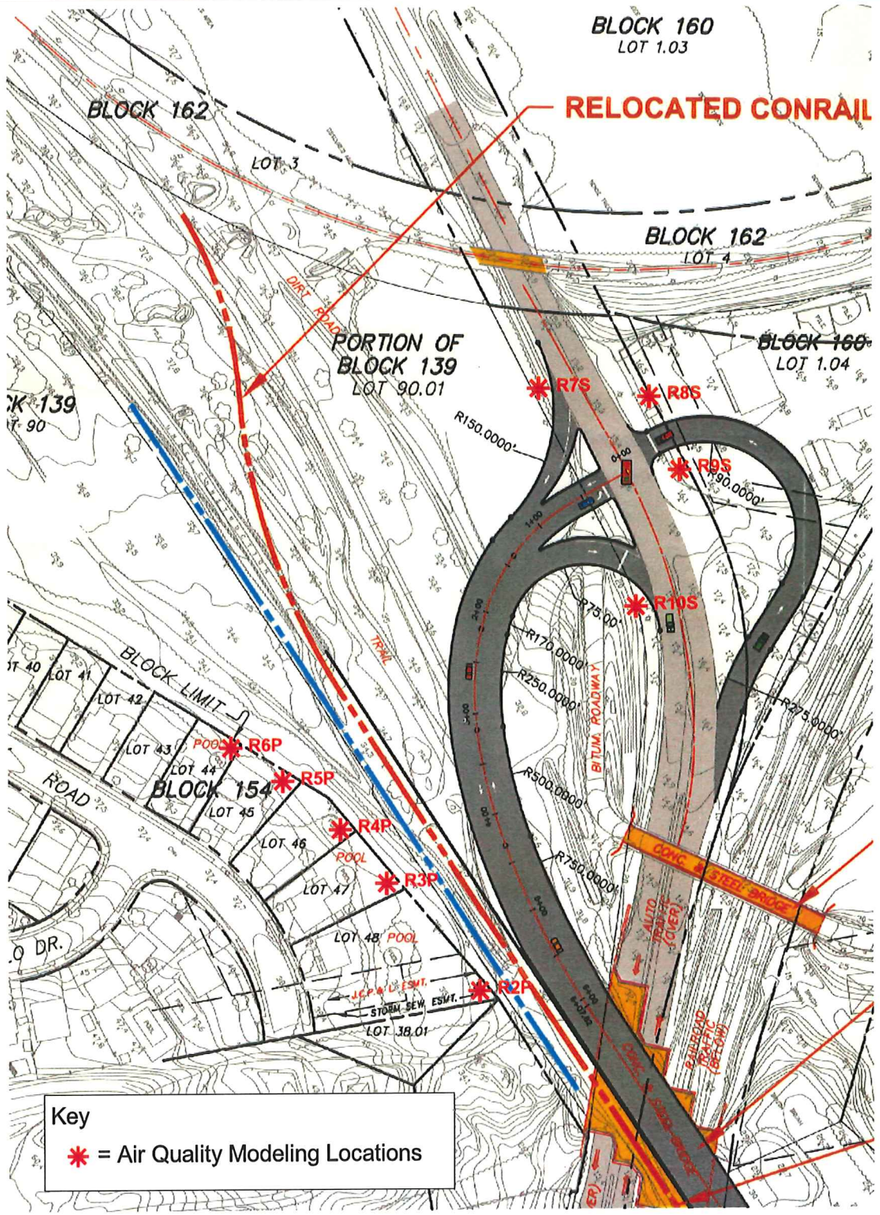
Idle and free-flow vehicular emission factors were obtained from the NJDEP modified MOBILE 5A-H computer model (USEPA), which were specifically tailored to account for New Jersey inspection maintenance (I/M) programs. This model provides emission factors based on varying vehicular characteristics such as the operating mode of the vehicle (hot/cold start percentages), specific vehicular mixes, speed, temperature, and year. CO emission factors were calculated for winter conditions when internal combustion engines produce greater quantities of CO and air pollutant dispersion characteristics are reduced. A 70 percent centralized and 30 percent decentralized ratio was used in the emissions model.

The dispersion (microscale) model that was used for this study was the USEPA's Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections (CAL3QHC). CAL3QHC is a PC-based modeling methodology developed to predict the level of CO or other inert pollutant concentrations from both moving and idling motor vehicles. A "wind sensitivity" analysis was run for various wind angles to determine which conditions result in the highest downwind CO concentrations at each of the selected receptors.

For comparison to State and Federal Air Quality Standards, CO concentrations are determined for the peak hour and 8-hour time periods. The peak hour CO concentration is determined from the modeling itself, while the 8-hour CO concentration is determined by multiplying the peak hour value by a persistence factor of 0.7. This persistence factor represents a combination of the variability in both traffic and meteorological conditions. Background or ambient CO concentrations are then added to the modeled CO concentrations. Background CO concentrations are obtained from a nearby representative station in the NJDEP monitoring network. The Perth Amboy station was selected for use in this study.

Stationary Source

The proposed building will be heated by a natural gas-fired HVAC system. The unit will be energy-efficient and will be under service contract to assure peak performance. The major pollutant of concern when burning natural gas is nitrogen oxides. Nitrogen oxide emissions are functions of combustion chamber temperature, combustion product cooling rate, and the local characteristics of the natural gas consumed.



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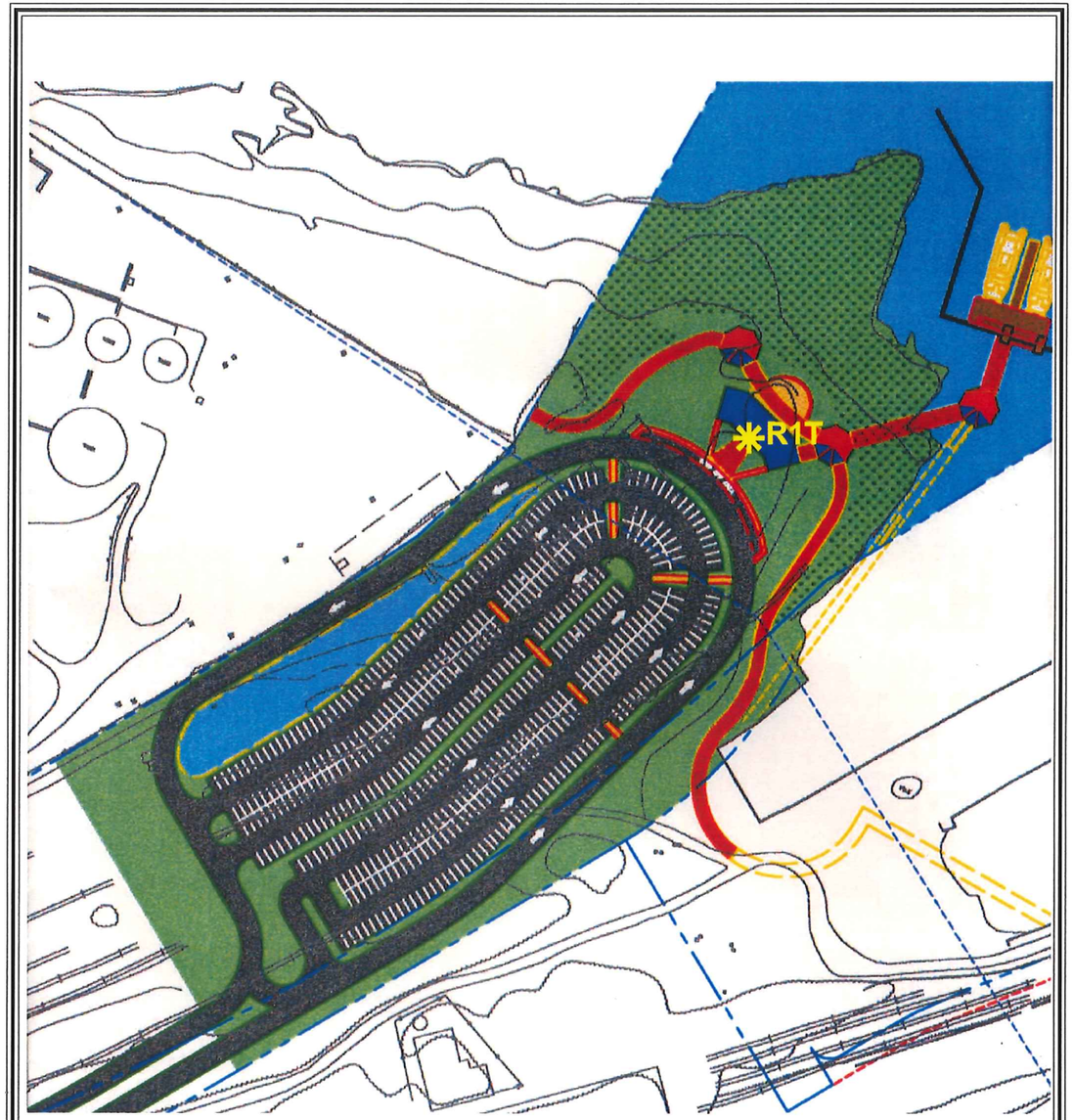
136 W. 16th Street
Suite 3E, POB 1206
New York, NY 10011

Air Quality Modeling Locations
South Amboy Ferry Terminal Project
South Amboy, New Jersey

SOURCE:	FIGURE #
PHE	1



Key
* = Air Quality Modeling Locations

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Air Quality Modeling Locations (cont.)
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE: P.H.E.

FIGURE # 2

5.0 Air Quality Modeling Results

Mobile Source

The results of the dispersion modeling (microscale) analysis for both the "No Build" and "Proposed Action" scenarios and for both peak time periods are presented in the following Tables 2, 3, and 4. It should be noted that these results are based on worst case parameters including peak hour traffic, winter temperatures, wind angle, and idling vehicles, calculated to achieve the highest predicted CO concentration at each sensitive receptor.

Table 2: South Amboy Ferry Terminal EA
ETC Year 2003 CO Concentration (in ppm)*

		AM Peak Period				PM Peak Period			
		1-Hour		8-Hour		1-Hour		8-Hour	
Recept ID	Description	No Build	Prop Action	No Build	Prop Action	No Build	Prop Action	No Build	Prop Action
R1T	New Ferry Terminal Building	3.9	3.9	2.8	2.8	3.9	3.9	2.8	2.8
R2P	Residential Property Line Block 154, Lot 48	4.1	4.2	2.9	3.0	4.1	4.2	2.9	3.0
R3P	Residential Property Line Block 154, Lot 47	4.0	4.1	2.9	2.9	3.9	4.1	2.8	2.9
R4P	Residential Property Line Block 154, Lot 46	4.0	4.0	2.9	2.9	3.9	4.0	2.8	2.9
R5P	Residential Property Line Block 154, Lot 45	4.0	4.0	2.9	2.9	3.9	4.0	2.8	2.9
R6P	Residential Property Line Block 154, Lot 44	4.0	4.0	2.9	2.9	3.9	4.0	2.8	2.8
R7S	Sidewalk Southwest Corner	4.4	4.7	3.2	3.4	4.3	4.6	3.1	3.3
R8S	Sidewalk Northwest Corner	4.7	6.2	3.4	4.3	4.5	6.5	3.2	4.6
R9S	Sidewalk Northeast Corner	4.7	5.5	3.4	3.9	4.6	5.2	3.3	3.7
R10S	Sidewalk Southeast Corner	4.2	4.7	3.0	3.4	4.2	4.8	3.0	3.4

Source: PHE, Inc., 2002

* Inclusive of ambient CO concentration, NJDEP Perth Amboy monitoring station.

Table 3: South Amboy Ferry Terminal EA
ETC+10 Year 2013 CO Concentration (in ppm)*

		AM Peak Period				PM Peak Period			
		1-Hour		8-Hour		1-Hour		8-Hour	
Recept ID	Description	No Build	Prop Action	No Build	Prop Action	No Build	Prop Action	No Build	Prop Action
R1T	New Ferry Terminal Building	3.7	3.7	2.6	2.6	3.7	3.7	2.6	2.6
R2P	Residential Property Line Block 154, Lot 48	3.9	4.0	2.7	2.8	3.9	4.0	2.7	2.8
R3P	Residential Property Line Block 154, Lot 47	3.8	3.9	2.7	2.7	3.7	3.9	2.6	2.7
R4P	Residential Property Line Block 154, Lot 46	3.8	3.9	2.7	2.7	3.7	3.9	2.6	2.7
R5P	Residential Property Line Block 154, Lot 45	3.8	3.8	2.7	2.7	3.7	3.8	2.6	2.7
R6P	Residential Property Line Block 154, Lot 44	3.8	3.8	2.7	2.7	3.7	3.8	2.6	2.7
R7S	Sidewalk Southwest Corner	4.2	4.5	3.0	3.2	4.1	4.4	2.9	3.1
R8S	Sidewalk Northwest Corner	4.5	5.8	3.2	4.1	4.2	6.2	3.0	4.4
R9S	Sidewalk Northeast Corner	4.5	5.4	3.2	3.8	4.3	5.0	3.1	3.5
R10S	Sidewalk Southeast Corner	4.0	4.5	2.8	3.2	4.0	4.6	2.8	3.2

Source: PHE, Inc., 2002

* Inclusive of ambient CO concentration, NJDEP Perth Amboy monitoring station.

Table 4: South Amboy Ferry Terminal EA
Design (ETC+20) Year 2023 CO Concentration (in ppm)*

		AM Peak Period				PM Peak Period			
		1-Hour		8-Hour		1-Hour		8-Hour	
Recept ID	Description	No Build	Prop Action	No Build	Prop Action	No Build	Prop Action	No Build	Prop Action
R1T	New Ferry Terminal Building	3.6	3.6	2.6	2.6	3.6	3.6	2.6	2.6
R2P	Residential Property Line Block 154, Lot 48	3.8	3.9	2.7	2.8	3.8	3.9	2.7	2.8
R3P	Residential Property Line Block 154, Lot 47	3.7	3.8	2.7	2.7	3.6	3.8	2.6	2.7
R4P	Residential Property Line Block 154, Lot 46	3.7	3.8	2.7	2.7	3.6	3.8	2.6	2.7
R5P	Residential Property Line Block 154, Lot 45	3.7	3.8	2.7	2.7	3.6	3.8	2.6	2.7
R6P	Residential Property Line Block 154, Lot 44	3.7	3.7	2.7	2.7	3.6	3.8	2.6	2.7
R7S	Sidewalk Southwest Corner	4.1	4.4	3.0	3.2	4.0	4.4	2.9	3.2
R8S	Sidewalk Northwest Corner	4.4	5.9	3.2	4.2	4.2	6.3	3.0	4.5
R9S	Sidewalk Northeast Corner	4.4	5.5	3.2	3.9	4.3	5.0	3.1	3.6
R10S	Sidewalk Southeast Corner	3.9	4.4	2.8	3.2	3.9	4.6	2.8	3.3

Source: PHE, Inc., 2002

* Inclusive of ambient CO concentration, NJDEP Perth Amboy monitoring station.

Comparison of the modeled results to the CO 1-hour and 8-hour New Jersey and National Ambient Air Quality Standards of 35 ppm and 9 ppm, respectively, indicate that all of the modeled receptors were well below the standard for all modeled time periods and for both the No Build and Proposed Action scenarios. The Proposed Action scenario does, however, selectively result in slightly increased CO concentrations at certain receptors. NJDEP has identified "de minimus" thresholds of 1.6 ppm for the 1-hour and 0.4 ppm for the 8-hour time periods, if the project indicates the potential for future exceedances of the 1-hour and 8-hour standards of 35 and 9 ppm. An air quality impact is considered significant if these de minimus thresholds are exceeded. Based on the fact that future predicted air quality levels from the proposed ferry terminal do not approach these criteria, the project would not significantly impact air quality.

For the majority of receptors, the primary source of CO pollution came from vehicular emissions at the intersection of Main Street / New Access Road. Parking lot emissions did not have a significant effect on nearby receptors due mainly to the source/receptor distances involved.

Stationary Source

Natural gas is one of the cleanest burning fuels used for heating of domestic and small commercial buildings. Typical domestic natural gas-fired HVAC systems generate 0.0001 lb/cu ft, or less, of nitrogen oxide.

The stationary pollutant emissions from the proposed ferry terminal building would be comparable to that of surrounding residences. Due to the new technology and efficiency of the natural gas-fired HVAC unit to be installed in the proposed ferry terminal building, stationary pollutant emissions from the terminal would be insignificant. In addition, the large source/receptor distances would provide further mitigation.

Since natural gas will be used as fuel, projected annual emissions of particulates will be negligible and emission of nitrogen oxides (NOx) would be less than the threshold for air quality review of stationary sources.

6.0 Conformity Determination

The USEPA promulgated the Transportation Conformity Rules (TCR) under the Clean Air Act Amendments (CAAA). The TCR provides criteria and procedures for Determining Conformity to State Implementation Plans (SIP) of transportation plans, programs, and projects funded or approved under Title 23USC or the Federal Transit Act. This project is located in an Ozone nonattainment area and, hence, conformity determination is required.

The South Amboy Intermodal Transportation Center project is included in the Fiscal Years 2003 – 2005 Statewide Transportation Improvement Program (STIP), Fiscal Year 2002 Transition List. The results of the CO analysis indicate that the CO concentrations will be well below the NAAQS of 1-hour 35 ppm and 8-hour 9 ppm. This project, therefore, conforms to the goals set forth in the Clean Air Act Amendments of 1990 and the Final Conformity Rule.

7.0 Construction Impacts

A temporary increase in air pollution would occur from suspended particulate matter (fugitive dust), particularly during clearing and excavation activities at the Site. Ground clearing activities should be minimal at the Site due to the "construction - ready" nature of the existing ground. Mitigative measures, such as the application of pallatives or the speed restriction of heavy-duty equipment on unpaved surfaces, could also be applied to further reduce fugitive particulate emissions to adjacent areas. Due to the size and phasing of the proposed project, fugitive dust is not anticipated to have a significant impact on air quality.

TECHNICAL ENVIRONMENTAL STUDY

NOISE

Technical Environmental Study

NOISE

1.0 Introduction

The following Technical Environmental Study (TES) describes the results of the noise analysis conducted to determine potential environmental impacts associated with the proposed construction and operation of a ferry facility in South Amboy, New Jersey. The elements of the proposed action would include the provision of access to the site across Main Street; construction of an upland access roadway between Main Street and the ferry parking area, construction of a parking area and ferry terminal; and in-water marine improvements to accommodate the operation of ferry vessels. The marine improvements include dredging of the ferry basin, slips, and access channel, construction of a breakwater and associated slips for the ferry and support vessels, and installation of new replacement bulkhead.

A more detailed description of the proposed action is presented in Sections 1.0 and 3.0 of the Environmental Assessment (EA).

2.0 Existing Noise Conditions

Background

A noise monitoring study was conducted to determine the existing noise characteristics of the project area anticipated to be affected by development of the ferry operation. Specifically, the noise study was designed to (i) collect noise measurements representative of the exposure of adjacent residential receptors to noise levels generated by existing vehicular activities and (ii) use the monitored noise data as a measurement of ambient (i.e., No Build) noise levels.

The study was designed to reflect the collection of noise measurements during both the most sensitive time periods (i.e., nighttime) and time periods with the most vehicular activity (i.e., peak hour). The ambient noise measurement study was conducted for a consecutive 49-hour time period in order to minimize the possibility of anomalous noise events. A site reconnaissance was conducted prior to the initiation of our noise monitoring to (i) help facilitate proper placement of the noise instrument, (ii) obtain an understanding of the neighborhood layout, and (iii) observe periods of vehicular activity, particularly with respect to the truck travel across the ConRail bridge related to McCormick Aggregate. McCormack personnel were not provided notification of the monitoring schedule so as to avoid modification in their operations. In the design and conduct of this noise study reflected, to the extent possible, the intent of the most current New Jersey Department of Environmental Protection (NJDEP) Model Noise Control Ordinance and the City of South Amboy Noise Code.

Program Description

Determination of existing noise conditions consisted of monitoring noise sources at ground level (i.e., microphone elevation at 5 feet) along the McCormack access road boundary and the residence located at 96 Pupek Road (see Figure 1, Noise Monitoring Locations). A location was selected that provided maximum exposure to noise sources, yet was representative of residential sensitive receptor property boundaries.

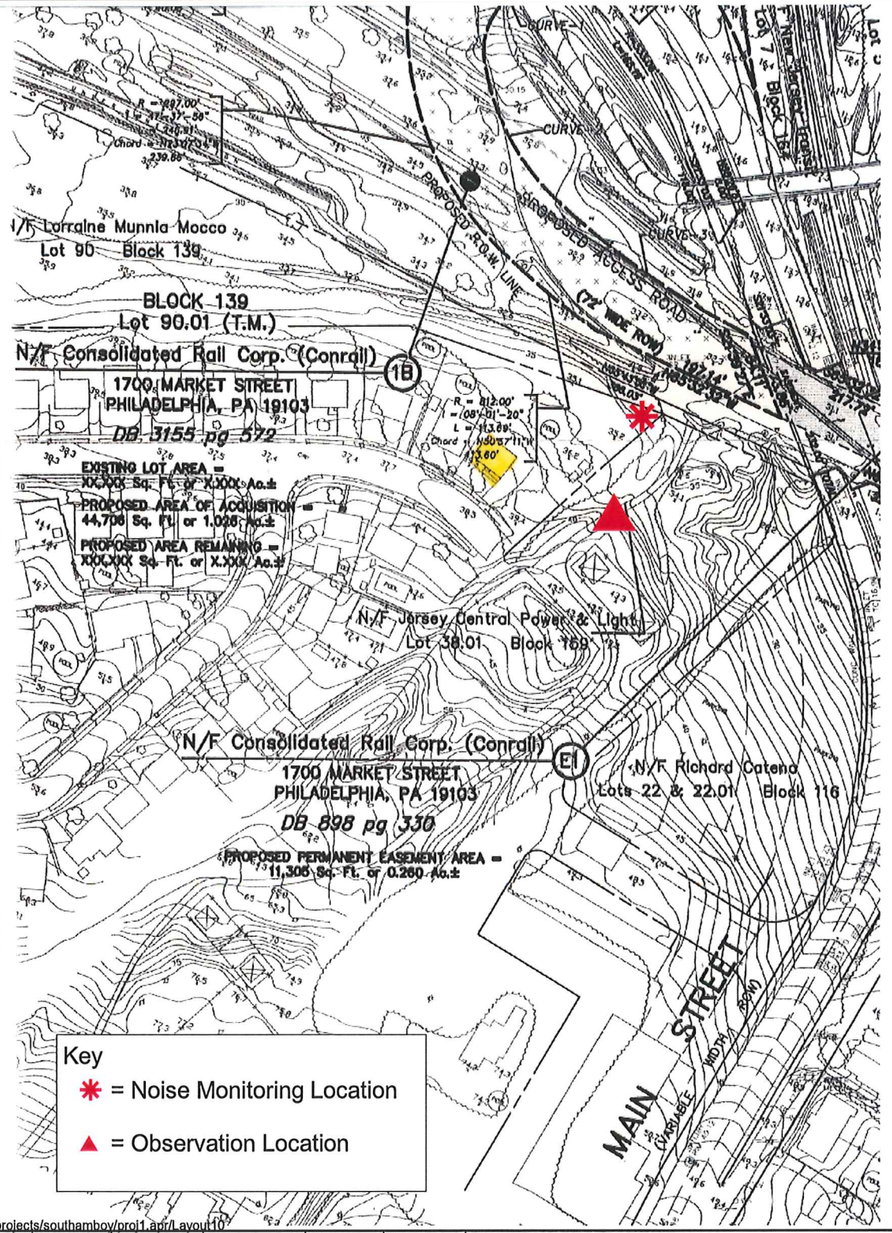
Monitoring was conducted during weekday periods representative of "typical" conditions. The time periods monitored were from 2:00 PM on Tuesday, 7 November 2000 until 2:42 PM on Thursday, 9 November 2000. Several adjacent neighbors had been previously consulted to identify the times at which peak yard activities occur and the times when most of the noise complaints were lodged. Monitored noise data was collected (i.e., datalogged) in 60-minute time increments.

Ambient noise monitoring was conducted using all Type 1 instruments. The entire monitoring system was calibrated prior to and checked after each monitoring session, and set to a "fast" time constant and A-weighting. All instrumentation had a valid and dated factory certification. All measurement procedures conformed to the American National Standards Institute (ANSI) and Federal Highway Administration (FHWA) requirements. Concurrent with noise measurements, monitoring personnel recorded meteorological parameters, obtained photographic records, and noted the character of the noise source. Noise descriptors measured included the Leq(h), Lmax, L1, L5, L10, L50, L90, L95, and L99 (e.g., L10 = noise level exceeded 10% of the time). For this particular study, the most important recorded components of noise were the Leq(h) and Lmax(h). The Leq(h) is the "average" noise descriptor, measured over 1-hour, which more heavily weighs louder sounds. The Lmax(h) is the "maximum" noise descriptor recorded during the specified time interval (1 hour in this case).

Field Observations

From the standpoint of the affected residential receptors, the McCormack operation consisted of heavy-duty dump truck pass-bys on the adjacent access roadway. Due to the City's Noise Code and a history of residential complaints, the McCormack operation does not start until after 7:00 AM on weekdays and occasionally on Saturdays. The trucks tend to queue on the Main Street right-of-way prior to 7:00 AM in an effort to be first in line. Truck activity drops off after 5:00 PM. A nearly steady stream of heavy-duty vehicles (HDV) were observed on the access road between the hours of 7:00 AM and approximately 5:00 PM during the three days PHE personnel were on site. The HDVs were primarily the traditional construction-type dump trucks, with a few container-type trucks mixed in. Vehicle speeds were varied, ranging from approximately 10 to 25 mph, but averaging approximately 20 mph. Traffic counts on the access road are presented in the Table 1.

During the 49-hour monitoring session, weather parameters remained within acceptable limits for noise monitoring. Conditions ranged from clear to mostly cloudy, temperatures ranged from 41° F to 62° F, relative humidity ranged from 44% to 79%, and wind speeds ranged from calm to 10 mph (variable directions).



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136 W. 16th Street
Suite 3E, POB 1206
New York, NY 10011

Noise Monitoring Location
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE: P.H.E.

FIGURE # 1

Table 1:
Summary of Ambient Noise Monitoring
Ambient Noise Study
South Amboy Ferry Terminal EA
7 - 9 November 2000

Date / Time Period	Leq(h) (dBA)	Lmax(h) (dBA)	North B HDV[a]	South B HDV[a]	NB/SB MDV[a]	NB/SB LDV[a]	Extraneous Noises
11/7/00							
1400-1500	59.5	77.7	45	44	0	6	None
1500-1600	59.4	78.2					
1600-1700	58.4	79.6					
1700-1800	58.1	74.2					
1800-1900	57.0	73.7					
1900-2000	56.3	70.4					
2000-2100	54.6	70.9					
2100-2200	53.5	68.6					
2200-2300	51.2	69.6					
2300-0000	56.7	73.8					
11/8/00							
0000-0100	51.7	70.2					
0100-0200	52.3	68.6					
0200-0300	48.3	59.8					
0300-0400	46.9	65.1					
0400-0500	49.9	71.7					
0500-0600	53.3	71.7					
0600-0700	54.1	73.6					
0700-0800	59.1	74.3	37	54	0	4	Train horns – 4
0800-0900	59.4	79.0	34	36	2	4	Train horns – 4 Helicopter – 1 Dog barking – 3
0900-1000	59.0	77.8					
1000-1100	60.3	79.2	40	45	0	13	Truck horn – 1
1100-1200	59.3	76.9					
1200-1300	59.8	78.4					
1300-1400	59.9	76.0					
1400-1500	60.0	75.8	35	41	0	13	Gun range – 1 Lawnmower – 1 Train horn – 1

Table 1:
Summary of Ambient Noise Monitoring (*continued*)
Ambient Noise Study
South Amboy Ferry Terminal EA
7 - 9 November 2000

Date / Time Period	Lavg(h) (dBA)	Lmax(h) (dBA)	North B HDV[a]	South B HDV[a]	NB/SB MDV[a]	NB/SB LDV[a]	Extraneous Noises
1500-1600	59.1	78.3	24	22	2	17[b]	None
1600-1700	59.4	76.6	27	17	0	8	Leaf blower – 2 Train horn – 1
1700-1800	55.2	73.0	5	0	0	1	Gun range – 1 Helicopter – 1
1800-1900	55.6	75.2					
1900-2000	51.5	69.5					
2000-2100	51.1	72.7					
2100-2200	52.3	78.6					
2200-2300	50.7	72.0					
2300-0000	47.4	72.0					
11/9/00							
0000-0100	45.6	57.7					
0100-0200	51.6	72.5					
0200-0300	46.2	67.3					
0300-0400	45.7	61.8					
0400-0500	48.0	63.3					
0500-0600	51.0	64.9					
0600-0700	54.7	68.3					
0700-0800	58.5	78.1					
0800-0900	57.9	79.4					
0900-1000	58.9	82.5					
1000-1100	59.2	78.8					
1100-1200	60.6	87.5					
1200-1300	64.8	85.3					
1300-1400	60.5	75.3					
1400-1442	60.6	78.1					

Source: PHE, Inc., 2000

[a] Vehicular traffic on McCormack operation access road. HDV = heavy-duty vehicles, MDV = medium-d vehicles, LDV = light-duty vehicles, NB = northbound, SB = southbound.
[b] One of the LDV was a motorcycle.

Noise Monitoring Results

Detailed results of the ambient noise monitoring study are presented in the Table 1. The most important recorded components of the noise monitoring data were the Leq(h) and Lmax(h). Because of the number of time intervals recorded, the data is also presented graphically for better interpretation (see bar charts in Figures 2 and 3).

For the entire 49-hour monitoring period, the Leq(h) ranged from 45.6 dBA, between midnight and 1:00 AM on 9 November, to 64.8 dBA, between 12:00 noon and 1:00 PM on 9 November. The Lmax(h) ranged from 57.7 dBA, which occurred between midnight and 1:00 AM on 9 November, to 87.5 dBA, which occurred between 11:00 AM and 12:00 noon on 9 November. The Lmax(h) rarely dropped below 65 dBA, even during nighttime hours.

Comparison to Noise Standards

The noise standard adopted by the City of South Amboy (South Amboy Noise Code, Chapter 97, dated 25 May 1991), specifies a maximum permissible sound level of 50 dBA between the hours of 10:00 PM and 7:00 AM, and 65 dBA between the hours of 7:00 AM and 10:00 PM. These permissible noise levels refer to a residential receiving property with a commercial/industrial noise source, as is the scenario for this study.

At all times during the monitoring session, the maximum permissible sound levels of 50 dBA (10:00 PM to 7:00 AM) and 65 dBA (7:00 AM to 10:00 PM) were exceeded. There were even occasions when the Leq(h) noise level exceeded the maximum permissible sound level of 50 dBA during the 10:00 PM to 7:00 AM time period.

A comparison to FHWA and NJDOT Noise Standards is covered in Section 3 for future scenarios.

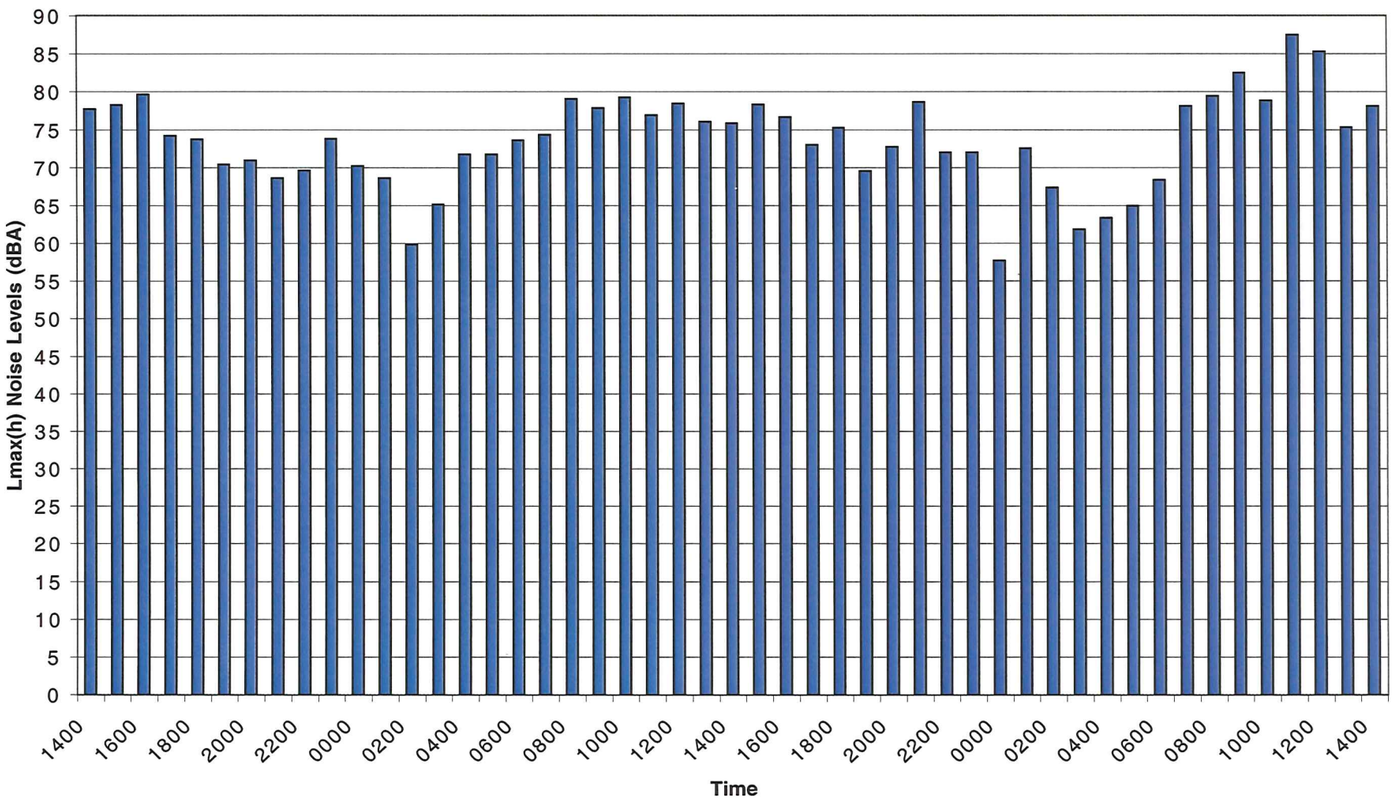
3.0 Project Build Conditions

Background

To some degree, roadway generated noise affects virtually every environment. Actual levels of roadway-generated noise will vary with traffic conditions, and by particular vehicle types. Automobiles are often not the greatest factor controlling peak noise levels. Heavy trucks and buses can, in many cases, be the primary contributors to high ambient noise levels. Exhaust, engine, and tire noises are the primary sources of the high noise levels associated with heavy vehicles. This problem is compounded whenever these vehicles are traveling up a grade.

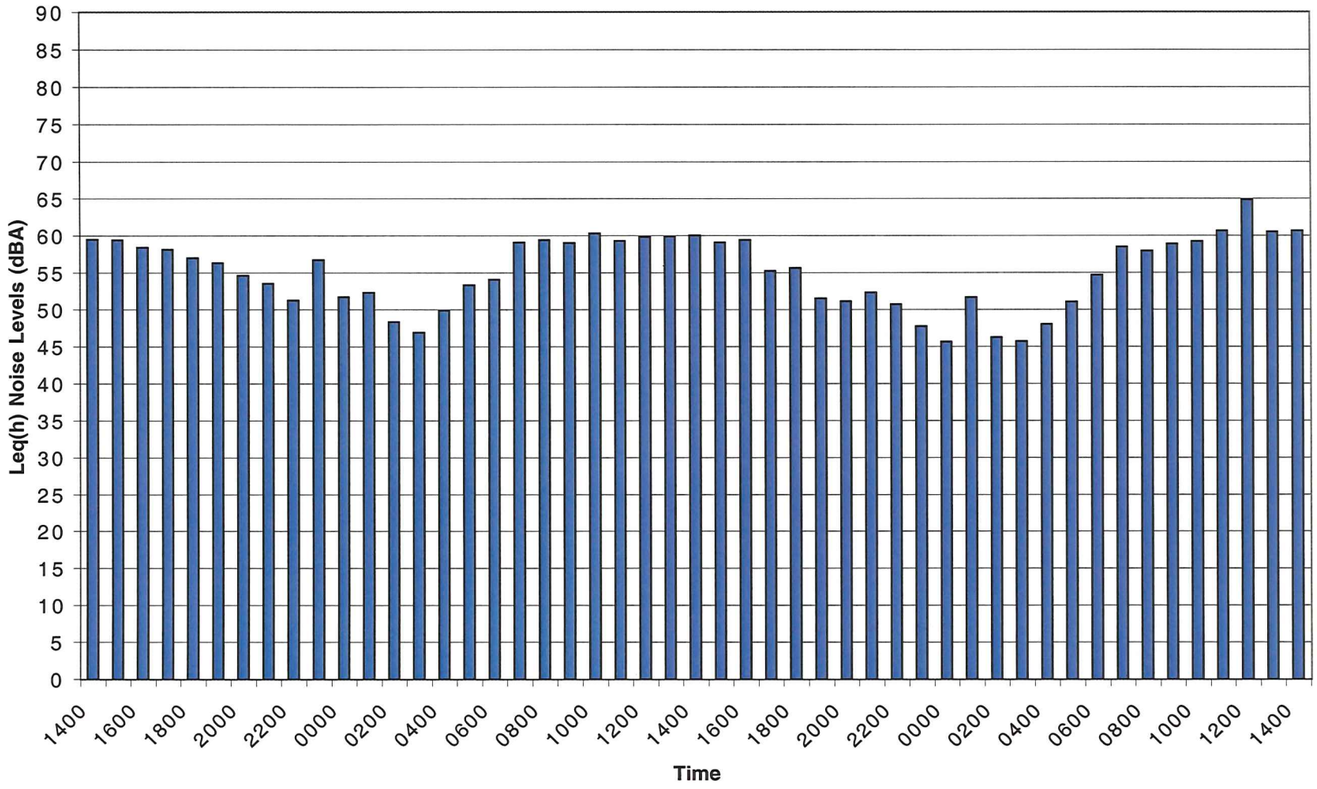
The effects of roadway-generated noise can best be evaluated through an analysis of the impacts it will have on different human activities. Generally, residential uses will be one of the most sensitive to interference caused by high noise levels. The extent to which annoyance to noise levels will be perceived is contingent upon the existing background or ambient noise level. Variations which will create large increases or peaks in background noise levels will be

FIGURE 2: South Amboy EA Noise Monitoring Study 7-9 Nov 2000
Lmax(h) Noise Levels



Source: PHE, Inc. 2000

FIGURE 3: South Amboy EA Noise Monitoring Study 7-9 Nov 2000
Leq(h) Noise Levels



Source: PHE, Inc. 2000

perceived with much more annoyance than those that will blend with the existing background noise levels.

The standard measurement unit of noise is the decibel (dB), generally adjusted to the A-scale (dBA), which corresponds to the frequency response of an average human ear when listening to ordinary, everyday sounds. The A-scale frequency weighting de-emphasizes the noise contribution from the lower frequency noise component and emphasizes the higher frequency noise component where the human ear is most sensitive. Most people can just detect sound level changes of 3 dB outside a controlled laboratory environment, where a 5 dB change is more readily noticeable. A 10 dB change in sound is usually judged as a doubling (or halving) of sound.

Noise Modeling Program

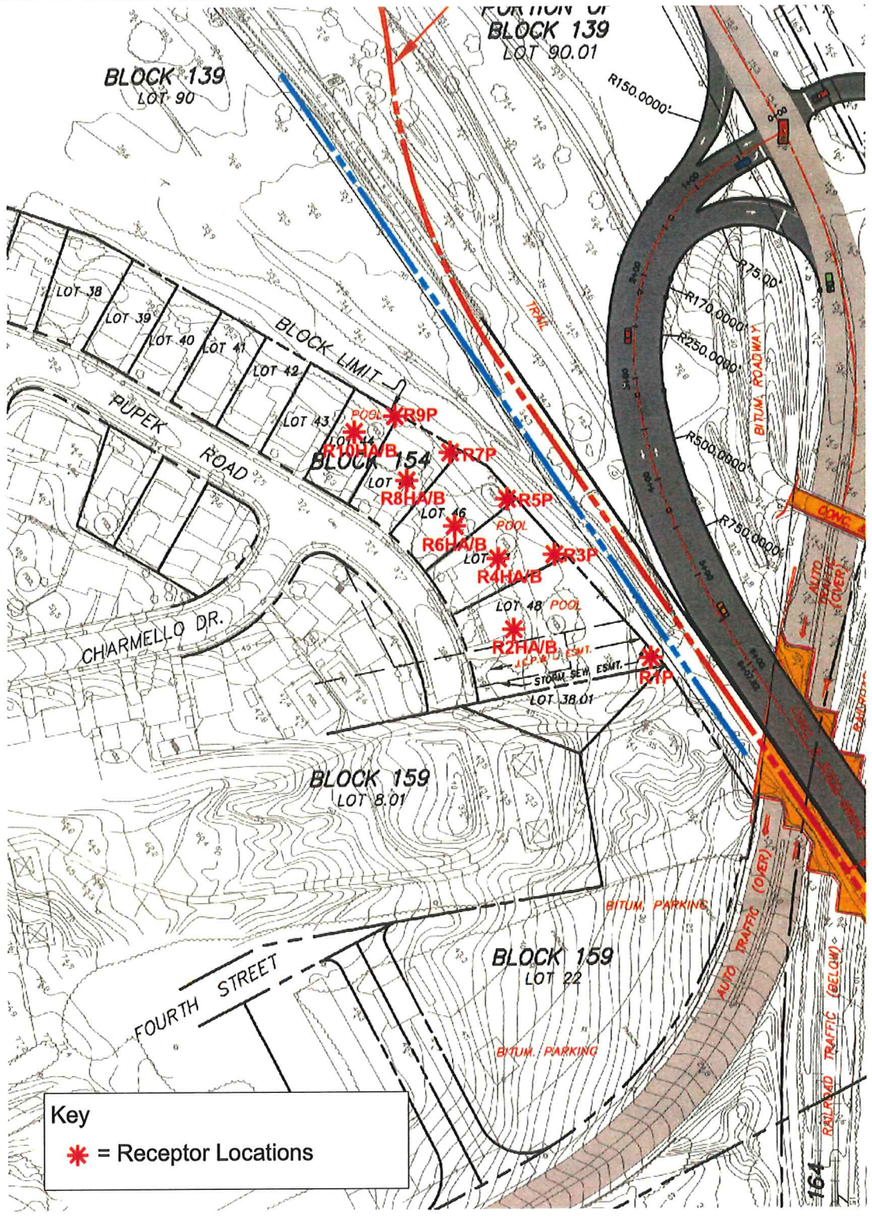
To estimate noise impacts to the nearby residences on Pupek Road due to the proposed construction of a new access road to the ferry terminal, a noise modeling program was conducted. This program utilized STAMINA 2.0, a Federal Highway Administration (FHWA) Level 2 highway traffic noise prediction model. STAMINA 2.0 calculates noise levels along roadway segments using vehicular volumes and speeds and adjusts the noise levels by incorporating vehicular type and roadway grade. The model also calculates noise attenuation by incorporating reflective and absorptive barriers, ground cover, and atmospheric absorption.

Traffic data was provided by CME Associates (see "Traffic Impact Analysis for City of South Amboy, Access Road and Ferry Terminal", December 2002, as presented in the Traffic Technical Environmental Study, Volume II). Noise modeling was conducted at five existing residential locations along Pupek Road, which lies just south of the proposed new access roadway. At each residential property, noise modeling was conducted at the closest property line, and at residential setbacks at multiple heights to simulate 1st floor and 2nd floor elevations. Modeling locations are shown on Figure 4, Noise Modeling Locations. These modeling locations were chosen to represent highest expected noise levels at sensitive residential receptors affected by vehicular noise (primarily the new access roadway) and correspond to one of the monitoring locations (see Section 2, Existing Noise Conditions).

Modeling was performed for the No Build and Proposed Action scenario years of ETC (2003), ETC+10 (2013), and ETC+20 (2023) for both the AM and PM peak hour time periods. The ETC+20 was also the Design Year. Noise contributions from Main Street and the McCormack facility were also included in this study.

Noise Modeling Results

The peak hour predicted noise levels (Leq(h), in dBA) for the selected roadway links and receptors are presented below in Tables 2, 3, and 4.



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DATE:	DRAWN BY:	REVIEWED BY:	SCALE:	PROJECT #	SHEET #
June 2001	MDS	MJM	1"=140'	39.0413	1 OF 1

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Jersey City, NJ 07305

136 W. 16th Street
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New York, NY 10011

Noise Modeling Locations
South Amboy Ferry Terminal Project
South Amboy, New Jersey

SOURCE:	FIGURE #
PHE	4

Table 2: Noise Modeling Results (Peak Hour Leq(h) in dBA)
South Amboy Ferry Terminal EA
ETC Year 2003

Receptor ID	Receptor Description	No Build 2003 AM	Prop Action 2003 AM	No Build 2003 PM	Prop Action 2003 PM
R1P	Block 154, Lot 48 Property line	63.8	63.5	59.6	61.3
R2HA	Block 154, Lot 48 Residence, 1st floor	61.8	61.7	57.8	59.4
R2HB	Block 154, Lot 48 Residence, 2nd floor	62.4	62.3	58.3	59.8
R3P	Block 154, Lot 47 Property line	63.2	62.8	58.7	60.6
R4HA	Block 154, Lot 47 Residence, 1st floor	61.7	61.4	57.5	59.2
R4HB	Block 154, Lot 47 Residence, 2nd floor	62.1	61.9	57.9	59.5
R5P	Block 154, Lot 46 Property line	62.4	61.9	57.9	59.7
R6HA	Block 154, Lot 26 Residence, 1st floor	61.0	60.7	56.9	58.5
R6HB	Block 154, Lot 26 Residence, 2nd floor	61.3	61.1	57.2	58.8
R7P	Block 154, Lot 45 Property line	61.2	60.8	57.0	58.7
R8HA	Block 154, Lot 45 Residence, 1st floor	60.3	60.1	56.3	57.9
R8HB	Block 154, Lot 45 Residence, 2nd floor	60.5	60.3	56.6	58.1
R9P	Block 154, Lot 44 Property line	60.3	60.0	56.3	57.8
R10HA	Block 154, Lot 44 Residence, 1st floor	59.7	59.5	55.8	57.3
R10HB	Block 154, Lot 44 Residence, 2nd floor	59.9	59.7	56.0	57.4

Source: PHE, Inc. 2002

Table 3: Noise Modeling Results (Peak Hour Leq(h) in dBA)
South Amboy Ferry Terminal EA
ETC+10 Year 2013

Receptor ID	Receptor Description	No Build 2013 AM	Prop Action 2013 AM	No Build 2013 PM	Prop Action 2013 PM
R1P	Block 154, Lot 48 Property line	63.8	63.9	59.7	61.9
R2HA	Block 154, Lot 48 Residence, 1st floor	61.8	62.0	57.9	60.0
R2HB	Block 154, Lot 48 Residence, 2nd floor	62.4	62.6	58.4	60.4
R3P	Block 154, Lot 47 Property line	63.2	63.1	58.8	61.2
R4HA	Block 154, Lot 47 Residence, 1st floor	61.7	61.7	57.6	59.8
R4HB	Block 154, Lot 47 Residence, 2nd floor	62.1	62.2	58.0	60.1
R5P	Block 154, Lot 46 Property line	62.4	62.2	58.0	60.4
R6HA	Block 154, Lot 26 Residence, 1st floor	61.0	61.1	57.0	59.1
R6HB	Block 154, Lot 26 Residence, 2nd floor	61.3	61.4	57.3	59.4
R7P	Block 154, Lot 45 Property line	61.2	61.1	57.1	59.3
R8HA	Block 154, Lot 45 Residence, 1st floor	60.4	60.4	56.5	58.5
R8HB	Block 154, Lot 45 Residence, 2nd floor	60.5	60.6	56.7	58.6
R9P	Block 154, Lot 44 Property line	60.3	60.3	56.4	58.4
R10HA	Block 154, Lot 44 Residence, 1st floor	59.7	59.8	56.0	57.9
R10HB	Block 154, Lot 44 Residence, 2nd floor	59.9	60.0	56.1	58.0

Source: PHE, Inc. 2002

Table 4: Noise Modeling Results (Peak Hour Leq(h) in dBA)
South Amboy Ferry Terminal EA
ETC+20 Year 2023 (Design Year)

Receptor ID	Receptor Description	No Build 2023 AM	Prop Action 2023 AM	No Build 2023 PM	Prop Action 2023 PM
R1P	Block 154, Lot 48 Property line	63.8	64.3	59.8	62.5
R2HA	Block 154, Lot 48 Residence, 1st floor	61.9	62.4	58.0	60.6
R2HB	Block 154, Lot 48 Residence, 2nd floor	62.4	63.0	58.5	61.0
R3P	Block 154, Lot 47 Property line	63.2	63.5	58.9	61.8
R4HA	Block 154, Lot 47 Residence, 1st floor	61.7	62.1	57.7	60.4
R4HB	Block 154, Lot 47 Residence, 2nd floor	62.1	62.6	58.1	60.7
R5P	Block 154, Lot 46 Property line	62.4	62.6	58.1	61.0
R6HA	Block 154, Lot 26 Residence, 1st floor	61.0	61.4	57.1	59.7
R6HB	Block 154, Lot 26 Residence, 2nd floor	61.3	61.7	57.4	59.9
R7P	Block 154, Lot 45 Property line	61.3	61.5	57.2	59.8
R8HA	Block 154, Lot 45 Residence, 1st floor	60.4	60.8	56.6	59.1
R8HB	Block 154, Lot 45 Residence, 2nd floor	60.6	61.0	56.8	59.2
R9P	Block 154, Lot 44 Property line	60.4	60.7	56.5	59.0
R10HA	Block 154, Lot 44 Residence, 1st floor	59.8	60.2	56.1	58.4
R10HB	Block 154, Lot 44 Residence, 2nd floor	59.9	60.4	56.2	58.6

Source: PHE, Inc. 2002

The highest modeled noise level (Leq(h)) from the proposed project was 64.3 dBA at receptor R1P, the closest residence property line to the new access roadway, for the 2023 Design Year Proposed Action AM scenario. Differences in noise levels between the No Build and Proposed Action scenarios ranged between –0.5 dBA (a decrease) and +2.9 dBA (an increase). The slight decreases in noise levels due to the Proposed Action scenario occurred only in the 2003 AM peak period, and were a function of a change in vehicular mix due to McCormack operation phase-out.

In general, AM peak periods resulted in higher noise levels than PM peak periods due to higher traffic volumes and a greater mix of heavy-duty vehicles. Due to the growth in background traffic volumes, as well as growth in project usage, noise levels increased slightly in future years for all scenarios.

Comparison to Noise Standards

The most frequently chosen descriptor of roadway noise is the 1-hour equivalent sound level or Leq(h). The Leq(h) is a measure of the total sound energy averaged over the duration of the observation (or modeling) period. The one-hour Leq is used by the Federal Highway Administration (FHWA), the New Jersey Department of Transportation (NJDOT), and the US Department of Housing and Urban Development (US HUD) as a design standard. These standards provide the basis upon which to compare and evaluate predicted noise levels. For highway (roadway) noise, the FHWA promulgates individual States to determine their own noise criteria. In the case of New Jersey, the NJDOT Bureau of Environmental Analysis has chosen an Leq(h) of 66 dBA as a level for noise abatement criteria for residential receptors (property line). Therefore, if a predicted or monitored Leq(h) meets or exceeds 66 dBA during any 1 hour time period, then noise abatement feasibility is required. In addition, predicted traffic noise levels that substantially exceed (10 dBA) existing noise levels are considered criteria for noise abatement. Noise abatement could take on many aspects, such as noise barriers, building design, and/or increases source-receptor distance.

Modeled on-site increases in vehicular noise levels due to proposed project implementation range from –0.5 (a decrease) to +2.9 dBA (Leq(h)) compared to No Build levels. These increments are barely perceptible to the human ear. The highest predicted noise, located at the closest proposed residential receptor (R1P), had an Leq(h) of 64.3 dBA. This is below the NJDOT noise abatement criteria of 66 dBA.

Comparison of the modeled predicted noise levels to the City of South Amboy Noise Code are not possible due to the difference in noise criteria utilized (see Section 2).

4.0 Construction Noise

There will be temporary increased noise associated with on-site construction activities. These noise impacts will only affect the nearby existing residential community to the south. Although it is difficult to accurately predict construction noise, due to the variability of construction techniques, which typically are not mandated to a contractor, general conclusions about

construction noise impacts may be based upon the types of construction work anticipated and types of equipment used. In addition, construction noise would typically be confined to daylight hours during which general background noise levels are higher and perceived annoyance is less. There should be no significant impacts during the noise sensitive evening or nighttime hours. The City of South Amboy Noise Code prohibits construction activities between 6 PM and 7 AM on weekdays (non emergency), weekends, holidays, or when maximum permissible sound levels exceed 50 dBA (10 PM to 7 AM) or 65 dBA (7 AM to 10 PM).

The equipment operating at a specific location will depend upon which phase of the job is occurring at that time. The activities generally breakdown into the following 6 phases:

(1) Demolition - The removal of the existing roadways and debris require the use of cranes, pavement breakers, air compressors, dozers and hand tools. Dump trucks and front end loaders will be used to remove the resulting debris.

(2) Ground clearing - Unwanted vegetation will be removed. Dozers, dump trucks and front end loaders are generally used to accomplish this phase.

(3) Earthwork - The existing topography is altered so as to fit the desired contours of the new site. Equipment involved in the excavation of soils includes dozers, graders, scrapers, earthmovers, and backhoes.

(4) Paving - Pavers, concrete trucks, dump trucks, vibrators, and rollers are utilized in this phase.

(5) Pile Driving – Pile driving will occur in conjunction with construction of the breakwater, ferry pier, and elevated walkway.

(6) Erection - This phase will include bridge construction. The primary extra piece of equipment involved would be a crane.

As some of the noisier phases of construction approach the existing residential receptors to the south, it may be necessary to employ mitigative measures. These would include the use of quieter construction equipment and staggering schedules.

TECHNICAL ENVIRONMENTAL STUDY

SEDIMENTS AND HAZARDOUS MATERIALS

Technical Environmental Study

SEDIMENTS AND HAZARDOUS MATERIALS

1.0 INTRODUCTION

This Technical Environmental Study (TES) describes the results of the sediments and hazardous materials investigations conducted to determine potential environmental impacts associated with the proposed construction and operation of a ferry facility in South Amboy, New Jersey. The elements of the proposed action would include the provision of access to the site across Main Street; construction of an upland access roadway between Main Street and the ferry parking area, construction of a parking area and ferry terminal; and in-water marine improvements to accommodate the operation of ferry vessels. The marine improvements include dredging of the ferry basin, slips, and access channel, construction of a breakwater and associated slips for the ferry and support vessels, and installation of new replacement bulkhead.

A more detailed description of the proposed action is presented in Sections 1.0 and 3.0 of the Environmental Assessment (EA).

2.0 SEDIMENT AND DREDGING

As part of the development of the ferry terminal, approximately 35,000 cubic yards of sediment will require dredging from the subtidal portion of the site. In order to characterize the sediment, a limited sampling and analysis plan was implemented. The sampling plan was approved by NJDEP on 26 February 2001, and required the collection of nine sediment cores to project depth of 10-feet. Each of the nine sample cores was analyzed for grain size, percent moisture, and total organic carbon (TOC). The location of the sample cores is shown in Figure 1, Sediment Sampling Locations. The core samples were then further combined into four composites:

Composite A (Sample cores 1, 2, and 3)
Composite B (Sample cores 4, 5, and 6)
Composite C (Sample cores 7, 8, and 9)
Composite D (Bottom six inches of sample cores 1-9)

Each of the sediment composites was analyzed for grain size, percent moisture, and TOC; bulk sediment chemistry consisting of semi-volatile organics, pesticides, PCBs, dioxin/furans, and metals; and modified elutriate testing. The results of the analyses are presented in Tables 1 through 3 (Characterization of Sediment).

Field ID	Lat Decimal Min	Long Decimal Min
SA-1	4029.45850	7416.57500
SA-2	4029.44866	7416.54566
SA-3	4029.43383	7416.52933
SA-4	4029.45913	7416.50033
SA-5	4029.47666	7416.53566
SA-6	4029.49383	7416.57150
SA-7	4029.51333	7416.56583
SA-8	4029.50133	7416.52833
SA-9	4029.47833	7416.50800

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June 2001	MDS	MJM	1"=130'	39.0413	1 OF 1

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Sediment Sampling Locations
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE:	FIGURE #
PHE	1

Table 1:
Characterization of Sediment
Individual Core Sample Analyses

	Sample ID:	1 Core	2 Core	3 Core	4 Core	5 Core	6 Core	7 Core	8 Core	9 Core
	Lab Sample #:	L4236-1	L4236-2	L4236-3	L4236-4	L4236-5	L4236-6	l-4236-7	l4236-8	l4236-9
	Date Collected:	4/5/01	4/5/01	4/5/01	4/5/01	4/5/01	4/5/01	4/5/01	4/5/01	4/5/01
	Matrix:	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Analyte	Units									
% Moisture	%	11.4	35.6	50.6	61.8	50.7	51.9	58.1	62.8	45.8
% Solid	%	88.6	64.4	49.4	38.2	49.3	48.1	41.9	37.2	54.2
USACOE GRAIN SIZE										
% Gravel	%	2.13	6.59	5.43	0	6.16	1	0	0	1.9
% Sand	%	18.81	59.19	16.69	5.02	11.48	4.54	10.35	25.55	10.04
% Clay	%	49.8	24.34	48.89	58.89	43.42	56.56	18.37	68.13	69.21
% Silt	%	29.26	9.88	28.99	36.09	38.94	37.9	71.28	6.32	18.85
TOC Original	ppm	12700	2270	14600	24300	21300	23100	33700	40600	23600
TOC Duplicate	ppm	13800	2480	14200	25800	20100	21900	32800	43900	21300
TOC Average	ppm	13200	2380	14400	25100	20700	22500	33300	42300	22400
% Solids	%	88.6	64.4	49.4	38.2	49.3	48.1	41.9	37.2	54.2

Source: PHE, Inc. 2001

Table 2:
Characterization of Sediment
Modified Elutriate Testing Results

Sample ID:		Comp. A	Comp. B	Comp. C	Comp. A
Type:		SPLP Extract	SPLP Extract	SPLP Extract	MEP Elutriate Total
Lab Sample #:		L2440-1	L2440-2	L2440-3	L2440-4
Date Collected:		4/13/01	4/13/01	4/13/01	4/13/01
Matrix:		liquid	liquid	liquid	liquid
Analyte	**Units**				
TCL SEMIVOLATILES					
Phenol	ppb	<0.56	<0.56	<0.56	<0.56
bis(2-Chloroethyl)ether	ppb	<1.03	<1.03	<1.03	<1.03
2-Chlorophenol	ppb	<0.96	<0.96	<0.96	<0.96
1,3-Dichlorobenzene	ppb	<0.99	<0.99	<0.99	<0.99
1,4-Dichlorobenzene	ppb	<0.89	<0.89	<0.89	<0.89
1,2-Dichlorobenzene	ppb	<0.94	<0.94	<0.94	<0.94
2-Methylphenol	ppb	<0.99	<0.99	<0.99	<0.99
bis(2-Chloroisopropyl)ether	ppb	<1.12	<1.12	<1.12	<1.12
3+4-Methylphenol	ppb	<0.83	<0.83	<0.83	<0.83
N-Nitrosodi-n-propylamine	ppb	<0.80	<0.80	<0.80	<0.80
Hexachloroethane	ppb	<0.73	<0.73	<0.73	<0.73
Nitrobenzene	ppb	<0.93	<0.93	<0.93	<0.93
Isophorone	ppb	<0.82	<0.82	<0.82	<0.82
2-Nitrophenol	ppb	<0.88	<0.88	<0.88	<0.88
2,4-Dimethylphenol	ppb	<1.13	<1.13	<1.13	<1.13
bis(2-Chloroethoxy)methane	ppb	<0.76	<0.76	<0.76	<0.76
2,4-Dichlorophenol	ppb	<0.72	<0.72	<0.72	<0.72
1,2,4-Trichlorobenzene	ppb	<0.96	<0.96	<0.96	<0.96
Naphthalene	ppb	0.25	0.96	0.2	<0.99
4-Chloroaniline	ppb	<0.63	<0.63	<0.63	<0.63
Hexachlorobutadiene	ppb	<0.96	<0.96	<0.96	<0.96
4-Chloro-3-methylphenol	ppb	<0.94	<0.94	<0.94	<0.94
2-Methylnaphthalene	ppb	0.23	0.56	0.26	<0.84
Hexachlorocyclopentadiene	ppb	<7.09	<7.09	<7.09	<7.09
2,4,6-Trichlorophenol	ppb	<0.78	<0.78	<0.78	<0.78
2,4,5-Trichlorophenol	ppb	<0.54	<0.54	<0.54	<0.54
2-Chloronaphthalene	ppb	<0.87	<0.87	<0.87	<0.87
2-Nitroaniline	ppb	<0.95	<0.95	<0.95	<0.95
Dimethylphthalate	ppb	<1.30	<1.30	<1.30	<1.30
Acenaphthylene	ppb	<0.86	<0.86	<0.86	<0.86
2,6-Dinitrotoluene	ppb	<0.84	<0.84	<0.84	<0.84
3-Nitroaniline	ppb	<0.58	<0.58	<0.58	<0.58
Acenaphthene	ppb	<1.00	1.5	<1.00	<1.00
2,4-Dinitrophenol	ppb	<3.67	<3.67	<3.67	<3.67
4-Nitrophenol	ppb	<2.12	<2.12	<2.12	<2.12
Dibenzofuran	ppb	<0.83	<0.83	<0.83	<0.83
2,4-Dinitrotoluene	ppb	<0.68	<0.68	<0.68	<0.68
Diethylphthalate	ppb	0.22	<14.3	<14.3	0.99
4-Chlorophenyl phenyl ether	ppb	<0.76	<0.76	<0.76	<0.76
Fluorene	ppb	<0.82	1.3	<0.82	<0.82
4-Nitroaniline	ppb	<0.70	<0.70	<0.70	<0.70
4,6-Dinitro-2-methylphenol	ppb	<5.70	<5.70	<5.70	<5.70
N-Nitrosodiphenylamine	ppb	<0.67	<0.67	<0.67	<0.67
4-Bromophenyl phenyl ether	ppb	<0.72	<0.72	<0.72	<0.72
Hexachlorobenzene	ppb	<0.69	<0.69	<0.69	<0.69
Pentachlorophenol	ppb	<0.33	<0.33	<0.33	<0.33
Phenanthrene	ppb	<0.64	1.8	0.22	<0.64
Anthracene	ppb	<0.67	0.33	<0.67	<0.67
Carbazole	ppb	<0.65	0.46	<0.65	<0.65
Di-n-butylphthalate	ppb	0.97	0.71	0.8	0.85
Fluoranthene	ppb	<0.53	<0.53	<0.53	<0.53
Pyrene	ppb	<0.76	<0.76	<0.76	<0.76
Butylbenzylphthalate	ppb	<3.48	<3.48	<3.48	<3.48
3,3'-Dichlorobenzidine	ppb	<0.52	<0.52	<0.52	<0.52
Benzo(a)anthracene	ppb	<0.64	<0.64	<0.64	<0.64
Chrysene	ppb	<0.52	<0.52	<0.52	<0.52
bis(2-Ethylhexyl)phthalate	ppb	1.3	1.2	1.7	1.3
Di-n-octylphthalate	ppb	<1.04	<1.04	<1.04	<1.04
Benzo(b)fluoranthene	ppb	<0.81	<0.81	<0.81	<0.81
Benzo(k)fluoranthene	ppb	<0.92	<0.92	<0.92	<0.92
Benzo(a)pyrene	ppb	<0.70	<0.70	<0.70	<0.70
Indeno(1,2,3-cd)pyrene	ppb	<0.58	<0.58	<0.58	<0.58
Dibenz(a,h)anthracene	ppb	<0.66	<0.66	<0.66	<0.66
Benzo(g,h,i)perylene	ppb	<0.62	<0.62	<0.62	<0.62

Source: PHE, Inc. 2001

Table 2:
Characterization of Sediment
Modified Elutriate Testing Results

Sample ID:		Comp. A	Comp. B	Comp. C	Comp. A
Type:		SPLP Extract	SPLP Extract	SPLP Extract	MEP Elutriate Total
Lab Sample #:		L2440-1	L2440-2	L2440-3	L2440-4
Date Collected:		4/13/01	4/13/01	4/13/01	4/13/01
Matrix:		liquid	liquid	liquid	liquid
Analyte	**Units**				
TCL PCBs (AROCHLOR)					
PCB 1016	ppb	<0.080	<0.080	<0.080	<0.080
PCB 1221	ppb	<0.030	<0.030	<0.030	<0.030
PCB 1232	ppb	<0.11	<0.11	<0.11	<0.11
PCB 1242	ppb	<0.020	<0.020	<0.020	<0.020
PCB 1248	ppb	<0.090	<0.090	<0.090	<0.090
PCB 1254	ppb	<0.040	<0.040	<0.040	<0.040
PCB 1260	ppb	<0.080	<0.080	<0.080	<0.080
TCL PESTICIDES					
alpha-BHC	ppb	<0.0040	<0.0040	<0.0040	<0.0040
beta-BHC	ppb	<0.0090	<0.0090	<0.0090	<0.0090
delta-BHC	ppb	<0.0040	<0.0040	<0.0040	<0.0040
gamma-BHC (Lindane)	ppb	<0.0030	<0.0030	<0.0030	<0.0030
Heptachlor	ppb	<0.0040	<0.0040	<0.0040	<0.0040
Aldrin	ppb	<0.0040	<0.0040	<0.0040	<0.0040
Heptachlor epoxide	ppb	<0.0030	<0.0030	<0.0030	<0.0030
Endosulfan I	ppb	<0.0030	<0.0030	<0.0030	<0.0030
Dieldrin	ppb	<0.0040	<0.0040	<0.0040	<0.0040
4,4'-DDE	ppb	<0.0020	<0.0020	<0.0020	<0.0020
Endrin	ppb	<0.0020	<0.0020	<0.0020	<0.0020
Endosulfan II	ppb	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDD	ppb	<0.0040	<0.0040	<0.0040	<0.0040
Endosulfan sulfate	ppb	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	ppb	<0.0040	<0.0040	<0.0040	<0.0040
Methoxychlor	ppb	<0.0040	<0.0040	<0.0040	<0.0040
Endrin ketone	ppb	<0.0060	<0.0060	<0.0060	<0.0060
Endrin aldehyde	ppb	<0.0040	<0.0040	<0.0040	<0.0040
alpha-Chlordane	ppb	<0.0020	<0.0020	<0.0020	<0.0020
gamma-Chlordane	ppb	<0.0050	<0.0050	<0.0050	<0.0050
Toxaphene	ppb	<1.07	<1.07	<1.07	<1.07
DIOXINS					
2,3,7,8-TCDD	pg/L	<2.30	<1.70	<3.70	<1.50
1,2,3,7,8-PeCDD	pg/L	<2.60	<2.10	<4.90	<1.90
1,2,3,4,7,8-HxCDD	pg/L	<2.80	<2.40	<5.40	<2.20
1,2,3,6,7,8-HxCDD	pg/L	<2.90	<2.50	<5.50	<2.20
1,2,3,7,8,9-HxCDD	pg/L	<2.90	<2.50	<5.50	<2.20
1,2,3,4,6,7,8-HpCDD	pg/L	<5.40	<4.30	<9.90	<4.50
1,2,3,4,6,7,8,9-OCDD	pg/L	54	106	56.7	72.2
2,3,7,8-TCDF	pg/L	<2.30	<1.80	<3.80	<1.30
1,2,3,7,8-PeCDF	pg/L	<2.10	<1.60	<3.80	<1.50
2,3,4,7,8-PeCDF	pg/L	<2.10	<1.60	<3.80	<1.60
1,2,3,4,7,8-HxCDF	pg/L	<2.20	<1.60	<3.90	<1.70
1,2,3,6,7,8-HxCDF	pg/L	<2.10	<1.60	<3.80	<1.70
2,3,4,6,7,8-HxCDF	pg/L	<2.40	<1.80	<4.40	<1.90
1,2,3,7,8,9-HxCDF	pg/L	<2.90	<2.10	<5.20	<2.30
1,2,3,4,6,7,8-HpCDF	pg/L	<3.40	<2.30	<5.90	<2.70
1,2,3,4,7,8,9-HpCDF	pg/L	<4.70	<3.20	<8.20	<3.70
1,2,3,4,6,7,8,9-OCDF	pg/L	<7.30	<5.50	<13.8	<4.90
Total TCDD	pg/L	<2.30	<1.70	<3.70	<1.50
Total PeCDD	pg/L	<2.60	<2.10	<4.90	<1.90
Total HxCDD	pg/L	<2.90	<2.50	<5.50	6
Total HpCDD	pg/L	<5.40	7.6	<9.90	<4.50
Total TCDF	pg/L	<2.30	<1.80	<3.80	<1.30
Total PeCDF	pg/L	<2.10	<1.60	<3.80	<1.60
Total HxCDF	pg/L	<2.30	<1.70	<4.30	<1.90
Total HpCDF	pg/L	<4.00	<2.70	<6.90	<3.10

Source: PHE, Inc. 2001

Table 2:
Characterization of Sediment
Modified Elutriate Testing Results

Sample ID:		Comp. A	Comp. B	Comp. C	Comp. A
Type:		SPLP Extract	SPLP Extract	SPLP Extract	MEP Elutriate Total
Lab Sample #:		L2440-1	L2440-2	L2440-3	L2440-4
Date Collected:		4/13/01	4/13/01	4/13/01	4/13/01
Matrix:		liquid	liquid	liquid	liquid
Analyte	**Units**				
TAL METALS (EPA7000 Series)					
Aluminum	ppm	0.43	<0.10	<0.10	2.96
Antimony	ppm	<0.0057	<0.0057	<0.0057	<0.0057
Arsenic	ppm	<0.0038	<0.0038	0.071	<0.0038
Barium	ppm	0.35	0.22	0.2	0.099
Beryllium	ppm	<0.0011	<0.0011	<0.0011	<0.0011
Cadmium	ppm	<0.0011	0.002	0.005	<0.0011
Calcium	ppm	4.76	5.24	7.7	185
Chromium	ppm	<0.0011	<0.0011	<0.0011	<0.0011
Cobalt	ppm	0.002	0.001	<0.0011	<0.0011
Copper	ppm	0.004	0.001	0.005	<0.0011
Iron	ppm	0.36	0.25	0.14	0.52
Lead	ppm	<0.0014	0.001	<0.0014	<0.0014
Magnesium	ppm	7.32	13.7	24.8	595
Manganese	ppm	0.043	0.047	0.017	0.52
Nickel	ppm	0.003	0.002	0.005	0.005
Potassium	ppm	15.7	28.1	41.5	229
Selenium	ppm	<0.0020	<0.0020	<0.0020	<0.0020
Silver	ppm	0.003	0.002	0.004	0.024
Sodium	ppm	127	241	399	5910
Thallium	ppm	<0.0020	<0.0020	<0.0020	<0.0020
Vanadium	ppm	0.006	0.007	0.011	<0.0011
Zinc	ppm	0.074	0.17	0.14	0.026
Mercury, Total	ppm	0.00006	0.000083	0.000064	0.000065
Cyanide (Method 335.2)	ppm	0.004	0.002	0.004	<0.0030
TOTAL SUSPENDED SOLIDS (Method 2540D)					
Total Suspended Solid	mg/L	NR	NR	NR	35

Source: PHE, Inc. 2001

Table 2:
Characterization of Sediment
Modified Elutriate Testing Results

Sample ID:		Comp. A	Comp. B	Comp. B	Comp. C	Comp. C
Type:		MEP Elutriate Diss	MEP Elutriate Total	MEP Elutriate Diss	MEP Elutriate Total	MEP Elutriate Diss
Lab Sample #:		L2440-5	L2440-6	L2440-7	L2440-8	L2440-9
Date Collected:		4/13/01	4/13/01	4/13/01	4/13/01	4/13/01
Matrix:		liquid	liquid	liquid	liquid	liquid
Analyte	**Units**					
TCL SEMIVOLATILES						
Phenol	ppb	<0.56	<0.56	<0.56	<0.56	<0.56
bis(2-Chloroethyl)ether	ppb	<1.03	<1.03	<1.03	<1.03	<1.03
2-Chlorophenol	ppb	<0.96	<0.96	<0.96	<0.96	<0.96
1,3-Dichlorobenzene	ppb	<0.99	<0.99	<0.99	<0.99	<0.99
1,4-Dichlorobenzene	ppb	<0.89	<0.89	<0.89	<0.89	<0.89
1,2-Dichlorobenzene	ppb	<0.94	<0.94	<0.94	<0.94	<0.94
2-Methylphenol	ppb	<0.99	<0.99	<0.99	<0.99	<0.99
bis(2-Chloroisopropyl)ether	ppb	<1.12	<1.12	<1.12	<1.12	<1.12
3+4-Methylphenol	ppb	<0.83	<0.83	<0.83	<0.83	<0.83
N-Nitrosodi-n-propylamine	ppb	<0.80	<0.80	<0.80	<0.80	<0.80
Hexachloroethane	ppb	<0.73	<0.73	<0.73	<0.73	<0.73
Nitrobenzene	ppb	<0.93	<0.93	<0.93	<0.93	<0.93
Isophorone	ppb	<0.82	<0.82	<0.82	<0.82	<0.82
2-Nitrophenol	ppb	<0.88	<0.88	<0.88	<0.88	<0.88
2,4-Dimethylphenol	ppb	<1.13	<1.13	<1.13	<1.13	<1.13
bis(2-Chloroethoxy)methane	ppb	<0.76	<0.76	<0.76	<0.76	<0.76
2,4-Dichlorophenol	ppb	<0.72	<0.72	<0.72	<0.72	<0.72
1,2,4-Trichlorobenzene	ppb	<0.96	<0.96	<0.96	<0.96	<0.96
Naphthalene	ppb	<0.99	<0.99	<0.99	<0.99	<0.99
4-Chloroaniline	ppb	<0.63	<0.63	<0.63	<0.63	<0.63
Hexachlorobutadiene	ppb	<0.96	<0.96	<0.96	<0.96	<0.96
4-Chloro-3-methylphenol	ppb	<0.94	<0.94	<0.94	<0.94	<0.94
2-Methylnaphthalene	ppb	<0.84	<0.84	<0.84	<0.84	<0.84
Hexachlorocyclopentadiene	ppb	<7.09	<7.09	<7.09	<7.09	<7.09
2,4,6-Trichlorophenol	ppb	<0.78	<0.78	<0.78	<0.78	<0.78
2,4,5-Trichlorophenol	ppb	<0.54	<0.54	<0.54	<0.54	<0.54
2-Chloronaphthalene	ppb	<0.87	<0.87	<0.87	<0.87	<0.87
2-Nitroaniline	ppb	<0.95	<0.95	<0.95	<0.95	<0.95
Dimethylphthalate	ppb	<1.30	<1.30	<1.30	<1.30	<1.30
Acenaphthylene	ppb	<0.86	<0.86	<0.86	<0.86	<0.86
2,6-Dinitrotoluene	ppb	<0.84	<0.84	<0.84	<0.84	<0.84
3-Nitroaniline	ppb	<0.58	<0.58	<0.58	<0.58	<0.58
Acenaphthene	ppb	<1.00	0.27	0.6	<1.00	<1.00
2,4-Dinitrophenol	ppb	<3.67	<3.67	<3.67	<3.67	<3.67
4-Nitrophenol	ppb	<2.12	<2.12	<2.12	<2.12	<2.12
Dibenzofuran	ppb	<0.83	<0.83	<0.83	<0.83	<0.83
2,4-Dinitrotoluene	ppb	<0.68	<0.68	<0.68	<0.68	<0.68
Diethylphthalate	ppb	1.3	0.62	0.55	0.31	0.74
4-Chlorophenyl phenyl ether	ppb	<0.76	<0.76	<0.76	<0.76	<0.76
Fluorene	ppb	<0.82	<0.82	0.3	<0.82	<0.82
4-Nitroaniline	ppb	<0.70	<0.70	<0.70	<0.70	<0.70
4,6-Dinitro-2-methylphenol	ppb	<5.70	<5.70	<5.70	<5.70	<5.70
N-Nitrosodiphenylamine	ppb	<0.67	<0.67	<0.67	<0.67	<0.67
4-Bromophenyl phenyl ether	ppb	<0.72	<0.72	<0.72	<0.72	<0.72
Hexachlorobenzene	ppb	<0.69	<0.69	<0.69	<0.69	<0.69
Pentachlorophenol	ppb	<0.33	<0.33	<0.33	<0.33	<0.33
Phenanthrene	ppb	<0.64	<0.64	0.3	<0.64	<0.64
Anthracene	ppb	<0.67	<0.67	<0.67	<0.67	<0.67
Carbazole	ppb	<0.65	<0.65	<0.65	<0.65	<0.65
Di-n-butylphthalate	ppb	1.1	1.3	1.2	1.3	2.2
Fluoranthene	ppb	<0.53	<0.53	<0.53	<0.53	<0.53
Pyrene	ppb	<0.76	<0.76	<0.76	<0.76	<0.76
Butylbenzylphthalate	ppb	<3.48	<3.48	<3.48	<3.48	<3.48
3,3'-Dichlorobenzidine	ppb	<0.52	<0.52	<0.52	<0.52	<0.52
Benzo(a)anthracene	ppb	<0.64	<0.64	<0.64	<0.64	<0.64
Chrysene	ppb	<0.52	<0.52	<0.52	<0.52	<0.52
bis(2-Ethylhexyl)phthalate	ppb	1.7	2.6	1.6	3	3.4
Di-n-octylphthalate	ppb	<1.04	<1.04	<1.04	<1.04	<1.04
Benzo(b)fluoranthene	ppb	<0.81	<0.81	<0.81	<0.81	<0.81
Benzo(k)fluoranthene	ppb	<0.92	<0.92	<0.92	<0.92	<0.92
Benzo(a)pyrene	ppb	<0.70	<0.70	<0.70	<0.70	<0.70
Indeno(1,2,3-cd)pyrene	ppb	<0.58	<0.58	<0.58	<0.58	<0.58
Dibenz(a,h)anthracene	ppb	<0.66	<0.66	<0.66	<0.66	<0.66
Benzo(g,h,i)perylene	ppb	<0.62	<0.62	<0.62	<0.62	<0.62

Source: PHE, Inc. 2001

Table 2:
Characterization of Sediment
Modified Elutriate Testing Results

Sample ID:		Comp. A	Comp. B	Comp. B	Comp. C	Comp. C
Type:		MEP Elutriate Diss	MEP Elutriate Total	MEP Elutriate Diss	MEP Elutriate Total	MEP Elutriate Diss
Lab Sample #:		L2440-5	L2440-6	L2440-7	L2440-8	L2440-9
Date Collected:		4/13/01	4/13/01	4/13/01	4/13/01	4/13/01
Matrix:		liquid	liquid	liquid	liquid	liquid
Analyte	**Units**					
TCL PCBs (AROCHLOR)						
PCB 1016	ppb	<0.080	<0.080	<0.080	<0.080	<0.080
PCB 1221	ppb	<0.030	<0.030	<0.030	<0.030	<0.030
PCB 1232	ppb	<0.11	<0.11	<0.11	<0.11	<0.11
PCB 1242	ppb	<0.020	<0.020	<0.020	<0.020	<0.020
PCB 1248	ppb	<0.090	<0.090	<0.090	<0.090	<0.090
PCB 1254	ppb	<0.040	<0.040	<0.040	<0.040	<0.040
PCB 1260	ppb	<0.080	<0.080	<0.080	<0.080	<0.080
TCL PESTICIDES						
alpha-BHC	ppb	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
beta-BHC	ppb	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090
delta-BHC	ppb	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
gamma-BHC (Lindane)	ppb	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Heptachlor	ppb	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Aldrin	ppb	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Heptachlor epoxide	ppb	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Endosulfan I	ppb	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dieldrin	ppb	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
4,4'-DDE	ppb	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Endrin	ppb	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Endosulfan II	ppb	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDD	ppb	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Endosulfan sulfate	ppb	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	ppb	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Methoxychlor	ppb	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Endrin ketone	ppb	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Endrin aldehyde	ppb	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
alpha-Chlordane	ppb	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
gamma-Chlordane	ppb	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Toxaphene	ppb	<1.07	<1.07	<1.07	<1.07	<1.07
DIOXINS						
2,3,7,8-TCDD	pg/L	<1.60	<1.60	<1.70	<1.40	<1.00
1,2,3,7,8-PeCDD	pg/L	<2.10	<2.20	<2.40	<1.80	<1.40
1,2,3,4,7,8-HxCDD	pg/L	<2.20	<2.30	<2.50	1.9	<1.50
1,2,3,6,7,8-HxCDD	pg/L	<2.20	<2.40	<2.50	4	<1.50
1,2,3,7,8,9-HxCDD	pg/L	<2.30	<2.40	<2.50	3.5	<1.50
1,2,3,4,6,7,8-HpCDD	pg/L	<4.40	5.3	<4.60	22.1	<2.20
1,2,3,4,6,7,8,9-OCDD	pg/L	<6.20	310	<7.00	555	6.4
2,3,7,8-TCDF	pg/L	<1.50	<1.60	<1.70	<1.30	<1.10
1,2,3,7,8-PeCDF	pg/L	<1.50	<1.60	<1.70	3.7	<1.00
2,3,4,7,8-PeCDF	pg/L	<1.60	<1.60	<1.80	<1.40	<1.00
1,2,3,4,7,8-HxCDF	pg/L	<1.90	2.2	<1.80	5.3	1.8
1,2,3,6,7,8-HxCDF	pg/L	<1.90	<1.70	<1.80	<1.40	<0.90
2,3,4,6,7,8-HxCDF	pg/L	<2.10	<1.90	<2.00	2.6	<1.00
1,2,3,7,8,9-HxCDF	pg/L	<2.50	<2.30	<2.40	<1.90	<1.20
1,2,3,4,6,7,8-HpCDF	pg/L	<3.40	<2.90	<3.10	9.7	<1.40
1,2,3,4,7,8,9-HpCDF	pg/L	<4.80	<4.00	<4.30	<3.20	<1.90
1,2,3,4,6,7,8,9-OCDF	pg/L	<5.00	<5.70	<5.70	11.8	<2.90
Total TCDD	pg/L	<1.60	<1.60	<1.70	<1.40	<1.00
Total PeCDD	pg/L	<2.10	<2.20	<2.40	<1.80	<1.40
Total HxCDD	pg/L	3.6	4.1	<2.50	25.5	8.9
Total HpCDD	pg/L	<4.40	15.2	<4.60	58.2	<2.20
Total TCDF	pg/L	<1.50	<1.60	<1.70	<1.30	<1.10
Total PeCDF	pg/L	<1.60	<1.60	<1.80	3.7	<1.00
Total HxCDF	pg/L	<2.10	2.2	<2.00	7.9	1.8
Total HpCDF	pg/L	<4.00	<3.40	<3.60	16.8	<1.60

Source: PHE, Inc. 2001

Table 2:
Characterization of Sediment
Modified Elutriate Testing Results

Sample ID:		Comp. A	Comp. B	Comp. B	Comp. C	Comp. C
Type:		MEP Elutriate Diss	MEP Elutriate Total	MEP Elutriate Diss	MEP Elutriate Total	MEP Elutriate Diss
Lab Sample #:		L2440-5	L2440-6	L2440-7	L2440-8	L2440-9
Date Collected:		4/13/01	4/13/01	4/13/01	4/13/01	4/13/01
Matrix:		liquid	liquid	liquid	liquid	liquid
Analyte	Units					
TAL METALS (EPA7000 Series)						
Aluminum	ppm	3.32	3.43	2.64	4	3.23
Antimony	ppm	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057
Arsenic	ppm	<0.0038	<0.0038	<0.0038	0.056	<0.0038
Barium	ppm	0.12	0.14	0.15	0.097	0.24
Beryllium	ppm	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Cadmium	ppm	<0.0011	<0.0011	<0.0011	0.002	<0.0011
Calcium	ppm	207	179	194	207	213
Chromium	ppm	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Cobalt	ppm	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Copper	ppm	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Iron	ppm	0.24	4.26	0.27	3.28	0.16
Lead	ppm	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
Magnesium	ppm	653	620	582	647	640
Manganese	ppm	0.56	0.18	0.17	0.19	0.18
Nickel	ppm	0.002	<0.0011	<0.0011	0.002	0.002
Potassium	ppm	252	236	222	248	243
Selenium	ppm	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Silver	ppm	0.024	0.023	0.024	0.021	0.022
Sodium	ppm	6540	6180	5780	6440	6380
Thallium	ppm	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Vanadium	ppm	<0.0011	0.001	<0.0011	0.003	0.008
Zinc	ppm	0.037	0.03	0.025	0.035	0.07
Mercury, Total	ppm	0.000066	0.000094	0.000065	0.00023	0.000087
Cyanide (Method 335.2)	ppm	0.002	0.002	0.002	0.002	0.001
TOTAL SUSPENDED SOLIDS (Me						
Total Suspended Solid	mg/L	NR	50	NR	42	NR

Source: PHE, Inc. 2001

Table 3:
Characterization of Sediment
Sediment Bulk Chemistry

Sample ID:		A Composite	B Composite	C Composite	D Composite
Lab Sample #:		L4236-10	L4236-11	L4236-12	L4236-13
Date Collected:		4/5/01	4/5/01	4/5/01	4/5/01
Matrix:		Sediment	Sediment	Sediment	Sediment
Analyte	Units				
TCL SEMIVOLATILES					
Phenol	ppb	<29.1	<36.0	<42.9	<33.3
bis(2-Chloroethyl)ether	ppb	<36.6	<45.3	<54.0	<41.8
2-Chlorophenol	ppb	<30.1	<37.2	<44.4	<34.4
1,3-Dichlorobenzene	ppb	<36.6	<45.2	<53.9	<41.8
1,4-Dichlorobenzene	ppb	<37.4	<46.2	<55.0	<42.7
1,2-Dichlorobenzene	ppb	<37.8	<46.7	<55.6	<43.1
2-Methylphenol	ppb	<30.0	<37.1	<44.2	<34.3
bis(2-Chloroisopropyl)ether	ppb	<21.9	<27.0	<32.2	<25.0
3+4-Methylphenol	ppb	<24.6	<30.4	<36.2	<28.1
N-Nitrosodi-n-propylamine	ppb	<30.5	<37.7	<45.0	<34.9
Hexachloroethane	ppb	<38.0	<47.0	<56.0	<43.4
Nitrobenzene	ppb	<42.0	<51.9	<61.8	<47.9
Isophorone	ppb	<28.3	<34.9	<41.6	<32.3
2-Nitrophenol	ppb	<32.2	<39.8	<47.5	<36.8
2,4-Dimethylphenol	ppb	<18.1	<22.4	<26.6	<20.6
bis(2-Chloroethoxy)methane	ppb	<33.2	<41.0	<48.9	<37.9
2,4-Dichlorophenol	ppb	<31.0	<38.3	<45.6	<35.3
1,2,4-Trichlorobenzene	ppb	<34.3	<42.4	<50.5	<39.2
Naphthalene	ppb	<36.1	<44.6	67	<41.2
4-Chloroaniline	ppb	<38.0	<46.9	16	<43.4
Hexachlorobutadiene	ppb	<34.8	<43.0	<51.3	<39.8
4-Chloro-3-methylphenol	ppb	<23.7	<29.2	<34.9	<27.0
2-Methylnaphthalene	ppb	<34.1	14.7	26.6	<38.9
Hexachlorocyclopentadiene	ppb	<56.6	<70.0	<83.4	<64.7
2,4,6-Trichlorophenol	ppb	<38.0	<47.0	<56.0	<43.4
2,4,5-Trichlorophenol	ppb	<35.2	<43.6	<51.9	<40.2
2-Chloronaphthalene	ppb	<35.3	<43.6	<52.0	<40.3
2-Nitroaniline	ppb	<24.7	<30.5	<36.3	<28.1
Dimethylphthalate	ppb	<31.6	<39.0	<46.5	<36.0
Acenaphthylene	ppb	<30.3	23.6	28.9	<34.6
2,6-Dinitrotoluene	ppb	<26.0	<32.2	<38.4	<29.7
3-Nitroaniline	ppb	<22.2	<27.5	<32.7	<25.4
Acenaphthene	ppb	<35.0	75.4	30.4	<39.9
2,4-Dinitrophenol	ppb	<31.1	<38.4	<45.8	<35.5
4-Nitrophenol	ppb	<42.3	<52.2	<62.2	<48.3
Dibenzofuran	ppb	<33.6	44.7	22.1	<38.3
2,4-Dinitrotoluene	ppb	<19.4	<23.9	<28.5	<22.1
Diethylphthalate	ppb	<24.8	<30.6	<36.5	<28.3
4-Chlorophenyl phenyl ether	ppb	<34.5	<42.6	<50.8	<39.4
Fluorene	ppb	<30.6	99	38.1	<35.0
4-Nitroaniline	ppb	<33.1	<40.9	<48.7	<37.8
4,6-Dinitro-2-methylphenol	ppb	<34.0	<42.0	<50.1	<38.8
N-Nitrosodiphenylamine	ppb	<30.4	<37.5	<44.7	<34.7
4-Bromophenyl phenyl ether	ppb	<32.4	<40.0	<47.6	<36.9
Hexachlorobenzene	ppb	<29.5	<36.4	<43.4	<33.6
Pentachlorophenol	ppb	<21.8	<26.9	<32.1	<24.9
Phenanthrene	ppb	<24.7	543	218	<28.2
Anthracene	ppb	<26.4	183	79.9	<30.1
Carbazole	ppb	<23.9	<29.5	<35.2	<27.3
Di-n-butylphthalate	ppb	46.5	61.3	76.9	85.5
Fluoranthene	ppb	<22.1	473	322	<25.3
Pyrene	ppb	<22.3	660	347	<25.5
Butylbenzylphthalate	ppb	<26.7	<33.0	17.5	<30.5
3,3'-Dichlorobenzidine	ppb	<62.7	<77.5	20.5	<71.6
Benzo(a)anthracene	ppb	<19.1	312	209	<21.8
Chrysene	ppb	<23.5	291	263	<26.8
bis(2-Ethylhexyl)phthalate	ppb	42.9	51.7	1040	88.5
Di-n-octylphthalate	ppb	<27.8	<34.3	<40.9	<31.7
Benzo(b)fluoranthene	ppb	<25.1	156	145	<28.6
Benzo(k)fluoranthene	ppb	<23.0	218	161	<26.3
Benzo(a)pyrene	ppb	<18.6	206	218	<21.2
Indeno(1,2,3-cd)pyrene	ppb	<17.8	<22.0	76.9	<20.3
Dibenz(a,h)anthracene	ppb	<19.2	<23.7	<28.2	<21.9
Benzo(g,h,i)perylene	ppb	<19.2	<23.7	76.9	<21.9

Source: PHE, Inc. 2001

Table 3:
Characterization of Sediment
Sediment Bulk Chemistry

Sample ID:		A Composite	B Composite	C Composite	D Composite
Lab Sample #:		L4236-10	L4236-11	L4236-12	L4236-13
Date Collected:		4/5/01	4/5/01	4/5/01	4/5/01
Matrix:		Sediment	Sediment	Sediment	Sediment
Analyte	Units				
TCL PCB (AROCHLOR)					
PCB 1016	ppb	<1.58	<1.95	<2.33	<1.81
PCB 1221	ppb	<7.44	<9.20	<11.0	<8.50
PCB 1232	ppb	<1.65	<2.04	<2.43	<1.88
PCB 1242	ppb	<1.24	<1.53	<1.83	<1.42
PCB 1248	ppb	<2.79	<3.45	<4.11	<3.19
PCB 1254	ppb	<4.22	<5.22	169	101
PCB 1260	ppb	<4.85	<6.00	<7.15	<5.54
TCL PESTICIDES					
alpha-BHC	ppb	<0.71	<0.88	<1.05	<0.82
beta-BHC	ppb	<0.84	<1.03	<1.23	<0.96
delta-BHC	ppb	<0.60	<0.74	<0.88	<0.69
gamma-BHC (Lindane)	ppb	<0.73	<0.90	<1.07	<0.84
Heptachlor	ppb	<0.81	<1.01	<1.20	<0.93
Aldrin	ppb	<0.66	<0.81	<0.97	<0.76
Heptachlor epoxide	ppb	<0.93	<1.15	<1.37	<1.07
Endosulfan I	ppb	0.089	0.55	1.09	0.23
Dieldrin	ppb	<0.85	<1.05	<1.26	<0.98
4,4'-DDE	ppb	0.084	0.66	4.18	1.93
Endrin	ppb	<0.91	<1.13	<1.35	<1.05
Endosulfan II	ppb	0.33	0.52	0.88	0.21
4,4'-DDD	ppb	0.2	0.2	2.92	0.98
Endosulfan sulfate	ppb	0.43	0.41	0.94	0.43
4,4'-DDT	ppb	0.2	0.45	1.91	0.77
Methoxychlor	ppb	<1.01	<1.25	<1.48	<1.16
Endrin ketone	ppb	<0.82	<1.02	<1.21	<0.94
Endrin aldehyde	ppb	<2.16	<2.67	<3.18	<2.48
alpha-Chlordane	ppb	<1.09	<1.35	<1.61	<1.25
gamma-Chlordane	ppb	<0.71	<0.88	<1.05	<0.82
Toxaphene	ppb	<15.7	<19.3	<23.1	<18.0
DIOXINS					
2,3,7,8-TCDD	pg/g	0.27	1.1	7.1	3.9
1,2,3,7,8-PeCDD	pg/g	0.4	2.2	<2.10	2
1,2,3,4,7,8-HxCDD	pg/g	0.42	3.4	<2.40	<1.10
1,2,3,6,7,8-HxCDD	pg/g	1	5.2	24.6	16.5
1,2,3,7,8,9-HxCDD	pg/g	1.2	7.8	14.3	9.1
1,2,3,4,6,7,8-HpCDD	pg/g	26.9	129	235	194
1,2,3,4,6,7,8,9-OCDD	pg/g	1320	4440	5780	4140
2,3,7,8-TCDF	pg/g	0.99	19.9	11.5	5.6
1,2,3,7,8-PeCDF	pg/g	0.33	29.5	27.1	19.8
2,3,4,7,8-PeCDF	pg/g	0.43	17.6	6.4	2.5
1,2,3,4,7,8-HxCDF	pg/g	0.75	102	22.8	10.6
1,2,3,6,7,8-HxCDF	pg/g	0.38	40.8	7.7	4.2
2,3,4,6,7,8-HxCDF	pg/g	0.42	28.6	8.3	3.6
1,2,3,7,8,9-HxCDF	pg/g	0.13	4.9	<1.70	<0.80
1,2,3,4,6,7,8-HpCDF	pg/g	2.6	229	62	37.2
1,2,3,4,7,8,9-HpCDF	pg/g	0.4	43.4	<4.10	<1.50
1,2,3,4,6,7,8,9-OCDF	pg/g	3.8	338	112	77.3
Total TCDD	pg/g	12.4	13.1	78.5	58.9
Total PeCDD	pg/g	5.3	23.8	55.3	27
Total HxCDD	pg/g	22.4	108	261	200
Total HpCDD	pg/g	91	450	656	564
Total TCDF	pg/g	9.4	104	272	152
Total PeCDF	pg/g	5.6	171	140	89.3
Total HxCDF	pg/g	4.4	305	137	83.1
Total HpCDF	pg/g	5.8	378	124	71.4

Source: PHE, Inc. 2001

Table 3:
Characterization of Sediment
Sediment Bulk Chemistry

Sample ID:		A Composite	B Composite	C Composite	D Composite
Lab Sample #:		L4236-10	L4236-11	L4236-12	L4236-13
Date Collected:		4/5/01	4/5/01	4/5/01	4/5/01
Matrix:		Sediment	Sediment	Sediment	Sediment
Analyte	Units				
TAL METALS (EPA 7000 Series)					
Aluminum	ppm	5820	12200	12500	9910
Antimony	ppm	<0.40	<0.49	<0.58	<0.45
Arsenic	ppm	1.65	6.03	43.4	3.29
Barium	ppm	28.4	34.7	72.4	26.3
Beryllium	ppm	0.085	0.39	0.48	0.31
Cadmium	ppm	<0.031	<0.038	1.4	<0.036
Calcium	ppm	712	2070	2600	3670
Chromium	ppm	10.8	21.3	54.3	19.8
Cobalt	ppm	5.56	12.2	14.2	10.4
Copper	ppm	10.2	41.5	208	18.9
Iron	ppm	8160	18100	22600	16600
Lead	ppm	9.65	31	135	14.3
Magnesium	ppm	1260	4350	4880	3770
Manganese	ppm	75.9	475	228	489
Nickel	ppm	6.67	18.7	31.2	15
Potassium	ppm	1210	3040	3550	2730
Selenium	ppm	1.66	<0.17	<0.21	<0.16
Silver	ppm	<0.15	<0.18	0.67	<0.17
Sodium	ppm	1850	3730	6240	2900
Thallium	ppm	1.26	<0.17	<0.21	<0.16
Vanadium	ppm	17.5	28.6	39.5	27.1
Zinc	ppm	21.3	65.5	266	50.8
Mercury	ppm	0.13	0.42	2.75	0.18
Cyanide	ppm	0.12	<0.27	0.1	<0.25
TOC Original	ppm	14000	15700	26300	13900
TOC Duplicate	ppm	14400	16300	22000	15600
TOC Average	ppm	14200	16000	24100	14800
% Moisture	%	35.5	47.8	56.2	43.7
% Solid	%	64.5	52.2	43.8	56.3
USACOE Grain Size					
% Gravel	%	4.19	3.81	0	0
% Sand	%	50.74	10.96	4.78	14.04
% Clay	%	27.93	53.79	57.66	57.41
% Silt	%	17.14	31.45	37.56	28.55

Source: PHE, Inc. 2001

3.0 HAZARDOUS MATERIALS

3.1 Modified Phase I Environmental Assessment

A modified Phase I Environmental Site Assessment (ESA) was performed at the Site to determine if there were any potential areas of environmental concern (AOCs) as a result of the historic use, storage, and disposal of hazardous and toxic materials at the Site or adjacent properties. The Phase I ESA included a site reconnaissance, review of the historical usage of the property, review of regulatory records (including a database search, internet search, and file reviews), and conversations with representatives of the current occupants of the property. The complete Modified Phase I ESA is included at the end of this TES.

3.2 Previous Investigations

Various consultants conducted investigations of the Conrail parcel prior to the initiation of this project. The reports of these investigations were reviewed to find additional potential AOCs. A summary of the review of these documents is provided in Table 4.

3.3 Potential AOCs

The following potential areas of concern (AOCs) were identified during the Phase I ESA and document review:

- Impact from adjacent sites (JCP&L to the north);
- Firing Range (lead, etc.);
- Historic fill;
- Historic discharges due Site use (rail yard, hazardous waste storage, etc.);
- 4 Former 30,000-gallon ASTs;
- Groundwater; and
- Ordinance in the harbor area.

3.4 Site Investigation

Based on the results of the Phase I ESA and the review of previous soil and groundwater investigations conducted at the Conrail parcel, supplemental soil and groundwater investigations were performed to characterize current conditions at the various potential AOCs. These investigations did not include any inquiry with respect to radon and methane gas, asbestos, or lead-based paint. Figure 2 (Areas of Concern) shows the locations of these potential AOCs and the locations of the subsequent supplemental investigation samples. The complete Site Investigation Report is included at the end of this TES.

UNPAVED TRUCK/EQUIPMENT STORAGE
(McKEON AOC#4)

SEPTIC TANK
(McKEON AOC#1)

FUEL OIL AST AND PUMP HOUSE
(McKEON AOC#3)

AST FARM
(McKEON AOC#2)

McKEON PROPERTY

POLICE FIRING RANGE
(CONRAIL AOC #3)

APPROXIMATE LOCATION
OF RAILROAD TIE PILE
(CONRAIL AOC #6)

APPROXIMATE LOCATION OF FORMER FUEL ASTs

ASH DEPOSITS
(CONRAIL AOC #5)

FORMER ENGINE HOUSE
AND FUELING PAD
(CONRAIL AOC#1)

APPROXIMATE LOCATION OF
FORMER TRANSFORMERS

OIL/WATER SEPARATOR
(CONRAIL AOC #2)

CONRAIL PROPERTY

EMBANKMENT/SUSPECT HISTORIC FILL
(CONRAIL AOC #4)

SPECTRASERV PROPERTY

GRAPHIC SCALE
(IN FEET)

200 100 0 100 200 400

DATE:	DRAWN BY:	REVIEWED BY:	SCALE:	PROJECT #	SHEET #
11/14/01	JFK	MM	AS SHOWN	39.0413	1 OF 1

POTOMAC-HUDSON ENVIRONMENTAL, INC.

166 John Street
PO Box 7
South Amboy, NJ 08879

23 Chapel Avenue
Jersey City, NJ 07305

136 W. 16th Street
Suite 3E, POB 1206
New York, NY 10011

DATE	REVISION	DRAWN BY	REVIEWED BY	RELEASED BY

Areas of Concern
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE: 0501053_site2.dwg
PMK (8/14/01)

FIGURE # 2

C:\Projects\SouthAmboyFerryTerminalProject\cadfinals\figure4-8.dwg LAYOUT:11x17 low profile

TABLE 4

PREVIOUSLY-IDENTIFIED AREAS OF CONCERN AND SUMMARY OF REMEDIAL INVESTIGATION RESULTS

Conrail Property

South Amboy, Middlesex County, New Jersey

AOC Description	Potential Contaminant	Matrix	Roux Associates, RI Results and Conclusions
O.H. Materials Corporation (OHM)			
Fueling Pad Area			
S-1, S-2, and S-3	TPHC, PAH	Surface Soil	TPHC less than 10,000 ppm and limited in vertical extent.
Former Fuel Storage ASTs			
S-10 and S-11	TPHC, VOC, PAH	Surface Soil	Reportedly addressed by Conrail (OHM) as part of AST removal activities.
Engine House Area			
S-14	TPHC, PAH	Surface Soil	TPHC less than 10,000 ppm.
Open Track Area (ie. Railroad Track) Area			
S-15 through S-17	TPHC, PAH	Surface Soil	S-15 exceeds 10,000 ppm - requires remediation.
Background			
S-9	BaP, PCB, Thallium	Surface Soil	Reportedly addressed by Conrail (OHM) by soil excavation.
Groundwater			
OHM-1	Pb	Groundwater	Dissolved lead less than GWQC.
OHM-2	BTEX	Groundwater	Separate-phase product encountered.
OHM-3	Xylenes	Groundwater	Separate-phase product encountered.
Paulus, Sokolowski & Sartor, Inc. (PS&S)			
Storage Building (i.e. Former Fuel Storage ASTs)			
TP-C5	PCBs at 0.58 ppm; Pb at 420 ppm	Soil	Isolated exceedance; dissolved lead in groundwater less than GWQC.
Former TowerStructure (West of the Engine House)			
TP-C7	Be at 1.0 ppm	Soil	De minimis soil concentration; no beryllium in site groundwater.
TP-C7	BaP; Various PAHs greater than RDCSS	Soil	Compliance averaging with TP-C4, TP-C6, TP-C10 and S-6.
TP-C7	Pb at 550 ppm	Soil	Dissolved lead less than GWQC. No sheen observed in RI test pit conducted by Roux.
TP-C10	Various PAHs greater than RDCSCC and less than NRDCSCC	Soil	Concentrations less than NRDCSCC therefore no action.
TP-C17	Sheen	Groundwater	No sheen observed in RI test pit.
Shooting Range (aka Pistol Range)			
TP-C8	As at 22 ppm	Soil	De minimis soil concentration. No arsenic in site groundwater.
TP-C11	Observed a sheen during test pits	Groundwater	No sheen observed in RI test pit conducted by Roux.
TP-C11	Anomaly	Soil	Nothing observed in RI test pit. Numerous small firearm shells observed in Shooting Range.
Open Pier Area (Eastern end of Site)			
TP-C15	Various PAHs reported by PS&S greater than RDCSCC	Soil	No PAH exceedances in RI soil samples.
Fueling Pad Area			
TP-C18	Sheen	Groundwater	No sheen observed in RI test pit conducted by Roux.
TP-C19	TPHC reported by PS&S at 710,000 ppm; PCBs at 0.63 ppm	Soil	RI results indicated TPHC less than 10,000 ppm; didn't evaluate PCBs
Engine House Area			
MWC-3	TPHC greater than 10,000	Soil	TPHC less than 10,000 ppm in adjacent RI test pits.
MWC-4	TPHC greater than 10,000	Soil	TPHC less than 10,000 ppm in adjacent RI test pits.
Groundwater			
MWC-1	Pb above GWQC	Groundwater	Dissolved lead less than GWQC.
MWC-2	Elevated Sb	Soil	No antimony detected in site groundwater.
MWC-3	Benzene, Chlorobenzene	Groundwater	Separate-phase product encountered. Downgradient wells ND for BTEX.
MWC-3	Free Product	Groundwater	Separate-phase product encountered.
MWC-4	Chlorobenzene	Groundwater	Separate-phase product encountered.
MWC-5	Pb above GWQC	Groundwater	Dissolved lead less than GWQC.

KEY:

TPHC - Total petroleum hydrocarbons
PAH - Polynuclear aromatic hydrocarbons
VOC - Volatile organic compounds
BaP - Benzo (a) pyrene
RDCSCC - Residential Direct Contact Soil Cleanup Criteria
NRDCSCC - Non-Residential Direct Contact Soil Cleanup Criteria
PCB - Polychlorinated biphenyls
ppm - parts per million
GWQC - Groundwater Quality Criteria.
RI - Remedial Investigation
Pb - Lead
BTEX - Benzene, toluene, ethylbenzene, xylenes
As - Arsenic
Be - Beryllium
Sb - Antimony
ND - Non-detect

3.4.1 Soil Investigation

The supplemental soil investigation consisted of a total of 71 soil samples collected from 52 soil borings conducted in the various potential AOCs using a hand auger. Table 5 (Soil Sampling Summary) below identifies the breakdown of the borings, soil samples, and analyses by type of AOC.

Table 5: Soil Sampling Summary

Potential AOC	Borings in PAOC	Samples in PAOC	Analysis
Adjacent Uses	8	8	TPH, BN+15, PP Metals
Firing Range	18	21	PP Metals
Historic Fill	20	36	TPH, BN+15, PP Metals, PCBs
Historic Uses	6	6	TPH, BN+15

Source: PMK 2001
TPH – Total Petroleum Hydrocarbons
BN+15 – Base/Neutral extractable organics
PP Metals – Priority Pollutant Metals

A summary of the exceedances of the NJDEP Residential Direct Contact Soil Cleanup Criteria (RDCSCC) by AOC and contaminant are shown below in Table 6, while the specific exceedances of the RDCSCC are listed in Table 7 on page 4.

Table 6: Summary of Supplemental Soil Investigation Exceedances

AOC	Description	Exceedances of RDCSCC
Conrail #3	Firing Range	Antimony, Lead
Conrail #4	Embankment/Suspected Historic Fill	Arsenic, Antimony, Lead Chrysene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Total Petroleum Hydrocarbons (TPH)
Conrail #6	Railroad tie pile	Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene

Source: PMK 2001

Table 7: Soil Sampling Exceedances

Sample ID	Contaminant	Concentration (mg/kg)	NJDEP RDCSCC* (mg/kg)
AOC3-S9A	Antimony	17.4	14
	Lead	438	400
AOC3-S11A	Lead	410	400
AOC3-S17A	Lead	467	400
AOC4-S1A	Benzo(a)anthracene	3.0	0.9
	Benzo(b)fluoranthene	5.6	0.9
	Benzo(k)fluoranthene	1.9	0.9
	Benzo(a)pyrene	2.6	0.66
	Antimony	15.1	14
	Arsenic	29.5	20
	Lead	539	400
AOC4-S1B	Antimony	25.2	14
	Arsenic	38.8	20
	Lead	1,090	400
AOC4-S2A	Arsenic	20.3	20
	Lead	3,140	400
AOC4-S3A	Arsenic	41.7	20
AOC4-S3B	Arsenic	57.7	20
	Lead	400	400
AOC4-S4A	Benzo(a)anthracene	2.1	0.9
	Benzo(b)fluoranthene	2.7	0.9
	Benzo(k)fluoranthene	1.4	0.9
	Benzo(a)pyrene	2.7	0.66
	Arsenic	20.9	20
AOC4-S4B	Arsenic	42.4	20
AOC4-S5A	Antimony	17.1	14
	Arsenic	24.5	20
AOC4-S5B	Antimony	33.2	14
	Arsenic	47.2	20
	Lead	565	400
AOC4-S6A	Arsenic	39.8	20
AOC4-S6B	Arsenic	68.7	20
AOC4-S9A	TPH	140,000	10,000
AOC4-S12A	Benzo(a)anthracene	9.3	0.9
	Chrysene	9.3	9
	Benzo(b)fluoranthene	6.1	0.9
	Benzo(k)fluoranthene	12.0	0.9
	Benzo(a)pyrene	7.8	0.66
AOC4-S14B	Antimony	16.8	14
AOC4-S15A	Antimony	18.0	14
AOC4-S16A	Antimony	18.3	14
	Arsenic	26.1	20
AOC4-S17A	Antimony	16.7	14
AOC4-S17B	Antimony	20.3	14
	Arsenic	30.1	20
	Lead	441	400
AOC4-S18A	Benzo(b)fluoranthene	1.2	0.9
AOC4-S19A	Benzo(a)anthracene	0.97	0.9
	Benzo(b)fluoranthene	2.9	0.9
	Benzo(k)fluoranthene	0.95	0.9
	Benzo(a)pyrene	0.97	0.66
	Antimony	15.1	14
AOC4-S19B	Antimony	19.6	14
	Arsenic	30.6	20
AOC6-S2	Benzo(b)fluoranthene	2.4	0.9
	Benzo(k)fluoranthene	1.3	0.9
	Benzo(a)pyrene	1.2	0.66
AOC6-S4	Benzo(b)fluoranthene	0.97	0.9
	Benzo(k)fluoranthene	1.1	0.9
	Benzo(a)pyrene	0.67	0.66

Source: PMK 2001
mg/kg – milligrams per kilogram
RDCSCC – Residential Direct Contact Soil Cleanup Criteria

3.4.2 Supplemental Groundwater Investigation

Groundwater samples were collected from seven existing monitoring wells on site. Four additional wells were not sampled because free product was present in the wells at the time of sampling. The groundwater samples were analyzed for Volatile Organics (VO+10), Base/Neutral extractable organics (BN+15), and Priority Pollutant Metals (PP Metals). A summary of the groundwater sampling is presented in Table 8 below.

Table 8: Groundwater Sampling Summary

Potential AOC	Monitoring Wells	Sampling in PAOC	Analyses
Adjacent Uses	OHM-7, OHM-8, MWC-5	2	VO+10, BN+15, PP Metals
Historical Uses	OHM-1 through OHM-6 and MWC-1 through MWC-4	5 (4 wells not sampled because of free product present)	VO+10, BN+15, PP Metals

Source: PMK 2001

None of the results of the laboratory analyses of groundwater samples exceeded the applicable NJDEP Ground Water Quality Standards (GWQS) for VO+10 or BN+15. The metals results for arsenic, lead, and/or antimony were found to exceed the GWQS in five of the samples as indicated in the Table 9 below.

Table 9: Groundwater Sampling Results

Sample ID	Contaminant	Concentration (ug/L)	GWQS (ug/L)
Adjacent Uses			
OHM-7	Arsenic	11.2	8
	Lead	21.6	10
OHM-8	Arsenic	16.9	8
	Lead	43.3	10
Historic Uses			
OHM-2	Lead	14.3	10
OHM-5	Arsenic	8.1	8
	Lead	14.6	10
MWC-1	Antimony	119	20
	Arsenic	131	8
	Lead	101	10

Source: PMK 2001

ug/L – micrograms per liter

Modified Phase I ESA

PMK Group
CONSULTING & ENVIRONMENTAL ENGINEERS

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February 7, 2001

Potomac-Hudson Environmental, Inc.
166 John Street
P.O. Box 7
South Amboy, New Jersey 08879

ATTN: MR. DAVID DRAPER

RE: MODIFIED ENVIRONMENTAL SITE ASSESSMENT – HAZ MAT
INTERMODAL TRANSPORTATION CENTER
SOUTH AMBOY, NEW JERSEY
PMK GROUP #0500149

Dear Mr. Draper:

In accordance with the revised confirming proposal, dated September 27, 2000, **PMK Group** has conducted a modified environmental assessment of the proposed Intermodal Transportation Center in South Amboy, New Jersey. The following details the findings of a site reconnaissance survey and a review of federal and state environmental databases, Sanborn Fire Insurance Maps and historic aerial photographs.

SITE DESCRIPTION AND PROPERTY HISTORY

The subject area, located off of Main Street in the City of South Amboy, Middlesex County, New Jersey, is occupied by a series of inactive rail lines which are overgrown with vegetation, several monitoring wells (approximately 15), a concrete pad and an active firing range. The subject area extends to the east into the Raritan Bay and to the west beyond Main Street. The western portion of the subject area curves to the north, and contains a small parcel on the northern side of Main Street. The area to the west of Main Street is also occupied by a series of inactive rail lines, while the area to the north of Main Street is undeveloped.

Available information suggests that the subject area has been historically utilized by the Pennsylvania Railroad Company as a coal-shipping terminal and once contained a coal yard, several large aboveground tanks of unknown contents and structures utilized as a locomotive house, offices, machine shops, an oil house, etc. A book entitled "The Pennsylvania Railroad Company 1846 - 1946," written by Burgess & Kennedy, referenced the area as: "...a large coal terminal at South Amboy, from which Pennsylvania anthracite and bituminous coal were to be distributed to the whole New York area." An exact date for the start of operation or closure of the railroad and coal port in the subject area was not available. Additional information indicates that the Modern Transportation Company, the current owner of portions of the subject area,

utilized a barge and ship for storage of industrial and domestic waste prior to transfer to other vessels (The News Tribune, August 18, 1976). It is unknown if the waste was stored within the limits of the subject area. It should also be noted that a facility listed under the name Spectraserv, Inc., potentially operated a waste transfer station within or in the vicinity of the subject area. In general, the subject area appears to have a long history of railroad and port related uses. It should also be noted that plans for a pistol range on the subject site were accepted by the City of South Amboy in April 1985. The pistol range is currently situated on the northeastern corner of the subject area.

ENVIRONMENTAL RECORDS REVIEW

The **PMK Group** reviewed the latest information from federal, state and local agencies with regards to potential environmental contamination, as compiled in an Area Study Report prepared by Environmental Data Resources, Inc. (EDR), and dated October 5, 2000. The standard environmental record sources are outlined below. For the purposes of this report, the study area includes the subject property, plus at 250 -foot buffer around the entire area.

Federal Listings

National Priority List (NPL)

Listings from the EDR Area Study Report were reviewed to obtain information regarding National Priorities List (NPL) sites that exist within or in the vicinity of the subject area. The NPL is a list compiled by Environmental Protection Agency (EPA) pursuant to CERCLA 42 USC 9605(a)(8)(B) of properties with the highest priority for cleanup pursuant to EPA's Hazard Ranking System. A review of the EDR Report indicates that there are no NPL sites listed within or in the immediate vicinity of the subject area.

RCRA Notifier's Listing

The Resource Conservation and Recovery Act (RCRA) Notifier's Listing contains information regarding facilities which are reported by the EPA to generate, treat, store, and/or dispose of hazardous materials/wastes. The RCRA Notifier's Listing is divided into four separate categories:

1. RCRA Small Quantity Generators (SQG) - facilities that either generate between 100 kilograms and 1,000 kilograms (220 and 2,200 lbs, respectively) of hazardous waste per month or meet other applicable requirements of RCRA.

2. RCRA Large Quantity Generators (LQG) - facilities that either generate more than 1,000 kilograms (2,200 lbs) of hazardous waste per month or meet other applicable requirements of RCRA.

3. RCRA Treatment, Storage and Disposal Facilities (TSD) - facilities on which treatment, storage, and/or disposal of hazardous wastes takes place, as defined and regulated by RCRA.

4. RCRA Corrective Action Report (CORRACTS) identifies hazardous waste handlers with RCRA corrective action activity.

A review of the listing as provided in the EDR Area Study Report revealed that two RCRA Small Quantity Generators are referenced within the subject area. Modern Transportation Company is referenced as a small quantity generator with existing violations. The facility is listed as a hazardous waste transporter. In addition, Spectraserv Inc. is referenced as a small quantity generator with no reported violations. No RCRA Small or Large Quantity Generators, TSD Facilities, or CORRACTS sites are referenced within the immediate vicinity of the subject area.

CERCLIS Listing

The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) is a list of sites compiled by the EPA that have been investigated, or are currently being investigated, for possible inclusion on the NPL list, due to hazardous substance contamination. A review of the CERCLIS listing, as provided in the EDR Study Area Report indicates that Modern Transportation Company is referenced on the CERCLIS – No Further Remedial Action Planned database. The listing references numerous spills reported on to the docks and into the water. The site is noted as a potential hazard to the bay.

ERNS Listing

EPA's Emergency Response Notifications System (ERNS) is a list of reported CERCLA hazardous substance releases or spills in quantities greater than the reportable quantity, as maintained at the National Response Center. Notification requirements for such releases or spills are codified in 40 CFR parts 302 and 355. A review of the listings as provided in the EDR Study Area Report indicates that no ERNS incidents occurred within or in the immediate vicinity of the subject area.

State Listings

NJDEP State Hazardous Waste Program Site Listing

The New Jersey Department of Environmental Protection (NJDEP) documents hazardous waste sites located in New Jersey which require remedial actions but are not eligible for federal funding assistance and are not included on the NPL. Our review of the sites contained in the EDR Study Area Report reveal that there are no state hazardous waste sites referenced within on in the immediate vicinity of the subject area.

NJDEP Solid Waste Facility Directory

The NJDEP Solid Waste Division compiles a directory of all solid waste facilities that are operating, formerly operated or are under construction and are located in New Jersey. A review of the EDR Report indicates that one site within the subject area is referenced on the EDR Study Area Report Orphan Listing as a solid waste facility. Spectraserv Inc. is referenced as a closed transfer station (facility ID: 1220000537). The authorized waste for the former station was reportedly septic tank cleanout waste and liquid sewage sludge. No sites in the immediate vicinity of the subject area were referenced as solid waste facilities/landfills.

NJDEP Bureau of Underground Storage Tank Listing

The NJDEP Bureau of Underground Storage Tanks (BUST) listing details registered underground storage tanks (USTs) located within New Jersey. A review of the NJDEP listing, as provided in the EDR Study Area Report indicates that there are no registered underground storage tanks at sites located within on in the immediate vicinity of the subject area.

NJDEP/BUST Enforcement Listing

The NJDEP-BUST, Enforcement Listing is complied by the Division of Responsible Party Site Remediation and details reported leaks and/or discharges from UST systems, as well as problematic USTs. A review of the NJDEP listing contained in the EDR Study Area Report indicates that there are no leaking underground storage tanks reported at sites located within or in the immediate vicinity of the subject area.

New Jersey Release / New Jersey Spills Database

The NJ Release database is compiled by the Department of Environmental Protection and details reported hazardous materials releases at sites on which no investigation has been conducted. The NJ Spills database, also compiled by the Department of Environmental Protection, details initial notification information of hazardous materials incidents. A review of the NJDEP listing as compiled in the EDR Study Area Report indicates that one site within the subject area and two sites in the immediate vicinity of the subject area are referenced on the NJ Release/NJ Spills database.

The on-site listing is referenced as being located at the "Dirt Road at end of Main Street by Railroad Tracks in South Amboy." This incident (NJDEP Case #93-1029-1208-15) is referenced as a discharge of an oil-like substance, reported by the Middlesex County Hazardous Materials Unit. The status at the time of the incident is reported as a spill from an unknown source; product in river; no further information and nor cleanup at this time. The NJ Release/NJ Spills database also references a site, which is located adjacent to the southern side of the subject area. This site, known as Amboy Aggregates (NJDEP Case #94-03-01-2041-01) is located off of Lower Main Street in

South Amboy. The incident is referenced as a discharge of an unknown amount of hydraulic oil and diesel fuel. The status at the time of the incident is referenced as many spills on site from leaking equipment; oil-like substances leaching into bay leaving a sheen; no cleanup. In addition to the above-referenced incidents, the residence at 327 Main Street in South Amboy is also noted on the NJ Release/NJ Spills database under NJDEP Case #00-03-03-1055-46 for an air release. No further information was detailed for this listing. The NJDEP – Division of Site Remediation was contacted for further information on the above referenced cases.

The NJDEP representative indicated that there was no information under the referenced case numbers in their computer system, and that the cases may have been referred to local officials.

HISTORIC AERIAL PHOTOGRAPHS

Aerial photographs were reviewed at the New Jersey Department of Environmental Protection – Tidelands Management Bureau office in Trenton, New Jersey. Mr. Michael Ryan, of the Tidelands Management Bureau, provided aerial photographs dated 1940, 1947, 1951, 1954, 1958, 1962, 1971, 1974, 1977, 1987 and 1991. Observations made during a review of the aerial photographs are detailed below.

1940 Aerial Photograph – 1:20,000

A review of the 1940 aerial photograph indicates that the subject area is occupied by a series of railroad tracks throughout the site, three large structures, and several smaller structures. The western end of the subject area is partially cleared, and appears to be sandy. Surrounding areas include: several structures, varying in size, to the north; two large structures and a small cleared area to the south; a body of water to the east; and a cleared area to the west.

1947 Aerial Photograph – 1: 11,500

A review of the 1947 aerial photograph indicates that the subject area and surrounding areas to the north, east and west have remained relatively unchanged since the 1940 aerial photograph. A third large structure has been erected to the south. In addition, the cleared sandy area to the south has increased in size.

1951 Aerial Photograph – 1:20,000

A review of the 1951 aerial photograph indicates that the subject area is occupied by one large structure, at least one small structure and the existing railroad tracks. Surrounding areas have remained relatively unchanged since the 1947 aerial photograph, however, one large above ground tank has been erected to the north.

1954 Aerial Photograph – 1:20,000

A review of the 1954 aerial photograph indicates that the subject area and the surrounding areas have remained relatively unchanged since the 1951 aerial photograph. It should be noted that a large area of sandy material is extending into the water to the far south of the subject area.

1958 Aerial Photograph – 1:20,000

A review of the 1958 aerial photograph indicates that the subject area is occupied by three small structures, two medium-sized structures, one large structure and the existing railroad tracks. The sandy area to the south has increased in size. Remaining surrounding areas have remained relatively unchanged since the 1954 aerial photograph. A stone or piling barrier is noted in the body of water, at the eastern end of the subject area.

1962 Aerial Photograph – 1: 20,000

A review of the 1962 aerial photograph indicates that the subject area and surrounding areas have remained relatively unchanged since the 1958 aerial photograph.

1971 Aerial Photograph – 1: 20,000

A review of the 1971 aerial photograph indicates that the subject area and surrounding areas have remained relatively unchanged since the 1962 aerial photograph.

1974 Aerial Photograph – 1: 35,000

A review of the 1974 aerial photograph indicates that the subject area and surrounding areas have remained relatively unchanged since the 1971 aerial photograph.

1987 Aerial Photograph – 1:40,000

A review of the 1987 aerial photograph indicates that the subject area is occupied by the existing railroad tracks, a large structure (potentially a building or concrete slab), several small structures, and a small structure adjacent to a cleared area on the northeastern end of the subject area. Surrounding areas consist of: a large facility with multiple above ground storage vessels to the north; the existing body of water to the east; two large structures and several docks, followed by a large sand pit to the south; and the continuation of railroad tracks, and undeveloped areas to the west.

1991 Aerial Photograph – 1:40,000

A review of the 1991 aerial photograph indicates that the subject area and surrounding areas have remained relatively unchanged since the 1987 aerial photograph. It should be noted that the cleared area at the northeastern end of the subject area currently contains an irregularly-shaped formation, which consists of five parallel lines and one perpendicular line running through the center. The purpose of this formation is unknown. (It should be noted that the irregularly-shaped formation is situated in the vicinity of the present day firing range.)

SANBORN FIRE INSURANCE MAPS

Sanborn Fire Insurance Maps for the years 1886, 1891, 1896, 1901, 1908, 1919, 1930, 1948 and 1953 were provided by Environmental Data Resources, Inc. Observations made during a review of the Sanborn Fire Insurance Maps are detailed below.

1886 Sanborn Fire Insurance Map

The available 1886 Sanborn Fire Insurance Map depicts only a small portion of the subject area. A single railroad track is depicted as entering through the northwestern side of the subject area and leads to a series of tracks labeled as the railroad coal stockyard. One residence, with three associated structures of unknown use, exist to the northwest of the subject area. Vacant land, followed by railroad lines and residences to the west and southwest.

1891 Sanborn Fire Insurance Map

The 1891 Sanborn Fire Insurance Map depicts only as small portion of the subject area. A review of the 1891 Sanborn Fire Insurance Map indicates that this area and surrounding areas to the northwest, west and southwest have remained relatively unchanged since the 1886 Sanborn Fire Insurance Map.

1896 Sanborn Fire Insurance Map

The 1896 Sanborn Fire Insurance Map depicts only as small portion of the subject area. A review of the 1891 Sanborn Fire Insurance Map indicates that this area and surrounding areas to the northwest, west and southwest have remained relatively unchanged since the 1891 Sanborn Fire Insurance Map.

1901 Sanborn Fire Insurance Map

The 1901Sanborn Fire Insurance Map depicts only a small portion of the subject area. A review of the 1901 Sanborn Fire Insurance Map indicates that this area and surrounding areas to the west and southwest have remained relatively unchanged since the 1896 Sanborn Fire Insurance Map. It should be noted that the dwelling and associated

structures to the northwest of the subject area have been removed and replaced with a two family home.

1908 Sanborn Fire Insurance Map

The 1908 Sanborn Fire Insurance Map depicts only a small portion of the subject area. A review of the 1908 Sanborn Fire Insurance Map indicates that this area and surrounding areas to the west and southwest have remained relatively unchanged since the 1901 Sanborn Fire Insurance Map. The two-family home to the northwest has been converted in to the Pennsylvania Railroad YMCA Hall.

1919 Sanborn Fire Insurance Map

The 1919 Sanborn Fire Insurance Map depicts a large portion of the subject area between Main Street and the Raritan Bay. Several railroad tracks are situated throughout the subject area. The area is labeled as Pennsylvania Railroad. Three large buildings, four small structures and four large above ground storage tanks are depicted among the railroad tracks. The large structures area not labeled, however, one is noted to contain a kitchen, office and storage area. The four small structures are labeled as water closets (2), a sand dryer, and a pump hose. The above ground storage tanks are labeled as having a 30,000-gallon capacity. The contents of the tanks are not indicated. Railroad sidings and three additional structures are situated on the eastern end of the subject area. One of the structures is unlabeled, while the others are labeled as a carpenter shop, and an oil house. Additional railroad tracks in an area labeled as the Eastern Coal Dock Company are situated to the south of the subject area. No other surrounding areas are depicted.

1930 Sanborn Fire Insurance Map

The 1930 Sanborn Fire Insurance Map indicates that the subject area and surrounding areas have remained relatively unchanged since the 1919 Sanborn Fire Insurance Map. Two of the large on-site structures are noted to be labeled as a locomotive house and a machine shop. The label on the third structure is unclear. The New Jersey Central Power and Light Company exists to the north. The Eastern Coal Dock Company remains to the south.

1948 Sanborn Fire Insurance Map

The 1948 Sanborn Fire Insurance Map indicates that the subject area is occupied by the existing railroad tracks, one existing large structure, five small structures (two garages, one office, two storage facilities) and two existing tanks. The Eastern Coal Dock Company to the south is now labeled as the Seaboard Coal Dock Company.

1953 Sanborn Fire Insurance Map

The 1953 Sanborn Fire Insurance Map indicates that the subject area and surrounding areas have remained relatively unchanged since the 1948 Sanborn Fire Insurance Map.

FILE REVIEW REQUESTS

Requests were made to the Middlesex County Hazardous Materials Unit, the Middlesex County Health Department, the New Jersey Department of Environmental Protection and the United States Environmental Protection Agency to review any file information which may be available for the subject area. The following details information provided in response to the above-referenced requests.

Middlesex County Hazardous Materials Unit

Ms. Maria E. Rittenhouse, Principal Clerk Typist, responded to the October 10, 2000 request for information via written correspondence, dated October 16, 2000. Ms. Rittenhouse indicated that her office does not file by block and lot numbers, therefore, as there is no specific street address, she is unable to locate any information regarding the property. The original October 10, 2000 request for information also referenced two NJDEP case numbers which were reported for the property. Two separate pieces of correspondence from Ms. Rittenhouse, also dated October 16, 2000 indicated that she had no record of NJDEP Case #94-03-01-2041-01, but file information was available for NJDEP Case #93-10-29-1208-15.

According to Ms. Rittenhouse's files, NJDEP Case #93-10-29-1208-15 was reported to the Middlesex County Hazardous Materials Unit on October 29, 1993. A discharge notification report indicates that the incident was reported by an anonymous caller as an oil-like substance coming off of the railroad tracks that go over the bridge crossing at Raritan River that lead to Perth Amboy. An observation/even description form indicates that the Hazardous Materials Unit responded to the incident, and found a stain of oil on tracks and stones. The stain was reported to have been there for some time. No further information was provided.

Middlesex County Health Department

Mr. Don N. Dingler, Management Specialist, responded to the October 10, 2000 request for information via written correspondence, dated October 19, 2000. Mt. Dingler indicated that his office has no information in their files regarding the property.

New Jersey Department of Environmental Protection

A request for information was submitted to the NJDEP Office of Legal Affairs on October 10, 2000. The following responses have been received:

- Acknowledgement of our request from Walter Brown dated November 29, 2000; The letter indicated that the request would be forwarded tot eh appropriate NJDEP program(s).

- Response from the Bureau of Discharge Prevention dated November 14, 2000, which indicated that their office has no file information for the property.

- Acknowledgement of our request from the Division of Responsible Party Site Remediation's File Review Unit (undated), indicating that a search of their files would be conducted.

- A telephone response from Mr. Frank Klapinski, of the Bureau of Pre-Treatment and Residuals. Mr. Klapinksi indicated that he had a file for a Spectraserv site in the vicinity of the property. He was unsure if the Spectraserv operations were conducted on or adjacent to the subject property. A file review was scheduled for October 17, 2000. The file review revealed the following:

    - Spectraserv, Inc., formerly known as Modern Transportation Inc., operated in South Amboy under solid waste permit #122000537. The South Amboy Residuals Transfer Station was to be utilized as an interim holding and transfer facility. The location of the transfer station was described as being situated on the confluence of the Raritan River and the Arthur Kill, across from Perth Amboy, adjacent to the defunct NJ Transit Engine Terminal and the JCP & L Generating Station to the north' McCormack Sand and residences to the south; train tracks and a business district to the west and a waterway to the east. A site map indicated that the operation was situated adjacent to the subject property, but it should be noted that former and proposed site boundaries may overlap and the transfer station may have been accessed through a portion of the subject area.

    - According to the file information, two barges were utilized to store residuals. The barges reportedly consisted of a 750,000-gallon holding vessel and a 2,000,000-gallon transport vessel. The barges were shown on a site map to be situated in the waterway, along the southern edge of the proposed marina.

    - The original permit application was issued in the 1970s. The facility reportedly ceased operations in 1981. The Spectraserv facility was reportedly registered as a RCRA-Treatment, Storage and Disposal facility until it was delisted on January 23, 1986. It should be noted that applications for new permits were filed in September 1993. A memorandum, dated November 4, 1998, indicated that the September 1993 permit was inactivated on October 30, 1998 due to an incomplete application and the amount of time that had lapsed.

- A file for Modern Transportation Company revealed the following: a barge fire (3/84); a discharge of diesel and motor oil from a tugboat (12/83); and abandoned drums and scrap metal (4/80); a May 1982 letter from the NJDEP regarding the use of Block 161, Lots 20 & 20R being utilized for dredge spoil disposal; a September 1978 memorandum indicating that ocean dumping activities were to end by December 1981; and indication that the facility had 40 industrial waste accounts for ocean disposal, including Merck, whose waste was store in a Liberty Ship.

Unites States Environmental Protection Agency

A request was submitted to the USEPA on October 10, 2000 for informant regarding the property. An acknowledgement of our request, dated October 18, 2000, indicated that the USEPA had 20 days to respond to our request. Written correspondence from Patrick Harvey, dated December 19, 2000, indicated that the records filed in his office area filed by the name of the facility as opposed to property information (i.e., address, owner, location, etc.). Therefore, a search could not be conducted. The also indicated that information on specific facilities registered with the USEPA could be found on the USEPA web page. A Facility Questionnaire Query was conducted on the USEPA web page. No information was found for Modern Transportation Company or Consolidated Railroad, owners of portions of the subject property.

FINDINGS & CONCLUSIONS

Based upon the review of various databases and historic sources, and a site reconnaissance, the following potential areas of concern have been noted:

1. The subject site has historically been utilized as a coal storage and transport facility and a rail yard. Four 30,000-gallon aboveground storage tanks (contents unknown), a machine shop and an oil house are known to have been present in the subject area. Various contaminants may potentially be present on-site as a result of historic operations.

2. Available information indicates that waste from unknown origins may have historically been stored within the subject area. Various contaminants may potentially be present on-site as a result of former waste storage.

3. Available information suggests that discharges have occurred at an adjacent site. The potential exists for contaminants to have migrated into the subject area. Additionally, discharges to the adjacent waterway also have the potential to impact the subject area.

4. The subject area currently contains a firing range. Contaminants may be present in the vicinity of the firing range as a result of ammunition/casings being deposited in surface soils.

5. Several monitoring wells were observed to currently be present within the subject area. The purpose of the monitoring wells is unknown.

6. A file review at the NJDEP revealed that Spectraserv operated a temporary storage and transfer facility in the vicinity of the property. Site maps indicated that waste was stored in barges, which were situated on the southern side of the proposed marina.

LIMITATIONS

It is understood that Potomac-Hudson Environmental (the Client) is preparing an Environmental Assessment of the subject area for the City of South Amboy. Potomac-Hudson Environmental has requested that that **PMK Group** identify the potential for the historic use, storage, and disposal of hazardous and toxic materials with the subject area.

It should be recognized that this report is prepared solely for the use of Potomac-Hudson Environmental and the City of South Amboy; other parties relying on the report must do so at their own risk and shall honor the General Conditions the in **PMK Group's** revised proposal, dated September 21, 2000. The scope of services, schedule and relative risks associated with this investigation have been discussed with Potomac-Hudson Environmental. Modifications in the scope of work, budget or schedule, as originally proposed, may result in information or sources that manifest subsequent to issuance of this report. Assuming such information exists, the impact of the same could not have been considered in the formulation of our findings and opinions presented in this report. Such information, as well as our opinion on the impact of this information on our findings and conclusions, will be transmitted under separate cover, as approximate.

This report has been prepared exclusively for Potomac-Hudson Environmental and the City of South Amboy, and the information obtained is only relevant for the dates of the records reviewed or as of the date of the latest site visit. The information contained herein is only valid as of the date of the report, and will require an update to reflect recent records/site visits. Additionally, the information contained herein is not to be transferred to parties other than Potomac-Hudson Environmental and the City of South Amboy without the prior written authorization from the **PMK Group**.

Potomac-Hudson Environmental and the City of South Amboy should recognize that this report is not a comprehensive *property* characterization and should not be construed as such. The findings and conclusions as presented in this report are based on results of the site reconnaissance, a review of the specified regulatory records, a review of the historical usage of the *property*, and conversations with representatives of the current occupants of the *property*. The absence of significant indicators that suggest that hazardous materials/wastes have impacted the property does not preclude the presence of hazardous materials/wastes at the *property*. In addition, Potomac-Hudson Environmental and the City of South Amboy should recognize that this investigation did

not include any inquiry with respect to radon and methane gas, asbestos, lead-based paint, or wetlands.

Therefore, the report should only be deemed conclusive with respect to the information obtained. No guarantee or warranty of the results of this investigation is implied within the intent of this report or any subsequent reports, correspondence or consultation, either expressed or implied. Potomac-Hudson Environmental and the City of South Amboy should also recognize that the services performed were conducted in accordance with the local standard of care in the geographic region at the time the services were rendered.

If there are any questions regarding the information contained herein, please do not hesitate to contact the undersigned at (908) 686-0044.

Respectfully Submitted,

PMK Group

Thomas O. Mineo, P.E.
Senior Project Manager
TM/tb/gnv/projectdata/0500149/0500149R100900

Tricia A. Black
Project Scientist

PMK Group
CONSULTING & ENVIRONMENTAL ENGINEERS

SITE INVESTIGATION REPORT
CONRAIL PROPERTY
MAIN STREET
BLOCK 162, LOTS 6, 6.01 & 25.01
SOUTH AMBOY, NEW JERSEY
PMK GROUP #0501053

VOLUME I of VIII

PREPARED FOR:

MIDDLESEX COUNTY IMPROVEMENT AUTHORITY
101 INTERCHANGE PLAZA
CRANBURY, NEW JERSEY 08512

PREPARED BY:

PMK GROUP
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Senior Project Manager

AUGUST 15, 2001

PMK Group
CONSULTING & ENVIRONMENTAL ENGINEERS

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PMK Group
CONSULTING & ENVIRONMENTAL ENGINEERS

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1.0 INTRODUCTION

The **PMK Group, Inc. (PMK)**, acting as the environmental consultant for the Middlesex County Improvement Authority (MCIA), conducted a Site Investigation at the Conrail Property site, (hereinafter designated as "the Site") in accordance with the recommendations presented in the Preliminary Assessment Report (PAR) prepared by Excel Environmental Resources, Inc. (Excel). The site is identified as Block 162, Lots 6, 6.01, and 25.01 on the Tax Maps of the City of South Amboy, Middlesex County, New Jersey. All site investigation activities were performed in accordance with the NJDEP *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E).

A Site Location Map is presented as Plate 1. In addition, a Site Plan indicating pertinent site features is presented as Plate 2.

2.0 SITE BACKGROUND

The Site has historically been utilized by several companies. The operations consisted of a rail yard, coal shipping terminal, marine berthing facility, and fueling and maintenance of diesel and electric locomotives. The present owner of the site is CSX Transporation / Norfolk-Southern joint venture. The Site was decommissioned and only remnant foundations associated with former buildings remain on site. A portion of the property is currently used as a small arms pistol range by local law enforcement agencies and Conrail. A PA report of the property was prepared by Excel of North Brunswick, New Jersey for MCIA. In addition, an Environmental Assessment (EA) report is being prepared by PMK and Potamic-Hudson Environmental, Inc. (PHE) of South Amboy, New Jersey for the potential redevelopment of the site as an intermodal transportation facility.

The following Areas of Concern (AOCs) were identified during the PA and addressed during the Site Investigation:

- AOC #1 – Former Engine House and Fueling Pad Ground Water Investigation
- AOC #2 – Oil / Water Separator and Associated Drainage System
- AOC #3 – Pistol Range
- AOC #4 – Embankment Soil Quality / Suspect Historical Fill
- AOC #5 – Ash Deposits
- AOC #6 – Railroad Tie Piles

The locations of these AOCs are shown on the Site Plan, Plate 2.

2.1 AOC #1– FORMER ENGINE HOUSE AND FUELING PAD GROUND WATER INVESTIGATION

Historical environmental reports indicate Total Petroleum Hydrocarbon (TPH) impacted soil has been documented in the area of the Engine House and Fueling Pad. Free-phase product was encountered in the ground water within this area. Review of the existing data indicates that impacts to soil quality associated with petroleum products have been confirmed.

2.2 AOC #2 – Oil / Water Separator and Assoicated Drainage System

During site inspection of the site, a brick subgrade structure was located east of the Engine House that may be associated with the oil / water separator. A two foot diameter steel corrugated pipe was also observed east of the Engine house, in addition to three inlets.

2.3 AOC #3 – Pistol Range

A pistol range is located in the northeastern section of the property. The pistol range is approximately 180 feet long and 90 feet wide. The ground surface consists of gravel with a network of concrete sidewalks throughout the pistol range. Spent shells are littered throughout the pistol range.

2.4 AOC #4 – Embankment Soil Quality and Suspect Historical Fill

The embankment is located along the southern property boundary and is composed of soil mixed with ballast, gravel, slag, coal, and cinders. Miscellaneous debris, including old railroad ties, empty drums, and trash were observed along the embankment. The area is vegetated with trees and dense underbrush. Review of historical reports indicates polynuclear aromatic hydrocarbon (PAH) compounds and metals are present in sporadic locations at concentrations that exceed the NJDEP Residential Direct Contact Soil Cleanup Criteria (RDCSCC).

2.5 AOC #5 – Ash Deposits

Dark gray, ash-like deposits were observed on the ground surface adjacent to the chain link fence that traverses the northern boundary of the Conrail Property bordering the Reliant Property. The material was dry and hardened. The material was deposited on the crest of a small embankment that borders the interior of the fence line. In addition, small deposits of the material were observed in the vicinity of monitoring well OHM-5 and the former above ground storage tank cradles.

2.6 AOC #6 – Railroad Tie Piles

A large pile of abandoned railroad ties was observed in the northern section of the property, west of AOC #3 – Pistol Range and southeast of AOC #5 – Ash Deposits. Inspection of the ties indicated that they might be creosote coated and / or stained from historical petroleum product discharges when the ties were in use.

3.0 PHYSICAL SETTING

The following section presents information which may be useful in evaluating certain site characteristics, including subsurface conditions, groundwater flow across the site and potential contaminant migration pathways.

3.1 Land Use

The subject site is located within an industrial area of South Amboy. Land uses within approximately 1,000 feet radial distance from the site were visually observed to consist primarily of industrial property and the Raritan Bay to the East. The Site Location Map, Plate 1, presents the general location and development of the land area in the vicinity of the subject site.

3.2 Site Topography

A review of the South Amboy, New Jersey Quadrangle USGS Topographic Map (7.5 minute series) dated 1955 (photo-revised 1982), indicates that the site topography is relatively flat with two tiers. Ground surface elevation at the site is between mean sea level (MSL) and approximately 10 to 20 feet above MSL. The regional overland drainage appears to be directed in an easterly direction, towards the Raritan Bay, which borders the eastern portion of the site. The topography of the site and adjacent areas is presented on a portion of the South Amboy Quadrangle USGS Topographic Map, presented as Plate 1.

3.3 Regional Geology And Hydrology

The Site is located within the New Jersey Coastal Plain Physiographic Province that is underlain by unconsolidated sands and clays of Cretaceous and Tertiary age. The Cretaceous and Tertiary-age sediments were deposited during major cycles of sea level changes, transgression and recession, and formed a seaward thickening depositional sequence in New Jersey. The Coastal Plain deposits are generally characterized as well-sorted sands, glauconitic sands, and lenses of clay that vary in thickness. Quaternary age deposits that include both stratified and unstratified sand and gravel with some clay overlie the Coastal Plain deposits. Native soils in the vicinity of the site are generally overlain by non-indigenous fill that was deposited during development, especially in the northern and easternmost waterfront portions on the Site. Review of historic environmental reports indicates that soil at the site is fill material consisting of dark brown to black sand with silt and varying amounts of ash, cinders, gravel, wood, slag, and coal underlain by native deposits of silt and clay. The bedrock underlying the New Jersey Coastal Plain consists of igneous, metamorphic, and sedimentary rocks of Traissic and Jurassic age of the Newark Basin. The sedimentary rock in the vicinity of the Site is in the Passaic Formation that is characterized as a reddish-brown to gray shale and mudstone.

The surface water bodies in the area include the Raritan River and Raritan Bay located adjacent to the northern and eastern sections of the Site. Based on review of historic environmental reports, groundwater occurs under unconfined conditions in the overburden soils at depths ranging from four to seven feet below ground surface (bsg). The underlying aquifer is the Potomac-Raritan-Magothy aquifer system. Depending upon the site topography and location in relationship to the Raritan Bay, shallow groundwater generally flows to the east-northeast toward the Raritan Bay following the general grade of the ground surface topography. Slight fluctuation in the groundwater flow gradient in the eastern sections of the Site in close proximity to the Raritan Bay are anticipated due to tidal influence from surface water in the adjacent Raritan Bay.

4.0 SCOPE OF WORK

The purpose of our site investigation was to perform an evaluation of existing soil and groundwater conditions and to identify the types of contamination, if any, present in the soil and groundwater at the site. The site investigation activities were conducted in accordance N.J.A.C. 7:26E. The following scope of work was performed at the subject site.

1) Prepared a Health and Safety Plan in accordance with OSHA regulations.

2) Performed soil sampling in the areas identified by Excel by performing 52 soil borings throughout the site by hand auger and collecting samples at 0 to 1.5 feet below ground surface (bgs) (Eighteen borings in AOC #3, 20 borings in AOC #4, eight borings in AOC #5, six borings in AOC #6).

3) Performed a ground water investigation by collecting ground water samples from the monitoring wells present at the site and obtained ground water level measurements during low and high tides.

4) Performed an investigation of the oil / water separator system and associated drainage system using smoke and dye.

5) Evaluated the findings and prepared this Site Investigation Report.

5.0 SITE ASSESSMENT

5.1 SOIL INVESTIGATION

On June 6, 7, and 11, 2001, PMK representatives were onsite to conduct a soil investigation at the subject site. Soil investigation activities were performed to ascertain the potential presence and extent of soil impacts in the identified areas of concern. A total of 52 soil borings were installed at the Site. Soil borings were advanced using a hand auger. All field work was performed under the direct technical observation of a subsurface evaluator from PMK.

The soil samples were obtained using a hand auger and subsequently placed in laboratory prepared jars. The soil samples were transmitted to a NJDEP certified laboratory Chemtech Consulting Group, Inc. of Mountainside, New Jersey (Chemtech, NJ Lab Certification No. 12013) for chemical analysis. Table 1, Sampling Summary, summarized the sampling and testing protocol adopted. Standard C.O.C procedures were implemented to track the samples.

5.1.1 AOC #3 – Pistol Range

On June 6, 2001, representatives of PMK were onsite to advance 18 borings in the area of the pistol range. As per NJDEP Technical Regulations, a boring was performed every 900 square feet section of the pistol range. Soil borings AOC3-S1 through AOC3-S18 were advanced to 1.5 feet below ground surface (bgs) using a hand auger. Boring locations were biased towards areas within each grid that contained the most surficial metal debris.

Two soil samples were collected from each soil boring at 0 to 0.5 feet bgs and 1.0 to 1.5 feet bgs. The soil samples collected at 0 to 0.5 feet bgs (sample A) were analyzed immediately. The soil samples collected at 1.0 to 1.5 feet (sample B) were activated if sample A indicated contaminant concentrations above the most stringent NJDEP Soil Cleanup Criteria (SCC). Soil samples were analyzed for Priority Pollutants (PP) Metals (USEPA method 6010 and 7471)

5.1.2 AOC #4 – Embankment Soil Quality / Suspect Historical Fill

On June 7 and 11, 2001, representatives from PMK were onsite to advance 20 borings along the embankment of the southern area of the site. Soil borings AOC4-S1 through AOC4-S20 were

advanced to 1.5 feet bgs using a hand auger. Boring locations were biased towards areas with the presence of ash, coal, slag, and other metal debris.

Two soil samples were collected from each soil boring at 0 to 0.5 feet bgs and 1.0 to 1.5 feet bgs. The soil samples collected at 0 to 0.5 feet bgs (sample A) were analyzed immediately for Total Petroleum Hydrocarbons (TPH, USEPA method 418.1), base / neutral organics plus a forward library search of fifteen additional compounds (BN+15, USEPA method 8270), PP Metals, and 25% percent of the A samples were analyzed for polychlorinated biphenlys (PCBs, USEPA method 8081A) based on TPH results. The soil samples collected at 1.0 to 1.5 feet bgs (sample B) were activated if sample A was above the most stringent NJDEP Soil Cleanup Criteria. These "B" samples were only collected for TPH and PP Metals analysis due to holding time restrictions.

5.1.3 AOC #5 – Ash Deposits

On June 6, 2001, representatives of PMK were onsite to advance 8 borings in the area where ash deposits were observed on the site. Soil borings AOC5-S1 through AOC5-S4 were advanced in the vicinity of the OHM-5 and the AST cradles and soil borings AOC5-S5 through AOC5-S8 were advanced along the fence line to 1.5 feet bgs using a hand auger biased to areas with stressed vegetation.

Two soil samples were collected from each soil boring at 0 to 0.5 feet bgs and 1.0 to 1.5 feet bgs. The soil samples collected at 0 to 0.5 feet bgs (sample A) were analyzed immediately for TPH, BN+15 and PP Metals. The soil samples collected at 1.0 to 1.5 feet bgs (sample B) would be activated if sample A indicated contaminant concentrations above the most stringent NJDEP Soil Cleanup Criteria. These "B" samples were only collected for TPH and PP Metals analysis due to holding time restrictions.

5.1.4 AOC #6 – Railroad Ties Pile

On June 6, 2001, representatives of PMK were onsite to advance six (6) borings around the railroad tie piles. Soil borings AOC6-S1 through AOC6-S6 were advanced to 0.5 feet bgs using a hand auger. Boring locations were biased to areas with surficial staining. One soil sample was collected from each soil boring at 0 to 0.5 feet bgs. The samples were analyzed for TPH and BN+15.

5.2 GROUNDWATER INVESTIGATION

5.2.1 Monitoring Well Sampling

On June 6, 2001, PMK representatives were onsite to perform groundwater sampling. Prior to sampling, oil / water level measurements were collected. Free phase product was observed in monitoring wells OHM-3, OHM-4, MWC-3, and MWC-4. The free phase product levels were 1.03 feet in OHM-3, 0.01 feet in OHM-4, 5.16 feet in MWC-3, and 0.01 feet in MWC-4. These monitoring wells were not sampled due to product observed in the wells. Monitoring wells OHM-6, MWC-2, and MWC-5 were damaged and could not be sampled. The remaining monitoring wells identified in the Excel report and an additional monitoring well discovered by PMK were sampled. Each monitoring well sampled was purged using a peristaltic pump and pertinent groundwater data was monitored using a Water Analyzer (Horiba). Groundwater samples were collected using the Low Flow method in accordance with NJDEP Region 2 "Ground Water Sampling Procedure, Low

Stress (Low Flow) Purging and Sampling" SOP. Ground water data was recorded on the Ground Water Sampling Records and copies of these records are presented in Appendix A.

A total of seven groundwater samples (OHM-1, OHM-2, OHM-5, OHM-7, OHM-8, MWC-1, and EMW-1) were collected from the monitoring wells and analyzed for volatile organic compounds plus a forward library search of nontargeted compounds VO+10 (USEPA method 624), BN+15 (USEPA Method 625) and PP Metals (USEPA method 200.7 and 245.1). The samples were collected in accordance with the NJDEP *Field Sampling Procedures Manual* (May 1992) and the requirements of N.J.A.C. 7:26E-3.7.

The groundwater samples were obtained using a dedicated Teflon bailer for VO+10 and BN+15 analysis and dedicated Teflon tubing for the PP metals analysis and were subsequently placed in laboratory prepared jars. The groundwater samples were transported to Chemtech for analysis and standard C.O.C. procedures were used to track the samples. A summary of the Groundwater Sampling program implemented at the Site is presented in Table 1.

5.2.2 Ground Water Level Measurements

On June 13, 2001, a PMK representative was on site to collect ground water level measurements during low and high tide events. The measurements were collected from the 1st low and 2nd high tides of the day. Ground water level measurements were not collected from monitoring wells OHM-6, MWC-2, and MWC-5 due to the wells being damaged. Based upon the readings collected at these two particular tidal events, there is not a significant change in ground water elevations between low and high tides. Free phase product was encountered in monitoring wells OHM-3 and MWC-3 during both measurement events at 0.34 feet in OHM-3 and 4.85 feet in MWC-3. Free phase product was not encountered in OHM-4 and MWC-4, but was encountered during the ground water sampling event. This could be due to a small sheen on the water table present during the sampling event, but not present during the collection of ground water level measurements. The results of the ground water level measurements collected during low and high tides do not show the area to be significantly tidally influenced. There was a slight difference in ground water level measurements in monitoring wells OHM-2 and MWC-1. The difference in ground water level was 0.01 feet in OHM-2 and 0.04 feet in MWC-1. PMK suggests additional monitoring of ground water elevations for a 48–hour period to determine the variations in ground water level measurements between four (4) full tidal cycles. Table 4, Ground Water / Product Level Measurements at Low and High Tides, summarizes the ground water / product level measurement collected during low and high tides.

5.3 OIL / WATER SEPARATOR AND ASSOCIATED DRAINAGE SYSTEM

On June 13, 2001, PMK representatives were onsite to conduct an investigation of the oil / water separator system and associated drainage system. During the investigation, PMK identified seven inlets near the oil / water separator pit and former Engine House in addition to the 2 foot diameter corrugated steel pipe and the oil / water separator pit. Inlets 1 through 5 are collection points for surface runoff. Inlets 6 and 7 are access points for the drainage system. The structures were numbered Inlet 1 through Inlet 7 for ease of tracking during this investigation. A detailed description of the drainage system and the results of the smoke and dye tests is presented below.

The oil / water separator pit contains two pipes. One pipe is entering into the brick structure and the other pipe is an outfall for the brick structure. The inflow pipe is an 8-inch corrugated steel pipe on the northern side of the pit in line with the 2-foot corrugated steel stickup pipe located east of monitoring well OHM-2. The outfall pipe is located on the southeastern side of the pit and flows in an eastern direction. Three inlets are located east of the oil / water separator pit. These inlets are identified as Inlets 1 through 3. Inlets 1 and 2 have two openings, one on the eastern (outfall) and one on the western side (inflow) of the inlets. Inlet 3 has three inflow locations, all on the western side of the inlet and an outfall on the eastern side. Inlet 4 is located east of Inlet 3. The area between these two inlets is a swale lined with a half cut corrugated steel pipe open to the air. Inlet 4 has a 6 foot diameter steel grate over the inlet and has an inflow located at the western side and an outfall on the southern side. Inlet 5 is located south of Inlet 4 in a subgrade brick structure with two inflow pipes located to the west and north and one outfall to the east. Inlet 6 is located southeast of Inlet 5 that was once covered with a manhole cover and has a service access into the inlet. Inflow and outfall pipes could not be identified. Inlet 7 is located west of Inlet 6 and has a manhole cover that could not be removed. The outfall in the Raritan Bay is located along the bulkhead east of Inlet 6.

PMK performed a smoke and dye test in order to determine how the drainage system was connected. The smoke test was performed in lieu of the dye test in some areas due to free phase product found in several monitoring wells near the area. Smoke and dye were introduced in various locations throughout the site to determine how the drainage system was connected.

Smoke was introduced into the 2 foot corrugated steel pipe and revealed smoke coming from the ground on the western side of the pipe. The ground surface in this area contains cobbles and coarse gravel. No other observations were made. Smoke and dye was introduced in Inlet 1, but the results were inconclusive. PMK suspects that Inlet 1 could be connected to Inlet 3, but has no proof. Smoke was introduced into Inlet 2, and smoke was observed coming out the northwestern opening of Inlet 3. Inlet 3 is believed to flow towards Inlet 4 due to the visible open swale line with corrugated steel piping. A smoke test was performed at Inlet 5. Smoke was introduced in the northern pipe. Smoke was observed coming out of the southern pipe in Inlet 4. Smoke was introduced in the eastern pipe of Inlet 5, but the results were inconclusive. PMK suspects this pipe could be connected to either Inlet 6 or 7, but has no proof. Smoke was introduced into Inlet 6 and revealed smoke coming from a broken section of piping leading to the outfall at the bulkhead. Dye and smoke tests were performed on the oil / water separator outfall. The results of the smoke test were inconclusive, however, dye was observed in Inlet 5 coming from the inflow pipe on the western side. A smoke test was performed on the oil / water separator inflow, but the results were inconclusive. PMK suspects that the 2 foot corrugated steel pipe is connected to the oil / water separator pit in some way, but has no proof. Inlet 7 could not be tested due to the manhole being inaccessible. PMK suspects that this inlet could be connected to Inlet 5 or 6, but has no proof. The locations of the oil / water separator, 2 foot corrugated steel pipe, and associated inlets discovered during the investigation and the confirmed connection through the smoke and dye tests is present on Plate 4, Oil / Water Separator and Associated Drainage System (AOC #2).

6.0 ANALYTICAL RESULTS

6.1 SOIL SAMPLING RESULTS

The analytical laboratory reports, dated June 16, 2001, July 16 and 17, and August 6 and 13, 2001, for the soil sampling at the subject site are presented in Volume II through VII. The soil sampling results have been reviewed and the results are summarized on Tables 2.1 through 2.4. The criteria used to evaluate the soil sampling results are based upon the most stringent NJDEP Soil Cleanup Criteria (N.J.A.C. 7:26D, revised May 3, 1999). These criteria are presented along with the analytical results in the summary tables.

6.1.1 AOC #3 – Pistol Range

A review of the analytical results for PP-Metals analysis indicated that the antimony and lead concentrations exceeded the most stringent NJDEP SCC. Antimony was detected at a concentration of 17.4 mg/kg in sample AOC4-S9A, exceeding the most stringent NJDEP SCC of 14.0 mg/kg. Lead was detected at concentrations of 438 mg/kg in sample AOC4-S9A, 410 mg/kg in sample AOC3-S11A, and 467 mg/kg in sample AOC4-S17A exceeding the most stringent NJDEP SCC of 400 mg/kg. All other concentrations of PP-Metals are below the most stringent NJDEP SCC. All detectable contaminant concentrations are presented on the summary table along with the SCC.

Based upon contaminant concentrations exceeding the most stringent NJDEP SCC, soil samples AOC3-S9B, AOC3-S11B, and AOC3-S17B were analyzed for PP-Metals. A review of the analytical results for PP Metals analysis indicated all concentrations are below the most stringent NJDEP SCC. The results are summarized on Table 2.1.

6.1.2 AOC #4 – Embankment Soil Quality / Suspect Historical Fill

A review of the analytical results for TPH indicated concentrations ranged from 180 mg/kg to 140,000 mg/kg. Sample AOC4-S9A is above the most stringent NJDEP SCC of 10,000 mg/kg for total organic contaminants. All other results for TPH are below the most stringent NJDEP SCC. Based on upon contaminant concentrations exceeding the most stringent NJDEP SCC, sample AOC4-S9B was analyzed for TPH.

A review of the TPH analytical result for sample AOC4-S9B indicated a TPH concentration of 6,800 mg/kg. The concentration is below the most stringent NJDEP SCC.

A review of the analytical results for the BN+15 analysis indicated benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and chrysene concentrations exceeded the most stringent NJDEP SCC. Benzo(a)anthracene was detected at concentrations of 3.0 mg/kg in sample AOC4-S1A, 2.1 mg/kg in sample AOC4-S4A, 9.3 in sample AOC4-S12A, and 0.97 mg/kg in sample AOC4-S19A exceeding the most stringent NJDEP SCC of 0.9 mg/kg. Benzo(b)fluoranthene was detected at concentrations of 5.6 mg/kg in sample AOC4-S1A, 2.7 in sample AOC4-S4A, 6.1 mg/kg in sample AOC4-S12A, 1.2 mg/kg in sample AOC4-S18A, and 2.9 mg/kg in sample AOC4-S19A exceeding the most stringent NJDEP SCC of 0.9 mg/kg. Benzo(k)fluoranthene was detected at concentrations of 1.9 mg/kg in sample AOC4-S1A, 1.4 mg/kg in sample AOC4-S4A, 12.0 mg/kg in sample AOC4-S12A, and 0.95 mg/kg in sample AOC4-S19A exceeding the most stringent NJDEP SCC of 0.9 mg/kg. Benzo(a)pyrene was detected at

concentrations of 2.8 mg/kg in sample AOC4-S1A, 2.7 mg/kg in sample AOC4-S4A, 7.8 mg/kg in sample AOC4-S12A, and 0.97 mg/kg in sample AOC4-S19A exceeding the most stringent NJDEP SCC of 0.66 mg/kg. Chrysene was detected at a concentration of 9.3 mg/kg in sample AOC4-S12A exceeding the most stringent NJDEP of 9.0 mg/kg. All other detectable contaminant concentrations are presented on the summary table along with the SCC.

A review of the analytical results for PP-Metals analysis indicated antimony, arsenic, and lead concentrations exceeding the most stringent NJDEP SCC. Antimony was detected at concentrations of 15.1 mg/kg in sample AOC4-S1A, 17.1 mg/kg in sample AOC4-S5A, 18.0 mg/kg in sample AOC4-S15A, 18.3 mg/kg in sample AOC4-S16A, 16.7 mg/kg in sample AOC4-S17A, and 15.1 mg/kg in sample AOC4-S19A exceeding the most stringent NJDEP SCC of 14.0 mg/kg. Arsenic was detected at concentrations of 29.5 mg/kg in sample AOC4-S1A, 20.3 mg/kg in sample AOC4-S2A, 41.7 mg/kg in sample AOC4-S3A, 24.5 in sample AOC4-S5A, 39.8 mg/kg in sample AOC4-S6A, and 26.1 mg/kg in sample AOC4-S16A exceeding the most stringent NJDEP SCC of 20 mg/kg. Lead was detected at concentrations of 539 mg/kg in sample AOC4-S1A and 3,140 mg/kg in sample AOC4-S2A exceeding the most stringent NJDEP SCC of 400 mg/kg. All other contaminant concentrations were below the most stringent NJDEP SCC. All detectable concentrations are presented on the summary table along with the SCC.

Based upon contaminant concentrations exceeding the most stringent NJDEP SCC, soil samples AOC4-S1B, AOC4-S2B, AOC4-S3B, AOC4-S4B, AOC4-S5B, AOC4-S6B, AOC4-S15B, AOC4-S16B, AOC4-S17B, and AOC4-S19B were analyzed for PP Metals. A review of the analytical results for PP-Metals analysis indicated antimony, arsenic, and lead concentrations exceeding the most stringent NJDEP SCC. Antinomy was detected at concentrations of 25.2 mg/kg in sample AOC4-S1B, 33.2 mg/kg in sample AOC4-S5B, 20.3 mg/kg in sample AOC4-S14B, 20.3 mg/kg in sample AOC4-S17B, and 19.6 mg/kg in sample AOC4-S19B exceeding the most stringent NJDEP SCC of 14.0 mg/kg. Arsenic was detected at concentrations of 38.8 mg/kg in sample AOC4-S1B, 57.7 mg/kg in sample AOC4-S3B, 42.4 mg/kg in sample AOC4-S4B, 47.2 mg/kg in sample AOC4-S5B, 68.7 mg/kg in sample AOC4-S6B, 30.1 mg/kg in sample AOC4-S17B, and 30.6 mg/kg in sample AOC4-S19B exceeding the most stringent NJDEP SCC of 20 mg/kg. Lead was detected at concentrations of 1,090 mg/kg in sample AOC4-S1B, 400 mg/kg in sample AOC4-S3B, 565 mg/kg in sample AOC4-S5B, and 441 mg/kg in sample AOC4-S17B. All other concentrations were below the most stringent NJDEP SCC. All detectable concentrations are presented on the summary table along with the SCC.

The analytical laboratory by mistake also analyzed the following samples: AOC4-S9B, AOC4-S10B, AOC4-S11B, AOC4-S12B, AOC4-S13B, and AOC4-S14B. A review of the analytical results for the PP Metals analysis indicated a concentration of antinomy in sample AOC4-S14B of 16.8 mg/kg exceeding the most stringent NJDEP SCC of 14.0 mg/kg. All other concentrations are below the most stringent NJDEP SCC. All detectable concentrations are presented on summary tables along with the SCC.

A review of the analytical results for poly chlorinated biphenyls (PCBs) analysis indicated that all contaminant concentrations are below the most stringent NJDEP SCC of 0.49 mg/kg. All detectable contaminant concentrations are presented on the summary table along with the SCC. The results are presented on Table 2.2.

6.1.3 AOC #5 – Ash Deposits

A review of the analytical results for TPH indicated TPH concentrations ranged from 250 mg/kg to 1,400 mg/kg. All contaminant concentrations are below the most stringent NJDEP SCC of 10,000 mg/kg for total organic contaminants. No contingent samples were activated because the TPH results were below the most stringent NJDEP SCC.

A review of the analytical results for the BN+15 analysis indicated that the concentrations are all below the most stringent NJDEP SCC. All detectable contaminants concentrations are presented on the summary table along with the SCC.

A review of the analytical results for PP-Metals analysis indicated that the concentrations are all below the most stringent NJDEP SCC. All detectable contaminants are presented on the summary table along with the SCC. No contingent samples were activated because the PP Metals results were below the most stringent NJDEP SCC. The results are summarized on Table 2.3.

6.1.4 AOC #6 – Railroad Tie Piles

A review of the analytical results for TPH indicated TPH concentrations ranged from 450 mg/kg to 860 mg/kg. All concentrations are below the most stringent NJDEP SCC.

A review of the analytical results for the BN+15 analysis indicated the concentrations of benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)pyrene exceeded the most stringent NJDEP SCC. Benzo(b)fluoranthene was detected at concentrations of 2.4 mg/kg in sample AOC6-S2 and 0.970 mg/kg in sample AOC6-S4 exceeding the most stringent NJDEP SCC of 0.9 mg/kg. Benzo(k)fluoranthene was detected at concentrations of 1.3 mg/kg in sample AOC 6-S2 and 1.1 mg/kg in sample AOC6-S4 exceeding the most stringent NJDEP SCC of 0.9 mg/kg. Benzo(a)pyrene was detected at concentrations of 1.2 mg/kg in sample AOC6-S2 and 0.670 mg/kg in sample AOC6-S4 exceeding the most stringent NJDEP SCC of 0.66 mg/kg. All other concentrations for BN+15 are below the most stringent NJDEP SCC. All detectable concentrations are presented on the summary table along with the SCC. The results are summarized on Table 2.4.

6.2 Ground Water Sampling Results

The analytical laboratory report, dated June 22, 2001, for ground water sampling at the Site is presented in Volume VIII. The ground water results have been reviewed and the results are summarized in Table 3.2. The criteria used to evaluate the ground water sampling results is based upon the NJDEP Ground Water Quality Standards (GWQS) (N.J.A.C. 7:9-6 revised February 1, 1993) and the NJDEP memorandum – Changes to the Safe Drinking Water Act and Effects of GWQS (February 5, 1997).

A review of the analytical results for the VO+15 analysis indicated that the concentrations are all below the most stringent NJDEP SCC. All detectable contaminant concentrations are presented on the summary table along with the GWQS.

A review of the analytical results for the BN+15 analysis indicated that the concentrations are all below the most stringent NJDEP SCC. All detectable contaminant concentrations are presented on the summary table along with the GWQS.

A review of the analytical results for the PP-Metals analysis indicated concentrations of antimony, arsenic, and lead exceeding the GWQS. Antimony was detected at a concentration of 119 µg/l in sample MWC-1 exceeding the GWQS of 20 µg/l. Arsenic was detected at concentrations of 8.1 µg/l in sample OHM-5, 11.2 µg/l in sample OHM-7, 16.9 µg/l in sample OHM-8, 131 µg/l in sample MWC-1, and 15.9 µg/l in sample EMW-1 exceeding the GWQS of 8.0 µg/l. Lead was detected at concentrations of 14.3 µg/l in sample OHM-2, 14.6 µg/l in sample OHM-5, 21.6 µg/l in sample OHM-7, 43.3 µg/l in sample OHM-8, and 101 µg/l in sample MWC-1 exceeding the GWQS of 10.0 µg/l. All other contaminant concentrations were below the GWQS. All detectable contaminant concentrations are presented on the summary table along with the SCC.

7.0 SUMMARY OF FINDINGS

Based on the information obtained during the Site Investigation and a review of the laboratory test results, we have determined the following:

1. There was no significant contamination encountered in the investigation of AOC #5.

2. Surficial soil contamination exists at the site in the form of PAH compounds, arsenic, antimony, lead, and total petroleum hydrocarbons in localized areas of AOC #4, #5, and #6.

3. In the Pistol Range (AOC#3), it was demonstrated that contamination does not extend below surface grade.

4. Free phase product was encountered in several wells, however, no organic contaminants were present at concentrations in excess of the GWQS in the surrounding wells that were sampled.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon reviewing the above findings, PMK recommends the following:

1. Soil contamination is present throughout the site. The contaminants above the most stringent NJDEP SCC are TPH, metals, and PAH compounds. PMK recommends capping the entire site. If construction will take place in areas where contamination is above the NJDEP SCC, PMK recommends that the soil generated during site grading operations be properly classified and disposed of at a NJDEP approved facility.

2. Free phase product was found in OHM-3 and MWC-3. PMK recommends the development of a plan to address the removal or treatment in place of the product encountered in these monitoring wells.

3. Ground water contamination is present in the majority of the monitoring wells sampled. The contaminants present in the ground water above the GWQS are antinomy, arsenic, and lead. These contaminants are also found in the soil above the NJDEP SCC. However, arsenic and lead contamination was also found in the upgradient monitoring wells above the GWQS. PMK recommends further delineation of ground water contamination in the western area of the site to determine possible contamination coming from off site, and

the establishing of a Classification Exception Area (CEA), for metals contamination at the site.

4. PMK recommends well abandonment for damaged monitoring wells OHM-6, MWC-2 and MWC-5, and install new monitoring wells near the former locations and collect ground water samples to determine if ground water impacts are observed in these areas.

5. Based on ground water level measurements collected during low and high tides, the area is only minimally influenced by the tides. PMK recommends further monitoring of ground water levels throughout the site for a 48-hour period to confirm tidal influence on the site.

6. PMK recommends removing or sealing the oil / water separator pit and associated drainage system.

7. The recommendations of PMK based upon the investigation will be explained in greater length in the Conceptual Remedial Action Workplan.

PMK Group
CONSULTING & ENVIRONMENTAL ENGINEERS

TABLE 1
SAMPLING SUMMARY
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

PMK SAMPLE ID	LABORATORY SAMPLE ID	DATE SAMPLED	DEPTH (ft)*	MATRIX	ANALYTICAL PARAMETERS	SAMPLING METHOD
SOIL SAMPLING:						
AOC - 3: Pistol Range						
AOC3-S1A	L4664-01	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S2A	L4664-03	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S3A	L4664-05	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S4A	L4664-07	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S5A	L4664-09	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S6A	L4664-11	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S7A	L4664-13	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S8A	L4664-15	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S9A	L4664-17	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S9B	L4664-18	6/6/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC3-S10A	L4664-19	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S11A	L4664-21	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S11B	L4664-22	6/6/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC3-S12A	L4664-23	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S13A	L4664-25	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S14A	L4664-27	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S15A	L4664-29	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S16A	L4664-31	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S17A	L4664-33	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC3-S17B	L4664-34	6/6/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC3-S18A	L4664-35	6/6/01	0-0.5'	Soil	PP-Metals	Hand Auger
AOC - 4: Embankment Soil Quality/Suspect Historic Fill						
AOC4-S1A	L4662-01	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S1B	L4662-02	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S2A	L4662-03	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15, PCBs	Hand Auger
AOC4-S2B	L4662-04	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S3A	L4662-05	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S3B	L4662-06	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S4A	L4662-07	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S4B	L4662-08	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S5A	L4662-09	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S5B	L4662-10	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S6A	L4662-11	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S6B	L4662-12	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S7A	L4662-13	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15, PCBs	Hand Auger
AOC4-S8A	L4662-15	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger

PMK Group
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TABLE 1 (cont)
SAMPLING SUMMARY
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

PMK SAMPLE ID	LABORATORY SAMPLE ID	DATE SAMPLED	DEPTH (ft)*	MATRIX	ANALYTICAL PARAMETERS	SAMPLING METHOD
SOIL SAMPLING:						
AOC - 4: Embankment Soil Quality/Suspect Historic Fill (cont)						
AOC4-S9A	L4662-17	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15, PCBs	Hand Auger
AOC4-S9B	L4662-18	6/7/01	1.0-1.5'	Soil	TPH, PP-Metals	Hand Auger
AOC4-S10A	L4662-19	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S10B	L4662-20	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S11A	L4662-21	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S11B	L4662-22	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S12A	L4662-23	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S12B	L4662-24	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S13A	L4662-25	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15, PCBs	Hand Auger
AOC4-S13B	L4662-26	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S14A	L4662-27	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15, PCBs	Hand Auger
AOC4-S14B	L4662-28	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S15A	L4725-01	6/11/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S15B	L4725-02	6/11/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S16A	L4725-03	6/11/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S16B	L4725-04	6/11/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S17A	L4662-33	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S17B	L4662-34	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S18A	L4662-35	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15, PCBs	Hand Auger
AOC4-S19A	L4662-37	6/7/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC4-S19B	L4662-38	6/7/01	1.0-1.5'	Soil	PP-Metals	Hand Auger
AOC4-S20A	L4662-39	6/7/01	0.0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC - 5: Ash Deposits						
AOC5-S1A	L4663-01	6/6/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC5-S2A	L4663-03	6/6/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC5-S3A	L4663-05	6/6/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC5-S4A	L4663-07	6/6/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC5-S5A	L4663-09	6/6/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC5-S6A	L4663-11	6/6/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC5-S7A	L4663-13	6/6/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC5-S8A	L4663-15	6/6/01	0-0.5'	Soil	TPH, PP-Metals, BN+15	Hand Auger
AOC - 6: Railroad Tie Piles						
AOC6-S1	L4665-001	6/6/01	0-0.5'	Soil	TPH, BN+15	Hand Auger
AOC6-S2	L4665-002	6/6/01	0-0.5'	Soil	TPH, BN+15	Hand Auger
AOC6-S3	L4665-003	6/6/01	0-0.5'	Soil	TPH, BN+15	Hand Auger
AOC6-S4	L4665-004	6/6/01	0-0.5'	Soil	TPH, BN+15	Hand Auger
AOC6-S5	L4665-005	6/6/01	0-0.5'	Soil	TPH, BN+15	Hand Auger
AOC6-S6	L4665-006	6/6/01	0-0.5'	Soil	TPH, BN+15	Hand Auger

PMK Group
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TABLE 1 (cont)
SAMPLING SUMMARY
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

PMK SAMPLE ID	LABORATORY SAMPLE ID	DATE SAMPLED	DEPTH (ft)*	MATRIX	ANALYTICAL PARAMETERS	SAMPLING METHOD
GROUNDWATER SAMPLING						
AOC - 1: Former Engine House and Fueling Pad						
OHM-1	L4666-01	6/6/01	5.84	Groundwater	VO+10, BN+15, PP-Metals	Bailer, Tubing
OHM-2	L4666-02	6/6/01	6.22	Groundwater	VO+10, BN+15, PP-Metals	Bailer, Tubing
OHM-5	L4666-03	6/6/01	13.65	Groundwater	VO+10, BN+15, PP-Metals	Bailer, Tubing
OHM-7	L4666-04	6/6/01	18.89	Groundwater	VO+10, BN+15, PP-Metals	Bailer, Tubing
OHM-8	L4666-05	6/6/01	12.45	Groundwater	VO+10, BN+15, PP-Metals	Bailer, Tubing
MWC-1	L4666-06	6/6/01	7.24	Groundwater	VO+10, BN+15, PP-Metals	Bailer, Tubing
EMW-1	L4666-07	6/6/01	16.20	Groundwater	VO+10, BN+15, PP-Metals	Bailer, Tubing
FB	L4666-09	6/6/01	--	Groundwater	VO+10, BN+15, PP-Metals	--
TB	L4666-10	6/601	--	Groundwater	VO+10, BN+15, PP-Metals	--

Legend:

PP Metals - Priority Pollutant Metals
TPH - Total Petroleum Hydrocarbons
BN+15 - Base-Neutral Organic Compounds
VO+10 - Volatile Organic Compounds

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TABLE 2.1
SOIL SAMPLING RESULTS SUMMARY
AOC #3 - PISTOL RANGE
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

SAMPLE ID	AOC3-S1A	AOC3-S2A	AOC3-S3A	AOC3-S4A	AOC3-S5A	AOC3-S6A	AOC3-S7A	AOC3-S8A	AOC3-S9A	AOC3-S9B	AOC3-S10A	NJDEP Residential Direct Contact Soil Cleanup Criteria (mg/kg)	NJDEP Non Residential Direct Contact Soil Cleanup Criteria (mg/kg)	NJDEP Impact to Ground Water Soil Cleanup Criteria (mg/kg)
LAB SAMPLE ID	L4664-01	L4664-03	L4664-05	L4664-07	L4664-09	L4664-11	L4664-13	L4664-15	L4664-17	L4664-18	L4664-19			
DATE COLLECTED	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01			
DEPTH (ft.)	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	1.0-1.5'	0-0.5'			
DILUTION FACTOR	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0			
ANALYTICAL PARAMETERS														
PP Metals (mg/kg)														
Antimony	2.1 B	1.2 B	5.4 B	3.3 B	2.1 B	1.1 B	2.0 B	2.2 B	17.4	4.9	1.6 B	14	340	–
Arsenic	6.7	3.9	15.9	7.7	4.9	3.3	6.1	5.4	19.6	9.1	4.9	20	20	–
Beryllium	0.25 B	0.28 B	0.49 B	0.35 B	0.28 B	0.34 B	0.37 B	0.64	0.47 B	0.21 B	0.41 B	2	2	–
Cadmium	ND	ND	0.08 B	ND	ND	ND	ND	ND	ND	0.30 B	ND	39	100	–
Chromium	6.2	7.3	9.1	7.8	6.9	5.8	8.9	16.1	14.8	6.8	8.6	–	500	–
Copper	35.4	20.9	119	53.2	33.0	22.7	48.1	40.8	330	99.2	33.8	600	600	–
Lead	86.6	37.6	200	119	69.3	48.7	95.6	49.7	438	232	93.2	400	600	–
Mercury	0.02	ND	0.11	0.03	ND	ND	0.03	0.02	0.12	0.08	ND	14	270	–
Nickel	3.3 B	3.1 B	7.7	4.6	3.9 B	2.0 B	3.6 B	9.1	13.3	6.8	4.0 B	250	2,400	–
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.43 B	ND	63	3,100	–
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.37 B	ND	110	4,000	
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.49 B	ND	2	2	–
Zinc	37.1	27.8	70.5	41.8	39.0	18.9	29.8	52.3	110	51.3	25.1	1,500	1,500	–

Legend:

mg/kg - parts per million
B - Estimated Concentration
ND - Not Detected
17.4 - Exceeded the NJDEP SCC

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TABLE 2.1 (cont)
SOIL SAMPLING RESULTS SUMMARY
AOC #3 - PISTOL RANGE
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

SAMPLE ID	AOC3-S11A	AOC3-S11B	AOC3-S12A	AOC3-S13A	AOC3-S14A	AOC3-S15A	AOC3-S16A	AOC3-S17A	AOC3-S17B	AOC3-S18A	NJDEP Residential Direct Contact Soil Cleanup Criteria (mg/kg)	NJDEP Non Residential Direct Contact Soil Cleanup Criteria (mg/kg)	NJDEP Impact to Ground Water Soil Cleanup Criteria (mg/kg)
LAB SAMPLE ID	L4664-21	L4664-22	L4664-23	L4664-25	L4664-27	L4664-29	L4664-31	L4664-33	L4664-34	L4664-35			
DATE COLLECTED	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01			
DEPTH (ft.)	0-0.5'	1.0-1.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	1.0-1.5'	0-0.5'			
DILUTION FACTOR	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0			
ANALYTICAL PARAMETERS													
TCLP Metals (mg/kg)													
Antimony	8.1	ND	1.8 B	2.3 B	0.87 B	5.3 B	1.7 B	6.3 B	1.3	1.3 B	14	340	--
Arsenic	12.9	2.9	3.0	8.1	2.8	7.4	3.0	3.9	3.2	1.7	20	20	--
Beryllium	0.36 B	0.22 B	0.22 B	0.52 B	0.40 B	0.35 B	0.28 B	0.26 B	ND	0.19 B	2	2	--
Cadmium	ND	ND	ND	0.36 B	ND	0.18 B	ND	ND	0.14 B	ND	39	100	--
Chromium	9.7	7.1	4.7	10.8	6.7	6.6	5.1	6.5	5.5	4.5	--	500	--
Copper	103	10.6	79.1	295	11.9	70.3	18.4	71.2	81.7	3.2	600	600	--
Lead	410	10.2	89.8	170	18.7	110	43.4	467	41.5	19.5	400	600	--
Mercury	0.08	0.03	ND	0.05	ND	0.02	ND	ND	0.05	ND	14	270	--
Nickel	7.7	2.1	6.1	7.3	1.7 B	4.0 B	1.9 B	4.4	2.35	1.5 B	250	2,400	--
Selenium	ND	ND	ND	0.74	ND	ND	ND	ND	ND	ND	63	3,100	--
Thallium	ND	ND	ND	ND	ND	0.32 B	ND	0.27 B	0.64 B	ND	2	2	--
Zinc	63.4	12.1	87.9	752	12.6	37.4	19.9	360	27.7	16.9	1,500	1,500	--

Legend:

mg/kg - parts per million
J - Estimated Concentration
ND - Not Detected
410 - Exceeded the NJDEP SCC

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TABLE 2.2
SOIL SAMPLING RESULTS SUMMARY
AOC #4 - Embankment Soil Quality/Suspect Historic Fill
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

SAMPLE ID	AOC4-S1A	AOC4-S1B	AOC4-S2A	AOC4-S2B	AOC4-S3A	AOC4-S3B	AOC4-S4A	AOC4-S4B	AOC4-S5A	AOC4-S5B	AOC4-S6A	AOC4-S6B	AOC4-S7A	AOC4-S8A	AOC4-S9A	AOC4-S9B	AOC4-S10A	AOC4-S10B	NJDEP	NJDEP	NJDEP
LAB SAMPLE ID	L4662-01	L4662-02	L4662-03	L4662-04	L4662-05	L4662-06	L4662-07	L4662-08	L4662-09	L4662-10	L4662-11	L4662-12	L4662-13	L4662-15	L4662-17	L4662-18	L4662-19	L4662-20	Residential	Non Residential	Impact to
DATE COLLECTED	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	Direct Contact	Direct Contact	Ground Water
DEPTH (ft.)	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	0-0.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	Soil Cleanup	Soil Cleanup	Soil Cleanup
DILUTION FACTOR	1, 5	1.0	1.0	1.0	1.0	1.0	1, 5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	Criteria (mg/kg)	Criteria (mg/kg)	Criteria (mg/kg)
ANALYTICAL PARAMETERS																					
Total Petroleum Hydrocarbons (mg/kg)																					
TPH	180	NA	760	NA	560	NA	660	NA	470	NA	380	NA	800	210	140,000 D	6400	810	NA	10,000	10,000	NS
Base/Neutral Organics (mg/kg)																					
Phenanthrene	0.87	NA	0.11	NA	0.19	NA	0.15	NA	0.3	NA	ND	NA	0.098	ND	0.22	NA	0.27	NA	NS	NS	NS
Carbazole	0.18	NA	ND	NA	ND	NA	0.049	NA	0.044	NA	ND	NA	ND	ND	ND	NA	ND	NA	NS	NS	NS
Anthracene	0.66	NA	ND	NA	ND	NA	0.36	NA	0.11	NA	ND	NA	0.066	ND	0.063	NA	0.059	NA	10,000	10,000	100
Naphthalene	0.18	NA	ND	NA	0.043 J	NA	ND	NA	0.083	NA	ND	NA	ND	ND	0.038 J	NA	0.12	NA	230	4,200	100
Acenaphthylene	0.67	NA	ND	NA	ND	NA	0.98	NA	0.054	NA	ND	NA	0.057	ND	ND	NA	0.043	NA	NS	NS	NS
2-Methylnaphthalene	0.15	NA	0.046	NA	0.053	NA	ND	NA	0.092	NA	ND	NA	0.039 J	ND	0.073	NA	0.15	NA	NS	NS	NS
Acenaphthene	0.061	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	ND	ND	NA	ND	NA	3,400	10,000	100
Dibenzofuran	0.17	NA	ND	NA	ND	NA	ND	NA	0.051	NA	ND	NA	ND	ND	0.059	NA	0.055	NA	NS	NS	NS
Di-n-butylphthalate	0.086	NA	0.073	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	ND	ND	NA	ND	NA	5,700	10,000	100
Fluoranthene	4.1 D	NA	0.18	NA	0.31	NA	3.3 D	NA	0.5	NA	0.046	NA	0.42	ND	0.37	NA	0.28	NA	2,300	10,000	100
Flourene	0.058	NA	ND	NA	ND	NA	0.066	NA	ND	NA	ND	NA	ND	ND	ND	NA	ND	NA	2,300	10,000	100
Pyrene	4.2 D	NA	0.22	NA	0.31	NA	5.5 D	NA	0.57	NA	0.046	NA	0.45	ND	0.56	NA	0.39	NA	1,700	10,000	100
Butylbenzylphthalate	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	ND	ND	NA	0.047	NA	1,100	10,000	100
Benzo(a)anthracene	2.1 D	NA	0.093	NA	0.15	NA	2.1	NA	0.21	NA	ND	NA	0.16	ND	0.073	NA	0.14	NA	0.9	4	500
Chrysene	3.4 D	NA	0.13	NA	0.18	NA	2.3	NA	0.3	NA	ND	NA	0.3	ND	0.12	NA	0.24	NA	9	40	500
Bis(2-Ethylhexyl)phthalate	0.052	NA	0.075	NA	0.077	NA	0.072	NA	0.068	NA	ND	NA	0.059	ND	0.17	NA	0.65	NA	49	210	100
Benzo(b)fluoranthene	4.6 D	NA	0.18	NA	0.2	NA	2.7 D	NA	0.3	NA	ND	NA	0.36	ND	0.11	NA	0.27	NA	0.9	4	50
Benzo(k)fluoranthene	1.9	NA	0.057 J	NA	0.12	NA	1.1	NA	0.29	NA	ND	NA	0.2	ND	0.17	NA	0.19	NA	0.9	4	500
Benzo(a)pyrene	2.5	NA	0.072	NA	0.14	NA	2	NA	0.19	NA	ND	NA	0.14	ND	ND	NA	0.14	NA	0.66	0.66	100
Indeno(1,2,3-cd)pyrene	0.52	NA	0.049 J	NA	0.065 J	NA	0.3	NA	0.047 J	NA	ND	NA	0.071	ND	ND	NA	ND	NA	0.9	4.00	500
Benzo(g,h,i)perylene	0.71	NA	0.06	NA	0.085	NA	0.58	NA	0.073	NA	ND	NA	0.095	ND	ND	NA	0.093	NA	NS	NS	NS
TIBNC	11.098	NA	7.581	NA	4.499	NA	5.923	NA	8.14	NA	0.84	NA	4.88	4.582	10.42	NA	3.23	NA	10,000	10,000	NS
TBNC	29.167	NA	1.345	NA	1.923	NA	22.557	NA	3.312	NA	0.092	NA	2.515	ND	2.026	NA	3.137	NA	10,000	10,000	NS
Priority Pollutants Metals (mg/kg)																					
Antimony	151	252	9.2	11.7	10.3	9.6 B	4.3 B	8.8 B	177	33.2	4.9 B	10.3 B	3.1 B	2.0 B	2.8 B	0.63 B	2.3 B	2.7 B	14	340	NS
Arsenic	28	38.6	20	17.3	41.7	57.7	20.9	42.4	23.5	47.2	39.8	68.7	15.7	9.3	3.7	1.3	13.5	9.9	20	20	NS
Beryllium	0.11 B	0.35 B	0.22 B	0.24 B	0.20 B	0.68 B	0.22 B	0.45 B	0.08 B	0.32 B	0.35 B	0.71 B	0.25 B	0.08 B	ND	ND	0.10 B	0.08 B	2	2	NS
Cadmium	ND	ND	0.35 B	0.14 B	ND	ND	ND	ND	ND	ND	ND	0.98 B	ND	ND	ND	ND	ND	0.20 B	39	100	NS
Chromium	17.0	22.6	52.4	7.6	12.4	20.1	11.1	23.3	6.3	16.5	7.4	21.0	7.9	3.0	46.9	3.9	9.7	10.5	--	500	NS
Copper	238	377	127	108	159	360	78.9	210	104	208	194	299	65.2	55.7	52.8	10.9	49.2	63.6	600	600	NS
Lead	659	1090	340	301	313	400	127	186	290	555	88.1	200	96.6	67.2	51.3	8.7	68.1	77.7	400	600	NS
Mercury	0.11	0.17	0.07	0.11	0.05	0.11	0.06	0.07	0.08	0.11	0.17	0.09	0.02	0.02	0.01	ND	0.02	0.03	14	270	NS
Nickel	10.9	14.3	9.1	6.0	6.7	13.9	7.6	10.8	3.4 B	8.4	4.9	16.0	6.1	2.1 B	5.1	0.63 B	3.9 B	3.7 B	250	2,400	NS
Selenium	ND	ND	ND	0.75	0.62	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	63	3,100	NS
Silver	ND	ND	0.72 B	0.33 B	0.99 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	110	4,100	NS
Thallium	ND	ND	ND	0.64 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	2	NS
Zinc	27.1	62.1	338	43.5	29.7	46.7	48.5	47.2	14.9	33.7	14.4	45.9	25.8	6.5	12.3	3.9	25.7	23.4	1,500	1,500	NS
Polychlorinated biphenlys (mg/kg)																					
Aroclor 1260	NA	NA	0.0009 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.023	NA	0.010 J	NA	NA	NA	0.49	2	50

Legend:

mg/kg - parts per million
TIBNC - Tentatively Identified Base Neutral Compounds
TBNC - Total Base Neutral Compounds

ND - Not Detected
D - Diluted
J - Estimated Concentration

D - Dilution Factor
B - Estimated Concentration
140,000 - Exceeded the NJDEP SCC

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TABLE 2.2 (cont)
SOIL SAMPLING RESULTS SUMMARY
AOC #4 - Embankment Soil Quality/Suspect Historic Fill
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

SAMPLE ID	AOC4-S11A	AOC4-S11B	AOC4-S12A	AOC4-S12B	AOC4-S13A	AOC4-S13B	AOC4-S14A	AOC4-S14B	AOC4-S15A	AOC4-S15B	AOC4-S16A	AOC4-S16B	AOC4-S17A	AOC4-S17B	AOC4-S18A	AOC4-S19A	AOC4-S19B	AOC4-S20A	NJDEP Residential Direct Contact Soil Cleanup Criteria (mg/kg)	NJDEP Non Residential Direct Contact Soil Cleanup Criteria (mg/kg)	NJDEP Impact to Ground Water Soil Cleanup Criteria (mg/kg)
LAB SAMPLE ID	L4662-21	L4662-22	L4662-23	L4662-24	L4662-25	L4662-26	L4662-27	L4662-28	L4725-01	L4725-02	L4725-03	L4725-04	L4662-33	L4662-34	L4662-35	L4662-37	L4662-38	L4662-39			
DATE COLLECTED	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/11/01	6/11/01	6/11/01	6/11/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01	6/7/01			
DEPTH (ft.)	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	1.0-1.5'	0-0.5'	0-0.5'	1.0-1.5'	0-0.5'			
DILUTION FACTOR	1.0	1.0	1, 10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0			
ANALYTICAL PARAMETERS																					
Total Petroleum Hydrocarbons (mg/kg)																					
TPH	670	NA	690	NA	7700	NA	7,000	NA	390	NA	240	NA	410	NA	4,600	690	NA	290	10,000	10,000	NS
Base/Neutral Organics (mg/kg)																					
Phenanthrene	0.31	NA	21.0 D	NA	0.19	NA	0.16	NA	0.2	NA	0.36	NA	0.12	NA	0.58	0.48	NA	0.048	NS	NS	NS
Carbazole	0.035	NA	2.4	NA	ND	NA	ND	NA	ND	NA	0.036	NA	ND	NA	0.15	0.082	NA	ND	NS	NS	NS
Anthracene	0.082	NA	5.7 D	NA	0.066	NA	ND	NA	0.042 J	NA	0.082	NA	ND	NA	0.34	0.32	NA	ND	10,000	10,000	100
Naphthalene	0.13	NA	1.7	NA	0.078	NA	0.085	NA	0.06	NA	0.09	NA	ND	NA	0.14	0.14	NA	ND	230	4,200	100
Acenaphthylene	0.048	NA	0.062	NA	ND	NA	ND	NA	0.039 J	NA	0.072	NA	ND	NA	0.26	0.25	NA	ND	NS	NS	NS
2-Methylnaphthalene	0.15	NA	0.91	NA	0.2	NA	0.098	NA	0.07	NA	0.071	NA	ND	NA	0.32	0.11	NA	ND	NS	NS	NS
Acenaphthene	ND	NA	4.8 D	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	0.040 J	ND	NA	ND	3,400	10,000	100
Dibenzofuran	0.06	NA	1.4	NA	0.056	NA	0.04	NA	0.035	NA	0.074	NA	ND	NA	0.13	0.087	NA	ND	NS	NS	NS
Di-n-butylphthalate	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	0.075	ND	NA	0.053	5,700	10,000	100
Fluoranthene	0.31	NA	17.0 D	NA	0.11	NA	0.13	NA	0.29	NA	0.54	NA	0.18	NA	0.91	1.5	NA	ND	2,300	10,000	100
Flourene	ND	NA	2.2	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	0.043	ND	NA	0.058	2,300	10,000	100
Pyrene	0.36	NA	25.0 D	NA	0.19	NA	0.11	NA	0.23	NA	0.43	NA	0.17	NA	0.87	1.6	NA	ND	1,700	10,000	100
Butylbenzylphthalate	0.038	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	ND	NA	ND	1,100	10,000	100
Benzo(a)anthracene	0.15	NA	[redacted]	NA	0.053	NA	0.057	NA	0.14	NA	0.29	NA	0.11	NA	0.41	[redacted]	NA	ND	0.9	4	500
Chrysene	0.24	NA	[redacted]	NA	0.079	NA	0.12	NA	0.19	NA	0.44	NA	0.19	NA	0.6	1.7	NA	ND	9	40	500
Bis(2-Ethylhexyl)phthalate	0.39	NA	0.51	NA	0.12	NA	0.17	NA	0.11	NA	0.037	NA	ND	NA	0.11	0.092	NA	ND	49	210	100
Benzo(b)fluoranthene	0.24	NA	[redacted]	NA	0.095	NA	0.1	NA	0.15	NA	0.44	NA	0.16	NA	[redacted]	[redacted]	NA	ND	0.9	4	50
Benzo(k)fluoranthene	0.28	NA	[redacted]	NA	0.1	NA	0.098	NA	0.17	NA	0.37	NA	0.082 J	NA	0.4	[redacted]	NA	ND	0.9	4	500
Benzo(a)pyrene	0.16	NA	[redacted]	NA	0.062	NA	0.089	NA	0.14	NA	0.3	NA	0.083	NA	0.33	[redacted]	NA	ND	0.66	0.66	100
Indeno(1,2,3-cd)pyrene	0.042 J	NA	0.67	NA	ND	NA	ND	NA	0.055 J	NA	0.12	NA	0.051 J	NA	0.1	0.28	NA	ND	0.9	4	500
Benzo(g,h,i)perylene	0.093	NA	1.7	NA	ND	NA	ND	NA	0.069	NA	0.14	NA	0.06	NA	0.22	0.35	NA	ND	NS	NS	NS
TIBNC	4.35	NA	22.6	NA	4.66	NA	3.39	NA	7.63	NA	7.68	NA	4.564	NA	11.28	6.6	NA	2.98	10,000	10,000	NS
TBNC	3.748	NA	129.552	NA	1.399	NA	1.257	NA	0.788	NA	3.892	NA	1.206	NA	7.228	12.781	NA	0.159	10,000	10,000	NS
Priority Pollutants Metals (mg/kg)																					
Antimony	2.3 B	2.7 B	3.1 B	3.1 B	6.7	5.7 B	12.9	[redacted]	[redacted]	5.3 B	[redacted]	8.8	[redacted]	[redacted]	11.0	[redacted]	[redacted]	0.35 B	14	340	NS
Arsenic	10.2	11.3	10.9	8.1	8.2	7.2	9.1	9.5	9.6	14.7	[redacted]	14.0	14.2	[redacted]	13.1	19.0	[redacted]	2.1	20	20	NS
Beryllium	0.07 B	0.07 B	0.07 B	0.04 B	0.14 B	0.09 B	0.19 B	0.15 B	0.28 B	0.29 B	0.35 B	0.30 B	0.09 B	0.34 B	0.19 B	0.13 B	0.34 B	0.06 B	2	2	NS
Cadmium	0.31 B	0.17 B	ND	0.04 B	0.37 B	0.17 B	ND	ND	ND	ND	0.42 B	ND	ND	ND	ND	ND	ND	ND	39	100	NS
Chromium	13.2	8.0	12.2	11.0	71.0	64.4	12.5	18.7	18.7	8.5	11.9	12.8	4.6	15.3	25.3	14.2	26.9	18.4	–	500	NS
Copper	48.8	43.0	92.9	47.7	109	84.1	84.3	105	148	80.1	253	124	78.3	168	118	112	199	13.8	600	600	NS
Lead	63.4	59.4	77.7	76.1	144	104	166	185	322	110	324	241	214	[redacted]	180	195	322	5.5	400	600	NS
Mercury	0.02	0.04	0.02	0.04	0.05	0.01	0.02	0.05	ND	0.26	0.10	0.24	0.07	0.40	0.03	0.08	0.13	ND	14	270	NS
Nickel	4.2	3.0 B	2.9 B	3.2 B	10.4	6.2	5.6	5.4	11.9	4.6	6.9	6.7	2.2 B	6.6 B	8.3	7.8	15.3	5.1	250	2,400	NS
Selenium	ND	0.33 B	ND	ND	ND	ND	ND	0.39 B	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND	63	3,100	NS
Silver	ND	ND	ND	ND	ND	0.31 B	ND	0.18 B	ND	ND	ND	0.68 B	ND	ND	ND	ND	ND	ND	110	4,100	NS
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.6 B	ND	ND	1.2 B	ND	2	2	NS
Zinc	27.3	36.4	25.5	23.2	44.9	33.9	22.1	20.8	174	27.2	41.8	123	14.3	42.9	27.1	15.2	45.0	19.1	1,500	1,500	NS
Polychlorinated biphenlys (mg/kg)																					
Aroclor 1260	NA	NA	NA	NA	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.038	NA	NA	NA	0.49	2	50

Legend:

TPH - Total petroleum hydrocarbons
mg/kg - parts per million
TIBNC - Tentatively Identified Base Neutral Compounds
TBNC - Total Base Neutral Compounds

NS - No Standard
ND - Not Detected
D - Diluted
J - Estimated Concentration

E - Exceeded Calibration Range
D - Dilution Factor
B - Estimated Concentration
[redacted] Exceeded NJDEP SCC

PMK Group
CONSULTING ENGINEERS

TABLE 2.3
SOIL SAMPLING RESULTS SUMMARY
AOC #5 - ASH DEPOSITS
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

SAMPLE ID	AOC5-S1A	AOC5-S2A	AOC5-S3A	AOC5-S4A	AOC5-S5A	AOC5-S6A	AOC5-S7A	AOC5-S8A	NJDEP	NJDEP	NJDEP
LAB SAMPLE ID	L4663-01	L4663-03	L4663-05	L4663-07	L4663-09	L4663-11	L4663-13	L4663-15	Residential	Non Residential	Impact to
DATE COLLECTED	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	Direct Contact	Direct Contact	Ground Water
DEPTH (ft.)	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	Soil Cleanup	Soil Cleanup	Soil Cleanup
DILUTION FACTOR	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	Criteria (mg/kg)	Criteria (mg/kg)	Criteria (mg/kg)
ANALYTICAL PARAMETERS											
Total Petroleum Hydrocarbons (mg/kg)											
TPH	1400	190	330	250	440.0	350	700	800	10,000	10,000	NS
PP Metals (mg/kg)											
Antimony	3.7 B	1.7 B	4.0 B	1.4 B	3.7 B	3.3 B	0.95 B	1.5 B	14	340	--
Arsenic	10	7.3	10.4	6.8	19.1	7.6	4.4	5.0	20	20	--
Beryllium	0.26 B	0.35 B	0.26 B	0.11 B	0.70	0.70	0.67 B	0.57	2	2	--
Cadmium	0.66	1.1	0.87	0.47	7.5	7.5	1.7	1.6	39	100	--
Chromium	7.9	9.1	9.2	4.4	20.2	23.1	18.8	18.0	--	500	--
Copper	67.3	42.1	96.0	44.6	230	143	57.9	58.1	600	600	--
Lead	79.5	31.7	134	35.9	68.2	37.2	31.9	43.7	400	600	--
Mercury	0.03	0.02	ND	ND	0.09	0.02	ND	0.04	14	270	--
Nickel	4.7	3.0 B	7.4	2.2 B	11.7	9.3	6.2 B	6.3	250	2,400	--
Selenium	0.63	0.85	ND	ND	ND	ND	ND	ND	63	3,100	--
Thallium	ND	ND	0.80 B	0.49 B	0.75 B	0.96 B	ND	0.46 B	2	2	--
Zinc	49.4	35.4	69.9	26.7	635	139	67.6	175	1,500	1,500	--
Base/Neutral Organics Compounds (mg/kg)											
Phenanthrene	0.059	ND	0.056	ND	0.065	ND	ND	ND	NS	NS	NS
Naphthalene	0.042 J	ND	ND	ND	ND	ND	ND	ND	230	4,200	100
2-Methylnaphthalene	0.084	ND	0.1	ND	ND	ND	ND	ND	NS	NS	NS
Di-n-butylphthalate	ND	ND	0.052	0.079	ND	ND	0.16	0.094	5,700	10,000	100
Fluoranthene	0.052	0.058	0.05	ND	0.09	ND	ND	ND	2,300	10,000	100
Pyrene	0.055	0.053	0.052	ND	0.094	ND	0.055	ND	1,700	10,000	100
Benzo(a)anthracene	0.044	ND	ND	ND	0.053	ND	ND	ND	0.9	4	500
Chrysene	0.052 J	0.038 J	0.044 J	ND	0.059 J	ND	ND	ND	9	40	500
Bis(2-Ethylhexyl)phthalate	0.038	0.04	ND	ND	ND	ND	ND	ND	49	210	100
Benzo(b)fluoranthene	0.049	0.051	0.042	ND	0.076	ND	ND	ND	0.9	4	50
Benzo(a)pyrene	0.037 J	ND	ND	ND	0.05 J	ND	ND	ND	0.66	0.66	100
Benzo(g,h,i)perylene	ND	ND	ND	ND	0.041 J	ND	ND	ND	NS	NS	NS
TIBNC	5.229	2.288	7.04	4.081	3.24	4.05	5.83	5.16	10,000	10,000	NS
TBNC	0.512	0.24	0.396	0.079	0.528	ND	0.215	0.094	10,000	10,000	NS

Legend:

TPH - Total petroleum hydrocarbons
mg/kg - parts per million
ND - Not Detected
TIBNC - Tentatively Identified Base Neutral Compounds
TBNC - Total Base Neutral Compounds

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TABLE 2.4
SOIL SAMPLING RESULTS SUMMARY
AOC #6 - Railroad Tie Piles
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

SAMPLE ID	AOC6-S1	AOC6-S2	AOC6-S3	AOC6-S4	AOC6-S5	AOC6-S6	NJDEP	NJDEP	NJDEP
LAB SAMPLE ID	L4665-001	L4665-002	L4665-003	L4665-004	L4665-005	L4665-006	Residential	Non Residential	Impact to
DATE COLLECTED	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	Direct Contact	Direct Contact	Ground Water
DEPTH (ft.)	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	Soil Cleanup	Soil Cleanup	Soil Cleanup
DILUTION FACTOR	1.0	1.0, 5.0	1.0	1.0	1.0	1.0	Criteria (mg/kg)	Criteria (mg/kg)	Criteria (mg/kg)
ANALYTICAL PARAMETERS									
Total Petroleum Hydrocarbons (mg/kg)									
TPH	710	840	580	860	590	450	10,000	10,000	NS
Base/Neutral Organics (mg/kg)									
Phenanthrene	0.069	2.0	0.150	1.1	0.660	0.220	NS	NS	NS
Carbazole	ND	0.470	0.040	0.310	0.280	0.093	NS	NS	NS
Anthracene	ND	0.450	0.130	0.240	0.260	0.140	10,000	10000	100
Naphthalene	ND	0.220	0.046	0.042 J	0.048	0.066	230	4,200	100
Acenaphthylene	ND	0.250	0.087	0.120	0.093	0.180	NS	NS	NS
2-Methylnaphthalene	ND	0.170	0.046	0.076	0.062	0.094	NS	NS	NS
Acenaphthene	ND	0.170	ND	0.042 J	0.042 J	ND	3,400	10,000	100
Dibenzofuran	ND	0.280	ND	0.062	0.039	ND	NS	NS	NS
Di-n-butylphthalate	0.100	0.110	0.039 J	ND	0.160	0.087	5,700	10,000	100
Fluoranthene	0.140	5.6 D	0.430	2.6	2.0	0.850	2,300	10,000	100
Flourene	ND	0.220	ND	0.062	0.056	ND	2,300	10,000	100
Pyrene	0.110	4.0 D	0.400	2.2	1.7	0.770	1,700	10,000	100
Butylbenzylphthalate	0.049	0.180	ND	0.660	0.470	0.140	1,100	10,000	100
Benzo(a)anthracene	0.038	0.480	0.260	0.390	0.390	0.500	0.9	4	500
Chrysene	0.110	2.4	0.530	1.5	0.950	0.660	9	40	500
Bis(2-Ethylhexyl)phthalate	ND	0.078	0.120	0.049	0.050	ND	49	210	100
Benzo(b)fluoranthene	0.051	2.4	0.560	0.970	0.770	0.730	0.9	4	50
Benzo(k)fluoranthene	0.077 J	1.3	0.530	1.1	0.660	0.870	0.9	4	500
Benzo(a)pyrene	ND	1.2	0.280	0.670	0.290	0.550	0.66	0.66	100
Indeno(1,2,3-cd)pyrene	ND	0.110	0.140	0.084	0.062	0.130	0.90	4.00	500
Benzo(g,h,i)perylene	ND	0.210	0.180	0.140	0.120	0.170	NS	NS	NS
TIBNC	13.760	26.190	3.5	18.87	10.230	6.730	10,000	10,000	NS
TBNC	0.744	22.298	3.968	12.417	9.162	6.250	10,000	10,000	NS

Legend:

TPH - Total petroleum hydrocarbons
mg/kg - parts per million
TIBNC - Tentatively Identified Base Neutral Compounds
TBNC - Total Base Neutral Compounds

NS - No Standard
ND - Not Detected
D - Diluted
J - Estimated Concentration
2.4 - Exceeded the NJDEP SCC

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PMK Group
CONSULTING ENGINEERS

TABLE 3.1
GROUND WATER/PRODUCT LEVEL MEASUREMENTS
AT LOW AND HIGH TIDE
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK GROUP/RTE PROJECT NO. 0501053/7101018

LOW TIDE			HIGH TIDE		
Date: 6/13/01 Time: 8:01 AM			Date: 6/13/01 Time: 2:07 PM		
Well ID	Depth to Product (ft)	Depth to Groundwater (ft)	Well ID	Depth to Product (ft)	Depth to Groundwater (ft)
OHM-1	-	5.65	OHM-1	-	5.65
OHM-2	-	6.57	OHM-2	-	6.58
OHM-3	6.88	7.22	OHM-3	6.88	7.22
OHM-4	-	5.50	OHM-4	-	5.50
OHM-5	-	13.72	OHM-5	-	13.72
OHM-7	-	19.00	OHM-7	-	19.00
OHM-8	-	12.52	OHM-8	-	12.58
EMW-1	-	14.80	EMW-1	-	14.80
MWC-1	-	7.60	MWC-1	-	7.64
MWC-3	7.15	12.00	MWC-3	7.15	12.00
MWC-4	-	7.00	MWC-4	-	7.00

* Monitoring Wells OHM-6, MWC-2 and MWC-5 were damaged and ground water level measurements could not be obtained.

PMK Group
CONSULTING ENGINEERS

TABLE 3.2
GROUNDWATER SAMPLING ANALYTICAL RESULTS SUMMARY
CONRAIL PROPERTY
MAIN STREET
SOUTH AMBOY, NEW JERSEY
PMK Project No. 0501053

SAMPLE ID	OHM-1	OHM-2	OHM-5	OHM-7	OHM-8	MWC-1	EMW-1	FB	TB	NJDEP
LAB SAMPLE ID	L4666-001	L4666-002	L4666-003	L4666-004	L4666-005	L4666-006	L4666-007	L4666-09	L4666-10	Ground Water
DATE COLLECTED	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	6/6/01	Quality
DEPTH (ft.) *	5.84	6.22	13.65	18.89	12.45	7.24	16.20	--	--	Standards
DILUTION FACTOR	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--	--	(ppb)
ANALYTICAL PARAMETERS										
Volatile Organic Compounds (ug/l)										
Acetone	ND	ND	ND	ND	ND	ND	450	ND	ND	700
TIVOC	ND	ND	ND	ND	3.1	ND	21.3	ND	11.8	500
TVOC	ND	ND	ND	ND	ND	ND	450	ND	ND	500
Base/Neutral Organics (ug/l)										
Naphthalene	ND	ND	0.4	ND	ND	ND	ND	ND	NA	300
1,3-Dichlorobenzene	ND	0.6	ND	ND	ND	ND	ND	ND	NA	600
Diethylphthalate	1.7	1.6	0.8	0.7	0.7	0.8	3.1	0.5	NA	5,000
Di-n-butylphthalate	1	0.7	5.4	4.2	4.0	6.9	3.0	3.9	NA	900
Phenanthrene	ND	ND	ND	ND	ND	ND	0.7 J	ND	NA	--
Pyrene	ND	0.3 J	ND	ND	ND	ND	0.6	ND	NA	200
Acenaphthene	ND	1.1	ND	ND	ND	ND	ND	ND	NA	400
Fluorene	ND	1.9	0.4 J	ND	ND	ND	0.5	ND	NA	300
Anthracene	ND	0.6 J	ND	ND	ND	ND	ND	ND	NA	2,000
Butylbenzylphthalate	0.4	0.3	0.3	ND	ND	0.3 J	0.4	ND	NA	100
Bis(2-Ethylhexyl)phthalate	1.7	1.1	1.0	0.9	2.2	1.1	2.1	0.8	NA	30
TIBNC	26.3	69.6	37.6	13.5	14.0	22.3	370.6	18.4	NA	500
TBNC	4.8	8.2	8.3	5.8	6.9	9.1	10.4	5.2	NA	500
Metals (ug/L):										
Antimony	ND	10.0 B	6.4 B	ND	ND	119	9.6 B	ND	NA	20
Arsenic	4.6 B	3.8 B	8.1 B	11.2	16.9	131	15.9	ND	NA	8
Beryllium	0.35 B	0.48 B	0.70 B	2.8 B	5.3	0.96 B	0.66 B	ND	NA	20
Cadmium	ND	0.74 B	ND	0.51 B	1.2 B	ND	ND	ND	NA	4
Chromium	ND	15.0	5.9 B	15.2	22.1	20.4	1.3 B	ND	NA	100
Copper	8.1 B	81.8	9.1 B	21.8	89.5	239	4.7 B	ND	NA	1,000
Lead	3.1	14.3	4.6	21.6	13.9	101	ND	ND	NA	10
Mercury	ND	ND	ND	ND	ND	0.54	ND	ND	NA	2
Nickel	ND	10.0 B	3.0 B	14.5 B	54.6	ND	ND	ND	NA	100
Zinc	14.2 B	58.4	32.9	284	349	477	25.5	ND	NA	5,000

LEGEND:

* Depth below existing grade
ug/l - parts per billion
J - Estimated Concentration
B - Estimated Concentration
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ND - Not Detected
NA - Not Analyzed
NS - No Standard

TIVOC - Tentatively identified Volatile Organic Compounds
TVOC - Total Volatile Organic Compounds
TIBNC - Tentatively Identified Base Neutral Compounds
TBNC - Total Base Neutral Compounds
8.1 B - Exceeded the GWQS

TECHNICAL ENVIRONMENTAL STUDY

SOCIOECONOMIC ANALYSIS

Environmental Assessment of the
Intermodal Ferry Transportation Center

City of South Amboy, New Jersey

TECHNICAL ENVIRONMENTAL STUDY: SOCIOECONOMIC ANALYSIS

1.0 EXISTING SOCIOECONOMIC CONDITIONS

For purposes of the social and economic impacts, two impact areas are defined: the immediate project area as shown in Figure 1 and described in Section 3.0 of this Environmental Assessment and the secondary impact area. The secondary impact area comprises the entire city of South Amboy. The city of South Amboy was defined as the secondary impact area because of the relatively small land area of the city (approximately 1.8 square miles), the magnitude of the project and the homogeneity of the population. These are such that social, and to an even greater extent, economic impacts would likely be felt throughout the municipality. The project, as proposed, is entirely within census tract 0075, the largest part being limited to the area east of the New Jersey Transit Tracks, plus a small portion where the access road joins Main Street.

Several methods were used to assess the socioeconomic environment of the area. Secondary data were obtained from the U. S. Census Bureau, the Middlesex County Planning Department and various prior studies of the area. A windshield survey of the project area and adjacent areas and interviews with local and county officials constituted primary data collected for this study.

1.1 Population

The population of South Amboy has declined since1980. The total population for the town was 8,353 in 1980, reduced to 7,863 by the 1990 census, and was estimated to be 7, 713 by the U.S. Census Bureau in 1999. The reduction from 1980 to 1990 represented a 5.86% decline, and if estimates are approximately accurate, the decline between 1980 and 1999 represented a 7.7 percent drop. In Census tract 0075, which is the tract that includes the project area, the decline between 1980 and 1990 was approximately 6.45 percent, from 3,518 persons to 3,291 persons (see Table 1).

Table 1: Population for South Amboy by Census tract; 1980 (actual) through 2001 (estimate)

Population	South Amboy	Tract 0075	Tract 0076
1980	8,353	3,518,	4,804
1990	7,863	3,291	4,536
Percent Change	-5.9%	-6.5%	-5.6%
Estimated1996	7,907	n/a	n/a
Estimated 2001	8,008	n/a	n/a

Source: U.S. Bureau of the Census; Draft Report: South Amboy Station Area Planning Project (1997) City of South Amboy and NJ Transit (prepared by Wallace, Roberts &Todd and Real Estate Strategies, Inc.

RARITAN BAY

WETLANDS

BREAKWATER

FERRY DOCK

FERRY TERMINAL BUILDING

RETENTION POND

PUBLIC WALKWAY

PARKING LOT

ACCESS ROADWAY

GRAPHIC SCALE
(IN FEET)

250 125 0 125 250 500

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136 W. 16th Street
Suite 3E, POB 1206
New York, NY 10011

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Proposed Action Alternative
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE: Operations2.dwg
CME Associates (8/27/01)

FIGURE # 1

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Part of the decline has been symptomatic of a trend toward smaller households. Although the number of households increased slightly in South Amboy from 1980 to 1990 (2,886 and 2,938, or 1.8 percent) the number of persons in each household declined (from 2.67 to 2.60, or 2.62 percent) (see Tables 2 and 3).

Table 2: Detailed 1990 Census Data for South Amboy City

Place Name	South Amboy City,NJ
NUMBER OF PERSONS	7863
NUMBER OF FAMILIES	2094
NUMBER OF HOUSEHOLDS	2938
MEDIAN HOUSEHOLD INCOME	37933
AGE 0 THRU 4	538
AGE 5 THRU 9	479
AGE 10 THRU 19	921
AGE 20 THRU 49	3655
AGE 50 THRU 64	1034
AGE 65 AND OVER	1236
WHITE	7692
BLACK	24
INDIAN	8
ASIAN	91
OTHER RACE	48
HISPANIC	246
OWNER OCCUPIED	1853
RENTER OCCUPIED	1085
PERCENT AGE 0 THRU 4	6.8
PERCENT AGE 5 THRU 9	6.1
PERCENT AGE 10 THRU 19	11.7
PERCENT AGE 20 THRU 49	46.5
PERCENT AGE 50 THRU 64	13.2
PERCENT AGE 65 AND OVER	15.7
PERCENT WHITE	97.8
PERCENT BLACK	0.3
PERCENT INDIAN	0.1
PERCENT ASIAN	1.2
PERCENT HISPANIC	3.1
PERCENT OTHER RACE	0.6
PERCENT OWNER OCCUPIED	63.1
PERCENT RENTER OCCUPIED	36.9
FIPS STATE-COUNTY CODE	34023

Source: Middlesex County

Table 3: Detailed 1990 Census Data for Middlesex County

County Name	Middlesex County
POPULATION 1992	684456
POP PER SQUARE MILE 1992	2203.7
POPULATION 1990	671780
POPULATION 1980	595893
POPULATION 1970	583813
POPULATION 1960	433856
AGE 0 THRU 4, 1990	44943
AGE 5 THRU 9, 1990	39061
AGE 10 THRU 19, 1990	82595
AGE 20 THRU 49, 1990	333504
AGE 50 THRU 64, 1990	92860
AGE 65 AND OVER, 1990	78817
PERCENT AGE 0 THRU 4	6.7
PERCENT AGE 0 THRU 17	21.5
PERCENT AGE 5 THRU 9	5.8
PERCENT AGE 10 THRU 19	12.3
PERCENT AGE 20 THRU 49	49.6
PERCENT AGE 50 THRU 64	13.8
PERCENT AGE 65 AND OVER	11.7
WHITE 1990	550006
BLACK 1990	53629
AMER IND/ESKIMO/ALEUT '90	1066
ASIAN OR PAC ISLANDER '90	44869
OTHER RACE 1990	22210
PERCENT WHITE 1990	81.9
PERCENT BLACK 1990	8.0
PERCENT INDIAN 1990	0.2
PERCENT ASIAN 1990	6.7
PERCENT OTHER RACE 1990	3.3
HISPANIC 1990	59776
PERCENT HISPANIC 1990	8.9
HOUSEHOLDS 1990	238833
POP PER HOUSEHOLD 1990	2.71
FAMILIES 1990	175451
MEDIAN HOUSEHOLD INC 1989	45623
PER CAPITA INCOME 1989	18714
PCT POP BELOW POVERTY '89	5.1
PCT FAM BELOW POVERTY '89	3.4
EL/SEC SCHOOL ENROLL 1990	93837
PCT PUBLIC SCHL ENROLL 90	86.8
PERSONS 25 AND OVER 1990	447679
PCT HIGH SCHOOL GRAD 1990	79.4
PCT COLLEGE GRADUATE 1990	26.5
HOUSING UNITS 1990	250174
OCCUPIED HSG UNITS 1990	238833
OWNER OCCUPIED HU 1990	160991
PERCENT OWNER OCCUPIED	67.4
MEDIAN VALUE 1990	164700

Source: Middlesex County

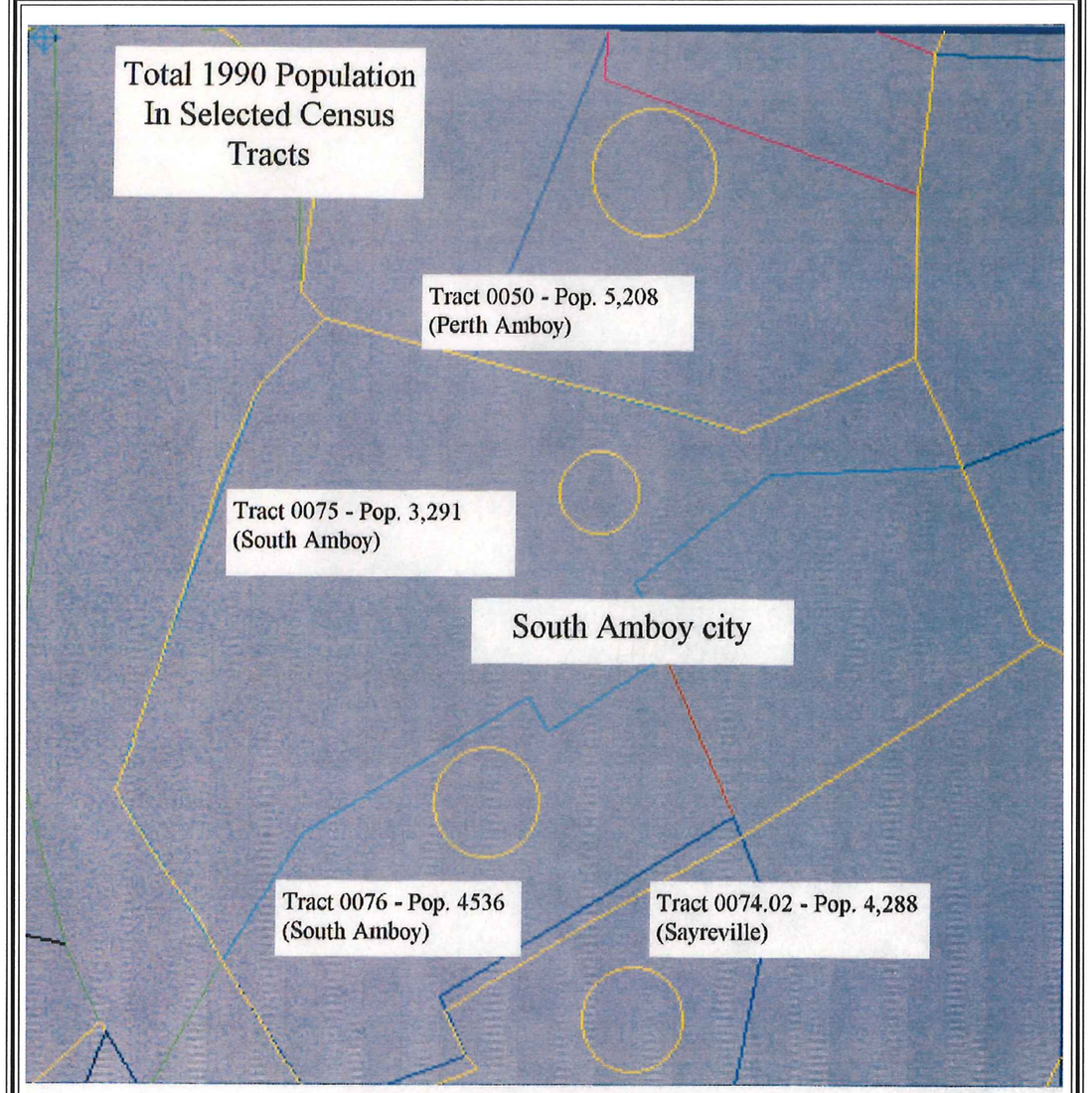
The proposed access road, parking and ferry terminal are located in census tract 340230075. As noted above, the Station Planning Area includes most of Tracts 340230075 and 340230076. Selected 1990 Census data are provided in Table 4.

Table 4: Detailed 1990 Census Data - Tracts 0075 and 0076

FIPS STATE CODE	34	34
FIPS County Code	023	023
CENSUS TRACT NUMBER	**0075**	**0076**
NUMBER OF PERSONS	3291	4536
NUMBER OF FAMILIES	882	1201
NUMBER OF HOUSEHOLDS	1190	1737
MEDIAN HOUSEHOLD INCOME	39928	36211
AGE 0 THRU 4	216	322
AGE 5 THRU 9	204	273
AGE 10 THRU 19	386	531
AGE 20 THRU 49	1524	2113
AGE 50 THRU 64	492	537
AGE 65 AND OVER	469	760
WHITE	3229	4427
BLACK	15	9
INDIAN	4	4
ASIAN	30	61
OTHER RACE	13	35
HISPANIC	123	123
OWNER OCCUPIED	831	1011
RENTER OCCUPIED	359	726
LAND AREA (SQ. MILES)	0.8	0.6
WATER AREA (SQ. MILES)	0.7	0.4
PERCENT AGE 0 THRU 4	6.6	7.1
PERCENT AGE 5 THRU 9	6.2	6.0
PERCENT AGE 10 THRU 19	11.7	11.7
PERCENT AGE 20 THRU 49	46.3	46.6
PERCENT AGE 50 THRU 64	14.9	11.8
PERCENT AGE 65 AND OVER	14.3	16.8
PERCENT WHITE	98.1	97.6
PERCENT BLACK	0.5	0.2
PERCENT INDIAN	0.1	0.0
PERCENT ASIAN	0.9	1.3
PERCENT HISPANIC	3.7	2.7
PERCENT OTHER RACE	0.4	0.8
PERCENT OWNER OCCUPIED	69.8	58.2
PERCENT RENTER OCCUPIED	30.2	41.8

Source: Middlesex County

The maps presented in Figures 2 through 8 provide graphic illustrations of the information contained in Tables 2 through 4, and support the conclusion that the proposed project does not result in environmental justice impacts.



Circles are roughly proportional to the population within the Census Tract. The circle for Tract 0075 has a diameter of 1.

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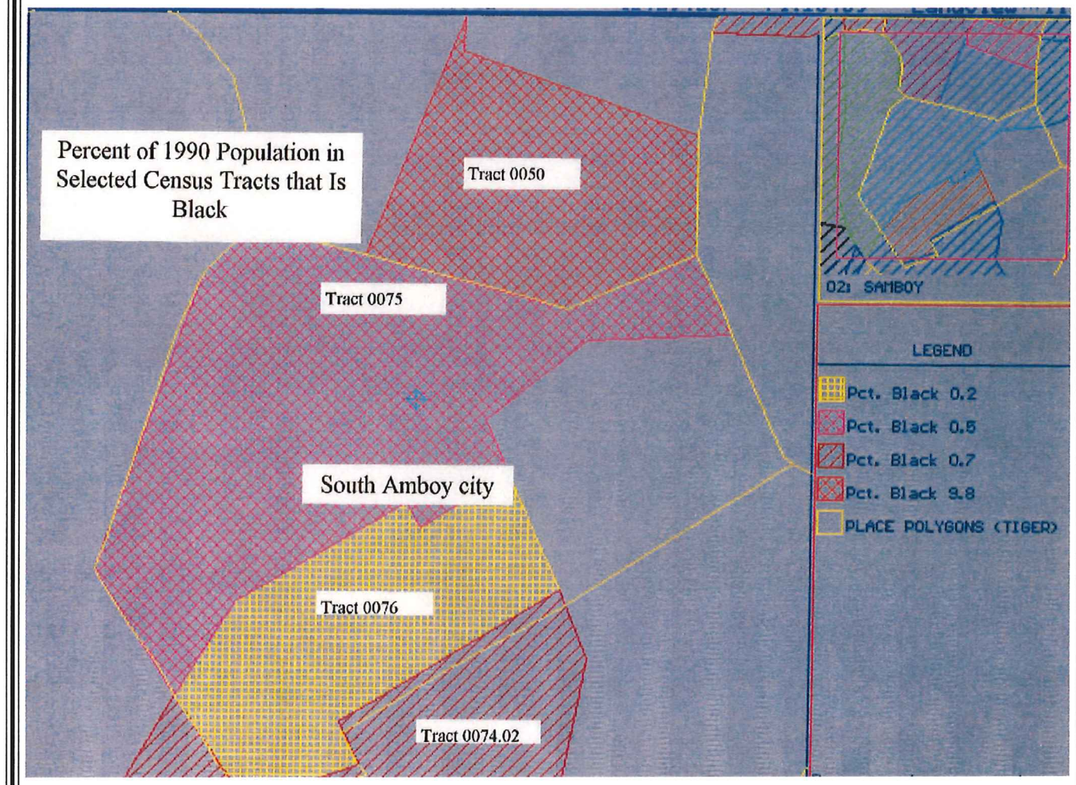
Total 1990 Population
In Selected Census Tracts

SOURCE: Middlesex County

FIGURE # 2



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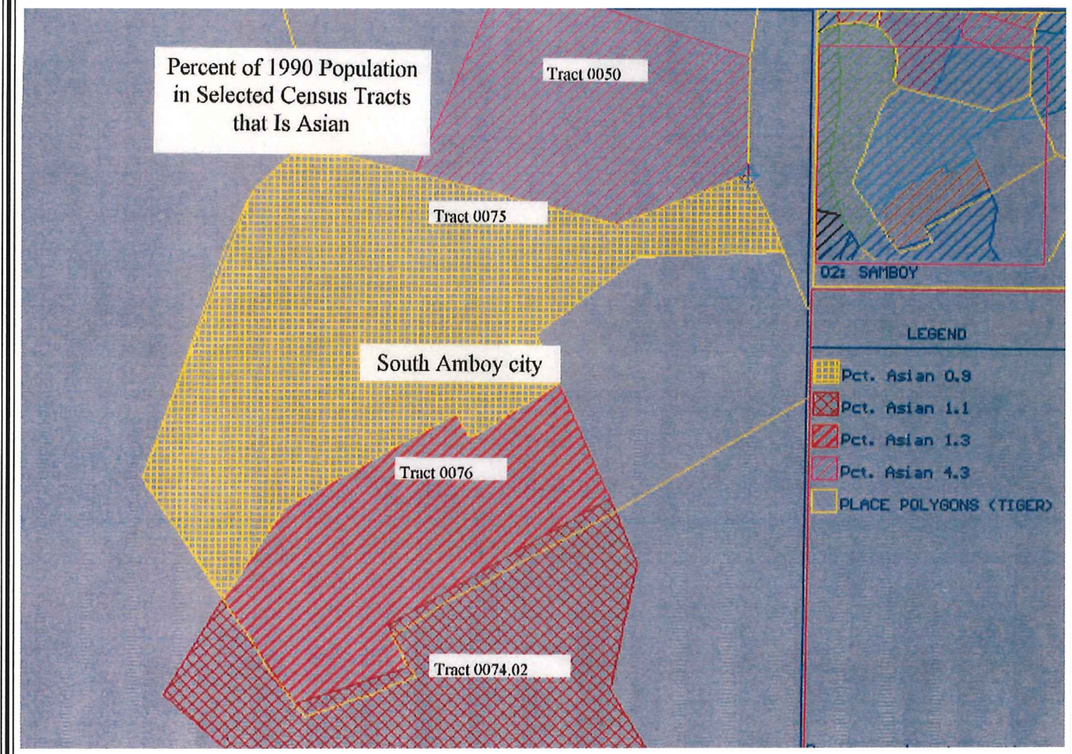
Percent of 1990 Population In Selected Census Tracts That Is Black

SOURCE: Middlesex County

FIGURE # 3



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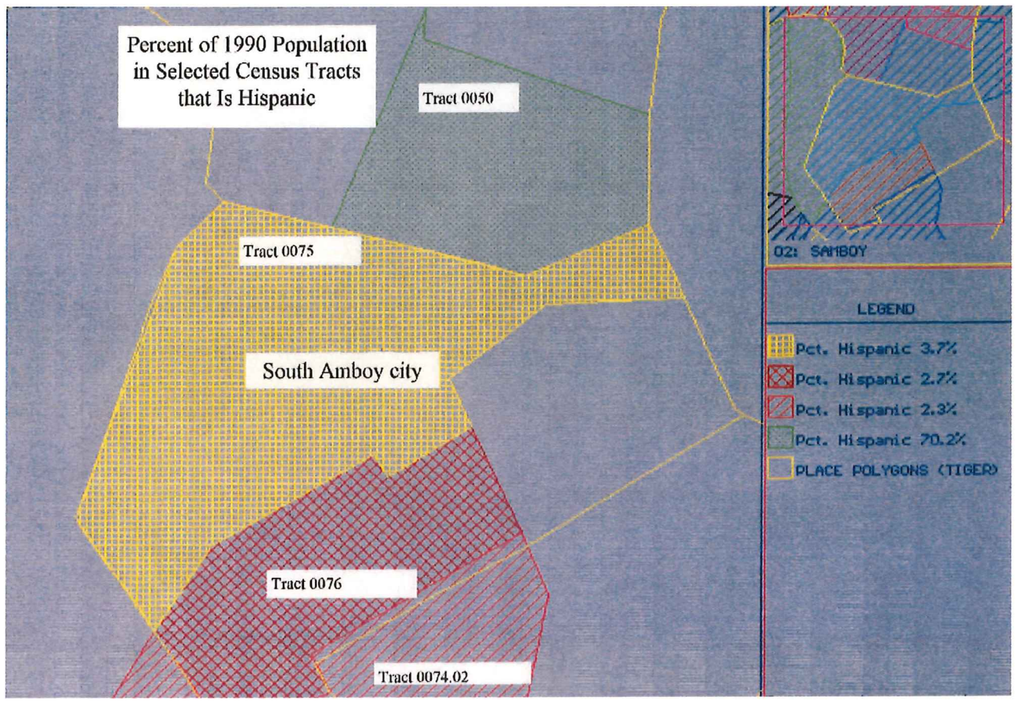
Percent of 1990 Population
In Selected Census Tracts
That Is Asian

SOURCE:	FIGURE #
Middlesex County	4



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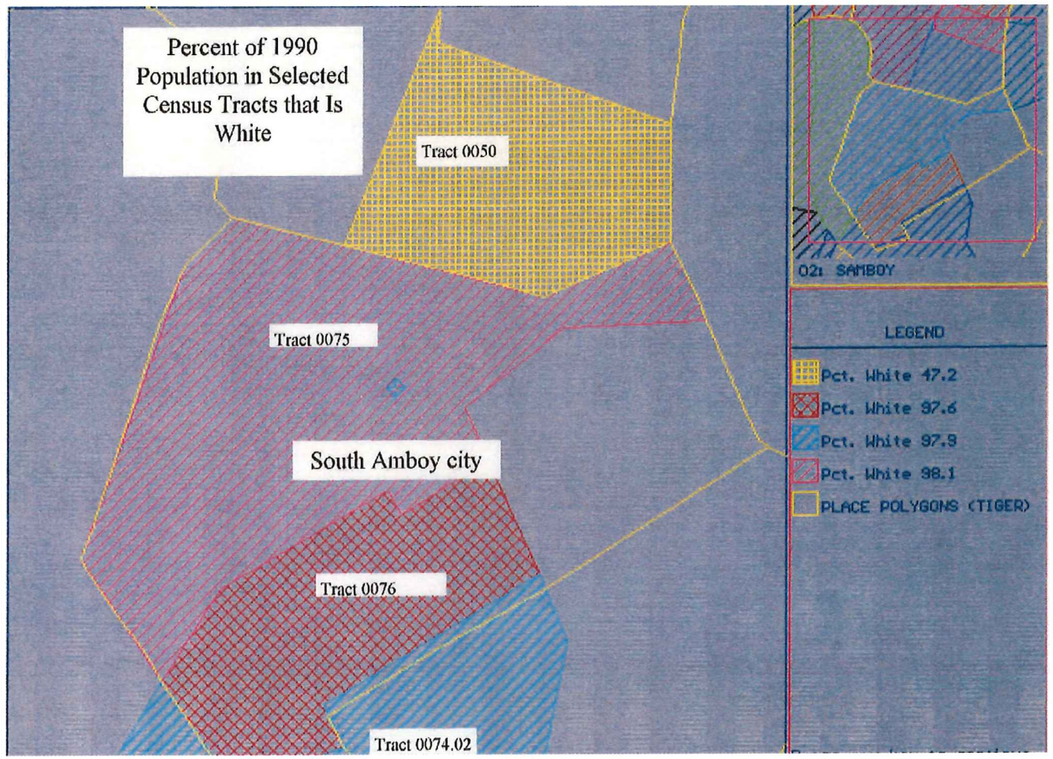
Percent of 1990 Population In Selected Census Tracts That Is Hispanic

SOURCE: Middlesex County

FIGURE # 5



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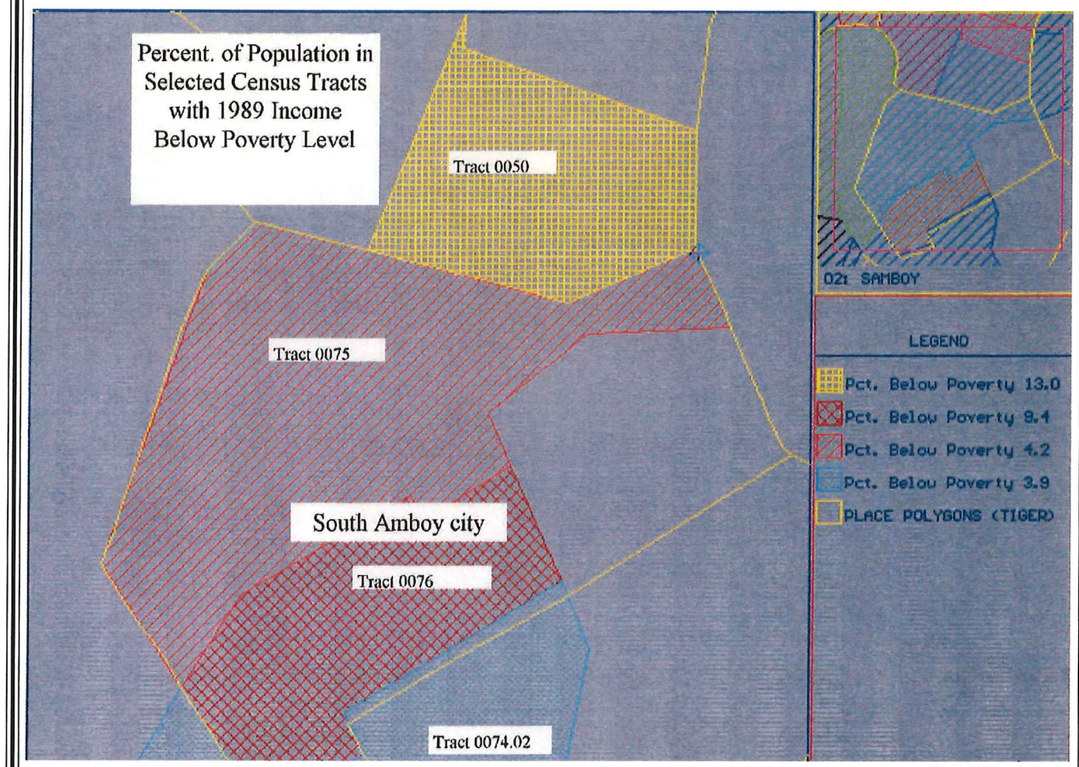
Percent of 1990 Population In Selected Census Tracts That Is White

SOURCE: Middlesex County

FIGURE # 6



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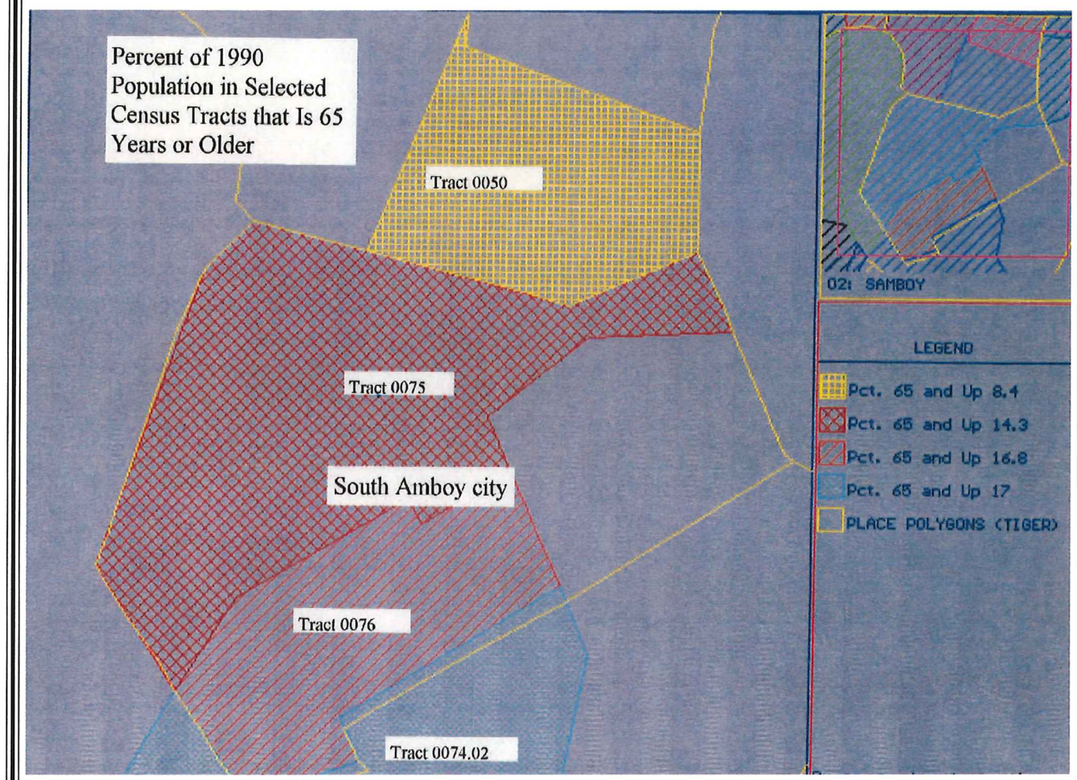
Percent of Population In Selected Census Tracts with 1989 Income Below Poverty Level

SOURCE: Middlesex County

FIGURE # 7



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Percent of 1990 Population
in Selected Census Tracts
That Is 65 Years or Older

SOURCE: Middlesex County

FIGURE # 8

1.2 Land Use

South Amboy once stretched from the area that is now Cranbury to Sayreville and had a land area equal to 100 square miles. It's history dates back to the 17th century when Dutch settlers arrived to protect New Amsterdam (now Manhattan) from the British. Tracks for the Camden and Amboy Railroad were laid in the 1830's and from these tracks the city gained its form and identity as a regional transfer point between Philadelphia and New York. The Raritan Bay also provided maritime access to the area. Coal and other goods were transferred from trains to barges for distribution all along the east coast. The combination of the Bay and rail, allowed South Amboy to provide coach passenger transfers between New York City and Philadelphia. Through the 19th century the City was a significant regional transportation and manufacturing center, producing terra cotta, paint and textiles.

Today, the City encompasses about 1.8 square miles. The majority of its formerly industrial areas are now either vacant or under-utilized (representing over 30% of the City's land mass), its port is no longer active, and its population is dependent on its neighboring communities for employment, retail and recreational needs.

Land uses in South Amboy include single- and multi-family residences, commercial offices and retail facilities, industrial uses, governmental facilities, transit-related uses, institutional uses and recreational uses. Single family units are concentrated in the area south of Second Street between Broadway and Feltus Avenue; and, between Fourth Street and Raritan Street, west of the railroad tracks and up to Route 35. An older two-story public housing development is located east of Mason Street between Bayshore and Jerome Streets. McCarthy Towers, a federally subsidized mid-rise residential building for the elderly, is located at the intersection of Broadway and Gordon Streets.

South Amboy's central business district, including City Hall and a number of retail, service and restaurant establishments, is located along Broadway between Main Street and Bordentown Avenue. The importance of Broadway as the commercial focus of the City is evident with the recent sidewalk, façade and lighting improvements. Delicatessens/sandwich shops, small grocery stores, and taverns can be found throughout the City.

Institutional uses are concentrated in the southeastern section of the City. The South Amboy High School and Sadie Pope Dowdell Public Library, which opened in September 1996, is located in this area very near the shore of the bay. This large facility and the surrounding grounds represent a significant change in usage and character in this area of the City. Other institutional uses in close proximity to the new school and library building include a sports complex with Little League Baseball fields, the Enterprise Snorkel Rescue Company and the Disabled American Veterans meeting hall. Additional institutional uses are located on Broadway and intersecting streets, between Gordon and Main Streets.

Recreational uses are also concentrated in the southeastern portion of the City, along the Raritan Bay shoreline. They include the Babe Ruth Ballfield, Allie Clark Sports complex and South Amboy Boat Club (a private facility) located at the foot of George Street; and, at the Sayreville

borders the entrance to the Raritan Bay Park. Traditionally, the local residents have used this portion of shoreline for fishing and passive recreation.

Industrial uses are located in the northeast section of the City adjacent to the Raritan Bay. They include a New Jersey Power & Light generating station and the McCormack Sand facility. Surface and raised level railroad tracks serving both freight and passenger traffic is a significant feature in this part of the City.

It is in this industrial area that the South Amboy Regional Intermodal Transportation Center is proposed. The access road to the Center would begin just east of the intersection of Main Street and Broadway. This intersection represents the point of bifurcation between the residential and commercial portion of the City and the industrial, waterfront area. There are no residential properties and no pedestrian activity on Main Street, east of Broadway with the exception of two residences on a spur of Main Street. This roadway, which is approximately 300 feet long, is identified herein as a "spur" because it is separated from the actual Main Street roadway by a guardrail and gradually by elevation. It has no street sign to indicate its name and no outlet. The houses on this spur are approximately 450 feet south of the nearest property to be acquired for the purposes of the proposed action as shown in the survey of Proposed Right-of-Way Acquisitions for the South Amboy Intermodal Transportation Center, prepared by CME Associates, June 12, 2000.

The area east of this intersection is zoned M-1 for light industrial and M-2 for heavy industrial uses. The associated properties have several listed owners including the N/F Consolidated Rail Corporation, which is also known as Conrail, a tax-exempt entity. Development of the proposed action will occur on the following properties according to the survey of Proposed Right-of-Way Acquisitions for the South Amboy Intermodal Transportation Center referenced above (see Table 5).

Table 5: Proposed Right-of Way Acquistions from Survey Prepared by CME Associates (June 2000)

Parcel	Blk	Lot	Owner / Address	Acreage Proposed for Acquisition	Notes
4	162	1.04	N/F J.T. & R. McKeon 11 Research Ave. Sayreville, NJ	0.568	Entire lot=1.638 ac tax value=104,400 property tax=$5,397.48
1B	139	90.01	N/F Consolidated Rail Corp. 1700 Market St. Philadelphia, Pa. 19103	1.026	
E1	162	6.01	N/F Consolidated Rail Corp. (as above)	0.260 easement	
E2	162	6.01	N/F Consolidated Rail Corp. (as above)	0.288 easement	
E3	162	6.02	N/F Great Lakes Dredge & Dock Co. PO Box 3220, Main St. S. Amboy, NJ 09979	0.078	Entire lot=5.65 ac. tax value=$28,300 property tax=$1,463
2A	161	90	N/F Modern Transportation Co. 75 Jacobus Ave. South Kearney, NJ	2.543	Entire lot=33.26 ac. tax value=$249,500 property tax=$13,000
E3	161	90	N/F Modern Transportation Co. (as above)	0.675 easement	
E4	161	90	N/F Modern Transportation Co. (as above)	1.359 easement	
2B	161	90	N/F Modern Transportation Co. (as above)	11.784 riparian 2.236 land	
1A	162	25.01 & 6	N/F Consolidated Rail Corp. (as above)	11.628 riparian 8.973 land	
E1	116	22 & 22.01	N/F Consolidated Rail Corp. (as above) and N/F Richard Catena (no address noted)	0.260 easement	

Source: City of South Amboy

1.3 Housing

South Amboy has a gridiron layout, with compact, walkable streets and sidewalks. Most streets intersect with Broadway, which offers a pedestrian friendly main street. Most of the residential lots are small.

According to the 1990 census there are 3,057 units of housing in South Amboy. Estimates for 1996 indicate that South Amboy's housing stock had increased 3.4% to 3,160 units. There were 1,238 housing units in Census Tract 0075 and 1,808 in Census Tract 0076, according to the 1990 Census. There are no housing units in the proposed development area.

Most of South Amboy's housing was built before 1920 and although the homes range in size and style; many of the homes are moderate to small in size, are 2 to 3 stories and are colonials and Cape Cods. The older and generally larger homes tend to be Victorians; and the more recently built homes are bi-levels with some duplexes. These different style homes are mixed throughout the town with no particular pattern or concentration. Many of the homes have driveways and no garages, and are on small parcels. The homes generally range in condition from fair to good with a number of homes in need of capital improvements and general maintenance. Many of the wood framed homes are covered with aluminum or vinyl siding.

The nearest residential neighborhood to the proposed South Amboy Intermodal Transportation Center would be the area between the Conrail railroad tracks and Fourth Street. This is an area of modest 2-story, homes on small parcels. The overall conditions of the homes vary with most being in good condition. Small front lots, sidewalks and winding blocks, characterize this neighborhood.

An analysis of building permits for privately owned, residential housing from 1995 to 1990 shows a marked difference between South Amboy and its neighbors, Sayreville and Perth Amboy. Sayreville surrounds South Amboy on three sides; Perth Amboy is South Amboy's neighbor to the north across Raritan Bay (see Table 6).

Table 6: Building Permits for South Amboy, Sayreville, and Perth Amboy; 1995 through 1999.

Year/Place	South Amboy	Sayreville	Perth Amboy
1999	5	167	257
1998	4	134	107
1997	6	179	169
1996	6	124	2
1995	5	125	5

Source. Bureau of the Census

Public Housing

An older two-story public housing development is located east of Mason Street between Bayshore and Jerome streets. McCarthy Towers, a federally subsidized mid-rise residential building for the elderly, is located at the intersection of Broadway and Gordon streets. A (no name) motel that reportedly provides temporary shelter for welfare recipients is located on the north-west corner of South Amboy on Raritan Street near the junction of Route 35.

1.4 Community and Public Recreation Facilities

Community Facilities

Community facilities include public buildings, offices and meeting places, schools, hospitals, firehouses and places of worship. In South Amboy there is one police station, five all-volunteer fire stations, one library, one public elementary and intermediate school, and one public junior

high school and high school. It has several places of worship and a very active senior citizen center to provide multiple services to a significant portion of South Amboy's population.

Information on the location of community facilities was obtained from field investigations, interviews with local officials and documentary sources. The latter included the Middlesex County Open Space and Recreation Plan (1995) and a Public Parks and recreational facilities inventory, prepared by Wallace, Roberts & Todd (April 1997). A listing of community facilities for the City of South Amboy is provided in Table 7, below.

Table 7: Community Facilities, South Amboy

Facility	Location
South Amboy High School and Public Library	Rosewell St. at George St.
South Amboy Elementary & Intermediate School	241 John St.
Saint Mary's Regional High School & Elementary School Annex	Steven's Ave., between Augusta & Church Sts.
Saint Mary's Catholic Church	Steven's Ave., between Augusta & Church Sts.
Saint Mary's Convent	Steven's Ave., at Augusta St.
Sacred Heart Church	Washington Ave., between Cedar and Elm Sts.
Sacred Heart School	Washington Ave., between Cedar and Elm Sts.
South Amboy Municipal Building / Police Headquarters	140 N. Broadway, between Augusta & Church Sts.
U.S. Post Office	Broadway at Bordentown Ave.
Independence Enterprise E&H Co. No. 1 Firehouse	N. Broadway, between Augusta & Church Sts.
Enterprise Snorkel Co. No. 1 Firehouse	George & Rosewell Sts.
Protection Fire Co.	David St. & Feltus Ave.
Progressive Fire. Co.	Bordentown Ave. & Catherine St.
Mechanicsville Fire House	Raritan St. at Alpine St.
Disabled American Veterans Hall	John O'Leary Blvd. at foot of George St.
South Amboy Elks Club	Washington Blvd. at Rt. 35
South Amboy First Aid & Safety Squad	Main St. at Thompson St.
Charles W. Hoffman, M.D. Senior Citizen Center	Stevens Ave., between Henry & David Sts.
NJ Transit South Amboy Transit Station	Mason St., between Henry and David St.
First Baptist Church	Stockton St. at Second St.
First Presbyterian Church	Broadway at Church St.
Christ Episcopal Church with thrift shop and preschool	Main St. at Broadway

Source: PHE, 2001

Parks and Recreation Facilities

Information on the existence and location of public parklands and recreational facilities was collected from field investigations and interviews with local officials and several documentary sources. A copy of the most recent survey of Recreational Facilities for South Amboy was verified as current as of November 2000 with regard to parks and recreational facilities within South Amboy. A listing of these parks and recreational facilities is provided below in Table 8.

Table 8: Public Parks & Recreation Facilities in South Amboy

Facility Name	Location
Veteran's Field	Feltus Ave., south of Portia St.
Charmello Park	Conlogue Ave. and Catherine St.
Pine Avenue Park	Pine Ave., east of George St.
Bordentown Avenue Park	Bordentown Ave., north of Pine Ave.
Babe Ruth Ballfield	John O'Leary Blvd., southern waterfront area.
Allie Clark Sports Complex	John O'Leary Blvd., southern waterfront area.
David Street Park	David & Rosewell Streets
Rosewell Street, Street Hockey Court	Rosewell St. south of David St.
Second Street Park	Second & Potter Streets
Zdanowicz Park I	Cedar & Sixth Streets
Zdanowicz Park III	Fifth & Connors Streets
Barkalow Street Park	Barkalow St., north of Stevens Ave.
Pupek Road Basketball Court	Pupek Rd., north of Stevens Ave.
Veteran's Memorial Park	Steven's Ave. & Pupek Rd.
Ciszewski Park	Conover St., south of Alpine St.

Source: Recreational Facilities Map of South Amboy, Middlesex County Department of Engineering, January 1998; verified by Superintendent Mary Lou DeBliss, November 2000.

There are no national or state parks or recreational facilities in South Amboy. Nor are there any County parks or recreational facilities located in South Amboy with the exception of the new Raritan Bay Park. This 136-acre county park, built at the edge of the Raritan Bay and on the former Old Morgan Landfill, is primarily located in Sayreville at the southern border of South Amboy. The main access road, entrance and a park gazebo are located in South Amboy. The Middlesex County Open Space and Recreation Plan identifies the municipalities of South Amboy and Sayreville as the owners of the parkland. This park is about one and a half miles from the proposed access road to the ferry terminal, or nearest part of the proposed South Amboy Regional Intermodal Transportation Center. John O'Leary Boulevard, which provides waterfront access along the southern end of South Amboy and to the park area, does not provide access to the northern shore of the Raritan Bay.

1.5 Fiscal and Economic Resources

The project area includes several ratables that are operating businesses . A considerable area of land is presently owned by Consolidated Rail Corporation (Conrail), whose property is exempt from local real estate taxes. Some property will be acquired outright by South Amboy, and in certain instances permanent easements will be obtained by the city to accommodate the proposed action. Table 9 indicates the property owners who will be affected, the planned acquisition, taxes presently paid by property owners and the approximate part of the tax revenue that will be lost to the city through acquisition.

Table 9: Affected Property Owners

Owner	Size (acres)	Taxes	Planned Acquisition (acres)	Approximate Tax Loss to City
Conrail		N/A	12.654 land 8.97 riparian	None
Modern Transportation Co., Inc.	28.93 land 17.677 riparian	$13,000	4.779 land 11.784 riparian	None
Great Lakes Dock & Dredge	5.566	$1,500	0.078	$21.02
John and Robert McKeon	1.638	$5,397.48	0.568	$1,871.65

Source: PHE, 2001

In addition to the above, the city will acquire permanent easements amounting to 2.034 acres from Modern Transportation and 0.288 acres from Conrail.

According to local officials, although only about half of the property in the project area owned by Conrail is needed, the city plans to acquire the other half to be made available to developers for ancillary development. Further, the city will incur no relocation costs, since the businesses located in the project area will continue to operate there under a joint venture agreement between Great Lakes Dock & Dredge and Modern Transportation. This agreement will permit them to share land and waterside facilities, thus reducing the total operating space required. The small excavating company owned by the McKeon brothers is expected to close, but local officials state that the McKeons had planned to close the business anyway.

1.6 Employment

According to the 1990 census, total employment in South Amboy in 1990 was 3,969 persons. According to the 1990 census, about 17% of employed persons residing in South Amboy work in South Amboy. Per capita income in the City in 1989 according to the 1990 census was $15,133. Table 10 shows where residents of South Amboy worked according to 1990 census data.

Table 10: Place of Employment Data

Work Location	South Amboy Residents Employed
South Amboy	670
Outside South Amboy	3299
In Middlesex County (including South Amboy)	2702
Outside New Jersey	283

Source: Bureau of the Census - 1990 Census

South Amboy has historically been a major transportation center, capitalizing on its waterfront and the development of railroads through the city. Coal and manufactured products were among the materials moved through South Amboy. A vigorous industrial base had also developed in the city by the turn of the century with cigar, paint, munitions and textiles forming the industrial base. By the 1970s, industry had dwindled sharply in South Amboy. It's waterside transportation

activity was curtailed in the early 1980s, when dredge spoil from the dredging of the Raritan Channel was dumped along the South Amboy coastline, adding 66 acres of land to the city's inventory. Current development efforts in South Amboy are geared to the city's transportation assets. Other strategies focus on "boutique" retail facilities that can compete with large regional malls in nearby areas of Middlesex County.

2.0 ANTICIPATED SOCIOECONOMIC IMPACTS OF PROJECT

Consideration of socioeconomic impacts has been given to four specific areas: population and neighborhoods; land use including housing; community facilities including parks and recreation facilities; fiscal resources including economic impacts. For each of these topic areas, the impacts are examined in terms of the "No Action Alternative," and the "Proposed Action" scenario.

2.1 Population and Neighborhoods

Under the No Action Alternative, no immediate impacts would affect the surrounding neighborhoods. Presumably the downward population trend would continue and the economic health of South Amboy would decline or, at best, remain level. Long-term effects on surrounding neighborhoods would likely reflect a gradual decline.

Proposed Action

No demographic changes are anticipated as a result of the Proposed Action alternative. For projects characterized by a large influx of employees for a lengthy construction phase, operations phase and ultimate decommissioning, there is often a demographic impact on existing neighborhoods. Although some temporary short-term changes may occur during the construction phase of the project, these are likely to be minor in nature and would last only during a comparatively short construction phase of the project. It is not anticipated that large operating staffs would require residence in South Amboy.

A general improvement in economic health in South Amboy induced by the expenditure of some $15.5 million construction dollars, some of which would go to local vendors and workers, and by the long-term spending associated with increased commuter traffic should benefit neighborhoods surrounding the project area. No community cohesion impacts are likely, since the project is essentially self-contained, away from residential neighborhoods. No segmenting of communities by physical barriers or separation of neighborhoods from community facilities is anticipated.

2.2 Land Use

No significant changes in land use are anticipated under the No Build alternative. Industrial and commercial uses in the project area would probably remain as they are, at least for the short term. Unused or under utilized industrial properties would likely remain so.

Under the proposed action, Improved utilization of waterfront property should result. Unused or under utilized land would be turned to a productive use that should provide improved economic

returns to the community as a whole. The proposed action could also stimulate other associated waterfront development that would be beneficial to the community.

Housing

Under the No Action Alternative, it is not anticipated that there will be any change in either housing demand or supply, beyond the existing background growth. Housing development in surrounding communities will continue to outstrip the growth in South Amboy.

The scenario posed by the proposed action would improve the general economic environment in South Amboy and could result in a growth in residential real estate values. This could result in some additional growth in housing development in South Amboy. New private residential building permits have been relatively flat in South Amboy, compared to its neighbors. The proposed action could stimulate some growth in private housing in the city. No adverse effects on housing are anticipated

2.3 Community and Recreational Facilities

No effect on community facilities is anticipated under this alternative.

Similarly, under the Proposed Action, no adverse effect on community facilities is anticipated. None of the existing Community facilities are located within or adjacent to the properties enveloped in the South Amboy Regional Intermodal Transportation Center. Christ Episcopal Church, which is located on Main Street near the intersection of Broadway, is the closest community facility. The proposed action should not affect any activities at, or access to, any of these community facilities.

None of the existing parks or recreational facilities is located within or adjacent to the proposed South Amboy Regional Intermodal Transportation Center. It does not appear that access to these parks and recreational facilities will be impacted by the proposed action.

2.4 Fiscal Resources

No effect is anticipated under the No Action alternative. No change would occur in the taxes received from present industrial and commercial users of the project area. The long-term decline in industrial activity in South Amboy could result in an eventual loss of tax revenue from the existing businesses on the site.

Under the proposed action, there would be some loss of tax revenue in the short term. However, given the city's 2000 tax levy of $1.005 million, the loss of less than $7000 annually would be negligible. School District taxes in 2000 amounted to $3.389 million. Again, the loss would be minimal under the proposed action. Property acquisition costs will be paid in large part by a $14.2 million federal grant and a $1 million state grant leaving only approximately $1.8 million to be raised by the city. There would be no loss of existing jobs as a result of the proposed action and there would be no relocation costs associated with removal of existing businesses. Given the potential for future taxable development, the proportion of the $15.5 million in construction costs

that would be spent in South Amboy, the presumed increase in commuter traffic and spending, and creation of new jobs, the fiscal impacts would appear to be entirely beneficial.

Economic

As with the fiscal impacts, none are anticipated under the No Build alternative, except for a possible long-term loss of industrial businesses, such as Amboy Aggregates, and associated jobs. This possible loss would be part of an historic trend, evident in South Amboy since the 1970s.

Under the Proposed Action alternative, the economic impacts on South Amboy appear to be entirely beneficial. There would be no loss of existing businesses for a period of at least five years. No business relocation costs would be incurred. No existing jobs would be lost for at least a 5-year period. The multiplier effect of construction expenditures, jobs created during both construction and operation of the terminal facility, the probability of additional, related development and the spending generated by an increased commuter throughput should all create a healthy stimulus to South Amboy's economy.

TECHNICAL ENVIRONMENTAL STUDY

NATURAL RESOURCES

Environmental Assessment of the
Intermodal Ferry Transportation Center
City of South Amboy, New Jersey

TECHNICAL ENVIRONMENTAL STUDY: NATURAL RESOURCES

1.0 NATURAL RESOURCES

1.1 Geology

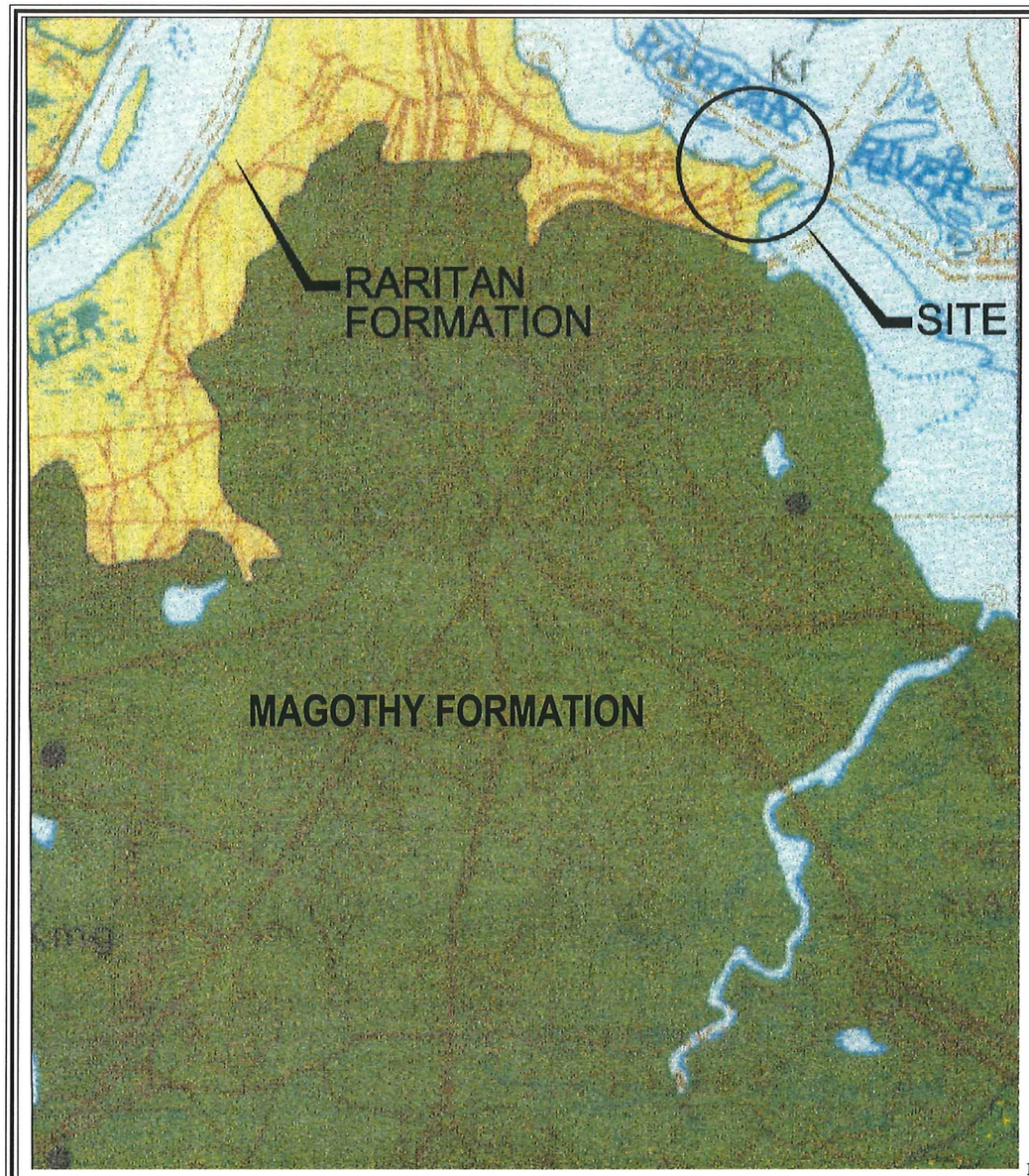
The USGS Geologic Map of the Newark 1° x 2° Quadrangle, New Jersey, Pennsylvania and New York indicates that the Site is located in the Coastal Plain which consists of gently seaward-sloping surface on poorly consolidated sediments of Tertiary and Cretaceous age (See Figure 1, Geologic Map). These rocks form a southeastward-thickening, gently tilted prism of strata that exceeds 2,480 feet in thickness along the coast, and thins to a feather edge along the Fall Line where it unevenly overlaps the Southern Piedmont and Newark Basin. Whereas the oldest Cretaceous clastic sediments are mostly non-marine, the overlying units are mostly marginal marine in origin.

The New Jersey Coastal Plain is underlain by unconsolidated and semi-consolidated siliciclastic sediments of Cretaceous and Cenozoic age. These sediments constitute a gently dipping, seaward-thickening wedge that is more than 1,920 m (6,300 ft) thick in the southern part of the state. Coastal Plain sediments accumulate along the Atlantic continental margin in a variety of non-marine deposits of the Raritan Formation, as much as 13 m (43 ft) thick, and are exposed in the southeastern part of the map area

The entire project area is located within the geologic formation known as the Raritan Formation (Upper Cretaceous, upper Cenomanian). This formation consists of an upper clayey silt (Woodbridge Clay Member) and a lower sand (Farrington Sand Member). Formation occurs only in northern part of central sheet.

Woodbridge Clay Member

Silt, clayey, dard-gray; weathers to red brown or white, locally interbedded with light-gray, fine to very fine grained sand (primarily quartz and mica with little feldspar). Very micaceous (muscovite, chlorite, and biotite) in both silty and sandy beds. Very woody, mostly fine pieces in layers and coated with pyrite. Locally, tree stumps, in upright position, are found near base of unit as are transported individual logs several feet in length. Siderite occurs in discontinuous beds and as flattened slab concretions as much as 0.6 m (1.8 ft) in maximum diameter. Fossil casts of marine mollusks are present, particularly near the top of the formation. Locally, well –developed burrows of *Ophiomorpha nodosa* filled with iron oxides weather out of the clay-silt. The Woodbridge is approximately 20 m (66 ft) thick in the vicinity of Sayreville, Middlesex County, where the South River has stripped away the overlying Magothy Formation, and it crops out in many places on the Perth Amboy and New Brunswick quadrangles to the north, but not in the quadrangle to the south or southwest. The Woodbridge does not crop out in the Delaware



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DATE:	DRAWN BY:	REVIEWED BY:	SCALE:	PROJECT #	SHEET #
March 2001	MDS	M.J.M.	N/A	39.0413	1 OF 1

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136 W. 16th Street
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New York, NY 10011

Geology Map
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE: PMK Group

FIGURE # 1

River valley southwest of Trenton. The late Cenomanian ammonites *Metoicoceras bergquisti* and *Metengonoceras sp*. were described from the upper part of the Woodbridge (Cobban and Kennedy, 1990). Pollen from the unit belongs to the *Complexipollis-Atlantopollis* Assemblage Zone of latest Cenomanian and early Turonian age (Christopher, 1979, 1982).

Farrington Sand Member

Sand, quartz, fine to medium-grained, crossbedded, very micaceous, white, interbedded with thin to thick, dark, silt beds. Rock fragments are a minor sand constituent. No burrows were observed in the unit. Unit is exposed only in pits dug below the overlying Woodbridge Clay Member. Typically, thickness is about 9 to 10.5 m (30-40 ft). Pollen from the Farrington is similar to the pollen in the Woodbridge.

1.2 Soils

The Soil Survey of Middlesex County, New Jersey has designated the Site as primarily Urban Land (UL) (See Figure 2, Soil Survey Map). This unit consists of areas where more than 80 percent of the surface is covered by industrial plant, shopping and business centers, and other structures, and usually located in the highly populated northern half of the country. The areas generally range from 2 to 1,000 acres. Most are nearly level to moderately sloping, but a few are strongly sloping and steep. Fill material has most likely been used to raise the grade of wet soils, and most areas have been excavated or filled.

1.3 Water Resources

1.3.1 Surface Waters

General

The site is located within the Raritan Bay at the mouth of the Raritan River. The Raritan River is classified as SE1 waters according to the Surface Water Quality Guide. SE1 waters are saline estuarine waters with designated uses such as, shellfish harvesting, primary and secondary contact recreation, and maintenance, migration, and propagation of the natural and established biota. The entire site drains into the Raritan Bay, which is also classified as SE1.

Quantitative criteria regarding the Raritan River and the Raritan Bay exist for the following: dissolved oxygen, temperature, nutrients, bacteria, and heavy metals. Prior to 1991, the samples taken from the Raritan River indicated good water quality.

The Raritan River and Raritan Bay are believed to be heavily influenced by point and non-point sources of pollution. For example, the elimination of the American Cyanimid discharge had resulted in improvements in the water quality of both water bodies. However, runoff from urban surfaces, storm sewers, and roadways is believed to be an increasing problem in the region due to the developed state of the surrounding area. A number of hazardous waste sites, many of which

UL = Urban land
PM = Pits, sand and gravel
PO = Psamments, sulfidic substratum
DTB = Downer-Urban land complex, 0 to 10 percent slopes

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March 2001	MDS	MJM	N/A	39.0413	1 OF 1

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Soil Survey Map
South Amboy Ferry Terminal
City of South Amboy, New Jersey

SOURCE: Middlesex Cnty. Soil Survey

FIGURE # 2

are on the National Priority List, are located in the Raritan River watershed. Some of these sites have been reported as impacting the nearby surface waters.

Biological assessments in the Raritan River indicate that the macroinvertebrate populations are moderately impaired. The portion of the Raritan River near the project area and the Raritan Bay are suitable for shellfish harvesting; however, in most areas this practice is classified as either prohibited or special restricted (required special processing) depending on the exact location. In addition, there is a fishing advisory in effect due to PCB contamination of certain fishes in the tidal section of the river.

Monitoring Program

A four-season monitoring program was conducted beginning in the summer 2000 season and continuing through the spring 2001 season. This program included the collection and analysis of water quality samples at multiple depths at six locations: four locations within the ferry basin and one location outside of the basin. Parameters measured included dissolved oxygen (DO), pH, salinity, oxidation-reduction potential, and temperature at critical surface, mid, and bottom depths. Biochemical oxygen demand (BOD, 5-day) and coliforms (total fecal) were collected from the surface depth.

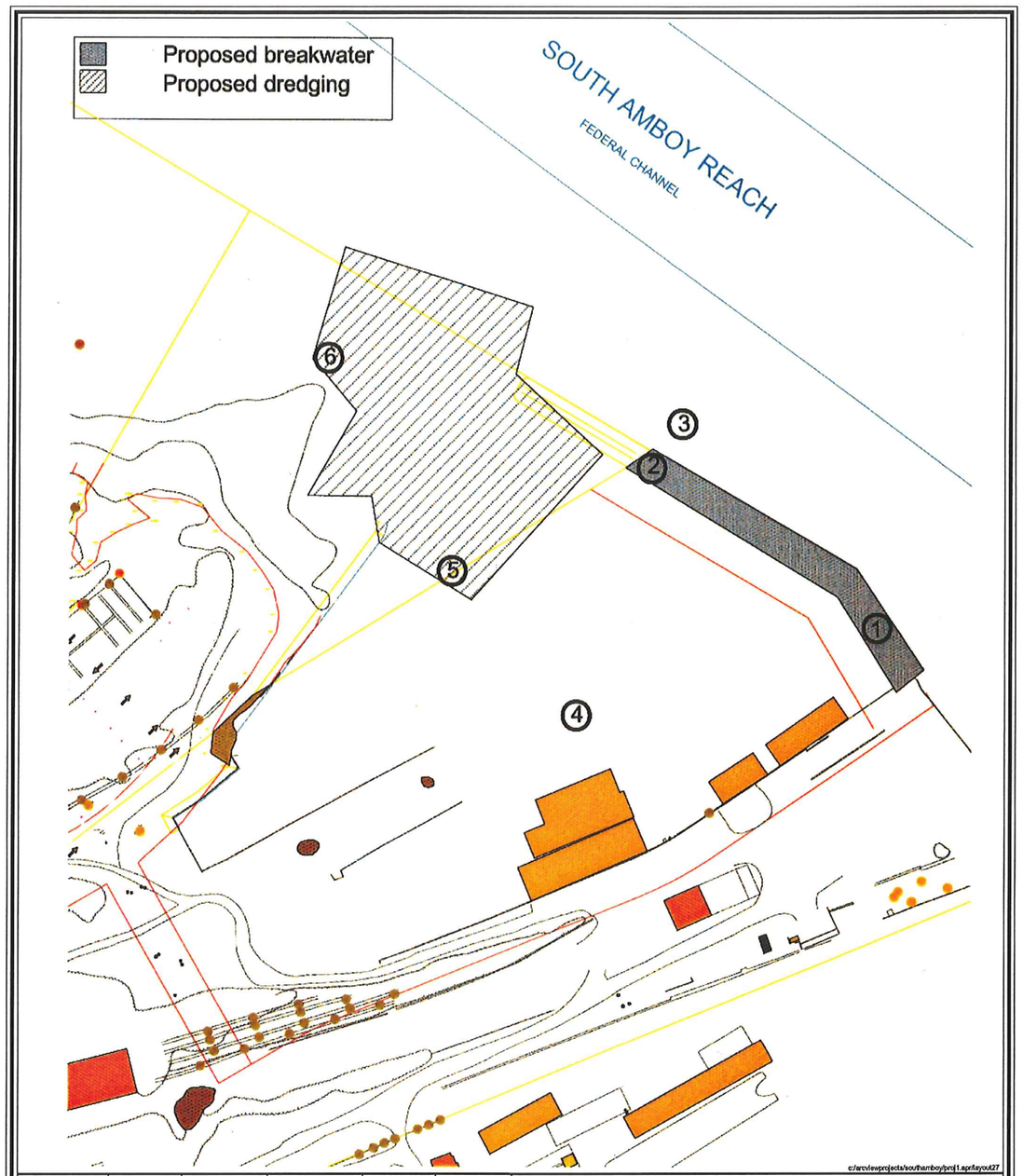
The location of the water quality sampling stations is shown in Figure 3, Water Quality Sampling Locations. The results of this program are presented in Table 1 and summarized below.

Surface fecal coliform (FC) levels were generally below the applicable SE1 standard of 200 counts/100ml except on one occasion in June 2001. On this occasion, coliform levels at all stations were above the SE1 standard and ranged from 2200 to 3800 counts/100ml. These elevated levels may be related to a significant precipitation event, 0.90 inches of rainfall measured at Newark Airport, the day prior to sampling and with no precipitation for the week prior to that event. For the other three sampling events, coliform levels were either below detection limits or under 50 counts/100ml.

At all depths and at all stations, the dissolved oxygen (DO) levels were above the 4.0 mg/l SE1 standard throughout the one-year monitoring period. As expected, recorded DO levels were lower during the warmer months and with increasing depth. DO levels ranged from a summer seasonal low of 4.6 mg/l to a winter seasonal high of 11.6 mg/l.

1.3.2 Groundwater

Groundwater information was obtained from existing data sources and from previous aquifer studies performed by the Middlesex County Department of Planning. Groundwater is located within interconnected openings formed by joints, fractures, and solution channels based on the underlying geologic formation. South Amboy is situated above the Potomac-Raritan-Magothy aquifer. This aquifer is highly productive and is the most-used confined aquifer in the Coastal Plain sole source aquifer system. This aquifer system extends throughout the Coastal Plain and attains a maximum thickness of 4,100 ft. The Potomac-Raritan-Magothy aquifer is comprised of two aquifers, the Farrington and the Old Bridge aquifers. The project site is situated above the



DATE:	DRAWN BY:	REVIEWED BY:	SCALE:	PROJECT #	SHEET #
June 2001	MDS	MJM	1"=130'	39.0413	1 OF 1

POTOMAC-HUDSON ENVIRONMENTAL, INC.

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Water Quality Sampling Locations
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE: PHE

FIGURE # 3

Table 1:
Water Quality Monitoring Results
South Amboy Ferry Terminal EA
South Amboy, New Jersey

Date: 09/18/00
Tidal State: High/slack

Parameter	Units	Monitoring Stations																	
		1			2			3			4			5			6		
		S	M	B	S	M	B	S	M	B	S	M	B	S	M	B	S	M	B
Depth	meters	0.6	3.3	6.1	0.5	1.7	3.0	0.4	3.7	7.1	0.5	2.6	4.6	0.3		1.5	0.5		1.5
Temperature	°C	21.7	21.6	21.5	21.7	21.6	21.6	21.7	21.6	21.6	21.8	21.6	21.5	21.8		21.8	21.9		21.8
Salinity	0/00	21.3	23.0	23.3	21.8	22.6	22.9	21.1	23.2	23.4	21.4	23.0	23.5	22.1		22.8	20.6		21.6
pH		6.98	6.97	6.92	7.07	7.08	7.07	7.12	7.14	7.14	7.08	7.12	7.13	7.10		7.11	7.07		7.06
ORP	volts	+0.175	+0.176	+0.178	+0.171	+0.172	+0.173	+0.166	+0.167	+0.168	+0.156	+0.155	+0.154	+0.162		+0.166	+0.161		+0.163
DO	mg/l	6.1	6.2	6.6	6.2	6.1	6.3	5.8	6.0	6.3	5.7	5.7	5.9	5.8		5.9	6.0		5.8
BOD5	mg/l	< 2.0			< 2.0			< 2.0			3.4			< 2.0			2.6		
Fecal Coliforms	Colonies/100 ml	< 10			< 10			< 10			10			50			10		

Date: 11/14/00
Tidal State: High/Ebb

Parameter	Units	Monitoring Stations																	
		1			2			3			4			5			6		
		S	M	B	S	M	B	S	M	B	S	M	B	S	M	B	S	M	B
Depth	meters	0.7	3.2	5.6	0.7	2.8	5.1	0.8	4.1	7.8	0.3	1.7	3.5	0.7		1.5	0.2		1.8
Temperature	°C	11.5	11.5	11.5	11.6	11.5	11.5	11.6	11.5	11.5	11.6	11.6	11.6	11.6		11.6	11.6		11.6
Salinity	0/00	24.1	25.0	25.0	24.2	24.9	24.9	24.2	24.8	24.9	24.2	24.6	24.6	24.2		24.6	24.1		24.3
pH		7.50	7.47	7.41	7.57	7.58	7.57	7.59	7.59	7.59	7.59	7.60	7.60	7.59		7.60	7.60		7.60
ORP	volts	+0.235	+0.240	+0.243	+0.230	+0.233	+0.235	+0.228	+0.229	+0.231	+0.226	+0.229	+0.232	+0.230		+0.231	+0.236		+0.239
DO	mg/l	7.6	7.8	8.1	7.5	7.7	8.1	7.4	7.5	7.8	7.5	7.8	8.3	7.7		7.8	7.7		7.8
BOD5	mg/l	10			3.0			2.6			< 2.0			< 2.0			< 2.0		
Fecal Coliforms	Colonies/100 ml	< 1			10			< 10			< 10			10			20		

Table 1 (continued):
Water Quality Monitoring Results
South Amboy Ferry Terminal EA
South Amboy, New Jersey

Date: 03/20/01
Tidal State: Low/Slack

Parameter	Units	Monitoring Stations																	
		1			2			3			4			5			6		
		S	M	B	S	M	B	S	M	B	S	M	B	S	M	B	S	M	B
Depth	meters	0.5	1.9	4.4	0.5	1.4	2.8	0.5	2.2	4.1	0.5	1.6	2.5	-	0.4	-	-	0.6	-
Temperature	°C	6.3	5.7	5.6	6.4	5.7	5.7	6.3	5.7	5.6	6.5	5.8	5.6		7.2			7.1	
Salinity	0/00	14.1	21.4	22.6	13.6	21.2	21.9	13.8	21.7	22.7	13.0	18.5	22.2		11.6			10.8	
pH		7.90	7.83	7.78	7.90	7.84	7.79	7.90	7.81	7.76	7.90	7.84	7.73		7.74			7.71	
ORP	volts	+0.183	+0.183	+0.180	+0.172	+0.173	+0.170	+0.164	+0.164	+0.162	+0.158	+0.157	+0.157		+0.151			+0.137	
DO	mg/l	10.0	10.3	10.3	10.0	10.5	10.7	10.1	10.5	10.5	10.3	10.4	10.7		11.2			11.6	
BOD5	mg/l	2.3			2.1			< 2.0			< 2.0			< 2.0			< 2.0		
Fecal Coliforms	Colonies/100 ml	38			32			48			2			8			10		

Date: 06/18/01
Tidal State: Mid / Ebb

Parameter	Units	Monitoring Stations																	
		1			2			3			4			5			6		
		S	M	B	S	M	B	S	M	B	S	M	B	S	M	B	S	M	B
Depth	meters	0.4	2.4	4.6	0.3	1.9	3.9	0.6	2.4	4.5	0.6	1.5	2.6		0.4			0.4	
Temperature	°C	22.5	20.7	20.5	21.6	20.8	20.7	22.4	20.9	20.7	21.8	21.1	20.9		22.9			22.8	
Salinity	0/00	8.5	20.4	21.6	8.4	20.6	21.3	4.8	19.9	21.1	7.5	17.2	20.2		4.5			4.4	
pH		7.22	6.82	6.76	7.34	6.92	6.86	7.32	6.99	6.91	7.32	6.99	6.91		7.23			7.18	
ORP	volts	+0.231	+0.243	+0.242	+0.255	+0.266	+0.258	+0.276	+0.284	+0.275	+0.304	+0.317	+0.315		+0.275			+0.276	
DO	mg/l	5.7	5.2	5.2	5.7	5.0	5.2	5.8	5.2	5.2	5.7	4.6	4.8		6.7			6.6	
BOD5	mg/l	45			50			36			39			40			35		
Fecal Coliforms	Colonies/100 ml	3400			2600			3000			3600			3800			2200		

Source: PHE, Inc., 2001

Notes:

- Depth: Surface (S) Middle (M) Bottom (B)
- u = Indicates a compound was analyzed for but not detected, M = missing.

Farrington aquifer, which has excellent water quality but also has large concentrations of iron in some areas. It is very unlikely that there is an aquifer recharge area in the vicinity of the project area due to the presence of a confining layer of clay situated approximately 25 feet beneath the sandy soils that exist within the project area (Orndorff, C.R. 1998, Bedrock Geologic Map of Central and Southern New Jersey).

Groundwater depth data was obtained from the nearest Middlesex County observation well. The closest well to the site (NJ-WRD well no. 23-0482) is located approximately 3.5 miles to the north of the site, at the American Cyanamid facility. The data from this well indicates that the depth to groundwater in this region is relatively shallow and is affected by tidal fluctuations. On September 11, 2000, the depth to groundwater was measured at 1.29 ft. below the ground surface. However, groundwater recharge is limited due to the impervious cover that dominates the region. The groundwater underlying the project area is classified by the NJDEP as Class II-A. The primary use of Class II-A groundwater is potable water. Secondary uses of Class II-A groundwater include agricultural water and industrial water. The two major local rivers (Raritan River and Arthur Kill) function as groundwater discharge points.

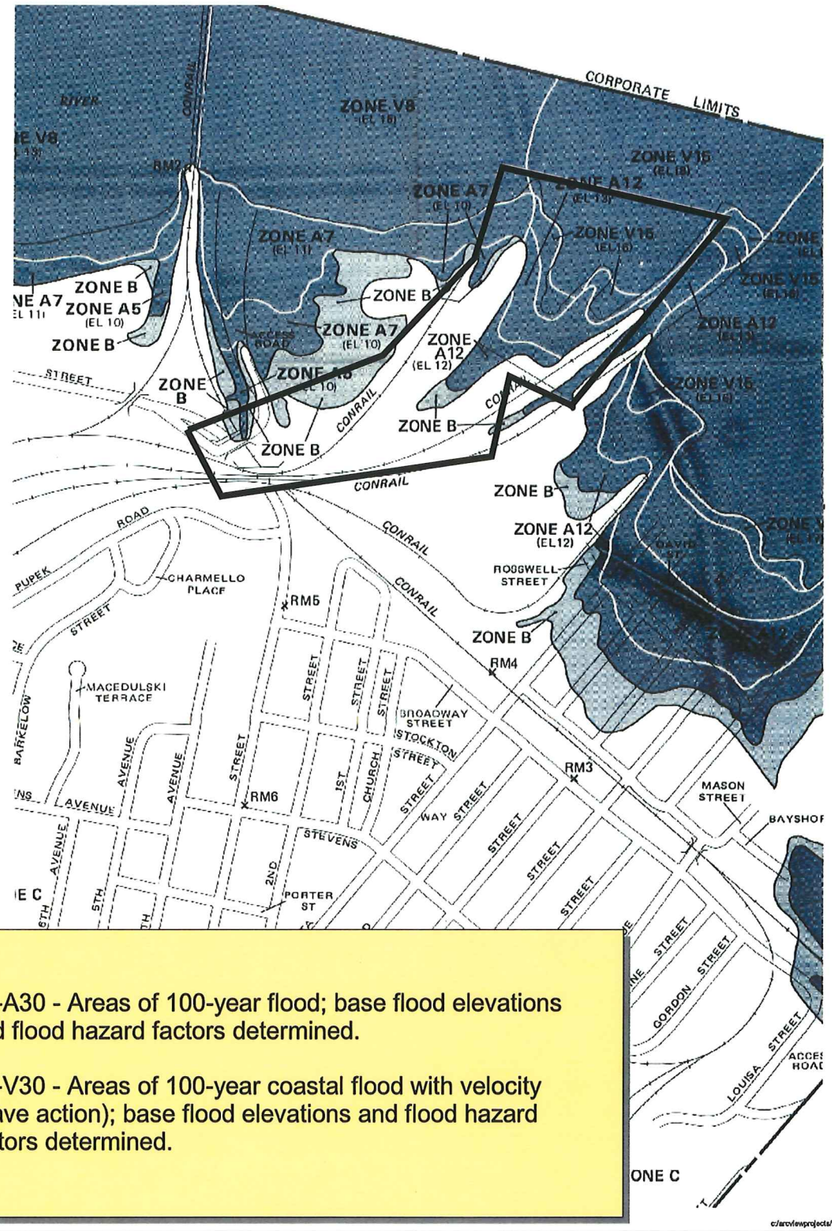
1.3.3 Tidal Flood Zone

Review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the City of South Amboy indicates that the areas of the Site along the waterfront lie within an area of 100-year coastal flooding with velocity, with base flood elevations between 16 and 17 feet. Areas of the Site slightly inland lie within an area of 100-year flood with a base flood elevation between 12 and 13 feet. The remainder of the Site does not lie within a floodplain. This is confirmed by the USGS Flood-prone Maps that indicate the area of the Site along the waterfront lies within a USGS Documented Flood prone Area, and the remainder of the Site does not lie within a Flood prone Area. A representation of the 100-year tidal flood zone is provided as Figure 4, 100-Year Flood Map.

1.4 Terrestrial Resources

Field inspections of the project site has identified a number of common species of wildlife observed directly or indirectly, including avian species (finches, song sparrows, pigeons, mockingbird, cardinal, American crow, blue jays, Canada geese, red-winged blackbirds, herring gulls, ring-billed gull, great black –backed gull, double-crested cormorant, great blue Heron, egret, starling, mourning dove, hermit thrush) and mammals (rabbits, rats, field mice, meadow voles).

A number of plant and plant communities were identified through a series of transects conducted across the project site. The transect data are included as Attachment A to this TES. The communities included old field in secondary succession, old field in secondary succession with shrub component, early succession woodlot, early succession wooded edge, and tidal salt marsh/rocky intertidal zone.



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March 2001	MDS	M.J.M.	N/A	39.0413	1 OF 1

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100-Year Flood Map
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE:	FIGURE #
FEMA	4

A summary of the species identified with community annotation is presented in Table 2, Species List for Site Vegetation.

1.5 Aquatic Resources

The waterfront elements of the proposed action, including dredging, construction of the breakwater and ferry pier, and installation of bulkheads, will affect the littoral and subtidal zones of the site. In order to characterize the site and identify the aquatic resources of the Raritan Bay, a four-season monitoring program was conducted beginning in the summer 2000 season and continuing through the spring 2001 season.

Fisheries Resources

Blueback herring, striped bass, alewife, and American shad are migratory finfish that have been historically documented in the project area.

The project area has been designated as Essential Fish Habitat (EFH) for several species of fish. Based upon a review of the "Guide to Essential Fish Habitat Designations in the Northeastern United States," issued by the National Oceanic and Atmospheric Administration/National Marine Fisheries Service, the following life stages of the following species are known to occur in the proposed project area.

- Red Hake (larvae, juvenile, adults)
- Winter Flounder (eggs, larvae, juveniles, adults)
- Windowpane Flounder
- Atlantic sea herring (larvae, juveniles, adults)
- Bluefish (juveniles, adults)
- Atlantic butterfish (larvae, juveniles, adults)
- Atlantic mackerel (juveniles, adults)
- Summer flounder (larvae, juveniles, adults)
- Scup (eggs, larvae, juveniles)
- Black sea bass (juveniles, adults)

An EFH evaluation has been conducted as part of the Department of Army permitting process, and is included as Attachment B to this TES.

In order to document current usage of the site-specific habitat, fisheries resources were sampled in replicate using a 16-foot otter trawl at four locations. These locations are shown in Figure 5, Aquatic Sampling Locations.

The results of these trawls are presented in Table 3, Summary of Fish Species Collected. Of the 17 fish species collected and identified during the sampling events, only two species, Summer flounder and Winter flounder, are targeted to the essential fish habitat list.

Table 2:
Species List for Site Vegetation

South Amboy, New Jersey

Common Name	Scientific Name	Community Type*
Alkali Grass	Distichlis spicata	D
Autumn Olive	Eleagnus umbellate	D
Beach Plum	Prunus maritime	B, C, D
Bittersweet	Celastrus spp.	B
Black Locust	Robinia pseudoacacia	B, C, D
Blackberry	Rubus spp.	B
Canada Goldenrod	Soildago Canadensis	B, C
Canada Goldenrod	Solidago Canadensis	A, B, D
Chickweed	Cerastium spp.	A
Common Mullein	Verbascum thapsus	A, B, C, D
Common Ragweed	Ambrosia arte,osoofolia	A, B, C, D
Common Reed	Phragmites spp.	D
Cottonwood	Populus deltoids	A
Dogbane	Apocynum spp.	A
Dwarf Sumac	Rhus copallina	A, B, C, D
Elderberry	Sambucus Canadensis	B
Evening Primrose	Oenothera biennis	A, C
Goldenrod	Solidago spp.	D
Grass	Graminaea spp.	B, C, D
Grass	Gramineae	A
Grass	Panicum spp.	A, B, C, D
Gray Birch	Betula populifolia	B
Groundsel Bush	Baccharis halimifolia	B
Hackberry	Celtis occidentalis	D
Hawthorn	Crataegus spp.	A
Hyssop-leaved Boneset	Eupatorium hyssopifolium	A, B
Indigo Bush	Amorph fruticosa	A
Japanese Honeysuckle	Lonicera japonica	B
Japanese Knotweed	Polygonum cuspidatum	B
Jimsonweed	Datura stramonium	A
Lady's Thumb	Polygonum persicaria	A
Lance-leaved Plantain	Plantago lanceolata	A
Marsh Elder	Iva Frutescens	D
Milkweed	Asclepias spp.	D
Narrow-leaved Goldenrod	Euthamia graminifolia	A, B, C, D
New England Aster	Aster nove-angliae	B
Nightshade	Solanum dulcamara	C
Pathrush	Juncus tenuis	A
Poison Ivy	Toxicodendron radicans	C

Table 2 (Con't.)
Species List for Site Vegetation

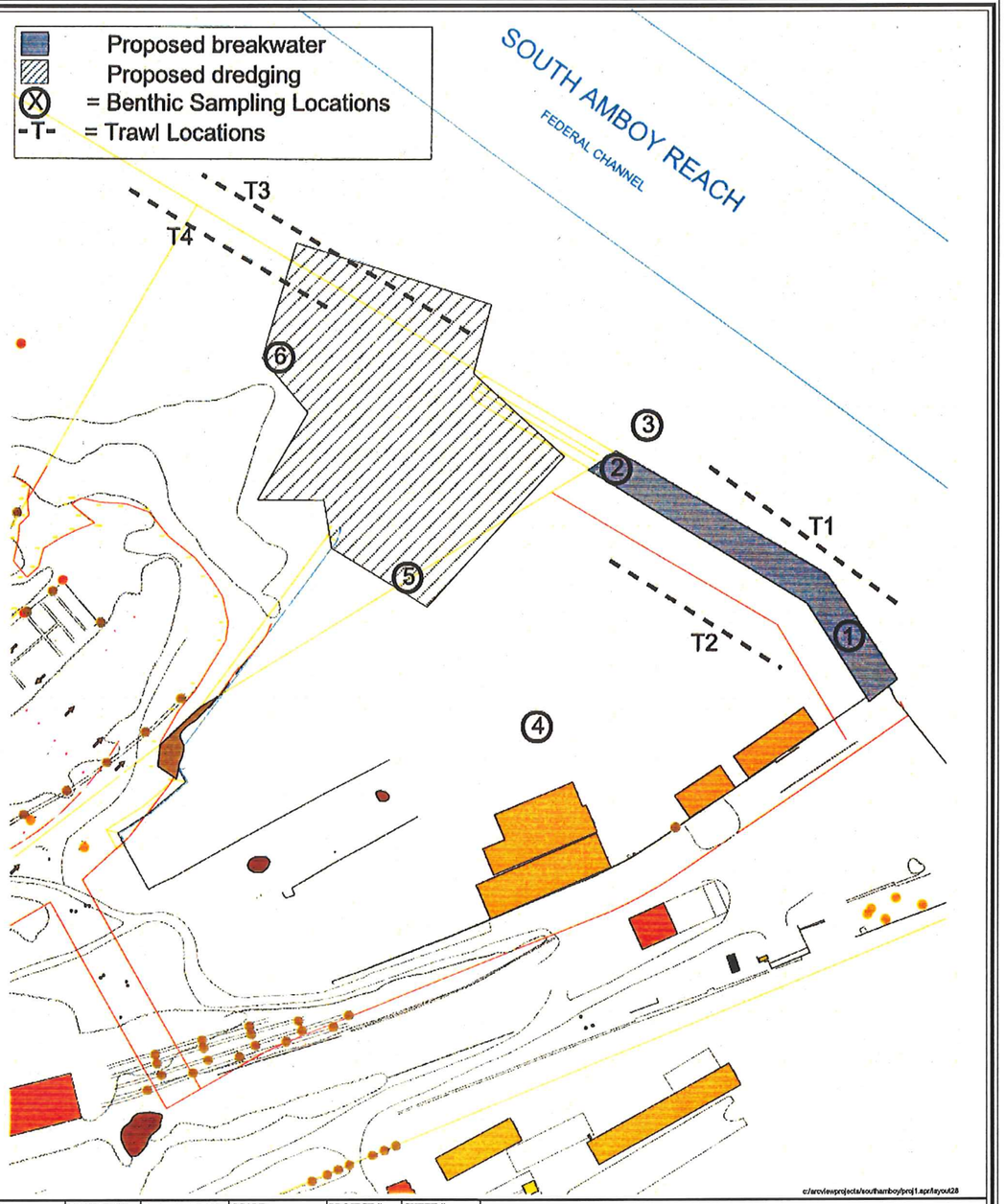
South Amboy, New Jersey

Common Name	Scientific Name	Community Type*
Pokeweed	Phytolaca Americana	A
Princess Tree	Paulownia tomentosa	C
Queen Annes's Lace	Daucus carota	B
Red Maple	Acer rubrum	C
Rough-leaved Goldenrod	Solidago rugosa	A, B, C
Round-headed Bush Clover	Lespedeza capitata	A
Salt Meadow Hay	Spartina patens	D
Seaside Goldenrod	Solidago sempervirens	A, B, C, D
Showy Goldenrod	Solidago speciosa	A, B, D
Small White Aster	Aster vimineus	B
Smooth Cordgrass	Spartina alterniflora	E
Spotted Knapweed	Centaurea maculosa	D
Sweet Everlasting	Gnaphalium obtusifolium	A, B, C
Thistle	Cirsium spp.	A, B
Trailing Wild Bean	Straphostyles helvola	A
Tree of Heaven	Ailanthus altissima	A, B, C, D
Virginia Creeper	Parthenocissus quinquefolia	C, D
Wax Myrtle	Myrica cerifera	A, B
White Mulberry	Morus alba	C
White Snakeroot	Eupatorium rugosum	A, B, C, D

Source: PMK, 2000

*** COMMUNITY**

TYPE	DESCRIPTION
A	Old Field in Secondary Succession
B	Old Field in Secondary Succession with Shrub Component
C	Early Succession Woodlot
D	Early Succession Wooded Edge
E	Tidal Salt Marsh/Rocky Intertidal Zone



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June 2001	MDS	MJM	1"=130'	39.0413	1 OF 1

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Aquatic Sampling Locations
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE:	FIGURE #
PHE	5

Table 3:
Summary of Fish Species Collected
Intermodal Ferry Transportation Center
South Amboy, New Jersey

Scientific (Common Name)	Summer 2000	Fall 2000	Winter 2001	Spring 2001
American Eel (Anguilla rostrata)				X
Bay anchovy (Anchoa mitchilli)	X	X		
Croaker (Micropoganias undulatus)		X		
Lizard Fish (Synodus foetans)	X			
Hogchoker (Trinectes maculatus)				X
Pipefish (Sygnathus fuscus)	X	X	X	X
Puffer (Sphoeroides maculatus)	X			
Sea robin (Prionotus sp.)	X	X		
Smallmouth Flounder (Etropus microstomus)	X	X		
Spot (Leiostomus xanthurus)	X			
Spotted hake (Urophycis regius)		X		X
Summer flounder (Pseudopleuronectes americanus)	X			X
Sundial (Scophthalamus aquosus)		X		
Toadfish (Opsanus tau)				X
Weakfish (Cyonscion regalis)	X			X
Windowpane flounder (Lophopsetta maculata)	X	X		X
Winter flounder (Paralichths dentatus)		X		X

Source: PHE, 2001.

Benthic Resources

A seasonal monitoring program was conducted to determine the characteristics of the benthic community at the site. Benthic resources were sampled in triplicate at six locations. These locations are shown on Figure 5, Aquatic Sampling Locations. All benthic organisms were identified to the lowest practical taxon.

The results of these benthic surveys are presented in Table 4, Summary of Benthic Organisms Collected. The majority of the species collected were from the Class Polychaeta, and included worms that are generally considered to be pollution-tolerant species.

1.6 Threatened and Endangered Species

During field inspection, no evidence of critical wildlife habitats was observed above the waterline of the Raritan Bay. The herbaceous tidal wetland area contains many common species of birds, crustaceans, and mollusks but no endangered or threatened species habitat was observed or expected due to the degraded nature of the area.

Also, according to the (October 12, 2000) NJDEP, Natural Heritage Program correspondence (see Appendix B, Correspondence) for endangered and threatened species, the database "does not have any records for rare plants, animals, or natural communities on the site". However, the Raritan Bay is known to support endangered and threatened species. The letter from the National Marine Fisheries Service (NMFS) (see Appendix B, Correspondence) states that loggerhead, green, Kemp's ridley, and leatherback sea turtles may be present in the project area.

1.7 Wetlands

Wetlands are defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated conditions.

There is a tidal salt marsh located at the northern edge of the property boundary with Raritan Bay. The tidal marsh is approximately 71,000 square feet (1.63 acres) in size and is comprised of several plant communities. The lower portion of the marsh that is directly adjacent to the Raritan Bay is comprised primarily of Saltwater cordgrass (Spartina alterniflora). Seawater spikegrass (Distichlis spicata) and Salt-meadow hay (Spartina patens) dominate the plant community that is slightly above the cordgrass. The highest region of the marsh that is directly adjacent to the pistol range largely consists of Common reed (Phragmites australis). During site investigations, the tidal marsh was observed as filled with various types of debris that had been deposited by the tide.

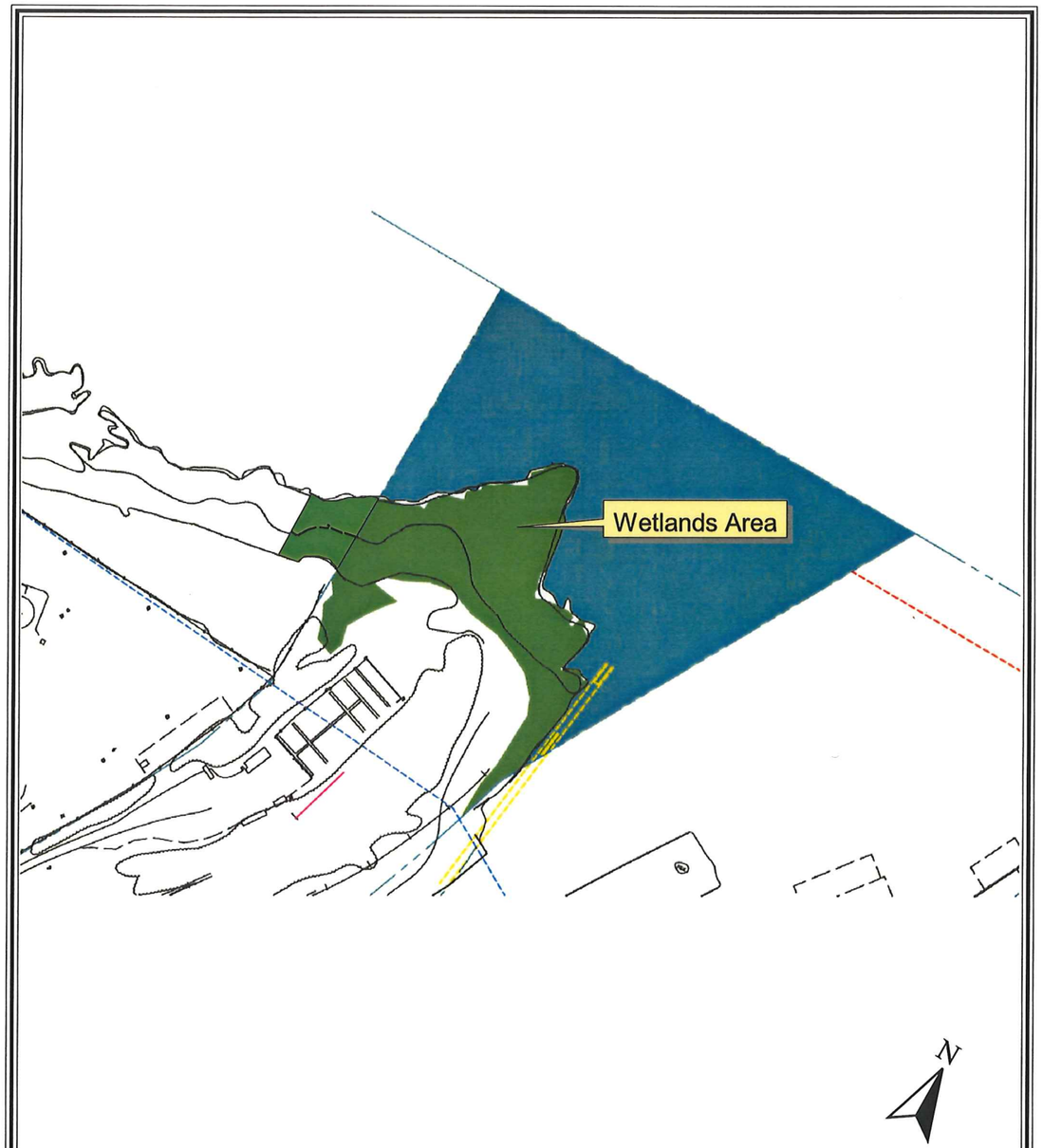
The wetland habitats are NJDEP mapped coastal wetlands. No other wetland areas were observed at the interior portion of the property or near the waterfront. The remaining waterfront areas that are present on the site are comprised of rocky intertidal zones, wooden docks, concrete piers, and bulkheads.

Table 4:
Summary of Benthic Organisms Collected
Intermodal Ferry Transportation Center
South Amboy, New Jersey

	Season			
Class / Species	**Summer 2000**	**Fall 2000**	**Winter 2001**	**Spring 2001**
Annelida				
Polychaeta				
Streblospio benedicti	X	X	X	X
Eteone sp.	X	X		
Haploscoloplos sp.	X	X	X	X
Capitella capitata	X	X	X	X
Notomastus sp.		X		
Lycastopsis pontica		X		
Pectinaria gouldii			X	X
Dodecaceria corallii		X		
Clymenella torquata		X		X
Lepidonotus squamatus	X			
Cirratulus cirratus			X	X
Nereis viridis			X	X
Autolytus sp.			X	X
Owenia fusiformus			X	
Heteromastus filiformis				X
Polydora ligna				X
Amphitrite sp.				X
Marphysa sanguinea			X	
Oligochaeta				
Mollusca				
Gastropoda				
Crangon septemspinosum		X		
Nassarius spp		X	X	X
Bivalvia				
Mulinia lateralis	X	X	X	X
Mya arenaria			X	
Arthropoda				
Mysis sp.	X	X		X
Gammarus sp.			X	
Amphipoda scud				X
Amphipods	X			
Nemathelminthes	X			X

Source: PHE, 2001.

The tidal wetlands, comprised of cordgrass, spikegrass, and salt hay, are shown in Figure 6, Wetlands Map.



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Wetlands Map
South Amboy Ferry Terminal Project
City of South Amboy, New Jersey

SOURCE:	FIGURE #
PHE	6

Attachment A

Vegetation Transect Data

Stephen F. Goodyear of Aqua-niche and Timothy R. DeGraff of the PMK Group collected the vegetation data on October 20, 2000. The precise location of the transects and data points were field adjusted due to the dissected nature of the subject property. The approximate heading of the transects was 60 degrees. The circle plots with percentage of aerial coverage were field estimated using professional judgment. In communities with woody vegetation, a 25 foot radius was used. In herbaceous communities, a 5 foot radius was used. The list of incidentals are plants that were identified on the subject property; however, they did not fall into any data collection points. The locations of the transects, data points, vegetation communities, and site photographs are shown on the site map in Attachment #.

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-1/DP-1	*Ambrosia artemisiifolia*	Common Ragweed	A	15
	Panicum spp.	Grass	A	15
	Solidago sempervirins	Seaside Goldenrod	A	5
	Solidago rugosa	Rough-leaved Goldenrod	A	5
	Eupatorium rugosum	White Snakeroot	A	5
	Solidago canadensis	Canada Goldenrod	A	5
	Euthamia graminifolia	Narrow-leaved Goldenrod	A	5
	Amorph fruticosa	Indigo Bush	A	5
	Gnaphalium obtusifolium	Sweet Everlasting	A	1
	Verbascum thapsus	Common Mullein	A	1

BAREGOUND	**15%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-2/DP-2	Gramineae	Grass	A	70
	Ambrosia artemisiifolia	Common Ragweed	A	5
	Cerastium spp.	Chickweed	A	3
	Solidago sempervirens	Seaside Goldenrod	A	2

BAREGOUND	**20%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-2/DP-3	*Oenothera biennis*	Evening Primrose	A	25
	Solidago sempervirens	Seaside Goldenrod	A	10
	Ailanthus altissima	Tree of Heaven	A	5
	Ambrosia artemisiifolia	Common Ragweed	A	3
	Eupatorium rugosum	White Snakeroot	A	2
	Cirsium spp.	Thistle	A	1
	Rhus copallina	Dwarf Sumac	A	1

BAREGOUND	**53%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-3/DP-4	*Oenothera biennis*	Evening Primrose	A	20
	Verbascum thapsus	Common Mullein	A	10
	Ambrosia artemisiifolia	Common Ragweed	A	10
	Straphostyles helvola	Trailing Wild Bean	A	7
	Panicum spp.	Grass	A	2
	Gnaphalium obtusifoium	Sweet Everlasting	A	2
	Datura stramonium	Jimsonweed	A	2
	Solidago sempervirins	Seaside Goldenrod	A	1
	Polygonum persicaria	Lady's Thumb	A	1

BAREGOUND	**45%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-4/DP-5	*Robinia pseudoacacia*	Black Locust	C	20
	Ailanthus altissima	Tree of Heaven	C	2
	Prunus serotina	Black Cherry	C	2
	Morus alba	White Mulberry	C	2
	Panicum spp.	Grass	C	2
	Ambrosia artemisiifolia	Common Ragweed	C	80
	Euthamia graminifolia	Naroow-leaved Goldenrod	C	2
	Verbascum thapsus	Common Mullein	C	1
	Oenothera biennis	Evening Primrose	C	1
	Solanum dulcamara	Nightshade	C	1

BAREGOUND	**5%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-5/DP-6	*Robinia pseudoacacia*	Black Locust	C	30
	Acer rubrum	Red Maple	C	15
	Ailanthus altissima	Tree of Heaven	C	15
	Ambrosia artemisiifolia	Common Ragweed	C	25
	Panicum spp.	Grass	C	10
	Gramineae spp.	Grass	C	10
	Solidago sempervirens	Seaside Goldenrod	C	1
	Eupatorium rugosum	White Snakeroot	C	1
	Solidago rugosa	Rough-leaved Goldenrod	C	1
	Gnaphalium obtusifoium	Sweet Everlasting	C	1

BAREGOUND	**51%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-5/DP-7	*Ambrosia artemisiifolia*	Common Ragweed	B	15
	Panicum spp.	Grass	B	25
	Robinia psedoacacia	Black Locust	B	2
	Gramineae spp.	Grass	B	15
	Gnaphalium obtusifolium	Sweet Everlasting	B	2
	Aster vimineus	Small White Aster	B	1

BAREGOUND	**42%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-5/DP-8	*Ambrosia artemisiifolia*	Common Ragweed	B	30
	Panicum spp.	Grass	B	2
	Solidago sempervirins	Seaside Goldenrod	B	1
	Solidago rugosa	Rough-leaved Goldenrod	B	1
	Solidago canadensis	Canada Goldenrod	B	1
	Baccharis halimifolia	Groundsel Bush	B	3
	Rubus spp.	Blackberry	B	2
	Rhus copallina	Dwarf Sumac	B	1
	Ailanthus altissima	Tree of Heaven	B	1
	Myrica cerifera	Wax Myrtle	B	1
	Prunus serotina	Black Cherry	B	1
	Gramineae spp.	Grass	B	40
	Robinia pseudoacacia	Black Locust	B	10

BAREGOUND	**15%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-5/DP-9	*Robinia pseudocacia*	Black Locust	B	15
	Myrica cerifera	Wax Myrtle	B	3
	Rhus copallina	Dwarf Sumac	B	1
	Ambrosia artemisiifolia	Common Ragweed	B	40
	Panicum spp.	Grass	B	15
	Eupatorium rugosum	White Snakeroot	B	2
	Solidago sempervirins	Seaside Goldenrod	B	1
	Solidago rugosa	Rough-leaved Goldenrod	B	1
	Soildago canadensis	Canada Goldenrod	B	1
	Verbascum thapsus	Common Mullein	B	1

BAREGOUND	**15%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-6/DP-10	*Spartina alterniflora*	Smooth Cordgrass	E	90

BAREGOUND	**10%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-6/DP-11	*Robinia pseudoacacia*	Black Locust	C	20
	Ailanthus altissima	Tree of Heaven	C	20
	Prunus serotina	Black Cherry	C	2
	Morus alba	White Mulberry	C	2
	Rhus copallina	Dwarf Sumac	C	2
	Ambrosia artemisiifolia	Common Ragweed	C	90
	Solidago rugosa	Rough-leaved Goldenrod	C	1
	Parthenocissus quinquefolia	Virginia Creeper	C	1

BAREGOUND	**8%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-6/DP-12	*Robinia pseudoacacia*	Black Locust	C	40
	Prunus serotina	Black Cherry	C	25
	Morus alba	White Mulberry	C	2
	Ailanthus altissima	Tree of Heaven	C	1
	Eupatorium rugosum	White Snakeroot	C	10
	Ambrosia artemisiifolia	Common Ragweed	C	5
	Toxicodendron radicans	Poison Ivy	C	2
	Soildago canadensis	Canada Goldenrod	C	1
	Solidago rugosa	Rough-leaved Goldenrod	C	1
	Parthenocissus quinquefolia	Virginia Creeper	C	1

BAREGOUND	**80%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-6/DP-13	*Rhus copallina*	Dwarf Sumac	B	15
	Robinia pseudoacacia	Black Locust	B	5
	Prunus serotina	Black Cherry	B	5
	Betula populifolia	Gray Birch	B	2
	Ailanthus altissima	Tree of Heaven	B	2
	Ambrosia artemisiifolia	Common Ragweed	B	30
	Panicum spp.	Grass	B	15
	Gramineae spp.	Grass	B	5
	Eupatorium rugosum	White Snakeroot	B	3

BAREGOUND	**47%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-6/DP-14	*Panicum spp.*	Grass	A	20
	Eupatorium hyssopifolium	Hyssop-leaved Boneset	A	4
	Ambrosia artemisiifolia	Common Ragweed	A	2
	Solidago speciosa	Showy Goldenrod	A	1
	Euthamia graminifolia	Narrow-leaved Goldenrod	A	1
	Solidago sempervirins	Seaside Goldenrod	A	1
	Myrica cerifera	Wax Myrtle	A	1

BAREGOUND	**70%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-6/DP-15	*Robinia pseudoacacia*	Black Locust	B	20
	Betula populifolia	Gray Birch	B	2
	Polygonum cuspidatum	Japanese Knotweed	B	2
	Panicum spp.	Grass	B	20
	Gramineae spp.	Grass	B	15
	Ambrosia arte,osoofolia	Common Ragweed	B	10
	Eupatorium hyssopifolium	Hyssop-leaved Boneset	B	5
	Lonicera japonica	Japanese Honeysuckle	B	2
	Verbascum thapsus	Common Mullein	B	2
	Solidago sempervirins	Seaside Goldenrod	B	1
	Euthamia graminifolia	Narrow-leaved Goldenerof	B	1
	Solidago speciosa	Showy Goldenrod	B	1
	Cirsium spp.	Thistle	B	1
	Daucus carota	Queen Annes's Lace	B	1
	Aster nove-angliae	New England Aster	B	1
	Aster vimineus	Little White Aster	B	1

BAREGOUND	**38%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-7/DP-16	*Ailanthus altissima*	Tree of Heaven	D	10
	Rhus copallina	Dwarf Sumac	D	10
	Prunus serotina	Black Cherry	D	5
	Eleagnus umbellate	Autumn Olive	D	2
	Prunus maritime	Beach Plum	D	1
	Ambrosia artemisiifolia	Common Ragweed	D	30
	Panicum spp.	Grass	D	10
	Centaurea maculosa	Spotted Knapweed	D	10
	Verbascum thapsus	Common Mullein	D	2
	Solidago spp.	Goldenrod	D	2
	Eupatorium rugosum	White Snakeroot	D	2
	Euthamia graminifolia	Narrow-leaved Goldenrod	D	2
	Graminaea spp.	Grass	D	1
	Solidago canadensis	Canada Goldenrod	D	1

BAREGOUND	**38%**

DATA POINT	SCIENTIFIC NAME	COMMON NAME	COMMUNITY TYPE	PERCENT COVERAGE
T-7/DP-17	*Robinia pseudoacacia*	Black Locust	D	10
	Prunus serotina	Black Cherry	D	5
	Celtis occidentalis	Hackberry	D	5
	Ailanthus altissima	Tree of Heaven	D	2
	Ambrosia artemisiifolia	Common Ragweed	D	30
	Solidago canadensis	Canada Goldenrod	D	5
	Eupatorium rugosuum	White Snakeroot	D	2
	Gramineae spp.	Grass	D	2
	Parthenocissus quinquefolia	Virginia Creeper	D	2
	Centaurea maculosa	Spotted Knapweed	D	1
	Solidago sempervirins	Seaside Goldenrod	D	1
	Solidago speciosa	Showy Goldenrod	D	1
	Asclepias spp.	Milkweed	D	1
	Verbascum thapsus	Common Mullein	D	1

BAREGOUND	**54%**

COMMUNITY TYPE	DESCRIPTION	RADIUS USED (Feet)
A	Old Field in Secondary Succession	5
B	Old Field in Secondary Succession with Shrub Component	25
C	Early Succession Woodlot	25
D	Early Succession Wooded Edge	25
E	Tidal Salt Marsh/Rocky Intertidal Zone	5

INCIDENTALS

COMMUNITY TYPE	SCIENTIFIC NAME	COMMON NAME
A	*Phytolaca americana*	Pokeweed
	Apocynum spp.	Dogbane
	Crataegus spp.	Hawthorn
	Juncus tenuis	Pathrush
	Plantago lanceolata	Lance-leaved Plantain
	Lespedeza capitata	Round-headed Bush Clover
	Populus deltoides	Cottonwood
C	*Sambucus canadensis*	Elderberry
	Celastrus spp.	Bittersweet
D	*Paulownia tomentosa*	Princess Tree
E	*Spartina patens*	Salt Meadow Hay
	Distichlis spicata	Alkali Grass
	Phragmites spp.	Common Reed
	Iva Frutescens	Marsh Elder

Attachment B

Essential Fish Habitat Evaluation

Essential Fish Habitat Evaluation
South Amboy Ferry Project
South Amboy, New Jersey

The following Essential Fish Habitat (EFH) evaluation has been prepared by Potomac-Hudson Environmental, Inc. (PHE) pursuant to the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act. The purpose of this evaluation is to assess the potential impacts associated with the proposed action to identified fisheries habitat in the project area.

1.0 General Description of Project Site

The project site is located along the South Amboy waterfront on Raritan Bay, east of the NJ Transit Coastline railroad bridge and immediately west of South Amboy Aggregates.

The site was the location of a former barge operation involved in the transshipment of coal from South Amboy to the metropolitan region. It was also the site of a major munitions explosion in 1950 that effectively destroyed the waterside facilities at that time. Although the site had been a deeper water port up to the explosion, subsequent silting and erosion of the upland portion of the shoreline have resulted in current water depths of from one to nine-feet mean low water (MLW). To the east of the proposed ferry dock is a deeper water channel used by South Amboy Aggregates. To the north of the project site is located the Raritan Channel.

The substrate in this portion of the bay is composed of primarily silt underlain by sand.

2.0 Description of the Proposed Action

The actions proposed for the site and the subject of this Department of Army Permit application are part of the South Amboy Ferry Project, and include the following activities:

(i) Dredging and Upland Disposal

Approximately 36,000 cy of sediments have been estimated to be dredged to provide sufficient depths within the ferry basin, slips, and access channel. It is anticipated that all dredged material would be disposed in an upland, on-site location. The dredged material would be used as fill to bring the upland portion of the site to the desired grade.

(ii) Construction of Ferry Pier, Wave Barrier, and Elevated Walkway

The ferry dock would be designed for two ferry slips. An elevated 14-foot walkway would connect the ferry dock with the mainland. A wave barrier would be located on the western edge of the dock to buffer wave energy from vessel wakes.

(iii) Construction of Floating Breakwater

The proposed breakwater would be a floating structure approximately 816-feet in length and 40-feet in width (32,640 sf or 0.75-acre). The breakwater depth would be 10-feet, consisting of two-feet of freeboard above the water surface and eight-feet of depth below the surface. The breakwater would be held in place with 18 piles, located on 48-foot centers. The breakwater piles would be steel. The wood used in the breakwater construction would be CCA-treated hardwood.

(iv) Enhancement of Wetlands

Within the rocky, debris-strewn area between the former, degraded bulkhead and the eroded upland, the Applicant proposes to vegetate approximately 4,600 square feet of this area with native species, viz., Spartina alterniflora and S. patens. Because of the degraded nature of the bulkhead in this area, the proposed site is subject to tidal influence. The placement of vegetation in this area will better secure the area from erosion by decreasing wave energy, create additional habitat for wildlife, and enhance the aesthetic value of the area.

3.0 Essential Fish Habitat

The project area falls within the 10'x10' square having the following coordinates: 40° 30.0' N, 74° 10.0' W, 40° 20.0' S, and 74° 20.0' N. Within this area, EFH has been designated for fifteen species and their life stages, as noted below in Table B-1.

Table B-1:
Summary of EFH Species

Species		Life Cycle Stage			
Common Name	**Latin Name**	**Eggs**	**Larvae**	**Juveniles**	**Adults**
Red hake	Urophycis chuss		x	x	x
Winter flounder	Pleuronectes americanus	x	x	x	x
Windowpane flounder	Scopthalmus aquosus	x	x	x	x
Atlantic sea herring	Clupea harengus		x	x	x
Bluefish	Pomatomus saltatrix			x	x
Atlantic butterfish	Peprilus triacanthus		x	x	x
Atlantic mackeral	Scomber scombrus			x	x
Summer flounder	Paralicthys dentatus		x	x	x
Scup	Stenotomus chrysops	x	x	x	
Black sea bass	Centropristus striata			x	x
King mackeral	Scomberomorus cavalla	x	x	x	x
Spanish mackeral	Scomberomorus maculatus	x	x	x	x
Cobia	Rachycentron canadum	x	x	x	x
Sandbar shark	Charcharinus plumbeus		x		x

Source: National Marine Fisheries Service Web Site, October 2001

The waterfront elements of the proposed action, including dredging, construction of the breakwater, ferry pier, and wave barrier, will affect the littoral and subtidal zones of the site. In order to characterize the site and identify the aquatic resources of the Raritan Bay, a four-season monitoring program was conducted beginning in the summer 2000 season and continuing through the spring 2001 season.

In order to document current usage of the site-specific habitat, fisheries resources were sampled in replicate using a 16-foot otter trawl at four locations. These locations are shown in Figure 4-9, Aquatic Sampling Locations.

The results of these trawls are presented in Table B-2, Summary of Fish Species Collected.

Table B-2:
Summary of Fish Species Collected
Intermodal Ferry Transportation Center
South Amboy, New Jersey

Scientific (Common Name)	Summer 2000	Fall 2000	Winter 2001	Spring 2001
American Eel (Anguilla rostrata)				X
Bay anchovy (Anchoa mitchilli)	X	X		
Croaker (Micropoganias undulatus)		X		
Lizard Fish (Synodus foetans)	X			
Hogchoker (Trinectes maculatus)				X
Pipefish (Sygnathus fuscus)	X	X	X	X
Puffer (Sphoeroides maculatus)	X			
Sea robin (Prionotus sp.)	X	X		
Smallmouth Flounder (Etropus microstomus)	X	X		
Spot (Leiostomus xanthurus)	X			
Spotted hake (Urophycis regius)		X		X
Summer flounder (Pseudopleuronectes americanus)	X			X
Sundial (Scophthalamus aquosus)		X		
Toadfish (Opsanus tau)				X
Weakfish (Cyonscion regalis)	X			X
Windowpane flounder (Lophopsetta maculata)	X	X		X
Winter flounder (Paralichths dentatus)		X		X

Source: PHE, 2001.

Of the 17 fish species collected and identified during the sampling events, only two species, Summer flounder and Winter flounder, are targeted to the essential fish habitat list.

4.0 Anticipated Project Effects

Dredging

Removal of the upper, unconsolidated sediment by clamshell dredge would result in the temporary loss of all benthic flora and sessile and slow moving infauna and epifauna occupying the areas to be dredged. This would include polychaetes, clams, annelids, snails, barnacles, and others. Larger, more motile epifauna, such as crabs and shrimp, and finfish would be able to escape or avoid the immediate area of dredging activity.

Dredging of the ferry basin and access would not have long-term effects on the aquatic resources. The area to be dredged is estimated to be 171,000 sf or 3.93-acres, which is a very small portion of similar habitat within the Raritan bay ecosystem. The short-term loss (in terms of the proportion of the available standing crop removed) of these organisms would be insignificant in view of similar distributions and densities of organisms and substrate types throughout the Bay and South Amboy vicinity.

Although measures would be taken to minimize turbidity, tides and currents would increase the turbidity plume zone.

The overall short term impacts of marina construction, however, would be negligible because:

- Dredging and blasting would occur over a relatively short period during cooler months when oxygen levels in the water column are high and most migratory species would be absent.

- Extensive field and laboratory studies of the effects of suspended solids on benthos downstream of dredging operations indicate that effects would be either nonexistent or restricted to a narrow zone of extremely high turbidity values. As far back as 1938, Lunz reported that oysters were not harmed by sediments resuspended during dredging operations. Similarly Ingle (1952) found oysters survived when placed in cages within 75 yards of an active dredge, and Saila et al. (1972) commented that most marine animals can withstand exposure to high concentrations of suspended solids for short periods. Where occasional effects were demonstrated, they usually involved specific life stages, season of dredging, duration of exposure, or other highly specific factors (Rose 1973). None of the conditions identified by Rose would be operative at the South Amboy ferry site.

- Recolonization by benthos after dredging would be generally very rapid, measured on a scale of weeks to about two years, depending on magnitude, locale, and season of dredging (Harrison et al. 1964; Harrison 1967; CBL 1970; Slotta et al. 1973; Kaplan et al. 1974; Rosenberg 1977; Wildish and Thomas 1985; Jones 1986), especially near urban areas that are subject to an unusual amount of environmental stress. Apparently, populations exposed to these conditions of frequent disturbance rarely attain equilibrium in numbers or biomass, and are characterized by opportunistic species that would quickly

invade the area (Grassle and Grassle 1974). Working in Long Island Sound, McCall (1977), for example, reported that experimentally defaunated sediments were recolonized within 10 days at densities reaching 10 individuals per square meter.

- Because recolonization of the marina bottom would be rapid, little or no loss (perhaps even an initial increase) in benthic community production would occur; as benthic succession takes place (Rhoads and Germano 1982), the new community would "converge" toward the community previously present as substrate composition in the newly constructed marina progresses towards its original state.

During the period for dredging, the dominant finfish species in the area would include several demersal taxa - Winter flounder, Windowpane, and Summer flounder. Due to the depth of the water, the majority of migratory species would be absent or present at low densities during the cooler months when dredging is proposed. .

Where dredging impacts on fishes have been previously studied, few if any adverse effects have been noted. Unlike the benthos, fish are highly mobile and can avoid areas they find unsuitable. On the other hand, fish and mobile shellfish, such as shrimp and crabs, may be attracted to the vicinity of dredging operations, probably to feed in the area (Ingle 1952; Stickney 1973). It is only when forcibly exposed to very high suspended solids or concentrated toxics that fish or shellfish may be affected. Sherk et al. (1974) found, for example, that high concentrations of very fine particles can coat the respiratory epithelium of fishes, thereby interfering with respiration. Some pertinent conclusions of Sherk et al. (1974) were that (i) bottom-dwelling fish species were most tolerant and filter-feeding fish species were least tolerant of the addition of suspended solids, (ii) adult forms were less sensitive than juveniles, and (iii) no sublethal effects were observed.

The conclusion that impacts on finfish and mobile benthos would be of minimal consequence during marina construction is based on the following:

- Dredging would not occur when migratory fish species would be abundant nor when larval and juvenile fish densities for most taxa would be high.

- All dredging would take place along an open shoreline where dilution volume, currents, etc., would result in rapid dissipation of the dredge plume.

- Except for a narrow zone immediately around the dredge, suspended solid loads would not reach levels that interfere with normal fish functions. As stated by O'Connor and Sherk (1974) in their extensive studies on suspended solids effects on fishes, "the results presented...show 'effect' levels of suspended particles to be rather much greater than concentrations that could be found in natural circumstances or in the vicinity of dredging activities (see, e.g. Masch and Espey 1967)."

- The low levels of organics and metals in the sediments of the marina would pose no potential toxic threat to fishes in the area in terms of their mobilization during dredging.

- Dredging during cooler months would not result in limiting oxygen concentrations occurring around the dredging zone.

- Fish and mobile epibenthos would be capable of avoiding the dredging operation and plume and by "choice" may feed in the vicinity.

The fish species most directly exposed to the dredge "plume" would be demersal forms that are tolerant of high suspended solids in the water column because of their bottom dwelling habits.

Breakwater

The proposed breakwater would be a floating structure approximately 816-feet in length and 40-feet in width (32,640 sf or 0.75-acre). The breakwater depth would be 10-feet, consisting of two-feet of freeboard above the water surface and eight-feet of depth below the surface. The breakwater would be held in place with 18 piles, located on 48-foot centers..

Water depths in the area where the breakwater would be located average approximately 13-feet mean low water (MLW). Average tidal range is 5.3 feet. Thus, at low tide, approximately six-feet of open water would remain between the lowest point of the breakwater and the substrate. At high tide, this distance would increase to approximately 11-feet.

Potential impacts associated with the construction and operation of the breakwater include diminishment of circulation within the ferry basin, obstruction to finfish movement, and shadowing.

The breakwater is not anticipated to adversely impede circulation or finfish movement. The provision of an opening between the substrate and bottom of the breakwater ranging in depth from approximately six to 11-feet would provide unimpeded circulation beneath the breakwater. This circulation would prevent any potential for water inside the breakwater from becoming stagnant and experiencing depletion of dissolved oxygen (DO) levels.

Similarly, the opening beneath the breakwater would allow finfish and motile epibenthos to move freely between the basin and adjacent water.

The shading or shadows created by the proposed breakwater would not result in significant adverse impacts to marine ecology. Shadows from the structure would not remain static but would move with the orbit of the earth around the sun. Therefore, even in those instances when there would be a reduction of light, it should only last for a short period. Further, the range of water velocity likely to be encountered at the ferry basin would ensure that phytoplankton entrained in this flow would pass quickly through the shadow.

Further, effective light penetration in Raritan Bay, as measured by a Secchi disk, ranges from four- to seven-feet. Thus, the shadow effect of the breakwater below eight feet would be negligible since light penetration at that depth is minimal.

Based on the foregoing it would be indicated that the shading impacts of the breakwater would have little or no impact on the intertidal or marine organisms at the ferry site.

Ferry Dock, Wave Barrier, and Elevated Walkway

The ferry dock would be a pile-supported structure attached to the mainland by a similarly pile-supported walkway. The walkway would pass across a vegetated saltmarsh (Spartina alterniflora) at an elevation of approximately 7-feet mean high water (MHW) and for a distance of approximately 80-feet. The activities associated with the construction of the ferry pier or landing that could potentially affect the aquatic environment include (i) noise, vibration, and turbidity associated with pile driving and (ii) potential shadowing resulting from the construction of the ferry dock and elevated walkway.

The actions associated with pile driving are only expected to result in minor amounts of turbidity and/or resuspension of sediment for short periods of time. The minimal adverse effects and vibrations from this activity are likely to result in fish temporarily avoiding the immediate project area until the activity is completed.

The water depth beneath the ferry dock would be dredged to an approximately 10-foot depth. Thus, for the reasons set forth under the preceding discussion on the breakwater regarding effective light penetration in the bay, the ferry dock would not have an adverse affect on phytoplankton or photosynthesis.

Although the elevated walkway to the ferry dock crosses a saltmarsh, its 14-foot width and the elevation above the vegetation effectively result in no permanent shading. Various studies support the conclusion that a slight to moderate reduction in light does not affect the photosynthetic performance, and, therefore, the growth and productivity of a plant. Kearney et al. studied the effects of docks on salt marsh vegetation in Connecticut. They compared vegetation density and height beneath and adjacent to these structures and used them as indices of vegetative change. Their plot of vegetation height versus dock height interval for saltmarsh cordgrass (Spartina alterniflora), demonstrated that the effects of shading decrease markedly after approximately 70 centimeters (2.3 feet), and dock height above 480 centimeters (15.7 feet) appears to produce little or no effect on vegetation height. Moreton (unpub. data) photographed intertidal grasses below piers, ranging from 2-1/2 to 3-1/2 feet above the surface of sand or mud and approximately four feet wide, in Cape Cod, Massachusetts. Moreton noted grasses growing abundantly and luxuriantly under tall piers and concluded that the direct sunlight at various times during the day together with strong indirect light for most of the day are apparently more than adequate to maintain the intertidal grasses.

Thus, no adverse aquatic impacts are anticipated with the ferry dock and walkway.

The construction of a wave barrier on the side of the ferry dock facing the wetlands will result in preventing wave energy from potentially eroding any of the existing marsh. No impact from this barrier is anticipated.

A likely beneficial impact of the installation of the floating barge and associated piles would be as new habitat for marine macrophytes and invertebrates, such as gastropods, barnacles, and other sessile or clinging organisms.

5.0 Conclusion

Because of the short duration impacts of most of these activities, no mitigative measures appear to be necessary. Although a limited area of shallow water habitat would be converted to deeper water habitat through dredging, such conversion is actually a re-establishment of former depths (pre-1950's) and would not constitute a major impact since similar shallow water habitats are found throughout the Raritan Bay ecosystem.