APÉNDICE I

ESTUDIO DE SONIDO AMBIENTAL

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ACE Ref. No. 0041-001

28 de junio de 2007

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Subdirector Ejecutivo
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Asunto: Informe Sobre El Resultado Del Estudio Para Estimar El Impacto Del Ruido Causado Por El Transito En Las Carreteras PR-325 y PR-3116 Sobre El Proyecto Central Guánica, Guánica, PR.

Estimado Arq. Pumarada:

A continuación se presentan los detalles del estudio mencionado en el epígrafe. Este estudio se realizó para evaluar el potencial de impacto de ruido en el Proyecto Central Guánica causado por el aumento en el tráfico en las Carreteras PR-325 y PR-3116 para el año 2027.

Proyecto Central Guánica es un proyecto residencial, turístico, comercial, marino y recreativo a ubicarse en los terrenos ocupados por la Antigua Central Azucarera de Guánica en el Poblado Ensenada. La Figura 1 presenta la ubicación del proyecto en el Cuadrángulo Topográfico de Guánica. El Plano Conceptual del proyecto se muestra en la Figura 2.

Descripción del Estudio

El estudio de ruido consistió de calcular un estimado del tránsito esperado en las Carreteras PR-325 y PR-3116 para los años 2007 y 2027; Medir el nivel de ruido existente por medio de un sonómetro; Estimar, mediante un modelo matemático computadorizado, el impacto de ruido en los residentes de dos residencias típicas para los años 2007 y 2027 causado por el volumen de tráfico en las carreteras PR-325 y PR-3116; Y evaluar si el tráfico futuro presenta un aumento significativo en los niveles de ruido que experimentarían los residentes del Proyecto Central Guánica. Cada una de estas tareas se detalla a continuación.

Datos De Tránsito

Para este estudio se utilizaron datos de transito obtenidos del "Estudio de Tránsito Proyecto Antigua Central Guánica y Monte Las Pardas – Carretera PR-325, Barrio Ensenada, Guánica, Puerto Rico" preparado por PLC Consulting Engineers & Planners. Según el estudio antes mencionado, un total de 429 vehículos por hora transitan por la carretera PR-325 en hora pico, mientras que unos 249 vehículos por hora transitan por la carretera PR-3116 en hora pico. Este último número se utilizó para calcular el nivel de ruido a los residentes típicos del proyecto durante el año 2007.

Se estimó el volumen de tránsito, en hora pico, para el año 2027 usando una tasa de crecimiento anual de 2%. Esto nos dio un tránsito estimado de 601 vehículos por hora en la PR-325 y 349 vehículos por hora en la PR-3116.

Siguiendo la recomendación de la Autoridad De Carreteras y Transportación (ACT), el tránsito se desglosó según se muestra en la siguiente tabla:

Tipo de Vehículo	Porciento	PR-14		PR-535	
		2007	2027	2007	2027
Vehículos Livianos	95	408	571	237	331
Camiones Livianos	3	13	18	7	10
Camiones Pesados	2	9	12	5	7

Nivel De Ruido Existente

Se usó un sonómetro marca Quest, modelo 2900 para realizar el estudio de ruido. El estudio se llevo a cabo el 19 de marzo de 2007 entre las 5:00PM y las 6:15 PM. Se calibró el instrumento previo a ser usado. Se ajustó el alcance del instrumento para medir entre 50 dBA y 110 dBA. Se obtuvieron datos por 31 minutos. Esto excede el tiempo mínimo de medición, el cual es de 30 minutos.

Los puntos de medición se muestran en la Figura 3 del Apéndice A. Esto nos da una medida de ruido en campo libre al cual estaría expuesta cualquier persona actualmente. Los resultados más importantes del estudio de ruido en el punto de medición fueron:

Niveles de Ruido Existentes	Punto de Medición #1	Punto de Medición #2	Punto de Medición #3
Nivel mínimo (LMIN):	51.6 dBA	51.6 dBA	51.6 dBA
Nivel máximo (LMAX):	84.0 dBA	88.4 dBA	82.2 dBA
Nivel equivalente (1 hora) (LEQ_1):	61.4 dBA	68.6 dBA	58.0 dBA

Los resultados del estudio de ruido se presentan en el Apéndice B.

Simulación

Se estimó el nivel de ruido para los años 2007 y 2027 que se generaría por el tráfico en las Carreteras PR-325 y PR-3116 utilizando el modelo "Traffic Noise Model", versión 2.5 de la Administración de Carreteras Federal (FHWA, por sus siglas en ingles). Este es el modelo oficial requerido por la FHWA para evaluar el impacto de ruido causado por aquellos proyectos de construcción o ampliación de carreteras con financiamiento, parcial o total, de fondos federales. El modelo requiere se entren los siguientes datos, como mínimo:

- Descripción de la carretera o del segmento de interés.
- Descripción de receptores.
- Número y tipo de vehículos adicionales.
- Nivel (LEQ_1) de ruido actual. (opcional)

Utilizando los datos suministrados, el modelo calcula el nivel de ruido que se generará con el aumento en tránsito. El programa tiene otras capacidades que van más allá del ámbito de este estudio. Los datos en que se fundamenta el estudio y los resultados se presentan en las tablas Del Apéndice C. Estas son:

- Roadway: Presenta los datos descriptivos de los segmentos de las carreteras de interés suplidos al programa.

- Traffic: Presenta el volumen de tránsito en el periodo de interés en la carretera a modelarse. Estos datos se le suplen al programa.

- Receivers: Datos de distancia y elevación de los receptores de ruido a ser evaluados.

- Results: Esta tabla presenta los resultados de la modelación.

Las tablas con los resultados de la simulación para el año 2007 se encuentran en Apéndice C. Las tablas con los resultados de la simulación para el año 2027 se encuentran en Apéndice D.

Discusión y Conclusión

La normativa federal vigente (23 CFR 772) establece las condiciones para definir impacto por ruido:

- Un nivel de ruido mayor de 67 dBA en el exterior de zonas residenciales como el umbral de impacto.

- Acercarse al umbral (66 dBA o más).

- Un aumento de 10 decibeles sobre el nivel de ruido existente (medido o estimado).

- También, admiten como definición aceptable del termino "poco o ningún impacto" un incremento en ruido ≤ 10 dBA al nivel de ruido existente. En este caso, la mitigación no es necesaria.

Estimados de ruidos mayores que estas condiciones requieren la implementación de medidas de minimización de ruido. La medición del nivel de ruido actual reveló que el nivel existente es de 66.3 dBA. Este nivel está por debajo del umbral de impacto, pero sobrepasa el punto de acercarse al umbral establecido en la reglamentación.

Mediante la simulación se determinó que el ruido estimado causado por el tráfico en las Carreteras PR-325 y PR-3116 para los años 2007 y 2027 para los receptores 1, 2 y 3del proyecto propuesto son:

Nivel De Ruido Estimado (dBA)				
Receptor	**2007 Sin Barrera**	**2007 Con Barrera**	**2027 Sin Barrera**	**2027 Con Barrera**
1	54.2	50.6	55.7	52.2
2	63.3	57.7	64.7	59.3
3	51.5	37.2	53.1	39.1

Al evaluar los resultados obtenidos se concluye que el nivel de ruido estimado para los años 2007 y 2027 es:

1. Menor que el umbral (67 dBA) establecido por las normas vigentes según se evidencia en las corridas sin barreras para los años 2007 y 2027.

2. Menor que el umbral (67 dBA) establecido por las normas vigentes según se evidencia en las corridas con barreras para los años 2007 y 2027.

3. No cumple con la definición de "acercarse al umbral" (entre 66 y 67 dBA) según enunciada en las normas vigentes.

4. El nivel de ruido estimado es menor al ruido de campo libre medido.

5. Debido a que el estudio se hizo en la condición límite de hora pico y para los receptores más cercanos a la carretera, se desprende que el nivel de ruido impactando al receptor en otros momentos y otros lugares del proyecto deben de ser menores.

6. Por lo tanto, a base del estudio descrito en este documento, se concluye que el aumento en el tráfico en las Carreteras PR-325 y PR-3116 para el año 2027 no presenta un impacto de ruido significativo a los receptores del proyecto Central Guánica, por lo que no es necesaria la construccion de una barrera de ruido. No obstante se recomienda la construcción de una barrera de seguridad con una altura de mínima de 5 pies (según se ilustra en las figuras denominadas "Plan View" en los Apéndices C y D), la cual tendrá el beneficio de disminuir aun mas el nivel de ruido producido por el transito en las carreteras PR-325 y PR-3116.

Si tiene alguna duda o desea aclarar cualquier punto de este informe, comuníquese con nosotros al (787) 268-7072 o al (787) 309-4973.

Atentamente,

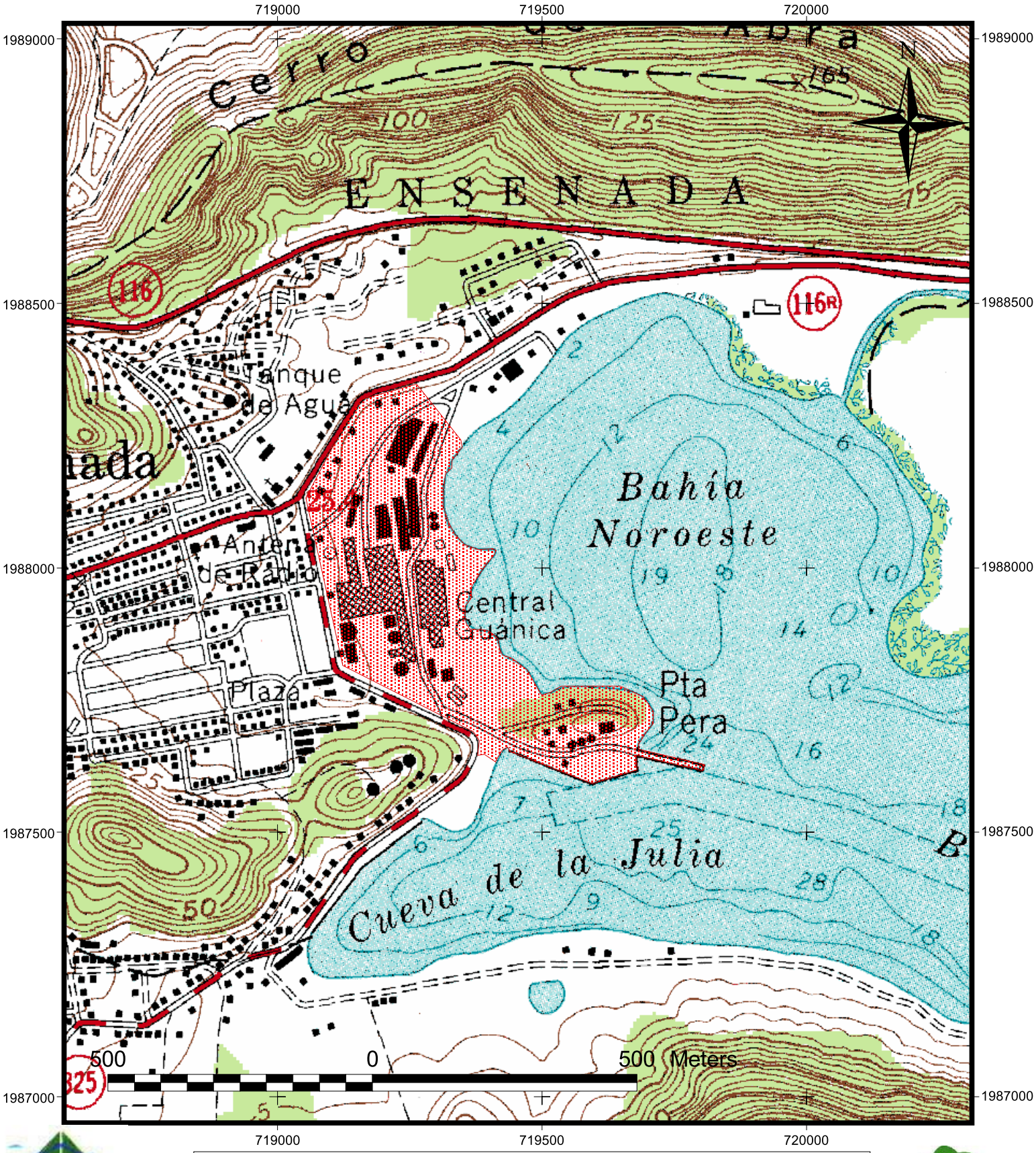
William Sarriera

Anejos

Apéndice A

Mapas de Localización y Distribución

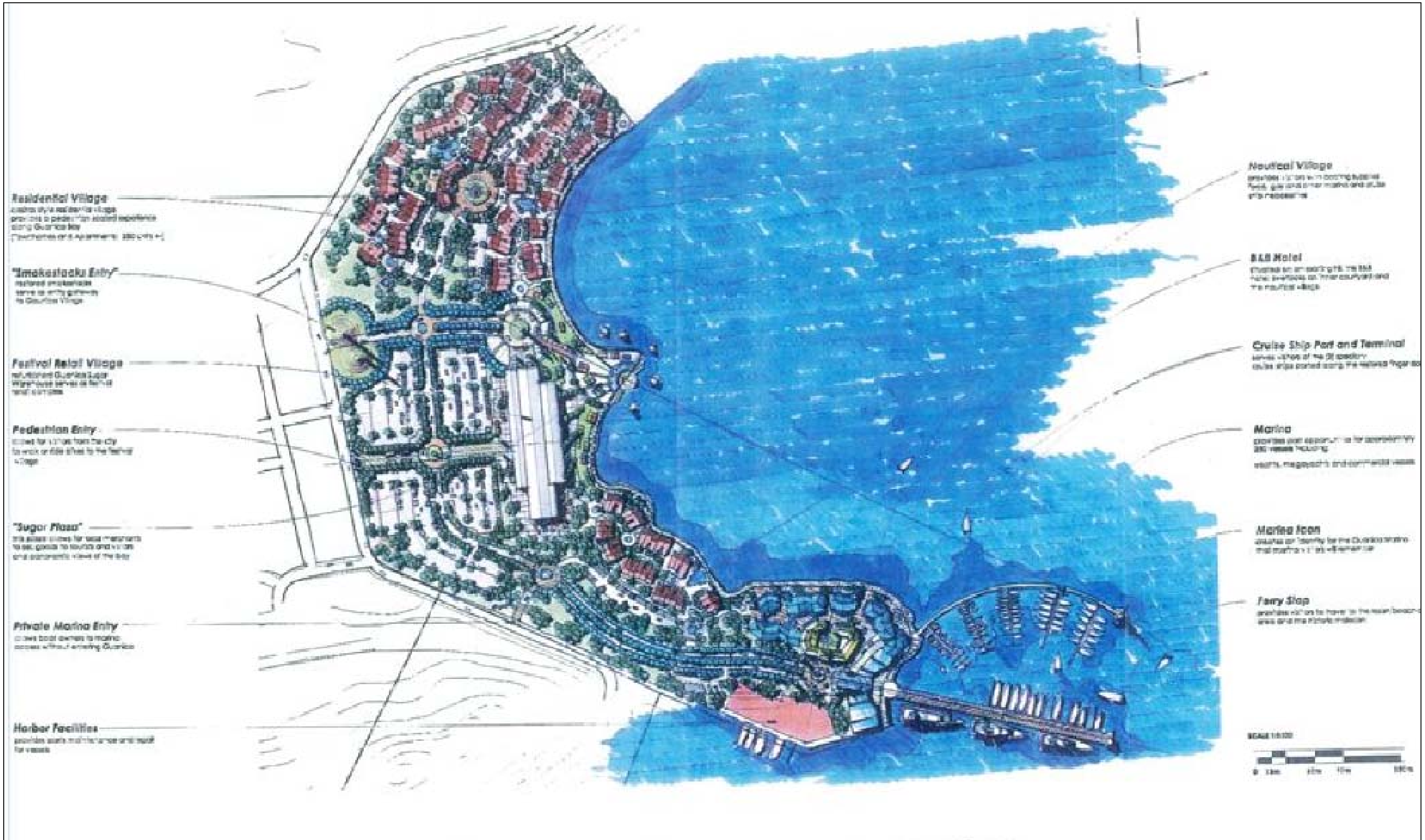
Figura 1 - Mapa de Ubicación
Estudio de Ruido Proyecto Central Guánica
Carretera Estatal PR-325, Ensenada, Guánica, Puerto Rico



Leyenda:

Area del Proyecto

Image Cuadrangulo Topografico Guanica (USGS 1966)



ACE ENVIRONMENTAL, INC. CONSULTANTS AND TRAINERS PO BOX 19895, SAN JUAN, PR 00910	ADMINISTRACION DE TERRENOS ESTUDIO DE RUIDO PROYECTO CENTRAL GUANICA CARRETERA ESTATAL PR-325, ENSENADA, GUANICA, PUERTO RICO	SCALE 1:5000	PLANO CONCEPTUAL PROYECTO CENTRAL GUANICA	FIG. 2

ACE ENVIRONMENTAL, INC. CONSULTANTS AND TRAINERS PO BOX 19895, SAN JUAN, PR 00910	ADMINISTRACION DE TERRENOS ESTUDIO DE RUIDO PROYECTO CENTRAL GUANICA CARRETERA ESTATAL PR-325, ENSENADA, GUANICA, PUERTO RICO	SCALE 1:5000	UBICACION DE RECEPTORES	FIG. 3

Apéndice B

Resultados de Medición de Ruido

CG-NS- (06222007).sdat

2900 Integrating/Logging Sound Level Meter

FW Version: 02.4 Serial Number: CDB120023

Name: E. Vázquez

Company: ACE Environmental, Inc.

Work Area: Central Guánica Noise Study

Description: Receptor 1

Comments: None

Group 1 Test 1

Test Started: 6/22/2007 12:54:34P
Test Ended: 6/22/2007 1:25:31P

Run Time: 00:30:56

Measuring Parameters

Range: 60 - 120 dB Weighting: A Time Constant: Fast
Threshold: Off Exchange Rate: 3 dB Peak Weighting: A

Summary

Peak Level: 93.9 dB, 6/22/2007 1:02:55PM
Max Level: 84.0 dB, 6/22/2007 1:02:54PM

Min Level: 51.6 dB, 6/22/2007 12:54:35PM
Overload: 0.00%

LEQ:	61.4 dB	SEL(3):	93.9 dB	TWA:	49.5 dB	TAKM5:	67.4 dB
LDN:	61.4 dB	CNEL:	61.4 dB	Pa2Sec:	1.0		
L5:	68.5 dB	L10:	65.2 dB	L50:	51.6 dB	L90:	51.6 dB

Comments:

CG-NS- (06222007).sdat

2900 Integrating/Logging Sound Level Meter

FW Version: 02.4 Serial Number: CDB120023

Name: E. Vázquez

Company: ACE Environmental, Inc.

Work Area: Central Guánica Noise Study

Description: Receptor 2

Comments: None

Group 1 Test 2

Test Started: 6/22/2007 1:35:31P
Test Ended: 6/22/2007 2:06:36P

Run Time: 00:31:04

Measuring Parameters

Range: 60 - 120 dB Weighting: A Time Constant: Fast
Threshold: Off Exchange Rate: 3 dB Peak Weighting: A

Summary

Peak Level: 97.1 dB, 6/22/2007 1:53:32PM
Max Level: 88.4 dB, 6/22/2007 1:53:31PM

Min Level: 51.6 dB, 6/22/2007 1:35:32PM
Overload: 0.00%

LEQ:	68.6 dB	SEL(3):	101.2 dB	TWA:	56.7 dB	TAKM5:	75.6 dB
LDN:	68.6 dB	CNEL:	68.6 dB	Pa2Sec:	5.2		
L5:	75.3 dB	L10:	72.3 dB	L50:	56.3 dB	L90:	51.6 dB

Comments:

CG-NS- (06222007).sdat

2900 Integrating/Logging Sound Level Meter

FW Version: 02.4 Serial Number: CDB120023

Name: E. Vázquez

Company: ACE Environmental, Inc.

Work Area: Central Guánica Noise Study

Description: Receptor 3

Comments: None

Group 1 Test 3

Test Started: 6/22/2007 2:12:26P
Test Ended: 6/22/2007 2:43:23P

Run Time: 00:30:57

Measuring Parameters

Range: 60 - 120 dB Weighting: A Time Constant: Fast
Threshold: Off Exchange Rate: 3 dB Peak Weighting: A

Summary

Peak Level: 82.2 dB, 6/22/2007 2:19:59PM
Max Level: 76.6 dB, 6/22/2007 2:19:58PM

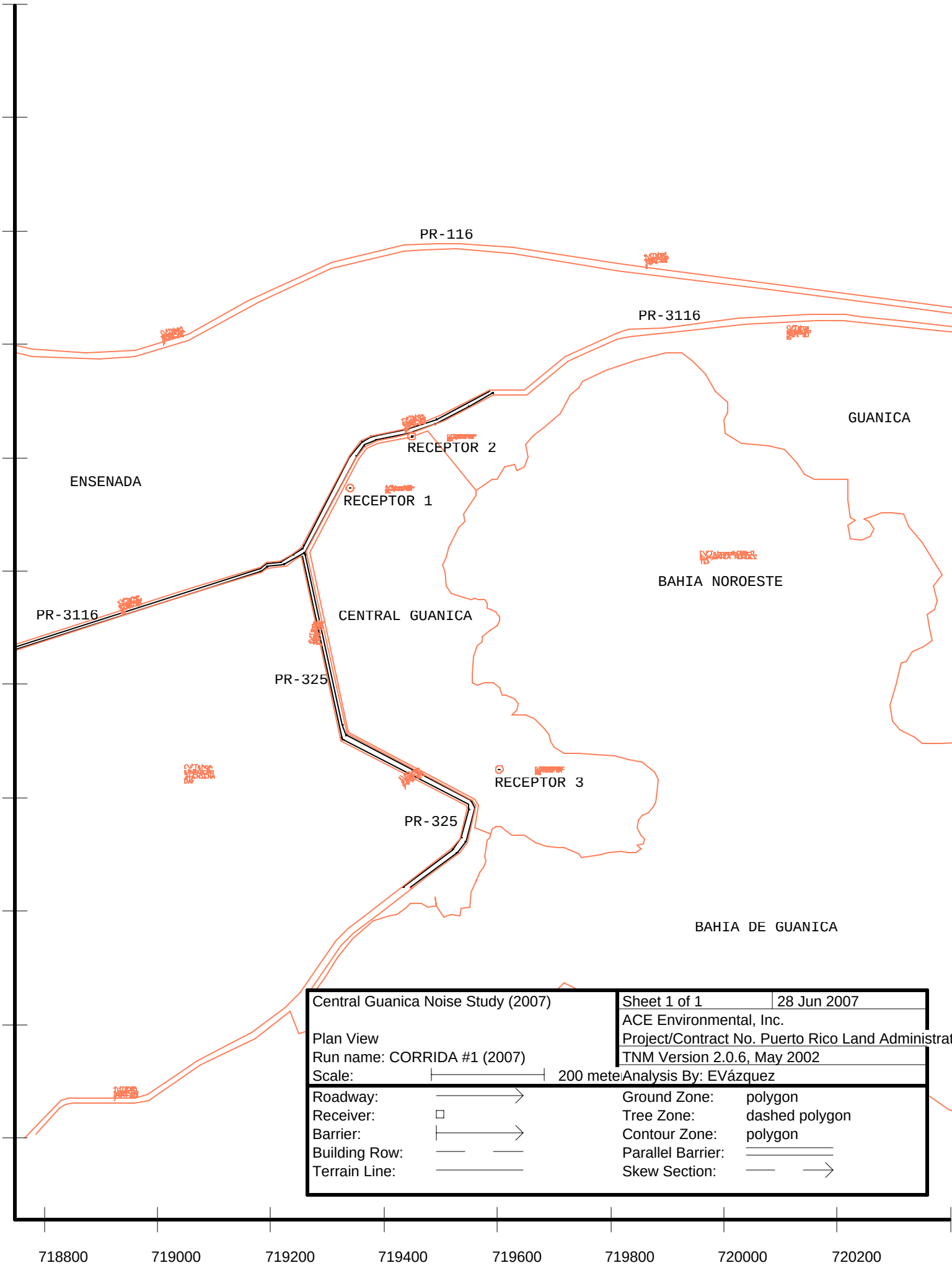
Min Level: 51.6 dB, 6/22/2007 2:12:38PM
Overload: 0.00%

LEQ:	58.0 dB	SEL(3):	90.3 dB	TWA:	45.9 dB	TAKM5:	62.7 dB
LDN:	58.0 dB	CNEL:	58.0 dB	Pa2Sec:	0.4		
L5:	63.6 dB	L10:	61.8 dB	L50:	53.5 dB	L90:	51.6 dB

Comments:

Apéndice C

Resultados De La Simulación, Año 2007


PR-116
PR-3116
GUANICA
RECEPTOR 2
ENSENADA
RECEPTOR 1
BAHIA NOROESTE
PR-3116
CENTRAL GUANICA
PR-325
RECEPTOR 3
PR-325
BAHIA DE GUANICA
Central Guanica Noise Study (2007)
Plan View
Run name: CORRIDA #1 (2007)
Scale:
200 mete
Sheet 1 of 1
28 Jun 2007
ACE Environmental, Inc.
Project/Contract No. Puerto Rico Land Administrat
TNM Version 2.0.6, May 2002
Analysis By: EVázquez
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
8600
718800
719000
719200
719400
719600
719800
720000
720200

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2007)
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 20 deg C, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	2	1	61.4	54.2	66	-7.2	10	----	54.2	0.0	8	-8.0
Receiver2	4	1	68.6	63.3	66	-5.3	10	----	63.3	0.0	8	-8.0
Receiver3	6	1	58.0	51.5	66	-6.5	10	----	51.5	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min dB	Avg dB	Max dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: RECEIVERS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2007)

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			m	m	m	m	dBA	dBA	dB	dB	
Receiver1	2	1	719,138.8	1,988,148.1	11.00	1.50	61.40	66	10.0	8.0	Y
Receiver2	4	1	719,247.8	1,988,239.4	14.00	1.50	68.60	66	10.0	8.0	Y
Receiver3	6	1	719,401.8	1,987,651.9	10.00	1.50	58.00	66	10.0	8.0	Y

ACE Environmental, Inc. **28 June 2007**
EVázquez **TNM 2.0**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **Puerto Rico Land Administration**
RUN: **Central Guanica Noise Study (2007)**

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h
PR-3116 (EAST)	point1	1	118	64	4	64	2	64	0	0	0	0
	point2	2	118	64	4	64	2	64	0	0	0	0
	point3	3	118	64	4	64	2	64	0	0	0	0
	point4	4	118	64	4	64	2	64	0	0	0	0
	point5	5	118	64	4	64	2	64	0	0	0	0
	point6	6	118	64	4	64	2	64	0	0	0	0
	point7	7	118	64	4	64	2	64	0	0	0	0
	point8	8	118	64	4	64	2	64	0	0	0	0
	point9	9	118	64	4	64	2	64	0	0	0	0
	point10	10	118	64	4	64	2	64	0	0	0	0
	point11	11	118	64	4	64	2	64	0	0	0	0
	point12	12	118	64	4	64	2	64	0	0	0	0
	point13	13										
PR-3116 (WEST)	point14	14	118	64	4	64	2	64	0	0	0	0
	point15	15	118	64	4	64	2	64	0	0	0	0
	point16	16	118	64	4	64	2	64	0	0	0	0
	point17	17	118	64	4	64	2	64	0	0	0	0
	point18	18	118	64	4	64	2	64	0	0	0	0
	point19	19	118	64	4	64	2	64	0	0	0	0
	point20	20	118	64	4	64	2	64	0	0	0	0
	point21	21	118	64	4	64	2	64	0	0	0	0
	point22	22	118	64	4	64	2	64	0	0	0	0
	point23	23	118	64	4	64	2	64	0	0	0	0

	point24	24	118	64	4	64	2	64	0	0	0	0
	point25	25	118	64	4	64	2	64	0	0	0	0
	point26	26	118	64	4	64	2	64	0	0	0	0
	point28	27										
PR-325 (NORTH)	point29	28	204	48	6	48	4	48	0	0	0	0
	point30	29	204	48	6	48	4	48	0	0	0	0
	point31	30	204	48	6	48	4	48	0	0	0	0
	point32	31	204	48	6	48	4	48	0	0	0	0
	point33	32	204	48	6	48	4	48	0	0	0	0
	point34	33	204	48	6	48	4	48	0	0	0	0
	point35	34	204	48	6	48	4	48	0	0	0	0
	point36	35										
PR-325 (SOUTH)	point37	36	204	48	6	48	4	48	0	0	0	0
	point38	37	204	48	6	48	4	48	0	0	0	0
	point39	38	204	48	6	48	4	48	0	0	0	0
	point40	39	204	48	6	48	4	48	0	0	0	0
	point41	40	204	48	6	48	4	48	0	0	0	0
	point42	41	204	48	6	48	4	48	0	0	0	0
	point43	42	204	48	6	48	4	48	0	0	0	0
	point44	43	204	48	6	48	4	48	0	0	0	0
	point45	44										

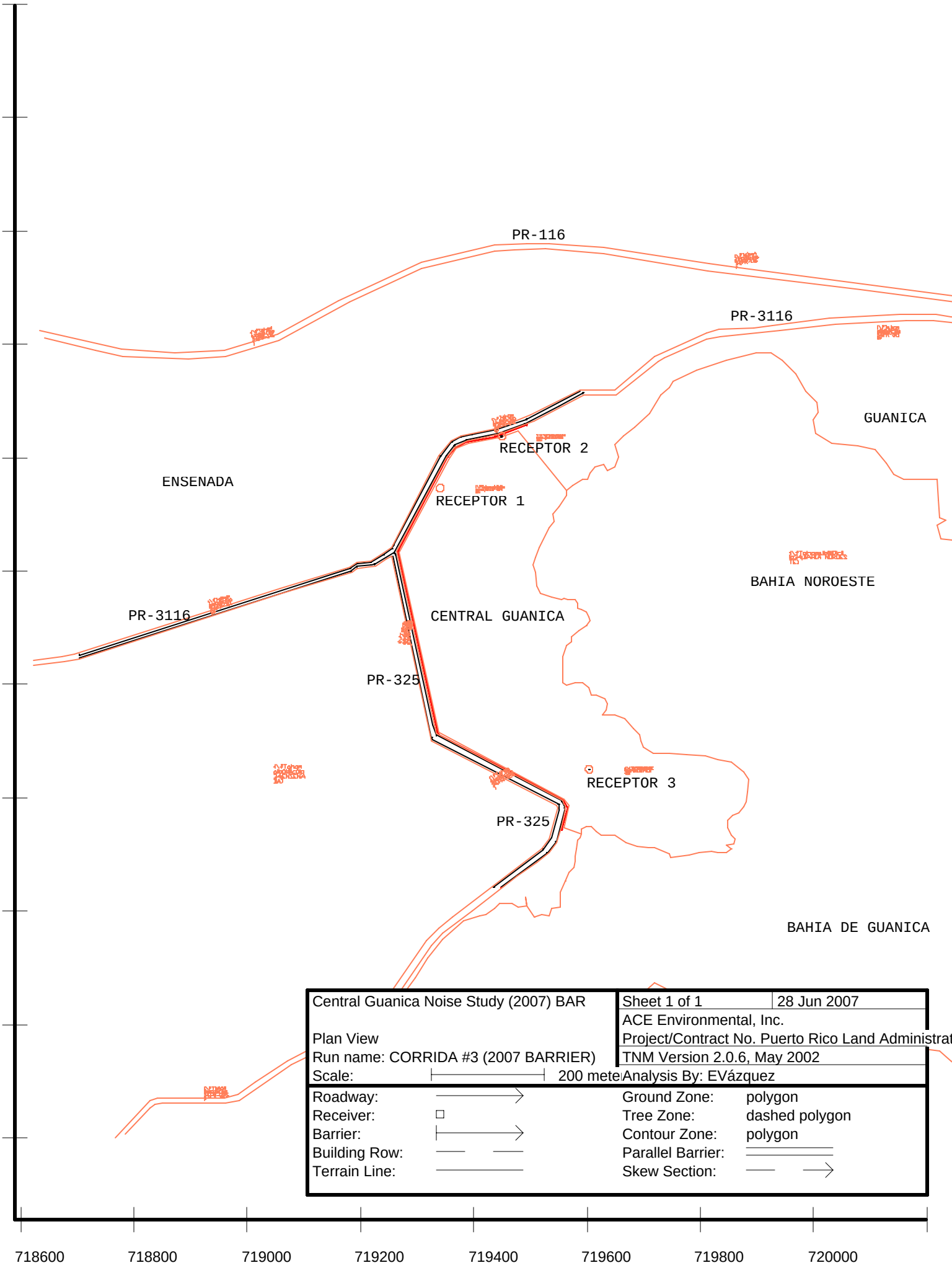
ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: ROADWAYS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2007)

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	m			m	m	m		km/h	%		
PR-3116 (EAST)	5.0	point1	1	718,500.9	1,987,847.9	20.00				Average	
		point2	2	718,982.0	1,988,000.8	19.00				Average	
		point3	3	718,992.8	1,988,010.1	17.00				Average	
		point4	4	719,017.8	1,988,012.6	16.00				Average	
		point5	5	719,023.8	1,988,013.8	15.00				Average	
		point6	6	719,058.4	1,988,034.1	15.00				Average	
		point7	7	719,150.3	1,988,206.0	15.00				Average	
		point8	8	719,164.6	1,988,224.0	15.00				Average	
		point9	9	719,186.1	1,988,233.4	14.00				Average	
		point10	10	719,241.1	1,988,244.2	14.00				Average	
		point11	11	719,290.0	1,988,262.1	15.00				Average	
		point12	12	719,349.6	1,988,293.1	14.00				Average	
		point13	13	719,391.5	1,988,315.9	14.00					
PR-3116 (WEST)	5.0	point14	14	719,385.4	1,988,319.4	0.00				Average	
		point15	15	719,290.0	1,988,269.2	0.00				Average	
		point16	16	719,236.2	1,988,250.1	0.00				Average	
		point17	17	719,193.2	1,988,241.8	0.00				Average	
		point18	18	719,174.1	1,988,238.2	0.00				Average	
		point19	19	719,158.7	1,988,229.9	0.00				Average	
		point20	20	719,138.3	1,988,203.5	0.00				Average	
		point21	21	719,055.9	1,988,046.0	0.00				Average	
		point22	22	719,053.6	1,988,040.0	0.00				Average	
		point23	23	719,038.1	1,988,029.4	0.00				Average	
		point24	24	719,015.4	1,988,017.2	0.00				Average	
		point25	25	718,991.5	1,988,015.0	0.00				Average	

		point26	26	718,979.6	1,988,006.6	0.00				Average	
		point28	27	718,500.9	1,987,853.8	0.00					
PR-325 (NORTH)	5.0	point29	28	719,245.8	1,987,443.2	0.00	Stop	0.00	100	Average	
		point30	29	719,328.1	1,987,505.2	0.00				Average	
		point31	30	719,343.7	1,987,525.5	0.00				Average	
		point32	31	719,359.2	1,987,584.0	0.00				Average	
		point33	32	719,352.1	1,987,595.9	0.00				Average	
		point34	33	719,131.2	1,987,711.8	0.00				Average	
		point35	34	719,125.2	1,987,730.8	0.00				Average	
		point36	35	719,059.6	1,988,031.6	0.00					
PR-325 (SOUTH)	3.7	point37	36	719,054.8	1,988,028.1	0.00				Average	
		point38	37	719,124.0	1,987,707.0	0.00				Average	
		point39	38	719,126.4	1,987,703.4	0.00				Average	
		point40	39	719,348.5	1,987,590.0	0.00				Average	
		point41	40	719,348.5	1,987,580.4	0.00				Average	
		point42	41	719,335.3	1,987,530.2	0.00				Average	
		point43	42	719,319.9	1,987,510.0	0.00				Average	
		point44	43	719,232.7	1,987,443.2	0.00				Average	
		point45	44	719,232.7	1,987,444.2	0.00					


PR-116
PR-3116
GUANICA
RECEPTOR 2
ENSENADA
RECEPTOR 1
BAHIA NOROESTE
PR-3116
CENTRAL GUANICA
PR-325
RECEPTOR 3
PR-325
BAHIA DE GUANICA
Central Guanica Noise Study (2007) BAR
Sheet 1 of 1
28 Jun 2007
ACE Environmental, Inc.
Plan View
Project/Contract No. Puerto Rico Land Administrat
Run name: CORRIDA #3 (2007 BARRIER)
TNM Version 2.0.6, May 2002
Scale:
200 mete
Analysis By: EVázquez
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
00
718600
718800
719000
719200
719400
719600
719800
720000

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2007) BAR
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 20 deg C, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver												
Name	No.	#DUs	Existing	No Barrier					With Barrier			
			LAeq1h	LAeq1h		Increase over existing		Type	Calculated	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n	Impact	LAeq1h	Calculated	Goal	Calculated
							Sub'l Inc					minus
												Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	2	1	61.4	50.6	66	-10.8	10	----	50.6	0.0	8	-8.0
Receiver2	4	1	68.6	57.7	66	-10.9	10	----	57.7	0.0	8	-8.0
Receiver3	6	1	58.0	37.2	66	-20.8	10	----	37.2	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: BARRIERS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2007) BAR

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Increment	Perturbs #Up	#Dn	On Struct?	Important Reflections?
		m	m	$/sq m	$/cu m	m	m:m	$/m			m	m	m	m	m				
Barrier1	W	0.00	30.48	0.00				0.00	point1	1	719,291.6	1,988,259.5	14.00	1.52	0.00	0	0		
									point2	2	719,251.5	1,988,243.8	14.00	1.52	0.00	0	0		
									point3	3	719,235.3	1,988,238.8	14.00	1.52	0.00	0	0		
									point4	4	719,185.6	1,988,228.9	14.00	1.52	0.00	0	0		
									point5	5	719,165.7	1,988,218.9	14.00	1.52	0.00	0	0		
									point6	6	719,152.1	1,988,202.8	14.00	1.52	0.00	0	0		
									point7	7	719,064.9	1,988,037.2	15.00	1.52	0.00	0	0		
									point8	8	719,133.4	1,987,717.9	13.00	1.52	0.00	0	0		
									point9	9	719,137.1	1,987,712.9	14.00	1.52	0.00	0	0		
									point10	10	719,355.8	1,987,598.9	11.00	1.52	0.00	0	0		
									point11	11	719,363.7	1,987,584.4	11.00	1.52	0.00	0	0		
									point12	12	719,353.4	1,987,545.0	10.00	1.52					

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: RECEIVERS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2007) BAR

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			m	m	m	m	dBA	dBA	dB	dB	
Receiver1	2	1	719,138.8	1,988,148.1	11.00	1.50	61.40	66	10.0	8.0	Y
Receiver2	4	1	719,247.4	1,988,239.2	14.00	1.50	68.60	66	10.0	8.0	Y
Receiver3	6	1	719,401.8	1,987,651.9	10.00	1.50	58.00	66	10.0	8.0	Y

ACE Environmental, Inc. **28 June 2007**
EVázquez **TNM 2.0**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **Puerto Rico Land Administration**
RUN: **Central Guanica Noise Study (2007) BAR**

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h
PR-3116 (EAST)	point1	1	118	64	4	64	2	64	0	0	0	0
	point2	2	118	64	4	64	2	64	0	0	0	0
	point3	3	118	64	4	64	2	64	0	0	0	0
	point4	4	118	64	4	64	2	64	0	0	0	0
	point5	5	118	64	4	64	2	64	0	0	0	0
	point6	6	118	64	4	64	2	64	0	0	0	0
	point7	7	118	64	4	64	2	64	0	0	0	0
	point8	8	118	64	4	64	2	64	0	0	0	0
	point9	9	118	64	4	64	2	64	0	0	0	0
	point10	10	118	64	4	64	2	64	0	0	0	0
	point11	11	118	64	4	64	2	64	0	0	0	0
	point12	12	118	64	4	64	2	64	0	0	0	0
	point13	13										
PR-3116 (WEST)	point14	14	118	64	4	64	2	64	0	0	0	0
	point15	15	118	64	4	64	2	64	0	0	0	0
	point16	16	118	64	4	64	2	64	0	0	0	0
	point17	17	118	64	4	64	2	64	0	0	0	0
	point18	18	118	64	4	64	2	64	0	0	0	0
	point19	19	118	64	4	64	2	64	0	0	0	0
	point20	20	118	64	4	64	2	64	0	0	0	0
	point21	21	118	64	4	64	2	64	0	0	0	0
	point22	22	118	64	4	64	2	64	0	0	0	0
	point23	23	118	64	4	64	2	64	0	0	0	0

	point24	24	118	64	4	64	2	64	0	0	0	0
	point25	25	118	64	4	64	2	64	0	0	0	0
	point26	26	118	64	4	64	2	64	0	0	0	0
	point28	27										
PR-325 (NORTH)	point29	28	204	48	6	48	4	48	0	0	0	0
	point30	29	204	48	6	48	4	48	0	0	0	0
	point31	30	204	48	6	48	4	48	0	0	0	0
	point32	31	204	48	6	48	4	48	0	0	0	0
	point33	32	204	48	6	48	4	48	0	0	0	0
	point34	33	204	48	6	48	4	48	0	0	0	0
	point35	34	204	48	6	48	4	48	0	0	0	0
	point36	35										
PR-325 (SOUTH)	point37	36	204	48	6	48	4	48	0	0	0	0
	point38	37	204	48	6	48	4	48	0	0	0	0
	point39	38	204	48	6	48	4	48	0	0	0	0
	point40	39	204	48	6	48	4	48	0	0	0	0
	point41	40	204	48	6	48	4	48	0	0	0	0
	point42	41	204	48	6	48	4	48	0	0	0	0
	point43	42	204	48	6	48	4	48	0	0	0	0
	point44	43	204	48	6	48	4	48	0	0	0	0
	point45	44										

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: ROADWAYS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2007) BAR

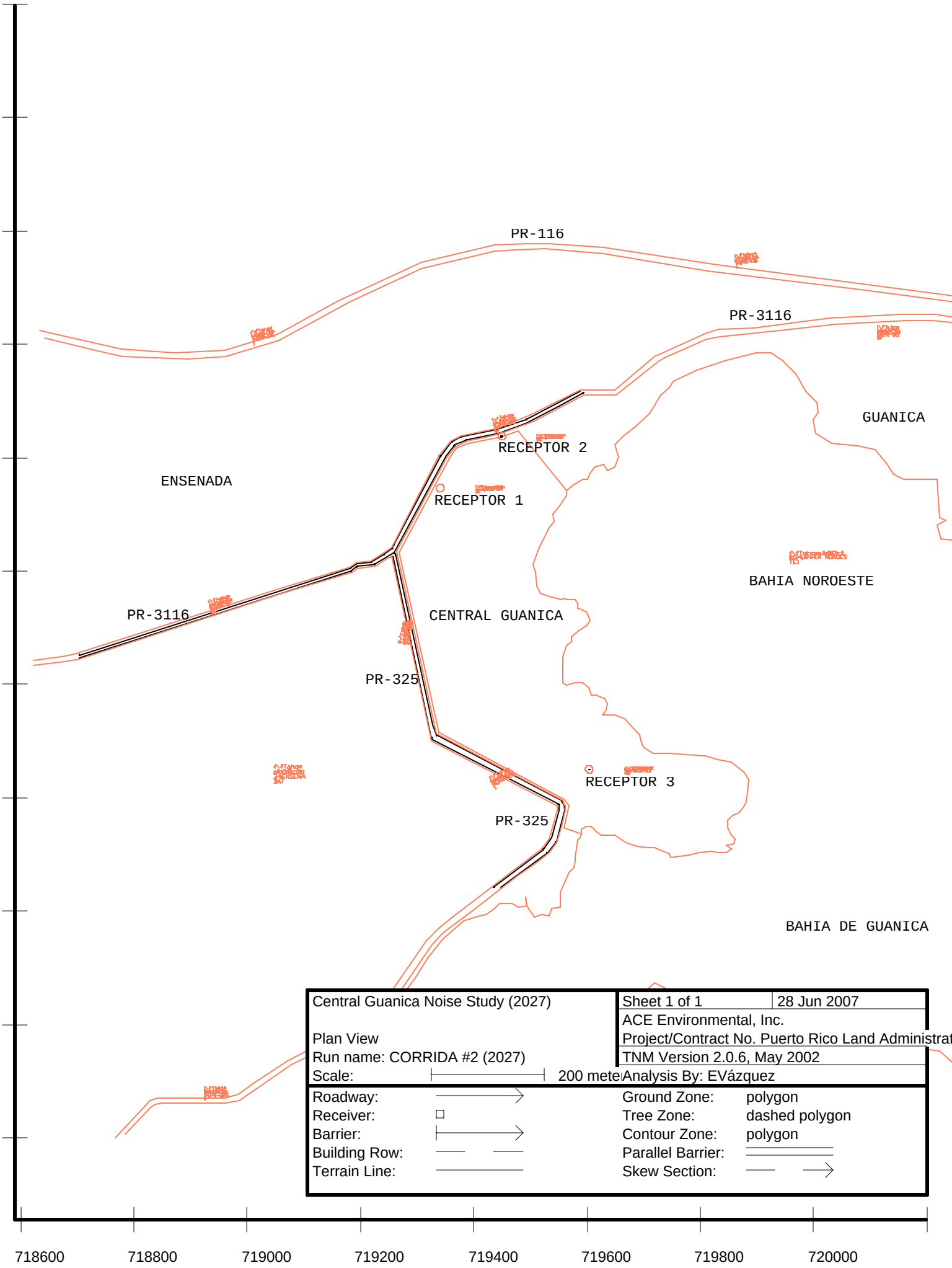
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	m			m	m	m		km/h	%		
PR-3116 (EAST)	5.0	point1	1	718,500.9	1,987,847.9	20.00				Average	
		point2	2	718,982.0	1,988,000.8	19.00				Average	
		point3	3	718,992.8	1,988,010.1	17.00				Average	
		point4	4	719,017.8	1,988,012.6	16.00				Average	
		point5	5	719,023.8	1,988,013.8	15.00				Average	
		point6	6	719,058.4	1,988,034.1	15.00				Average	
		point7	7	719,150.3	1,988,206.0	15.00				Average	
		point8	8	719,164.6	1,988,224.0	15.00				Average	
		point9	9	719,186.1	1,988,233.4	14.00				Average	
		point10	10	719,241.1	1,988,244.2	14.00				Average	
		point11	11	719,290.0	1,988,262.1	15.00				Average	
		point12	12	719,349.6	1,988,293.1	14.00				Average	
		point13	13	719,391.5	1,988,315.9	14.00					
PR-3116 (WEST)	5.0	point14	14	719,385.4	1,988,319.4	0.00				Average	
		point15	15	719,290.0	1,988,269.2	0.00				Average	
		point16	16	719,236.2	1,988,250.1	0.00				Average	
		point17	17	719,193.2	1,988,241.8	0.00				Average	
		point18	18	719,174.1	1,988,238.2	0.00				Average	
		point19	19	719,158.7	1,988,229.9	0.00				Average	
		point20	20	719,138.3	1,988,203.5	0.00				Average	
		point21	21	719,055.9	1,988,046.0	0.00				Average	
		point22	22	719,053.6	1,988,040.0	0.00				Average	
		point23	23	719,038.1	1,988,029.4	0.00				Average	
		point24	24	719,015.4	1,988,017.2	0.00				Average	
		point25	25	718,991.5	1,988,015.0	0.00				Average	

		point26	26	718,979.6	1,988,006.6	0.00				Average	
		point28	27	718,500.9	1,987,853.8	0.00					
PR-325 (NORTH)	5.0	point29	28	719,245.8	1,987,443.2	0.00	Stop	0.00	100	Average	
		point30	29	719,328.1	1,987,505.2	0.00				Average	
		point31	30	719,343.7	1,987,525.5	0.00				Average	
		point32	31	719,359.2	1,987,584.0	0.00				Average	
		point33	32	719,352.1	1,987,595.9	0.00				Average	
		point34	33	719,131.2	1,987,711.8	0.00				Average	
		point35	34	719,125.2	1,987,730.8	0.00				Average	
		point36	35	719,059.6	1,988,031.6	0.00					
PR-325 (SOUTH)	3.7	point37	36	719,054.8	1,988,028.1	0.00				Average	
		point38	37	719,124.0	1,987,707.0	0.00				Average	
		point39	38	719,126.4	1,987,703.4	0.00				Average	
		point40	39	719,348.5	1,987,590.0	0.00				Average	
		point41	40	719,348.5	1,987,580.4	0.00				Average	
		point42	41	719,335.3	1,987,530.2	0.00				Average	
		point43	42	719,319.9	1,987,510.0	0.00				Average	
		point44	43	719,232.7	1,987,443.2	0.00				Average	
		point45	44	719,232.7	1,987,444.2	0.00					

Apéndice D

Resultados De La Simulación, Año 2027



Central Guanica Noise Study (2027)	Sheet 1 of 1 / 28 Jun 2007
	ACE Environmental, Inc.
Plan View	Project/Contract No. Puerto Rico Land Administrat
Run name: CORRIDA #2 (2027)	TNM Version 2.0.6, May 2002
Scale: 200 mete	Analysis By: EVázquez

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2027)
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 20 deg C, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	2	1	61.4	55.7	66	-5.7	10	----	55.7	0.0	8	-8.0
Receiver2	4	1	68.6	64.7	66	-3.9	10	----	64.7	0.0	8	-8.0
Receiver3	6	1	58.0	53.1	66	-4.9	10	----	53.1	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: RECEIVERS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2027)

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			m	m	m	m	dBA	dBA	dB	dB	
Receiver1	2	1	719,138.8	1,988,148.1	11.00	1.50	61.40	66	10.0	8.0	Y
Receiver2	4	1	719,247.4	1,988,239.2	14.00	1.50	68.60	66	10.0	8.0	Y
Receiver3	6	1	719,401.8	1,987,651.9	10.00	1.50	58.00	66	10.0	8.0	Y

ACE Environmental, Inc. **28 June 2007**
EVázquez **TNM 2.0**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **Puerto Rico Land Administration**
RUN: **Central Guanica Noise Study (2027)**

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h
PR-3116 (EAST)	point1	1	166	64	5	64	3	64	0	0	0	0
	point2	2	166	64	5	64	3	64	0	0	0	0
	point3	3	166	64	5	64	3	64	0	0	0	0
	point4	4	166	64	5	64	3	64	0	0	0	0
	point5	5	166	64	5	64	3	64	0	0	0	0
	point6	6	166	64	5	64	3	64	0	0	0	0
	point7	7	166	64	5	64	3	64	0	0	0	0
	point8	8	166	64	5	64	3	64	0	0	0	0
	point9	9	166	64	5	64	3	64	0	0	0	0
	point10	10	166	64	5	64	3	64	0	0	0	0
	point11	11	166	64	5	64	3	64	0	0	0	0
	point12	12	166	64	5	64	3	64	0	0	0	0
	point13	13										
PR-3116 (WEST)	point14	14	166	64	5	64	3	64	0	0	0	0
	point15	15	166	64	5	64	3	64	0	0	0	0
	point16	16	166	64	5	64	3	64	0	0	0	0
	point17	17	166	64	5	64	3	64	0	0	0	0
	point18	18	166	64	5	64	3	64	0	0	0	0
	point19	19	166	64	5	64	3	64	0	0	0	0
	point20	20	166	64	5	64	3	64	0	0	0	0
	point21	21	166	64	5	64	3	64	0	0	0	0
	point22	22	166	64	5	64	3	64	0	0	0	0
	point23	23	166	64	5	64	3	64	0	0	0	0

	point24	24	166	64	5	64	3	64	0	0	0	0
	point25	25	166	64	5	64	3	64	0	0	0	0
	point26	26	166	64	5	64	3	64	0	0	0	0
	point28	27										
PR-325 (NORTH)	point29	28	285	48	9	48	6	48	0	0	0	0
	point30	29	285	48	9	48	6	48	0	0	0	0
	point31	30	285	48	9	48	6	48	0	0	0	0
	point32	31	285	48	9	48	6	48	0	0	0	0
	point33	32	285	48	9	48	6	48	0	0	0	0
	point34	33	285	48	9	48	6	48	0	0	0	0
	point35	34	285	48	9	48	6	48	0	0	0	0
	point36	35										
PR-325 (SOUTH)	point37	36	285	48	9	48	6	48	0	0	0	0
	point38	37	285	48	9	48	6	48	0	0	0	0
	point39	38	285	48	9	48	6	48	0	0	0	0
	point40	39	285	48	9	48	6	48	0	0	0	0
	point41	40	285	48	9	48	6	48	0	0	0	0
	point42	41	285	48	9	48	6	48	0	0	0	0
	point43	42	285	48	9	48	6	48	0	0	0	0
	point44	43	285	48	9	48	6	48	0	0	0	0
	point45	44										

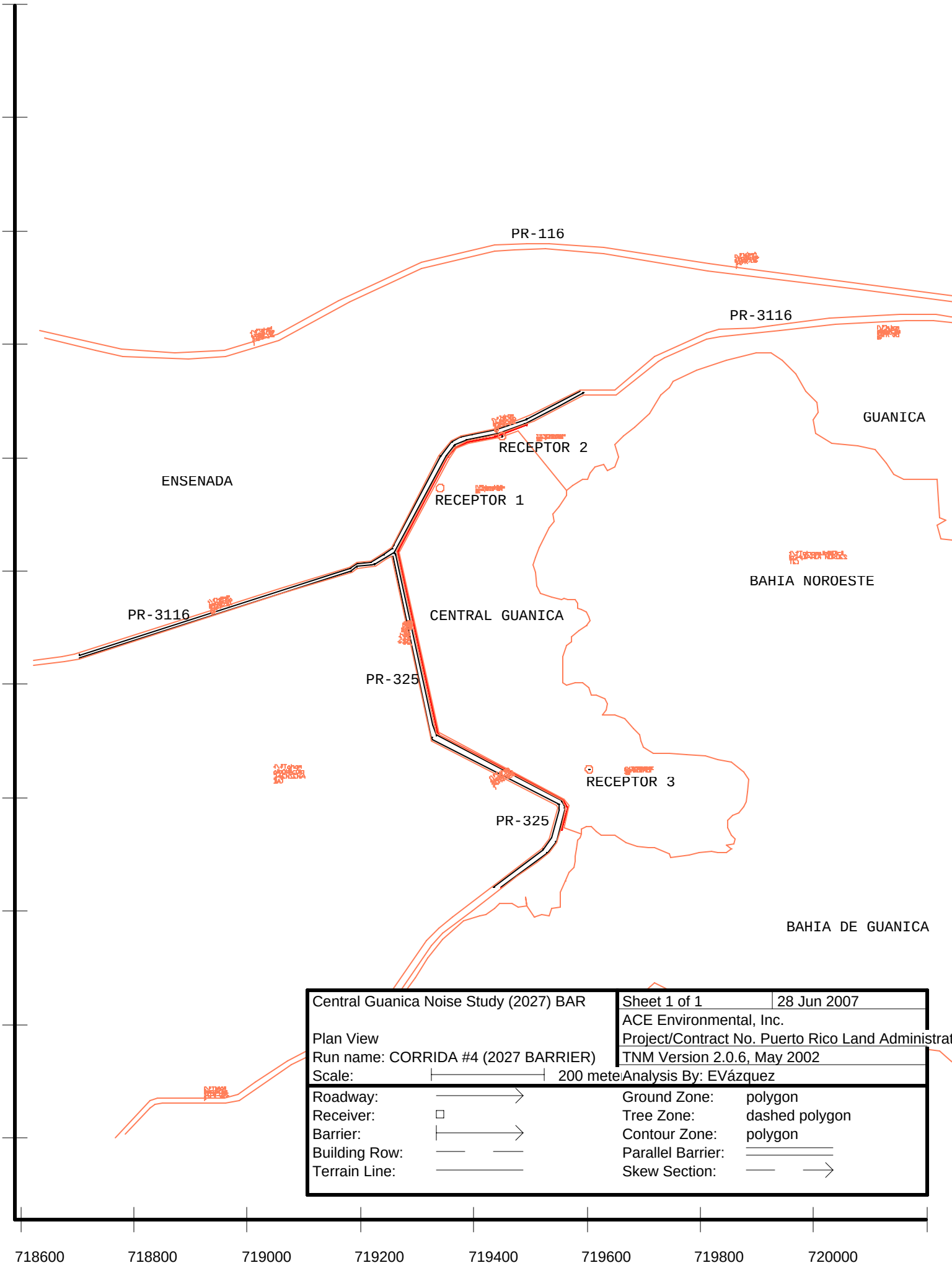
ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: ROADWAYS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2027)

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	m			m	m	m		km/h	%		
PR-3116 (EAST)	5.0	point1	1	718,500.9	1,987,847.9	20.00				Average	
		point2	2	718,982.0	1,988,000.8	19.00				Average	
		point3	3	718,992.8	1,988,010.1	17.00				Average	
		point4	4	719,017.8	1,988,012.6	16.00				Average	
		point5	5	719,023.8	1,988,013.8	15.00				Average	
		point6	6	719,058.4	1,988,034.1	15.00				Average	
		point7	7	719,150.3	1,988,206.0	15.00				Average	
		point8	8	719,164.6	1,988,224.0	15.00				Average	
		point9	9	719,186.1	1,988,233.4	14.00				Average	
		point10	10	719,241.1	1,988,244.2	14.00				Average	
		point11	11	719,290.0	1,988,262.1	15.00				Average	
		point12	12	719,349.6	1,988,293.1	14.00				Average	
		point13	13	719,391.5	1,988,315.9	14.00					
PR-3116 (WEST)	5.0	point14	14	719,385.4	1,988,319.4	0.00				Average	
		point15	15	719,290.0	1,988,269.2	0.00				Average	
		point16	16	719,236.2	1,988,250.1	0.00				Average	
		point17	17	719,193.2	1,988,241.8	0.00				Average	
		point18	18	719,174.1	1,988,238.2	0.00				Average	
		point19	19	719,158.7	1,988,229.9	0.00				Average	
		point20	20	719,138.3	1,988,203.5	0.00				Average	
		point21	21	719,055.9	1,988,046.0	0.00				Average	
		point22	22	719,053.6	1,988,040.0	0.00				Average	
		point23	23	719,038.1	1,988,029.4	0.00				Average	
		point24	24	719,015.4	1,988,017.2	0.00				Average	
		point25	25	718,991.5	1,988,015.0	0.00				Average	

		point26	26	718,979.6	1,988,006.6	0.00				Average	
		point28	27	718,500.9	1,987,853.8	0.00					
PR-325 (NORTH)	5.0	point29	28	719,245.8	1,987,443.2	0.00	Stop	0.00	100	Average	
		point30	29	719,328.1	1,987,505.2	0.00				Average	
		point31	30	719,343.7	1,987,525.5	0.00				Average	
		point32	31	719,359.2	1,987,584.0	0.00				Average	
		point33	32	719,352.1	1,987,595.9	0.00				Average	
		point34	33	719,131.2	1,987,711.8	0.00				Average	
		point35	34	719,125.2	1,987,730.8	0.00				Average	
		point36	35	719,059.6	1,988,031.6	0.00					
PR-325 (SOUTH)	3.7	point37	36	719,054.8	1,988,028.1	0.00				Average	
		point38	37	719,124.0	1,987,707.0	0.00				Average	
		point39	38	719,126.4	1,987,703.4	0.00				Average	
		point40	39	719,348.5	1,987,590.0	0.00				Average	
		point41	40	719,348.5	1,987,580.4	0.00				Average	
		point42	41	719,335.3	1,987,530.2	0.00				Average	
		point43	42	719,319.9	1,987,510.0	0.00				Average	
		point44	43	719,232.7	1,987,443.2	0.00				Average	
		point45	44	719,232.7	1,987,444.2	0.00					


PR-116
PR-3116
GUANICA
RECEPTOR 2
ENSENADA
RECEPTOR 1
BAHIA NOROESTE
PR-3116
CENTRAL GUANICA
PR-325
RECEPTOR 3
PR-325
BAHIA DE GUANICA
Central Guanica Noise Study (2027) BAR
Sheet 1 of 1
28 Jun 2007
ACE Environmental, Inc.
Plan View
Project/Contract No. Puerto Rico Land Administrat
Run name: CORRIDA #4 (2027 BARRIER)
TNM Version 2.0.6, May 2002
Scale:
200 mete
Analysis By: EVázquez
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
00
718600
718800
719000
719200
719400
719600
719800
720000

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2027) BAR
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 20 deg C, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver												
Name	No.	#DUs	Existing	No Barrier					With Barrier			
			LAeq1h	LAeq1h		Increase over existing		Type	Calculated	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n	Impact	LAeq1h	Calculated	Goal	Calculated
							Sub'l Inc					minus
												Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	2	1	61.4	52.2	66	-9.2	10	----	52.2	0.0	8	-8.0
Receiver2	4	1	68.6	59.3	66	-9.3	10	----	59.3	0.0	8	-8.0
Receiver3	6	1	58.0	39.1	66	-18.9	10	----	39.1	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: BARRIERS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2027) BAR

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Increment	Perturbs #Up	#Dn	On Struct?	Important Reflections?
		m	m	$/sq m	$/cu m	m	m:m	$/m			m	m	m	m	m				
Barrier1	W	0.00	30.48	0.00				0.00	point1	1	719,291.6	1,988,259.5	14.00	1.52	0.00	0	0		
									point2	2	719,251.5	1,988,243.8	14.00	1.52	0.00	0	0		
									point3	3	719,235.3	1,988,238.8	14.00	1.52	0.00	0	0		
									point4	4	719,185.7	1,988,228.9	14.00	1.52	0.00	0	0		
									point5	5	719,165.7	1,988,218.9	14.00	1.52	0.00	0	0		
									point6	6	719,152.1	1,988,202.8	14.00	1.52	0.00	0	0		
									point7	7	719,064.9	1,988,037.2	15.00	1.52	0.00	0	0		
									point8	8	719,133.4	1,987,717.9	13.00	1.52	0.00	0	0		
									point9	9	719,137.1	1,987,712.9	14.00	1.52	0.00	0	0		
									point10	10	719,355.8	1,987,598.9	11.00	1.52	0.00	0	0		
									point11	11	719,363.7	1,987,584.4	11.00	1.52	0.00	0	0		
									point12	12	719,353.4	1,987,545.0	10.00	1.52					

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: RECEIVERS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2027) BAR

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			m	m	m	m	dBA	dBA	dB	dB	
Receiver1	2	1	719,138.8	1,988,148.1	11.00	1.50	61.40	66	10.0	8.0	Y
Receiver2	4	1	719,247.8	1,988,239.4	14.00	1.50	68.60	66	10.0	8.0	Y
Receiver3	6	1	719,401.8	1,987,651.9	10.00	1.50	58.00	66	10.0	8.0	Y

ACE Environmental, Inc. **28 June 2007**
EVázquez **TNM 2.0**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **Puerto Rico Land Administration**
RUN: **Central Guanica Noise Study (2027) BAR**

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h	veh/hr	km/h
PR-3116 (EAST)	point1	1	166	64	5	64	3	64	0	0	0	0
	point2	2	166	64	5	64	3	64	0	0	0	0
	point3	3	166	64	5	64	3	64	0	0	0	0
	point4	4	166	64	5	64	3	64	0	0	0	0
	point5	5	166	64	5	64	3	64	0	0	0	0
	point6	6	166	64	5	64	3	64	0	0	0	0
	point7	7	166	64	5	64	3	64	0	0	0	0
	point8	8	166	64	5	64	3	64	0	0	0	0
	point9	9	166	64	5	64	3	64	0	0	0	0
	point10	10	166	64	5	64	3	64	0	0	0	0
	point11	11	166	64	5	64	3	64	0	0	0	0
	point12	12	166	64	5	64	3	64	0	0	0	0
	point13	13										
PR-3116 (WEST)	point14	14	166	64	5	64	3	64	0	0	0	0
	point15	15	166	64	5	64	3	64	0	0	0	0
	point16	16	166	64	5	64	3	64	0	0	0	0
	point17	17	166	64	5	64	3	64	0	0	0	0
	point18	18	166	64	5	64	3	64	0	0	0	0
	point19	19	166	64	5	64	3	64	0	0	0	0
	point20	20	166	64	5	64	3	64	0	0	0	0
	point21	21	166	64	5	64	3	64	0	0	0	0
	point22	22	166	64	5	64	3	64	0	0	0	0
	point23	23	166	64	5	64	3	64	0	0	0	0

	point24	24	166	64	5	64	3	64	0	0	0	0
	point25	25	166	64	5	64	3	64	0	0	0	0
	point26	26	166	64	5	64	3	64	0	0	0	0
	point28	27										
PR-325 (NORTH)	point29	28	285	48	9	48	6	48	0	0	0	0
	point30	29	285	48	9	48	6	48	0	0	0	0
	point31	30	285	48	9	48	6	48	0	0	0	0
	point32	31	285	48	9	48	6	48	0	0	0	0
	point33	32	285	48	9	48	6	48	0	0	0	0
	point34	33	285	48	9	48	6	48	0	0	0	0
	point35	34	285	48	9	48	6	48	0	0	0	0
	point36	35										
PR-325 (SOUTH)	point37	36	285	48	9	48	6	48	0	0	0	0
	point38	37	285	48	9	48	6	48	0	0	0	0
	point39	38	285	48	9	48	6	48	0	0	0	0
	point40	39	285	48	9	48	6	48	0	0	0	0
	point41	40	285	48	9	48	6	48	0	0	0	0
	point42	41	285	48	9	48	6	48	0	0	0	0
	point43	42	285	48	9	48	6	48	0	0	0	0
	point44	43	285	48	9	48	6	48	0	0	0	0
	point45	44										

ACE Environmental, Inc. 28 June 2007
EVázquez TNM 2.0

INPUT: ROADWAYS
PROJECT/CONTRACT: Puerto Rico Land Administration
RUN: Central Guanica Noise Study (2027) BAR

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	m			m	m	m		km/h	%		
PR-3116 (EAST)	5.0	point1	1	718,500.9	1,987,847.9	20.00				Average	
		point2	2	718,982.0	1,988,000.8	19.00				Average	
		point3	3	718,992.8	1,988,010.1	17.00				Average	
		point4	4	719,017.8	1,988,012.6	16.00				Average	
		point5	5	719,023.8	1,988,013.8	15.00				Average	
		point6	6	719,058.4	1,988,034.1	15.00				Average	
		point7	7	719,150.3	1,988,206.0	15.00				Average	
		point8	8	719,164.6	1,988,224.0	15.00				Average	
		point9	9	719,186.1	1,988,233.4	14.00				Average	
		point10	10	719,241.1	1,988,244.2	14.00				Average	
		point11	11	719,290.0	1,988,262.1	15.00				Average	
		point12	12	719,349.6	1,988,293.1	14.00				Average	
		point13	13	719,391.5	1,988,315.9	14.00					
PR-3116 (WEST)	5.0	point14	14	719,385.4	1,988,319.4	0.00				Average	
		point15	15	719,290.0	1,988,269.2	0.00				Average	
		point16	16	719,236.2	1,988,250.1	0.00				Average	
		point17	17	719,193.2	1,988,241.8	0.00				Average	
		point18	18	719,174.1	1,988,238.2	0.00				Average	
		point19	19	719,158.7	1,988,229.9	0.00				Average	
		point20	20	719,138.3	1,988,203.5	0.00				Average	
		point21	21	719,055.9	1,988,046.0	0.00				Average	
		point22	22	719,053.6	1,988,040.0	0.00				Average	
		point23	23	719,038.1	1,988,029.4	0.00				Average	
		point24	24	719,015.4	1,988,017.2	0.00				Average	
		point25	25	718,991.5	1,988,015.0	0.00				Average	

		point26	26	718,979.6	1,988,006.6	0.00				Average	
		point28	27	718,500.9	1,987,853.8	0.00					
PR-325 (NORTH)	5.0	point29	28	719,245.8	1,987,443.2	0.00	Stop	0.00	100	Average	
		point30	29	719,328.1	1,987,505.2	0.00				Average	
		point31	30	719,343.7	1,987,525.5	0.00				Average	
		point32	31	719,359.2	1,987,584.0	0.00				Average	
		point33	32	719,352.1	1,987,595.9	0.00				Average	
		point34	33	719,131.2	1,987,711.8	0.00				Average	
		point35	34	719,125.2	1,987,730.8	0.00				Average	
		point36	35	719,059.6	1,988,031.6	0.00					
PR-325 (SOUTH)	3.7	point37	36	719,054.8	1,988,028.1	0.00				Average	
		point38	37	719,124.0	1,987,707.0	0.00				Average	
		point39	38	719,126.4	1,987,703.4	0.00				Average	
		point40	39	719,348.5	1,987,590.0	0.00				Average	
		point41	40	719,348.5	1,987,580.4	0.00				Average	
		point42	41	719,335.3	1,987,530.2	0.00				Average	
		point43	42	719,319.9	1,987,510.0	0.00				Average	
		point44	43	719,232.7	1,987,443.2	0.00				Average	
		point45	44	719,232.7	1,987,444.2	0.00					