KB Environmental Sciences

MEMO

Date: December 28, 2012

To: David Deka, 13th Floor Investments

From: Carrol Fowler

Subject: Sabal Palm Traffic Noise Barrier Study

As a result of our meeting with Broward County staff on December 7, 2012, KB Environmental Sciences, Inc. (KBE) performed additional traffic noise analysis for the planned residences in Sabal Palm. This Memorandum presents the results of the analysis.

Purpose of the Additional Analysis

Broward County staff agreed that the same traffic noise-related criteria should apply to the planned residences within the Sabal Palm community as the criteria that were used by Florida's Turnpike Enterprise (FTE) to evaluate the existing residences in Pompano Park, the subdivision north of Sabal Palm. The criteria used by FTE to analyze improvements to the turnpike resulted in the construction of the noise barrier that currently parallels the turnpike and reduces traffic noise within Pompano Park.

When evaluating improvements to a roadway, FTE prepares reports that document the criteria and results of their traffic noise impact evaluations. The Turnpike's analysis of the Pompano Park noise barrier is presented in a Noise Study Report (NSR) Addendum[1]. The NSR documents the following:

- Impact Criteria – To identify the residences within Pompano Park that would be impacted by traffic noise, the FTE based their analysis on the requirements of the Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772) and the requirements of Chapter 17, Noise, of the Florida Department of Transportation (FDOT)/FTE Project Development and Environment (PD&E) Manual.[2] The FHWA regulations stipulate that noise abatement (i.e., reduction) measures should be considered when predicted traffic noise levels approach, meet, or exceed what are referred to as Noise Abatement Criteria (NAC). The FHWA's Noise Abatement Criteria (NAC) varies depending on a property's land use. For residential land uses, the NAC for outdoor (i.e., exterior) traffic noise is 67 decibels on the "A"-weighted scale (dB(A)). To comply with the FHWA's requirements to consider abatement when noise levels approach the NAC, the FDOT/FTE considered abatement when levels were predicted to be 66 dB(A) (within one dB(A) of the criteria). Of note, the FHWA, FDOT, and FTE did/do not consider noise abatement for indoor (i.e., interior) residential traffic noise levels.

- Benefit Criteria – To be considered "benefited" by a noise abatement measure, the FTE requires that the traffic noise level at an impacted site be reduced at least five dB(A). While the NSR prepared by the FTE does not provide detailed predicted reductions for each of the impacted residences within Pompano Park, Table 11 of the NSR (**see Attachment 1**) documents that all of the 19 first row

[1] Noise Study Report Addendum for Widening Florida's Turnpike from North of Sunrise Boulevard to Atlantic Boulevard, Broward County, FL, Financial Project ID Number 406097-1, Florida's Turnpike Enterprise, June 2004.
[2] Project Development and Environment Manual, Part 2: Analysis and Documentation, FDOT/FTE, http://www.dot.state.fl.us/emo/pubs/pdeman/Pt2ch17_052411-current.pdf

residences and all of the 14 second row residences that were predicted to be impacted by the improvements would be benefited by the noise barrier at a height of 20 feet (the height of the existing barrier). Table 11 also documents that the average predicted insertion loss (i.e., reduction in traffic noise due to the barrier) for these sites is 7.7 dB(A).

Computer Model Input/Analysis Methodology

Since the last traffic noise evaluation was performed for the Sabal Palm property, the site plan was revised. Currently, detached two-story single-family homes are planned. The analysis presented in this Memorandum assumes this revised site plan (depicted in **Figure 1)**.

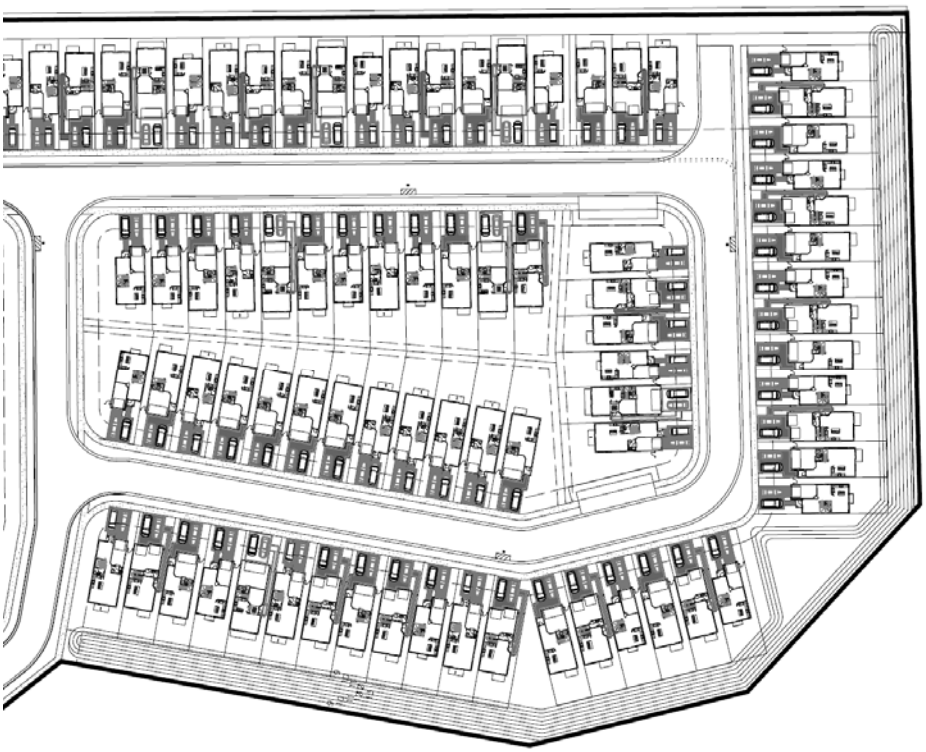

Figure 1 - Revised Sabal Palm Site Plan

The methodologies used to evaluate traffic noise for the Sabal Palm property were the same methodologies used by the FDOT/FTE to evaluate traffic noise for proposed roadway improvement projects. The criteria and methodologies are discussed in greater detail in the FDOT/FTE PD&E Manual. For the purpose of demonstrating that this is the case, a list of the impact and other evaluation criteria were provided to Mariano Berrios, FDOT's Environmental Programs Administrator. The list, and Mr. Berrios' confirmation, are provided in **Attachment 2** of this Memorandum.

The detailed noise study of the Sabal Palm property was performed using the latest version of FHWA's Traffic Noise Model (TNM-Version 2.5). The traffic data used in the TNM for the turnpike through lanes and ramps were the same data used by FTE to evaluate the existing Pompano Park barrier (see Attachment 1). A total of 160 receptors (i.e., locations of predicted traffic noise) were evaluated. These receptors were located downstairs in both the front yard and back yard of each planned residence and at the point of each dwelling that would be closest to the turnpike through lanes. Of note, receptors were not located upstairs because the

dwellings are not planned to be constructed with balconies and, as previously stated, there are no NAC for interior traffic noise levels for residential land uses. The graphical output from the TNM for the Sabal Palm property is provided in **Figure 2**. This graphic depicts the locations of the existing noise barrier in Pompano Park, the turnpike through lanes and ramps, and the locations for which traffic noise was predicted. This graphic also depicts what are referred to as "building rows". This input is used by the TNM to consider the shielding effects of structures (in this case, the two-story dwellings within Sabal Palm).

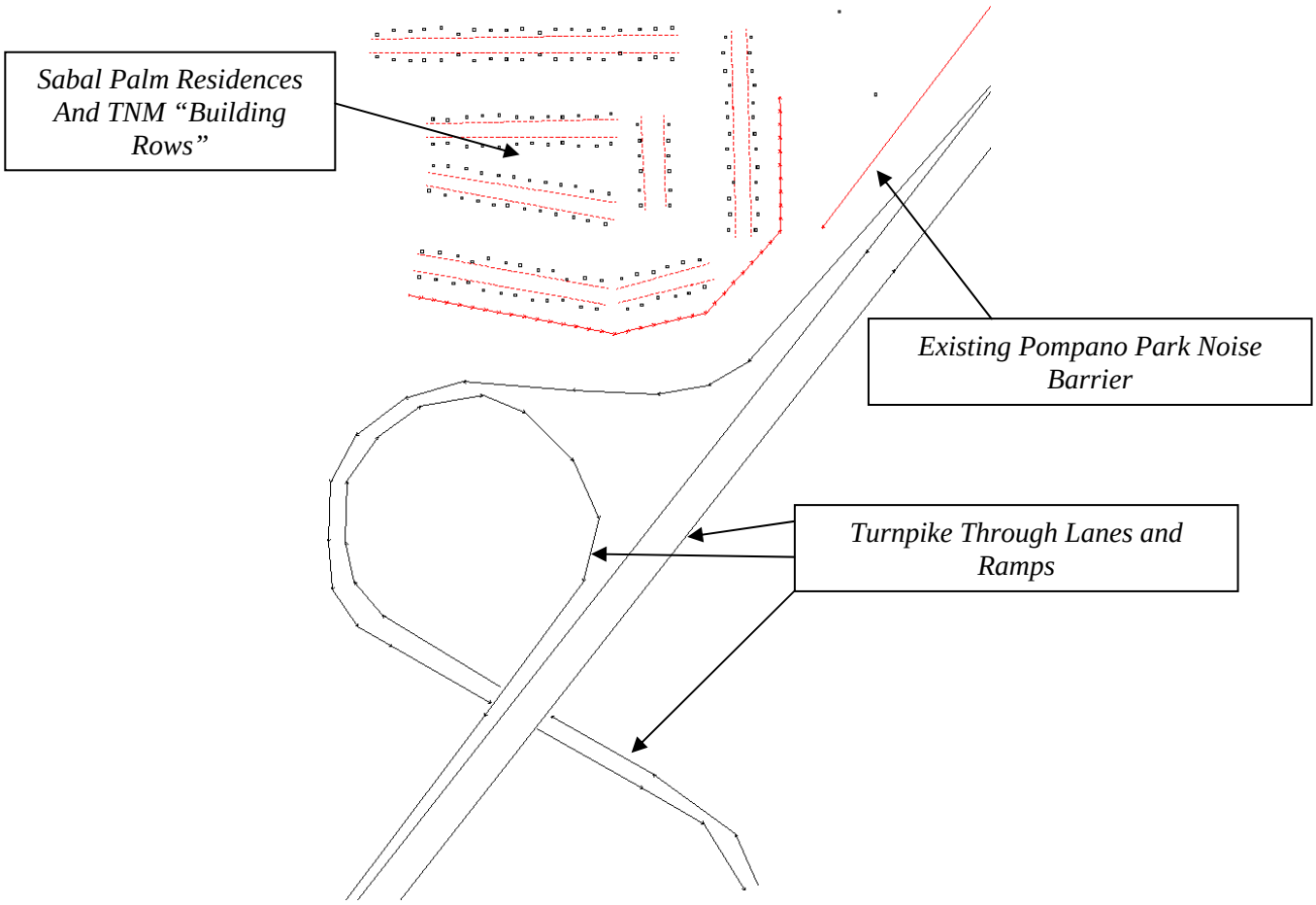

Figure 2 TNM Graphical Output

Predicted Traffic Noise – Sabal Palm

The detailed results from the TNM are provided in **Attachment 3** to this Memorandum. These results predict that traffic noise levels would approach, meet, or exceed the NAC at 29 of the evaluated receptor locations (24 of the planned dwellings) if a noise barrier is not constructed between the dwellings in Sabal Palm and the turnpike. The locations of the impacted areas/lots are shown on **Figure 3**.

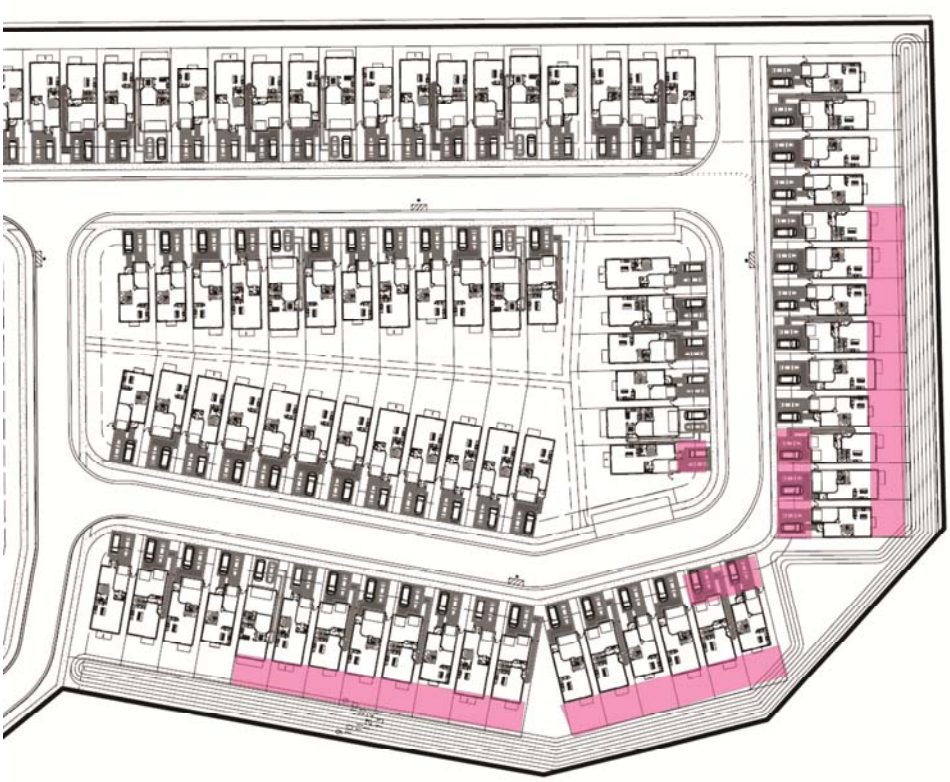

Figure 3 – Areas/Lots Impacted by Traffic Noise

Noise Abatement

A noise barrier was evaluated for the impacted areas/lots within Sabal Palms. The goal of the analysis was to provide the areas/lots with at least the same reduction in traffic noise as the existing noise barrier provides the residences in Pompano Park (i.e., an average reduction of 7.7 dB(A)).

For barrier heights of 11, 12, and 13 feet, **Table 1** provides the number of impacted areas/lots and the average insertion loss (i.e., reduction in traffic noise) for the residences in Sabal Palm. As shown, at a combined berm/wall height of 11 feet, a noise barrier would not reduce traffic noise levels at all of the 29 impacted areas within Sabal Palms. However, at a height of 12 feet, the barrier would reduce traffic noise levels at all of the areas and provide an average insertion loss of 8.1 dB(A)—a slightly greater reduction than the Pompano Park barrier provides. To determine if raising the barrier height would increase the benefit substantially, a berm/barrier 13 feet in height was also evaluated. As shown, increasing the barrier height to 13 feet only increases the average reduction by 0.6 dB(A). This is considered a minimal benefit. Of note, this is consistent with the FTE's analysis of the Pompano Park noise barrier because the FTE did not increase the height of that barrier from 20 to 22 feet because doing so would only have resulted in an additional 0.9 dB(A) reduction (see the FTE's NSR text in Attachment 1). As such, a berm/barrier 12 feet in height is recommended as the optimal barrier design for the impacted areas/lots in Sabal Palm. The extent of the berm/barrier is illustrated on **Figure 4**.

Table 1 – Noise Barrier Evaluation for Sabal Palm

Height of Berm/Wall (Top Elevation)	Number of Impacted and Benefited Areas	Average Insertion Loss	Notes
11 Ft (20.3 Ft)	27	-	Would not benefit all impacted areas/lots
12 Ft (21.3 Ft)	29	8.1	Provides a greater average reduction than the Pompano Park barrier
13 Ft (22.3 Ft)	29	8.7	Provides only a minimal additional benefit

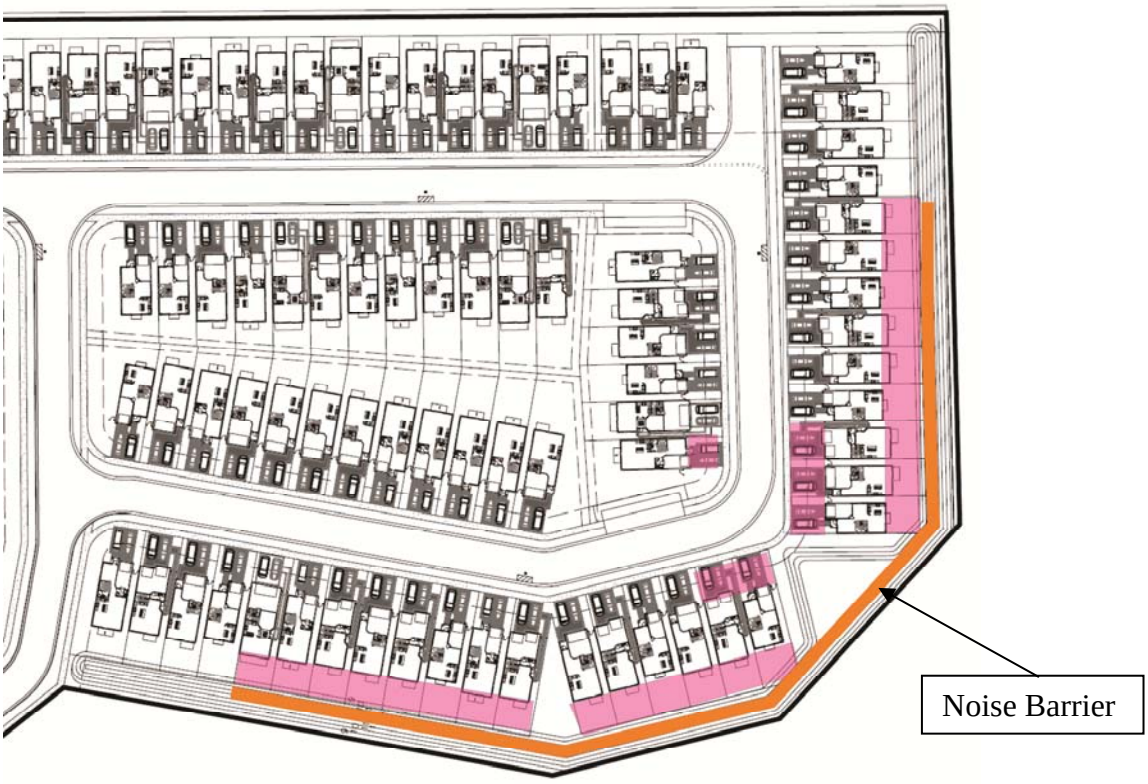

Figure 4 – Noise Barrier Extent

Comparison - Sabal Palm and Pompano Park

As stated above, the existing Pompano Park barrier is 20 feet in height. As demonstrated through previous analysis, there was a need for the FTE to construct a barrier of this height because the turnpike roadway is elevated on the north end of the barrier. This elevated roadway reduces the acoustically effective height of the Pompano Park barrier such that the effective height averages only eight feet for the first row of homes behind the barrier and only six feet for the second row of homes. The data (e.g., top of wall elevation, elevation of the

turnpike, and elevation of the homes) that were used to calculate the effective barrier height are provided in **Attachment 4**.

Presumably because there was a belief that the barrier elevations should be the same to provide the same reduction in traffic noise, Broward County staff requested that KBE compare the top elevation of the Pompano Park noise barrier to the top elevation of the Sabal Palm barrier. Using data provided by FTE and the revised site plan for Sabal Palm, the top elevations (above mean sea level) of the two barriers are:

- Pompano Park – 27.4 feet
- Sabal Palm – 21.3 feet

While one might think the top elevations of the barriers should be approximately the same because they provide essentially the same reduction in traffic noise, this is not the case. The greater elevation of the Pompano Park barrier is necessary because both the elevations of the residences in Pompano Park and the turnpike paralleling the barrier increase from south to north. This results in a reduction of traffic noise more than 7.7 dB(A) for the residences on the south end of the barrier and a reduction less than 7.7 dB(A) for the residences on the north end.

The effect of the elevation differences is illustrated on **Figure 5**. As shown, on the south end of the barrier (Station 5194) all of the noise sources on the turnpike (i.e., car tires on the pavement, truck engines, and truck stacks) are below the top of the barrier. At this location, the Pompano Park noise barrier provides the maximum amount of insertion loss. Moving north, as the elevation of the turnpike increases, the sources of noise rise above the top of the barrier resulting in less and less benefit to the residences. This situation is best demonstrated by the photograph provided in **Figure 6** which is a view of the existing Pompano Park barrier looking from the north end of the barrier to the south end of the barrier. It is evident by this photograph that the roadway is above the barrier on the north end and transitions to an elevation below the barrier on the south end.

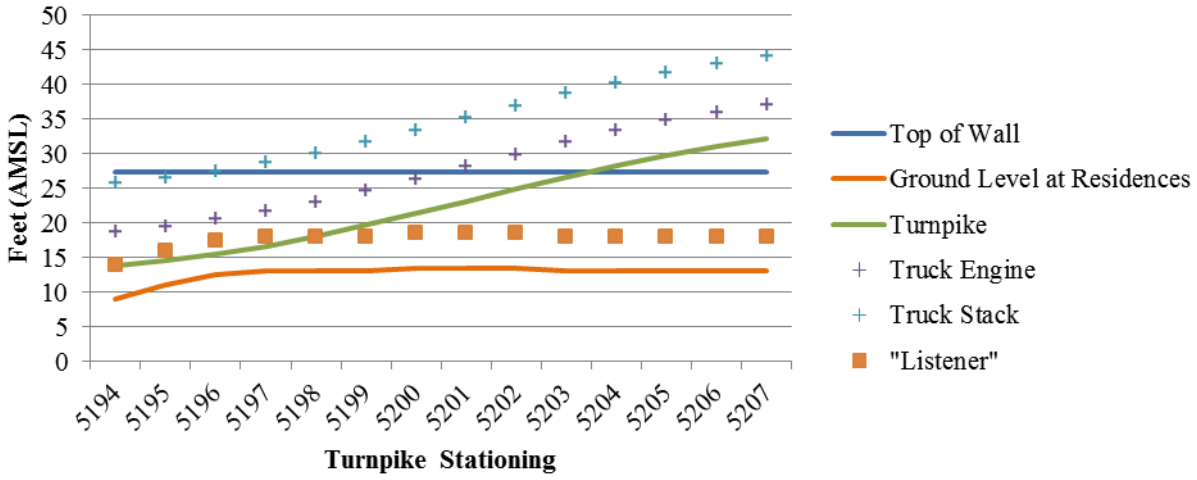

Figure 5 – Pompano Park Noise Barrier

Figure 6 – Photograph of Pompano Park Noise Barrier

Summary

In a December 7, 2012 meeting with Broward County staff, it was agreed that the same impact and benefit criteria used by the FTE that resulted in the construction of the Pompano Park barrier should be applied to the Sabal Palm barrier. Using this approach, additional analysis was performed resulting in a recommendation that a 12 foot berm/wall combination noise barrier (top barrier elevation of 21.3 feet) be constructed between the planned residences in Sabal Palm and the turnpike. The barrier would benefit all of the areas/lots that would be impacted by traffic noise.

Attachment 1 – Select Pages from FTE's NSR

NOISE STUDY REPORT

for

Widening Florida's Turnpike
From North of Sunrise Boulevard to Atlantic Boulevard
Broward County, FL
PD&E Study

Financial Project ID Number: 406097-1

September 2003

Prepared for:

Florida's Turnpike Enterprise

Prepared by:

CONSULTING ENGINEERING & SCIENCE, INC.
Civil Engineers Coastal Engineers Environmental Scientists

In Association With

Kimley-Horn and Associates, Inc

2.11 NB-W4 - Pompano Park

Noise levels at 19 first-row residences and 14 second-row residences in this neighborhood are predicted to approach or exceed the NAC for the Build condition. The results of the analysis of a noise barrier for this neighborhood are provided in Table 11. At a height of 20 feet and a length of 1,300 feet, the noise barrier would provide at least a 5 dBA reduction to all 33 residences with predicted noise levels that approach or exceed the NAC. No other residences are predicted to benefit from this noise barrier. Raising the noise barrier to the maximum height of 22 feet does not benefit any additional residences identified as impacted. Additionally, raising the noise barrier to the maximum height of 22 feet would increase the average noise reduction by only 0.9 dBA. Because of the minimal amount of additional benefit that would be achieved by increasing the barrier height or length, a 20-foot high and 1,300-foot long noise barrier located outside the clear zone was determined to be the optimal barrier design for this residential area.

Table 11
Noise Barrier Evaluation for NB-W4 (Non-Shoulder Segment)

HEIGHT (Feet)	LENGTH (Feet)	NUMBER OF BENEFITTED RECEIVERS			AVERAGE PREDICTED INSERTION LOSS* (dBA)	ESTIMATED COST
		Impacted	Not Impacted	Total		
11	1,300	5	0	5	5.6	$357,500
12	1,300	5	0	5	6.3	$390,000
13	1,300	11	0	11	6.3	$422,500
14	1,300	11	0	11	7.1	$455,000
15	1,300	11	0	11	7.6	$487,500
16	1,300	11	0	11	8.3	$520,000
17	1,300	11	0	11	8.8	$552,500
18	1,300	16	0	16	8.0	$585,000
19	1,300	30	0	30	7.6	$617,500
20	1,300	33	0	33	7.7	$650,000
21	1,300	33	0	33	8.2	$682,500
22	1,300	33	0	33	8.6	$715,000

Notes: * = Noise levels presented for benefitted receiver sites only.

Table 5
TNM Traffic Data Summary

ROADWAY SEGMENT**	ALTERNATIVE	DIRECTION	PREDICTED PEAK HOUR VOLUME*****	LEVEL-OF-SERVICE C VOLUME***	Truck Factor (percentage)	Autos	Medium Trucks	Heavy Trucks	Number of Lanes	Lane Volumes			SPEED (Miles Per Hour)
										Autos	Medium Trucks	Heavy Trucks	
Florida's Turnpike SR 838/West Sunrise Boulevard to SR 870/Commercial Boulevard	Existing	Northbound	4,813	4,820	1.86	4,723	45	45	3	1,574	15	15	65
		Southbound	5,228	4,820	1.86	4,730	45	45	3	1,577	15	15	65
	No-Build (2030)	Northbound	8,600	4,820	1.86	4,730	45	45	3	1,577	15	15	65
		Southbound	9,500	4,820	1.86	4,730	45	45	3	1,577	15	15	65
	Build (2030)	Northbound	9,400	6,480	1.86	6,359	60	60	4	1,590	15	15	65
		Southbound	10,600	6,480	1.86	6,359	60	60	4	1,590	15	15	65
Florida's Turnpike SR 870/Commercial Boulevard to SR 814/Atlantic Boulevard	Existing	Northbound	3,691	4,820	1.86	3,622	34	34	3	1,207	11	11	65
		Southbound	4,585	4,820	1.86	4,500	43	43	3	1,500	14	14	65
	No-Build (2030)	Northbound	8,100	4,820	1.86	4,730	45	45	3	1,577	15	15	65
		Southbound	9,000	4,820	1.86	4,730	45	45	3	1,577	15	15	65
	Build (2030)	Northbound	9,500	6,480	1.86	6,359	60	60	4	1,590	15	15	65
		Southbound	10,600	6,480	1.86	6,359	60	60	4	1,590	15	15	65
Florida's Turnpike - SR 870/Commercial Boulevard Interchange Northbound	Existing	off-ramp	1,998	1,480	1.86	1,452	14	14	1	1,452	14	14	35
		on-ramp	876	1,480	1.86	860	8	8	1	860	8	8	35
	No-Build (2030)	off-ramp	2,600	1,480	1.86	1,452	14	14	1	1,452	14	14	35
		on-ramp	2,100	1,480	1.86	1,452	14	14	1	1,452	14	14	35
	Build (2030)	off-ramp	464(WBSP)/780/ 1,356(EBSP) = 2600	2,812****	1.86	455/765/ 1,331	4/7/13	4/7/13	1	455/765/ 1,331	4/7/13	4/7/13	35
		on-ramp	2,700	1,480	1.86	1,452	14	14	1	1,452	14	14	35
Florida's Turnpike - SR 870/Commercial Boulevard Interchange Southbound	Existing	off-ramp	633	1,480	1.86	621	6	6	1	621	6	6	35
		on-ramp	1,276	1,480	1.86	1,252	12	12	1	1,252	12	12	35
	No-Build (2030)	off-ramp	1,900	1,480	1.86	1,452	14	14	1	1,452	14	14	35
		on-ramp	2,400	1,480	1.86	1,452	14	14	1	1,452	14	14	35
	Build (2030)	off-ramp	428(EBSP)/1,972 =2400	1,480****	1.86	420/1,935	4/18	4/18	1	420/1,935	4/18	4/18	35
		on-ramp	1,454/946(SBSP)= 2400	1480	1.86	1,426/928	13/9	13/9	1	1,426/928	13/9	13/9	35
SR 816/Oakland Park Boulevard - East of Florida's Turnpike (Assumptions 6 lanes, Class III, Two-Way Arterial)	Existing	Eastbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
		Westbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
	No-Build (2030)	Eastbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
		Westbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
	Build (2030)	Eastbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
		Westbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
SR 816/Oakland Park Boulevard - West of Florida's Turnpike (Assumptions 6 lanes, Class III, Two-Way Arterial)	Existing	Eastbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
		Westbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
	No-Build (2030)	Eastbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
		Westbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
	Build (2030)	Eastbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45
		Westbound	NA	1,020	1.92	1,000	10	10	3	333	3	3	45

Table 5 (cont.)
TNM Traffic Data Summary

ROADWAY SEGMENT**	ALTERNATIVE	DIRECTION	PREDICTED PEAK HOUR VOLUME*****	LEVEL-OF-SERVICE C VOLUME***	Truck Factor (percentage)	Autos	Medium Trucks	Heavy Trucks	Number of Lanes	Lane Volumes			SPEED (Miles Per Hour)
										Autos	Medium Trucks	Heavy Trucks	
Rock Island Road (Assumptions 4 lanes, major local road, non-state, to be widened in the future to 6 lanes north of Commercial Blvd.)	Existing	Northbound	NA	1,120	1*	1,109	6	6	2	554	3	3	35*
		Southbound	NA	1,120	1*	1,109	6	6	2	554	3	3	35*
	No-Build (2030)	Northbound	NA	1,740	1*	1,723	9	9	3	574	3	3	40*
		Southbound	NA	1,740	1*	1,723	9	9	3	574	3	3	40*
	Build (2030)	Northbound	NA	1,740	1*	1,723	9	9	3	574	3	3	40*
		Southbound	NA	1,740	1*	1,723	9	9	3	574	3	3	40*
SR 870/Commercial Boulevard – East of Florida's Turnpike (Assumptions 6 lanes, Class III, Two-Way Arterial)	Existing	Eastbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
		Westbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
	No-Build (2030)	Eastbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
		Westbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
	Build (2030)	Eastbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
		Westbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
SR 870/Commercial Boulevard - West of Florida's Turnpike (Assumptions 6 lanes, Class III, Two-Way Arterial)	Existing	Eastbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
		Westbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
	No-Build (2030)	Eastbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
		Westbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
	Build (2030)	Eastbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
		Westbound	NA	1,020	1.64	1,003	8	8	3	334	3	3	45
SR 7/NW 40th Street - East of Florida's Turnpike (Assumptions 6 lanes, Class II, Two-Way Arterial)	Existing	Eastbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
		Westbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
	No-Build (2030)	Eastbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
		Westbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
	Build (2030)	Eastbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
		Westbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
SR 7/NW 40th Street - West of Florida's Turnpike (Assumptions 6 lanes, Class II, Two-Way Arterial)	Existing	Eastbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
		Westbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
	No-Build (2030)	Eastbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
		Westbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
	Build (2030)	Eastbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
		Westbound	NA	2,110	1.31	2,082	14	14	3	694	5	5	40
NW 31st Street - East of Florida's Turnpike (Assumed this is Avenue not street, 6 lanes, Class I, Two-Way Arterial)	Existing	Eastbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
		Westbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
	No-Build (2030)	Eastbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
		Westbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
	Build (2030)	Eastbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
		Westbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35

Table 5 (cont.)
TNM Traffic Data Summary

ROADWAY SEGMENT**	ALTERNATIVE	DIRECTION	PREDICTED PEAK HOUR VOLUME*****	LEVEL-OF-SERVICE C VOLUME***	Truck Factor (percentage)	Autos	Medium Trucks	Heavy Trucks	Number of Lanes	Lane Volumes			SPEED (Miles Per Hour)
										Autos	Medium Trucks	Heavy Trucks	
S. Lyons Road - West of Florida's Turnpike (Assumptions 6 lanes, Class I, Two-Way Arterial)	Existing	Eastbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
		Westbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
	No-Build (2030)	Eastbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
		Westbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
	Build (2030)	Eastbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
		Westbound	NA	2,720	1*	2,693	14	14	3	898	5	5	35
S.R. 814/Atlantic Boulevard - East of Florida's Turnpike (Assumptions 6 lanes, Class II, Two-Way Arterial)	Existing	Eastbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
		Westbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
	No-Build (2030)	Eastbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
		Westbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
	Build (2030)	Eastbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
		Westbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
S.R. 814/Atlantic Boulevard - West of Florida's Turnpike (Assumptions 6 lanes, Class II, Two-Way Arterial)	Existing	Eastbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
		Westbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
	No-Build (2030)	Eastbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
		Westbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
	Build (2030)	Eastbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40
		Westbound	NA	2,110	1.85	2,071	20	20	3	690	7	7	40

Notes: Shaded regions indicate data used in TNM model

* Information is presented based on assumptions, due to a lack of RCI data and/or inability to calculate future year data.

**Assumptions for RCI data collection involved the following county, section, and sub-section codes: SR 7: 86100000, Lyons Road: 86000222, Rock Island Road: 86000047, Commercial Boulevard: 86014000, Oakland Park Boulevard: 86090000, Atlantic Boulevard: 86130000

*** Level of Service C Capacity Thresholds are provided for peak hour, peak direction. The actual level of service standard for off system facilities is LOS D. Assumptions for off system facilities identified are based upon information published by the Broward County MPO in *Roadway Capacity Analysis for 2001 and 2025 dated September 2002* and the 2002 Quality and Level of Service Manual, Table 4-7, Generalized Peak Hour Directional Volumes for Florida's Urbanized Areas. Level of service C thresholds for ramp roadways are based on capacity information published in the Highway Capacity Manual in Table 25-3, and volume/capacity ratio of 0.74 for LOS C as suggested in Table 23-2 for freeway segments with free flow speeds of 70 mph. Level of service C thresholds for freeway segments are based on Free Plan analysis assuming K30 of 10.66% and D30 of 52.65%, free flow speed of 70 mph, interchange density relating to Class 3, truck percentage of 2%, and a local adjustment factor of 0.98.

****LOS C threshold refers to the volume of all ramps combined due to the design of the ramp roadways.

*****Based on data provided in the Draft Project Traffic Memorandum for Broward Widening PD&E Study dated November 2002, AM peak hour was determined to be worst case overall review of 2030 Broward Model showed Vol/Cap>LOS C on off-system facilities.

NA = not applicable

EBSP = Eastbound SunPass, WBSP = Westbound SunPass, SBSP = Southbound SunPass.

Attachment 2 – List of Criteria/Methodology/Marino Berrios response

L Carrol Fowler

From: Berrios, Mariano <Mariano.Berrios@dot.state.fl.us>
Sent: Thursday, November 01, 2012 2:01 PM
To: L Carrol Fowler
Subject: RE: FDOT/Turnpike Traffic Noise Analysis Procedures

The items listed in your e-mail are in accordance with noise analysis requirements established in Part 2, Chapter 17 of the FDOT PD&E Manual used for FDOT projects.

Mariano Berrios
ENVIRONMENTAL PROGRAMS ADMINISTRATOR
FLORIDA DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL MANAGEMENT OFFICE
605 SUWANNEE STREET, MS 37
TALLAHASSEE, FLORIDA 32399-0450

TELEPHONE: (850)414-5250
FAX: (850)414-4443
E-MAIL: mariano.berrios@dot.state.fl.us

Hang Up, Buckle Up and Drive Safely!

From: L Carrol Fowler [mailto:cfowler@kbenv.com]
Sent: Thursday, November 01, 2012 1:01 PM
To: Berrios, Mariano
Subject: FDOT/Turnpike Traffic Noise Analysis Procedures

Mariano:

I am preparing a traffic noise analysis for a developer in south Florida. For the purpose of demonstrating to others (e.g., city and county officials) that the analysis was performed following procedures detailed in the FDOT's Project Development and Environment (PD&E) Manual, those involved have requested that I have someone with FDOT confirm that each of the following are documented in the Manual and routinely used by analysts (such as myself) when performing assessments for roadway improvement projects:

- FDOT, which includes Florida's Turnpike Enterprise (FTE), only consider traffic noise abatement measures for properties at which a predicted traffic noise level approaches, meets, or exceeds the Federal Highway Administration's (FHWA's) Noise Abatement Criteria (Page 17-11, Section 17-5.4: Traffic Noise Impacts).
- Traffic noise levels are predicted using the FHWA's Traffic Noise Model (TNM)—(Page 17-2, first paragraph, last sentence).
- These criteria, and the level which FDOT/FTE consider to "approach" the NAC are listed on Table 17.1 of the PD&E Manual (Page 17-35)
- For residential land uses, the FDOT/FTE NAC for exterior areas of frequent use is 66 decibels on the "A"-weighted scale (Page 17-35, Table 17.1).
- There are no NAC for interior traffic noise levels for residential land uses (Page 17-35, Table 17.1).
- To be considered "benefited" by a noise barrier, the barrier must provide at least a 5 dB(A) reduction in predicted traffic noise levels (Page 17-3, Definition of Benefited Receptor).
- To be considered a feasible abatement measure, the number of impacted receptors required to achieve a 5 dB(A) or greater reduction must be two or greater (Page 17-15, Section 17-6.1.1 – Noise Reduction Factor, last sentence).
- The goal of any noise abatement measure is a reduction in traffic noise of 7 dB(A) for at least one "impacted" receptor (Page 17-4, Definition of Noise Reduction Design Goal).

Are you able to confirm the above are stated in the PD&E Manual and routinely used by analyst when performing traffic noise assessments?

Carrol

Carrol Fowler
KB Environmental Sciences, Inc.
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9500 Koger Blvd N, STE 211
St Petersburg FL 33702
CFowler@KBEnv.com Skype: cfowler53

Browse KBE's services at our website: http://www.KBEnv.com

Attachment 3 – Detailed Predicted Traffic Noise Levels

Lot No. /Location (B=Backyard, F=Frontyard)	Predicted Noise Level Without Barrier	Impacted based on FDOT/FTE Criteria?	Noise Barrier Height/Predicted Insertion Loss (IL)							
			11 ft			12 ft			13 ft	
			dB(A)	IL		dB(A)	IL		dB(A)	IL
170B	54.5		53.9	0.6		53.9	0.6		53.9	0.6
169B	55.0		54.3	0.7		54.3	0.7		54.3	0.7
168B	55.1		54.4	0.7		54.3	0.8		54.3	0.8
167B	55.0		54.2	0.8		54.2	0.8		54.2	0.8
166B	55.5		54.7	0.8		54.6	0.9		54.6	0.9
165B	55.2		54.1	1.1		54.1	1.1		54.1	1.1
164B	55.5		54.4	1.1		54.4	1.1		54.3	1.2
163B	55.9		54.9	1.0		54.9	1.0		54.9	1.0
162B	56.2		55.1	1.1		55.1	1.1		55.1	1.1
161B	56.4		55.4	1.0		55.4	1.0		55.3	1.1
160B	56.7		55.5	1.2		55.5	1.2		55.5	1.2
159B	57.0		55.9	1.1		55.9	1.1		55.8	1.2
158B	57.2		56.2	1.0		56.1	1.1		56.1	1.1
157B	57.5		56.4	1.1		56.4	1.1		56.3	1.2
156B	57.8		56.8	1.0		56.8	1.0		56.7	1.1
155B	58.0		56.9	1.1		56.9	1.1		56.8	1.2
154B	58.3		57.3	1.0		57.2	1.1		57.2	1.1
153B	58.6		57.6	1.0		57.5	1.1		57.5	1.1
152B	59.1		58.7	0.4		58.6	0.5		58.6	0.5
121B	64.3		61.9	2.4		61.7	2.6		61.6	2.7
120B	64.6		61.9	2.7		61.6	3.0		61.5	3.1
119B	65.1		62.0	3.1		61.7	3.4		61.5	3.6
118B	65.5		61.9	3.6		61.6	3.9		61.4	4.1
117B	66.1	Yes	61.5	4.6		61.0	5.1		60.6	5.5
116B	66.6	Yes	60.6	6.0		59.9	6.7		59.2	7.4
115B	67.4	Yes	60.9	6.5		60.1	7.3		59.5	7.9
114B	68.3	Yes	61.4	6.9		60.7	7.6		60.0	8.3
113B	69.6	Yes	62.1	7.5		61.3	8.3		60.6	9.0
112B	70.7	Yes	62.8	7.9		62.0	8.7		61.3	9.4
111B	72.0	Yes	63.6	8.4		62.8	9.2		62.2	9.8
110B	73.4	Yes	64.1	9.3		63.3	10.1		62.6	10.8
109B	74.6	Yes	64.4	10.2		63.7	10.9		62.8	11.8
108B	75.0	Yes	65.1	9.9		64.2	10.8		63.4	11.6
107B	74.5	Yes	64.9	9.6		64.0	10.5		63.3	11.2
106B	74.0	Yes	64.6	9.4		63.7	10.3		63.1	10.9
105B	73.0	Yes	64.2	8.8		63.5	9.5		62.7	10.3

Lot No. /Location (B=Backyard, F=Frontyard)	Predicted Noise Level Without Barrier	Impacted based on FDOT/FTE Criteria?	Noise Barrier Height/Predicted Insertion Loss (IL)								
			11 ft			12 ft			13 ft		
			dB(A)	IL		dB(A)	IL		dB(A)	IL	
104B	72.4	Yes	63.9	8.5		63.1	9.3		62.4	10.0	
103B	71.9	Yes	63.6	8.3		62.8	9.1		62.2	9.7	
102B	70.6	Yes	63.0	7.6		62.3	8.3		61.7	8.9	
101B	69.6	Yes	62.4	7.2		61.7	7.9		61.0	8.6	
100B	68.5	Yes	61.7	6.8		61.0	7.5		60.3	8.2	
99B	68.1	Yes	61.2	6.9		60.5	7.6		59.9	8.2	
98B	67.7	Yes	60.7	7.0		60.1	7.6		59.5	8.2	
97B	67.1	Yes	60.2	6.9		59.7	7.4		59.1	8.0	
96B	66.6	Yes	60.1	6.5		59.6	7.0		59.0	7.6	
95B	66.0	Yes	61.1	4.9		60.8	5.2		60.5	5.5	
94B	65.4		62.9	2.5		62.8	2.6		62.7	2.7	
93B	65.3		63.9	1.4		63.8	1.5		63.7	1.6	
92B	64.7		63.6	1.1		63.5	1.2		63.5	1.2	
91B	64.2		63.3	0.9		63.3	0.9		63.2	1.0	
122B	58.7		55.2	3.5		54.9	3.8		54.5	4.2	
123B	59.0		55.4	3.6		55.0	4.0		54.6	4.4	
124B	59.5		55.8	3.7		55.3	4.2		54.9	4.6	
125B	59.9		56.1	3.8		55.6	4.3		55.2	4.7	
126B	60.9		57.8	3.1		57.2	3.7		56.6	4.3	
127B	61.5		58.7	2.8		58.1	3.4		57.5	4.0	
128B	61.7		57.4	4.3		56.8	4.9		56.2	5.5	
129B	60.0		56.3	3.7		55.8	4.2		55.3	4.7	
130B	58.9		55.8	3.1		55.4	3.5		54.9	4.0	
131B	58.2		55.5	2.7		55.1	3.1		54.7	3.5	
132B	57.7		55.3	2.4		55.0	2.7		54.6	3.1	
133B	57.3		55.0	2.3		54.7	2.6		54.4	2.9	
134B	57.3		55.0	2.3		54.7	2.6		54.5	2.8	
135B	56.9		54.5	2.4		54.2	2.7		54.0	2.9	
136B	56.6		54.1	2.5		53.8	2.8		53.6	3.0	
137B	56.2		54.0	2.2		53.8	2.4		53.6	2.6	
138B	56.0		54.2	1.8		54.0	2.0		53.8	2.2	
139B	55.7		53.9	1.8		53.8	1.9		53.6	2.1	
140B	56.4		55.0	1.4		54.8	1.6		54.7	1.7	
141B	55.8		53.8	2.0		53.6	2.2		53.4	2.4	
142B	56.1		53.8	2.3		53.6	2.5		53.3	2.8	
143B	56.5		53.9	2.6		53.6	2.9		53.3	3.2	
144B	56.9		54.2	2.7		53.9	3.0		53.6	3.3	

Lot No. /Location (B=Backyard, F=Frontyard)	Predicted Noise Level Without Barrier	Impacted based on FDOT/FTE Criteria?	Noise Barrier Height/Predicted Insertion Loss (IL)								
			11 ft			12 ft			13 ft		
			dB(A)	IL		dB(A)	IL		dB(A)	IL
145B	57.3		54.4	2.9		54.2	3.1		53.9	3.4
146B	57.6		54.6	3.0		54.3	3.3		53.9	3.7
147B	57.7		54.9	2.8		54.6	3.1		54.2	3.5
148B	57.5		55.1	2.4		54.7	2.8		54.4	3.1
149B	57.9		55.3	2.6		54.9	3.0		54.5	3.4
150B	58.2		55.3	2.9		54.9	3.3		54.5	3.7
151B	58.5		55.4	3.1		55.0	3.5		54.6	3.9
170F	55.5		54.8	0.7		54.7	0.8		54.7	0.8
169F	55.4		54.6	0.8		54.6	0.8		54.5	0.9
168F	55.3		54.3	1.0		54.3	1.0		54.2	1.1
167F	55.3		54.2	1.1		54.1	1.2		54.1	1.2
166F	55.2		53.9	1.3		53.8	1.4		53.8	1.4
165F	54.5		52.7	1.8		52.6	1.9		52.5	2.0
164F	54.9		53.1	1.8		53.0	1.9		52.9	2.0
163F	55.1		53.2	1.9		53.1	2.0		53.0	2.1
162F	55.4		53.4	2.0		53.4	2.0		53.3	2.1
161F	55.7		53.8	1.9		53.7	2.0		53.6	2.1
160F	55.8		53.8	2.0		53.7	2.1		53.6	2.2
159F	56.4		54.5	1.9		54.4	2.0		54.3	2.1
158F	56.8		54.9	1.9		54.9	1.9		54.7	2.1
157F	57.4		55.5	1.9		55.4	2.0		55.3	2.1
156F	58.1		56.4	1.7		56.3	1.8		56.1	2.0
155F	58.5		56.5	2.0		56.3	2.2		56.1	2.4
154F	60.3		57.6	2.7		57.4	2.9		57.1	3.2
153F	60.8		58.2	2.6		57.9	2.9		57.7	3.1
152F	61.1		58.5	2.6		58.2	2.9		58.0	3.1
121F	60.3		57.6	2.7		57.3	3.0		57.0	3.3
120F	60.4		57.3	3.1		56.9	3.5		56.6	3.8
119F	60.8		57.6	3.2		57.1	3.7		56.8	4.0
118F	60.9		58.0	2.9		57.6	3.3		57.3	3.6
117F	61.6		58.0	3.6		57.5	4.1		57.0	4.6
116F	62.0		58.1	3.9		57.6	4.4		57.1	4.9
115F	62.6		58.4	4.2		57.8	4.8		57.2	5.4
114F	63.5		59.0	4.5		58.4	5.1		57.7	5.8
113F	64.3		59.6	4.7		58.9	5.4		58.3	6.0
112F	65.1		61.3	3.8		60.7	4.4		60.2	4.9
111F	66.7	Yes	61.1	5.6		60.3	6.4		59.6	7.1

Lot No. /Location (B=Backyard, F=Frontyard)	Predicted Noise Level Without Barrier	Impacted based on FDOT/FTE Criteria?	Noise Barrier Height/Predicted Insertion Loss (IL)								
			11 ft			12 ft			13 ft		
			dB(A)	IL		dB(A)	IL		dB(A)	IL	
110F	68.3	Yes	62.1	6.2		61.3	7.0		60.5	7.8	
109F	71.0	Yes	63.4	7.6		62.6	8.4		61.9	9.1	
108F	69.4	Yes	62.4	7.0		61.6	7.8		61.0	8.4	
107F	67.2	Yes	61.2	6.0		60.5	6.7		59.9	7.3	
106F	65.8		60.5	5.3		59.8	6.0		59.1	6.7	
105F	64.8		60.0	4.8		59.2	5.6		58.6	6.2	
104F	64.4		60.0	4.4		59.3	5.1		58.6	5.8	
103F	64.2		60.2	4.0		59.5	4.7		58.9	5.3	
102F	63.8		61.2	2.6		60.5	3.3		59.7	4.1	
101F	63.1		60.1	3.0		59.4	3.7		58.7	4.4	
100F	62.3		59.1	3.2		58.4	3.9		57.7	4.6	
99F	62.2		58.6	3.6		58.1	4.1		57.5	4.7	
98F	61.5		57.9	3.6		57.4	4.1		56.9	4.6	
97F	61.1		57.4	3.7		56.9	4.2		56.4	4.7	
96F	60.7		57.0	3.7		56.6	4.1		56.1	4.6	
95F	60.3		56.7	3.6		56.4	3.9		56.0	4.3	
94F	59.5		56.9	2.6		56.7	2.8		56.4	3.1	
93F	59.3		56.7	2.6		56.5	2.8		56.2	3.1	
92F	58.8		56.5	2.3		56.3	2.5		56.0	2.8	
91F	58.4		56.7	1.7		56.6	1.8		56.4	2.0	
122F	62.4		58.4	4.0		57.8	4.6		57.4	5.0	
123F	63.0		58.8	4.2		58.1	4.9		57.6	5.4	
124F	63.6		59.1	4.5		58.4	5.2		57.8	5.8	
125F	64.4		59.5	4.9		58.8	5.6		58.2	6.2	
126F	65.4		60.0	5.4		59.3	6.1		58.7	6.7	
127F	66.2	Yes	60.5	5.7		59.8	6.4		59.1	7.1	
128F	64.2		59.7	4.5		59.1	5.1		58.5	5.7	
129F	63.1		59.1	4.0		58.4	4.7		57.9	5.2	
130F	62.4		58.7	3.7		58.0	4.4		57.5	4.9	
131F	61.7		58.2	3.5		57.7	4.0		57.1	4.6	
132F	61.1		57.7	3.4		57.2	3.9		56.7	4.4	
133F	60.7		57.3	3.4		56.9	3.8		56.4	4.3	
134F	60.2		56.9	3.3		56.5	3.7		56.1	4.1	
135F	59.9		56.7	3.2		56.2	3.7		55.8	4.1	
136F	59.6		56.4	3.2		56.1	3.5		55.7	3.9	
137F	59.1		56.3	2.8		56.0	3.1		55.6	3.5	
138F	58.8		56.1	2.7		55.9	2.9		55.6	3.2	

Lot No. /Location (B=Backyard, F=Frontyard)	Predicted Noise Level Without Barrier	Impacted based on FDOT/FTE Criteria?	Noise Barrier Height/Predicted Insertion Loss (IL)								
			11 ft			12 ft			13 ft		
			dB(A)	IL		dB(A)	IL		dB(A)	IL	
139F	59.1		57.1	2.0		57.0	2.1		56.8	2.3	
140F	56.1		54.9	1.2		54.8	1.3		54.8	1.3	
141F	56.2		54.9	1.3		54.8	1.4		54.8	1.4	
142F	56.5		55.0	1.5		54.9	1.6		54.9	1.6	
143F	56.8		55.2	1.6		55.1	1.7		55.1	1.7	
144F	57.1		55.5	1.6		55.5	1.6		55.4	1.7	
145F	57.2		55.5	1.7		55.4	1.8		55.3	1.9	
146F	57.4		55.7	1.7		55.6	1.8		55.5	1.9	
147F	57.6		55.9	1.7		55.9	1.7		55.8	1.8	
148F	57.9		56.2	1.7		56.1	1.8		56.0	1.9	
149F	58.1		56.4	1.7		56.3	1.8		56.2	1.9	
150F	58.2		56.4	1.8		56.3	1.9		56.2	2.0	
151F	58.3		56.4	1.9		56.3	2.0		56.2	2.1	
Count/Average		29		7.4			8.1			8.7	

Attachment 4 – Effective Barrier Height Calculations and Supporting Data

Pompano Park

Effective Barrier Height

Stations	5194	5195	5196	5197	5198	5199	5200	5201	5202	5203	5204	5205	5206	5207	Average
Ground Elevations at Residences	**9**	**11**	**12.5**	**13**	**13**	**13**	**13.5**	**13.5**	**13.5**	**13**	**13**	**13**	**13**	**13**	13
"Listener" at each Station	**14**	**16**	**17.5**	**18**	**18**	**18**	**18.5**	**18.5**	**18.5**	**18**	**18**	**18**	**18**	**18**	18
Top of Wall	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27
Turnpike Elevation (tires)	13.83	14.56	15.51	16.68	18.06	19.67	21.42	23.18	24.94	26.69	28.34	29.79	31.06	32.14	23
Turnpike Elevation (engine)	18.83	19.56	20.51	21.68	23.06	24.67	26.42	28.18	29.94	31.69	33.34	34.79	36.06	37.14	28
Turnpike Elevation (stack)	25.83	26.56	27.51	28.68	30.06	31.67	33.42	35.18	36.94	38.69	40.34	41.79	43.06	44.14	35

Effective Wall Height (ft) - 1st row of homes															
Stations	**5194**	**5195**	**5196**	**5197**	**5198**	**5199**	**5200**	**5201**	**5202**	**5203**	**5204**	**5205**	**5206**	**5207**	**Average**
at tires	16.2	14.8	13.6	12.8	12.1	11.4	10.4	9.6	8.8	8.3	7.5	6.9	6.3	5.8	10
at engine	14.0	12.6	11.3	10.5	9.9	9.2	8.1	7.3	6.5	6.0	5.3	4.6	4.1	3.6	8
at stack	10.9	9.4	8.2	7.4	6.8	6.0	5.0	4.2	3.4	2.9	2.2	1.5	0.9	0.5	5
													Average		8

Notes:

Distance between 1st row of homes to centerline of turnpike = 230 ft

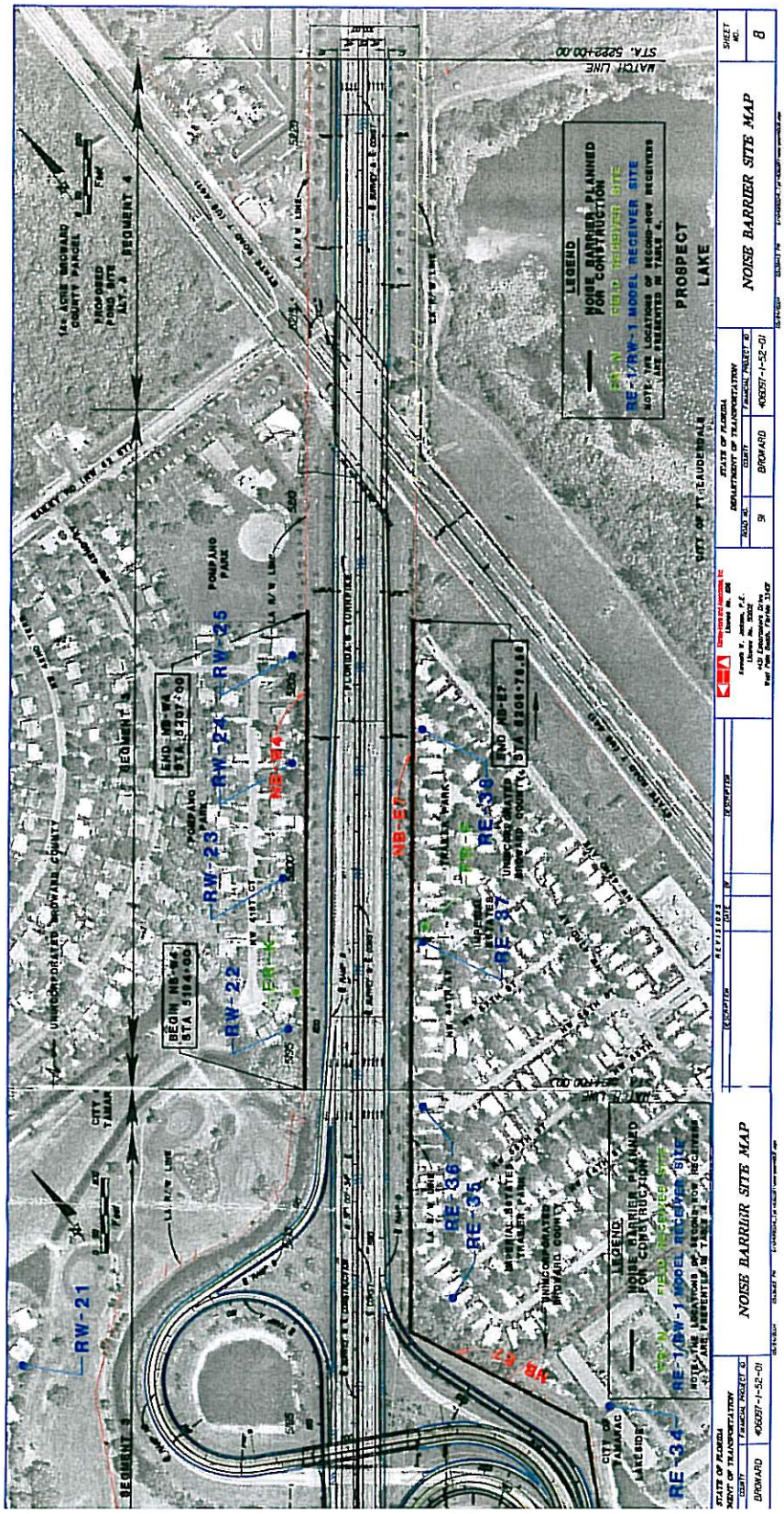
Distance between 1st row of homes to wall = 103 ft

Effective Wall Height (ft) - 2nd row of homes															
Stations	**5194**	**5195**	**5196**	**5197**	**5198**	**5199**	**5200**	**5201**	**5202**	**5203**	**5204**	**5205**	**5206**	**5207**	**Average**
at tires	15.6	14.3	13.1	12.2	11.4	10.5	9.2	8.2	7.2	6.3	5.4	4.5	3.8	3.1	9
at engine	12.6	11.4	10.2	9.3	8.5	7.5	6.3	5.3	4.2	3.4	2.4	1.6	0.8	0.2	6
at stack	8.5	7.2	6.1	5.2	4.4	3.4	2.2	1.1	0.1	-0.7	-1.7	-2.6	-3.3	-3.9	2
													Average		6

Notes:

Distance between 2nd row of homes to centerline of turnpike = 230 ft +79 ft = 309ft

Distance between 2nd row of homes to wall = 103 ft +79ft = 182ft


NOISE BARRIER SITE MAP
LEGEND
NOISE BARRIER PLANNED FOR CONSTRUCTION
FIELD RECEIVER SITE
RE-1/RW-1 MODEL RECEIVER SITE
PROSPECT LAKE
RW-21
RW-23
RW-22
RW-24
RW-25
RE-34
RE-35
RE-36
RE-37
RE-38
NB-E7
NB-M4
BEGIN NB-M4 STA. 5104+00
END NB-M4 STA. 5207+00
END NB-E7 STA. 5206+75.88
SEGMENT 3
SEGMENT 4
CITY TAMARAC
CITY OF FT. LAUDERDALE
POMPANO PARK
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
BROWARD
406057-1-52-01
SHEET NO. 8

COMPONENTS OF CONTRACT PLANS SET

ROADWAY PLANS
SIGNING AND PAVEMENT MARKING PLANS
SIGNALIZATION PLANS
INTELLIGENT TRANSPORTATION SYSTEMS (ITS) PLANS
LIGHTING PLANS
STRUCTURES PLANS
RETAINING WALL PLANS
SOUND BARRIER WALL PLANS
UTILITY RELOCATION PLANS
ARCHITECTURAL PLANS
A DETAILED INDEX APPEARS ON THE KEY SHEET OF EACH COMPONENT

INDEX OF ROADWAY PLANS

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
1A,1B	REVISION INDEX SHEET
2,2A,2B,2C,2D,2E	SUMMARY OF PAY ITEMS
3-16	DRAINAGE MAP
17-23	SUPPLEMENTAL DRAINAGE MAP
24-37	TYPICAL SECTION
38	NOT USED
39-56	TYPICAL SECTION
57-58,58A,59,59A	SUMMARY OF QUANTITIES
60-61,61A-61B,62-89	SUMMARY OF DRAINAGE STRUCTURES
90-100	VERIFIED UTILITY LOCATIONS
101-111	PROJECT NETWORK CONTROL
112-115	PROJECT LAYOUT
116-159	PLAN
160-213	PROFILES
214	NOT USED
215	INTERSECTION DETAIL
216	INTERCHANGE LAYOUT
217-222	CURVE AND COORDINATE DATA
223-225	RAMP TERMINAL DETAILS RAMP A
226	RAMP TERMINAL DETAILS RAMP B
227	RAMP TERMINAL DETAILS RAMP C
228	RAMP TERMINAL DETAILS RAMP D
229-230	RAMP TERMINAL DETAILS RAMP E
231-238,238A,238B,238C	MISCELLANEOUS DETAILS
239-252,252A,252B,252C	DRAINAGE DETAILS
253	OPTIONAL MATERIALS TABULATION
254-274	DRAINAGE STRUCTURES
275	DRAINAGE STRUCTURES
276-314	DRAINAGE STRUCTURES
314A	NOT USED
315-319,319A,320-323	DRAINAGE STRUCTURES
324	NOT USED
325-380,380A,381-401,399A	DRAINAGE STRUCTURES
401A,402-426	DRAINAGE STRUCTURES
427	POND DETAIL
428-429	POND CROSS SECTIONS
430	CROSS SECTION PATTERN SHEET
430A	ROADWAY SOILS SURVEY
431-658	CROSS SECTIONS
659-701	STORMWATER POLLUTION PREVENTION PLAN
702-715,715A thru 715D, 716-837,837A,838-857,857A, 858-863,863A,863B,864-872	TRAFFIC CONTROL PLANS
873-876	NOT USED
877-885	TRAFFIC CONTROL PLANS
886-890	NOT USED
891-1119	TRAFFIC CONTROL PLANS
1120-1121	NOT USED
1122-1125	TRAFFIC CONTROL PLANS
1126-1129	NOT USED
1130-1210,1210A thru 1210Z, 1210AA thru 1210ZZ, 1210AB thru 1210AP,1211-1346	TRAFFIC CONTROL PLANS
1347-1387	UTILITY ADJUSTMENTS

GOVERNING STANDARDS AND SPECIFICATIONS: FLORIDA DEPARTMENT OF TRANSPORTATION, DESIGN STANDARDS DATED JANUARY 2004, AND STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION DATED 2004, AS AMENDED BY CONTRACT DOCUMENTS.

APPLICABLE 2004 INTERIM STANDARDS

INDEX NO.	SHEET NO.	INDEX DATE	INDEX NO.	SHEET NO.	INDEX DATE
0304	1-6 OF 6	01-01-05	05115	1-6 OF 6	01-01-05
0400	1 OF 1	08-21-03	510	1-5 OF 5	01-01-05
05000	1 OF 1	08-21-03	07346	5 OF 13	01-01-05
05015	1-16 OF 16	01-01-05	07500	1 OF 3	01-01-05

FOR INTERIM STANDARDS CLICK ON "DESIGN STANDARDS" AT THE FOLLOWING WEB SITE: http://www.dot.state.fl.us/rddesign/

REVISIONS

SEE REVISION INDEX SHEET 1A, 1B

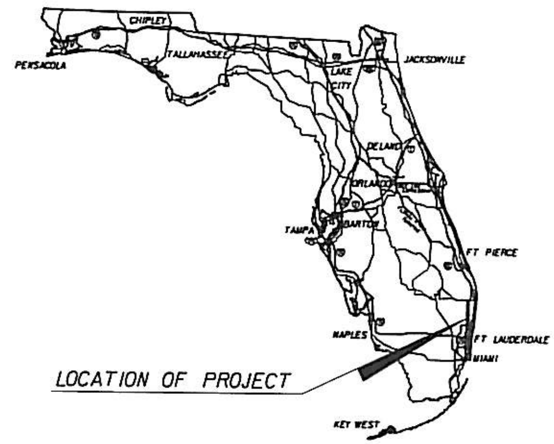
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
FINAL "AS-BUILT" PLANS
CONTRACT PLANS

FINANCIAL PROJECT ID 406097-1-52-01

BROWARD COUNTY (86470)

STATE ROAD NO. 91 (FLORIDA'S TURNPIKE)

NORTH OF SUNRISE BOULEVARD TO ATLANTIC BOULEVARD



LOCATION OF PROJECT

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COUNTY MP 17.957
TURNPIKE MP 66.044

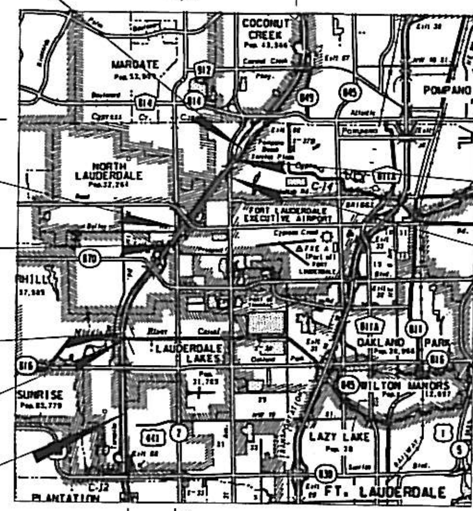
END BRIDGE
5214+25.40

BEGIN BRIDGE
5210+95.40

END BRIDGE
5097+12.41

BEGIN BRIDGE
5096+21.08

BEGIN PROJECT
STA. 5010+00.00
COUNTY MP 11.593
TURNPIKE MP 59.681



END BRIDGE
5299+27.30

BEGIN BRIDGE
5296+27.80

PROJECT LENGTH IS BASED ON ℄ SURVEY

LENGTH OF PROJECT	LINEAR FEET	MILES
ROADWAY	32879.17	6.227
BRIDGES	720.83	0.136
NET LENGTH OF PROJECT	33600.00	6.363
EXCEPTIONS	-	-
GROSS LENGTH OF PROJECT	33600.00	6.363

FDOT PROJECT MANAGER: WILLIAM F. SLOUP, P.E.
GEC PROJECT MANAGER: PETER T. KUHNE, P.E.

INDEX OF FINAL PLANS
> Computation Books 1-7
> Field Book 1 - Bridge
> Field Books 2-5 & 7 - Roadway
(Field Book 6 - voided)
> Field Books 1 to 8 - Pile Driving
> See Pages 1C-1 to 1C-3 for Shop Drawings Log

KEY SHEET REVISIONS		
DATE	BY	DESCRIPTION
03/06/09	KWJ	ADDED SHEET 1B

ROADWAY SHOP DRAWINGS TO BE SUBMITTED TO:

KIMLEY-HORN AND ASSOCIATES, INC.
KENNETH W. JACKSON, P.E.
4431 EMBARCADERO DRIVE
WEST PALM BEACH, FLORIDA 33407

PLANS PREPARED BY:

Kimley-Horn and Associates, Inc.

4431 EMBARCADERO DRIVE
WEST PALM BEACH, FLORIDA 33407
(561) 845-0665 PHONE
(561) 882-0198 FAX

CONTRACT NO. C-8492
VENDOR NO. VF-560-885-615-001
CERTIFICATE OF AUTHORIZATION NO. 696

Name of Contractor - Community Asphalt Corp.
Name of CEI Consultant - Target Engineering Group, Inc.
Sr. Project Engineer - Bryan Williams, P.E.
Project Administrator - Richard Lavin, P.E.
District Secretary - James Ely
Date Work Started - February 6, 2006
Date Work Final Accepted - March 5, 2010

NOTE: THE SCALE OF THESE PLANS MAY HAVE CHANGED DUE TO REPRODUCTION.
NOTE: THE VERTICAL DATUM FOR THESE PLANS IS NAVD 1988.
THIS PROJECT TO BE LET TO CONTRACT WITH FINANCIAL PROJECT ID 406097-3-52-01.

This project was constructed in substantial compliance with these plans as provided by the Engineer of Record. If changes were made, they are indicated by ink revision and bear the seal, signature and date of the responsible engineer.

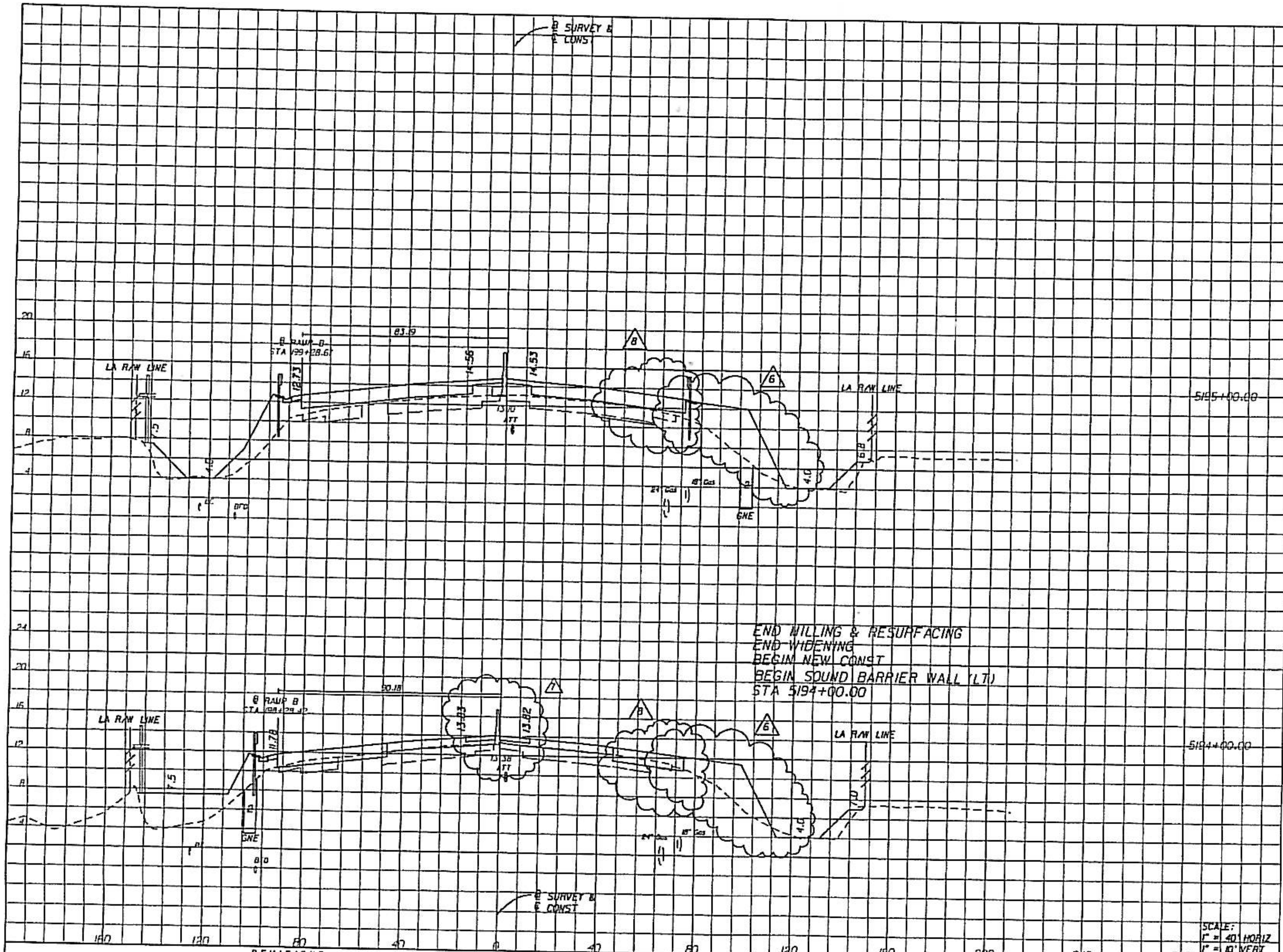
ROADWAY PLANS
ENGINEER OF RECORD: KENNETH W. JACKSON, P.E.

P.E. NO.: 50602

FISCAL YEAR	SHEET NO.
05	1

NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.

jose.castaneda 4/23/2009 9:19:47 AM K:\WPB_Design\040950545_Tpk\406097\1520\rev9\406097\1\roadway\keysrd01Rev9.dgn



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0		58		250	
	0		279		637

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REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
09/14/07	KWJ	6 REVISED SHOULDER AND SLOPE	6/23/08	KWJ	8 MODIFIED SHOULDER & GUARDRAIL
2/01/08	KWJ	7 MODIFIED MAINLINE ALIGNMENT AROUND THE COMMERCIAL BLVD INTERCHANGE			

Kimley-Horn and Associates, Inc.
Certificate Of Authorization No. 696
Kenneth W. Jackson, P.E.
License No. 50602
4431 Embarcadero Drive
West Palm Beach, Florida 33407

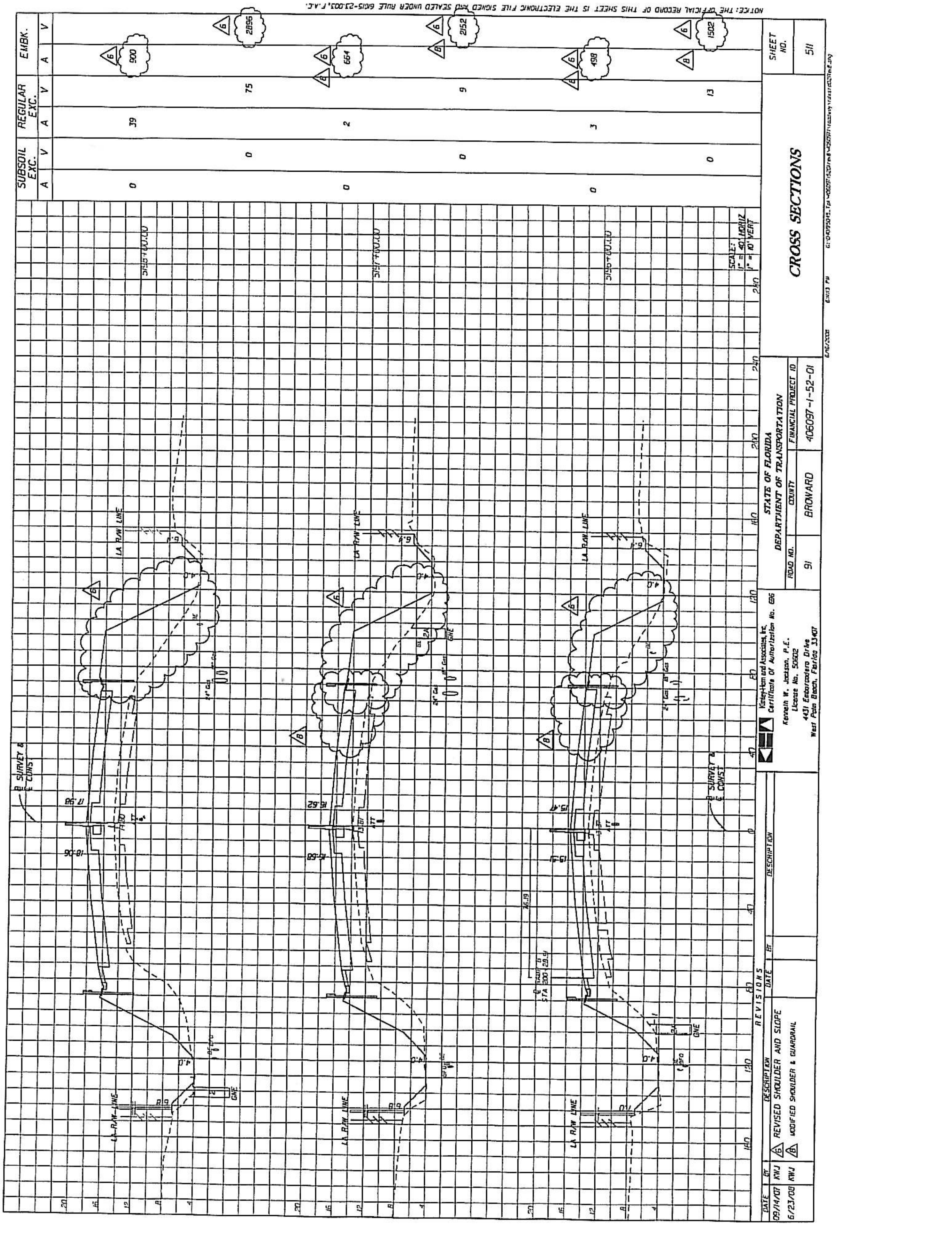
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
91	BROWARD	406097-1-52-01

CROSS SECTIONS

SHEET NO. 510

6/16/2008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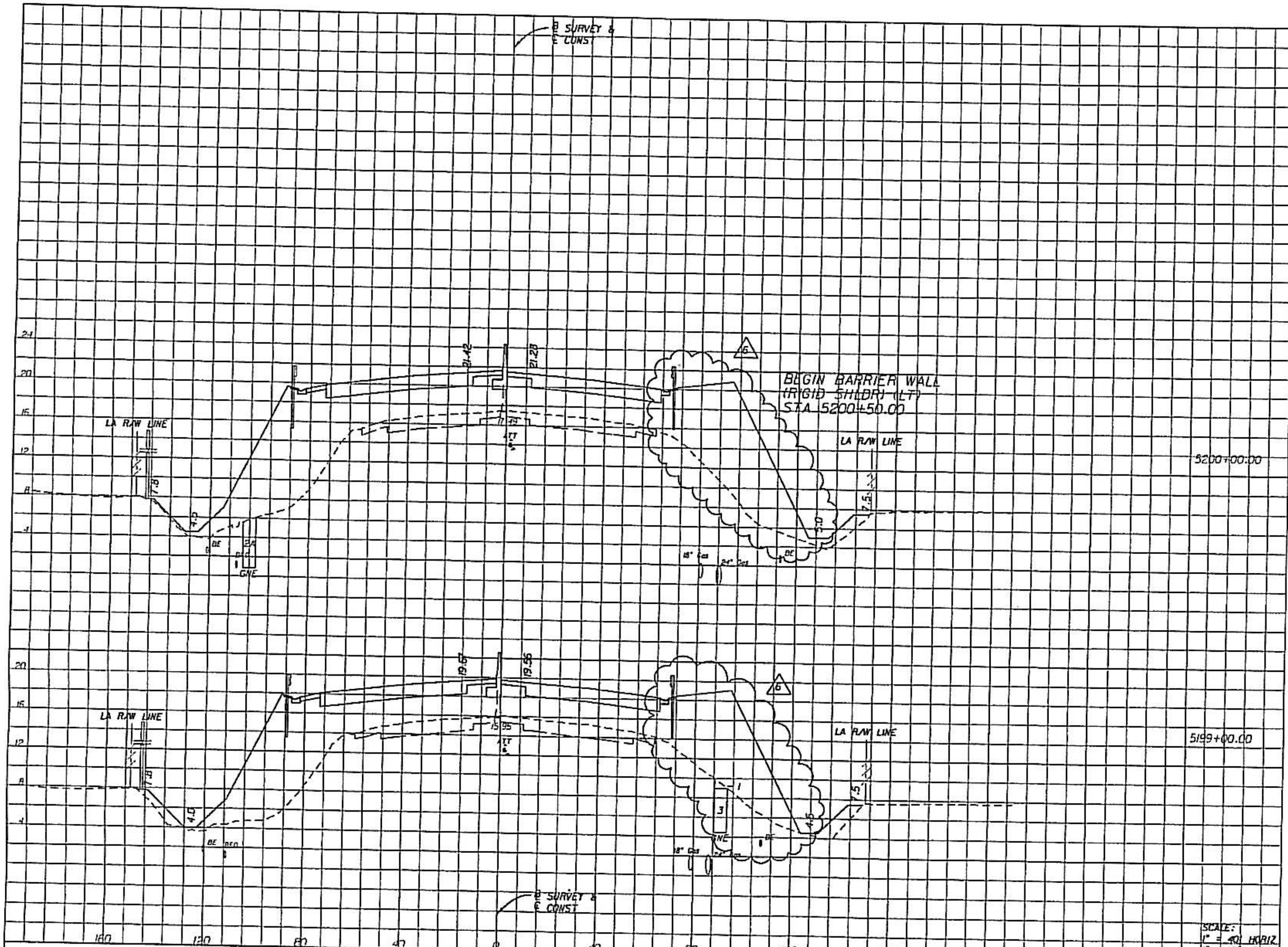
REGULAR EXC.
EMBK.
3158+00.00
3157+00.00
3156+00.00
SCALE: 1" = 40' HORIZ 1" = 10' VERT
LA R/W LINE
B SURVEY & ℄ CONST
CROSS SECTIONS
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD NO. 91
COUNTY BROWARD
FINANCIAL PROJECT ID 406097-1-52-01
SHEET NO. 511
Kimley-Horn and Associates, Inc. Certificate of Authorization No. 696
Kenneth W. Jackson, P.E. License No. 50602
4431 Embarcadero Drive West Palm Beach, Florida 33407
REVISIONS
09/14/07 KWJ REVISED SHOULDER AND SLOPE
6/23/08 KWJ MODIFIED SHOULDER & GUARDRAIL



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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
10/29/07	KWJ	6 REVISED SHOULDER AND SLOPE			

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License No. 50602
4431 Embarcadero Drive
West Palm Beach, Florida 33407

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
91	BROWARD	406097-1-52-01

CROSS SECTIONS

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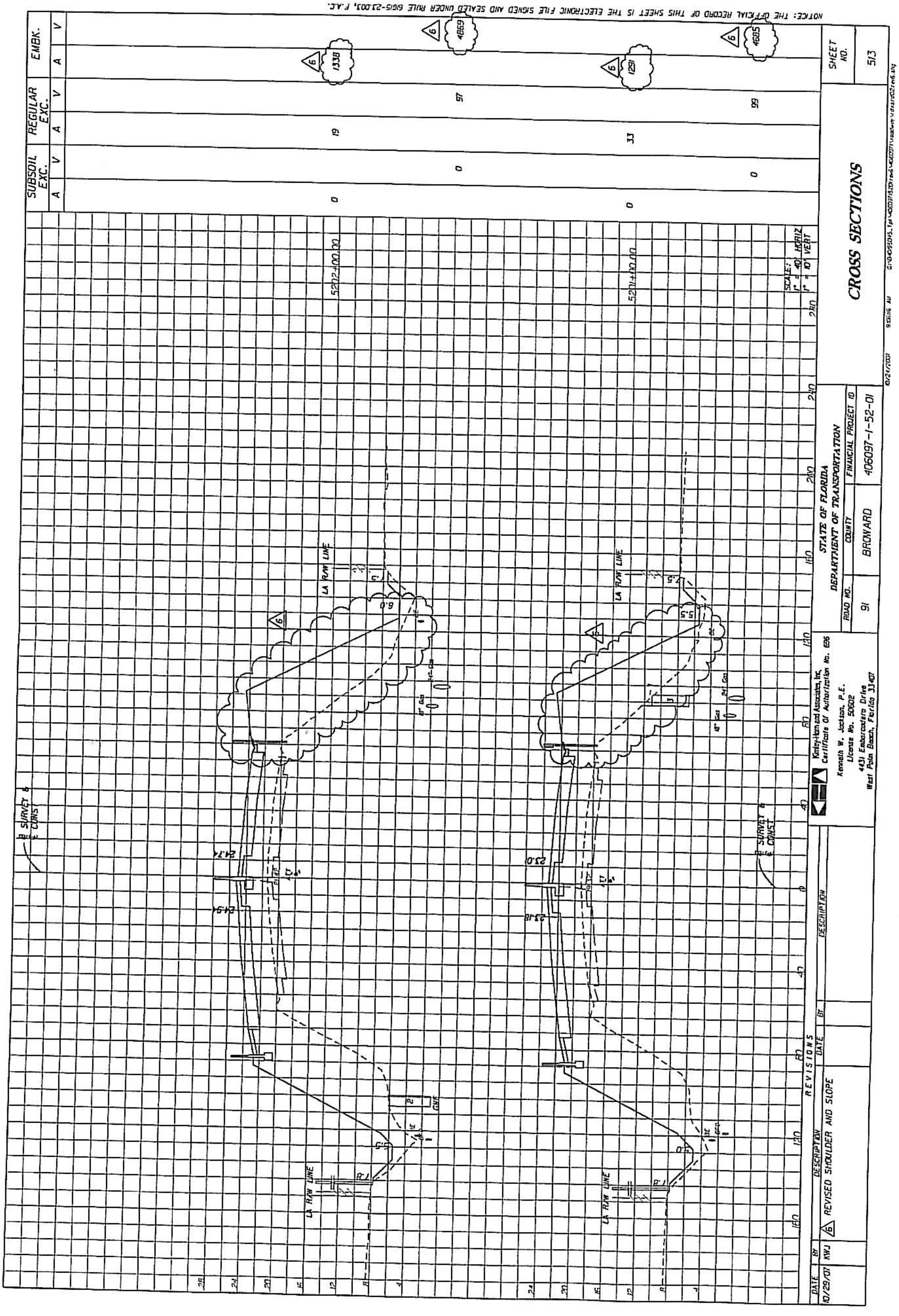
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1338
4869
1291
4685
19
97
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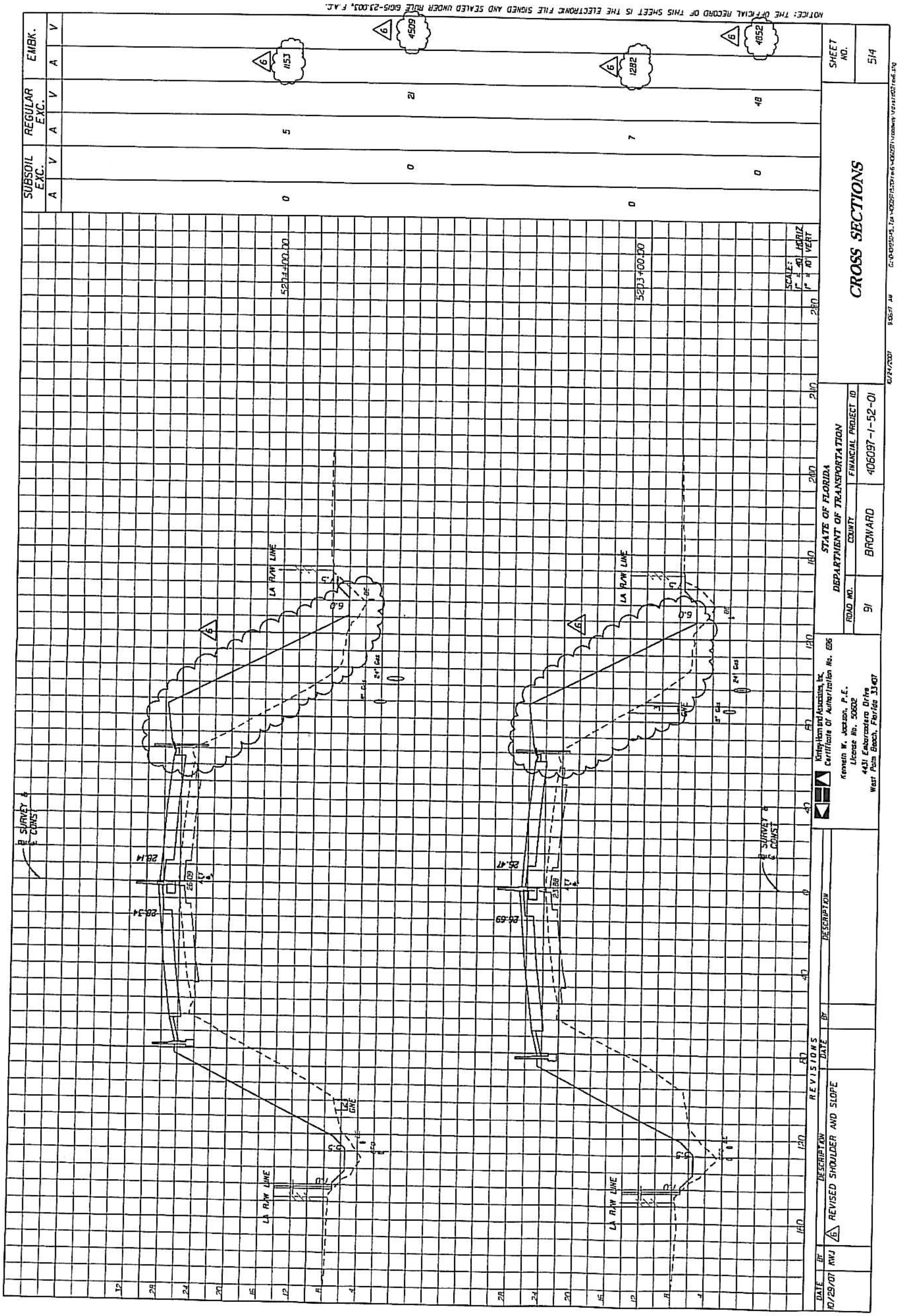
520+400.00
521+400.00
SCALE: 1" = 40' HORIZ 1" = 10' VERT
LA R/W LINE
SURVEY & CONST
24.1
23.0
21.9
23.18
6.0
5.5
120
80
40
0
40
80
120
160
200
240
280
REVISIONS
DATE
BY
DESCRIPTION
10/29/07
KWJ
REVISED SHOULDER AND SLOPE
Kimley-Horn and Associates, Inc.
Certificate Of Authorization No. 696
Kenneth W. Jackson, P.E.
License No. 50602
4431 Embarcadero Drive
West Palm Beach, Florida 33407
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
ROAD NO.
COUNTY
FINANCIAL PROJECT ID
91
BROWARD
406097-1-52-01
CROSS SECTIONS
SHEET NO.
513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1282
4852
SCALE: 1" = 40' HORIZ 1" = 10' VERT
LA R/W LINE
6.0
24" Gas
28.34
26.09
28.14
25.88
25.47
26.69
SURVEY & CONST
REVISED SHOULDER AND SLOPE
10/29/07
KWJ
REVISIONS
DATE
BY
DESCRIPTION
Kimley-Horn and Associates, Inc.
Certificate Of Authorization No. 696
Kenneth W. Jackson, P.E.
License No. 50602
4431 Embarcadero Drive
West Palm Beach, Florida 33407
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
ROAD NO.
COUNTY
FINANCIAL PROJECT ID
91
BROWARD
406097-1-52-01
CROSS SECTIONS
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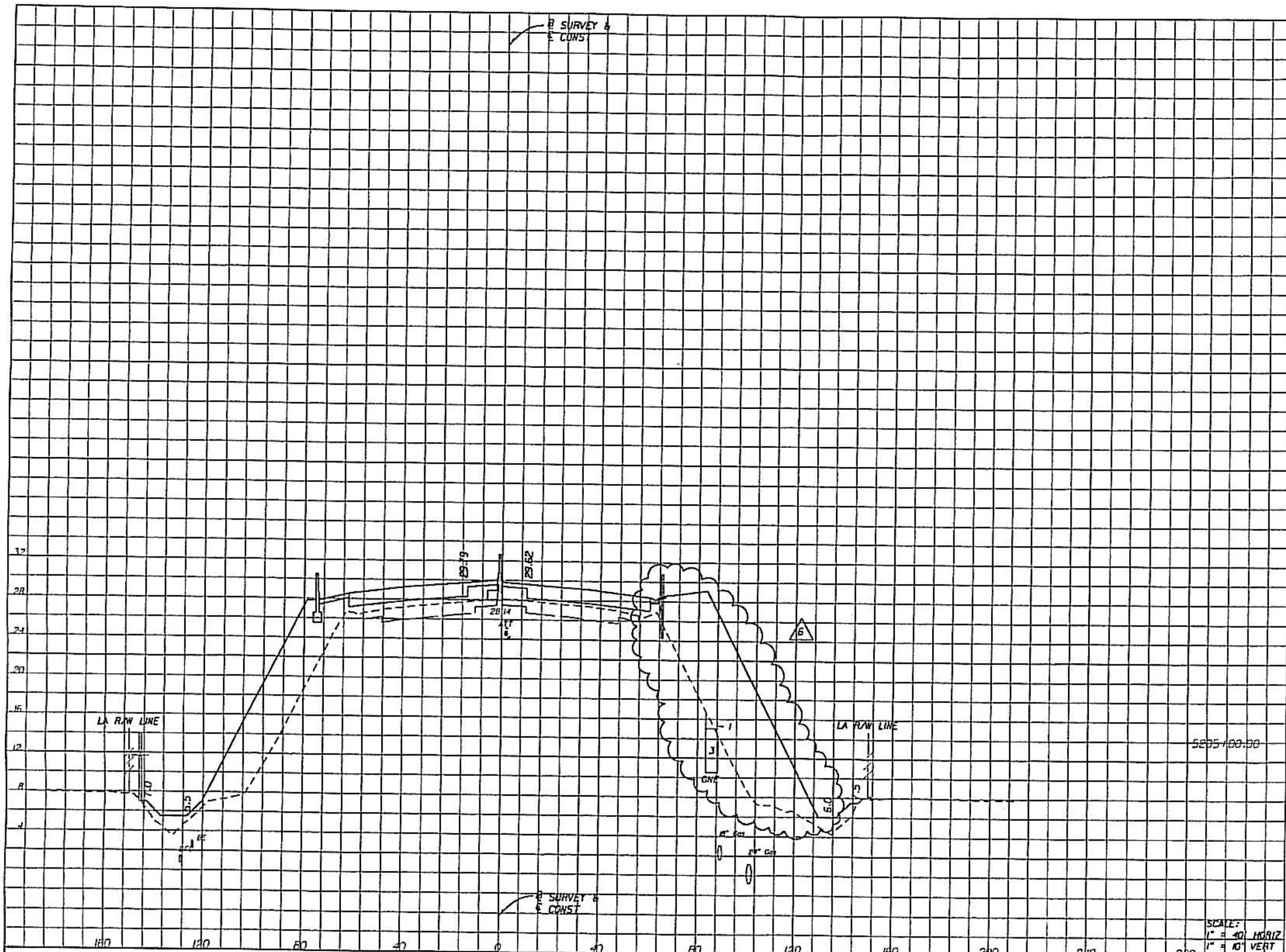

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REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
10/29/07	KWJ	6 REVISED SHOULDER AND SLOPE			

Kimley-Horn and Associates, Inc.
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West Palm Beach, Florida 33407

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
91	BROWARD	406097-1-52-01

CROSS SECTIONS

SHEET NO. 515

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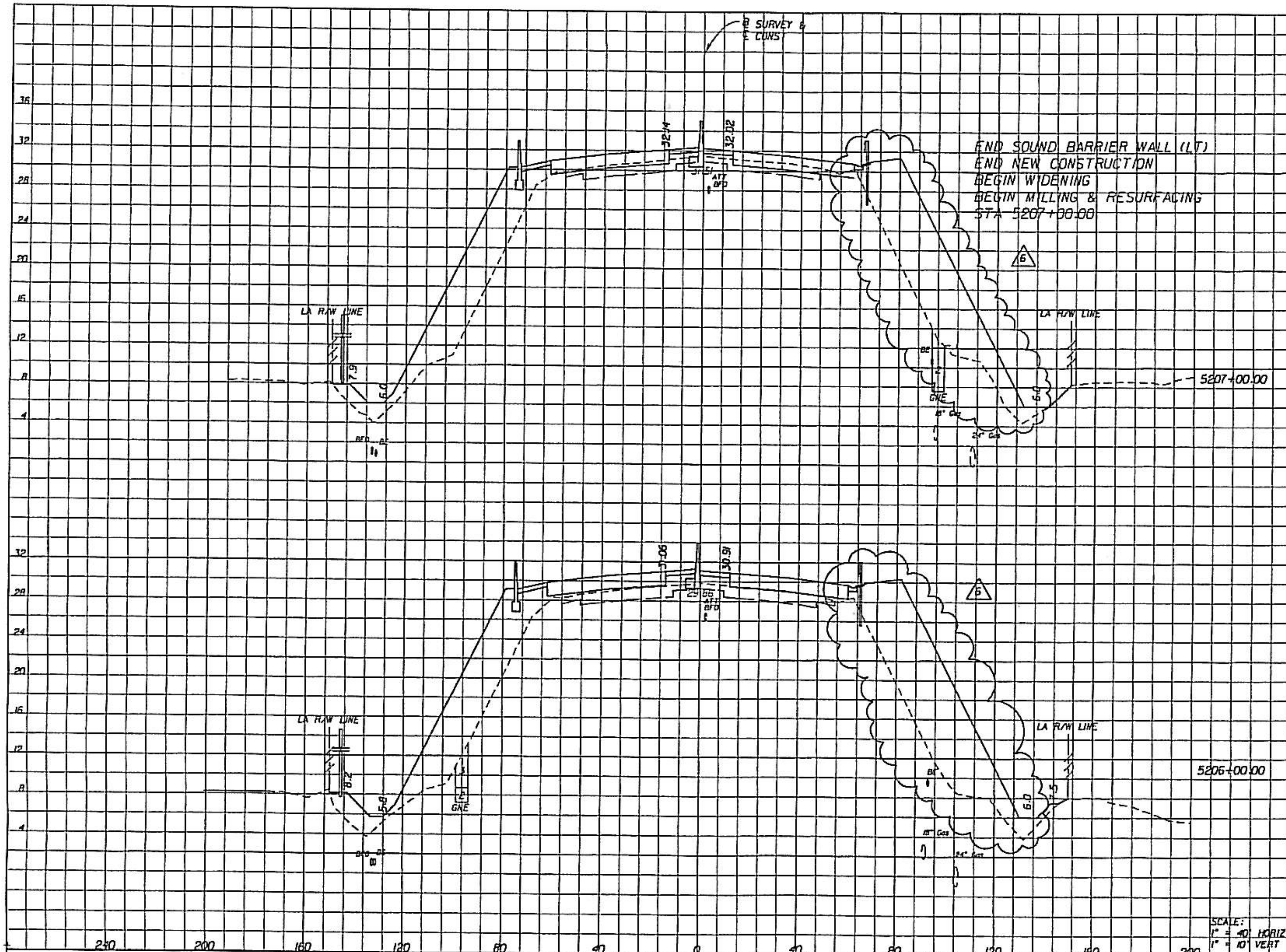

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
10/29/07	KWJ	6 REVISED SHOULDER AND SLOPE			

Kimley-Horn and Associates, Inc.
Certificate Of Authorization No. 696
Kenneth W. Jackson, P.E.
P.E. License No. 50602
4431 Embarcadero Drive
West Palm Beach, Florida 33407

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
91	BROWARD	406097-1-52-01

CROSS SECTIONS

SHEET NO. 516

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Attachment 5 – Credentials and Resume

Credentials

Carrol Fowler graduated from the University of South Florida in 1978 and is a Chief Scientist with, and President of, KB Environmental Sciences, Inc. Mrs. Fowler is certified by the FDOT to perform traffic noise analysis (Certificate No. 27) and has been performing this type of analysis for more than 30 years. The vast majority of projects for which she has provided such services have been FDOT-sponsored or reviewed. She is also a long-standing member of FDOT's Noise Task Team, a team that consists of representatives of each of FDOT's District offices and a few select consultants.

References: Jeff James, FDOT D1 – Jeffrey.W.James@dot.myflorida.com
Bill Walsh, FDOT D5 – William.Walsh@dot.myflorida.com
Robin Rhinesmith, FDOT D7 – Robin.Rhinesmith@dot.myflorida.com

Resume

Provided on the following page.

L. Carrol Fowler

KB Environmental Sciences

Chief Scientist

Mrs. Fowler works from KB Environmental Sciences, Inc. office in St. Petersburg. Her noise expertise encompasses field monitoring to establish background levels and computer simulation to establish both existing and future conditions. She is considered an expert in the technical analysis of the traffic noise effects of proposed roadway projects. She has a thorough knowledge of numerous environmental impact prediction tools (e.g., computer models and screening tools). These models include the Federal Highway Administration's Traffic Noise Model (TNM) for highway traffic noise/noise barrier assessments and the Federal Aviation Administration's Integrated Noise Model for airport assessments.

Expertise

- Traffic noise analysis to support highway improvement projects.

Experience

- A total of 32 years
- 7.5 years with KBE
- 19.5 years with other private consulting firms
- Five years with a government regulatory agency

Education

- BA, 1978
  Geography
  University of South Florida

Certifications / Professional Affiliations

- Highway Noise Analyst - Florida Department of Transportation (FDOT) 1994 – Certificate No. 27
- National and Florida Association of Environmental Professionals

Mrs. Fowler is a long-standing member of the Florida Department of Transportation's Noise Task Team and has, on behalf of the Department, demonstrated the use of the TNM.

Representative Projects – Discipline Management and/or Technical Analysis

Project Highlights

- Interstate 75 (I-75) Project Development and Environment (PD&E) Study from north of University Parkway to north of Moccasin Wallow Road, FDOT District 1, Manatee County, FL–Traffic Noise Analyst who provided discipline management and technical analysis to upgrade the existing six-lane, limited access interstate to a 10-lane four-roadway system. Within the project limits, 898 noise sensitive sites were determined to have the potential to be impacted by traffic noise with the improvements. The sites were comprised of single-and multi-family residences, a recreational vehicle (RV) park, a cemetery, a regional park, playgrounds within several of the residential communities, hotel, restaurants with outdoor dining, and a golf course. Noise barriers were determined to be both a potentially feasible and reasonable abatement measure for eight residential areas and the RV park.
- I-75 from Golden Gate Parkway to Colonial Boulevard, FDOT District 1, Collier and Lee Counties, FL-Traffic Noise Analyst who provided discipline management and technical analysis for this design-build project. After a final determination of acoustic feasibility and cost reasonableness, noise barriers were constructed to abate traffic noise levels for five residential communities and a park (at a cost of approximately ten million dollars).

- I-75 from north of Moccasin Wallow Road to US 301, FDOT District 7, Manatee and Hillsborough Counties, FL- Both interim and ultimate improvements were evaluated for this segment of Interstate 75. The interim improvements studied would upgrade three interchanges and have minimal noise-related impacts while the ultimate improvements would improve existing interchanges, consider possible new interchanges, and increase the capacity of the mainline through lanes. Noise sensitive sites within this project corridor comprised 979 sites (single family residences, common use pools, an assisted living facility, and a recreational area at a high school). Noise barriers were determined to be both potentially acoustically feasible and cost reasonable to abate traffic noise for from 384 to 828 of the impacted sites depending on barrier height. The estimated cost of the barriers ranged from $13 to $22 million.
- Ben C. Pratt/Six Mile Cypress Parkway, FDOT District 1, Lee County, FL-The Lee County Department of Transportation evaluated the widening of the last two – lane section of Ben C. Pratt/Six Mile Cypress Parkway in Fort Myers, Florida. Within the project corridor there were four noise sensitive areas comprised of single-family residences, a common use tennis court (recreational area) and an open air structure at the Six Mile Cypress Slough Preserve used for public educational purposes. Noise abatement measures were not considered for any of the noise sensitive sites because predicted levels with the roadway improvement did not approach, meet, or exceed the Federal Highway Administration's Noise Abatement Criteria.
- US 41 (SR 45) Intersection Improvements from 10th Street to 14th Street, FDOT, District 1, Sarasota, FL –This proposed project involved construction of roundabouts at two intersections. Although only a four block area comprised the study area, more than 75 noise sensitive sites were evaluated (including single- and multi-family residences, three active sports areas and three parks). Potential impacts were identified at 49 of the sites and noise abatement, in the form of a noise barrier, was determined to be both potentially acoustically feasible and cost reasonable to abate predicted levels at a multi-family residence.
- SR 29 from Cowboy Way to US 27, FDOT District 1, Hendry and Glades Counties, FL-The FDOT conducted a PD&E Study to evaluate upgrading this 2-lane facility to a 4-lane facility, including the addition of a new bridge over the Caloosahatchee River. Approximately 165 noise sensitive sites were evaluated. Several of the evaluated sites are considered "special" and evaluated as being so. These sites included a RV park, a courthouse, a library, a park, a municipal boat dock, and a playground. The results of the analysis indicated that noise barriers were a potential acoustically feasible and cost reasonable measure to abate predicted impacts at the RV park.

Other Project Experience

- SR 29 from Oil Well Road to SR 82
- SR 674 from US 301 to CR 579
- US 41 from Old US 41 to Corkscrew Road
- SR 70 from NE 80th Ave. to the County Line
- SR 31 from SR 80 to CR 78
- I-4 from west of Memorial Boulevard to Polk/Osceola County Line
- SR 64 from west of I-75 to East of Lorraine Road
- County Road 851 (CR 851) from CR 896 (Pine Ridge Rd) to CR 862 (Vanderbilt Beach Road)
- North/South Route (SR 563)

- CR 862 from CR 31 (Airport Pulling Road) to CR 951 (Collier Boulevard)
- Interstate 75 from SR 64 to Kay Road
- Bee Ridge Road from East of McIntosh Road to Cattlemen Road
- US 41 from CR 951 to CR 92
- SR 54 from Suncoast Parkway to US 41
- Lithia-Pinecrest Road from CR 39 to SR 60
- Big Bend Road from Covington Garden Drive to Simmons Loop
- SR 415 from Reed Ellis Road to Acron Lake Road
- SR 500 from US 192 to Country Boulevard
- SR 710 from SW Trail Drive to SR 76
- NW 7th Avenue Reversible Lane Project
- I-75 and I-4 (Downtown Interchange)
- SR 686 (East Bay Drive),
- SR 688 (Ulmerton Road)
- SR 45 (US 41)
- SR 699 (Blind Pass Road)
- US 19 (Pinellas County)
- Drew Street (Pinellas County)
- SR 54 from east of US41 to Cypress Creek Bridge (Pasco County)
- SR 39 (Hillsborough County)
- I-4 (Hillsborough County)
- East-West Roadway (Hillsborough County)
- SR 574 (Martin Luther King, Jr. Boulevard)
- US 301 from north of SR 674 to Gibsonton Drive
- SR 415 from Reed Ellis Road to Acorn Lake Road (Volusia County)
- SR 600 (Gandy Boulevard)
- CR 581 (Bruce B. Downs Boulevard,
- I-275 (Hillsborough County)
- I-75 (Hillsborough County)
- US 441 from SR 44 to SR 46