DRAFT MEMORANDUM

Date: January 29, 2019

To: Stephan Heimburg, PE, Hardesty & Hanover

From: Carrol Fowler, KB Environmental

Subject: **Financial Management Number 438547-1-22-01**
Air Quality Screening Test
Orlando South Ultimate Interchange
Florida's Turnpike (SR 91, MP 254) and Beachline Expressway (SR 528, MP 4)
Orange County

The proposed project is located in Orange County, an area currently designated by the U.S. Environmental Protection Agency (USEPA) to be an attainment area for all air pollutants for which there are National Ambient Air Quality Standards (NAAQS). Because the project is in an attainment area and the project would reduce congestion, it is not likely that the proposed improvements would have an impact on local or regional totals of air pollutants/pollutant precursor emissions or on concentrations of NAAQS-regulated pollutants in the ambient air. Additionally, because the project is in an attainment area, the State Implementation Plan conformity requirements of the Clean Air Act (CAA) are not applicable. Regardless, for the purpose of disclosure, the project alternatives were subjected to the FDOT's project level analysis for the air pollutant carbon monoxide (CO).

The project alternatives were subjected to a carbon monoxide (CO) screening model that makes various conservative worst-case assumptions related to site conditions, meteorology and traffic. The Florida Department of Transportation's (FDOT's) screening model for CO uses United States Environmental Protection Agency (USEPA) - approved software to produce estimates of one-hour and eight-hour CO at default air quality receptor locations. The one-hour and eight-hour estimates can be directly compared to the current one-and eight-hour NAAQS for CO.

The project-level analysis for the No-Build alternative and the Build alternative (Alternative 3) was performed using FDOT's screening test (CO Florida 2012). The alternatives were evaluated for both the opening year of the project (2025) and the project's design year (2045). To evaluate the effect of the project, the results of the screening test for both alternatives and both years were compared to the one- and eight-hour NAAQS for CO (35 and 9 parts per million [ppm], respectively).

In the year 2025 (the opening year of the project), the intersection forecast to have a combination of the highest approach volume and greatest delay in both the A.M. and P.M. peak periods is the intersection of Orange Blossom Trail and Landstreet Road. In the year 2045 (the project's design year), the intersection forecast to have a combination of the highest approach volume and greatest delay in both the A.M. and P.M. peak periods is the intersection of Orange Blossom Trail and Sand Lake Road (State Road 482). The traffic data that was used to determine which intersections should be subjected to the screening model (i.e., the intersections with the highest approach volume and greatest delay) was obtained from the *Systems Interchange Justification Report* (November 2019) that was prepared for the project's Project Development and Environment (PD&E) Study. The arterial speed (i.e., the intersection approach speed) assumed in the analysis was a nominal and conservatively low 20 miles-per-hour.

Based on the screening model results (**Table 1**), the highest predicted one- and eight-hour concentrations would not exceed the NAAQS for carbon monoxide regardless of alternative in either the opening or design year of the project. Therefore, the project "passes" the air quality screening test. The forecast traffic data used in the screening analysis and the detailed output from the screening test are provided in **Attachment A and Attachment B** of this Technical Memorandum, respectively.

Table 1
Results of the Carbon Monoxide (CO) Screening Model

Year	Intersection	Alternative	Maximum CO Levels (ppm)		Passes Screening Test?
			One Hour NAAQS/Project Concentration	Eight Hour NAAQS/Project Concentration	
2025	Orange Blossom Trail and Landstreet Road	No-Build	35 / 6.2	9 / 3.7	Yes
		Build	35 / 5.3	9 / 3.2	Yes
2045	Orange Blossom Trail and Sand Lake Road	No-Build	35 / 7.2	9 / 4.3	Yes
		Build	35 / 6.0	9 / 3.6	Yes

ATTACHMENT A
TRAFFIC DATA FOR
AIR QUALITY SCREENING TEST

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	390	580	480	110	460	120	2040	410	280	2200	30
Future Volume (vph)	200	390	580	480	110	460	120	2040	410	280	2200	30
Satd. Flow (prot)	1671	1759	1495	1588	1621	1495	1671	4803	1495	1671	4793	0
Flt Permitted	0.950			0.950	0.970		0.950			0.950		
Satd. Flow (perm)	1671	1759	1495	1588	1621	1495	1671	4803	1495	1671	4793	0
Satd. Flow (RTOR)			105			105			188		1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	211	411	611	505	116	484	126	2147	432	295	2316	32
Shared Lane Traffic (%)				38%								
Lane Group Flow (vph)	211	411	611	313	308	484	126	2147	432	295	2348	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	Free	Prot	NA	
Protected Phases	8	8	1	4	4	5	1	6		5	2	
Permitted Phases			8			4			Free			
Total Split (s)	42.0	42.0	28.0	36.0	36.0	30.0	28.0	72.0		30.0	74.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Act Effct Green (s)	35.2	35.2	63.2	29.2	29.2	59.2	21.2	65.2	180.0	23.2	67.2	
Actuated g/C Ratio	0.20	0.20	0.35	0.16	0.16	0.33	0.12	0.36	1.00	0.13	0.37	
v/c Ratio	0.65	1.20	1.03	1.22	1.18	0.86	0.64	1.23	0.29	1.37	1.31	
Control Delay	77.0	172.2	90.8	187.0	172.9	60.0	90.2	154.4	0.3	241.1	188.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	77.0	172.2	90.8	187.0	172.9	60.0	90.2	154.4	0.3	241.1	188.3	
LOS	E	F	F	F	F	E	F	F	A	F	F	
Approach Delay		115.6			127.4			126.8			194.2	
Approach LOS		F			F			F			F	

Intersection Summary	
Cycle Length: 180	
Actuated Cycle Length: 180	
Offset: 116 (64%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.37	
Intersection Signal Delay: 148.3	Intersection LOS: F
Intersection Capacity Utilization 114.3%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 9: Orange Blossom Trail & Landstreet Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	300	290	480	230	460	120	1700	320	250	2120	30
Future Volume (vph)	150	300	290	480	230	460	120	1700	320	250	2120	30
Satd. Flow (prot)	1671	1759	1495	1588	1635	1495	1671	4803	1495	1671	4793	0
Flt Permitted	0.950			0.950	0.978		0.950			0.950		
Satd. Flow (perm)	1671	1759	1495	1588	1635	1495	1671	4803	1495	1671	4793	0
Satd. Flow (RTOR)			105			107			188		1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	158	316	305	505	242	484	126	1789	337	263	2232	32
Shared Lane Traffic (%)				38%								
Lane Group Flow (vph)	158	316	305	313	434	484	126	1789	337	263	2264	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	Free	Prot	NA	
Protected Phases	8	8	1	4	4	5	1	6		5	2	
Permitted Phases			8			4			Free			
Total Split (s)	37.0	37.0	19.0	39.0	39.0	29.0	19.0	75.0		29.0	85.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Act Effct Green (s)	30.2	30.2	49.2	32.2	32.2	61.2	12.2	68.2	180.0	22.2	78.2	
Actuated g/C Ratio	0.17	0.17	0.27	0.18	0.18	0.34	0.07	0.38	1.00	0.12	0.43	
v/c Ratio	0.56	1.07	0.63	1.10	1.49	0.84	1.12	0.98	0.23	1.28	1.09	
Control Delay	77.6	140.0	43.3	148.2	282.9	56.1	183.3	58.7	0.3	208.5	96.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	77.6	140.0	43.3	148.2	282.9	56.1	183.3	58.7	0.3	208.5	96.2	
LOS	E	F	D	F	F	E	F	E	A	F	F	
Approach Delay		89.5			159.5			56.9			107.9	
Approach LOS		F			F			E			F	

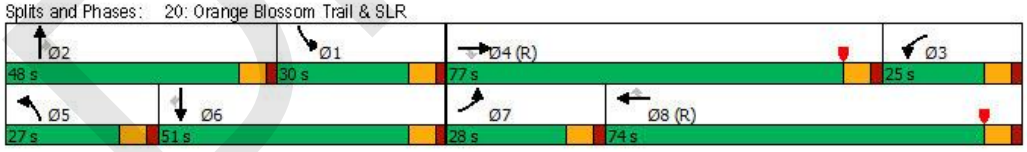
Intersection Summary	
Cycle Length: 180	
Actuated Cycle Length: 180	
Offset: 94 (52%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.49	
Intersection Signal Delay: 98.2	Intersection LOS: F
Intersection Capacity Utilization 106.1%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 9: Orange Blossom Trail & Landstreet Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	650	1600	950	560	3160	310	620	1880	730	720	1700	440
Future Volume (vph)	650	1600	950	560	3160	310	620	1880	730	720	1700	440
Satd. Flow (prot)	3335	4940	1538	3335	4940	1538	3335	4940	1538	3335	4940	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3335	4940	1538	3335	4940	1538	3335	4940	1538	3335	4940	1538
Satd. Flow (RTOR)			291			147			190			206
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	684	1684	1000	589	3326	326	653	1979	768	758	1789	463
Shared Lane Traffic (%)												
Lane Group Flow (vph)	684	1684	1000	589	3326	326	653	1979	768	758	1789	463
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Total Split (s)	28.0	77.0	77.0	25.0	74.0	74.0	27.0	48.0	48.0	30.0	51.0	51.0
Total Lost Time (s)	6.8	6.8	6.8	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8
Act Effct Green (s)	21.2	70.2	70.2	18.1	67.1	67.1	20.2	41.2	41.2	23.2	44.2	44.2
Actuated g/C Ratio	0.12	0.39	0.39	0.10	0.37	0.37	0.11	0.23	0.23	0.13	0.25	0.25
v/c Ratio	1.74	0.87	1.29	1.76	1.81	0.49	1.75	1.75	1.54	1.77	1.47	0.87
Control Delay	382.3	64.6	168.7	370.9	383.7	3.5	369.6	365.9	271.5	394.4	262.5	52.8
Queue Delay	0.0	47.6	3.5	0.7	0.0	0.0	0.3	0.0	0.5	0.0	0.0	53.0
Total Delay	382.3	112.2	172.2	371.6	383.7	3.5	369.8	365.9	272.0	394.4	262.5	105.9
LOS	F	F	F	F	F	A	F	F	F	F	F	F
Approach Delay		184.9			352.8			345.5			271.6	
Approach LOS		F			F			F			F	

Intersection Summary	
Cycle Length: 180	
Actuated Cycle Length: 180	
Offset: 114 (63%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.81	
Intersection Signal Delay: 293.2	Intersection LOS: F
Intersection Capacity Utilization 159.2%	ICU Level of Service H
Analysis Period (min) 15	

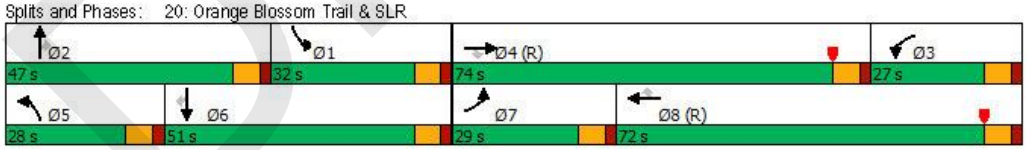
Splits and Phases: 20: Orange Blossom Trail & SLR



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	650	1280	920	560	2740	310	620	1430	730	720	1890	440
Future Volume (vph)	650	1280	920	560	2740	310	620	1430	730	720	1890	440
Satd. Flow (prot)	3335	4940	1538	3335	4940	1538	3335	4940	1538	3335	4940	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3335	4940	1538	3335	4940	1538	3335	4940	1538	3335	4940	1538
Satd. Flow (RTOR)			294			147			212			185
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	684	1347	968	589	2884	326	653	1505	768	758	1989	463
Shared Lane Traffic (%)												
Lane Group Flow (vph)	684	1347	968	589	2884	326	653	1505	768	758	1989	463
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Total Split (s)	29.0	74.0	74.0	27.0	72.0	72.0	28.0	47.0	47.0	32.0	51.0	51.0
Total Lost Time (s)	6.8	6.8	6.8	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8
Act Effct Green (s)	22.2	67.2	67.2	20.1	65.1	65.1	21.2	40.2	40.2	25.2	44.2	44.2
Actuated g/C Ratio	0.12	0.37	0.37	0.11	0.36	0.36	0.12	0.22	0.22	0.14	0.25	0.25
v/c Ratio	1.66	0.73	1.28	1.58	1.61	0.50	1.67	1.36	1.51	1.63	1.64	0.90
Control Delay	345.0	78.3	177.9	299.6	303.5	12.1	330.2	199.4	260.8	335.1	331.2	59.5
Queue Delay	0.0	2.3	8.5	0.0	1.0	0.0	20.3	0.0	0.2	0.0	0.0	8.5
Total Delay	345.0	80.6	186.4	299.6	304.5	12.1	350.6	199.4	261.1	335.1	331.2	68.0
LOS	F	F	F	F	F	B	F	F	F	F	F	E
Approach Delay		175.1			278.7			249.3			294.1	
Approach LOS		F			F			F			F	

Intersection Summary	
Cycle Length: 180	
Actuated Cycle Length: 180	
Offset: 93 (52%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.67	
Intersection Signal Delay: 251.9	Intersection LOS: F
Intersection Capacity Utilization 148.4%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 20: Orange Blossom Trail & SLR



ATTACHMENT B
SCREENING TEST RESULTS

CO Florida 2012 - Results
Wednesday, December 4, 2019

Project Description

Project Title	Orlando South Ultimate Interchange PD&E
Facility Name	OBT and Landstreet Road
User's Name	C Fowler
Run Name	2025 No Build
FDOT District	5
Year	2025
Intersection Type	E-W Freeway 4 X 4
Arterial Speed	20 mph
Max Approach Traffic	3620 vph

Environmental Data

Temperature	47.8 F
Reid Vapor Pressure	13.3 psi
Land Use	Suburban
Stability Class	D
Surface Roughness	108 cm
1 Hr. Background Concentration	3.3 ppm
8 Hr. Background Concentration	2.0 ppm

Results
(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	5.2	3.1
2	5.6	3.4
3	6.2	3.7
4	5.7	3.4
5	5.5	3.3
6	5.2	3.1
7	5.6	3.4
8	6.2	3.7
9	5.7	3.4
10	5.5	3.3
11	5.3	3.2
12	5.7	3.4
13	6.2	3.7
14	5.7	3.4
15	5.5	3.3
16	5.2	3.1
17	5.7	3.4
18	6.2	3.7
19	5.7	3.4
20	5.5	3.3

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**********PROJECT PASSES**********

CO Florida 2012 - Results
Wednesday, December 4, 2019

Project Description

Project Title	Orlando South Ultimate Interchange PD&E
Facility Name	OBT and Landstreet Road
User's Name	C Fowler
Run Name	2025 Build
FDOT District	5
Year	2025
Intersection Type	E-W Freeway 4 X 4
Arterial Speed	20 mph
Max Approach Traffic	2400 vph

Environmental Data

Temperature	47.8 F
Reid Vapor Pressure	13.3 psi
Land Use	Suburban
Stability Class	D
Surface Roughness	108 cm
1 Hr. Background Concentration	3.3 ppm
8 Hr. Background Concentration	2.0 ppm

Results
(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	4.6	2.8
2	4.8	2.9
3	5.3	3.2
4	4.9	2.9
5	4.7	2.8
6	4.6	2.8
7	4.8	2.9
8	5.3	3.2
9	4.9	2.9
10	4.7	2.8
11	4.6	2.8
12	4.9	2.9
13	5.3	3.2
14	4.9	2.9
15	4.7	2.8
16	4.6	2.8
17	4.9	2.9
18	5.3	3.2
19	4.9	2.9
20	4.7	2.8

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**********PROJECT PASSES**********

CO Florida 2012 - Results
Wednesday, December 4, 2019

Project Description

Project Title	Orlando South Ultimate Interchange PD&E
Facility Name	OBT and SLR (SR 482)
User's Name	C Fowler
Run Name	2045 No Build
FDOT District	5
Year	2045
Intersection Type	E-W Freeway 4 X 4
Arterial Speed	20 mph
Max Approach Traffic	5340 vph

Environmental Data

Temperature	47.8 F
Reid Vapor Pressure	13.3 psi
Land Use	Suburban
Stability Class	D
Surface Roughness	108 cm
1 Hr. Background Concentration	3.3 ppm
8 Hr. Background Concentration	2.0 ppm

Results
(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	6.1	3.7
2	6.4	3.8
3	7.1	4.3
4	6.5	3.9
5	6.2	3.7
6	6.1	3.7
7	6.4	3.8
8	7.1	4.3
9	6.5	3.9
10	6.2	3.7
11	6.1	3.7
12	6.4	3.8
13	7.2	4.3
14	6.5	3.9
15	6.2	3.7
16	6.1	3.7
17	6.5	3.9
18	7.1	4.3
19	6.5	3.9
20	6.2	3.7

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**********PROJECT PASSES**********

CO Florida 2012 - Results
Wednesday, December 4, 2019

Project Description

Project Title	Orlando South Ultimate Interchange PD&E
Facility Name	OBT and SLR (SR 482)
User's Name	C Fowler
Run Name	2045 Build
FDOT District	5
Year	2045
Intersection Type	E-W Freeway 4 X 4
Arterial Speed	20 mph
Max Approach Traffic	3610 vph

Environmental Data

Temperature	47.8 F
Reid Vapor Pressure	13.3 psi
Land Use	Suburban
Stability Class	D
Surface Roughness	108 cm
1 Hr. Background Concentration	3.3 ppm
8 Hr. Background Concentration	2.0 ppm

Results
(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	5.2	3.1
2	5.5	3.3
3	5.9	3.5
4	5.5	3.3
5	5.3	3.2
6	5.2	3.1
7	5.5	3.3
8	5.9	3.5
9	5.5	3.3
10	5.3	3.2
11	5.2	3.1
12	5.5	3.3
13	6.0	3.6
14	5.5	3.3
15	5.3	3.2
16	5.2	3.1
17	5.6	3.4
18	5.9	3.5
19	5.6	3.4
20	5.3	3.2

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**********PROJECT PASSES**********