

Final Air Quality Technical Memorandum

**Project Development and Environment (PD&E) Study to Widen
Western Beltway (SR 429) from North of I-4/SR 429 Interchange
to Seidel Road**

Orange and Osceola Counties

Financial Project ID No. 446164-1-22-01

ETDM No. 14446

January 2023



Date: January 12, 2023
To: Michael Leo, PE, FTE Project Manager.
Prepared By: Mariano Berrios, Senior Transportation Specialist (RS&H, Inc.)
Project: Widening of Western Beltway (SR 429) from North of I-4/SR 429 Interchange to Seidel Road
Financial Project ID No. 446164-1-22-01
Orange and Osceola Counties, Florida
Subject: Air Quality Technical Memorandum

INTRODUCTION

The Florida Department of Transportation (FDOT), Florida's Turnpike Enterprise is evaluating improvements to the Western Beltway/State Road (SR) 429 from north of Interstate 4 (I-4) in Osceola County (Milepost 1) to the Seidel Road interchange (Milepost 11) in Orange County, a distance of approximately 10 miles (see Figure 1). The Western Beltway (SR 429) is part of a limited-access, tolled beltway around Orlando, and is part of the overall Florida's Turnpike system of tolled expressways. Western Beltway (SR 429) is currently a four-lane divided expressway with 10-foot paved outside shoulders and four-foot paved inside shoulders with guardrail in the median. Improvements being evaluated include widening from two to four lanes in each direction, incorporating interchange modifications and safety improvements along SR 429, adding, or upgrading Intelligent Transportation Systems (ITS), and adding a potential new interchange location at an extension of Livingston Road. An adjacent project, the Poinciana Parkway Extension Connector PD&E Study (Financial Project Identification Number [FPID] 446581-1-22-01) from County Road (CR) 532 to north of the I-4/SR 429 interchange will also evaluate improvements along SR 429 from the I-4 interchange to north of Sinclair Road. If Poinciana Parkway Extension Connector moves forward, the widening of Western Beltway (SR 429) will match that project north of Sinclair Road. However, in order to maintain independent utility, should the Poinciana Parkway Extension Connector not move forward, the Western Beltway widening would continue south of Sinclair Road to the I-4 interchange.

As part of this PD&E Study, the project has been reviewed for air quality impacts consistent with the guidance provided by Federal Highway Administration (FHWA) as described in Part 2, Chapter 19 of the FDOT PD&E Manual entitled Air Quality (dated July 1, 2020). The purpose of this Technical Memorandum is to document the findings of the air quality analysis.

Air Quality Analysis

The proposed project is located in Orange and Osceola Counties, Florida which are currently designated as being in attainment for the following criteria air pollutants: ozone, nitrogen dioxide, particulate matter (2.5 microns in size and 10 microns in size), and carbon monoxide; and designated as maintenance for sulfur dioxide and lead.

The Build and No Build 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 FDOT's screening model, CO Florida 2012, uses the United States Environmental Protection Agency (USEPA) software [Motor Vehicle Emission Simulator (MOVES) version 2010a and CAL3QHC] to produce estimates of one-hour and eight-hour CO concentrations at default air quality receptor locations. The one-hour and eight-hour estimates can be directly compared to the one- and eight-hour National Ambient Air Quality Standards for CO that are 35 parts per million (ppm) and 9 ppm, respectively.

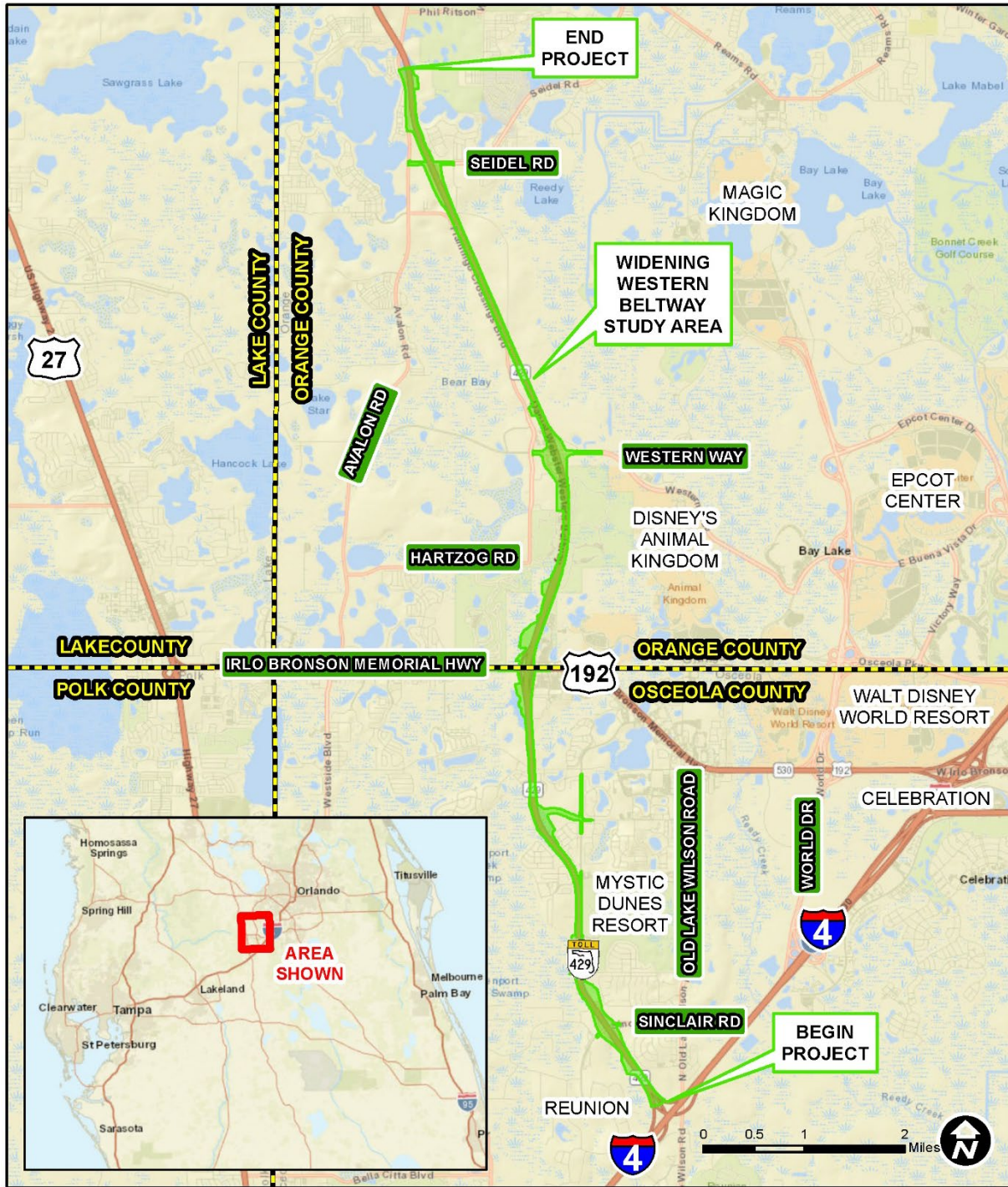
The highest total traffic volumes for the Build and No Build Alternatives are associated with the Western Beltway and Irlo Bronson Memorial Hwy./US 192 interchange. Both the Build and No Build Alternatives were evaluated for the project's design year 2050. The traffic data used in this evaluation is provided in Table 1, which was developed from the Preliminary Project Traffic Forecast Memorandum (PTFM) dated January 2021

Estimates of CO were predicted for the default receptors that are located 10 feet to 150 feet from the edge of the roadway. The results of the screening test are summarized in Table 2. Only the maximum one-hour and eight-hour CO concentrations are presented in this table. The results of the screening model are included as an attachment to this memorandum. Based on the results from the screening model, the highest project-related CO one- and eight-hour levels are not predicted to meet or exceed the one- or eight-hour National Ambient Air Quality Standards for this pollutant with either the Build or No Build Alternatives. As such, the project "passes" the screening model.

The project is located in an area which is designated in attainment for CO Ambient Air Quality Standards under the criteria provided in the Clean Air Act. Therefore, the Clean Air Act conformity requirements as related to transportation improvements do not apply to the project.

Construction activities will cause short-term air quality impacts in the form of dust from earthwork and unpaved roads. These impacts will be minimized by adherence to all applicable State and local regulations and to the FDOT Standard Specifications for Road and Bridge Construction.

Figure 1: Project Location Map



	<p>PROJECT DEVELOPMENT AND ENVIRONMENT (PD&E) STUDY TO WIDEN THE WESTERN BELTWAY from I-4 to Seidel Road Orange and Osceola Counties FPID No.: 446164-1-22-01</p>	<p>PROJECT LOCATION MAP</p>
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Table 1: Traffic Data for Air Quality Analysis

Roadway Type	Roadway Name	Roadway Segment	2050	
			Vehicles Per Hour	Cruise Speed (mph)
No Build Alternative				
North/South Freeway	Western Beltway (SR 429)	Northbound Approach	3,920	65
		Southbound Approach	6,080	65
East/West Principal Arterial	Irlo Bronson Memorial Hwy./US 192	Eastbound Approach	2,870	45
		Westbound Approach	3,850	45
Build Alternative				
North/South Freeway	Western Beltway (SR 429)	Northbound Approach	4,210	65
		Southbound Approach	6,770	65
East/West Principal Arterial	Irlo Bronson Memorial Hwy./US 192	Eastbound Approach	2,820	45
		Westbound Approach	3,550	45

Source: Preliminary Project Traffic Forecast Memorandum (January 2021)

Table 2: Predicted CO Concentrations

Alternative	Design Year	Receptor Site Number(s)	Maximum One-Hour CO Concentration (ppm)	Maximum Eight-Hour CO Concentration (ppm)
Western Beltway (SR 429) and Irlo Bronson Memorial Hwy./US 192 Interchange				
No Build	2050	6, 7, 16 & 17	8.4	5.0
Build	2050	6, 7, 16, & 17	8.0	4.8

Note: * The predicted worst-case one-hour and eight-hour CO concentrations for the No Build and Build Alternatives are below the NAAQS of 35 ppm for one-hour concentrations and 9 ppm for eight-hour concentrations

Mobile Source Air Toxics

For the preferred alternative analyzed in the State Environmental Impact Report (SEIR) for this PD&E Study, the amount of mobile source air toxics (MSAT) emitted would be proportional to the vehicle

miles traveled (VMT), if other variables such as fleet mix are the same for each alternative. The VMT estimated for the Build Alternative is slightly higher than that for the No Build Alternative because the additional capacity increases the efficiency of the roadway and may attract traffic from other facilities in the transportation network. Refer to Table 3 Annual Average Daily Traffic (AADT) and VMT along the Western Beltway (SR 429). For the section between Sinclair Rd. and Irlo Bronson Memorial Hwy./US 192, the new interchange at Livingston Rd. breaks the No-Build VMT into two separate Build sections, Sinclair Rd. to Livingston Rd. and Livingston Rd. to Irlo Bronson Memorial Hwy./US 192.

An increase in VMT would lead to higher MSAT emissions for the preferred alternative along the SR 429 corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset by lower MSAT emission rates due to increased speeds; according to the Environmental Protection Agency’s (EPA) MOVES2014a model, emissions of all priority MSAT decrease as speed increases. Also, emissions for the preferred build alternative will likely be lower than present levels in the design year because of EPA’s national control programs that are projected to reduce annual MSAT emissions by over 90 percent between 2010 and 2050, as shown in Figure 2.

Table 3: Annual Average Daily Traffic (AADT) and VMT along the Western Beltway (SR 429)

Location	No-Build	Build	Length (miles)*	No-Build	Build	% Change
	2050 AADT**			2050 VMT		
I-4 to Sinclair Road	45,300	49,700	1.1	49,830	54,670	9.7
Sinclair Rd. to Livingston Rd.	45,000	47,000	2.5	112,500	117,500	4.4
Livingston Rd. to Irlo Bronson Memorial Hwy./US 192		50,300	1.4	63,000	70,420	11.8
Irlo Bronson Memorial Hwy./US 192 to Western Way	50,400	53,000	2.2	110,880	116,600	5.1
Western Way to Seidel Road	62,300	64,000	3.1	193,130	198,400	2.7

*Lengths were measured from the center of interchange to interchange / location

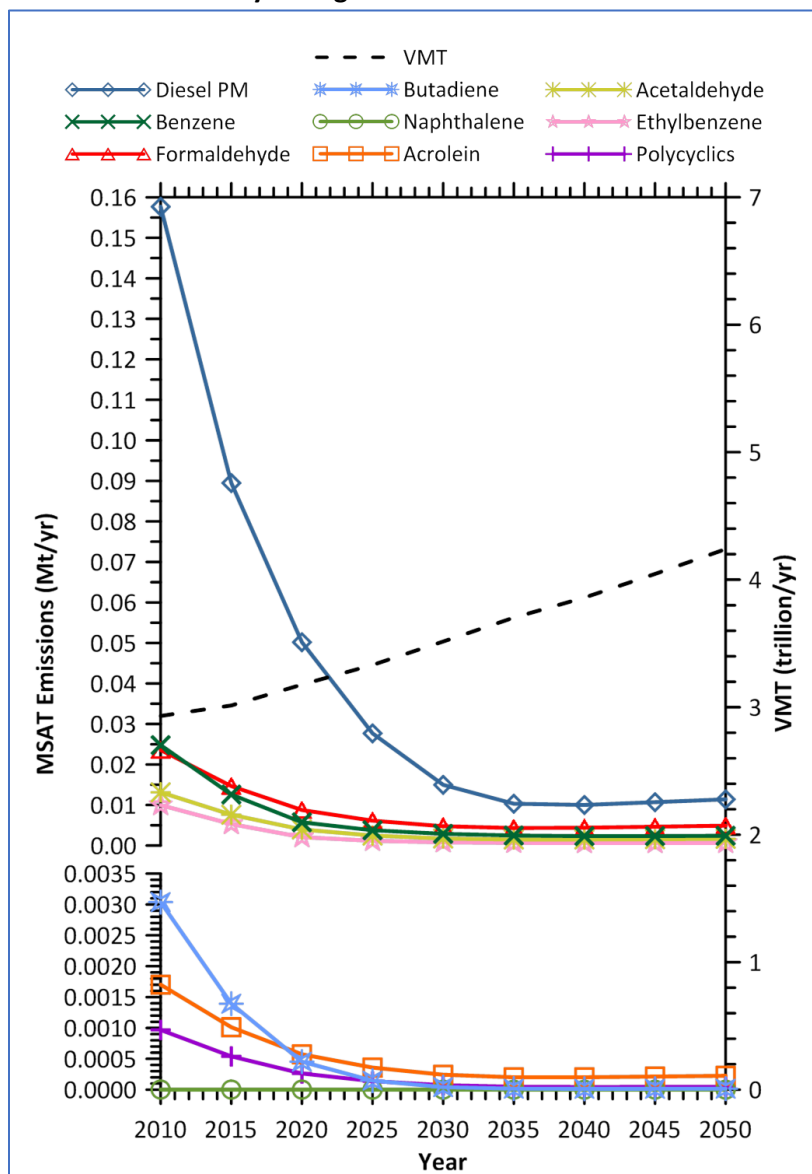
**2050 AADT from the Preliminary Traffic Forecasting Memo dated January 2021

Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is substantial (even after accounting for VMT growth) and should result in MSAT emissions in the project area to be lower in the future in nearly all cases.

The proposed improvements may have the effect of moving some traffic closer to nearby populated areas; therefore, there may be localized areas where ambient concentrations of MSAT could be higher under the Build Alternatives than the No-Build Alternative. However, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot reliably be quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. In sum, when a highway is widened, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No-Build Alternative, but this could be offset due to increases in speeds and reductions in congestion

(which are associated with lower MSAT emissions). Also, MSAT will be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region wide MSAT levels to be significantly lower than today.

Figure 2: FHWA Projected National MSAT Emission Trends 2010-2050 for Vehicles Operating on Roadways using EPA's MOVES2014a Model



Source: EPA MOVES2014a model runs conducted by FHWA, September 2016.

ATTACHMENTS

Air Quality Screening Results

CO Florida 2012

CO Florida 2012 - Results
 Tuesday, October 11, 2022

Project Description

Project Title Western Beltway (SR 429) Widening
 Facility Name SR 429
 User's Name Mariano Berrios
 Run Name 2050 PM No-Build Alternative
 FDOT District 5
 Year 2050
 Intersection Type N-S Diamond
 Speed Arterial 45 mph Freeway 65 mph
 Approach Traffic Arterial 3850 vph Freeway 6080 vph

Environmental Data

Temperature 47.8 °F
 Reid Vapor Pressure 13.3 psi
 Land Use Urban
 Stability Class D
 Surface Roughness 175 cm
 1 Hr. Background Concentration 5.0 ppm
 8 Hr. Background Concentration 3.0 ppm

Results

(ppm, including background CO)		
Receptor	Max 1-Hr	Max 8-Hr
1	8.0	4.8
2	6.7	4.0
3	7.9	4.7
4	7.5	4.5
5	7.4	4.4
6	8.4	5.0
7	8.4	5.0
8	8.0	4.8
9	6.2	3.7
10	7.6	4.6
11	8.0	4.8
12	6.7	4.0
13	7.8	4.7
14	7.4	4.4
15	7.3	4.4
16	8.4	5.0
17	8.4	5.0
18	8.0	4.8
19	6.2	3.7
20	7.6	4.6

 *****PROJECT PASSES*****
 NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED

CO Florida 2012 - Results
 Tuesday, October 11, 2022

Project Description

Project Title Western Beltway (SR 429) Widening
 Facility Name SR 429
 User's Name Mariano Berrios
 Run Name 2050 PM Build Alternative
 FDOT District 5
 Year 2050
 Intersection Type N-S Diamond
 Speed Arterial 45 mph Freeway 65 mph
 Approach Traffic Arterial 3550 vph Freeway 6770 vph

Environmental Data

Temperature 47.8 °F
 Reid Vapor Pressure 13.3 psi
 Land Use Urban
 Stability Class D
 Surface Roughness 175 cm
 1 Hr. Background Concentration 5.0 ppm
 8 Hr. Background Concentration 3.0 ppm

Results (ppm, including background CO)		
Receptor	Max 1-Hr	Max 8-Hr
1	7.9	4.7
2	6.5	3.9
3	7.6	4.6
4	7.2	4.3
5	7.2	4.3
6	8.0	4.8
7	8.0	4.8
8	7.6	4.6
9	6.1	3.7
10	7.7	4.6
11	7.9	4.7
12	6.5	3.9
13	7.5	4.5
14	7.1	4.3
15	7.1	4.3
16	8.0	4.8
17	8.0	4.8
18	7.6	4.6
19	6.1	3.7
20	7.7	4.6

 *****PROJECT PASSES*****
 NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED
