DRAFT TECHNICAL REPORT
AIR QUALITY ANALYSIS

STATE ROAD 52

Submitted to:

FLORIDA DEPARTMENT OF TRANSPORTATION
Tallahassee, Florida

Submitted by:

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This report pertains to a 23-mile segment of State Road 52 (SR 52) between U.S. 19 and I-75 in Pasco County (see Figure 1 for a location map). SR 52 is presently a 2-lane rural highway within the project limits.

Vehicular traffic demands on SR 52 are projected to exceed the capacity of the existing 2-lane roadway. This deficiency has led to an awareness of the need for major improvements to the SR 52 corridor.

An assessment of the probable impacts of the proposed action on local air quality was conducted. The methodology utilized conforms to the Department's Guidelines for Microscale Analysis of Air Quality Near Highways in Florida. The TEXIN algorithm was used to determine projected CO concentrations. This computer model combines: 1) traffic analysis at an intersection; 2) MOBILE2, which provides vehicle carbon monoxide (CO) emission factors based on projected traffic characteristics; and 3) CALINE3, a finite line source dispersion model which processes data on roadway orientation and design, vehicle emission factors, traffic, and meteorological information to calculate the concentration of roadway-induced CO at specific receptors. CO projections were made using the worst probable meteorological conditions expected to result in the maximum possible 1-hour and 8-hour average concentrations at the selected receptor points. These conditions include an atmospheric stability class of D (neutral), a wind speed of 2 miles per hour (mph), an ambient air temperature of 52 degrees Fahrenheit (°F) and the worst wind angle for each receptor location. The default national averages were used for the vehicle age and mix parameters.

Due to the lack of appropriate empirical data regarding background CO concentrations in the area, a value of 1.5 parts per million (ppm) was assumed for both 1-hour and 8-hour calculations. This volume has been shown to be representative in similar suburban areas. A complete listing of input data is presented in Tables 1 through 10.

The average hourly traffic for the peak 8-hour period was determined to be approximately 75 percent of peak-hour traffic. Therefore, 8-hour concentrations were estimated by taking 75 percent of peak-hour

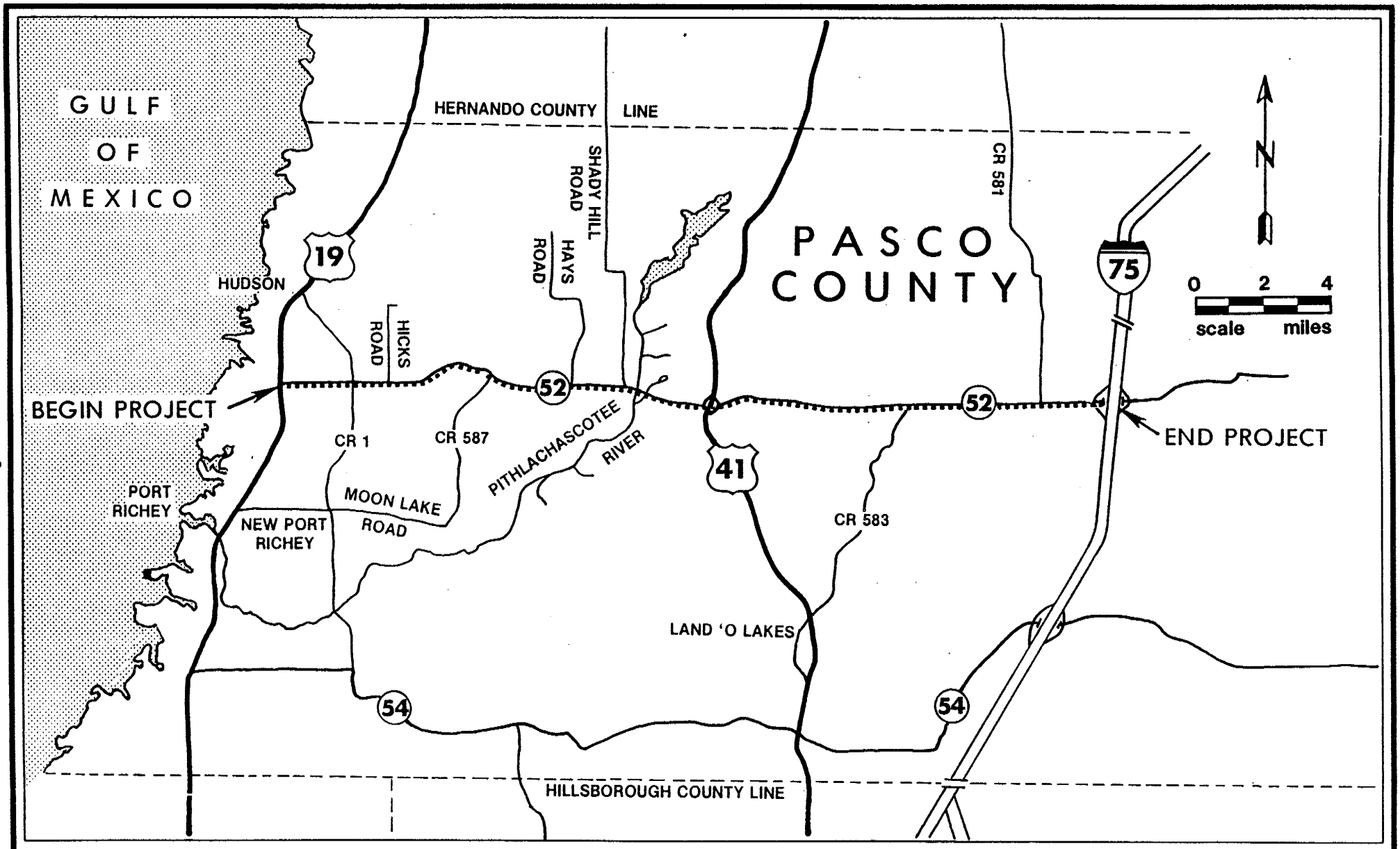

Figure 1
PROJECT LOCATION MAP

SOURCE: RS&H, 1986

SR 52 FROM SR 55
(U.S. 19) TO SR 93 (I-75)
IN PASCO COUNTY

concentrations. These values were then multiplied by a 0.6 persistence factor, since it is unlikely that the worst-case, 1-hour meteorological conditions would persist for 8 hours.

Based on an evaluation of traffic data, it was determined that the intersections of County Road 1 (CR 1) and U.S. 19 with SR 52 would be expected to experience the most severe air quality conditions. Therefore, detailed evaluation of CO concentrations was limited to these areas.

Due to the absence of any more sensitive sites in close proximity to the roadway, parking lots closest to each intersection were chosen as sites for the worst-case receptors. One receptor was placed in each quadrant of the intersection on the corner of the parking lot nearest the intersection. Table 11 gives the distance from each receptor to the nearest roadway edge.

CO concentrations were calculated for the existing facilities (1985), for the first year of operation (1990) build/no-build alternatives, and for design year (2010) build/no-build alternatives. The build alternative includes the recommended intersection improvements for CR 1 and U.S. 19 in addition to the widening of SR 52.

The results of the air quality analysis (Tables 12 and 13) indicate that the proposed action will not result in a violation of the national ambient air quality standards for maximum 1-hour (35 ppm) and 8-hour (9 ppm) CO concentrations. The maximum 1-hour and 8-hour concentrations projected for the build alternative at the SR 52/CR 1 intersection are 10.7 ppm and 5.6 ppm, respectively. The maximum 1-hour and 8-hour concentrations projected for the build alternative at the SR 52/U.S. 19 intersection are 10.2 ppm and 5.4 ppm, respectively. The 1990 and 2010 build alternative projections are lower than the projections for the no-build alternative due to improved traffic flow. The improved traffic flow at the intersections result in less excess emissions caused by idling, acceleration, and deceleration.

Although there is a National Ambient Air Quality Standard (NAAQS) for airborne lead, monitoring by the Florida Department of Environmental Regulation (FDER) has shown no recent violations of the standard in Florida. In addition, increasingly stringent U.S. Environmental Protection Agency regulations governing lead concentrations in gasoline are resulting in significantly lower measured lead levels in Florida. Therefore, motor vehicle lead emissions from the study area will not have a significant effect on the environment, regardless of which alternative is chosen.

This project is in an area where the State Implementation Plan (SIP) does not contain any transportation control measures. Therefore, the conformity procedures of 23 CFR 770 do not apply. This project is in conformance with the SIP because it will not cause violations of air quality standards and will not interfere with any transportation control measures.

Construction activities may cause minor short-term air quality impacts in the form of dust from earthwork and unpaved roads and smoke from open burning. These impacts will be minimized by adherence to all state and local regulations and to the Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction.

Table 1. 1985 Existing CR 1/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	48	48	48	48
Vehicle/Hour	671	793	964	850
Speed (mph)	37	36	33	35
Through Lanes	1	1	1	1
L. Turn Lanes	1	1	1	1
R. Turn Lanes	1	1	1	1
Left Fraction	0.30	0.26	0.17	0.19
Right Fraction	0.11	0.17	0.24	0.16
Left Turn Signal	Yes	Yes	Yes	Yes

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)

Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 6

Source: RS&H, 1986.

Table 2. 1990 No-Build CR 1/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	48	48	48	48
Vehicle/Hour	855	1,505	1,140	1,340
Speed (mph)	36	9	16	12
Through Lanes	1	1	1	1
L. Turn Lanes	1	1	1	1
R. Turn Lanes	1	1	1	1
Left Fraction	0.33	0.21	0.18	0.14
Right Fraction	0.12	0.15	0.24	0.17
L. Turn Signal	Yes	Yes	Yes	Yes

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)

Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 6

Source: RS&H, 1986.

Table 3. 1990 Build CR 1/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	84	88	72	76
Vehicle/Hour	855	1,505	1,140	1,340
Speed (mph)	40	37	40	38
Through Lanes	2	2	2	2
L. Turn Lanes	2	2	1	1
R. Turn Lanes	1	1	1	1
Left Fraction	0.33	0.21	0.18	0.14
Right Fraction	0.12	0.15	0.24	0.17
L. Turn Signal	Yes	Yes	Yes	Yes

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)

Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 6

Source: RS&H, 1986.

Table 4. 2010 No-Build CR 1/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	48	48	48	48
Vehicle/Hour	1,160	2,170	1,580	1,930
Speed (mph)	15	5	8	5
Through Lanes	1	1	1	1
L. Turn Lanes	1	1	1	1
R. Turn Lanes	1	1	1	1
Left Fraction	0.31	0.21	0.18	0.14
Right Fraction	0.14	0.15	0.22	0.17
L. Turn Signal	Yes	Yes	Yes	Yes

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)

Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 6

Source: RS&H, 1986.

Table 5. 2010 Build CR 1/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	108	112	108	112
Vehicle/Hour	1,160	2,170	1,530	1,930
Speed (mph)	40	37	39	38
Through Lanes	3	3	3	3
L. Turn Lanes	2	2	2	2
R. Turn Lanes	1	1	1	1
Left Fraction	0.31	0.21	0.18	0.14
Right Fraction	0.14	0.15	0.23	0.17
L. Turn Signal	Yes	Yes	Yes	Yes

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)
Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 6

Source: RS&H, 1986.

Table 6. 1985 Existing U.S. 19/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	112	64	110	36
Vehicle/Hour	1,255	606	1,940	50
Speed (mph)	39	37	38	41
Through Lanes	3	1	3	1
L. Turn Lanes	2	2	1	1
R. Turn Lanes	1	0	1	0
Left Fraction	0.22	0.61	0.02	0.54
Right Fraction	0.01	0.34	0.18	0.36
L. Turn Signal	Yes	Yes	Yes	No

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)

Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 5

Source: RS&H, 1986.

Table 7. 1990 No-Build U.S. 19/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	112	64	110	36
Vehicle/Hour	2,235	1,705	2,270	75
Speed (mph)	37	7	37	40
Through Lanes	3	1	3	1
L. Turn Lanes	2	2	1	1
R. Turn Lanes	1	0	1	0
Left Fraction	0.17	0.57	0.03	0.53
Right Fraction	0.02	0.36	0.22	0.33
L. Turn Signal	Yes	Yes	Yes	No

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)
Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 5

Source: RS&H, 1986.

Table 8. 1990 Build U.S. 19/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	112	100	110	48
Vehicle/Hour	2,235	1,705	2,270	75
Speed (mph)	37	38	37	40
Through Lanes	3	1	3	1
L. Turn Lanes	2	3	1	1
R. Turn Lanes	1	1	1	1
Left Fraction	0.17	0.57	0.03	0.53
Right Fraction	0.02	0.36	0.22	0.33
L. Turn Signal	Yes	Yes	Yes	No

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)

Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 5

Source: RS&H, 1986.

Table 9. 2010 No-Build U.S. 19/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	112	64	110	36
Vehicle/Hour	3,225	2,460	3,210	90
Speed (mph)	35	5	35	40
Through Lanes	3	1	3	1
L. Turn Lanes	2	2	1	1
R. Turn Lanes	1	0	1	0
Left Fraction	0.17	0.57	0.02	0.56
Right Fraction	0.02	0.36	0.23	0.33
L. Turn Signal	Yes	Yes	Yes	No

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)
Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 5

Source: RS&H, 1986.

Table 10. 2010 Build U.S. 19/SR 52 Input Data

	Link Direction			
	North	East	South	West
Link	+Y	+X	-Y	-X
Center X (ft)	0	0	0	0
Center Y (ft)	0	0	0	0
End X (ft)	0	1,000	0	-1,000
End Y (ft)	1,000	0	-1,000	0
Roadway Width (ft)	124	100	110	48
Vehicle/Hour	3,225	2,460	3,210	90
Speed (mph)	35	36	35	40
Through Lanes	3	1	4	1
L. Turn Lanes	2	3	1	1
R. Turn Lanes	1	1	1	1
Left Fraction	0.17	0.57	0.02	0.56
Right Fraction	0.02	0.36	0.23	0.33
L. Turn Signal	Yes	Yes	Yes	No

Roadway Height [feet (ft)] = 0
Vertical Alignment = 1
Roughness = 108 centimeter (cm)
Temperature = 52°F
Cycle Length = 120 second (sec.)
Wind Speed = 2 miles per hour (mph)
% Cold Start = 21
% Hot Start = 27
Signal Phases = 5

Source: RS&H, 1986.

Table 11. Receptor Locations for Air Quality Analysis

Intersection of SR 52 and U.S. 19 for the No-Build Alternative
Receptor 1: 20 feet north of SR 52; 50 feet east of U.S. 19.
Receptor 2: 25 feet south of SR 52; 35 feet east of U.S. 19.
Receptor 3: 30 feet south of SR 52; 40 feet west of U.S. 19.
Receptor 4: 30 feet north of SR 52; 45 feet west of U.S. 19.
Intersection of SR 52 and U.S. 19 for the Build Alternative
Receptor 1: same as no-build alternative.
Receptor 2: 15 feet south of SR 52; 35 feet east of U.S. 19.
Receptor 3: same as no-build alternative.
Receptor 4: same as no-build alternative.
Intersection of SR 52 and CR 1 for the No-Build Alternative
Receptor 1: 40 feet north of SR 52; 30 feet east of CR 1.
Receptor 2: 60 feet south of SR 52; 25 feet east of CR 1.
Receptor 3: 30 feet south of SR 52; 25 feet west of CR 1.
Intersection of SR 52 and CR 1 for the Build Alternative
Receptor 1: 30 feet north of SR 52; 15 feet east of CR 1.
Receptor 2: 15 feet south of SR 52; 10 feet east of CR 1.
Receptor 3: 15 feet south of SR 52; 10 feet west of CR 1.

Source: RS&H, 1986.

Table 12. 1-Hour and 8-Hour Projected CO Concentrations (ppm) at the SR 52/CR 1 Intersection

Year	Receptor	Worst-Case Wind Angle†	Concentrations (ppm)* 1-Hour	8-Hour
Without Project				
1985	1	195	10.3	5.5
	2	335	8.5	4.7
	3	25	9.3	5.0
1990	1	195	10.3	5.5
	2	325	7.9	4.4
	3	75	10.5	5.6
2010	1	195	14.1	7.2
	2	290	11.6	6.0
	3	75	14.6	7.4
With Project				
1990	1	200	9.9	5.3
	2	300	10.1	5.3
	3	45	9.5	5.1
2010	1	200	10.6	5.7
	2	310	10.7	5.6
	3	75	10.5	5.6

*1-hour and 8-hour concentrations include a background of 1.5 ppm.
†Wind angles are in degrees from north.

Source: RS&H, 1986.

Table 13. 1-Hour and 8-Hour Projected CO Concentrations (ppm) at the SR 52/U.S. 19 Intersection

Year	Receptor	Worst-Case Wind Angle†	Concentrations (ppm)* 1-Hour	8-Hour
Without Project				
1985	1	225	12.6	6.5
	2	315	12.9	6.6
	3	75	11.9	6.2
	4	105	12.1	6.3
1990	1	105	12.0	6.2
	2	75	12.9	6.6
	3	80	12.9	6.6
	4	100	12.8	6.6
2010	1	105	14.3	7.3
	2	75	15.3	7.7
	3	80	14.4	7.3
	4	100	14.7	7.4
With Project				
1990	1	220	8.9	4.8
	2	335	8.8	4.8
	3	80	10.1	5.4
	4	100	10.2	5.4
2010	1	200	8.6	4.7
	2	340	8.5	4.7
	3	80	9.8	5.2
	4	100	9.6	5.1

*1-hour and 8-hour concentrations include a background of 1.5 ppm.
†Wind angles are in degrees from north.

Source: RS&H, 1986.