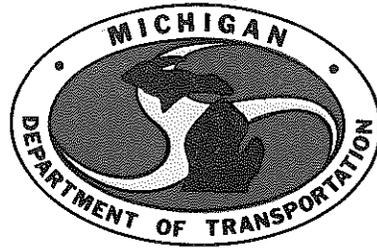


AIR MONITORING IN THE VICINITY OF  
I 475 IN THE CITY OF FLINT



**TESTING AND RESEARCH DIVISION  
RESEARCH LABORATORY SECTION**

AIR MONITORING IN THE VICINITY OF  
I 475 IN THE CITY OF FLINT

Research Laboratory Section  
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## Background

This is the second in a series of studies that compare pre-construction air quality with the air quality after construction to determine the effect of a new roadway on air quality in the project area. A previous report looked at reconstructed M 99 (Logan St) in the City of Lansing.

## Summary

A slight decrease in measured post-construction carbon monoxide from pre-construction levels was found indicating that new roadways which improve traffic flow appear to help improve air quality in the area. The decrease correlates closely with lower background levels of carbon monoxide at the monitoring site after construction. Lower background levels are to be expected based on two factors: wind speeds were higher during post-construction monitoring, and Federal emission controls on new cars that continue to enter the fleet reduce exhaust emissions.

## Carbon Monoxide Measurements

The monitoring site selected to measure the existing air pollution in the project area before construction and the pollution generated after the roadway was constructed, was located on the property of the City of Flint Water Works about 1,000 ft east of I 475 (Fig. 1). This particular site was chosen because it was: downwind (for prevailing winds) of I 475; away from tall structures; accessible to electrical power; and, adequately secure.

The pre-construction monitoring was performed during the period December 30, 1977 through May 15, 1978 and the post-construction monitoring during the period December 16, 1981 through June 30, 1982; thus, both the high carbon monoxide winter conditions and the lower spring and summer conditions were included in the monitoring periods.

Carbon monoxide and meteorological data (wind speed and direction) were recorded every five minutes, 24 hours a day. The five-minute readings were reduced to one-hour and eight-hour averages. The 10 highest one-hour averages of carbon monoxide for each monitoring period, are shown in Table 1.

The data in Table 1 show that of the 10 highest one-hour carbon monoxide levels: 1) 50 percent from Period 1 and 60 percent from Period 2 occurred during or near the a.m. peak hour (7:30 to 8:30); 2) 100 percent from both periods occurred when the wind speed was 3 mph or less; and, 3) 90 percent from Period 2 occurred when the wind was blowing from a westerly direction (225 to 315 degrees) across I 475 toward the monitor. Wind speeds from Period 1 were generally too low to accurately indicate any wind direction. The insert, upper right in Figure 1, shows the method used to designate wind direction.

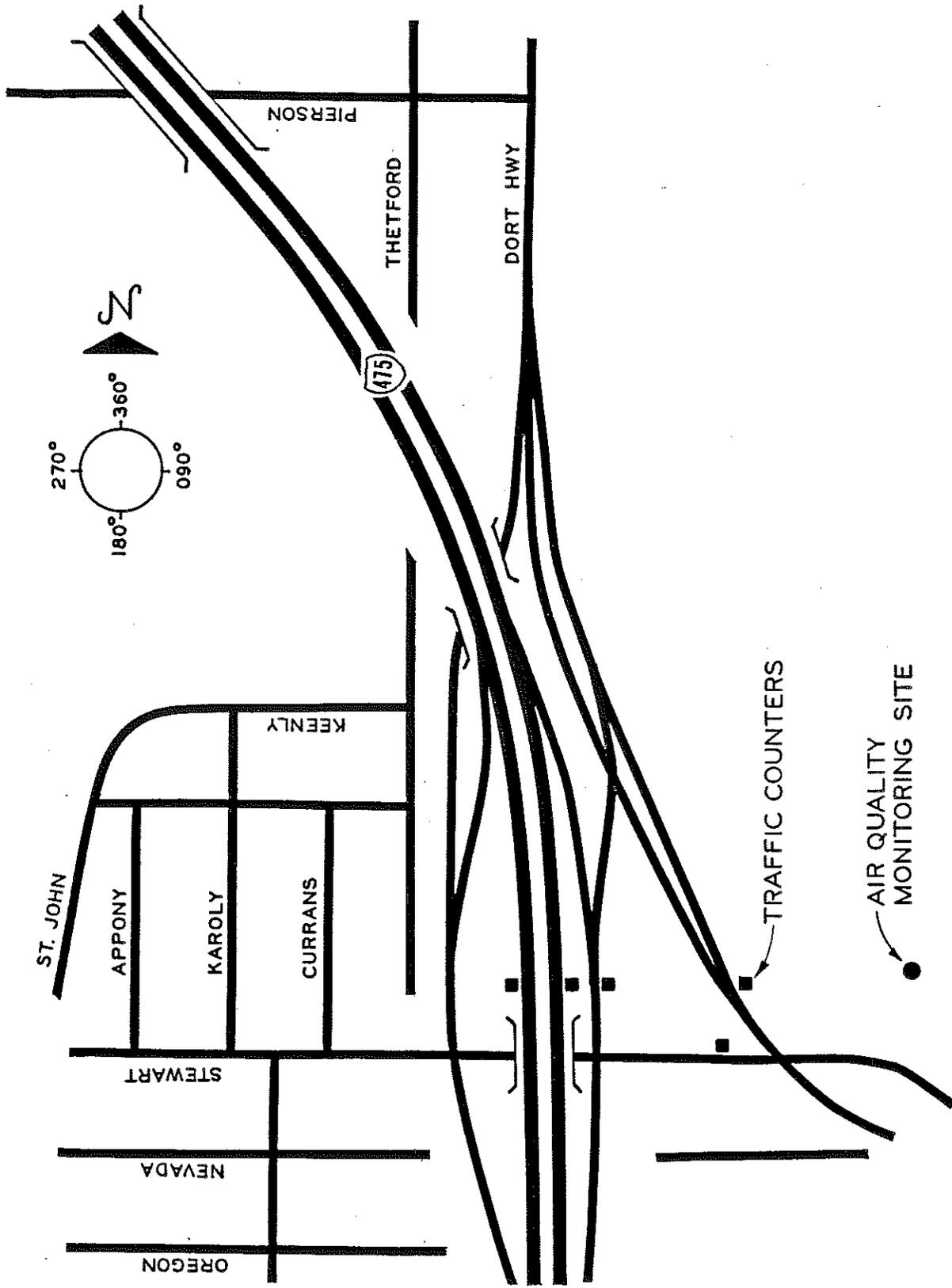


Figure 1. I 475 in Flint showing monitoring site and traffic counters.

The remaining carbon monoxide data show: 1) 99 percent of the total one-hour averages from both periods (Period 1 - 2,533 averages, Period 2 - 4,205 averages) were 3 mg/cu m or less; 2) 27 percent of the 3 mg/cu m or higher levels from Period 1 and 40 percent from Period 2 occurred between 7:00 a.m. and 9:00 a.m.; and, 3) 73 percent of the 3 mg/cu m or higher levels from Period 1 and 78 percent from Period 2 occurred when the wind speed was 3 mph or less.

The 10 highest eight-hour averages of carbon monoxide are shown in Table 2. The highest eight-hour averages showed essentially the same trends as the highest one-hour averages: usually included the a.m. traffic peak, occurred when the wind was blowing from a westerly direction (225 to 315 degrees), and when wind speeds were low.

If the average of the 10 highest values are compared for pre-construction and post-construction monitoring, a slight decrease in carbon monoxide levels is shown.

	<u>Average of one- hour averages</u>	<u>Average of eight- hour averages</u>
Before Construction	4.9 mg/cu m	2.8 mg/cu m
After Construction	4.7 mg/cu m	2.5 mg/cu m

The remainder of the data also shows the same slight decrease in carbon monoxide levels after construction.

All one-hour and eight-hour carbon monoxide averages are easily within Federal air quality standards (one-hour - 40 mg/cu m; eight-hour - 10 mg/cu m).

### Traffic Counts

Traffic speeds and volume counts were measured at several locations (Fig. 1) in the study area by the Transportation Planning Division. Volume counts were recorded every 15 minutes during a 45-hour period beginning at 12:00 noon, October 19, 1982. The traffic speeds were measured during the a.m. peak, p.m. peak, and during an off-peak hour on August 16 and 17, 1983. The volumes along with the speeds are presented in Table 3. The volumes are summarized into total and directional 24-hour volumes, one-hour volumes (off-peak) and the highest a.m. and p.m. hour volumes.

TABLE 1  
HIGHEST MEASURED CARBON MONOXIDE CONCENTRATIONS  
ONE-HOUR AVERAGES

Date of Occurrence	Ending Hour	Carbon Monoxide, mg/cu m	Wind Direction, degrees	Wind Speed, mph
Before Construction - December 30, 1977 - May 15, 1978				
February 3	10	7.3	-*	1
February 3	9	5.3	-	1
March 7	10	5.0	60	1
March 9	8	4.9	-	1
March 9	9	4.6	130	1
February 12	24	4.6	220	1
January 18	23	4.5	-	-
March 2	9	4.5	180	1
March 2	8	4.3	-	0
March 7	11	4.3	60	2

TABLE 2  
HIGHEST MEASURED CARBON MONOXIDE CONCENTRATIONS  
EIGHT-HOUR AVERAGES

Date of Occurrence	Ending Hour	Carbon Monoxide, mg/cu m	Wind Direction, degrees	Wind Speed, mph
Before Construction - December 30, 1977 - May 15, 1978				
February 3	10	3.5	-	0-1
January 19	5	3.4	-	-
March 9	9	3.1	-	1-2
March 2	9	2.9	-	0-1
March 7	13	2.7	030-080	0-3
February 4	7	2.6	030-040	1
February 13	2	2.5	220-320	1-3
March 9	7	2.4	-	1-2
March 11	1	2.3	170-320	1-3
April 22	7	2.2	-	0-1

Date of Occurrence	Ending Hour	Carbon Monoxide, mg/cu m	Wind Direction, degrees	Wind Speed, mph
After Construction - December 16, 1981 - June 30, 1982				
February 12	10	6.4	280	2
February 5	3	5.4	290	2
February 12	11	5.2	250	2
March 8	9	4.8	250	2
March 25	8	4.8	250	2
March 6	8	4.3	280	2
February 12	9	4.1	270	2
March 6	9	4.1	270	2
January 26	22	3.9	220	3
March 6	7	3.9	270	2

\*Wind speeds of 1 mph or less do not accurately indicate wind direction.

TABLE 3  
TRAFFIC COUNTS - 1982

I 475		Steward Road			Dort Highway			Service Road Total	
Total Both Directions	North-bound	South-bound	Total Both Directions	East-bound	West-bound	Total Both Directions	North-bound	South-bound	
29,178	13,193	15,985	9,400	5,220	4,180	13,773	7,252	6,521	4,897
<2,059>	<616(61)>	<1443(63)>	<628>	<397(28)>	<231(29)>	<874>	<448(38)>	<426(41)>	<229(34)>
[2,910]	[1,539(59)]	[1,375(62)]	[983]	[551(28)]	[432(29)]	[1,346]	[817(40)]	[529(40)]	[732(37)]

000 24 hr volume  
 <000> a.m. peak traffic, vehicles/hr  
 [000] p.m. peak traffic, vehicle/hr  
 (00) traffic speeds, mph