

OKI CMAQ Analysis



THE BANKS INTERMODAL TRANSIT FACILITY

THE BANKS INTERMODAL TRANSIT FACILITY
BUILD GRANT SUBMISSION OF JULY 19, 2018

Exhibit 1

10/1/2009

The Banks Intermodal Facility CMAQ Analysis

The Banks Intermodal Facility consists of a 6000-6500 space multi-level parking structure linking the Cincinnati Riverfront Transit Center to the Cincinnati CBD. Approximately 80% of the 54,000 CBD employees work within ½ mile of this centrally-located facility. Facilities will be provided for general parking, park-and-ride with bus transit, carpool, vanpool, bus connections, and bicycle facilities. Future light rail and streetcar connections are anticipated. SORTA's Riverfront Parking Shuttle and TANK's Southbank Shuttle will be rerouted to serve the Intermodal Facility. The project will promote increased ridesharing by providing discounted monthly parking for carpools and vanpools. A 75% reduction in a \$100 monthly parking pass was assumed for this air quality analysis. Vehicles with 3 or more persons would be eligible for this discount, with an average weekday daily savings per rideshare vehicle of \$3.41. In addition to this substantial financial incentive for ridesharing, at least 250 preferred parking spaces will be provided. The preferred spaces will be located near street connections and elevators. For purposes of modeling the air quality benefits, it was assumed that the preferred locations would result in a 1 minute walk time savings for carpools and vanpools as compared to general parking. The U.S. EPA's COMMUTER Model 2.0 was used in this evaluation. Detailed methodology for EPA's model can be found at <http://www.epa.gov/otaq/stateresources/tools.htm>. Specific local data provided to the COMMUTER model can be found in the attached analysis details.

In addition to discounted and preferred carpool and vanpool parking, SORTA will replace three old transit buses with three new clean diesel/biodiesel buses. These buses average 90 daily vehicle miles traveled. Emission factors for the old and new buses were derived from U.S. EPA's MOBILE 6.2 emission factor model. Details are provided in the attached analysis.

This project is expected to significantly reduce daily vehicle emissions. The quantified reductions are 33.95 lbs. of volatile organic compounds (VOC), 489.40 lbs. of carbon monoxide (CO), 55.74 lbs. of nitrogen oxides (NO_x), and 0.93 lbs. of fine particulates (PM_{2.5}). Additional air quality benefits are expected from improved transit and bicycle connections, as well as improved traffic flow throughout the CBD. VOC and NO_x are principal precursors of ground-level ozone. The Cincinnati region is nonattainment for both ground-level ozone and fine particulate federal air quality standards. The Banks Intermodal Facility will contribute to the region's timely attainment of these standards.

COMMUTER MODEL RESULTS

SCENARIO INFORMATION

Description	The Banks Intermodal Facility, CMAQ Analysis
Scenario Filename	BANKS_access&financial.vme
Emission Factor File	
Performing Agency	OKI
Analyst	Andy Reser
Metropolitan Area	Cincinnati, OH
Area Size	2 - Medium (750,000 to 2 million)
Analysis Scope	1 - Area-Wide (e.g., MSA, county)
Analysis Area/Site	Cincinnati CBD
Total Employment	54,335

PROGRAMS EVALUATED

☒	Site Walk Access Improvements
☐	Transit Service Improvements
☒	Financial Incentives
☐	Employer Support Programs
☐	Alternative Work Schedules
☐	User-Supplied Final Mode Shares

MODE SHARE IMPACTS

Mode	Baseline	Final	%Change
Drive Alone	82.4%	77.3%	-5.1%
Carpool	8.2%	13.9%	+5.7%
Vanpool	0.1%	0.1%	+0.0%
Transit	5.3%	5.0%	-0.3%
Bicycle	0.1%	0.1%	-0.0%
Pedestrian	3.2%	3.0%	-0.2%
Other	0.7%	0.7%	-0.0%
No Trip	-	0.0%	+0.0%
Total	100.0%	100.0%	-

Shifted from Peak to Off-Peak	0.0%
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TRAVEL IMPACTS (relative to affected employment)

Quantity	Peak	Off-Peak	Total
Baseline VMT	572,060	359,634	931,693
Final VMT	551,176	346,505	897,681
VMT Reduction	20,884	13,129	34,012
% VMT Reduction	3.7%	3.7%	3.7%
Baseline Trips	57,219	35,971	93,190
Final Trips	55,361	34,803	90,164
Trip Reduction	1,858	1,168	3,026
% Trip Reduction	3.2%	3.2%	3.2%

EMISSION REDUCTIONS (positive values are decreases)

lbs/day:

Pollutant	Peak	Off-Peak	Total
HC	21.10	12.85	33.95
CO	296.70	190.31	487.01
NOx	30.15	18.91	49.06
PM2.5	0.54	0.34	0.87
Toxics			
Acetaldehyde	0.145	0.089	0.235
Acrolein	0.008	0.005	0.014
Benzene	0.672	0.412	1.084
1, 3-Butadiene	0.066	0.041	0.106
Formaldehyde	0.188	0.116	0.304
MTBE	0.000	0.000	0.000
CO2	21,095	13,261	34,356

tons/day:

Pollutant	Peak	Off-Peak	Total
HC	0.011	0.006	0.017
CO	0.148	0.095	0.244
NOx	0.015	0.009	0.025
CO2 (metric tons)	9.6	6.0	15.6

GASOLINE CONSUMPTION AND COST SAVINGS

Reduction in gasoline consumption (gallons/day)	1,756
Gasoline cost savings (\$/day)	\$4,390

The Banks Intermodal Facility		
The Banks Intermodal Facility consists of a 6000-6500 space multi-level parking structure linking the Cincinnati Riverfront Transit Center adjacent to the CBD with park-and-ride, carpool, vanpool, rideshare bus, bicycle, future light rail and streetcar and general public parking. SORTA's Riverfront Parking Shuttle and TANK's Southbank shuttle will be rerouted to serve the Intermodal Facility. The project will promote increased ridesharing by providing discounted parking for vanpools and carpools. The discounted parking will increase the attractiveness of the shared ride mode. Approximately 250 preferred parking spaces will be reserved for vanpools and carpools. SORTA will replace 3 old transit buses with 3 new clean diesel/biodiesel buses.		
1) Use EPA's COMMUTER Model - Release 2.0 to evaluate discounted parking and preferred parking locations for carpools and vanpools at the Banks Intermodal Facility. Detailed methodology for EPA's model can be found at http://www.epa.gov/otaq/stateresources/tools.htm		
	Local data provided to COMMUTER Model	
	Analysis area:	Cincinnati CBD
	Office employment:	45636
	Non-Office employment:	8699
	Percent of CBD employment withing 1/2 mile of site:	80%
	Reduced daily parking cost for car/vanpools (75% off \$100 monthly permit):	\$3.41 daily savings
	Preferred parking locations for car/vanpools:	1 min. savings in walk access time
	<u>Work-trip mode shares</u>	
	Auto-Drive Alone:	82.4
	Auto-Carpool:	8.2
	Vanpool:	0.1
	Transit:	5.3
	Bicycle:	0.1
	Walk:	3.2
	Other:	0.7
	<u>Work-trip length</u>	
	average person-trip length:	9.7
	average trip length-vanpool:	30
	average trip length-bicycle:	2.9
	average trip length-walk:	0.9
	<u>Vehicle occupancy</u>	
	average carpool occupancy:	2.5
	average vanpool occupancy:	12
	<u>MOBILE Scenario Inputs</u>	
	calendar year:	2010
	season:	summer
	climate type:	severe
	I/M program:	none
	fuel type:	RFG
	PADD:	2
	<u>Percent VMT by facility type</u>	
	freeway:	36.6
	arterial:	49.5
	local road:	11.9
	ramp:	2
	COMMUTER Model Results	
	Vehicle trip reduction	3,026
	VMT Reduction:	34,012
	Daily Emission reductions	<u>lbs.</u>
	VOC:	33.95
	CO:	487.01
	NOx:	49.06
	PM2.5:	0.87

2) Estimate emissions savings from replacing 3 old buses (12 years old) with new buses			
		number of old buses:	3
		average daily VMT:	90
		Emission factors (g/mi) for 12-year old urban transit buses ¹ :	
		VOC:	0.32
		CO:	4.48
		NOx:	16.27
		PM2.5:	0.13
		total old bus emissions (grams)	
		VOC:	86.29
		CO:	1209.65
		NOx:	4393.22
		PM2.5:	33.89
		number of new buses:	3
		average daily VMT:	90
		Emission factors (g/mi) for new diesel urban transit buses ² :	
		VOC:	0.32
		CO:	0.47
		NOx:	5.04
		PM2.5:	0.02
		total new bus emissions (grams)	
		VOC:	86.29
		CO:	125.60
		NOx:	1361.96
		PM2.5:	5.59
		Daily emission reduction from bus replacements (lbs.)	<u>lbs.</u>
		VOC:	0.00
		CO:	2.39
		NOx:	6.68
		PM2.5:	0.06
Total daily emission reductions (COMMUTER Model and Bus replacements)			<u>lbs.</u>
		VOC:	33.95
		CO:	489.40
		NOx:	55.74
		PM2.5:	0.93
¹ MOBILE6.2 emission factor for 12-year old urban transit bus operating on local streets			
² MOBILE6.2 emission factor for new urban transit bus operating on local streets			
Revised 10/1/2009			