



June 11, 2020

Dear Data User:

This dataset includes the analysis year 2040 inputs and outputs from the Air Quality Conformity Analysis completed in June 2020. The horizon year is 2050 and reflects the policies and projects adopted in the *ON TO 2050* Regional Comprehensive Plan.

The air quality analysis is completed twice annually, in the first quarter and the third quarter. The data associated with the analysis is named based on the year the analysis was completed (C20) and the quarter it was completed (Q2 or Q4). Therefore, the files in this dataset are referred to as C20Q2 data.

The analysis years for this conformity cycle include 2015, 2020, 2025, 2030, 2040, and 2050. We associate scenario numbers with the analysis years as shown below. You will notice the scenario numbers 100–700 referenced in many of the filenames or in headers within the files. The CMAP Data Sharing Hub includes one dataset for each of the analysis years.

Analysis year	Scenario number
2015	100
2020	200
2025	300
2030	400
2040	600
2050	700

Resource Descriptions

Data Description (DataDescription_C20Q2_600_June2020.pdf)

This .pdf describes the contents of the files within the dataset.

Trip Generation Data (tg_c20q2_600.csv)

This is a comma-separated values table containing the trip generation inputs and outputs by trip generation zone, the most disaggregate modeling geography. The trip generation zone ID is subzone17. The information can be linked to the trip generation zone shapefile, described later, via the variable subzone17. This file includes a number of variables related to low and high-income workers. The definition of a low-income worker for our purposes is a worker who earns less than the regional median income. A high-income worker earns more than the regional median income. The variables are defined this way:

subzone17	Trip generation zone
fips	Census county code
cnty_name	County name
state	Illinois, Wisconsin, or Indiana, because the modeled region covers multiple states
puma1	1% PUMA ID
puma5	5% PUMA ID
zone17	Traffic analysis zone that the subzone is aggregated up to

chicago	Flag for “in Chicago”: 1 = Yes 0 = No
cbd	Flag for “in Chicago CBD”: 1 = Yes 0 = No
row_column	Area of the region: 1 = Inner Chicago 2 = Outer and inner suburbs 3 = Mid-suburban 4 = Fringe and external area
area	Area of the subzone in square miles
cmap	Flag for “in CMAP region”: 1 = Yes 0 = No
households	Number of households
avg_vehicles	Average number of available vehicles per household
avg_adults	Average number of adults per household
avg_workers	Average number of workers per household
avg_children	Average number of children per household
avg_income_index	Ratio of the subzone average income to the regional median income
avg_age_index	Average householder age code: 1 = 16–34 2 = 35–64 3 = 65+
gq_mil	Persons in military barracks
gq_univ	Persons in college/university dormitories
gq_16to64	Persons in other groups quarters age 16-64
gq_65plus	Persons in other group quarters age 65 or older
retail_emp	Retail employment
tot_emp	Total employment
hi_earn_share	Percent of subzone workers who earn more than the regional median income
nhp	Non-home-based productions
nha	Non-home-based attractions
hwplo	Home-based work low-income productions
hwphi	Home-based work high-income productions
hwalo	Home-based work low-income attractions
hwahi	Home-based work high-income attractions
hop	Home-based other productions
hoa	Home-based other attractions
wrkautoms	Ratio of the workers in the subzone who commute by auto divided by the total workers in the subzone
pef	Walkability index
zmedinc	Median income of resident TAZ

Trip Generation Emme Matrices (prods_attrs_c20q2_600.zip)

This compressed file contains 8 Emme format files of person trip productions and attractions which were imported and used as origin and destination totals for the trip distribution model. The source of this data is the trip generation outputs described previously, aggregated up to the traffic analysis zone system, zone17. These are ASCII text files in Emme batch format. The information can be linked to the traffic analysis zone shapefile zone17, described later, via the zone number.

Filename	Contents	Filename	Contents
hwphi.in	Home-based work productions, high-income	hwahi.in	Home-based work attractions, high-income
hwplo.in	Home-based work productions, low-income	hwalo.in	Home-based work attractions, low-income
hop.in	Home-based other productions	hoa.in	Home-based other attractions
nhp.in	Non-home-based productions	nha.in	Non-home-based attractions

The production files have 3 lines of headers followed by “origin zone” “all:” “trips” in each of the remaining records.

The attraction files have 3 lines of headers followed by “all” “destination zone:” “trips” in each of the remaining records.

Distributed Trip Tables (trips_c20q2_600.zip)

This compressed file includes thirteen ASCII text file matrices in Emme batch format. They include four rows of headers, with the remaining trip records formatted:

Origin D₁:Trips₁ D₂:Trips₂ D₃:Trips₃ D₄:Trips₄.

The CMAP network assignment process requires the truck vehicle trips (actual matrix contents) to be converted to vehicle equivalents. The factors used are b-plate and light trucks=1 vehicle equivalent, medium trucks=2 vehicle equivalents, and heavy trucks=3 vehicle equivalents.

Because of the unique way the transit network is coded, the transit trip tables cannot be assigned directly to the transit network. Please contact me if you need more information on this topic.

File Contents and Control Totals

Filename	Format	Contents	2040
mf1.txt	P/A	Home-based work auto person trips	7,009,361
mf2.txt	P/A	Home-based other auto person trips	11,913,344
mf3.txt	O/D	Non-home-based auto person trips	6,612,258
mf4.txt	O/D	B-plate truck vehicle trips	2,902,982
mf5.txt	O/D	Light truck vehicle trips	343,205
mf6.txt	O/D	Medium truck vehicle trips	319,534
mf7.txt	O/D	Heavy truck vehicle trips	552,938
mf8.txt	O/D	Auto point-of-entry vehicle trips	310,941
mf9.txt	O/D	Truck point-of-entry vehicle trips	133,260
mf10.txt	O/D	Airport trip vehicle trips	91,935
mf14.txt	P/A	Home-based work transit person trips	817,013
mf42.txt	P/A	Home-based other transit person trips	760,926
mf43.txt	O/D	Non-home-based transit person trips	231,959

These totals existed within the model. Rounding of decimals while exporting may cause your totals to vary slightly.

Distributed Work Trip Tables (worktrips_c20q2_600.zip)

This folder contains the work trip details tables. The low and high-income trip tables represent travel made by workers who earn below and above the regional median income. The individual trip tables sum to the totals for home-based work auto and home-based work transit trips shown in the previous section.

Filename	Format	Contents	2040
mf36.txt	P/A	Home-based work total person trips, low income	4,103,334
mf37.txt	P/A	Home-based work total person trips, high income	3,723,051

mf40.txt	P/A	Home-based work transit person trips, low income	375,789
mf41.txt	P/A	Home-based work transit person trips, high income	441,224
mf48.txt	P/A	Home-based work auto person trips, low income	3,727,075
mf49.txt	P/A	Home-based work auto person trips, high income	3,281,692

These totals existed within the model. Rounding of decimals while exporting may cause your totals to vary slightly.

HOV Trip Tables (hovtrips_c20q2_600.zip)

This folder contains individual SOV and HOV trip details tables by purpose. Mf101, mf102, and mf103 contain home based work trips for SOV, HOV2 and HOV3+, respectively. Mf104, mf105, and mf106 hold home based other trips, and mf107, mf108, and mf109 hold non-home based trips.

Emme Highway Networks (emmetet_highway_c20q2_600.zip)

This compressed file includes files named network_p1–network_p8. These are ASCII format assigned Emme highway network files exported from the database for period 1 through period 8, denoted by the file labels p1–p8. Each network file consists of two parts. The first part is the node file, the second part is the link file. The time period we usually use the network for is shown in the header, although the network file itself has no consideration of the number of hours the period lasts. The period link capacity would be calculated during the modeling process using @emcap*lanes*hours in the period for each link.

I have also included a “daily” network that has all links (including both directions of reversible lanes) and an associated attribute table that has the daily assigned volume in vehicles.

The compressed file also contains files titled attribs_p1–attribs_p8. These are ASCII format Emme extra attribute files for period 1 through period 8, denoted by the file labels p1–p8. The file format and contents of the networks and network extra attributes are presented on the following page.

The periods are defined:

Period 1: 8pm–6am	Period 2: 6–7am	Period 3: 7–9am	Period 4: 9–10am
Period 5: 10am–2pm	Period 6: 2–4pm	Period 7: 4–6pm	Period 8: 6–8pm

Many people are interested in using the congested link travel times. The congested link travel times in minutes are included as “timau” in the extra attribute file. Use caution, however, as these times are raw model results. CMAP adjusts the arterial speeds before using them in the air quality analysis software. Also, you will notice that links with an i-node or j-node less than 2000 have the same congested times in all periods. These are centroid connectors and the travel time is based on distance, not on congestion.

Network and extra attribute file layout

A network file contains two sections, nodes and links, whose starts are marked by “t nodes init” and “t links init”.

t nodes init										
a*	1	686803	1905336	0	0	0	0001			
* denotes centroid	node #	x-coord	y-coord	user1	user2	user3	node label			
t links init										
a	1	15213	0.12	ASHTmlb	1	1.0	6	0	0	0
add link	inode	jnode	length mi.	modes	type	lanes	volume delay function	user1	user2	user3

Extra Attribute File Contents

inode	jnode	@speed	@width	@parkl	@toll	@sigic	@tipid
1	15213	30	10	0	0	0	0
<i>inode</i>	<i>jnode</i>	<i>posted speed</i>	<i>lane width</i>	<i>parking allowed</i> 0=no 1=yes	<i>toll in dollars</i>	<i>signal interconnect</i> 0=no 1=yes	<i>links with a number or *** are links with TIP projects</i>

@ftime	@emcap	@avelw	@vadt	timau
0	0	10	375	3.5
<i>free flow travel time</i>	<i>capacity per lane per hour</i>	<i>average lane width</i>	<i>period assigned modeled volumes in vehicles</i>	<i>congested auto travel time in minutes</i>

Disregard the field titled “total,” which is meaningless and only results from the method of exporting the data.

Additional Description of Highway Link Variables

The following table provides information on how the network volume delay functions and modes are defined, as well as a little descriptive information about some of the additional network attributes.

<u>Modes</u> A = Generalized auto S = Single-occupant auto H = High-occupancy auto T = General truck b = B-plate truck l = Light truck m = Medium truck h = Heavy truck	<u>Volume Delay Function Codes</u> 1 = Arterial street 2 = Freeway 3 = Freeway/expressway to arterial street 4 = Expressway 5 = Freeway/expressway to freeway/expressway ramp 6 = Auto access to network 7 = Link where toll is paid 8 = Metered expressway entrance ramp
lanes = Number of driving lanes parkl = Number of parking lanes on link avelw, width = Average width of link's driving lanes	ftime = Uncongested travel time on link emcap = Lane capacity at level of service E

AM Peak Highway Network Shapefile (highwayshp_ampk_c20q2_600.zip)

This is a shapefile exported from the travel demand model software and contains the highway assignment results for the am peak (7–9am) traffic volumes in vehicles. These links are directional and the volumes in vehicles are contained in “data1”. The coordinate system for this shapefile is IL State Plane East, NAD 27 (US Feet).

PM Peak Highway Network Shapefile (highwayshp_pmpk_c20q2_600.zip)

This is a shapefile exported from the travel demand model software and contains the highway assignment results for the pm peak (4–6pm) traffic volumes in vehicles. These links are directional and the volumes in vehicles are contained in “data1”. The coordinate system for this shapefile is IL State Plane East, NAD 27 (US Feet).

Daily Highway Network Shapefile (highwayshp_c20q2_600.zip)

This is a shapefile exported from the travel demand model software and represents the daily assigned volumes. It includes all the links available throughout the day by direction. For example, both directions of the reversible lanes are included. Using node numbers as unique identifiers, the data attribute files from the loaded highway networks can be linked to this file. This file also includes daily link volumes by

class, in vehicle equivalents. The coordinate system for this shapefile is IL State Plane East, NAD 27 (US Feet).

Vehicle class volumes are:

- @avauv – Auto SOV vehicles
- @avh2v – Auto HOV 2 vehicles
- @avh3v – Auto HOV 3+ vehicles
- @avbq – B-plate trucks
- @avlqv – Light trucks
- @avmqv – Medium trucks vehicle equivalents
- @avhqv – Heavy trucks vehicle equivalents

@vadt contains the sum of vehicle class vehicle equivalents, converted to vehicles – ($@avauv + @avh2v + @avh3v + @avbqv + @avlqv + (@avmqv/2) + (@avhqv/3)$).

Toll rates are:

- @toll – Auto toll (dollars)
- @toll2 – Light truck toll (dollars)
- @toll3 – Medium truck toll (dollars)
- @toll4 – Heavy truck toll (dollars)

These are daytime tolls for trucks.

Emme Transit Networks (emmenet_transit_c20q2_600.zip)

This compressed file contains the Emme format modeled peak and off-peak transit network input files for the analysis year. Network_pk and network_op contain nodes and links for peak and off-peak. Itins_pk and itins_op are the transit route itineraries for peak and off-peak. Attribs_pk and attribs_op are segment variables for the transit itineraries for peak and off peak. Within attribs_pk and attribs_op, @ltime is the current scheduled time on the link, @hwytm is the modeled period auto travel time on the same link, and @zfare is an attribute describing points where extra fares are charged.

Transit Network Codes

<u>Transit Route Modes</u>	<u>Access Modes</u>	<u>Transfer Modes</u>
A = Generalized auto	w = From origin to Metra	m = Between bus/Metra
B = CTA regular bus	v = From origin to CTA rail	c = Between Bus/CTA rail
E = CTA express bus	u = From origin to bus	b = Between bus/bus (except on-the-node transfers)
P = Pace regular		r = Between CTA rail/CTA rail
Q = Pace express	<u>Egress Modes</u>	t = Between CTA rail/Metra
L = Pace local	y = CTA rail to destination	d = Between Metra/Metra
C = CTA rail	z = Metra to destination	
M = Metra rail	x = Bus to destination	

Emme TOD Period Transit Networks (emmenet_transit_tod_c20q2_600.zip)

This compressed file contains the Emme format modeled transit network input files for each of the eight time of day periods for the analysis year. Rail.network_<period> and bus.network_<period> contain nodes and links. Rail.itinerary_<period> and bus.itinerary_<period> are the transit route itineraries. Railnode.extatt_<period> and busnode.extatt_<period> are node variables for the transit network. Within the node variable files, @pspace is the number of parking spaces and @pcost is the cost of parking in cents. Access.network_<period> contains transit network access links.

Peak Transit Network Shapefile (transitshp_pk_c20q2_600.zip)

This file contains the shapefile of the AM peak period transit network exported from Emme. The coordinate system for this shapefile is IL State Plane East, NAD 27 (US Feet).

Off-Peak Transit Network Shapefile (transitshp_op_c20q2_600.zip)

This file contains the shapefile of the mid-day period transit network exported from Emme. The coordinate system for this shapefile is IL State Plane East, NAD 27 (US Feet).

Transit and Highway Skims (skims_c20q2_600.zip)

This directory contains the zipped “level of service” matrix files used in the model run. They are in Emme batch format text files and can be read by any text editor. The file contents are as follows, with 9999’s indicating zonal interchanges not connected by transit in the transit matrices:

mf922.txt = Indexed transit in-vehicle minutes (off-peak)
mf923.txt = Indexed transit walk transfer minutes (off-peak)
mf938.txt = Indexed transit total wait time x2 (off-peak)
mf939.txt = Indexed transit peak headway x1.25 (off-peak)
mf930.txt = Indexed transit priority mode (off-peak)
mf928.txt = Indexed final average transit fare (off-peak)
mf822.txt = Indexed transit in-vehicle minutes (peak)
mf823.txt = Indexed transit walk transfer minutes (peak)
mf838.txt = Indexed transit total wait time x2 (peak)
mf839.txt = Indexed transit peak headway x1.25 (peak)
mf830.txt = Indexed transit priority mode (peak)
mf828.txt = Indexed final average transit fare (peak)
mf44.txt = AM peak (7–9am) skimmed highway time
mf45.txt = AM peak (7–9am) skimmed highway distance
mf46.txt = Mid-day (10am–2pm) skimmed highway time
mf47.txt = Mid-day (10am–2pm) skimmed highway distance
mf837.txt = Indexing file (peak), see following
mf937.txt = Indexing file (off-peak), see following

mf837, mf937: this is a zone indexing file needed to move transit trips to an “assignment” origin if a transit assignment is being undertaken.

Emme Databank (emmebank_c20q2_600.7z)

This is the final databank for the analysis year and was created with Emme version 4.3. It was zipped using 7-Zip software because of its large size. Most of the files described in this document are exported from the databank. If you have the software, you can either use the exported files or use the Emme databank directly.

Emme Databank Matrix Directory (emmemat_c20q2_600.7z)

The current version of Emme stores matrices externally from the Emme databank. This file contains the entire directory of matrices referenced by the Emme databank described previously. If the user is interested in using the Emme databank with its matrices, this file should be downloaded and uncompressed in the same directory as the databank. This has also been zipped using 7-Zip software.

Subzone 2017 Geography (subzones17_CMAP_2019.zip)

This compressed file contains the subzones17 shapefile, which can be linked to the trip generation information. It covers the entire modeled area. The coordinate system for this shapefile is IL State Plane East, NAD 27 (US Feet).

Traffic Analysis Zone 2017 Geography (zones17_CMAP_2019.zip)


This compressed file contains the zones17 shapefile, which can be linked to trip productions and attractions and distributed trip table information. This geography covers the entire modeled area. The coordinate system for this shapefile is IL State Plane East, NAD 27 (US Feet).

Current Roadway Volumes

Current ESRI shapefiles of roadway volumes can be downloaded by county from IDOT's website <http://apps.dot.illinois.gov/gist2/>. We do not have this data available pre-coded onto the roadway network.

I hope you find this information helpful. If you have any questions please don't hesitate to call me at 312-386-8744 or email me at cbozic@cmmap.illinois.gov.

Sincerely,



Claire Bozic
Senior Analyst