



October 10, 2019

Dear Data User:

This dataset includes the analysis year 2040 inputs and outputs from the Air Quality Conformity Analysis completed in October 2019. 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 (C19) and the quarter it was completed (Q1 or Q3). Therefore, the files in this dataset are referred to as C19Q3 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.

|            |
|------------|
| 2015 – 100 |
| 2020 – 200 |
| 2025 – 300 |
| 2030 – 400 |
| 2040 – 600 |
| 2050 – 700 |

### **Resource Descriptions**

#### **Data Description C19Q3 2040 October 2019 (Data\_Description\_C19Q3\_600\_October\_2019.pdf)**

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

#### **Trip Generation C19Q3 2040 Spreadsheet October 2019 (TG\_C19Q3\_600.xlsx)**

This is an Excel workbook 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:

|           |  |
|-----------|--|
| subzone   | 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  |
| households                                     | Number of households   |
| available vehicles per household               | Average number of available vehicles per household   |
| adults per household                           | Average number of adults per household   |
| workers per household                          | Average number of workers per household  |
| children per household                         | Average number of children per household   |
| income quartile index                          | Ratio of the zonal average income to the regional median income  |
| age of householder index                       | Average householder age code: 1=16-34, 2=35-64, 3=65+  |
| pedestrian environment factor                  | Walkability index  |
| military barracks pop                          | Persons in military barracks   |
| college dorm pop                               | Persons in college/university dormitories  |
| other gq pop age 16 to 64                      | Persons in other groups quarters age 16-64   |
| other gq pop age 65 plus                       | Persons in other group quarters age 65 or older  |
| retail employment                              | Zonal retail employment  |
| total employment                               | Total zonal employment   |
| hi income worker share                         | Percent of zonal workers who earn more than the regional median income                                     |
| sum of non-home based productions              | Non-home based productions   |
| sum of non-home based attractions              | Non-home based attractions   |
| sum of home-based work low income productions  | Home-based work low income productions   |
| sum of home-based work high income productions | Home-based work high income productions  |
| sum of home-based work low income attractions  | Home-based work low income attractions   |
| sum of home-based work high income attractions | Home-based work high income attractions  |
| sum of home-based other productions            | Home-based other productions   |
| sum of home-based other attractions            | Home-based other attractions   |
| cmap   | 1=in CMAP region, 0=outside CMAP region  |

### **Trip Generation C19Q3 2040 Emme Matrices October 2019 (Panda\_C19Q3\_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 batchin format. The information can be linked to the traffic analysis zone shapefile zone17, described later, via the zone number.

| File Name | Contents                                 | File Name | 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 C19Q3 2040 October 2019 (trips\_C19Q3\_600.zip)**

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

Origin D<sub>1</sub>:Trips<sub>1</sub> D<sub>2</sub>:Trips<sub>2</sub> D<sub>3</sub>:Trips<sub>3</sub> D<sub>4</sub>:Trips<sub>4</sub>.

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     | 7,011,672  |
| mf2.txt P/A     | Home-based other auto person trips    | 11,912,453 |
| mf3.txt O/D     | Non-home based auto person trips      | 6,612,350  |
| 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     | 310,940    |
| 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  | 814,711    |
| mf42.txt (P/A)  | Home-based other transit person trips | 761,818    |
| mf43.txt O/D    | Non-home based transit person trips   | 231,871    |

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

**Distributed Work Trip Tables C19Q3 2040 October 2019 (worktrips\_C19Q3\_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.

| Name Format  | Contents  | 2040      |
|--------------|---|-----------|
| mf36.txt P/A | Home-based work total person trips, low income    | 4,103,338 |
| mf37.txt P/A | Home-based work total person trips, high income   | 3,723,055 |
| mf40.txt P/A | Home-based work transit person trips, low income  | 374,980   |
| mf41.txt P/A | Home-based work transit person trips, high income | 439,729   |
| mf48.txt P/A | Home-based work auto person trips, low income     | 3,727,886 |
| mf49.txt P/A | Home-based work auto person trips, high income    | 3,283,188 |

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

**Loaded Highway Networks C19Q3 2040 October 2019 (net\_C19Q3\_600.zip)**

This compressed file includes files named net.p1 – net.p8. These are ASCII format assigned Emme highway network files exported from the database for period 1 through period 8, denoted by the file extensions .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 extensions .p1 - .p8. The file format and contents of the networks and network extra attributes is presented on the following page.

The periods are defined:

|                    |                   |                   |                    |
|--------------------|-------------------|-------------------|--------------------|
| Period 1: 8pm-6am  | Period 2: 6am-7am | Period 3: 7am-9am | Period 4: 9am-10am |
| Period 5: 10am-2pm | Period 6: 2pm-4pm | Period 7: 4pm-6pm | Period 8: 6pm-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.

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                         |              |              |              |
| <i>* denotes centroid</i> | <i>node#</i> | <i>x-coord</i> | <i>y-coord</i>    | <i>user1</i> | <i>user2</i> | <i>user3</i> | <i>node label</i>            |              |              |              |
| t links init              |              |                |                   |              |              |              |                              |              |              |              |
| a                         | 1            | 15213          | 0.12              | ASHThmlb     | 1            | 1.0          | 6                            | 0            | 0            | 0            |
| <i>add link</i>           | <i>inode</i> | <i>jnode</i>   | <i>length mi.</i> | <i>modes</i> | <i>type</i>  | <i>lanes</i> | <i>volume delay function</i> | <i>user1</i> | <i>user2</i> | <i>user3</i> |

## 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<br/>0=no<br/>1=yes</i> | <i>toll in dollars</i> | <i>signal interconnect<br/>0=no<br/>1=yes</i> | <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>   | <u>Volume Delay Function Codes</u>                |
|--|---|
| A = generalized auto                                 | 1 = arterial street                               |
| S = single occupant auto                             | 2 = freeway                                       |
| H = high occupancy auto                              | 3 = freeway/expressway to arterial street         |
| T = general truck                                    | 4 = expressway                                    |
| b = b-plate truck                                    | 5 = freeway/expressway to freeway/expressway ramp |
| l = light truck                                      | 6 = auto access to network                        |
| m = medium truck                                     | 7 = link where toll is paid                       |
| h = heavy truck                                      | 8 = metered expressway entrance ramp              |
| lanes = number of driving lanes                      | ftime = uncongested travel time on link           |
| parkl = number of parking lanes on link              | emcap = lane capacity at level of service E       |
| avelw, width = average width of link's driving lanes |   |

### AM Peak Loaded Highway Network C19Q3 2040 October 2019 (AMpk\_C19Q3\_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". Coordinates are IL State Plane East, NAD27.

### PM Peak Loaded Highway Network C19Q3 2040 October 2019 (PMpk\_C19Q3\_600.zip)

This is a shapefile exported from the travel demand model software and contains the highway assignment results for the pm peak (4-6 pm) traffic volumes in vehicles. These links are directional and the volumes in vehicles are contained in "data1". Coordinates are IL State Plane East, NAD27.

### Daily Highway Network C19Q3 2040 October 2019 (hwysph\_C19Q3\_600.zip)

This is a shapefile exported from the travel demand model software and representing 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. Coordinates are IL State Plane East, NAD27.

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.

### Transit and Highway Skims C19Q3 2040 October 2019 (transitskims\_C19Q3\_600.zip)

This directory contains the zipped "level of service" matrix files used in the model run. They are in Emme batchin 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 = midday (10am-2pm) skimmed highway time  
mf47.txt = midday (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 Peak Transit Network Shapefile C19Q3 2040 October 2019 (transit\_pk\_shp\_C19Q3\_600.zip)**

This file contains the shapefile of the AM peak period transit network exported from Emme. Coordinates are IL State Plane East, NAD27.

**Emme Off-Peak Transit Network Shapefile C19Q3 2040 October 2019 (transit\_op\_shp\_C19Q3\_600.zip)**

This file contains the shapefile of the midday period transit network exported from Emme. Coordinates are IL State Plane East, NAD27.

**Emme Transit Network Batchin C19Q3 2040 October 2019 (emme\_tran\_C19Q3\_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.txt and attribs\_op.txt are segment variables for the transit itineraries for peak and off peak. Within attribs\_pk.txt and attribs\_op.txt, @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 point 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 Databank C19Q3 2040 October 2019 (emmebank\_C19Q3\_600.zip)**

This is the final databank for the analysis year and was created with Emme version 4.2. It was zipped using 7zip 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 C19Q3 2040 October 2019 (emmemat\_C19Q3\_600.zip)**

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 7zip software.

**Emme TOD Period Transit Network Batchin C19Q3 2040 October 2019 (emme\_TODtransit\_C19Q3\_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.

**HOV Trip Tables C19Q3 2040 October 2019 (HOVtrips\_C19Q3\_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.

**Subzone 2017 Geography (subzones17\_CMAP\_2019.zip)**

Subzones17.zip contains the compressed subzones17 shapefile, which can be linked to the trip generation input files in each of the model year directories. It covers the entire modeled area. The coordinate system for this file is IL State Plane East, NAD 27 (US Feet)

**Traffic Analysis Zone 2017 Geography (zones17\_CMAP\_2019.zip)**


The 2019 Q3 conformity used traffic analysis zone system Zone17. This can be linked to trip productions and attractions and distributed trip table information. This geography covers the entire modeled area. The coordinate system 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@cmapp.illinois.gov](mailto:cbozic@cmapp.illinois.gov).

Sincerely,



Claire Bozic  
Senior Analyst