# Zonal Attributes

## CBD

The CBD variable is defined in the TAZ file in the field “CBD.” Domain = {0, 1}

## PCT\_SEWER

Data on whether or not parcels are connected to sewage systems are available from the DLGF data. However, when plotting which parcels the data shows as being connected to sewage systems, it was clear that there were some issues, so this variable is not currently included in the model. Domain = [0, 1]

## PRKBUFF\_AC

Parks were identified from multiple sources. Some were taken from OpenStreetMap. There were shapefiles found that contained parks in Greenwood, Marion County, and Hamilton County. Some parcels were indicated in the Department of Local Government Finance (DLGF) data as being owned by a parks department. A shapefile of points for parks in Hendricks County was found. The component parcels of each park were obtained by viewing satellite imagery. Data from all of these sources were combined into a single ESRI shapefile with one polygon representing all parks. A Python script was written to create a shapefile for the area of each TAZ that intersected the park polygon, and then divide that area by the total area of the TAZ. All data was then divided by the maximum. Domain = [0, 1]

## WATBUFF\_AC

Two shapefiles were located containing locations of water: one had rivers, and the other had lakes and ponds. The two were combined into a single polygon, and a 50-meter buffer around it was created. A Python script was written to create a shapefile for the area of each TAZ that intersected the water polygon, and then divide that area by the total area of the TAZ. All data was then divided by the maximum. Domain = [0, 1]

## ANOISE\_X

A map of noise contours was obtained from the Indianapolis Airport Authority, and every TAZ that intersected the light blue contour was considered to be in a noise area. Domain = {0, 1}

## PCTLOWINC

The percentage of households in each TAZ that are low-income households is defined in the TAZ file in the field “pct\_lowInc.” Domain = [0, 1]

## PBB\_WHITE

Data on minority status of households were taken from the CTPP 5-year data from 2006-2010 by CTPP TAZ. Because the IndyMPO TAZs are nested inside the CTPP TAZs, each IndyMPO TAZ was given the percentage of its parent CTPP TAZ. Domain = [0, 1]

## ACC\_POP\_PK

The number of people within 20 minutes of a TAZ were calculated using a 2016 base-year TDM run. They were then divided by the maximum value. Domain = [0, 1]

## ACC\_RET\_PK

The number of retail jobs within 20 minutes of a TAZ were calculated using a 2016 base-year TDM run. They were then divided by the maximum value. Domain = [0, 1]

## ACC\_NRE\_PK

The number of non-retail jobs within 20 minutes of a TAZ were calculated using a 2016 base-year TDM run. They were then divided by the maximum value. Domain = [0, 1]

## HFREQ\_BUS

The number of high-frequency bus stops per TAZ were calculated by first obtaining the stop locations from IndyGo’s 2015 GTFS data (P:\MPO\20\_Data\Transit\2015 IndyGo GTFS\20150920 Google). All stops from the system’s three high-frequency routes (8, 10, 39) were geocoded. This does include stops from where various routes split up, so those may need to be removed. The number of stops within each TAZ was normalized by the area, and then by the maximum value. Domain = [0, 1]

## PCTLRT

Indianapolis currently has no light rail system, so this is equal to zero for all zones. Domain = [0, 1]

## TRNACC\_EMP

The number of jobs within a 60-minute transit ride of a TAZ were calculated using a 2016 base-year TDM run. They were normalized by the maximum value. Domain = [0, 1]

## HOUSE\_DEN

The number of housing units per acre for each TAZ was computed using DLGF data. A residential area field was created that was the parcel area if the parcel had a residential land use and zero if it did not. This was converted from square meters to acres. The number of residential units was calculated from the dwelling and building files from the DLGF data. The total number of units for each TAZ was divided by the residential area of each corresponding TAZ. The data was then normalized by the maximum value. Domain = [0, 1]

## AVGHHINC

The average TAZ household income was available in the TAZ file in the field “AVGINC.” It was then normalized by the maximum value. Domain = [0, 1]

## ATT\_NRE\_PK

The number of non-retail jobs that can reach a zone within a 20-minute drive was calculated from a TDM 2016 base year run. They were then normalized by the maximum value. Domain = [0, 1]

## ATT\_POP\_PK

The number of people that can reach a zone within a 20-minute drive was calculated from a TDM 2016 base year run. They were then normalized by the maximum value. Domain = [0, 1]

## ATT\_RET\_PK

The number of retail jobs that can reach a zone within a 20-minute drive was calculated from a TDM 2016 base year run. They were then normalized by the maximum value. Domain = [0, 1]

# Real Estate Attributes

## PARC\_PER\_U

The parcel acreage per residential unit was computed using the parcel and dwelling tables from the DLGF data. Real estate type was classified based on each parcel. For single-family houses, the parcel area for each TAZ was added up. This was then divided by the number of parcels in each TAZ (equal to the number of units as these are single-family houses).

## FIN\_SQ\_FT

The building, parcel, and dwelling tables were used to calculate the average area of each unit by parcel. For each TAZ, the area of each unit and the number of residential units in each building or dwelling were added up, and then the ratio was taken.

## SPACEFIRM

The built square feet in use by occupant firms was calculated by adding up the area of each real estate type by TAZ, which was determined by each parcel’s land use.

## FAR

The floor-area ratio was calculated by adding up the built area of each real estate type in each TAZ by adding up the area of all of the buildings, adding up the area of each parcel by real estate type, and then computing the ratio.

# Fixed Supply

The fixed supply was computed by adding up the number of units of each real estate type in each TAZ, and then finding the proportions of each real estate type in TAZ by market. The residential proportions were multiplied by the number of households in each TAZ according to the TAZ file, and the non-residential proportions were multiplied by the number of jobs in each TAZ.

# Control Totals

For the residential market, the control totals were estimated using CTPP data (Number of vehicles) combined with the Woods and Poole data provided by HNTB (Householder race and Income data). The income classifications in the Woods and Poole data (<$30k, $30-60k, $60-100k, >$100k) were slightly different than the income classifications used in the Cube Land model (<$30k, $30-50k, $50-100k, >$100k). To account for this, the two intermediate categories were evenly disaggregated into subcategories based on increments of $10k. They were then re-aggregated into new income categories.

The Woods and Poole data included data on population by race (white or non-white) by county. The percentages of people in each race were calculated and then multiplied by all of the income categories to get household income by race by county. Data on household vehicle ownership for households with an income less than $30k were then obtained from the CTPP. The percentage of households with no vehicles and one or more vehicles were then calculated, and multiplied by the number of low-income households in each racial category.

The control totals for all ten residential agent categories were now obtained for each county. These were then added up and rounded. Because the number of households from the Woods and Poole data (751920) did not match the number of households in the TAZ file, and thus the number of housing units in the fixed supply (745845). The proportion of each agent category was calculated, and then multiplied by the number of housing units in the fixed supply. The same procedure was done using InfoUSA data in order to get the total number of jobs in each agent category.

It should be noted that this methodology assumed that the relationships between householder race and income and householder race and number of vehicles were independent. Data on householder race by income by vehicle ownership was searched for within the CTPP tables, but was not found.