



## **Title: Building the Database**

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## Title: Building the Database

### Abstract

The purpose of this project is to create a comprehensive database for each metropolitan area that will a) support local research initiatives, b) allow comparative studies of various urban freight topics, and c) identify urban freight data gaps among the four metropolitan areas. We explain the data collection plan and the data that has been collected for the partner metropolitan areas: Los Angeles, New York, Paris, and Seoul. City logistics data falls into five categories of information: jurisdiction, infrastructure, land use, flows, and policy. The availability of data elements differs across metropolitan areas.

### Introduction

Comparable data is essential for building our understanding of goods movement and its impacts in metropolitan areas. Phase 1 of the MetroFreight research program is the development of a comprehensive and comparable set of data for the partner metropolitan areas: Los Angeles, New York, Paris and Seoul.

There is no commonly available source of data on freight movements within metropolitan areas. Indeed, comparable data at the sub-metropolitan level across different countries is limited, even for basic information such as population characteristics or supply of transport facilities. Different levels of government collect data at various geographical scales and within political boundaries that are not always compatible.

Metropolitan planning organizations (MPO) in the US have begun collecting urban freight data, but their efforts are largely limited to commercial truck movement and the data is available only in a few major trade node metropolitan areas such as Los Angeles, San Francisco and Chicago. A large proportion of freight data belongs to the private sector and there is no protocol for researchers to share it. Moreover, there has been no systematic work that successfully integrates freight data from different sources.

The Phase 1 work first aims to establish a comprehensive data base for each metro area. The data base has shared principles for collecting data. The objectives of the Phase 1 data collection are as follows:

1. Create a comprehensive data base for each metro area that will:
  - support local research initiatives
  - allow comparative studies of various urban freight topics over the life of the VREF grant
  - identify urban freight data gaps among all four metro areas
2. Provide the basis for development of a Global City Logistics Index to categorize cities with respect to city logistics attributes and spatial patterns.

This report describes the data collection plan and the data that has been collected. Project 1B, the Urban Freight Landscape Atlas, presents the first comparative study based on the data collected.

## Data Collection Plan

In order to generate a truly comparable database, it is necessary to establish a set of rules and criteria that all the data must meet. This section presents the framework used to structure the data collection.

### Metropolitan Areas *Boundaries*

The metropolitan area is the macro unit of analysis:

- Los Angeles: Combined Statistical Area (CSA)
- New York: Metropolitan Statistical Area (MSA), part of Combined Statistical Areas (CSA)
- Paris: Paris region (Region Ile-de-France)
- Seoul: Seoul Metropolitan Area

We also consider another level of data analysis: the central area, for its specific issues related to urban freight and deliveries. In all cases we use the central city: Los Angeles, New York City, Paris, and Seoul.

### *Granularity/spatial units*

Our goal is to collect data at the smallest spatial unit possible. The metropolitan areas have the following granularity:

- Los Angeles and New York: Year 2010 US Census tracts.
- Paris: municipalities (there are 1281 municipalities in the Paris region and 20 districts within Paris) and possibly “IRIS”, a sub-municipal tract for national statistics (b/w 2000 to 5000 people in each IRIS).
- Seoul: Gu (quite equivalent to borough or district), and Dong/Eup/Myeon (smallest unit for Census).

### *Data format*

All spatial data is geo-coded in GIS format<sup>1</sup> using the ArcMap package by ESRI. All matrix data files are in Excel (when possible geotagging identifier will be provided to link the data tables into a GIS) or other files compatible across mac/windows platforms; all files stored in group Dropbox.

### Types of data

City logistics data falls into five categories of information: jurisdictions, infrastructure, land use, flows, and policy.

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<sup>1</sup> Shapefile is the common format that is easy to export and readable by the great majority of GIS packages.

**TABLE 1: TYPES OF DATA**

<i>Jurisdictional</i>	Political boundaries: CSAs, MSAs, municipal, counties or equivalent, transportation districts, air quality districts, port authorities, airport authorities. Geographic boundaries: ZIP codes, census tracts, Traffic Analysis Zones.
<i>Infrastructure</i>	Street network. Highway network. Public transport network. Freight rail transport network. Airport terminals. Rail terminals. Port terminals. Distribution centers and container depots.
<i>Land Use</i>	Geographic features (rivers, topography, green space/parks). Distribution of socioeconomic attributes: population, employment, number of firms, establishments by industry type.
<i>Flows</i>	Vehicle fleet data. Vehicle flows. Commodity flows. Freight companies.
<i>Policy</i>	Parking regulations; truck operations regulations; fuel and emissions regulations; zoning maps and codes; building codes.

### A. Jurisdictional

#### A1. Governmental boundaries

- Political and geographic boundaries: large granularity for study area delineation and small granularity for geographical and statistical analyses
- Large: metropolitan areas
- Small: census areas, postal codes, and transportation analysis zones

#### A2. Special authority districts

- Special authorities relevant to metropolitan and local freight operation rules and regulations

### B. Infrastructure

#### B1. Freeway/highway/arterial system

- Geographical schematics of land transportation network from traffic monitoring systems, regional travel models, and public sources

#### B2. Public transportation

- Transit lines, stops, and attributes

#### B3. Freight rail and intermodal system

- Facility location and capacity of freight rail terminals, tracks, switch locations, yards, and stations
- Facility location and capacity of rail-truck, air-truck, port-truck, rail-port, port-truck-rail intermodal systems

#### B4. Seaport terminals

- Location, type of terminals (container, bulk, ro-ro), terminal capacity (number of cranes, berths), and access to rail

#### B5. Cargo service airport terminals

- Number of runways and terminal facilities, type of terminals (refrigerated and perishable), availability of customs services, access to seaport and intermodal facilities, and freight forwarder information

#### B6. Warehousing and distribution centers, container depots

- Facility locational, operational, land-use/zoning and physical characteristics

- Address, XY coordinates, truck trip generation, area size, number of docks, cross-docking availability, automation, etc.

### *C. Land use*

#### C1. Population characteristics

- Population counts and socio-economic characteristics by spatial unit

#### C2. Employment characteristics

- Jobs, establishments by spatial unit and by industry sectors, annual/decennial

#### C3. Densities

- Population and employment density calculated based on the population and employment counts per area embedded in C1 and C2

#### C4. Topographic features

- National/state park, mountains, open space, parks and green space, protected areas, and water features

### *D. Flows*

#### D1. Vehicle fleet data

- Number of registered vehicles by type, size, age, fuel type (diesel, CNG, electric; non-motorized)

#### D2. Transport flows

- Local truck flows: volume, frequency, deliveries/pickups, loading/unloading activities
- Metropolitan freight flows from traffic monitoring systems and regional travel models
  - Freight flows by mode (land, water, or air), by time of day (AM/PM peak; workday/weekend), by type of vehicle (truck size, weight, axle number, train tonnage, number of cars, etc.)
  - Freight flows on link-based loaded networks and origin-destination matrices
- Commodity and freight flow estimation to/from/within region by ton/value, by industry sector, by commodity type, by mode of travel, and by trade hubs
- Trade statistics of seaports, cargo service airports, and intermodal facilities

### *E. Policies and regulations*

#### E1. Traffic regulations

- Truck parking regulation on streets, truck stops and rest stations on highways
- Long term and short term loading zones
- Truck route/zone restrictions by weight and vehicle type
- Oversized truck regulation

#### E2. Fuel and emissions regulations

- Truck and locomotive fuel economy and emission standards by governance level (national, regional, and local standards) by fuel type, engine size or vehicle weight

#### E3. Operator regulations

- Freight facility operation: seaport/cargo airport, intermodal, and warehousing facility operation, hours of service, type of commodity
- Vehicle operation: pickup and delivery, loading/unloading regulations

#### E4. Land use regulations

- Regional and municipal land use/zoning regulations tailored for freight, warehousing, and logistics industries

- Building codes on site-level pickup/delivery facilities, off-street loading zones requirements

## Data collection summary across four metro areas

The availability of data elements in the framework above differs across metro areas. The following table shows whether different data elements exist, are available and collected in the four metropolitan areas.

### A. Jurisdictional

<b>Data Elements</b>	<b>Los Angeles</b>	<b>New York</b>	<b>Paris</b>	<b>Seoul</b>
<i>Political boundaries (municipal, county, or equivalent)</i>	Yes	Yes	Yes	Yes
<i>Special authority districts</i>	Yes	No	Yes	N/A

### B. Infrastructure

<b>Data Elements</b>	<b>Los Angeles</b>	<b>New York</b>	<b>Paris</b>	<b>Seoul</b>
<i>Street Network</i>	Yes	Yes	Yes	Yes
<i>Highway Network</i>	Yes	Yes	Yes	Yes
<i>Public Transport Network</i>	Yes	Yes	No	Yes
<i>Rail Transport Network</i>	Yes	Yes	No	Yes
<i>Waterway System</i>	N/A	Yes	Yes	N/A
<i>Airport Terminals</i>	Yes	Yes	No	Yes
<i>Rail Terminals</i>	Yes	Yes	Yes	Yes
<i>Port Terminals</i>	Yes	Yes	Yes	Yes
<i>Distribution Centers</i>	Yes	Yes	No	Yes
<i>Container Depots</i>	Yes	Yes	No	Yes

### C. Land use

<b>Data Elements</b>	<b>Los Angeles</b>	<b>New York</b>	<b>Paris</b>	<b>Seoul</b>
<i>Population Characteristics</i>	Yes	Yes	Partly	Yes
<i>Employment</i>	Yes	Yes	Yes	Yes
<i>Number of Firms</i>	Yes	No	Partly	Yes
<i>Economic Activity/ distribution of establishments by industry type</i>	Yes	No	Yes	Yes
<i>Features (River, topography, green space)</i>	Yes	Yes	Yes	Yes

### D. Flows

<b>Data Elements</b>	<b>Los Angeles</b>	<b>New York</b>	<b>Paris</b>	<b>Seoul</b>
<i>Vehicle Fleet Data</i>	No	No	No	No
<i>Vehicle Flows</i>	Yes	No	No	Yes
<i>Truck O-D</i>	Yes	No	No	No
<i>Railroads</i>	No	No	No	No
<i>Commodity Flows</i>	Yes	Yes	No	Yes
<i>Freight Companies</i>	Yes	No	No	No
<i>Paris Urban Freight Survey</i>	N/A	N/A	Yes	N/A

## E. Policies and regulations

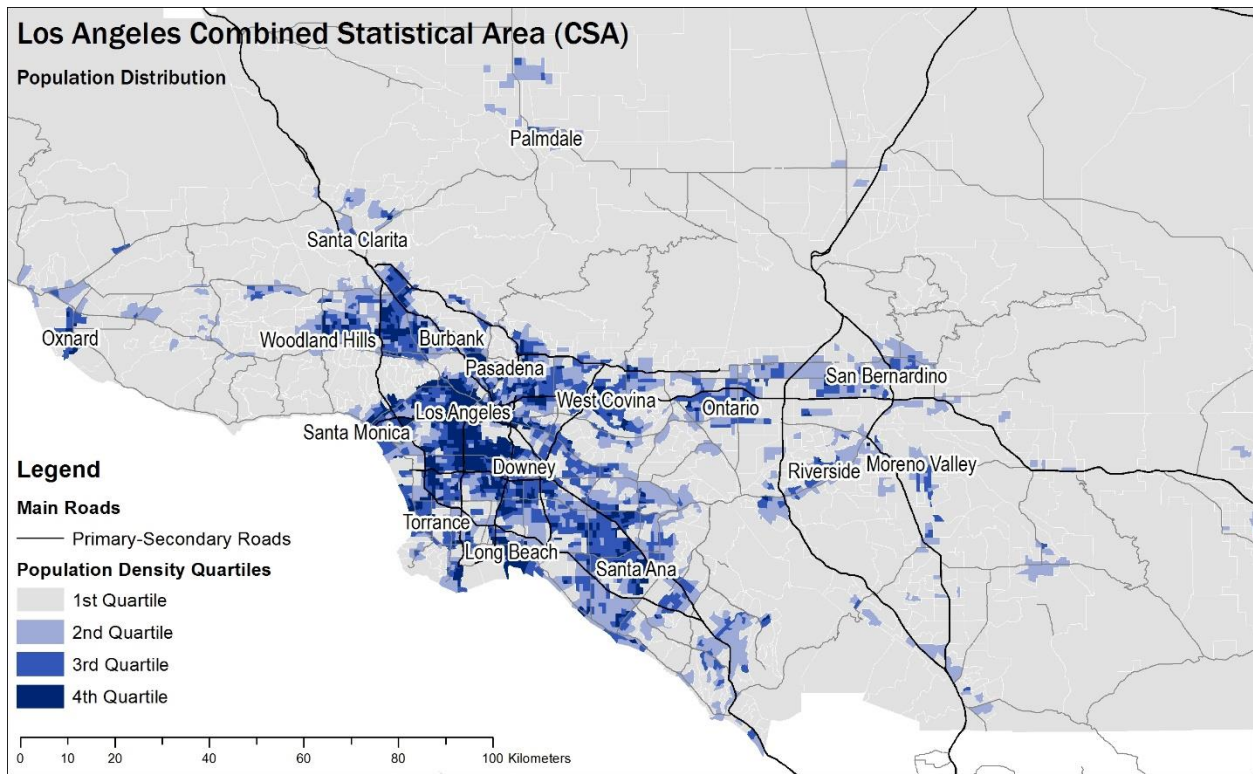
<b>Data Elements</b>	<b>Los Angeles</b>	<b>New York</b>	<b>Paris</b>	<b>Seoul</b>
<i>Traffic Regulation - Parking and Loading</i>	Partly	Yes	Partly	Yes
<i>Truck Routes</i>	Yes	Yes	Yes	Partly
<i>Fuel and Emissions Regulations</i>	Yes	Yes	Yes	Yes
<i>Operator Regulations</i>	No	No	No	No
<i>Land Use Regulation - Zoning</i>	Yes	Yes	Yes	Yes
<i>Service and Code Restrictions</i>	No	No	Yes	No

The most comprehensive data set has been collected for Los Angeles. Appendix A provides a complete description of all data collected for Los Angeles.

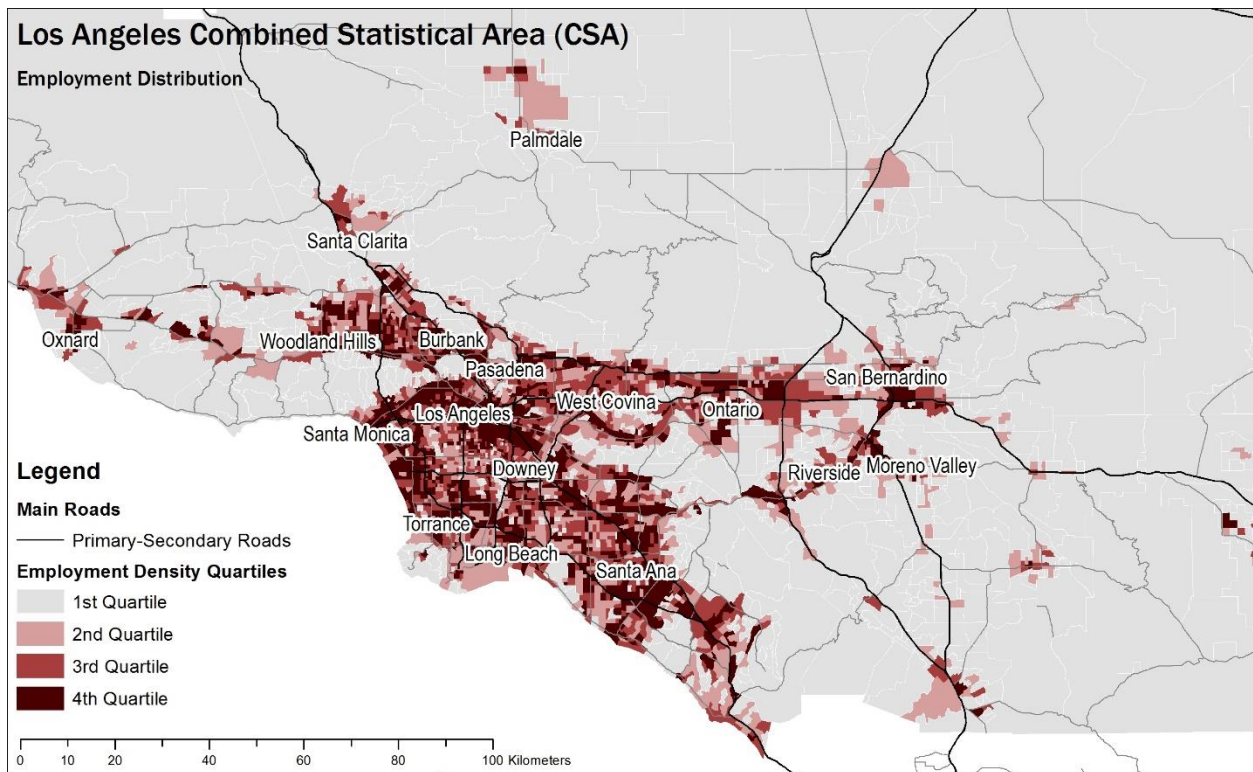
## Thematic Maps

The data collected can be displayed as thematic maps depicting the nature and configuration of city logistics of the main metropolitan areas. This will enable us to build a “City Logistics Atlas” for each city. Among the basic maps that have been created for each metropolitan area:

- City reference map with jurisdictions and features.
- Population and employment distributions (general land uses).
- Road transport system.
- Freight terminals (ports, airports)

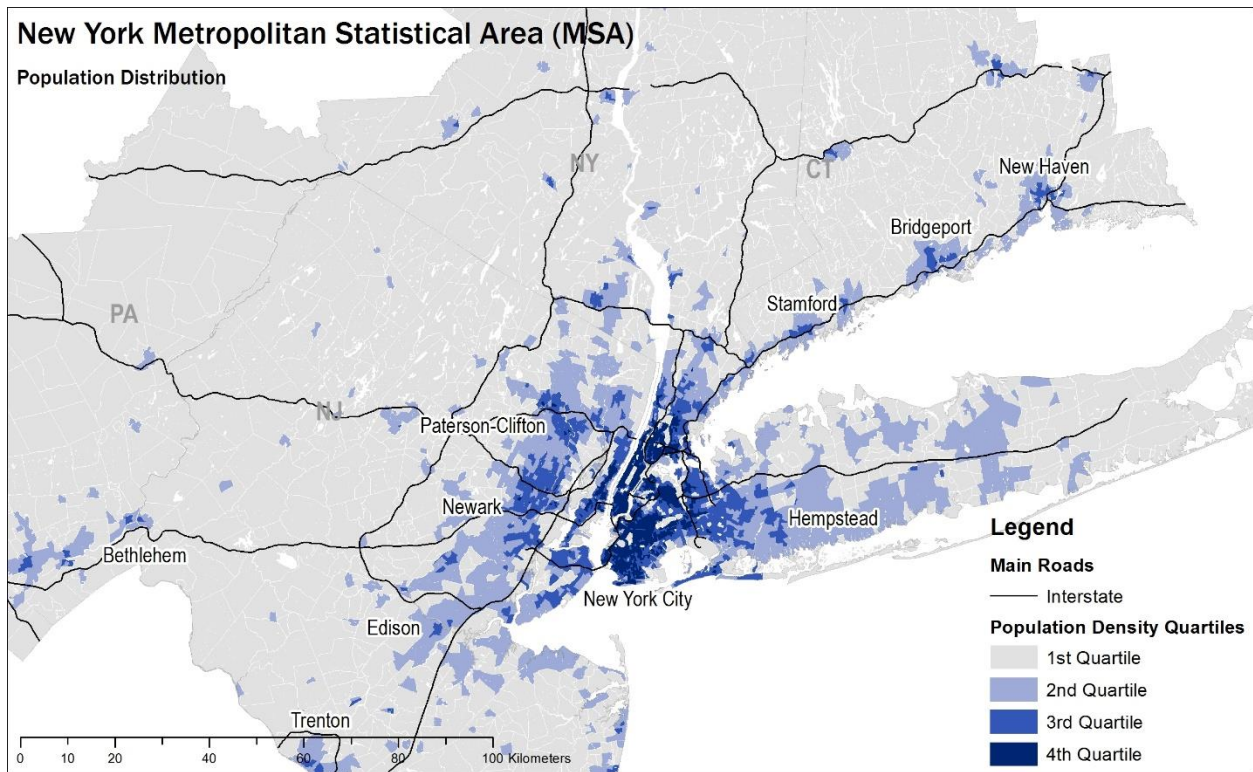


**FIGURE 1 POPULATION DISTRIBUTION IN LOS ANGELES CSA**

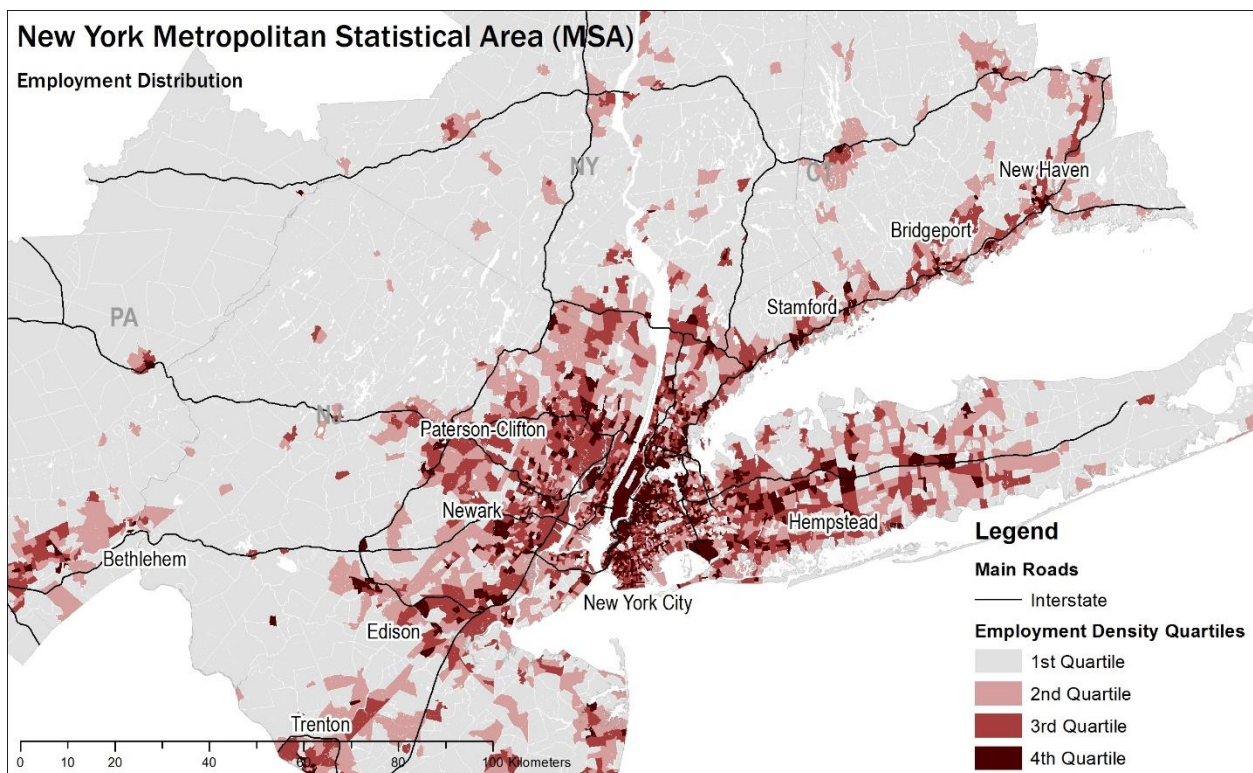


**FIGURE 2 EMPLOYMENT DISTRIBUTION IN LOS ANGELES CSA**





**FIGURE 3 POPULATION DISTRIBUTION IN NEW YORK MSA**



**FIGURE 4 EMPLOYMENT DISTRIBUTION IN NEW YORK MSA**

### Paris Region (Region Ile-de-France)

Population Distribution

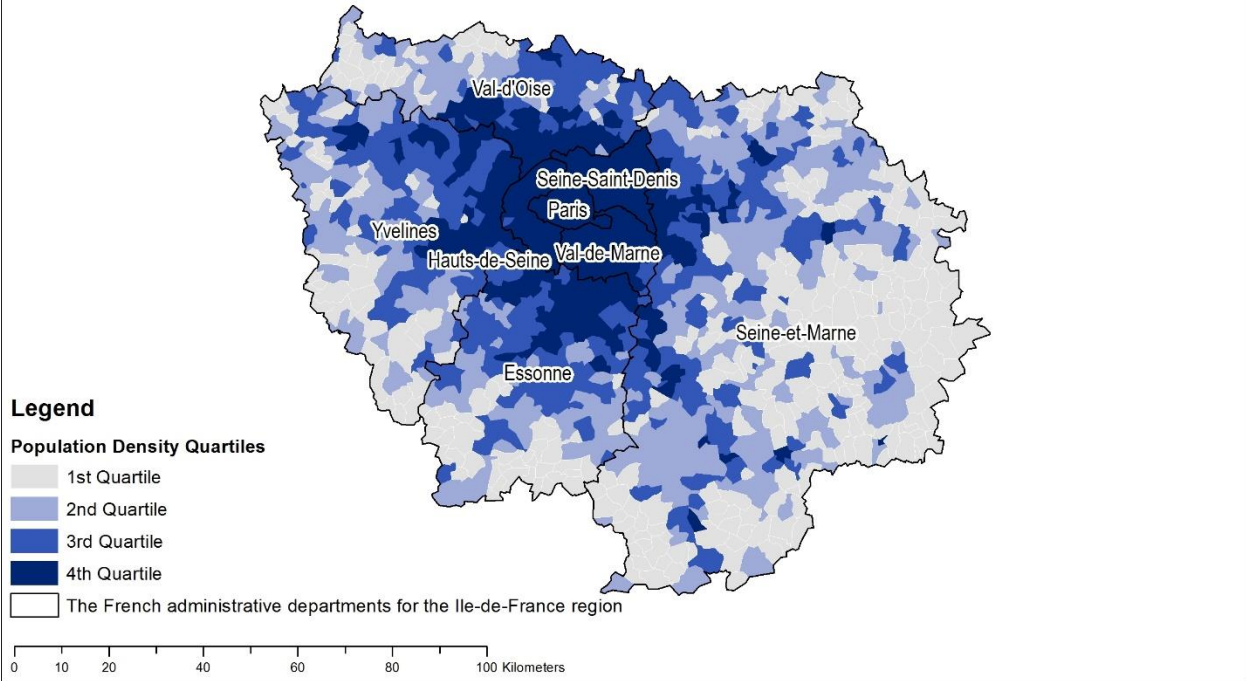


FIGURE 5 POPULATION DISTRIBUTION IN PARIS REGION

### Paris Region (Region Ile-de-France)

Employment Distribution

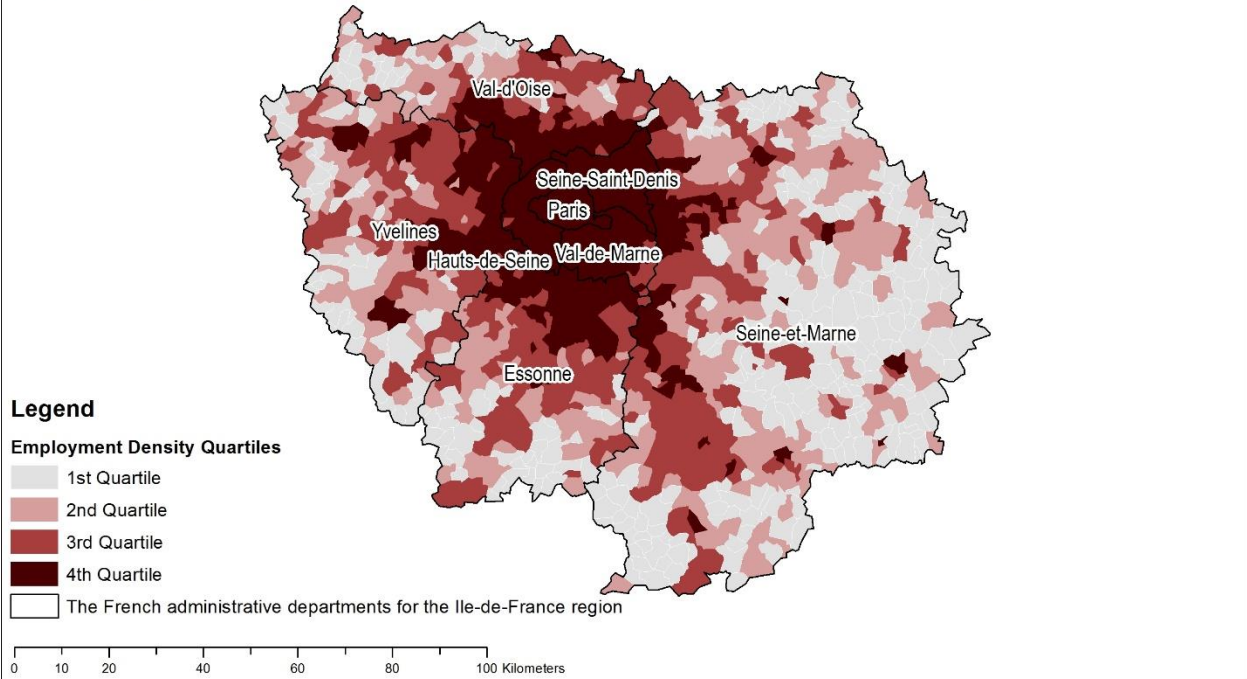


FIGURE 6 EMPLOYMENT DISTRIBUTION IN PARIS REGION

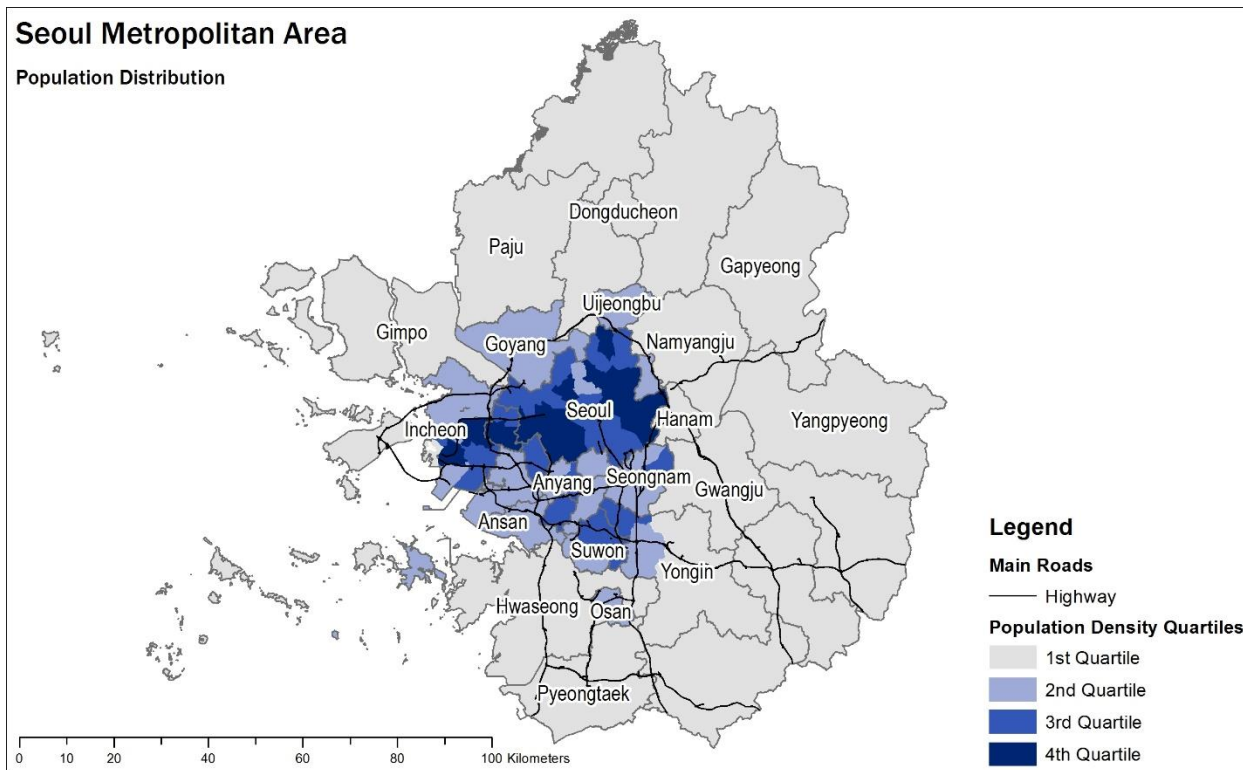


FIGURE 7 POPULATION DISTRIBUTION IN SEOUL METROPOLITAN AREA

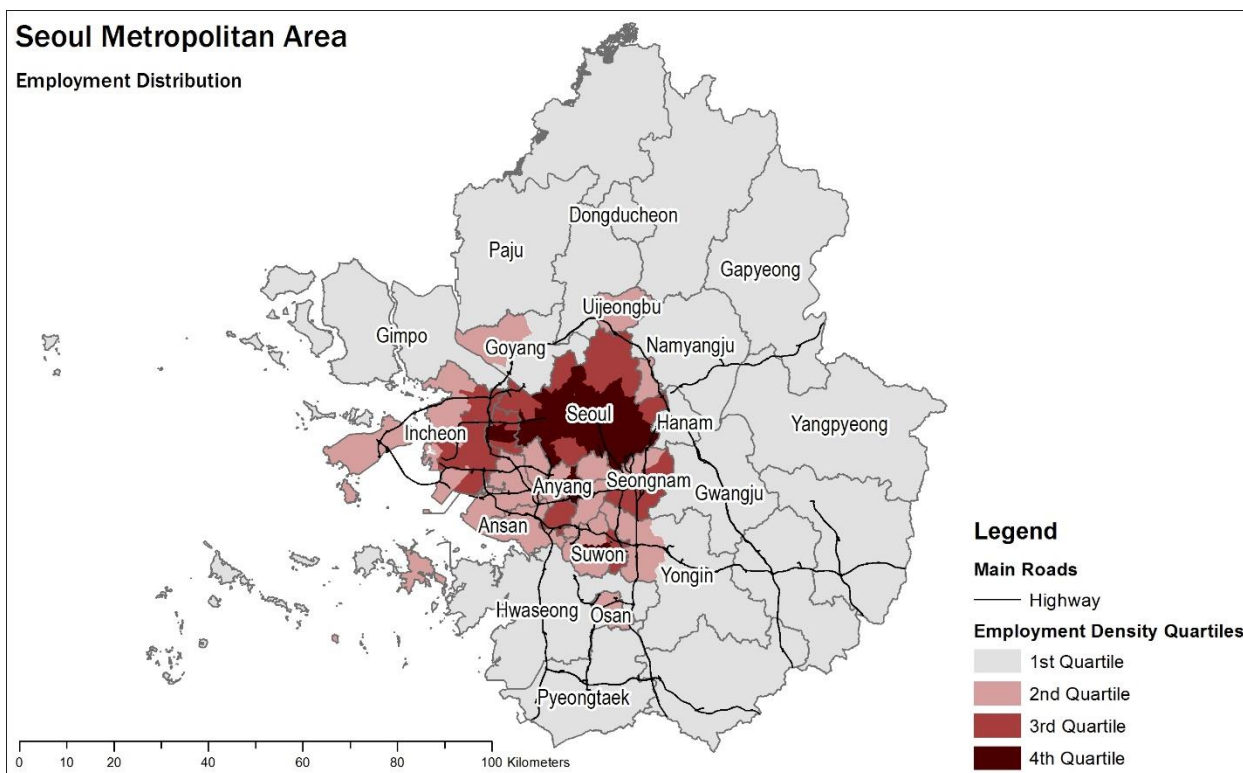


FIGURE 8 EMPLOYMENT DISTRIBUTION IN SEOUL METROPOLITAN AREA

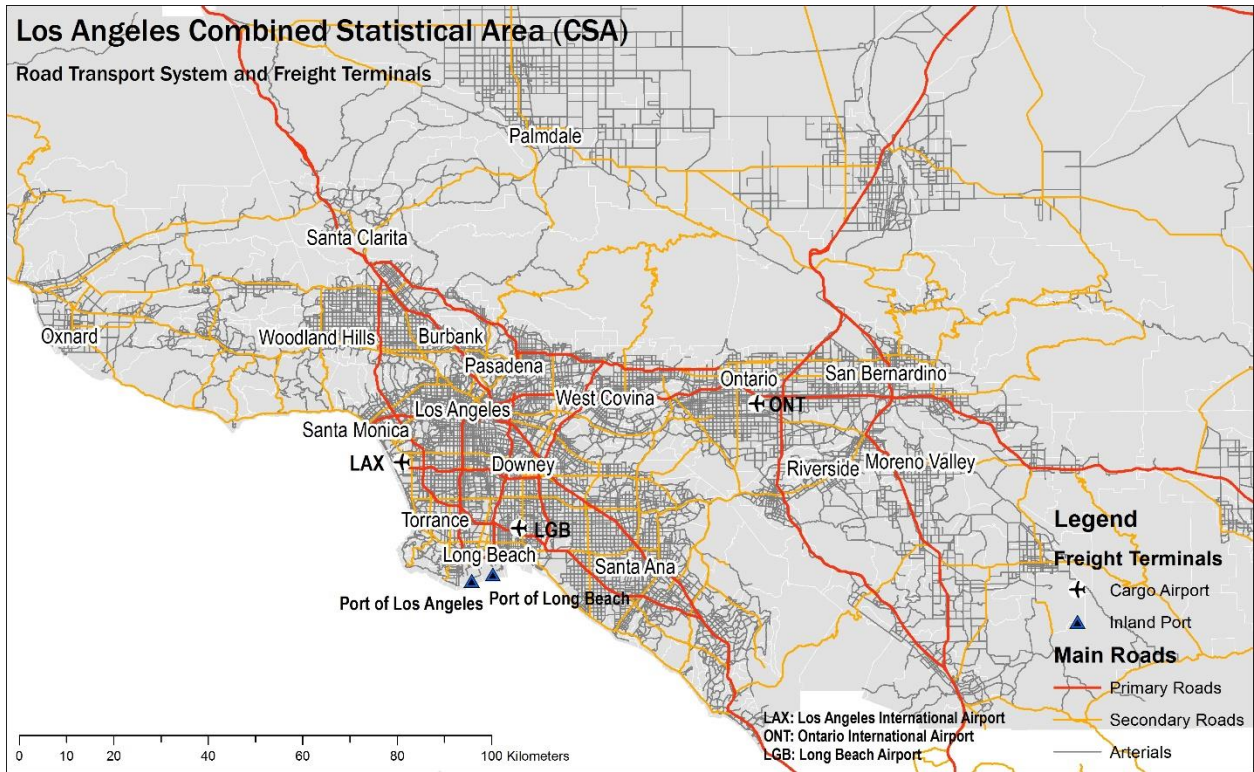


FIGURE 9 ROAD TRANSPORT SYSTEM AND FREIGHT TERMINALS IN LOS ANGELES CSA

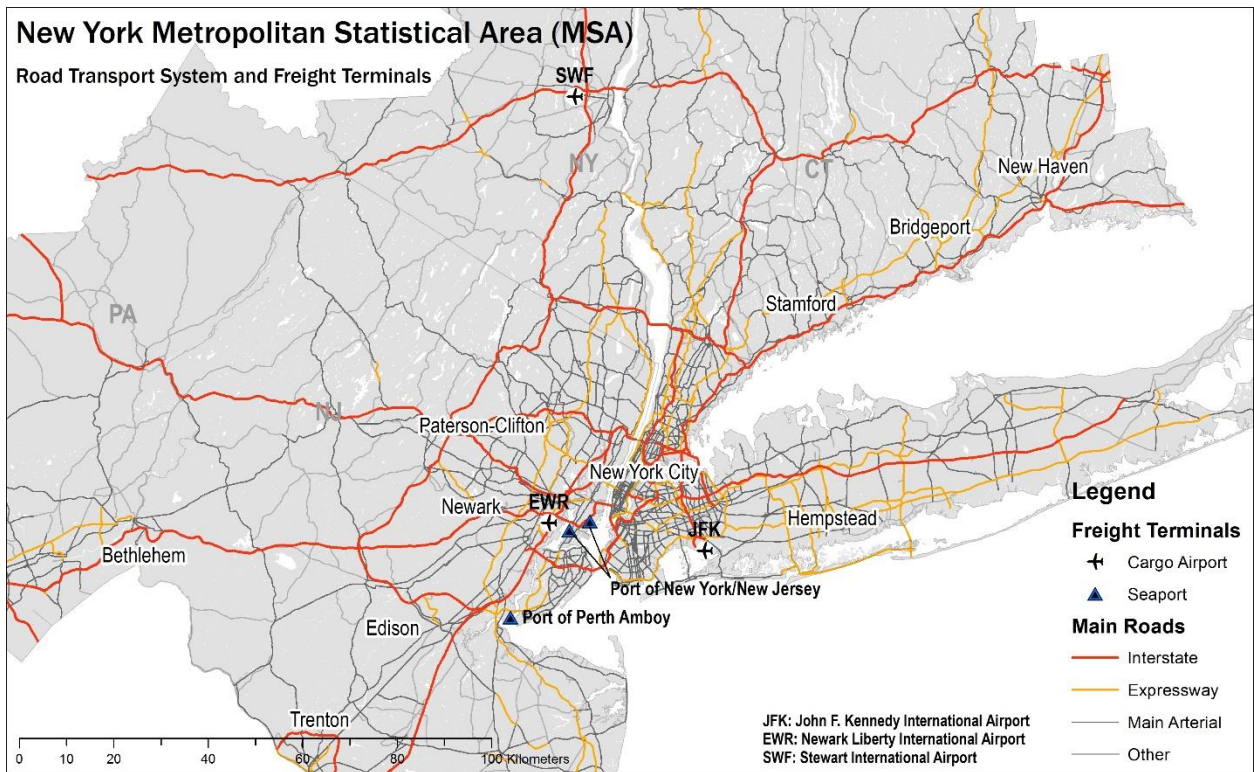


FIGURE 10 ROAD TRANSPORT SYSTEM AND FREIGHT TERMINALS IN NEW YORK MSA

## Paris Region (Region Ile-de-France)

### Water Transport System and Freight Terminals

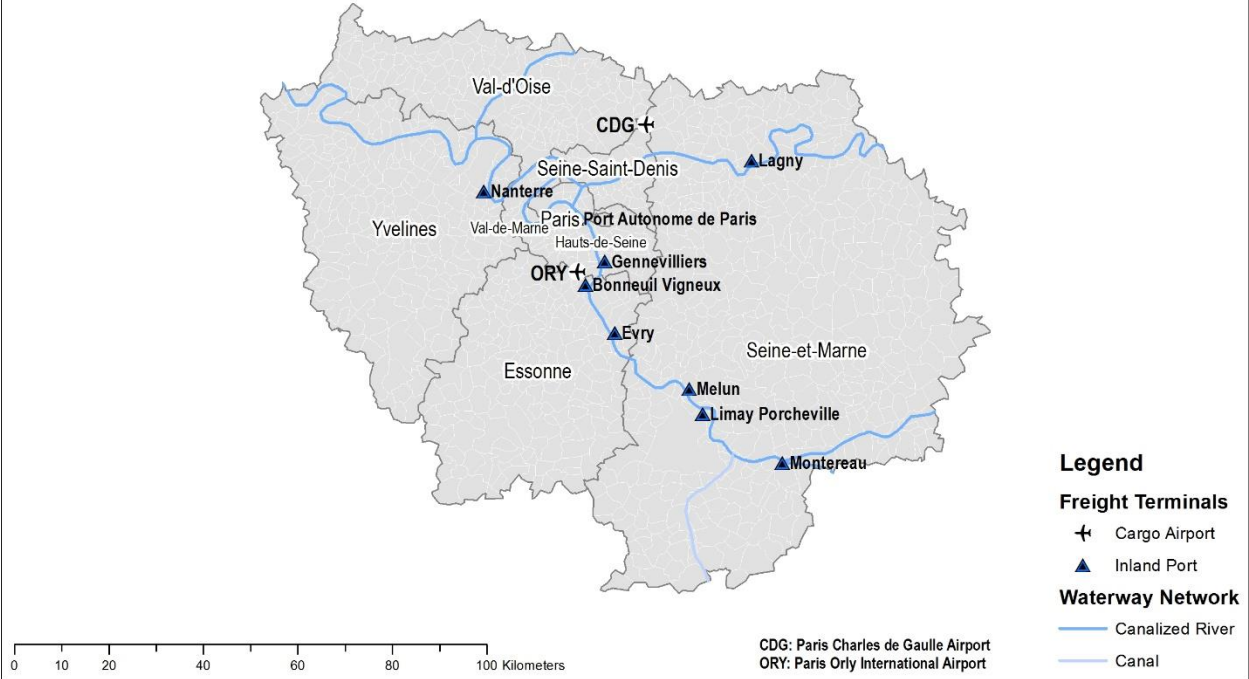


FIGURE 11 ROAD TRANSPORT SYSTEM AND FREIGHT TERMINALS IN PARIS REGION

## Seoul Metropolitan Area

### Road Transport System and Freight Terminals

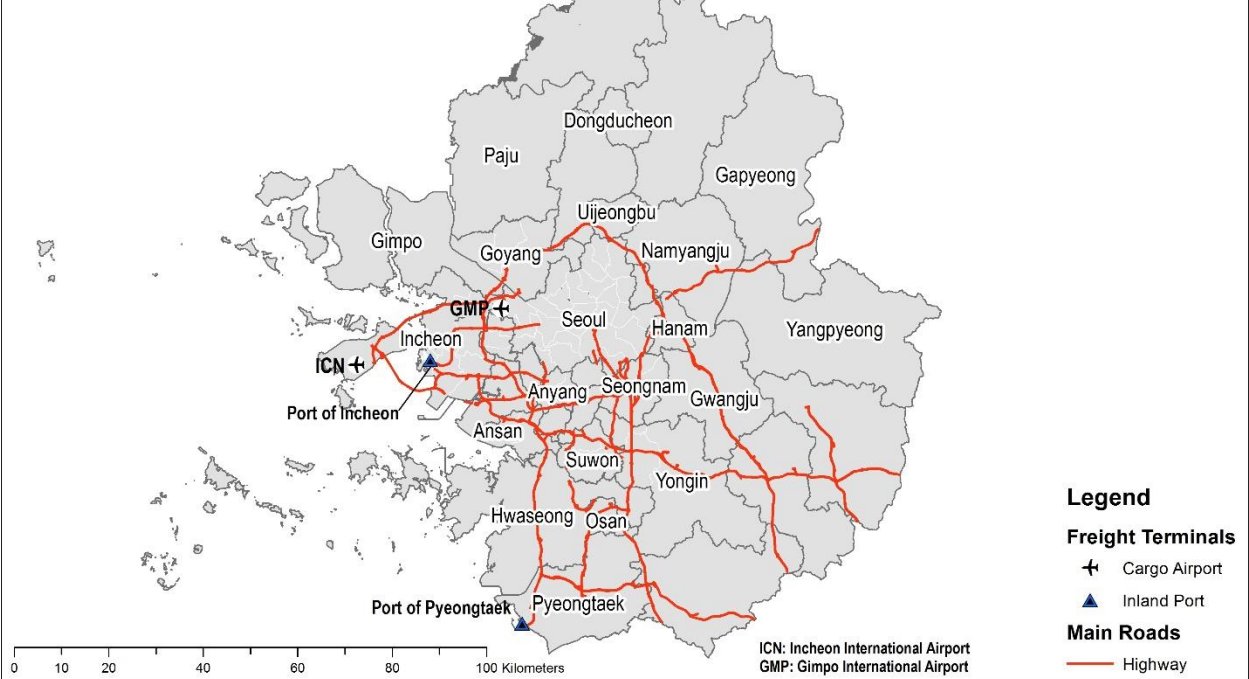


FIGURE 12 ROAD TRANSPORT SYSTEM AND FREIGHT TERMINALS IN SEOUL METROPOLITAN AREA

# Appendix A. CITY LOGISTICS DATA COLLECTION IN LOS ANGELES

## *A. Jurisdictional*

- A1. Governmental boundaries
  - A1.1 Metropolitan area: Combined Statistical Areas (CSAs), Metropolitan Statistical Areas (MSAs)
  - A1.2 Counties
  - A1.3 Municipalities
  - A1.4 Postal code boundaries: Census ZIP Code tabulated areas, TeleAtlas products (subsidiary of TomTom International)
  - A1.5 Census tracts: small area census boundary
  - A1.6 Transportation Analysis Zones (TAZs) by SCAG, regional planning agency
  
- A2. Special authority districts
  - A2.1 California State Department of Transportation Districts
  - A2.2 Public transit service areas
  - A2.3 Port of Los Angeles and Port of Long Beach authorities
  - A2.4 Airport authorities: LAX, ONT, LGB
  - A2.5 Air quality districts: South Coast Air Quality Management District

## *B. Infrastructure*

- B1. Freeway/highway /arterial system
  - B1.1 Geocoded ADMS highway system
    - Actual network data with geometrics of highway systems XY coordinates of every highway segment as available) in Oracle database
  - B1.2 Geocoded ADMS arterial system
    - Number of lanes, signalized intersections, and length of segments
    - All arterials in LA county only
  - B1.3 Regional transportation plan data
    - Schematics of highway and arterial transportation network for regional transportation modeling by SCAG
  - B1.4 Network systems elsewhere in California
    - Sacramento arterial system by SACOG, 2008 model year
    - San Francisco loaded highway and arterial system with commercial vehicle estimation, by MTC/ABAG, 2010 model year
    - San Diego highway and arterial system by SANDAG, 2003, 2006, 2008 model years
  
- B2. Public transportation
  - B2.1 Detailed LA Metro public transit network, 2010-2013 annual vintages
  - B2.2 Metrolink transit network
  - B2.3 Transit lines, stops and attributes compiled by SCAG
  
- B3. Rail system
  - B3.1 Freight railroad system
    - Rail terminals, tracks, switch locations, yards, and stations
  
- B4. Port terminals

#### B4.1 Location and facility capacity of ports and terminals

- Container terminals, bulk and break-bulk terminals (grain, gravel), ro-ro facilities (Roll/on/Roll/off)
- Geo-data from National Geospatial-Intelligence Agency (NGA)

#### B5. Airport terminals

##### B5.1 Major cargo-service airports

- Location data from National Transportation Atlas Database 2012; Federal Aviation Administration (FAA)

#### B6. Distribution centers and container depots

##### B6.1 Warehousing jobs, establishment location, and facility capacity data

- National Establishment Time-Series 1993-2009, NAICS493 warehousing and storage
- ZIP Code business patterns, 1994-2013, NAICS493 warehousing and storage
- CoStar, commercial real estate listing service, facilities over 30,000 square feet

### *C. Land use*

#### C1. Population characteristics

##### C1.1 U.S. Census

- 2010 Census dataset and geography: Population, households, housing tenure, income, workers, employment status, occupation, poverty, median house price, race/ethnicity (most recent census data), housing units by type

#### C2. Employment characteristics – jobs, establishments by industry sector by spatial unit

##### C2.1 National Establishment Time-Series (NETS)

- Establishment and employment data with XY coordinates
- 1993-2009
- By 6 digit NAICS sectors

##### C2.2 SCAG employment

- 1980, 1990, 2000, 2008, 2012 available in census tracts in 2 digit NAICS sectors
- 1980, 1990, 2000 only in urban areas
- 2008 and 2012 in SCAG area
- INFOUSA 2011 (used for the SCAG freight works study)

##### C2.3 Longitudinal Employer-Household Dynamics (LEHD)

- 2002-2013 in census blocks
- Employment available in 2 digit NAICS sectors

##### C2.4 County Business Patterns (CBP)

- 1986-2013 available in county in 6 digit NAICS sectors
- Establishment, employment data, and payroll

##### C2.5 ZIP Code Business Patterns (ZBP)

- 1994-2013 in USPS ZIP codes
- Establishment, employment data, and payroll

#### C3. Densities

##### C3.1 Population Density

- Based on 2010 census tract boundary and 2010 dataset

- Calculated based on the population count per area embedded in C1
- C3.2 Employment Density
- Retail and warehouse density embedded in C2

C4. Topographic features (mountains, rivers, etc.)

C4.1 Water features: rivers and lakes

- Impaired water bodies, California water bodies, LA water bodies

C4.2 Open space: parks and green space

- California protected area, California State parks

## *D. Flows*

D1. Vehicle fleet data

D1.1 Number of registered vehicles

- LA Metro: 2010 MISTER registered truck fleet data by ZIP code

D2. Transport flows

D2.1 Regional flows (SCAG Regional Transportation Plan)

- Data 1. Link-based loaded truck model, part of SCAG RTP
- Data 2. Origin/Destination matrices in Tier 1 TAZs (4,109 TAZs) for total flow, passenger flow, truck flow
- All in 3 truck categories in 5 time periods of the day in 2008 and 2012
- Three types of trucks: Light-heavy, medium-heavy, and heavy-heavy duty trucks
- Five periods of day: AM peak, midday, PM peak, evening, and night

D2.2 Freeways/highways/arterials traffic flows

- ADMS: daily average traffic volumes (5 periods of day); delay measures contained
- Weigh in Motion (WIM) and Automated Vehicle Classification (AVC): truck/van volumes by truck size, weight, axle number; only for highways; from PeMS (Performance Measurement System); 2008-2011 in CA

D2.3 Accidents: number of accidents, number of truck involved accidents

- California Highway Patrol Statewide Integrated Traffic Records System (SWITRS): 2005-2007; number of truck-involved accidents

D2.4 Railroads

- Number of trains per day, tonnage/cars or some other volume estimate; measures of freight rail system delays; data from USC Viterbi School of Engineering

D2.5 Commodity flows survey (CFS)

- Commodity flow data to/from region; within region, in tons, dollars, by industry sector, for trade hubs

D2.6 Local truck flows: not collected

D2.7 Freight companies; urban trucking industry

- Establishment and employment data are available in NETS

D2.8 Freight Analysis Framework (FAF)

- Based on Commodity Flow Survey 2002, 2007 and 2012 and additional sources
- FAF version 3 (FAF3) estimates for tonnage, value, and domestic ton-miles by region of origin and destination, commodity type, and mode for 2007 and 2012 (provisional), the most recent year, and forecasts through 2040.
- State-to-state flows for these years plus 1997 and 2002, summary statistics, and flows by truck assigned to the highway network for 2007 and 2040



## D2.9 WISERTrade

- Similar to CFS, but focusing more on international commerce details
- Relevant to SoCal: CA, LA Metro, and LA/LB Ports to/from the rest of the world
- In 2000-2013, annually
- By HS (Harmonized System) and by SITC (Standard International Trade Classification)
- By multiple units (total value, air value, air weight, vessel value, vessel weight, container value, container weight, other values)

## *E. Policies and regulations*

### E1. Traffic regulations (central city only)

#### E1.1 Parking restrictions

- Not collected

#### E1.2 Truck routes

- Weight restrictions, vehicle restrictions
- LA County only: Countywide Strategic Truck Arterial Network (CSTAN)

#### E1.3 Oversize truck

- Federal definition only

### E2. Fuel and emissions regulations

#### E2.1 National standards (EPA), State (CA), and ARB (CA)

- Truck fuel economy standards, by fuel type, engine size or vehicle weight

#### E2.2 Locomotive fuel economy standards

- Not collected

#### E2.3 National truck emissions standards

- Federal definition only
- By fuel type, engine size or vehicle weight

#### E2.4 State / SCAQMD fuel or emissions standards

- Not collected

### E3. Operator regulations

#### E3.1 Operator hours of service

- Not collected

### E4. Land use regulations

#### E4.1 SCAG Land Use/Zoning

- Detailed lot-level data of 6 counties in SCAG region
- Residential, commercial, industrial, open space, un-zoned, and public

#### E4.2 LA County land use/zoning

- Tax lot data

#### E4.3 Pickup and delivery regulations (service hours)

- Not collected

#### E4.4 Off-street loading zones requirements (city level building codes)

- Not collected

#### E4.5 Building code on site level pickup/delivery facilities

- Not collected

#### E4.6 Government owned land in CA