

3 METHOD OVERVIEW AND STEP-BY-STEP PROCESS TO CONDUCT A CURB OCCUPANCY STUDY

A team of seven trained data collectors worked to document curb use over three days in each of five study areas, spanning roughly six weeks in October and December 2017. Collectors worked in four-to-five-hour shifts so that each study area, a three-by-three city block grid, would be continuously observed during daytime hours. Creating a three-by-three city block grid around a designated prototype building offered sufficient diversity of curb space types for commercial vehicle parking (both [authorized and unauthorized](#)). The study documents the parking behavior of [delivery, service](#), and other commercial and [passenger](#) vehicles along representative Greater downtown curb faces.

While a video camera-based data-collection was considered, a camera can be blocked by a large vehicle or other impediment. Human observers have the advantage of being able to easily sidestep potential obstacles to ensure clear sightlines along the curb, where traffic conditions are dynamic.

By inventorying CVLZs and PLZs for each study area and comparing Seattle Department of Transportation's curb-use GIS database to the on-the-ground reality found in field testing, the research team built a customized curb map and data-collection form for each study area. Based on each study area map, data collectors were assigned up to four strategic positions on the blocks in each area to maximize both visibility all along the curb and the diversity of curb parking types captured (CVLZ, PLZ, hydrants, tow-away zones, and lanes, where inadequate commercial vehicle parking might occur). Any commercial vehicle parked anywhere along the curb for one minute or more was recorded as was any vehicle (including passenger) parked in a CVLZ for one minute or more. Customized data-collection forms were divided by specific curb spaces and zones to be monitored at each position, with space for the data collector to record:

- The start/end time a vehicle spent parked at the specific curb space (recorded to the minute)
- The type of vehicle parked at the specific curb space

Step 1. Determine study parameters

Based on project scope and budget, determine at the outset the:

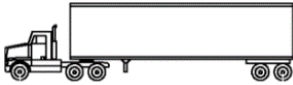







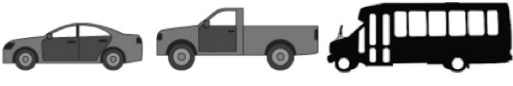


1. Scope/size of study area
2. Number and types of representative curb spaces to be observed
3. Location of each curb area to be observed
4. Data-collection/observation hours for study areas (unlike an inventory, periods of low activity should be avoided if the project seeks to document "typical" usage)
5. Use of human data collectors versus video/other technology to capture vehicle occupancy

Step 2. Use UFL’s detailed vehicle typology to accurately track vehicle categories

The UFL typology covers 10 separate vehicle categories, from various types of trucks and vans to passenger vehicles to cargo bikes. **NOTE:** While passenger vehicles could be performing delivery/commercial functions, passenger vehicles were not treated as commercial vehicles in this occupancy study due to challenges in systematically identifying whether they were making deliveries or otherwise carrying a commercial permit.

UFL curb occupancy vehicle typology

Table 2. Commercial and Non-Commercial Vehicles Included in Occupancy Study

COMMERCIAL VEHICLES (CV)		
Delivery Commercial Vehicles (4 subtypes shown below)		
Truck with Trailer (T)		Truck with trailer, three or more axles.
Box Truck (B)		Single-unit trucks, three axles or less.
Cargo Van (CV)		A cargo van is a one-piece unit, while a box truck has a separate cab and cargo box.
Cargo Bike (C)		
Garbage Truck (G)		
Service Commercial Vehicles (Van or Pick-Up Truck) (SV)		
Van (V)		A cargo or service van usually displays a business logo. If such information was not visible, the vehicle was recorded as a ‘van.’
Construction Vehicles		
CATEGORIZED AS NON-COMMERCIAL VEHICLES IN THIS ANALYSIS		
Passenger Vehicle (P)		
Taxi (X)		
Motorcycle (M)		
Others (O)	Includes fire and police trucks and vans, and other buses.	

Step 3. Assess each study area for data needed to build maps and data-collection forms

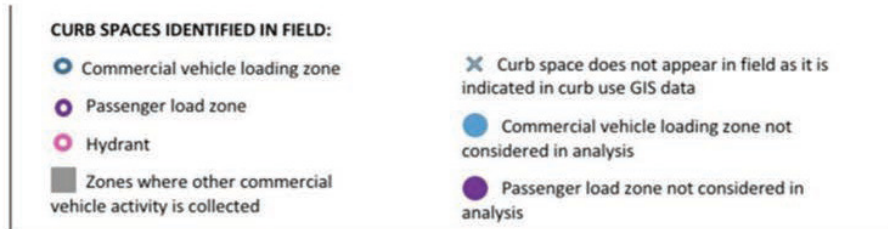
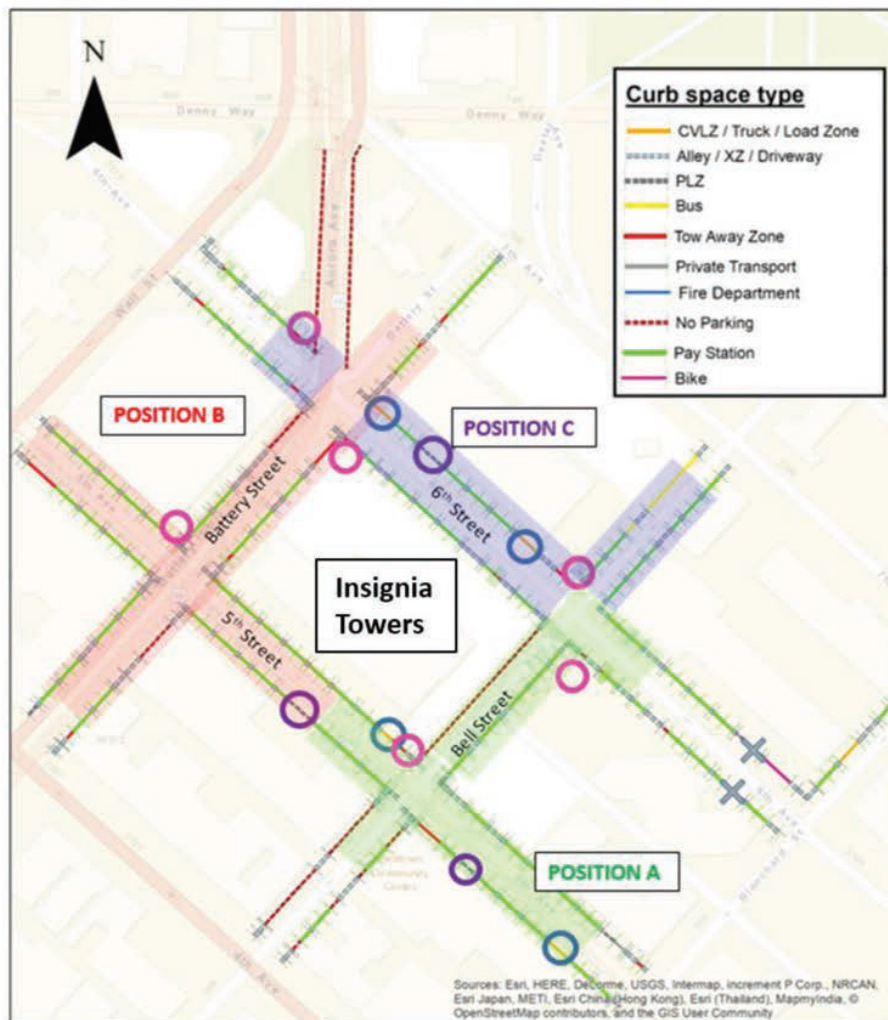
Identify the different types of curb parking and their characteristics (e.g. length, location, use restrictions).

If using a GIS curb space database, confirm accuracy in field and revise as needed.

Determine number/location of data collector positions for each study area based on visibility, number, and distribution of CVLZs and passenger load zones (PLZs) serving the building.

Ensure positions keep data collectors out of regular traffic flow and vehicle entry/exit.

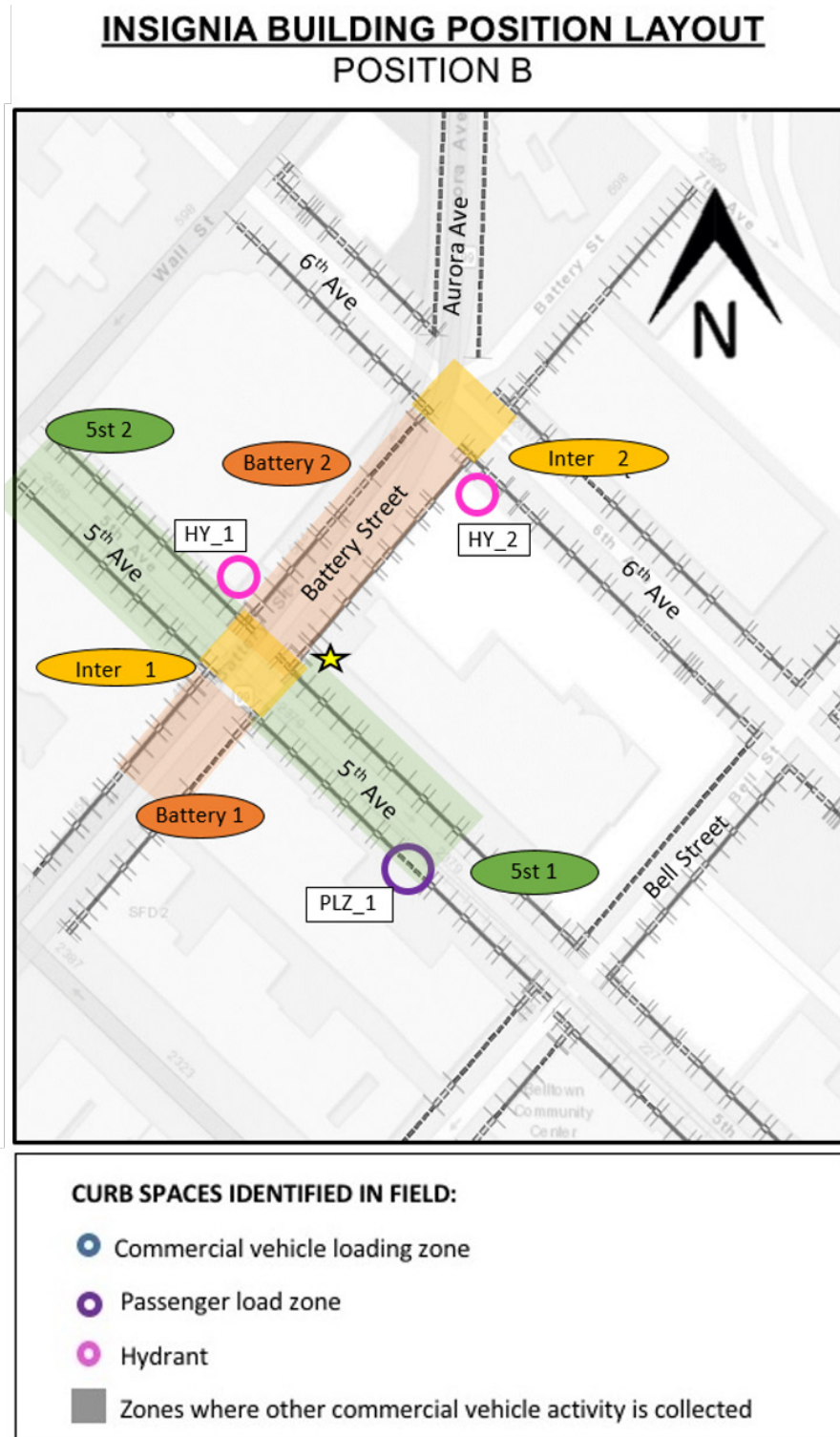
See a sample map of three positions from the UFL occupancy study below:



Step 4: Prepare customized data-collector position maps and data-collection forms

For each position in each study area, collectors need:

Position map. Include easily identifiable curb space features in field for each data-collector position (marked with star), as shown below.



Data-collection forms. Create a paper form in Microsoft Excel as shown below, ordered to allow data collectors to easily scan the curb and color-coded to allow collectors to easily find specific curb features (hydrant, PLZ, intersection etc.) on the position layout map.

		Curb Space Data Collection: Insignia Building - Position B										Collector initials:		Date:		Sheet						
		Vehicle type code: Truck (T) Box truck (B) Cargo Van (CV) Service Van (SV) Van (V) Passenger & Pick-up (P) Motorcycle (M) Cargo-bikes (C)																				
		Vehicle color code: USPS (US) Blue (B) Black (BK) Brown (BW) Green (G) Gold (GO) Red (R) Silver (S) White (W)																				
Time	PLZ 1		5th 1				Battery 1			HY_1	5th 2				Inter 1	Battery 2				HY_2	Inter 2	
	a	b	Right Curb a	Right Curb b	Center	Left Curb a	Left Curb b	Turn lane	Center		Left curb	Right Curb a	Right Curb b	Center		Left Curb a	Left Curb b	Right Curb a	Right Curb b			Center
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Observations																						

Pilot-test maps and forms before official collection begins.

Step 5. Select data-collection tools

For each data-collection shift, collectors need:

- Position map
- Clipboard
- Security vest
- Data-collection forms
- Binoculars (as needed)
- Digital watch/timekeeping device to record start/end time of each vehicle's parking
- Official document from sponsoring agency (including agency official contact information) explaining project and granting data-collection authorization

Step 6. Recruit and train data collectors

Recruiting: Project budget; timeline; survey length/complexity; security concerns; time needed for in-field collection, including commute time to/within study area, and in-office quality-control determine number of data collectors and supervisors needed. In the UFL curb occupancy study, three to five collectors (number based on study area visibility and built environment) worked per four-to-five-hour shift, per three-by-three city block study area.

Training: Two sessions recommended, with first done in classroom-type setting and second done in field.

First session: Covers study parameters, vehicle typology, data-collection method, key curb terms, position map and data-collection forms.

Second session: Covers (and lets collectors practice in field) using position map and pilot-testing data-collection form to record CVs that park anywhere along the curb and all vehicles that park in CVLZs.

Step 7. Collect data

Develop check-out/check-in process for collectors' needed shift materials.

Ensure continuous observation of the curb in each study area. In the UFL project, data collector shifts ranged from 4-5 hours to ensure continuous observation of each three-by-three city block grid study area during daytime hours over three weekdays.

Provide regular breaks to collectors assigned to a curb position (who must not take their eyes off the curb while in position.) Such breaks can include rotating position collectors into the role of monitoring other collectors in nearby study areas.

Establish comprehensive security protocol and multilayer communications plan for all interested parties to avoid unsafe situations in field, including instructing data collectors to carry official documents from sponsoring agency (including official contact information) explaining project and granting data-collection authorization.

Recruit and inform police and other relevant agencies to help communicate with all building managers in the survey area.

- In Seattle, police notified all survey area building managers in real time where/when collectors were working via pre-existing information exchange for building operators and the police.
- Seattle Department of Transportation [webpage](#) communicated to public and stakeholders where and when data collectors were working.

Step 8. Create data transcript

Establish a method for data collectors to transcribe recorded field observations no more than 24 hours after their shift ends, allowing them to double-check entries (first step in data cleaning). In the UFL project, data collectors received a Google Excel sheet for each study area, shown below.

Day	Study Area	Curb ID	Curb Type	Start Time	End Time	Vehicle Type

Step 9. Clean data

A data-collection lead must review the data and check for data transcript errors and missing values.

Step 10. Assemble and summarize data

Assemble data in final format that best meets city and/or researcher needs, such as a final spreadsheet listing every vehicle observed, the study area it was in, the type of curb spot it was parked in, and the amount of time it was parked there. This allows for a broad range of data analysis relevant to the study project goals.

Glossary

Commercial Vehicles (CVs) [^back](#)

In the UFL study, commercial vehicles (CVs) includes a wide range of delivery and construction vehicles, service vehicles and garbage trucks but excludes all passenger vehicles.

Passenger Vehicles [^back](#)

In the UFL study, passenger vehicles include cars, pick-up trucks, and shuttle buses. While passenger vehicles could be performing delivery/commercial functions, passenger vehicles were not treated as commercial vehicles in this study due to challenges in systematically identifying whether they were making deliveries or otherwise carrying a commercial permit.

Unauthorized [^back](#)

In the UFL study, unauthorized commercial vehicle parking includes passenger loading zone (PLZ), travel lanes, bus lanes, curb segments close to hydrants, tow-away-zones, shuttle bus parking, and intersections.

Authorized and Unauthorized [^back](#)

In the UFL study, authorized and unauthorized curb spaces include travel lanes, bus lanes, curb segments close to hydrants, tow-away-zones, shuttle bus parking, intersections, on-street meter parking and temporary construction zones.

Delivery [^back](#)

In the UFL study, delivery commercial vehicles include box trucks, cargo vans, trucks with trailer, cargo bikes.

Service [^back](#)

In the UFL study, service commercial vehicles include vans or pick-up trucks used to provide services (e.g., installation, maintenance) with company logos visible to data collectors.

Passenger [^back](#)

In the UFL study, passenger vehicles include cars, pick-up trucks, and shuttle buses. While passenger vehicles could be performing delivery/commercial functions, passenger vehicles were not treated as commercial vehicles in this study due to challenges in systematically identifying whether they were making deliveries or otherwise carrying a commercial permit.