Smart Parking Management for Efficiency and Affordability

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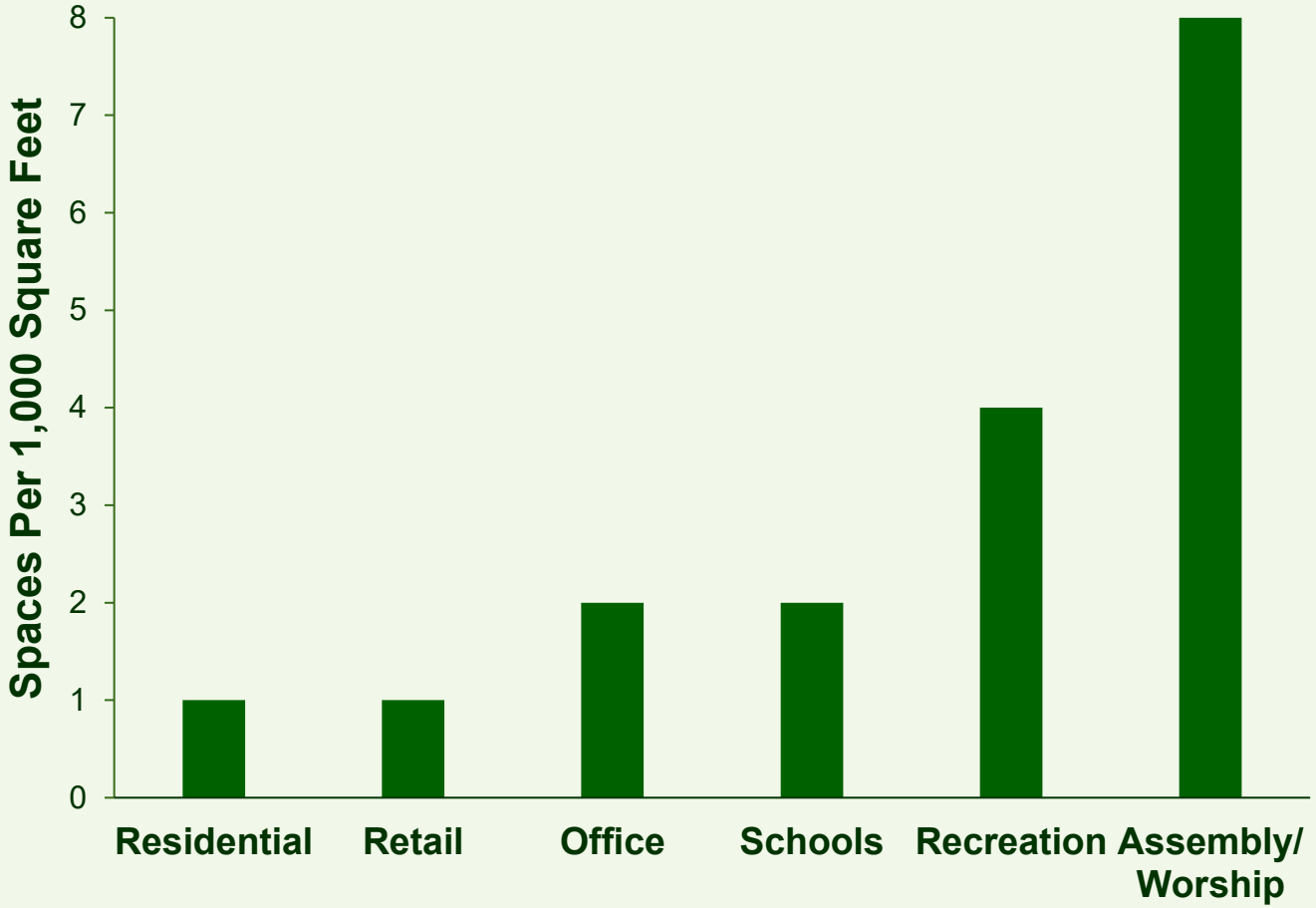
Vehicles Require Infrastructure

- Every time somebody purchases a motor vehicle they expect governments to provide roads and businesses to provide parking facilities for their use.
- *Motorists complain if this is not abundant and free.*
- These facilities are never really free, the choice is between paying for them directly through user fees or indirectly through higher taxes, rents and prices for retail goods.

Honolulu Parking Minimums

Like most cities, Honolulu requires property owners to provide off-street parking.

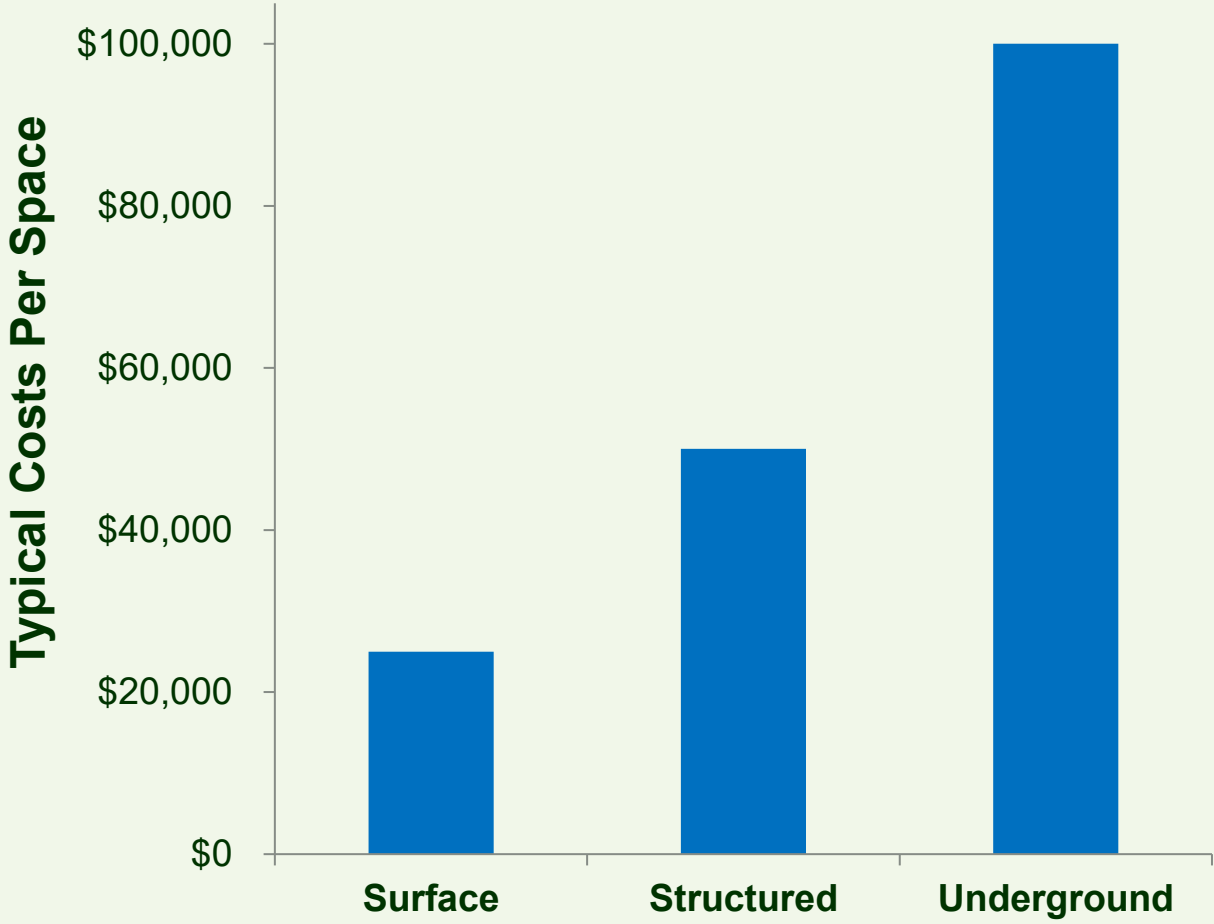
These are inefficient and unfair to people who are forced to pay for costly parking facilities they do not need.



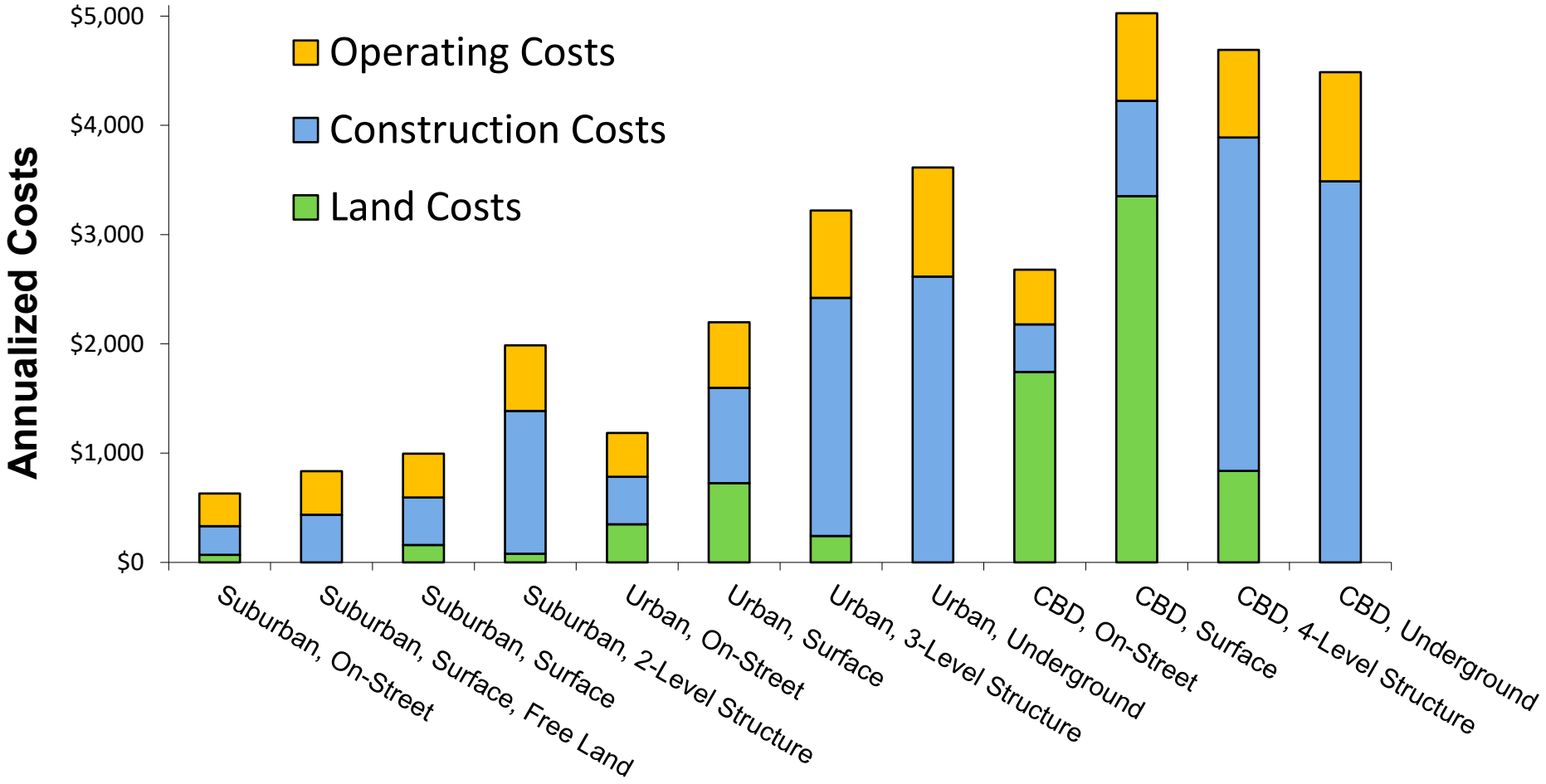
https://codelibrary.amlegal.com/codes/honolulu/latest/honolulu/0-0-0-20721

Typical Parking Costs

Urban parking spaces typically cost about as much as a motor vehicle, and since typical communities have 3-6 parking spaces per vehicle, total parking facility costs typically exceed total vehicle costs.

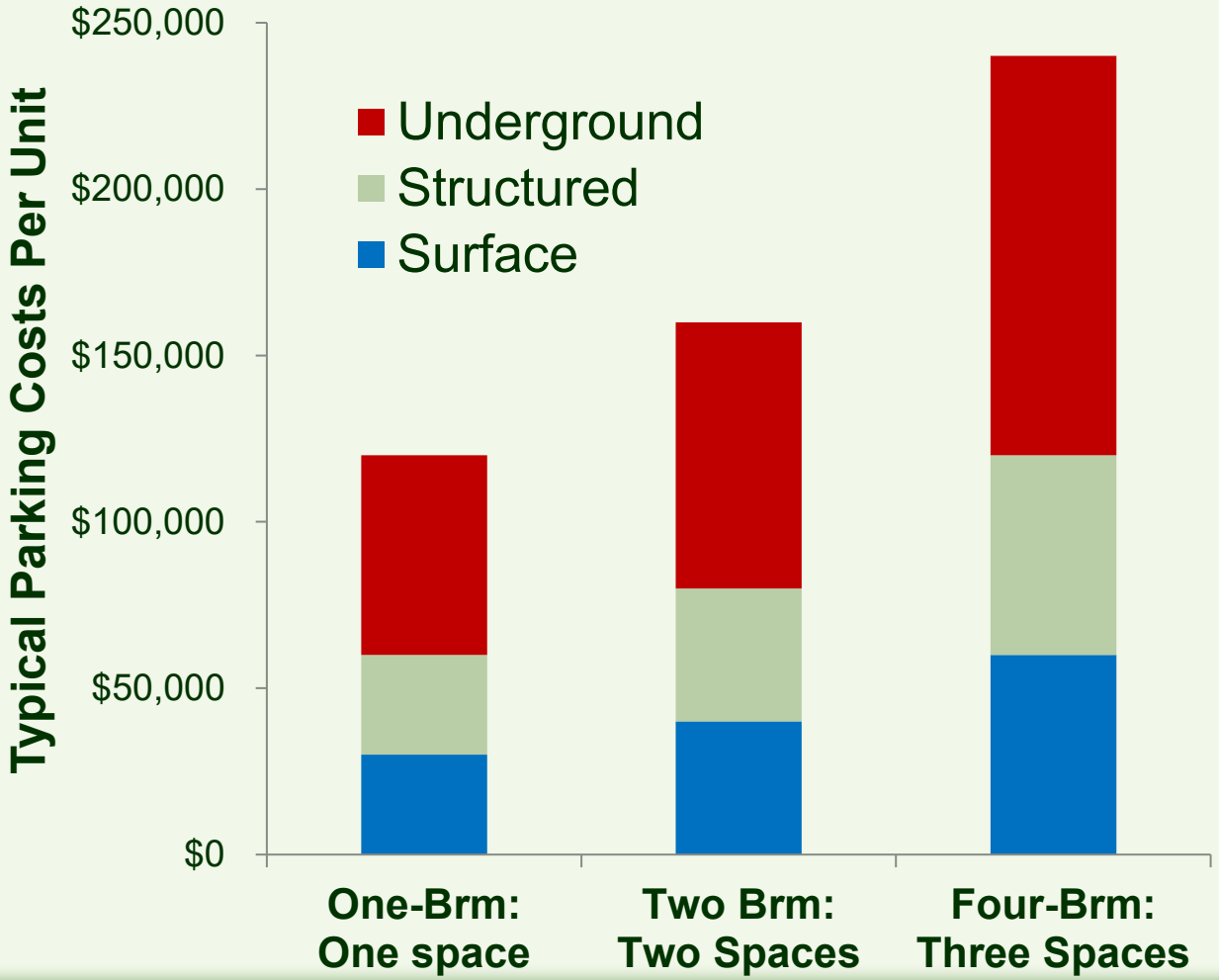


Annualized Parking Facility Costs



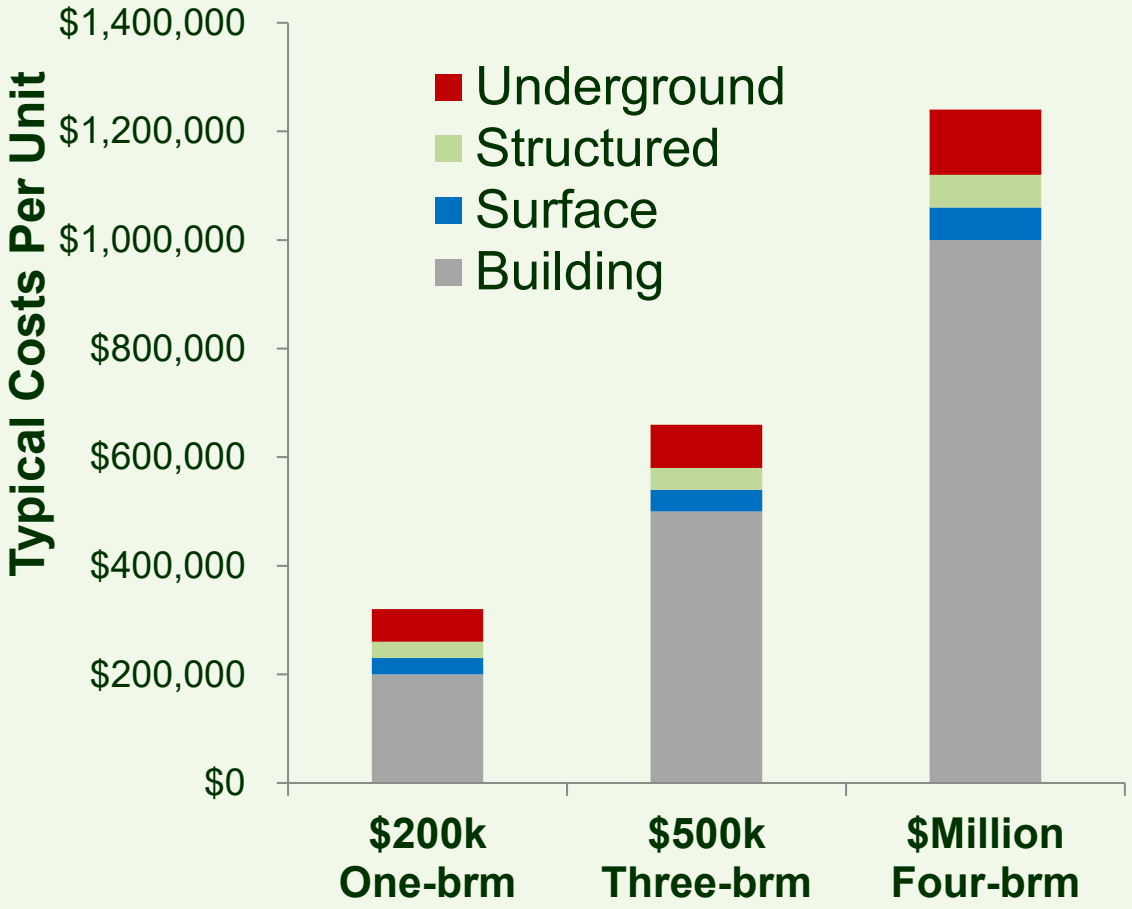
Typical Parking Costs per Home

Parking minimums add from $30,000 to provide one surface space required for a one-bedroom apartment, up to $240,000 for three underground spaces for a four-bedroom single- or multi-family home.



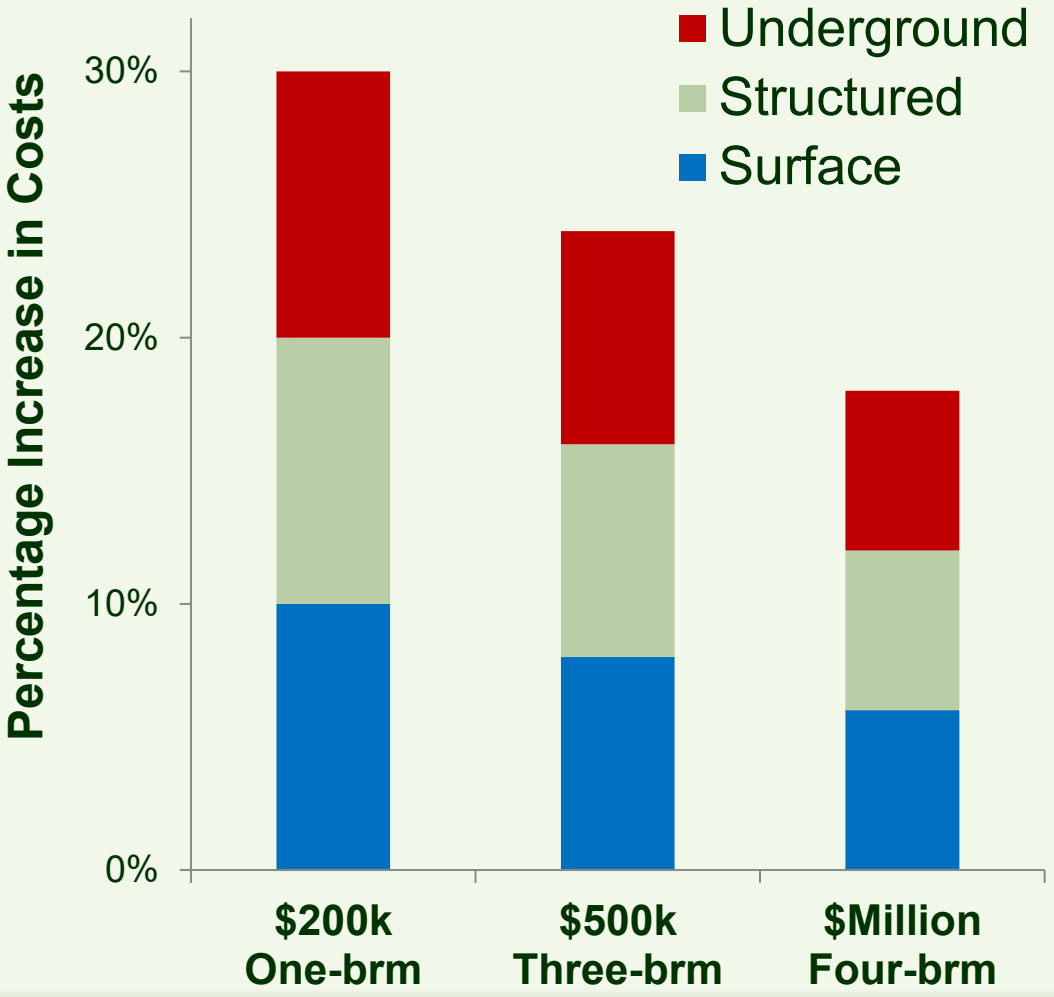
Parking and Housing Costs

Off-street parking significantly increases housing costs.



Percent Cost Increase

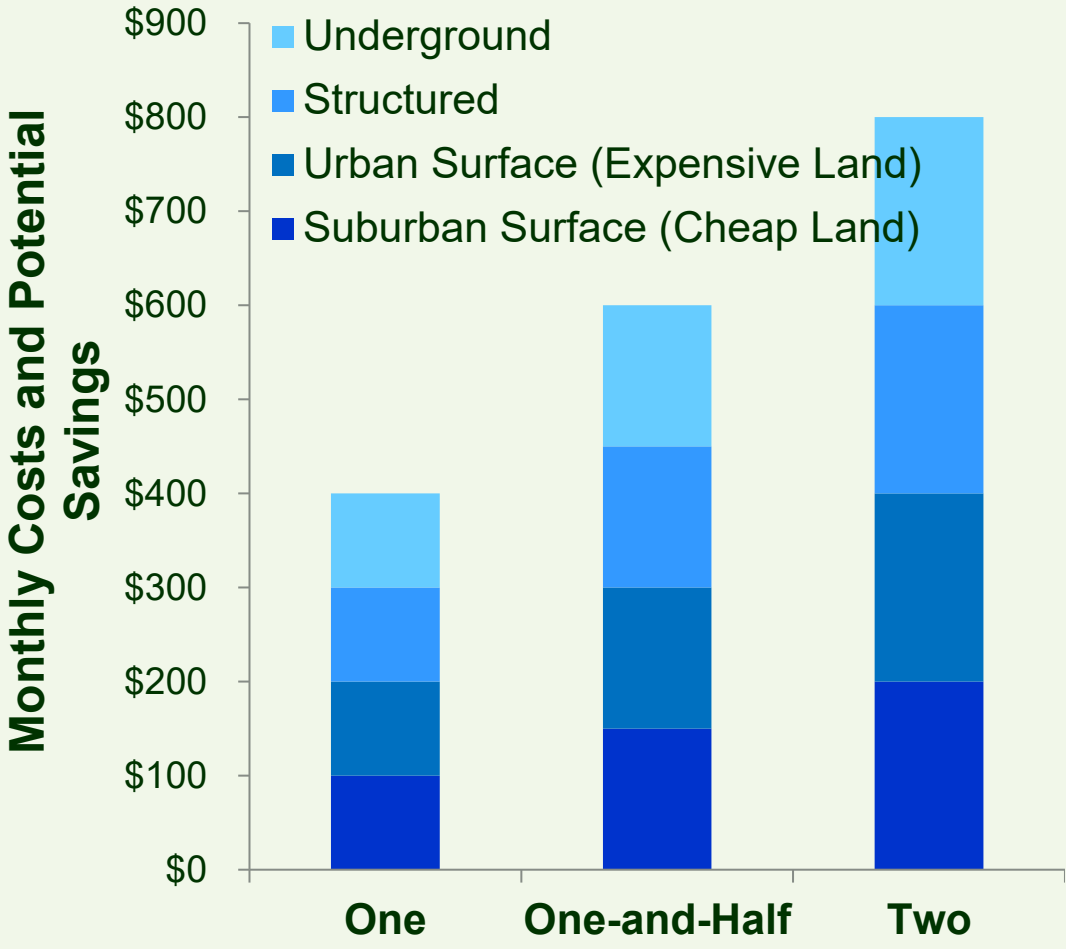
Parking minimums typically increase construction costs from 6% to provide 3 surface spaces for a million-dollar four-bedroom house up to 30% to provide one underground space for a $300,000 apartment.



Costs and Potential Savings

Each space typically increases rents or mortgages from $100 per month for surface parking in low land cost areas up to $400 per month for underground parking. This typically increases housing costs 10-20%.

Some jurisdictions encourage or require rental multifamily housing to unbundle parking (rent parking separately from housing) so for example rather than paying $3,000 per month for an apartment with two parking spaces, occupants pay $2,600 for the apartment and $200 for each parking space demanded.



Other (Indirect) Parking Costs

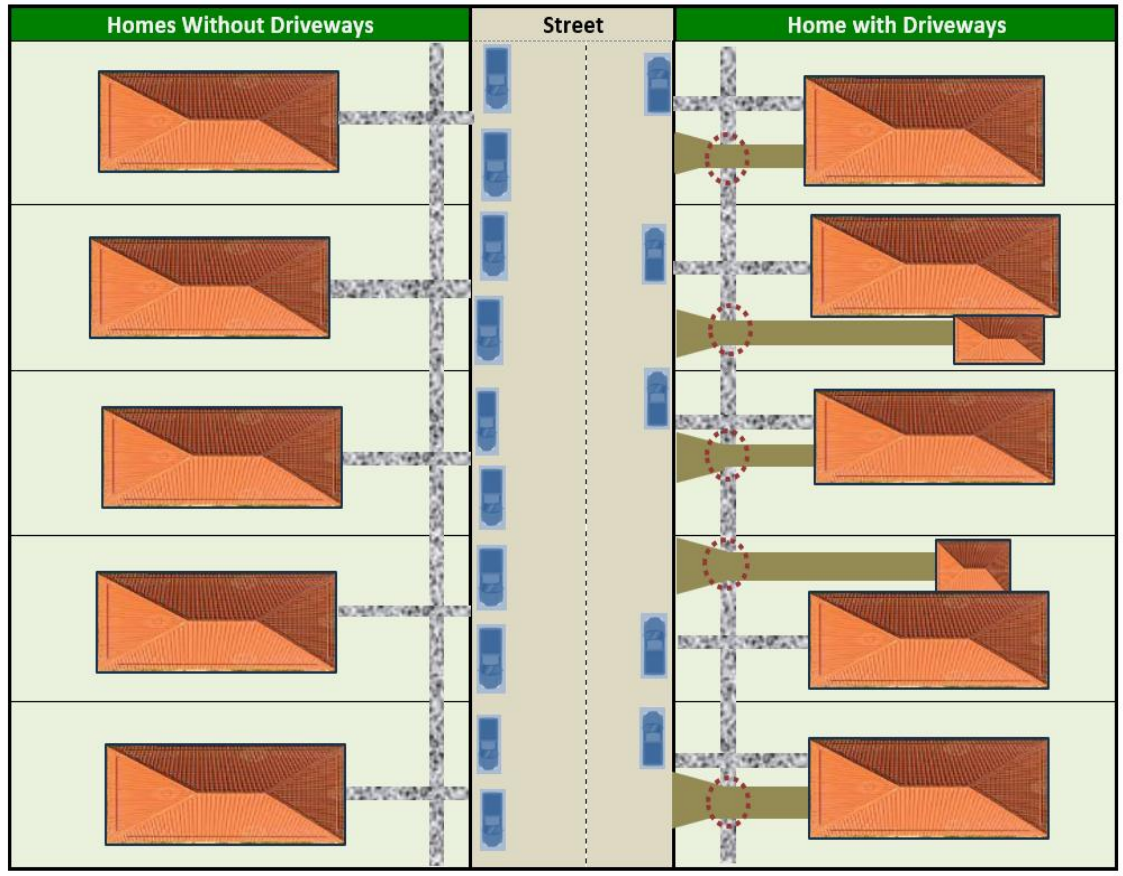
Off-street parking minimums increase pavement area, driveways, plus vehicle ownership and use, all of which impose additional costs. Virtually everybody benefits from more efficient parking management which reduces the number of parking spaces needed to serve parking demands.

More Pavement Area	More driveways	More Vehicles
• Stormwater management costs. • Heat island effects. • Displaced greenspace and habitat. • Ugliness.	• Reduced on-street parking. • Obstacle to pedestrians (particularly wheelchair users). • More crash risk.	• More traffic congestion. • More crash risk. • More pollution emissions. • Barrier to active travel (more difficult walking and bicycling).

On- and Off-Street Parking Trade-Offs

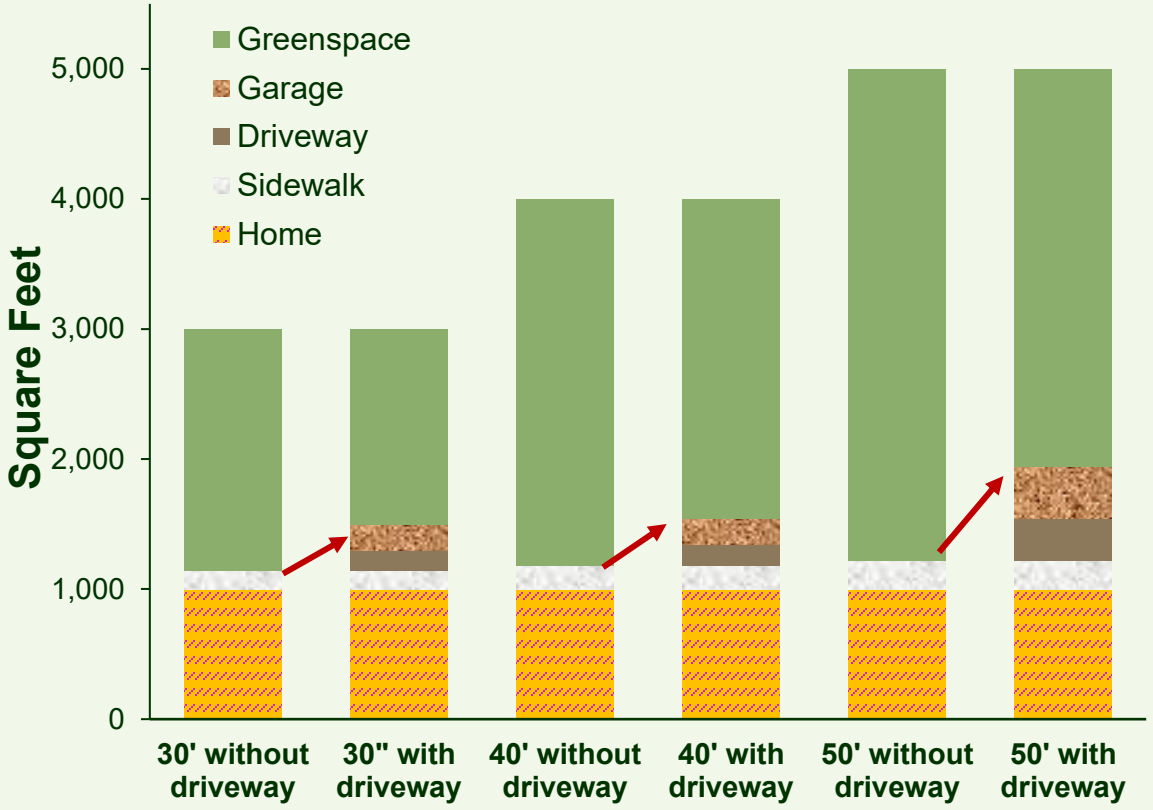
Public parking spaces (blue) are available to any motorist, but private spaces may only be used by residents and designated guests. A 40-foot-wide lot can have two on-street spaces, but only one if it has a driveway, reducing public supply by half. Although most driveways are designed to accommodate multiple vehicles, many don't.

Driveways that serve less than two vehicles tend to reduce total parking availability. They also increase housing costs, impervious surface area, and pedestrian risk where driveways cross sidewalks (red circles).



On- and Off-Street Parking Trade-Offs

Driveways and garages increase a home's impervious surface area by 25% to 50% which increases stormwater management costs, heat island effects, and greenspace displacement.



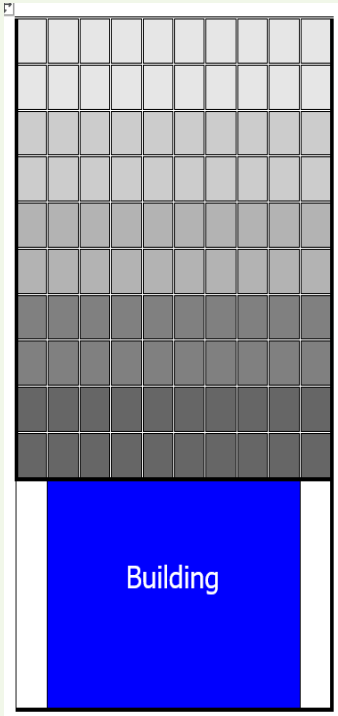
On- and Off-Street Parking Trade-Offs

Driveways significantly reduce on-street public parking capacity.

Many residents would be better off overall with less off-street parking and better managed on-street spaces.

How Much is Needed?

The number of parking spaces needed to serve a destination varies significantly depending on factors such as the quality of travel options available, and how parking facilities are managed.



100 spaces at an automobile-oriented location, unmanaged and unpriced.

80 spaces at a multi-modal location, unmanaged and unpriced.

60 spaces at a multi-modal location, managed efficiently and unpriced.

40 spaces at a multi-modal location, managed efficiently and $2 per day.

20 spaces at a multi-modal location, managed efficiently and $5 per day.

What's the Problem?

Parking minimums are intended to ensure that motorists never have trouble finding a convenient space.

Is that necessary?

- Parking is usually available if motorists are willing to walk a few blocks or pay directly.
- How severe are the problem of less convenient and more costly parking?
- How much does parking oversupply cost society?
- How can parking be managed to meet motorists needs with fewer spaces?
- Can better information, regulation and enforcement address spillover problems?

This apartment parking lot is never more than about 40% occupied. It is ugly and imposes large direct and indirect costs. Is parking oversupply desirable? Are there more efficient ways to serve parking demands?

Parking Requirement Biases

Methods used to establish parking minimums tend to assume that "more is better," with little cost consideration:

- Apply the same minimums for high- and low-income households.
- Apply the same minimums in high- and low-land-cost locations.
- Are based on demand studies performed in automobile-dependent locations.
- Reflect an 85th percentile demand curve (85 of 100 sites will have unoccupied spaces during peak periods), an 85th occupancy rate (parking facilities are considered full if 85% full) and a 10th design hour (parking facilities are sized to fill only ten hours per year).

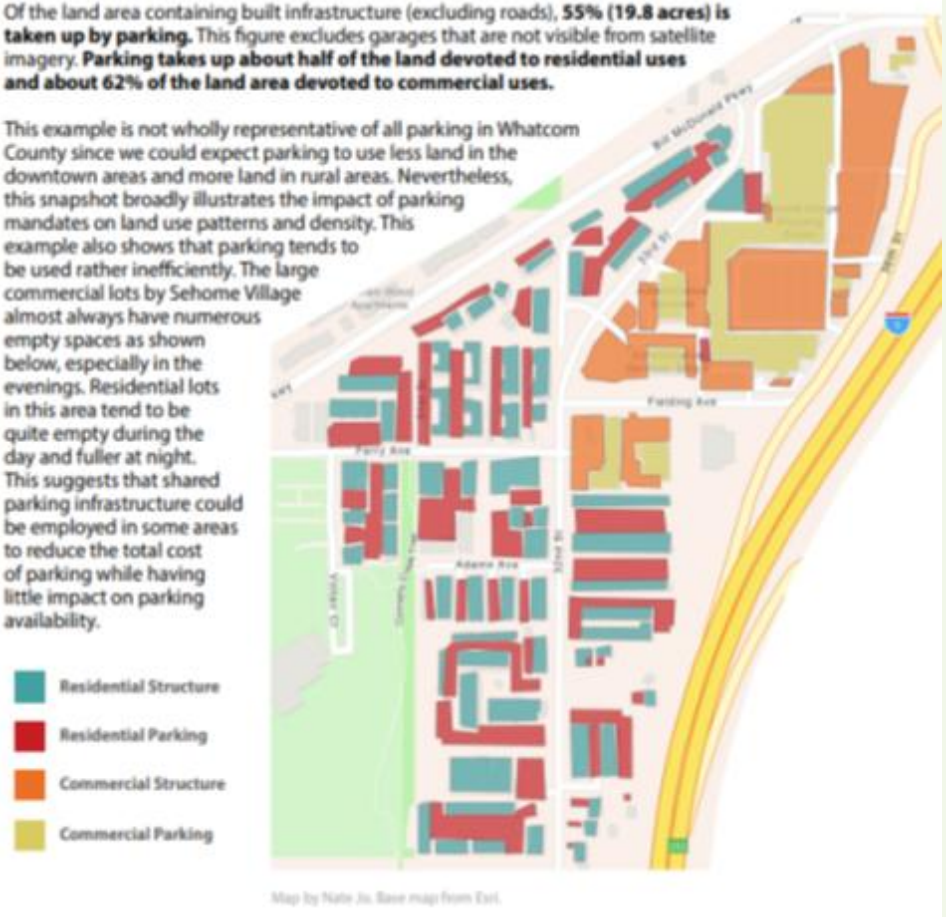
These minimums result in multiple spaces per vehicle in most areas, so most parking spaces are unoccupied most times, and most communities have parking spaces that are seldom or never used.

Parking Policy & Housing Affordability

54% of renters in Whatcom county own 1 or 0 cars, yet most rental developments require 1.5 or 2 parking spaces per unit.

Of the land area containing built infrastructure (excluding roads), **55% (19.8 acres) is taken up by parking.** This figure excludes garages that are not visible from satellite imagery. **Parking takes up about half of the land devoted to residential uses and about 62% of the land area devoted to commercial uses.**

This example is not wholly representative of all parking in Whatcom County since we could expect parking to use less land in the downtown areas and more land in rural areas. Nevertheless, this snapshot broadly illustrates the impact of parking mandates on land use patterns and density. This example also shows that parking tends to be used rather inefficiently. The large commercial lots by Sehome Village almost always have numerous empty spaces as shown below, especially in the evenings. Residential lots in this area tend to be quite empty during the day and fuller at night. This suggests that shared parking infrastructure could be employed in some areas to reduce the total cost of parking while having little impact on parking availability.



Inefficient and Unfair

Example

A 20 unit apartment building has 30 parking spaces, as required by code. All occupants pay for these facilities in their rents. Five households are car-free, ten own one-car, five own two or more cars, and some would own fewer vehicles if parking was unbundled (rented separately from housing).

As a result, households that own fewer than two cars subsidize the parking costs of those that own two or more. This is unfair, and since vehicle ownership tends to increase with income, it is regressive.

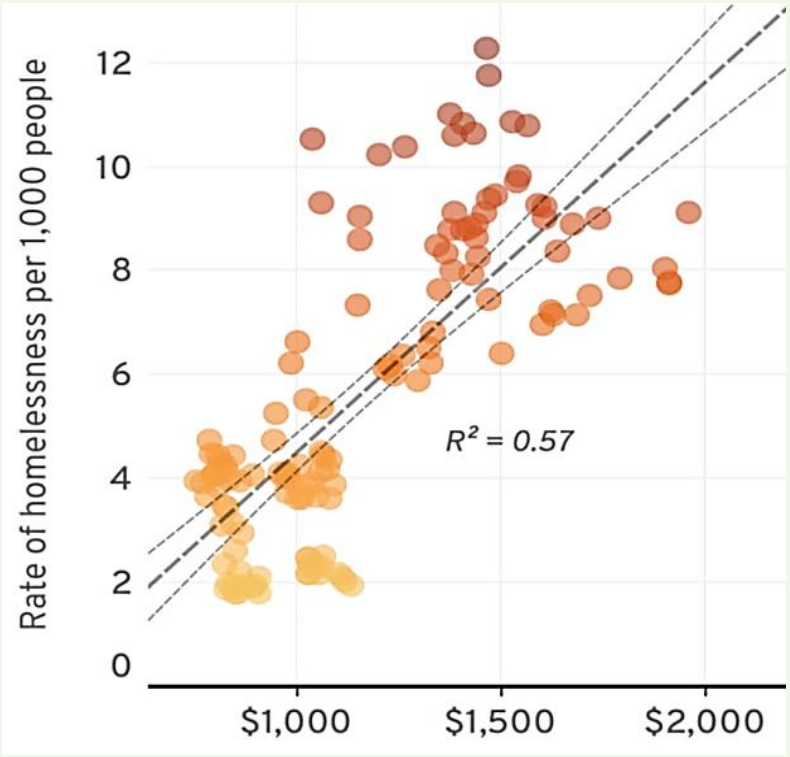
There are better ways to manage parking.

Addressing Homelessness Problems

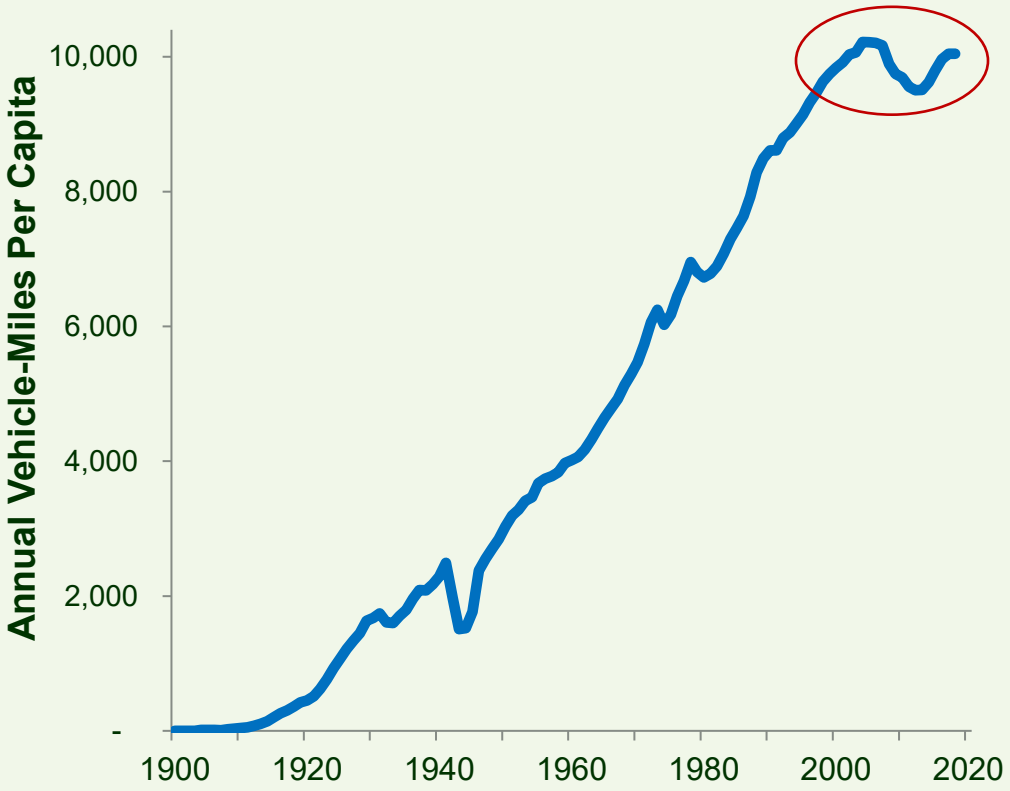
There is a statistically strong positive relationship between market rents and homelessness rates.

As rents increase, low- and moderate-income households face more financial stress, have fewer options if evicted, landlords can be choosy, and social service agencies have fewer options for providing emergency housing.

Reducing parking minimums and unbundling parking from housing is one of the most effective strategies for reducing homelessness problems.



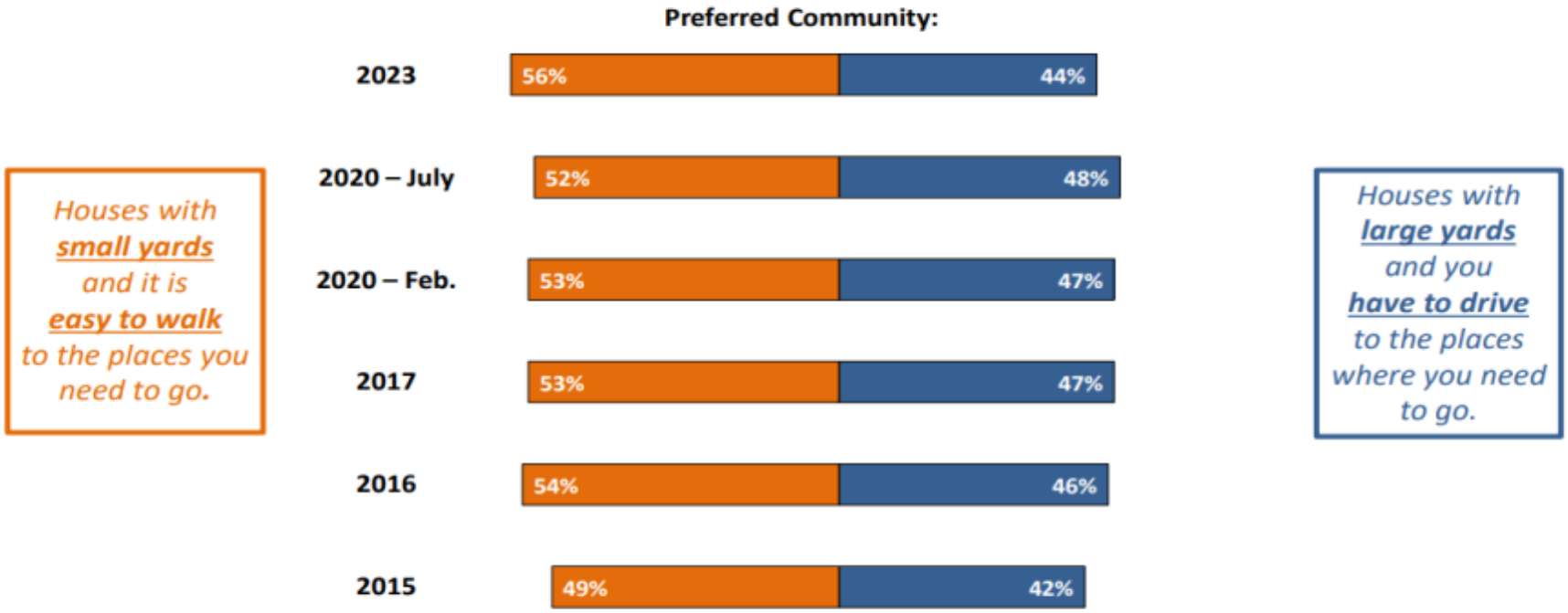
Timely: Vehicle Travel is Peaking



- Aging population
- High fuel prices
- Increasing poverty
- Affordability
- Increasing urbanization
- Changing consumer preferences
- Health and environmental concerns
- Resilience planning
- New technologies and modes

Consumer Preferences (NAR 2023)

Majority Prefer Houses With Small Yards and More Walkability Over Homes With Large Yards and More Driving



NATIONAL ASSOCIATION of REALTORS®

Q.7 Continue to imagine that you are moving to another home. These next questions are about the kind of community where you would like to live. Please select the community that you prefer.

AMERICAN STRATEGIES

National Association of Realtors Community and Transportation Preferences Survey

Old and New Parking Paradigm

Old Paradigm	New Paradigm
Transportation means driving.	Not everybody uses automobiles. Transportation systems are multimodal.
Parking problem means inadequate parking supply.	There can be many types of parking problems including inadequate or excessive supply, inadequate user information, too low or high prices, and inefficient management.
Maximize parking supply.	Too much supply is as harmful as too little.
All parking demand should be satisfied on-site. Motorists should walk minimal distances to cars.	Parking can often be provided off-site, allowing parking facilities to serve multiple destinations.
Parking should be unpriced or as inexpensive as possible, funded indirectly.	As much as possible, users should pay directly for parking facilities.
Parking should be available on a first-come basis.	Parking should be prioritized to favor higher value users.
Analysis should focus on motorists' convenience.	Analysis should consider all impacts, including strategic goals.
Parking management is a last resort, to be applied only if facility expansion is infeasible.	Parking supply should be minimized and only expanded after all cost-effective management solutions are implemented.
Innovation faces a high burden of proof and should only be applied if proven and widely accepted.	Innovations should be encouraged, since even unsuccessful experiments can provide useful information.

Litman, *Parking Management: Comprehensive Implementation Guide*

Mobility Versus Accessibility

Mobility (physical movement)

- Favors faster modes and longer trips
- Ignores land use impacts
- Supports highway expansion and sprawl

Accessibility (ability to reach desired services and activities)

- Favors multi-modalism. Recognizes the roles of non-motorized and public transport.
- Recognizes land use impacts on accessibility
- Supports comprehensive, integrated planning and smart growth development

Walk Score

Walk Score indicates the number of services and activities accessible by walking.

Serving PwD

Many people with disabilities (PwDs) have mobility impairments plus low to moderate incomes. They can gain independence, opportunity and dignity, by living in a compact urban village with the following features:

- An accessible sidewalk network.
- Complete streets with low traffic speeds.
- 70 or higher Walk Score.
- Frequent public transit services with accessible buses, trains and stations.
- Affordable and accessible housing.

Few North American neighborhoods have these attributes.

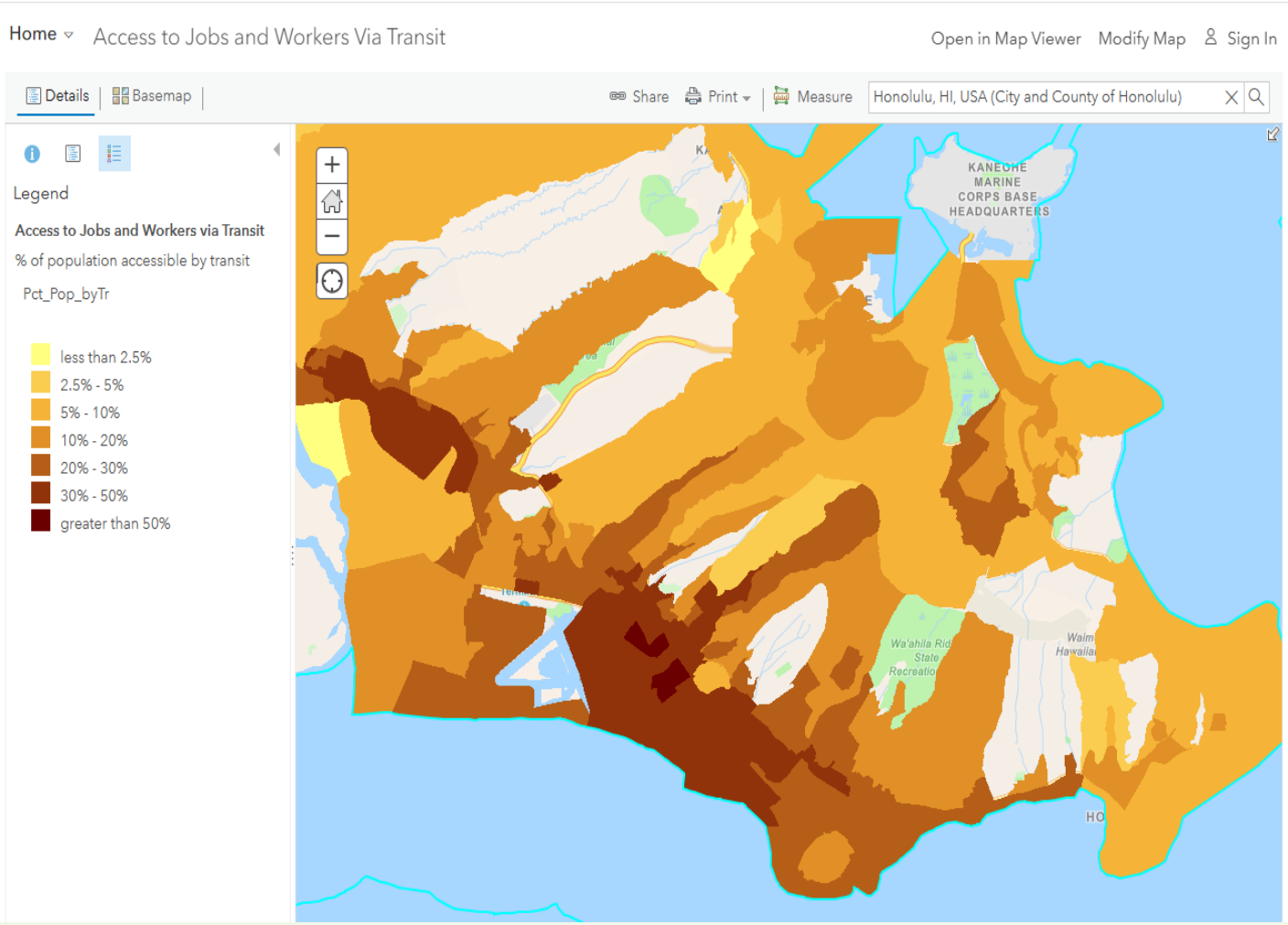
Urban Villages for People with Disabilities

www.planetizen.com/blogs/117156-urban-villages-people-disabilities .

Transit Job Access

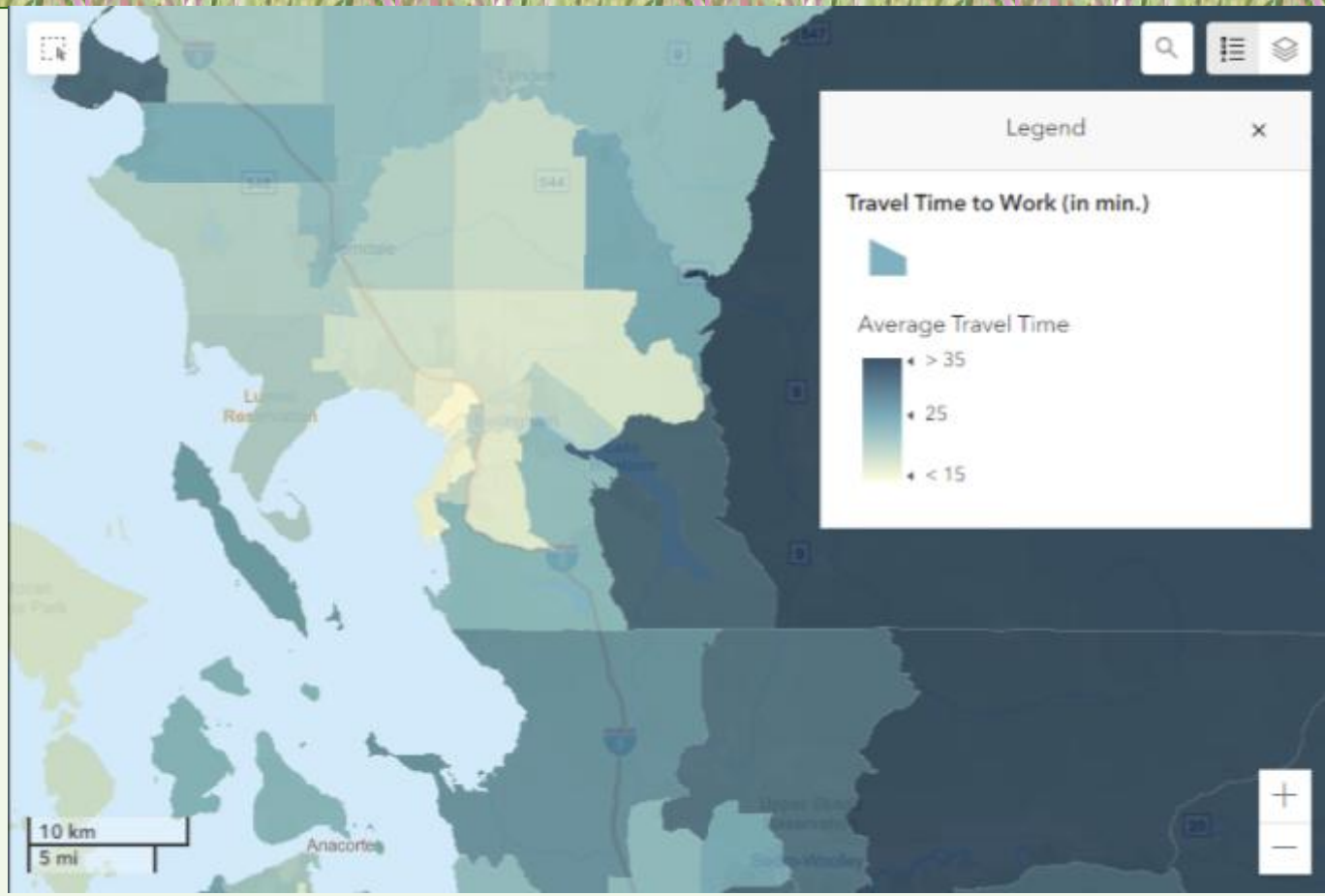
Central urban neighborhood residents can access more and better jobs without a car.

Smart Location Mapping



Commute Duration

Residents of compact, multimodal neighborhoods have much shorter commute duration than in automobile-dependent, urban-fringe areas.

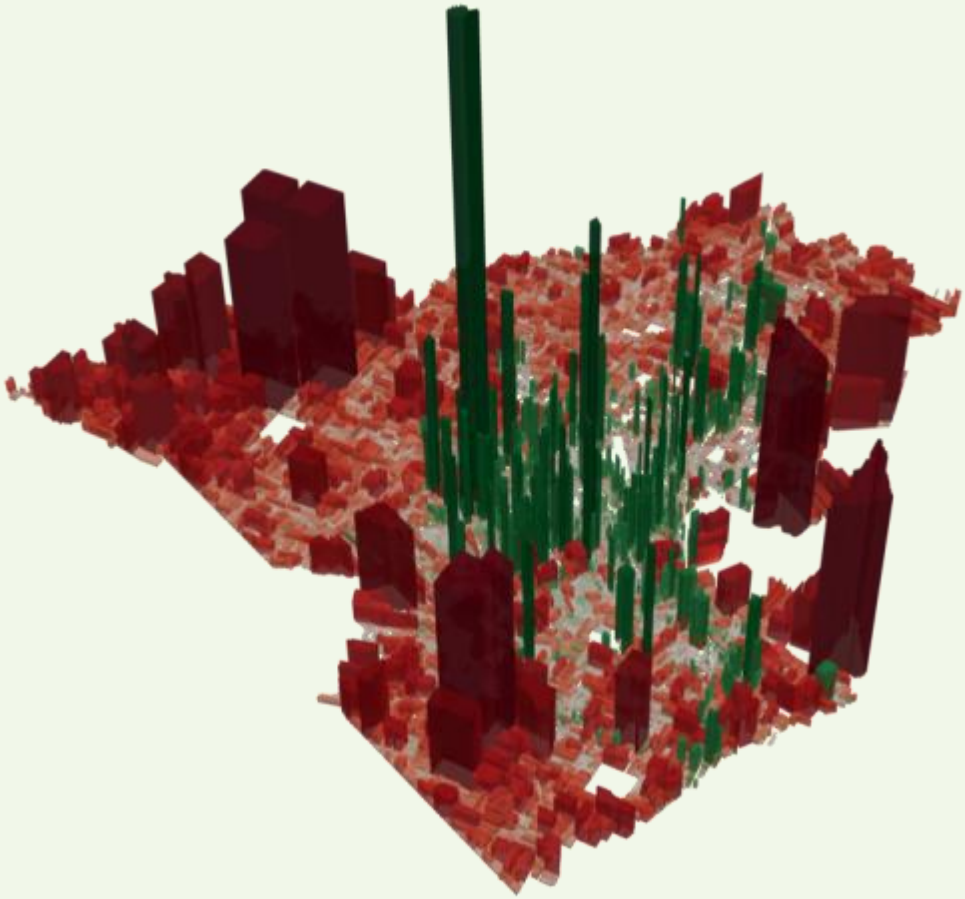


Mineta Institute Commute Duration Dashboard
https://transweb.sjsu.edu/research/2064-Commute-Duration-Dashboard-Guide

Opportunity and Prosperity

Compact, mixed development provides more economic opportunities and increased productivity, property value and tax revenue per acre than lower-density areas.

(*Strong Towns* and *Urban 3*)



Lafayette, Louisiana

Local Economic Impacts

- Advocates often argue that cities must provide abundant, free parking to be economically competitive.
- Some parking is necessary but efficient management can greatly reduce the parking supply needed to serve these demands.
- Efficient parking management reduces total costs and supports economic development.

Parking management supports economic productivity:

- Reduces development costs.
- Allows more compact housing and commercial space, so more people can live, work and shop.
- Increases housing and transportation affordability so households have more money to spend on local goods.
- Increases efficiency: delivery vehicles and urgent errands can always find a convenient parking space if they are willing to pay.
- Creates more attractive, livable urban neighborhoods and streets.
- Improves walkability.
- Filters out the cheapskates.

Efficient Parking Management

Parking Management consists of various strategies that result in more efficient use of existing parking resources.

Why Parking Management?

Now more efficient management is increasingly used to address parking problems, particularly in growing communities and downtowns areas.

- Saves money.
- Improves motorist convenience.
- Increases affordability.
- Creates more attractive and successful downtown.
- Economic development.
- Encourages walking, cycling and public transit use.
- Supports environmental goals.

Parking Management Principles

- *Consumer choice.* People should have viable parking and travel options.
- *User information.* Motorists should have information on their parking and travel options.
- *Sharing.* Parking facilities should serve multiple users and destinations.
- *Efficient utilization.* Parking facilities should be sized and managed so spaces are frequently occupied.
- *Flexibility.* Parking plans should accommodate uncertainty and change.
- *Prioritization.* The most desirable spaces should be managed to favor higher-priority uses.
- *Pricing.* As much as possible, users should pay directly for the parking facilities they use.
- *Peak management.* Special efforts should be made to deal with peak-demand.
- *Quality.* Parking facility quality (aesthetics, convenience, safety, etc.) is as important as quantity.
- *Comprehensive analysis.* All significant costs and benefits should be considered in parking planning.

Parking Management Benefits

Facility cost savings. Reduces costs to governments, businesses, developers and consumers.

More motorists' convenience. Many strategies increase parking and travel options, reduce parking congestion, improve user information, and create more attractive facilities.

Supports non-auto modes. Many strategies support walking, bicycling and public transit..

Supports equity objectives. Reduces subsidies from non-drivers to drivers, improves non-auto travel options, and increases housing and transportation affordability.

Better facility design. Parking management gives designers and planners more ways to address parking demands.

Reduced congestion. Reduces traffic volumes and congestion, including vehicles cruising for a space.

Revenue generation. Some management strategies generate revenues.

Reduces land consumption. Parking management can reduce land requirements and so helps preserve greenspace and reduce stormwater management and heat island effects.

Supports transportation demand management (TDM) and reduces traffic problems.

Supports Smart Growth. Parking management allows more compact development.

More livable communities. Helps create more attractive, inclusive and affordable communities.

Shared Parking

Parking spaces are shared by multiple users, increasing efficiency:

- On-street parking
- Public off-street parking
- Sharing between different land uses.
- Sharing spaces with a parking lot.

Regulate Parking

Manage and regulate the most convenient spaces to favor higher-value trips.

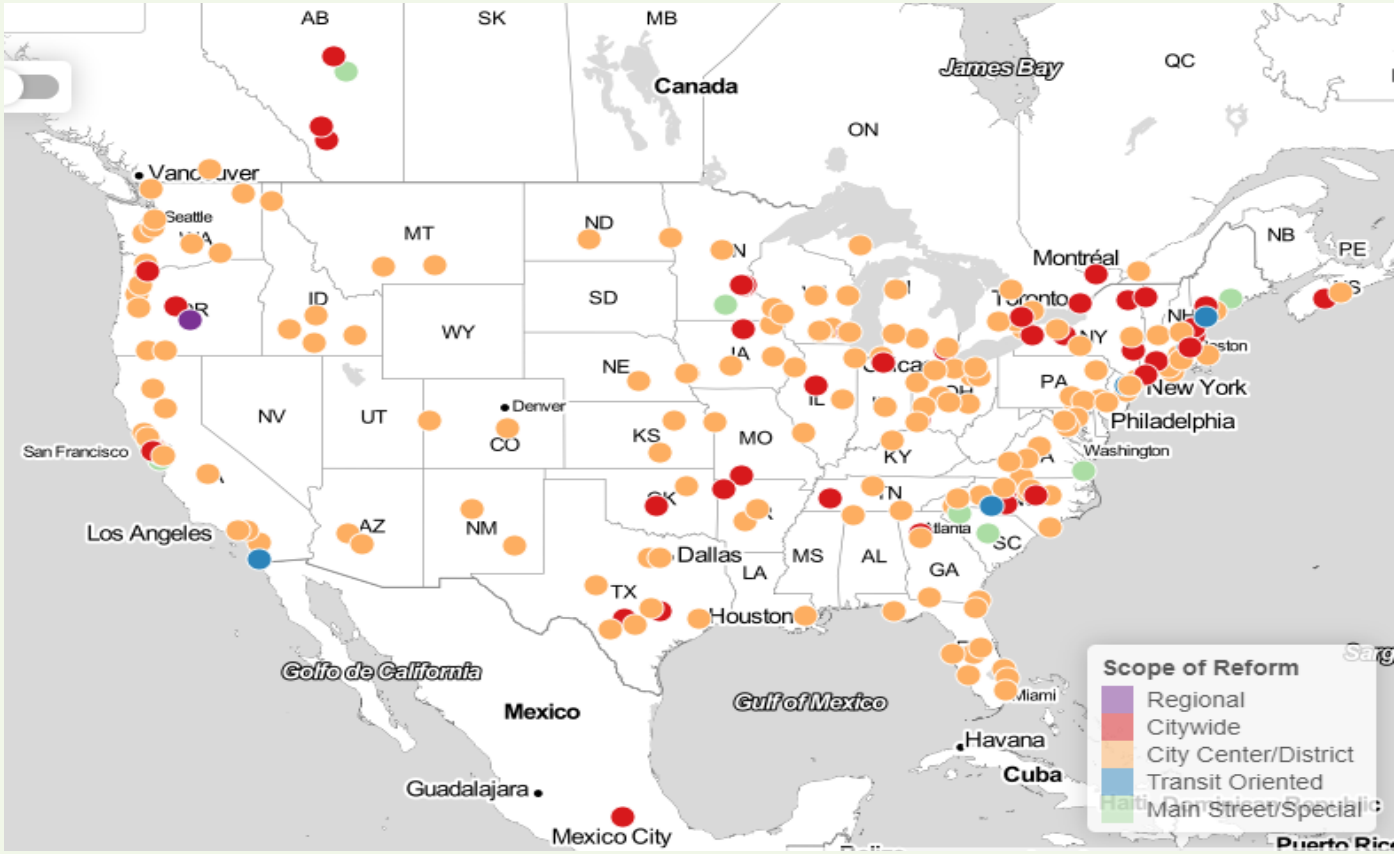
- Duration (e.g. 60-minute maximum).
- Time (e.g., no parking 9am-5pm).
- Type of Use (deliveries, taxis)
- User Type (customers, residents, disabled users).

Eliminate or Reduce Minimums

Reduce or adjust requirements to more accurately reflect demand at a particular location, taking into account geographic, demographic and economic factors.

Parking Reforms

This map by the Parking Reform Network identifies North American jurisdictions that are reforming their parking policies for efficiency and fairness.



Adjustment Factors

Factor	Typical Adjustments
Geographic Location. Vehicle ownership and use rates in an area.	Adjust requirements to reflect actual vehicle ownership and trip generation rates. 40-60% reductions are often justified in Smart Growth neighborhoods.
Residential Density. Number of residents or housing units per acre/hectare.	Reduce requirements 1% for each resident per acre (e.g. 15% where at 15 residents per acre and 30% at 30 res. per acre).
Employment Density. Number of employees per acre/hectare.	Reduce requirements 10-15% in areas with 50 or more employees per gross acre.
Land Use Mix. Land use mix located within convenient walking distance.	Reduce requirements 5-15% in mixed-use developments and shared parking.
Transit Accessibility. Nearby transit service frequency and quality.	Reduce requirements 10% within ¼ mile of frequent bus service, and 20-50% within ¼ mile of a rail transit station.
Carsharing. Whether carsharing services are located within or nearby a building.	Reduce residential requirements 10-20% if carshare vehicles are located onsite, or 5-10% if located nearby.
Walkability and bikability. Walking environment quality.	Reduce requirements 5-15% in very walkable and bikeable areas, and substitute bike parking for up to 10% of car parking.
Demographics. Age and physical ability of residents or commuters.	Reduce requirements 20-40% for housing for young (under 30), elderly (over 65) or disabled people.
Income. Average income of residents or commuters.	Reduce requirements 10-20% for the 20% lowest income households, and 20-40% for the lowest 10%.
Pricing. Parking that is priced, unbundled or cashed out.	Reduce requirements 10-30% for cost-recovery prices, and 10-20% for unbundling (parking rented separate from building space).
Sharing/overflow. Ability to share parking facilities with other nearby land uses.	Depends on the differences in peak demands with other land use. 20-40% reductions are often possible.
Management programs. Parking and mobility management programs implemented at a site.	Reduce requirements 10-40% at worksites with effective parking and mobility management programs.

Remote (Intercept) Parking

- Encouraging longer-term parkers (e.g., employees) to use less-convenient, off-site parking, so more convenient spaces are available for priority users (e.g. customers).
- Negotiate sharing agreements for offsite, overflow parking.
- Provide directions to offsite parking facilities.

Curb Management

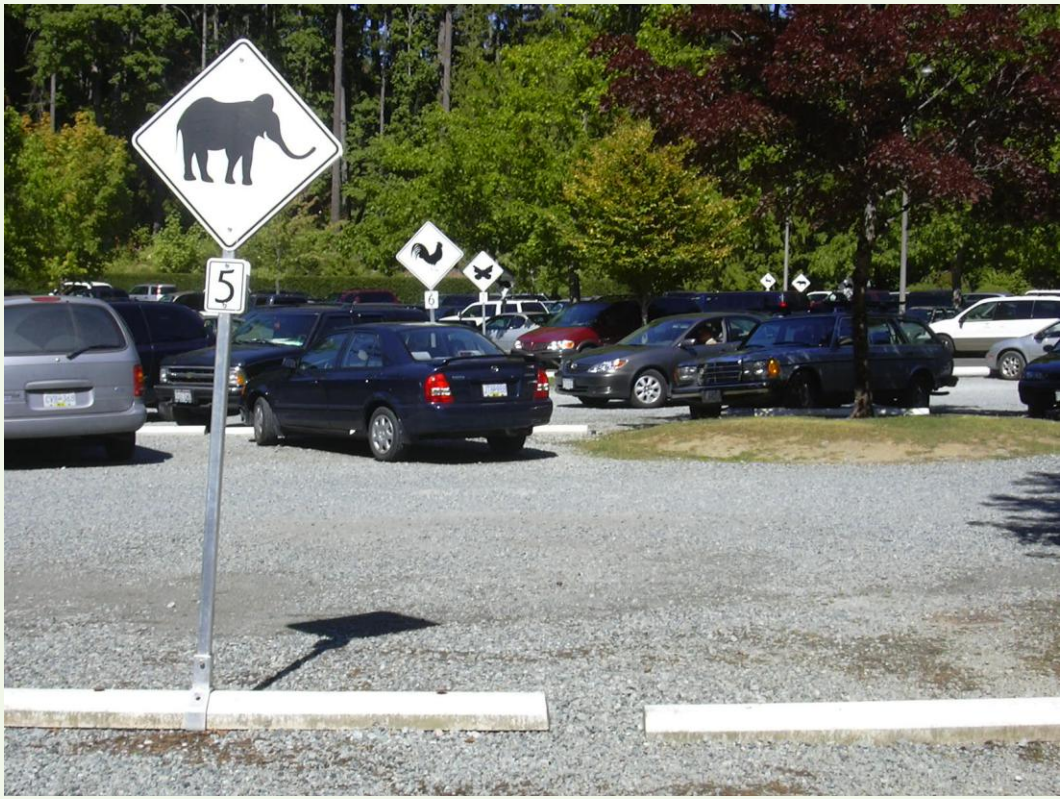
- Define curb priorities.
- Regulate and price parking to favor higher-value uses.
- Provide user information on parking availability and prices.
- Effective but respectful enforcement.

Typical curb priorities:

- Sidewalks, crosswalks, universal design.
- Bike- and bus-lanes.
- Bus stops and taxi stands.
- Deliveries and passenger pickup.
- Short-term customer parking.
- Longer-term customer parking.
- EV charging.
- Residential parking.
- Employee parking.
- Bike- and scooter sharing parking.
- Greenspace (streetscaping and parklets).
- Sidewalk businesses.
- Truck parking.

Improve User Information

- Provide convenient information on parking availability and price, using maps, signs, brochures and electronic communication.



Efficient Pricing

- Parking is never really free, consumers either pay directly or indirectly.
- Paying directly tends to be more fair and efficient, and typically reduces parking demand 10-30%.

Efficient Prices

- Set to achieve maximum 85% occupancy.
- Vary by location and time.
- Adjusted as needed to reflect changing demands.
- Motorists can choose between cheaper but less convenient, and premium service and priced parking.
- Motorists pay for just the amount of time they are parked.

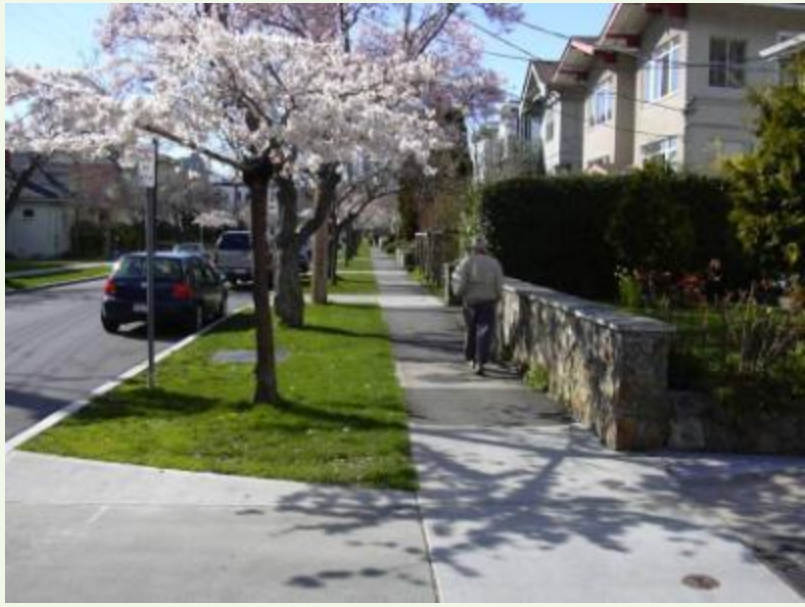
Encourage Non-Auto Modes

Encourage travellers to walk, bicycle, carpool, ride transit and telework rather than drive in order to reduce parking demands.

Improve Walkability

Improved walking conditions:

- Expands the range of parking spaces that serves a destination, increasing its functional supply.
- Allows more “park once” trips, so customers leave their vehicle in a central location and walk to various destinations, reducing the total number of parking spaces needed.
- Allows walking and transit trips to substitute for driving, reducing parking demand.



Small is Good!

Micromodes, including e-bikes, e-scooters and their variants, are affordable and resource-efficient.

They approximately double the portion of trips that can be made without an automobile.

This increases the return on investment from pedestrian and bicycle improvements, and increases the need for sidewalk and path management.

Bicycle Parking

- Allow bicycle parking and changing facilities to substitute for a portion of automobile parking.
- Mandate minimum bicycle parking.
- Include a combination of short-term and long-term bicycle parking.

Attracting Discretionary Riders

- Quality service (convenient, fast, comfortable).
- Low fares.
- Support (walkable communities, park & ride facilities, commute trip reduction programs).
- Convenient information.
- Parking pricing or “cash out”.
- Integrated with special events.
- Positive Image.

Better Use of Existing Supply

- Spaces for smaller vehicles and motorcycles.
- Angled rather than parallel curb parking.
- Valet parking.
- Use currently unused spaces.
- Flexible spaces.

Address Negative Impacts

- Develop overflow parking plan to address occasional peaks.
- Address specific spillover problems.
- Improve enforcement.
- Design parking facilities to fit well into their environment.
- Improve relations with neighbors.
- Compensate for spillover impacts.

Parking Management Impacts

Strategy	Typical Reductions	Traffic Reduction
Shared parking	10-30%	
Parking regulations	10-30%	
More Accurate and Flexible Minimums	10-30%	
Parking maximums	10-30%	
Remote parking	10-30%	
Smart growth	10-30%	✓
Walking and Bicycling Improvements	5-15%	✓
Carsharing services	10-30%	✓
Increase Capacity of Existing Facilities	5-15%	
Transportation demand management (TDM)	10-30%	✓
Parking pricing	10-30%	✓
Improve pricing methods	Varies	✓
Financial incentives	10-30%	✓
Unbundle parking	10-30%	✓
Parking tax reform	5-15%	✓
Bicycle facilities	5-15%	✓
Improve Information and Marketing	5-15%	✓
Improve enforcement	Varies	
Transport management assoc.	Varies	✓
Overflow parking plans	Varies	
Address spillover problems	Varies	
Parking Facility Design and Operation	Varies	

Comprehensive Analysis

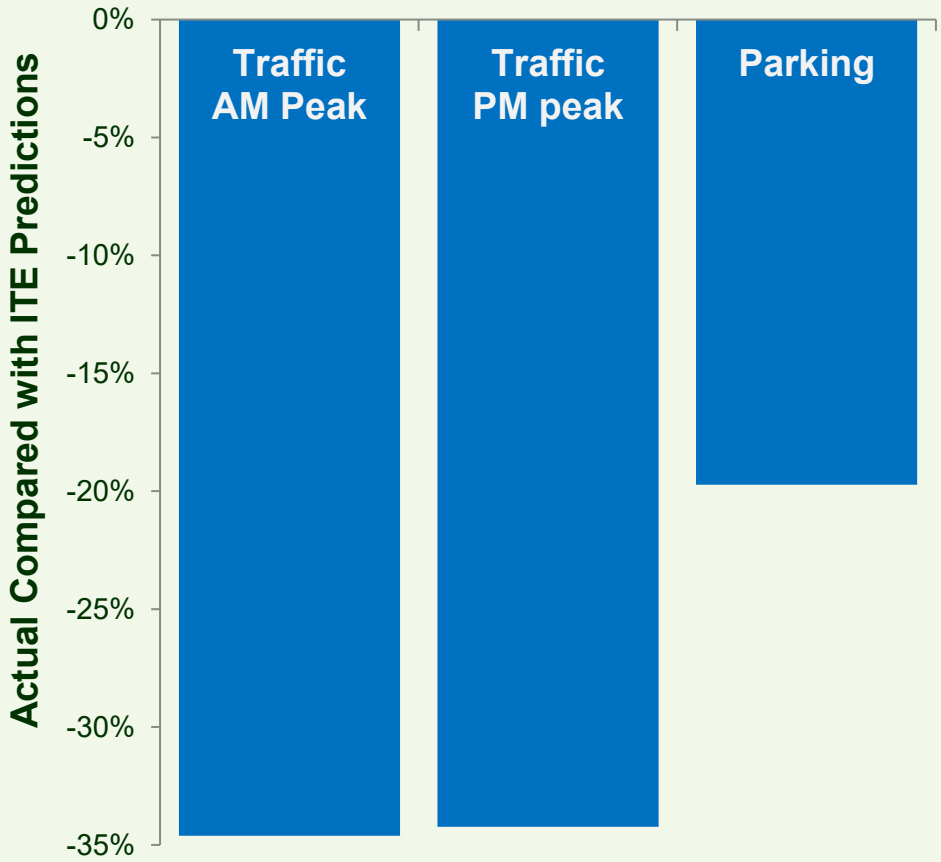
Name	Description
Land costs	Value of land devoted to parking facilities.
Construction costs	Project construction expenses.
Operation and maintenance	On-going operation and maintenance costs.
Implementation	Ease of implementation.
User convenience	The relative ease of use.
Consumer choice	Impacts on the range of parking, transport and housing options available.
User financial impacts	Additional consumer payments, savings or benefits.
Revenues	Additional revenue to facility owners.
Spillover impacts	May cause undesired use of off-site parking spaces.
Economic development impacts	Changes in employment and business activity.
Travel impacts	Shifts in parking location, mode, destination, time, etc.
Traffic impacts	Changes in vehicle traffic volumes, including reductions in car trips and increased cruising for available parking spaces.
Accessibility impacts	Changes in the location and dispersion of activities.
Greenspace preservation	Changes in the amount of land devoted to landscaping, farms and habitat.
Stormwater and heat island	Changes in impervious surface area, stormwater and heat gain costs.
Fairness and equity	Changes in unjustified subsidies, and impact on disadvantaged people.

TDM Policies and Programs

Improve Options	TDM Incentives	Smart Growth	Programs
Public transit improvements	Road space reallocation	Connectivity	Commute trip reduction programs
Active transport (walking and bicycling) improvements	Decongestion pricing (variable road tolls)	Complete streets	School and campus transport management
Rideshare programs	Distance-based road fees and insurance premiums	Smart Growth/New Urbanism/Transit Oriented Development (TOD)	Freight transport management
Flextime	Efficient parking pricing (cost recovery, unbundling, cash out)	Parking reforms	Transport management associations
Telework (telecommuting, Internet shopping, etc.)	Fuel or carbon tax increases	VMT developer fees	TDM marketing
Car- and bikesharing		Car-free planning	
		Urban growth boundaries	

Success Stories

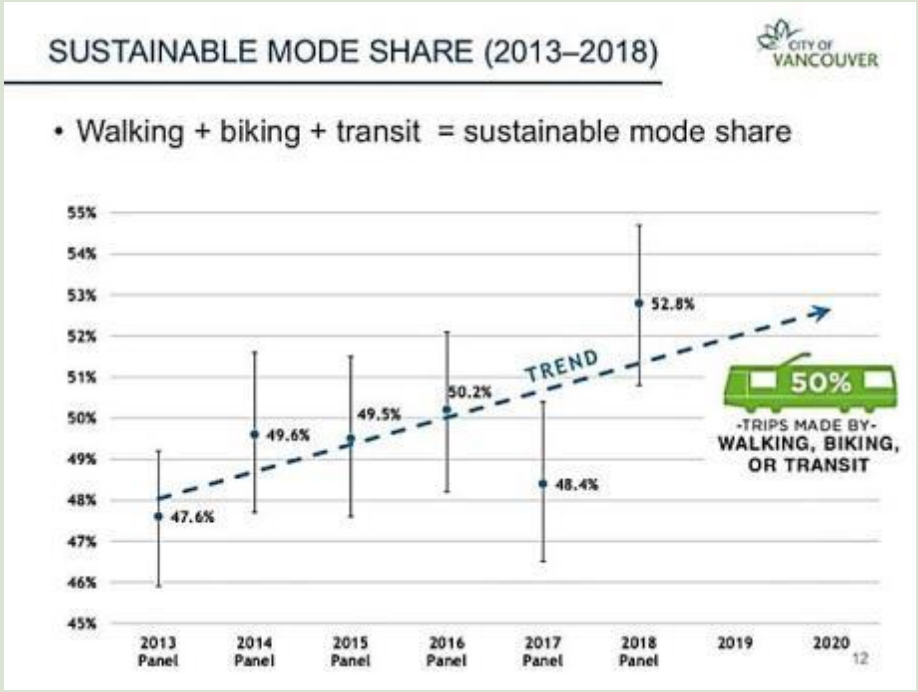
Office buildings with TDM programs actually generate a third fewer trips and require 20% fewer parking spaces than predicted by Institute of Transportation Engineers' models. This indicates that TDM programs can significantly reduce traffic impact fees and parking facility costs, and indirect traffic impacts such as congestion, crash risk and pollution emissions.



Mike Spack and Jonah Finkelstein (2014), *Travel Demand Management: Analysis of the Effectiveness of TDM Plans*, Spack Consulting (www.spackconsulting.com); at https://bit.ly/2K97eTj.

Success Stories

Vancouver Transport Panel Survey



Between 2013 and 2018, walking, bicycling and transit mode shares increased from 48% to 53%, due to multi-modal planning and TDM incentives.

Victoria Travel Survey, 2017-2022

Between 2017 and 2022, total automobile trips declined 13% despite 9% population growth. Per capita vehicle trips declined 20% while walking and bicycling increased significantly.

Sprawl Repair

Many suburbs are becoming more urban by redeveloping malls into compact, mixed, walkable villages. (Tachieva 2015)

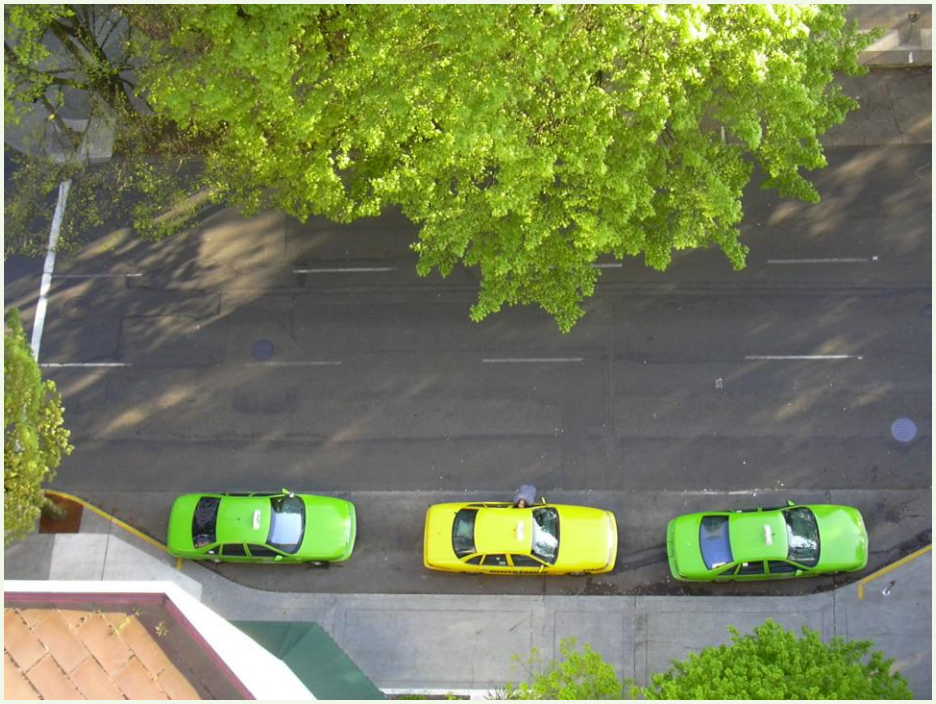
Integrated Parking Management

Implement parking management as an integrated package that anticipates potential problems and future needs.

Significant Benefits

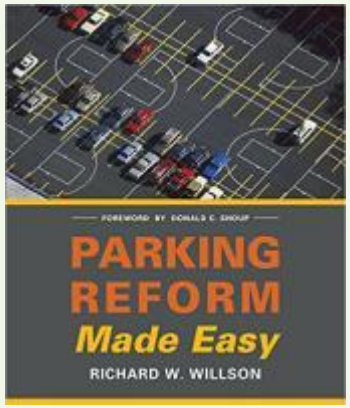
Improved management typically reduces needed parking supply 20-60% compared with what conventional planning requires, without reducing user convenience or increasing total costs.

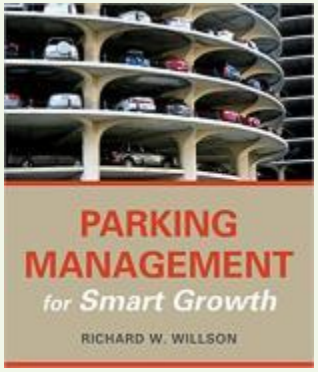
Changes Required



- Change the way we think about and solve parking problems.
- New zoning codes and development practices.
- New organizational relationships to provide parking management and brokerage services.

Supported by Professional Organizations





- Institute of Transportation Engineers
- Planning Institutes
- Federal, provincial regional and local transport agencies
- Development and business organizations
- And much more...

“Parking Management Strategies, Evaluation and Planning”

“Parking Requirement Impacts On Housing Affordability”

“Comprehensive Parking Supply, Cost and Pricing”

“Off-Street Versus On-Street Parking Trade-Offs”

“Parking Taxes: Options and Implementation”

“Parking Management Best Practices”

“Online TDM Encyclopedia”

and more...

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