Mobility and Green Buildings

City of Houston

Green Building Resource Center

July 26 2017

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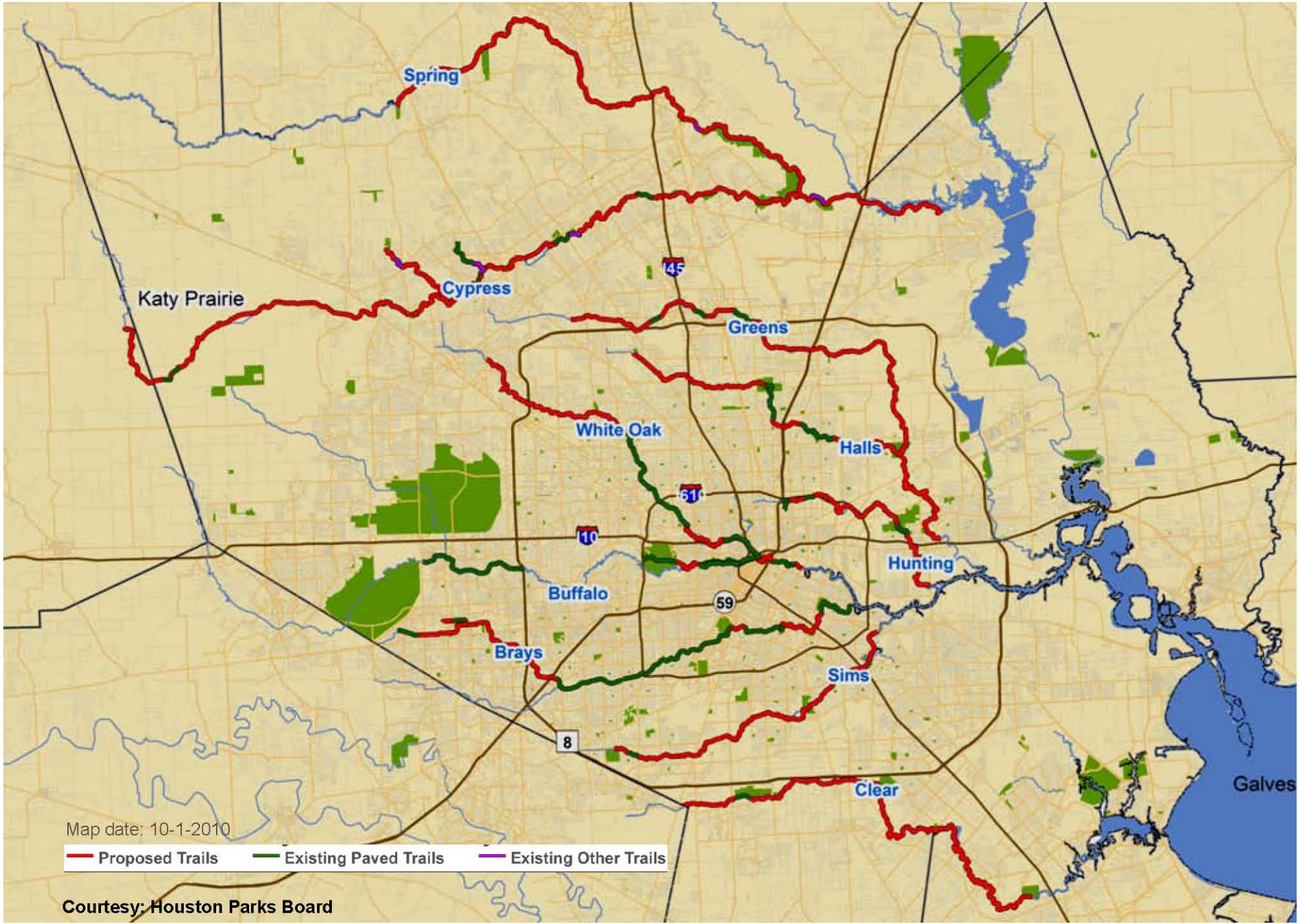
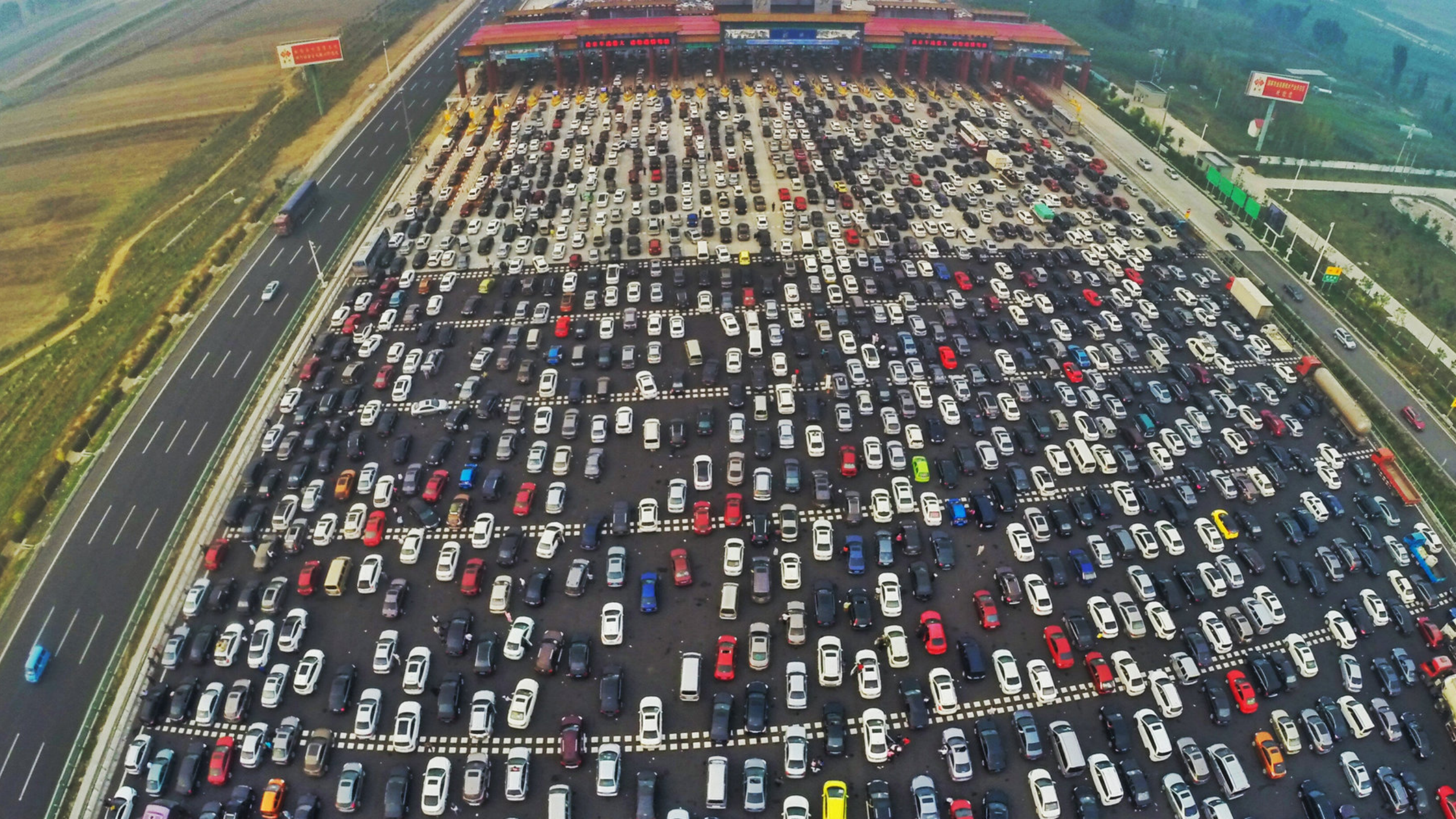
DLR Group
Architecture Engineering Planning Interiors

Bayou Greenway Initiative -- 2010



Courtesy: Houston Parks Board


SPEED LIMIT 60
END
NO TRUCKS LEFT LANE
HC EXIT 5
EAST
610
WEST
EXIT ONLY
ACCIDENT INVESTIGATION SITE NEXT RIGHT
THRU TRUCKS WITH HAZARDOUS MATERIALS USE
WATCH FOR ICE ON BRIDGE
15 MPH
END
SOUTH
LANE ENDS
MERGE LEFT

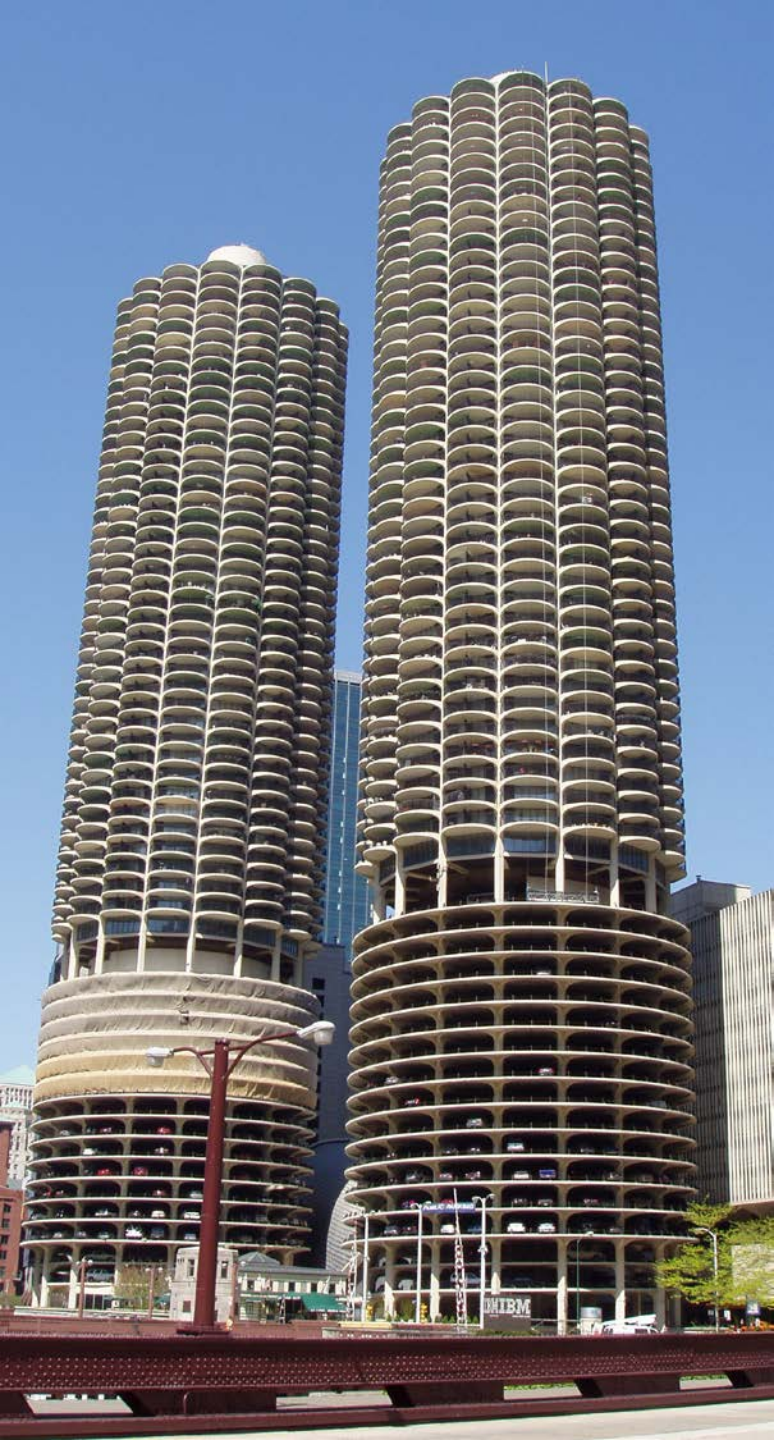


How will the demand for parking change in residential and office buildings?


TUNDRA PARKING GARAGE


INVISIBLE MAN
TO KILL A MOCKINGBIRD
THE LORD OF THE RINGS
J.R.R. TOLKIEN
A TALE OF TWO CITIES
CHARLES DICKENS


P
PARKING
DO NOT BLOCK




alchemist
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ADVANCED ARRIVAL

URBANIZING PARKING

1 DROP-OFF SERVICE

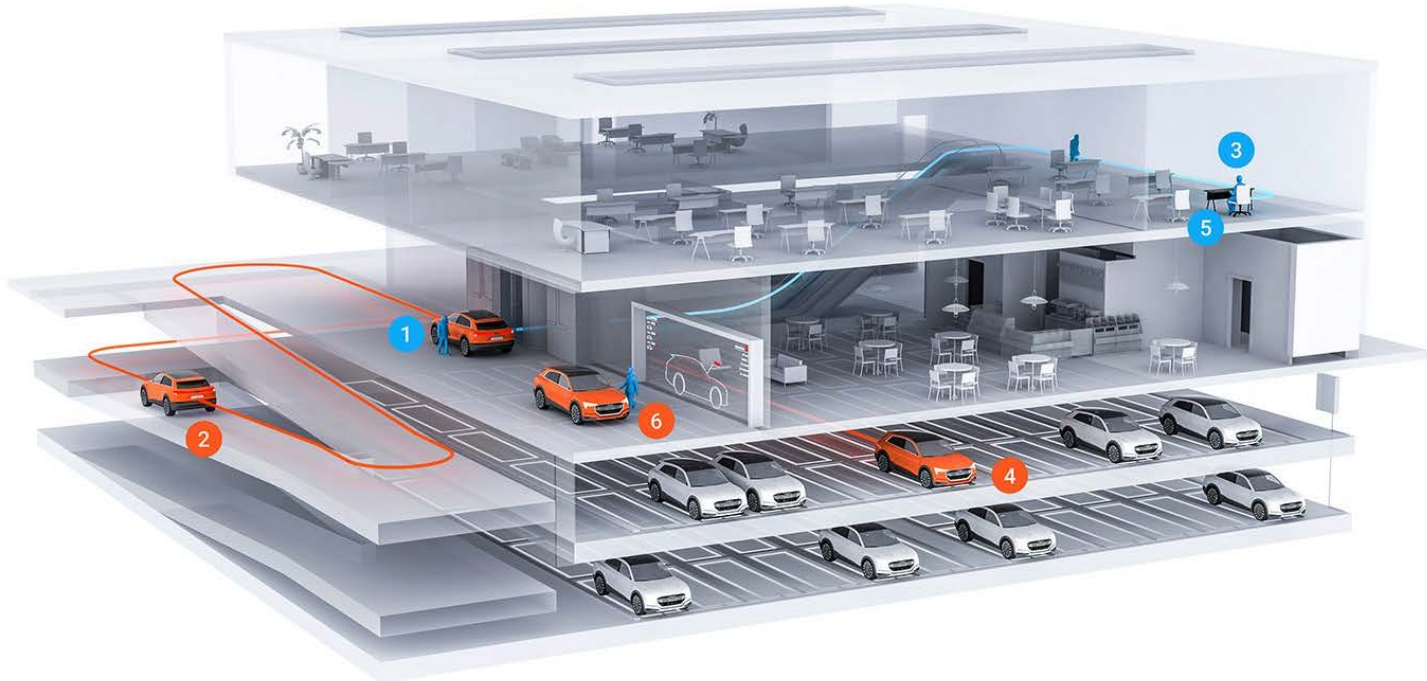
Instant access to urban life without any detours

3 GAINING TIME

More time – less hassle circling. Piloted parking frees up valuable leisure time

5 CAR ON DEMAND

Providing individualized premium mobility via service app



2 CAR PARKS ITSELF

Efficient parking - Courtesy of piloted car technology

4 INDUCTIVE CHARGING

Charging the car while parking and always ready to go

6 PICK-UP SERVICE

Meet your car in a stress-free lounge atmosphere

Where are We With Regard to the Evolution of Autonomous Vehicles?

Autonomous Vehicles Defined (NHTSA)

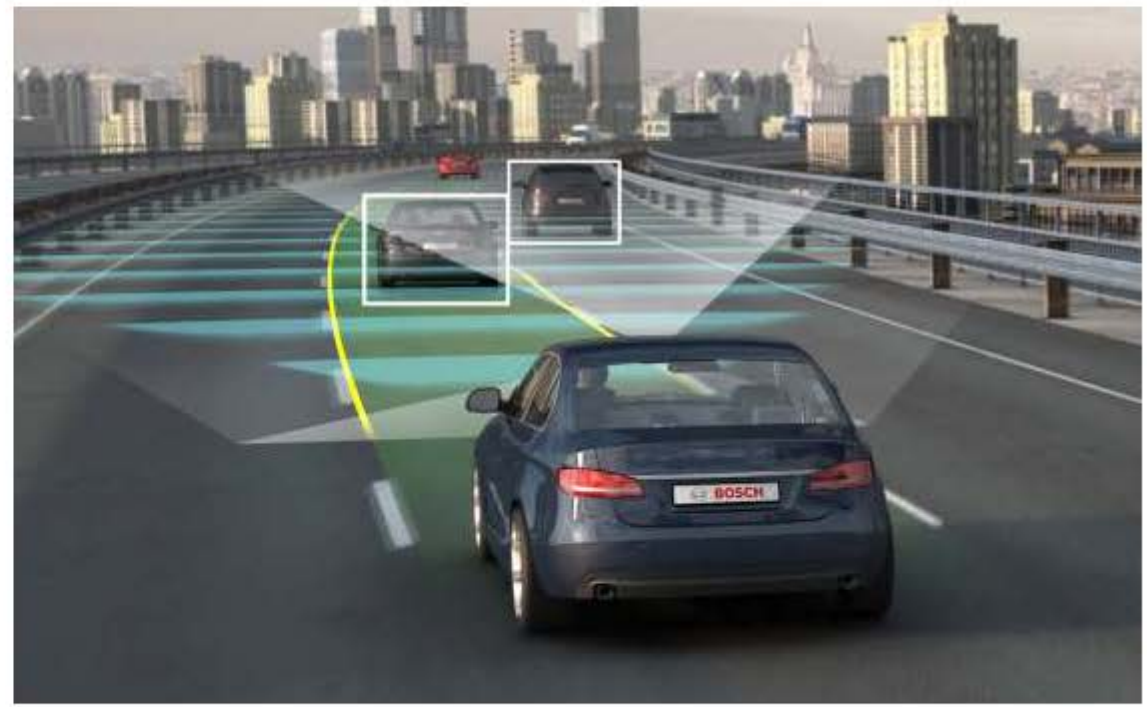
- An autonomous car (driverless car, self-driving car, robotic car) is a vehicle that is capable of sensing its environment and navigating without human input.
- In the future, they may be owned or shared.

Level 2 Self Driving Car

- At least two controls can be automated in unison, such as adaptive cruise control in combination with lane keeping.
- 2017 Ford Fusion ($22,000 sticker price) has Pre-Collision Assist with Pedestrian Detection and Active Braking.

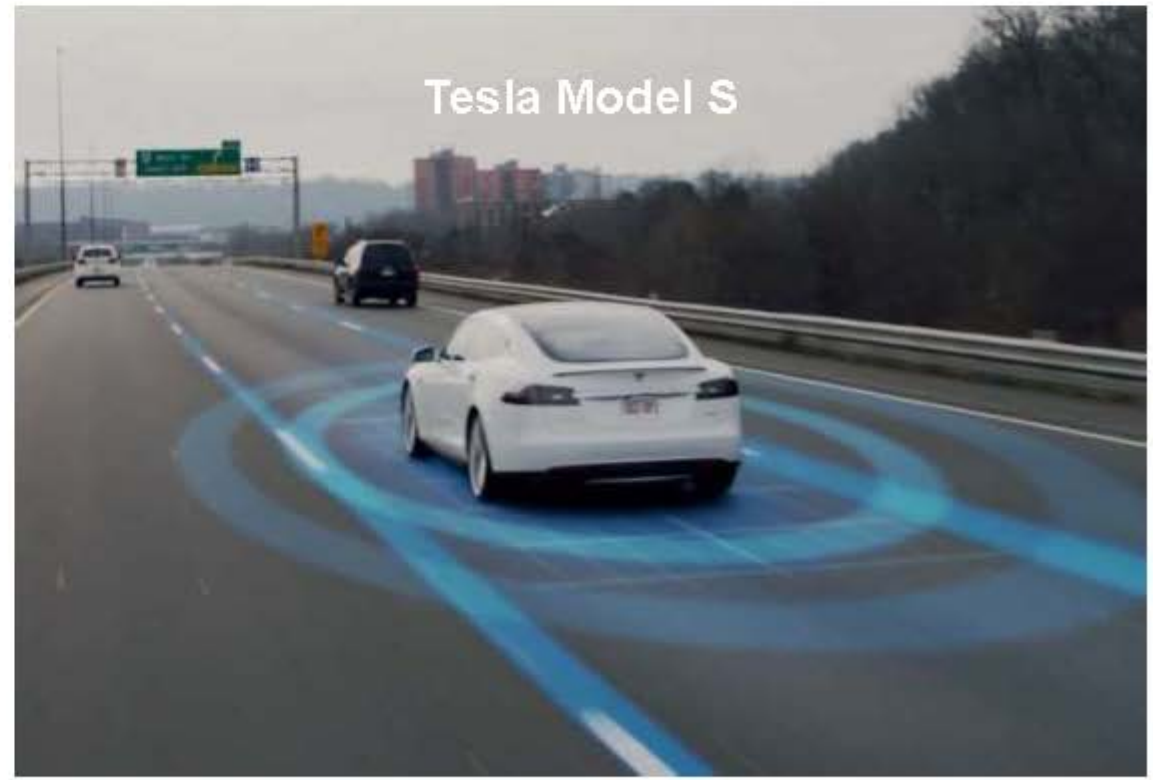
The Technology is Here and Being Used Already

- Anti-Lock Brakes
- Electronic Stability Control
- Adaptive Cruise Control
- Lane-Departure Warning System
- Back-Up Cameras
- Blindspot Detection

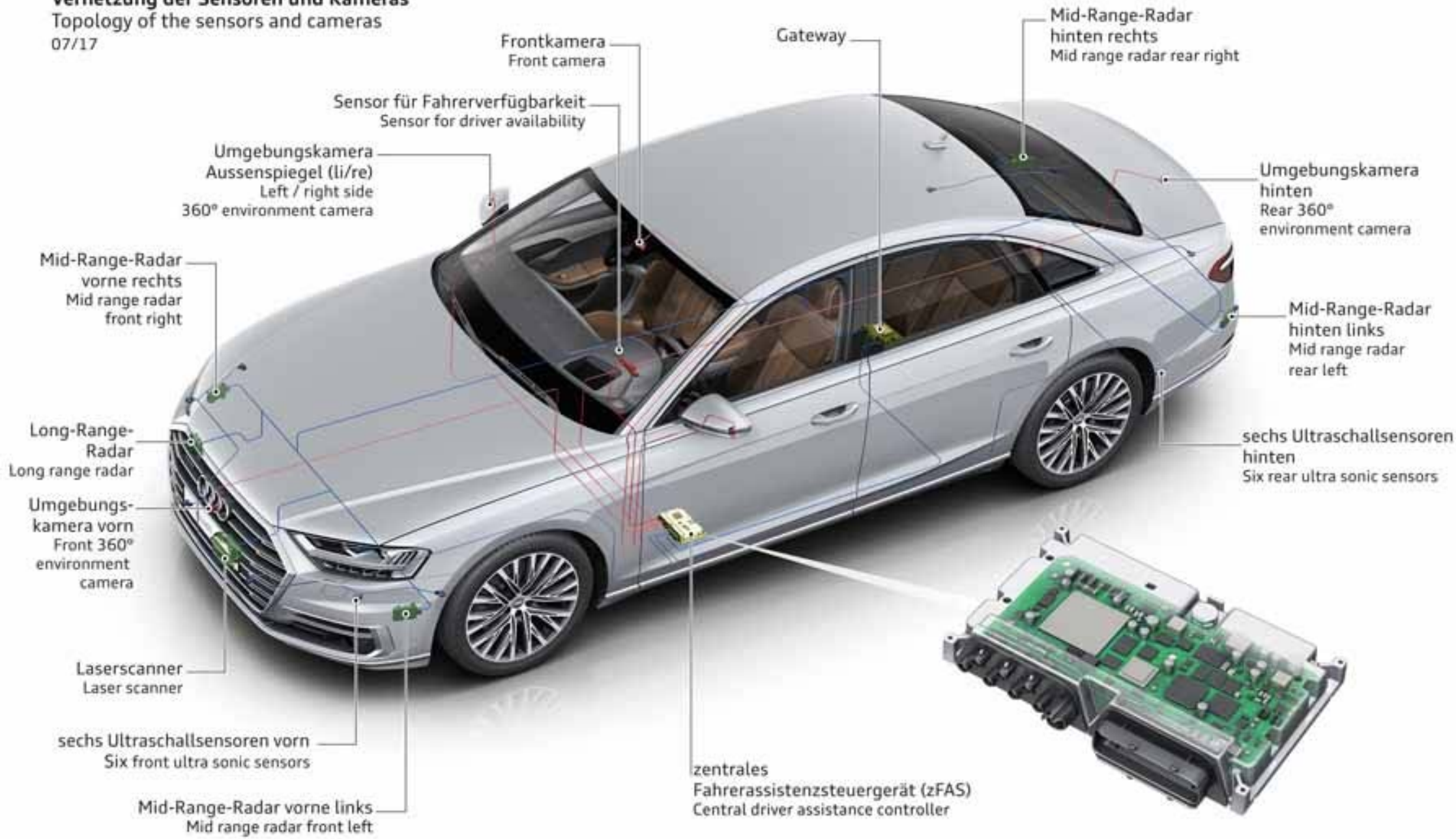


Level 3 Self Driving Car

- The driver can fully cede control of all safety-critical functions in certain conditions.
- The car senses when conditions require the driver to retake control and provides a "sufficiently comfortable transition time" for the driver to do so.



Vernetzung der Sensoren und Kameras
Topology of the sensors and cameras
07/17



Level 4 Self Driving Car

- The vehicle performs all safety-critical functions for the entire trip, with the driver not expected to control the vehicle at any time.
- As this vehicle would control all functions from start to stop, it could include unoccupied cars.

L-5 Full Automation

AV car-sharing vehicles or taxi

Eliminates 7 to 10 private cars

AV mobility services

On-demand convenience for local and long distance traffic

AV's offer higher utilization rates than private cars

(SOV's are idle more than 94% of the time)

So Who are the Players?

(Recently) Ripped From the Headlines

Uber's Self-Driving Cars Debut in Pittsburgh

WSJ Sept 14th

Self-Driving Cars Gain Powerful Ally: The Government

New York Times Sept 20th

Self-Driving Cars Coming in Months, Not Years

Forbes Sept 17th

Exec: Most Lyft Rides Will Be in Autonomous Cars in 5 Years

Bloomberg Sept 18th

How will self-driving trucks (ACV's) impact industrial development?

Autonomous trucks advantages to manufacturers

Human drivers must take mandatory rest periods

Autonomous trucks operate continuously

Resulting in increased efficiency and fewer delays in delivery.

Early adoption in freight/goods transport:

Warehousing, manufacturing and storage facilities will likely relocate to lower-cost areas; the subsequent drop in distribution costs may make online retail relatively more attractive.

“Uberisation” and the sharing economy

The IOT and mobile apps will **match demand and supply** providing on-demand solutions

Warehouse or transport capacity to be shared

Source: http://www.jll.be/belgium/en-gb/Documents/JLL-The%20new%20industrial%20revolution_final.pdf

As loading processes become more efficient and road transportation times become shorter and more predictable, **truck courts may become smaller.**

AVs might cause new facilities to be built in **different locations** since the cost and timing factors may change significantly.

Larger multi-modal facilities will continue to be built due to the cost efficiency of shipping goods by rail and sea.

Large industrial tenants may demand **smaller facilities that encircle the CBD** rather than one large facility located outside of it.

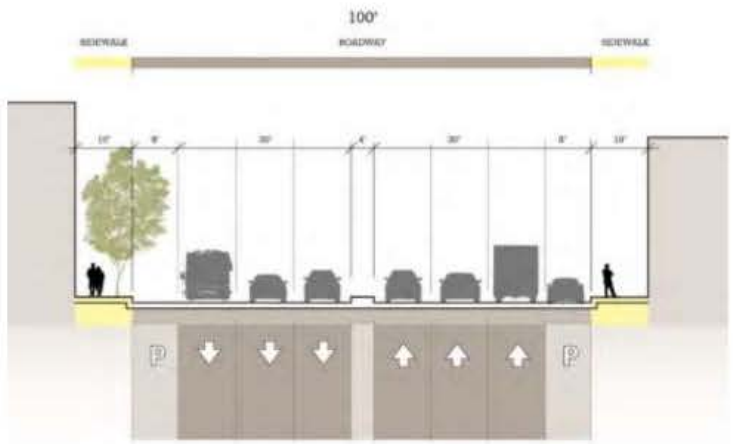
Source: http://www.supplychain247.com/article/nike_unveils_its_most_advanced_most_sustainable_distribution_center

So How Will Autonomous Vehicles Impact Commercial Real Estate Development and Land Use?

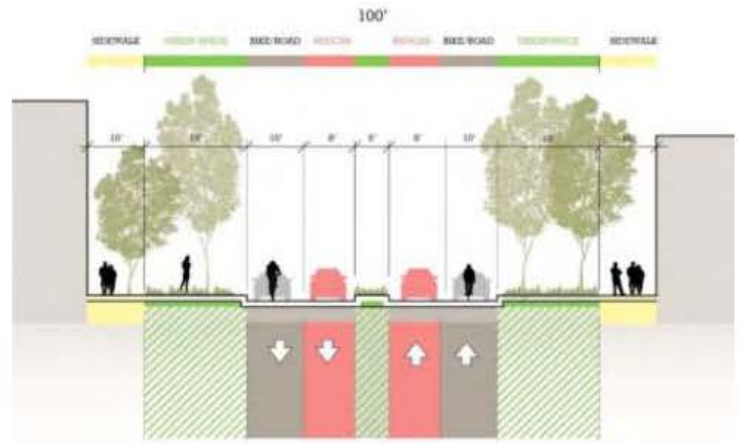
Questions to Think About

1. How will self-driving cars impact urban and suburban development?
2. How will self-driving trucks impact industrial development?
3. How will the demand for parking change in residential and office buildings?
4. How will self-driving cards change the way we live, work and play?
5. Will building design change?

BEFORE



AFTER



Roadway : 80%

Green Space : 0%

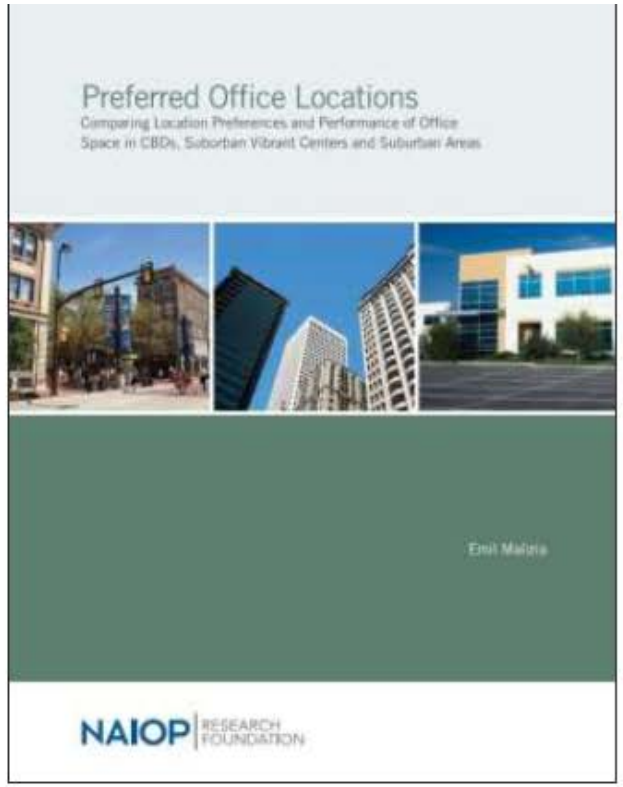
Roadway : 20%

Green Space : 42%

Shared AV's could increase available urban space by 30% percent, largely through the elimination of parking spaces, greatly reduce urban heat island effect (UHI)

Parking space reduction would make our cities greener, increase quality of life and also create the potential for additional housing

Source: Diagram of 19th Avenue in San Francisco before and after AVs. Gerry Tierney of Perkins and Will; presented on 5/14/2014 at SPUR



http://urbanland.uli.org/wp-content/uploads/sites/5/2016/07/3-Doral-Site-Plan-CR-Codina-Partnersa.jpg

AV's will allow parking to be uncoupled from the building;

new developments will become denser; and more space within them will be available for productive use.

Suburban office parks built to accommodate vehicular traffic

will likely continue to towards becoming more mixed-use in nature.

Source:http://scholarship.sha.cornell.edu/cgi/viewcontent.cgi?article=1152&context=crer

The way to densify suburban sites was to build parking structures…

How long will these building types be around?

AV's and on demand fleets of AV's could reduce parking by 70-90%

Design parking garages to be REPURPOSED for other uses…

Source:https://cdn0.vox-cdn.com/uploads/chorus_asset/file/6908213/autonomous2.0.jpg

Will building design change?

Site Design:

Drop off and pick-up of occupants at the front door
"5:00 School Zone Syndrome"

Interface of service vehicles with building-mail & deliveries

Urban agriculture-Recreation-Ground Water Recharge Zones

Reduces impervious surface area, reduces Urban Heat Islands (UHI)

Office:

Flexible-more dense-more occupants per sf

Healthy buildings-Vertical Mixed Use-

AV's as work modules

New Demand Factors:

Data Centers-growth-(possible use for repurposed parking garages)

Increase need for high tech and creative professionals collaborative work environments

Advanced Arrival

The car parking challenge

PARKING

01 REDUCE PARKING PROVISION

02 REDUCE BUILDING COST

03 OPTIMIZE MANAGEMENT COST

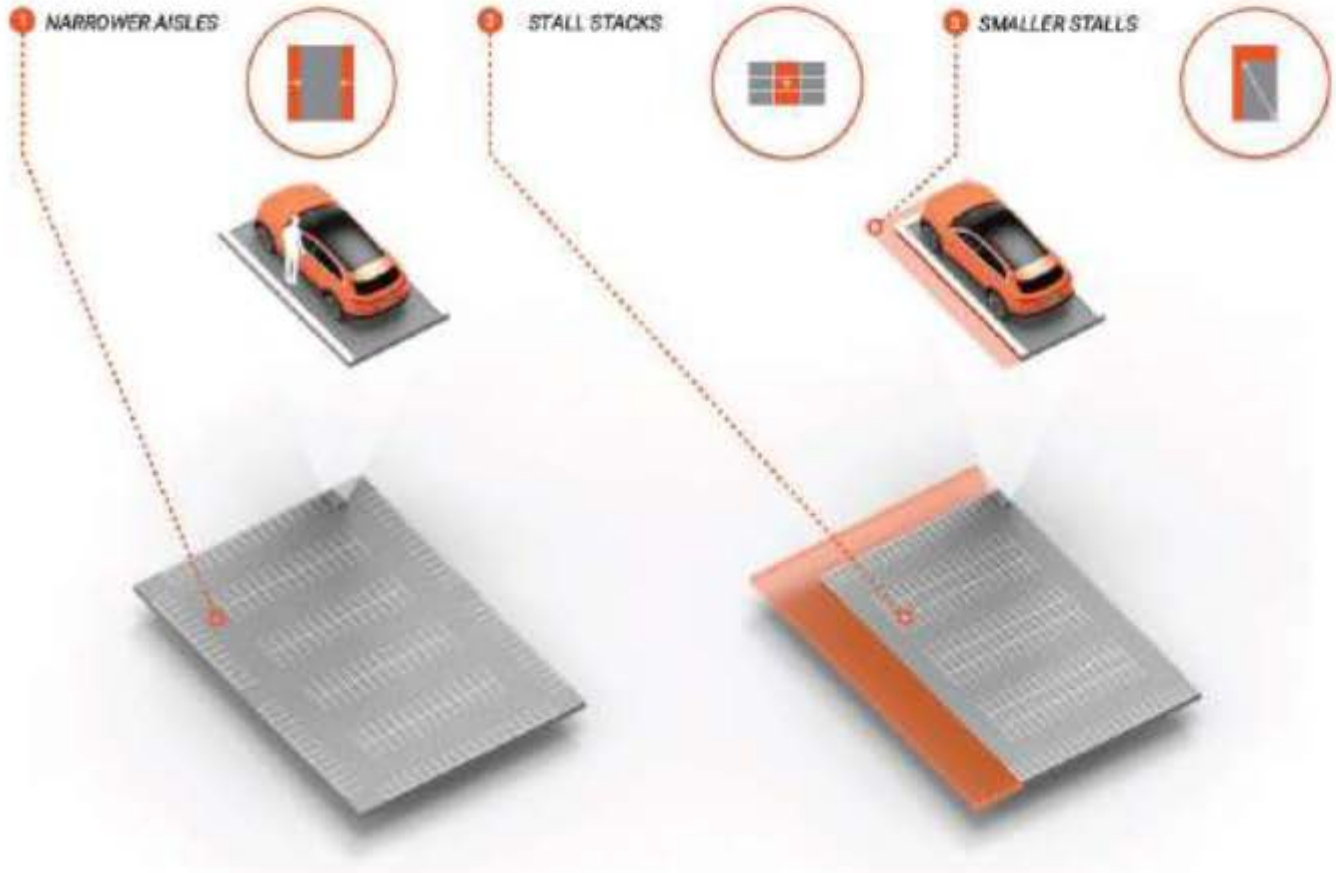
USER

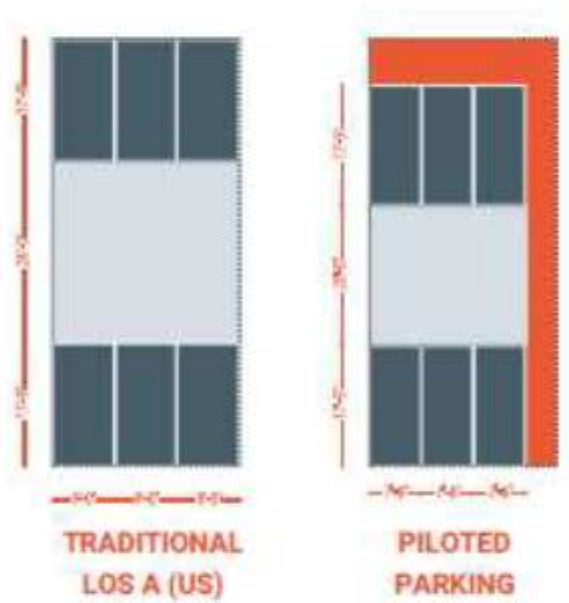
04 REDUCE COST OF OWNERSHIP

05 INCREASE COMFORT

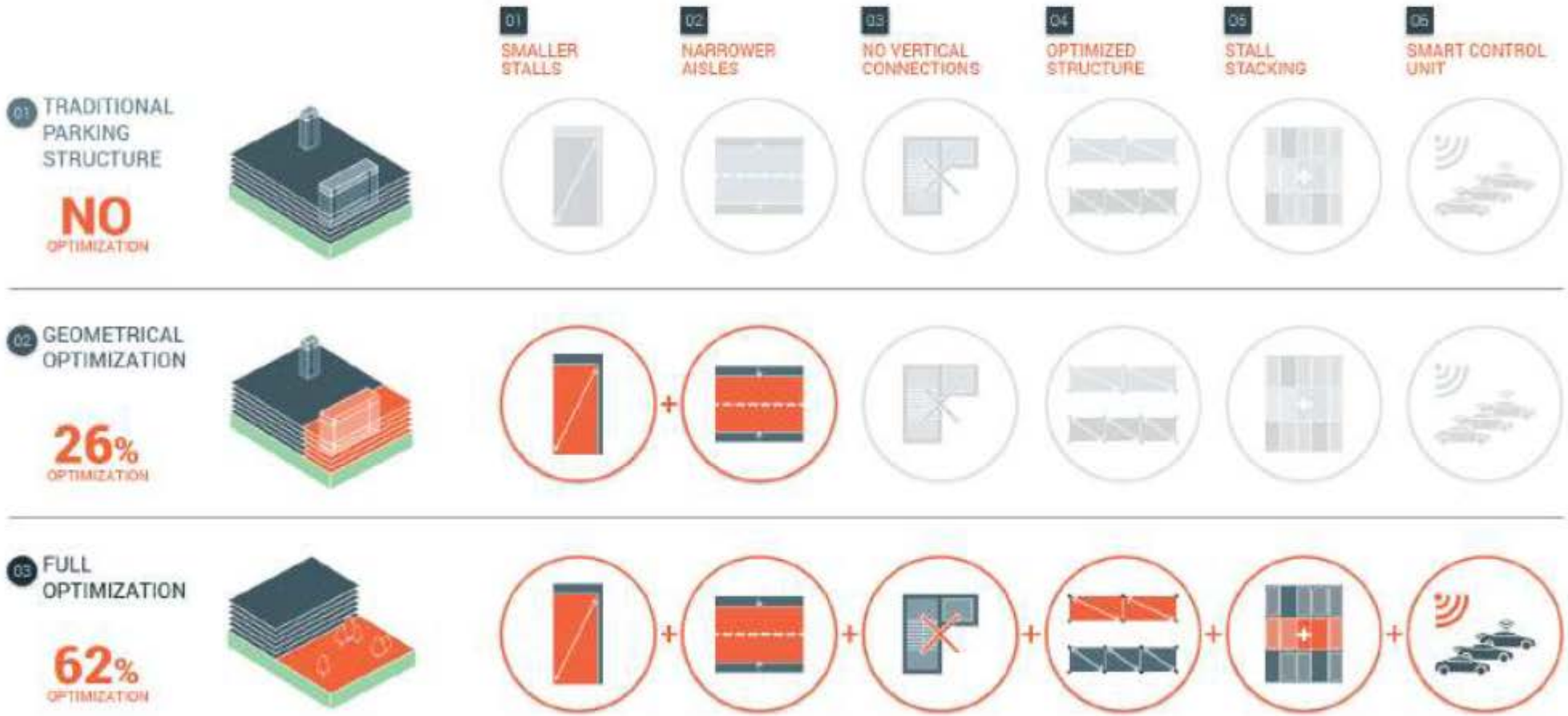
ADVANCED ARRIVAL

New Concept of Parking Facility
Piloted Parking - Space Optimization



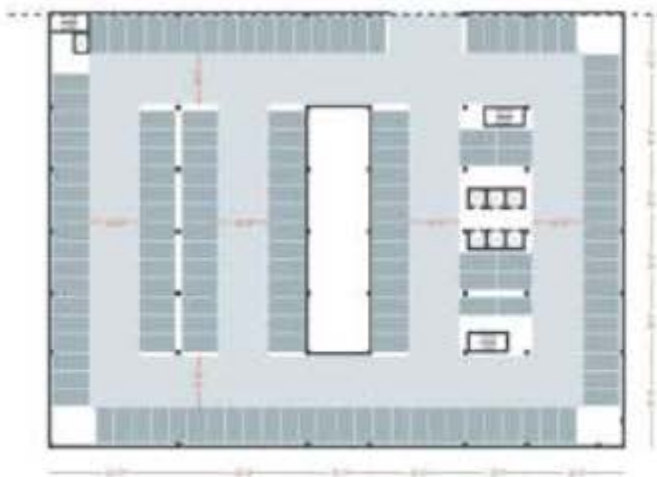


Reduction of Space and Construction Cost
Optimization levels



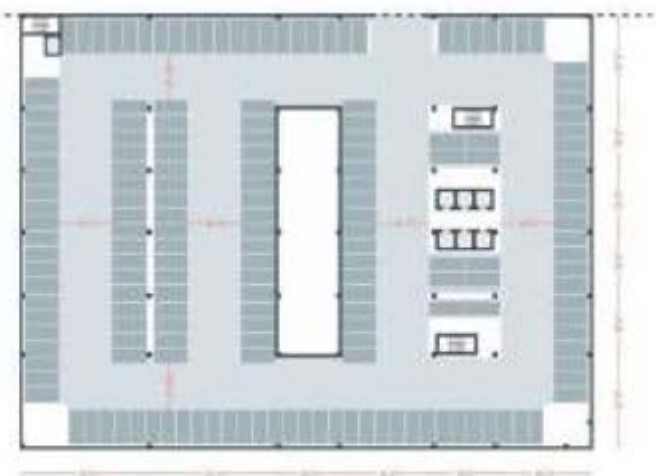
New Concept of Parking Facility
Assembly Row

NO OPTIMIZATION



148 parking spaces

GEOMETRICAL OPTIMIZATION

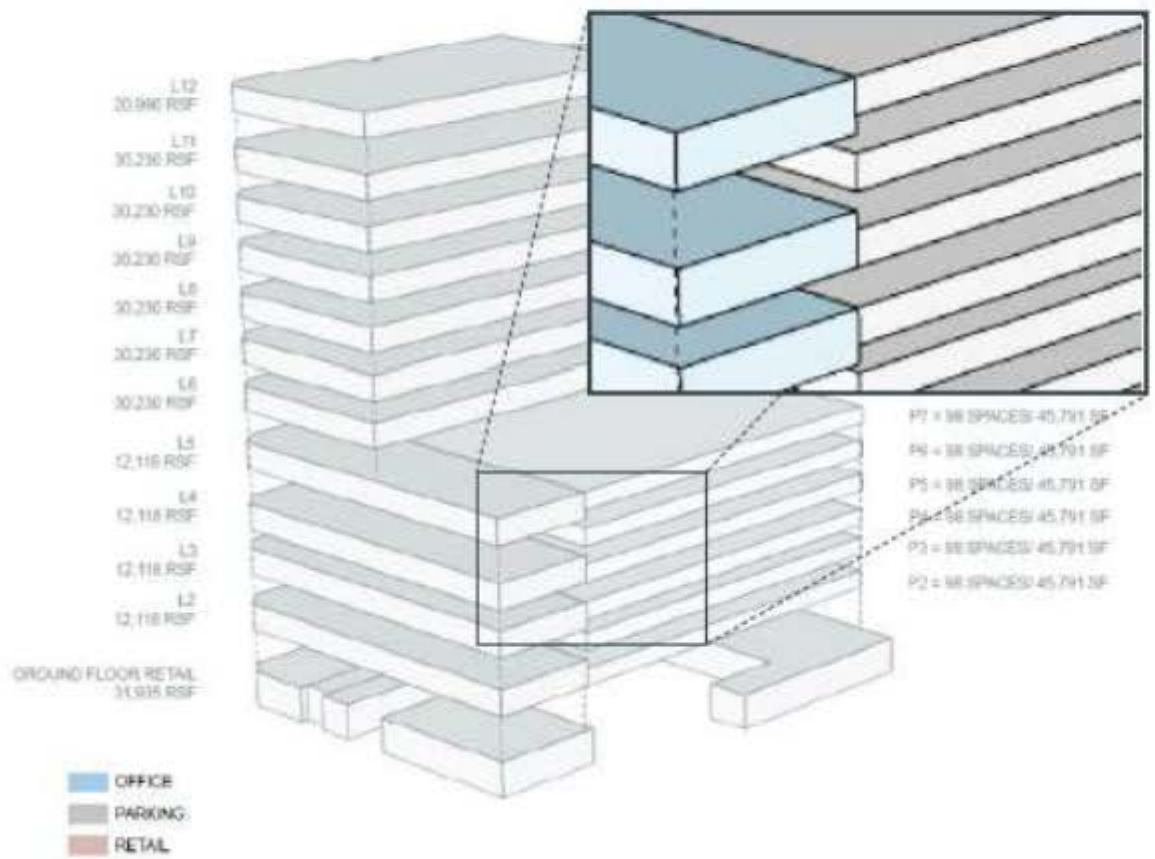


178 parking spaces

FULL OPTIMIZATION

240 parking spaces

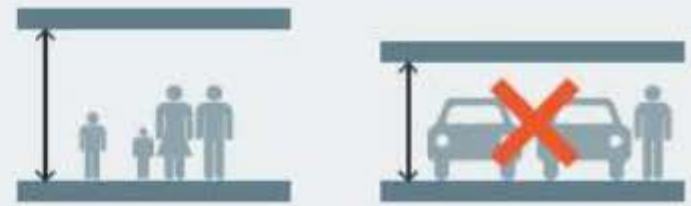
Block 5 Design
Retrofitting of parking areas



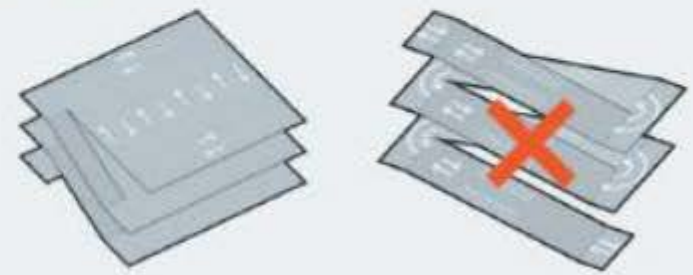
RETRO-FITTING PARKING STRUCTURES

PLAN AHEAD FOR RECONVERSION TO OTHER USES

CEILING HEIGHT should respect the minimum requirement for hosting other living/working functions



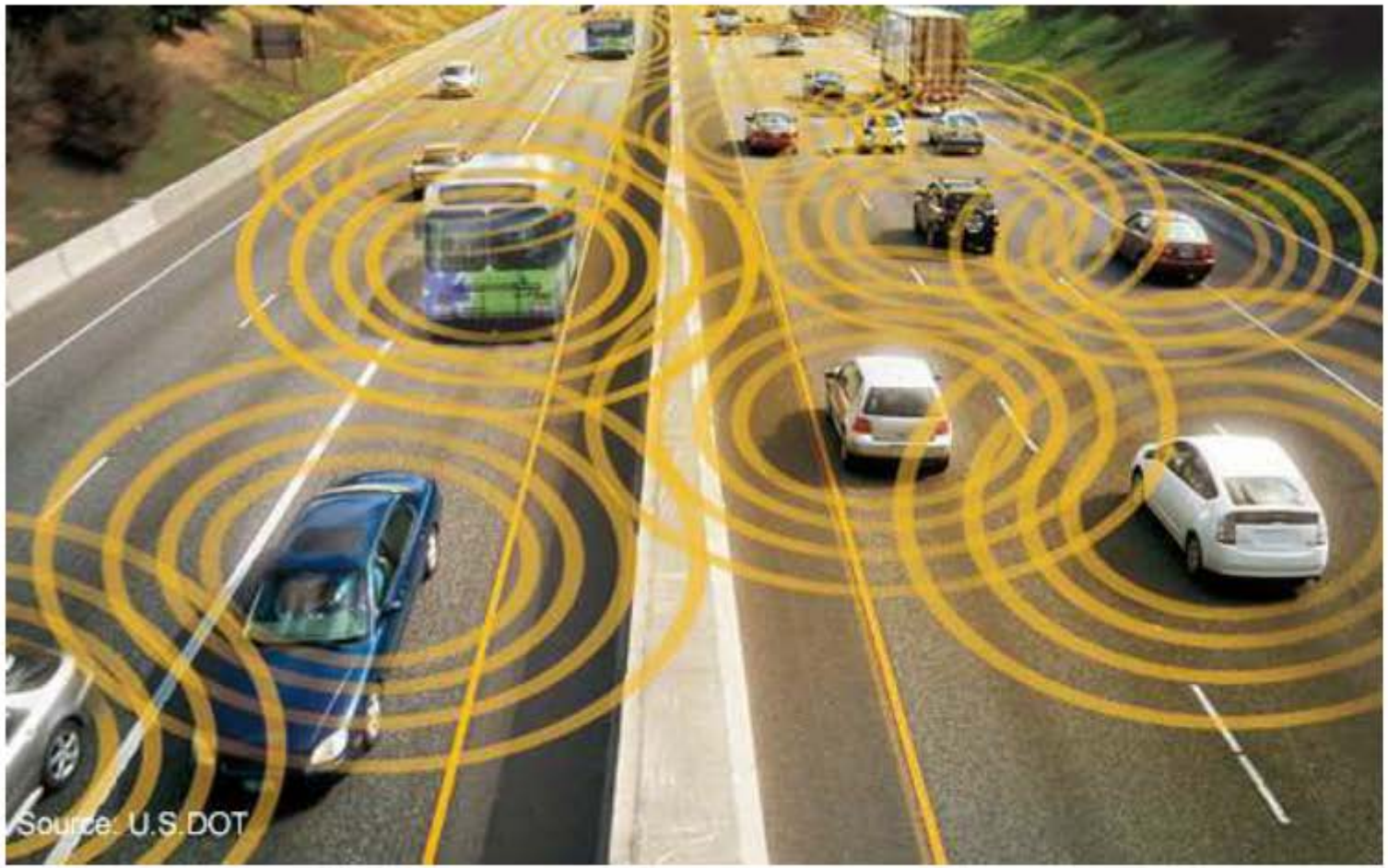
Parking decks should be **FLAT** and not ramps



What are the Societal Benefits of Autonomous Vehicles?

Big Picture Benefits

1. Increased Mobility
2. Anticipated Reduction in Automobile Accidents
3. Decreased (or Eliminated) Traffic Congestion
4. Increases in Fuel Economy
5. Enhanced Human Productivity



Reduced Congestion

80% Improvement in traffic throughput
2040 VMT Increase by 65%

Higher Fuel Efficiency

23-39% improvement in highway fuel economy

Gain In Productivity

56 minutes per day freed up for other uses

Source:bosch

How will AV's change the way we live, work and play?

Efficiency of Services:

"Uberisation" - Life on Demand and As Needed

Democratization of Mobility:

Over 65+ population segment growing 50% faster
Allow a variety of age ranges to be mobile

Health and Welfare:

Reduction of road fatalities
90% of car accidents caused by human error

Reduced Stress:

Commute time reductions
More family time
Leisure/Hobby time

Mobile/Everything Custom/Everything SMART:

Manufacturing
Work
3-D Printing
Connected, Sensors and the IOT

“We humans are really good at a lot of things, driving cars isn’t necessarily one of them compared to the automated processes that are digital and foolproof. I just have huge confidence in the safety aspects of this.” *[WA State Governor, Jay Inslee]*

"When the first driverless car is on the road, I think people will start thinking about zoning changes,“ *[Manlo Ventures Managing Director, Venky Ganesan]*

CBRE predicts gas station real estate will be reclaimed as well. CBRE researcher Revathi Greenwood points to a shift to autonomous vehicles in a 2016 whitepaper, predicting a "pay-per-mile" model rather than a full car ownership model.

Several New Jersey landlords are using the perk to overcome a lack of office parking, connect offices with downtowns and attract employees who do not own cars. Hugo Neu Corp. launched a program in March that offers $50 monthly credits for tenants' employees without cars to commute to its Kearny Point office. Marcus Partners plans to offer new tenant employees at its building in Morristown a program that pays the first $3 of any Uber or Lyft trip that starts or ends at the office. These subsidies could help office landlords avoid parking costs, which run between $20K and $35K/space, according to a NKF report.

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The convergence of three new technologies—**automation**, **electrification**, and **shared mobility**—has the potential to create a whole new wave of automation-induced sprawl without proper planning and regulation.

“This will completely change us as a society,” says Shannon McDonald, an architect, assistant professor at Southern Illinois University-Carbondale, and an expert in future mobility planning. **“I think it’ll have the same transformational change as the introduction of the automobile.”**

Self-driving cars will disrupt more than the auto industry. Here are the winners and losers

Joel Barbier, director, Cisco Digitization Office
Wednesday, 3 May 2017

Parking:

The U.S. has about 144 billion square feet of total parking, which represents up to one-third of the total real estate in some large cities. Reports estimate self-driving vehicles have the potential to reduce parking space by about 61 billion square feet. A reduction in the demand for parking can result in reclaiming this valuable real estate for more beneficial social and economic purposes. However, it also means significantly less money for cities through parking tickets.

Real Estate:

While freeing up parking space may present an opportunity, real estate agents should be worried. Faster and easier commutes will shift residential value from properties in urban centers to those in suburban areas.

Insurance:

About 90 percent of car accidents are caused by human error. In the world of autonomous vehicles, we can expect to see a major reduction in the number of accidents, which will significantly change the insurance revenue model. In anticipation of this shift, some insurers are rolling out usage-based insurance policies (UBIs), which charge consumers based on how many miles they drive and the safety of their driving habits.

Law Enforcement

Legal Professionals

Hotels

Media, Entertainment, Online Retail

Package and Food Delivery

Auto Repair

Auto Manufacturing

Thank you

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