RICE UNIVERSITY

DRIVING FORCES:
projections of the car city

by: Heather Brooke Rowell

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APPROVED THESIS COMMITTEE:

Fares el-Dahdah
Associate Professor of Architecture & Graduate Program Chair

Mark Wamble
Architecture, Craig Francis Cullinan Professor

Eva Franch
Architecture, Wortham Fellow 2008

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As the threat of a global energy crisis becomes increasingly apparent, the viability of the current automobile, along with its tailored national infrastructure and the beloved car-culture, is in certain jeopardy.

This thesis seeks to develop and analyze a series of possible scenarios that yield distinct architectural movements derived from the current car city as we know it today, cognizant of the past's lingering strengths and mindful of the future's dwindling resource palette. It is to be viewed as a means of by which to identify and map some of the forces at play in the future of the city by describing their connectivity, their volatility, and understanding them through grounded, measured trajectories. It is the hope that through an exercise such as this, we might be able to make more informed decisions for the future by projecting from both the past and present.
special thanks

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for mom + pops
Chapter 1 _ HOUSTON: CAR CITY

The gas powered internal combustion engine, designed over a century ago, has proven to be one of America's greatest influences on urban policy, cultural and infrastructural development, and technological advancement. The American city was developed with very little insight into the future, focused on immediate gains, driven by a single fuel source, and armed with a full-fledged campaign towards a singular mode of transportation. As the threat of a global energy crisis becomes increasingly apparent, the viability of the current automobile, along with its tailored national infrastructure and the beloved car-culture, is in certain jeopardy.
We know now that a city dictated by the car is not sustainable. By identifying possible factors, or driving forces, that may create the change that ultimately leads to a new city model, this thesis seeks to develop and analyze a series of possible scenarios that yield distinct architectural movements derived from the current car city as we know it today; cognizant of the past's lingering strengths and mindful of the future's dwindling resource palette.

Houston's history and current condition make it a perfect example of automobile-derived development. Lack of density and a social stronghold demanding privacy, property and selfhood are two factors that will no doubt resonate into the future, but what might the factors be that tip the scales towards a new city typology?

The following diagrams describe the current state of Houston and will be used as a means to ground and subsequently launch this investigation by creating a bank of current knowns to aid in the scenario building process.
Houston has not only accepted the car culture, it demands it. The 10-county metropolitan area boasts over 575 miles of highways and expressways and has plenty of drivers to fill them. 1 in every 4.5 vehicles in Texas are registered to the Houston Metro area. Harris County alone accounts for 15% of the states registered vehicles. Houston has a lot of roads, a lot of drivers, and a ton of land. Claiming 639 square miles, Houston is the size of New York City, Seattle, Washington, DC, San Francisco, Boston, and Miami combined.
Spaciousness may be what makes Houston special, but it also makes it difficult to get from place to place without the help of a motorized apparatus. In terms of city density, Houston has one of the loosest weaves in the nation.
THE 100 FOOT RULE:

* Trips by rail and bus decline by approximately 0.65% for every 100' increase of distance between a metro station and a residential site. The same rule can be applied to the distance between an office and the station.

It is this lack of density that makes successful mass transportation a pretty big hurdle in Houston. A 1994 traffic study found that trips by rail and bus decline by approximately 0.65% for every 100' increase of distance between a metro station and a residential site. The same rule can be applied to the distance between an office and the station.
A study funded by the City of Houston in 2006 found that 55.5% of Houstonians wouldn’t use mass transportation even if it were more efficient. Most people simply aren’t willing to give up their air conditioned capsule, brave the cockroaches, heat, and flash floods in order find the nearest bus stop. In addition, another study found that 52% of people make a stop during their commute to and from work...dropping off kids, running an errand, buying a latte and are afraid that using public transportation would limit those freedoms.
In 2006, the Harris County commissioned a study that mapped the current population trends and projected their impact on the city in 2035. Their study found that Harris county is growing at a rate higher than the city itself and that population growth would increase greatest around the edges of the city of Houston, particularly on the northwest, west and south sides.

These projections assumed that fuel costs, road construction, and cultural values would remain in their current trajectory. This thesis seeks to question projections such as this, ones that paint a future as a direct derivative of the past or current condition. Instead, the following investigation strives to identify possible drivers that would alter the path of the current car city and thus create an entirely new city typology.
Chapter 2 _ METHODOLOGY FOR PROJECTIONS

There have been many depictions of what American cities may look like in the future. Most of the ones we think of paint an image derived from a linear projection extending from car city's current state....One of endless resources. Or, they project a future that idealizes the past. If we look at how we got where we are today, the real car city was created with very little insight into the future: focused on immediate gains, driven by a single fuel source, and armed with a full-fledged campaign towards a singular mode of transportation.

What are the factors or driving forces that will create the change to the car city model? Will the driving force for change be the automobile once again as it reinvents itself, or will new inventions, technologies, or cultural demands become the new city development crutch? Will our cities become more global or more localized as the energy crisis unfolds? The future is unknown, but by developing future scenarios one may be able to avoid paralysis from uncertainty and gain the foresight that creates positive action.

Lawrence Wilkinson is the founder and director of Global Business Network, a company that utilizes a scenario planning strategy to help large corporations plan for the future. The methodology for projecting future architectural and urban developments in this thesis is loosely based on Wilkinson's model.
The diagram above represents the scenario building method by which this thesis will investigate the re-invention of the automobile driven development. At the top are a series of cards that represent broad identifiers of possible drivers - things that could tip the scale towards new architectural movements or models: political, social dynamics, environmental, technological, aesthetic, economic and infrastructural factors.

If we are to insert their impact into a series of measurable knowns we can begin to extract an infinite number of possible fates between the car and the city that holds it dear. Measureables may include but are not limited to: population, number of vehicles, primary energy sources, transportation energy sources, energy use by sector, population by location, and travel times.
As a way of controlling the number of possibilities, two major axes have been defined that each of the scenarios must fall within. One axis describes the nature of the city itself, and one describes the social and political ideology of the people who reside there.
This is a scenario site plan.

Each scenario is derived from the development of a site plan.

Here we have the mappings of the measureables over time. This particular plan describes population, energy use and source, transportation energy, population by location and average household income.

These are the drivers. Gray drivers indicate initial catalysts. Major drivers are shown in black and can directly affect the measurable charts. White drivers are secondary and occur as a result of a major driver.

Lastly, each action is analyzed for its implications on the automobile and auto infrastructure, energy, the user and/or culture, politics and the economy, and the urban environment.

The scenarios were built by starting with one or two drivers and playing them out over time, inserting additional drivers as the story unfolds, until a new urban model arises.
Delphi Expert Opinions:

Delphi studies will be used to help place major developments within the scenarios. A Delphi study is a poll of expert opinions.

The diagram above shows the results of a Delphi study conducted by EurEnDel in 2004. The study asked a group of experts when they thought specific advances would be made on the topic of Europe's energy future. The blue bar represents the mean value of time of occurrence for each of the statements shown to the left of the graph.
Chapter 3 _ Mapping the Macro

Rather than simply projecting possibilities from our current state, this thesis strives to place each scenario within a larger context by understanding the presence of the past in each of the developed scenarios.

This investigation is launched by adopting the structural evolutionary timeline first proposed by Charles Jencks in 1971. In his book, Architecture 2000, Jencks described 6 major traditions in architecture that pulsate over time, resurfacing, readapting to, and re-evaluating current conditions. This notation helps to organize past, current and future methodologies and movements. Some may gain strength in relation to each other while others may develop in a somewhat independent fashion. Their ebb and flow can be visually described as a series of tendrils, an interrelated 3-dimensional bundle. Jencks flattened the timeline to catalog architectural movements in relation to their respective traditions and used the timeline as a tool to predict future movements within the profession. //
6 Major Traditions

Charles Jencks Structural Diagram for the six major traditions. He concludes that these traditions are autonomous but tend to stabilize around a common core.
The Evolutionary Timeline

The Evolutionary timeline is depicted as a 3-dimensional bundle of interrelated tendrils. The diagram on the following page is a reproduction of Jencks original timeline. The red texts are all car-city related and placed in their respective traditions for the purpose of this thesis research.
The Evolutionary timeline updated with car-city references. In chapter 8, the timeline will be revisited, updated with the following scenarios and projecting the next 100 years.
Chapter 4 _ Scenario 1: Energy Belts

By the end of the 20th century, early suburban shopping centers and entertainment hubs were no longer frequented, upstaged by newer models of the same typologies. With their failures, adjacent neighborhoods were losing inhabitants. Fuel crisis also contributed to the weakening of the bedroom communities as many residents began moving back into the city center. Quickly, the empty carcasses of the un-used commercial districts became city liabilities and are feared to foster crime. Housing near these failed centers quickly looses value and once wealthy, upscale neighborhoods become low-income housing opportunities.

Capitalizing on the success of new automobile technologies, all new suburban development in the mid-21st century is based on alternative automobile infrastructures. Development is built tight to and densely around high speed transportation hubs to the city center.

With this new development, the geographic mapping of demographics blurs. New, dense, walkable, and technologically advanced neighborhoods constructed around the high speed transportation corridors draw the most affluent crowds. This is in part due to the cost of the newest green gadgets and in part due to the social status that comes with being totally "green." The inner city, filled with alluring amenities but slower to adapt to green status, is mostly middle class. The old suburbia belongs to the lower class and is a diverse, artistic, multi-cultural center.
Fearful of alienating the poorer fringe neighborhoods, those communities unable to purchase new, efficient vehicle options and lacking mass transportation offerings, the city begins to create subsidized electric car infrastructures along and hourly rental car systems become very popular. Large scale solar collection hubs overtake derelict shopping centers and the suburbs are coined as a city's energy belt.

The suburban energy belt is a very important piece of the city structure. Cities fight to incorporate the outlining areas, often losing to the strong, wealthy centers. The co-dependence of the energy belt with the city center creates greater metro-collaboration, blurring the boundaries between city and suburb and increasing the size of the city proper. //

driving forces

+ Expansion of High Speed Public Transit lines.
+ Electric vehicle infrastructures
+ Power grid unable to meet surge in consumption. Innovative, new decentralized production methods result - ex: heat islands become energy islands.

+ Rise of Green consumerism - the Green Elite.
+ Energy poverty in the suburbs

+ Government mandated efficiency standards in automobiles.
+ Tax incentives for energy R+D
+ Energy subsidies for energy poor like subsidized public electric vehicle stations.
+ Annexation of the "Energy Belts"

+ Suburbs and exurbs become an important source of energy to the city - collectively, they become known as the "Energy Belt."
+ Green elite neighborhoods help to fund and develop the extension of light rail lines.
This diagram is the "site plan" for the Energy Belt scenario. The site plan was used to build the scenario. The colored graphs represent the measureables that are affected by the drivers (located in the middle of the plan).

Gray drivers indicate initial catalysts. Major drivers are shown in black and can directly affect the measurable charts. In this case, infrastructural, social dynamics and technological changes were considered the primary drivers. White drivers are secondary and occur as a result of a major driver.

Each action is then analyzed for its implications on the automobile and auto infrastructure, energy, the user and/or culture, politics and the economy, and the urban environment.
here we go:

rising transportation energy costs

failing commercial districts

ENERGY POVERTY

subsidized transportation solutions

HEAT ISLANDS to ENERGY ISLANDS

innovative, decentralized energy production

ENERGY BELT

GREEN ELITE DEVELOPMENTS

cutting edge green tech
electric car infrastructure

high density

built on rail line

shifting social + economic demographics

new urban model
Chapter 5 _ Scenario 2: Re-Fab

Most U.S. cities experience massive growth at the end of the 20th century through the beginning of the 21st century. Transportation systems struggle to keep up with increasing loads. Relying on centralized energy systems and without sufficient funds to make a quick shift to smaller systems, overpopulation leads to blackouts and difficulty maintaining the massive grid.

As gas prices steeply rise, the United States airline system fails. Without an easy means to travel long distances, America grows in perceived scale. People turn their attention to city and regional affairs realizing the environmental and financial need to be self-sufficient at the local level.

The downfall of centralized, massive infrastructures along with the increasing cost of imported goods due to energy costs causes a shift towards locally sustainable, small scale development.

Due to the energy crisis and in an effort to curb energy consumption, politicians enact a carbon tax, forcing citizens to evaluate every purchase for its carbon footprint. It is required by the government for every product to disclose the location of origin for each component part. A numerical factor is assigned to each product representing its overall carbon footprint, and thus its markup for tax purposes.
The carbon tax laws are met with a new business type that capitalizes on a carbon tax break policy for building products that are recycled from previous constructions and re-distributed locally. Local Material databases allow residents to search banks of local re-used materials from which to construct from. The tax incentive is so great, that large building typologies follow suit and a new stylistic shift occurs toward buildings with adhoc, economically and environmentally "green" aesthetics.

Bio-degradability of waste is enforced through government policy since shipping it out of one's city is no longer a viable option. Energy from mass composting is realized. Vehicles are powered from local sources and are fabricated from bio-degradable products. Eventually, the compost created from old cars helps to fuel current cars. Intercity connects are paid by federal systems and are most successful as high speed mass transit rail systems. //
This site plan was used to develop the Re-Fab scenario with infrastructural, political and social dynamic factors selected as the primary drivers (those drivers that are the principle catalysts for urban and architectural change).
there are no hybrid airplanes:

- community oriented, land conservation
- re-establishment of old transportation infrastructures

economic and ideological shifts

development of
LOCAL MATERIAL DATABASE

CARBON TAX

everyone goes green!

driving forces
Chapter 6 _ Scenario 3: For Rent

Two main factors led to this city model. First, the failing purely capitalist, shoddy constructions and overall lack of foresight that dominated most of the 20th century is blamed for the massive recession that takes place in the first half of the 21st. Many people felt that the downfall was in great part due to the fact the US effectively putting all its eggs in one basket, citing the singular automobile engine type and primary reliance on oil for energy. The devastating blow to the economy is met with a strong push towards global networking and capitalist strategies.

Secondly, global warming is responsible for violent turbulence across the US. Record breaking hurricanes pummel the Gulf Coast. Tornadoes ravage the Midwest and rising sea levels begin to deplete coastal cities. This led to a national fear for permanent settlement and ecologically irresponsible development. Adaptable housing systems start popping up on coastal communities first. Their seasonal movement inland creates a need for new development typologies to accommodate them.

By 2006, there were several perfect storms that were causing things to change. Cars built in 2006 had worse fuel economies than cars built in the 1980s and as fuel prices increased consumers began to demand more out of their automobiles.
At the same time, cheap construction costs, low energy bills, and vast amounts of land allowed people to build bigger houses even though the average family size was decreasing. By 2006, the size of the home had more than doubled from the 1950s. Just as the automobile had experienced, the trend of overconsumption was simply not sustainable.

All of these factors led to an overall rejection of property ownership. Rental properties comprise over 60% of the housing market by 2030. The business of renting properties is lucrative, and large corporations begin to buy up successful rental operations and creating housing chains. The houses were marketed as complete products, fully furnished. The housing chains were successful because they allowed migrating customers (whether b/c of season weather shifts or market fluctuations) to re-reside in a replica of the house they lived in. “Home sweet home” could be in several places.

Transportation options were also lucrative as rental units. Some cities went so far as to create public rental stations for vehicles and would allow you to rent by the hour.
Global warming is responsible for increased weather extremes, leading to increased insurance and property loss. The cost of extreme weather events has increased over time, and the trend shows no signs of slowing. In response, governments have implemented policies to address the root cause of climate change, including renewable energy initiatives and carbon pricing. Despite these efforts, the rate of change in temperatures and weather patterns is not sufficient to mitigate the impact of global warming.

### Energy Implication

- **DIVERSIFY!!**
  - Increase in energy diversification and innovation.

### User / Cultural Implication

- **CONSUMER ANXIETY**
  - Initial changes in consumer behavior are needed to adapt to the new energy systems.

### Political / Economic Impact

- **CRASSIC POLICY CHANGE**
  - Government policies are changing to encourage renewable energy sources.

### Urban Implication

- **NATIONAL HOUSING CHAINS**
  - Urban policies are being re-evaluated to address climate change impacts.

### SITE PLAN

- **FOR RENT S3**
  - New developments are focusing on energy efficiency and adaptation.
YES. WE HAVE A HOME FOR YOU THERE, TOO.

national housing chains

driving forces
Chapter 7 _ Scenario 4: Internation Highway

It took years to perfect the technology, but in the year 2090, over 40 nations around the world created the Internation Highway system. The network utilized existing automobiles that were able to move in autopilot mode through advanced use of global positioning systems. By this point, one was able to get in their car and virtually travel around the world by programming their car GPS. Designated routes were developed. Overseas travel was done by an advanced ferrying system where one's car is inserted into an airplane or ocean vessel.

Leading up to the Internation Highway, the United States developed similar travel routes starting in highly congested urban areas. Houston, Texas was one of the first cities to take part as a means to help alleviate extra long commute times; the first automated systems were placed in conjunction with existing major highways and beltways. As the technology was perfected, capitalist adventures latched on, like global positioning advertising. A system that continually updated a tailored database of commercial, entertaining, or even historical points of interest as one traveled. This technology destroyed the need for roadside billboards.
The creation of the Internation Highway strengthened partnerships between foreign countries, but also ignited a new love affair with the personal automobile. Once one was able to virtually do whatever they please while driving, the car became the ultimate symbol of freedom and a real extension of the home.

Once again, the car had become an important driving force as a key influence on political, cultural and infrastructural development. //
KEEP YOUR CAR, SAVE YOUR GAS.
THE TEXAS AUTOMATED HIGHWAY SYSTEM
www.texasfreedomride.gov

NEW "FREEDOMS" = NEW LOVE AFFAIR W/ CAR

GLOBAL POSITIONING ADVERTISING = DEATH OF THE BILLBOARD

driving forces
Chapter 8 _ Projection Analysis

This thesis builds upon Jencks evolutionary timeline by adding each of the scenarios to his overall representation of the past, present and future. The first three projections fall somewhat neatly within the 6 traditions as described by Jencks. But, as globalization occurs, the traditions will blur. And, as personal freedom and global information increase, the gap between social majorities and a minorities will decrease. It could be inferred that all races become "minorities" in any given area, or even further that the word minority itself begins to be an antiquated term. As this happens, my updated evolutionary timeline suggests that the architects' role within this system has much less to do with designing from allegiances to the past than it is about isolated alliances...which is to say that one architect may find themselves part of many movements simultaneously, choreographed by the driving forces they are required to respond to. The architect, if you will, becomes a modern carpet bagger.

The traditions will blur, but it would be naive to suggest that there would no longer be traditions. Jencks idea of traditions suggests that there is conflict, moments of rebellion and reaction. Even a globalized world will have frictions. Rather, the final segments of my timeline simply show that new traditions will emerge, and their means of representation will look quite different from what we've seen thus far. Here, the emergent traditions are represented as a much more integrated, amorphous system rather than bundled tendrils. Within the system, islands are suggested that might be created by distinct drivers (environmental, political, social, etc.) within a particular region.

Following the updated evolutionary timeline, a breakdown of each scenario is provided describing both their connectivity and separation to the past. //
above: Energy Belts

below: Re-Fab
above: For Rent
below: International Highway
This thesis, in the end, is not trying to predict the future, as that would be impossible. Rather, it is to be viewed as a means by which to identify and map some of the forces at play in the future of the city by describing their connectivity, their volatility, and understanding them through grounded, measured trajectories. It is the hope that through an exercise such as this, we might be able to make more informed decisions for the future by projecting from both the past and present.
Adhocism: /'ad-ˈhäk-ism/ (n)
Design methodology that is developed by collaging parts together with little regard for the whole.

Airstream: /ˈer-,strēm/ (n)
The infamous monocoque travel trailer first designed by Wally Byam in 1934.

Amphibious Car: (n)
A passenger vehicle with the ability to travel on both land and water.

Asphalt: /ˈas-,folt/ (n)
A carefully refined residue from the distillation process of selected crude oils (also known as bitumen). The primary use of asphalt is in road construction, where it is used as the glue or binder for the aggregate particles. (Wikipedia)

Auto park: (n)
An area reserved for the sole purpose of storing automobiles.

Autoworker: /ˈo-tō-,wər-kar, ˈä-/ (n) d.1941
A person employed in the automobile manufacturing industry.

Bedroom community: (n)
A residential area, typically suburban, that offers few employment opportunities thus requiring residents to commute to work. As bedroom communities develop, retail businesses usually follow suit. Eventually, the bedroom community may evolve out of its original status when offices relocate into new suburban office parks located near these large residential swaths.

Beltway: /ˈbelt-, wā/ (n)
A highway built to surround an urban area, and an eventual catalyst for sprawling development. (also: beltline, ring road)

Big-Box: (n)
A large, one story, concrete block constructed, retail store surrounded by vast amounts of paved parking surface. Typically 50,000 to 250,000 sq ft of space, these structures tend to be placed in areas not prepared for their installation and arrive to an area in multiples. As a result, the big box retail stores are often blamed for traffic problems and sprawl.

Billboard: /ˈbil-,bōrd/ (n) d.1851
A large, flat panel used to display outdoor advertising. Billboards are very common along US highways. By 2030, they were almost all replaced with global position tailored advertising, in-car ad-campaigns that track your position and advertise accordingly. (see Global Position Tailored Advertising)
**Bio-fuels:** (n)
A solid, liquid or gas fuel derived from relatively recently dead biological material and is distinguished from fossil fuels, which are derived from long dead biological material. *(Wikipedia)*

Examples of biofuels include Biogas, Bioethanol, Biobutanol, Biodiesel, Oilgae, and Straight vegetable oil.

**Broadacre City:**
A suburban development concept created by Frank Lloyd Wright late in his career while at Taliesin. Both an urban planning model and socio-political scheme, the Broadacre city suggested that each American family receive 1 acre of land within the development. The city plan held the automobile as the primary means of transportation. *(historical planning lineage: Garden City > Broadacre City > Edge City)*

**C architecture:** (n)
A term to describe structures that are developed in direct relation to the automobile. Automobile-derived development. Carchitecture can also be used to describe architecture that is meant to be viewed from the car.

"Carchitecture has been a long, slow evolutionary response to the problem of accommodating the inherent contradiction of the car; the car will set society free, an automotive society creates traffic, traffic enslaves society." 

**Carpal Tension Syndrome:** (n)
A disorder found common in commuters. Symptoms may include high temper, aggressive driving behavior, and increased blood pressure that flair up in heavy traffic and while searching for a parking spot.

**Car pool:** (n)
An organized group of people who commute together. *(carpool, adj.)*

**Carport:** (n)
d.1939
One of the first gestures towards integrating the car with architecture, a carport is an open sided structure used to provide shelter for an automobile. A carport may stand alone or be attached to another structure. Due to its visual porosity, the carport tends to maintain its initial, singular role as vehicular shelter rather than doubling as a residential storage hub like its historical successor, the garage.

**Carbon Tax:** (n)
An environmental tax on emissions of carbon dioxide and other greenhouse gases. Carbon taxes result in the creation of the Local Material Database. *(Wikipedia)*

**Car Stereo System:**
A term used to describe the sound or video system fitted in an automobile. A stock car audio system refers to one that was specified by the manufacturer when the car was built. A custom car audio installation can involve anything from the upgrade of the radio to a full-blown customization of a car based around its audio equipment. Events are held where entrants compete for the loudest or most innovative systems. *(Wikipedia)*
Cloverleaf:
An interchange between two major highways that allows traffic to change from one to the other without requiring any left turns or crossings and that from above resembles a 4-leaf clover. (Merriam-Webster)

Compact car: (n)
A car size class denoting automobiles that are smaller than a mid-sized car, but larger than a subcompact car. Typically compact cars have a straight 4 cylinder engine and wheelbases between 100 and 105 inches. Compact cars had some of the lowest sales in the US during the 1990s but resurged with the gas crisis of the early 21st century due to their lightweight and gas economy.

By 2030, transportation regulations required that all cars meet compact car size requirements.

Cruise control:
A system, developed in 1945, which automatically controls the rate of motion of a motor vehicle. The driver sets the speed and the system will take over the throttle of the car to maintain the same speed. (Wikipedia)

By 2080, cruise control gave a driver complete freedom by controlling the speed of the car as well as the direction. A passenger could input a destination location into the system panel and leave the rest of the driving to the cruise control system. Speed and direction is determined by GPS devices that track a vehicle's position in relation to nearby automobiles and obstacles.

Cruising: (v)
To go about the streets at random but on the lookout for possible developments (Merriam-Webster). Some cities and towns view cruising as a gateway to trouble and crime with teens and ban the act. Police enforce this ban by cruising.

Cul-de-sacs: \kal-di- sak\ (n)
A street that is closed at the end. The word stems from French literally meaning bottom of bag. The road time is most common in suburban neighborhoods where bulbous round paved areas terminate the road and is surrounded by houses. Some research in the early 2000s showed that cul-de-sacs had high vehicle accident rates, especially involving pedestrian children.1 Very few cul-de-sacs were being created after these results were published and many neighborhoods found means to open the street and connect back into adjacent roadways.


Dashboard: \dash- bort\ (n)
1. (In an automobile or similar vehicle) a panel beneath the front window having various gauges and accessories for the use of the driver; instrument panel.
2. A shield located on the front of a horse-drawn vehicle to block water, mud, or snow.
**Drive-Thru:** \(\text{driv-thru}\)
(n)
A service offered by an establishment to allow a customer to purchase a product or make a transaction without leaving their vehicle.

**Drop-City**
An artist's community established in 1965 in southern Colorado. People from all over the world came to partake in construction projects, many created from recycled car parts. Drop City became known as the first rural hippie commune.

**Duck:** (n)
A term coined by Denise Scott Brown and Robert Venturi to describe a building whose structural shape is symbolic, often in the most literal sense.

**Eco-Cybernetic:** (n)
An architectural movement that envisions the synthesis of the natural world and the built environment through interdisciplinary research and development and by understanding the structure of such holistic systems.

**Electric Vehicle:** (EV) (n)
A vehicle with one or more electric motors. Although the electric vehicle was first developed in the early 1900s, its prominence on United States roadways didn't truly take flight until the mid-2000s as a result of the fuel crisis, technological development, and political backing.

**Energy Belts:**
A term used to describe the reinvention of the suburb after the onslaught of the energy crisis. As the price of energy rose, the suburbs began to empty, shifting the demographic from middle to predominately lower class neighborhoods. As these neighborhoods struggled to purchase power, government initiatives worked to subsidize public electric car infrastructures and create large tax credits for neighborhoods that purchase alternative energy systems. By the mid 2000s, most suburban areas were powered by their own decentralized systems and eventually began to offer excess energy back to the main city.

The co-dependence of the energy belt with the city center created greater metro-collaboration, blurring the boundaries between city and suburb and increasing the size of the city proper.

**Energy Islands / Heat Island:**
A heat island is defined as a metropolitan area with a surface temperature significantly higher than its surroundings. The rise in temperature is attributed to modifications of the natural land surfaces due to urban development. By the mid to late 2000s, technology allowing electricity to be produced from heat led to high heat islands to be dubbed as energy islands for their capability to return energy to the grid.

**Exurb:** \(\text{exurb}\)
A region of development that lies outside a city's boundaries and often even further beyond its suburbs. The exurbs were often settled by wealthy families throughout the 1900s. By the
mid-2000s the exurbs were one of the few places that had little sociographic uprooting, unlike the city proper and the immediate suburbs.

Fast food: \\f\(\text{fas(t)}\)-, \(\text{f\text{"u}d}\) 
Food that can be prepared and served quickly. The fast food restaurant serves all food in a takeout container and typically has a drive-thru window for fast transactions that don't require one to get out of their vehicle.

Featherweights: 
A movement towards lightweight construction first in vehicles to gain efficiency, and followed by building construction techniques through the use of smart material technology. Lighter materials are cheaper to transport, easier to install and easy to replace.

Fuel cell vehicle: (FCV) 
Any vehicle that uses a fuel cell to produce its on-board motive power. Fuel cells onboard FC hydrogen vehicles create electricity using hydrogen fuel and oxygen from the air. (Wikipedia)

Fueling Station: (n) 
A commercial structure used for fueling automobiles. It typically includes a covered pumping station and a building that contains the cashier desk. Early gas stations were built in conjunction with automobile service facilities. Later, it became more popular for the station to offer convenience store products. (also: service station, gas station)

Garage 
1. An area created for the storage of automobiles, although it often is used for the storage of other possessions. Garages may be attached or detached from a residence.
2. A commercial facility for servicing automobiles.

Garage Band (n) 
An amateur rock band that often practices in a residential garage. The garage band sound became influential in modern rock, especially the punk circuits; recognizable and replicated with its simple chords and hollow, low-cost recording sounds.

Garden Cities: 
Garden cities, a movement founded by Ebenezer Howard in 1898, were to be planned, self-contained communities surrounded by greenbelts, and containing carefully balanced areas of residences, industry, and agriculture (Wikipedia). There are many communities that were built on the garden city concept, but most surviving one simply exist as dormitory suburbs.

Garouse: \(\text{g\text{"a} r\text{"u} s}\) (n) 
A residence built within the walls of or on top of a garage. Many garouses are secondary structures to a larger residence, although the design typology may be freestanding.
Gas Guzzler:
A term used to describe a very large automobile that requires an extraordinary amount of fuel to run due to its size and weight.

In the 1990s, gas guzzlers were marketed by the US automakers as safe, rugged, and dependable. Although their original market may have been young men, the size and safety factors led it to be a "soccer mom" favorite and by the end of 1998, their sales exceeded ____ . Gas guzzlers are responsible for the loosening of the CAFÉ standards set forth by the Sport Utility Vehicles, SUVs.

Gas Station: (n)
A commercial structure used for fueling automobiles. It typically includes a covered pumping station and a building that contains the cashier desk. Early gas stations were built in conjunction with automobile service facilities. Later, it became more popular for the gas station to offer convenience store products. (also: service station, fuel station)

Global Highway System:
The GHS is an automated, international transportation network created in the late 2000s.

Global Positioning System (G.P.S.): (n)
A Global Navigation Satellite System (GNSS) developed by the United States Department of Defense. Although GPS has many uses, it created profound changes in the development car/driver interfaces. In automobiles, GPS was originally used as a tool for navigation and emergency aid. Later, the technology led to in-car advertising, an amenity that delivered real time information and maps on upcoming locations and could be customized to the passenger’s interests. By 2030, billboards were nearly obsolete. (see Global Position Tailored Advertising)

Global Position Tailored Advertising: (n)
A means by which to advertise in automobiles and a system that eventually replaced the highway billboard. GPT advertising works off of the Global Navigation Satellite System (GNSS) and delivers real time information and maps on upcoming locations. Typically found on an automobile’s dashboard, the data received can be customized to the passenger’s interests.

Glossies: \glä-sëz\ A term for the magazines used as a tool throughout the 30s-2000s as a way of marketing and a propaganda pusher. Style conscious citizens and architects also use the glossies as a way to feed a desire for eye candy. By the 1990s, the printed glossies were becoming replaced with the flexibility and individualization of the internet. The new form of visual stimulus becomes known as the “pixels.” (See also: pixels)

Grease Monkey: (n)
A mechanic. (1928)

Green Elite:
A social class that rose in prominence and power in the early 2000s. The green elite is comprised of individuals who gained wealth and social status through investing in and using
advanced environmental technology in their homes, offices, and personal vehicles.

**Greenbelt:** *(n)*
A swath of undeveloped land (typically agricultural land, forest, or reclaimed land) around a town or city that is protected to prevent development and is often used for recreational purposes.

**Gridlock:** *(n)*
A traffic jam created when gridded streets are so congested that vehicular motion becomes impossible. (1980)

**Heat Island \ Energy Islands:**
A heat island is defined as a metropolitan area with a surface temperature significantly higher than its surroundings. The rise in temperature is attributed to modifications of the natural land surfaces due to urban development. By the mid to late 2000s, technology allowing electricity to be produced from heat led to high heat islands to be dubbed as energy islands for their capability to return energy to the grid.

**HOV lane:**
High Occupancy Vehicle Lane. A highway lane reserved for vehicles with more than one passenger as a means to promote car-pooling and reduce traffic congestion in sprawling cities.

**Hybrid vehicle:**
An automobile that has two or more distinct motors to move the vehicle.

**Hydrogen fuel vehicle:**
A vehicle that uses hydrogen as its on-board fuel for motive power. In hydrogen internal combustion engine vehicles, the hydrogen is combusted in engines in fundamentally the same method as traditional internal combustion engine vehicles. In fuel-cell conversion, the hydrogen is reacted with oxygen to produce water and electricity, the latter of which is used to power an electric traction motor. *(Wikipedia)*

**Interstate Highway System:**
The Dwight D. Eisenhower National System of Interstate and Defense Highways, commonly called the Interstate Highway System (or simply, the Interstate System), is a network of limited-access highways (also called freeways or expressways) in the United States that is named for the President who championed its creation. The Interstate Highway System is a subsystem of the National Highway System. It was authorized by the Federal-Aid Highway Act of 1956. *(Wikipedia)*

**Leap Frog:**
The act of bypassing vacant land available for development in order to build in a more remote location.

**Levittown:** *(n)*
An American suburban development located in Hicksville, NY. It was built by Levitt & Son after WWII for demobilized veterans. Levittown had winding roads, ample accommodations for the automobile and single family homes. The development was a leader in the bedroom community movement.
Light Rail
A rapid transit public transportation system and often considered the modern version of the streetcar. Light rail systems are constructed above ground and cost considerably less to develop than underground subway systems.

Local Material Database:
An online resource that catalogs new and used construction materials within a specific locale. The LMD became a standard in virtually every community after the US government enacted the national carbon tax and in an effort to offset the increase in construction costs by re-using materials from dismantled buildings. Recycled materials were assessed a lower carbon tax than new materials and those that were required to be shipped in from a location distant to the build site.

Mm Make and Model
Terms readily used in the automotive industry to describe the Manufacturer and Style of a vehicle. Typically model names attempt to reflect the market ideology that the vehicle will be sold in. Because of this, the names are also indicative of the six major traditions and the respective strength of a tradition at the time a vehicle was manufactured. Some examples of model names are listed below:

1900-1929 _ logical
Chalmers
Fleetwood
Mascotte Touring
Model-T
Model
Plymouth
Roadster
Runabout

1930-1959 _ self-conscious
Barracuda
Beetle
Continental
Coupe deVille
F-1
Mark II
Sixty Special
Thunderbird

1960-1979 _ intuitive, un-self conscious
Capri
Corvair
Escort
Falcon
Firebird
Impala
Marauder
Mustang
Sting Ray

1980-1999 _ self conscious
Camry
Cavalier
Celebrity
Cherokee
Explorer
Freestyle
Ranger
Suburban
Tahoe
Taurus

2000-2030 _ activist, idealist, intuitive
Edge
Fit
Focus
Federa
Prius
Puras
Sky
XTerra

Mall Rat: (n)
A term used to characterize a young person, typically in the teen years, who frequents the shopping mall for the purpose of socializing rather than shopping. A mall rat may aimlessly roam the mall for hours on end. The term mall rat is mostly segregated to suburban areas where teens claim there “is nothing else to do.” Mall rats are usually not of age to drive and are “dropped off” at the shopping mall by someone with a vehicle.
Mass-Customization:
A movement that aimed to give consumers a customized product at mass-production prices, changing the relationship between production and consumption. The point in the design process that the consumer becomes involved varies, as it can occur in the design, fabrication, assembly, or post production phases of the project.

Mass-customization techniques were widely used the vehicle and product industries in the early 2000s, and later, the techniques gained a stronghold on architectural developments (i.e. for rent scenario).

McMansion:
A term used to describe a large single-family residence, indistinct in relation to adjacent homes. The McMansion is often found in a large subdivision where it is constructed in an assembly line fashion, typically with a hodgepodge aesthetic and a superfluous number of rooflines. With an area typically ranging between 3,000-5,000 SF and a footprint that takes up the majority a small lot, the McMansion is usually sold to upper-middle class Americans.

Megaburb:
A suburban area with an accelerated growth rate that continues to climb.

Mixed Use Development:
A building or set of buildings that allows for multiple uses (often residential, commercial, institutional, industrial).

Mobile Architecture (n)
A term used to describe creating adaptable architecture by providing a framework that can be altered and changed by the people who use them; promoted by Yona Friedman among others. The concept of mobile architecture influenced the Metabolists of the 1960s and 1970s.

Mobile Home:
A home that is prefabricated, in a factory rather than on site, and transported to a location, typically by tractor trailer on highways. The mobile home was widely used for low class housing in the 20 and 21st centuries, but by the mid 2000s, the benefits of being mobile became much more prevalent and the mobile home lost its low class social stigma.

Motopia:
A utopian city envisioned by G.A. Jellicoe that is fully landscaped with roads on top of roofs in an effort to leave the ground entirely for pedestrians. In the mid-2000s, a movement called Returnscapes, held to remnants of Jellicoe’s dream by ensuring undisturbed landscape views from the vehicle and attempting to restore the American landscape.

Motorhead:
1. A British heavy metal band formed in 1975 and led by bassist, singer songwriter, Lemmy.
2. American slang for a speed freak, lead foot (someone who loves to travel at very fast, sometimes dangerous speeds in their automobile). Typically, there is an inverse relationship between gas prices and number of motorheads found on roadways.
NASCAR: abbreviation for National Association for Stock Car Auto Racing

N.I.M.B.Y. An acronym for Not In My Backyard.

National Highway System (NHS): A transportation system of approximately 160,000 miles (256,000 kilometers) of roadway, including the Interstate Highway System as well as other roads, which are important to the nation’s economy, defense, and mobility. The NHS was developed in 1995 by the United States Department of Transportation in cooperation with the states, local officials, and metropolitan planning organizations. (Wikipedia)

National Park System (NPS): Developed in 1916 by the United States Congress through the National Park Service Organic Act. The NPS manages all the National Parks and many conservation and historical properties. The National Parks are protected from most human development and can all be accessed by vehicle.

New Suburbanism: An architectural and urban planning movement that aims to develop suburban communities based on the principles of New Urbanism and Smart Growth.

New Urbanism: An architectural and urban planning movement that focuses on pedestrian friendly and transit oriented projects as well as “sustainable growth.”

Noise barrier: A wall or solid obstruction built along high traffic roadways in an effort to reduce noise transmission to adjacent neighborhoods.

O.O.T.B: An acronym for outside the beltline. In the late 90s and early 2000s, the acronym was used by young urbanites to describe the typically sprawling areas outside the a cities inner transportation ring and thought of as un-hip, boring, and un-cultured.

Office Park: A business complex consisting of one or more office buildings set in a park-like landscape. Together, the buildings are often referred to as a campus. (hooper,yen)

Oil Change: A process of replacing the motor oil, used for lubrication of internal combustion engine parts. Most car manufacturers recommend replacing the oil every 2-3,000 miles as regular car maintenance. Commercial establishments dedicated to this service were common throughout the gas-power vehicle’s existence.

Park and Plug: A public parking lot that affords users the ability to recharge their electric car while it is being stored in the lot.

Park and Ride: A public parking lot designated for commuters who wish to park their personal vehicles and transfer to a
public transportation such as bus, train, or carpool. Park and ride locations are typically located in suburban areas.

**Parkway:**
A roadway in which trucks and heavy vehicles are excluded and either part of a public park, connecting parks within a system, or flanked by landscaped grounds may be designated as a parkway.

**Pixel Pushers:** \(\text{\textit{\textbackslash pik-s\textsuperscript{3}l 'pu-shar}}\)
A term used to describe marketing strategists of the mid-late 2000s. The pixel pushers were most interested in selling a product through information education. Since any fact could be checked with the next Google search, the marketing campaigns of the mid to late 2000s were layered, hierarchical, and interactive.

**Pixels:** \(\text{\textit{\textbackslash pik-s\textsuperscript{3}ls}}\)
A term used to describe the internet ads, the most powerful means of visual advertising in the 21st century. Unlike the designers involved in the glossies, the pixel pushers were able to feed desire for visual stimuli by creating personalized, interactive interfaces online. (see also: glossies, pixel pushers)

**Plug-In City:**
The name for a mega-structure framework envisioned by Peter Cook of Archigram in 1964. The structure was equipped with standardized slots in which program cells could be inserted.

**Power pig:**
Ainefficientbuildingthatoverconsumes energy. The term was first coined in 2015 when the United States found it difficult to meet energy demands in an affordable fashion.

**Pre-Fab:**
A term to describes home that are fabricated off site in sections that can be easily shipped and assembled. Although the term describes an approach is very similar to “modular home” it differs in that a pre-fab home typically has a modernist aesthetic associated with it.

**Rr Re-Fab:**
The Re-Fab movement of the mid-2000s was an architectural answer to the looming energy crisis and government mandated carbon tax. By assembling buildings using recycled parts from disassembled buildings, architects were able to offset the high construction costs associated with new construction under the new laws. The aesthetic that resulted from the movement was, naturally, one of borrowed style.

**Returnscapes:**
A movement that wished to revitalize the American roadways by removing all advertising, power lines, and any other visual obstructions in an effort to open the automobile sightlines back to the landscape. The development of Global Positioning Advertisement allowed for the realization of this concept on many United States roadways by the mid-2000s.
RV: An acronym for Recreation Vehicle. An RV is a vehicle serves as both personal automobile and travel home. The vehicle is intended for anything from temporary leisure activities as well as full-time living. Permanent dwellers often park their RVs in designated RV trailer parks that offer plug ins to electricity, water, and waste systems.

Sprawl: A term to describe development extending beyond the outskirts of a city, unchecked, haphazard, automobile dependent, with low population density and onto previously undeveloped land.

Starter castle: An grossly large new home, often built on the site of a torn-down modest home. The term is a play on "starter home," as in a home for a first time homebuyer. See also: McMansion.

Shopping Mall: A building or group of buildings that contains many retail establishments with pedestrian pathways connecting them all together. The strip shopping mall is typically an outdoor complex with covered walkways and adjacent, strip-like parking areas. Regional malls are usually enclosed systems with large atrium areas for daylight on walkways. In this case, vast amounts of parking surround the facilities.

Strip Mall: A building or group of buildings that contains many retail establishments with pedestrian pathways connecting them all together. The strip shopping mall is typically an outdoor complex with covered walkways and adjacent, strip-like parking areas.

Smart Growth: A movement that advocates developing with compact, mixed-use, transit-oriented and pedestrian friendly components within the city center or older suburbs rather than constructing property at the city edges.

Suburban: (adj) The outlying development of a city or town.

Suburb: (n) Residential areas that surround the urban centers of a city or town. Suburbs are low in population density, typically a sea of detached, single family homes. Although suburban areas often have political autonomy, it is common for them to be dependent on the city center for jobs and services. The number of suburbs exploded in the United States after WWII as returning veterans flocked to the suburbs. By 1950, more people lived in the suburbs than elsewhere in the United States. (Managing Urban America)

Soccer Mom: A term used to describe a typical suburban mom with children. The name implies she taxis them around to various extra-curricular activities, including soccer practice.
**SUV:**
An acronym for Sport Utility Vehicle – a large passenger vehicle, built on a truck chassis and usually capable of 4-wheel drive. The SUV became a vehicle of choice in the 1990s as American car manufacturers began to market it for its sportiness and safety features. The SUV gets terrible gas mileage and typically disregards aerodynamics.

**Technoburb:**
A suburb or exurb that has, overtime, morphed into an independent city with its own infrastructure, industry, and services. Typcially, the technoburb houses technology based jobs that allow residents to work within the city limits or use telecommuting technology to connect to workplaces outside the city. The term was first coined by Robert Fishman in his book *Bourgeois Utopias*.

**Telecommuting:**
A work arrangement in which employees enjoy flexibility in hours and working location as the daily commute to a central place of work is replaced by telecommunication links. As a result, many people find it possible to work from home. *(Wikipedia)*

**Toll road:**
A road that requires the driver to pay a fee for its use. The funds are typically used to finance construction and operations.

**Town Center:**
A term used to describe the geographical center of a town or, more often, the commercial center of the town. In the early 21st century, many suburban areas began to develop their own town centers in an effort to become more independent from their adjacent city.

**Traffic jam:**
A condition that occurs when roadways become congested with too many vehicles causing slow travel speeds.

**Travel Trailer:**
A trailer that is pulled behind a vehicle that provides a place to sleep that is more comfortable than a tent. The trailer serves as a means of accommodation while on a journey or vacation.

**V-V** *v-ē-'ät* (n) d. 1930
An internal combustion engine having two banks of four cylinders each with the banks at an angle to each other; an automobile having such an engine *(Meriam-Webster)*.

**White Flight:**
A term originally used to describe the demographic trend occurring in the 1950s-70s in which working, middle class white people moved away from urban areas that are becoming racially desegregated to white suburbs or exurbs. During the energy crisis of the 2000s, the concept of white flight resurfaced as the suburbs lost property value and city centers rose in value. At this point, the white flight movement reversed as the middle class white demographic moved from the suburbs back to the city center.
Zip-Cars:
A vehicle cosharing company founded in 1999 providing customers with daily or hourly car rental. The zip-car concept became wildly popular by the mid-2000s when the majority of Americans began to preferring rental to ownership.
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