Hexagonal Cities

Cities have evolved from the inside out. A lonely outpost along a trade route will have grown to a village, a town and eventually a modern metropolis. Cities offer rural folks greater creature comforts and more economic opportunities. As the 21st-century progresses, greater numbers of folks will live in urban milieus.

With rare exceptions, the layout of cities has not changed in more than 2,200 years. Cities follow the example of Alexandria where throughways extend north-south and east-west. Buildings occupy squares or rectangular spaces. Intersections are mostly four-way, where two streets crisscross at right angles.

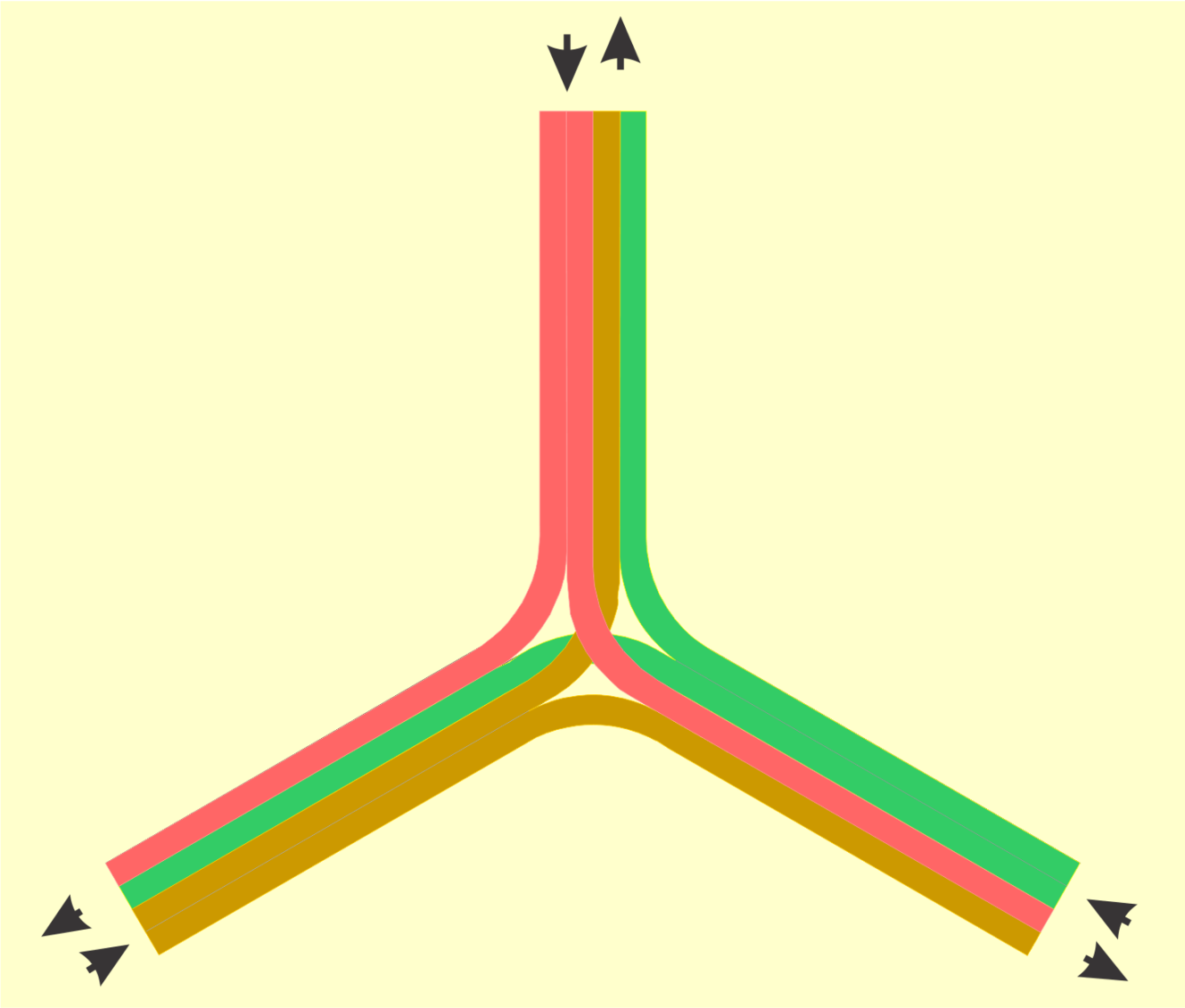
Four-way intersections pose no problem for pedestrians, bicycles or horse-drawn carriages. Collisions at intersections have been rare until the 20th-century and the advent of motor vehicles. Since the Ford Model-A, the pace of living has increased dramatically. Few people live within a stone's throw of their workplace, so commuters face ever increasing traffic snarls.

The problem is that four-way intersections represent bottlenecks since the north-south traffic cannot move safely unless the east-west traffic has stopped. Likewise the east-west traffic cannot move safely unless the north-south traffic has stopped. Advanced left-turn signals may solve one problem, but they reduce the overall flow of traffic. Stop & go semaphores cut traffic flow to less than 50%.

Cities with rectangular grids are not optimized for motor vehicles. City managers are being forced to discourage or outlaw cars in the downtown cores of cities. The next step will be to eliminate motor vehicles altogether. Another solution would be to design better cities. No doubt the cost of rebuilding a major city from scratch is far too prohibitive. But who knows what the future holds? Fifty years from now, humans could be founding cities on the moon or Mars. If the

ecological doomsday arrives, the ocean may rise several meters and flood the world's coastal cities. In this case, refugees will need new places to live, and new cities will spring up on open parcels of land. It would be a shame to design these new cities on rectangular grid lines, when a hexagonal grid could ease traffic congestion as well as saving fuel and extending the life of brakes.

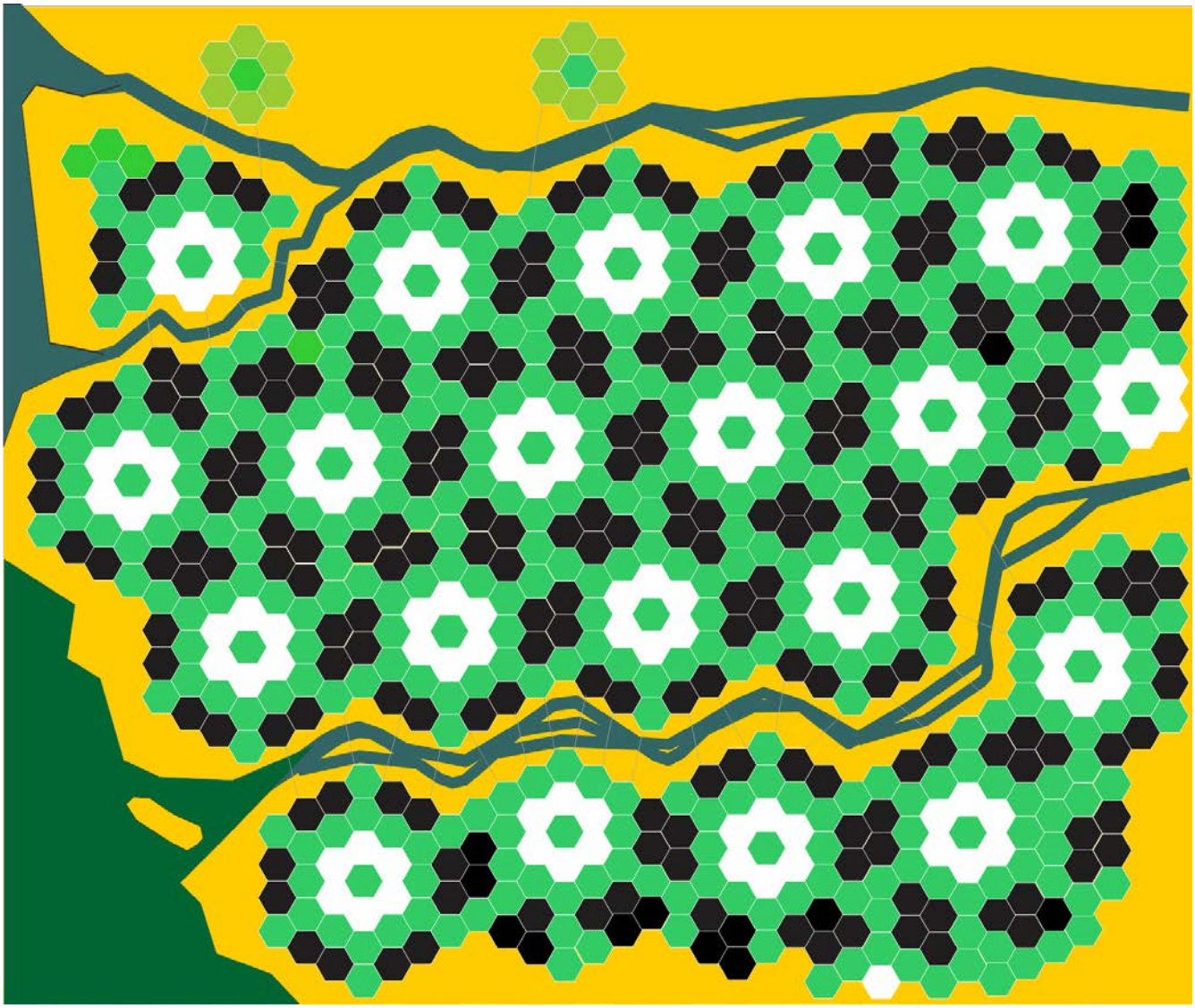
Hexagonal grids allow for 3-way intersections and continuous traffic flow. 3-way intersections have three 60° right turns and three 60° left turns.



Travelers negotiate right turns as merging exercises, which converge on the same level as straight lengths of roadway. Meanwhile the curved

embankments are canted to reflect optimal driving speeds. 33% of left turns proceed on the same level as the straightaways; 33% of left turns form an overpass, and 33% of left turns form an underpass.

Horizontal space is conserved with a modest addition of vertical leeway. The turns do not require drastic reductions in speed, although hexagonal grids will force drivers to zigzag and negotiate frequent turns during the normal course of travel. The abundance of turns will keep drivers alert and attentive.



Above, you see a birds-eye view of a hexagonal city.

Hexagonal grids involve continuous zigzags, even when drivers travel to straight-line destinations. Zigzagging adds 15% more distance than

rectangular-grid drivers use to reach straight-line destinations.

Straight-line travel is the shortest distance between start and goal, and it requires the route to be aligned with the grid lines. In practice, some destinations will be offset from the grid lines, so that rectangular-grid drivers must take at least one 90° turn to reach their destination.

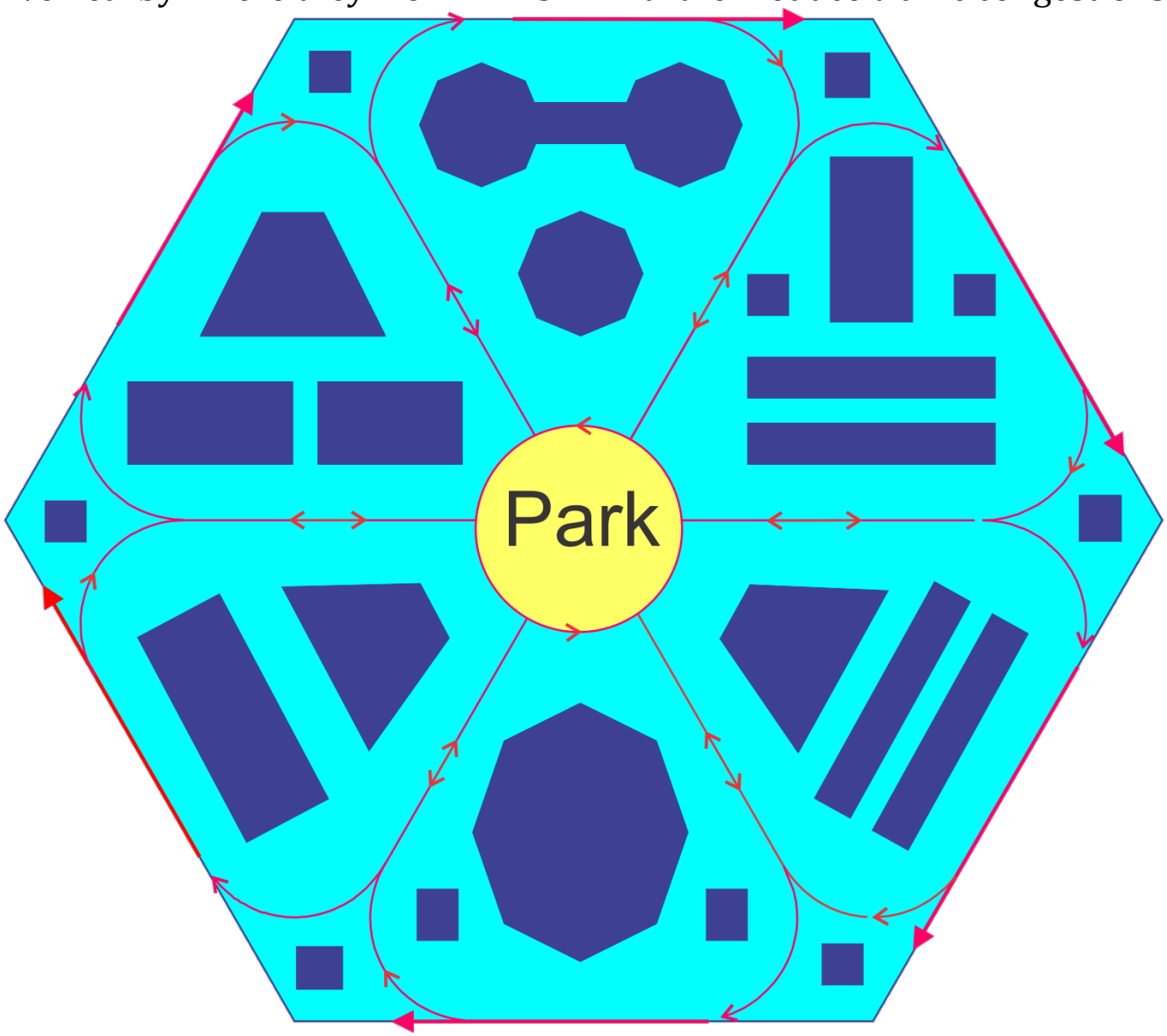
Let's say a delivery truck travels ten blocks north, turns and then travels ten blocks east or west. This example requires 41% more distance than the crow flies, and it represents the maximum distance incurred for rectangular-grid travel. Hexagonal grids offer 60° turns and two more zigzags. Six altogether. The worst-case scenario for hexagonal-grid drivers works out to 33% more than the crow flies.

If you run errands to all possible destinations from a random starting point, you will find the average distance traveled in either grid works out to a ratio of 4/pi more than the proverbial crow.

To enjoy the greatest benefits from the hexagonal grid, the city needs to be modular and distributed. Forget about massing all the tallest buildings in one section of the downtown core. Cities are stuck on the same template as the computer industry circa the 1960s, when libraries, businesses and government agencies made do with single mainframe computers. Clerks and executives fought over computer time for their pet projects. Everyone had to wait in line like rush-hour traffic at red lights.

Cheaper PCs forced the computer industry to distribute the workload. Instead of one-monster main-frame, hundreds and thousands of PCs did the job much more efficiently. Nowadays we have laptops, tablets and an assortment of mobile devices that connect everyone in the office to everyone else. A modular, distributed city will work the same way. Stores, nightclubs, offices, libraries, residential dwellings, stadiums, parks will be distributed evenly throughout the metropolitan area. When rush hour happens, there won't be a massive stampede in one direction or another. Folks will travel in random directions, and traffic congestion will be reduced. Property values will be much the same from

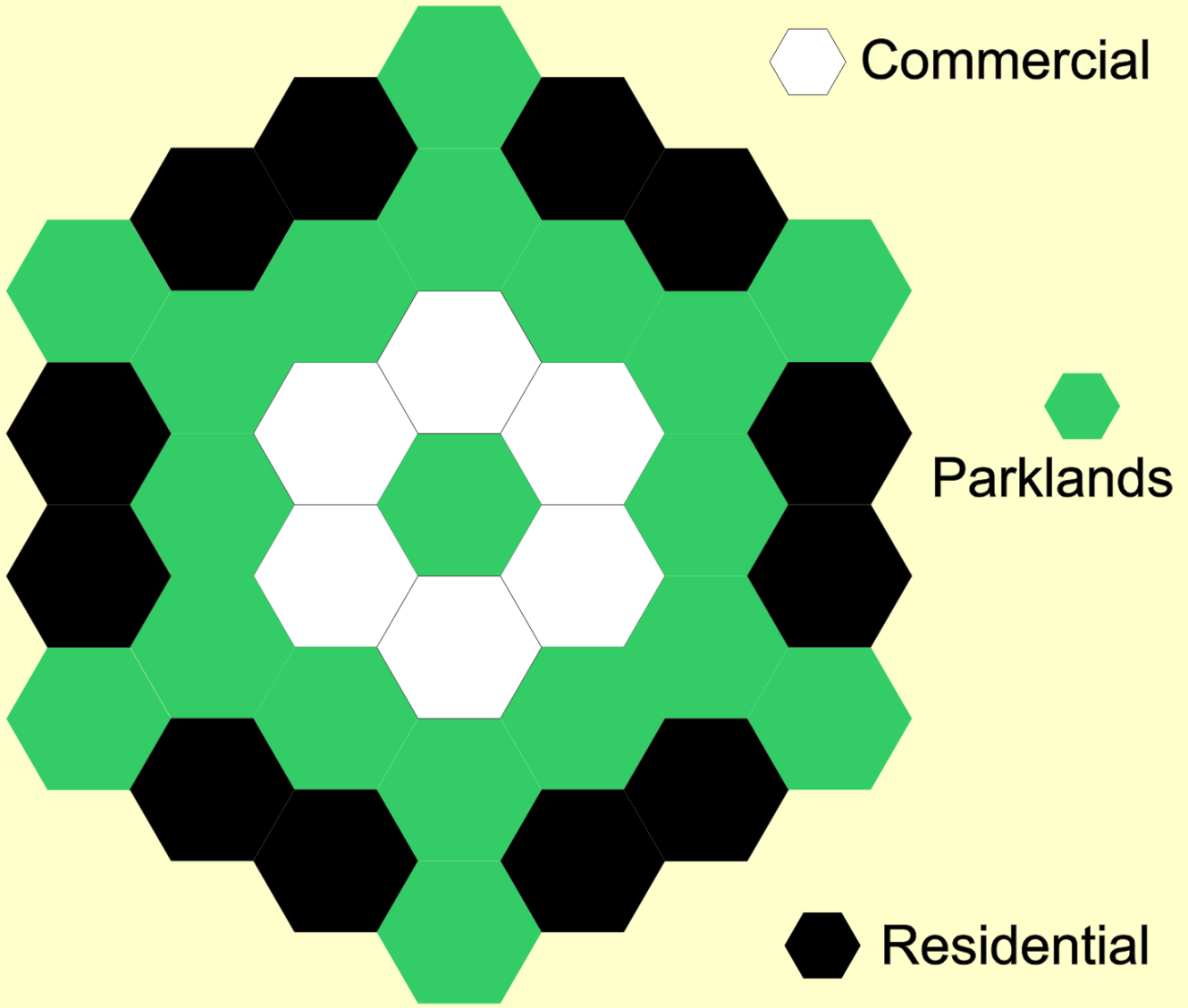
one neighborhood to the next, so workers will have a greater incentive to live nearby where they work. This will further reduce traffic congestions.



Hexagonal grids allow nonstop traffic flow, which lends more efficient travel than rectangular grids, because momentum is conserved, energy is saved and traffic flow maximized. Vehicles may travel at high speeds along hexagonal byways. Once a driver enters a hex or nexus, the speed limits would decrease dramatically.

The hexagonal block or nexus would be 15 times larger than normal city blocks. Cars entering a hexagon would drive slowly and straight to a central parking garage. Because of the larger area, a typical hexagon

would be a whole neighborhood or shopping complex. It could have dozens of buildings or few stadium-sized arenas. The faster-moving vehicles would remain on the corridors along the borders of each hexagon.



The white hexes signify commercial hubs; the black hexes signify residential neighborhoods and the brighter gray hexes represent urban parks. The darker gray hexes could mark university campuses or industrial parks.

Please note the urban parks represent 50% of the city land. No urban dweller should be denied the refreshing sight of trees, flowers and duck ponds. Much of the so-called urban stress is self-induced. It's one thing

to endure the dissonant sounds of urban activity; it's another to have a nearby place to escape from it. A city with the quality-of-life built-in will reduce the hours of sick leave by 75% or more.

The city would have 50% parklands. Neighborhoods would be modular where workspaces and shopping jaunts would be easily accessible from surrounding residential nexes. Urban angst would largely vanish when folks have ready access to the tranquility of nature. A city with a high-quality-life index will breed less crime, less stress, more personal time and more enjoyment for everyone. You have to assume the urban wealth will be more focused on The Commons, so there will be less incentive for individuals to acquire disposable junk.

With design from scratch, functional urban habitats can be built incorporating multilevel hexagonal grids. Cars would move rapidly without hindrance on dedicated levels of the honeycomb's wax outlines. Cyclists, pedestrians, urban trams, cartage trucks and passenger vehicles will navigate along separate horizontal planes for greater safety.

To enforce a hexagonal makeover on a rectangular-gridded city would be way too costly. But the future holds many surprises. Climate change in the 21st-centurycould raise ocean levels by more than 50 meters. Such a dramatic rise would engulf coastal cities around the globe. As many as 35% of the world's population would be forced to move inland to higher ground. New cities would then emerge in the rural countryside. It would be an opportunity to design these novo cities for modern transportation. By 2100 we could see several hexagonal cities.

Likewise, colonies on Mars may well reap the hexagonal-grid design from the get-go.