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TRANSPORT INFRASTRUCTURES- BETWEEN UTOPIAS AND SCIENCE FICTION

LIFTING passengers on elevated sidewalks or SHOOTING them below the ground?

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Article reviewed by PhD. Peter Niented

ABSTRACT

"A sustainable transportation system is one in which fuel consumption, vehicle emissions, safety, congestion, and social and economic access are of such levels that they can be sustained into the indefinite future without causing great or irreparable harm to future generations of people throughout the world." (RICHARDSON, 1999) Since the 20th century, the solutions offered by planners, utopists and artists to manage traffic and transportation were predominantly concerned with the main symptom of traffic, the 'car', neglecting to consider the actual disease, which was 'unlivable and alienating cities'. For the past two centuries many architects, planners, artists and politicians attempted to offer solutions based on spatial differentiation of transportation means and on infrastructural layering, separating the realm for cars, public transportation and pedestrians. This article intends to offer a new perspective on mobility issues, reviewing and exploring strategies for a softer, accessible, integrated and regenerative mobility.

Fig. 1. "Retro Futuristic Transportation", 1962. Cover of the Magazine La Domenica del Corriere, in a drawing by Walter Molino.

For the past two centuries many architects and planners dealing with transport issues, have tried to offer solutions based on spatial differentiation of transportation means and on infrastructural layering, separating the realm for cars, public transportation and pedestrians. Some of the most innovative ideas often appear to be reflected in science fiction books and movies, and even in comics and paintings. Just like Utopian ideas inspired and influenced planning practices in the late 19th and in the 20th century, sci-fi movies, comics and books seem to have predicted many of the new infrastructural innovations. It is hard to determine who was the first to inject the new ideas: whether it was fiction who imagined innovative solutions to overcome cities' struggles, or, vice versa, architects, planners and theorists elaborated and materialized the fantasies imagined by sci-fi writers and sketched by artists. By looking back at some of the most revealing examples of transport solutions proposed by both planners and architects or writers and artists, this article tries to explore these reciprocities, starting from their common desire to give an original answer to the enduring problem of growing cities and traffic.

The need to organize public means of transportation has largely influenced urban settlements, making explicit the extension of the city's vertical dimension beneath the ground. A part from architects and planners, in the first half of the 20th century several writers, artists and movie directors were dealing with the problems related to growing cities and mobility. Some of the solutions imagined for a future (which is not so far from where we are now), were concerning the infrastructures themselves, and on partially eliminating the need for cars or private means of transpiration in the first place. *(Fig. 1)* The writer Isaac Asimov offers a fascinating example in his 1954 science fiction novel Caves of Steel. In a futuristic over-populated New York city (3000 years into the future), made of underground city complexes covered by huge metal domes, the movement of people - and positronic brains, or Robots - around the city is hierarchically organized by a system of moving conveyor belts, that gradually lead pedestrians toward the railed and glassed moving platforms which guarantee high speed transportation: the 'expressways'. As the protagonist himself, detective Baley describes:

"There was the usual, entirely normal crowd on the 'expressway': the standees on the lower level and those with seat privileges above. A continuous trickle of humanity filtered off the expressway, across the 'decelerating strips' to 'localways' or into the 'stationaries' that led under arches or over bridges into the endless mazes of the City Sections. Another trickle, just as continuous, worked inward from the other side, across the 'accelerating strips' and onto the 'expressway'. [...] He [Baley] stepped

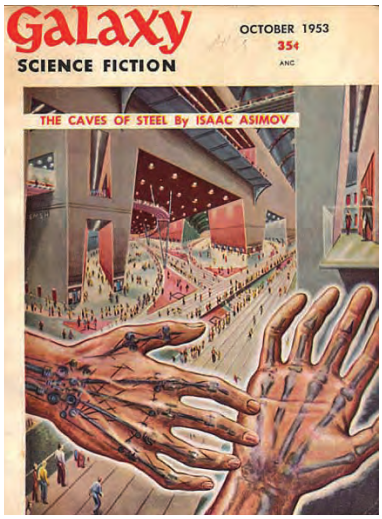

Fig. 2."The Caves of Steel", Isaac Asimov. In Galaxy Oct - 1953. Illustration by Ed Emshwiller.

Fig. 3. "Railway Sidewalk", Alfred Speer, 1871. Source: http://www.6sqft.com/in-1872-broadway-almost-became-a-giant-moving-sidewalk/

from strip to strip with the ease of a lifetime's practice. Children learned to "hop the strips" as soon as they learned to walk. Baley scarcely felt the jerk of acceleration as his velocity increased with each step. He was not even aware that he leaned forward against the force. In thirty seconds he had reached the final sixty-mile-an-hour strip and could step aboard the railed and glassed-in moving platform that was the expressway." (ASIMOV, 2011) *(Fig. 2)*.

Elevating the pedestrians to a higher level and transporting them on conveyor belts to overcome the traffic, was a strategy that had already been proposed much earlier by Alfred Speer, who developed the Railway Sidewalk [New York, 1871][1], which consisted in an elevated loop moving people up and down Broadway (NY). Just like the accelerating strips imagined by Asimov, the walkway was in constant movement. If realized it would have been the first form of mass rapid transit *(Fig. 3)*.

The tendency of layering infrastructure and multiplying roads above and underground, was already present in very old drawings by Leonardo da Vinci for Milan, in 1490 *(Fig. 4)* but it was later extensively used by planners and architects as a strategy to solve the problem of traffic in growing cities. In the 19th century, the Metropolis to be like London and Manhattan, "began to be built from below the ground, the protected and invisible place of fast transit" (CIORRA, 2013, p. 82). Harvey Wiley

1. The elevated moving sidewalk, which Speer called "Endless Traveling or Railway Sidewalk", was a giant conveyor belt elevated above the street, which offered repair from bad weather and services for the passengers. The passengers that did not wish to walk on the moving sidewalk, had the option to travel seated on moving chairs.

Corbett, for example, in his Project for New York [1913], proposes the Three Deck City concept: "First", he says, "divide the traffic into the three natural divisions into which we long ago began its segregation - rail, wheel and foot". To solve congestion problems Corbett suggested leaving the electric rail traffic underground, the cars on the surface (possibly divided into two levels, one for fast, and one for slow motor traffic) and to "elevate the sidewalk to the existing second story level, and leave the street level wholly to wheel traffic" (WILCOX, 1931). In Corbett's proposal to guarantee pedestrian connectivity, streets were bridged at the sidewalk level and foot traffic never had to cross car traffic. In his drawings, the elevated sidewalks show direct access to the stores and buildings on levels above ground, where natural light is abundant and air is cleaner. This last characteristic is also present in the "Visionary City of New York" paining by William Robinson Leigh [1908], where suspended bridges, piercing through the high-rise buildings, allow accessing buildings on multiple levels, solving the problems related to distribution and access in a vertically expanding city. Speer's Railway Sidewalk mentioned earlier, Corbett's Three Deck City and the "Visionary City of New York" paining by Leigh, all share the vision of an "uninterrupted development of each kind of street traffic" (WILCOX, 1931) and the desire to move pedestrian traffic on a higher level, consequently revolutionizing the ground floor and the traditional conception of access to buildings *(Fig. 5, 6 a-b)*.

Fig. 4. Leonardo da Vinci, "sviluppo e sezione dei palazzi della città a strade sopraelevate", for Milan (1490 circa.) Source: LANZAVECCHIA, Giuseppe (1999) "La Citta' dell'Utopia. Dalla Citta' Ideale alle Citta' del Terzo Millennio".

The idea of multilevel infrastructures wrapped around and piercing through buildings manifested itself in the drawings and through the optimistic eyes of Futurists like Sant'Elia at the beginning of the 20th century, expressing faith in technology and progress *(Fig. 7 a,b)* .There seems to be a resemblance between Sant'Elia's drawings and Frank Paul's cover for the science fiction book "The Moon of Doom" by Earl L. Bell (1928), and the "Cities of Tomorrow" Illustration for the American science fiction magazine Amazing Stories (1939) by the same illustrator *(Fig. 8 a,b)*. In The Long Tomorrow [Illustration by Jean Giraud, aka Moebius – French comic artist, 1970 circa.] - a story comic written by Dan O'Bannon, set in a future city

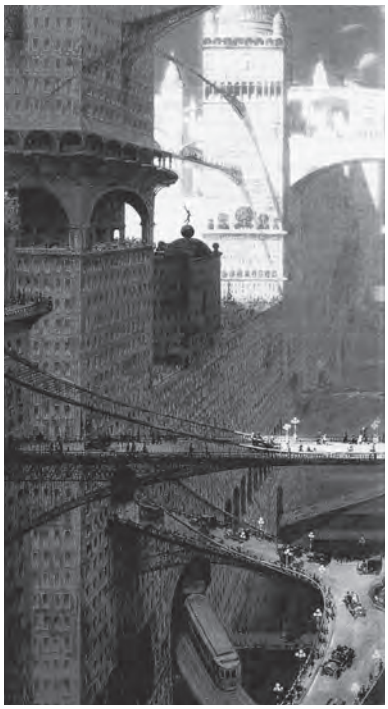

Fig. 5. Visionary City of New York, by William Robinson Leigh (1908)

Fig. 6a

Fig. 6b

Fig. 6 a,b."City of 1950", Harvey Wiley Corbett for Popular Science Monthly. Illustrator Frank R. Paul, 1925; "Project for New York" Harvey Wiley Corbett for the New York Tribune, 1910; "Three deck city" Harvey Wiley Corbett, 1931.

developed underground on several levels with suspended streets - the multilevel infrastructures were multiplying deep underground. Such a suggestive image inspired Luc Besson in the movie The Fifth Element [1997], but Korben Dallas'[2] vehicle was a flying taxi cab, whereas in the comic that inspired it the only flying objects were plain helicopters *(Fig. 9 a,b)*.

A multilayered approach - very similar to Corbett's "Three deck city" - can be observed in the project for the Radiant City by Le Corbusier [Paris, 1924], known as 'The Contemporary City of Three Million Inhabitants'. The project was an attempt to make the "superficial Garden City principles superficially practicable in dense city", the road layout seems organized like a "mechanical toy". In his plan "he included great arterial roads for express one-way traffic", while underground streets were reserved for heavy vehicles and deliveries; subways were placed at the lower deck and trains at the upper deck of the multilayered underground system. This way the ground level was open to air-buses and air-taxis and the pedestrians were kept "off the streets and in the parks". Le Corbusier attempted to make planning for the automobile an integral part of his scheme, and his was, in the 1920's and early 1930's, a new, exciting idea" (JACOBS, 1961, p. 23) *(Fig. 10,11)*.

2. In the movie Corben Dallas is a taxicab driver and former special forces major, who lives in a small, super-functional apartment of a high rise building. He has the task of helping Leeloo recover four mystical stones essential for the defense of Earth against an impending attack.

Observing the Houston tunnel network (Texas) today, it seems that we are moving in the exact opposite direction. Cars are free to move and rule on the surface, out in the open air, while people are being moved underground to hide the failures of contemporary cities. In downtown Houston to get away from traffic congestion and pollution, people get around the city through the Houston tunnel system - a network of underground streets between downtown business-district buildings. It consists in an entirely private

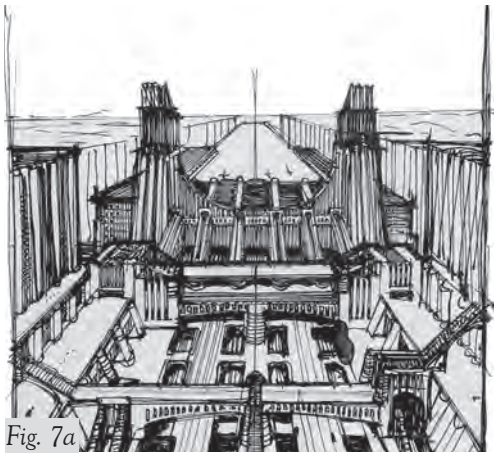
Fig. 7a

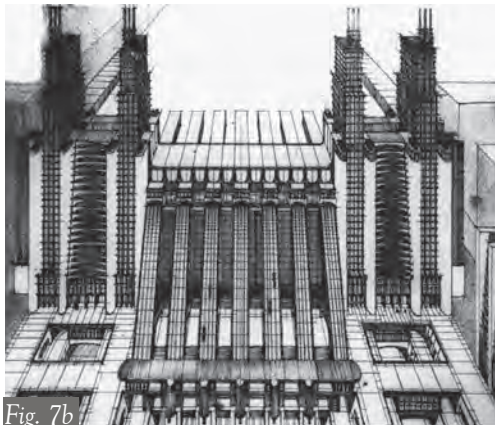
Fig. 7b

Fig. 7a,b.
a) Antonio Sant'Elia, "Station for Trains and Airplanes" (Stazione per treni e aerei), 1914. Pencil and ink on paper.
b) "Stazione d'aeroplani e treni con ascensori dai tre piani stradali. Pinacoteca Civica di Como, Italy. Source: Photo Courtesy Musei Civici Como


Fig. 9b

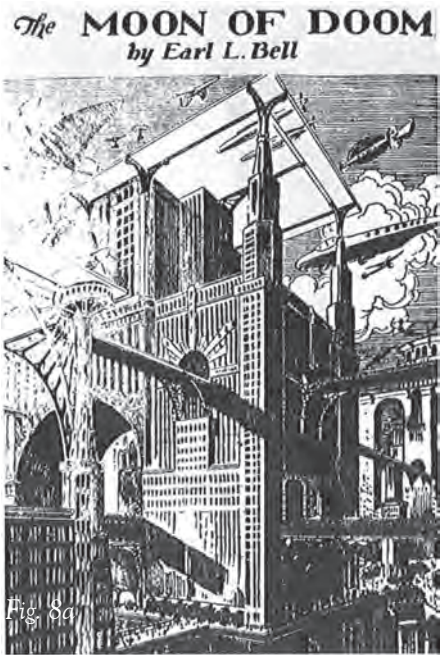

Fig. 8a

Fig. 8b

Fig. 8a,b. a) Cover for the science fiction book The Moon of Doom by Earl L. Bell (1928), illustrator Frank Paul. b) "Cities of Tomorrow", illustration for the American science fiction magazine Amazing Stories (1939), illustrator Frank Paul. Source: LANZAVECCHIA, Giuseppe (1999) "La Citta' dell'Utopia. Dalla Citta' Ideale alle Citta' del Terzo Millennio".

Fig. 9a

Fig. 9a,b. "The Long Tomorrow", Moebius (Jean Giraud), 1970 circa., story set in a future city developed underground on several levels with suspended streets. The image inspired Luc Besson in the movie "The Fifth Element", 1997. Source: LANZAVECCHIA, Giuseppe (1999) "La Citta' dell'Utopia. Dalla Citta' Ideale alle Citta' del Terzo Millennio".

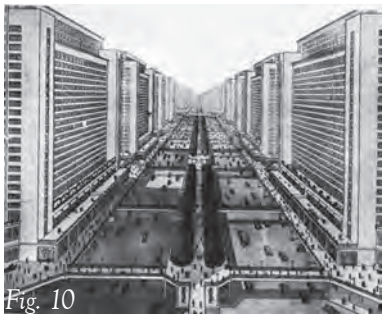
Fig. 10

Fig. 10. "Plan Voisin", proposal for the Ville Radieuse, Le Corbusier, 1925-1933

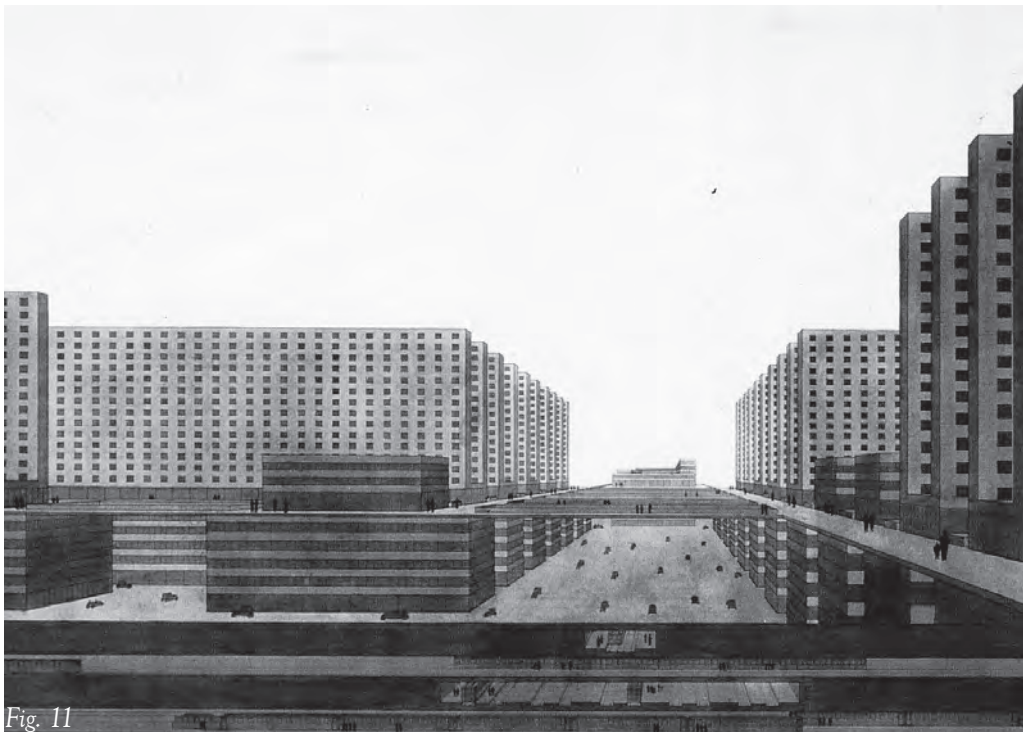
Fig. 11

Fig. 11. "Vertical City", Ludgwig Hilberseimer, watercolor, 1924. Source: Art Institute of Chicago. Source: LANZAVECCHIA, Giuseppe (1999) "La Citta' dell'Utopia. Dalla Citta' Ideale alle Citta' del Terzo Millennio".

subterranean, climate-controlled, pedestrian system under permanent camera surveillance, accessible through building lobbies and not from the streets[3]. In its initial phases, it was clearly inspired by the tunnel system at Rockefeller Plaza in New York City. In fact, a private building owner, Ross Sterling, built the first link in the 1930's to connect two neighboring buildings he owned. As it expanded and became an actual alternative – controlled[4] - network for pedestrians, new facilities and services were added along the network and portions of the tunnel now contain gift shops, newsstands, banks, technology centers, flower shops, copy centers, dry cleaners, and food courts similar to a major shopping mall. So now, apart from office workers, they are also widely used by tourists *(Fig. 12 a-c)*.

A part from attempts to hang passengers on elevated railways and conveyor belts also the experiment of shooting them through pneumatic tubes, buried deep underground, were made as early as the 1800. It is worth mentioning the 'almost' successful experiment by Alfred Ely Beach *(Fig. 13)*. In the 1870's, inspired by the London parcel tube system (English Pneumatic Mail), Beach proposed the same thing for New York, but instead of shooting small tubes for mail and packages, the system was intended for the transport of passengers across the city. The Beach Pneumatic Transit was an actual underground passenger railway, but the trains were meant to be propelled by pneumatics instead of

3. The system, composed by tunnels and aboveground skywalks, is approximately 7 miles (11 km) long; the pedestrian walkways link 95 full city blocks 20 feet (6 m) below Houston's downtown streets. The underground passageways link office towers to hotels, banks, corporate and government offices, restaurants, retail stores, and the Houston Theater District. There are similar systems in Dallas, Oklahoma City, Montreal and Toronto.

4. The tunnel is generally open during weekday business hours only, as the access is possible exclusively from private building lobbies.

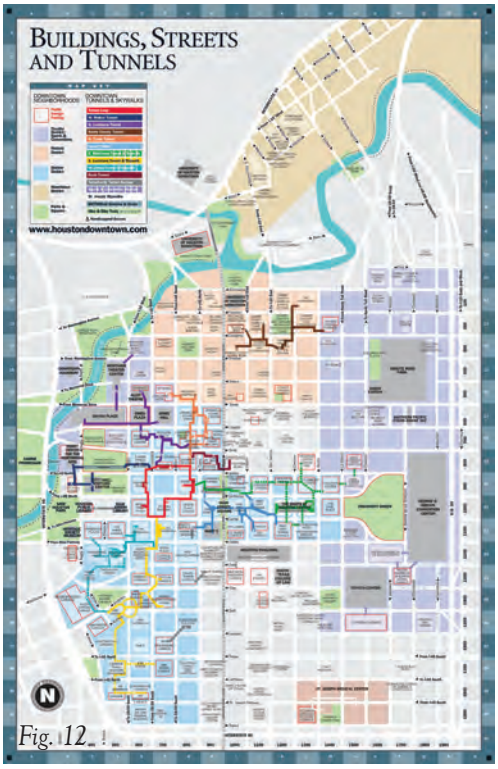

Fig. 12

Fig. 13

steam engines[5] *(Fig. 14 a-c)*.

Several variants of the principle of Atmospheric Railway were proposed in the early 19th century (Dalkey Atmospheric Railway, Dublin 1843; Crystal Palace pneumatic railway London in 1864); some attempts were made in the 20th century (vactrain - or vacuum tube train, 1960s) and a number of practical forms were implemented. The most recent project, conceived by entrepreneur Elon Musk in 2013 is the Hyperloop: reduced-pressure tubes in which pressurized capsules ride on an air cushion driven by linear induction motors and air compressors. In 2013 Musk, SpaceX and Tesla Motors started developing Hyperloop technology and making it explicitly open-sourced. In order to accelerate the development of a functional prototype and to encourage innovation amongst students, in 2015 SpaceX organized the "SpaceX Hyperloop Pod Competition". The competition, aimed at university students and independent engineering teams, is open to teams interested in designing half-size pods and testing them in summer 2016, on a test track built by SpaceX in California. Several universities are taking up the challenge; among them, TU Delft is participating with a team of 6 students, and JumpStartFund has partnered with UCLA in California[6] *(Fig. 15 a,c)*.

Fig. 12. Houston downtown tunnels, map. Source: http://houstonwalks.blogspot.al/

Fig.13. Gilbert's proposal for the "City Elevated Railway"- pneumatic elevated railway, 1872. Engraving on Scientific American for April 13, 1872.

5. In 1867 Beach financed himself two demonstrations of pneumatic dispatch, one of which was large enough for passengers to ride in. In 1869, the Beach Pneumatic Transit Company of New York secretly constructed a 95 m long, 2.7 m diameter pneumatic subway line under Broadway, to demonstrate the possibilities of the new transport mode. The line only operated for a few months, closing after Beach was unsuccessful in getting permission to extend it. (lord_k, 2010).

6. Last year UCLA's SUPRASTUDIO in the design and architecture program, collaborated with JumpStartFund, and the students are working on design solutions for the new transit system (DAVIES, 2015) (DAVIES, 2014)

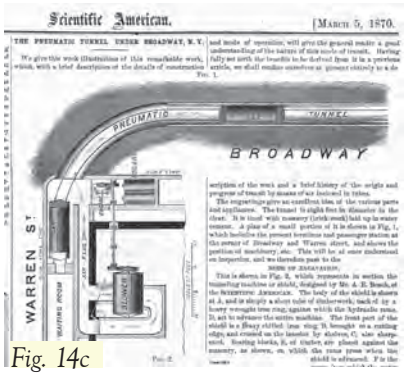

Fig. 14c

Fig. 14b

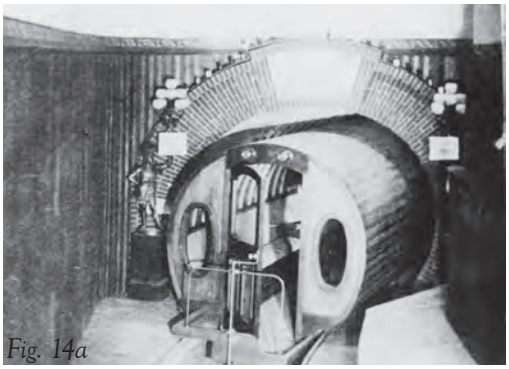

Fig. 14a

Fig. 14a-c."Beach Pneumatic Transit" (underground railway), 1860s-1870s. a,b) Scientific American, March 5, 1870, Scan: Joseph Brennan; c) The Beach Pneumatic Subway Tunnel under Broadway, 1873. Source: New York Historical Society.

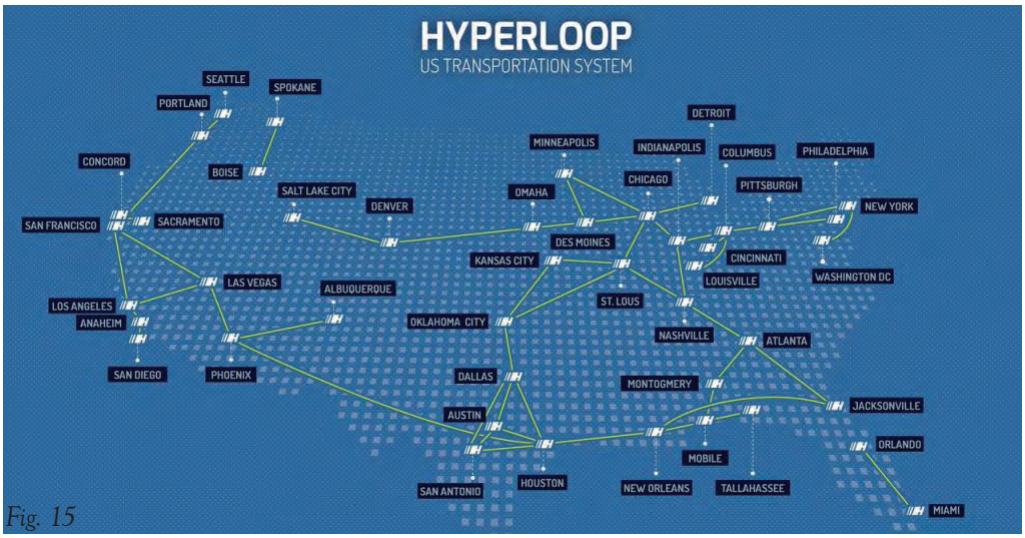

Fig. 15

Fig. 15. "Hyperloop" project, LA. © HTT Jump Start Fund. Source:http://www.wired.com/2015/02/construction-hyperloop-track-starts/

CONCLUSION

It is not by coincidence that some of the most interesting and innovative ideas concerning transportation infrastructures were developed, and/or diffused, in the figurative and performing arts, particularly in Sci-Fi stories, and they were in some form reinterpreted and applied in 19th century utopias or 20th century planning practices. The main tendencies were multiplying and layering infrastructures vertically, both above and underground, differentiating traffic hierarchically and optimizing the transport networks through a multimodal approach. The strategies are always based on the belief that traffic problems can be solved by the road infrastructure alone. On the other hand, the main differences among the strategies examined in the article, lie in the choice to privilege motor vehicles or pedestrians, shared or private means of transportation, and consequently in the decision to move one of them underground and to lift the other above ground. Many of the ideas elaborated in Sci-Fi movies and comic books have materialized after half a century, some others were never implemented, and they might never be, as time has caught up with them and they already appear old and obsolete. Nevertheless, the freedom that the arts confer to the imagination still remains a valuable asset and a source of endless inspection for planners and architects who are 'imagining' future cities.

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