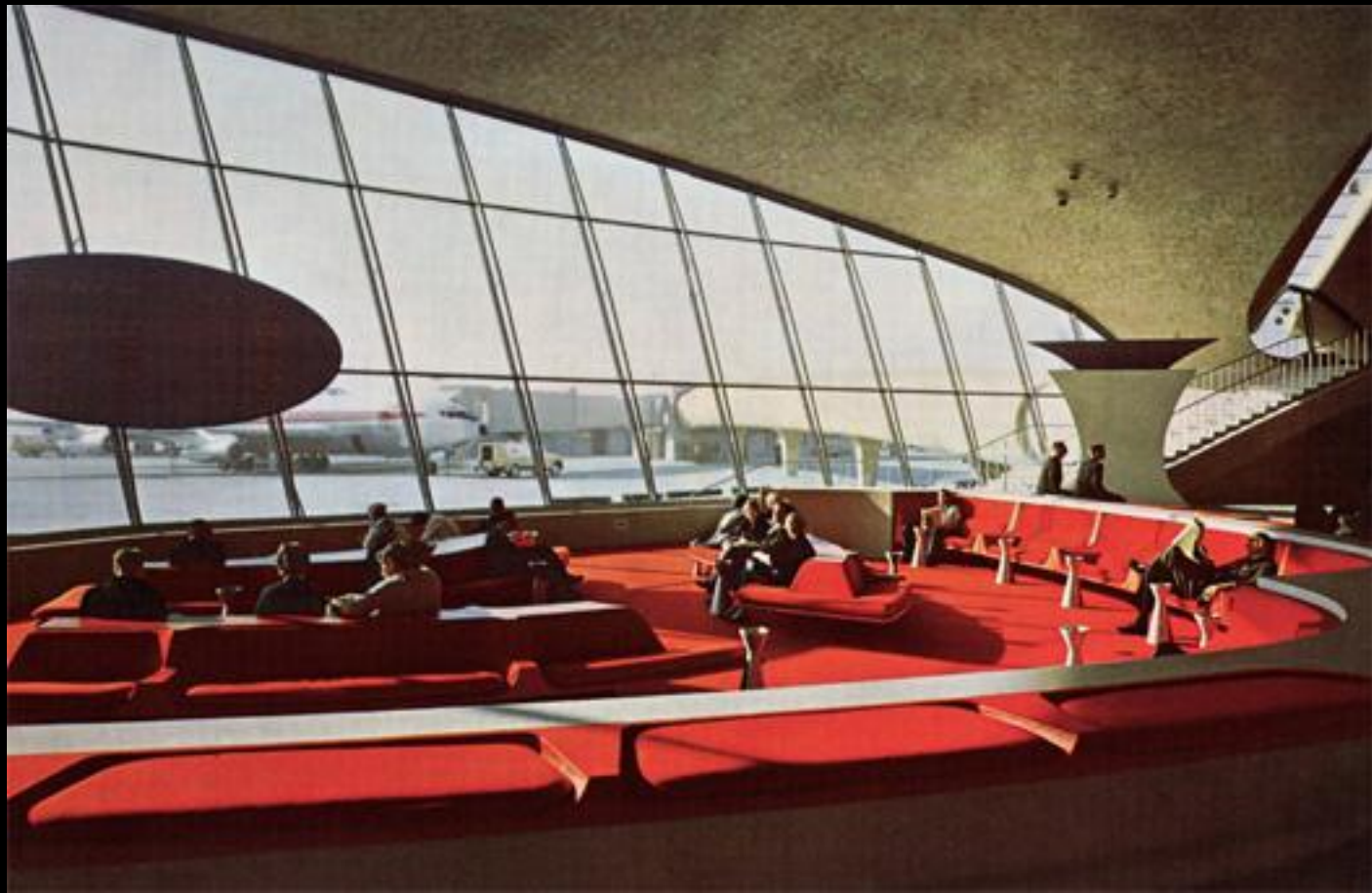


[The following slides were presented at the LoopTransPort-2018 Conference, July 23-24, 2018,
by Marta Nowak (Univ. California, Los Angeles). Copyright retained by the author.]

HYPERLOOP: RETHINKING LONG DISTANCE TRAVEL THROUGH ARCHITECTURE, URBAN DESIGN AND HUMAN EXPERIENCE



TWA terminal by Eero Saarinen



TWA terminal by Eero Saarinen



O'Hare Airport Restaurant



Jimmy Carter and an aide hop a fence at LaGuardia airport in New York City.







INTERNATIONAL CERTIFICATE OF
VACCINATION OR PROPHYLAXIS

AS APPROVED BY

THE WORLD HEALTH ORGANIZATION

CERTIFICAT INTERNATIONAL DE
VACCINATION OU DE PROPHYLAXIE

APPROUVÉ PAR

L'ORGANISATION MONDIALE DE LA SANTE

BRIAN COHEN

TRAVELER'S NAME—NOM DU VOYAGEUR

ADDRESS—ADRESSE (Number—Numéro) (Street—Rue)

(City—Ville)

(County—Département)

(State—Pays)



DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

CDC 731 (formerly PHS-731)

CS1







← All other passports

← Fast track
By invitation only

UK/EU Passports  →
Including Switzerland and the European Economic Area

 ePassport gates →

UK Border

Border control information

Border control information





Visas

KOREA IMMIGRATION
REPUBLIC OF KOREA
대한민국
ADMITTED
2013 SEP 14
2013 DEC 13
GIMHAE AIRPORT 056

28 DEC 2013

PERMITTED TO ENTER AND
REMAIN IN SINGAPORE
FOR NINETY DAYS FROM
DATE SHOWN ABOVE.
27 DEC 2013
IMMIGRATION SINGAPORE
VISIT PASS
Subject to Reg. 12 (7)
Immigration Regulations

14

Visas

NOI VISA IMMIGRATION
出国
DEPARTED
入国審査官-日本国
KANSAI
14. SEP. 2013
IMMIGRATION
2144

16. SEP. 2013
KANSAI
入国審査官-日本国
2122

上陸許可
4. NOV 2013
KANSAI
2115

NOI VISA
出国
DEPARTED
入国審査官
KANSAI
1. NOV
IMMIGRATION
2114

上陸許可
3. JAN
KANSAI
入国審査官
2214

KOREA IMMIGRATION
REPUBLIC OF KOREA
대한민국
ADMITTED
2014
2014
UNTA
INC

15

ump, support any friend, oppose any foe, in

order to assure the survival
John F. Kennedy







ADDRESS
444-232815
444-232815
QTY - 1000







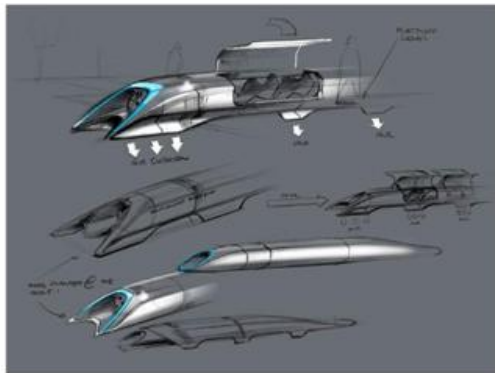
?



ELON MUSK

[Photo: Scott Olson, Getty Images]

Hyperloop Alpha



Intro

The first several pages will attempt to describe the design in everyday language, keeping numbers to a minimum and avoiding formulas and jargon. I apologize in advance for my loose use of language and imperfect analogies.

The second section is for those with a technical background. There are no doubt errors of various kinds and superior optimizations for elements of the system. Feedback would be most welcome - please send to hyperloop@spacex.com or hyperloop@teslamotors.com. I would like to thank my excellent compadres at both companies for their help in putting this together.

Background

When the California "high speed" rail was approved, I was quite disappointed, as I know many others were too. How could it be that the home of Silicon Valley and JPL - doing incredible things like indexing all the world's knowledge and putting rovers on Mars - would build a bullet train that is both one of the most expensive per mile and one of the slowest in the world? Note, I am

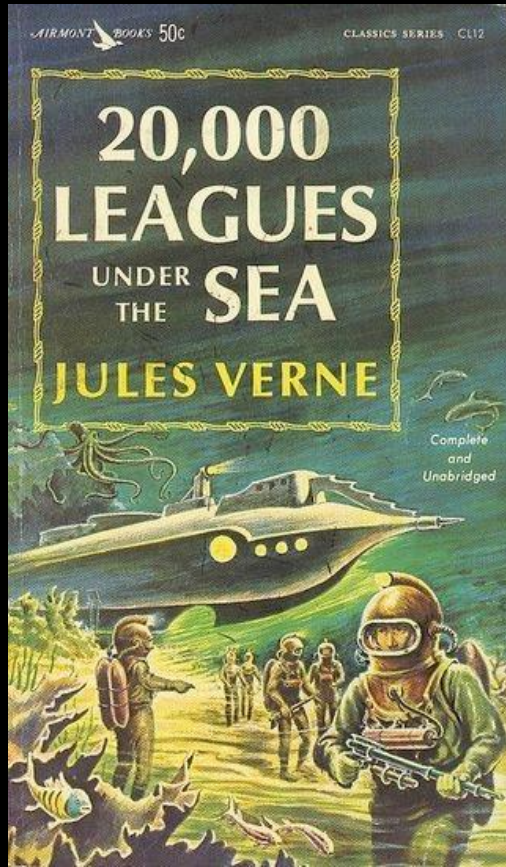


760MPH

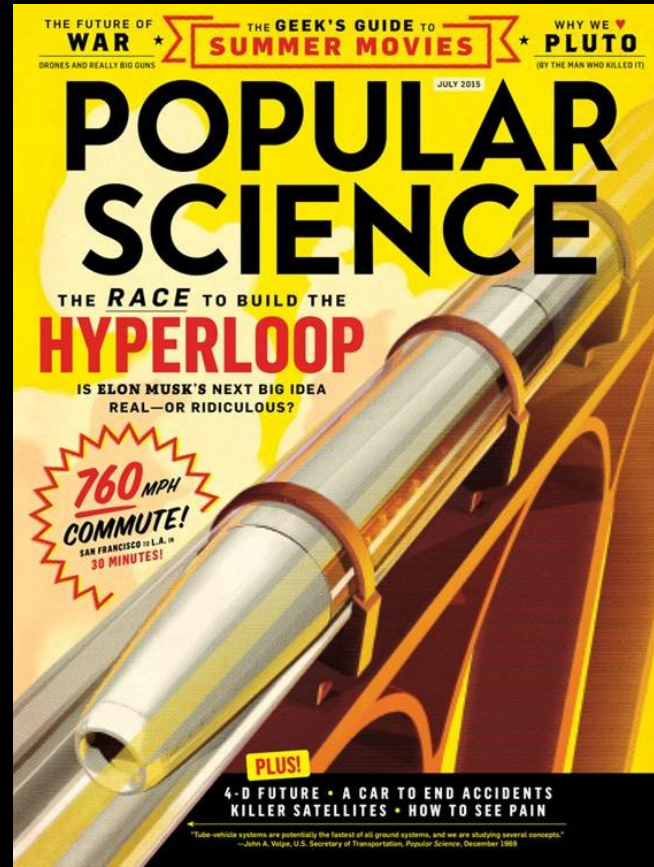
28 Passengers

capsules TRAVELING IN 30S INTERVALS

TRIP TICKET \$20



Jules Verne published in 1870



Popular Science July 2015

SILK ROAD

Precedent

Modes of Transportation:
Ancient Road



Year:
202 BC- 8 AD

Cause:
The Ruler of Han Dynasty in ancient China wants to develop the economy by opening up new markets to different countries. Also they want to use the road to make more alliance with western countries fighting towards Huns.

Effects and Results:
Trading activities along the Silk Road over many centuries facilitated the transmission not just of goods but also ideas and culture, notably in the area of religions. Zoroastrianism, Judaism, Buddhism, Christianity, Manichaeism, and Islam all spread across Eurasia through trade networks that were tied to specific religious communities and their institutions. Notably, established Buddhist monasteries along the Silk Road offered a haven, as well as a new religion for foreigners.

18



Distance:
(miles)

4000

Time:
(Minutes/Hours/days)

90

Load:
(*hour)

Cargo: 0.2t
People: 8

Cost:
(Dollar/mile)

Past: 0.1
Now: 12

TRANSCONTINENTAL RAILROAD

Precedent

Modes of Transportation:

Railroad
1862-1869



Cause:

-In 1830 the locomotive was invented, having lots of railways built in the East. -In 1849, gold mining is discovered in California, thus introducing a heightened interest of economics and migration to the West.

-Railroad lobbyist from Union Pacific and Central Union pushed for railway to the West

-President Abraham Lincoln signed the Pacific Railroad Act

Effects and Results:

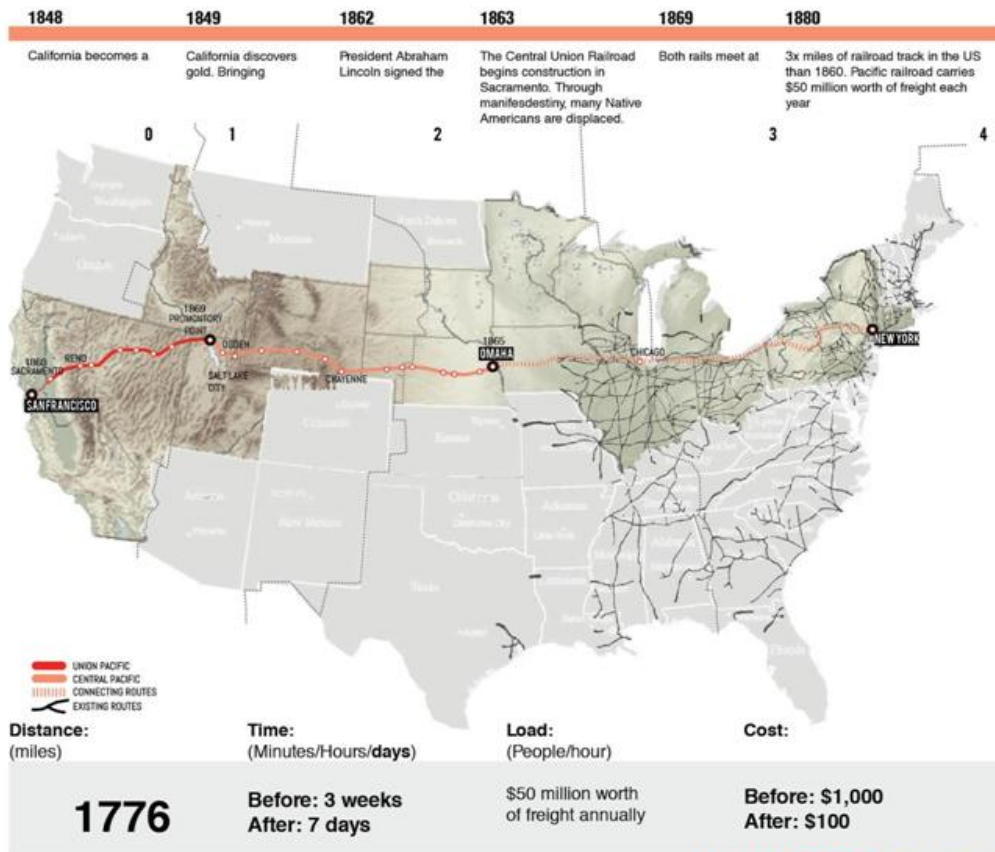
22 -It opened the US to the Pacific, linking both coasts. First intercontinental continental railroad.

-Immediate effects were an increase of migrants to discover the west. 2.5 million from 1895-1916

-While thousands of Native Americans were displaced.

-Economic, industrial, agricultural growth for the United States

- New growth of towns along route.



U.S. HIGHWAY TRAFFIC VOLUME

HIGHWAY TRAFFIC VOLUME ON INTERSTATE AND NON-INTERSTATE HIGHWAYS

32



Figure 3: US Highway 50 westbound, West of Eureka, NV



Figure 4: Aerial View of a Los Angeles Highway Intersection



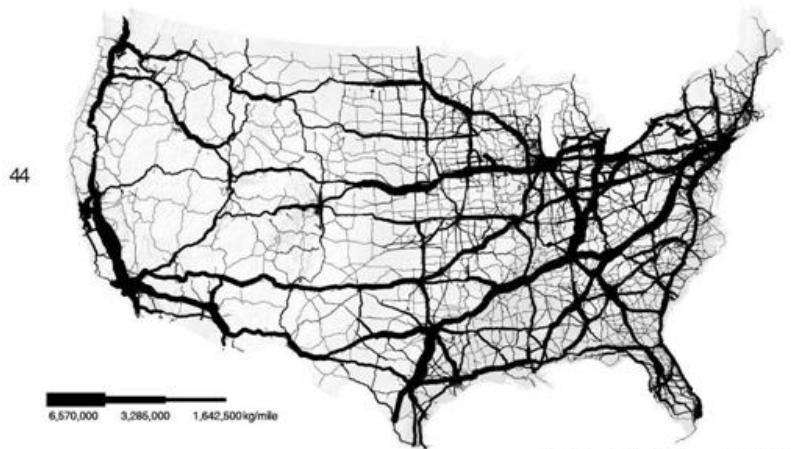
50,000 25,000 12,500

US Highway Traffic Volume

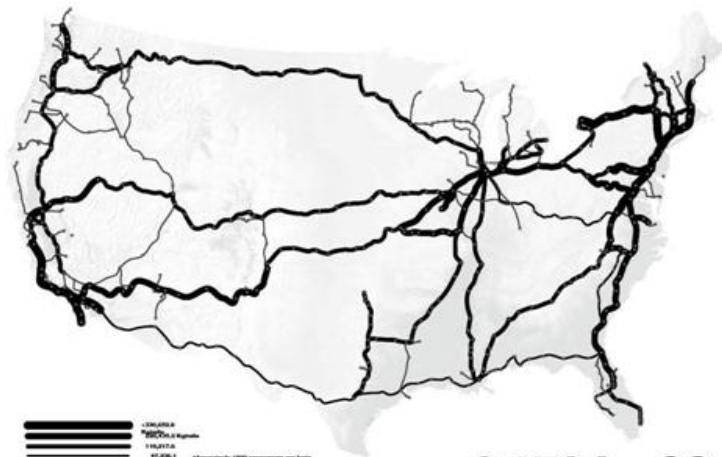
CARBON EMISSION

ANNUAL CARBON EMISSION ON HIGHWAY AND RAILWAY

Car



0.225 kg CO₂
per passenger mile



0.172 kg CO₂
per passenger mile



Ridership

1. San Francisco, CA
2. Boston, MA
3. New York, NY
4. Washington, DC
5. Chicago, IL
6. Philadelphia, PA
7. Baltimore, MD
8. Sacramento, CA
9. Los Angeles, CA
10. Milwaukee, WI



Most Visited Cities

1. New York, NY
2. Miami, FL
3. Los Angeles, CA
4. San Francisco, CA
5. Las Vegas, NV
6. Boston, MA
7. Washington, DC
8. Chicago, IL
9. Atlanta, GA
10. San Diego, CA



Population Growth

1. Austin, TX
2. Las Vegas, NV
3. Raleigh, NC
4. Houston, TX
5. Phoenix, AZ
6. Charlotte, NC
7. San Antonio, TX
8. Dallas, TX
9. Fort Worth, TX
10. Nashville-Davidson



Public Transport System

1. San Francisco, CA
2. Boston, MA
3. New York, NY
4. Washington, DC
5. Chicago, IL
6. Philadelphia, PA
7. Miami, FL
8. Minneapolis, MN
9. Baltimore, MD
10. Seattle, WA



Job Number

1. New York, NY
2. Los Angeles, CA
3. Chicago, IL
4. Washington, DC
5. Dallas, TX
6. Philadelphia, PA
7. Houston, TX
8. San Francisco, CA
9. Miami, FL
10. Atlanta, GA



Job Growth

1. New York, NY
2. Dallas, TX
3. Houston, TX
4. Los Angeles, CA
5. Miami, FL
6. San Francisco, CA
7. Chicago, IL
8. Atlanta, GA
9. Seattle, WA
10. Boston, MA

City Name Population Score

City Name	Population	Score
New York, NY	8,206,037	10
Los Angeles, CA	3,857,790	10
Chicago, IL	2,748,666	10
Houston, TX	2,300,261	10
Philadelphia, PA	1,567,657	9
Phoenix, AZ	1,486,250	9
San Antonio, TX	1,362,951	9
San Diego, CA	1,300,348	8
Dallas, TX	1,241,162	8
San Jose, CA	982,765	8
Austin, TX	842,500	8
Jacksonville, FL	686,207	7
Indianapolis, IN	654,862	7
San Francisco, CA	625,983	7
Columbus, OH	609,798	7
Fort Worth, TX	777,982	6
Charlotte, NC	775,202	6
Denver, CO	701,425	6
El Paso, TX	672,528	6
Memphis, TN	655,155	6
Boston, MA	636,675	5
Seattle, WA	604,526	5
Denver, CO	604,265	5
Washington, DC	602,223	5
Nashville, TN	624,408	5
Baltimore, MD	621,342	5
Louisville, KY	605,110	4
Portland, OR	603,106	4
Chattanooga, TN	589,158	4
Milwaukee, WI	589,916	4
Las Vegas, NV	586,424	4
Albuquerque, NM	565,417	3



Cascadia

Major Cities:
Seattle, Portland
Pop: 8 million
Export Industries:
Informational services &
manufacturing, farm
GDP: \$563

Northern California

Major Cities:
San Francisco, San Jose,
Sacramento, Stockton
Pop: 24.3 million
Export Industries: Informational
services, farm
GDP: \$909

Southern California

Major Cities:
Los Angeles, San Diego, Las
Vegas, Riverside
Pop: 15.1 million
Export Industries:
Informational services, tourism
GDP: \$1334

Front Range

Major Cities:
Denver, Salt Lake City,
Albuquerque
Pop: 7.7 million
Export Industries:
Construction and natural
resources, informational services,
GDP: \$334

Texas Triangle

Major Cities:
Dallas, Houston, San Antonio,
Fort Worth
Pop: 20.3 million
Export Industries: Construction and
natural resources
GDP: \$723

Gulf Coast

Major Cities:
New Orleans, Houston
Pop: 6.6 million
Export Industries:
Construction and natural resources
GDP: \$755

Florida

Major Cities:
Miami, Jacksonville, Orlando, Tampa
Pop: 17.5 million
Export Industries: Retail trade
and tourism
GDP: \$765

Piedmont Atlantic

Major Cities:
Atlanta, Charlotte, Nashville, Mem-
phis, Raleigh, Virginia Beach
Pop: 18.8 million
Export Industries: Transportation,
and warehousing
GDP: \$1149

North East

Major Cities:
Washington DC, Philadelphia,
Baltimore, New York City, Boston
Pop: 52.7 million
Export Industries:
Financial services, education,
healthcare, federal gov.
GDP: \$3751

Great Lakes

Major Cities:
Chicago, Minneapolis, Detroit,
Kansas City, Cleveland,
Indianapolis
Pop: 52.9 million
Export Industries: Manufacturing
GDP: \$2314



Phase 1: This strategy answers to the infrastructure the Megaregions need to interact more seamlessly between metropolitans.
Phase 2: Coastal regions become more connected making intercontinental and international economies smoother.
Phase 3: Eventually the whole nation is interconnected, making it easier to travel from one coast to the other as easy as it is in Europe.

ROUTE CONSTRAINTS

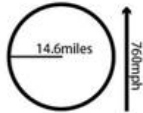
Route from L.A. to Vegas

Bend Radius

Min Bend Radius: 2.28miles(3.67km)
Speed: 300mph(480kph)



Min Bend Radius: 14.6miles(23.5km)
Speed: 760mph(1220kph)



Min Bend Radius: 7.80miles(12.6km)
Speed: 555mph(890kph)



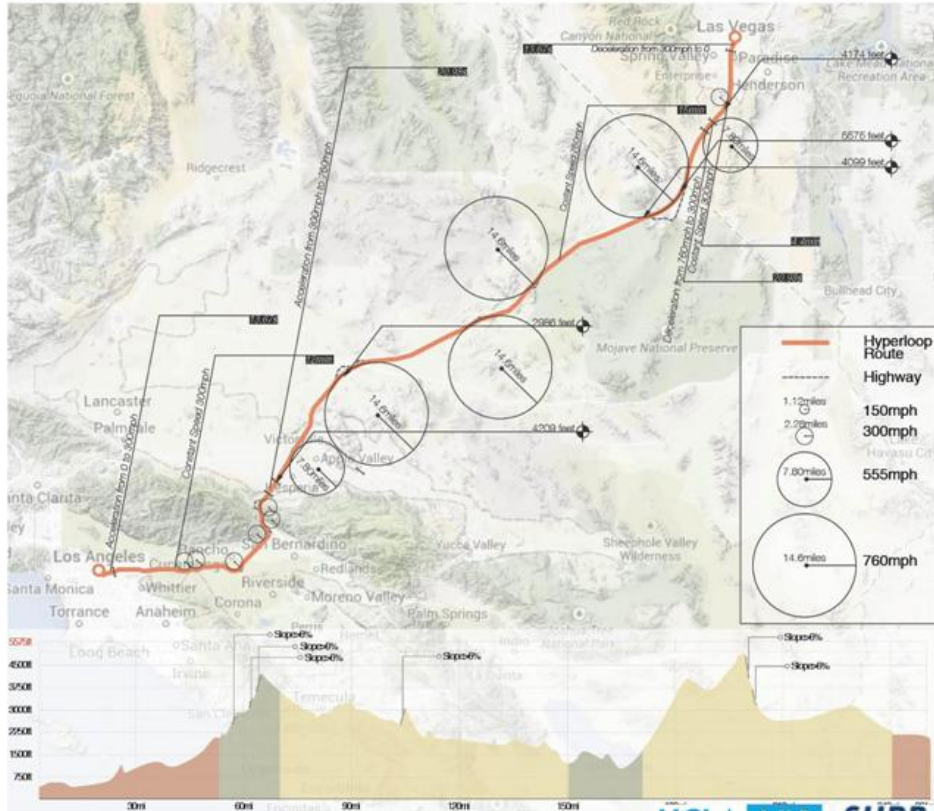
Min Bend Radius: 2.28miles(3.67km)
Speed: 300mph(483kph)



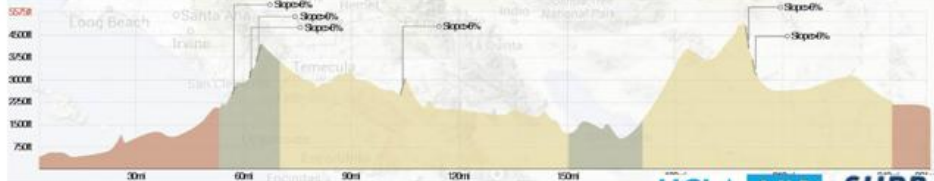
Bend Radius
Pylon Gradient < 6%



68



	Hyperloop Route
	Highway
	150mph
	300mph
	555mph
	760mph



EI CAMINO REAL 1780 1860
Infrastructure History of Los Angeles

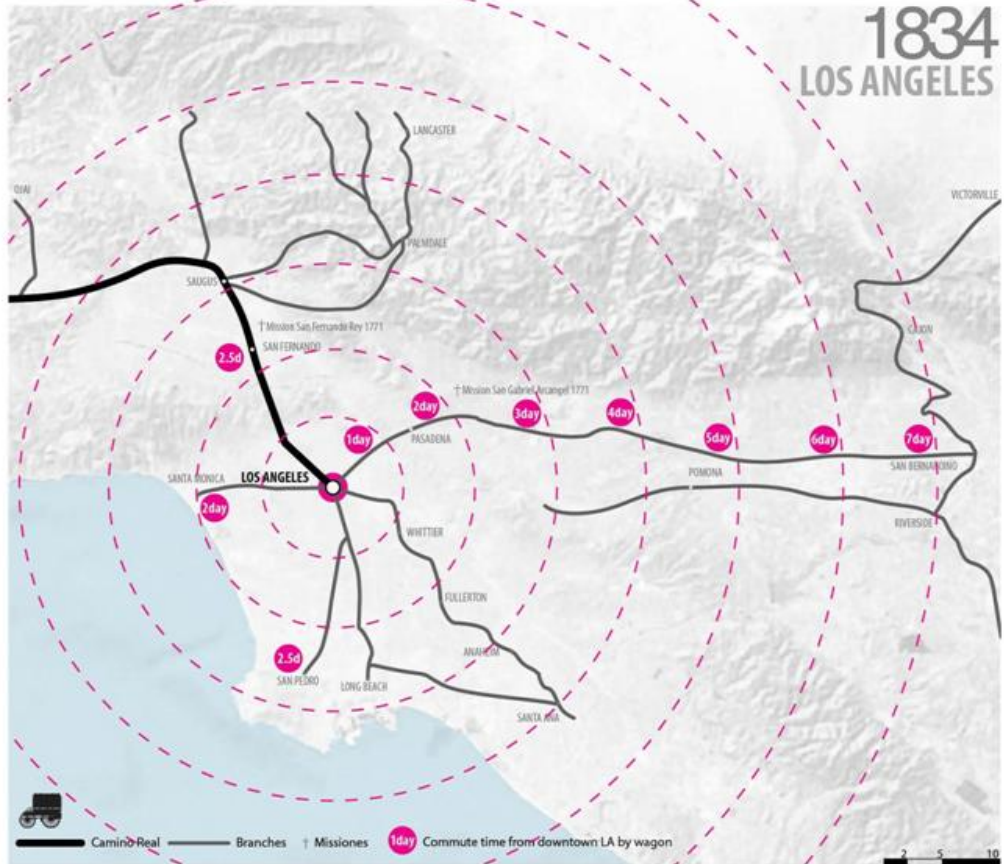


Fig1: 1925 postcard depicting an automobile on El Camino Real in front of Mission San Fernando



Fig2: A view of El Camino Real in Tustin



Fig3: Bell erected by the Auto Club in 1908

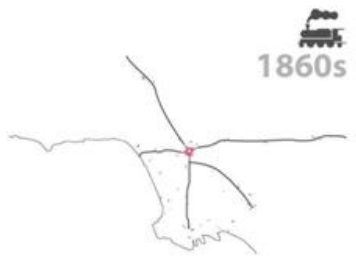
91





Fig4: Roadside marker in 1937



Fig5: Roadside marker in 1937

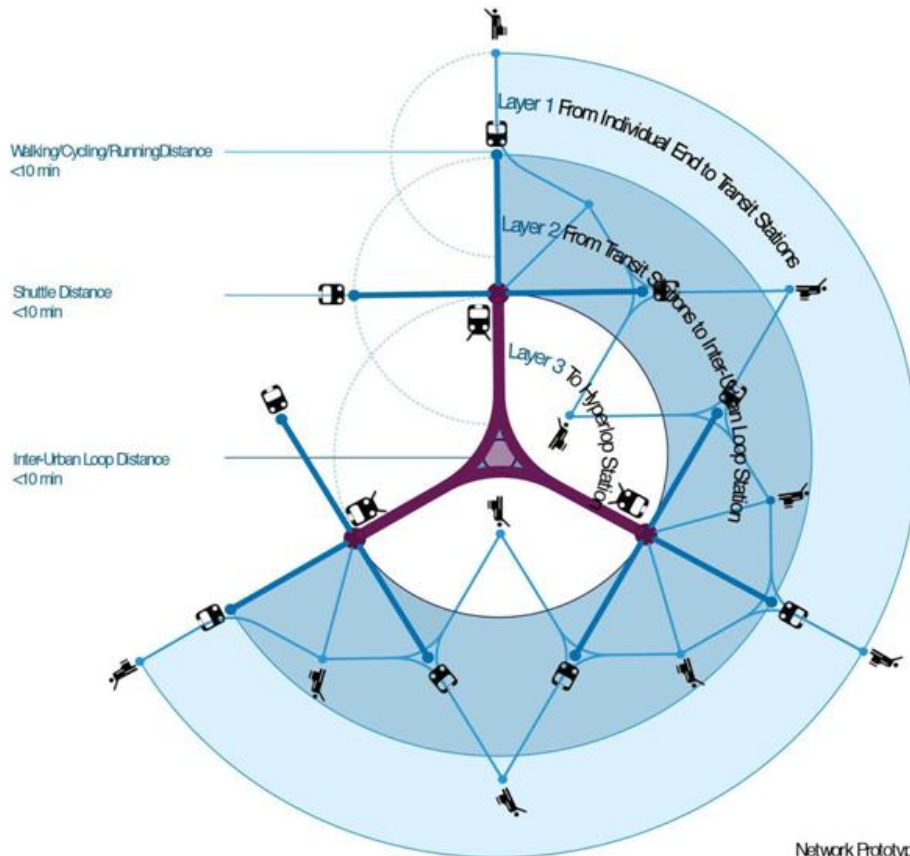


 30 mins' capture area from downtown LA without traffic
 30 mins' capture area from downtown LA with traffic

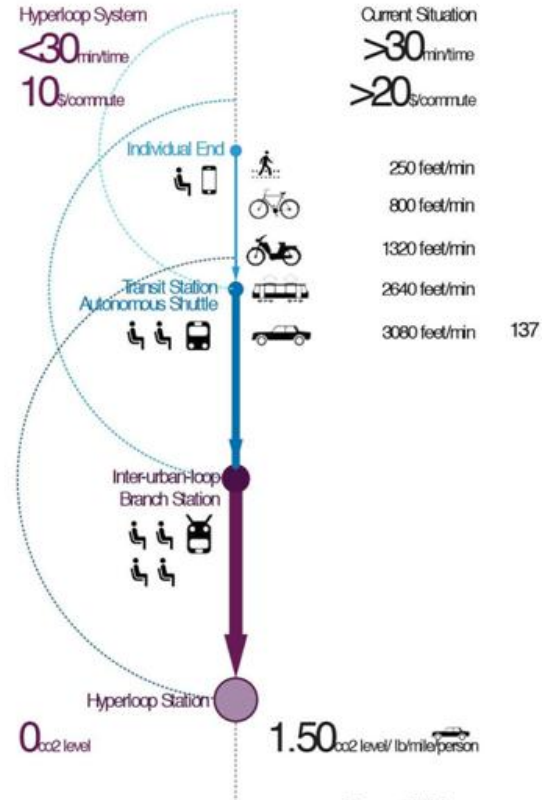


Locate a MAIN Station: Smooth Transit

Strategy 01 | Smooth Transit



Network Prototype



Phase01: Settlement of Main Station

Strategy 01| Smooth Transit

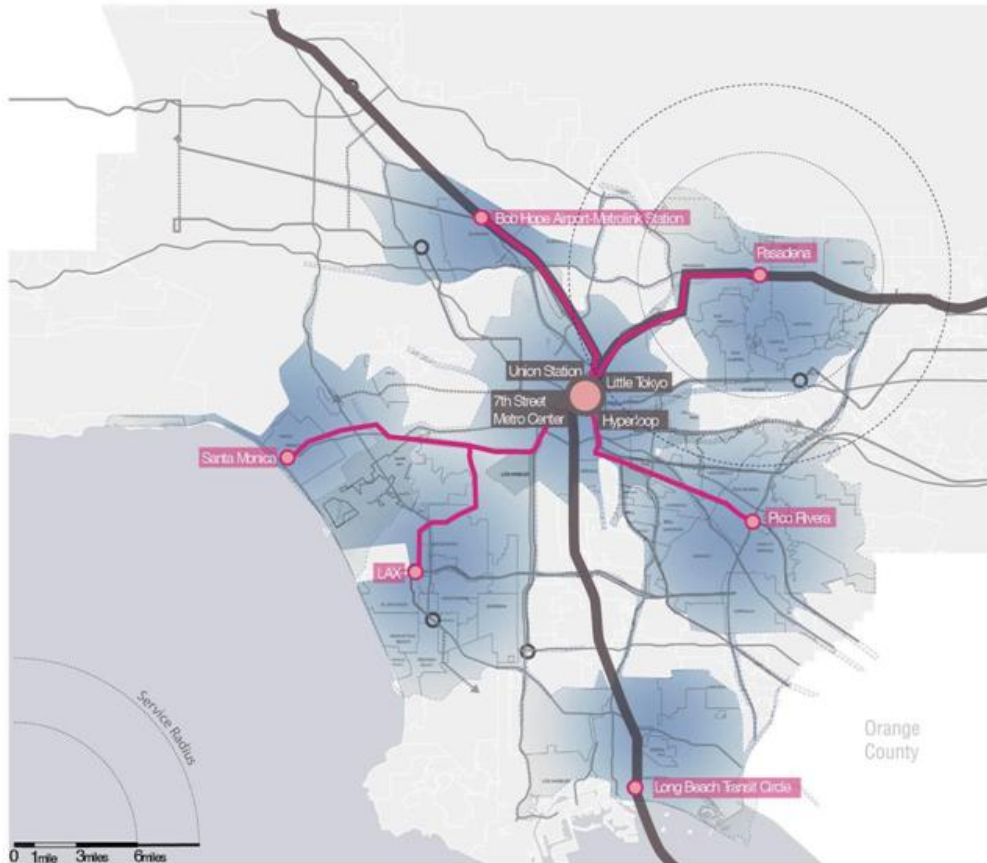
140



Hyperloop main station helps efficient transit from 3 destinations


-  Urban Hyperloop
-  Urban Hyperloop Branches
-  45 miles/h
6 miles = 10 minutes drive (local)
9 miles = 10 minutes drive (freeway)





Proposal in 1950
Fig 43: Airtrain proposal

- Urban Hyerloop
- Urban Hyperloop Branches

 45 miles/h
 6 miles = 10 minutes drive (local)
 9 miles = 10 minutes drive (freeway)

PASSENGER CIRCULATION

Time Based Non-stop Station

With the growth of time people stay in station, there will be more passengers stay in the station, so the size of station is expanding and more functions are needed to add into the space.

The behavior of passengers become more free and the design of whole station will face more troubles.

1 Minute Station:

Number of passengers in station in rush hour: 112

Amenities: none

208 6 Minutes Station:

Number of passengers in station in rush hour: 672

Amenities: restroom, automat

15 Minutes Station:

Number of passengers in station in rush hour: 1680

Amenities: restroom, automat, cafe, supermarket

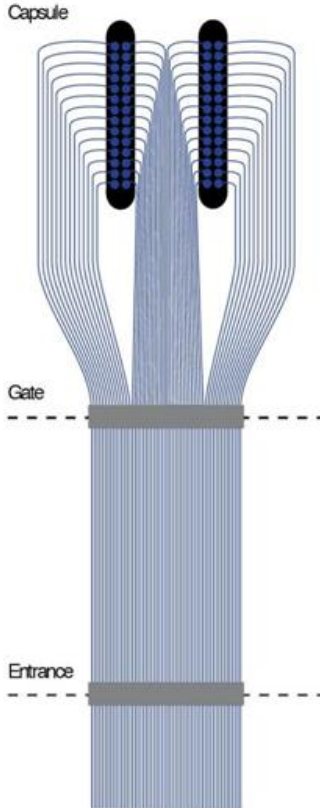
>30 Minutes Station:

Number of passengers in station in rush hour: >3360

Amenities: restroom, automat, cafe, supermarket, restaurant, mall,.....

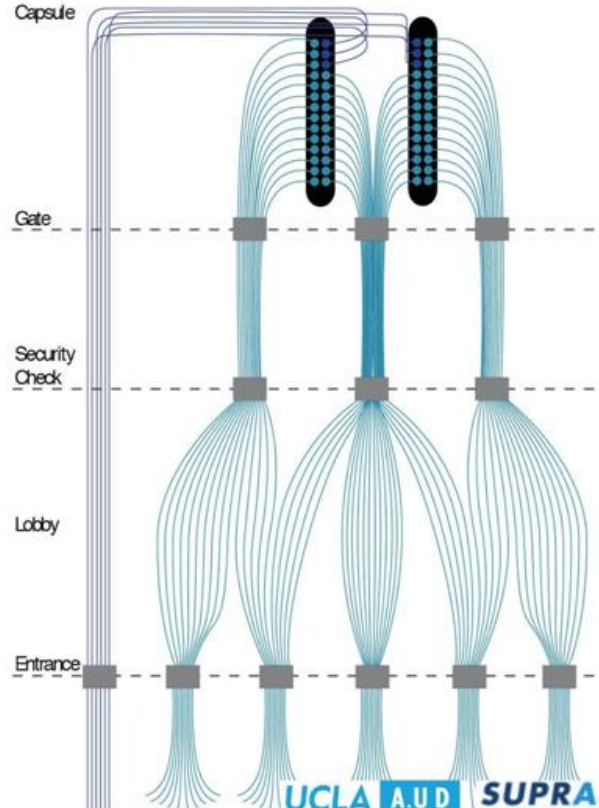
Total Passengers 112

Passenger Flow in 1 Min Station



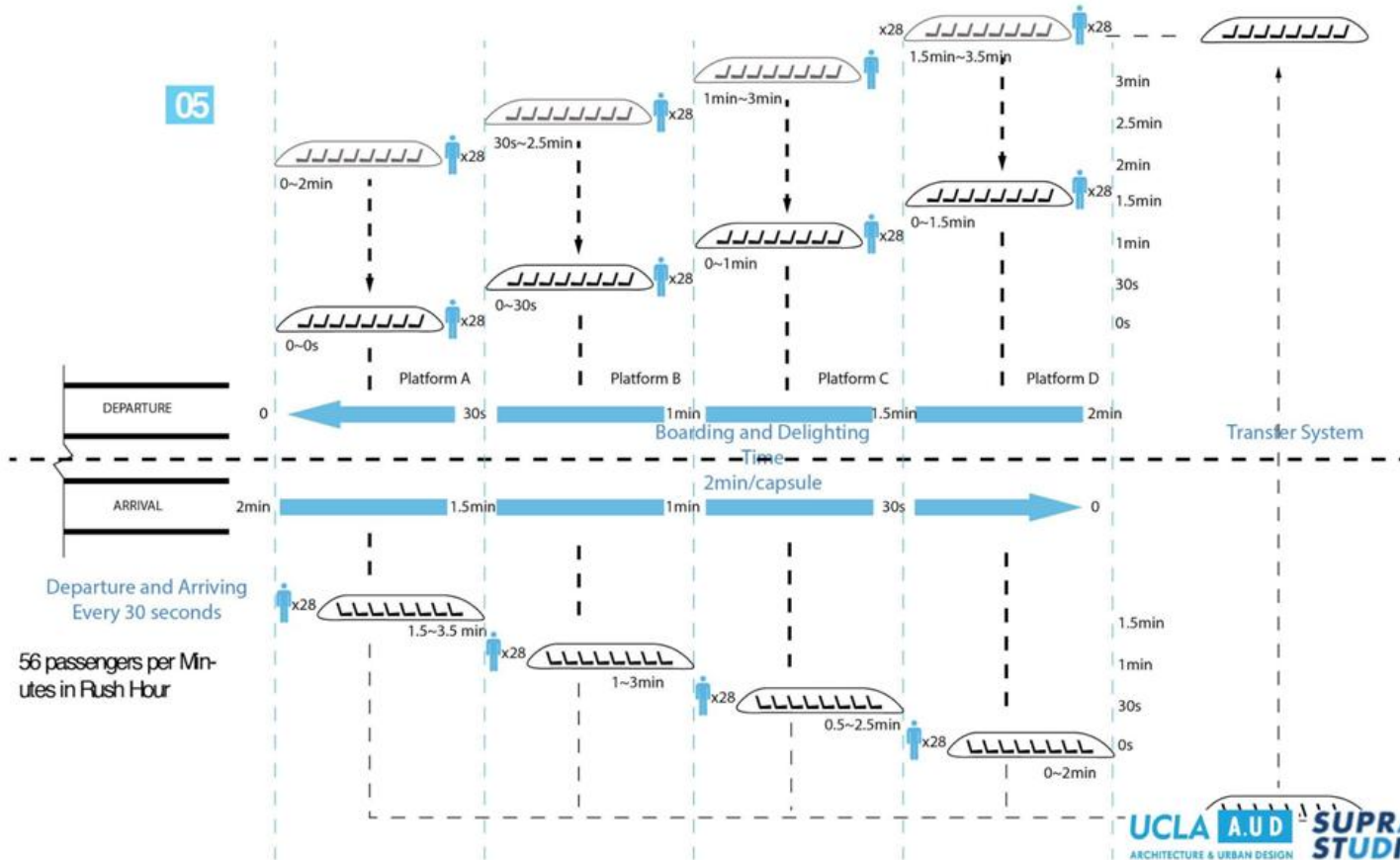
672

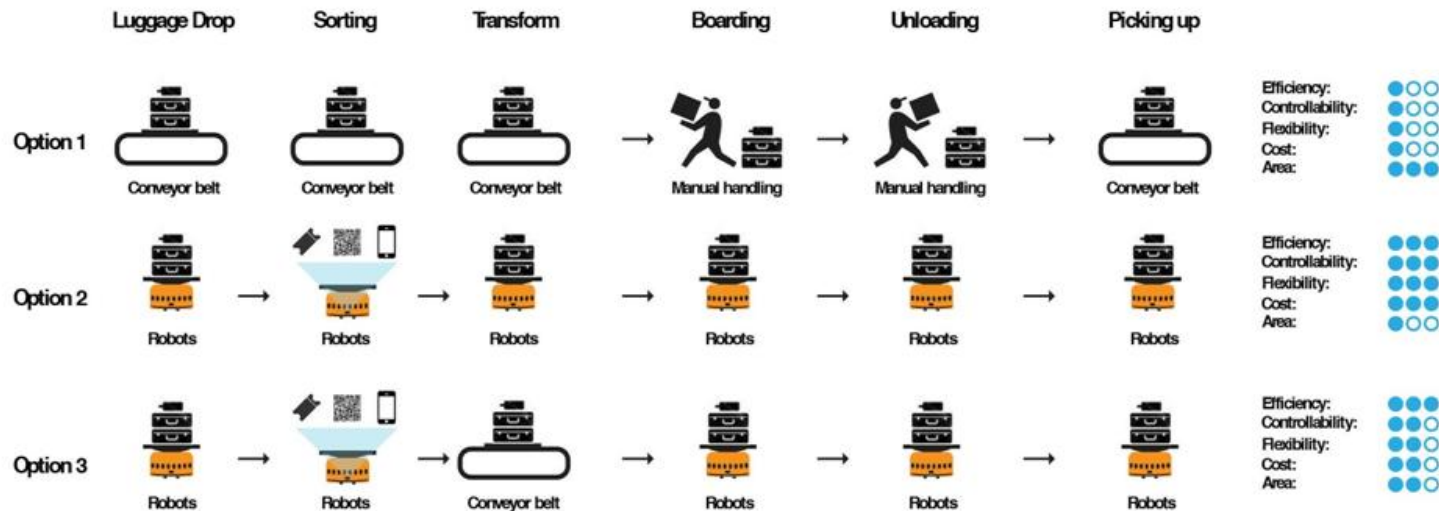
Passenger Flow in 6 Mins Station



CAPSULE DISPATCHING

05



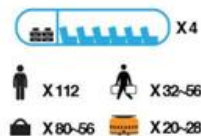
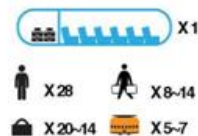


Kiva Robot



16 inches tall
 25 inches wide
 330 Pounds (150 Kilograms)
 3-5 baggage
 lift 3 times (330 lbs)

Robots calculate



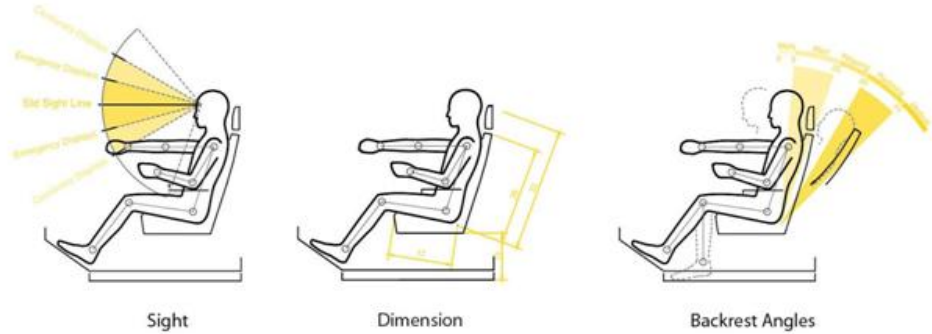
Dropping&sorting	X 20-28
Transform	X 20-28
Boarding	X 20-28
Unloading	X 20-28
Total:	X 80-112

Dropping&sorting	X 20-28
Transform	Conveyor belt
Boarding	X 20-28
Unloading	X 20-28
Total:	X 60-84

SEATING ARRANGEMENT

Social Space In Seating Design

Critical factors in human scale

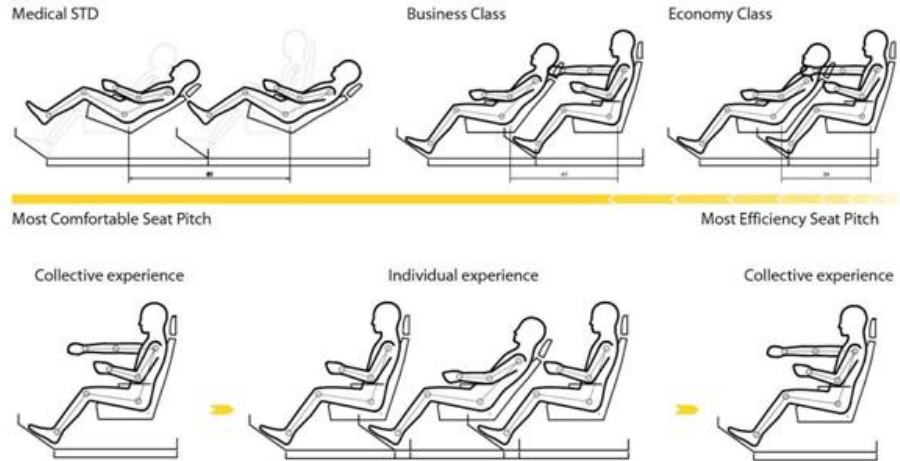


262

The whole journey



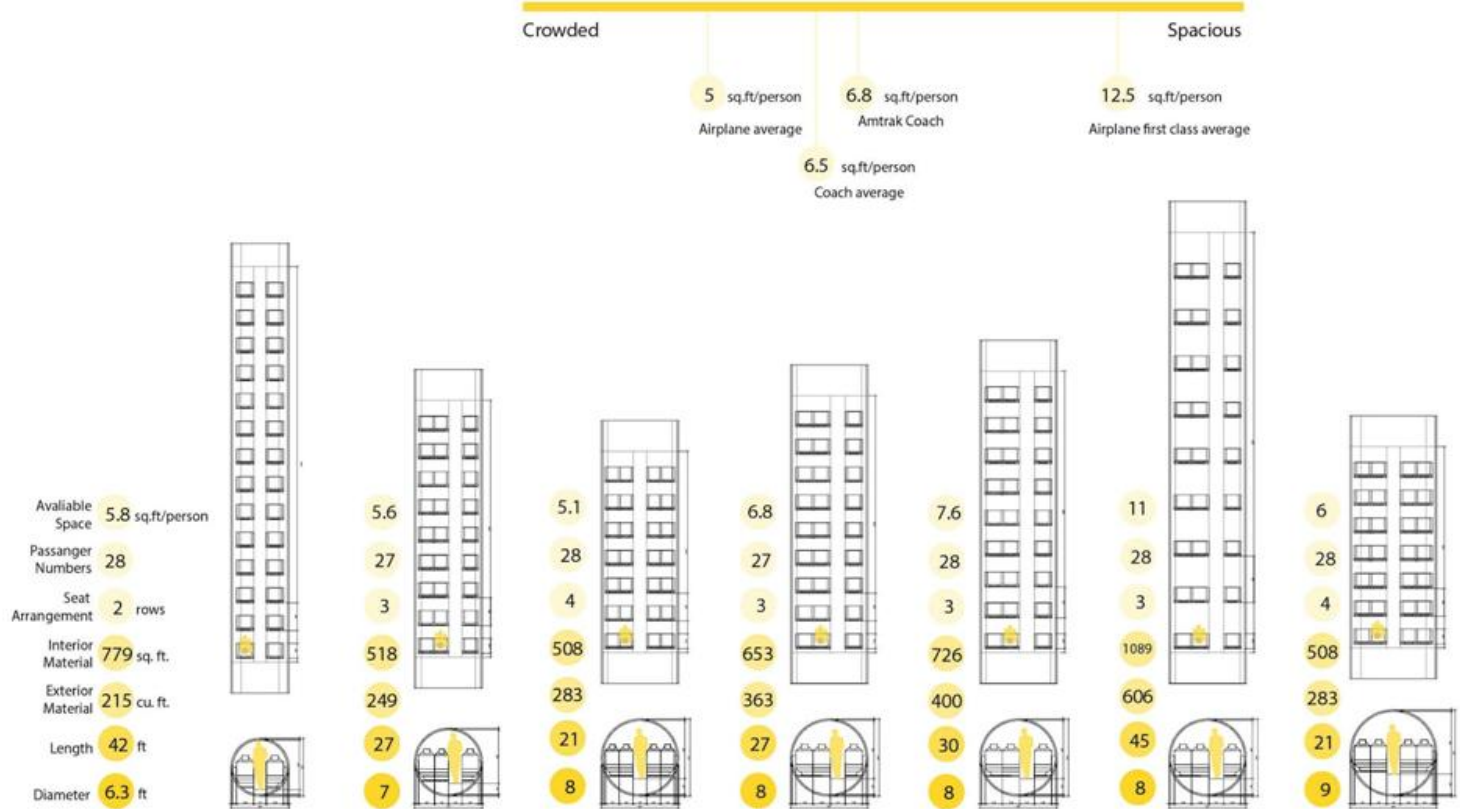
Fin 18



Fin 19

CAPSULE DIMENSION

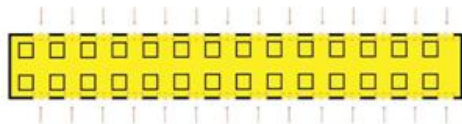
Capsule Dimension Based On Seating Arrangement



BOARDING STRATEGY

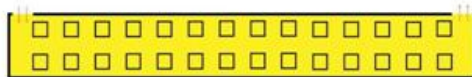
Doors, Slide-in Seats and Bubbles

DOORS



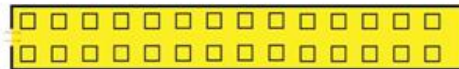
STRATEGY 1

BOARDING TIME: max 20s
LOADING PLACE: head and bottom LOADING TIME: 10-70s
TOTAL TIME: max 90s



STRATEGY 2

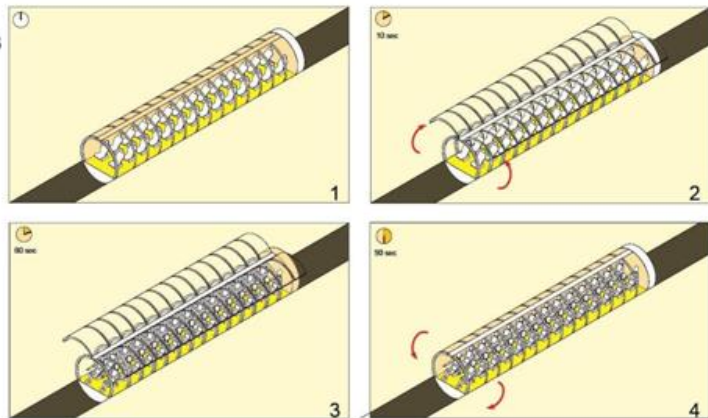
BOARDING TIME: max 40s
LOADING PLACE: head and bottom LOADING TIME: 10-70s
TOTAL TIME: max 120s



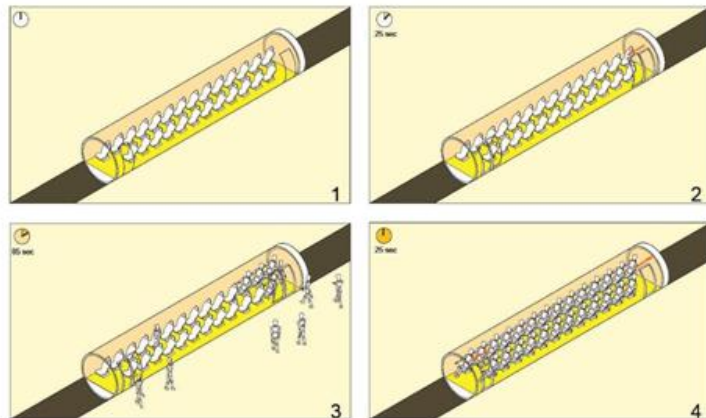
STRATEGY 3

BOARDING TIME: max 80s
LOADING PLACE: head and bottom LOADING TIME: 10-70s
TOTAL TIME: max 160s

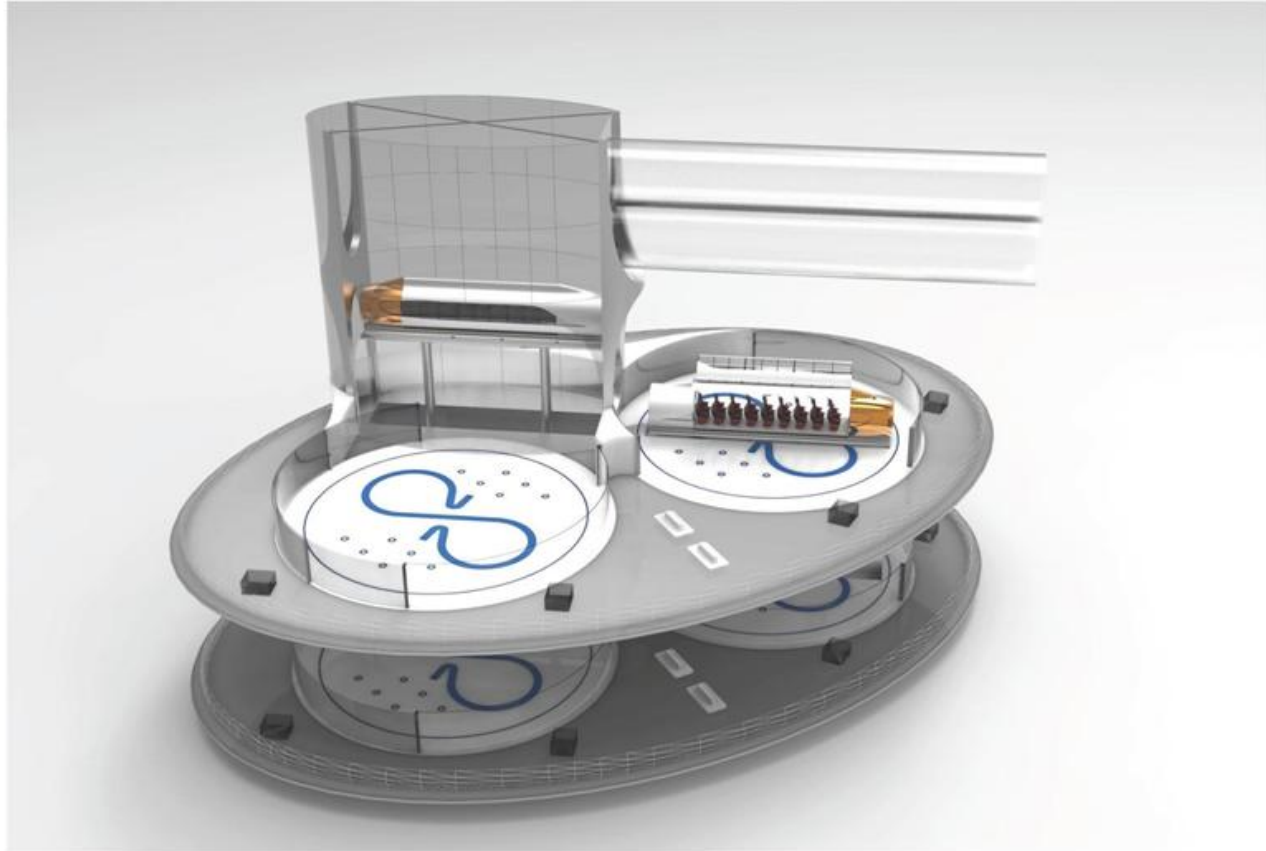
266



STRATEGY 1



STRATEGY 2





Entrance scene

