A NATIONAL SC MAGLEV NETWORK AWAITS GOVERNMENT INVESTMENT IN A MAGLEV TEST FACILITY SIMILAR TO THAT OF JAPAN AND GERMANY

PROBLEM: CURRENT U.S. SURFACE TRANSPORT IS CONGESTED, COSTLY, INEFFICIENT, & DANGEROUS

1. OLD, OBSOLETE & UNSAFE INFRASTRUCTURE

2. HIGH REPAIR, OPERATING & MAINTENANCE COSTS

3. ALMOST TOTALLY DEPENDENT ON FOSSIL FUELS

4. GENERATES TONS OF UNHEALTHY POLLUTION AND CARBON DIOXIDE EVERY MINUTE

SURFACE TRANSPORTATION POLICY OBJECTIVES:

1. IMPROVE SAFETY
2. INCREASE ENERGY, ENVIRONMENTAL & ECONOMIC EFFICIENCY OF U.S. LOGISTICS IN NEXT GENERATION OF SURFACE TRANSPORTATION
3. REDUCE SUBSIDY BURDEN ON TAXPAYERS
4. INCREASE THE NUMBER OF MANUFACTURING, CONSTRUCTION AND HIGH TECH ENGINEERING AND SERVICE JOBS

HIGHWAY SAFETY

- 33,000 deaths per year! In the 15 years since 2000 AD, 500,000 people have died on US highways, more than the 426, 665 battle deaths in all of America's wars in the 20th Century – The Spanish American, World Wars I and II, Korea, Vietnam, and Desert Storm. Over 100 times more than the 9/11 deaths.
- America needs to build new 21st Century transport systems that will greatly reduce highway deaths, injuries, and collisions, eliminate pollution and greenhouse gas emissions, and be faster, cheaper, and less stressful. Sadly, America is not doing much right now to achieve this goal.

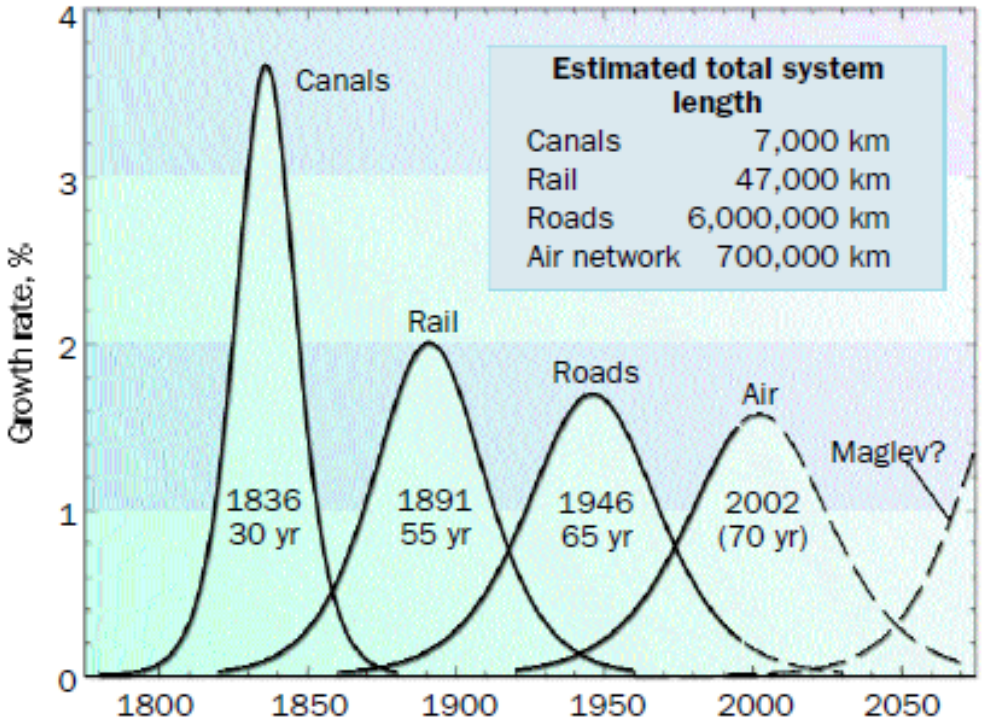
AIR QUALITY HEALTH CONCERNS

Along our heavily traveled auto and freight corridors automobile and truck exhausts create a high level of unhealthy pollution.

Studies show that polluted air in high traffic corridors cause:

- Mental retardation and stunted lung development in fetuses & young people.
- Higher Risk of Cancer
- Higher Incidence of Asthma

EFFICIENCY IS THE DRIVER IN THE EVOLUTION OF TRANSPORTATION



Smoothed historical rates of growth of the major components of the U.S. transport infrastructure, showing the peak year and the time for the system to grow from 10% to 90% of its extent (conjecture shown by dashed curves).

Source: Ausubel, Jesse and Cesare Marchetti, "The Evolution of Transport," The Industrial Physicist, American Institute of Physics, April/May 2001, pp. 20-24.

SOLUTION:

Augment U.S. Interstate Highway System with 300 mph Electric Maglev Guided Surface Transport Technology

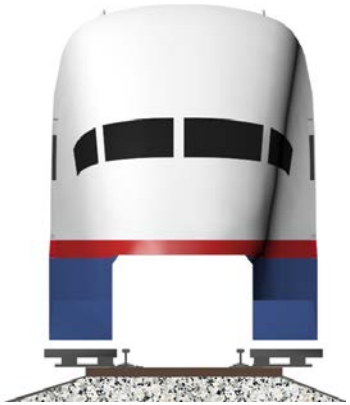
- **INCREASE ECONOMIC EFFICIENCY AND SAFETY OF US LOGISTICS AND TRAVEL**
- **IMPROVE PUBLIC SAFETY & HEALTH**
- **REDUCE PUBLIC TAX BURDEN**

US INTERSTATE MAGLEV NETWORK

Table 1: Population and States Served by the Network

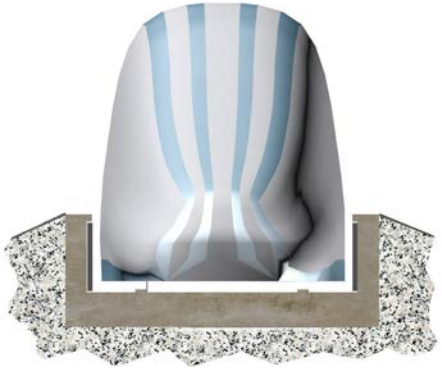
Maglev Network	States In Network	Population of States in Network (millions)	Population Living Within 15 Miles of Stations (millions)	Route Miles in Network
First, Second and Third Waves Completed	48 plus Toronto, Montreal & Vancouver	315 includes Toronto, Montreal & Vancouver	232 includes Toronto, Montreal & Vancouver	29,000
74% of population in States live within 15 Miles of a Station				

MODERN PROPULSION OPTIONS



M-2000 SC MAGLEV EDS QUADRUPOLE IN PLANAR MODE

M-2000 SC MAGLEV EDS QUADRUPOLE IN MONORAIL



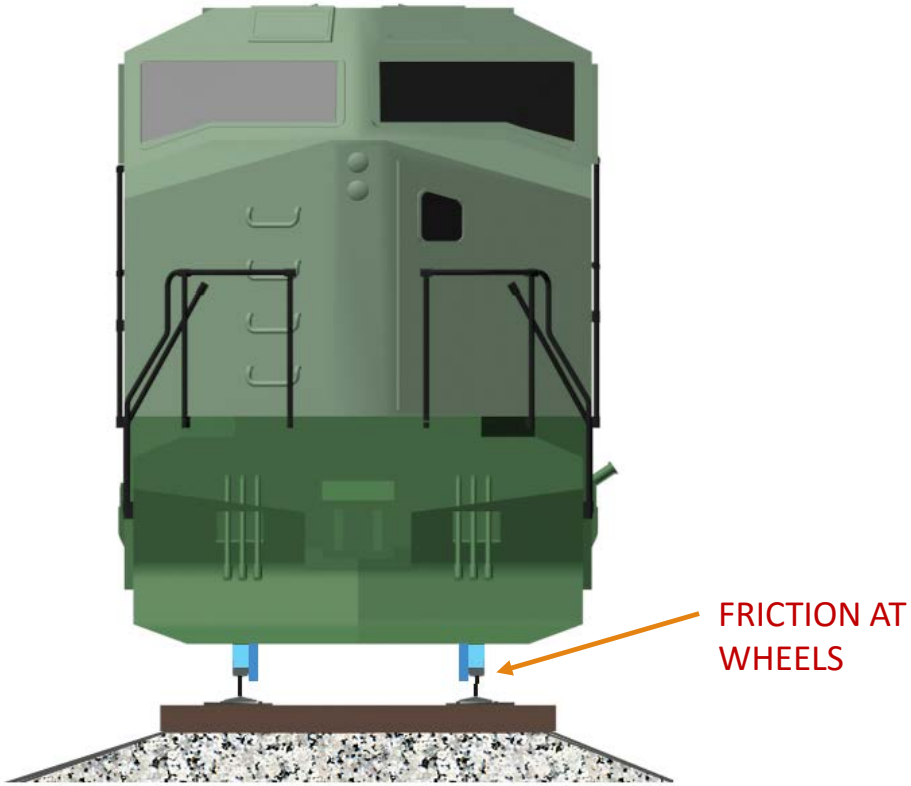
JR SC MAGLEV EDS - DIPOLE

MAGLEV EMS

DIESEL HYBRID

ELECTRIC HSR

DIESEL HYBRID PROPULSION

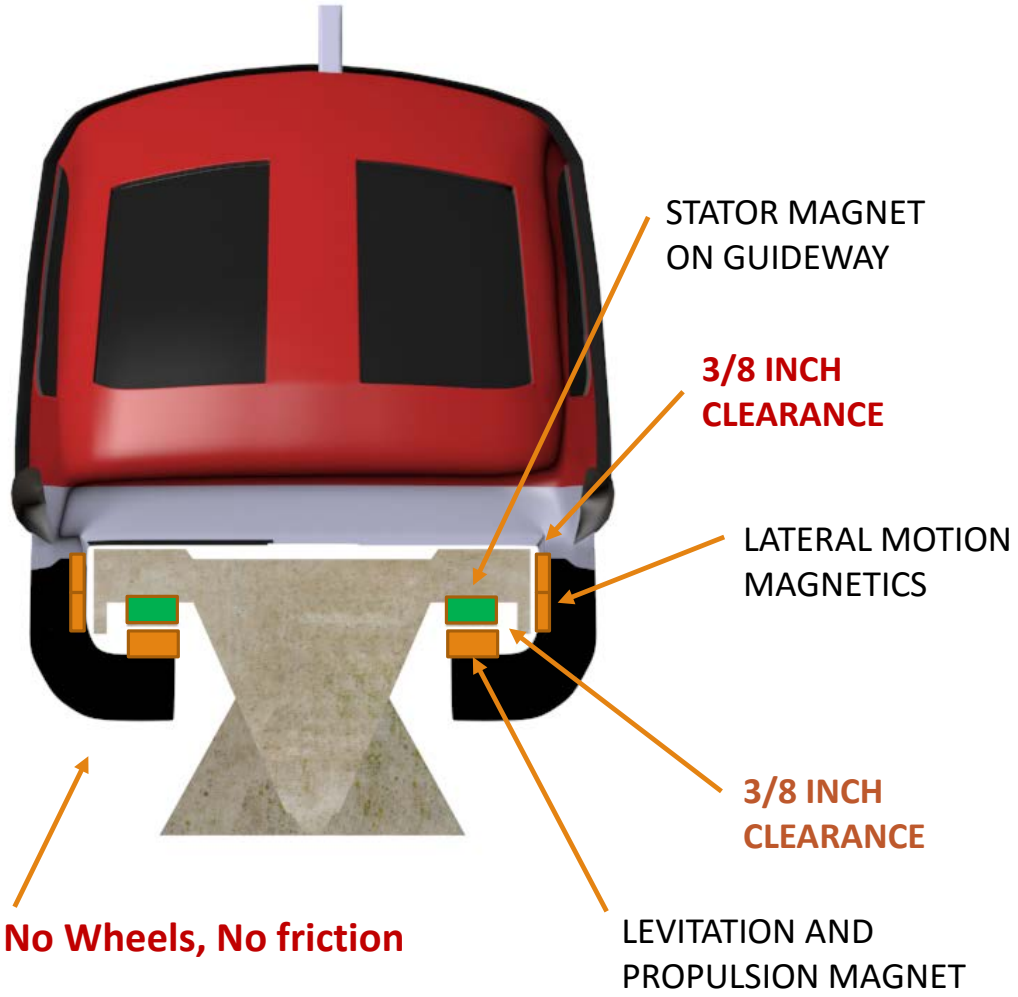


- Diesel Hybrid train is being designed with sophisticated sodium-metal batteries that will store energy recovered during braking
- GE built its first electric locomotive prototype in 1895. However, high electrification costs caused GE to turn its attention to Diesel
- Hybrid diesel can run constant speed of 110, top speed 125 mph
- Requires fossil fuel
- Heavy weight of steel wheeled locomotive on steel rails is required for traction. This translates into high track maintenance and greater operating costs

ELECTRIC PROPULSION – HSR

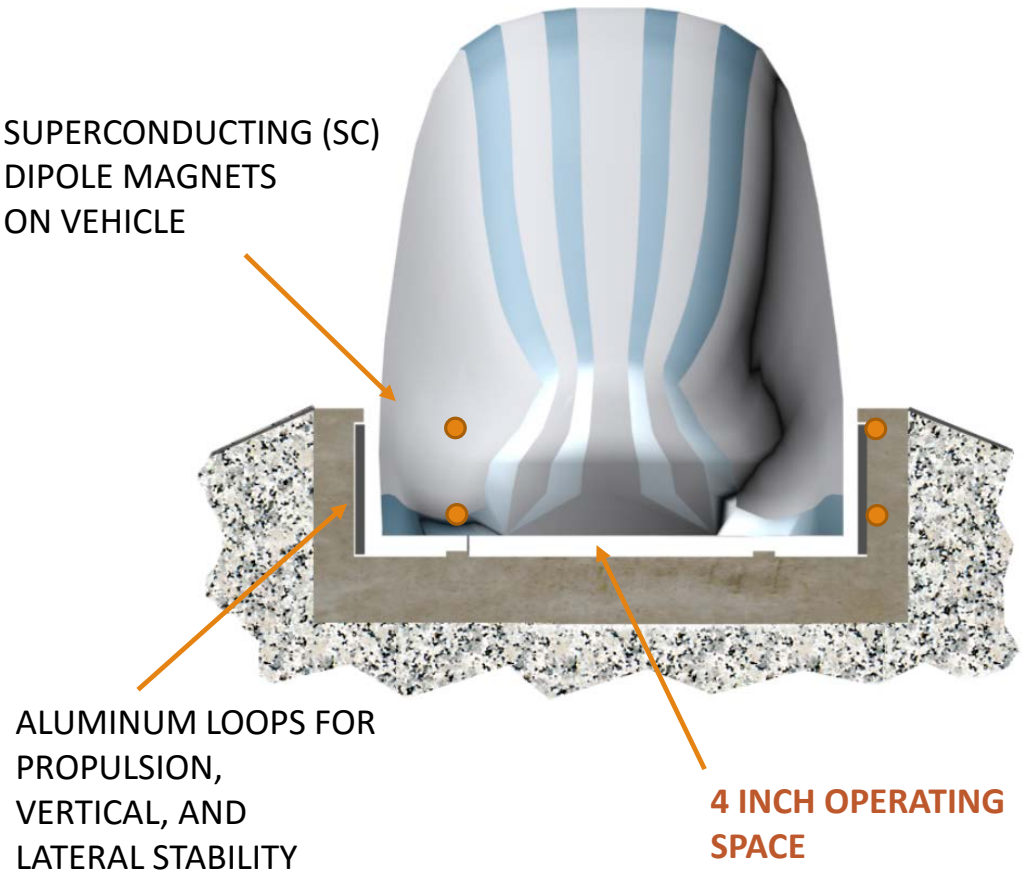
- The *Acela Express* is the only high speed rail service in North America that exceeds 125 mph.
- The Amtrak Acela service started in 2000 and is certified for a top speed of 165 mph and reaches a maximum of 150 mph in regular service.
- America's government-run passenger rail service, received $1.4 billion in taxpayer subsidies.
- The *Acela* carried more than 3.3 million passengers in 2011 compared to domestically, **U.S. airlines** carried 642.2 million **passengers**, in 2011
- Study shows that Amtrak loses $32 per passenger
- Amtrak service is often shut-down due to commercial electric power problems

MAGNETIC PROPULSION-EMS



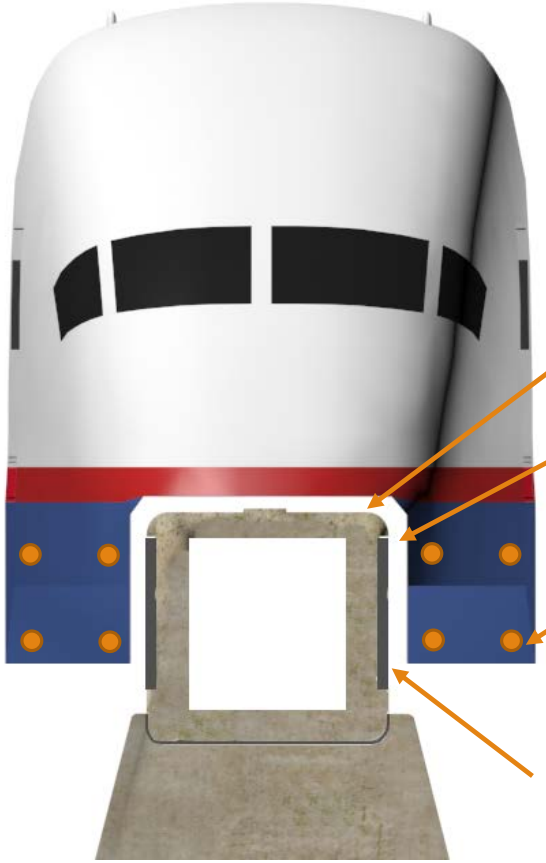
- Shanghai Maglev built by Germany's Transrapid, runs at 268 mph. Daily operation started in 2004. The journey takes 7 minutes and 20 seconds to complete the distance 18.6 miles. A train can reach 217 mph in 2 minutes, with the maximum normal operation speed of 268 mph reached thereafter.
- Record speed of 311 mph
- The electromagnetic suspension EMS uses attractive magnetic force system to levitate.
- Requires emergency battery power in event of power failure
- High construction cost of precision guideway to keep 3/8 inch clearance

JR SC MAGLEV DIPOLE PROPULSION – EDS



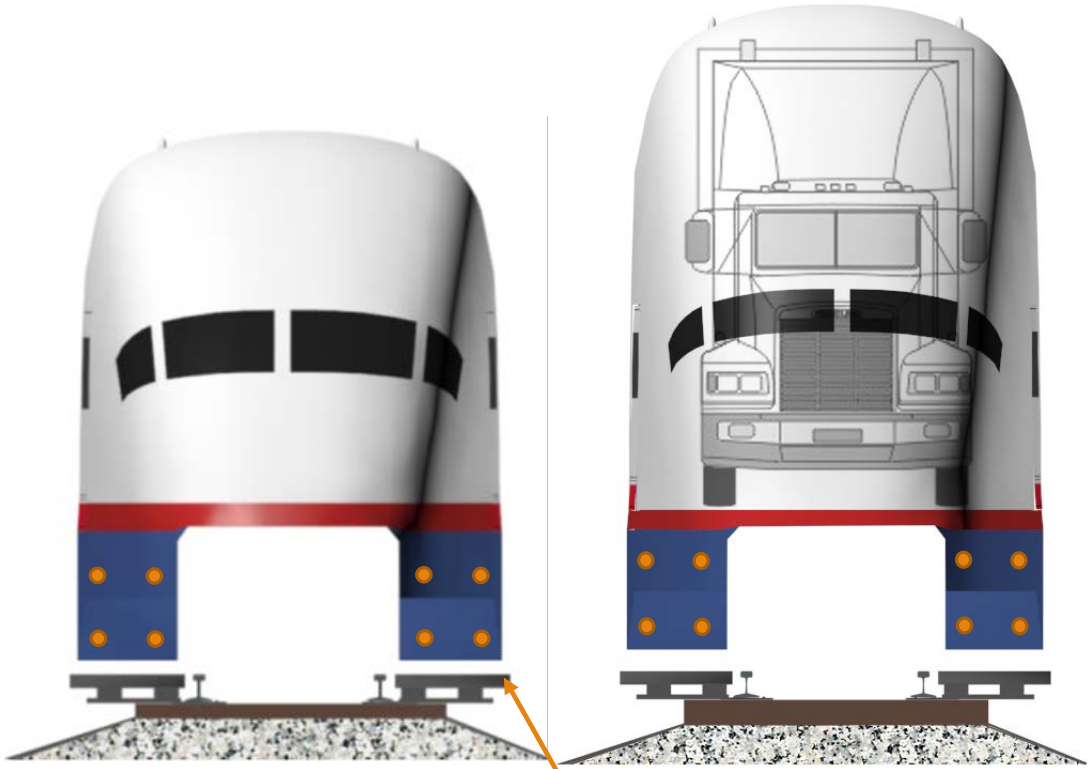
- Japan's Maglev Passenger Transport is based on 1966 U.S. invention by Drs. James Powell and Gordon Danby from Brookhaven National Laboratory.
- 1st Generation Maglev 2000 superconducting (SC) repelling magnetic force system built by Japan Central Railway System, testing began in 1977.
- In December 2003, a three-car Maglev reached a maximum speed of 361 mph, **(world speed record for rail vehicles)**
- The major differences between EDS maglev train and EMS maglev train is EDS maglev train uses repelling force of super-cooled, superconducting electromagnets to achieve 4 inch operating clearance
- U-track disadvantage in heavy rain ice and snow

M-2000 SC MAGLEV QUADRUPOLE – MONORAIL EDS



- Drs. James Powell and Gordon Danby have created 2ND Generation Maglev 2000 System Design
- Hollow prefabricated box beam elevated monorail guideway with polymer concrete panels with aluminum loops to provide vertical lift, lateral stability, and linear synchronous propulsion provides for safe high-speed operations.
- Eliminates overhead catenary/pantograph
- Superconducting (SC) quadrupole magnets can run even after the power supply has been shut off, for example in the event of a blackout.
- It's 4 inch operating clearance can operate in ice and snow conditions. The 4" gap allows ground movement such as caused by earthquakes.

M-2000 SC MAGLEV QUADRUPOLE – PLANAR EDS



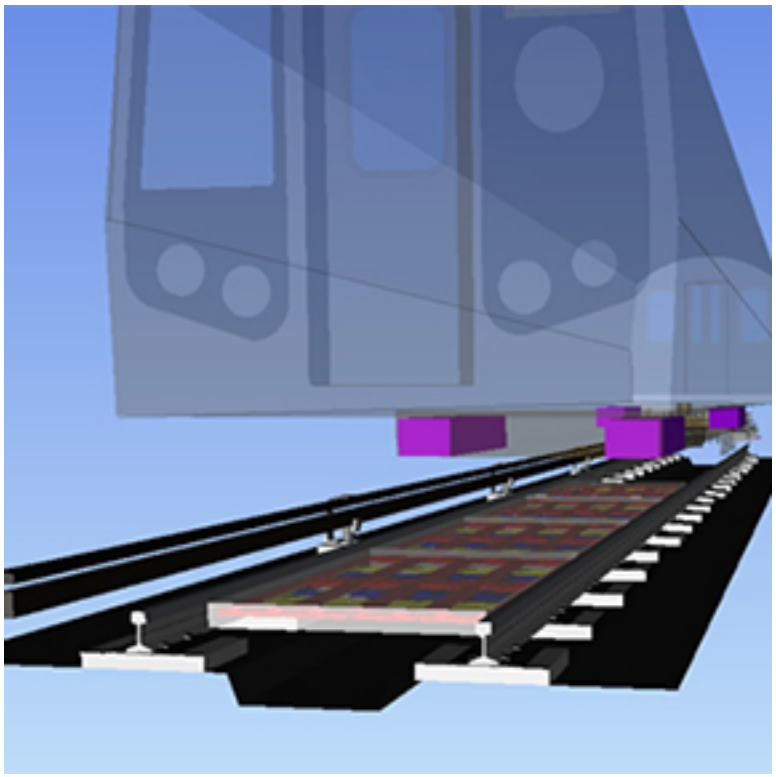
Passenger Vehicle

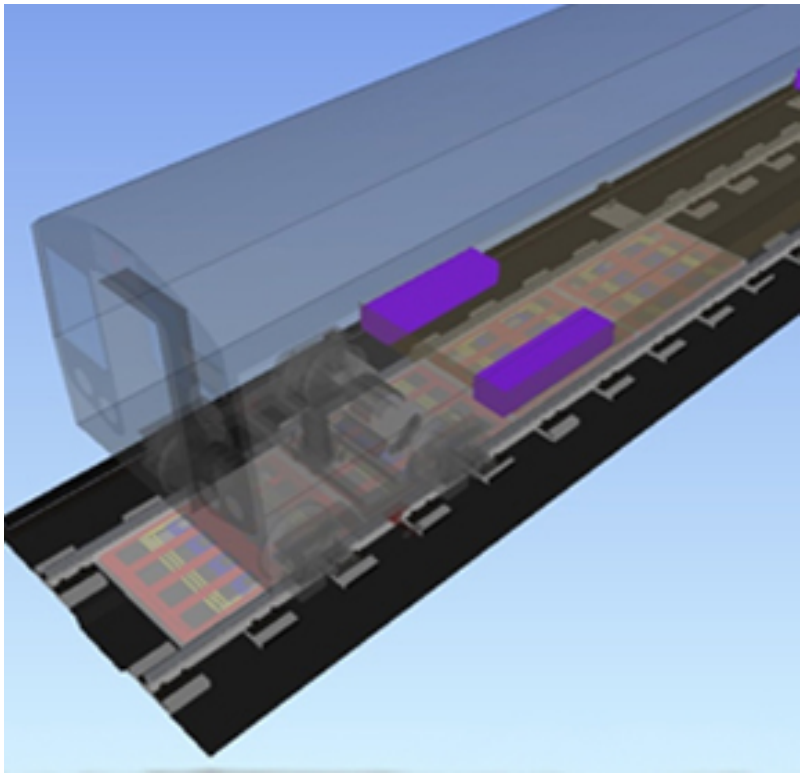
Freight Vehicle

ALUMINUM LOOPS IN POLYMER CONCRETE PANELS FOR PROPULSION, VERTICAL, AND LATERAL STABILITY

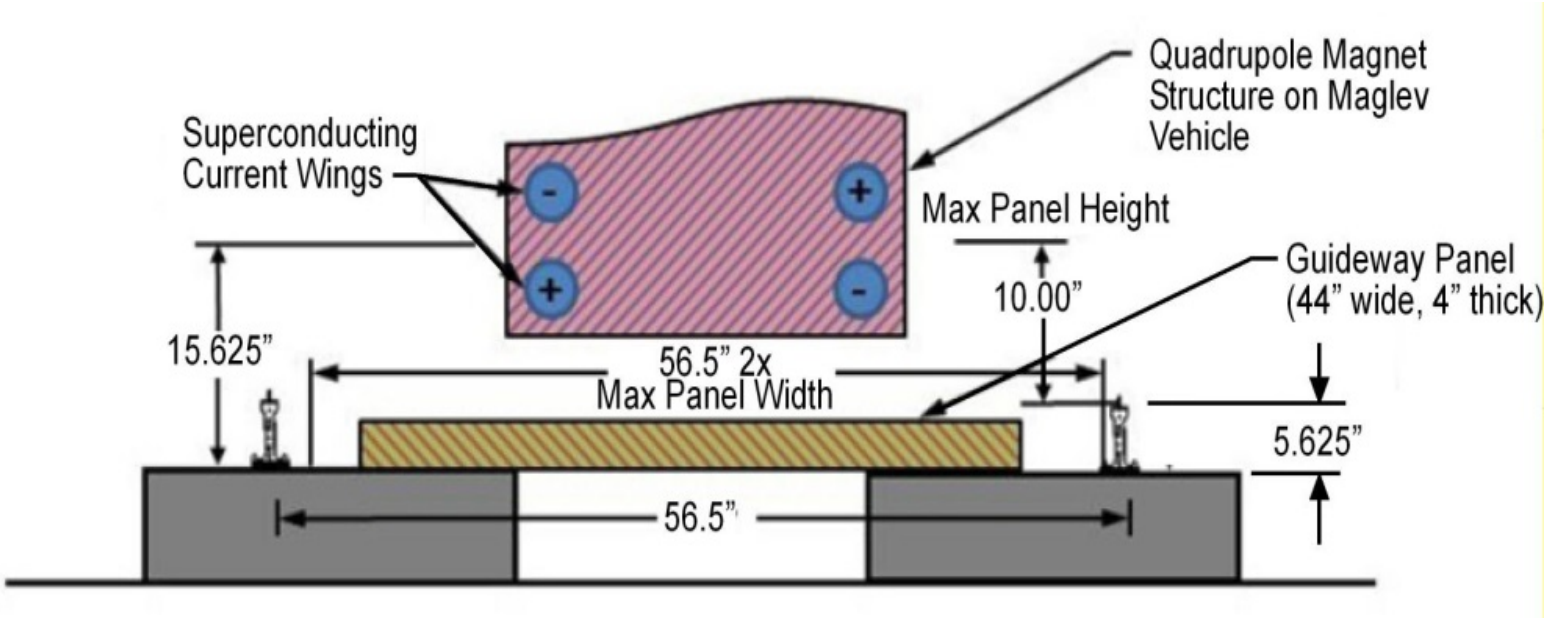
- Quadrupole Magnets permit using existing railways and infrastructure with little modification
- Less expensive than elevated monorail guideways
- Less disruptive when accessing built up metropolitan areas
- Maglev can transition from high speed monorail guideways to planar mode with ease.
- Compatible with Maglev 2000 passenger or freight carrier vehicles
- Operating in on-grade planar road rather than elevated mode slows speeds for safety

NEW YORK CITY SUBWAY ADAPTED TO MAGLEV

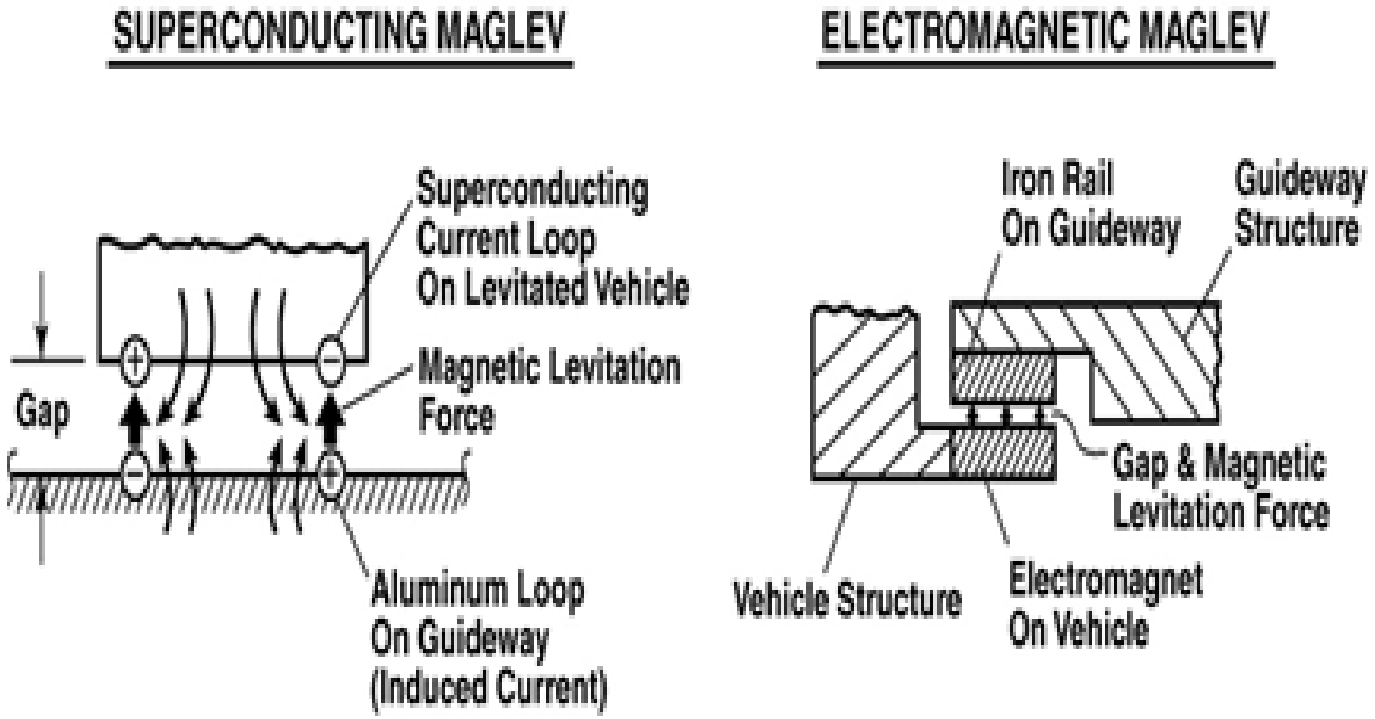




CROSS SECTION DRAWING OF NEW YORK CITY SUBWAY TRACK WITH ATTACHED MAGLEV GUIDEWAY PANEL AND VEHICLE QUADRUPOLE MAGNET ABOVE IT



GAP ADVANTAGE:
REPELLING FORCE VS ATTRACTIVE FORCE



WHY SUPERCONDUCTING (SC) MAGLEV?

- Maglev eliminates rolling friction and is therefore more efficient than steel-wheeled guided surface transport.
- Superconducting Magnets eliminate electrical resistance and are much more powerful than conventional electromagnets.
- Conventional electromagnets of equivalent strength to superconducting magnets would melt the magnets.

WHY 300 MPH INTERCITY TRUCKING?

- Highway Damage by Trucks is Equivalent to 9400 Autos.
- Average Cost of Trucking is 30 cents per Ton mile Compared to SC Maglev at 10 cents Per Ton Mile.
- Highway Freight Trucks Average 50 mph.
- Trucks are Often Slowed by Weather and Congestion.

MAGLEV ECONOMICS

- Savings of $1,000 Per Capita in Reduced Cost of Goods Delivered and Reduced Travel Fares
- 5 cents per passenger mile, & 10 cents per ton mile based on
- Much Faster Construction with Factory Built Guideway Components
- Much Lower Operating Costs of Superconducting Magnets by Avoidance of Rolling-Friction of Rails and Much Greater Efficiency & Regeneration of Electricity to Grid When Braking.
- Much Lower Maintenance Costs Compared to Heavier Steel-wheel Rail Systems and Catenary for Electric Current Transmission

INTERNATIONAL COMPETITION

"This is the story of a contest almost no one is watching. At stake is the preeminence in the production and sale of a revolutionary new mode of transportation. It is called Magnetic Levitation-Maglev for short. It will define the coming century much as the railroad defined the last one, and the automobile and airplane have defined this one." Daniel Patrick Moynihan, 1989

Japan

Germany

China

Korea

United States is not competing.
It has <u>not</u> funded a test facility like those funded by the governments of Japan, Germany, Korea, and China

GERMANY'S INVESTMENT IN TRANSRAPID 19.5 MILE TEST FACILITY

JAPAN'S INVESTMENT IN YAMANASHI 26.6 MILE MAGLEV TEST FACILITY

MERKEL RIDES MAGLEV TRAIN AFTER SHANGHAI TOUR

GOV.cn Wednesday, May 24, 2006

Accompanied by Chinese Vice Premier Zeng Peiyan (R), German Chancellor Angela Merkel rides the maglev (magnetic levitation) rail line in Shanghai, east China, May 23, 2006.[Xinhua Photo]

Angela Merkel finished her maiden trip to China as German Chancellor with a cruise on Shanghai's futuristic Maglev train yesterday.

Merkel's business-centred visit concluded with her riding from Longyang Road to Pudong International Airport on the Siemens-made magnetic train.

After clinching 19 major business co-operation deals on Monday, Merkel met members of the German business community in Shanghai during her 16-hour long visit to the city, making sure they were the first to know about the freshly inked agreements.

"You have already done a good job in Shanghai," Merkel told them. "The 2010 Shanghai World Expo is a good opportunity for you, too."

The Japan Times NEWS

NATIONAL

Daschle rides maglev in push for U.S. version

KYODO, JIJI

ARTICLE HISTORY | NOV 17, 2013

NAGOYA – A former senator advising a U.S. maglev advocacy group rode one of the magnetically levitated trains on Saturday on a test track in Yamanashi Prefecture.

Tom Daschle, who is advising The Northeast Maglev group, praised the quality of the Central Japan Railway Co. train after taking a ride at speeds of 500 kph.

TNEM is lobbying for a maglev system to be built between New York and Washington in conjunction with the railway, better known as JR Tokai.

"We'd like to share the technology as a symbol of Japan-U.S. cooperati
will be an international standard that can be adopted anywhere in the
Chairman Yoshiyuki Kasai.

House of Japan

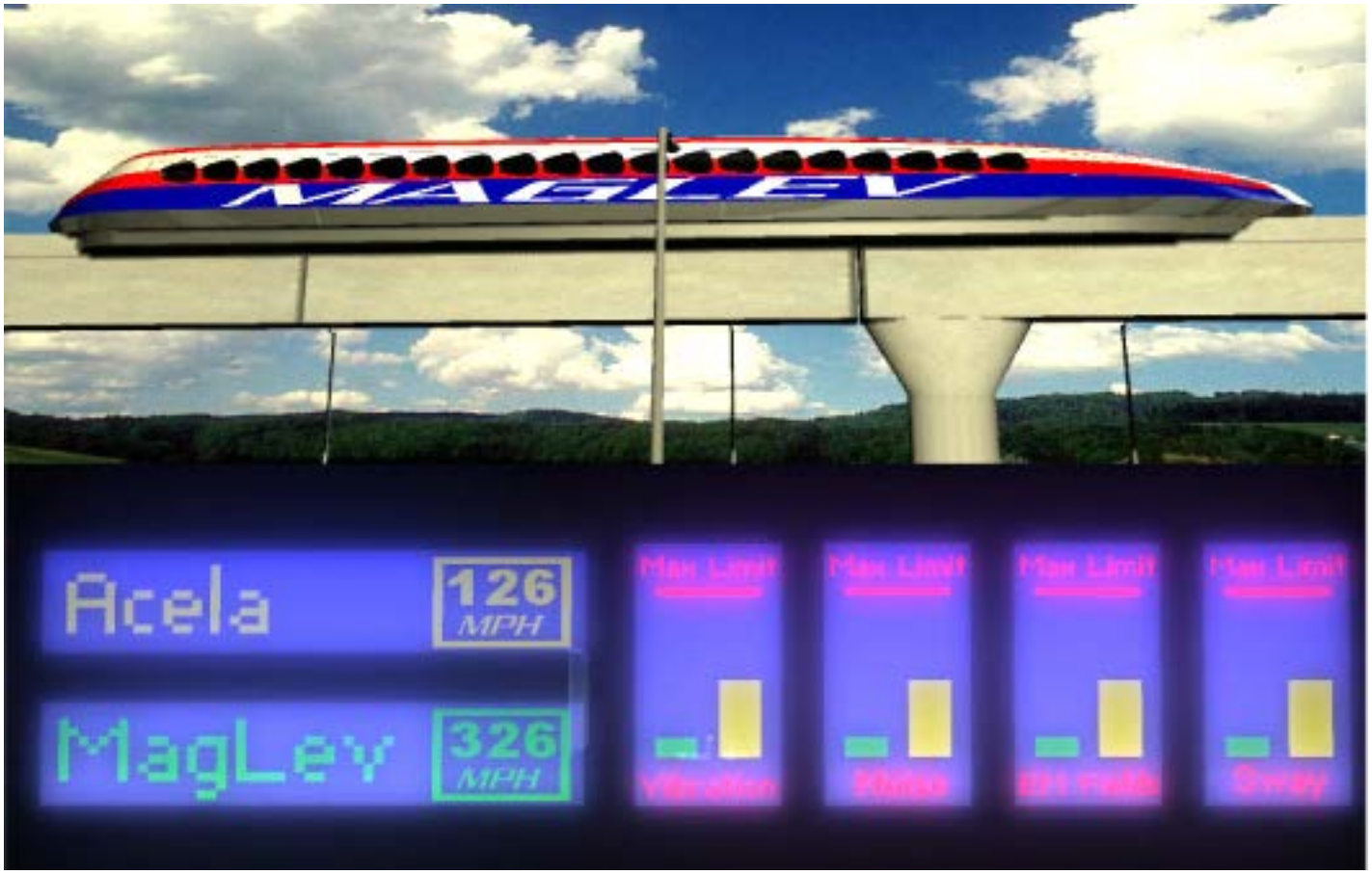
JAPAN NEWS AUTO TECHNOLOGY CULTURE TRAVEL CUISINE . ALL YOU NEED TO KNOW ABOUT JAPAN!

JR TOKAI MAY OPEN NEW MAGLEV TRAIN STATION BEFORE 2020 OLYMPICS

Central Japan Railway Co. is considering opening a new station for its magnetically levitated trains in Kofu in Yamanashi Prefecture, west of Tokyo, ahead of the 2020 Tokyo Olympics, according to a source familiar with the matter.

AERODYNAMIC DESIGN

An artist's drawing of an aerodynamic design. A 300 mph Maglev vehicle experiences only atmospheric drag. There is no rolling friction since the Maglev vehicle uses the repelling force of magnetism to travel more than 4 inches above the guideway panels, which are shown here mounted on the side of a prefabricated concrete beam.

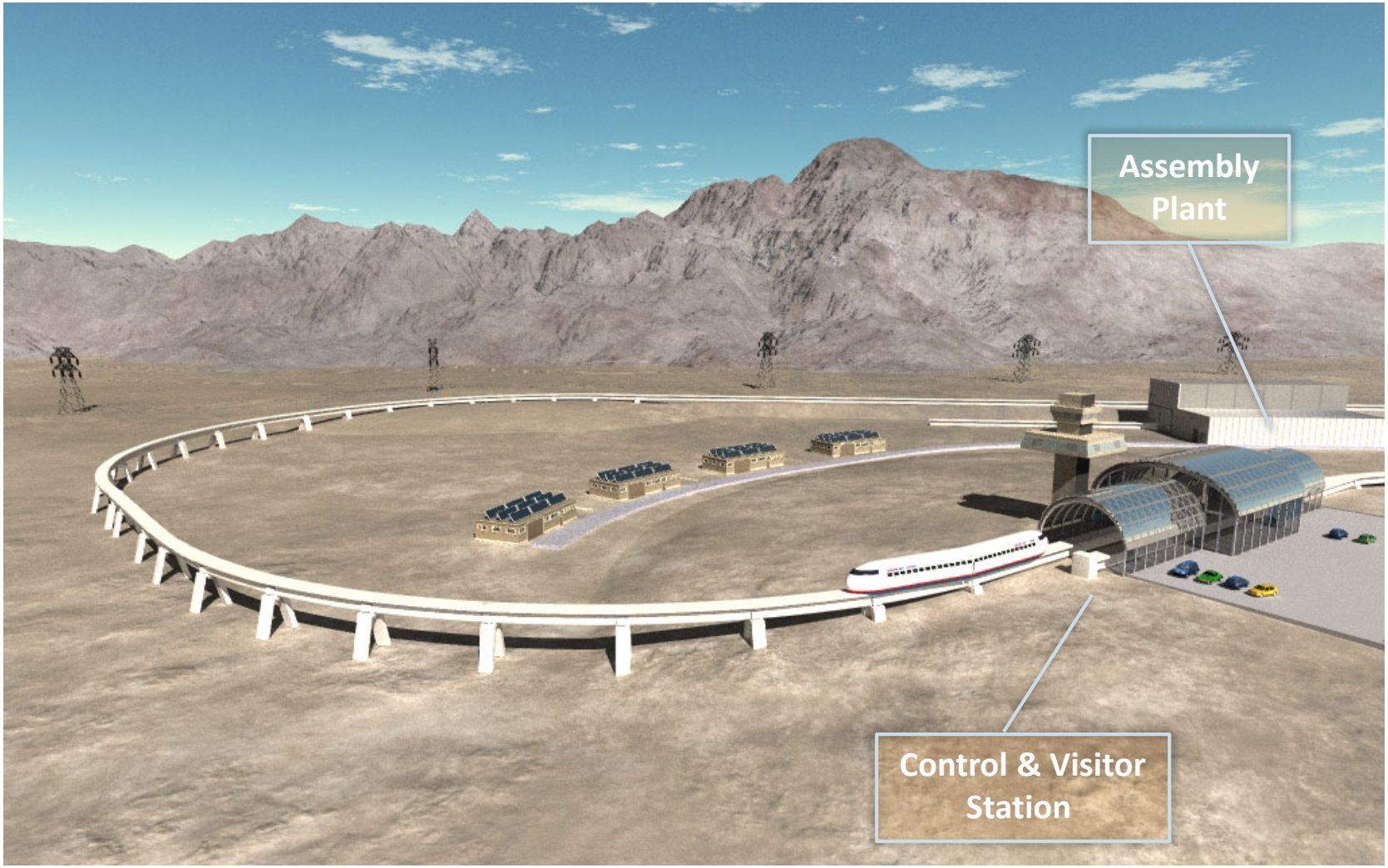


SURFACE TRANSPORTATION ACT REAUTHORIZATION

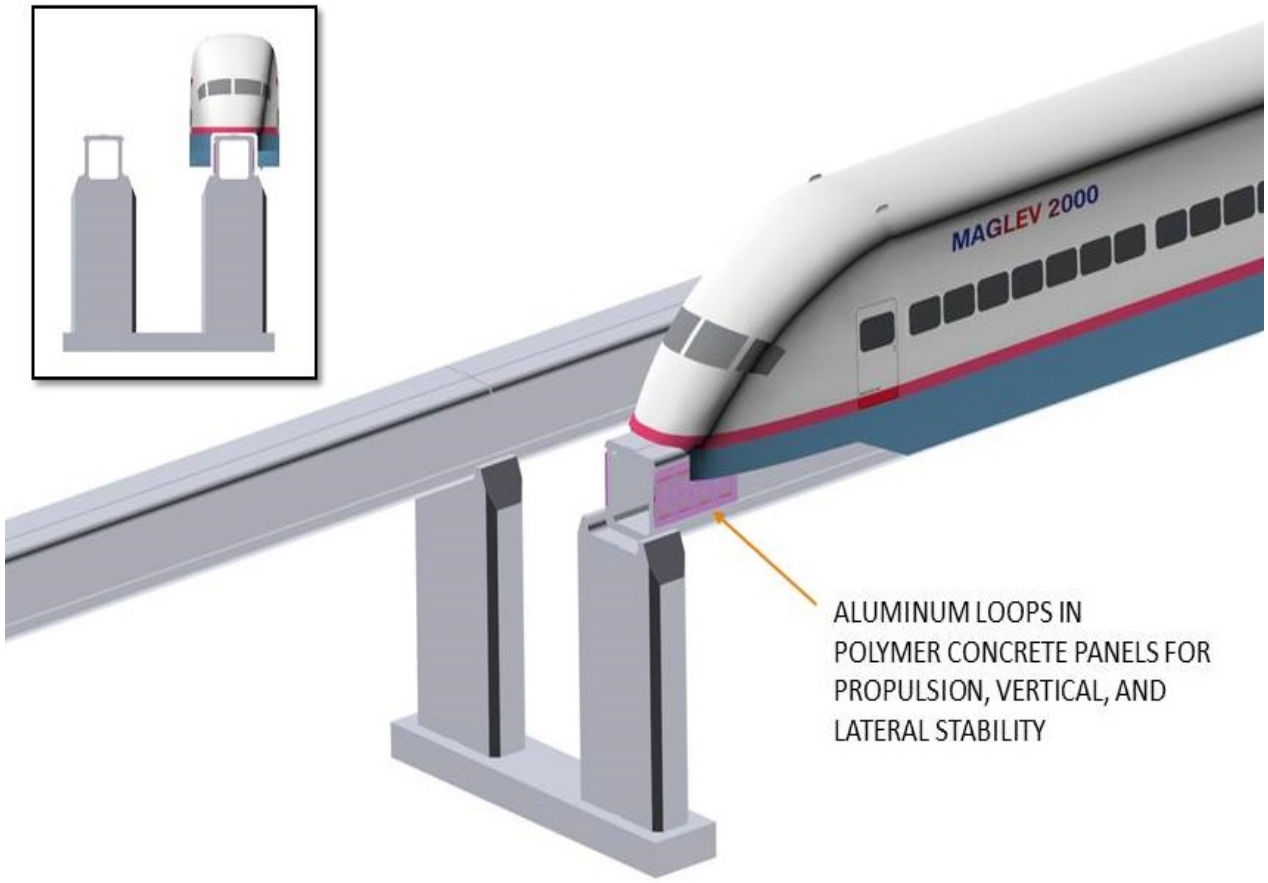
Proposed Amendment to Establish a Maglev Transportation Technical Testing Program

Implement, to the maximum extent practical, preliminary qualifications of magnetically levitated (Maglev) guideway gage standard, including lowest cost potential for two-way elevated narrow-beam superconducting repelling force Maglev guideway system with capabilities for carrying tractor-trailer type highway freight trucks and freight containers, high-speed electronic switching, dual-use of conventional railway trackage and deployable along the rights-of-way of highways, railways, and power lines consistent with section 302 of Title 49, United States Code; provided that the Secretary of Transportation in collaboration with Department of Commerce, National Institute of Standards and Technology shall establish a five-year engineering development, demonstration and technical testing program to competitively test preliminary maglev guideway gage standards and establish these standards by rules issued not later than 6 years from the date of enactment of this paragraph.

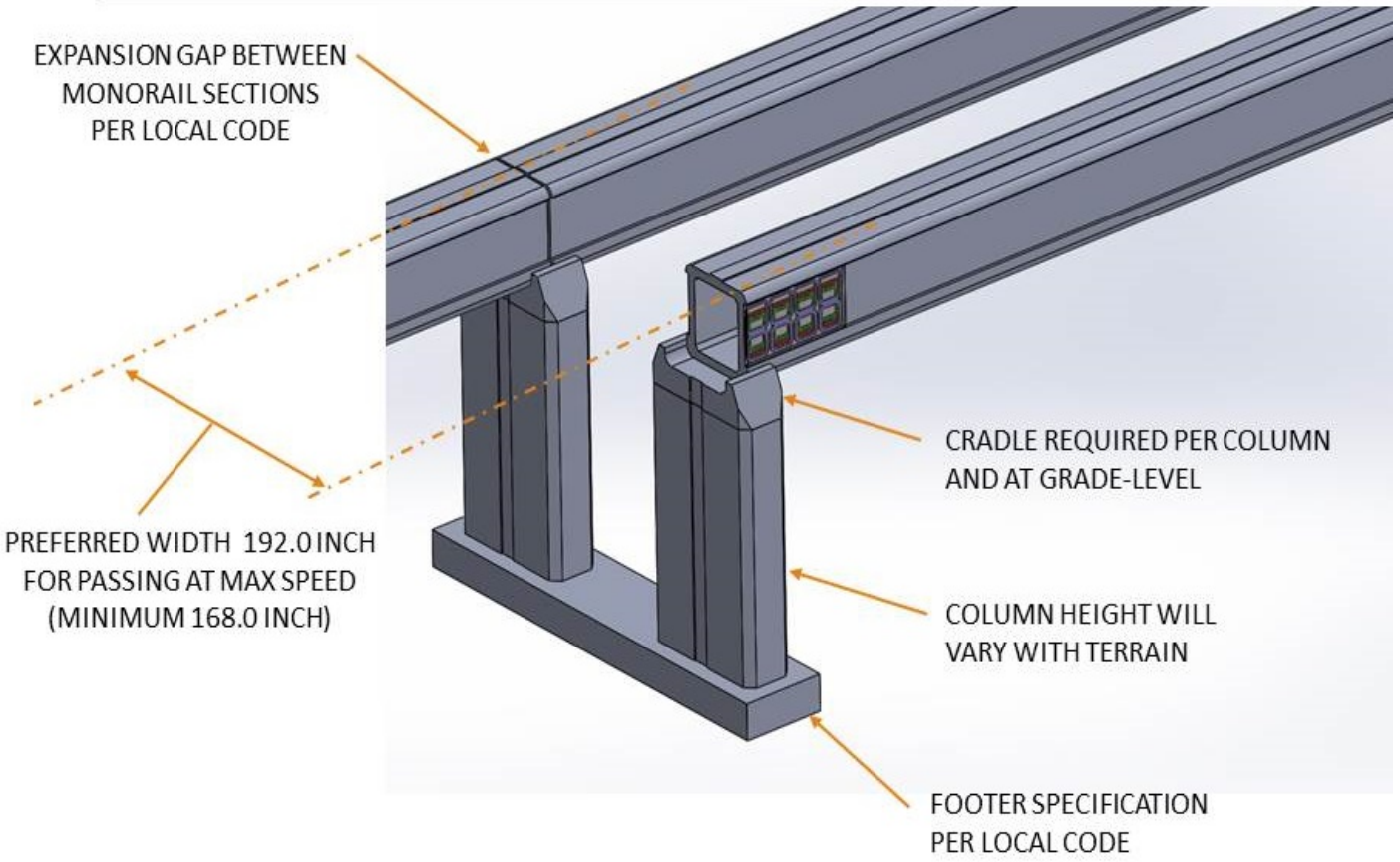
SC MAGLEV TEST & CERTIFICATION FACILITY CONCEPTUAL VIEW



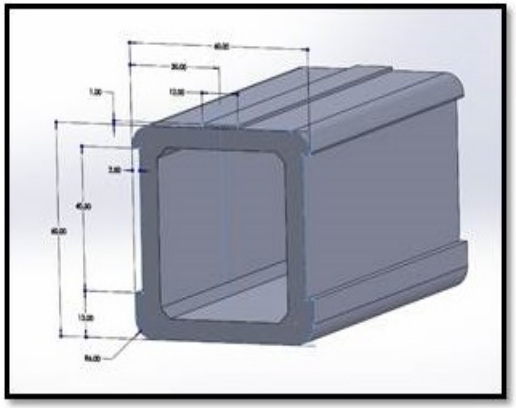
DUAL/BIDIRECTIONAL MONORAIL CONFIGURATION



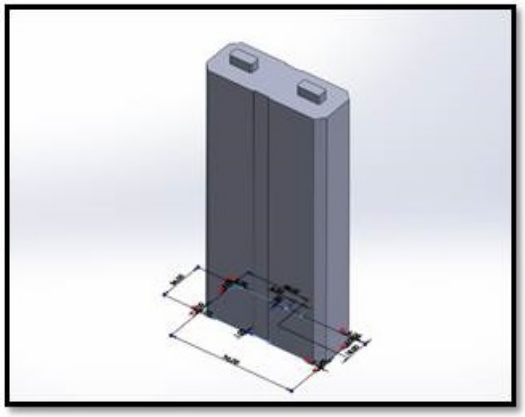
MAGLEV TEST FACILITY COMPONENTS



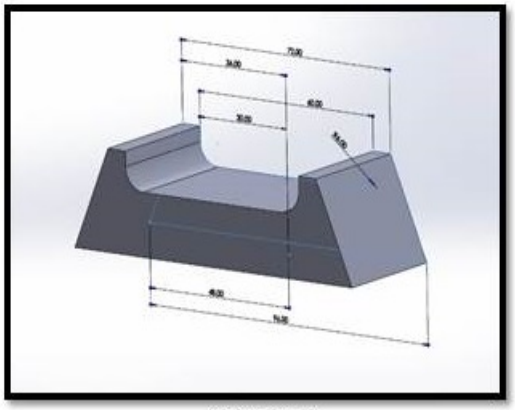
PREFABRICATED GUIDEWAY COMPONENTS



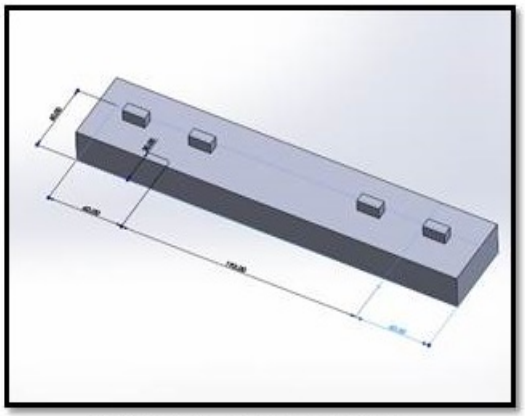
MONORAIL BEAM



COLUMNS

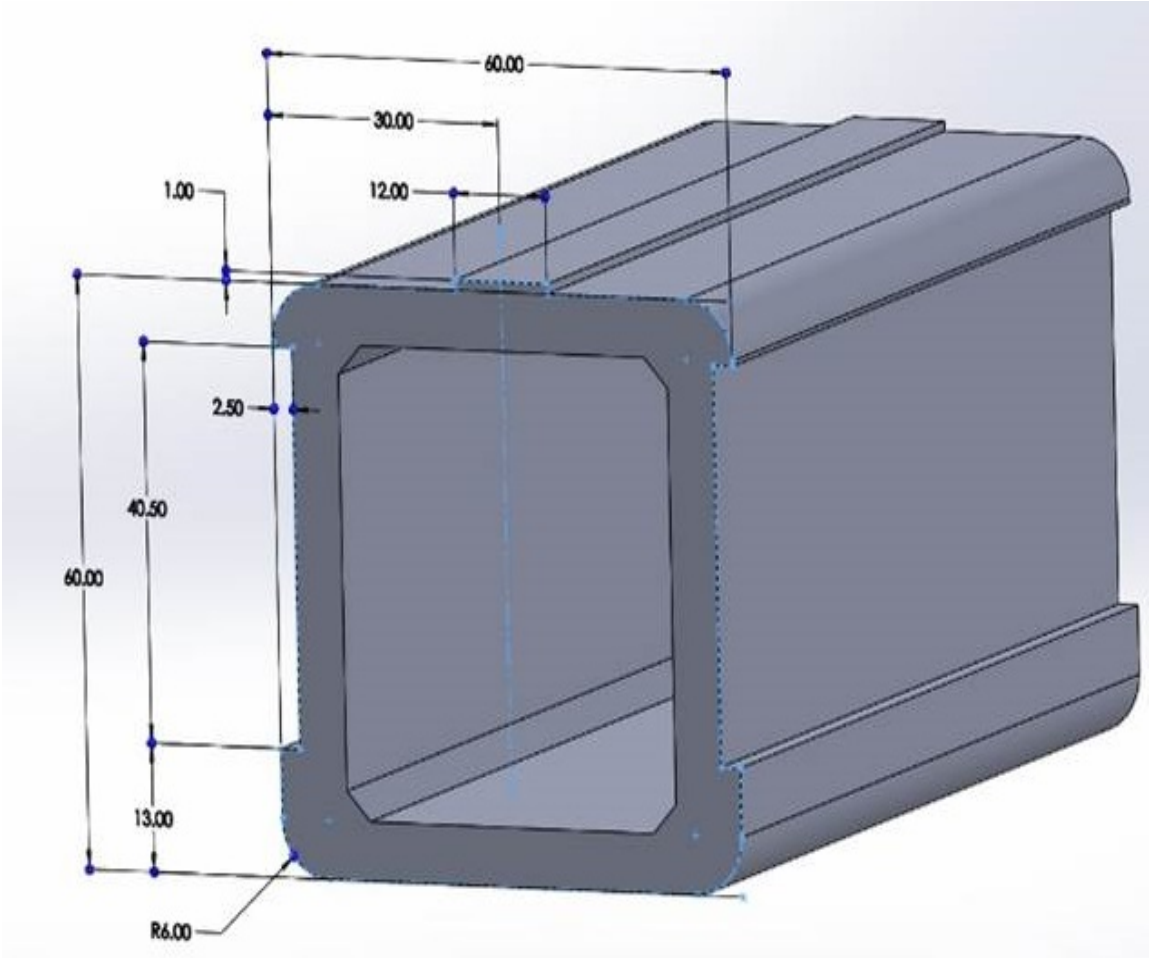


CRADLE

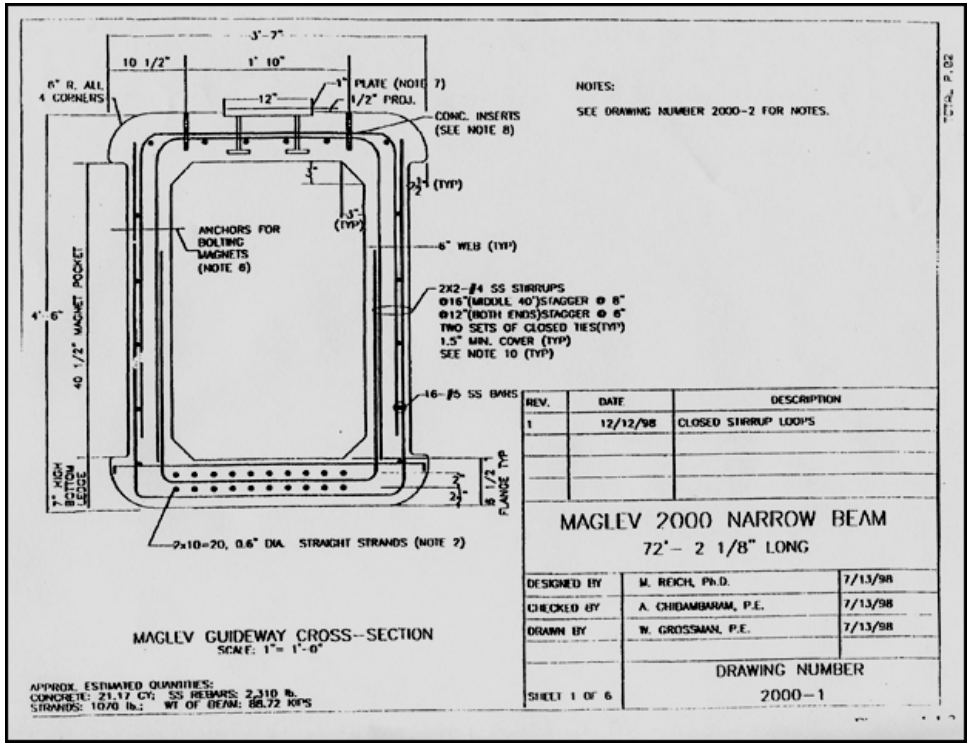


FOOTER – TWO TRACK

POST TENSIONED PRE-STRESSED CONCRETE BEAM

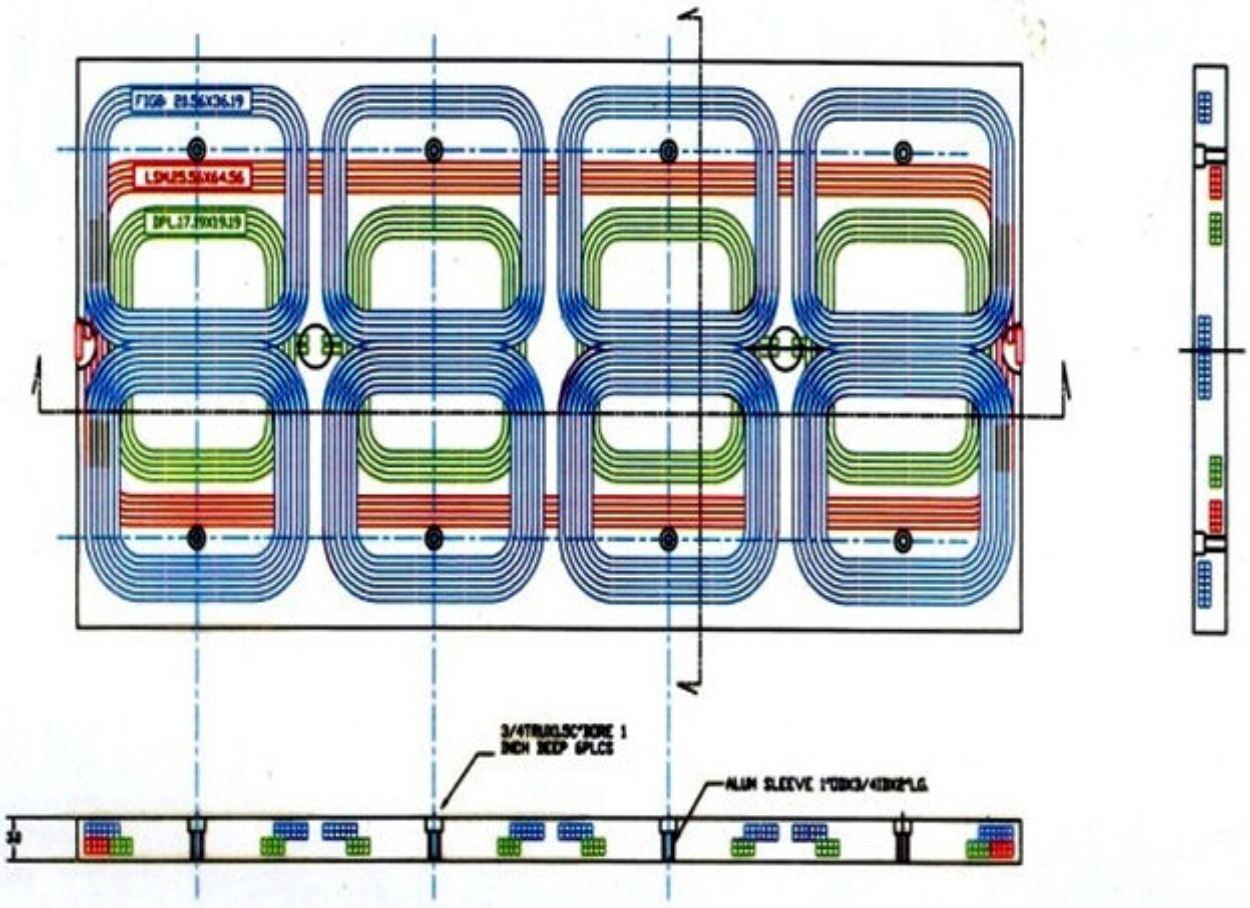


MONORAIL GUIDEWAY BEAM DESIGN

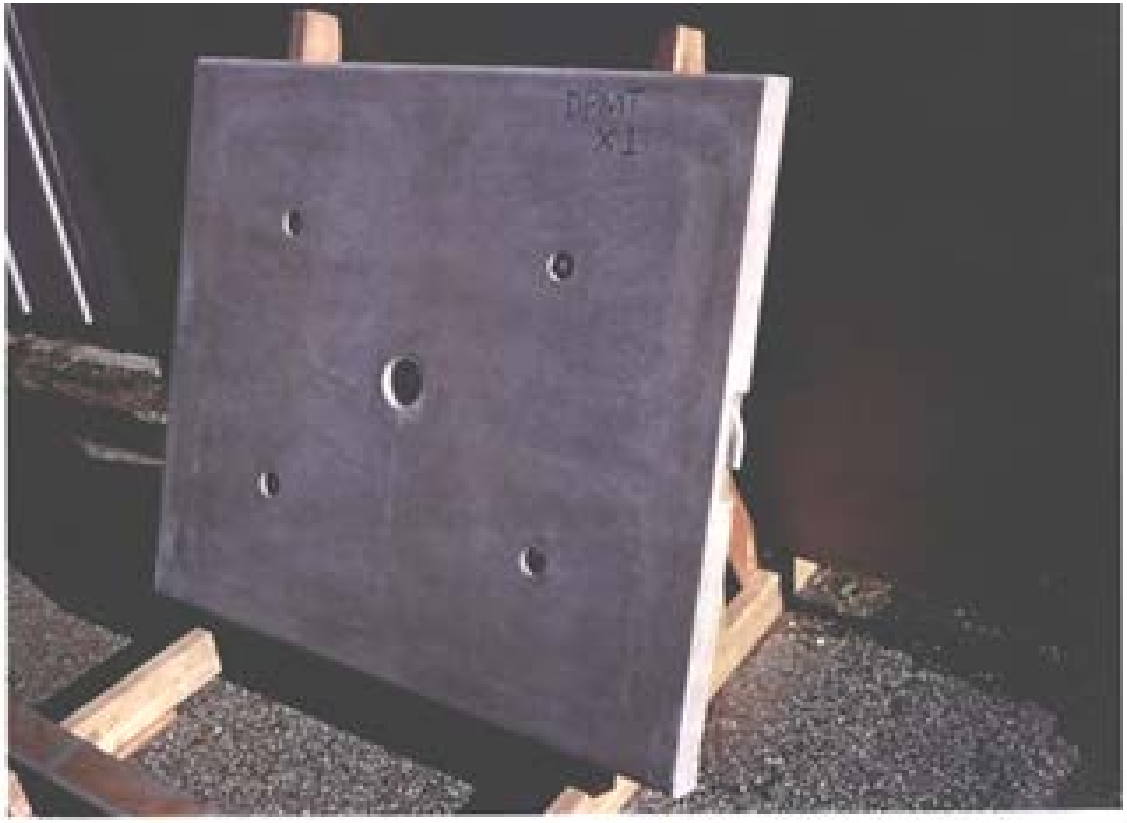


ACTUAL BEAM FABRICATED IN NJ AND SHIPPED TO FLORIDA

ALUMINUM COILS FOR LEVITATION AND PROPULSION

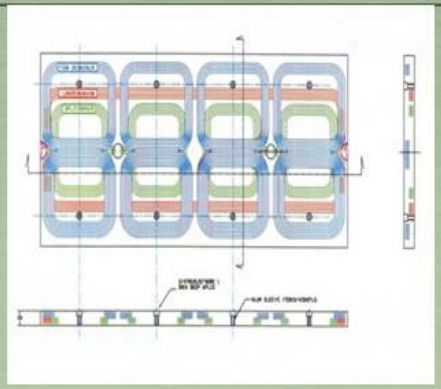


ALUMINUM COILS ENCAPSULATED IN POLYMER CONCRETE (CUT TO SHOW WIRE)

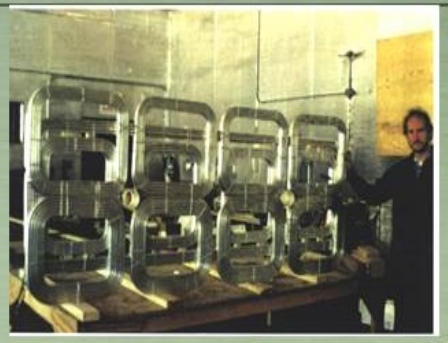


GUIDEWAY PANELS

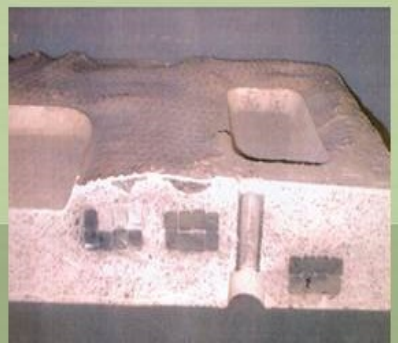
Drawing of aluminum loop guideway panel providing vertical lift and stability, and linear synchronous propulsion



Completed Guideway Panel with Figure of 8 Dipole, and LSM Propulsion Loops



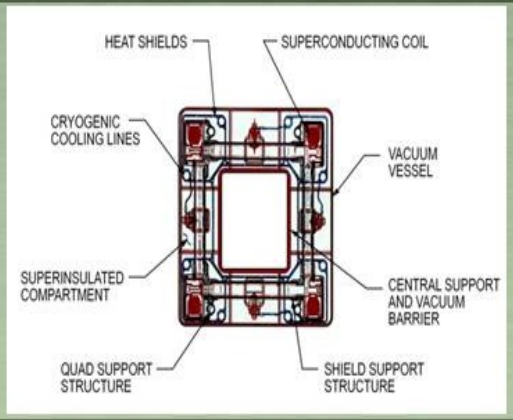
Guideway Loop Panel Encased in Polymer Concrete Matrix



Polymer Concrete Panel with Enclosed Aluminum Loop Exposed for 2 years to Outdoor Environment with Multiple Freeze-Thaw Cycles

QUADRUPOLE MAGNET MODULES

Cross Section of Quadrupole Magnet With 2 Superconducting Loops of Opposite Magnetic Polarity Enclosed in Cryostat

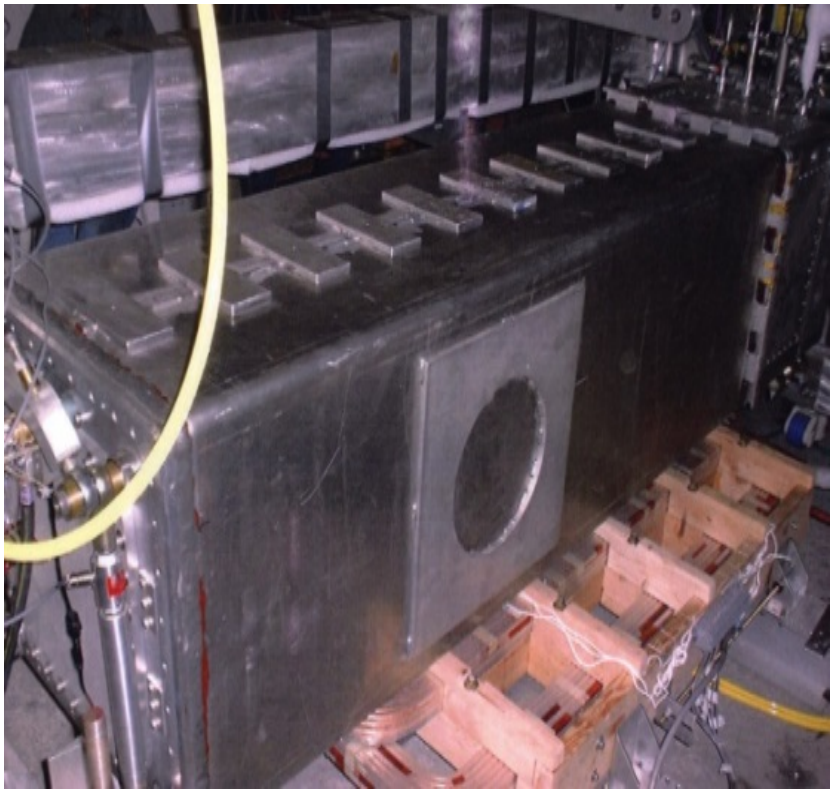


NbTI Superconducting Loop for Maglev 2000 Quadrupole. 600,000 Amp Turns Capability

NbTi Superconducting Loop Enclosed in Stainless Steel Jacket that Contains Liquid Helium Coolant

Assembly of Maglev 2000 Superconducting Quadrupole into Cryostat– Successfully Tested at Design Current of 600,000 Amps

QUADRUPOLE MAGNETS IN INSULATION



CONSTRUCTION TECHNIQUE SIMILAR TO D.C. SILVER LINE