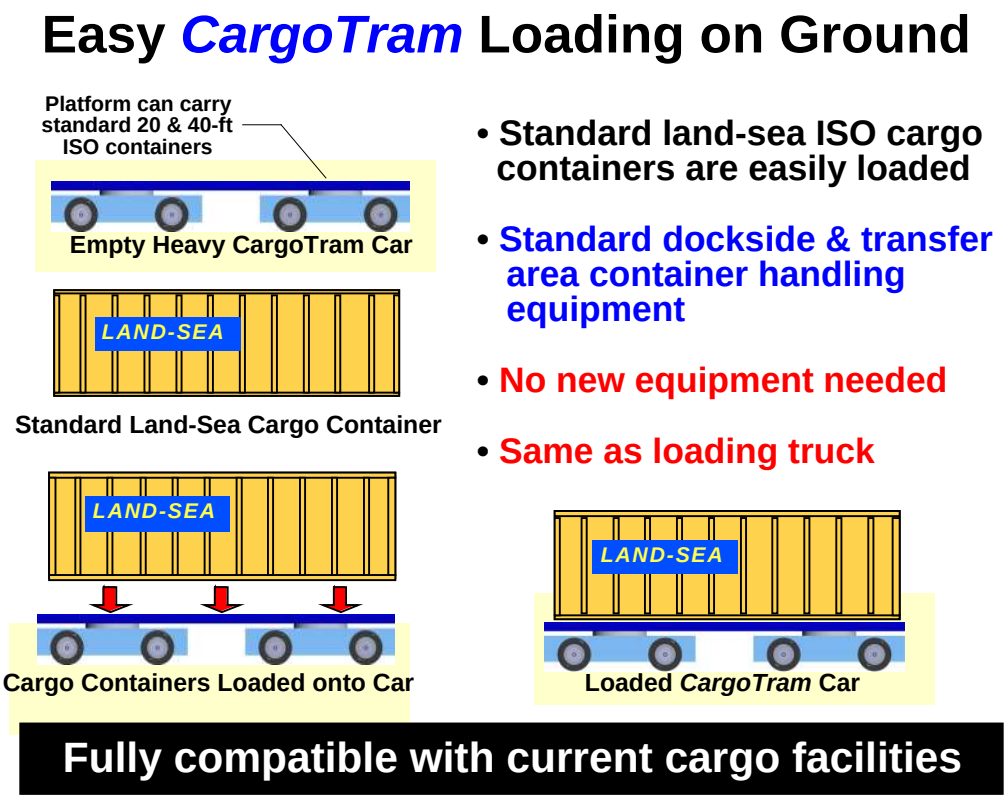
ROAM TRANSPORT SYSTEMS *21st CenturyTransport*

CargoTram™ Updated Port Area Operating Plan

1. Port Area and Rail Intermodal Center Internal Operations

The following decribes the general operating plan for use of CargoTrams both within ports and within railroad intermodal centers.

In both port and railroad intermodal centers, CargoTrams operate in essentially the same manner as current heavy diesel trucks and serve the same points in these types of locations. Loading and unloading of carrier vehicles of trams is accomplished as illustrated below. No new or special equipment is necessary.



There are three major differences between cargo movement via truck and via CargoTrams and they are as follows:

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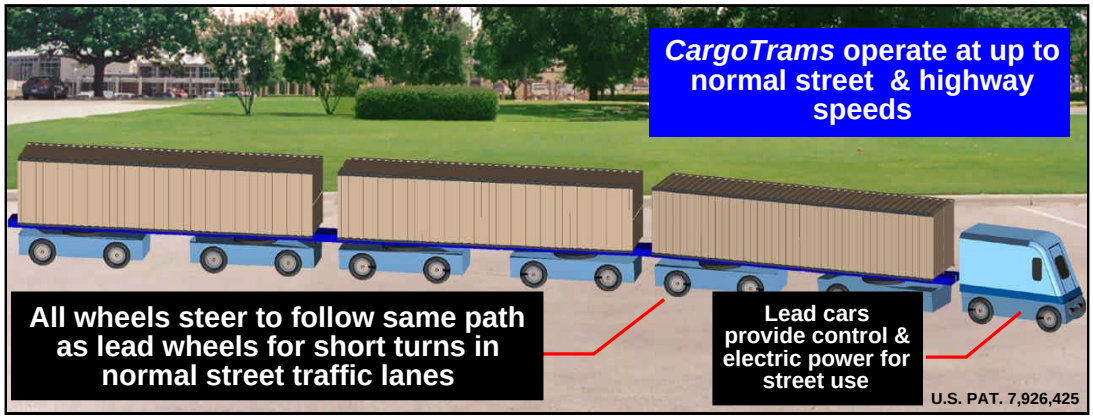
1.1 Instead of standard truck tractor with a single trailer carrying a single container, CargoTrams consist of a lead vehicle that supplies electrical power to electric motors in up to five container carriage vehicles that are coupled together and to the lead car. Thus a single tram with a single driver can move five times as many containers as a truck with near-zero pollution. The CargoTrams are capable of operating within the port and railroad centers and on local streets in the same manner as large trucks as illustrated below.

Port, Transfer Facility & Street Operation

Containers move on hybrid powered dualmode trams



Dualmode *CargoTrams* operate in port, rail yards, on streets & roads as trucks
Three-car tram shown – Longer or shorter trams may be used
(Three-car trams provide 70,000 containers / day rail capacity)

No new dockside or transfer terminal installations

1.2 Steering of the of the lead car front wheels is supplied by the operator in the lead car. Steering for the rear wheels of the lead car and all wheels in the cargo carrier vehicles in the tram by on-board control systems. These control systems steer each set of wheels following the front wheels of the lead car to follow the same track on the ground thus allowing much smaller radius turns than possible with typical heavy trucks. This reduces the current space that is required to maneuver large trucks

1.3 The electrical power to operate the trams is supplied by a combination of batteries charged during SuperWay™ operations and then re-charged as

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needed by a CNG-powered generator in the lead car. No diesel exhaust products are produced!

It is very important to realize that because of the above type of operation, it is not necessary to install any sort of complex and costly overhead superway system in either location. Neither type of facility is cluttered with such elevated superway. Such superway would (1) require use of valuable space for support piers and (2) possibly interfere with operation of other facility equipment such as cranes, etc.

CargoTrams can be used both for movement of containers (1) between the dock and sorting areas and (2) between the sorting areas and remote rail intermodal centers just as trucks do this job today.

2. Operations between Ports and Rail Intermodal Centers

The following decribes the general operating plan for use of CargoTrams under superway-supplied electric power on elevated superways between ports and railroad intermodal centers. Photos of a smaller version of the elevated suprway are provided on the next page.

Between ports and railroad intermodal centers, CargoTrams provide the same transportation as current heavy diesel trucks but without the air pollution and serve the same points in these types of locations. However, there are four major differences and they are as follows:

2.1 Instead of standard truck tractor with a single trailer carrying a single container, CargoTrams consist of a lead vehicle with an operator that controls the entire tram. Thus a single tram with a single driver can move five times as many containers as a truck.

2.2 During superway operations, steering for all wheels is based upon error signals from each wheel location based upon electromagnetic sensing of the distance from steering reference rails located in each side of the superway. A positive backup mechanical interlock steering system assures continued steering control in the event of any failure of the primary electrical/electronic steering system. The only driver control is of speed, braking and selection of switching direction at switch Y-points. The driver

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Attractive, Low Profile Stainless *SuperWay*

Guideways elevated above street & pedestrian traffic - *MicroWay SuperWay* photo

Minimum sky blockage – No wide elevated conventional train shadows

U.S. Patent 6,837,167

assumes steering control as the tram leaves the superway for street operation.

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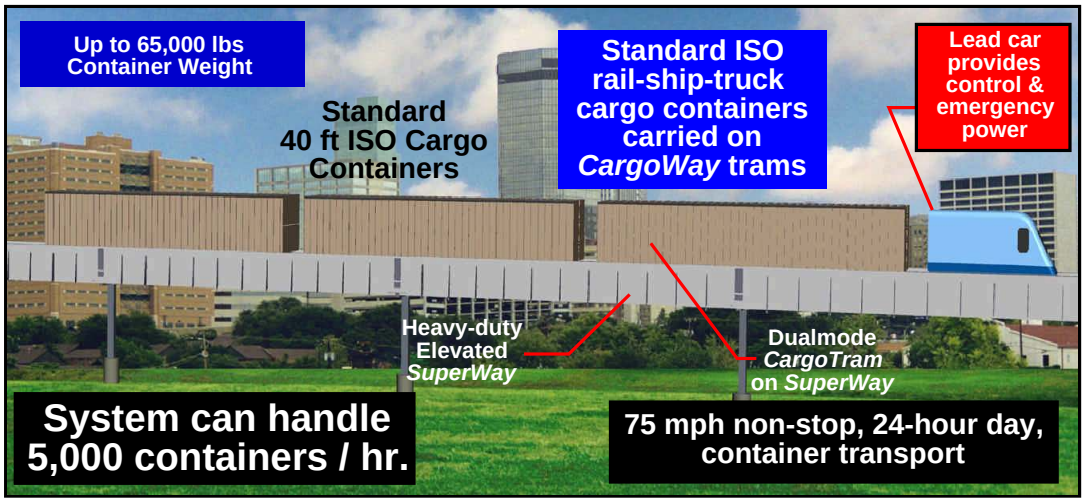
CargoTram™ Heavy Cargo System

Containers on electrically-powered dualmode trams



Three car tram shown – Longer or shorter trams may be used

(Dualmode trams may enter and exit *SuperWay* at MULTIPLE points)

U.S. PAT. 7,926,425

2.3 During superway operation, electrical power from the superway is supplied to the electric motors in the lead car and to each of the five container carriage vehicles that are coupled together with the lead car. No diesel exhaust products are produced! Batteries carried aboard the lead car are re-charged from superway-supplied power so that the trams leave the superway with fully-charged batteries so that short trips from the superway may be accomplished entirely on battery power. The CNG-powered generator in the lead car is used only when the level of the battery charge falls below a certain level. (In the event of a complete power failure, the CNG-powered generator may be used to provide power for the tram while on the superway to avoid the tram needing to sit stalled on the superway.)

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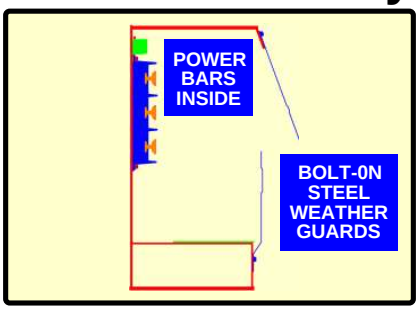
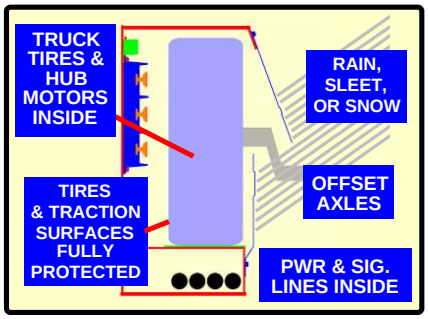
Low-cost, All-weather, Enclosed Wheelways

- **Low-cost wheelways**
  - Parts cut from flat steel
  - Machine-welded construction
  - Low material & labor costs
  - Bolt-in electric power bars
  - Truck guideway sections to site



Single wheelway cross-sections

- **All-weather, wheelways**
  - Wheels & power collectors inside
  - Protected electric power bars
  - Dry & ice-free traction surfaces
  - Safe operation in any weather
  - Whisper-quiet operation



Wheelways & cross-members form self-supporting "U" structure

2.4 Minimum is made of freeways or city streets at ends of the superway. Thus there are minimal delays in shipment from freeway or street traffic problems. On-superway speed is always the same speed set for the superway.

3. Low Energy Use – Lower energy use than for linear motors

Use of permanent-magnet, direct-drive electric motors located inside the wheels results in minimum electrical energy use to propel the vehicles. This type of motor converts 95% of the electrical energy used to mechanical power for propulsion.

Because the mechanical gap between the fixed electrical poles and the permanent-magnet rotor poles of these motors is closely controlled by a common rotary bearing, the gaps are very small. (Small inter-pole gaps in all types of electric motors result in the highest efficiency.) Inter-pole gaps in this type of motor are on the order of from 10 to 20 thousands of an inch!

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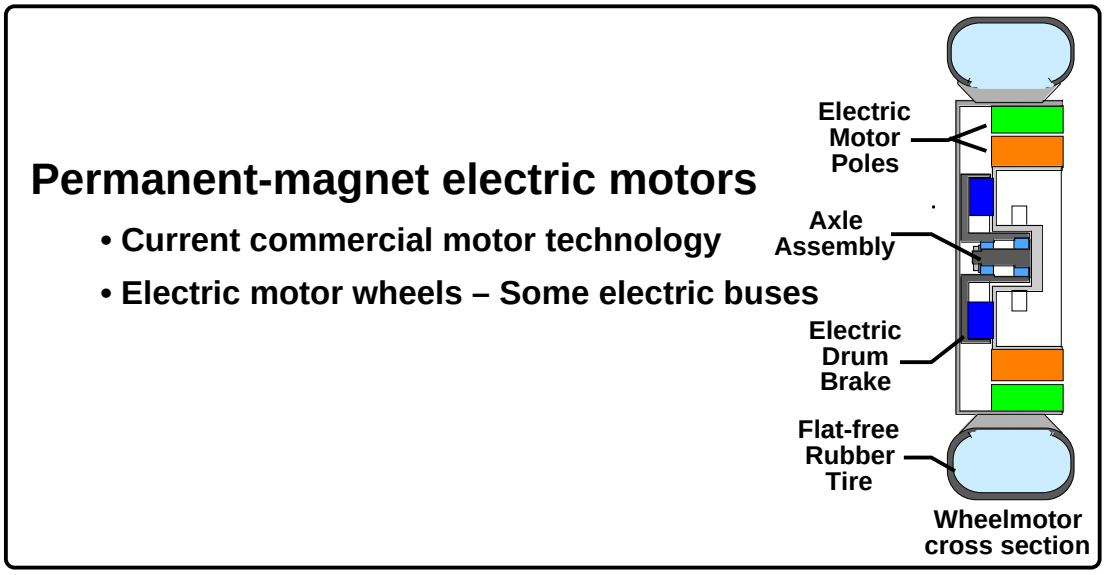

By comparison, the inter-pole gaps between fixed and moving poles of the types of linear motors that must be used in such systems as magnet levitation and steel wheel systems must be much larger to allow for variations in levitation separation in magnetic levitation systems. In steel wheel on steel rail systems, the gaps must also be much larger to allow for wear of steel wheels and rails in the case of steel wheel on steel rail systems.

The amount of energy recovery during motor braking is also higher for the close-tolerance-gap rotary motors, thus leading to higher efficiency during braking. In the case of the motors used in CargoWay™ vehicles, approximately 85% of the kinetic energy is recovered during braking.

The net result is that the electric power used for CargoWay vehicle motors is very low.

4. Possible Future Automated System Growth operations.

The CargoWay system can later become a fully automated system within which individual automated container carriers can be automatically dispatched from the port to a specific destination such as a railroad intermodal center operated by a specific railroad, to large local area

warehouse districts or to distant destinations. Likewise carriers can be dispatched in the opposite direction back to specific ports.

Such automated operation would become practical at such time that it became space and financially feasible to extend superway all of the way to load/unload points both within the ports and the railroad yards. In most cases both the amount of additional superway needed and the impact on load/unload facilities would significant and would likely result in a large cost increase. Should superway be installed in such areas, it could not be allowed to interfere with truck and crane operations.

For automated operation, carriers that would always remain on the CargoWay superway would be required instead of the dualmode CargoTrams previously described. The following illustration shows such an automated carrier with a container on the superway.

The lower illustration shows both an empty carrier with the drag-reducing end caps folded down for movement without a container aboard. This same lower illustration also depicts loading of containers and the manner in which the drag-reduction end caps fold away for loading of the container.

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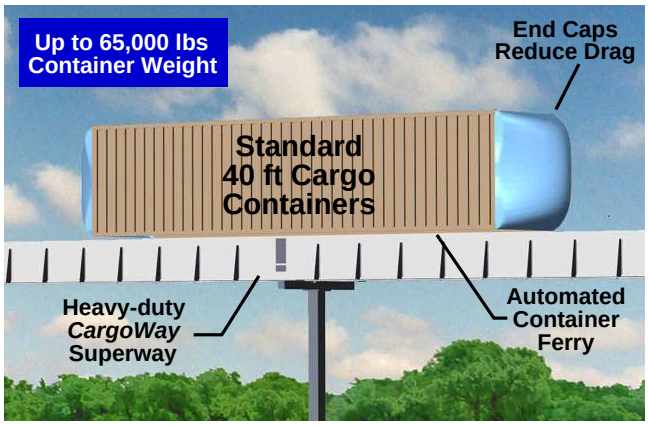
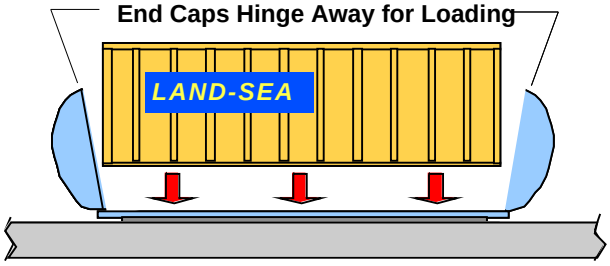


CargoWay™ **ferry with container on *SuperWay***

End caps fold down on empty cars for reduced air drag



Cargo containers loaded onto car

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5. Added Comments

5.1 CargoWay superway is designed to be placed on existent freeway, road, or railway right of way and should require no additional and expensive right of way.

5.2 CargoWay superway components are made entirely of rust-free stainless-steel for zero maintenance. All elements other than the reinforced concrete piers are factory-built and trucked to the site for erection.

5.3 CargoWay superway is designed to maximize the physical strength of the steel members to allow the superway to be produced with a minimum amount of material for very low cost.

5.4 CargoWay uses high-pressure, standard heavy-duty truck tires that operate inside enclosed superway rail tubes on effectively continuous flat steel traction surfaces for very low noise levels and long tire tread life.

5.5 CargoWay vehicles use electric wheel motors and thus have no gearboxes and drive shafts for minimum weight and complexity and low maintenance costs.

5.6 The all-steel, bolted-together superway design plus support of the superway on steel uprights allows the superway to sway in the event of earthquakes without crumbling or falling.

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