

OTG SILVER BULLET HIGH SPEED INTERCITY RAIL

PREPARED BY
OWEN TRANSIT GROUP, INC.

General: Owen Transit Group, Inc. is offering a solution to high-speed intercity travel called the HighRoad Silver Bullet dual-sided high speed monorail. This paper describes the Silver Bullet high speed monorail as an option for grade-separated intercity travel.

Performance and Speed: The Silver Bullet is designed for 214 mph and will achieve 181 mph average speed over a 100-mile route, accounting for acceleration, deceleration and station stops. The Silver Bullet system is a new technology and has not yet been built and tested. When four city stops enroute are put into the planning (to serve a region rather than just end-of-line destinations), the average Silver Bullet speed becomes 153 mph.

Total time of travel for the 100 mile trip becomes 46 minutes for Silver Bullet including station stops. To determine alternative systems' value to a passenger, waiting time in the station (which varies according to the frequency of departure) must be added to the trip time, making Silver Bullet a preferred choice. Frequent departures increase the average speed of the passenger. Silver Bullet can depart more often than the alternatives. Silver Bullet will deliver the average passenger to his destination faster than other forms of transportation, including air travel up to 250 miles.

The Silver Bullet system uses one vehicle of 47 passengers each arriving/departing at short intervals. As brief as 15 second intervals can be achieved by using a patented extended dwell time procedure, resulting in over 10,000 passengers per hour per side. Two vehicle consists can double that capacity.

The Silver Bullet is capable of up to 7 % ascending and descending gradients, made possible by the high horsepower motors and the multiple braking systems provided.

Vehicles: Silver Bullet vehicles are made from advanced aircraft-type composites with steel frames, used for many years by other systems with great success.

The Silver Bullet windows and doors on the guideway side can be used in an emergency for passengers to leave a vehicle via the top of the flat guideway. The flat guideway top also allows rescue personnel to access a vehicle in the event an assisted evacuation is needed. This arrangement also allows another Silver Bullet vehicle on the opposite side of the guideway to attend a stopped vehicle on the guideway and transfer personnel from one vehicle to another.

The Silver Bullet vehicle has a four-point active pneumatic suspension, controlled by accelerometers to achieve an automatically-tilting cabin on higher-speed curves. This suspension system also levels the vehicle cabin in a station to make boarding easier and to make it accessible for wheelchair occupants.

Stations: The standard size for a Silver Bullet station is 50 feet long, with a typical 145 foot width, including platforms, as determined by the standards of the National Fire Protection Association (NFPA/ANSI-130 and NFPA-101), security and personal safety requirements, and compliance with the Federal Law governing accommodations for persons with disabilities (ADA). Silver Bullet stations are accessible from each side of the station and accordingly have two sets of escalators and elevators

The Silver Bullet station could be added to an existing guideway without interruption of service or modification of the guideway beam. The large, well-lit Silver Bullet platform makes passengers visible to the outside through large station end-wall windows. Exterior appearance can be coordinated with the architectural requirements of the community. Stations can also be integrated into larger commercial, governmental or institutional buildings.

Tracks: The Silver Bullet guideway is an elevated pre-stressed and post-tensioned concrete track-beam, using tilting-cabin technology for increasing passenger comfort. Lateral forces on the guideway are carried through the reinforced concrete structure. The lower cost Silver Bullet elevated guideway and tilting-cabin technology provide the lowest cost of construction. Silver bullet switching is accomplished by proven swing-beam and turn-table technologies.

Noise: Silver Bullet systems have rail noise minimized by means of the patented QuietRail system of sound dampening and absence of wheel flanges while still retaining the efficiency of steel wheel on steel rail.

Safety: All designers and operators prefer having safe systems, and will make great efforts to reduce or eliminate risk to people and property. Silver Bullet technology is an adaptation of existing automated elevated automated rail systems which have run for years without safety problems. Operator-controlled high speed trains have good safety records, marred occasionally by collisions and derailments due to equipment (wheel or track) failure or by collisions at unprotected intersections and with other trains. Elevated Silver Bullet systems promise to have fewer safety problems than high speed trains. A special feature of the Silver Bullet system is three levels of braking which allow an emergency braking rate of 3/10 g, or 9.6 fps/s, allowing stopping in just a fraction of the distance required by high speed trains.

The shape of the Silver Bullet guideway provides a wide, flat surface on the top for an emergency walkway accessible from a stopped vehicle in accordance with NFPA/ANSI-130. Additionally, this same guideway top surface allows a rail-guided emergency vehicle (such as an Emergency Medical Service or Fire Department vehicle) to quickly reach passengers in the vehicle. This vehicle can also be used to push a disabled Silver Bullet vehicle to a nearby station or service area.

Materials used in all vehicles must comply with the Federal Transit Administration standards for fire and smoke safety criteria. All vehicles must provide for emergency telephones for passenger use, and have emergency voice speakers for announcing safety instructions to the passengers. The Silver Bullet vehicle also has real-time television cameras and microphones in the cabin for continuous monitoring by security officers

Propulsion: Typical railroad High Speed Rail uses both conventional diesel-electric locomotive drives and electric high voltage motors powered typically from overhead wires. The Silver Bullet system uses standard AC electric motors with digital solid-state controls to provide smooth accelerations, including short-term motor overloading, making available horsepower for acceleration and climbing grades more than that of conventional motors. The Silver Bullet electrical power bars and drive wheels are located below an overhanging portion of the guideway, effectively sheltered from ice and snow.

Braking: Each Silver Bullet vehicle uses regenerative AC motors and solid-state controls to provide 100% braking during normal operation. In addition, the Silver Bullet vehicle has two 100% stand-by pneumatic fail-safe auxiliary braking systems which can apply braking to a fixed braking rail on the guideway, avoiding potential loss of brakes by "heat fade". All three systems are used to provide

emergency braking. The added braking capability of the Silver Bullet system allows safe descent of steeper gradients. The pneumatic brake systems on the Silver Bullet are redundant and fail-safe, so that in the event of power failure or loss of pneumatic pressure the vehicle will quickly brake to a full stop. This braking capacity is greater than that provided by conventional high speed rail systems.

Capital Cost: The recently-publicized California high speed rail line was to have cost about \$60 million a mile, including vehicles, right-of-way and bridges. A Silver Bullet high speed monorail line for the same terrain is estimated to cost about half that amount.

Operating Subsidy: Operating costs for maglev and high speed trains are not known, and estimated subsidies for overcoming operating losses have not been published. Estimates of cost for operating the Silver Bullet are about \$ 201 per vehicle hour, less than the hourly revenues from operation. Using a competitive fare of about \$ 40 (40 cents per mile) for a trip between Atlanta and Chattanooga, net revenue could pay for operating costs and reimbursement of revenue bonds needed to pay for a substantial part of the local cost of construction (with the greater part of the cost from Federal Government sources).

Management/Consultants/Contractors: Providers of maglev, high speed rail and Silver Bullet systems have consultants, contractors and management in place for fulfillment of their offerings. Team members of the firms have national and international credentials in transportation design and construction, and are available for services upon receipt of design/build contracts.

Conclusion: Based on capital costs, operating subsidies, and construction cost reimbursement, the Silver Bullet high speed monorail system offers more passenger convenience and lowest cost. Assuming added subsidies from Government would be required to support the maglev and conventional high speed trains, the Silver Bullet offers the added advantage of not requiring added annual subsidies over the life of the system.

The above information was obtained from published articles and the manufacturers' documents. Specifics of OTG, Inc. products are subject to revision without notice.