HIGHROAD RTS AND LIGHT RAIL TRANSIT SYSTEMS

PREPARED BY
OWEN TRANSIT GROUP, INC.

Consultants, officials and service providers who must select a locally preferred transit technology must make comparisons of all feasible alternative systems. As a prospective feasible alternative, the Owen Transit Group, Inc. (OTG) HighRoad Rapid Transit System (HRTS) is presented in comparison with a generic type of late model light rail system. Data used is from openly published sources. These pages are to define some of those system distinctive features.

General: Light rail transit systems have been in use in cities around the world since 1885, offering low-speed light-capacity transit for use principally in high-density urban settings. Systems are characterized by street-level operation, combined with pedestrian and automobile traffic. Boarding is at street level and stations are often not needed.

In contrast, single-beam monorails such as HighRoad Rapid Transit System are a newer type of convenient, rider-friendly transit that provides vehicles running on opposite sides of a single elevated guideway. Since right-of-way usage is minimized, system flexibility is maximized and disturbance to the community during construction is minimized. The HighRoad RTS allows full access under the guideway.

Performance and Speed: The HighRoad RTS offers 70 mph service while the typical light rail designs run at speed closer to the 40 mph, except when used in exclusive right-of-way where speeds may be at 70 mph. The standard light rail designs use single cars to carry up to 200 or more passengers at infrequent intervals, whereas the HighRoad system typically uses one or two vehicles of 140 passengers each arriving and departing at frequent intervals. As brief as 15-second headway intervals can be achieved on the HighRoad system by using a patented extended dwell time procedure, resulting in as many as 67,200 passengers per hour per side with a two-vehicle consist. By comparison with heavy rail, the fast and frequent HighRoad RTS can approach the capacity of heavy rail in extremely dense urban settings.

For intercity and commuter rail service the HighRoad Silver Bullet is designed for speeds up to 214 mph with 46 seated passengers and an attendant. This system can be used to connect regional airports to other cities in the region not served by aircraft. Light rail systems are not capable of high speeds.

The HighRoad RTS is capable of up to 7 % grades, made possible by its high horsepower motors and its multiple braking systems. Standard light rail systems use DC motors and flanged steel wheels and are capable of climbing 7% grades as well.

Capital Cost: Published costs of the HighRoad RTS is in the range of $32 to $39 million per mile, depending on number of vehicles, stations, length of line and topography. Estimated costs include right-of way and utility relocation allowances, design fees and licenses. Standard light rail costs have varied from a low of $30 million a mile to as high as $110 million a mile, depending on terrain, line length, location and stations. Costs used for light rail comparison do not include capitalized future operating costs covered by taxpayer subsidies, whereas the HighRoad RTS costs are fully inclusive..

Operating Costs: The A-C powered HighRoad RTS operating costs are estimated to be less than the light rail costs due to much lower construction costs allowed by use of an elevated single guideway instead of at-grade tracks through built-up areas. Additionally, the D-C powered light rail vehicles incur added power costs associated with converting AC power to DC power, whereas the HighRoad RTS uses locally

available standard AC power. As a result of the lower operating costs, the HighRoad RTS can more easily cover its costs from farebox revenues and not require additional operating subsidies.

Vehicles: The HighRoad RTS vehicles are designed with advanced lightweight composites and use existing, proven components for its construction. These include proven-in-service doors, air conditioning, motors, wheels, solid-state power controllers, signal controls, security systems, and pneumatic braking components, all available from non HighRoad-provider sources. Standard light rail systems use specific monorail provider-provided parts. Light rail vehicles are defined as light by the passenger capacity compared to subways. In fact, the vehicles are very heavy due to the need to design for crash protection with other vehicles.

A convenient feature of light rail is that passengers can step down short stairs through doors to grade. Accessibility for handicapped riders is limited, and passengers wheelchairs must be tied down to the vehicle with restraints. The HighRoad RTS doors on the guideway side are operable for passengers to walk out directly to the guideway top (or for wheelchairs to roll out) and for rescue personnel to access the vehicle in the event an evacuation is needed. This multiple door arrangement also allows another HighRoad vehicle to attend a stopped vehicle on the guideway and transfer personnel from one vehicle to another, or for an emergency medical service vehicle to use the guideway top as a roadway for easy vehicle access or attend an on-board malfunction.

Propulsion: The HighRoad RTS system uses standard independent AC electric motors with digital solid-state VFD (variable frequency drive) controls to provide smooth accelerations, including short-term motor overloading, increasing horsepower for acceleration and climbing grades to double that offered by conventional motors. Light rail vehicles usually have DC electric motors and receive power from an overhead trolley wire. In some cases an at-grade high voltage electric third rail is used for light rail power instead of the usual overhead pole-supported wires over the tracks. This requires special protection for the public and special attention to roadway flooding. All HighRoad power equipment is elevated and the public is well-protected.

Braking: Each HighRoad RTS vehicle uses regenerative AC motors and solid-state controls to provide 100% braking during normal operation. In addition, the HighRoad RTS vehicle has two 100% stand-by pneumatic fail-safe auxiliary braking systems which apply braking to a fixed braking rail on the guideway, avoiding potential loss of brakes by "heat fade". All three HighRoad systems combined provide 300% normal braking for use in emergency braking, allowing safe descent of steeper gradients. The pneumatic brake systems on the HighRoad RTS 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. Light rail braking systems usually use friction pads applied to the wheels and are restricted to small grades.

Tracks and Guideway: There are major differences in the two rail systems. Light rail vehicles usually run on parallel sets of tracks at grade or elevated, or use one set of tracks with passing turnouts and operator-controlled passing waits. Light rail wheels are flange-type steel which run on steel rails. Sound-deadening of the light rail system rails and support structure is difficult due to the use of flanges on the wheels which grind track sides to keep the vehicle on the rails, sometimes requiring use of flange grease.

The HighRoad RTS operates on flat rails attached to a high-mass concrete beam and uses sound-deadening material for the "Quiet Rail" patented rail surface interface with the concrete. The HighRoad system of three-wheel connection provides a patented non-derailable attachment to the guideway and eliminates flange grinding with no-flange wheels. Additionally, the drive wheels and the top rail of the HighRoad RTS guideway are protected from snow and ice accumulations by the overhanging top of the guideway.

Stations: The standard size for a HighRoad RTS station is 50 feet long, with a typical 150 foot combined road-spanning width, 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). HighRoad RTS stations are accessible from each side of the station and accordingly have two sets of stairways and elevators. HighRoad complies with the American Society of Civil Engineers Standards for transit systems.

In contrast, the light rail vehicles may be accessible at many convenient points at grade and may not require a station. However, boarding is frequently located away from roadways since boarding would interfere with traffic and make center-of-roadway boarding hazardous to the passengers. The smallest light rail station would be the length of the vehicle or of trainsets up to several hundred feet long. Elevated stations are not used often because of the very high cost of elevating the large station and two sets of tracks. The light rail station at grade would likely cost less for construction, could be added to an existing track system without interruption of service or track modification, as could the HighRoad RTS.

Power and Controls: The light rail system usually uses high voltage DC power for main traction, with power delivered by a suspended wire above the tracks accessed by a trolley pantograph. The HighRoad RTS uses a widely available voltage (480/277 Volt 3-phase AC) for supplying power by means of dual pantographs running on power bars located beneath the guideway top overhang. The HighRoad RTS station embodies an auxiliary power generator to maintain the station in full operation (elevators, escalators, lights, security, guideway doors) and provide partial power to the guideway power bars for safety power to the vehicles. On-board UPS (uninterrupted power source) batteries are provided in the HighRoad vehicles for continued safe operation of controls, communications and lights even during an extended power shutdown.

Safety: The shape of the HighRoad RTS 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 SUV-style vehicle (such as for Emergency Medical Service or Fire Department use) to quickly reach passengers in the vehicle. This vehicle can also be used to push a disabled vehicle to a nearby station or service area. The light rail tracks are usually accessible by means of the adjacent roadway, except when a grade separation is used.

Materials used in both vehicles must comply with the Federal Transit Administration standards for fire and smoke safety criteria. Both vehicles must provide for emergency telephones for passenger use, and have emergency voice speakers for safety instructions to the passengers. The HighRoad RTS vehicle also has real-time television cameras and sound monitoring in the cabin for continuous remote monitoring by security officers. Light rail vehicles have operators on board whereas HighRoad RTS vehicles are driverless, controlled by redundant computers and central control station supervising monitors..

Conclusion: Each of the two systems discussed above offer advantages to the public. The variances between systems offer officials who are charged with system selection a choice between modes (light rail or monorail) that offer clearly distinctive differences.

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

