Evaluation of the Economic Viability of Narrow-Gauge Local Rail Systems

Prepared in Cooperation with the
State of Florida Department of Transportation
and the United States Department of Transportation

Prepared by
Center for Urban Transportation Research
University of South Florida
Tampa, Florida

CUTR

November 2001

Florida Department of Transportation
Transit Office
605 Suwanee Street, MS- 26
Tallahassee, Florida 32399-0450
850-414-4500
Suncom 994-4500

FDOT Project Manager: Jon Ausman

Center for Urban Transportation Research
University of South Florida
College of Engineering
4202 East Fowler Avenue, CUT 100
Tampa, Florida 33620-5375
813-974-3120
Suncom 574-3120

CUTR Project Manager: Laurel Land

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CHAPTER 1

INTRODUCTION

The purpose of this project is to investigate and determine whether narrow-gauge local rail is a viable transportation alternative in Florida. A number of proposals for transit greenways have been developed for various communities throughout Florida. One component of transit greenways is a small-scale rail trolley (without the catenary and noise) that would run parallel with a pedestrian path at a low rate of speed (10-15 mph). This would enable convenient access to and from the trolley at any point along its path, without the need for designated stops.

This first chapter will review the history of narrow-gauge rail, various types and uses of narrow-gauge rail, and costs for equipment, construction, operation and maintenance.

HISTORY

A standard gauge railway has a distance of 56.5 inches (4'-8½") between the parallel rails. A shorter distance between the rails characterizes narrow gauge, historically, 24 to 40 inches. Narrow gauge passenger and freight rail began in Britain in the early 1860s, although examples of this type of rail had been used in mines and quarries since the early 1400s. The justification for using narrow gauge in America was based on cost savings. It was argued that a narrow gauge railway would require less right-of-way, less excavation, less construction, less capital expenditures, and less operating costs, resulting in an estimated 25% savings over the cost of building a standard gauge railway. It was also speculated that a narrow train would weigh less, be able to handle steeper grades and sharper turns, and bridges would not have to be built to carry the extra load of a standard gauge. Since most trips involved long, cross-country travel, this would result in lowering the cost of moving goods, thereby creating competition and more profitability.

Narrow gauge fever spread, and construction of rail lines began in the 1870s. It was soon discovered, however, that the smaller trains were not conducive for long distance travel, and they needed more locomotive power to handle the stress of the steep grades and sharp turns. Narrow gauge locomotives typically ran at 25-30 mph, but the heavier locomotives were unsafe even at speeds of 15-20 mph. The trains were tall and narrow,

causing them to tip over. Derailments were a daily routine, and bridges collapsed under the weight of the heavier locomotives. These tragedies were so frequent, it quickly became apparent that narrow gauge trains did not satisfy early expectations.

Compounding the problem was the fact that there was no standard width for narrow gauge rail lines (some were as narrow as 18 inches wide; others were 24, 30, 36 or 40 inches), the weight of the rail itself varied, and the equipment used to load commodities onto standard rail cars was incompatible with narrow gauge cars. Consequently, narrow gauge rail lines were soon abandoned or converted to standard gauge. The movement was short-lived, reaching its peak in America in 1885.

LITERATURE REVIEW

Trains have always held a fascination for people, and there are many museums and clubs that foster a sentimental relationship with the old narrow gauge rail. Extensive research was conducted in an attempt to locate narrow gauge trains that were substantially similar to the trolley-type depicted in the transit greenway initiative. A literature search was conducted using libraries, Internet, Transportation Research Information Services (produced and maintained by the Transportation Research Board), Transportation Planning Division of the American Planning Association, and interviews over the telephone, in person, and email.

One thing is clear: narrow gauge rail is very diverse, not only in the width between the rails, but also in the type of rails, engines, and wheels used. Many narrow gauge trains still exist in America and throughout the world. Most of the ones located in the United States now operate as tourist attractions or within amusement parks, traveling limited distances. Those located outside of America operate primarily for passenger transport at higher rates of speed and for longer distances, often using advanced technology to overcome previous challenges. The most common types of propulsion used are steam and electric with a catenary. Because these are not similar enough to warrant comparison, they were not included for consideration in this project.

Other types of engines include gas, diesel, electric (without a catenary), and hybrids (diesel-electric; gas-electric; diesel-hydraulic; and electric-hydraulic). These types of trains are, most often, found in zoos in the United States. This may be due, in part, to their quiet, environmental-friendly operation. These trains provide the basic technology for the

trolley proposed in the transit greenway initiative (hereafter referred to as "narrow gauge rail trolley").

Research did not find any public transportation train or trolley that operates in a fashion similar to the proposed narrow gauge rail trolley. There are three known privately-owned and operated trolleys that run on narrow gauge rail. One is located on City Island in Harrisburg, Pennsylvania (photograph in Appendix A). It is a very small trolley (12 passengers) that shares the 1¼ mile track with a 24" gauge steam engine train. City Island is a recreational/tourist facility that offers a variety of activities and concessionaires, in essence, functioning much like an amusement park. The train and trolley are owned, operated, and maintained by a private concern.

Another narrow gauge rail trolley shares a three-acre parcel with Trainland on International Drive in Orlando. It has only been in operation a few months. This trolley is a 30" gauge, 20-passenger demonstration, intended to induce the business owners on International Drive to buy into a project that would run the trolley for 5½ miles, connecting Belz Factory Outlet Mall, Universal Studios, Sea World, and the Orlando Convention Center, along with numerous other tourist-oriented businesses and attractions. The proposal for the International Drive project is included in Appendix B.

The third narrow gauge rail trolley has been operating at Disneyland in Anaheim, California since 1993 (photograph in Appendix A). This trolley completes a very short loop every two minutes, travels at 5 mph and seats only 8 people. Again, it is privately owned, and operates strictly in an amusement park setting.

Only four manufacturers of narrow gauge trains could be identified, making the market somewhat proprietary in nature: C.P. Huntington, a division of Chance Industries (the leading manufacturer and distributor of park trains); Cummings; Severn-Lamb; and Custom Locomotive. Information from these manufacturers is included in Appendix C. Custom and Severn-Lamb specialize in building trains and/or trolleys to customer specifications, using narrow gauge technology.

COST ESTIMATES

Capital Costs

As stated above, only three trolleys could be identified as models for this research. All are custom built (albeit by the same manufacturer, Custom Locomotive), and are very different. Therefore, attempting to use them to identify costs is not feasible. In fact, identifying capital and maintenance costs for something that has no real prototype is difficult, to say the least. In order to estimate capital costs, quotes were solicited using the following specifications for trains used in amusement parks, since these are currently manufactured, though on a limited basis:

- 24" gauge
- one diesel locomotive engine
- accommodations for 30 passengers
- wheelchair accessible

The technology used for these park trains (engine and track) is the same as that for the proposed trolleys, and can be used as a basis for comparison, much like buses and rubber-tired trolleys are analogous. Quotes were given for the purchase of a train meeting the above specifications as follows:

C.P. Huntington:	$134,000	(28 passengers)
Cummings:	$150,000	(40 passengers)
Severn-Lamb:	$180,000	(21 passengers)
Custom:	$200,000	(21 passengers)

Sixteen to twenty pound rail track is used to run these trains. Estimates for purchase and installation of the track range from $25 to $38 a linear foot. This is for typical installation on a gravel rail bed, *unlike* the installation into poured concrete, depicted in the transit greenway proposal. Bob Schuster of Trainland has laid track in concrete and estimates the cost for twenty pound rail and installation to be comparable to gravel at $30 to $35 per linear foot. When installed, the top of the rail is level with the surrounding pavement. Preparation of the site for the tracks is done in a manner similar to that for sidewalk construction. Tracks and ties are laid within the prepared area, river rock is spread around the ties, and concrete is poured, stabilizing the rail. (See photographs of installation, included in Appendix D.)

One major cost of the narrow gauge rail trolley is the purchase of right-of-way. This is in contrast to the rubber-tired trolley or bus that would operate in existing right-of-way. It is estimated that a system of this type requires 10 to 12 feet, most likely on both sides of the road. Trolleys can be manufactured with the capacity to be bi-directional; however, this would mean that only one trolley could operate on the track, greatly reducing the frequency of operation. Of course, cost of right-of-way is dependent upon location, zoning, existing structures, and litigation. This makes cost estimates impossible to predict, but nevertheless, an important factor to consider.

Because the narrow gauge rail trolley is intended to capture pedestrians, a key element in the viability of this whole concept is the existence of sidewalks. This may necessitate the purchase of additional right-of-way and/or installation of sidewalks that parallel the railway. Other considerations include costs for parking facilities, intersection improvements, signage, landscaping, and amenities such as benches, lighting, and trash receptacles.

Maintenance Costs

In an effort to determine maintenance costs, it was necessary to identify the location of narrow gauge trains that are substantially similar to those outlined in the previous section, i.e., 24" or 30" gauge rail, operating on a minimum 16 pound track with diesel, gas, or hybrid locomotion. Places operating a train meeting these specifications were identified and contacted.

- Toonerville Trolley Train - Soo Junction, Michigan
- Green Meadows Petting Farm - Kissimmee, Florida
- Atlanta Zoo - Atlanta, Georgia
- Detroit Zoo - Royal Oak, Michigan
- Indianapolis Zoo - Indianapolis, Indiana
- Memphis Zoo - Memphis, Tennessee
- Oregon Zoo - Portland, Oregon
- St. Louis Zoo - St. Louis, Missouri
- Dorney Park - Allentown, Pennsylvania
- Kennywood Amusement Park - West Mifflin, Pennsylvania
- South of the Border - Dillon, South Carolina

When discussing costs associated with the train(s), a specific request was made to separate labor, operation, and maintenance (which includes parts). As previously seen in the diversification of narrow gauge rail, a wide diversification of maintenance costs was

reported; several factors contribute to this spread. Some of these trains are custom-built or re-built as parts for the trains became unavailable. Typically, this involves preserving the exterior of the locomotive, and replacing the engine. This means that the engine parts are more readily available, but other parts, such as wheels, axles, and ornamentation, are custom-made.

One train (Toonerville Trolley) is a genuine 1933 narrow-gauge train running on original rail. They report annual maintenance costs of $150,000 to $200,000, since nearly everything must be custom built. In this case, an effort to maintain the train's historic integrity is most important. The maintenance costs for this train become even more inflated when considering that the track is 5½ miles long, but the train only runs two times a day for two months out of the year, and two times a week for another two months. Of course, they also maintain a second locomotive for back-up purposes.

On the opposite end of the spectrum is the Atlanta Zoo, which reports that they spend less than $15,000 a year for maintenance, most of which is preventive. They have two C.P. Huntington trains; one is six years old and one is a year old. These trains run eight to nine hours a day, every day of the year (except in inclement weather), on a ¾ mile track. The maintenance supervisor indicated that these trains made a profit the first year.

Several factors are involved in the reported maintenance costs.

- Performance of ongoing, preventive maintenance
- Age of vehicle(s) and rail
- Amount of use (trips per day, days per year, etc.)
- Exposure (to salt air, moisture, cold, etc.)
- Type of vehicle (custom versus manufactured)
- Type of rail
- Contracted versus on-site maintenance facility

Prior research and/or records (other than historical) regarding these vehicles is virtually non-existent, which may be due to their novelty and private ownership. This, combined with the current restricted use and location of these trains, makes it difficult to estimate potential costs for a train/trolley that will be used in a similar setting. One thing is certain: rail is a specialized field that requires specialized knowledge for its operation and maintenance. It is also necessary to have a specialized facility to accommodate the maintenance of these trains. Consideration must be given as to how the train will be moved off the working track and into the maintenance facility.

To gain a better understanding of costs, a variety of railway technicians and engineers were contacted. Again, they all seemed to have different views regarding the feasibility of a narrow gauge rail trolley, and the costs associated therewith. When asked specifically about the rail type and placement in concrete, some of them were skeptical. Others were positive, citing less maintenance due to stability of the rail and protection from conditions which cause deterioration of cross ties. One technician indicated that it must work well, since much of the old electric trolley rail has been in place for over 50 years.

Larry Colflesh, an experienced yard manager for Amtrak in Philadelphia, expressed concern over anything that is custom-built. He pointed out that it is difficult, time-consuming, and expensive when parts need to be replaced. He added, "When a product is completely custom-built, it limits the number of qualified individuals able to maintain the unit."

This is confirmed by the Detroit Zoo, who owns custom trains built in the early 1950s that have been retrofitted with Chrysler gasoline engines. The maintenance manager indicated that they spent $300,000 last year for spare parts – all custom made – to have on hand. They anticipate these spare parts will suffice for about two to three years before making another similar investment. Oregon Zoo has its own machine shop on site and is fortunate to have found an experienced machinist to fabricate parts, as needed.

George Brenyo, with E-Transit in Orlando, says that many parts of the trolley at Trainland can be purchased "off the shelf." The rest have computer aided design (CAD) schematics, which means the parts can be easily reproduced. This also means, however, that those parts are not readily available, and must be specially made.

Clearly, those parks who have purchased trains manufactured by C.P. Huntington (no matter what the age of the train) have lower maintenance costs than the others. Owners of the Huntington trains indicate that parts are readily available from the manufacturer and often from local distributors.

Lloyd Choate, of Judsonia, Arkansas, owns and maintains seven trains (most of which were manufactured by Huntington). He indicates that maintenance costs of a Huntington train for the first 10 years run approximately $15,000 a year. After that, he estimates the cost to be roughly $25,000 a year. He says that these trains are built like tractors; they are heavy duty and pretty much maintenance-free (except for preventive care, such as oil changes, lubrication, etc.). Mr. Choate says that all train parts are expensive, and he uses substitute parts whenever he can. He admits to using "bathroom parts" to substitute for

the replacement of ornamentals, and claims creativity is the key to keeping maintenance costs under control. Mr. Choate verified that Huntington has maintained standardization for many years, so that many new train parts can be used on an older train.

Operating Costs

When attempting to identify operating costs for the trains, nearly every park indicated that these activities are shared with other departments and expenses are lumped together. For instance, use of fuel is not restricted to the train, but is shared with other park vehicles and equipment. A train conductor may spend part of his time on inspection and maintenance, so cost for labor is not divided by tasks. Thus, *actual* operating costs were not able to be identified, and it was necessary to rely upon other sources for cost estimates.

Fuel

The four manufacturers of park trains were contacted to determine if the engines had a standard rating for fuel consumption, similar to those for automobiles. No such rating exists. Cummings and Severn-Lamb provided estimates of fuel consumption, based on years of experience with these trains. Cummings indicated that for 400 hours of operation, he spends $800 for diesel, or $2.00 per hour. Severn-Lamb indicated that they burn about one gallon of diesel fuel per hour (selling at about $1.85 per gallon retail at the time of this writing), and about 1½ gallons of propane per hour (about $1.60 per gallon retail). Some proponents would argue that propane has additional "hidden" savings, because it burns more completely, resulting in fewer engine deposits, fewer oil and filter changes, and increased engine life.

The Toontown Jolly Trolley at Disneyland runs all day (12 hours) on a 15 gallon tank of diesel (about one gallon per hour), in line with the above estimates.

Labor

A telephone interview of all public transit (bus) systems in Florida revealed that the median starting salary for bus drivers is $10.82 per hour. Benefits are generally assumed to be 30 percent of the wages earned, making the hourly rate $14.07, substantially higher than the International Drive proposal.

In the International Drive proposal (Appendix B), the hourly wage for a conductor is listed as $8.65 ($198,000 a year ÷ 11 conductors ÷ 2080 hours a year = hourly salary). Again adding 30 percent for benefits (well above the limited benefit package outlined in the proposal), the hourly rate is $11.25. George Brenyo (one of the originators of the proposal) stated that it takes less skill to operate the rail trolley than to drive a bus, accounting for the lower wage.

Pinning down labor costs for maintenance mechanics was not as easy, because it is dependent upon years of experience, type(s) of certification, and whether or not they operate under a union. A rough estimate for unionized bus mechanics is $16.00 per hour; non-union is $14.00 per hour.

Larry Colflesh of Amtrack stated that mechanics are paid approximately $14.00 per hour for work on gasoline engines and $16.00 to $18.00 for diesel or electric engines. He added that they also employ pipefitters, electricians, and machinists to maintain and repair the trains.

There would be a limited number of vehicles in environments where the proposed narrow gauge rail trolley operates. As such, it would be essential to hire, at a minimum, an experienced rail mechanic. This may be difficult to find and would, most likely, cause wages to be increased (because of supply and demand).

A more viable option may be to contract for these services, similar to South Florida's Tri-Rail commuter train. Tri-Rail is merely an administrative agent, contracting with Herzog Transit for all of its services.

SUMMARY

Narrow gauge rail came to the United States in the 1870s and developed without industry standards, creating a very diverse set of railways and locomotives. However, its diversity contributed to its demise. We continue to see this diversity today, even though its use in the United States is standard in its association with tourist attractions and amusement parks.

A narrow gauge rail trolley has been proposed as part of the transit greenway initiative; however, no known trolleys currently exist that perform in a similar capacity. As such, it

was necessary to draw inferences from narrow gauge trains used in zoos, as they employ the same technology as that proposed for the rail trolley.

The largest expenditure is, by far, the initial capital outlay, which includes purchase of right-of-way and equipment, installation, supporting infrastructure (including sidewalks and maintenance facility), and amenities. While maintenance costs could be substantially more than that for buses, it must be weighed in light of the total expenditures and project feasibility. It is doubtful, however, that operation and maintenance costs alone would make or break this project.

The next phase of this project will include comparing costs for the narrow gauge rail trolley to that for rubber-tired trolleys and buses. CUTR will also estimate ridership/mode shift expectations, review potential revenue sources, and evaluate community impact. Based on the results of the formative evaluation and research, CUTR will draw conclusions regarding the overall feasibility of narrow gauge rail trolleys, and submit a final report.

CHAPTER 2

INTRODUCTION

The first chapter looked at the history of narrow gauge rail, reviewed literature, and evaluated costs for capital, maintenance, and operation. These could be viewed as the physical or concrete aspects of the project. This second memorandum will discuss ridership expectations, potential revenue sources, and community impact – the incorporeal aspects of narrow gauge rail trolley.

RIDERSHIP EXPECTATIONS

Assumptions of ridership for any form of transit are based on several factors: cost, availability, and convenience of parking; road congestion; transit frequency (headway); location of activity centers; land use; density; trip generation; and demographic information, such as age, income, and vehicle ownership. In this project, specific locations were not identified in the scope, so these factors are unknown and incomparable. Therefore, it is necessary to estimate ridership using a different measure, such as population. Population statistics are readily available, making it easy to evaluate any location.

Calculations from the 1995 Nationwide Personal Transportation Survey (Appendix E) show that Florida has an overall transit usage rate of .88% of person trips, roughly half of the national average, with 9.2 trips per household (less than the standard rate of 10[1]). The Florida Statistical Abstract[2] can be used to determine local population and average number of people per household. Using these figures, it is then possible to estimate trips based on population.

For the sake of comparing greenway proposals, the formula used to estimate ridership is generous, applying the local rate of persons per household, the accepted standard of 10 trips per household, and a transit rate of 1% of person trips.

$((P \div H) \times 10) \times .01 = R$

Where:
- P = Population
- H = Persons per Household
- R = Ridership

In the Transit Greenway Study for Lake Park (dated October 1998), daily trips are estimated at a low of 8,030 to a high of 11,840. Applying the above formula (P = 6,853; H = 2.34) results in an estimated 293 trips per day. Even with total buildout of the master plan, ridership would never reach these expectations.

In the Fort Pierce proposal (October 1999), ridership is anticipated to range from 407 to 1,406 daily trips. Using the 1999 population estimate of 36,800 and one household consisting of 2.56 people, the ridership expectation would be 1,438 trips per day. This time, the proposed estimate is much closer to what may be expected, particularly on the low end.

These estimates are put into perspective and the generosity of the above formula can be better understood by taking a brief look at ridership statistics for Winter Haven Area Transit (WHAT). WHAT has been operating a bus service for two years, covering most of the incorporated area and some areas outside of the boundaries of Winter Haven. The current average ridership is 500 trips per day, and has exceeded every expectation for the system. If the above formula were applied (P = 26,022 and H = 2.53), a daily ridership of 1,028 would be anticipated – twice the current ridership, and a high expectation even for a mature system.

This formula compensates for visitors and tourists, except in certain unusual circumstances, such as some beach locations, Kissimmee /Disney, and International Drive in Orlando, but remains unrealistically high for the following reasons:

- Rail trolley is limited in its geographic coverage and, therefore, serves a limited population with limited trip purposes.
- It assumes there is somewhere to go (i.e., a "there" there).
- Unless precipitating factors exist (limited, costly, and/or inconvenient parking, road congestion, high incidence of tourists, travelers, and/or elderly), reasons to use transit are diminished.

- Florida's rate of auto ownership is growing twice as fast as its population[3], while overall transit use is declining.
- This is a niche market.

To get a more realistic perspective, CUTR gathered ridership information from trolley and smaller fixed routes that have characteristics similar to those in the greenways initiative. (See Table 1.)

Table 1
Ridership for Similar Florida Routes

Transit Agency/City	Year	Route	Type	Route Miles	Trips/ Rev Hr	Trips/ Rev Mi
VOTRAN / Daytona Beach	1998	700	Trolley	23.3	14.2	.94
VOTRAN / Daytona Beach	2001	500	Beach Tram	2.1	8.3	1.00
VOTRAN / Daytona Beach	1998	15	Downtown		33.6	3.10
TALTRAN / Tallahassee	1999	13	Circulator	5.1	30.3	3.96
TALTRAN / Tallahassee	99/00		Trolley	3.0	12.5	1.40
Citrus Connection / Lakeland	99/00		Downtown Trolley	1.8	13.7	1.52
HARTLINE / Tampa	2000	3	Connector	3.5	7.6	.88
HARTLINE / Tampa	2000	46	Beach	4.4	7.4	.58
HARTLINE / Tampa	2000	84	NeighborhoodCirculator	4.1	2.0	.15
HARTLINE / Tampa	2000	88	Neighborhood Circulator	3.5	3.4	.24
ECAT / Pensacola	99/00		Downtown Trolley		6.1	
LEETRAN / Fort Myers	2000	115	Circulator		6.4	.48
LEETRAN / Fort Myers	2000	300	Beach Trolley	4.5	11.0	.82

Factors in the above table could be used to calculate ridership for a rail trolley. The median for riders per revenue hour is 7.6 and the average is 12.0. Assuming the rail trolley runs every ten minutes for ten hours per day (8:00 am - 6:00 pm), expected daily ridership would be between 456 and 720. The greenways initiative states that the ideal length of a route should not exceed 6 miles. Using riders per revenue mile (having a mean of .91 and an average of 1.26), a six mile route running every ten minutes for ten hours a

day would yield between 328 and 454 riders per day. These projections may still be exaggerated, because these numbers come from established systems with interconnecting routes.

REVENUE SOURCES

Funding is an area that abounds in favor of the rail trolley project idea. Opportunities for funding transit and transportation projects are plentiful, largely restricted by project type, location, use, and effect. A municipality that decided to pursue implementation of a rail trolley would, most certainly, be able to secure a good deal of financial support. Potential options for funding are listed below.

Bonds

A bond is a certificate or evidence of a debt on which the issuing company or governmental body promises to pay the bondholders a specified amount of interest for a specified length of time, and to repay the loan on the expiration date. Bonds are sold to finance improvements and may require voter approval. (See also, *Tax Increment Financing.*)

Congestion Mitigation and Air Quality (CMAQ) Improvement Program

In some areas, CMAQ Program funds may be used for operating costs for a 3-year period, so long as those systems measurably demonstrate reductions in traffic delays and/or air quality.

County Incentive Grant Program

This program provides grants to counties to improve a transportation facility which is located on the State Highway System or which relieves traffic congestion on the State Highway System.

Dedicated Millage Rates

At least four counties in Florida dedicate millage to their transit system: Hillsborough, Pinellas, Polk, and Volusia. These ad valorem taxes have been a major source of revenue for the systems. Florida's Constitution limits the amount of ad valorem taxes that may be levied by a municipality to 10 mills.

Development Agreements

A local government may agree to approve a new development plan if the developer agrees to provide transportation improvements or right-of-way needed to support the development. Improvements are then turned over to the public agency, which is responsible for maintenance and operation. This is a voluntary approach, although the resulting agreements are binding. The process also typically involves some concessions on the part of the municipality.

Exactions

Monetary payments, contributions of land, or infrastructure improvements may be required by a government agency as a condition of development approval. Such exactions are typically determined through negotiations between a municipality and a developer. Regulatory exactions must be roughly proportional both in nature and degree to the impacts of the regulated activity.

Federal Demonstration Projects

This funding is promoted by congressmen who feel a project is neeed within their area and is applied for through federal appropriation bills

Fundraising

A variety of fundraising activities can be used to encourage local businesses, property owners, or philanthropic groups to contribute financial assistance toward transportation activities.

Gas Taxes

In essence, this is a user fee that enables government to tax gasoline for the purpose of funding transportation expenditures. Gas taxes are of central importance to assuring adequate transportation funding. Florida is a leader in the use of local option gas taxes for transportation funding.

Grants

Grants come in a variety of forms and are offered by a variety of government and public agencies, private sources, and foundations. Grants are monetary contributions that do not have to be repaid. They are usually distributed through an application process, and may be for any number of purposes. A few of the more common grants that may be available for the rail trolley are listed below.

Section 5307

Formula program that funds capital and operating assistance in urbanized areas.

Section 5309

Provides transit capital assistance for new fixed guideway systems and extensions to existing fixed guideway systems, fixed guideway modernization, and bus and bus related facilities.

Section 5311

Formula program that funds capital and operating assistance in non-urbanized areas.

Impact Fees

Impact fees are charges levied against a development project to help fund the cost of off-site capital improvements that benefit that development. The fee is determined by assessing the projected impact the development will have on surrounding public facilities. Fees must not exceed the proportionate share of the cost of serving a given development, and cannot be used to address existing deficiencies. In other words, the need for new facilities must be attributable to new development.

Local Agency Partnering

Local agency partnering involves the uniting of local agencies to achieve an end that will benefit all parties. The parties voluntarily sign a contract that specifies a financial commitment, as well as a commitment to implementation. This is a widely-used form of financial support. A narrow gauge rail trolley may cross district boundaries (city to county, for instance), and the lack of participation by one government could have a negative effect on the other(s).

National Corridor Planning and Development Program (NCPD)

This program, under the Federal Highway Administration, provides funding for planning, project development, construction and operation of projects that serve high priority corridors throughout the United States. States and metropolitan planning organizations (MPOs) are eligible for discretionary grants for feasibility studies, planning, multi-state coordination, environmental review, and construction.

Other Federal Programs

A variety of programs and funding exist within the realm of the federal government, beyond those already mentioned. Because of the numerous branches of the federal

government, frequent changes in funding provisions and allocation, and associated restrictions in each program area, it would be necessary for the local government agency to explore other possible funding sources. Some areas where funding may exist include the Department of Commerce, Environmental Protection Agency, Small Business Administration, Economic Development Administration, and the Department of Housing and Urban Development.

Public/Private Partnerships

A public/private partnership is the pairing and cooperation of public and private resources to achieve an end that will benefit both the private developer and the public sector. A local government may benefit from the construction of a needed improvement at a low cost and in a more expeditious manner than could be accomplished by the government. The private enterprise may benefit from the profits earned through its implementation.

Regional Surface Transportation Program

Transportation projects on a system funded by federal-aid (functionally classified above a local road in urban areas or above a minor collector in rural areas) are eligible for RSTP funds. Monies are available to fund capital costs for transit projects, and fringe and corridor parking facilities.

Reserve Funds

In reserve fund financing, funds are accumulated in advance for capital improvements. The accumulation may result from surplus or earmarked operational revenues, funds in depreciation reserves, or the sale of capital assets.

Safety Funds

Any unit of local or state government can request highway safety funds for projects to demonstrate, evaluate, or enhance a special countermeasure activity. The applicant must show that an identified highway safety problem exists within their jurisdiction and is supported by documented evidence.

Sales Tax

Sales tax is a state or local-level tax on the retail sale of specified property or services. It is a percentage of the cost. Usually, levying a sales tax for the purpose of funding special projects (such as transportation), requires a public referendum.

Small County Outreach Program

This program provides assistance to small county governments for resurfacing or reconstructing county roads **or** in constructing capacity or safety improvements to county roads.

Special Assessment Districts

Special assessment districts levy a tax on property owners who will benefit from specific improvements. These may be initiated by local governments, developers, or property owners wishing to expedite the improvement(s). One parameter of special assessment districts is that property owners must not pay more than they receive in special benefits.

State Infrastructure Bank (SIB)

This is a plot pogram under which four states – California, Florida, Missouri, and Rhode island – are authorized to enter into cooperative agreements to set up infrastructure revolving funds eligible to be capitalized with federal transportation funds. This new SIB program gives states the capacity to increase the efficiency of their transportation investment and leverage federal resources by attracting non-federal public and private investment. As loans are repaid, the initial capital is replenished, and it can support a new cycle of projects.

State-Shared Revenue Sources

Florida has two sources of state-shared revenue, which may be used for right-of-way acquisition and transportation improvements. The first is authorized by the Florida Constitution and is a $.02 motor fuel tax. Eighty percent of the total revenue generated is allocated for debt service on bond issuance; the remaining twenty percent is allocated to local governments. The second type is a $.01 county gas tax which is also used for county debt service.

State Transportation Trust Fund (STTF)

The two major contributors to this fund are state fuel sales tax revenue (of which about 90 percent goes to the STTF), and the State Comprehensive Enhanced Transportation System (SCETS) tax. Other sources include Florida's fuel use tax, aviation fuel tax, vehicle licensing fees, initial auto registration fees, and rental car surcharges. In accordance with §206.46, Florida Statutues, 15 percent of all revenues distributed to the STTF are to be dedicated annually by FDOT for public transit and capital rail projects.

Public Transit Service Development Program

The Service Development Program was enacted by the Florida Legislature to provide initial funding for special projects. The program is selectively applied to determine whether a new or innovative technique or measure can be used to improve or expand public transit in an area. Service Development projects specifically include projects involving the use of new technologies, services, routes, or vehicle frequencies; the purchase of special transportation services, and other such techniques for increasing service to the riding public as are applicable to specific localities and user groups.

Service Development projects are subject to specified times of duration, but no more than three years for system operations and maintenance procedures and no more than two years for marketing and technology projects.

Surface Transportation Program (STP)

The STP provides flexible funding that may be used by states and local municipalities for projects on any Federal-aid highway, including mass transit, pedestrian and bicycle facilities, as well as on roads and highways.

Tax Increment Financing

This is a type of bond financing used in areas where large-scale redevelopment is feasible. A redevelopment district is designated and assigned a tax base equivalent to the value of all property within the district. The area is redeveloped with proceeds from the sale of tax increment bonds. These bonds are sold by the municipality or tax district to fund improvements. Once redevelopment is completed, the developed property has a higher assessed value and yields more tax revenue. The tax "increment" above the initially established level is used to retire the bonds. Once the bonds are retired, the tax revenues from the enhanced tax base are distributed normally.

Transit Enhancements

This funding is designed to enhance the travel experience for public transit riders, and may include access for disabled persons, historic preservation, bus shelters, landscaping, or bicycle/pedestrian facilities.

Transportation Community and System Preservation Pilot Program (TCSP)

The TCSP provides funding for planning, implementation, and research to investigate and address the relationships between transportation and community and system preservation, and to identify private sector-based initiatives, such as transit-oriented development,

traffic-calming measures, or other projects to reduce need for future infrastructure investments

Transportation Corporations

Florida transportation finance and planning law provides for the creation of transportation corporations. These are nonprofit corporations authorized to act on behalf of the FDOT to assist with project planning and design, assemble right-of-way and financial support, and promote projects. "Project" is defined as any improvement to an existing highway that is included in an adopted work program. The legislation is aimed at increasing private sector financial support for development of transportation facilities and systems by new and alternative means.

Transportation Development Districts

Transportation development districts are special assessment districts that are established for the purpose of funding a desired transportation improvement. They allow the imposition of special taxes in an area that would benefit from the transportation project. Special assessments are derived from development that will be generated as a result of the transportation facility. Revenue bonds are often issued to cover the improvement, backed by anticipated increases in tax revenue.

Transportation Enhancements

Transportation enhancements are transportation-related activities that are designed to strengthen the cultural, aesthetic, and environmental aspects of the nation's intermodal transportation system. The Transportation Enhancements Program provides for the implementation of a variety of non-traditional projects, with examples including restoration of historic transportation facilities, bike and pedestrian facilities, and preservation of abandoned railway corridors.

Transportation for Livable Communities

These funds are available for bicycle, pedestrian, transit or other projects that enhance community vitality, including planning studies.

Transportation Outreach Program

This program is dedicated to funding transportation projects of a high priority, based on preservation, enhancing economic growth, and improving choices for mobility.

COMMUNITY IMPACT

Attempting to determine the impact of a trolley or circulator route involves several variables, much like those for estimating ridership. Areas that have experienced the greatest perceived success have had factors that pre-existed the system: high density/intensity; activity centers; congestion; frequent headway; costly, inconvenient, or limited parking; etc. "Success" is also subjective, and may be more in the eyes of the beholder. Every transit agency that was asked about their trolley indicated that it was successful. (Obviously, there is a great deal of political pressure to answer affirmatively.) Yet, when commissioners, local planners, and the general public were surveyed, answers varied. While defining "success" may be debatable, everyone agrees that their trolley has had a positive influence on public perception. The novelty of a trolley creates a desirable image, whether or not it is utilized to the extent anticipated.

In an attempt to determine community impact and success of trolleys and circulator routes, the following Florida transit systems were contacted:

Pensacola	Lakeland
Fort Myers	Tallahassee
Daytona Beach	Tampa
St. Petersburg	International Drive (Orlando)

The systems vary in their provision of service, many operating during limited hours/days of the week and/or times of the year, making "success" and "community impact" even more subjective.

Generally speaking, the longer the route and the shorter the headway, the more riders per revenue hour. Actual ridership numbers were unable to be obtained for International Drive, but a visual survey on any given day reveals a significant amount of use, running at about 50% capacity most of the time. This area is a mecca for visitors, who often do not have automobiles or are sharing an auto with others. This makes them captive to alternative transportation.

On the other hand, Tallahassee and Lakeland trolleys, operating in downtown environments, continue to exist more for aesthetic (rather than economic) reasons, although they have a few peak weeks when visitors swarm the town (the legislative session in Tallahassee and Lakeland's Sun 'N Fun Fly-In) and the trolleys are utilized more fully. In places where walkability is good and the center of activity is limited, there is less

reason to use transit. Time is essential to travel, and even though headway is frequent (15-20 minutes) in these areas, walking to a destination would probably take less time.

Land Use

Attempts to determine the community impact of a trolley yielded little or no response. In most cases, transit is a reaction to buildout and/or redevelopment. As stated above, most municipalities feel the greatest impact of the trolley has been on community image. Planners, city managers, and transit managers indicated that the trolley has worked in conjunction with redevelopment efforts, but more indirectly. They do not see transit as a catalyst to development efforts.

Tallahassee was the only exception. The City-County Land Development Regulations (LDRs) encourage development in the central core of the city. A strategic plan is currently underway, which will offer financial incentives to promote reinvestment in deteriorating areas. Officials believe that transit is one element that will draw people to locate or relocate to the inner city. It must be understood, however, that linking transit to livability is based on an entire system, not merely on one route.

One example of using transit to encourage redevelopment is seen in Detroit. The City demonstrated a striking example of foresight when it built its downtown people mover (DPM) in 1987 – a time when automated guideways were the latest fad. Over half of the three mile loop served virtually nothing, and ridership was scanty for several years after completion of the project. Like many other cities, Detroit had experienced rapid deterioration of its downtown. Businesses had relocated to the suburbs, leaving behind massive, beautiful buildings to become victims of deterioration and vandalism. Most area residents thought the DPM was a huge waste of time and money, referring to it as the "train to nowhere."

In recent years, downtown Detroit has experienced a resurgence. New construction and renovation have given life to a city on the verge of death, and perhaps the DPM provided the impetus. New art and entertainment districts, casinos, stadium, hotels, and highrise condominiums fill the areas surrounding the DPM that were void at its beginning, but now connect them to areas that managed to survive degradation, such as the riverfront, business district, city center, Greektown, Bricktown, Cobo Hall, and Joe Louis Arena. Current ridership is approximately 12,000 people per day. Unfortunately, first impressions are hard to shake, and many people still view the DPM as a flop.

Since 1976, Detroit has had a narrow-gauge electric trolley route serving the downtown core with a fleet of nine vintage trolleys built between 1895 and 1925. These trolleys have a catenary and run on a track that is one meter wide (approximately 39 inches). Like the greenways proposal, the track is in the sidewalk and must contend with heavy street and pedestrian traffic. Trolley operators are paid the same as motor coach operators. Mr. Ken Ong, with Detroit Department of Transportation, stated that the trolley is mostly used as a tourist attraction, and as subsidiary transit during special events such as the International Auto Show. He feels that the trolley has contributed to improving Detroit's image, but for the same price ($.50), it is usually much quicker for people to take the DPM. Mr. Ong attributes the success of the DPM to its dedicated right-of-way, allowing rapid, safe transport.

SUMMARY

Because the narrow gauge rail trolley is a specialized form of transit, traveling a limited distance and serving a limited audience, ridership is expected to be nominal, except in areas that have large numbers of tourists and visitors. Three different methods are used to predict ridership: population, riders per revenue hour, and riders per revenue mile. Based on these methods, the 1998 Lake Park Transit Greenways proposal contains ridership projections that are outlandish, but the Fort Pierce proposal, prepared one year later, demonstrates more realistic estimates.

Funding is the strongest part of the narrow gauge rail concept, with potential funding from many sources – public and private, local, state, and federal. The ability to secure funding may be largely determined by the degree of buy-in from local agencies, so that it can be put on the list of planned improvements (Capital Improvements Program [CIP] and/or Transportation Improvements Program [TIP]).

Determining the success of trolleys to stimulate redevelopment is subjective, but it is clear that everyone loves the image they create. Trains and trolleys cause us to reminisce of days gone by, and make us smile inside. In light of the negative connotations usually associated with bus transit (particularly in Florida), this is not a bad thing. For the most part, transit exists to address density, intensity, and congestion, which occur after buildout. Two exceptions to this rule are seen in Tallahassee and Detroit. Tallahassee is attempting to use transit to encourage redevelopment in deteriorating areas. Time will determine the success of their strategy. Detroit put part of their people mover in areas

that were vacant, in order to stimulate development and connect to what was left of the heart of the downtown. It was a huge gamble that worked.

The final chapter will combine the elements discussed in Chapters 1 and 2, and will discuss the potential feasibility and viability of the narrow gauge rail trolley concept.

CHAPTER 3

INTRODUCTION

Chapters 1 and 2 found facts and gathered information to serve as the bases upon which to draw conclusions and make recommendations. The first chapter reviewed the history of narrow-gauge rail, various types and uses of narrow-gauge rail, and costs for equipment, construction, operation and maintenance. The second chapter looked at ridership expectations, potential revenue sources, and community impact. This third and final chapter will provide a summative evaluation and substantiation for determinations regarding the narrow gauge rail.

SUMMARY OF FINDINGS

First, there is no narrow gauge rail trolley operating in a public transportation environment, like those appearing in the greenway proposals. There are a few rail trolleys that are privately owned and operated in a limited environment. In order to estimate costs, trains that run in amusement parks having a 24" or 30" gauge with a diesel, gas or hybrid engine (as opposed to steam) were evaluated. The technology used for these park trains is the same as that for the proposed rail trolleys, and can be used for comparison, like buses and rubber-tired trolleys.

Park trains are manufactured on a limited basis, but rail trolleys are custom made, causing the initial cost of the vehicle to be substantially increased. Custom-made trolleys also require custom-made parts, resulting in increased maintenance costs. Additionally, a service area needs to be created and specialty technicians need to be employed to maintain the rail trolleys, compounding the maintenance costs.

Costs for right-of-way are variable and are usually the most expensive part of any transportation project. The one component contingent upon the viability of narrow gauge rail trolley is the existence of sidewalks, which may necessitate the purchase of additional right-of-way and/or installation of sidewalks that parallel the railway. The width of area needed for a rail trolley is approximately 10-12 feet on both sides of the road. In areas where right-of-way is also needed for sidewalk installation, this width is increased to approximately 18-20 feet.

Mode shift is expected to be consistent with the overall transit usage rate for Florida of .88% of persons trips[4] in areas with high density. It is also anticipated that a rail trolley, if located in an activity center, could generate ridership consistent with small circulator and/or trolley routes – about 8 to 12 passenger trips per revenue hour.

BENEFITS OF RAIL TROLLEY

Much like rubber-tired trolleys typically seen in downtown environments, one of the most favorable elements of a narrow gauge rail trolley is its nostalgia, luring us to ride. Unlike the old historic trolleys, the incorporation of new technology can make these rail trolleys quiet and less obtrusive, further inviting us to take a ride. This nostalgia removes any unfavorable image of public transit and makes it palatable to everyone.

The presence of rail in the ground is like an advertisement for transportation. It begs the questions of destination and frequency, arousing the interest of visitors. A rail trolley using electric power can even go directly into a doorway or building, heightening the awareness of transportation and improving its convenience.

The low speed of operation creates a safe environment for motorists, pedestrians, and bicyclists. Rail trolleys are also equipped with emergency brakes that automatically engage in the event of engine failure.

The rail trolley is easy to operate and requires no special training. As a result, the market for recruiting drivers is good and a lower salary can be paid. Since labor is the most expensive part of any transit operation, substantial savings can be realized.

The strongest support for rail trolley implementation is funding. It is possible to tap into funds designated for rail, public transportation, innovation, community redevelopment, and multimodalism. Proponents would also argue that the rail trolley costs less to maintain than a standard bus and the lifetime is indefinite, thereby getting the most return on taxpayer contribution.

ISSUES FOR CONSIDERATION

Success of a narrow gauge trolley is subjective, and depends upon many external factors, such as high density and attractors. These same factors increase the interface between bicycles, pedestrians, automobile traffic, driveways, and intersections. This means an increase for potential accidents. Since the vehicle practically drives itself, there may also be a danger for the driver to be too relaxed.

There is a good deal of concern over maintenance and repair. A special facility must be built to accommodate the rail trolley. The most convenient location for a maintenance facility is near the rail line; however, it may not be the most practical. If there is no way for the rail trolley to pull into a maintenance shed near the line, then the vehicle must be removed from the track and transported to another location. This is costly, time-consuming, and inconvenient. The maintenance facility needs individualized parts and a part-time technician trained in rail. As discussed in Chapter 1, there will also be a need for someone who can manufacture or tool some of the parts. The field of capable rail technicians is narrow, and further limited by the fact that they would only be needed on a part-time basis.

As mentioned previously, a favorable aspect of rail trolley is the fact that drivers need no special training and may be paid a lower salary. However, this is a moot point if the transit agency is unionized, negating any potential savings.

Travelers in the United States cannot be compared to European travelers and residents who are accustomed to taking mass transit. The culture in the United States is clearly focused on traveling convenience, not cost. An increase in traffic congestion and travel-to-work time does not appear to be sufficient enough for travelers to change modes from auto to transit. According to the American Public Transportation Association, the highest ever public transportation ridership was recorded in 1946, with 23.4 billion trips taken. In 1999, ridership was estimated at 9.1 billion. "We still love the car; we still love the things the car gives us."[5]

Cars are mass-produced, easy to purchase, and support a personal image. Additionally, gas is cheap. When commuting in a personal vehicle, travelers can eat, drink, listen to music, and be comfortable. If congestion gets too bad or a back-up occurs, options are available; they can detour, pull off and get a cup of coffee, or go shopping. Driving a

single-occupancy vehicle is the most convenient, comfortable, and flexible way to travel in the United States, making it the preferred mode of choice.

A review of a typical downtown circulator trolley demonstrates its inconvenience. For example, let's say a worker wants to eat lunch at a restaurant one mile away. The trolley runs every 10 minutes, meaning he has a potential maximum wait time of 20 minutes (10 minutes going and 10 minutes for the return trip), along with a 10 minute ride. Round trip travel to a destination one mile away could take up to half an hour. The inconvenience is too great to choose this mode.

The greenways concept is packaged for master planned communities having elements of sustainable living. These types of communities cater to higher income residents and visitors, where the environment is conducive to recreational pedestrians. If there is somewhere to go and the surroundings along the way are pleasant, the walk becomes part of the experience. People live here because they LIKE to walk. A rail trolley would be part of the decor which adds to the ambience. Consequently, it is unlikely that the rail trolley would be viable in this environment. It is charming, but not practical. In large master planned communities, golf carts and bicycles work well for longer travel distances or for those who do not desire to walk. They provide the convenience of an automobile, without the noise, cost, speed, and parking requirements.

The ideal maximum length of a rail trolley, as stated in the greenways proposal, is six miles and only caters to pedestrians. Cyclists would not use it, which further reduces the demand for ridership.

The right-of-way needed for a rail trolley is approximately 10 feet in width, or 18-20 feet with a sidewalk. In most cases, when installing rail for a trolley in a developed area, right-of-way would need to be purchased from both sides of the road, unlike a road widening project where right-of-way can be purchased on one side. This requires double the amount of property owners involved in taking. It has been suggested that the rail trolley could run in utility easements. While this may seem like a viable option, the practical application would be very limited, due to location and the need to secure approval.

Similarly, it has also been suggested that the rail trolley could run in a dedicated easement. This would require either a taking of the properties or the willing approval of each and every property owner along the desired path. Getting that kind of consensus would be nearly impossible.

Another concern, albeit less significant, is the inflexibility of rail. Once the route is determined and the rail is laid, re-routing is removed from the realm of possibilities. Additionally, if the rail trolley fails to succeed and is discontinued, the rail remains in the ground (preferably imbedded in concrete) and becomes a public eyesore (like the infrastructure for some monorails).

Many local studies and presentations have been conducted to promote the rail trolley, including but not limited to Lake Park, Monroe County (Key West), Fort Pierce, Fort Lauderdale, Volusia (Daytona Beach), and Miami. As of yet there has been no buy-in, at least not sufficient enough to bring to fruition. This raises a question of practicality, particularly since funding does not appear to be an issue. The predominant concern is not whether rail trolley *could* work, but whether the benefits outweigh the limitations. There are, however, places where the use of rail trolley may be appropriate, but they are restrictive.

CONDITIONS FOR SUCCESS

It is important for any public investment to have a high degree of potential success prior to implementation. As such, it is necessary to match the service to the demand. The monorail is similar to the rail trolley in its uniqueness, and is a good example of successful operations only in limited environments. Many cities spent millions of dollars for a monorail project that seemed like a good idea at the time, only to become a public embarrassment due to its minimal use. In nearly every case, more money was spent in a desperate attempt to save, revive, and/or promote the system, only to have it stand as a monument of failure. This is why it is critical to apply caution when evaluating the potential for using rail trolley.

A question of success arises over the practical application of the use of rail trolley and the environment in which it could operate successfully. Like any transit system, there must first be a high density of places in which to go (destination) and places from which to come (origin). As stated in *Public Transportation*, "Transit works best where travel is concentrated in space and time."[6] There must also be an existing inconvenience that precipitates people to ride rather than walk, drive, or bike. This may include congestion, insufficient, inconvenient or expensive parking, or an inability to drive or walk.

The most viable environments that could support rail trolley are areas that have a high density of tourism, business/retail, and recreational uses or, again, where precipitating factors are most likely to exist. For example, International Drive in Orlando is lined with hotels, restaurants, attractions, and retail stores. Many people come to the area without transportation, or they need to share a vehicle with others, making them transit-dependent. Even if they have a vehicle, it is inconvenient to use when traversing the corridor. Traffic congestion is ever-present, unfamiliarity with the area creates stress when driving, and hotel parking is often constrained (there may not be a place to park upon return or it will be an undesirable distance from the door), creating the impetus for people to use transit.

Another example is Panama City Beach, where the seasonal congestion is so bad that traffic on Front Beach Road is at a near standstill most of the day. A rail trolley running adjacent to the sidewalk in this corridor would be a very desirable transportation alternative. It would also provide a safe alternative for college party-goers.

A potentially viable use for rail trolley may be as a shuttle between parking and major destinations, such as a recreation complex, central business district or airport. The drawback would be that, except for the airport, it would only be operational during certain peak times.

FINAL COMMENTS

Rail trolleys are attractive and nostalgic, but for legitimate use as public transport, they do not attract a wide audience. The truth is that rail-type local transit was replaced because of greater efficiency of buses, and only historic interest (such as those in San Francisco, San Jose, and New Orleans) remains. Nowadays, local rail in the United States is attractive only when operating on a separately dedicated right-of-way, like commuter or light rail.

Higher technology and modern looking vehicles are more appealing, and many options are available for providing small-scale transportation in pedestrian-friendly environments. In beach communities where environmental concerns are heightened, electric transit vehicles are attractive (like those used in Miami Beach). One of the newest technologies is an optically-guided bus. It is quiet, runs in a dedicated right-of-way, and can shut down if anything interrupts its path, thereby reducing accident potential. Trams, like those used at

amusement parks to transport visitors to and from the parking lot, could also be used in a pedestrian-scale environment.

It is doubtful that rail trolley would be successful as a stand-alone transit system. In other words, it is best if it connects to other transit modes, such as bus or rail, resulting in increased ridership.

Finally, there is a fine line between trendy planning and innovative planning. Looking back at some instances of trendy planning reveals a few major faux pas. People movers, mentioned earlier, are one example of trendy planning. Another example is defensible space, which removed neighborhood elements in an effort to feel safe. To explain, this concept was most often applied to public housing. Specifically, instead of parking in a driveway or parking lot, yards were removed so that people could park in front of their unit. It was thought that play areas located in between buildings made it easy for criminals to escape to places that were not accessible by car. So playgrounds gave way to internal road systems. Millions of dollars were spent for "improvements" that destroyed the essence of community, and made people retreat indoors. It didn't take long for these communities to experience high vacancy rates (which actually *increased* the incidence of crime) and their ultimate demolition.

For those who may believe that the narrow gauge rail trolley is truly innovative, be sure that its application is in an environment that can sustain and promote the concept. A proven example is far better than a good idea.

ENDNOTES

[1] *Trip Generation*, 6th ed., Institute of Transportation Engineers, 1997.

[2] *Florida Statistical Abstract 2000,* 34th Ed., Tables 1.25 and 2.05, Bureau of Economic and Business Research, University of Florida, 2000.

[3] "Merge Lanes Ahead," *Florida Planning*, March 1997.

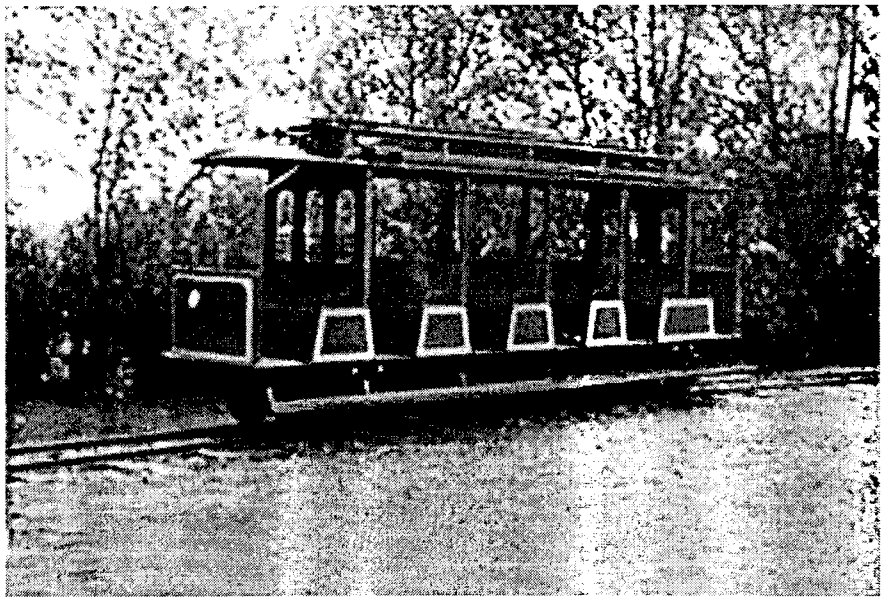
[4] According to the 1995 Nationwide Personal Transportation Survey.

[5] *Have Car, Will Commute*, www.CNN.com, September 28, 2000.

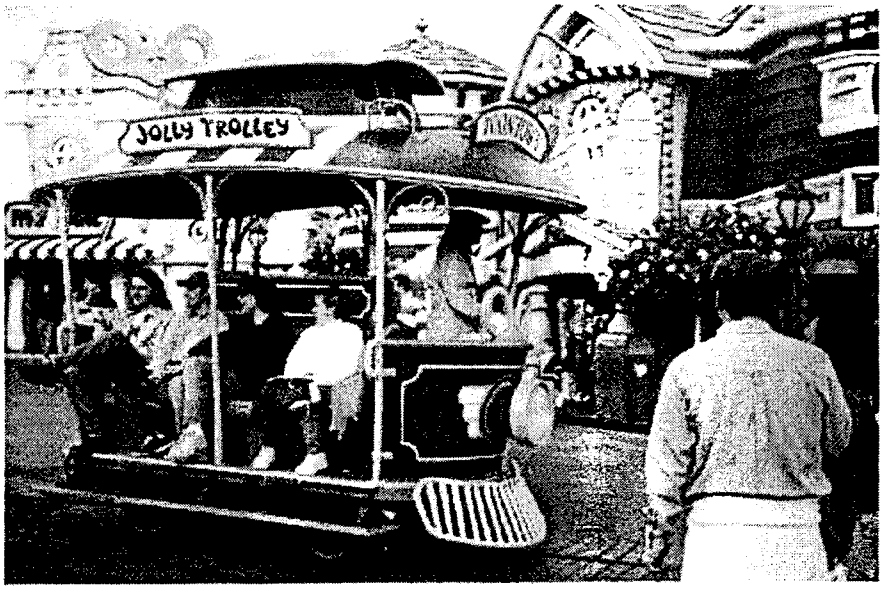
[6] Gray, G.E. and Hoel, L.A. *Public Transportation, 2d Ed.*, Prentice-Hall, Englewood, NJ, 1992, p.372.

APPENDIX A

City Island Park



Toontown Jolly Trolley



APPENDIX B

NARROW GAUGE RAIL

GREENWAY TRANSIT TROLLEY

SERVICE PROPOSAL

For

INTERNATIONAL DRIVE BUSINESS COMMUNITY

Submitted By

CUSTOM LOCOMOTIVE CORPORATION
1750 North Campbell
Chicago, Illinois 60647

The 30-inch narrow-gauge-rail trolley equipment proposed by Custom Locomotive will operate at pedestrian-compatible (10–15 mph) or vehicular competitive (30 mph) speeds and can be installed to enhance the image and marketability of the International Drive tourism-oriented business community. Custom's Trolleys' will meet ADA requirements. The proposed system will incorporate approximately 60 user-friendly, architecturally attractive transit stations at the appropriate intervals.

The trolleys proposed for International Drive are electrically powered. They are 80 to 84 inches wide, 9'-6" in height and 32 feet long. They are Air Conditioned. They are single or dual directional and are designed as typical historic Victorian-style Trolleys. Each car carries approximately 40 passengers depending upon seating configuration, and can be assembled into two or three car trains to provide higher capacities at 5 to 10 minute headway frequency internals so as to easily accommodate maximum passenger demands. Custom also offers open style trolleys and smaller 24-inch gauge rail vehicles. These smaller trolleys have less range, seating capacity and speed options.

The Custom Trolley installation proposed for International Drive will cost approximately $22,000,000 for the 5.5-mile system inclusive of:

1) architectural, landscape and engineering design services;
2) rail installation;
3) 33 trolley vehicles
4) fully equipped transit maintenance facility within one mile of the International Drive Trolley route;
5) landscape and sidewalk enhancements;
6) 60 freestanding or intermodal/parking facility-related stations; and
7) the transit station ticket equipment and gift/refreshments/snacks transit station amenities.

The revenue projections are based upon fare box, advertising and transit stations (gifts/refreshments/snacks) revenues but financial alternatives include the MSTU revenue, parking, underground utility corridor joint development at parking facilities, and a variety of possible transit Greenway corridor use fees.

The following proforma shows possible income and operational cost projections depending upon the route, design, and operational parameters implemented. This proforma assumes a $2.00 per day, per adult and $1.00 per day, per child ticket for 1.5 million passengers.

The International Drive corridor extends 5-1/2 miles, connecting Belz Factory Outlet Mall with Universal, Sea World, and numerous independently-owned tourism oriented businesses, attractions, restaurants, hotels and resorts, including the Orlando-Orange County Convention Center. In combination with Disney World and downtown Orlando destinations, International Drive businesses represent the desired destinations of a significant majority of the millions of visitors arriving by automobile, bus, airplane and train transportation alternatives. Utilizing the existing Municipal Services Taxing Unit (MSTU) that currently operates the I-Ride rubber tire Trolley Service, Custom Locomotive suggests that its 30" narrow gauge rail trolley equipment be installed out of the roadway but within the existing right-of-way and parking areas so that the following goals can be achieved:

1) The existing road system is not disrupted for months at a time during the construction or operational phases of the project;
2) The proposed Custom Trolley Service is installed and operational with a 12 to 18 month time frame in coordination with the current trolley service;
3) That the operation of the proposed Custom Trolley Service is less expensive to maintain, more customer friendly and more dependable and predictable than most rubber tire transit systems;
4) The initial planning phase is used to:
   a) establish the most beneficial corridor improvements, routes, service schedules, design criteria and parking transit amenities that will increase business opportunities for International Drive;
   b) integrate the Trolley Service with a transit connector to the Orlando International Airport and downtown Orlando;
   c) assure that the Custom Trolley Service operates without a continuing tax subsidy or governmental interference; and
   d) negotiate with local, state and federal governmental entities to allow the Custom Trolley Service capital expenditures to be accepted as the financial match requirement for the transit connections between International Drive, Orlando and the Orlando International airport, and to accelerate the Airport linkage to International Drive.

This opportunity to install a Custom Trolley Service represents the best choice available to the International Drive business community and will complement any regional ground transit service options based on bus, light rail or monorail technology.

Proposed Trolley Installation Cost Budget for International Drive

	Description			Total
A)	**Electrically Powered Rail Trolley Transit System**			
1)	33 Air Conditioned 30"gauge trolleys - 80"wide x 32' long	220,000	7,260,000	
2)	33 Bi-Directional Trolley Controls (Optional)	8,000	264,000	
3)	33 Freight for Each Trolley-Shipped Chicago to Orlando	1,500	49,500	
	Total		7,573,500	7,573,500
B)	**Site Improvements - Track & Miscellaneous**		-	
1)	11 Miles of Track Installed 5.5 South Bound & 5.5 North		4,558,100	
2)	Crossings, Sidewalks and Landscaping		2,120,000	
3)	Miscellaneous Equipment		22,900	
5)	Professional & Consultants Fees		1,500,000	
6)	Insurance and Contingency		1,220,000	
	Total		9,421,000	9,421,000
C)	**Stations and Platform Stops**		-	
1)	60 ConcretePlatforms-BusStopStyleStations-TktVending!	20,000	1,200,000	
	Total		-	1,200,000
D)	**Trolley Barn and Service Facilities**		-	
1)	2 acres land acquisition for Trolley Barn & Parking		1,500,000	
2)	40,000 sq ft Trolley Barn & Service Center	$40 per foo	1,600,000	
3)	Tools, Parts & Maintenance Equipment		300,000	
4)	Paved and Lighted Parking - 30 cars		120,000	
5)	440-Volt Electrical Service for Chargers & Accessories		200,000	
	2-weeks testing and start-up costs		50,000	
	Total		3,770,000	3,770,000
	Grand Total			21,964,500

Typical Annual Operation Costs for Trolley System on Int'l Drive

					per day	30 days	365 days	
Gross Revenue on 1,500,000 Riders per year								
Fair Box:								
3,200	Adults	per day	@	2.00	6,400	192,000	2,336,000	
800	Children	per day	@	1.00	800	24,000	292,000	
		Total Ridership Revenue			7,200	216,000	2,628,000	2,628,000
Note: Above prices are for all-day use								
Transit Station Revenue: (Gifts and Refreshments)								
3,000	(assumes 3000 transactions)			1.00	3,000	90,000	200,000	
	Less cost of goods			0.40	1,200	36,000	80,000	
	NetRevenue-Gfts&Rfrshmts			0.60	1,800	54,000	120,000	120,000
Advertising Revenue: based on 12 Panels Outside & 14 Inside						Per Trolley		
396	@ 300/mo Rental Outside			300		118,800	1,425,600	
462	@ $75/mo Rental Inside			75		34,650	415,800	
		Total Advertising Revenue					1,841,400	1,841,400
		Gross annual Revenue						4,589,400

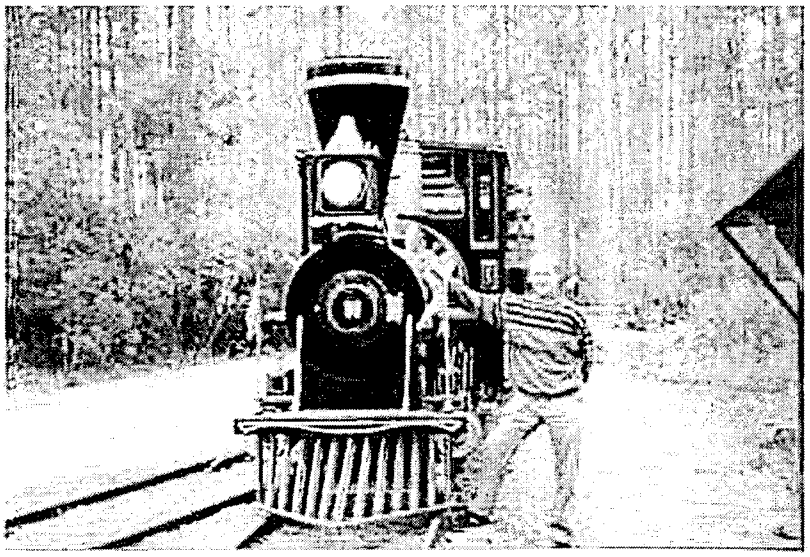
Cost of Operations

Utilities			5,000	60,000	
Employees	Tickets & Gifts	4	2,400	28,800	
	(Mainly Vending Machine Operation)				
	Management	2	10,000	120,000	
	Trn/Trolley Eng.	11	16,500	198,000	
	Conductors	11	16,500	198,000	
	Maint & Utility	6	13,000	156,000	
	EmplContr&Comp		9,636	115,632	
Insurance	Health		3,300	39,600	
	Liability		12,000	144,000	
Telephone			1,500	18,000	
Fuel	Generators for A/C and Charging Batteries		6,600	79,200	
Maintenance and Repair Parts and Supplies			17,500	210,000	
Maintenance Supplies			1,500	18,000	
Supplies	Fare Receipts		1,250	15,000	
Advertising and Promotion			10,000	120,000	
Professional Fees			3,000	36,000	
				1,556,232	1,556,232
		Net Revenue			3,033,168

APPENDIX C

Cummings Amusement Park Trains

-------SITE DIRECTORY------- OK



Cummings Locomotive Works manufactures steam style trains to custom order, 24, 36 and standard 56 inch gauges.

CONTENTS

BACKGROUND

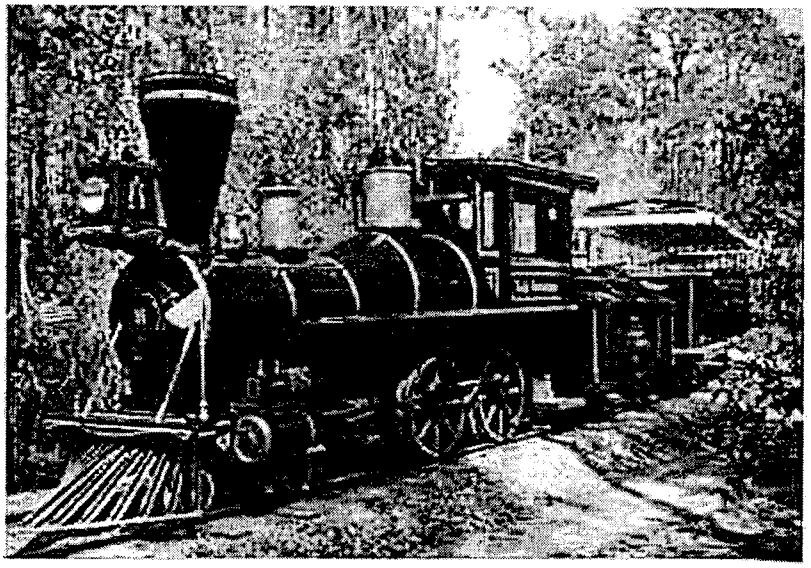
Cummings Locomotive Works Replicas are based on replicas of the 1849-1890's. In the 1800's many an entrepreneur built a train of their own, and in the years of 1849 to 1890 there were over 120 different models made.

Malcolm Cummings decided, because of his fascination with old steam trains throughout his life to build replica steam models. For economic reasons he propels the replicas with hydraulic diesel power. When he designed his plans for a steam train he wanted it to be large enough to haul people of all ages, so he decided to make his scale 36" gauge. From his research of train pictures, he chose the design from different models in books to combine what was pleasing to his eye and scaled it from that.

GO TO TOP OF PAGE

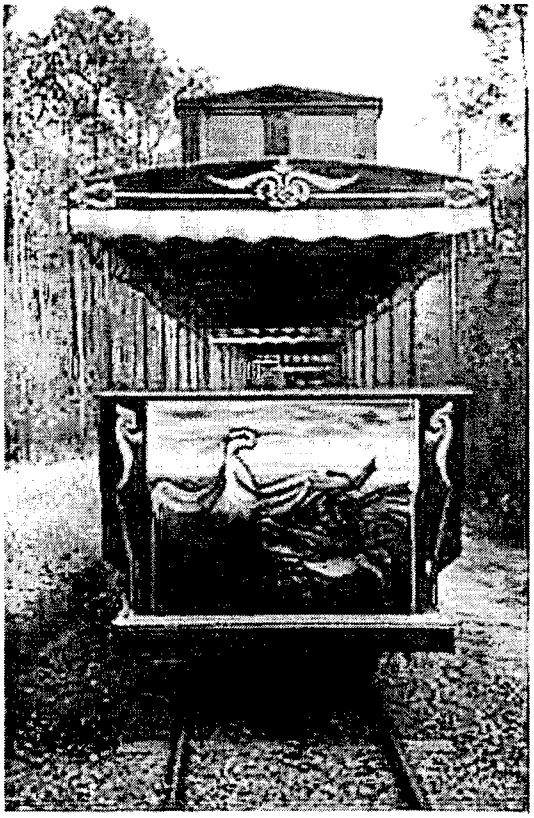
TECHNICAL DETAILS

All moulds and patterns were made by Malcolm Cummings and were put together in a replica wood model to get the patterns just right. Then from the patterns he had he had iron castings made and fiberglass moulds for parts that would be made from fiberglass.



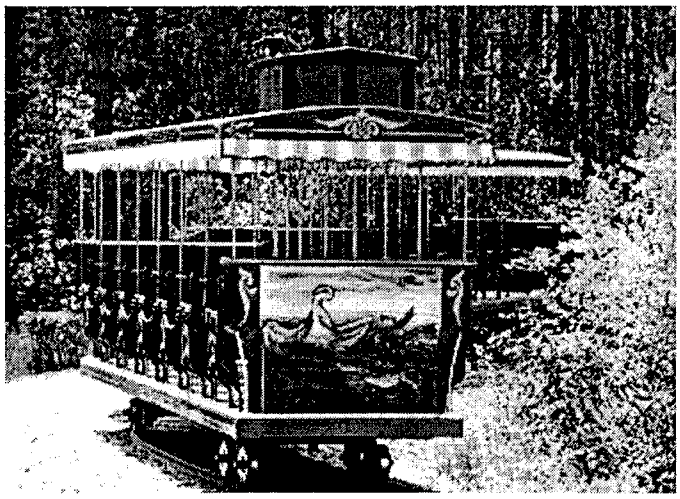
The wheels are all cast of cast steel. Parts that don't wear are made of cast iron. All the brass is cast from brass from our moulds. Real brass parts are flag poles, cab handrails, name plates and a real bell. Parts that were originally constructed from metal like the boiler and smokestack are made from fiberglass from his own moulds. Other brass parts to look authentic are made from fiberglass and made to look brass like. This way everything looks authentic and is economical to maintain. The cowcatcher and the side panels for the seats of the coaches are cast from aluminium from his personal pattern design.

The working parts are all designed by Malcolm Cummings. The brakes are on the locomotive and four wheels on each car, and the locomotive and coaches can be painted to the purchasers specification. (with two colours on the loco, and one colour on the coaches) There is room for the Engineer to sit comfortably in the cab of 36" gauge with a perfect view from the cab to all points ahead or back to see clearly what is going on at all times. The cab is made of fiberglass as well fiberglass trim and a vinyl roof. In the cab there is night lighting and a PA system to each coach and a cassette recorder to play music from engine to coaches or messages, which ever you desire. (PA system optional)

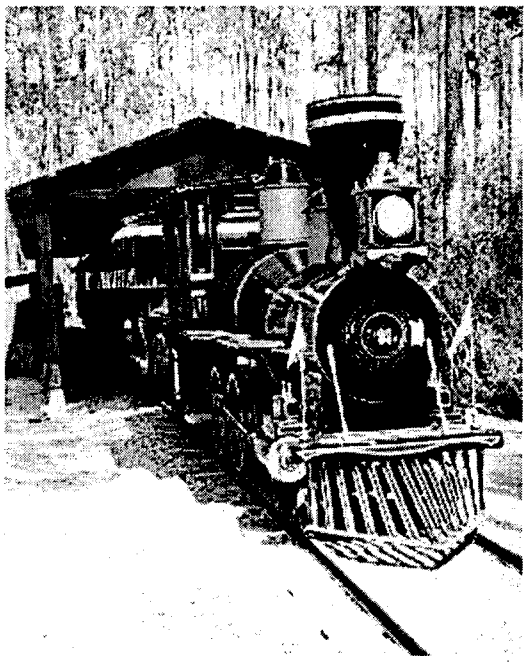


There is a cluster of gauges in the cab which consists of air pressure, water temperature, hour clock, hourmeter, tachometer, fuel level, hydraulic pressure and voltmeter. The coaches all have a fiberglass deck with outdoor carpeting. Coaches come with or without canopies. Canopies are made of fiberglass and are an option. All locomotives are equipped with air compressors. Night lighting on coaches is optional. Each locomotive comes with a tender car. An extensive Service and Maintenance manual is included.

Each coach of the 36" gauge is 25' long and can haul an average of 30 adults. Coaches can be equipped with wheelchair access. These trains can be operated from 0-12 miles per hour.



It is recommended that the 36" gauge train be run on a 30 lb. (or larger) rail spiked to 6" by 6" ties. Track layout, radii and bolting specifications must be approved in writing by Cummings Locomotive Works before a contract is signed.



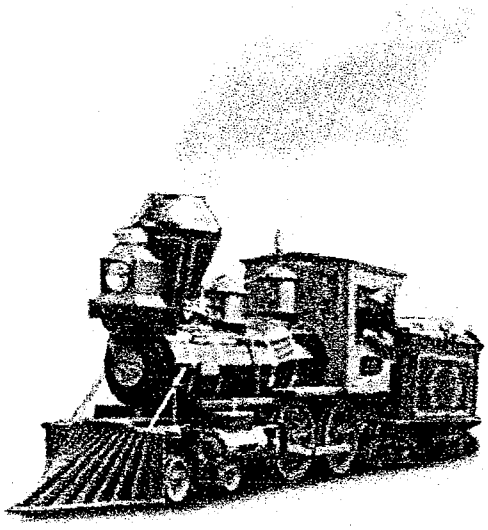
Dimensions and specifications may change without notice.

There are many more reasons why you should consider a Cummings train when you plan your park or playground or

36 INCH GAUGE

Custom Locomotive

Custom Locomotive, Inc. has been in business for over 15 years, serving the public with high quality trains for entertainmnet and transportation.



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Custom

Locomotive

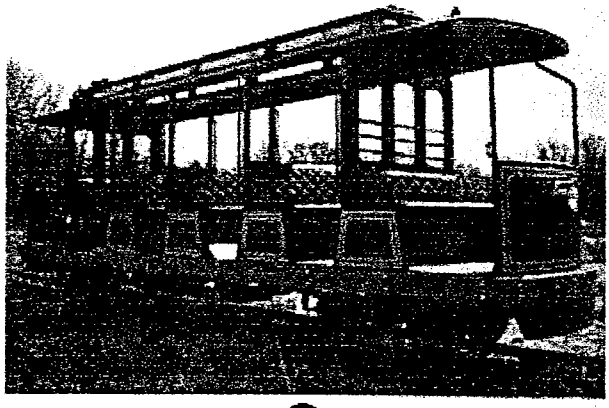
1750 North Campbell Avenue, Chicago IL 60647

Phone: 773-486-0466 Fax: 773-486-1711

email: info@customloco.com

Our Trains

Trolley



Back List Next

Model:	Trolley
Gauge:	14" to 16"
Length:	17'
Width:	36"
Height:	6'
Weight:	3500 lbs.

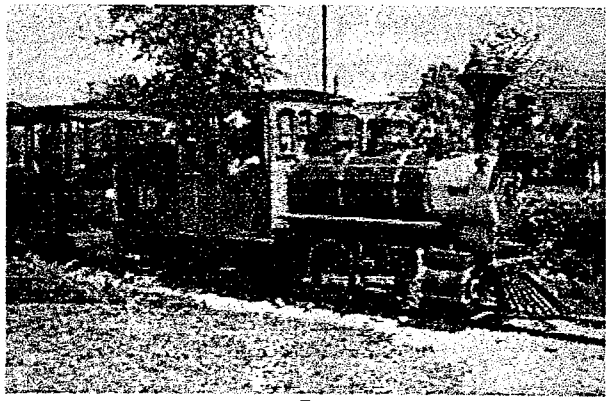
Also available:

Model:	Trolley
Gauge:	24"
Length:	20' to 32'
Width:	4' to 6'
Height:	6'-8' or 9'-6'
Weight:	6000 lbs. to 20,000 lbs.

Custom Locomotive

Our Trains

Mason



Back List Next

Model:	Mason
Gauge:	14" to 36"
Length:	19'
Width:	4'-6"
Height:	7'
Weight:	11,200 lbs.

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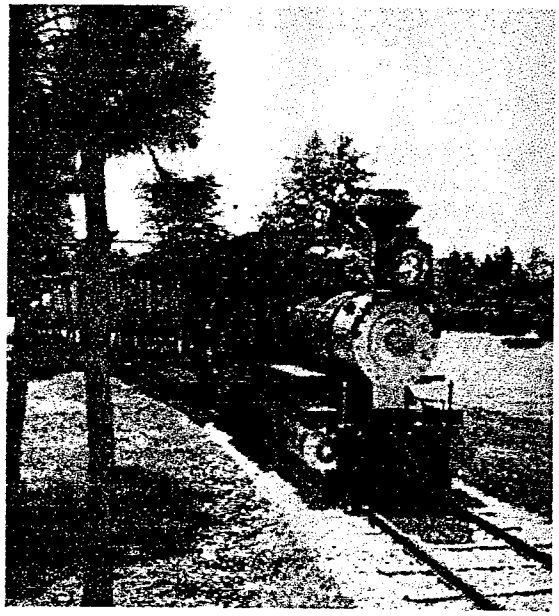
Custom Locomotive

What We Do

Train Installation

Custom Locomotive has a crew of personnel to do full installations anywhere in the world. These installations include: track layout, train transport, switch box installs, crossing gates, traffic lights, bridges, and landscaping.



Back

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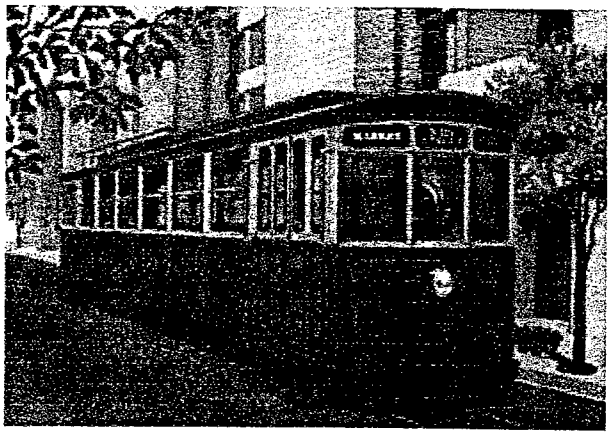
What We Do

Public Transportation

Are you looking for an interesting way to let your public travel from various hot-spots within your city or town? Why not consider a public transportation solution from Custom Locomotive. We can develop a transit system using various models and sizes of locomotives from classic steam train replicas to our futurist and modern CX -2000 trains.



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C. P. HUNTINGTON TRAIN

"Almost any zoo can benefit from the addition of a C.P. Huntington train. We've depended on the added revenues since we installed our first one in 1963. It's a fun and relaxing way to view the zoo."

Roy Shea, Director
Indianapolis Zoo

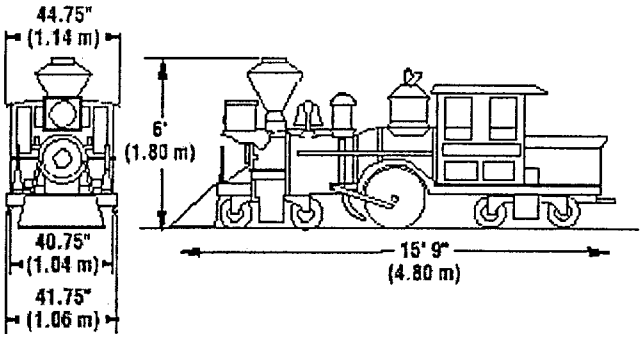
BACK

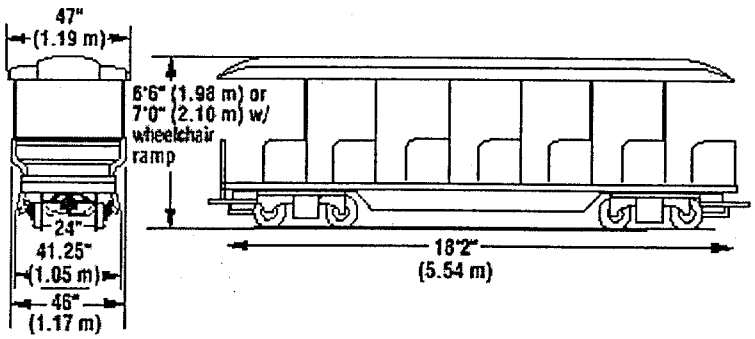
Review the ride specifications below while the video is loading. If the video doesn't load, you may need to get the Quicktime plugin. To print the specifications, choose Print from the file menu.

OPTIONS

- PA System: Amplifier controls and microphone installed in locomotive; three waterproof speakers in each coach.
- Trim: Chrome in place of brass.
- Dome Lights: Two dome lights per coach, controlled from locomotive.
- Handicap Access: One or two position kits.
- Optional wheelchair access package (one or two position kits) with tie-downs available.
- Auxiliary rubber tire drive system to increase gradeability.

SPECIFICATIONS





This ride conforms to all applicable ASTM amusement ride standards in effect on the date of manufacture.

1863 COACHES BRAKES

Air brakes on all wheels, built-in emergency system applies all brakes if loss of air pressure occurs.

SEATING

Number of seats.....7

Max. passengers per seat.....2 adults and 1 child or 4 children

Max. passenger weight per seat .....430 lbs. (194 kg)

Max. total number of passengers per coach.....14 adults and 7 children or 28 children (load from either side)

Max. total passenger weight .....3,010 lbs. (13.5 kg)

BRAKES

Air brakes on all wheels, belt-driven Midland air compressor, 3.61 cu. ft. air storage tank (meets ASME specifications).

OPERATOR CONTROLS

Directional control (combined throttle and transmission control), keyed ignition switch (gasoline engine), keyed ignition with pre-heat for glow plugs (diesel engine), remote throttle and choke (gasoline engine), smoker, bell, sander, PA, head-light, air whistle.

INSTRUMENTATION

Gauges: water temperature, ammeter, oil pres-sure, air pressure, hour meter, pre-heat indicator light (diesel option).

WEIGHT .....6,100 lbs. (2,745 kg)

TRACK GAUGE.....24 in. (61 cm)

MINIMUM TRACK CURVE RADIUS....50 ft. (15 m)

RECOMMENDED TRACK CURVE RADIUS....75 ft. (22.5m)

Minimum passenger height.....42 inches (107 cm) (unaccompanied by adult)

WEIGHT (EMPTY).....2,700 lbs. (12.2 kg)

LOCOMOTIVE ENGINE

Teledyne Continental industrial water-cooled engine.

Number of cylinders....4 (in-line)

Displacement ....165 cu. in.

Type of fuel.....gasoline, diesel or propane

Maximum horsepower rating at governed speed:
- Gasoline engine ....64 @ 2,400 rpm
- Diesel engine .....55 @ 2,400 rpm
- Propane engine.....58 @ 2,400 rpm

Continuous horspower rating:
- Gasoline engine ....51 @ 2,400 rpm.
- Diesel engine .....47 @ 2,400 rpm
- Propane engine .....58 @ 2,400 rpm

TRANSMISSION

Funk Reverse-O-Matic, through Chance-built reduction box and 90° drive gearbox to all eight drive wheels.

MAX. RIDE SPEED.....12 mph (19.2 kmh)

MAX. RECOMMENDED GRADE...See Grade Chart

LENGTH & PASSENGER CAPACITY

1 locomotive & 2 coaches....51 ft., 4 in. (15.6 m)
(Capacity: 28 adults, 14 children or 56 children)

1 locomotive & 3 coaches....69 ft., 2 in. (21.1 m)
(Capacity: 42 adults, 21 children or 84 children)

1 locomotive & 4 coaches.....87 ft. (26.5 m)
(Capacity: 56 adults, 28 children or 112 children)

1 locomotive & 5 coaches..104 ft., 10 in. (32 m)
(Capacity: 70 adults, 35 children or 140 children)

1 locomotive & 6 coaches...122 ft., 8 in. (37.4 m)
(Capacity: 84 adults, 42 children or 168 children)

1 locomotive & 7 coaches ..140 ft., 6 in. (42.8 m)
(Capacity: 98 adults, 49 children or 196 children)

PERCENT GRADE RISE PER 100 FT.	ANGLE DEGREES AND MINUTES	NUMBER OF COACHES WITH 11 PASSENGERS EACH	
		NORMAL RAILS 15	SANDED RAILS 25
1	0° - 34'	10	10
2	1° - 9'	6	10
3	1° - 43'	4	7
4	2° - 17'	3	5
5	2° - 52'	2	4
6	3° - 26'	1	3
7	4° - 0'	1	3
8	4° - 34'	1	2
9	5° - 9'	—	2
10	5° - 43'	—	1
11	6° - 17'	—	1
12	6° - 51'	—	1
13	7° - 24'	—	—
14	7° - 58'	—	—
15	8° - 32'	—	—
MAXIMUM DRAW BAR PULL		915 LBS (412 KG)	1,525 LBS (698 KG)

Specifications are effective as of publication date. Because we try to improve every Chance product, these specifications are subject to change without notice.

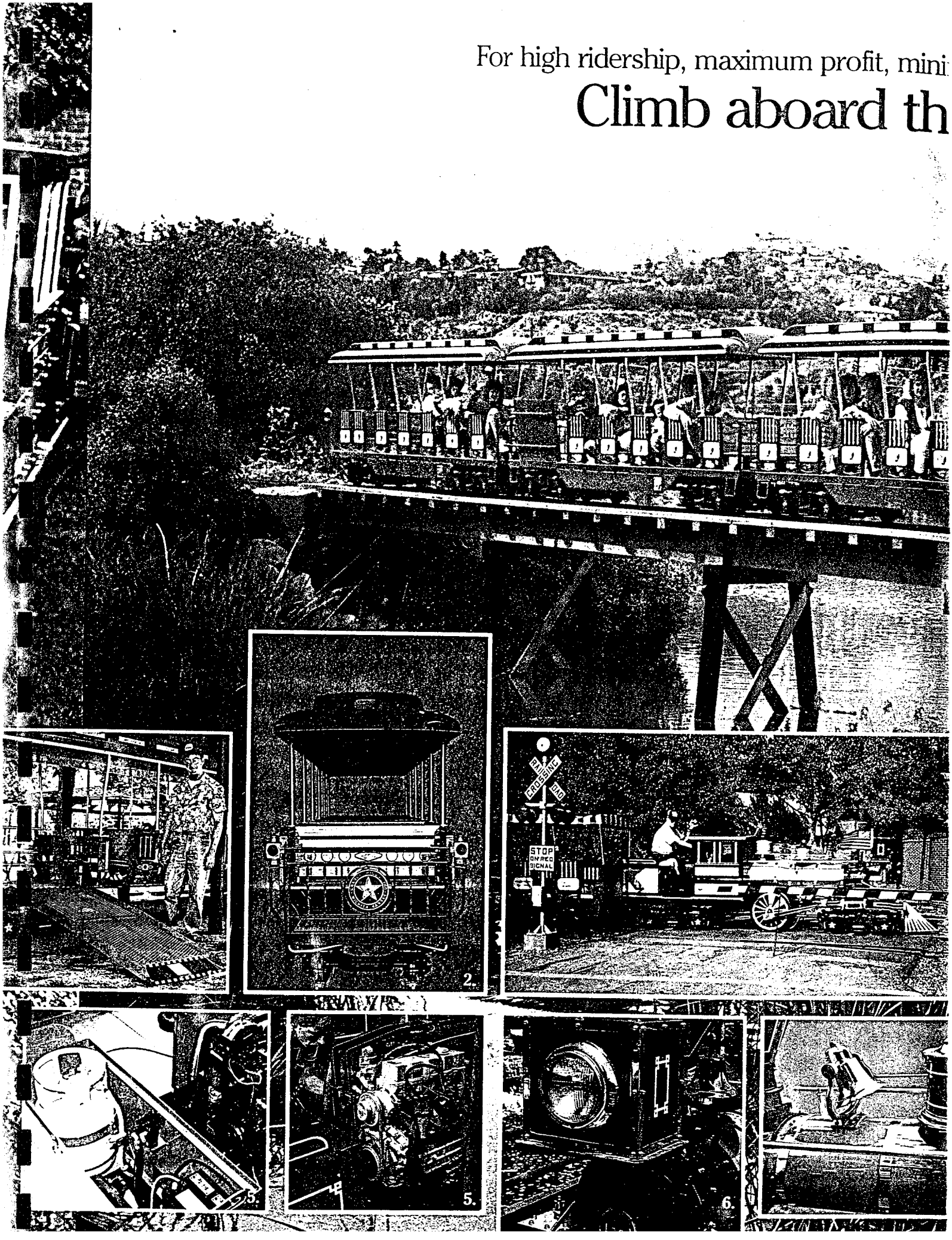
Dimensions given are approximate. For actual dimensions and installation specifications, refer to Chance Rides foundation drawings.

Home | Products | About Chance | Services | Job Openings
Carnival Routes | Connections | Site Map | What's New | Help

P.O. Box 12328 | Wichita, KS 67277-2328 U.S.A. | E-mail us at rides@rides.com
Telephone: 316-942-7411 | FAX: 316-942-7416 | 24-Hour Customer Service Line: 1-800-CHANCE-1

For high ridership, maximum profit, mini

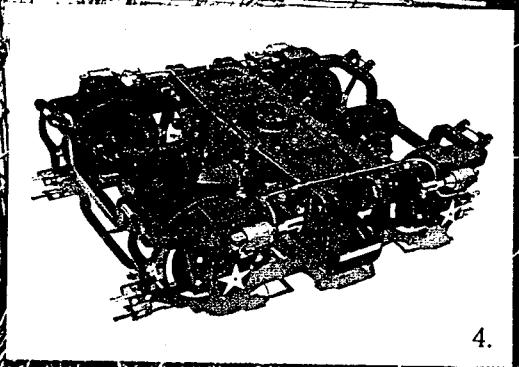
Climb aboard th

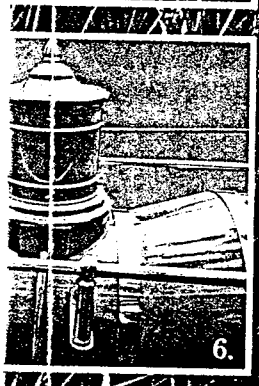


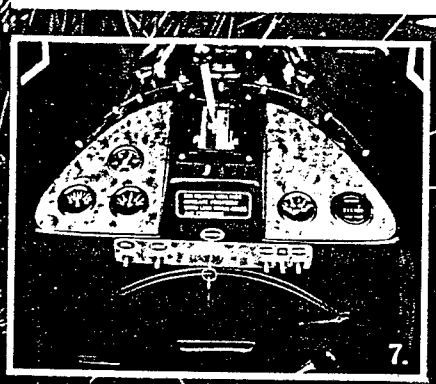
imum maintenance and true historic appeal...

ıe C.P. Huntington!

Optional Propane Engine for Indoor or Outdoor Use







1. Optional wheelchair ramp for handicap access.
2. Attention to detail shows from front to back. C.P. Huntington coaches show handcrafted quality and excellent design. They're comfortable, easy to maintain.
3. Convenient Chance crossing gates and signals add realism and convenience to your layout. See back page for complete listing.
4. Authentic train trucks provide a smooth ride and years of service for C.P. Huntington. Minimum turning radius is only 50 feet!
5. Power is supplied by a tough, industrial water-cooled engine, available in either gasoline, diesel or propane.
6. Authenic detailing in design, paint, woodwork, brass or chrome makes the C.P. Huntington a handcrafted standout.
7. A convenient control panel puts all operations within easy reach of the engineer.

SEVERN-LAMB USA, INC.

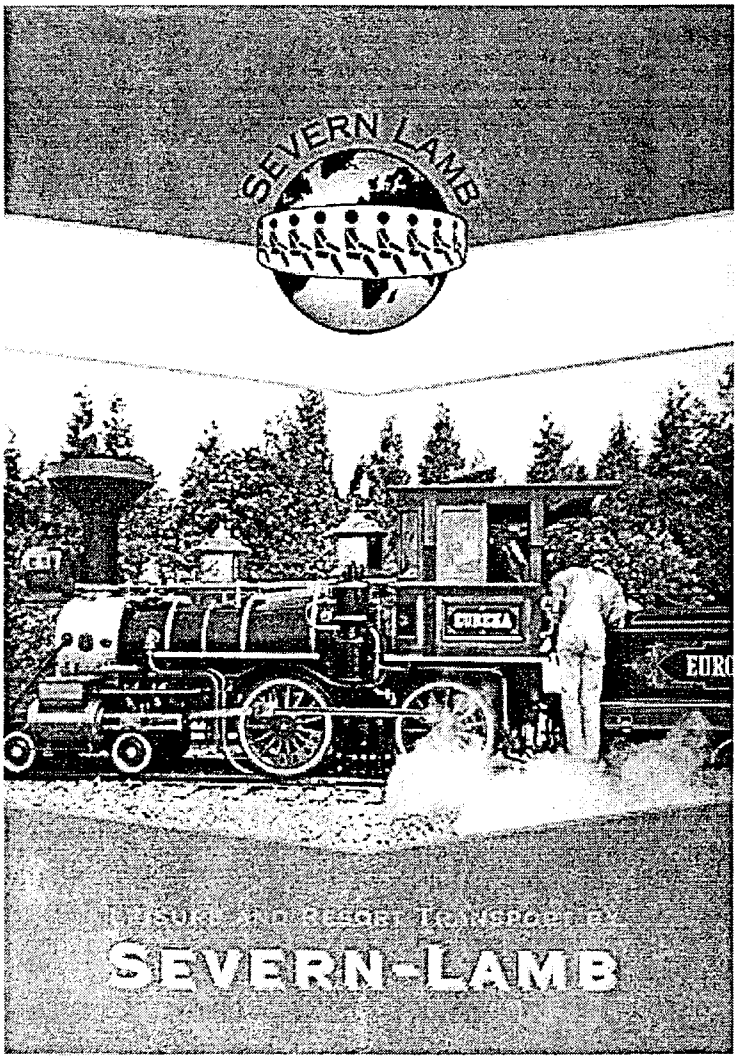
Marketing Service For Severn-Lamb Limited, UK.

PO Box 149 Westwood, NJ 07675
Tel (201) 666-2800 Fax (201) 666-1645

e-mail:trains@severn-lambusa.com

Our Trains

- Rail Trains
- More Rail Trains
- Monorail
- Electric Trains
- Road Trains
- Custom Design
- What's New
- UK Headquarters Web Site



Rail Trains, Road Trains, Electric Trains, Monorails, and Custom Designed Museum, Historical and Theme Models

Severn-Lamb Ltd., a most unusual company, has become the most inventive and

successful train manufacturer in the world. Building **rail trains** from the smallest gauge up to 36" gauge, all beautifully detailed, including authentic *Great Western and Old American* style trains in a choice of drive systems. This includes live steam locomotives with authentic coaches on a 36" gauge track which have been delivered to Euro-Disney and Port Aventura, Spain, the latest and newest large theme park in Europe.

Details are from polished swinging brass bells, chime whistles, air conditioned mahogany coaches from the large "Jupiter 1869" train, PA systems, cast custom logos, choice of colors, themed locomotive bodies, handicap access, and many more customized items suitable for all different train sizes. This includes the Arrow River, the newest electric train in the Severn-Lamb product line offering a beautifully detailed family train which holds both adults and children and operates indoors and outdoors.

The Severn-Lamb product line offers, furthermore, a great trackless train/tram system. These unique and colorful **Dotto Road Trains** operate in a wide variety of climate and terrain conditions for any and all applications of transporting people within the park, sight seeing, shuttle service from the parking lot to the main gate, etc, etc.

For those needing a super efficient high volume people mover Severn-Lamb Ltd. offers the **SL Monorail Series.** These futuristic monorails running on elevated track are a perfect solution where space is at a premium.

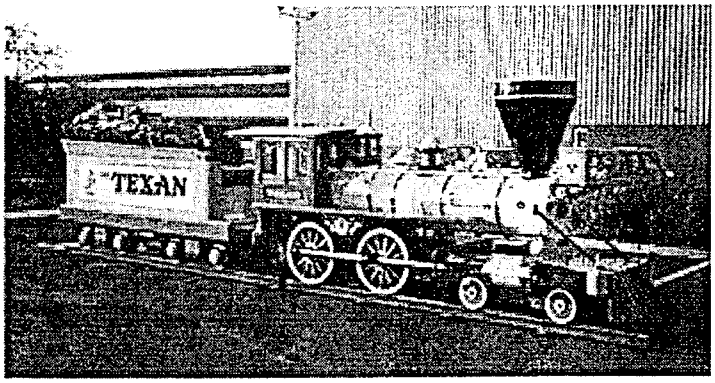
Severn-Lamb Ltd. also possesses the ability to manufacture one of a kind products from the reproduction of a piece of historical equipment as a static model for a museum to themed operation equipment for resorts and parks.

Please direct any inquiries to:

Jurgen Schmidt, President or **Ken Jowaiszas,** Director of Marketing Services

RAIL TRAINS

Texan

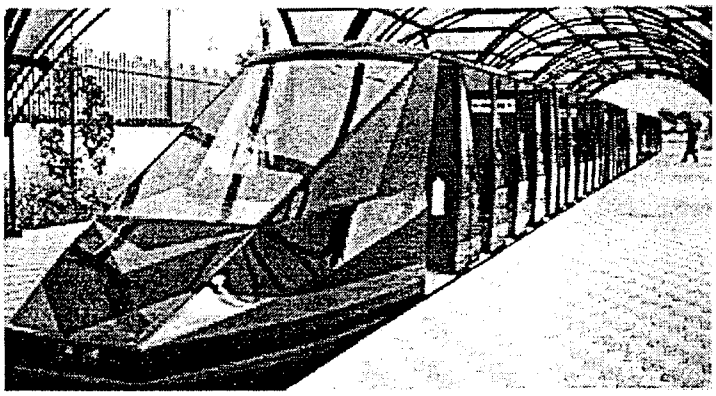


The Texan offers all the authentic detail and maintainability of its larger stable mate, the Lincoln, incorporating the same power system in a smaller scale train. This has the advantage of allowing a very tight turning radius of only 40 feet (12 metres) while retaining a relatively high capacity of as many as 126 adults on flat track. Customising options are offered. Passenger coaches have forward facing seats and are constructed of steel and aluminum.

Specification in Brief:-

o Standard drive system	: Diesel hydraulic	o Coach seating capacity	: 21 adults each
o Gauge	: 24" (610mm)	o Train capacity with four coaches	: 84 adults
o Minimum radius	: 40 feet (12 metres)	o Minimum rail weight	: 12lb/yard - 6kg/metre
o Maximum gradient pulling for fully laden coaches	: 3%		

Vulcan



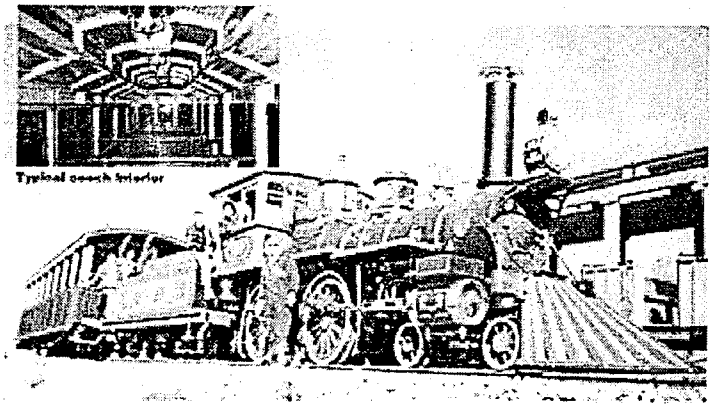
This futuristic train offers a high capacity alternative to our more traditional products. Designed as a shuttle with all controls duplicated at the front and rear of the train, the Vulcan is equally efficient operating on a conventional close-loop configuration. Severn-Lamb's philosophy of incorporating commercially proven components into their products extends to the Vulcan where the propulsion system is similar to the Lincoln and Texan. Construction is re-enforced polyester on a steel frame.

Specification in Brief:-

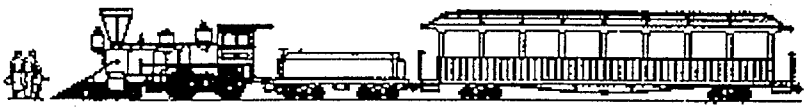
o Standard drive systems	: Diesel hydraulic	o Maximum gradient pulling six fully laden coaches	: 2.5%
o Gauge	: 36" (915mm)	o Total seating capacity	: 224 adults
o Minimum radius	: 170 feet (50 m)	o Minimum rail weight	: 30lb/yard - 15kg/metre
o Maximum gradient pulling for fully laden coaches	: 1.5%		

RAIL TRAINS

Jupiter



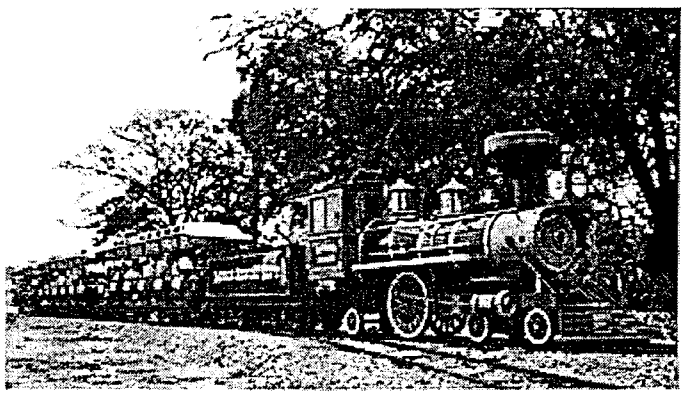
This massive Locomotive, weighing more than 50,000lbs (23,000kgs) in its live steam version, has the power to haul as many as 480 guests in six coaches on a flat track. Severn-Lamb have caputured in this authentic replica the essential essence of the Old West. Available in steam or diesel version, a number of detail customising options are offered making each locomotive truly unique. Coaches are of traditional timber design and constructed in re-enforced polyester on steel frames for longevity and ease of maintenance.



Specification in Brief:-

- **o Standard drive systems : Diesel hydraulic and live steam**
- **o Gauge : 36" (915mm)**
- **o Minimum radius : 170 feet (50 metres)**
- **o Maximum gradient pulling four fully laden coaches : 1.5%**
- **o Coach seating capacity : 80 adults each**
- **o Train capacity with four coaches : 320 adults**
- **o Minimum rail weight : 50lb/yard - 25kg/metre**

Lincoln



The Severn-Lamb Lincoln Locomotive effectively combines the elegance of a bygone age with the efficiency of modern components. The driver seated in his comfortable cabin and protected from the elements, has a single lever to control both speed and direction.

Simple to operate and maintain, the Lincoln offers a high capacity train ride of as many as 216 adults in six coaches on flat track. As with all Severn Lamb products a number of customising options are offered. Coaches are either toast-rack or of traditional timber effect construction.

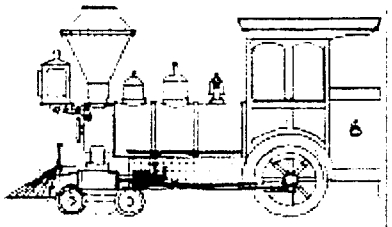
Specification in Brief:-

o Standard drive system	: Diesel hydraulic	o Maximum gradient pulling four fully laden coaches	: 1.75%
o Gauge	: 24" (610mm)	o Coach seating capacity	: 36 adults each
o Minimum radius (4-4-0)	: 100 feet (30 metres)	o train capacity with four coaches	: 144 adults
o Maximum radius (4-2-2)	: 50 feet (15 metres)	o Minimum rail weight	: 30lb/yard - 15kg/metre

Home Page || Rail Trains || More Rail Trains || Monorail || Electric Trains || Road Trains || Custom Design || What's New

Note:

Two additional custom narrow gauge rail manufacturers were identified after Technical Memorandum 1 was written. No quotes were solicited and brochures are included for information only.



E. TRANSIT, INC.

CUSTOM DESIGNED VEHICLES

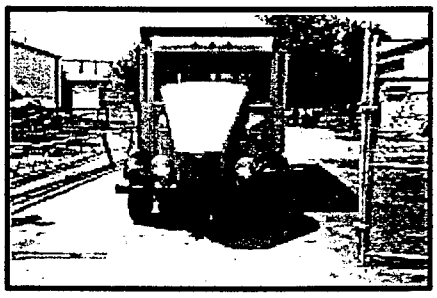
E. Transit offers the custom mass transit solution for your needs:

- Rubber Tire Transit Trolley – 39 Passenger
- Rubber Tire Hybrid Electric Trolley – 10 to 14 Passenger
- 1930's Era Bus (1934) – 20 to 28 Passenger
- Street Locomotive – 1 to 2 Passenger (New for 2000)
- Street Train Cars – 24 to 32 Passenger (New for 2000)
- 24" Gauge Rail Trolley (hybrid electric) – 29 Passenger
- 24" Gauge Rail Trolley (diesel hydraulic) – 25 Passenger
- Large Capacity Tram – 89 Passengers (New for 2000)

Vehicle bodies are themed, painted, and detailed to clients needs. All vehicles include lighting that meets or exceeds FMVSS Standards, AM/FM tape player with Driver interrupt P/A System, and Courtesy or Safety Lighting packages.

Vehicle options:

- Air Conditioning Systems
- Handicap Access / ADA compliance
- CNG (Compressed Natural Gas) or Propane Conversion
- Diesel Engine
- Interior Enhancements (Wood, brass, and paint details), Sign Frames, etc.
- Hybrid or all electric drive systems.
- Bells, whistles, "Smoking" smoke stacks, and more.

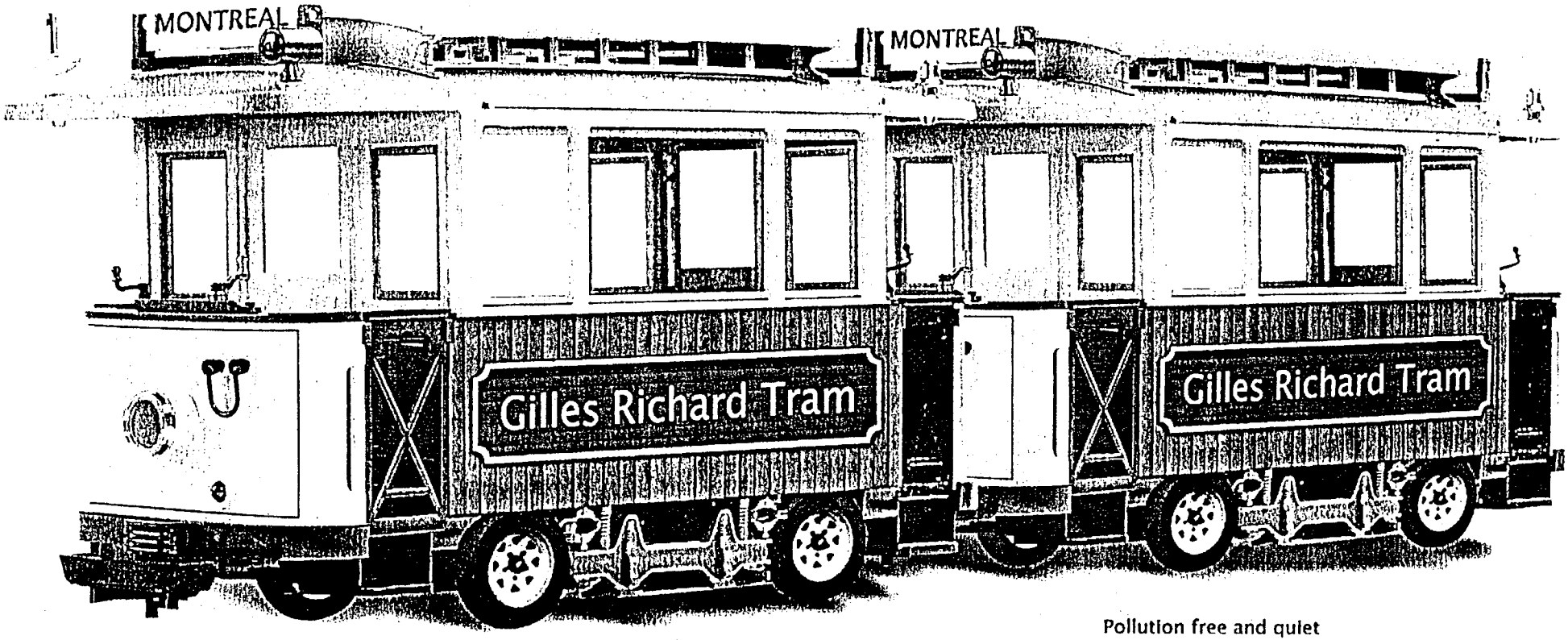


For more information or detailed specifications contact our sales department:

725 W. Central Blvd. Orlando, FL 32805
(407) 650-9597

GILLES RICHARD PRODUCTIONS

TRAMWAY PROJECT



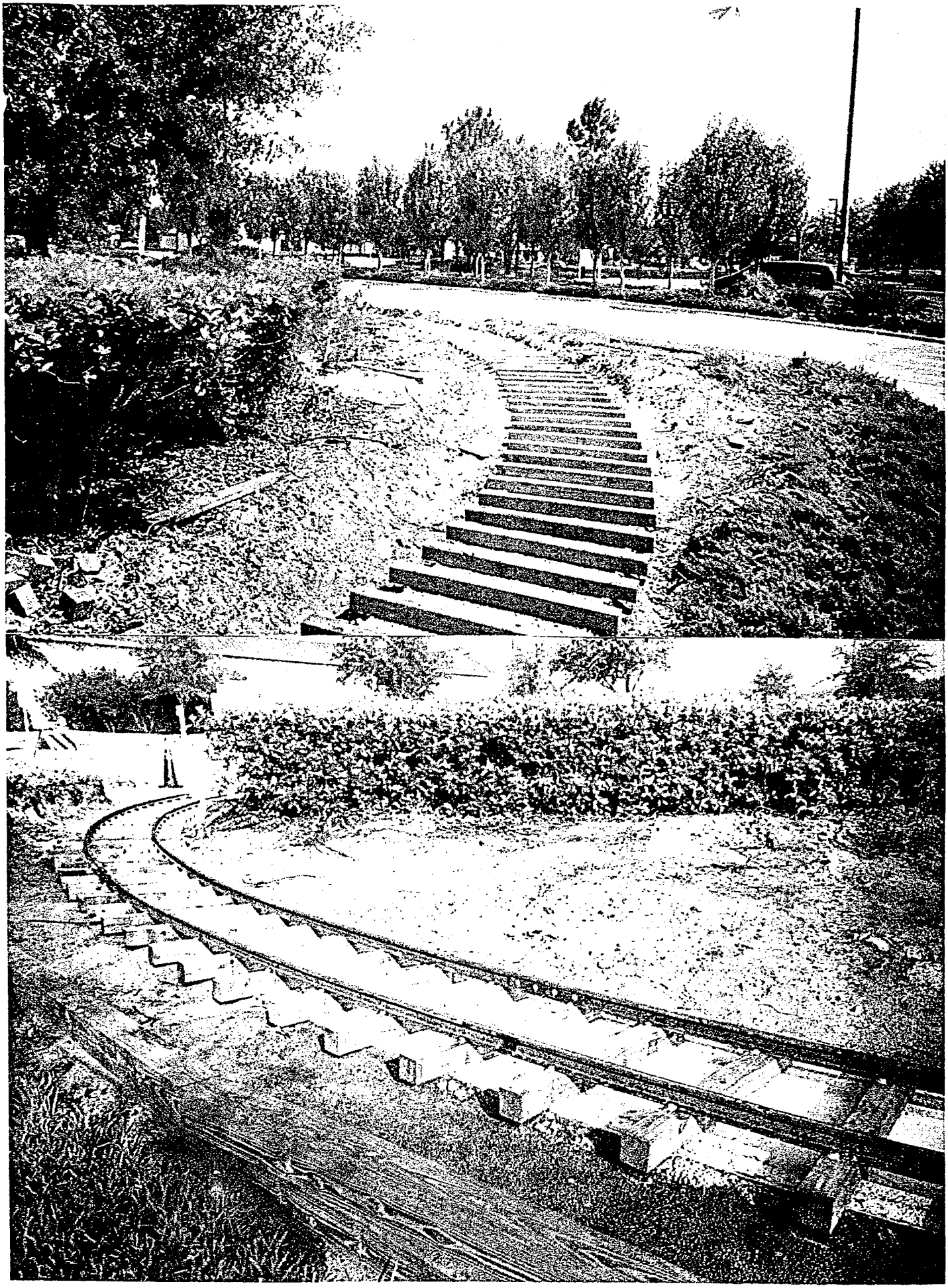
Pollution free and quiet
Inside or outside
Capacity: 12 passengers per car
Electrically powered by 8 X 6V batteries
Dimensions : 60" W X 144" L
8 back up batteries for greater range
4 wheels steering on cars

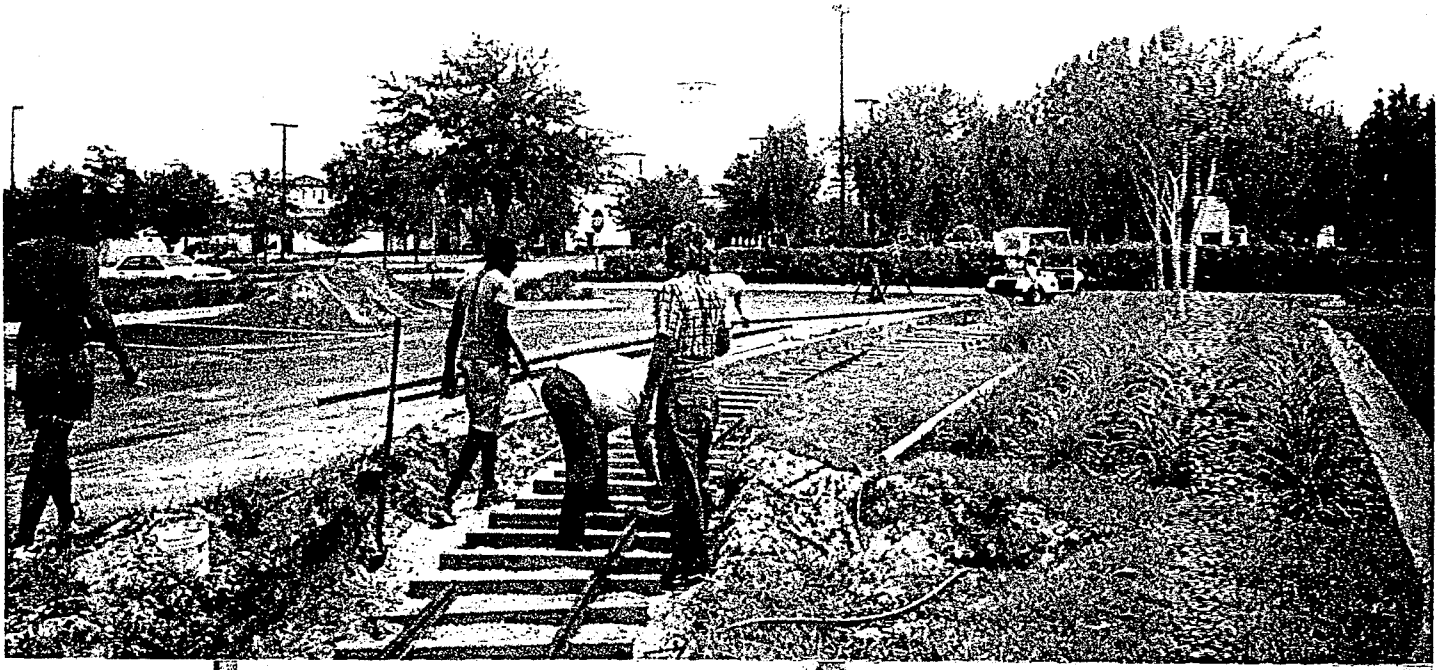
GILLES RICHARD PRODUCTIONS
2017, rue Parthenais
Suite 101
Montréal (Québec)
H2K 3T1 CANADA

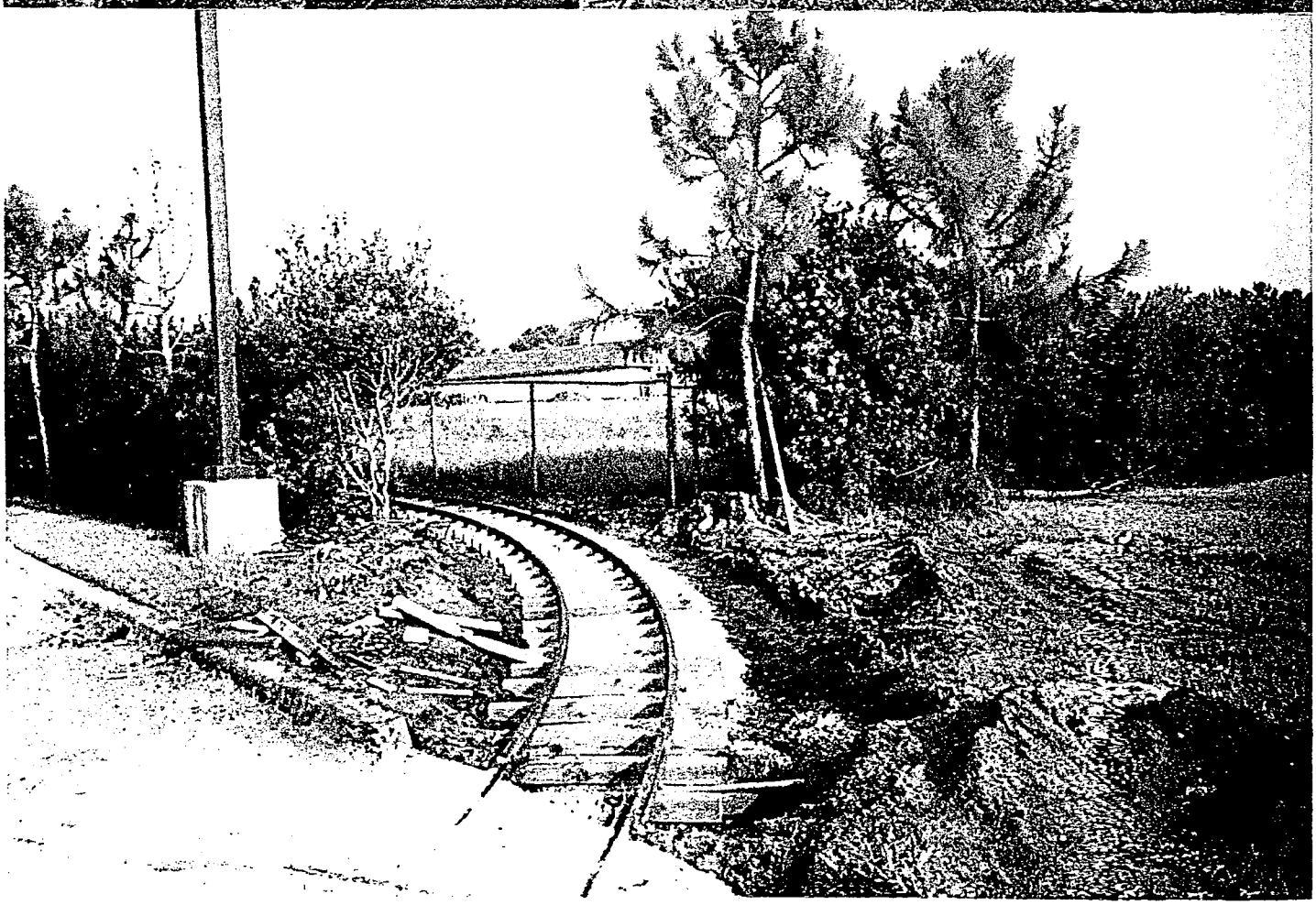
email: grichard@mlink.net website: gillesrichard.com
Tél.: (514)528-6789 or 1-800 632-9301 Fax: (514)528-6875 or 1-800-632-9302

Can build to suit for rail

APPENDIX D







APPENDIX E

NPTS Calculations for Florida*

Area	Sample Size			Transit Split			Work Trips			Trips in Peak Hours
	Households	Person Trips[1]	Trips per Household	Peak[2]	Off-peak	All Hours	Peak	Off-peak	All Hours	
Ft Lauderdale	126	1,044	8.3	1.87%	2.58%	2.31%	33.06%	13.09%	20.76%	38.42%
Miami	165	1,439	8.7	3.62%	2.10%	2.60%	34.19%	12.16%	19.33%	32.57%
Orlando	105	1,000	9.5	0.98%	0.72%	0.83%	30.27%	12.39%	19.59%	40.24%
Tampa-St Pete	141	1,341	9.5	2.05%	0.47%	1.02%	22.65%	9.46%	14.07%	34.93%
Rest of Florida	592	5,575	9.4	0.32%	0.34%	0.33%	24.91%	10.94%	16.06%	36.63%
State	1,129	10,399	9.2	1.10%	0.76%	0.88%	26.80%	11.16%	16.86%	36.43%

[1]Number of person trips by mode (transit vs. non-transit), purpose (work and non-work), and by hour of day
[2]Peak hours include: 6:00am - 9:00am and 4:00pm - 7:00pm

*Calculations made by CUTR, using the Florida portion of the 1995 Nationwide Personal Transportation Survey database.