

HEADLIGHTS



HEADLIGHTS

The Magazine of Electric Railways

Published since 1939 by the Electric
Railroaders' Association, Inc.

Volume 61, Number 1-6
January-June, 1999

Staff

Editor and Art Director
Sandy Campbell

Contributing Editors

Raymond R. Berger, Clive Foss,
James N. J. Henwood, Peter Kocan,
Arthur Lonto, Frank S. Miklos,
Bruce Russell and J. William Vigrass

Electric Railroaders'
Association, Inc.



National Headquarters

Grand Central Terminal
New York City

Mailing Address

P.O. Box 3323, Grand Central Station
New York, NY 10163-3323

E-Mail

era@juno.com

Subscriptions

Headlights is sent free to members of the
E.R.A. Applications for E.R.A. membership
are supplied upon request.

Changes of Address

Send address changes to the E.R.A.
along with an old address label
from a recent issue.

Correspondence

All inquiries regarding the activities
of the E.R.A. should be directed to
our New York headquarters.

Contributions

Send all items for publication
in *Headlights* to the editor. Manuscripts
should be submitted on diskette, e-mailed
to our Internet address, or typewritten.
Photos, illustrations and maps are needed
as well. Please send original negatives or
slides when possible and include
descriptions for each image along with
your name and address.

© 1999 ELECTRIC RAILROADERS' ASSOC.,
INC. ALL RIGHTS RESERVED. 991112

CONTENTS Jan-June

COLUMNS

3 NEWS

Peter Kocan compiles a roundup of rail transit activities from around the world.

6 BOOKS

James N. J. Henwood reviews *Cable Car in America*, *Yale Bowl and the Open Trolleys*,
and *Interurban to St. Albert: The Edmonton Interurban Railway*.

FEATURES

9 TREN URBANO: SAN JUAN'S NEW RAPID TRANSIT LINE

An exclusive progress report by Bruce Russell, J. William Vigrass and
Raymond R. Berger.

22 FOCUS ON ARGENTINA, PART 4: BUENOS AIRES PRE-METRO

The final installment of Bruce Russell's extensive coverage of rapid transit systems
in Argentina focuses on the Buenos Aires light rail line.

32 THE STREETCARS OF JUAN PERÓN

Clive Foss shows how the Perón regime boosted its streetcars as part of the
propaganda it constantly produced.

36 ROCHELLE WEBER'S NEW YORK

An artist's unusual paintings celebrate the rhythms of contemporary New York.

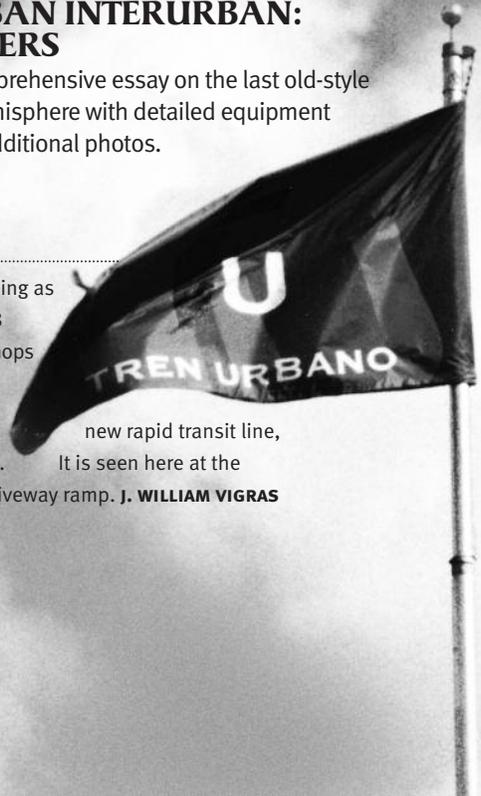
38 THE HERSHEY CUBAN INTERURBAN: EQUIPMENT ROSTERS

Clive Foss concludes his comprehensive essay on the last old-style
interurban in the western hemisphere with detailed equipment
rosters, a bibliography and additional photos.

ON THE COVER

Hershey Cuban. (cover) As imposing as
a PE blimp, newly repainted 3018
stands ready to depart Hershey Shops
for Jaruco in 1996. **CLIVE FOSS**

Tren Urbano. (below) San Juan's
new rapid transit line,
the Tren Urbano, has its own flag.
It is seen here at the
entrance to the yard and shop driveway ramp. **J. WILLIAM VIGRAS**





FRANK S. MIKLOS

Above, one of Portland's new low-floor cars emerging from the downtown end of Westside Tunnel.

PORTLAND, ORE.

The Tri-County Metropolitan Transportation District of Oregon (Tri-Met) celebrated the opening of the 18-mile Westside MAX light rail line on September 12, 1998. The line extends light rail from downtown Portland west through Beaverton to Hillsboro, bringing the MAX system to 33 miles. The line has 20 stations including Washington Park, which is in a three-mile tunnel under the city's West Hills. Located 260 feet below the surface, the station is one of the deepest in North America. (A rival is the Forest Hills station in San Francisco's Twin Peaks tunnel used by the K, L and M LRT lines.) Construction of the Westside line began in May 1994. Estimated total cost is \$994 million. Beaverton was served by Southern Pacific's electrified lines until July

1929. The 15-mile MAX line to Gresham (served by Portland Electric Power-Portland Traction interurban cars until 1958) opened in September 1986. Ridership has increased 60% since then and now averages 31,400 daily on weekdays. With the Westside line, daily average weekday passenger count is expected to reach 50,000.

PASSENGER TRANSPORT

SAN DIEGO

The 6.2-mile Mission Valley West (MVW) line, paralleling the San Diego River, opened to traffic on November 23, 1997. It cost \$220 million, far more than earlier portions of the light rail system which were built largely along existing railroad rights-of-way or on city streets. 40% of the new line is above or below grade.

There are two long viaducts, each with stations, three major bridges, and seven stations. It is through-routed with the original north-south San Ysidro (border) Blue Line. Planning for two extensions is under way, one to continue the mission Valley line east about six miles to connect with the El Cajon-Santee Orange line in La Mesa, and the other to leave the MVW line north about three miles to Balboa Avenue. Prior to the opening of the MVW line, average daily weekday ridership of the light rail lines was nearly 56,000, with a farebox recovery (of operating expenses) of 67%. The new line is expected to average about 6,000 daily. RGI

LOS ANGELES

The Los Angeles County Metropolitan Transportation Authority has sent 750 volts of direct current through 7,000 feet of third rail between the Vermont-Beverly and Vermont-Sunset stations of the Metro Red line Vermont-Hollywood 4.6-mile extension. The extension is to be placed in service in May 1999 after several months of testing of the third rail, cab signals, automatic train control, and software support systems. This will increase the Red line mileage to 11.1. The 6.3-mile extension from Hollywood-Vine to Lankershim and Chandler in North Hollywood is scheduled to open in May 2000.

PASSENGER TRANSPORT

SAN FRANCISCO

Ground was broken on November 3, 1997, for a 7.5 mile extension of BART south from Colma to Millbrae with a 1.2-mile east-west "wye" to serve San Francisco International Airport. The project's cost is estimated at about \$1.2 billion, of which \$750 million will come from federal taxpayers and the remainder from state and local taxpayers and agencies. Completion is scheduled for December 2001. Most of the extension will be underground with new stations at South San Francisco and San Bruno. The Airport station will be elevated at the new International Terminal now under construction. Ridership is expected to reach nearly 70,000 daily by 2010, including nearly 20,000 to and from the airport. The station at Millbrae will be located on 16 acres and will have three tracks for BART trains and two tracks for CalTrain's Peninsula passenger train service between San Francisco and San Jose.

PASSENGER TRANSPORT

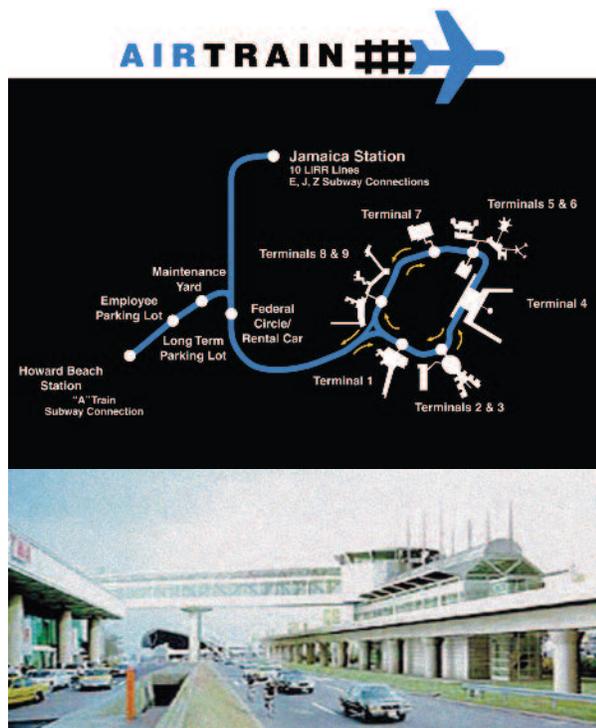
MANILA

Ground-breaking ceremonies for Manila's second LRT took place on November 15, 1997. It will be elevated for a distance of about nine miles, connecting Santala and Recto, with 11 stations. Japan is financing the Philippine project. RGI

Right, route map of the AirTrain to Kennedy Airport. Below it, an architect's rendering of Terminal 5-6 Station at Kennedy Airport. Bottom, Bombardier-built AirTrain is similar in design to the Vancouver Skytrain. Both are light rail vehicles and use magnetic propulsion.

NEW YORK
New York State Governor George Pataki announced on September 16, 1998 that work has started on the Port Authority's \$1.5 billion "AirTrain" to Kennedy Airport. The 8.4-mile light rail line includes a two-mile loop linking the airport's nine terminals and a 3.3-mile line to the MTA's Howard Beach subway station (about 65 minutes from Penn Station in Manhattan on the 'A' train), both to open in 2002, and a 3.1-mile line north to the Long Island Rail Road's Jamaica station (about 20 minutes from Penn Station), to be completed by 2003. Though extension of the AirTrain to Manhattan is "under study", it hardly seems likely (or even possible) since the sleek new trains use magnetic propulsion, making them incompatible with the New York subway.

NEW YORK POST



PORT AUTHORITY OF NEW YORK AND NEW JERSEY

MetroCards (magnetic-stripped fare cards), introduced in 1993, accounted for no more than 15% of transit trips until July 1997 when only MetroCard riders could transfer free between subways and buses. At that time usage climbed to 40%. In January 1998 purchasers of ten rides (\$15) received MetroCards good for eleven

rides and usage climbed to 66%. With the introduction of monthly, weekly and daily reduced-cost MetroCards higher usage is anticipated. Eventually metal tokens, now needed to ride the subways without a MetroCard, may be eliminated.

NEWARK STAR LEDGER

Trains on six subway lines are now operating with only the motorman and no conductor. The one-man service began in September 1996 on three full-time shuttles: Franklin Avenue in Brooklyn, 42nd Street in Manhattan, and Rockaway Park in Queens. Two more lines operate as one-man shuttles after midnight: Dyre Avenue in The Bronx, and the West End line in Brooklyn. The Brooklyn-Queens Crosstown (G) line began operating in March 1998 with only the motorman on weekends. An effort to require the state to pay for a conductor on all trains

was vetoed by Governor Pataki who complained that state taxpayers were already subsidizing New York City and suburban mass transit by \$1.3 billion a year.

NEW YORK POST

NEW JERSEY
The U.S. Congress passed spending bills that included \$6 million for final design and land acquisition for an eventual 8.8-mile rail link between Elizabeth, Newark Airport and the Newark City subway, including a one-mile rail link connecting Newark's Broad Street and Pennsylvania Stations, a \$463 million project. The spending bills also allot \$70 million to continue construction on the 20.5-mile \$1.7 billion light rail line between Bayonne and Ridgefield via Hoboken.

NEWARK STAR LEDGER

Work continues on the Port Authority's Newark Airport monorail, due to open early in 2001 between the airport and a new station, two miles south of Newark, on Amtrak's Northeast Corridor. The station is on the site of the Pennsylvania Railroad's abandoned Waverly Yard. It will be served by Amtrak and New Jersey Transit trains and the Newark Airport-Elizabeth light rail line. It is about 12 miles and 20 minutes from Penn Station in Manhattan.

WALL STREET JOURNAL



COURTESY OF BOMBARDIER TRANSPORTATION

In April 1998 Union County approved \$376,000 for a study by Raytheon (responsible for the Hudson-Bergen light rail line) to determine the cost to build and operate a light rail line from the port section of Elizabeth to Cranford (about seven miles) and then to Plainfield (another seven miles). Initial estimate of the cost of the line is \$150–\$175 million. The county would like to have the line connected ultimately to Newark International Airport.

Also in April 1998, Montclair agreed to New Jersey Transit's plan to connect the Montclair branch to the Boonton line. The project cost is estimated at \$42 million and construction time is estimated at about 18 months. The distance is only about a quarter mile, but the project has been held up for years because about 30 houses that would have to be torn down are in a mostly black neighborhood. Under the proposed agreement, building owners would be compensated and renters would get the equivalent of four years rent plus relocation costs. The Montclair branch is electrified and the connection to the Boonton line would be electrified to Great Notch, permitting easier travel for Boonton line passengers to Newark and possibly to directly to Penn Station in Manhattan.

NEWARK STAR LEDGER

CHICAGO

On November 9, 1997, the Red (Howard-Dan Ryan) and Blue (O'Hare-Douglas-Congress) lines began one-man operation. All CTA rapid transit lines are now one-man operated except that six- and eight-car trains add a conductor while in the subway for safety and to speed loading and unloading. Earlier in the year, the CTA celebrated several anniversaries: in May the 90th of the Brown (Ravenswood) line, in October the 50th of the CTA, and in the same month the 100th of the Loop "L". Two cars from 1923 offered free trips around the loop. At the same time car No. 1 and a Lake Street "L" steam locomotive were on display.

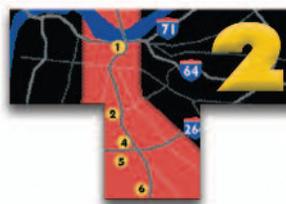
RAY DEGROOTE

BALTIMORE

Revenue service on two new light rail extensions, one to Penn Station in the city, and the other to the Baltimore-Washington International Airport, began on December 6, 1997. The two branches are operated as one through-line supplementing the north-south Hunt Valley-Glen Burnie main line. Delivery of 18 cars from Adtranz has been delayed. RGI

LOUISVILLE

The Transit Authority of River City (TARC) outlined this year's action plan for "Transportation Tomorrow Phase 2" (T2) at its kick-off advisory Work Group meeting held April 14th at TARC. The Board voted to study the feasibility of



electric light rail or bus rapid transit to connect downtown Louisville with the Smokestown and Shelby Park neighborhoods, major employment sites, and the Louisville airport. Based on public input and technical findings, the T2 Work Group and Policy Committee recommended eliminating several options, including building additional highway lanes on I-65 between Downtown Louisville and the Kentucky Fair and Exposition Center; commuter rail using existing tracks; automated guideway trains such as monorail; and new, untested technologies. The cost of a rapid transit line is tentatively estimated at \$325 to \$475 million.

PASSENGER TRANSPORT

DENVER

Voters in November 1997 defeated a six-county mass transit plan that included two light rail lines. Colorado's governor, however, announced that the state would put up \$88.9 million for the 20-mile extension southeast along I-25 to Lincoln Avenue and Parker Road, replacing a proposal to widen I-25. The state DOT has applied for \$355.5 million of federal tax money for the same purpose. RGI

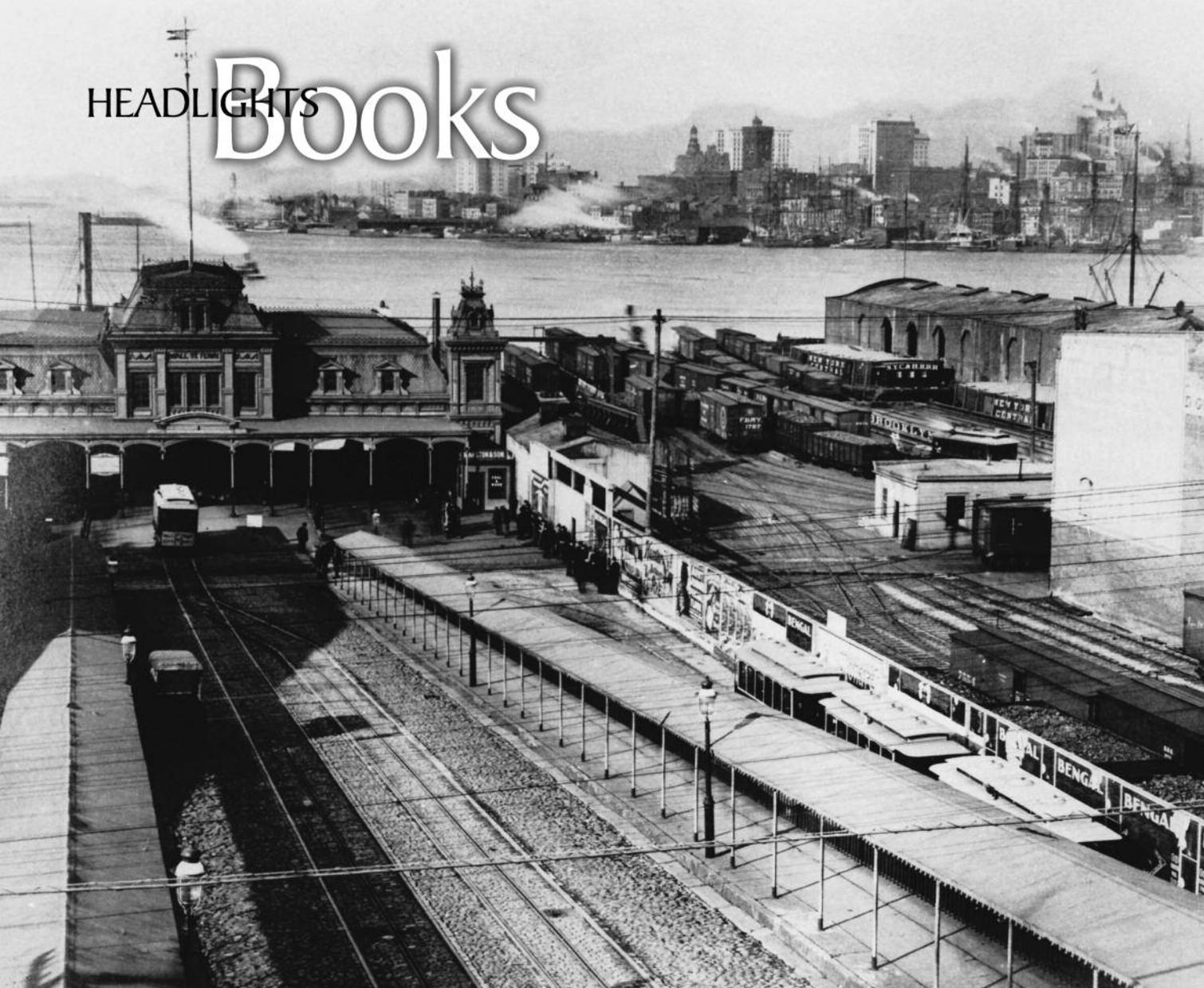
SAARBRUCKEN, GERMANY

Fifteen low-floor Bombardier rail cars started international light rail service between Saarbrücken and Saarguemines, France. Service began on October 24, 1997. This is Europe's second example of a light rail service sharing track with mainline trains. The first example of such through working is in Karlsruhe. Dual mode cars operate on about 11 miles on German main line track with just under a mile on French main line track (15,000 volts AC). The remainder is on local city street tracks in Saarbrücken (750 volts DC).

PASSENGER TRANSPORT

COMPILED BY **PETER KOCHAN**

T2 LOGO MONTAGE
BY **SANDY CAMPBELL**



EDWARD B. WATSON COLLECTION / ARTHUR J. LONTO

Car No. 5 of the Brooklyn Heights Cable Railway (Lewis & Fowler 1890) leaving the Wall Street Ferry Terminal at the foot of Montague St., Brooklyn. NOVEMBER 24, 1899

THE CABLE CAR IN AMERICA, REVISED EDITION

by George W. Hilton, 1997
Stanford University Press
Stanford, Calif. 94304-2235
8½" x 11", 484 pp.,
\$34.95 soft cover, \$75 hard cover

Certain books, by virtue of their content, comprehensive treatment of the subject, scholarship, and readability have attained the status of being regarded as classics in their field. Such a volume is George Hilton's monumental study of American cable cars, now available once again in either a soft cover or cloth edition. First published in 1971 and revised in 1982, *The Cable Car in America* has been reprinted by Stanford University Press in generous format, with all of its fascinating diagrams, maps and illustrations included.

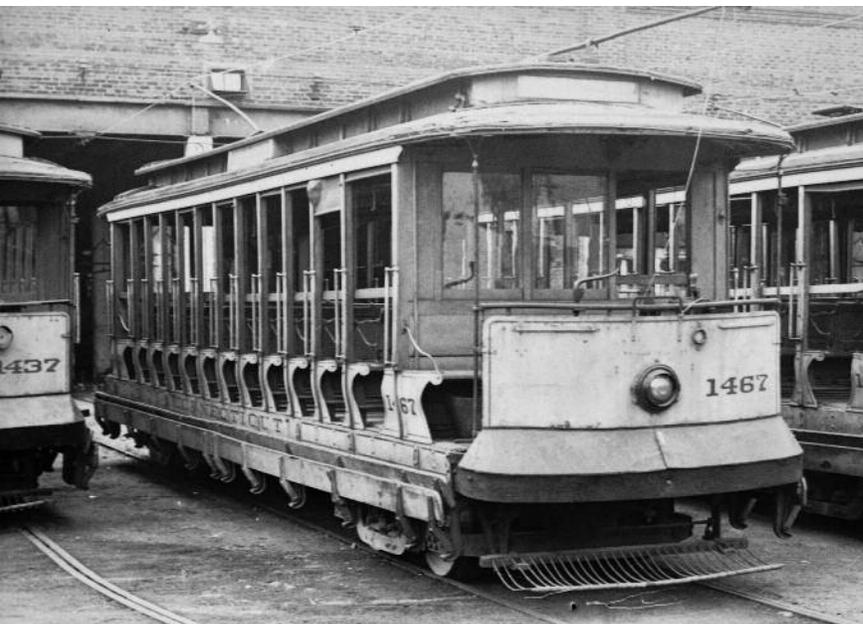
The book is divided into two parts. In the first half, Hilton presents the most thorough, detailed history of the industry which one can find. In separate chapters, he describes the inventions and technological advances which led to the pioneer installation in San Francisco in 1873; the period of

expansion, which began in 1882 and peaked by 1889, and which included, altogether, 59 street railways and two rapid transit lines, totaling 360 miles; the mechanics of the grip and the various types which developed; the cable, its structure, placement and hazards; the conduits, through which the endless cables ran, and the difficulties presented in keeping them open, negotiating curves and crossing opposing cable lines, the powerhouse, with its steam engines and huge flywheels which propelled the cable, the economics of cable operation and the heavy investment required; and the decline of the industry, as electric cars proved themselves to be inherently superior, and cable systems retreated until, by 1906, only 29 miles remained, in four cities. By mid-century even the remaining installations in San Francisco were threatened, although an enlightened citizenry would insist on their preservation. The second half of the book consists of a city by city description of each cable company, with a succinct history, routes, and a rope map of the cable installation including grades, footage and powerhouse locations and equipment.

There are hundreds of period photographs, drawings and diagrams culled from contemporary trade journals showing

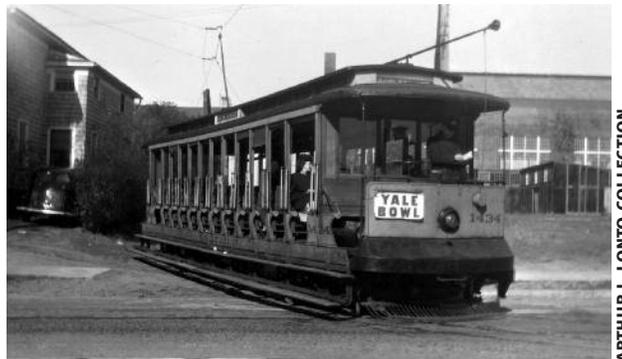
the cable world in all its fascinating and frightening complexity. Reproduction is excellent and lovers of mechanical detail will particularly enjoy them. Again and again, Hilton drives home the point that cable systems, while mechanical marvels and testaments to the ingenuity of their builders and the wonders of cast iron, would never have existed if electrical traction had been developed earlier. Their inherent costs and hazards made them easy prey for electric cars after the early 1890s and led to their near extinction.

Happily, people can still ride on the cable cars in San Francisco, and readers everywhere now have at hand once more this unsurpassed study of their evolution and significance. If your library shelves do not hold a copy of the previous edition, now is the time to add this definitive work to your collection. REVIEWED BY **JAMES N. J. HENWOOD**



Above, New Haven No. 1467 at James Street Barn. 1947

Top right, New Haven No. 1434 at Yale Bowl. NOVEMBER 9, 1947



ARTHUR J. LONTO COLLECTION

YALE BOWL AND THE OPEN TROLLEYS

by John D. Somers, 1996

Dorrance Publishing Co.

643 Smithfield Street

Pittsburgh, Pa. 15222

8½" x 11" soft cover, 46 pp.,

\$16 plus \$3.50 postage

Those beyond a certain age may recall that the last regular use of open streetcars in the United States was on the Connecticut Company's run from downtown New Haven to the Yale Bowl on Derby avenue near the city limits in November 1947. The Connecticut Company, which began converting its rail lines to bus in the 1930's, retained a fleet of about 80 open cars for football services basically because they were such efficient movers of large crowds. In 1947, with the fleet decimated by age and the end of all rail service at hand, the open cars had their last fling.

This book, with slick paper and a generous, uncluttered layout which leaves many pages partially blank, is basically an album of photographs, with extensive captions, and some text. The opens are featured, especially during their final year, but there are a few views of other cars, buses, crowds, and the Yale Bowl. A center spread map of New Haven City lines in 1927, and a full page detailed map of the vicinity of the Yale Bowl, make the routes used by the opens easy to follow. A roster and short bibliography are included.

So, join the crowd, climb aboard, hang from the running boards, and head for the Yale Bowl, where, even if your team lost, you could anticipate an exciting ride back.

REVIEWED BY **JAMES N. J. HENWOOD**

ALLEN NELSON / ARTHUR J. LONTO COLLECTION



SPRAGUE LIBRARY

Although the Edmonton and St. Albert Interurban line had a brief existence, local streetcars served that city until the early 1950s. A feature of the Edmonton streetcar system was the service over the High Level Bridge where the streetcars shared the upper level with Canadian Pacific trains. The cars ran left-handed so that in an emergency their doors would open onto the bridge and not into space.

SEPTEMBER 1950

INTERURBAN TO ST. ALBERT: THE EDMONTON INTERURBAN RAILWAY

by Raymond Corley and Douglas Parker, 1995
Havelock House
5211 Lansdowne Drive
Edmonton, Alberta
Canada TGH 4L2
40 pp., US \$9.95

The interurban era produced many companies with short life spans, but it is doubtful if any can match the record of the Edmonton Interurban Railway, which operated only six months. The company was formed by French capitalists from St. Albert to link their community, which was

along the Sturgeon River, with Edmonton, about ten miles to the southeast. Long and involved negotiations with the town and provincial governments were eventually successful in securing a charter and operating rights. As built in 1913, the Interurban took an indirect route, zig-zagging to serve a company-backed residential development and a coal mine. Unable to run directly into central Edmonton, the Interurban connected with the tracks of the municipally-owned Edmonton Radial Railway on the edge of town. To save money, the company announced it would purchase five gasoline-electric cars, although only one ever operated. The last spike was driven in July, 1913, and service began at the end of September, using a Drake Automatrice gas-electric car. Edmonton was slow to complete its connections and through service did not begin until December.

Conditions finally looked promising for the small line by the spring of 1914, but it all came to a sudden end on April 1 when fire destroyed the car and its barn. Efforts were made to resume service, but nothing came of them. Bus service on a direct highway route replaced the would-be interurban, although the Edmonton Radial electrified a portion of its tracks to the calder district and operated them as part of its streetcar system until 1949.

One would not think the brief life of such a short operation would make compelling reading, but in the hands of these authors it does. The book is exceptionally well-written, and the research is thorough and comprehensive. The layout is attractive; photographs are sharp, and several maps provide needed detail. Full roster data, such as it was, and a plan of Drake Car No. 1 are provided, as well as detailed end notes and a bibliography. This is good history, well-written, and it will be enjoyed by anyone with an interest in the subject.

REVIEWED BY JAMES N. J. HENWOOD

Outbound Whyte Ave. car crossing inbound track at north end of High Level Bridge.

SEPTEMBER 1950



SPRAGUE LIBRARY

Many railfans, particularly rapid transit enthusiasts, will soon flock to Puerto Rico to inspect, ride and photograph the world's newest electric railway, commonly known as Tren Urbano.

By November 2001, it is expected that the initial 10.6-mile portion of a larger two-line system will start operation, linking the communities of Bayamon, Guaynabo, Cupey, Rio Piedras, Hato Rey and Santurce. When completed, the system will be shaped like a sideways letter 'H', with Old San Juan at the top left, the Munoz Marin Airport on the top right, Bayamon on the lower left and Carolina on the bottom right. In the middle of the system the connecting line will run between Rio Piedras and Sagrado Corazon.

The initial line, called Phase 1, will run from Bayamon east to Rio Piedras, then turn north over the connecting line to Sagrado Corazon in Santurce. Phase 1A continues the line north to the Minillas Government Center in Santurce. The second line, Phase 2, will run from Rio Piedras east to Carolina. Phase 3, the third line, will also travel east, from the Minillas Government Center to Luis Marin International Airport. Finally, a fourth line, Phase Four, will run westward from Minillas to Old San Juan. At this time it is not known how these lines will be through-routed.

Background

Puerto Rico passed from Spanish to American jurisdiction in 1898 following the Spanish-American War. It was a very colonial island and somewhat poor, with

mostly agricultural economy. San Juan, the capital, never had horsecars, because of the city's small size, but they were operated in some other cities like Ponce and Magueyez. However, there was a 2'6" gauge light railway line between San Juan and Rio Piedras, a side-of-the-road operation along Avenida Ponce de Leon. It was called the Ubarri Tramway after its owner. Eventually, the Puerto Rico Light and Power Company, Limited (of Canada) acquired it, re-gauged it to standard gauge, and electrified it.

About the same time, a local line was built in a sideways figure eight, connecting Old San Juan, Condado, Santurce and Miramar. They had a 12-car fleet, including eight double-truck Peter Witt cars, built by the Perley A. Thomas Car Company. During World War II, New York City's Third Avenue Railway

TREN URBANO

SAN JUAN'S
NEW RAPID
TRANSIT
LINE

AN EXCLUSIVE PROGRESS REPORT
BY BRUCE RUSSELL, J. WILLIAM VIGRASS
AND RAYMOND R. BERGER

TREN URBANO



J. WILLIAM VIGRASS

San Juan, Puerto Rico. (opening page) The skyline of San Juan is seen here from the waterfront.

Yard and Shop. (above) Tren Urbano yard and shop construction was well underway as of January 22, 1999, when this photograph was taken. The framework in the foreground is for a substation.

System sold three single-truck Birneys to San Juan. Unfortunately, German torpedoes sank the freighter carrying them.

In 1928, the Rio Piedras suburban line, with its single track and passing sidings, was abandoned after it was badly damaged in a hurricane. The city route continued in operation until 1950 when it, too, closed. Explosive population growth with the resultant expansion of housing past Miramar, Santurce and Condado made the suburban trolleys obsolete. Further, numerous breakdowns of the aging 12-car fleet made them unreliable as well. Although many other Latin American transit systems had acquired second-hand trolleys from the U.S., none had ever gone to Puerto Rico. Thus, in 1950 it was decided to close the remaining local line rather than modernize, rebuild, and expand it beyond the original end of the line at Calle Parque in Condado.

The most prevalent form of public transportation on the island is public cars, or publicos. These operate in line service in urban areas or in point-to-point suburban or interurban service. Their operation is based on the ability to fill the public car, usually to seating capacity. The Puerto Rico Public Service Commission regulates the hours of operation and fares, and licenses operators. Publicos and buses were the trolleys main competition. In metropolitan San Juan, many bus routes were consolidated into the Puerto Rico Bus Company, and later into the Autoridad de Metropolitana de Autobuses, or AMA.

Today, AMA is a modern urban transit system with six trunk routes and numerous feeder lines that meet in 11 transit centers. In addition, Metrovil, a subsidiary of Peter Pan Bus Lines of Springfield, Mass., operates the two heaviest trunk routes. Even with a modern

The most prevalent form of public transportation on the island is public cars, or publicos.

POOR BUS AND PUBLICOS SERVICE has forced even the poorest citizens to have automobiles.

fleet of RTS and Flexible Metro buses, service is very inadequate. With the average family having four children, the population has been doubling every 20 years. All AMA buses are back in the garage by 8:30 PM; Metrovial service finishes at 11 PM. Poor bus and publicos service has forced even the poorest citizens to have automobiles. Throughout the island, city streets reflect colonial times and are woefully inadequate today. Traffic jams are normal occurrences and increase in frequency, size and duration annually.

Light Rail Considered and Rejected

In the early 1970s Puerto Rican officials began to think about a European-style light rail network. It appeared to offer an ideal solution to move people throughout metropolitan San Juan and it was planned to use freeway/expressway right-of-ways. The lines planned were basically the same as the rapid transit system planned or under construction today.

For various reasons, including lack of funding, the proposed light rail lines never advanced beyond the study stages. In 1990 another series of studies was done to see if rail transit was practical for metropolitan San Juan. It concluded that the need for rail transit was greater than before. This is not surprising considering that the population had doubled since the first studies in the 1970s; ridership forecasts were in excess of 100,000 passengers per day. Based on these projections, the focus shifted from light rail transit to heavy rapid transit with total grade separation, high-level platforms and large vehicles designed to operate in trains of up to six cars on frequent headways.

Plans Patterned After Miami and Caracas

Planners in San Juan looked at the rapid transit operations in Miami and in Caracas to study heavy rail in a tropical environment. Dade Metro operates in warm or hot weather for most of the year with no adverse impact. The 1991 hurricane in Miami proved that a third-

rail elevated line could withstand hurricane-force winds with minimal damage.

As a result, transit planners settled on a completely grade separated rail rapid transit system similar to Dade-Metro's Metrorail line. About 40% of the line will be at or near grade, with the remainder being elevated. A 1.2-mile subway runs under Avenida Ponce de Leon with two stations, one near the Rio Piedras Plaza and the other at the University of Puerto Rico. In June 1998, additional funds became available that allow an extension of the line from the northern terminal at Sagrado Corazon in Santurce to the Minillas Government Center in a subway under Avenida Ponce de Leon.

Contract Awarded to Siemens

Local planners released a proposal for a 10.6-mile line running from Bayamon to Santurce, the first portion of an eventual 40-mile system. After these plans were approved, bids were solicited for the initial operating segment. Three firms submitted bids, namely, Bombardier and Lavallin of Canada, and Siemens of Germany. Bombardier's team consisted of many retired employees from the New York City Transit system. Lavallin worked closely with Italy's Breda Costruzione Ferroviari, which has extensive experience in the rail transit field, particularly in Washington, San Francisco and Los Angeles. In the end, however, a DBOM Contract (Design, Build, Operate and Maintain) was awarded to Siemens Transportation Systems. This contract is similar to the DBOM contract awarded to the 21st Century Rail Corporation by NJ Transit for the Hudson-Bergen Light Rail Line in New Jersey.

The Government of Puerto Rico Department of Transportation and Public Works, Highway and Transportation Authority administers Tren Urbano.

A Consortium is Formed

After the Tren Urbano contract was awarded to Siemens, they began to assemble teams to work towards the goal of having the first trains in service in 2001.

An organization known as the Siemens Transit Team, or STT, was created. It consisted of numerous sub-contractors, including the local firm of Requena Associates, who are responsible for much of the station architecture, as well as civil engineering for the right-of-way.

The North American consulting firm Parsons Brinckerhoff, Quade and Douglas was also recruited.

Description of the Original Route

The first section of the line, known as Phase One, will be 10.6 miles long, with additional non-revenue shop trackage. There will be 16 stations, two of which will be in subway, one in an open cut and the others at grade or on elevated structure. Stations will be a mixture of island and outside platforms.

Current will be supplied through third rail energized at 750 volts DC. Catenary was ruled out because of concerns about visual intrusion on the line, which will emphasize attractive stations and structures.

Several stations will have parking lots, and all are designed for easy transfers between feeder bus routes and the popular publicos. The Rio Piedras and University of Puerto Rico subway stations will feature artwork and other embellishments by local residents. All signs will be in Spanish and English. Public address announcements will be in Spanish.

Funding for Tren Urbano

The money for the construction of the Caribbean's first rail transit system comes from varied sources, including a \$307 million grant from the United States Department of Transportation. Local funds account for about 33% of the project's cost. These come from local license fees and motor fuel taxes, along with road tolls on three major highways. Two of these highways are nearly as busy as the New Jersey Turnpike. The balance will be derived by selling certificates of participation for annual ISTEA appropriations from the federal government. The total budget for Phase One is over \$1 billion.



Tren Urbano

San Juan

Puerto Rico

San Juan

Guaynabo





ERA MAPS

Sandy Campbell,
Designer



Trujillo Alto

TREN URBANO



Bayamon. (left and top right) Bayamon, January, 1999.

Pre-casting. (bottom right) Pre-casting at Sageado Caroyon.

J. WILLIAM VIGRASS

If the projected patronage of **OVER 100,000 DAILY PASSENGERS** is accurate, the operation of four car trains, particularly in rush hours, will be of brief duration.

An option for 10 cars more than the 64 initially ordered was exercised in 1998, the another eight in 1999. Thus, the total number of cars on order is now 82. The 1998 add-on was because of the additional running time required for the two stations that were added, Domenech (elevated) and University of Puerto Rico (subway). The 1999 add-on was to provide enough cars for the extension of the line from the Sagrado Corazon terminal to a new terminal at Minillas, with two stations, San Mateo and Minillas, both in subway.

Rolling Stock to be Built in California

Siemens Transportation Systems will build 82 rapid transit cars for Tren Urbano at its facilities in Sacramento, California, although the car shells will come from Semmering-Graz-Pauker from their Vienna, Austria plant. The Siemens Sacramento facility has produced light rail cars for several North American transit systems. The Tren Urbano cars will be the first Siemens' stainless steel rapid transit cars ever built, and the first subway cars constructed by Siemens in Sacramento. Some of the final components of the Tren Urbano cars will be installed in San Juan to provide employment for local residents. Testing of the cars prior to revenue service will also be done in San Juan.

The cars will be configured in two-car



J. WILLIAM VIGRASS

married pairs and will initially operate in trains up to four cars in length, although all stations will be able to hold six car trains. If the projected patronage of over 100,000 daily passengers is accurate, the operation of four car trains, particularly in rush hours, will be of brief duration.

The cars are 75' long, 10'3" wide at the floor and 12'6" high from the roof to the top of the running rails. They have three 56"-wide doors per side to provide

faster boarding and unloading in anticipation of heavy traffic. These handsome stainless steel cars with fiberglass reinforced plastic ends will be capable of high acceleration and braking. Four 125 KW, 167 HP (continuous rating) AC traction motors with a WABCO D-4-A-S compressor will be used in conjunction with a Knorr braking system.

Tightlock couplers, manufactured by Dellner, will be used. Main trainline functions will be controlled by the SIBAS 32 microcomputer. The 28" wheels are unusual in that they are somewhat small for a rapid transit car. The heavy-duty Westcode HVAC system is designed to meet the needs of a tropical environment. Westcode will also manufacture the door operators, but three of the married-paired cars will have IFE (Austrian) doors.

Inspection, maintenance and repairs will be done at Tren Urbano's shop facility near the Martinez Nadal (formerly Las Lomas) station. The shop is adjacent to the main line right-of-way between the Martinez Nadal and Torrimar stations and track access is available from both ends. The Control Center and an



J. WILLIAM VIGRASS

TREN URBANO



J. WILLIAM VIGRASS

Mock-up. (top) Cab mock-up of Tren Urbano vehicle is 1/3 length (25') and has one set of doors and one each of each type of window and seat. A full-size cab is a key portion on which ergonomic engineering has been demonstrated with a variety of people. Actual components were used in the final mock-up. Main functions of the train will be controlled by the SIBAS 32 microcomputer.



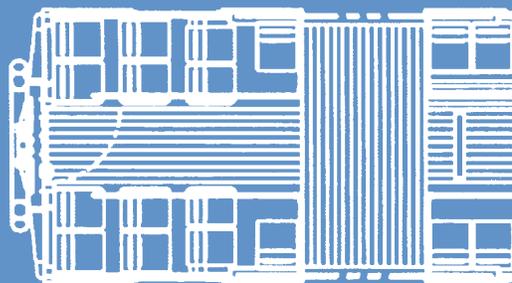
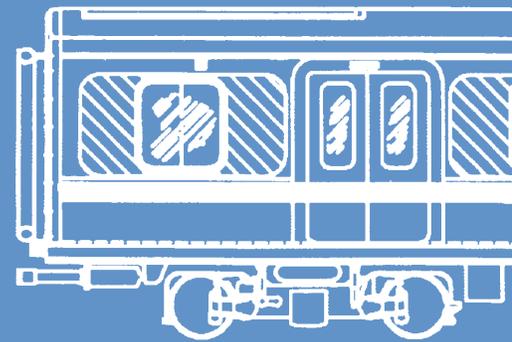
J. WILLIAM VIGRASS

Siemens Assembly Line. (middle) Car No. 1 being assembled at Siemens Mass Transit Division in Sacramento, California, on May 3, 1999. Cars are constructed of stainless steel and configured in married pairs. Multiple coupling of up to three married pairs allows for maximum flexibility in meeting varying passenger flow. The car shell was fabricated by Semering-Graz-Pauker of Vienna, Austria, a member of the Siemens Group. To its left is LRV 1001 for Valencia, Venezuela, one of 12 being assembled in Sacramento. The Valencia LRVs are Siemens SD460s, the same as St. Louis, Missouri.



J. WILLIAM VIGRASS

Like a Rock. (bottom) Interior of the car shell shows skillful fabrication by Semering-Graz-Pauker. Six wide double-leaf pocket doors allow for rapid and easy boarding, and two wheelchair parking areas are provided in each car. A pleasant ride is promised thanks to powerful air conditioning, passenger information systems and extra-wide cantilevered seats.



SIEMENS TREN URBANO VEHICLE SPECIFICATIONS

TECHNICAL CHARACTERISTICS

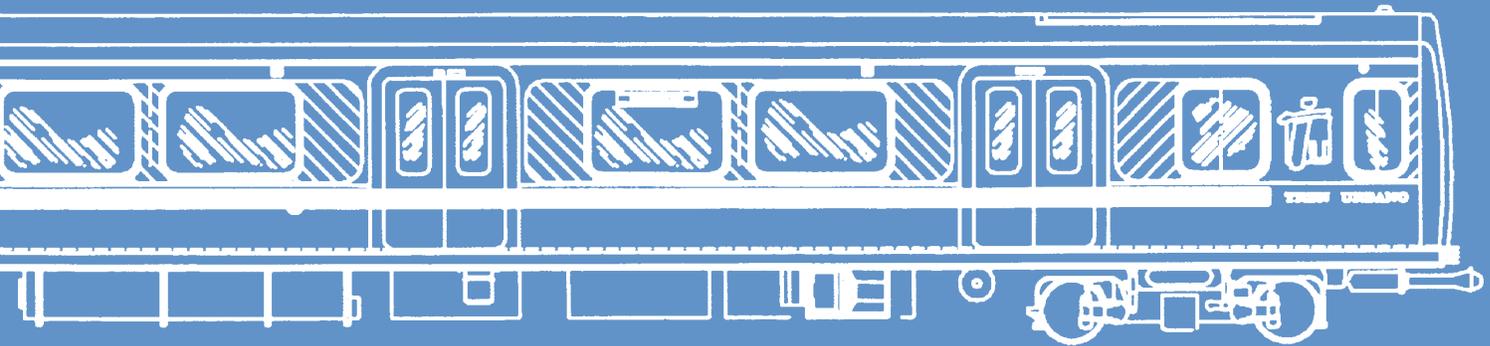
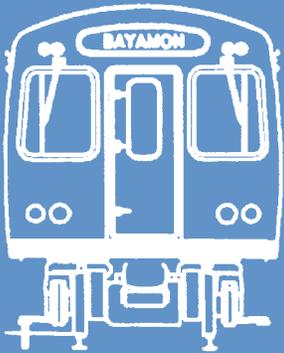
Supply Voltage	750 Volts DC
Boarding	Three high level doors per side and two end doors
Car Body Material	Stainless steel
Suspension System	Primary: rubber chevron springs; secondary: air springs
Friction Brake System	Electro-pneumatic with spring applied parking brake
Propulsion System	AC-IGBT, four motors per car
Traction Motor Rating	125 kW (167 HP) continuous

PERFORMANCE AND CAPACITY

Maximum Speed	63 mph	(100 km/h)
Service Acceleration	3 mph per second	(1.35 m/s ²)
Service Deceleration	3 mph per second	(1.35 m/s ²)
Maximum Emergency Braking Rate	3.5 mph per second	(1.55 m/s ²)
Number of Seats	72	
Total Passengers Per Car	240	

DIMENSIONS AND WEIGHTS

Vehicle Length	75' 5"	(23 m)
Vehicle Width	10' 6"	(3204 mm)
Height, Rail to Roof	12' 5"	(3810 mm)
Floor Height Above Rail	43"	(1100 mm)
Doorway Width (Side)	56"	(1420 mm)
Doorway Height (Side)	78"	(1980 mm)
Wheel Diameter (New)	28"	(710 mm)
Truck Wheelbase	95"	(2400 mm)
Truck Center Distance	52" 2"	(15,900 mm)
Rail Gauge	4" 8.5"	(1435 mm)



TREN URBANO

administration building and are also located at the site. Security features such as closed-circuit cameras are used.

Siemens Operation and Maintenance for Five Years

Tren Urbano is a turnkey project; Siemens will operate and maintain the system for five years, with the possibility of extending the contract to 10 years. The contract gives Siemens the respon-

sibility of completing all the line "systems". This includes cars, signals, electric traction, track, communication, fare collection, escalators and elevators.

There are six civil engineering bid segments that were bid separately to allow local engineering and construction firms to bid on these design/build packages. Since the Puerto Rico Highway and Transportation Authority administers Tren Urbano, they selected their best

highway construction firms for five of the six contracts for the Phase 1 line. A North American tunnel construction consortium, familiar with rapid transit tunnel construction, was selected to build the subway under Avenida Ponce de Leon in Rio Piedras.

Siemens coordinates these segments and when all the work is completed, they will install their systems. After the line opens, they plan to employ a staff

Fit To Be Tied. New rail (115 lb RE) piled up at the yard and shop was rolled by Bethlehem Steel.



STATION NAMES WERE REFINED. Some were changed to better reflect the communities they served. Other station names were shortened to make them easier to remember.

that is hoped will take great pride in their work and include the daily cleaning of trains and stations. Customer service is planned to include uniformed staff on trains and stations.

Phase One Route and Structure Changes

In March 1995, the Puerto Rico Highway and Transportation Authority circulated a Draft Environmental Impact Statement, which evaluated the benefits and impacts of a proposed rapid transit line. At that time, it was intended to build a line from the Luchetti Industrial Park in Bayamon to Sagrado Corazon in Santurce. Following this, a number of public meetings and hearings were held to address the concerns of the neighboring community. Six changes to the original plans were made by the time the Final Environmental Impact Statement was made in November 1995.

1. The line was cut back from the Luchetti Industrial Park to Bayamon Central. Because of concerns about an adverse impact to the wetlands between the two locations, and because of estimates of light use of the Luchetti station, it was decided not to build this portion of the line.

2. The original plans for Tren Urbano included a maintenance and storage facility just beyond the Luchetti station. Since this portion of the line was eliminated, a new siding was eventually selected on the south side of the main line right-of-way between the Martinez Nadal and Torrimar stations.

3. The Bayamon Central station location was changed slightly to a location closer to AMA's Bayamon bus terminal and the El Canton shopping mall. East of there, a route, which crosses over Highway 2 and passes between the Municipal Stadium and the Ruben Rodriguez Coliseum, was selected. Deportivo (formerly Complejo Deportivo) station is just east of that point, with the Bayamon Judicial Building adjacent to the station.

4. The Martinez Nadal (formerly Las Lomas) station was moved slightly east to give the opportunity to better intermodal facilities.

TREN URBANO STATIONS

ORIGINAL NAMES	CURRENT NAMES
1. Luchetti	(station eliminated)
2. Bayamon Centro	1. Bayamon
3. Complejo Deportivo	2. Deportivo
4. Jardines de Caparra	3. Jardines
5. Torrimar	4. Torrimar (name unchanged)
6. Las Lomas	5. Martinez Nadal
7. San Alfonso	6. Las Lomas
8. De Diego	7. San Francisco
9. Centro Medico	8. Centro Medico (name unchanged)
10. Villa Nevarez	(station eliminated)
11. Estacion Experimental	(station eliminated)
12. Villa Nevarez	9. Cupey (new location)
13. Rio Piedras (station added)	10. Rio Piedras (name unchanged)
14. Centro Juicio (station added)	11. Universidad
15. Hato Rey	12. Pinero
16. Nuevo Centro	13. Domenech
17. Sagrado Corazon	14. Centro Roosevelt
	15. Hato Rey
	16. Sagrado Corazon (name unchanged)

5. The Villa Nevarez and Estacion Experimental stations were combined and a new location for the Villa Nevarez station was selected. This reduced construction costs, provided better intermodal facilities and reduced the environmental impact at both sites. The new Villa Nevarez station was later renamed "Cupey".

6. The approach to the Sagrado Corazon station was slightly modified in order to improve the placement of columns for the elevated structure over the Martin Pena Canal. This slight modification shortens the bridge span over the canal, avoiding the placement of columns in the waterway. It also reduces costs by eliminating the need to acquire private property in the area.

1998 Changes: Final Alignment, Then Construction at Last

A number of changes took place in 1998 in the Phase 1 line, even while construction was under way.

Plans for the development of land owned by the University of Puerto Rico near Avenida Ponce de Leon and the Tren Urbano subway alignment were

finalized. This allowed for the construction of the second station near the subway portal adjacent to Avenida Ponce de Leon and the south service road of Avenida Jesus Pinero. It is named "Universidad".

In the original plans for Phase 1, space for a station at Domenech Street was allowed. Located between stations at Avenida Jesus Pinero and Avenida Roosevelt, this area is considered a good traffic generator with the Department of Labor building, the Puerto Rico Telephone Company building and the new facilities of EDP College within one block of the station entrance. With additional funding available, along with construction cost savings mentioned above, it was decided to construct this station, which will be named "Domenech".

Station names were refined. Some were changed to better reflect the communities they served. Other station names were shortened to make them easier to remember. Listed above is a table comparing original and current station names.

TREN URBANO

Phase IA: The Minillas Extension

In June 1998, the Department of Transportation and Public Works, Highway and Transportation Authority issued a Draft Environmental Impact Statement which proposed a 1.6 kilometer extension of the Tren Urbano line from the Phase One terminal, the Sagrado Corazon elevated station north to the area near the Minillas Government Center.

Five heavy rail alternatives were proposed: [1] an elevated structure along Highways 1 and 22, two expressways; [2] a subway underneath Avenida Ponce de Leon; [3] a subway underneath Avenida Fernandez Juncos; [4] an elevated structure mid-block between Avenidas Fernandez Juncos and Avenida Ponce de Leon; and [5] a subway underneath mid-block between the above two thoroughfares.

Feasibility studies and cost estimates were prepared. Consideration was given

the Ponce de Leon Subway Alignment, which were estimated to cost \$288.8 million and \$385.2 million respectively. On the Highway Alignment, a mid-point station was proposed at Calle Los Angeles. The Ponce de Leon subway alignment has a mid-point station called "San Mateo". The Highway Alignment Minillas station will be in open cut between Avenidas Fernandez Juncos and Ponce de Leon, parallel to Highway 22, just before it enters the Minillas (Highway) Tunnel. The Ponce de Leon subway station is to be just east of that point.

Fortunately, a deal has been struck that preserves both alternatives. The Phase 1A Minillas Extension will be built using Alternate 2, the subway under Avenida Ponce de Leon. However, the alignment for Alternate One, the Highway 1 and 22 routing, will be preserved for use in Phase 3, the Minillas to International Airport line. It is expected that

Las Lumas. (left) Work progresses at Las Lumas station, seen here in January.

Moving Right Along. (right) The traveler supplied by Paolo de Nicola of Italy is shown at Bayamon where it had just erected several segments of guideway on August 27, 1998.



J. WILLIAM VIGRASS

to the extension of Tren Urbano to the International Airport and to Old San Juan. Alternatives 3 and 4 were rejected because of significant construction and operational impacts. Alternate 5 was rejected because extensive land acquisition was necessary, it required extensive underpinning of the columns supporting the overhead structure of Highway 22 and disruption of nearby Pavia Hospital.

This left the Highway Alignment and

the extension will be in operation in 2004.

Conclusion

In November 2001, if all goes according to plan, Puerto Rico will have the first rail-based transit system in the Caribbean. For many decades local transportation in much of Latin America and the Caribbean has been based on buses. What is about to occur in San Juan is a hopeful sign of future trends. ☺



J. WILLIAM VIGRASS

In November 2001, if all goes according to plan, Puerto Rico will have **THE FIRST RAIL-BASED TRANSIT SYSTEM** in the Caribbean.

