The City of Seattle

Landmarks Preservation Board

700 Third Avenue · 4th floor · Seattle, Washington 98104 · (206) 684-0228

REPORT ON DESIGNATION LPB 107-1/03

Name and Address of Property: **Seattle Monorail**

Legal Description:

1. Guideway
Lot 5 of Block 21 in D. T. Denny's Third Addition to North Seattle, as recorded in Vol. 1 of Plats, page 145, records of King County Washington; together with that portion of vacated Fourth Avenue adjacent to said Lot 5 that was vacated by Ordinance 115773; plus . . .

2. Guideway
Lots 5, 6, and 8 of Block 56, and Lot 1 of Block 57, in D. T. Denny's Park Addition to North Seattle, as recorded in vol. 2 of Plats, Page 46, Records of King County Washington; together with that portion of vacated Fourth Avenue adjacent to said Lot 8 that was vacated by Ordinance 115773; together with that portion of Thomas Street adjacent to said Lot 6 and said Lot 1; plus

3. Seattle Center Station
a portion of the South 20 feet of Lot 4, Lot 5, the North 5 of the portion of the West 10 Feet of Lot 6, the North 20 Feet of Lot 7, Lot 8, and the South 1 Feet of Lot 9, all in Block 51, D. T. Denny's Third Addition to North Seattle, as recorded in Vol. 1 of Plats, Page 145, Records of King County Washington; together with that portion of the alley lying adjacent to said portions of Lots 4 through 9 that was vacated by Ordinance 90267.

At the public meeting held on April 16, 2003, the City of Seattle's Landmarks Preservation Board voted to approve designation of the Seattle Monorail as a Seattle Landmark based upon satisfaction of the following standards for designation of SMC 25. 12.350:

(A.) It is the location of, or is associated in a significant way with, an historic event with a significant effect upon the community, City, state or nation.

(D.) It embodies the distinctive visible characteristics of an architectural style, or period, or of a method of construction.

(E.) It is an outstanding work of a designer or builder.

(F.) Because of its prominence of spatial location, contrasts of siting, age, or scale, it is an easily identifiable visual feature of its neighborhood or the City and contributes to the distinctive quality or identity of such neighborhood or the City.

STATEMENT OF SIGNIFICANCE:

The Monorail's system consists of four distinct components. These include the two stations -- the north station with the nearby Monorail Administration Building at the Seattle Center, the south station on the east side of Westlake Center near the northwest intersection of Pike Street and Fifth Avenue, the raised concrete guideway structure of pylons and beams which extends through the Denny Regrade neighborhood between the two stations, and the two trains, which are each made up of two single-end articulated cars permanently connected into a double-ended train.

The site of the Monorail is thus quite complex, and includes the current two stations and the guideway structure, which covers a 0.9-mile distance between the stations.

The Seattle Monorail is an important element in downtown Seattle, as an expressive piece of urban architecture and an outstanding work of its original designer and builder. For nearly forty years it has been a well-recognized physical landmark in the city as well as in the Denny Regrade neighborhood through which it runs.

The Monorail's distinctive physical form is both a static and kinetic reminder of the Seattle's Century 21 Exhibition. Construction of the Monorail provided a popular symbol of the World's Fair and a solution to a complex traffic problem for fair planners. It embodied the early 1960's confident belief in the future, which held that technology could solve urban problems. Its design and appearance in Seattle is a reminder of the promise and influence that space travel held in the collective minds of previous generations.

Historic Context

Seattle's Monorail System

Similar to the Space Needle, the Monorail symbolizes the city of Seattle to visitors and residents alike, and represents a time when future innovation appeared limitless.

Early on Century 21 organizers envisioned a futuristic mode of transportation to the Fairgrounds and within its confines. It was felt that a monorail could fit the Fair's focus on modern technology as well as provide answers to the region's transportation future. In 1959 a variety of plans were presented including some from such notable firms as St. Louis Car Company, Goodyear, Northrop and Lockheed Aircraft. Fair organizers initially turned down the early plan that was presented by Alwac International Inc. for an Alweg monorail, and Lockheed Aircraft was selected as the prime contractor with its "fighter plane" styled monorail. Ultimately the City and Fair organizers could not even raise the cost of initial engineering let alone cover the payments for the construction costs. It appeared that there would be no monorail in Seattle until Alweg offered to cover the cost of the system early in 1960.

Rather than being a city transit initiative, construction of Seattle's Monorail was a speculative venture undertaken by Alweg International of Cologne, Germany. Seeking to promote the monorail as the ideal form

of urban rapid transit, Alweg used the occasion of Seattle's 1962 Century 21 World's Fair, to prove it.[1] Event organizers, eager to showcase this future mode of urban transit, happily accepted Alweg's no cost offer to construct a monorail for the Seattle World's Fair. Construction contracts were signed on December 21, 1960 with construction of the guideway beginning in April of 1961.

Disney had built a smaller (5/8)-scale monorail based on the Alweg concepts in 1959 at California's Disneyland, and the company was anxiously awaiting the opportunity to demonstrate a full-scale system in the United States. The timing and space-age theme of the World's Fair were opportune, and Alweg invested $4.2 million of its own funds to create the pylons, rails, trains and stations that comprise the system.

In return, the company received considerable publicity and payment from collected fares, as well as a 25-cent surcharge on each fairground admission. According to the agreement, the City of Seattle would acquire the Monorail after the fair if Alweg's receipts totaled $3.5 million or more (if less, the City would make up the difference). This agreement assumed that the City wished to pursue this form of high-speed transit. There was discussion amongst fair organizers regarding extending the Monorail south to Boeing's Duwamish plant, and then on to Tacoma after the fair[2].

The first Monorail test runs took place on March 3, 1962. Despite press reports referring to its bumpy ride[3], the trains were an instant success, carrying over 179,000 passengers before the fair opened. The official opening occurred April 19, 1962. Newspaper accounts stated "it took two swings before Mrs. Sixten Holmquist, wife of the president of Alweg, Inc., shattered a champagne bottle to launch the Monorail." Fares cost 50 cents one-way and 75 cents round trip for adults, and 50 cents and 35 cents respectively for children.

On September 17, 1962, over one month before the Fair ended, the monorail system had paid for itself through fares and the surcharge on each admission to the Fair. The two trains operated from 8:45 a.m. to 12:15 a.m., carrying more than eight million passengers over the duration of the fair. More than 90 percent of visitors to the fair rode the Monorail.

Alweg International retained ownership of the Monorail until 1965, when the City of Seattle purchased and placed it under the control of the Seattle Transit System. (Following the fair the Monorail was turned over at no cost to the Century 21 Corporation (which produced the fair), before being sold to the City in 1965 for $600,000.)

The City continues to own the Monorail.[4] Presently, Seattle's Monorail is unique as the only public transit system in the United States to return a profit.

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1 At that time, Alweg became incorporated as Alweg Rapid Transit Systems of Washington State (NW 1962), a branch of its European parent company. This initiative demonstrated the firm's goal of generating further business in Seattle and other North American cities.

2 "Take Me to the Fair," p. 43.

3 *Sunset Magazine*, April 1962.

4 Metro Transit operated and maintained the Monorail after it assumed control of the Seattle Transit System in January 1973. Between 1973 and 1994, the Seattle Center paid operational and maintenance costs, provided janitorial services for the trains (washing, sweeping and waxing), set fare collections, determined operating hours, and maintained the north and south stations. The City, acting through its Director of the Seattle Center, retains ownership and control of the Monorail. The current concessionaire, Seattle Monorail Services, Inc., provides operators for the trains, maintenance and repair of all moving equipment, beamway columns and mechanical and electrical equipment. The shop facilities at Seattle Center Station, including tools and equipment, are the property of the City, but remain under the control of the concessionaire. The concessionaire's superintendent oversees operators, maintenance, power maintenance, personnel training, safety, scheduling special and emergency services, purchasing, and budget and expense monitoring.

Since its construction, a number of proposals have been made for extending the Monorail. Ideas have included adding a Denny Regrade station, constructing an extension through portions of the Seattle Center, and expanding the Monorail into a citywide or regional transit system. In 1977, the City applied for Capital Grant Funding from the Urban Mass Transportation Administration (UMTA) to construct an improved and extended Monorail system based on the downtown "People Mover" demonstration program. A 1979 report explored options for expanding the route and adding stations.[5]
In November 1984, the City contracted with Raymond Kaiser Engineers to identify rehabilitation and upgrading needs for the Monorail. To improve service, ride quality and carrying capacity, the primary goal was to relocate the guideways, and design and construct a new station. This analysis included various alternatives to relocate the southern station to integrate with the proposed Westlake Mall development in the city's retail core. After selection of a preferred alternative (named the George Benson Alternative after a City Councilman), the preliminary engineering work commenced.

In June 1994, Seattle Monorail Services, Inc., then a joint venture with Railsafe Incorporated, a Seattle-based private operator of railway systems, became the operator of the Monorail as a concessionaire to the City of Seattle.

The Monorail, the Seattle World's Fair and the Seattle Center

The Monorail was a vital component of the 1962 Seattle World's Fair, as it provided a significant advantage for fair organizers. The 74-acre fair site, which subsequently became the Seattle Center, was bordered by water to the west and Queen Anne Hill to the north. No major arterial extended through the site, leading officials to realize that they needed a mass transit system to connect the fair with the hotels, stores and offices of the downtown retail core, approximately 1.2 miles south of the fairgrounds. The Monorail provided a further advantage by reducing the need for adjacent parking spaces, as fairgoers could park downtown and take the train to the fairgrounds.

The fair was originally envisioned as a "Gateway-to-the-Pacific" trade festival, with initial funding of $7.5 million raised through public bonds in 1957. Civic leaders justified this expense on the basis of the economic benefits it promised: strengthening the local economy; asserting Seattle's role as gateway to Asia, and increasing local and state tax revenues. "World's Fair" status was secured through additional local economic investment in the site and federal appropriation of $9 million for the purpose of a United States science exhibit.[6]

The timing of Congress's funding decision was opportune. By the end of the l950s, concern over losing the space race to the Soviet Union was paramount in the minds of many citizens and politicians. Indeed, the Federal financial investment in the fair served as one measure of America's response to Soviet advances in space.

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[5] UMTA did not choose Seattle to demonstrate a new-technology system, but it encouraged the city to study the feasibility of improving the corridor, and to use UMTA grants geared toward rail rehabilitation. Produced by De Leuw, Cather & Co., the 1979 report addressed the feasibility of expanding the route, adding stations and expanding service hours (in response to projected residential and commercial growth, as well as an attempt to minimize pressure on overburdened buses, parking, and street systems.) The report compared several alternatives, and identified two as the best options for route extension. The first option would serve the Convention Center, the Seattle Center garage, and the Opera House entertainment complex. Option two would complete the loop around the Seattle Center, and add a station near the Coliseum to serve Lower Queen Anne.

[6] This sum was then the largest allocation approved by Congress for a World's Fair science exhibit.

The emergence of the "Man in the Space Age" theme led one 1961 report to note that "Come April 21, 1962, Seattle's World Fair will have the race for outer space won -- figuratively, that is." Indeed, Seattle's fair continued the tradition of international exhibits in showcasing advancements in technology. Fair visitors expected to see tangible evidence of how men and women would live, work and play in the twenty-first century, or as one newspaper account put it, "space-age gazing in a crystal ball."

Paired with the Space Needle, the Monorail was the ideal advertising vehicle for the technology-based fair. Together the two structures followed technical initiatives exhibited in past World's Fairs, such as London's 1851 Exposition featuring the Crystal Palace, the Eiffel Tower erected in 1889 in Paris, and the Motorama built by General Motors for New York's 1939 World's Fair.[7]

Seattle's Century 21 Exposition furthered this tradition with an emphasis on science and the future, attracting worldwide attention while serving a national need. The tradition of celebrating technology continued after the Century 21 Exhibition, with Buckminister Fuller's "geodesic dome" design for Expo 67 in Montreal, and later in Washington State with the Expo 21 in Spokane in 1972.

The master plan for the fair site and buildings, which called for its subsequent evolution into a regional civic and cultural center, involved the expertise of planners, architects, landscape architects and contractors. Several pre-existing buildings in the Denny Regrade were saved from demolition and adapted for use at the fair, including the Washington National Guard Armory, the Civic Auditorium, Veterans Hall, and the High School Memorial Stadium.

In 1957, Seattle architect and planner Paul Thiry became principal designer of the grounds. His design unified the pedestrian precinct of approximately thirty city blocks and ordered the spaces into "the Five Worlds of Century 21." He organized these through a series of pathways, streets and plazas known as "the Boulevards of the World."

A linkage between the fair grounds and Seattle's downtown core was consistent with the forward-thinking theme of Century 21, highlighting a new system of elevated transportation. Indeed, the Monorail represented the first large-scale venture of this mode of transport in the United States. Other transportation systems at the fair also celebrated future technology. These included capsule-shaped elevators in the Space Needle, pedal carts, suspended system of pod-like gondolas that made up the Skyway (which is now located at the Western Washington Fairgrounds in Puyallup), and amusement rides in the "Gay Way."

Unlike the temporary structures of previous world's fairs, many of the buildings on the Seattle site were designed as permanent structures, and were later adapted as part of the Seattle Center complex. The long-range vision of city planners allowed the appropriation of money for this purpose. The design of these buildings occurred at the height of Modernism, and many of their original designs reflect this. Modernist structures adapted for more contemporary uses after the fair included the Armory (used as the Food Circus for the fair, and later the Center House); Minoru Yamasaki's Science Pavilion, the Swedish Pavilion/Northwest Crafts Center, and the Opera House.

Long-range planning and vision prior to the World's Fair allowed the site to later become a permanent, multi-purpose complex for both the city of Seattle and the region. In the master plan for the site, Paul Thiry and Seattle landscape architect Richard Haag developed a scheme of covered passageways and tree-lined paths to

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[7] In the United States, the earliest international fairs included those in Philadelphia in 1876; Chicago, 1893; Atlanta, 1895; Buffalo, 1901; Portland, 1905; Seattle's Alaska-Yukon-Pacific Exhibition, 1909; and San Diego, 1915. Twentieth-century exhibitions celebrated the future as much as the present at the Chicago Century of Progress, 1933-1935; the San Francisco Exhibition, 1936-1937; the New York World's Fair, 1939-1940; and the Brussels World Fair, 1958.

guide visitors to the various areas of the site and frame vistas of the surrounding city and horizon. They treated the internal zones of the Seattle Center grounds individually.

The area of Memorial Stadium would become a plaza with underground parking, serving as a formal landscaped link with a proposed convention center. The northwest court area would become an open space for flower shows and other community events. (Subsequent construction of the Bagley Wright Theater supplanted these uses.) A large, sculptural fountain, designed by San Francisco landscape architect Lawrence Halprin, near the center of the fair has become a permanent amenity. The International Fountain and the Flag Plaza, located at the center of the exposition grounds, were placed in the center to symbolize the "crossroads of the world." This placement aided in the formal arrangement of the grounds.

Paul Thiry envisioned the removal of the periphery walls after the fair to visually open the Seattle Center to the public. This and other features of Thiry's plan have been implemented since 1962, including landscaping and permanent paving, which helped to make the site usable and enjoyable year round. Expansion and addition of performance, exhibit and theater spaces have occurred in the last dozen years.

As a conveniently located and large recreation site in the city, the Seattle Center enjoys continued use for major public events such as Bumbershoot, the Folklife Festival, and the Bite of Seattle. Its cultural facilities are numerous -- the Opera House, Children's Theatre, Bagley Wright Theater, Pacific Northwest Ballet headquarters, Coliseum/Key Arena, and the Pacific Science Center. These facilities, as well as the Monorail continued to serve both residents and visitors to the Puget Sound region. They are cultural dividends from the long ago fair.

A Modern Vision of Transportation

The rapid growth of America's metropolitan areas following World War II was aided by, and limited to, available transportation systems. By the late 1950s, traffic congestion had become a major urban development problem, requiring the examination of new systems of mass rapid transit.

The proposal by Alweg International to construct a monorail system in Seattle occurred at a juncture in American life when "travel of the future, both on the earth and off, [had] stimulated the imaginations of the general public."[8] The 1957 orbit launch of the Soviet Union's Sputnik 1 provided a catalyst for this interest, igniting a "space race" between the Soviets and the United States. The U. S. responded by launching Explorer 1 in 1958. In 1961, the Soviet Union launched the first cosmonaut into space; in 1962, John Glenn became the first American to orbit the earth.

To a nation eager to display its scientific and technological strength to the world, the Alweg Monorail system symbolized the future of public transit (enthusiastically billed as "tomorrow's transit today" by promoters and fair organizers). By 1961, millions of TV viewers had seen Walt Disney's monorail system on Disney's Sunday night television show, and many became convinced of its future role in public transit systems. To many transportation planners, the Monorail was a prime candidate for solving the problems of congested a metropolis. One report optimistically stated that the "Monorail in the future promises to do for urban transportation what the jet accomplished in air travel and once again make mass rapid transit the popular way to go." Another newspaper report noted, "The Seattle fair may be remembered as the event from which a solution for pressing problems of transit in many American cities was evolved"[9]

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[8] According to an article "LA's Worst Transit Decision," by Kim Pederson. In 1963 Alweg offered the City of Los Angeles a 40-mile system under similar terms as it provided the Monorail to Seattle, but city officials declined the offer. See the Monorail Society web site www.monorails.org/tMspages/LA1963.html

Monorails Through History

An examination of the development of the Monorail system for passenger vehicles, begins with a definition of the word "monorail." Webster's Dictionary defines it as: "1. A single rail serving as a track for trucks or cars suspended from it or balanced on it. 2. A railway with such a track".[10] The Monorail Society's official definition states: "MO*NO*RAIL n. 1. A single rail serving as a track for passenger or freight vehicles. In most cases rail is elevated, but monorails can also run at grade, below grade or in subway tunnels. Vehicles either suspend from, or straddle, a narrow guideway. Monorail vehicles are wider than the guideway that supports them"[11]

The idea of using a single beam or rail for the transportation of people or goods dates back over 180 years to 1821 with construction of a simple freight line on the docks of London, England. The first passenger-carrying monorail, the Cheshunt Railway, began operations in 1825 in Cheshunt, England. Based on an 1821 patent by Henry Robinson Palmer, the Cheshunt was intended to carry bricks, but it carried passengers at its opening.

A monorail specifically designed to transport people first appeared at the Philadelphia Centennial Exposition in 1876. Created by General Le-Roy Stone, it was an ornate double-decker design, propelled along two main wheels by a rotary steam engine (at the rear of the vehicle). A modified version of Stone's design was used along a four-mile line between Bradford and Gilmore, Pennsylvania. Built in 1878 to transport oil drilling equipment and personnel, it soon began accepting local passengers. To increase power, a locomotive type, piston-driven engine was added in 1879. During that year, a fatal crash occurred and the line ceased operation a short time later.

Other designs followed. One, by Captain J. V. Meigs in 1886, boasted a curvilinear aerodynamic design. Ahead of its time, it was never implemented on a large scale. The Enos Electric Company tested the first suspended monorail (built of light, open steelwork) in Greenville, New Jersey in 1887, but did not build a major system. A steel-railed, passenger- monorail 9.5 miles in length began operation in Ireland in 1888. Named the Listowel & Ballybunion Railway (for the towns it linked), it ran until 1924, ceasing operations due to road transport competition and rising operating costs.

Perhaps the best known of the early monorails is the *Wuppertal Schwebebahn* ("suspended railway"), the world's oldest operating system. Located in the Ruhr district of Germany, geography dictated that a portion of this line would be above the Wupper River, rendering conventional railway options unfeasible.

In nearby Cologne, civil engineer Eugen Langen had successfully tested a double-track monorail system, and impressed railway promoters selected his design. Construction began in 1898, and the *Schwebebahn* opened to the public on March 1, 1901. Presently the route extends 8.3 miles with a carrying capacity of 3,500 passengers an hour and a top speed of 35 miles per hour.

Locally a variety of monorail plans surfaced between the late 1890s and the start of World War I. One plan touted travel times between Tacoma's Commencement Bay and Seattle's Elliott Bay of 20 minutes. (This plan resulted in construction of a test loop on the Tacoma waterfront.) Another scheme boasted an unlikely trip time between Edmonds and Seattle of only 10 minutes. Most of these plans appeared to be no more than elaborate stock swindles while others were whimsical fantasies.

Current Operating Monorail Systems

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[10] "What is Monorail?", The Monorail Society web site.

[11] "What is Monorail?", The Monorail Society web site.

The success of Seattle's new Monorail generated interest on the part of transit engineers from North America and abroad. A total of 43 monorail systems currently operate in North America, Europe, Japan, Asia, Australia, and South America.

The system that brought recognition to the monorail concept in the twentieth century was designed, not for urban transit, but as a visitors' attraction to a new theme park in California. Early in the planning process for Disneyland, Walt Disney envisioned a monorail that would represent the train of the future. Disney's designers installed a 5/8 scale Alweg monorail in 1959; its loop route extends 2.3 miles.

The opening of Walt Disney World, Florida in 1971 provided Disney with the opportunity to use its Disneyland experience to design and build a more elaborate monorail system. Built in two phases (1971 and 1982), its 14.7-mile route incorporates six stations and carries 150,000 passengers per day. Smaller systems soon followed the Disney and Seattle monorail systems, including an installation for Expo67 in Montreal. In 1969, the Philadelphia Zoo built a one-mile-long monorail. Known as the "Safari Monorail," it commenced service with three trains, two of which currently operate.

Other North American monorail locations include: Magic Mountain theme park in California (.6 mile-system; built in 1971); Pearlridge Mall, Hawaii (0.3 miles; date unknown); the Miami Metro Zoo (two miles; 1982); Tampa International Airport (0.6 miles; automated with eight stations; 1991); Las Vegas (one mile; two "casino" stations; 1995); and Newark International Airport (3.9 miles; seven-stations; 1995).[12]

The first monorail system in Japan predates its American counterpart by two years. In 1957, the Tokyo Metropolitan government experimented with a monorail as a new way to alleviate traffic congestion, using its Ueno Zoo site as a pilot project. Just 300 yards in length, this system was based on the *Wuppertal Schwebebahn*, with cars suspended below the guideway.

Subsequent to this modest undertaking, Japan commenced on the Inuyama system, the first multi-station Alweg monorail in that country. The Japanese Hitachi Company, impressed by Seattle's Alweg installation, purchased the technology that same year. (The Alweg Company sold old blueprints to the company, so it would not have the latest improvements made to the system. Hitachi went on, however, to install more Alweg-based transit monorails than anywhere in the world to date.) The original 1962 trains continue to run over a 0.7-mile, three-station route.

Planning for the 1964 Tokyo Olympic Games led to the development of the Tokyo-Haneda line, completed the same year. With ten stations situated along its 11.8-mile route, this privately owned and operated system has carried over one billion passengers since opening.

Other Japanese monorails include: the Mukogaoka system (0.75-mile; 1965), co-developed by Kawasaki of Japan and Lockheed Aircraft of California; a monorail in Shonan, twenty miles southwest of Tokyo (4.1 miles; six stations; 1970); an Alweg-based system in Kitakyushu (5.5 miles; built by Hitachi in 1985); a suspended system in Chiba City (9.7 miles; eighteen stations; 1988); a system in Osaka that carries 150, 000 passengers a day (13.3 miles; fourteen stations; 1990); and a system in Tama, east of Tokyo (3.4 miles; seven stations; anticipated to grow to 58 miles). Future proposed Japanese monorails include an extensive system at Tokyo Disneyland (2001) and an 8.2-mile system on the island of Naha, complete with fifteen stations (2002).[13]

The Monorail's Designers

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[12] "Transit Monorails of the World," Monorail Society web site.

[13] *ibid.*

Alweg's Founder: Axel Leonard Wenner-Gren

The creator of the Alweg monorail system was Axel Leonard Wenner-Gren (1881-1961), a Swedish industrialist and scientist. Born in Uddevalla, Sweden and educated in Germany, he began his career working for the Swedish Electric Lamp Company, eventually becoming its majority shareholder. In 1921 Wenner-Gren founded the Electrolux Company to manufacture vacuum cleaners and, later, refrigerators.[14] He then acquired one of Sweden's largest wood-pulp mills, as well as the Bofors Munitions Works. In 1941 Wenner-Gren established and endowed the Wenner-Gren Foundation for Nordic Cooperation and Research, an institute for the development of innovative scientific study.

Currently, the Wenner-Gren Foundation's sphere of interest is the support of research in all branches of anthropology, and closely related disciplines concerned with human origins, development, and variation.

The Designer, Alweg International

Wenner-Gren founded Alweg International in 1952, deriving its name from his own initials ([A]xel [L]eonard [W]enner-[G]ren). To test the effectiveness of his monorail system, Wenner-Gren constructed a reduced-scale test course outside Cologne, Germany. (A team of technicians, led by a Dr. Hinsken, was responsible for its engineering.) The system design was a closely guarded secret, and the test course was off-limits to the general public. Lacking photographs of the trains, some German publications used artist renderings, each depicting its own vision of what became known as the "rail torpedo".

Originally, Wenner-Gren promoted his monorail concept for both urban transportation and long-distance industrial (freight) traffic. Early test results, however, indicated that economic viability was limited to metropolitan (passenger) use. After five years of testing and revisions, the first public demonstration occurred in 1957. Its co-developers and technicians, Willi Brose, Karl Lindlar and Willi Fusswinkel, were on hand to operate the system. The test course consisted of two passenger trains, 36 feet in length, and a capacity of approximately 200 persons. The emphasis was on comfort and safety; the trains operated at an average speed of 50 miles per hour.

All components of the monorail system, including the stations, were to be standardized using the unit construction system. This system, Alweg argued, would prove cost effective over conventional means of public transport.

Reports indicate that Walt Disney and his wife had visited the Alweg test course while on a trip to Germany. Believing the Alweg system to be a practical solution to transportation problems at home, Disney ordered a 5/8-scale system built for his planned theme park in Anaheim, California. When it opened in 1959, the Disneyland monorail, which ran through Tomorrow-Land, proved to be one of the park's most popular attractions. Two years later, Alweg constructed a demonstration monorail at the World Exhibition and Century Celebration in Turin, Italy. The following year, the Seattle World's Fair showcased the Alweg system, bringing worldwide attention to the firm.

In 1963, Cologne city officials and transportation planners established plans to expand the existing Alweg system. Transfer points linked the system to underground connections, and station locations were located every 800 to 1000 meters along the route.

The death of Alweg's visionary, Wenner-Gren, in November 1961, negatively impacted the firm and control soon passed to the Krupp Company. The expansion of the Cologne test system went unrealized. By 1967 it had ceased operation, its system of pylons and guideways dismantled and trucked away. What was once a

[14] Some may notice that the slide-base designed Electrolux model, ca. 1923 – 1956, is surprisingly similar in appearance to a car of the Seattle Monorail.

center for transportation innovation underwent redevelopment as a recreational area. After fifteen years of progress, Alweg was no longer in business.

Currently there are 15 manufacturers of monorail systems worldwide, including eight in the United States, one in Canada, two in Japan and four in Europe. Their success in implementing monorail systems varies from development stage to complete systems.

The Stations Designers and the General Contractor

Howard S. Wright Construction Company, the Contractor

Construction of Seattle's Monorail took just ten months. Its general contractor, the Howard S. Wright Construction Co., which was instrumental in this process, was also co-owner and general contractor for the Space Needle. Howard Wright was a prominent developer in Seattle, operating a firm originally founded in the 1890s by his grandfather and namesake.[15]

Throughout its history, the company founded by Howard S. Wright, Sr., has been an active participant in shaping the character of the built environment in the Puget Sound region. The company also participated in the development and construction of industrial projects in the area. In 1935, the company completed the Puget Sound Pulp and Timber Company Mill in Bellingham. This project represented the first $1,000,000 project undertaken by a private firm in the Pacific Northwest. Howard S. Wright brought his son Howard H. Wright into the business in 1923. Shortly after that he offered to sell the company to his son and his son-in-law, George J. Schuchart.

As business partners Howard H. Wright and George J. Schuchart expanded the firm's expertise with construction of large commercial buildings in downtown Seattle and Everett, and work on the Washington State University campus. The company, as Wright Schuchart, expanded into fields such as marine construction and military projects. This included building structures such as bridges, cargo and oilrig deck structures, pump mills, as well as military housing facilities in Port Orchard, and a B-52 bomber hangar at Larson Air Force Base in Moses Lake for the Boeing Company.

Howard H. Wright's son, Howard S. Wright (1927 - 1996) joined his father's company and eventually assumed direction of the Wright Schuchart Companies along with George J. Schuchart's son, George S. Schuchart. For the World's Fair, the company was responsible for construction of the Coliseum, the Skyride, the Space Needle and the Monorail. The firm invested heavily in the Space Needle (with John Graham and three other investors), eventually acquiring sole ownership of it.[16]

The Howard S. Wright Company has played a significant role in the development of Seattle. It has constructed eighteen major buildings and added more than seven million square feet of built space to the city.

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[15] The senior Howard S. Wright was born in Nova Scotia Canada, 1861 and worked as a carpenter. He arrived in the U. S. in 1883 and moved to Port Townsend in Washington Territory in 1885, where he began building houses. In the 1890s he moved his home to Everett and became a contractor.

[16] After the 1962 Century 21 World's Fair the company formed Harbor Mechanical, Inc., Harbor Electrical, Inc. and Schuchart Industrial Contractors, Inc. to serve additional construction markets. By the 1980s, the companies included Howard S. Wright Construction, Wright Schuchart Harbor Company, and the General Construction Company, each of which provided different construction services. Well known construction achievements in Seattle by the Howard S. Wright Construction Company include the Columbia (Bank of America) Center, the Washington Mutual Tower, the IBM Building, the Westin Hotel, and Northgate Mall (the first indoor mall in North America).

The company has helped to create the current skyline of Seattle, shaping its physical character and contributing to its growth as an urban center.

Adrian Wilson, Architect of the original Westlake and Seattle Center Stations

Preliminary research has yielded limited information on the Monorail station architects, Adrian Wilson and Associates. Based in Los Angeles, Adrian Wilson was in practice by at least 1941. That year, he joined fellow architects, including Richard Neutra, in the construction of Los Angeles' Hacienda Village, a 72-unit public housing project inspired by suburban living and Ranch style design. Working with the same team, he also helped design (in 1941-1942) the City's Pueblo del Rio housing project, a series of 57 two-story units placed on a 17.5-acre site – providing 400 living units. Of brick and reinforced concrete construction, they expressed a subdued Modernism in their horizontal banding of windows, walls, and roofs.[17]

The last documented project that can be attributed to Adrian Wilson and Associates is the Arnold Schoenberg Institute (1978), located on the campus of the University of Southern California. Its exposed concrete walls, metal and glass windows and roofs create a complex angular sculpture – set above a landscape of ferns and trees.

Designers of the Later Westlake Station

The designers of the 1988 Westlake Station were Parsons Brinckerhoff, Engineers and TRA (the Richardson Associates), with Metro as the client; and RTLK, the design team responsible for the Westlake Center shopping mall and office building.

Parsons Brinckerhoff was established by engineer William Barclay Parsons, setting up its first office in New York City (Lower Manhattan) in 1885. Major projects undertook by Parsons included New York City's first subway, the IRT, and charting a 1000-mile railroad in China, from Canton to Hankow. In 1906, Henry M. Brinckerhoff joined the firm. He is best known as co-inventor of the "third rail" (which revolutionized rapid transit), while also designing road and highway networks throughout the United States.

The company was primarily responsible for the Detroit – Windsor Tunnel (1920), conducted numerous rapid transit projects (including San Francisco's BART system) and is currently working on the Boston Central Artery/Tunnel, the largest urban highway redevelopment project in the U.S. today. The firm focuses primarily on providing planning, engineering, construction management and maintenance services.

DESCRIPTION:

The Original Monorail Design

Original Alweg Train Design

After four decades of service, the Monorail trains do not appear dated. Rather they have become a familiar and cherished part of the Seattle cityscape. The two trains that currently comprise the passenger vehicles were designed by an Italian automobile-building firm and manufactured in Germany. According to the Monorail Society, Seattle's Monorail vehicles are the only Alweg-built trains still operating today. Promotional literature in 1962 touted the "interior comfort and eye-catching design" of these streamlined cars with wide windows and contoured glass ceiling windows providing panoramic views.

The two trains operated originally on a two-beam guideway that was 1.2 miles long; currently it is 0.9 miles. The original train's design enabled them to operate at speeds of up to 60 miles per hour, resulting in a one-

[17] Los Angeles: An Architectural Guide, p. 278-280.

way trip between downtown and the Seattle Center of 95 seconds on the original system. (Currently the typical train speed is 45 miles per hour.)

Each train consists of two, single-end articulated cars permanently connected into a double-ended train that totals 122 feet in length, ten feet three inches in width, and fourteen feet tall. The trains are constructed of lightweight aluminum, each weighing 100,000 pounds when empty. The cost of each train set, in 1962, was $200,000.

Each train seats up to 124 people, although maximum capacity with standing room is 450. Up to 10,800 passengers can be carried each hour by both trains, assuming three minutes of waiting at each station, and six round-trips per train per hour. Although Alweg designed the system for possible upgrade to completely automatic system, the Monorail trains are operator-controlled. They feature driving controls at either end, allowing for a two-driver system.

The four sections of each train contain control and operating equipment. Basically the trains operate in a manner very similar to the subways of New York City in terms of propulsion, brake system, etc. The unique difference with the monorail is the use of rubber tires on a concrete beam system, which assures a quiet system, and a relatively narrow overhead track width.[18]

The trains ride on 16, 39.5-inch diameter pneumatic rubber load tires. In addition there are 48, 26-inch diameter horizontal pneumatic rubber tires that press against the sides of the guide beam for stability and guidance. In total, each train uses 64 pneumatic tires, providing more than three times the traction of steel wheels on steel rails. The expected performance of each tire is approximately 50,000 miles. Because each of the trains straddles a beam, derailment is impossible.

Power switchgear stations, located at both stations, use 700 volts of DC power, fed from the Seattle City Light Central Sub-Station. Eight General Electric 300-volt, 6,500 r.p.m. electric motors draw 700 volts DC from an indented central rail running along the concrete beam to power each train. Side access flaps on each car that provide quick and easy access for the maintenance of the trains' electric motors, air compressors, braking equipment, generators, and other equipment located below the floor of the trains.

Alweg designed the trains using heavy duty transit industry components. Most replacement parts are still available from G. E, Westinghouse Air Brake (WABCO), Rockwell/Merrier and other equipment manufacturers. Other parts, which are unavailable, are manufactured by Monorail maintenance personnel or local fabricating shops.

Train Operation

Like many other mechanical devices, the Monorail requires a certain minimum levels of skill and knowledge, attained primarily through training and education. A Commercial Drivers License CDL, which is required of bus drivers, is required of all operators before they are given specific training. Fundamental to the trains' operation are their directional lever, controller and brake handles. These are subject to a series of safety checks and startup procedures.[19]

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[18] The design of static components and the plug-in method of mounting reduced and simplified maintenance of the static cam magnetic system, the control system for propelling the train. The arrangement of the system components allows maximum accessibility (G. E. Instructions).

[19] The operator's first steps are to check the underside of the train for open panels or other obstacles, and to verify the illumination of a red light (indicating power) on the Monorail beam. Next, the operator conducts a test to confirm that maintenance personnel have activated all required switches. The operator enters the train by releasing a safety latch and opening the

The trains currently operate daily as both an attraction and a method of transportation for Seattle residents, commuters, and visitors to downtown and the Seattle Center.

One-way travel on the Monorail's 0.9-mile-long route typically takes about two minutes to complete with current speeds. From the commercial retail business district, the route begins at the third floor Westlake Center terminus, located at Fifth Avenue and Pine Street, with elevator and stairway access from Fifth Avenue. Seattle's revitalized central business district serves an upscale shopping destination, both locally and regionally. This, and construction of new amusement and cultural facilities at the Seattle Center have resulted in the Monorail's continued popularity.

The Route

Heading northwest along Fifth Avenue from the Westlake Station through the Denny Regrade neighborhood, the system extends nine blocks to Denny Way where it turns north along Fifth Avenue. At the angular intersection of Denny and Broad the guiderail system curves. It is supported by large steel beams and columns and constructed over several low-scale masonry buildings dating from the 1920s – 1950s. Arriving at the Seattle Center, the system curves west, and terminates at the Monorail Station approximately 30 yards north

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second door from the end of the train. Once inside, the train operator proceeds to the desired control end, inserting the directional lever into the controller (set to the "neutral" position) and the brake handle into the brake valve ("handle off" position). The operator then depresses the controller handle and turns the transfer switch to the "on" position, while deploying the transfer button.

The controller is equipped with a "dead man's switch" feature. Thus the controller handle must be held down at all times while the train is motion. If the controller handle is allowed to pop up the train's emergency brakes activate and the train comes to a full stop. The brake handle then is moved into "emergency" (locked) position, and then back to the "handle off" position. Moving the brake handle into the "suppression" notch allows reservoir and brake pipe pressures to equalize (indicated by white needles on both gauges). While in running position, the brake cylinder pressure should be at zero, and the main reservoir pressure between 105 and 120 pounds (red needle gauges). After checking the voltmeter for proper reading, the operator closes the doors with a switch. This activates an amber dash light, indicating that the train is ready to operate.

A main switch (as well as three-way switches at both ends of the train) controls interior lights, heaters and fans. Roof vents (six per train) operate with the rotation of a handle below each vent (closed during periods of rain). Prior to departing the station, the operator verifies that the loading platform is clear of passengers and closes the doors. The controller has three positions or points of power, and is placed in the "first point" to initiate movement. After a few seconds, the operator notches the controller to the "second point". Full power is gained after completing the first turn (when heading south towards downtown from the direction of the Seattle Center), the operator moves the controller into" third point."

At a marked spot, approximately halfway down the guideway, the controller is placed in the power off position, and the train coasts the remaining distance. As the train approaches the station the operator uses the brake handle to activate the train's dynamic brakes which slow the train using its own electric motors. As the train enters the station the operator uses the brake handle to activate the air brakes to bring the train to a full stop at a reference mark that places the trains doors even with the station's platform gates. When the train arrives at its destination station, the operator follows a series of safety measures for disembarking of passengers.

of the Space Needle. Inside the Center grounds, the route becomes a tunnel within the recently constructed Experience Music Project. The Seattle Center anchors the north end of the system.

The Stations

The Original Westlake Station

When opened in 1962, the two stations were very colorful and brightly lit. Plastic roofs allowed illumination from within, and made them easily identifiable from a distance. The design intent for the original Westlake station called for its suspension above the busy street without disrupting the normal flow of automobiles and surface transit, thus the building was supported on columns. Originally, visitors could purchase tickets at booths in ca. 1960 Westlake Mall, which was decorated with plants and trees around the station. With the station elevated above the Mall and Pine Street, inclined moving sidewalks, known as "speed ramps," were constructed to provide access to the station.

The Original Seattle Center Station

The Century 21 World's Fair Station (currently the Seattle Center Station) represented the main entry to the fair; half of all visitors entered the grounds via the Monorail. Visitors entering the fair would purchase tickets at the Alweg Building and travel via a doubled concrete ramp system to the upper level of the Station.

The Alweg Building was originally a temporary multi-story structure with administrative offices at the upper level, supported by a partially open framework below. Ticket booths were placed at the grade level, allowing ample access from the building to the adjacent Monorail station. The simple, rectangular, flat roofed, 27.7' by 66.3' building remains, but has been changed with the complete infill of the lower space. Originally the building was characterized by concrete block lower walls, textured T-111 plywood cladding, and repetitive aluminum framed windows. A large neon sign on the south facade that read, "ALWEG Century 21 Monorail Entrance," identified the original building.

Presently the building is not a functional part of the Monorail system. Current uses include an art gallery at the lower level, which is accessed on the south from the Seattle Center grounds, and administrative offices on the upper level for the system's concessionaire. The upper level is linked to the southern platform of the Monorail by a small, steel-framed pedestrian bridge.

The original two-level Seattle Center Station remains intact, with the upper platform level for passengers, and the lower level for maintenance and repair of the trains. Maintenance tasks occur in the station, with the exception of guideway maintenance, which is performed from an open aluminum cart that is lifted onto the guideway system.

The lower level of the station is characterized by its utilitarian, industrial qualities. Open space predominates, except for rooms on the west end and the cast-in-place concrete and concrete block walls, which serve as enclosure and structure. Concrete beams support the two guideways. At the west end, there are several enclosed offices, personnel locker and storage spaces, a toilet room, and cast concrete stair system leading to the upper floor. A neon sign, reading "ALWEG," is hung from the steel frame in the middle of the maintenance space. (Originally it was integrated into the Monorail sign in the Station above.)

Loading and unloading operations designed within each of the original stations eliminated potential congestion caused by using the same doors for both exits and entries. Passengers exited onto the outer platforms, while boarding passengers entered on the center platform. This system still operates at the Seattle Center where the Station retains both its center and outer platforms.

The loading platforms are surmounted by a frame of welded steel with angled and curved sections supporting the multi-section roof canopy. The open canopy of corrugated metal and translucent panels recalls the

complex sectional profiles of early twentieth American industrial buildings, which were designed also to maximize natural light. Currently the steel frame, expanded metal screen, and the steel surrounds which make up the railing system are painted a deep turquoise. Other features of the station include the steel stem-mounted globe light fixtures and the original Monorail sign, with a contemporary surround, located above the south entry ramp.

Seattle Center Station Rehabilitation

This station rehabilitation occurred in 1988 at the same period as train car rehabilitation, and required separate design teams and contractors to coordinate their work. Modifications in 1988 included provision of control equipment, signage and lighting additions, and replacement of the ticket booths. Two enclosed, pod-like ticket booths are placed at the west end, accessible on the south by a wide concrete ramp from the Center grounds, or via a wide pedestrian bridge from the Center House.

A new, concrete block electrical vault was recently constructed at the northwest end, and the upper platforms extended to the west. Symmetrically placed exit stairs were constructed at the west end of each outer platform; these consist of cantilevered concrete treads supported by painted steel frames.

The ramp and station structure are one element, supported by curved, cast-in-place concrete walls and straight concrete block wall sections that enclose the lower level. Mature landscaping on the south side these walls include evergreen shrubs and trees. While the construction of the Experience Music Project (EMP) in 2000 obscured views of the station from the north and east, it afforded an additional unique experience of transportation piercing through the new building.

The Monorail Route

The rail route line consists of parallel, reinforced concrete beams that are elevated 25 feet above grade and supported by T- and inverted U-shaped, reinforced concrete pylons. Construction of the pylons along the route required drilling of 4.5-foot shafts (to a depth of 25 feet below street level) for the foundations. Once foundation work was complete, the tilt-up pylons were formed and cast horizontally on the street adjacent to where they would eventually rest.

Cranes lifted each 54-ton T-pylon onto the four-foot-square foundation, secured by high strength, steel anchor bolts. This process was repeated for the heavier U-pylons supporting the curved rail lengths. Squarely centered within the street right-of-way and occupying only one lane of traffic, the T-pylons rest 85 feet apart on straightaway route portions. The U-pylons sit 60 feet apart through the curves.

Trucks transported the pre-stressed concrete beams (train guideways) to the site. Measuring 3 by 5 feet, these beams featured hollow cores to reduce weight. They were manufactured primarily in two lengths: 100 feet for the straight-aways and 60 to 75 feet for the curved sections. The top surface of each beam was saw-cut to improve tire traction during wet weather. Using two mobile cranes, workers positioned as many as eighteen beams onto pylons (securing them with bolts) each day. The parallel beams are set about 12 feet apart.

Track and station structures were complete in December 1961 after only ten month's construction. The entire system was composed of 7,200 tons of pre-stressed concrete, 7,500 tons of reinforced concrete, 250 tons of structural steel, 600 tons of reinforcing steel and 120 tons of pre-stressed steel.

Westlake Mall Station Modifications, 1967 – 1968 and 1977

To reduce the bulk of the original structure, modifications to the Westlake Mall station were completed in 1968, based on the designs of Durham, Anderson & Freed Architects of Seattle. The estimated cost for this modification was $197,000. Changes to the design entailed the removal of many original design features. These included the translucent vaulted roof material; the cantilevered outboard girder supports (four piers); the north end platform handrails; the fourteen foot-wide east and west side platforms; the speed ramp at the

south end of the station (which was replaced with a return stairway); and the speed ramp at the north end of the station (which was replaced by a fixed concrete ramp system).

Once the changes were complete, loading and unloading of passengers was restricted to the center platform. Operators then adjusted new movable traffic control fences depending on traffic flow. Crowding at the downtown station remained until it was relocated in 1988.

Beam and power rail repairs were completed in 1965 and 1977. ABAM Engineers, Inc., (formerly known as Concrete Technology) of Tacoma, identified the necessary repairs that were undertaken. These included reworking the power rail expansion joints, repairs to the top and side finger plates, cleaning of the insulators, and bringing the power rail back into alignment relative to the guidance surfaces on the beamway.

The 1988 Westlake Station Relocation and Construction

The Westlake Station was relocated to a site north of Pine Street, and incorporated into the Westlake Center Project in 1988. The new station was integrated into the design of the private shopping mall. The design and location diminished the presence of the Station.

The removal and replacement of the original station represented a shift in public attitude toward the Monorail. Whereas the 1962 era station was a bold symbol of technological progress and innovation, its current physical presence is contextual rather than object-like. Removal of the former station also opened an east-west view corridor along Pine Street, and eliminated a large shadow at the street level.

During construction, a temporary station was located within the Fifth Avenue right-of-way, north of its junction with Stewart Street. This 140-foot long single elevated side-platform station occupied the space above the western half of the right-of-way and was only capable of servicing the "Blue Train".

Completed in 1988, the current Westlake station design evolved from the desire to maintain a two-track system yet minimizes covering and shading of the street below (a much-criticized drawback of the original station). Preservation of view corridors was also a goal. Thus the two guidebeams presently converge to minimize obstructed air space, forming gauntlet tracks. This design allows only one train to approach and enter the station at a time, and thus only one platform is available to load and unload downtown passengers. To accommodate a single platform design, the station features eight retractable passenger boarding ramps, allowing the loading and unloading of passengers from the easternmost train, No. 6202. The ramps retract to a position underneath the platform when the westernmost train, No. 6201, enters the terminus.

The platform of the current Westlake Station is set within a long opening at the upper floor level in the east façade of the Westlake Center. Framing is provided by a large, white concrete truss. The form and the platform opening contrast with the reflective blue-green spandrel glass of the remaining portion of the building's wall.

Access to the station platform is provided through the Westlake Center's multi-story retail shopping mall, via a system of communicating stairs, exit stairs, escalators and elevators. Station-dedicated vertical circulation consists of a ceramic-tile clad staircase and one elevator, with landings at the Metro tunnel mezzanine, the Fifth Avenue street level, and the platform level. The design of the new station also provided a janitorial room, public address system, and station furniture.

The terminus also features eight electric safety gates, which control passenger access to the edge of the boarding platform. The gates align with the train doors, and the train operator controls the gates.[20] Despite these innovations, riders at this station experience crowding, and longer loading and unloading periods than at the Seattle Center Station. Due to its location within the building's perimeter wall, the platform prevents views of the arriving trains from the north or the dense urban corridor made up by Fifth Avenue to the south.

[20] 1988 Draft Operation Rules and Procedures

Changes to the Original Cars

Train Colors
In the late 1970s, the train exteriors were repainted resulting in changes to the traditional color schemes of the original "Blue Train" and "Red Train.". (Th "Blue Train" had been named the "Spirit of Seattle" during the Fair. The "Red Train" was named the "Spirit of Century 21" during the Fair and renamed "The Spirit of '76" in 1976 to commemorate the nation's bicentennial.) The color changes prompted complaints from many Seattle residents who fondly recalled the original colors. The red and blue stripes have been eliminated, however, reducing the original identity of each car.

While Metro operated the system the trains were numbered No. 6201 and 6202 respectively for maintenance tracking purposes. Later they were renumbered No. 601 and 602 then renumbered back to No. 6201 and 6202. Recently the car exteriors have been painted or "wrapped" to promote specific events at the Seattle Center.

Train Car Rehabilitation and Maintenance
Coinciding with the removal of the Westlake Mall station and its reconstruction in 1988, both Monorail trains underwent rehabilitation and upgrade to replace worn materials and improve technology. Twenty-six years of service had amounted to 500,000 miles of operation per train. This continuous operation took and continues to take its toll in the form of worn upholstery, soiled and discolored textured wall panels, chipped fiberglass window frames, scratched and distorted curved Plexiglas end windows, leaking rubber window gaskets, and deteriorated wood floors and floor tiles.

Prior restoration work, consisting primarily of repairs to three of the train car ends, was undertaken after separate accidents in 1971 and 1979. In both incidents, repair and reconstruction work was not always consistent with the Alweg's original design, due in part to issues of expediency and lack of access to the original manufacturer's drawings.

Rehabilitation and subsequent maintenance treatments have included removal and replacement of worn and faded finish materials, seats and bases, the driver control console, wainscot panels (replaced with rubber base), windows and window retaining straps, the plywood sub-floor, floor tiles and hatches. Some of the original materials were refurbished and then reinstalled.

In 1988, wiring and circuit protection equipment were replaced. Only one train underwent rehabilitation at a time -- the west track (Train No. 6201, the earlier "Blue Train") cars first, followed by the east (Train No. 6202, the earlier "Red Train") cars. Since 1988, routine maintenance has included periodic re-upholstery of train car seats, and changes to internal lighting and ceiling finishes. Recently, the ceiling finishes have been replaced with new acoustic tile, and flooring with new linoleum.

Integrity

Although the changes to the south terminus in downtown Seattle have been significant, the physical integrity of the Monorail appears intact. At the Seattle Center, despite lengthening of the platforms and revisions to access routes, the station form retains its original character-defining features. The 0.9 mile guideway system of concrete pylons and beams, which run from the Seattle Center south to Olive Way, is original with the exception of the tunnel through the EMP.

While the guideway width has been changed, and reduced in width south of Olive Street, to accommodate the new Westlake Station design, it remains a tectonic system of cast-in-place and pre-cast concrete elements. The original Alweg trains remain having been preserved through a remarkably consistent effort at ongoing

maintenance. The impression gained by riding or simply viewing the Seattle Monorail in year 2002 is similar to that in 1962: streamlined passenger travel, quietly moving through urban space towards a Modern future.

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The features of the Landmark to be preserved, include*:* the Monorail cars and their interiors, the concrete guideways/beams and pylons, the Seattle Center station, and *exclude* the following: the Westlake Station, the concrete guideways/beams and pylons built in conjunction with the Westlake Station alterations in 1988; the skybridge to the Center House, the Seattle Center Administrative Offices/Alweg Building (exterior and interior), 1988 and later renovations including the paving, ramp and stairs on the exterior of the Seattle Center Station, the electrical vault building, and the two ticket booths.

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Karen Gordon
City Historic Preservation Officer

cc: Virginia Anderson
Shelly Yapp
Susan Boyle
Andrew Phillips
Joel Horn
Roger Pearce
Lorne McConachie, LPB
Yvonne Sanchez, DON
Diane Sugimura, DCLU
Cheryl Mosteller, DCLU
Ken Mar, DCLU