

Constructing Urban Infrastructure: The Hillside Elevators of Valparaíso, Chile

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INTRODUCTION

Interest in Latin American architecture and urbanism has concentrated on either the pre-Colombian and colonial periods or twentieth century modernism. The architecture which emerged after the independence of South American colonies in the nineteenth century remains unexplored. Engineering and technological inventions of the last century had a major impact on urban development in the newly independent countries and helped to define their identities. Recent democratic revolutions and the adoption of free market policies have focused international interest on entrepreneurship and trade as if these were new arrivals on the continent, but more than a century ago these forces created Valparaíso.

The Chilean port of Valparaíso is one of the most distinctive urban environments in all of South America. An abrupt change of level occurs between the coastal strip and the foothills rising in an arc to a height of almost 2,000 feet, forming steep cliffs which separate the city into two levels hundreds of feet apart. Upper and lower cities are tenuously connected by streets winding up the ravines, steep stairways and a network of fifteen nearly vertical pedestrian elevators or *ascensores*. The city's structure is analogous to that of a house organized into base, *piano nobile* and attic, with the *ascensores* acting as communicating stairs, allowing Valparaíso's inhabitants to experience the city's spatial qualities in an extraordinary way.

The *ascensores* of Valparaíso are memorable machines that represent the city as the Tour Eiffel does Paris, civic architecture that is both an important element of everyday life and one of the most potent features of the landscape — form, symbol and function all at once. The elevators are kinetic parts of the city fabric, hybrids of art and technology, blurring the distinction between buildings and machines. Nowhere else in the world do elevators exist in such concentration and variety, or with equivalent social and cultural significance. Besides providing pedestrian transportation, the hillside elevators organize a network of urban spaces which define neighborhoods and promote social exchange. This paper discusses the origins of the *ascensores*, their integration with the urban fabric of Valparaíso, its social and economic development, and the relationship between technology and urbanism at the turn of the century.

VALPARAÍSO

The origin of Valparaíso's name is disputed.¹ The historian Vicuña Mackenna wrote that Juan de Saavedra, the first Spaniard to set foot on the shore in 1535, named it "Valparaíso" after his native village in Spain. According to other accounts "va al paraíso" ("goes to paradise") described the passage through purgatory before arrival in the lush central valley of Quillota on the eastern slopes of the coastal mountains. Coastal settlement was discouraged during the period of

Spanish colonization and Valparaíso was not considered to be a desirable destination.

Arid Valparaíso is scorched by hillside fires during the summer and thick mud flows from the ravines after torrential winter rains. There are strong south east winds, periodic floods and frequent earthquakes. Major temblors shook the city in 1730, 1751, 1822, 1906, 1965 and 1985. Pablo Neruda, the Nobel Prize-winning Chilean poet, described the port as a wounded whale shaking itself. The harbor, when compared with San Francisco, Seattle or most other ports on the Pacific coast, is unprotected from prevailing winds and surging seas. But despite its unfavorable climate and geography, with the dearth of natural harbors along the Pacific coast of South America, its proximity to Santiago and the fertile agricultural region of Quillota, and favorable winds, Valparaíso was destined to become Chile's most important seaport. From Valparaíso merchandise went overland on mules to Santiago or to the northern towns and mining districts.

After Chile's independence from Spain in 1810, trade transformed Valparaíso from a small colonial outpost into a major cosmopolitan center at the end of the nineteenth century. By 1822 foreigners represented nearly a quarter of the port's residents and dominated commerce. Contemporary accounts describe a population of several thousand people, which fluctuated with the number of ships in the harbor, frequenting the many shops, cafes, billiard halls, bars and brothels. An underworld of muggers, thieves, and murderers preyed upon drunken sailors, earning Valparaíso the rough and tumble, bawdy reputation for which it became famous.

Chile's merchant marine grew from the three ships owned by the Spaniards to over seventy by 1830. The construction of warehouses in which shippers could store merchandise for a fee helped to increase mercantile activity but port facilities remained primitive. There were no docks and porters were forced to carry heavy loads ashore on their backs through waist-deep water from the anchored sailing vessels. The city was described as an ugly, dry, dirty, dog and crime ridden city of about 40,000 inhabitants by many foreign sailors including Fred Walpole, who wrote in the 1840's: "After a long sea journey any landing area would seem beautiful, but not this one."

Nevertheless progress was swift. The technological innovations of the nineteenth century were adopted and by 1852 the installation of a telegraph line allowed for good communication among major Chilean commercial centers. The telegraph also made the connection of the railway line between Valparaíso and Santiago possible in 1863. Valparaíso had a decent theater, daily newspaper, gas lighting, and fire brigade before Santiago.² The steep coastal slope and marshy sediments in the bay which had made it impossible for tall ships to use the harbor dock were finally overcome when the first docks and port structures were built in 1883, with great technical difficulties.³ The installation of a new rail link to transport agricul-

tural products from Chile's Central Valley to Valparaíso helped to further expand markets.⁴ As in the rest of the world, the railways changed the existing environment, spawning new structures to connect and service the system: larger and more complex harbors, bridges, custom houses, stock exchanges and banks for finance.⁵

Growth in shipping brought an increase in population to Valparaíso that continued even after construction of the Panama Canal eliminated the necessity for the long trips around Cape Horn. Sailors of all nations settled in Valparaíso's dynamic urban center, bringing with them their own churches, schools, sports clubs and social facilities. Valparaíso was transformed by this culture of immigration. Reflecting in 1929 on the amazing transformation of Valparaíso in the nineteenth century, William Joseph Showalter described the city in a *National Geographic Magazine* article as a magic scene, "a jeweled sickle on a cloudless, moonless night,"⁶ one of the most astounding port spectacles in the world. As settlement began to spill out of Valparaíso's basic plan during the second half of the nineteenth century, it was essential for the city to grow. Expansion was possible through building on the hills or reclaiming land from the sea; eventually Valparaíso did both.

"THE CITY ON ITS FEET"

Construction of hillside neighborhoods posed a unique transportation problem; since most businesses, as well as government buildings, theaters and cafes were located near the port, a daily migration to and from the hills over steep unpaved paths was impractical. To link the residential neighborhoods with the commercial districts, twenty-eight inclined public elevators of all shapes and sizes were built by entrepreneurs between 1883 and 1912, and became a public utility service in 1915. Fifteen elevators have survived and operate on a regular basis.

Elevators for both goods and passengers existed in British textile mills as early as 1830. Inherently unsafe, these mechanisms were operated by cables from the main engine of the factory. Elisha Otis eventually solved the safety problem by devising a ratchet and pawl system located at the sides of the elevator shaft. The first inclined elevator or *ascensor* in Valparaíso was installed in 1883 at *Concepcion* hill, two years earlier than the first of a similar network of hillside elevators built in Lisbon.⁷ Despite initial concerns about their strength and stability, the *ascensores* soon became an indispensable means of transportation. Connections between the *ascensores* and streetcar network on the coastal strip made the city's transportation system one of the first and most efficient in South America. Instead of semiprivate lobbies to elevators, and complicated subterranean interchanges between horizontal and vertical modes of transportation, Valparaíso offered public plazas and open terraces with views out over the city and the harbor.

Referring to the high-rise buildings made possible by the newly invented safe elevator, the *Scientific American* reported with evident pride that "in the modern city the streets are often vertical."⁸ In Valparaíso vertical buildings were mandated by the steep geography of the hills. The technological conquest of the slope in the nineteenth century was a precursor of all that twentieth century architecture would try to achieve: expansiveness, light, air, openness, freedom. Valparaíso attained an aerial quality with an architecture which had not freed itself from its foundations.⁹ "La Ciudad de pie," "The city on its feet" is how the Chilean Nobel Prize winning poet Gabriela Mistral described Valparaíso. Buildings that appear to be single very tall houses are often stacked assemblies of numerous individual units.

PALACES OF TIN

The architecture of "*El Plan*" – Valparaíso's flat sliver of land adjacent to the Pacific – is comprised mainly of stuccoed brick masonry reinforced by metal or wood framing. This simple, sturdy form of construction is characteristic of a range of structures,

including the many massive retaining walls built into the hills. In contrast to these monumental forms, the hillside houses are lightweight timber frame structures clad with corrugated iron sheets or wood siding and often painted in bright colors. The use of wood is similar to North American balloon framing. Cladding panels, doors and window frames were shipped into the port and assembled on site, used as a modular building panel systems or randomly, in combination with wood siding. Bridges often span between buildings on opposite sides of canyons.

On the flatter areas of selected hills, European immigrants built mansions in the style of their homelands. But like the layout of the hills themselves, the houses of Valparaíso are mostly an unpredictable, maze-like blend of styles and construction methods. Settlers imported an architecture characterized by the use of verandahs, sash windows, and wooden trellises and blended it with the Spanish colonial vernacular of *balcones*, *miradores*, *patios*, and *galerías* overlooking the sea. Sociability coupled with the desire for protection, enclosure and highly private shelter produced the *miradores* or lookout porches, and the *galerías*, expanses of windows creating the effect of a conservatory. *Galerías* retain heat in the winter and act as a sunscreen in summer, allowing cool air to flow into the house when opened.¹⁰

Individual builders devised their own techniques for fighting gravity and resisting earthquakes, creating a unique city of winding streets, stairways, walks and lookout points which began to string together the isolated hills. Unsteady in appearance, barely clinging to the hills, these houses proved to be firmer during earthquakes than the sturdier looking structures on *El Plan*: "The hills of Valparaíso decided to dislodge their inhabitants, to let go of the houses on top, to let them dangle from cliffs that are red with clay, yellow with gold thimble flowers, and a fleeting green with wild vegetation. But houses and people clung to the heights, writhing, digging in, worrying, their hearts set on staying up there, hanging on, tooth and nail, to each cliff. The port is a tug of war between the sea and nature, untamed on the *cordilleras*. But it was man who won the battle little by little. The hills and the seas abundance gave the city a pattern, making it uniform, not like a barracks, but with the variety of spring, its clashing colors, its resonant bustle. The houses became colors, a blend of amaranth and yellow, crimson and cobalt, green and purple."^{11, 12}

URBAN MACHINES

The *ascensores* made the colonization of the Valparaíso hills possible. The necessity for daily arduous hikes up and down many flights of stairs was eliminated through these ingenious machines. Journeys between home and work could be accomplished in short periods of time with little effort. Contemporary prints reveal that towards the end of the nineteenth century, the hills of Valparaíso were sparsely populated but this began to change as the upper terminal facilities for the *ascensores* acted as anchors for settlement on relatively empty land. Upper and lower points of arrival were developed in conjunction with small plazas, commercial centers or public viewing terraces. The city and its services and structures became as much complex mechanical artifacts as they were built environments.

Social life occurs in and around these urban machines. Like gates to medieval towns, the terminals act as entrances to the various neighborhoods, reflecting the social and ethnic diversity of Valparaíso's urban hills. The *ascensores*' links to the life of the local community are experienced during journeys between home and work, on the trips up and down the hills, and while waiting for elevator cabs to arrive. In the morning, the *ascensores* collect a diverse population into the unifying bowl of *El Plan* and disperse them again to the surrounding hills later in the day. This very social from of public transportation provides contact between groups of people who work together in the commercial heart of the city but who live in more segregated residential communities in the hills.

Most *ascensores* are in private ownership but a few are run by the city's government. Since some of the elevators date back to 1883, their technical specifications vary greatly. Load capacity of the cabs is from eight to twenty-five people. The travel distance ranges from 100 to 300 feet, the angle of inclination from 30 to 90 degrees.¹³ Some *ascensores* travel on inclined tracks suspended in mid-air, linking together fragments of the city. In places where the terrain is uneven, intermediate bridges spanning the valleys were built to keep the tracks level. Alternative roots in the form of public stairways often run parallel to the tracks. With the exception of *Ascensor Artillería*, terminals in the lower city are built on infill sites within the existing urban fabric. Sometimes as is the case with the *Ascensor El Peral* at the *Cerro Alegre* the lower terminal is situated within an existing building. *Paseos* or *plazas* take advantage of breathtaking vantage points near the *ascensores*, as is the case with *Paseo 21 de Mayo* and the *Ascensor Artillería*. Unlike the square plaza which resulted from the gridiron plan imposed on most Spanish colonial settlements, these open spaces are linear, creating horizontal planes on the inclined slopes of the hills. Together with *miradores* and *gallerias*, they create horizontal counterpoints to the vertical stairways and elevator tracks.

Kinetic parts of the city fabric, hybrids of art and technology, *ascensores* blur the distinction between buildings and machines:

El Peral built in 1902 serves the square in front of the city courthouse (*Plazoleta de la Justicia*) and the Yugoslav Promenade above, built in 1929 and overlooking the naval hero Prat's monument. The *paseo* is surrounded by gardens.

Cordilleras: (fig.1) built in 1894 with a 70 degree incline starts from the poor section of the port and ends at Bird Watching Rock and the *Plazoleta Eleuterio Ramirez*.

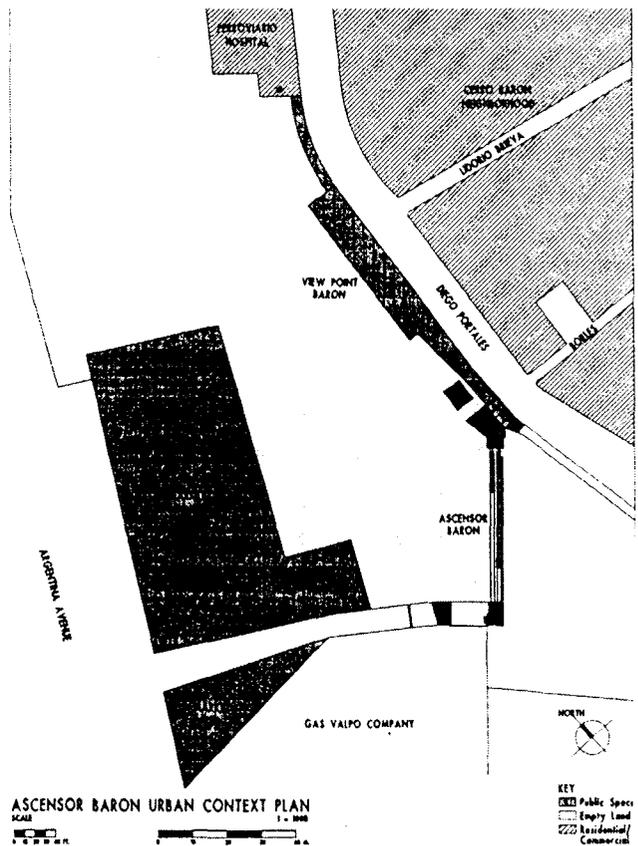


Fig. 2. Ascensor Barón.



Fig. 1. Ascensor Cordilleras

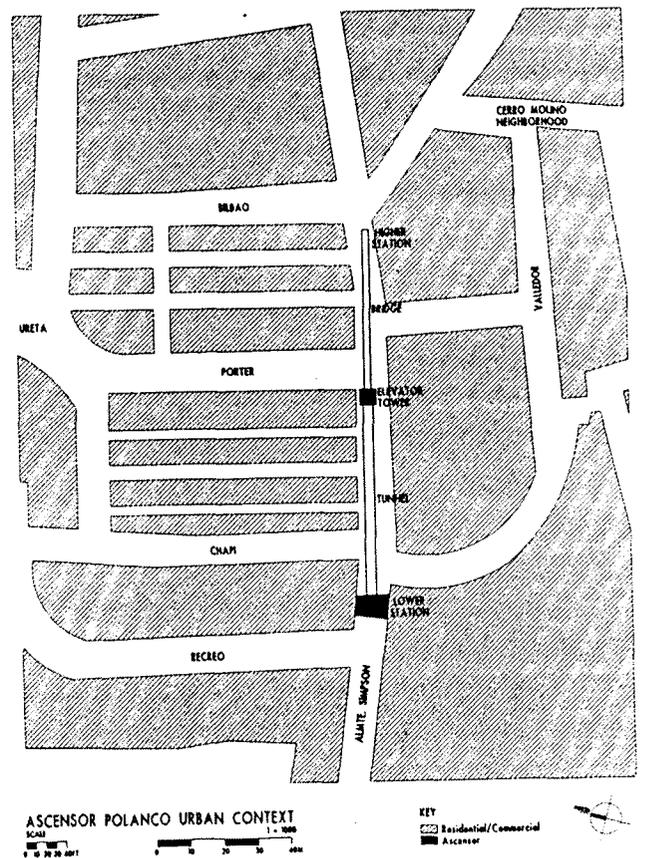


Fig. 3. Ascensor Polanco.

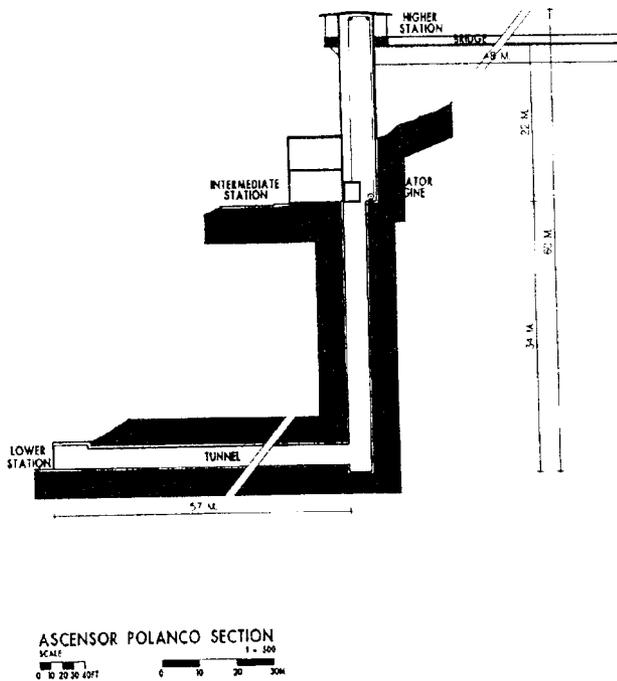


Fig. 4. Ascensor Polanco.

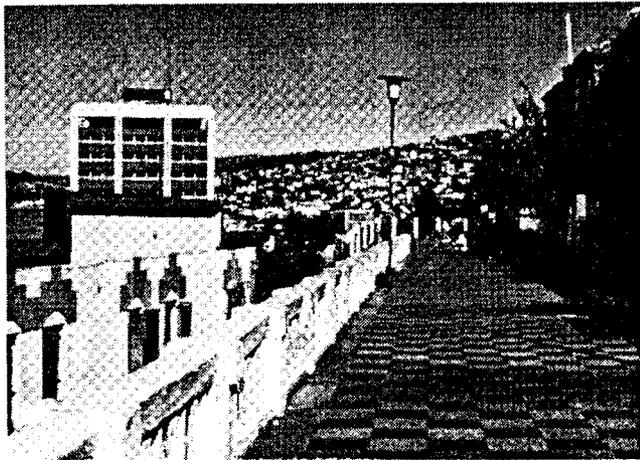


Fig. 5. Paseo Atkinson.

Artillería built in 1914, the longest *ascensor*, faces the Naval Building and arrives at the *Paseo 21 de Mayo*, a horizontal walk partially shaded by trees. A small metal pavilion like a bandstand marks the *Paseo's* beginning and offers spectacular views of the bay. The upper terminal is the city's largest. At its peak, when operating at full capacity it could transport a hundred people at once. Today there is an adjacent parking area. The wooden terminal building is two floors high and contains a small shopping arcade.

Baron: the base station is at the market (fig. 2). The machine room is open and has an elevator museum.

Polanco, built in 1915, uses a vertical shaftway and a tunnel to conquer the slope. (fig. 3 and fig. 4) Access to the hoistway is gained through a damp, 180-foot long underground tunnel at the base of the hill leading to a 170-foot high elevator.

Concepción, built in 1883, is the pioneering Valparaíso elevator. It arrives at the *Paseo Gervassoni*. A few houses away is the *Paseo Atkinson* (fig.5) which ends at the *Escalera de la Concepción*.

Ascensor Esmeralda, now dismantled, used to arrive at the *Paseo*

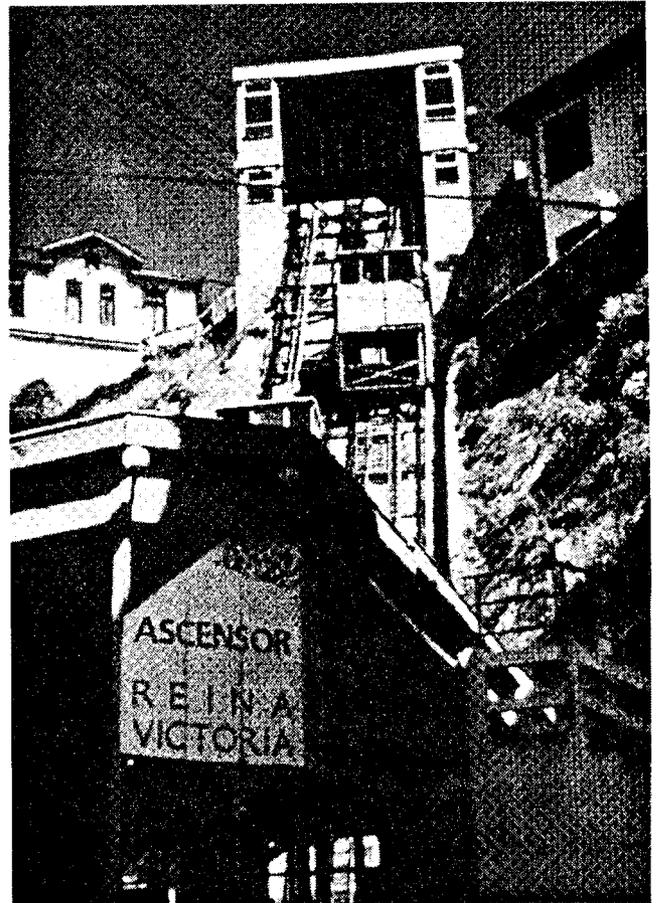


Fig. 6. Ascensor ReinaVictoria.

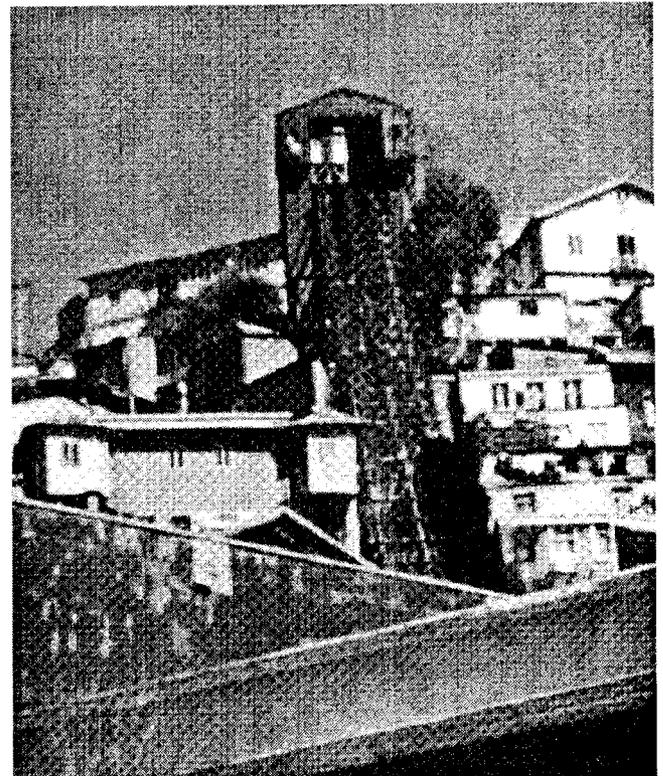


Fig. 7. Ascensor Las Monjas.

Atkinson, one of the most beautiful streets of old Valparaíso, overlooking the *Plaza Anibal Pinto*.

Their names reveal the affection that each neighborhood had for its elevators: *Reina Victoria*, (fig.6) *Las Monjas* (fig.7), *San Augustin*, *Espiritu Santo*, *Los Lecheros* and *Mariposa*. The hillside elevators offered Valparaíso a grand new symbol, a network of urban monuments that reinforced civic pride and symbolized a sense of common purpose and destiny. The elevators symbolically mark the transition from lower to upper city, from the world of work, commerce and public life to the intimacy of neighborhood, family and home.¹⁴

FUTURE OF THE CITY

Ironically the technology which fueled Valparaíso's growth ultimately hastened its decline. The Panama Canal and the container port of San Antonio south of Valparaíso were created by the same nineteenth century technology which had made the transformation of Valparaíso from village to seaport possible. The Panama Canal in particular was a major factor in the collapse of Valparaíso's shipping industry. In 1896, 860,000 tons of goods went through the port of Valparaíso; in 1913, just before the opening of the Panama Canal the number had nearly doubled to 1,650,000. But by 1930 the tonnage had decreased to the level of 1896.

Today Valparaíso's hillside neighborhoods extend over forty-two of the surrounding hills of the coastal plateau, and are home to almost all of the city's 400,000 people. Once the elevators rose to the farthest extent of the residential areas, but population increases forced construction higher and higher up the hillsides. Elevators that once reached the top dwellings are now serving a smaller percentage of people. There are more paved streets for cars and buses and new facilities for mass transit in the hills. Pollution is high. Access to current centers of production and consumption is inefficient. Commerce has moved north to the neighboring city of Viña del Mar, or to Santiago. The move to consolidate industry and commerce in the capital has further damaged Valparaíso's prosperity, lamented in the expression: "Tan lejos del mar, tan cerca de Santiago" ("So far from the sea, so close to Santiago.")¹⁵ Plans for development of the region between Valparaíso and Santiago envision Valparaíso as a future coastal suburb of the capital.

CONCLUSION

The city of Valparaíso was a creation of nineteenth-century civil engineering, a vital urban port whose star began to fade as it ceased to function as a center of cross cultural trade. Its huge breakwaters, port installations, landfills as well as the hillside elevators were all triumphs of technology over topographical constraints, a colossal effort by its citizens to fashion an arresting landscape out of a mountainous sliver of coastline. In the nineteenth century entrepreneurs in Valparaíso used engineering technology to create a new world. People from all nations settled in Valparaíso and fashioned an eclectic architecture perfectly adapted to its environment. Migrants from the countryside, foreign immigrants, and artisans constructed neighborhoods on individual hills which reflected their various ethnicities, and social and economic status.

When cast and wrought iron were introduced as structural materials, they blurred the distinction between buildings and machines. The only real difference was that machines performed work.¹⁶ But with the *ascensores* the distinction between buildings and machine did not exist. Technology and city fabric were integrated unobtrusively (fig. 7). Reyner Banham's contention that to keep up with technological change, the architect would have to emulate the Futurists and discard all cultural baggage was misguided.¹⁷ Situated at the interface of culture and nature, the *ascensores* were as much about the ground as its defiance, as much about constructing the site

as creating the object, as much about topography as technology, as much about tradition as innovation. Fascinating as objects in themselves, the *ascensores* were part of a more complex spatial, social and technological matrix both more complex and more fundamental that transcends their appeal of as objects.

Many of the original *ascensores* have been dismantled, but for the people of Valparaíso those that have survived remain sentinels expressive of their collective aspirations, symbols of what Valparaíso once was and may once again become. They serve as a link its past as a great maritime center, when the elevators were symbolic of the city's pride in its accomplishments, before much of its economic base was lost. As such they have a real and symbolic importance for the reversal of Valparaíso's fortunes. The *ascensores* capture the essence of the place, memorable machines that represent the city as the Tour Eiffel does Paris, civic architecture that is both an important element of everyday life and one of the most potent features of the landscape - form, symbol and function all at once, a testimony to the entrepreneurial nation building spirit of Chile's nineteenth century. The *ascensores* survive as a symbol of these aspirations in all of Valparaíso's disparate neighborhoods - from the elites to middle class and working class communities. Their potential to inspire new work may contain the vision of a future Valparaíso informed by the sense of common purpose of its urban past.

NOTES

- ¹ Vicuña McKenna, *Historia de Valparaíso: Crónica política, comercial y pintoresca de su ciudad y de su puerto, desde su descubrimiento hasta nuestros días 1536-1868* (Valparaíso, Impr. A. de Cox y Taylor, 1869-72).
- ² Araya Ghisolfo y otros, *Valparaíso busca su Destino* (Santiago: Colección Terra Nostra No. 16, 1989).
- ³ Collier, Simon and F. William Sater, *A History of Chile 1808-1994* (Cambridge, Cambridge University Press, 1996).
- ⁴ Peters, Tom, *Building the Nineteenth Century* (Cambridge, MA, MIT Press, 1996).
- ⁵ General information on Valparaíso can be found in the following publications: Benjamín Subercaseaux, *Breviario de una loca geografía* (Valparaíso: Editorial Universidad de Valparaíso, 1995); Joaquín Edwards Bello, *Valparaíso y otros lugares* (Valparaíso, Ediciones Universitarias de Valparaíso, Universidad Católica de Valparaíso, 1974); Julio Flores, *Valparaíso: Cultural y artístico* (Valparaíso: Universidad Católica de Valparaíso, Editorial Valparaíso, 1979).
- ⁶ William Joseph Showalter, "Twin Stars of Chile: Valparaíso, the Gateway and Santiago, the Capital with a Progressive Present and a Romantic Past." *National Geographic Magazine* No. 55 (January/June 1929): 197.
- ⁷ Edite Estrela, *Lisboa. A cidade dos elevadores* (Lisboa, Companhia Carris de Ferro de Lisboa, 1986).
- ⁸ D. Cecil Elliot, *Technics and Architecture* (Cambridge, MA, MIT Press, 1992), p. 345.
- ⁹ Lukas, *Apuntes porteños* (Valparaíso, Edición Renzo Pacchenino, 1971).
- ¹⁰ Myriam Waisberg, *Casas de Playa Ancha: la vivienda de fines del siglo XIX en Valparaíso* (Santiago, Fondo Nacional de Desarrollo Científico y Tecnológico, 1988).
- ¹¹ Pablo Neruda, *Valparaíso* (Valparaíso: Universidad de Valparaíso, 1992).
- ¹² Pablo Neruda, *Memoirs* Translated from the Spanish by Hardie St. Martin. (New York, Farrar, Straus and Giroux, 1977).
- ¹³ Jacques Raab, "The Inclined Lifts of Valparaíso: a Panorama of Chile's Hillside Elevators," *Elevator World* (May 1996): 55-61.
- ¹⁴ Rodrigo Perez de Arce, *Valparaíso, Balcon sobre el Mar* (Santiago: Ediciones Nueva Universidad Pontificia Universidad Católica de Chile, 1972).
- ¹⁵ Ignacio Santa María, Santa Cruz, "Un proyecto Alternativo para el desarrollo urbano regional de Valparaíso," *EURE Revista latinoamericana de estudios urbano-regionales*, vol. 14, no 44 (October 1988): 79-89.
- ¹⁶ Toom Peters, *Building the Nineteenth Century* (Cambridge, MA: MIT Press, 1996), p. 351.
- ¹⁷ Reyner Banham, *Theory and Design in the First Machine Age* (Cambridge, MA: MIT Press), p. 330.