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**Politics and the Engineering Mind:
O. H. Ammann and the Hidden Story of the
George Washington Bridge**

Othmar Ammann was at once a mathematician, a forerunner in the industrial revolution and a dreamer in steel. He was a master of suspension and a builder of the most beautiful architecture known to man, a combination of realist and artist rarely found in this highly practical world.
(Robert Moses, *Poet in Steel*, 1968)

O. H. Ammann is generally viewed as one of the great bridge builders of the modern world. He designed and then supervised the construction of most of the major water crossings completed in the New York region during the past seventy-five years—the Bayonne Bridge and the George Washington span during the 1920s and early 1930s; the Bronx-Whitestone in the 1930s; the Throgs Neck and Verrazano-Narrows bridges in the 1950s and 1960s. He had a crucial role in the design and building of the Golden Gate Bridge in the 1930s. As bridge engineer and chief engineer at the Port of New York Authority, he supervised the building of two other bridges—the Goethals and Outerbridge—as well as the construction of the first tube of the Lincoln Tunnel.

Ammann's bridges are important not only as engineering structures, but because of their impact on urban development in the New York area—for they have had a major influence in shaping the residential patterns, and the patterns of employment and recreation, across a vast bistate region.¹ As the quotation from Robert Moses suggests, Ammann's bridges also have an artistic quality which gives them, and their designer, a distinctive place in the long history of bridge-building, and of civil engineering more generally, in the Western world.

Much has been written about Ammann—about his early life in Switzerland, his professional development in Europe and in the United States, and his engineering accomplishments. The articles and commentaries began as the great towers of the George Washington Bridge were being erected in the late 1920s; for the attention of engineers and

journalists was drawn to this Hudson River crossing, which would be the longest single-span bridge in the world, and to its Swiss-American creator.² Ammann's artistic achievement was highlighted in a well-known essay by Le Corbusier in the 1930s:

The George Washington Bridge over the Hudson is the most beautiful bridge in the world. Made of cables and steel, it gleams in the sky like an arch upturned, blest. It is the only seat of grace in a disheveled city.³

During the past five decades the outflow of articles and papers has continued, and Ammann's ranking as one of the major figures of bridge design and engineering administration has been solidified.⁴

What is missing from the written record of Ammann's life and contributions is a crucial chapter on Othmar Ammann as "political entrepreneur"—on Ammann's major role in organizing public support for the first of these great bridges, the George Washington. This chapter in Ammann's life is critical to understanding why a bridge was constructed across the Hudson in that decade, permitting the rapid suburbanization of northeastern New Jersey and the surrounding hinterland. It is also crucial in explaining why a young engineer of only moderate reputation was chosen to design and build that gigantic span, and how it came to pass that this engineer was able to use his technical and artistic talents to create the series of great bridges that stamped him as a major figure in the engineering profession. Finally, Ammann's political activities are significant for an understanding of why the Port of New York Authority left the field of railroad planning to become a leading player in the new age of rubber-tired transportation.

The purpose of this essay is to sketch out an answer to these questions, and in doing so to illustrate two broader points: (1) that biographical analysis can be valuable as a route to increasing our understanding of patterns of political power and social causation in a society; and (2) that close biographical probing may be especially helpful when previous writings have treated an individual as an example of an "ideal type" of his or her specialized profession.

The essay is divided into several parts. The first section provides a brief summary of Ammann's life and work, as they have been described in a dozen biographical essays and magazine articles, a book-length biography, and commentaries on Ammann in many books dealing with bridge engineering, the development of the New York region, and the history of the George Washington Bridge.⁵ In these published accounts, there are some puzzling aspects and apparent gaps. The second part of the essay identifies these and briefly notes how the events of the "missing years" in Ammann's early career were uncovered.

Then we turn to those missing years and summarize the steps through which Othmar Ammann confronted a contentious and often hostile environment, found his early hopes for a major span across the Hudson shattered, sketched out his own approach to a Hudson bridge, and then entered the ranks of the unemployed. At this point he began, haltingly, to put together a coalition which would provide political

support for a Hudson River bridge, and which might indeed endorse his own vision of such a bridge, placed where *he* thought it should go. It is his efforts in building this coalition, and in orchestrating its activities toward a successful conclusion, that justify calling Ammann, the engineer and artist, by the additional title of political entrepreneur.⁶ The final part of the essay considers the broader questions listed above.

The Life of a Great Bridge Engineer: The Standard Account

Keen instruments, strung to a vast precision
Bind town to town and dream to ticking dream.
(Hart Crane, *The Bridge*)

Ammann was born in 1879 in Canton Schaffhausen in Switzerland. In 1898 he entered the ETH Zurich (the Swiss Federal Polytechnic Institute), where he studied with Wilhelm Ritter, a distinguished bridge designer. Graduating in 1902, he worked as a structural draftsman in Europe for two years and then, at the urging of one of his former professors, left for America.⁷

Ammann arrived in New York in the spring of 1904 and found employment with a local engineering company. During the next several years he worked for engineering firms in Manhattan, Chicago and Pennsylvania, and he worked on several major bridges, including the Queensboro in New York City. The possibility of a bridge across the Hudson also attracted his early attention.⁸ In 1912 Ammann joined the firm of Gustav Lindenthal, a railroad-bridge engineer with an international reputation, and Lindenthal soon appointed him as his chief aide in work on the Hell Gate Bridge.⁹ Much of Ammann's time during the years 1912-17 was devoted to the Hell Gate, where he was in charge of all office and field operations, supervising a team of ninety-five engineers.¹⁰

The Hell Gate Bridge was completed in early 1917, and Lindenthal then had very little engineering work to occupy his staff. He suggested that Ammann take a temporary position in New Jersey, managing a clay pottery mine in which Lindenthal had invested. Ammann took that job, at the Such Clay Pottery Company in Middlesex County; and with his managerial skills he turned a shaky financial enterprise into a healthy firm, which earned a modest profit for Lindenthal and other investors. In 1920 Lindenthal called him back to assist in developing plans for a gigantic railroad-vehicular bridge which would cross the Hudson at 57th Street.¹¹

Ammann worked on this project with Lindenthal from 1920 until 1923. By the middle of 1922, however, Ammann had become concerned that the 57th Street bridge could not be constructed in the near future, because of its great cost, the reluctance of the railroads to commit themselves to using the bridge, and the opposition of Manhattan business and political leaders to a project that would dump twenty lanes of traffic into the midtown area. Ammann urged Lindenthal to cut down the size of his project and to shift its location north of midtown Manhattan. Lindenthal resisted, and in the spring of 1923 Ammann left his employ and entered private practice on his own.¹²

After two years in private practice, Ammann was hired by the Port of New York Authority in July 1925 as its bridge engineer, and he was placed in charge of the design and execution of the proposed span across the Hudson between Fort Lee in North Jersey and 179th Street in Manhattan. He was also given supervisory control over construction of three smaller Port Authority bridges, between New Jersey and Staten Island. All of the biographical and other accounts agree that the Port Authority's decision in 1925 to commit its energies to constructing a bridge at 179th Street, and to hire Ammann to carry out that challenging task, were the crucial steps in the flowering of his career.¹³

Ammann stayed with the Port Authority, as bridge engineer and then as chief engineer, until 1939, with collateral duty in the 1930s as chief engineer for Robert Moses's Triborough Authority. During these years, he designed and constructed the George Washington, the Bayonne, and the Bronx-Whitestone bridges; he also supervised construction of the Goethals, Outerbridge, and Triborough spans in the New York region, and he was an influential adviser in the designing of the Golden Gate Bridge. By 1939, however, the Great Depression had taken its toll on the financial health of the Port Authority, and on its energy and vision. There were no challenging projects in the offing, and Ammann then left the agency, joining forces with another engineer to found the firm of Ammann & Whitney, which in the next several decades worked on a wide range of projects around the world.

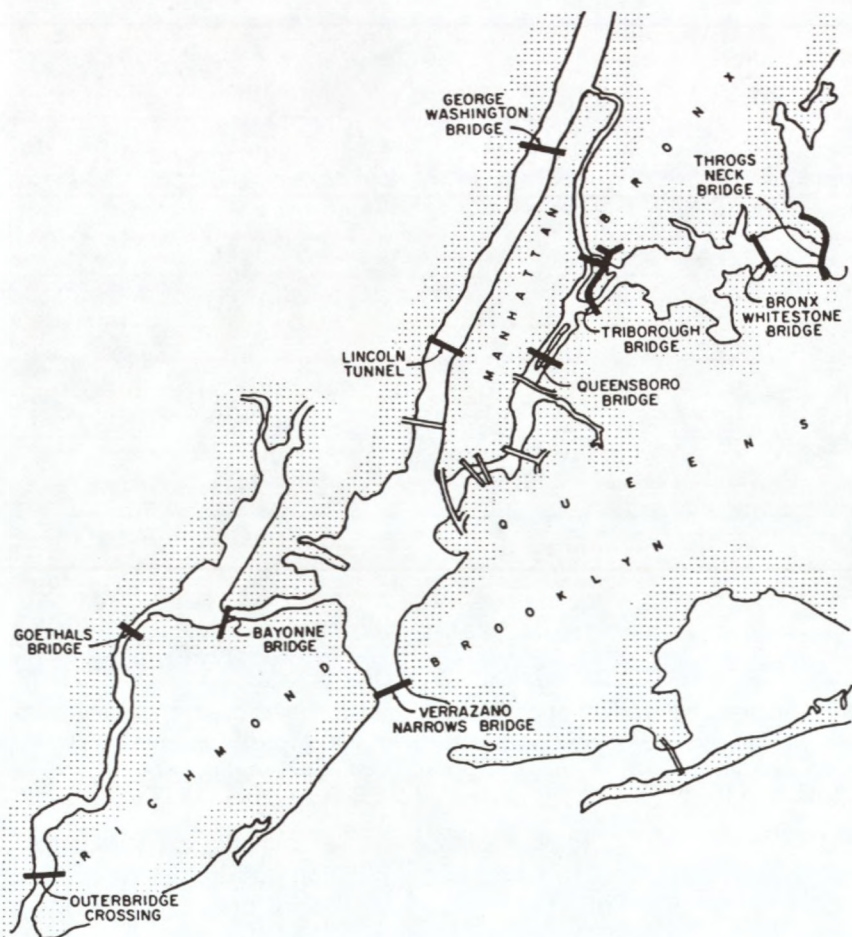
During the 1940s and early 1950s, Ammann's old employers—the Port Authority and Robert Moses—engaged in intermittent warfare over control of airports and vehicular projects in the New York region, but by the mid-1950s they agreed to combine their energies on behalf of several new highway projects. Once again they called upon Ammann, this time to design and supervise construction of a new bridge across the East River (at Throgs Neck), a lower deck for the George Washington Bridge, and a structure that would again give to New York the longest single-span bridge in the world, the Verrazano-Narrows Bridge across the entrance to New York harbor.¹⁴ The Verrazano Bridge was completed in 1964, and the next year, at the age of 86, Othmar Ammann died. On the centennial of his birth, in 1979, celebrations were held in New York and in Switzerland, and the Swiss government issued a stamp in honor of this leading citizen of both countries.

The Puzzle and a Search for the Missing Pieces

Luck is important to those who work in the structural arts; great engineering assignments are comparatively rare, and it takes great assignments to make great engineers. In that respect, Ammann has been lucky

('Poet in Steel,' *The New Yorker*, June 1934)

The paragraphs above summarize the well-known biographical account. But there are some gaps, or puzzling aspects of the story. For example, why did the Port Authority hire Ammann in 1925 to take charge of designing and constructing a giant bridge across the Hudson?



New York City River crossings designed or supervised by O. H. Ammann. Courtesy of The New York Academy of Sciences.

Could "luck" possibly explain the happy choice? In view of the size and regional importance of this project, prominent engineers around the world might have been expected to seek the commission; and because of the importance of the project to the Port Authority (in 1925 it had no operating facilities at all), that agency might have been expected to reach out for a bridge engineer with a major reputation and a record of independent accomplishment. Ammann had neither; he had been second in command to Lindenthal on the Hell Gate and other, smaller projects, and he had won a prize for a published paper on the Hell Gate Bridge. He had no significant engineering achievements to his own



O. H. Ammann at the dedication of the second deck of the George Washington Bridge (1962), shown with Governor Richard J. Hughes of New Jersey (center) and Governor Nelson A. Rockefeller of New York (right), with a bust of Ammann in the background. Courtesy of the Port Authority of NY&NJ.

individual credit. Ammann's limited reputation had in fact cost him a commission at the Port of New York Authority only a few months earlier. In the fall of 1924, he had submitted a bid to design two smaller bridges for the Port Authority, but his offer had not been accepted; the agency concluded that for their first operating projects, they would need to turn to "an engineer of long established reputation."¹⁵

Related to the question of why the Port Authority chose Ammann is a second issue: why did the Port Authority—which had been expected to carry out a plan for better railroad connections and rail freight terminals in the New York region—decide to build a gigantic bridge for motor vehicles? Published materials provide important elements of an answer, but they leave significant gaps as well. Part of the answer lies in the attitude of the railroads, and in the growing importance of motor trucks. During the 1920s, the Port Authority's efforts to improve outmoded rail facilities made little progress, primarily because of resistance from the region's dozen rail corporations. Meanwhile, freight distributors expanded their use of over-the-road vehicles for goods

shipments within the New York region and beyond; but efficient truck movement across the region was stymied by the Hudson River, which had no tunnel or bridge crossings.¹⁶ To overcome the Hudson barrier, New York State and New Jersey had created bridge and tunnel commissions, which in 1920 began a tunnel under the Hudson, between Jersey City and Canal Street in Manhattan. During the next two years, the "cooperating" commissions disagreed about engineering and financing issues, and progress on the tunnel was delayed. After 1922, however, the joint effort proceeded harmoniously, and commission members began to think about constructing a *series* of vehicular tunnels, possibly at 40th Street in Manhattan, at 125th Street, and several in between. Private investors began to gather support for a tunnel crossing too, perhaps at 125th Street.¹⁷

At this point, Alfred E. Smith, who was elected governor of New York in 1922, entered the picture. Smith did not believe that private corporations should build and control major highway arteries across the Hudson, and in early 1923 he vetoed a bill that would have authorized such ventures. He was also skeptical of relying on the existing interstate commissions, which had shown a proclivity to internecine warfare, and which would need state funds to construct a series of interstate tunnels. Smith's clear preference was to place the development of all interstate crossings for motor vehicles as well as railroads entirely in the hands of the Port of New York Authority, which was authorized to use toll revenues to pay for its own projects—potentially sparing Al Smith and other state officials from the burden of using tax revenues for bridge and tunnel projects.¹⁸

Smith's views were important, but they could not be determinative. The Port Authority could assume these wider duties only if both New York and New Jersey passed new legislation, and there was strong sentiment in the Republican-dominated houses in both states to rely on the joint tunnel commissions or on private ventures. New Jersey's governor Silzer also sought to interest private capital, and through most of 1923 and perhaps well into 1924 the Port Authority's own staff did not appear much interested in adding vehicular bridges to its duties.¹⁹ Throughout much of 1923, one might reasonably have predicted that the Canal Street tunnel would be followed by a series of other tunnels under the Hudson—perhaps next at 40th Street and 110th Street—built by the joint commissions, and possibly with one or two financed by private investors.

However, in 1924 local civic groups and public officials in North Jersey began to demand that the Port Authority construct a great bridge at Fort Lee, an influential Republican senator from that area championed the cause and introduced legislation, and Governor Silzer joined the public campaign, urging that the Port Authority take action. In New York, local business groups took up the cry. Early in 1925, both state legislatures passed legislation which compelled the Port Authority—which may still have been reluctant to take on the task—to turn its energies to designing a Hudson River bridge.

To restate the second question, therefore, in altered form: why was

the divided sentiment on *where* to cross the Hudson and *how* (bridge versus tunnel; joint commission versus Port Authority versus private initiatives) replaced during 1924 by a clear, sustained demand for Port Authority action to build a great bridge at 179th Street?

The published biographical record on O. H. Ammann suggests a third question as well: What was Ammann doing between the time he left Lindenthal in the spring of 1923 and the summer of 1925, when he joined the staff of the Port Authority? The published materials indicate that he was in private practice as an engineer, and that he investigated various sites for a trans-Hudson vehicular bridge and decided a span between 179th Street and Fort Lee would be the best location. But beyond that sparse description, the published record provides little information. As it turns out, the detailed answer to this third question also provides major clues to answering the first two queries.

In the spring of 1987, my primary motivation in thinking about these issues was not biographical, with a focus on Othmar Ammann. Rather, it was historical and political, as I tried to sort out the forces that led the Port Authority to change direction in the 1920s, leaving the field of rail freight and embracing the automotive age—a field in which the agency would become famous, or infamous, depending on one's point of view. It seemed evident that the decision to hire Ammann and to put him in charge of the Hudson Bridge project signaled the Port Authority's commitment to this new direction. To determine why the Port Authority hired Ammann might cast light on the larger issue. Unfortunately, the published literature on the Port Authority's early history and on the politics surrounding the building of the George Washington Bridge, though quite extensive, is not very helpful on this point. Ammann seemed to appear, essentially, from nowhere.²⁰

One possible research strategy at this point, and the one I adopted, was temporarily to set aside the wealth of materials on institutional history, interest group pressures, and the dynamics of interstate conflict, and to pursue the issue biographically—looking for information on Ammann's earlier career which might help to clarify the political issue of direct concern. A search of the Port Authority's files revealed no information on Ammann's early career or why he was chosen.²¹ However, David Billington, professor of civil engineering at Princeton, did have some materials on Ammann, including one booklet with a section titled "Autobiography"—which contained four pages of notes in Ammann's handwriting, listing brief information on his birth and education and on his activities from the late nineteenth century through 1956.²²

Ammann never fleshed out these sketchy notes, but a few lines reproduced here provided useful clues in answering the questions noted above:

Own studies & promotion activities for bridging Hudson at 179th Str.
Promotion of G. W. Br;

Rea - Silzer Dwight Morrow Binder

Creation of the Port of N.Y. Auth. in 1921? - its primary purpose -
incidental functions of
financing & building of bridges (Arthur Kill Br - G. W. Br. - Bayonne Br.
Later

Holland T. - Lincoln T. P.A. Bldg. Commissioners & Manager

Chf. Eng of Br. - Chf Eng.

The first line indicated that Ammann was active in promoting the idea of a bridge at 179th Street, but it was not clear whether this was before or after the Port Authority was created in 1921. The reference to "Silzer" in the second line suggested that Ammann had had some contact with Governor Silzer during this period, and a search for biographical information on Silzer yielded an early connection between the two: before his election as governor in 1922, Silzer had been a political leader in Middlesex County, New Jersey, and a member of the board of directors of a local business, the Such Pottery Company, where Ammann was the operating manager from 1917-20!

The next step was to look at the official gubernatorial papers, stored in the State Archives in Trenton. An hour with those materials suggested that the Silzer files would go a long way toward answering all three of my questions.²³ The files contain more than one hundred letters, drawings and notes, most of them between January 1923 and July 1925. The great bulk of the materials is correspondence between Silzer and Ammann, but there are also letters between the governor and Port Authority officials, the governor and Gustav Lindenthal, and the governor and Dwight Morrow, a member of the J. P. Morgan banking firm, who provided advice to Silzer and Ammann on the possibility of private financing for a bridge across the Hudson.

There were other leads to pursue. Billington had suggested that Edward Cohen, currently the managing partner at Ammann & Whitney, might be helpful. Cohen sent a paper he had written, and he suggested that I call Othmar's daughter, Margot, and his son, Werner. Werner had some recollections of the early 1920s, but he had been away at college during part of the "missing years," and he had no detailed knowledge of his father's activities on the Hudson Bridge project. Margot had fewer recollections of the early 1920s (she was one year old in 1923), but she did have a most valuable source—letters from Ammann to his mother in Switzerland, written between his arrival in the United States in 1904 and her death in 1928. These were in German, and she offered to translate them, an offer I gladly accepted.

Margot Ammann and Edward Cohen also suggested another important source of information—the Ammann archives in Winterthur, Switzerland, which are maintained there, together with an exhibition on his works, by Urs Widmer, mayor of the city and at one time a staff member at Ammann & Whitney. During the summer of 1988, Widmer went through Ammann's diaries and other materials on file in Winterthur and sent me dozens of pages of diary entries and other information, which helped to fill in the story of Ammann's "missing years."

To confirm and amplify Ammann and Silzer's descriptions of the bridge campaign, it was also desirable to locate newspapers published during the 1920s which carried articles on the organizing activities of Ammann and others concerned with Hudson River crossings. The most detailed accounts appeared in the *Palisadian*, a weekly newspaper published in a town near the New Jersey terminus of the George Washington Bridge. The *Palisadian* has appeared continuously since 1906, its reporters gave extensive coverage to the campaign for the bridge, and—unlike the old issues of many weeklies in the state—the editions had been bound every year and were stored at its offices. More than two dozen articles on the activities of Ammann and other supporters of a vehicular bridge in that area were published during the years 1923–25.

The Team of Ammann and Silzer

To take a stand, to be passionate . . . is the politician's element, and above all the element of the political leader.

(Max Weber, "Politics as a Vocation")

What emerges from the records in the New Jersey State Archives—supplemented by Ammann's letters to his mother, his diary entries, and newspaper articles—is the creation of an informal but close alliance between Ammann and Silzer beginning in the winter of 1922–23. Ammann was certain that the technology was now available to permit a single-span bridge to be cast across the Hudson in the vicinity of 179th Street in Manhattan—even though such a span would be nearly *twice* the length of any bridge span yet constructed.²⁴ And the new technologies should make it possible to meet high standards of esthetic as well as technical achievement—a combination that might attract any first-class engineer. Moreover, the expanding use of automobiles and trucks across the New York region—exemplified by long lines of vehicles waiting to use trans-Hudson ferries from Bergen and northern Manhattan—indicated to Ammann that there was a real need for a bridge located well north of congested mid-Manhattan. Therefore Ammann was ready to throw his considerable energies into the dual task of working out the detailed design requirements needed to show that such a bridge was technically feasible, and helping to create the public support needed before the great span could be approved and constructed.

For his part, Silzer could see the economic advantages to New Jersey that would flow from improved transportation between New York City and the North Jersey suburban areas, and he could see the advantage to his own political prospects that might follow if the great bridge, with its stimulus to commerce across the northern part of the state, were commenced during his term in office. However, Silzer was a Democrat, and the area of his state that would be most directly affected by a new bridge at Ammann's preferred location was Bergen County, a major Republican stronghold. Silzer and his party were not much loved in that northern suburban area, nor in the state legislature, which was also controlled by the Republicans. If Silzer hitched his political star in a

public and sustained way to a campaign to build a great Hudson bridge, *neither* would be likely to benefit. It would be better for Silzer to leave the visible organizing efforts to local interests in North Jersey and New York, which would probably be ready to campaign vigorously once Ammann had demonstrated the engineering and economic feasibility of the great design.²⁵

During the next two years the campaign went forward, with Ammann frequently spending his days in the political trenches, while at night he was bent over engineering drawings and calculations.²⁶ Silzer was absorbed largely in other policy issues, accompanied by recurring political battles with an unfriendly state legislature; but he provided constant encouragement to Ammann and occasional guidance on political strategies. At several important points he also intervened directly to promote Ammann's interests, which he made essentially his own. Before describing the nature of that alliance and Ammann's activities in more detail, I should say a little more about related developments in the years just prior to and during the winter of 1922-23.

Two engineering mentalities. The divisions and conflicts between Ammann and Gustav Lindenthal—Ammann's mentor, benefactor, and boss for many years—are crucial to the story of the George Washington Bridge. And they illustrate two very different relationships between "politics and the engineering mind."

Both Lindenthal and Ammann were civil engineers on a grand scale—bridge-builders who came from Europe to the United States because the young nation had the vast expanse, the wide rivers and deep ravines, that could provide great challenges to engineering designs and construction skill for years to come. Moreover, America had the commercial vitality and urge for "efficiency" in transport that would require that great bridges be cast across the East River, the Hudson, the Mississippi and other waterways; and she had the wealth that would allow resources—great amounts of manpower and matériel—to be gathered and orchestrated and used according to the designs of great engineers. Also, more generally, by the late nineteenth century the nation which had built the Erie Canal and the transcontinental railway seemed imbued with a philosophy about planning and building that fit the hopes and aspirations of these two engineers and their compatriots. The planner Daniel Burnham expressed the basic American value that underlay the great projects and that attracted Lindenthal and Ammann from their home countries:

Make no little plans; they have no magic to stir men's blood . . . Make big plans; aim high in hope and work, remembering that a noble logical diagram once recorded will never die . . . Remember that our sons and grandsons are going to do things that would stagger us. Let your watchword be order and your beacon beauty.²⁷

Lindenthal got here first. Born in Austria in 1850, Lindenthal studied engineering in Europe and crossed the Atlantic in 1874. After working

for several years in Pittsburgh, he came to New York and drew up his first plan for a bridge across the Hudson in 1888. The span would rise on the Jersey shore at Hoboken, land at 23rd Street in Manhattan, and carry trains over the river on ten railroad tracks.²⁸ The Pennsylvania Railroad, which had to transfer its thousands of rail passengers each day to ferries crossing the Hudson, was strongly interested; but the project was delayed as the Pennsylvania tried to work out a joint plan with other rail lines that also deposited their Manhattan-bound passengers at ferry terminals on the Jersey shore.

Meanwhile, Lindenthal was appointed bridge commissioner for New York City in 1902, where he completed the Williamsburg Bridge and planned the Manhattan and the Queensboro bridges (all three spanning the East River, from Manhattan to Brooklyn or Queens). He found working in the political environment of New York City to be personally and professionally frustrating, and in 1904, after a series of conflicts with city officials on engineering and esthetic issues, he resigned.²⁹ Thereafter Lindenthal devoted his energies mainly to privately sponsored enterprises. His most important project after 1903 was the Hell Gate Bridge, commissioned by the Pennsylvania Railroad, which he began designing in 1907 and completed in 1917. It was the largest single-span arch bridge in the world.³⁰

With the Hell Gate project completed, Lindenthal turned his attention once again to the great bridge across the Hudson. Now he moved it uptown, to 57th Street; and, noting the increasing importance of automobiles and trucks, he added twenty lanes for vehicular traffic. The entire structure would cost \$180 million, Lindenthal estimated, but he was certain that private capital could be raised to meet this total, and that the Hudson bridge would be a profitable undertaking—as well as an immense benefit to North Jersey and New York.

As Lindenthal prepared to develop the designs needed for the 57th Street bridge, and to begin a campaign to raise the necessary money and political support,³¹ he turned to Ammann for assistance. As noted earlier in this essay, Ammann had been one of his top aides on the Hell Gate during the years 1912-17; and during the years 1917-20, Ammann had been manager of the Such Clay Pottery Company, working under the board of directors—which included both Lindenthal and George Silzer.

In 1920 Ammann rejoined Lindenthal in New York, becoming his principal assistant at the North River Bridge Company—the corporate vehicle, created by Lindenthal, through which he hoped to obtain funding for the 57th Street span as a private bridge, and the organization which would build the huge structure. For two years, Ammann worked loyally and energetically on engineering issues associated with the plan. At first, he worked with considerable enthusiasm, judging from his report home:

The new project brings me great satisfaction, it is a great noble structure, and . . . the concept and modeling of the project demand intense attention and work . . . It will be possible for one-half million passen-

gers and 12,000 vehicles and 4,000 tons of freight to pass over it per hour . . . The towers will be as high as the tallest skyscraper in New York.³²

During these two years, however, Lindenthal's plan received a series of debilitating blows: influential civic and business interests announced their opposition to a bridge at 57th Street, fearing that it would make traffic congestion in the midtown area intolerable; the bistate Port of New York Authority rejected it for the same reasons, and was pressing ahead with an alternative plan, involving rail tunnels under the Hudson and under New York Bay; and the major railroads and other potential investors refused to invest the millions needed to make the project a reality. By the fall of 1922, Lindenthal's financial situation was very rocky, and his company could only afford to pay Ammann part of his monthly wages.

At this point, the close alliance between the two men began to sunder; and it soon became clear that their underlying values and worldviews were quite different. Both men shared the enthusiasm for the great project that Lindenthal had created in his mind and on paper. But to Lindenthal, there was no alternative; neither tunnels under the Hudson, nor bridges farther upriver, nor a bridge limited to motor vehicles (and therefore much cheaper than a bridge strengthened to carry railroad trains)—none of these could possibly meet the vast need for improved transportation between Manhattan and the western regions. Moreover, as New York City's bridge commissioner, Lindenthal had had a taste of engineering work in a highly political environment, and he was not inclined to rely on that uncertain and conflict-filled route. The rational working environment, the corporate sponsorship, the freedom to design, and the international acclaim accompanying his Hell Gate project had demonstrated the right way to do it. In Lindenthal's mind, insulation and professional integrity were crucial, and the engineer could be relied upon to work out the best way to meet the other goals and constraints within which all great engineering projects must be designed and carried out—concerns with economy and with the esthetic quality of the project itself, and an understanding of how the project would fit into the broader patterns of economic and social relationships within the region.³³

Ammann's perspective was different. Lindenthal's great bridge, in its original dimensions, would be wonderful. To Ammann, however, the substantive arguments and the political strength of the opponents deserved the same steely-eyed analysis that a good engineer devoted to understanding the stresses on bridge cables and the stability of the ground under proposed bridge towers. If influential opponents thought the bridge too large, or badly located, Ammann could draw on his engineering experience and perhaps find ways to modify the plan, rather than let it go down to defeat. And as to the financing problem, private funding would be welcomed—since that would reduce the prospect that the project would become mired in the conflicts of politics. But if private investors could not be attracted, then a great bridge

sponsored by government was better than no Hudson crossing at all—or the awful alternative (to a bridge engineer) of tunnels in the mud, under the Hudson.³⁴

On the subordinate issues of location, type of bridge, sponsorship and financing, Ammann was a pragmatist. His main goal was to span the Hudson. Of course he had the psychological advantage, in thinking about alternatives, that the original design was not *his* plan; Lindenthal had been working on a railroad bridge across the Hudson to the middle of Manhattan since 1888—for more than thirty years. Ammann was a mere forty-two, nearly thirty years younger than his boss; possibly youth permitted greater flexibility.

Perhaps most important, however, Ammann—in contrast to Lindenthal—could encompass political obstacles, and strategies to overcome them, within the analytic framework of his engineering mind. Any good engineer knew, for example, that you had to design your bridge in relation to the character of the terrain where the towers would sit. Therefore, if preliminary studies suggested the tower footing would be solid rock and closer exploration revealed softer ground, adjustments and even major redesigns would be necessary; and sometimes long weeks and months of arduous work would be needed to solve the problem and ensure that the tower and the bridge would hold. Moreover, bridge engineering was not an armchair activity; you had to go into the field continuously, marshal and motivate your workers, and modify your abstract designs as the land and the weather and the impact of human mischance required.

So too, close exploration of the *political* terrain associated with any large project was essential; and this exploration might require meeting with local politicians and business people and interested citizens, in towns and county courthouses across the region, in order to work through the proper combination of engineering, esthetic and political designs.

Or does this stretch the concept of an “engineering mind” too far? Perhaps Ammann can simply be viewed as a first-class engineer who, for a brief time and when it was absolutely necessary, showed that he also had the separate talents of the first-class political entrepreneur. My guess is that the talents were more closely joined, at least in this taciturn but passionate Swiss-American.

When Ammann pondered the problems that confronted Lindenthal and the 57th Street bridge in the fall of 1922, he concluded that the best way to meet these difficulties was to reduce the size and cost of the proposed bridge. If the bridge were limited to motor vehicles and light rail transit, the heavy, expensive structure needed for freight trains could be replaced by a lighter span, at much lower cost, and private investors might well be attracted to invest in a moderate-cost toll bridge for vehicles. Also, if influential citizens opposed a bridge at 57th Street, why not construct a bridge farther north, away from the congested midtown area? Once that crossing proved successful, a modest bridge at 57th Street might also receive wide support.

During the fall and winter of 1922, Ammann urged Lindenthal to

reduce the size of the 57th Street project, and to consider shifting his short-term goal to an uptown bridge for autos, trucks and light transit. But Lindenthal thought a crossing uptown would be too far north to attract much vehicular traffic; also, railroads as well as motor vehicles needed better access to New York, and a railroad bridge would bring freight and passengers to mid-Manhattan with marvelous efficiency. To Lindenthal, the 57th Street project was the only satisfactory way to solve the region's major freight and passenger problem of integrating New York City's vast economic strength and its people with the economies of New Jersey and the rest of the continent.

As 1922 drew to a close, it seemed evident to Ammann that he would have to take some initiative on his own. His diaries and other writings during these months do not provide clear evidence that he was deeply distressed, and his letters to his relatives are guarded. But a year later, Ammann expressed his feelings about Lindenthal, the 57th Street bridge, and the possibilities for a brighter future, in a frank letter to his mother:

In order for you to understand my situation for many months, in fact for a whole year, I will no longer conceal from you that the giant project for which I have been sacrificing time and money for the past three years, today lies in ruins. In vain, I as well as others have been fighting against the unlimited ambition of a genius who is obsessed with illusions of grandeur. He has the power in his hands and refuses to bring moderation into his gigantic plans. Instead, his illusions lead him to enlarge his plans more and more, until he has reached the unheard of sum of half a billion dollars—an impossibility even in America.

However, I have gained a rich experience and have decided to build anew on the ruins with fresh hope and courage—and, at that, on my own initiative and with my own plans, on a more moderate scale. It is a hard battle³⁵

But if Ammann felt compelled to strike out on a new course at the end of 1922, perhaps breaking free of Lindenthal, he would need to forge a new alliance which could help him achieve his goal. And this brought him to George S. Silzer.

Silzer's aspirations. In November 1922, George Silzer, Democrat from Middlesex County, and a former state senator, was elected governor of New Jersey. He would serve as the state's chief executive from January 1923 until January 1926, with the state legislature controlled by the Republicans throughout those years.

Silzer was an activist in his philosophy of government, a Wilson Democrat. Indeed Silzer had been one of Woodrow Wilson's chief aides in the legislature when Wilson was governor in 1911-13.³⁶ One of Silzer's strongest interests before and during his years as governor was the improvement of highway transportation; he viewed this goal as crucial to the state's economic growth. Thus he supported extensive road-building programs, as well as bridges which would connect his

own Middlesex County to nearby Staten Island.³⁷ Consistent with his reputation as a Wilson Democrat, Silzer denounced the log-rolling methods and inefficiencies of the existing county and state highway agencies, he created a new state highway body to devise an efficient road system, and he urged "scientific planning" in all areas of state government.

The possibility of opening the large rural areas of northeast New Jersey to rapid economic development was attractive to Silzer; and a crucial step in achieving this goal would be improved access from the northern counties to New York City. So the new governor might be in a receptive mood if Othmar Ammann could bring him a feasible plan to dissolve the Hudson barrier.

The alliance. Silzer's victory in the 1922 election provided Ammann with an opportunity to reach out for assistance, as he tried to extricate himself from Lindenthal's fixation. Ammann, Lindenthal, and Silzer were already well acquainted through their mutual interest in the Such Clay Pottery Company.³⁸ Moreover, it seems clear that Silzer and Lindenthal had discussed the 57th Street bridge.³⁹

At some point in the weeks before George Silzer took office in mid-January, Ammann talked with him about the need for a Hudson River crossing, about the economic and political problems that surrounded the Lindenthal bridge, and about the advantages of a bridge farther north, joining vast and rural Bergen County to the urbanized eastern shore. The bridge could be limited to motor vehicles and light trolleys, which meant that its cost would be far less than the Lindenthal colossus. Ammann had studied various sites, and he preferred a bridge that swept from the Palisades cliffs, in the town of Fort Lee, across the river to 179th Street in Manhattan.⁴⁰

We have no direct account of the views which Silzer expressed at this meeting, but later evidence (discussed below) clearly indicates that he was enthusiastic about Ammann's proposed bridge, and that he hoped it might be financed by private capital. Moreover, Silzer was wary of the alternative "low-cost" way to overcome the Hudson barrier—a series of tunnels under the Hudson.⁴¹

But if a Fort Lee bridge was a promising idea, what role should Silzer take in advancing the cause? Bergen County was Republican territory, and Democrat Silzer apparently felt it would be unwise to associate his name too closely with a crossing that would need active Republican support if it were to be approved by the state legislature; if it were viewed as "Silzer's bridge," Ammann's proposal might fail. However, Silzer could offer guidance on how Ammann and others interested in the Fort Lee bridge might gain public support; he could contact financial people confidentially, in the hope that private capital might be attracted to the scheme; and he could approach the recently created Port of New York Authority to ask if it would endorse such a bridge as consistent with its general goals.⁴²

The major burden, then, fell to Ammann, and as the new year opened he faced a difficult task. He would need to develop local interest

in his Fort Lee bridge—within the communities of Bergen County and nearby Passaic County, and across the river, in northern Manhattan and the Bronx, and perhaps farther north in Westchester and southwestern Connecticut. Indeed, he would need to persuade local business leaders and elected officials not only that his bridge was an interesting idea, but that it was the *best solution* for the near future, in that it was better for the communities and for the economic growth of the region than the alternatives which were already being actively discussed. Two of these alternatives—underwater tunnels at 110th Street and 125th Street—also promised economic benefits for Bergen and Passaic counties, and for New York City; moreover, a private association had already been created to press for the 125th Street tunnel, and editors at Bergen County's major daily newspaper, *The Bergen Record*, were supporting that plan.

Then there was the 57th Street bridge. Ammann had not yet broken with Lindenthal; and he still hoped the great man might be persuaded to join forces with Ammann, perhaps take the leading role, and attract the private capital and political support needed for the Fort Lee plan. But if Lindenthal stood firm, the prominent civic leaders and financial men who had joined his board of directors would probably stand with him. While that combined force might never produce a real bridge at 57th Street, its opposition might doom Ammann's uptown scheme.

For Ammann, the answer to that situation came in three parts: He would need to sketch out a bridge design that was so dramatic, so arresting, that it would claim the attention and approval of the attentive publics of northern New Jersey and New York. And he would need to work out the probable cost for the bridge, so that it would strike a chord as financially feasible, in contrast to Lindenthal's gigantic scheme. Then he would need to take this design, and his ideas on how the bridge would benefit the region, directly to the public officials and local groups on both sides of the Hudson.

The first two steps were, for Ammann, comparatively easy. Trained in the great Swiss tradition, and apprenticed with Lindenthal, Ammann's developed engineering skills were a match for his considerable esthetic instincts. He had had many years of experience, with Lindenthal and earlier, in working out the detailed costs associated with bridges large and small.⁴³ In addition, Ammann's training and experience had led him to conclude that bridges of longer span might carry sufficient deadweight to make extensive vertical trusses unnecessary. Ammann's own careful analysis supported this intuition, and he was then able to design a bridge which was strikingly light in appearance, and which carried a cost estimate proportionately lower than other long-span bridges.⁴⁴

The third step, which involved knocking on doors and trying to convince skeptical or preoccupied local officials, newspaper reporters and shopkeepers, was a different story. Ammann had confidence in his professional abilities, and in the value of a great bridge at Fort Lee. But he was a modest man, and one who did not talk easily of his interests and his passions, especially when those interests would be linked to

advancing his own career.⁴⁵ However, if he were to make any headway in developing public support for a bridge between Fort Lee and 179th Street, Ammann would have to break through his natural reticence and advocate action on his plan, until a civic organization could be formed to take the leading role in this public relations effort.

This third step would also mean that Ammann would have to break formally with Lindenthal, unless he could convince Lindenthal to join him, so that Ammann could campaign openly for the uptown bridge. In the short run, this break would almost certainly mean that Ammann would have to join the ranks of the unemployed: to carry out the engineering studies for the Fort Lee crossing, and to campaign for approval, would absorb almost all his waking hours. There would be no time available to work on other projects with another engineering firm.

Finally, before the campaign could be successful, he and Governor Silzer would have to find an operating organization which could take Ammann's designs, raise the funds needed, and actually build the bridge. If Lindenthal were to change his views, the great man's North River Bridge Company could do the job. Otherwise, Ammann and Silzer would need to explore ways of creating a separate private corporation, or perhaps consider what kind of governmental agency might undertake the complex project.

Into the political arena. In the first months of 1923, Ammann and the governor began their joint campaign. On 9 January Ammann reported to Silzer that he had met with the governing board of Bergen County, and that their initial reaction was to support "the bridge at Fort Lee." They also agreed, Ammann said, with Silzer's view that no new vehicular tunnels under the Hudson should be constructed until the Holland Tunnel was in operation.⁴⁶

A week later, Silzer was sworn in as governor, and in his inaugural address, he referred to the advantages of northern New Jersey: "It is especially attractive to those who find the congestion of New York City unbearable, and who seek to live in a section at once high, healthy and accessible." But North Jersey was not really accessible, Silzer pointed out, especially to motor vehicles, which had to wait for hours to cross the Hudson by ferry. It was now time, Silzer argued, to give close consideration to building a bridge across the Hudson, a bridge "of ample size to care for vehicular and passenger travel, and for railroad terminal service."⁴⁷

During the spring of 1923, Ammann met with several local groups in North Jersey, described his idea for a wide span at Fort Lee, and received some encouragement, but no one offered to take on the major task of organizing support across the counties that would benefit from the bridge. Meanwhile, Silzer contacted Dwight Morrow, a Wall Street expert in finance, for an evaluation of the prospects that Lindenthal's bridge could be built with private capital; Morrow's response on 2 March was decidedly pessimistic. Ammann, noting that opposition by Manhattan interests had not abated, and that the large cost of the 57th Street bridge was a major obstacle, urged Lindenthal to cut down the

size of the bridge and move it northward. But Lindenthal was adamant, and by the end of March, Ammann had left his firm.⁴⁸

During the summer and fall of 1923, Ammann made little progress in gaining support for his own bridge. The possibility of a vehicular tunnel at 125th Street, financed by investors, appeared to be of greater interest in the area of Bergen County, and a private association had begun to raise funds for that enterprise which would almost certainly kill any prospects for a Fort Lee bridge, at least in the near term. Other investors began to look at 110th Street, and at 40th Street, as possible sites for private undertakings. But the tunnel investors, and their supporters in the New Jersey legislature, soon ran into double-barreled opposition: the governor of New York, Al Smith, said that he was strongly opposed to *any* private tunnels or bridges across the Hudson River; and the recently created Port of New York Authority objected, noting that it had developed a set of tunnel projects too, and arguing that all river crossings should be constructed as part of a comprehensive plan for transportation in the bistate region.⁴⁹

Helping the Port Authority to redefine its goals. In November 1923, the Port Authority announced that it would hold a public hearing on "the proposed additional vehicular tunnels." Now Governor Silzer and his bridge-building adviser saw an opportunity to enlist the Port Authority for service in their own campaign. That agency, which had been created in 1921 primarily to help solve a freight railroad problem, had studied Lindenthal's railroad-bridge plan in 1921-22 and rejected it as infeasible. As a result, the Port Authority commissioners and staff thought in terms of *tunnels*, which could be used to bring the rail lines from New Jersey and the west under the Hudson River and into Manhattan and Brooklyn. But bridges as well as tunnels were (at least in the abstract) in their domain; and though they thought mainly about railroads, they also had some interest in freight movement by truck, and trucks could travel on bridges as well as in tunnels.

On 20 November Silzer met with Julian Gregory, an influential member of the Port Authority board of commissioners, and said that he thought it unwise for the Port Authority's hearing to be limited to tunnels. That restriction, Silzer argued, "might be construed as limiting him [the governor], and the Port Authority, exclusively to tunnels," whereas he was "open-minded to any bridge proposition that might come forward." Indeed, the governor told Gregory, "he understood there was a strong sentiment on the part of some in favor of a bridge across the Hudson River." At the board meeting the next day, Gregory summarized Silzer's views and suggested that the December hearing be expanded to include the question of bridges across the Hudson as well as tunnels, and the Port Authority board agreed.⁵⁰

The Port Authority's hearing was scheduled for 5 December, and during the intervening weeks, Ammann worked furiously to strengthen the analytical case for a bridge at Fort Lee. His calculations indicated that a long-span bridge at that location would cost no more than \$30 million in contrast to more than \$500 million for the Lindenthal project.

Moreover, the immediate cost could be reduced to \$25 million, if the electric railway tracks he had included in the design were deferred until later.

Based on existing ferry traffic and studies done by the recently formed Committee on the Regional Plan, Ammann then estimated that three million vehicles would use the Fort Lee bridge in the first year. This would be enough to meet all annual charges, if a reasonable toll charge were levied. Assuming continued increases ("in a few years the traffic should treble," he told Silzer), capital costs could also be paid off, and the bridge would in time be self-supporting.

He then suggested to Silzer that they talk with "some of the prominent bankers" to see if private investors might be willing to underwrite such a bridge, and Silzer sent Ammann to talk with Dwight Morrow of the J. P. Morgan firm. Meeting in early December, Morrow and Ammann agreed that the bridge might well be self-supporting, but Morrow doubted that adequate private capital could be attracted; both wrote to Silzer to recommend that *public* funds be used, either state moneys, or bonds floated by the Port of New York Authority.⁵¹

The Port Authority's public hearing strengthened Ammann's position. Most speakers agreed that more vehicular crossings of the Hudson were needed; and while there was support for new tunnels below 57th Street, the prestigious Committee on the Regional Plan and other speakers argued for a bridge farther north. The crucial question was, *who* would take responsibility for such a bridge, and here Ammann's own views were clear. "The most practicable way" to proceed, he wrote to Silzer the day after the hearing, would be to have the Port Authority take on the challenge. This would also allow that agency, which so far had no construction or operating projects at all, to "test its working ability." Therefore, he urged Silzer to place Ammann's Fort Lee plan "at the earliest possible moment before the Port Authority."

A few days later, the two men talked by telephone, and Ammann suggested that the Port Authority should be asked to make definitive studies not only of the Fort Lee plan but also of other interstate crossings that had been proposed—for example, bridges from Perth Amboy and Bayonne to Staten Island and a scaled-down version of the 57th Street span. If the Port Authority were to conduct such studies, Ammann noted, it would need an expert bridge engineer, and "I shall be frank in stating that I should be glad to occupy such a position."⁵²

Ammann and Silzer had agreed that Ammann would put together an extensive report on the Fort Lee project, which would cover technical engineering issues, traffic projections, financing questions, and probable impact of the bridge on regional development. On 17 December Ammann's twenty-two page analysis reached Silzer's desk. That afternoon the governor forwarded the report to the Port Authority, with a letter from Ammann which concluded that the Fort Lee bridge could be paid for in twenty years. Silzer also released a public statement on his actions, noting that the Ammann plan was consistent with his own 1923 inaugural statement on the need for more Hudson crossings, and suggesting that the Port Authority could finance the Fort Lee bridge by

issuing tax-exempt bonds, with "ample security" to be provided by tolls on the bridge.

The governor's efforts for the day had not yet ended. He also wrote a private letter to Commissioner Julian Gregory at the Port Authority, suggesting that, in carrying out its studies of the various bridge plans, the Port Authority might want to secure the services of "such a man as Mr. Ammann, who is thoroughly skilled in this kind of work."⁵³ Gregory responded quickly, expressing his personal preference for bridging the Hudson at some point north of 125th Street. He also noted that Port Authority officials were now considering whether they should continue to focus their energies so strongly on moving freight by rail or whether there might be a large role for trucks, in tunnels and over bridges. The Port Authority's staff then reviewed Ammann's report and on 21 December the commissioners reported to the two governors that they would carry out a detailed study of the Fort Lee plan.⁵⁴ Perhaps the Port Authority would now join Ammann in embracing the new automotive age!⁵⁵

Ammann's efforts were beginning to bear fruit. But the events thus far brought a measure of pain as well as pleasure. Most hurtful was the behavior of Lindenthal. Silzer had sent him a personal copy of Ammann's detailed report on the Fort Lee plan, and on 20 December the great engineer responded with a letter condemning his former assistant, and alleging that Ammann had stolen Lindenthal's own ideas:

Mr. A. had been my trusted assistant and friend for ten years, trained up in my office and acquainted with all my papers and methods. But I know his limitations. He never was necessary or indispensable [sic] to me Now it appears that A. used his position of trust, the knowledge acquired in my service and the data and records in my office, to compete with me in plans for a bridge over the Hudson and to discredit my work on which I had employed him. He does not seem to see that his action is unethical and dishonorable⁵⁶

In addition, since the Port Authority now agreed to make a close study of Ammann's proposal, he waited for a call to join the Port Authority's staff and take part in that study, but in vain.

On the campaign trail. Christmas came, and went, and Ammann was still an unemployed engineer—unemployed, but with much to do. The Port Authority would study his Fort Lee plan and would, he hoped, find that his engineering design and his analysis of costs, traffic flows, and financing were sound. But Ammann knew that the bistate agency, which had been created to solve railroad problems, and staffed by railway engineers and statisticians, would be far more likely to take the next step and agree to *build* the great bridge if it found a ground swell of popular support for Ammann's 3,000-foot span. Moreover, legislative approval and probably some initial state funding would be required to get the project underway; here again, Trenton and Albany would be much more willing to commit their funds and the Port Authority's

efforts to this project, if local groups on both sides of the Hudson demanded action, for a bridge they felt was sorely needed.

So Ammann once again threw his energies into the effort to organize public support for the Fort Lee enterprise. Between late December 1923 and April 1924 he held dozens of meetings with chambers of commerce and other groups in Bergen and nearby Passaic and Morris counties in New Jersey; he wrote to and visited similar associations in the Bronx, Harlem, Washington Heights, Westchester and Yonkers in New York State; and he traveled into Connecticut and explained his arguments for the Fort Lee bridge before the civil engineering society of that state.

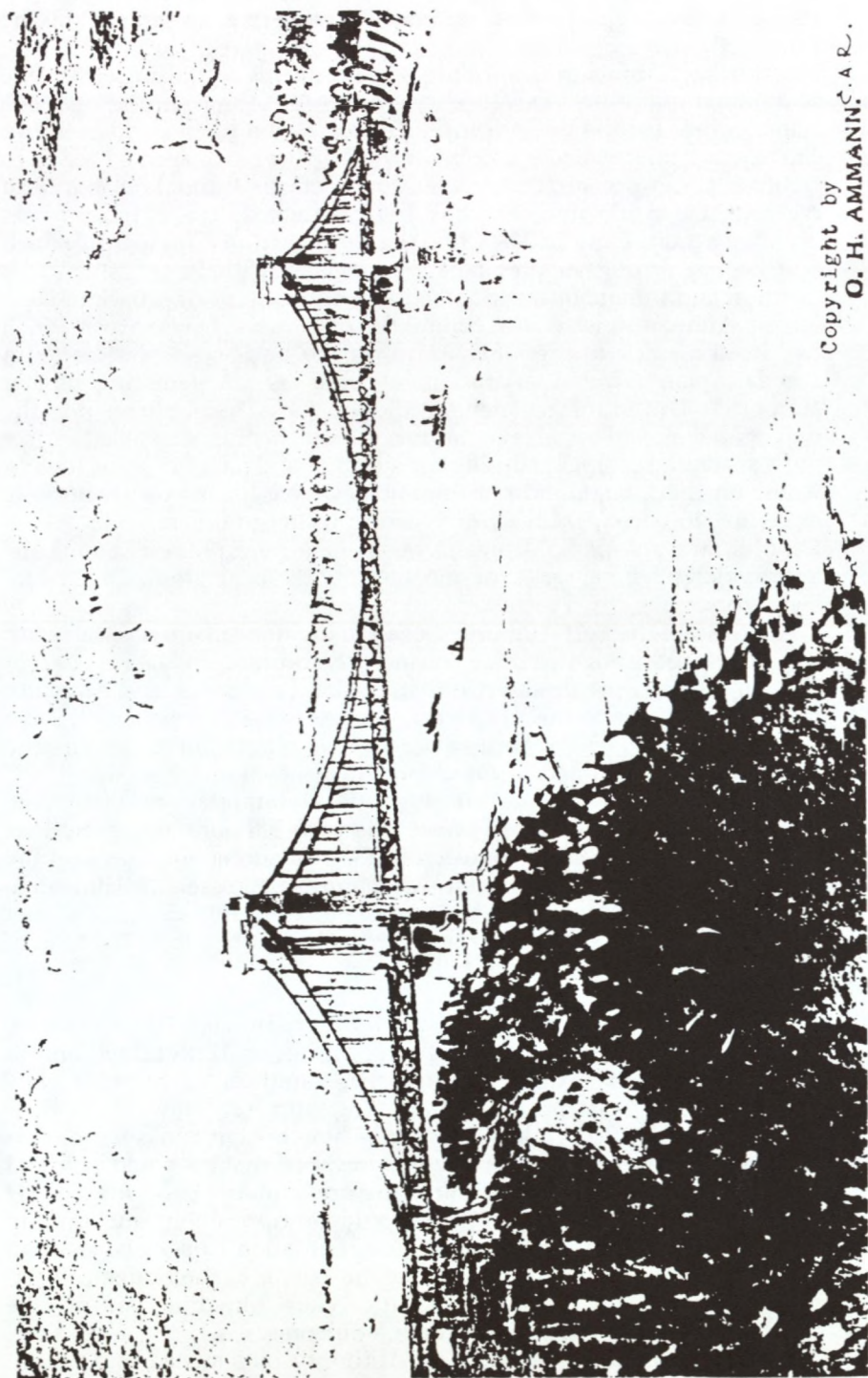
By December 1923 he had developed working sketches of the proposed bridge, with its thin, graceful roadway, and its great towers, which would be vast metal structures, sheathed in monumental stone. And now, when he spoke, Ammann could show his audiences some visual hint of his own deep motivations, which lay beyond engineering technique, beyond matters of practicality. It was true that the bridge would be a major engineering achievement; moreover, it would have a great impact on the efficiency of travel across a wide region, and so it might provide real benefits for residential choice, and recreation, and economic growth. But a vast structure like this could also be—*should* also be—a work of art, and here was a large part of Ammann's incentive as he worked, without pay, to design and encourage the building of the Fort Lee bridge. Years before, reflecting on the Hell Gate Bridge, a monument to Lindenthal's own esthetic imagination and engineering skill, Ammann had argued that

a great bridge in a great city, although primarily utilitarian in its purpose, should nevertheless be a work of art to which Science lends its aid. An elaborate stress sheet, worked out on a purely economic and scientific basis, does not make a great bridge. It is only with a broad sense for beauty and harmony, coupled with wide experience in the scientific field, that a monumental bridge can be created.⁵⁷

Now *he* might have the opportunity to create such a bridge, if the public and the state legislatures would approve it and if some other engineer, of "greater reputation," were not chosen!

With increasing evidence of local support for the project, Ammann met with a state senator from Bergen County, William Mackey, and found him ready to press for legislation authorizing the Port Authority to construct a bridge at Fort Lee and smaller spans between Staten Island and New Jersey. During the spring of 1924, the New Jersey legislature took the first step, endorsing Port Authority study and construction of two Staten Island bridges, and New York State approved similar legislation. In late May, Governor Silzer sent a brief note to the Port Authority's general counsel, Julius Henry Cohen:

It has just occurred to me, in connection with the two bridges over Staten Island and your other bridge work, that the Port Authority ought to avail itself of the services of Mr. O. H. Ammann . . . I understand that just at the moment he is available . . .⁵⁸



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Ammann's sketch of his proposed bridge at Fort Lee (about December 1923). Courtesy of Margot Ammann Durrer.

He was indeed available and had been for more than a year. But still the Port Authority did not call.

Although Ammann was willing to continue his organizing efforts, he had hoped that the various local groups might form a citizens' association to press for the bridge project. In April, the Englewood Board of Trade and other business groups in the Fort Lee area seemed ready to create such an organization to coordinate efforts throughout northern New Jersey. Ammann then took his case across the river and was gratified when, early in May, the Harlem Board of Commerce, which had been a strong supporter of a tunnel at 125th Street, shifted its position and unanimously endorsed the Ammann bridge. Back in New Jersey, Ammann met with a committee of North Jersey mayors which had been formed to press for action on the bridge, and he drafted a strategic plan which the committee could use in gathering further support.⁵⁹ Unfortunately, neither the business associations nor the mayors developed a viable organization, and neither was able to carry out a sustained campaign during the summer and fall of 1924. Silzer told Ammann that he still did not think it desirable for him, a Democratic governor, to become actively involved in trying to organize support in Republican territory. So Ammann once again found himself taking the lead, engaged in a series of meetings with local groups and state legislators.⁶⁰

By the fall, the Port Authority began to organize in order to carry out the authorized bridge studies. During the autumn, the agency sought bids for design work on the two Staten Island crossings, and Ammann responded. As he wrote to Governor Silzer on 2 November: "I have submitted to the Port Authority a bid for the preparation of plans for the Arthur Kill Bridges and am now anxiously awaiting their decision." While he waited, his political efforts produced important results: In late January 1925 the New Jersey senate passed a bill authorizing the Port Authority to construct a bridge across the Hudson at Fort Lee, and the state assembly soon followed suit. Ammann then crossed the Hudson to New York, where companion legislation had been introduced, and met with local and state officials, urging favorable action; and in late March, New York State approved the bill.⁶¹

From political entrepreneur to bridge builder. The Port Authority now moved forward to build a bridge from Fort Lee to 179th Street, and to construct the two spans which had been authorized between New Jersey and Staten Island. But would Ammann have any role in their design and construction? In a letter on 27 March Ammann conveyed his concern to the governor. He expressed his hope that he would be asked to "take charge of the working out of the preliminary plans" for the Fort Lee bridge, but he thought there would be opposition, and that an engineer "with long practice and wide reputation" might be selected instead. Reviewing his many activities on behalf of the bridge project, Ammann concluded that he would appreciate "anything you may be able to do to help" achieve a favorable outcome.

Two weeks later, with the Port Authority bills signed in Trenton,

Governor Silzer once again wrote to Julian Gregory, who was now chairman at the Port Authority. Noting that the Port Authority would soon be proceeding with the Fort Lee bridge, Silzer suggested that "you take into consideration for the doing of this work the name of O. H. Ammann" Silzer continued: "Mr. Ammann was one of the pioneers in this project, has spent two years of his time in advising the public of its advantages, has drawn freely upon his own ability as engineer, and in every way has probably done more than any other one man to bring this bridge into being."⁶² Silzer also sent a copy of this letter to Chief Engineer William Drinker at the Port Authority; and he sent a copy to Ammann, with a note: "I have it in the back of my mind somewhere that Mr. Drinker had an impression that you were an able assistant, but that you had not had the experience to independently undertake work of this kind." The governor suggested Ammann talk with Drinker about this impression.

A few days later, Ammann met with Drinker. He thought it was an "encouraging interview," though it contained disappointing news: Drinker told him that the Port Authority had concluded that their first projects—the two Staten Island bridges—should be awarded to "an engineer of long established reputation."⁶³ The job went to an independent engineering firm on an outside contract.

However, in its short and thus far uneventful life, the Port Authority had already begun to develop a few traditions. One of these was a preference for hiring its own engineers and other experts as regular members of the staff, rather than relying heavily on outside contractors. By late April, Drinker (himself a railroad man) had concluded that the Port Authority ought to hire an engineer with bridge-building experience. Chairman Gregory subsequently wrote to Governor Silzer that Drinker had recommended Othmar Ammann for the post.

The commissioners soon concurred with Drinker's recommendation, and on 3 July Ammann sent a letter to Silzer noting that he had assumed his duties as "bridge engineer on the Port Authority staff" on 1 July and thanking the governor for his "goodwill and efforts on my behalf." The long and active campaign ended on a restrained note, with the governor's final letter to an engineer who had at last landed a job, and who would now have to show that he had the capacity not only to fight for but also to build a great bridge.

July 15, 1925.

My dear Mr. Ammann:

I have your letter of July 3d, and am, as you know, pleased at your appointment, because I am sure that you will be of much service to the two states.

Yours very truly,
s/George S. Silzer
Governor

Mr. O. H. Ammann
Boonton, N.J.

Ammann's Engineering Triumphs and the Dying of Political Light

Gongs in white surplices, beshrouded wails,
Far strum of fog horns . . . signals dispersed in veils.
(Hart Crane, "Harbor Dawn")

There the story ends, and Ammann is lost from sight. Not, of course, the story of Othmar Ammann, engineer and artist. This tale of Ammann had yet forty years to run and would be filled with activity and achievement. But the story of Ammann's political efforts, and their important role in permitting him to exercise his engineering genius—that story was at an end in 1925; and within a few years it was erased from the historical record.

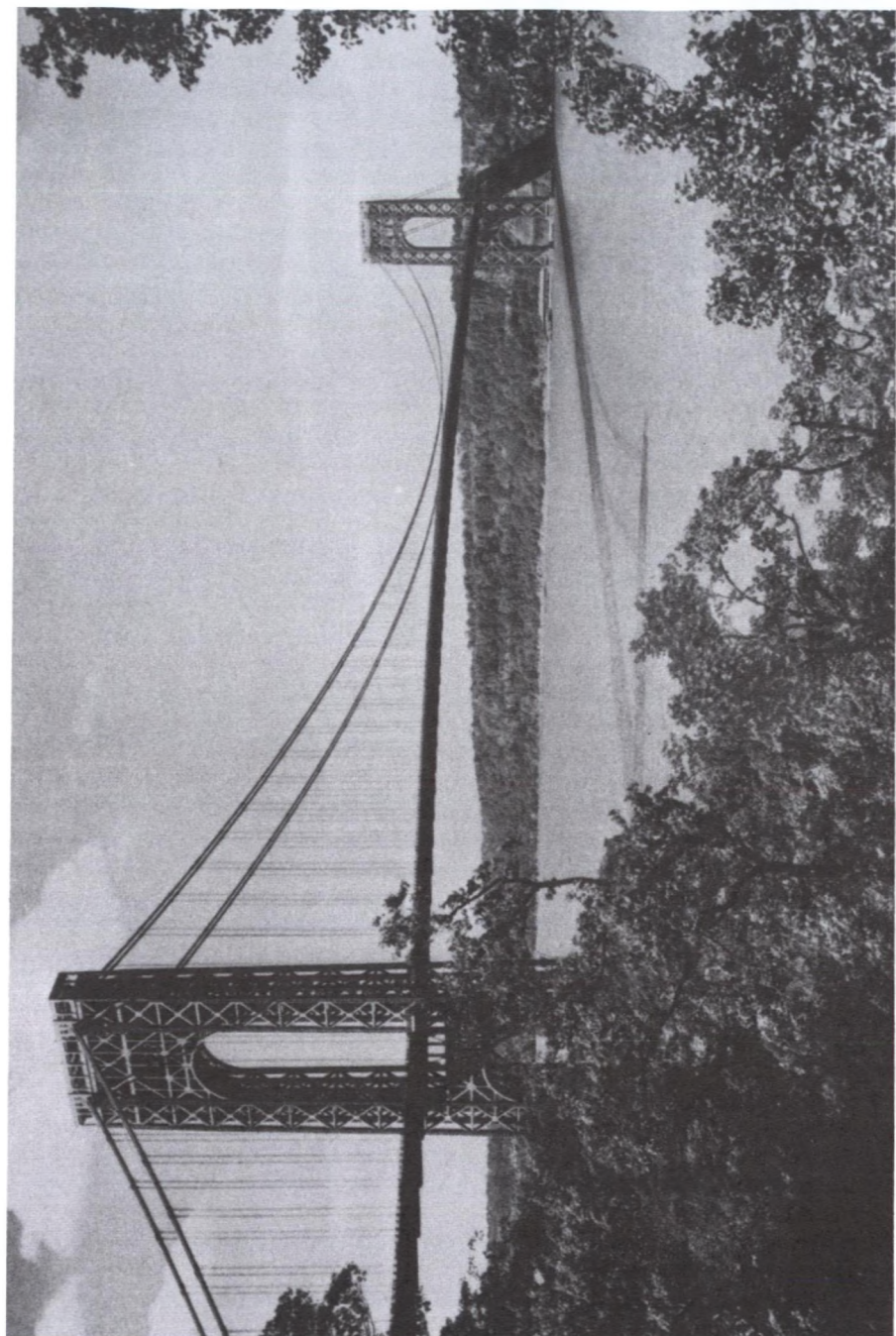
The triumphs. With the Port Authority now committed to his dream, the engineer poured his energies into the tasks before him, completing the detailed design for the Hudson River Bridge, organizing the staff and consultants to carry out that large effort, and at the same time supervising the construction of the two smaller Staten Island bridges authorized in 1924. In 1925 the legislatures authorized a third Staten Island span, from Bayonne, New Jersey, and so Ammann, while building the longest suspension bridge in the world at Fort Lee, also designed what would turn out to be the longest arch bridge in the world for the Bayonne crossing. The Fort Lee span, later renamed the George Washington Bridge, was initially expected to be finished in mid-1932; but the Port Authority's political insulation, and the willingness of the agency's senior executives to allow Ammann to set his own course, permitted him to exercise his considerable organizing talents once again. The effort moved ahead with unusual speed, and the crossing was completed eight months ahead of schedule and at a cost far below the 1925 estimate. The Bayonne Bridge was also opened in 1931, ahead of schedule and below cost; and both bridges won applause from engineers and observers for their engineering and esthetic merits.⁶⁴

These efficient and spectacular achievements stamped the Port of New York Authority as a strikingly effective organization and, especially in view of the halting efforts of its rival—the joint state bridge and tunnel commissions—ended the debate on how bridges and tunnels in the New York region should be constructed and operated.⁶⁵ With the support of the governors of both states, the Port Authority absorbed the joint commissions' staff in 1931, and its lucrative project, the Holland Tunnel; and the Port Authority was then authorized to begin work on a second tunnel, to mid-Manhattan.⁶⁶ Had the Port Authority performed in a mediocre manner in these early bridge projects, it is quite possible that the bridge and tunnel commissions would have retained control of the Holland crossing; and if that had occurred, the Port Authority would have faced a very uncertain future.⁶⁷

What Ammann and his engineering team had done, therefore, was to ensure that the Port Authority would have the reputation for effective action and the strong financial base which would permit it, in the 1940s and 1950s, to reach out into new fields—into airport activities, marine



Ammann and other Port Authority staff members at the site of the George Washington Bridge in 1925; Ammann is third from the left; Chief Engineer William Drinker of the Port Authority is third from the right. Courtesy of the Port Authority of NY&NJ.



The George Washington Bridge shortly after completion, taken from the Manhattan shore. Courtesy of Port Authority of NY&NJ.

terminals, and other urban development enterprises. Meanwhile, in the 1930s, Ammann would continue his engineering achievements, supervising construction of the Lincoln Tunnel, helping to design the Golden Gate Bridge, and, working with Robert Moses, creating a series of important bridges for his Triborough Authority.

History rewritten. The story that ends in 1925 is the tale of Ammann the political entrepreneur, as his energies were absorbed in the technical and administrative activities summarized above. Since Ammann would henceforth be associated with the Port Authority's leaders and with Robert Moses, with men and women who could take the political lead (and the political heat) while Ammann toiled in his favorite garden of structural art, that ending should not be surprising. What is remarkable, however, is that the story of how Ammann got there—into his favorite garden, as a dominant structural artist and engineer—was soon lost from sight; and the story of the Fort Lee bridge and the Port Authority's change in direction was rewritten without him, or nearly so.

The fading of his political light did not occur at once. In the *New Yorker* profile in 1934, Ammann's role in the development of the great bridge is briefly described: "He prepared his blueprints and became his own advocate; he spoke before public gatherings and interviewed public officials. Eventually he convinced Governor Silzer of New Jersey that the two adjoining states should erect the bridge . . ." (p. 25). However, in that essay and in other early articles, Ammann's personality and his reputation are described in ways that must soon overshadow all else, making it difficult to imagine Ammann appealing for support among local gatherings in Teaneck and Leonia, or making his way by ferry, sketches of his bridge under his arm, to dark halls in Washington Heights and the Bronx, or draining his savings while waiting for others to act. By 1934, Ammann is "one of the immortals of bridge engineering and design, a genius . . ." What kind of a man is he? He is "quiet . . . tactful and courteous in his relationships with other men, calm in his judgments, flawless in his engineering . . ." In "contrast to the mightiness of his work, [Ammann] is quiet, mild spoken and retiring."⁶⁸

By the 1940s, Ammann's entrepreneurial role in the origin of the George Washington Bridge vanishes from sight. In *Bridges and Their Builders*, David Steinman and Sara Ruth Watson, whose goal is to tell the story of great bridges as "an epic of human vision and courage, high hopes and disappointments, heroic efforts and inspiring achievements," offer rich descriptions of the campaigns to obtain approval of the Brooklyn Bridge, the Golden Gate, and many others. But of the Fort Lee bridge they tell the reader only that Silzer advocated it in 1923, that he and Al Smith wanted the Port Authority to build it, and that "two years later" the state legislatures gave their approval.⁶⁹

A far more detailed description of the political activities leading to the approval of the George Washington span is provided in Jacob Binder's 1942 book. Binder was an active member of the Bergen County coalition that came to life in 1924-25 to press for state approval, and his



Ammann at his Port Authority desk in the 1930s. Courtesy of Port Authority of NY&NJ.

lengthy discussion conveys a sense of authenticity. In his account, however, Ammann's contribution is that of dedicated bridge designer; others do all the political work.⁷⁰

In the 1940s two other books treated Othmar Ammann and the George Washington Bridge in some detail. Both books were concerned with the political forces that shaped the creation of the Port of New York Authority and its first decades of operation, and Ammann was once again relegated to his engineering role. In his classic volume, *The Port of New York Authority*, Erwin Bard described the efforts of Al Smith to persuade the Port Authority to take on vehicular projects, and Bard indicated that the Port Authority's staff was at first not eager to add that task to its rail-improvement plans. Then, in 1924-25, the state legislatures authorized Port Authority action to construct three Staten Island bridges and a Hudson River span. At that point, negotiations with the railroads were collapsing, and within the Port Authority, Bard noted, "the center of gravity began shifting to vehicular traffic," since bridge-building "offered a chance" to show that the agency could accomplish something. So the Port Authority's staff was "reshaped to fit the needs of construction," and "Othmar H. Ammann was engaged as Bridge

Engineer." Of Ammann's background, Bard says only this: "Coming to the Port Authority with no great reputation, he became widely known as designer of its bridges and head of its Engineering Department."⁷¹

The other volume was written by Julius Henry Cohen, author of the legislation creating the Port Authority, as well as its general counsel from 1921 until his retirement in 1942. During his years with the Port Authority, Cohen kept careful track of the political activities affecting the agency.⁷² Therefore, it would seem unlikely that he was entirely ignorant of Ammann's crucial political role in the campaign for the Fort Lee bridge. Yet Cohen's discussion of Ammann omits that effort, and in fact Cohen cites Ammann to illustrate the gulf that separates the methods of the engineer from those of the political leader.⁷³

Since Ammann's death in 1965, several extensive biographical essays on his life and work have appeared. Almost all have been written by engineers who, perhaps naturally, have concentrated on Ammann as bridge designer and engineering administrator. They do offer brief hints of the "crucial years" of 1923-25, but little more. In a 1974 biography of Ammann, for example, Fritz Stüssi reports that Ammann left Lindenthal's employ in the spring of 1923, that he submitted a detailed report on the Fort Lee bridge to Silzer in December 1923, and that he was hired by the Port Authority sometime in 1925.⁷⁴

Urs Widmer's perceptive 1979 essay provides detailed information on Ammann's early training and on his engineering activities. He also notes that the break with Lindenthal occurred in 1923 in part because Ammann feared that the campaign for tunnels would soon sweep aside the possibility of a bridge across the Hudson.⁷⁵ Widmer's article provides one of the two best summary descriptions of Ammann's activities in the two years after he left Lindenthal.⁷⁶ The other is found in a brief essay by Ammann's daughter.⁷⁷

In the most recent paper on Ammann's work, by Edward Cohen, the "missing years" are again touched on briefly. Cohen indicates that Ammann left Lindenthal after a spring 1923 argument about trimming the size of the Hudson bridge, and that Ammann then worked on his own for two years, designing a more modest span, which would be attractive to Governor Silzer and others in terms of financial cost and esthetic appearance. In 1925, with the Port Authority authorized to construct the bridge, it thereupon "appointed Ammann Bridge Engineer."⁷⁸

Why the political entrepreneur was lost. So Ammann's early role as political organizer has continued in eclipse. There are undoubtedly several reasons for this gap in the biographical and historical record, some of them attributable to individual authors.⁷⁹ I am inclined to place considerable emphasis, however, on Ammann's position as exemplar of the engineering profession in its ideal form. That image of Ammann has, I would argue, tended to prevent any close consideration of other important aspects of Ammann's talents and behavior, even by those—including Widmer and Cohen—who have had access to a fair portion of the evidence regarding Ammann's political activities in the early 1920s.

What I mean is this. When one reads the engineering literature, one

learns that the highest standards of the profession (perhaps particularly of the profession of civil engineering) are *efficiency, economy, and grace*, captured in a structure that is actually *built*, and that works.⁸⁰ The goal of "efficiency" entails "a desire for minimum materials, which results in less weight, less cost, and less visual mass." The discipline of "economy" means a desire for simplicity in construction as well as "a final integrated form." The search for grace, or "engineering elegance," involves the visual expression of efficiency and economy "through thinness and integration," and through contrast with the surrounding environment.⁸¹

All of Ammann's engineering achievements—from his designs for the George Washington and Bayonne bridges in the 1920s through his Verrazano-Narrows span in the 1950s—emphasize these values at a very high level of distinction.⁸² Moreover, his writing, which also strikes a high level in clarity and detail, underscores the importance of these values in his own work.⁸³

But Ammann was exemplar for a profession for reasons that go beyond the "daring elegance" of his designs, and beyond the fact that these structures were built at low cost and remain standing. To those who knew him, he also personified the traits of character which had stamped the best members of the engineering craft extending back into the nineteenth century and beyond. As John Jervis, builder of the Erie Canal and other large projects of a previous era, had written:

A true engineer, first of all, considers his duties as a trust and directs his whole energies to discharge of the trust He is so immersed in his profession that he has no occasion to seek other sources of amusement, and is therefore always at his post. He has no ambition to be rich, and therefore eschews all commissions that blind the eyes and impair fidelity to his trust.

Also, like the engineers of the earlier period, Ammann was "independent, austere" and "self-confident."⁸⁴

In addition, Ammann's distinctive abilities and personality were underscored by contrast with some other prominent bridge builders of the twentieth century: Lindenthal and Steinman, whose bridge-tower embellishments did not reach the high standards of economy and grace found in Ammann's structures, and especially Joseph B. Strauss, the chief engineer for the Golden Gate Bridge. Any story of the building of that great structure would have to devote considerable attention to Strauss. But since Strauss was widely understood to be a bridge designer of very modest capacities, any effort to examine why he headed the engineering team, and how the bridge was designed and public support obtained, would soon lead the historian into the complex story of Strauss as political entrepreneur, the field in which he made his major contributions.⁸⁵

In contrast, from the early 1930s onward Ammann was viewed by members of his profession and by the wider public as "one of the immortals of bridge engineering and design"; and his quiet manner and

self-assurance reinforced the perception that this was an engineer's engineer. Therefore, when the historian or engineer asks why Ammann was chosen to design the George Washington Bridge, the answer may seem self-evident: the Port Authority chose Ammann because he was the best man for the job. Thus, in exploring why the Port Authority shifted gears to take on this task, and how public support for building the bridge was obtained, the researcher easily passes by Ammann, and looks for the answers in the activities of real estate developers and other interest groups in the region, and in the imperialistic visions of an ambitious Port Authority.⁸⁶ Not that these factors are irrelevant; but it now seems clear, I think, that they do not provide an adequate explanation.

The Study of Political Power and the Role of Biography

In their efforts to understand how political power is organized and used in a society, political scientists have generally directed their energies toward examining the actions of interest groups and the behavior of government bureaucracies. With few exceptions, that perspective treats the role of individuals as insignificant in shaping government policy and the use of public resources, except insofar as individuals act "in role," as members and leaders of pressure groups and bureaucracies whose aim is to maximize the economic profit or other goals of their own, narrow organizations.⁸⁷

The general argument illustrated by this study of the "George Washington Bridge case" is that the traditional political-science perspective is too narrow, and that close biographical studies—scrutinizing the evolving perceptions, motivations and activities of specific individuals—will often be rewarding, opening up lines of inquiry that extend beyond role-bound behavior and the kind of reductionism that the traditional mode of inquiry often entails. In this case, the evidence drawn from a biographical study of Ammann, joined with an exploration of institutional and other factors, indicates that Ammann's activities in the 1920s were influential in several directions. Some of these were noted in earlier sections of the essay; let me at this point identify these areas of influence and suggest their relationships with broader forces at work.

Ammann's impact on urban development in the New York region. If one asks, for example, why the vast reaches of Bergen County and nearby areas in northeastern New Jersey remained as a rural enclave until the 1920s, while areas on Long Island equally distant from Manhattan had become densely populated, it seems clear that the absence of bridges and tunnels connecting North Jersey to Manhattan's major employment centers was a major factor. Geography and technology joined forces here, since the Hudson River was far wider than the waterway separating Long Island from Manhattan. East of Manhattan, technological advances had permitted bridges to be cast across the East River beginning in the 1880s, supplanting the several ferry routes; and as a result, the pressure for "suburban" living soon sent the

population flowing into Brooklyn, Queens and Nassau County. Then, as the automobile grew in popularity after 1910, residences spread widely across Long Island, far from the rail lines that crossed the river.

By 1910, however, geography no longer stood in the way of bridges and tunnels across the wide Hudson. Engineering advances would permit bridge spans of 3,500 feet and longer; and except for some uncertainty about how to remove carbon monoxide, engineering techniques would also permit long vehicular tunnels under rivers like the Hudson. Widespread popular demand was present too; automobiles and trucks crossing the Hudson by ferry sometimes had to wait five or six hours in long lines at ferry terminals.⁸⁸

What was missing in 1910 and subsequent years was the organizational and political capacity to span the Hudson. Two states had to agree on where to locate interstate bridges and tunnels, on private versus public financing, and on what governmental bodies would build or monitor the building of these major arteries of commerce and communication. By 1919, *one* vehicular tunnel had been started, haltingly, by two state commissions working uneasily together; but that tunnel would provide only two lanes in each direction, and projections indicated that three or four times that capacity was needed. Should there be two or three more tunnels, distributing traffic (and suburban population growth) across Union, Essex, Morris and southern Bergen counties? Or should there be one great bridge with capacity equal to all those tunnels—and if a bridge, should it lead into midtown Manhattan, or be farther north, shifting population growth to northern Bergen and Passaic counties, and perhaps diverting some traffic away from congested mid-Manhattan?

Local government officials and real estate developers at the terminus of a tunnel in Jersey City or Weehawken could see the advantage in tax ratables if one of the river crossings was located near that local community, so an incremental series of tunnels was probably likely to be the result of interest-group and local community pressure. It was more difficult to gather the political support needed for a large bridge; a bridge would cost more than any single tunnel, and this meant that political (and financial) support would have to be gathered more widely—which was difficult especially in Bergen County, where there were dozens of small towns, and little tradition of cooperation among these towns and villages. Moreover, to build a bridge with eight to twelve lanes meant that there might be no need for tunnels for a long time; so the bridge was a threat to those who wanted tunnel crossings near their own communities.

To simplify only slightly, what Ammann did was to alter the political environment significantly, perhaps dramatically. He wanted a great bridge flung out from the high Palisades. He had wanted one since 1904; it was an engineer's dream. When Lindenthal proved unequal to the task of understanding the complex reality of the political environment, Ammann broke free. By the start of 1923, he had achieved the first step, convincing one state governor that a vehicular bridge at the Palisades was feasible and desirable. During the next two years he overcame the

political fragmentation and mutual suspicion that made cooperation among local civic groups and political officials so difficult: he had an idea, he could show it visibly and dramatically, and he was persuasive in arguing that the citizens of Englewood and Teaneck and Boonton—and their counterparts in the North Bronx and Westchester—should exercise their political muscle in order to help accomplish his dream, rather than waiting in long ferry lines until someone else could put another tunnel down, under the mud.⁸⁹

Perhaps most important in terms of his short-term and long-term impact on the New York region, Ammann exercised a profound influence on the direction and the reputation of the Port of New York Authority. He did this in part by recognizing that the Port Authority—in contrast to the joint bridge and tunnel commissions—had the political characteristics required to get the great bridge built, and to get it built efficiently.⁹⁰ If the Port Authority had not been created precisely to build large vehicular bridges, it still might be persuaded to do the job—especially if his ally, New Jersey's governor, could help to stretch the Port Authority's collective mind.

In the long run, of course, Ammann's influence on the agency depended on his performance as a bridge builder and administrator; the argument regarding that role and his impact are set forth in the previous section. There are other factors, certainly, that come into play in mapping the causes of the Port Authority's expanding domain and power in the 1940s and beyond. However, Ammann's early efforts, through 1931, probably rank as necessary if not sufficient in understanding why that agency would later prosper, why it had the reputation and funds needed to permit it to take over the region's airports and build the world's largest bus terminal in the 1940s, and then, in the 1950s, to define and take the lead in meeting the region's highway needs, defeating Robert Moses when he resisted, and joining with him when that strategy was consistent with the Port Authority's vision of how to shape the bistate region.⁹¹

Benefits and dangers. What is true in this case applies to other cases as well. That is, biographical analysis often adds an important dimension of understanding regarding the uses of political power and the evolution of social policy. We have biographical studies now, for example, which advance our knowledge of how the American navy came to accept—though reluctantly—major improvements in gunfire technology and technique in the early 1900s; of why the American social security system evolved as it did from the 1930s to the 1980s; and of the factors that were crucial in the creation and evolution of the United States forest service.⁹² We could use more such studies, particularly in fields in which interest groups, bureaucratic incentives, and “underlying” economic and social forces are generally viewed as providing an adequate understanding of the patterns of power and the structure of social outcomes.

A further point worth noting here is that a sustained effort of biographical analysis tends to “stretch the mind” of the researcher, suggesting additional perspectives from which a problem can be and

perhaps ought to be studied. The biographer needs to be able to see the situation from "behind the eyes" of the (political) actor, and that effort leads one to attempt to understand the situation as it was perceived by those involved—at a time when the future was unknown and obstacles which now seem unimportant loomed large. As a consequence, the researcher may uncover important causal variables that are not readily identified when we view the problem from "the outside," when the future is known. Interviews and written records approached through other perceptual lenses than biography can be used in this way too, of course, but the biographer may be more likely to immerse herself or himself in the situation as it was seen and felt by participants at the time, and therefore may be able to unearth additional lines of causal inquiry.⁹³

In addition, biographical studies may be helpful in encouraging individuals to find meaning in their lives—by suggesting that individuals can act, even if they live in complex and fragmented societies, with some hope of "making a difference." As Jean Strouse, biographer of Alice James, notes:

Future historians may characterize the late twentieth century by its sense of fragmentation, its lack of confidence in history's progress, its loss of consensus about what an 'exemplary' life might be. People still long for models of wholeness, though—for evidence that individual lives and choices matter.

Biographical studies, she argues, may provide useful cases to illustrate those positive themes.⁹⁴

Having been absorbed now for several years in a set of three intertwined biographical studies, I should conclude on a cautionary note. The biographer needs to be alert to the danger that the subject of his or her attention may threaten to swallow the researcher. Lippmann's biographer recalls his concern partway through his many years of work:

I came to fear the way in which he would insidiously take over my life—take it over in time, until I often felt I hardly had any life outside of Walter Lippmann, and also by forcing me constantly to define myself in terms of him and him in terms of me.⁹⁵

Equally important, all biographers run the risk of becoming so attracted to the subject, or so repulsed, that the objectivity which is essential to careful analysis is lost.⁹⁶ As I argue elsewhere, this is a danger well illustrated by Robert Caro's important but one-sided biography of Robert Moses.⁹⁷ It is a danger not easily avoided, but perhaps less likely for those—such as political scientists—who use biographical analysis as an adjunct in probing patterns of power and influence than for the researcher whose central goal is biography.

Princeton University
Princeton, New Jersey

Appendix

Letters to Governor Silzer

(Courtesy of State Archives, New Jersey.)

O. H. AMMANN
CONSULTING ENGINEER

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470 - 4th Ave.,

7 DEY STREET

NEW YORK.

Jan. 9, 1923.

Personal

Hon. George S. Silzer,
Governor of New Jersey,
Trenton, N.J.

Dear Governor :-

I had a very satisfactory meeting today with the Board of Freeholders of Bergen County. They are unanimously and strongly in favor of the bridge at Fort Lee, and pledged their influence not only locally, but all over the State, towards effecting whatever legislation is necessary to provide funds with which the project can be developed. They expressed themselves in sympathy with your policy that no money should be spent for additional vehicular tunnels until the one now under construction has been tried out.

They asked me to communicate on their behalf at once with you and the Port Authority and to suggest that steps be taken at once to introduce the necessary bill in the legislature.

Respectfully yours,

O. H. Ammann

Post Office
The North River Bridge Company

December 20, 1923

New York

My dear Governor:

I have your letter of Dec. 18th with enclosure. I had already seen the matter in the newspapers and of course I was surprised. Mr. Ammann on Monday morning before I reached my office, got hold of my unfinished draft of my address which I delivered last evening (copy enclosed). Later in the day he called to inform me that he had written to you and to the Port Authority about his idea of a bridge at Washington Heights. It now appears that he had done this to forestall my address and used you as the channel to do so.

A bridge at Fort Lee of the kind described by him, cannot be built for \$25,000,000. The estimate is far too low. It is the same old way to mislead the public either from design or from ignorance, just as the estimate of Gen. Goethals of \$10,000,000 for the vehicular tunnel, which when fully completed will now cost \$45,000,000. The public cannot judge of such vagaries in estimates of which engineers are constantly guilty.

Mr. A. had been my trusted assistant and friend for ten years, trained up in my office and acquainted with all my papers and methods. But I know his limitations. He never was necessary or indispensable to me. Many other assistant engineers are very able and glad to fill his position. But one does not like to make changes and train up new men as long as it is not necessary.

Now it appears that A. used his position of trust, the knowledge acquired in my service and the data and records in my office, to compete with me in plans for a bridge over the Hudson and to discredit my work on which I had employed him. He does not seem to see that his action is unethical and dishonorable.

I believe that in the public interest all proposed crossings of the Hudson River, including any bridge at Fort Lee, should and will be investigated, but it seems to me that it should be done without violation of professional ethics.

I attended a meeting yesterday of a Special Committee appointed by the Board of Estimate and Apportionment at which the appointment of a Board of Engineers was proposed as per enclosed list. It will probably be passed upon favorably.

Yours very truly,

G. Kindershat

Hon. Geo. S. Silzer,
Metuchen, N.J.

PS - The Special Committee consists of

Hon. Grover A. Whalen, Chairman
Commissioner John H. Delaney
Corporation Counsel
Mr. Arthur Tuttle.

O. H. AMMANN
CONSULTING ENGINEER

NEW YORK 800 1 8
NEW YORK 800 2 8
NEW YORK 800 1 8

470 - 4th Ave.,
7 DEY STREET
NEW YORK Jan. 23, 1904.

Personal

Hon. George S. Silzer,
Governor of New Jersey,
Metuchen, N. J.

Dear Governor :-

Permit me to report to you the situation relative to the Fort Lee bridge. While progress is apparently slow, it is nevertheless encouraging. There are quite a number of communities whose chambers of commerce or other civic bodies are giving the proposition earnest consideration. That so far no public meetings have been arranged is due to two factors. First, these bodies act very slowly, they appoint committees which have to report back before the boards will take action. Second, there are a number of cross currents due to the many projects which are just now being laid before these bodies. Thus in Paterson the bridge proposition was delayed by the Jersey City transit plan and important local matters. It will come up only next monday, but I am assured that it will then be given earnest consideration. A number of influential men are back of it. Passaic has the matter under consideration today. Englewood with the surrounding smaller towns is arranging for a public meeting in the near future. The project is also before a number of associations on the N. Y. side.

So far I had to act single handed with no organization available to take immediate charge of and back the proposition. I am now endeavoring to form such an organization but that too takes time. I feel confident, however, that when the movement is once started it will bring out strong public opinion in favor of the proposition.

I trust that I do not impose too much upon your valuable time, but I consider it my duty to keep you informed on the situation.

Respectfully yours,

O. H. Ammann

O. H. AMMANN
CONSULTING ENGINEER

NEW YORK CITY
NEW YORK 100 100
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NEW YORK 100 100
NEW YORK 100 100

470 FOURTH AVENUE
NEW YORK January 29, 1925

Hon. George S. Silzer,
Governor of New Jersey,
METUCHEN, NEW JERSEY.

Dear Governor:-

I was glad to note that the Hudson River Bridge Bill passed the Senate without opposition. The Assembly will undoubtedly follow suit.

As you may know a similar bill has recently been introduced in the New York Legislature by Assemblyman A. Spencer Reid (Democrat). I have, therefore, concentrated my efforts to the New York side. Besides the local organizations I have secured strong endorsement by various organizations in Rockland and Westchester Counties. The matter is also before the State Automobile & the State Realty Associations which have considerable influence in Albany.

One thing that has puzzled me in my efforts is the utter lack of a spirit of co-operation between the various civic organizations, due not only to indifference but to a good deal of antagonism and jealousy. I trust, however, that the individual endorsement will help much in getting the bill passed in Albany.

Very sincerely yours,

O. H. Ammann

P.S. The enclosed "interview" was with Mr. J. W. Binder, a Hackensack, Secretary of the "Mackay Hudson River Bridge Association" & former advocate of the 125th Street Tunnel. He is now an ardent supporter of the bridge. I also understand that Mr. Selmer J. Bengtson, the brother of Mr. Lindenthal's bridge, who formerly opposed the bridge, has joined in the movement for the bridge.

Adm. —

Notes

¹ On their impact on residential and employment patterns in the New York region, see M. N. Danielson and J. W. Doig, *New York: The Politics of Urban Regional Development* (Berkeley, CA, 1982), chap. 6.

² See "A Monumental Bridge: New York Will Soon Possess Another 'World's Greatest' . . .," *Scientific American* (November 1927): 418-20, and M. K. Wisheart, "The Greatest Bridge in the World and the Man Who is Building It," *The American Magazine* (June 1928): 34, 183-89.

³ Le Corbusier, "A Place of Radiant Grace," in his *When the Cathedrals Were White*, trans. F. Hyslop and J. Finney (New York, 1936).

⁴ As David Billington comments: "No twentieth-century engineer has left more of a mark on steel bridge design than Othmar Ammann. Taken as a whole, his designs . . . provide the best example of structural steel bridge art done in this century." Billington, *The Tower and the Bridge* (New York, 1983), 129. When the American Society of Civil Engineering prepared to commemorate its 100th Anniversary in 1952, it chose an Ammann creation; the U.S. stamp that year honoring the Society shows a wooden covered bridge in the lower lefthand corner, with the George Washington span extending across the main body of the stamp.

⁵ See in particular the items listed in notes 7, 8, 10, 13, 20, and 22.

⁶ The entrepreneur identifies new goals, works out the steps essential to achieving these goals, and marshals the resources needed to move forward toward his or her preferred ends. Generally the entrepreneur's efforts require overcoming hostile forces and other obstacles, and they often entail some risk to the entrepreneur's financial security and career. See J. W. Doig and E. C. Hargrove, eds., *Leadership and Innovation* (Baltimore, MD, 1987, 1990), 7-8, and sources cited there. On the concept of the "political entrepreneur," see also John H. Mollenkopf, *The Contested City* (Princeton, NJ, 1983), 6ff.

⁷ The professor, K. E. Hilgard, had worked as a railroad-bridge engineer in the United States, and he pressed Ammann to go to the U.S.A., where "the engineer has greater freedom in applying individual ideas" and where young men were sometimes put in charge of work "which, in Europe, only graybreads would be allowed to perform." Hilgard as quoted in Wisheart, "The Greatest Bridge," 183.

⁸ Ammann later reported that "my first serious interest in the problem of bridging the Hudson was awakened shortly after my arrival in New York," when he visited the top of the Palisades cliffs on the Jersey shore across from Manhattan. "For the first time I could envisage the bold undertaking, the spanning of the broad waterway with a single leap of 3000 feet from shore to shore, nearly twice the longest span in existence. . . . From that moment . . . I followed all developments with respect to the bridging of the Hudson River with keenest interest." Quoted in Urs C. Widmer, "Othmar Hermann Ammann, 1879-1965: His Way to Great Bridges," *Swiss American Historical Society Newsletter* 15 (1979): 5-6. During these years, the only way that horses and motor vehicles could travel between New Jersey and New York City was via ferry—unless they journeyed fifty miles north, where the Hudson was much narrower and smaller bridges had been constructed. Travelers without horse, auto or truck could cross the Hudson as railroad passengers, once the Pennsylvania Railroad tunnel and two smaller rail tunnels under the Hudson were completed in 1908-10. The question of whether and how a bridge might be cast over the Hudson had been debated sporadically since the early 1800s.

⁹ The Hell Gate crossing would span the East River between Queens and The Bronx, two sections of New York City, and would fill the major gap in the Eastern rail system, allowing railroad trains to travel from New England to New York City and then into New Jersey and across the continental United States. The Hell Gate would be the longest arch bridge in the world. See Billington, *The Tower and the Bridge*, 125-28.

¹⁰ See Edward Cohen, with Frank Stahl and Susan Wilson, "The Legacy of Othmar H. Ammann," TMs, 1 May 1987, Ammann & Whitney, New York, NY, 8.

¹¹ The proposed bridge, as Lindenthal sketched it out in 1920, included 12 railroad tracks and 20 vehicular lanes on two levels, carried by a single gigantic span across the Hudson. The cost was \$180 million or more. See Widmer, "Othmar Hermann Ammann," 10, and Rebecca Read Shanor, *The City That Never Was* (New York, 1988), 142.

¹² See Widmer, "Othmar Hermann Ammann," 11; Cohen, "The Legacy," 9.

¹³ On Ammann's career at the Port Authority and subsequently, see Leon Katz, "O. H. Ammann, Master Bridge Builder: A Remembrance," *Embassy News* (August 1979): 20-21; Leon Katz, "A Poet in Steel," *Portfolio: A Quarterly Review of Trade and Transportation* 1 (Summer 1988): 33-39; Fritz Stüssi, *Othmar H. Ammann: Sein Beitrag zur Entwicklung des Brückenbaus* (Basel, 1974), 46ff.; Urs Widmer, ed., *Othmar H. Ammann: 60 Jahre Brückenbau* (1979), 38-94; and the papers by Widmer and Cohen cited earlier.

¹⁴ On the highway studies in the 1950s and the earlier battles, see J. W. Doig, "Regional Conflict in the New York Metropolis: The Legend of Robert Moses and the Power of the Port Authority," *Urban Studies* 27 (1990): 209-25.

¹⁵ Ammann wrote on 21 Nov. 1924 to George S. Silzer, "I have submitted to the Port Authority a bid for the preparation of plans for the Arthur Kill Bridges and am now anxiously awaiting their decision." When he met with the Port Authority's chief engineer on 17 April 1925, however, he learned that since these would be the Authority's "first work, it appeared advisable to give it to an engineer of long established reputation" (Ammann to Silzer, 17 April 1925). The two bridges over the Arthur Kill—a narrow waterway between New Jersey and Staten Island—are the Goethals and the Outerbridge Crossing; they were designed by two private consultants whose names are now largely erased from the Port Authority's institutional memory. Ammann is often listed incorrectly as the designer of these two metal monsters.

¹⁶ Trucks and passenger automobiles could cross the Hudson only by waiting in long lines for a ferry, or by traveling dozens of miles north to pass over the narrower Hudson via a bridge near Poughkeepsie.

¹⁷ For summaries of these developments, see Erwin W. Bard, *The Port of New York Authority* (New York, 1942), 180-81, and Jacob W. Binder, *All in a Lifetime* (Hackensack, NJ, 1942), 174-80.

¹⁸ Smith's favorable inclination toward the Port Authority was also shaped by his earlier involvement: During his first term as governor (1919-21), Smith had pressed for the creation of the bistate agency. Defeated for reelection, he had then been appointed by the new governor (Nathan Miller) in 1921 as one of the Port Authority's first set of commissioners. Elected governor once again, he took office in 1923 convinced that the Port Authority had an important role to play in overcoming the fabled inefficiencies in the New York region's transportation system. See Erwin W. Bard, *The Port of New York Authority*, 32-33, 181-82, and J. W. Doig, "Entrepreneurship in Government: Historical Roots in the Progressive Era," paper presented at the annual meeting of the American Political Science Association, Washington, DC, 1-2 Sept. 1988, 58-62, 72-76, 81.

¹⁹ On the Port Authority's attitude, and Silzer's views, see Bard, *The Port of New York Authority*, 182-85, and several items in the Silzer files in the New Jersey Archives: E. Outerbridge to G. Silzer, 9 March 1923; Silzer's veto message on New Jersey bill for private bridges and tunnels, October 1923; Ammann to Silzer, 22 Nov. 1923; Silzer to D. Morrow, 27 Nov. 1923; Morrow to Silzer, 5 Dec. 1923; J. Gregory to Silzer, 18 Dec. 1923.

²⁰ The classic study of the Port Authority's first decades is Erwin Bard's 1942 book, *The Port of New York Authority*. Bard indicates that Governor Alfred E. Smith urged the Port Authority to take on bridge-and-tunnel projects for motor vehicles in 1923-25, and that the Port Authority staff was reluctant to embrace that new task. But the possibility that the Port Authority could carry out its preferred program—large rail projects—faded by 1925-26, since the railroads were unwilling to cooperate. A bridge-building program "offered a chance" for some kind of achievement in an organization that was floundering. At that point, Ammann "was engaged as Bridge Engineer." He arrived, Bard concludes, "with no great reputation" (185, 193). The book offers no information on why he was chosen. Two other books—Julius Henry Cohen, *They Built Better than They Knew* (New York, 1946), and Jacob Binder, *All in a Lifetime*, 1942—discuss the political activities surrounding the Port Authority's Hudson Bridge project. Both refer to Ammann's engineering activities at the Port Authority but provide little information on why he was selected to take charge of the bridge project. Cohen appears to assess Ammann as a "pure engineer" who lacked the talents and inclination needed to be an adept political organizer (123).

²¹ The relevant materials from the 1920s appear to have been destroyed when the Port Authority offices were moved to the World Trade Center in the early 1970s.

²² In discussion, Billington agreed that it was surprising the Port Authority had chosen

Ammann to carry out the George Washington Bridge project, rather than a more prominent engineer or consulting firm. Billington had the impression Ammann might have put his own name forward in some way, but he had no details. Billington has also written on Ammann; his book, *The Tower and the Bridge*, discusses Ammann's engineering and his esthetics, and earlier, in 1977, he had written an article, "History and Esthetics in Suspension Bridges," which criticized Ammann's George Washington Bridge design on both technical and esthetic grounds, raising a modest flurry among the faithful.

²³ A brief vignette on the search: When I called the State Archives in July 1987, I knew that the papers of many of the state's governors had not yet been organized, and I thought that Silzer's—like the gubernatorial papers of Woodrow Wilson and others—might still be in folders without subject headings. "You're in luck," a staff member responded when I called, "we've had a student here this summer, and he's just finished organizing Silzer's papers." I asked whether there were any files titled Hudson River Bridge, or George Washington Bridge. The answer was "no." Perhaps this was a dead end. Did she see *any* files on bridges? "Well, yes," she responded, "there's a very bulky file here labeled 'Ammann Bridge.'" I soon headed for Trenton.

²⁴ The main span of a bridge at 179th Street would be 3,500 feet; the longest spans then in existence or under construction were the Manhattan Bridge (1,470 feet) and Williamsburg (1,600 feet), both across the East River to Manhattan, Bear Mountain Bridge over the narrower Hudson farther north (1,630 feet), the Delaware River Bridge to Philadelphia (1,750 feet), and the Ambassador Bridge over the Detroit River to Canada (1,850 feet). The engineering advances that would, in Ammann's opinion, make possible this giant step in span length included the creation of new alloy steels, development of more accurate methods of shop fabrication and shop assembling of bridge parts, better methods of calculating stresses and of model experimentation, and an improved conception of how to evaluate the forces that stabilize (or "stiffen") a massive bridge. Ammann's views on these issues are set forth in several speeches and papers during the 1920s and 1930s; for a summary discussion, see his paper, "Brobdingnagian Bridges," *Technology Review* 33 (July 1931): 441–44, 464.

²⁵ Silzer did not set down these views systematically in one place. However, I believe this is a fair summary of his thinking in 1922–25. My main sources for his views are Silzer's inaugural address in January 1923, his public addresses in January 1924 and 1925, and the correspondence and newspaper clippings found in the "Ammann Bridge" file in the New Jersey Archives—particularly his letters of 7 June 1923 (to the managing editor of the *New York Times*), and 27 Nov. 1923 (to Dwight Morrow), Silzer's public statement of 17 Dec. on Ammann's plans, Ammann's letters to Silzer on 12, 13, 17, and 24 Dec. 1923 (which summarize their several discussions), Silzer's letter to Port of New York Authority commissioner Julian Gregory, 31 Dec. 1923; and a number of similar materials in 1924 and early 1925. Some specific examples will be given later in this essay.

²⁶ "Our neighbor knew how much midnight oil father was burning because she often had to attend to her sick mother during the night. 'Whenever I looked over to the Ammann house, at one o'clock, three o'clock, there was always a light burning in Mr. Ammann's study and I knew he was working.'" Margot Ammann Durrer, "Memories of My Father," *Swiss American Historical Society Newsletter* 15 (1979): 29.

²⁷ The quotation is from a 1907 paper by Burnham, a Chicago architect and planner, and is widely reprinted; it is quoted here from the frontispiece of a recent book that describes the wondrous hopes of Lindenthal and a large band of engineers and others who sought to reshape New York: Rebecca Read Shanor, *The City That Never Was: Two Hundred Years of Fantastic and Fascinating Plans that Might Have Changed the Face of New York* (New York, 1988).

²⁸ For this summary of Lindenthal's life and work, I draw mainly on Billington, *The Tower and the Bridge*, 123–32, and Shanor, *The City That Never Was*, 136–49.

²⁹ See Sharon Reier, *The Bridges of New York* (New York, 1977), 41–57. The City engineers were under constant pressure to allocate contracts to firms associated with influential politicians. On the strategies used by Tammany Hall in obtaining Queensboro Bridge contracts in 1903, for example, see the summary of court hearings reported in "Dummies in City Contract," *New York Times*, 25 March 1911.

³⁰ The Hell Gate Bridge spans the upper part of the East River and is a key link between

the rail lines in New England and the railroad system that extends from Manhattan under the Hudson River to the rest of the nation.

³¹ Lindenthal's aim was to finance the bridge project with private capital. However, he would need *some* governmental assistance—approval of the federal government for a bridge across a navigable waterway; and perhaps monopoly rights, in order to ensure investors in his bridge that toll revenues would not be drained off by any competing bridge to Manhattan.

³² Ammann to his mother, Rosa Labhardt Ammann, 24 April 1921; trans. Margot Ammann, 1988.

³³ Lindenthal was fairly explicit in sketching out his perceptions and values on these several issues, particularly in his reports in 1921–22, and in his letters to Governor Silzer in 1924 and 1925. See specific citations later in this essay.

³⁴ Indeed one of those tunnels had been started already, in 1920, between Canal Street in lower Manhattan and Jersey City; and there were plans afoot to follow that effort with a series of other underwater crossings, which might in time (so argued *tunnel* engineers and their associates) entirely eliminate the need for bridges over the wide Hudson. Perhaps a bridge could be more esthetic—even a work of art; the tunnelers would admit this, though a look at the Queensboro Bridge suggested to some that such promise could easily be despoiled. Tunnels, however, were probably cheaper; and since they could be constructed at *many* locations up and down the river, they would disperse traffic, not concentrate it into one monstrous traffic jam, as Lindenthal's great bridge seemed likely to do. As Othmar's son Werner points out (letter to the author, 15 December 1989), his father was not invariably opposed to tunnels; indeed, in the 1930s he would supervise the construction of the Lincoln Tunnel under the Hudson River (to 40th Street in Manhattan). In the early 1920s, however, when a series of tunnels might have eliminated the possibility ever of constructing a great bridge over the Hudson, I believe that Ammann viewed the tunnel option as very undesirable. On Othmar Ammann's attitude in 1923, see note 75, and associated text.

³⁵ Ammann to his mother, 14 December 1923; trans. Margot Ammann, 1988.

³⁶ See Arthur S. Link, *Wilson: The Road to the White House* (Princeton, NJ, 1947), 245–46.

³⁷ On Silzer's values and programs, see his inaugural address (January 1923), his first and second annual messages to the legislature (January 1924 and 1925), Irving S. Kull et al., *New Jersey: A History* (New York, 1930), 3:1080–83, and Paul A. Stellhorn and Michael J. Birkner, eds., *The Governors of New Jersey, 1664–1974* (Trenton, NJ, 1982), 194–96.

³⁸ Ammann's diary entries during the years 1917–20, when he was manager of the company, list several meetings with Silzer and other directors, including Lindenthal.

³⁹ The tone of Lindenthal's 30 January 1923 letter to Silzer suggests that earlier discussions of engineering and financial details had taken place between the two men.

⁴⁰ And so Ammann's 1904 vision might be reclaimed, and converted into steel. "I could envisage the bold undertaking, the spanning of the broad waterway with a single leap of 3,000 feet from shore to shore, nearly twice the longest span in existence . . ."—Ammann's recollection of his visit to the top of the Jersey Palisades, shortly after his arrival in America; see note 8.

⁴¹ The effort to build a vehicular tunnel between Jersey City and Canal Street, started in 1919, had been carried forward with much quarreling and many delays by two state commissions, and in 1923, completion of the Holland Tunnel was still years off. There was also some concern that the ventilation system in the underwater tunnel would not carry off the carbon monoxide; why build a second death trap, skeptics asked, until the first has been tried out?

⁴² The Port Authority had been created by the two states in April 1921 and was mandated to devise a plan to improve freight transportation in the bistate region around New York Bay. The agency's first plan, published in 1922, focused on ways to improve railroad service, including the construction of underwater rail tunnels between North Jersey and New York City. But the agency also viewed trucks as relevant to its task, serving as feeders between rail terminals and customers. So it might view a bridge at 179th Street as valuable for moving feeder trucks across the region.

⁴³ The Swiss heritage included his student years in Zurich with Wilhelm Ritter, who emphasized esthetic as well as technical principles in bridge-building. See David P. Billington, "Wilhelm Ritter: Teacher of Maillart and Ammann," *Journal of the Structural*

Division: American Society of Civil Engineers (1980): 1103–16. And, at a genetic level, Ammann may also have drawn upon his maternal grandfather, Emanuel Labhardt, a well-known landscape artist. Margot Ammann, "Beauty and the Bridge," *TMs*, 1977, 1.

⁴⁴ Since early in the nineteenth century, engineers had attempted to make suspension bridges "more and more rigid, in order to eliminate the wavelike motion due to flexibility." Rigidity was obtained by using heavy trusses, which required large amounts of expensive steel. Ammann's studies convinced him that "for a long-span suspension bridge a rigid system was not necessary." By eliminating large, stiff trusses, Ammann reduced the cost of the bridge by about 15 percent. The quotations are from the form nominating the George Washington Bridge to be a National Historic Engineering Landmark, as quoted in Leon Katz, "A Poet in Steel," 34.

⁴⁵ As he wrote to his mother in 1921: "Toward strangers one is always covered with a veil. . . . The human soul must not expose itself to the profanities of the world." 12 February 1921; trans. Margot Ammann, 1988; my comments on Ammann's personality also benefited from discussions with Margot Ammann and Sylva Brunner.

⁴⁶ O. H. Ammann, letter to Governor George S. Silzer, 9 January 1923; from the George Silzer files in the New Jersey Archives, Trenton. In general, when the writer, addressee and date of a letter are provided in the text, footnote references will be omitted below. The 9 January letter is the first correspondence between Ammann and Silzer in the Silzer files; see letters reproduced in Appendix.

⁴⁷ Silzer, "Inaugural Address," 16 Jan. 1923, 8. As his reference to "railroad terminal service" suggests, neither Silzer nor Ammann were yet ready to break entirely with Lindenthal; part of Lindenthal's plan was a railroad terminal at the Manhattan end of the 57th Street bridge.

⁴⁸ Ammann reported one of their final exchanges in his diary entry of 22 March 1923: "Submitted memo to G.L., urging reduction of H.R.Br. program dated Mar. 21. G.L. rebuked me severely for my 'timidity' and 'shortsightedness' in not looking far enough ahead. He stated that he was looking ahead for a 1000 years" (quoted in Widmer [1977], 8). "Lindenthal took the first opportunity to lay Ammann off," Edward Cohen concludes, "and in 1923 the two men parted" (Cohen [1987] 9).

⁴⁹ The Port Authority's 1922 Comprehensive Plan, which had been endorsed by the legislatures of both states, included an array of rail tunnels under the Hudson River and other waterways in the region. Governor Smith's opposition was motivated in part by his belief that the Port Authority should have control over all interstate tunnels and bridges, and in part by his general opposition to monopoly control by a private corporation over a crucial transportation facility. Since New York State's official approval would be needed for a private tunnel into that state, the threat of a gubernatorial veto was an important obstacle for the private association.

⁵⁰ Port of New York Authority, Board of Commissioners, Minutes, meeting of 21 Nov. 1923.

⁵¹ This summary is drawn from Ammann letters to Silzer, 22 Nov., 6 Dec. 1923; Silzer letter to Morrow, 27 Nov. 1923; Morrow letter to Silzer, 5 Dec. 1923.

⁵² Ammann to Silzer 12 Dec., 13 Dec. 1923. Having left Lindenthal's employ early in the spring of 1923, Ammann had continued to work full-time on the Fort Lee bridge project without pay, using his savings to support his family, during the remainder of 1923.

⁵³ Amman to Silzer, 17 Dec. 1923 (with attachments); Silzer to the Port Authority Commissioners, 17 Dec. 1923; Silzer to Gregory, 17 Dec. 1923.

⁵⁴ Gregory to Silzer, 19 Dec. 1923; Port Authority Commissioners, Minutes, 19 Dec. 1923; Port Authority Commissioners, letters to Governors Silzer and Smith, 21 Dec. 1923.

⁵⁵ Both Ammann and the Port Authority had their roots in the era of railroads and rail freight, but Ammann had found it easy to respond—in his general thinking about transportation patterns, and in developing detailed designs—to the increasing use of trucks and automobiles. In part, this reflected his broad disposition to let his mind absorb new facts and use them to modify his views about the world (rather than reinterpreting new facts so they were consistent with his fixed views). In addition, to a bridge engineer, designing wide spans for cars and trucks offered great advantages over railway bridges, for the structures could be lighter and less costly, and their location was not limited to the endpoints of existing rail lines. To Ammann in particular, with his driving esthetic interest in constructing bridges which had a "light and graceful appearance," the automotive age

offered possibilities for artistic achievement denied to those who built in the railroad era. On Ammann's esthetic perspective, see Billington, *The Tower and the Bridge*, 128-46.

⁵⁶ Lindenthal to Silzer, 20 Dec. 1923 (reproduced in the Appendix). I have no direct evidence that Governor Silzer showed this letter to Ammann, but Silzer's general habit was to send letters he received to other interested parties, and Ammann's letters to Silzer in subsequent months make it clear that he knew Lindenthal had criticized his behavior on professional and personal grounds. As earlier sections of this essay indicate, Lindenthal's characterization of Ammann's actions was quite unfair.

⁵⁷ Ammann, "The Hell Gate Arch Bridge and Approaches of the New York Connecting Railroad Over the East River," a paper delivered at a civil engineering meeting in 1917 and published in the American Society of Civil Engineering, *Transactions* (1918): 863.

⁵⁸ Silzer to Cohen, 22 May 1924.

⁵⁹ These events are described in Englewood Board of Trade, letter to Silzer, 3 April 1924, and Ammann to Silzer, 7 and 27 May 1924. For newspaper reports of Ammann's efforts during these months, see "Fort Lee Bridge is Advocated by Engineer Ammann," *Bergen Evening Record*, 5 March 1924; "Bridge at Fort Lee Sure, Says Ammann," *Palisadian*, 25 April 1924; and "Bridge the Hudson Meeting Monday: Engineer Ammann Will Tell of Proposed Structure," *Bergen Evening Record*, 3 May 1924.

⁶⁰ Ammann to Silzer, 23 July, 23 and 29 Nov. 1924; Silzer to Ammann, 24 Nov. 1924; *Palisadian*, 14 Nov. 1924; *Boonton Times*, 28 Nov. 1924.

⁶¹ See *Bergen Record*, 13 Jan. 1925; Ammann to Silzer, 29 Jan., 25 Feb. and 27 March 1925. See also J. W. Binder letter to Silzer, 4 March 1925, informing the governor that the "Mackay Hudson River Bridge Association" has now been formed to urge that the Port Authority build the Fort Lee bridge.

⁶² Silzer to Gregory, 14 April 1925.

⁶³ Ammann to Silzer, 17 April 1925.

⁶⁴ The initial Staten Island spans, the Goethals and the Outerbridge, were completed under Ammann's supervision in 1928. On the Port Authority's political insulation and Ammann's administrative abilities, see Bard, *The Port of New York Authority*, chap. 7. The stone coverings on the George Washington Bridge towers, shown in Ammann's 1923 sketch and in his detailed plans, were omitted for reasons of cost.

⁶⁵ The Port Authority also attracted support because, as Al Smith had noted years earlier, it had the potential to pay for its projects via toll receipts and rents, and therefore without direct use of tax revenues.

⁶⁶ Completed in 1927 after eight years of political and technical problems, the Holland Tunnel between Jersey City and Canal Street in Manhattan took in millions of dollars a year in automobile and truck tolls.

⁶⁷ The Depression sharply reduced the number of motor vehicles using the Port Authority's crossings in the 1930s, and traffic across the three Staten Island bridges was additionally hurt by construction of the Pulaski Skyway. Traffic over the George Washington and the three Staten Island bridges turned out to be insufficient in the early and mid-1930s to pay operating expenses and debt on the bonds. Without the toll revenue from the Holland Tunnel, which maintained high traffic levels, the Port Authority would have been close to bankruptcy in the 1930s. See the analysis in Bard, *The Port of New York Authority*, chap. 8.

⁶⁸ The last quotation is from "They Stand Out in a Crowd," *Literary Digest* (28 April 1934): 13; the others above are from "Poet in Steel," 23, 24.

⁶⁹ David B. Steinman and Sara Ruth Watson, *Bridges and Their Builders* (New York, 1941), xv, 341. It should be noted, however, that Steinman was also a prominent bridge designer, that he worked with Lindenthal and Ammann on the Hell Gate Bridge, and that his relationship with Ammann was always competitive and perhaps at times antagonistic. See Billington, *The Tower and the Bridge*, 141-46, for an interesting analysis of the relationship between the two men. That Steinman disregarded the drama leading to the 1925 decision might be ascribed partly to his animus toward Ammann and his success. Steinman does describe the construction process at the George Washington Bridge in some detail and with admiration (340-45), but Ammann is barely mentioned.

⁷⁰ Here, in summary form, is what Binder says: In 1923, after Governors Silzer and Smith vetoed the legislation approving private tunnels, Binder himself took the initiative, studying the question of whether the Port Authority might take on the task of constructing

a bridge or tunnel across the Hudson to Bergen County, Binder's home territory. In the course of his explorations, Binder visited the Port Authority's offices, where he met the staff, including "a quiet, retiring man" named Othmar Ammann, whose table "was covered with sketches of a great bridge which he hoped some time to build across the Hudson." After talking with "this quiet man who never raised his voice under any provocation," Binder concluded that "here was a master of his profession." But as to Ammann's idea for a great bridge, "no one knew anything about it," except a few "engineering societies" which Ammann had addressed. "What was needed," Binder saw, was "a campaign of education" in the region, "creating public sentiment in its favor." Binder and his allies thereupon organized a campaign which was "opened by Senator Mackay" with a speech in October 1924. A series of meetings followed, and an association to advance the bridge project was formally organized on 7 January 1925. Jacob W. Binder, *All In a Lifetime*, 182-88, and see also 174-208. Binder's recollection that he met Ammann prior to the fall of 1924 in the Port Authority's offices is difficult to credit. In the winter of 1924-25, we know that Senator Mackay wrote to Ammann at an office (which he had borrowed for professional work) on Fourth Avenue. In any event, the Binder-Mackay organization began long after Ammann's efforts.

⁷¹ See Bard, *The Port of New York Authority*, 181-85, 193. Bard goes on to describe at length Ammann's design and administrative accomplishments at the Port Authority (193-201). Bard's conclusion is that "insofar as any joint effort may be attributed to one man, the success of the Port Authority" as a construction agency "may be attributed to Othmar H. Ammann" (193).

⁷² See the recollections of Willam Pallmé, one of Cohen's legal aides at the Port Authority in the 1930s (letter to J. Doig, March 1988), and, generally, Doig, "Entrepreneurship in Government," 16ff.

⁷³ "I learned the difference between the technique of engineers and the technique of Al Smith," Cohen writes, when he looked at blueprints and other engineering work carried out at the Port Authority by Ammann and his colleagues. "The engineer prepares every detail. He does not begin construction until all his plans are tested. . . ." But "if there is a statesman's job to do, another method must be evolved." Al Smith and other political leaders might have a goal in mind, but in order to win "concurrence from others—especially legislators"—they must engage in continual negotiation and compromise, an approach antithetical to that of the non-political engineer. Cohen, *They Built Better Than They Knew*, 123-24.

⁷⁴ Fritz Stüssi, *Othmar H. Ammann: Sein Beitrag zur Entwicklung des Brückenbaus* (Basel, 1974), 13-14, 26, 46.

⁷⁵ As Ammann wrote to Samuel Rea, president of the Pennsylvania Railroad on 12 June 1923: "If this bridge proposition is not carried out the tunnel projects already underway will be pushed and supported by popular demand. . . . A popular notion, fed by tunnel advocates and . . . widely distributed sensational statements about the enormity of a bridge undertaking, appears to be gaining ground that tunnels are preferable" (quoted in Widmer, "Othmar Hermann Ammann," 12). Rea had for several years encouraged both Lindenthal and Ammann in their bridge projects.

⁷⁶ "In daytime he worked on his project, and in the evening he made speeches wherever there was an opportunity. When he returned to his Boonton home around midnight, he was tired, but still looked forward to the distraction of a game of chess with his wife. Obstinate he fought for his idea and his project. In 1924 he became a U.S. citizen, and at last, early in 1925, the States . . . gave the green light to the Port Authority . . . to build a bridge [at Fort Lee]." Widmer, "Othmar Hermann Ammann," 15.

⁷⁷ In "Memories of My Father," Margot Ammann Durrer writes that after leaving Lindenthal, Ammann "prepared plans for and advocated construction of a more moderate bridge to cross the Hudson River between Fort Lee and Upper Manhattan. . . . Father modestly glossed over the hard struggle to get the bridge under way: the bitter controversies with others of his profession, the years of working without any income, the many lectures to political groups and ladies clubs" (29).

⁷⁸ Cohen also notes that Ammann was provided with working space—on "huge cutting room tables"—by a Boonton neighbor who was a senior official of a firm in Manhattan's garment district, and that this neighbor and Ammann's brother Ernst (who lived in Switzerland) provided some financial support in 1923-25. And Cohen refers to

Ammann's work at the Such Clay Company, which provided him with contact with George Silzer, "who would become governor of New Jersey and an influential figure in the Port Authority." The connections are not further explored. Edward Cohen, "The Legacy," 9-12.

⁷⁹ For example, Binder clearly wanted to emphasize the importance of his own role in organizing public support for the Fort Lee bridge; therefore, he had little incentive to lay out the activities of Ammann and others who worked at that task before Binder arrived. On Steinman's motivation, see note 69.

⁸⁰ For valuable discussions of engineering ideals, see Elting E. Morison, *From Know-How to Nowhere: The Development of American Technology* (Cambridge, MA, 1974), esp. 6-8, 88-96, 127-29, and David P. Billington, *The Tower and the Bridge*, esp. chap. 1 and pp. 266ff.

⁸¹ Billington, *The Tower and the Bridge*, 267, 269. Some of these characteristics are clearly focused on the kinds of works produced by the civil engineer. Perhaps the phrasing in Morison (*From Know-How to Nowhere*, 8) captures a value which would apply to engineers more generally: "a daring elegance . . . the ultimate morality of the engineer—if it works."

⁸² For an extensive discussion of these aspects of Ammann's work, see Billington, *The Tower and the Bridge*, esp. 130-34, 137-40.

⁸³ See in particular his 1918 paper, "The Hellgate Arch Bridge over the East River in New York City," which won the ASCE prize that year for its quality of analysis and exposition, his 1931 article, "Broddingnagian Bridges," in *Technology Review*, and his extensive 1933 report, "George Washington Bridge—General Conception and Development of Design." When teachers of English at an engineering school (Polytechnic of Brooklyn) prepared a book of essays to assist their engineering students to write clearly, one of several essays they selected from twentieth-century engineers was another Ammann paper, his March 1926 "Tentative Report on the Hudson River Bridge" (Walter J. Miller and Leo E. A. Saidla, eds., *Engineers as Writers* [New York, 1953], 237-51).

⁸⁴ The references to nineteenth-century engineers are taken from Morison, *From Know-How to Nowhere*, 68, 93.

⁸⁵ For a detailed discussion of Strauss and "his" bridge, see John van der Zee, *The Gate: The True Story of the Design and Construction of the Golden Gate Bridge* (New York, 1986).

⁸⁶ For an analysis that emphasizes these factors, see, for example, Danielson and Doig, *New York*, 186-94.

⁸⁷ See, for example, the studies by Herbert Kaufman, Pendleton Herring, and others, discussed in Doig and Hargrove, eds., *Leadership and Innovation*, chap. 1.

⁸⁸ To simplify the discussion, I leave aside the issue of why an extensive network of rail tunnels was not built under the Hudson River. Most New Jersey railroads terminated at the Hudson, although two did go via tunnel to Manhattan.

⁸⁹ The difficulties that Ammann encountered in attempting to persuade local groups to pull together in support of the Fort Lee bridge are suggested by his letters to Governor Silzer; see, for example, his optimistic assessment of 9 Jan. 1923, and his less happy reports of 23 Jan. 1924 and 29 Jan. 1925 (all reproduced in the Appendix).

⁹⁰ The Port Authority's commissioners were appointed by the two governors for fixed, extended terms, and the agency was expected to make its decisions as to appropriate projects (for regional development) based on broad planning criteria. The fact that the Port Authority was expected to undertake projects only if they could be financed without recourse to tax revenues added to the agency's apparent political insulation.

⁹¹ For a review of the Port Authority's evolution after 1931, and of the conflicts with Moses, see Doig, "Regional Conflict in the New York Metropolis," 206ff.

⁹² On these three cases, see respectively Elting E. Morison, *Admiral Sims and the Modern American Navy* (New York, 1942), and two essays in Doig and Hargrove, *Leadership and Innovation*: Theodore R. Marmor, "Entrepreneurship in Public Management: Wilbur Cohen and Robert Ball," and John Milton Cooper, Jr., "Gifford Pinchot Creates a Forest Service."

⁹³ See the discussion of "imaginative reconstruction" as a crucial step in analyzing patterns of power and social outcomes, in Robert MacIver, *Social Causation* (New York, 1964), esp. 258-59 and 391.

⁹⁴ Jean Strouse, "The Real Reasons," in William Zinsser, ed., *Extraordinary Lives: The Art and Craft of American Biography* (Boston, 1988), 184-85.

⁹⁵ Ronald Steel, "Living with Walter Lippmann," in Zinsser, *Extraordinary Lives*, 124.

⁹⁶ "The relation of the biographer to the subject is the very core of the biographical enterprise. Idealization of the hero or heroine blinds the writer of lives to the meaning of the materials. Hatred or animosity does the same." Leon Edel, *Writing Lives* (New York, 1984), 14.

⁹⁷ See Robert Caro, *The Power Broker* (New York, 1974), and Doig, "Regional Conflict in the New York Metropolis," 225-32.

Acknowledgments

An earlier version of this essay was presented as a lecture at the annual meeting of the Swiss American Historical Society on 22 October 1988 in New York City. The Society provided a grant in 1987 to further the research reported in this paper, and additional funds were provided by the foundation Pro Helvetia and by the Alfred P. Sloan Foundation. The author is grateful for this financial support and for the research assistance of Alexis Faust, Janice Finney, and Paul Margie, whose activities were funded through these grants.

The author is also grateful for the encouragement, advice and documentary materials provided by Margot Ammann Durrer, Werner Ammann, Sylva Brunner, David Billington, Robert Mark, Michael Mahoney, and Rebecca Read Shanor, and by Edward Cohen of Ammann & Whitney, Urs Widmer in Winterthur, Switzerland, Leon Katz and Vincent DeConzo at the Port Authority of NY&NJ, Karl Niederer and his staff at the New Jersey Archives, the staff of the New York State Archives, Elizabeth Lukach at the *Palisadian*, and Malcolm Borg and his associates at the *Bergen Record*.

