HOBOKEN AVENUE VIADUCT, STATE RTE. 139
((Route 1 Extension, Structure No. 0904-152)
Between Palisade Avenue and Collard Street
Jersey City
Hudson County
New Jersey

HAER NJ-140
HAER NJ-140

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
NORTHEAST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
U.S. Custom House, 3rd Floor
200 Chestnut Street
Philadelphia, PA 19106

HISTORIC AMERICAN ENGINEERING RECORD
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Location: Between Palisade Avenue and Collard Street
Jersey City
Hudson County, New Jersey

USGS Jersey City Quadrangle, Universal Transverse Mercator
Coordinates: 18.579310.4510160 (west end)
18.579980.4509420 (east end)

Date of Construction: 1924-1932

Engineer: New Jersey State Highway Department

Present Owner: State of New Jersey Department of Transportation

Present Use: Vehicular highway

Significance: The Hoboken Avenue Viaduct is one in a series of structures that make up the approach road to the 1927 Holland Tunnel. Known historically as the Route 1 Extension, the approach road is considered America's first limited-access, superhighway. Recognizing that the tunnel was going to introduce a tremendous volume of traffic into an already congested area, Route 1 Extension was conceived and designed to service through transportation. It marked the first time that the economic theories of railway location were applied to a vehicular road.

Built between 1924-1932, the highway retains its original design at its eastern end, which traverses a fully developed section of Jersey City on or under a series of viaducts including the 3,380'-long Hoboken Avenue Viaduct. The easternmost five miles of the original 13.1-mile-long extension is a National Register-listed historic district.

Project Information: This documentation fulfills stipulations in the Memorandum of Agreement between the New Jersey State Historic Preservation Office and the New Jersey Division, Federal Highway Administration for Structure No. 0904-152. The documentation was undertaken as part of the mitigation of adverse effects as a result of a rehabilitation project that removed original fabric from the Hoboken Avenue Viaduct, including replacement of the upper-level deck and balustrades.

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Historic Context/Background

The Hoboken Avenue Viaduct is the 3,380'-long depressed roadway or subway that carries State Route 139 on its lower level and carries local streets, including Hoboken Avenue, State Highway, and cross streets, on its upper level. The viaduct extends westward on a straight tangent from east of Palisade Avenue to near Collard Street in the Heights part of Jersey City. It is part of the limited-access, 13.1-mile-long, approach road (originally known as Route 1 Extension) to the Holland Tunnel that is considered America's first superhighway.

The approach road was planned, designed, and constructed by the New Jersey State Highway Commission between 1924 and 1932 to alleviate the tremendous volume of traffic that the 1927 Holland Tunnel under the Hudson River introduced into an already congested region of metropolitan northern New Jersey. This superhighway between the state's main north-south route (US Route 1 south of the city of Elizabeth) and the tunnel integrated a high-volume, through road with no grade crossings into fully developed urban settings in Essex and Hudson counties. It was the first time in this country that economic theories of location and operation were applied to the planning and design of an unrestricted-use, vehicular highway, a concept that was not successfully repeated until the Pennsylvania Turnpike in the mid 1930s. The Route 1 Extension represented the transfer from railroads to highways of design ideas based on safety, traffic service, and economic theory (Lavis, pp. 1020-1040), and it reflects the thinking of the New Jersey State Highway Commission under the leadership of William G. Sloan, Chief Engineer, who more than any other individual was responsible for the design (New Jersey State Highway Commission, np). New Jersey's highway became the precedent and set the standard for the planning and design of subsequent high-speed, limited-access highways.

The Hoboken Avenue Viaduct is part of the 5-mile-long, eastern portion of Route 1 Extension that is composed of a series of structures that are sequential or linked by short sections of at-grade roadway. The eastern portion of the highway traverses a highly industrialized and populated portion of Jersey City dominated by residential development crisscrossed by a myriad of 19th-century passenger and freight railroads and yards servicing the Port of New York. The highway eliminates all at-grade crossings with local streets and railroads, thus Route 1 Extension is carried on or under structure, such as the Hoboken Avenue Viaduct, Conrail Viaduct, and 12th Street Viaduct.

The highway was built at a time when there were no vehicular precedents or models to emulate. The planning, design, and execution of Route 1 Extension was very much the

product of a progressive governor (George S. Silzer); a state highway commission committed to solving New Jersey's already legion and looming traffic-congestion problems; and William G. Sloan, the state highway engineer appointed by the commission. New Jersey's approach road to the Holland Tunnel marked the first time that the economic theory of railway location, and its resultant free, uninterrupted flow of through traffic without interference with local uses, was applied to a highway design. The state used the proven theories of the economics of railroad location to justify the unprecedented cost and complicated design of the highway, and the road represented the transference to highways of design based on economic theory, safety, and traffic service. It was the genius of William Sloan and his staff of seasoned railroad men that made the seemingly obvious link between trunk or main railroad lines and the new "through trunk highway." They used Arthur M. Wellington's classic treatise, The Economic Theory of the Location of Railways (1877), to justify the unprecedented cost and the design of the Holland Tunnel approach road (Lavis, p. 1020-22). A 1930 article in Engineering News-Record stated that "the whole enterprise [Route 1 Extension] is superhighway in the fullest meaning of the term," and "it is a credit to the state highway engineers and commissioners of New Jersey that in meeting the problem which confronted them they considered no solution less than the best" ("A True Superhighway," p. 961). In 1932, Thomas MacDonald, chief of the federal Bureau of Public Roads (predecessor of the Federal Highway Administration) referred to the Route 1 Extension as "the greatest highway project in the United States today" (Reddan, p. 83), and truly it was.

The significance of the New Jersey State Highway Commission's accomplishment is enhanced when considered within the financial context of building urban highways in the 1920s. The use of federal aid for roads in cities with a population of more than 5,000 was not permitted. Even though the Route 1 Extension was this country's most expensive roadway project of the first third of the 20th century, the $40 million cost of its ambitious design and construction was borne entirely by New Jersey's state government. The state assumed responsibility for relieving its own urban traffic congestion, something that nearly all other cities and states avoided until a change in the federal funding laws in the late 1930s.

Although the highway and its component structures were designed largely for through traffic, the engineers of the New Jersey State Highway Commission recognized the need to provide local access to important points along the route. Where connections between the highway on structure and surface streets were made, the highway divided into two separate roadways to admit a central, inclined approach that was generally 24' wide to accommodate two-way traffic. Where local conditions did not permit this arrangement, the highway was carried through the center, and the structure was

widened on both sides to accommodate outside ramps flanking the highway and connecting to the surface streets. Since there were hardly any precedents for highway access ramps, the ramp system is one of the most significant design aspects of the highway and its viaducts.

Amazingly, despite the fact that the Route 1 Extension continues to serve a high volume of traffic, the east end survives largely as originally designed because there is simply no room to accommodate widening or upgrading of the highway through the tightly packed urban environment. The eastern section of the Route 1 Extension that maintains the aspects of integrity as specified in the National Register of Historic Places criteria for evaluation was nominated to the National Register in 2004.

The Hoboken Avenue Viaduct represented one of the most technically challenging, construction aspects of the Route 1 Extension project. The contractor, Public Service Production Company of Newark, New Jersey, removed more than 80,000 cubic yards of earth and trap rock, an unusually hard and dense rock that makes up Bergen Hill. To this difficulty was added the necessity of safeguarding the adjacent properties from drilling and blasting. The greatest fear was that construction of the viaduct would damage the 1857-61 Bergen Tunnel or the 1907-10 Bergen Archways (a series of tunnels and cuts), both of which carried the Erie Railroad's lines through the ridge parallel to and within 50' of the Hoboken Avenue Viaduct. Carefully placed drill holes and light charges of dynamite were required, and each day the contractor notified the railroad of the times of the blasts so that trains would not be passing. Following each shot, representatives of the railroad and contractor inspected the walls of the Bergen Tunnel and the Bergen Archways for damage. The blasting and earth-removal operations were carried out successfully but were time consuming ("Building Double-Decked Highway in Trap Rock Cut," 1926).

Physical Description of the Hoboken Avenue Viaduct

The Route 1 Extension traverses Bergen Hill in a depressed roadway or subway that extends westward on a straight tangent from east of Palisade Avenue to the east end of the Conrail Viaduct near Collard Street in the Heights part of Jersey City (photograph NJ-140-9). The cut is covered by an approximately 3,380'-long structure known as the Hoboken Avenue Viaduct. The viaduct reflects the general design characteristics used for the entire highway with through traffic in the subway separated from local traffic at street level. The subway is in a 60'-wide and 25'-deep cut with the Route 1 Extension roadway placed directly on the rock substrate. From that roadway level, the subway has the appearance of a tunnel because the local streets are carried overhead on structure (photograph NJ-140-1). It has a 14'-high vertical clearance. This

arrangement with the local streets overhead permits free communication of the pre-existing, local north-south streets in the Heights area. At the time of construction in 1924-32, it also provided by way of its upper level a new, much-needed, multi-lane, local thoroughfare, known as State Highway from Oakland Avenue west to JFK (formerly Hudson) Boulevard. East of Oakland Avenue, the street is Hoboken Avenue, the historic road from Hoboken up the hill to the Heights (photographs NJ-140-2 and NJ-140-7).

This 27'-wide upper roadway is carried on 50'-wide and 5'-deep, transverse, built-up steel girders with closely spaced, framed in stringers spans. The girders, which are of typical steel plate construction, are placed every 20' (photographs NJ-140-5 and NJ-140-6). Expansion joints are at every fourth or fifth girder, and twin flexible columns are used at the expansion joints.

Long sections of the south side of the subway are open with the transverse beams supported on reinforced concrete columns to facilitate ventilation (photographs NJ-140-3 and NJ-140-5). Elsewhere on the south side and all along the north side, the girders are supported on the concrete retaining walls. Standard design concrete balustrade originally filled all the bays between the columns on the south side, but some sections were replaced with safety-shape concrete barriers in 1979. The center barrier median was also placed in 1979 (photograph NJ-140-1).

At the west end, as the lower level roadway curves south and diverges from the upper roadway, the south side of the upper roadway is carried on a 155'-long, Warren deck truss (photograph NJ-140-8). The truss is supported on rock on one end and on an outboard column on the south side of the lower-level roadway. This design eliminated the need of columns in the median or near the edge of the lower roadway. The limit of the overhead portion of the viaduct is indicated by the curved expansion joint in State Highway near its intersection with Collard Street (photograph NJ-140-7). All steel is fully encased in concrete.

The subway is naturally ventilated by the openings on the south side of the structure and by open ventilation bays located over the westbound lanes (photographs NJ-140-2 and NJ-140-5). The open ventilator bays extend the length, and they originally had open tops enclosed by the standard-design concrete balustrades. The framed ventilation bays also serve to separate eastbound traffic, completely supported on structure, from westbound traffic that is on grade on Hoboken Avenue and State Highway. In 1979, the balustrades were replaced with safety-shape concrete barriers at the cross streets in order to improve sight lines, and open-grid steel deck panels were placed over all of the openings. Sections of the original balustrades remain at the middle of most blocks (photograph NJ-140-2).

Sources of Information

"A True Superhighway." Engineering News-Record. Vol. 104 (June 12, 1930), p. 961.

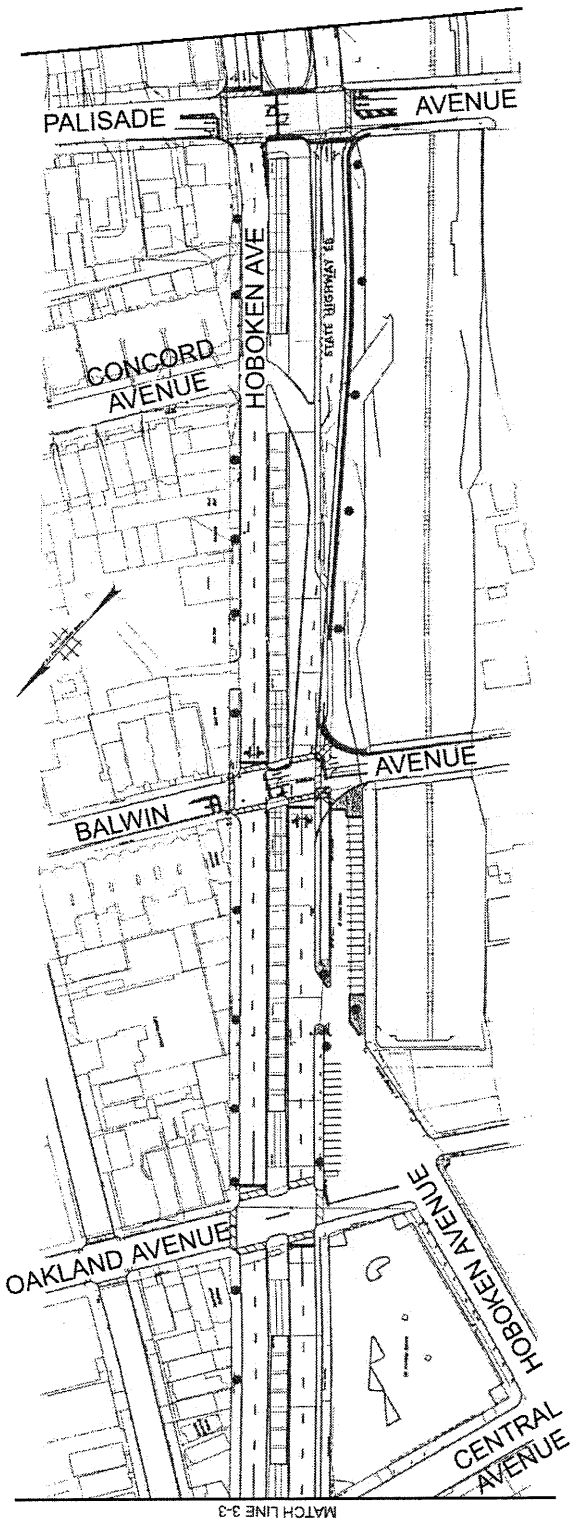
"Building Double-Decked Highway in Trap Rock Cut." Engineering News-Record. Vol. 97 (Sept. 9, 1926), pp. 415-16.

Lavis, Fred. "Highways as Elements of Transportation," American Society of Civil Engineers Transactions, Vol. 95 (1931), pp. 1020-1040.

New Jersey State Highway Commission. "Route 1 Extension." Annual Report of 1925. np.

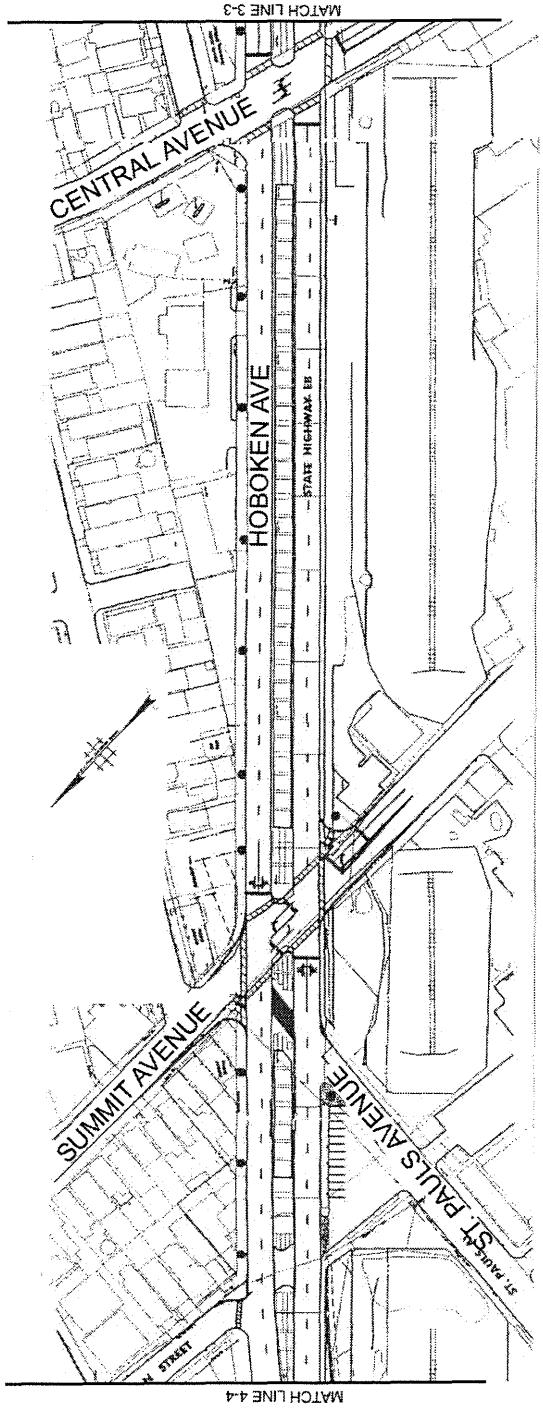
_____. Annual Reports, 1923-1933.

Reddan, Frank. "A Super-Highway System Being Supplemented by A SUPER VIADUCT." Scientific American. August, 1932. pp. 83-85.



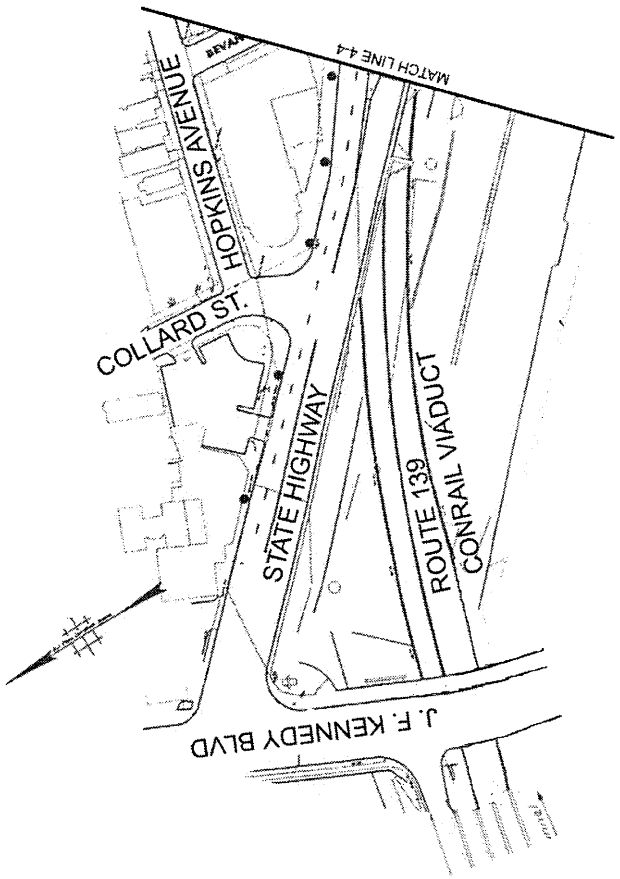
SCALE APPROX. 1"=330'

Existing General Plan
Hoboken Avenue Viaduct East Section,
Hudson County, NJ
By Lichtenstein Consulting Engineers
for New Jersey Department of
Transportation, 2004



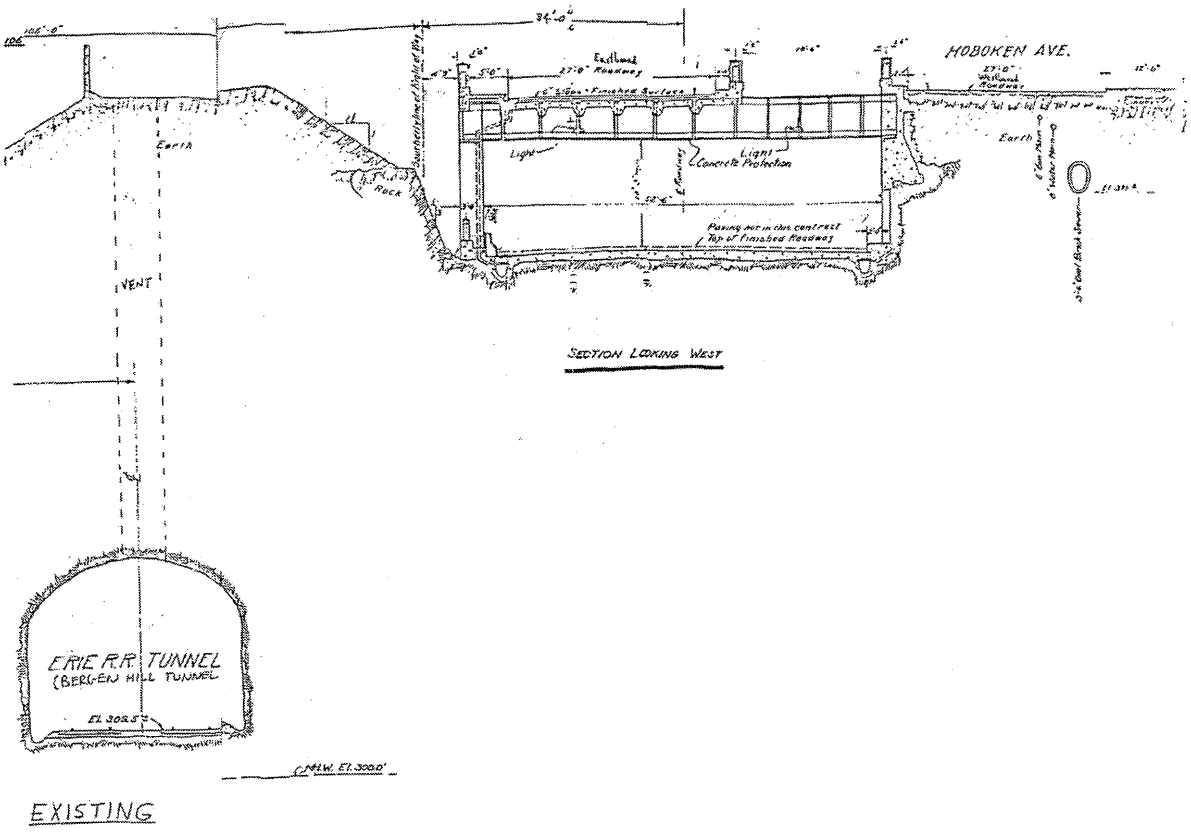
SCALE APPROX. 1"=330'

Existing General Plan
Hoboken Avenue Viaduct Center Section,
Hudson County, NJ
By Lichtenstein Consulting Engineers
for New Jersey Department of
Transportation, 2004



Existing General Plan
Hoboken Avenue Viaduct West Section,
Hudson County, NJ
By Lichtenstein Consulting Engineers
for New Jersey Department of
Transportation, 2004

SCALE APPROX. 1"=330'



EXISTING TYPICAL CROSS SECTION
HOBOKEN AVENUE VIADUCT
Hudson County, NJ
By New Jersey Department
of Transportation, n.d.