Sixth Street Bridge (Sixth Street Viaduct) **HAER No.** CA-176
Sixth Street between Mateo Street and Inez Street, over 101 Freeway
City of Los Angeles
County of Los Angeles
California

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Western Region
Department of the Interior
San Francisco, California 94107

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HISTORIC AMERICAN ENGINEERING RECORD

SIXTH STREET BRIDGE (SIXTH STREET VIADUCT)

HAER No. CA-176

Location: Sixth Street between Mateo Street and Inez Street, over the 101 Freeway, City of Los Angeles, County of Los Angeles, California

USGS Los Angeles Quadrangle, 7.5'
UTM Coordinates 11 386300-387450 3766700-3767000

Period of Construction: 1932

Engineer: City of Los Angeles Chief Engineer Merrill Butler

Builder: J. F. Knapp

Present Owner: City of Los Angeles
200 North Main Street
Los Angeles, CA 90012

Present Use: Connector street for inner City industrial/commercial and residential travel over the Los Angeles River.

Significance: Sixth Street Viaduct is an example of Moderne design, with the detailing referred to as "starved Classicism." Sixth Street Viaduct was the last and the most monumental of the twelve City of Los Angeles river bridges that were built as part of the City Beautiful Plans of the early 1900's. City beautiful plans were inspired by the civic architecture of Paris and Rome, which sought to beautify United States cities by constructing grand civic monuments, incorporating both building and public works projects.

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Date: May 7, 1996

I. DESCRIPTION

The Sixth Street Viaduct over the Los Angeles is one of ten City of Los Angeles historic bridges for which design has been completed for seismic retrofit. Sixth Street Viaduct is one example of the viaduct and bridge designs created by the Bureau of Engineering of the City of Los Angeles in order to develop a City Beautiful plan in the early 1900's. City Beautiful plans were inspired by the civic architecture of Paris and Rome, and these plans sought to beautify America's cities by constructing grand civic monuments, both buildings and public works projects.[1]

Sixth Street Viaduct is the largest viaduct built in the City of Los Angeles in the period from 1910 to 1932 (Figures 1 and 2). Sixth Street Viaduct is one of twelve significant bridges across the Los Angeles River, nine of these bridges are viaducts. With a total length of 3546 feet, Sixth Street Viaduct is the largest concrete bridge built in Califomia prior to 1945. Most of the spans are concrete girders carried on concrete piers. The river spans differ in that they are unusual asymmetrical steel through arches. These steel arches measure 150 feet in length, and they begin at the deck at the extremes but continue through the piers on the inside.[2]

Sixth Street is a main artery carrying two lanes of traffic in each direction in a westerly/easterly direction. The viaduct is 74 feet wide, stands between 46 and 72 feet high, the west portion measures 880 feet in length, and the east portion extends 2036 feet in length. Sixth Street Bridge's west portion has 12 fairly evenly spaced spans on the same skew, while the east portion consists of 31 unevenly spaced spans with different skews. The superstructure consists of ornate concrete light standards, two sidewalks, asphalt concrete wearing surface on a concrete deck, massive concrete pylons, arched reinforced concrete girders, and intermediate and end diaphragms.[3]

Sixth Street Bridge consists of a west approach abutment and Piers 1 through 11 on the west side; west, center, and east river piers; and piers 12 through 41 and an east approach abutment on the east side. Each pier consists of three columns, with each column having been constructed with incised and cast concrete, and each column having a different, irregular cross-section. Piers 5 through 11 are unique in that a ramp for access into the Los Angeles River has been constructed between the middle and southemmost columns. This bridge is the only one of the twelve significant historic bridges to have ramp access to the river.

II. ARCHITECTURAL AND ENGINEERING INFORMATION

Sixth Street Viaduct was designed by City of Los Angeles engineer Merrill Butler, who was the significant designer and Engineer of Bridges for the City of Los Angeles from 1923 to 1963. Sixth Street Viaduct is considered a major example of Merrill Butler's work. Mr. Butler was instrumental in designing many of the historic bridges over the Los Angeles River to complete the City Beautiful Plan of the Los Angeles Municipal Art Commission.

Sixth Street Viaduct is the largest bridge in the series of bridges built between 1910 and 1932, and is designed in the PWA Moderne style. Each of the supporting columns and piers is unique in design and structure. Each of the columns have been constructed with incised and cast concrete and each has a different, irregular cross-section. These geometrically designed columns complement the Streamlined Moderne design of the bridge.

Sixth Street Viaduct was intended to connect Los Angeles with the Boyle Heights region. In order to accomplish this, the piers were constructed at angles to allow the bridge to curve towards Boyle Heights. This resulted in unusual triangular shaped sections located at piers 21 and 22, 23 and 24, 29 and 30, and 37 and 38. The piers have directional shifts between each of the triangular sections. Sixth Street Viaduct's design made retrofit of the viaduct difficult due to the sizable forces that would be anticipated during a design-level earthquake (0.60 g peak bedrock acceleration).[3]

Architectural treatment of Sixth Street Bridge is PWA or Streamlined Moderne design; notable for its massive, angular sculptural forms based on classical models. This treatment of detail on the viaduct is often called "starved classicism." The structure is highlighted with Moderne detail, with two 40 foot high pylons at the east portal, 4 smaller pylons near the river spans, and 2 small pylons at the west portals.[2] The two 40 foot high eastern pylons which flank the eastern entrance to the bridge are the most prominent feature of Sixth Street bridge. These clearly mark a ceremonial entrance to downtown Los Angeles from the historic residential neighborhood of Boyle Heights.[4]

The original handrails and light standards (lacking the original light fixtures) are still in existence. There is no work proposed to be performed on the handrails, as the handrails were determined to have retained their structural integrity. The Moderne style is evident in the handrail design. A bell shaped detail, constructed in cast concrete, is dissected by a vertical flute; the bell shaped detail alternates with an elliptical opening. Rectangular shaped dentils, also constructed of incised, cast concrete, project from beneath the handrails, adding detail to the outside of the bridge. Three pairs of horizontal lines are incised into the top of each of the outer columns on each pier. These add to the ornamentation of the bridge, which still retains its stark modernism. In addition, replication of the original light fixtures is proposed as a mitigation measures for Sixth Street Bridge.

III. HISTORICAL INFORMATION

City Beautiful plans, popular in the 1920's and 1930's, were an attempt to make American city monuments, civic buildings, and public works structures emulate the architecture of Rome and Paris. The concept of City Beautiful bridges were expressed in Charles Mulford Robinson's 1909 report "The City Beautiful" to the Los Angeles Municipal Art Commission. He chided the

City for erecting truss bridges as major river crossings , arguing they are "..about as ugly as they can be. As these are replaced, handsome structures should be substituted...the concrete arch now makes practicable a bridge that is beautiful at no more cost than the old ugly iron bridge of the railroad type."[1]

In a 1913 article published in *The Architect and Engineer of California*, H. G. Tyrell makes a forceful case for City Beautiful bridges. Mr. Tyrell argued that, as a city grows, bridges will proliferate at major crossings. These many bridges, he wrote, "will stand at almost every water crossing, either as an honor or as a shame to their originators." He wrote that the bridges should be treated as public monuments, like post offices or city halls, and decorated in the same manner. "The proper role for the beautifying of public works is to adorn those structures which are of greatest public service." H.G. Tyrell thought the adornments should be Beaux Art Classicism set forth in grand fashion in the 1893 Chicago World's Fair.[1]

Passage of a large bond measure in 1923, made construction of the viaducts possible. City Engineer John Griffin wrote that the viaducts were constructed within the City of Los Angeles to "excite favorable comment from visitors who enter and leave the City by the railways," which pass under most of these bridges, and "...to raise the status of Los Angeles as an enterprising, properly developed city." When the viaducts were completed in 1932, John Griffin reiterated the intent of the program and pointed to his success in achieving that. "The viaducts themselves have taken their place among the sightly structures of the city."[1]

Sixth Street Bridge Viaduct was the last and largest of the bridges and viaducts that were constructed from 1910 to 1932. City Engineer of Bridges Merrill Butler was credited with the design of this and many of the other City Beautiful plan bridges that were constructed in the 1920's and 1930's. The plaque that is attached to the southwest handrail includes the inscription: Sixth Street Viaduct, John C. Porter, Mayor; Board of Public Works members; Members of the City Council; County Supervisors; John F. Knapp, contractor; and "Completed November 1932".

Sixth Street Viaduct has been determined to be eligible for the National Register of Historic Properties. Sixth Street Viaduct is eligible under Criterion A as an important element in the development of the Los Angeles transportation system, linking the historic residential neighborhood of Boyle Heights with downtown Los Angeles. Sixth Street Viaduct is also eligible under Criterion C as one of the series of City Beautiful bridges across the Los Angeles River. In addition, the viaduct is a fine example of a reinforced concrete bridge, for which the State of California is historically noted.

IV. SOURCES

California Department of Transportation, Historic Bridge Inventory, Arch Bridge Rating Sheet, Sixth Street Viaduct, Bridge #:53C-595S, 8/15/86

California Department of Transportation, *Historic Highway Bridges of California,* 1990

California Department of Transportation - District 7, ***Seismic Retrofit of Sixth Street Bridge (Sixth Street Viaduct),*** *Bridge no. 53-595S, Spanning Route 101 in the City of Los Angeles, 07-LA-!)!/s0.2, EA # 07212-147201 SEISMIC RETROFIT,* ***Finding of Adverse Effect,*** Ann Scheid, June 1994

City of Los Angeles, Department of Public Works, Bureau of Engineering, Structural Engineering Division, ***Sixth Street Viaduct over the Los Angeles River (East Portion) Seismic Retrofit - Strategy Meeting,*** Shailesh Patel and Dennis C. Finn, March 15, 1995

V. PROJECT INFORMATION

The design of Sixth Street Bridge made an alternatives analysis of proposed seismic retrofit designs almost impossible. None of the known alternatives could compensate for the changes in angles and the resultant forces on the bridge. As a last resort to seismically retrofit the bridge, in-fill shearwalls are proposed to be constructed at Piers 1, 8, 10, 11, 13, 15, 17, 21 and 22, 23 and 24, 26, 29 and 30, 32, 35, 37 and 38, and 41. Due to the angle configuration of Piers 21 and 22, 23 and 24, 29 and 30, and 37 and 38, transverse in-fill shearwalls will be constructed to create a triangular enclosure for more seismic stability. In addition, due to the presence of the access ramp to the Los Angeles River, piers 8, 10, and 11 will only be infilled between the center and north columns in order to keep the access ramp clear (Figures 3 through 6).

The proposed seismic retrofit of the Sixth Street Viaduct has been determined to have an "Adverse Effect" by the California Department of Transportation. The adverse effect is on the viaducts integrity of design with respect to the qualities of significance under Criterion C. Essential to the design is the visual effect of the columns supporting the span. As Sixth Street Viaduct is the tallest of the City Beautiful bridge, and the Santa Ana freeway and various railroads run under the bridge, this retrofit will be apparent to many commuters.

Proposed mitigation for the seismic retrofit is the addition of an architectural treatment on the infill shearwalls which will continue the stepped geometry of the columns on the wall surfaces. This treatment will be two inset lines which will start at ground level, parallel the columns to just below the bentcap, turn a right angle at the bent cap to the next column, turn a right angle at the adjacent column, to the ground surface (Figure 7). In addition, the historic lanterns will be replicated and will replace the existing modern cobra head light fixtures.

This document has been prepared by the City of Los Angeles in compliance with the National Historic Preservation Act as mitigation for the proposed seismic retrofit of Sixth Street Bridge/Viaduct over the Los Angeles River. The preparer would like to thank the following people for their help:

Jim Doty and Neil Drucker, Environmental Supervisor II's, for their help in compiling and reviewing the necessary information, and
Vicky Komie, Environmental Associate II, for her knowledge of the historic records and data bases required to compile this report.

ENDNOTES

1. California Department of Transportation, *Historic Highway Bridges of California,* 1990

2. California Department of Transportation, Historic Bridge Inventory, Steel Arch Bridge Rating Sheet, Sixth Street Bridge, Bridge #:53-595S

3. City of Los Angeles, Department of Public Works, Bureau of Engineering, Structural Engineering Division, ***Sixth Street Viaduct over the Los Angeles River (East Portion) Seismic Retrofit - Strategy Meeting***, Shailesh Patel and Dennis C. Finn, March 15, 1995

4. California Department of Transportation - District 7, ***Seismic Retrofit of Sixth Street Bridge (Sixth Street Viaduct),*** *Bridge no. 53-595S, Spanning Route 101 in the City of Los Angeles, 07-LA-!)!/s0.2, EA # 07212-147201 SEISMIC RETROFIT,* ***Finding of Adverse Effect***, Ann Scheid, June 1994

FIGURE 1 - VICINITY MAP

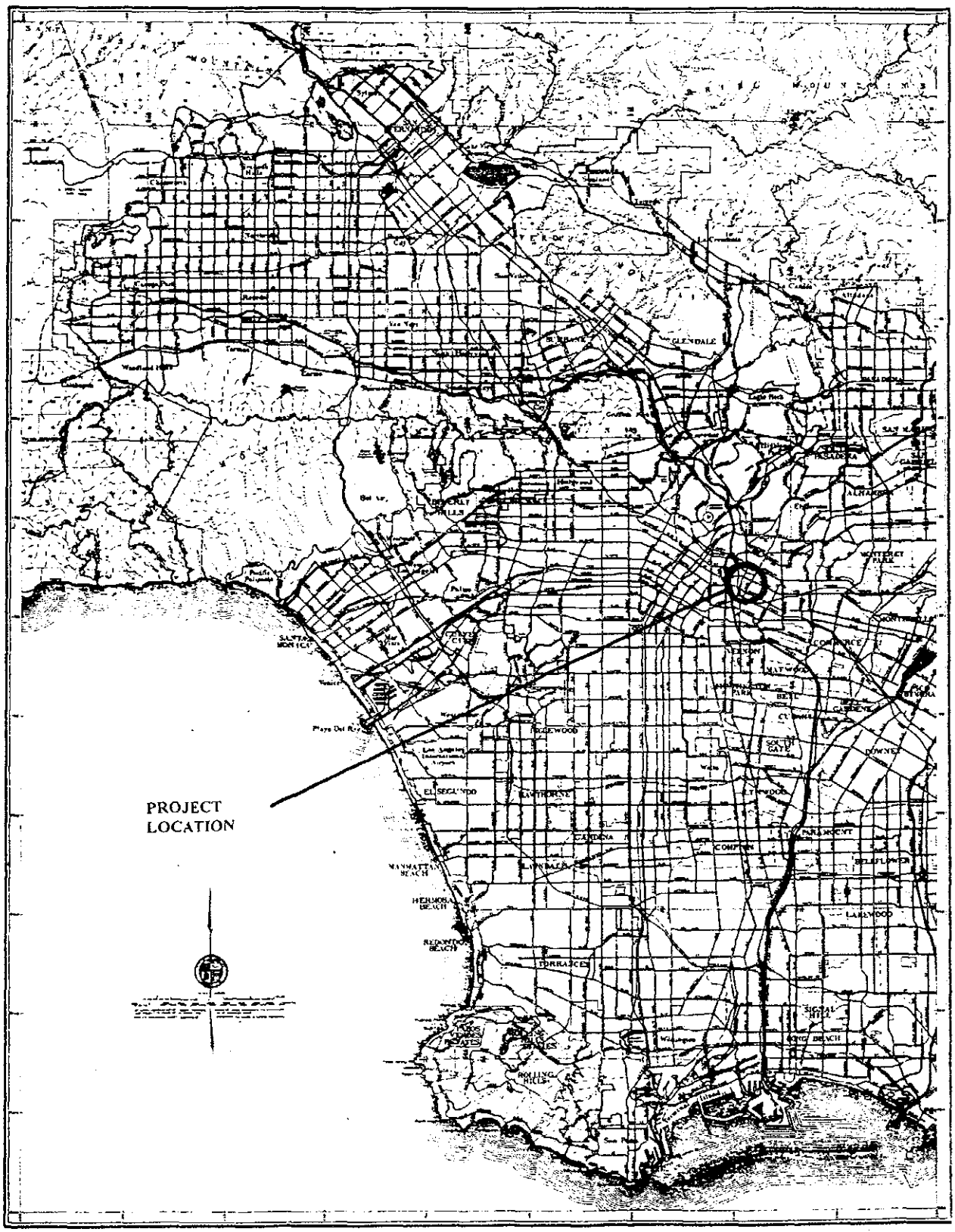

FIGURE 2 - LOCATION MAP

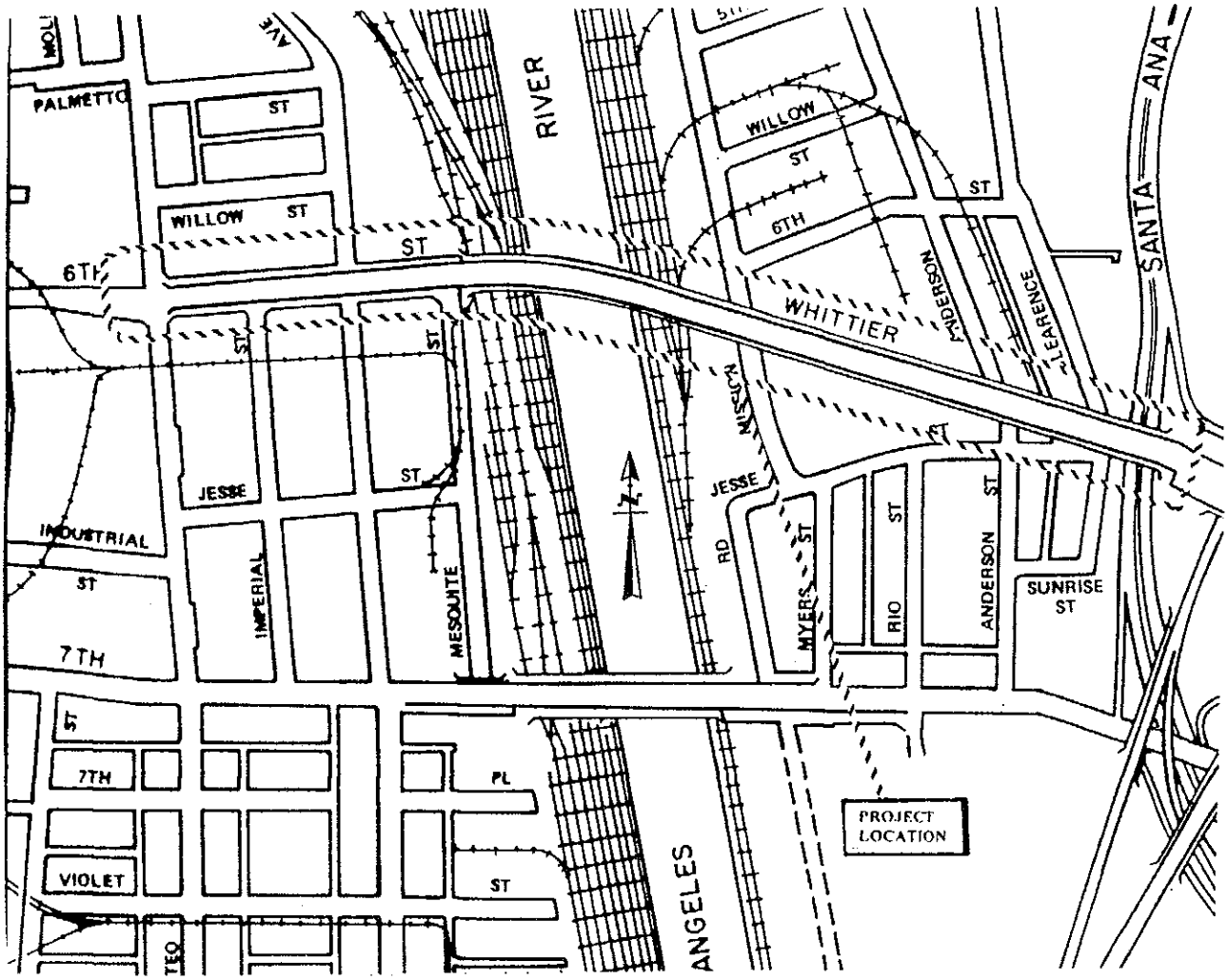

FIGURE 3 - PLAN SHEET 1

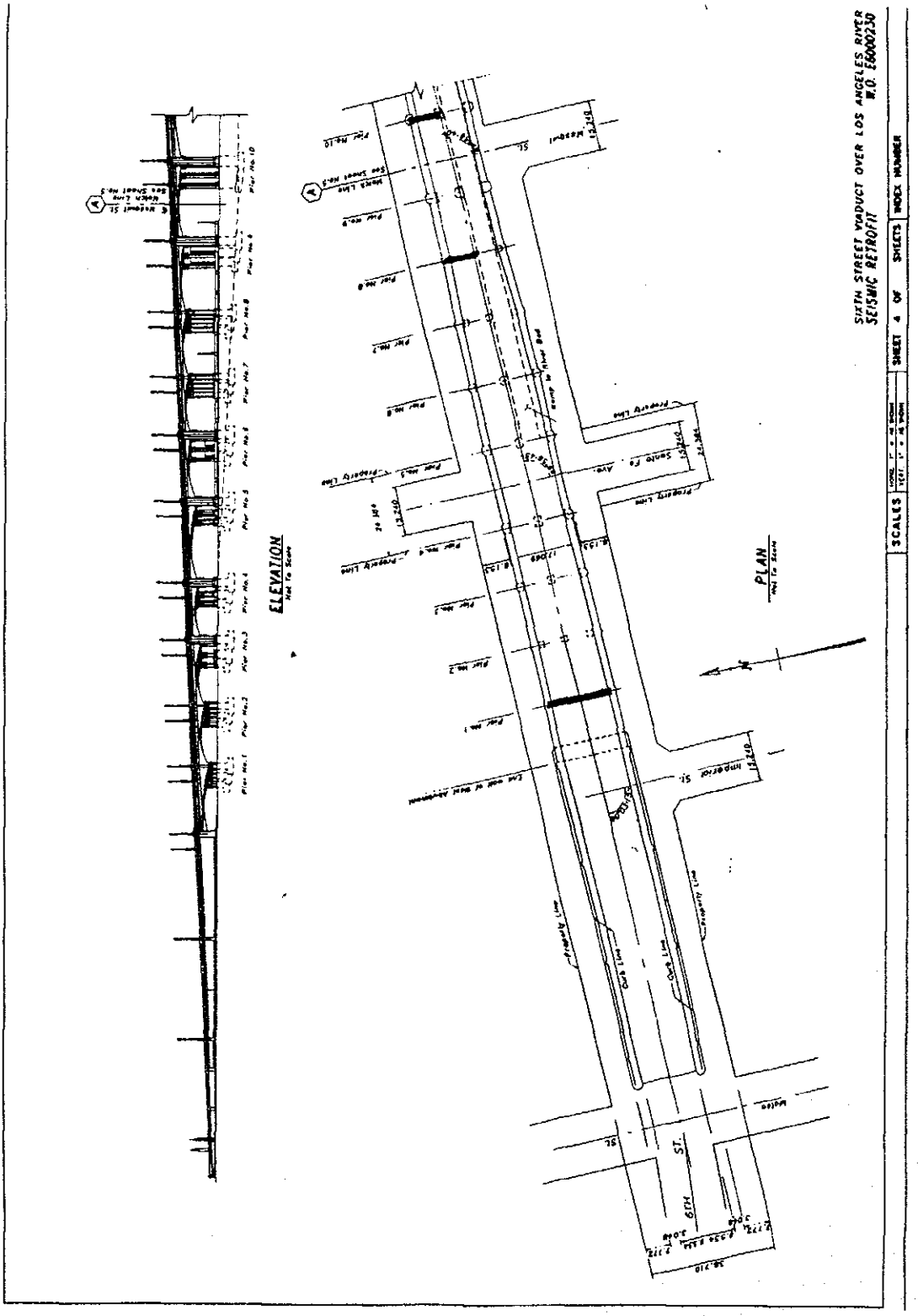

FIGURE 4 - PLAN SHEET 2

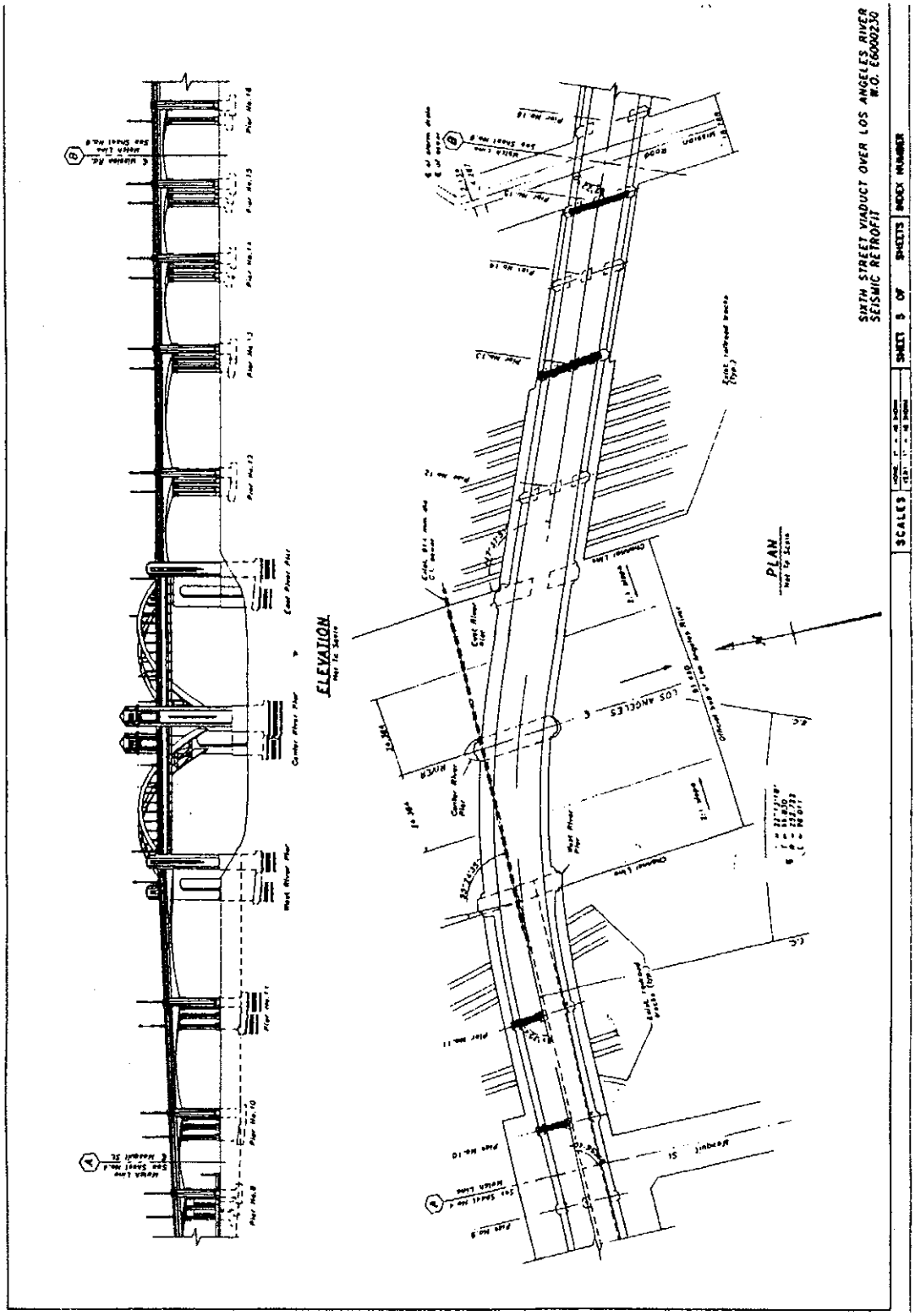

FIGURE 5 - PLAN SHEET 3

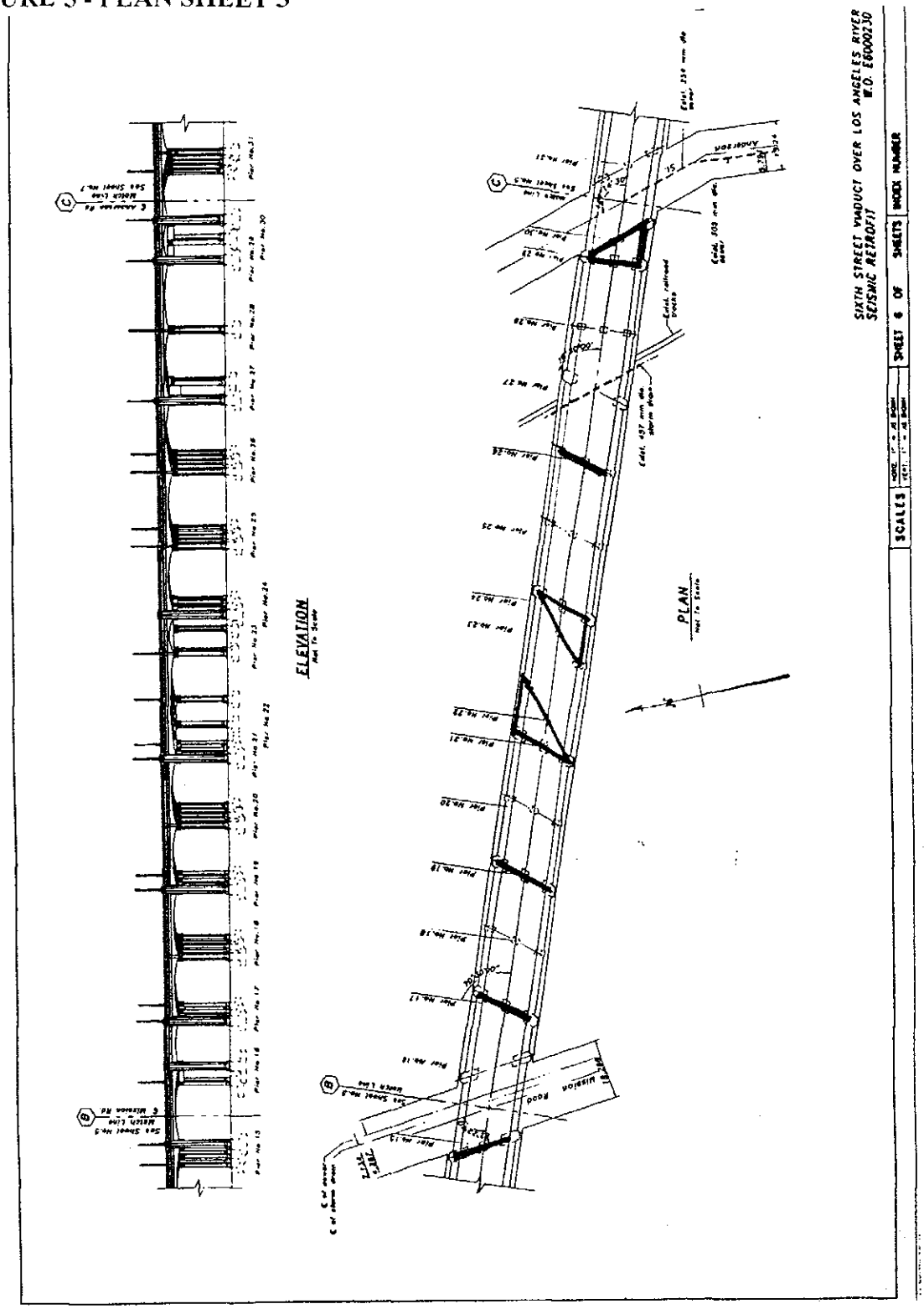

FIGURE 6 - PLAN SHEET 4

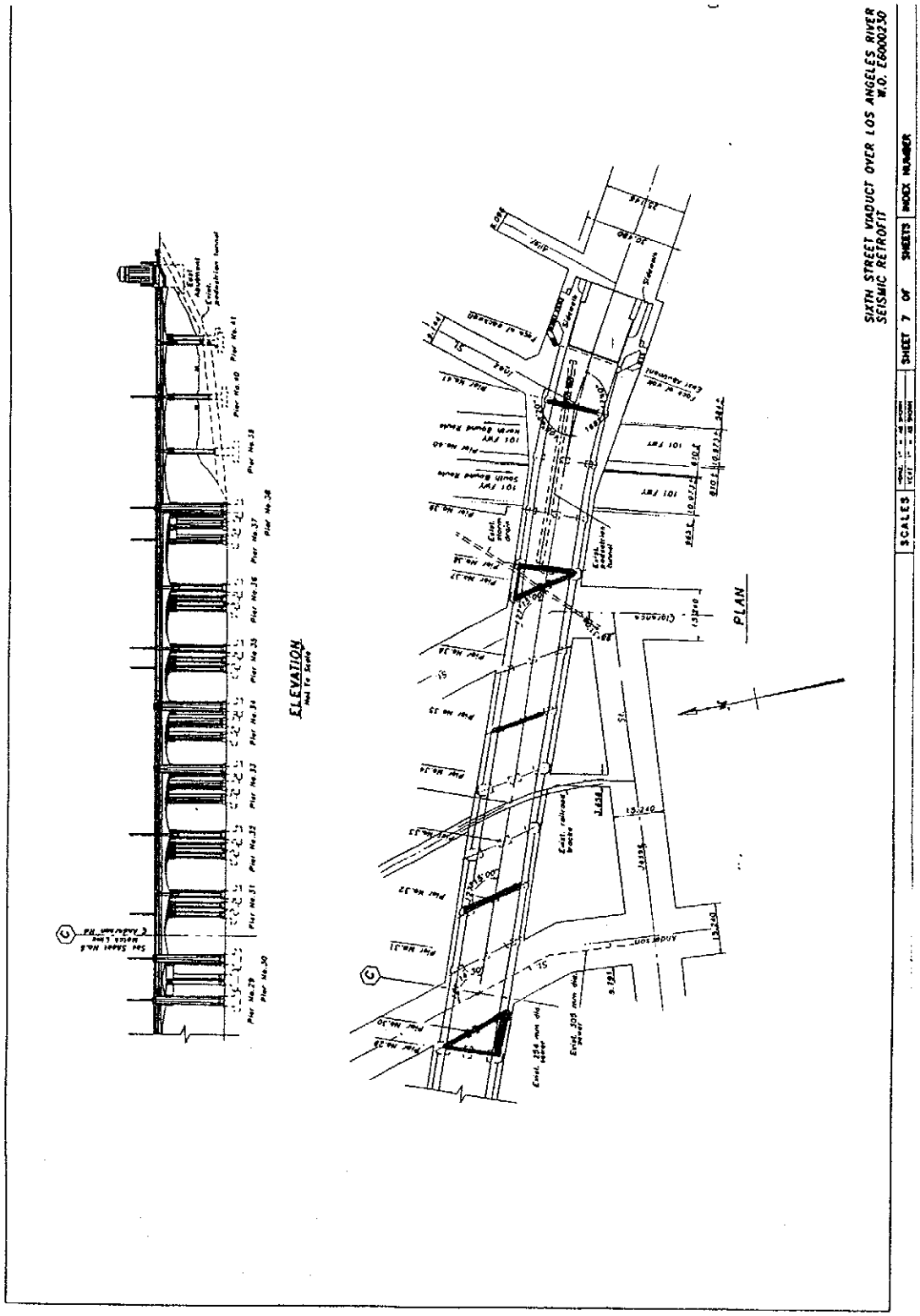

FIGURE 7 - ARCHITECTURAL TREATMENT PLAN SHEET