OPERATION, MAINTENANCE, REPAIR, REPLACEMENT, AND REHABILITATION MANUAL

LOS ANGELES COUNTY DRAINAGE AREA
CALIFORNIA

DECEMBER 1999

LOS ANGELES DISTRICT, CORPS OF ENGINEERS
LOS ANGELES, CALIFORNIA

LADM No. 1130-2-13

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FORWARD

1. This revision of the Los Angeles County Drainage Area Project Operation, Maintenance, Repair, Replacement and Rehabilitation Manual adds data sheets and maps for those project units of the Los Angeles County Drainage Area, California - Rio Hondo and Los Angeles River - Whittier Narrows Dam to Pacific Ocean. The manual includes those project units constructed by the U.S. Army Corps of Engineers, Los Angeles District, the maintenance of which is not reported in the semi-annual Operation and Maintenance Reports.

2. This manual supercedes all previously issued versions of LADM No. 1130-2-13.

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PART I - INTRODUCTION

AUTHORITY

1. This manual is prepared pursuant to the Code of Federal Regulations, Title 33, Article 208.10, Section 7, 68 Stat 809; 33 USC 709, which directs the operation and maintenance procedures for all structures and facilities constructed by the United States for local flood protection. In accordance with paragraph 10 of Section (a), and subsequent Engineering Regulations adopted by the Department of the Army, an Operation and Maintenance Manual for the completed project will be furnished to local interests to assist them in carrying out their obligations. The Code of Federal Regulations (Extract) is included in this manual as Appendix I. Certain maintenance activities may require authorization under Section 404 of the Clean Water Act (33 U.S.C. 1344), Section 10 of the Rivers and Harbor Act of 1899 (33 U.S.C. 403), or Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1413).

2. The preparation of the Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) manual is governed by ER 1130-2-304, which includes information on the policies and procedures applicable to civil works projects for which operation and maintenance is a responsibility of the Corps of Engineers; and ER 1150-2-301 which contains information applicable to projects for which operation and maintenance is a responsibility of local interests.

PURPOSE

3. This manual is intended to guide the operation and maintenance of federally constructed flood control facilities under the auspices of the local sponsor. This manual specifies the policies and procedures which are part of the statutory responsibilities of the U.S. Army Corps of Engineers with regard to the operation and maintenance of these facilities. This manual was prepared so it can be used as a guide for the operation and maintenance of flood control levees and channels in Los Angeles County, and as a guide for simplifying the reporting of operation and maintenance. The manual serves as a comprehensive index of all Federally-constructed flood control facilities in the Los Angeles County Drainage Area and specifies the policies and procedures which are part of the statutory responsibilities of the U.S. Army Corps of Engineers with regard to the operation and maintenance of these facilities.

PARTS OF MANUAL

4. The manual is prepared in seven parts.

a. PART I — Part I is an introduction to this manual.

b. PART II — Part II consists of a description of the project along with pertinent information and construction history.

c. PART III — Part III consists of a summary of general operation and maintenance responsibilities.

d. PART IV — Part IV consists of the operation procedures for all facilities and appurtenant structures.

e. PART V — Part V discusses maintenance procedures with corollary responsibilities, including periodic inspections and the training of personnel.

f. PART VI — Part VI describes reporting requirements and the preparation of the various required reports.

g. PART VII — Part VII describes the procedures for submitting a permit application to the Corps of Engineers, Regulatory Branch, (Regulatory Branch) and includes a Section 404 permit application with current instructions.

5. APPENDICES

a. APPENDIX I — Code of Federal Regulations (Extract).

b. APPENDIX II — Authorizing Document and Project Cooperation Agreement (PCA)

c. APPENDIX III — Sample Reporting Forms

d. APPENDIX IV — Sample Permit Application

e. APPENDIX V — Basis for Recommending Repairs. This appendix is expanded beyond the features of the authorized project to assist in evaluating other non-Federal flood control projects.

f. APPENDIX VI — Maps and Data Sheets. This appendix includes project summary sheets along with a project map.

SCOPE OF MANUAL

6. Basic operation and maintenance procedures are included in this manual for Federally-constructed flood control facilities under the jurisdiction of the local sponsor. Essential instructions are provided in sufficient detail to insure proper operation of the flood control protective works and maintenance of these facilities in a manner that will assure their continued functioning.

PART II - PROJECT INFORMATION

AUTHORIZATION

1. The Acts of Congress which authorized the construction of the flood control system in Los Angeles County are in two groups: previous project and existing project. The first category includes the Emergency Relief Appropriation Acts of April 8, 1935 and 1936. The second category includes the Flood Control Act of June 22, 1936, as amended by the Acts of May 15, 1937 and June 28, 1938; and the Acts of August 18, 1941; December 22, 1944; July 24, 1946; May 17, 1950; September 3, 1954; and July 3, 1958 and the Water Resources Development Act of 1990 (PL 101-640).

DESCRIPTION OF PROJECT

2. Project Location. The Los Angeles County flood control improvements consist of an extensive system of dams, debris basins, and channels within the Los Angeles River Basin. The improvements are located throughout the Los Angeles River Basin (See Appendix VI).

3. The principal drainage basin in southwestern California encompasses the surrounding mountains and the coastal plain on which metropolitan Los Angeles is situated. The total drainage area covered by Federally-constructed flood control facilities is 1,717 square miles and extends southerly from the Santa Susana and San Gabriel Mountains, Sierra Madre Range, to the Pacific Ocean. The eastern boundary lies in the Puente Hills and the western boundary in the Santa Monica Mountains and Simi Hills. This area lies principally within Los Angeles County, although small sections extend into the adjacent counties of Ventura, Orange, and San Bernardino.

4. Four major streams and numerous tributaries drain the area; these are the Los Angeles River, the San Gabriel River, the interconnecting Rio Hondo, and Ballona Creek. Relevant facts concerning each are as follows:

a. The drainage area of the Los Angeles River is 753 square miles, or about 44 percent of the drainage basin. The main channel is approximately 50 miles long and its tributaries have an aggregate length of about 225 miles. The principal tributaries covered in this manual (upstream to downstream) are: Caballero Creek, Tujunga Wash, Burbank-Western, Burbank-Eastern, Verdugo Wash, Sycamore Wash, Rio Hondo, and, Compton Creek.

b. The San Gabriel River drainage area is 698 square miles, or about 41 percent of the drainage basin. The river is approximately 58 miles long and its tributaries total about 76 miles in length. Principal tributaries in this manual are Walnut Creek, San Jose Wash, and Coyote Creek.

c. The Rio Hondo, although tributary to the Los Angeles River, connects with the San Gabriel River in the Whittier Narrows Flood Control Basin. It receives most of its flow from the latter, but also drains the adjacent area to the north and northwest. The tributary area of the Rio Hondo is 137 square miles or about 8 percent of the basin. Its length is approximately 20 miles and the aggregate length of its tributaries is about 60 miles. The principal tributaries are Sawpit Wash, Santa Anita Wash, Arcadia Wash, Eaton Wash, Rubio Wash, and Alhambra Wash.

d. The drainage area of Ballona Creek is 129 square miles or about 7 percent of the basin. The length of the main channel is approximately 9 miles; its tributaries total about 19 miles. The major tributaries are Benedict Canyon, Sawtelle-Westwood, and Centinela Creek.

5. The Flood Control Act of 1941, which was the basic authorization of the Los Angeles County Drainage Area Project as presently constituted, reflects the general comprehensive plan submitted by the Los Angeles County Flood Control District (LACFCD). This plan includes, in addition to the streams and tributaries listed above, 20 debris basins and 5 flood control dams. The latter are covered by separate Operation and Maintenance Manuals. Previous to the establishment of the general plan the Federal Government constructed 6 debris basins and one flood control dam, in addition to certain sections of channel included in the above description. Thus the LACDA project for the purpose of this manual covers all flood control facilities constructed by Emergency Relief funds, whether completed under the previous project or the existing project categories; and those constructed by regular Flood Control funds, except where those facilities are covered by separate manuals. A general plan of the project is included in Appendix VI.

CONSTRUCTION HISTORY

6. The Los Angeles County Drainage Area project was initiated under the provisions of the Emergency Relief Appropriation Act of April 8, 1935. This Act appropriated a total of $13,869,000 for the construction of 14 separate units of the Los Angeles County comprehensive plan for drainage and flood control. The project as funded was composed of the following units:

- Sycamore and Verdugo Washes
- Ballona Creek
- Lower Los Angeles River
- Los Angeles River: Fletcher to Lankershim
- Rubio Wash
- Little Dalton Wash
- Upper Los Angeles River
- Kenter Canyon storm drain
- La Cresenta: Channels and Debris Basins for Hay, Dunsmuir, Eagle, Shields, Blanchard, Haines, and Snover Canyons
- Long Beach northeast drainage system
- Alhambra Wash
- Eaton Wash
- Compton Creek
- Arroyo de los Jardines

Work was begun in September 1936.

7. On October 21, 1935, $4,000,000 of the original allocation was revoked and the project was reduced to 10 units; the eliminated units were Verdugo-Sycamore Washes, Little Dalton Wash, Upper Los Angeles River, and Arroyo de los Jardines. Subsequently an additional $3,135,000 was allocated from the ERA Act of 1935 and $3,910,000 from the ERA Act of 1936. Under the provisions of these allotments, two of the units eliminated earlier were restored and two units were combined, making a total

of 11 units in the revised project; the final allocation was $16,914,000. The project was composed of the following units:

- Los Angeles River
- Long Beach northeast drainage system
- Kenter Canyon storm drain
- Arroyo de los Jardines
- Sycamore and Verdugo Washes
- La Cresenta (Dunsmuir Canyon, Shields Canyon, Eagle Canyon, Snover-Weber Canyons, Hay Canyon, and Haines Canyon)
- Alhambra Wash
- Compton Creek
- Rubio Wash
- Eaton Wash Dam
- Ballona Creek

8. The Flood Control Act of March 6, 1936 provided for preliminary examination and survey for flood control of the Los Angeles River, the San Gabriel River, and their tributaries. The results of this survey were incorporated in the Flood Control Act of June 22, 1936. Subsequently it was decided to include the Ballona Creek Channel and tributaries in the project; the Flood Control Act of May 15, 1937, amended the June 22 Act to read: "construction of reservoirs and principal flood channels in Los Angeles and San Gabriel Rivers and tributaries thereof". The June 22 Act as amended provided an amount not to exceed $70,000,000 for this purpose.

9. On June 30, 1937, those portions of the project which were incomplete were transferred to the more comprehensive project adopted in the Flood Control Act of June 22, 1936. Those which were complete were placed in the category of previous project and their operation and maintenance accepted by the Los Angeles County Flood Control District; these facilities include Arroyo de los Jardines, which had been transferred to the Work Progress Administration for completion; Rubio Wash; Kenter Canyon storm drain; Eaton Wash Dam; the La Cresenta improvement; and the Long Beach northeast drainage system. The incomplete facilities were incorporated as part of the existing project.

10. The general plan as constituted by the Act of June 22, 1936, as amended, included the following, as of 18 October 1938:

COMPTON CREEK	Los Angeles River to Hooper Ave
ALHAMBRA WASH	
BALLONA CREEK	
LOS ANGELES RIVER	Rio Hondo to Lankershim Boulevard
SAN GABRIEL RIVER	Canyon to Santa Fe Reservoir
	Whittier Narrows Flood Control Basin to Pacific Ocean
HAINES CANYON	
HANSEN DAM	
SEPULVEDA DAM	
SANTA FE DAM	
WHITTIER NARROWS DAM	

11. The June 22, 1936 Act, as initially amended, directed the responsible local agencies to provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project, except as otherwise provided. The Act of June 28, 1938 subsequently amended this provision and directed that title to all lands, easements, and rights-of-way for the project should be acquired by the United States, or obtained by the responsible local agency and conveyed to the United States.

12. With reference to the original June 22 Act, the Board of Supervisors of Los Angeles County by a resolution dated December 1, 1937 agreed to furnish all necessary rights-of-way, assume responsibility for all damage claims, and maintain the improvements after completion, in accordance with the regulations prescribed in the Act. It was pursuant to this agreement that the completed portions of the previous project were accepted by the Flood Control District.

13. Under the June 28, 1938 modification, the United States assumed the obligation for acquisition of rights-of-way and reimbursed local interests for expenditures made by them for those items in the existing project. Furthermore, the United States assumed the responsibility for maintenance and operation of completed works of the existing project; at this point it was felt that the United States should maintain and operate all flood control structures to assure the proper functioning of the project as a whole. It was recommended that as a measure of their cooperation, local interests should furnish to the United States without cost all lands, easements, and rights-of-way necessary for further development of the project; and that local interests bear a certain percentage of costs involved in construction of additional flood control facilities.

14. As a result of this policy change the United States retained operation and maintenance responsibilities on flood control facilities completed subsequent to June 23, 1938 and arranged for such responsibilities to be transferred back for existing project facilities completed prior to this date. The specific units involved are listed below.

a. Operation and maintenance returned to the United States by agreement of 12 October 1940:

i. HAINES CANYON. The County Flood Control District accepted Haines Canyon Channel in its entirety as of May 31, 1938 and the debris basin on August 24, 1938; the debris basin and the channel upstream of station 123+30.00 were transferred back to the United States.

ii. ALHAMBRA WASH. The County Flood Control District accepted Alhambra Wash between Rio Hondo and the S.P. Ry and San Pasqual Wash on 23 October 1938. The channel upstream from Valley Blvd, including San Pasqual Wash and Mill Creek, was returned.

iii. BALLONA CREEK. The County Flood Control District accepted Ballona Creek from Redondo Blvd to Adams Blvd on 13 July 1937 and from Adams Blvd to station 14+75 on 21 March 1939. The channel was subsequently divided such that the United States accepted from La Salle Ave to Washington Blvd and from station 23+46.99 to the Pacific Ocean.

b. Operation and maintenance retained by the United States:

i. LOS ANGELES RIVER. The reach from Lankershim Blvd to Stewart and Gray Rd was retained by the United States. This maintenance also includes the section of Burbank-Western from Victory Blvd to the Los Angeles River.

ii. COMPTON CREEK. The reach from 122nd Street to the S.P. Ry was retained.

iii. VERDUGO WASH. The section from San Fernando Road to the Los Angeles River was retained.

iv. SAN GABRIEL RIVER. The channel from San Gabriel Canyon to Santa Fe Dam was retained.

These channels comprise about 43.2 linear mile's for which operation and maintenance is the responsibility of the United States. In addition, the United States operates and maintains the five flood control dams and basins constructed under existing project.

15. The Flood Control Act of August 18, 1941 approved the general comprehensive plan for the LACDA Project and provided $25,000,000 for further accomplishment of that plan. Furthermore, this Act repealed certain sections of the June 28, 1938 Act and reinstated those provisions of the June 22, 1936 Act which direct local agencies to provide without cost to the United States the necessary lands and to maintain and operate all works after completion in accordance with regulations prescribed by the Secretary of War. The provisions of this Act form the basis for the flood control policies of all subsequent construction on the LACDA project. The units in the comprehensive plan deferred in the 1941 Act are listed in figure 1. This compilation represents without substantial modification the LACDA Project as it was subsequently constructed.

16. On August 17, 1944 the Code of Federal Regulations, Title 33, was published; these regulations established the basic policies and procedures relative to Federal construction of flood control facilities which are implemented in this manual, reiterating the provisions of the 1941 Flood Control Act regarding operation and maintenance of such facilities. These responsibilities include the preparation of a semiannual report covering the operation of protective works, the maintenance ' work necessary to insure serviceability of the structures at all times, and the related inspection procedures. The regulations also establish the review procedures by which the U.S. Army Corps of Engineers determines that a proposed improvement or alteration in the protective works will not adversely affect the functioning of the facilities.

17. The provisions of these regulations apply to all subsequent construction by the Federal government in Los Angeles County. With the exceptions previously noted, the County Flood Control District operates and maintains all remaining flood control facilities which are covered in this manual. The details of operation and maintenance for each unit in the project are provided in Appendix VI. It should, however, be further noted that the semiannual report covering operation and maintenance submitted by the County Flood Control District excludes the previous project facilities, those units operated and maintained by the U.S. Army Corps of Engineers, and those units the construction of which was begun with Emergency Relief Act funds.

18. The review procedures for proposed improvements or alterations are similarly partitioned. The U.S. Army Corps of Engineers reviews and issues approval for work on those project units operated and maintained by the Government; reviews and comments on proposed work in those existing project reaches operated and maintained by the County Flood Control District; and is not consulted on work involving previous project units. The County actually issues permits to authorize such work on flood control channels and debris basins. The U.S. Army Corps of Engineers issues easements for improvement or alterations within the rights-of-way of Federally-owned flood control basins. This general policy was modified in September 1961 when the decision was made by the U.S. Army Corps of Engineers to review only hydraulic and structural requirements on those units constructed in part with Emergency Relief Act funds; this decision established a policy which is currently followed but is, however, undocumented.

19. It should be noted that the period of time during which the policy reversal relative to local operation and maintenance was in effect has created an inconsistency in the general attitude toward civil works adopted by the United States. Several attempts have since been made to resolve the question of Federal maintenance of projects solely for the benefit of local interests; in 1953 the Committee on Appropriations for the House of Representatives, concerned with the Fiscal Year 1954 Appropriation Bill, found the inconsistency "untenable" and declared that they would entertain no further requests for funds to maintain such works. They therefore recommended that operation and maintenance responsibilities be transferred to the County.

20. In a letter dated November 10, 1953 the County Flood Control District agreed to accept these responsibilities subject to the following conditions:

a. That Congress first amend existing flood control legislation in such a manner as to uniformly require all responsible local agencies throughout the nation to assume such maintenance.

b. Either certain corrective measures be completed prior to transfer to the 'County, or the Government retain responsibility for future operation.

c. That the District does not waive the right of recovery of funds expended by the District as required under the 1936 Act for which it was or will be reimbursed under the terms of the 1938 amendment.

21. Although efforts were made to fulfill these conditions, to date the conditions as a whole have not been met. The matter remains unresolved.

22. The Flood Control Acts of December 22, 1944 and July 24, 1946 each allocated $25,000,000 for further accomplishment of the general comprehensive plan. The Act of May 15, 1950 modified the general plan to authorize construction of channel improvements on Rio Hondo to conduct flood water and other releases from Whittier Narrows Flood Control Basin to the Los Angeles River and provided an additional $40,000,000 for prosecution of the plan. The Act of September 3, 1954 appropriated $12,500,000 and the final Act of July 3, 1958 authorized an additional $44,000,000.

23. A detailed index of the LACDA Project as currently constructed and a set of data sheets and maps providing pertinent construction and design data on each unit are given in Appendix VI.

24. The LACDA Project was complete with the grand total cost for the implementation of the comprehensive plan from Federal and local sources of $445,140,000 (as of 30 June 1970).

25. The Los Angeles County Drainage Area, California, Flood Control Improvement Project was authorized by the Water Resources Development Act of 1990 (PL 101-640). The Act authorized construction of channel improvements to increase channel capacity on the Rio Hondo and Los Angeles River from the Whittier Narrows Flood Control Basin to the Pacific Ocean at a total first cost of $327,000,000. At the present time the improvements are in various stages of completion.

STORM TYPES

26. Three types of storms produce precipitation in the Los Angeles River basin: general winter storms, local storms and general summer storms.

General winter storms usually occur from December through March. These storms, which often last for several days, reflect orographic influences and are accompanied by widespread precipitation in the form of rain and, at higher elevations, some snow.

Local storms can occur at any time of the year, either during general storms or as isolated phenomena. Those occurring in the winter are generally associated with frontal systems. These storms cover comparatively small areas, but result in high-intensity precipitation for durations of up to 6 hours.

General summer storms in this area are usually associated with tropical cyclones and occur very infrequently. They are known to have occurred in the late summer and early fall months, but have not resulted in any major floods during the period of record.

RUNOFF CHARACTERISTICS

27. Due to the steep slopes, runoff from the mountains concentrates quickly. However, flood and debris flows are regulated at existing dams and debris basins. Runoff from urban watersheds is generally uncontrolled and is characterized by high flood peaks of short duration that result from high-intensity rainfall on watersheds with a high percentage of impervious cover. The flood hydrographs from these type of events are typically of less than 12 hours durations. As an example of this quick response, during the flood of 16 February 1980, the flow rate in the LAR at Wardlow increased from 2/3rds of channel capacity (86,000 ft 3/s) to full (129,000 ft 3/s) in less than 1 hour; 2 hours later the flow rate had recessed back to 2/3rds of channel capacity. Similar responses have been observed since, notably in both January and March of 1995.

PROJECT COOPERATION AGREEMENT

28. The U.S. Army Corps of Engineers, Los Angeles District and the Los Angeles County Flood Control District have entered into a Project Cooperation Agreement PROJECT COOPERATION AGREEMENT (PCA) on August 7, 1995, as required by Public Law (99-622). A copy of the duly

executed PROJECT COOPERATION AGREEMENT (PCA) is included as Appendix II. The County Flood Control District will operate and maintain all the non-federal features of the Los Angeles County Drainage Area.

EMERGENCY OPERATIONS

29. General.-- The operation program which includes flood emergency procedures, is in four phases: (a) Pre-Stormflow phase; (b) Initial stormflow phase; (c) Final stormflow phase; and (d) Post-stormflow phase. Each of these phases include varying degrees of mobilization or demobilization, patrolling (including operation and maintenance), and reporting. Pertinent information on these phases is given in Part IV.

Liaison with Department of the Army, Corps of Engineers.-- During all four phases of operation, the Los Angeles County Flood Control District has the responsibility of maintaining close liaison with the Reservoir Operation Center of the Department of the Army, Corps of Engineers, Los Angeles District. Exchange of hydrologic and hydraulic data, including precipitation and stormflow data, will be coordinated between the two agencies. Pertinent information on liaison and coordination is given in extracts from the Los Angeles District's Natural Disaster Activities, OM 500-1-1, (revised annually).

Points of Contact:

(a) U.S. Army Corps of Engineers, Los Angeles District Reservoir Operation Control Center (ROC).
Radio: WUK4-ROC
Telephone #: 213- 452-3623
213- 452-3527

(b) Los Angeles County Flood Control District.
24 Hour Emergency Assistance:
Telephone #: 626- 458-HELP
1-800-675-4357

(c) FEMA - Disaster Field Office
Telephone #: 818- 431-3000

(d) State of California - Office of Emergency Services
Telephone #: 818-304-8383

REGULATORY PERMITS

30. The local sponsor, in coordination with the Corps Project Manager, shall contact the Corps of Engineers Regulatory Branch. The Regulatory Branch issues permits to authorize discharges of dredged or fill material (including excavation) into waters of the United States pursuant to Section 404 of the Clean Water Act, and structures or work in or affecting navigable waters of the U.S. pursuant to Section 10 of the Rivers and Harbors Act of 1899. Certain activities associated with the operation and

maintenance of flood control projects which take place within waters of the U.S. may require permits unless:

a. a regional general permit has been issued by the Regulatory Branch for maintenance of the flood control project, or

b. the activity qualifies for the maintenance exemption.

The exemption is for maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, and riprap and concrete lined channels and waterways. The bottom of an unlined channel or basin is not considered a structure, even when enclosed by levees. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs (typically within one year) to qualify for this exemption.

For further Section 404 guidance, See PART V, MAINTENANCE and INSPECTION, and PART VII, REGULATORY PERMIT PROGRAM of this manual.

FIGURE 1

LOS ANGELES COUNTY DRAINAGE AREA PROJECT (August 18,1941)

Project Unit

LOS ANGELES RIVER SYSTEM

Hansen Flood Control Basin*
Sepulveda Flood Control Basin*
Lopez Flood Control Basin*
Los Angeles River:
    Niagara Street to Stewart and Gray Road
    Owensmouth Ave to Niagara St and Stewart and Gray Road to Pacific Ocean
Haines Canyon
Sycamore Wash
Verdugo Wash
Concord St to Canada Blvd
Canada Blvd to Debris Basin
Compton Creek
Alameda St to Hooper Ave Storm Drain
Hooper Ave Storm Drain to Main St
Caballero Creek
Wilson Canyon and Mansfield Street
Lopez Canyon Diversion
Pacoima Wash
Blue Gum Canyon
Tujunga Wash
Burbank-Western
Burbank-Eastern System
Blanchard Canyon
Dead Horse Canyon and Royal Blvd
Winery Canyon

SAN GABRIEL RIVER SYSTEM

Santa Fe Flood Control Basin*
Whittier Narrows Flood Control Basin*
San Gabriel River:
San Gabriel Canyon to Santa Fe Flood Control Basin
Santa Fe Flood Control Basin to the Ocean
Walnut Creek System
Walnut Creek Inlet
Marshall Creek
Emerald Wash and Live Oak Wash

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*Unit covered in separate Operation and Maintenance Manual

Thompson Creek and San Jose Wash
Coyote Creek

RIO HONDO SYSTEM

Alhambra Wash
Rio Hondo: Santa Fe Ry to Whittier Narrows Flood Control Basin
Sawpit Wash
Sierra Madre Villa
Santa Anita
Arcadia Wash
Rubio Wash
Rubio Canyon Diversion

BALLONA CREEK SYSTEM

Ballona Creek
Higgins and Coldwater Canyon
Benedict Canyon
Sawtelle-Westwood
Centinela Creek

PART III -SUMMARY OF OPERATION AND MAINTENANCE RESPONSIBILITIES

OPERATION AND MAINTENANCE REGULATIONS

1. This manual implements the basic regulations applicable to operation and maintenance of Federally-constructed flood control structures which are contained in Article 208.10 of the Code of Federal Regulations, Title 33. An extract of the regulation is included as Appendix I of this manual.

2. Section (a) of Article 208.10 states:

> "(1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits."

3. This section details the procedures prescribed by the Secretary of the Army pertaining to both operation and maintenance of flood control facilities, including the establishment of an agency responsible for implementing these procedures, the inspection of the flood control structures, and the reporting of their condition.

4. In accordance with ER 1110-2-401, the District Engineer may update the manual for changed conditions or, if warranted, to correct conditions discovered during inspections. Such updating will be performed in consultation with the project sponsor.

AGENCIES RESPONSIBLE FOR OPERATION AND MAINTENANCE

5. Organizations responsible for operation and maintenance: The Los Angeles County Flood Control District and the Department of the Army, Corps of Engineers, Los Angeles District, are separately required to maintain organizations capable of adequately operating and maintaining the project units for flood control. The County shall appoint an official (referred to "Superintendent" in the basic regulations) who shall be responsible for the development and proper functioning of that County's operation and maintenance organization in accordance with instructions in this manual.

6. Assistance to be furnished by the District Engineer. The District Engineer shall:

a. Furnish to the Superintendent "as-constructed" reproducible drawings of the flood-control improvements, as soon as they are available after completion of construction.

b. Make prior determination that any proposed encroachment, improvement, excavation, or construction within the rights-of-way, or alteration of the flood control works, will not impact the channel capacity or flow characteristics, or the flood control structures; and furnish the Superintendent with a written approval.

c. Assist the Superintendent, as may be practicable, in the performance of his duties in ascertaining storm development having flood-producing potentialities, assembling flood-fighting forces and material, and initiating and carrying out flood-fighting operations.

FUNCTIONS OF THE OPERATION AND MAINTENANCE ORGANIZATIONS

FUNCTIONS

7. General. The functions of the organizations responsible for the operation and maintenance of the flood control system are traditionally divided into two categories: those concerned with operation or use of the flood control facilities, and those involved in the continuing maintenance of the facilities themselves. These functions are detailed in PART IV and PART V of this manual, respectively, and are summarized here. Also, reporting functions are detailed in PART VI of this manual, and Section 404 permit requirements are detailed in PART VII.

OPERATION

8. Functions. Operation, as defined in this context, encompasses all uses of the flood control system or any of its components. The principal and overriding purpose of the system is clearly the conveyance of storm-runoff in such a way that the impact of the runoff on the urbanized areas through which it passes is minimized and the efficient functioning of the project produces the benefits set forth in the project authorization. There is, however, an increasing awareness of the system's functional possibilities with respect to other purposes; the attitude of the Government toward alternative uses is generally favorable where such uses are compatible with the system's primary purpose. The operation function, then, is subdivided as follows:

a. Flood Operation. The flood operation function includes responsibility for operating the project in accordance with Federal flood control regulations.

b. Mobilization. The mobilization function includes responsibility for providing sufficient equipment, material, and trained personnel for adequate operation of the project units in times of flood emergency.

c. Coordination. The coordination function requires that appropriate measures be taken to insure that the activities of all local organizations connected with the protective works are coordinated with the operating agency during flood periods.

d. Inspection. The inspection function provides for scheduled patrolling of flood control activities during periods of storm runoff in order to detect and correct any condition which endangers the structure. Also included in this function is a complete inspection following each major high water period, to ascertain if any other damage has occurred.

e. Multi-Purpose. Multi-purpose Use is the term applied to all uses of flood control facilities which do not involve conveyance of storm runoff. They include, but are not limited to, water conservation, wetland / wildlife habitat, water quality functions, recreation, and development for increased land utilization.

MAINTENANCE

9. Functions. Maintenance includes all activities concerned with insuring proper and continued functioning of the project units. The aspects of the maintenance function are as follows:

a. Inspection. The inspection function requires that such inspections shall be made as are necessary to insure that the flood control facilities are maintained in a properly functioning condition. Those inspections may include, as necessary, test programs to determine the condition of those features, and investigation to determine the cause of some potential or actual malfunction and the corrective action necessary, where such cannot be adequately ascertained by direct inspection. Programs of this type may be used in making current and long-range maintenance policies. If "test programs" and "investigations" involve activities which discharge dredged or fill material (includes excavation) into waters of the United States, or involve work or structures in or affecting navigable waters of the United States, permits should be obtained from the Regulatory Branch of the responsible District Office of the Corps of Engineers (Regulatory Branch) prior to commencement of the activity.

b. Training. The training function includes responsibility for implementing a program, subject to Corps review, to provide an adequate number of trained personnel to perform the various functions of operation and maintenance under either normal or flood-emergency conditions.

c. Public Interest. The public-interest function includes the responsibility for providing police protection of the project units and the responsibility for public health and safety in connection with the various flood control facilities.

REVIEW AND REPORTING REGULATIONS

10. Project Review. Federal regulations require that no improvement or construction within the project right of-way or change in any feature of the flood control facilities be made without prior determination by the District Engineer or his authorized representative, and that the improvement or alteration will not adversely affect the structural integrity of the channel and appurtenant facilities, the hydraulic functioning of the flood control facilities (such as causing a change to the water surface profile or introducing wave action), nor violate environmental agreements. This responsibility includes all determinations concerning multi-purpose uses of the project. The regulations also imply a corollary responsibility which requires inspection and supervision of work at all stages of construction to insure that such work adheres to proper engineering standards. These responsibilities are categorized as the project review function. Any improvements or construction within the project right-of-way or change in any feature of the flood control facilities must also be authorized by the Regulatory Branch if the work involves discharges of dredged or fill material (includes excavation) into waters of the United States, or involves work or structures in or affecting navigable waters of the United States.

11. Reports. Federal regulations require that the operating and maintaining agency prepare a semiannual report to the District Engineer covering operation and maintenance of the flood control facilities, together with such supplemental or supporting reports as are required by the District Engineer.

PART IV - OPERATION

INTRODUCTION

GENERAL

1. The term "operation", as defined in PART III, encompasses all uses of the flood control system or any of its components. Clearly, the principal use of the system, the purpose for which it was designed and constructed, is to collect and convey storm runoff in such a way that its impact on urban areas is minimized. The maintenance program and flood-operation procedures are oriented toward this purpose.

2. Alternate uses are permitted under special circumstances. Federal regulations forbid the use of protective works for other than flood control purposes if that use adversely impacts flood operations or maintenance of the protective works: The District Engineer is responsible for evaluating a proposed use and determining whether or not a conflict or incompatibility with the flood control purpose exists. If the proposed alternate use requires work which involves discharges of dredged or fill material (including excavation) into waters of the United States, or involves work or structures in or affecting navigable waters of the United States, the local sponsor or the proponent of the changed use may need a permit from the Regulatory Branch. Such a use may not be implemented without approval of the District Engineer.

3. The following sections present the federal directive for operation of the facilities, the current flood-operation procedures, with their corollary functions, and a discussion of the current status of multi-purpose use activities.

FLOOD-OPERATION PROCEDURES

GENERAL

4. The operation program, which specifies flood-operation procedures, consists of four phases: pre-stormflow, initial stormflow, final stormflow, and post-stormflow. Each phase is characterized by a degree of mobilization or demobilization - a patrol procedure which includes inspection, operation of field facilities such as gates and staff gages, and any immediate maintenance, and a reporting requirement. The gage which reports electronically to the Los Angeles County Flood Control District storm center should be used as the storm flow gate for the entire river. Pertinent information on these phases follows.

PRE-STORMFLOW PHASE

5. Operations. The pre-stormflow phase occurs whenever the National Weather Service forecasts rainfall of more than 0.30 inches per hour, or more than 2.00 inches in a 24 hour period. The operations during this phase are described below.

a. Mobilization. Only such mobilization is required as is necessary to perform the operations under the pre-stormflow phase.

b. Patrolling. The completed units should be rapidly but completely patrolled to determine their readiness to accommodate stormflow. The responsibilities of the patrols include the following:

i. Spreading ground headworks and diversion works (mechanical gates) should be set to keep stormflows from inundating the spreading grounds, unless an operator is continuously on duty to monitor the conditions of the works during stormflow.

ii. Side drain gates should be freed of any debris and their proper seating checked.

iii. Equipment and material should be readied for use at debris-accumulation locations or at other locations where trouble might occur.

c. Reporting. No written reports are required for submittal to the District Engineer. However, internal documentation may be helpful if flow increases to the point where a stormflow report is required.

INITIAL STORMFLOW PHASE

6. Operations. The initial stormflow phase begins when rainfall begins. The major operations during this phase are described below.

a. Mobilization. Such mobilization is required as is necessary to perform the operations under the initial stormflow phase. However, the operation and maintenance organization should be alerted for full mobilization.

b. Patrolling. The project units should be given a routine patrolling; a staff gage level and time of reading should be recorded for each project unit equipped with streamflow gaging equipment. Finally, the requirements for the pre-stormflow phase should be checked to insure that they have been met.

c. Reporting. No written reports are required for submittal to the District Engineer. However, internal documentation may be helpful if flow increases to the point where a stormflow report is required.

FINAL STORMFLOW PHASE

7. Operations. The final stormflow phase occurs when the water surface elevation observed at any project unit equipped with streamflow gaging apparatus reaches the staff gage level at one-third capacity (see the appropriate data sheet in Appendix VI for design flows). Flood-operations begin at this point; the major responsibilities during this phase are described below.

a. Mobilization. Full mobilization is required. Each sponsor must have a "Storm Operations Manual" which establishes a staffing plan for flood fighting with shifts established for 24-hour operation. Staff must be either on duty or on-call.

b. Patrolling. Patrolling of the project units should be complete and comprehensive. If deemed an emergency by the Corps, an after-the-fact permit may be required (where the District Engineer issues a permit authorizing the emergency corrective measures completed during the storm). The responsibilities of the patrols include the following:

i. The staff gage level with time of reading should be recorded.

ii. Photographs should be made at locations where stormflow damage is occurring or has occurred, where such damage has been repaired, where unusual conditions are noted, or where visual records may be useful in making maintenance determinations.

iii. Side drain gates should be checked for proper operation. If a gated drain should backflow, the upstream end of the drain inlet should be closed.

iv. All debris accumulations that would reduce channel capacity should be dislodged or removed at the discretion of the patrolling unit.

v. Any condition endangering any flood control structure should be corrected.

c. Reporting. A stormflow report is required to supplement the spring semiannual report. In addition, the Reservoir Regulation Section of the U.S. Army Corps of Engineers should be notified immediately whenever a staff gage level indicates that stormflow has reached one-third of the channel capacity. If stormflow is very large or if unusual damage occurs, a special report may also be required.

POST-STORMFLOW PHASE

8. Operations. The post-stormflow phase occurs when the water surface elevations at the various project units equipped with streamflow gaging equipment fall below the staff gage readings indicated on the data sheets in Appendix VI, and available meteorologic or hydrologic data indicate decreasing flow. The phase ends after storm runoff has stopped, and all the major operations indicated below have been performed.

a. Mobilization. Some demobilization is possible during this phase; however, full demobilization should be delayed until the operations for this phase have been completed.

b. Patrolling. The project units should be rapidly but completely inspected. The responsibilities of the patrols include the following:

i. All damaged flood control facilities should be located, reported, and photographed.

ii. Side drain gates should be freed of debris and checked for proper seating.

iii. Each channel should be checked to ascertain whether or not the accumulation of debris/sediment has reached the point where removal should be effected (see appropriate data sheet in Appendix VI).

iv. All openings of intake structures and the entrances of conduits should be freed of debris.

v. Appropriate temporary or permanent repairs of damaged flood control facilities should be initiated.

vi. Equipment and materials should be inventoried and made ready for subsequent stormflow.

c. Reporting. No written reports are required for submittal to the District Engineer. However, internal documentation may be helpful if a stormflow report or a special report will be required.

COORDINATION WITH U.S. ARMY CORPS OF ENGINEERS

9. The operation and maintenance organization is responsible for maintaining close liaison with the Reservoir Regulation Section of the District during all four phases of operation. Exchange of hydrologic and hydraulic data, including precipitation and stormflow data, is useful in the operation procedures of both agencies. Pertinent information on liaison and coordination is given in the flood-emergency manual SPL OM 500-1-1, titled "Natural Disaster Activities", published annually by the District. This manual also covers flood-emergency assistance procedures.

AUXILIARY FUNCTIONS

10. Corollary to the flood-operation procedures outlined above are several related responsibilities described by Federal regulations and listed below:

a. Coordination. The Code of Federal Regulations, Title 33, article 208.10, section (a) reads in part as follows:

> "(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods."

b. Inspection. The Code of Federal Regulations, Title 33, article 208.10, section (g) reads in part as follows:

> "(2) Operation. Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of...debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired."

MULTI-PURPOSE USE

GENERAL

11. Multi-purpose use is the term applied to any use of the flood control system or its components which involves activities other than the conveyance of storm runoff. The Code of Federal Regulations, Title 33, article 208.10, section (h), states in part:

> "those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefore."

The criterion which forms the basis for such approval is the requirement that a proposed use not adversely affect the functioning of the protective facilities. Determinations of this nature are made as part of the review procedures outlined in PART V of this manual.

12. Although the project was designed for and its principal use remains flood control, there is an increasing awareness of the systems possibilities for use in other activities. The Government's attitude toward such alternative uses is generally favorable where such uses are compatible with flood control. Any proposed uses which involve discharges of dredged or fill material (including excavation) into waters of the United States, or involve work or structures in or affecting navigable waters of the United States, may require a permit from the Regulatory Branch. The use may also have to comply with the 404 (b) (1) guidelines which regulates activities in wetlands that are water and non-water dependent.

13. However, the National Environmental Policy Act of 1969 requires the preparation of a detailed statement on the environmental impact of any proposed action involving Federally-constructed facilities. This requirement particularly includes proposals for multi-purpose use. State and local regulations may require assessments. In any event it is the responsibility of the applicant to satisfy all regulations which are applicable to his proposed work. Approval of multi-purpose use may also be subject to public meeting procedures in addition to the usual environmental review procedures. The potential multi-purpose uses involving the flood control project are discussed in the following paragraphs.

WATER CONSERVATION

14. The use of the flood control system in water conservation is compatible with the system's basic purpose. However, it should be noted that the easements or rights-of-way which permit the passage of storm runoff sometimes are written to allow only the passage of storm runoff; legal difficulties of this type must be resolved before a water distribution plan may be implemented.

15. The problem of water supply to an urban area the size of Los Angeles have been of concern to the various municipal and regional water districts for some time. A number of units of the LACDA system were designed to accommodate the diversion of channel flow to adjacent spreading grounds or percolation of channel flow directly through the invert of the channel. Furthermore, the operation schedules for several of the flood control dams are oriented toward retaining storm runoff whenever possible for later release to spreading facilities.

RECREATION

16. Various local recreation and planning agencies whose jurisdictions include parts of the flood control system may become increasingly interested in the recreational possibilities of the flood control rights-of-way. Since these lands are likely to remain in their present condition for some time, investment in the development of recreation facilities on them for public use seems justified; the Government's attitude encourages such use. Any proposed recreational facilities that involve discharges of dredged or fill material (including excavation) into waters of the United States, or involves work or structures in or affecting navigable waters of the United States, shall be authorized by the Regulatory Branch in a Corps permit.

17. Recreational features have been or can be developed within the basins of flood control dams and along the berm roadways of the channels in the form of bicycle, hiking, and equestrian trails. This development generally involves special berm and invert access ramps, under crossings and protective fencing, and occasionally more extensive recreational features.

18. Such uses generally do not interfere with flood control activities; some concern must be given, however, for the maintenance of proper access control to prevent unauthorized access to areas beyond the recreation limits, particularly during the storm season. Recreation proposals are evaluated through the usual review procedures, coordinated with the Recreation Resource Specialists of the District.

DEVELOPMENT FOR INCREASED LAND UTILIZATION

19. There has been an increased interest in private development within flood control rights-of-way to increase the utilization of lands adjacent to these rights-of-way. This increased utilization may involve the construction of a building or bridge which spans the channel, although proposals to use the berm roadway space for parking or loading are more common. The most significant proposals for development, however, involve covering the channel itself in order to connect both sides of the channel right-of-way. This type of development creates the question of maintenance for the channel cover. Since the cover is built by and for private interests, a public agency such as the United States Government or the Local Sponsor cannot be expected to maintain the cover, yet it is difficult to assign the responsibility for maintenance to a private interest. Current policy states that each proposal for development of this type will be reviewed on an individual basis.

20. In any event, a proposed development must be compatible with existing land use zoning. Since the United States does not establish zoning regulations, the responsibility for insuring compatibility of existing zoning with a proposed land use lies with the applicant, and any conflicts must be resolved before approval is granted by the United States. Any proposed private developments that involve discharges of dredged or fill material (including excavation) into waters of the United States, or involves work or structures in or affecting navigable waters of the United States, shall be authorized by the Regulatory Branch in a Corps permit.

MISCELLANEOUS

21. Proposals are frequently made for temporary use of flood control facilities or rights-of-way for a variety of purposes other than those previously discussed. Such proposals are highly diverse, ranging

from motion picture filming to bus driver training classes, and are seldom in the interest of the general public. The Government's attitude is one of tolerance, as long as the requirement of no adverse effect on the protective works is met. Any proposal that involves discharges of dredged or fill material (including excavation) into waters of the United States, or involves work or structures in or affecting navigable waters of the United States, shall be authorized by the Regulatory Branch in a Corps permit.

22. All such proposals are evaluated under the usual review procedure; consideration must be given to the loading which a proposed use would produce on channel structures, the effects on channel capacity, potential damages, the maintenance of proper access control, potential conflicts with other multi-purpose uses or normal operation procedures, and other such factors.

WETLANDS/WILDLIFE HABITAT

23. The Corps is required by law to regulate discharges of dredged or fill material (including excavation) into waters of the United States which includes compliance with the Endangered Species Act and the Fish and Wildlife Coordination Act. These regulated activities may involve impacts to wetlands/wildlife habitats that may require revised maintenance procedures and/or mitigation for impacts to wetlands and wildlife habitats. The Regulatory Branch should be contacted when maintenance activities and/or other activities may require a permit which impacts wetland/wildlife habitats or involves impacts to species listed as endangered or proposed for listing.

24. Should the periodic removal of accumulated sediment within the outlet and adjacent channel area be deemed necessary, excavation and dredging maintenance activities shall consider potential impacts on existing resources, including but not limited to, sensitive species (e.g., endangered California least tern), coastal and inland water quality, aquatic and emergent vegetation, fish and wildlife, economics, and other general environmental resources. The periodic removal of accumulated sediment shall occur in a manner consistent with the sections on frequency of sediment removal and 404 permit requirements in Part V.

WATER QUALITY FUNCTIONS

25. The Corps requires compliance with Sections 401, 402, and 404 of the Federal Water Pollution Control Act of 1972 which supports the preservation and establishment of wetlands as biomass treatment of many various pollutants, including nutrients, suspended materials, and other pollutants. Operation and maintenance impacts shall be coordinated with the Regulatory Branch and Local Water Quality Control Agency to avoid, minimize, and mitigate for impacts to wetland water quality functions.

PART V - MAINTENANCE and INSPECTION

INTRODUCTION

OVERALL MAINTENANCE RESPONSIBILITIES

1. The previously referenced article of the Code of Federal Regulations, Title 33, section (b), states, ". . .The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood." Although the broad scope of this directive allows considerable freedom of interpretation, it clearly implies a responsibility to detect and correct any condition which might adversely affect the functioning of the flood control system. Explicitly defined are the maintenance function, which involves actual repair and restoration procedures; and the inspection function, which includes programs and procedures necessary to detect hazardous or malfunctioning conditions.

2. Implicit in this directive are also several additional functions which are less directly related to the immediate maintenance requirements, but which affect the continued functioning of the system in a manner appropriate to its design purposes. These implicit functions include the training, public-interest, project review, and reporting functions.

MAINTENANCE ASPECTS OF APPENDIX VI

3. The data sheets of Appendix VI provide relevant information of significant features of specific reaches or units of the project. This information includes a brief construction history; locations of gaging stations or streamflow measuring equipment, access ramps to channel invert or berm roadways, bridges, and other pertinent features. Also provided is a list of features the condition of which is to be checked for the semiannual reports.

4. It is the intention to make these data sheets as comprehensive and accurate as possible, particularly with respect to vehicular access to the channel invert and berms, since this type of information is critical to efficient inspection and maintenance procedures. It is therefore requested that any observed discrepancy from the features listed be reported to the Operations Branch of the District, so that the manual may be revised to reflect such changes.

MAINTENANCE FUNCTION

ROUTINE MAINTENANCE MEASURES

5. Code Requirements. The Code of Federal Regulations, under referenced Title 33, specifies in some detail the routine maintenance procedures for various types of flood control facilities. These can be best summarized as follows:

> "..(g) Channels and floodways - (1) Maintenance. Periodic inspection of improved channels and floodways shall be made by the Superintendent to be certain that:
>
> (i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;
(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;
(iv) Banks are not being reduced by the formation of shoals;
(v) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;
(vi) Riprap sections and deflection dikes and walls are in good condition;
(vii) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project work.
(viii) The capacity of the channel is not being reduced by sediment deposition beyond the limits described in Paragraph 14

...Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent."

a. The referenced article of Title 33 further states that the Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

6. 404 Permit Requirements: Title 33, parts 320-330, states that maintenance or other activities in which discharges of dredged or fill material (including excavation and substrate disturbance involving vegetation removal) into waters of the U.S., including but not limited to channels, flood ways, and impoundments, require the responsible entity to apply for and obtain a Clean Water Act Section 404 permit from the Regulatory Branch prior to commencement of such activities. In some cases a Rivers and Harbors Act Section 10 permit may also be required.

7. Exemptions from 404 Permit Requirements. Maintenance activities of currently serviceable structures and emergency reconstruction of recently damaged parts are generally exempt from the 404 permit requirement. Examples of structures are dikes, dams, levees, groins, riprap, and concrete lined channels and floodways. The bottom of an unlined (earthen or "soft") channel or basin is not considered to be a structure, even when beset by levees. Modifications or character change in scope or size of original fill designs is not considered to be maintenance. Emergency reconstruction must occur within a reasonable period of time after damage occurs (typically within one year) to qualify for the exemption. Concrete lined channels and other structures with shoals that support significant wetland vegetation growth may no longer be serviceable and thus not eligible for the 404 permit exemption; the Regulatory Branch must be notified prior to initiation of maintenance activities in such instances.

ESTHETIC TREATMENT MAINTENANCE

8. General. Urbanization adjacent to flood control projects has increased significantly in recent years and is expected to continue. Correspondingly, this has increased project visibility necessitating the need not only for a higher quality project esthetic treatment, but also for better maintenance of the finished product. With regard to current economic conditions, careful consideration should be given to future maintenance needs during preliminary planning and design stages of project development. Plant

material and earth-tone colored gravel and rock play an important role in esthetic treatment since they provide intrinsic beauty, erosion control, environmental quality, and if utilized correctly, low-maintenance characteristics. Other than plant species selection, slope steepness can be the most important factor affecting low-maintenance potential. Slopes exceeding 3 horizontal to 1 vertical are generally more labor intensive (and more expensive) to landscape initially as well as maintain later. This applies not only to plant material, gravel, and rock, but to hardscape surfaces (grouted stone, ornamental concrete and pavers) as well. The use potential of machinery (mowers, etc.) decreases proportionally as slopes increase from 3:1. It is therefore becoming increasingly more important that project slopes maintain steepness ratios not exceeding 3:1, wherever and whenever possible.

9. Esthetic treatment maintenance shall maintain or improve upon the original design concept level of esthetic quality and utilitarian effectiveness.

10. Landscaping. The following actions shall be applied, as necessary, to maintain the landscaping (trees, shrubs, ground covers, turf, and vines):

a. Supplemental watering - plans shall be watered as necessary to maintain an adequate supply of moisture within the root zone. Runoffs, puddling, and wilting will be prevented.

b. Foliage pruning - for plant health and containment, to maintain the planting design concept, or to reduce fire hazards. Pruning is generally not necessary in native type landscapes, except for plants encroaching into access roads and existing equestrian and bicycle trails.

c. Root pruning - to prevent damage to paving systems, structures, and underground piping, or as part of landscape management.

d. Pest control - (including herbicides, insecticides, rodenticides, and fungicides) as necessary for plant or plant community health. State certified applicators and EPA approved methods and materials shall be used.

e. Weed abatement - apply in a timely manner prior to weeds going to seed to maintain planting concept. Methods utilized may be herbicide (chemical) treatment, by hand methods or by mechanical methods, including mowing and weed whipping.

f. Fertilization and soil amending - as necessary for each plant grouping. Soil testing may be necessary in problem soil areas.

g. Plant removal - if necessary for plant community health (i.e. overcrowding, etc.) with consideration given to plant replacement.

h. Plant replacement/reseeding - if necessary to maintain planting concept, or for erosion control.

i. Additional plantings - to correct design deficiencies or to strengthen the planting design concept, or for erosion control and slope protection.

11. Hardscaping. Hardscaping, which must be maintained to appear as originally placed, basically consists of the following features:

a. Gravel and stone ground covers - remove debris, regrade gravel and stone areas as necessary, and supplement as needed with in-kind material.

b. Paving systems - (including ornamental grouted stone, stamped concrete, paver blocks and asphalt pavements) - regrout, repair, repave, replace material in-kind, excavate and regrade, as necessary. Keep areas clean and free of debris.

c. Ornamental walls, fencing and barriers - (including planters, artificial stonework, rock structures, and bollards). Replace material in-kind, repair, repaint or restain, as necessary.

d. Concrete walls - include in periodic inspections for structural integrity, and repair as necessary.

e. Signage, sign pedestal, and wall murals (i.e. artwork) - replace, repair, repaint, and restain as needed; remove visual obstructions which may include plant material trimming as necessary; and keep surfaces clean after plant community establishment.

f. Lighting systems - replace and repair lighting elements immediately as necessary.

g. Graffiti and vandalism - repair, remove, repaint and restain as necessary, immediately and continually to discourage further damage.

12. Irrigation Systems. Irrigation systems shall be repaired as necessary and upgraded to match new technology when applicable and available. The systems shall be adjusted to compliment plant growth (such as extending sprinkler risers as plants mature).

13. Site Inspections. After plant community establishment, the plants shall be inspected at least once a year for native or other drought-tolerant landscapes (i.e. self-sufficient landscapes); for ornamental, permanently irrigated planting areas, the plants should be inspected monthly.

NON-ROUTINE MAINTENANCE

14. Certain maintenance procedures which are not explicitly described as routine by the sections of referenced Title 33 are implied by the directive to insure serviceability in times of flood. Such procedures would include repair of any damage caused by storm runoff, maintenance of the berm roadway and the right-of-way fencing (so as to provide unimpeded access to the project units at all times), restoration of subdrain system, and other such required maintenance which occurs on an irregular basis.

INSPECTION FUNCTION

INSPECTIONS

INSPECTION FUNCTION

INSPECTIONS

15. General. The Code of Federal Regulations, under the referenced article of Title 33, states that inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and at such intermediate times at such may be necessary to insure the best possible care of the protective works.

16. Purpose. The purpose of these inspections is to determine whether or not each project unit and the flood control system are in a properly functioning condition. This responsibility involves locating and recommending repairs for any damage which may have been caused by storm runoff or the action of other natural forces, insuring that access to all project units is maintained at all times, and preventing unauthorized encroachment on or access to the project right-of-way. The Code of Federal Regulations is quite specific on this point; section (a), under the referenced article of Title 33, reads in part:

> "(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities."

17. Criteria. Appendix V provides the criteria for locating and recommending repairs. It defines each reporting feature, and briefly summarizes the features' pertinent design criteria. This information provides the inspection personnel with a design background to assist in determining deviations from an "as constructed" condition. Typical deviations are listed with the repair terminology to be used in recommending repairs. Figures 1 and 2 at the end of Part VI provide a complete listing of reporting features.

18. Reports. The results of the periodic inspection are noted in the appropriate semiannual report; these results provide the basis for the maintenance program as a whole and in particular, the investigation and test program.

INVESTIGATION AND TEST PROGRAM

19. Purpose. The investigation and test program is designed to provide criteria for making current and long-range maintenance determinations. A test program is to be initiated whenever the condition of a reporting feature cannot be adequately determined by direct inspection. An investigation program is to be initiated when the cause of a reporting feature's condition and the necessary corrective actions are not immediately apparent.

20. Types of Programs. The various types of programs are described below.

a. In general, most investigation and test programs are recommended when the spring semiannual report is prepared. Those programs, which are completed in time to implement repairs during the summer months, are classified as "short-term programs".

b. Those programs that require more than one year to develop adequate information are termed "continuing programs".

c. Certain reporting features require "periodic programs" whose initiation and continuance is a function of regularly established annual periods rather than by specific recommendations during the semiannual inspections. Such periodic test programs may in turn recommend investigation programs which may be implemented on a short-term, continuing, or periodic basis.

21. Relationship of Programs to Semiannual Report. The semiannual operation and maintenance report forms are described in PART VI and illustrated in Appendix III. The sequence has been prepared for a typical reach and shows each phase of the report with backup documents. The following paragraphs provide specific information on the entries to be made in certain columns of the report form.

a. Column 5. For reporting features involved in periodic test programs, no mention need be made of deviations in column 5 of the semiannual report. However, for reporting features involved in investigation and non-periodic test programs the deviation shall be reported in column 5.

b. Column 14. Whenever an investigation or test program is initiated an appropriate notation is to be made in column 14.

c. Column 19. Whenever an investigation or test program is either completed before the fall semiannual report or continued after its submittal, an appropriate notation is to be made in column 19, as indicated in PART VI. Whenever this notation indicates that a short-term or continuing investigation program is complete or that a test program has begun, a supporting report covering the program should accompany the semiannual report.

22. Basis for Initiating Program. The criteria for determining deviations from "as constructed" conditions are provided in Appendix V. Given an observed deviation which requires further study, the factors to be considered in conducting an investigation or test program are also described in Appendix V. This appendix provides the information necessary to develop and conduct such a program.

23. Special Test Program Requirements. Certain recurrent problems with reporting features require more detailed discussion.

a. Concrete Cracking. Whenever a test program is recommended to determine the condition of cracks in reporting features, the test program will include measurements to determine if the crack is stable; or if not, the rate of displacement and crack progression. If the test program indicates that the crack is stable, the appropriate repair is recommended in column 15 of the semiannual report. However, if the crack is found to be active, an investigation program is recommended to determine the cause of the crack and the necessary corrective action.

b. Scour Areas. Any unlined channel may experience scour. This is especially true where major side channels or side drains enter the channel. An annual test program is required to determine the extent of this scour and to follow its effects; this test program will include a survey to plot the channel profile in areas that scour is noted.

c. Subdrain Systems.

i. For each subdrain system a test program is required annually for three years after construction and every three years thereafter, provided the test indicates normal operation. If surging or cleaning is necessary to obtain test results, the system shall be tested every year until a three-year period shows normal operation.

ii. A test program is always carried out in conjunction with normal maintenance flushing operation. The procedure for the various types of subdrain systems are given below.

(1) Pipeless gravel drains, with weepholes shall be flushed at each weephole with sufficient water to develop a clear discharge at adjacent weepholes.

(2) Pipe drains with weepholes shall be flushed from weephole to weephole with sufficient water to develop a clear and free-flowing discharge of at least five cubic feet per minute out of adjacent weepholes (as measured with calibrated equipment).

(3) Pipe drains with clean-out and open outlets shall be flushed from clean-out to discharge head with sufficient water to develop a clear and free-flowing discharge of at least five cubic feet per minute at the open outlet (as measured with calibrated equipment).

(4) Manhole systems shall be flushed from clean-out to manhole and from manhole to manhole with sufficient water to develop a clear and free-flowing discharge of at least five cubic feet per minute at the downstream manhole (as measured with calibrated equipment).

d. Side Drains.

i. The Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) govern the discharge of municipal, industrial, or commercial wastes into navigable waters of the United States or tributaries thereof; this classification includes all channels in the flood control system. An annual test program is required for side drainage facilities carrying effluent of any kind except storm runoff or ground water baseflow in order to predict the rate of deterioration caused by the effluent, to provide a basis for annual repairs or replacement, and to determine whether health and sanitation requirements are being violated. The test information should include the quantity of flow, temperature of the waste with its acidity or alkalinity expressed in pH values, the extent of concrete staining or deterioration, and the extent or growth, if any.

ii. All side drains are subject to hydraulic and structural review under the provisions of the above cited act. In cases involving waste discharge, the review also includes the degree of rehabilitation or renovation required to maintain flood control structures in proper operating condition; this involves analysis of corrosive action, gaseous emissions, sediment depositions, and similar factors. In addition, the State Regional Water Quality Control Boards assume the responsibility for monitoring the discharge of water under the 1972 amendments to the Federal Water Pollution Control Act and any applicable state regulations; a permit from a State Board is required with a permit from the appropriate flood control organization before a side drain can be connected to a flood control facility. The maintaining

organization should ascertain from the appropriate Board which observed discharges are covered by permit; those discharges which are not should be reported to that Board.

iii. The discharge of oil or other hazardous materials into the flood control system is prohibited. Reports of such discharges should be directed to the Operations Branch of the District and will be handled by existing Federal and State contingency plans (see the appropriate Environmental Protection Agency, Coast Guard, or State Fish and Game Contingency Plans).

e. Any improvements, excavation, construction, or alteration, which involve discharges of dredged or fill material (including excavation) into waters of the United States, or involves work or structures in or affecting navigable waters of the United States, shall be authorized by the Regulatory Branch under a Corps permit.

TRAINING FUNCTION

TRAINING RESPONSIBILITIES

24. Program. The training responsibilities of the operation and maintenance organization include the establishment, with annual evaluation and revision, of a regularly scheduled program to provide training in certain critical areas.

a. Inspection Training. Inspection training will be designed to insure uniform inspection procedures, uniform reporting, and inspection controls over repairs and project construction; to qualify alternative personnel for each type of inspection; and to supplement and verify adequacy of the inspectors.

b. Repair Training. Repair training is intended to insure uniform repair procedures and competent workmanship. A corollary responsibility is the development of standard repair methods, in cooperation with the District. These methods should be documented in written form to insure that the techniques and procedures are not lost with personnel changes.

c. Investigation and Test Training. Training in the investigation and test program will be designed to develop and maintain uniform methods, procedures, and valid program results.

d. Operation Training. Operation training is designed to maintain crews adequately trained in operational procedures. Such training shall conform to the specifications of the flood-emergency manual, SPL OM 500-1-1, titled "Natural Disaster Activities", published annually by the District.

PUBLIC-INTEREST FUNCTION

POLICE PROTECTION

25. The operation and maintenance organization is responsible for providing police protection for the project units, obtaining adequate ordinances protecting the units, and obtaining limited police authority for the operation and maintenance organization. Adequate policing will minimize litter and damage due

to malicious mischief. The operation and maintenance organization is responsible for removing litter and repairing any such damage.

PUBLIC HEALTH AND SAFETY

26. The operation and maintenance organization should develop liaison with organizations responsible for public health in order to prevent the accumulation of waste discharges, insect-breeding areas, and other menaces in the flood control rights-of-way.

27. The Code of Federal Regulations, under referenced Title 33, clearly states that unimpaired access to all flood control facilities by authorized personnel be provided at all times. However, this access must be restricted to prevent trespassing or uses which might interfere with flood control. The facilities may be regarded as an attractive nuisance, and adequate fencing must be provided to prevent unauthorized persons, especially children, from gaining access to the right of-way and harming either themselves or the facilities. However, security provisions must consider recreational uses, where applicable. The coordination of project features and access with emergency service organizations such as police, fire, and swift water rescue are the responsibility of the local sponsor.

PROJECT REVIEW

AUTHORIZATION

28. The basic authorization of the Project review function derives from the Code of Federal Regulations, Title 33, article 208.10, section (a), which reads in part as follows:

> "(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval."

29. These specifications apply to the Project review for all Federally authorized flood control facilities.

REVIEW PROCEDURES

30. Federal regulations assign the responsibility for providing an interface between the general public and the U.S. Army Corps of Engineers project review to the Local Sponsor. Applications for permits are submitted to the Local Sponsor, which requests comments from the District and then issues or denies a permit. This procedure applies to all facilities for which reports are made to the Corps of Engineers, but does not apply on those units for which reports are not made.

31. The review procedures adopted by the Corps of Engineers in the Los Angeles District are detailed in the "Flood Control Projects Manual".

32. The project review by the District includes responsibility for engineering evaluation of any improvement or alteration. In most cases, such improvements are part of the purpose for which the flood control right-of-way was obtained, such as street or utility crossings and side drain connections. In some cases, however, an evaluation must be made to determine if the proposed work will adversely affect the functioning of the flood control facilities. The responsibility for determinations of such multi-purpose uses is also included in the District's review procedures.

33. The District maintains "as permit constructed" plans which reflect all changes or modifications in the project units. Maintenance of current plans requires drawings or prints of all proposed work and a completion notice to indicate that a project is finished.

34. Applications for a permit to modify the Los Angeles County Drainage Area project must be reviewed and approved by the District with regards to potential hydraulic impacts. For the channels where flow conditions are subcritical and stable, numerical modeling of proposed modifications using a standard one-dimensional flow procedure will be sufficient. To facilitate the review, a master hydraulic numerical model based on the Corps of Engineer's HEC-RAS computer program will be developed and maintained by the District. This model will be provided upon request to all applicants for a permit to modify the project. The applicants will be required to demonstrate the impacts of the proposed modifications on the design water surface profile by using the HEC-RAS model. After the permit application is reviewed and approved, and the construction of the proposed modification is completed, the District will update the master HEC-RAS data file accordingly. However, different requirements will apply for channels where the flow conditions are near critical and are therefore very unstable. Furthermore, the flow conditions are highly three-dimensional, with many large standing waves extending across the water surface and reflecting off of the channel sides. The flow conditions are especially sensitive to disturbances caused by certain bridges and access ramps, and by openings in the channel sides at large storm drain outlets. These complex and unstable flow conditions can not be analyzed adequately with a simple one-dimensional numerical model using the HEC-RAS program. Therefore, the District may require a permit applicant to submit an evaluation of the proposed modification based on the Corps two-dimensional numerical model incorporated in the High-Vel 2D computer program, or by physical model testing. The decision to require either more rigorous numerical modeling or physical model testing will be made by the District on a case-by-case basis. The decision will be based on the type and extent of the proposed modification, and the complexity of flow conditions in the channel at the location of the proposed modification. The District will make this decision based on a detailed review of the hydraulic data presented in the applicable project hydraulic design reports and physical model testing reports.

35. An important part of the project review procedure is the requirement that an appropriate block-letter channel station number visible from invert, access ramps, or berm roadway be placed wherever possible to identify the location of a reporting feature for inspections or maintenance work. On vertical channel or spillway walls the block-lettering should be at a height above the invert which is convenient for lettering and readily visible. On grouted stone or stone side slopes, the lettering should be applied on flush mortar pads. This identification is the responsibility of the operation and maintenance

organization. Where initial stationing was placed as a part of the construction contract, the local sponsor is responsible for maintaining the markings.

PROJECT INSPECTIONS

36. The operation and maintenance organization will inspect project construction to insure that improvements or alterations do not interfere with the proper functioning of the project and that the construction follows acceptable standard engineering practice. These inspections will also verify locations to insure that the "as-permit constructed" plans accurately reflect the actual condition of the project unit.

PART VI - OPERATION & MAINTENANCE REPORTS

REPORT FUNCTIONS

GENERAL REPORTING ACTIVITIES

1. The basis for the report function is given in the Code of Federal Regulations, Title 33, article 208.10, section (a) which reads in part as follows:

> "(6) It shall be the duty of the Superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works."

2. Although the operation and maintenance organization is required to submit several types of operation and maintenance reports to the District Engineer, all reporting activities must be oriented toward the submittal of two basic reports each year. These semiannual reports are then supplemented by additional reports as necessary.

3. The following sections of this chapter define the required reports, report organization, and reporting terminology. The reports can be narrative letter reports or summarized on a form designed by the sponsor. The suggested forms included in this document have been used on other projects and are included as examples. The only requirement is that the information identified be included in the reports.

TYPES OF REPORTS

4. Semiannual Operation and Maintenance Report. The semiannual reports, which are the basic communication on the functioning of the flood control system, are prepared in two phases: the spring phase, which indicates the maintenance requirements of the project units at the end of the flood season; and the fall phase, which indicates the ability of those units to accommodate storm runoff after the summer maintenance. The two phases, with the supporting reports which may accompany the basic reports, give a successively revised picture of the operation and maintenance of the project from the start of one flood season to the start of the next.

5. Quarterly Operation and Maintenance Report. Federal regulations require a complete inspection at least every 90 days to determine the need for temporary or permanent maintenance and to initiate the necessary maintenance for the project units. However, because two such quarterly inspections coincide with the two phases of semiannual reports, the requirements for quarterly reports are as follows:

January	A separate report is required on a rapid inspection to determine maintenance needs. A copy of this report is also included with the spring semiannual report.
April	The April quarterly inspection is for the sole purpose of determining whether conditions exist that would interfere with the detailed inspection required for the spring phase of the semiannual report. A separate report is not required, since the results of the April inspection are indicated on the semiannual report form.

July — The July quarterly inspection is essentially a progress report on summer maintenance. A separate report is not required, although a copy must be included in the fall semiannual report.

October — Maintenance work performed during the summer is repeated in the fall phase of the semiannual report; a separate report for the quarterly inspection is not required.

The required separate quarterly reports need only be very brief summary descriptions of maintenance needs and the status of the project units.

6. Investigation and Test Program Report. A supplemental report that accompanies the fall phase of the semiannual report is the investigation and test report. Such a report presents the findings of each test program which is carried out to determine the condition of a reporting feature and the results of each investigation program undertaken to determine the cause of a reporting feature's condition and the necessary corrective action.

7. Stormflow Operation Report. A supporting report which accompanies the spring phase of the semiannual report is the stormflow operation report, which contains the log of operations for each project unit during those periods in which storm runoff is above the staff gage reading indicated on the data sheets in Appendix VI. The log report form shall be the responsibility of the operation and maintenance organization.

8. Special Reports. Special reports are prepared to describe any unusual occurrence which affects the flood control system; such phenomenon may include large flood flows or unusual damage from storm runoff, earthquakes, or other causes. A Special Report is to be transmitted to the District Engineer within one week of the occurrence. A copy is to accompany the next following semiannual report.

9. Manual Revision Report. The revision report should include comments, suggestions, and additional data from those directly concerned with operation and maintenance, as well as policy-making, administration, funding, and programming information. The District is particularly concerned with maintaining the accuracy of this manual; since it will be periodically revised, observed discrepancies or inaccuracies and comments relative to the manual's effectiveness in fulfilling its intended function will be incorporated where appropriate.

REPORT ORGANIZATION

10. Time of Submittal. The spring phase of the semiannual report shall be submitted to the District Engineer on or before 1 June and the fall phase on or before 1 December. Included with these reports are any quarterly reports, investigation and test reports, stormflow reports, and manual revision reports. Special reports are transmitted as indicated previously.

11. Report Groupings. For the purpose of this manual, the project has been divided into reaches which correspond roughly with a project unit constructed under one contract, and, where applicable, organized by authorizations or major streams.

12. Fiscal Statements. Information on cost of operation and maintenance is required as part of the semiannual report. Actual costs are to be given when possible, as shown on the sample transmittal letter in Appendix III. Estimates may be used for items where actual costs are not available. Operation and maintenance costs for any work performed or paid for by the operation and maintenance organization are to be shown irrespective of the source of funds. Costs for work performed by other agencies and not reimbursed by the operation and maintenance organization are not required.

13. Inclusions in Semiannual Report.

a. The list of reports which may be included in the spring submittal is given below.

i. Spring phase of the semiannual operation and maintenance report (including the April inspection).

ii. Copy of the January quarterly report.

iii. Stormflow operation reports.

iv. Manual revision reports.

v. Special reports (the originals of which were previously submitted).

b. The list of reports which may be included in the fall submittal is given below.

i. Fall phase of the semiannual operation and maintenance report (including the October inspection)

ii. July quarterly report.

iii. Investigation and test program reports.

REPORTING TERMINOLOGY

14. All those features of the project units that must be inspected, operated, and maintained (and hence reported on) are called reporting features for the purpose of this manual. Each such feature is defined here so that use of these terms will be consistent and clear.

15. The maintenance and inspection requirements of certain reporting features have commonalities which allow them to be described as a group by a single general term which is defined to include them all. For this reason, instructions in the manual on condition reporting, on inspection and testing requirements, on design considerations, and on maintenance and repair are organized into groups by such general terms, each of which is then subdivided by specific reporting features. These features are further differentiated into subgroups. In the case of channels, the subgroups contain those features which extend along the channel and occur only at specific channel locations; in the case of debris and detention basins, the subgroups contain those features associated with the spillway and outlet channel, those associated with the outlet works and those associated with the embankment and basin. A tabulation of reporting features organized by general terms is given in Figure 1 and Figure 2, for channels and detention/debris basins respectively.

PREPARATION OF FORMS

16. Forms to Be Used. The reporting agency has the option to use narrative report, reporting agency form, or use the Corps SPL 403 & 403a forms. When the construction of a project unit is completed and transferred from construction status to operation and maintenance status, master reproducible semiannual report forms SPL 403, SPL 403a, and SPL 403b are supplied to the operation and maintenance organization by the District. These forms are illustrated in Appendix III. For each completed project unit, one copy each of SPL 403a (the signature page) and SPL 403b (the backup page), along with as many copies of SPL 403 as are necessary to cover a reach, are required.

17. Flood Control Channels. The reporting agency has the option to use narrative report, reporting agency form, or use the Corps SPL 403 & 403a forms. The steps to use Corps SPL 403 & 403a forms are described below.

a. Using as many forms SPL 403 as necessary and one SPL 403a, type in Column 1 the reporting features shown on the appropriate data sheet(s) in Appendix VI. Features should be listed from upstream to downstream by reaches of not more than 1,000 feet in length. These subreaches need not be uniformly the same length and may comprise only a single bridge, confluence section, or other special channel configuration. The length, however, should not exceed 1,000 feet since these subdivisions are intended to eliminate several types of repairs to a single reporting feature, which would require more specific location data than can be provided by these reporting techniques.

b. Using the terminology in Figures 1 and 2, type the reporting features which are included in a particular subreach. Leave sufficient space for any additional features constructed within the subreach under separate lease or permit. Then draw a line across the form to indicate the end of the subreach.

c. After a reporting feature has been typed in column 1, in column 2 type the letter "C" if the feature was constructed under the channel contract or the letter "P" if constructed under a permit or lease.

d. From the "As-constructed" drawings or the "as-permit constructed" drawings locate the channel stationing of each reporting feature and type either a specific station or the extent of a reach in column 3.

e. Type the applicable data sheet code number(s) and title(s) on the heading of each form SPL 403 and the signature form SPL 403a. The pages should be numbered from upstream to downstream. The form SPL 403a is the final sheet of the report.

18. When the heading, signature block, and first three columns of the semiannual report are completed, reproducibles are made from them; the master forms are then filed for use the following year. The copies are used in completing the spring phase of the semiannual report.

19. Whenever modifications are made to existing reporting features, or additional features are added by project construction, the master report form is corrected and new reproducible are made. If a change is made after the reproducible is reproduced, the revision is typed on it so that the feature may be reported on by the inspector.

is made after the reproducible is reproduced, the revision is typed on it so that the feature may be reported on by the inspector.

PREPARATION FOR THE SPRING SEMIANNUAL INSPECTION

20. Spring Housecleaning. Effective inspection and maintenance requires physical and visual accessibility to all reporting features. Debris and vegetation should be cleared away, although meticulous neatness is not required. The guiding principle should be that to the general public the appearance of the project units reflects on the competency and adequacy of the flood control facilities. A specific task to be performed is the removal of debris obscuring inspection or hindering maintenance. Accumulations on bridge piers should be removed, and debris on toe blocks and invert slabs should be windrowed lengthwise along the invert to permit inspection and maintenance and to prevent ponding. Vegetation obscuring inspection of channel condition should be removed, eradicated, or trimmed, as applicable.

21. Relationship to April Quarterly Report. As previously stated, the April quarterly report is made for the sole purpose of determining whether conditions exist that would interfere with the detailed inspection required for the spring phase of the semiannual reports. A separate April quarterly report is not necessary; the results of this inspection are noted on the semiannual report. If this reconnaissance indicates that a reporting feature is visually and physically accessible for the detailed inspection, that feature is dated and initialed in column 4 of the semiannual report. If the reporting feature is inaccessible, the notations are not made until subsequent inspection indicates that the feature has been "house cleaned" and is ready for the spring inspection.

22. Cleaning Deferral. If the reconnaissance indicates that cleaning maintenance may reasonably be performed at intervals longer than one year, the inspector should initial a circled letter in column 4 and give his reasons for recommending deferral in a similarly lettered note on an applicable backup page. However, cleaning should not be deferred if debris or vegetation accumulation might be objectionable, and in no event shall such maintenance be phased over a period of more than five years or deferred for more than a year. Approval of phasing or deferral by the operation and maintenance organization must also be indicated in the note and the year that the maintenance will be performed should be recorded.

THE SPRING SEMIANNUAL INSPECTION

23. As the inspection is performed, the handwritten notations to be made in the indicated columns are given below.

a. Column 5. Any deviation of the reporting features from the "as-constructed" drawings is reported in column 5. The terminology to be used in reporting such deviations must correspond to that on the data sheets in Appendix VI. If the deviation exists because the feature is being constructed under permit or lease, use the term "active permit"; if no deviation exists, the abbreviation "AC" for "as-constructed" is placed in the column.

b. Notations are made in columns 6 through 18 in all cases where a deviation is reported, where there is an "active permit" feature, or an investigation or test program is recommended or is being continued from a preceding year. In all other cases no notation is made.

i. Columns 6 through 13 inclusive are used to indicate the eight categories into which deviation causes have been divided

(1) Column 6. Normal deterioration, progressive wear, or displacement.
(2) Column 7. Loadings, including debris, vehicles, and structures.
(3) Column 8. Vegetation.
(4) Column 9. Modification of adjacent facilities, including side drains, utilities, bridges, or other project construction activities.
(5) Column 10. Public mischief and / or litter.
(6) Column 11. Flood emergency flow.
(7) Column 12. Storm runoff.
(8) Column 13. Other.

The applicable column is marked with either an "X" or a circled number referencing a note on a backup page; all other columns are indicated with a "-".

ii. Column 14. This column applies only to those reporting features for which an investigation or testing program is recommended or is being continued from the preceding year. This status is denoted with an "X" to indicate that an investigation or test program is recommended, "T" to indicate that a program is being continued from a preceding year, and a "-" to indicate that no program is involved. The "Inspection Function" in PART V discusses the basis for recommending investigation or test programs.

iii. Column 15. This column is used to indicate the recommended repair for the deviation reported in column 5. The terminology used must correspond with that given in Appendix V. For some recommended repairs supplemental information is supplied; this information may be a station identification, a quantity of materials needed, or a circled number which corresponds to an explanatory note on a backup page. In general the recommended repair should be listed without regard to when the repair would be required or when it could be made, since such decisions are made in the operation and maintenance organization's office.

iv. Filing in columns 16 and 17 is normally the responsibility of the operation and maintenance office; consideration is given to the type of repair recommended, the estimated time required, and the availability of personnel.

(1) Column 16. Column 16 will contain the programmed repair completion dates of the current summer, as estimated with regard to maintenance priorities. The official responsible for approving these dates must initial them. When the column is not applicable, write a "-".

(2) Column 17. Column 17 will be used only if the repairs are to be accomplished within the next three years. Repairs which cannot be effected during the current summer may be programmed within the next three years with revisions made annually. When the column is not applicable, write a "-".

v. Column 18. Column 18 may be used as part of the spring semiannual report or may be deferred until the fall phase. If used during the spring phase, the column contains a circled number which references an explanatory note concerning the deferral of repairs on a backup page. This

explanation must either contain the scheduled date of repair or indicate that the work has been or will be corrected in conjunction with project work. A "-" indicates that no repair is involved.

c. Columns 19 and 20 are not used during the spring phase of the semiannual report.

d. Column 21. Column 21 indicates any deviations noted and corrected during the period 15 October to 15 April; a circled number with a corresponding explanatory note details the type of deviation(s) noted, the cause thereof, the repairs made, and the date such repairs were completed. No other type of entry is required.

24. The spring semiannual report should be reviewed by the organization superintendent for signature. The reports are then used to make at least two copies of the entire report, one copy of which is filed for reference by the operation and maintenance organization and another of which is submitted to the District as indicated in the "Report Organization" subsection of "Report Functions" in this Part. The reports are then filed by the operation and maintenance organization for use in preparing the fall semiannual report.

FALL SEMIANNUAL REPORT

GENERAL

25. The fall semiannual report describes the final inspection of repairs and project construction scheduled for completion before the start of the flood season. It also serves to verify that the project units are ready for stormflow.

PREPARATION OF FORMS

26. As previously indicated, the reporting agency has the option to use narrative report, reporting agency form, or use the Corps SPL 403 & 403a forms.

27. If using Corps SPL 403 & 403a forms, note the following instructions: During the course of the fall semiannual inspection columns 18 through 21 are completed for all reporting features which required entries in columns 6 through 17; in other cases no entries in these columns are made.

a. Column 18. If column 18 was not used during the spring phase; it is now completed with a circled number which references an explanatory note concerning the deferral of repairs on a backup page. This explanation must either include the scheduled date of repair or indicate that the work has been or will be corrected in conjunction with project work. A "-" indicates that no repair is involved.

b. Column 19. Column 19 contains required information on a scheduled investigation and test program, if applicable (see Column 14). This column may contain a completion date when the program was finished before the fall semiannual report, the letter "T" to indicate that the program will continue, or a "-" when no program is involved. The results of a completed program will be submitted in the supporting investigation and test program report.

c. Column 20. Column 20 is used to indicate the status of repairs scheduled for completion the preceding summer. The entry consists of the inspector's initials to indicate completion of the inspection, or a "-" to indicate that no repair or construction is involved.

d. Column 21. Column 21 provides a place for indicating any remarks as may be required to clarify conditions found during repairs. The entry will be a circled number which references an explanatory note on a backup page. A "-" indicates that no clarification is required.

28. The fall semiannual report should be reviewed by the organization superintendent for signature. The reports are used to make at least one copy, which is forwarded to the District as indicated in the "Report Organization" subsection of "Report Functions" section of this Part. The originals are then filed for reference by the operation and maintenance organization.

FIGURE 1

REPORTING FEATURES FOR FLOOD CONTROL CHANNELS

GENERAL		TYPICAL REPORTING FEATURE	
TERM	INCLUSION	ALONG CHANNEL	AT A CHANNEL STATION
EARTHWORK	Fills, cuts, slopes, levees, embankments	Earth channel invert Earth levee Earth berm roadway	Earth Berm access ramp
CONCRETEWORK	Concrete diversion works, side drain structures, public utilities, bridges	Concrete channel invert Concrete channel side slopes Concrete toe protection Concrete channel walls Concrete channel roof slab Reinforced concrete pipe	Concrete invert access ramp Concrete inlet structure Concrete confluence section Equestrian ramp
STONEWORK	Grouted or ungrouted stone facings, sand and gravel bedding and filters	Stone channel invert Stone channel sideslope Stone toe protection	Stone invert stabilizer Derrick stone protection
SUBDRAIN SYSTEM	Closed system with manholes, open systems with outlets into channel, pipeless gravel drains, overflow spillways		Side drain Side overflow spillway
PUBLIC UTILITY	Sewer, water, gas, oil, electricity, telephone		Public utility
FENCING	Wall safety fencing, safety fencing at ends of channels, covered channel barricades, spillway barricades, public utility barricades, access gates, chain barricades	Fencing	Fencing
BRIDGE	Freeway, highway, street, pedestrian, railroad, public utility, gaging station, diversion works		Bridge Bridge piers
BITUMINOUS SURFACING		Surfaced berm roadway	Surfaced berm-access ramp Surfaced side drain entrance
CHANNEL INSPECTION MANHOLE	Vertical street drains, manholes		Channel inspection manhole
GAGING STATION	Floatwells, gages, recorders, transmitters, station houses, gates, ladders, cables		Gaging station
SPREADING GROUNDS DIVERSION	Pipes, gates, and other facilities for diversion of water		Spreading grounds diversion
RIGHTS-OF-WAY	Access ways and ramps, encroachments, loadings, and uses	Rights-of-way	Rights-of-way
LANDSCAPING	Trees, shrubs, grass, etc.		
SPECIAL FEATURES			Control sill Drop structure Piezometer Trashracks

FIGURE 2

REPORTING FEATURES OF DETENTION AND DEBRIS BASINS

TERM	INCLUSIONS	SPILLWAY AND OUTLET CHANNEL	OUTLET WORKS	EMBANKMENT AND BASIN
EARTHWORK	Fills, cuts, slopes, levees, embankments	Earth berm roadway		Earth embankment Earth embankment-access road Earth basin-access road
CONCRETEWORK	Pool drain conduits, side drains, public utility, bridge, basin inlet	Concrete channel invert Concrete channel side slopes Concrete spillway apron Broadcrest concrete spillway Concrete channel roof slab Spreading grounds diversion		Inlet structure
STONEWORK	Grouted or ungrouted stone facing, sand and gravel bedding and filters, drainage ways, basin inlet.	Stone spillway apron		Stone side slope
SUBDRAIN SYSTEM	Closed systems with manholes, open systems with spillway outlets, pipelines gravel drains with weepholes, toe drains for drain blankets	Subdrain system		Subdrain system
SIDE DRAIN	Side drains with or without gates, overflow spillway	Side Drain		
PUBLIC UTILITY	Sewer, gas, water, oil, electricity, telephone	Public utility		Public utility
FENCING	Wall safety fencing, spillway barricades, public utility barricades, access gates, chain barricades	Fencing	Fencing	Fencing
BRIDGE	Street, pedestrian, public utility, catwalks and stairways to intake towers.	Bridge	Bridge	Bridge
BITUMINOUS SURFACING		Surfaced spillway apron		Surfaced embankment-access ramp Surfaced basin-access ramp Surfaced side drain entrance Surfaced parking area Surfaced spillway-access ramp
DEBRIS STORAGE CAPACITY				Debris storage capacity
STAFF GAGE				Staff gages
INTAKE TOWER	Structures and facilities at inlet end		Intake tower	
POOL DRAIN CONDUIT			Pool drain conduit Spillway drain pipes	
POOL DRAIN DIVERSION	All structures and facilities at inlet end		Spreading grounds diversion	
RIGHTS-OF-WAY	Access ways and ramps, encroachments, loadings, land use	Rights-of-way		Rights-of-way
LANDSCAPING	Trees, shrubs, grass, etc.			
SPECIAL FEATURES		Trashracks		Trashracks

PART VII - REGULATORY PERMIT PROGRAM

GENERAL

APPLICABLE LAWS AND STATUTES

1. Laws. The Corps permit program is based mainly on three Acts of Congress.

a. Section 9 and 10 of the RIVERS AND HARBORS ACT of 1899 prohibit unauthorized construction in navigable waters of the United States.

b. Section 404 of the CLEAN WATER ACT governs disposal of dredged or fill material in waters of the United States.

c. Section 103 of the MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT of 1972 regulates transportation of dredged material for the purpose of dumping into ocean waters.

2. Statutes. Other statutes also affect Corps regulatory authority.

a. The NATIONAL ENVIRONMENTAL POLICY ACT of 1969 defines the national policy for encouragement of productive harmony between man and his environment, as evaluated through Environmental Impact Statements and Assessments.

b. The FISH AND WILDLIFE PRESERVATION ACT of 1956 requires the Corps to coordinate permit applications with State and Federal Fish and Wildlife agencies.

c. The NATIONAL HISTORIC PRESERVATION ACT of 1966 requires coordination on matters concerning historic and archaeological preservation.

d. The COASTAL ZONE MANAGEMENT ACT of 1972 requires that activities comply with and be certified by a State's coastal zone management program.

e. The ENDANGERED SPECIES ACT of 1973 requires coordination to insure protection of endangered and threatened species.

f. The EXECUTIVE ORDER 11988 of 1977 requires that the District Engineer avoid authorizing flood plain development whenever practicable.

WATERS DEFINED

3. Waters of the United States. Waters of the United States, which are subject to Corps of Engineers' jurisdiction under Section 404 of the Clean Water Act, include:

a. Territorial seas, measured seaward a distance of three miles;

b. Coastal and inland waters, lakes, rivers and streams, and their tributaries;

c. Interstate waters and their tributaries;

d. Wetlands adjacent to all the above waters; and

e. Isolated wetlands and lakes, intermittent streams, and other waters that are not part of a tributary system to interstate waters or to navigable waters of the Unites States, the degradation or destruction of which could affect interstate commerce.

4. Navigable Waterways of the Los Angeles District.

a. Pacific Ocean, Harbors and Estuaries, Colorado River

AUTHORITIES

5. General. The Congress of the United States has assigned to the U.S. Army Corps of Engineers the responsibility for regulation of construction and other work in the waters of the United States. The Corps is charged with protecting our nation's harbors and navigation channels from destruction and encroachments, and with restoring and maintaining environmental quality. This is accomplished by regulating activity in three areas: discharge of dredged or fill material in coastal and inland waters and wetlands; construction and dredging in navigable waters of the United States; and transport of dredged material for dumping into ocean waters.

6. Major Federal Coordinating Agencies.

a. U.S. Fish and Wildlife Service
b. National Marine Fisheries Service
c. Environmental Protection Agency

7. Major State and Local Coordinating Agencies.

a. California State Lands Division
b. California Department of Fish and Game
c. California Water Quality Control Board
d. California Coastal Commission
e. Arizona Department of Game and Fish
f. Arizona Department of Environmental Quality
g. Various city and county agencies in project areas

REQUIRED PERMITS

PURPOSE OF PERMIT PROGRAM

8. The Corps Permit Program, administered by the Regulatory Branch, seeks to insure that our nation's water resources and wetlands are used in the best interest of the public. This includes consideration of environmental, cultural and other public interest concerns.

9. Who should Obtain a Permit? Any person, firm, or agency (including Federal, state, and local governmental agencies) planning to work in waters of the United States should first contact the Corps of Engineers regarding the need to obtain a permit from the Regulatory Branch. Permits, licenses, variances, or similar authorization may also be required by other Federal, state and local statutes.

10. The necessary permits are required even when land next to or under the water is privately owned. Both the property owner and contractor may be held liable for violation of Federal law if work begins before permits have been obtained. Penalties for proceeding with work without a permit issued by the Corps may include:

a. Removal of work and restoration of area.
b. Administrative penalties of up to $25,000 per day for each violation.
c. Fine of up to $50,000 per day for each violation.
d. Up to three years in prison.

11. Typical Activities Requiring Permits.

a. General. The listed activities in waters of the Unites States may require permits.

i. Construction of such structures as piers, wharves, bulkheads, dolphins, marinas, ramps and floats.

ii. Placement of wires and cables over the water, pipes or cables under the water, and intake and outfall pipes.

iii. Dredging, excavation and depositing of fill and dredged material.
iv. Transport of dredged material for the purpose of dumping into ocean waters.
v. Any construction of revetments, groins, breakwaters, levees, dams, dikes and weirs.
vi. Placement of riprap and road fills.
vii. Grading or land leveling activities.
viii. Sand mining and related activities.

b. Wetlands.

i. Wetlands are those areas that are inundated or saturated by surface or ground water (either fresh or salt) at a frequency and duration sufficient to support vegetation adapted for life in saturated soil condition.

ii. Wetlands and other saturated soils associated with coastal and inland waters may be of considerable value to the public interest, even though they are not directly or actively used by the public. Examples of such values are: water retention to limit flooding; ground water recharge areas; filtering of contaminated surface water; nutrient source for aquatic organisms; and resting, breeding, cover and feeding habitat for wildlife.

iii. Wetlands and other special aquatic sites are afforded additional protection in the Corps of Engineers' section 404 permitting program.

iv. Wetlands include such areas as swamps, marshes, bogs, estuaries, certain unique pond systems, and inland and coastal shallows. These wetland types are characterized by:

(1) Predominance of aquatic or emergent wetland vegetation. Some species of these plants are non-persistent and are obviously present only during the growing season (e.g. loose strife, ludwigia, annual knotwoods and salt marsh fleabane). Others are persistent and can typically be found standing even during the non-growing season (e.g. cordgrass, common pickleweed, cattails, willows, bulrush, soft rushes and sedges, alder, mulefat, cottonwood, and sycamore).

(2) Type of water regime (saltwater vs. freshwater, tidal vs. nontidal, and either permanently flooded in the case of aquatic systems or occasionally to regularly flooded in the case of flats, marshes and swamps). If the water regime is not apparent during the summer or non-growing season or if the high water mark is not apparent, evaluation of soil characteristics can determine the identity of a wetland.

12. Factors Considered in Issuing a Permit. Overall, a permit must be found to be not contrary to the public interest. All factors which may be relevant to the proposal must be considered. Among those are: conservation, economics, aesthetics, general environmental concerns, wetlands, fish and wildlife values, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people. In addition, the public interest review and, of equal importance, an analysis of alternative project designs that avoid negative impacts to the aquatic ecosystem must be conducted and considered.

13. Permit Fees. Some permits, such as nationwide permits, do not require a fee. Fees for other permits are assessed according to the proposed use. For example, the fee for work to be done for commercial and industrial use is $100; for private or noncommercial use, the fee is $10. The applicant will be notified of the required fee. No fee is required for Federal, state, or local government agencies. Permit fees are subject to future changes.

PERMIT APPLICATION

14. A sample of the Department of Army Permit Application is included in Appendix IV. Actual permit applications can be obtained from the Regulatory Branch.

APPENDICES

I Code of Federal Regulations (Extract)

II Authorizing Document and Project Cooperation Agreement (PCA)

III Sample Reporting Forms

IV Sample Permit Application

V Basis for Recommending Repairs

VI Data Sheets and Maps

APPENDIX I

CODE OF

FEDERAL REGULATIONS

(EXTRACT)

TITLE 33 - NAVIGATION AND NAVIGABLE WATERS

Chapter II - Corps of Engineers, Department of the Army

PART 208 - FLOOD CONTROL REGULATIONS

AUTHORITY: § 208.10 issued under Sec. 7, 58 Stat. 890; 33 U.S.C. 709.

§ 208.10 *Local flood protection works; maintenance and operation of structures and facilities* - (a) *General.* (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of the Army, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the Department of the Army or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the Superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The Department of the Army will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under this part.

(b) *Levees* - (1) *Maintenance.* The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weed, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drains are in good working condition;

(vi) No revetment work or riprap has been displace, washed out, or removed;

(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is will shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days; and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation.* During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls* - (1) *Maintenance.* Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation.* Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) *Drainage structures* - (1) *Maintenance.* Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation.* Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(e) *Closure structures* - (1) *Maintenance.* Closure structures for traffic openings shall be inspected by the Superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order;

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replace immediately.

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants* - (1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, building, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals no to exceed one year. A record shall be kept showing the results of such test. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on test and repairs. Operating personnel for the plant shall be present during tests. any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) *Channels and floodways* - (1) *Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) *Miscellaneous facilities* - (1) *Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior runoff during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor.

(Sec. 3, 49 Stat. 1571, as amended; 33 U.S.C. 701C) [9 F.R. 9999, Aug. 17, 1944; 9 F.R. 10203, Aug. 22, 1944]

APPENDIX II

AUGUST 1995
PROJECT COOPERATION AGREEMENT
(PCA)

PROJECT COOPERATION AGREEMENT BETWEEN
THE DEPARTMENT OF THE ARMY
AND
THE LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
FOR CONSTRUCTION OF THE
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA FLOOD CONTROL PROJECT

THIS AGREEMENT is entered into this 7th day of August, 1995, by and between the DEPARTMENT OF THE ARMY (hereinafter the "Government"), represented by the Assistant Secretary of the Army (Civil Works), and the Los Angeles County Flood Control District, a body corporate and politic (hereinafter the "Non-Federal Sponsor"), represented by the Chair of its Board of Supervisors.

WITNESSETH, THAT:

WHEREAS, construction of the LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA FLOOD CONTROL PROJECT in LOS ANGELES COUNTY, CALIFORNIA was authorized by Section 101(b) of the Water Resources Development Act of 1990, P.L. 101-640, in accordance with the report of the Acting Chief of Engineers, dated 30 June 1992, as modified and approved for construction by the Acting Assistant Secretary of the Army (Civil Works) on behalf of the Secretary of the Army in a letter to the President of the Senate dated 19 July 1995;

WHEREAS, the Government and the Non-Federal Sponsor desire to enter into a Project Cooperation Agreement for construction of the LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA FLOOD CONTROL PROJECT (hereinafter the "Project", as defined in Article I.A. of this Agreement);

WHEREAS, Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, specifies the cost-sharing requirements applicable to the Project;

WHEREAS, Section 221 of the Flood Control Act of 1970, Public Law 91-611, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, provide that the Secretary of the Army shall not commence construction of any water resources project, or separable element thereof, until each non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;

WHEREAS, the Non-Federal Sponsor does not qualify for a reduction of the maximum non-Federal cost share pursuant to the guidelines that implement Section 103(m) of the Water Resources Development Act of 1986, Public Law 99-662, as amended;

WHEREAS, Section 902 of Public Law 99-662 establishes the maximum amount of costs for the LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA FLOOD CONTROL PROJECT and sets forth procedures for adjusting such maximum amount;

WHEREAS, the final report of the Acting Chief of Engineers, dated 30 June 1992, as modified and approved for construction by the Acting Assistant Secretary of the Army (Civil Works) on behalf of the Secretary of the Army in a letter to the President of the Senate dated 19 July 1995, provides that the Non-Federal Sponsor will receive credit for constructing portions of the Project following authorization that the Government determines are compatible with the Project;

WHEREAS, the Non-Federal Sponsor proposes to perform certain work (hereinafter the "Non-Federal Construction", as defined in Article I.K. of this Agreement) which falls within the work required under the Project;

WHEREAS, the Government and Non-Federal Sponsor have the full authority and capability to perform as hereinafter set forth and intend to cooperate in cost-sharing and financing of the construction of the Project in accordance with the terms of this Agreement.

NOW, THEREFORE, the Government and the Non-Federal Sponsor agree as follows:

ARTICLE I - DEFINITIONS AND GENERAL PROVISIONS

For purposes of this Agreement:

A. The term "Project" shall mean the modification of the Rio Hondo from Whittier Narrows Dam to the Los Angeles River and continuing down the Los Angeles River to the Pacific Ocean including the Compton Creek Tributary. The modifications are as follows: (a) raising the height on 41.2 miles of existing levees; (b) alteration, lowering, raising, or replacement and attendant removal of various existing railroad bridges by the Government; (c) relocation of all other types of bridges by the Non-Federal sponsor that the Government determines are necessary for the construction, operation, or maintenance of the Project; (d) minor modifications or pier modifications of various bridges to improve flow capacity of the channel; (e)widening and converting to rectangular cross-section 1.5 miles of channel below the confluence with the Rio Hondo; (f) armoring the land side of the levees in four locations on the main channels and along Compton Creek and (g) applying a concrete overlay in reaches with an existing rough grouted stone channel surface, as generally described in the Los Angeles County Drainage Area Review Feasibility Study\Environmental Impact Statement, Revised Final Report, dated February 1992, and approved by the Acting Chief of Engineers on 30 June, 1992 and with such modifications as were recommended by the Acting Assistant Secretary of the Army (Civil Works) in his letter to the President of the Senate dated 19 July 1995. The Project includes the Non-

Federal Construction described in Article I.K. of this Agreement.

B. The term "total project costs" shall mean all costs incurred by the Non-Federal Sponsor and the Government in accordance with the terms of this Agreement directly related to construction of the Project. Subject to the provisions of this Agreement, the term shall include, but is not necessarily limited to: continuing planning and engineering costs incurred after October 1, 1985; advanced engineering and design costs; preconstruction engineering and design costs; engineering and design costs during construction; the costs of investigations to identify the existence and extent of hazardous substances in accordance with Article XV.A. of this Agreement; costs of historic preservation activities in accordance with Article XVIII.A. of this Agreement; actual construction costs, including the costs of alteration, lowering, raising, or replacement and attendant removal of existing railroad bridges and approaches thereto; the credit amount for the Non-Federal Construction performed by the Non-Federal Sponsor and afforded in accordance with Article II.D.5. of this Agreement; costs of participation in the Project Coordination Team in accordance with Article V of this Agreement; costs of contract dispute settlements or awards; the value of lands, easements, rights-of-way, relocations, and suitable borrow and dredged or excavated material disposal areas for which the Government affords credit in accordance with Article IV of this Agreement; and costs of audit in accordance with Article X of this Agreement. The term does not include any costs for operation, maintenance, repair, replacement, or rehabilitation; any costs due to betterments; or any costs of dispute resolution under Article VII of this Agreement.

C. The term "financial obligation for construction" shall mean a financial obligation of the Government or a financial obligation of the Non-Federal Sponsor for the Non-Federal Construction, other than an obligation pertaining to the provision of lands, easements, rights-of-way, relocations, and borrow and dredged or excavated material disposal areas, that results or would result in a cost that is or would be included in total project costs.

D. The term "non-Federal proportionate share" shall mean the ratio of the Non-Federal Sponsor's total cash contribution required in accordance with Articles II.D.1. and II.D.3. of this Agreement to total financial obligations for construction, as projected by the Government.

E. The term "period of construction" shall mean the time from the date the Government first notifies the Non-Federal Sponsor in writing, in accordance with Article VI.B. of this Agreement, of the scheduled date for issuance of the solicitation for the first construction contract to the date that the District Engineer notifies the Non-Federal Sponsor in writing of the Government's determination that construction of the Project is complete.

F. The term "highway" shall mean any public highway, roadway, street, or way,

including any bridge thereof.

G. The term "relocation" shall mean providing a functionally equivalent facility to the owner of an existing utility, cemetery, highway or other public facility, or railroad.. (excluding existing railroad bridges and approaches thereto) when such action is authorized in accordance with applicable legal principles of just compensation or as otherwise provided in the authorizing legislation for the Project or any report referenced therein. Providing a functionally equivalent facility may take the form of alteration, lowering, raising, or replacement and attendant removal of the affected facility or part thereof.

H. The term "fiscal year" shall mean one fiscal year of the Government. The Government fiscal year begins on October 1 and ends on September 30.

I. The term "functional portion of the Project" shall mean a portion of the Project that is suitable for tender to the Non-Federal Sponsor to operate and maintain in advance of completion of the entire Project. For a portion of the Project to be suitable for tender, the District Engineer must notify the Non-Federal Sponsor in writing of the Government's determination that the portion of the Project is complete and can function independently and for a useful purpose, although the balance of the Project is not complete.

J. The term "betterment" shall mean a change in the design and construction of an element of the Project resulting from the application of standards that the Government determines exceed those that the Government would otherwise apply for accomplishing the design and construction of that element.

K. The term "Non-Federal Construction" shall mean those improvements constructed by the Non-Federal Sponsor that the District Engineer determines are compatible with the Project. The Non-Federal Construction includes construction of the authorized improvements as well as planning, engineering, design, supervision and administration, and other activities associated with construction, but does not include the construction of betterments or the provision of lands, easements, rights-of-way, relocations, or suitable borrow and dredged or excavated material disposal areas associated with the Non-Federal Construction.

ARTICLE II - OBLIGATIONS OF THE GOVERNMENT AND THE NON-FEDERAL SPONSOR

A. The Government, subject to receiving funds appropriated by the Congress of the United States (hereinafter, the "Congress") and using those funds and funds provided by the Non-Federal Sponsor, shall expeditiously construct the Project (including alteration, lowering, raising, or replacement and attendant removal of existing railroad bridges and approaches thereto but excluding all relocations), applying those procedures usually applied to Federal projects, pursuant to Federal

laws, regulations, and policies.

1. The Government shall afford the Non-Federal Sponsor the opportunity to review and comment on the solicitations for all contracts, including relevant plans and specifications, prior to the Government's issuance of such solicitations. The Government shall not issue the solicitation for the first construction contract until the Non-Federal Sponsor has confirmed in writing its willingness to proceed with the Project. To the extent possible, the Government shall afford the Non-Federal Sponsor the opportunity to review and comment on all contract modifications, including change orders, prior to the issuance to the contractor of a Notice to Proceed. In any instance where providing the Non-Federal Sponsor with notification of a contract modification or change order is not possible prior to issuance of the Notice to Proceed, the Government shall provide such notification in writing at the earliest date possible. To the extent possible, the Government also shall afford the Non-Federal Sponsor the opportunity to review and comment on all contract claims prior to resolution thereof. The Government shall consider in good faith the comments of the Non-Federal Sponsor, but the contents of solicitations, award of contracts, execution of contract modifications, issuance of change orders, resolution of contract claims, and performance of all work on the Project (whether the work is performed under contract or by Government personnel), shall be exclusively within the control of the Government.

2. Throughout the period of construction, the District Engineer shall furnish the Non-Federal Sponsor with a copy of the Government's Written Notice of Acceptance of Completed Work for each contract for the Project.

3. Notwithstanding paragraph A.1. of this Article, if, upon the award of any contract for construction of the Project, cumulative financial obligations for construction would exceed $312,000,000 the Government and the Non-Federal Sponsor agree to defer award of that contract and all subsequent contracts for construction of the Project until such time as the Government and the Non-Federal Sponsor agree to proceed with further contract awards for the Project, but in no event shall the award of contracts be deferred for more than three years. Notwithstanding this general provision for deferral of contract awards, the Government, after consultation with the Non-Federal Sponsor, may award a contract or contracts after the Assistant Secretary of the Army (Civil Works) makes a written determination that the award of such contract or contracts must proceed in order to comply with law or to protect life or property from imminent and substantial harm.

B. The Non-Federal Sponsor may request the Government to accomplish betterments. Such requests shall be in writing and shall describe the betterments requested to be accomplished. If the Government in its sole discretion elects to accomplish the requested betterments or any portion thereof, it shall so notify the Non-Federal Sponsor in a writing that sets forth any applicable terms and conditions, which must be consistent with this Agreement. In the event of conflict between such a writing

and this Agreement, this Agreement shall control. The Non-Federal Sponsor shall be solely responsible for all costs due to the requested betterments and shall pay all such costs in accordance with Article VI.C. of this Agreement.

C. When the District Engineer, after consultation with the Non-Federal Sponsor, determines that the entire Project is complete or that a portion of the Project has become a functional portion of the Project, the District Engineer shall so notify the Non-Federal Sponsor in writing and furnish the Non-Federal Sponsor with an Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual (hereinafter the "OMRR&R Manual") and with copies of all of the Government's Written Notices of Acceptance of Completed Work for all contracts for the Project or the functional portion of the Project that have not been provided previously. Upon such notification, the Non-Federal Sponsor shall operate, maintain, repair, replace, and rehabilitate the entire Project or the functional portion of the Project in accordance with Article VIII of this Agreement.

D. The Non-Federal Sponsor shall contribute a minimum of 25 percent, but not to exceed 50 percent, of total project costs in accordance with the provisions of this paragraph.

1. The Non-Federal Sponsor shall provide a cash contribution equal to 5 percent of total project costs in accordance with Article VI.B. of this Agreement.

2. In accordance with Article III of this Agreement, the Non-Federal Sponsor shall provide all lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas that the Government determines the Non-Federal Sponsor must provide for the construction, operation, and maintenance of the Project, and shall perform or ensure performance of all relocations that the Government determines to be necessary for the construction, operation, and maintenance of the Project.

3. If the Government projects that the value of the Non-Federal Sponsor's contributions under paragraphs D.1. and D.2. of this Article and Articles V, X, and XV.A. of this Agreement will be less than 25 percent of total project costs, the Non-Federal Sponsor shall provide an additional cash contribution, in accordance with Article VI.B. of this Agreement, in the amount necessary to make the Non-Federal Sponsor's total contribution equal to 25 percent of total project costs.

4. If the Government determines that the value of the Non-Federal Sponsor's contributions provided under paragraphs D.2. and D.3. of this Article and Articles V, X, and XV.A. of this Agreement has exceeded 45 percent of total project costs, the Government, subject to the availability of funds, shall reimburse the Non-Federal Sponsor for any such value in excess of 45 percent of total project costs. After such a determination, the Government, in its sole discretion, may provide any

remaining Project lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas and perform any remaining Project relocations on behalf of the Non-Federal Sponsor.

5. The Assistant Secretary of the Army (Civil Works) is authorized to afford credit for the Non-Federal Construction for any work accomplished by the Non-Federal Sponsor that the Government determines is compatible with the Project. The affording of such credit and the actual amount of credit shall be subject to the limitations of Article II.F. of this Agreement. To afford such credit, the Government shall apply the credit amount toward any additional cash contribution required under paragraph D.3. of this Article. If the credit amount exceeds the amount of such additional cash contribution, the Government, subject to the availability of funds, shall, on behalf of the Non-Federal Sponsor, provide Project lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas, or perform Project relocations, equal in value to such excess credit amount. As an alternative, and in its sole discretion, the Government may make a payment to the Non-Federal Sponsor in an amount equal to such excess credit amount, up to the value of contributions under paragraph D.2. of this Article and Articles V, X, and XV.A. of this Agreement. In no event shall the credit amount afforded exceed the lesser of 45 percent of total project costs or the value of the Non-Federal Sponsor's contributions required under paragraphs D.2. and D.3. of this Article and Articles V, X, and XV.A. of this Agreement.

E. The Non-Federal Sponsor may request to perform Non-Federal Construction work. Such requests shall be in writing and shall describe the work to be accomplished by the Non-Federal Sponsor. If the District Engineer, in his sole discretion agrees with the Non-Federal Sponsor's request to perform such work, the District Engineer shall notify the Non-Federal Sponsor in writing that sets forth any applicable terms and conditions which must be consistent with this Agreement. The Non-Federal Sponsor shall perform the Non-Federal Construction with its own forces or by contract.

F. Subject to the availability of appropriations and the limitations of this paragraph, the Non-Federal Sponsor shall receive credit, in accordance with Article II.D.5. of this Agreement toward its share of total project costs, for the approved actual cost of the Non-Federal Construction as if accomplished by the Government by contract.

1. The Non-Federal Construction shall not commence until the designs, detailed plans and specifications, and arrangements for prosecution of the work have been approved by the District Engineer. Proposed changes in approved designs, plans, and specifications must also be reviewed and approved by the District Engineer in advance of performance of the related Non-Federal Construction.

2. The District Engineer or his designee is authorized to inspect the Non-Federal Construction at any and all times.

3. Credit shall be dependent upon the appropriation of funds applicable thereto or funds available therefor, and shall not take precedence over other pending work of higher priority at the same or other improvement projects.

4. Any work undertaken by the Non-Federal Sponsor prior to the effective date of this Agreement shall not be subject to credit pursuant to this Agreement.

5. No credit shall be given unless and until the District Engineer has certified that the work subject to credit is compatible with the Project and has been performed in accordance with this Agreement.

6. This Agreement shall not be construed as either committing the Government to assume any responsibility placed on the Non-Federal Sponsor or any other Non-Federal entity by the conditions of project authorization or any other applicable statute or regulations, or as committing the Government to credit the Non-Federal Sponsor if the Project is modified so as to make the Non-Federal Construction no longer an integral part of the Project.

7. Credit shall not be given for any work which does not, in the judgement of the Government, conform to the description set forth in Article I.K. of this Agreement.

8. The amount of credit shall not exceed the Government's estimate of what the cost of the Non-Federal Construction would be if it were accomplished by the Government as a component of the Project or the Non-Federal Sponsor's actual auditable costs for the Non-Federal Construction, whichever is less.

9. The amount of credit for which the Non-Federal Sponsor may be eligible pursuant to this Agreement is not subject to interest charges, nor is it subject to adjustment to reflect changes in price levels between the time the Non-Federal Construction is completed and the time that the credit is afforded.

10. The actual amount of credit is subject to an audit to determine reasonableness, allocability, and allowability of costs.

G. The Non-Federal Sponsor may request the Government to provide lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas or perform relocations on behalf of the Non-Federal Sponsor. Such requests shall be in writing and shall describe the services requested to be performed. If in its sole discretion the Government elects to perform the requested services or any portion thereof, it shall so notify the Non-Federal Sponsor in a writing that sets forth any applicable terms and conditions, which must be consistent with this Agreement. In the event of conflict between such a writing and this Agreement, this Agreement shall control. The Non-Federal Sponsor shall be solely responsible for all costs of the requested services and shall pay all such costs in accordance with Article VI.C. of this Agreement. Notwithstanding the provision of lands, easements, rights-of-way, and

suitable borrow and dredged or excavated material disposal areas or performance of relocations by the Government, the Non-Federal Sponsor shall be responsible, as between the Government and the Non-Federal Sponsor, for the costs of cleanup and response in accordance with Article XV.C. of this Agreement.

H. The Government shall perform a final accounting in accordance with Article VI.D. of this Agreement to determine the contributions provided by the Non-Federal Sponsor in accordance with paragraphs B., D., and E. of this Article and Articles V, X, and XV.A. of this Agreement and to determine whether the Non-Federal Sponsor has met its obligations under paragraphs B., D., and E. of this Article.

I. The Non-Federal Sponsor shall not use Federal funds to meet the Non-Federal Sponsor's share of total project costs under this Agreement unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

J. The Non-Federal Sponsor agrees to participate in and comply with applicable Federal floodplain management and flood insurance programs.

K. Not less than once each year the Non-Federal Sponsor shall inform affected interests of the extent of protection afforded by the Project.

L. The Non-Federal Sponsor shall publicize flood plain information in the area concerned and shall provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the flood plain and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the Project.

M. The Non-Federal Sponsor shall prescribe and enforce regulations, or undertake other actions, preventing obstruction of or encroachment on project works that would reduce the authorized level of protection afforded or hinder operation, maintenance, repair, replacement, and rehabilitation of the Project.

N. The Non-Federal Sponsor shall hold and save the United States free from damages due to demolition work, except for damages due to the fault or negligence of the United States or its contractors.

O. The Non-Federal Sponsor shall provide for the adjudication of all water-rights claims resulting from construction, operation, maintenance, repair, replacement, and rehabilitation of the Project, and hold and save the United States free from damages due to such claims.

P. The Non-Federal Sponsor shall ensure that construction, operation, maintenance, repair, replacement, and rehabilitation of any non-Federal entity's

constructed flood control features do not diminish the flood protection provided by the Project or jeopardize the structural integrity of the Project.

Q. The Non-Federal Sponsor shall prescribe and enforce regulations, or undertake other actions, managing stormwater runoff (hereinafter the "stormwater management plan") from within Los Angeles County to ensure that the quantity or concentration of stormwater inflow does not reduce the authorized level of flood protection.

1. The Non-Federal Sponsor shall develop a stormwater management plan and submit it to the District Engineer no later than one year prior to the end of the period of construction of the project. The District Engineer shall review and certify within 60 days that the plan will accomplish the objectives stated in Article II.Q. of this Agreement.

2. Every 5 years after the end of the period of construction, the Non-Federal Sponsor shall submit a report to the District Engineer on the performance of the stormwater management plan in maintaining the authorized level of flood protection. The report should include any changes recommended to improve performance of the plan. The District Engineer shall review those reports and certify that the Non-Federal Sponsor's plan is still adequate or make recommendations to the Non-Federal Sponsor for changes as appropriate.

ARTICLE III - LANDS, RELOCATIONS, DISPOSAL AREAS, AND PUBLIC LAW 91-646 COMPLIANCE

A. The Government shall determine the lands, easements, and rights-of-way required for the construction, operation, and maintenance of the Project, including those required for relocations, borrow materials, and dredged or excavated material disposal. The Government in a timely manner shall provide the Non-Federal Sponsor with general written descriptions, including maps as appropriate, of the lands, easements, and rights-of-way that the Government determines the Non-Federal Sponsor must provide, in detail sufficient to enable the Non-Federal Sponsor to fulfill its obligations under this paragraph, and shall provide the Non-Federal Sponsor with a written notice to proceed with acquisition of such lands, easements, and rights-of-way. Prior to the end of the period of construction, the Non-Federal Sponsor shall acquire all lands, easements, and rights-of-way set forth in such descriptions. Furthermore, prior to issuance of the solicitation for each construction contract, the Non-Federal Sponsor shall provide the Government with authorization for entry to all lands, easements, and rights-of-way the Government determines the Non-Federal Sponsor must provide for that contract. For so long as the Project remains authorized, the Non-Federal Sponsor shall ensure that lands, easements, and rights-of-way that the Government determines to be required for the operation and maintenance of the Project and that were provided by the Non-Federal Sponsor are retained in public ownership for uses compatible with the authorized purposes of the Project.

B. The Government, after consultation with the Non-Federal Sponsor, shall determine the improvements required on lands, easements, and rights-of-way to enable the proper disposal of dredged or excavated material associated with the construction, operation, and maintenance of the Project. Such improvements may include, but are not necessarily limited to, retaining dikes, wasteweirs, bulkheads, embankments, monitoring features, stilling basins, and de-watering pumps and pipes. The Government in a timely manner shall provide the Non-Federal Sponsor with general written descriptions of such improvements in detail sufficient to enable the Non-Federal Sponsor to fulfill its obligations under this paragraph, and shall provide the Non-Federal Sponsor with a written notice to proceed with construction of such improvements. Prior to the end of the period of construction, the Non-Federal Sponsor shall provide all improvements set forth in such descriptions. Furthermore, prior to issuance of the solicitation for each Government construction contract, the Non-Federal Sponsor shall prepare plans and specifications for all improvements the Government determines to be required for the proper disposal of dredged or excavated material under that contract, submit such plans and specifications to the Government for approval, and provide such improvements in accordance with the approved plans and specifications.

C. The Government, after consultation with the Non-Federal Sponsor, shall determine the relocations necessary for the construction, operation, and maintenance of the Project, including those necessary to enable the removal of borrow materials and the proper disposal of dredged or excavated material. The Government in a timely manner shall provide the Non-Federal Sponsor with general written descriptions, including maps as appropriate, of such relocations in detail sufficient to enable the Non-Federal Sponsor to fulfill its obligations under this paragraph, and shall provide the Non-Federal Sponsor with a written notice to proceed with such relocations. Prior to the end of the period of construction, the Non-Federal Sponsor shall perform or ensure the performance of all relocations as set forth in such descriptions. Furthermore, prior to issuance of the solicitation for each Government construction contract, the Non-Federal Sponsor shall prepare or ensure the preparation of plans and specifications for, and perform or ensure the performance of, all relocations the Government determines to be necessary for that contract.

D. The Non-Federal Sponsor in a timely manner shall provide the Government with such documents as are sufficient to enable the Government to determine the value of any contribution provided pursuant to paragraphs A., B., or C. of this Article. Upon receipt of such documents the Government, in accordance with Article IV of this Agreement and in a timely manner, shall determine the value of such contribution, include such value in total project costs, and afford credit for such value toward the Non-Federal Sponsor's share of total project costs.

E. The Non-Federal Sponsor shall comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform

Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 C.F.R. Part 24, in acquiring lands, easements, and rights-of-way required for the construction, operation, and maintenance of the Project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and shall inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

ARTICLE IV - CREDIT FOR VALUE OF LANDS, RELOCATIONS, AND DISPOSAL AREAS

A. The Non-Federal Sponsor shall receive credit toward its share of total project costs for the value of the lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas that the Non-Federal Sponsor must provide pursuant to Article III of this Agreement, and for the value of the relocations that the Non-Federal Sponsor must perform or for which it must ensure performance pursuant to Article III of this Agreement. However, the Non-Federal Sponsor shall not receive credit for the value of any lands, easements, rights-of-way, relocations, or borrow and dredged or excavated material disposal areas that have been provided previously as an item of cooperation for another Federal project. The Non-Federal Sponsor also shall not receive credit for the value of lands, easements, rights-of-way, relocations, or borrow and dredged or excavated material disposal areas to the extent that such items are provided using Federal funds unless the Federal granting agency verifies in writing that such credit is expressly authorized by statute.

B. For the sole purpose of affording credit in accordance with this Agreement, the value of lands, easements, and rights-of-way, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, shall be the fair market value of the real property interests, plus certain incidental costs of acquiring those interests, as determined in accordance with the provisions of this paragraph.

1. Date of Valuation. The fair market value of lands, easements, or rights-of-way owned by the Non-Federal Sponsor on the effective date of this Agreement shall be the fair market value of such real property interests as of the date the Non-Federal Sponsor provides the Government with authorization for entry thereto. However, for lands, easements, or rights-of-way owned by the Non-Federal Sponsor on the effective date of this Agreement that are required for the construction of the Non-Federal Construction, fair market value shall be the value of such real property interests as of the date the Non-Federal Sponsor awards the first construction contract for the Non-Federal Construction, or, if the Non-Federal Sponsor performs the construction with its own labor, the date that the Non-Federal Sponsor begins construction of the Non-Federal Construction. The fair market value of lands, easements, or rights-of-way acquired by the Non-Federal Sponsor after the effective date of this Agreement shall be the fair market value of such real property interests at the time the interests are acquired.

2. General Valuation Procedure. Except as provided in paragraph B.3. of this Article, the fair market value of lands, easements, or rights-of-way shall be determined in accordance with paragraph B.2.a. of this Article, unless thereafter a different amount is determined to represent fair market value in accordance with paragraph B.2.b. of this Article.

a. The Non-Federal Sponsor shall obtain, for each real property interest, an appraisal that is prepared by a qualified appraiser who is acceptable to the Non-Federal Sponsor and the Government. The appraisal must be prepared in accordance with the applicable rules of just compensation, as specified by the Government. The fair market value shall be the amount set forth in the Non-Federal Sponsor's appraisal, if such appraisal is approved by the Government. In the event the Government does not approve the Non-Federal Sponsor's appraisal, the Non-Federal Sponsor may obtain a second appraisal, and the fair market value shall be the amount set forth in the Non-Federal Sponsor's second appraisal, if such appraisal is approved by the Government. In the event the Government does not approve the Non-Federal Sponsor's second appraisal, or the Non-Federal Sponsor chooses not to obtain a second appraisal, the Government shall obtain an appraisal, and the fair market value shall be the amount set forth in the Government's appraisal, if such appraisal is approved by the Non-Federal Sponsor. In the event the Non-Federal Sponsor does not approve the Government's appraisal, the Government, after consultation with the Non-Federal Sponsor, shall consider the Government's and the Non-Federal Sponsor's appraisals and determine an amount based thereon, which shall be deemed to be the fair market value.

b. Where the amount paid or proposed to be paid by the Non-Federal Sponsor for the real property interest exceeds the amount determined pursuant to paragraph B.2.a. of this Article, the Government, at the request of the Non-Federal Sponsor, shall consider all factors relevant to determining fair market value and, in its sole discretion, after consultation with the Non-Federal Sponsor, may approve in writing an amount greater than the amount determined pursuant to paragraph B.2.a. of this Article, but not to exceed the amount actually paid or proposed to be paid. If the Government approves such an amount, the fair market value shall be the lesser of the approved amount or the amount paid by the Non-Federal Sponsor, but no less than the amount determined pursuant to paragraph B.2.a. of this Article.

3. Eminent Domain Valuation Procedure. For lands, easements, or rights-of-way acquired by eminent domain proceedings instituted after the effective date of this Agreement, the Non-Federal Sponsor shall, prior to instituting such proceedings, submit to the Government notification in writing of its intent to institute such proceedings and an appraisal of the specific real property interests to be acquired in such proceedings. The Government shall have 60 days after receipt of such a notice and appraisal within which to review the appraisal, if not previously approved by the Government in writing.

a. If the Government previously has approved the appraisal in writing, or if the Government provides written approval of, or takes no action on, the appraisal within such 60-day period, the Non-Federal Sponsor shall use the amount set forth in such appraisal as the estimate of just compensation for the purpose of instituting the eminent domain proceeding.

b. If the Government provides written disapproval of the appraisal, including the reasons for disapproval, within such 60-day period, the Government and the Non-Federal Sponsor shall consult in good faith to promptly resolve the issues or areas of disagreement that are identified in the Government's written disapproval. If, after such good faith consultation, the Government and the Non-Federal Sponsor agree as to an appropriate amount, then the Non-Federal Sponsor shall use that amount as the estimate of just compensation for the purpose of instituting the eminent domain proceeding. If, after such good faith consultation, the Government and the Non-Federal Sponsor cannot agree as to an appropriate amount, then the Non-Federal Sponsor may use the amount set forth in its appraisal as the estimate of just compensation for the purpose of instituting the eminent domain proceeding.

c. For lands, easements, or rights-of-way acquired by eminent domain proceedings instituted in accordance with sub-paragraph B.3. of this Article, fair market value shall be either the amount of the court award for the real property interests taken, to the extent the Government determined such interests are required for the construction, operation, and maintenance of the Project, or the amount of any stipulated settlement or portion thereof that the Government approves in writing.

4. Incidental Costs. For lands, easements, or rights-of-way acquired by the Non-Federal Sponsor within a five-year period preceding the effective date of this Agreement, or at any time after the effective date of this Agreement, the value of the interest shall include the documented incidental costs of acquiring the interest, as determined by the Government, subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of costs. Such incidental costs shall include, but not necessarily be limited to, closing and title costs, appraisal costs, survey costs, attorney's fees, plat maps, and mapping costs, as well as the actual amounts expended for payment of any Public Law 91-646 relocation assistance benefits provided in accordance with Article III.E. of this Agreement.

C. After consultation with the Non-Federal Sponsor, the Government shall determine the value of relocations in accordance with the provisions of this paragraph.

1. For a relocation other than a highway, the value shall be only that portion of relocation costs that the Government determines is necessary to provide a functionally equivalent facility, reduced by depreciation, as applicable, and by the salvage value of any removed items.

2. For a relocation of a highway, the value shall be only that portion of

relocation costs that would be necessary to accomplish the relocation in accordance with the design standard that the State of California would apply under similar conditions of geography and traffic load, reduced by the salvage value of any removed items.

3. Relocation costs shall include, but not necessarily be limited to, actual costs of performing the relocation; planning, engineering and design costs; supervision and administration costs; and documented incidental costs associated with performance of the relocation, but shall not include any costs due to betterments, as determined by the Government, nor any additional cost of using new material when suitable used material is available. Relocation costs shall be subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of costs.

D. The value of the improvements made to lands, easements, and rights-of-way for the proper disposal of dredged or excavated material shall be the costs of the improvements, as determined by the Government, subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of costs. Such costs shall include, but not necessarily be limited to, actual costs of providing the improvements; planning, engineering and design costs; supervision and administration costs; and documented incidental costs associated with providing the improvements, but shall not include any costs due to betterments, as determined by the Government.

ARTICLE V - PROJECT COORDINATION TEAM

A. To provide for consistent and effective communication, the Non-Federal Sponsor and the Government, not later than 30 days after the effective date of this Agreement, shall appoint named senior representatives to a Project Coordination Team. Thereafter, the Project Coordination Team shall meet regularly until the end of the period of construction. The Government's Project Manager and a counterpart named by the Non-Federal Sponsor shall co-chair the Project Coordination Team.

B. The Government's Project Manager and the Non-Federal Sponsor's counterpart shall keep the Project Coordination Team informed of the progress of construction and of significant pending issues and actions, and shall seek the views of the Project Coordination Team on matters that the Project Coordination Team generally oversees.

C. Until the end of the period of construction, the Project Coordination Team shall generally oversee the Project, including issues related to design; plans and specifications; scheduling; real property and relocation requirements; real property acquisition; contract awards and modifications; contract costs; the Government's cost projections; final inspection of the entire Project or functional portions of the Project; preparation of the proposed OMRR&R Manual; anticipated requirements and needed

capabilities for performance of operation, maintenance, repair, replacement, and rehabilitation of the Project; and other related matters. This oversight shall be consistent with a project management plan developed by the Government after consultation with the Non-Federal Sponsor.

D. The Project Coordination Team may make recommendations that it deems warranted to the District Engineer on matters that the Project Coordination Team generally oversees, including suggestions to avoid potential sources of dispute. The Government in good faith shall consider the recommendations of the Project Coordination Team. The Government, having the legal authority and responsibility for construction of the Project, has the discretion to accept, reject, or modify the Project Coordination Team's recommendations.

E. The costs of participation in the Project Coordination Team shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

ARTICLE VI - METHOD OF PAYMENT

A. The Government shall maintain current records of contributions provided by the parties and current projections of total project costs and costs due to betterments. By April of each year and at least quarterly thereafter, the Government shall provide the Non-Federal Sponsor with a report setting forth all contributions provided to date and the current projections of total project costs, of total costs due to betterments, of the maximum amount of total project costs determined in accordance with Article XIX of this Agreement, of the components of total project costs, of each party's share of total project costs, of the Non-Federal Sponsor's total cash contributions required in accordance with Articles II.B., II.D., and II.E. of this Agreement, of the non-Federal proportionate share, and of the funds the Government projects to be required from the Non-Federal Sponsor for the upcoming fiscal year. On the effective date of this Agreement, total project costs are projected to be $312,000,000, and the Non-Federal Sponsor's cash contribution required under Article II.D. of this Agreement is projected to be $15,600,000. Such amounts are estimates subject to adjustment by the Government and are not to be construed as the total financial responsibilities of the Government and the Non-Federal Sponsor.

B. The Non-Federal Sponsor shall provide the cash contribution required under Articles II.D.1. and II.D.3. of this Agreement in accordance with the provisions of this paragraph.

1. Not less than 60 calendar days prior to the scheduled date for issuance of the solicitation for the first construction contract, the Government shall notify the Non-Federal Sponsor in writing of such scheduled date and the funds the Government determines, after consideration of any credit afforded pursuant to Article II.D.5. of this Agreement, to be required from the Non-Federal Sponsor to meet the

non-Federal proportionate share of projected financial obligations for construction through the first fiscal year of construction, including the non-Federal proportionate share of financial obligations for construction incurred prior to the commencement of the period of construction. Not later than such scheduled date, the Non-Federal Sponsor shall verify to the satisfaction of the Government that the Non-Federal Sponsor has deposited the required funds in an escrow or other account acceptable to the Government, with interest accruing to the Non-Federal Sponsor.

2. For the second and subsequent fiscal years of construction, the Government shall notify the Non-Federal Sponsor in writing, no later than 60 calendar days prior to the beginning of that fiscal year, of the funds the Government, after consideration of any credit afforded pursuant to Article II.D.5. of this Agreement, determines to be required from the Non-Federal Sponsor to meet the non-Federal proportionate share of projected financial obligations for construction for that fiscal year. No later than 30 calendar days prior to the beginning of the fiscal year, the Non-Federal Sponsor shall make the full amount of the required funds for that fiscal year available to the Government through the funding mechanism specified in Article VI.B.1. of this Agreement.

3. The Government shall draw from the funds provided by the Non-Federal Sponsor such sums as the Government deems necessary to cover: (a) the non-Federal proportionate share of financial obligations for construction incurred prior to the commencement of the period of construction; and (b) the non-Federal proportionate share of financial obligations for construction as they are incurred during the period of construction.

4. If at any time during the period of construction the Government determines that additional funds will be needed from the Non-Federal Sponsor to cover the non-Federal proportionate share of projected financial obligations for construction for the current fiscal year, the Government shall notify the Non-Federal Sponsor in writing of the additional funds required, and the Non-Federal Sponsor, no later than 60 calendar days from receipt of such notice, shall make the additional required funds available through the payment mechanism specified in Article VI.B.1. of this Agreement.

C. In advance of the Government incurring any financial obligation associated with additional work under Article II.B. or II.E. of this Agreement, the Non-Federal Sponsor shall verify to the satisfaction of the Government that the Non-Federal Sponsor has deposited the full amount of the funds required to pay for such additional work in an escrow or other account acceptable to the Government, with interest accruing to the Non-Federal Sponsor. The Government shall draw from the funds provided by the Non-Federal Sponsor such sums as the Government deems necessary to cover the Government's financial obligations for such additional work as they are incurred. In the event the Government determines that the Non-Federal Sponsor must

provide additional funds to meet its cash contribution, the Government shall notify the Non-Federal Sponsor in writing of the additional funds required. Within 30 calendar days thereafter, the Non-Federal Sponsor shall provide the Government with a check for the full amount of the additional required funds.

D. Upon completion of the Project or termination of this Agreement, and upon resolution of all relevant claims and appeals, the Government shall conduct a final accounting and furnish the Non-Federal Sponsor with the results of the final accounting. The final accounting shall determine total project costs, each party's contribution provided thereto, and each party's required share thereof. The final accounting also shall determine costs due to betterments and the Non-Federal Sponsor's cash contribution provided pursuant to Article II.B. of this Agreement.

1. In the event the final accounting shows that the total contribution provided by the Non-Federal Sponsor is less than its required share of total project costs plus costs due to any betterments provided in accordance with Article II.B. of this Agreement, the Non-Federal Sponsor shall, no later than 90 calendar days after receipt of written notice, make a cash payment to the Government of whatever sum is required to meet the Non-Federal Sponsor's required share of total project costs plus costs due to any betterments provided in accordance with Article II.B. of this Agreement.

2. In the event the final accounting shows that the total contribution provided by the Non-Federal Sponsor exceeds its required share of total project costs plus costs due to any betterments provided in accordance with Article II.B. of this Agreement, the Government shall, subject to the availability of funds, refund the excess to the Non-Federal Sponsor no later than 90 calendar days after the final accounting is complete; however, the Non-Federal Sponsor shall not be entitled to any refund of the 5 percent cash contribution required pursuant to Article II.D.1. of this Agreement. In the event existing funds are not available to refund the excess to the Non-Federal Sponsor, the Government shall seek such appropriations as are necessary to make the refund.

ARTICLE VII - DISPUTE RESOLUTION

As a condition precedent to a party bringing any suit for breach of this Agreement, that party must first notify the other party in writing of the nature of the purported breach and seek in good faith to resolve the dispute through negotiation. If the parties cannot resolve the dispute through negotiation, they may agree to a mutually acceptable method of non-binding alternative dispute resolution with a qualified third party acceptable to both parties. The parties shall each pay 50 percent of any costs for the services provided by such a third party as such costs are incurred. The existence of a dispute shall not excuse the parties from performance pursuant to this Agreement.

ARTICLE VIII - OPERATION, MAINTENANCE, REPAIR, REPLACEMENT, AND REHABILITATION (OMRR&R)

A. Upon notification in accordance with Article II.C. of this Agreement and for so long as the Project remains authorized, the Non-Federal Sponsor shall operate, maintain, repair, replace, and rehabilitate the entire Project or the functional portion of the Project, at no cost to the Government, in a manner compatible with the Project's authorized purposes and in accordance with applicable Federal and State laws as provided in Article XI of this Agreement and specific directions prescribed by the Government in the OMRR&R Manual and any subsequent amendments thereto.

B. The Non-Federal Sponsor hereby gives the Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Non-Federal Sponsor owns or controls for access to the Project for the purpose of inspection and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the Project. If an inspection shows that the Non-Federal Sponsor for any reason is failing to perform its obligations under this Agreement, the Government shall send a written notice describing the non-performance to the Non-Federal Sponsor. If, after 30 calendar days from receipt of notice, the Non-Federal Sponsor continues to fail to perform, then the Government shall have the right to enter, at reasonable times and in a reasonable manner, upon property that the Non-Federal Sponsor owns or controls for access to the Project for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the Project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Government shall operate to relieve the Non-Federal Sponsor of responsibility to meet the Non-Federal Sponsor's obligations as set forth in this Agreement, or to preclude the Government from pursuing any other remedy at law or equity to ensure faithful performance pursuant to this Agreement.

ARTICLE IX - INDEMNIFICATION

The Non-Federal Sponsor shall hold and save the Government free from all damages arising from the construction, operation, maintenance, repair, replacement,

and rehabilitation of the Project and any Project-related betterments, except for damages due to the fault or negligence of the Government or its contractors.

ARTICLE X - MAINTENANCE OF RECORDS AND AUDIT

A. Not later than 60 calendar days after the effective date of this Agreement, the Government and the Non-Federal Sponsor shall develop procedures for keeping books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement. These procedures shall incorporate, and apply as appropriate, the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 C.F.R. Section 33.20. The Government and the Non-Federal Sponsor shall maintain such books, records, documents, and other evidence in accordance with these procedures and for a minimum of three years after the period of construction and resolution of all relevant claims arising therefrom. To the extent permitted under applicable Federal laws and regulations, the Government and the Non-Federal Sponsor shall each allow the other to inspect such books, documents, records, and other evidence.

B. Pursuant to 32 C.F.R. Section 33.26, the Non-Federal Sponsor is responsible for complying with the Single Audit Act of 1984, 31 U.S.C. Sections 7501-7507, as implemented by Office of Management and Budget (OMB) Circular No. A-128 and Department of Defense Directive 7600.10. Upon request of the Non-Federal Sponsor and to the extent permitted under applicable Federal laws and regulations, the Government shall provide to the Non-Federal Sponsor and independent auditors any information necessary to enable an audit of the Non-Federal Sponsor's activities under this Agreement. The costs of any non-Federal audits performed in accordance with this paragraph shall be allocated in accordance with the provisions of OMB Circulars A-87 and A-128, and such costs as are allocated to the Project shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

C. In accordance with 31 U.S.C. Section 7503, the Government may conduct audits in addition to any audit that the Non-Federal Sponsor is required to conduct under the Single Audit Act. Any such Government audits shall be conducted in accordance with Government Auditing Standards and the cost principles in OMB Circular No. A-87 and other applicable cost principles and regulations. The costs of Government audits performed in accordance with this paragraph shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

ARTICLE XI - FEDERAL AND STATE LAWS

In the exercise of their respective rights and obligations under this Agreement, the Non-Federal Sponsor and the Government agree to comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of

Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulations 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army".

ARTICLE XII - RELATIONSHIP OF PARTIES

A. In the exercise of their respective rights and obligations under this Agreement, the Government and the Non-Federal Sponsor each act in an independent capacity, and neither is to be considered the officer, agent, or employee of the other.

B. In the exercise of its rights and obligations under this Agreement, neither party shall provide, without the consent of the other party, any contractor with a release that waives or purports to waive any rights such other party may have to seek relief or redress against such contractor either pursuant to any cause of action that such other party may have or for violation of any law.

ARTICLE XIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, nor any resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE XIV - TERMINATION OR SUSPENSION

A. If at any time the Non-Federal Sponsor fails to fulfill its obligations under Article II.B., II.D., II.E., VI, or XVIII.C. of this Agreement, the Assistant Secretary of the Army (Civil Works) shall terminate this Agreement or suspend future performance under this Agreement unless he determines that continuation of work on the Project is in the interest of the United States or is necessary in order to satisfy agreements with any other non-Federal interests in connection with the Project.

B. If the Government fails to receive annual appropriations in amounts sufficient to meet Project expenditures for the then-current or upcoming fiscal year, the Government shall so notify the Non-Federal Sponsor in writing, and 60 calendar days thereafter either party may elect without penalty to terminate this Agreement or to suspend future performance under this Agreement. In the event that either party elects to suspend future performance under this Agreement pursuant to this paragraph, such suspension shall remain in effect until such time as the Government receives sufficient appropriations or until either the Government or the Non-Federal Sponsor elects to terminate this Agreement.

C. In the event that either party elects to terminate this Agreement pursuant to this Article or Article XV of this Agreement, both parties shall conclude their activities relating to the Project and proceed to a final accounting in accordance with Article VI.D. of this Agreement.

D. Any termination of this Agreement or suspension of future performance under this Agreement in accordance with this Article or Article XV of this Agreement shall not relieve the parties of liability for any obligation previously incurred. Any delinquent payment shall be charged interest at a rate, to be determined by the Secretary of the Treasury, equal to 150 per centum of the average bond equivalent rate of the 13-week Treasury bills auctioned immediately prior to the date on which such payment became delinquent, or auctioned immediately prior to the beginning of each additional 3-month period if the period of delinquency exceeds 3 months.

ARTICLE XV - HAZARDOUS SUBSTANCES

A. After execution of this Agreement and upon direction by the District Engineer, the Non-Federal Sponsor shall perform, or cause to be performed, any investigations for hazardous substances that the Government or the Non-Federal Sponsor determines to be necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (hereinafter "CERCLA"), 42 U.S.C. Sections 9601-9675, that may exist in, on, or under lands, easements, and rights-of-way that the Government determines, pursuant to Article III of this Agreement, to be required for the construction, operation, and maintenance of the Project. However, for lands that the Government determines to be subject to the navigation servitude, only the Government shall perform such investigations unless the District Engineer provides the Non-Federal Sponsor with prior specific written direction, in which case the Non-Federal Sponsor shall perform such investigations in accordance with such written direction. All actual costs incurred by the Non-Federal Sponsor for such investigations for hazardous substances shall be included in total project costs and cost shared in accordance with the provisions of this Agreement, subject to an audit in accordance with Article X.C. of this Agreement to determine reasonableness, allocability, and allowability of costs.

B. In the event it is discovered through any investigation for hazardous substances or other means that hazardous substances regulated under CERCLA exist in, on, or under any lands, easements, or rights-of-way that the Government determines, pursuant to Article III of this Agreement, to be required for the construction, operation, and maintenance of the Project, the Non-Federal Sponsor and the Government shall provide prompt written notice to each other, and the Non-Federal Sponsor shall not proceed with the acquisition of the real property interests until both parties agree that the Non-Federal Sponsor should proceed.

C. The Government and the Non-Federal Sponsor shall determine whether to initiate construction of the Project, or, if already in construction, whether to continue with work on the Project, suspend future performance under this Agreement, or terminate this Agreement for the convenience of the Government, in any case where hazardous substances regulated under CERCLA are found to exist in, on, or under any lands, easements, or rights-of-way that the Government determines, pursuant to Article III of this Agreement, to be required for the construction, operation, and maintenance of

the Project. Should the Government and the Non-Federal Sponsor determine to initiate or continue with construction after considering any liability that may arise under CERCLA, the Non-Federal Sponsor shall be responsible, as between the Government and the Non-Federal Sponsor, for the costs of clean-up and response, to include the costs of any studies and investigations necessary to determine an appropriate response to the contamination. Such costs shall not be considered a part of total project costs. In the event the Non-Federal Sponsor fails to provide any funds necessary to pay for clean up and response costs or to otherwise discharge the Non-Federal Sponsor's responsibilities under this paragraph upon direction by the Government, the Government may, in its sole discretion, either terminate this Agreement for the convenience of the Government, suspend future performance under this Agreement, or continue work on the Project.

D. The Non-Federal Sponsor and the Government shall consult with each other in accordance with Article V of this Agreement in an effort to ensure that responsible parties bear any necessary clean up and response costs as defined in CERCLA. Any decision made pursuant to paragraph C. of this Article shall not relieve any third party from any liability that may arise under CERCLA.

E. As between the Government and the Non-Federal Sponsor, the Non-Federal Sponsor shall be considered the operator of the Project for purposes of CERCLA liability. To the maximum extent practicable, the Non-Federal Sponsor shall operate, maintain, repair, replace, and rehabilitate the Project in a manner that will not cause liability to arise under CERCLA.

ARTICLE XVI - NOTICES

A. Any notice, request, demand, or other communication required or permitted to be given under this Agreement shall be deemed to have been duly given if in writing and either delivered personally or by telegram or mailed by first-class, registered, or certified mail, as follows:

If to the Non-Federal Sponsor:

Director
L. A. County Department of Public Works
900 South Fremont
Alhambra, CA 91803-1331

If to the Government:

District Engineer
U.S. Army Corps of Engineers
Los Angeles District
Attn: CESPL - PM - C
P.O. Box 2711
Los Angeles, CA 90053-2325

B. A party may change the address to which such communications are to be directed by giving written notice to the other party in the manner provided in this Article.

C. Any notice, request, demand, or other communication made pursuant to this Article shall be deemed to have been received by the addressee at the earlier of such time as it is actually received or seven calendar days after it is mailed.

ARTICLE XVII - CONFIDENTIALITY

To the extent permitted by the laws governing each party, the parties agree to maintain the confidentiality of exchanged information when requested to do so by the providing party.

ARTICLE XVIII - HISTORIC PRESERVATION

A. The costs of identification, survey and evaluation of historic properties shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

B. As specified in Section 7(a) of Public Law 93-291 (16 U.S.C. Section 469c(a)), the costs of mitigation and data recovery activities associated with historic preservation shall be borne entirely by the Government and shall not be included in total project costs, up to the statutory limit of one percent of the total amount authorized to be appropriated for the Project.

C. The Government shall not incur costs for mitigation and data recovery that exceed the statutory one percent limit specified in paragraph B. of this Article unless and until the Assistant Secretary of the Army (Civil Works) has waived that limit in accordance with Section 208(3) of Public Law 96-515 (16 U.S.C. Section 469c-2(3)). Any costs of mitigation and data recovery that exceed the one percent limit shall not be included in total project costs but shall be cost shared between the Non-Federal Sponsor and the Government consistent with the minimum non-Federal cost sharing requirements for the underlying flood control purpose, as follows: 25 percent borne by the Non-Federal Sponsor, and 75 percent borne by the Government.

ARTICLE XIX - SECTION 902 PROJECT COST LIMITS

The Non-Federal Sponsor has reviewed the provisions set forth in Section 902 of Public Law 99-662, as amended, and understands that Section 902 establishes the maximum amount of total project costs for the Los Angeles County Drainage Area, California Flood Control Project. Notwithstanding any other provision of this Agreement, the Government shall not make a new Project financial obligation, make a Project expenditure, or afford credit toward total project costs for the value of any contribution provided by the Non-Federal Sponsor, if such obligation, expenditure, or credit would result in total project costs exceeding this maximum amount, unless otherwise authorized by law. On the effective date of this Agreement, this maximum amount is estimated to be $374,400,000, as calculated in accordance with ER 1105-2-100 using October 1, 1994 price levels and allowances for projected future inflation. The Government shall adjust this maximum amount in accordance with Section 902.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement, which shall become effective upon the date it is signed by the Government.

ATTEST:

JOANNE STURGES
Executive Officer-Clerk
of the Board of Supervisors

By _____
Deputy

Los Angeles County
Flood Control District,
~~a body corporate and politic~~

By _____
Chair, Board of Supervisors

DATE: AUG 07 1995

APPROVED AS TO FORM:
DEWITT W. CLINTON
COUNTY COUNSEL

By _____

ADOPTED
BOARD OF SUPERVISORS
COUNTY OF LOS ANGELES

APR 0 6 1995

JOANNE STURGES
EXECUTIVE OFFICER

DEPARTMENT OF THE ARMY

By _____
JOHN H. ZIRSCHKY
Acting Assistant Secretary of the Army
(Civil Works)

DATE: 8-10-95

CERTIFICATE OF AUTHORITY

I, DeWitt W. Clinton, do hereby certify that I am the principal legal officer of the LOS ANGELES COUNTY FLOOD CONTROL DISTRICT that the Los Angeles County Flood Control District is a legally constituted public body with full authority and legal capability to perform the terms of the Agreement between the Department of the Army and the Los Angeles County Flood Control District in connection with the LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA FLOOD CONTROL PROJECT, and to pay damages in accordance with the terms of this Agreement, if necessary, in the event of the failure to perform, as required by Section 221 of Public Law 91-611 (42 U.S.C. Section 1962d-5b), and that the person who has executed this Agreement on behalf of the LOS ANGELES COUNTY FLOOD CONTROL DISTRICT has acted within his or her statutory authority.

IN WITNESS WHEREOF, I have made and executed this certification this 7th day of August 1995.

DEWITT W. CLINTON
COUNTY COUNSEL

By _____
Deputy

CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Gloria Molina

Chair, Board of Supervisors

DATE: AUG 07 1995

ATTEST: JOANNE STURGES
EXECUTIVE OFFICER -
CLERK OF THE BOARD OF SUPERVISORS
BY Sylvia J. Wilkerson, Deputy

APPROVED AS TO FORM
DE WITT W. CLINTON, County Counsel

Deputy

COUNTY OF LOS ANGELES CALIFORNIA

APPENDIX III

SAMPLE REPORTING FORMS

APPENDIX III

SAMPLE FORMS

Instructions for Use

1. BASIC ORGANIZATION. Both the spring and fail semiannual operation and maintenance reports submitted by the operation and maintenance organization to the Corps of Engineers, Los Angeles District, are organized in basically the same way. As explained in PART VI, each debris basin or reach of channel has associated with it a set of forms SPL 403, a signature page form SPL 403a, and optional form(s) SPL 403b for any explanatory notes. There is one set of such forms for each of the project features listed in Appendix VI, and these sets are grouped into a package of all sequence numbers which comprise a particular channel. There is one such package for each major channel, with a cover letter providing operation and maintenance expenditure information for the channel and any debris basins. The series of packages which cover the entire project are submitted as the semiannual report.

2. TRANSMITTAL LETTERS. Sample transmittal letters are provided in this Appendix. In general, the samples are self-explanatory; however, certain parts are clarified below.

a. SUBJECT. The subject block will include the name of the channel and the sequence numbers which are covered by the package which follows.

b. FISCAL STATEMENT. The operation and maintenance financial information to be provided with each transmittal letter includes gross expenditures for plant, equipment, material, labor, and overhead. The spring semiannual report covers the period from 16 October to 15 April (inclusive); the fall submittal covers from 16 April to 15 October (inclusive) in addition to the totals from the spring submittal. The specific entries required are indicated on the sample forms.

3. SEMIANNUAL REPORT FORMS. Detailed instructions for the preparation of the semiannual report forms are included in PART VI. The suggested procedures for preparing the forms are:

a. Prepare a master form for each reach as defined in Appendix VI. Columns 1, 2, and 3 should be completed on this master form. For column 1, include all applicable reporting features as defined as "Typical Reporting Features" on Figures 1 and 2 of Part VI of the main report. Features can be grouped to be defined by station reaches as required in column 3. Column 2 is self explanatory. In column 3, identify the reach by stations or the station at which a feature, such as a bridge or side drain, crosses or enters the channel. SPL Form 403a, which allows for signatures, is used as the last page.

b. The prepared master form is reproduced and column 4 is dated and initialed by the inspector in the field indicating his certification that all reporting features are visually and physically accessible for the spring inspection.

c. A second stage reproducible of the form used by the inspector is prepared to reflect findings during the spring inspection. Recommended repairs will be noted.

d. Any remarks will be noted in column 21 and detailed on SPL Form 403b.

e. A second stage reproducible of the spring report will be prepared to indicate what repairs have been completed. Any additional remarks will be added to SPL Form 403b.

FILE NO:
SUBJECT: Spring Semiannual Operation and Maintenance Report 19__
CHANNEL. *<Channel or debris basin and identifier>*
DATE: *(1 June or before)*

District Engineer
U.S. Army Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053-2325

Dear Sir:

This transmittal contains the operation and maintenance report for (*name of project feature)*in accordance with the manual LADM 1130-2-13. The following are included in this submittal:

Basic report	Spring phase of semiannual report (15 October 19__ to April 19__)
Supporting reports	January 19__ quarterly report Storm operation report(s) of (date) Copy of special report(s) of (date) Operation and maintenance manual revisions

The fiscal statement of gross operation and maintenance expenditures, summarized for the above project unit(s), is as follows:

AMOUNT	DATE
stormflow operations	
$	
inspection and reporting new permit inspection	
TOTAL gross expenditures, 15 October to 15 April $	

Comments on these expenditures are as follows:

(Comments)

Sincerely yours,

(name), Chief Engineer

Encl
1. Spring semiannual report
2. January quarter report
3. Storm operation report(s)
4. Copy of special report(s)
5. Manual revisions, if any

FILE NO:
SUBJECT: Fall Semiannual Operation and Maintenance Report 19__
CHANNEL. *<Channel or debris basin and identifier>*
DATE: *(1 December or before)*

District Engineer
U.S. Army Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053-2325

Dear Sir:

This transmittal, which contains the operation and maintenance report for (*name of project feature)* in accordance with the manual LADM 1130-2-13, completes the semiannual operation and maintenance report for the period from 15 October 19__ to 15 October 19__. The following are included in this submittal:

Basic report	Spring phase of semiannual report (15 October 19__ to April 19__)
Supporting reports	January 19__ quarterly report
	Storm operation report(s) of (date)
	Copy of special report(s) of (date)
	Operation and maintenance manual revisions

The fiscal statement of gross operation and maintenance expenditures, summarized for the above project unit(s), is as follows:

	15 October 19__ to 15 April 19__	15 April 19__ to 15 October 19__	15 October 19__ to 15 April 19__
Stormflow operations	$	$	$
Inspection and reporting			
New permit inspection			
Preparation and debris removal			
Repairs			
Investigation and test program	_____	_____	_____
TOTAL	$	$	$

Comments on these expenditures are as follows:

(Comments)
Sincerely yours,

(name), Chief Engineer
Encl
1. Fall semiannual report
2. July quarter report
3. Investigation and test report
4. Copy of special report(s)
5. Manual revisions, if any

SEMIANNUAL OPERATION AND MAINTENANCE REPORT

1. The following items of semiannual report will be supplied by the U.S. Army Corps of Engineers, Los Angeles District, to the Operation and Maintenance Branch.

a. Reporting features
b. Project or permit
c. Identification
d. Reported deviation
e. Deviation cause
f. Investigation and testing
g. Recommended repair
h. Repair scheduled

APPENDIX III

SAMPLE FORMS

Instructions for Use

1. BASIC ORGANIZATION. Both the spring and fail semiannual operation and maintenance reports submitted by the operation and maintenance organization to the Corps of Engineers, Los Angeles District, are organized in basically the same way. As explained in PART VI, each debris basin or reach of channel has associated with it a set of forms SPL 403, a signature page form SPL 403a, and optional form(s) SPL 403b for any explanatory notes. There is one set of such forms for each of the project features listed in Appendix VI, and these sets are grouped into a package of all sequence numbers which comprise a particular channel. There is one such package for each major channel, with a cover letter providing operation and maintenance expenditure information for the channel and any debris basins. The series of packages which cover the entire project are submitted as the semiannual report.

2. TRANSMITTAL LETTERS. Sample transmittal letters are provided in this Appendix. In general, the samples are self-explanatory; however, certain parts are clarified below.

a. SUBJECT. The subject block will include the name of the channel and the sequence numbers which are covered by the package which follows.

b. FISCAL STATEMENT. The operation and maintenance financial information to be provided with each transmittal letter includes gross expenditures for plant, equipment, material, labor, and overhead. The spring semiannual report covers the period from 16 October to 15 April (inclusive); the fall submittal covers from 16 April to 15 October (inclusive) in addition to the totals from the spring submittal. The specific entries required are indicated on the sample forms.

3. SEMIANNUAL REPORT FORMS. Detailed instructions for the preparation of the semiannual report forms are included in PART VI. The suggested procedures for preparing the forms are:

a. Prepare a master form for each reach as defined in Appendix VI. Columns 1, 2, and 3 should be completed on this master form. For column 1, include all applicable reporting features as defined as "Typical Reporting Features" on Figures 1 and 2 of Part VI of the main report. Features can be grouped to be defined by station reaches as required in column 3. Column 2 is self explanatory. In column 3, identify the reach by stations or the station at which a feature, such as a bridge or side drain, crosses or enters the channel. SPL Form 403a, which allows for signatures, is used as the last page.

b. The prepared master form is reproduced and column 4 is dated and initialed by the inspector in the field indicating his certification that all reporting features are visually and physically accessible for the spring inspection.

c. A second stge reproducible of the form used by the inspector is prepared to reflect findings during the spring inspection. Recommended repairs will be noted.

d. Any remarks will be noted in column 21 and detailed on SPL Form 403b.

e. A second stage reproducible of the spring report will be prepared to indicate what repairs have been completed. Any additional remarks will be added to SPL Form 403b.

FILE NO:
SUBJECT: Spring Semiannual Operation and Maintenance Report 19__
CHANNEL. *<Channel or debris basin and identifier>*
DATE: *(1 June or before)*

District Engineer
U.S. Army Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053-2325

Dear Sir:

This transmittal contains the operation and maintenance report for *(name of project feature)* in accordance with the manual LADM 1130-2-13. The following are included in this submittal:

Basic report	Spring phase of semiannual report (15 October 19__ to April 19__)
Supporting reports	January 19__ quarterly report Storm operation report(s) of (date) Copy of special report(s) of (date) Operation and maintenance manual revisions

The fiscal statement of gross operation and maintenance expenditures, summarized for the above project unit(s), is as follows:

AMOUNT	DATE
stormflow operations	
$	
inspection and reporting new permit inspection	
TOTAL gross expenditures, 15 October to 15 April $	

Comments on these expenditures are as follows:

(Comments)

Sincerely yours,

(name), Chief Engineer

Encl
1. Spring semiannual report
2. January quarter report
3. Storm operation report(s)
4. Copy of special report(s)
5. Manual revisions, if any

FILE NO:
SUBJECT: Fall Semiannual Operation and Maintenance Report 19__
CHANNEL. *<Channel or debris basin and identifier>*
DATE: *(1 December or before)*

District Engineer
U.S. Army Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053-2325

Dear Sir:

This transmittal, which contains the operation and maintenance report for *(name of project feature)* in accordance with the manual LADM 1130-2-13, completes the semiannual operation and maintenance report for the period from 15 October 19__ to 15 October 19__. The following are included in this submittal:

Basic report	Spring phase of semiannual report (15 October 19__ to April 19__)
Supporting reports	January 19__ quarterly report
	Storm operation report(s) of (date)
	Copy of special report(s) of (date)
	Operation and maintenance manual revisions

The fiscal statement of gross operation and maintenance expenditures, summarized for the above project unit(s), is as follows:

	15 October 19__ to 15 April 19__	15 April 19__ to 15 October 19__	15 October 19__ to 15 April 19__
Stormflow operations	$	$	$
Inspection and reporting			
New permit inspection			
Preparation and debris removal			
Repairs			
Investigation and test program	_____	_____	_____
TOTAL	$	$	$

Comments on these expenditures are as follows:

(Comments)
Sincerely yours,

(name), Chief Engineer
Encl
1. Fall semiannual report
2. July quarter report
3. Investigation and test report
4. Copy of special report(s)
5. Manual revisions, if any

SEMIANNUAL OPERATION AND MAINTENANCE REPORT

1. The following items of semiannual report will be supplied by the U.S. Army Corps of Engineers, Los Angeles District, to the Operation and Maintenance Branch.

a. Reporting features
b. Project or permit
c. Identification
d. Reported deviation
e. Deviation cause
f. Investigation and testing
g. Recommended repair
h. Repair scheduled

APPENDIX IV

SAMPLE PERMIT APPLICATION

SAMPLE PERMIT APPLICATION

The following pages provide detailed instructions for preparing the Department of Army Permit Application. If you have any questions, please call the Corps of Engineers, Regulatory Branch that has jurisdiction over your area.

Instructions for Preparing a
Department of the Army Permit Application

Blocks 1 through 4. To be completed by Corps of Engineers.

Block 5. Applicant's Name. Enter the name of the responsible party or parties. If the responsible party is an agency, company, corporation or other organization, indicate the responsible officer and title. If more than one party is associated with the application, please attach a sheet with the necessary information marked **Block 5.**

Block 6. Address of Applicant. Pleas provide the full address of the party or parties responsible for the application. If more space is needed, attach an extra sheet of paper marked **Block 6.**

Block 7. Applicant Telephone Number(s). Please provide the number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed if you choose to have an agent.

Block 8. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer or any other person or organization. *Note:* An agent is not required.

Block 9 and 10. Agent's Address and telephone number. Please provide the complete mailing address of the agent, along with the telephone number where he/she can be reached during normal business hours.

Block 11. Statement of Authorization. To be completed by applicant if an agent is to be employed.

Block 12. Proposed Project Name or title. Please provide name identifying the proposed project (i.e., Landmark Plaza, Burned Hills Subdivision or Edsall Commercial Center).

Block 13. Name of Waterbody. Pleas provide the name of any stream, lake, marsh or other waterway to be directly impacted by the activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14. Proposed Project Street Address. If the purpose project is located at a site having a street address (not a box number), please enter here.

Block 15. Location of Proposed Project. Enter the county and state where the proposed **project is located.** If more space is required, please attach a sheet with the necessary information marked **Block 15.**

Block 16. Other Location Descriptions. If available, provide the Section, Township and Range of the site and/or the latitude and longitude. You may also provide description of the proposed project location, such as lot numbers, tract numbers or you may choose to locate the proposed project site from a known point (such as the tight descending bank of Smith Creek, one mile down form the Highway 14 bridge). If a large river or stream, include the river mile of the proposed project site if known.

Block 17. Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as will as names. Also provide distances from known locations and any other information that would assist in locating the site.

Block 18. Nature of Activity. Describe the overall activity or project. Give appropriate dimensions of structures such as wingwalls, dikes (identify the materials to be used in construction, as well as the methods by which the work is to be done), or excavations (length, width, and height). Indicate whether discharge of dredged or fill material is involved. Also, identify any structure to be constructed on a fill, piles or float supported platforms.

The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked **Block 18.**

Block 19. Proposed Project Purpose. Describe the purpose and need for the proposed project. What will it be used for and why? Also, include a brief description of any related activities to be developed as the result of the proposed project. Give the approximate dates you plan to both begin and complete all work.

Block 20. Reason(s) for Discharge. If the activity involves the discharge of dredged and/or fill material into a wetland or other waterbody, including the temporary placement of material, explain the specific purpose of the placement of the material (such as erosion control).

Block 21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards. Describe the material to be discharged and amount of each material to be discharged within Corps jurisdiction. Please be sure this description will agree with your illustrations. Discharge material includes: rock, sand, clay, concrete, etc.

Block 22. Surface Areas of Wetlands or Other Waters Filled. Describe the area to be filled at each location. Specifically identify the surface areas, or part thereof, to be filled. Also include the means by which the discharge is to be done (backhoe, dragline, etc.). If dredged material is to be discharged on an upland site, identify the site and the steps to be taken (if necessary) to prevent runoff from the dredged material back into a waterbody. If more space is needed, attach an extra sheet of paper marked **Block 22.**

Block 23. Is any portion of the Work Already Complete? Provide any background on any part of the proposed project already completed. Describe the area already developed, structures completed, any dredged or fill material already discharged, the type of material, volume in cubic yards, acres filled, if a wetland or other waterbody (in acres or square feet). If the work was done under an existing Corps permit, identify the authorization if possible.

Block 24. Names and Addresses of Adjoining Property Owners, Lessees, etc., Whose Property Adjoins the Project Site. List complete names and full mailing addresses of the adjacent property owners (public and private) lessees, etc., whose property adjoins the waterbody or aquatic site where the work is being proposed so that they may be notified of the proposed activity (usually by public notice). If more space is needed, attach an extra sheet of paper marked **Block 24.**

Information regarding adjacent landowners is usually available through the office of the tax assessor in the county of counties where the project is to be developed.

Block 25. Information about Approvals or Denials by Other Agencies. You may need the approval of other Federal, state or local agencies for your project. Identify any application you have submitted and the status, if any (approved or denied) of each application. You need not have obtained all other permits before applying for a Corps permit.

Block 26. Signature of Applicant or Agent. The application must be signed by the owner or other authorized party (agent). This signature shall be an affirmation that the party applying for the permit possesses the requisite property rights to undertake the activity applied for (including compliance with special conditions, mitigation, etc.).

DRAWINGS AND ILLUSTRATIONS

General Information

Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are identified as a **Vicinity Map, a Plan View or a Typical Cross-section Map.** Identify each illustration with a figure or attachment number.

Please submit one original, or good quality copy, of all drawings on 8 ½x11 inch plain white paper (tracing paper or film may be substituted). Use the fewest number of sheets necessary for your drawings or illustrations.

Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view or cross section). **While illustrations need not be professional (many small, private illustrations are prepared by hand), they should be clear, accurate and contain all necessary information.**

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT
(33 CFR 325)

OMB APPROVAL NO. 0710-003
Expires October 1996

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of InformationOperations and Reports, 1215 Jefferson Davis Highway, Suite [redacted], Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC [redacted]3. Please DO NO RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application for a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE *(an agent is not required)*
6. APPLICANT'S ADDRESS	9. AGENT'S ADDRESS
7. APPLICANT'S PHONE NOS. W/AREA CODE a. Residence [redacted]. Business	10. AGENT'S PHONE NOS. W/AREA CODE a. Residence b. Business

11. STATEMENT OF AUTHORIZATION

I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT'S SIGNATURE DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE *(see instructions)*

13. NAME OF WATERBODY, IF KNOWN *(if applicable)*	14. PROJECT STREET ADDRESS *(if applicable)*
5. LOCATION OF PROJECT COUNTY STATE	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN, *(see instructions)*

17. DIRECTIONS TO THE SITE

[redacted]

ENCLOSURE OF FED ST IS OBSC ETE Enclosure: CE [illegible]

18. Nature of Activity *(Description of project, include all features)*

19. Project Purpose *(Describe the reason or purpose of the project, see instructions)*

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

22. Surface Area in Acres of Wetlands or Other Waters Filled *(see instructions)*

23. Is Any Portion of the Work Already Complete? Yes _____ No _____ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

25. List of Other Certifications or Approvals/Denials Received from other Federal, State or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

*Would include but is not restricted to zoning, building and flood plain permits

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT _____ DATE _____ SIGNATURE OF AGENT _____ DATE _____

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

*U.S.GPO:1994-520-478/82018

APPENDIX V

BASIS FOR RECOMMENDING REPAIRS

TABLE OF CONTENTS

APPENDIX V
BASIS FOR RECOMMENDING REPAIRS
PART I GENERAL

PURPOSE

1. This appendix provides a basis for recommending repairs of the reporting features for which deviations are reported in column 5 of the semiannual reports. This basis includes general and specific design criteria for the project units, the terminology to be used in noting deviations, and the terminology to be used in specifying repairs.

2. Pertinent design information is provided here to familiarize operation and maintenance personnel with some of the considerations involved in designing the project features, the condition of which is to be reported on. Although this manual cannot include all the specialized knowledge required by a designer, the information provided will enable the personnel, in particular the inspectors, to determine the implications of any observed deviations and recommend the proper preventive or restorative maintenance.

DEFINITION OF DEVIATION

3. A deviation refers to a departure from the "as-constructed" or "as-permit constructed" condition of are reporting feature. It is this deviation which is reported in column 5 of the spring semiannual report.

RECOMMENDATION OF REPAIRS

4. The narrowness of column 15 does not permit the use of lengthy explanations of recommended repairs. A list of common repair terminology is included here with an explanation of the repair purpose or procedure although no attempt is made to enumerate all possible repair conditions. Where the explanation is omitted, the purpose or procedure is self-evident. The terms are organized by the general terms under which the reporting features are categorized, but a corrective action may be applicable to more than one type of problem. Thus, the organization or terminology given here need not be strictly adhered to; whatever corrective action is appropriate to rectify a problem should be recommended. Note that in certain instances the deviations or repair terminology has been omitted. Typical terminology for these portions has not yet been developed.

PART II FLOOD CONTROL CHANNELS

GENERAL

Basic Design Concept

5. The broad design concept for the flood control channels in the Los Angeles River Basin project involves a relatively nonrigid channel lining supported by uniform bearing and loading provided by the surrounding earth. For a trapezoidal channel this concept presumes that the earth supports the walls. For a rectangular channel, this concept presumes that when the channel is empty the walls support the dry earth behind them and when the channel is full the earth supports the walls.

EARTHWORK

Definition

6. The general term EARTHWORK encompasses all uses of earth which serve a direct function in the flood control system, including fills, cuts, slopes, levees, and embankments.

General Design Criteria

7. Pertinent information on design criteria applicable to earthwork is given below.

a. COMPACTED FILL. Earth around structures must be maintained at original grade to preserve design loading and must be kept tight against the structure.

b. SURFACE DRAINAGE. All areas must be free draining. Furthermore, surface drainage must be kept from seeping into any shrinkage cracks between the earth and the face of the structure. Otherwise, the earth will become saturated, resulting in undue stress on the structure or seepage to an outlet or subdrain system at a lower level. Any conditions that would permit saturation of earth adjacent to the channel must be prevented.

c. SETTLEMENT. All structures must be closely observed for signs of settlement in the surrounding earth; settlement must be investigated to determine whether there has been loss of material because of seepage.

Specific Design Criteria

8. Pertinent information on design criteria applicable to specific reporting features is given below.

a. EARTH CHANNEL INVERT:

(1) GRADE CONTROL. Established grades are to be maintained to prevent undermining of toe protection and stabilizers. The results of aggradation, degradation, or subsidence must be corrected.

(2) PONDING CONTROL. To promote insect control and health protection the earth invert must be maintained in a free-draining condition so that ponding stagnant pools are eliminated.

(3) DEBRIS AND VEGETATION CONTROL. Debris, objectionable growth, shoals, and waste materials must not encroach on the invert. Excess material that will not move readily with low flows must be removed. Measures must be taken to control objectionable growth by approved chemical or mechanical means.

b. EARTH CHANNEL LEVEE:

(1) SETTLEMENT. Settlement and sloughing that cause material change in levee grade or cross section must be remedied. For minor changes due to nominal consolidation of materials, the levee should be restored to original line and grade with materials similar

to the existing levee. If the changes in line or grade are greater than one foot, an investigation must be made to determine the cause before permanent restoration work is started.

(2) SEEPAGE. Both the land side and the channel side must be inspected for evidence of piping or seepage through the levee, saturated areas, or sand boils. Such conditions must be investigated immediately and appropriate remedial action initiated.

(3) EROSION CONTROL. Levee tops must be maintained so that water will not collect and spill down the back slopes to cause erosion of the levee. Growth of grass should be encouraged to help stabilize these slopes.

(4) PEST CONTROL. Burrowing animals, which may be the cause of levee failure when water erodes and saturates the levee, must be exterminated. Dens and runways formed within the levee must be opened up and backfilled with thorough compaction.

(5) VEGETATION CONTROL. Grasses should be encouraged where erosion control is required but growth must be maintained to prevent objectionable weed growth. Vegetation which produces deep roots that may lead to seepage, saturation, or erosion problems if the roots are allowed to die and decay should be controlled. Approved chemical treatments may be used for control of growth.

c. EARTH BERM ROADWAY: Full access under all weather conditions must be maintained for necessary operation and maintenance equipment, although this access must be restricted to authorized personnel. This requirement includes erosion control to prevent the formation of ruts which might interfere with vehicular access and measures to remove debris and trash which tends to accumulate on the roadway.

d. EARTH BERM-ACCESS ROADWAY: All access points to the berm roadway are to be gated and kept locked in order to prevent unauthorized use of the flood control facilities; the gates, however, must be maintained in workable condition for use by operation and maintenance personnel.

Deviations

9. The terminology to be used in reporting deviations is as follows:

a. Local settlement, sloughing, and ponding

b. Piping, seepage, saturated areas, and water-pressure boils

c. Erosion

d. Rodent holes

e. Inadequate shallow root vegetation

f. Deep root vegetation

g. Changed line, grade, or section

h. Separation of fill at junction with structure

i. Debris accumulation

j. Other

Repair Terminology

10. Typical repair terminology for recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Piping	Open and compactly fill seepage paths through levee
Crowning	For water runoff from berms, fills, embankments, and levees
Seeding slopes	For erosion control
Exterminating burrowing animals	Open and compactly rill burrow holes to maintain levee and embankment integrity
Filling and compacting	To restore line and grade
Eradicating deep root vegetation	Accomplished prior to extensive growth to prevent seepage decay paths of subdrain cloggage
Seepage path removal	Remove and compactly fill between structures and earth; direct water away from structure-earth junctions
Resloping areas to drain	To correct situation caused by modified adjacent facilities

CONCRETE WORK

Definition

11. The general term CONCRETE WORK encompasses all concrete structures which function as part of the flood control system. This includes all concrete work integrally a part of diversion works, side drain structures, public utilities, and bridges.

General Design Criteria

12. Pertinent information on design criteria applicable to concrete work is given below.

a. GENERAL. All concrete work must be checked for evidence of deterioration, structural cracking, or displacement. The source of the trouble must be located and eliminated, and remedial work must be completed before loss of strength occurs in the structure.

b. UNDERCROSSINGS. Pipes or conduits undercrossing the channel may cause undermining to the channel. The area adjacent to the crossing must be inspected carefully for evidence of materials being carried away. Cracks in the channel lining must be noted especially and tests undertaken to determine whether undermining has occurred.

c. CRACKING. Minor shrinkage and temperature cracking occurs in most structures, but continued development of crack patterns and increase in size of cracks is evidence of stress and possible loss of integrity in the structure. Large cracks that will allow considerable water to penetrate the wall or slab must be sealed to prevent migration of backflow material through the crack and damage to the wall or subdrain system caused by the increased water pressure.

d. JOINTS. If joints show continued evidence of opening or closing other than as a result of temperature stresses, the cause must be determined. Joint openings that permit the earth to be carried away must be sealed. Spalling must be investigated and repaired to protect the reinforcement and to prevent further erosion resulting from abrasion during storm flows. Vegetation must be controlled to prevent joint displacement or leakage resulting from root growth or decay.

Specific Design Criteria

13. Pertinent information on design criteria applicable to specific reporting features is presented below.

a. CONCRETE CHANNEL INVERT:

(1) EROSION. Invert slabs are subject to abrasion from sand, gravel, and debris carried by storm flows. This problem is particularly critical where the invert is a structural slab and carries steel reinforcement from the channel walls. Repairs must be made to these slabs before they are materially weakened by erosion and before the cover on the main steel reinforcement has been reduced to two inches.

(2) LOADING. Invert slabs are designed for uniform loading from water; any concentrated loads such as vehicles (other than passenger cars and pickup trucks) should not be permitted without an investigation considering the condition of the slab, the amount and type of reinforcement, the type of subgrade material, and the location of water table. This investigation should be handled in accordance with the usual project review procedures.

(3) DISPLACEMENT. Displacement of invert slabs may be caused by settlement, undermining, uplift, or by reaction of the adjacent wall where the invert serves as a wall footing. Cracking should be sealed. If the slab has settled, undermining should be investigated. Settlement, due to consolidation or subsidence of the subgrade, must be corrected when the integrity of the structure is threatened or when damage is sustained during storm flow. Mud jacking to correct settlement of invert slabs may be used except where a subdrain system is under the slab or at the base of an adjacent channel wall.

(4) DEBRIS AND VEGETATION. Debris or vegetation must not be allowed to accumulate on the invert slabs. Such accumulations may become a public health hazard or may cover a source of trouble requiring maintenance; as such they should be removed at least on an annual basis.

(5) JOINTS. Leaky joints which permit the passage of earth indicate the need for an investigation program to determine the cause of the leakage. Remedial action should then be taken on the subdrain system to restore the filters and bedding materials, and seal the leaky joints.

b. CONCRETE CHANNEL SIDE SLOPES: Concrete side slopes are generally reinforced for temperature stresses only. Therefore a careful investigation must be made of extensive cracking or movement of the slabs. Cracks should then be sealed.

c. CONCRETE TOE PROTECTION: Concrete toe protection is a footing for concrete and stoneside slopes. The heavy toe protection is subject to scour, water pockets, and undermining. Undermining is particularly critical with earth invert when erosion starts just downstream from a stabilizer and develops a deep, meandering, high-velocity, low-flow channel adjacent to the toe protection.

d. CONCRETE CHANNEL WALLS:

(1) LINE AND GRADE. Concrete channel walls must be inspected for evidence of movement from line and grade.

(2) CRACKING. Cracking of concrete channel walls must be sealed.

(3) DEFLECTION. Concrete walls are designed for a stable deflection. Tilting may be caused by rotation of the wall and footing or by excessive backfill pressures caused by saturation or surcharge loading. Some deflection may be expected at the top of channel walls next to bridge abutments; however, such walls must be inspected regularly to be certain that the deflection is not increasing.

(4) ENCROACHMENTS. Encroachments are not permitted on the rights-of-way. Such encroachments might interfere with access to the channel invert or berm, or change the loadings on the channel structure or foundation.

(5) DRAINAGE. Grading behind channel walls must be maintained to properly drain the area.

e. CONCRETE CHANNEL ROOF SLAB: Many covered channels are beneath streets, surrounded by public utilities and side drains. Leakage or water traveling along the outside of pipes can saturate the earth next to the channel; leakage into the channel or a change in deflection of a roof slab are symptomatic of excess loadings from saturated earth. Similar problems may result from additional surcharge loadings which could occur as a result of subsequent land development. In either case, prompt investigation and remedial action are necessary.

f. REINFORCED CONCRETE PIPE CHANNEL: A circular channel is a monolithic conduit structure that is used for high-velocity flow, especially in areas of rapidly changing slope. In such channels, leakage or changes in deflection can result in rapid disintegration; cavitation in a rough area can extensively ravel the channel. Loading correction and prompt patching minimize the occurrence of these problems.

g. CONCRETE INVERT-ACCESS RAMP:

(1) FENCING. Controlled access is necessary for operation and maintenance requirements and for public safety. Fencing tension should be checked and adjusted after the initial settlement period; gates must be unobstructed and in operable condition.

(2) RAMP DISPLACEMENT. Invert-access ramps are rigid as compared to the channel and are made independent by means of expansion joints at walls or side slopes. Minor displacement is normal, but the ramp should be stable shortly after construction; subsequent displacement of the ramp requires investigation and remedial action.

(3) STEEL SPLASH GUARD. The steel splash guard slip joint must be free to move.

h. CONCRETE INLET STRUCTURE: A concrete inlet structure diverts storm runoff from an unimproved wash into an improved channel. The structure may include concrete channel walls, concrete channel side slopes, or both with a transition section, arranged so as to funnel runoff into the improved floodway. Applicable criteria may be found under these headings.

i. CONCRETE CONFLUENCE SECTION: A concrete confluence section is the junction of two improved channels; as such the confluence is a point of potential turbulence and the integrity of the channels should be carefully watched. The applicable criteria can be found under the particular channel type(s) involved.

j. EQUESTRIAN RAMP: Equestrian ramps enable horseback riders to underpass bridge crossings. Ramps of this type are found on trapezoidal channels and are basically similar to invert-access ramps.

Deviations

14. The terminology to be used in reporting deviations is as follows:

a. Deterioration, wear, and Spalling

b. Cracking, active or stable

c. Displacement, including settlement

d. Joint leakage and deterioration of expansion joint material

e. Water leakage and ponding

f. Accumulation of pollutant materials

g. Debris accumulation

h. Metal parts, including metal splash guard at invert-access ramp

i. Other

Repair Terminology

15. Typical repair terminology for recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Sealing cracked concrete	Where cracks permit the migration of earth, repair by sawing, chipping, cleaning, and dry packing of concrete. In areas without subdrain systems, subgrade areas shall be pressure grouted to restore uniform structure bearing.
Restoring scoured or eroded	areas When the area is damaged to a depth between 1½ and 2 inches, saw and chip the area to a uniform 2-inch depth, and concrete the area flush with existing.
Resealing expansion joints	Use bituminous material

STONEWORK

Definition

16. The general term STONEWORK includes all grouted or ungrouted stone for facings and revetments, and sand and gravel beddings and filters.

General Design Criteria

17. Pertinent information on design criteria applicable to stonework is given below.

a. FILTER LAYERS. Filter layers are placed under ungrouted stonework to prevent its settlement due to loss of levee material through the stones. There may be one or more filter and drain layers of different grading depending upon the grading of the underlying material. In the event of settlement in stonework, the continuity of these layers should be investigated when restoring the stonework to line and grade. Filter and/or drain layers are also used under grouted stonework as well as under concrete side slopes in areas where the earth may become saturated. These layers permit the free passage of water to the subdrain system and prevent failure of the surfacing from local and area-wide hydrostatic pressure. Slopes and inverts that have drain and/or filter layers must be carefully inspected to see that no condition is permitted to develop that would inhibit the functioning of these drainage layers.

b. VEGETATION CONTROL. Vegetation control will be required for all areas of stonework to prevent displacement of the stone by root growth as well as from eddies induced by accumulation of debris on brush growing through the stonework. Vegetation control is also an important consideration in protecting continuity of the filter layers under stonework. Specific

Design Criteria

18. Pertinent information on design criteria applicable to specific reporting features is presented below.

a. STONE CHANNEL INVERT: A stone invert permits percolation to recharge underground water supplies.

(1) CORRECTING MIGRATION. Stone tends to migrate during large flows and needs some windrowing to reestablish low flow near the middle of the channel, away from the toe protection, and to prevent migration past the next downstream stabilizer.

(2) MAINTAINING GRADE. Invert grade must be maintained by moving stone upstream and by adding stone as necessary.

(3) PREVENTING POCKETS. Stone is used in partial earth invert areas to prevent pocketing of the invert and undermining of the toe protection.

b. STONE CHANNEL SIDE SLOPE:

(1) DETERIORATION. Ungrouted stone showing deterioration must be replaced or must be protected from further weathering by grouting.

(2) SETTLEMENT. Settlement in an ungrouted stone side slope must be investigated to determine whether the failure is in the earth levee or in the filter and drain layers under the stonework.

(3) DISPLACEMENT. An ungrouted stone side slope must be checked after each storm flow to determine whether displacement has occurred.

(4) CRACKS. A grouted stone side slope must be inspected for cracks indicating movement or distress in the lining. Development of cracks is especially important if layers of fill or drain material are under the facing; continued cracking may indicate malfunctioning of the subdrainage system or settlement of the earth levee. Hairline cracks may be expected because of shrinkage in the grout or because of temperature changes; however, if movement from these stresses should concentrate so that larger cracks develop, they must be sealed to prevent excessive water from entering them and overloading the subdrain system.

c. STONE TOE PROTECTION: The stone toe protection is the foundation for the earth levee toe and for the concrete or stone side slope. The toe protection is subject to displacement from excessive sidecutting for channel flows; earth, stone, and grading must be used to shift the low flow area away from the toe protection and to maintain invert grade.

d. STONE INVERT STABILIZER: A stone invert stabilizer, which provides a barrier to degradation of a channel invert, is constructed of stone of various sizes with filter layers beneath. The amount of scour occurring in the channel between stabilizers must be investigated to determine whether the channel remains stabilized without the danger of undercutting the toe protection between stabilizers or the danger of displacing the stabilizers.

e. DERRICK STONE PROTECTION: Derrick stone provides protection for the upstream end of an improved channel by preventing high-velocity runoff from scouring beneath the invert or levees. Applicable criteria may be found under stone channel invert.

Deviations

19. The terminology to be used in reporting deviations is as follows:

a. Stone deterioration

b. Settlement, displacement, and sliding

c. Progressive grout cracking

d. Discontinuity of sand and gravel drain or filter areas

e. Vegetation

f. Debris accumulation

g. Other

Repair Terminology

20. Typical repair terminology for recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Replacing deteriorated or displaced stone	To prevent erosion of invert or levees
Seating cracked grouted stonework	Chip, clean, and dry pack to prevent loss or clogging of filter and drain material
Stabilizer restoration	Reestablish grade between stabilizer and side slope toe with existing stone or by partly reconstructing the stabilizer

SUBDRAIN SYSTEM

Definition

21. The general term SUBDRAIN SYSTEM includes closed systems with manholes, open systems with outlets into the channel, and pipeless gravel drains behind channel walls with weepholes.

General Design Criteria

22. Subdrain systems, both open and closed, are designed to relieve uplift pressure on the channel structure. In some areas, the subdrains produce water continuously and their functioning is easily ascertained on regular inspections. In other areas the subdrains may discharge only when the maximum ground water level for which they were designed is reached. In these normally dry areas the systems must be given careful inspection and appraisal. Although the subdrains may not produce water for extended periods of time, they are a vital part of the channel structure and must not be neglected.

Specific Design Criteria

23. Pertinent information on design criteria applicable to specific reporting features is presented below.

a. OPEN TYPE. Open type subdrain systems, such as weepholes and longitudinal pipe drains with open outlets into the channel at short intervals, are subject to loss of percolating properties because flood-carried mud and silt can flow back into the system and be deposited there. Because this type permits saturation of the subgrade and wall backfill by stormflow, the system must be carefully inspected and tested to make certain that the filter and drain material is still capable of carrying water freely to the channel outlets. These outlets must be kept free of root growth and debris accumulation.

b. CLOSED TYPE. Closed type subdrain systems are designed to prevent stormflow from entering the drains. The outlets of such systems have a double flapgate assembly mounted in the outlet manholes.

(1) Manholes must be cleaned out annually and the flapgate assemblies must be checked to insure proper seating and lubrication.

(2) Subdrain pipes must be flushed out annually for the first 3 years after construction. Subsequently, the pipes need to be flushed at 3-year intervals if tests indicate proper functioning.

(3) The system is so arranged that flushing water can be run downstream in the piping from manhole to manhole. The upstream end of the drains have plugs that can be removed for the flushing operation.

(4) During the flushing operations, the effluent must be carefully observed for evidence of sand, which indicates failure and possible undermining of the structure. When sand appears in the effluent, the source of the trouble must be located.

(5) Security of the manhole covers is important. If the covers are not secured during storm runoff, debris filling the manhole can make the drain inoperative. Vandals may also wedge the flapgates open. In either case, the manhole is to be freed and restored to normal operation.

(6) The sequencing of debris removal is of extreme importance to the proper functioning of the subdrain system. When floodflows subside, there will be varying amounts of channel sedimentation or shoaling, in addition to the subinvert hydrostatic forces. The removal of any channel sedimentation before the underlying subdrainage system is flushed WILL result in uplifting and failure of the channel invert. The primary maintenance response after a flood cycle and BEFORE any sediment removal will be to flush the subdrain systems and maintain a clear area, no less than ten (10) feet around any invert manhole (which are the pressure relief points for the invert subdrain system). Manhole stations may be marked on the top of channel walls in order to assist maintenance crews in their location. Wall drains should also be flushed BEFORE any invert sediment removal. A ten (10) foot clear area around the wall drains will also be required.

(7) The Superintendent will be responsible for preparing an item-specific standard field procedure for both subdrainage system flushing and for the COMBINED operation of system flushing THEN sediment removal. The standard field procedures will become an attachment to this document.

Deviations

24. The terminology to be used in reporting deviations is as follows:

a. Debris in outlets

b. Debris in manholes

c. Damaged concrete work

d. Damaged metal parts

e. Discharge variations in various portions of the system

f. Other

25. Typical repair terminology for recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Repair hinged manhole covers	Cover should be shut after each inspection, test, or repair for security
Caulking open wall drains	Caulk between concrete and pipe with dry pack or mastic to hold pipe securely in place
Backflushing and swabbing	To be used for subdrain systems, including individual open wall drains, where tests indicate impaired functioning. Moderate upstream surging shall be used to start debris moving

SIDE DRAIN

Definition

26. The general term SIDE DRAIN includes side drains with or without gates, storm drains, vertical street drains, and overflow spillways.

General Design Criteria

27. Side drains are a potential source of danger to the channel structure if they are not carefully maintained. Leakage developing in or around the drain structure can cause failure of the adjacent channel structure. Side drains are gated where the inlet to the drain is below the design water surface of the channel; these automatic drainage gates prevent reverse flow during periods of large stormflow in the channel. Debris interfering with gate closure must be cleared away; otherwise extensive flooding of tributary areas and saturation of earth behind channel walls may occur, resulting in channel failure when channel flow draws down before the earth can drain adequately.

Specific Design Criteria

28. Pertinent information on design criteria applicable to specific reporting features is given below.

a. INLET OR OUTLET STRUCTURE. An inlet or outlet structure must be inspected for evidence of movement, especially for evidence of joint opening, since this may result in saturation of the structure rill; movement may also result in seepage from the structure fill into the channel. Either condition must be remedied. Furthermore, the connection between the structure and the pipe must be checked carefully; the pipe itself must be restored or replaced upon evidence of deterioration.

b. AUTOMATIC DRAINAGE GATES.

(1) Improper seating must be corrected.

(2) Hinges must be kept rust free and lubricated.

(3) The safety bars must be secured in place to insure proper functioning.

(4) Debris must be cleared away; wedging open of the gates must not be permitted.

c. SPILLWAY INLET STRUCTURES. The channel upstream of weir crests must be kept free of sand and debris deposits.

d. SIDE OVERFLOW SPILLWAYS.

(1) Any condition must be corrected that permits water to bypass the spillway and erode the fill behind the channel wall or saturate the backfill.

(2) Special attention must be given to crack development if vehicles cross the structure.

e. INDUSTRIAL WASTE DISCHARGES. Side drains carrying industrial waste must be checked for accelerated deterioration; action must be taken to assure that treatment measures are adequate to prevent pollution, rodent or pest breeding, or contamination of underground water supplies.

Deviations

29. The terminology to be used in reporting deviations is as follows:

a. Deteriorated pipe condition

b. Galvanized or bituminous metal pipe coating deterioration

c. Concrete pipe joints deterioration

d. Movement of channel inlet structure

e. Problems at inlet facilities to side drain

f. Improper gate seating, seals, and operation

g. Debris accumulation or vegetation

h. Seepage around pipe

j. Other

Repair Terminology

30. The repair terminology for recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Pipe replacement	
Pipe recoating	
Invert repairing	
Gate recoating	
Recaulking concrete pipe joints and pipe-to-structure junction	
Gate lubrication and renewal of gate seals	

Commercial drain restoration	Restoration to be effected by operation & maintenance organization or by owner
Pollution discharge for commercial drain	Refer to Regional Water Quality Control Board
Flood control structure restoration	Reconstruction to be effected by owner necessitated by commercial drain failure

PUBLIC UTILITY

Definition

31. The general term PUBLIC UTILITY includes sewer, water, gas, oil, electricity, telephone or any other utility lines which overcross or undercross the channel.

General Design Criteria

32. Continuing liaison with utility personnel will reduce maintenance problems by providing utility installation and construction crews with adequate information on design, construction, operations, and maintenance of flood control facilities. Leaks in utility pipes near or under the channel or changes in the earthwork or concrete work configuration must be corrected in order to minimize the probability of channel failure.

Deviations

33. The terminology to be used in reporting deviations is as follows:

a. Leakage or seepage along pipe

b. Visible changes in other reporting features along utility alignment

c. Safety fencing condition

d. Other

Repair Terminology

34. The repair terminology for recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Replacement	
Patching	
Caulking or remortaring	
Support or suspension replacement	
Reconditioning of safety fencing	
Flood control structure restoration necessitated by utility failure	Reconstruction to be effected by utility owner

FENCING

Definition

35. The general term FENCING includes wall safety fencing, safety fencing at ends of channels, covered channel barricades, spillway safety barricades, public utility safety barricades, access gates, and chain barricades.

General Design Criteria

36. Pertinent information general design criteria applicable to fencing is given below.

a. Fencing must be intact at all times.

b. Broken or lost caps on posts must be replaced to prevent water from collecting in pipe base and rusting the metal.

c. Galvanizing on pipe and wire mesh must be checked for excessive weathering or oxidation.

d. Alignment and tension must be regularly tested and adjusted.

e. Gates must be secured and regularly adjusted for ease of operation.

f. Wood guard posts must be kept intact and properly painted; they should be regularly tested for rot and termites.

Deviations

37. The terminology to be used in reporting deviations is as follows:

a. Metal and coating of barbed wire, tension wires, posts, caps, fittings, clips, braces, cables and chains

b. Tension, bending, and attachment of fabric and barbed wire

c. Alignment and mounting of fabrics, posts, gate posts, and gates

d. Termination at bridges, structures, or other fencing

e. Padlocks and security hardware

f. Missing fencing accessories

g. Traffic fence guards, including wheel bumpers and guard rails

h. Vegetation

i. Other

Repair Terminology

38. The repair terminology to be used in recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Painting and recoating	Paint with rust inhibitor and aluminum finish coat
Replacement	Realignment and adjustment

BRIDGE

Definition

39. The general term BRIDGE includes freeway, highway, street, railroad, pedestrian, public utility, gaging station, and diversion works bridges.

Maintenance Responsibilities

40. When the bridge abutment is an integral part of the channel structure, the maintenance of the abutment is similar to that of the adjacent channel walls, except that any routine work required shall be in liaison with the agency owning the bridge. Piers and pier-nose extensions within the channel shall be handled similarly. Work at bridges necessary to keep the channel operating at full capacity is also the responsibility of the operation and maintenance organization, which shall take such action as is deemed necessary and shall effect whatever liaison is required by the circumstances. The maintenance of the bridge seats and superstructure is the responsibility of the agency owning the bridge.

Deviations

41. The terminology to be used in reporting deviations is as follows:

a. Visible changes in other reporting features adjacent to footings, piers, or abutments

b. Settlement, racking, or other obvious stress in structure

c. Public utility supports, or leakage in utility pipes

d. Earthwork

e. Concrete work

f. Condition of wood construction, including timbers and piles

g. Other

Repair Terminology

42. The repair terminology to be used in recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Smoothing and patching	To be used on rough areas of piers or pier extensions to minimize debris accumulation
Resealing expansion joints	Use bituminous material

Structure restoration or removal	To be performed by operation and maintenance organization or by bridge owner
Painting and coating	To be used as preservative treatment for wood, structural steel, and other parts
Tightening and securing	To be used for fasteners, supports, and anchorages
Flood control structure reconstruction necessitated by bridge failure	To be performed by operation and maintenance organization or by bridge owner

BITUMINOUS SURFACING

Definition

43. The general term BITUMINOUS SURFACING includes surfaced berm roadways, surfaced berm-access ramps, and surfaced side drain entrances.

General Design Criteria

44. Pertinent information on general design criteria applicable to bituminous surfacing is given below.

a. Surfaced berm roadways and surfaced berm-access ramps must be maintained to permit passage of vehicles at all times for operation, maintenance, and repair. It should also be noted that In certain instances(noted on the appropriate data maps in Appendix IV) the surfaced berm roadway provides a portion of the channel capacity and must be kept completely clear of debris and vegetation.

b. Weed growth must be controlled to keep the road open, passable, and Identifiable under all weather conditions.

c. Roadways and access ramps must be inspected for condition of surfacing, development of cracks and ruts, and condition of shoulders.

d. Adequate drainage must be maintained.

e. Depressions must be repaired by filling to grade or by removal and replacement of subgrade.

f. Side drain entrances must be kept free of debris to prevent ponding and possible saturation of earth behind channel wall.

Deviations

45. The terminology to be used in reporting deviations is as follows:

a. Excessive vegetation

b. Undermining or raveling of lips and edges

c. Settlement

d. Deterioration of joint areas at streets

e. Base or subgrade failure

f. Areas requiring patching

g. Inadequate curb or cutoff

h. Other

Repair Terminology

The repair terminology to be used in recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Eradicating vegetation	
Patching	
Installing cutoff	Install below grade to control raveling
Resurfacing	
Restoring or installing curbs	To control drainage
Replacement of bituminous surfacing with concrete	To control chronic conditions

CHANNEL INSPECTION MANHOLE

Definition

46. The general term CHANNEL INSPECTION MANHOLE includes vertical street drains and manholes.

Deviations

47. The terminology to be used in reporting deviations is as follows:

a. Metal parts including grate or locking cover and manhole steps on ladder attachments

b. Concrete work, including precast manhole sections and joints

c. Debris accumulation

d. Other

GAGING STATION

Definition

48. The general term GAGING STATION includes floatwells, gages, recorders, transmitters, station houses, gates, ladders, and cables.

General Design Criteria

49. Gaging stations provide data for regulations and control of storm runoff. Stations must be fully operational during the entire flood season, since operations and flood-emergency procedures depend on the accuracy and reliability of this data.

Deviations

50. The terminology to be used in reporting deviations is as follows:

a. Security

b. Debris accumulation in floatwell

c. Operating equipment failure

d. Concrete work

e. Fencing

f. Metal parts

g. Other

Repair Terminology

51. The repair terminology to be used in recommending repairs is as follows:

TERMINOLOGY

Reconditioning of operating equipment

Renewing staff gage indications

Reconditioning or reconstructing security measures

SPREADING GROUNDS DIVERSION

Definition

52. The general term SPREADING GROUNDS DIVERSION includes all facilities involved in diverting portions of channel flow into spreading grounds to replenish underground water supplies.

General Design Criteria

53. Pertinent information on general design criteria applicable to spreading ground diversions is given below.

a. Gates are normally positioned to maximize the use of ordinary channel flow; the gates must be closed during flood operations, but may be opened during periods of decreasing flow to maximize utilization of storm runoff.

b. Debris interference with gate operations must be corrected to prevent flooding or failure.

RIGHTS-OF-WAY

Definition

54. The general term rights-of-way includes access way, access ramp, encroachments, loadings near channel structures, and various land uses interfering with effective operation and maintenance.

General Design Criteria

55. Areas adjacent to flood control channels must permit the access necessary to comply with all operation and maintenance requirements. The channel and flood control facilities are designed for specific loadings; any condition which might change these loadings must be prevented.

Deviations

56. The terminology to be used in reporting deviations is as follows:

a. Discontinuity of berm roadway and access ramps

b. Controlled access to public streets or turnarounds

c. Width of berm roadway

d. Type of encroachment, including parking, storage, fence, structure, overhead clearance, underground pipes, and joint use of maintenance access with others for such purposes as landscaping and control of weeds and trash

e. Land status

f. Other deviation that restricts effective flood control protection, operation, maintenance, and/or community betterment

Repair Terminology

57. The repair terminology to be used in recommending repairs is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
Retention of adequate width berm roadway	To prevent encroachments across right-of-way
Maintenance of continuous berm roadway	Where streets overcross the channel to provide access to the street, turnarounds, or access ramps beneath bridges

Removal of encroachments	
Land usage	To preserve minimum width right-of-way adjacent to channel for flood control use
Maintenance of controlled access and other security controls	To restrict access to authorized persons
Mosquito abatement	To eliminate ponding areas wherever practical and to eliminate insect breeding elsewhere

LANDSCAPING

Definition

58. Landscaping is often provided to improve the aesthetic appearance of projects, particularly those concerned with recreation; this includes consideration of the visual effects of the project environment: plants, shrubs, and trees, project structures, roads, paths, etc.

General Design Criteria

59. A primary purpose of landscaping in aesthetic enhancement; thus any condition which inhibits or adversely affects the development of a landscape plan should be corrected. It should also be noted, however, that landscaping also functions for other purposes, in particular surface drainage and erosion control. These aspects must also be considered in maintenance determinations.

SPECIAL FEATURES

Definition

60. The general term SPECIAL FEATURES includes reporting features that do not fit into other general term areas or that normally fit under other general terms but that also involve special problems.

General Design Criteria

61. Pertinent information on general design criteria applicable to each special feature is given below.

a. CONTROL SILL. Specific design criteria applicable to the control sills in the subsidence areas of the Los Angeles River are presented below. These criteria are based on predictions of the ultimate subsidence; levee heights and toe depths based on the relationship with control sill heights were designed to meet the existing conditions and the ultimate subsidence.

(1) Levee toe depths were established by using a gradient of 0.005 for ultimate scour profile with no subsidence at the Willow St drop structure (Station 154+00), with 0.50 foot of
subsidence at the Anaheim St. control sill (Station 78+00), and with a minimum elevation of -12.0 feet below mean sea level at the downstream control sill (Station 16+00). The levee heights were established to prevent overtopping by the design flood under present conditions and these ultimate conditions.

(2) If ultimate subsidence exceeds the limits assumed for design, with the resultant need to raise the two control sills in order to protect the levee toes, the levee heights must be maintained 25 feet above the sill elevation at station 78+00 and 21 feet above the sill elevation at station 16+00.

b. DROP STRUCTURE. The drop structures on the San Gabriel River between Santa Fe Dam and Whittier Narrows Flood Control Basin are subject to damage from stones carried by turbulent water and from differential settlement forces due to the stone invert. These drop structures are also equipped with breakaway fencing which will collapse at the shear pins when a 168-pound horizontal force is applied on a fence post four feet above the hinge.

c. PIEZOMETER. The purpose of piezometer installation is to provide pressure data from the subgrade under the concrete channel invert that are correlated with the pressure depth of water in the channel. These installations furnish data on the efficiency of the subdrain system in eliminating unbalanced uplift forces on the invert. The piezometer installations must be checked and verified so that the data obtained are valid.

d. TRASHRACKS. Trashracks serve to prevent large pieces of debris from entering an improved channel at its upstream end. The trash should be removed whenever the accumulation becomes sufficient to block the entrance of water into the channel.

Deviations

62. The terminology to be used in reporting deviations for each special feature is as follows:

a. CONTROL SILL. Subsidence rate

b. DROP STRUCTURE. Collapsed breakaway safety fencing

c. PIEZOMETER.
(1) Continuity of power supply
(2) Continuity of electrical circuits
(3) Zero reading indication
(4) Metal parts

d. TRASHRACKS.
(1) Accumulation of debris
(2) Metal parts

Repair Terminology

63. The repair terminology to be used in recommending repairs for each special feature is as follows:

TERMINOLOGY	REPAIR PURPOSE OR PROCEDURE
a. CONTROL SILLS.	
Reestablish invert grade control	Add a layer of grouted stone with or without increasing levee heights on the basis of an investigation program for settlement rates and revised ultimate subsidence
b. DROP STRUCTURE.	
Remove stone from flood control basin	To reduce concrete scour
Reestablish basin drainage	To reduce ponding, contamination, and insect breeding
Repair safety fencing	To provide collapse of breakaway fence during stormflow and safety at other times
c. PIEZOMETER.	
Reestablish power supply	
Recondition electrical equipment	

Recalibrate equipment	
Reconstruct safety measures	
d. TRASHRACKS.	
Remove debris	Prevents blockage of inlet structure
Repaint or replace racks	To reduce rusting of the racks

PART III DETENTION BASINS AND DEBRIS BASINS

GENERAL

64. The reporting features applicable to debris basins and detention basins overlap to some extent with those applicable to flood control channels, which are detailed in Part II of this Appendix. Thus only those reporting features which apply solely to debris basins will be presented here.

DEBRIS STORAGE CAPACITY

Definition

65. The general term DEBRIS STORAGE CAPACITY refers to the capacity of the debris basin to store debris which accompanies storm runoff from the surrounding Area.

General Design Criteria

66. Whenever the accumulation of debris in the basin reaches approximately 25% of the basin's design storage capacity, the debris must be removed. To insure early detection and timely removal of any excess accumulation, an estimate as to the amount of debris in the basin should be made during each periodic inspection; after each major debris-producing storm a survey should be made to determine the actual amount of accumulation. The results of these estimates and surveys should be noted in the appropriate operation and maintenance report. The design storage capacity and the maximum allowable debris accumulation are indicated on the debris basin data sheet in Appendix VI.

Deviation

67. The terminology to be used in reporting deviations is as follows:

a. Capacity reduced by _____%

b. Capacity reduction exceeds 25%.

Repair Terminology

68. The repair term applicable to this reporting feature is as follows:

TERMINOLOGY

Removal of debris

STAFF GAGE

Definition

69. The general term STAFF GAGE refers to the set of individual gages which enable the operation personnel to ascertain the water surface elevation.

General Design Criteria

70. Staff gages should be aligned in a vertical position and the elevations marked on them should be clearly legible. Any lateral or vertical displacement or any significant decrease in the legibility of markings should be corrected.

Deviations

71. The terminology to be used in reporting deviations is as follows:

a. Vertical alignment

b. Horizontal displacement

c. Legibility

d. Deterioration of painting

Repair Terminology

72. The repair terminology to be used in recommending repairs is as follows:

TERMINOLOGY
Restore alignment
Renew staffgage markings
Repaint

INTAKE TOWER

Definition

73. The general term INTAKE TOWER includes the intake tower and all other structures and facilities at the inlet end of the pool drain system, such as a cleanout manhole or inlet structure.

General Design Criteria

74. Any accumulation of debris which is interfering with the flow of water into the intake tower and inlet structure must be removed. Gates if present must be fully operational at all times.

Deviations

75. The terminology to be used in reporting deviations is as follows:

a. Debris accumulation

b. Gate seating, seals, and operation

c. Concrete work

d. Metal parts

Repair Terminology

76. The repair terminology to be used in recommending repairs is as follows:

TERMINOLOGY

Removal of debris

Gate recoating

Gate lubrication and renewal of gate seals

POOL DRAIN CONDUIT

Definition

77. The general term POOL DRAIN CONDUIT includes all facilities for conveyance of water from the intake structure to the spillway channel.

General Design Criteria

78. Pertinent information on general design criteria applicable to the pool drain conduit is given below.

a. Any accumulation of debris which is interfering with the flow of water through the conduit must be removed.

b. Concrete sections must be watched for evidence of cracks or joint openings which might permit passage of water into the surrounding fill.

c. Pipes must be inspected for evidence of displacement or leakage.

Deviations

79. The terminology to be used in reporting deviations is as follows:

a. Deterioration of pipe condition

b. Deterioration of concrete pipe joints

c. Debris accumulation

d. Seepage or leakage on outside of pipe

e. Other

Repair Terminology

80. The repair terminology to be used in recommending repairs is as follows:

TERMINOLOGY

Removal of debris

Pipe replacement

Recaulking concrete pipe joints

Sealing cracked concrete

POOL DRAIN DIVERSION

81. The general term POOL DRAIN DIVERSION includes all diversion structures and outlet facilities for diverting water form the pool drain conduit(s) into adjacent spreading grounds.

General Design Criteria

82. Pertinent information on general design criteria applicable to the,,pool drain diversion is given below.

a. Any accumulation of debris which is interfering with the flow of water through the structures or with the operation of the gates must be removed.

b. Access to diversion structures must be maintained at all times.

c. Gates should normally be positioned to maximize the use of ordinary channel how,, the gates must be closed during flood operations, but may be opened during periods of decreasing flow to maximize utilization of storm runoff.

d. Diversion and outlet structures must be inspected for evidence of movement and especially for evidence of joint opening at junctions with conduit, which would result in saturation of fill around structure.

Deviations

83. The terminology to be used in reporting deviations is as follows:

a. Debris accumulation

b. Impaired access to diversion structures

c. Improper gate seating, seals and operation

d. Deterioration of conduit junction

e. Other

Repair Terminology

84. The repair terminology to be used in recommending repairs is as follows:

TERMINOLOGY

Removal of debris

Restore access

Gate recoating

Gate lubrication and renewal of gate seals

Recaulking junction

APPENDIX VI

PROJECT DATA SHEETS

APPENDIX VI

PROJECT DATA SHEETS

INTRODUCTION

1. This appendix contains data sheets for all completed flood control facilities which were constructed by the Federal Government in the Los Angeles County Drainage Area, except where such facilities are covered by other operation and maintenance manuals. A comprehensive map of the entire project, which includes all flood control improvements in the Los Angeles County area, is included in this Appendix.

2. The data sheets and maps are grouped alphabetically by major drainage areas as follows:

DRAINAGE AREA	BASIC CODE
Ballona Creek	BC
Los Angeles River	LAR
Rio Hondo	RH
San Gabriel River	SGR

Each channel tributary to one of these major streams is assigned a sequence letter; these tributaries are arranged alphabetically. Debris basins accompany the channels into which they drain. The reaches within a sequence letter are arranged from downstream to upstream (see the Index in this Appendix).

3. The data sheets and maps on project units for which operation and maintenance is the responsibility of the U.S. Army Corps of Engineers are printed on yellow paper; data on project units for which operation and maintenance is the responsibility of the Los Angeles County Flood Control District are printed on blue paper where maintenance is not reported to the U.S. Army Corps of Engineers and on white where maintenance is reported in the semiannual reports.

4. Where an entry is blank on a data sheet, the information is not available.

THE SEMIANNUAL REPORTS

5. Each data sheet has a section called "Reporting Features", which lists all features of the project unit whose condition is to be reported in the semiannual reports submitted by the operation and maintenance organization to the U.S. Army Corps of Engineers, Los Angeles District.

6. Detailed instructions on the preparation of both the semiannual reports are given in PART III. Pertinent information on the procedures and terminology for recommending repairs in these reports is given in APPENDIX III.

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Channel	Sheet Number	Reach
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BALLONA CREEK	BC-A-1	Vista del Mar to Pacific Ocean
	BC-A-2	La Salle Ave to Vista del Mar
	BC-A-3	Washington Blvd to La Salle Ave
	BC-A-4	Redondo Blvd to Washington Blvd
Arroyo de los Jardines	BC-A-5	
BENEDICT CANYON	BC-B-1	Cattaraugus Ave to Ballona Creek
	BC-B-2	Olympic Blvd to Cattaraugus Ave
	BC-B-3	Lexington Rd to Olympic Blvd
	BC-B-4	Hillgrove Dr to Lexington Rd
CENTINELA CREEK	BC-C-1	Jefferson Blvd to Ballona Creek
	BC-C-2	La Tijera Blvd to Jefferson Blvd
HIGGINS-COLDWATER CANYONS	BC-D-1	
KENTER CANYON	BC-E-1	
REXFORD-MONTE MAR BRANCH	BC-F-1	
SAWTELLE-WESTWOOD	BC-G-1	Braddock Dr to Ballona Creek
	BC-G-2	Washington PI to Braddock Dr
	BC-G-3	Charnock Rd to Washington PI
Westwood Branch	BC-G-4	National Blvd to Charnock Rd
	BC-G-5	Pico Blvd to National Blvd
	BC-G-6	Massachusetts Ave to Pico Blvd
	BC-G-7	Moraga Dr to Massachusetts Ave
	BC-G-8	Casiano Rd to Moraga Dr
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	LAR-A-3	Willow St to Twentieth St
	LAR-A-4	Wardlow Rd to Willow St
	LAR-A-5	Carson St to Wardlow Rd
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	LAR-A-7	Sixty-third St to Dominguez St
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	LAR-A-9	Compton Blvd to Atlantic Ave

Channel	Sheet Number	Reach
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	LAR-A-14	Florence Ave to Stewart and Gray Rd
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	LAR-D-5	Childs Canyon Debris Basin
Brand Canyon, Childs Canyon,	LAR-D-6	Elmwood Canyon
	LAR-D-7	Elmwood Canyon Debris Basin
	LAR-D-8	Brand Canyon Debris Basin
BURBANK WESTERN	LAR-E-1	Victory Blvd to Los Angeles River
	LAR-E-2	S.P. Ry to Victory Blvd
	LAR-E-3	Cohasset St to S.P. Ry
	LAR-E-4	Roscoe Blvd to Cohasset St
La Tuna Canyon	LAR-E-5	
Stough Canyon	LAR-E-6	
	LAR-E-7	La Tuna Canyon Debris Basin
	LAR-E-8	Stough Canyon Debris Basin
DEAD HORSE CANYON	LAR-F-1	
DUNSMUIR CANYON	LAR-G-1	
	LAR-G-2	Dunsmuir Canyon Debris Basin
EAGLE CANYON,	LAR-H-1	
SHIELDS CANYON	LAR-H-2	Shields Canyon Debris Basin
	LAR-H-3	Eagle Canyon Debris Basin
CABALLERO CREEK	LAR-I-1	Channel Inlet to Los Angeles River
COMPTON CREEK	LAR-J-1	S.P. Ry to Los Angeles River
	LAR-J-2	Alondra. Blvd to S.P. Ry
	LAR-J-3	122nd St to Alondra Blvd
	LAR-J-4	Lanzit Ave to 122nd St
	LAR-J-5	Main St to Lanzit Ave
	LAR-J-6	Artesia Freeway to Confluence with Los Angeles River
HAINES CANYON	LAR-K-1	Plainview Ave to Tujunga Wash
	LAR-K-2	Debris Basin to Plainview Ave
	LAR-K-3	Haines Canyon Debris Basin
HAY CANYON	LAR-L-1	
	LAR-L-2	Hay Canyon Debris Basin

Channel	Sheet Number	Reach
LOPEZ CANYON DIVERSION	LAR-M-1	Lopez Canyon to Hansen Flood Control Basin
PACOIMA WASH	LAR-N-1	Paxton St to Tujunga Wash
	LAR-N-2	Lopez Flood Control Basin to Paxton St
ROYAL BOULEVARD	LAR-O-1	
SNOVER CANYON, WEBBER CANYON	LAR-P-1	
	LAR-P-2	Snover Canyon Debris Basin
SYCAMORE WASH	LAR-Q-1	Glendale Ave to Los Angeles River
TUJUNGA WASH	LAR-R-1	Magnolia Blvd to Los Angeles River
	LAR-R-2	Vanowen St to Magnolia Blvd
	LAR-R-3	Beachy Ave to Vanowen St
	LAR-R-4	Hansen Dam to Beachy Ave
VERDUGO WASH	LAR-S-1	Glenoaks Blvd to San Fernando Rd
	LAR-S-2	San Gabriel Ave to Glenoaks Blvd
	LAR-S-3	Debris Basin to San Gabriel Ave
WILSON CANYON	LAR-T-1	Astoria St to Pacoima Wash
	LAR-T-2	Debris Basin to Astoria St
	LAR-T-3	Wilson Canyon Debris Basin
Mansfield St	LAR-T-4	LAR-T-5 Schoolhouse Canyon Debris Basin
WINERY CANYON	LAR-U-1	LAR-U-2 Winery Canyon Debris Basin
	RIO HONDO DRAINAGE AREA	
RIO HONDO	RH-A-1	S.P. Ry to U.P. Ry
	RH-A-2	Santa Ana Freeway to S.P. Ry
	RH-A-3	Washington Blvd to Santa Ana Pwy
	RH-A-4	Whittier Narrows to Washington Blvd
	RH-A-5	Whittier Narrows Flood Control Basin
	RH-A-6	Valley Blvd to Whittier Narrows
	RH-A-7	Lower Azusa Rd to Valley Blvd
	RH-A-8	Peck Rd to Lower Azusa Rd
	RH-A-9A, B, and C	Los Angeles River to Whittier Narrows Dam
	RH-A-9D	Los Angeles River to Whittier Narrows Dam

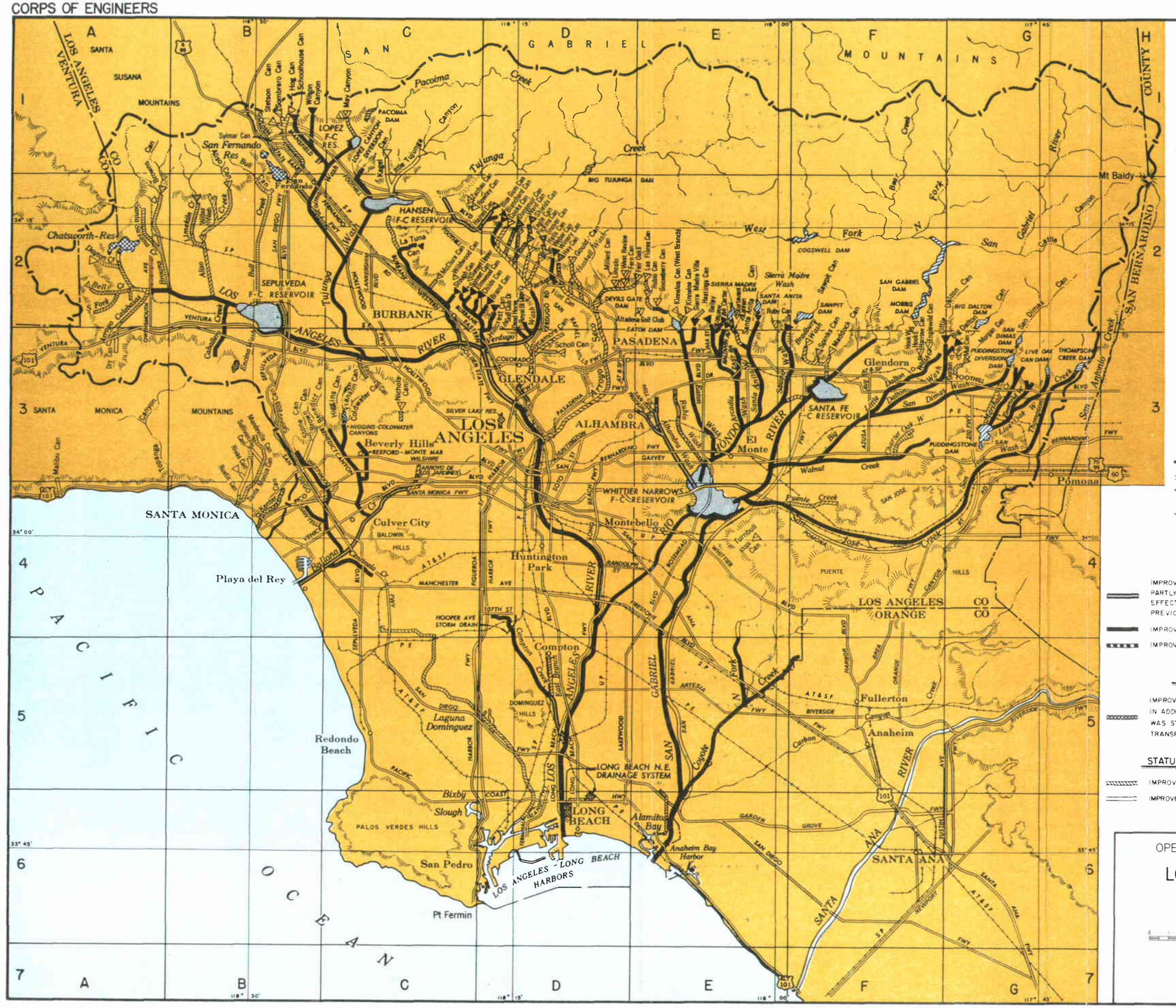
Channel	Sheet Number	Reach
ALHAMBRA WASH	RH-B-1	Valley Blvd to Rio Hondo
	RH-B-2	Roses Rd to Valley Blvd with San Pasqual Branch
ARCADIA WASH	RH-C-1	Huntington PI to Rio Hondo
Lima St Branch, Auburn Branch	RH-C-2	
Baldwin Ave Branch	RH-C-3	
East Branch	RH-C-4	Colorado PI to Huntington Pl
	RH-C-5	Orange Grove Ave to Colorado P1
	RH-C-6	Auburn Debris Basin
	RH-C-7	Bailey Debris Basin
	RH-C-8	Carter Debris Basin
EATON WASH	RH-D-1	Rosemead Blvd to Rio Hondo
	RH-D-2	Huntington Dr to Rosemead Blvd
	RH-D-3	Eaton Dam to Huntington Dr
RUBIO CANYON DIVERSION	RH-D-4	
RUBIO WASH	RH-E-1	
SANTA ANITA WASH	RH-F-1	A.T.S.F. Ry to Rio Hondo
	RH-F-2	Debris Basin to A.T.S.F. Ry
	RH-F-3	Santa Anita Debris Basin
Sierra Madre Wash Inlet	RH-F-4	
SAWPIT WASH	RH-G-1	Duarte Rd to Rio Hondo
	RH-G-2	Debris Basin to Duarte Rd
	RH-G-3	Sawpit Debris Basin
SIERRA MADRE VILLA	RH-H-1	
	RH-H-2	Sierra Madre Villa Debris Basin
SAN GABRIEL RIVER DRAINAGE AREA		
SAN GABRIEL RIVER	SGR-A-1	Seventh St to Pacific Ocean
	SGR-A-2	Coyote Creek to Seventh St
	SGR-A-3	Del Amo, Blvd to Coyote Creek
	SGR-A-4	Fairton St to Del Amo Blvd
	SGR-A-5	Cecilia St to Fairton St
	SGR-A-6	Washington Blvd to Cecilia St
	SGR-A-7	Whittier Narrows to Washington Blvd
	SGR-A-8	Whittier Narrows Flood Control Basin
	SGR-A-9	Walnut Creek to Whittier Narrows
	SGR-A-10	Lower Azusa Rd to Walnut Creek

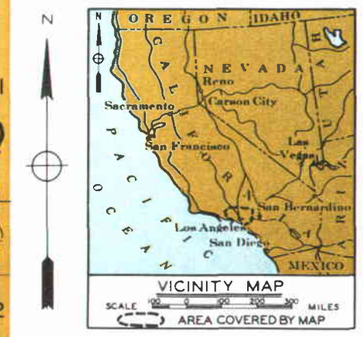
Channel	Sheet Number	Reach
	SGR-A-11	Santa Fe Flood Control Basin to Lower Azusa Rd
	SGR-A-12	Mouth of Canyon to Santa Fe Flood Control Basin
BIG DALTON WASH	SGR-B-1	Los Angeles St to Walnut Creek
	SGR-B-2	San Dimas Wash to Los Angeles St
	SGR-B-3	Barranca Ave to San Dimas Wash
	SGR-B-4	Alosta Ave to Barranca Ave
	SGR-B-5	Debris Basins co Alosta Ave
	SGR-B-6	Big Dalton Debris. Basin
	SGR-B-7	Little Dalton Debris Basin
COYOTE CREEK	SGR-C-1	Carson St to San Gabriel River
	SGR-C-2	North Fork to Carson St
	SGR-C-3	Upstream of North Fork
North Fork	SGR-C-4	
LITTLE DALTON WASH	SGR-D-1	Fifth St to Big Dalton Wash
	SGR-D-2	Cullen Ave to Fifth St
	SGR-D-3	Loraine Ave to Cullen Ave
LIVE OAK WASH	SGR-E-1	"A" St to Puddingstone Reservoir
	SGR-E-2	"D" St to "A" St
	SGR-E-3	Upstream from "D" St
Emerald Wash	SGR-E-4	
Marshall Creek	SGR-E-5	Foothill Blvd to Puddingstone Diversion Channel
	SGR-E-6	Debris Basins to Foothill Boulevard
SAN JOSE CREEK		
San Jose Creek Diversion	SGR-F-1	
San Jose Creek	SGR-F-2	Sixth Ave to San Jose Creek Diversion
	SGR-F-3	Anaheim-Puente Rd to Sixth Ave
	SGR-F-4	Nogales Ave to Anaheim-Puente Rd
	SGR-F-5	Benton Rd to Nogales Ave
San Jose Wash	SGR-F-6	Nicholet St to Benton Rd
	SGR-F-7	Thompson Creek to Nicholet St
Thompson Creek	SGR-F-8	Mountain Ave to San Jose Wash
	SGR-F-9	Thompson Creek Dam to Mountain Ave
SAN DIMAS WASH	SGR-G-1	Grand Ave to Big Dalton Wash
	SGR-G-2	A.T.S.F. Ry to Grand Ave
	SGR-G-3	Puddingstone Diversion Dam to A.T.S.F. Ry
WALNUT CREEK		

Channel	Sheet Number	Reach
Walnut Creek Inlet Channel	SGR-H-1	Francisquito Ave to San Gabriel River
Walnut Creek	SGR-H-2	California Ave to Walnut Creek Inlet Channel
	SGR-H-3	Charter Oak Wash to California Ave
	SGR-H-4	Covina Hills Rd to Charter Oak Wash

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY





VICINITY MAP

SCALE 0 50 100 200 300 MILES

AREA COVERED BY MAP

LEGEND

- BOUNDARY OF DRAINAGE AREA
- FLOOD-CONTROL CHANNEL
- FLOOD-CONTROL DAM AND RESERVOIR
- DEBRIS BASIN
- WATER SUPPLY RESERVOIR

STATUS OF EXISTING PROJECT

- IMPROVEMENT COMPLETED BY C. OF E. PARTLY WITH E.R.A. FUNDS AND PARTLY WITH REGULAR FUNDS. PART OF THE IMPROVEMENT WAS EFFECTED UNDER THE PREVIOUS PROJECT (SEE UNDER "STATUS OF PREVIOUS PROJECT")
- IMPROVEMENT COMPLETED BY C. OF E. – WITH REGULAR FUNDS
- IMPROVEMENT TO BE CONSTRUCTED BY C. OF E. – WITH REGULAR FUNDS

STATUS OF PREVIOUS PROJECT

- IMPROVEMENT COMPLETED BY C. OF E. – WITH E.R.A. FUNDS. IN ADDITION, ALL EXISTING-PROJECT IMPROVEMENT MARKED WAS STARTED UNDER THE PREVIOUS PROJECT AND THEN WAS TRANSFERRED TO THE EXISTING PROJECT FOR COMPLETION.

STATUS OF NON-FEDERAL CONSTRUCTION

- IMPROVEMENT COMPLETED BY LOCAL INTERESTS
- IMPROVEMENT TO BE CONSTRUCTED BY LOCAL INTERESTS

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA

CALIFORNIA

SCALE IN MILES 0 1 2 3 4 5 6 7 8 9 10

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

30 DECEMBER 1973


OPEN SECTION


COVERED SECTION


CIRCULAR SECTION


STREET BRIDGE

FOOTBRIDGE OR UTILITY BRIDGE


BERM - ACCESS RAMP


INVERT - ACCESS RAMP (RECTANGULAR CHANNELS)


INVERT - ACCESS RAMP (TRAPEZOIDAL CHANNELS)


EQUESTRIAN RAMP


BERM DEAD END


BERM TURNAROUND


SUBDRAIN MANHOLE


INSPECTION MANHOLE


LEVEE


EARTH LEVEE


INVERT STABILIZER OR CONTROL SILL


SPREADING GROUNDS DIVERSION


DROP STRUCTURE

CONST. PROJECT LIMIT

CITY OR COUNTY BOUNDARY


GAGING STATION


STORM DRAIN

FLOW ARROW

NORTH ARROW


EXISTING STRUCTURE

NOTE: THE TERM "TYPICAL" DENOTES AN ITEM WHICH OCCURS MORE THAN ONCE ON A DATA MAP

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LEGEND SYMBOLS

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
BC-A-1

BALLONA CREEK CHANNEL
Vista del Mar to Pacific Ocean

Construction Data
Contract No:

Start: 1938
Finish: 1939

Plans:
Folio Title: BALLONA CREEK OUTLET
Pacific Ave to Ocean

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers; 12 October 1940

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none

To Right Berm: from above Vista del Mar through Marina del Rey
To Left Berm: Esplanade Ln, Pacific Ave, Trolley Way

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Pacific Ave	3	0	abandoned

Reporting Features

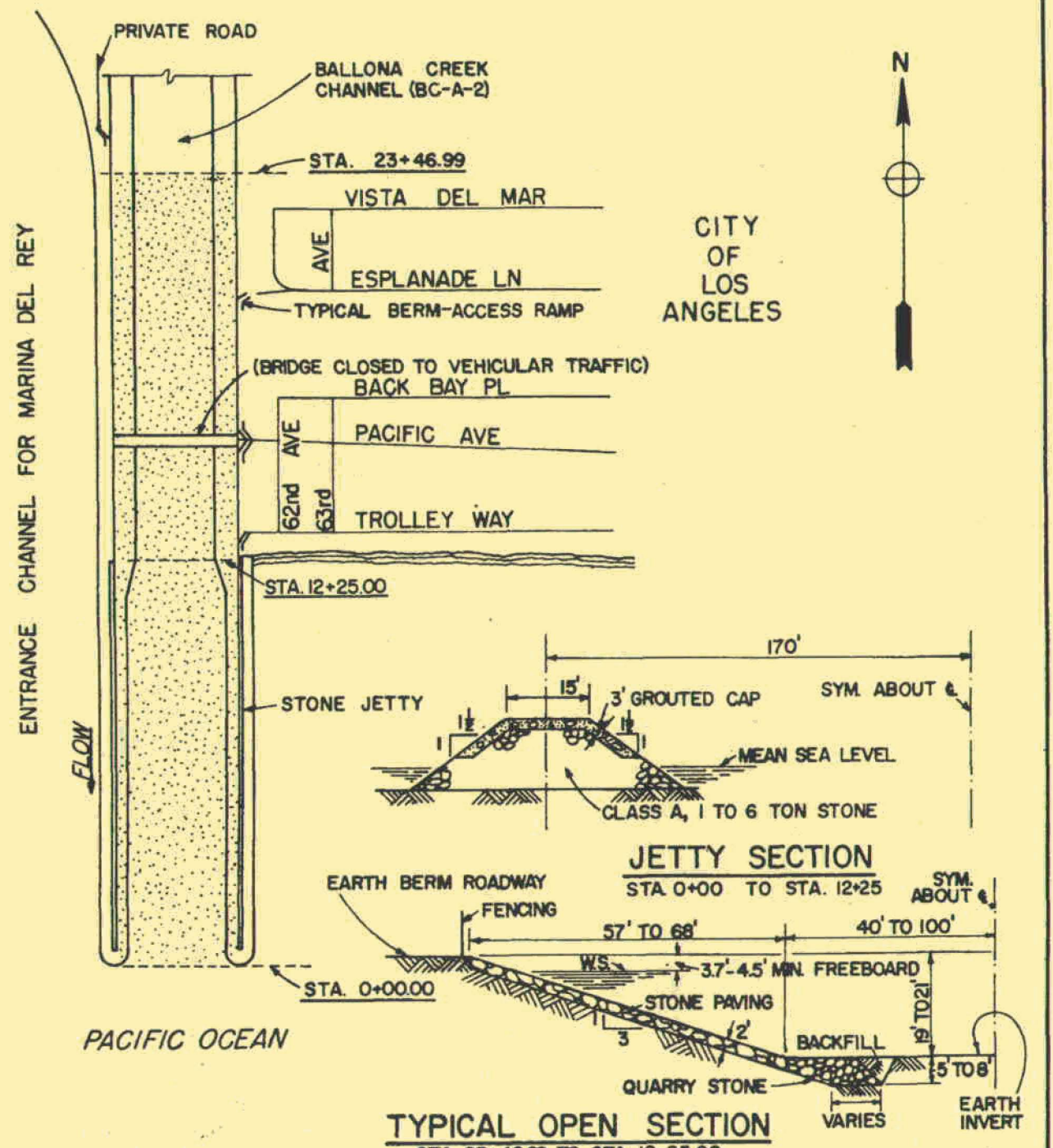
Along Channel
Earth invert
Grouted stone jetty
Concrete capping
Earth berm roadway
Rights-of-way
Fencing

At a Channel Station
Outlet structure
Side drain
Earth berm-access ramp
Bridge
Public Utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
23+46.99	12+25.00	TRAP	9.49-966	46,000



LEGEND

OPEN SECTION

----- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BALLONA CREEK CHANNEL
VISTA DEL MAR TO PACIFIC OCEAN

SCALE IN FEET

250 0 250 500 750 1000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-A-1

DATA SHEET BC-A-2

BALLONA CREEK CHANNEL
La Salle Ave to Vista del Mar

Construction Data

Contract No:

Start: 1935
Finish: 1936

Plans:

Folio Title: BALLONA CREEK OUTLET
Redondo Blvd to Pacific Ocean

Local Assurances

Resolution Dated: 1 December 1937

Operation and Maintenance Transferred to: LACFCD, 21 March 1939 [ERA]

Stormflow Data

Gaging Station Location: downstream of Sawtelle Blvd (sta 218+29±)

Type: Recording (LACFCD – F38C-R)

Staff Gage Reading at One-third Capacity: 8.6 ft on gage (12,290 cfs)

Access Ramps

To Invert: from Ocean Dr, downstream of Overland Ave (sta 257+50±)

To Right Berm: Overland Ave, Sepulveda Blvd, Inglewood Blvd, Centinela Ave, Lincoln Blvd, private drive off Fiji Way

To Left Berm: Overland Ave, Sepulveda Blvd, Culver Dr, Inglewood Blvd, Centinela Ave, Lincoln Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Overland Ave	2	0	Culver City
Sta 244+70±	2	0	Culver City (footbridge)
Sepulveda Blvd	7	0	Los Angeles County
Sawtelle Blvd	7	0	City of Los Angeles
San Diego Fwy	2	0	State of California
Inglewood Blvd	2	0	City of Los Angeles
Centinela Ave	2	0	City of Los Angeles
Marina Fwy	0	0	State of California
P. E. Ry	3	0	P.E.R.R.
Lincoln Blvd	3	0	Los Angeles County
Culver Blvd	3	0	Los Angeles County

Reporting Features

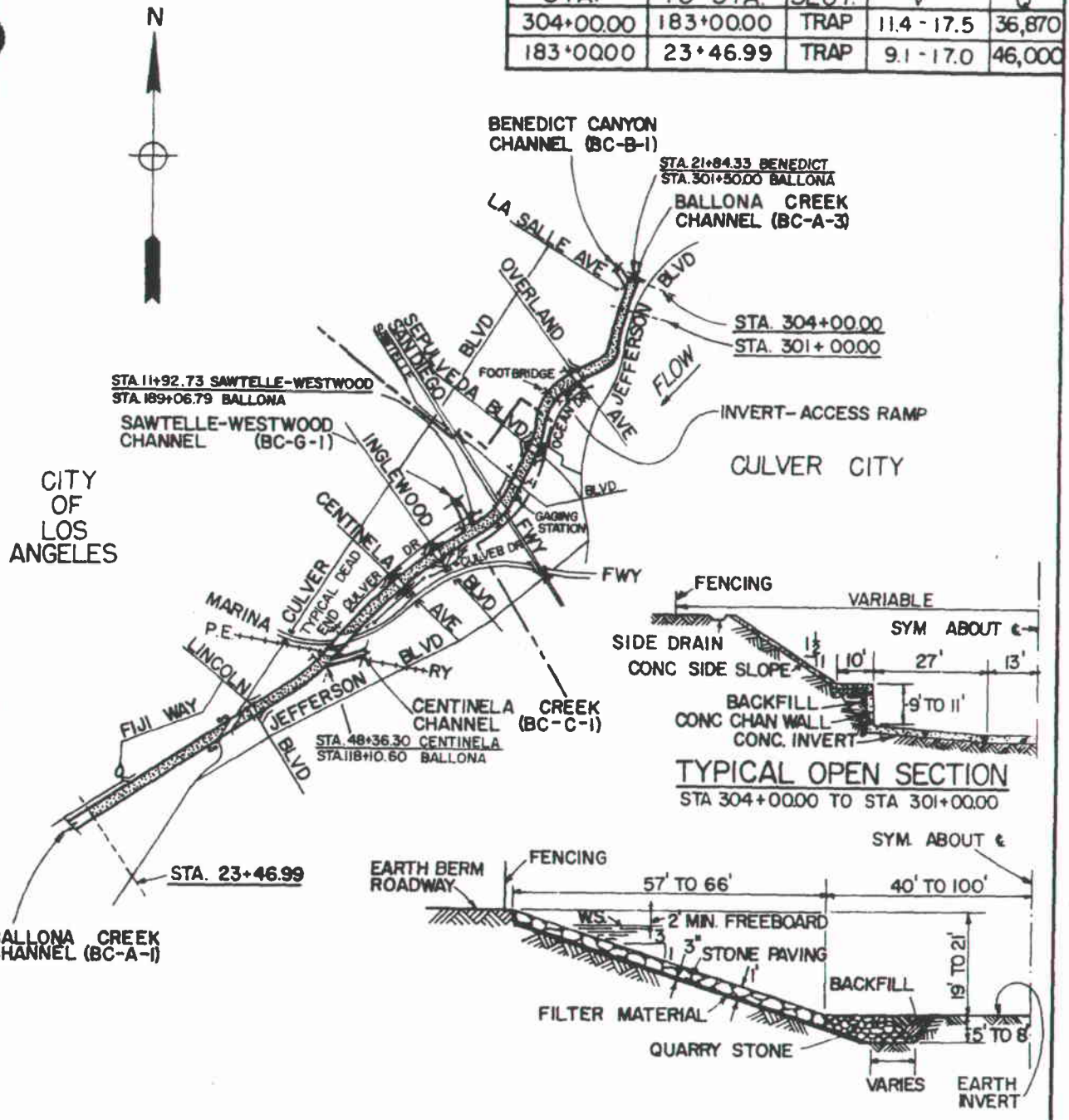
Along Channel	At a Channel Station
Earth berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Concrete and grouted stone side slopes	Concrete confluence section
Subdrain system	Gaging station
Rights-of-way	Public utility
Fencing	Bridge

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
304+00.00	183+00.00	TRAP	11.4 - 17.5	36,870
183+00.00	23+46.99	TRAP	9.1 - 17.0	46,000



LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BALLONA CREEK CHANNEL
LA SALLE AVE TO VISTA DEL MAR

SCALE IN FEET

2000 0 2000 4000 6000 8000 10,000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-A-2

DATA SHEET
BC-A-3

BALLONA CREEK CHANNEL
Washington Blvd to La Salle Ave

Construction Data

Contract No:

Start: 1938
Finish: 1939

Plans:

Folio Title: BALLONA CREEK OUTLET
Redondo Blvd to Pacific Ocean

Local Assurances

Resolution Dated:

Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers; 12 October 1940

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use BC-A-2

To Right Berm: none
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Exposition Blvd	0	0	City of Los Angeles and P.E.R.R.
P.E. Ry	2	0	City of Los Angeles and P.E.R.R.
Higuera St	4	0	Culver City
Duquesne Ave	0	0	Culver City

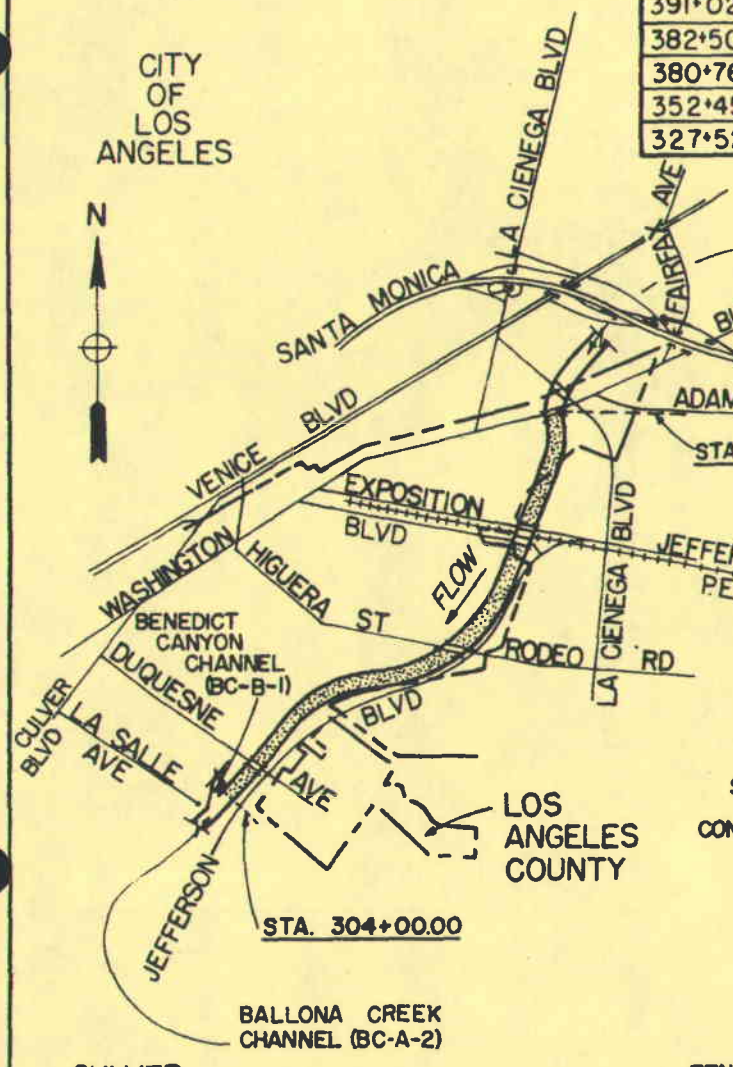
Reporting Features

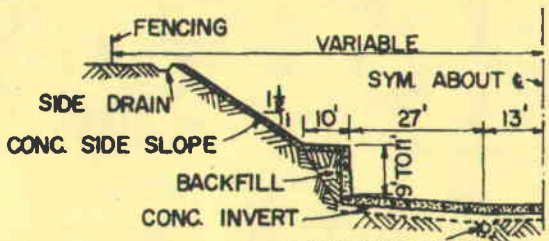
Along Channel	At a Channel Station
Earth berm roadway	Side drain
Concrete channel invert	Bridge
Concrete channel walls	Public utility
Concrete channel side slopes	
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

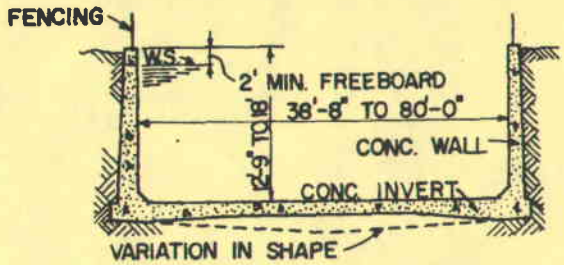
DESIGN DATA

STA.	TO STA.	SECT	V	Q
391+02.48	382+50.00	RECT	25.6 - 26.5	25,350
382+50.00	380+76.12	COMB	25.0 - 26.5	25,350
380+76.12	352+45.00	COMB	17.8 - 20.9	30,000
352+45.00	327+52.75	COMB	20.9 - 23.3	34,540
327+52.75	304+00.00	COMB	17.3 - 23.3	36,870





TYPICAL OPEN SECTION
STA. 385+00.00 TO STA. 304+00.00



TYPICAL OPEN SECTION
STA. 391+02.48 TO STA. 385+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BALLONA CREEK CHANNEL
WASHINGTON BLVD TO LA SALLE AVE

SCALE IN FEET
1000 0 1000 2000 3000 4000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-A-3

DATA SHEET
BC-A-4

BALLONA CREEK CHANNEL
Redondo Blvd to Washington Blvd

Construction Data
Contract No:

Start: 1936
Finish: 1937

Plans:
Folio Title: BALLONA CREEK OUTLET
Redondo Blvd to Pacific Ocean

Local Assurances
Resolution Dated: 1 December 1937
Operation and Maintenance Transferred to: LACFCD, 13 July 1937 [ERA]

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none; use BC-A-2

To Right Berm: none
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Fairfax Ave	0	0	City of Los Angeles
Cadillac Ave	0	0	State of California
Santa Monica Fwy	0	0	State of California
Service bridge (beneath freeway)	0	0	City of Los Angeles
La Cienega Blvd	0	0	City of Los Angeles
Washington Blvd	0	0	City of Los Angeles

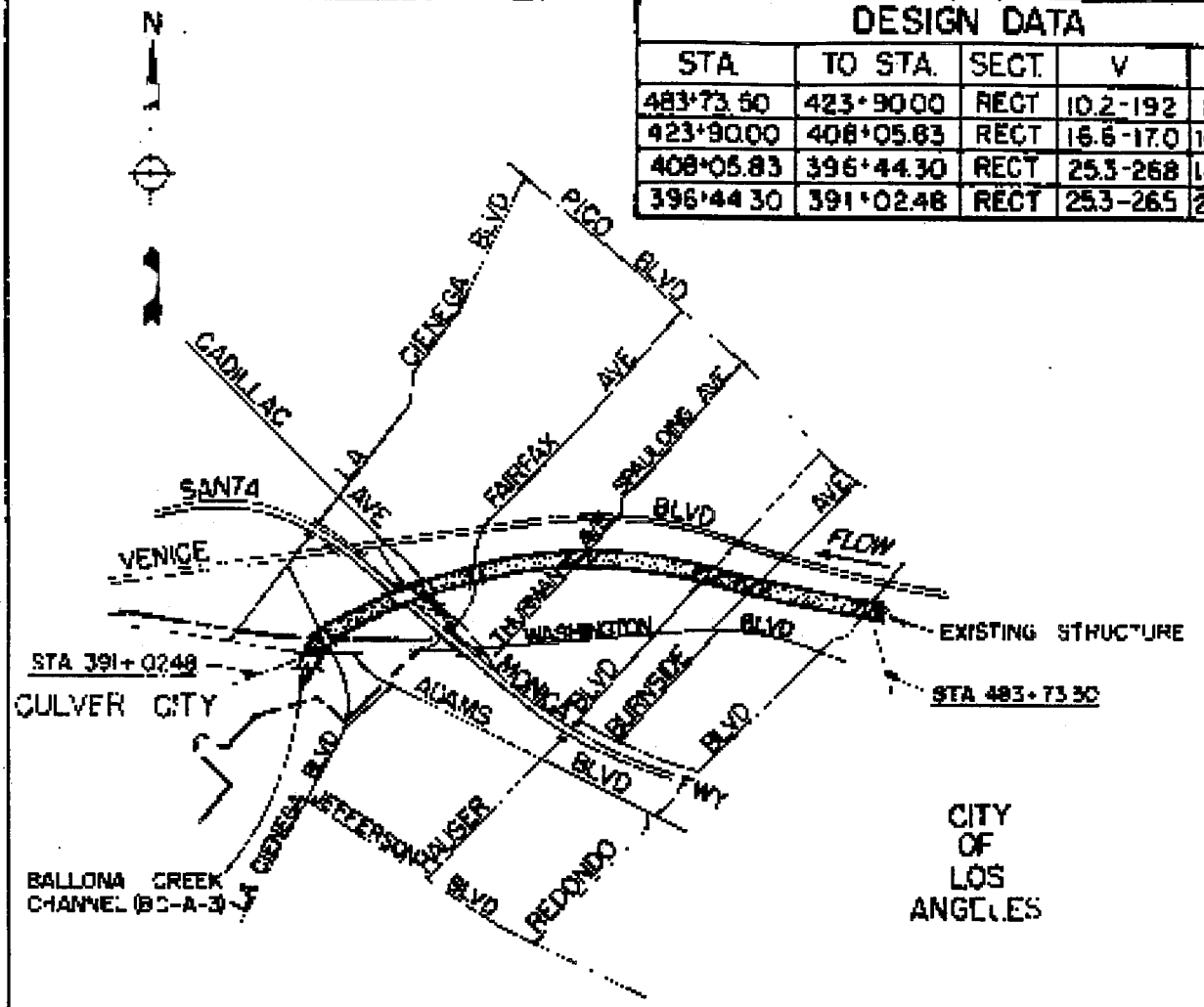
Reporting Features

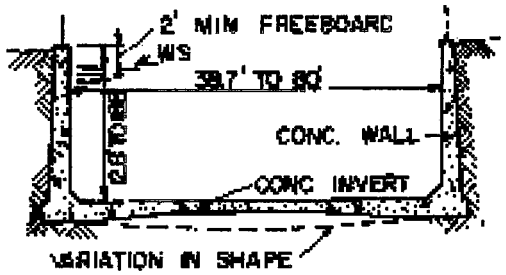
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Concrete channel roof slab	Public utility
Subdrain system	
Rights-of-way	
Fencing	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA	TO STA.	SECT.	V	Q
483+73.50	423+90.00	RECT	10.2-19.2	8,500
423+90.00	408+05.83	RECT	16.6-17.0	14,150
408+05.83	396+44.30	RECT	25.3-26.8	18,500
396+44.30	391+02.48	RECT	25.3-26.5	23,350





TYPICAL OPEN SECTION
STA. 483+73.30 TO STA 391+02.48

LEGEND

- OPEN SECTION
- COVERED SECTION
- STREET BRIDGE
- ----- CONST. PROJECT LIMIT
- ---- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BALLONA CREEK CHANNEL
REDONDO BLVD TO WASHINGTON BLVD

SCALE IN FEET
0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-A-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
BC-A-5

ARROYO DE LOS JARDINES

Construction Data

Contract No: Force Account

Start: 26 September 1935
Finish: 15 September 1936

Plans: D.O. Series 23/1-11
Folio Title: ARROYO DE LOS JARDINES

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 15 February 1938

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

None

Reporting Features

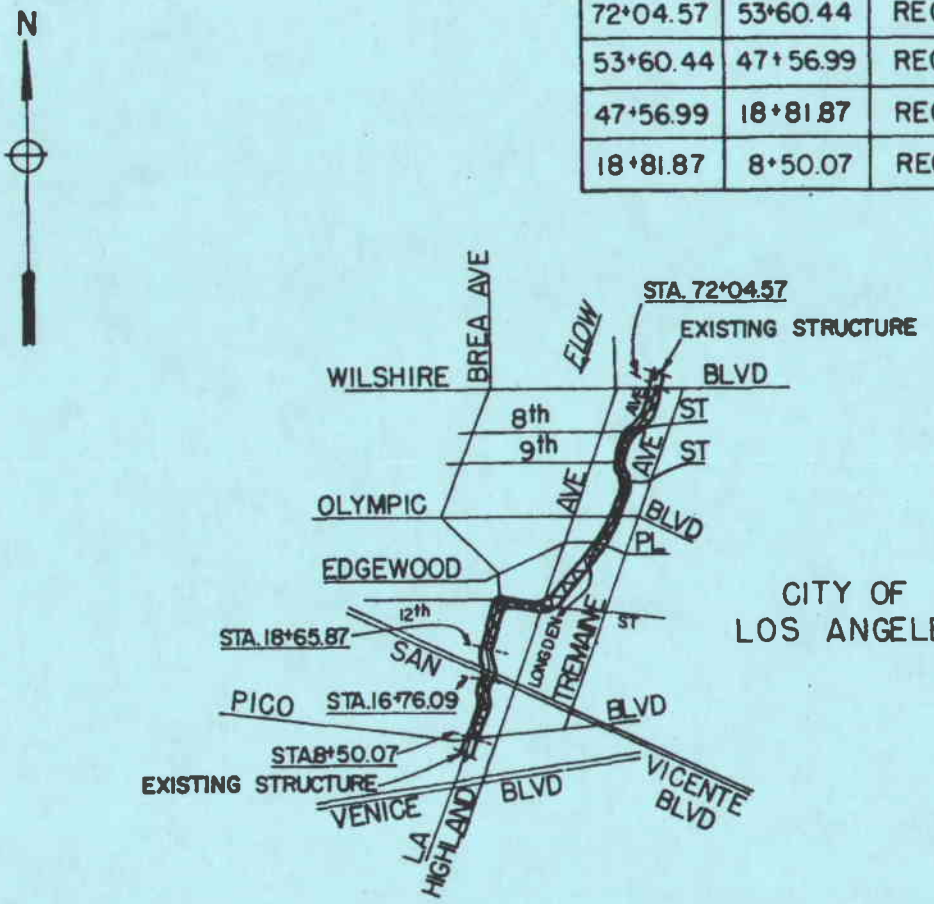
Along Channel
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Rights-of-way

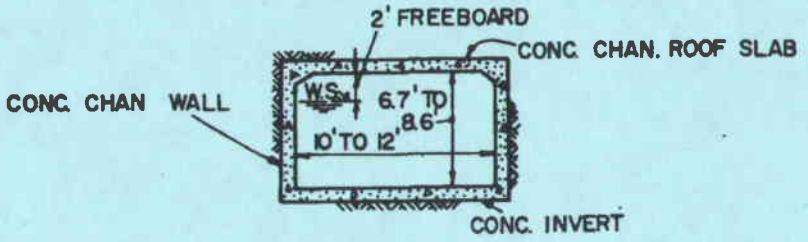
At a Channel Station
Side drain
Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA	TO STA	SECT	V	Q
72+04.57	53+60.44	RECT	18.6 - 21.3	1210
53+60.44	47+56.99	RECT	12.7 - 14.6	1225
47+56.99	18+81.87	RECT	14.7 - 27.8	1385
18+81.87	8+50.07	RECT	12.3 - 16.5	1500





TYPICAL COVERED SECTION

STA. 72+04.57	TO	STA. 18+65.87
STA. 16+76.09	TO	STA. 8+50.07

LEGEND

- COVERED SECTION
- EXISTING STRUCTURE
- ----- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

ARROYO DE LOS JARDINES

SCALE IN FEET

1000 0 1000 2000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA BC-A-5

DATA SHEET
BC-B-1

BENEDICT CANYON CHANNEL
Cattaragus Ave to Ballona Ck

Construction Data

Contract No: DA 61-174
Matt J. Zaich Co

Start: 16 May 1961
Finish: 28 August 1962

Specifications: CIVENG 61-20
Plans: D.O. Series 201/50-109
Folio Title: BENEDICT CANYON CHANNEL
Cattaragus Ave to Ballona Creek

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 16 May 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use BC-A-2

To Right Berm: none
To Left Berm: none

Bridges

None

Reporting Features

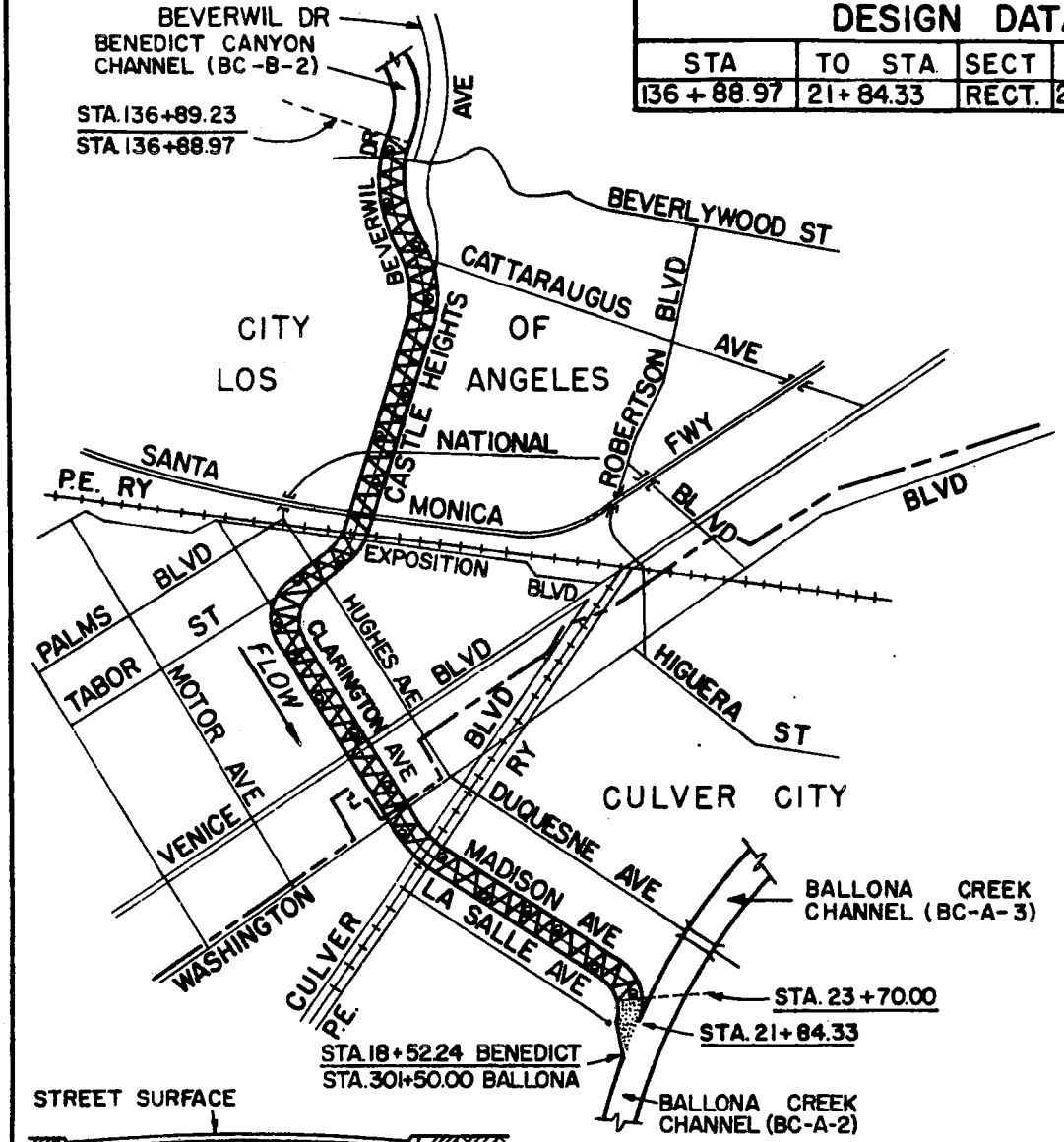
Along Channel
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Subdrain system
Fencing
Rights-of-way

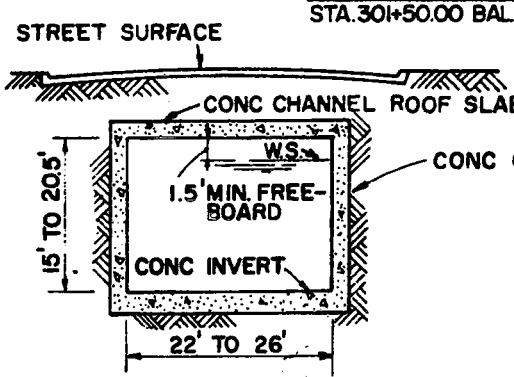
At a Channel Station
Side drain
Channel inspection manhole
Concrete confluence section
Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

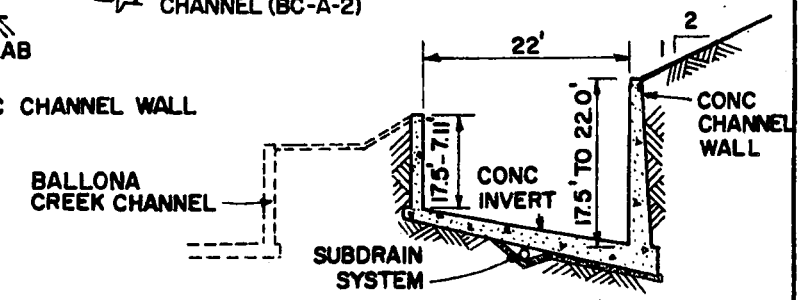
STA	TO STA	SECT	V	Q
136+88.97	21+84.33	RECT.	29.0-40.6	12,000





TYPICAL COVERED SECTION

STA.136+88.97 TO STA.23+70.00



TYPICAL OPEN (CONFL.) SECTION

STA. 23+70.00 TO STA 21+84.33

LEGEND

- COVERED SECTION
- OPEN SECTION
- CONST. PROJECT LIMIT
- INSPECTION MANHOLE
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BENEDICT CANYON CHANNEL

CATTARAUGUS AVE TO BALLONA CREEK

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-B-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET BC-B-2

BENEDICT CANYON CHANNEL
Olympic Blvd. to Cattaraugus Ave

Construction Data

Contract No: DA 62-119
Kirst Const Co

Start: 12 March 1962
Finish: 28 February 1963

Specifications: CIVENG 62-10
Plans: D.O. Series 201/111-201
Folio Title: BENEDICT CANYON CHANNEL
Lexington Rd to Cattaraugus Ave

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 16 May 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use BC-A-2

To Right Berm: Monte Mar St, Beverlywood St
To Left Berm: Monte Mar St, Sawyer St, Beverwil Dr

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Monte Mar St	0	2	City of Los Angeles
Sta 158+47	0	0	Private vehicular bridge
Sta 154+43	0	0	Private footbridge

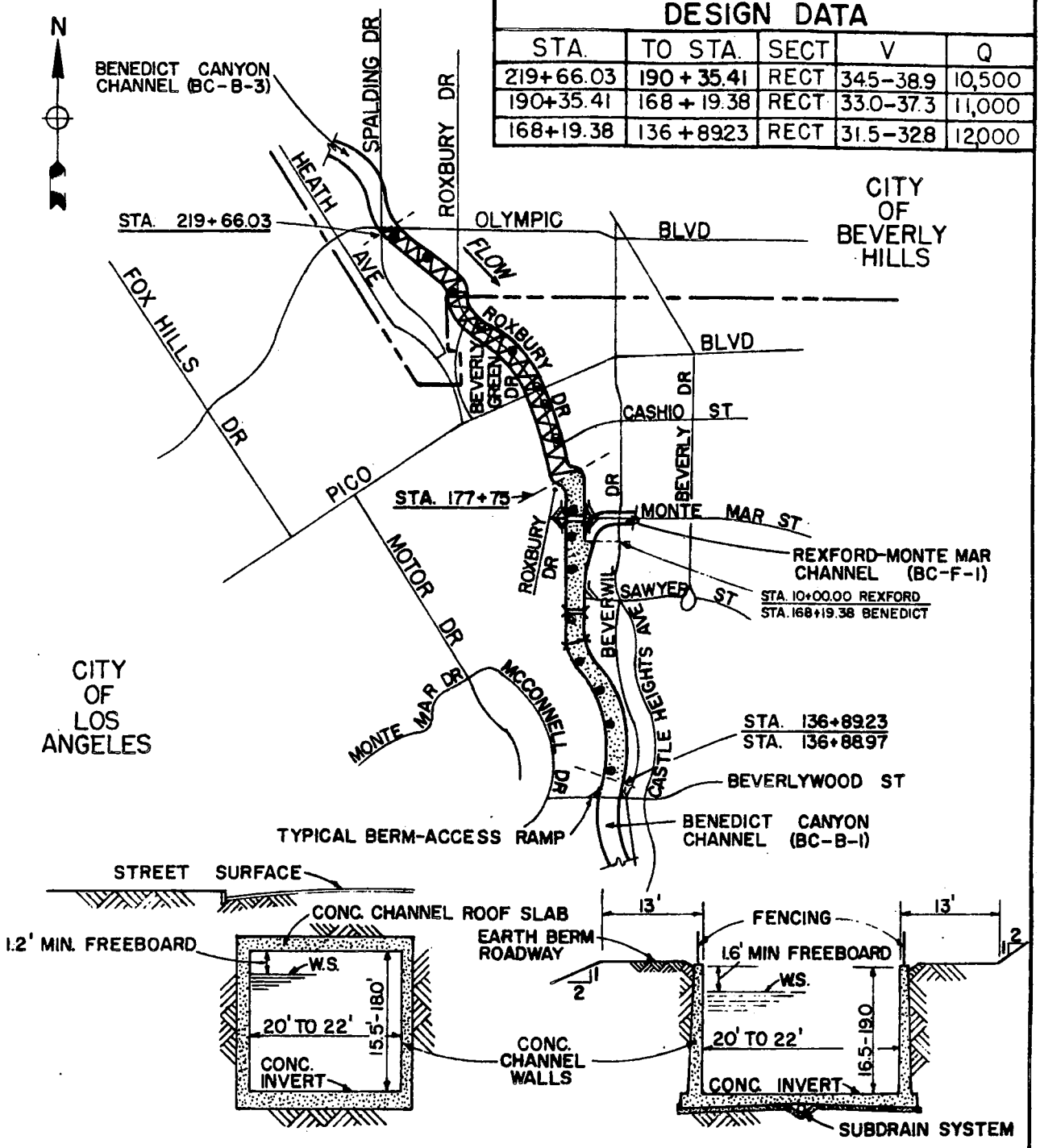
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Side drain
Concrete channel invert	Surfaced berm-access ramp
Concrete channel walls	Channel inspection manhole
Concrete channel roof slab	Bridge
Subdrain system	Public utility
Fencing	Subdrain manhole
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT	V	Q
219+66.03	190+35.41	RECT	34.5-38.9	10,500
190+35.41	168+19.38	RECT	33.0-37.3	11,000
168+19.38	136+89.23	RECT	31.5-32.8	12,000



TYPICAL COVERED SECTION

STA. 219+66.03 TO STA. 177+75.00

TYPICAL OPEN SECTION

STA. 177+75.00 TO STA. 136+89.23

LEGEND

- COVERED SECTION
- OPEN SECTION
- STREET BRIDGE
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT
- SUBDRAIN MANHOLE
- CHANNEL INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BENEDICT CANYON CHANNEL

OLYMPIC BLVD TO CATTARAUGUS AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-B-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
BC-B-3

BENEDICT CANYON CHANNEL
Lexington Rd to Olympic Blvd

Construction Data

Contract No: DA 61-119
Kirst Const Co

Start: 12 March 1962
Finish: 28 February 1963

Specifications: CIVENG 62-10
Plans: D.O. Series 201/111-201
Folio Title: BENEDICT CANYON CHANNEL
Lexington Rd to Cattaraugus Ave

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 16 May 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use BC-A-2

To Right Berm: none
To Left Berm: none

Bridges

None

Reporting Features

Along Channel
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Fencing
Rights-of-way

At a Channel Station
Side drain
Channel inspection manhole
Concrete confluence section
Public utility

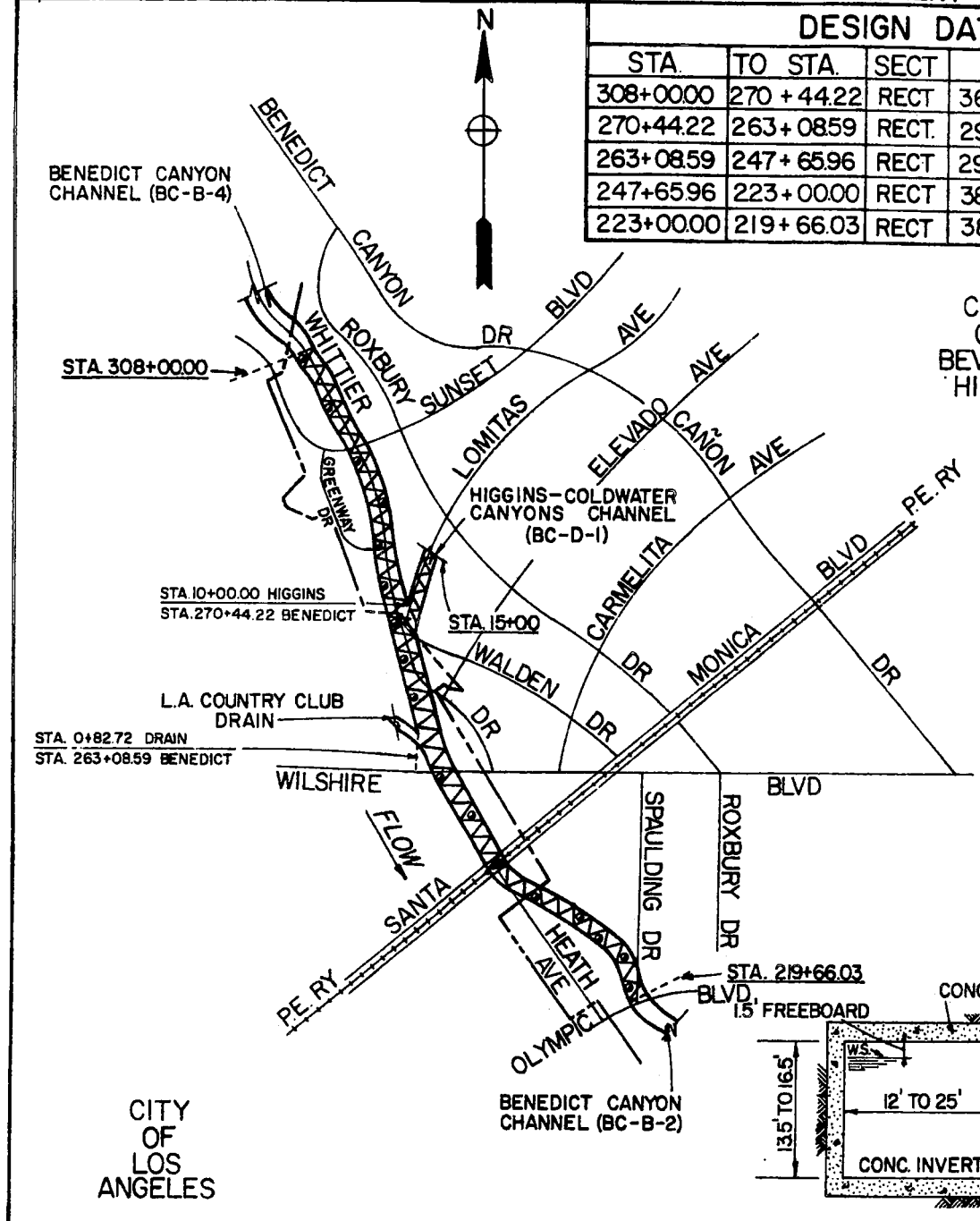
CORPS OF ENGINEERS

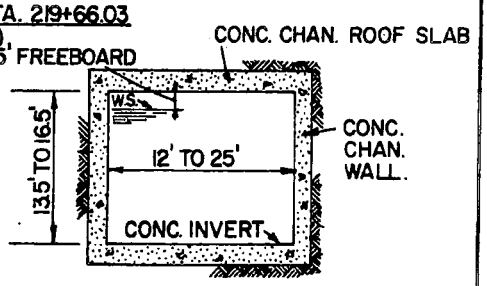
DEPARTMENT OF THE ARMY

BC-B-3

DESIGN DATA

STA.	TO STA.	SECT	V	Q
308+00.00	270+44.22	RECT	36.6-42.0	6,000
270+44.22	263+08.59	RECT.	29.4-37.1	9,000
263+08.59	247+65.96	RECT	29.4-42.3	9,700
247+65.96	223+00.00	RECT	38.8-42.0	10,200
223+00.00	219+66.03	RECT	38.1-38.3	10,500





TYPICAL COVERED SECTION

STA. 308+00.00 TO STA. 219+66.03

LEGEND

- COVERED SECTION
- CHANNEL INSPECTION MANHOLE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BENEDICT CANYON CHANNEL LEXINGTON RD TO OLYMPIC BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-B-3

DATA SHEET
BC-B-4

BENEDICT CANYON CHANNEL
Hillgrove Dr to Lexington Rd

Construction Data

Contract No: DA 63-140
Oberg Const Co

Start: 26 April 1963
Finish: 18 January 1964

Specifications: CIVENG 63-17
Plans: D.O. Series 201/222-274
Folio Title: BENEDICT CANYON CHANNEL
Hillgrove Dr to Lexington Rd

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 14 October 1964

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use BC-A-2

To Right Berm: none
To Left Berm: none

Bridges

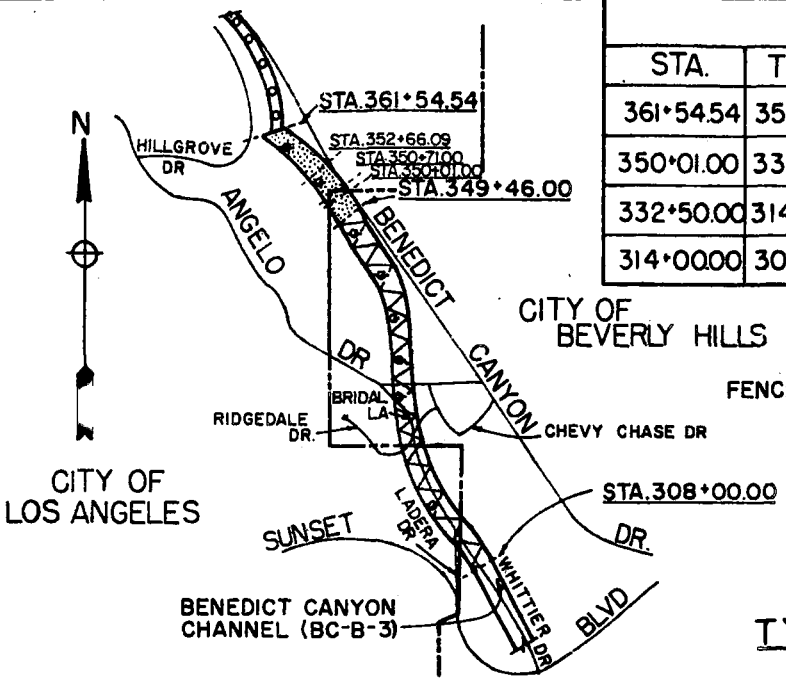
None

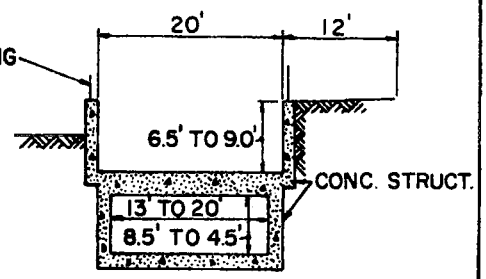
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Channel inspection manhole
Concrete channel side slopes	Public utility
Concrete channel roof slab	
Fencing	
Rights-of-way	

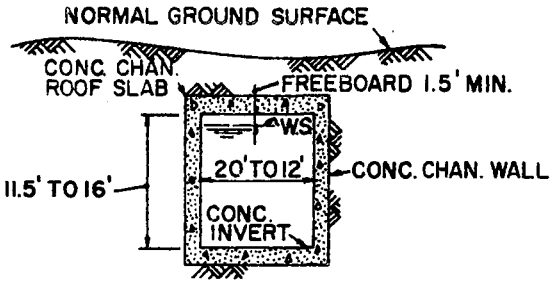
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
361+54.54	350+01.00	RECT.	22.9-27.4	2140
350+01.00	332+50.00	RECT.	35.1-38.6	5000
332+50.00	314+00.00	RECT.	36.5-39.6	5500
314+00.00	308+00.00	RECT.	37.1-38.2	6000

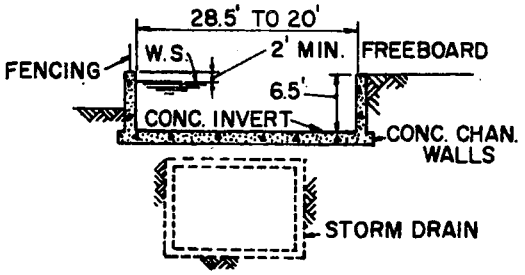




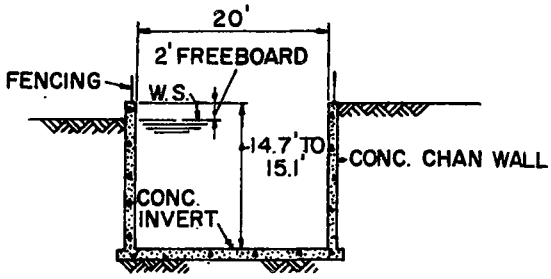
TYPICAL OPEN SECTION
STA.350+71.00 TO STA.350+01.00
(CONFLUENCE STRUCTURE)



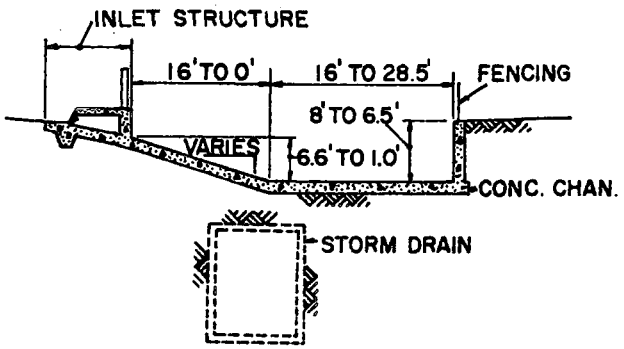
TYPICAL COVERED SECTION
STA.349+46.00 TO STA. 308+00.00



TYPICAL OPEN SECTION
STA.352+66.09 TO STA. 350+71.00



TYPICAL OPEN SECTION
STA.350+01.00 TO STA.349+46.00



TYPICAL OPEN SECTION
STA. 361+54.54 TO STA. 352+66.09 (INLET SECTION)

LEGEND

- COVERED SECTION
- OPEN SECTION
- STORM DRAIN
- INSPECTION MANHOLE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BENEDICT CANYON CHANNEL
HILLGROVE DR. TO LEXINGTON RD.

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
BC-C-1

CENTINELA CREEK CHANNEL
Jefferson Blvd to Ballona Ck

Construction Data

Contract No: DA 62-195
Charles J. Rounds Co

Start: 15 June 1961
Finish: 10 May 1962

Specifications: CIVENG 61-23
Plans: D.O. Series 368/40-125, 184
Folio Title: CENTINELA CREEK CHANNEL
Jefferson Blvd to Ballona Ck

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from left side at Hammack St, just downstream of Centinela Blvd (sta 89+63)

To Right Berm: Jefferson Blvd, Beatrice St, Mesmer Ave, Inglewood Blvd, Centinela Blvd
To Left Berm: Jefferson Blvd, Mesmer Ave, Margaret Ave, Hammack St, Alberta Dr, alley off Hammack St

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Jefferson Blvd	0	2	City of Los Angeles
Mesmer Ave	0	2	City of Los Angeles
Inglewood Blvd	0	2	City of Los Angeles
Centinela Blvd	0	2	Los Angeles County
P.E. Ry	0	2	P.E.R.R.

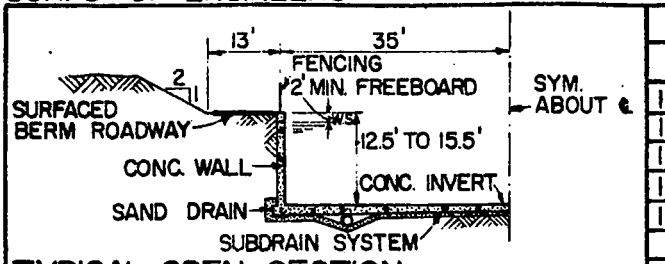
Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Concrete invert-access ramp
Concrete channel invert	Surfaced berm-access ramp
Concrete channel walls	Side drain
Concrete channel side slopes	Concrete confluence section
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	Subdrain manhole
Earth channel invert	

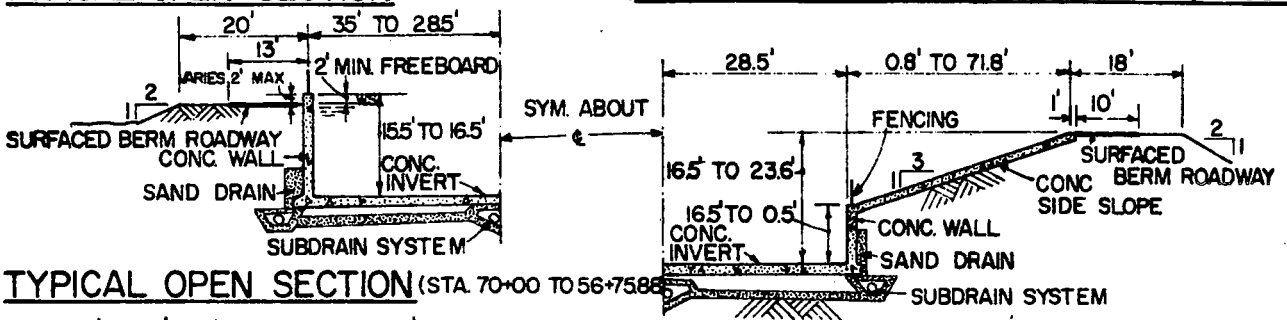
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

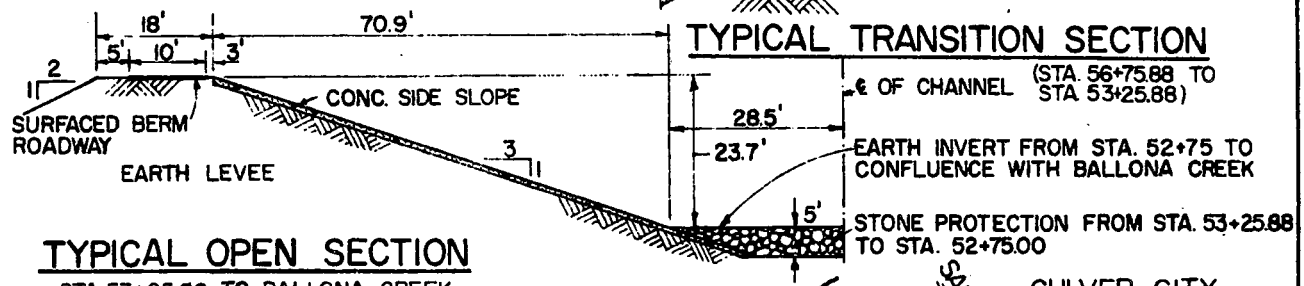
STA.	TO STA.	SECT	V	Q
145 + 00.00	137 + 15.00	RECT	9.4 - 10.0	7400
137 + 15.00	136 + 40.00	RECT	9.7 - 9.8	7600
136 + 40.00	134 + 24.84	RECT	11.3 - 11.4	8350
134 + 24.84	108 + 00.00	RECT	10.6 - 11.7	8500
108 + 00.00	56 + 75.88	RECT	8.9 - 11.7	8700
56 + 75.88	53 + 25.88	TRAN	4.1 - 11.5	8700
53 + 25.88	48 + 36.30	TRAP	4.1 - 9.6	8700



TYPICAL OPEN SECTION (STA. 145+00 TO 70+00)

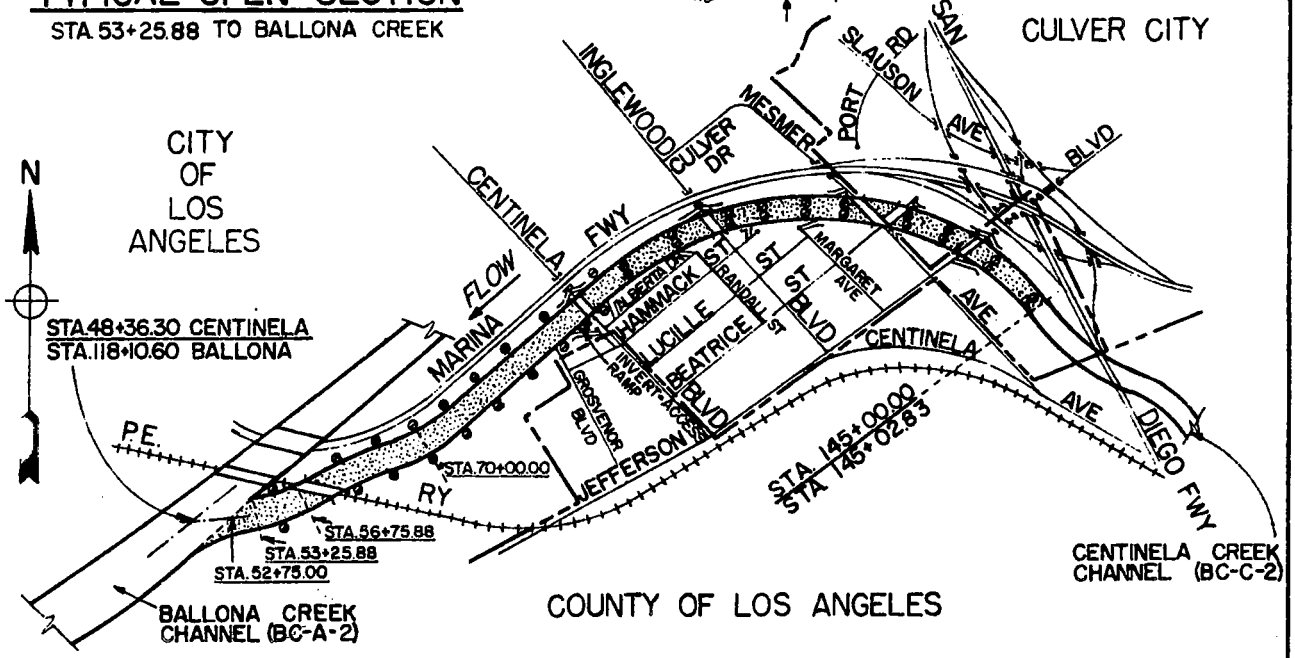


TYPICAL OPEN SECTION (STA. 70+00 TO 56+75.88)



TYPICAL TRANSITION SECTION (STA. 56+75.88 TO STA. 53+25.88)

TYPICAL OPEN SECTION
STA. 53+25.88 TO BALLONA CREEK



LEGEND

- OPEN SECTION
- TYPICAL BERM-ACCESS RAMP
- STREET BRIDGE
- ---- CONST. PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY
- SUBDRAIN MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

CENTINELA CREEK CHANNEL
JEFFERSON BLVD TO BALLONA CREEK

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-C-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
BC-C-2

CENTINELA CREEK CHANNEL
La Tijera Blvd to Jefferson Blvd

Construction Data

Contract No: DA 61-180
State Division of Highways

Start: 1 November 1961
Finish: 24 October 1962

Specifications:
Plans: D.O. Series 368/126-172
Folio Title: CENTINELA CREEK CHANNEL
La Tijera to Jefferson Blvd

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 15 May 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use BC-C-1

To Right Berm: Centinela Ave, Sepulveda Blvd
To Left Berm: none

Bridges

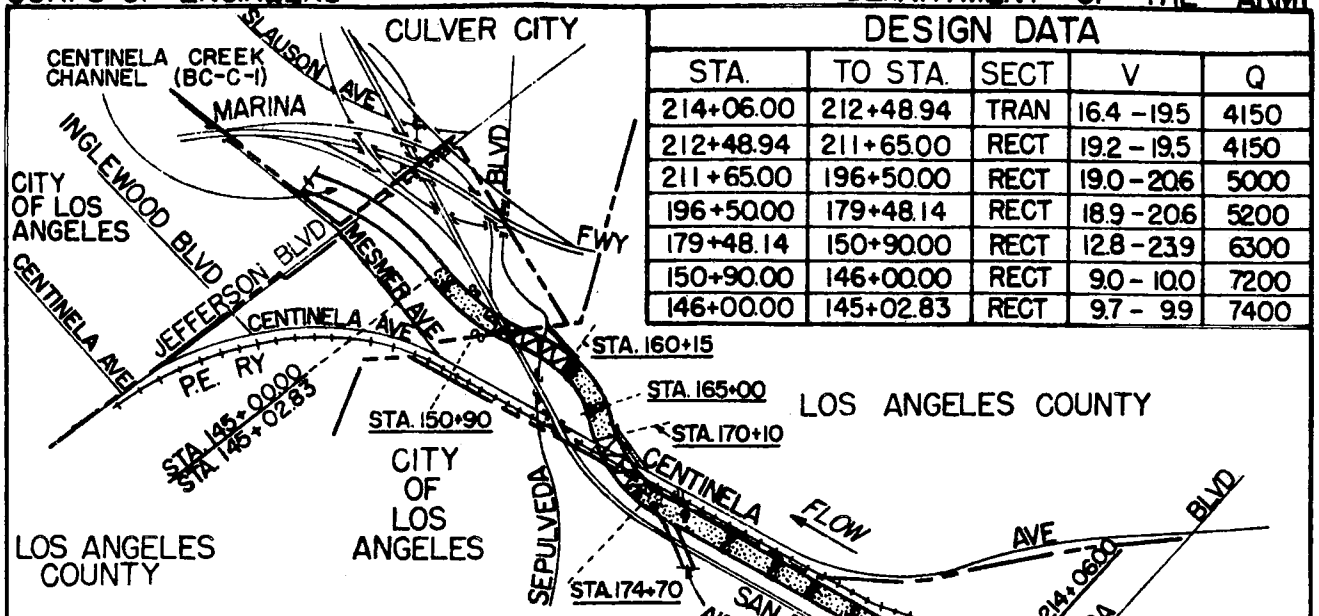
None

Reporting Features

Along Channel
Surfaced and earth berm roadway
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Subdrain system
Fencing
Rights-of-way

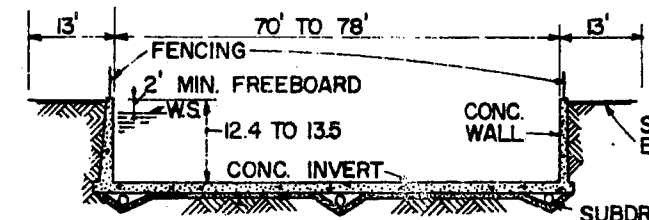
At a Channel Station
Surfaced berm-access ramp
Side drain
Subdrain manhole
Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

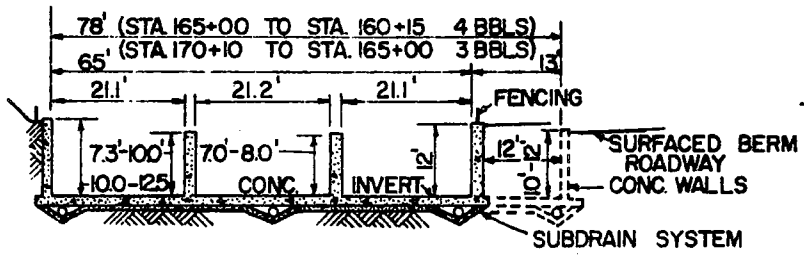


DESIGN DATA

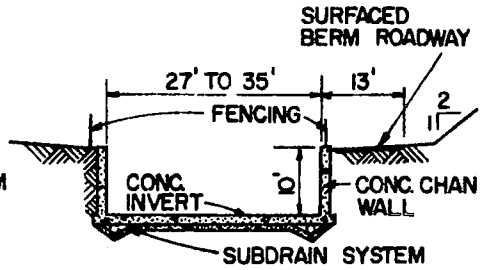
STA.	TO STA.	SECT	V	Q
214+06.00	212+48.94	TRAN	16.4 - 19.5	4150
212+48.94	211+65.00	RECT	19.2 - 19.5	4150
211+65.00	196+50.00	RECT	19.0 - 20.6	5000
196+50.00	179+48.14	RECT	18.9 - 20.6	5200
179+48.14	150+90.00	RECT	12.8 - 23.9	6300
150+90.00	146+00.00	RECT	9.0 - 10.0	7200
146+00.00	145+02.83	RECT	9.7 - 9.9	7400



STA. 150+90.00 TO STA. 145+02.83

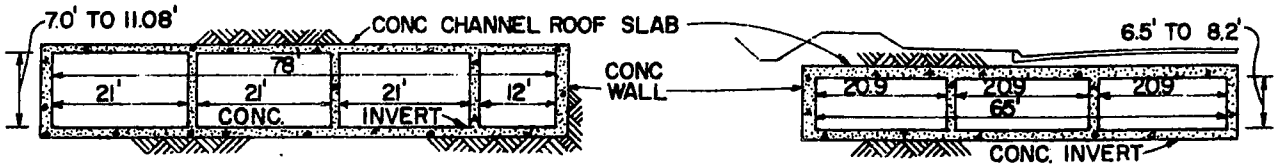


STA. 170+10.00 TO STA. 160+15.00



STA. 214+06.00 TO STA. 174+70.00

TYPICAL OPEN SECTIONS



STA. 160+15.00 TO STA. 150+90.00

STA. 174+70.00 TO STA. 170+10.00

TYPICAL COVERED SECTIONS

LEGEND

- COVERED SECTION
- OPEN SECTION
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT
- SUBDRAIN MANHOLE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM ROADWAY TURNAROUND

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

CENTINELA CREEK CHANNEL
LA TIJERA BLVD TO JEFFERSON BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-C-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
BC-D-1

HIGGINS-COLDWATER CANYONS CHANNEL

Construction Data

Contract No: DA 63-138
R.A. Wattson Co

Start: 22 April 1963
Finish: 1 April 1964

Specifications: CIVENG 63-16
Plans: D.O. Series 211/61-131
Folio Title: HIGGINS-COLDWATER CANYONS CHANNEL
Channels Inlet to Benedict Canyon

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 2 December 1964

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

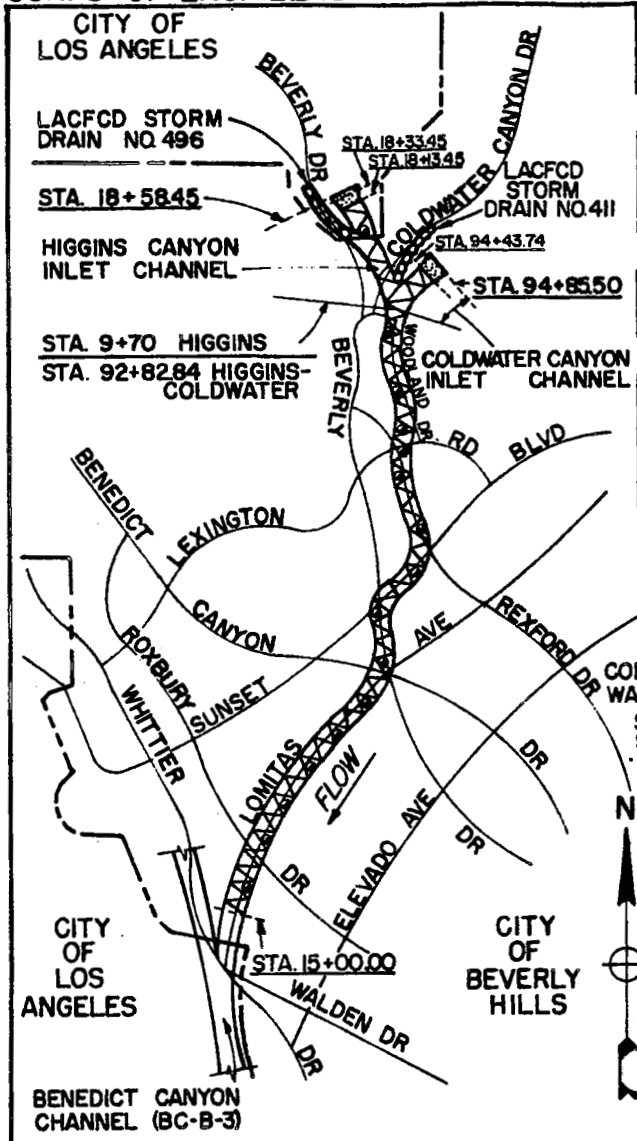
Bridges

None

Reporting Features

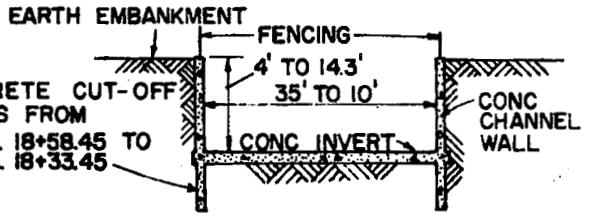
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Channel inspection manhole
Concrete channel roof slab	Inlet structure
Fencing	Trash racks
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

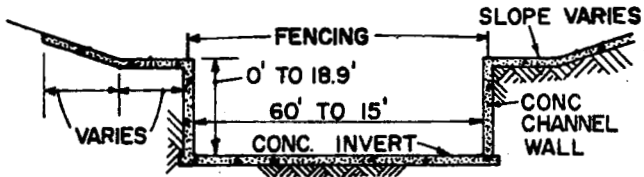


DESIGN DATA

STA.	TO STA.	SECT	V	Q
HIGGINS CANYON INLET CHANNEL				
18+58.45	14+22.01	RECT	9.0-36.4	800
14+22.01	13+82.20	RECT	32.7-35.1	1100
13+82.20	9+70.00	RECT	30.2-39.0	2000
COLDWATER CANYON INLET CHANNEL				
94+85.50	93+11.39	RECT	9.7-30.6	1400
93+11.39	92+82.84	RECT	30.6	2500
HIGGINS-COLDWATER CANYONS CHANNEL				
92+82.84	57+70.00	RECT	27.6-41.6	4000
57+70.00	42+80.00	RECT	30.6-39.8	4200
42+80.00	31+70.00	RECT	25.0-31.1	4350
31+70.00	15+00.00	RECT	24.5-33.7	4500

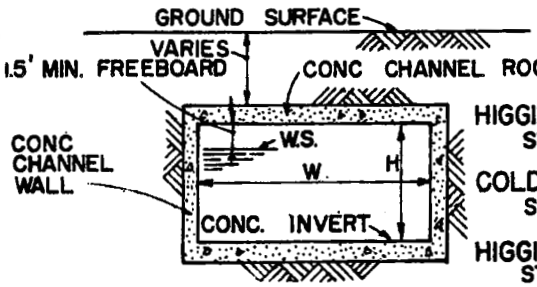


HIGGINS CANYON INLET CHANNEL
STA. 18+58.45 TO STA. 18+13.45



COLDWATER CANYON INLET CHANNEL
STA. 94+85.50 TO STA. 94+43.74

TYPICAL OPEN SECTIONS



	H	W
HIGGINS CANYON INLET STA. 18+13.45 TO STA. 9+70.00	4.0' TO 9.5'	10.0' TO 35.0'
COLDWATER CANYON INLET STA. 94+43.74 TO STA. 92+82.84	4.95' TO 9.5'	15.0' TO 26.0'
HIGGINS-COLDWATER CANYONS STA. 92+82.84 TO STA. 15+00.00	9.5' TO 14.5'	10.0' TO 20.0'

TYPICAL COVERED SECTION

LEGEND

- OPEN SECTION
- COVERED SECTION
- CONST. PROJECT LIMIT
- CITY BOUNDARY
- INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

HIGGINS-COLDWATER CANYONS CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-D-1

DATA SHEET
BC-E-1

KENTER CREEK CHANNEL

Construction Data

Contract No: 13-130

Start: 16 November 1935
Finish: 27 January 1937

Specifications:
Plans: D.O. Series 28/1-25, 29/1-25, 30/1
Folio Title: KENTER CANYON – LACFCD No. 70
Pacific Ocean to Sta 172+11.06

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 29 June 1937

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

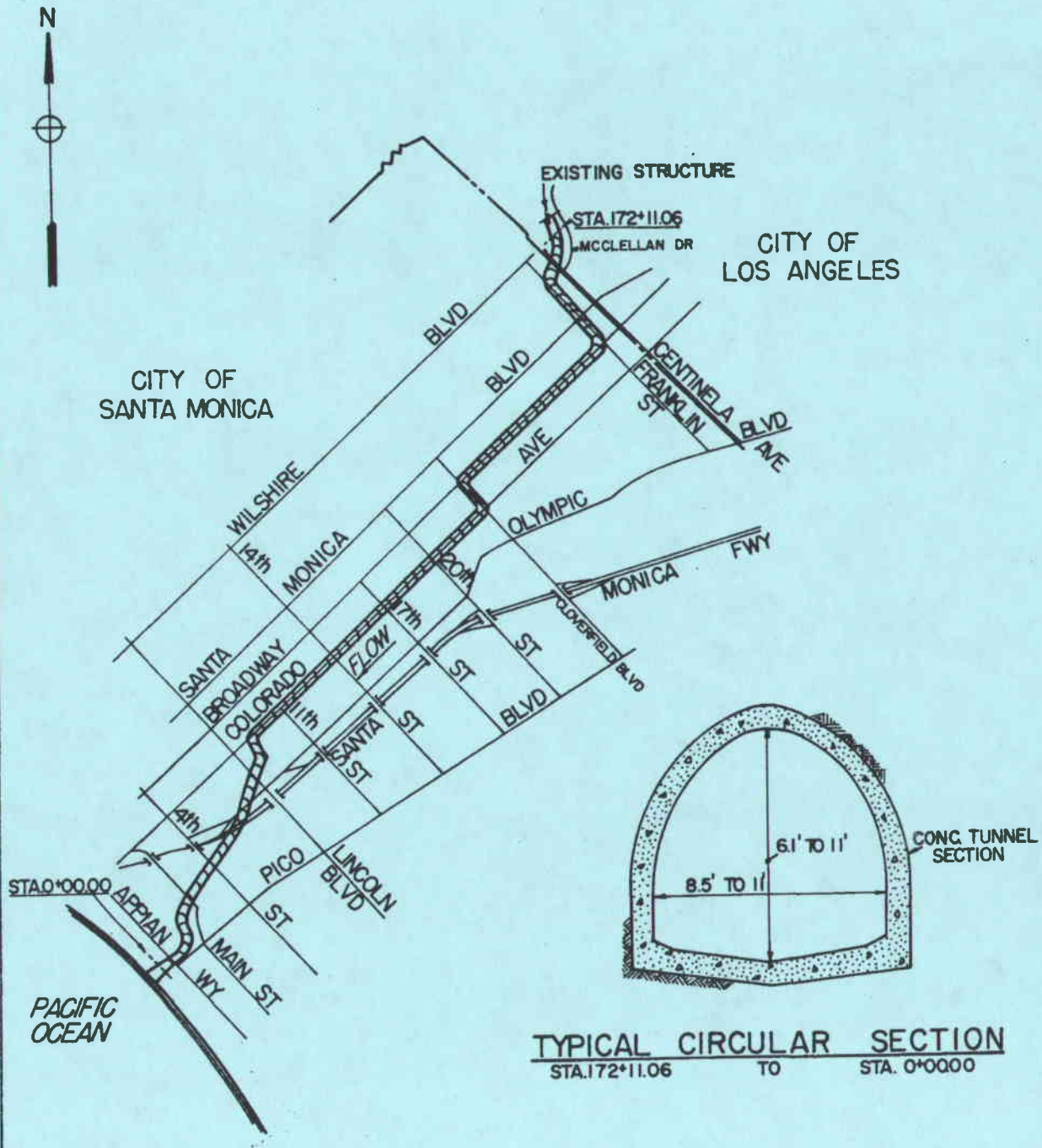
None

Reporting Features

Along Channel	At a Channel Station
Concrete circular channel	Public utility
Fencing	Side drain
Rights-of-way	

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY



TYPICAL CIRCULAR SECTION

STA.172+11.06 TO STA. 0+00.00

LEGEND

- CIRCULAR SECTION
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

KENTER CANYON CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA BC-E-1

DATA SHEET REXFORD-MONTE MAR BRANCH
BC-F-1

Construction Data

Const Limits:	Sta 139+38.14 to Sta 17+76.58	Sta 17+76.58 to Sta 10+00.00
Contract No:	DA 63-129	DA 62-119
Charles J. Rounds Co		Kirst Const Co
Start:	19 March 1963	12 March 1962
Finish:	4 December 1963	28 February 1963
Specifications:	CIVENG 63-6	CIVENG 62-10
Plans:	D.O. Series 211/1-60	C.O. Series 201/111-201
Folio Title:	REXFORD-MONTE MAR CHANNEL	BENEDICT CANYON CHANNEL
	Carmelita Ave to Beverwil Dr	Lexington Rd to Cattaraugus Ave

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 8 December 1964

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

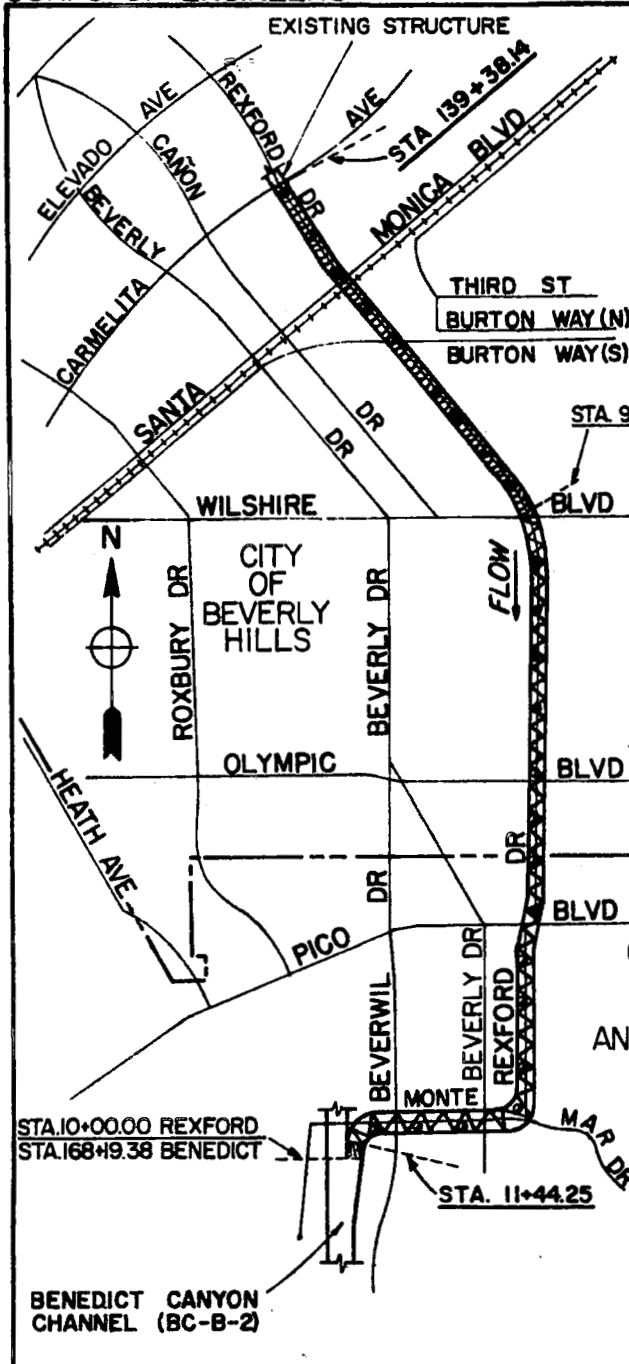
Bridges

None

Reporting Features

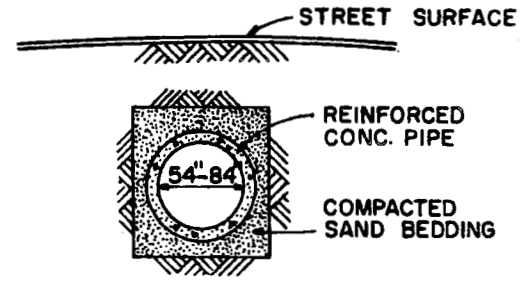
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Channel inspection manhole
Concrete channel roof slab	Public utility
Concrete circular channel	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

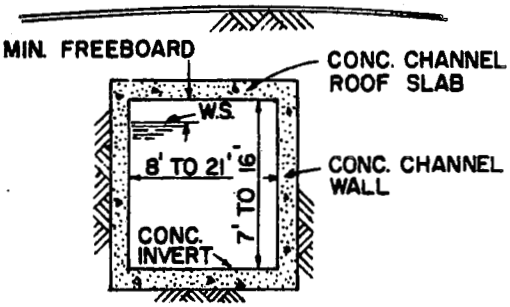


DESIGN DATA

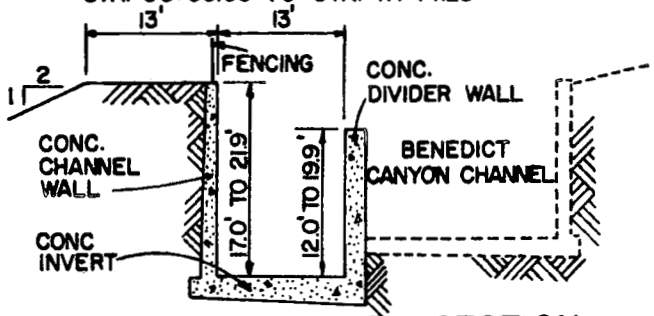
STA.	TO STA.	SECT	V	Q
139+38.14	127+15.00	CIRC	19.0 – 19.1	250
127+15.00	112+30.00	CIRC	22.0 – 26.5	500
112+30.00	96+00.00	CIRC	22.3 – 24.1	700
96+00.00	95+50.00	TRAN	22.3 – 25.0	1100
95+50.00	76+70.00	RECT	19.3 – 25.0	1100
76+70.00	65+00.00	RECT	8.7 – 22.4	1400
65+00.00	41+50.00	RECT	8.6 – 9.7	1800
41+50.00	10+00.00	RECT	10.4 – 11.2	1900



TYPICAL CIRCULAR SECTION
STA. 139+38.14 TO STA. 96+00.00



TYPICAL COVERED SECTION
STA. 96+00.00 TO STA. 11+44.25



TYPICAL OPEN SECTION
STA. 11+44.25 TO STA. 10+00.00

LEGEND

- CIRCULAR SECTION
- COVERED SECTION
- OPEN SECTION
- CONST. PROJECT LIMIT
- INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

REXFORD-MONTE MAR BRANCH

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
BC-G-1

SAWTELLE-WESTWOOD CHANNEL
Braddock Dr to Ballona Ck

Construction Data

Contract No: W-2590
Spencer Webb Co

Start: 29 June 1949
Finish: 4 November 1949

Specifications: CIVENG 49-67
Plans: D.O. Series 400/1-16
Folio Title: SAWTELLE-WESTWOOD SYSTEM
Ballona Creek to Braddock Dr

Local Assurances

Resolution Dated: 3 May 1949
Operation and Maintenance Transferred to: LACFCD, 21 April 1950

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use BC-G-2

To Right Berm: none
To Left Berm: none

Bridges

None

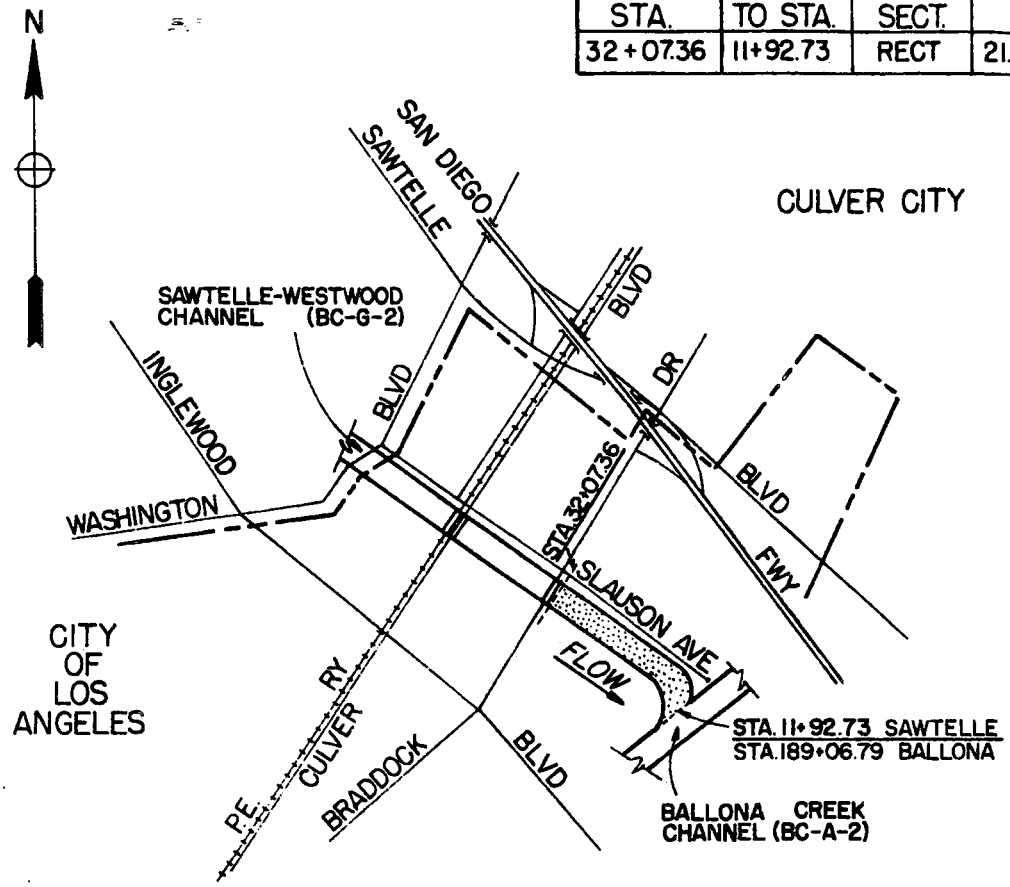
Reporting Features

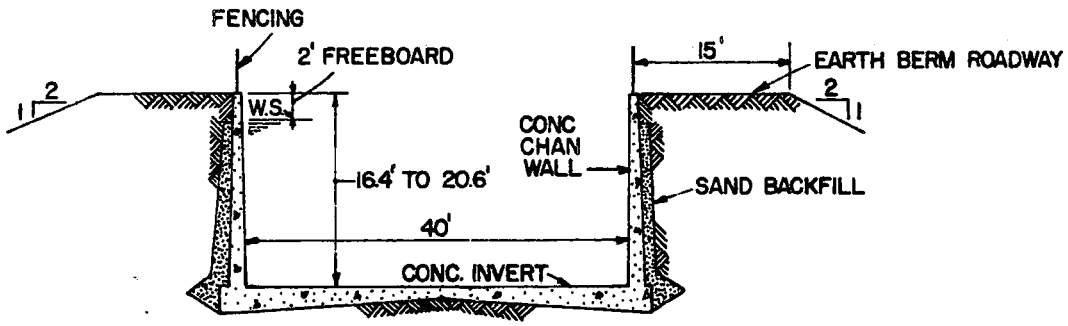
Along Channel	At a Channel Station
Earth berm roadway	Side drain
Concrete channel invert	Public utility
Concrete channel walls	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
32+07.36	11+92.73	RECT	21.0-27.0	13,000





TYPICAL OPEN SECTION

STA. 32+07.36 TO STA. 11+92.73

LEGEND

OPEN SECTION

CITY OR COUNTY BOUNDARY

CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAWTELLE-WESTWOOD CHANNEL

BRADDOCK DR TO BALLONA CREEK

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-G-1

DATA SHEET
BC-G-2

SAWTELLE-WESTWOOD CHANNEL
Washington Pl to Braddock Dr

Construction Data

Contract No: DA 205
Spencer, Webb, and White

Start: 21 February 1950
Finish: 22 January 1951

Specifications: CIVENG 50-21
Plans: D.O. Series 400/51-94
Folio Title: SAWTELLE-WESTWOOD SYSTEM
Braddock Dr to Charnock Rd

Local Assurances

Resolution Dated: 13 December 1949
Operation and Maintenance Transferred to: LACFCD, 8 February 1951

Stormflow Data

Gaging Station Location: immediately upstream of Culver Blvd (sta 46+29)
Type: Recording (LACFCD – F301-R)
Staff Gage Reading at One-third Capacity: 4.7 ft on gage (4333 cfs)

Access Ramps

To Invert: through right wall downstream of Washington Blvd (sta 52+00)

To Right Berm: Culver Blvd
To Left Berm: none

Bridges

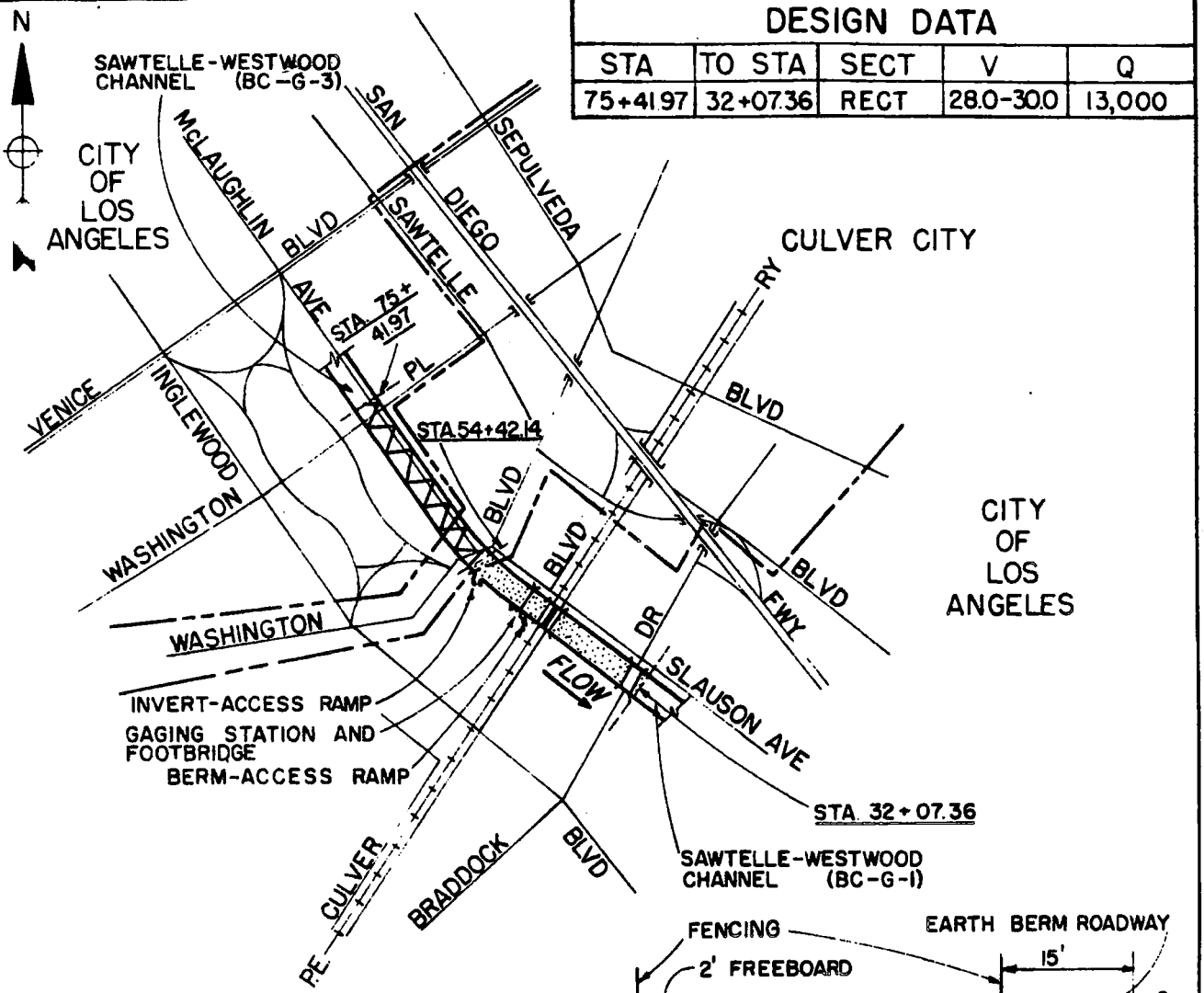
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 46+35	0	0	LACFCD (gaging station footbridge)
P.E. Ry	0	2	P.E.R.R.
Culver Blvd	0	2	City of Los Angeles
Braddock Dr	0	2	City of Los Angeles

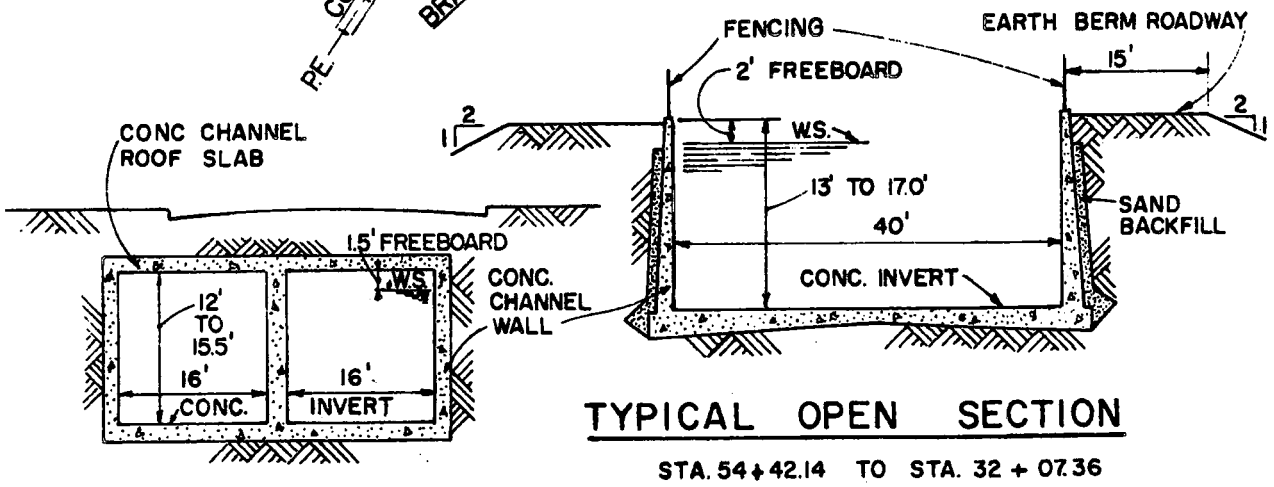
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Concrete channel roof slab	Bridge
Fencing	Gaging station
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA	TO STA	SECT	V	Q
75+41.97	32+07.36	RECT	28.0-30.0	13,000





TYPICAL OPEN SECTION

STA. 54+42.14 TO STA. 32+07.36

TYPICAL COVERED SECTION

STA. 75+41.97 TO STA. 54+42.14

LEGEND

- COVERED SECTION
- OPEN SECTION
- STREET BRIDGE
- ---- CONST. PROJECT LIMIT
- ----- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAWTELLE-WESTWOOD CHANNEL

WASHINGTON PL TO BRADDOCK DR

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-G-2

DATA SHEET
BC-G-3

SAWTELLE-WESTWOOD CHANNEL
Charnock Rd to Washington Pl

Construction Data

Contract No: DA 292
A. Teichert and Son

Start: 5 June 1950
Finish: 31 December 1951

Specifications: CIVENG 50-32
Plans: D.O. Series 400/101-134
Folio Title: SAWTELLE-WESTWOOD SYSTEM
Braddock Dr to Charnock Rd

Local Assurances

Resolution Dated: 13 December 1949
Operation and Maintenance Transferred to: LACFCD, 8 February 1951

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use BC-G-2

To Right Berm: Charnock Dr, McLaughlin Ave
To Left Berm: Venice Blvd

Bridges

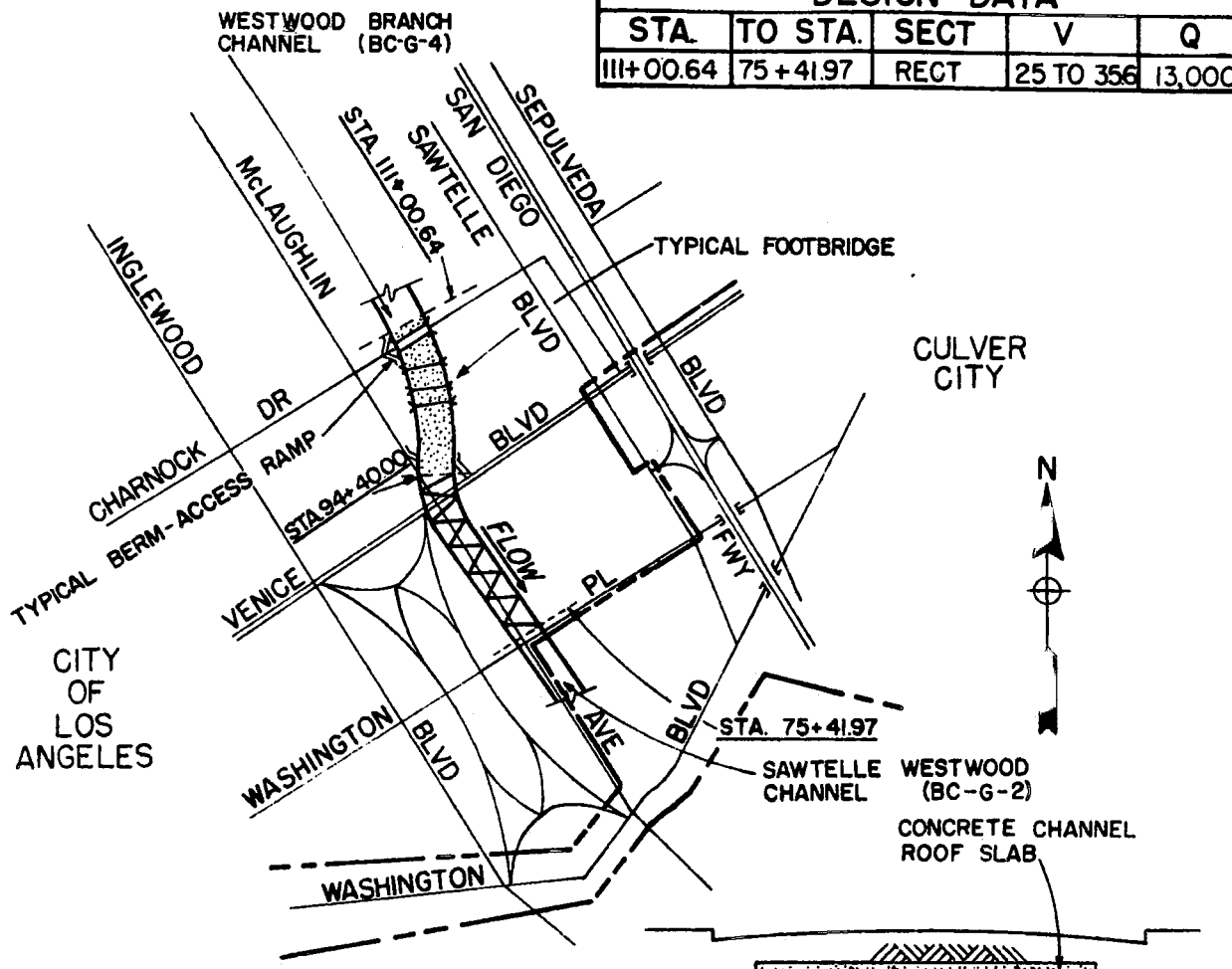
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Charnock Rd	0	2	City of Los Angeles
Sta 107+90	0	0	City of Los Angeles
Sta 105+94	0	0	City of Los Angeles
Sta 104+48	0	0	City of Los Angeles

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Concrete channel roof slab	Public utility
Fencing	
Rights-of-way	

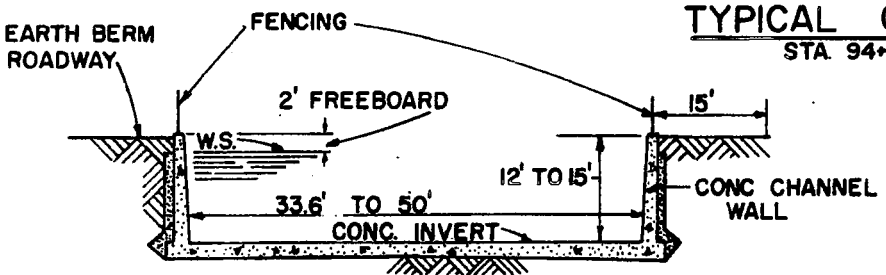
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
111+00.64	75+41.97	RECT	25 TO 356	13,000



TYPICAL COVERED SECTION

STA. 94+40.00 TO STA. 75+41.97



TYPICAL OPEN SECTION

STA. 111+00.64 TO STA. 94+40.00

LEGEND

- COVERED SECTION
- OPEN SECTION
- STREET CROSSING
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAWTELLE WESTWOOD CHANNEL CHARNOCK RD TO WASHINGTON PL

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-G-3

DATA SHEET
BC-G-4

WESTWOOD BRANCH CHANNEL
National Blvd to Charnock Rd

Construction Data

Contract No: DA 56-174
McDonald and Kruse

Start: 29 May 1956
Finish: 31 December 1956

Specifications: CIVENG 56-49
Plans: D.O. Series 160/1-49
Folio Title: SAWTELLE-WESTWOOD SYSTEM
Westwood Branch Channel

Local Assurances

Resolution Dated: 23 August 1955
Operation and Maintenance Transferred to: LACFCD, 19 November 1957

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: through right side from Palms Blvd (sta 11+93)

To Right Berm: Queensland St, Sepulveda Blvd, Palms Blvd
To Left Berm: Tilden Ave, Sepulveda Blvd, Sawtelle Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sepulveda Blvd	0	2	City of Los Angeles
San Diego Fwy	0	0	State of California
Sawtelle Blvd	0	2	City of Los Angeles

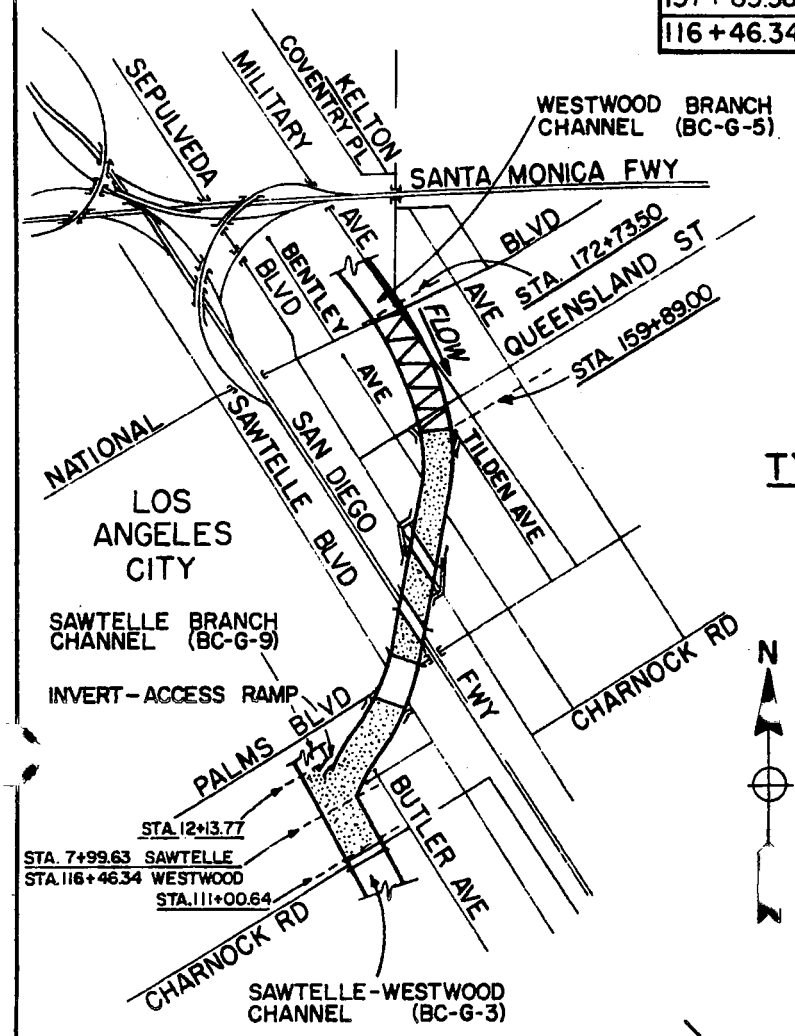
Reporting Features

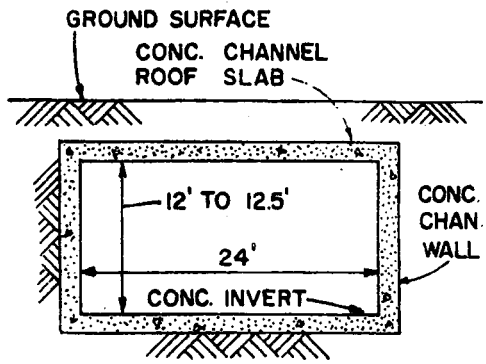
Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Concrete confluence section
Concrete channel roof slab	Bridge
Fencing	Concrete invert-access ramp
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

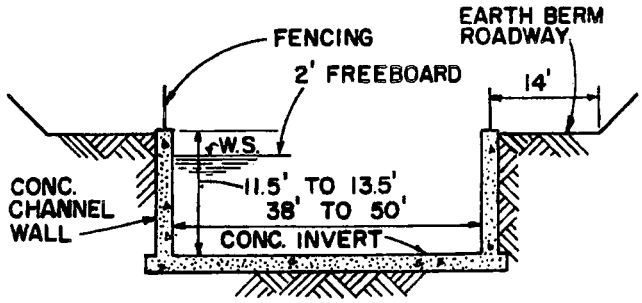
STA.	TO STA.	SECT.	V	Q
172+73.50	157+85.38	RECT.	27 TO 29	7,200
157+85.38	116+46.34	CONFL.	23 TO 29	10,000
116+46.34	111+00.64	RECT.	23 TO 25	13,000





TYPICAL COVERED SECTION

STA. 172+73.50 TO STA. 159+89.00



TYPICAL OPEN SECTION

STA 159+8900 TO STA 111+00.64

LEGEND

- COVERED SECTION
- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WESTWOOD BRANCH CHANNEL NATIONAL BLVD TO CHARNOCK RD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-G-4

DATA SHEET
BC-G-5

WESTWOOD BRANCH CHANNEL
Pico Blvd to National Blvd

Construction Data

Contract No: DA 59-19
Alwood Corp and Kirst Const

Start: 3 September 1958
Finish: 8 October 1959

Specifications: CIVENG 58-25
Plans: D.O. Series 160/53-116
Folio Title: SAWTELLE-WESTWOOD SYSTEM
Westwood Branch Channel

Local Assurances

Resolution Dated: 23 August 1955
Operation and Maintenance Transferred to: LACFCD, 10 October 1960

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

None

Reporting Features

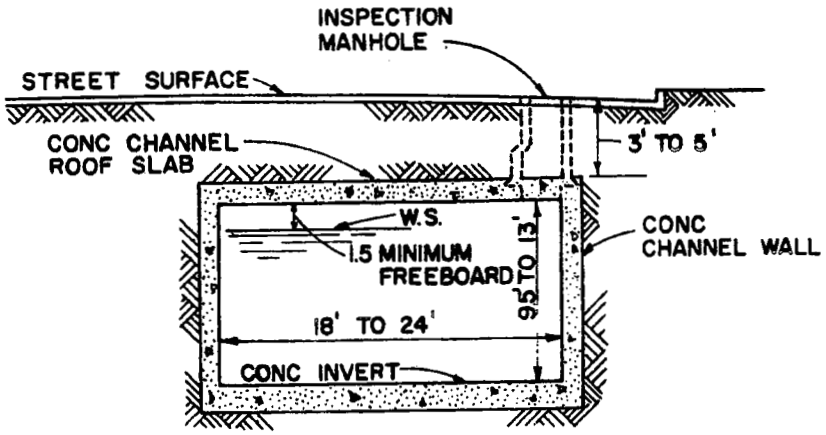
Along Channel
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Fencing
Rights-of-way

At a Channel Station
Side drain
Channel inspection manhole
Public utility

CORPS OF ENGINEERS

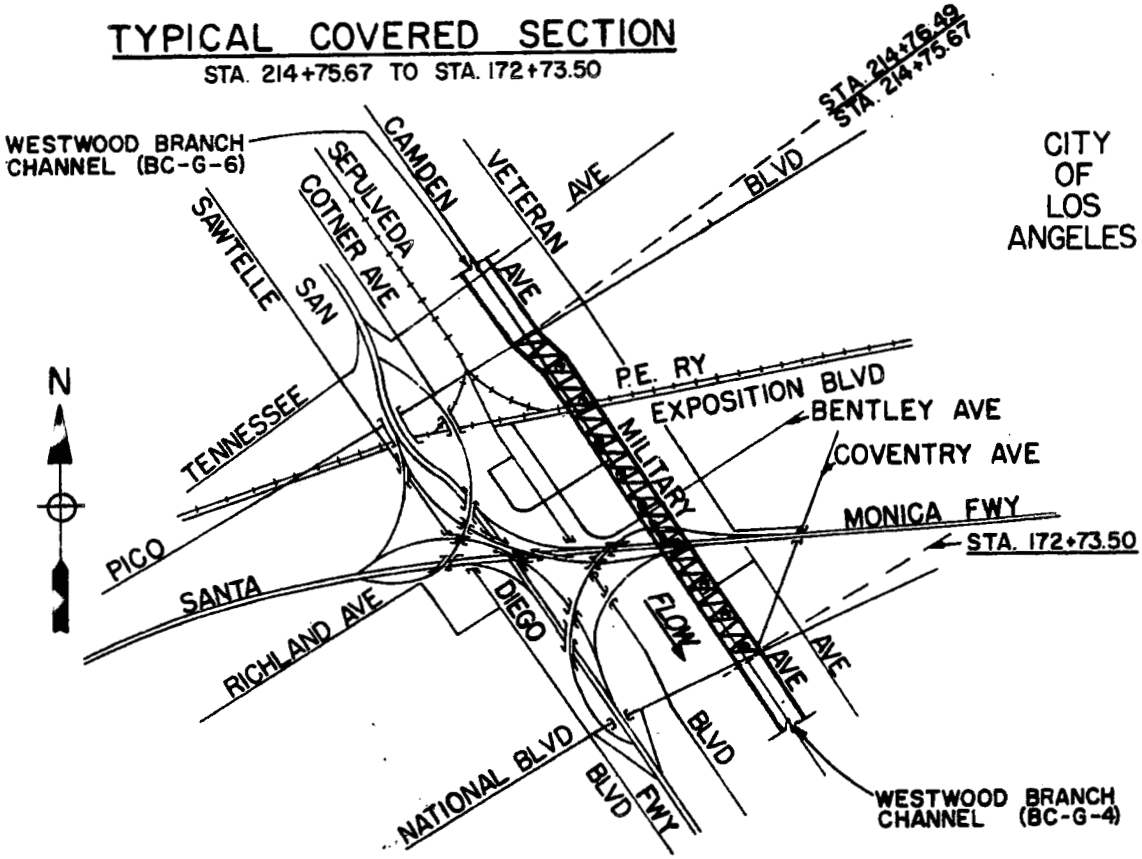
DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
214+75.67	190+00.00	RECT.	35.4-38.4	7650
190+00.00	172+73.50	RECT.	29.4-34.9	7750



TYPICAL COVERED SECTION

STA. 214+75.67 TO STA. 172+73.50



LEGEND

COVERED SECTION

CONST. PROJECT LIMIT

INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WESTWOOD BRANCH CHANNEL

PICO BLVD TO NATIONAL BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-G-5

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
BC-G-6

WESTWOOD BRANCH CHANNEL
Massachusetts Blvd to Pico Blvd

Construction Data

Contract No: DA 59-114
Pacific Allied

Start: 2 March 1959
Finish: 2 February 1960

Specifications: CIVENG 59-22
Plans: D.O. Series 161/9-43
Folio Title: SAWTELLE-WESTWOOD SYSTEM
Westwood Branch Channel

Local Assurances

Resolution Dated: 23 August 1955
Operation and Maintenance Transferred to: LACFCD, 15 November 1960

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

None

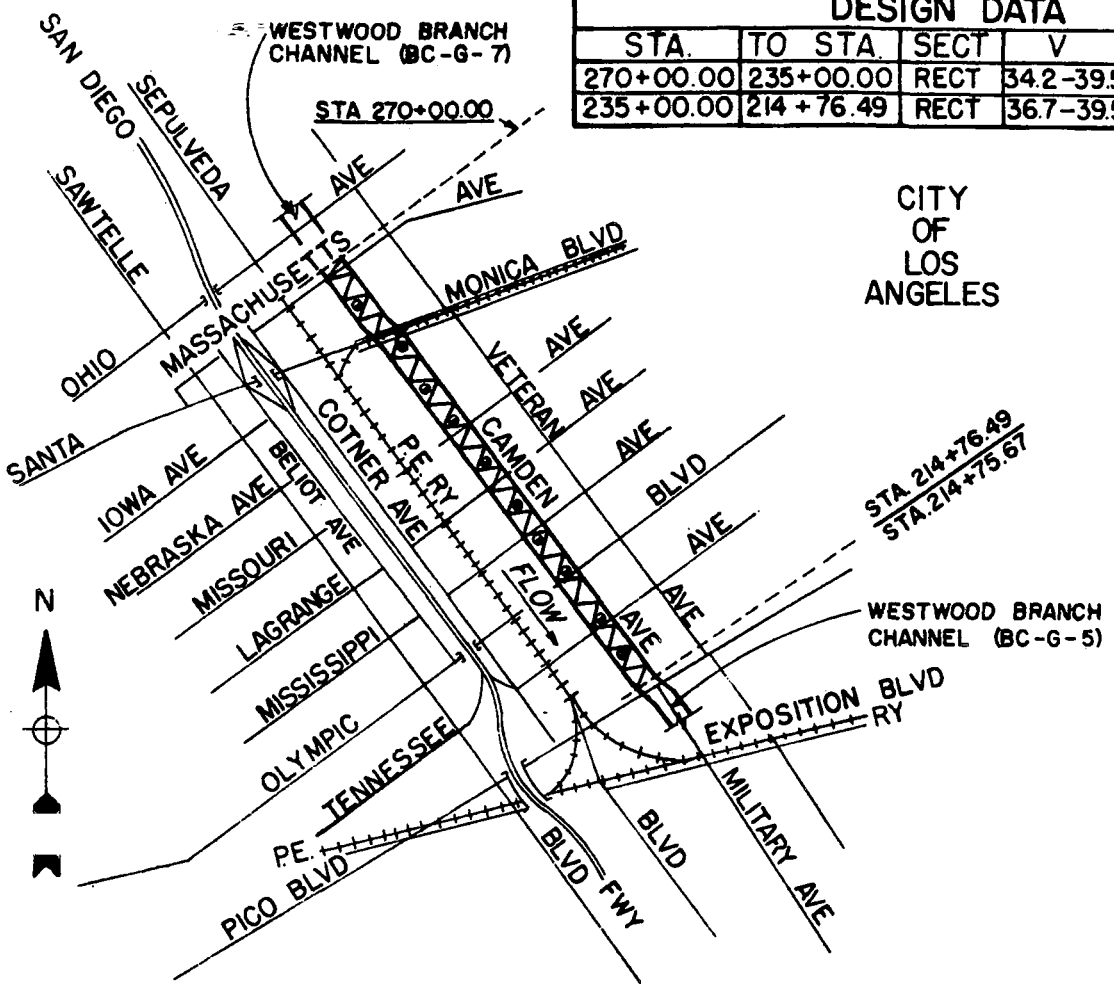
Reporting Features

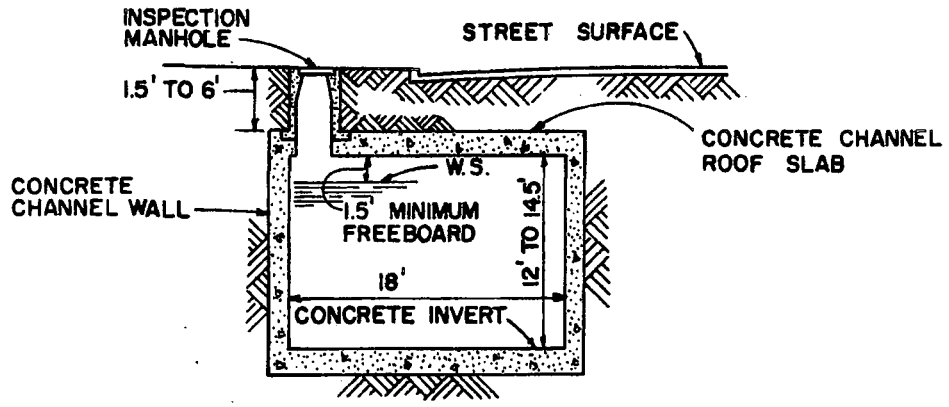
Along Channel
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Fencing
Rights-of-way

At a Channel Station
Side drain
Channel inspection manhole
Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
270+00.00	235+00.00	RECT	34.2-39.5	7350
235+00.00	214+76.49	RECT	36.7-39.5	7500





TYPICAL COVERED SECTION

STA. 270+00.00 TO STA. 214+76.49

LEGEND

- COVERED SECTION
- ----- CONST. PROJECT LIMIT
- CHANNEL INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WESTWOOD BRANCH CHANNEL

MASSACHUSETTS AVE TO PICO BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-G-6

DATA SHEET
BC-G-7

WESTWOOD BRANCH CHANNEL
Moraga Dr to Massachusetts Blvd

Construction Data

Contract No: DA 60-164
R.A. Wattson Co

Start: 8 March 1960
Finish: 23 December 1960

Specifications: CIVENG 60-14
Plans: D.O. Series 161/58-96
Folio Title: SAWTELLE-WESTWOOD SYSTEM
Westwood Branch Channel

Local Assurances

Resolution Dated: 23 August 1955
Operation and Maintenance Transferred to: LACFCD, 12 September 1961

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

None

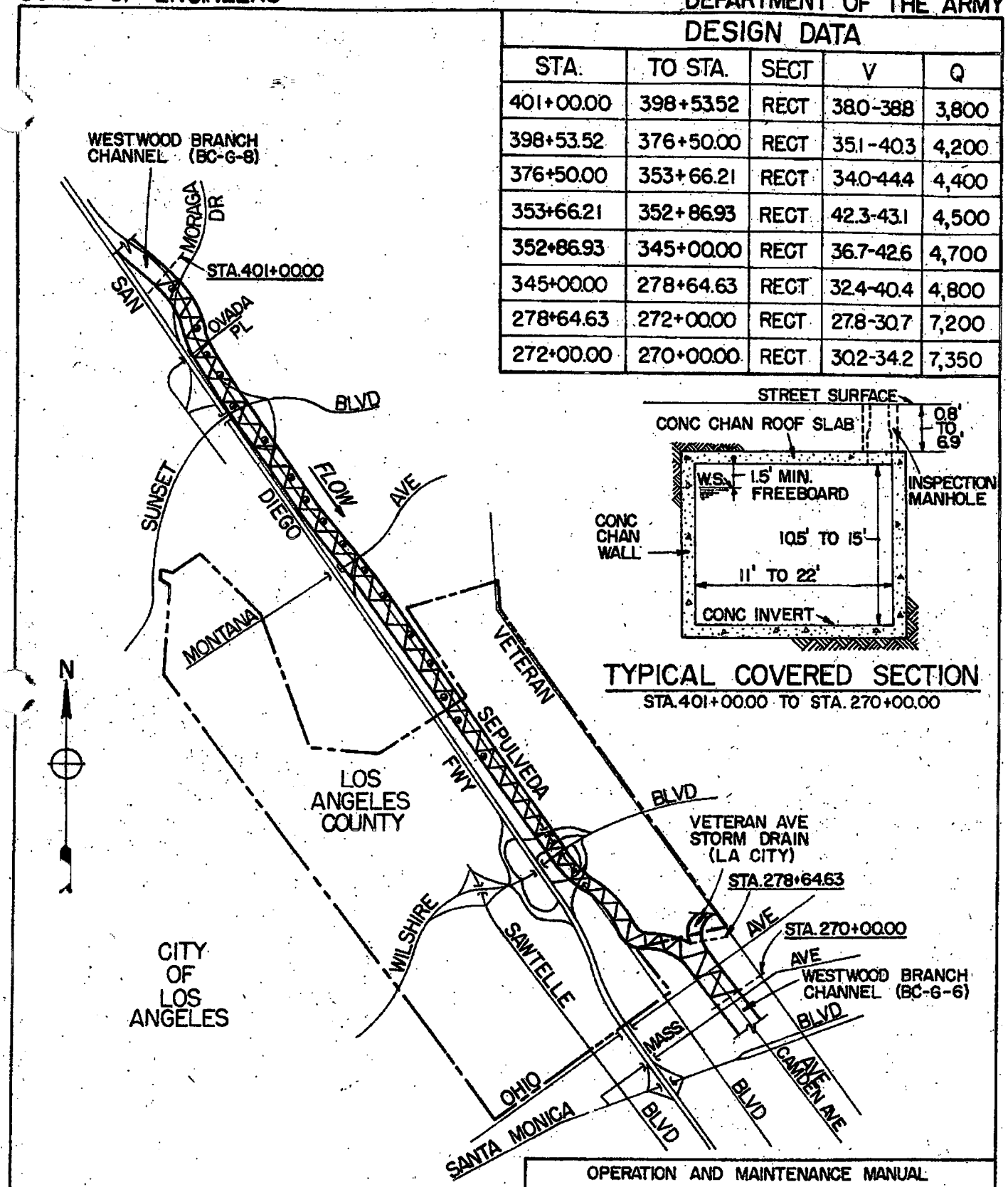
Reporting Features

Along Channel
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Fencing
Rights-of-way

At a Channel Station
Side drain
Channel inspection manhole
Public utility

DESIGN DATA

STA.	TO STA.	SECT	V	Q
401+00.00	398+53.52	RECT	38.0-38.8	3,800
398+53.52	376+50.00	RECT	35.1-40.3	4,200
376+50.00	353+66.21	RECT	34.0-44.4	4,400
353+66.21	352+86.93	RECT	42.3-43.1	4,500
352+86.93	345+00.00	RECT	36.7-42.6	4,700
345+00.00	278+64.63	RECT	32.4-40.4	4,800
278+64.63	272+00.00	RECT	27.8-30.7	7,200
272+00.00	270+00.00	RECT	30.2-34.2	7,350



TYPICAL COVERED SECTION

STA.401+00.00 TO STA.270+00.00

LEGEND

- COVERED SECTION
- CONST. PROJECT LIMIT
- INSPECTION MANHOLE
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WESTWOOD BRANCH CHANNEL

MORAGA DR TO MASSACHUSETTS AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-G-7

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
BC-G-8

WESTWOOD BRANCH CHANNEL
Casiano Rd to Moraga Dr

Construction Data

Contract No: DA 60-131
Guy F. Atkinson Co

Start: August 1960
Finish: January 1962

Specifications: California State Highway Specifications, Federal Aid Project VII-LA-158-LA
Plans: D.O. Series 161/45-53
Folio Title: SAWTELLE-WESTWOOD SYSTEM
Westwood Branch Channel

Local Assurances

Resolution Dated: 23 August 1955
Operation and Maintenance Transferred to: LACFCD, 28 August 1962

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

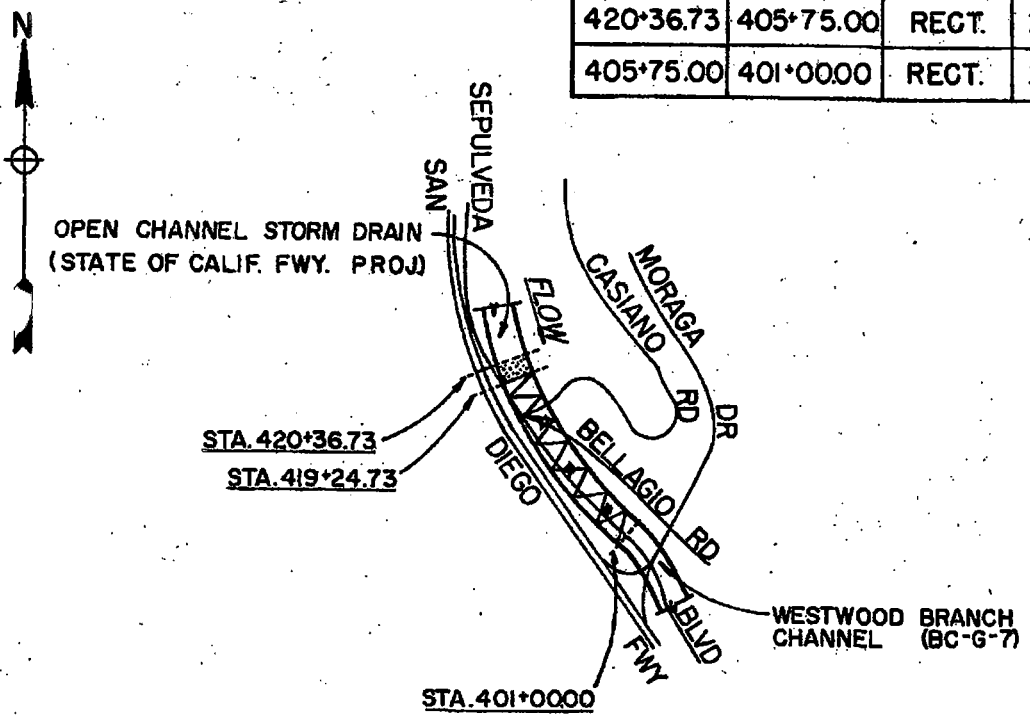
Bridges

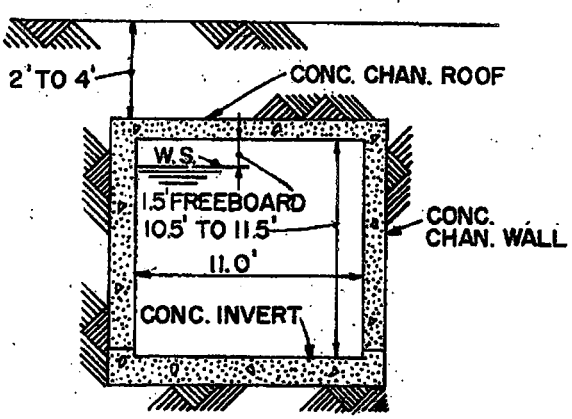
None

Reporting Features

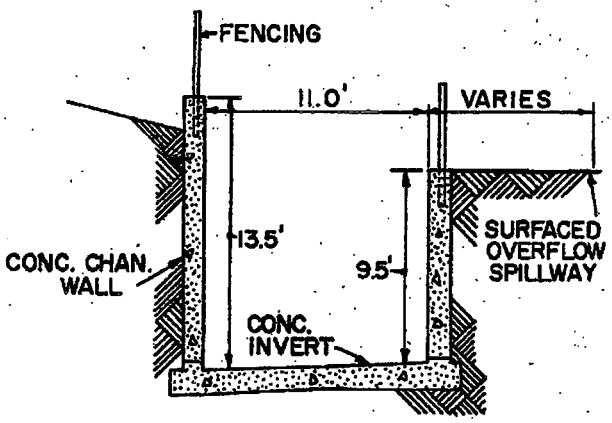
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Surfaced side drain entrance
Concrete channel roof slab	Channel inspection manhole
Fencing	Public utility
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
420+36.73	405+75.00	RECT.	35.0-39.9	3,700
405+75.00	401+00.00	RECT.	38.0-38.4	3,800





TYPICAL COVERED SECTION
STA. 419+24.73 TO STA. 401+00.00



TYPICAL OPEN SECTION
STA. 420+36.73 TO STA. 419+24.73

LEGEND

- OPEN SECTION
- COVERED SECTION
- INSPECTION MANHOLE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WESTWOOD BRANCH CHANNEL
CASIANO RD TO MORAGA DR

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-G-8

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
BC-G-9

SAWTELLE BRANCH CHANNEL
Pico Blvd to Charnock Dr

Construction Data

Contract No: 64-19 — Start: 3 September 1958
Alwood Corp and Kirst Const — Finish: 8 October 1959

Specifications: CIVENG 58-25
Plans: D.O. Series 160/53-116
Folio Title: SAWTELLE-WESTWOOD SYSTEM
Sawtelle Branch Channel

Local Assurances

Resolution Dated: 23 August 1955
Operation and Maintenance Transferred to: LACFCD, 6 December 1960

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use BC-G-4

To Right Berm: Palms Blvd
To Left Berm: Palms Blvd

Bridges

None

Reporting Features

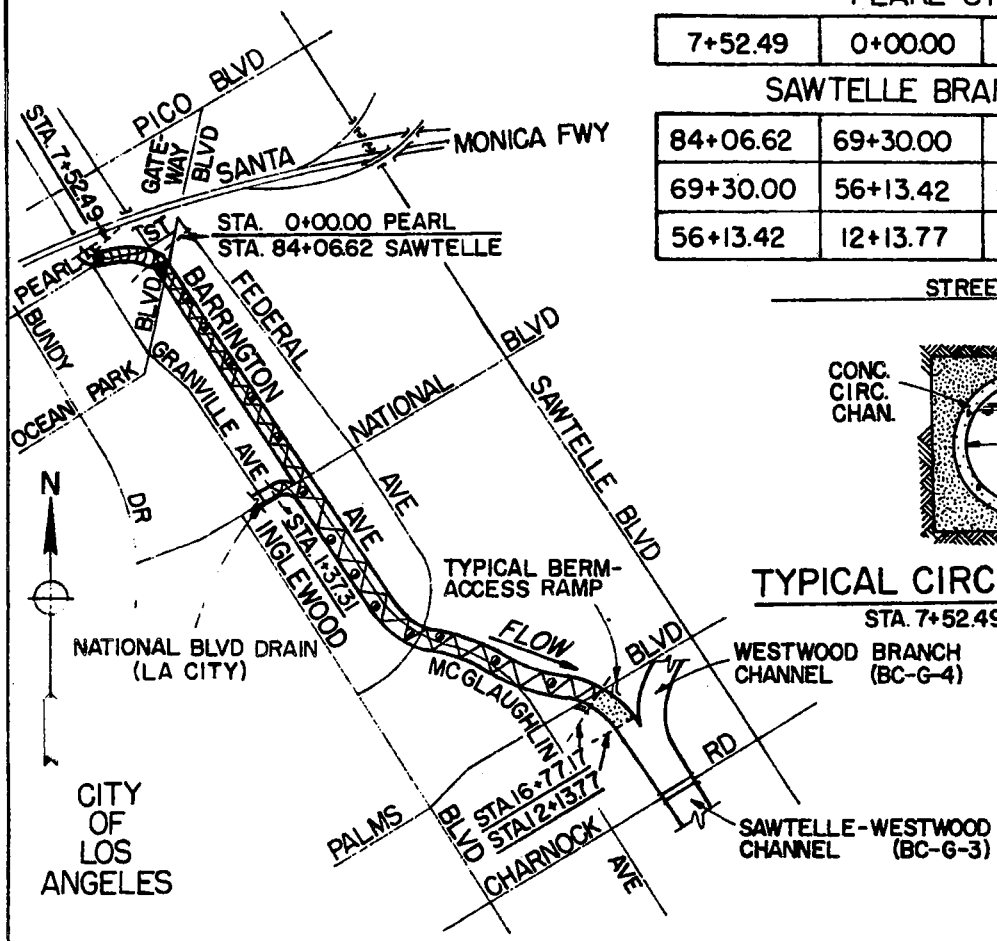
Along Channel
Earth berm roadway
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Concrete circular channel
Fencing
Rights-of-way

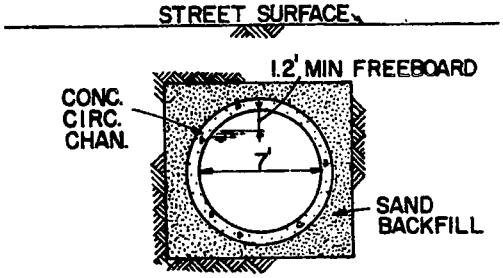
At a Channel Station
Earth berm-access ramp
Channel inspection manhole
Side drain
Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

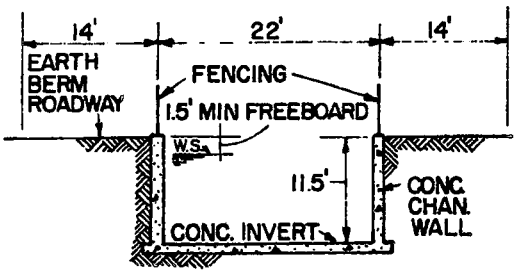
DESIGN DATA

STA.	TO STA.	SECT	V	Q
PEARL ST DRAIN				
7+52.49	0+00.00	CIRC	14.7-17.0	500
SAWTELLE BRANCH CHANNEL				
84+06.62	69+30.00	RECT	20.9-22.4	2,600
69+30.00	56+13.42	RECT	20.0-21.0	3,300
56+13.42	12+13.77	RECT	19.8-23.5	4,100

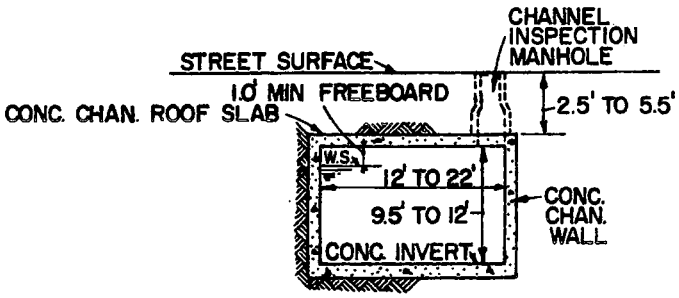




TYPICAL CIRCULAR SECTION
STA. 7+52.49 TO STA. 0+00.00



TYPICAL OPEN SECTION
STA. 16+77.17 TO STA. 12+13.77



TYPICAL COVERED SECTION
STA. 84+06.62 TO STA. 16+77.17

LEGEND
- CIRCULAR SECTION
- COVERED SECTION
- OPEN SECTION
- ----- CONST. PROJECT LIMIT
- CHANNEL INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAWTELLE BRANCH CHANNEL
PICO BLVD TO CHARNOCK RD

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

BC-G-9

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-1

LOS ANGELES RIVER CHANNEL
Seventh St to Pacific Ocean

Construction Data

Contract No: DA-ENG-2847
Peter Kiewit Sons' Co

Start: 29 May 1953
Finish: 1 December 1953

Specifications: CIVENG 53-40
Plans: D.O. Series 420/33-49
Folio Title: LOS ANGELES RIVER IMPROVEMENT
7th St to Pacific Ocean

Local Assurances

Resolution Dated: 26 February 1952
Operation and Maintenance Transferred to: LACFCD, 28 September 1954

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: from oil company yard beneath Seventh St Bridge, at downstream end through power company yards

To Left Berm: at downstream end through parking lot

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 47+54	4	0	Southern California Edison Co (utility)
P.E. Ry	5	0	P.E.R.R.
Ocean Blvd	3	0	City of Long Beach

Reporting Features

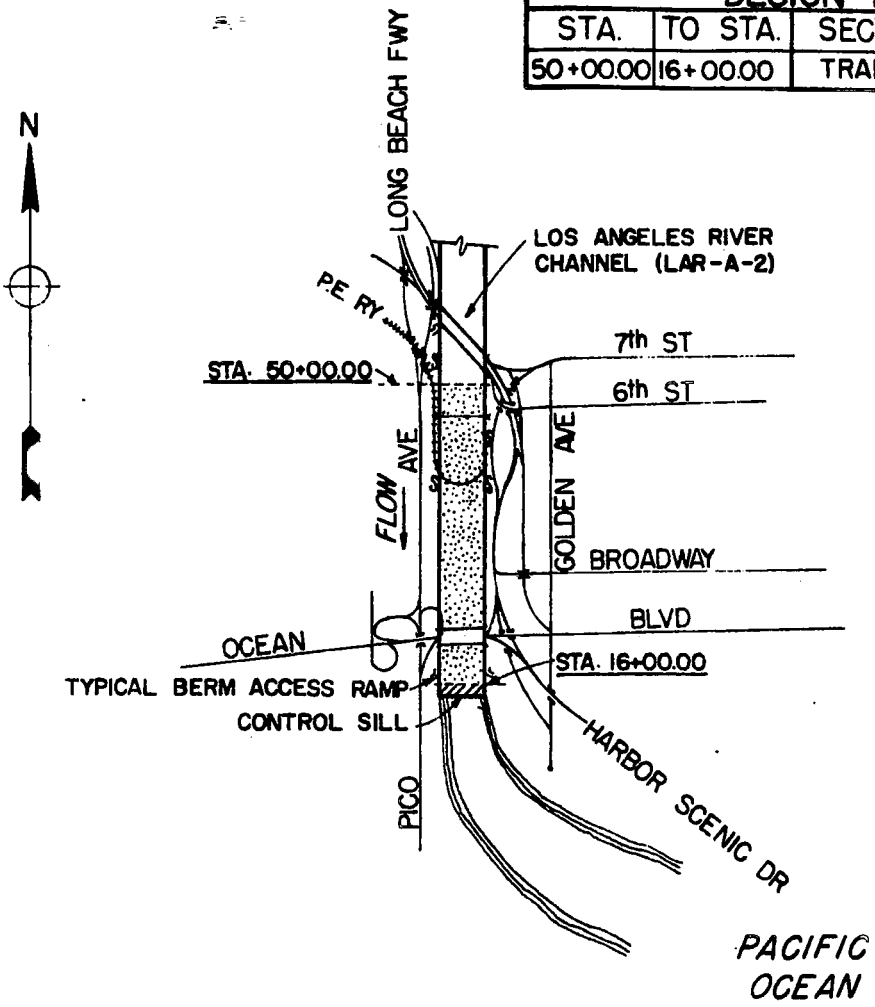
Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced and earth berm-access ramp
Earth channel invert	Side drain
Earth channel levee	Bridge
Stone channel side slopes	Control sill
Stone toe protection	Public utility
Fencing	
Rights-of-way	

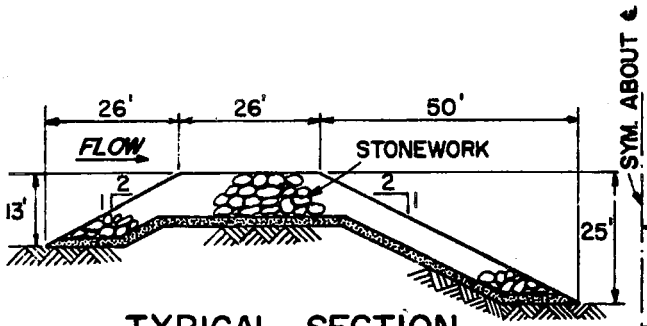
NOTE: Elevations are to be taken in subsidence areas along channel levees and control sills, and submitted in semiannual report.

CORPS OF ENGINEERS

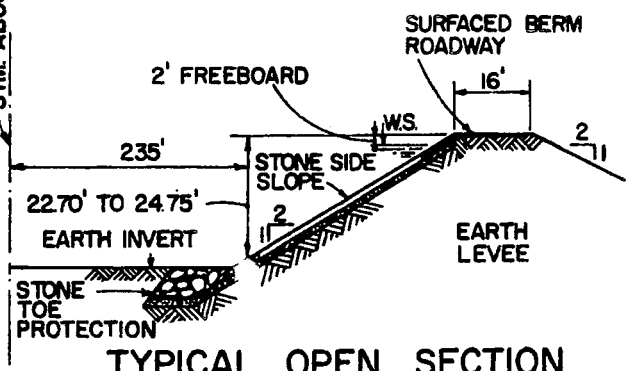
DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
50+00.00	16+00.00	TRAP	12.6-23.8	146,000





TYPICAL SECTION
THRU CONTROL SILL



TYPICAL OPEN SECTION
STA. 50+00.00 TO STA. 16+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- CONST. PROJECT LIMIT
- TYPICAL BERM TURNAROUND

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

SEVENTH ST TO PACIFIC OCEAN

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-2

LOS ANGELES RIVER CHANNEL
Twentieth St to Seventh St

Construction Data

Contract No: DA 3603
Guy F. Atkinson Co

Start: 20 April 1954
Finish: 26 May 1955

Specifications: CIVENG 54-30
Plans: D.O. Series 148/51-87
Folio Title: LOS ANGELES RIVER IMPROVEMENT
20th St to 7th St

Local Assurances
Resolution Dated: 26 February 1952
Operation and Maintenance Transferred to: LACFCD, 28 July 1955

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none

To Right Berm: from Pacific Coast Hwy between Long Beach Fwy and River, from Anaheim St to Long Beach Fwy (northbound) ramp, from Long Beach Fwy (northbound) below Anaheim St

To Left Berm: Nineteenth St, Seventeenth St, from LA County yards below Seventeenth St, Fairbanks Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Pacific Coast Hwy	6	0	State of California
Anaheim St	5	0	City of Long Beach
Seventh St Bridge (Shoemaker Bridge)	5	0	Board of Harbor commissioners

Reporting Features

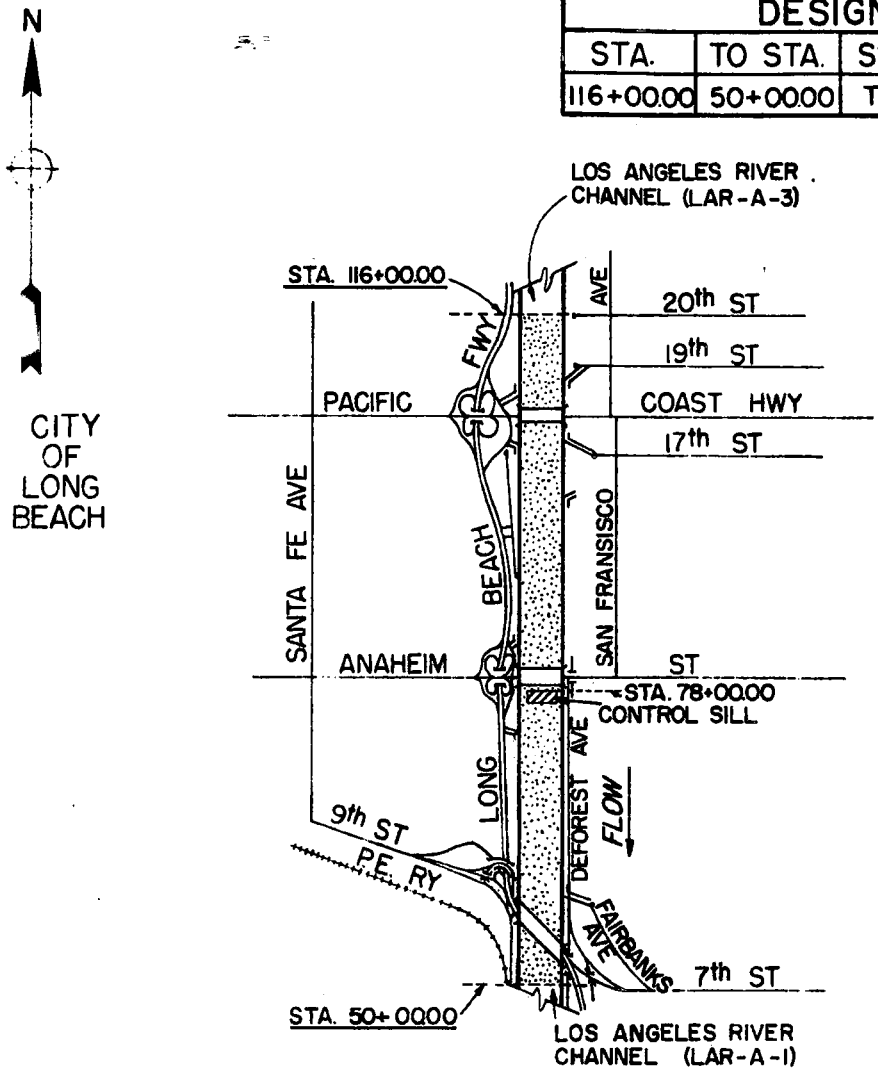
Along Channel	At a Channel and Earth Station
Surfaced berm roadway	Surfaced and earth berm-access ramp
Earth channel invert	Side drain
Earth channel levee	Bridge
Stone channel side slopes	Public utility
Stone toe protection	Control sill
Fencing	
Rights-of-way	

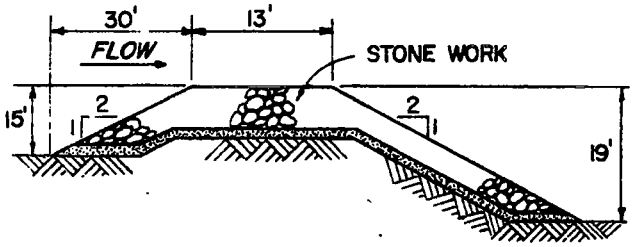
NOTE: Elevations are to be taken in subsidence areas along channel levees and control sills, and submitted in semiannual report.

CORPS OF ENGINEERS

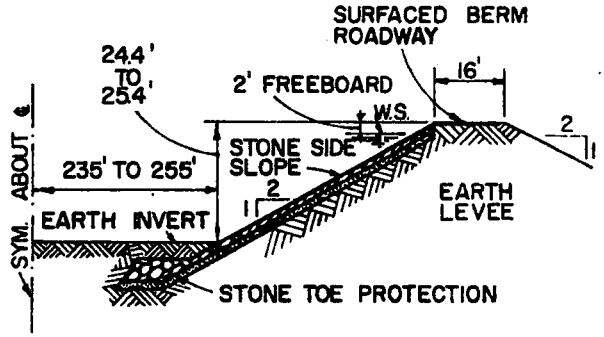
DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
116+00.00	50+00.00	TRAP.	11.5 – 12.4	146,000





TYPICAL SECTION THRU CONTROL SILL



TYPICAL OPEN SECTION

STA. 116+00.00 TO STA. 50+00.00

LEGEND

- OPEN SECTION
- CONST. PROJECT LIMIT
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL TWENTIETH ST TO SEVENTH ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
LAR-A-3

LOS ANGELES RIVER CHANNEL
Willow St to Twentieth St

Construction Data

Contract No:	DA-ENG-3698	Start:	18 January 1955
	J.B. Stringfellow Co	Finish:	30 December 1955
Specifications:	CIVENG 55-21		
Plans:	D.O. Series 148/88-100		
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Willow St to 20th St		

Local Assurances

Resolution dated: 26 February 1952
Operation and Maintenance Transferred to: LACFCD, 1 August 1956

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: From Long Beach Fwy (northbound) above Pacific Coast Hwy
To Left Berm: none

Bridges

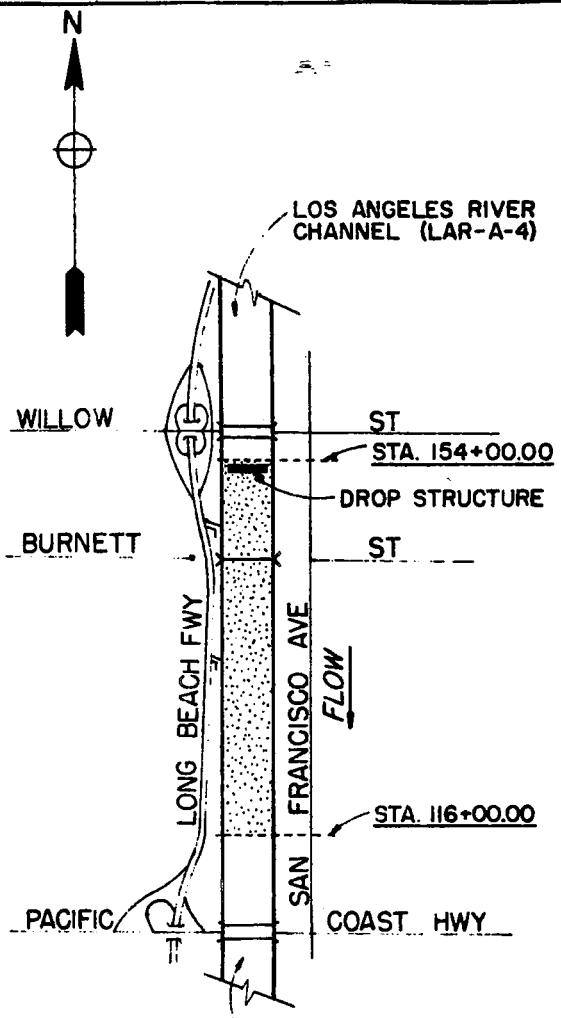
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 145+111±	7	0	Richfield Oil Co (utility bridge)

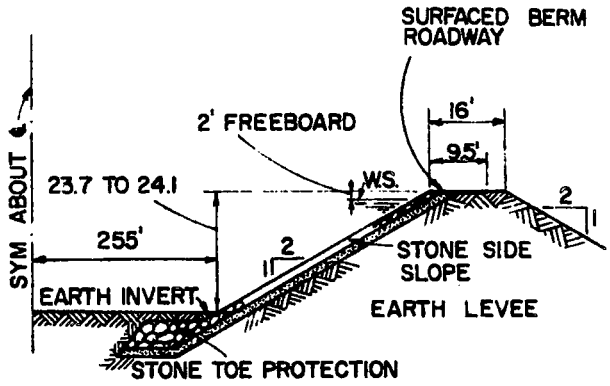
Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Earth berm-access ramp
Earth channel invert	Side drain
Earth channel levee	Bridge
Stone channel side slopes	Drop structure
Stone toe protection	Public utility
Subdrain system	
Fencing	
Rights-of-way	

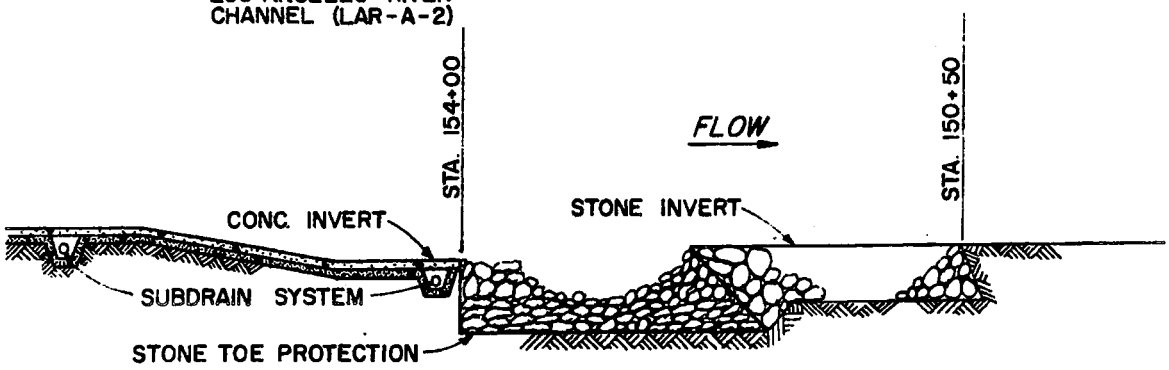
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
154+00.00	116+00.00	TRAP	11 – 12	146,000





TYPICAL OPEN SECTION
STA. 154+00.00 TO STA. 116+00.00



TYPICAL SECTION THRU DROP STRUCTURE

LEGEND

- OPEN SECTION
- STREET BRIDGE
- UTILITY BRIDGE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
WILLOW ST TO TWENTIETH ST

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-3

DATA SHEET
LAR-A-4

LOS ANGELES RIVER CHANNEL
Wardlow Rd to Willow St

Construction Data

Contract No:	DA-ENG-4332	Start:	4 April 1955
	Clyde W. Wood and Sons, Inc	Finish:	10 January 1956
Specifications:	CIVENG 55-27		
Plans:	D.O. Series 149/1-23		
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Wardlow Rd to Willow St		

Local Assurances

Resolution Dated: 21 June 1955 and 26 February 1952
Operation and Maintenance Transferred to: LACFCD, 1 August 1956

Stormflow Data

Gaging Station Location: downstream of Wardlow St (sta 204+95)
Type: Recording (LACFCD--F319-R)
Staff Gage Reading at One-third Capacity: 10.6 ft on gage (48,667 cfs)

Access Ramps

To Invert: none; use LAR-A-7

To Right Berm: Willow St to Long Beach Fwy (northbound) ramp
To Left Berm: Twenty-sixth Way, Twenty-fifth Way

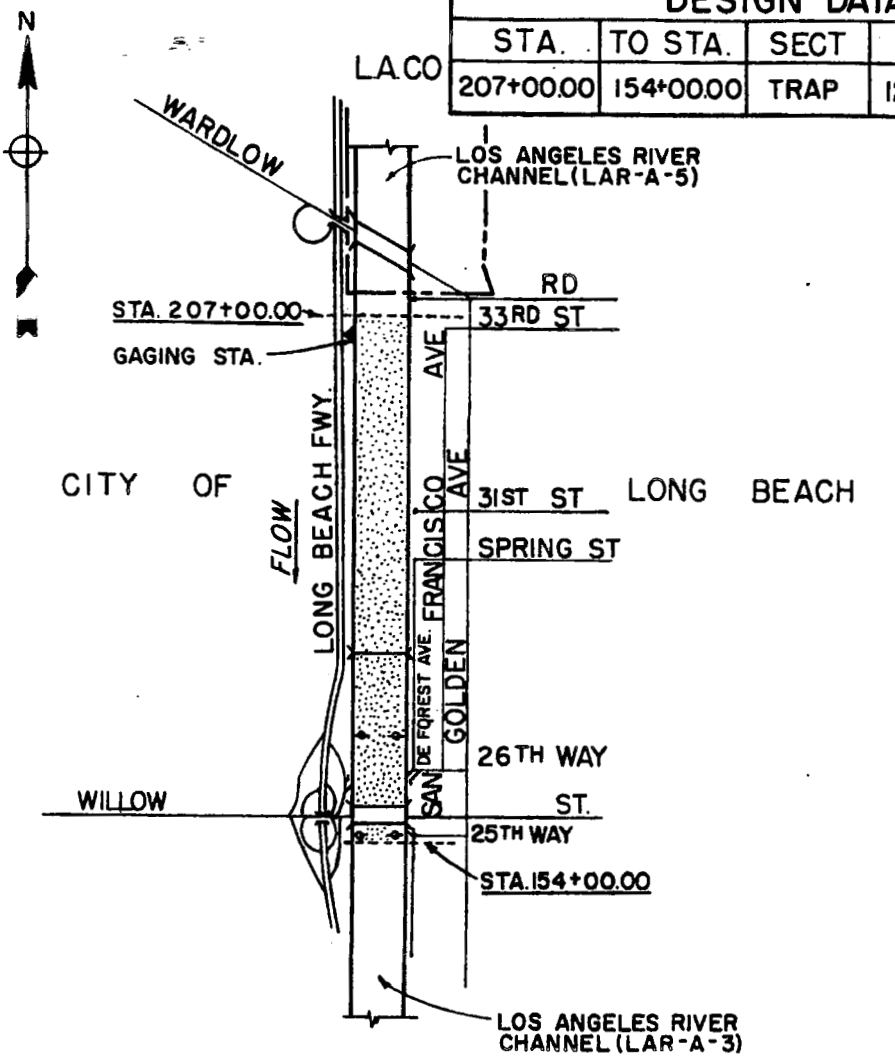
Bridges

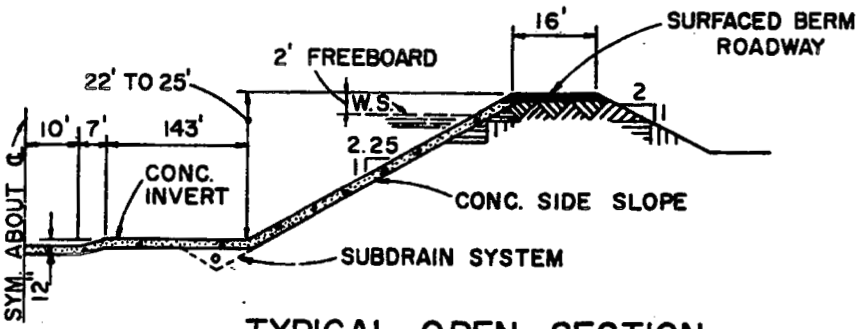
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 171+57	4	0	private utility overcrossing
Willow St	9	0	City of Long Beach

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Earth channel levee	Side drain
Concrete channel invert	Gaging station
Concrete channel side slopes	Bridge
Subdrain system	Public utility
Fencing	Subdrain manhole
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
207+00.00	154+00.00	TRAP	12.1-31.7	146,000





TYPICAL OPEN SECTION
STA. 207+00.00 TO STA. 154+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- UTILITY BRIDGE
- TYPICAL BERM-ACCESS RAMP
- INSPECTION MANHOLE
- SUBDRAIN MANHOLE
- ----- CONST. PROJECT LIMIT
- ——— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
WARDLOW RD TO WILLOW ST

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-5

LOS ANGELES RIVER CHANNEL
Carson St to Wardlow Rd

Construction Data

Contract No: DA-ENG-4372
Clyde W. Wood and Sons, Inc

Start: 7 June 1955
Finish: 10 January 1956
supplemental work completed 9 August 1956

Specifications: CIVENG 55-40
Plans: D.O. Series 149/25-45
Folio Title: LOS ANGELES RIVER IMPROVEMENT
Carson St to Wardlow St

Local Assurances

Resolution Dated: 21 January 1955
Operation and Maintenance Transferred to: LACFCD, 20 February 1957

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-7

To Right Berm: none
To Left Berm: none

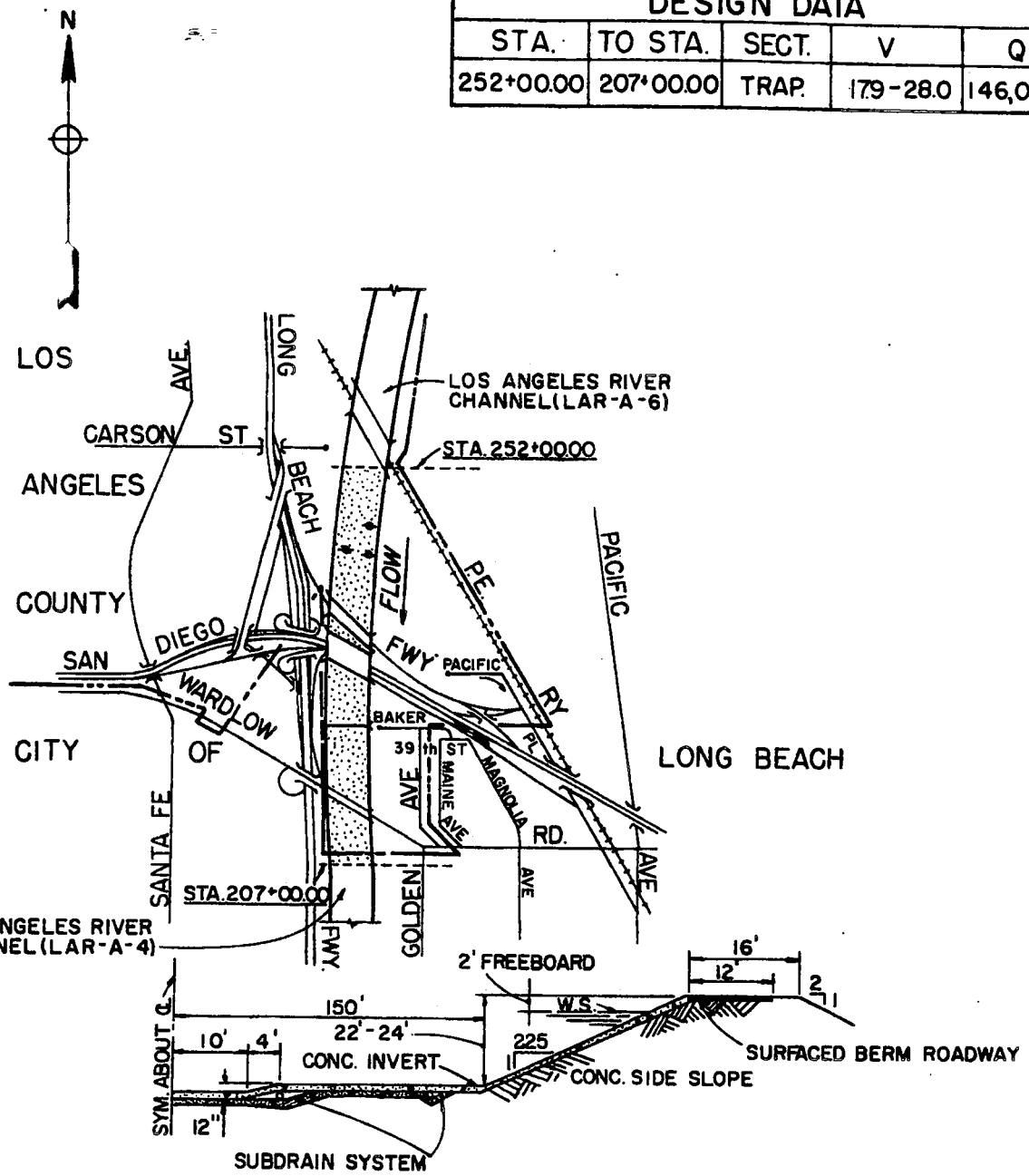
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
San Diego Fwy	4	0	State of California
Sta 227+51	2	0	Union Oil Co (utility bridge)
Wardlow Rd	6	0	City of Long Beach

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Earth channel levee	Side drain
Concrete channel invert	Bridge
Concrete channel side slopes	Public utility
Subdrain system	Subdrain manhole
Fencing	
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
252+00.00	207+00.00	TRAP.	17.9-28.0	146,000



TYPICAL OPEN SECTION

STA. 252+00.00 TO STA. 207+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- UTILITY BRIDGE
- TYPICAL BERM-ACCESS RAMP
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

CARSON ST TO WARDLOW RD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-5

DATA SHEET
LAR-A-6

LOS ANGELES RIVER CHANNEL
Dominguez St to Carson St

Construction Data

Contract No:	DA 56-19	Start:	27 October 1955
	Guy F. Atkinson Co	Finish:	31 December 1956
Specifications:	CIVENG 56-8		
Plans:	D.O. Series 149/51-78		
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Below Dominguez to Carson St		

Local Assurances

Resolution Dated: 21 June 1955
Operation and Maintenance Transferred to: LACFCD, 17 April 1957

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-7

To Right Berm: Carson St
To Left Berm: none

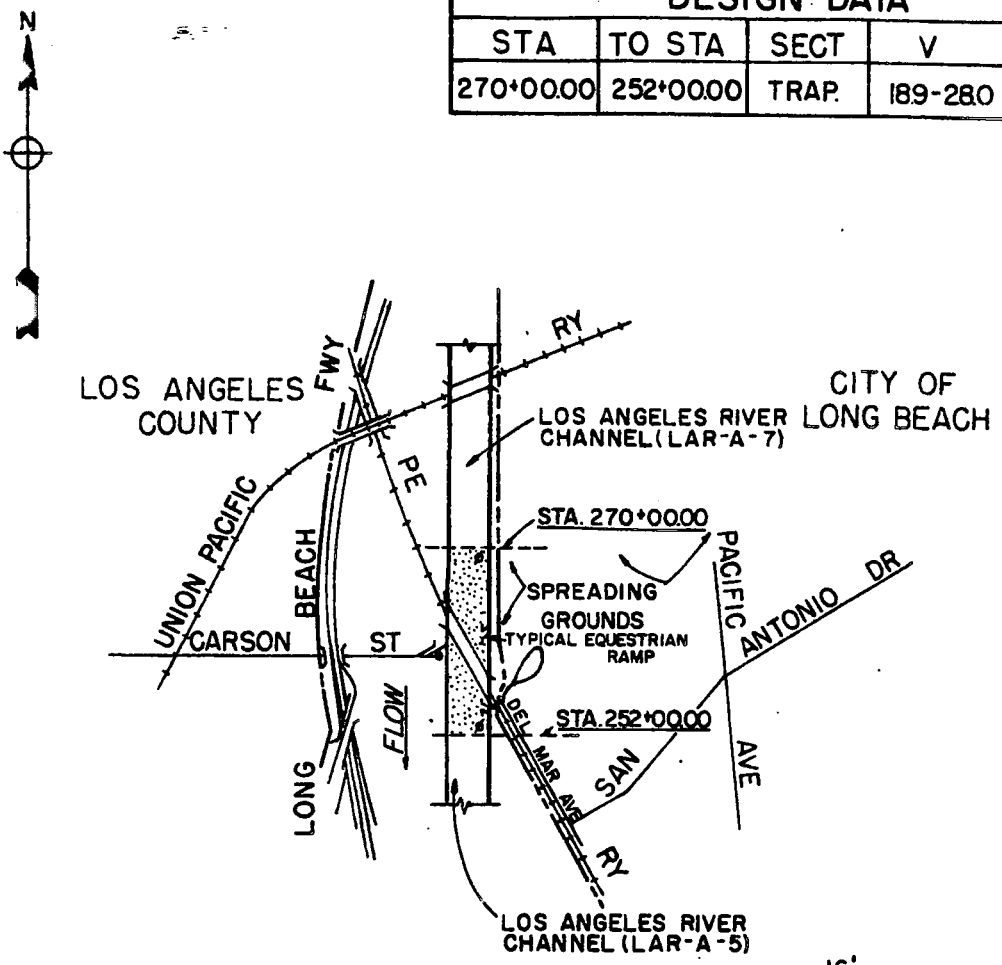
Bridges

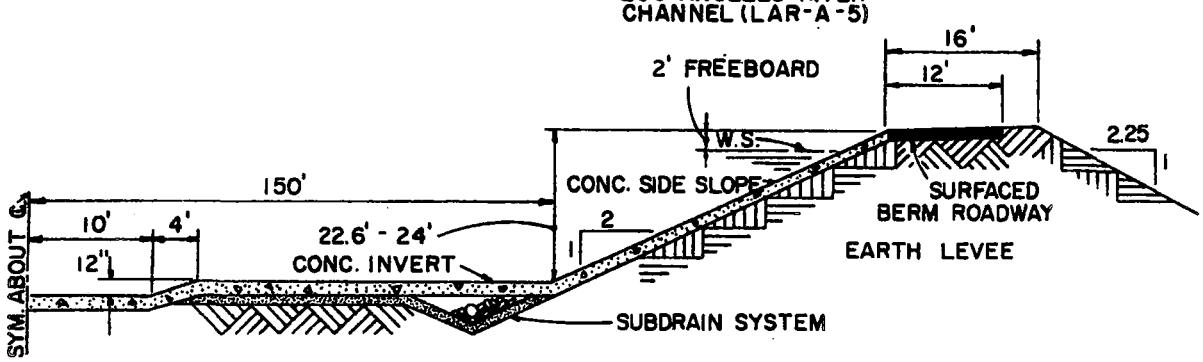
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
P.E. Ry	6	0	P.E.R.R.

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Earth channel levee	Side drain
Concrete channel invert	Bridge
Concrete channel side slopes	Public utility
Subdrain system	Equestrian ramp
Fencing	Subdrain manhole
Rights-of-way	

DESIGN DATA				
STA	TO STA	SECT	V	Q
270+00.00	252+00.00	TRAP.	18.9-28.0	146,000





TYPICAL OPEN SECTION

STA. 270+00.00 TO STA. 252+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- SUBDRAIN MANHOLE
- ----- CONST. PROJECT LIMIT
- ——— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
DOMINGUEZ ST TO CARSON ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-6

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-7

LOS ANGELES RIVER CHANNEL
Sixty-third St to Dominguez St

Construction Data

Contract No:	DA 57-83	Start: 15 April 1957
	Griffith Co	Finish: 24 January 1958
Specifications:	CIVENG 57-10	
Plans:	D.O. Series 164/25-85	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT 63rd St to Below Dominguez	

Local Assurances

Resolution Dated: 17 April 1956
Operation and Maintenance Transferred to: LACFCD, 20 May 1958

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from right and left berms, downstream of Del Amo Blvd (sta 302+00±), at confluence with Compton Creek (sta 289+00±)

To Right Berm: Long Beach Blvd, Del Amo Blvd

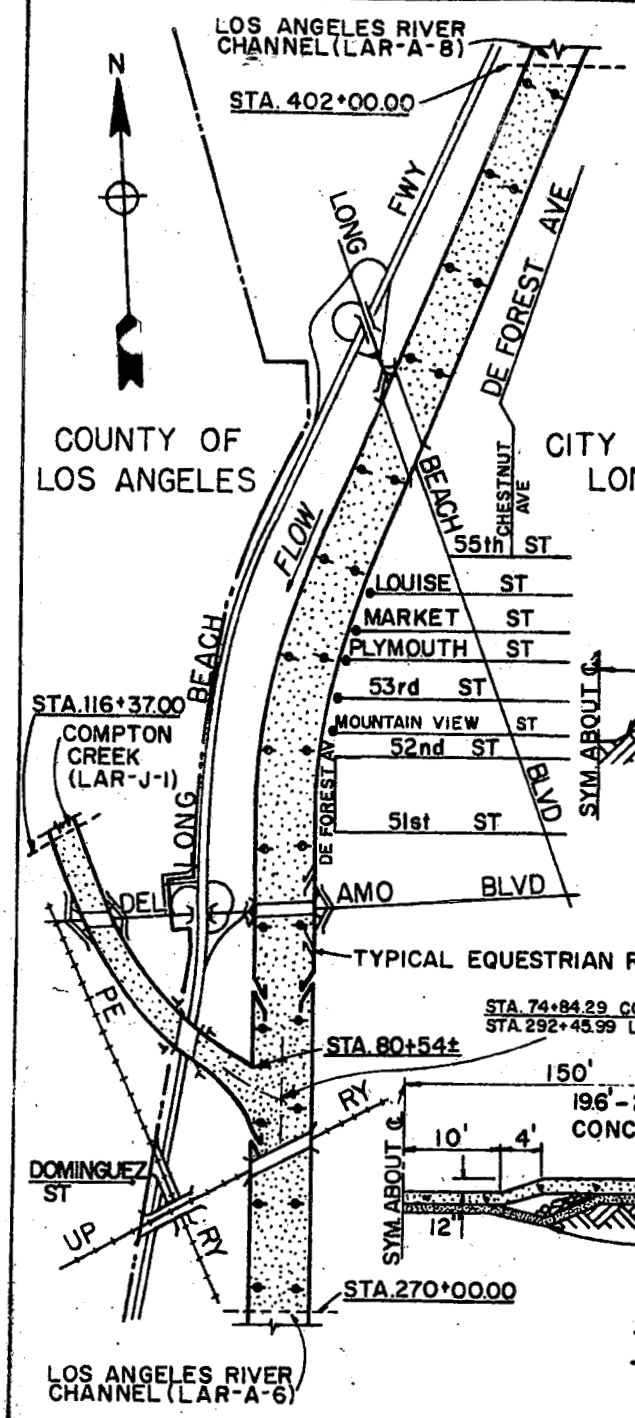
To Left Berm: Del Amo Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Los Angeles River:			
Long Beach Blvd	7	0	City of Long Beach
Del Amo Blvd	5	0	City of Long Beach
U.P. Ry	6	0	U.P.R.R.
Compton Creek:			
Del Amo Blvd	3	0	Los Angeles County
Long Beach Fwy	3	0	State of California

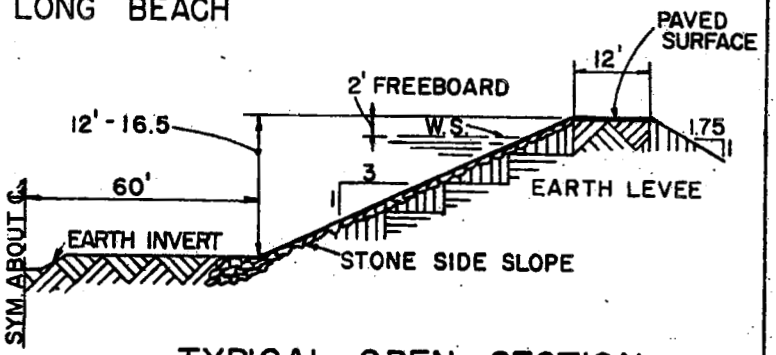
Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Concrete invert-access ramp
Earth channel levee	Surfaced berm-access ramp
Concrete channel invert	Concrete equestrian ramp
Concrete channel side slopes	Concrete confluence section
Subdrain system	Side drain
Fencing	Bridge
Rights-of-way	Public utility
Stone channel side slopes	Subdrain manhole
Earth channel invert	

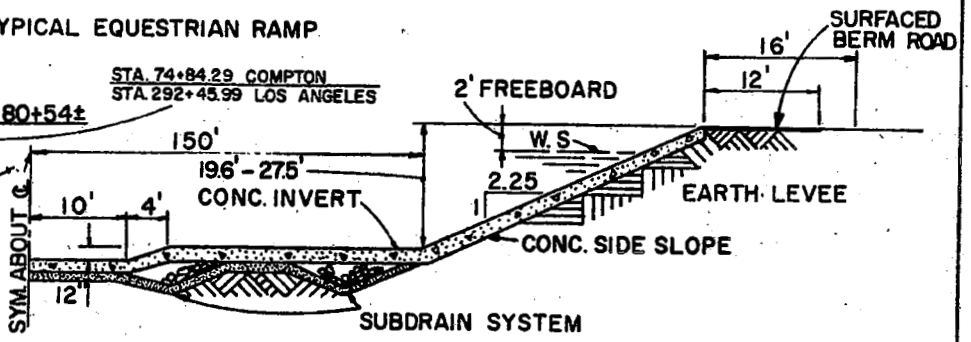


DESIGN DATA

STA.	TO STA.	SECT.	V	Q
LOS ANGELES RIVER				
402+00.00	310+00.00	TRAP	17.5-27.5	140,000
310+00.00	270+00.00	TRAP	16.5-28.0	146,000
COMPTON CREEK				
116+37.00	80+54±	TRAP	5.1-6.5	13,750



TYPICAL OPEN SECTION
COMPTON CREEK
STA. 116+37.00 TO STA. 80+54±



TYPICAL OPEN SECTION
LOS ANGELES RIVER
STA. 402+00.00 TO STA. 270+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL INVERT-ACCESS RAMP
- TYPICAL BERM-ACCESS RAMP
- SUBDRAIN MANHOLE
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
SIXTY-THIRD ST TO DOMINGUEZ ST

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
LAR-A-8

LOS ANGELES RIVER CHANNEL
Atlantic Ave to Sixty-third St

Construction Data

Contract No:	DA 56-184	Start:	4 June 1956
	Clyde W. Wood and Sons, Inc	Finish:	1 November 1956
Specifications:	CIVENG 56-62		
Plans:	D.O. Series 164/1-23		
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Atlantic Ave to 63rd St		

Local Assurances

Resolution Dated: 17 April 1956
Operation and Maintenance Transferred to: LACFCD, 20 February 1957

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from right side downstream of Artesia Blvd (sta 415+00±)

To Right Berm: from Long Beach Fwy (northbound), Artesia Blvd
To Left Berm: none

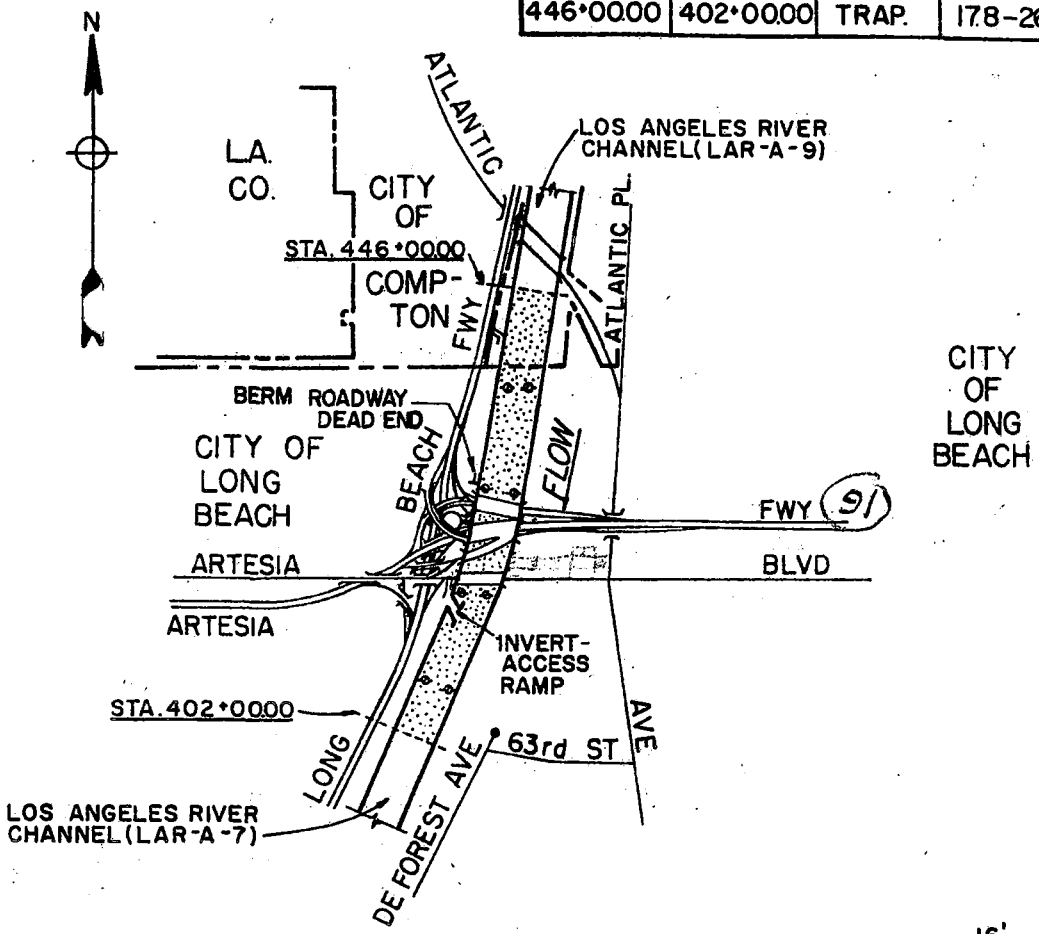
Bridges

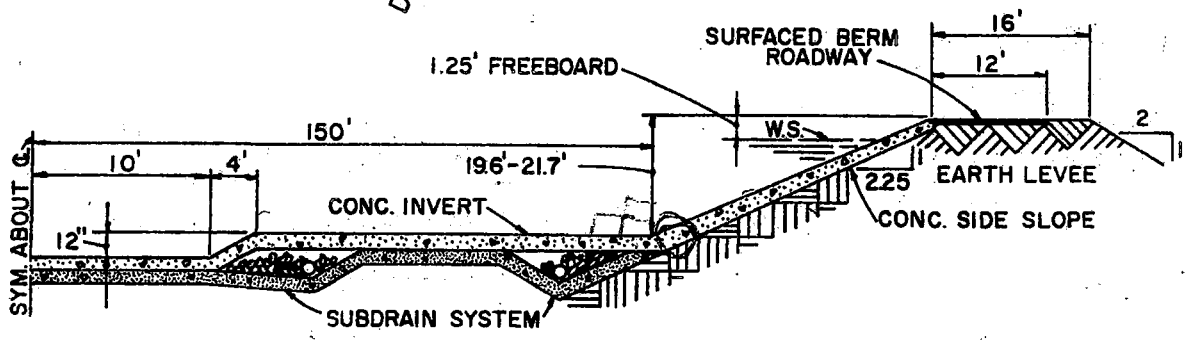
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Artesia Fwy	3	0	State of California
Artesia Blvd	5	0	City of Long Beach

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Earth channel levee	Concrete invert-access ramp
Concrete channel invert	Side drain
Concrete channel side slopes	Bridge
Subdrain system	Public utility
Fencing	Subdrain manhole
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
446+00.00	402+00.00	TRAP.	17.8-26.8	140,000





TYPICAL OPEN SECTION

STA. 446+00.00 TO STA. 402+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- SUBDRAIN MANHOLE
- ----- CONST. PROJECT LIMIT
- ——— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

ATLANTIC AVE TO SIXTY-THIRD ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-8

DATA SHEET LOS ANGELES RIVER CHANNEL
LAR-A-9 Compton Blvd to Atlantic Ave

Construction Data

Contract No:	DA 56-69	Start: 3 January 1956
	Winston Brothers Co	Finish: 26 December 1956
Specifications:	CIVENG 56-18	
Plans:	D.O. Series 149/80-109	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Compton Blvd to Atlantic Ave	

Local Assurances

Resolution Dated: 13 December 1955
Operation and Maintenance Transferred to: LACFCD, 18 January 1957

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-8

To Right Berm: Alondra Blvd
To Left Berm: Alondra Blvd

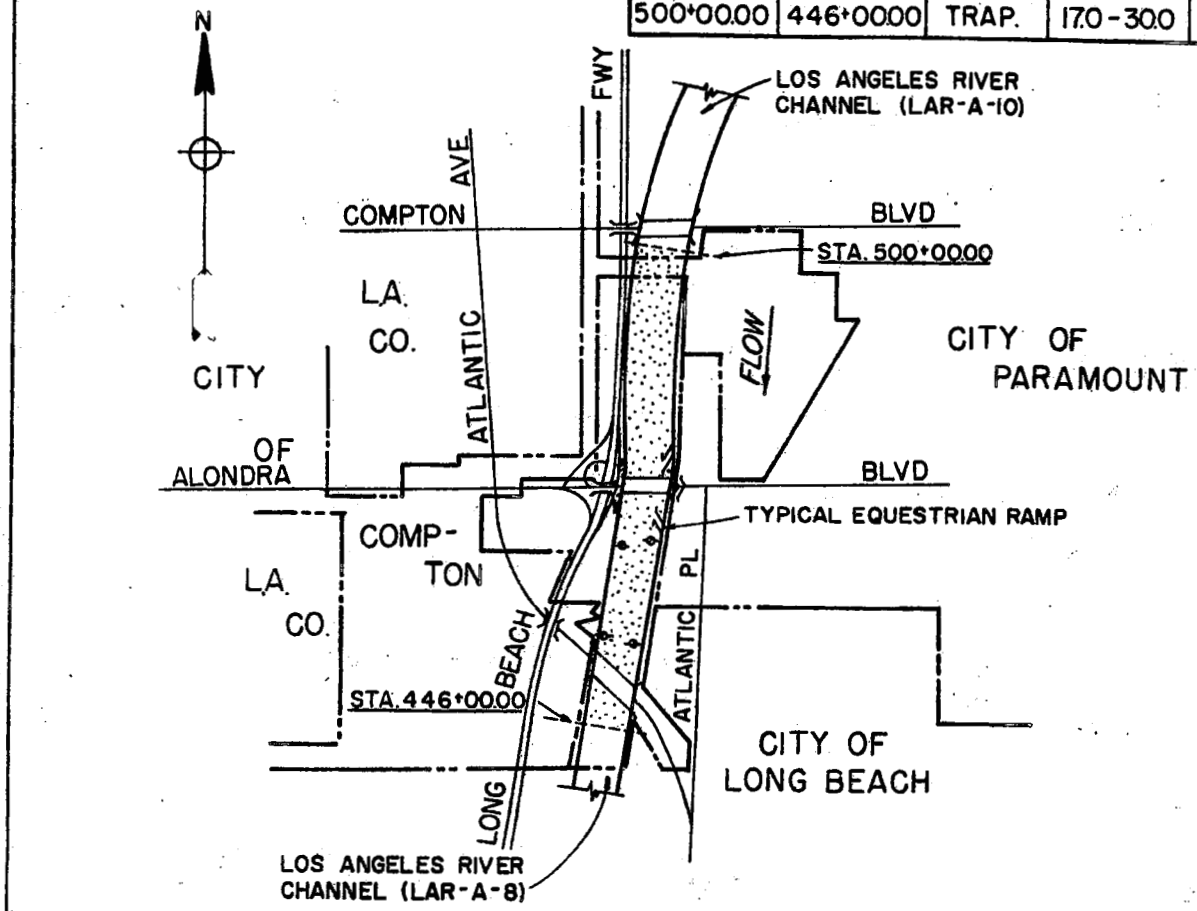
Bridges

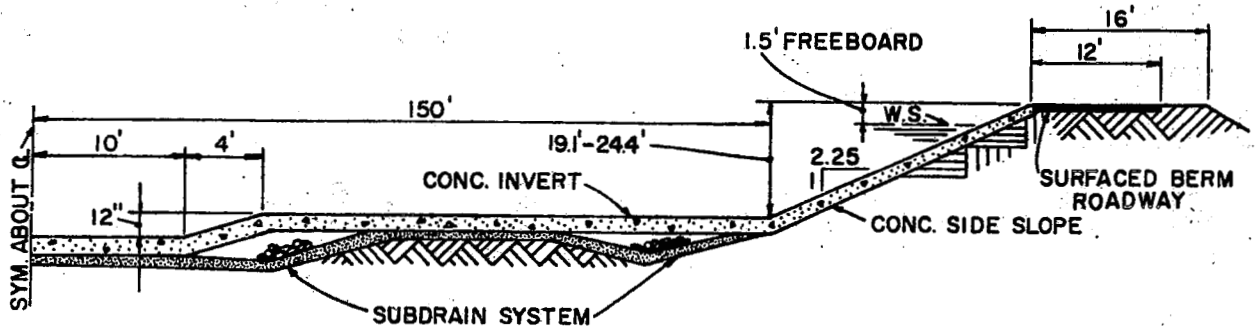
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Alondra Blvd	5	0	Los Angeles County
Atlantic Ave	7	0	Los Angeles County and City of Compton

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Earth channel levee	Side drain
Concrete channel invert	Bridge
Concrete channel side slopes	Public utility
Subdrain system	Equestrian ramp
Fencing	Subdrain manhole
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
500+00.00	446+00.00	TRAP.	17.0-30.0	140,000





TYPICAL OPEN SECTION

STA. 500+00.00 TO STA. 446+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

COMPTON BLVD TO ATLANTIC AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-9

DATA SHEET
LAR-A-10

LOS ANGELES RIVER CHANNEL
Josephine St to Compton Blvd

Construction Data

Contract No:	DA-ENG-4370	Start: 1 June 1955
	A. Teichert and Son, Inc	Finish: 11 January 1956
	M.J. Bevanda	
Specifications:	CIVENG 55-39	
Plans:	D.O. Series 148/1-35	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT	
	P.E. Ry Bridge to Compton Blvd	

Local Assurances

Resolution Dated: 21 June 1955
Operation and Maintenance Transferred to: LACFCD, 13 June 1956

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-8

To Right Berm: from Long Beach Fwy (northbound) above Rosecrans Ave, Compton Blvd
To Left Berm: Rosecrans Ave, Compton Blvd

Bridges

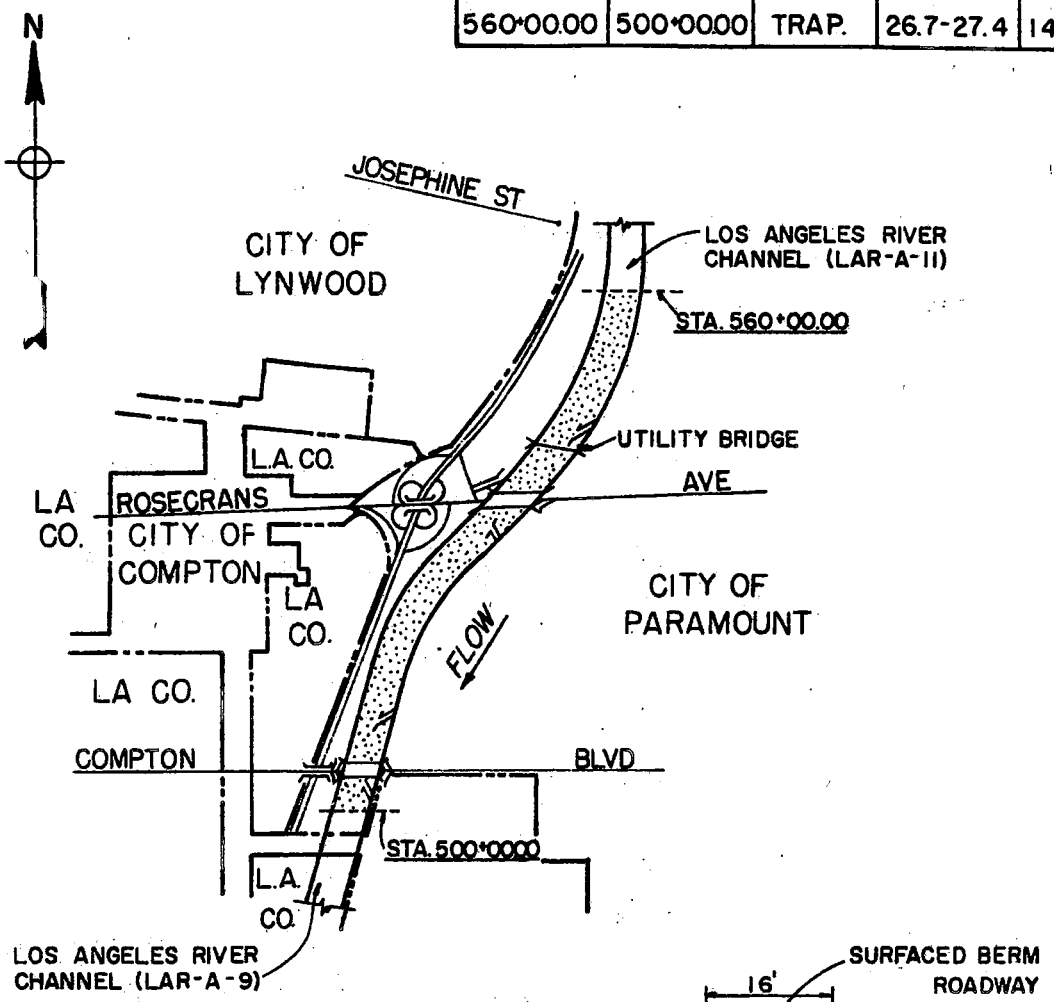
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 537+38	2	0	Standard Oil Co (utility bridge)
Rosecrans Ave	7	0	City of Paramount and Los Angeles County
Compton Blvd	5	0	Los Angeles County

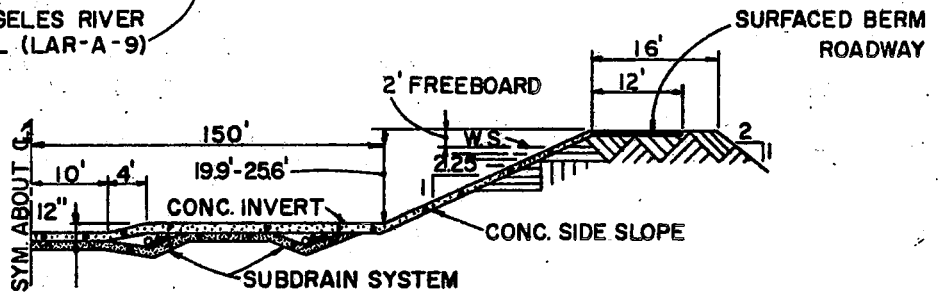
Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Earth channel levee	Side drain
Concrete channel invert	Bridge
Concrete channel side slopes	Public utility
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
560+00.00	500+00.00	TRAP.	26.7-27.4	140,000





TYPICAL OPEN SECTION

STA. 560+0000 TO STA. 500+0000

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL EQUESTRIAN RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
JOSEPHINE ST TO COMPTON BLVD

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-10

DATA SHEET
LAR-A-11

LOS ANGELES RIVER CHANNEL
Century Blvd to Josephine St

Construction Data

Contract No:	DA-ENG-2694	Start: 26 March 1953
	Guy F. Atkinson Co	Finish: 5 March 1954
Specifications:	CIVENG 53-30	
Plans:	D.O. Series 429/23-125	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT P.E. Ry Bridge and Adjacent Channel	

Local Assurances

Resolution Dated: 23 January 1951
Operation and Maintenance Transferred to: LACFCD, 17 March 1954

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-8 or LAR-A-12

To Right Berm: none
To Left Berm: none

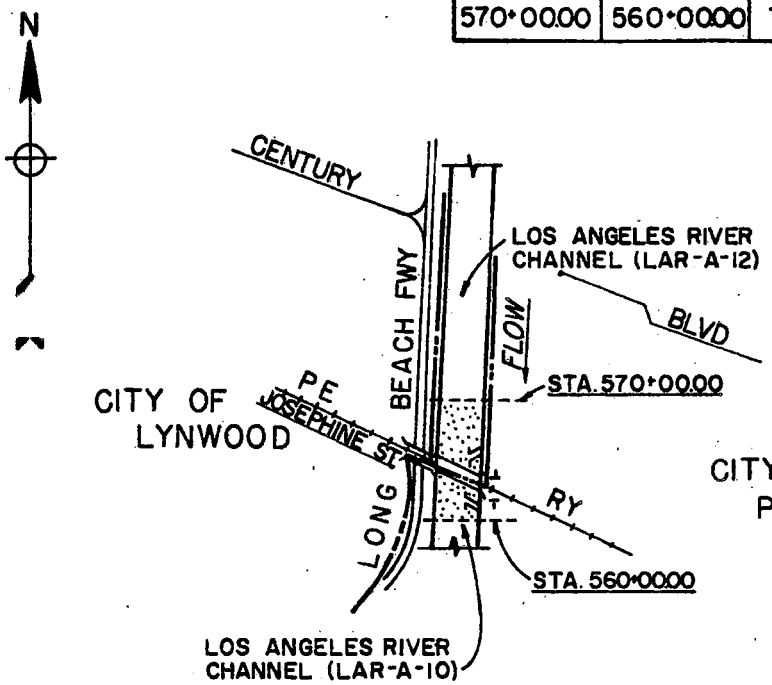
Bridges

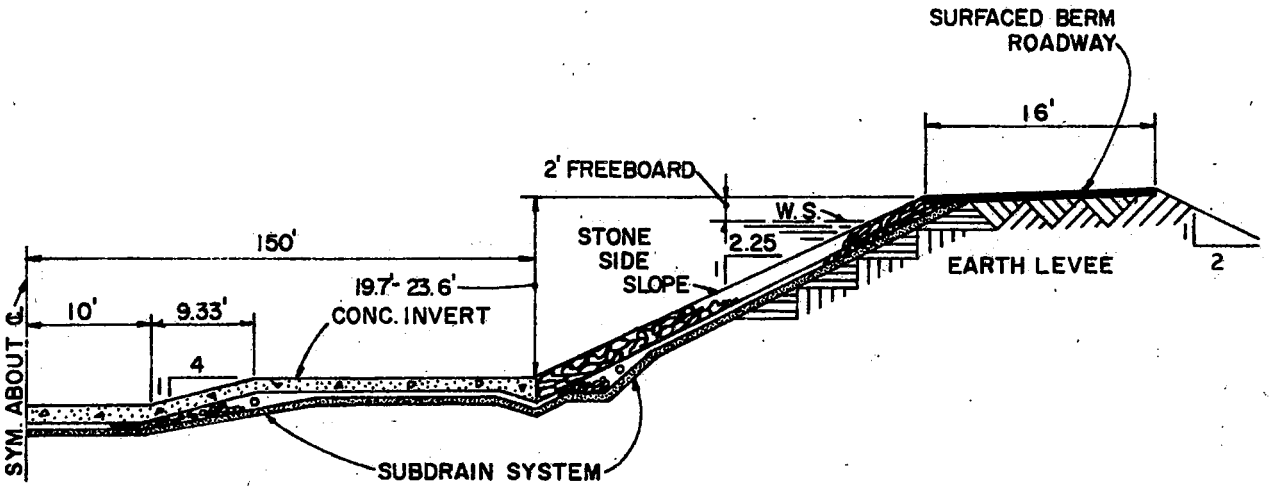
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
P.E. Ry	3	0	P.E.R.R.

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Side drain
Earth channel levee	Equestrian ramp
Concrete channel invert	Bridge
Grouted stone channel side slopes	Public utility
Subdrain system	
Fencing	
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
570+00.00	560+00.00	TRAP.	17.0-26.7	140,000





TYPICAL OPEN SECTION

STA. 570+00.00 TO STA. 560+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL EQUESTRIAN RAMP
- TYPICAL BERM DEAD END
- ------ CONST. PROJECT LIMIT
- ——-- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

CENTURY BLVD TO JOSEPHINE ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-11

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-12

LOS ANGELES RIVER CHANNEL
Imperial Hwy to Century Blvd

Construction Data

Contract No:	DA 1070	Start: 30 March 1951
	Peter Kiewit Sons' Co	Finish: 21 November 1951
Specifications:	CIVENG 51-20	
Plans:	D.O. Series 429/91-106	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Imperial Hwy to P.E. Ry Bridge	

Local Assurances

Resolution Dated: 11 April 1944
Operation and Maintenance Transferred to: LACFCD, 15 February 1952

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: below Imperial Hwy from LACFCD yards (sta 630+10±)

To Right Berm: none
To Left Berm: from LACFCD yards

Bridges

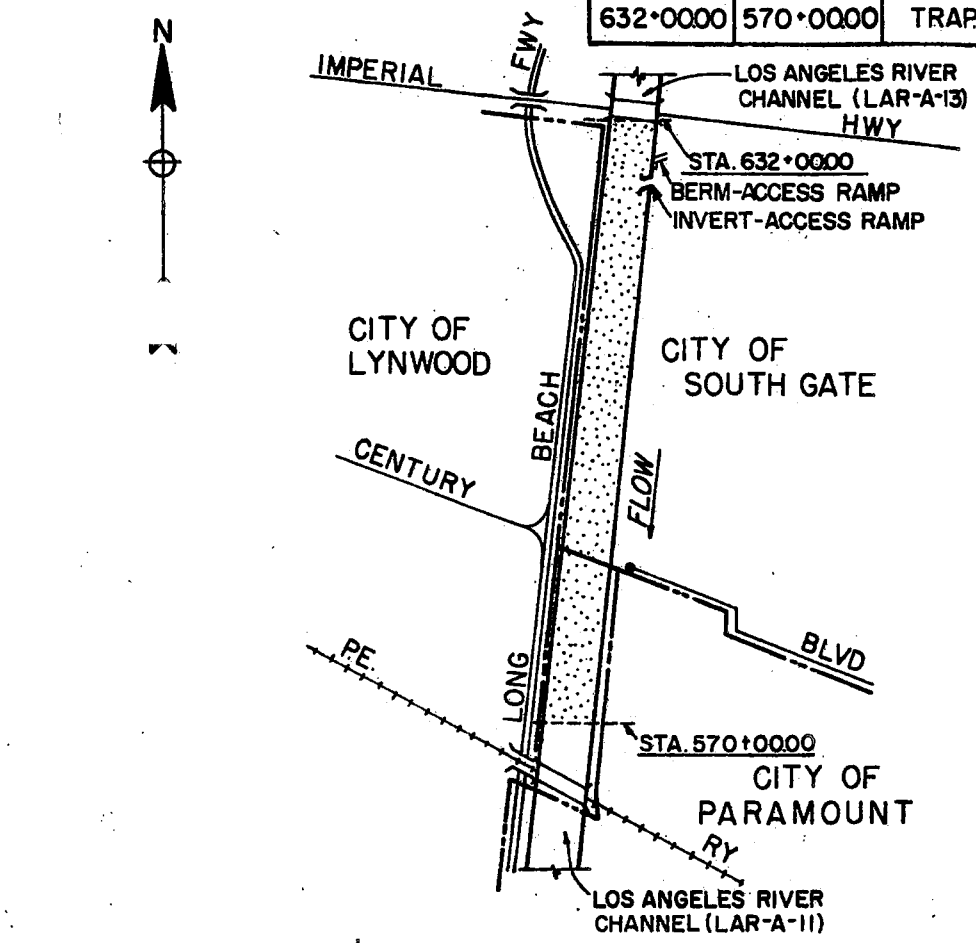
None

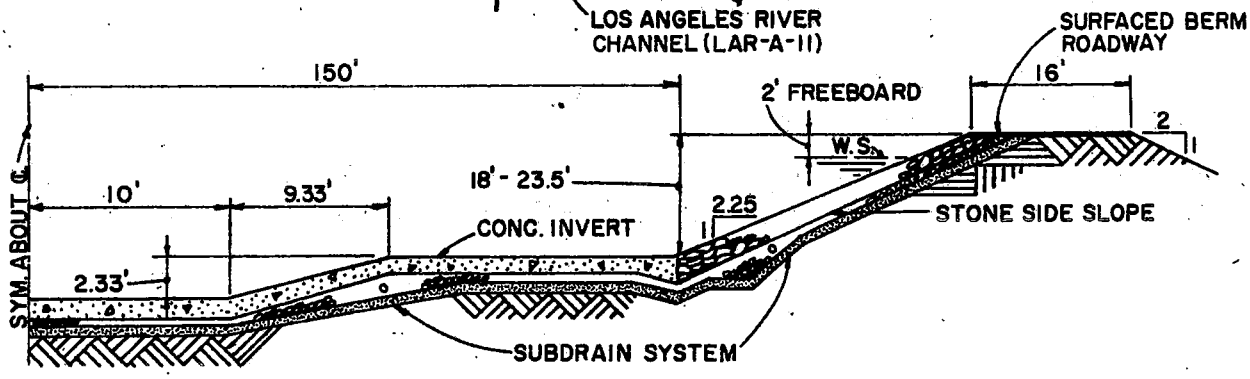
Reporting Features

Along Channel
Surfaced berm roadway
Earth channel levee
Concrete channel invert
Stone channel side slopes
Subdrain system
Fencing
Rights-of-way

At a Channel Station
Side drain
Surfaced berm-access ramp
Concrete invert-access ramp
Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
632+00.00	570+00.00	TRAP.	19.0-28.0	140,000





TYPICAL OPEN SECTION

STA. 632+00.00 TO STA. 570+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- ----- CONST. PROJECT LIMIT
- ——— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

IMPERIAL HWY TO CENTURY BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-12

DATA SHEET
LAR-A-13

LOS ANGELES RIVER CHANNEL
Stewart and Gray Rd to Imperial Hwy

Construction Data

Contract No:	DA-ENG-1070	Start: 17 April 1951
	Peter Kiewit Sons' Co	Finish: 20 December 1951
Specifications:	CIVENG 51-13	
Plans:	D.O. Series 429/51-87	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT	
	Stewart and Gray Rd to Imperial Hwy	

Local Assurances

Resolution Dated: 23 February 1951
Operation and Maintenance Transferred to: LACFCD, 22 April 1952

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from right berm, upstream of Long Beach Fwy (sta 655+00)

To Right Berm: Tweedy Blvd
To Left Berm: from Rod and Gun Club just below Long Beach Fwy

Bridges

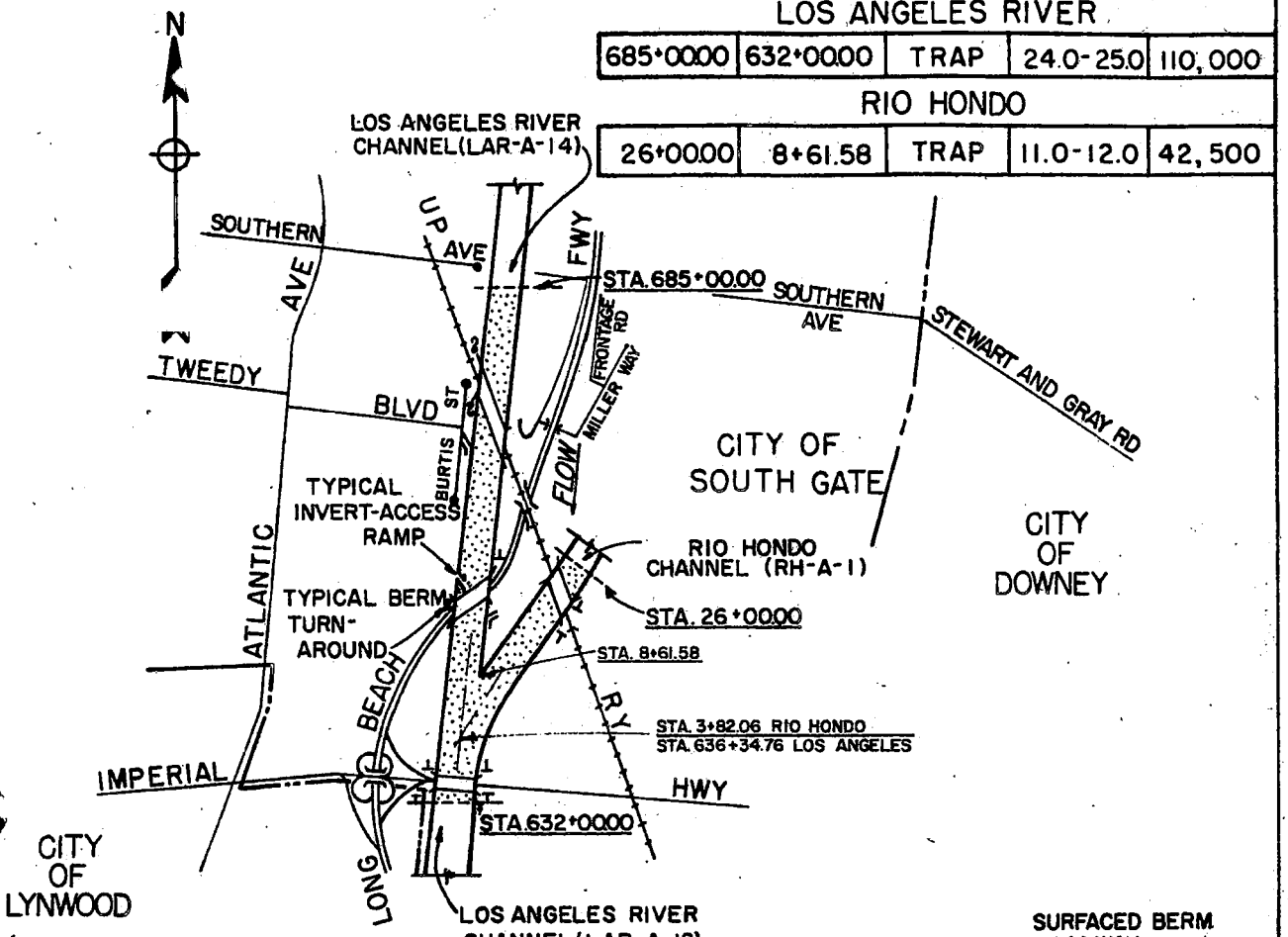
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Los Angeles River:			
U. P. Ry	4	0	U.P.R.R.
Long Beach Fwy	3	0	State of California
Imperial Hwy	4	0	County of Los Angeles
Rio Hondo Channel			
U. P. Ry	4	0	U.P.R.R.

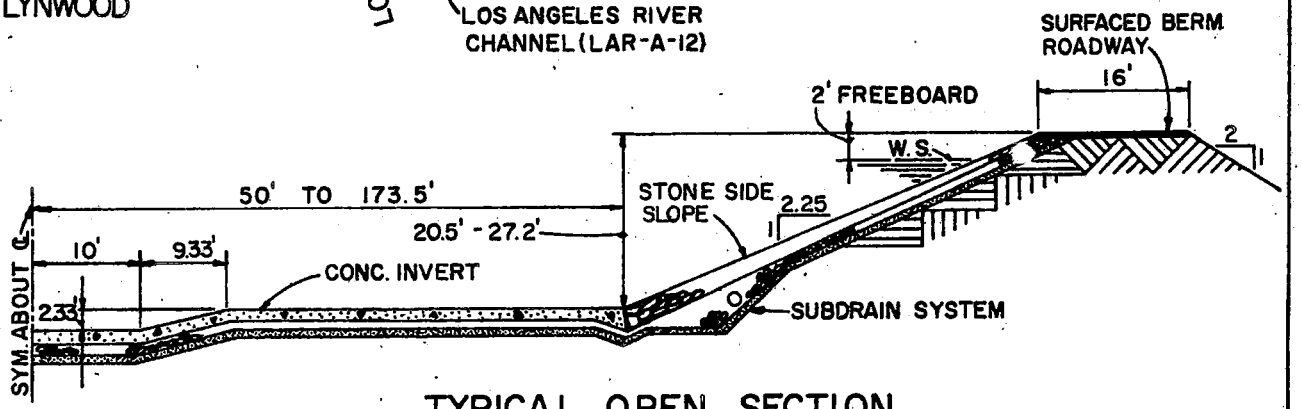
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Surfaced berm-access ramp
Earth channel levee	Concrete invert-access ramp
Stone channel side slopes	Side drain
Surfaced berm roadway	Bridge
Subdrain system	Concrete confluence section
Rights-of-way	Public utility
Fencing	

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
LOS ANGELES RIVER				
685+00.00	632+00.00	TRAP	24.0-25.0	110,000
RIO HONDO				
26+00.00	8+61.58	TRAP	11.0-12.0	42,500





TYPICAL OPEN SECTION

(LOW FLOW CHANNEL FOR LOS ANGELES RIVER ONLY)
STA.685+00.00 TO STA.632+00.00 - LOS ANGELES RIVER
STA. 26+00.00 TO STA. 8+61.58 - RIO HONDO

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
STEWART & GRAY RD TO IMPERIAL HWY

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA
LAR-A-13

DATA SHEET
LAR-A-14

LOS ANGELES RIVER CHANNEL
Florence Ave to Stewart and Gray Rd

Construction Data

Contract No:	DA 56-170 Winston Brothers Co	Force Account
Specifications:	CIVENG 56-71	
Plans:	D.O. Series 147/1-14	D.O. LA427/1-73,428/1-6
Start:	15 May 1956	1937
Finish:	14 December 1956	May 1942
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Florence Ave to Stewart and Gray Rd	LOS ANGELES RIVER IMPROVEMENT Randolph St to Stewart and Gray Rd

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: downstream of Firestone Blvd (sta 702+48)
Type: Recording (LACFCD--F34D-R)
Staff Gage Reading at One-third Capacity: 7.4 ft on gage (40,000 cfs)

Access Ramps

To Invert: none; use LAR-A-13

To Right Berm: River Rd
To Left Berm: Long Beach Fwy (southbound)

Bridges

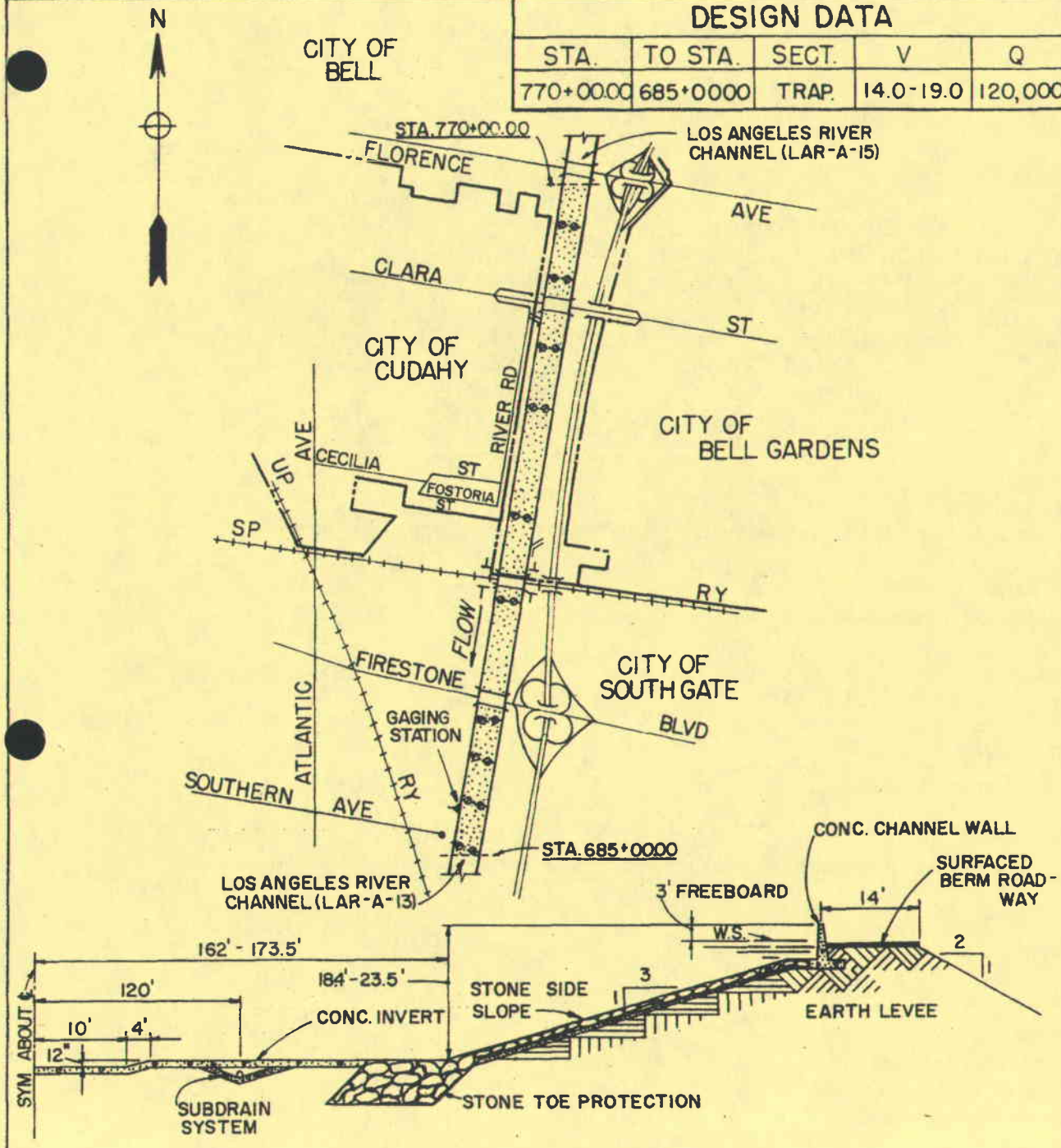
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Clara St	4	0	Los Angeles County
S.P. Ry	3	2	S.P.R.R.
Firestone Blvd	3	0	City of South Gage

Reporting Features

Along Channel	At a Channel Station
Earth channel levee	Side drain
Concrete channel invert	Surfaced berm-access ramp
Concrete channel walls	Gaging station
Stone channel side slopes	Bridge
Stone toe protection	Subdrain manhole
Surfaced berm roadway	Public utility
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
770+00.00	685+0000	TRAP.	14.0-19.0	120,000



TYPICAL OPEN SECTION

STA. 770+00.00 TO STA. 685+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM DEAD END
- TYPICAL BERM-ACCESS RAMP
- SUBDRAIN MANHOLE
- ----- CONST. PROJECT LIMIT
- ——— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

FLORENCE AVE TO STEWART & GRAY RD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-14

DATA SHEET
LAR-A-15

LOS ANGELES RIVER CHANNEL
Randolph St to Florence Ave

Construction Data

Contract No:	INVERT DA 57-7 Clifford C. Bong Co	SIDE SLOPES Force Account
Specifications:	CIVENG 56-72	
Plans:	D.O. Series 147/16-33	D.O. LA427/1-73 and 42VI-6
Start:	27 July 1956	1937
Finish:	15 January 1957	May 1942
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Atlantic Ave to Florence Ave	LOS ANGELES RIVER IMPROVEMENT Randolph St to Stewart and Gray Rd

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none; use LAR-A-13

To Right Berm: none
To Left Berm: none

Bridges

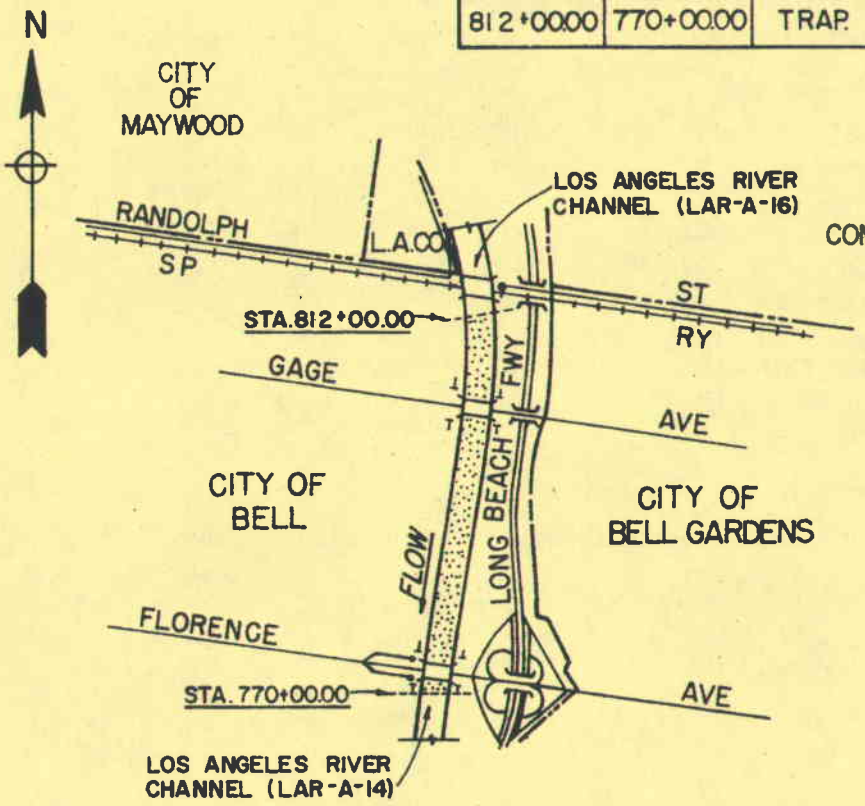
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Gage Ave	4	0	City of Bell
Florence Ave	5	0	City of Bell

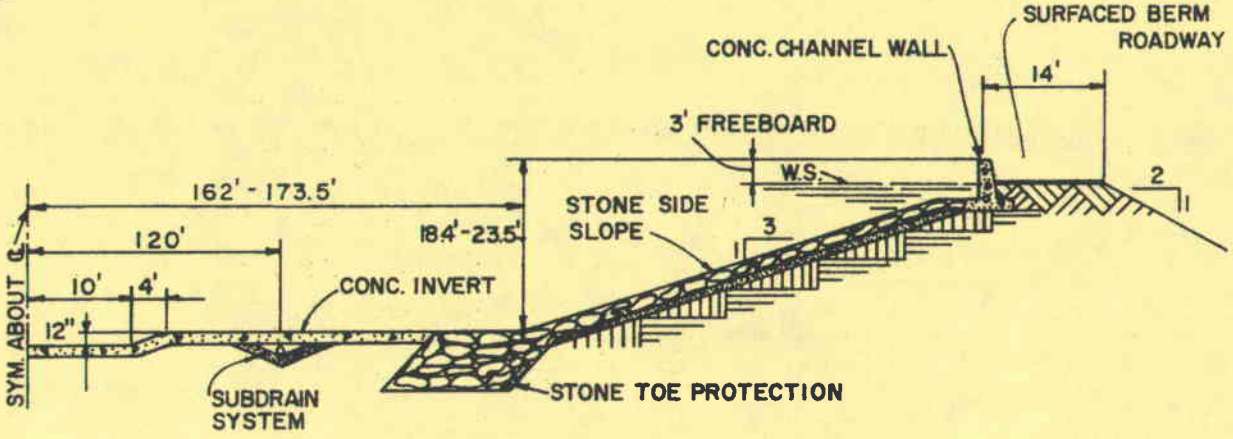
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Stone channel side slopes	Public utility
Stone toe protection	
Surfaced berm roadway	
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
812+00.00	770+00.00	TRAP.	16.0-20.0	109,500





TYPICAL OPEN SECTION

STA.812+00.00 TO STA. 770+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

RANDOLPH ST TO FLORENCE AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-15

DATA SHEET
LAR-A-16

LOS ANGELES RIVER CHANNEL
Atlantic Blvd to Randolph St

Construction Data

Contract No:	INVERT DA 59-119 Griffith Co	SIDE SLOPES Force Account
Specifications:	CIVENG 59-23	
Plans:	D.O. Series 147/36-67	D.O. LA347/1-75 and 348/1-29
Start:	30 March 1959	1941
Finish:	7 October 1959	July 1942
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Soto St to Randolph St	LOS ANGELES RIVER IMPROVEMENT Atlantic Ave to Randolph St

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none; use LAR-A-13

To Right Berm: Slauson Ave
To Left Berm: none

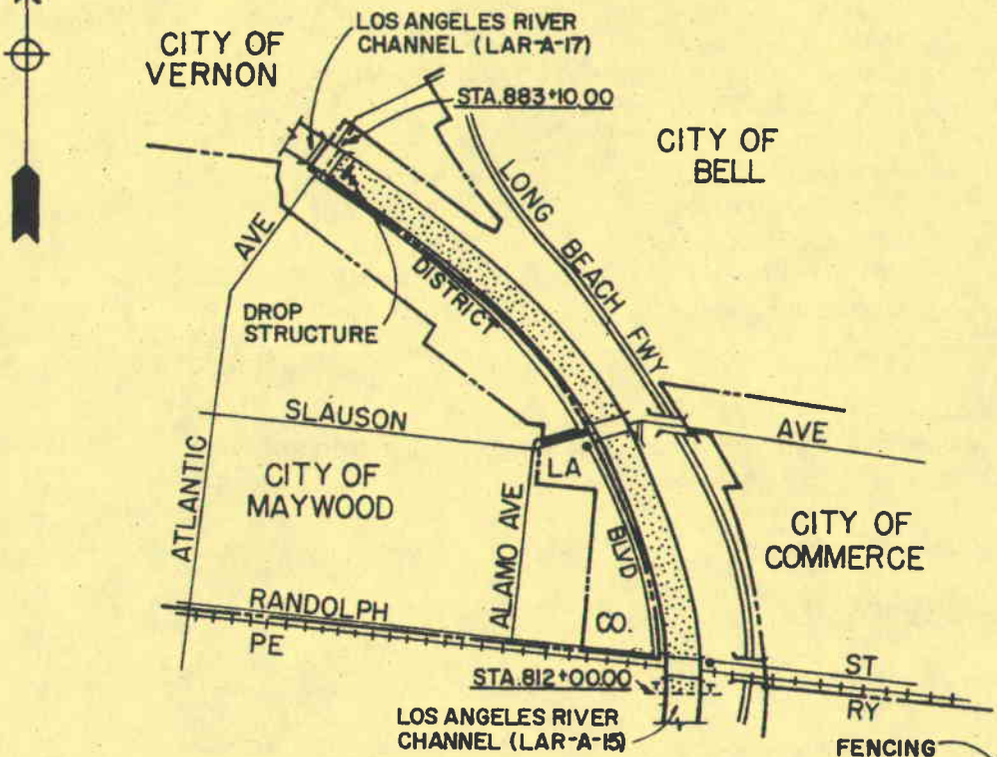
Bridges

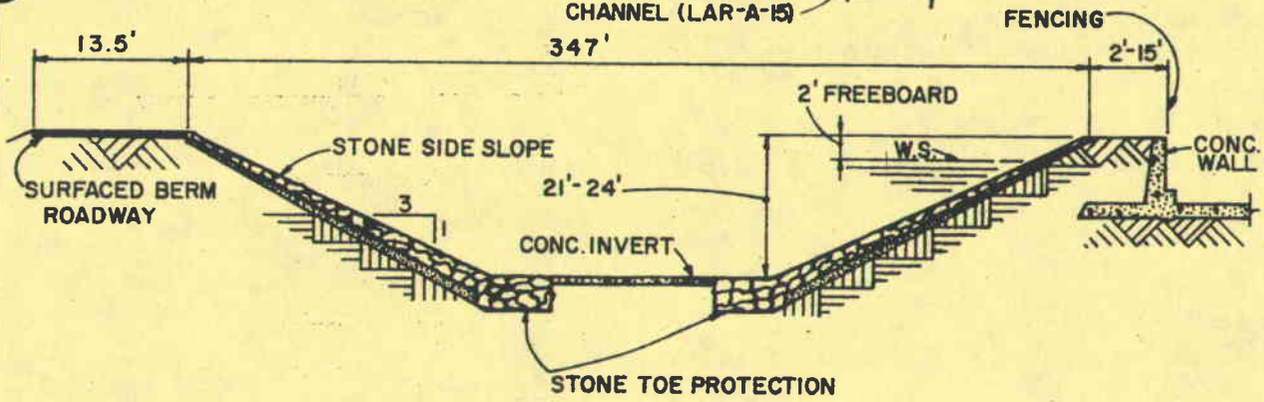
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Slauson Ave	4	0	City of Los Angeles
P.E. Ry	3	0	P.E.R.R.

Reporting Features

Along Channel	At a Channel Station,
Earth channel levee	Surfaced berm-access ramp
Earth and surfaced berm roadway	Side drain
Concrete channel invert	Bridge
Concrete channel walls	Public utility
Stone channel side slopes	Drop structure
Stone toe protection	
Subdrain system	
Fencing	
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
883+10.00	812+00.00	TRAP.	17.9-19.9	109,500





TYPICAL OPEN SECTION

STA.883+10.00 TO STA.812+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL ATLANTIC BLVD TO RANDOLPH ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-16

DATA SHEET
LAR-A-17

LOS ANGELES RIVER CHANNEL
Downey Rd to Atlantic Blvd

Construction Data

Contract No:	DA 59-119	ENG 994
	Griffith Co	Rohl Connely Co
Specifications:	CIVENG 59-23	
Plans:	D.O. Series 147/36-67	D.O. LA417/3-75,418/1-43
Start:	30 March 1959	March 1940
Finish:	7 October 1959	December-1940
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Soto St to Randolph St	LOS ANGELES RIVER IMPROVEMENT Downey Rd to Atlantic Blvd

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-13

To Right Berm: none
To Left Berm: Bandini Blvd, Atlantic Blvd

Bridges

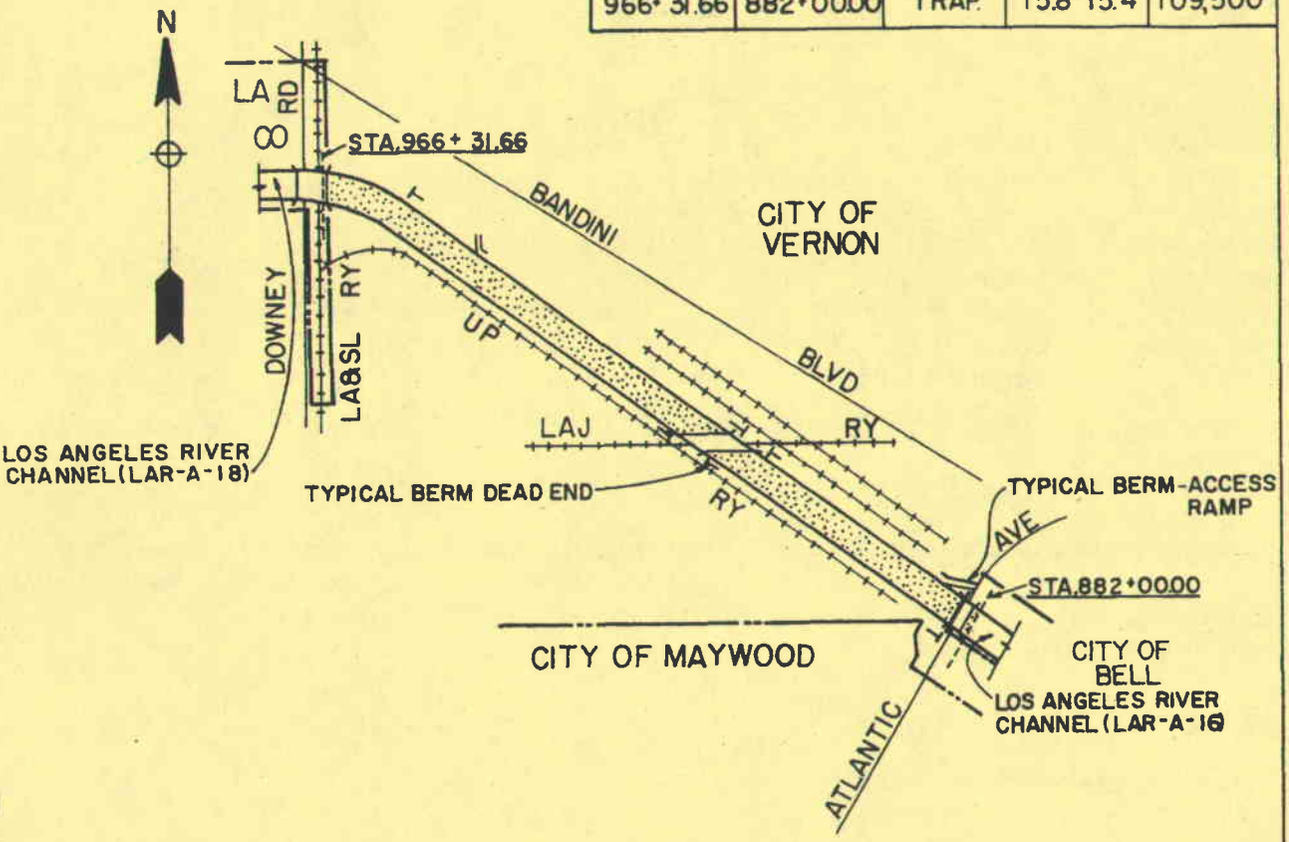
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
L.A. Junction Ry	4	0	L.A.J.R.R.
Atlantic Blvd	6	2	State of California

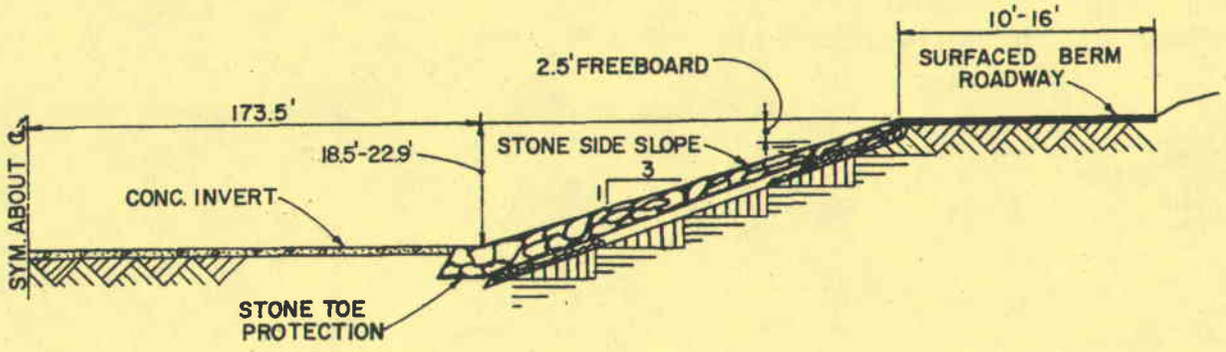
Reporting Features

Along Channel	At a Channel Station
Earth channel levee	Side drain
Concrete channel invert	Surfaced berm-access ramp
Stone channel side slopes	Bridge
Stone toe protection	Public utility
Surfaced berm roadway	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA	SECT.	V	Q
966+31.66	882+00.00	TRAP.	15.8-15.4	109,500





TYPICAL OPEN SECTION

STA.966+31.66 TO STA.882+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- ----- CONST. PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

DOWNEY RD TO ATLANTIC BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-17

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-18

LOS ANGELES RIVER CHANNEL
Soto St to Downey Rd

Construction Data

Contract No:	DA 59-119 Griffith Co	Force Account
Specifications:	CIVENG 59-23	
Plans:	D.O. Series 147/36-67	D.O. LA333/6-71
Start:	3 March 1959	1938
Finish:	7 October 1959	November 1940
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Soto St to Randolph St	LOS ANGELES RIVER IMPROVEMENT Soto St to Downey Rd,

Local Assurances

Resolution Dated:

Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: at Downey Rd (sta 968+40±)

To Right Berm: Downey Rd
To Left Berm: Bandini Blvd, Downey Rd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Bandini Blvd	7	0	City of Vernon
Downey Rd	5	0	Los Angeles County
U.P. Ry	11	0	U.P.R.R.

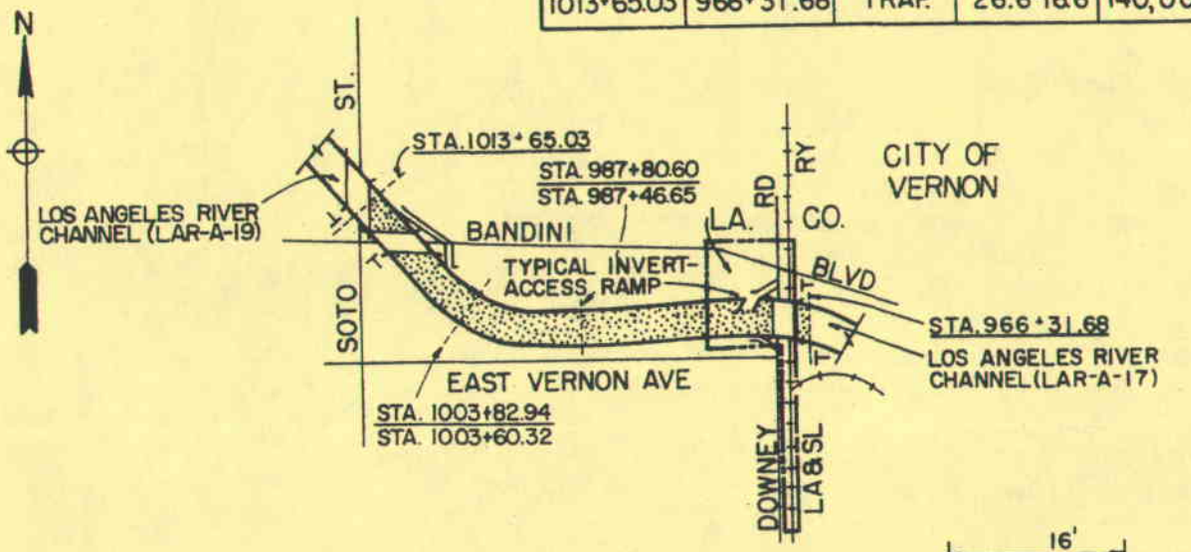
Reporting Features

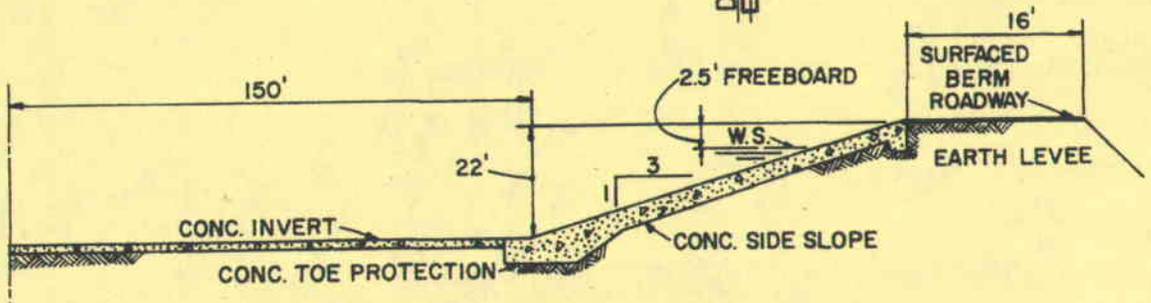
Along Channel	At a Channel Station
Concrete channel invert	Earth and surfaced berm-access ramp
Concrete and stone channel side slopes	Concrete invert-access ramp
Stone and concrete toe protection	Side drain
Surfaced berm roadway	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

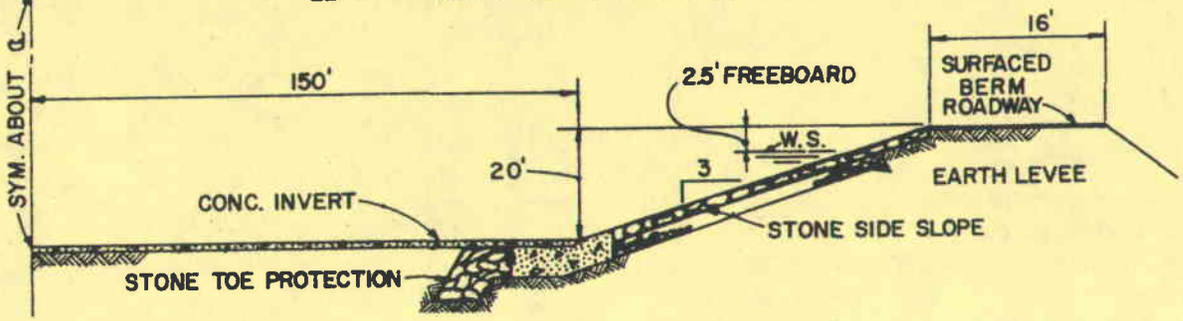
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1013+65.03	966+31.68	TRAP.	26.6-16.6	140,000





TYPICAL OPEN SECTION

RIGHT: STA. 1013+00.00 TO STA. 987+80.60
LEFT: STA. 1013+00.00 TO STA. 1003+82.94



TYPICAL OPEN SECTION

RIGHT: STA. 987+46.65 TO STA. 966+31.68
LEFT: STA. 1003+60.32 TO STA. 966+31.68

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

SOTO ST TO DOWNEY RD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
LAR-A-19

LOS ANGELES RIVER CHANNEL
Washington Blvd to Soto St

Construction Data

Contract No: Force Account
Start: 1938
Finish: January,19.39

Plans: LA 322/1-40
Folio Title: LOS ANGELES RIVER IMPROVEMENT
S.P. Ry to Soto St

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-18

To Right Berm: none
To Left Berm: Soto St

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Washington Blvd	4	0	City of Los Angeles
A.T.S.F. Ry	3	0	A.T.S.F.R.R.
Twenty-sixth St	2	2	City of Los Angeles
Soto St	5	21	City of Los Angeles

Reporting Features

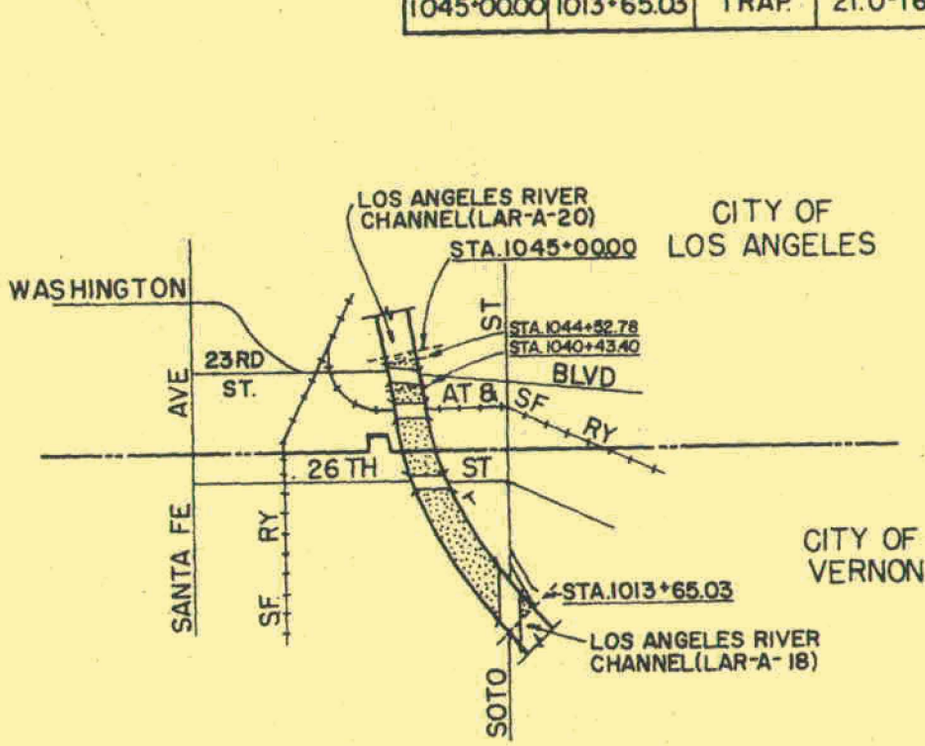
Along Channel
Earth berm roadway
Concrete channel invert
Concrete channel walls
Subdrain system
Fencing
Rights-of-way

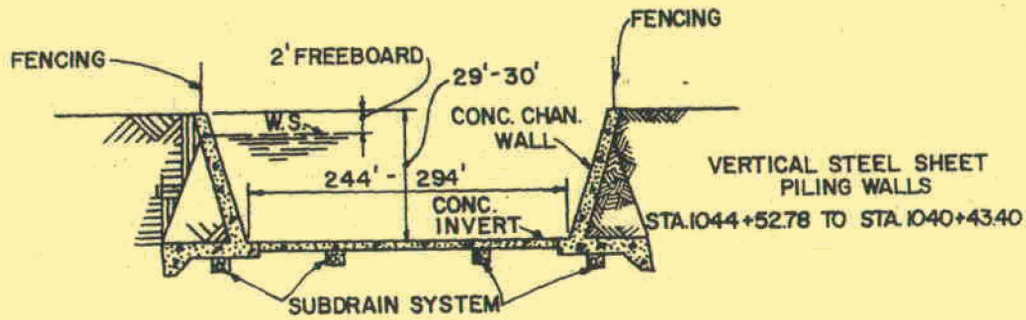
At a Channel Station
Side Train
Surfaced berm-access ramp
Bridge
Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1045+00.00	1013+65.03	TRAP.	21.0-16.6	104,000





TYPICAL OPEN SECTION

STA.1045+00.00 TO STA.1013+65.03

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

WASHINGTON BLVD TO SOTO ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-A-19

DATA SHEET
LAR-A-20

LOS ANGELES RIVER CHANNEL
Olympic Blvd to Washington Blvd

Construction Data

Contract No:	ENG-910	Start:	1940
	Griffith Co	Finish:	4 December 1941
Specifications:	C.P. No. 1		
Plans:	D.O. Series 318/5-7		
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Twenty-third St to Olympic Blvd		

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none; use LAR-A-18

To Right Berm: none
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Olympic Blvd	2	2	State of California
U. P. Ry	2	0	U.P.R.R.

Reporting Features

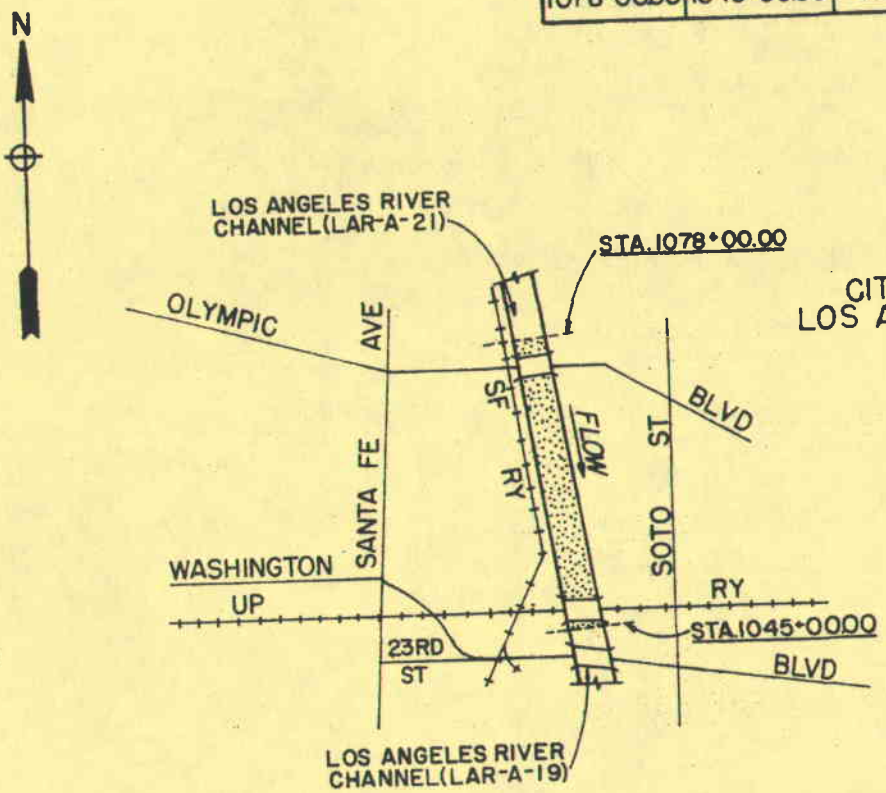
Along Channel	At a Channel Station
Earth berm roadway	Side drain
Concrete channel invert	Bridge
Concrete channel side slopes	Public utility
Concrete toe protection	
Subdrain system	
Fencing	
Rights-of-way	

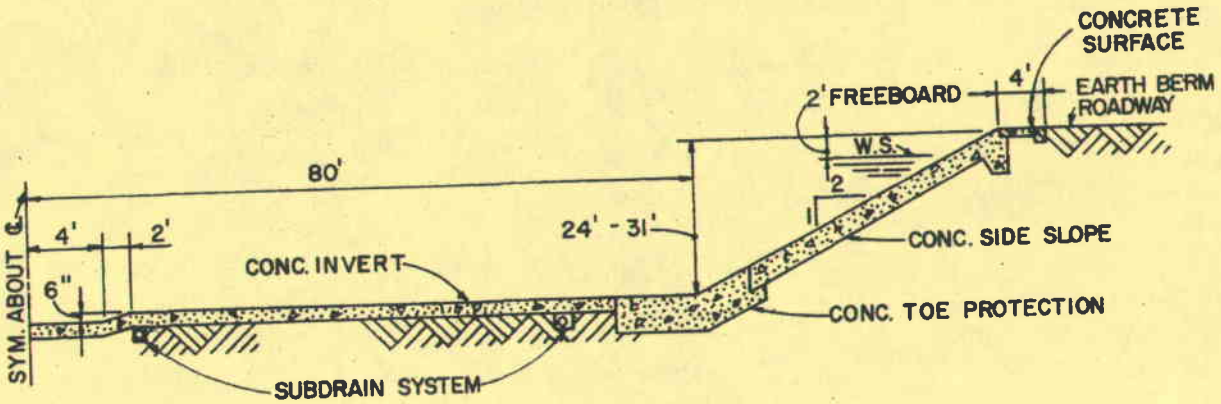
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
1078+0000	1045+0000	TRAP.	14.0-30.0	104,000





TYPICAL OPEN SECTION

STA.1078+0000 TO STA.1045+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- ----- CONST. PROJECT LIMIT
- —-- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL OLYMPIC BLVD TO WASHINGTON BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-21

LOS ANGELES RIVER CHANNEL
Fourth St to Olympic Blvd

Construction Data

Contract No:	ENG 1043	Start:	10 May 1940
	Morrison Knudson	Finish:	16 November 1941
Specifications:	CIVENG 353		
Plans:	D.O. Series 329/1-73		
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Olympic Blvd to Fourth St		

Local Assurances

Resolution Dated:

Operation and Maintenance Transferred to: Operation Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: beneath Sixth St bridge

To Right Berm: none
To Left Berm: none

Bridges

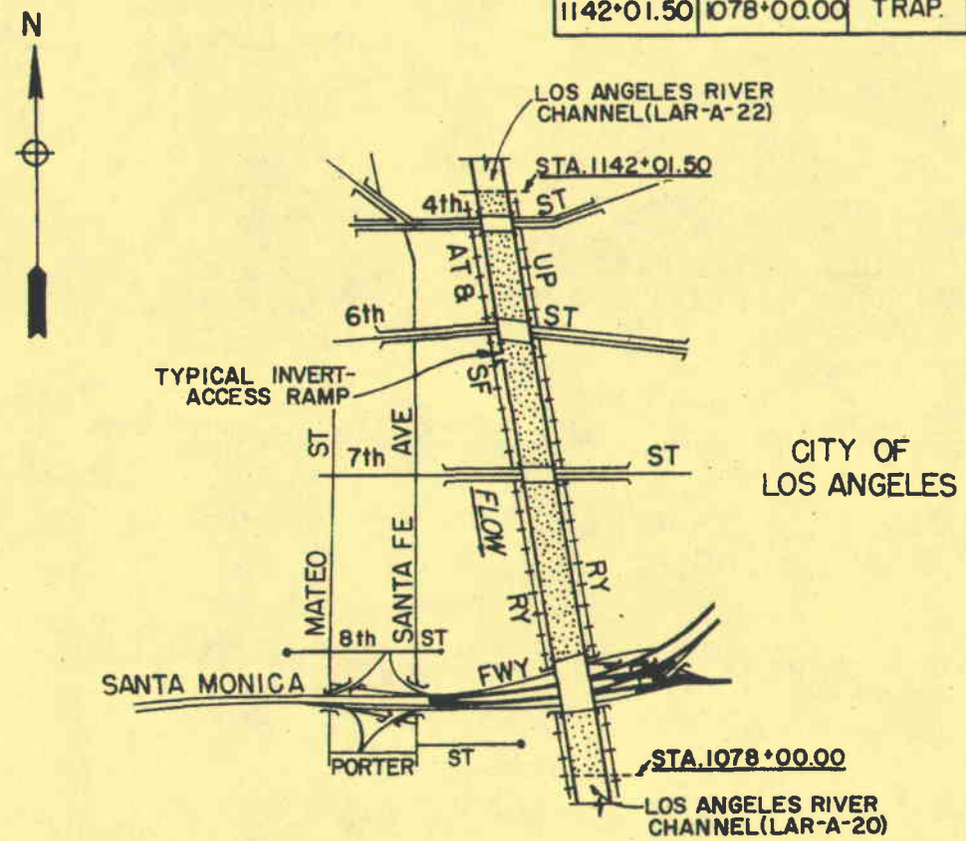
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Fourth St	0	2	City of Los Angeles
Sixth St	1	0	City of Los Angeles
Seventh St	2	2	City of Los Angeles
Santa Monica Fwy	1	0	State of California

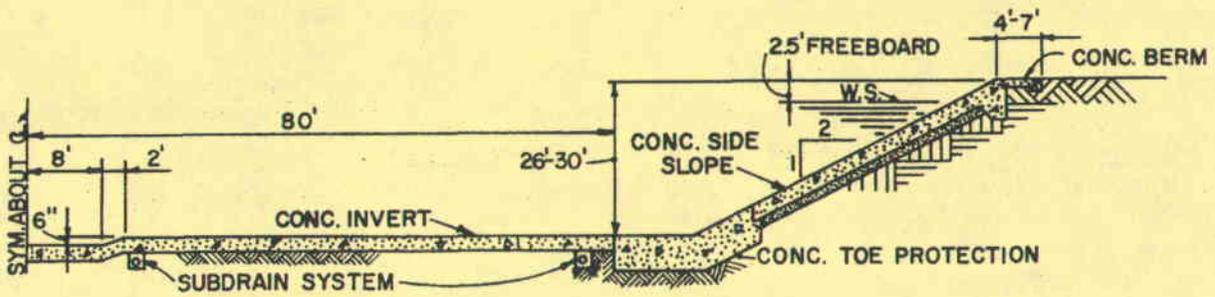
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel side slopes	Bridge
Concrete toe protection	Concrete invert-access ramp
Subdrain system	Public utility
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1142+01.50	1078+00.00	TRAP.	32.1 - 34.5	104,000





TYPICAL OPEN SECTION

STA.1142+01.50 TO STA.1078+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- ------ CONST. PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

FOURTH ST TO OLYMPIC BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-A-21

DATA SHEET
LAR-A-22

LOS ANGELES RIVER CHANNEL
Santa Ana Fwy to Fourth St

Construction Data

Contract No:	G 1377	Start:	1940
	Griffith Co	Finish:	September 1941
Specifications:	CIVENG 41-100		
Plans:	D.O. Series 301/1-81,329/2-27,55-72		
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Fourth St to Aliso St		

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To invert: none; use LAR-A-18

To Right Berm: none
Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
First St	1	0	City of Los Angeles

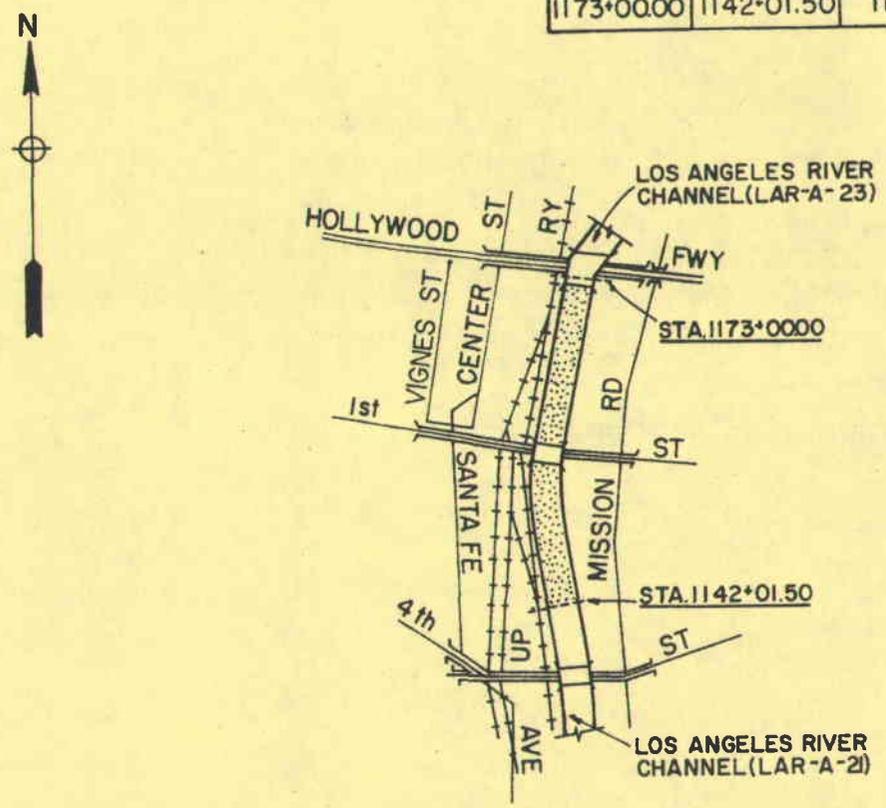
Reporting Features

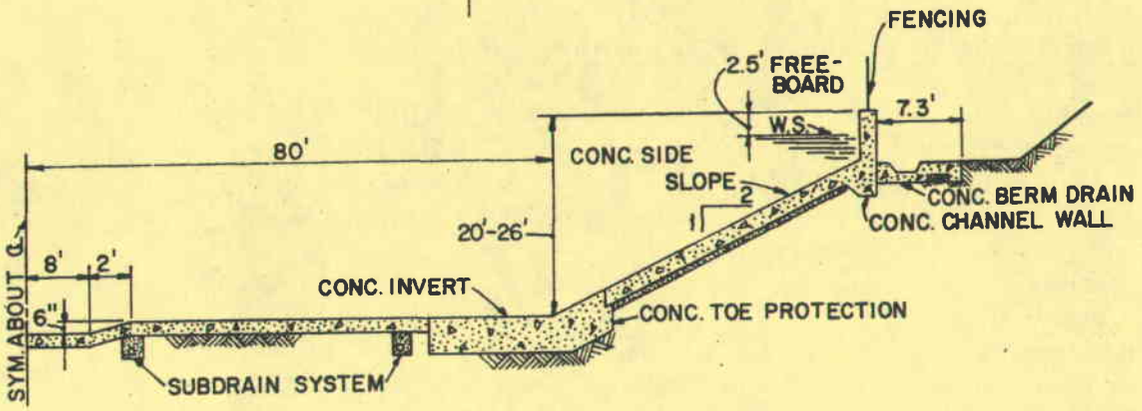
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel side slopes	Bridge
Concrete channel walls	Public utility
Concrete toe protection	
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1173+00.00	1142+01.50	TRAP.	28.3-27.0	104,000





TYPICAL OPEN SECTION

STA 1173+00.00 TO STA.1142+01.50

LEGEND

- OPEN SECTION
- STREET BRIDGE
- ------ CONST. PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

SANTA ANA FWY TO FOURTH ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-A-22

DATA SHEET
LAR-A-23

LOS ANGELES RIVER CHANNEL
Alhambra Ave to Santa Ana Fwy

Construction Data

Contract No:	DA 1884	Start:	25 April 1946
	Guy F. Atkinson	Finish:	May 1947
Specifications:	CIVENG 46-149		
Plans:	D.O. Series 337/6-53, 338/1-49		
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Aliso St to Alhambra Ave		

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none; use LAR-A-26

To Right Berm: none
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
S.P. Ry	2	0	S.P.R.R.
U.P. Ry	2	0	U.P.R.R.
Macy St	0	2	City of Los Angeles
Hollywood Fwy	0	0	State of California

Reporting Features

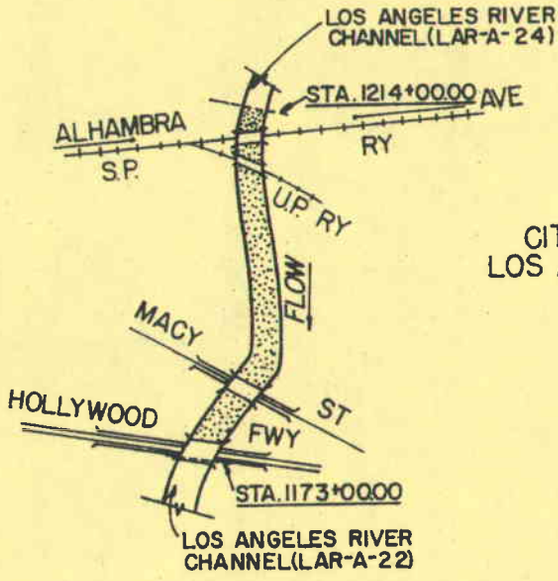
Along Channel
Earth berm roadway
Concrete channel invert
Concrete channel side slopes
Concrete channel walls
Concrete toe protection
Subdrain system
Fencing
Rights-of-way

At a Channel Station
Side drain
Bridge
Public utility

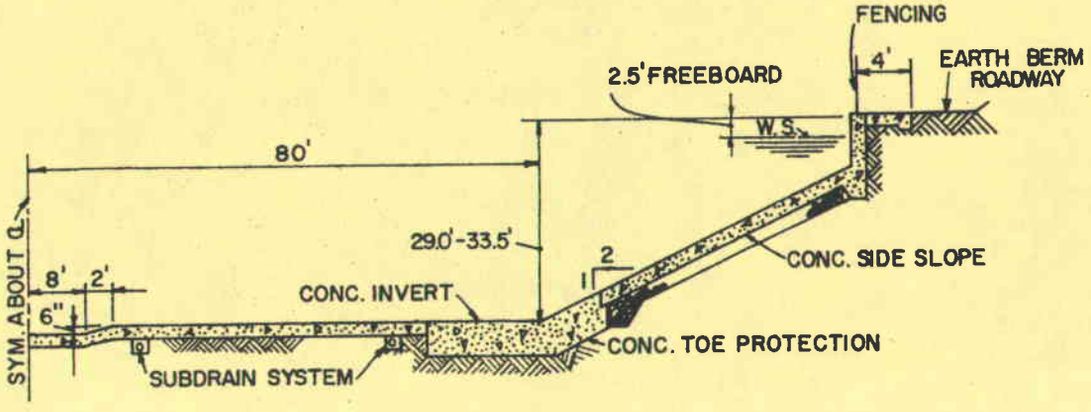
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1214+00.00	1173+00.00	TRAP.	16.8-35.4	104,000



CITY OF
LOS ANGELES



TYPICAL OPEN SECTION

STA. 1214+00.00 TO STA. 1173+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
ALHAMBRA AVE TO SANTA ANA FWY

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-A-23

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-24

LOS ANGELES RIVER CHANNEL
North Broadway to Alhambra Ave

Construction Data

Contract No:	DA 1831	Start:	May 1946
	E.R. Bishop Co	Finish:	February 1947
Specifications:	CIVENG 56-148		
Plans:	D.O. Series 308/1-11, 65, 72-79		
Folio Title:	LOS ANGELES RIVER CHANNEL North Broadway to Cardinal St		

Local Assurances

Resolution Dated:

Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-26

To Right Berm: none

To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Spring St	1	2	City of Los Angeles
Main St	2	0	City of Los Angeles

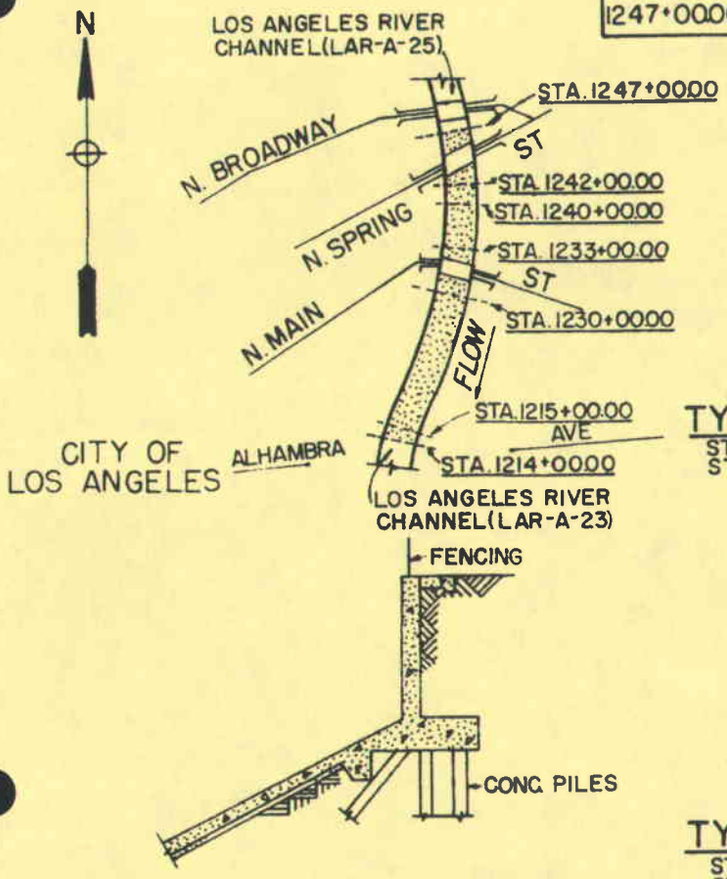
Reporting Features

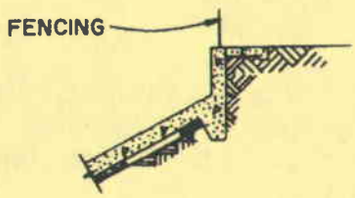
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel side slopes	Bridge
Concrete channel walls	Public utility
Concrete toe protection	
Earth berm roadway	
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

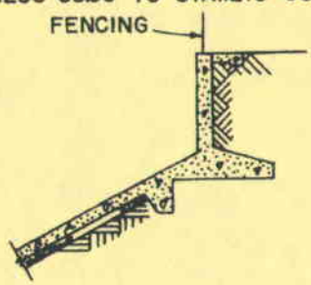
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
1247+00.00	1214+00.00	TRAP.	16.8-35.4	104,000



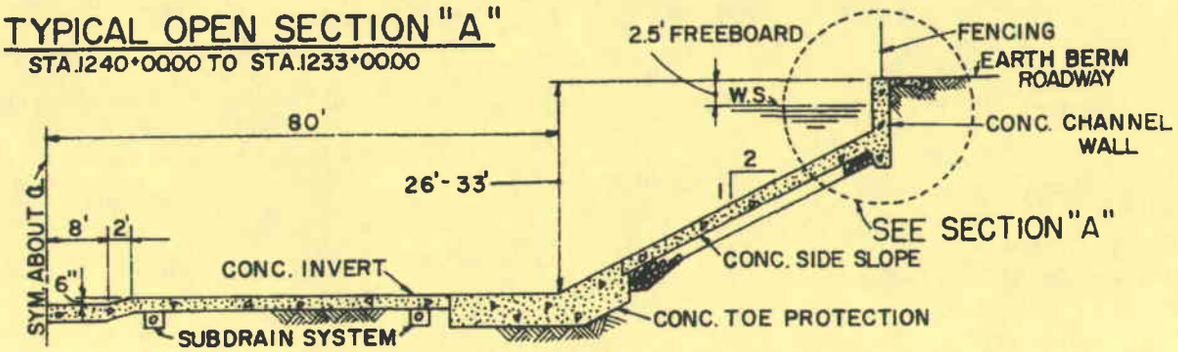


TYPICAL OPEN SECTION "A"
STA.1247+00.00 TO STA.1242+00.00
STA.1230+00.00 TO STA.1215+00.00



TYPICAL OPEN SECTION "A"
STA.1242+00.00 TO STA.1240+00.00
STA.1233+00.00 TO STA.1230+00.00
STA.1215+00.00 TO STA.1214+00.00

TYPICAL OPEN SECTION "A"
STA.1240+00.00 TO STA.1233+00.00



TYPICAL OPEN SECTION
STA.1247+00.00 TO STA.1214+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
NORTH BROADWAY TO ALHAMBRA AVE

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-25

LOS ANGELES RIVER CHANNEL
Pasadena Fwy to North Broadway

Construction Data

Contract No:	DA 1413	Start: 21 April 1941
	Griffith Co	Finish: January 1942
Specifications:	CIVENG 41-112	
Plans:	D.O. Series 303/1-75, 304/1-15	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT	
	Arroyo Seco to North Broadway	

Local Assurances

Resolution Dated:

Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-26

To Right Berm: none
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
S.P. Ry	4	0	S.P.R.R.
North Broadway	2	0	City of Los Angeles

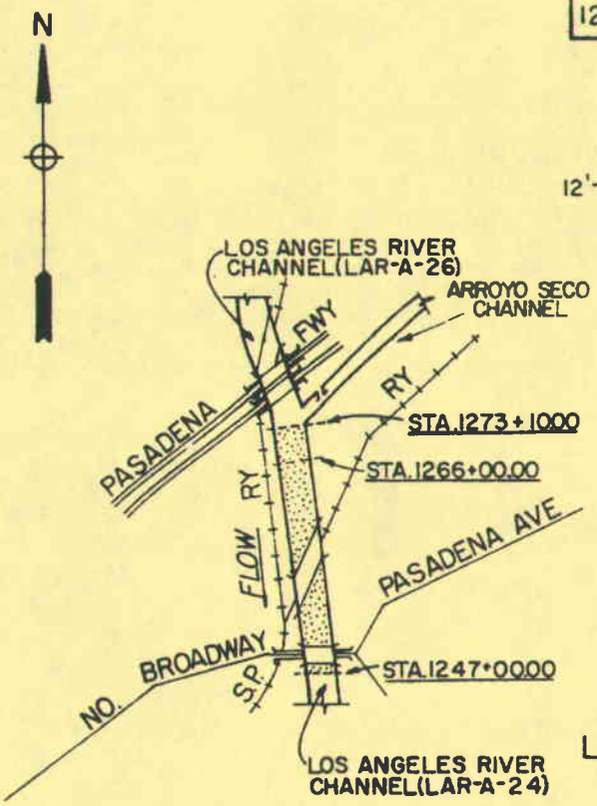
Reporting Features

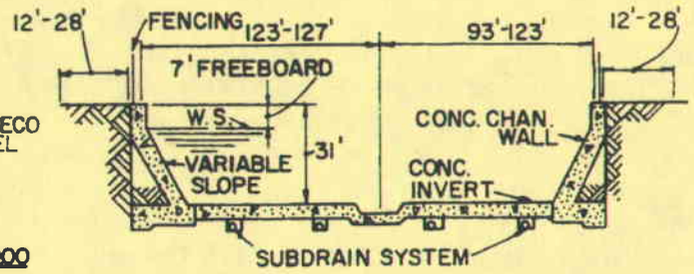
Along Channel	At a Channel Station
Earth levee	Side drain
Concrete channel invert	Bridge
Concrete channel side slopes	Public utility
Concrete channel walls	
Concrete toe protection	
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS

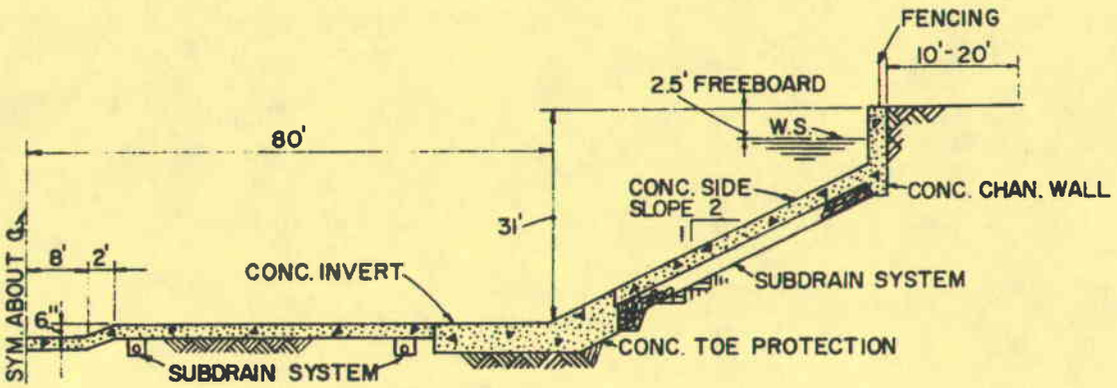
DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1273+10.00	1247+00.00	TRAP.	16.6 - 35.0	104,000





TYPICAL OPEN SECTION
STA.1273+10.00 TO STA.1266+00.00



TYPICAL OPEN SECTION
STA.1266+00.00 TO STA.1247+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- ------ CONST. PROJECT LIMIT
- ——— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

PASADENA FWY TO NORTH BROADWAY

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-26

LOS ANGELES RIVER CHANNEL
Golden State Fwy to Pasadena Fwy

Construction Data

Contract No: Force Account Start: 1939
Finish: January 1940

Plans: D.O. Series 319/2-81
Folio Title: LOS ANGELES RIVER IMPROVEMENT
Dayton Ave to Arroyo Seco

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: on right side at Riverside Dr (sta 1286+55±)
Type: Recording (LACFCD--F57C-R)
Staff Gage Reading at One-third Capacity: 9.1 ft on gage (27,900 cfs)

Access Ramps

To Invert: from Arroyo Seco Channel off San Fernando Rd

To Right Berm: Riverside Dr
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Golden State Fwy	1	0	State of California
Figueroa St	0	2	City of Los Angeles
S.P. Ry	1	2	S.P.R.R.
Pasadena Fwy	0	2	State of California

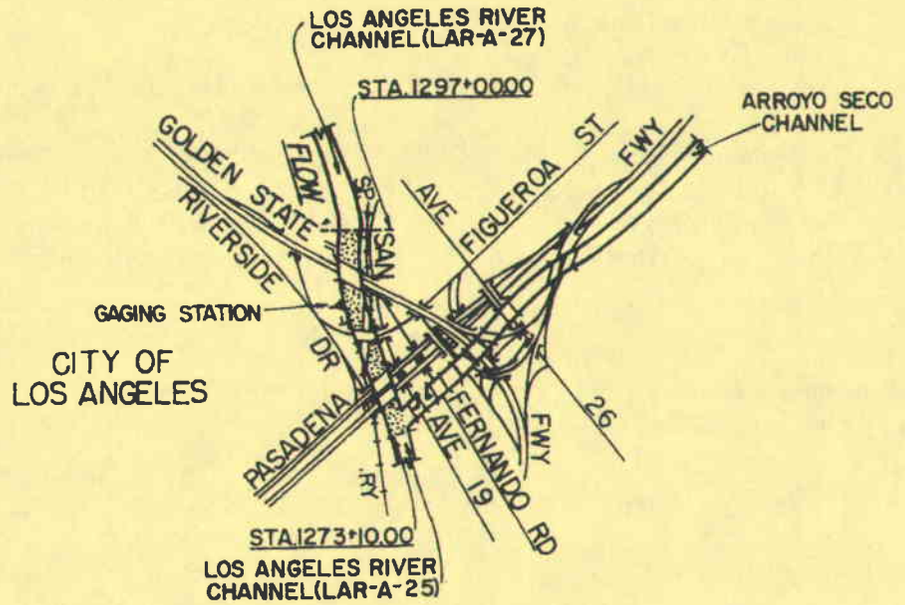
Reporting Features

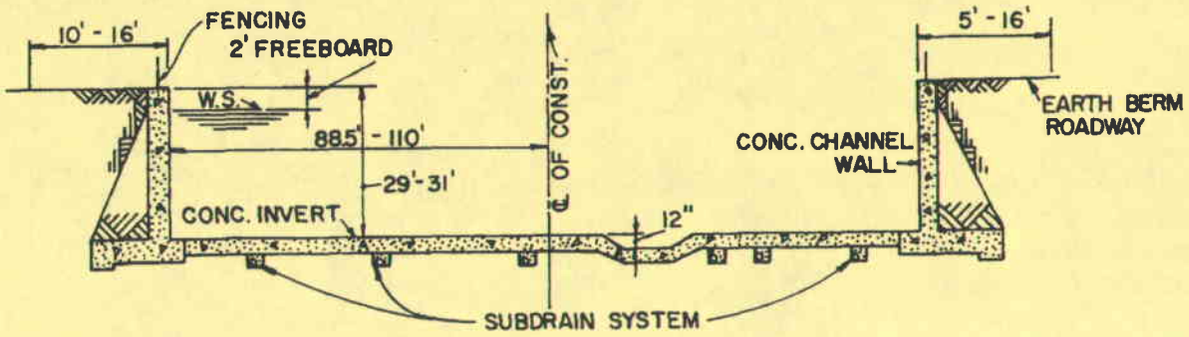
Along Channel	At a Channel Station
Concrete channel invert	Earth berm-access ramp
Concrete channel walls	Concrete invert-access ramp
Earth berm roadway	Side drain
Subdrain system	Gaging station
Fencing	Public utility
Rights-of-way	Bridge

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
1297+00.00	1278+86.07	RECT.	18.9 - 11.3	83,700
1278+86.07	1273+10.00	RECT.	28.5 - 18.9	104,000





TYPICAL OPEN SECTION

STA.1297+00.00 TO STA.1273+10.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM TURN AROUND
- ------ CONST PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL GOLDEN STATE FWY TO PASADENA FWY

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-A-26

DATA SHEET
LAR-A-27

LOS ANGELES RIVER CHANNEL
Blimp St to Golden State Fwy

Construction Data

Contract No:	DA 56-201 Clyde W. Wood and Sons, Inc	Force Account
Specifications:	CIVENG 56-69	
Plans:	D.O. Series 315/95-100	D.O. LA311/1-95
Start:	5 July 1956	1938
Finish:	26 September 1956	October 1938
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Blimp St to Dayton Ave	LOS ANGELES RIVER IMPROVEMENT Fletcher Dr to Dayton Ave

Local Assurances

Resolution dated:

Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data:

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-26

To Right Berm: none

To Left Berm: none

Bridges

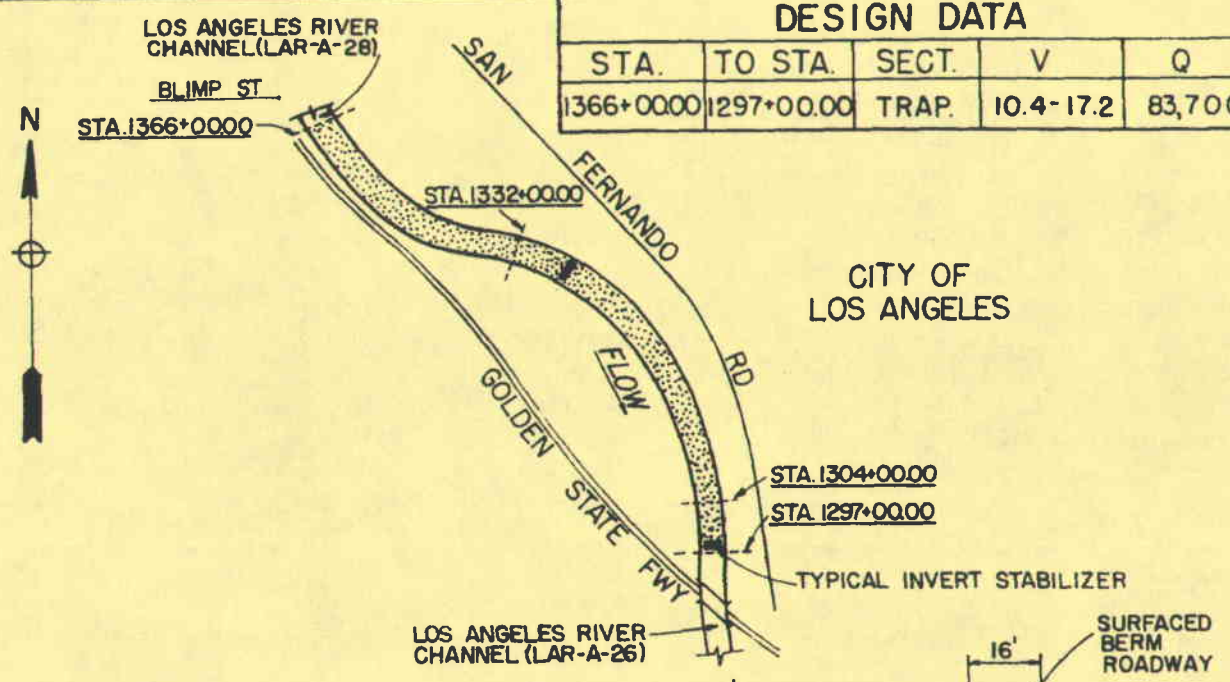
none

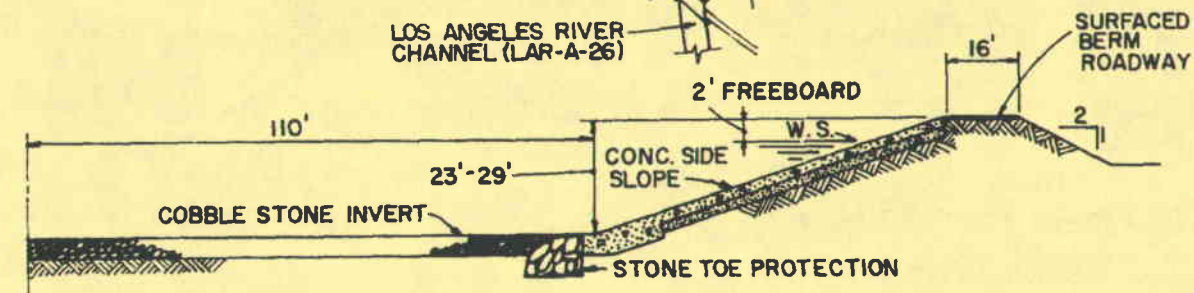
Reporting Features

Along Channel	At a Channel Station
Earth channel levee	Stone invert stabilizer
Concrete and stone channel side slopes	Side drain
Stone channel invert	Public utility
Surfaced berm roadway	
Stone toe protection	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

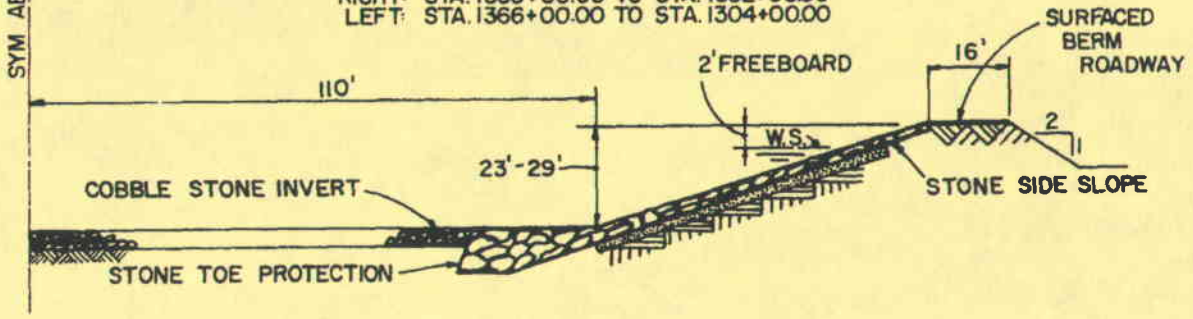
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1366+00.00	1297+00.00	TRAP.	10.4-17.2	83,700





TYPICAL OPEN SECTION

RIGHT: STA. 1366+00.00 TO STA. 1332+00.00
LEFT: STA. 1366+00.00 TO STA. 1304+00.00



TYPICAL OPEN SECTION

RIGHT: STA. 1332+00.00 TO STA. 1297+00.00
LEFT: STA. 1304+00.00 TO STA. 1297+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- ----- CONST. PROJECT LIMIT
- ——— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL BLIMP ST TO GOLDEN STATE FWY

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-28

LOS ANGELES RIVER CHANNEL
Hyperion Ave to Blimp St

Construction Data

Contract No:	DA 56-94	Force Account
	Clyde Woods and Sons, Inc	
Specifications:	CIVENG 56-20	
Plans:	D.O. Series 315/95-100	LA311/1-95
Start:	13 February 1956	1938
Finish:	17 July 1956	October 1938
Folio Title:	LOS ANGELES RIVER IMPROVEMENT	LOS ANGELES RIVER IMPROVEMENT
	Hyperion Blvd to Blimp St	Fletcher Dr to Dayton Ave

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-26

To Right Berm: Acresite St, Fletcher Dr, through S.P. yards
To Left Berm: Glendale Blvd, Fletcher Dr, Ripple St

Bridges

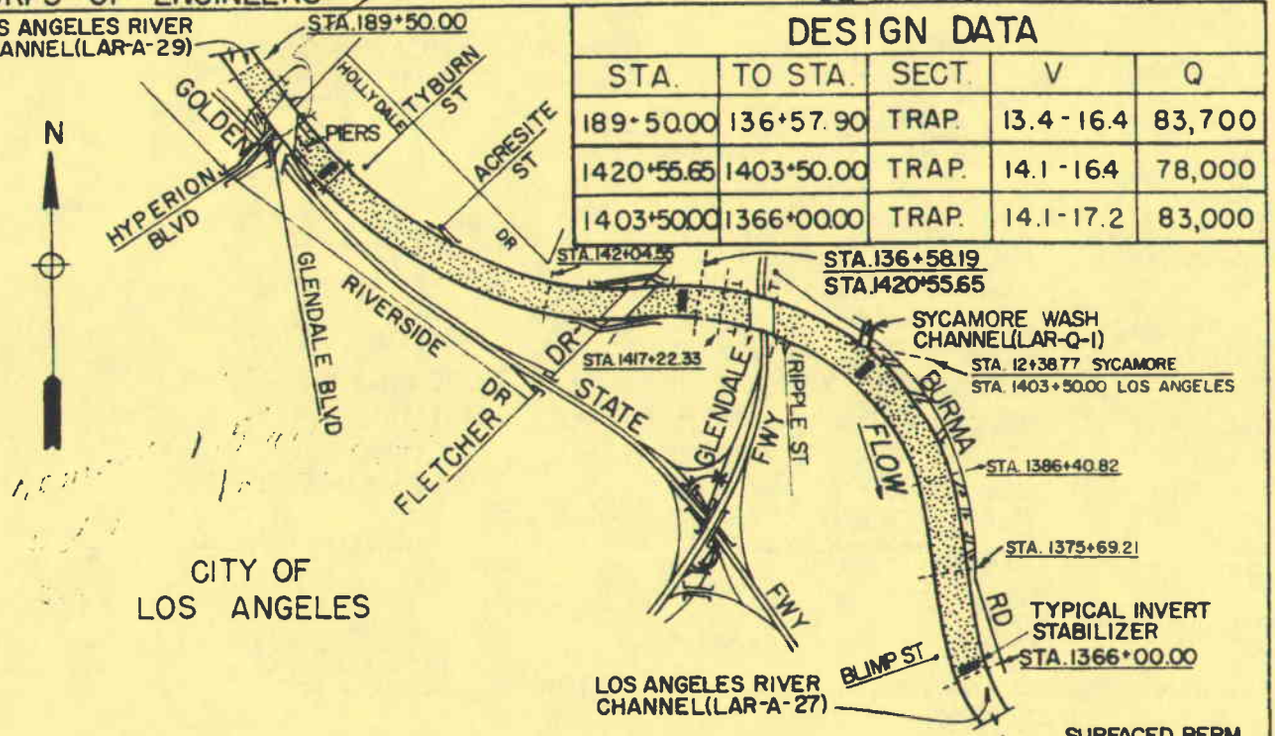
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Glendale Blvd	7	0	City of Los Angeles
Sta 177+60	2	0	Utility crossing
Fletcher Dr	8	0	State of California
Glendale Fwy	2	0	State of California

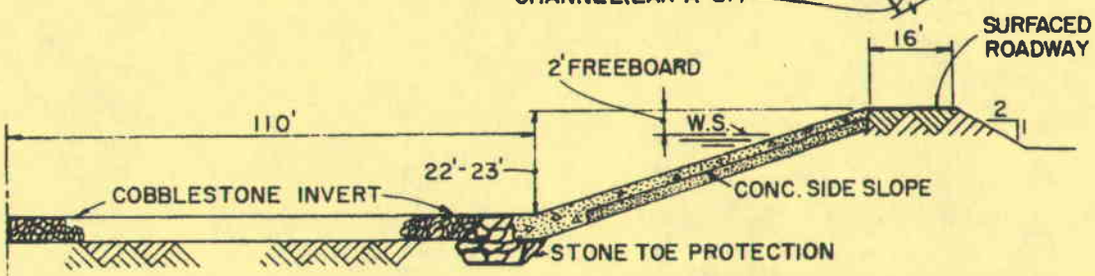
Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced and earth berm-access ramp
Concrete and stone channel side slopes	Stone invert stabilizer
Stone toe protection	Side drain
Stone channel invert	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

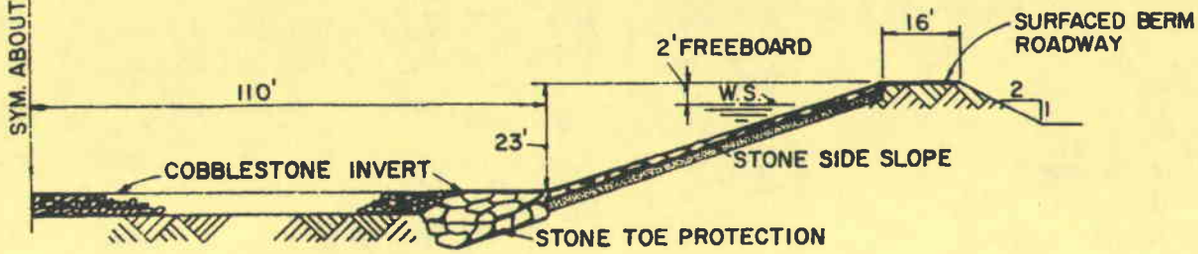
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
189+50.00	136+57.90	TRAP.	13.4 - 16.4	83,700
1420+55.65	1403+50.00	TRAP.	14.1 - 16.4	78,000
1403+50.00	1366+00.00	TRAP.	14.1 - 17.2	83,000





TYPICAL OPEN SECTION

RIGHT: STA.189+50.00 TO STA.1417+22.33
STA.1386+40.82 TO STA.1366+00.00
LEFT: STA.142+04.55 TO STA.1375+69.21



TYPICAL OPEN SECTION

RIGHT: STA.1417+22.33 TO STA.1386+40.82
LEFT: STA.189+50.00 TO STA.142+04.55
STA.1375+69.21 TO STA.1366+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- UTILITY BRIDGE
- ----- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
HYPERION AVE TO BLIMP ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-29

LOS ANGELES RIVER CHANNEL
Los Feliz Blvd to Hyperion Ave

Construction Data

Contract No:	DA 56-6 and DA 60-45	Force Account
	J.B. Stringfellow	
	Hubbs Const Co, Inc	
Specifications:	CIVENG 56-1 and CIVENG 59-23	
Plans:	D.O. Series 315/87-111	LA65/1-137
Start:	26 August 1955; 9 September 1959	1938
Finish:	22 March 1955; 6 November 1959	October 1938
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Mariposa St to Dayton Ave	LOS ANGELES RIVER IMPROVEMENT Mariposa St to Fletcher Dr

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-26

To Right Berm: Los Feliz Blvd, Legion Ln
To Left Berm: Los Feliz Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Los Feliz Blvd	5	0	City of Los Angeles
Sunnynook Dr	8	0	City of Los Angeles (footbridge)

Reporting Features

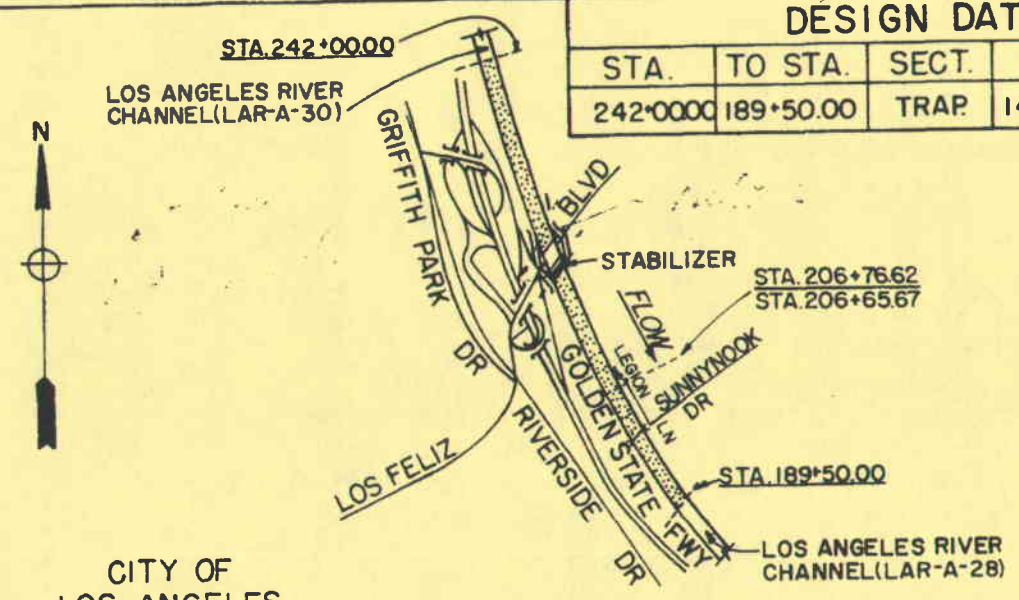
Along Channel	At a Channel Station
Surfaced berm roadway	Earth berm-access ramp
Stone channel invert	Stone invert stabilizer
Concrete and stone channel side slopes	Side drain
Concrete and stone toe protection	Bridge
Fencing	Public utility
Rights-of-way	

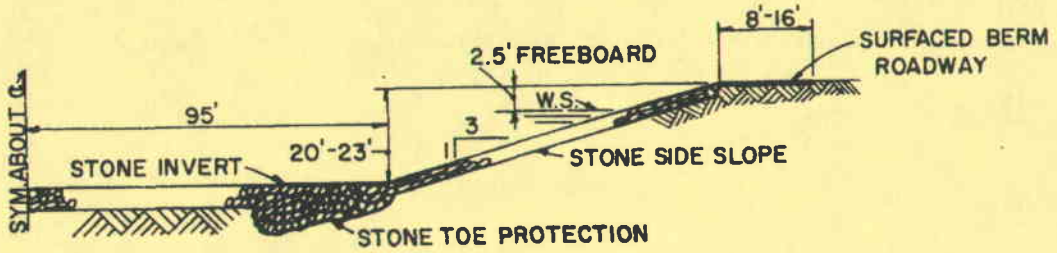
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

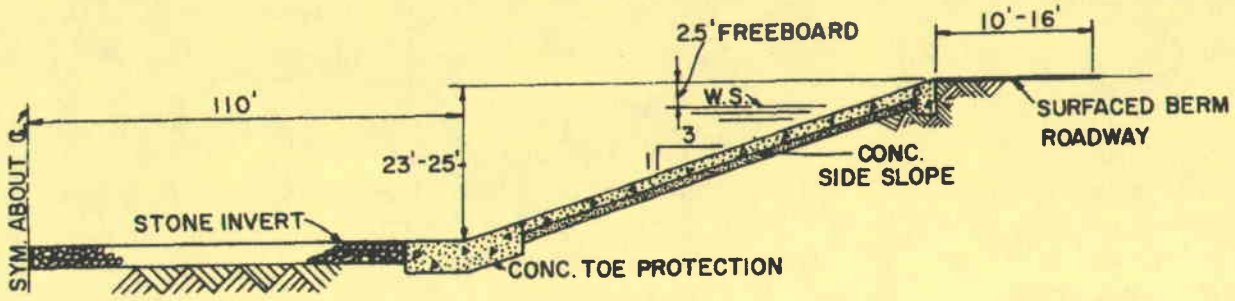
STA.	TO STA.	SECT.	V	Q
242+0000	189+50.00	TRAP.	14.0-18.7	78,000





TYPICAL OPEN SECTION

RIGHT: STA. 242+00.00 TO STA. 206+76.62
LEFT: STA. 242+00.00 TO STA. 189+50.00



TYPICAL OPEN SECTION

RIGHT: STA. 206+65.67 TO STA. 189+50.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- FOOTBRIDGE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

LOS FELIZ BLVD TO HYPERION AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-30

LOS ANGELES RIVER CHANNEL
Doran St to Los Feliz Blvd

Construction Data

Contract No:	ENG 3656 and Da 56-6 Clyde W. Wood and Sons, Inc J.B. Stringfellow	Force Account
Specifications:	CIVENG 55-1 and CIVENG 56-1	
Plans:	D.O. Series 315/82-94	LA65/1-137
Start:	21 August 1954	1938
Finish:	19 November 1954	May 1939
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Victory Blvd to Los Feliz Blvd	LOS ANGELES RIVER IMPROVEMENT Mariposa St to Fletcher Dr

Local Assurances

Resolution Dated:

Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-35

To Right Berm: Zoo Dr
To Left Berm: Colorado Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Colorado St	2	0	State of California

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Concrete and stone channel invert	Concrete equestrian ramp
Concrete and stone channel side slopes	Stone invert stabilizer
Stone toe protection	Side drain
Concrete channel walls	Bridge
Fencing	Public utility
Subdrain system	
Rights-of-way	

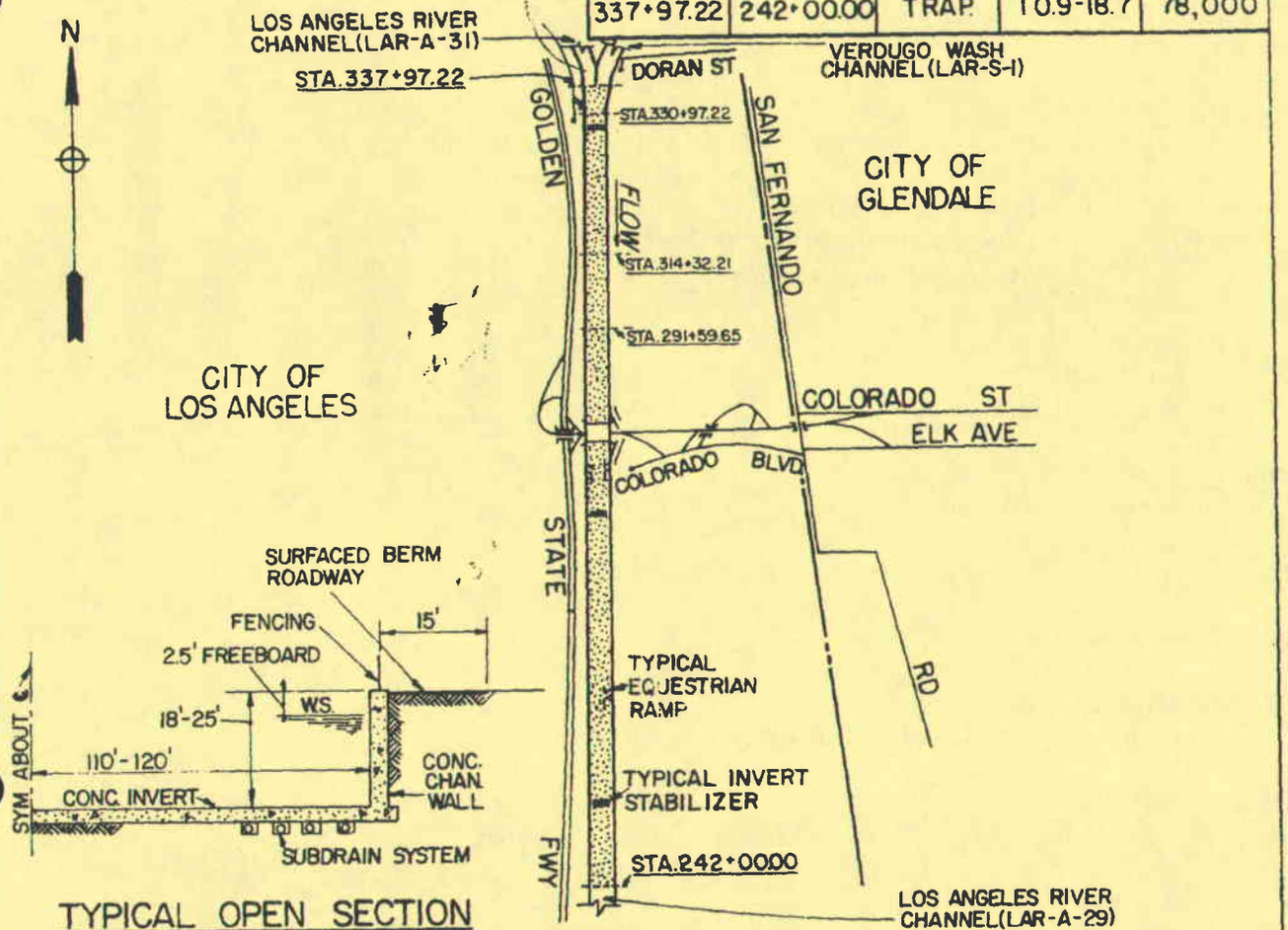
LAR-A-30

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
337+97.22	242+00.00	TRAP.	10.9-18.7	78,000



TYPICAL OPEN SECTION
STA.337+97.22 TO STA.330+97.22

STONE SIDE SLOPES
RIGHT BANK: STA.291+59.65 TO STA.242+00.00
LEFT BANK: STA.314+32.21 TO STA.242+00.00

TYPICAL OPEN SECTION
STA.330+97.22 TO STA.242+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
DORAN ST TO LOS FELIZ BLVD

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-30

OPERATION AND MAINTENANCE MANUAL

DATA SHEET LAR-A-31

LOS ANGELES RIVER CHANNEL
Golden State Fwy to Doran St

Construction Data

Contract No: Force Account — Start: 1938, Finish: May 1939

Plans: D.O. Series 315/1-79, 316/1-87, 317/1-24, 331/1-52

Folio Title: LOS ANGELES RIVER IMPROVEMENT
Mariposa St to Fletcher Ave

Local Assurances

Resolution Dated:

Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-35

To Right Berm: Zoo Dr

To Left Berm: from Glendale Water Dept., Doran St

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Los Angeles River:			
Golden State Fwy	2	0	State of California
Ventura Fwy	1	1	State of California
Verdugo Wash:			
San Fernando Rd	1	2	City of Glendale

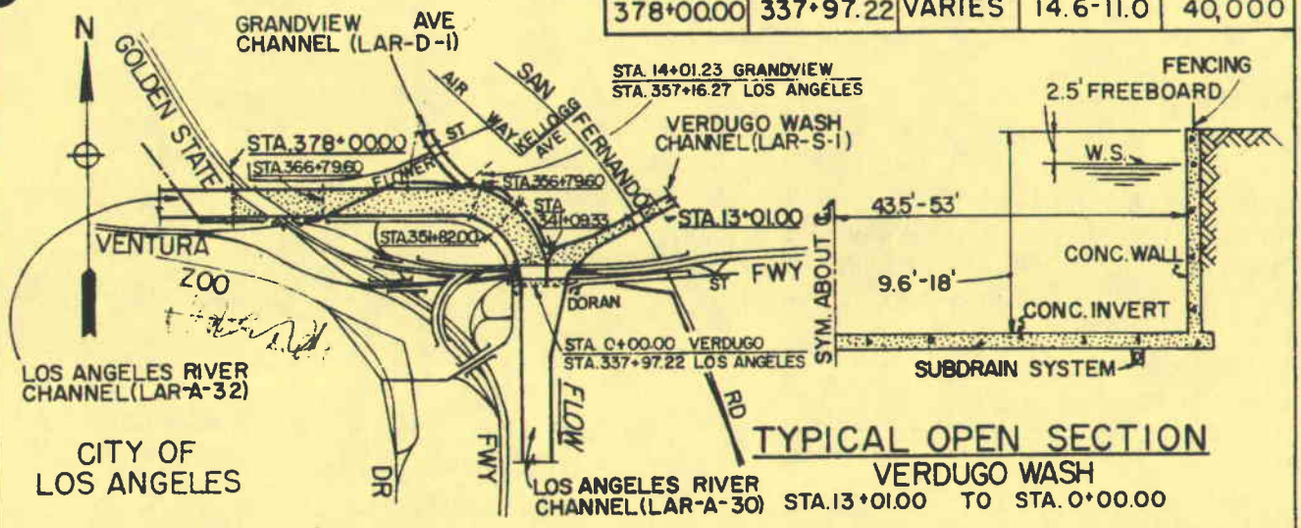
Reporting Features

Along Channel	At a Channel Station
Concrete and stone channel invert	Side drain
Concrete channel walls	Bridge
Stone channel side slopes	Surfaced berm-access ramp
Surfaced berm roadway	Side overflow spillway
Stone toe protection	Public utility
Subdrain system	
Fencing	
Rights-of-way	

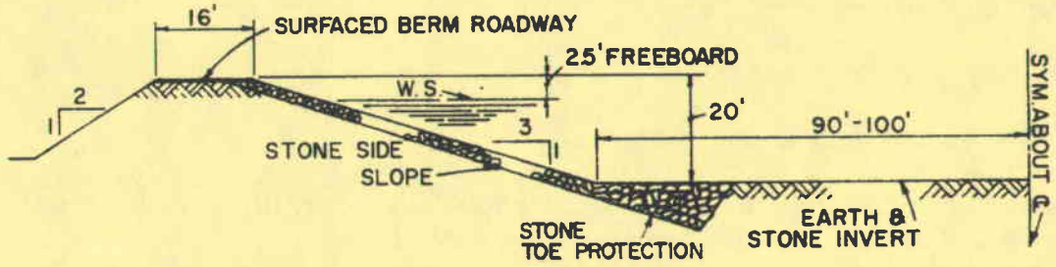
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

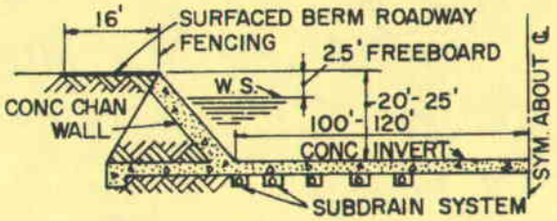
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
378+00.00	337+97.22	VARIES	14.6-11.0	40,000

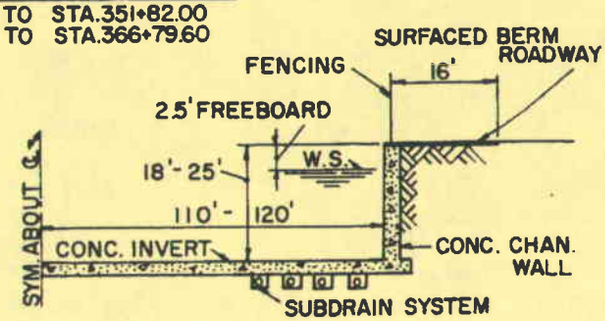


TYPICAL OPEN SECTION
VERDUGO WASH
STA. 13+01.00 TO STA. 0+00.00



TYPICAL OPEN SECTION
RIGHT: STA. 378+00.00 TO STA. 351+82.00
LEFT: STA. 378+00.00 TO STA. 366+79.60





TYPICAL OPEN SECTION
STA. 351+82.00 TO STA. 341+09.33
STA. 366+79.60 TO STA. 356+79.60

RIGHT
LEFT

TYPICAL OPEN SECTION
STA. 341+09.33 TO STA. 337+97.22
STA. 356+79.60 TO STA. 337+97.22

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- ------ CONST. PROJECT LIMIT
- ——-- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
GOLDEN STATE FWY TO DORAN ST

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-32

LOS ANGELES RIVER CHANNEL
Mariposa St to Golden State Fwy

Construction Data

Contract No: Force Account — Start: 1938, Finish: 1939

Specifications: CIVENG 60-2
Plans: D.O. Series 65/80-137, 313/3, 4, 63
Folio Title: LOS ANGELES RIVER IMPROVEMENT
Mariposa St to Fletcher Dr

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-26 or LAR-A-35

To Right Berm: Forest Lawn Dr, from westbound Ventura Fwy, Victory Blvd
To Left Berm: Western Ave (from equestrian trail)

Bridges

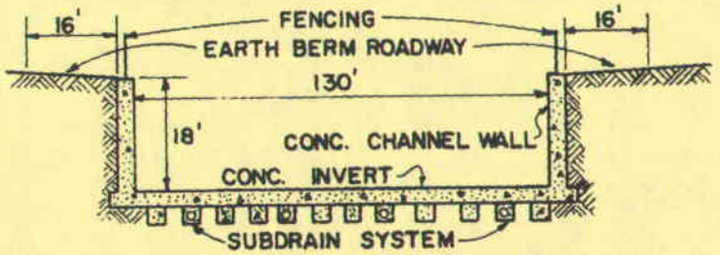
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 427+75	0	0	City of Los Angeles (utility crossing)
Victory Blvd	4	0	City of Los Angeles
Golden State Fwy	2	2	State of California

Reporting Features

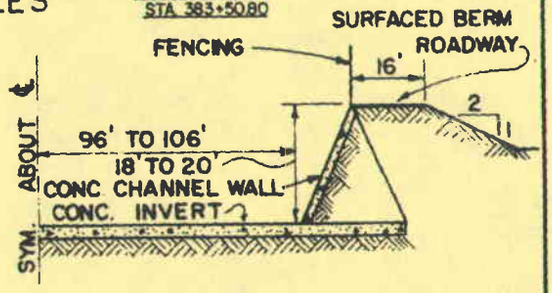
Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Concrete channel invert	Concrete confluence section
Earth and stone channel invert	Stone invert stabilizer
Concrete channel side slopes	Side drain
Stone toe protection	Side overflow spillway
Concrete channel walls	Public utility
Fencing	Bridge
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

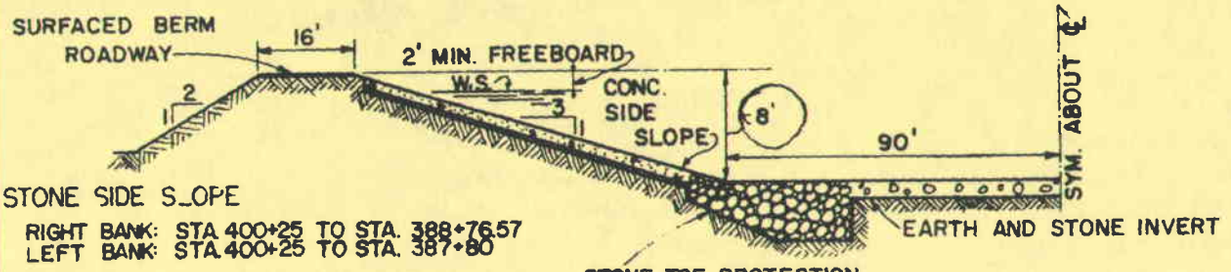
DESIGN DATA				
STA.	TO STA.	SECT	V	Q
446+00	410+00	RECT.	23	40,000
410+00	378+00	TRAP.	14 - 30	40,000



STA. 446+00 TO STA. 410+00



STA 410+00 TO STA. 405+00



STONE SIDE SLOPE

RIGHT BANK: STA 400+25 TO STA. 388+76.57
LEFT BANK: STA 400+25 TO STA. 387+80

RIGHT BANK: STA. 383+50.80 TO STA. 378+00
LEFT BANK: STA. 384+70 TO STA. 378+00

EARTH AND STONE INVERT

STONE TOE PROTECTION

CONCRETE INVERT
STA. 387+80 TO 384+50

TYPICAL OPEN SECTIONS

STA. 405+00 TO STA. 378+00

LEGEND

- OPEN SECTION
- BRIDGE
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT
- TYPICAL BERM-ACCESS RAMP

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA
LOS ANGELES RIVER CHANNEL
MARIPOSA ST TO GOLDEN STATE FWY

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-33

LOS ANGELES RIVER CHANNEL
Niagara St to Mariposa St

Construction Data

Contract No: Force Account
Start: 1938
Finish: February 1939

Plans: LA309/2-58
Folio Title: LOS ANGELES RIVER IMPROVEMENT
Lankershim Blvd to Mariposa St

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: at Mariposa St (abandoned)

Access Ramps

To Invert: none; use LAR-A-35

To Right Berm: Forest Lawn Dr, from Ventura Fwy
To Left Berm: Catalina St, Riverside Dr, Beachwood Dr, from Edison right-of-way

Bridges

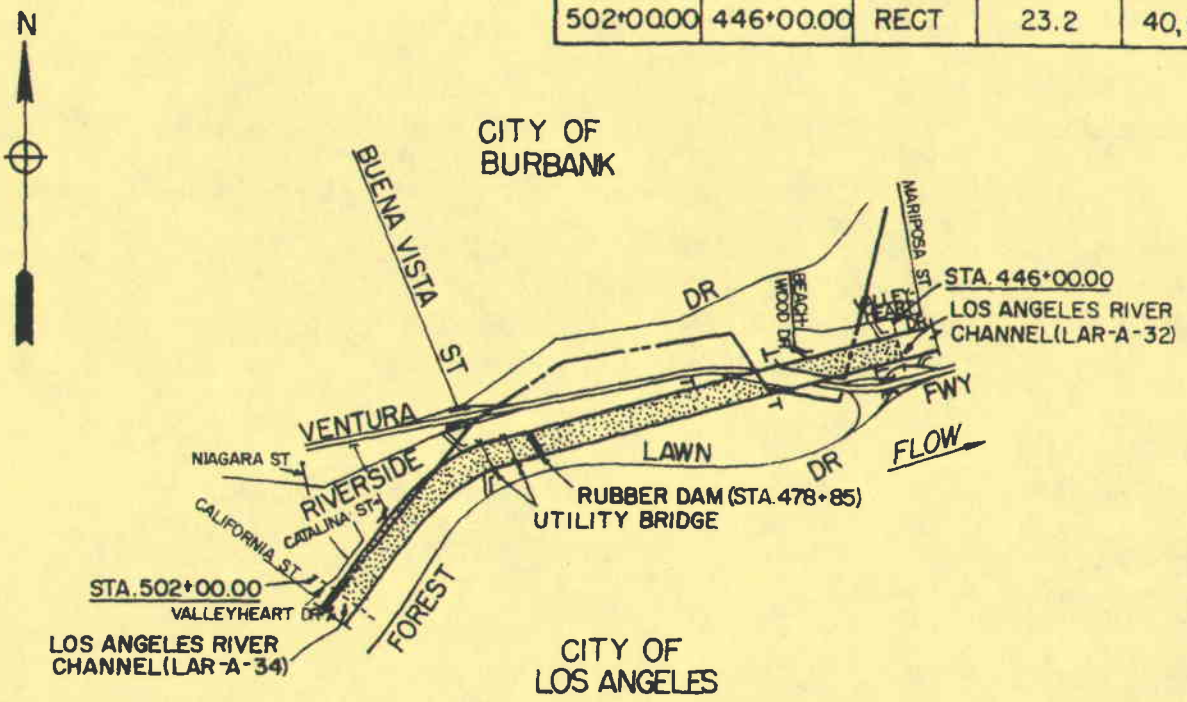
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 501+75	0	0	Southern Counties Gas Co (footbridge)
Sta 501+70	1	0	Utility crossing
Ventura Fwy	0	0	State of California

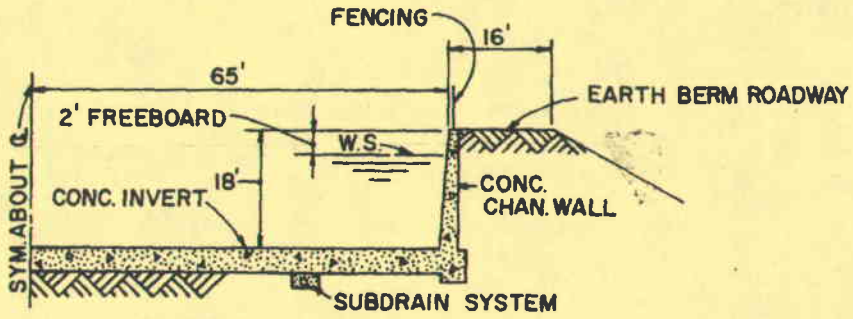
Reporting Features

Along Channel
Concrete channel walls
Concrete channel invert
Earth berm roadway
Subdrain system
Fencing
Rights-of-way

At a Channel Station
Side drain
Surfaced berm-access ramp
Rubber dam
Bridge
Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
502+00.00	446+00.00	RECT	23.2	40,000





TYPICAL OPEN SECTION
STA. 502+00.00 TO STA. 446+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
NIAGARA ST TO MARIPOSA ST

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-34

LOS ANGELES RIVER CHANNEL
Lankershim Blvd to Niagara St

Construction Data

Contract No: ENG 1971
Vinnel Co, Inc
Ralph A. Bell

Start: 23 April 1947
Finish: 28 May 1948

Specifications: CIVENG 47-21
Plans: D.O. Series 310/30-54
Folio Title: LOS ANGELES RIVER IMPROVEMENT
Niagara St to Lankershim Blvd

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-35

To Right Berm: Forest Lawn Dr
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 588+50	0	0	Universal Studios (utility crossing)
Barham Blvd	4	0	City of Los Angeles

Reporting Features

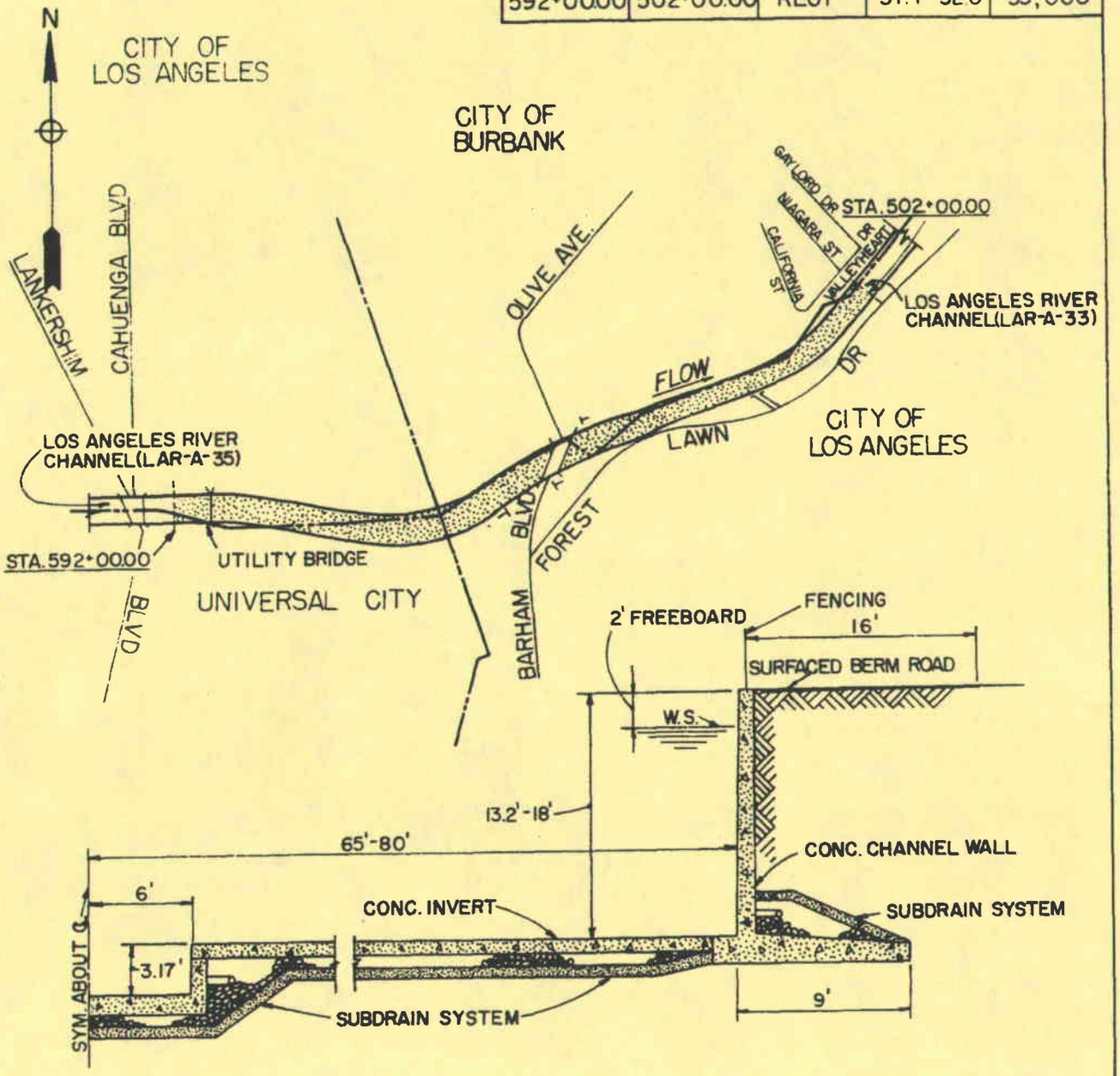
Along Channel
Concrete channel invert
Concrete channel walls
Subdrain system
Surfaced berm roadway
Fencing
Rights-of-way

At a Channel Station
Surfaced berm-access ramp
Side drain
Side overflow spillway
Bridge
Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
592+00.00	502+00.00	RECT	31.1-32.0	55,000



TYPICAL OPEN SECTION

STA. 592+00.00 TO STA. 502+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- ----- CONST. PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

LANKERSHIM BLVD TO NIAGARA ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-A-34

DATA SHEET LOS ANGELES RIVER CHANNEL
LAR-A-35 Radford Ave to Lankershim Blvd

Construction Data

Contract No:	ENG 2187	Start:	1 January 1948
	Bressi and Bevanda Const, Inc	Finish:	11 May 1949
Specifications:	CIVENG 48-19		
Plans:	D.O. Series 340/1-29		
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Lankershim Blvd to Tujunga Wash		

Local Assurances

Resolution Dated: 25 April 1944
Operation and Maintenance Transferred to: LACFCD, 3 September 1950

Stormflow Data

Gaging Station Location: upstream of Tujunga Ave (sta 666+79)
Type: Recording (Corps of Engineers)
Staff Gage Reading at One-third Capacity: 7.0 ft on gage (11,400 cfs)

Access Ramps

To Invert: from Willowcrest Ave off Lankershim Blvd (sta 611+40)

To Right Berm: Tujunga Ave, Vineland Ave, Willowcrest Ave, through Universal Studios
To Left Berm: from Tujunga Wash, Colfax Ave, Fair Ave

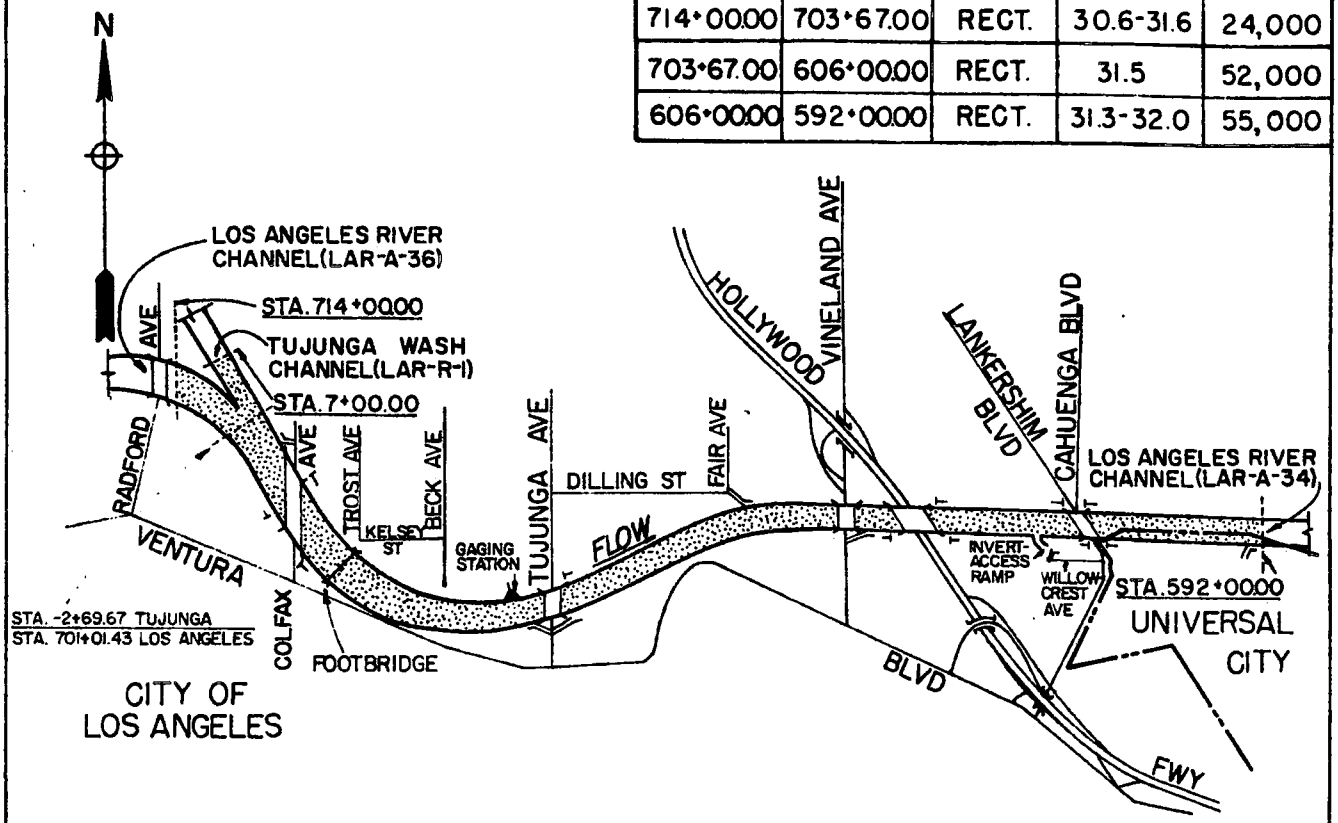
Bridges

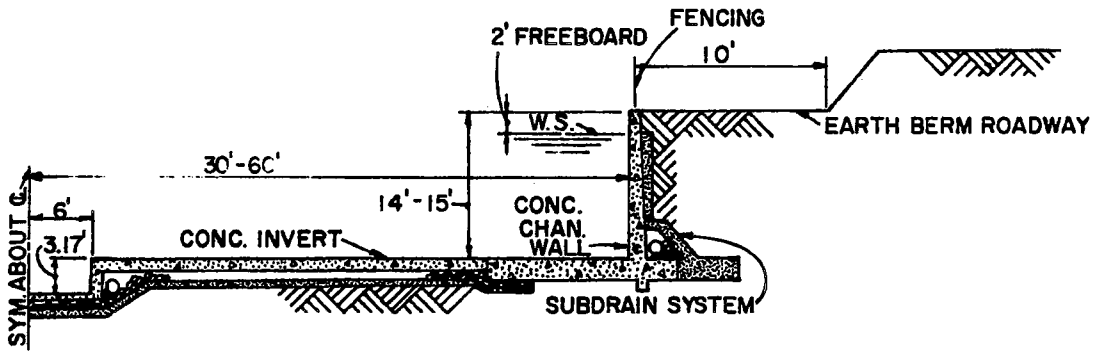
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Colfax Ave	0	0	City of Los Angeles
Sta 692+39	0	0	City of Los Angeles (footbridge)
Tujunga Ave	0	0	City of Los Angeles
Vineland Ave	0	2	City of Los Angeles
Hollywood Fwy	1	0	State of California
Lankershim Blvd	0	0	City of Los Angeles

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth and surfaced berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Gaging station
Subdrain system	Side drain
Fencing	Bridge
Rights-of-way	Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
714+00.00	703+67.00	RECT.	30.6-31.6	24,000
703+67.00	606+00.00	RECT.	31.5	52,000
606+00.00	592+00.00	RECT.	31.3-32.0	55,000





TYPICAL OPEN SECTION

STA. 714+00.00 TO STA. 592+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
RADFORD AVE TO LANKERSHIM BLVD

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-35

DATA SHEET LOS ANGELES RIVER CHANNEL
LAR-A-36 Whitsett Ave to Radford Ave

Construction Data

Contract No:	ENG 2532	Start: 11 April 1949
	Matich Bros and Y.L. Yeger	Finish: 27 February 1950
Specifications:	CIVENG 49-47	
Plans:	D.O. Series 395/1-69	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT	
	Tujunga Wash to Whitsett Ave	

Local Assurances

Resolution Dated: 19 September 1944
Operation and Maintenance Transferred to: LACFCD, 17 March 1950

Stormflow Data

Gaging Station Location: downstream of Radford Ave (abandoned)

Access Ramps

To Invert: none; use LAR-A-35

To Right Berm:	Ventura Ct, Radford Ave
To Left Berm:	Valleyheart Dr, Laurel Canyon Blvd, Valleyheart Dr, from parking lot off Radford Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Whitsett Ave	0	2	City of Los Angeles
Sta 747+48	0	0	City of Los Angeles (footbridge)
Laurel Canyon Blvd	0	2	City of Los Angeles
Radford Ave	0	2	City of Los Angeles
Sta 714+25	0	0	LACFCD (gaging station footbridge)

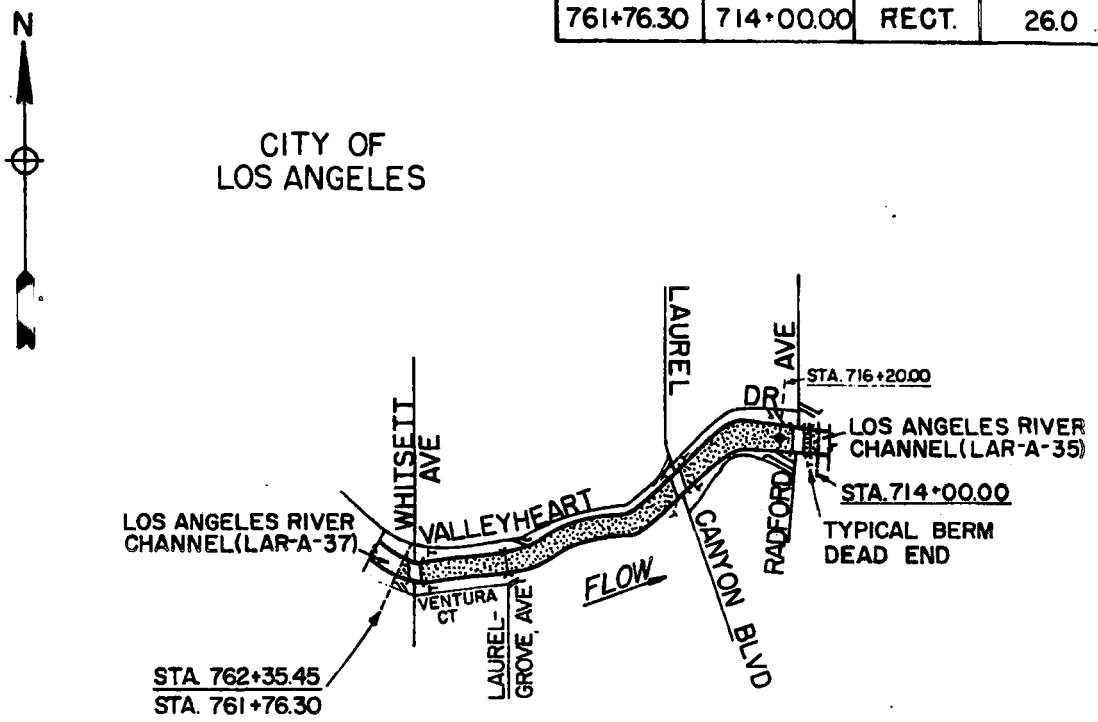
Reporting Features

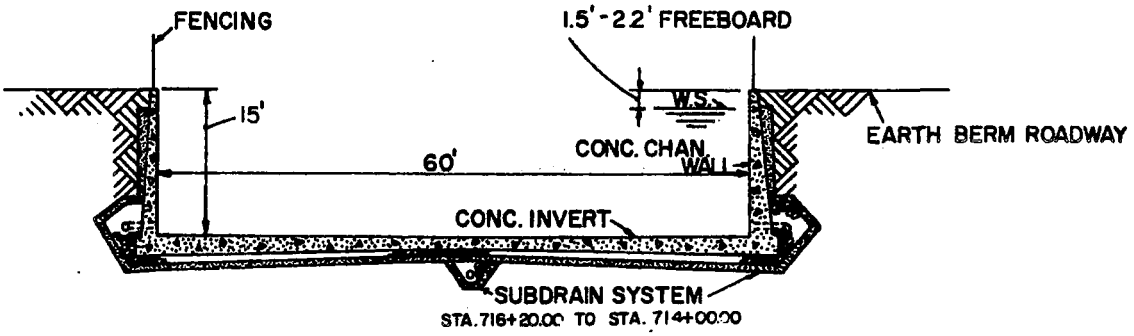
Along Channel	At a Channel Station
Earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Subdrain system	Public utility
Fencing	Subdrain manhole
Rights-of-way	

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
761+76.30	714+00.00	RECT.	26.0	21,500





TYPICAL OPEN SECTION

STA. 761+76.30 TO STA. 714+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- CONST. PROJECT LIMIT
- SUBDRAIN MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL WHITSETT AVE TO RADFORD AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-A-36

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-37

LOS ANGELES RIVER CHANNEL
Fulton Ave to Whitsett Ave

Construction Data

Contract No:	ENG 192	Start: 31 March 1950
	A. Teichert and Son, Inc	Finish: 19 January 1951
Specifications:	CIVENG 50-16	
Plans:	D.O. Series 402/1-56	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Whitsett Ave to Fulton Ave	

Local Assurances
Resolution Dated: 19 September 1944
Operation and Maintenance Transferred to: LACFCD, 11 September 1951

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none; use LAR-A-38

To Right Berm: Coldwater Canyon Ave, Whitsett Ave
To Left Berm: Valleyheart Dr

Bridges

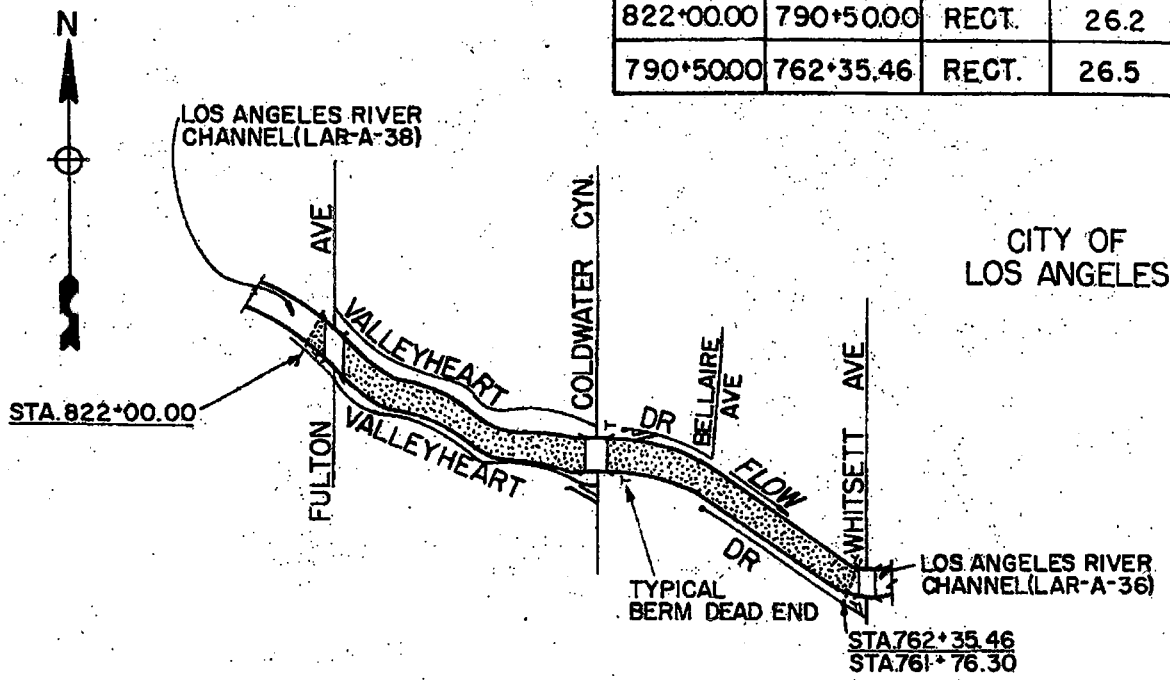
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Fulton Ave	0	2	City of Los Angeles
Coldwater Canyon Ave	0	2	City of Los Angeles

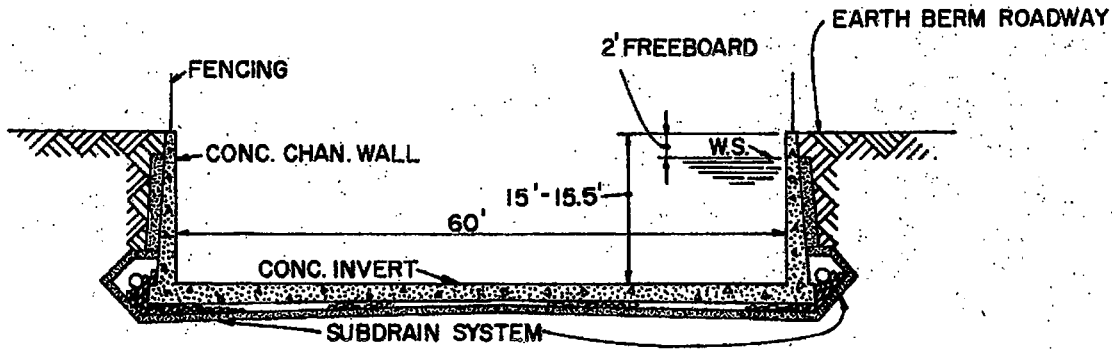
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Subdrain system	Public utility
Fencing	
Rights-of-way	

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
822+00.00	790+50.00	RECT.	26.2	21,000
790+50.00	762+35.46	RECT.	26.5	21,500





TYPICAL OPEN SECTION

STA.822+00.00 TO STA.762+35.46

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
FULTON AVE TO WHITSETT AVE

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-37

DATA SHEET
LAR-A-38

LOS ANGELES RIVER CHANNEL
Van Nuys Blvd to Fulton Ave

Construction Data

Contract No:	ENG 1043	Start: 13 March 1951
	A. Teichert and Son, Inc	Finish: 29 February 1952
Specifications:	CIVENG 51-19	
Plans:	D.O. Series 407/1-79	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Fulton Ave to Van Nuys Blvd	

Local Assurances

Resolution Dated: 19 September 1944
Operation and Maintenance Transferred to: LACFCD, 21 March 1952

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from right berm off Valleyheart Dr (sta 882+24)

To Right Berm:	Valleyheart Dr, Woodman Ave, Moorpark St
To Left Berm:	Riverside Dr, Valleyheart Dr, Tyrone Ave, Hazeltine Ave, Woodman Ave, Moorpark St

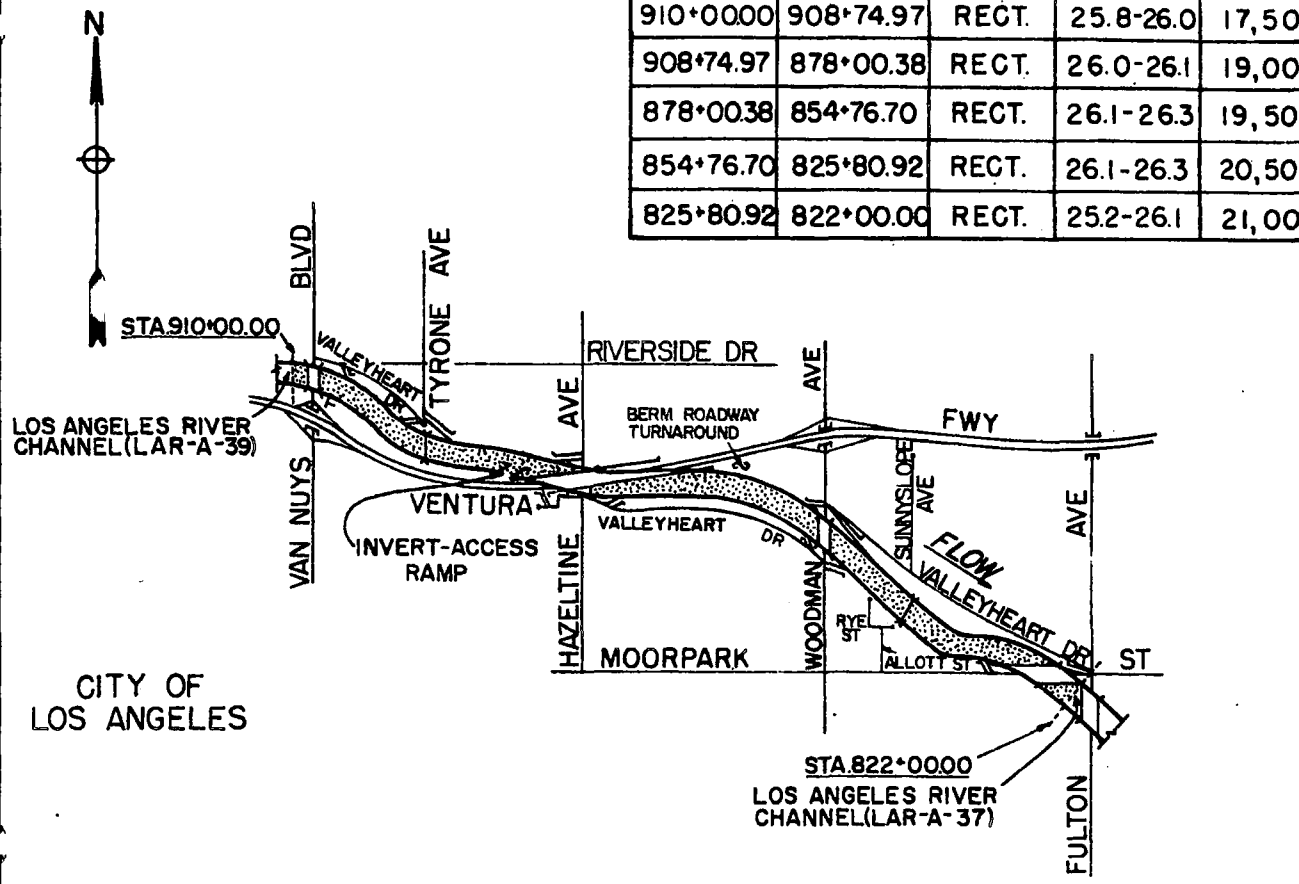
Bridges

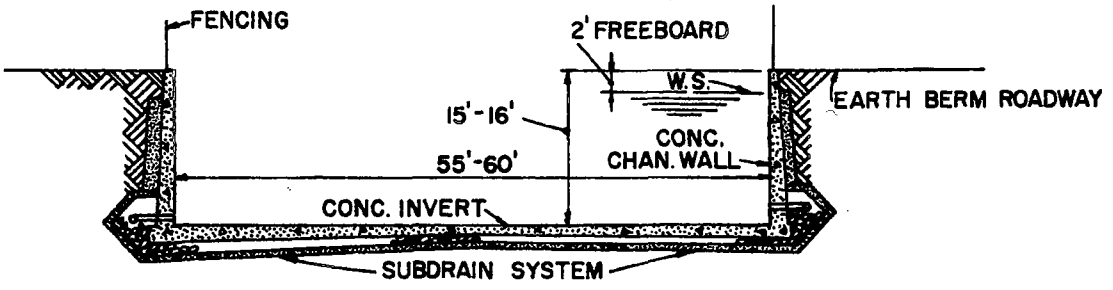
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Van Nuys Blvd	0	2	City of Los Angeles
Sta 893+40 (Tyrone Ave)	0	0	City of Los Angeles (footbridge)
Ventura Fwy	0	0	State of California
Hazeltine Ave	0	2	State of California
Woodman Ave	0	2	City of Los Angeles
Sta 835+24± (Sunnyslope Ave)	0	0	City of Los Angeles (footbridge)
Moorpark St	0	2	City of Los Angeles

Reporting Features

Along Channel	At a Channel Station
Earth and surfaced berm roadway	Earth berm-access ramp
Concrete channel walls	Concrete invert-access ramp
Concrete channel invert	Side drain
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
910+00.00	908+74.97	RECT.	25.8-26.0	17,500
908+74.97	878+00.38	RECT.	26.0-26.1	19,000
878+00.38	854+76.70	RECT.	26.1-26.3	19,500
854+76.70	825+80.92	RECT.	26.1-26.3	20,500
825+80.92	822+00.00	RECT.	25.2-26.1	21,000





TYPICAL OPEN SECTION

STA.910+00.00 TO STA.822+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
VAN NUYS BLVD TO FULTON AVE

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-A-38

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-39

LOS ANGELES RIVER CHANNEL
Sepulveda Flood Control Basin to Van Nuys Blvd

Construction Data

Contract No:	DA 1781	Start: 4 July 1952
	Teichert and Son, Inc	Finish: 22 August 1953
Specifications:	CIVENG 52-17	
Plans:	D.O. Series 407/91-122	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Van Nuys Blvd to Sepulveda Dam	

Local Assurances

Resolution Dated: 31 September 1944
Operation and Maintenance Transferred to: LACFCD, 3 November 1953

Stormflow Data

Gaging Station Location: upstream of Sepulveda Blvd (sta 966+50)
Type: Recording (USCS--11092450)
Staff Gage Reading at One-third Capacity: 6.2 ft on gage (5,667 cfs)

Access Ramps

To Invert: from right berm upstream of Sepulveda Blvd (sta 966+08)

To Right Berm: Sepulveda Blvd, Valleyheart Dr, Kester Ave
To Left Berm: none

Bridges

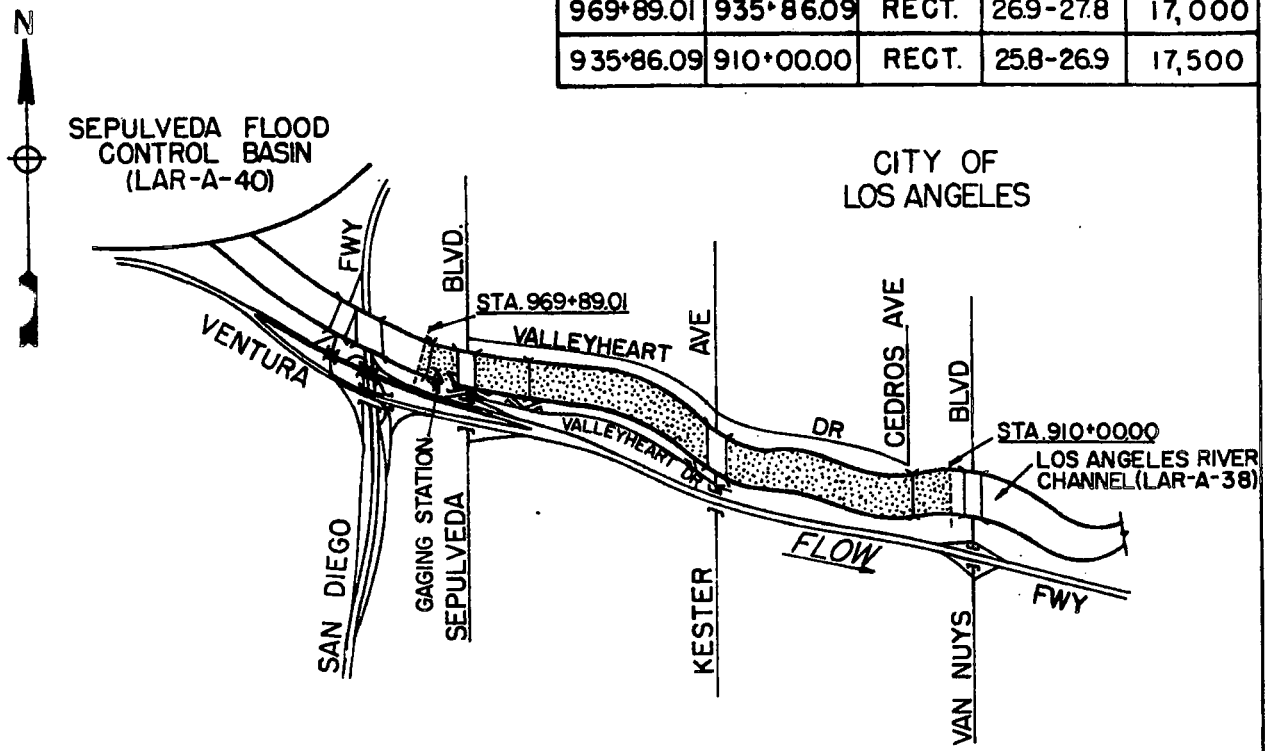
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 966+30	0	0	LACFCD (gaging station footbridge)
Sepulveda Blvd	0	0	City of Los Angeles
Sta 951+23	0	0	City of Los Angeles (utility crossing)
Kester Ave	0	0	City of Los Angeles
Sta 921+79	0	0	City of Los Angeles

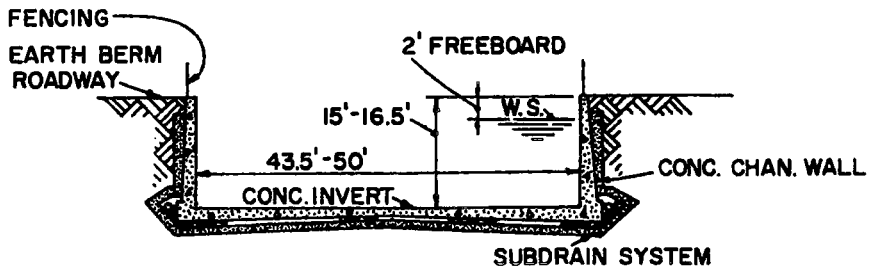
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Subdrain system	Concrete invert-access ramp
Fencing	Gaging station
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
969+89.01	935+86.09	RECT.	26.9-27.8	17,000
935+86.09	910+00.00	RECT.	25.8-26.9	17,500





TYPICAL OPEN SECTION

STA. 969+89.01 TO STA. 910+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- UTILITY BRIDGE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

SEPULVEDA F.C.B. TO VAN NUYS BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-A-39

DATA SHEET
LAR-A-40

LOS ANGELES RIVER CHANNEL
Sepulveda Flood Control Basin

Construction Data

Contract No: ENG 966 Start: 31 December 1939
Bressi and Bevanda Const, Inc; Finish: 30 December 1941
J.A. Dowling; and D.G. Gordon

Specifications:
Plans: LA 135/1-26
Folio Title: LOS ANGELES RIVER IMPROVEMENT
Sepulveda Dam: Bridges and Channels

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-39 or LAR-A-41

To Right Berm: Balboa Blvd
To Left Berm: Balboa Blvd, Hayvenhurst Ave, Woodley Ave

Bridges

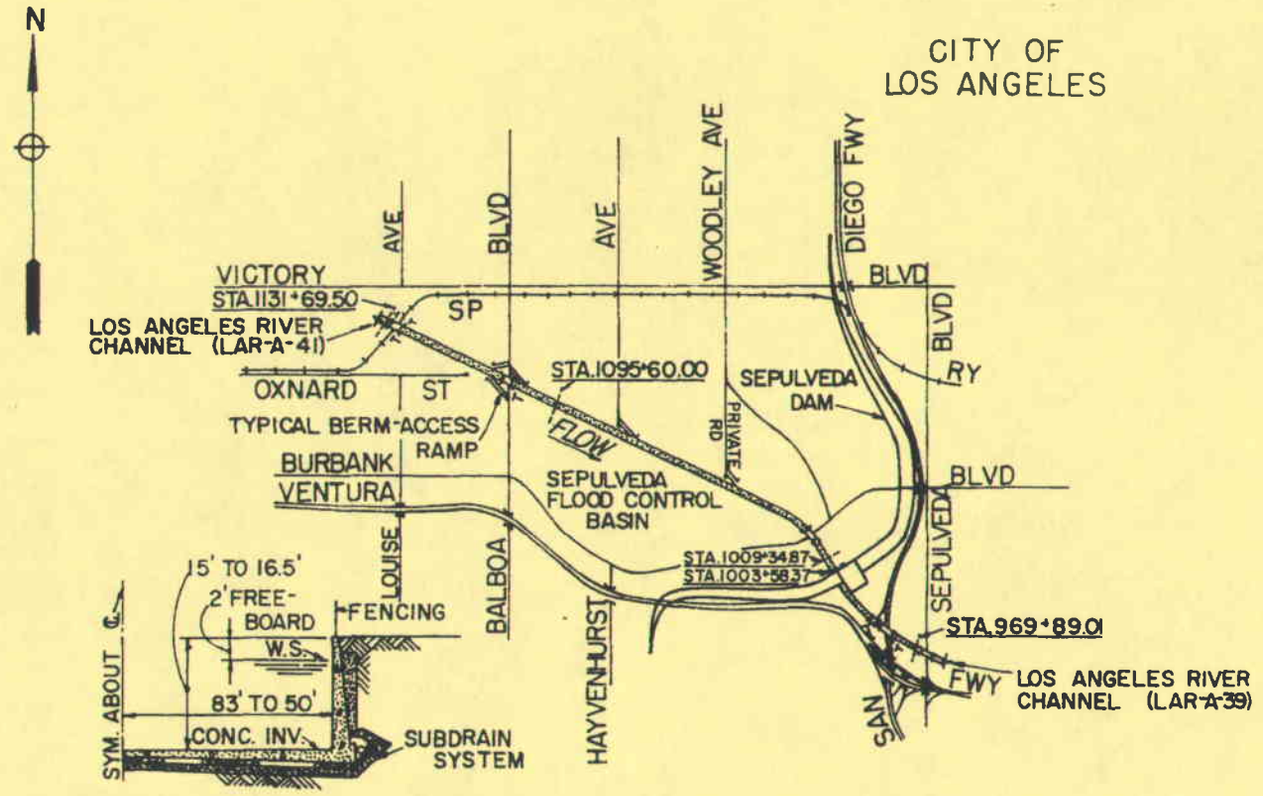
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
S. P. Ry	4	0	S.P.R.R.
Balboa Blvd	6	0	City of Los Angeles
Burbank Blvd	2	0	City of Los Angeles

Reporting Features

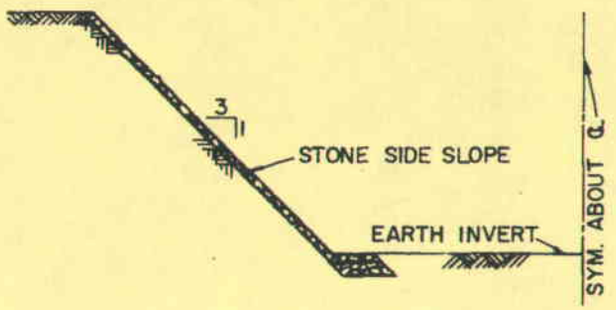
Along Channel
Earth and stone channel side slopes
Earth and stone channel invert
Concrete channel walls
Concrete channel invert
Earth berm roadway
Fencing
Rights-of-way

At a Channel Station
Bridge
Earth berm-access ramp
Side drain
Public utility

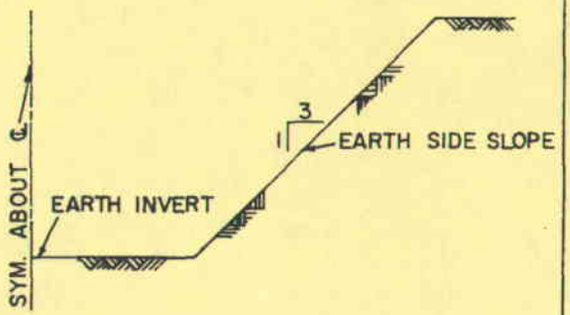
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



TYPICAL OPEN SECTION
STA.1003+58.37 TO STA.969+89.01



TYPICAL OPEN SECTION
STA.1131+69.50 TO STA.1095+60.00



TYPICAL OPEN SECTION
STA.1095+60.00 TO STA.1003+58.37
STONE INVERT:
STA.1009+34.87 TO STA.1003+58.37

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
SEPULVEDA FLOOD CONTROL BASIN

SCALE IN FEET
2000 0 2000 4000 6000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-A-40

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-41

LOS ANGELES RIVER CHANNEL
Reseda Blvd to Sepulveda Flood Control Basin

Construction Data

Contract No:	ENG 3605	Start: 21 April 1954
	MacDonald and Kruse	Finish: 15 April 1955
Specifications:	CIVENG 54-32	
Plans:	D.O. Series 351/1-63, 68-70, 80-93	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Reseda Blvd to Sepulveda F.C. Basin	

Local Assurances

Resolution Dated: 18 August 1953
Operation and Maintenance Transferred to: LACFCD, 27 February 1957

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from right berm off Kittridge St (sta 1209+00)

To Right Berm:	Reseda Blvd, Victory Blvd, Lindley Ave, Zelzah Ave, Whiteoak Ave
To Left Berm:	alley off Lemay St, Kittridge St, Victory Blvd, Lindley Ave, Zelzah Ave, Duncan St, Whiteoak Ave, from vacant lot off Victory Blvd

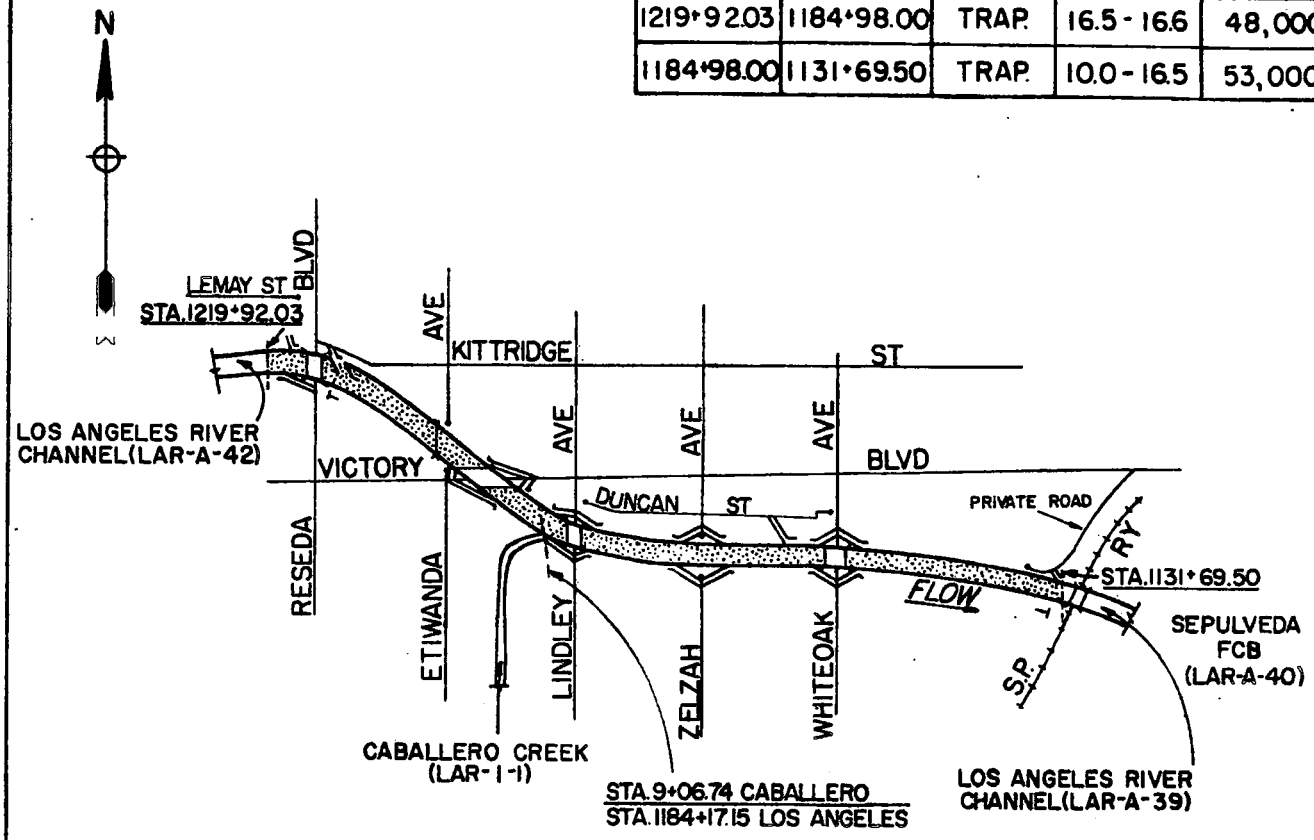
Bridges

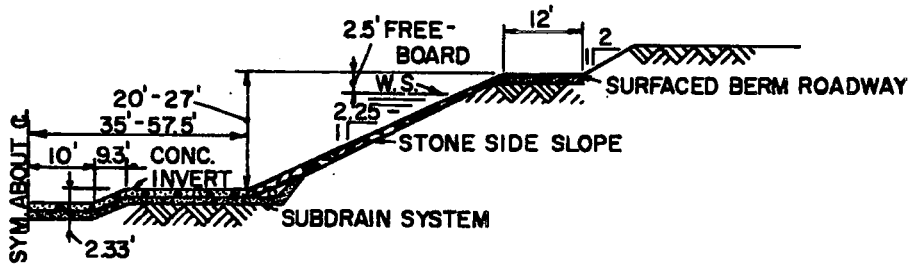
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Reseda Blvd	2	2	City of Los Angeles
Sta 1200+66	2	2	City of Los Angeles (footbridge)
Victory Blvd	2	2	City of Los Angeles
Lindley Ave	2	2	City of Los Angeles
Whiteoak Ave	2	2	City of Los Angeles

Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Surfaced berm-access ramp
Stone channel side slopes	Concrete invert-access ramp
Surfaced and earth berm roadway	Side drain
Subdrain system	Bridge
Fencing	Side overflow spillway
Rights-of-way	Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1219+92.03	1184+98.00	TRAP.	16.5 - 16.6	48,000
1184+98.00	1131+69.50	TRAP.	10.0 - 16.5	53,000





TYPICAL OPEN SECTION
STA.1219+92.03 TO STA.1131+69.50

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- TYPICAL INVERT-ACCESS RAMP
- ------ CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL
RESEDA BLVD TO SEPULVEDA F.C.B.

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA
LAR-A-41

OPERATION AND MAINTENANCE MANUAL

DATA SHEET LOS ANGELES RIVER CHANNEL
LAR-A-42 Corbin Ave to Reseda Blvd

Construction Data

Contract No:	DA 56-25	Start: 18 November 1955
	Winston Bros Co	Finish: 12 January 1957
Specifications:	CIVENG 56-11	
Plans:	D.O. Series 352/13-89	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT	
	Corbin Ave to Reseda Blvd	

Local Assurances

Resolution Dated: 18 August 1953
Operation and Maintenance Transferred to: LACFCD, 10 September 1958

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-A-43

To Right Berm: Corbin Ave, Tampa Ave, Vanalden Ave, Wilbur Ave
To Left Berm: Corbin Ave, Tampa Ave, Vanalden Ave, Wilbur Ave, from Aliso Creek

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Corbin Ave	1	2	City of Los Angeles
Tampa Ave	1	2	City of Los Angeles
Vanalden Ave	1	2	City of Los Angeles
Wilbur Ave	1	2	City of Los Angeles
Sta 1222+37	2	2	City of Los Angeles (footbridge)

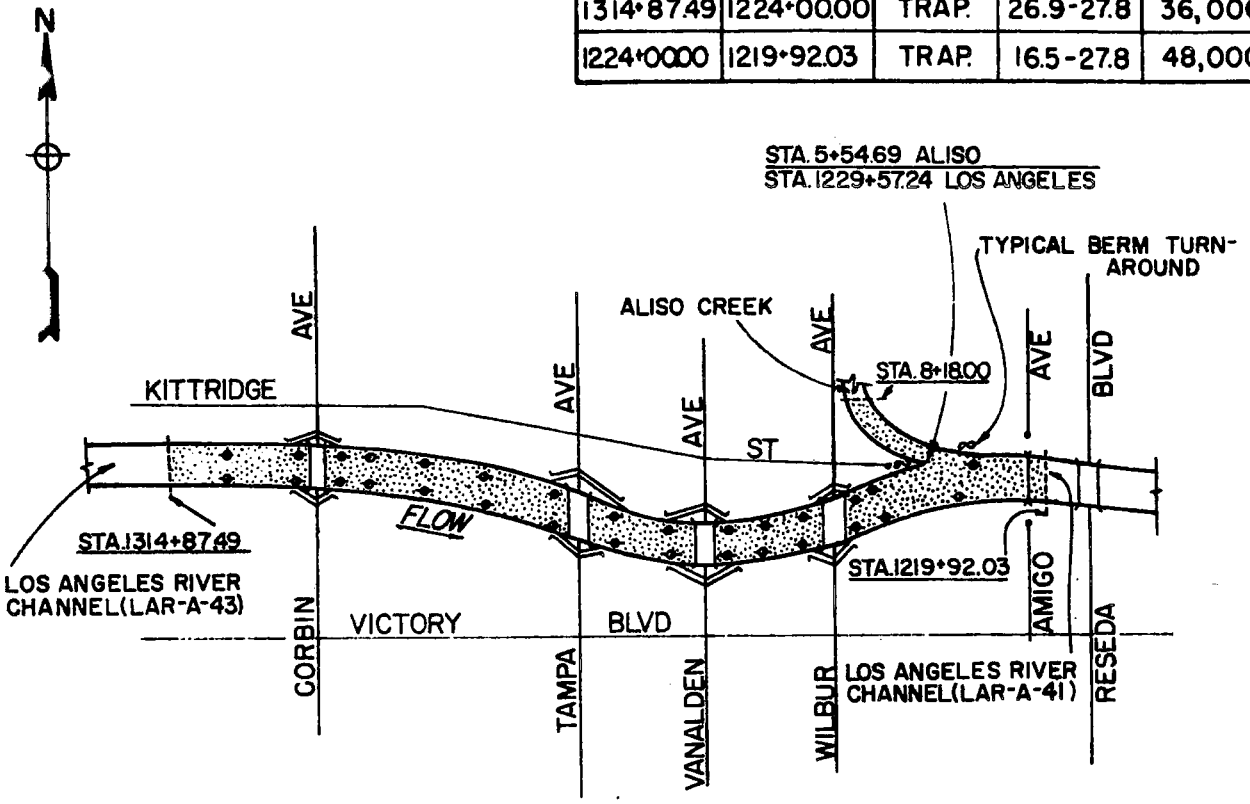
Reporting Features

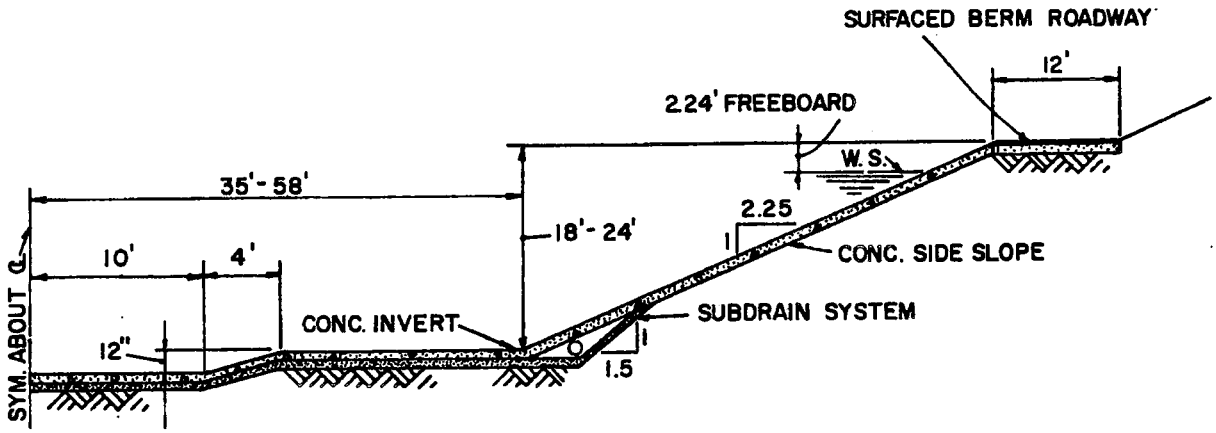
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Side drain
Concrete channel invert	Surfaced berm-access ramp
Concrete channel side slopes	Side overflow spillway
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT	V	Q
1314+87.49	1224+00.00	TRAP.	26.9-27.8	36,000
1224+00.00	1219+92.03	TRAP.	16.5-27.8	48,000





TYPICAL OPEN SECTION

STA. 1314+87.49 TO STA. 1219+92.03

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- UTILITY BRIDGE
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

CORBIN AVE TO RESEDA BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-A-42

DATA SHEET
LAR-A-43

LOS ANGELES RIVER CHANNEL
Owensmouth Ave to Corbin Ave

Construction Data

Contract No:	DA 57-171	Start: 16 April 1957
	A. Teichert and Son, Inc	Finish: 15 February 1958
Specifications:	CIVENG 57-30	
Plans:	D.O. Series 176/1-133	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Owensmouth Ave to Corbin Ave	

Local Assurances

Resolution Dated: 18 August 1953
Operation and Maintenance Transferred to: LACFCD, 23 September 1958

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from right berm downstream of Owensmouth Ave (sta 1414+00)

To Right Berm:	Owensmouth Ave, Canoga Ave, Variel Ave, De Soto Ave, Mason Ave, Delco Ave, Comanche Ave, Winnetka Ave
To Left Berm:	Bassett St, Owensmouth Ave, Bassett St, Variel Ave, Bassett St, De Soto Ave, Lurline Ave, from Browns Creek, Mason Ave, Delco Ave, Hartland Ave, Vanowen St, Comanche Ave, Quakertown Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Owensmouth Ave	0	2	City of Los Angeles
Canoga Ave	1	2	City of Los Angeles
S.P. Ry	1	2	S.P.R.R.
Sta 1394+56	1	2	City of Los Angeles (footbridge)
De Soto Ave	1	2	City of Los Angeles
Mason Ave	1	2	City of Los Angeles
Vanowen St	2	2	City of Los Angeles
Winnetka Ave	1	2	City of Los Angeles

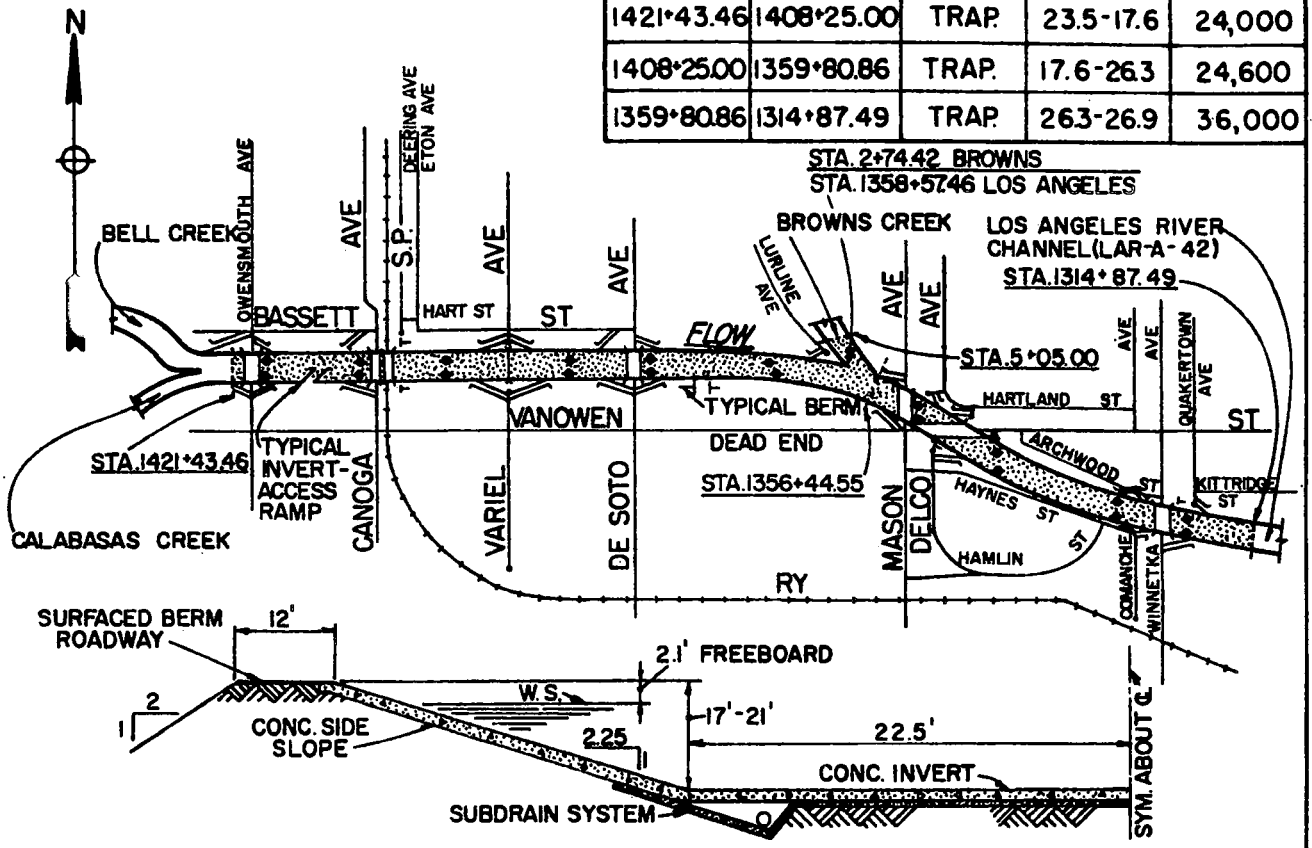
Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Concrete invert-access ramp
Concrete channel invert	Surfaced berm-access ramp
Concrete channel side slopes	Side drain
Subdrain system	Side overflow spillway
Fencing	Bridge
Rights-of-way	Public utility
	Subdrain manhole

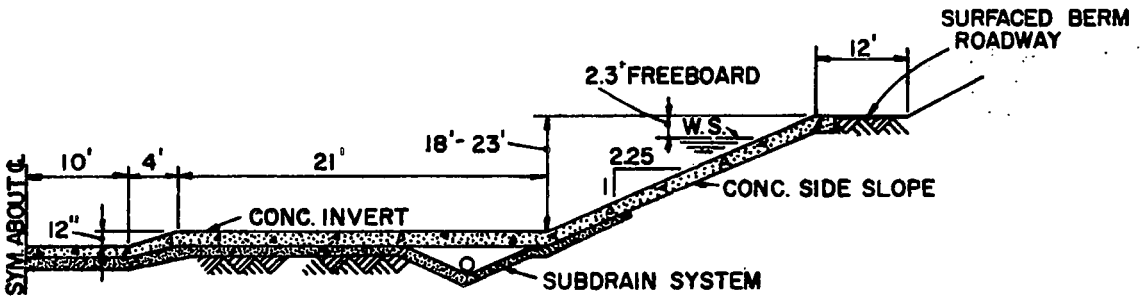
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
1421+43.46	1408+25.00	TRAP.	23.5-17.6	24,000
1408+25.00	1359+80.86	TRAP.	17.6-26.3	24,600
1359+80.86	1314+87.49	TRAP.	26.3-26.9	36,000



TYPICAL OPEN SECTION
STA. 1421+43.46 TO STA. 1356+44.55



TYPICAL OPEN SECTION
STA. 1356+44.55 TO STA. 1314+87.49

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- UTILITY BRIDGE
- SUBDRAIN MANHOLE
- ------ CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER CHANNEL

OWENSMOUTH AVE TO CORBIN AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
LAR-A-44

LOS ANGELES RIVER CHANNEL
Willow Street to Pacific Ocean

Construction Data

Contract No: DCW09-96-C-0041 Start: 10/21/96
Serrano & Cone, Inc. Finish:

Specifications:
Plans:
Folio Title: LOS ANGELES RIVER IMPROVEMENT
Willow Street to Pacific Ocean

Local Assurances

Resolution Dated: 8/10/95
Operation and Maintenance Transferred to:

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm:
- from oil company yard beneath Seventh Street Bridge, at downstream end through power company yards
- from Pacific Coast Hwy between Long Beach Fwy and River, from Anaheim St to Long Beach Fwy (northbound) ramp, from Long Beach Fwy (northbound) below Anaheim St
- from Long Beach Fwy (northbound) above Pacific Coast Highway

To Left Berm:
- at downstream end through parking lot
- Nineteenth St, Seventh St, from LA County yards below Seventeenth St, Fairbanks Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 47 + 54	4	0	SCE Co. (utility)
P.E. Ry	5	0	P.E.R.R.
Ocean Blvd	3	0	City of Long Beach
Pacific Coast Hwy	6	0	State of California
Anaheim St	5	0	City of Long Beach
Seventh St (Shoemaker) Bridge	5	0	Board of Harbor Commissioners

Reporting Features

Along Channel
Surfaced berm roadway
Earth channel invert
Earth channel levee
Stone channel side slopes
Stone toe protection
Fencing
Rights-of-way
Parapet walls
Retaining walls
Safety railing

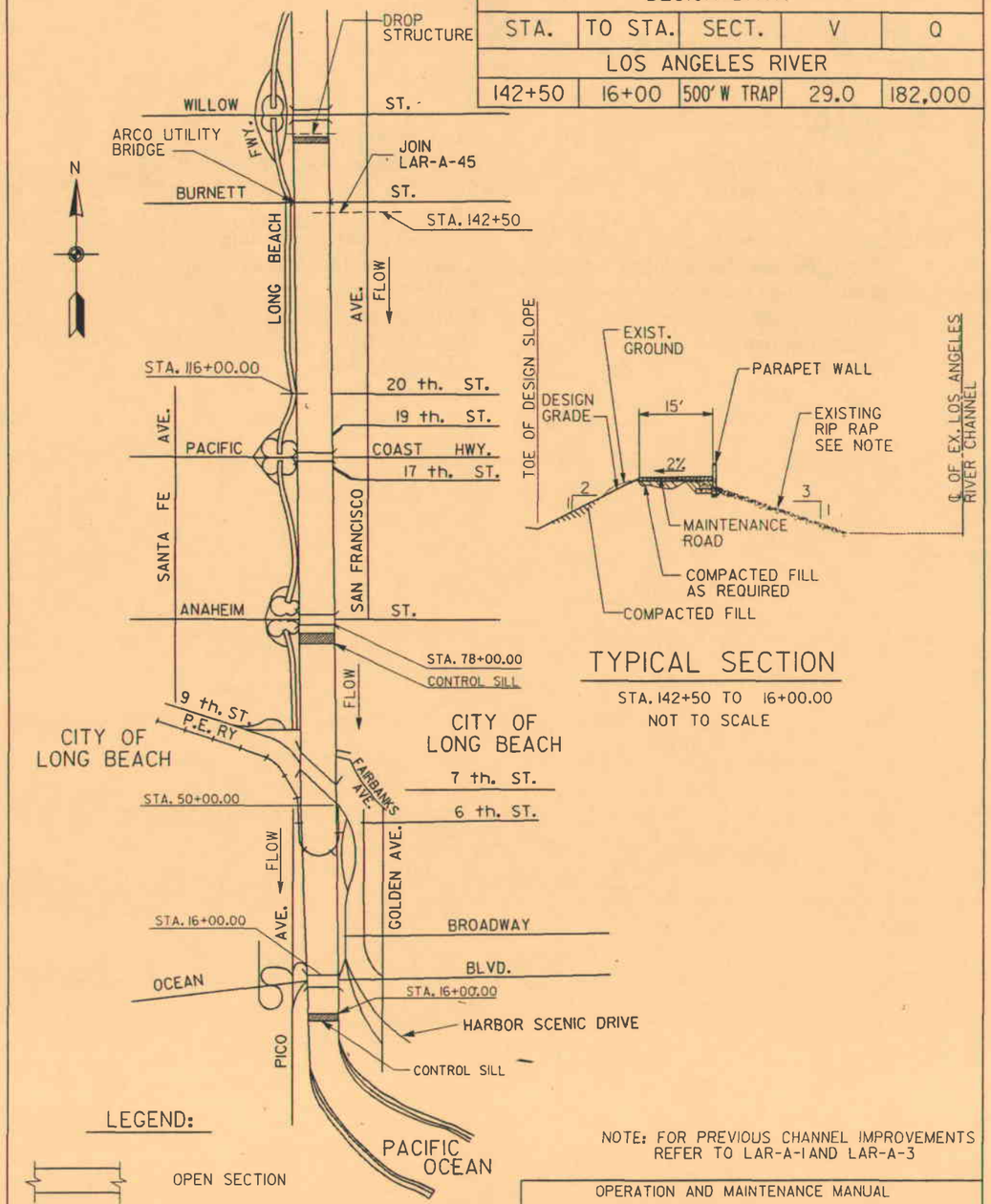
At a Channel Station
Surfaced and earth berm-access ramp
Side drain
Bridge
Control sill
Public Utility

NOTE: Elevations are to be taken in subsidence areas along channel levees and control sills, and submitted in semiannual report

CORPS OF ENGINEERS

DEPARTMANT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
LOS ANGELES RIVER				
142+50	16+00	500' W TRAP	29.0	182,000



TYPICAL SECTION

STA. 142+50 TO 16+00.00
NOT TO SCALE

LEGEND:

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- UTILITY BRIDGE

NOTE: FOR PREVIOUS CHANNEL IMPROVEMENTS REFER TO LAR-A-1 AND LAR-A-3

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER

WILLOW STREET TO THE PACIFIC OCEAN

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-A-44

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-45

LOS ANGELES RIVER CHANNEL
Long Beach Boulevard to Willow Street

Construction Data
Contract No: DCW09-98-C-0014 Start: 2/28/98
Brutoco Eng. & Construction Inc. Finish:
Specifications:
Plans:
Folio Title: LOS ANGELES RIVER IMPROVEMENT
Long Beach Blvd to Willow Street

Local Assurances
Resolution Dated: 8/10/95
Operation and Maintenance Transferred to:

Stormflow Data
Gaging Station Location: Sta 204 + 95 - downstream of Wardlow Road
Type: Recording (LACFCD–F319-R)
Staff Gage Reading at One-third Capacity: 10.6 Ft on gage (48,667 cfs)

Access Ramps
To Invert: Right berm - downstream of Del Amo Boulevard; upstream of UPRR Bridge
Left berm - downstream of Wardlow Rd; upstream of UPRR Bridge

To Right Berm:
- From Long Beach Fwy (northbound) above Pacific Coast Hwy
- Willow St to Long Beach Fwy (northbound) ramp
- Carson St
- Long Beach Blvd., Del Amo Blvd

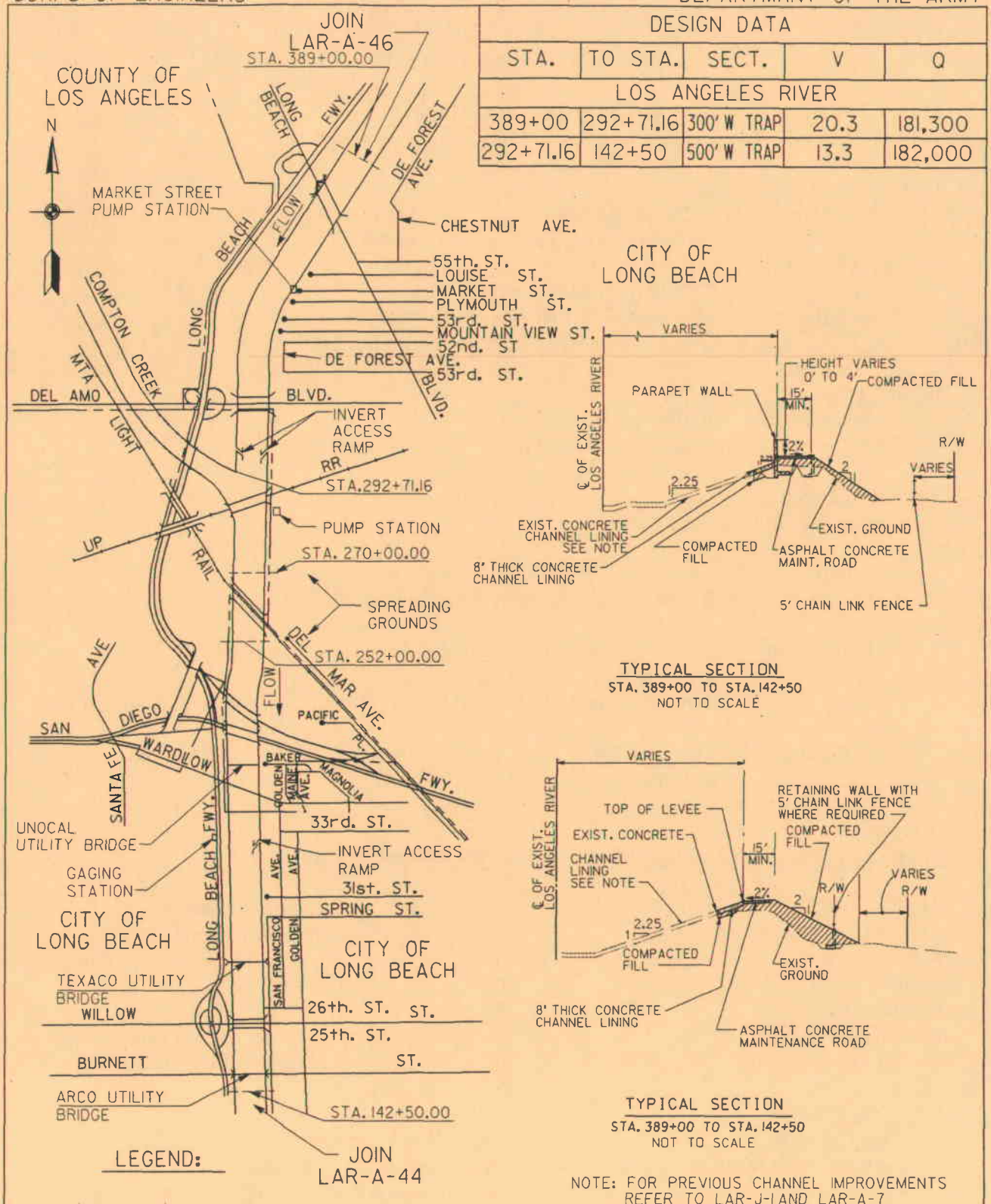
To Left Berm:
- Twenty-sixth Way, Twenty-fifth Way
- Del Amo Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Willow Street	9	0	City of Long Beach
Sta 171+57	4	0	Texaco utility overcrossing
Wardlow Road	6	0	City of Long Beach
Sta 227+51	2	0	Union Oil Co (utility bridge)
San Diego Fwy	4	0	State of California
MTA (Light Rail)	3	0	MTA
UPRR	3	0	Port of Long Beach
Del Amo Blvd	5	0	City of Long Beach
Long Beach Blvd	7	0	City of Long Beach

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Earth berm-access ramp
Earth channel invert	Side drain
Earth channel Levee	Bridge
Concrete channel invert	Concrete invert access ramp
Concrete channel side slopes	Concrete confluence section
Stone channel side slopes	Drop Structure
Stone toe protection	Public Utility
Subdrain system	Gaging Station
Fencing	Subdrain Manhole
Rights-of-way	Equestrian Ramp



DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
LOS ANGELES RIVER				
389+00	292+71.16	300' W TRAP	20.3	181,300
292+71.16	142+50	500' W TRAP	13.3	182,000

CITY OF LONG BEACH

TYPICAL SECTION
STA. 389+00 TO STA. 142+50
NOT TO SCALE

TYPICAL SECTION
STA. 389+00 TO STA. 142+50
NOT TO SCALE

NOTE: FOR PREVIOUS CHANNEL IMPROVEMENTS REFER TO LAR-J-1 AND LAR-A-7

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER

LONG BEACH BOULEVARD TO WILLOW STREET

2000 0 2000 4000 6000 8000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
LAR-A-46 A&B

LOS ANGELES RIVER CHANNEL
Century Freeway to Long Beach Boulevard

Construction Data

Contract No: DCW09-98-C-0040 Start: 10/23/98
Ortiz Enterprise, Inc. Finish:
Specifications:
Plans: D.O. Series 374/265-411:
Folio Title: LOS ANGELES RIVER IMPROVEMENT
Century Freeway to Long Beach Boulevard

Local Assurances

Resolution Dated: 8/10/95
Operation and Maintenance Transferred to:

Stormflow Data

Gaging Station Location: None

Access Ramps

To Invert: from right side downstream of Artesia Blvd. (Sta 415+00+/-)

To Right Berm:
- from Long Beach Freeway (northbound), Artesia Blvd
- Alondra Blvd
- from Long Beach Fwy (northbound) above Rosecrans Ave, Compton Blvd

To Left Berm:
- Alondra Blvd
- Rosecrans Ave, Compton Ave

Bridges

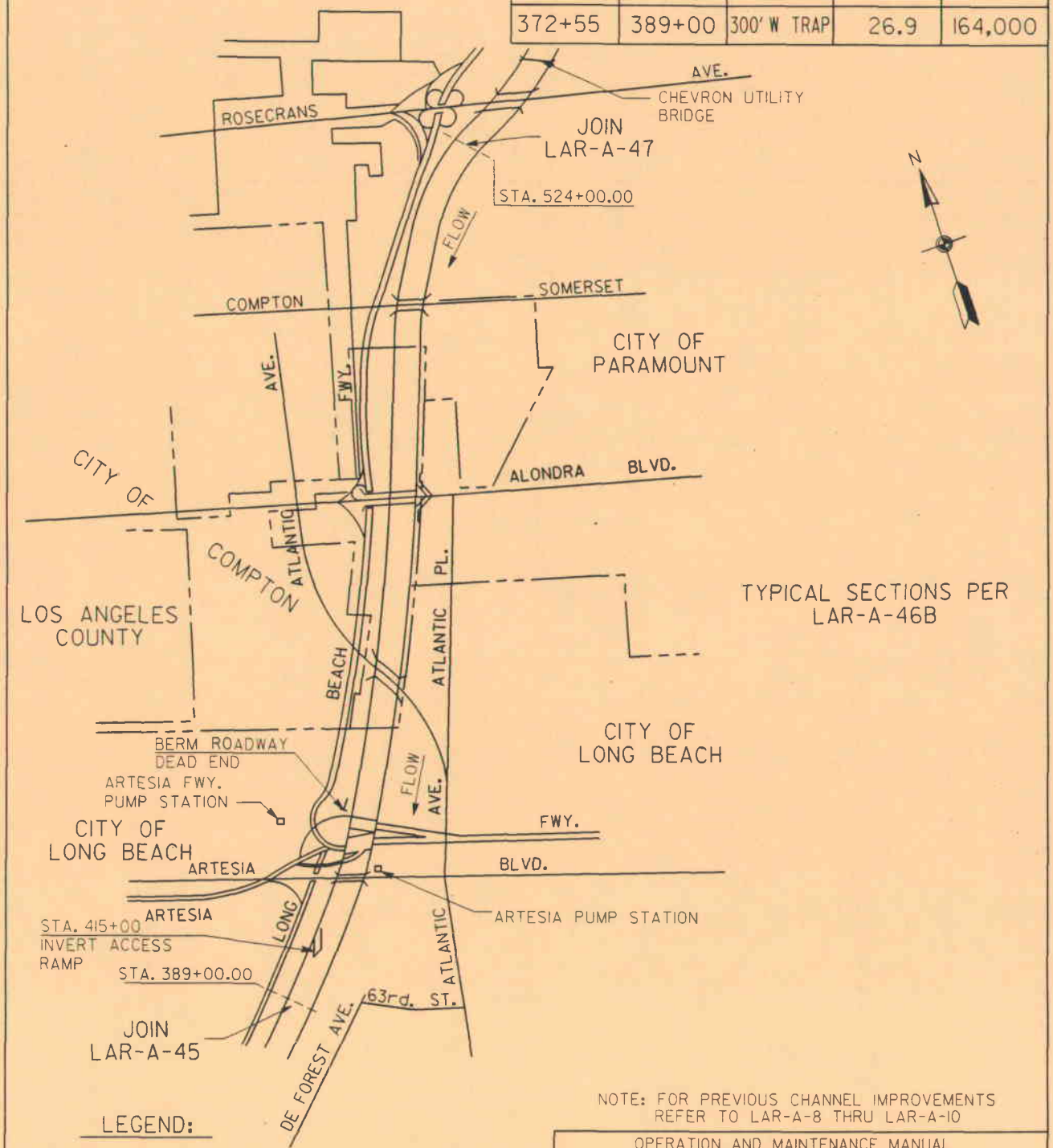
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Artesia Blvd	5	0	City of Long Beach
Artesia Fwy	3	0	State of California
Atlantic Ave	7	0	Los Angeles County and City of Compton
Alondra Blvd	7	0	Los Angeles County
Compton Blvd	5	0	Los Angeles County
Rosecrans Ave	7	0	City of Paramount and Los Angeles County
Sta 537+38	2	0	Chevron (Utility Bridge)

Reporting Features

Along Channel
Surfaced berm roadway
Earth channel Levee
Concrete channel invert
Concrete channel side slopes
Subdrain system
Fencing
Rights-of-way

At a Channel Station
Surfaced berm-access ramp
Concrete invert access ramp
Side drain
Bridge
Public utility
Subdrain Manhole

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
LOS ANGELES RIVER				
511+48	524+00	300' W TRAP	28.9	164,000
372+55	389+00	300' W TRAP	26.9	164,000



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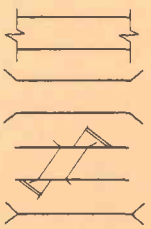


OPEN SECTION

STREET BRIDGE

TYPICAL BERM-ACCESS RAMP

UTILITY BRIDGE

NOTE: FOR PREVIOUS CHANNEL IMPROVEMENTS REFER TO LAR-A-8 THRU LAR-A-10

OPERATION AND MAINTENANCE MANUAL

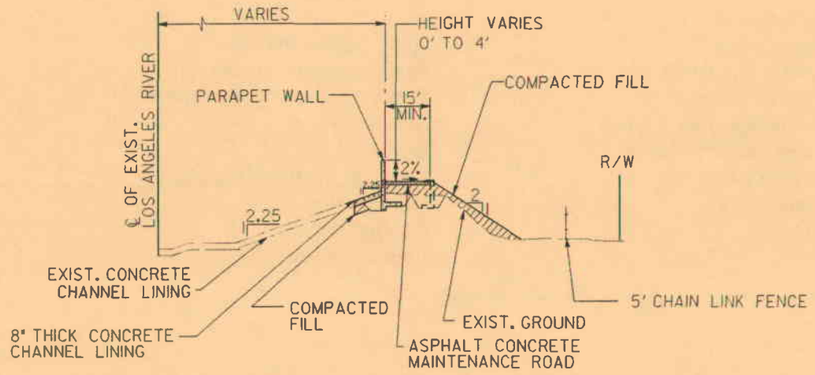
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER

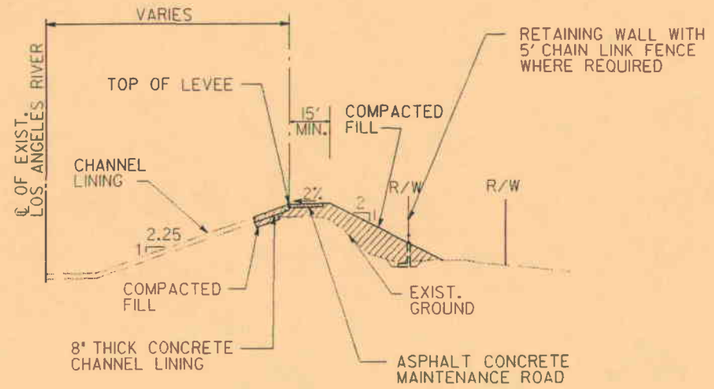
CENTURY FREEWAY TO LONG BEACH BOULEVARD

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA



TYPICAL SECTION
STA. 524+00 TO STA. 389+00
NOT TO SCALE



TYPICAL SECTION
STA. 524+00 TO STA. 389+00
NOT TO SCALE

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA,
CALIFORNIA

LOS ANGELES RIVER
CENTURY FREEWAY TO
LONG BEACH BOULEVARD

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-A-46B

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-A-47 A&B

LOS ANGELES RIVER CHANNEL
Confluence with Rio Hondo

Construction Data
Contract No:
Start:
Finish:

Specifications:
Plans: D.O. Series
Folio Title: LOS ANGELES RIVER IMPROVEMENT (Rio Hondo Confluence to Century Fwy)
RIO HONDO CHANNEL IMPROVEMENTS (Firestone Blvd to Los Angeles River)

Local Assurances
Resolution Dated: 8/10/95
Operation and Maintenance Transferred to:

Stormflow Data
RIO HONDO CHANNEL
Gaging Station Location: Upstream of Stewart and Gray Rd. (Sta 69+45)
Type: Recording (LACFCD – F45B-R)
Staff Gage Reading at One-third Capacity: 7.8 ft on gage (14,167 cfs)

Access Ramps
LOS ANGELES RIVER
To Invert:
- from right berm, upstream from Long Beach Fwy. (Sta 655+00)
- below Imperial Hwy from LACFCD yards (Sta 622+15±)

To Right Berm:
- Tweedy Blvd
- from Long Beach Freeway (northbound) above Rosecrans Ave, Compton Blvd

To Left Berm:
- from Rod and Gun Club, just below Long Beach Fwy
- Rosecrans Ave, Compton Ave
- from LACFCD yards

RIO HONDO CHANNEL
To Right Berm:
- Firestone Blvd, Southern Ave, Garfield Ave

To Left Berm:
- from Edison right-of-way, Garfield Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
LOS ANGELES RIVER			
U.P. Ry	4	0	U.P.R.R.
Long Beach Fwy	3	0	State of California
Imperial Hwy	4	0	County of Los Angeles
Century Fwy	4	0	State of California
Sta 537+38	2	0	Standard Oil Co (Utility Bridge)
Rosecrans Ave	7	0	City of Paramount and Los Angeles County
Compton Blvd	5	0	Los Angeles County
P.E. Ry	3	0	P.E.R.R
RIO HONDO CHANNEL			
U.P. Ry	4	0	U.P.R.R.
Firestone Blvd.	5	0	City of South Gate
Southern Ave.	2	0	City of South Gate
Garfield Ave.	3	0	City of South Gate

Reporting Features

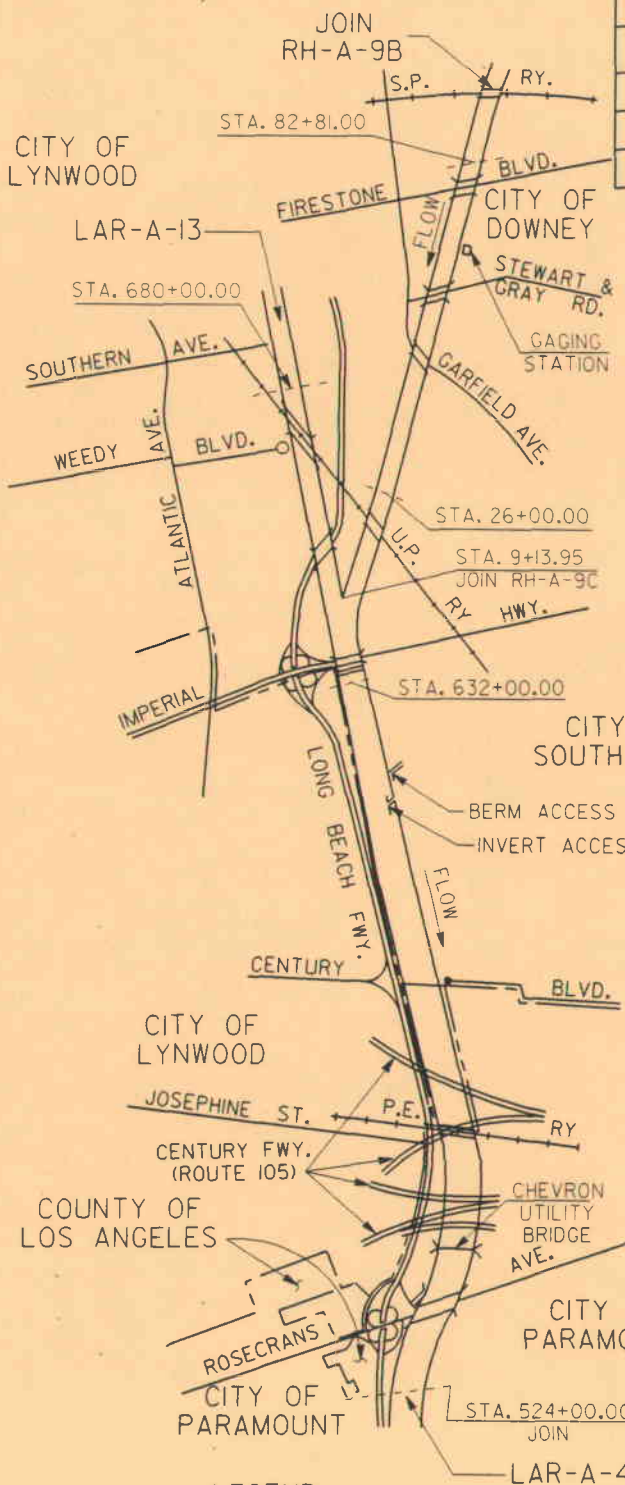
Along Channel
- Concrete channel invert
- Earth channel Levee
- Stone channel side slopes
- Surfaced berm roadway
- Subdrain system
- Rights-of-way
- Fencing

At a Channel Station
- Surfaced berm-access ramp
- Concrete invert access ramp
- Side drain
- Bridge
- Concrete confluence section
- Public utility
- Gaging Station
- Equestrian Ramp

CORPS OF ENGINEERS

DEPARTMANT OF THE ARMY

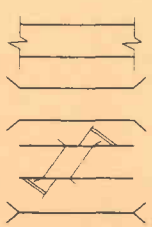
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
LOS ANGELES RIVER				
680+40	677+00	250' W TRAP	31.80	140.00
634+00	632+64.47	300' W TRAP	28.42	184,000
632+64.47	624+00	300' W TRAP	26.39	184,000



NOTE: TYPICAL SECTIONS PER LAR-A-47B

NOTE: FOR PREVIOUS CHANNEL IMPROVEMENTS REFER TO LAR-A-10 THRU LAR-A-13 AND RH-A-1

LEGEND:



OPEN SECTION

STREET BRIDGE

TYPICAL BERM-ACCESS RAMP

UTILITY BRIDGE

OPERATION AND MAINTENANCE MANUAL

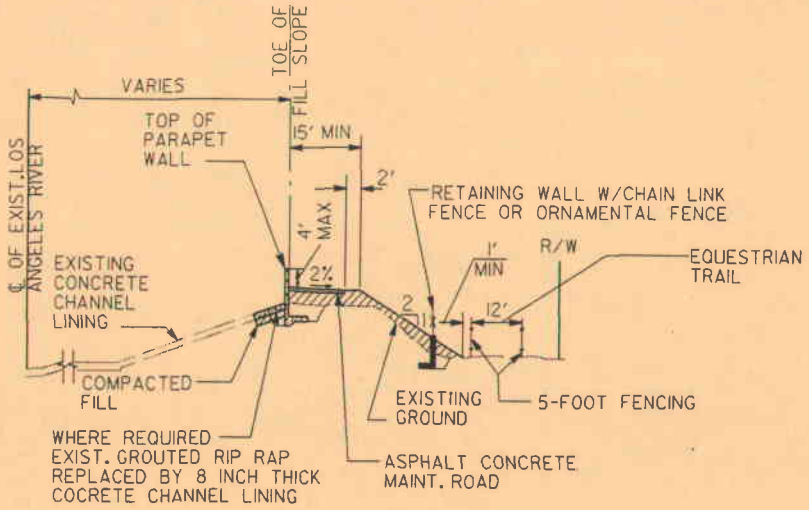
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER

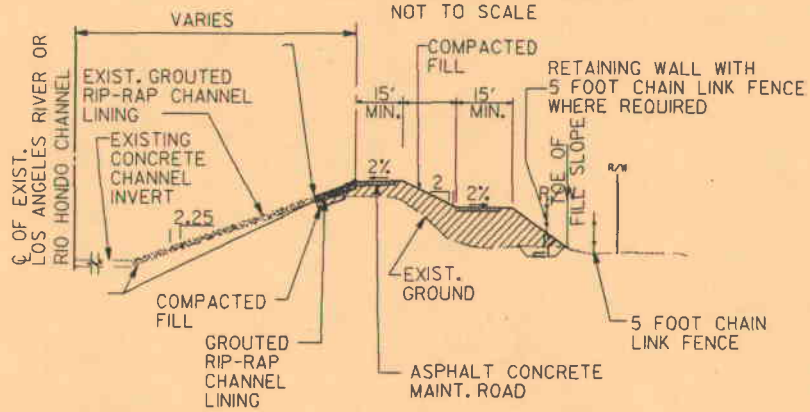
CONFLUENCE WITH THE RIO HONDO CHANNEL

1000 0 1000 2000 3000 4000

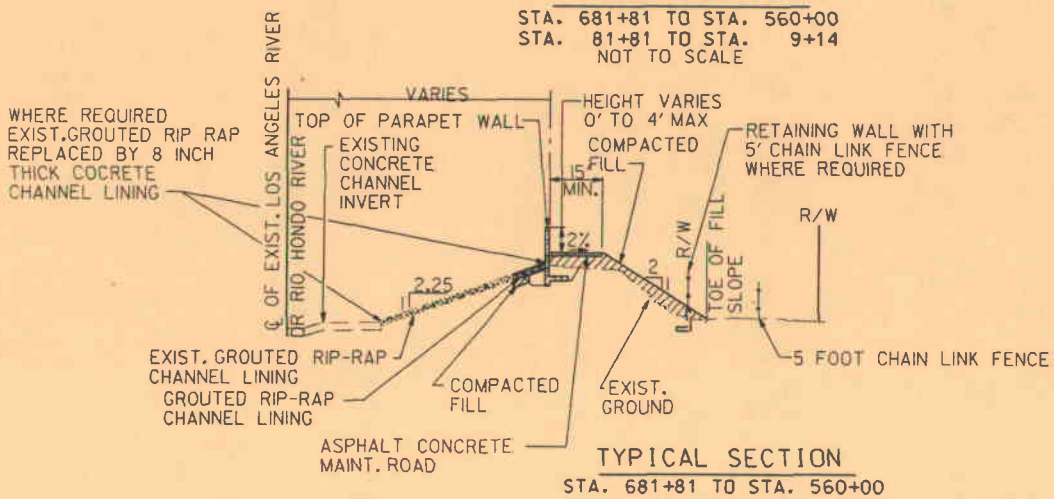
OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-A-47A



TYPICAL SECTION
STA. 560+00 TO STA. 524+00
NOT TO SCALE



TYPICAL SECTION
STA. 681+81 TO STA. 560+00
STA. 81+81 TO STA. 9+14
NOT TO SCALE



TYPICAL SECTION
STA. 681+81 TO STA. 560+00
STA. 81+81 TO STA. 9+14
NOT TO SCALE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOS ANGELES RIVER

CONFLUENCE WITH THE RIO HONDO CHANNEL

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-A-47B

OPERATION AND MAINTENANCE MANUAL

DATA SHEET BLANCHARD CANYON CHANNEL
LAR-B-1

Construction Data

Contract No:	DA 67-C-0044	Start:	6 April 1967
	R.P. Burress	Finish:	3 January 1968
Specifications:	CIVENG 66-20		
Plans:	D.O. Series 202/30-72		
Folio Title:	BLANCHARD CANYON CHANNEL AND DEBRIS BASIN		
	Blanchard Canyon Channel		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 2 July 1968

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

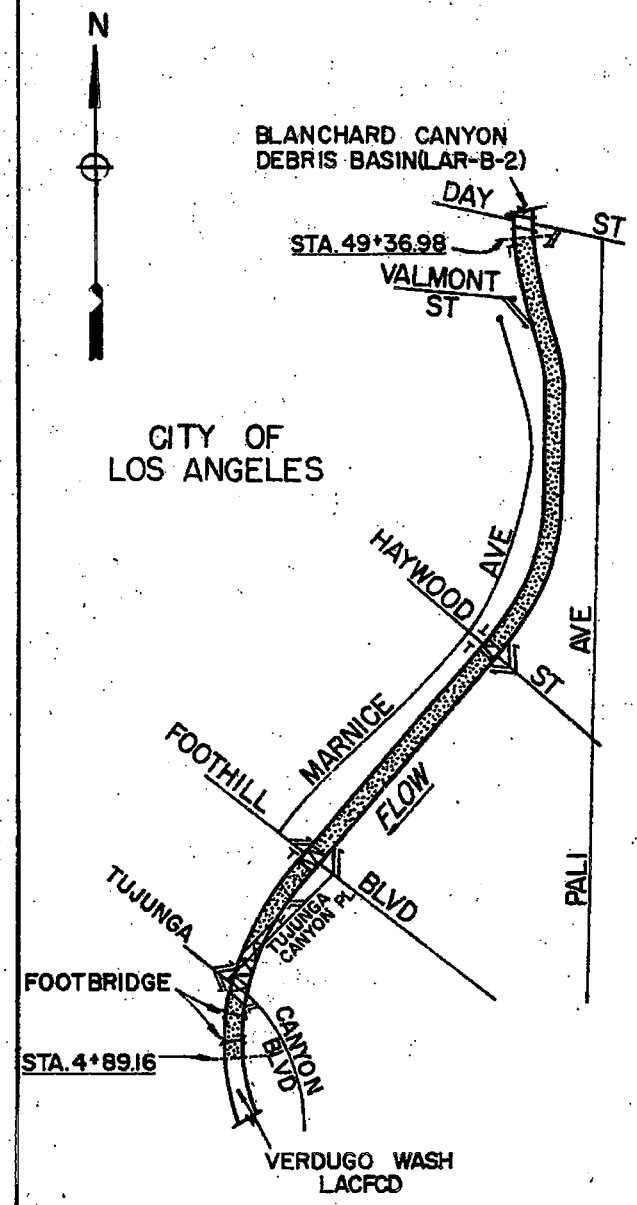
To Right Berm: Valmont St, Foothill Blvd, Tujunga Canyon Blvd
To Left Berm: Day St, Haywood St, Foothill Blvd, Tujunga Canyon Pl, Tujunga Canyon Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 10+67	0	0	Private vehicular bridge
Sta 5+67	0	0	Private vehicular bridge

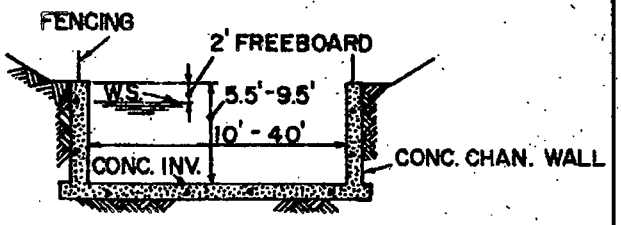
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Surfaced berm-access ramp
Concrete channel roof slab	Bridge
Surfaced berm roadway	Public utility
Fencing	
Rights-of-way	

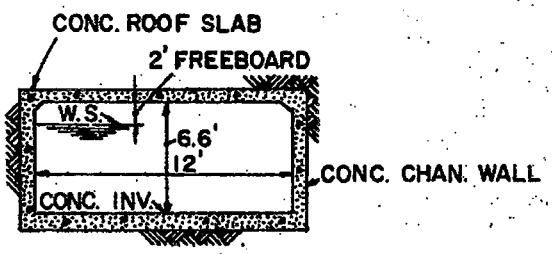


DESIGN DATA

STA.	TO STA.	SECT.	V	Q
49+36.98	35+50.00	RECT.	40.6-42.1	1,300
35+50.00	29+50.00	RECT.	41.2-44.2	1,600
29+50.00	20+60.00	RECT.	42.2-43.8	1,700
20+60.00	18+25.00	RECT.	43.7-45.2	1,800
18+25.00	4+89.16	RECT.	39.3-46.7	2,000



TYPICAL OPEN SECTION
STA. 49+36.98 TO STA. 4+89.16



TYPICAL COVERED SECTION
AS NOTED

LEGEND
- OPEN SECTION
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- COVERED SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BLANCHARD CANYON CHANNEL

SCALE IN FEET
500 0 500 1000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-B-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET BLANCHARD CANYON DEBRIS BASIN
LAR-B-2

Construction Data

Contract No:	DA 67-C-0044	Start:	6 April 1967
	R.P. Burress	Finish:	3 January 1968
Specifications:	CIVENG 66-20		
Plans:	D.O. Series 202/30-72		
Folio Title:	BLANCHARD CANYON CHANNEL AND DEBRIS BASIN		
	Blanchard Canyon Debris Basin		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 2 July 1968

Stormflow Data

Staff Gages: 10
Basin Staff Gage Elevation at One-third Design Discharge: 2055 ft msl

Access Roads

To Embankment:	from Blanchard Canyon Rd or Day St
To Basin:	from top of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	375 ft	Length	335 ft
Crest Width	20 ft	Crest Width	40 ft
Crest Elevation	2065 ft msl	Crest Elevation	2053 ft msl
Side Slope	1 on 2	Design Capacity	3,000 cfs
Pool Drain:		**Intake Tower:**	
Length	263 ft	Top Elevation	2059 ft msl
Diameter	36 in	Height above Invert	34.5 ft
Design Capacity	170 cfs	Inside Dimensions	5 ft diameter

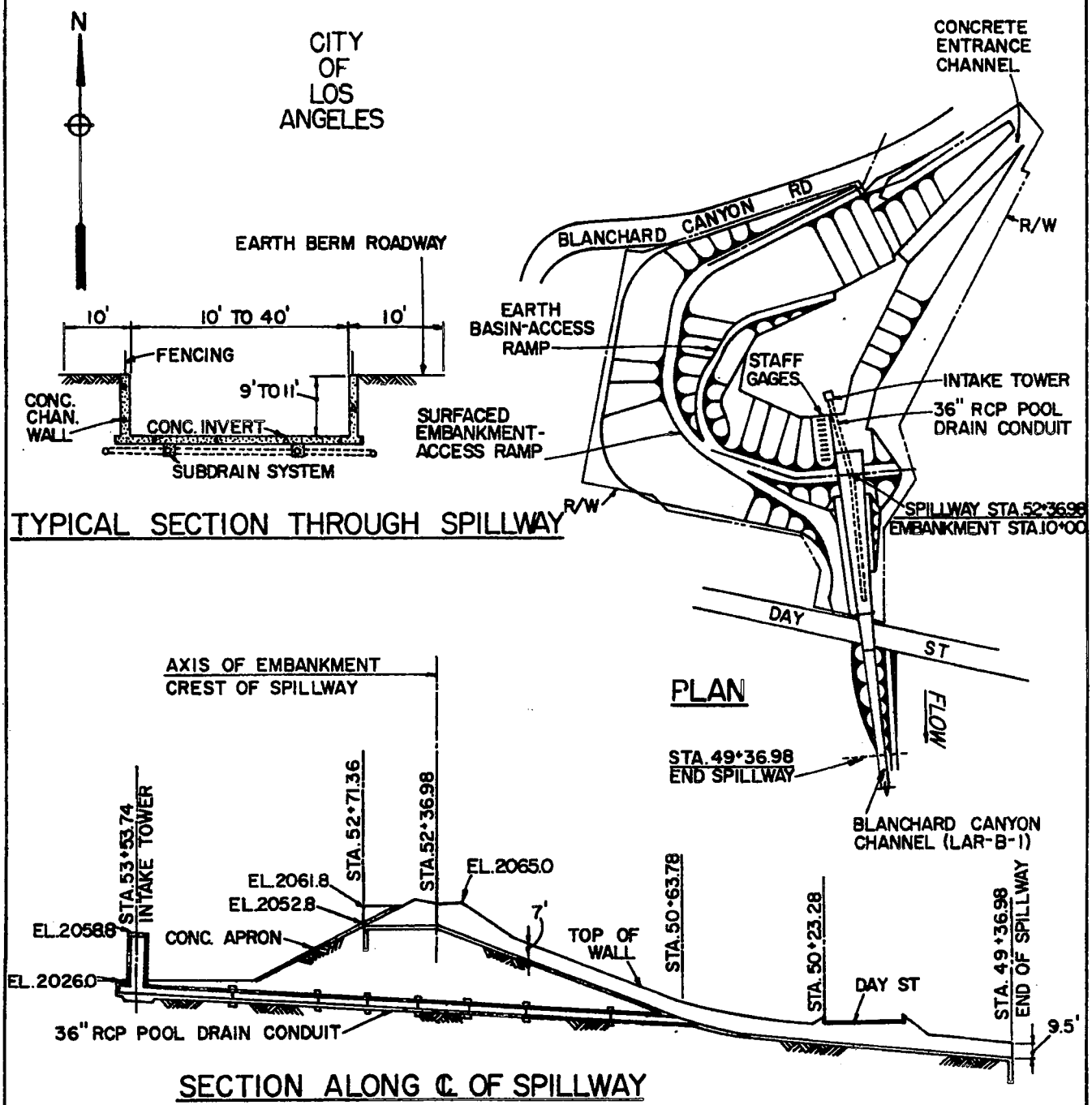
Drainage Area: 0.50 sq mi
Debris Basin Capacity: 80,000 cu yds
Maximum Allowable Accumulation of Debris: 20,000 cu yds

REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Concrete spillway apron
Earth berm roadway
Subdrain system
Bridge
Fencing
Rights-of-way

Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

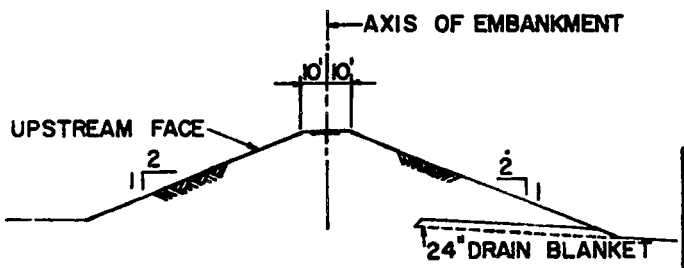
Embankment and Basin
Earth embankment
Earth basin-access ramp
Surfaced embankment-access ramp
Staff gages
Debris storage capacity
Inlet structure
Fencing
Rights-of-way



TYPICAL SECTION THROUGH SPILLWAY

PLAN

SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BLANCHARD CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-B-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET LAR-C-1 BLUE GUM CANYON CHANNEL

Construction Data

Contract No:	DA 67-C-0044	Start: 6 April 1967
	R. P. Burress	Finish: 31 February 1968
Specifications:	DACWO 67-B-0017	
Plans:	D.O. Series 214/24-51	
Folio Title:	BLUE GUM CANYON CHANNEL AND DEBRIS BASIN	
	Blue Gum Canyon Channel	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 2 July 1968

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: Gish Ave

Bridges

none

Reporting Features

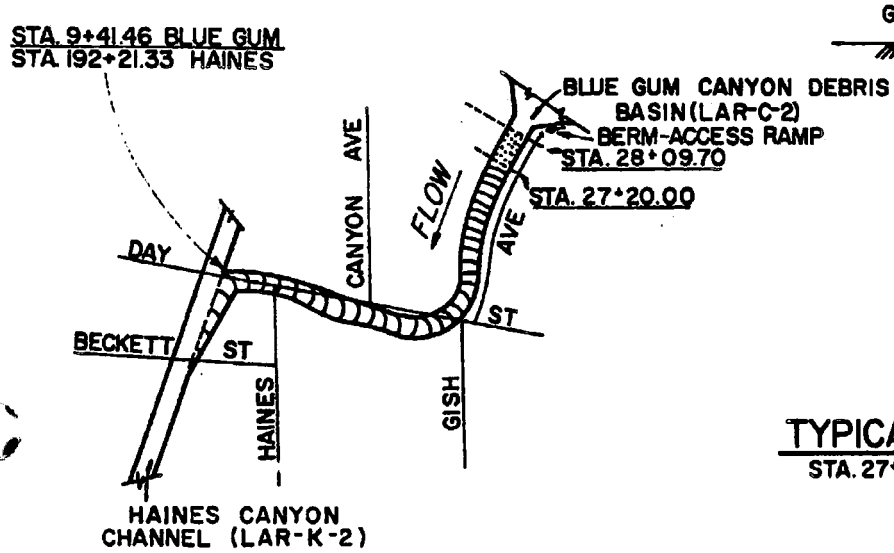
Along Channel	At a Channel Station
Reinforced concrete pipe	Channel inspection manhole
Concrete channel walls	Side drain
Concrete channel invert	Surfaced berm-access ramp
Surfaced berm roadway	Public utility
Fencing	
Rights-of-way	

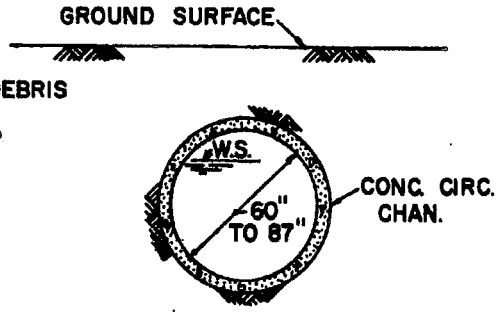
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
28+09.70	27+20.00	RECT.	40.2-40.9	450
27+20.00	18+99.08	CIRC.	35.8-40.8	450
18+99.08	16+61.00	CIRC.	25.7-31.9	550
16+61.00	9+41.46	CIRC.	17.6-25.4	600

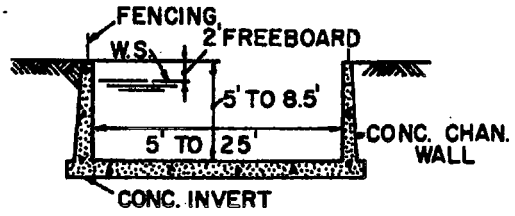
CITY OF LOS ANGELES





TYPICAL CIRCULAR SECTION

STA. 27+20.00 TO STA. 9+41.46



TYPICAL OPEN SECTION

STA. 28+09.70 TO STA. 27+20.00

LEGEND

- OPEN SECTION
- CIRCULAR SECTION
- ------- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BLUE GUM CANYON CHANNEL

SCALE IN FEET

500 0 500 1000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-C-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET BLUE GUM DEBRIS BASIN
LAR-C-2

Construction Data

Contract No:	DA 67-C-0044	Start:	1 April 1967
	R.P. Burress	Finish:	31 January 1968
Specifications:	DACW67-B-0017		
Plans:	D.O. Series 214/24-51		
Folio Title:	BLUE GUM CANYON CHANNEL AND DEBRIS BASIN		
	Blue Gum Debris Basin		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 2 July 1968

Stormflow Data

Staff Gages: 8
Basin Staff Gage Elevation at One-third Design Discharge: 2044 ft msl

Access Roads

To Embankment:	from Gish Ave and Haines Canyon Ave
To Basin:	from top of embankment to bottom of basin

Pertinent Design Data

Embankment:

Length	222 ft
Crest Width	20 ft
Crest Elevation	2053 ft msl
Side Slope	1 on 2

Spillway:

Length	256 ft
Crest Width	25 ft
Crest Elevation	2042 ft msl
Design Capacity	1300 cfs

Pool Drain:

Length	222 ft
Diameter	36 in
Design Capacity	160 cfs

Intake Tower:

Top Elevation	2048 ft msl
Height above Invert	25.5 ft
Inside Dimensions	4 ft x 4 ft

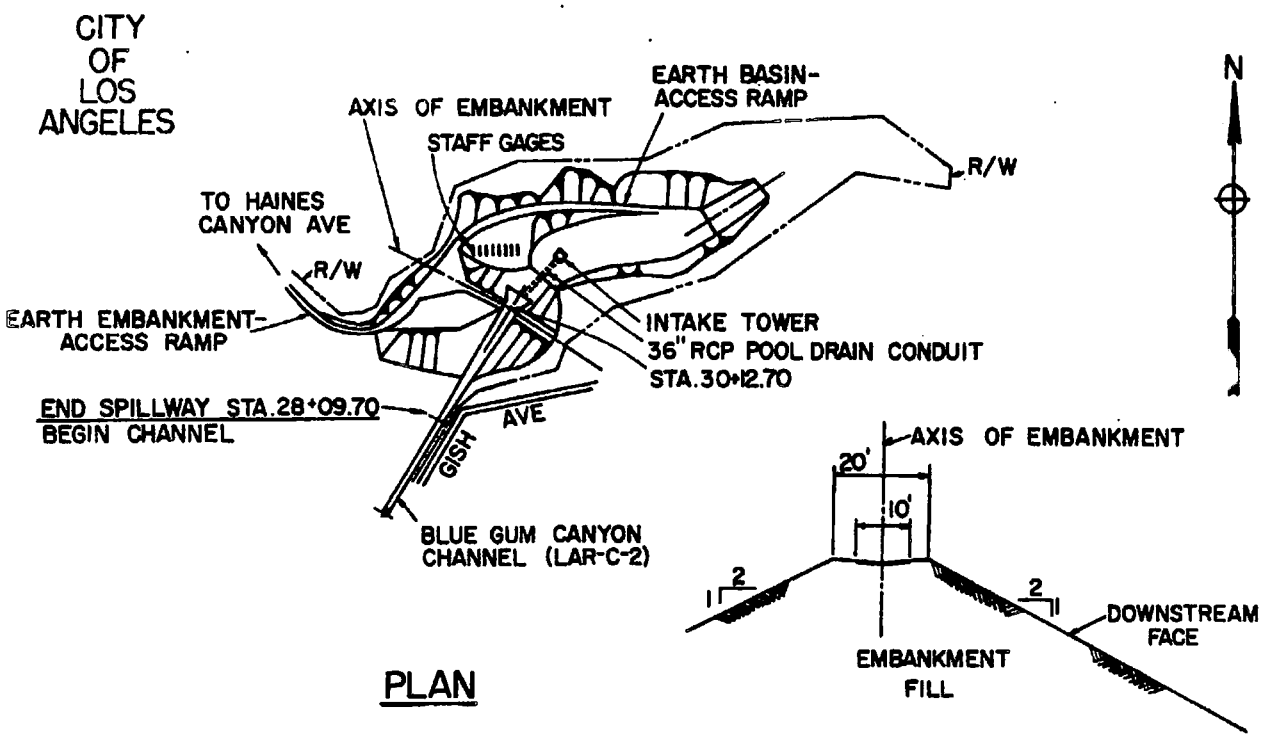
Drainage Area: 0.19 sq mi
Debris Basin Capacity: 35,000 cu yds
Maximum Allowable Accumulation of Debris: 8750 cu yds

REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Concrete spillway apron
Trashracks
Fencing

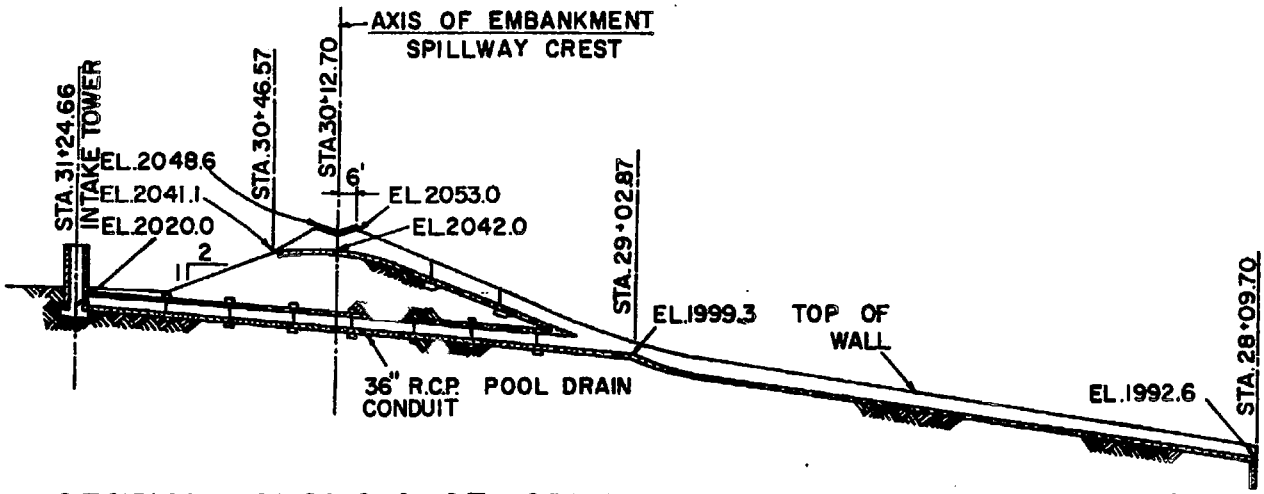
Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

Embankment and Basin
Earth embankment
Earth basin-access ramp
Earth embankment-access ramp
Debris storage capacity
Staff gages
Fencing
Rights-of-way

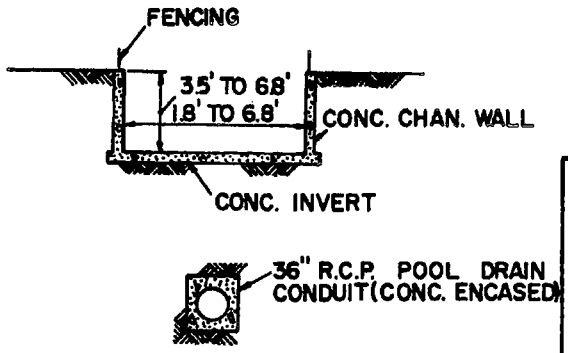


PLAN

TYPICAL EMBANKMENT SECTION



SECTION ALONG ℄ OF SPILLWAY AND OUTLET CHANNEL



TYPICAL SECTION THROUGH SPILLWAY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BLUE GUM CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA
LAR-C-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-D-1

GRANDVIEW AVENUE CHANNEL
HILLCREST CANYON CHANNEL

Construction Data

Contract No:	DA 62-127	Start: 9 April 1962
	Pascal and Ludwig, Inc	Finish: 26 February 1963
Specifications:	CIVENG 67-12	
Plans:	D.O. Series 205/37-120	
Folio Title:	BURBANK-EASTERN SYSTEM	
	Grandview Ave Channel and Hillcrest Canyon Channel and Debris Basin	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 10 December 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

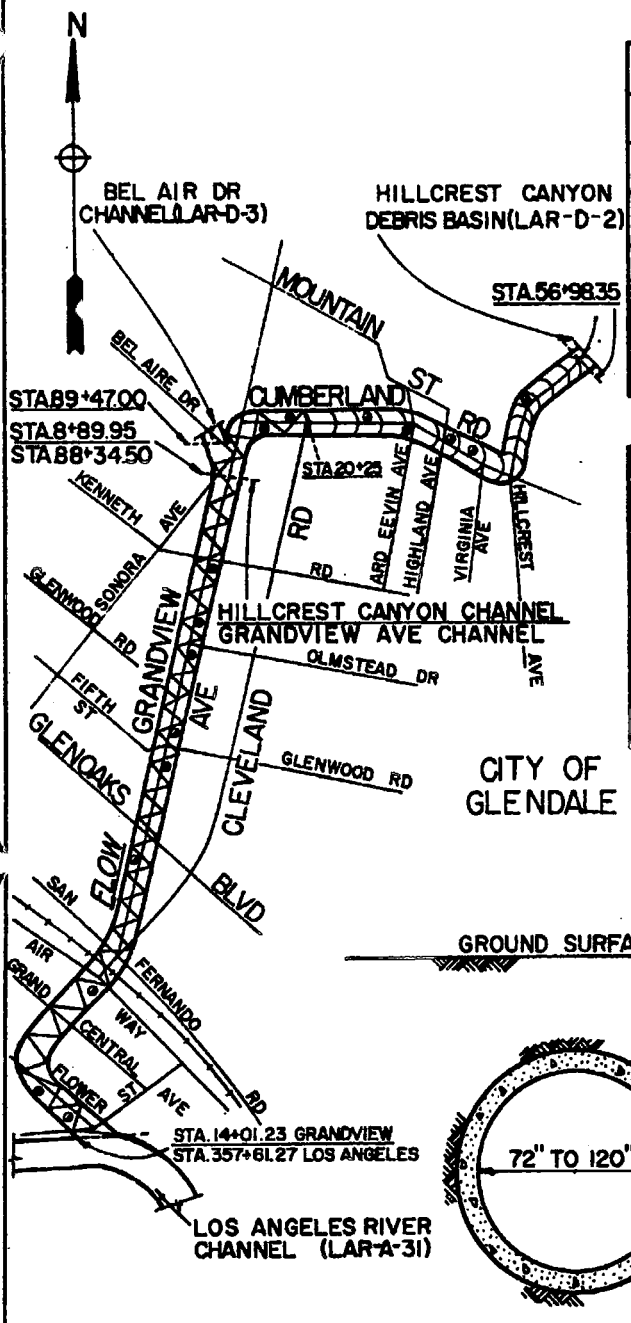
To Right Berm: none
To Left Berm: none

Bridges

none

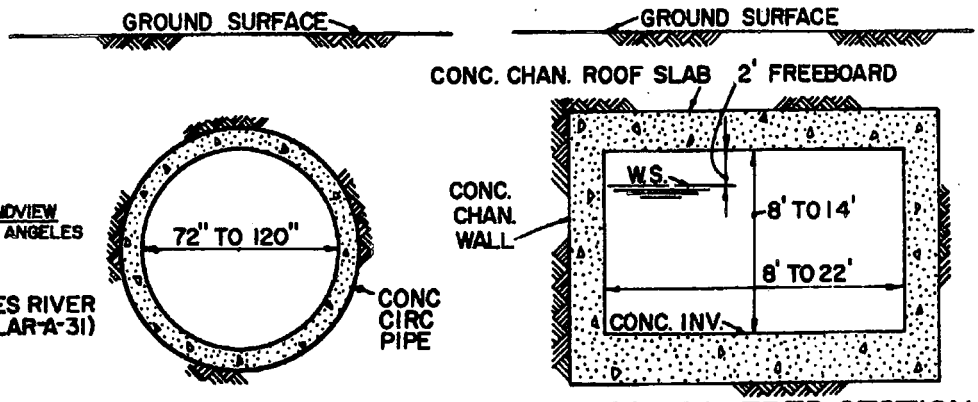
Reporting Features

Along Channel	At a Channel Station
Reinforced concrete pipe channel	Channel inspection manhole
Concrete channel invert	Side drain
Concrete channel walls	Concrete covered confluence section
Concrete channel roof slab	Public utility
Rights-of-way	



DESIGN DATA

STA.	TO STA.	SECT.	V	Q
HILLCREST CANYON CHANNEL				
56+98.35	44+80.00	CIRC.	43.9-50.5	900
44+80.00	38+50.00	CIRC.	40.0-43.4	1,000
38+50.00	27+75.00	CIRC.	32.9-40.0	1,100
27+75.00	23+80.00	CIRC.	32.9-33.9	1,300
23+80.00	20+25.00	CIRC.	32.9-39.6	1,500
20+25.00	11+30.00	RECT.	29.9-32.9	1,500
11+30.00	8+89.95	RECT.	29.9-33.0	1,700
GRANDVIEW AVE CHANNEL				
88+34.50	87+54.50	RECT.	39.9-40.5	1,700
87+54.50	65+00.00	RECT.	39.9-53.6	6,600
65+00.00	61+53.25	RECT.	53.9	6,700
61+53.25	51+96.66	RECT.	51.2-53.6	7,000
51+96.66	39+22.32	RECT.	42.4-53.6	7,400
39+22.32	14+01.23	RECT.	28.2-42.3	7,500



TYPICAL CIRCULAR SECTION
HILLCREST CANYON CHANNEL
STA. 56+98.35 TO STA. 20+25.00

TYPICAL COVERED SECTION
HILLCREST CANYON CHANNEL
STA. 20+25.00 TO STA. 8+89.95
GRANDVIEW AVE CHANNEL
STA. 88+34.50 TO STA. 14+01.23

LEGEND

- COVERED SECTION
- CIRCULAR SECTION
- CONST. PROJECT LIMIT
- CHANNEL INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

GRANDVIEW AVE CHANNEL
HILLCREST CANYON CHANNEL

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-D-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET HILLCREST CANYON DEBRIS BASIN
LAR-D-2

Construction Data

Contract No:	DA 72-127	Start:	9 April 1962
	Pascal and Ludwig, Inc	Finish:	26 February 1963
Specifications:	CIVENG 62-12		
Plans:	D.O. Series 205/37-120		
Folio Title:	BURBANK EASTERN SYSTEM Hillcrest Canyon Debris Basin		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 10 December 1963

Stormflow Data

Staff Gages: 10
Basin Staff Gage Elevation at One-third Design Discharge: 887 ft msl

Access Roads

To Embankment: from Caleb St

To Basin: from top of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	355 ft	Length	417 ft
Crest Width	20 ft	Crest Width	18 ft
Crest Elevation	901 ft msl	Crest Elevation	885 ft msl
Side Slope	upstream 1 on 2.25 downstream 1 on 1.75	Design Capacity	2,600 cfs
Pool Drain:		Intake Tower:	
Length	160 ft	Top Elevation	891 ft msl
Diameter	30 in	Height above Invert	28 ft
Design Capacity	100 cfs	Inside Dimensions	4 ft x 4 ft

Drainage Area: 0.35 sq mi
Debris Basin Capacity: 60,000 cu yds
Maximum Allowable Accumulation of Debris: 15,000 cu yds

REPORTING FEATURES

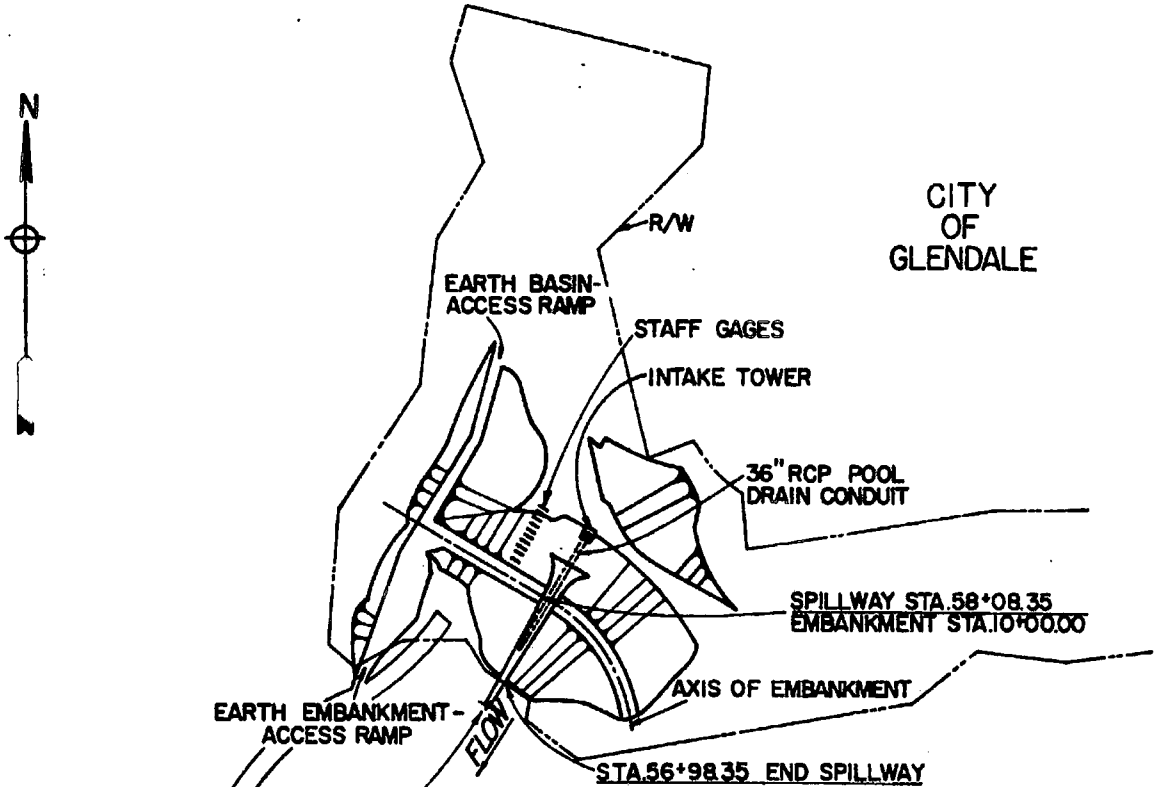
Spillway and Outlet Channel
Broadcrest concrete spillway
Trashracks
Concrete channel invert
Concrete channel walls
Concrete spillway apron
Subdrain system
Fencing

Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

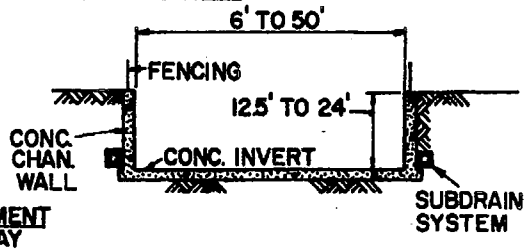
Embankment and Basin
Earth embankment
Earth embankment-access ramp
Earth berm-access ramp
Subdrain system
Debris storage capacity
Staff gages
Fencing
Rights-of-way

CORPS OF ENGINEERS

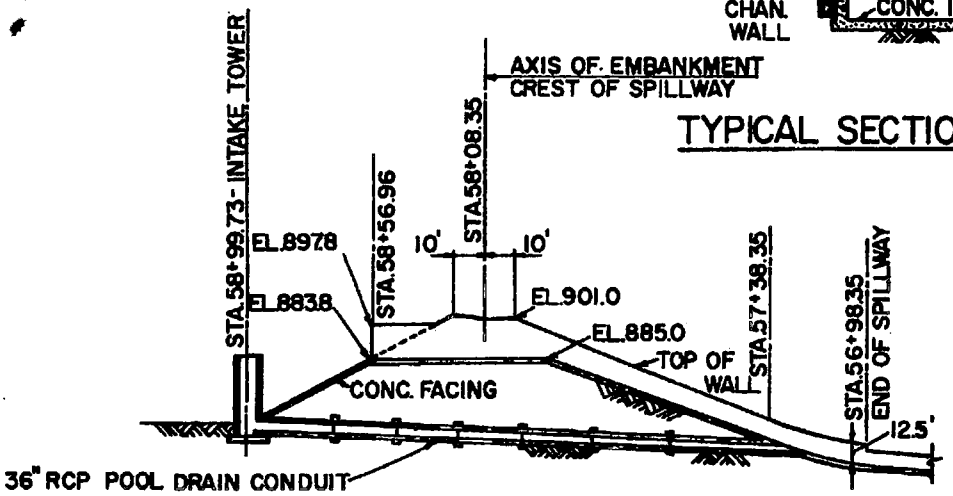
DEPARTMENT OF THE ARMY



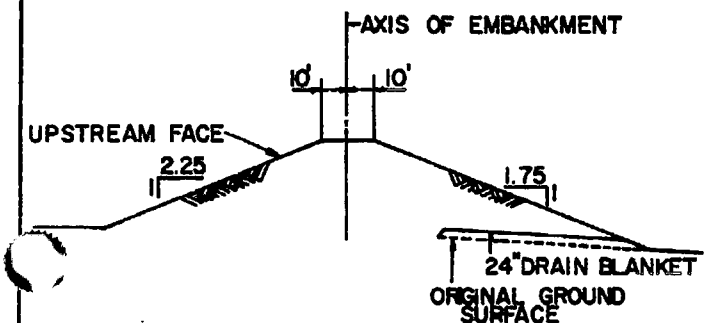
PLAN



TYPICAL SECTION THROUGH SPILLWAY



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

HILLCREST CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-D-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-D-3

BEL AIRE DR CHANNEL
SUNSET CANYON CHANNEL

Construction Data

Contract No:	DA 63-131	Start: 4 April 1963
	Pascal and Ludwig, Inc.	Finish: 1 April 1964
Specifications:	CIVENG 63-13	
Plans:	D.O. Series 205/165-259	
Folio Title:	BURBANK-EASTERN SYSTEM	
	Bel Aire Drive Channel and Tributary Channels and Debris Basins	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 10 November 1964

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

None

Reporting Features

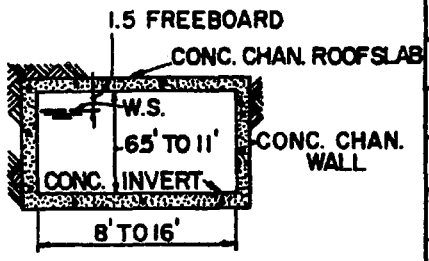
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Channel inspection manhole
Concrete channel roof slab	Concrete covered confluence section
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

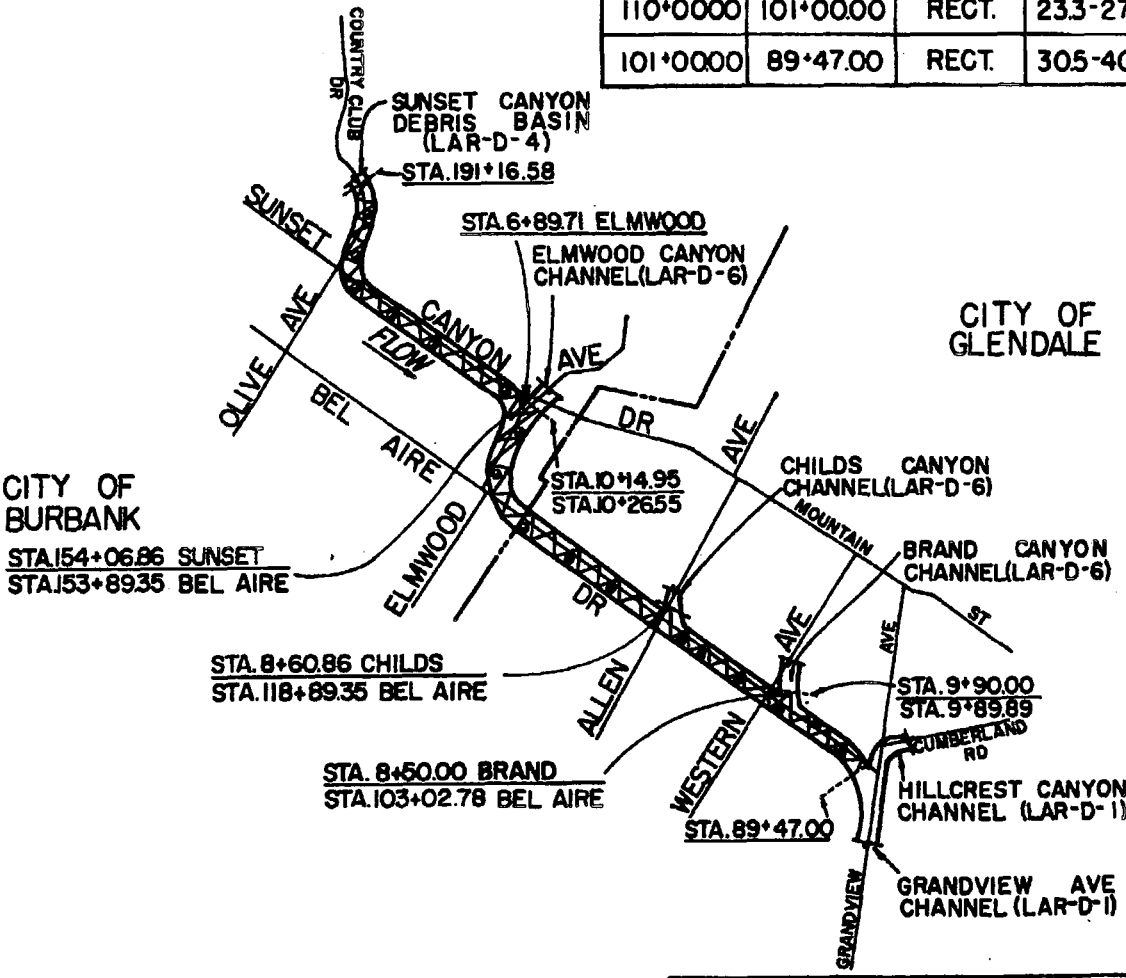
STA.	TO STA.	SECT.	V	Q
191+16.58	178+50.00	RECT.	49.0-53.6	1,800
178+50.00	174+00.00	RECT.	41.5	2,000
174+00.00	162+33.37	RECT.	41.5	2,200
162+33.37	154+06.86	RECT.	41.7-44.8	2,300
154+06.86	142+50.00	RECT.	38.7-46.9	2,900
142+50.00	129+00.00	RECT.	27.2-34.3	3,200
129+00.00	117+89.35	RECT.	23.5-26.2	3,400
117+89.35	117+25.00	RECT.	23.7	3,800
117+25.00	113+25.00	RECT.	22.7-24.1	3,900
113+25.00	110+00.00	RECT.	23.3-24.3	4,000
110+0000	101+00.00	RECT.	23.3-27.8	4,100
101+00.00	89+47.00	RECT.	30.5-40.6	5,300

N



TYPICAL COVERED SECTION

STA.191+16.58 TO STA.89+47.00



LEGEND

- COVERED SECTION
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT
- CHANNEL INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BEL AIRE DR CHANNEL
SUNSET CANYON CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-D-3

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-D-4

SUNSET CANYON DEBRIS BASIN

Construction Data

Contract No:	DA 63-131	Start: 4 April 1963
	Pascal and Ludwig, Inc	Finish: 1 April 1964
Specifications:	CIVENG 63-13	
Plans:	D.O. Series 205/165-259	
Folio Title:	BURBANK EASTERN SYSTEM	
	Sunset Canyon Debris Basin	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 10 November 1964

Stormflow Data

Staff Gages: 14
Basin Staff Gage Elevation at One-third Design Discharge: 1042 ft msl

Access Roads

To Embankment: from Country Club Dr to top of embankment
To Basin: from upper end of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	379 ft	Length	369 ft
Crest Width	20 ft	Crest Width	40 ft
Crest Elevation	1056 ft msl	Crest Elevation	1040 ft msl
Side Slope	upstream 1 on 2.25	Design Capacity	5,200 cfs
downstream:	upper 1 on 1.75 lower 1 on 2.5		
Pool Drain:		Intake Tower:	
Length	293 ft	Top Elevation	1046 ft msl
Diameter	30 in	Height above Invert	52 ft
Design Capacity	160 cfs	Inside Dimensions	4 ft x 4 ft

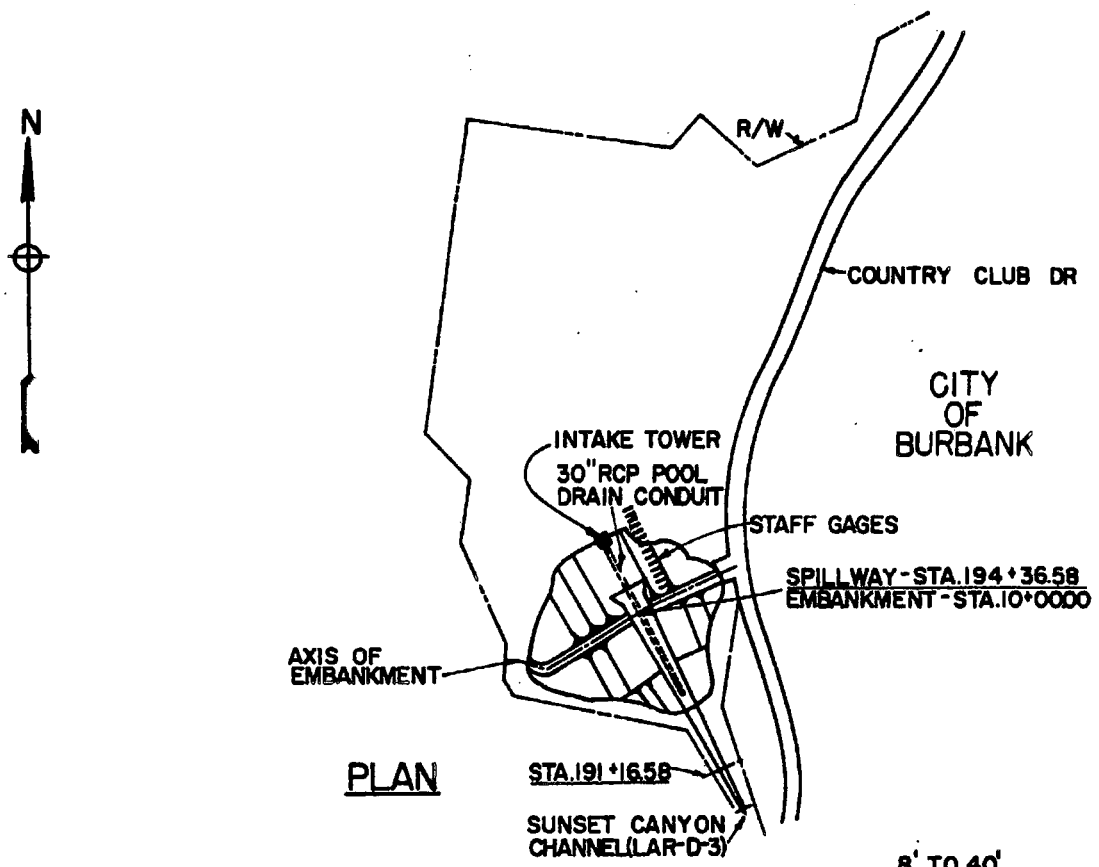
Drainage Area: 1.09 sq mi
Debris Basin Capacity: 185,000 cu yds
Maximum Allowable Accumulation of Debris: 46,000 cu yds

REPORTING FEATURES

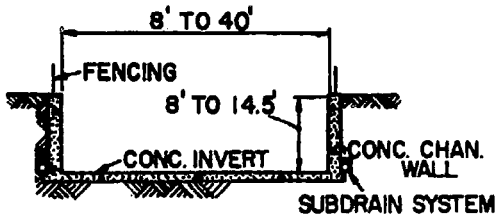
Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Concrete spillway apron
Subdrain system
Fencing
Rights-of-way

Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

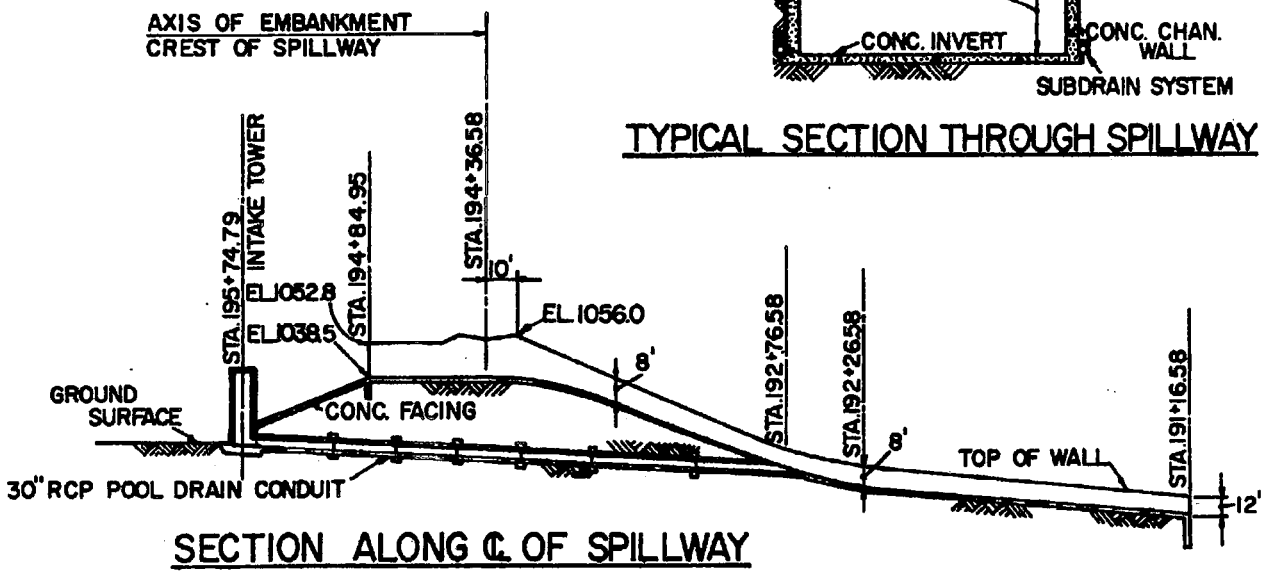
Embankment and Basin
Earth embankment
Surfaced embankment-access ramp
Debris storage capacity
Staff gages
Fencing
Rights-of-way



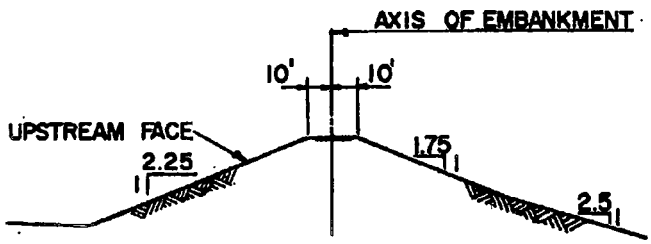
PLAN



TYPICAL SECTION THROUGH SPILLWAY



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SUNSET CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-D-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-D-5

CHILDS CANYON DEBRIS BASIN

Construction Data

Contract No:	DA 63-131	Start:	4 April 1963
	Pascal and Ludwig, Inc	Finish:	1 April 1964
Specifications:	CIVENG 63-13		
Plans:	D.O. Series 205/165-259		
Folio Title:	BURBANK EASTERN SYSTEM Childs Canyon Debris Basin		

Local Assurances

Resolution Dated: 3 March 1960
Operation and Maintenance Transferred to: LACFCD, 10 November 1964

Stormflow Data

Staff Gages: 13
Basin Staff Gage Elevation at One-third Design Discharge: 1060 ft msl

Access Roads

To Embankment: from Allen Ave and private road across abutment to top of embankment
To Basin: from top of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	339 ft	Length	213 ft
Crest Width	20 ft	Crest Width	23 ft
Crest Elevation	1071 ft msl	Crest Elevation	1058 ft msl
Side Slope	upstream 1 on 2.25 downstream upper 1 on 1.75 lower 1 on 2.5	Design Capacity	2,000 cfs
Pool Drain:		Intake Tower:	
Length	272 ft	Top Elevation	1066 ft msl
Diameter	30 in	Height above Invert	51 ft
Design Capacity	160 cfs	Inside Dimensions	4 ft x 4 ft

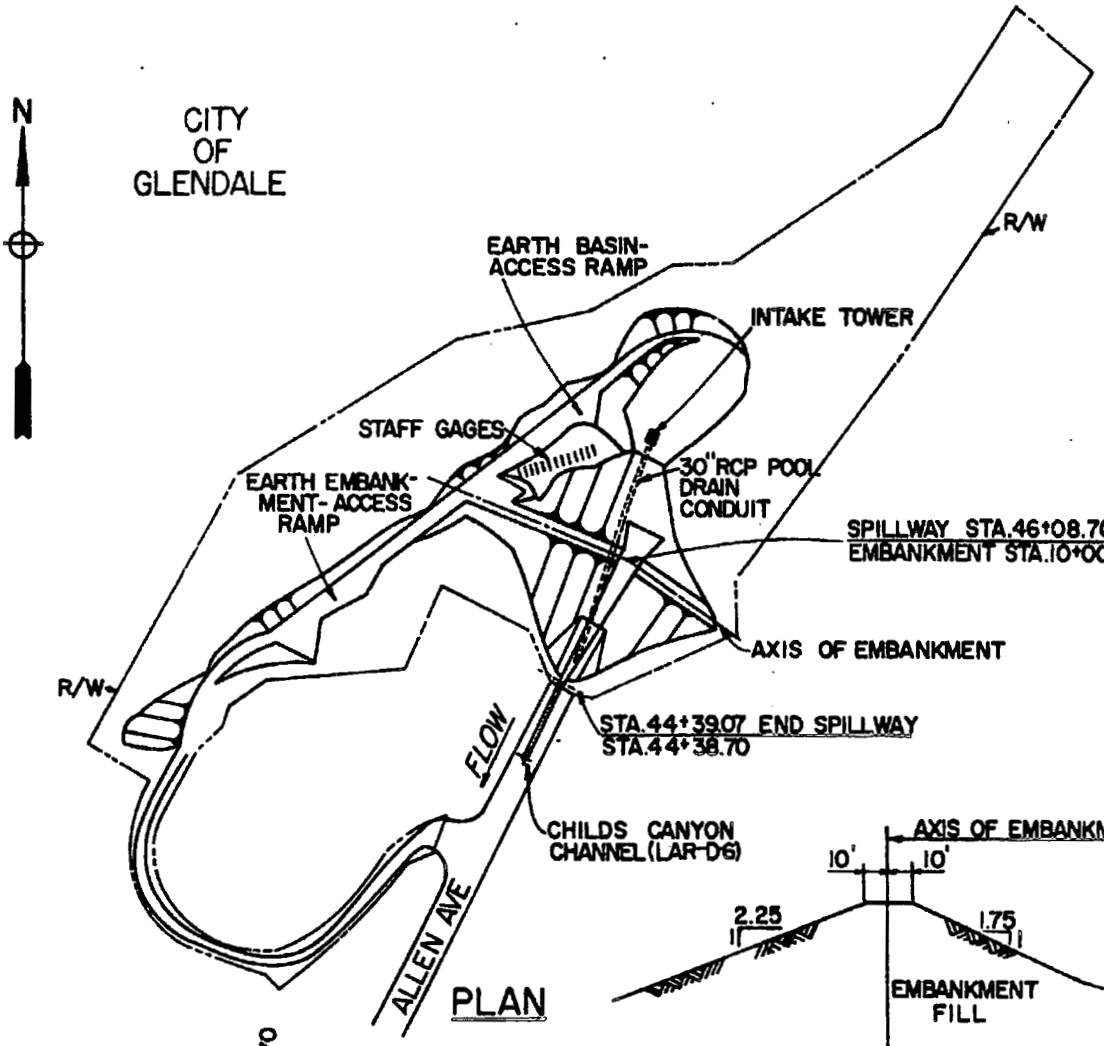
Drainage Area: 0.31 sq mi
Debris Basin Capacity: 55,000 cu yds
Maximum Allowable Accumulation of Debris: 13,750 cu yds

REPORTING FEATURES

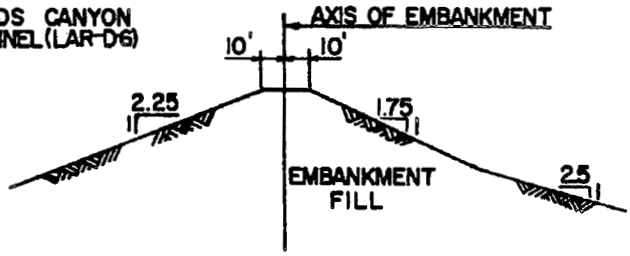
Spillway and Outlet Channel
Broadcrest concrete spillway
Trashracks
Concrete channel invert
Concrete channel walls
Rights-of-way
Fencing

Outlet Works
Intake tower
Concrete pool drain
conduit (ungated)

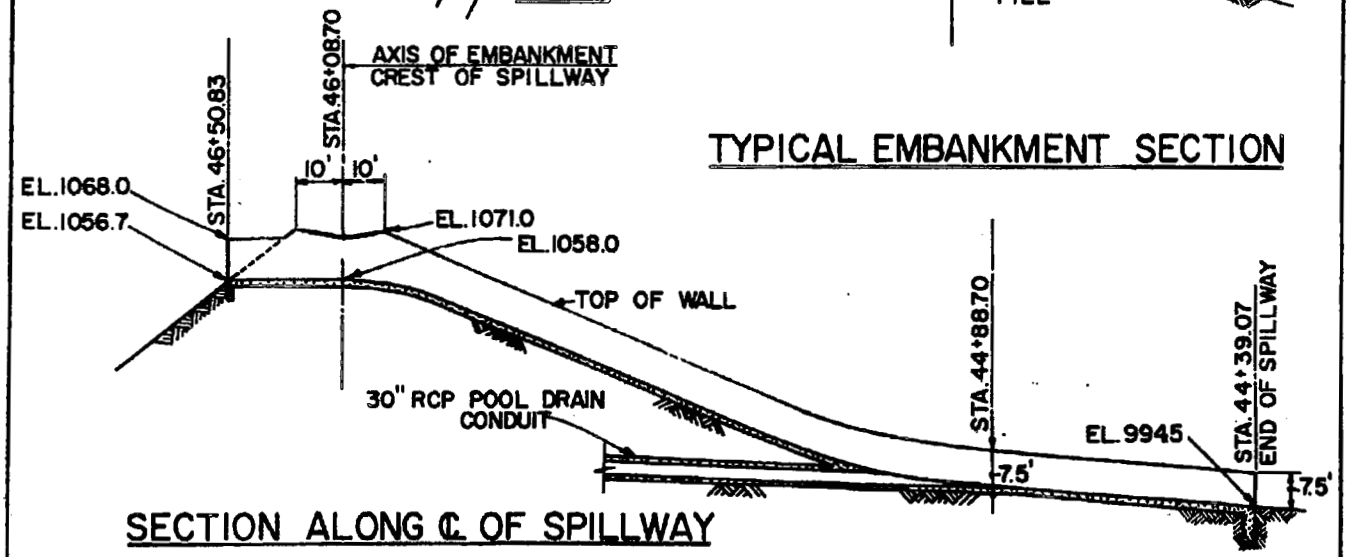
Embankment and Basin
Earth embankment
Earth basin-access ramp
Earth embankment-access road
Debris storage capacity
Staff gages
Fencing
Rights-of-way



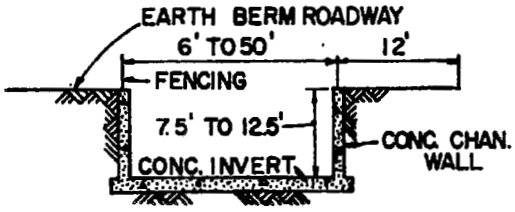
PLAN



TYPICAL EMBANKMENT SECTION



SECTION ALONG ℄ OF SPILLWAY



TYPICAL SECTION THROUGH SPILLWAY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

CHILDS CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-D-5

DATA SHEET
LAR-D-6

BRAND CANYON CHANNEL
CHILDS CANYON CHANNEL
ELMWOOD CANYON CHANNEL

Construction Data

	BRAND AND ELMWOOD CANYONS	CHILDS CANYON
Const. Limits:	BRAND AND ELMWOOD CANYONS	CHILDS CANYON
Contract No:	DA 64-135 Sully-Miller Contr Co	DA 63-131 Pascal and Ludwig, Inc.
Start:	18 May 1964	4 March 1963
Finish:	7 January 1965	1 April 1964
Specifications:	CIVENG 64-20	CIVENG 63-13
Plans:	D.O. Series 205/260-313	D.O. Series 205/165-259
Folio Title:	BURBANK EASTERN SYSTEM Bel Aire Drive Channel and Tributary Channels and Debris Basins	BURBANK EASTERN SYSTEM Bel Aire Drive Channel and Tributary Channels and Debris Basins

Local Assurances

Resolution Dated:	8 March 1960	8 March 1960
O&M Transferred to:	11 May 1965 (LACFCD)	10 November 1964 (LACFCD)

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

none

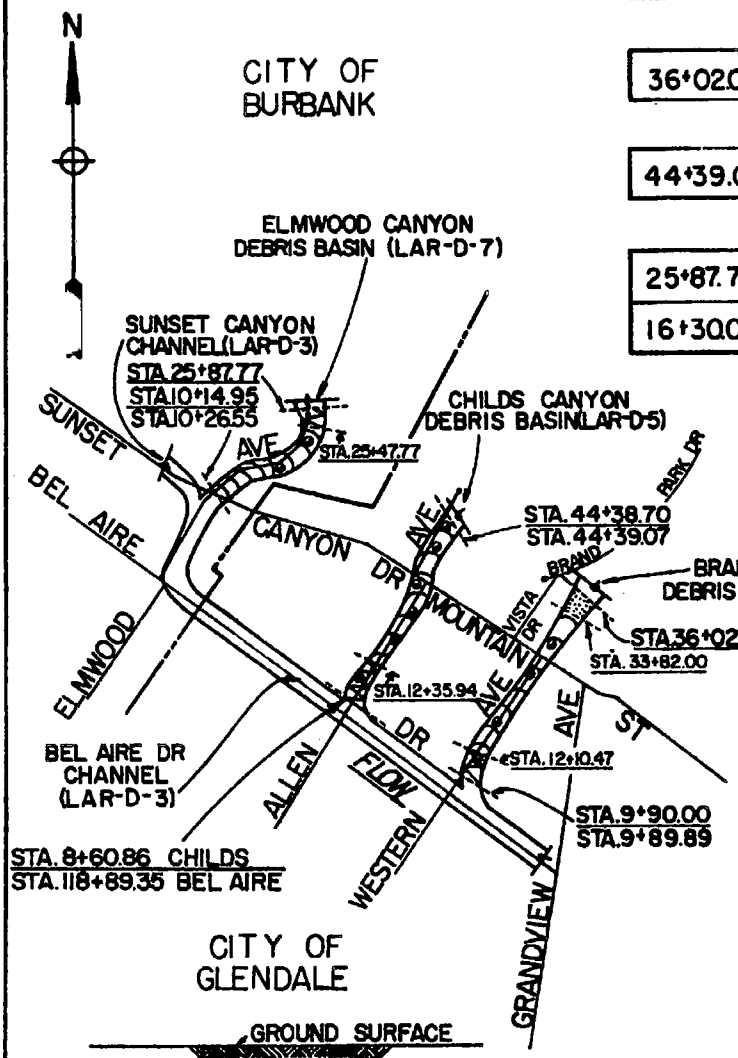
Reporting Features

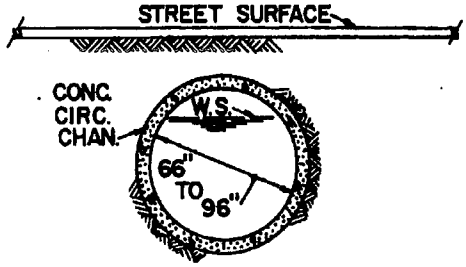
Along Channel	At a Channel Station
Reinforced concrete pipe section	Side drain
Concrete channel invert	Channel inspection manhole
Concrete channel walls	Public utility
Concrete channel roof slab	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

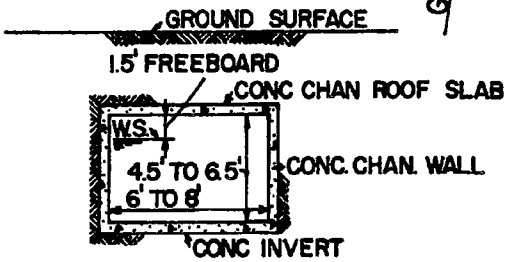
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
BRAND CANYON CHANNEL				
36+02.00	9+90.00	CIRC.	35.9-46.8	1600
CHILDS CANYON CHANNEL				
44+39.02	8+60.86	CIRC.	40.7-56.2	700
ELMWOOD CANYON CHANNEL				
25+87.77	16+30.00	CIRC.	42.3-57.0	800
16+30.00	10+14.95	CIRC.	40.3-41.0	900





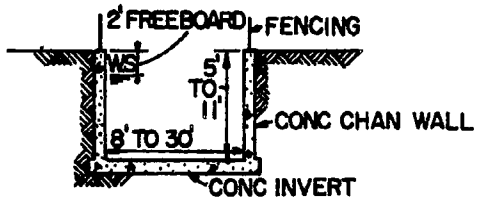
TYPICAL CIRCULAR SECTION

BRAND CANYON CHANNEL
STA.33+82.00 TO STA.12+10.47
CHILDS CANYON CHANNEL
STA.44+39.07 TO STA.12+35.94
ELMWOOD CANYON CHANNEL
STA.25+47.77 TO STA.10+14.95



TYPICAL COVERED SECTION

BRAND CANYON CHANNEL
STA.12+10.47 TO STA. 9+90.00
CHILDS CANYON CHANNEL
STA.12+35.94 TO STA. 8+60.86
ELMWOOD CANYON CHANNEL
STA.25+87.77 TO STA.25+47.77



TYPICAL OPEN SECTION

BRAND CANYON CHANNEL
STA.36+02.00 TO STA.33+82.00

LEGEND

- OPEN SECTION
- COVERED SECTION
- CIRCULAR SECTION
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY
- CHANNEL INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BRAND CANYON, CHILDS CANYON, AND ELMWOOD CANYON CHANNELS

SCALE IN FEET

1000 0 1000 2000 3000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-D-6

OPERATION AND MAINTENANCE MANUAL

DATA SHEET ELMWOOD CANYON DEBRIS BASIN
LAR-D-7

Construction Data

Contract No:	64-135	Start: 18 May 1964
	Sully-Miller Contr Co	Finish: 7 January 1965
Specifications:	CIVENG 64-20	
Plans:	D.O. Series 205/260-313	
Folio Title:	BURBANK EASTERN SYSTEM	
	Elmwood Canyon Debris Basin	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 11 May 1965

Stormflow Data

Staff Gages: 11
Basin Staff Gage Elevation at One-third Design Discharge: 940 ft msl

Access Roads

To Embankment:	from Elmwood Avenue
To Basin:	from top of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	235 ft	Length	204 ft
Crest Width	20 ft	Crest Width	22 ft
Crest Elevation	952 ft msl	Crest Elevation	937 ft msl
Side Slope	upstream 1 on 2.25	Design Capacity	2,400 cfs
	downstream		
	upper 1 on 1.75		
	lower 1 on 2.5		
Pool Drain:		Intake Tower:	
Length	218 ft	Top Elevation	945 ft msl
Diameter	30 in	Height above Invert	33 ft
Design Capacity	160 cfs	Inside Dimensions	4.5 ft x 4.5 ft

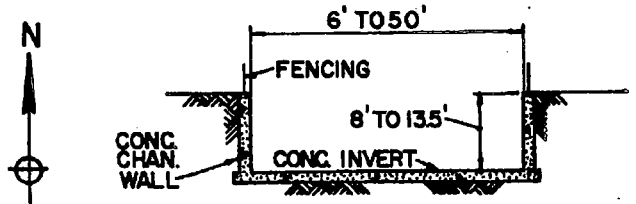
Drainage Area: 0.31 sq mi
Debris Basin Capacity: 70,000 cu yds
Maximum Allowable Accumulation of Debris: 17,500 cu yds

REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Concrete spillway apron
Fencing
Trashracks

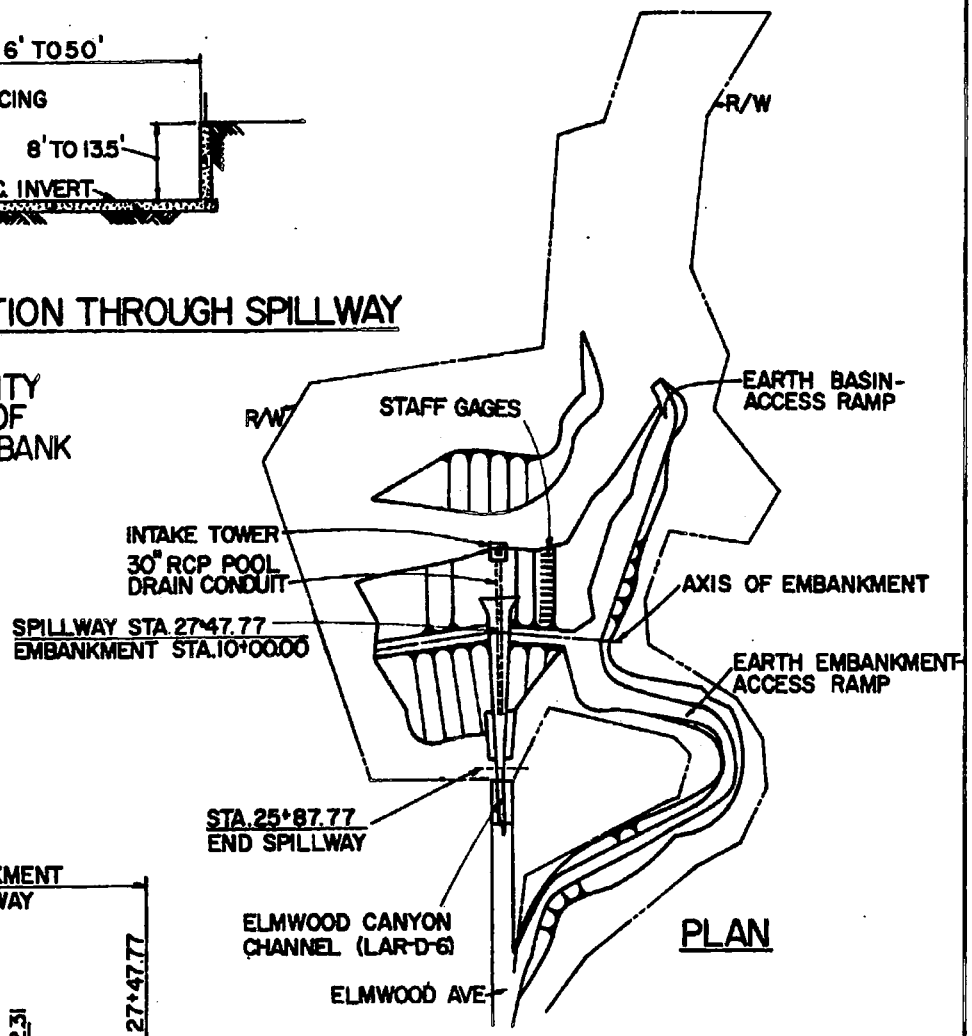
Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

Embankment and Basin
Earth embankment
Earth basin-access ramp
Earth embankment-access ramp
Staff gages
Surfaced parking area
Debris storage capacity
Fencing
Rights-of-way

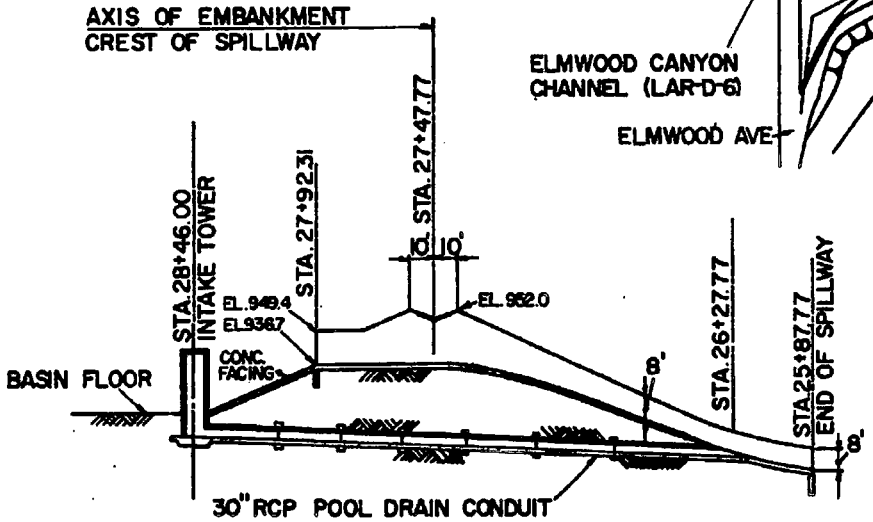


TYPICAL SECTION THROUGH SPILLWAY

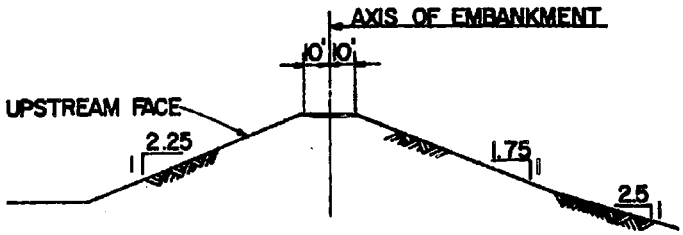
CITY OF BURBANK



PLAN



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

ELMWOOD CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-D-7

OPERATION AND MAINTENANCE MANUAL

DATA SHEET BRAND CANYON DEBRIS BASIN
LAR-D-8

Construction Data

Contract No:	DA 64-135	Start:	18 May 1964
	Sully-Miller Contr Co	Finish:	7 January 1965
Specifications:	CIVENG 64-120		
Plans:	D.O. Series 205/260-313		
Folio Title:	BURBANK EASTERN SYSTEM		
	Brand Canyon Debris Basin		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 11 May 1965

Stormflow Data

Staff Gages: 13
Basin Staff Gage Elevation at One-third Design Discharge: 892 ft msl

Access Roads

To Embankment: from Brand Park Dr and Western Ave
To Basin: from top of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	400 ft	Length	342 ft
Crest Width	20 ft	Crest Width	23 ft
Crest Elevation	903 ft msl	Crest Elevation	890 ft msl
Side Slope	upstream 1 on 2.5 downstream 1 on 1.75	Design Capacity	2,000 cfs
Pool Drain:		Intake Tower:	
Length	228 ft	Top Elevation	897 ft msl
Diameter	30 in	Height above Invert	38.3 ft
Design Capacity	160 cfs	Inside Dimensions	4.5 x 4.5 ft

Drainage Area: 1.03 sq mi
Debris Basin Capacity: 170,000 cu yds
Maximum Allowable Accumulation of Debris: 42,500 cu yds

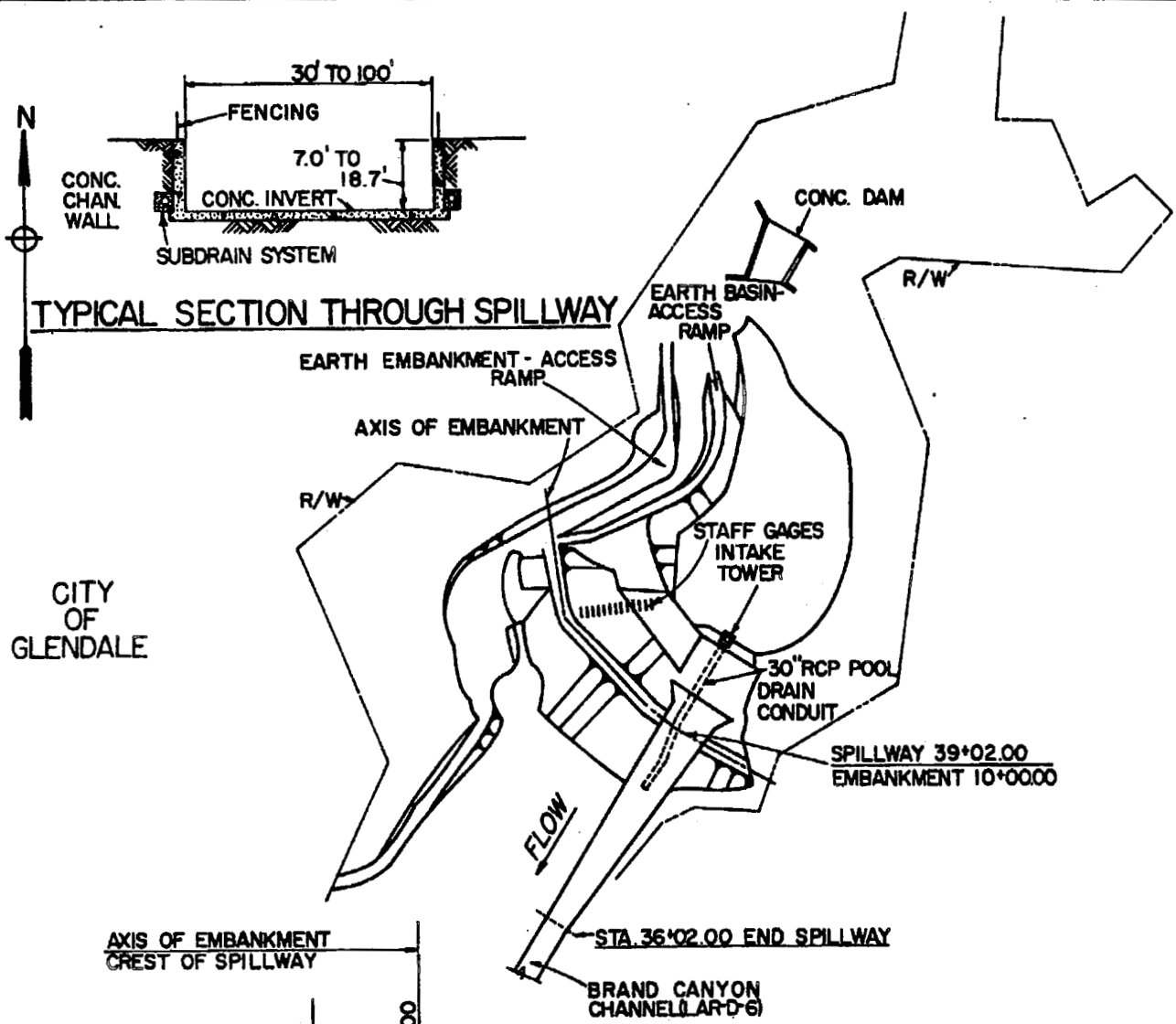
REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Concrete spillway apron
Trashracks
Subdrain system
Fencing

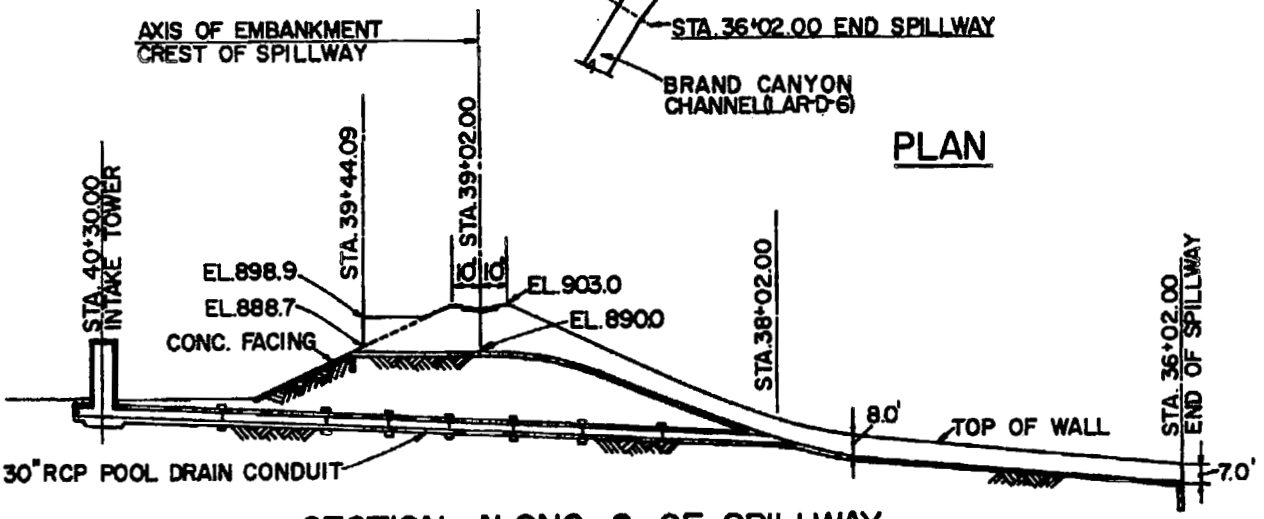
Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

Embankment and Basin
Earth embankment
Earth embankment-access ramp
Earth basin-access ramp
Staff gages
Inlet structure
Parking area
Debris storage capacity
Fencing
Rights-of-way

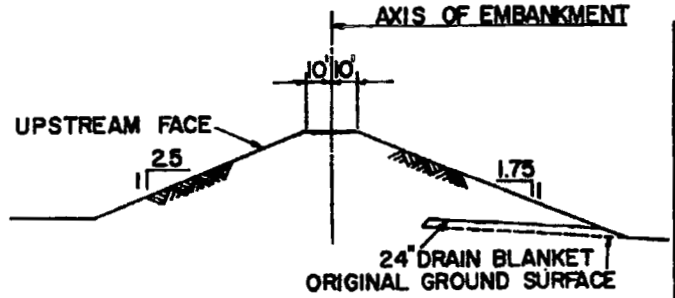
TYPICAL SECTION THROUGH SPILLWAY



PLAN



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BRAND CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-D-8

DATA SHEET
LAR-E-1

BURBANK-WESTERN CHANNEL
Victory Blvd to Los Angeles River

Construction Data

Contract No:	Force Account	Start: 1938
		Finish: December 1940
Specifications:	CIVENG 60-2	
Plans:	D.O. Series LA 331/1-44, 330/45-52	
Folio Title:	LOS ANGELES RIVER IMPROVEMENT Mariposa St to Fletcher Dr	

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: at Los Angeles River (sta 33+09)
Type: Recording (LACFCD--E285-R)
Staff Gage Reading at One-third Capacity: 3.6 ft on gage (5,000 cfs)

Access Ramps
To Invert: none; use LAR-E-3

To Right Berm: from equestrian field
To Left Berm: none

Bridges

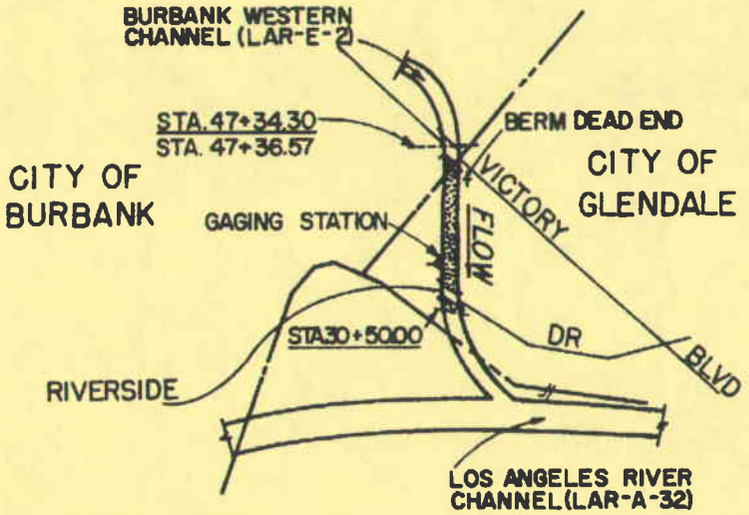
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Victory Blvd	0	2	City of Los Angeles
Riverside Dr	0	0	City of Los Angeles

Reporting Features

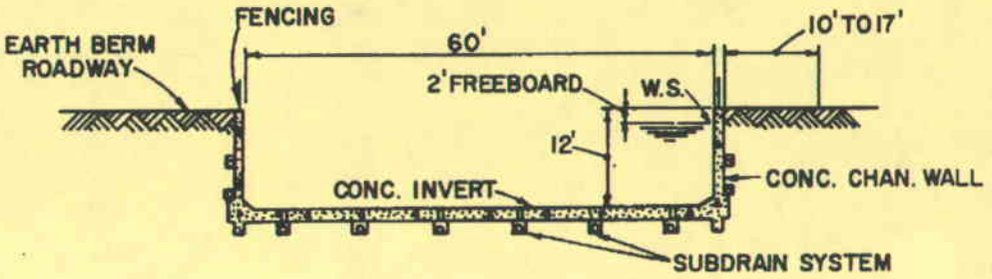
Along Channel	At a Channel Station
Earth berm roadway	Side drain
Concrete channel invert	Bridge
Concrete channel walls	Gaging station
Subdrain system	Public utility
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
47+36.57	30+50.00	RECT.		15,000



CITY OF LOS ANGELES



TYPICAL OPEN SECTION

STA. 47+36.57 TO STA. 30+50.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BURBANK WESTERN CHANNEL

VICTORY BLVD TO LOS ANGELES RIVER

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

DATA SHEET
LAR-E-2

BURBANK-WESTERN CHANNEL
S.P. Ry to Victory Blvd

Construction Data

Contract No: Force Account — Start: 1942, Finish: 1943

Plans: D.O. Series 385/14-41

Folio Title: BURBANK-WESTERN SYSTEM (LOWER)
Victory Blvd to Burbank Blvd

Local Assurances

Resolution Dated: 6 February 1940
Operation and Maintenance Transferred to: LACFCD, 26 April 1944

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-E-3

To Right Berm: none
To Left Berm: none

Bridges

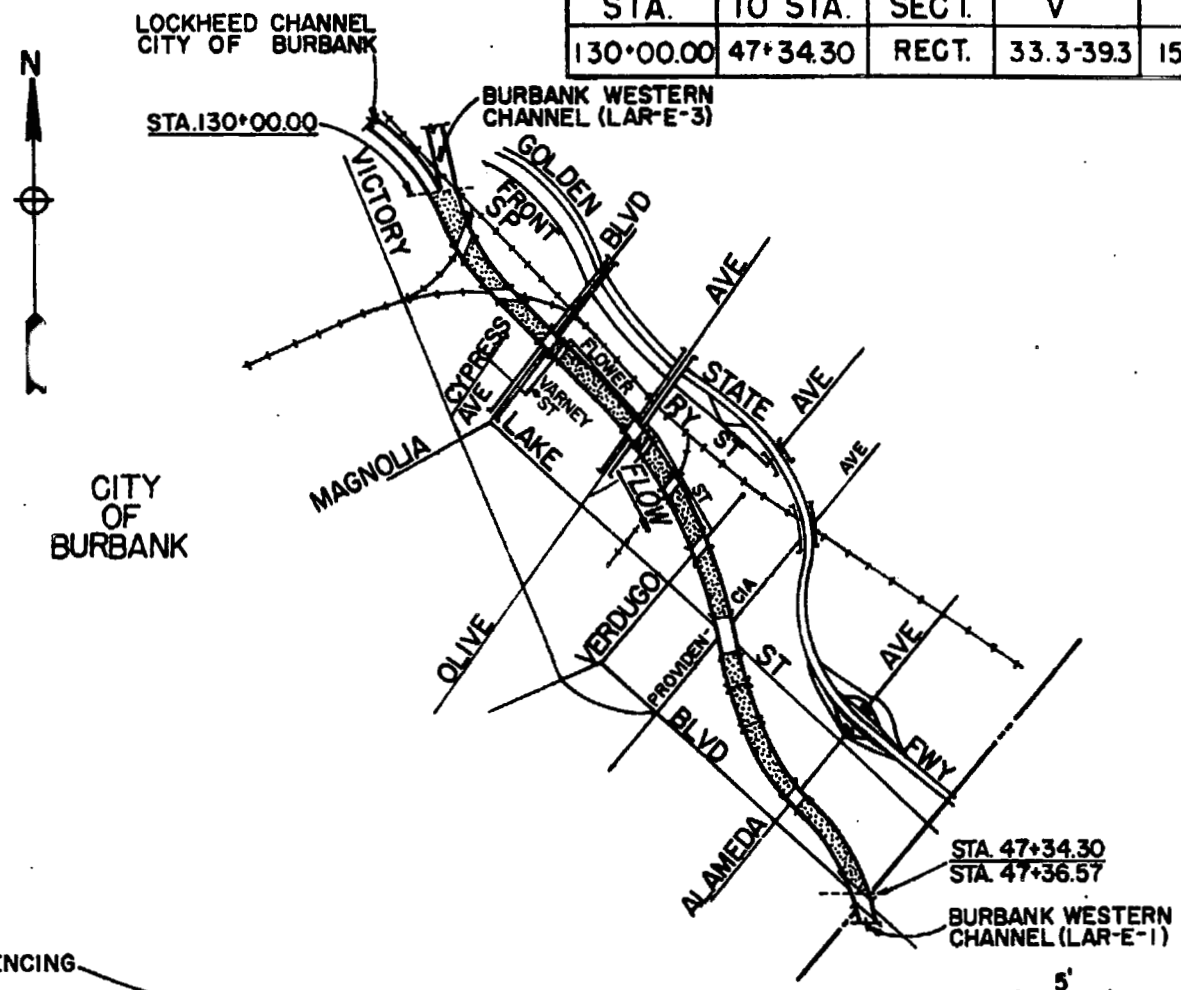
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
S. P. Ry	0	0	S.P.R.R.
S.P. Ry	0	0	S.P.R.R.
Magnolia Blvd	0	2	Los Angeles County
Varney St	0	2	Los Angeles County
Olive Ave	0	2	Los Angeles County
Flower St	0	2	Los Angeles County
S. P. Ry	0	2	S.P.R.R.
Verdugo Ave	0	2	Los Angeles County
Providencia Ave	0	2	Los Angeles County
Sta 73+58	0	0	City of Burbank (utility crossing)
Sta 69+75	0	0	City of Burbank (footbridge)
Alameda Ave	0	2	Los Angeles County

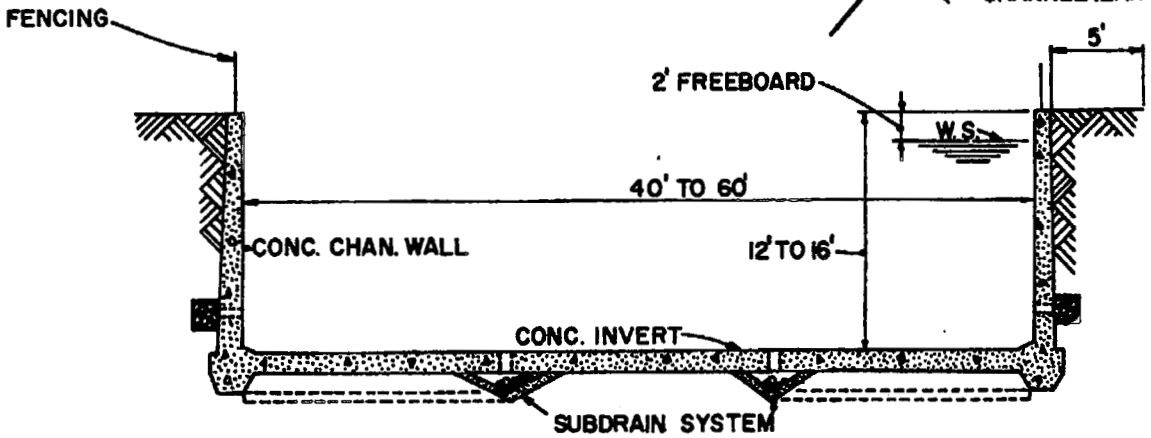
Reporting Features

Along Channel	At a Channel Station
Concrete channel walls	Side drain
Concrete channel invert	Bridge
Subdrain system	Public utility
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
130+00.00	47+34.30	RECT.	33.3-39.3	15,000





TYPICAL OPEN SECTION

STA.130+00.00 TO STA.47+34.30

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- UTILITY BRIDGE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BURBANK WESTERN CHANNEL

S.P.RY TO VICTORY BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-E-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET — BURBANK WESTERN CHANNEL
Cohasset St to S.P. Ry

Construction Data

Const. Limits	Sta 237+00.00 to Sta 133+75.00	Sta 133+75.00 to Sta 130+00.00
Contract No:	DA 58-79	DA 58-71
	B.J. Ukropina, T.P. Polich, S. Kral, and J.R. Ukropina	Oberg Const Corp
Start:	14 April 1959	23 December 1957
Finish:	14 October 1960	4 December 1958
Specifications:	Calif. State Hwy Specs (VII-LA-4-Brb)	CIVENG 58-5
Plans:	D.O. Series 168/19-100,107-113	D.O. Series 168/1-4,16-18,101-106
Folio Title:	BURBANK WESTERN SYSTEM (UPPER) Roscoe Blvd to Burbank Blvd	BURBANK WESTERN SYSTEM (UPPER) Burbank Blvd to Lockheed Channel

Local Assurances

Resolution Dated:	8 May 1956	8 May 1956
0 and M Transferred to:	29 May 1962 (LACFCD)	28 January 1959 (LACFCD)

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: through left wall at Lamer St (sta 195+50)

To Right Berm: none
To Left Berm: Naomi St, Tulare Ave, alley east of Frederic St, Winona Ave, Lamer St, Morgan Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Buena Vista St	0	2	City of Burbank

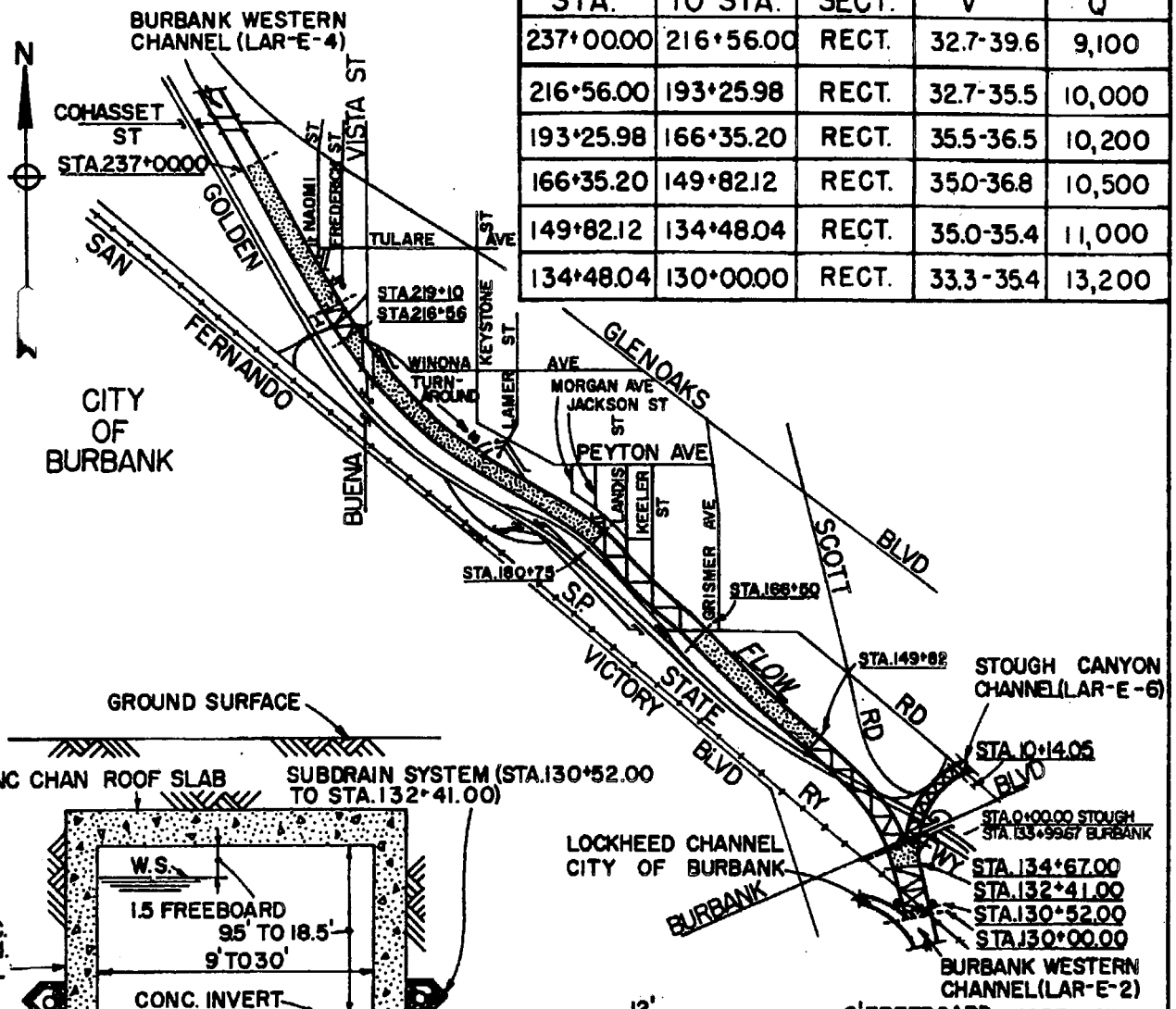
Reporting Features

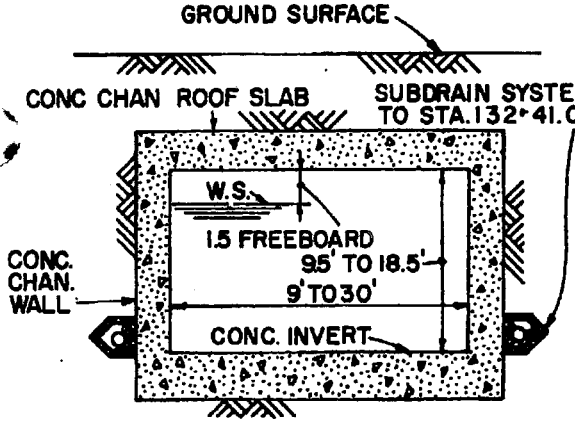
Along Channel	At a Channel Station
Earth berm roadway	Concrete invert-access ramp
Concrete channel invert	Surfaced berm-access ramp
Concrete channel walls	Side drain
Concrete channel roof slab	Bridge
Subdrain system	Public utility
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

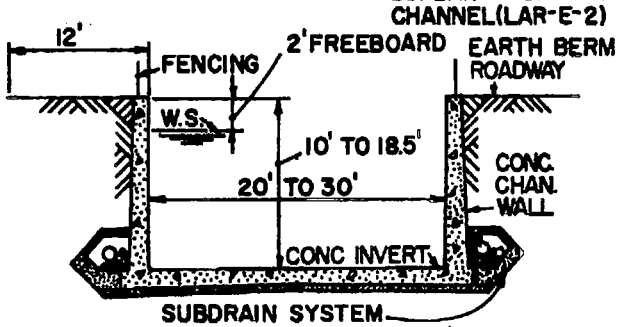
STA.	TO STA.	SECT.	V	Q
237+00.00	216+56.00	RECT.	32.7-39.6	9,100
216+56.00	193+25.98	RECT.	32.7-35.5	10,000
193+25.98	166+35.20	RECT.	35.5-36.5	10,200
166+35.20	149+82.12	RECT.	35.0-36.8	10,500
149+82.12	134+48.04	RECT.	35.0-35.4	11,000
134+48.04	130+00.00	RECT.	33.3-35.4	13,200





TYPICAL COVERED SECTION

STA.219+10.00 TO STA.216+56.00
STA.180+75.00 TO STA.166+50.00
STA.149+82.12 TO STA.134+67.00
STA.132+41.00 TO STA.130+52.00
STOUGH CANYON
STA. 10+14.05 TO STA 0+00.00



TYPICAL OPEN SECTION

STA.237+00.00 TO STA.130+00.00
(EXCEPT AS NOTED)

LEGEND

- OPEN SECTION
- STREET BRIDGE
- COVERED SECTION
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT
- INVERT-ACCESS RAMP

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BURBANK WESTERN CHANNEL
COHASSET ST TO S.P. RY

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-E-3

DATA SHEET
LAR-E-4

BURBANK WESTERN CHANNEL
Roscoe Blvd to Cohasset St

Construction Data

Contract No:	DA 58-79	Start:	14 April 1959
	B.J. Ukropina, T.P. Polich, S. Kral, and J.R. Ukropina	Finish:	14 October 1960
Specifications:	Calif. State Hwy Specs (VII-LA-4-Brb)		
Plans:	D.O. Series 168/19-100, 107-113		
Folio Title:	BURBANK WESTERN SYSTEM (UPPER) Roscoe Blvd to Burbank Blvd		

Local Assurances

Resolution Dated: 8 May 1956
Operation and Maintenance Transferred to: LACFCD, 29 May 1962

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-E-3 or LAR-E-5

To Right Berm: Glenoaks Blvd, Lanark St, Hollywood Way, Cohasset St
To Left Berm: Glenoaks Blvd, Cohasset St

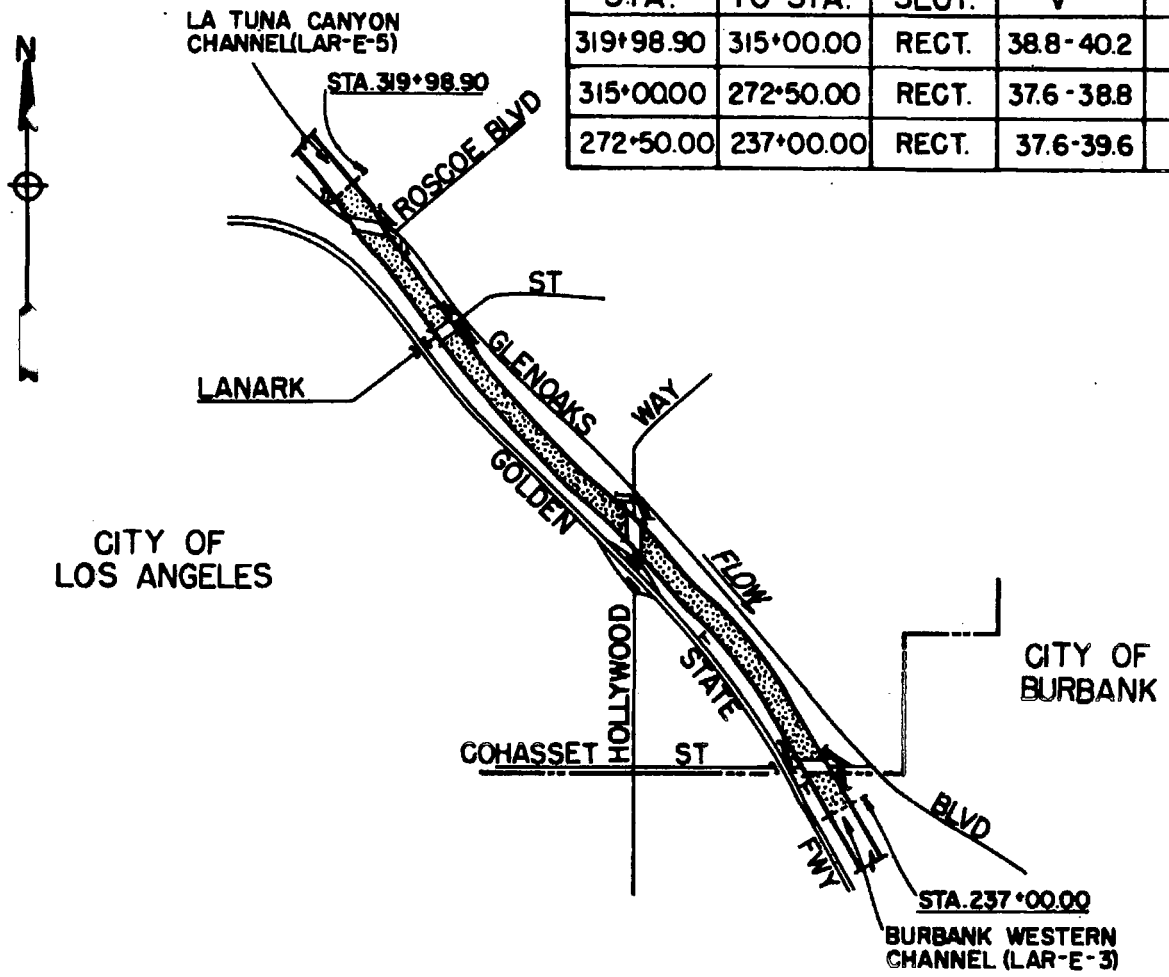
Bridges

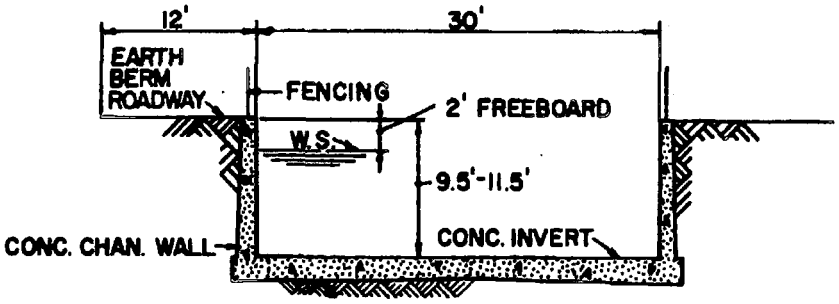
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Glenoaks Blvd	0	2	City of Los Angeles
Lanark St	0	2	City of Los Angeles
Hollywood Way	0	2	City of Los Angeles
Cohasset St	0	2	City of Los Angeles and City of Burbank

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Side drain
Concrete channel invert	Bridge
Concrete channel walls	Surfaced berm-access ramp
Fencing	Public utility
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
319+98.90	315+00.00	RECT.	38.8-40.2	8,500
315+00.00	272+50.00	RECT.	37.6-38.8	8,700
272+50.00	237+00.00	RECT.	37.6-39.6	9,100





TYPICAL OPEN SECTION
STA.319+98.90 TO STA.237+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BURBANK WESTERN CHANNEL
ROSCOE BLVD TO COHASSET ST

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET LA TUNA CANYON CHANNEL
LAR-E-5

Construction Data

Contract No.:	DA 60-150	Start: 16 March 1960
	Guy F. Atkinson Co	Finish: 31 January 1961
Specifications:	CIVENG 60-10	
Plans:	D.O. Series 169/1-63	
Folio Title:	BURBANK WESTERN SYSTEM (UPPER) Debris Basin to Roscoe Blvd	

Local Assurances

Resolution Dated: 18 February 1958
Operation and Maintenance Transferred to: LACFCD, 31 May 1961

Stormflow Data

Gaging Station Location: on right bank upstream of La Tuna Canyon Rd (abandoned)

Access Ramps

To Invert: through left wall downstream of Martindale Ave (sta 391+45)
To Right Berm: La Tuna Canyon Rd, private road at Martindale Ave, Wildwood Ave, Penrose St, Village Ave, Vinedale St, Nettleton St
To Left Berm: La Tuna Canyon Rd, private road at Martindale Ave, Wildwood Ave, Village Ave, Vinedale St, Nettleton St

Bridges

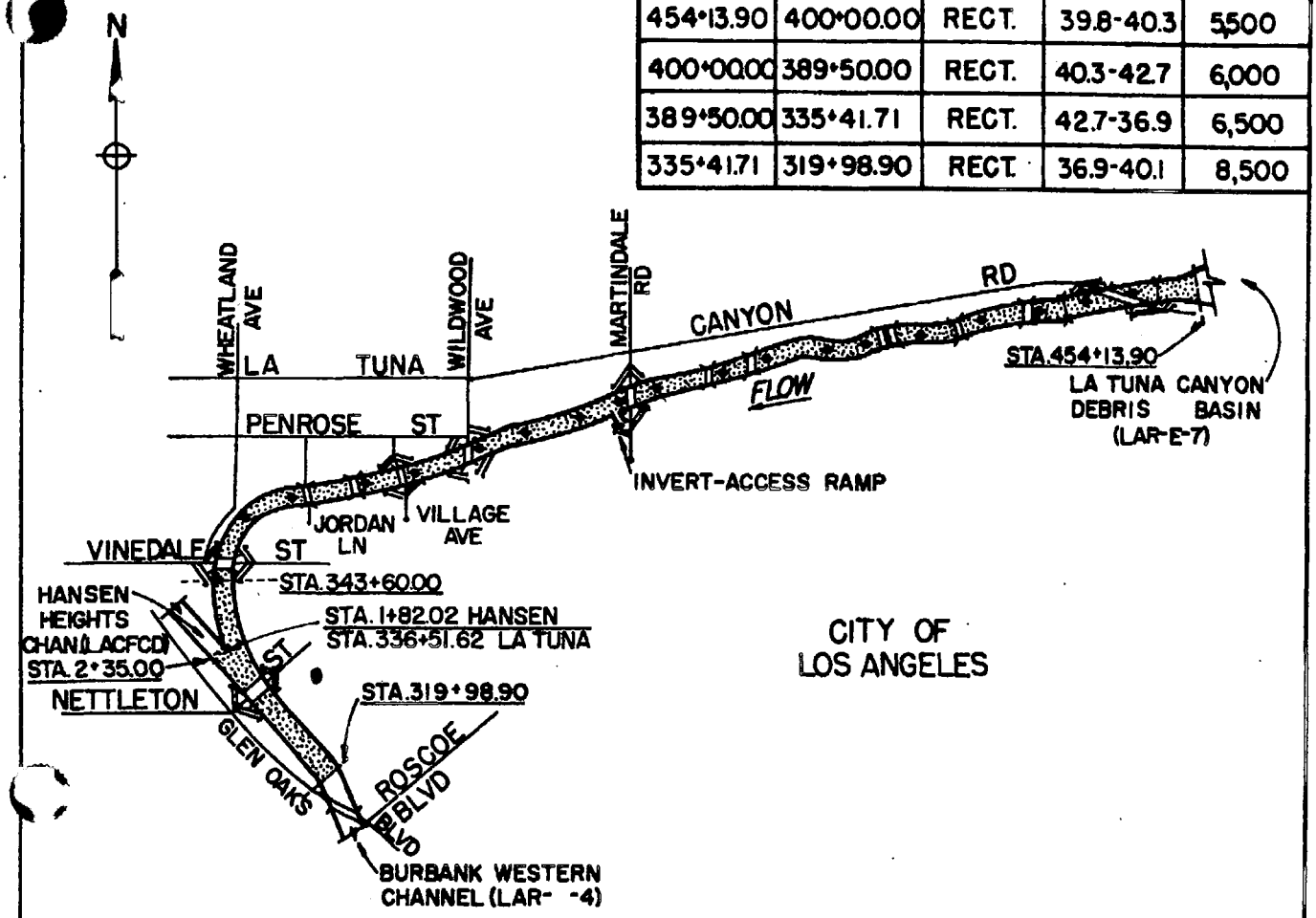
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 448+50	0	2	LACFCD (gaging station footbridge)
La Tuna Canyon Rd	0	2	City of Los Angeles
Sta 439+47	0	2	Private footbridge
Sta 436+62	0	2	Private vehicular bridge
Sta 427+85	0	2	Private vehicular bridge
Sta 420+40	0	2	Private vehicular bridge
Sta 412+97	0	2	Private vehicular bridge
Sta 405+50	0	2	Private vehicular bridge
Sta 401+30	0	2	Private vehicular bridge
Martindale Ave	0	2	City of Los Angeles
Sta 374+81	0	2	Private vehicular bridge
Sta 367+34	0	2	Private vehicular bridge
Sta 362+22	0	2	Private vehicular bridge
Sta 357+14	0	2	Private vehicular bridge
Vinedale St	0	2	City of Los Angeles
Nettleton St	0	2	City of Los Angeles

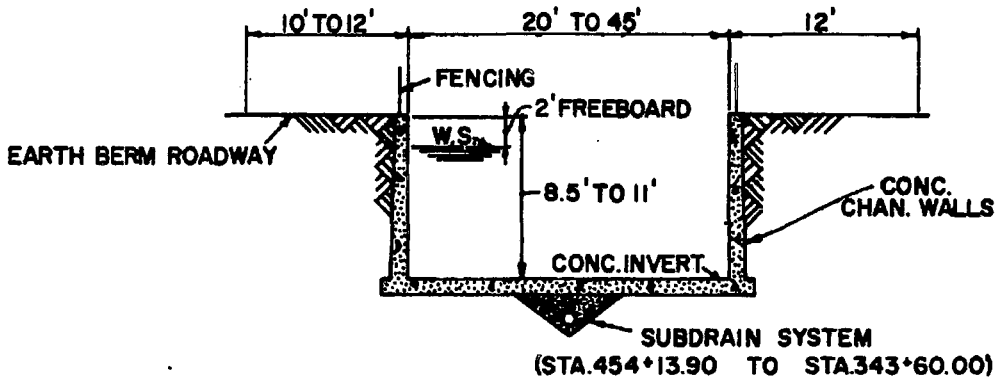
Reporting Features

Along Channel	At a Channel Station
Earth and surfaced berm roadway	Surfaced berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Concrete confluence section
Subdrain system	Side overflow spillway
Fencing	Surfaced side drainage entrance
Rights-of-way	Bridge
	Public utility

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
454+13.90	400+00.00	RECT.	39.8-40.3	5,500
400+00.00	389+50.00	RECT.	40.3-42.7	6,000
389+50.00	335+41.71	RECT.	42.7-36.9	6,500
335+41.71	319+98.90	RECT.	36.9-40.1	8,500





TYPICAL OPEN SECTION

STA.454+13.90 TO STA.319+98.90

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LA TUNA CANYON CHANNEL

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET STOUGH CANYON CHANNEL
LAR-E-6

Construction Data

Contract No:	DA 60-150	Start: 16 March 1960
	Guy F. Atkinson Co	Finish: 31 January 1961
Specifications:	CIVENG 60-10	
Plans:	D.O. Series 169/64-101	
Folio Title:	BURBANK WESTERN SYSTEM (UPPER)	
	Stough Canyon Branch	

Local Assurances

Resolution Dated: 18 February 1958
Operation and Maintenance Transferred to: LACFCD, 4 May 1961

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

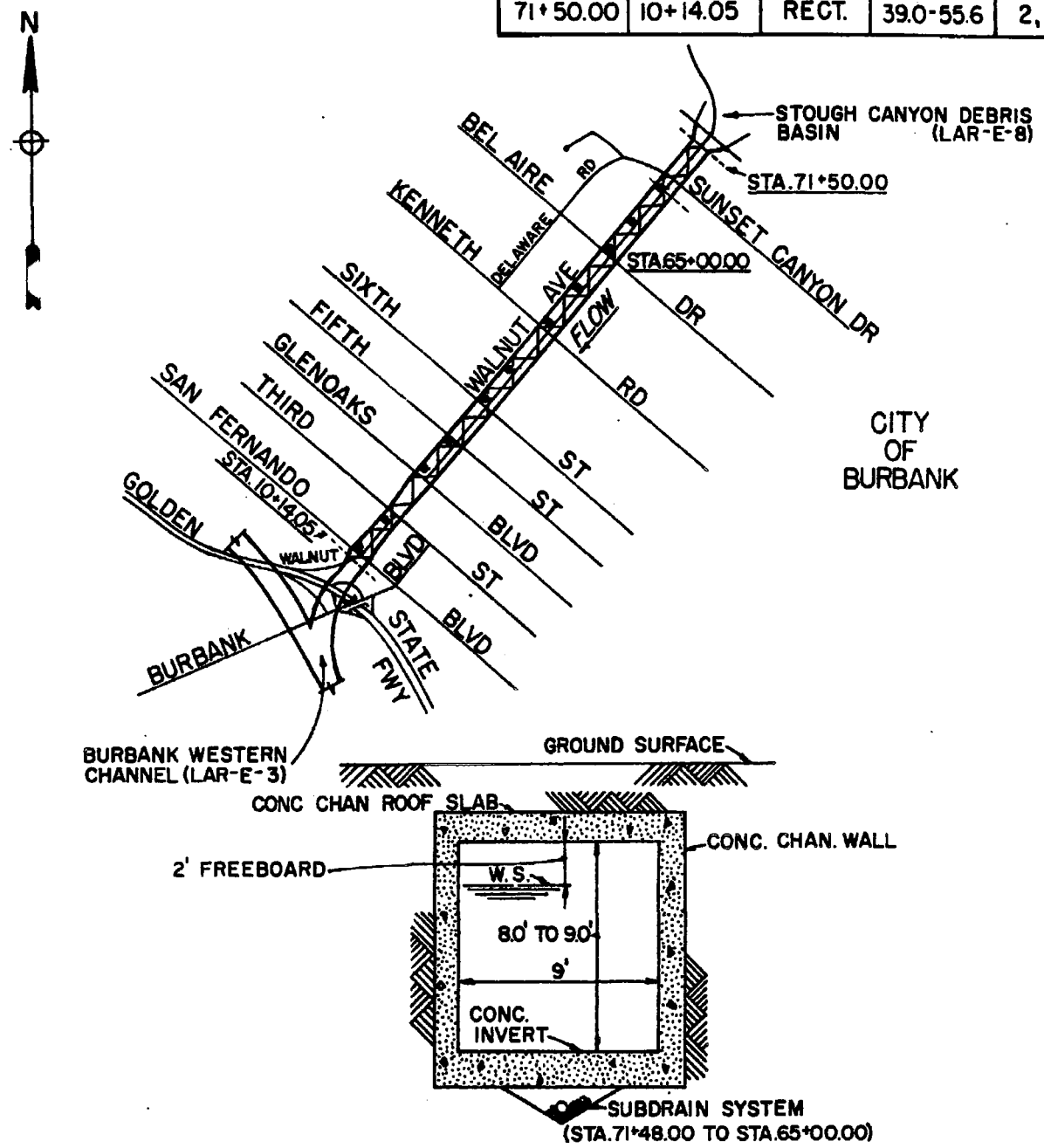
None

Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Channel inspection manhole
Concrete channel roof slab	Public utility
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
71+50.00	10+14.05	RECT.	39.0-55.6	2,600



TYPICAL OPEN SECTION
STA.71+50.00 TO STA.10+14.05

LEGEND

- OPEN SECTION
- COVERED SECTION
- CHANNEL INSPECTION MANHOLE
- ----- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

STOUGH CANYON CHANNEL

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET LA TUNA CANYON DEBRIS BASIN
LAR-E-7

Construction Data

Contract No:	DA 60-150	Start:	16 March 1960
	Guy F. Atkinson Co	Finish:	31 January 1961
Specifications:	CIVENG 60-10		
Plans:	D.O. Series 169/1-63		
Folio Title:	BURBANK WESTERN SYSTEM (UPPER)		
	La Tuna Canyon Debris Basin		

Local Assurances
Resolution Dated: 18 February 1958
Operation and Maintenance Transferred to: LACFCD, 4 May 1961

Stormflow Data
Staff Gages: 12
Basin Staff Gage Elevation at One-third Design Discharge: 1142 ft msl

Access Roads
To Embankment: from La Tuna Canyon to top of embankment
To Basin: from La Tuna Canyon Rd to north side of basin

Pertinent Design Data

Embankment:

Length	654 ft
Crest Width	20 ft
Crest Elevation	1157 ft msl
Side Slope	upstream 1 on 2.5 downstream 1 on 2.5

Spillway:

Length	362 ft
Crest Width	75 ft
Crest Elevation	1140 ft msl
Design Capacity	11,500 cfs

Pool Drain:

Length	215 ft
Diameter	36 in
Design Capacity	200 cfs

Intake Tower:

Top Elevation	1144 ft msl
Height above Invert	35 ft
Inside Dimensions	4 ft x 4 ft

Drainage Area: 5.3 sq mi
Debris Basin Capacity: 530,000 cu yds
Maximum Allowable Accumulation of Debris: 130,000 cu yds

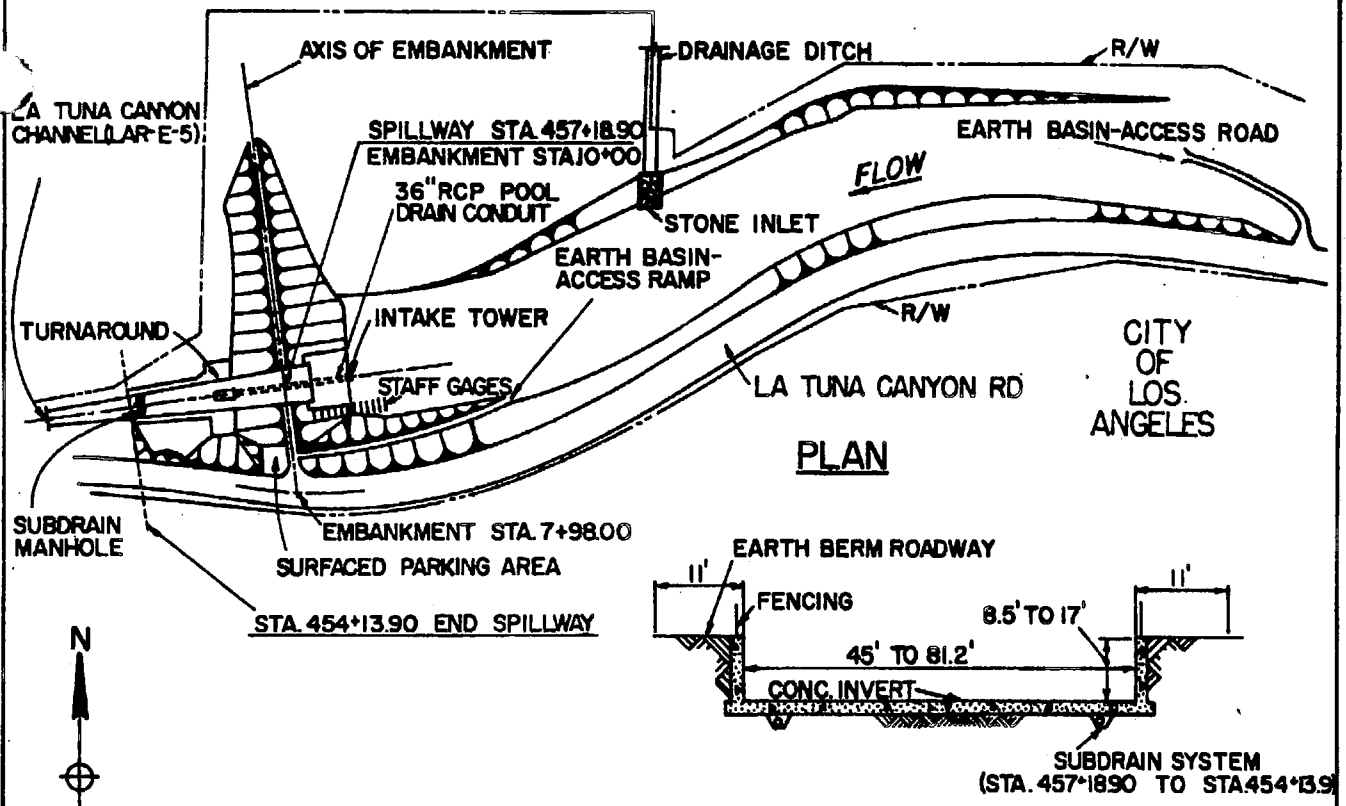
REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Earth berm roadway
Concrete spillway apron
Concrete channel invert
Concrete channel walls
Subdrain system
Fencing
Side drain
Rights-of-way

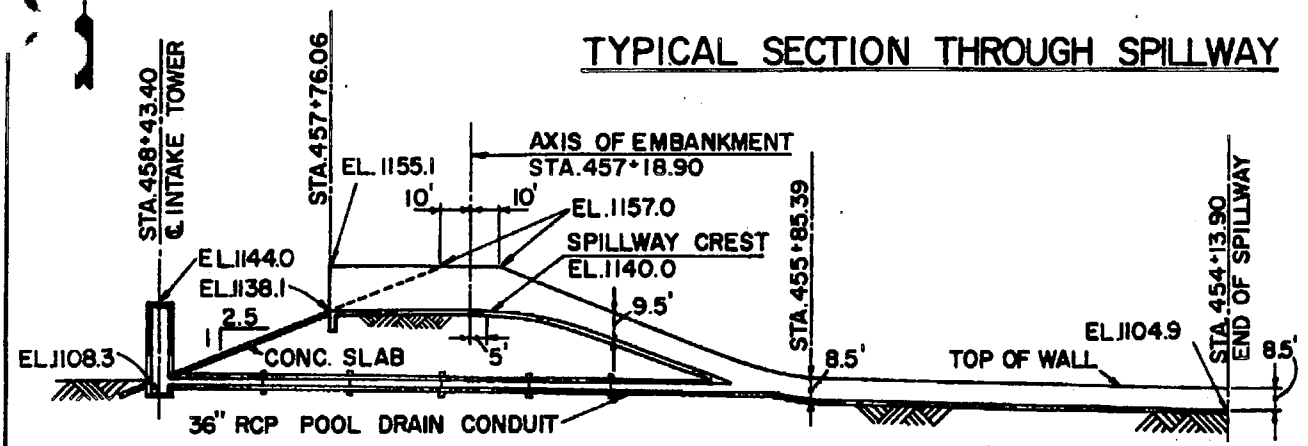
Outlet Works
Intake tower
Concrete pool drain conduit (ungated)
Bridge

Embankment and Basin
Earth embankment
Earth and surfaced basin-access ramp
Surfaced embankment-access ramp
Surfaced drainage ways
Surfaced parking area
Debris storage capacity
Staff gages
Rights-of-way

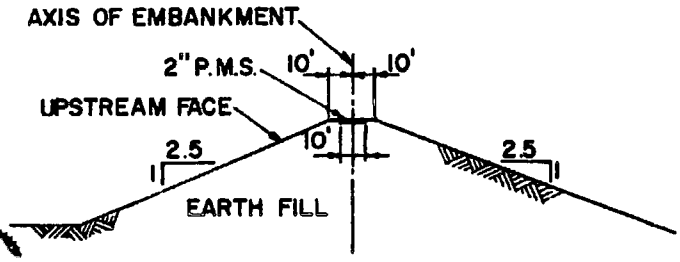
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



TYPICAL SECTION THROUGH SPILLWAY



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LA TUNA CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-E-7

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-E-8

STOUGH CANYON DEBRIS BASIN

Construction Data

Contract No:	DA 60-150	Start: 16 March 1960
	Guy F. Atkinson Co	Finish: 31 January 1961
Specifications:	CIVENG 60-10	
Plans:	D.O. Series 169/64-101	
Folio Title:	BURBANK WESTERN SYSTEM (UPPER)	
	Stough Canyon Debris Basin	

Local Assurances

Resolution Dated: 18 February 1958
Operation and Maintenance Transferred to: LACFCD, 31 May 1961

Stormflow Data

Staff Gages: 9
Basin Staff Gage Elevation at One-third Design Discharge: 1040 ft msl

Access Roads

To Embankment: from Walnut Ave to top of embankment
To Basin: from Walnut Ave to bottom of basin

Pertinent Design Data

Embankment:

Length	567 ft
Crest Width	20 ft
Crest Elevation	1044 ft msl
Side Slope	upstream 1 on 2 downstream 1 on 3

Spillway:

Length	188 ft
Crest Width	100 ft
Crest Elevation	1037 ft msl
Design Capacity	2,100 cfs

Pool Drain:

Length	141 ft
Diameter	36 in
Design Capacity	200 cfs

Intake Tower:

Top Elevation	1036 ft msl
Height above Invert	30 ft
Inside Dimensions	4 ft x 4 ft

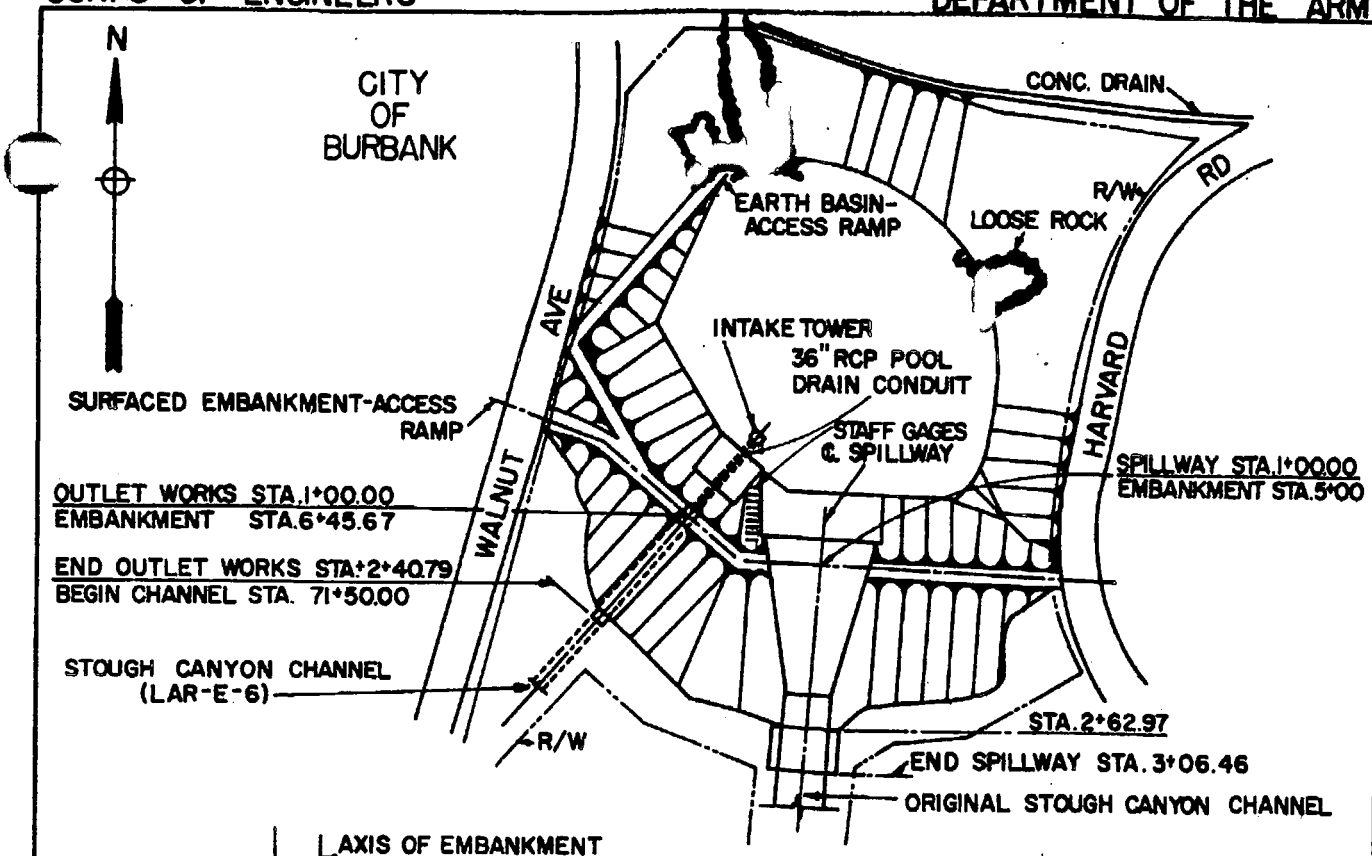
Drainage Area: 1.65 sq mi
Debris Basin Capacity: 158,000 cu yds
Maximum Allowable Accumulation of Debris: 40,000 cu yds

REPORTING FEATURES

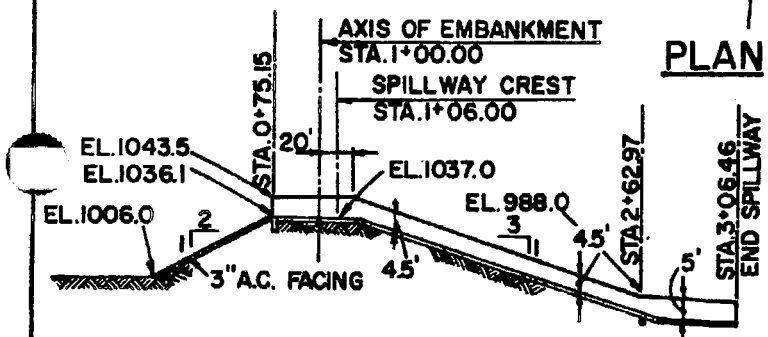
Spillway and Outlet Channel
Broadcrest concrete spillway
Earth berm roadway
Concrete channel invert
Concrete channel roof slab
Concrete channel walls
Surfaced spillway apron
Subdrain system
Fencing

Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

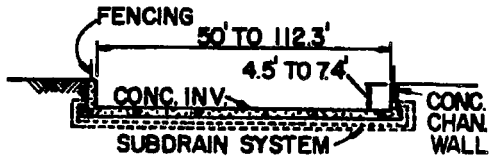
Embankment and Basin
Earth embankment
Earth basin-access ramp
Surfaced embankment-access ramp
Surfaced parking area
Debris storage capacity
Staff gages
Public utility
Fencing
Rights-of-way



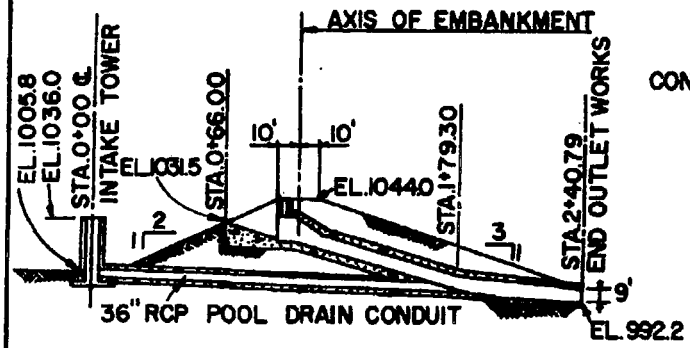
PLAN



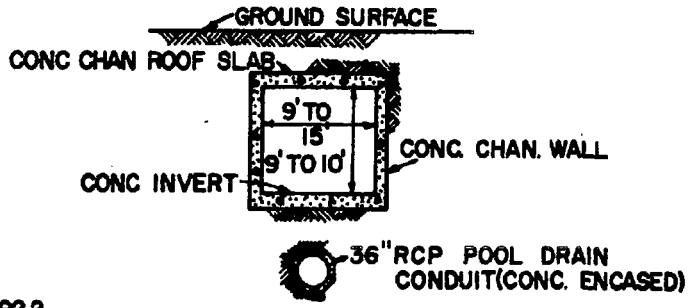
SECTION ALONG ℄ OF SPILLWAY



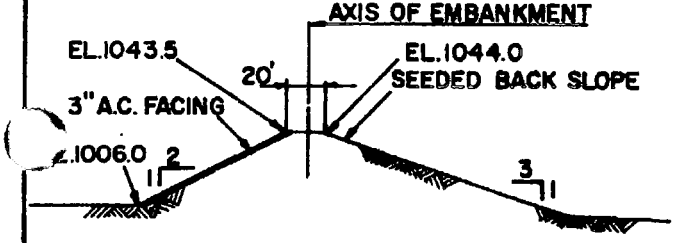
TYPICAL SECTION THROUGH SPILLWAY



SECTION ALONG ℄ OUTLET WORKS



TYPICAL SECTION THROUGH OUTLET WORKS CHANNEL



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

STOUGH CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-F-1

DEAD HORSE CANYON CHANNEL

Construction Data

Contract No:	DA 64-120	Start: 27 April 1964
	Charles J. Rounds Co	Finish: 6 November 1964
Specifications:	CIVENG 64-15	
Plans:	D.O. Series 217/17-61	
Folio Title:	DEAD HORSE CANYON AND ROYAL BOULEVARD CHANNELS Dead Horse Canyon Channel	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 13 November 1964

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

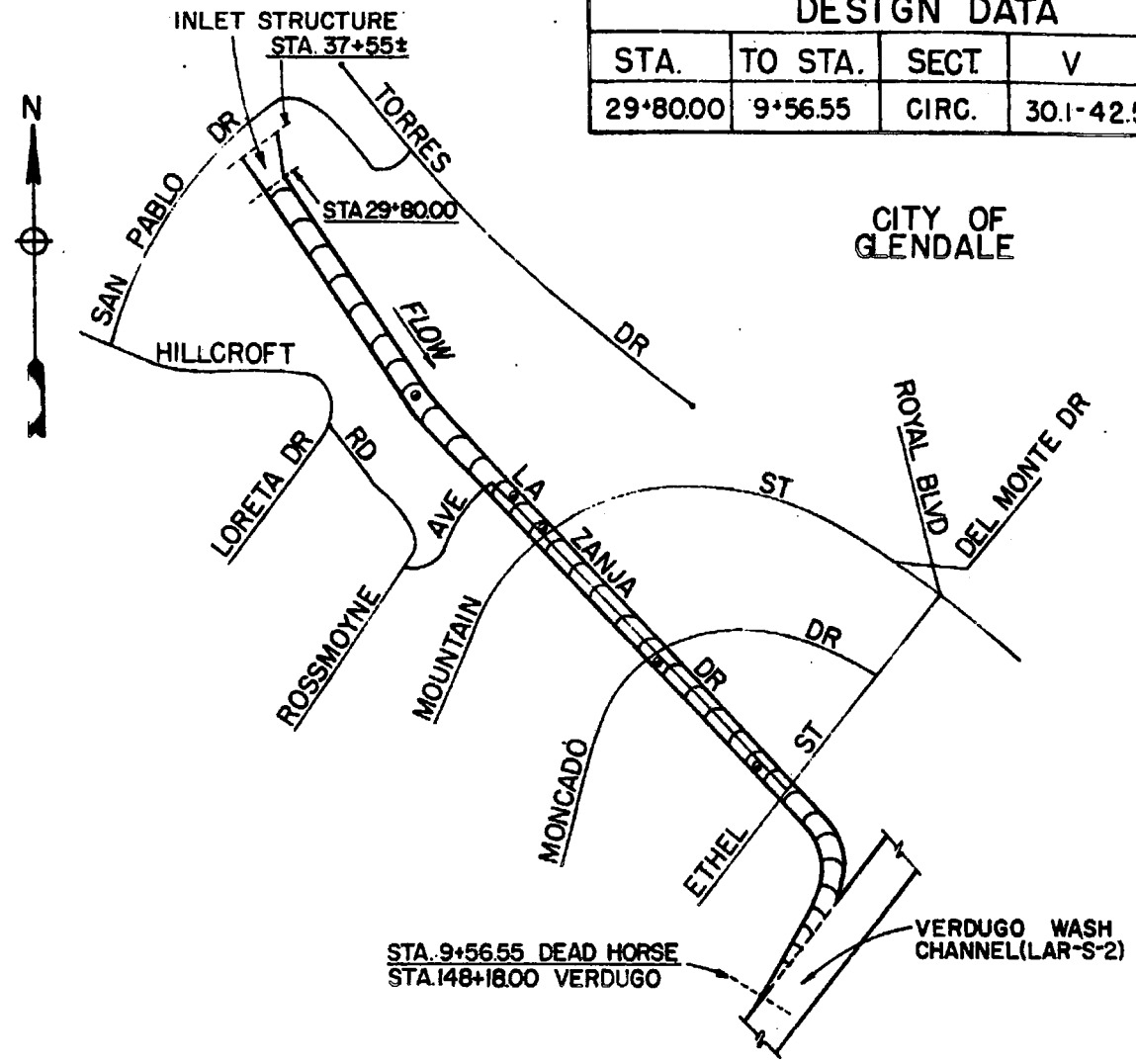
Bridges

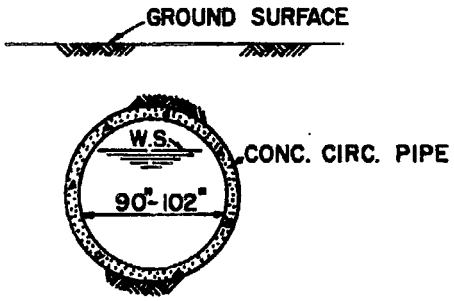
none

Reporting Features

Along Channel	At a Channel Station
Reinforced concrete pipe channel	Side drain
	Channel inspection manhole
	Public utility
	Concrete inlet structure

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
29+80.00	9+56.55	CIRC.	30.1-42.5	1,500





TYPICAL CIRCULAR SECTION

STA. 29+80.00 TO STA. 9+56.55

LEGEND

- CIRCULAR SECTION
- CONST. PROJECT LIMIT
- CHANNEL INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

DEAD HORSE CANYON CHANNEL

SCALE IN FEET

250 0 250 500

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-F-1

DATA SHEET DUNSMUIR CANYON CHANNEL
LAR-G-1

Construction Data

Contract No:	13-130	Start:	3 January 1936
		Finish:	October 1936
Plans:	D.O. Series 53/1-25, 54/1-26, 55/1-50		
Folio Title:	DUNSMUIR CANYON		

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 20 October 1936

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: Markridge Rd
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Markridge Rd	0	0	City of Glendale
Community Ave	0	0	City of Glendale
Altura Ave	0	0	City of Glendale
Sta 3+50±	0	0	Private footbridge
Sta 2+50±	0	0	Private footbridge

Reporting Features

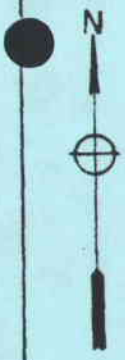
Along Channel	At a Channel Station
Concrete channel invert	Earth berm-access ramp
Concrete channel walls	Side drain
Concrete channel roof slab	Bridge
Earth berm roadway	Public utility
Fencing	
Rights-of-way	

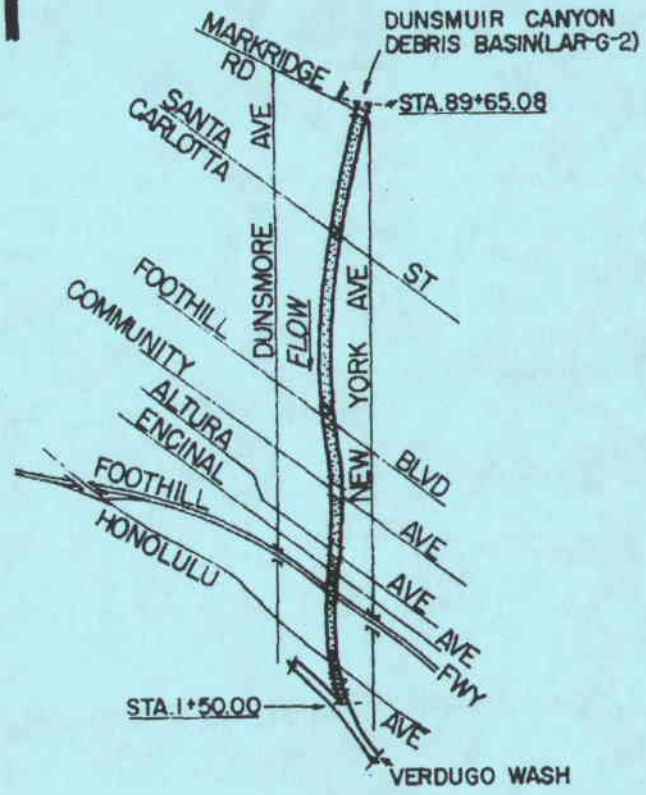
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

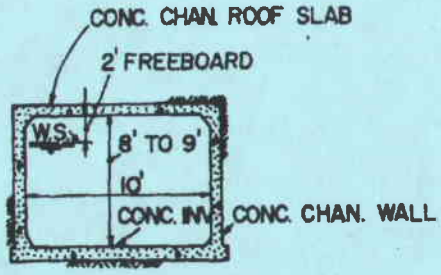
STA.	TO STA.	SECT.	V	Q
89+65.08	56+00.00	RECT.	16.8-62.5	3,000
56+00.00	1+50.00	RECT.	49.0-61.6	3,100





TYPICAL OPEN SECTION

STA. 89+65.08 TO STA. 1+50.00



TYPICAL COVERED SECTION

AS NOTED

LEGEND

- OPEN SECTION
- STREET BRIDGE
- COVERED SECTION
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

DUNSMUIR CANYON CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-G-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET LAR-G-2 DUNSMUIR CANYON DEBRIS BASIN

Construction Data

Contract No: 13-130 Start: September 1935
Finish: 14 October 1936

Plans: D.O. Series 53/1-25, 54/1-26, 55/1-50

Folio Title: DUNSMUIR CANYON

Local Assurances

Resolution Dated: 7 August 1935

Operation and Maintenance Transferred to: LACFCD, 20 October 1936

Stormflow Data

Staff Gages: 5

Basin Staff Gage Elevation at One-third Design Discharge:

Access Roads

To Embankment: from New York St and from Markridge Rd

To Basin: from east and west side of embankment to bottom of basin

Pertinent Design Data

Embankment:

Length	592 ft
Crest Width	15 ft
Crest Elevation	2272 ft msl
Side Slope	1 on 3

Spillway:

Length	259 ft
Crest Width	60 ft
Crest Elevation	2257 ft msl
Design Capacity	6,000 cfs

Pool Drain:

Length	22.5 ft
Diameter	18 in (3 pipes)
Design Capacity	

Drainage Area: 0.86 sq mi

Debris Basin Capacity: 97,000 cu yds

Maximum Allowable Accumulation of Debris: 24,250 cu yds

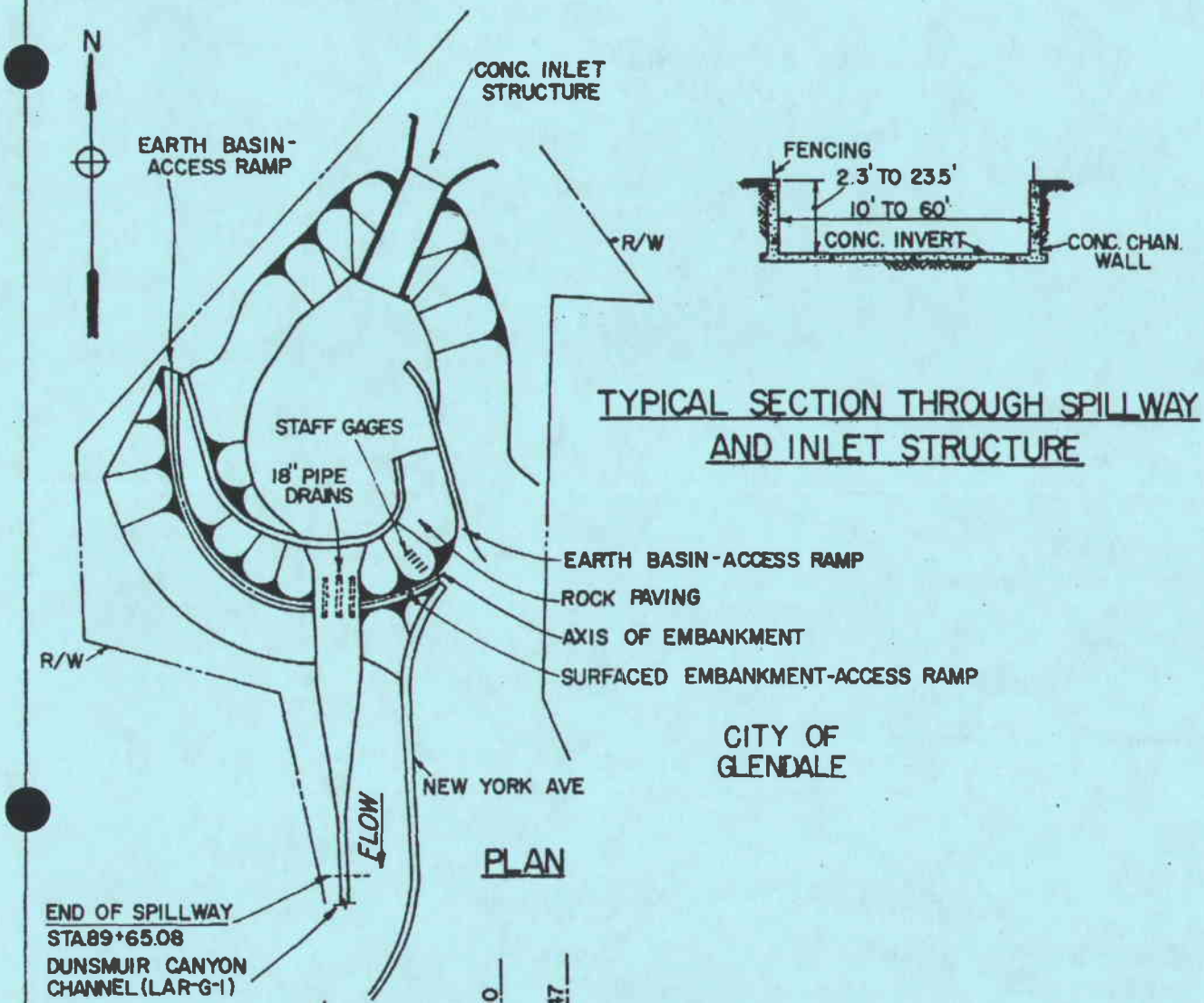
REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Trashracks
Fencing
Rights-of-way
Earth berm roadway

Outlet Works
Spillway drain pipes

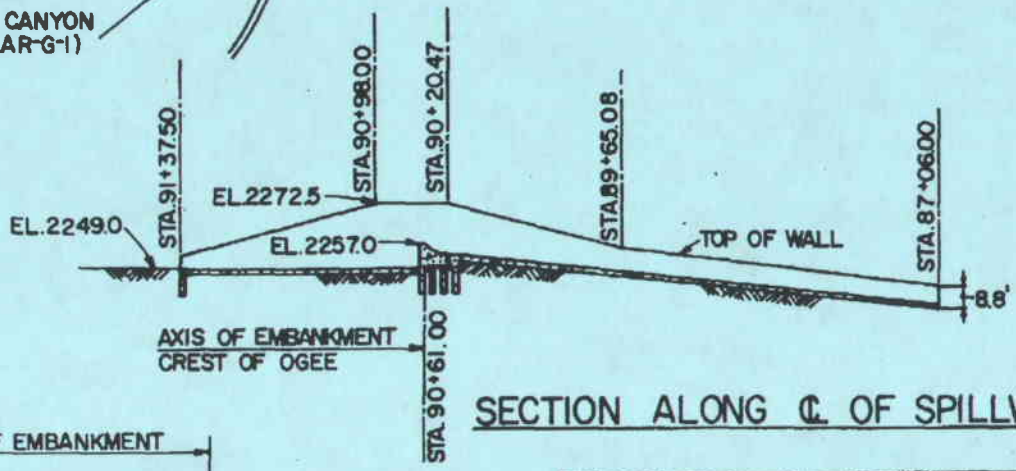
Embankment and Basin
Concrete inlet structure
Earth embankment
Surfaced embankment-access ramp
Earth basin-access ramp
Debris storage capacity
Stone side slopes
Staff gages
Fencing
Rights-of-way

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

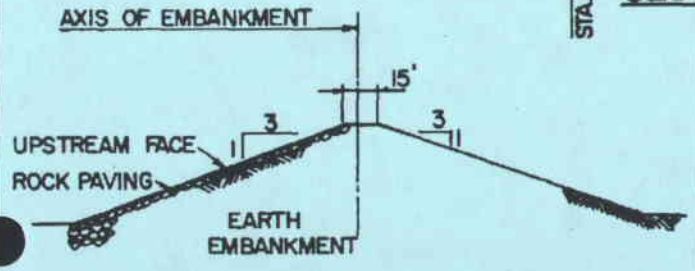


PLAN

TYPICAL SECTION THROUGH SPILLWAY AND INLET STRUCTURE



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

DUNSMUIR CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-G-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-H-1

EAGLE CANYON CHANNEL
SHIELDS CANYON CHANNEL

Construction Data

Contract No: 13-130

Start: September 1935
Finish: 7 October 1936 EAGLE
11 January 1937 SHIELDS

Plans: D.O. Series 53/1-25, 54/1-26, 55/1-50
Folio Title: EAGLE CANYON CHANNEL
SHIELDS CANYON CHANNEL

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 20 October 1936 EAGLE
26 January 1937 SHIELDS

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: Harmony Pl
To Left Berm: none

Bridge

None

Reporting Features

Along Channel
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Fencing
Rights-of-way

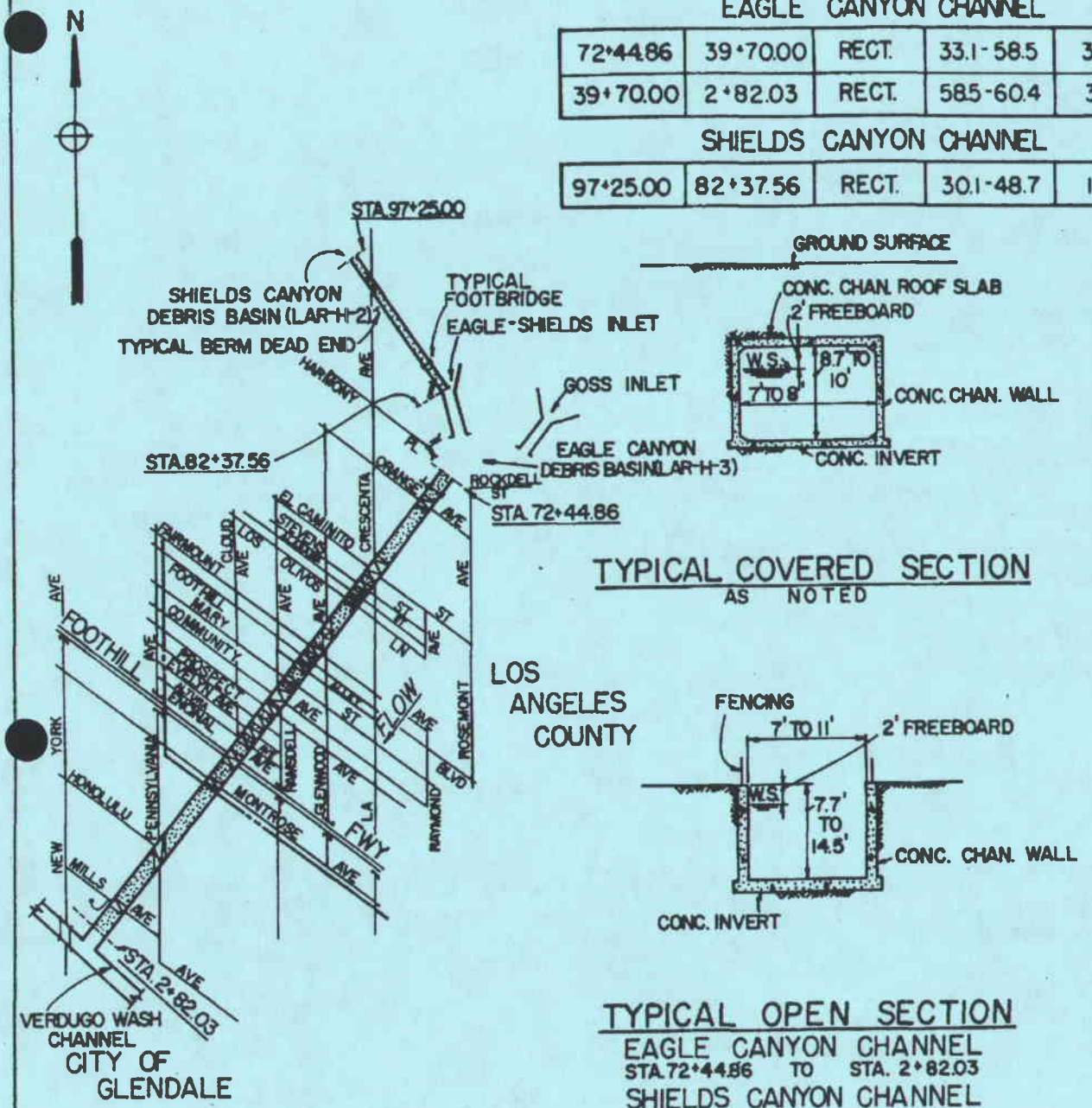
At a Channel Station
Side drain
Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
EAGLE CANYON CHANNEL				
72+44.86	39+70.00	RECT.	33.1-58.5	3,300
39+70.00	2+82.03	RECT.	58.5-60.4	3,500
SHIELDS CANYON CHANNEL				
97+25.00	82+37.56	RECT.	30.1-48.7	1,050



TYPICAL COVERED SECTION
AS NOTED

TYPICAL OPEN SECTION
EAGLE CANYON CHANNEL
STA. 72+44.86 TO STA. 2+82.03
SHIELDS CANYON CHANNEL
STA. 97+25.00 TO STA. 82+37.56

LEGEND

- OPEN SECTION
- STREET BRIDGE
- COVERED SECTION
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

EAGLE CANYON CHANNEL
SHIELDS CANYON CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-H-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-H-2

SHIELDS CANYON DEBRIS BASIN

Construction Data

Contract No: 13-130
Start: 3 September 1935
Finish: 11 January 1937

Plans: D.O. Series 53/1-25, 54/1-26, 55/1-50
Folio Title: SHIELDS CANYON

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 26 January 1937

Stormflow Data

Staff Gages:
Basin Staff Gage Elevation at One-third Design Discharge:

Access Roads

To Embankment: from La Cresenta Ave
To Basin: from top of embankment to bottom of basin

Pertinent Design Data

Embankment:

Length	416 ft
Crest Width	15 ft
Crest Elevation	2070 ft msl
Side Slope	1 on 3

Spillway:

Length	303 ft
Crest Width	30 ft
Crest Elevation	2058 ft msl
Design Capacity	2,100 cfs

Pool Drain:

Length	20 ft
Diameter	18 in (3 pipes)
Design Capacity	

Drainage Area: 0.27 sq mi
Debris Basin Capacity: 34,600 cu yds
Maximum Allowable Accumulation of Debris: 8,650 cu yds

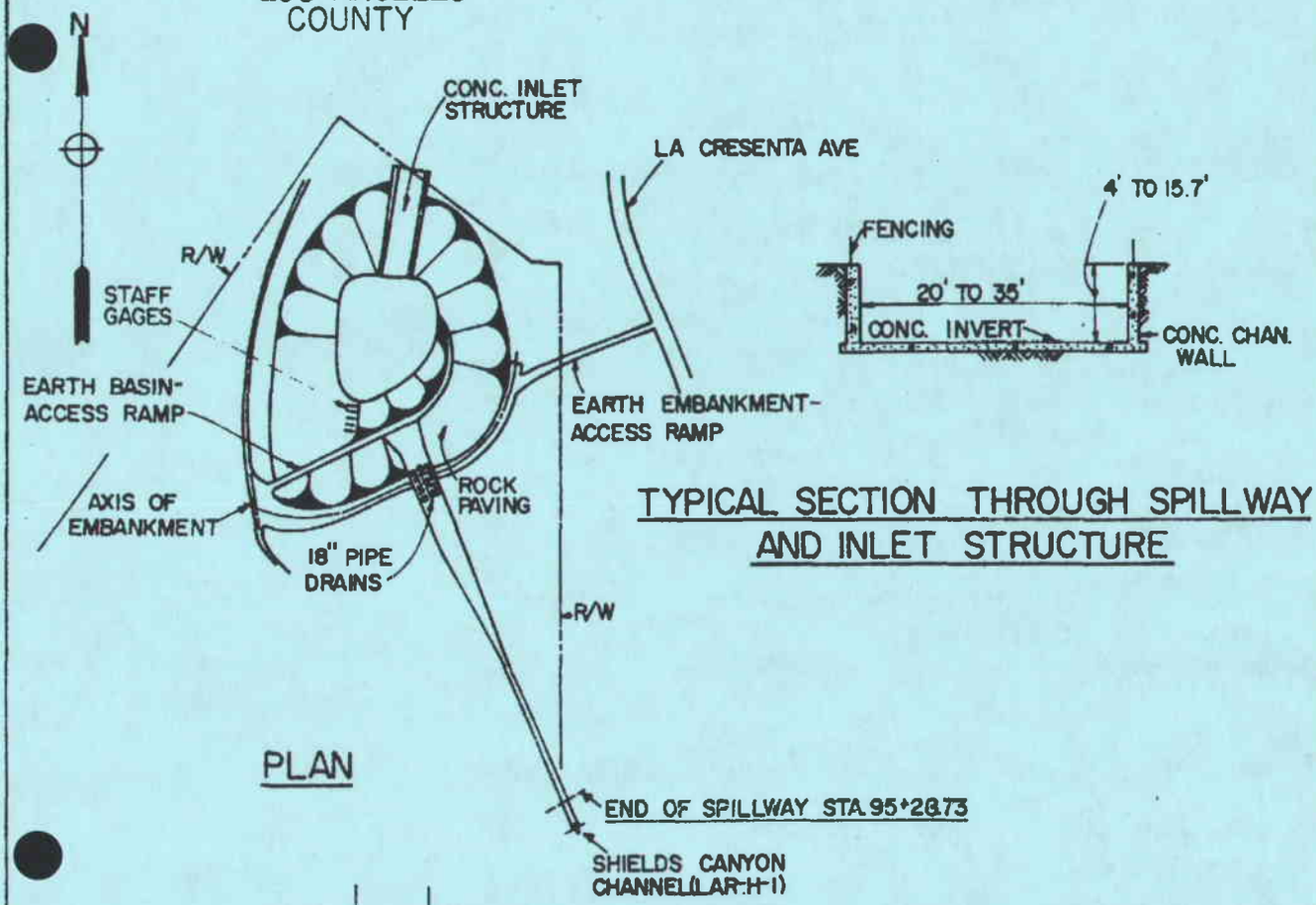
REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Trashracks
Fencing

Outlet Works
Spillway drain pipes

Embankment and Basin
Earth embankment-access ramp
Earth basin-access ramp
Concrete inlet structure
Debris storage capacity
Stone side slopes
Staff gages
Fencing
Rights-of-way

LOS ANGELES COUNTY

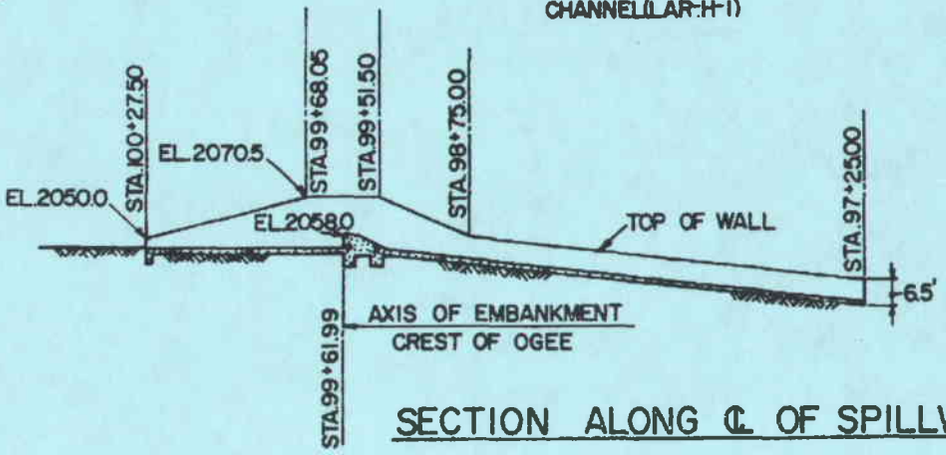


TYPICAL SECTION THROUGH SPILLWAY AND INLET STRUCTURE

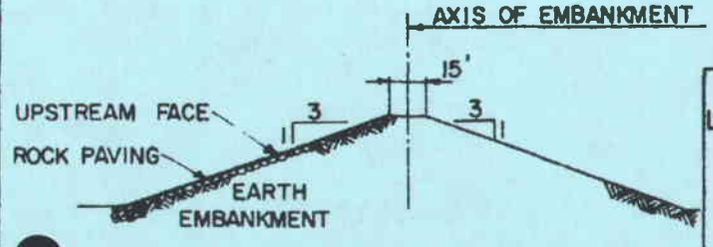
PLAN

END OF SPILLWAY STA. 95+28.73

SHIELDS CANYON CHANNEL (LAR-H-1)



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SHIELDS CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-H-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-H-3

EAGLE CANYON DEBRIS BASIN

Construction Data

Contract No: 13-130 Start: September 1935
Finish: 7 October 1936

Plans: D.O. Series 53/1-25, 54/1-26, 55/1-50
Folio Title: EAGLE CANYON

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 20 October 1936

Stormflow Data

Staff Gages: 3
Staff Gage Elevation at One-third Design Discharge:

Access Roads

To Embankment: from Harmony Pl
To Basin: from top of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	800 ft	Length	334 ft
Crest Width	15 ft	Crest Width	60 ft
Crest Elevation	1895 ft msl	Crest Elevation	1880 ft msl
Side Slope	1 on 3	Design Capacity	6,700 cfs

Pool Drain:
Length
Diameter 18 in (4 pipes)
Design Capacity

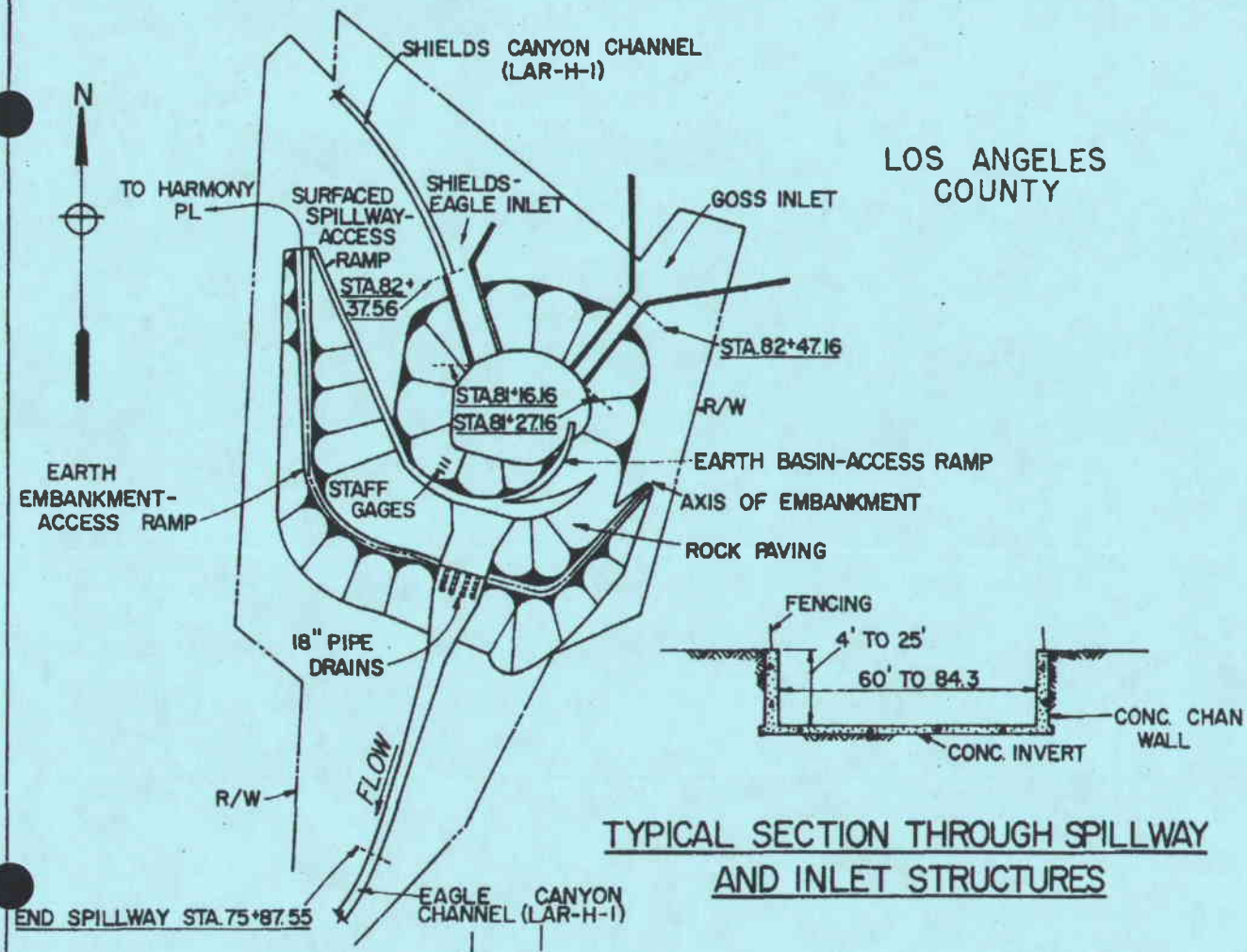
Drainage Area: 0.65 sq mi
Debris Basin Capacity: 71,500 cu yds
Maximum Allowable Accumulation of Debris: 17,875 cu yds

REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Trashracks
Subdrain system
Fencing

Outlet Works
Spillway drain pipes

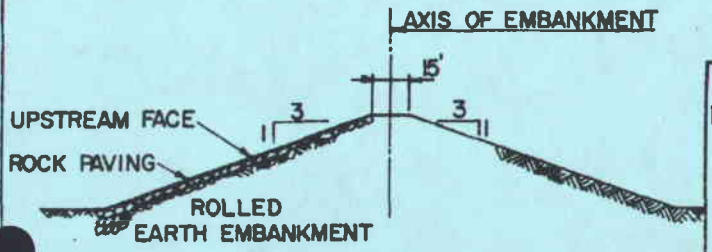
Embankment and Basin
Earth embankment-access ramp
Surfaced spillway-access ramp
Earth basin-access ramp
Concrete inlet structure
Stone side slopes
Staff gages
Fencing
Rights-of-way



TYPICAL SECTION THROUGH SPILLWAY AND INLET STRUCTURES

PLAN

SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

EAGLE CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-H-3

OPERATION AND MAINTENANCE MANUAL

DATA SHEET LAR-I-1

CABALLERO CREEK CHANNEL
Channel Inlet to LA. River

Construction Data

Contract No:	DA 60-210	Start: 19 May 1960
	Phalcon Const, Inc	Finish: 24 February 1961
Specifications:	CIVENG 60-24	
Plans:	D.O. Series 192/46-122	
Folio Title:	CABALLERO CREEK CHANNEL Channel Inlet to L.A. River	

Local Assurances

Resolution Dated: 12 May 1959
Operation and Maintenance Transferred to: LACFCD, 13 May 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: at upstream end of channel from levee (sta 148+09); from invert of L.A. River

To Right Berm: Reseda Blvd, Rosita St, Reseda Blvd, McCormick St, Killion St, Oxnard St, Topham St, Calvert St, Erwin St, Lindley Ave

To Left Berm: Reseda Blvd, Rosita St, Reseda Blvd, Tarzana Dr, Ventura Blvd, Oxnard St, Topham St, Calvert St, Erwin St, from right berm of L.A. River

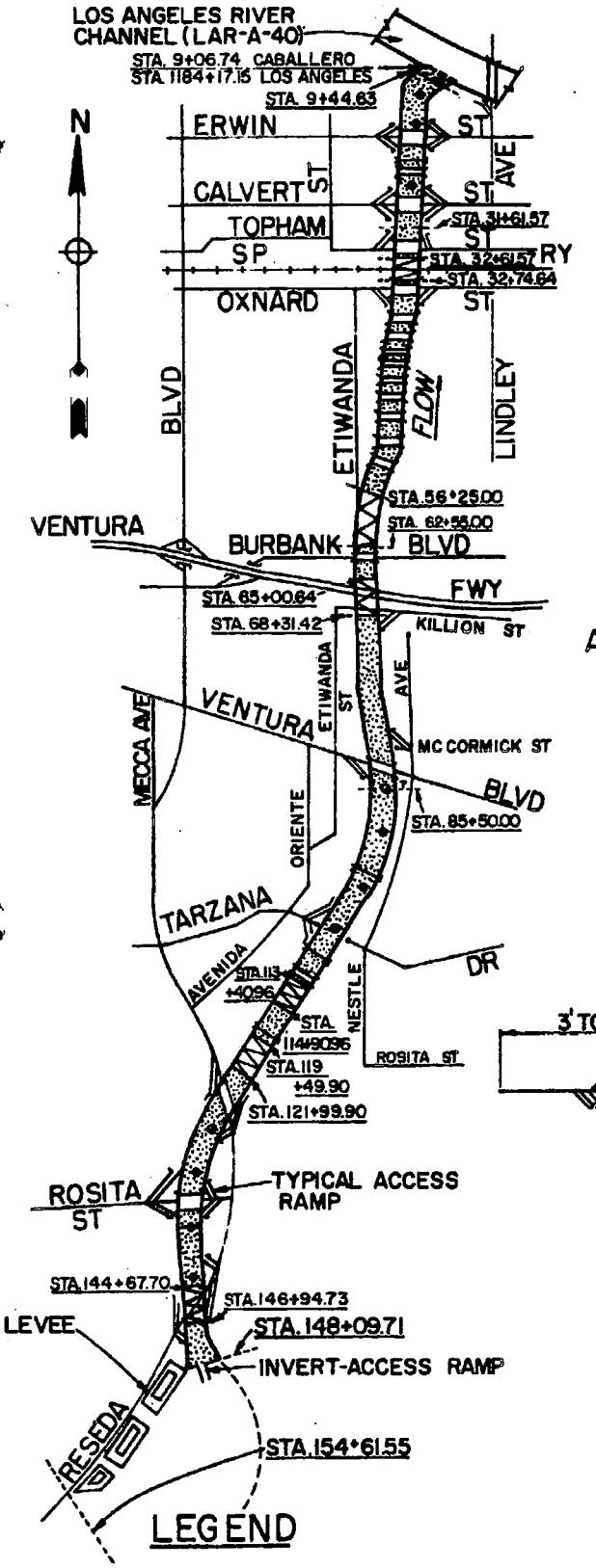
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Rosita St	0	2	City of Los Angeles
Reseda Blvd	0	2	City of Los Angeles
Sta 119+21	0	2	Private vehicular bridge
Sta 113+23	0	2	Private vehicular bridge
Sta 107+85	0	2	Private footbridge
Sta 97+06	0	2	Private footbridge
Ventura Blvd	0	2	City of Los Angeles
Burbank Blvd	0	2	City of Los Angeles
Sta 52+31	0	2	Private vehicular bridge
Sta 49+55	0	2	Private vehicular bridge
Sta 47+50	0	2	Private vehicular bridge
Sta 46+24	0	2	Private vehicular bridge
Sta 44+21	0	2	Private vehicular bridge
Sta 43+29	0	2	Private vehicular bridge
Sta 40+89	0	2	Private vehicular bridge
Sta 39+75	0	2	Private vehicular bridge
Sta 37+70	0	2	Private vehicular bridge
Oxnard St	0	2	City of Los Angeles
Topham St	0	2	City of Los Angeles
Calvert St	0	2	City of Los Angeles
Sta 23+39	0	2	Private vehicular bridge
Sta 22+11	0	2	Private vehicular bridge
Erwin St	0	2	City of Los Angeles

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Side drain
Earth levee	Surfaced berm-access ramp
Stone channel side slopes	Concrete invert-access ramp
Concrete channel invert	Bridge
Concrete channel walls	Public utility
Concrete channel roof slab	
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

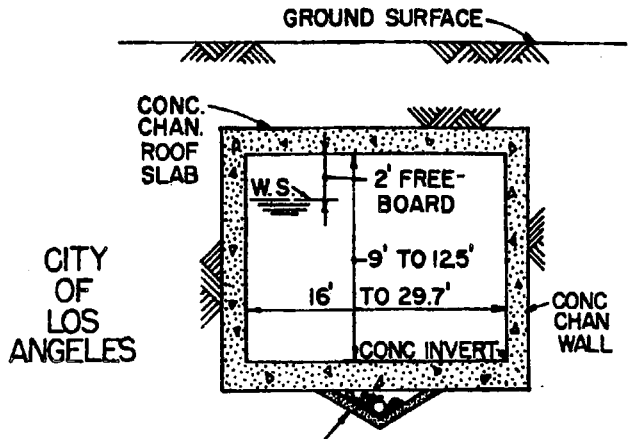


LEGEND

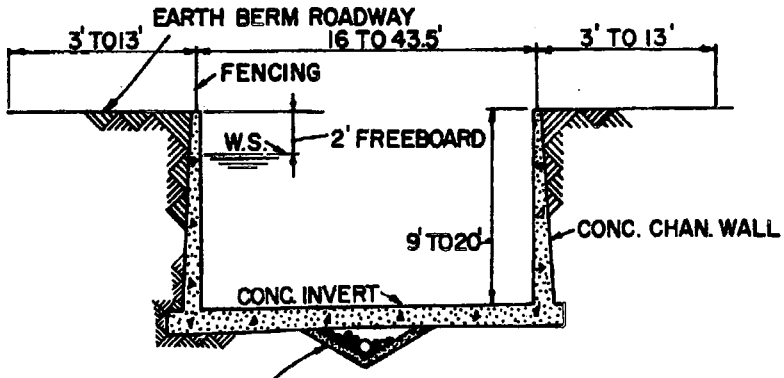
- OPEN SECTION
- STREET BRIDGE
- COVERED SECTION
- FOOTBRIDGE
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
148+09.71	134+14.00	RECT.	28.1 - 29.0	3,500
134+14.00	34+00.00	RECT.	28.5 - 29.0	4,000
34+00.00	9+06.74	RECT.	28.5 - 29.0	4,400



TYPICAL COVERED SECTION
(AS NOTED)



TYPICAL OPEN SECTION
STA. 148+09.71 TO STA. 9+06.74

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

CABALLERO CREEK CHANNEL

CHANNEL INLET TO LOS ANGELES RIVER

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
LAR-J-1

COMPTON CREEK CHANNEL
S.P. Ry to Los Angeles River

Construction Data

Contract No:	Force Account	Start:	1936
		Finish:	June 1937
Plans:	D.O. Series 308/100-102, 8/1-3		
Folio Title:	COMPTON CREEK		
	Compton City Boundary to Los Angeles River		

Local Assurances

Resolution Dated: 27 July 1949
Operation and Maintenance Transferred to: LACFCD, 2 February 1951 [ERA]

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: Santa Fe Ave
To Left Berm: Santa Fe Ave

Bridges

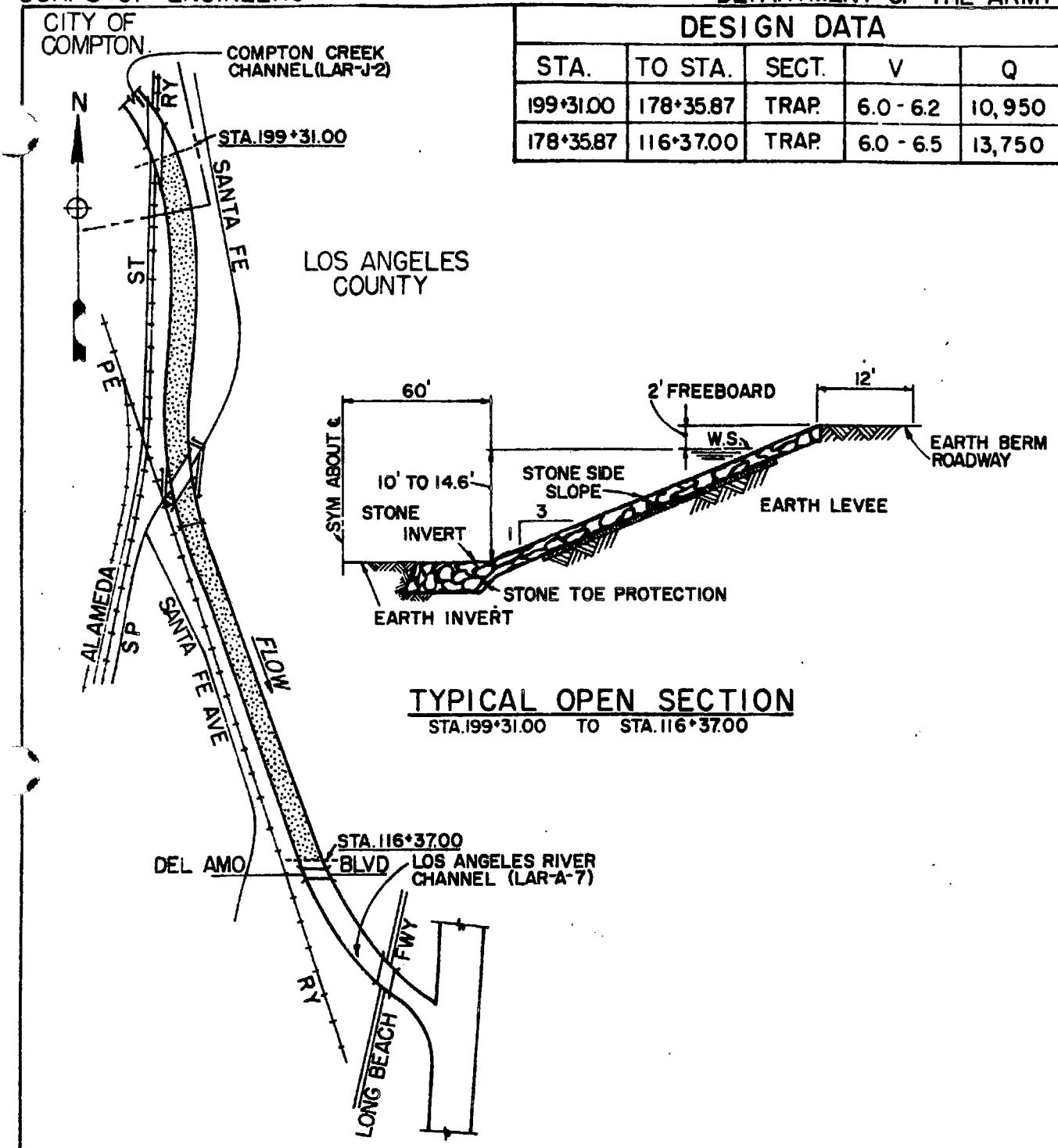
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Santa Fe Ave	3	0	Los Angeles County
Sta 151+20	3	0	Private footbridge

Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced and earth berm-access ramp
Earth channel invert	Bridge
Grouted stone channel side slopes	Side drain
Stone toe protection	Public utility
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
199+31.00	178+35.87	TRAP.	6.0 - 6.2	10,950
178+35.87	116+37.00	TRAP.	6.0 - 6.5	13,750



TYPICAL OPEN SECTION

STA. 199+31.00 TO STA. 116+37.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- ------ CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

COMPTON CREEK CHANNEL

S.P. RY TO LOS ANGELES RIVER

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-J-2

COMPTON CREEK CHANNEL
Alondra Blvd to S.P. Ry

Construction Data

Contract No:

Start:	1938	1949
Finish:	1939	1950
Specifications:		
Plans:	D.O. Series 8/1-24, 10/1-153	D.O. Series 398/100-108, 401/1-13
Folio Title:	COMPTON CREEK IMPROVEMENT Greenleaf St to Hooper Ave Storm Drain	COMPTON CREEK Main St to Los Angeles River

Local Assurances

Resolution Dated:

Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: upstream of Greenleaf Blvd (sta 242+10)

Type: Recording (LACFCD--F37B-R)

Staff Gage Reading at One-third Capacity: 6.0 ft on gage (3,000 cfs)

Access Ramps

To Invert: none; use LAR-J-4

To Right Berm:	Alondra Blvd, Oleander St, Tichenor St, Johnson St, Glencoe St, Greenleaf Blvd
To Left Berm:	Alondra Blvd, Oleander St, Reeve St, Tichenor St, Greenleaf Blvd, Alameda St, Artesia Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Oleander St	1	2	City of Compton
Sta 251+92	0	2	City of Compton
Greenleaf Blvd	1	2	City of Compton and Los Angeles County
P.E. Ry	1	2	P.E.R.R.
Artesia Blvd	4	0	State of California
Alameda St and S.P. Ry	3	0	City of Compton and S.P.R.R.

Reporting Features

Along Channel

Surfaced and earth berm roadway
Stone channel side slopes
Concrete and earth channel invert
Concrete channel walls
Stone toe protection
Subdrain system
Fencing
Rights-of-way

At a Channel Station

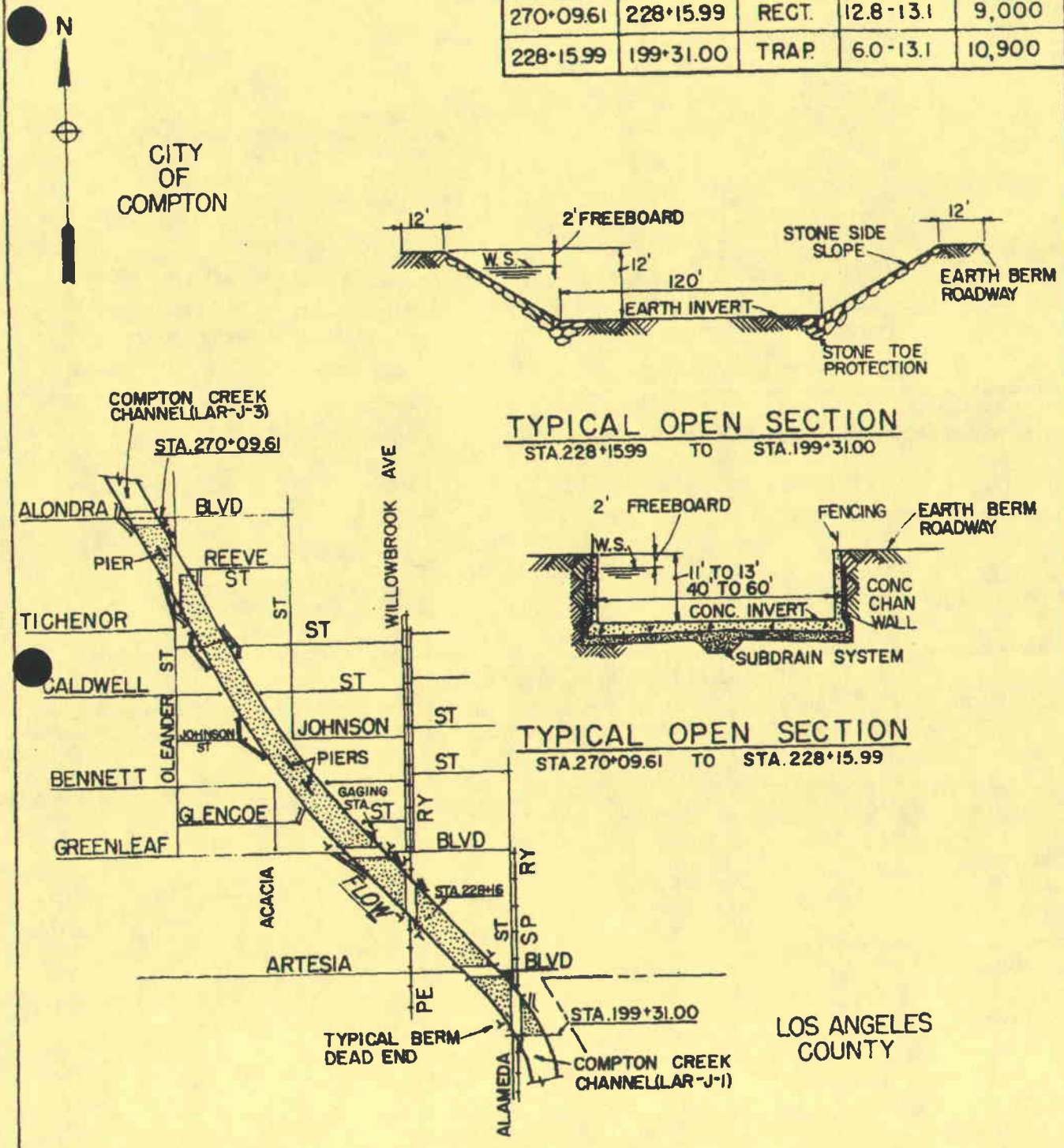
Surfaced and earth berm-access ramp
Bridge
Bridge piers
Side drain
Gaging station
Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
270+09.61	228+15.99	RECT.	12.8-13.1	9,000
228+15.99	199+31.00	TRAP.	6.0-13.1	10,900



LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

COMPTON CREEK CHANNEL

ALONDRA BLVD TO S.P. RY

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-J-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-J-3

COMPTON CREEK CHANNEL
122nd St to Alondra Blvd

Construction Data
Contract No:

Start:	1938	1949
Finish:	1939	1950
Specifications:		
Plans:	D.O. Series 8/1-24, 10/1-153	D.O. Series 398/100-108, 401/1-13
Folio Title:	COMPTON CREEK IMPROVEMENT Greenleaf St to Hooper Ave Storm Drain	COMPTON CREEK IMPROVEMENT Main St to Los Angeles River

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: none

Access Roads
To Invert: none; use LAR-J-4

To Right Berm:	El Segundo Blvd, Parmalee Ave, through parking lot at Cressey Park, Cressey Ave, Rosecrans St, Sherer Pl, Colin St, Alondra Blvd
To Left Berm:	El Segundo Blvd, N. Slater Ave, Cressey Ave, Rosecrans Ave, Cedar St, Elm St, Brazil St, Wilmington Ave, Compton Blvd, road behind Compton High School

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
El Segundo Blvd	1	2	City of Compton
Sta 383+43	0	2	City of Compton (footbridge)
Sta 339+48	1	0	Utility bridge
Rosecrans Ave	1	2	City of Compton
Sta 324+79	0	2	City of Compton (footbridge)
Wilmington Ave	1	2	City of Compton
Compton Blvd	1	2	City of Compton
Alondra Blvd	1	2	City of Compton

Reporting Features

Along Channel
Surfaced and earth berm roadway
Concrete channel invert
Concrete channel walls
Subdrain system
Fencing
Rights-of-way

At a Channel Station
Surfaced and earth berm-access ramp
Side drain
Bridge
Public utility

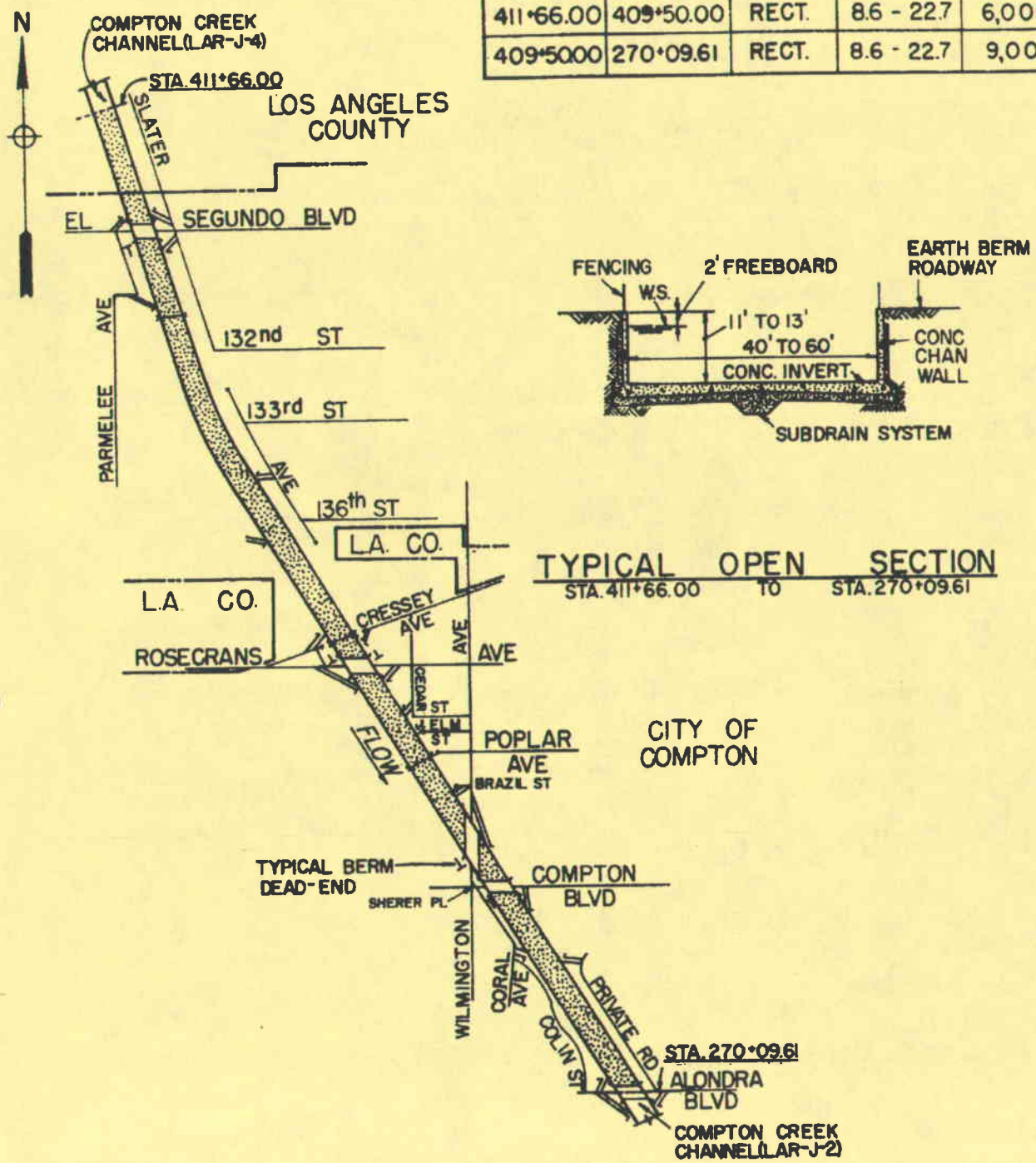
LAR-J-3

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
411+66.00	409+50.00	RECT.	8.6 - 22.7	6,000
409+5000	270+09.61	RECT.	8.6 - 22.7	9,000



TYPICAL OPEN SECTION

STA.411+66.00 TO STA.270+09.61

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- ------ CONST. PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

COMPTON CREEK CHANNEL

122nd ST TO ALONDRA BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

LAR-J-3

DATA SHEET
LAR-J-4

COMPTON CREEK CHANNEL
Lanzit Ave to 122nd St

Construction Data

Contract No:	DA 911	Start:	2 March 1951
	MacDonald and Kruse	Finish:	1 December 1951
Specifications:	CIVENG 50-26		
Plans:	D.O. Series 401/20-73		
Folio Title:	COMPTON CREEK IMPROVEMENT		
	Hooper Ave Storm Drain to Lanzit Ave		

Local Assurances

Resolution Dated: 27 July 1949
Operation and Maintenance Transferred to: LACFCD, 20 January 1954

Stormflow Data

Gaging Station Location: upstream of 120th St (sta 418+25)
Type: Recording (LACFCD--F302-R)
Staff Gage Reading at One-third Capacity: 3.0 ft on gage (2,100 cfs)

Access Ramps

To Invert: through right side downstream of 118th St from Robin St (sta 423+30)

To Right Berm: Lanzit Ave, 111th St, 113th St, Imperial Hwy, Central Ave, Robin St, 118th St, 120th St
To Left Berm: Lanzit Ave, Central Ave, Imperial Hwy, 120th St

Bridges

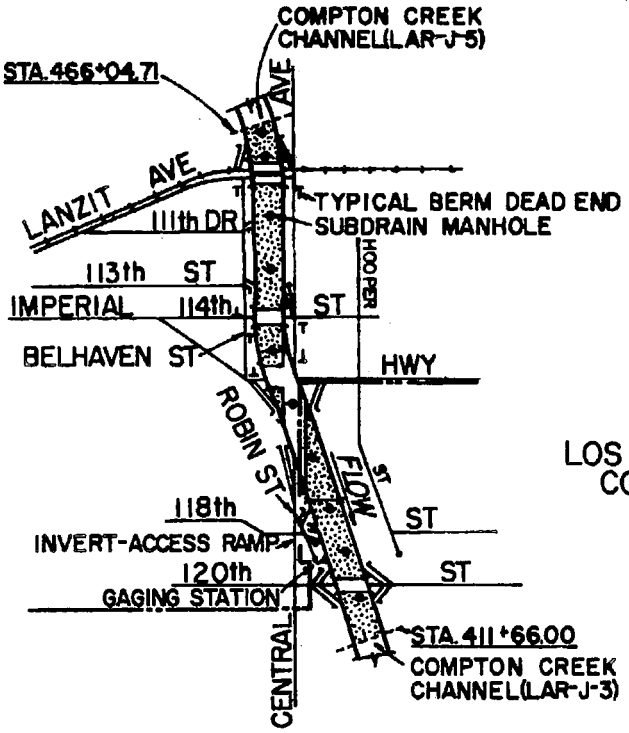
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
P.E. Ry	0	2	P.E.R.R.
Lanzit Ave	0	2	City of Los Angeles
114th St	0	2	City of Los Angeles
Imperial Hwy	0	2	City of Los Angeles
Sta 427+37±	0	2	City of Los Angeles (footbridge)
120th St	0	2	Los Angeles County

Reporting Features

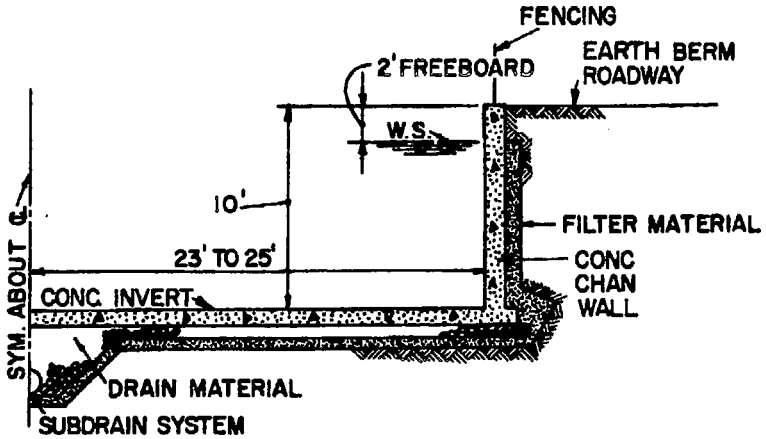
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Subdrain inspection manhole
Subdrain system	Bridge
Fencing	Gaging station
Rights-of-way	Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
466+04.71	499+00.00	RECT.	14.0-18.0	6,100
449+00.00	411+66.00	RECT.	17.8	6,300

CITY OF LOS ANGELES



LOS ANGELES COUNTY



TYPICAL OPEN SECTION

STA.466+04.71 TO STA.411+66.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- ----- CONST. PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

COMPTON CREEK CHANNEL

LANZIT AVE TO 122nd ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-J-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-J-5

COMPTON CREEK CHANNEL
Main St to Lanzit Ave

Construction Data

Contract No:	DA 911	Start: 2 March 1951
	MacDonald and Kruse	Finish: 1 December 1951
Specifications:	CIVENG 51-9	
Plans:	D.O. Series 406/1-54	
Folio Title:	COMPTON CREEK IMPROVEMENT	
	Main St to Lanzit Ave	

Local Assurances

Resolution Dated: 27 July 1949
Operation and Maintenance Transferred to: LACFCD, 20 January 1954

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: through right side from Wall St (sta 519+00±)

To Right Berm: Main St, Wall St, 108th St, Stanford Ave, Wadsworth Ave
To Left Berm: Main St, Wall St, Towne Ave, 107th St, 108th St, Stanford Ave, Clovis Ave

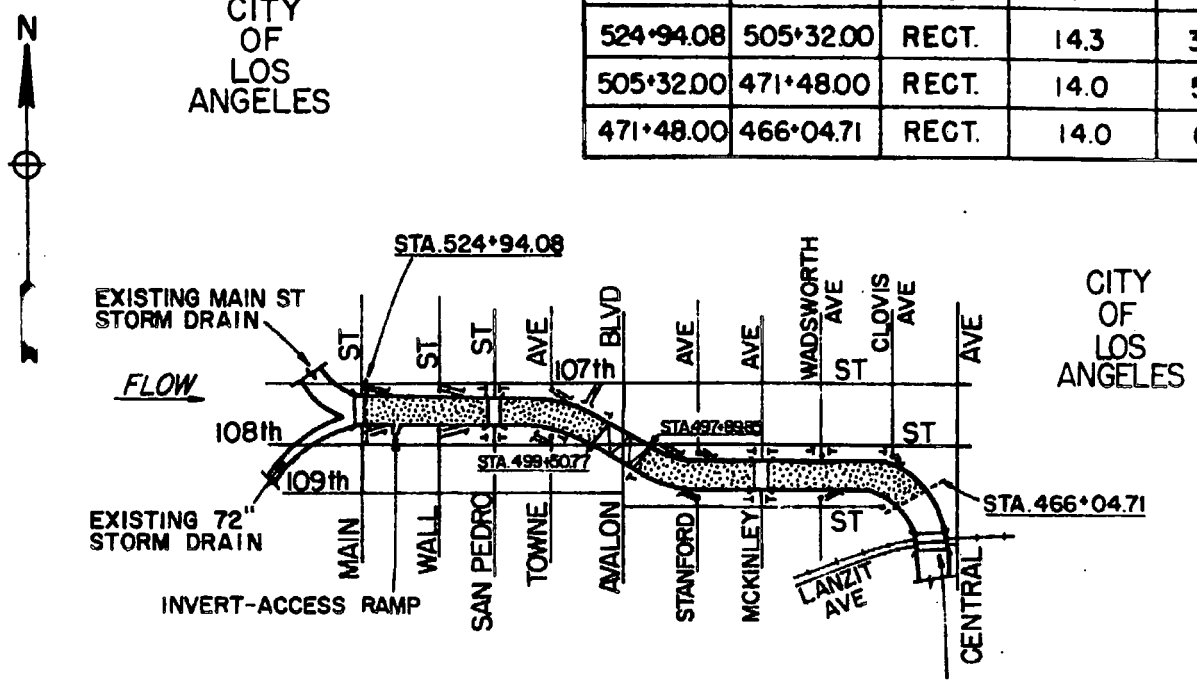
Bridges

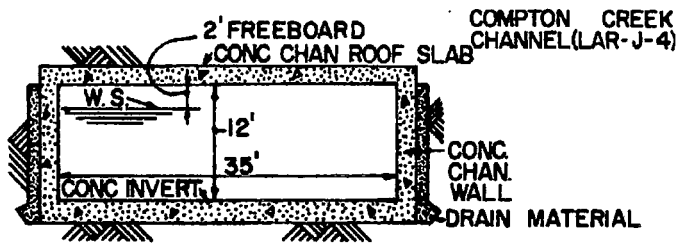
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
San Pedro St	0	2	City of Los Angeles
McKinley Ave	0	2	City of Los Angeles

Reporting Features

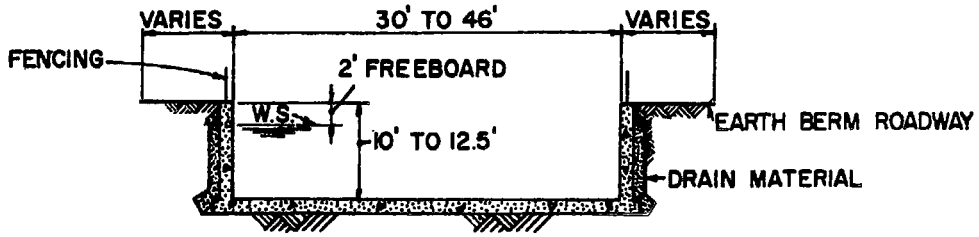
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Surfaced and earth berm roadway	Surfaced and earth berm-access ramp
Concrete channel walls	Concrete invert-access ramp
Concrete channel roof slab	Bridge
Fencing	Public utility
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
524+94.08	505+32.00	RECT.	14.3	3,900
505+32.00	471+48.00	RECT.	14.0	5,500
471+48.00	466+04.71	RECT.	14.0	6,100





TYPICAL COVERED SECTION
STA.499+50.77 TO STA.497+89.85



TYPICAL OPEN SECTION
STA.524+94.08 TO STA.499+50.77
STA.497+89.85 TO STA.466+04.71

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- COVERED SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

COMPTON CREEK CHANNEL
MAIN ST TO LANZIT AVE

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-J-5

DATA SHEET
LAR-J-6

COMPTON CREEK CHANNEL
Artesia Freeway at Compton Creek to Confluence with Los Angeles River

Construction Data

Contract No:	DACW09-95-C-0086	Start:	October 95
	R.J. Harris, Inc.	Finish:	November 96
Plans:	D.O. Series 374/001 thru 374/036		
Folio Title:	COMPTON CREEK IMPROVEMENTS		

Local Assurances

Resolution Dated: 10/8/95
Operation and Maintenance Transferred to:

Stormflow Data

Gaging Station Location: None

Access Ramps

To Invert:	None
To Right Berm:	Santa Fe Ave.
To Left Berm:	Santa Fe Ave.

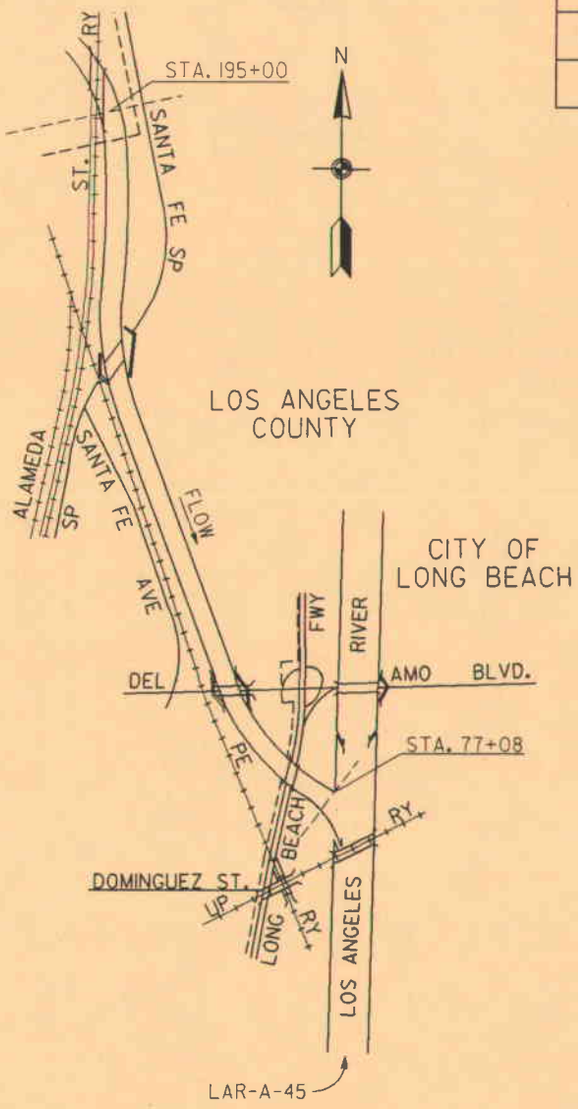
Bridges

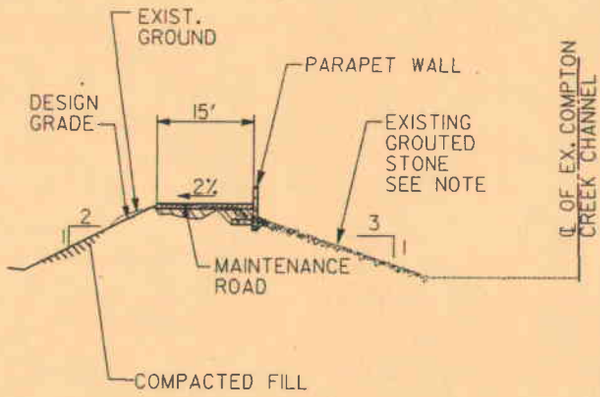
Location or Street Name	Integral Piers	with Channel Abutments	Owner
Santa Fe Ave.	3	0	Private footbridge
Sta. 151+20	3	0	County of Los Angeles
Del Amo Blvd.	3	0	County of Los Angeles
Long Beach Fwy.	3	0	State of California

Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced berm-access ramp
Earth channel invert	Concrete equestrian ramp
Concrete channel invert	Concrete confluence section
Concrete channel side slopes	Subdrain manhole
Grouted stone channel side slopes	Concrete invert access ramp
Stone toe protection	Bridge
Fencing	Side drain
Rights-of-way	Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
COMPTON CREEK CHANNEL				
194+00	199+31	120' W. TRAP	10.0	21,700
77+08	79+90	120' W. TRAP	5.1	17,300

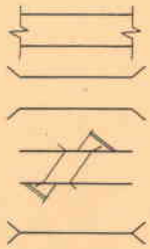




TYPICAL SECTION

STA. 77+08 TO 195+00
NOT TO SCALE

LEGEND:



OPEN SECTION

STREET BRIDGE

TYPICAL BERM-ACCESS RAMP

UTILITY BRIDGE

NOTE: FOR PREVIOUS CHANNEL IMPROVEMENTS REFER TO LAR-J-1 AND LAR-A-7

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

COMPTON CREEK CHANNEL

ARTESIA FREEWAY TO CONFLUENCE WITH LOS ANGELES RIVER

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
LAR-K-1

HAINES CANYON CHANNEL
Plainview Ave to Tujunga Wash

Construction Data

Contract No: Force Account — Start: 27 June 1936, Finish: 20 March 1937

Plans: D.O. Series 43/1-41

Folio Title: HAINES CANYON IMPROVEMENT
Tujunga Wash to Debris Basin

Local Assurances

Resolution Dated: 1 December 1937

Operation and Maintenance Transferred to: LACFCD, 31 May 1938 [ERA]

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: Foothill Blvd, Grenoble St, Oro Vista Ave

To Left Berm: McVine Ave, Foothill Blvd

Bridges

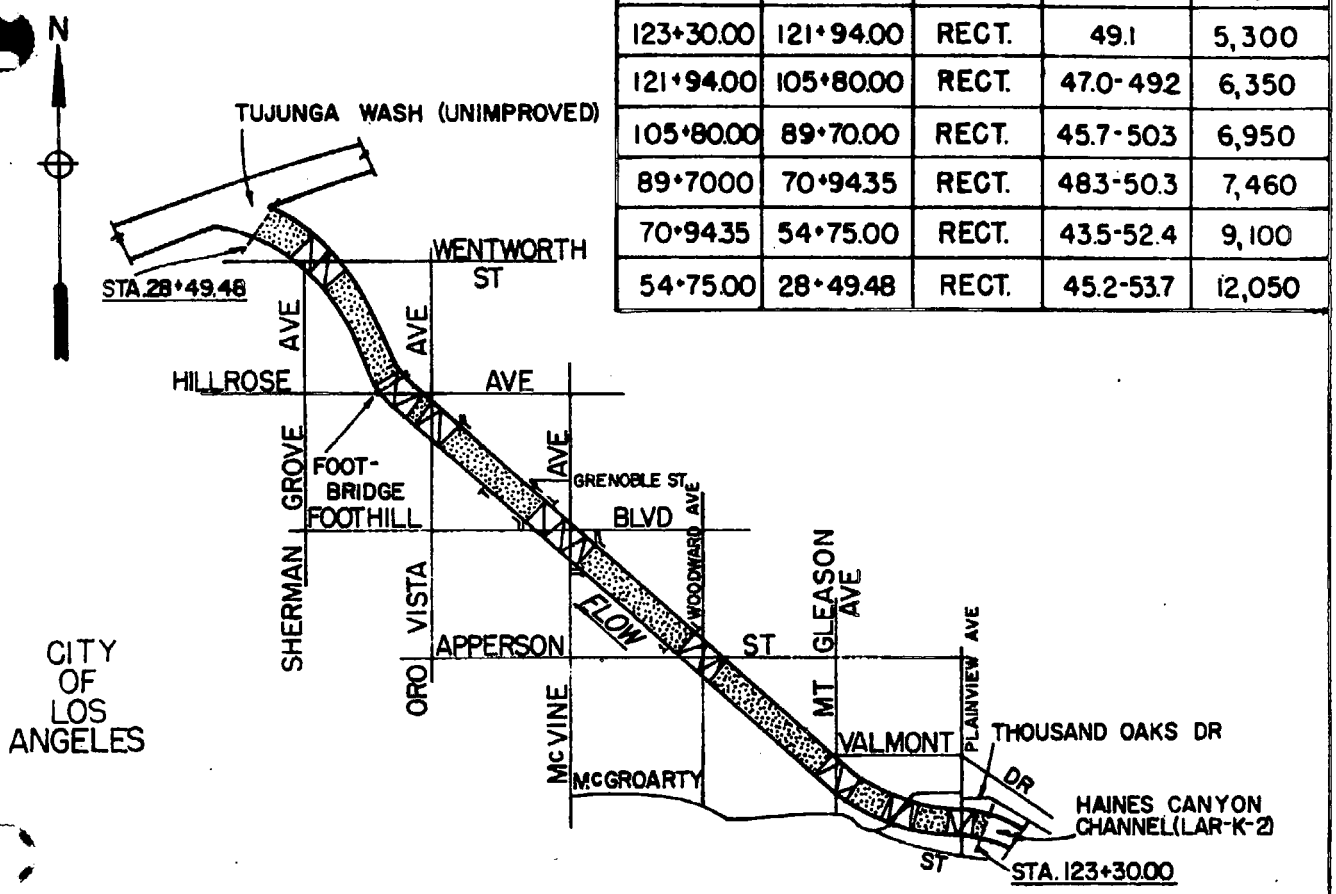
None

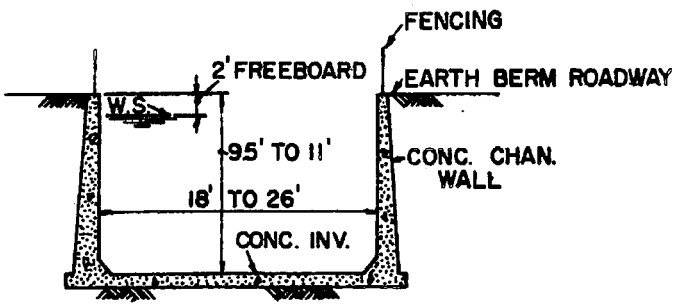
Reporting Features

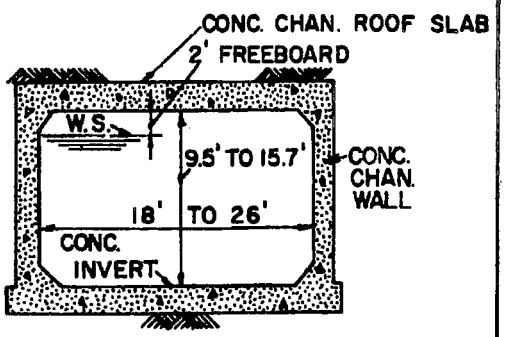
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Earth berm-access ramp
Concrete channel roof slab	Side overflow spillway
Earth berm roadway	Public utility
Fencing	
Rights-of-way	

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
123+30.00	121+94.00	RECT.	49.1	5,300
121+94.00	105+80.00	RECT.	47.0-49.2	6,350
105+80.00	89+70.00	RECT.	45.7-50.3	6,950
89+7000	70+94.35	RECT.	48.3-50.3	7,460
70+94.35	54+75.00	RECT.	43.5-52.4	9,100
54+75.00	28+49.48	RECT.	45.2-53.7	12,050







TYPICAL OPEN SECTION
STA. 123+30.00 TO STA. 28+49.48

TYPICAL COVERED SECTION
(AS NOTED)

LEGEND

- OPEN SECTION
- COVERED SECTION
- STREET BRIDGE
- ----- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

HAINES CANYON CHANNEL
PLAINVIEW AVE TO TUJUNGA WASH

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-K-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-K-2

HAINES CANYON CHANNEL
Debris Basin to Plainview Ave

Construction Data

Contract No: Force Account
Start: 27 August 1936
Finish: July 1938

Plans: D.O. Series 43/1-41
Folio Title: HAINES CANYON IMPROVEMENT
Tujunga Wash to Debris Basin

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers; 12 October 1940

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

none

Reporting Features

Along Channel
Concrete Channel invert
Concrete channel walls
Concrete channel roof slab
Earth berm roadway
Fencing
Rights-of-way

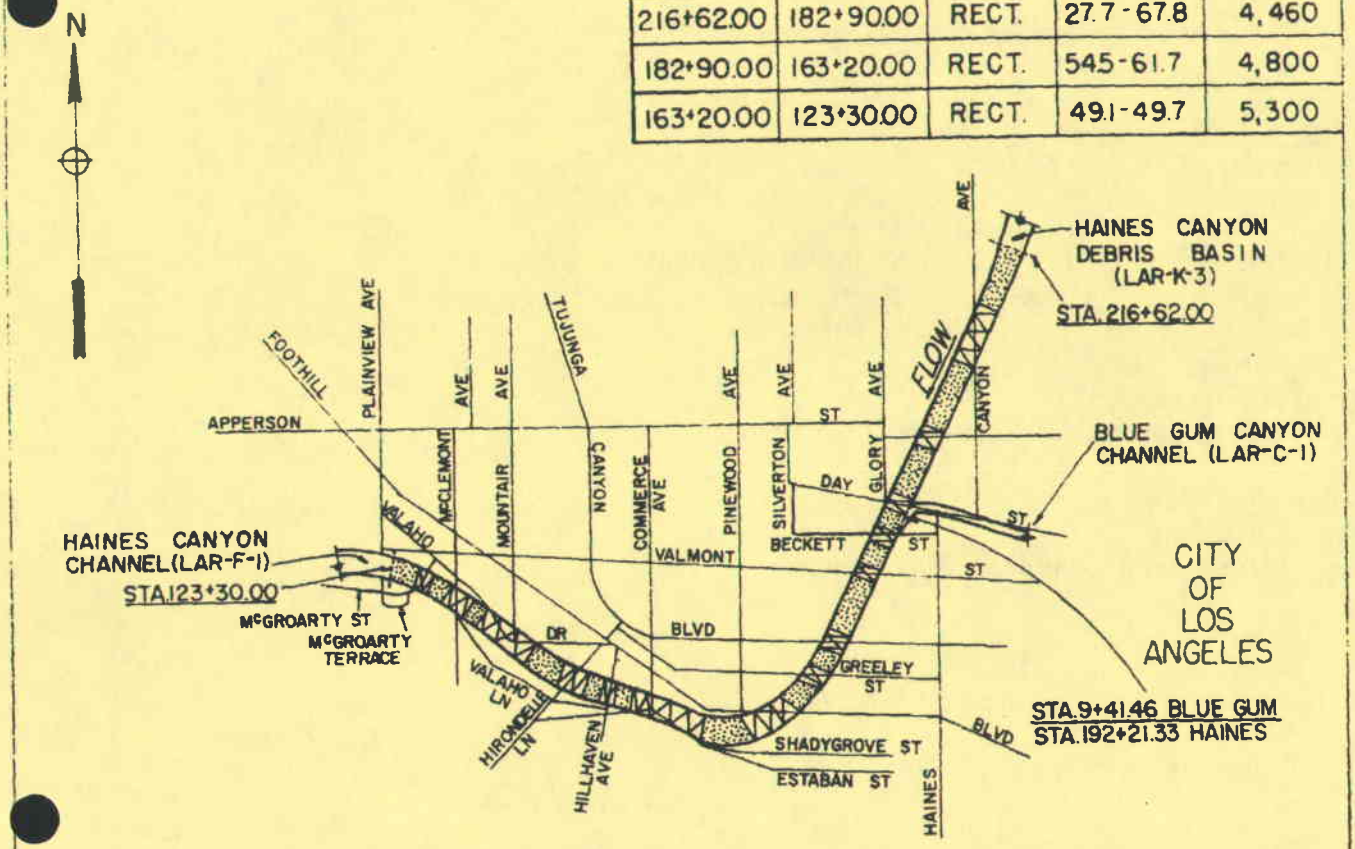
At a Channel Station
Side drain
Public utility

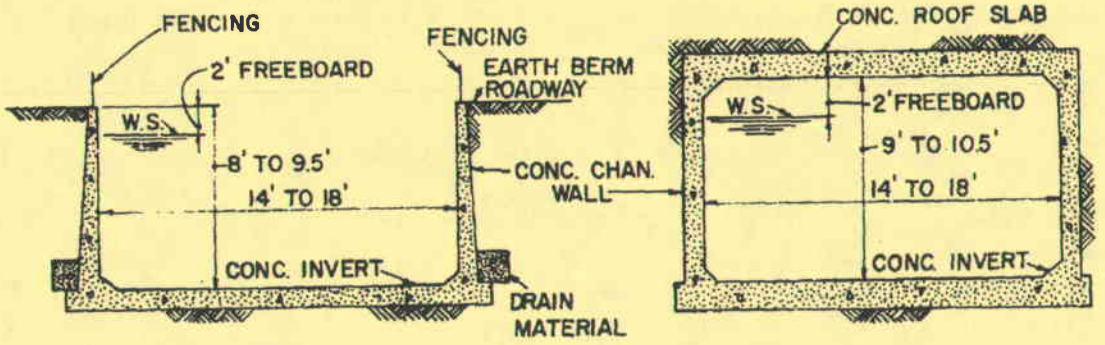
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
216+62.00	182+90.00	RECT.	27.7 - 67.8	4,460
182+90.00	163+20.00	RECT.	54.5 - 61.7	4,800
163+20.00	123+30.00	RECT.	49.1 - 49.7	5,300





TYPICAL OPEN SECTION
STA. 216+62.00 TO STA. 123+30.00

TYPICAL COVERED SECTION
(AS NOTED)

LEGEND

- OPEN SECTION
- CONST. PROJECT LIMIT
- COVERED SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

HAINES CANYON CHANNEL

DEBRIS BASIN TO PLAINVIEW AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-K-3

HAINES CANYON DEBRIS BASIN

Construction Data

Contract No: Force Account
Start: 4 October 1937
Finish: 25 June 1938

Plans: D.O. Series 43/1-41
Folio Title: HAINES CANYON IMPROVEMENT
Tujunga Wash to Debris Basin

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers; 12 October 1940

Stormflow Data

Staff Gages: none
Basin Elevation at One-third Design Discharge:

Access Roads

To Embankment: from Haines Canyon Rd
To Basin: from top of embankment to bottom of basin

Pertinent Design Data

Embankment:

Length	511 ft
Crest Width	15 ft
Crest Elevation	2203 ft msl
Side Slope	upstream 1 on 3 downstream 1 on 2.5

Spillway:

Length	457 ft
Crest Width	80 ft
Crest Elevation	2191 ft msl
Design Capacity	

Pool Drain: none

Intake Tower: none

Drainage Area: 1.53 sq mi
Debris Basin Capacity: 148,000 cu yds
Maximum Allowable Accumulation of Debris: 37,000 cu yds

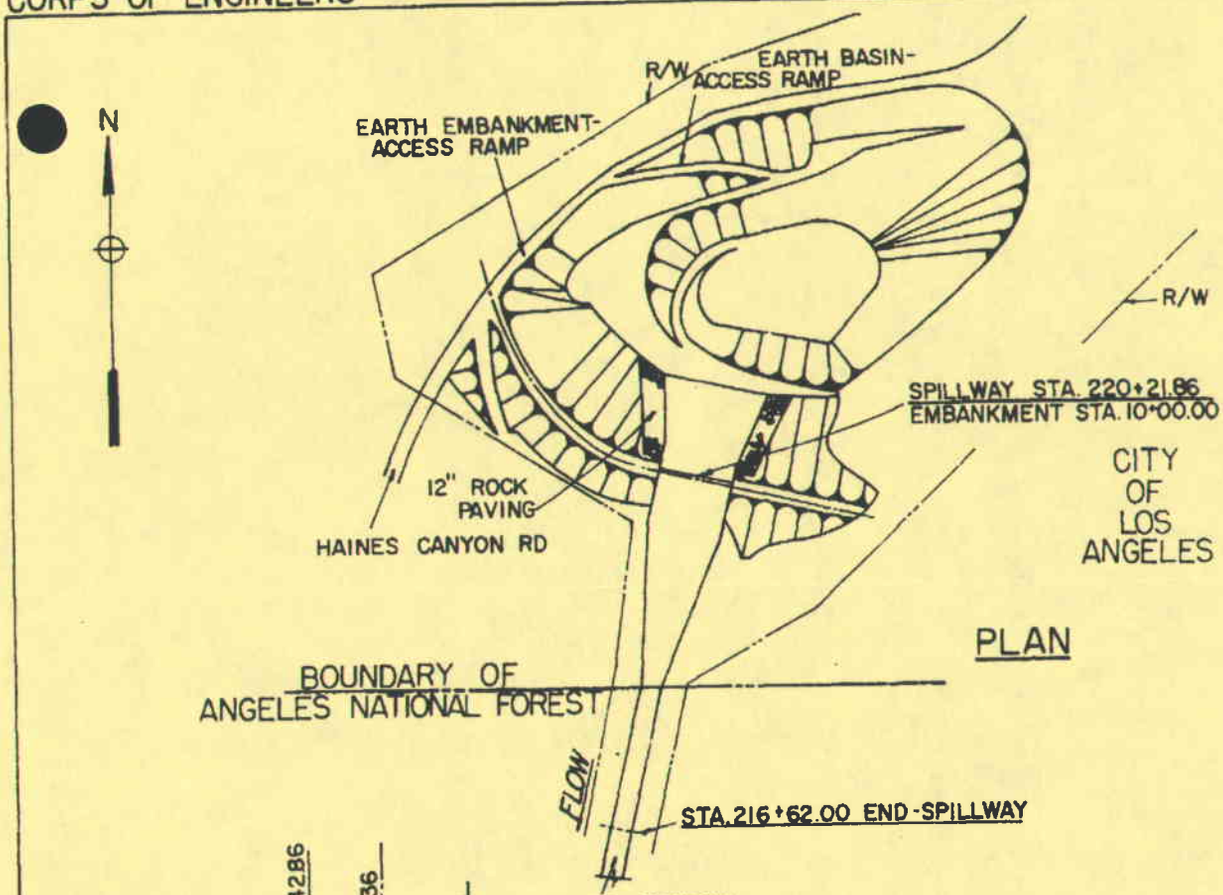
REPORTING FEATURES

Spillway and Outlet Channel
Concrete channel invert
Concrete channel walls
Stone spillway apron
Subdrain system
Fencing

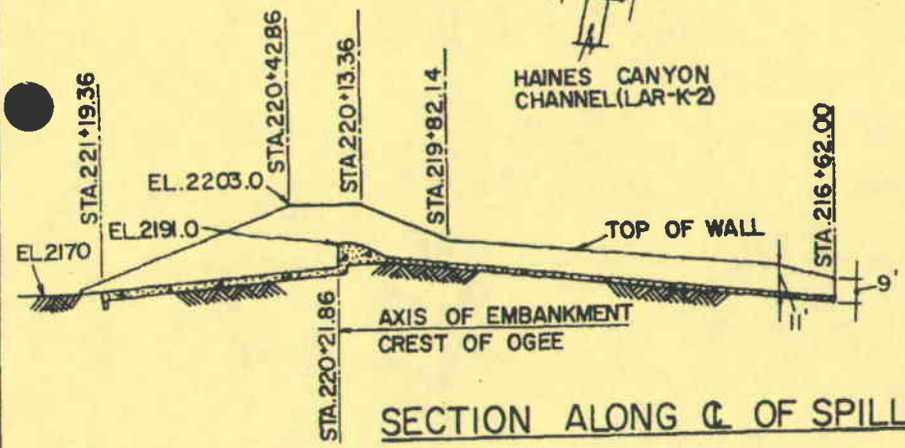
Embankment and Basin
Earth Embankment
Earth basin-access ramp
Earth embankment-access ramp
Subdrain system
Debris storage capacity
Fencing

CORPS OF ENGINEERS

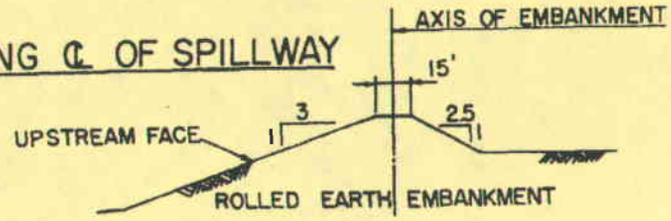
LAR-K-3
DEPARTMENT OF THE ARMY



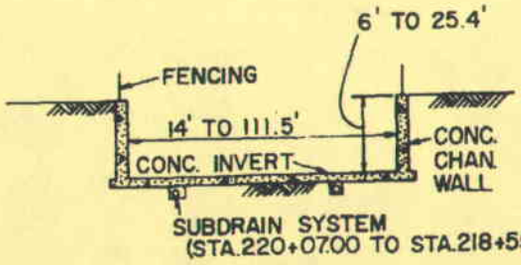
PLAN



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION



TYPICAL SECTION THROUGH SPILLWAY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

HAINES CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-K-3

OPERATION AND MAINTENANCE MANUAL

DATA SHEET HAY CANYON CHANNEL
LAR-L-1

Construction Data

Contract No: 13-130 Start: 20 October 1935
Finish: 10 October 1936

Plans: D.O. Series 59/1-24
Folio Title: HAY CANYON CHANNEL

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 20 October 1936

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: El Vago Ln
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 105+39	0	0	Private bridge
Sta 87+30±	0	0	Private bridge
Sta 87+00±	0	0	Private footbridge
Sta 84+00±	0	0	Private footbridge
Sta 83+00±	0	0	Private footbridge

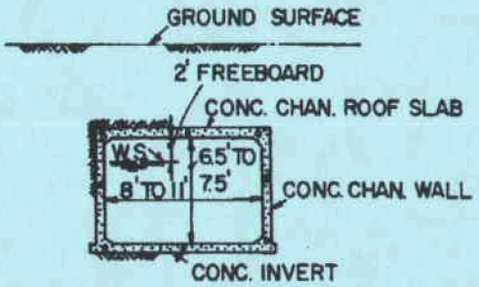
Reporting Features

Along Channel
Surfaced berm roadway
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Fencing
Rights-of-way

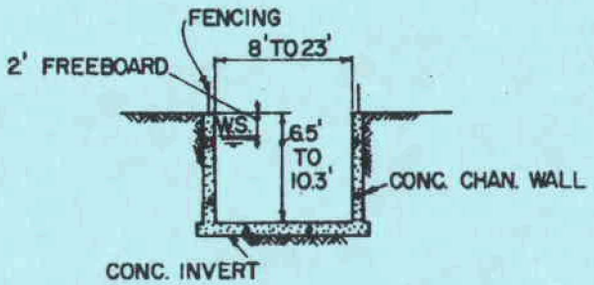
At a Channel Station
Surfaced berm-access ramp
Bridge
Side drain
Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
109+85.31	99+03.25	RECT	23.8-42.1	970
99+03.25	75+62.25	RECT.	42.1-47.1	1,070
75+62.25	43+46.50	RECT.	34.7-45.4	1,270
43+46.50	10+21.00	RECT.	22.9-29.9	1,360
10+21.00	7+00.00	RECT.	29.1-31.3	3,400



TYPICAL COVERED SECTION
AS NOTED



TYPICAL OPEN SECTION
STA. 109+85.31 TO STA. 7+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- COVERED SECTION
- TYPICAL BERM-ACCESS RAMP
- ----- CONST. PROJECT LIMIT
- ——— COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

HAY CANYON CHANNEL

SCALE IN FEET
1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-L-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET HAY CANYON DEBRIS BASIN
LAR-L-2

Construction Data

Contract No: 13-130 Start: 20 October 1935
Finish: 10 October 1936

Plans: D.O. Series 59/1-24
Folio Title: HAY CANYON CHANNEL

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 20 October 1936

Stormflow Data

Staff Gages: 4
Basin Staff Gage Elevation at One-third Design Discharge:

Access Roads

To Embankment: from El Vago St
To Basin: from west side of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	520 ft	Length	266 ft
Crest Width	15 ft	Crest Width	36 ft
Crest Elevation	1915 ft msl	Crest Elevation	1905 ft msl
Side Slope	1 on 3	Design Capacity	1440 cfs

Pool Drain:

Length	13.7 ft
Diameter	18 in (3 pipes)
Design Capacity	

Drainage Area: 0.17 sq mi
Debris Basin Capacity: 32,000 cu yds
Maximum Allowable Accumulation of Debris: 8,000 cu yds

REPORTING FEATURES

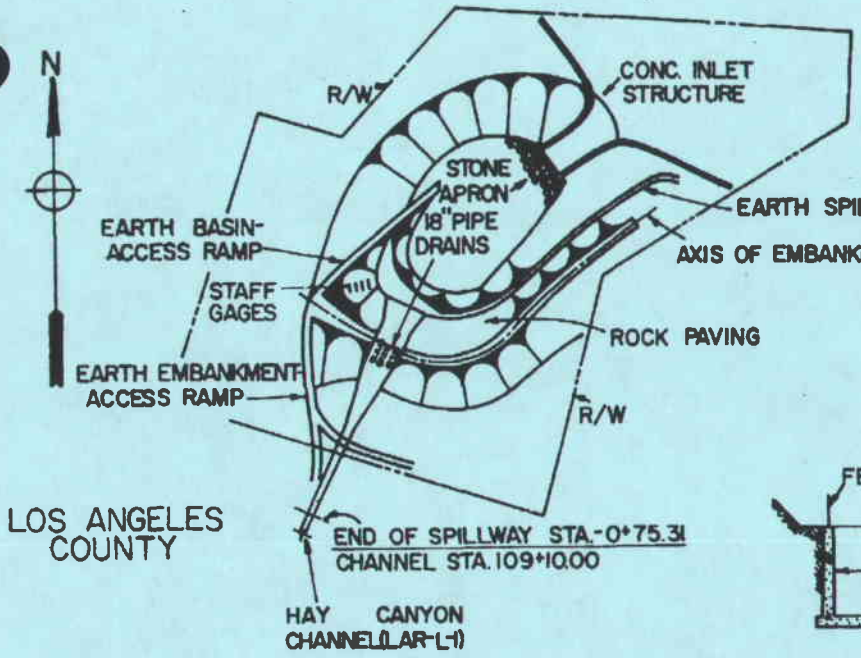
Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel roof slab
Concrete channel walls
Trashracks
Fencing

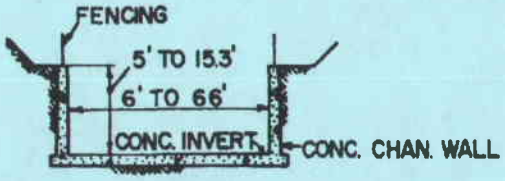
Outlet Works
Spillway drain pipes

Embankment and Basin
Concrete inlet structure
Earth embankment
Earth embankment-access ramp
Earth basin-access ramp
Earth spillway-access ramp
Debris storage capacity
Stone side slopes
Staff gages
Fencing
Rights-of-way

CORPS OF ENGINEERS

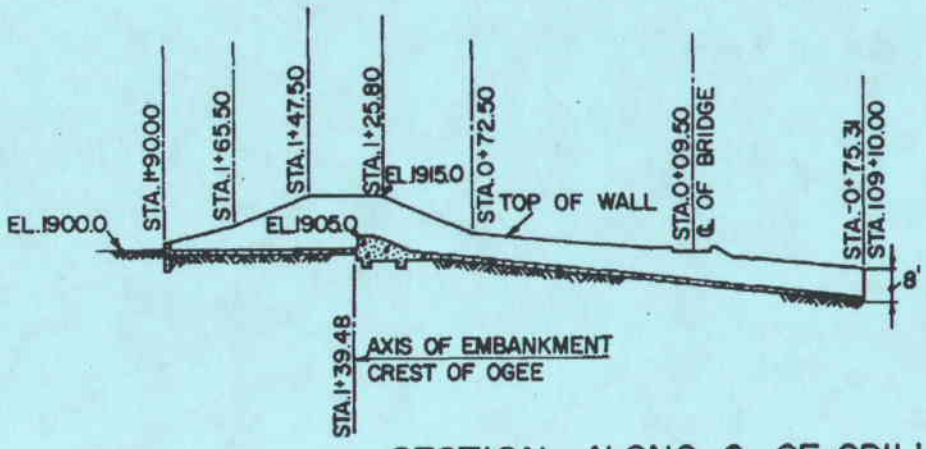
DEPARTMENT OF THE ARMY



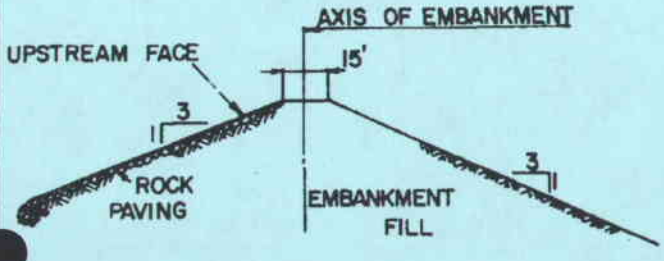


PLAN

TYPICAL SECTION THROUGH SPILLWAY AND INLET STRUCTURE



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

HAY CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-L-2

DATA SHEET
LAR-M-1

LOPEZ CANYON DIVERSION CHANNEL
Lopez Canyon to Hansen Flood Control Basin

Construction Data

Contract No:	DA 60-227	Start: 31 May 1960
	Oberg Const Co	Finish: 21 December 1960
Specifications:	CIVENG 60-29	
Plans:	D.O. Series 193/29-74	
Folio Title:	LOPEZ CANYON DIVERSION CHANNEL Lopez Canyon to Hansen Flood Control Basin	

Local Assurances

Resolution Dated: 12 May 1959
Operation and Maintenance Transferred to: LACFCD, 11 April 1961

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm:	Filmore St, Van Nuys Blvd, Terra Bella St, Foothill Blvd, Stonehurst Ave
To Left Berm:	Lopez Canyon Rd, Filmore St, Van Nuys Blvd, Terra Bella St, Foothill Blvd, Stonehurst Ave

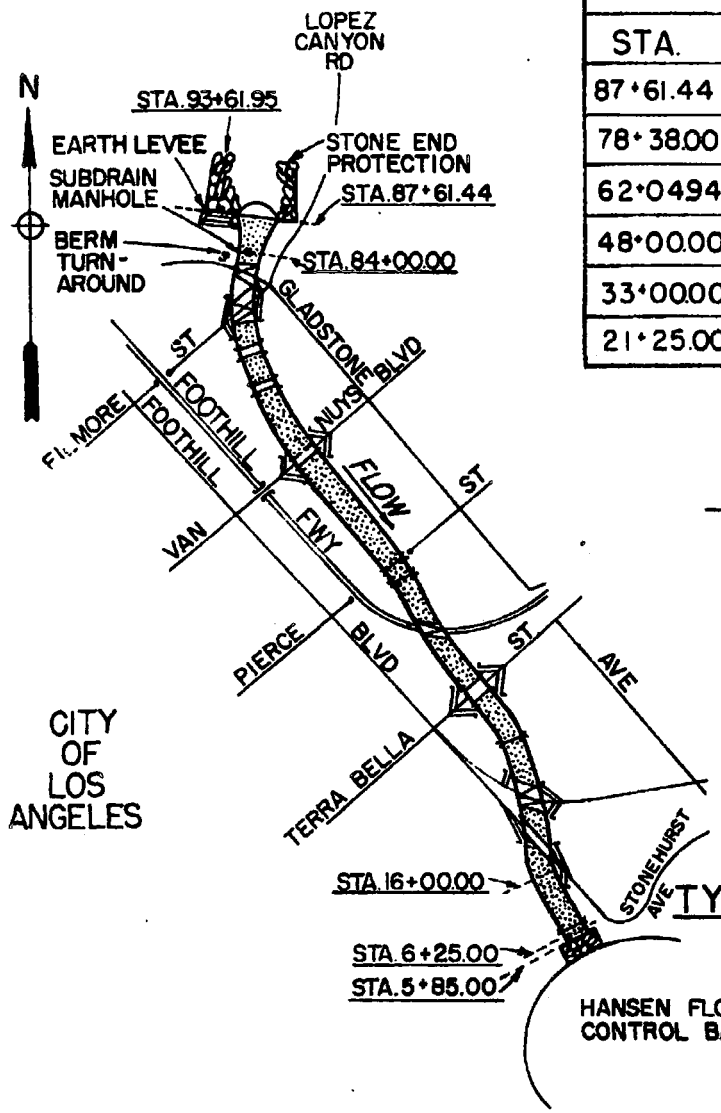
Bridges

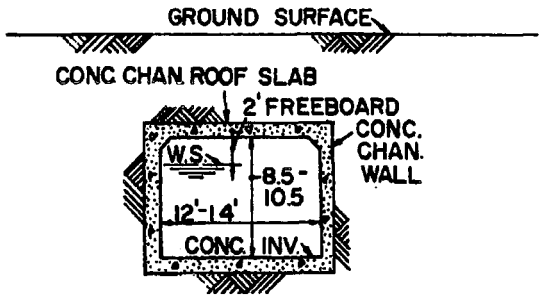
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 74+78	0	2	Private vehicular bridge
Sta 70+10	0	2	Private vehicular bridge
Pierce St	0	2	City of Los Angeles (footbridge)
Sta 45+57	0	2	Private footbridge
Terra Bella St	0	2	City of Los Angeles
Sta 27+44	0	2	Private footbridge
Stonehurst Ave	0	2	City of Los Angeles

Reporting Features

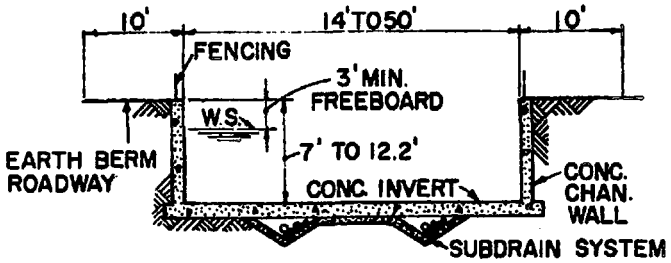
Along Channel	At a Channel Station
Concrete and stone channel invert	Surfaced berm-access ramp
Concrete channel walls	Trashracks
Concrete channel roof slab	Side drain
Surfaced and earth berm roadway	Bridge
Earth levee	Subdrain manhole
Subdrain system	Derrick stone protection
Fencing	Public utility
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
87+61.44	78+38.00	RECT.	11.6 - 30.0	2,400
78+38.00	62+04.94	RECT.	23.2-30.0	2,600
62+0494	48+00.00	RECT.	23.2-29.0	2,900
48+00.00	33+0.00	RECT.	29.0-39.2	3,200
33+00.00	21+25.00	RECT.	39.1 -39.2	3,300
21+25.00	5+85.00	RECT.	39.1-56.9	3,400

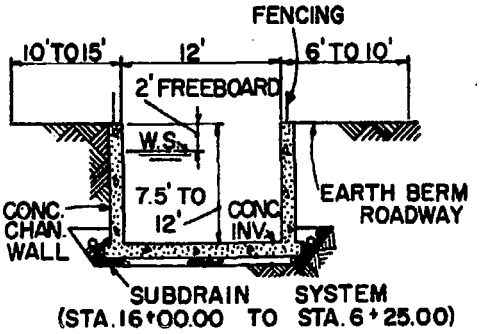




TYPICAL COVERED SECTION
(AS NOTED)



TYPICAL OPEN SECTION
STA.87+61.44 TO STA.84+00.00



TYPICAL OPEN SECTION
STA.84+00.00 TO STA.5+85.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- CONST. PROJECT LIMIT
- COVERED SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LOPEZ CANYON DIVERSION CHANNEL

LOPEZ CANYON TO HANSEN F.C.B.

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-M-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-N-1

PACOIMA WASH CHANNEL
Paxton St to Tujunga Wash

Construction Data

Contract No:	ENG 2363	Start:	15 December 1952
	A. Teichert and Sons, Inc	Finish:	1 December 1953
Specifications:	CIVENG 53-14		
Plans:	D.O. Series 143/1/89		
Folio Title:	PACOIMA WASH CHANNEL Tujunga Wash to Arleta Ave		

Local Assurances

Resolution Dated: 4 June 1952
Operation and Maintenance Transferred to: LACFCD, 1 February 1955

Stormflow Data

Gaging Station Location: upstream of Branford St (sta 36+84)
Type: Recording (LACFCD--F305-R)
Staff Gage Reading at One-third Capacity: 5.4 ft on gage (5,700 cfs)

Access Ramps

To Invert: none

To Right Berm: Devonshire St
To Left Berm: Filmore St, Van Nuys Blvd, Terra Bella St, Osborne St, Branford St, Wentworth St

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Paxton St	0	2	City of Los Angeles
Devonshire St	0	2	City of Los Angeles
Van Nuys Blvd	0	2	City of Los Angeles
Pierce St	0	0	City of Los Angeles (footbridge)
Terra Bella St	0	2	City of Los Angeles
Kagel Canyon St	0	0	City of Los Angeles (footbridge)
Osborne St	0	2	City of Los Angeles
Montague St	0	0	City of Los Angeles (footbridge)
Branford St	0	2	City of Los Angeles
Wentworth St	0	2	City of Los Angeles

Reporting Features

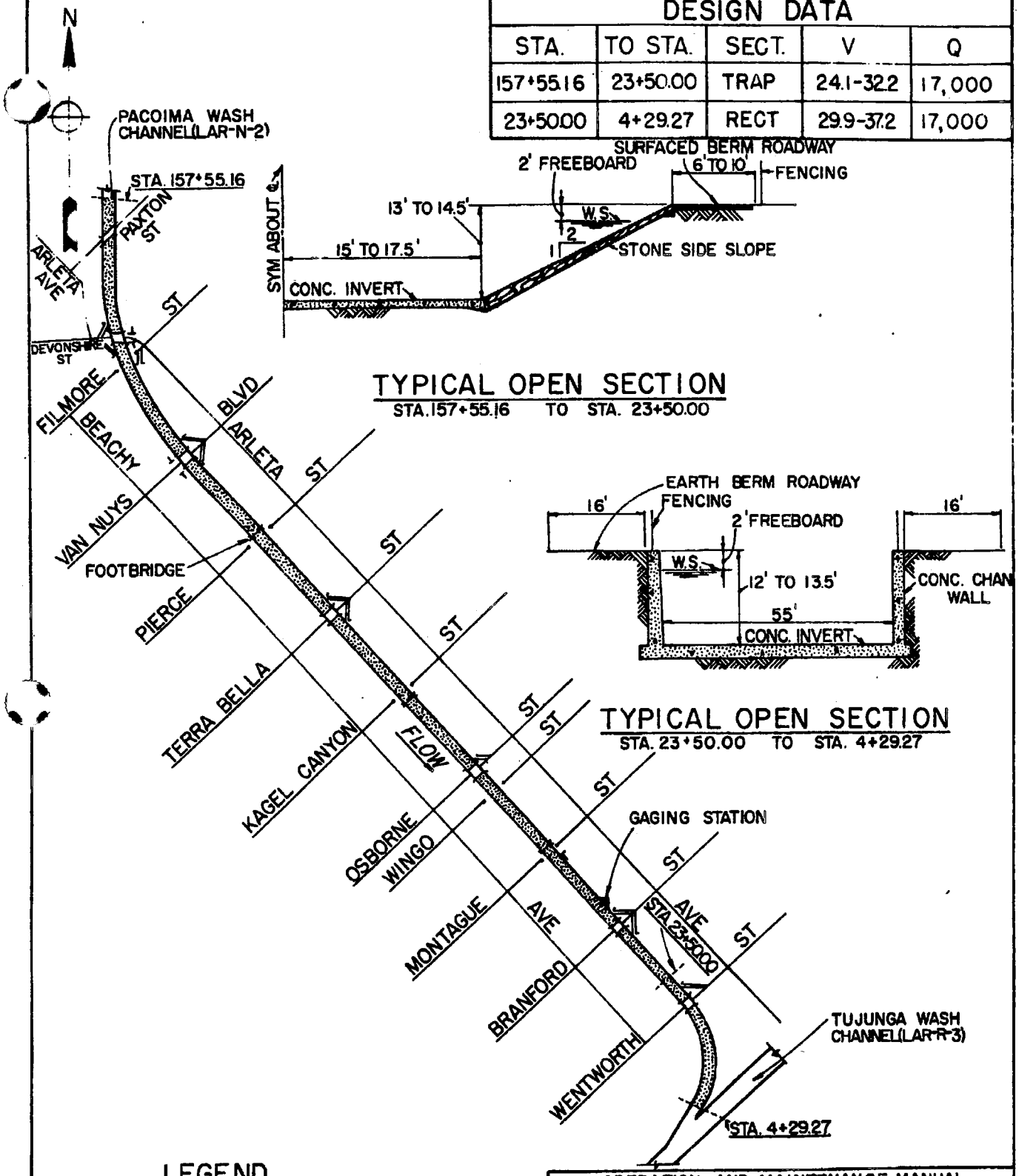
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced and earth berm-access ramp
Concrete channel walls	Gaging station
Concrete channel invert	Side drain
Stone channel side slopes	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
157+55.16	23+50.00	TRAP	24.1-32.2	17,000
23+50.00	4+29.27	RECT	29.9-37.2	17,000



LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

PACOIMA WASH CHANNEL

PAXTON ST TO TUJUNGA WASH

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA LAR-N-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-N-2

PACOIMA WASH CHANNEL
Lopez Flood Control Basin to Paxton St

Construction Data

Contract No:	ENG 2902	Start: 4 June 1953
	Guy F. Atkinson Co	Finish: 7 April 1954
Specifications:	CIVENG 53-38	
Plans:	D.O. Series 144/1-106	
Folio Title:	PACOIMA WASH CHANNEL Lopez Dam to Arleta Ave	

Local Assurances

Resolution Dated: 4 June 1952
Operation and Maintenance Transferred to: LACFCD, 1 February 1955

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm:	Fenton Ave, Gladstone Ave, Glenoaks Blvd, Fifth St, Bradley Ave, Telfair Ave, Laurel Canyon Blvd
To Left Berm:	Gladstone Ave, Glenoaks Blvd, Fifth St, Bradley Ave, Telfair Ave, Laurel Canyon Blvd

Bridges

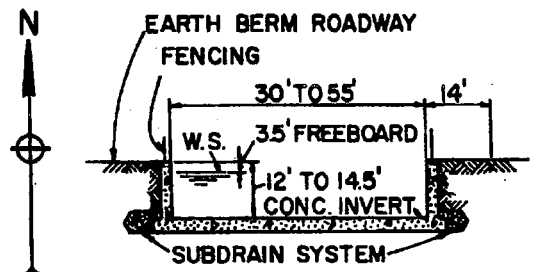
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Foothill Fwy	0	0	State of California
Foothill Blvd	0	0	City of Los Angeles
Glenoaks Blvd	0	0	City of San Fernando
Fifth St	0	0	City of San Fernando
Bradley Ave	0	0	City of Los Angeles
S.P. Ry	0	0	S.P.R.R.
San Fernando Rd	0	0	City of Los Angeles
Laurel Canyon Blvd	0	0	City of Los Angeles
Golden State Fwy	0	0	State of California
Sta 161+56±	0	0	Utility bridge

Reporting Features

Along Channel	At a Channel Station
Earth and surfaced berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Concrete confluence section
Stone channel side slopes	Spreading grounds diversion
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	

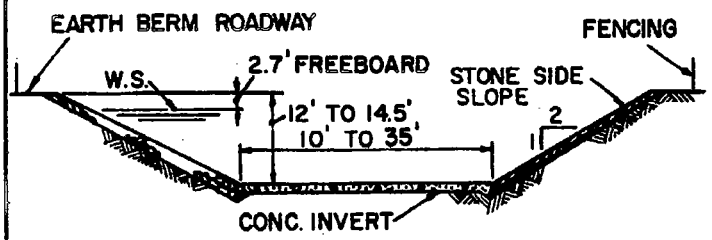
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
342+21.73	290+48.15	VARIES	36.2-42.9	11,000
290+48.15	165+19.35	VARIES	36.2-36.5	12,000
165+19.35	157+55.16	VARIES	32.6-36.5	17,000



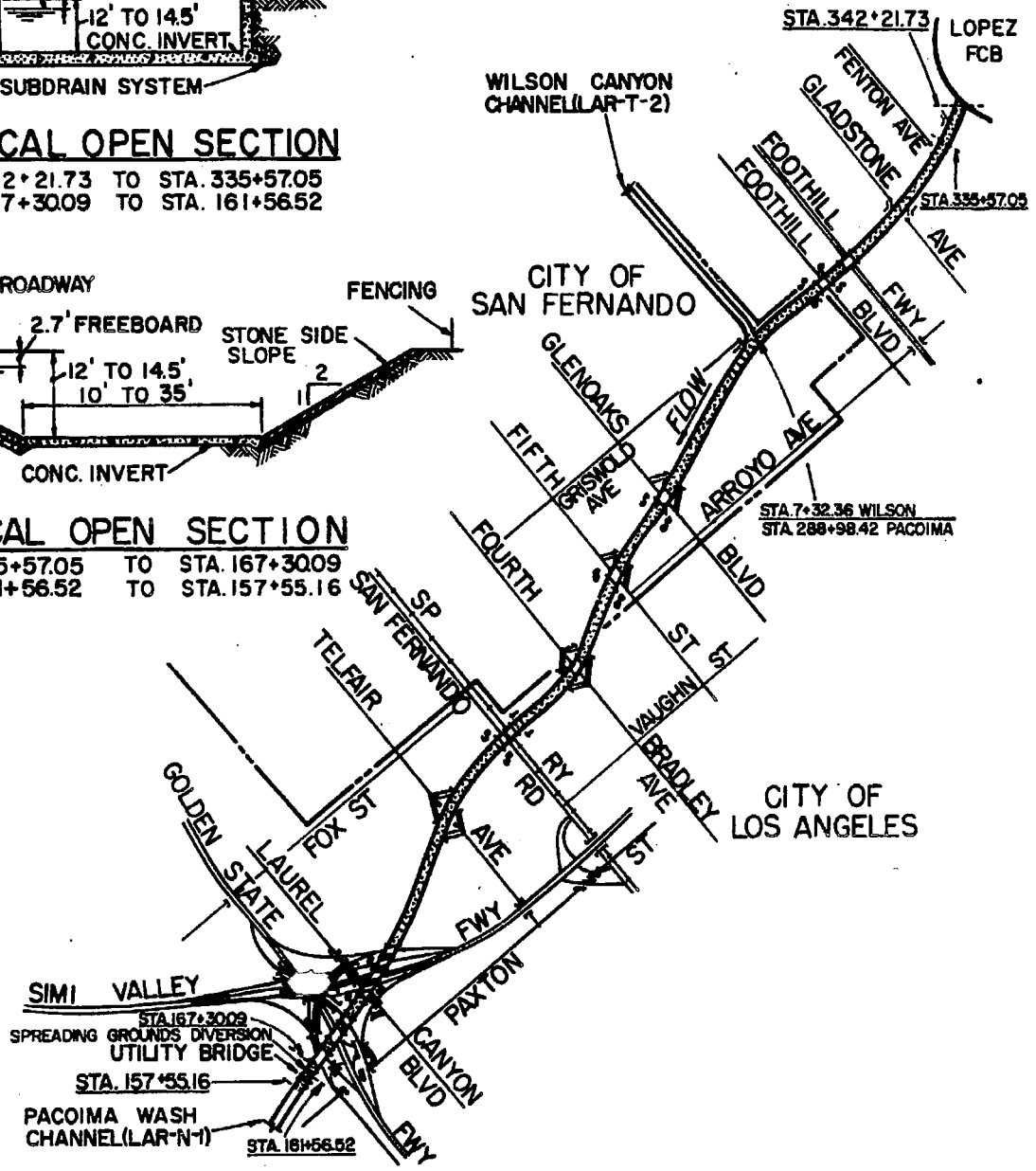
TYPICAL OPEN SECTION

STA. 342+21.73 TO STA. 335+57.05
STA. 167+30.09 TO STA. 161+56.52



TYPICAL OPEN SECTION

STA. 335+57.05 TO STA. 167+30.09
STA. 161+56.52 TO STA. 157+55.16



LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM TURNAROUND
- ----- CONST. PROJECT LIMIT
- ——-- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

PACOIMA WASH CHANNEL

LOPEZ F.C.B. TO PAXTON ST

SCALE IN FEET
1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA
LAR-N-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-O-1

ROYAL BOULEVARD CHANNEL

Construction Data

Contract No:	DA 64-120	Start: 27 April 1964
	Charles J. Rounds Co	Finish: 6 November 1964
Specifications:	CIVENG 64-15	
Plans:	D.O. Series 217/17-61	
Folio Title:	DEAD HORSE CANYON AND ROYAL BOULEVARD CHANNELS Royal Boulevard Channel	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 13 November 1964

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berrm: none

Bridges

None

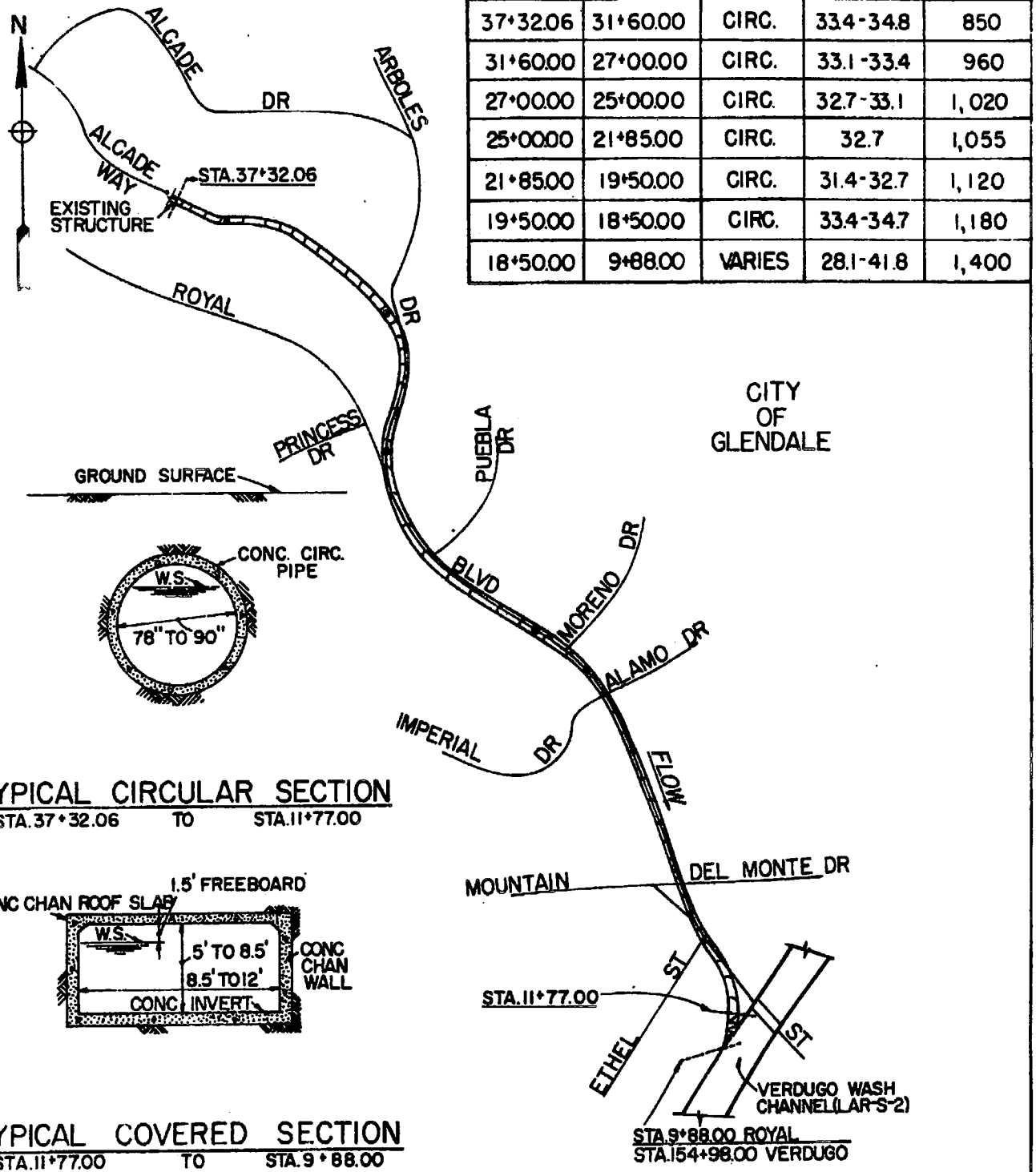
Reporting Features

Along Channel	At a Channel Station
Reinforced concrete pipe channel	Side drain
Concrete channel invert	Channel inspection manhole
Concrete channel walls	Public utility
Concrete channel roof slab	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
37+32.06	31+60.00	CIRC.	33.4-34.8	850
31+60.00	27+00.00	CIRC.	33.1-33.4	960
27+00.00	25+00.00	CIRC.	32.7-33.1	1,020
25+00.00	21+85.00	CIRC.	32.7	1,055
21+85.00	19+50.00	CIRC.	31.4-32.7	1,120
19+50.00	18+50.00	CIRC.	33.4-34.7	1,180
18+50.00	9+88.00	VARIES	28.1-41.8	1,400



TYPICAL CIRCULAR SECTION
STA.37+32.06 TO STA.11+77.00

TYPICAL COVERED SECTION
STA.11+77.00 TO STA.9+88.00

LEGEND

- CIRCULAR SECTION
- COVERED SECTION
- CONST. PROJECT LIMIT
- CHANNEL INSPECTION MANHOLE

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

ROYAL BOULEVARD CHANNEL

SCALE IN FEET
250 0 250 500

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-O-I

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-P-1

SNOVER CANYON CHANNEL
WEBBER CANYON CHANNEL

Construction Data

Contract No: 13-130 Start: 5 June 1936
Finish: October 1936

Plans: D.O. Series 53/1-25, 54/1-26, 55/1-50
Folio Title: SNOVER-WEBBER CANYON

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 9 March 1937

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm : none

Bridges

none

Reporting Features

Along Channel
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Reinforced concrete pipe section
Fencing
Rights-of-way

At a Channel Station
Concrete confluence structure
Public utility
Side drainage entrance

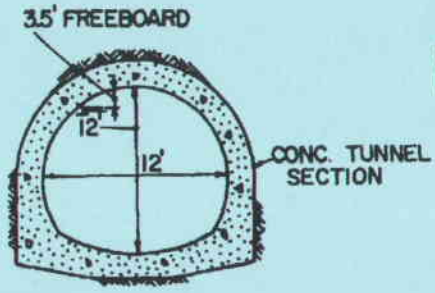
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

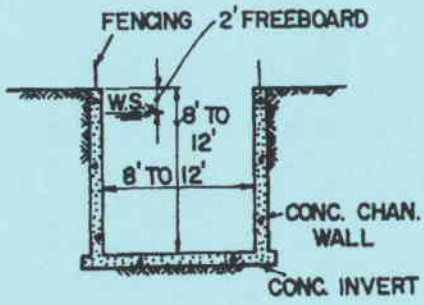
STA.	TO STA.	SECT.	V	Q
SNOVER CANYON CHANNEL				
33+59.25	31+00.00	RECT.	24.1-34.6	1,050
31+00.00	25+80.00	RECT.	28.4-37.4	1,300
25+80.00	20+30.00	RECT.	24.6-38.4	1,700
20+30.00	14+70.14	RECT.	35.7-41.9	1,800
14+70.14	11+23.10	CIRC.	44.4-60.1	3,300
WEBBER CANYON CHANNEL				
19+84.20	15+66.01	RECT.	49.9-50.1	1,500

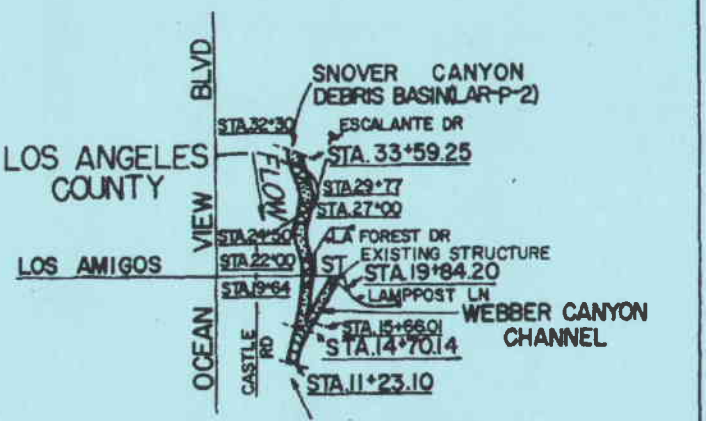
N



TYPICAL CIRCULAR SECTION

STA. 14+70.14 TO STA. 11+23.10





TYPICAL OPEN SECTION

SNOVER CANYON CHANNEL
STA. 33+59.25 TO STA. 14+70.14
WEBBER CANYON CHANNEL
STA. 19+84.20 TO STA. 15+66.01

TYPICAL COVERED SECTION

AS NOTED

LEGEND

- OPEN SECTION
- COVERED SECTION
- CIRCULAR SECTION
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SNOVER CANYON CHANNEL
WEBBER CANYON CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET CANYON DEBRIS BASIN
LAR-P-2

Construction Data

Contract No: 13-130 Start: September 1935
Finish: October 1936
Plans: D.O. Series 53/1-25, 54/1-26-, 55/1-50
Folio Title: SNOVER-WEBBER CANYON

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 9 March 1937

Stormflow Data

Staff Gages: 5
Basin Staff Gage Elevation at One-third Design Discharge:

Access Roads

To Embankment: from Escalante Dr
To Basin: from top of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	416 ft	Length	293 ft
Crest Width	15 ft	Crest Width	40 ft
Crest Elevation	1893 ft msl	Crest Elevation	1879 ft msl
Side Slope	1 on 3	Design Capacity	2,100 cfs

Pool Drain:

Length	14.6 ft
Diameter	18 in (3 pipes)
Design Capacity	

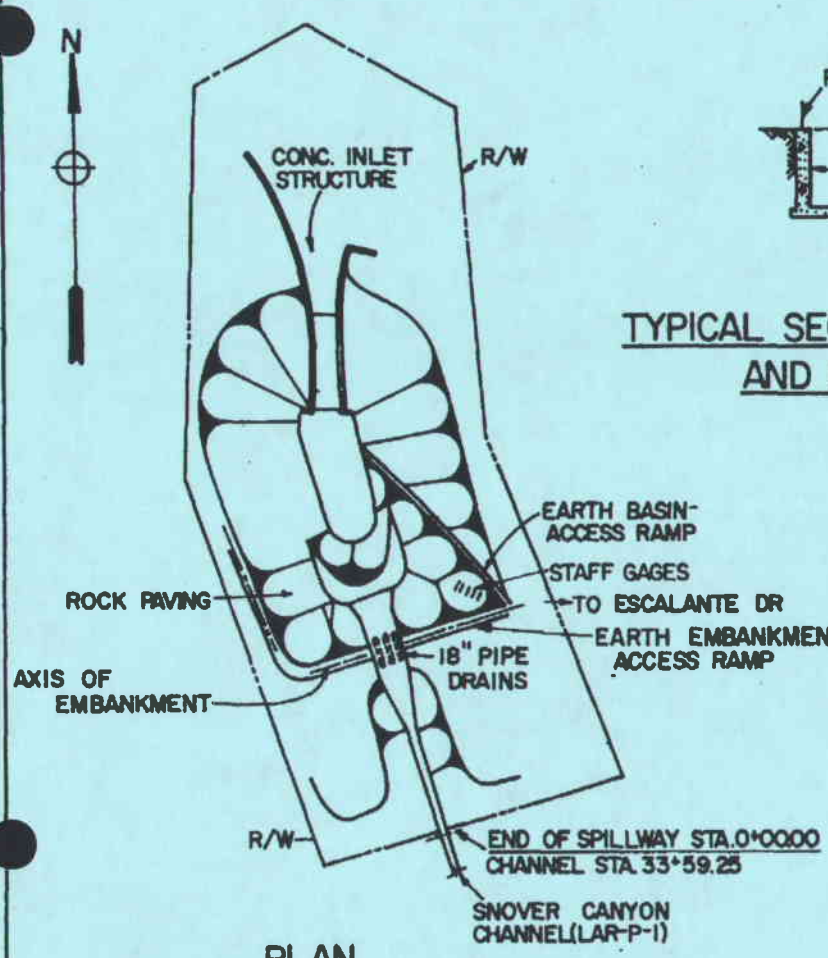
Drainage Area: 0.23 sq mi
Debris Basin Capacity: 23,000 cu yds
Maximum Allowable Accumulation of Debris: 5750 cu yd.8

REPORTING FEATURES

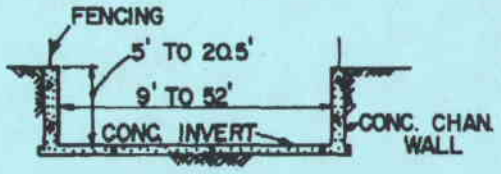
Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Trashracks
Fencing

Outlet Works
Spillway drain pipes

Embankment and basin
Earth embankment-access ramp
Earth basin-access ramp
Concrete inlet structure
Debris storage capacity
Stone side slopes
Staff gages
Fencing
Rights-of-way

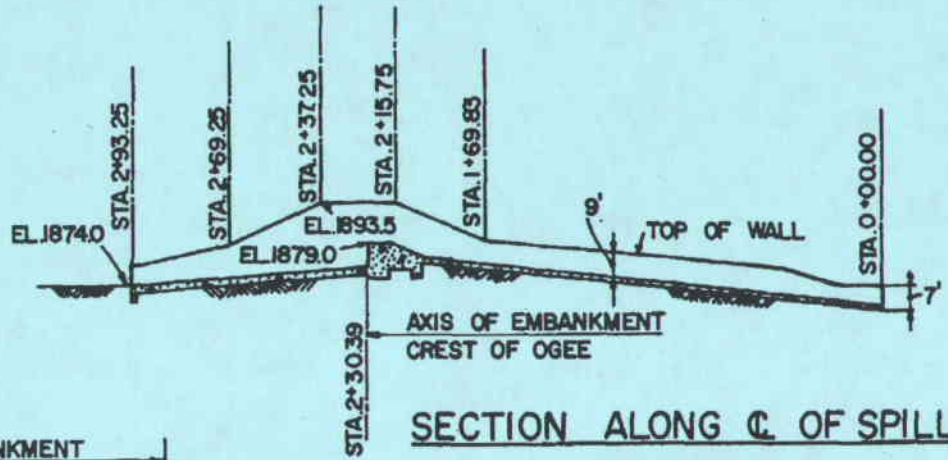


PLAN

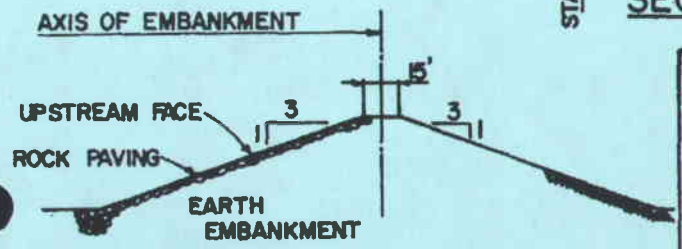


TYPICAL SECTION THROUGH SPILLWAY AND INLET STRUCTURE

LOS ANGELES COUNTY



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SNOVER CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-P-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-Q-1

SYCAMORE WASH CHANNEL

Construction Data

Contract No: Force Account

Start: 27 September 1935
Finish: 29 September 1936 [ERA]
18 November 1937 Definite Project

Plans: D.O. Series 33/1-11, 34/1-6
Folio Title: SYCAMORE WASH CHANNEL

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 21 October 1936 [ERA]
14 December 1937 Definite Project

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

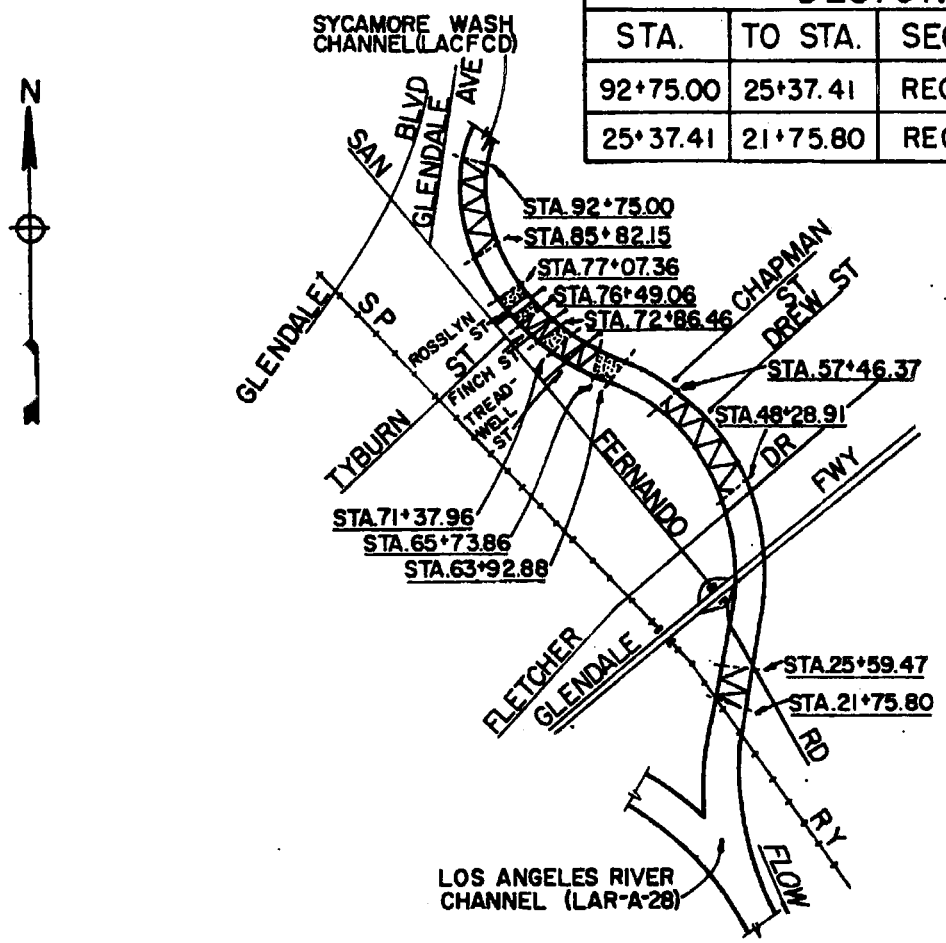
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Rosslyn St	0	2	City of Glendale

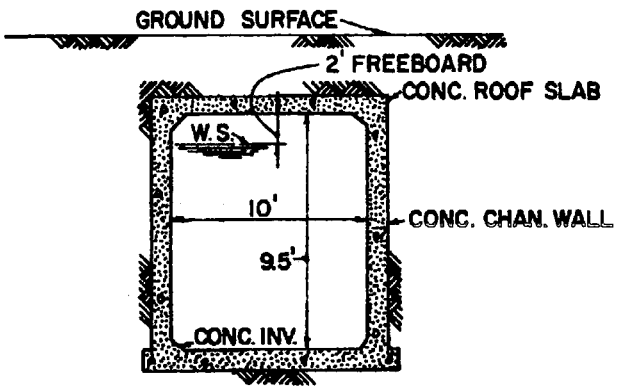
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Concrete channel roof slab	Public Utility
Fencing	
Rights-of-way	

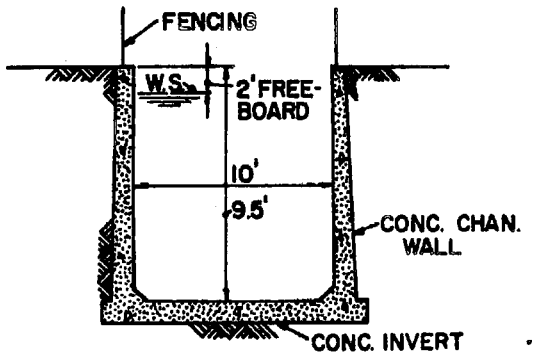
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
92+75.00	25+37.41	RECT.	21.7-27.3	2,060
25+37.41	21+75.80	RECT.	22.7-28.7	2,080





TYPICAL COVERED SECTION
AS NOTED



TYPICAL OPEN SECTION
AS NOTED

LEGEND

- OPEN SECTION
- COVERED SECTION
- EXISTING STRUCTURE
- STREET BRIDGE
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SYCAMORE WASH CHANNEL

GLENDALE AVE TO LOS ANGELES RIVER

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-Q-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-R-1

TUJUNGA WASH CHANNEL
Magnolia Blvd To Los Angeles River

Construction Data

Contract No:	W-ENG-2411	Start:	5 May 1949
	Bressi and Bevanda Const, Inc	Finish:	May 1950
Specifications:	CIVENG 49-7		
Plans:	D.O. Series 414/1-118		
Folio Title:	TUJUNGA WASH CHANNEL IMPROVEMENT Los Angeles River to Magnolia Blvd		

Local Assurances
Resolution Dated: 22 August 1944
Operation and Maintenance Transferred to: LACFCD, 23 May 1950

Stormflow Data
Gaging Station Location: downstream of Moorpark St (abandoned)

Access Ramps
To Invert: from right berm at Moorpark St (sta 30+73)

To Right Berm: Riverside Dr, Whitsett Ave, Moorpark St
To Left Berm: Whitsett Ave, Riverside Dr, Laurel Canyon Blvd, Moorpark St

Bridges

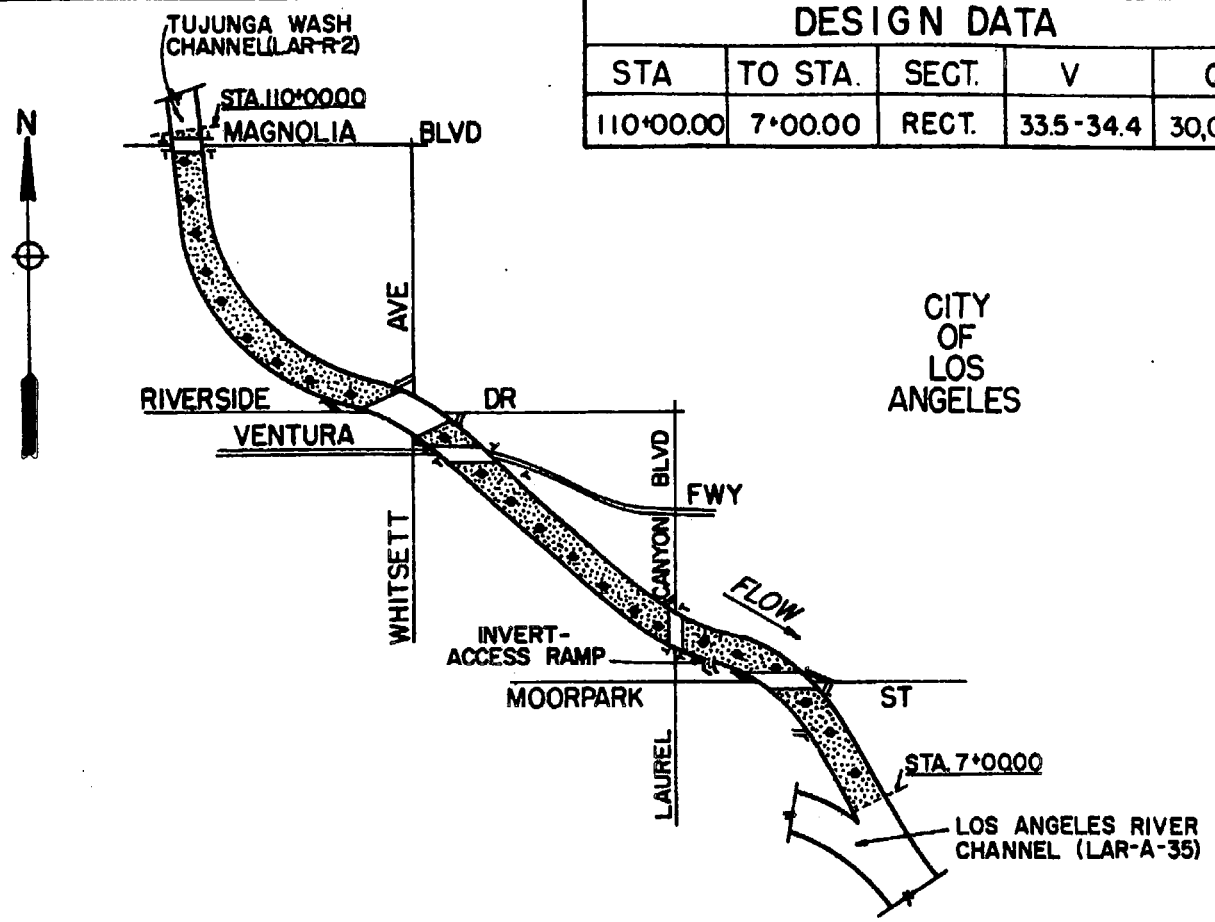
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Magnolia Blvd	0	2	City of Los Angeles
Riverside Dr	0	2	City of Los Angeles
Ventura Fwy	0	0	State of California
Laurel Canyon Blvd	0	2	City of Los Angeles
Moorpark St	0	2	City of Los Angeles

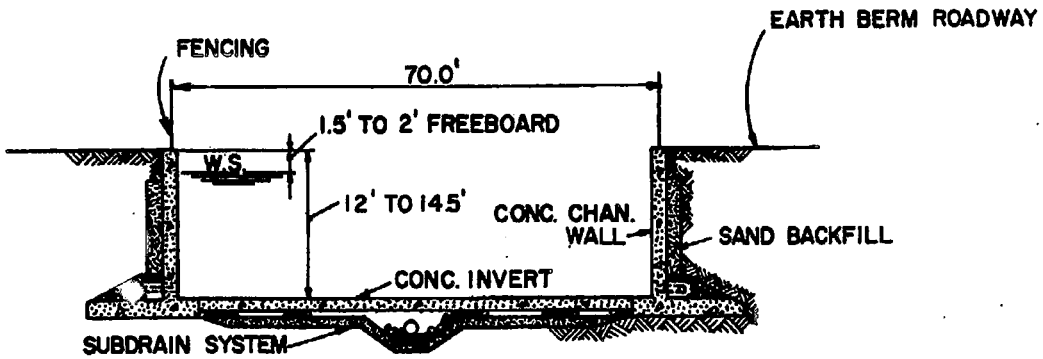
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Concrete invert-access ramp
Concrete channel invert	Earth berm-access ramp
Concrete channel walls	Subdrain manhole
Subdrain system	Side drain
Fencing	Bridge
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA	TO STA.	SECT.	V	Q
110+00.00	7+00.00	RECT.	33.5-34.4	30,000





TYPICAL OPEN SECTION

STA. 110+00.00 TO STA. 7+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- SUBDRAIN MANHOLE
- ----- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

TUJUNGA WASH CHANNEL

MAGNOLIA BLVD TO L.A. RIVER

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

LAR-R-1

DATA. SHEET
LAR-R-2

TUJUNGA WASH CHANNEL
Vanowen St to Magnolia Blvd

Construction Data

Contract No:	DA 70	Start:	31 October 949
	Bressi and Bevanda Const, Inc	Finish:	3 January 1952
Specifications:	CIVENG 50-7		
Plans:	D.O. Series 413/1-121		
Folio Title:	TUJUNGA WASH CHANNEL IMPROVEMENT Magnolia Blvd to Vanowen St		

Local Assurances
Resolution Dated: 22 August 1944
Operation and Maintenance Transferred to: LACFCD, 7 February 1952

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none

To Right Berm:	Vanowen St, Fulton Ave, Oxnard St, Burbank Blvd, Coldwater Canyon Ave, Chandler Blvd
To Left Berm:	Vanowen St, Victory Blvd, Oxnard St, Coldwater Canyon Ave, Burbank Blvd, Chandler Blvd

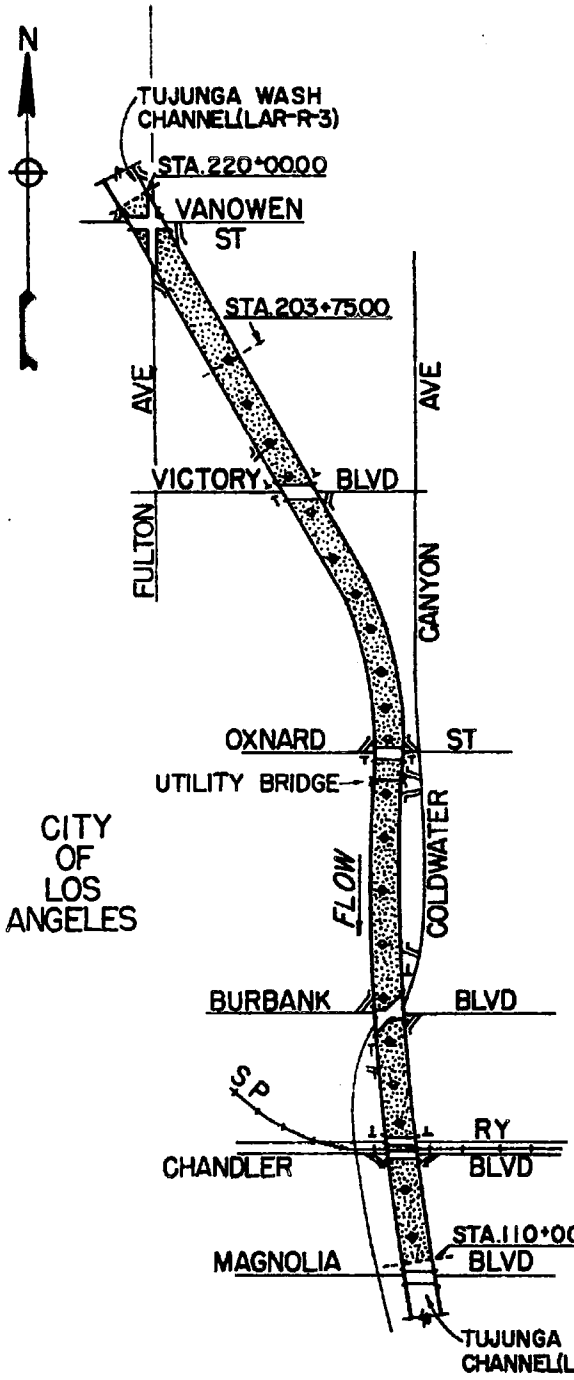
Bridges

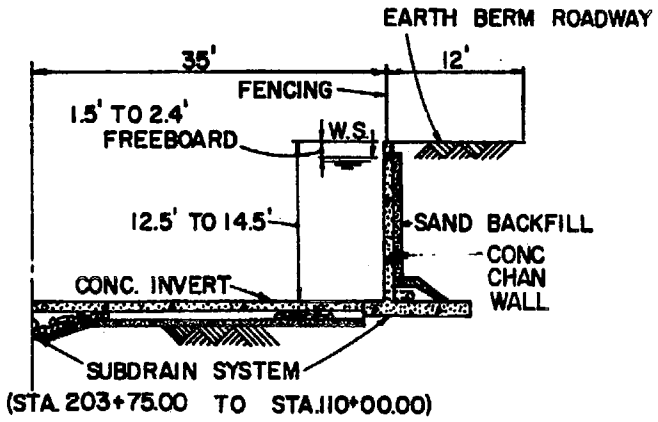
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Vanowen St and Fulton St	0	2	City of Los Angeles
Victory Blvd	0	2	City of Los Angeles
Oxnard St	0	2	City of Los Angeles
Sta 155+60	0	2	City of Los Angeles (utility crossing)
Burbank Blvd	0	2	City of Los Angeles
Chandler Blvd and S.P. Ry	0	2	City of Los Angeles and S.P.R.R.

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Subdrain system	Public utility
Fencing	
Rights-of-way	

DESIGN DATA				
STA.	TO STA	SECT.	V	Q
222+00.00	123+00.00	RECT.	34.2-38.7	29,000
123+00.00	110+00.00	RECT.	33.5-34.2	30,000





TYPICAL OPEN SECTION
STA.222+00.00 TO STA.110+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- SUBDRAIN MANHOLE
- ----- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

TUJUNGA WASH CHANNEL

VANOWEN ST TO MAGNOLIA BLVD

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-R-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-R-3

TUJUNGA WASH CHANNEL
Beachy Ave to Vanowen St

Construction Data

Contract No:	ENG 322	Start:	19 July 1950
	Bressi and Bevanda Constr, Inc	Finish:	29 November 1951
Specifications:	CIVENG 50-34		
Plans:	D.O. Series 412/1-102		
Folio Title:	TUJUNGA WASH CHANNEL IMPROVEMENT Vanowen St to Beachy Ave		

Local Assurances

Resolution Dated: 22 August 1944
Operation and Maintenance Transferred to: LACFCD, 12 December 1951

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use LAR-R-4

To Right Berm:	Nagle Ave, Roscoe Blvd, Cantara St, Nagle Ave, Saticoy St, Sherman Way
To Left Berm:	Roscoe Blvd, Cantara St. Saticoy St, Sherman Way

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Roscoe Blvd	0	2	City of Los Angeles
Cantara St	0	2	City of Los Angeles
Saticoy St	0	2	City of Los Angeles
S.P. Ry	0	2	S.P.R.R.
Sherman Way	0	2	City of Los Angeles

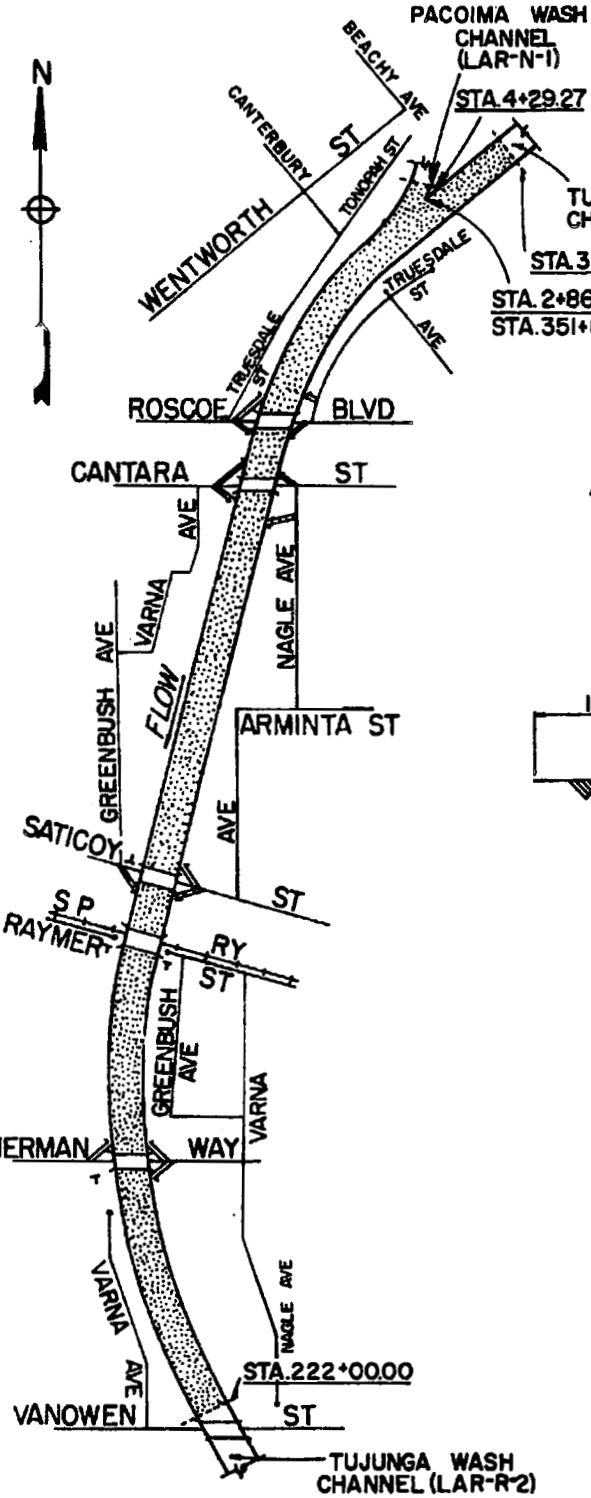
Reporting Features

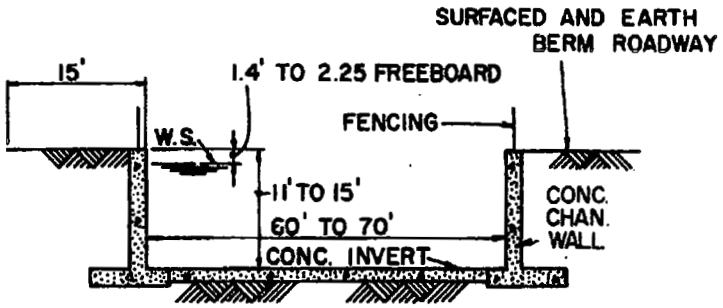
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Fencing	Concrete confluence section
Rights-of-way	Public utility

CORPS OF ENGINEERS

LAR-R-3
DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
362+00.00	351+88.66	RECT.	38.6	22,000
351+88.66	222+00.00	RECT.	38.6-38.7	29,000





TYPICAL OPEN SECTION
STA. 362+00.00 TO STA. 222+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

TUJUNGA WASH CHANNEL

BEACHY AVE TO VANOWEN ST

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-R-3

DATA SHEET
LAR-R-4

TUJUNGA WASH CHANNEL
Hansen Dam to Beachy Ave

Construction Data

Contract No:	DA 1042	Start: 6 March 1951
	Bressi and Bevanda	Finish: 12 February 1952
Specifications:	CIVENG 51-15	
Plans:	D.O. Series 408/1-115	
Folio Title:	TUJUNGA WASH CHANNEL IMPROVEMENT Beachy Ave to Hansen Dam	

Local Assurances

Resolution Dated: 22 August 1944
Operation and Maintenance Transferred to: LACFCD, 18 April 1952

Stormflow Data

Gaging Station Location: upstream of Glenoaks Blvd (sta 481+25)
Type: Recording (USGS--11090700)
Staff Gage Reading at One-third Capacity: 5.8 ft an gage (7,333 cfs)

Access Ramps

To Invert: on left side at Glenoaks Blvd (sta 478+09)

To Right Berm:	Laurel Canyon Blvd, Arleta Ave
To Left Berm:	Glenoaks Blvd, Laurel Canyon Blvd, Arleta Ave

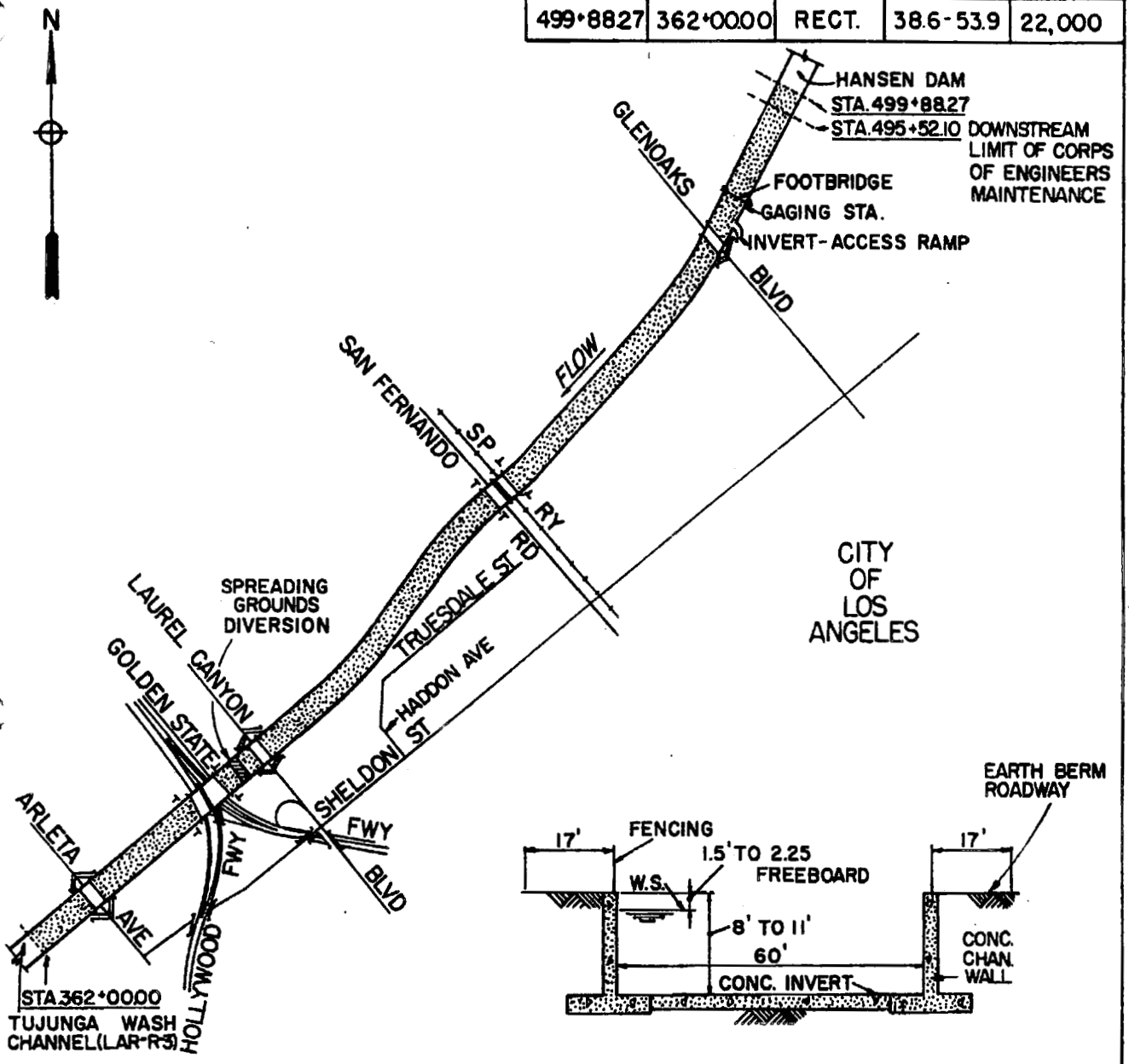
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Glenoaks Blvd	0	2	City of Los Angeles
S.P. Ry	0	2	S.P.R.R.
San Fernando Rd	0	2	City of Los Angeles
Laurel Canyon Blvd	0	2	City of Los Angeles
Golden State Fwy	0	0	State of California
Arleta Ave	0	0	City of Los Angeles

Reporting Features

Along Channel	At a Channel Station
Earth and surfaced berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Fencing	Gaging station
Rights-of-way	Spreading grounds diversion
Bridge	
Public utility	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
499+8827	362+0000	RECT.	38.6-53.9	22,000



TYPICAL OPEN SECTION
STA. 499+88.27 TO STA. 362+0000

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA
TUJUNGA WASH CHANNEL
HANSEN DAM TO BEACHY AVE
SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-R-4

DATA SHEET
LAR-S-1

VERDUGO WASH CHANNEL
Glenoaks Blvd to San Fernando Rd

Construction Data

Contract No: Force Account
Start: 1936
Finish: September 1937

Plans:
Folio Title: VERDUGO WASH IMPROVEMENT
Concord St to Glenoaks

Local Assurances

Resolution Dated: 1 December 1937
Operation and Maintenance Transferred to: LACFCD, 15 September 1937 [ERA]

Stormflow Data

Gaging Station Location: near Estelle Ave (sta 13+03±)
Type: Recording (LACFCD--F252-R)
Staff Gage Reading at One-third Capacity: 7.7 ft on gage (14,300 cfs)

Access Ramps

To Invert: none; use LAR-S-3

To Right Berm: none
To Left Berm: none

Bridges

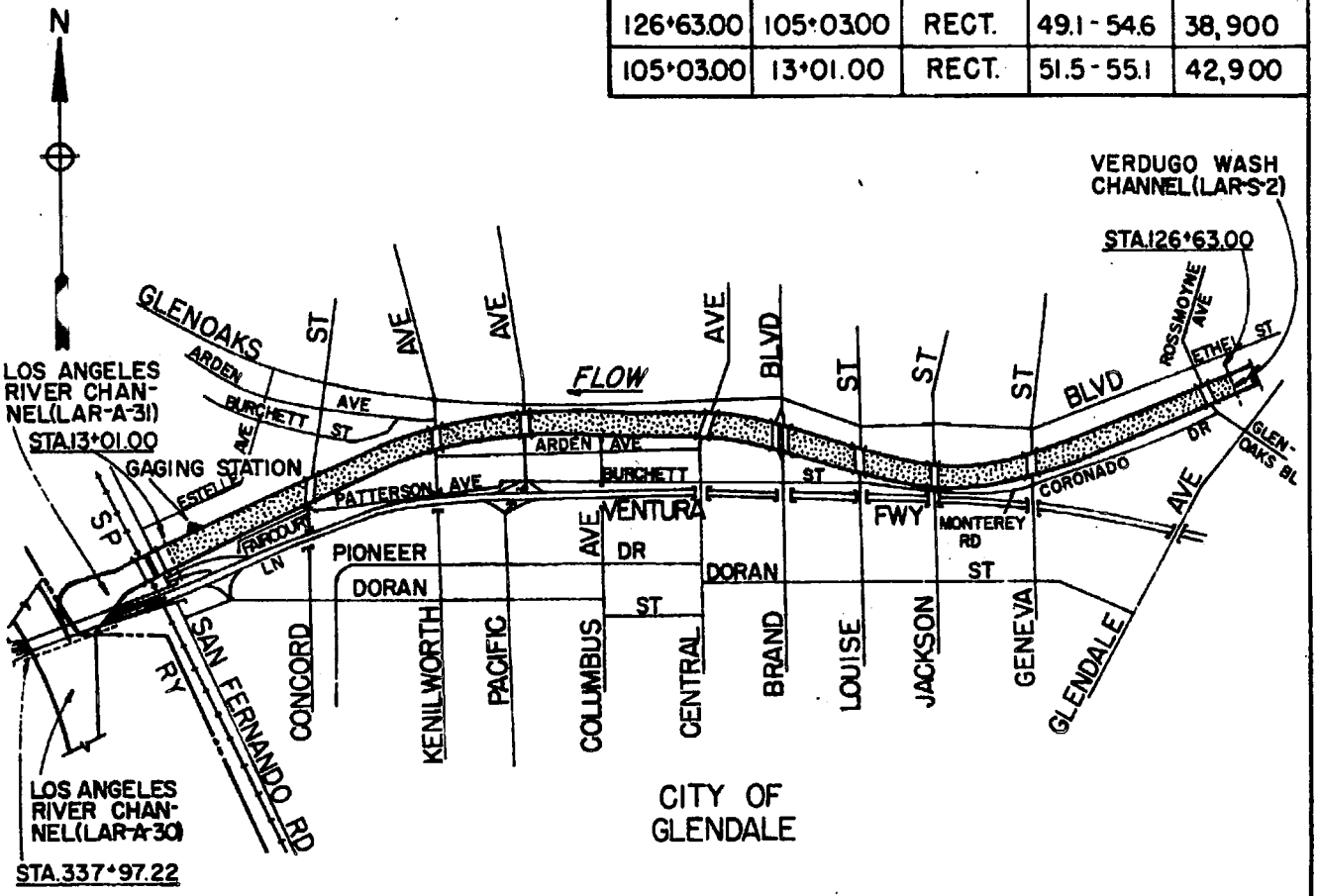
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Glenoaks Blvd	0	2	City of Glendale
Geneva St	0	2	City of Glendale
Jackson St	0	2	City of Glendale
Louise St	0	2	City of Glendale
Brand Blvd	0	2	City of Glendale
Central Ave	0	2	City of Glendale
Pacific Ave	0	2	City of Glendale
Kenilworth Ave	0	2	City of Glendale
Concord St	0	2	City of Glendale

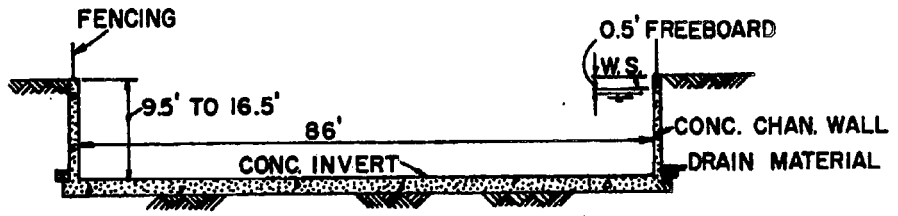
Reporting Features

Along Channel	At a Channel Station
Concrete channel walls	Side drain
Concrete channel invert	Gaging station
Fencing	Concrete overflow spillway
Rights-of-way	Public utility

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
126+63.00	105+03.00	RECT.	49.1 - 54.6	38,900
105+03.00	13+01.00	RECT.	51.5 - 55.1	42,900





TYPICAL OPEN SECTION
STA.126+63.00 TO STA.13+01.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

VERDUGO WASH CHANNEL
GLENOAKS BLVD TO SAN FERNANDO RD

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-S-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-S-2

VERDUGO WASH CHANNEL
San Gabriel Ave to Glenoaks Blvd

Construction Data

Contract No: Force Account

Start: 1935
Finish: September 1937

Plans:

Folio Title: VERDUGO WASH IMPROVEMENT

Local Assurances

Resolution Dated: 1 December 1936
Operation and Maintenance Transferred to: LACFCD, 1 September 1938 [ERA]

Stormflow Data

Gaging Station: none

Access Ramps

To Invert: none; use LAR-S-3

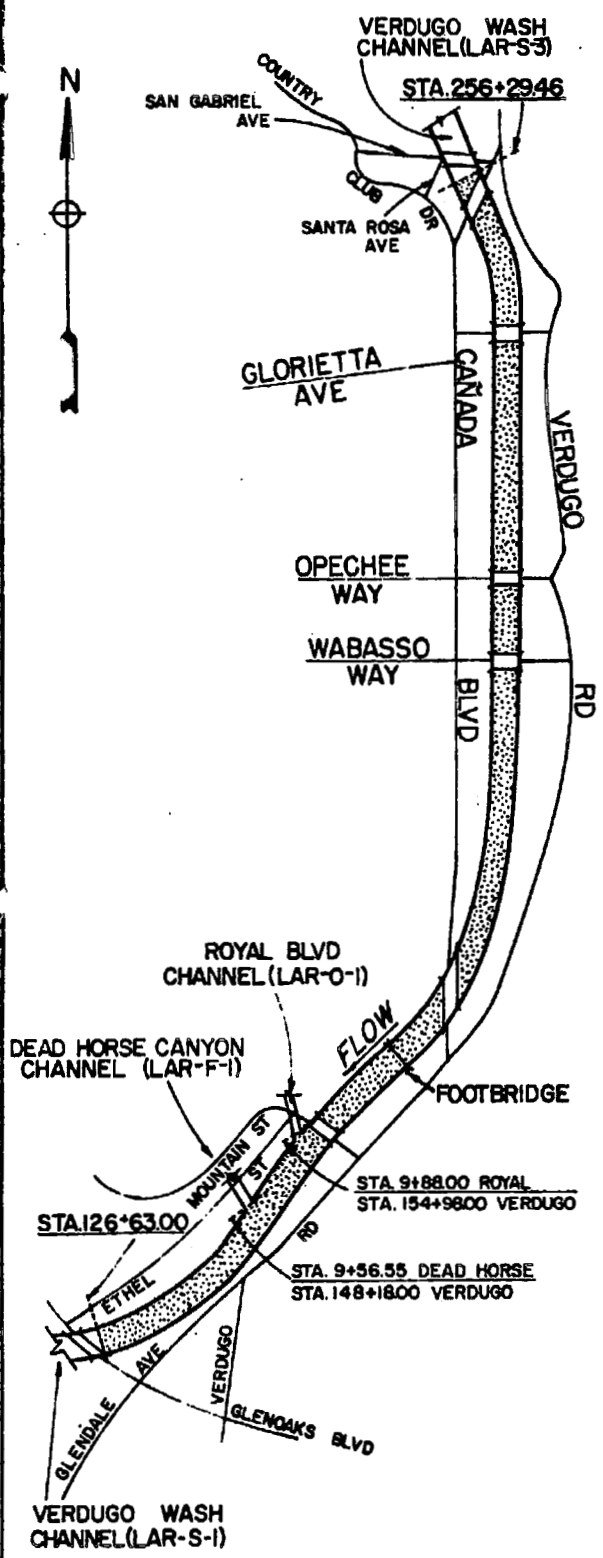
To Right Berm: none
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Canada Blvd	0	2	State of California
Glorietta Ave	0	2	City of Glendale
Opechee Way	2	2	City of Glendale
Wabasso Way	2	2	City of Glendale
Canada Blvd	2	2	State of California
Sta 193+02	0	2	City of Glendale (footbridge)
Mountain Ave	2	2	City of Glendale

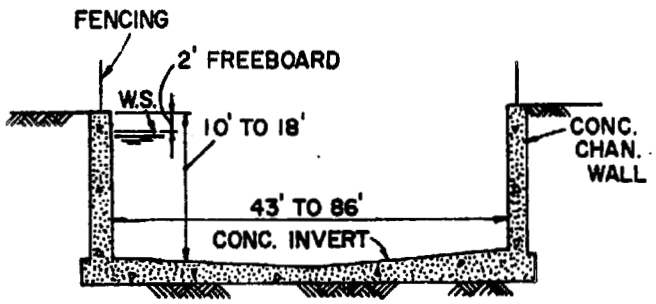
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Fencing	Side overflow spillway
Rights-of-way	Public utility



DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
256+29.46	216+61.97	RECT.	59.0-64.9	34,000
216+61.97	201+51.00	RECT.	55.1 - 59.0	36,000
201+51.00	183+42.00	RECT.	53.7 - 55.1	36,100
183+42.00	176+94.00	RECT.	53.7 - 53.9	36,800
176+94.00	156+47.00	RECT.	52.6-53.9	37,350
156+47.00	148+53.53	RECT.	51.0-52.6	37,600
148+53.50	126+63.00	RECT.	49.0-51.0	38,900

CITY OF GLENDALE



TYPICAL OPEN SECTION
STA.256+29.46 TO STA.126+63.00

LEGEND
- OPEN SECTION
- STREET BRIDGE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

VERDUGO WASH CHANNEL
SAN GABRIEL AVE TO GLENOAKS BLVD

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-S-2

DATA SHEET
LAR-S-3

VERDUGO WASH CHANNEL
Debris Basin to San Gabriel Ave

Construction Data

Contract No:	DA 67-C-0061	Start: 2 June 1967
	MacDonald and Kruse, Inc	Finish: 31 January 1968
Specifications:	CIVENG 67-B-0026	
Plans:	D.O. Series 216/26-54	
Folio Title:	VERDUGO WASH CHANNEL IMPROVEMENT	
	Verdugo Wash Channel	

Local Assurances

Resolution Dated: 8 February 1968
Operation and Maintenance Transferred to: LACFCD, 13 July 1970

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: at intersection of San Gabriel Ave and Santa Rosa Ave (sta 258+71)

To Right Berm: none
To Left Berm: none

Bridges

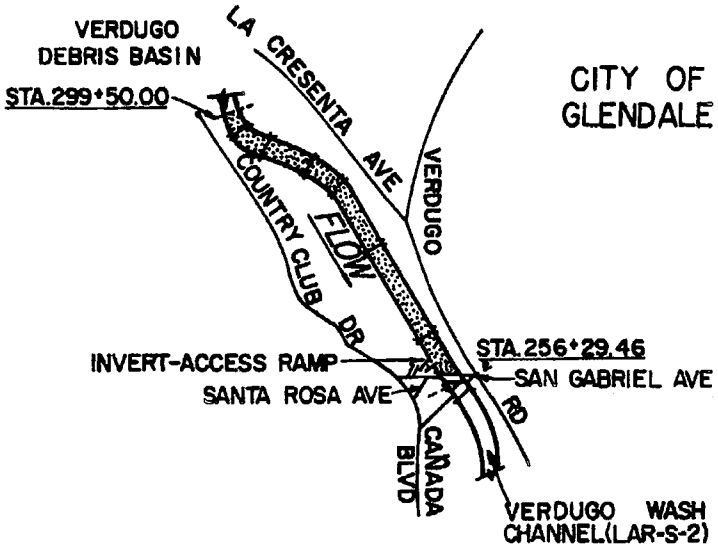
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta. 299+20	0	0	City of Glendale
Sta 293+94	0	0	City of Glendale
Sta 281+88	0	0	City of Glendale
Sta 279+73	0	0	City of Glendale
Sta 270+75	0	0	City of Glendale
Sta 259+93	0	0	City of Glendale
San Gabriel Ave	0	0	City of Glendale

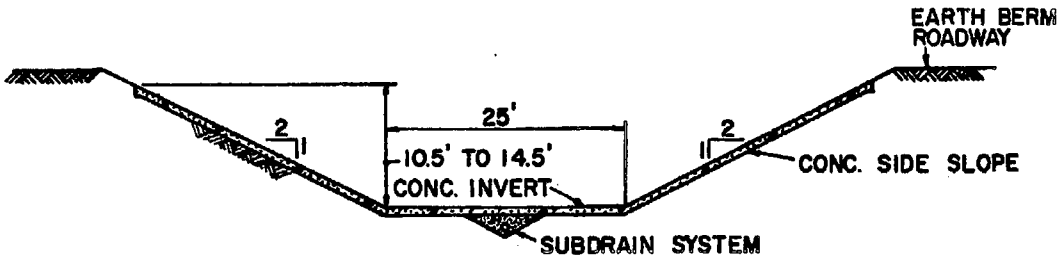
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel side slopes	Side overflow spillway
Surfaced and earth berm roadway	Concrete invert-access ramp
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
299+5000	256+29.46	TRAP.	7.6-51.4	18,000





TYPICAL OPEN SECTION

STA. 299+50.00 TO STA 256+29.46

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- ------ CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

VERDUGO WASH CHANNEL

DEBRIS BASIN TO SAN GABRIEL AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000 5000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA LAR-S-3

DATA SHEET
LAR-T-1

WILSON CANYON CHANNEL
Astoria St to Pacoima Wash

Construction Data

Contract No:	DA 61-97	Start: 23 January 1961
	Kirst Const Co	Finish: 24 January 1962
Specifications:	CIVENG 61-10	
Plans:	D.O. Series 144/54-92	
Folio Title:	WILSON CANYON AND MANSFIELD STREET CHANNELS Astoria St to Pacoima Wash	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 4 June 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm:	Astoria St, Newton St, from Pacoima Wash
To Left Berm:	Astoria St, Dronfield Ave, from Pacoima Wash

Bridges

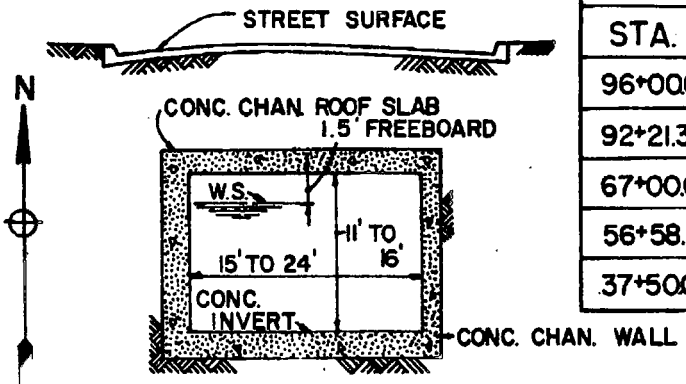
None

Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Channel inspection manhole
Concrete channel roof slab	Concrete covered confluence section
Surfaced berm roadway	Surfaced berm-access ramp
Fencing	Public utility
Rights-of-way	

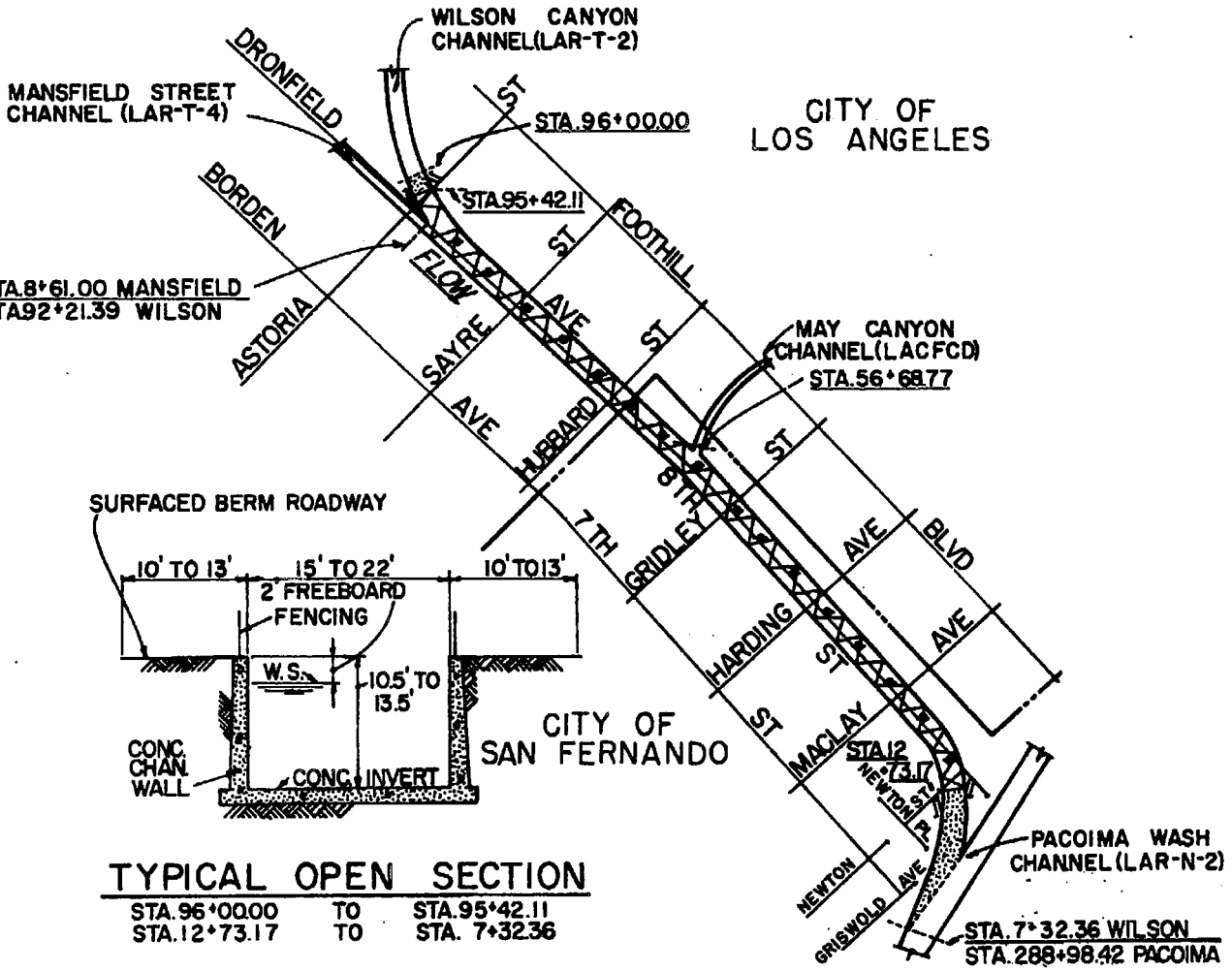
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
96+00.00	92+21.39	RECT.	40.3-44.3	5,400
92+21.39	67+00.00	RECT.	34.4-34.8	6,100
67+00.00	56+58.18	RECT.	34.8-39.6	6,400
56+58.18	37+50.00	RECT.	39.6-41.0	7,000
37+50.00	7+32.36	RECT.	29.2-39.5	7,500



TYPICAL COVERED SECTION

STA. 95+42.11 TO STA. 12+73.17



TYPICAL OPEN SECTION

STA. 96+00.00 TO STA. 95+42.11
STA. 12+73.17 TO STA. 7+32.36

LEGEND

- OPEN SECTION
- COVERED SECTION
- TYPICAL BERM-ACCESS RAMP
- INSPECTION MANHOLE
- ------ CONST. PROJECT LIMIT
- —— COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WILSON CANYON CHANNEL

ASTORIA ST TO PACOIMA WASH

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
LAR-T-2

WILSON CANYON CHANNEL
Debris Basin to Astoria St

Construction Data

Contract No:	DA 63-87	Start:	19 January 1962
	Oberg Const Corp	Finish:	29 November 1962
Specifications:	CIVENG 62-3		
Plans:	D.O. Series 194/94-170		
Folio Title:	WILSON CANYON AND MANSFIELD STREET CHANNELS Debris Basins to Astoria St		

Local Assurances
Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 4 June 1963

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none

To Right Berm: sta 162+70, sta 159+22, Olive View Dr, Tyler St, Polk St, Foothill Blvd
To Left Berm: sta 162+70, sta 159+22, Olive View Dr, Tyler St, Polk St, Foothill Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 162+70	0	0	Private bridge
Sta 159+22	0	0	Private bridge
Sta 153+00	0	0	Private footbridge
Olive View Dr	0	0	City of Los Angeles
Tyler St	0	0	City of Los Angeles
Foothill Blvd	0	0	City of Los Angeles

Reporting Features

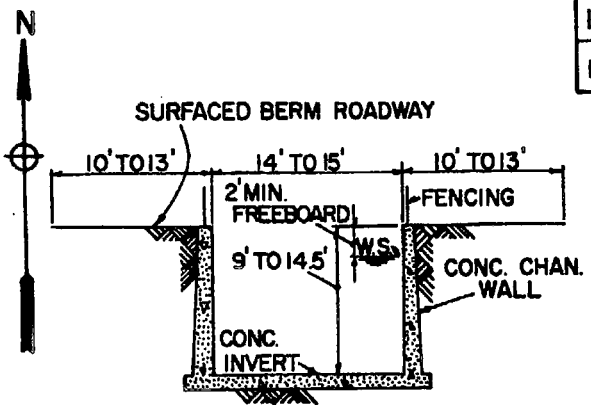
Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Surfaced berm-access ramp
Concrete channel roof slab	Bridge
Surfaced berm roadway	Public utility
Fencing	
Rights-of-way	

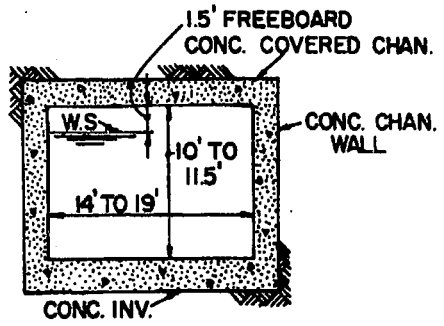
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
163+37.16	123+00.00	RECT.	41.0-50.9	4,300
123+00.00	96+00.00	RECT.	40.9-44.2	5,000



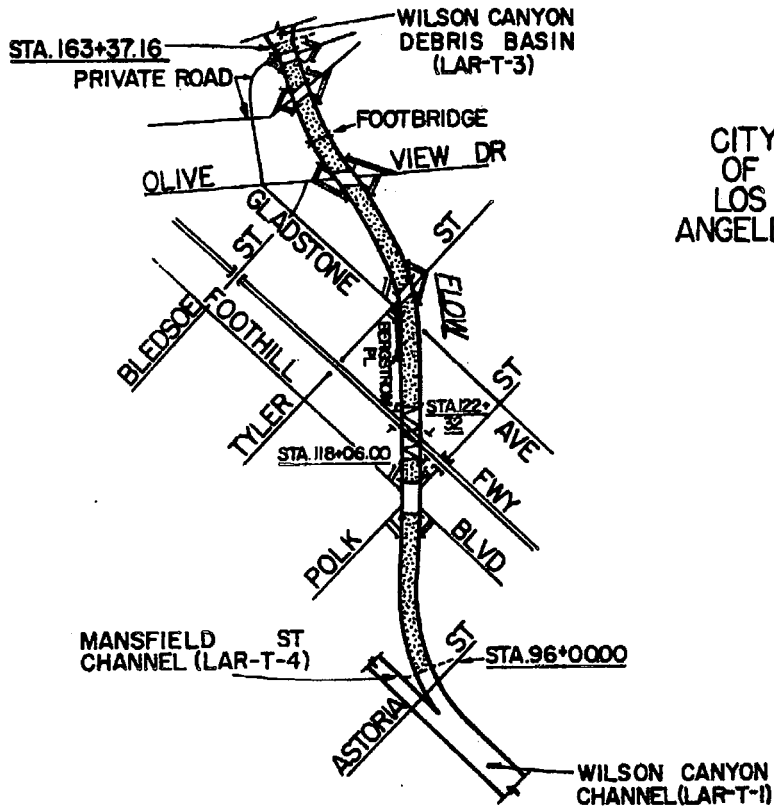


TYPICAL OPEN SECTION

STA.163+37.16 TO STA.122+32.00
STA.118+06.00 TO STA. 96+00.00

TYPICAL COVERED SECTION

STA.122+32.00 TO STA.118+06.00



CITY OF LOS ANGELES

LEGEND

- OPEN SECTION
- COVERED SECTION
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- STREET BRIDGE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WILSON CANYON CHANNEL DEBRIS BASIN TO ASTORIA ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
LAR-T-3

WILSON CANYON DEBRIS BASIN

Construction Data

Contract No:	DA 63-87	Start:	19 January 1962
	Oberg Const Corp	Finish:	29 November 1962
Specifications:	CIVENG 62-3		
Plans:	D.O. Series 194/94-170		
Folio Title:	WILSON CANYON AND MANSFIELD ST CHANNELS Wilson Canyon Debris Basin		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 4 June 1963

Stormflow Data

Staff Gages: 13
Basin Staff Gage Elevation at One-third Design Discharge:

Access Roads

To Embankment: from Saranac St to May Canyon Rd
To Basin: from top of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	666 ft	Length	515 ft
Crest Width	20 ft	Crest Width	60 ft
Crest Elevation	1543 ft msl	Crest Elevation	1526 ft msl
Side Slope	upstream 1 on 2.5 downstream 1 on 2	Design Capacity	9,600 cfs
Pool Drain:		Intake Tower:	
Length	326 ft	Top Elevation	1531 ft msl
Diameter	36 in	Height above Invert	39.5 ft
Design Capacity	180 cfs	Inside Dimensions	4 ft x 4 ft

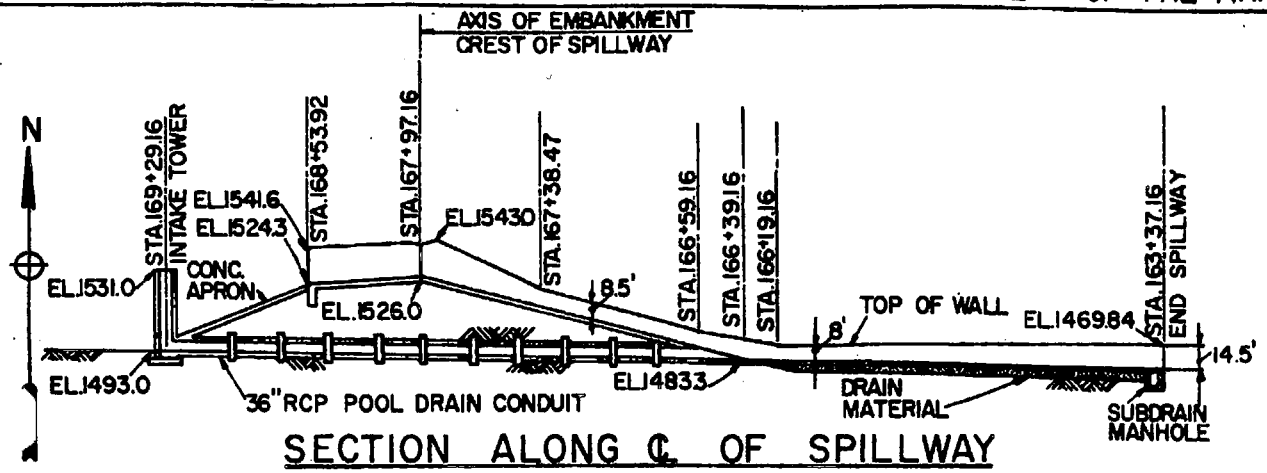
Drainage Area: 0.28 sq mi
Debris Basin Capacity: 300,000 cu yds
Maximum Allowable Accumulation of Debris: 75,000 cu yds

REPORTING FEATURES

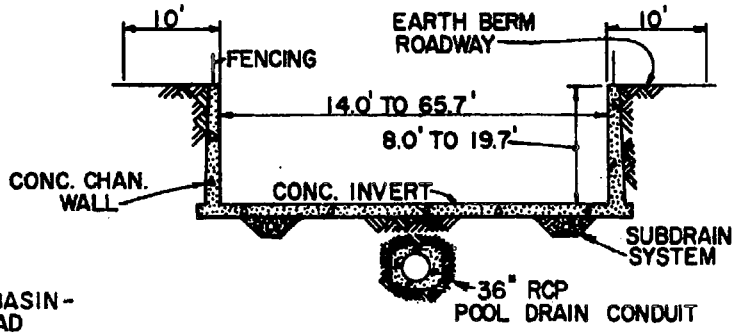
Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Concrete spillway apron
Earth berm roadway
Subdrain system
Subdrain manhole
Fencing

Outlet Works
Intake conduit
Concrete pool drain conduit (ungated)

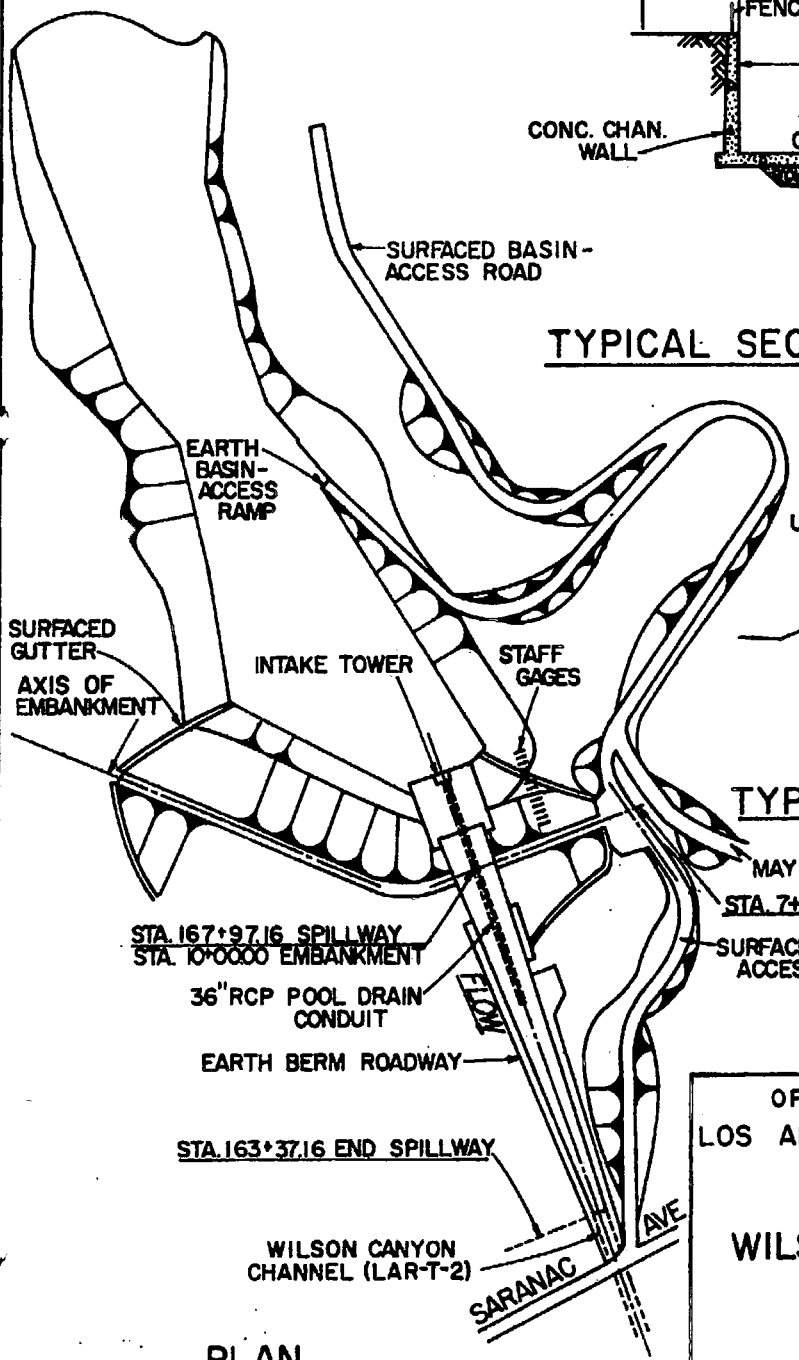
Embankment and Basin
Earth embankment
Earth basin-access ramp
Surfaced embankment-access road
Subdrain system
Debris storage capacity
Staff gages
Fencing
Rights-of-way



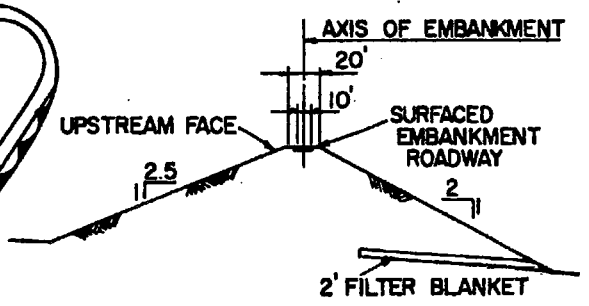
SECTION ALONG ℄ OF SPILLWAY



TYPICAL SECTION THROUGH SPILLWAY



PLAN



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WILSON CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-T-3

DATA SHEET MANSFIELD ST CHANNEL
LAR-T-4

Construction Data

Contract No:	DA 63-87	Start: 19 January 1962
	Oberg Const Corp	Finish: 29 November 1962
Specifications:	CIVENG 62-3	
Plans:	D.O. Series 194/94-170	
Folio Title:	WILSON CANYON AND MANSFIELD STREET CHANNELS	
	Mansfield St Channels	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 4 June 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm:	Foothill Blvd, Roxford St, Larkspur St
To Left Berm:	Larkspur St, Dronfield Ave

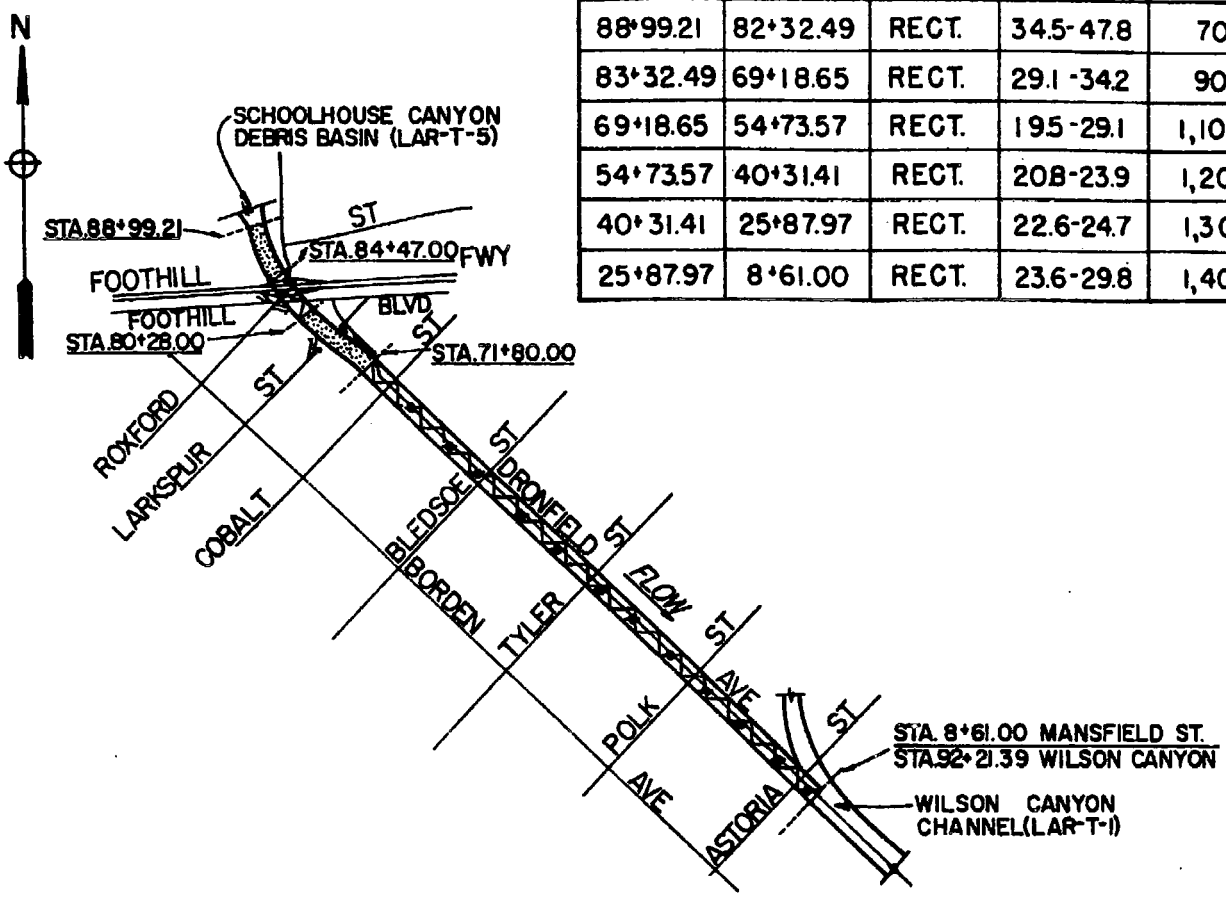
Bridges

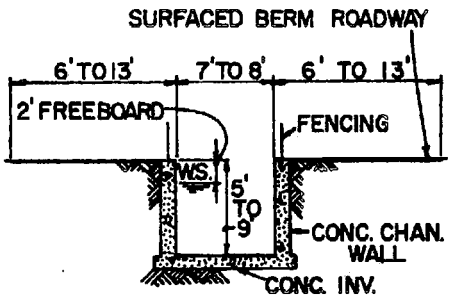
none

Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Channel Inspection manhole
Concrete channel walls	Surfaced berm-access ramp
Concrete channel roof slab	Side drain
Surfaced berm roadway	Public utility
Fencing	
Rights-of-way	

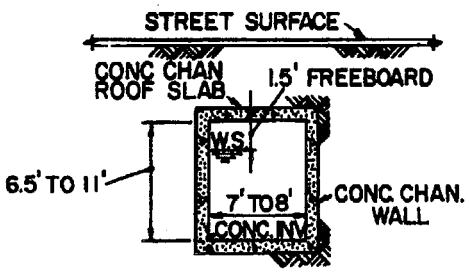
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
88+99.21	82+32.49	RECT.	34.5-47.8	700
83+32.49	69+18.65	RECT.	29.1 -34.2	900
69+18.65	54+73.57	RECT.	19.5-29.1	1,100
54+73.57	40+31.41	RECT.	20.8-23.9	1,200
40+31.41	25+87.97	RECT.	22.6-24.7	1,300
25+87.97	8+61.00	RECT.	23.6-29.8	1,400





TYPICAL OPEN SECTION

STA.88+99.21 TO STA.84+47.00
STA.80+28.00 TO STA.71+80.00



TYPICAL COVERED SECTION

STA. 84+47.00 TO STA.80+28.00
STA. 71+80.00 TO STA. 8+61.00

LEGEND

- OPEN SECTION
- COVERED SECTION
- TYPICAL BERM-ACCESS RAMP
- INSPECTION MANHOLE
- ------ CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

MANSFIELD ST CHANNEL

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-T-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET LAR-T-5 SCHOOLHOUSE CANYON DEBRIS BASIN

Construction Data

Contract No:	DA 63-87	Start: 19 January 1962
	Oberg Const Corp	Finish: 29 November 1962
Specifications:	CIVENG 62-3	
Plans:	D.O. Series 194/94-170	
Folio Title:	WILSON CANYON AND MANSFIELD ST CHANNEL Schoolhouse Canyon Debris Basin	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 4 June 1963

Stormflow Data

Staff Gages: 8
Basin Staff Gage Elevation at One-third Design Discharge: 1480 ft msl

Access Roads

To Embankment: from Roxford St
To Basin: from top of embankment to bottom of basin

Pertinent Design Data

Embankment:

Length	265 ft
Crest Width	20 ft
Crest Elevation	1491 ft msl
Side Slope	upstream 1 on 2 .5 downstream 1 on 2

Spillway:

Length	257 ft
Crest Width	20 ft
Crest Elevation	1478 ft ms
Design Capacity	1,800 cfs

Pool Drain:

Length	263 ft
Diameter	36 in
Design Capacity	205 cfs

Intake Tower:

Top Elevation	1484 ft msl
Height above Invert	24 ft
Inside Dimensions	4 ft x 4 ft

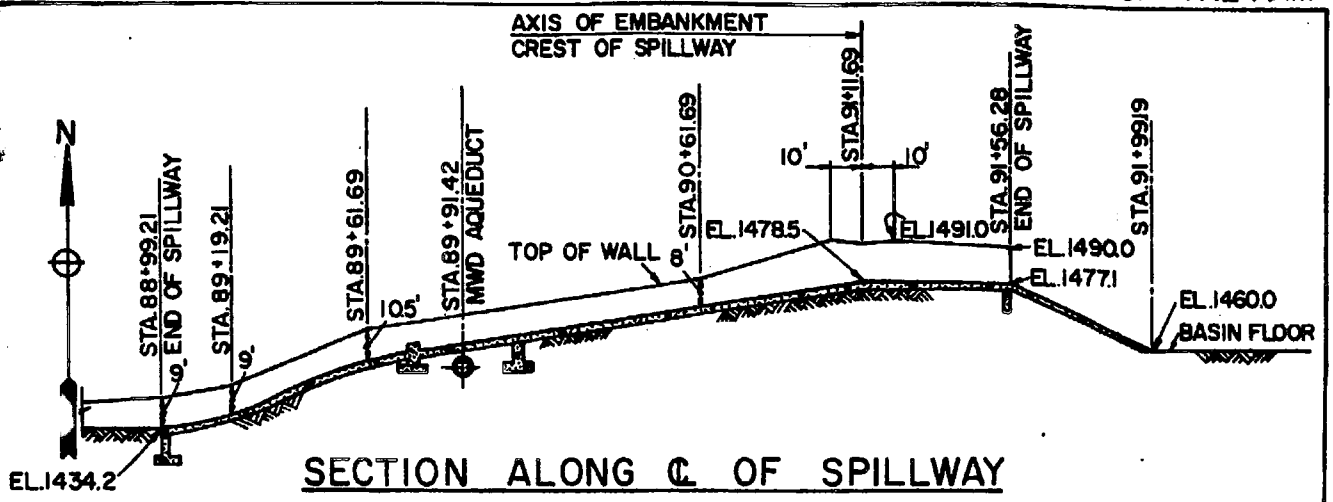
Drainage Area: 0.28 sq mi
Debris Basin Capacity: 60,000 cu yds
Maximum Allowable Accumulation of Debris: 15,000 cu yds

REPORTING FEATURES

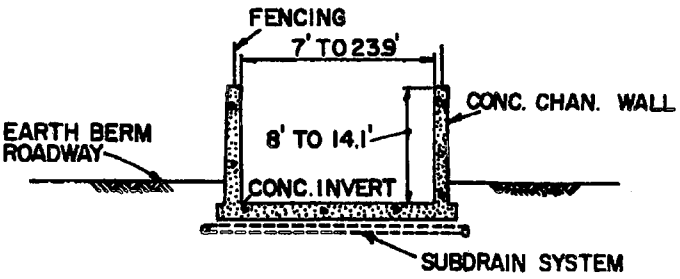
Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Earth berm roadway
Concrete spillway apron
Subdrain system
Fencing

Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

Embankment and Basin
Earth embankment
Surfaced basin-access ramp
Surfaced embankment-access road
Subdrain system
Debris storage capacity
Staff gages
Fencing
Rights-of-way

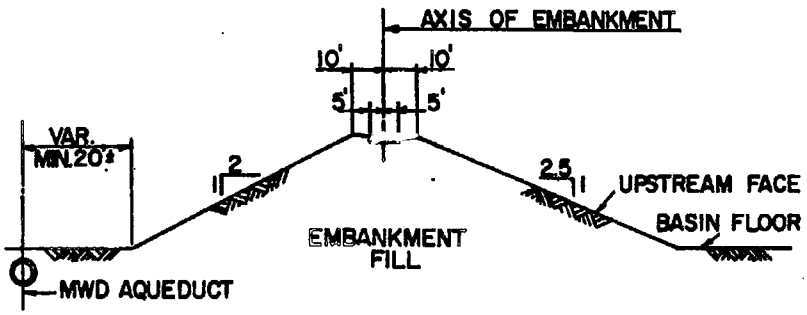


SECTION ALONG ℄ OF SPILLWAY

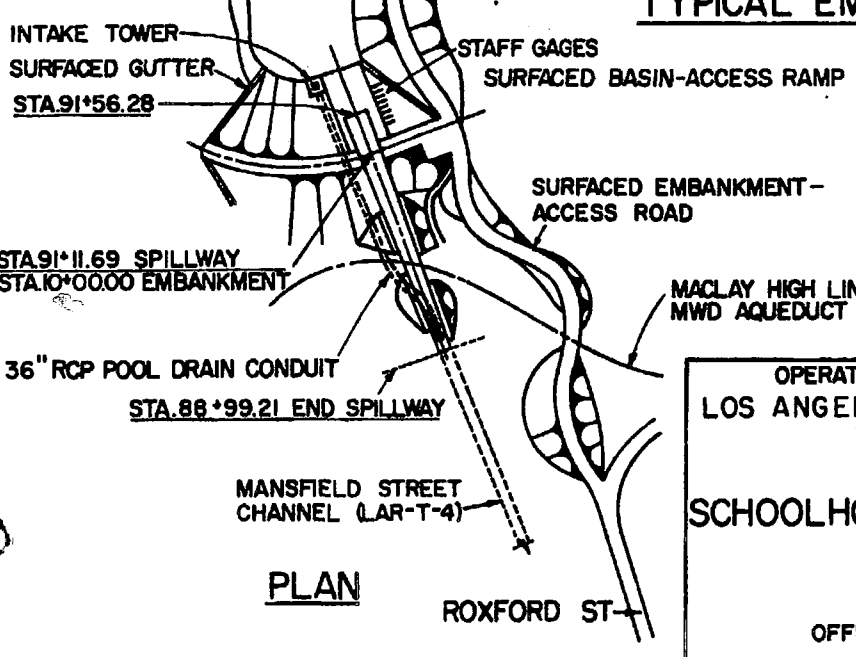


TYPICAL SECTION THROUGH SPILLWAY

CITY OF LOS ANGELES



TYPICAL EMBANKMENT SECTION



PLAN

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SCHOOLHOUSE CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-T-5

DATA SHEET
LAR-U-1

WINERY CANYON CHANNEL

Construction Data

Contract No:	DA 67-C-0061	Start: 2 June 1967
	MacDonald and Kruse, Inc	Finish: 31 January 1968
Specifications:	CIVENG 67-B-0026	
Plans:	D.O. Series 218/30-61	
Folio Title:	WINERY CANYON CHANNEL AND DEBRIS BASIN	
	Winery Canyon Channel	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 13 January 1970

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: Hacienda Dr, El Vago Rd, Olive Ln
To Left Berm: Hacienda Dr, El Vago Rd, Olive Ln

Bridges

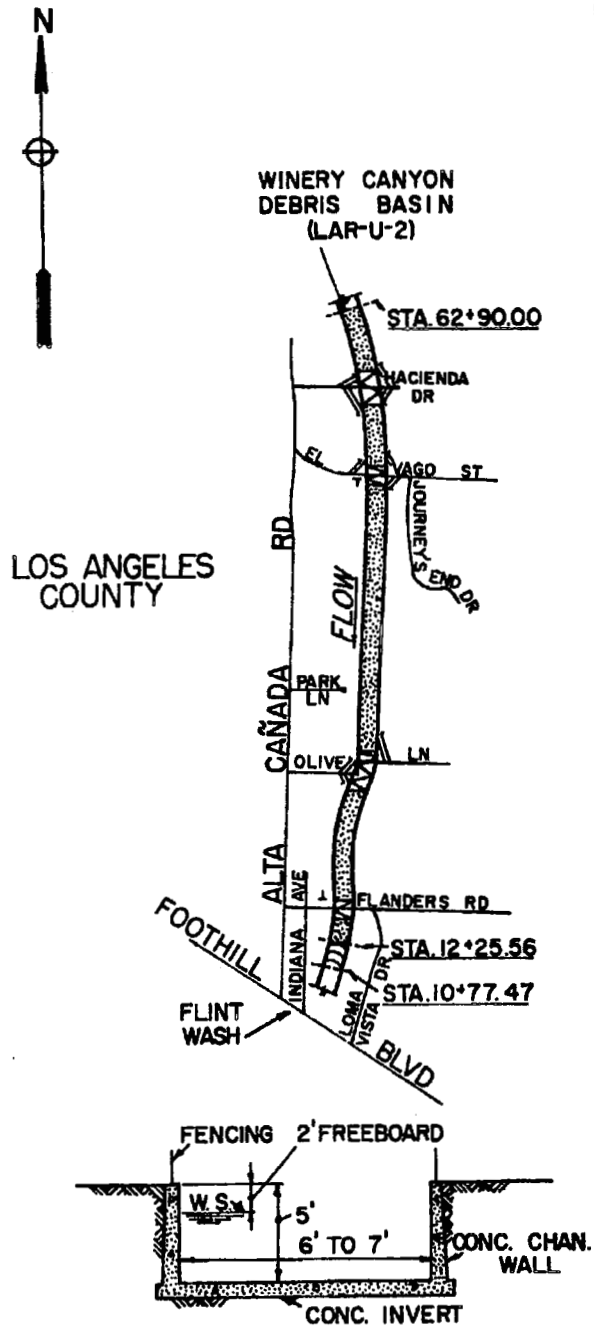
none

Reporting Features

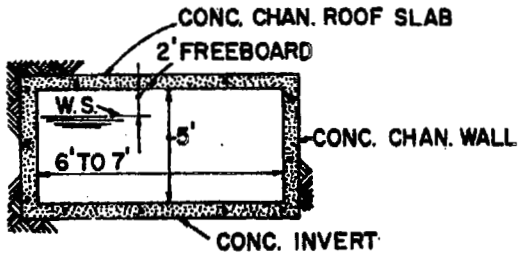
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced and earth berm-access ramp
Reinforced concrete pipe section	Side overflow spillway
Concrete channel invert	Side drain
Concrete channel walls	Public utility
Concrete channel roof slab	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

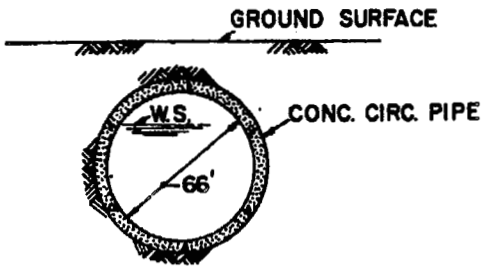
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
62+90.00	50+00.00	RECT.	34.9-35.6	450
50+00.00	39+00.00	RECT.	34.5-40.7	500
39+00.00	28+00.00	RECT.	34.5-38.1	600
28+00.00	16+00.00	RECT.	37.7-40.2	700
16+00.00	12+25.56	RECT.	39.0-41.5	750
12+25.56	10+77.47	CIRC.	40.9	750



TYPICAL OPEN SECTION
STA. 62+90.00 TO STA. 12+25.56



TYPICAL COVERED SECTION
UNDER STREETS



TYPICAL CIRCULAR SECTION
STA. 12+25.56 TO STA. 10+77.47

LEGEND

- OPEN SECTION
- COVERED SECTION
- CIRCULAR SECTION
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- ------ CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WINERY CANYON CHANNEL

SCALE IN FEET

1000 0 1000 2000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-U-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET WINERY CANYON DEBRIS BASIN
LAR-U-2

Construction Data

Contract No:	DA 67-C-0061	Start: 22 June 1967
	MacDonald and Kruse, Inc	Finish: 31 January 1968
Specifications:	CIVENG 67-B-0026	
Plans:	D.O. Series 218/30-61	
Folio Title:	WINERY CANYON CHANNEL AND DEBRIS BASIN	
	Winery Canyon Debris Basin	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 13 January 1970

Stormflow Data

Staff Gages: 7
Basin Staff Gage Elevation at One-third Design Discharge: 1937 ft msl

Access Roads

To Embankment: from El Vago St
To Basin: from top of embankment to bottom of basin and to canyon upstream of basin

Pertinent Design Data

Embankment:

Length	383 ft
Crest Width	20 ft
Crest Elevation	1947 ft msl
Side Slope	1 on 2

Spillway:

Length	232 ft
Crest Width	20 ft
Crest Elevation	1935 ft msl
Design Capacity	1,100 cfs

Pool Drain:

Length	196 ft
Diameter	36 in
Design Capacity	130 cfs

Intake Tower:

Top Elevation	1942 ft msl
Height above Invert	24.4 ft
Inside Dimensions	5 ft diameter

Drainage Area: 0.18 sq mi
Debris Basin Capacity: 30,000 cu. yds
Maximum Allowable Accumulation of Debris: 7500 cu yds

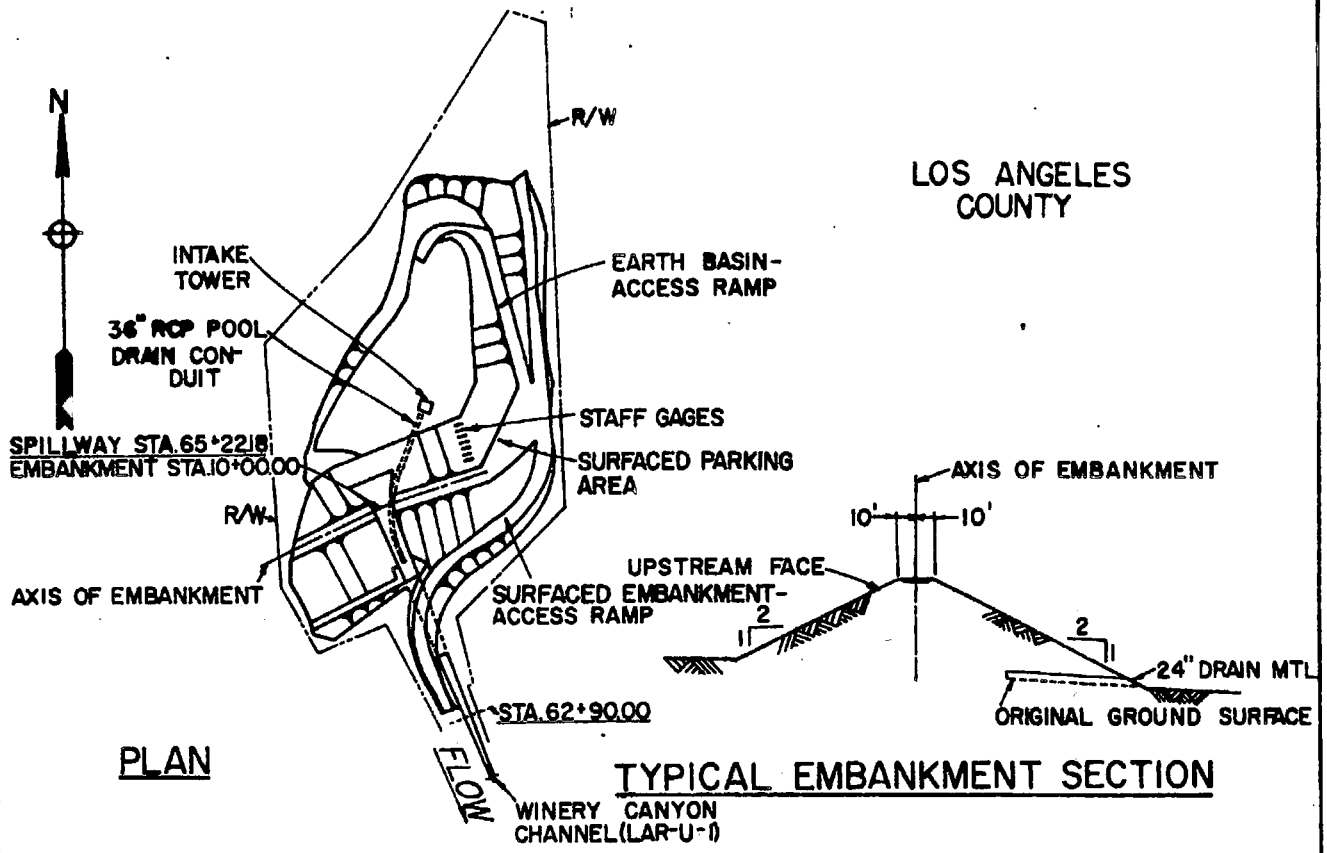
REPORTING FEATURES

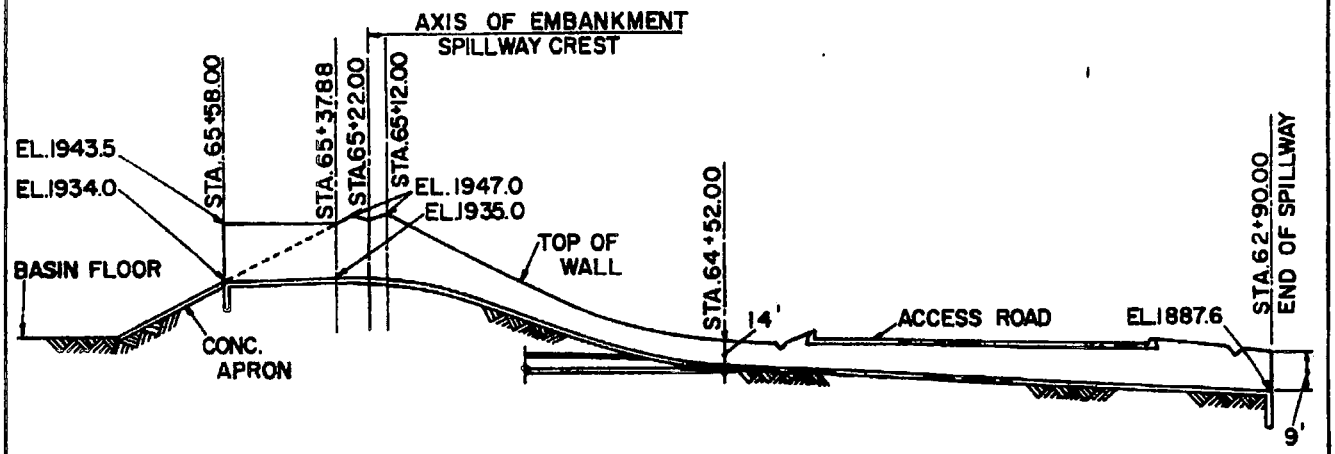
Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete spillway apron
Concrete channel walls
Fencing
Rights-of-way
Subdrain system

Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

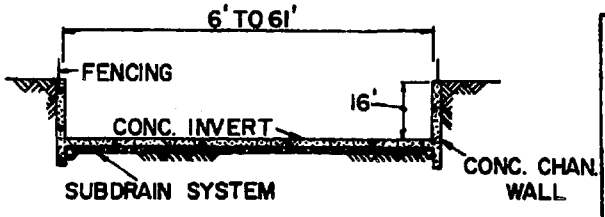
Embankment and Basin
Earth embankment
Earth basin-access ramp
Surfaced embankment-access ramp
Debris storage capacity
Staff gages
Surfaced parking area
Fencing
Rights-of-way
Subdrain system

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY





SECTION ALONG ℄ OF SPILLWAY



TYPICAL SECTION THROUGH SPILLWAY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WINERY CANYON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA LAR-U-2

DATA SHEET RH-A-1

RIO HONDO CHANNEL
S.P. Ry to U.P. Ry

Construction Data

Contract No:	DA 1098	Start: 15 April 1951
	Peter Kiewit Son's Co	Finish: 28 December 1951
Specifications:	CIVENG 51-23	
Plans:	D.O. Series 405/51-77	
Folio Title:	RIO HONDO CHANNEL S.P.R.R. Bridge to U.P.R.R. Bridge	

Local Assurances

Resolution Dated: 16 January 1951
Operation and Maintenance Transferred to: LACFCD, 9 January 1952

Stormflow Data

Gaging Station Location: upstream of Stewart and Gray Rd (sta 69+45)
Type: Recording (LACFCD--F45B-R)
Staff Gage Reading at One-third Capacity: 7.8 ft on gage (14,167 cfs)

Access Ramps

To Invert: none; use RH-A-2

To Right Berm: Firestone Blvd, Southern Ave, Garfield Ave
To Left Berm: from Edison right-of-way, Garfield Ave W,

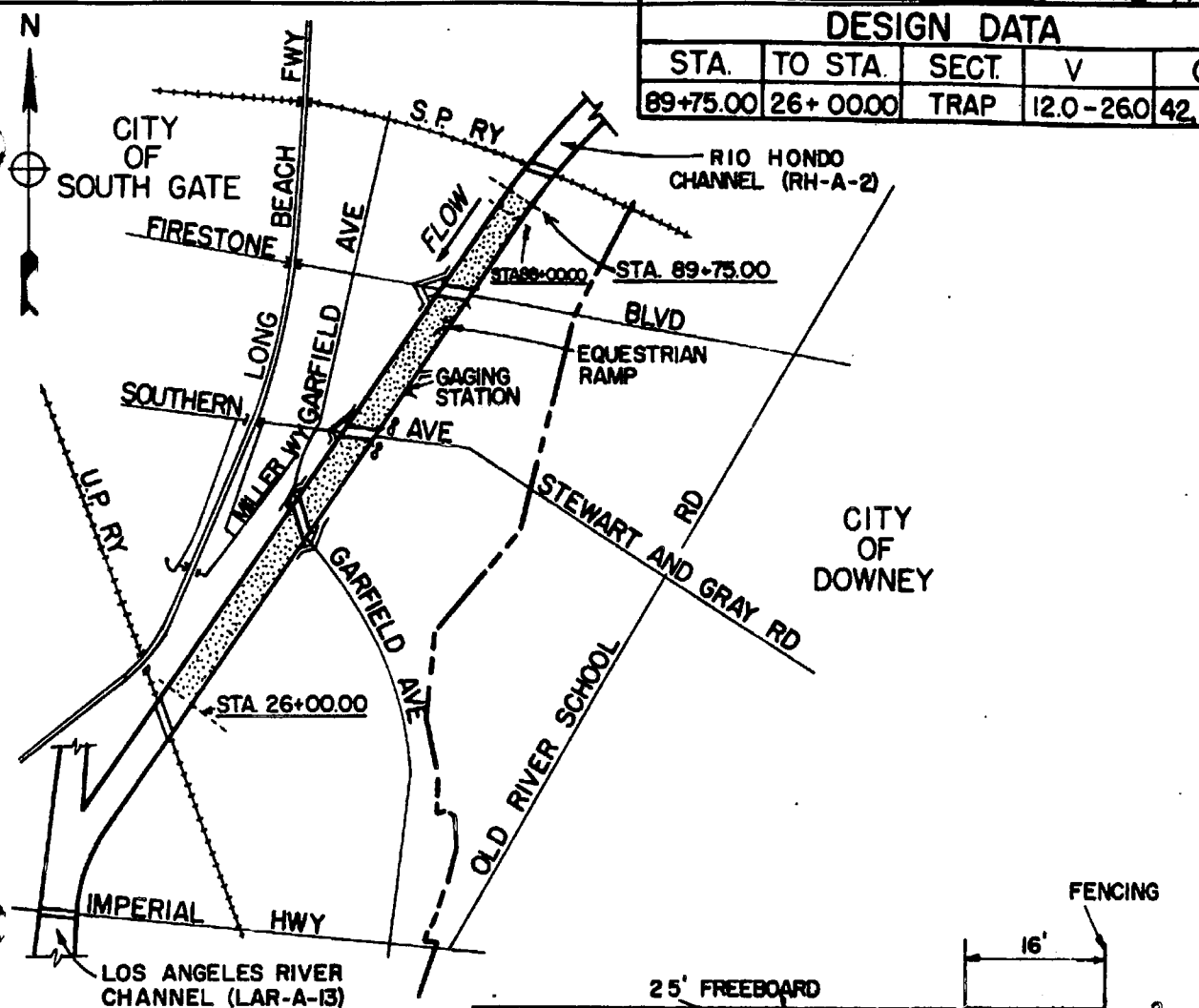
Bridges

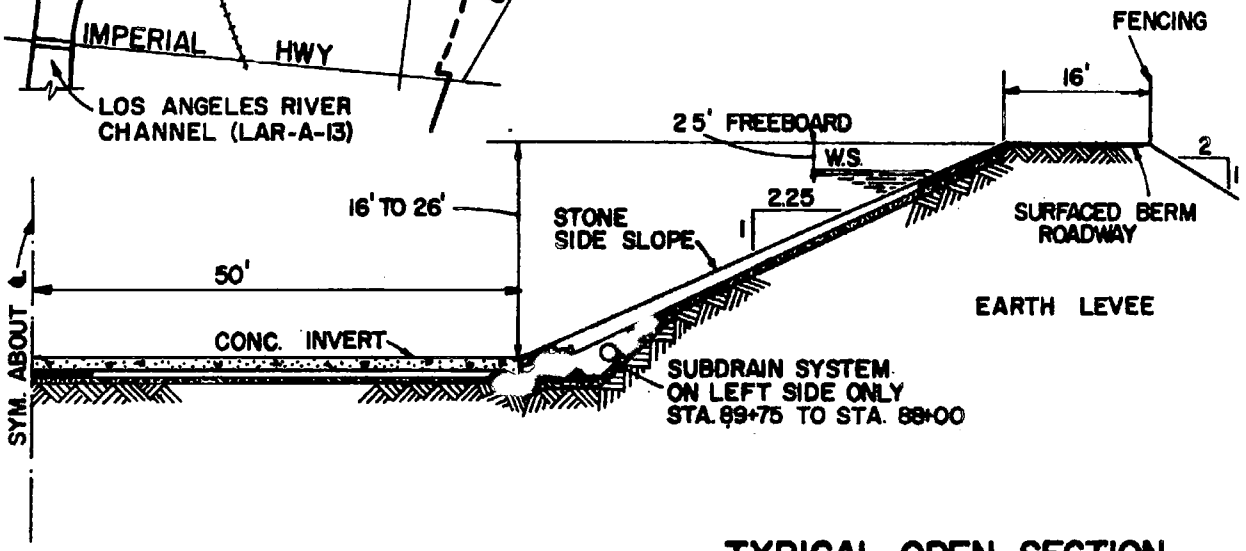
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Firestone Blvd	5	0	City of South Gate
Southern Ave	2	0	City of South Gate
Garfield Ave	3	0	City of South Gate

Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Stone channel side slopes	Surfaced berm-access ramp
Surfaced berm roadway	Equestrian ramp
Subdrain system	Gaging station
Fencing	Bridge
Rights-of-way	Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
89+75.00	26+00.00	TRAP	12.0-26.0	42,500





TYPICAL OPEN SECTION

STA 89+75.00 TO STA. 26+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA
RIO HONDO CHANNEL
S.P. RY TO U.P. RY

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEERS
LOS ANGELES, CALIFORNIA
RH-A-1

DATA SHEET
RH-A-2

RIO HONDO CHANNEL
Santa Ana Fwy to S.P. Ry

Construction Data

Contract No:	DA 2831	Start: 27 April 1953
	A. Teichert and Sons, Inc	Finish: 1 February 1954
	Bressi and Bevanda Const, Inc	
Specifications:	CIVENG 53-36	
Plans:	D.O. Series 405/81-134	
Folio Title:	RIO HONDO CHANNEL Santa Ana Fwy to S.P.R.R.	

Local Assurances

Resolution Dated: 16 January 1951
Operation and Maintenance Transferred to: LACFCD, 8 June 1954

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from left berm downstream of Florence Ave (sta 139+00)

To Right Berm: Bluff Rd, Florence Ave, Clara St
To Left Berm: Suva St, Florence Ave, Rio Hondo Dr

Bridges

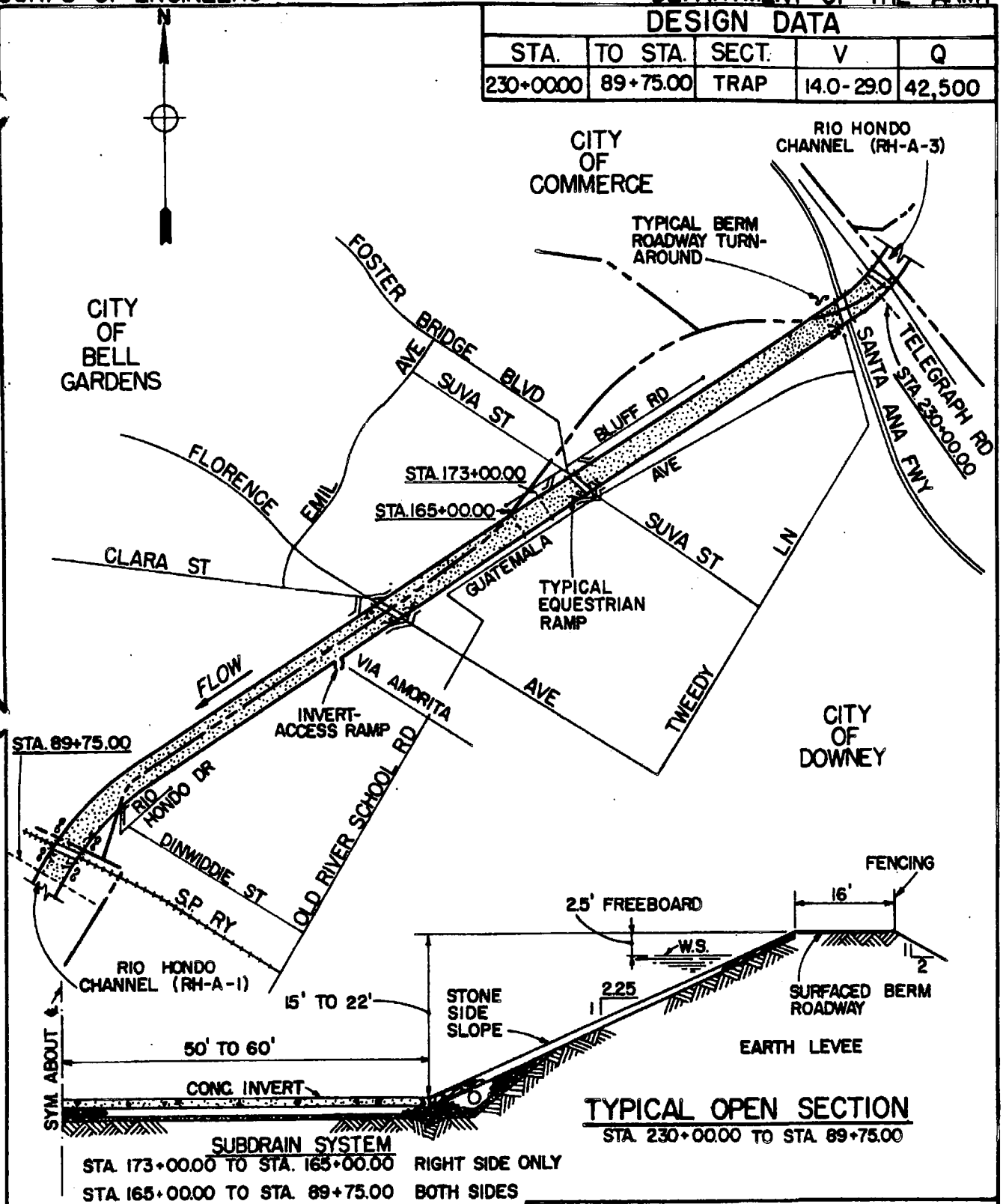
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Santa Ana Fwy	2	0	State of California
Suva St	2	0	City of Downey
Florence Ave	2	0	City of Bell Gardens and City of Downey
S.P. Ry	2	0	S.P.R.R.

Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Surfaced berm-access ramp
Stone channel side slopes	Concrete invert-access ramp
Surfaced berm roadway	Equestrian ramp
Subdrain system	Side drain
Fencing	Bridge
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
230+0000	89+75.00	TRAP	14.0-29.0	42,500



TYPICAL OPEN SECTION

STA. 230+00.00 TO STA. 89+75.00

SUBDRAIN SYSTEM

STA. 173+00.00 TO STA. 165+00.00 RIGHT SIDE ONLY

STA. 165+00.00 TO STA. 89+75.00 BOTH SIDES

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL

SANTA ANA FWY TO S.P. RY

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-A-2

DATA SHEET RH-A-3

RIO HONDO CHANNEL
Washington Blvd to Santa Ana Fwy

Construction Data

Contract No:	DA 3607	Start: 4 May 1954
	Oberg Brothers Const Co	Finish: 31 December 1954
Specifications:	CIVENG 54-34	
Plans:	D.O. Series 354/1-50	
Folio Title:	RIO HONDO CHANNEL Washington Blvd to Santa Ana Fwy	

Local Assurances

Resolution Dated: 16 January 1951
Operation and Maintenance Transferred to: LACFCD, 19 January 1955

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from left berm upstream of Slauson Ave (sta 246+15); downstream of Slauson Ave (sta 241+36)
To Right Berm: Bluff Rd, Slauson Ave, Telegraph Rd
To Left Berm: Telegraph Rd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
S.F. Ry	3	0	A.T.S.F.R.R.
Slauson Ave	2	0	City of Montebello and City of Pico Rivera
P.E. Ry	2	0	P.E.R.R.
Telegraph Rd	2	0	City of Montebello, City of Pico Rivera, and City of Commerce

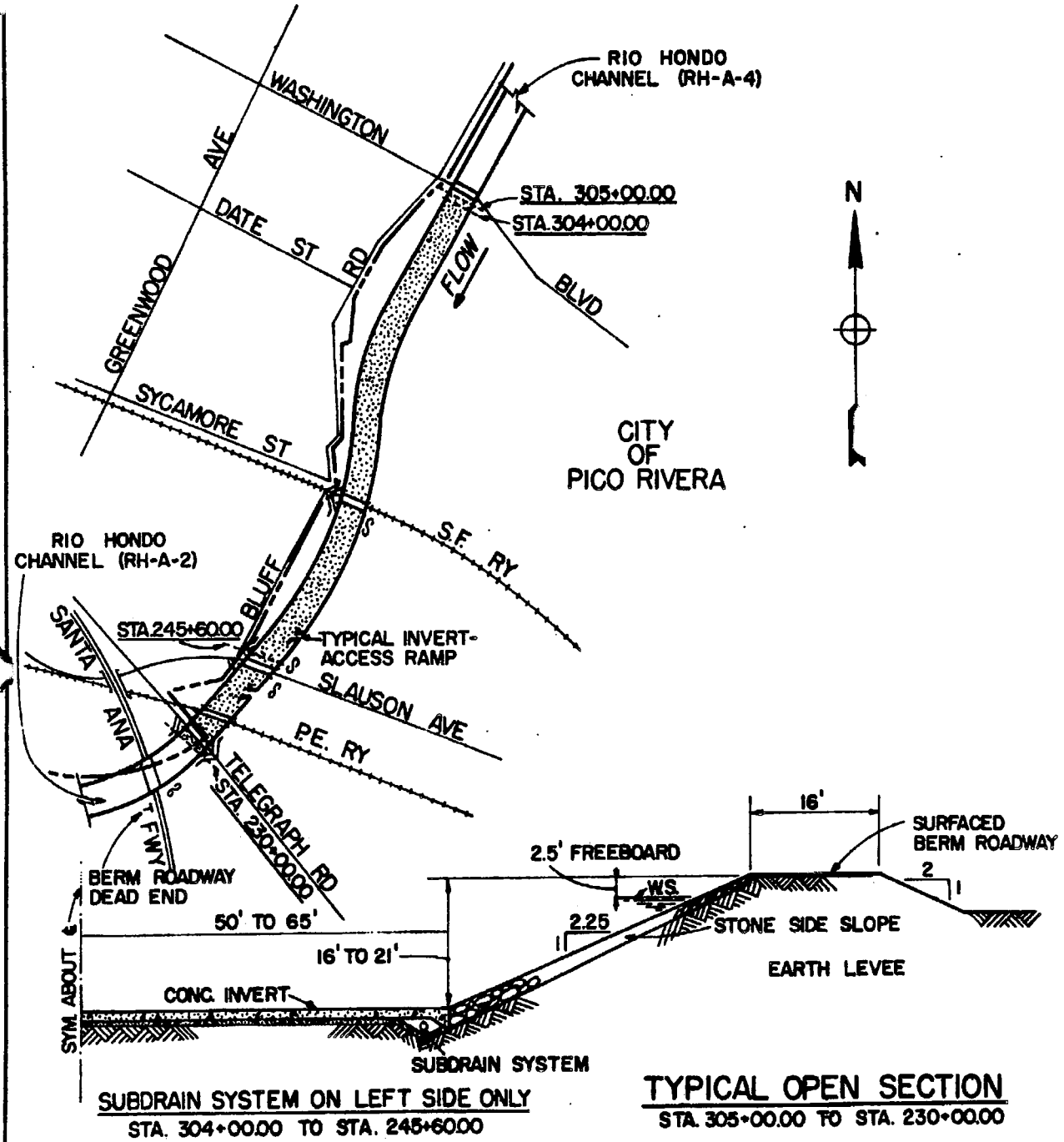
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Surfaced berm-access ramp
Stone channel side slopes	Concrete invert-access ramp
Surfaced berm roadway	Side drain
Subdrain system	Bridge
Fencing	Public Utility
Rights-of-way	

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
305+00.00	230+00.00	TRAP	14.0-27.0	42,500



SUBDRAIN SYSTEM ON LEFT SIDE ONLY
STA. 304+00.00 TO STA. 245+60.00

TYPICAL OPEN SECTION
STA. 305+00.00 TO STA. 230+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM ROADWAY TURNAROUND
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL
WASHINGTON BLVD TO SANTA ANA FWY

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-A-3

DATA SHEET
RH-A-4

RIO HONDO CHANNEL
Whittier Narrows to Washington Blvd

Construction Data

Contract No:	DA-ENG-3686	Start: 15 February 1955
	Winston Brothers	Finish: 28 March 1956
Specifications:	CIVENG 55-16	
Plans:	D.O. Series 355/1-100, 354/51-97	
Folio Title:	RIO HONDO CHANNEL	
	Whittier Narrows F.C. Basin to Washington Blvd	

Local Assurances

Resolution Dated: 16 January 1951
Operation and Maintenance Transferred to: LACFCD, 1 August 1956

Stormflow Data

Gaging Station Location: upstream of Beverly Blvd (sta 427+001)
Type: Recording (USGS-11102300)
Staff Gage Reading at One-third Capacity: 7.8 ft on gage (13,500 cfs)

Access Ramps

To Invert: from left berm upstream of Beverly Blvd (sta 420+00)

To Right Berm: from Whittier Narrows Dam
To Left Berm: Whittier Blvd, from spreading grounds, Washington Blvd

Bridges

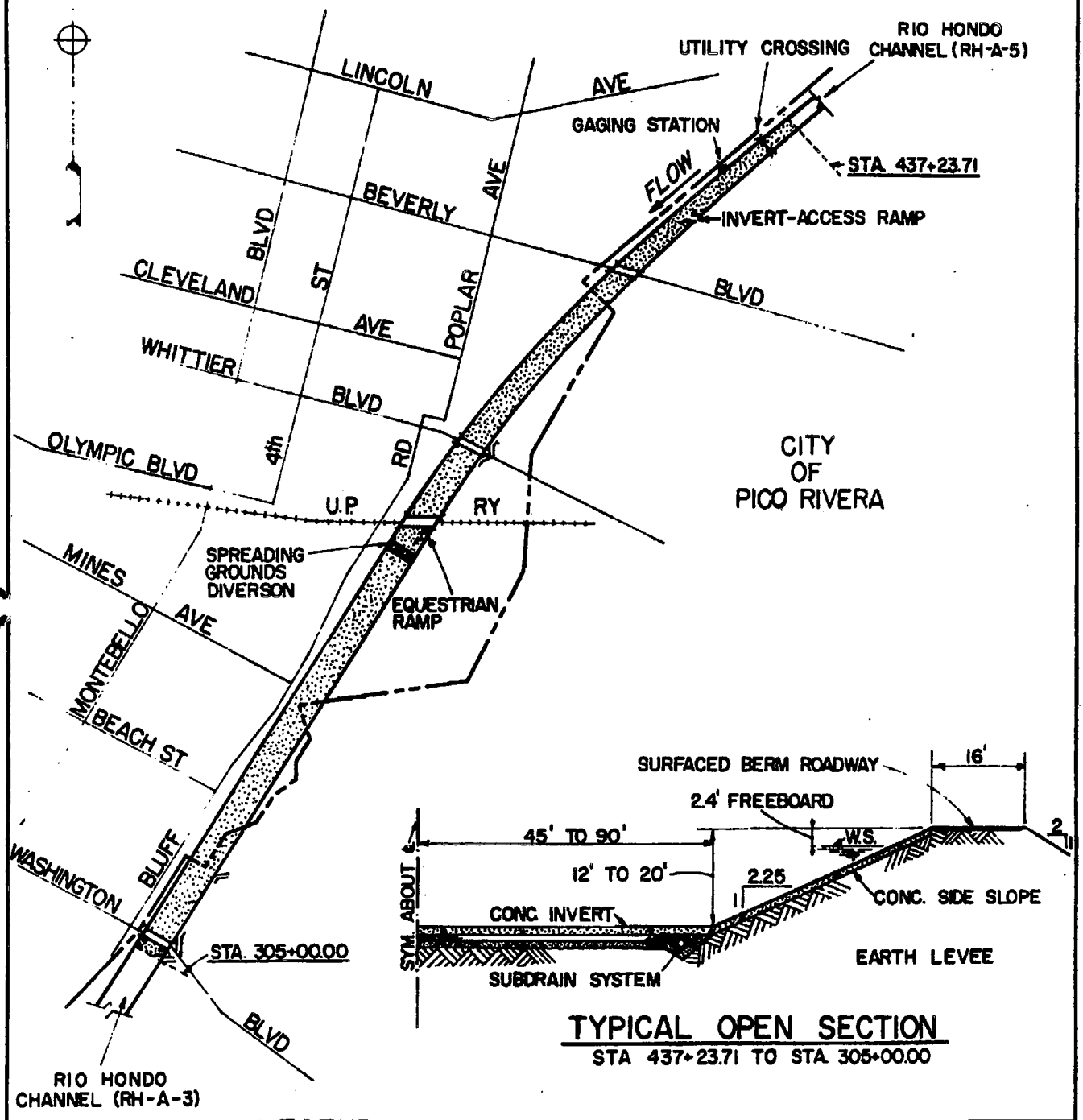
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 431+00	0	0	Southern California Gas Co (utility crossing)
Beverly Blvd	3	0	City of Pico Rivera and City of Montebello
Whittier Blvd	3	0	Los Angeles County
U.P. Ry	3	0	U.P.R.R.
Washington Blvd	3	0	City of Pico Rivera and City of Montebello

Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel side slopes	Side drain
Subdrain system	Gaging station
Fencing	Side overflow spillway
Rights-of-way	Bridge
	Spreading ground diversion
	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
437+23.71	339+50.00	TRAP	12.0-27.0	40,500
339+50.00	305+00.00	TRAP	21.0-27.0	42,500



TYPICAL OPEN SECTION

STA 437+23.71 TO STA 305+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- UTILITY BRIDGE
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL WHITTIER NARROWS TO WASHINGTON BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-A-4

DATA SHEET
RH-A-5

RIO HONDO CHANNEL
Whittier Narrows Flood Control Basin

Construction Data

Contract No:	ENG 3601	Start: 30 March 1954
	A. Teichert and Son and M. J. Bevanda.	Finish: 29 March 1957
Specifications:	CIVENG 54-29	
Plans:	D.O. Series 146/1-98	
Folio Title:	SAN GABRIEL RIVER IMPROVEMENT Whittier Narrows Flood Control Basin: West Embankment and Outlet Works	

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: below Garvey Ave (Sta 605+00); above San Gabriel Blvd
Type: Recording (LACFCD--F326-R); Recording (LACFCD--F64-R)
Staff Gage Reading at One-third Capacity: 4.2 ft on gage (6,000 cfs);
6.6 ft on gage (15,000 cfs)

Access Ramps
To Invert: none; use RH-A-4 or RH-A-7

To Right Berm: Garvey Ave, from embankment of dam
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Rio Hondo Channel:			
Garvey Ave	6	0	City of Rosemead
Pomona Fwy	4	0	State of California
San Gabriel Blvd	16	0	Los Angeles County
Rubio Wash Channel:			
Sta 150+07±	0	0	Berm roadway bridge

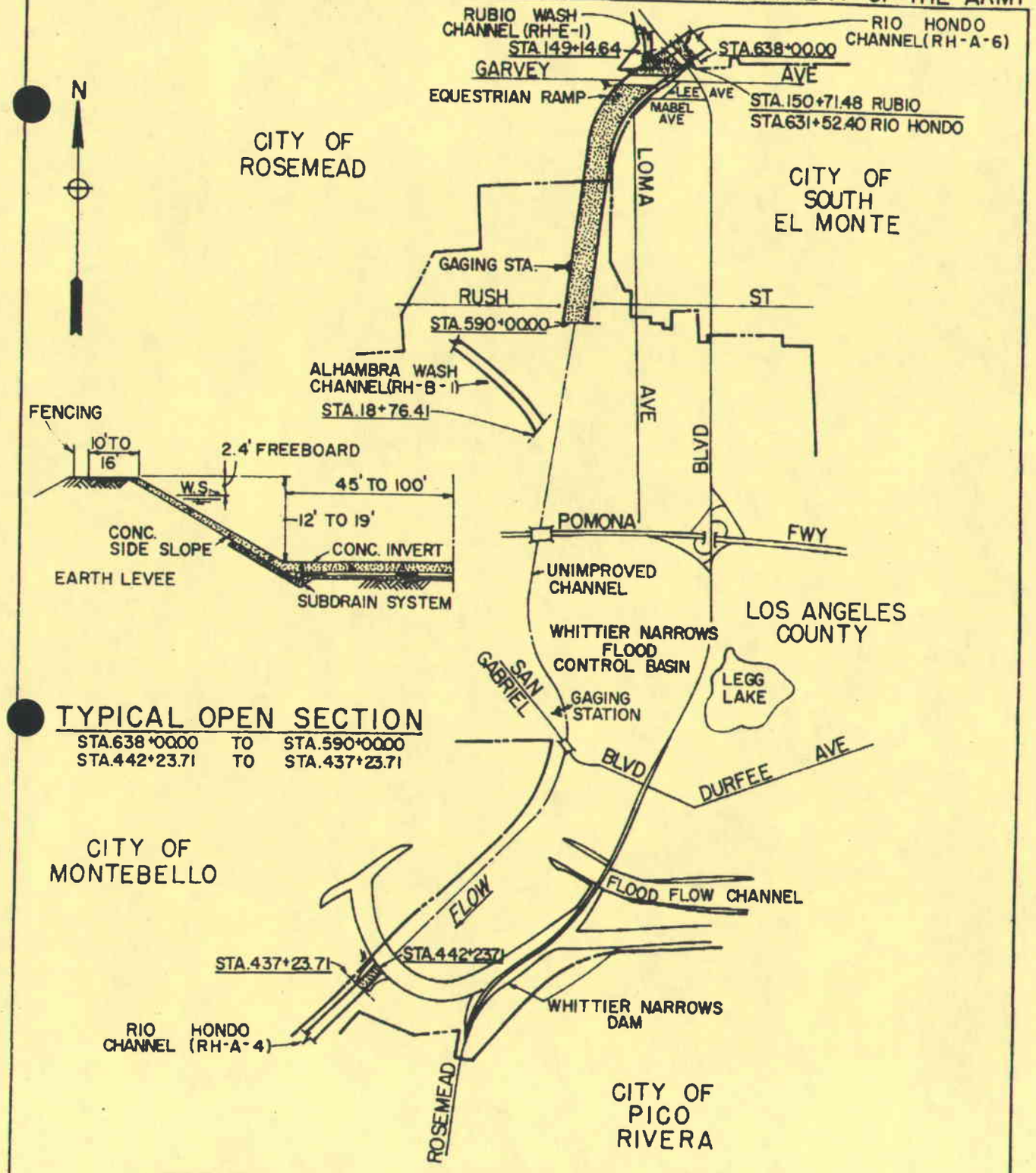
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Surfaced berm-access ramp
Concrete channel walls	Side drain
Concrete channel side slopes	Derrick stone
Surfaced and earth berm roadway	Equestrian ramp
Unimproved earth channel	Gaging station
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS

RH-A-5

DEPARTMENT OF THE ARMY



TYPICAL OPEN SECTION

STA.638+00.00	TO	STA.590+00.00
STA.442+23.71	TO	STA.437+23.71

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL

WHITTIER NARROWS FLOOD CONTROL BASIN

SCALE IN FEET

1000 0 1000 2000 3000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA RH-A-5

DATA SHEET
RH-A-6

RIO HONDO CHANNEL
Valley Blvd to Whittier Narrows

Construction Data

Contract No:	DA 56-72	Start: 30 January 1956
	A. Teichert and Son, Inc and M.J. Bevanda	Finish: 26 June 1957
Specifications:	CIVENG 56-19	
Plans:	D.O. Series 356/1-64	
Folio Title:	UPPER RIO HONDO CHANNEL Valley Blvd to Rosemead Blvd	

Local Assurances
Resolution Dated: 13 December 1955
Operation and Maintenance Transferred to: LACFCD, 27 August 1957

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none; use RH-A-7

To Right Berm: Valley Blvd, Whitmore St
To Left Berm: from Valley Blvd through parking lot, San Bernardino Fwy, Lashbrook Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Valley Blvd	2	0	Los Angeles County
P.E. Ry	4	0	P.E.R.R.
RTD Busway	2	0	S.C.R.T.D.
San Bernardino Fwy	3	0	State of California

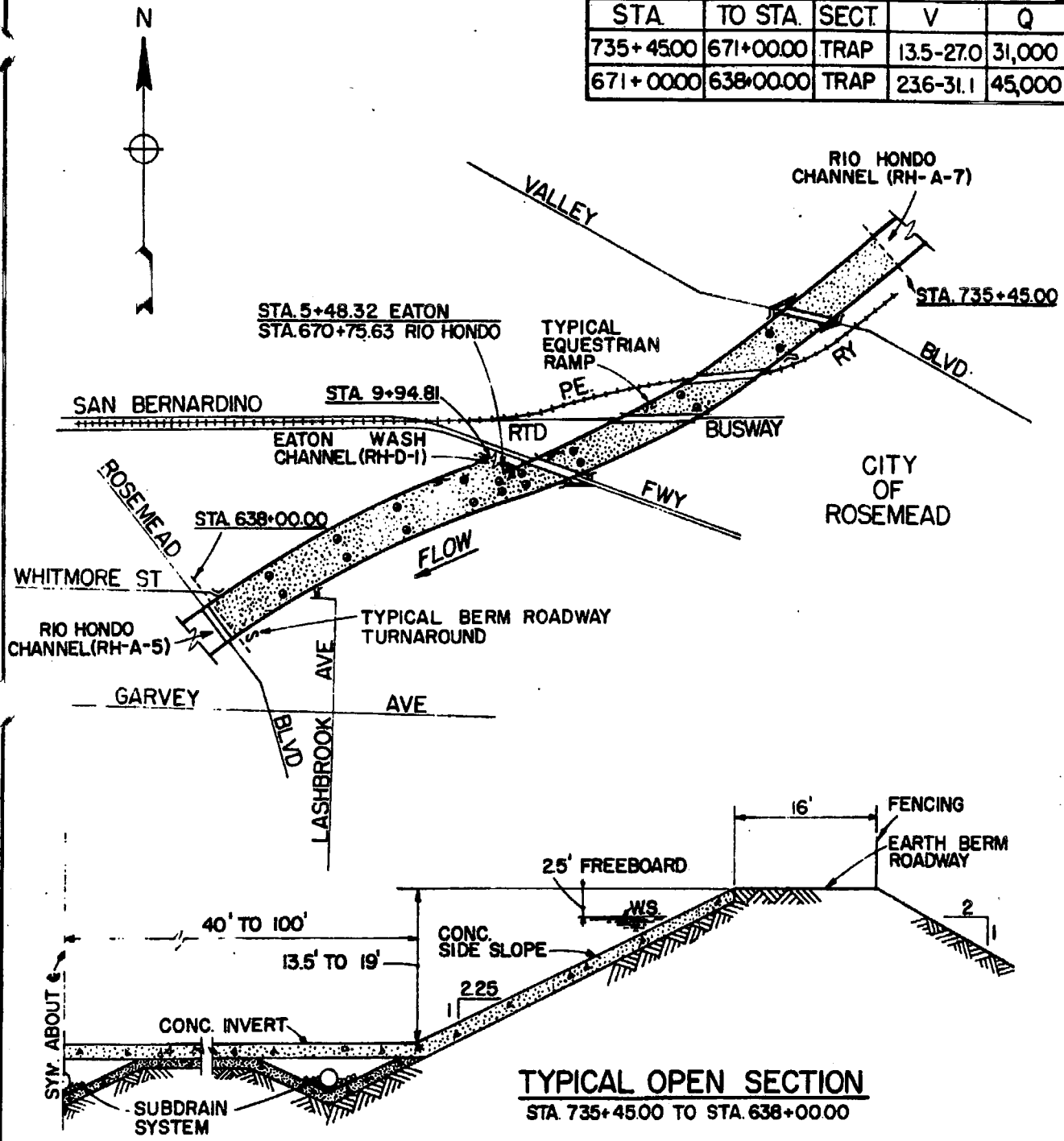
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Earth berm-access ramp
Concrete channel side slopes	Concrete equestrian ramp
Earth berm roadway	Side drain
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
735+45.00	671+00.00	TRAP	13.5-27.0	31,000
671+00.00	638+00.00	TRAP	23.6-31.1	45,000



TYPICAL OPEN SECTION

STA. 735+45.00 TO STA. 638+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CITY OR COUNTY BOUNDARY
- CONST PROJECT LIMIT
- SUBDRAIN MANHOLE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL VALLEY BLVD TO WHITTIER NARROWS

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
RH-A-7

RIO HONDO CHANNEL
Lower Azusa Rd to Valley Blvd

Construction Data

Contract No:	DA 58-124	Start:	4 April 1958
	Clyde W. Wood and Sons, Inc	Finish:	24 March 1959
Specifications:	CIVENG 58-11		
Plans:	D.O. Series 356/67-101		
Folio Title:	UPPER RIO HONDO CHANNEL Lower Azusa Rd to Valley Blvd		

Local Assurances

Resolution Dated: 9 July 1957
Operation and Maintenance Transferred to: LACFCD, 14 July 1959

Stormflow Data

Gaging Station Location: downstream of Lower Azusa Rd (sta 788+00)
Type: Recording (LACFCD—F192B-R)
Staff Gage Reading at One-third Capacity: 5.2 ft on gage (8667 cfs)

Access Ramps

To Invert: from right berm at El Monte Ave (sta 777+83)

To Right Berm:	Lower Azusa Rd, El Monte Ave
To Left Berm:	Lower Azusa Rd

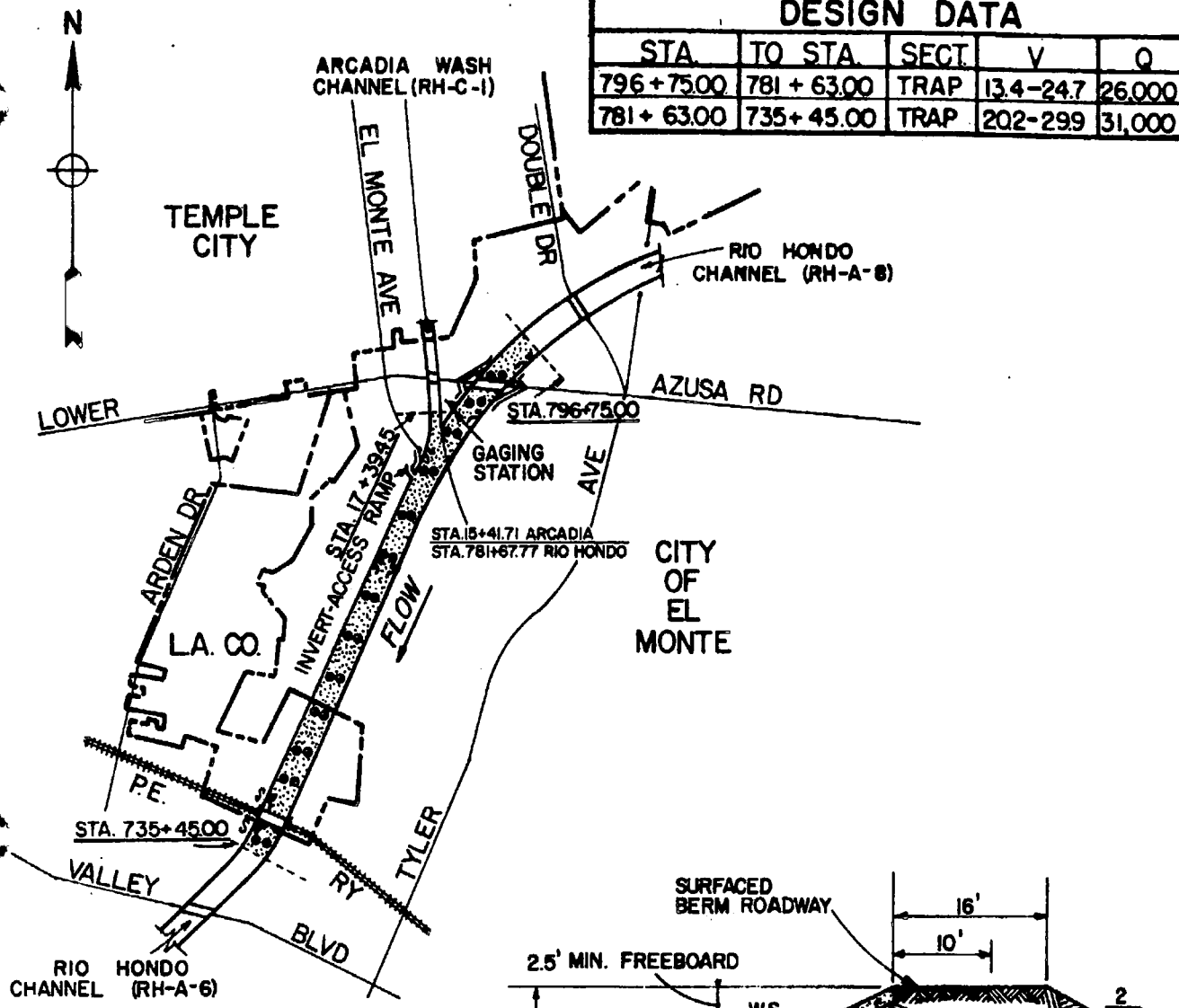
Bridges

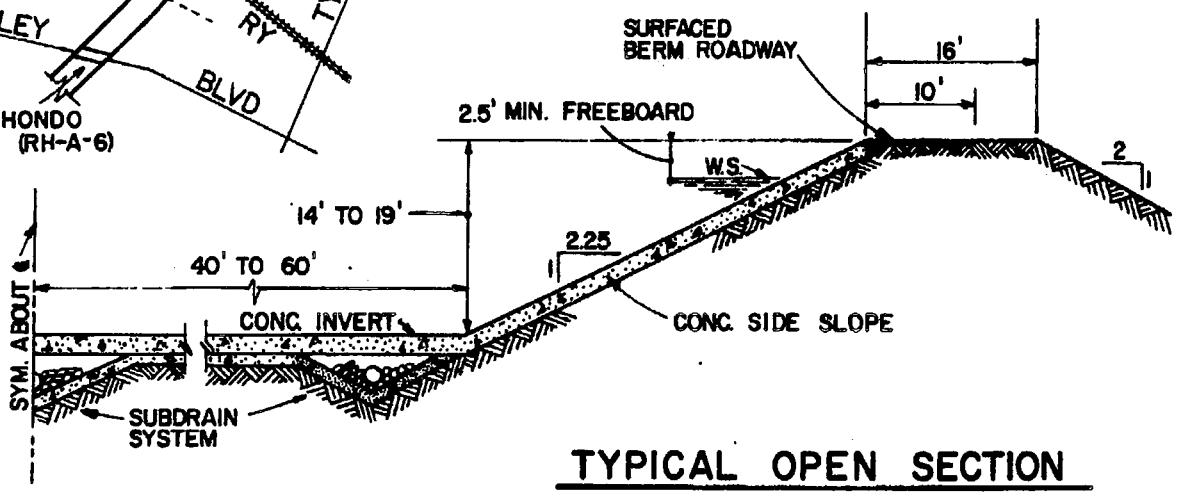
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Lower Azusa Rd	2	0	City of El Monte
S.P. Ry	2	0	S.P.R.R.

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Earth and surfaced berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel side slopes	Equestrian ramp
Subdrain system	Side drain
Fencing	Gaging station
Rights-of-way	Bridge
	Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
796+75.00	781+63.00	TRAP	13.4-24.7	26,000
781+63.00	735+45.00	TRAP	20.2-29.9	31,000





TYPICAL OPEN SECTION

STA. 796+75.00 TO STA. 735+45.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM ROADWAY TURNAROUND
- TYPICAL EQUESTRIAN RAMP
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL

LOWER AZUSA RD TO VALLEY BLVD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-A-7

DATA SHEET
RH-A-8

RIO HONDO CHANNEL
Peck Rd to Lower Azusa Rd

Construction Data

Contract No:	DA 59-89	Start: 7 April 1959
	Fredericksen and Kasler	Finish: 19 November 1959
Specifications:	CIVENG 59-20	
Plans:	D. O. Series 105/33-100	
Folio Title:	UPPER RIO HONDO CHANNEL Peck Rd to Lower Azusa Rd	

Local Assurances

Resolution Dated: 22 July 1958
Operation and Maintenance Transferred to: LACFCD, 27 September 1960

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use RH-B-2

To Right Berm: Santa Anita Ave
To Left Berm: Santa Anita Ave

Bridges

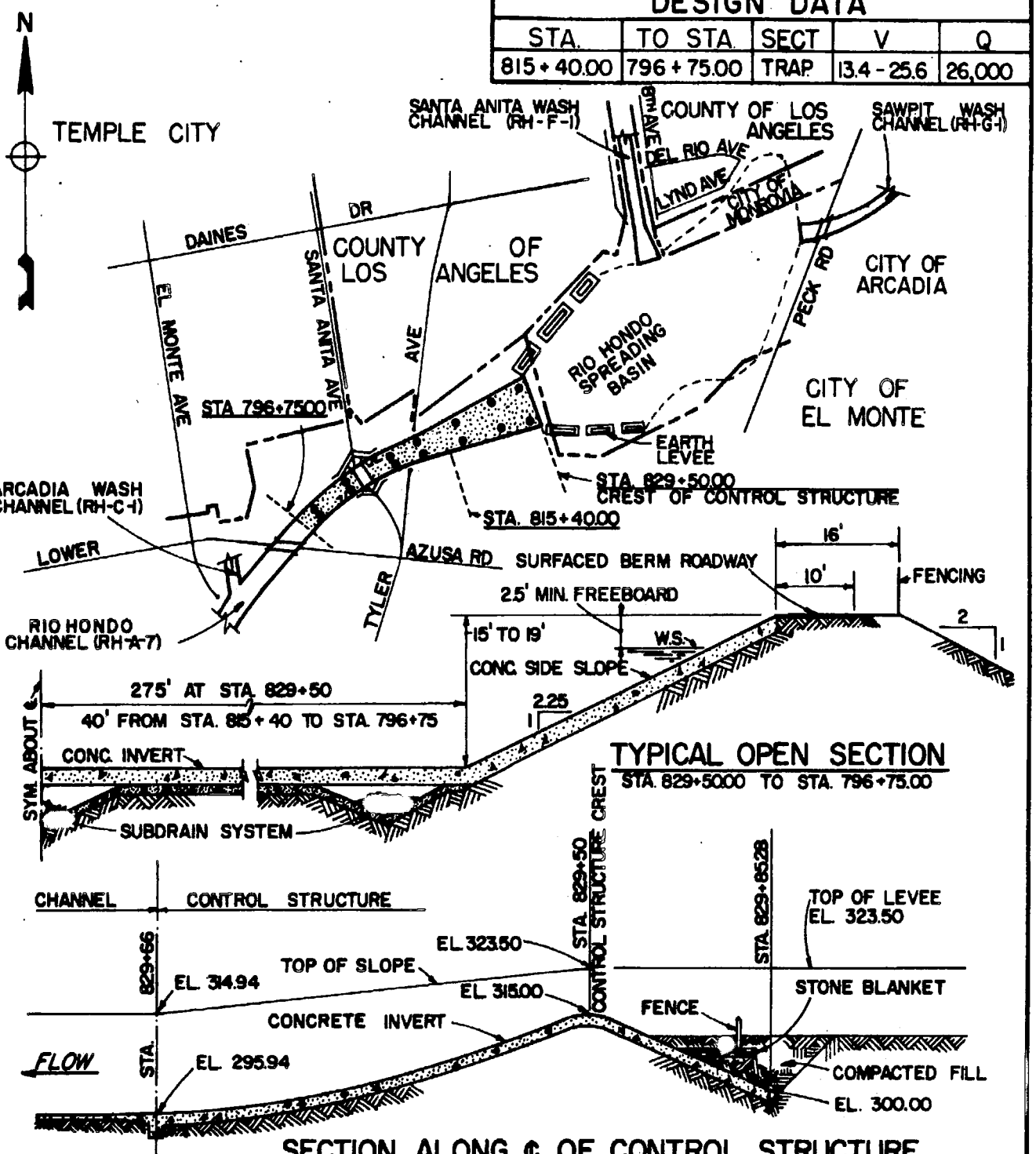
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Santa Anita Ave	2	0	City of El Monte

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel side slopes	Spreading grounds diversion
Subdrain system	Equestrian ramp
Earth levee	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
815+40.00	796+75.00	TRAP.	13.4 - 25.6	26,000



SECTION ALONG ℄ OF CONTROL STRUCTURE
(SUBDRAIN SYSTEM NOT SHOWN)

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL EQUESTRIAN RAMP
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL
PECK RD TO LOWER AZUSA RD

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-A-8

DATA SHEET — RIO HONDO CHANNEL
RH-A-9A, B, C & D — Firestone Blvd. To Whittier Narrows Dam

Construction Data
- Contract No: DACW09-99-C-0008 — Start: 1/31/99
- Yeager Construction Co., Inc. — Finish:
- Specifications:
- Plans: D.O. Series 374/425-689
- Folio Title: RIO HONDO CHANNEL
  Whittiers Narrow Dam to Firestone Blvd.

Local Assurances
- Resolution Dated: 8/10/99
- Operation and Maintenance Transferred to:

Stormflow Data
- Gaging Station Location: Upstream of Beverly Blvd.. (Sta 427+00±)
- Type: Recording (USGS-11102300)
- Staff Gage Reading at One-third Capacity: 7.8 ft on gage (13,500 cfs)

Access Ramps
- To Invert:
  - from left berm upstream of Beverly Blvd (Sta 420+00)
  - from left berm upstream of Slauson Ave (Sta 246+15); downstream of Slauson Ave (Sta 241+36)
  - from left berm downstream of Florence Ave (Sta 139+00)
- To Right Berm:
  - from Whittier Narrows Dam
  - Bluff Rd, Slauson Ave, Telegraph Rd
  - Bluff Rd, Florence Ave, Clara St
  - Firestone Blvd
- To Left Berm:
  - Whittier Blvd, from spreading grounds, Washington Blvd
  - Telegraph Rd
  - Suva St, Florence Ave, Rio Hondo Dr

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 431+00±	0	0	Southern California Gas Co. (utility crossing)
Beverly Blvd	3	0	City of Pico Rivera and City of Montebello
Whittier Blvd	3	0	County of Los Angeles
U.P. Ry	3	0	U.P.R.R.
Washington Blvd	3	0	City of Pico Rivera and City of Montebello
S.F. Ry	3	0	A.T.S.F.R.R.
Slauson Ave	2	0	City of Pico Rivera and City of Montebello
P.E. Ry	2	0	P.E.R.R.
Telegraph Rd	2	0	Cities of Pico Rivera, Montebello, and Commerce
Santa Ana Fwy	2	0	State of California
Suva St	2	0	City of Downey
Florence Ave	2	0	City of Bell Gardens and City of Downey
S.P. Ry	2	0	S.P.R.R.
Firestone Blvd	5	0	City of South Gate

Reporting Features

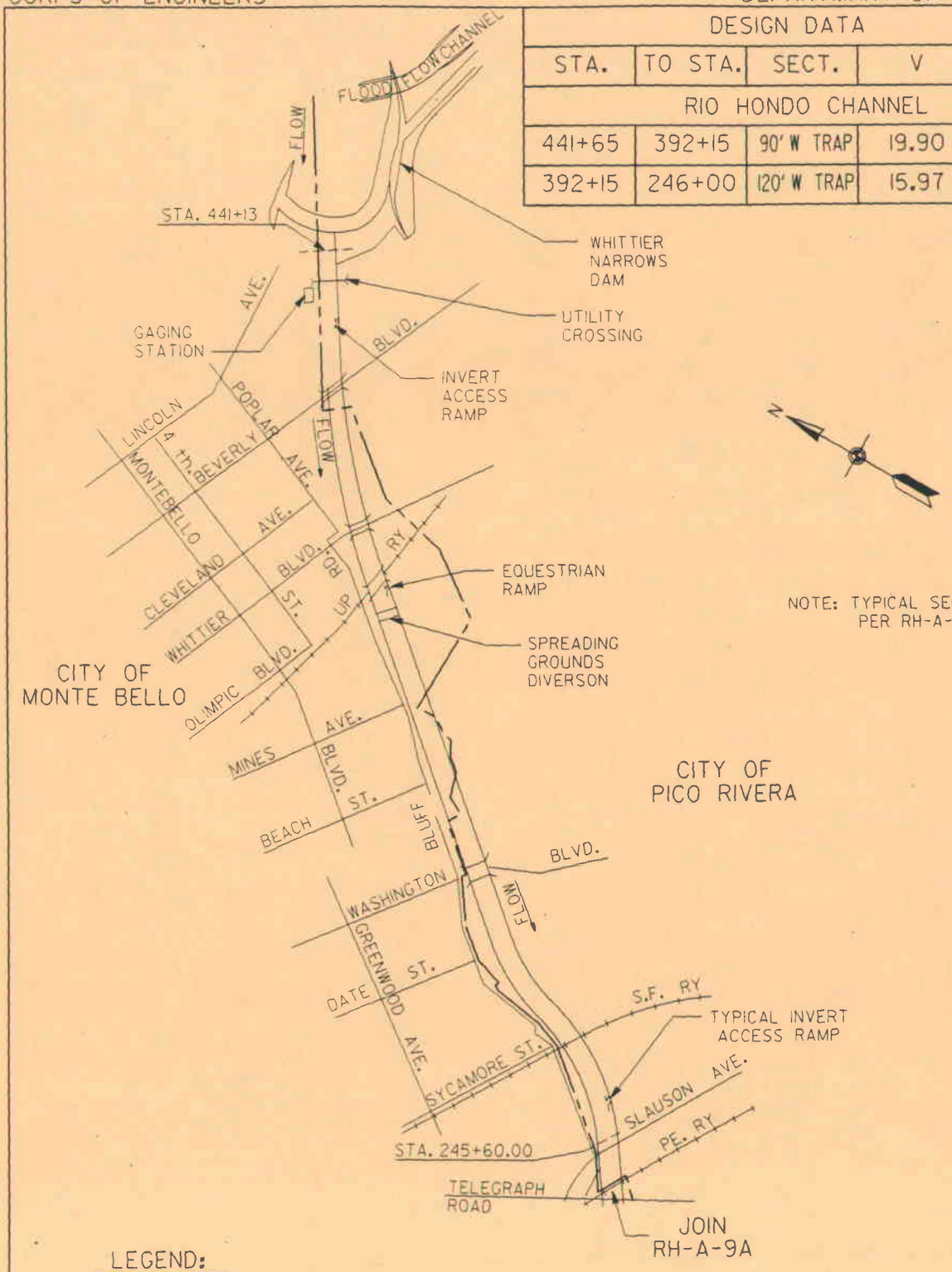
Along Channel
- Surfaced and earth berm roadway
- Concrete channel invert
- Concrete channel side slopes
- Subdrain system
- Fencing
- Rights-of-way

At a Channel Station
- Surfaced berm-access ramp
- Concrete invert access ramp
- Side drain
- Gaging Station
- Side overflow spillway
- Bridge
- Spreading ground diversion
- Public utility
- Equestrian Ramp

CORPS OF ENGINEERS

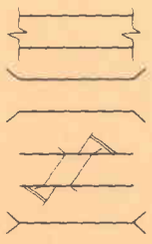
DEPARTMANT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
RIO HONDO CHANNEL				
441+65	392+15	90' W TRAP	19.90	46,640
392+15	246+00	120' W TRAP	15.97	51,650



NOTE: TYPICAL SECTION PER RH-A-9D

LEGEND:



OPEN SECTION

STREET BRIDGE

TYPICAL BERM-ACCESS RAMP

UTILITY BRIDGE

NOTE: FOR PREVIOUS CHANNEL IMPROVEMENTS REFER TO LAR-A-1 AND LAR-A-3

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL

WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD

1000 0 1000 2000 3000 4000

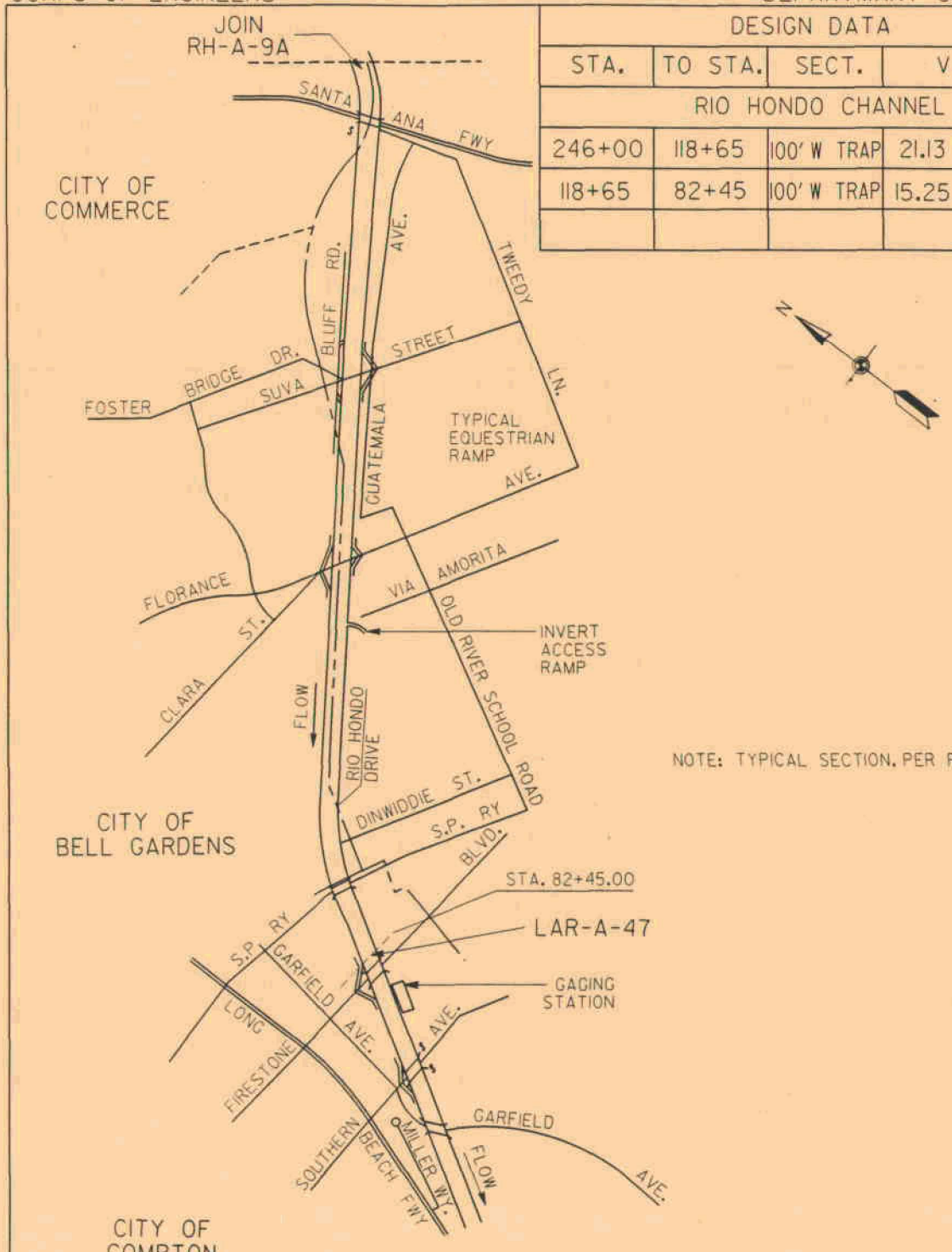
OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-A-9A

CORPS OF ENGINEERS

DEPARTMANT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
RIO HONDO CHANNEL				
246+00	118+65	100' W TRAP	21.13	52,900
118+65	82+45	100' W TRAP	15.25	52,900



NOTE: TYPICAL SECTION. PER RH-A-9D

LEGEND:

OPEN SECTION

STREET BRIDGE

TYPICAL BERM-ACCESS RAMP

FOOTBRIDGE

CONSTRUCTION PROJECT. LIMIT

CITY OR COUNTY BOUNDARY

NOTE: FOR PREVIOUS CHANNEL IMPROVEMENTS REFER TO RH-A-1 THRU RH-A-5

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL

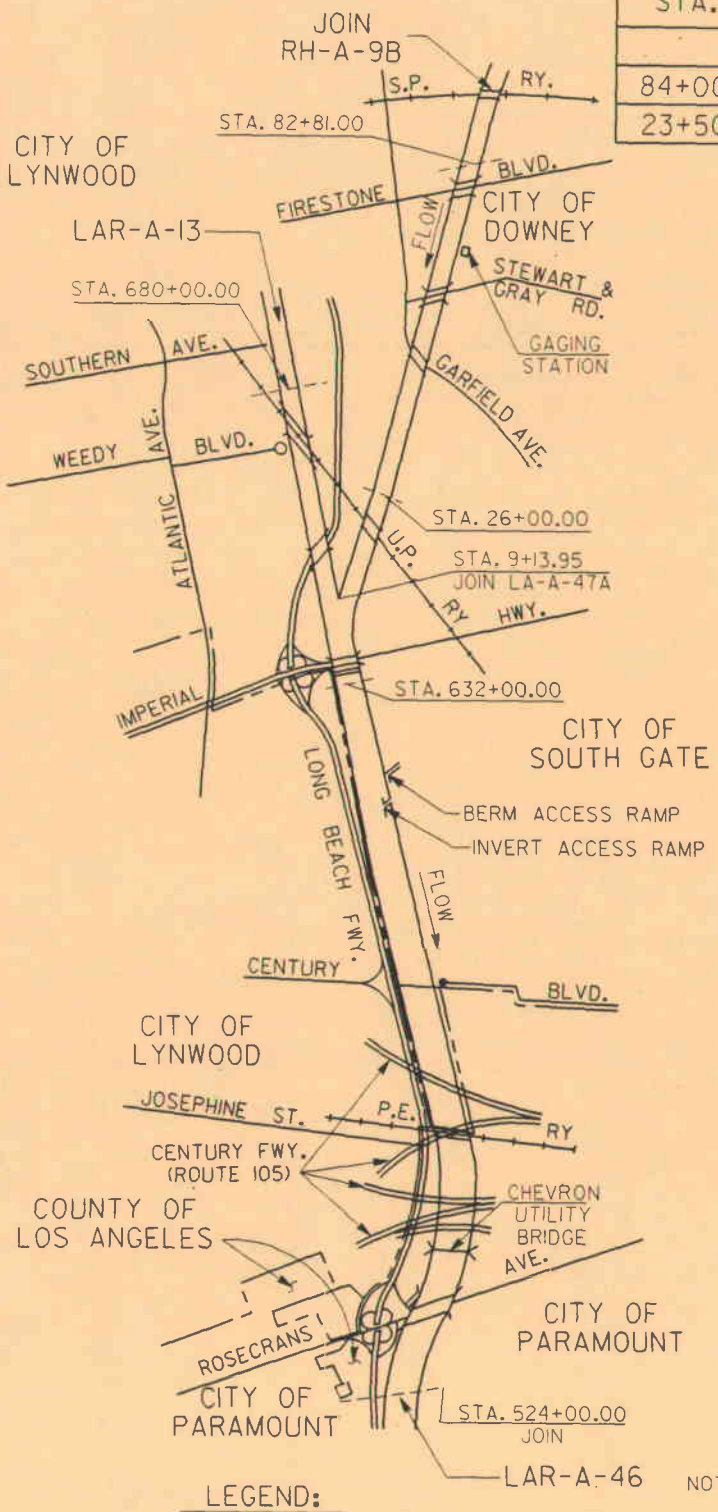
WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-A-9B

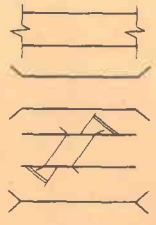
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
RIO HONDO CHANNEL				
84+00	70+50	100' W TRAP	25.09	52,900
23+50	9+13.95	100' W TRAP	11.92	52,900



NOTE: TYPICAL SECTIONS PER LAR-A-47B

NOTE: FOR PREVIOUS CHANNEL IMPROVEMENTS REFER TO LAR-A-10 THRU LAR-A-13 AND RH-A-1

LEGEND:



OPEN SECTION

STREET BRIDGE

TYPICAL BERM-ACCESS RAMP

UTILITY BRIDGE

CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

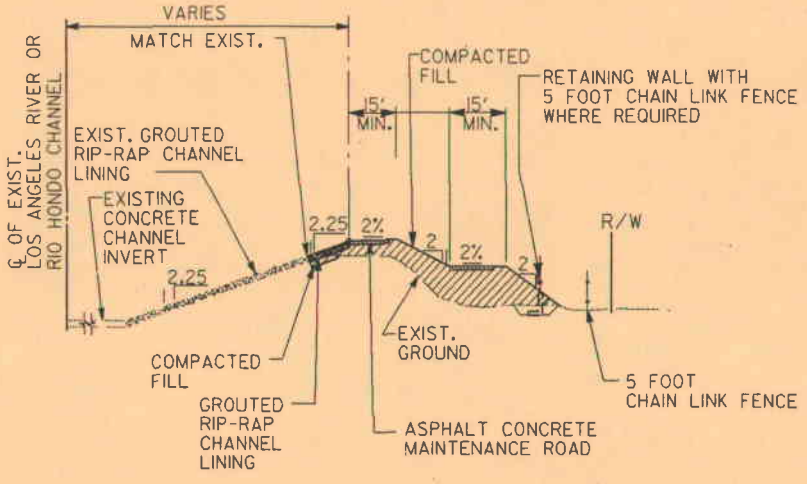
LOS ANGELES RIVER

CONFLUENCE WITH THE RIO HONDO CHANNEL

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

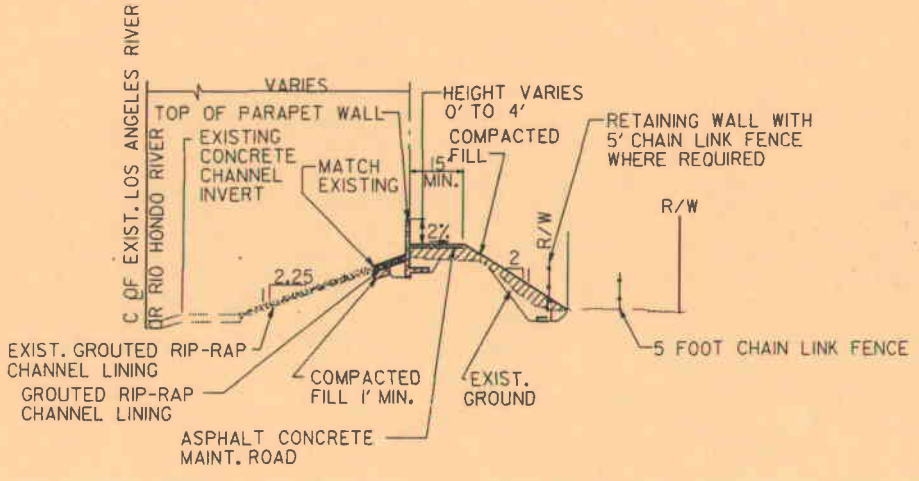
RH-A-9C



TYPICAL SECTION

STA. 441+00 TO STA. 9+14

NOT TO SCALE



TYPICAL SECTION

STA. 441+00 TO STA. 9+14

NOT TO SCALE

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RIO HONDO CHANNEL

WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-B-1

ALHAMBRA WASH CHANNEL
Valley Blvd to Rio Hondo

Construction Data

Contract:	Force Account	Start:	1938
Plans:	D.O. Series A80/4-60, 78/3-25, 79/4-56	Finish:	June 1938
Folio Title:	ALHAMBRA WASH IMPROVEMENT Roses Rd to New Ave		

Local Assurances

Resolution Dated: 13 October 1938
Operation and Maintenance Transferred to: LACFCD, 23 October 1938 [ERA]

Stormflow Data

Gaging Station Location: downstream of Garvey Ave, near Klingerman St (sta 73+70)
Type: Recording (LACFCD-F81D-R)
Staff Gage Reading at One-third Capacity: 4.1 ft on gage (3146 cfs)

Access Ramps

To Invert: just upstream of Emerson Pl Bridge, from Eckhart Ave (sta 115+82.16)

To Right Berm: none
To Left Berm: none

Bridges

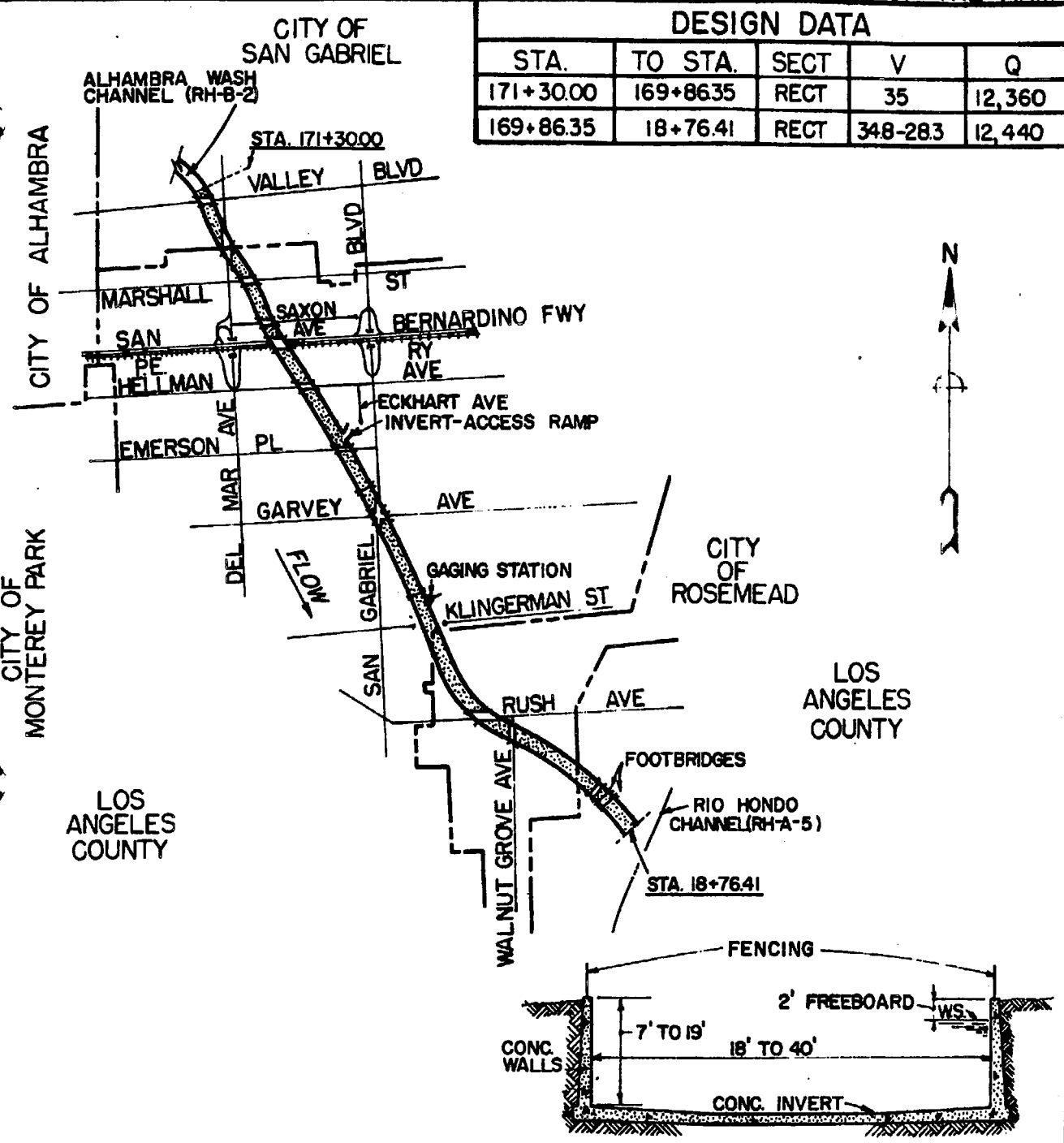
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Valley Blvd	0	2	City of San Gabriel
Del Mar Ave	0	2	City of San Gabriel
Marshall St	0	2	City of San Gabriel
Saxon Ave	0	2	City of San Gabriel
San Bernardino Fwy & P.E.Ry	0	2	State of California and P.E.R.R.
Hellman Ave	0	2	City of Rosemead
Emerson Pl	0	2	City of Rosemead
Sta. 110+45±	0	0	City of Rosemead (footbridge)
Garvey Ave	0	2	City of Rosemead
San Gabriel Blvd	0	2	City of Rosemead
Sta 73+70	0	0	LACFCD (gaging station footbridge)
Rush Ave	0	2	City of Rosemead
Walnut Grove Ave	0	2	City of Rosemead
Sta 32+60±	0	0	Private vehicular bridge
Sta 25+96±	0	0	Private pedestrian bridge
Sta 20+31±	0	0	Private pedestrian bridge

Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Concrete invert-access ramp
Fencing	Bridge
Rights-of-way	Gaging station
	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
171+30.00	169+86.35	RECT	35	12,360
169+86.35	18+76.41	RECT	348-283	12,440



TYPICAL OPEN SECTION

STA. 171+30.00 TO STA. 18+76.41

LEGEND

- TYPICAL OPEN SECTION
- STREET BRIDGE
- ----- CONST. PROJECT LIMIT
- ——— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

ALHAMBRA WASH CHANNEL VALLEY BLVD TO RIO HONDO

SCALE IN FEET

2000 0 2000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-B-1

DATA SHEET
RH-B-2

ALHAMBRA WASH CHANNEL
Roses Rd to Valley Blvd and San Pasqual Branch

Construction Data

Contract No: Force Account — Start: 1938, Finish: June 1938

Plans: D.O. Series A80/4-60, 78/3-25, 79/4-56

Folio Title: ALHAMBRA WASH IMPROVEMENT
Roses Rd to New Ave

Local Assurances

Resolution Dated: 13 October 1938

Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers; 12 October 1940

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none

To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Alhambra Wash:			
Roses Rd	0	2	City of Alhambra
Las Tunas Dr	0	2	City of Alhambra
Sta 260+50±	0	0	City of Alhambra
Mission Rd and S.P. Ry	0	2	City of Alhambra and S.P.R.R.
Sta 220+30±	0	2	City of San Gabriel
Sta 205+40	0	2	City of Alhambra
New Ave	0	2	City of San Gabriel
Sta 174+95±	0	2	City of San Gabriel (footbridge)
San Pasqual Wash:			
Sta 81+23	0	2	City of Alhambra (footbridge)
Alhambra Rd	0	2	City of Alhambra
Woodward Ave	0	2	City of Alhambra
Sta 52+50±	0	0	City of Alhambra (footbridge)
Main St (integral with covered section)	0	2	City of Alhambra
Bay State St	0	2	City of Alhambra
Mission Rd and S.P. Ry	0	2	City of Alhambra and S.P.R.R.
Sta 3+87±	0	2	City of San Gabriel

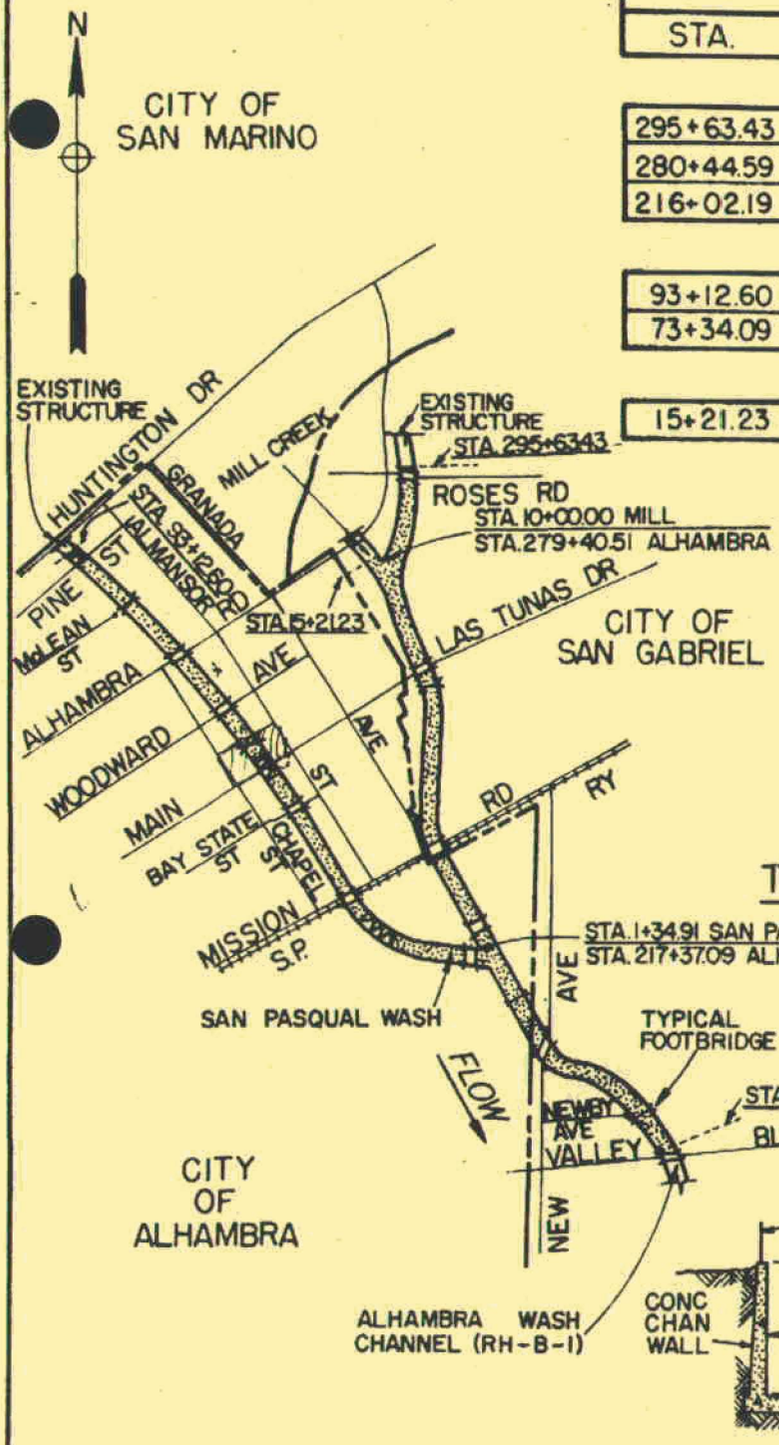
Reporting Features

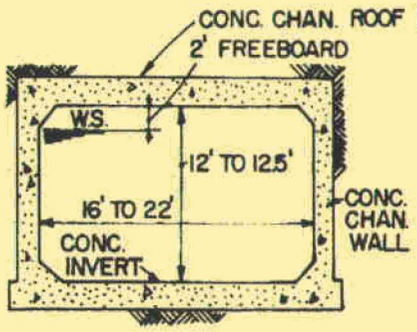
Along Channel	At a Channel Station
Concrete channel walls	Concrete confluence section
Concrete channel invert	Side drain
Concrete channel roof slab	Bridge
Surfaced and earth berm roadway	Public utility
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

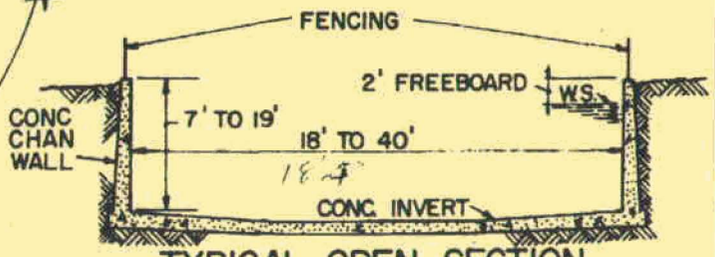
DESIGN DATA

STA.	TO STA.	SECT	V	Q
ALHAMBRA WASH				
295+63.43	280+44.59	RECT	35.0-41.9	3,350
280+44.59	216+02.19	RECT	31.1-35.4	8,650
216+02.19	171+30.00	RECT	31.2-35.0	12,360
SAN PASQUAL WASH				
93+12.60	73+34.09	RECT	27.4-38.2	4,000
73+34.09	0+00.00	RECT	29.7-41.2	4,550
MILL CREEK				
15+21.23	10+00.00	RECT	31.3	5,330





TYPICAL COVERED SECTION
(AS NOTED)



TYPICAL OPEN SECTION
STA. 295+63.43 TO STA. 171+30.00
SAN PASQUAL WASH
STA. 93+12.60 TO STA. 1+34.91

LEGEND

- TYPICAL OPEN SECTION
- TYPICAL CLOSED SECTION
- STREET BRIDGE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

ALHAMBRA WASH CHANNEL
ROSES RD TO VALLEY BLVD
SAN PASQUAL BRANCH

SCALE IN FEET
2000 0 2000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-B-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-C-1

ARCADIA WASH CHANNEL
Huntington Pl to Rio Hondo

Construction Data

Contract No:	DA 4327	Start:	24 March 1955
	MacDonald and Kruse	Finish:	10 January 1956
Specifications:	CIVENG 55-28		
Plans:	D.O. Series 371/1-99		
Folio Title:	ARCADIA WASH CHANNEL Huntington Pl to Rio Hondo		

Local Assurances

Resolution Dated: 21 June 1955
Operation and Maintenance Transferred to: LACFCD, 23 February 1956

Stormflow Data

Gaging Station Location: downstream of Grand Ave (sta. 36+95±)
Type: Recording (LACFCD-F317-R)
Staff Gage Reading at One-third Capacity: 4.2 ft on gage (3,667 cfs)

Access Ramps

To Invert: none; use RH-C-2 or RH-A-7

To Right Berm: at all street crossings
To Left Berm: at all street crossings

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Duarte Rd	0	2	City of Arcadia
Le Roy Ave	0	2	City of Arcadia
El Monte Ave	0	2	City of Arcadia
Camino Real	0	2	City of Arcadia
Norman Ave	0	2	City of Arcadia
Lemon Ave	0	2	City of Arcadia
Wistaria Ave	0	2	City of Arcadia
Las Flores Ave	0	2	City of Arcadia
Longden Ave	0	2	City of Arcadia
Palm Dr	0	2	City of Arcadia
Woodruff Ave	0	2	City of Arcadia
Sandra Ave	0	2	City of Arcadia
Las Tunas Dr	0	2	City of Arcadia
Live Oak Ave	0	2	City of Arcadia
Daines St	0	2	Los Angeles County
Freer St	0	2	Los Angeles County
Grand Ave	0	2	Los Angeles County
Lower Azusa Rd	0	2	Los Angeles County

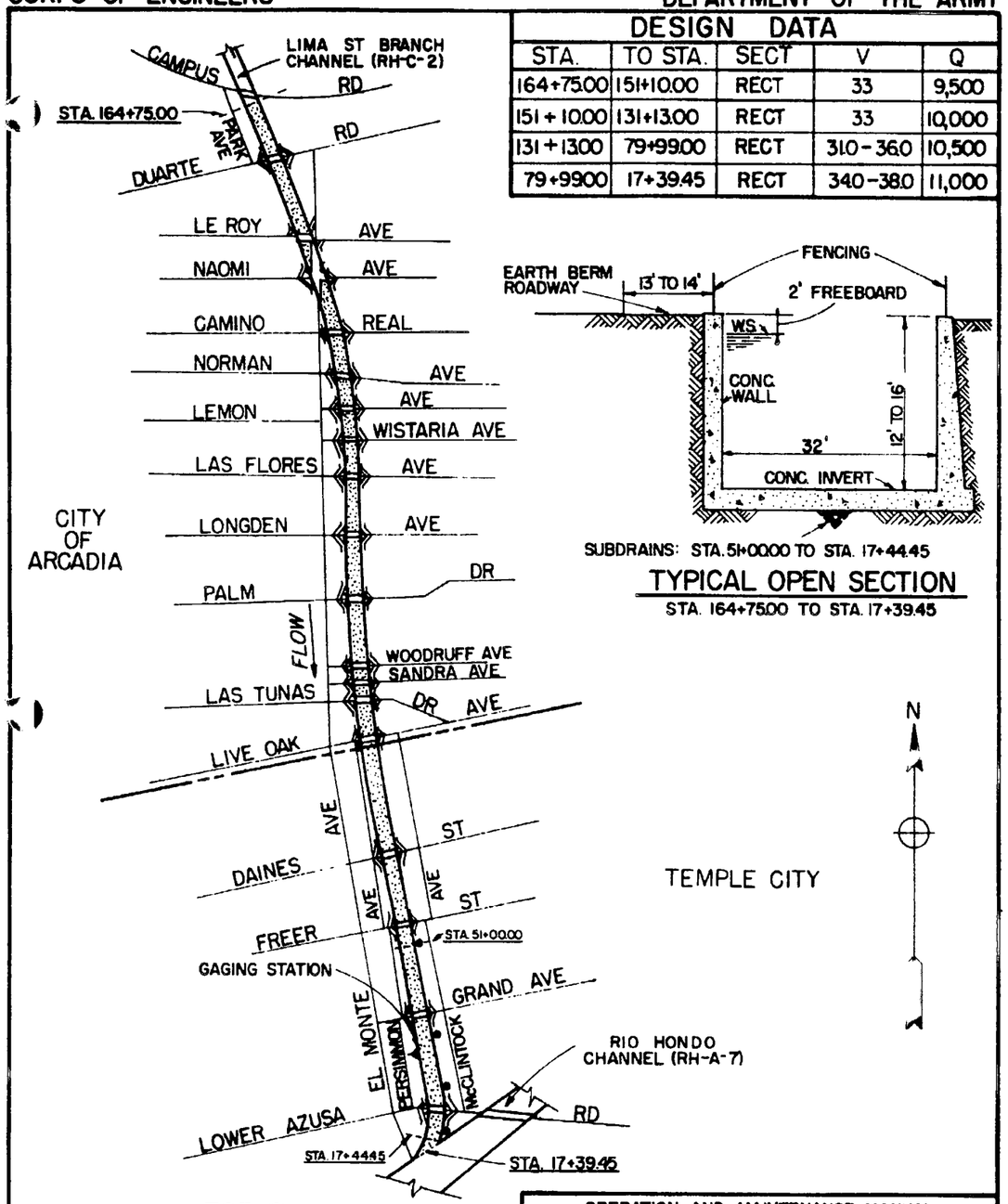
Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Gaging station
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	Subdrain manhole

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
164+75.00	151+10.00	RECT	33	9,500
151+10.00	131+13.00	RECT	33	10,000
131+13.00	79+99.00	RECT	31.0-36.0	10,500
79+99.00	17+39.45	RECT	34.0-38.0	11,000



SUBDRAINS: STA. 51+00.00 TO STA. 17+44.45

TYPICAL OPEN SECTION

STA. 164+75.00 TO STA. 17+39.45

LEGEND

- TYPICAL OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

ARCADIA WASH CHANNEL

HUNTINGTON PL TO RIO HONDO

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-C-1

DATA SHEET LIMA ST BRANCH
RH-C-2 AUBURN BRANCH

Construction Data

Contract No:	DA 56-167	Start: 22 May 1956
	Peter Kiewit Son's Co	Finish: 17 January 1957
Specifications:	CIVENG 56-48	
Plans:	D.O. Series 372/1-104	
Folio Title:	ARCADIA WASH CHANNEL	
	Debris Basins to Huntington Pl	

Local Assurances
Resolution Dated: 6 September 1955
Operation and Maintenance Transferred to: LACFCD, 4 December 1957

Stormflow Data
Gaging Station Location: upstream of Huntington Dr (west-bound) (sta 183+15)
Type: Recording (Department of Water Resources--2-7-5450)
Staff Gage Reading at One-third Capacity: 3.8 ft on gage (2333 cfs)

Access Ramps
To Invert: downstream of Huntington Dr (east-bound) (sta 172+45)

To Right Berm: Orange Grove Ave, Singingwood Dr, Hampton Dr
To Left Berm: Huntington Dr

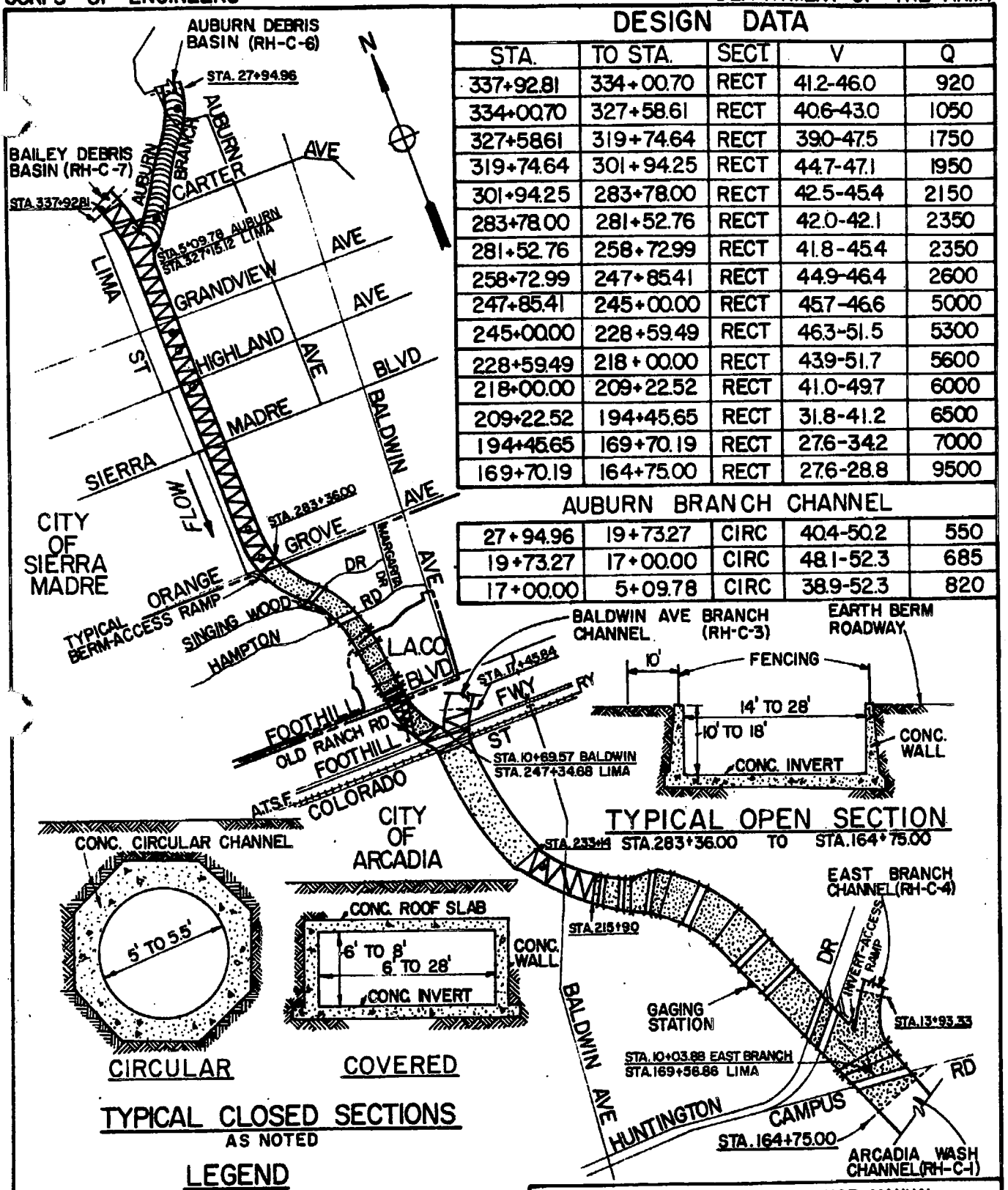
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Singingwood Dr	0	2	City of Arcadia
Hampton Rd	0	2	City of Arcadia
Sta 266+36	0	2	Private footbridge
Sta 265+80	0	2	Private footbridge
Sta 264+85	0	2	Private bridge
Sta 262+88	0	2	Private footbridge
Sta 261+15	0	2	Private footbridge
Sta 260+11	0	2	Private bridge
Foothill Blvd	0	2	Los Angeles County
Sta 209+60	0	2	Private bridge
Sta 206+34	0	2	Private bridge
Sta 202+67	0	2	Private bridge
Sta 200+00	0	2	Private bridge
Sta 197+80	0	2	Private bridge
Sta 196+54	0	2	Private bridge
Sta 193+80	0	2	Private bridge
Sta-191+36	0	2	Private bridge
Sta 182+25	0	2	Private bridge
Huntington Dr (west)	0	2	Los Angeles County
Huntington Dr (east)	0	2	Los Angeles County
Sta 169+85	0	2	Private footbridge
Sta 166+87	0	2	Private footbridge
Campus Rd	0	2	City of Arcadia

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Concrete circular channel	Gaging station
Concrete channel roof slab	Channel inspection manhole
Fencing	Bridge
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



DESIGN DATA

STA.	TO STA.	SECT	V	Q
337+92.81	334+00.70	RECT	41.2-46.0	920
334+00.70	327+58.61	RECT	40.6-43.0	1050
327+58.61	319+74.64	RECT	39.0-47.5	1750
319+74.64	301+94.25	RECT	44.7-47.1	1950
301+94.25	283+78.00	RECT	42.5-45.4	2150
283+78.00	281+52.76	RECT	42.0-42.1	2350
281+52.76	258+72.99	RECT	41.8-45.4	2350
258+72.99	247+85.41	RECT	44.9-46.4	2600
247+85.41	245+00.00	RECT	45.7-46.6	5000
245+00.00	228+59.49	RECT	46.3-51.5	5300
228+59.49	218+00.00	RECT	43.9-51.7	5600
218+00.00	209+22.52	RECT	41.0-49.7	6000
209+22.52	194+45.65	RECT	31.8-41.2	6500
194+45.65	169+70.19	RECT	27.6-34.2	7000
169+70.19	164+75.00	RECT	27.6-28.8	9500

AUBURN BRANCH CHANNEL

27+94.96	19+73.27	CIRC	40.4-50.2	550
19+73.27	17+00.00	CIRC	48.1-52.3	685
17+00.00	5+09.78	CIRC	38.9-52.3	820

LEGEND

- TYPICAL OPEN SECTION
- TYPICAL COVERED SECTION
- TYPICAL CIRCULAR SECTION
- STREET BRIDGE
- CONST. PROJECT LIMIT
- FOOTBRIDGE
- CHANNEL INSPECTION MANHOLE
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LIMA ST BRANCH CHANNEL
AUBURN BRANCH CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-C-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET RH-C-3 BALDWIN AVE BRANCH CHANNEL

Construction Data

Contract No:	DA 57-132	Start: 14 March 1957
	E. A. Irish	Finish: 31 January 1958
Specifications:	CIVENG 57-23	
Plans:	D.O. Series 159/17-48	
Folio Title:	ARCADIA WASH SYSTEM	
	Baldwin Ave Branch	

Local Assurances

Resolution Dated: 3 April 1956

Operation and Maintenance Transferred to: LACFCD, 19 August 1958

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use RH-C-2

To Right Berm: none

To Left Berm: none

Bridges

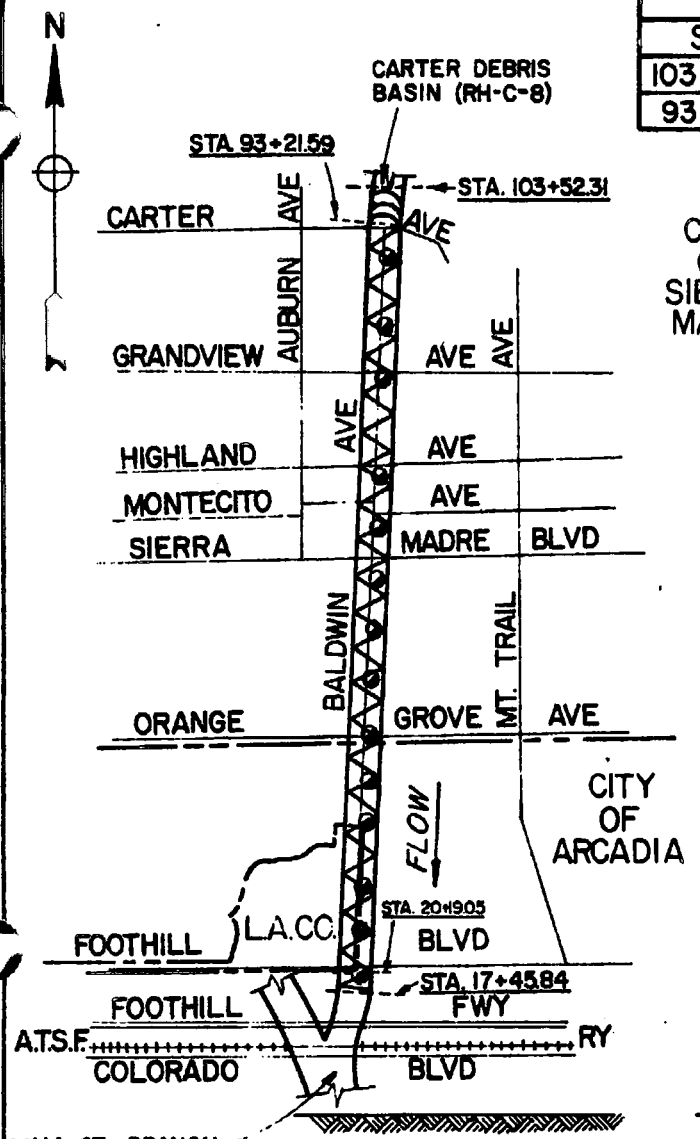
none

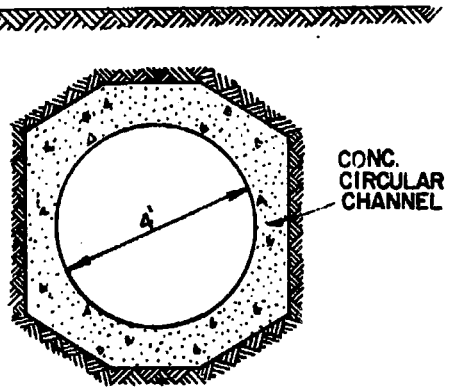
Reporting Features

Along Channel	At a Channel Station
Concrete channel invert	Side drain
Concrete channel walls	Channel inspection manhole
Concrete channel roof slab	Public utility
Concrete circular channel	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

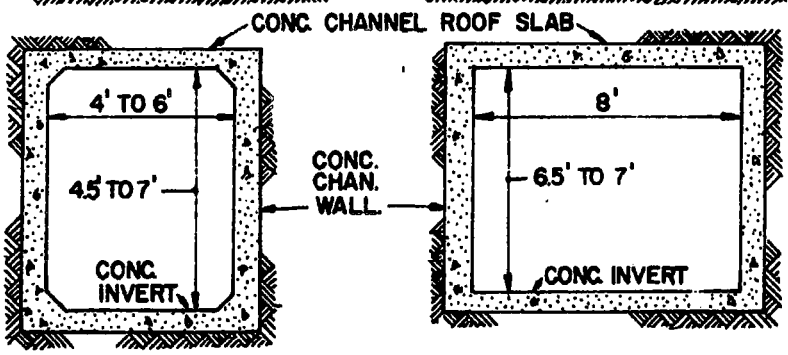
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
103+52.31	93+21.59	CIRC	30	350
93+21.59	17+45.84	RECT	37	1750





TYPICAL CIRCULAR SECTION

STA. 103+52.31 TO STA. 93+21.59



STA. 93 + 21.59 TO STA. 20 + 19.05 — STA. 20 + 19.05 TO STA. 17 + 45.84

TYPICAL COVERED SECTION

LEGEND

- COVERED SECTION
- CIRCULAR SECTION
- CHANNEL INSPECTION MANHOLE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BALDWIN AVE BRANCH CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-C-3

DATA SHEET
RH-C-4

EAST BRANCH CHANNEL
Colorado Pl to Huntington Pl

Construction Data

Contract No:	DA 56-193	Start: 20 June 1956
	Griswold Engineers, Inc	Finish: 20 December 1956
Specifications:	CIVENG 56-63	
Plans:	D.O. Series 159/1-15	
Folio Title:	ARCADIA WASH SYSTEM	
	East Branch--Colorado Pl to Huntington Pl	

Local Assurances

Resolution Dated: 6 September 1955
Operation and Maintenance Transferred to: LACFCD, 18 January 1957

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none; use RH-C-2

To Right Berm: none
To Left Berm: none

Bridges

none

Reporting Features

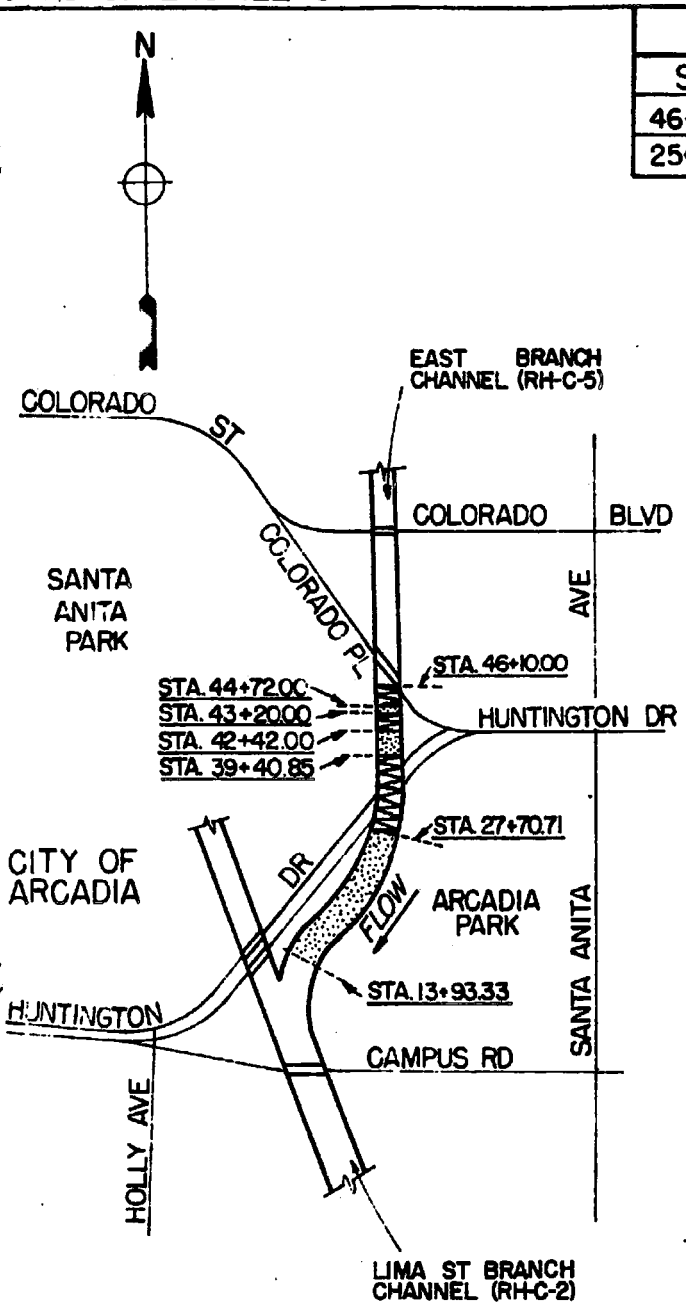
Along Channel
Earth berm roadway
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Fencing
Rights-of-way

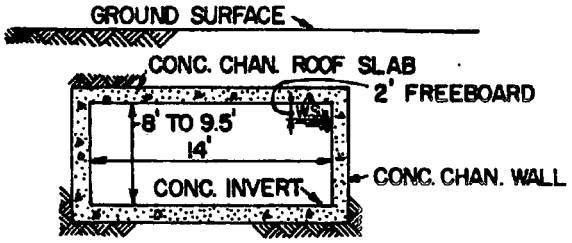
At A Channel Station
Side drain
Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

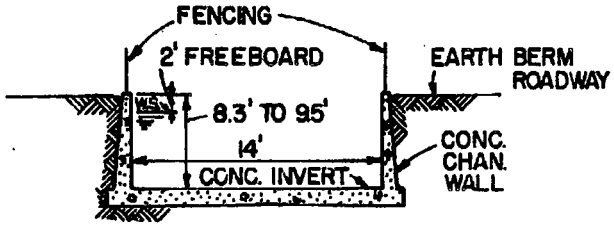
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
46+10.00	25+63.00	RECT	23.0-30.0	2,200
25+63.00	13+93.33	RECT	23.4-26.2	2,500





TYPICAL COVERED SECTION

AS NOTED



TYPICAL OPEN SECTION

STA. 46+10.00 TO STA. 13+93.33

LEGEND

- TYPICAL OPEN SECTION
- TYPICAL COVERED SECTION
- STREET BRIDGE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

EAST BRANCH CHANNEL

COLORADO PL TO HUNTINGTON PL

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-C-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-C-5

EAST BRANCH CHANNEL
Orange Grove Ave to Colorado Pl

Construction Data

Contract No:	DA 57-132	Start: 14 March 1957
	E. A. Irish	Finish: 31 January 1958
Specifications:	CIVENG 57-23	
Plans:	D.O. Series 159/49-87	
Folio Title:	ARCADIA WASH SYSTEM	
	East Branch--Orange Grove Ave to Colorado Pl	

Local Assurances

Resolution Dated: 3 April 1956
Operation and Maintenance Transferred to: LACFCD, 19 August 1958

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: None; use RH-C-2

To Right Berm: Foothill Blvd, Colorado Blvd
To Left Berm: Hacienda Dr, Foothill Blvd, Colorado Blvd, San Juan Dr

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Hacienda Dr	0	2	City of Arcadia
Foothill Blvd	0	2	City of Arcadia
Colorado Blvd	0	2	City of Arcadia
Sta 46+10	0	2	Private footbridge

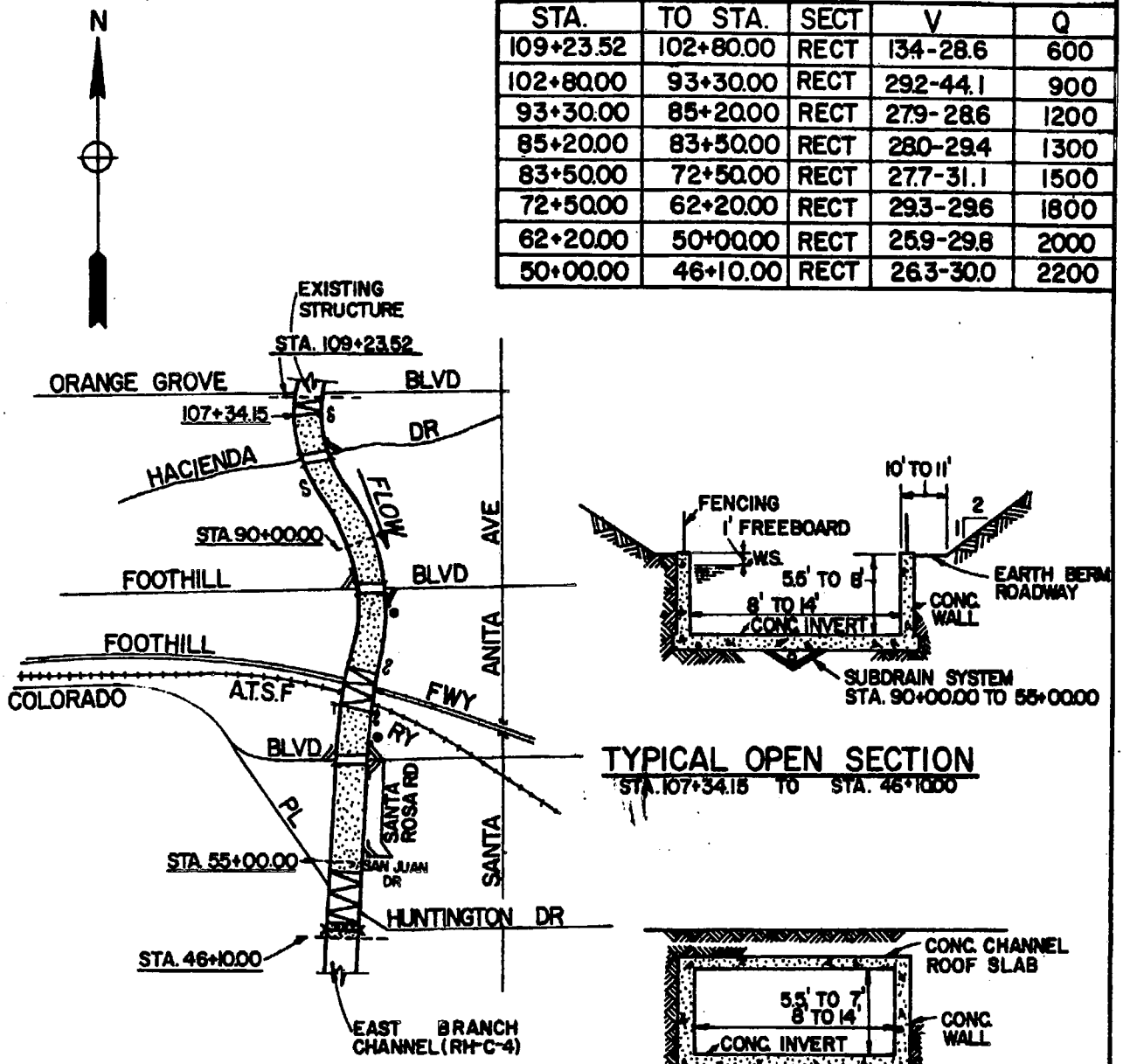
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Concrete channel roof slab	Subdrain manhole
Subdrain system	Public utility
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT	V	Q
109+23.52	102+80.00	RECT	13.4-28.6	600
102+80.00	93+30.00	RECT	29.2-44.1	900
93+30.00	85+20.00	RECT	27.9-28.6	1200
85+20.00	83+50.00	RECT	28.0-29.4	1300
83+50.00	72+50.00	RECT	27.7-31.1	1500
72+50.00	62+20.00	RECT	29.3-29.6	1800
62+20.00	50+00.00	RECT	25.9-29.8	2000
50+00.00	46+10.00	RECT	26.3-30.0	2200



TYPICAL OPEN SECTION

STA. 107+34.15 TO STA. 46+10.00

TYPICAL COVERED SECTION

AS NOTED

LEGEND

- OPEN SECTION
- COVERED SECTION
- FOOTBRIDGE
- STREET BRIDGE
- BERM-ACCESS RAMP
- BERM ROADWAY TURNAROUND
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

EAST BRANCH CHANNEL

ORANGE GROVE AVE TO COLORADO PL

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-C-5

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-C-6

AUBURN DEBRIS BASIN

Construction Data

Contract No:	DA 3664	Start:	13 September 1954
	T. M. Page Corp	Finish:	15 December 1954
Specifications:	CIVENG 55-8		
Plans:	D.O. Series 369/1-11		
Folio Title:	ARCADIA WASH SYSTEM Auburn Debris Basin		

Local Assurances

Resolution Dated: 21 June 1955
Operation and Maintenance Transferred to: LACFCD, 25 August 1955

Stormflow Data

Staff Gages: 5
Basin Staff Gage Elevation at One-third Design Discharge: 1277 ft msl

Access Roads

To Embankment: from Auburn Ave to top of embankment
To Basin: from east of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	542 ft	Length	158 ft
Crest Width	12 ft	Crest Width	30 ft
Crest Elevation	1283 ft msl	Crest Elevation	1275 ft msl
Side Slope	1 on 2.5	Design Capacity	900 cfs
Pool Drain:		**Intake Tower:**	
Length	136 ft	Top Elevation	1275 ft msl
Diameter	36 in	Height above Invert	17.2 ft
Design Capacity	210 cfs	Inside Dimensions	4 ft x 4 ft

Drainage Area: 0.21 sq mi
Debris Basin Capacity: 41,400 cu yds
Maximum Allowable Accumulation of Debris: 10,400 cu yds

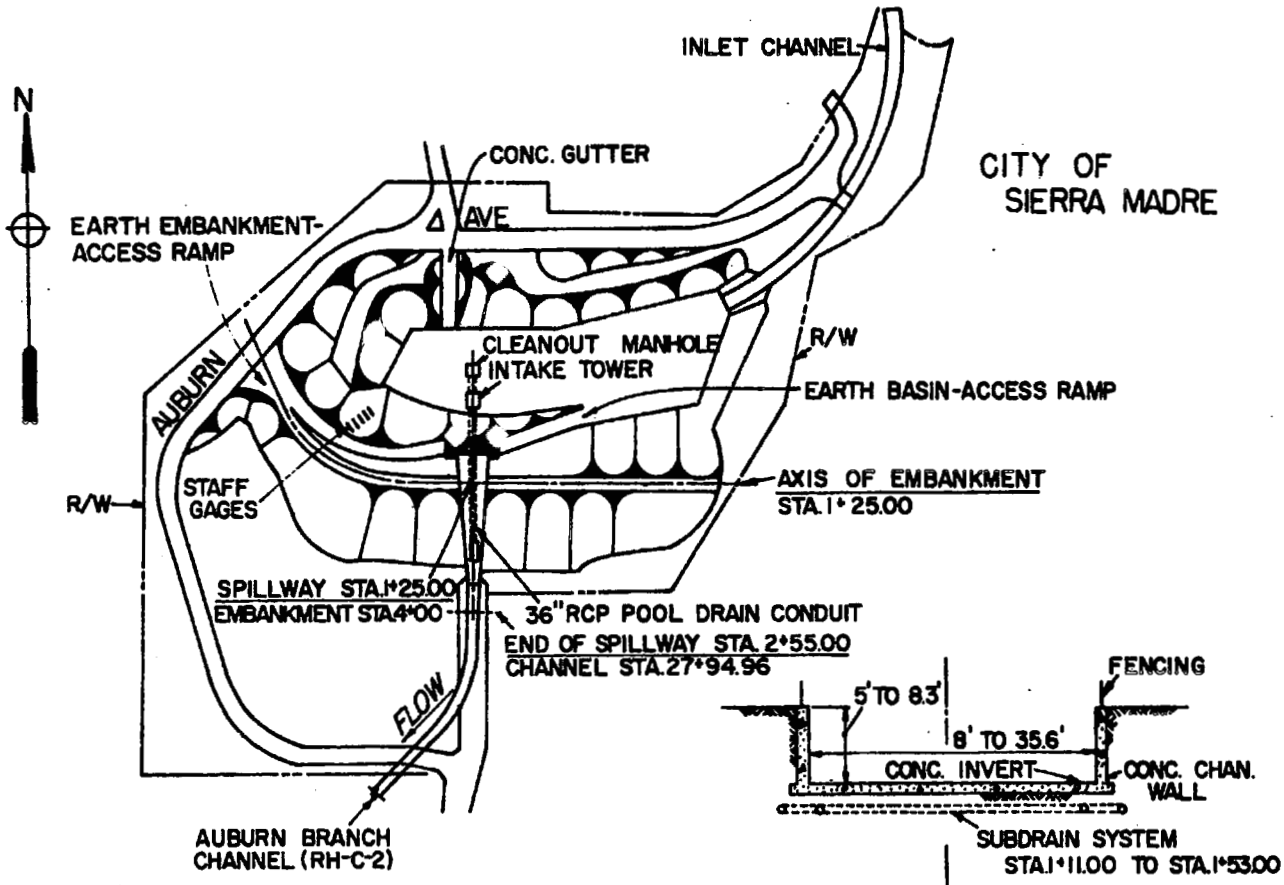
REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Stone spillway apron
Trashracks
Subdrain system
Fencing

Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

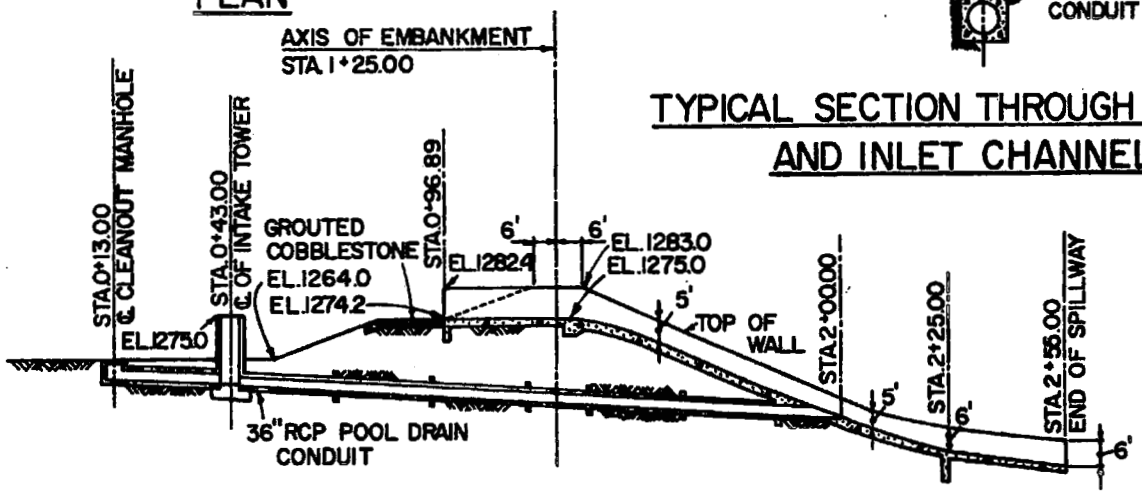
Inlet Channel
Concrete channel invert
Concrete channel walls
Side drain
Bridge

Embankment and Basin
Earth embankment
Earth embankment-access road
Earth basin-access ramp
Debris storage capacity
Staff gages
Subdrain system
Public utility
Fencing
Rights-of-way

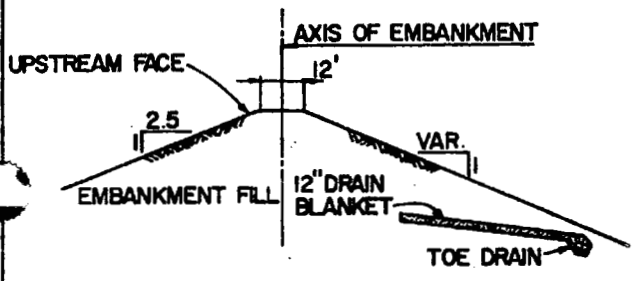


PLAN

TYPICAL SECTION THROUGH SPILLWAY AND INLET CHANNEL



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

AUBURN DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA RH-C-6

OPERATION AND MAINTENANCE MANUAL

DATA SHEET BAILEY DEBRIS BASIN
RH-C-7

Construction Data

Contract No:	DA 3664	Start:	13 September 1954
	T. M. Page Corp	Finish:	15 December 1954
Specifications:	CIVENG 55-8		
Plans:	D.O. Series 369/15-24		
Folio Title:	ARCADIA WASH SYSTEM Bailey Debris Basin		

Local Assurances
Resolution Dated: 21 June 1955
Operation and Maintenance Transferred to: LACFCD, 25 August 1955

Stormflow Data
Staff Gages: 10
Basin Staff Gage Elevation at One-third Design Discharge: 1157 ft msl

Access Roads

To Embankment:	from private road to top of embankment and west side of basin
To Basin:	from west side of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	585 ft	Length	257 ft
Crest Width	12 ft	Crest Width	30 ft
Crest Elevation	1166 ft msl	Crest Elevation	1155 ft msl
Side Slope	1 on 2.5	Design Capacity	2100 cfs
Pool Drain:		**Intake Tower:**	
Length	290 ft	Top Elevation	1156 ft msl
Diameter	36 in	Height above Invert	38.3 ft
Design Capacity	230 cfs	Inside Dimensions	4 ft x 4 ft

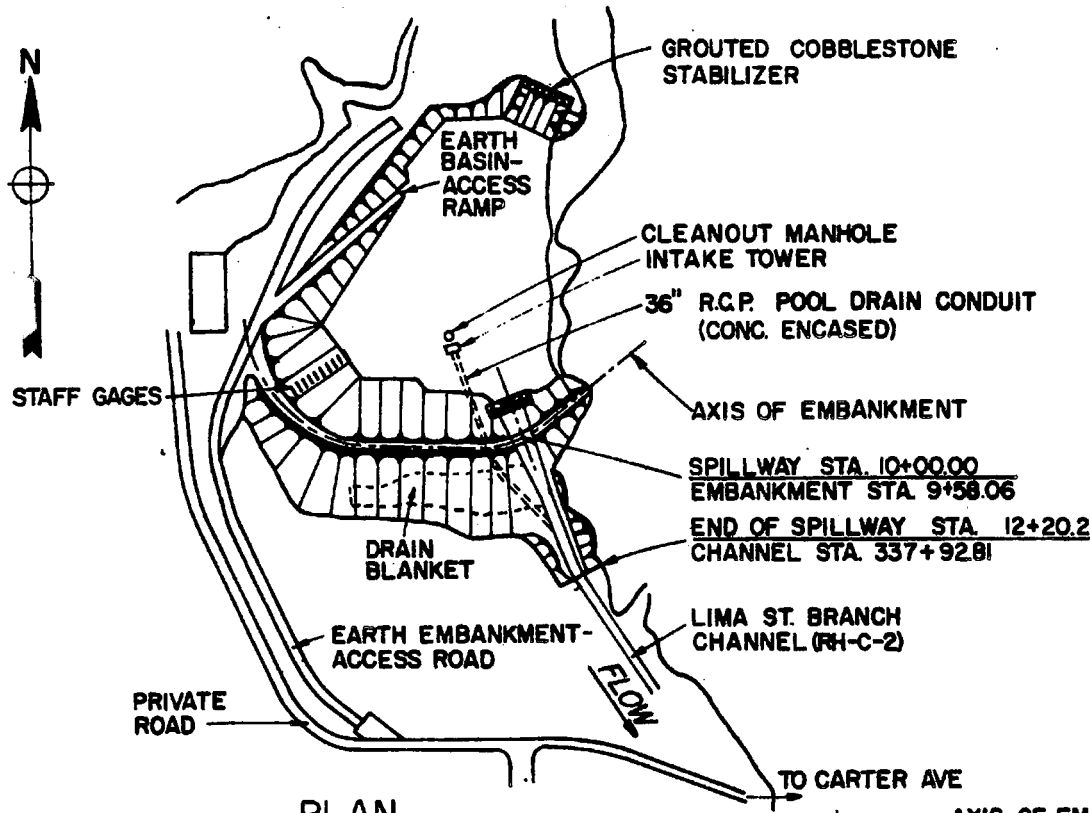
Drainage Area: 0.58 sq mi
Debris Basin Capacity: 128,900 cu yds
Maximum Allowable Accumulation of Debris: 31,900 cu yds

REPORTING FEATURES

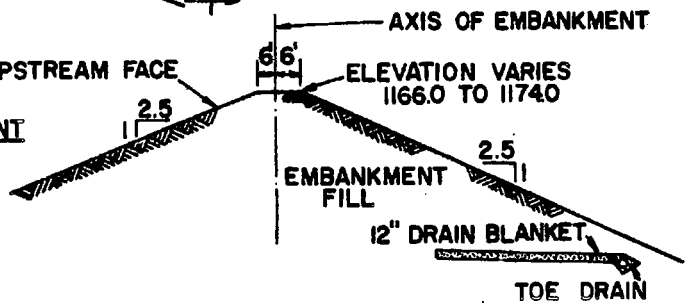
Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Stone spillway apron
Subdrain system
Fencing

Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

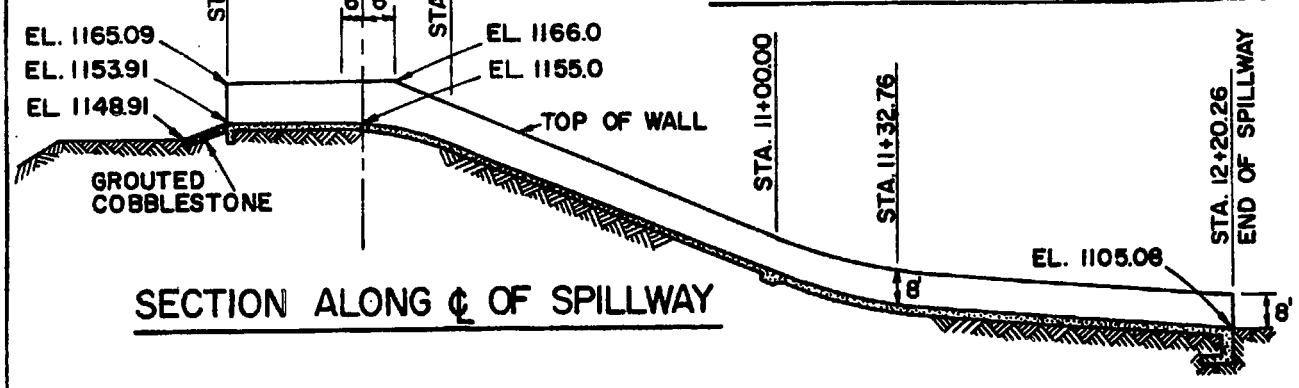
Embankment and Basin
Earth embankment
Earth embankment-access road
Earth basin-access ramp
Stone stabilizer
Subdrain system
Debris storage capacity
Staff gages
Fencing
Rights-of-way



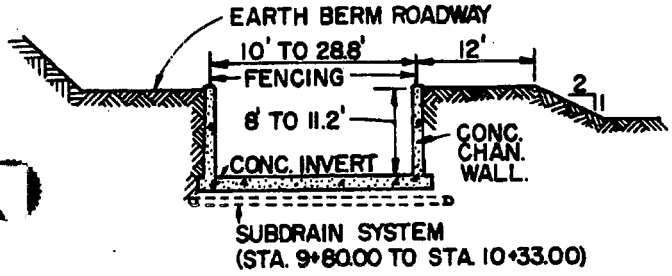
PLAN



TYPICAL EMBANKMENT SECTION



SECTION ALONG ℄ OF SPILLWAY



TYPICAL SECTION THROUGH SPILLWAY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BAILEY DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-C-7

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-C-8

CARTER DEBRIS BASIN

Construction Data

Contract No:	DA 3664	Start:	13 September 1954
	T. M. Page Corp	Finish:	15 December 1954
Specifications:	CIVENG 55-8		
Plans:	D.O. Series 369/28-37		
Folio Title:	ARCADIA WASH SYSTEM Carter Debris Basin		

Local Assurances

Resolution Dated: 21 June 1955
Operation and Maintenance Transferred to: LACFCD, 25 August 1955

Stormflow Data

Staff Gages: 6
Basin Staff Gage Elevation at One-third Design Discharge: 1240 ft msl

Access Roads

To Embankment:	from private road at intersection of Carter Ave and Baldwin Ave to top of embankment
To Basin:	from east side of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	164 ft	Length	210 ft
Crest Width	12 ft	Crest Width	30 ft
Crest Elevation	1245 ft msl	Crest Elevation	1238 ft msl
Side Slope	1 on 2.5	Design Capacity	500 cfs
Pool Drain:		**Intake Tower:**	
Length	183 ft	Top Elevation	1238 ft msl
Diameter	36 in	Height above Invert	22.0 ft
Design Capacity	200 cfs	Inside Dimensions	4 ft x 4 ft

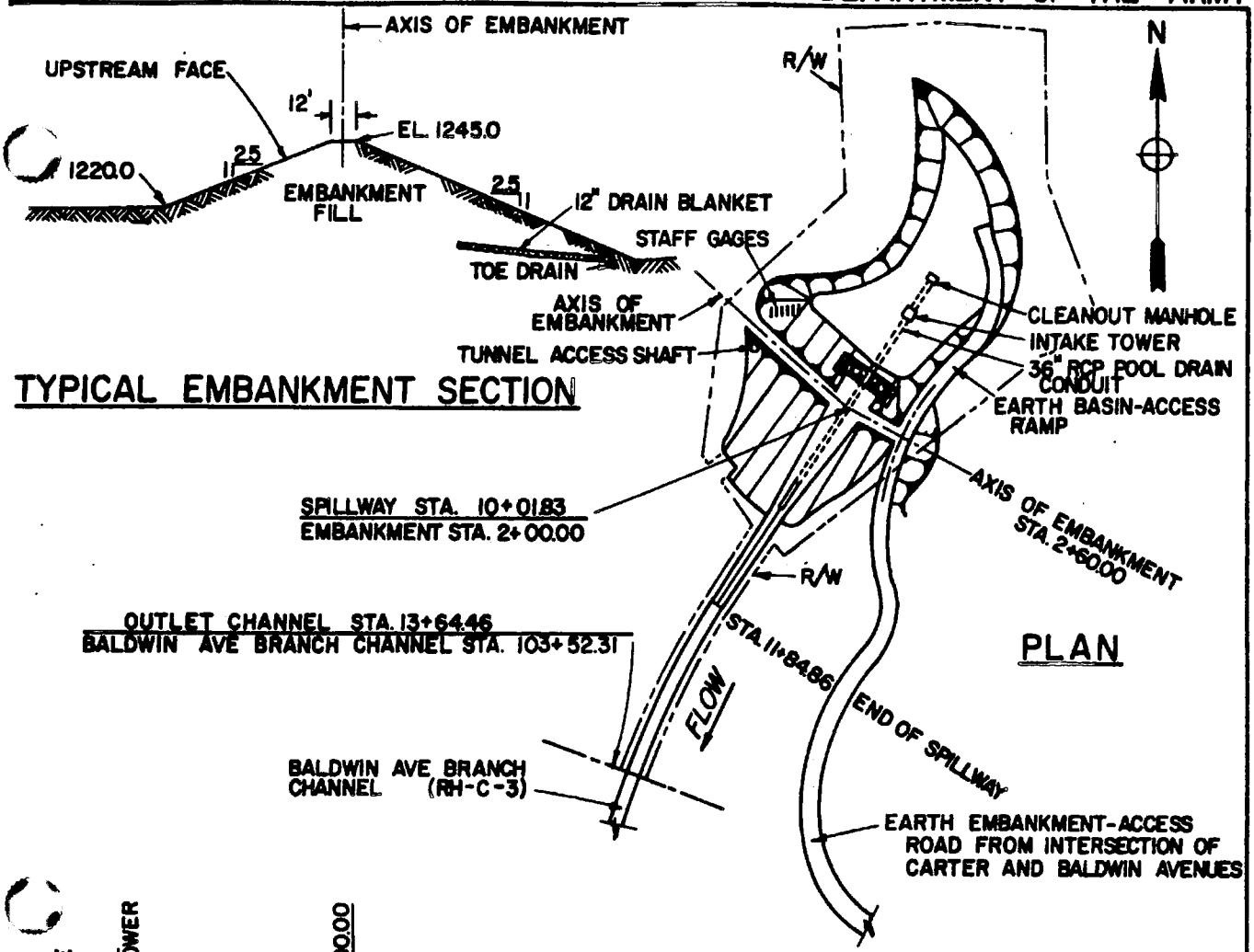
Drainage Area: 0.11 sq mi
Debris Basin Capacity: 18,700 cu yds
Maximum Allowable Accumulation of Debris: 4,700 cu yds

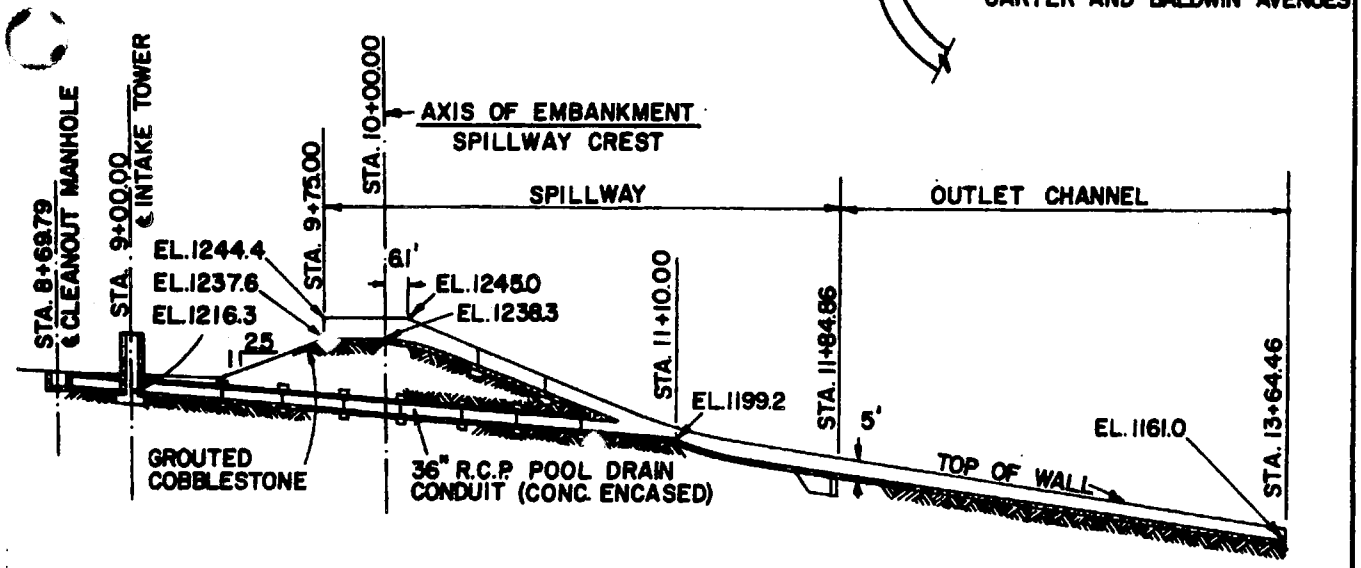
REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Stone spillway apron
Subdrain system
Fencing
Rights-of-way

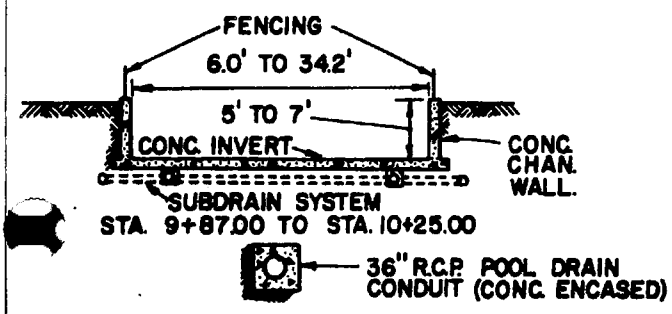
Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

Embankment and Basin
Earth embankment
Surfaced and earth embankment access roads
Earth basin-access ramp
Debris storage capacity
Staff gages
Subdrain system
Fencing
Rights-of-way





SECTION ALONG ℄ OF SPILLWAY AND OUTLET CHANNEL



TYPICAL SECTION THROUGH SPILLWAY AND OUTLET CHANNEL

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

CARTER DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-C-8

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-D-1

EATON WASH CHANNEL
Rosemead Blvd to Rio Hondo

Construction Data

Contract No:	DA-ENG-4326	Start: 24 March 1955
	Oberg Brothers Const Co	Finish: 14 March 1956
Specifications:	CIVENG 55-26	
Plans:	D.O. Series 156/1-70	
Folio Title:	EATON WASH CHANNEL Encinita Ave to Rio Hondo	

Local Assurances

Resolution Dated: 21 June 1955 and 3 April 1956
Operation and Maintenance Transferred to: LACFCD, 9 October 1956

Stormflow Data

Gaging Station Location: just upstream of Loftus Dr (sta 26+61)
Type: Recording (LACFCD--F318-R)
Staff Gage Reading at One-third Capacity: 4.3 ft on gage (5333 cfs)

Access Ramps

To Invert: none; use RH-D-2

To Right Berm:	Encinita Ave, Lower Azusa Rd, Temple City Blvd, Valley Blvd, Loftus Rd, San Bernardino Fwy
To Left Berm:	Encinita Ave, Lower Azusa Rd, Temple City Blvd, Valley Blvd, Loftus Rd, San Bernardino Fwy

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Encinita Ave	0	2	City of Temple City
Lower Azusa Rd	0	2	City of Temple City
Temple City Blvd	0	2	City of Temple City and City of El Monte
S.P. Ry	0	2	S.P.R.R.
Sta 58+50	0	0	Private bridge
Valley Blvd	0	2	County of Los Angeles
Loftus Rd	0	2	State of California
San Bernardino Fwy & P.E.Ry	0	2	State of California and P.E.R.R.
Sta 8+64	0	0	Utility crossing
Sta 7+47	0	0	Equestrian bridge

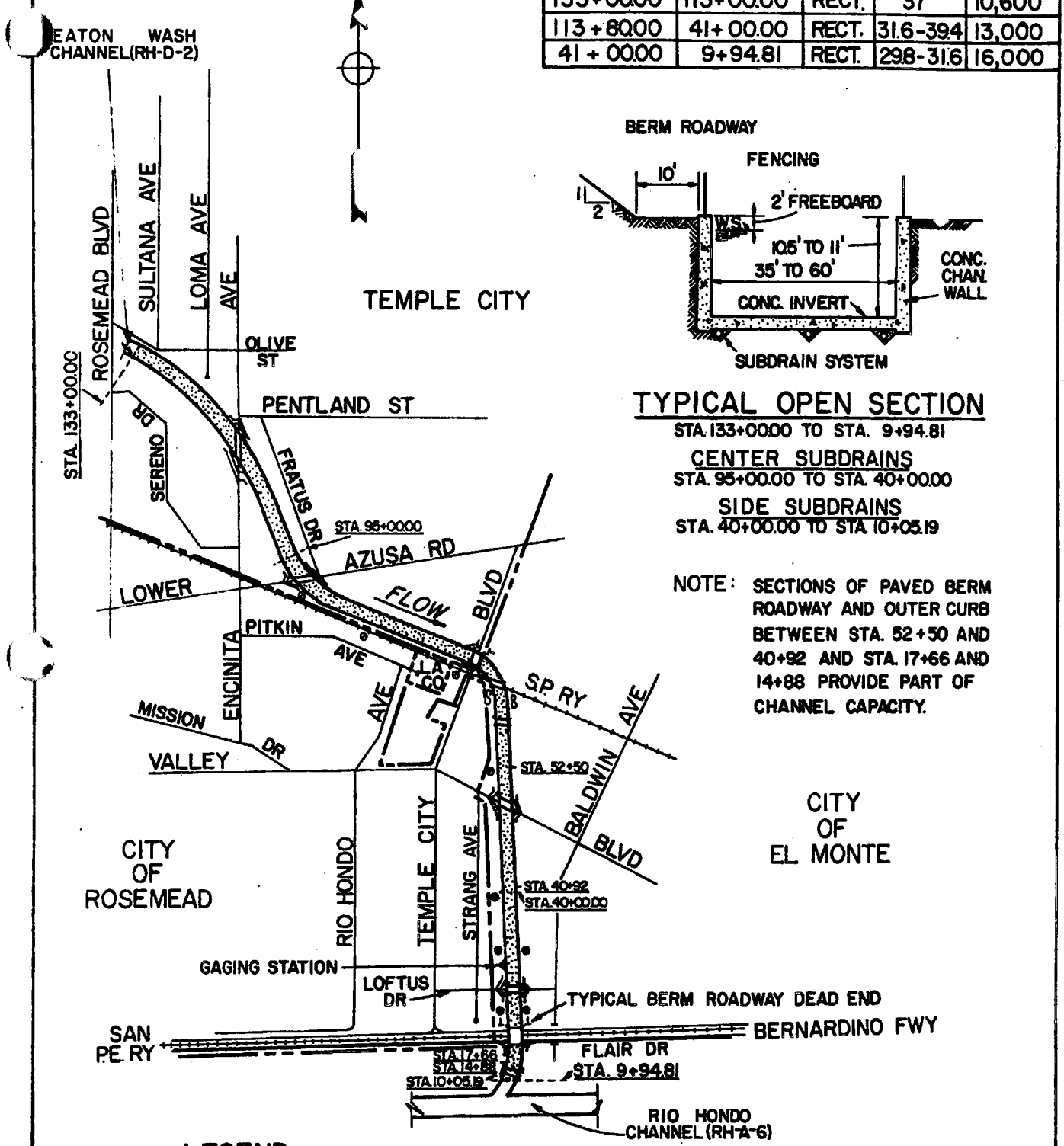
Reporting Features

Along Channel	At a Channel Station
Earth and surfaced berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Side overflow spillway
Subdrain system	Bridge
Fencing	Gaging station
Rights-of-way	Public utility
	Subdrain manhole

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT	V	Q
133+00.00	113+00.00	RECT.	37	10,600
113+80.00	41+00.00	RECT.	31.6-39.4	13,000
41+00.00	9+94.81	RECT.	29.8-31.6	16,000



TYPICAL OPEN SECTION

STA. 133+00.00 TO STA. 9+94.81

CENTER SUBDRAINS
STA. 95+00.00 TO STA. 40+00.00

SIDE SUBDRAINS
STA. 40+00.00 TO STA. 10+05.19

NOTE: SECTIONS OF PAVED BERM ROADWAY AND OUTER CURB BETWEEN STA. 52+50 AND 40+92 AND STA. 17+66 AND 14+88 PROVIDE PART OF CHANNEL CAPACITY.

LEGEND

- OPEN SECTION
- STREET BRIDGE
- BERM-ACCESS RAMP
- SUBDRAIN MANHOLE
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

EATON WASH CHANNEL
ROSEMEAD BLVD TO RIO HONDO

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-D-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-D-2

EATON WASH CHANNEL
Huntington Dr to Rosemead Blvd

Construction Data

Contract No:	DA 56-176	Start:	1 June 1956
	Oberg Brothers Const Co	Finish:	15 February 1957
Specifications:	CIVENG 56-44		
Plans:	D.O. Series 156/72-108, 165/1-19		
Folio Title:	EATON WASH CHANNEL Huntington Dr to Encinita Ave		

Local Assurances
Resolution Dated: 3 April 1956
Operation and Maintenance Transferred to: LACFCD, 14 May 1967

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: just above Duarte Rd (sta 234+50); at Wedgewood Ave (sta 153+14)

To Right Berm: at all street crossings
To Left Berm: at all street crossings

Bridges

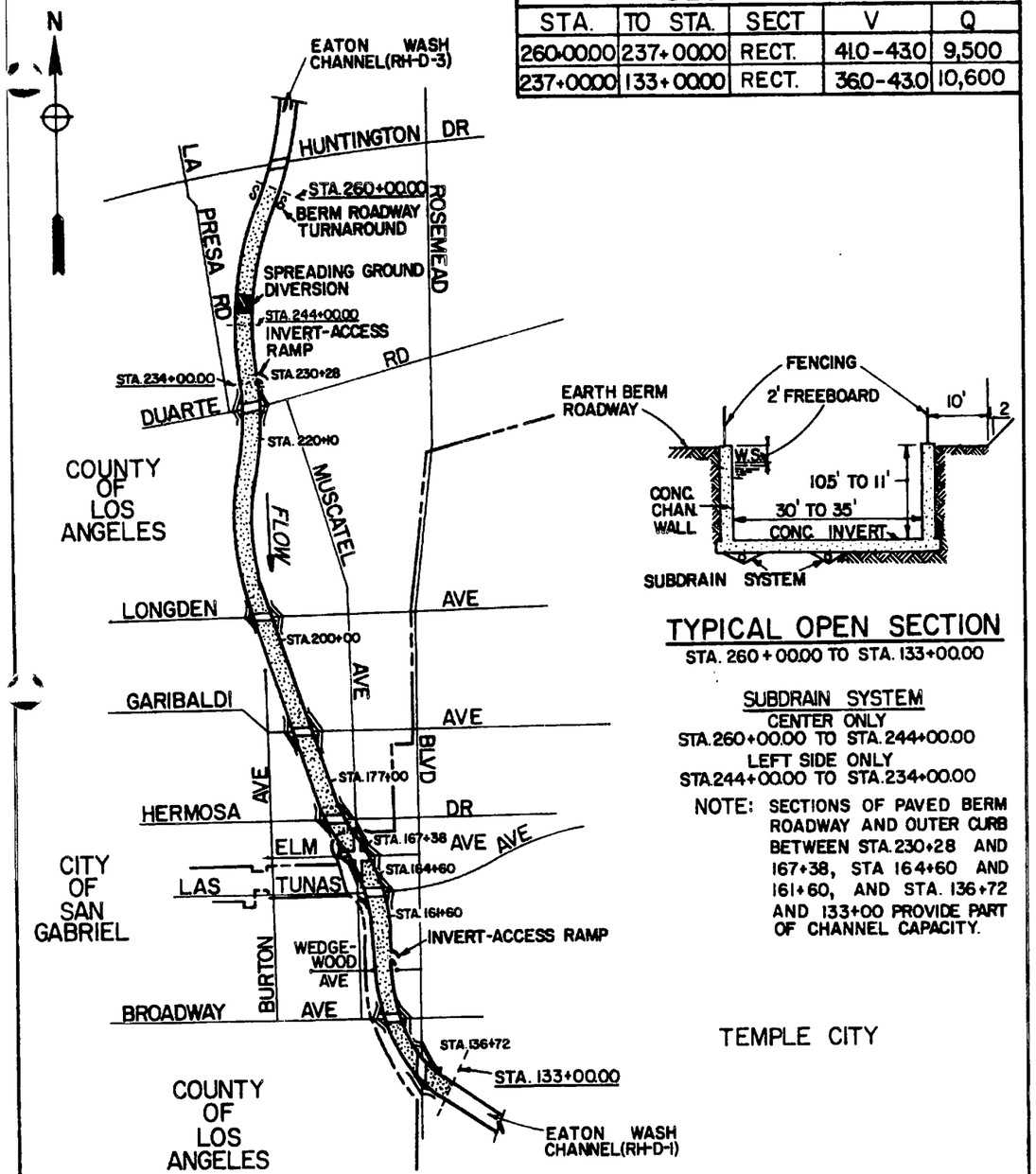
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Duarte Rd	0	0	Los Angeles County
Longden Ave	0	2	Los Angeles County
Garibaldi Ave	0	0	Los Angeles County
Hermosa Dr	0	2	Los Angeles County
Muscatel Ave	0	2	City of San Gabriel and Temple City
Elm Ave	0	2	City of San Gabriel and Temple City
Las Tunas Dr	0	1	Temple City
Broadway Ave	0	0	Temple City
Rosemead Blvd	0	2	Los Angeles County

Reporting Features

Along Channel	At a Channel Station
Earth and surfaced berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Subdrain system	Spreading grounds diversion
Fencing	Bridge
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
260+00.00	237+00.00	RECT.	41.0-43.0	9,500
237+00.00	133+00.00	RECT.	36.0-43.0	10,600



TYPICAL OPEN SECTION

STA. 260+00.00 TO STA. 133+00.00

SUBDRAIN SYSTEM
CENTER ONLY
STA. 260+00.00 TO STA. 244+00.00
LEFT SIDE ONLY
STA. 244+00.00 TO STA. 234+00.00

NOTE: SECTIONS OF PAVED BERM ROADWAY AND OUTER CURB BETWEEN STA. 230+28 AND 167+38, STA 164+60 AND 161+60, AND STA. 136+72 AND 133+00 PROVIDE PART OF CHANNEL CAPACITY.

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- ---- CONST. PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

EATON WASH CHANNEL
HUNTINGTON DR TO ROSEMEAD BLVD

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-D-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-D-3

EATON WASH CHANNEL
Eaton Dam to Huntington Dr

Construction Data

Contract No: DA 57-186 Start: 6 May 1957
E.A. Irish Finish: 18 April 1958

Specifications: CIVENG 57-29
Plans: D.O. Series 165/27-88
Folio Title: EATON WASH CHANNEL
Eaton Dam to Huntington Dr

Local Assurances

Resolution Dated: 3 April 1956
Operation and Maintenance Transferred to: LACFCD, 30 September 1958

Stormflow Data

Gaging Station Location: just downstream of Eaton Wash Dam (sta 405+73±); downstream of California St (sta 279+00)
Type: Recording (LACFCD--F271-R); recording
Staff Gage Reading at One-third Capacity: 2.2 ft on gage (1533 cfs); 3.5 ft on gage (3200 cfs)

Access Ramps

To Invert: from left berm downstream of Sierra Madre Blvd (south) (sta 386+08)

To Right Berm: Sierra Madre Blvd, Paloma St, Orange Grove Blvd, Foothill Blvd, Walnut St, Colorado Blvd, Del Mar St, California St
To Left Berm: Sierra Madre Blvd, Paloma St, Orange Grove Blvd, Foothill Blvd, Walnut St, Colorado Blvd, Del Mar St, California St

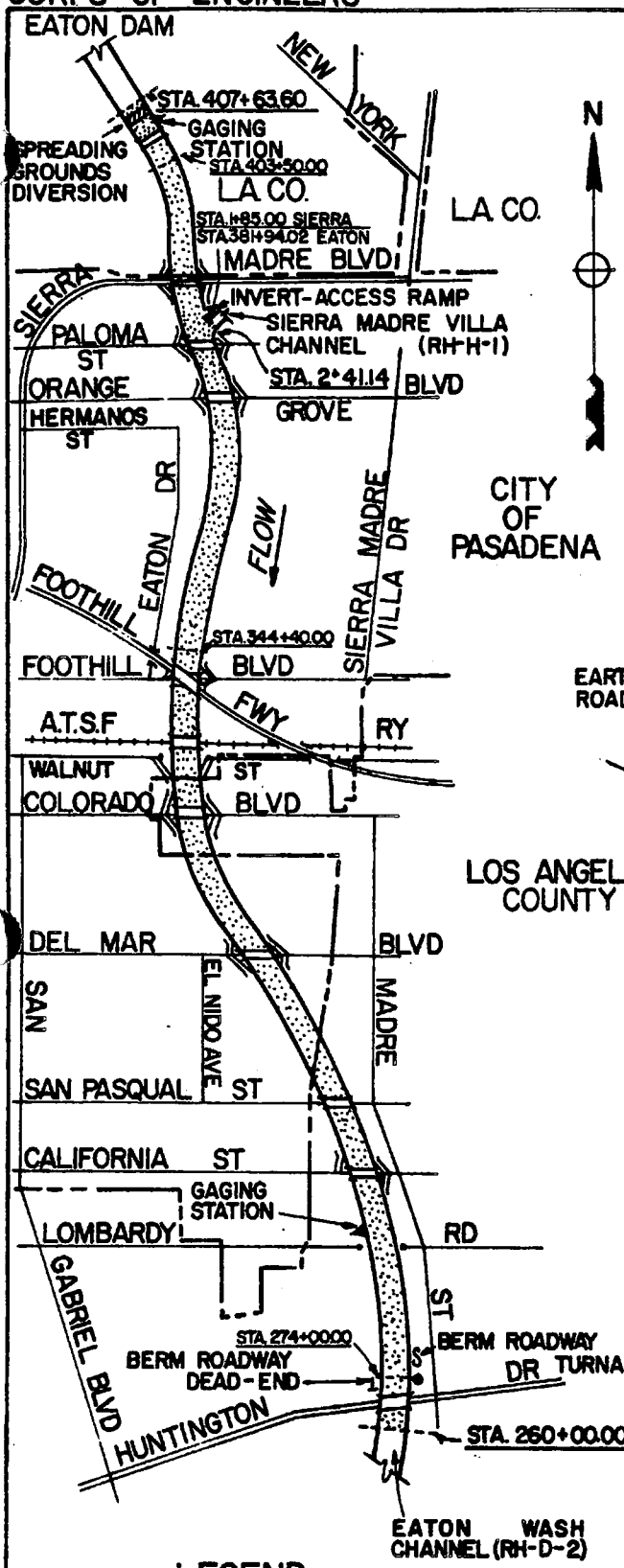
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 404+84	0	0	LACFCD
Sierra Madre Blvd (N)	0	2	Los Angeles County
Sierra Madre Blvd (S)	0	2	Los Angeles County
Paloma St	0	2	City of Pasadena
Orange Grove Blvd	0	0	City of Pasadena
Foothill Blvd	0	0	City of Pasadena
Foothill Fwy	0	0	State of California
A.T.S.F. Ry	0	0	A.T.S.F.R.R.
Colorado Blvd	0	1	Los Angeles County
Del Mar Blvd	0	0	City of Pasadena
San Pasqual St	0	0	City of Pasadena
California St	0	0	City of Pasadena
Huntington Dr	0	0	Los Angeles County

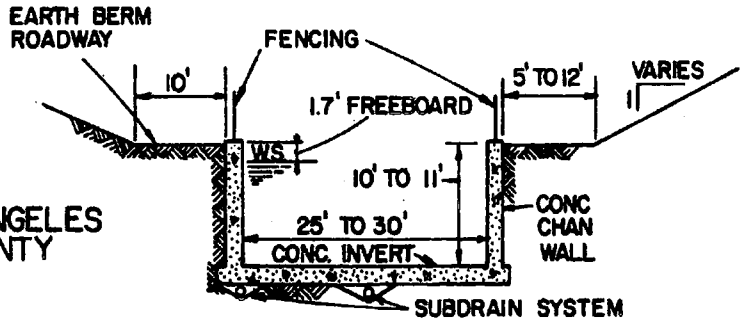
Reporting Features

Along Channel	At a Channel Station
Earth and surfaced berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Subdrain system	Bridge
Fencing	Gaging station
Rights-of-way	Spreading grounds diversion
	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



DESIGN DATA				
STA.	TO STA.	SECT	V	Q
407+63.60	381+42.00	RECT	18.6 - 39.5	6,600
381+42.00	328+63.72	RECT	31.8 - 44.6	8,500
328+62.72	260+00.00	RECT	39.3 - 45.3	9,600



TYPICAL OPEN SECTION

STA. 407+63.60 TO STA. 260+00.00

CENTER SUBDRAINS
STA. 274+00.00 TO STA. 260+00.00

LEFT SIDE SUBDRAINS
STA. 403+50.00 TO STA. 344+40.00

NOTE: SECTIONS OF PAVED BERM ROADWAY AND OUTER CURB BETWEEN STA. 328+33 AND 323+22 PROVIDE PART OF CHANNEL CAPACITY.

LEGEND

- TYPICAL OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- SUBDRAIN MANHOLE
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

EATON WASH CHANNEL
EATON DAM TO HUNTINGTON DR

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-D-3

DATA SHEET RH-D-4 — RUBIO CANYON DIVERSION CHANNEL

Construction Data

Contract No:	DA 59-21	Start: 1 October 1958
	A. Teichert and Son, Inc	Finish: 24 July 1959
Specifications:	CIVENG 59-1	
Plans:	D.O. Series 379/24-52	
Folio Title:	RUBIO CANYON DIVERSION CHANNEL,	

Local Assurances

Resolution Dated: 29 October 1957
Operation and Maintenance Transferred to: LACFCD, 15 December, 1959

Stormflow Data

Gaging Station Location: immediately upstream of Crest Dr (sta 56+75)
Type: Recording (LACFCD-F338-R)
Staff Gage Reading at One-third Capacity: 2.1 ft on gage 1033 cfs)

Access Ramps

To Invert: none; use RH-D-3

To Right Berm: none
To Left Berm: Crest Dr

Bridges

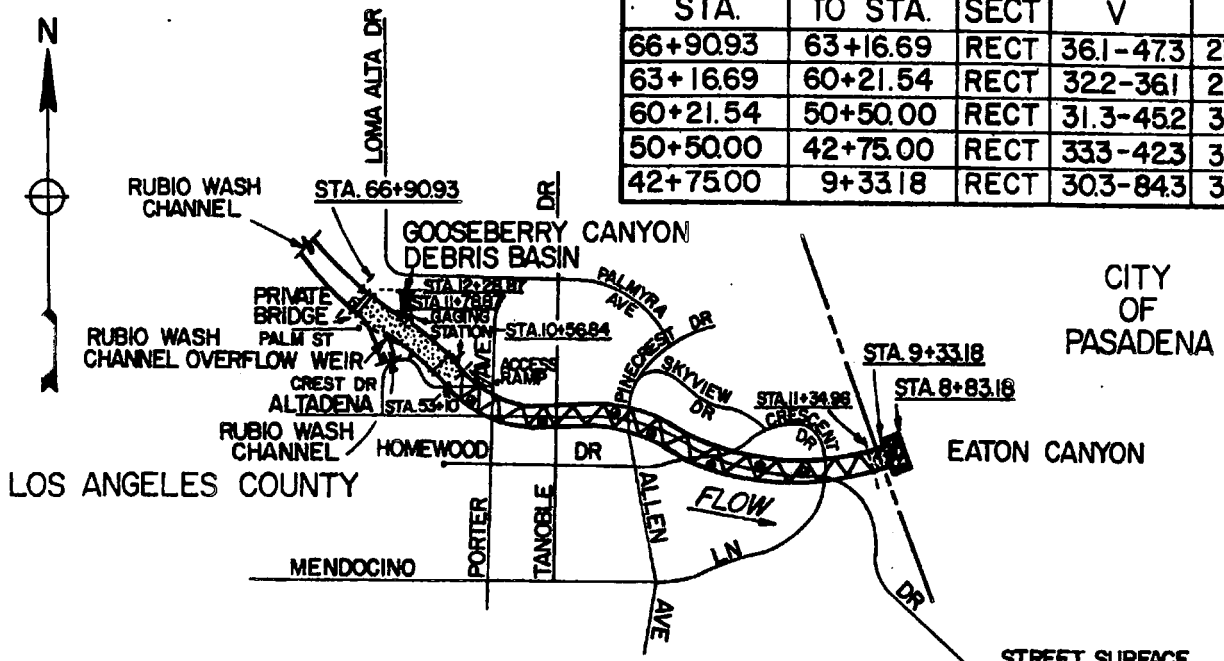
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 65+96	0	1	Private bridge
Sta 56+75	0	0	LACFCD (gaging station footbridge)

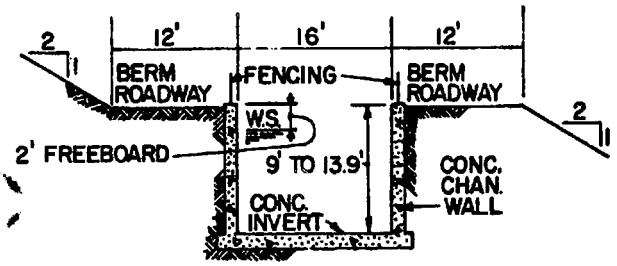
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Channel inspection manhole
Concrete channel roof slab	Concrete confluence section
Earth levee	Side overflow spillway
Fencing	Gaging Station
Rights-of-way	Surfaced side drainage entrance
	Bridge
	Trashracks
	Public utility

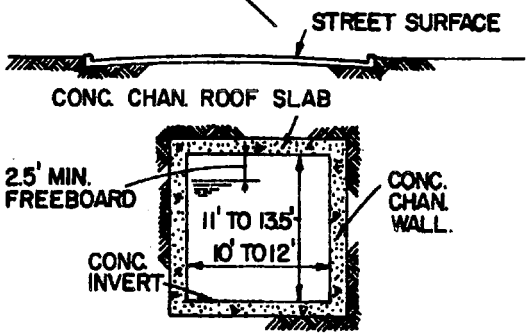
DESIGN DATA

STA.	TO STA.	SECT	V	Q
66+90.93	63+16.69	RECT	36.1-47.3	2300
63+16.69	60+21.54	RECT	32.2-36.1	2600
60+21.54	50+50.00	RECT	31.3-45.2	3100
50+50.00	42+75.00	RECT	33.3-42.3	3300
42+75.00	9+33.18	RECT	30.3-84.3	3500

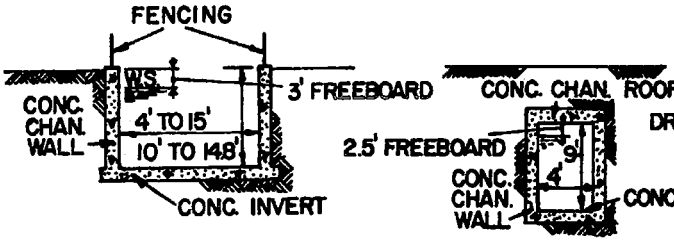




OPEN SECTION
STA. 66+90.93 TO STA. 53+10.00

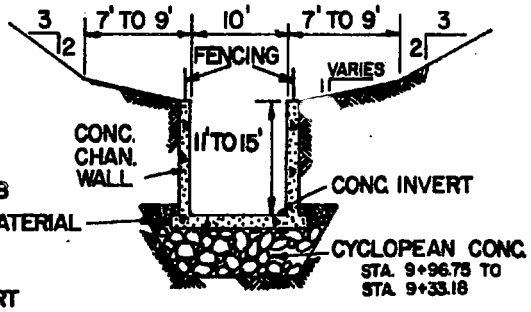


COVERED SECTION
STA. 53+10.00 TO STA. 11+34.96



OPEN SECTION
STA. 12+28.87 TO STA. 11+78.87

COVERED SECTION
STA. 11+78.87 TO STA. 10+56.84



OPEN CHUTE SECTION
STA. 11+34.96 TO STA. 9+33.18

TYPICAL SECTIONS
GOOSEBERRY CANYON INLET CHANNEL

TYPICAL SECTIONS
RUBIO CANYON DIVERSION CHANNEL

LEGEND

- OPEN SECTION
- COVERED SECTION
- CHANNEL INSPECTION MANHOLE
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RUBIO CANYON DIVERSION CHANNEL

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-E-1

RUBIO WASH CHANNEL

Construction Data

Contract No: 13-130
Start: September 1935
Finish: October 1936
Plans: D.O. Series 73/1-25, 74/1-33, 75/1
Folio Title: RUBIO WASH

Local Assurances

Resolution Dated: 7 August 1935
Operation and Maintenance Transferred to: LACFCD, 13 October 1937

Stormflow Data

Gaging Station Location: at Glendon Way (sta 102+75)
Type: Recording (LACFCD--F82-R)
Staff Gage Reading at One-third Capacity: 3.6 ft on gage (4,500 cfs)

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Lorain Rd	0	0	City of San Marino
Rose Ave	0	0	City of San Marino
Longden Dr	0	0	Los Angeles County
S.F. Ry	0	0	S.F.R.R.
Grand Ave	0	0	City of Rosemead
Mission Dr	0	0	City of Rosemead
Wells St	0	0	City of Rosemead
Valley Blvd	0	0	City of Rosemead
Walnut Grove Ave	0	0	County of Los Angeles
Marshall St	0	0	City of Rosemead
Sta 102+75	0	0	LACFCD (gaging station footbridge)
San Bernardino Fwy	0	0	State of California

Reporting Features

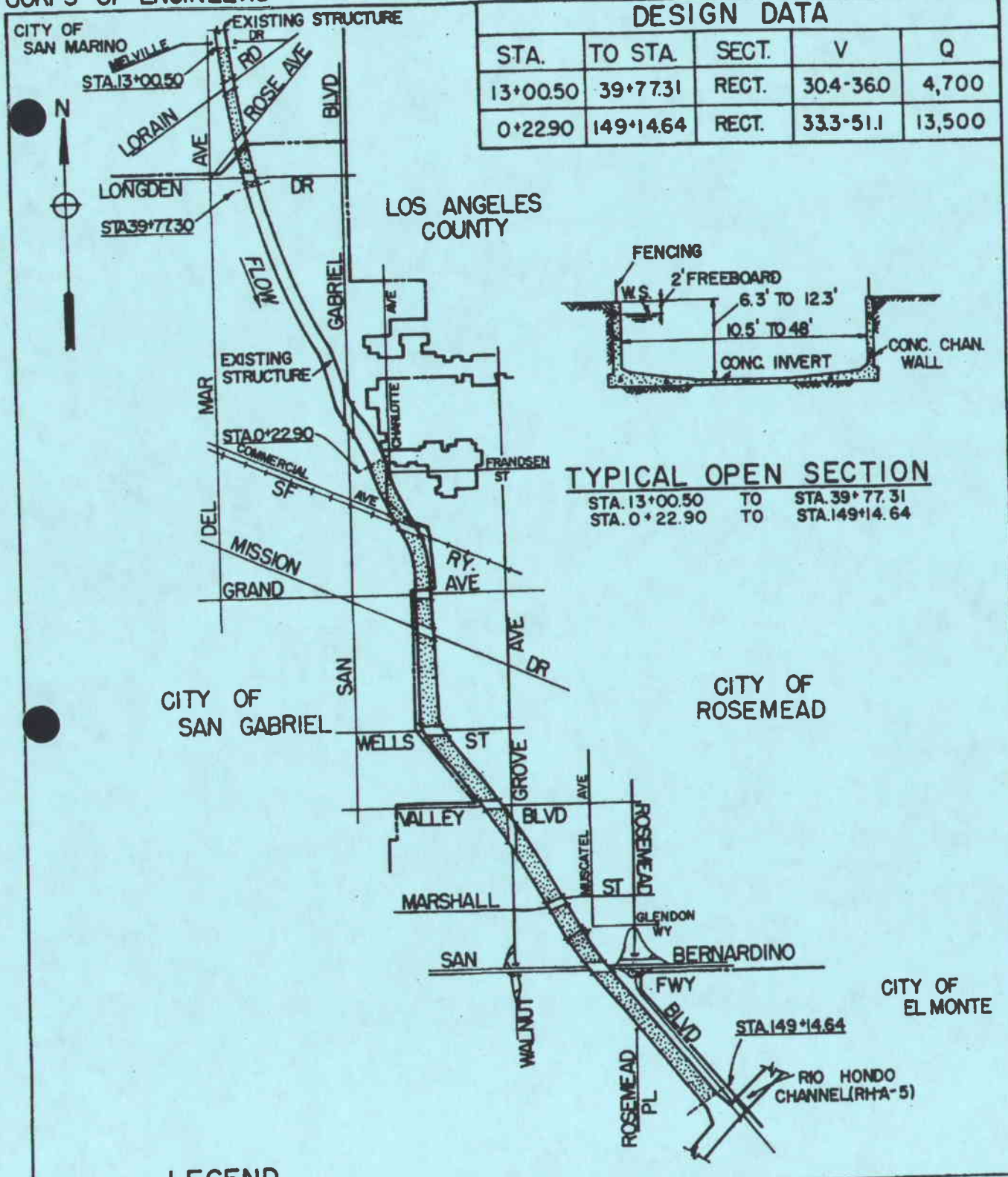
Along Channel	At a Channel Station
Concrete channel walls	Gaging station
Concrete channel invert	Bridge
Fencing	Side drain
Rights-of-way	Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
13+00.50	39+77.31	RECT.	30.4-36.0	4,700
0+22.90	149+14.64	RECT.	33.3-51.1	13,500



TYPICAL OPEN SECTION

STA. 13+00.50 TO STA. 39+77.31
STA. 0+22.90 TO STA. 149+14.64

LEGEND

- OPEN SECTION
- STREET BRIDGE
- GAGING STATION
- FOOTBRIDGE
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

RUBIO WASH CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA RH-E-1

DATA SHEET
RH-F-1

SANTA ANITA WASH CHANNEL
A.T.S.F. Ry to Rio Hondo

Construction Data

Const. Limits:	STA 150+00.00 TO STA 38+80.00	STA 38+80.00 TO STA 38+18.54
Contract No:	DA 58-136	DA 59-89
	A. Teichert and Sons, Inc	Fredericksen and Kasler
Start:	16 April 1958	7 April 1959
Finish:	25 January 1959	19 November 1959
Specifications:	CIVENG 58-15	CIVENG 59-20
Plans:	D.O. Series 367/64-105	D.O. Series 105/53-100
Folio Title:	SANTA ANITA WASH CHANNEL	UPPER RIO HONDO CHANNEL
	A.T.S.F. Ry to Rio Hondo	Peck Rd to Lower Azusa Rd

Local Assurances

Resolution Dated:	3 September 1957	22 July 1958
O&M Transferred to:	31 March 1959 (LACFCD)	29 August 1960 (LACFCD)

Stormflow Data

Gaging Station Location: immediately upstream of Longden Ave (sta 74+17±)
Gage Type: Recording (LACFCD-F193B-R)
Staff Gage Reading at One-third Capacity: 5.2 ft on gage (5,167 cfs)

Access Ramps

To Invert: from left berm approximately 1500 ft downstream of Live Oak Ave (sta 39+60±)

To Right Berm: Duarte Rd, Camino Real, Longden Ave, Live Oak Ave
To Left Berm: Duarte Rd, Camino Real, Longden Ave, Live Oak Ave

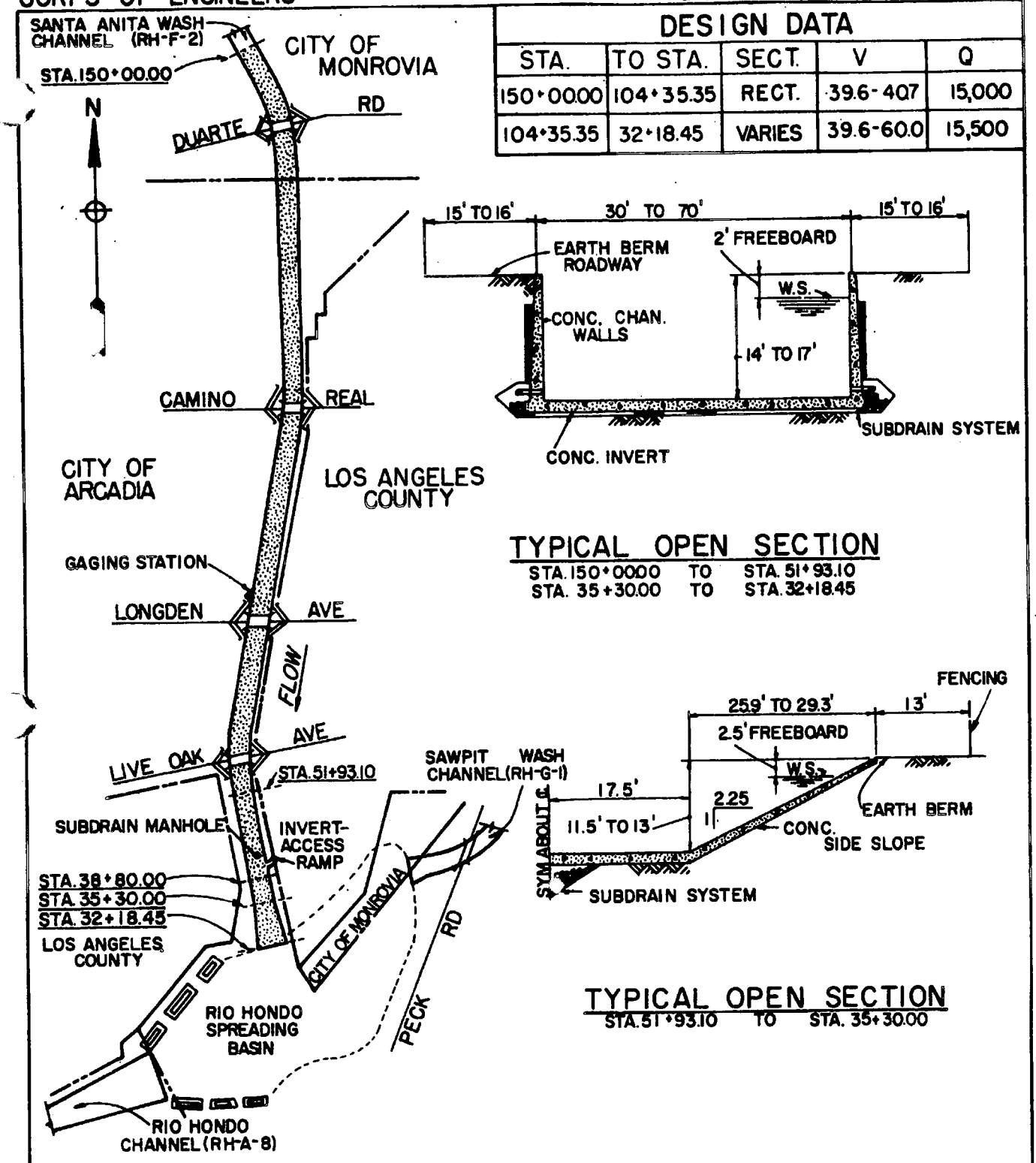
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Duarte Rd	0	0	City of Monrovia
Camino Real	0	2	City of Arcadia
Longden Ave	0	2	Los Angeles County and City of Arcadia
Live Oak Ave	0	2	Los Angeles County and City of Arcadia

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Concrete channel side slopes	Bridge
Subdrain system	Gaging station
Fencing	Equestrian tunnel
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



DESIGN DATA

STA.	TO STA.	SECT.	V	Q
150+00.00	104+35.35	RECT.	39.6-40.7	15,000
104+35.35	32+18.45	VARIES	39.6-60.0	15,500

TYPICAL OPEN SECTION

STA. 150+00.00 TO STA. 51+93.10
STA. 35+30.00 TO STA. 32+18.45

TYPICAL OPEN SECTION

STA. 51+93.10 TO STA. 35+30.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SANTA ANITA WASH CHANNEL
A.T.S.F. RY TO RIO HONDO

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-F-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-F-2

SANTA ANITA WASH CHANNEL
Debris Basin to A.T.S.F. Ry

Construction Data

Contract No:	DA 59-98	Start: 30 March 1959
	MacDonald and Kruse	Finish: 26 January 1960
Specifications:	CIVENG 59-19	
Plans:	D.O. Series 186/1-72	
Folio Title:	SANTA ANITA WASH CHANNEL IMPROVEMENT Debris Basin to A.T.S.F. Ry	

Local Assurances

Resolution Dated: 3 September 1957
Operation and Maintenance Transferred to: LACFCD, 18 April 1960

Stormflow Data

Gaging Station Location: downstream of Foothill Blvd (sta 210+50)
Type: Recording (LACFCD-F260C-R)
Staff Gage Reading at One-third Capacity: 5.1 ft on gage (4,833 cfs)

Access Ramps

To Invert: through right wall from Colorado Blvd (sta 201+31±)

To Right Berm:	Highland Oaks Dr immediately upstream and downstream of Sierra Madre Wash Inlet confluence, Sycamore Ave, Colorado Blvd, Second Ave, Fifth Ave
To Left Berm:	Sycamore Ave, Foothill Blvd, Second Ave, Colorado Blvd, Fifth Ave, Huntington Dr

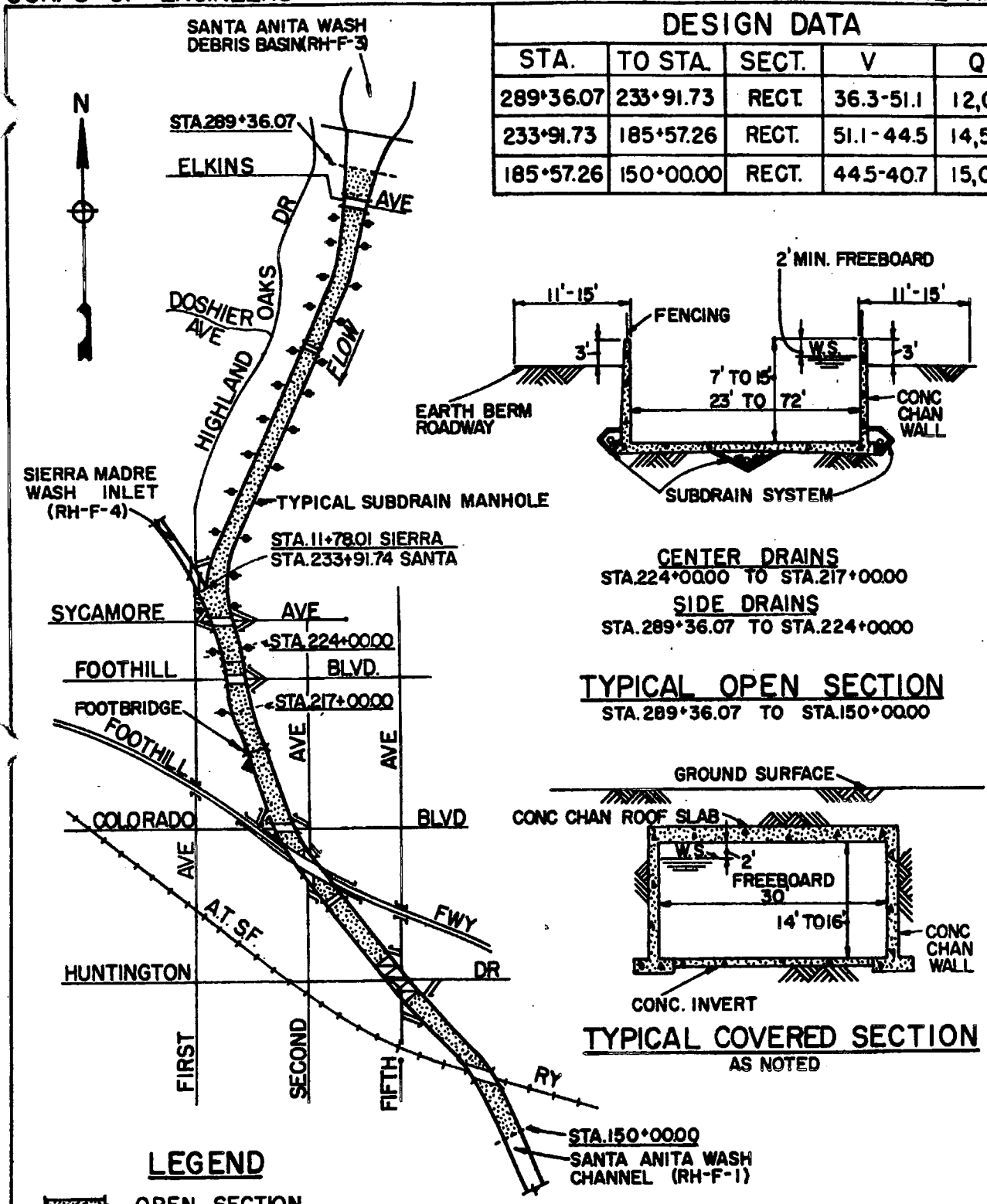
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Elkins Ave	0	2	City of Arcadia
Doshier Ave	0	2	City of Arcadia
Sycamore Ave	0	2	City of Arcadia
Sta 223+20	0	0	Los Angeles County (equestrian bridge)
Foothill Blvd	0	1	State of California
Sta 211+50	0	0	LACFCD (gaging station footbridge)
Colorado Blvd	0	0	City of Arcadia
Second Ave	0	0	City of Arcadia
Foothill Fwy	0	0	State of California
Sta 187+00	0	2	Peter Kiewit Son's Co

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Surfaced side drain entrance
Concrete channel roof slab	Side drain
Subdrain system	Bridge
Fencing	Gaging station
Rights-of-way	Equestrian tunnel
	Subdrain manhole
	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



DESIGN DATA

STA.	TO STA.	SECT.	V	Q
289+36.07	233+91.73	RECT.	36.3-51.1	12,000
233+91.73	185+57.26	RECT.	51.1-44.5	14,500
185+57.26	150+00.00	RECT.	44.5-40.7	15,000

CENTER DRAINS
STA. 224+00.00 TO STA. 217+00.00

SIDE DRAINS
STA. 289+36.07 TO STA. 224+00.00

TYPICAL OPEN SECTION
STA. 289+36.07 TO STA. 150+00.00

TYPICAL COVERED SECTION
AS NOTED

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL INVERT-ACCESS RAMP
- TYPICAL BERM-ACCESS RAMP
- GAGING STATION
- COVERED SECTION
- ----- CONST. PROJECT LIMIT
- —— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SANTA ANITA WASH CHANNEL DEBRIS BASIN TO A.T.S.F. RY.

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-F-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-F-3

SANTA ANITA DEBRIS BASIN

Construction Data

Contract No:	DA 59-98	Start: 30 March 1959
	MacDonald and Kruse	Finish: 26 January 1960
Specifications:	CIVENG 59-19	
Plans:	D.O. Series 186/1-72	
Folio Title:	SANTA ANITA WASH CHANNEL IMPROVEMENT Debris Basin to A.T.S.F. Ry	

Local Assurances

Resolution Dated: 3 September 1957
operation and Maintenance Transferred to: LACFCD, 18 April 1960

Stormflow Data

Staff Gages: 9
Basin Staff Gage Elevation at One-third Design Discharge: 777 ft msl

Access Roads

To Embankment:	from Elkins Ave and Forest Service Road to top of embankment
To Basin:	from Forest Service Road along west side of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	955 ft	Length	702 ft
Crest Width	20 ft	Crest Width	160 ft
Crest Elevation	796 ft msl	Crest Elevation	775 ft msl
Side Slope	1 on 2	Design Capacity	38,000 cfs
Pool Drain:		Intake Tower:	
Length	284 ft	Top Elevation	781 ft msl
Diameter	48 in	Height above Invert	32 ft
Design Capacity	400 cfs	Inside Dimensions	4 ft x 5 ft

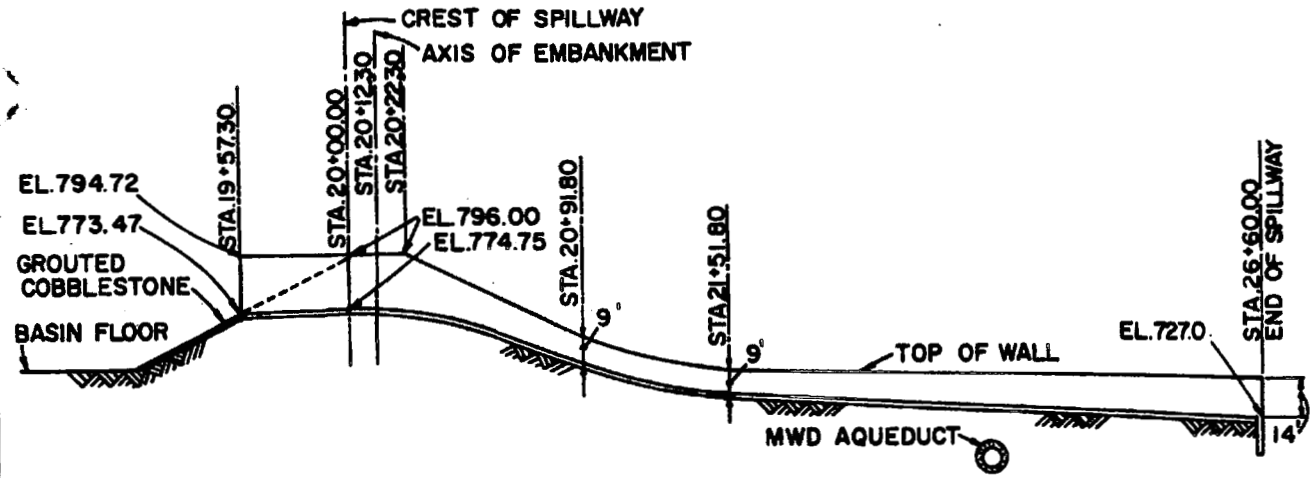
Drainage Area: 2.0 sq mi
Debris Basin Capacity: 374,000 cu yds
Maximum Allowable Accumulation of Debris: 94,000 cu yds

REPORTING FEATURES

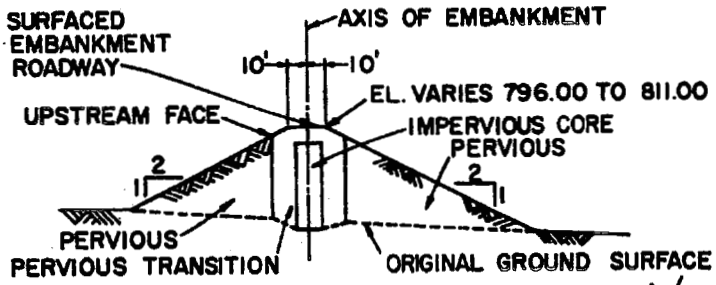
Spillway and Outlet Channel
Broadcrest concrete spillway
Stone spillway apron
Earth berm roadway
Concrete channel invert
Concrete channel walls
Spreading ground diversion
Subdrain system
Public utility
Fencing

Outlet Works
Intake tower
Concrete pool drain conduit (gated)
Bridge

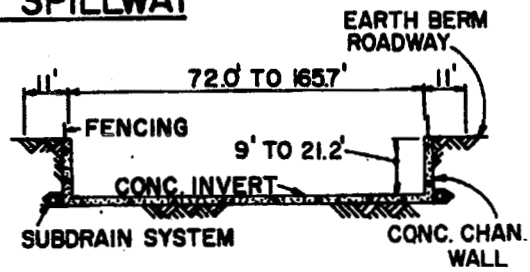
Embankment and Basin
Earth embankment
Earth embankment-access road
Earth basin-access ramp
Surfaced embankment roadway
Inlet structure
Bridge
Debris storage capacity
Staff gages
Surfaced drain entrance
Rights-of-way
Fencing



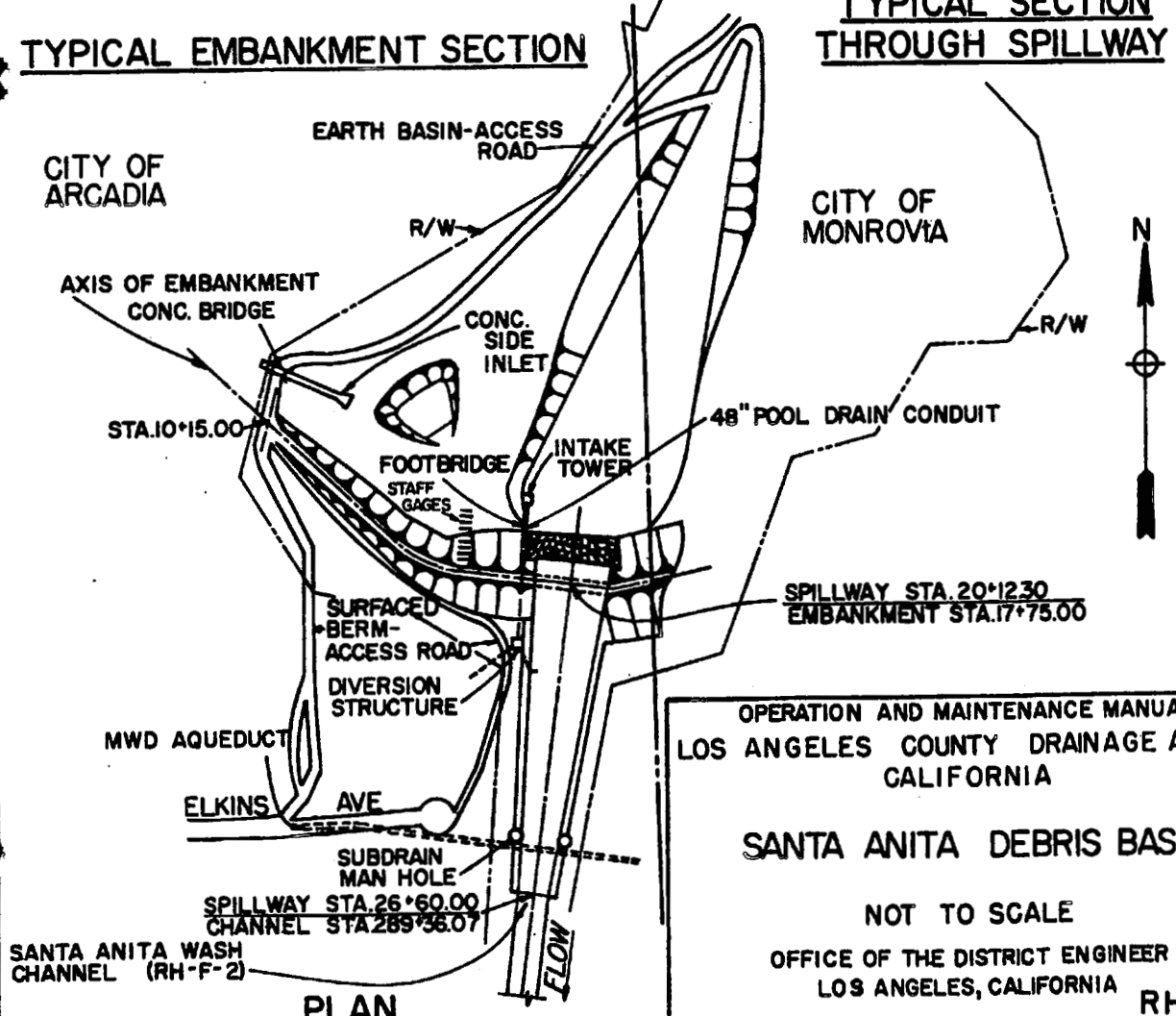
SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION



TYPICAL SECTION THROUGH SPILLWAY



PLAN

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SANTA ANITA DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET SIERRA MADRE WASH INLET
RH-F-4

Construction Data

Contract No:	DA 59-98	Start:	30 March 1959
	MacDonald and Kruse	Finish:	26 January 1960
Specifications:	CIVENG 59-19		
Plans:	D.O. Series 186/1-72		
Folio Title:	SANTA ANITA WASH CHANNEL IMPROVEMENT Debris Basin to A.T.S.F. Ry		

Local Assurances
Resolution Dated: 3 September 1957
Operation and Maintenance Transferred to: LACFCD, 18 April 1960

Stormflow Data
Gaging Station Location: immediately upstream of Highland Oaks Dr (sta 15+50)
Type: Recording (LACFCD--F267-R)
Staff Gage Reading at One-third Capacity: 3.8 ft on gage (1267 cfs)

Access Ramps

To Invert:	none; use RH-F-2
To Right Berm:	Highland Oaks Dr
To Left Berm:	Oakwood Dr, Highland Oaks Dr

Bridges

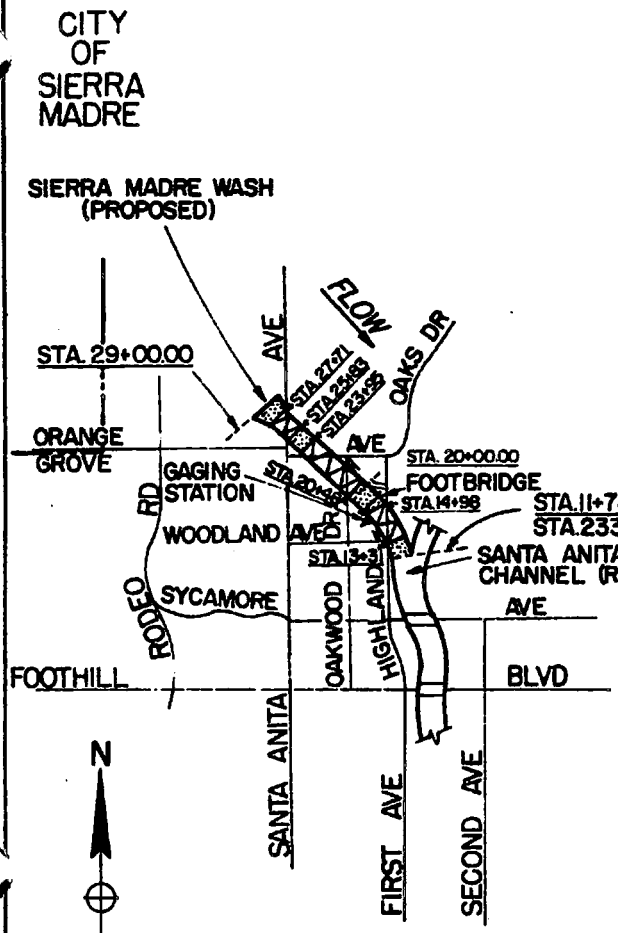
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 15+50	0	0	LACFCD (gaging station footbridge)

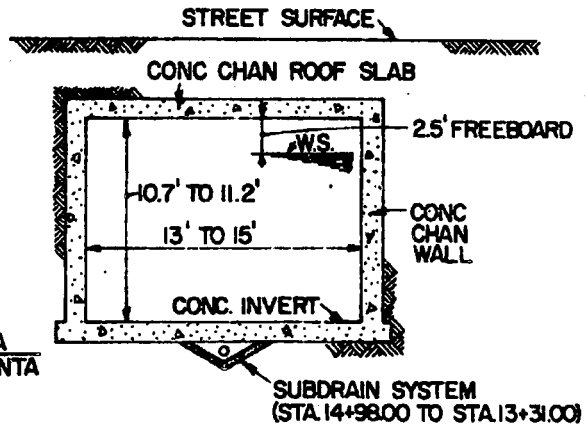
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Side drain
Concrete channel invert	Earth berm-access ramp
Concrete channel walls	Gaging station
Concrete channel roof slab	Bridge
Subdrain system	Public utility
Fencing	
Rights-of-way	

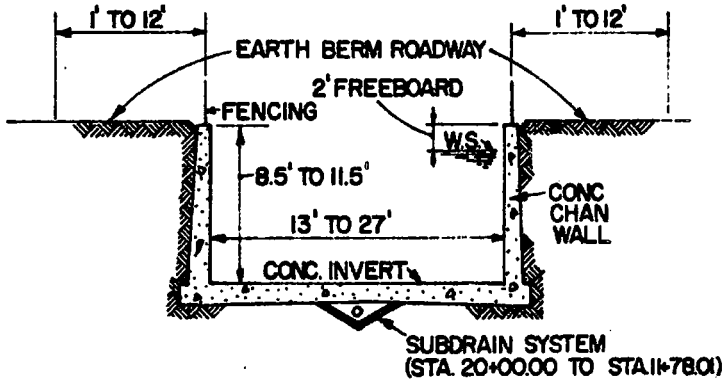
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT	V	Q
29+00.00	27+29.33	RECT.	25.9-29.1	3,600
27+29.33	11+78.01	RECT.	28.3-34.9	3,800





TYPICAL COVERED SECTION
AS NOTED



TYPICAL OPEN SECTION
STA. 29+00.00 TO STA. 11+78.01

LEGEND

- OPEN SECTION
- STREET BRIDGE
- COVERED SECTION
- TYPICAL BERM ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SIERRA MADRE WASH INLET

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-G-1

SAWPIT WASH CHANNEL
Duarte Rd to Rio Hondo

Construction Data

Const. Limits	STA 987+99.82 TO STA 885+91.88	STA 886+00.00 TO STA 872+35
Contract No:	DA 60-185	DA 59-89
	E.A. Irish	Fredericksen and Kasler
Start:	20 April 1960	7 April 1959
Finish:	30 November 1960	19 November 1959
Specifications:	CIVENG 60-15	CIVENG 59-20
Plans:	D.O. Series 369/40-72	D.O. Series 105/53-100
Folio Title:	SAWPIT WASH CHANNEL Duarte Rd to Rio Hondo	UPPER RIO HONDO CHANNEL Peck Rd to Lower Azusa Rd

Local Assurances

Resolution Dated:	12 May 1959	22 July 1958
O&M Transferred to:	14 March 1961 (LACFCD)	29 August 1960 (LACFCD)

Stormflow Data

Gaging Station Location: upstream of Peck Rd (sta 887+00)
Type: Recording (LACFCD-F194B-R)
Staff Gage Reading at One-third Capacity: 5.5 ft on gage (5,100 cfs)

Access Ramps

To Invert:	through left wall downstream of Longden Ave (sta 908+12)
To Right Berm:	Euclid Ave, Shrode St, Benrud St, California Ave, Myrtle Ave, Live Oak Ave, Peck Rd
To Left Berm:	Euclid Ave, Shrode St, Longden Ave, Live Oak Ave, Peck Rd

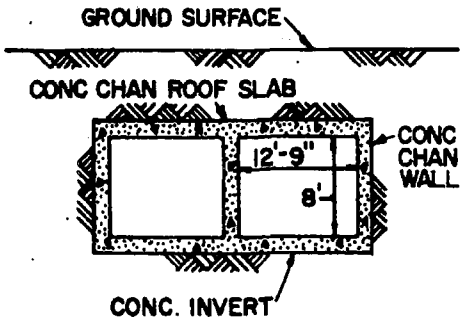
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Euclid Ave	0	2	Los Angeles County
Shrode St	0	0	Los Angeles County
Longden Ave	0	0	City of Irwindale
Live Oak Ave	0	0	City of Irwindale
Sta 887+75	0	0	LACFCD (gaging station footbridge)
Peck Rd	0	2	City of Monrovia and City of Irwindale

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Concrete invert-access ramp
Concrete channel invert	Surfaced berm-access ramp
Concrete channel walls	Surfaced side drain entrance
Concrete channel side slopes	Bridge
Concrete channel roof slab	Gaging station
Subdrain system	Side drain
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

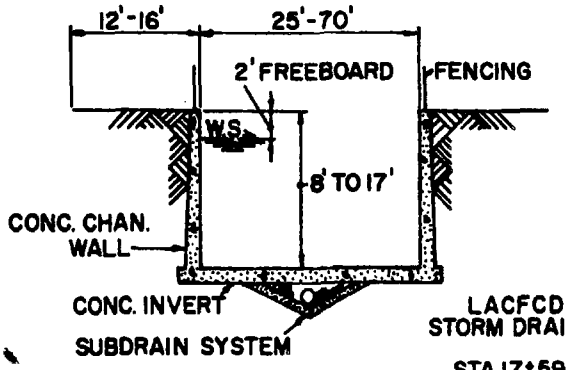


TYPICAL COVERED SECTION

STA. 17+59.86 TO STA. 16+71.37

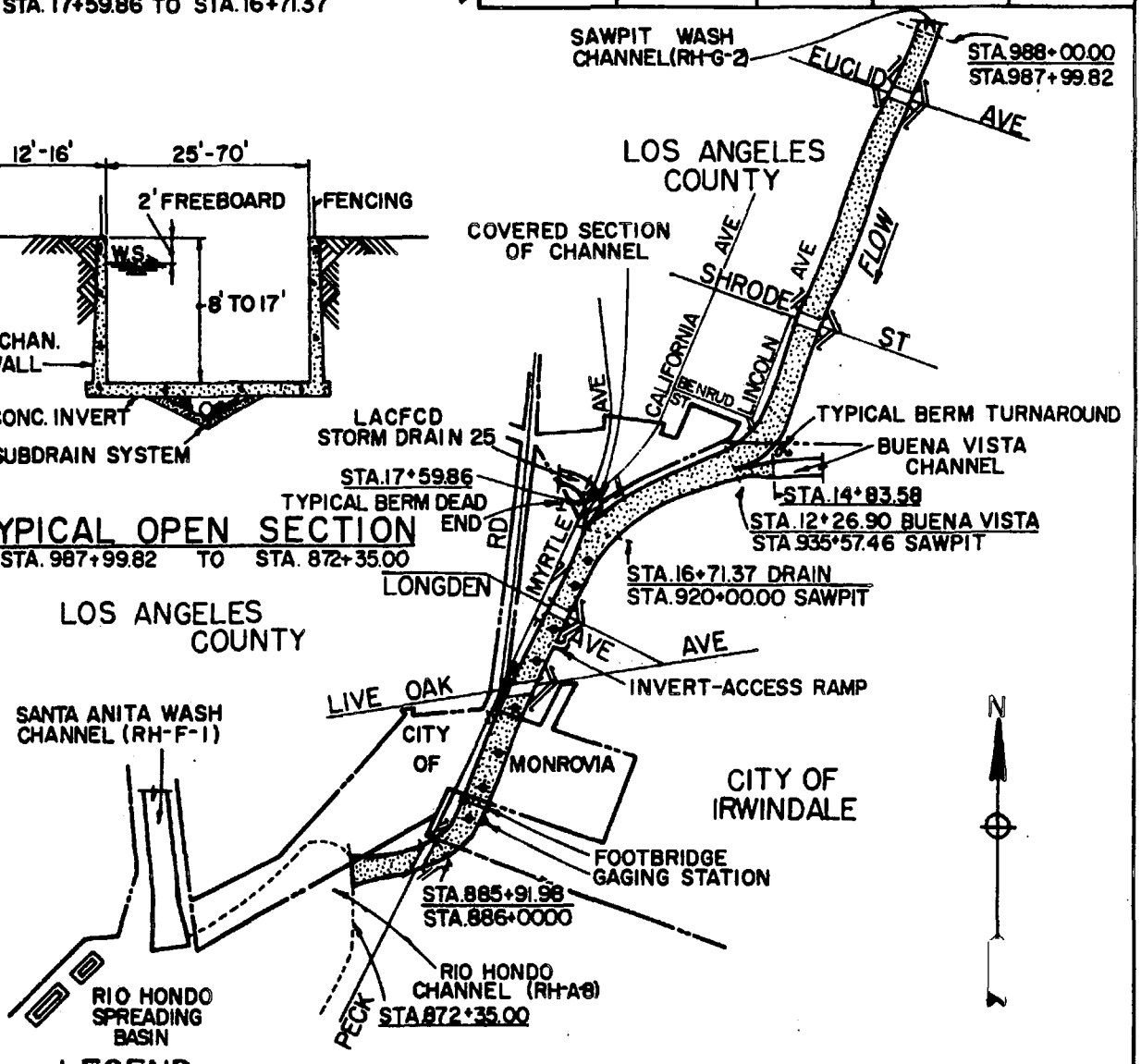
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
987+99.82	937+57.46	RECT.	37.5-28.9	5,000
935+57.46	926+00.00	RECT.	28.9-29.5	7,600
926+00.00	920+00.00	RECT.	29.5-28.7	9,100
920+00.00	911+00.00	RECT.	28.7-27.1	12,700
911+00.00	901+25.00	RECT.	27.1-29.3	13,500
901+25.00	878+08.35	RECT.	29.3-41.1	14,300
878+08.35	872+35.00	RECT.	41.1-59.4	15,300



TYPICAL OPEN SECTION

STA. 987+99.82 TO STA. 872+35.00



LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM ACCESS RAMP
- SUBDRAIN MANHOLE
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAWPIT WASH CHANNEL
DUARTE RD TO RIO HONDO

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-G-1

DATA SHEET
RH-G-2

SAWPIT WASH CHANNEL
Debris Basin to Duarte Rd

Construction Data

Contract No:	DA 4348	Start: 25 April 1955
	T.M. Page Corp/R.C.R. Corp	Finish: 30 January 1956
Specifications:	CIVENG 55-34	
Plans:	D.O. Series 370/31-68	
Folio Title:	SAWPIT WASH CHANNEL Debris Basin to Duarte Rd	

Local Assurances

Resolution Dated: 19 October 1954
Operation and Maintenance Transferred to: LACFCD, 23 February 1956

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert:	from left berm upstream of Norumbega Dr (sta 1116+00)
To Right Berm:	at all street crossings
To Left Berm:	at all street crossings

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 1130+00	0	2	LACFCD (debris basin road)
Norumbega. Dr	0	0	City of Monrovia
Greystone Ave	0	2	City of Monrovia
Foothill Blvd	0	2	City of Monrovia
Wild Rose Ave	0	2	City of Monrovia
Lemon Ave	0	0	City of Monrovia
P.E. Ry (abandoned)	0	2	P.E.R.R. (abutments only)
Royal Oaks Ave	0	2	City of Monrovia
P.E. Ry	0	2	P.E.R.R.
Huntington Dr	0	0	Los Angeles County
Central Ave	0	0	State of California
Foothill Fwy	0	0	State of California
Evergreen Ave	0	0	State of California
Sta 1002+84±	0	0	Avon Products building
Sta 1000+74	0	0	Avon Products vehicular bridge
A.T.S.F. Ry	0	0	A.T.S.F.R.R.
Duarte Rd	0	0	City of Monrovia

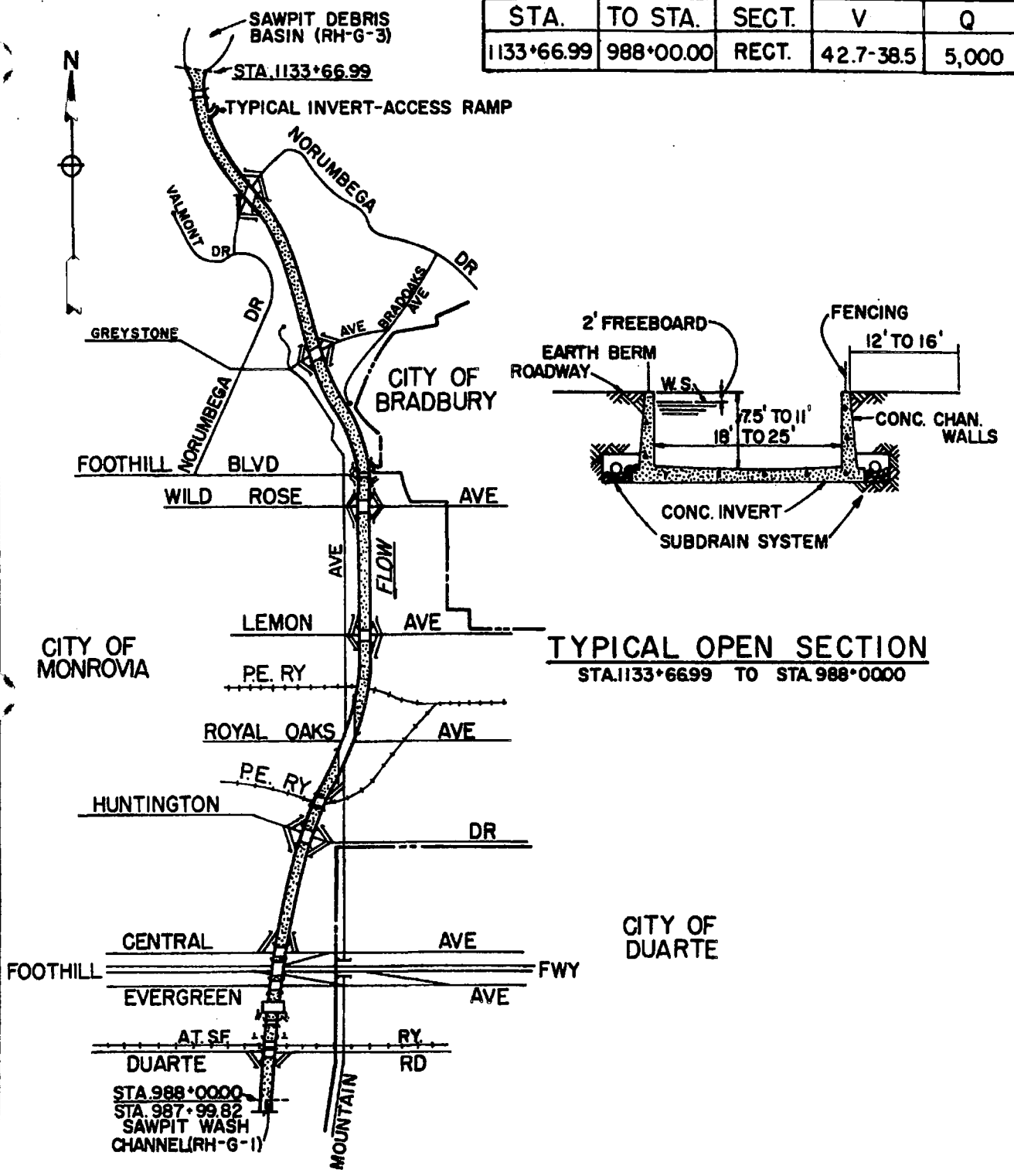
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Concrete channel roof slab	Bridge
Subdrain system	Public utility
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
1133+66.99	988+00.00	RECT.	42.7-38.5	5,000



TYPICAL OPEN SECTION

STA. 1133+66.99 TO STA. 988+0000

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM TURN AROUND
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAWPIT WASH CHANNEL

DEBRIS BASIN TO DUARTE RD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA

RH-G-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-G-3

SAWPIT DEBRIS BASIN

Construction Data

Contract No:	DA 3661	Start: 25 August 1954
	Clifford C. Bong and Co	Finish: 24 January 1955
	Jack Willson	
Specifications:	CIVENG 55-3	
Plans:	D.O. Series 370/1-18	
Folio Title:	SAWPIT WASH	
	Sawpit Debris Basin	

Local Assurances

Resolution Dated: 21 June 1955
Operation and Maintenance Transferred to: LACFCD, 10 January 1956

Stormflow Data

Staff Gage: 14
Basin Staff Gage Elevation at One-third Design Discharge: 985 ft msl

Access Roads

To Embankment:	from Canyon Blvd and debris basin road to top of embankment
To Basin:	none

Pertinent Design Data

Embankment:		Spillway:	
Length	520 ft	Length	460 ft
Crest Width	20 ft	Crest Width	110 ft
Crest Elevation	1000 ft msl	Crest Elevation	982 ft msl
Side Slope	1 on 2.5	Design Capacity	19,000 cfs
Pool Drain:		Intake Tower:	
Length	512 ft	Top Elevation	982 ft msl
Diameter	36 in	Height above Invert	51 ft
Design Capacity	215 cfs	Inside Dimensions	4 ft x 5 ft

Drainage Area: 3.07 sq mi
Debris Basin Capacity: 583,000 cu yds
Maximum Allowable Accumulation of Debris: 145,750 cu yds

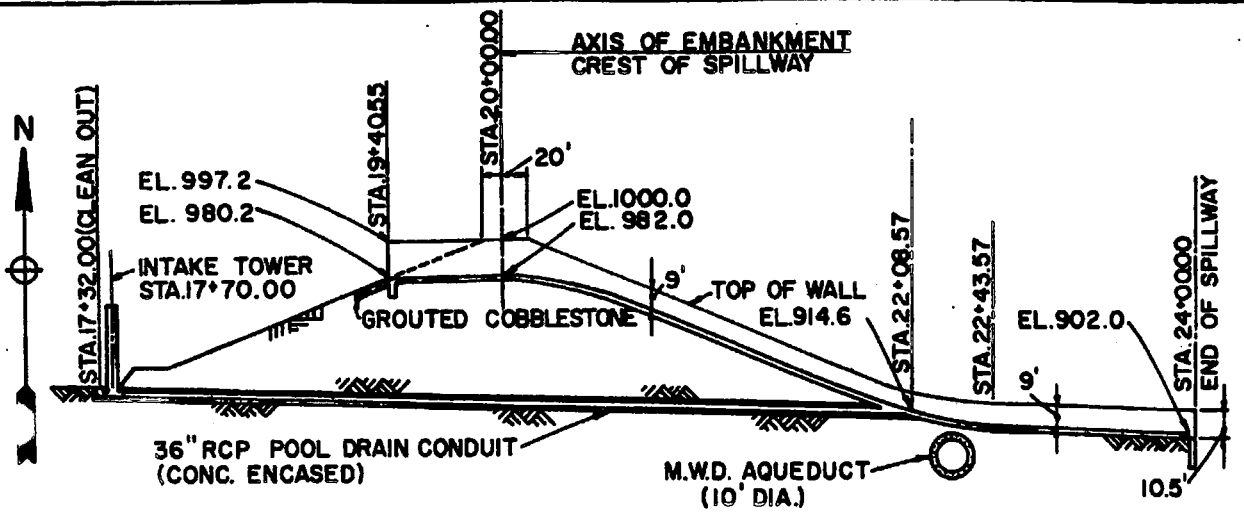
REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Concrete channel invert
Concrete channel walls
Stone spillway apron
Spreading grounds diversion
Subdrain system
Fencing
Rights-of-way

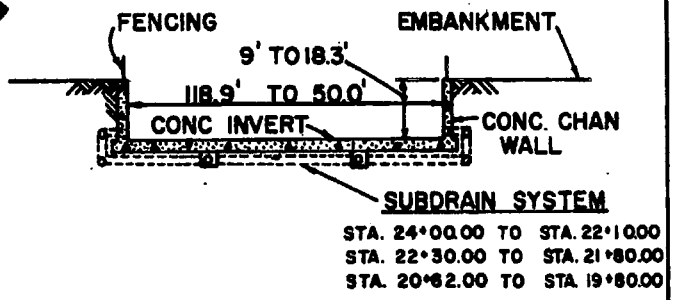
Outlet Works
Intake tower
Concrete pool drain conduit (gated)
Bridge

Embankment and Basin
Earth embankment
Surfaced embankment-access road
Debris storage capacity
Staff gages
Subdrain system
Fencing
Public utility

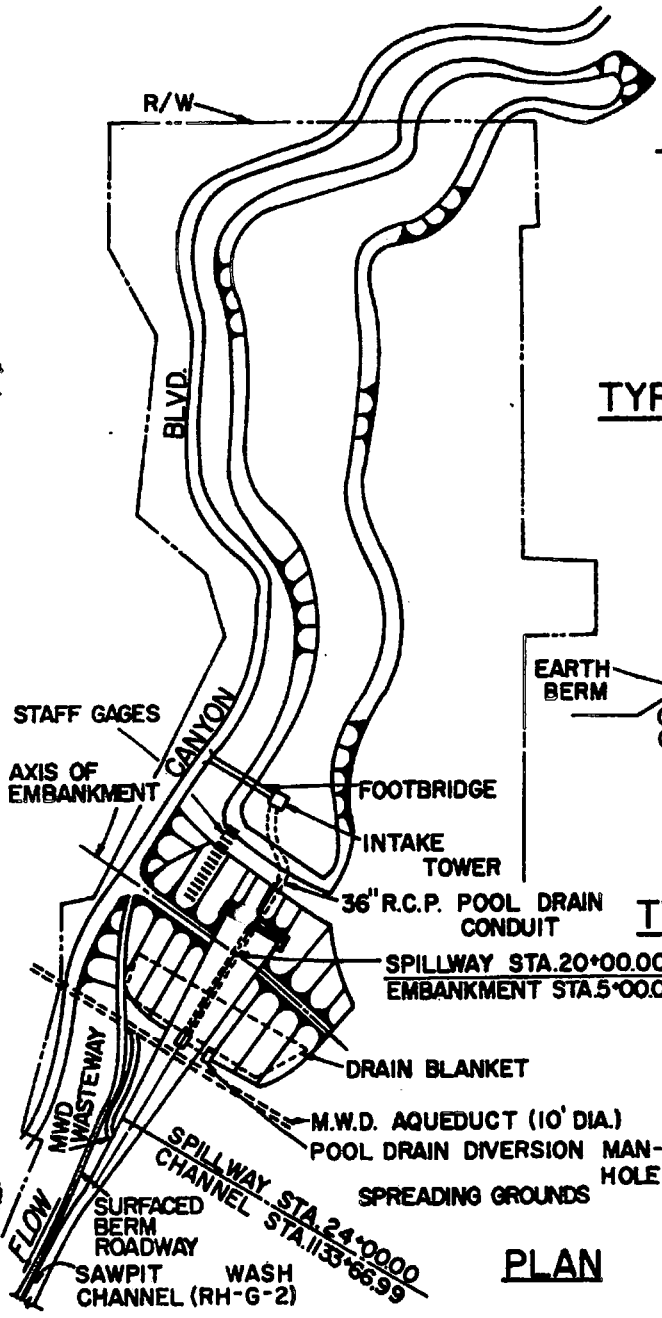
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



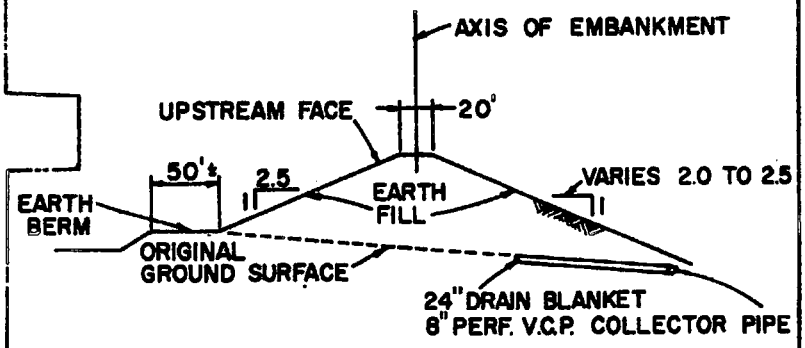
SECTION ALONG ℄ OF SPILLWAY



TYPICAL SECTION THROUGH SPILLWAY



PLAN



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAWPIT DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-G-3

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-H-1

SIERRA MADRE VILLA CHANNEL

Construction Data

Contract No:	CIVENG 57-196	Start: 1 July 1957
	T.M. Page Corp/R.C.R. Corp	Finish: 27 February 1958
Specifications:	CIVENG 57-44	
Plans:	D.O. Series 165/95-113	
Folio Title:	SIERRA MADRE VILLA CHANNEL Debris Basin to Eaton Wash	

Local Assurances

Resolution Dated: 3 April 1956
Operation and Maintenance Transferred to: LACFCD, 13 May 1958

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert:	none; use RH-D-3
To Right Berm:	from debris basin access road, Sierra Madre Villa Ave
To Left Berm:	none

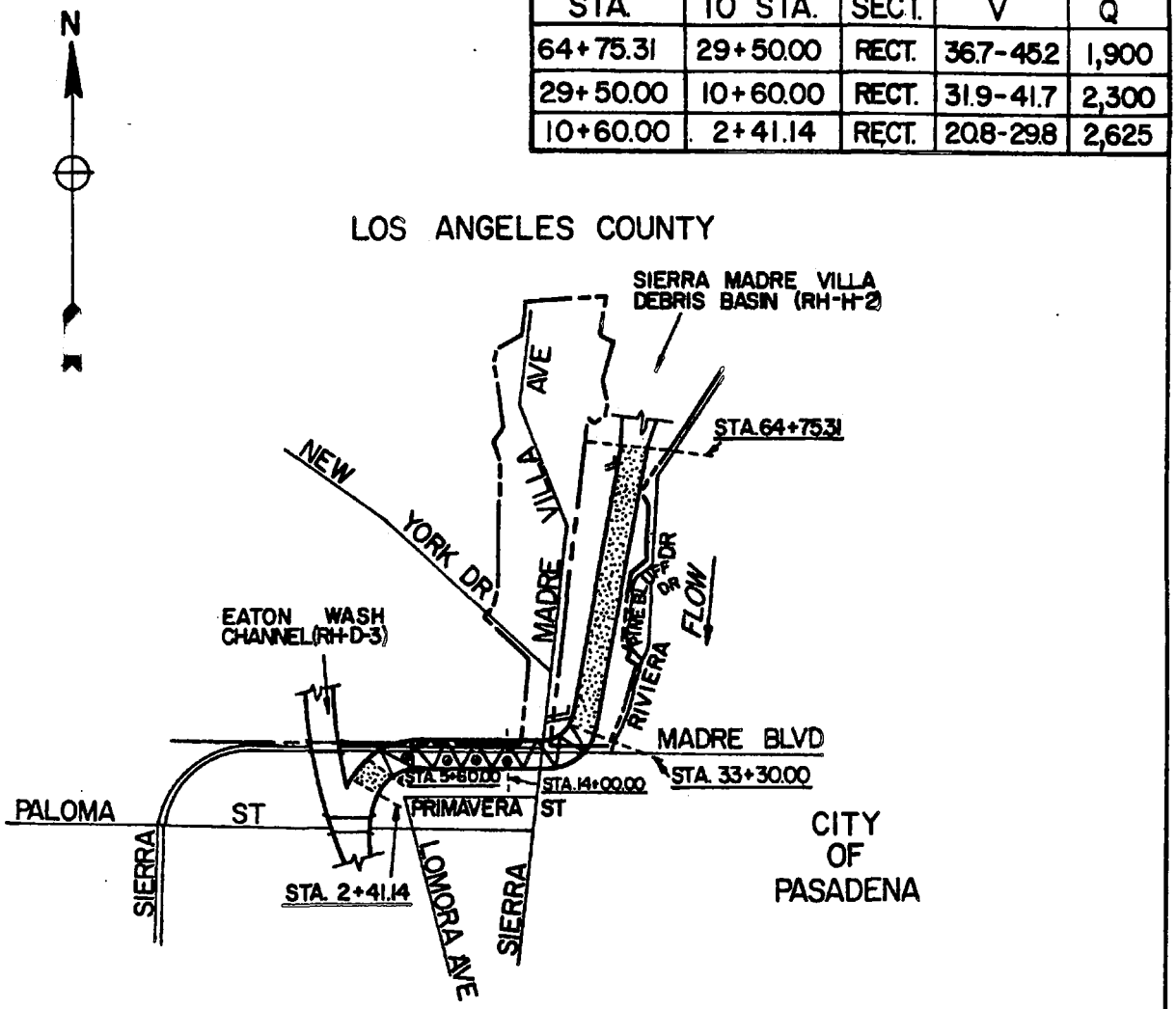
Bridges

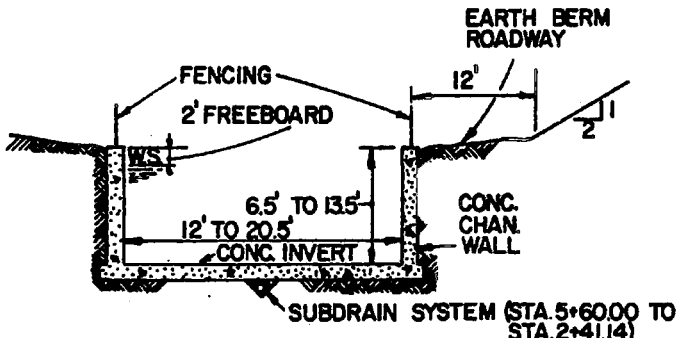
none

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Channel inspection manhole
Concrete channel roof slab	Public utility
Subdrain system	
Fencing	
Rights-of-way	

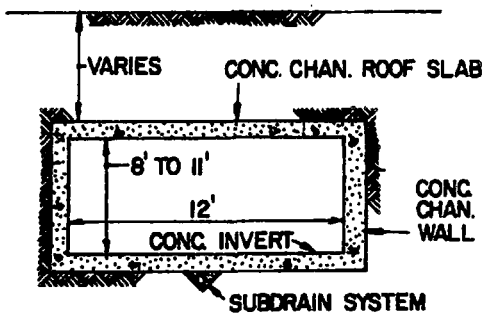
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
64+75.31	29+50.00	RECT.	36.7-45.2	1,900
29+50.00	10+60.00	RECT.	31.9-41.7	2,300
10+60.00	2+41.14	RECT.	20.8-29.8	2,625





TYPICAL OPEN SECTION

STA. 64+75.31 TO STA. 33+30.00
STA. 5+60.00 TO STA. 2+41.14



TYPICAL COVERED SECTION

STA. 33+30.00 TO STA. 5+60.00

CENTER SUBDRAIN

STA. 14+00.00 TO STA. 5+60.00

LEGEND

- OPEN SECTION
- COVERED SECTION
- BERM-ACCESS RAMP
- CHANNEL INSPECTION MANHOLE
- CITY OR COUNTY BOUNDARY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SIERRA MADRE VILLA CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-H-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
RH-H-2

SIERRA MADRE VILLA DEBRIS BASIN

Construction Data

Contract No:	DA 57-196	Start: 1 July 1957
	T.M. Page Corp/R.C.R. Corp	Finish: 27 February 1958
Specifications:	CIVENG 57-44	
Plans:	D.O. Series 165/92-113	
Folio Title:	SIERRA MADRE VILLA CHANNEL Debris Basin to Eaton Wash	

Local Assurances

Resolution Dated: 5 March 1957
Operation and Maintenance Transferred to: LACFCD, 13 May 1958

Stormflow Data

Staff Gages: 8
Basin Staff Gage Elevation at One-third Design Discharge: 1091 ft msl

Access Roads

To Embankment:	from Sierra Madre Villa Ave through golf course parking lot to top of embankment
To Basin:	from west side of embankment to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	906 ft	Length	322 ft
Crest Width	20 ft	Crest Width	48 ft
Crest Elevation	1103 ft msl	Crest Elevation	1089 ft msl
Side Slope	1 on 2.5	Design Capacity	4600 cfs
Pool Drain:		**Intake Tower:**	
Length	235 ft	Top Elevation	1094 ft msl
Diameter	36 in	Height above Invert	30.4 ft
Design Capacity	270 cfs	Inside Dimensions	4 ft x 4 ft

Drainage Area: 1.5 sq mi
Debris Basin Capacity: 334,000 cu yds
Maximum Allowable Accumulation of Debris: 84,000 cu yds

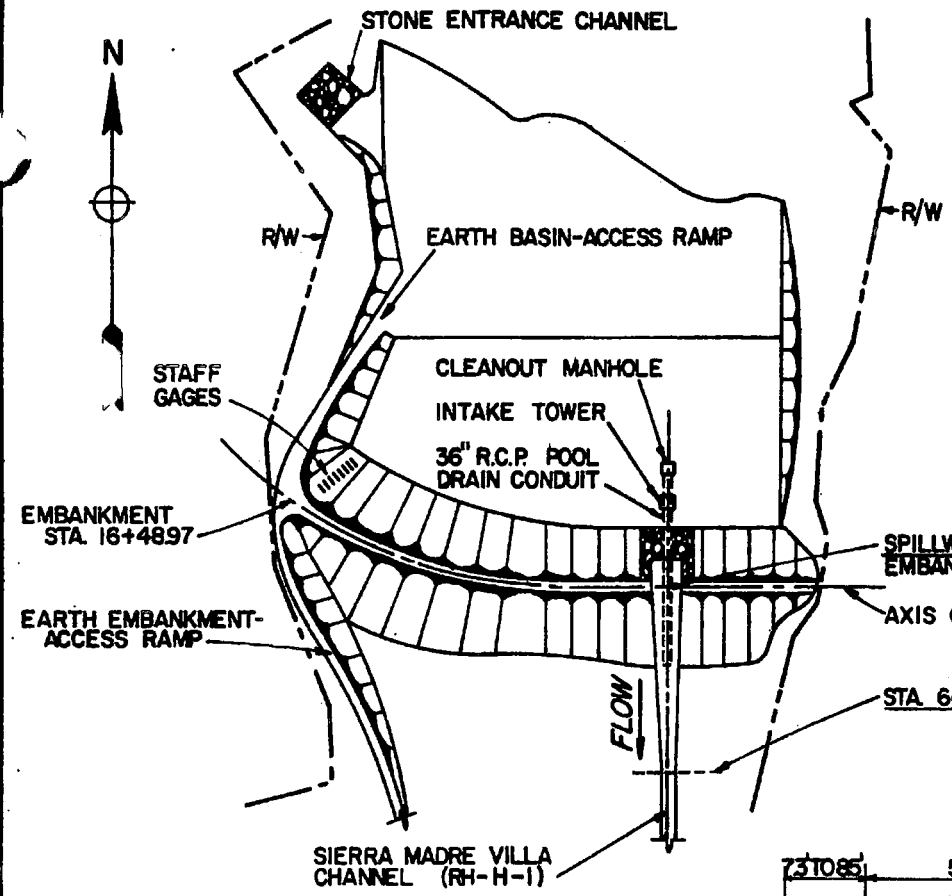
REPORTING FEATURES

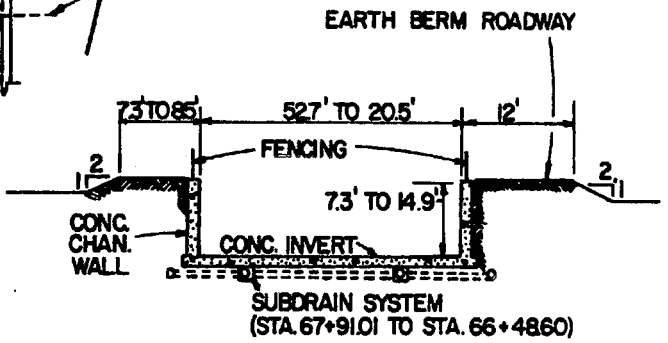
Spillway and Outlet Channel
Broadcrest concrete spillway
Earth berm roadway
Concrete channel invert
Concrete channel walls
Stone spillway apron
Subdrain system
Fencing
Rights-of-way

Outlet Works
Intake tower
Concrete pool drain conduit (ungated)

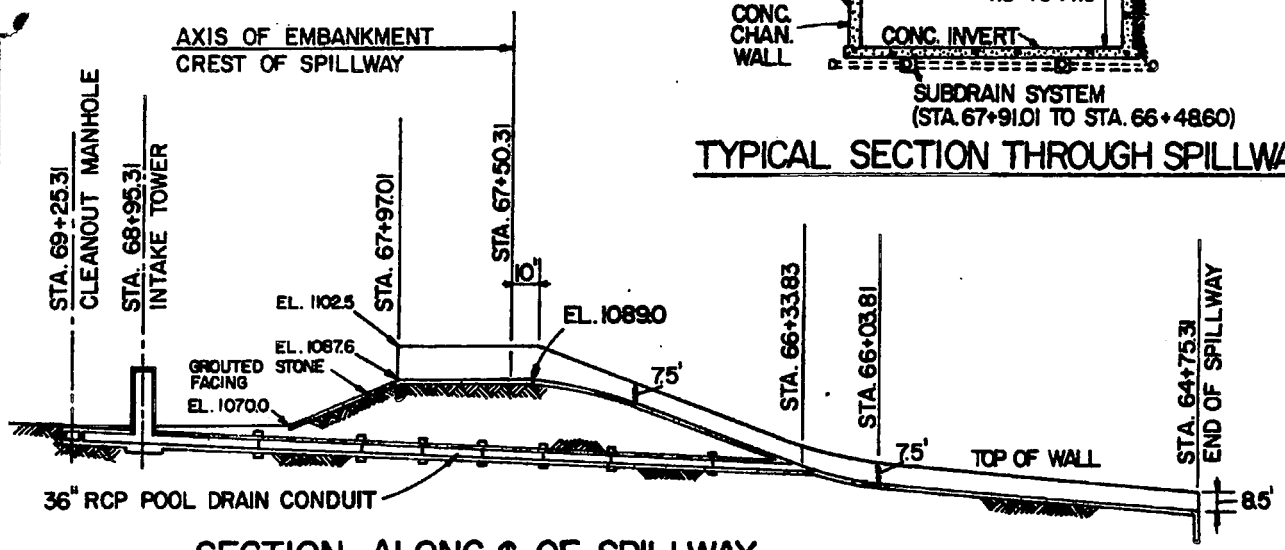
Embankment and Basin
Earth embankment
Earth embankment-access road
Earth basin-access ramp
Surfaced drain entrances
Debris storage capacity
Staff gages
Improved entrance channel
Rights-of-way
Subdrain system

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

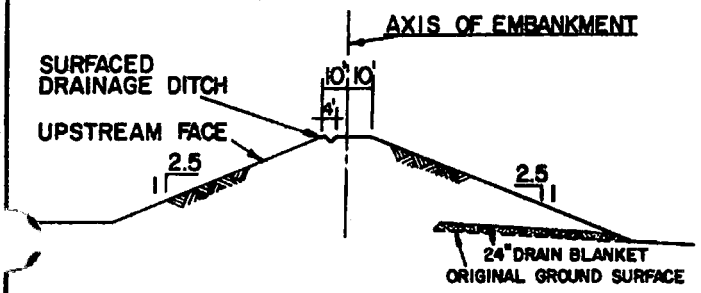




TYPICAL SECTION THROUGH SPILLWAY



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SIERRA MADRE VILLA DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-H-2

DATA SHEET SGR-A-1

SAN GABRIEL RIVER CHANNEL
Seventh St to Pacific Ocean

Construction Data

Contract No:	DA 61-157	Start:	10 May 1961
	Peter Kiewit and Sons Co	Finish:	15 April 1962
Specifications:	CIVENG 61-18		
Plans:	D.O. Series 152/39-112		
Folio Title:	SAN GABRIEL RIVER CHANNEL Seventh St to Pacific Ocean		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 20 April 1965

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert:	none
To Right Berm:	at all bridge crossings
To Left Berm:	at all bridge crossings

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Seventh St	7	0	Los Angeles County
Westminster Ave	4	0	Los Angeles County
Pacific Coast Hwy	6	0	State of California
Central Ave	12	0	City of Long Beach

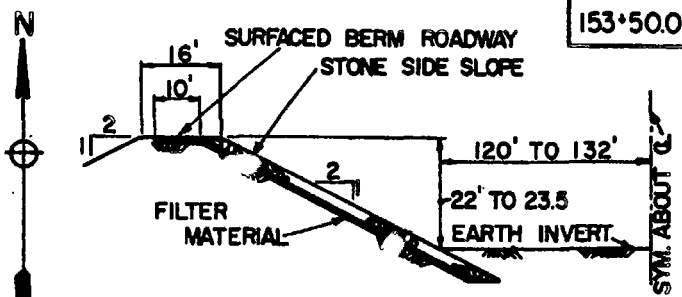
Reporting Features

Along Channel	At a Channel Station
Surfaced berm-access ramp	Surfaced berm roadway
Earth channel invert	Side drain
Stone channel side slopes	Bridge
Fencing	Public utility
Rights-of-way	Jetty section

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

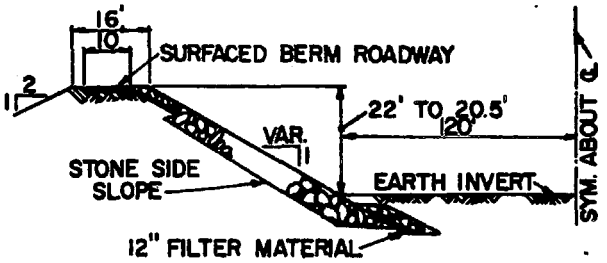
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
153+50.00	3+50.00	TRAP.	9.8-11.3	60,000



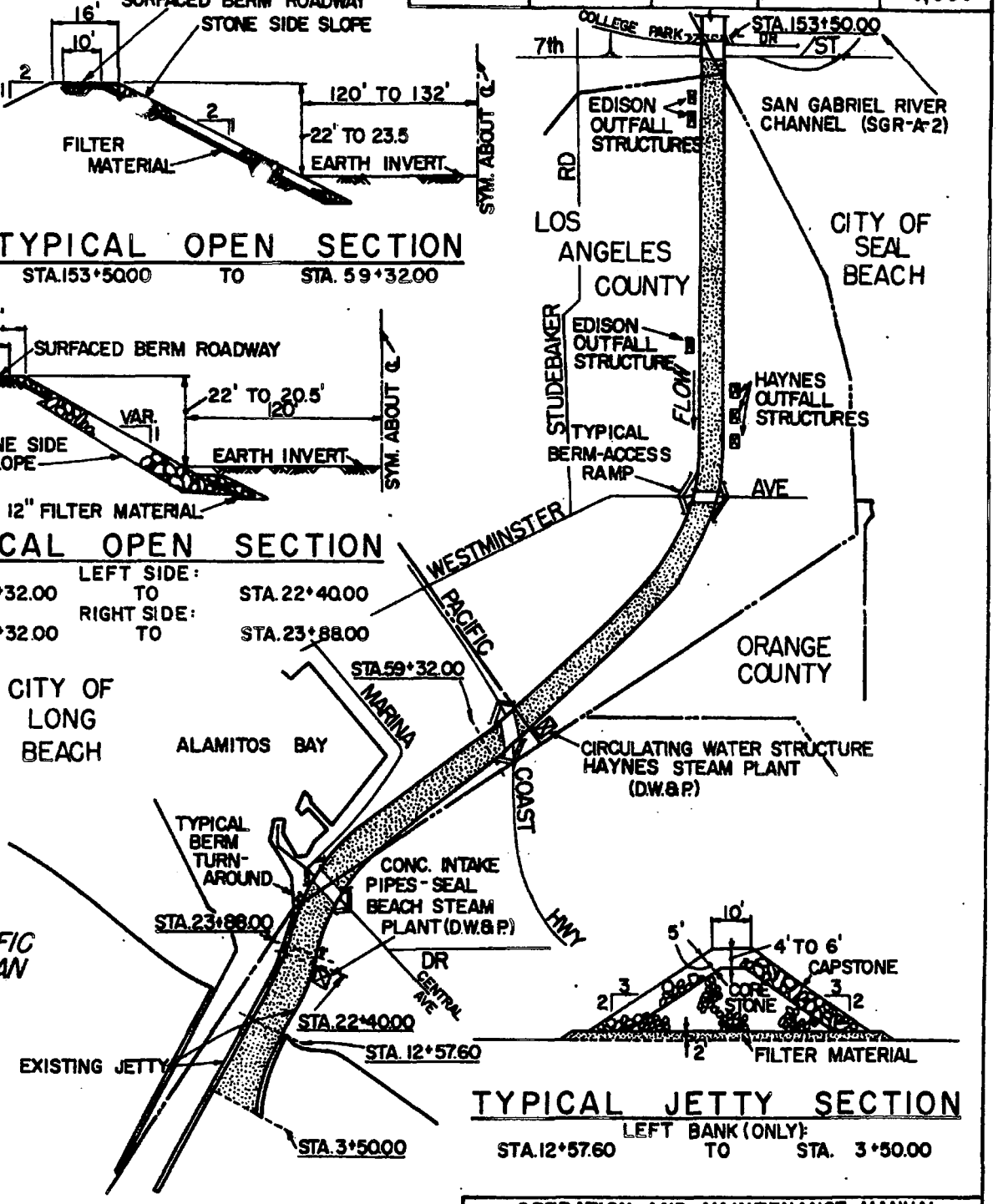
TYPICAL OPEN SECTION

STA.153+50.00 TO STA. 59+32.00



TYPICAL OPEN SECTION

LEFT SIDE:
STA.59+32.00 TO STA.22+40.00
RIGHT SIDE:
STA.59+32.00 TO STA.23+88.00



TYPICAL JETTY SECTION

LEFT BANK (ONLY):
STA.12+57.60 TO STA. 3+50.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL
SEVENTH ST TO PACIFIC OCEAN

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-A-1

DATA SHEET SAN GABRIEL RIVER CHANNEL
SGR-A-2 Coyote Ck to Seventh St

Construction Data

Contract No:	DA 62-142	Start:	14 March 1962
	Corona Quarries, Inc	Finish:	7 November 1962
Specifications:	CIVENG 62-20		
Plans:	D.O. Series 154/114-127		
Folio Title:	SAN GABRIEL RIVER CHANNEL		
	Coyote Ck to Seventh St		

Local Assurances
Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD 15 May 1963

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none

To Right Berm: Atherton St
To Left Berm: none

Bridges

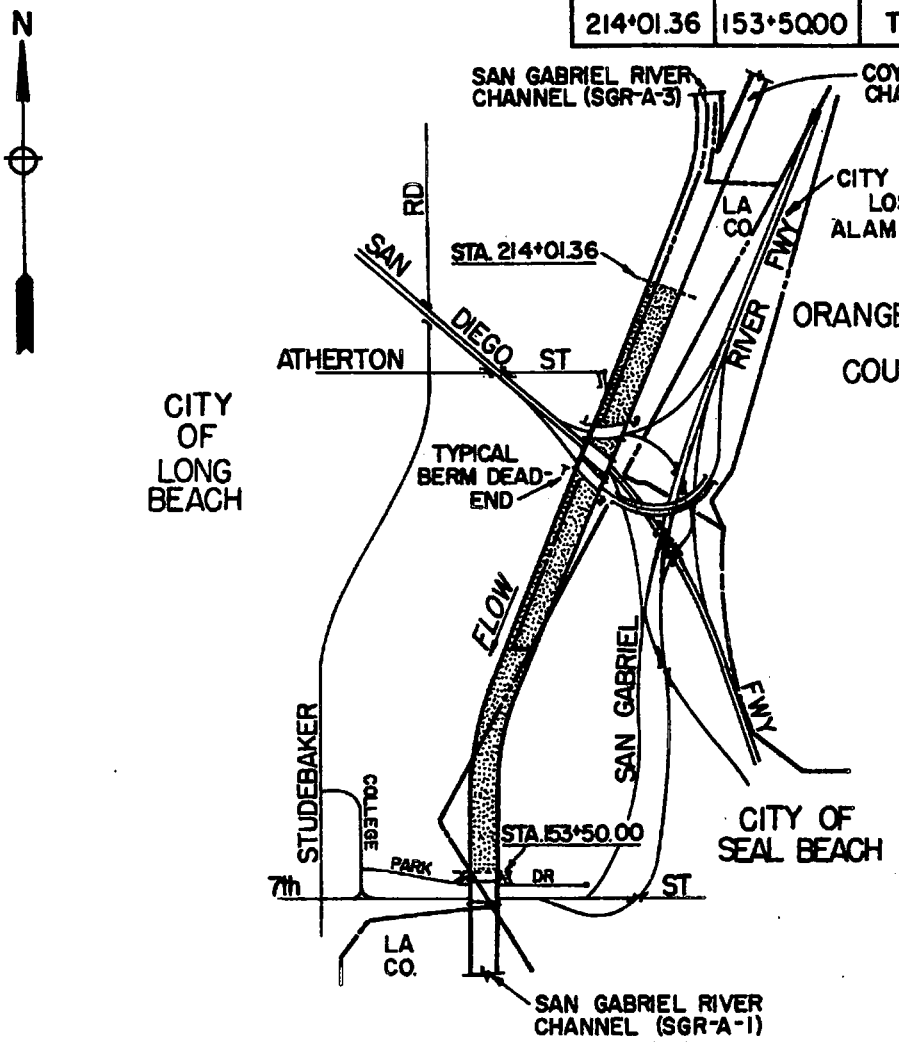
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
San Diego Fwy	4	0	State of California

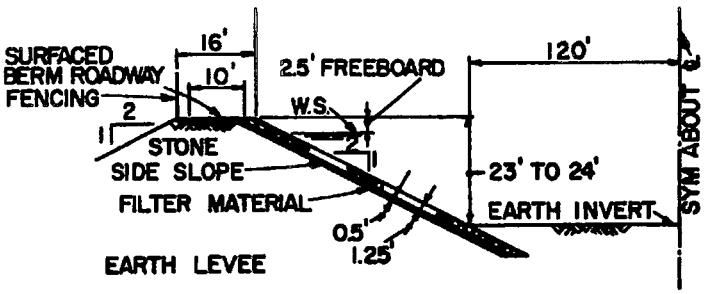
Reporting Features

Along Channel	At a Channel Station
Earth channel invert	Surfaced berm-access ramp
Stone side slopes	Side drain
Surfaced berm roadway	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
214+01.36	153+50.00	TRAP	9.8-10.5	60,000





TYPICAL OPEN SECTION

STA. 214+01.36 TO STA. 153+50.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM TURNAROUND
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL
COYOTE CREEK TO SEVENTH ST

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-A-2

DATA SHEET SAN GABRIEL RIVER CHANNEL
SGR-A-3 Del Amo Blvd to Coyote Ck

Construction Data

Contract No: DA 64-119 Start: 3 April 1964
Kasler Corp and G.H. Ball, Inc Finish: 15 November 1964
Specifications: CIVENG 64-16
Plans: D.O. Series 213/56-95
Folio Title: SAN GABRIEL RIVER IMPROVEMENT
Del Amo Blvd to Coyote Ck

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 14 December 1964

Stormflow Data

Gaging Station Location: upstream of Spring St (sta 290+50)
Type: Recording (LACFCD--F42B-R)
Staff Gage Reading at One-third Capacity: 7.2 ft on gage (6,667 cfs)

Access Ramps

To Invert: none; use SGR-A-4

To Right Berm: Del Amo Blvd, Carson St, Wardlow St, Spring St, Willow St
To Left Berm: Del Amo Blvd, Carson St, Wardlow St, Spring St, Willow St

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Del Amo Blvd	1	0	City of Lakewood and City of Cerritos
Carson 9t	2	0	Los Angeles County
Wardlow Rd	1	0	Los Angeles County
Spring St	3	0	City of Long Beach and Los Angeles County
Willow St	3	0	City of Long Beach and Los Angeles County

Reporting Features

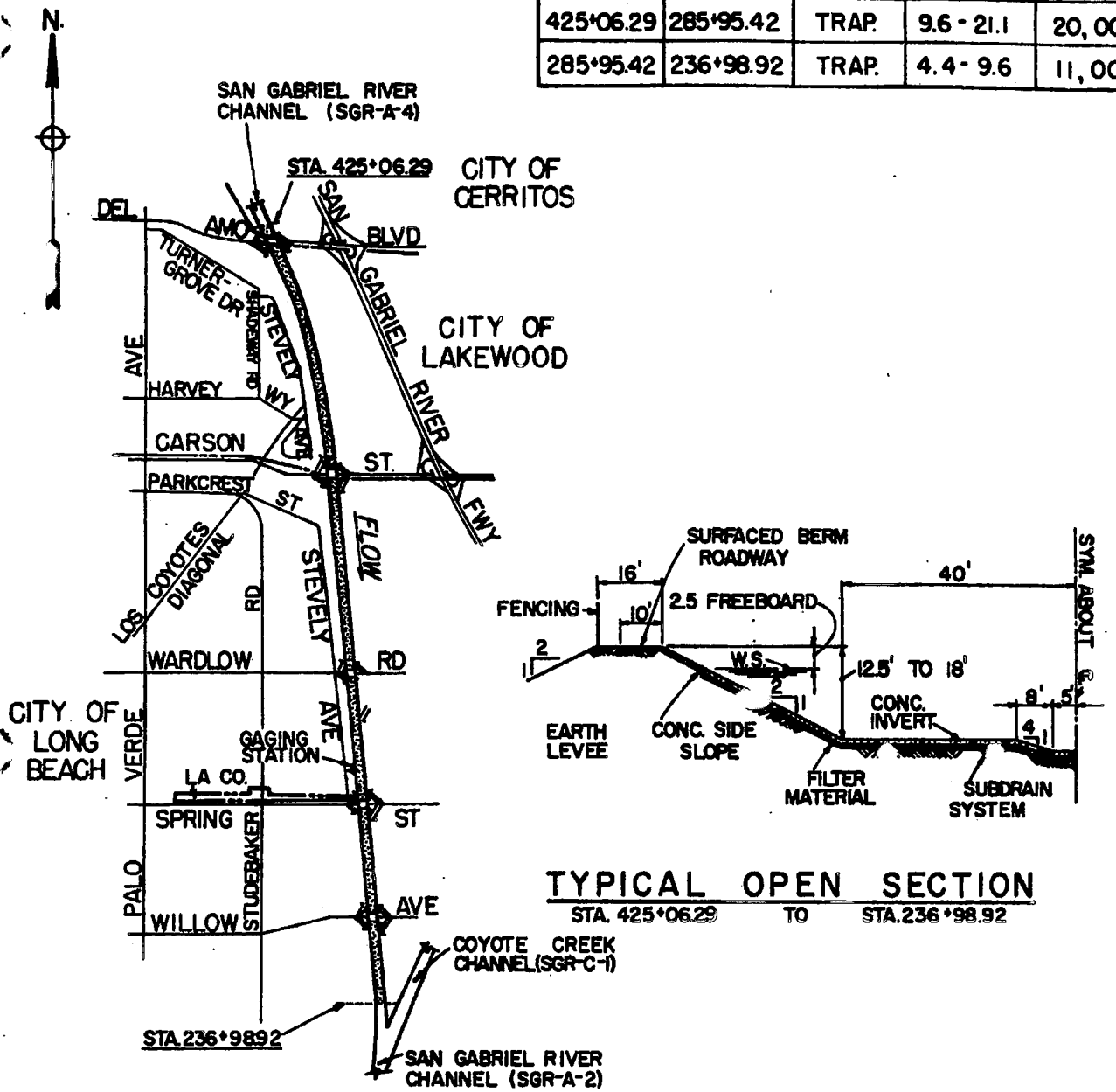
Along Channel
Surfaced berm roadway
Concrete channel invert
Concrete channel side slopes
Subdrain system
Fencing
Rights-of-way

At a Channel Station
Surfaced berm-access ramp
Gaging station
Side drain
Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
425+06.29	285+95.42	TRAP.	9.6 - 21.1	20,000
285+95.42	236+98.92	TRAP.	4.4 - 9.6	11,000



TYPICAL OPEN SECTION

STA. 425+06.29 TO STA. 236+98.92

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY.

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL

DEL AMO BLVD TO COYOTE CREEK

SCALE IN FEET

1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-A-3

DATA SHEET SAN GABRIEL RIVER CHANNEL
SGR-A-4 Fairton St to Del Amo Blvd

Construction Data

Contract No:	DA 65-142	Start: 19 April 1965
	Guy F. Atkinson Co	Finish: 28 January 1966
Specifications:	CIVENG 65-18	
Plans:	D.O. Series 213/96-150	
Folio Title:	SAN GABRIEL RIVER IMPROVEMENT Fairton St to Del Amo Blvd	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 19 July 1966

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: downstream of Alondra Blvd (sta 568+77); downstream of Artesia Blvd (sta 513+10)

To Right Berm: Alondra Blvd, Artesia Blvd, South St
To Left Berm: Alondra Blvd, Artesia Blvd, South St

Bridges

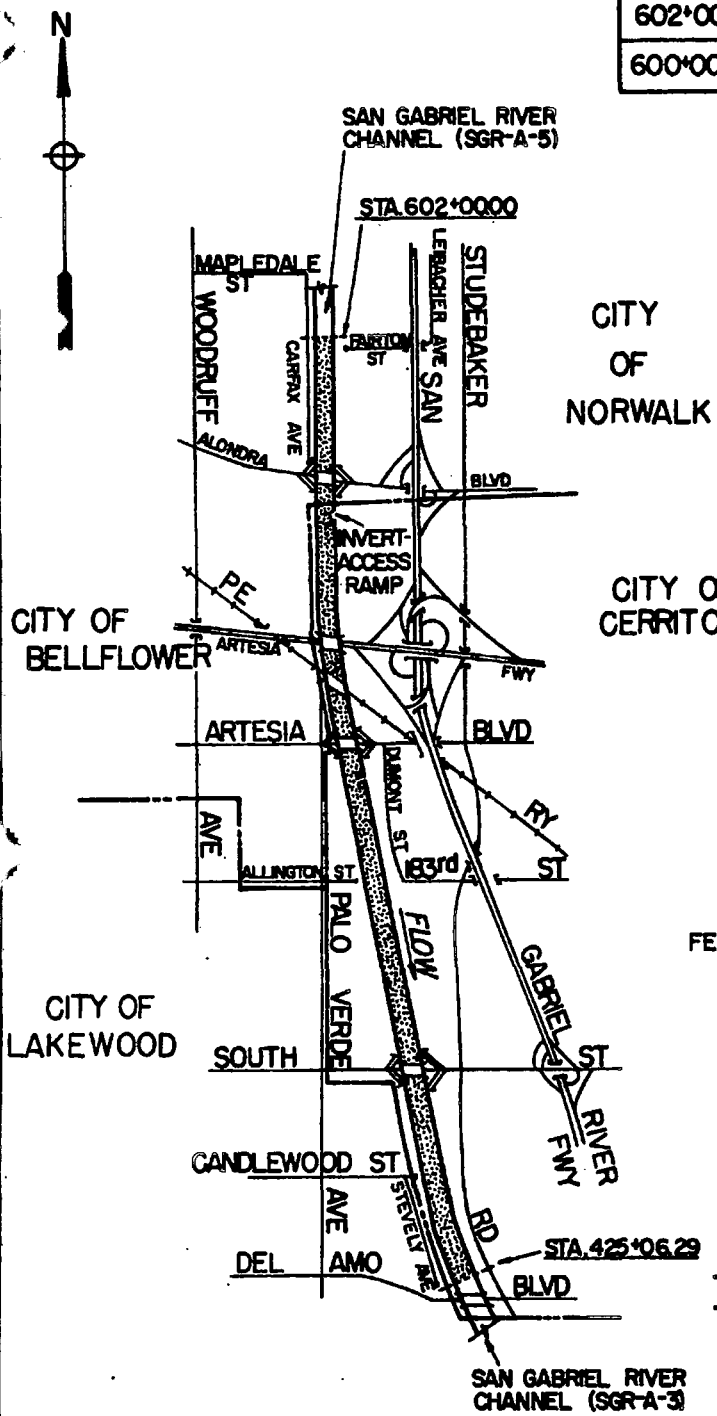
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Alondra Blvd	2	0	City of Bellflower
Artesia Fwy	1	0	State of California
P.E. Ry	4	0	P.E.R.R.
Artesia Blvd	2	0	State of California
South St	2	0	City of Lakewood and City of Cerritos

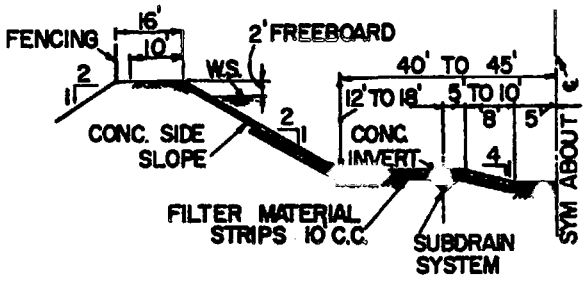
Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Concrete channel invert	Surfaced invert-access ramp
Concrete channel side slopes	Equestrian ramp
Subdrain system	Side drain
Fencing	Bridge
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
602+0000	600+0000	TRAP.	22.1	19,500
600+0000	425+0629	TRAP.	11.1 - 24.0	20,000





TYPICAL OPEN SECTION

STA.602+00.00 TO STA.425+06.29

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL EQUESTRIAN RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL

FAIRTON ST TO DEL AMO BLVD

SCALE IN FEET

1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-A-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET SAN GABRIEL RIVER CHANNEL
SGR-A-5 Cecilia St to Fairton St

Construction Data

Contract No:	DA 66-130	Start:	2 March 1966
	Kesler Corp	Finish:	25 November 1966
	G.H. Ball, Inc		
Specifications:	CIVENG 66-11		
Plans:	D.O. Series 213/151-187		
Folio Title:	SAN GABRIEL RIVER IMPROVEMENT		
	Cecilia St to Fairton St		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 28 December 1966

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: upstream of Firestone Blvd (sta 724+15); downstream of S.P. Ry (sta 713+00)

To Right Berm: Firestone Blvd, Imperial Hwy, Rosecrans Ave
To Left Berm: Firestone Blvd, Imperial Hwy, Rosecrans Ave

Bridges

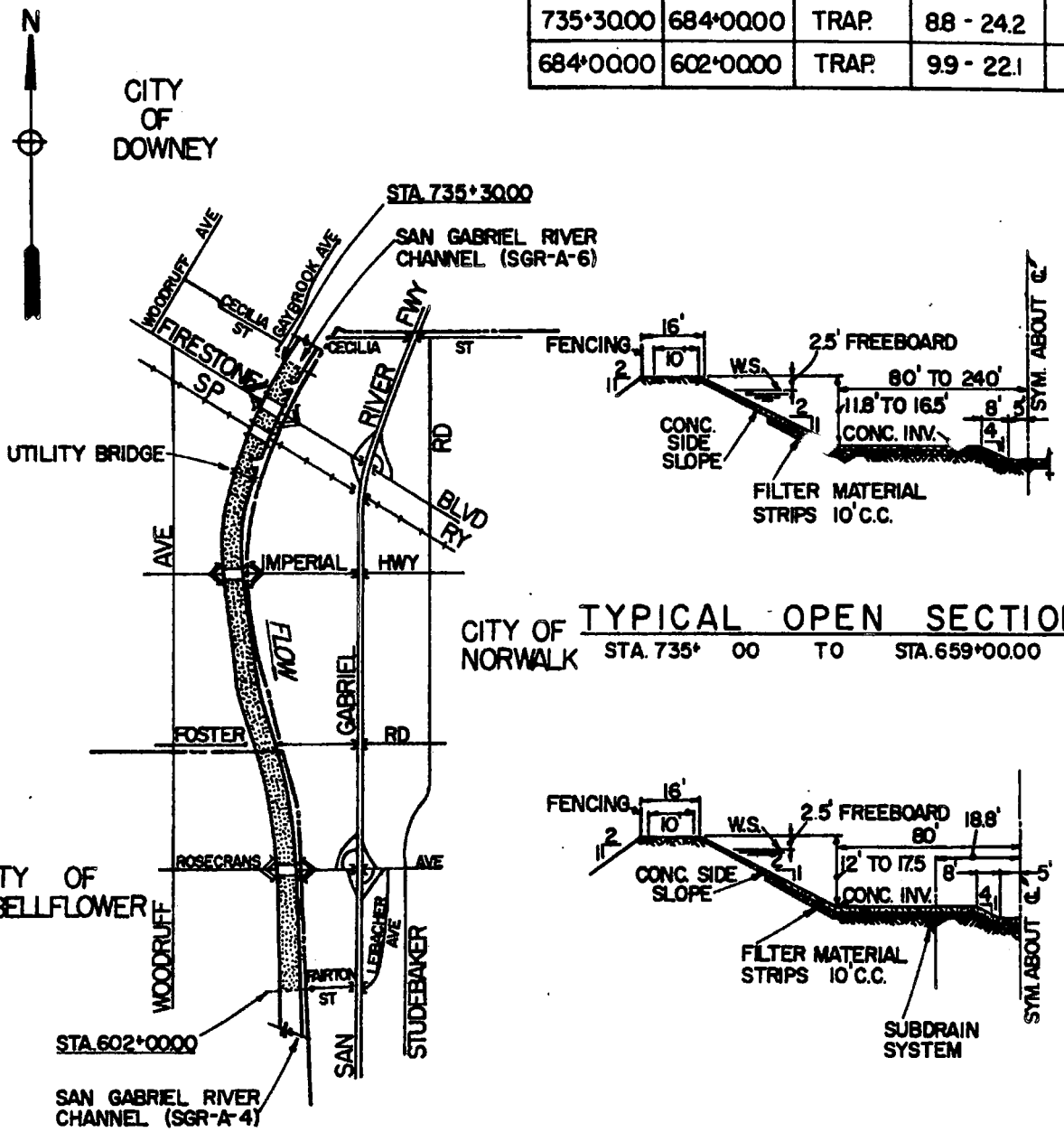
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Firestone Blvd	4	0	City of Downey
S.P. Ry	4	0	S.P.R.R.
Utility crossing	1	0	Mobil Oil and Southern Counties Gas Company
Imperial Hwy	2	0	City of Downey
Rosecrans Ave	2	0	City of Bellflower

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Subdrain system	Side drain
Concrete channel invert	Surfaced invert-access ramp
Concrete & stone channel side slopes	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
735+30.00	684+00.00	TRAP.	8.8 - 24.2	19,000
684+00.00	602+00.00	TRAP.	9.9 - 22.1	19,500



TYPICAL OPEN SECTION
STA. 735+00 TO STA. 659+00.00

TYPICAL OPEN SECTION
STA. 659+00.00 TO STA. 602+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL INVERT-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL

CECILIA ST TO FAIRTON ST

SCALE IN FEET

1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-A-5

OPERATION AND MAINTENANCE MANUAL

DATA SHEET SGR-A-6

SAN GABRIEL RIVER CHANNEL
Washington Blvd to Cecilia S

Construction Data

Contract No: DA 67-C-0059
Kirst Const Co
Start: 22 May 1967
Finish: 9 June 1968

Specifications: DA 67-0025
Plans: D.O. Series 213/216-363
Folio Title: SAN GABRIEL RIVER IMPROVEMENT
Whittier Narrows Dam to Cecilia St

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 29 April 1969

Stormflow Data

Gaging Station Location: downstream of Santa Ana Fwy (sta 787+50)
Type: Recording
Staff Gage Reading at One-third Capacity:

Access Ramps

To Invert: from right berm, immediately upstream and downstream of drop structures 5 and 6; from left berm, immediately upstream and downstream of drop structures 4 and 7

To Right Berm: Washington Blvd, Lundhal Dr, Telegraph Rd, Florence Ave
To Left Berm: Los Nietos Rd, Telegraph Rd, Florence Ave

Bridges

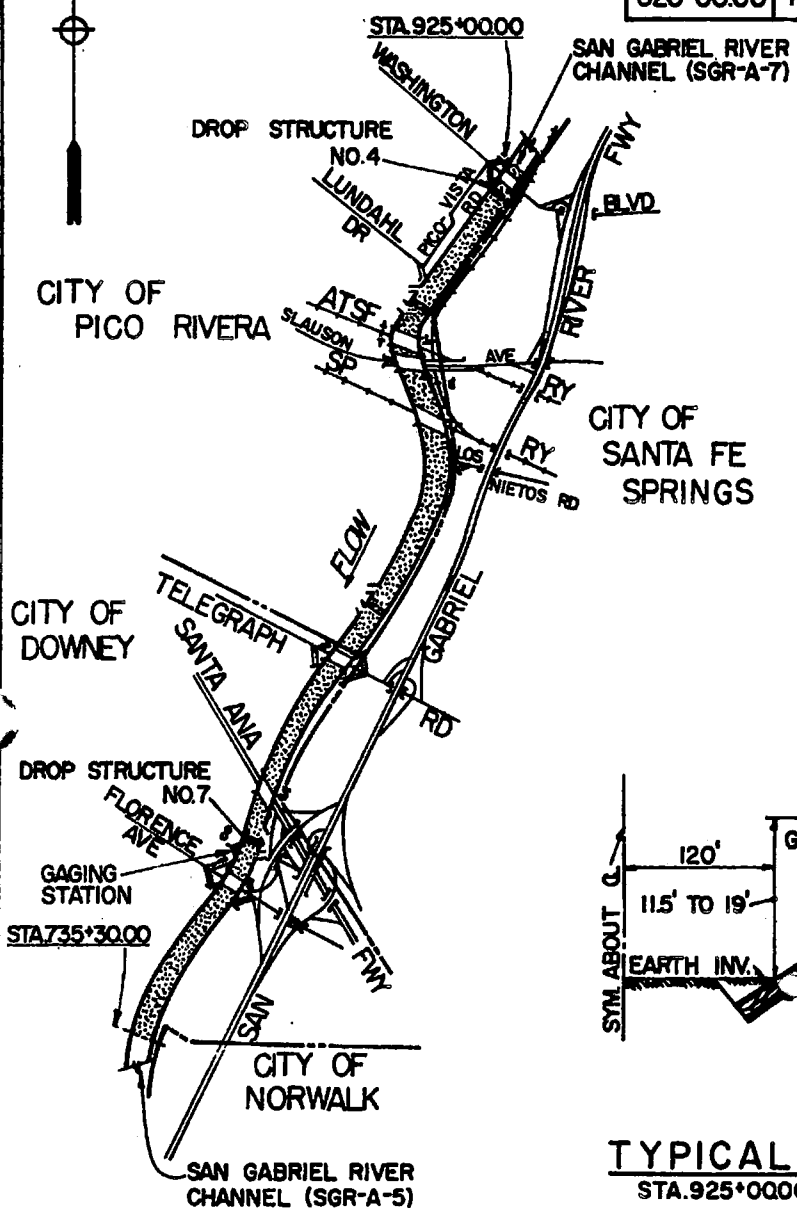
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Washington Blvd	4	0	City of Pico Rivera
A.T.S.F. Ry	6	0	A.T.S.F.R.R.
Slauson Ave	4	0	City of Pico Rivera
S.P. Ry	6	0	S.P.R.R.
Telegraph Rd	5	0	City of Downey, City of Pico Rivera and City of Cerritos
Santa Ana Fwy	5	0	State of California
Florence Ave	4	0	City of Downey

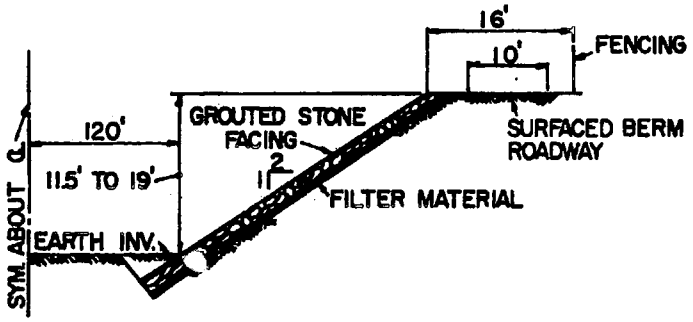
Reporting Features

Along Channel
Surfaced berm roadway
Earth channel invert
Stone channel side slopes
Fencing
Rights-of-way

At a Channel Station
Surfaced and earth berm-access ramp
Drop structure
Side drain
Concrete invert-access ramp
Gaging station
Bridge
Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
925+00.00	894+66.00	TRAP	8.0	14,700
894+66.00	820+00.00	TRAP	6.2 - 8.0	18,800
820+00.00	735+00.00	TRAP	7.9 - 13.2	19,000





TYPICAL OPEN SECTION

STA.925+00.00 TO STA.735+30.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL INVERT-ACCESS RAMP
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- TYPICAL BERM ROADWAY TURNAROUND
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL
WASHINGTON BLVD TO CECILIA ST

SCALE IN FEET
1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEETS
SGR-A-7

SAN GABRIEL RIVER CHANNEL
Whittier Narrows Dam to Washington Blvd

Construction Data

Contract No:	67-C-0059	Start: 22 May 1967
	Kirst Const Co	Finish: 9 June 1968
Specifications:	DA 67-0025	
Plans:	D.O. Series 213/216-363	
Folio Title:	SAN GABRIEL RIVER IMPROVEMENT Whittier Narrows Dam to Cecilia St	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 29 April 1969

Stormflow Data

Gaging Station Location: downstream of San Gabriel River Parkway (sta 1072+00)
Type: Recording
Staff Gage Reading at One-third Capacity: 6.3 ft on gage (4333 cfs)

Access Ramps

To Invert: from right berm, immediately upstream and downstream of drop structures 2 and 3; from left berm, immediately upstream and downstream of drop structure 1

To Right Berm: San Gabriel River Parkway, Beverly Blvd, Beverly Rd, Whittier Blvd, from spreading grounds

To Left Berm: San Gabriel River Parkway, Beverly Blvd, Whittier Blvd; from Country Club

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
San Gabriel River Parkway	5	0	City of Pico Rivera
Beverly Blvd	5	0	City of Pico Rivera
U.P. Ry	2	0	U.P.R.R.
Whittier Blvd	4	0	Los Angeles County

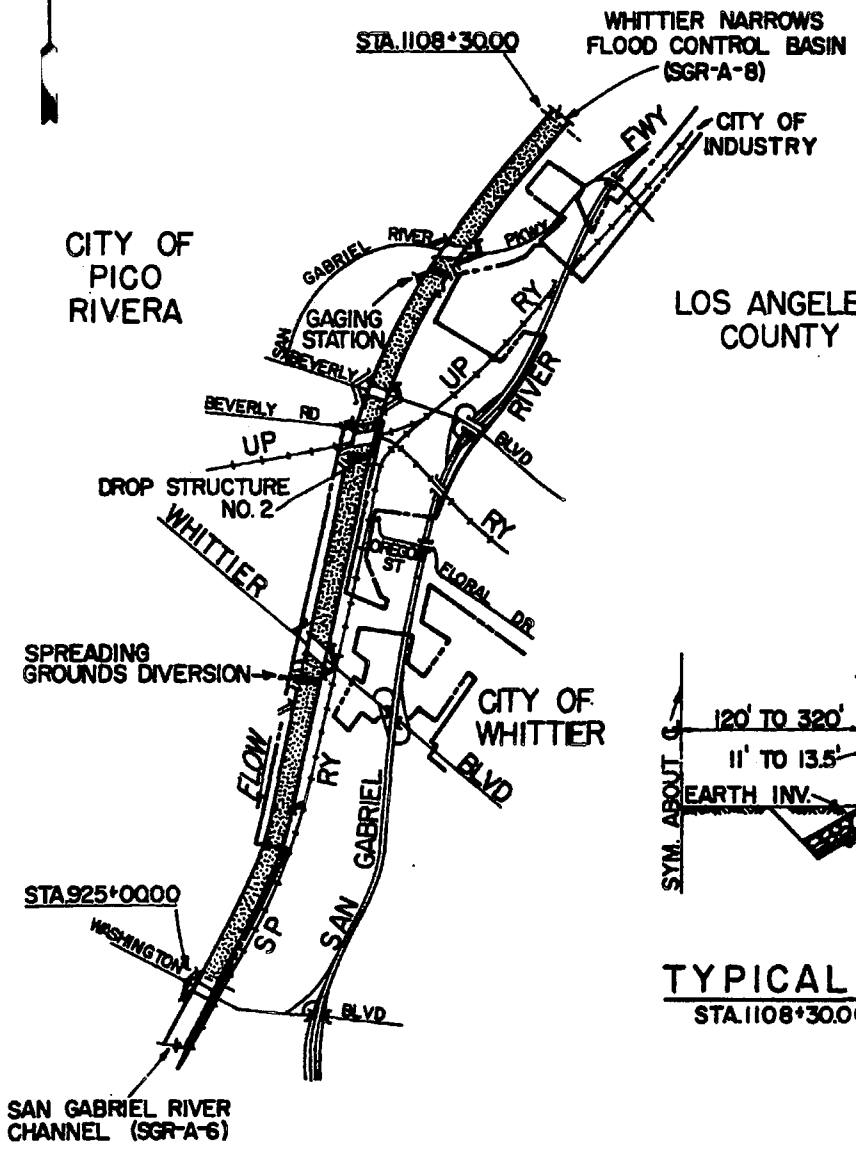
Reporting Features

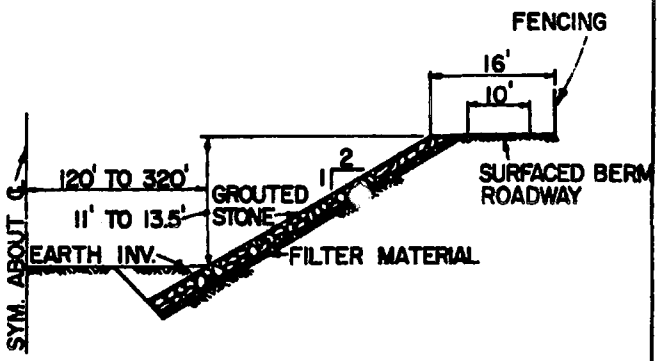
Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced and earth berm-access ramp
Earth channel invert	Drop structure
Concrete channel side slopes	Side drain
Fencing	Spreading grounds diversion
Rights-of-way	Gaging station
	Bridge
	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
1108+30.00	1076+75.00	VAR.	2.9 - 6.7	13,000
1076+75.00	1038+00.00	TRAP.	8.0	13,500
1038+00.00	996+00.00	TRAP.	8.0	14,000
996+00.00	925+00.00	TRAP.	8.0	14,500





TYPICAL OPEN SECTION

STA.1108+30.00 TO STA.925+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL INVERT-ACCESS RAMP
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL

WHITTIER NARROWS TO WASHINGTON BLVD

SCALE IN FEET

1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-A-7

DATA SHEET
SGR-A-8

SAN GABRIEL RIVER CHANNEL
Whittier Narrows Flood Control Basin

Construction Data

Contract No:	CHANNEL Eng 2275 A. Teichert and Son, Inc Bressi and Bevanda Const Co	RIGHT BANK LEVEE
Specifications:	CIVENG 53-5	DACW09-71-B-002
Plans:	D.O. Series 464/1-63	D.O. Series 464/136-138
Start:	13 October 1952	1970
Finish:	13 March 1953	Oct 1971
Folio Title:	SAN GABRIEL RIVER IMPROVEMENT Whittier Narrows Flood Control Basin: Central Embankment Channels, and Rosemead Blvd Relocation	SAN GABRIEL RIVER IMPROVEMENT Whittier Narrows Flood Control Basin

Local Assurances
Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data
Gaging Station Location: downstream of Peck Rd (sta 1187+38±)
Type: Recording (USGS--11087020)
Staff Gage Reading at One-third Capacity: 9.8 ft on gage (32,667 cfs)

Access Ramps
To Invert: none

To Right Berm: Thienes Ave, Peck Rd, through LACFCD spreading grounds, from flood control basin
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Pomona Fwy	8	0	State of California
Peck Rd	8	0	Los Angeles County

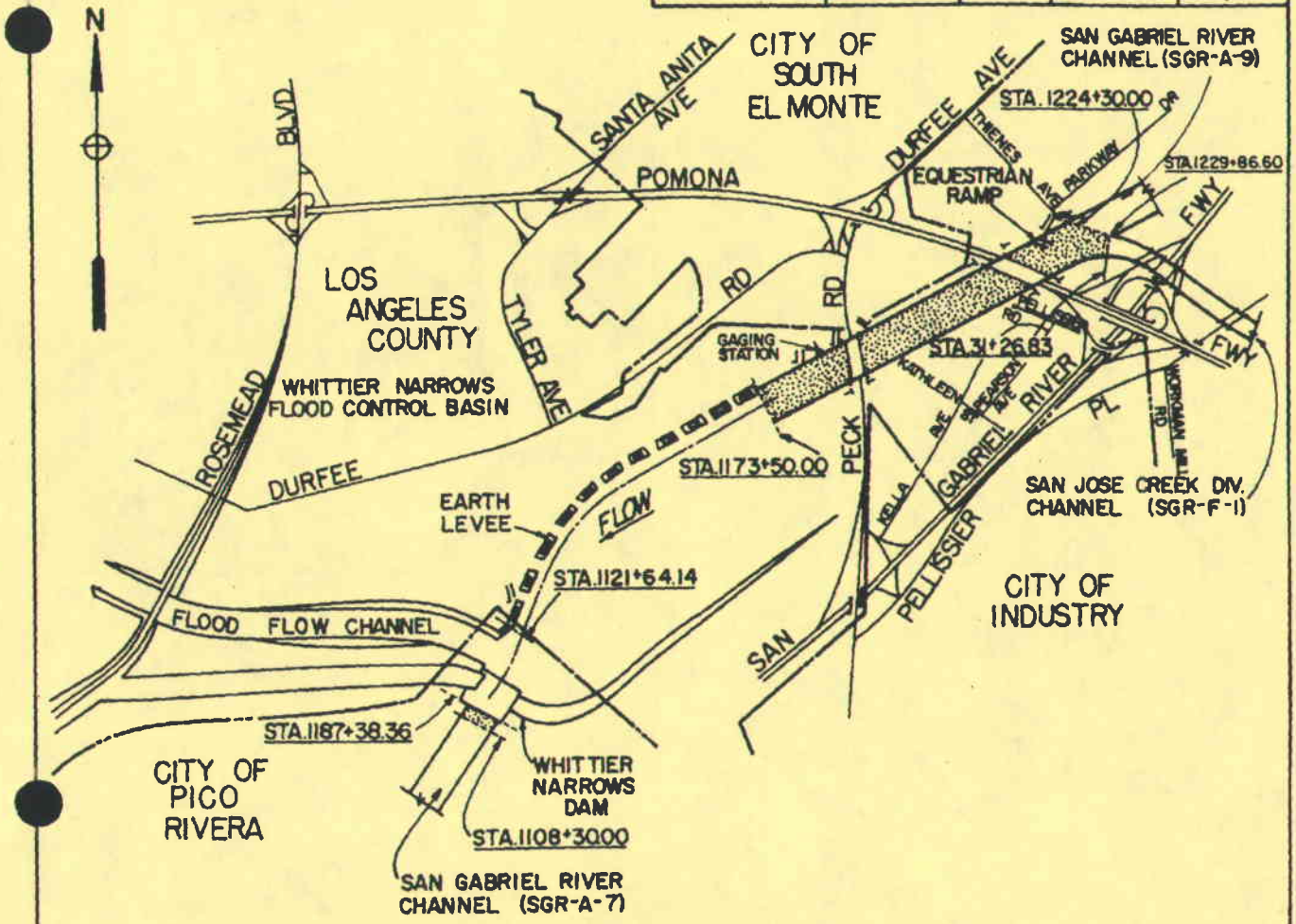
Reporting Features

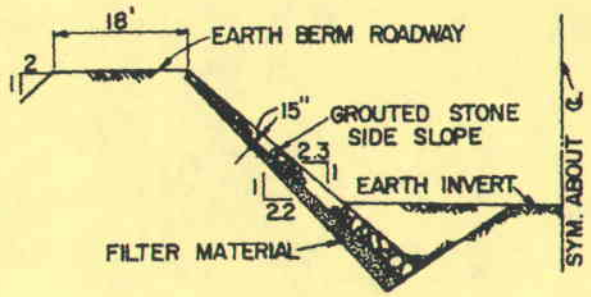
Along Channel	At a Channel Station
Stone channel side slopes	Earth berm-access ramp
Earth berm roadway	Stone stabilizer
Earth levee	Stone confluence section
Earth channel invert	Gaging station
Fencing	Bridge
Rights-of-way	Public utility

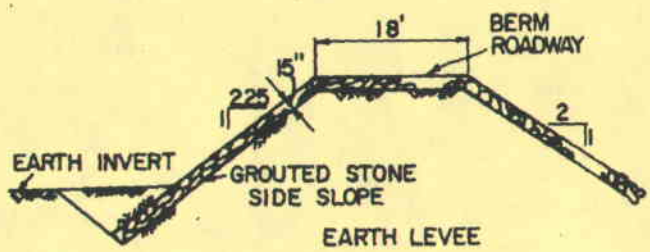
CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA	TO STA	SECT	V	Q
1224+30.00	1173+50.00	TRAP	13.0 - 17.9	98,000







TYPICAL OPEN SECTION

STA. 1224+30.00	TO	STA. 1173+50.00
STA. 1187+38.36	TO	STA. 1108+30.00

TYPICAL LEVEE SECTION

RIGHT BANK (ONLY):

STA. 1173+50.00	TO	STA. 1121+64.14

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL

WHITTIER NARROWS FLOOD CONTROL BASIN

SCALE IN FEET

1000 0 1000 2000 3000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-A-8

DATA SHEET
SGR-A-9

SAN GABRIEL RIVER CHANNEL
Walnut Creek to Whittier Narrows F.C. Basin

Construction Data

Contract No:	60-156	Start: 3 February 1960
	Kirst Const Co	Finish: 27 January 1961
Specifications:	CIVENG 60-11	
Plans:	D.O. Series 170/44-148	
Folio Title:	SAN GABRIEL RIVER IMPROVEMENT	
	Santa Fe F.C. Basin to Whittier Narrows F.C. Basin	

Local Assurances

Resolution Dated: 12 May 1959
Operation and Maintenance Transferred to: LACFCD, 24 May 1961

Stormflow Data

Gaging Station Location: downstream of Valley Blvd (sta 1306+00)
Type: Recording (LACFCD-F261C-R)
Staff Gage Reading at One-third Capacity: 8.7 ft on gage (20,000 cfs)

Access Ramps

To Invert: from left berm immediately upstream and downstream of Walnut Creek confluence and immediately upstream of San Jose Creek Diversion confluence; from right berm immediately upstream and downstream of drop structure #14 and immediately upstream of Thienes Ave

To Right Berm: Valley Blvd, Thienes Ave
To Left Berm: Valley Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
S.P. Ry	6	0	S.P.R.R.
Valley Blvd	7	0	Los Angeles County and City of Industry

Reporting Features

Along Channel	At a Channel Station
Earth channel invert	Surfaced berm-access ramp
Earth channel levee	Concrete invert-access ramp
Stone channel side slopes	Side drain
Surfaced berm roadway	Confluence section
Fencing	Bridge
Rights-of-way	Drop structure
	Gaging station
	Public utility

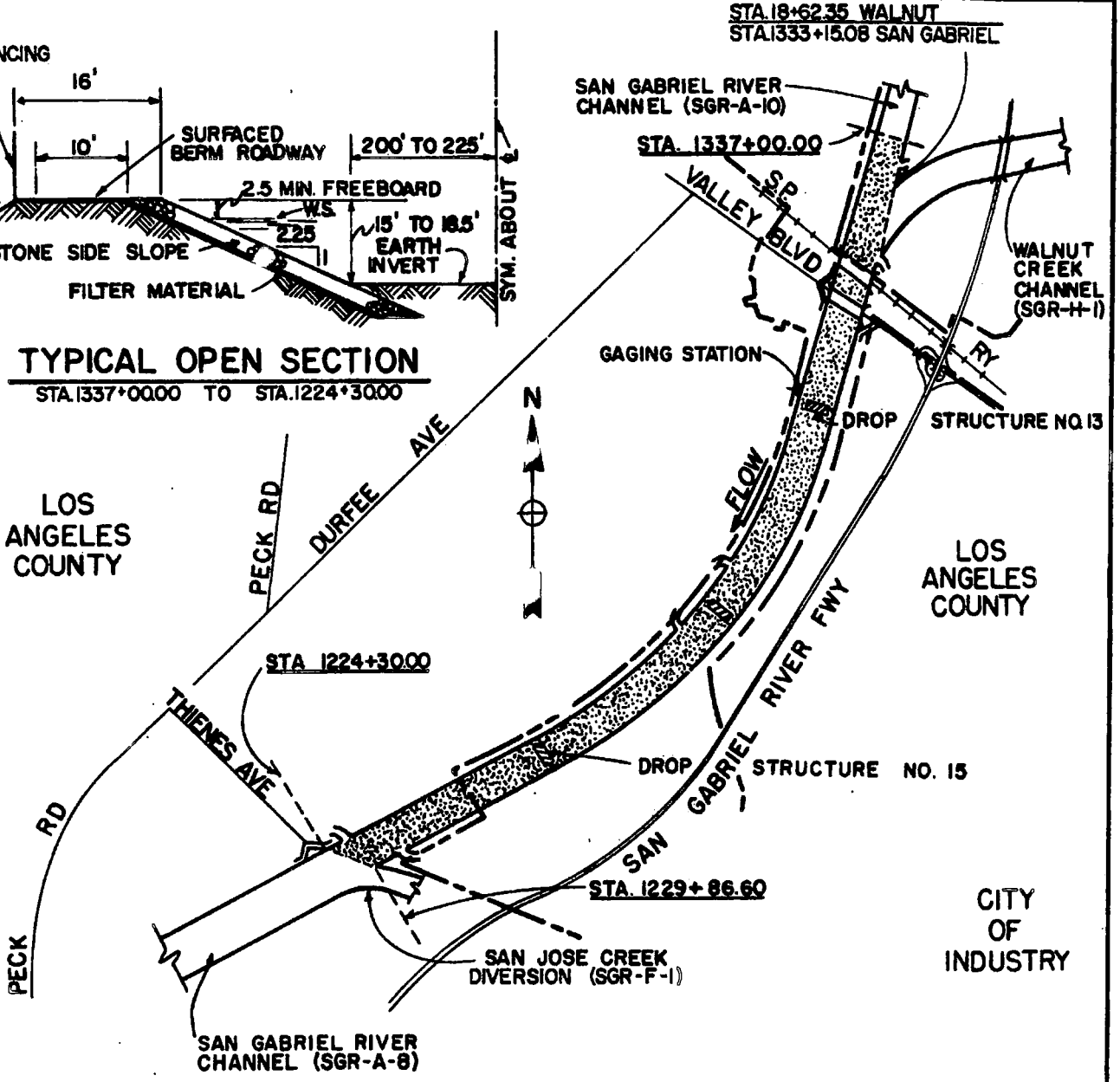
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
1337+00.00	1332+30.00	TRAP	6.9 – 7.8	41,000
1332+30.00	1224+30.00	TRAP	7.7–10.2	60,000

TYPICAL OPEN SECTION

STA.1337+00.00 TO STA.1224+30.00



LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL INVERT-ACCESS RAMP
- DROP STRUCTURE
- COUNTY OR CITY BOUNDRY
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL WALNUT CK TO WHITTIER NARROWS

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

SGR-A-9

OPERATION AND MAINTENANCE MANUAL

DATA SHEET SGR-A-10

SAN GABRIEL RIVER CHANNEL
Lower Azusa Rd to Walnut Creek

Construction Data

Contract No:	DA 60-156	Start:	3 February 1960
	Kirst Const Co	Finish:	27 January 1961
Specifications:	CIVENG 60-11		
Plans:	D.O. Series 170/44-148		
Folio Title:	SAN GABRIEL RIVER IMPROVEMENT Santa Fe F.C. Basin to Whittier Narrows F.C. Basin		

Local Assurances

Resolution Dated: 12 May 1959
Operation and Maintenance Transferred to: LACFCD, 24 May 1961

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from right berm, immediately upstream and downstream of drop structure #9, immediately upstream of drop structure #11, immediately upstream and downstream of San Bernardino Fwy
To Right Berm: Ramona Blvd
To Left Berm: Ramona Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
P.E. Ry	4 concrete 31 wooden	2	P.E.R.R.
Ramona Blvd	12	2	City of Irwindale and Los Angeles County
San Bernardino Fwy	8	2	State of California

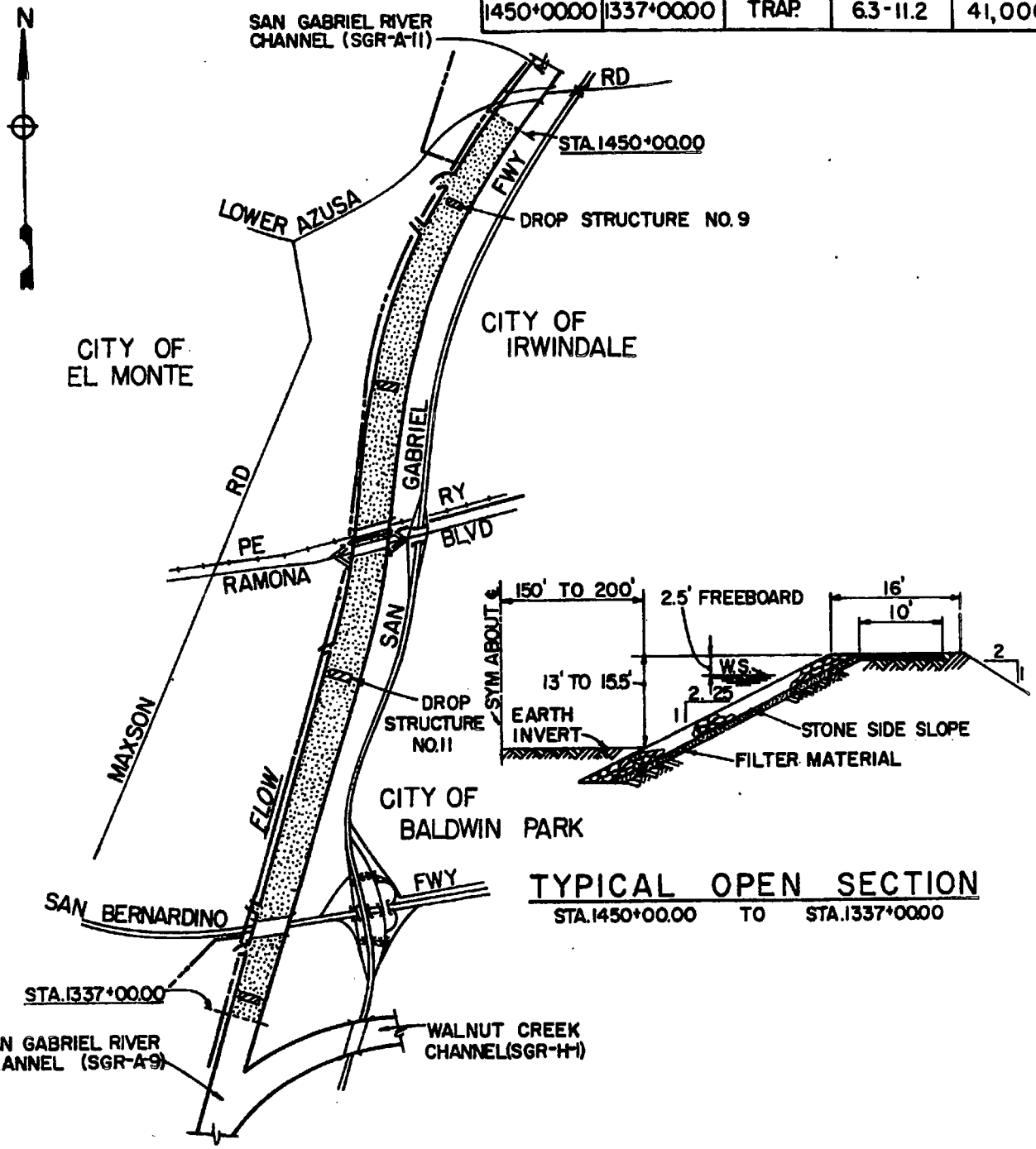
Reporting Features

Along Channel	At a Channel Station
Earth channel invert	Side drain
Earth channel levee	Surfaced berm-access ramp
Stone channel side slopes	Concrete invert-access ramp
Surfaced berm roadway	Drop structure
Fencing	Bridge
Rights-of-way	Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1450+0000	1337+0000	TRAP.	6.3-11.2	41,000



TYPICAL OPEN SECTION

STA. 1450+00.00 TO STA. 1337+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL INVERT-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL

LOWER AZUSA RD TO WALNUT CK

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA SGR-A-10

DATA SHEET SAN GABRIEL RIVER CHANNEL
SGR-A-11 Santa Fe F.C.B. to Lower Azusa Rd

Construction Data

Contract No:	DA 60-156	Start: 3 February 1960
	Kirst Const Co	Finish: 27 January 1961
Specifications:	CIVENG 60-11	
Plans:	D.O. Series 170/44-148	
Folio Title:	SAN GABRIEL RIVER IMPROVEMENT Santa Fe F.C. Basin to Whittier Narrows F.C. Basin	

Local Assurances
Resolution Dated: 12 May 1959
Operation and Maintenance Transferred to: LACFCD, 24 May 1961

Stormflow Data
Gaging Station Location: downstream of Arrow Hwy (sta 1547+95)
Type: recording (USGS--11085000)
Staff Gage Reading at One-third Capacity: 18.1 ft on gage (13,667 cfs)

Access Ramps
To Invert: from right berm immediately upstream and downstream from drop structures #1, #3, #5, and #7

To Right Berm: Arrow Hwy, Live Oak Ave, from Edison right-of-way, Lower Azusa Rd
To Left Berm: Arrow Hwy, Live Oak Ave, Lower Azusa Rd

Bridges

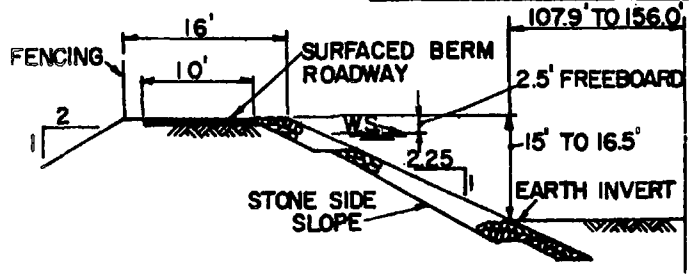
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Live Oak Ave	9	2	City of Irwindale
San Gabriel River Fwy	7	2	State of California
Lower Azusa Rd	13	2	City of Irwindale

Reporting Features

Along Channel	At a Channel Station
Earth channel invert	Surfaced berm-access ramp
Earth channel levee	Concrete invert-access ramp
Stone channel side slopes	Side drain
Surfaced berm roadway	Drop structure
Fencing	Gaging station
Rights-of-way	Bridge
	Public utility

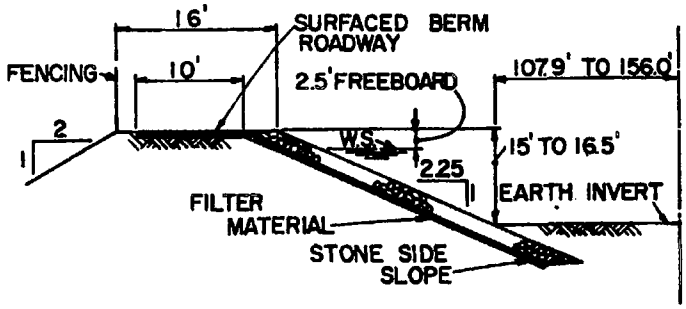
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
1558+20.56	1450+00.00	TRAP.	9.4 - 23.0	41,000



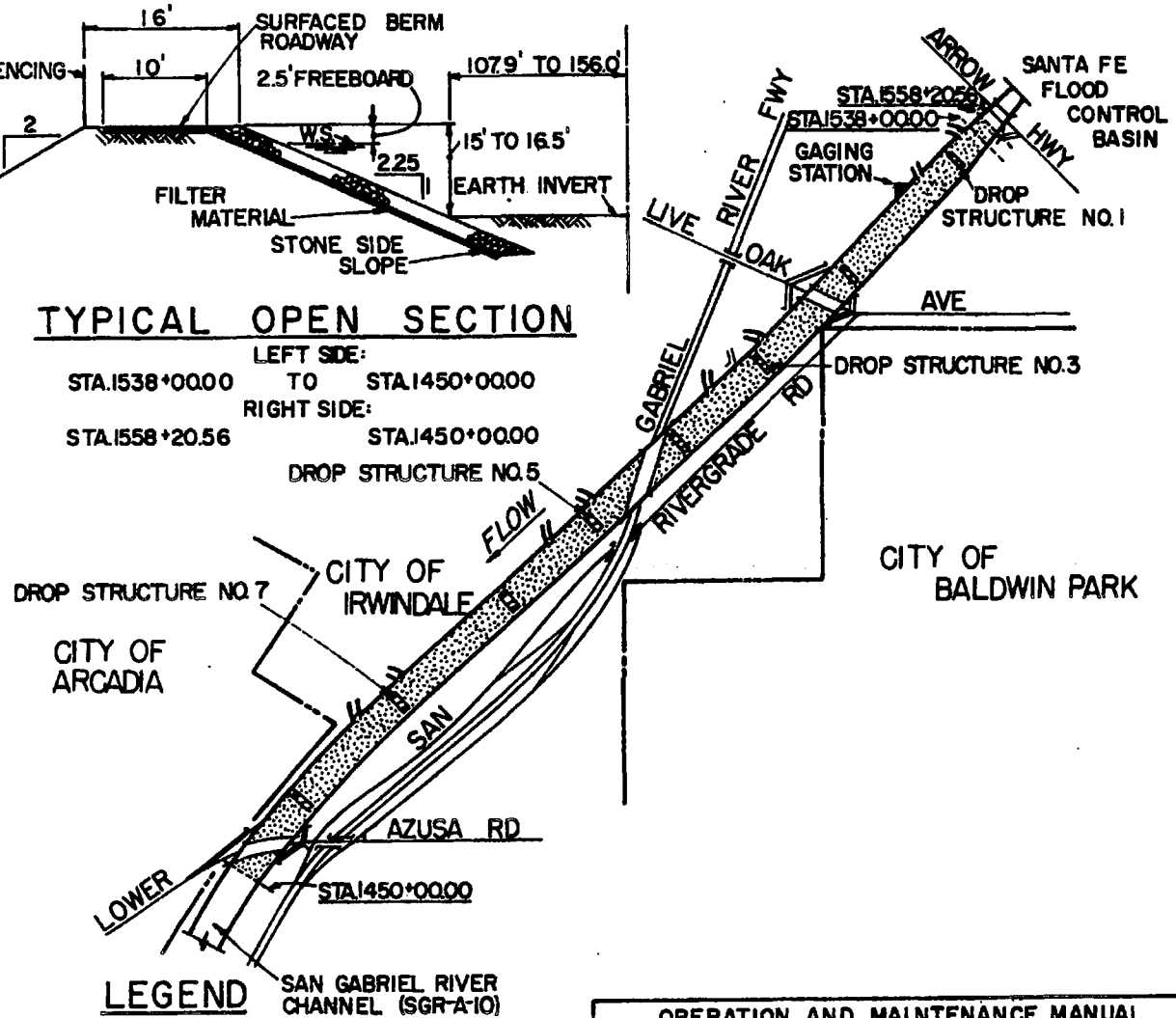
TYPICAL OPEN SECTION

LEFT SIDE (ONLY):
STA. 1558+20.56 TO STA. 1538+00.00



TYPICAL OPEN SECTION

LEFT SIDE:
STA. 1538+00.00 TO STA. 1450+00.00
RIGHT SIDE:
STA. 1558+20.56 STA. 1450+00.00



LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL INVERT-ACCESS RAMP
- ------ CONST. PROJECT LIMIT
- —— COUNTY OR CITY BOUNDARY

SAN GABRIEL RIVER CHANNEL (SGR-A-10)

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL

SANTA FE F.C.B. TO LOWER AZUSA RD

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-A-11

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-A-12

SAN GABRIEL RIVER CHANNEL
Mouth of Canyon to Santa Fe Dam

Construction Data

Contract No: W-04-353Eng-1981 Start: 1947
Macco Corp Finish: December 1947
Specifications:
Plans: D.O. Series 440/62-110
Folio Title: SAN GABRIEL RIVER IMPROVEMENT
Mouth of Canyon to Santa Fe Dam

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: downstream of Foothill Blvd (sta 33+87±)
Type: Recording (LACFCD—F190-R)
Staff Gage Reading at One-third Capacity: 5.4 gage (32,667 cfs)

Access Ramps

To Invert: none

To Right Berm: Fish Canyon Rd
To Left Berm: San Gabriel Canyon Rd, Foothill Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
P.E. Ry (abandoned)	17	0	P.E.R.R.
Foothill Blvd	12	0	Los Angeles County
Foothill Fwy	8	0	State of California
A.T.S.F. Ry	6	0	A.T.S.F.R.R.

Reporting Features

Along Channel
Stone channel side slopes
Earth channel invert
Surfaced berm roadway
Earth berm roadway
Earth levee
Fencing
Rights-of-way

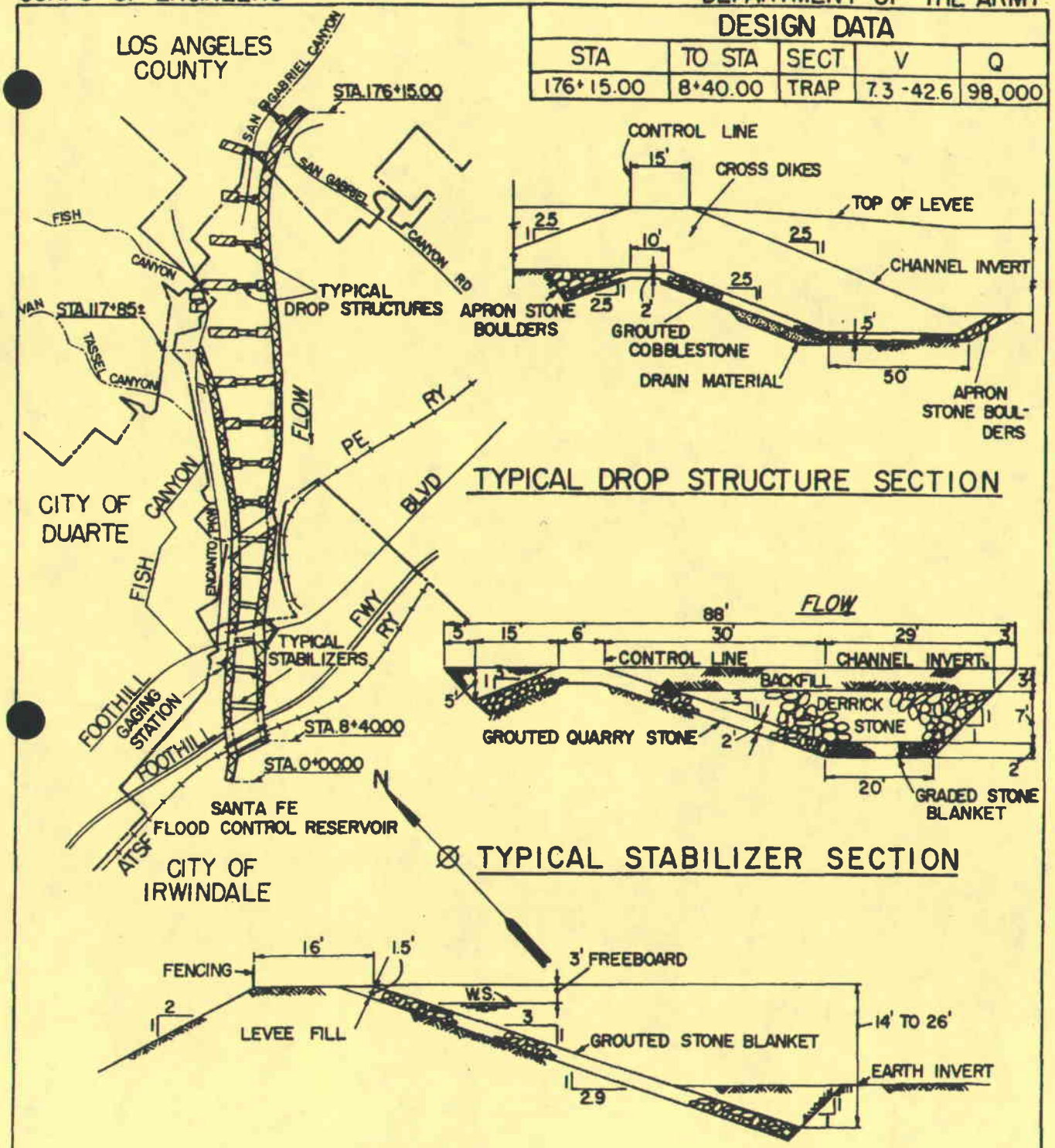
At a Channel Station
Drop structure
Stone apron
Side drain
Surfaced berm-access ramp
Stone stabilizer
Gaging station
Bridge
Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

SGR-A-12

DESIGN DATA				
STA	TO STA	SECT	V	Q
176+15.00	8+40.00	TRAP	7.3 -42.6	98,000



LEGEND

- EARTH LEVEE
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN GABRIEL RIVER CHANNEL

MOUTH OF CANYON TO SANTA FE FCB

SCALE IN FEET

2000 0 2000 4000 6000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-A-12

DATA SHEET
SGR-B-1

BIG DALTON WASH CHANNEL
Los Angeles St to Walnut Creek

Construction Data

Contract No:	DA 58-132	Start: 9 April 1958
	MacDonald and Kruse	Finish: 23 January 1959
Specifications:	CIVENG 58-12	
Plans:	D.O. Series 177/23-93	
Folio Title:	BIG DALTON WASH CHANNEL	
	Los Angeles St to Walnut Creek Inlet Channel	

Local Assurances

Resolution Dated: 29 October 1957
Operation and Maintenance Transferred to: LACFCD, 12 May 1959

Stormflow Data

Gaging Station Location: immediately upstream of Merced Ave (sta 41+00)
Type: Recording (LACFCD--F274B-R)
Staff Gage Reading at One-third Capacity: 5.1ft on gage (8,500 cfs)

Access Ramps

To Invert: none

To Right Berm:	Ramona Blvd, Puente Ave, Badillo St, Pacific Ave, Merced Ave, Garvey Ave
To Left Berm:	Ramona Blvd, Puente Ave, Badillo St, Pacific Ave, Merced Ave, Garvey Ave, Corak St

Bridges

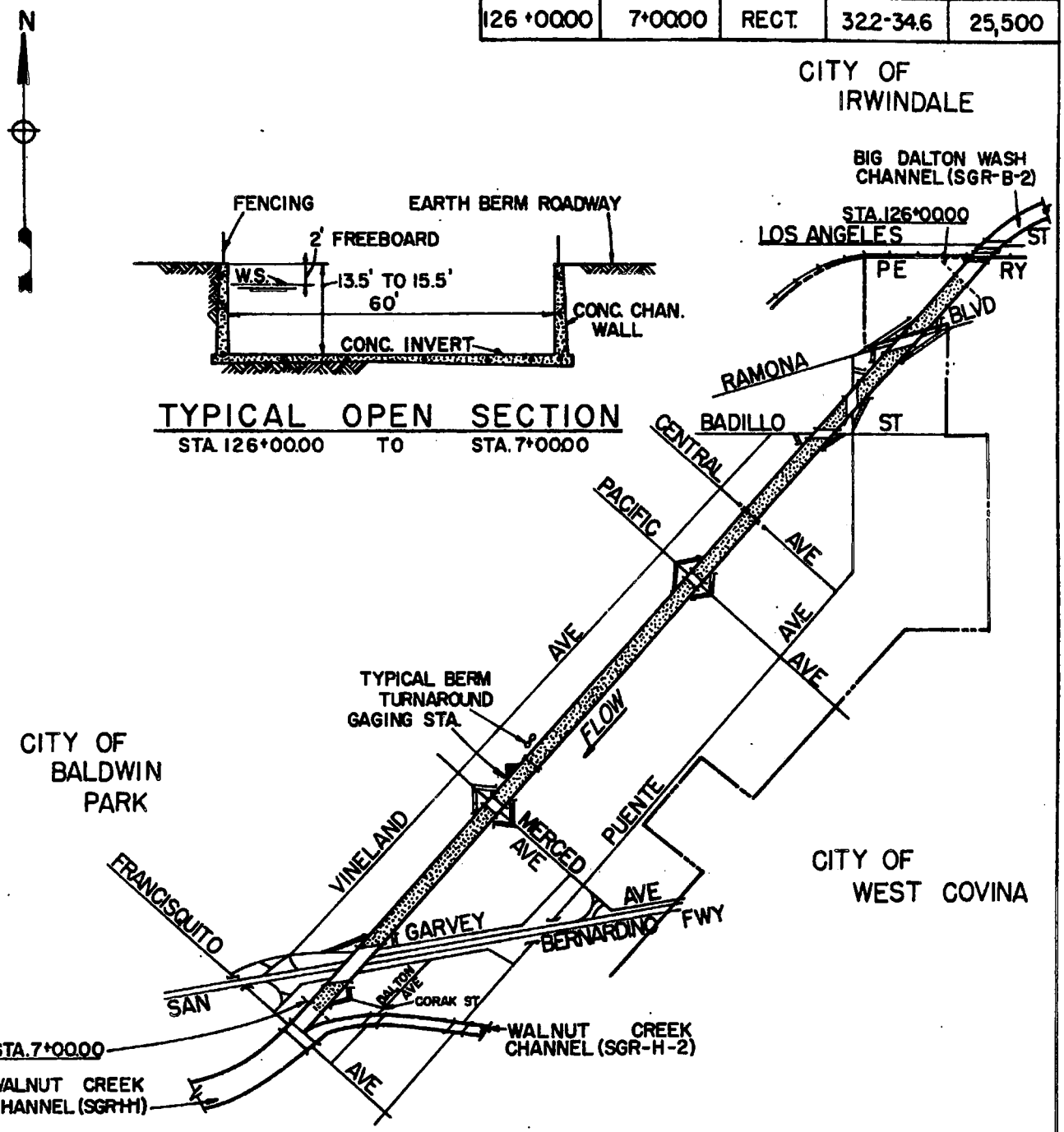
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Ramona Blvd	0	2	City of Baldwin Park
Puente Ave	0	2	City of Baldwin Park
Badillo St	0	2	City of Baldwin Park
Central Ave	0	0	City of Baldwin Park (footbridge)
Pacific Ave	0	2	City of Baldwin Park
Sta 42+00	0	0	LACFCD (gaging station footbridge)
Merced Ave	0	2	City of Baldwin Park
San Bernardino Fwy	0	1	State of California

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Side overflow spillway
Fencing	Bridge
Rights-of-way	Gaging station
	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
126+00.00	7+00.00	RECT.	32.2-34.6	25,500



TYPICAL OPEN SECTION

STA. 126+00.00 TO STA. 7+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BIG DALTON WASH CHANNEL

LOS ANGELES ST TO WALNUT CREEK

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-B-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-B-2

BIG DALTON WASH CHANNEL
San Dimas Wash to Los Angeles St

Construction Data

Contract No: DA 58-133
Alwood Corp

Start: 9 April 1958
Finish: 19 March 1959

Specifications: CIVENG 58-14
Plans: D.O. Series 181/1-112
Folio Title: BIG DALTON WASH CHANNEL
San Dimas Wash to Los Angeles St

Local Assurances

Resolution Dated: 29 October 1957
Operation and Maintenance Transferred to: LACFCD, 12 August 1959

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: through right wall just downstream of Cypress Ave (sta 149+88)

To Right Berm: at all street crossings
To Left Berm: at all street crossings

Bridges

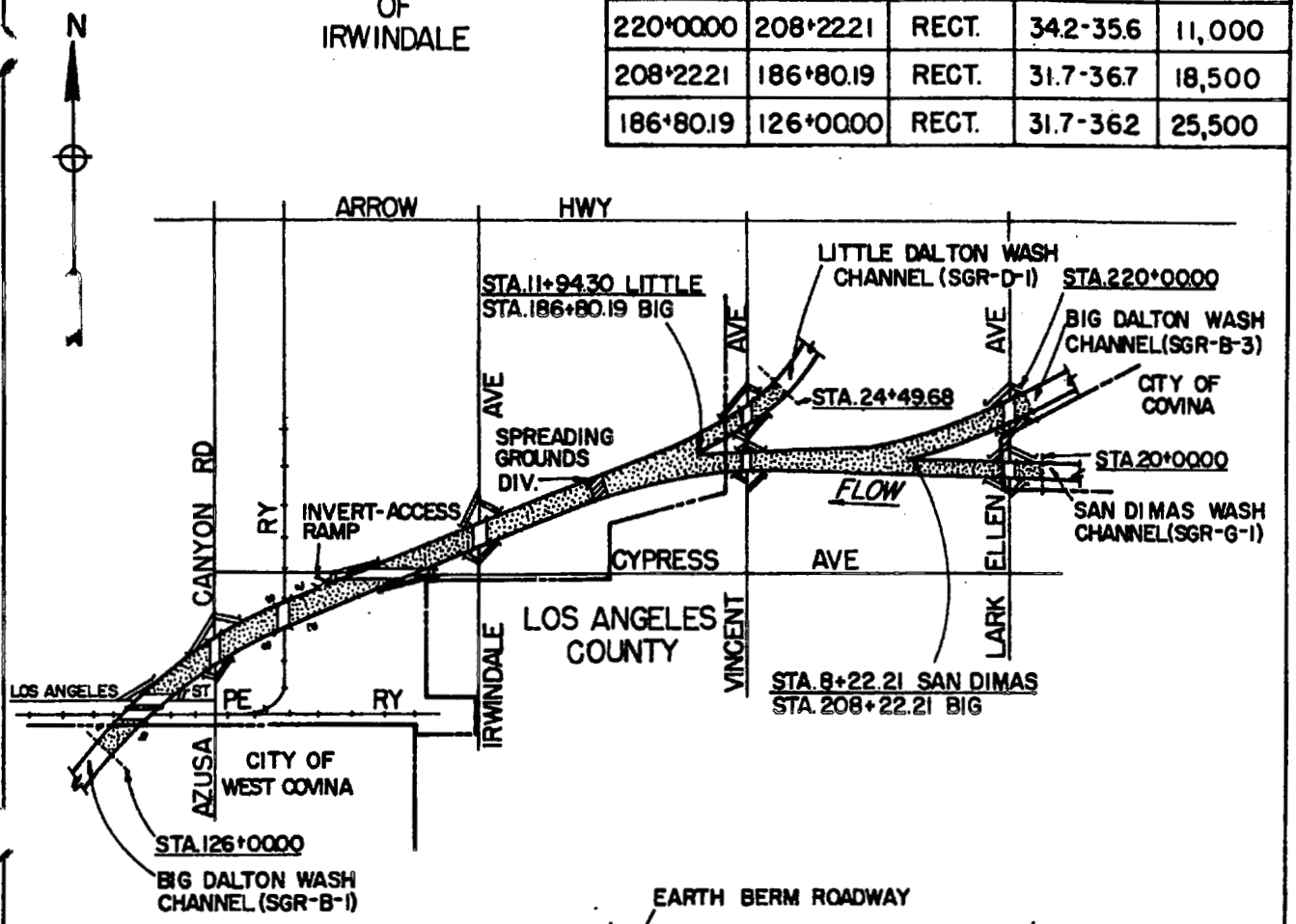
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Big Dalton Wash:			
Lark Ellen Ave	0	2	Los Angeles County
Vincent Ave	0	2	Los Angeles County and City of Irwindale
Irwindale Ave	0	2	City of Irwindale
Cypress Ave	0	2	City of Irwindale
P.E. Ry	0	2	P.E.R.R.
Azusa Canyon Rd	0	2	City of Irwindale
Los Angeles St	0	2	City of Irwindale
P.E. Ry	0	2	P.E.R.R.
Little Dalton Wash:			
Vincent Ave	0	2	Los Angeles County and City of Irwindale
San Dimas Wash:			
Lark Ellen Ave	0	2	Los Angeles County and City of Covina

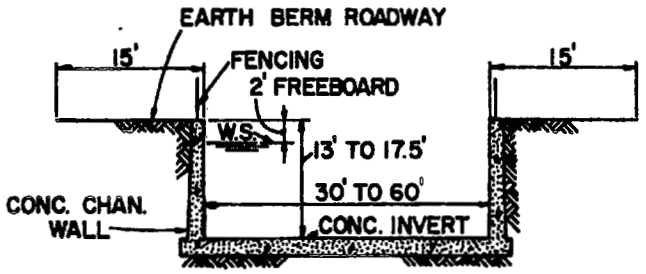
Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Fencing	Spreading grounds diversion
Rights-of-way	Bridge
	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
220+00.00	208+22.21	RECT.	34.2-35.6	11,000
208+22.21	186+80.19	RECT.	31.7-36.7	18,500
186+80.19	126+00.00	RECT.	31.7-36.2	25,500





TYPICAL OPEN SECTION
STA.220+00.00 TO STA.126+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM TURNAROUND
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BIG DALTON WASH CHANNEL

SAN DIMAS WASH TO LOS ANGELES ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-B-2

DATA SHEET
SGR-B-3

BIG DALTON WASH CHANNEL
Barranca Ave to San Dimas Wash

Construction Data

Contract No:	DA 59-133	Start:	20 April 1959
	A. Teichert and Son, Inc	Finish:	20 November 1959
Specifications:	CIVENG 59-27		
Plans:	D.O. Series 182/42-93		
Folio Title:	BIG DALTON WASH CHANNEL Ben Lomond Ave to San Dimas Wash		

Local Assurances
Resolution Dated: 6 May 1958
Operation and Maintenance Transferred to: LACFCD, 15 April 1960

Stormflow Data
Gaging Station Location: none

Access Ramps

To Invert:	through left wall upstream of Cerritos Ave (sta 287+32±)
To Right Berm:	at all street crossings
To Left Berm:	at all street crossings

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Barranca Ave	0	2	Los Angeles County
Gladstone St	0	2	Los Angeles County
Sta 319+35±	0	0	Gladstone School District (footbridge)
Citrus Ave	0	2	Los Angeles County and City of Azusa
Cerritos Ave	0	2	Los Angeles County and City of Azusa
Arrow Hwy	0	1	Los Angeles County
Azusa Ave	0	0	Los Angeles County

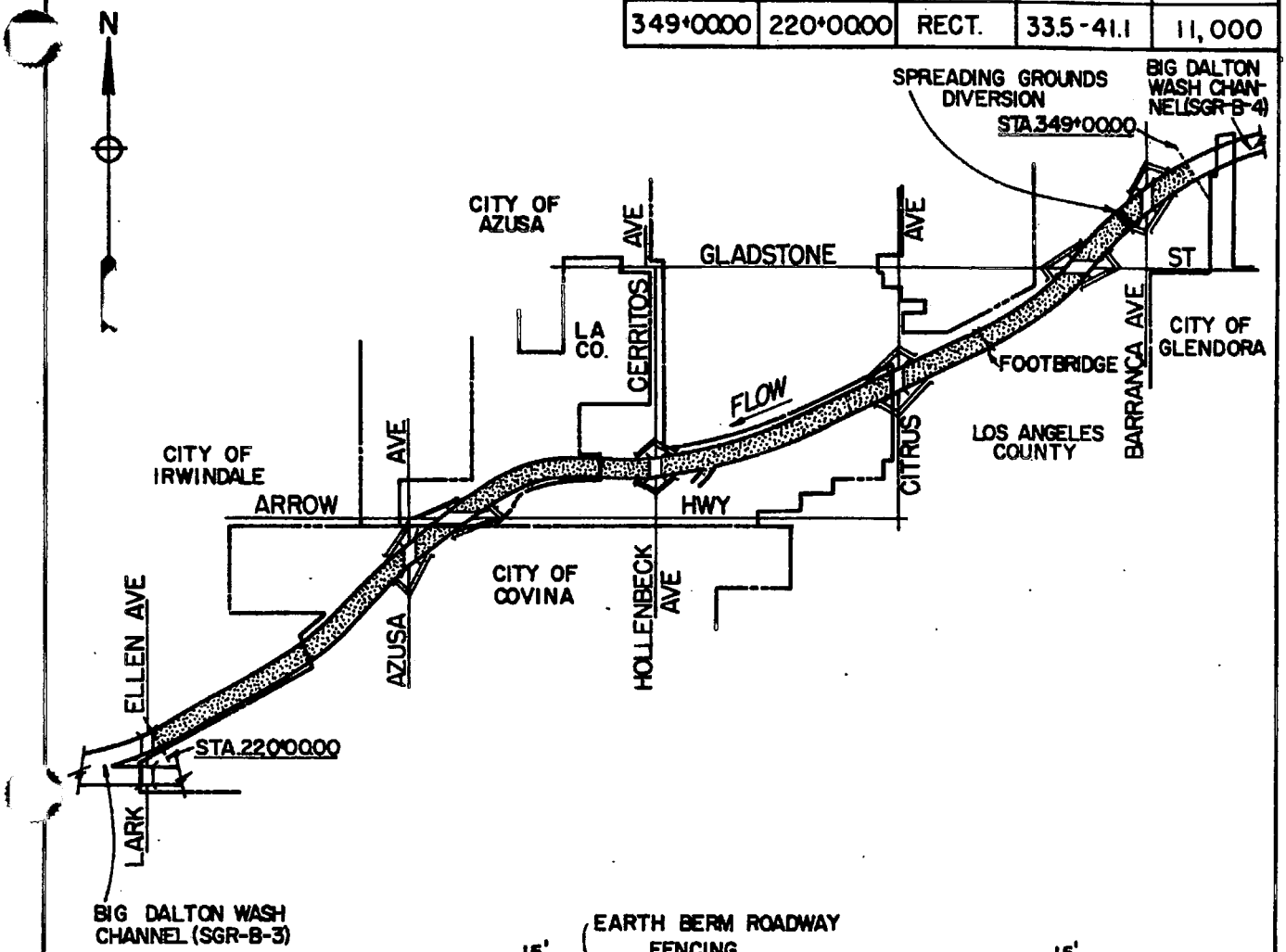
Reporting Features

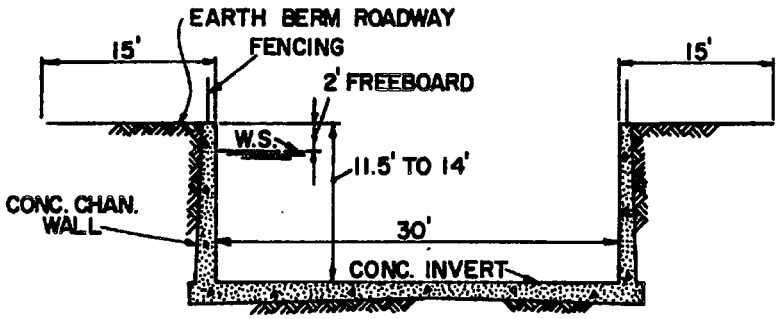
Along Channel	At a Channel Station
Earth berm roadway	Surfaced berm-access ramp
Concrete Channel invert	Concrete invert-access ramp
Concrete channel walls	Side overflow spillway
Fencing	Side drain
Rights-of-way	Spreading grounds diversion
	Bridge
	Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
349+0000	220+0000	RECT.	33.5-41.1	11,000





TYPICAL OPEN SECTION

STA.349+00.00 TO STA.220+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL INVERT-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BIG DALTON WASH CHANNEL

BARRANCA AVE TO SAN DIMAS WASH

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-B-3

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-B-4

BIG DALTON WASH CHANNEL
Alosta Ave to Barranca Ave

Construction Data

Contract No:	DA 59-141	Start:	30 April 1959
	Kirst Const Co	Finish:	19 February 1960
Specifications:	CIVENG 59-29		
Plans:	D.O. Series 183/1-40		
Folio Title:	BIG DALTON WASH CHANNEL Alosta Ave to Ben Lomond Ave		

Local Assurances
Resolution Dated: 6 May 1958
Operation and Maintenance Transferred to: LACFCD, 20 October 1960

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none

To Right Berm: Mauna Loa Ave, Glendora Ave, Grand Ave
To Left Berm: Mauna Loa Ave, Glendora Ave, Grand Ave

Bridges

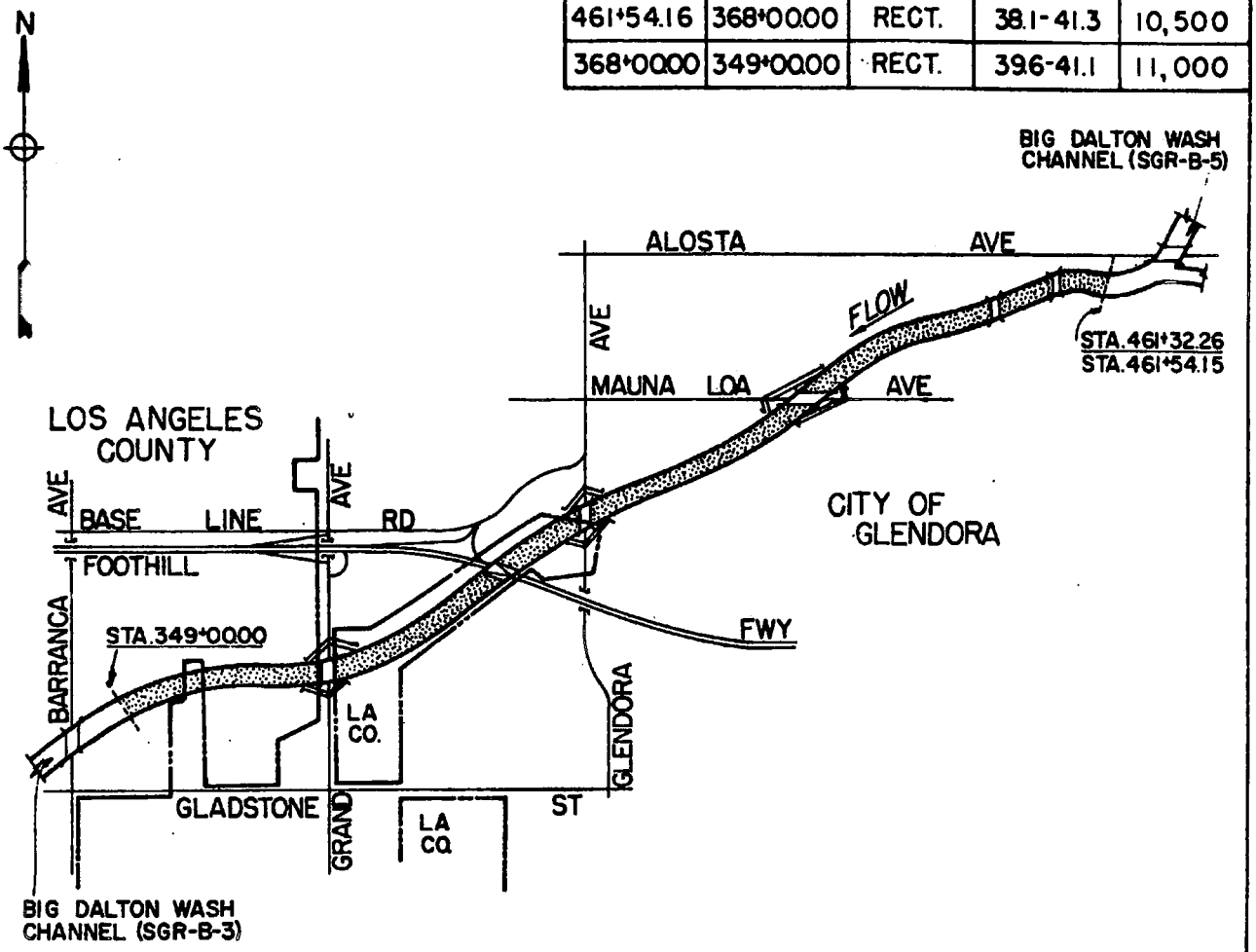
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 456+54	0	2	Private bridge
Sta 449+33	0	2	Private bridge
Mauna Loa Ave	0	2	City of Glendora
Glendora Ave	0	2	City of Glendora
Grand Ave	0	2	Los Angeles County and City of Glendora

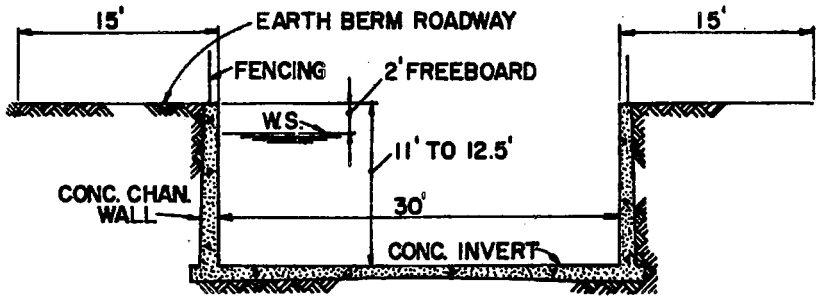
Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Side overflow spillway
Concrete channel roof slab	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
461+54.16	368+00.00	RECT.	38.1-41.3	10,500
368+00.00	349+00.00	RECT.	39.6-41.1	11,000





TYPICAL OPEN SECTION

STA.461+54.16 TO STA.349+00.00

LEGEND

- COVERED SECTION
- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BIG DALTON WASH CHANNEL

ALOSTA AVE TO BARRANCA AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-B-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-B-5

BIG DALTON WASH CHANNEL
Debris Basins to Alosta Ave

Construction Data

Contract No:	DA 59-141	Start:	30 April 1959
	Kirst Const Co	Finish:	19 February 1960
Specifications:	CIVENG 59-29		
Plans:	D.O. Series 183/43-112		
Folio Title:	BIG DALTON WASH CHANNEL Debris Basins to Alosta Ave		

Local Assurances

Resolution Dated: 6 May 1958
Operation and Maintenance Transferred To: LACFCD, 20 October 1960

Stormflow Data

Gaging Station Location: immediately upstream of Sierra Madre Blvd (sta 540+50)
Type: Recording (LACFCD--F202-R)
Staff Gage Reading at One-third Capacity: 2.2 ft on gage (2,333 cfs)

Access Ramps

To Invert: through right wall from Alosta Ave (sta 463+07)

To Right Berm: from Glendora Mountain Rd; Sierra Madre Ave, Foothill Blvd, Alosta Ave
To Left Berm: Sierra Madre Ave, Foothill Blvd, Alosta Ave

Bridges

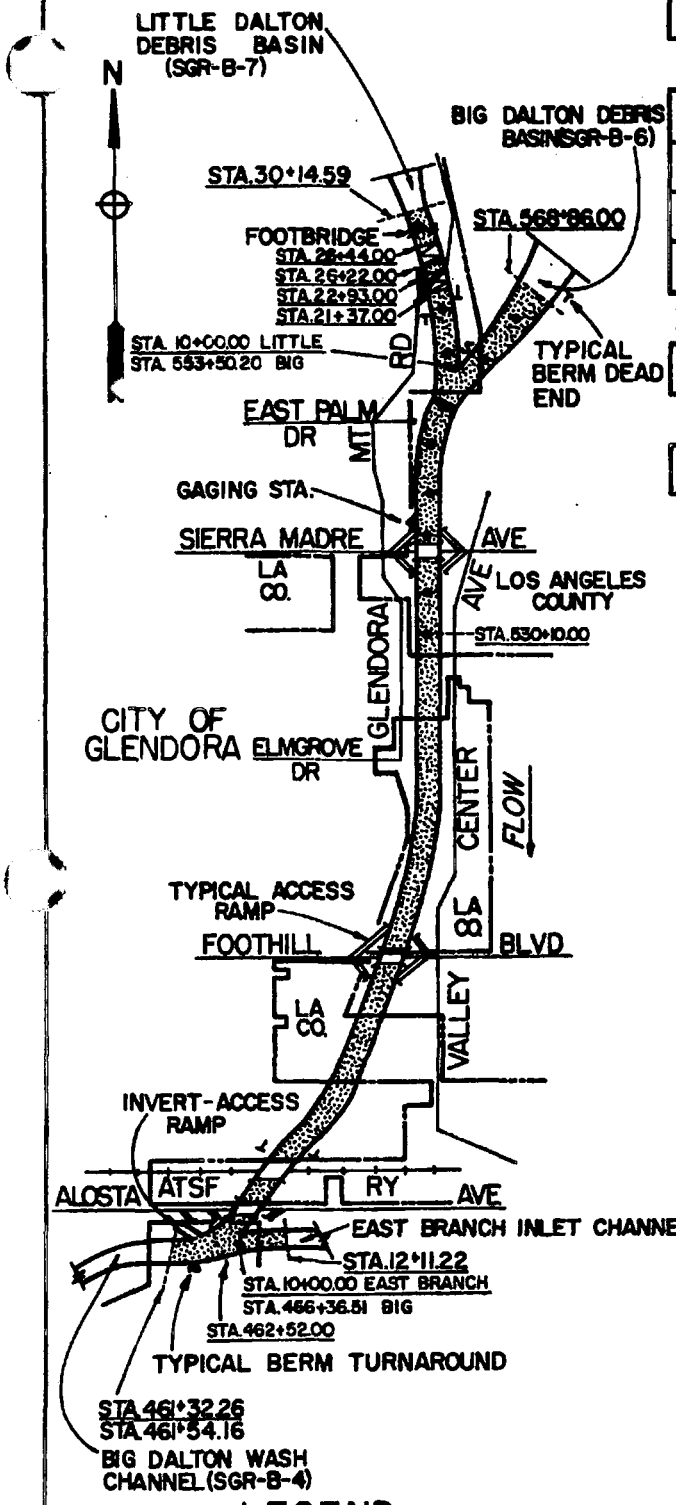
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Big Dalton Wash:			
Sierra Madre Ave	0	0	Los Angeles County
Foothill Blvd	0	2	Los Angeles County and City of Glendale
A.T.S.F. Ry	0	2	A.T.S.F.R.R.
Alosta Ave	0	2	State of California
Little Dalton Diversion:			
Sta 26+44	0	0	Private bridge

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Concrete invert-access ramp
Concrete channel invert	Surfaced berm-access ramp
Concrete channel walls	Side drain
Concrete channel roof slab	Side overflow spillway
Subdrain system	Gaging station
Rights-of-way	Bridge
	Public utility
	Subdrain manhole

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

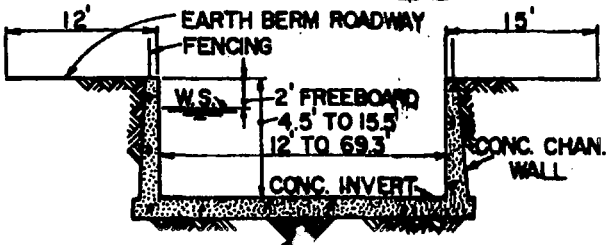


LEGEND

- OPEN SECTION
- STREET BRIDGE
- SUBDRAIN MANHOLE
- COVERED SECTION
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

DESIGN DATA

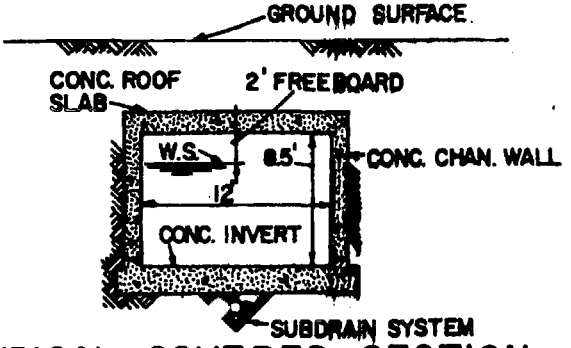
STA.	TO STA.	SECT.	V	Q
BIG DALTON WASH CHANNEL				
568+86.00	553+50.20	RECT.	33.6-39.6	5,000
553+50.20	466+36.51	RECT.	39.6-50.4	7,000
466+36.51	465+56.51	RECT.	37.9-44.0	10,400
465+56.51	461+32.36	RECT.	37.8-40.1	10,500
LITTLE DALTON WASH DIVERSION CHANNEL				
30+14.59	10+00.00	RECT.	36.9-43.7	3,000
EAST BRANCH INLET CHANNEL				
12+11.22	10+00.00	RECT.	18.6-29.8	3,400



BIG DALTON WASH : STA.568+86.00 TO STA.530+10.00
STA.466+36.51 TO STA.462+52.00

TYPICAL OPEN SECTION

AS NOTED



TYPICAL COVERED SECTION

LITTLE DALTON WASH DIV. CHANNEL

STA.26+44.00 TO STA.26+22.00
STA.22+93.00 TO STA.21+37.00

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BIG DALTON WASH CHANNEL

DEBRIS BASINS TO ALOSTA AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-B-5

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-B-6

BIG DALTON DEBRIS BASIN

Construction Data

Contract No:	DA 59-141	Start:	30 April 1959
	Kirst Const Co	Finish:	19 February 1960
Specifications:	CIVENG 59-29		
Plans:	D.O. Series 183/43-112		
Folio Title:	BIG DALTON WASH CHANNEL Debris Basin to Alosta Ave		

Local Assurances

Resolution Dated: 6 May 1958
Operation and Maintenance Transferred to: LACFCD 20 October 1960

Stormflow Data

Staff Gages: 11
Basin Staff Gage Elevation at One-third Design Discharge: 1134 ft msl

Access Roads

To Embankment:	from Big Dalton Canyon Rd to top of embankment
To Basin:	from Big Dalton Canyon Rd to bottom of basin

Pertinent Design Data

Embankment:		Spillway:	
Length	840 ft	Length	405 ft
Crest Width	20 ft	Crest Width	116 ft
Crest Elevation	1148 ft msl	Crest Elevation	1132 ft msl
Side Slope	upstream 1 on 2.5 downstream 1 on 2	Design Capacity	16,800 cfs
Pool Drain:		Intake Tower:	
Length	243 ft	Top Elevation	1148 ft msl
Diameter	48 in	Height above Invert	39.3 ft
Design Capacity	300 cfs	Inside Dimensions	4 ft x 5 ft

Drainage Area: 2.9 sq mi
Debris Basin Capacity: 580,000 cu yds
Maximum Allowable Accumulation of Debris: 145,000 cu yds

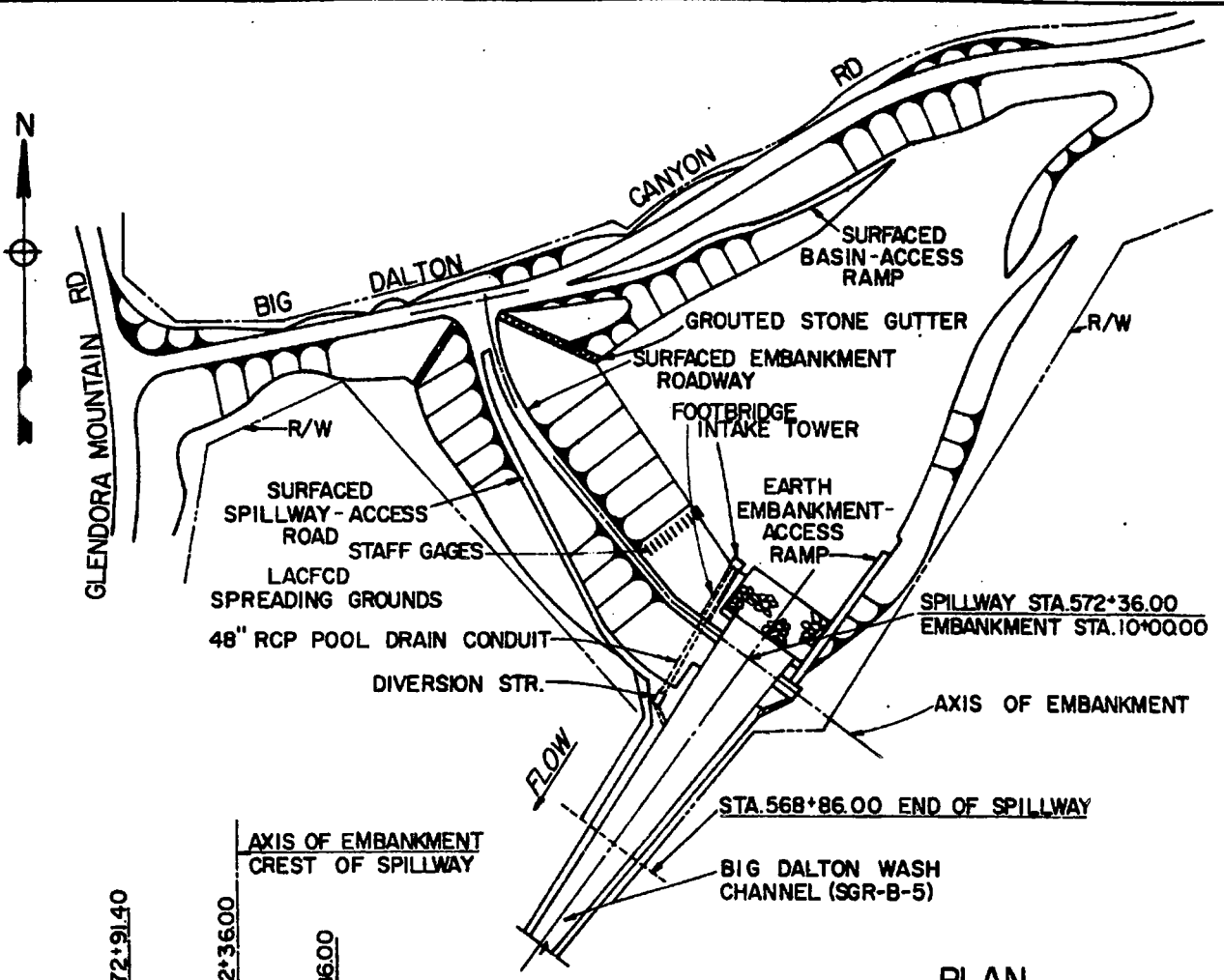
REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillw
Concrete channel invert
Concrete channel walls
Stone spillway apron
Earth berm roadway
Spreading grounds diversion
Subdrain system
Fencing
Rights-of-way

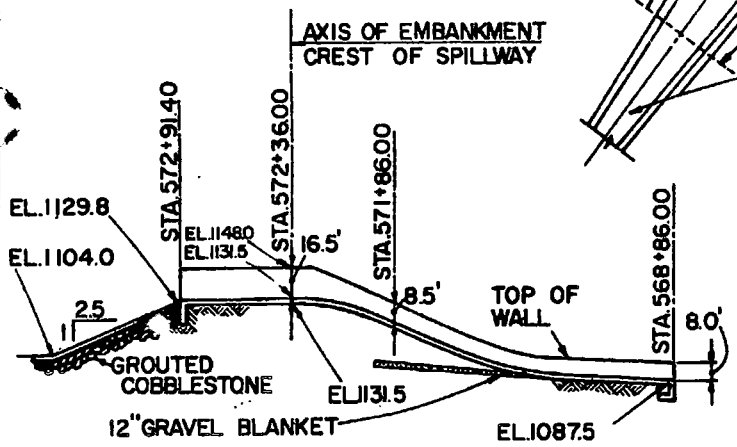
Outlet Works
Intake tower
Concrete pool drain conduit (gated)
Bridge

Embankment and Basin
Earth embankment
Stone gutter
Surfaced basin-access ramp
Surfaced embankment roadway
Surfaced spillway-access ramp
Debris storage capacity
Staff gages
Fencing
Public utility
Rights-of-way

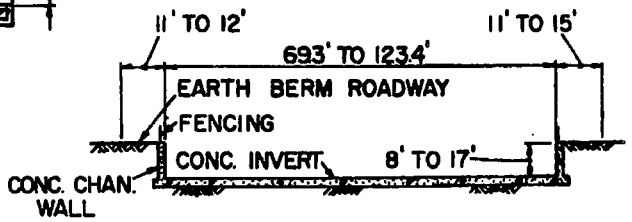
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



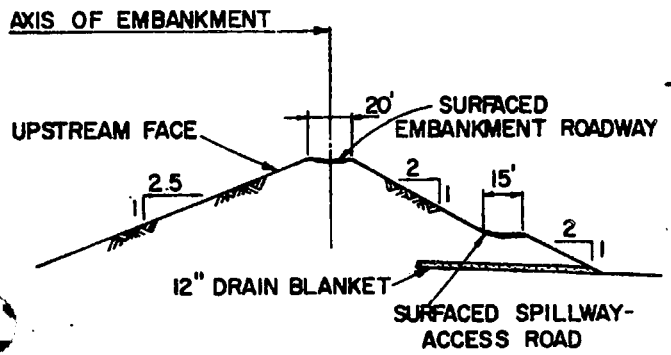
PLAN



SECTION ALONG ℄ OF SPILLWAY



TYPICAL SECTION THROUGH SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

BIG DALTON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-B-6

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-B-7

LITTLE DALTON DEBRIS BASIN

Construction Data

Contract No:	DA 59-141	Start:	30 April 1959
	Kirst Const Co	Finish:	19 February 1960
Specifications:	CIVENG 59-29		
Plans:	D.O. Series 183/43-112		
Folio Title:	BIG DALTON WASH CHANNEL Debris Basins to Alosta Ave		

Local Assurances

Resolution Dated: 6 May 1960
Operation and Maintenance Transferred to: LACFCD, 20 October 1960

Stormflow Data

Staff Gages: 15
Basin Staff Gage Elevation at One-third Design Discharge: 1188.0 ft msl

Access Roads

To Embankment:	from Glendora Mountain Rd to top of embankment
To Basin:	from right berm of spillway to top of embankment and bottom of basin

Pertinent Design Data

Embankment:

Length	543 ft
Crest Width	20 ft
Crest Elevation	1200 ft msl
Side Slope	upstream 1 on 2.5 downstream 1 on 2

Spillway:

Length	417 ft
Crest Width	84 ft
Crest Elevation	1186 ft msl
Design Capacity	8,600 cfs

Pool Drain:

Length	316 ft
Diameter	36 in
Design Capacity	225 cfs

Intake Tower:

Top Elevation	1200 ft msl
Height above Invert	61 ft
Inside Dimensions	4 ft x 4 ft

Drainage Area: 3.3 sq mi
Debris Basin Capacity: 627,000 cu yds
Maximum Allowable Accumulation of Debris: 157,000 cu yds

REPORTING FEATURES

Spillway and Outlet Channel
Broadcrest concrete spillway
Earth berm roadway
Concrete channel invert
Concrete channel walls
Stone spillway apron
Spreading grounds diversion
Subdrain system
Fencing

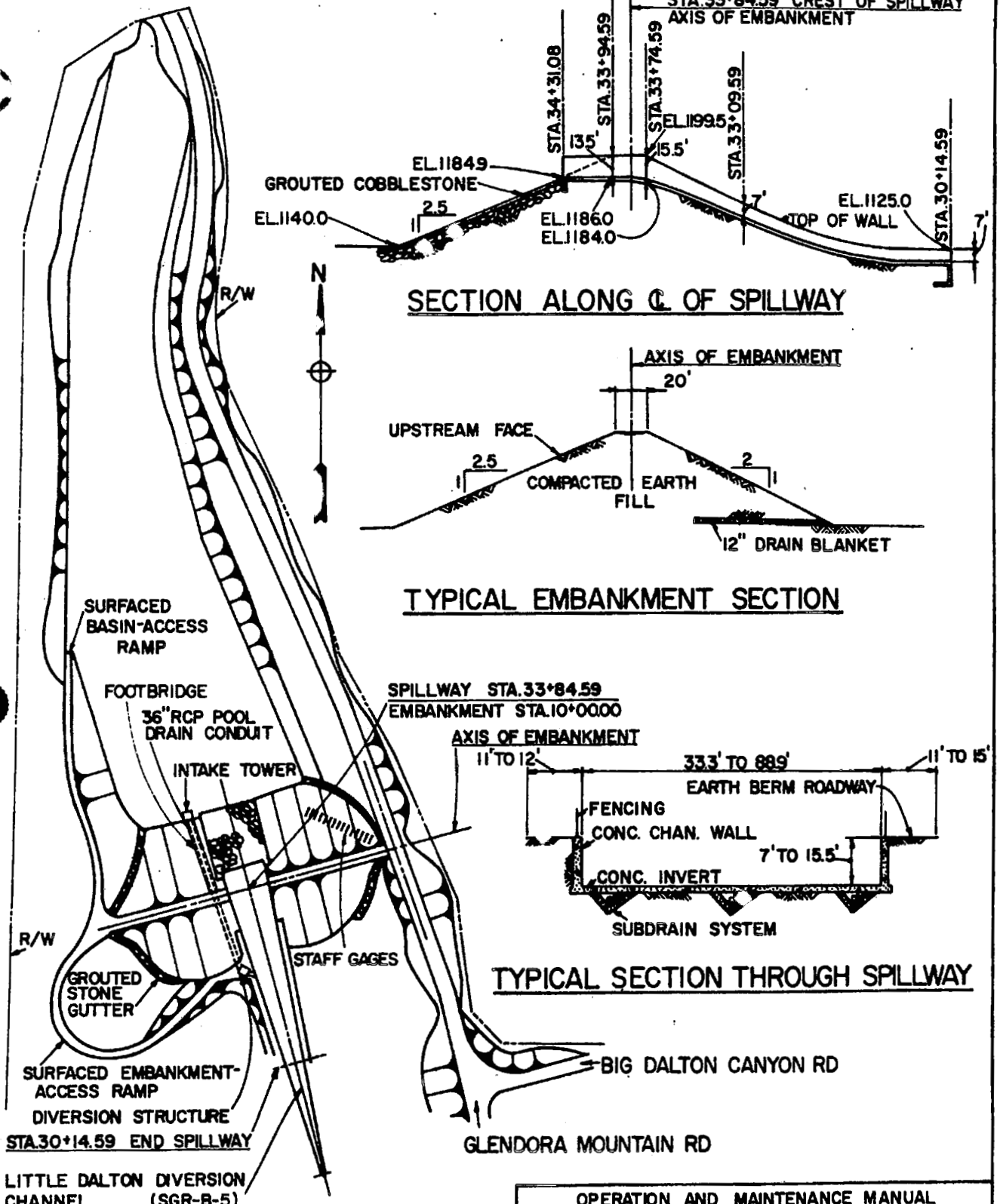
Outlet Works
Intake tower
Concrete pool drain conduit (gated)
Bridge

Embankment and Basin
Earth embankment
Surfaced basin-access ramp
Surfaced embankment-access ramp
Debris storage capacity
Staff gages
Public utility
Stone gutter
Fencing
Rights-of-way

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

SECTION ALONG ℄ OF SPILLWAY

TYPICAL EMBANKMENT SECTION



PLAN

TYPICAL SECTION THROUGH SPILLWAY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LITTLE DALTON DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-B-7

DATA SHEET
SGR-C-1

COYOTE CREEK CHANNEL
Carson St to San Gabriel River

Construction Data

Contract No:	DA 63-144	Start:	13 May 1963
	George A. Fuller Co	Finish:	15 August 1964
Specifications:	CIVENG 63-18		
Plans:	D.O. Series 198/27-85		
Folio Title:	COYOTE CREEK CHANNEL Carson St to San Gabriel River		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 1 December 1964

Stormflow Data

Gaging Station Location: downstream of Cerritos Ave (sta 119+35)
Type: Recording (LACFCD--F354-R)
Staff Gage Reading at One-third Capacity: 8.1 ft on gage (16,333 cfs)

Access Ramps

To Invert: from right side at downstream end (confluence with San Gabriel River) (sta 54+50±)

To Right Berm: Lincoln Ave, Wardlow Rd, Norwalk Blvd, Cerritos Ave, Willow St
To Left Berm: Lincoln Ave, Wardlow Rd, Norwalk Blvd, Cerritos Ave, Willow St

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Lincoln Ave	2	0	Los Angeles County
Sta 181+30	2	0	City of Long Beach (footbridge)
Wardlow Rd	3	0	City of Long Beach
Norwalk Blvd	5	0	City of Long Beach
Cerritos Ave	3	0	Orange County
San Gabriel River Fwy	3	0	State of California
Willow St	3	0	City of Long Beach

Reporting Features

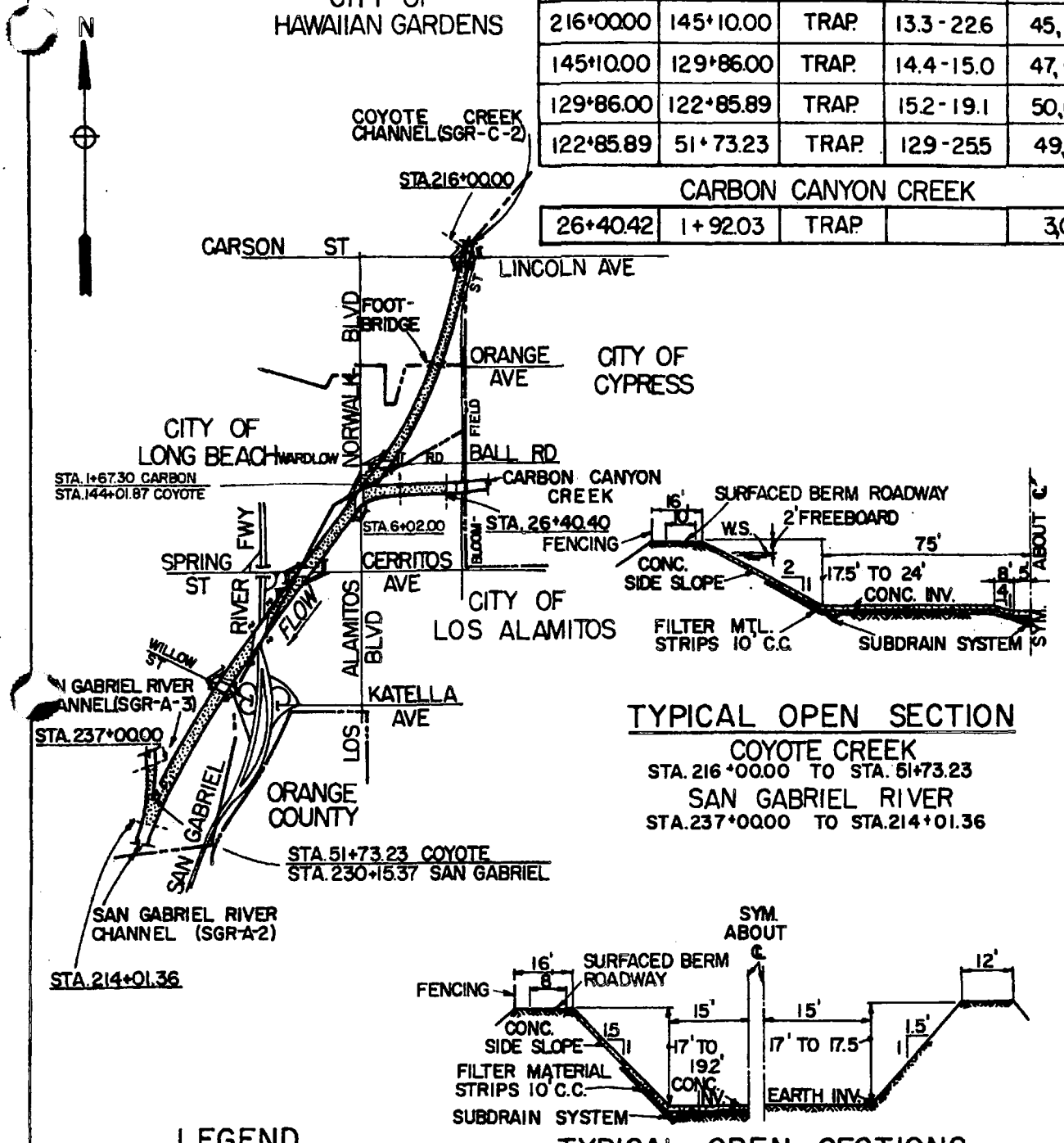
Along Channel
- Surfaced berm roadway
- Subdrain system
- Concrete channel side slopes
- Concrete channel invert
- Fencing
- Rights-of-way

At a Channel Station
- Surfaced berm-access ramp
- Concrete invert-access ramp
- Subdrain manhole
- Concrete confluence section
- Side drain
- Gaging station
- Bridge
- Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
216+00.00	145+10.00	TRAP.	13.3 - 22.6	45,000
145+10.00	129+86.00	TRAP.	14.4 - 15.0	47,000
129+86.00	122+85.89	TRAP.	15.2 - 19.1	50,000
122+85.89	51+73.23	TRAP.	12.9 - 25.5	49,000
CARBON CANYON CREEK				
26+40.42	1+92.03	TRAP.		3,000



TYPICAL OPEN SECTION

COYOTE CREEK
STA. 216+00.00 TO STA. 51+73.23
SAN GABRIEL RIVER
STA. 237+00.00 TO STA. 214+01.36

TYPICAL OPEN SECTIONS

CARBON CANYON CREEK
STA. 6+02.00 TO STA. 1+92.03 STA. 26+40.42 TO STA. 6+02.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL INVERT-ACCESS RAMP
- TYPICAL BERM-ACCESS RAMP
- GAGING STATION
- TYPICAL BERM ROADWAY TURNAROUND
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

COYOTE CREEK CHANNEL

CARSON ST TO SAN GABRIEL RIVER

SCALE IN FEET

1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

SGR-C-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-C-2

COYOTE CREEK CHANNEL
North Fork to Carson SL

Construction Data

Contract No:	DA 64-121	Start: 8 April 1964
	Teichert and Sons, Inc	Finish: 26 February 1965
Specifications:	CIVENG 64-17	
Plans:	D.O. Series 198/114-203	
Folio Title:	COYOTE CREEK CHANNEL	
	North Fork to Carson St	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 7 April 1965

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: at confluence with North Fork (sta 377+54); downstream of Centralia Rd (sta 233+25)

To Right Berm: Marquardt Ave, South St, Carmenita Ave, Del Amo Blvd, Centralia Rd
To Left Berm: Marquardt Ave, South St, Carmenita Ave, Del Amo Blvd, Centralia Rd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Marquardt Ave	3	0	Los Angeles County
Artesia Fwy	2	0	State of California
South St	3	0	City of Cerritos and Orange County
Carmenita Ave	3	0	City of Cerritos and Orange County
Del Amo Blvd	2	0	Los Angeles County
S.P. Ry	2	0	S.P.R.R.
Centralia Rd	2	0	Los Angeles County

Reporting Features

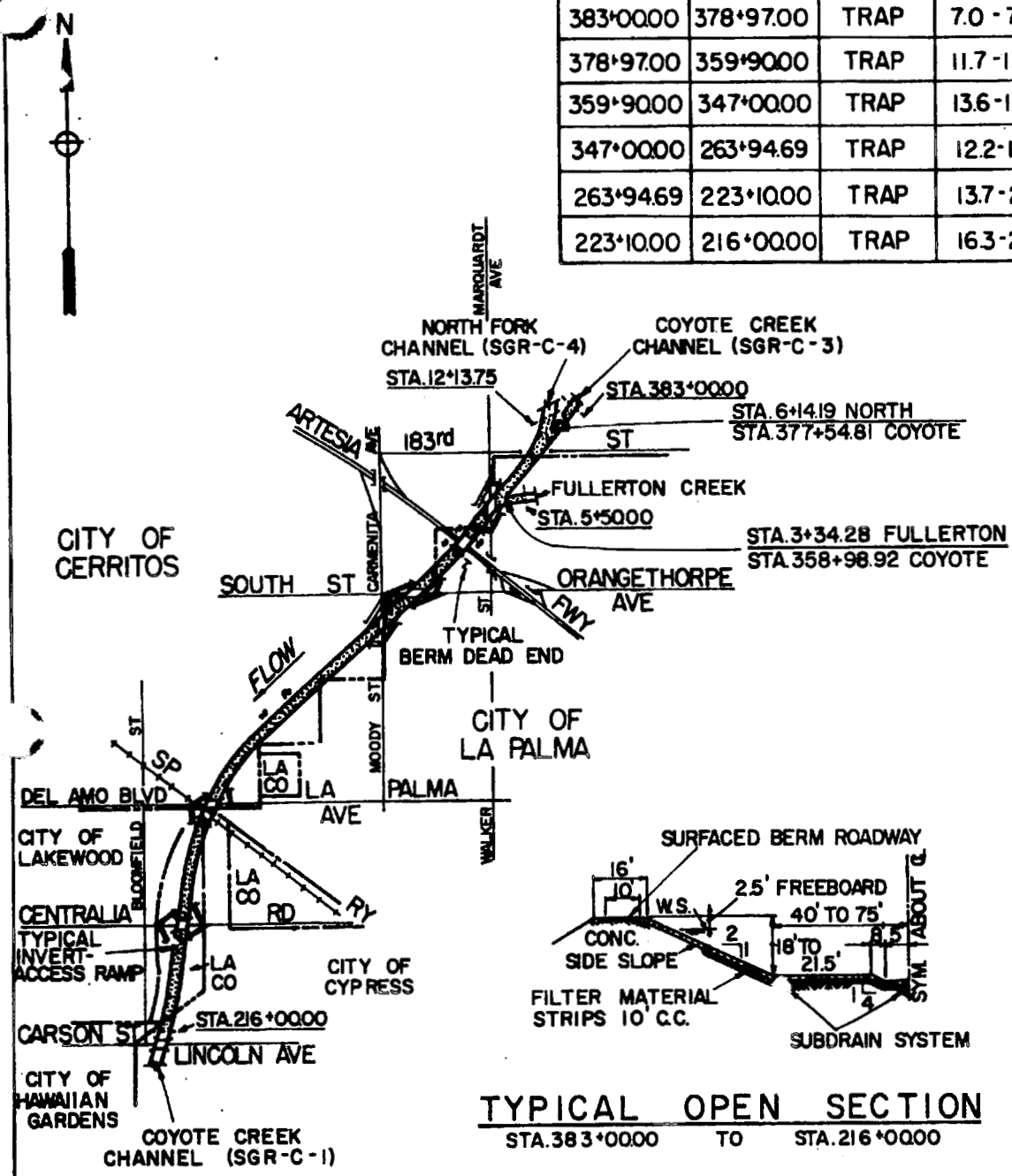
Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Concrete channel side slopes	Concrete invert-access ramp
Concrete channel invert	Subdrain manhole
Subdrain system	Concrete confluence section
Fencing	Side drain
Rights-of-way	Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
383+00.00	378+97.00	TRAP	7.0 - 7.1	15,000
378+97.00	359+90.00	TRAP	11.7 - 13.3	37,000
359+90.00	347+00.00	TRAP	13.6 - 13.9	40,000
347+00.00	263+94.69	TRAP	12.2 - 15.2	41,000
263+94.69	223+10.00	TRAP	13.7 - 23.4	42,000
223+10.00	216+00.00	TRAP	16.3 - 20.8	45,000



TYPICAL OPEN SECTION

STA.383+00.00 TO STA.216+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM ROADWAY TURNAROUND
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

COYOTE CREEK CHANNEL

NORTH FORK TO CARSON ST

SCALE IN FEET

1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA SGR-C-2

DATA SHEET
SGR-C-3

COYOTE CREEK CHANNEL
Upstream from North Fork Channel

Construction Data

Contract No:	DA 66-152	Start:	28 April 1966
	Guy F. Atkinson Co	Finish:	21 March 1967
Specifications:	CIVENG 66-16		
Plans:	D.O. Series 198/281-398		
Folio Title:	COYOTE CREEK CHANNEL Upstream from North Fork Channel		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 2 May 1967 (in conjunction with OCFCD)

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: below upstream end of channel (sta 598+37); downstream of ATSF bridge (sta 483+50)

To Right Berm: upstream end of channel, Rosecrans Ave, La Mirada Blvd, Stage Rd, Knott Ave, Lemont St, Firestone Blvd, Artesia Blvd, Valley View St

To Left Berm: upstream end of channel, Rosecrans Ave, La Mirada Blvd, Stage Rd, Knott Ave, Lemont St, Firestone Blvd, Artesia Blvd, Valley View St

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 588+67	1	0	Standard Oil Co
Rosecrans Ave	1	0	Los Angeles County
Sta 514+25+	1	0	Private footbridge
La Mirada Blvd	1	0	City of Buena Park
Stage Rd	1	0	City of Buena Park
A.T.S.F. Ry	1	0	A.T.S.F.R.R.
A.T.S.F. Ry	0	0	A.T.S.F.R.R.
Knott Ave	0	0	City of La Mirada and Los Angeles County
Lemont Ave	2	0	City of La Mirada
Santa Ana Fwy	2	0	State of California
S.P. Ry	2	0	S.P.R.R.
Artesia Blvd	0	0	Los Angeles County
Valley View St	2	0	City of Cerritos and Los Angeles County

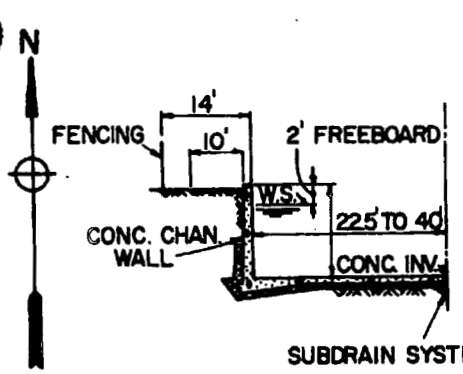
Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Subdrain system	Subdrain manhole
Concrete channel invert	Concrete invert-access ramp
Concrete channel side slopes	Side overflow spillway
Concrete channel walls	Concrete confluence section
Fencing	Side drain
Rights-of-way	Bridge
	Public utility

CORPS OF ENGINEERS

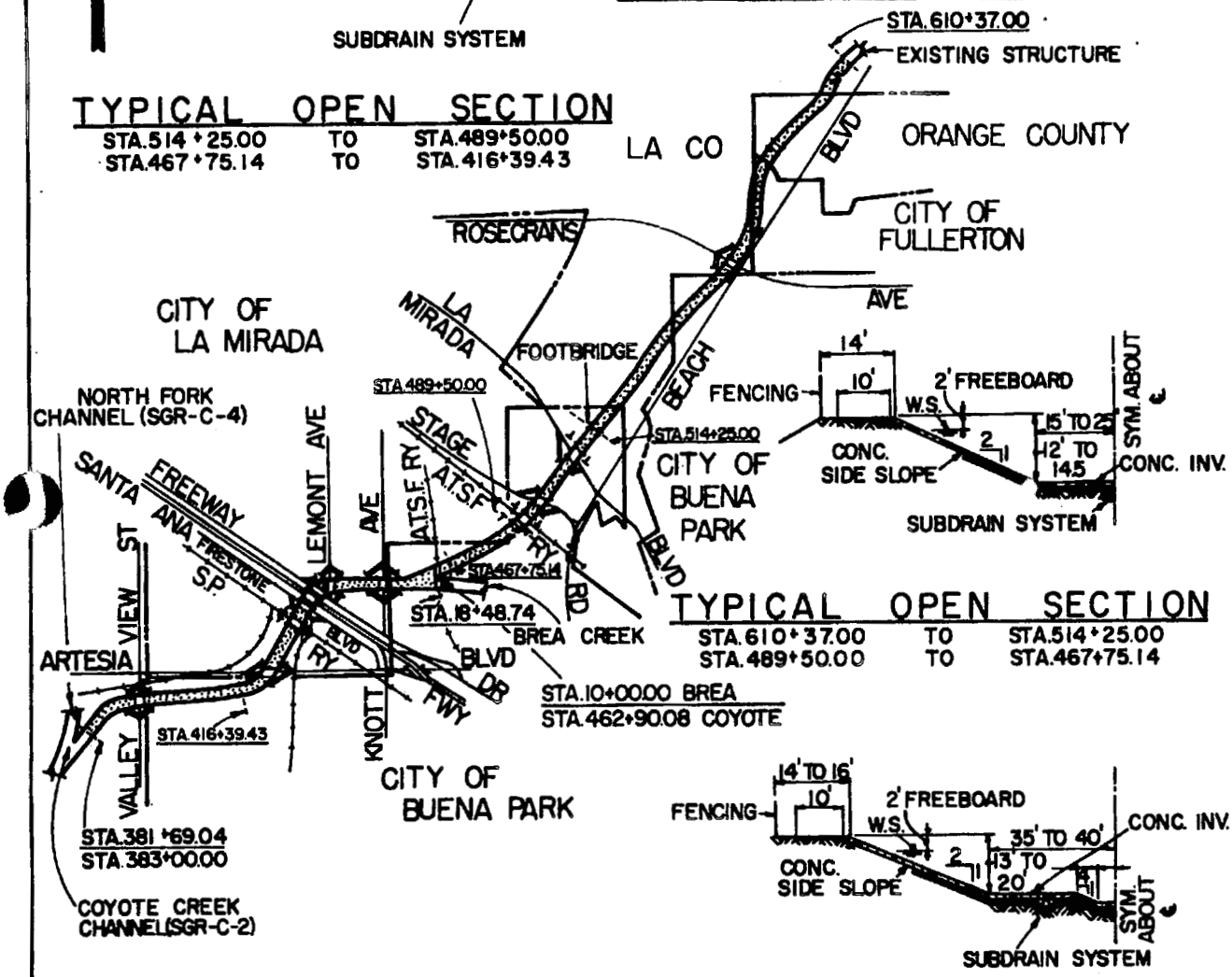
DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
610+37.00	516+25.00	TRAP.	17.3-38.5	15,000
516+25.00	489+50.00	RECT.	24.6-41.5	15,000
489+50.00	469+25.14	TRAP.	26.6-30.8	15,000
469+25.14	462+90.08	RECT.	30.2	15,000
462+90.08	416+39.43	RECT.	14.3-26.4	21,500
416+39.43	381+69.04	TRAP.	23.9-27.1	21,500



TYPICAL OPEN SECTION

STA.514+25.00 TO STA.489+50.00
STA.467+75.14 TO STA.416+39.43



TYPICAL OPEN SECTION

STA.610+37.00 TO STA.514+25.00
STA.489+50.00 TO STA.467+75.14

TYPICAL OPEN SECTION

STA.416+39.43 TO STA.381+69.04

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL INVERT-ACCESS RAMP
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM TURNAROUND
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA
CALIFORNIA

COYOTE CREEK CHANNEL

UPSTREAM OF NORTH FORK

SCALE IN FEET

1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

DATA SHEET
SGR-C-4

NORTH FORK CHANNEL

Construction Data

Contract No:	DA 65-144	Start:	16 April 1965
	Guy F. Atkinson Co	Finish:	24 February 1966
Specifications:	CIVENG 65-24		
Plans:	D.O. Series 198/204-280		
Folio Title:	COYOTE CREEK CHANNEL North Fork Channel		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 4 April 1967

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: downstream of Leffingwell Rd (sta 207+00); downstream of Rosecrans Ave (sta 113+70)

To Right Berm: upstream end of channel, Leffingwell Rd, Meyer Rd, Imperial Hwy, Wilshire Oil Co road, Foster Rd, Rosecrans Ave, Alondra Ave, Firestone Blvd, Artesia Blvd

To Left Berm: upstream end of channel, Leffingwell Rd, Meyer Rd, Imperial Hwy, Wilshire Oil Co road, Foster Rd, Rosecrans Ave, Alondra Ave, Firestone Blvd, Artesia Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Leffingwell Rd	1	0	Los Angeles County
Meyer Rd	1	0	Los Angeles County
Imperial Hwy	1	0	City of Santa Fe Springs and Los Angeles County
Sta 183+45	1	0	City of Santa Fe Springs (footbridge)
Sta 173+46	1	0	Wilshire Oil Co
Foster Rd	1	0	City of Santa Fe Springs
A.T.S.F. Ry	1	0	A.T.S.F.R.R.
Rosecrans Ave	1	0	City of Santa Fe Springs
Alondra Ave	1	0	City of Santa Fe Springs
Santa Ana Fwy	1	0	State of California
S.P. Ry	2	0	S.P.R.R.
Artesia Blvd	3	0	Los Angeles County

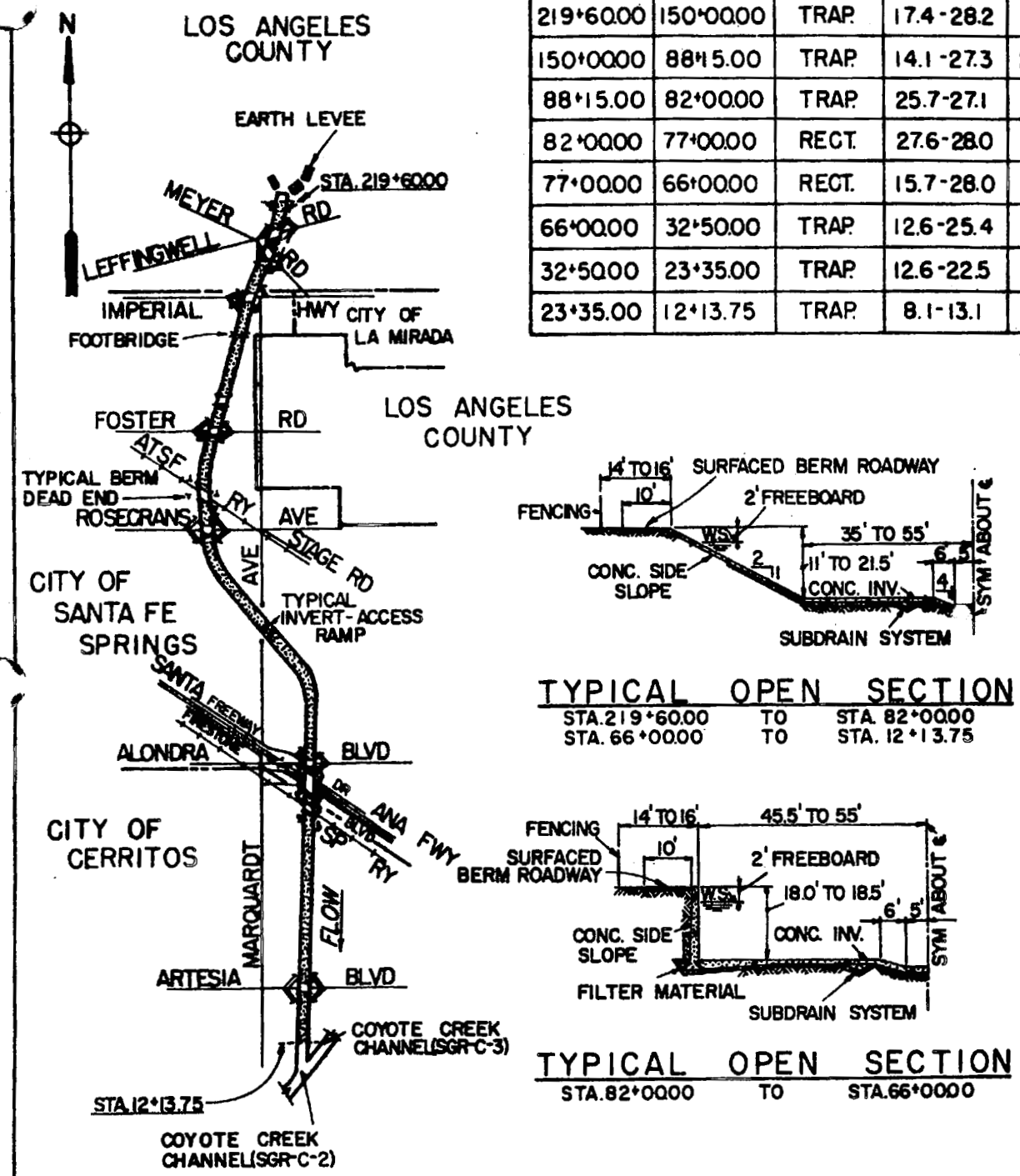
Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Subdrain system	Concrete invert-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Concrete confluence section
Concrete channel side slopes	Side overflow spillway
Fencing	Bridge
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
219+60.00	150+00.00	TRAP.	17.4-28.2	19,000
150+00.00	88+15.00	TRAP.	14.1-27.3	21,000
88+15.00	82+00.00	TRAP.	25.7-27.1	24,000
82+00.00	77+00.00	RECT.	27.6-28.0	24,000
77+00.00	66+00.00	RECT.	15.7-28.0	25,500
66+00.00	32+50.00	TRAP.	12.6-25.4	25,500
32+50.00	23+35.00	TRAP.	12.6-22.5	27,000
23+35.00	12+13.75	TRAP.	8.1-13.1	22,000



TYPICAL OPEN SECTION

STA. 219+60.00 TO STA. 82+00.00
STA. 66+00.00 TO STA. 12+13.75

TYPICAL OPEN SECTION

STA. 82+00.00 TO STA. 66+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM ACCESS-RAMP
- TYPICAL BERM ROADWAY TURNAROUND
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

NORTH FORK CHANNEL

SCALE IN FEET
1000 0 1000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-C-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-D-1

LITTLE DALTON WASH CHANNEL
Fifth St to Big Dalton Wash

Construction Data

Contract No:	DA 60-198	Start:	25 April 1960
	MacDonald and Kruse, Inc	Finish:	3 January 1961
Specifications:	CIVENG 60-22		
Plans:	D.O. Series 190/37-83		
Folio Title:	LITTLE DALTON WASH CHANNEL Fifth St to Big Dalton Wash		

Local Assurances

Resolution Dated: 10 March 1959
Operation and Maintenance Transferred to: LACFCD, 4 May 1961

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: at all street crossings
To Left Berm: at all street. crossings

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Fifth St	0	2	City of Azusa
Cerritos Ave	0	2	City of Azusa
Pasadena Ave	0	2	City of Azusa
First St	0	2	City of Azusa
Azusa Ln	0	2	Private bridge
Azusa Ave	0	2	City of Azusa
Gladstone St	0	2	City of Azusa and Los Angeles County
Lark Ellen Ave	0	2	Los Angeles County
Arrow Hwy	0	0	Los Angeles County
Sta 34+70	0	0	Gladstone School (footbridge)

Reporting Features

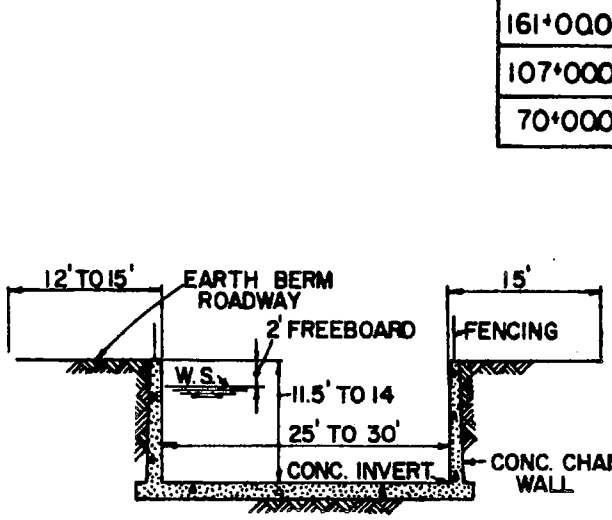
Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Side overflow spillway
Fencing	Bridge
	Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

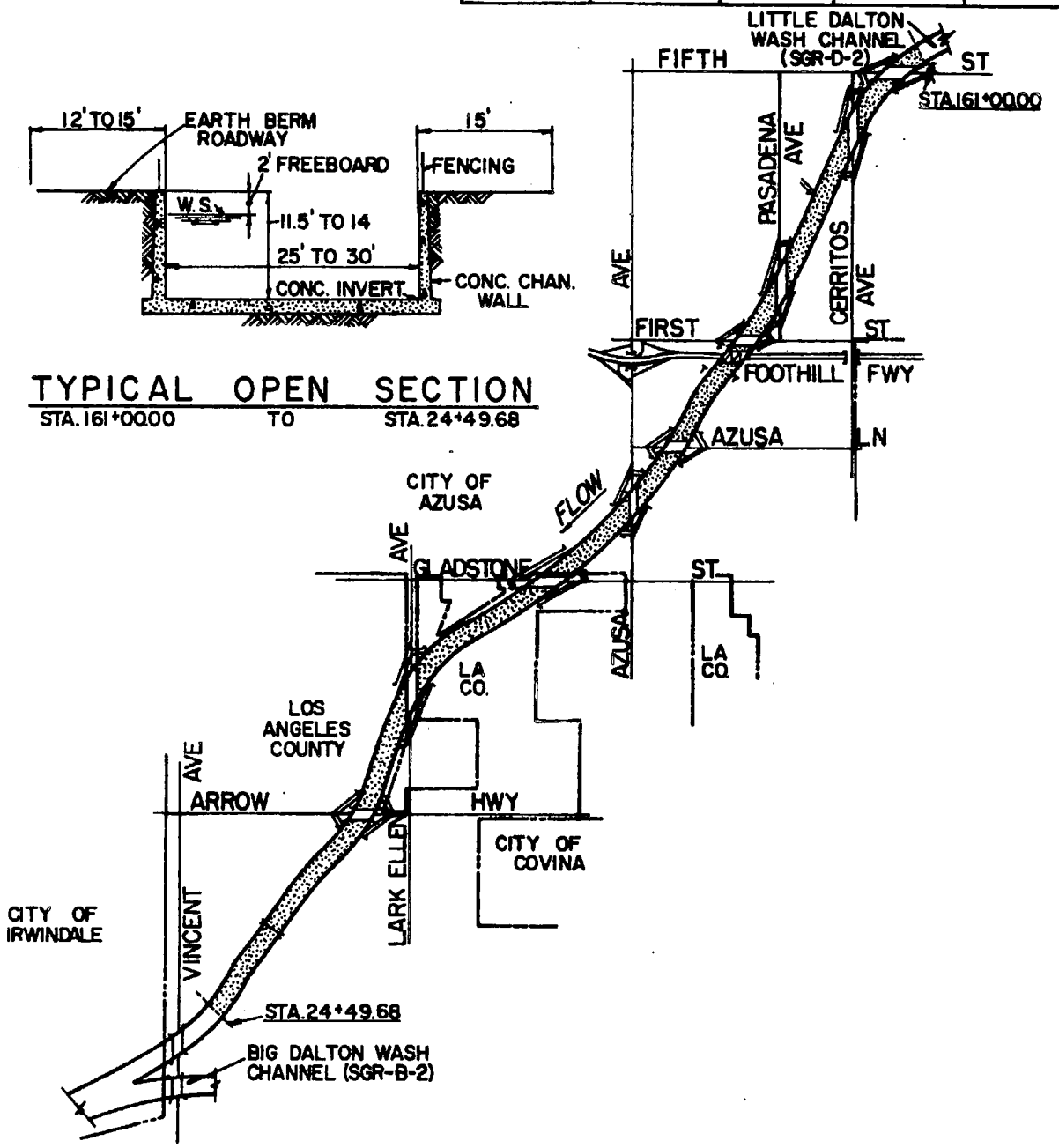
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
161+00.00	107+00.00	RECT.	33.5-36.7	8,000
107+00.00	70+00.00	RECT.	31.7-34.2	9,000
70+00.00	24+49.68	RECT.	28.7-31.9	9,500



TYPICAL OPEN SECTION

STA. 161+00.00 TO STA. 24+49.68



LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LITTLE DALTON WASH CHANNEL

FIFTH ST TO BIG DALTON WASH

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-D-1

OPERATION AND MAINTENANCE MANUAL

DATA 5HEET
SGR-D-2

LITTLE DALTON WASH CHANNEL
Cullen Ave to Fifth St

Construction Data

Contract No:	DA 60-229	Start: 27 May 1960
	A. Teichert and Son, Inc	Finish: 31 January 1961
Specifications:	CIVENG 60-23	
Plans:	D.O. Series 191/1-81	
Folio Title:	LITTLE DALTON WASH CHANNEL Loraine Ave to Fifth St	

Local Assurances

Resolution Dated: 10 March 1959
Operation and Maintenance Transferred to: LACFCD, 12 September 1961

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm:	Cullen Ave, Wabash Ave, Vista Bonita Ave, Glendora Ave, Grand Ave, Barranca Ave, Alosta Ave, Rockvale Ave
To Left Berm:	Mt View Ave, Wabash Ave, Vista Bonita Ave, Glendora Ave, Vermont Ave, Pennsylvania Ave, Barranca Ave, Citrus Ave, Alosta Ave, Rockvale Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 276+93	0	0	City of Glendora (footbridge)
Sta 272+68	0	0	City of Glendora (footbridge)
Sta 247+56	0	2	Private bridge
Barranca Ave	0	2	Los Angeles County
Sta 202+25	0	2	Citrus Union High School District
Citrus Ave	0	2	Los Angeles County
Sta 174+47	0	2	Private bridge
Rockvale Ave	0	2	City of Azusa

Reporting Features

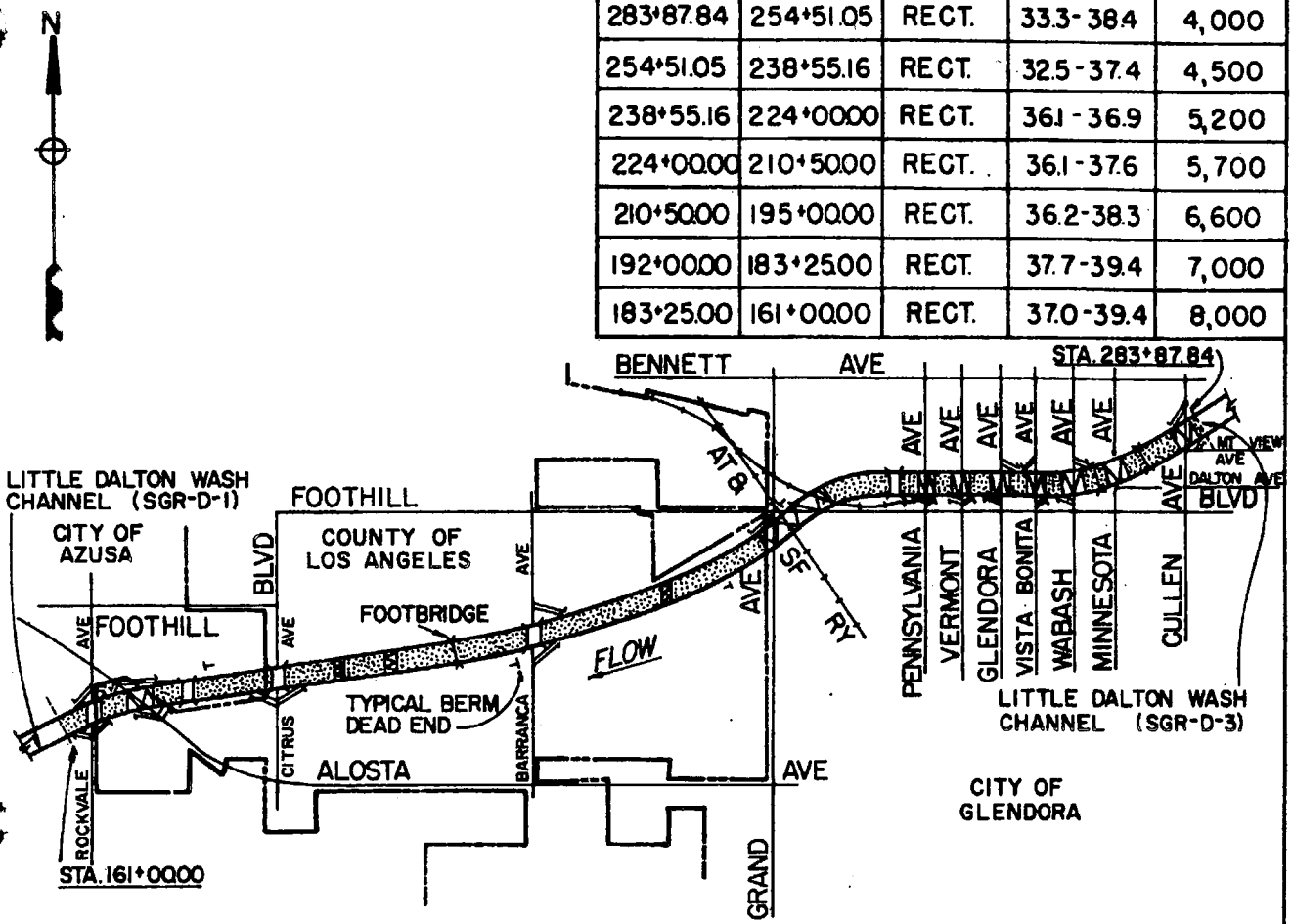
Along Channel
Earth berm roadway
Concrete channel invert
Concrete channel walls
Concrete channel roof slab
Surfaced berm roadway
Fencing
Rights-of-way

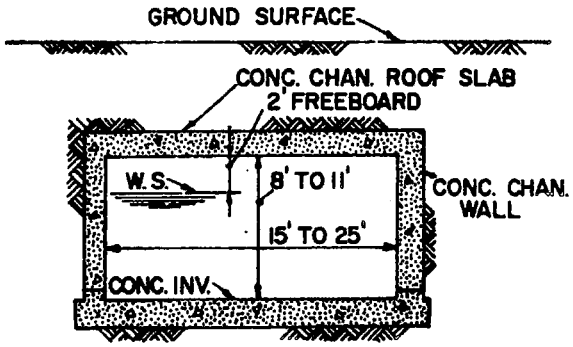
At a Channel Station
Surfaced berm-access ramp
Side drain
Side overflow spillway
Bridge
Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

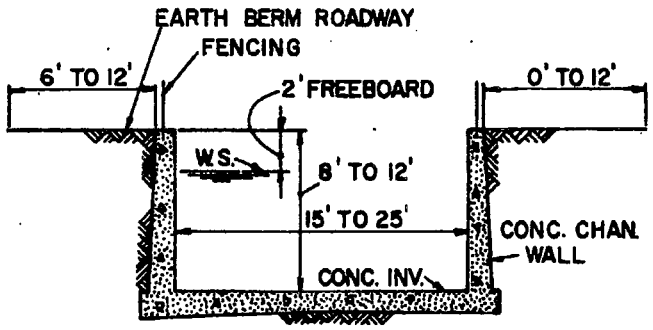
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
283+87.84	254+51.05	RECT.	33.3-38.4	4,000
254+51.05	238+55.16	RECT.	32.5-37.4	4,500
238+55.16	224+00.00	RECT.	36.1-36.9	5,200
224+00.00	210+50.00	RECT.	36.1-37.6	5,700
210+50.00	195+00.00	RECT.	36.2-38.3	6,600
192+00.00	183+25.00	RECT.	37.7-39.4	7,000
183+25.00	161+00.00	RECT.	37.0-39.4	8,000





TYPICAL COVERED SECTION

AS NOTED



TYPICAL OPEN SECTION

STA. 283+87.84 TO STA. 161+00.00

LEGEND

- OPEN SECTION
- COVERED SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LITTLE DALTON WASH CHANNEL

CULLEN AVE TO FIFTH ST

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA SGR-D-2

DATA SHEET
SGR-D-3

LITTLE DALTON WASH CHANNEL
Loraine Ave to Cullen Ave

Construction Data

Contract No:	DA 60-229	Start:	27 May 1960
	A. Teichert and Son, Inc	Finish:	31 January 1961
Specifications:	CIVENG 60-23		
Plans:	D.O. Series 191/1-81		
Folio Title:	LITTLE DALTON WASH CHANNEL Loraine Ave to Fifth St		

Local Assurances

Resolution Dated: 10 March 1959
Operation and Maintenance Transferred to: LACFCD, 12 September 1961

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm:	Loraine Ave, Sierra Madre Ave, Leadora Ave, Live Oak Ave, Bennett Ave, Lesterwest Way
To Left Berm:	Loraine Ave, Sierra Madre Ave, Leadora Ave, Live Oak Ave, Bennett Ave

Bridge

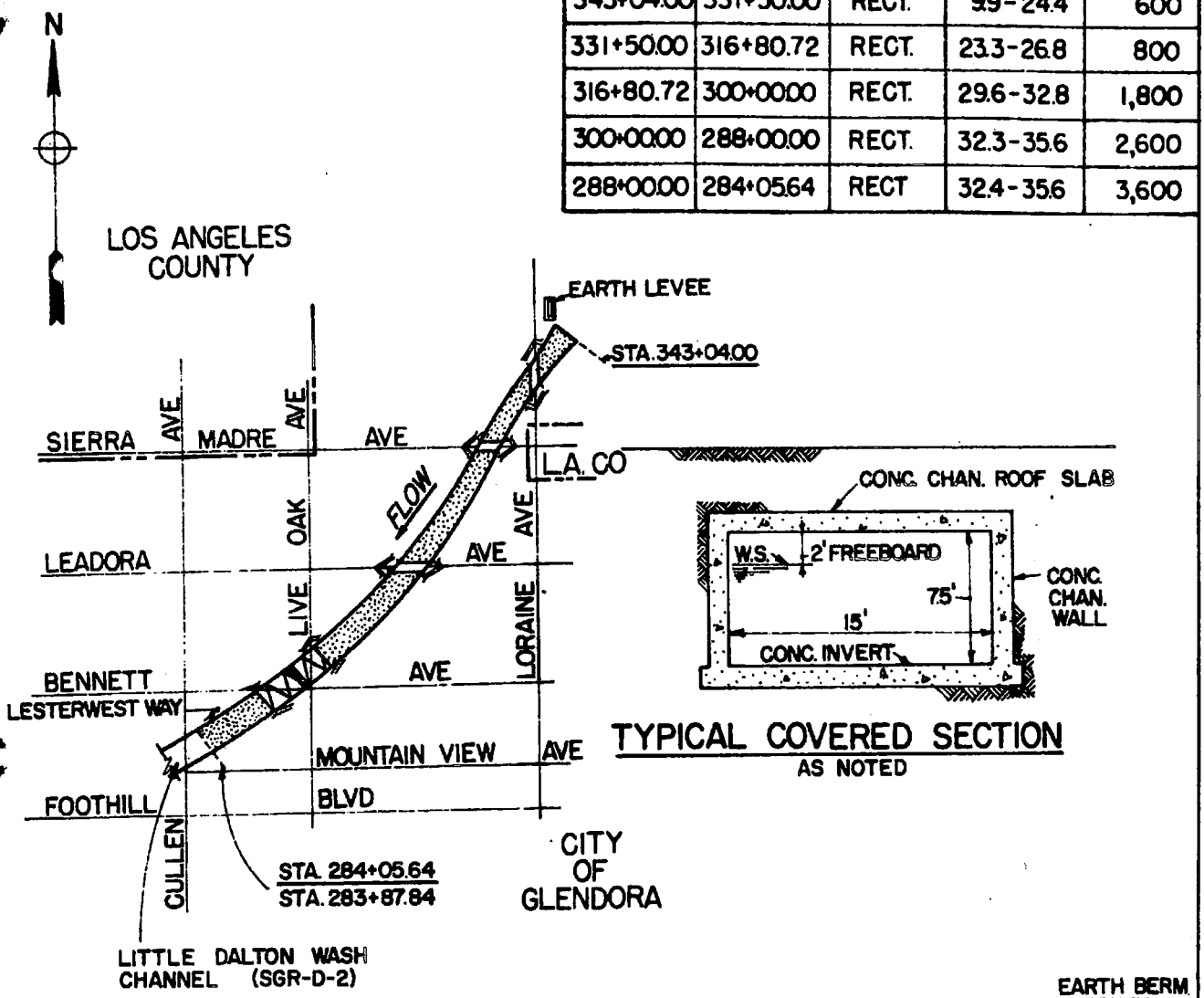
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Loraine Ave	0	2	City of Glendora
Sierra Madre Ave	0	2	City of Glendora
Leadora Ave	0	2	City of Glendora

Reporting Features

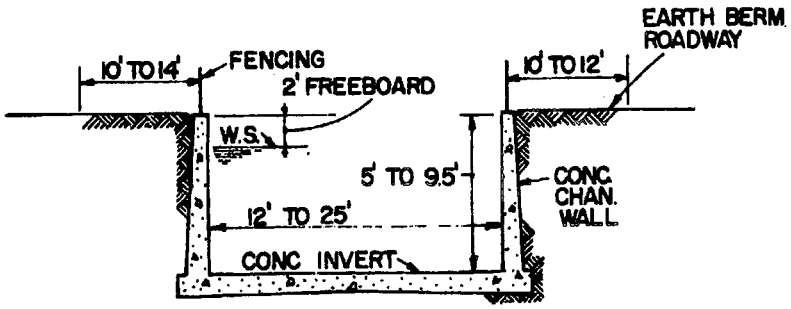
Along Channel	At a Channel Station
Earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Concrete channel roof slab	Public utility
Earth levee	
Fencing	
Rights-of-way	

DESIGN DATA

STA.	TO STA.	SECT	V	Q
343+04.00	331+50.00	RECT.	9.9 - 24.4	600
331+50.00	316+80.72	RECT.	23.3 - 26.8	800
316+80.72	300+00.00	RECT.	29.6 - 32.8	1,800
300+00.00	288+00.00	RECT.	32.3 - 35.6	2,600
288+00.00	284+05.64	RECT	32.4 - 35.6	3,600



TYPICAL COVERED SECTION
AS NOTED



TYPICAL OPEN SECTION
STA. 343+04.00 TO STA. 284+05.64

LEGEND

- OPEN SECTION
- COVERED SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- ---- CONST. PROJECT LIMIT
- ——— CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LITTLE DALTON WASH CHANNEL
LORAINE AVE TO CULLEN AVE

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-D-3

DATA SHEET
SGR-E-1

LIVE OAK WASH CHANNEL
"A" St to Puddingstone Reservoir

Construction Data

Contract No:	DA 66-113	Start:	5 February 1966
	Belczak and Goudeseune, Inc and John A. Artukovich Sons, Inc	Finish:	31 December 1966
Specifications:	CIVENG 66-9		
Plans:	D.O. Series 219/24-117		
Folio Title:	MARSHALL CREEK CHANNEL AND LIVE OAK WASH CHANNEL DOWNSTREAM FROM "A" ST		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 16 July 1968

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: downstream of Marshall Creek confluence (sta 10+84)

To Right Berm: "A" St, Puddingstone Dr
To Left Berm: "A" St, Puddingstone Dr

Bridges

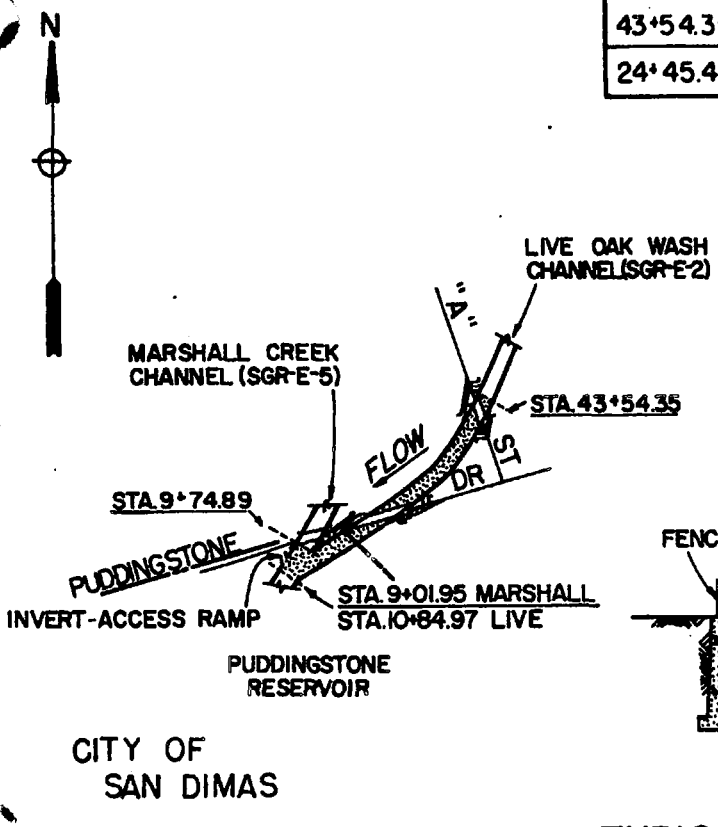
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
"A" St	0	0	City of La Verne
Puddingstone Dr	0	2	City of La Verne

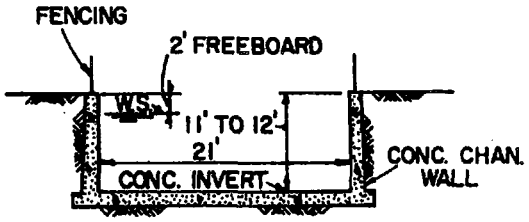
Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Concrete channel invert	Concrete confluence section
Concrete channel walls	Side drain
Concrete channel roof slab	Concrete invert-access ramp
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

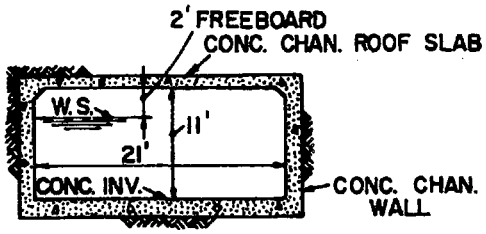
DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
43+54.35	24+45.40	RECT.	31.6-34.3	6,100
24+45.40	10+84.97	RECT.	33.3-34.1	6,200





TYPICAL OPEN SECTION

STA.43+54.35 TO STA.10+84.87



TYPICAL COVERED SECTION

UNDER STREETS

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LIVE OAK WASH CHANNEL

"A" ST TO PUDDINGSTONE RESERVOIR

SCALE IN FEET

1000 0 1000 2000 3000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA SGR-E-1

DATA SHEET
SGR-E-2

LIVE OAK WASH CHANNEL
"D" St to "A" St

Construction Data

Contract No:	DA 552-0	Start.:	6 August 1950
	Gould and Cross	Finish:	16 January 1951
Specifications:	CIVENG 50-28		
Plans:	D.O. Series 411/21-47		
Folio Title:	LIVE OAK WASH CHANNEL "D" St to "A" St		

Local Assurances

Resolution Dated: 9 November 1949
Operation and Maintenance Transferred to: LACFCD, 16 January 1951

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 77+91	0	0	City of La Verne (footbridge)
Bonita Ave	0	0	City of La Verne
Third St	0	0	City of La Verne
First St	0	0	City of La Verne
A.T.S.F. RY	0	0	A.T.S.F.R.R.
Arrow Hwy	0	0	City of La Verne
Walnut St	0	0	City of La Verne
S.P. Ry	0	0	S.P.R.R.

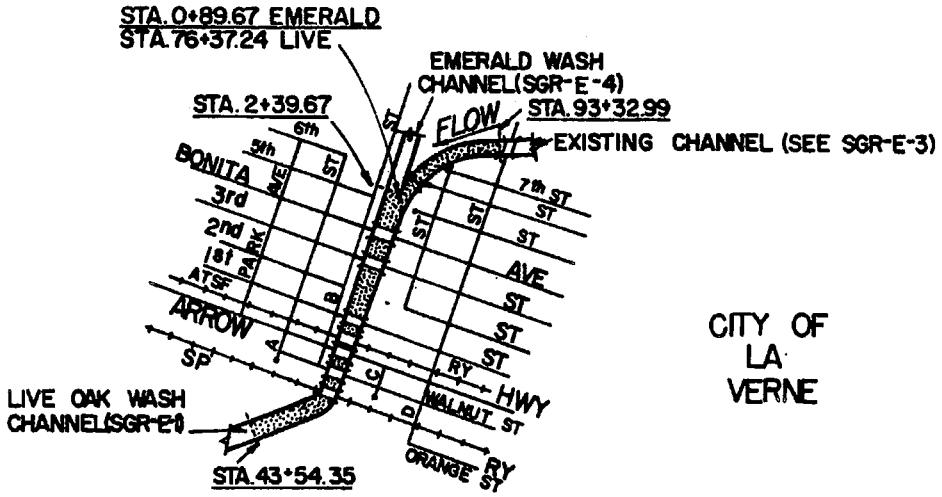
Reporting Features

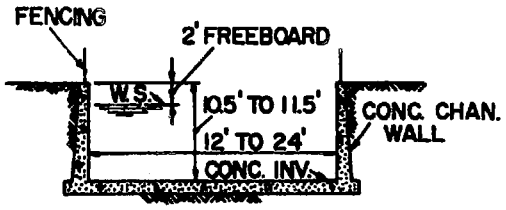
Along Channel	At a Channel Station
Surfaced berm roadway	Side drain
Concrete channel invert	Bridge
Concrete channel walls	Public utility
Concrete channel roof slab	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

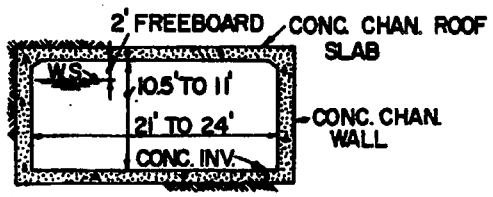
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
93+32.99	75+48.00	RECT.	26.3-29.5	3,300
75+48.00	66+75.00	RECT.	26.6-27.9	5,200
66+75.00	60+91.47	RECT.	27.0-28.7	5,500
60+91.47	54+81.07	RECT.	27.6-30.2	5,800
54+81.07	45+00.00	RECT.	29.7-31.6	6,000
45+00.00	43+54.35	RECT.	31.2-31.4	6,200





TYPICAL OPEN SECTION
STA. 93+32.99 TO STA. 43+54.35



TYPICAL COVERED SECTION
UNDER STREETS

LEGEND
- OPEN SECTION
- STREET BRIDGE
- FOOTBRIDGE
- CONST. PROJECT LIMIT

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LIVE OAK WASH CHANNEL
"D" ST TO "A" ST

SCALE IN FEET
1000 0 1000 2000 3000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-E-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-E-3

LIVE OAK WASH CHANNEL
Upstream from "D" Street

Construction Data

Contract No:	DA 63-162	Start: 20 June 1963
	Hane Const Co, Inc	Finish: 23 April 1964
Specifications:	CIVENG 63-23	
Plans:	D.O. Series 212/23-105	
Folio Title:	EMERALD WASH CHANNEL AND LIVE OAK WASH CHANNEL UPSTREAM FROM "D" ST	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 15 December 1964

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm:	Williams Ave, Amherst St, Bradford St, from orange grove, Foothill Blvd, FruitSt
To Left Berm:	Williams Ave, Amherst St, Bradford St, Foothill Blvd, Fruit St

Bridges

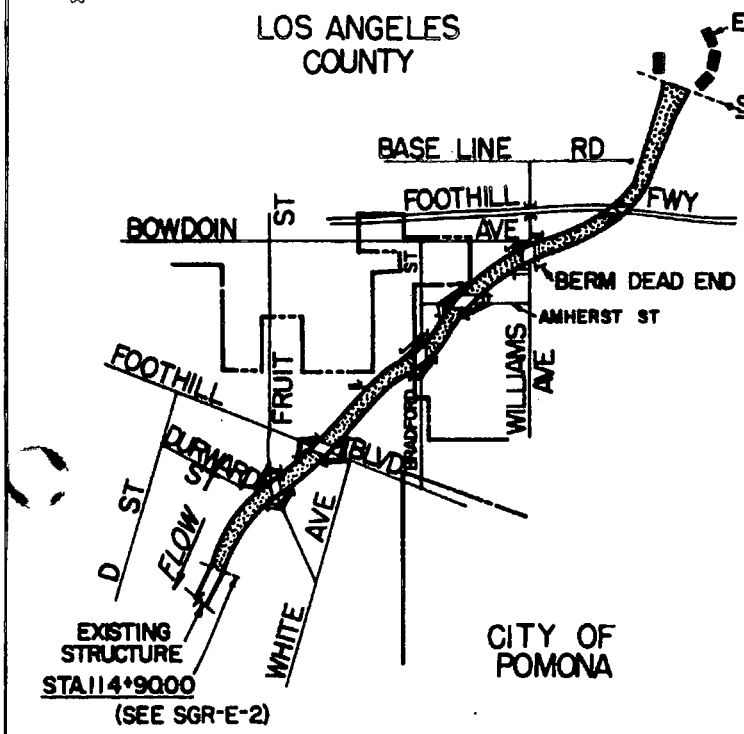
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Williams Ave	0	0	Los Angeles County
Amherst St	0	0	Los Angeles County
Bradford St	0	0	City of La Verne, Los Angeles County
Foothill Blvd	0	0	State of California
Fruit St	0	0	City of La Verne

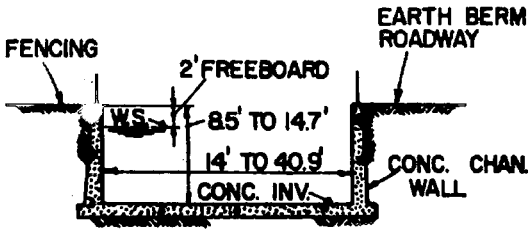
Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Earth levee
Concrete channel roof slab	Bridge
Fencing	Public utility
Rights-of-way	

DESIGN DATA

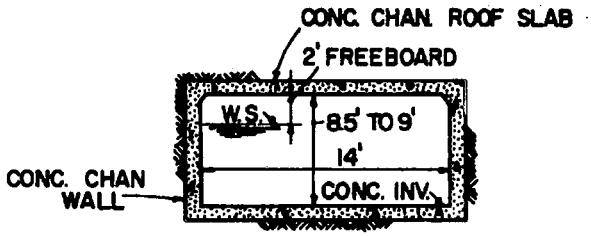
STA	TO STA	SECT	V	Q
195+29.02	170+00.00	RECT	13.0-33.2	2,600
170+00.00	161+25.00	RECT	33.2-35.5	2,700
161+25.00	153+00.00	RECT	35.2-37.3	2,800
153+00.00	145+96.39	RECT.	36.9-39.9	2,900
145+96.39	131+85.00	RECT.	39.6-39.9	3,000
131+85.00	114+90.00	RECT	36.8-40.2	3,300





TYPICAL OPEN SECTION

STA. 195+29.02 TO STA 114+90.00



TYPICAL COVERED SECTION

UNDER STREETS

LEGEND

- COVERED SECTION
- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

LIVE OAK WASH CHANNEL

UPSTREAM FROM "D" ST

SCALE IN FEET

1000 0 1000 2000 3000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-E-3

OPERATION AND MAINTENANCE MANUAL

DATA SHEET EMERALD WASH CHANNEL
SGR-E-4

Construction Data

Contract No:	DA 63-162	Start:	20 June 1963
	Hane Const Co, Inc	Finish:	23 April 1964
Specifications:	CIVENG 63-23		
Plans:	D.O. Series 212/23-105		
Folio Title:	EMERALD WASH CHANNEL AND LIVE OAK WASH CHANNEL UPSTREAM FROM "D" ST		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 14 August 1964

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none
To Right Berm: from Emerald Ave (West Branch), upstream end of channel, Base Line Rd, Bowdoin St, Emerald Ave, Foothill Blvd
To Left Berm: upstream end of channel, Base Line Rd, Bowdoin St, Emerald Ave, Foothill Blvd

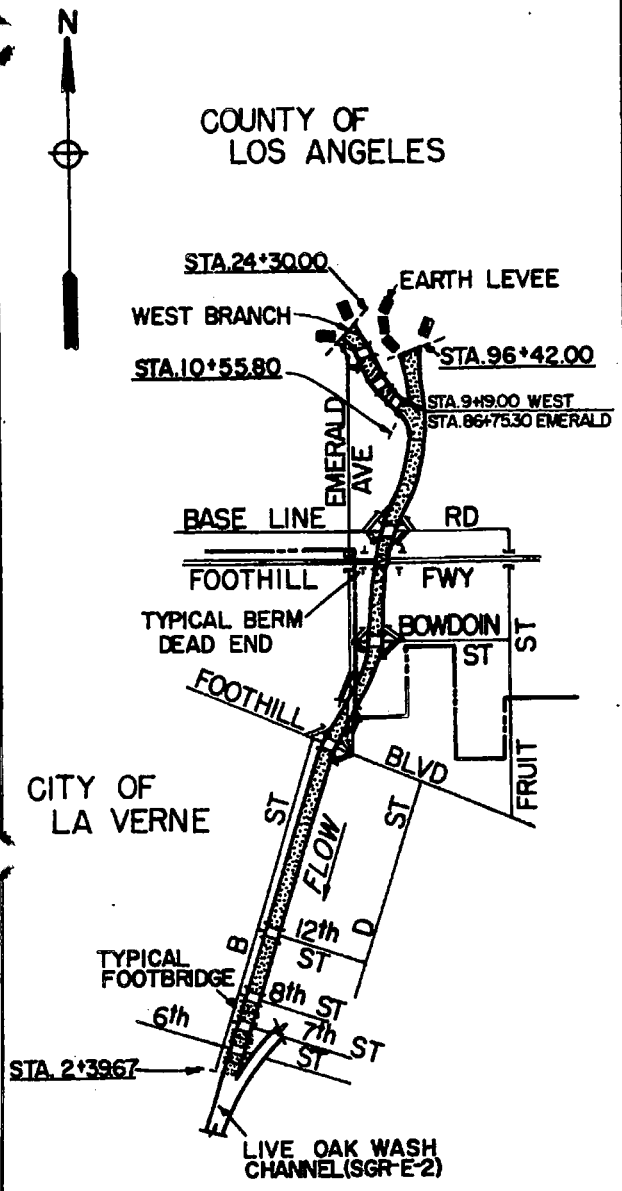
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Emerald Wash:			
Base Line Rd	0	0	State of California
Bowdoin St	0	0	Los Angeles County
Emerald Ave	0	0	Los Angeles County
Foothill Blvd	0	0	State of California
Twelfth St	0	0	City of La Verne
Eighth St	0	0	City of La Verne
Sta 12+89	0	0	City of La Verne (footbridge)
Seventh St	0	0	City of La Verne
Sta 9+14	0	0	City of La Verne (footbridge)
Sixth St	0	0	City of La Verne
Sta 3+89	0	0	City of La Verne (footbridge)
West Branch:			
Sta 20+40±	0	0	Private bridge
Sta 13+23±	0	0	Private bridge
Sta 11+35±	0	0	Private bridge

Reporting Features

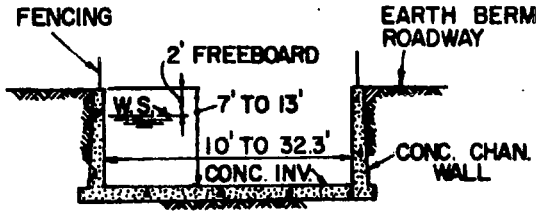
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced berm-access ramp
Concrete channel invert.	Side drain
Concrete channel walls	Side overflow spillway
Concrete channel roof slab	Concrete confluence section
Fencing	Bridge
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



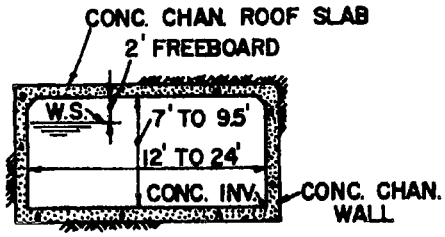
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
96+42.00	87+55.56	RECT.	10.2-23.8	1,000
87+55.56	74+00.00	RECT.	20.0-23.4	1,300
74+00.00	67+00.00	RECT.	20.1-24.8	1,700
67+00.00	60+75.00	RECT.	24.8	2,000
60+75.00	55+00.00	RECT.	26.5-28.7	2,200
55+00.00	46+90.00	RECT.	28.2-30.0	2,400
46+90.00	40+00.00	RECT.	30.1-31.7	2,900
40+00.00	34+50.00	RECT.	30.2	3,000
34+50.00	26+60.00	RECT.	30.0-30.8	3,100
26+60.00	2+39.67	RECT.	28.3-30.6	3,200
WEST BRANCH				
24+30.00	10+55.80	RECT.	8.6	400



TYPICAL OPEN SECTION

EMERALD WASH
STA. 96+42.00 TO STA. 2+39.67
WEST BRANCH
STA. 24+30.00 TO STA. 10+55.80



TYPICAL COVERED SECTION

UNDER STREETS

LEGEND

- OPEN SECTION
- COVERED SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

EMERALD WASH CHANNEL

SCALE IN FEET
1000 0 1000 2000 3000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-E-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-E-5

MARSHALL CREEK CHANNEL
Foothill Blvd to Puddingstone Diversion Channel

Construction Data

Contract No:	DA 66-113	Start:	5 February 1966
	Belczak and Goudeseune, Inc and John A. Artukovichs Sons, Inc	Finish:	31 December 1966
Specifications:	CIVENG 66-9		
Plans:	D.O. Series 219/24-117		
Folio Title:	MARSHALL CREEK CHANNEL AND LIVE OAK WASH CHANNEL DOWNSTREAM FROM "A" ST		

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 16 July 1968

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: through right wall at Live Oak Wash confluence (sta 9+01)

To Right Berm: Foothill Blvd, Wheeler Ave, Arrow Hwy, Puddingstone Dr
To Left Berm: Foothill Blvd, Wheeler Ave, Arrow Hwy, Puddingstone Dr

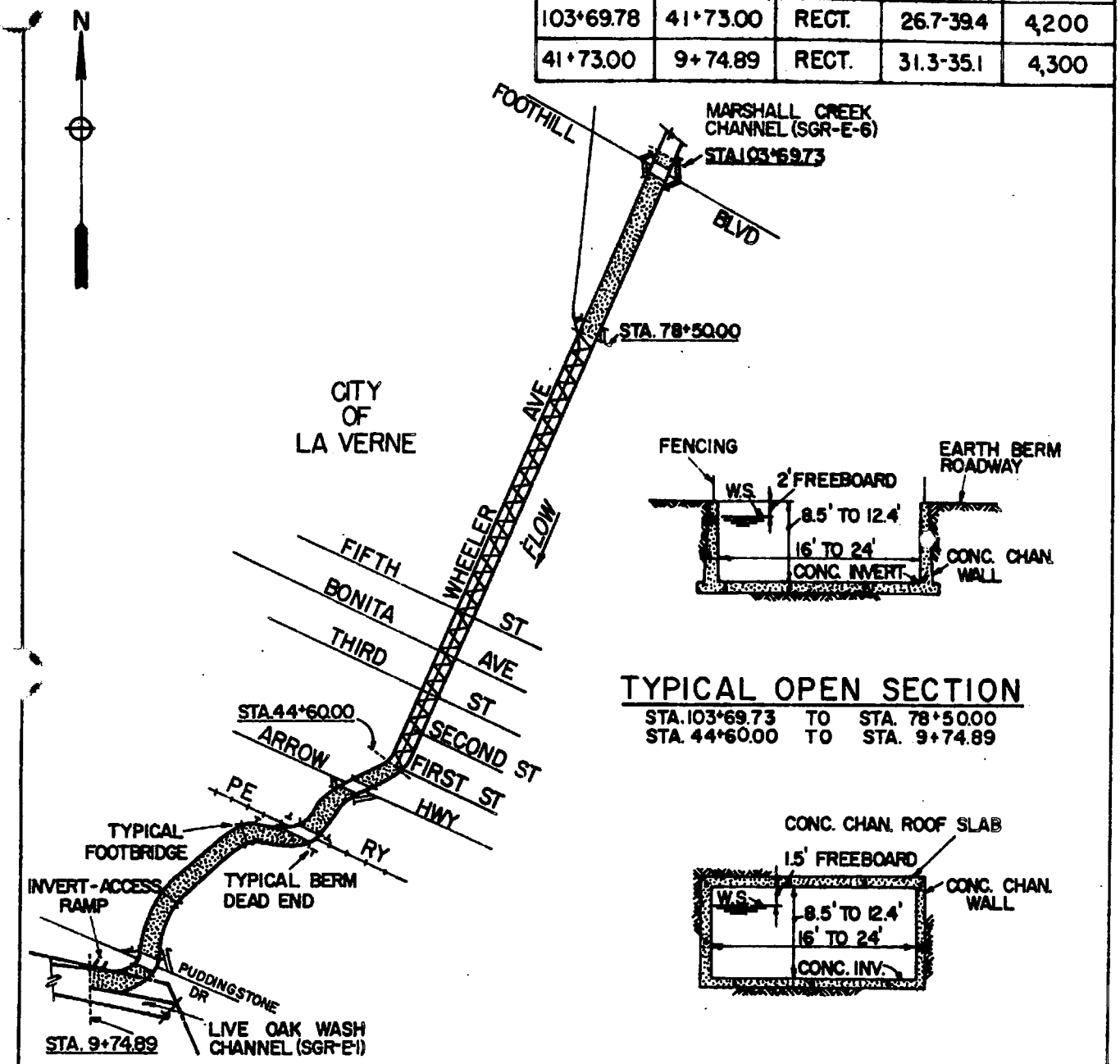
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Foothill Blvd	0	0	State of California
Arrow Hwy	0	0	City of La Verne and Los Angeles County
P.E. Ry	0	0	P.E.R.R.
Sta 31+95	0	0	City of La Verne
Sta 15+98	0	0	City of La. Verne
Puddingstone Dr	0	0	City of La Verne

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Concrete channel roof slab	Public utility
Fencing	
Rights-of-way	

DESIGN DATA				
STA.	TO STA	SECT	V	Q
103+69.78	41+73.00	RECT.	26.7-39.4	4,200
41+73.00	9+74.89	RECT.	31.3-35.1	4,300



TYPICAL OPEN SECTION

STA.103+69.73 TO STA. 78+50.00
STA. 44+60.00 TO STA. 9+74.89

TYPICAL COVERED SECTION

STA. 78+50.00 TO STA. 44+60.00

LEGEND

- OPEN SECTION
- COVERED SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

MARSHALL CREEK CHANNEL FOOTHILL BLVD TO PUDDINGSTONE DIVERSION CHANNEL

SCALE IN FEET
1000 0 1000 2000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-E-5

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-E-6

MARSHALL CREEK CHANNEL
Debris Basins to Foothill Blvd

Construction Data

Contract No: DA 66-113 Start: 5 February 1966
Belczak and Goudeseune, Inc Finish: 31 December 1966
and John A. Artukovichs Sons, Inc
Specifications: CIVENG 66-9
Plans: D.O. Series 219/24-117
Folio Title: MARSHALL CREEK CHANNEL AND LIVE OAK WASH CHANNEL DOWNSTREAM FROM "A" ST

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 16 July 1968

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: upstream end of channel, Base Line Rd; upstream end of West Branch
To Left Berm: Base Line Rd; upstream end of West Branch from orange grove

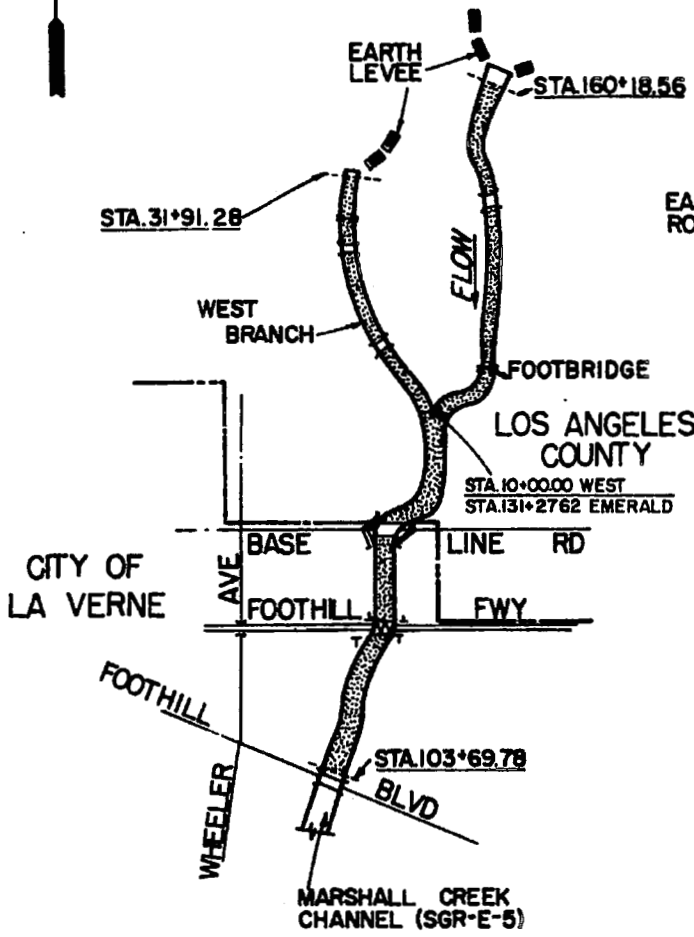
Bridges

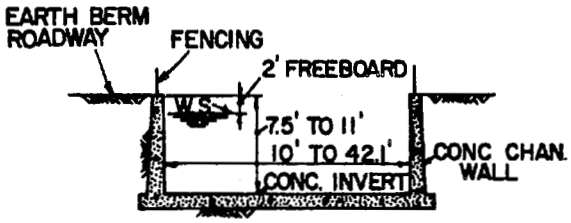
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Marshall Creek:			
Sta 150+71	0	0	Los Angeles County
Sta 135+46	0	0	Los Angeles County (footbridge)
Base Line Rd	0	0	Los Angeles County
West Branch:			
Sta 29+25	0	0	Los Angeles County (footbridge)
Sta 27+02	0	0	Los Angeles County
Sta 19+10	0	0	Los Angeles County

Reporting Features

Along Channel	At a Channel Section
Surfaced and earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Earth levee
Concrete channel roof slab	Side overflow spillway
Fencing	Trashracks
Rights-of-way	Bridge
	Concrete confluence section
	Public utility

DESIGN DATA				
STA	TO STA.	SECT	V	Q
160+18.56	131+27.62	RECT.	12.3-32.0	2,300
131+27.62	104+00.00	RECT.	32.2-37.6	4,100
104+00.00	103+69.78	RECT.	37.5-39.4	4,200
WEST BRANCH				
31+91.28	10+00.00	RECT.	11.9-32.1	1,900



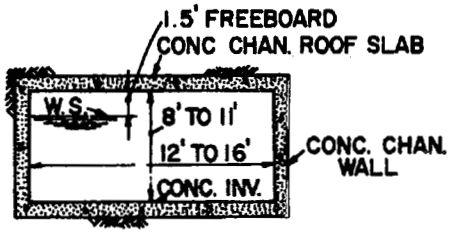


TYPICAL OPEN SECTION

STA. 160+18.56 TO STA. 103+69.78

WEST BRANCH

STA. 31+91.28 TO STA. 10+00.00



TYPICAL COVERED SECTION

UNDER STREETS

LEGEND

- COVERED SECTION
- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

MARSHALL CREEK CHANNEL

DEBRIS BASINS TO FOOTHILL BLVD

SCALE IN FEET

1000 0 1000 2000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-E-6

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-F-1

SAN JOSE CREEK DIVERSION CHANNEL

Construction Data

Contract No: ENG 2275
A. Teichert and Son, Inc
Bressi and Bevanda Const Co

Start: 13 October 1952
Finish: 12 March 1953

Specifications: CIVENG 53-5
Plans: D.O. Series 464/1-63
Folio Title: SAN GABRIEL RIVER IMPROVEMENT
Whittier Narrows Flood Control Basin:
Central Embankment, Channels and Rosemead Blvd Relocation

Local Assurances

Resolution Dated:
Operation and Maintenance Transferred to: Operations Branch, Corps of Engineers

Stormflow Data

Gaging Station Location: upstream of Workman Mill Rd (Sta 78+75)
Type: Recording (LACFCD--F312-R)
Staff Gage Reading at One-third Capacity: 8.1 ft on gage (14,333 cfs)

Access Ramps

To Invert: none

To Right Berm: Workman Mill Rd, from San Gabriel River
To Left Berm: Workman Mill Rd, from San Gabriel River

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Workman Mill Rd	6	0	Los Angeles County
San Gabriel River Fwy	2	0	State of California

Reporting Features

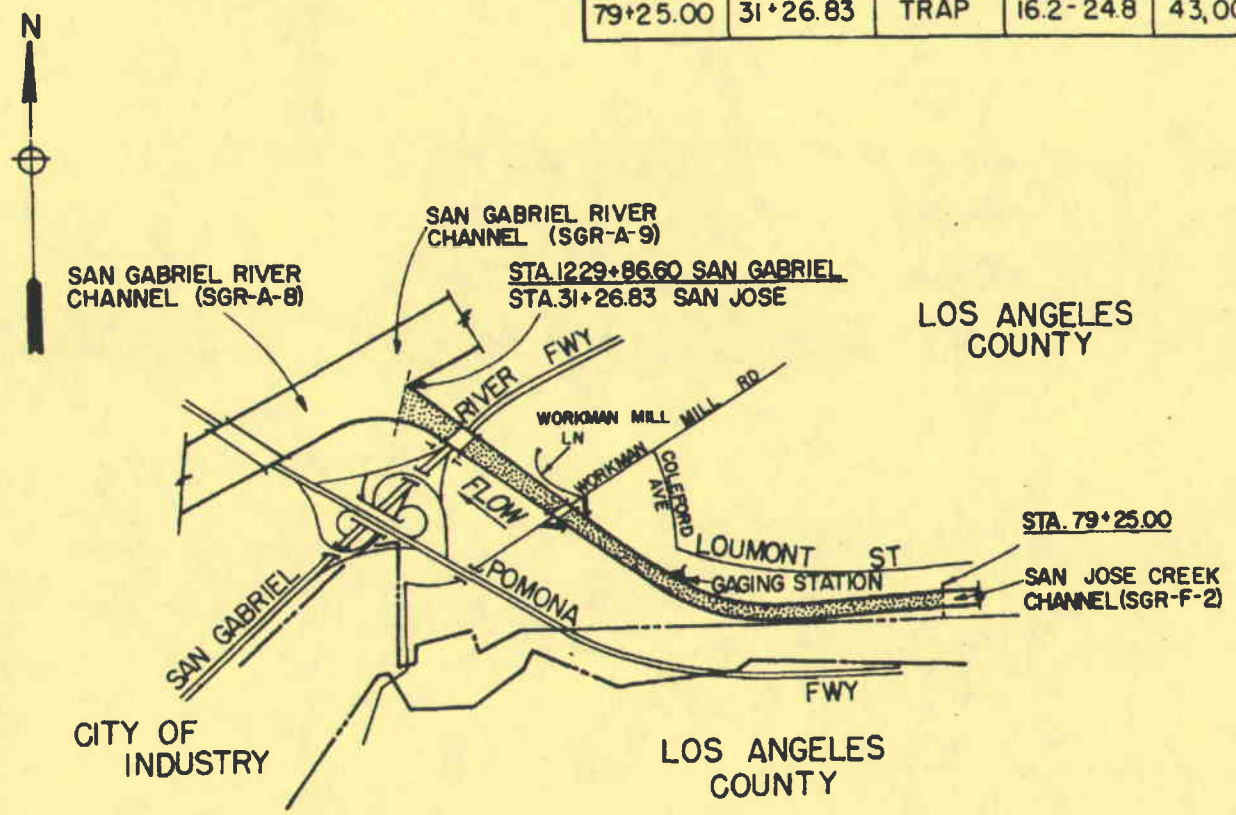
Along Channel
Stone channel side slopes
Earth channel side slopes
Earth channel invert
Surfaced and earth berm roadway
Fencing
Rights-of-way

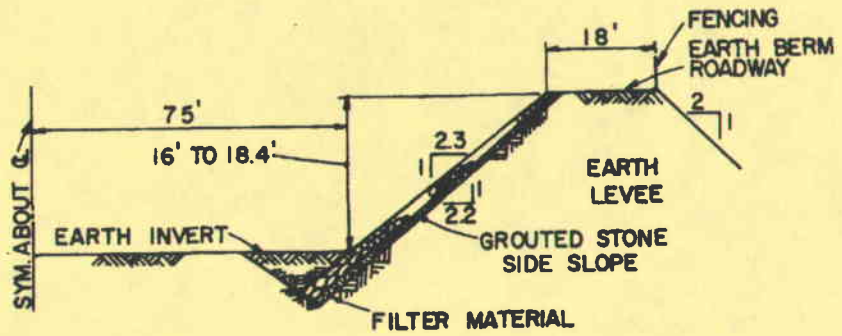
At a Channel Station
Stone toe protection
Surfaced and earth berm-access ramp
Stone stabilizer
Side drain
Bridge
Side overflow spillway
Public utility
Gaging station

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

DESIGN DATA				
STA	TO STA	SECT	V	Q
79+25.00	31+26.83	TRAP	16.2-24.8	43,000





TYPICAL OPEN SECTION

STA.79+25.00 TO STA.31+26.83

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- ----- CONST. PROJECT LIMIT
- ——— COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN JOSE CREEK DIVERSION CHANNEL

SCALE IN FEET

1000 0 1000 2000 3000

OFFICE OF THE DISTRICT ENGINEER

LOS ANGELES, CALIFORNIA SGR-F-1

DATA SHEET
SGR-F-2

SAN JOSE CREEK DIVERSION CHANNEL
Sixth Ave to San Jose Creek Diversion

Construction Data

Contract No:	DA 64-139	Start:	28 March 1964
Oberg Const Co		Finish:	27 January 1965
Specifications:	CIVENG 64-24		
Plans:	D.O. Series 207/40-60		
Folio Title:	SAN JOSE CREEK CHANNEL Sixth Ave to San Jose Creek Diversion		

Local Assurances

Resolution Dated: 20 March 1962
Operation and Maintenance Transferred to: LACFCD, 23 February 1966

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: none
To Left Berm: none

Bridges

none

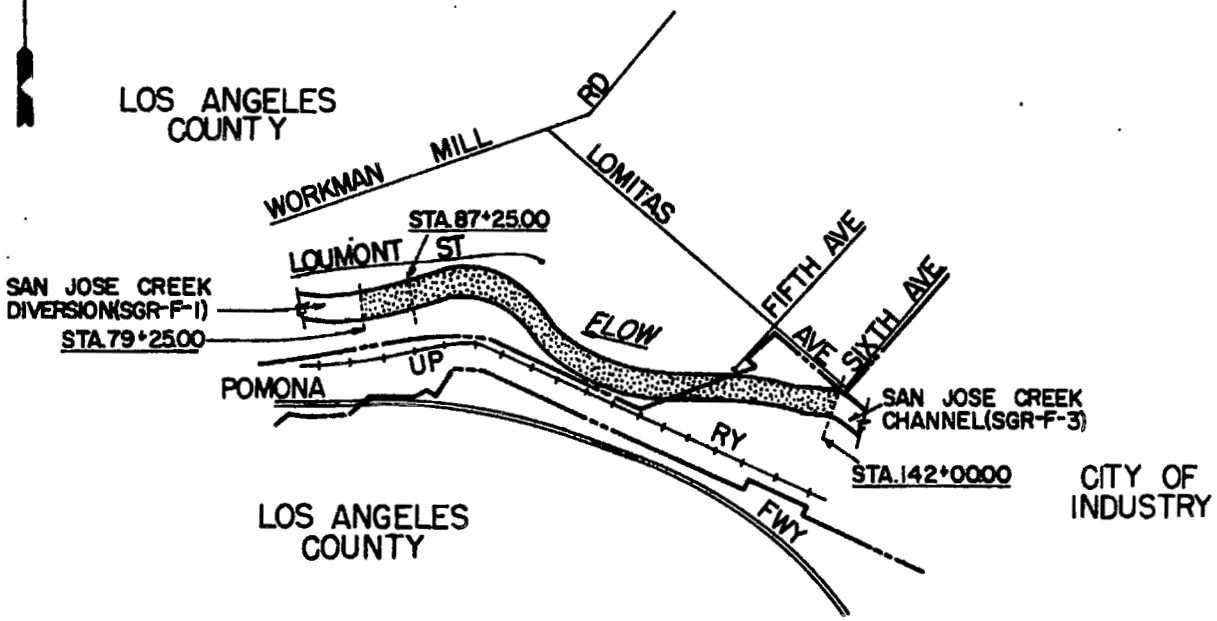
Reporting Features

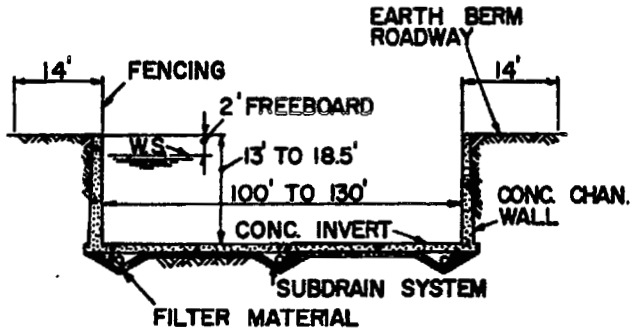
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Side drain
Concrete and stone channel side slopes	Surfaced berm-access ramp
Concrete channel walls	Side overflow spillway
Stone channel side slopes	Public utility
Subdrain system	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

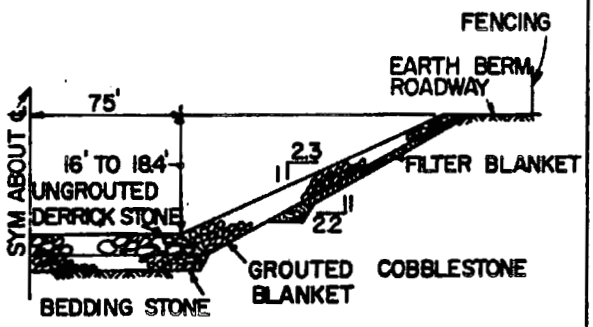
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
142+00.00	132+00.00	RECT.	25.6	42,600
132+00.00	120+00.00	RECT.	25.6-26.8	42,800
120+00.00	87+25.00	RECT.	27.0-32.9	43,000
87+25.00	79+25.00	TRAP	16.2-16.4	43,000





TYPICAL OPEN SECTION
STA.142+00.00 TO STA.87+25.00



TYPICAL OPEN SECTION
STA.87+25.00 TO STA.79+25.00

LEGEND

- OPEN SECTION
- ------ CONST. PROJECT LIMIT
- —— COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN JOSE CREEK CHANNEL

SIXTH AVE TO SAN JOSE CREEK DIVERSION

SCALE IN FEET
1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-F-2

DATA SHEET
SGR-F-3

SAN JOSE CREEK CHANNEL
Anaheim-Puente Rd to Sixth Ave

Construction Data

Contract No:	DA 66-123	Start:	18 February 1966
	MacDonald and Kruse, Inc	Finish:	23 February 1967
Specifications:	CIVENG 66-10		
Plans:	D.O. Series 207/61-212		
Folio Title:	SAN JOSE CREEK CHANNEL Anaheim-Puente Rd to Sixth Ave		

Local Assurances

Resolution Dated: 20 March 1962
Operation and Maintenance Transferred to: LACFCD, 3 March 1967

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from left berm, downstream of Anaheim-Puente Rd (sta 337+30); from right berm, upstream of Seventh Ave from Don Julian Rd (sta 173+07)

To Right Berm: Anaheim-Puente Rd, Stimson Ave, Hacienda Canyon Rd, Parriot Pl, Turnbull Canyon Rd, Seventh Ave

To Left Berm: Anaheim-Puente Rd, Stimson Ave, Parriot Pl, Turnbull Canyon Rd, Seventh Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
S.P. Ry	1	2	S.P.R.R.
S.P. Ry	2	2	S.P.R.R.
Stimson Ave	0	0	City of Industry
Hacienda Blvd	0	0	City of Industry
Parriot Pl	0	2	City of Industry
Turnbull Canyon Rd	1	0	City of Industry and Los Angeles County
U.P. Ry	1	2	U.P.R.R.
Seventh Ave	1	0	City of Industry

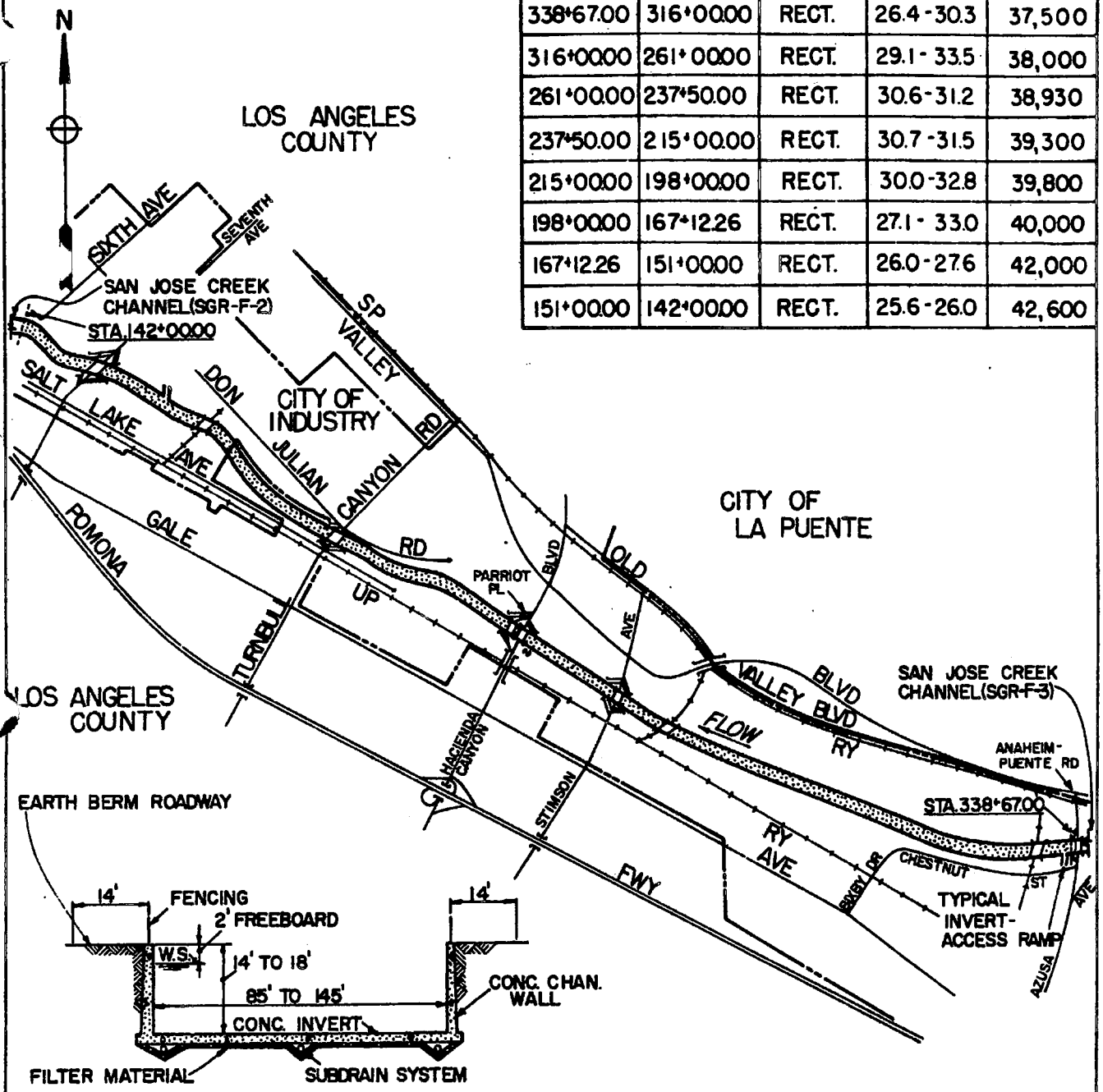
Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced berm-access ramp
Subdrain system	Surfaced invert-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
338+67.00	316+00.00	RECT.	26.4 - 30.3	37,500
316+00.00	261+00.00	RECT.	29.1 - 33.5	38,000
261+00.00	237+50.00	RECT.	30.6 - 31.2	38,930
237+50.00	215+00.00	RECT.	30.7 - 31.5	39,300
215+00.00	198+00.00	RECT.	30.0 - 32.8	39,800
198+00.00	167+12.26	RECT.	27.1 - 33.0	40,000
167+12.26	151+00.00	RECT.	26.0 - 27.6	42,000
151+00.00	142+00.00	RECT.	25.6 - 26.0	42,600



TYPICAL OPEN SECTION

STA.338+67.00 TO STA.142+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM TURNAROUND
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN JOSE CREEK CHANNEL

ANAHEIM-PUENTE RD TO SIXTH AVE

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-F-3

DATA SHEET
SGR-F-4

SAN JOSE CREEK CHANNEL
Nogales St to Anaheim-Puente Rd

Construction Data

Contract No:	DA 66-144	Start: 14 April 1966
	A. Teichert and Son, Inc	Finish: 23 February 1967
Specifications:	CIVENG 66-12	
Plans:	D.O. Series 207/160-207	
Folio Title:	SAN JOSE CREEK CHANNEL Nogales St to Anaheim-Puente Rd	

Local Assurances

Resolution Dated: 20 March 1962
Operation and Maintenance Transferred to: LACFCD, 27 March 1967

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm:	Nogales St, Arenth Ave, Anaheim-Puente Rd
To Left Berm:	Nogales St, Lawson St, Chestnut St, Anaheim-Puente Rd

Bridges

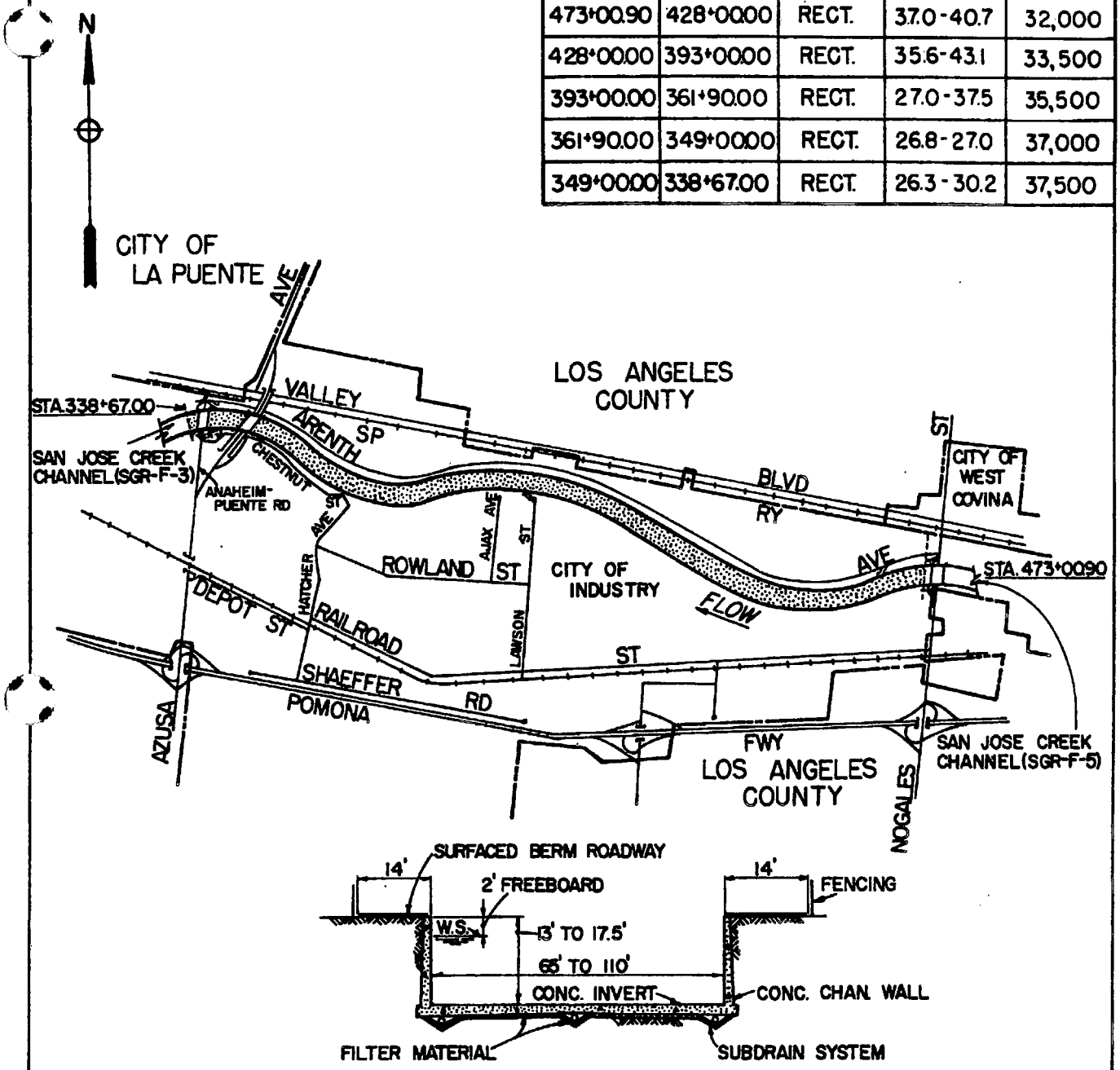
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Azusa Ave	0	0	City of Industry
Anaheim-Puente Rd	1	0	City of Industry

Reporting Features

Along Channel	At a Channel Station
Surfaced berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side overflow spillway
Concrete channel walls	Side drain
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
473+00.90	428+00.00	RECT.	37.0-40.7	32,000
428+00.00	393+00.00	RECT.	35.6-43.1	33,500
393+00.00	361+90.00	RECT.	27.0-37.5	35,500
361+90.00	349+00.00	RECT.	26.8-27.0	37,000
349+00.00	338+67.00	RECT.	26.3-30.2	37,500



TYPICAL OPEN SECTION

STA. 473+00.90 TO STA. 338+67.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN JOSE CREEK CHANNEL

NOGALES ST TO ANAHEIM-PUENTE RD

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-F-4

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-F-5

SAN JOSE CREEK CHANNEL
Benton Rd to Nogales St

Construction Data

Contract No:	DA 67-C-0066	Start: 1 June 1967
	Oberg Const Co	Finish: 28 May 1968
Specifications:	CIVENG 67-B-0031	
Plans:	D.O. Series 207/335-344	
Folio Title:	SAN JOSE CREEK CHANNEL Benton Rd to Nogales St	

Local Assurances

Resolution Dated: 20 March 1962
Operation and Maintenance Transferred to: LACFCD, 12 November 1968

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: downstream of Brea Canyon Rd from right berm (sta 644+30); downstream of Sentous Ave from right berm (sta 499+75)

To Right Berm: Benton Rd, Valley Blvd, Lemon Ave, Water St, Sentous Ave, Nogales St
To Left Berm: Benton Rd, Lemon Ave, Water St, Howell Rd, Sentous Ave, Nogales St

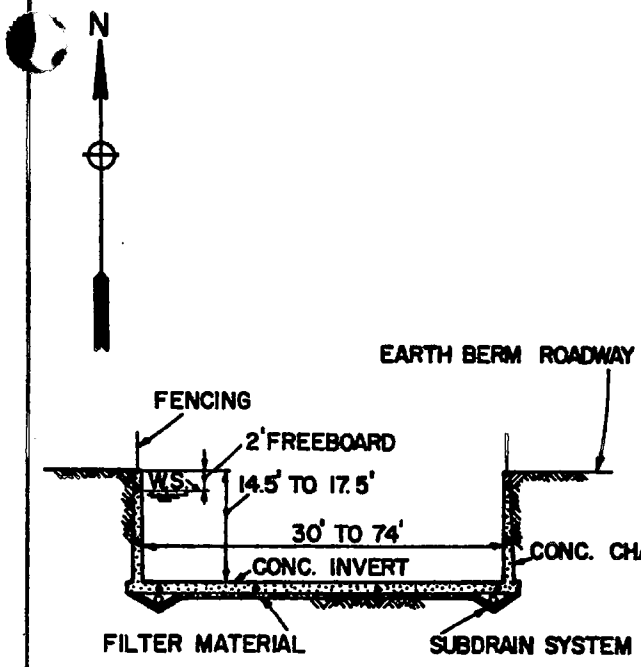
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Benton Rd	0	0	City of Industry
Brea Canyon Rd	1	0	City of Industry
S.P. Ry	0	0	S.P.R.R.
Lemon Ave	0	0	Los Angeles County
Water St	0	0	City of Industry and Los Angeles County
Sentous Ave	0	0	City of Industry
Nogales St	0	0	City of Industry

Reporting Features

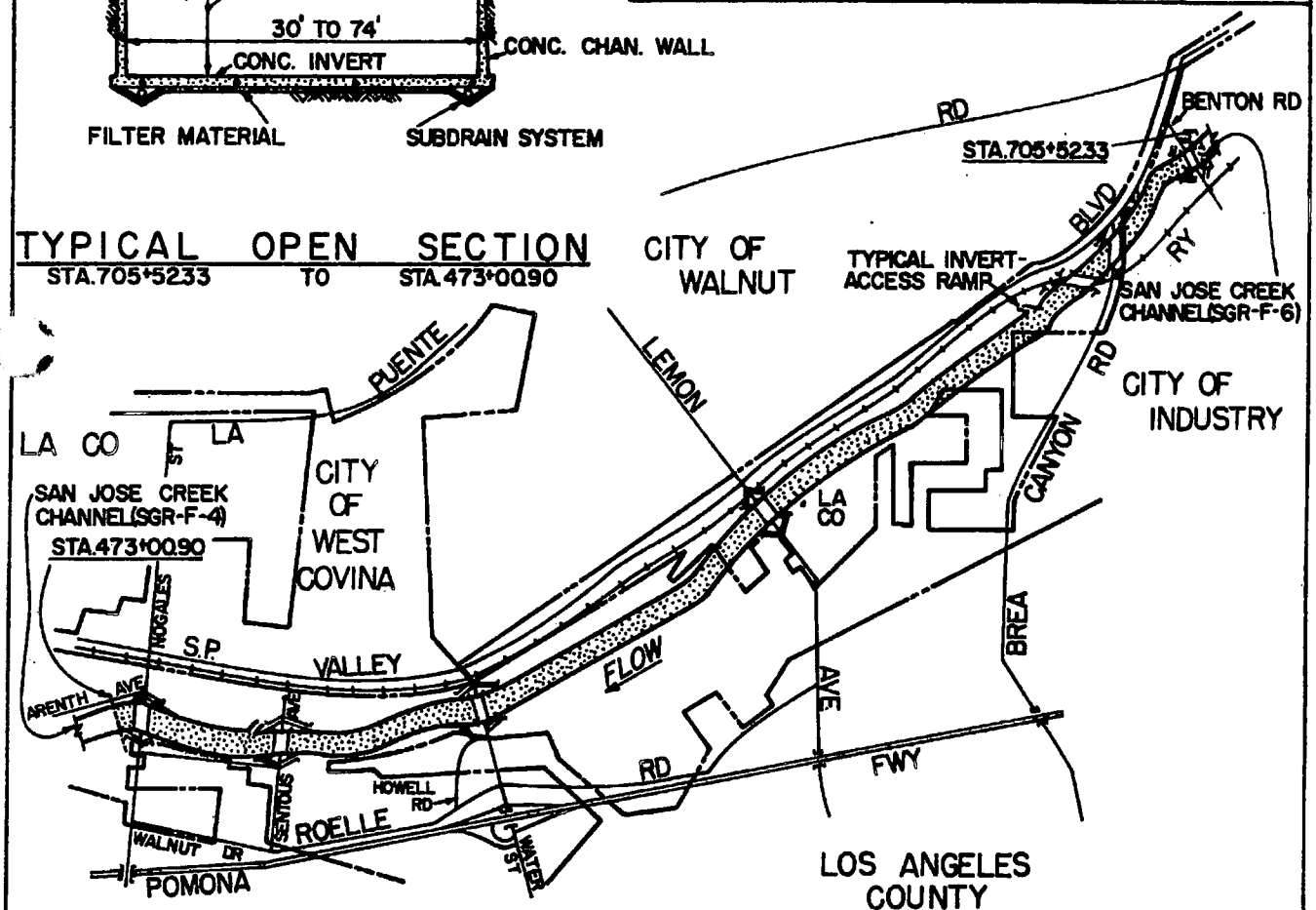
Along Channel	At a Channel Station
Surfaced berm roadway	Side drain
Subdrain system	Surfaced berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Bridge
Concrete channel roof slab	Public utility
Fencing	
Rights-of-way	

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
705+52.33	691+82.23	RECT.	33.4-38.1	13,600
691+82.23	661+43.25	RECT.	33.4-37.6	21,500
661+43.25	650+85.33	RECT.	34.8-37.2	23,800
650+85.33	608+21.27	RECT.	34.2-40.5	24,300
608+21.27	587+50.00	RECT.		24,600
587+50.00	580+65.00	RECT.		25,300
580+65.00	565+13.84	RECT.		26,500
565+13.84	556+20.00	RECT.		28,500
556+20.00	530+87.05	RECT.	34.1-41.1	31,000
530+87.05	473+00.90	RECT.	36.1-40.7	32,000



TYPICAL OPEN SECTION

STA. 705+52.33 TO STA. 473+00.90



LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM DEAD END
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN JOSE CREEK CHANNEL

BENTON RD TO NOGALES ST

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-F-5

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-F-6

SAN JOSE WASH CHANNEL
Nicholet St to Benton Rd

Construction Data

Contract No:	DA 62-135	Start: 24 April 1962
	MacDonald and Kruse, Inc	Finish: 1 December 1962
Specifications:	CIVENG 62-17	
Plans:	D.O. Series 204/54-96	
Folio Title:	THOMPSON CREEK AND SAN JOSE WASH CHANNELS Nicholet St to Benton Rd	

Local Assurances

Resolution Dated: 20 March 1962
Operation and Maintenance Transferred to: LACFCD, 16 May 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: upstream of Temple Ave from left side (sta 791+00)

To Right Berm: sta 809+09, Temple Ave, Valley Blvd
To Left Berm: Empress Rd, Temple Ave, Valley Blvd

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 809+09	0	0	State of California (pedestrian bridge)
Temple Ave	0	2	City of Pomona
Sta 785+50	0	0	State of California (pedestrian bridge)
Valley Blvd	0	2	City of Pomona

Reporting Features

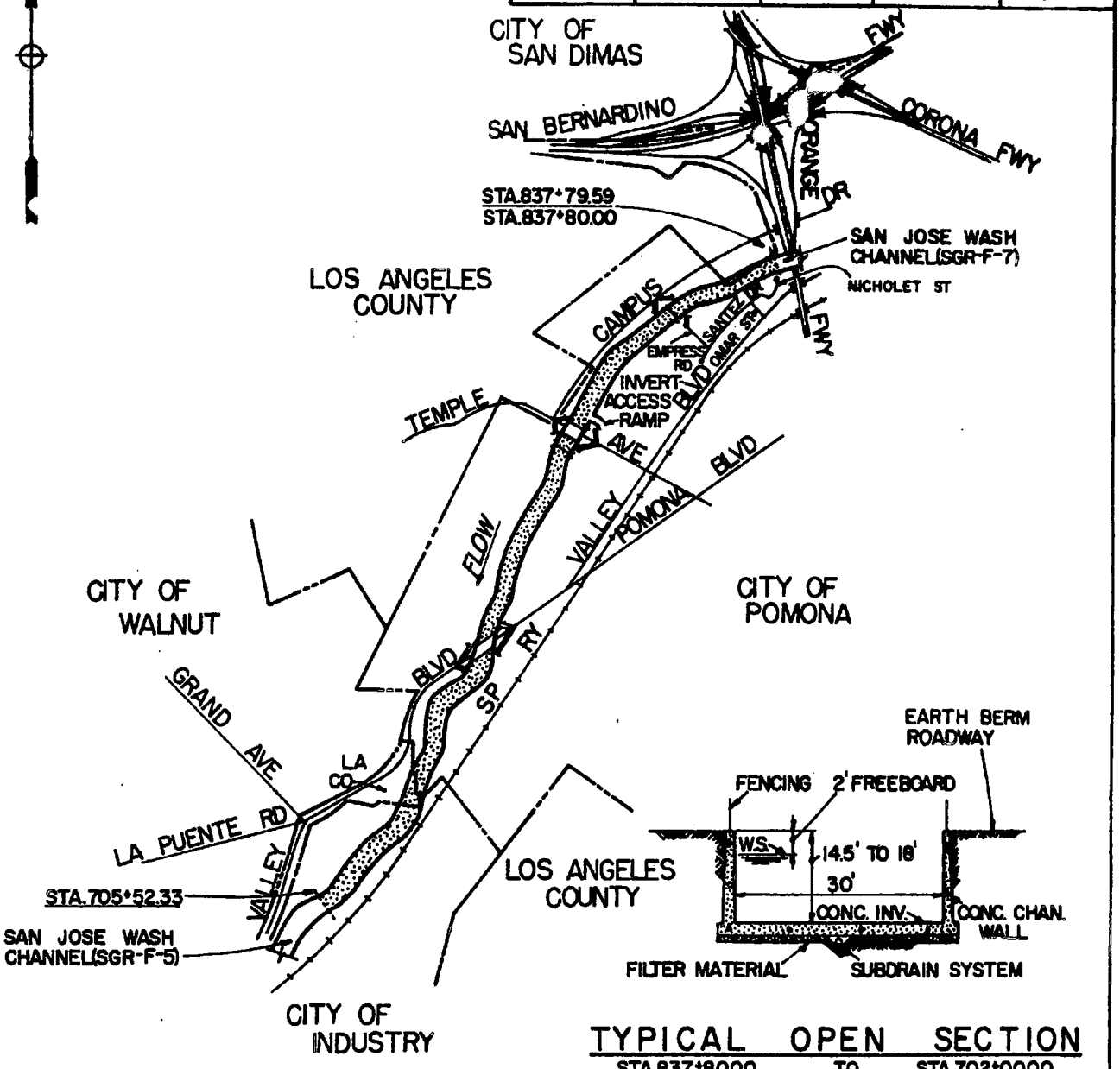
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced berm-access ramp
Subdrain system	Surfaced invert-access ramp
Concrete channel invert	Surfaced side drain
Concrete channel walls	Side overflow spillway
Fencing	Side drain
Rights-of-way	Bridge
	Public utility

CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY

SGR-F-6

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
837+80.00	775+00.00	RECT.	30.6-36.4	13,000
775+00.00	705+52.33	RECT.	29.4-37.4	13,600



TYPICAL OPEN SECTION

STA.837+80.00 TO STA.702+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- FOOTBRIDGE
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN JOSE WASH CHANNEL

NICHOLET ST TO BENTON RD

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-F-6

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-F-7

SAN JOSE WASH CHANNEL
Thompson Creek to Nicholet St

Construction Data

Contract No:	DA 63-132	Start: 4 April 1963
	MacDonald and Kruse, Inc	Finish: 31 March 1964
Specifications:	CIVENG 63-11	
Plans:	D.O. Series 204/97-172	
Folio Title:	THOMPSON CREEK AND SAN JOSE WASH CHANNEL White St to Nicholet St	

Local Assurances

Resolution Dated: 20 March 1962
Operation and Maintenance Transferred to: LACFCD, 8 December 1964

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from right side at Murchison Ave (sta 959+40)

To Right Berm:	Altura Ct, Murchison Ave, Weber St, Dudley St, Glen Ave, Ganesha Blvd, Ridgeway St
To Left Berm:	Hamilton Blvd, Dudley St, Glen Ave, Ganesha Blvd, Ridgeway St

Bridges

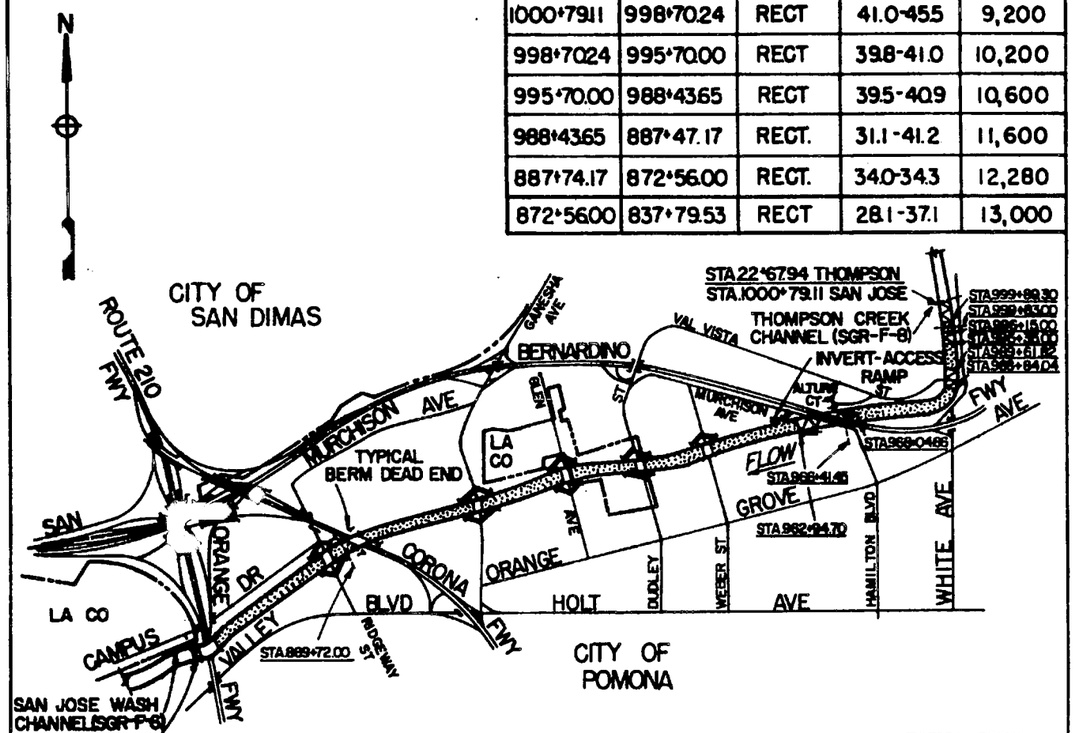
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Weber St	0	2	City of Pomona
Dudley St	0	2	Los Angeles County
Glen Ave	0	2	City of Pomona
Ganesha Blvd	0	2	City of Pomona
Corona Fwy (Route 71)	0	0	State of California
Ridgeway St	0	2	City of Pomona
Orange Fwy (Route 57)	0	0	State of California

Reporting Features

Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Surfaced invert-access ramp
Concrete channel walls	Side drain
Concrete channel roof slab	Side overflow spillway
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA	TO STA	SECT	V	Q
1000+79.11	998+70.24	RECT	41.0-45.5	9,200
998+70.24	995+70.00	RECT	39.8-41.0	10,200
995+70.00	988+43.65	RECT	39.5-40.9	10,600
988+43.65	887+47.17	RECT.	31.1-41.2	11,600
887+74.17	872+56.00	RECT.	34.0-34.3	12,280
872+56.00	837+79.53	RECT	28.1-37.1	13,000



TYPICAL COVERED SECTION
AS NOTED

TYPICAL OPEN SECTION
STA.1000+79.11 TO STA.837+79.53

LEGEND

- OPEN SECTION
- COVERED SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN JOSE WASH CHANNEL
THOMPSON CREEK TO NICHOLET ST

SCALE IN FEET
1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-F-7

DATA SHEET
SGR-F-8

THOMPSON CREEK CHANNEL
Mountain Ave to San Jose Wash

Construction Data

Const. Limits	Sta 248+69.68 to Sta 44+54.08	Sta 44+54.08 to Sta 22+67.94
Contract No:	DA 64-148	DA 63-132
	MacDonald and Kruse, Inc	MacDonald and Kruse, Inc
Specifications:	CIVENG 64-27	CIVENG 63-11
Plans:	D.O. Series 204/173-264	D.O. Series 204/97-172
Start:	23 June 1964	4 April 1963
Finish:	26 February 1965	31 March 1964
Folio Title:	THOMPSON CREEK CHANNEL	THOMPSON CREEK CHANNEL
	Mountain Ave to White Ave	White Ave to Nicholet St

Local Assurances

Resolution Dated:	8 March 1960	8 March 1960
O&M Transferred to:	7 April 1965 (LACFCD)	13 November 1964 (LACFCD)

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: from right side upstream of Bonita Ave (sta 111+80)

To Right Berm: Mountain Ave, sta 245+47, Glen Way, Towne Ave, Base Line Rd, Lane Court, Garey Ave, Foothill Blvd, Grove St, Bonita Ave, Fulton Rd, First St, Dupuy Dr, Arrow Hwy, Fulton Rd, White Ave, sta 40+60, McKinley Ave

To Left Berm: Mountain Ave, sta 245+47, Glen Way, Towne Ave, Base Line Rd, Summer Rd, Garey Ave, Foothill Blvd, Grove St, Bonita Ave, First St, Dupuy Dr, Arrow Hwy, La Verne Ave, White Ave

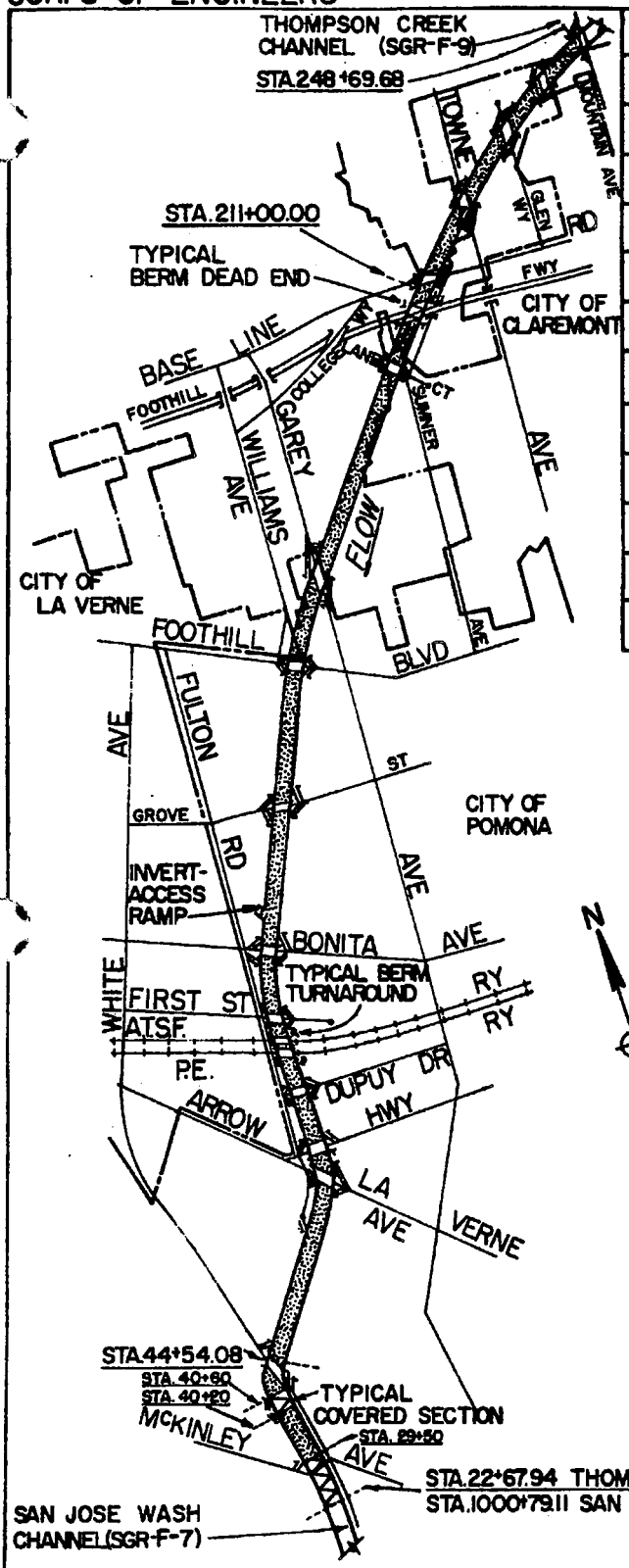
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 245+47	0	0	City of Claremont
Glen Way	0	0	City of Claremont
Towne Ave	0	0	Los Angeles County
Base Line Rd	0	0	Los Angeles County
Lane Court	0	0	City of Claremont
Garey Ave	0	0	City of Pomona and Los Angeles County
Foothill Blvd	0	0	City of Pomona
Grove St	0	0	City of Pomona
Bonita Ave	0	0	City of Pomona
First St	0	0	City of Pomona
A.T.S.F. Ry	0	0	A.T.S.F.R.R.
P.E. Ry	0	0	P.E.R.R.
Dupuy Dr	0	0	City of Pomona
Arrow Hwy	0	0	City of Pomona
La Verne Ave	0	0	City of Pomona
White Ave	0	2	City of Pomona

Reporting Features

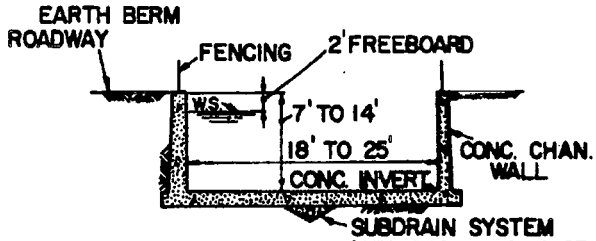
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced berm-access ramp
Subdrain system	Side drain
Concrete channel invert	Side overflow spillway
Concrete channel side walls	Surfaced invert-access ramp
Concrete channel roof slab	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



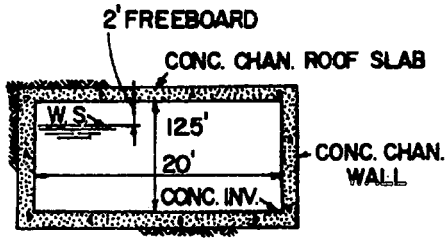
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
248+69.68	246+20.00	RECT.	28.5-36.3	2,700
246+20.00	215+90.00	RECT.	30.0-37.0	3,100
215+90.00	211+25.00	RECT.	34.3-36.5	4,300
211+25.00	205+50.00	RECT.	31.4-38.1	4,500
205+50.00	182+00.00	RECT.	31.4-39.2	6,500
182+00.00	152+00.00	RECT	36.9-44.7	6,800
152+00.00	149+37.85	RECT.	38.1-42.5	7,150
149+37.85	112+85.11	RECT.	38.1-41.5	8,000
112+85.11	108+75.00	RECT.	38.5-43.7	8,450
108+75.00	92+50.00	RECT.	37.9-42.1	9,000
92+50.00	22+67.94	RECT.	38.4-46.5	9,200



TYPICAL OPEN SECTION

STA. 248+69.68 TO STA. 29+50.00



TYPICAL COVERED SECTION

AS NOTED

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONT. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

THOMPSON CREEK CHANNEL

MOUNTAIN AVE TO SAN JOSE WASH

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-F-8

DATA SHEET. THOMPSON CREEK CHANNEL
SGR-F-9 Thompson Creek Dam to Mountain Ave

Construction Data

Contract No:	DA 67-C-0052	Start: 1 May 1967
	Belczak and Goudeseune, Inc	Finish: 28 May 1967
Specifications:	DACW09-67-B-0023	
Plans:	D.O. Series 204/269-295	
Folio Title:	THOMPSON CREEK AND SAN JOSE CHANNELS Thompson Dam to Mountain Ave	

Local Assurances
Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 16 July 1968

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none

To Right Berm: sta 303+79, sta 262+74, Mountain Ave
To Left Berm: sta 303+79, sta 262+74, Mountain Ave

Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Sta 326+90	0	0	Private bridge
Sta 303+79	0	0	Private bridge
Sta 262+74	0	0	Private bridge
Mountain Ave	0	0	City of Claremont and Los Angeles County

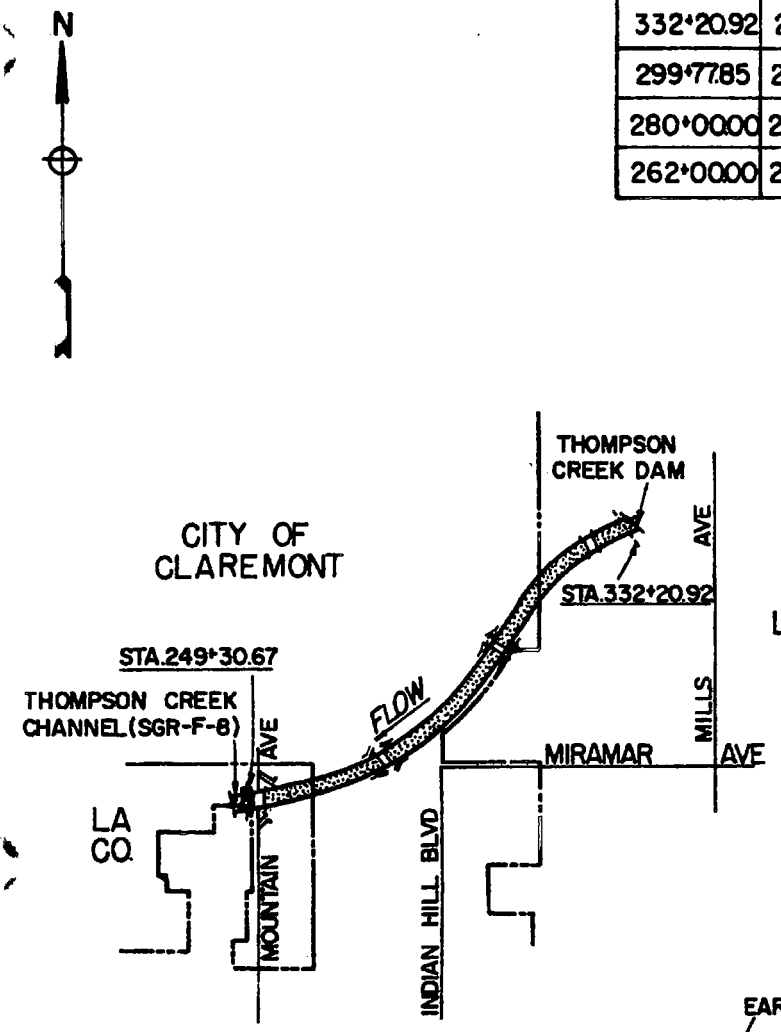
Reporting Features

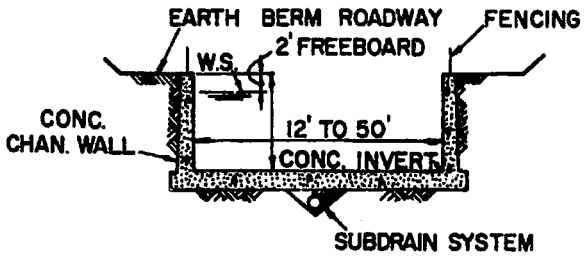
Along Channel	At a Channel Station
Surfaced and earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Side overflow spillway
Subdrain system	Bridge
Fencing	Public utility
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
332+20.92	299+77.85	RECT.	24.9-37.2	1,500
299+77.85	280+00.00	RECT.	22.7-34.1	2,000
280+00.00	262+00.00	RECT.	27.9-35.3	2,300
262+00.00	249+30.67	RECT.	28.5-36.3	2,700





TYPICAL OPEN SECTION

STA.332+20.92 TO STA.249+30.67

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

THOMPSON CREEK CHANNEL

THOMPSON CREEK DAM TO MOUNTAIN AVE

SCALE IN FEET

1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-F-9

DATA SHEET
SGR-G-1

SAN DIMAS WASH CHANNEL
Grand Ave to Big Dalton Wash

Construction Data

Contract No:	DA 58-146	Start:	23 April 1958
	Oberg Const Corp	Finish:	6 February 1959
Specifications:	CIVENG 58-20		
Plans:	D.O. Series 179/19-88		
Folio Title:	SAN DIMAS WASH CHANNEL Grand Ave to Big Dalton Wash		

Local Assurances

Resolution Dated: 29 October 1957
Operation and Maintenance Transferred to: LACFCD, 2 June 1959

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: through left wall from Barranca Ave (sta 125+94)

To Right Berm: Grand Ave, Arrow Hwy, Barranca Ave, Citrus Ave, Hollenbeck Ave, Conwell Ave, Azusa Ave

To Left Berm: Arrow Hwy, Barranca Ave, Citrus Ave, Hollenbeck Ave, Conwell Ave, Azusa Ave

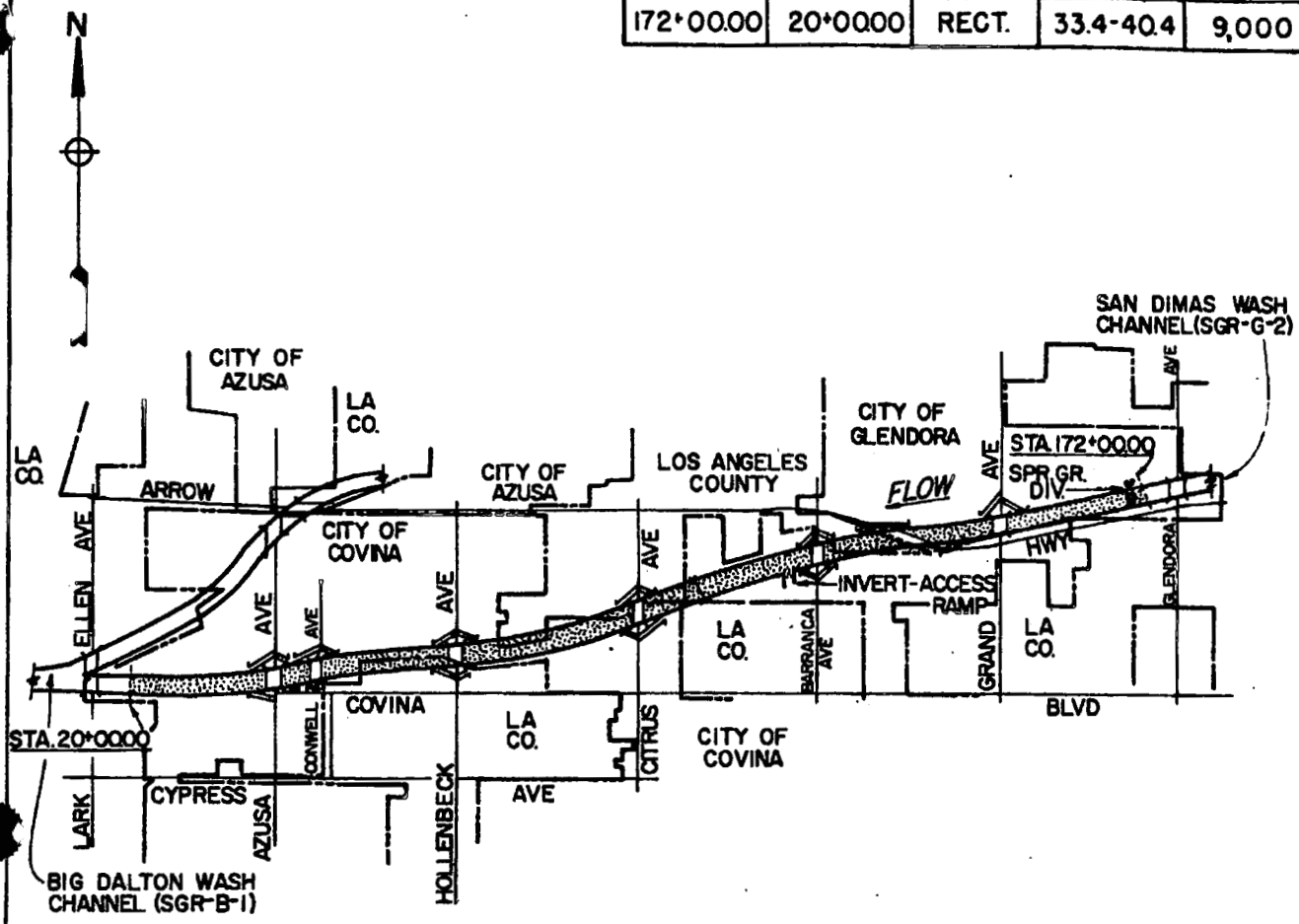
Bridges

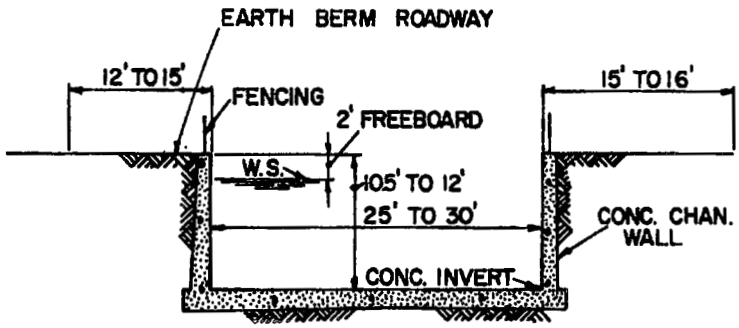
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Grand Ave	0	2	Los Angeles County and City of Glendora
Arrow Hwy	0	2	Los Angeles County and City of Covina
Barranca Ave	0	2	Los Angeles County
Sta 111+54	0	0	Covina School District (footbridge)
Citrus Ave	0	2	Los Angeles County
Hollenbeck Ave	0	2	City of Covina
Conwell Ave	0	2	City of Covina
Azusa Ave	0	2	City of Covina

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Fencing	Side overflow spillway
Rights-of-way	Spreading grounds diversion
	Bridge
	Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
172+00.00	20+00.00	RECT.	33.4-40.4	9,000





TYPICAL OPEN SECTION
STA. 172+00.00 TO STA. 20+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- FOOTBRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM TURNAROUND
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN DIMAS WASH CHANNEL
GRAND AVE TO BIG DALTON WASH

SCALE IN FEET
1000 0 1000 2000 3000 5000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-G-2

SAN DIMAS WASH CHANNEL
A.T.S.F. Ry to Grand Ave

Construction Data

Contract No:	DA 60-241	Start:	21 June 1960
	Fredericksen and Kasler	Finish:	22 December 1960
Specifications:	CIVENG 60-31		
Plans:	D.O. Series 179/112-141		
Folio Title:	SAN DIMAS WASH CHANNEL		
	A.T.S.F. Ry to Grand Ave		

Local Assurances

Resolution Dated: 12 May 1959
Operation and Maintenance Transferred to: LACFCD, 12 September 1961

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: Sunflower Ave, Gladstone St, Bonnie Cove Ave, Juanita Ave, Glendora Ave
To Left Berm: Gladstone St, Bonnie Cove Ave, Juanita Ave, Glendora Ave

Bridges

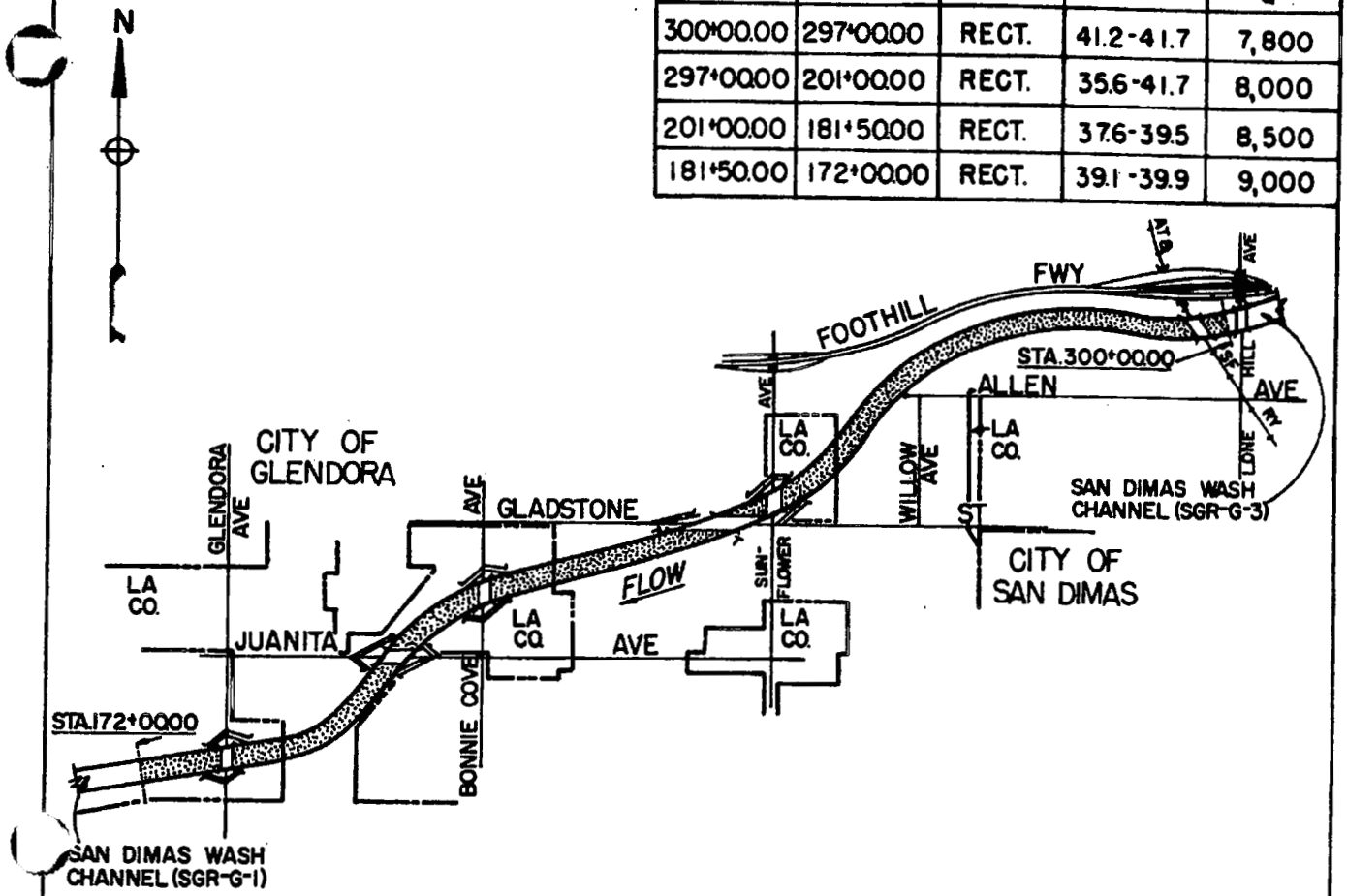
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
A.T.S.F. Ry	0	0	A.T.S.F.R.R.
Sunflower Ave	0	0	Los Angeles County
Gladstone St	0	2	City of Glendora
Bonnie Cove Ave	0	2	Los Angeles County
Juanita Ave	0	2	Los Angeles County
Glendora Ave	0	2	City of Glendora

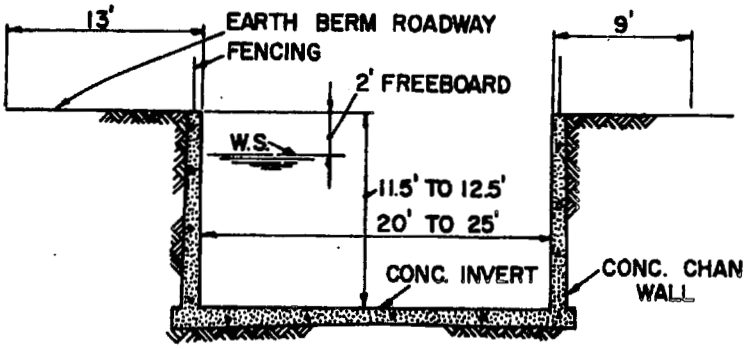
Reporting Features

Along Channel	At a Channel Station
Earth and surfaced berm roadway	Surfaced and earth berm-access ramp
Concrete channel invert	Side overflow spillway
Concrete channel walls	Side drain
Fencing	Bridge
Rights-of-way	Public utility

DESIGN DATA

STA.	TO STA.	SECT.	V	Q
300+00.00	297+00.00	RECT.	41.2-41.7	7,800
297+00.00	201+00.00	RECT.	35.6-41.7	8,000
201+00.00	181+50.00	RECT.	37.6-39.5	8,500
181+50.00	172+00.00	RECT.	39.1-39.9	9,000





TYPICAL OPEN SECTION

STA.300+00.00 TO STA.172+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM DEAD END
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN DIMAS WASH CHANNEL A.T.S.F. RY TO GRAND AVE

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

SGR-G-2

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-G-3

SAN DIMAS WASH CHANNEL
Puddingstone Diversion Dam to A.T.S.F. Ry

Construction Data

Contract No:	DA 62-129	Start: 9 April 1962
	B and P Trucking Co	Finish: 19 November 1962
Specifications:	CIVENG 62-15	
Plans:	D.O. Series 179/142	
Folio Title:	SAN DIMAS WASH CHANNEL Puddingstone Diversion Dam to A.T.S.F. Ry	

Local Assurance

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 15 May 1963

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: none

To Right Berm: Foothill Blvd, San Dimas Ave, Cataract Rd, Wehner Ln, Sta 347+55, Sta 334+59, Amelia Ave, Lone Hill Ave

To Left Berm: Foothill Blvd, Walnut Ave, San Dimas Ave, Cataract Rd, Wehner Ln, Sta 347+55, Sta 334+59, Amelia Ave, Lone Hill Ave

Bridges

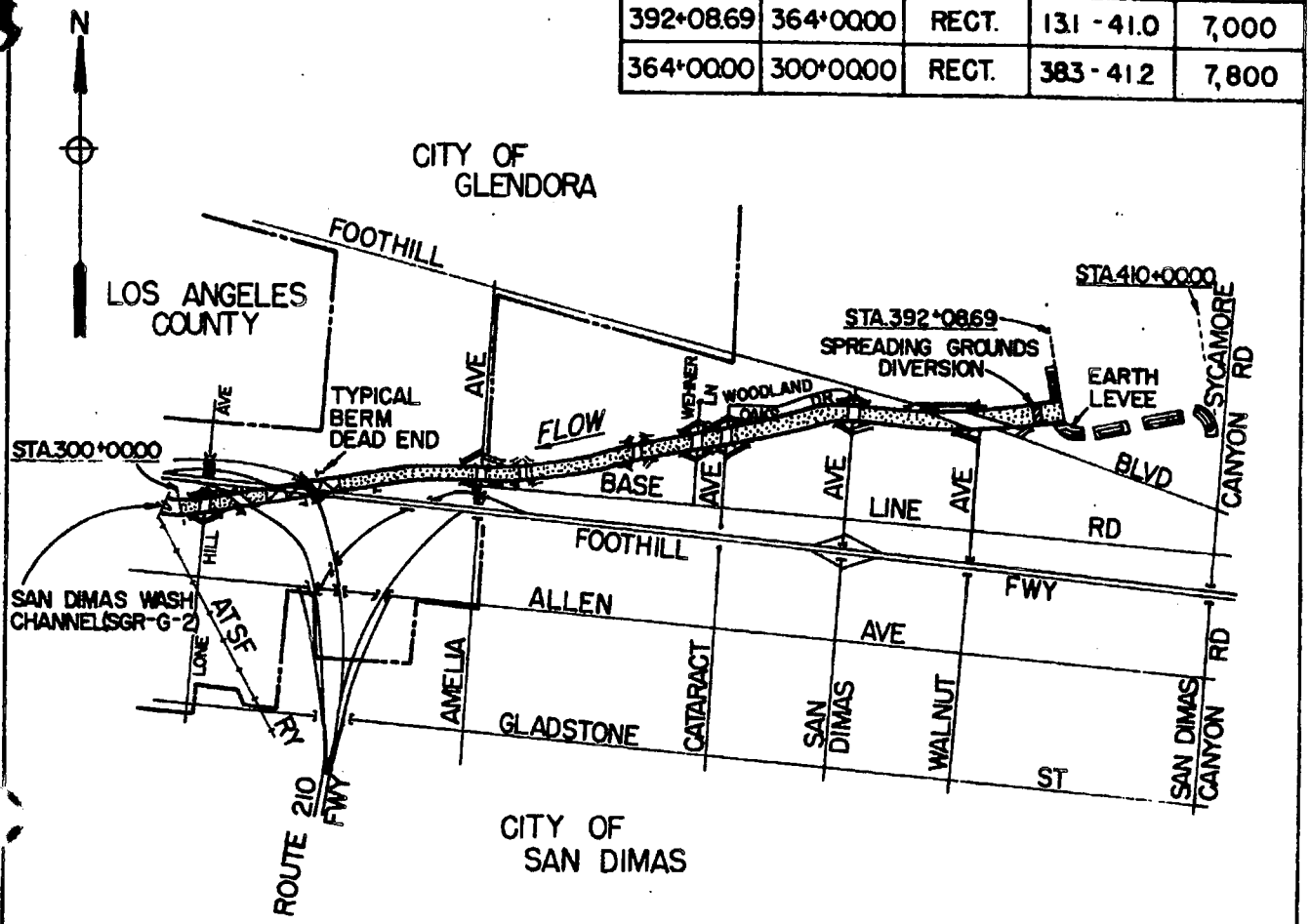
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Foothill Blvd	0	0	State of California
San Dimas Ave	0	0	City of San Dimas
Cataract Rd	0	0	County of Los Angeles
Wehner Ln	0	0	County of Los Angeles
Sta 347+55	0	0	Private bridge
Sta 334+59	0	0	Private bridge
Amelia Ave	0	0	City of Glendora
Lone Hill Ave	0	0	City of Glendora

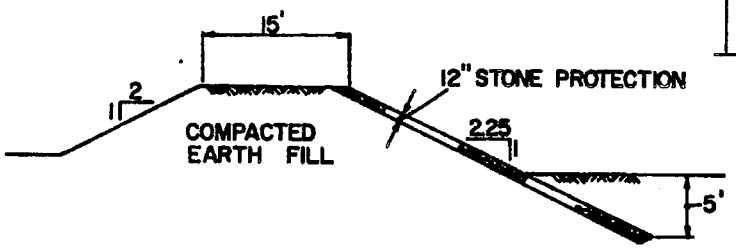
Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth and surfaced berm-access ramp
Concrete channel invert	Spreading grounds diversion
Concrete channel roof slab	Side drain
Concrete channel walls	Inlet structure
Fencing	Earth levee
Rights-of-way	Side overflow spillway
	Bridge
	Public utility

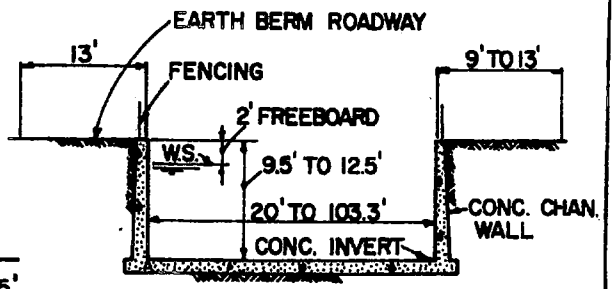
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
392+08.69	364+00.00	RECT.	13.1 - 41.0	7,000
364+00.00	300+00.00	RECT.	38.3 - 41.2	7,800





TYPICAL LEVEE SECTION



TYPICAL OPEN SECTION

STA.392+08.69 TO STA.300+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- COVERED SECTION
- TYPICAL BERM-ACCESS RAMP
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SAN DIMAS WASH CHANNEL

PUDDINGSTONE DIVERSION DAM TO A.T.S.F. RY

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

SGR-G-3

DATA SHEET
SGR-H-1

WALNUT CREEK INLET CHANNEL
Francisquito Ave to San Gabriel River

Construction Data	ORIGINAL CONTRACT	MODIFICATION CONTRACT
Const. Limits:	Sta 127+00.00 to Sta 10+80.00	Sta 28+00.00 to Sta 10+80.00
Contract No:	DA 57-183	DA 60-156
	MacDonald and Kruse	Kirst Const Co
Start:	1 May 1957	3 February 1960
Finish:	15 February 1958	27 January 1961
Specifications:	CIVENG 57-36	CIVENG 60-111
Plans:	D.O. Series 153/17-110	D.O. Series 170/44-148
Folio Title:	WALNUT CREEK INLET CHANNEL Big Dalton Wash to Gabriel River	SAN GABRIEL RIVER IMPROVEMENT Santa Fe F.C. Basin to Whittier Narrows F.C. Basin

Local Assurances

Resolution Dated:	21 August 1956	12 May 1959
O&M Transferred to:	LACFCD, 20 May 1958	LACFCD, 24 May 1961

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: from right side downstream of Francisquito Ave (sta 120+75)

To Right Berm: Francisquito Ave, Vineland Ave, Baldwin Park Blvd, Farnwell St, Syracuse Ave
To Left Berm: Francisquito Ave, Vineland Ave, Baldwin Park Blvd

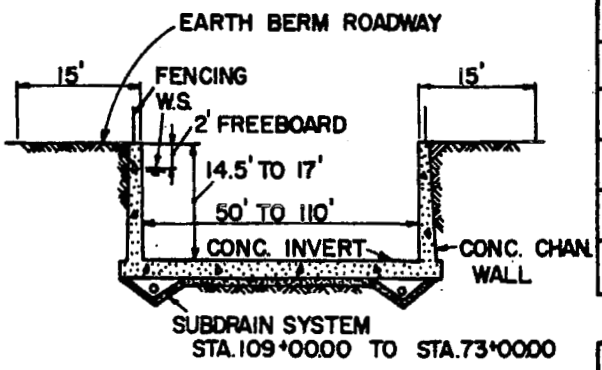
Bridges

Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Francisquito Ave	1	2	City of Baldwin Park
Vineland Ave	2	2	Los Angeles County
P.E. Ry	1	2	P.E.R.R
Baldwin Park Blvd	1	2	City of Covina
San Gabriel River Fwy	6	0	State of California

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Earth berm-access ramp
Concrete and stone channel invert	Side drain
Concrete channel walls	Concrete invert-access ramp
Stone channel side slopes	Subdrain manhole
Subdrain system	Bridge
Surfaced berm roadway	Public utility
Stone toe protection	
Fencing	
Rights-of-way	

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY



TYPICAL OPEN SECTION

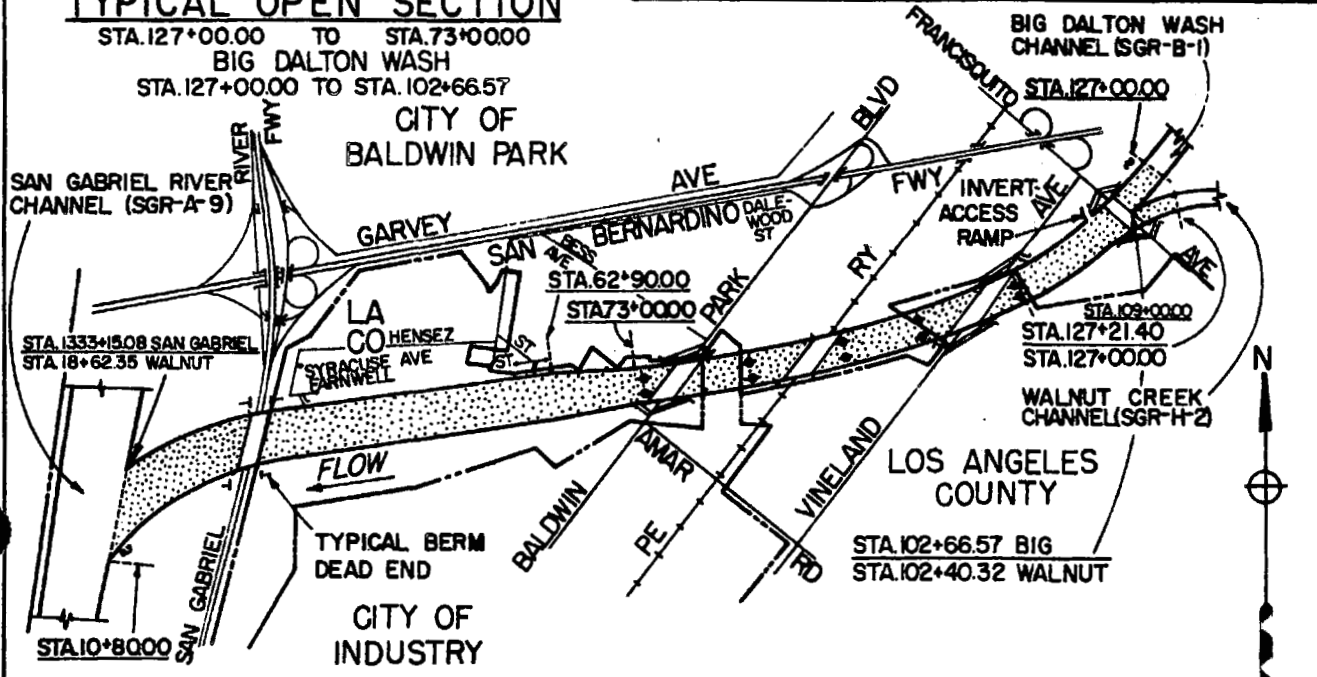
STA.127+00.00 TO STA.73+00.00
BIG DALTON WASH
STA.127+00.00 TO STA.102+66.57

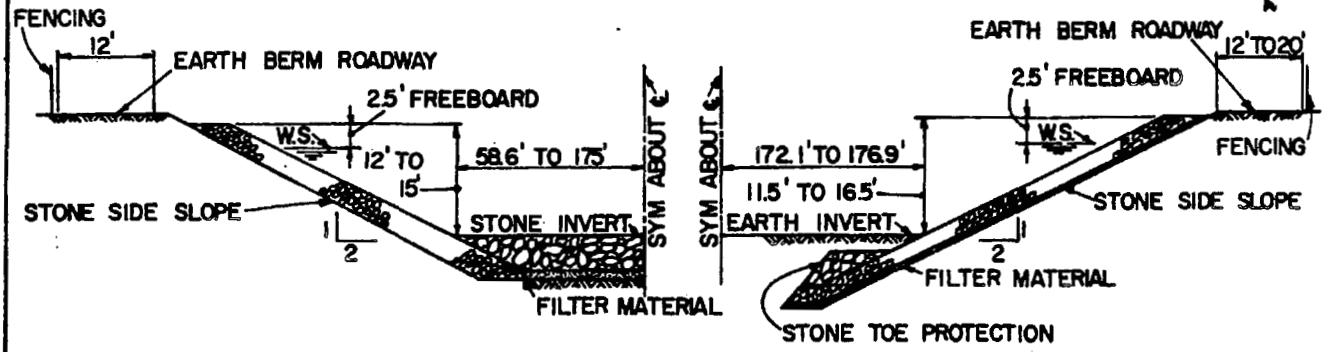
DESIGN DATA

STA.	TO STA.	SECT.	V	Q
127+00.00	123+00.00	RECT.	25.1-28.7	16,000
123+00.00	73+00.00	RECT.	26.9-35.9	40,000
73+00.00	63+00.00	VAR.	12.4-33.4	40,000
63+00.00	18+62.35	TRAP.	7.6-12.6	40,000

BIG DALTON WASH CHANNEL

127+00.00	102+66.57	RECT.	32.2-32.6	25,500





TYPICAL OPEN SECTION

STA.73+00.00 TO STA.62+90.00

TYPICAL OPEN SECTION

STA.62+90.00 TO STA.18+62.35

LEGEND

- OPEN SECTION
- STREET BRIDGE
- SUBDRAIN MANHOLE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM TURNAROUND
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WALNUT CREEK INLET CHANNEL

FRANCISQUITO AVE TO SAN GABRIEL RIVER

SCALE IN FEET
1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-H-1

OPERATION AND MAINTENANCE MANUAL

DATA SHEET
SGR-H-2

WALNUT CREEK CHANNEL
California Ave to Walnut Creek Inlet Channel

Construction Data

Contract No:	DA 61-141	Start: 3 April 1961
	A. Teichert and Son, Inc	Finish: 6 January 1962
Specifications:	CIVENG 61-16	
Plans:	D.O. Series 197/2-114	
Folio Title:	WALNUT CREEK CHANNEL	
	California Ave to Walnut Creek Inlet Channel	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 16 May 1962

Stormflow Data

Gaging Station Location: on right bank, 1000 feet upstream of Puente Ave (sta 151+60)
Type: Recording (LACFCD--F304-R)
Staff Gage Reading at One-third Capacity: 5.2 ft on gage (5333 cfs)

Access Ramps

To Invert: none

To Right Berm: at all street crossings
To Left Berm: at all street crossings

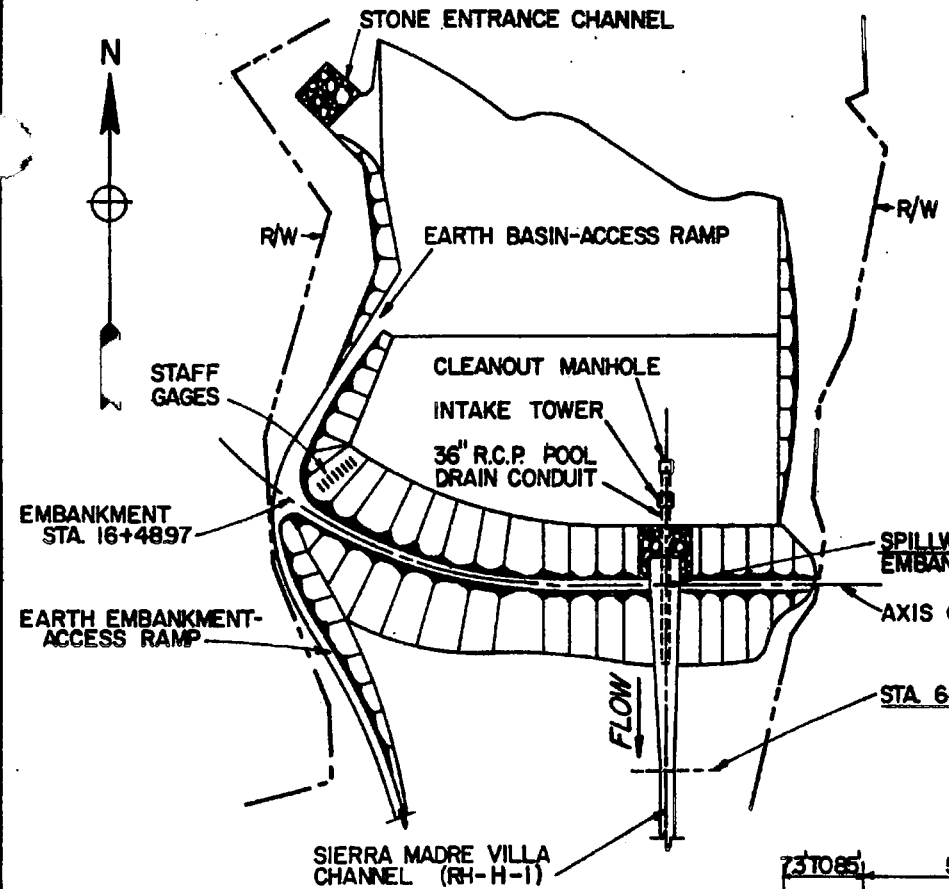
Bridges

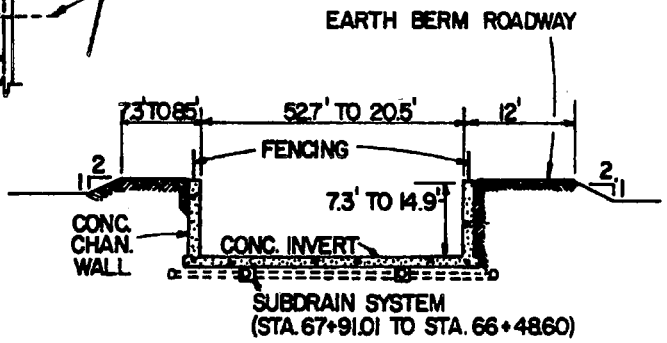
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Service Ave	0	2	City of West Covina
Sunset Ave	0	2	City of West Covina
Cameron Ave	0	2	City of West Covina
Sta 211+80	0	2	City of West Covina (footbridge)
Orange Ave	0	2	City of West Covina
Merced Ave	0	2	City of West Covina
Willow Ave	0	2	City of West Covina
Sta 152+30	0	0	LACFCD (gaging station footbridge)
Puente Ave	0	2	City of Covina
Big Dalton Ave	0	2	City of Baldwin Park

Reporting Features

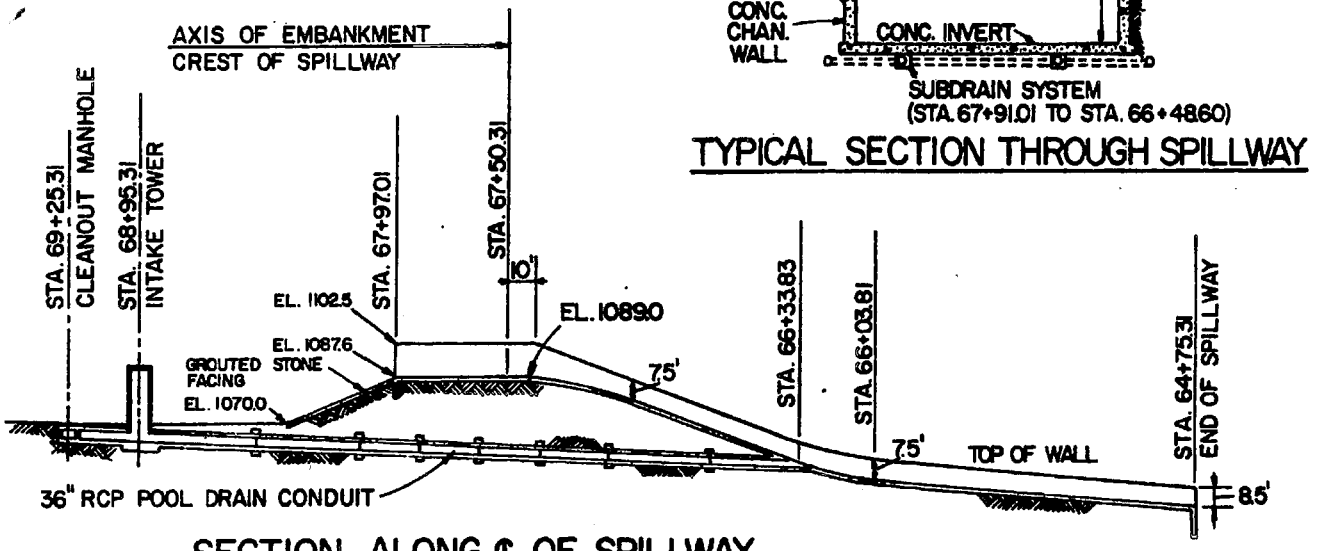
Along Channel	At a Channel Station
Earth and surfaced berm roadway	Surfaced berm-access ramp
Concrete channel invert	Gaging station
Concrete channel walls	Side drain
Fencing	Bridge
Rights-of-way	Public utility

CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

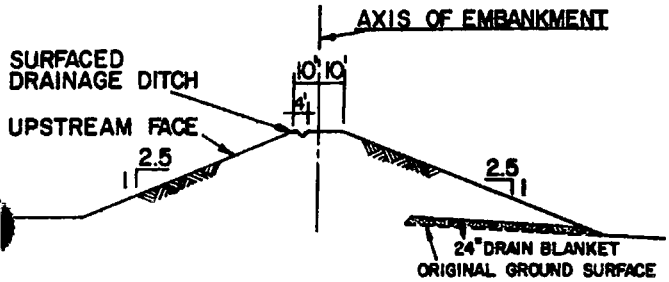




TYPICAL SECTION THROUGH SPILLWAY



SECTION ALONG ℄ OF SPILLWAY



TYPICAL EMBANKMENT SECTION

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

SIERRA MADRE VILLA DEBRIS BASIN

NOT TO SCALE

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA

RH-H-2

DATA SHEET
SGR-H-3

WALNUT CREEK CHANNEL
Charter Oak Wash to California Ave

Construction Data

Contract No:	DA 61-141	Start: 3 April 1961
	A. Teichert and Son, Inc	Finish: 6 January 1962
Specifications:	CIVENG 61-16	
Plans:	D.O. Series 197/120-203, 246	
Folio Title:	WALNUT CREEK CHANNEL Charter Oak Wash to California Ave	

Local Assurances

Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD, 16 May 1962

Stormflow Data

Gaging Station Location: none

Access Ramps

To Invert: through right wall downstream of Lark Ellen Ave (sta 294+36)

To Right Berm: at all street crossings
To Left Berm: at all street crossings

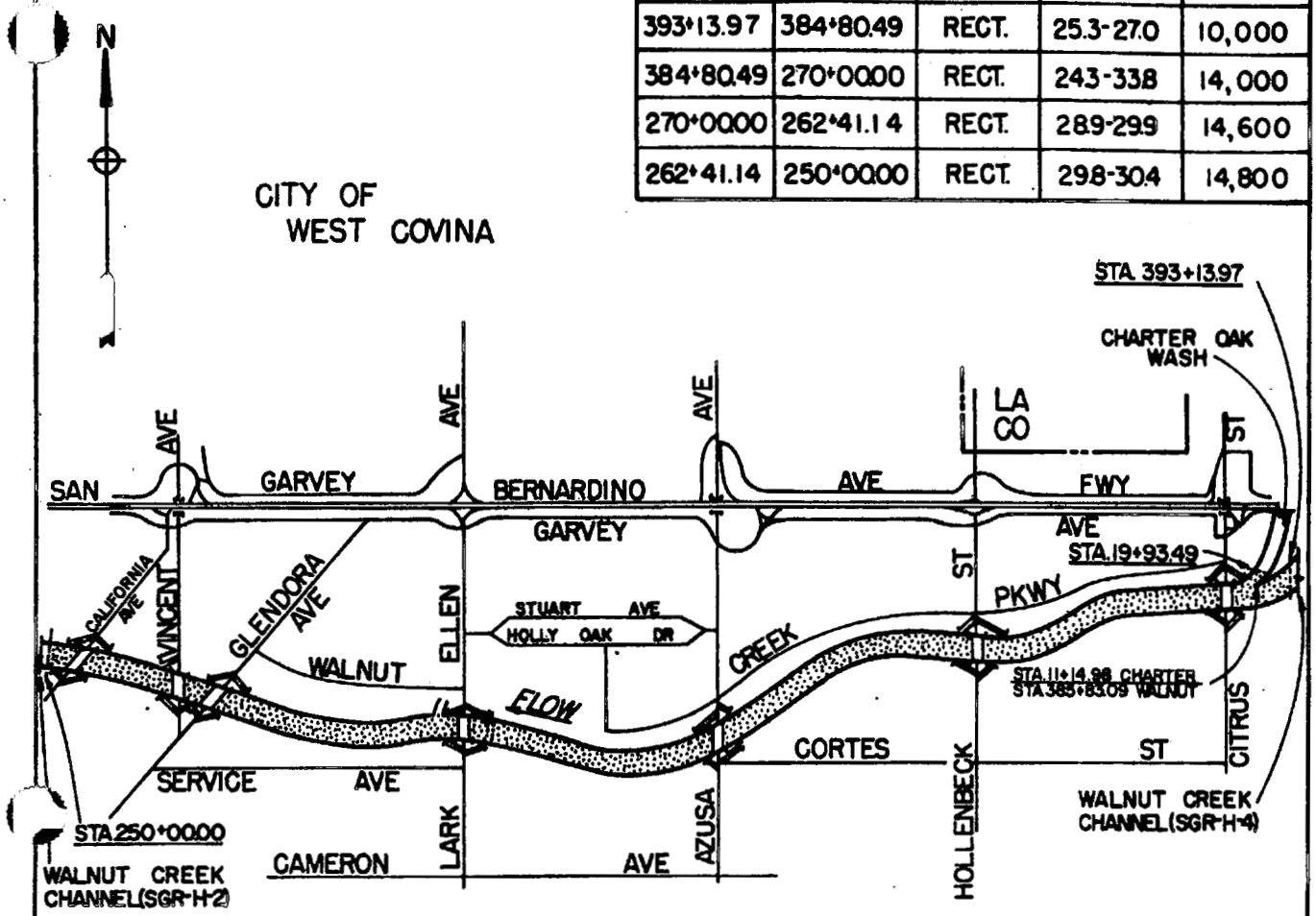
Bridges

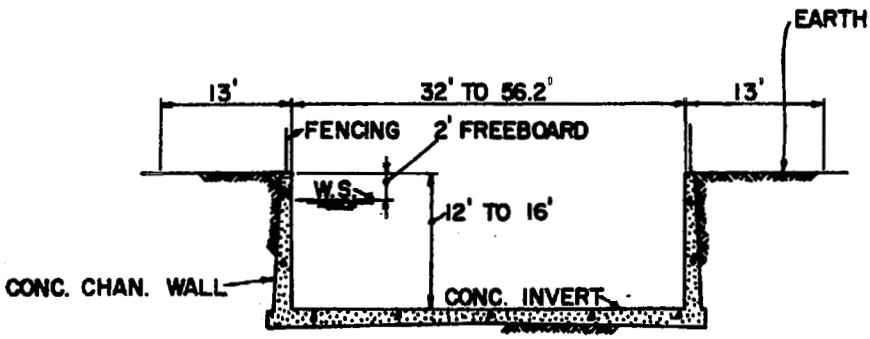
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Citrus St	0	2	City of West Covina
Hollenbeck St	0	0	City of West Covina
Azusa Ave	0	0	City of West Covina
Lark Ellen Ave	0	0	City of West Covina
Glendora Ave	0	2	City of West Covina
Vincent Ave	0	2	City of West Covina
California Ave	0	2	City of West Covina

Reporting Features

Along Channel	At a Channel Station
Earth and surfaced berm roadway	Surfaced berm-access ramp
Concrete channel invert	Concrete invert-access ramp
Concrete channel walls	Side drain
Fencing	Bridge
Rights-of-way	Public utility

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
393+13.97	384+80.49	RECT.	25.3-27.0	10,000
384+80.49	270+00.00	RECT.	24.3-33.8	14,000
270+00.00	262+41.14	RECT.	28.9-29.9	14,600
262+41.14	250+00.00	RECT.	29.8-30.4	14,800





TYPICAL OPEN SECTION

STA.393+13.97 TO STA.250+00.00

LEGEND

- OPEN SECTION
- STREET BRIDGE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL INVERT-ACCESS RAMP
- CONST. PROJECT LIMIT
- COUNTY OR CITY BOUNDARY

OPERATION AND MAINTENANCE MANUAL
LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WALNUT CREEK CHANNEL

CHARTER OAK WASH TO CALIFORNIA AVE.

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-H-3

DATA SHEET
SGR-H-4

WALNUT CREEK CHANNEL
Covina Hills Rd to Charter Oak Wash

Construction Data

Contract No:	DA 62-130	Start:	16 April 1962
	A. Teichert and Son, Inc	Finish:	16 November 1962
Specifications:	CIVENG 62-16		
Plans:	D.O. Series 197/205-246		
Folio Title:	WALNUT CREEK CHANNEL Covina Hills Rd to Charter Oak Wash		

Local Assurances
Resolution Dated: 8 March 1960
Operation and Maintenance Transferred to: LACFCD

Stormflow Data
Gaging Station Location: none

Access Ramps
To Invert: none

To Right Berm: at all street crossings
To Left Berm: at all street crossings

Bridges

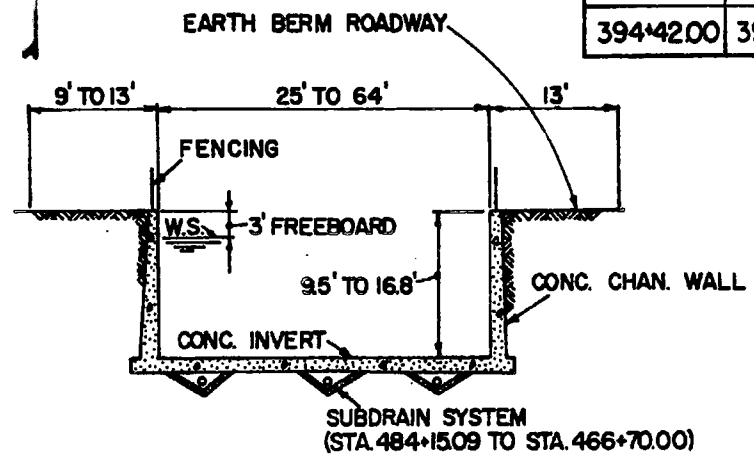
Location or Street Name	Integral Piers	w/Channel Abutments	Owner
Covina Hills Rd	0	2	Los Angeles County
Oak Canyon Rd	0	2	Private road
Grand Ave	0	2	Los Angeles County
San Bernardino Fwy	0	2	State of California
Holt Ave	0	2	City of West Covina
Barranca St	0	2	City of West Covina

Reporting Features

Along Channel	At a Channel Station
Earth berm roadway	Surfaced berm-access ramp
Concrete channel invert	Side drain
Concrete channel walls	Spreading grounds diversion
Subdrain system	Side overflow spillway
Fencing	Subdrain manhole
Rights-of-way	Bridge
	Public utility

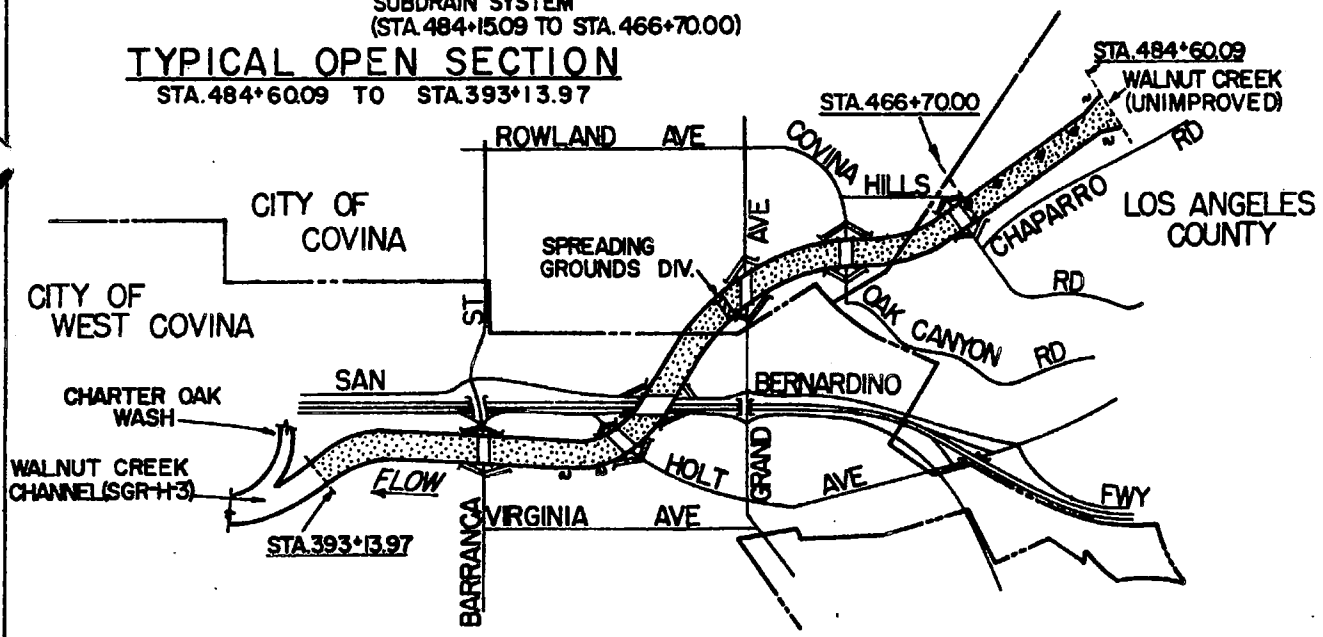
CORPS OF ENGINEERS — DEPARTMENT OF THE ARMY

DESIGN DATA				
STA.	TO STA.	SECT.	V	Q
484+60.09	430+75.09	RECT.	16.2-33.5	8,000
430+75.09	425+31.00	RECT.	28.8-32.1	8,500
425+31.00	421+00.00	RECT.	22.6-29.4	9,000
421+00.00	408+15.00	RECT.	25.1-28.6	9,500
408+15.00	400+57.00	RECT.	24.4-26.5	9,700
400+57.00	394+42.00	RECT.	26.2-27.0	9,800
394+42.00	393+13.97	RECT.	26.5-26.7	10,000



TYPICAL OPEN SECTION

STA.484+60.09 TO STA.393+13.97



LEGEND

- OPEN SECTION
- STREET BRIDGE
- SUBDRAIN MANHOLE
- TYPICAL BERM-ACCESS RAMP
- TYPICAL BERM TURNAROUND
- CONST. PROJECT LIMIT
- CITY OR COUNTY BOUNDARY

OPERATION AND MAINTENANCE MANUAL

LOS ANGELES COUNTY DRAINAGE AREA, CALIFORNIA

WALNUT CREEK CHANNEL

COVINA HILLS RD TO CHARTER OAK WASH

SCALE IN FEET

1000 0 1000 2000 3000 4000

OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES, CALIFORNIA SGR-H-4