OPERATION AND MAINTENANCE MANUAL

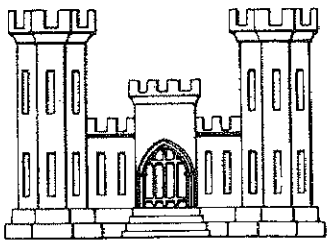
FOR

SAN LORENZO CREEK

FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

JANUARY 1963



U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

ARMY - SFO - C. E. CALIF

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
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SPNDE-E

20 January 1971

Mr. Paul E. Lanferman, Engineer-Manager
Alameda County Flood Control and
Water Conservation District
399 Elmhurst Street
Hayward, California 94544

Dear Mr. Lanferman:

The copies of the proposal to connect a storm sewer into San Lorenzo Creek at Ronda Street, which you furnished us as inclosures to your letter dated 10 December 1970, have been reviewed.

The drawings do not provide sufficient detail to determine the adequacy of the proposed connection through the channel wall. Compliance with the following criteria is required if we are to concur in the proposed connection through the concrete channel wall.

a. The openings in the concrete wall shall be round, with a radius three inches larger than the radius of the outside diameter of the pipe. The annular space around each pipe is to be packed with concrete, the outer (exposed) surface is to be finished in a workmanlike manner, and the pipe shall not protrude into the channel but shall be flush with the exposed face of the wall.

b. Excavation and backfill of trenches shall conform in all respects with the plans and specifications for the original channel improvements. In essence, the area is to be restored to the conditions prevailing prior to installing the proposed storm sewers, and shall include any disturbance to the existing fence and local drainage.

Sincerely yours,

James C. Wolfe

JAMES C. WOLFE,
Chief, Construction-
Operations Division

14 October 1963

ERRATA SHEET

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

The San Lorenzo Creek Operation and Maintenance Manual shall be changed as follows:

a. Page 9, line 1. Delete sentence beginning "Baffle plates made . . . . .".

b. Page 16. Delete subparagraph (f). Add new subparagraph (f). (f) The fish channel shall be inspected periodically between 1 October and 30 April and after each storm. All sand or other obstructions shall be removed from the fish channel.

c. Exhibit C, Semi-Annual Report. Under Concrete-Lined Channel, third item, delete "and baffle plates".

OPERATION AND MAINTENANCE MANUAL

FLOOD CONTROL PROJECT
SAN LORENZO CREEK
ALAMEDA COUNTY, CALIFORNIA

January 1963

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January 1963

INTRODUCTION

1. AUTHORIZATION

The San Lorenzo Creek Flood Control Project, Alameda County, California, was authorized by the Flood Control Act of 1954, Public Law 780, 83d Congress, 2d Session, approved 3 September 1954, which Act reads in part as follows:

> "Section 203. The following works of improvement for the benefit of navigation and the control of destructive flood waters and other purposes are hereby adopted and authorized to be prosecuted under the direction of the Secretary of the Army and the supervision of the Chief of Engineers in accordance with the plans in the respective reports hereinafter designated and subject to the conditions set forth therein: .....
>
> SAN LORENZO CREEK BASIN
>
> "The project for flood protection on San Lorenzo Creek, Alameda County, California, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 452, Eighty-third Congress, at an estimated cost of $3,790,000."

2. LOCATION

The San Lorenzo Creek Flood Control Project is located along the lower reaches of San Lorenzo Creek in the cities of Hayward, San Lorenzo and San Leandro, Alameda County, California. The creek drains an area of about 61 square miles in the foothills of the Coast Range Mountains on the east side of San Francisco Bay. San Lorenzo Creek flows westerly through the communities of Castro Valley, Hayward, San Lorenzo and San Leandro, and enters San Francisco Bay at a point about 14 miles southeast of the San Francisco-Oakland Bay Bridge. The stream flows parallel to highway U.S. 50 in the upper reaches of the basin and in the flood plain; in addition, to being crossed by numerous city streets, the creek is crossed by State highway sign routes 9 and 17 and the Southern Pacific Company and Western Pacific Railroad Company main line tracks.

3. DESCRIPTION OF PROJECT

The San Lorenzo Creek Project furnishes protection from flood damage to the cities of Hayward, San Lorenzo and San Leandro, California, by means of general improvement to approximately 27,670 feet of channel on the lower reaches of San Lorenzo Creek. The improvement consists of realigning, deepening and widening the channel; construction of rectangular concrete channel and stilling basin; construction of trapezoidal channel and levees with channel side slope protection consisting of concrete slabs in some reaches and riprap in other reaches; construction of earth-lined trapezoidal channel with levees in the lower reaches near San Francisco Bay and pier modifications at an existing bridge. The location of the project is shown on Exhibit B, Plate 1.

4. PROTECTION PROVIDED

The project as constructed prevents flooding of residential, commercial and agricultural areas situated within the project flood plain from floods up to the magnitude of the project design flood. The peak flow adopted for the project design flood is 10,400 cubic feet per second at Bridge Street in Hayward, California. The project provides protection for approximately 4,460 acres of which 2,620 acres are residential containing approximately 10,000 homes; 1,240 acres are commercial and limited agricultural, and 600 acres are agricultural. It is estimated that a flood of project design discharge would cause damages in the amount of $7,900,000 based on a 1958 price level.

5. CONSTRUCTION HISTORY

During 1954 and 1955 local interests constructed channel improvements on San Lorenzo Creek between San Francisco Bay and Hesperian Boulevard. Design of the work was based on flood control plans developed by the Corps of Engineers and included in the project document. A portion of the works was incorporated in the San Lorenzo Creek Flood Control Project and considered as construction in lieu of the required local cash contribution specified in the project document. Construction of the Federal project was initiated in March 1959 and completed in December 1961. A joint inspection was held on 11 January 1962 by the Corps of Engineers and Officials from the Alameda County Flood Control and Water Conservation District. The project was officially transferred to Alameda County for operation and maintenance on 9 February 1962. Entry Permits were issued by Alameda County prior to construction.

LOCAL COOPERATION

6. REQUIRED COOPERATION

By Resolution No. 2544 dated 28 September 1958, the Alameda County Flood Control and Water Conservation District has provided the following assurance that they will: *

a. Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project; *

b. Make all necessary vehicular bridge and utility alterations or replacements; *

c. Contribute 2.6 percent of the actual cost of the channel improvements, levees, and railroad bridge revisions, presently estimated at $96,000, or perform the equivalent thereof in construction of such improvements; *

d. Hold and save the United States free from damages due to the construction works; *

e. Maintain and operate the project after completion in accordance with regulations prescribed by the Secretary of the Army; and *

f. Prevent encroachment on the project channels which might interfere with their proper functioning for flood control. *

MAINTENANCE AND OPERATION

7. PURPOSE *

The purpose of this manual is to assist the responsible local authorities in carrying out their obligations through provision of information and advice as to the operation and maintenance requirements of the project.

8. REGULATIONS *

Title 33, Chapter II, Part 208.10 of the Code of Federal Regulations contains rules for the operation of local flood protection works approved by the Secretary of the Army in accordance with authority contained in Section 3 of the Flood Control Act of 22 June 1936 (49 Stat., 1571), as amended and supplemented. Paragraphs quoted hereinafter in this manual are taken from these regulations. A copy of the regulations will be found in Exhibit A. Compliance with these regulations is one of the requirements of local cooperation. Applicable portions of the regulations are quoted as follows: *

"(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."

9. DUTIES OF SUPERINTENDENT *

In line with the provisions covered by the regulations, the general duties of the Superintendent should include the following:

a. Semiannual report. Attention is directed to paragraph 208.10 * (a)(6) of the Flood Control Regulations (inclosed with this manual as * Exhibit A) which states: *

"(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." The report should be submitted within a ten-day period, prior to 1 June and 1 December of each year and should include all dated copies of reports of inspections made during the period of the report. The report should also include the nature, date of construction and date of removal of all temporary repairs, and dates of permanent repairs. In accordance with the regulations, inspections will be made prior to the beginning of the flood season and, otherwise, at intervals not to exceed 90 days. Immediate steps shall be taken to remedy any adverse conditions disclosed by such inspections. The check list shown in Exhibit C should be used in each inspection to insure that no feature of the protective system is overlooked. Items requiring maintenance should be noted thereon; if items are satisfactory, they should be so indicated by a check.

b. Training of key personnel. Key personnel should be trained * in order that regular maintenance work may be performed efficiently and to insure that unexpected problems related to flood control may be met in an orderly manner. The Superintendent should have available the names, addresses, telephone numbers of all his keymen and a reasonable number of substitutes. These keymen should, in turn, have similar data on all of the men that will be necessary for assistance in the discharge of their duties. The organization of keymen should include the following:

(1) An assistant to act in place of the Superintendent in case of his absence or indisposition.

(2) Section foremen in sufficient number to lead maintenance patrol work of the entire levee during flood fights. High qualities of leadership and responsibility are necessary for these positions.

c. Streamflow stages. Floods in the San Lorenzo Creek basin * are of the "flash" type since the time of concentration is only about three to four hours. This condition precludes long range forecasts of flooding by the Weather Bureau. However, in order to plan measures of protection in advance of a flood, it is suggested that the Superintendent should be cognizant of flood producing weather forecasts and the possibility of flooding in the San Lorenzo Creek Basin.

d. Application for Permits. Application for permits for con- * struction or use of any portion of right-of-way be referred by super- * intendent to the District Engineer for approval. *

10. CHANNEL IMPROVEMENTS *

a. Description. The project consists of 2,746 feet of earth-lined trapezoidal channel with setback levees; 654 feet of riprap-lined trapezoidal channel with levees; 3,737 feet of concrete-lined trapezoidal channel with levees; a reinforced concrete stilling basin; and 20,373 feet of reinforced-concrete rectangular channel. For convenience of survey, two sets of stationing were used during construction. Point of intersection for the two sets of stationing is in the

reinforced-concrete rectangular channel where station "A" 119+08.24 equals station "B" 0+00. In addition, a station equation was used in the concrete-lined trapezoidal channel where station "A" 70+78.41 equals station "A" 70+79.14. Project plans and profiles are shown on Exhibit B, Plates 2 through 19. These plates show channel invert elevations, channel bottom slopes and control elevations along the top of levees and reinforced-concrete rectangular channel walls. Project alignment is through a system of simple curves and modified spirals which are shown on Exhibit B, Plates 2 through 19, and Plate 23. All reference to distances hereinafter will be to the nearest foot. The plans should be used for the exact distances and elevations. All elevations given are based on mean sea level datum. Channel improvements begin at station "A" -1+60. Between station "A" 0+00 and this point, the channel bottom slope is daylighted and the levees are ramped down to existing ground. Between stations "A" +00 and "A" 26+76 the earth-lined trapezoidal channel has a 60-foot bottom width and 30-foot wide berms between the channel and the setback levees. Channel and levee side slopes are 1 vertical on 3 horizontal. (Note: hereinafter the designation "vertical" and "horizontal" will be omitted and slopes will be referred to as 1 on 3. The channel stationing will be considered as "A" stationing until otherwise noted). The levee is protected from erosive wave action by a 12-inch thick layer of riprap placed against the toe for a distance of 2 feet measured vertically. This protection extends from station 0+00 to 6+00. Between stations 26+76 and 27+46 the channel is transitioned from a 60-foot bottom width to a 75-foot bottom width and the levees converge eliminating the 30-foot wide berms. Channel and levee side slopes vary in this reach. The riprap-lined trapezoidal channel begins at station 27+46 and continues to station 34+00. The riprap is 12 inches thick and is placed on side slopes of 1 on 2.5. The toe of the riprap was placed 18 inches thick and extended below the channel bottom for a distance of 5 feet measured vertically. Where placement of riprap was made under water the thickness was increased to 18 inches. Between stations 27+46 and 28+43 the channel passes beneath the Southern Pacific Company railroad bridge and has a 75-foot bottom width. Between stations 28+43 and 28+79 the channel is transitioned from a 75-foot bottom width to a 60-foot bottom width. This channel dimension is held to station 29+64 where the channel is again transitioned. The channel is transitioned from a 60-foot bottom width to a 45-foot bottom width between stations 29+64 and 34+00. The concrete-lined trapezoidal channel begins at station 34+00 and continues to station 71+38. The concrete slope protection consists of an 8-inch thick concrete slab placed on an 8-inch thick filter bed of sand and gravel. The slab is extended below the channel bottom for a distance of 5 feet measured vertically. Channel side slopes are 1 on 2.5. Between stations 71+00 and 71+38 the channel bottom is transitioned from a 45-foot width to a 37-foot width and a 24-inch thick layer of derrick stone has been placed on a 12-inch thick layer of riprap. Between stations 71+38 and 71+90 the concrete-lined trapezoidal channel

is transitioned to a reinforced-concrete rectangular stilling basin. The channel bottom in the transition is protected by a 24-inch thick layer of derrick stone placed over a 12-inch thick layer of riprap. The channel side slopes are also protected by a 24-inch thick layer of derrick stone placed on a 12-inch thick layer of riprap. This protective cover is placed on a side slope of 1 on 2.5 and is grouted to form a smooth surface. The trapezoidal side slopes abut curved, vertical, reinforced-concrete channel walls. These walls are one foot thick at the top and progressively increase in thickness with depth. Maximum thickness at the base of the walls is two feet 8 inches in the section adjacent to the reinforced-concrete rectangular stilling basin. The stilling basin is considered to start at station 71+40. The reinforced-concrete rectangular portion of the stilling basin begins at station 71+90 where a 7-foot, 4-inch deep cutoff wall extends 2 feet, 8-1/2 inches above the stilling basin floor and retains the downstream derrick stone. The cutoff wall is one foot thick and extends in varying depths below the stilling basin floor slab. The stilling basin floor slab is of varying thickness being two feet thick at the centerline of the channel and increasing in thickness to 2 feet, 9 inches at the channel walls. The channel width in the stilling basin is 37 feet and the bottom slope varies as shown on Exhibit B, Plate 20. Seven jump blocks are situated in the floor of the stilling basin with the upstream edge located at station 72+34. The jump blocks are shown on Exhibit B Plate 20. The fish canal which extends the full length of the reinforced-concrete rectangular channel daylights in the stilling basin at station 72+56. The stilling basin is considered to end at station 72+97. The reinforced-concrete rectangular channel begins at station "A" 72+97 and continues to station "B" 156+92. Control elevations, channel centerline slopes and top of wall elevations may be seen on Exhibit B, Plates 6 through 19. The channel is 37 feet wide between stations "A" 72+97 and "B" 85+96. Between stations "B" 85+96 and "B" 86+31 the channel is transitioned to a 34-foot width which is continued to station "B" 156+92. The channel walls have a stem of varying thickness with a minimum thickness of one foot at the top. Channel walls on both right and left banks vary in height from about 12.5 to 13.5 feet in the 37-foot wide reach of channel and 13 to 21 feet in the 34-foot wide reach. A continuous 12-inch thick blanket of filter material was placed behind the channel walls and beneath the channel slab. A reinforced-concrete transition section was constructed beginning at station "B" 156+92 and abutting the existing structure at station "B" 157+62. The transition reduces the channel bottom width from 34 feet to 18 feet and changes the channel cross-section from a straight rectangular channel to a combination trapezoidal channel with vertical walls conforming with the existing structure. To allow anadronomous fish to migrate upstream during periods of low flow, a fish channel has been provided in the center of the rectangular concrete channel starting at station "A" 72+56 and continuing upstream to the existing structure at station "B" 157+62. The channel is trapezoidal in shape with a 5-foot top width, a one-foot bottom width

and an 8-inch depth. New 6-foot chain-link man-proof fencing has been erected, where required, on both sides of the project channel above the Southern Pacific Company railroad bridge at station "A" 28/26. The existing barbed wire fencing downstream from the Southern Pacific railroad bridge was replaced with new barbed wire fencing. Service ramps leading to the bottom of the reinforced concrete rectangular channel have been provided at channel stations "B" 60/00 and "B" 84/39. Access to these ramps is from Hampton Road. Twelve-foot wide service roads are provided on both sides of the trapezoidal channel and on one side of the rectangular concrete channel. A five-foot wide footpath is provided on the channel side opposite the service road. Service roads and footpaths are shown on Exhibit B, Plates 2 through 19. Access to the service roads is provided at the locations given in the following tabulation: *

* Rev June 1964

Project Station	Entrance Location	Road Location	Turn around Location
"B" 156/82 to "B" 144/41	Maple St., Hazel St.	Right Bank	none
"B" 144/11 to "B"122/90	Hazel St., Bridge St.	Right Bank	none
"B" 120/55 to "B" 91/00	Bridge St., Matton Rd.	Right Bank	none
"B" 89/00 to "B" 69/60	E.14th St.	Right Bank	"B" 70/00
"B"69/60 to "B" 65/12	Hampton Road	Left bank	none
"B" 63/74 to "B" 37/00	Lewelling Blvd. Meekland Ave	Right bank	"B" 62/68
"B" 36/00 to "B" 14/00	Meekland Av., Via Granada	Left bank	none
"B" 11/10 to "B" 0/00	Via Granada, Adams St.	Right bank	none
"A" 112/00 to "A" 88/86	Hesperian Blvd.,Washington Blvd.	Right bank	none
"A" 88/06 to "A" -0/50	Washington Blvd.,Vining Dr., Lewelling Blvd.nr lower SPRR	Right bank	"A" 1/50
"A" 88/06 to "A" -0/50	San Lorenzo Av. via Hermana Grant Av.nr lower SPRR	Left bank	"A" 0/73

Access to the footpath is given in the following tabulation:

Project Station	Gate location	Footpath Location	Gate size
"B" 157+62	Maple St.	Left bank	4-foot
"B" 144+47	Hazel Av.	Left bank	4-foot
"B" 143+85	Hazel Av.	Left bank	4-foot
"B" 120+55	Bridge St.	Left bank	4-foot
"B" 121+15	Bridge St.	Left bank	4-foot
"B" 90+60	East 14th St.	Left bank	4-foot
"B" 89+72	East 14th St.	Left bank	4-foot
"B" 84+40	Hampton Road	Left bank	Double 8-foot
"B" 69+60	Footpath begins at end of service Road	Right bank	none
"B" 68+63	Hampton Road	Left bank	Double 6-foot
"B" 65+46	Hampton Road	Left bank	Double 6-foot
"B" 60+00	Hampton Road	Left bank	Double 8-foot
"B" 37+10	Meekland Ave	Left bank	4-foot
"B" 36+10	Meekland Ave	Right bank	4-foot
"B" 20+60	SPRR bridge	Right bank	4-foot
"B" 20+15	SPRR bridge	Right bank	4-foot
"B" 12+80	Via Granada	Right bank	4-foot
"B" 12+35	Via Granada	Left bank	4-foot
"A" 115+30	Hesperian Blvd.	Left bank	4-foot
"A" 112+00	Parking Area off Hesperian Blvd.	Right bank	Double 6-foot
"A" 89+30	Washington Blvd.	Left bank	4-foot

b. Maintenance.

(1) General. An integral part of the maintenance program is the need for proper inspection as well as restorative work. As stated under "Duties of the Superintendent", a semiannual report to the District Engineer is required within the ten-day period prior to 1 June and 1 December of each year. In accordance with the regulations, inspections are to be made prior to the beginning of the flood season (1 November to 15 April) immediately following each major flood, and at intervals not to exceed 90 days. To insure that no feature of the protective system is overlooked, sample check lists, which may be reproduced, are furnished in Exhibit C. The check lists may be used as a basis for the semiannual report to the District Engineer.

(2) Levees. Inspection and maintenance of levees shall be in accordance with paragraph 208.10 (a) General, (see paragraph 10 of this manual) and paragraph 208.10 (b)(1) which states:

"(b) Levees - (1) Maintenance. The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structure 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 weeds, 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 area, or sand boils are occurring;

"(iv) The 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 displaced, 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 well 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."

Additional maintenance measures which are to be taken are as follows:

(a) The grade of the levees should be checked to be sure that settlement or sloughing has not lowered the protective height of the levee. Plates 2 through 6 of Exhibit B give the levee profile which can be used for this purpose. In all cases where the levee grade or side slopes do not meet the original contract specifications, fill material similar to that used in the original construction should be used to bring the levee up to original design and cross section. All objectionable material and debris should be removed and the levee surface scarified to a depth of approximately 6 inches prior to placing the new fill. All new material should be placed and compacted in layers.

(b) All displaced riprap shall be replaced as soon as possible after the recession of the damaging waters.

(c) Surfaces of the service roads shall be maintained by periodic sealing with bituminous materials at not greater than three-year intervals. All holes, soft areas, and damaged road surfaces shall be repaired annually. Unsatisfactory materials shall be cleaned out to firm undisturbed materials and patched, or completely replaced with similar materials and thoroughly bonded to adjacent undisturbed surfaces with a bituminous binder.

(d) Trees, brush, shrubs, or other vegetation with heavy stem or large trunk and root systems shall not be allowed to grow on the levees. The methods used to remove or retard such growth prior to the flood season may be through use of chemical sprays or cutting close to the surface of the riprap or other levee surface.

(e) Concrete lining shall be inspected for random cracking and large cracks filled to prevent lodgment of foreign materials that would support plant growth.

(f) Any damage to the concrete-lined portion of the trapezoidal channel, or scour beneath the concrete lining, shall be cleaned of all floatage and loose material to firm undisturbed material and filled with concrete.

(g) Protective fencing shall be repaired or replaced as required. Gates shall be kept in good working order and padlocks, or other means, shall be maintained for proper security measures.

(h) Measures shall be taken to exterminate burrowing animals and burrows filled in a manner such as described in the preceeding paragraph (c). *

(3) Rectangular channel. Inspection and maintenance of the reinforced concrete rectangular channel shall be in accordance with paragraph 208.10 (a) General (see paragraph 8 of this manual) and paragraph 208.10 (c) (1) which states:

(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 effects 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".

Inspection and maintenance of the reinforced concrete rectangular channel shall also be in accordance with paragraph 208.10 (g) (1), Channels and Floodways, which states:

"(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."

Additional maintenance measures which are to be taken are as follows:

(a) Any scour beneath the concrete channel, or damage to the concrete channel, shall be cleaned of all floatage and loose material to firm undisturbed material and filled with concrete.

(b) Surfaces of the service roads shall be maintained by periodic sealing with bituminous materials at not greater than three-year intervals. All holes, soft areas and damaged road surfaces shall be repaired annually. Unsuitable materials shall be cleaned out to firm undisturbed material and patched, or completely replaced with similar material, and thoroughly bonded to adjacent undisturbed surfaces with a bituminous binder.

(c) Channel walls and all concrete structures shall be inspected for random cracking, and large cracks filled to prevent lodgment of foreign materials that would support plant growth. All eroded concrete * shall be repaired as soon as any reinforcing steel is exposed or erosion * reaches a depth of 4 inches. *

(d) Protective fencing shall be repaired or replaced as required. Gates shall be kept in good working order and padlocks, or other means, shall be maintained for proper security measures.

(e) Necessary steps shall be taken to prevent damage to, or loss of, backfill behind walls through settlement, unauthorized removal of soil, sloughing of soil from adjacent property and deposition of refuse.

c. Operation.

(1) General. Operation of the channel, levees and floodwalls shall be in accordance with paragraph 208.10 (a), General (see paragraph 8 of this manual). *

(2) Levees. Operation of the levees shall be in accordance with paragraph 208.10 (b) (2) which states:

"(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."

Additional operational measures to be taken are as follows:

(a) Continuous observation will be made at the Southern Pacific Company railroad bridge across the creek to be certain that all floating debris passes under the bridge and does not cause a jam. Debris which lodges at the bridge will be removed by truck crane or similar equipment.

(3) Rectangular channel. Operation of the rectangular channel shall be in accordance with paragraph 208.10 (c)(2) which states:

"(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."

Additional operation measures to be taken are as follows:

(a) Continuous observation will be made from the bridges to be certain that all floating debris passes clear and does not cause a jam. Debris which lodges at a bridge will be removed by truck crane or similar equipment.

(b) Operation of the fish channel shall be coordinated with the local representative of the California Department of Fish and Game. The local fish and game warden shall be notified if salmon and steelhead become stranded at low tide, or by reason of an obstructed channel, during the period 1 October through 30 April.

11. INTERIOR DRAINAGE *

a. Description.

(1) Levees and earth channel. Runoff in the area downstream from the Southern Pacific Company railroad bridge (Sta. "A" 28/26) drains generally parallel with the improved channel and flows into the Bay. Drainage culverts have been placed as required to relieve localized runoff. Upstream from the Southern Pacific railroad bridge interior runoff is collected in local storm drain systems. All culverts leading through the levee are protected with riprap and are equipped with flapgates. Existing interior drainage systems have been utilized where possible. Table 1 given hereinafter contains pertinent data concerning the location, size and type of culvert utilized.

(2) Rectangular concrete channel. Runoff in the area upstream from the stilling basin utilizes existing culberts and discharges into the creek channel. Existing interior drainage systems have been modified and utilized where possible. Table 1 below contains pertinent data concerning the location, size and type of culvert utilized. Outlet details are shown on Exhibit B, Plate 22.

A six-inch perforated pipe subdrain, placed in the filter material behind the concrete walls, relieves hydrostatic pressure from the fill behind the concrete channel walls. The perforated pipe is drained through six-inch flapgates, Armco Model 100, which are recessed in the walls near the channel bottom. The openings are protected from debris by an expanded metal cover plate. Details are shown on Exhibit B, Plate 23. The location of the drains is shown on Exhibit B, Plates 2 through 19.

(2) Rectangular concrete channel. Runoff in the area upstream from the stilling basin utilizes existing culverts and discharges into the creek channel. Existing interior drainage systems have been modified and utilized where possible. Table 1 below contains pertinent data concerning the location, size and type of culvert utilized. Outlet details are shown on Exhibit B, Plate 22.

A six-inch perforated pipe subdrain, placed in the filter material behind the concrete walls, relieves hydrostatic pressure from the fill behind the concrete channel walls. The perforated pipe is drained through six-inch flapgates, Armco Model 100, which are recessed in the walls near the channel bottom. The openings are protected from debris by an expanded metal cover plate. Details are shown on Exhibit B, Plate 23. The location of the drains is shown on Exhibit B, Plates 2 through 19.

TABLE 1

No.	Location	Culvert Type	Culvert Dia-inches	Culvert Inv. elev.	Culvert Structure Type
1	A 1+67 (L)	CMP	30	-0.5	See "as-constr." Dwgs. Sht. 61
2	A 2+61 (R)	CMP	30	-0.3	See "as-constr." Dwgs. Sht. 61
3	A 96+73(L)	CMP	27	17.7	I
4	A 115+07(L)	Conc.	6	26.1	II A
5	A 115+18(L)	CI	4	30.0	I
6	A 115+66(R)	VCP	8	27.9	II A
7	A 116+10(R)	CMP	18	27.3	I
8	A 116+38(L)	RCP	18	29.5	I
9	A 117+68(R)	CMP	12	29.1	See Exhibit B Plate 22
10	B 2+33 (L)	CMP	15	29.6	II A
11	B 3+97 (R)	VCP	4	31.8	II A
12	B 4+31 (L)	RCP	39	26.1	I
13	B 8+14 (L)	VCP	4	33.0	II A
14	B 9+82 (R)	Conc.	8	33.0	II A
15	B 12+36(R)	CMP	15	34.4	II A
16	B 19+58(L)	Steel	5	35.6	I
17	B 21+72(R)	VCP	4	37.0	II A
18	B 21+86(R)	VCP	4	37.0	II A
19	B 23+08(R)	VCP	4	37.0	II A
20	B 24+61(R)	RCP	15	37.2	I
21	B 32+24(L)	VCP	4	41.0	II A
22	B 36+46(L)	Conc	5'x7'	35.2	-
23	B 37+10(L)	CMP	18	41.7	I
24	B 38+18(L)	VCP	4	47.4	I
25	B 38+99(L)	GI	1-1/2	43.4	I
26	B 41+09(R)	VCP	4	44.8	II A
27	B 48+02(R)	CMP	24	43.8	I
28	B 65+49(L)	CMP	12	53.1	II
29	B 73+48(R)	VCP	4	58.8	I
30	B 88+39(R)	CMP	6	62.5	I
31	B 89+00(L)	RCP	24	63.1	I
32	B 90+23(L)	RCP	18	62.0	I
33	B 90+30(R)	CMP	10	64.3	II A
34	B 90+65(R)	RCP	18	67.7	I
35	B 91+10(R)	RCP	12	63.5	I
36	B 91+23(R)	RCP	18	62.4	I
37	B 96+37(R)	CMP	36	59.3	I
38	B 103+80(R)	VCP	4	70.4	II A
39	B 103+83(R)	VCP	4	70.3	II A
40	B 104+44(R)	VCP	4	70.5	II A
41	B 104+54(R)	VCP	4	70.7	II A
42	B 107+48(L)	VCP	4	74.0	I
43	B 109+77(R)	CMP	24	72.0	I

TABLE 1 (continued)

No.	Location	Culvert Type	Dia-inches	Inv. elev.	Structure Type
44	B 111+81(R)	VCP	4	73.0	II A
45	B 111+90(L)	VCP	4	74.3	II B
46	B 112+38(R)	VCP	4	72.0	II A
47	B 118+00(R)	CMP	12	75.3	II A
48	B 120+69(R)	CMP	30	74.8	III B
49	B 121+21(R)	VCP	4	76.1	I
50	B 121+73(L)	GI	1-1/2	80.0	II B
51	B 122+51(L)	VCP	4	79.2	II A
52	B 122+66(R)	VCP	4	80.6	II A
53	B 123+18(L)	GI	2-1 1/2	79.4	II B
54	B 123+71(L)	CMP	6	79.1	II A
55	B 124+68(L)	CMP	8	78.5	II A
56	B 125+28(R)	VCP	4	80.0	I
57	B 126+50(R)	VCP	4	80.6	II A
58	B 126+61(L)	GI	1-1/2	78.2	II B
59	B 127+06(L)	CMP	8	77.8	I
60	B 127+53(L)	VCP	4	79.6	II A
61	B 127+62(R)	CMP	12	79.2	II A
62	B 128+38(R)	RCP	36	75.6	III
63	B 129+29(L)	GI	3/4	80.8	II B
64	B 130+51(R)	CMP	24	80.0	I
65	B 131+76(L)	GI	2	82.7	II B
66	B 132+07(L)	GI	2	82.8	II B
67	B 132+69(L)	CMP	10	81.5	II B
68	B 133+85(R)	CMP	15	77.7	I
69	B 135+04(R)	VCP	4	84.1	II A
70	B 140+88(L)	CMP	18	84.3	II B
71	B 144+30(R)	Conc	24	85.9	Special
72	B 144+20(L)	CMP	12	86.2	II B
73	B 147+12(R)	CMP	18	87.8	II A
74	B 148+28(R)	CMP	18	88.7	II A
75	B 148+62(R)	CMP	30	88.1	III A
76	B 150+15(R)	CMP	18	89.2	III A
77	B 153+51(L)	VCP	4	95.2	II B
78	B 153+86(L)	VCP	4	95.7	I
79	B 154+82(L)	VCP	4	97.4	II A
80	B 157+06(R)	VCP	4	100.4	I
81	B 157+07(R)	CMP	18	100.3	I
82	B 157+48(R)	VCP	4	100.6	I
83	B 157+49(R)	VCP	4	100.9	II B

b. Maintenance.

(1) General. Inspection and maintenance of the interior drainage system will be accomplished in accordance with the inspection schedule outlined heretofore under the section titled Chennel Improvements (Section 12b (1).

(2) Culverts. Inspection and maintenance of the culverts shall be in accordance with paragraph 208.10 (a), General (see paragraph 8 of this manual) and paragraph 208.10 (d) (1) which states:

"(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."

In addition to the prescribed inspection and maintenance program, the following measures are to be taken:

(a) All culverts shall be inspected prior to the flood season and immediately following each high water period, and all obstructions removed. *

(b) All nuts and bolts on flap gate assemblies shall be inspected to determine whether or not they are sufficiently tight and the hinges are operating freely.

* Rev June 1964

c. Operation.

(1) Culverts. Operation of culverts and attendant drainage ditches shall be in accordance with paragraph 208.10 (d)(2) which states:

"(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."

d. 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. The Superintendent shall take proper steps to prevent restriction of bridge openings. *

(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. *

SUGGESTED METHODS OF COMBATING FLOOD CONDITIONS

12. APPRAISAL OF PROBLEMS *

Most of the methods described hereinafter have been developed during years of experience with the various problems that often develop during periods of high water and they are not intended to restrict the Superintendent, or others concerned, to a rigid set of rules for every condition that may arise. If problems not covered by these suggestions arise, where the Superintendent is in doubt as to the procedures to be taken, he will be expected to consult the District Engineer, U.S. Army Engineer District, San Francisco, California, and follow standard engineering practice in meeting the situation. It should be noted that it is much better to be overprepared for a "flood fight" than to find at the last moment that preparations were incomplete or unsatisfactory. Confidence of the protected persons and firms is a valuable asset that should not be carelessly lost through inefficient operation of the protective system in time of emergency.

a. Earthen levees. An earthen levee is in possible danger whenever there is water against it. This danger varies with the height of the water, the duration of the flood stage, and the intensity of either current or wave action. A well constructed levee of proper section should if maintained and not overtopped, hold throughout any major flood. However, a serious accident may result in a break. Foundation troubles result in sand boils or a sinking levee, and the local use of unsatisfactory materials causes slides and sloughs. However, such threatened failures can be met if prompt action is taken and proper methods of treatment are used. Wave wash is to be expected whenever the levee is exposed to a wide stretch of open water and is serious if permitted to continue over a considerable length of time.

b. Premeditated damage. The Superintendent should continually guard against premeditated damage to the levee.

c. Security. Personnel of the Corps of Engineers, U.S. Army whether military or civilian, are not vested with any civil police authority in performance of their engineering duties, and they will not attempt to exercise any such authority. The responsibility for protecting flood control works against sabotage, acts of depredation, or other unlawful acts rests with the local interests through local and State governmental agencies. In the event local law enforcement agencies prove inadequate, local interests can request the aid of State forces, and if additional support becomes necessary, Federal troops can be requested as provided by law.

d. Inspection of flood control works. Immediately upon receipt of information that high water is imminent, the Superintendent should form a skeleton organization capable of quick expansion, and assign individuals (Sector Foremen) to have charge of definite sections of levees. As his initial activity, each Sector Foreman should go over his entire sector and parts of adjacent sectors, making a detailed inspection, particularly with reference to the following matters:

(1) Sector limits - ascertain that the dividing line between sectors is plainly determined and, if necessary, marked.

(2) Condition of new levees and recent repairs.

(3) Condition of culverts, flap gates, and protective riprap at inlets.

(4) Transportation facilities - roads and rail.

(5) Material supply - quantity, location and condition.

(6) Communications - locate and check all necessary telephones in the vicinity of the levee.

e. Preliminary repair work. After the initial inspection has been made, each Sector Foreman should recruit a labor crew and provide it with tools such as shovels, axes, wheelbarrows, etc. In addition, bulldozers, scrapers, trucks, etc., should be located and made ready for use in case of emergency. Then immediate action should be taken to perform the following work:

(1) Fill up holes or washes in the levee crown and slopes. Where new construction has been completed during the year, rain washes and deep gullies may have developed. While the levee is new, preparations should be made in advance to combat wave wash along the exposed reaches.

(2) Repair gaps where road crossings have been worn down and the levee is below grade. In filling the road crossings, it may be necessary to obtain material from landside borrow pits; in which case, excavation for the material should be kept at least 50 feet from the levee toe-ditches. Any filling done in this connection should be tamped in place and, if in an exposed reach, subject to wave wash, the new section should be faced with bags of sand.

(3) Repair and close all flapgates on culverts and see that they are seated properly before they are covered with floodwaters.

(4) Ascertain that all roads to and along the levee are in a good state of repair.

(5) Locate necessary tools and materials (sacks, sandbags, brush, lumber, lights, etc.) and distribute and store them at points where active maintenance is anticipated.

(6) Check and obtain repair of all telephone lines necessary for operation, obtain lists of all team forces, motorboats, motorcars, and truck transportation that can be made available.

(7) Make thorough arrangements with reliable sources for the supply, transportation, subsistence, and shelter for the necessary labor.

(8) Investigate all drainage ditches on the landside of the levee and open these drains when obstructions exist. Prepare to cut the necessary seep drainage ditches; however, no attempt should be made to drain the levee slope until actual seepage takes place.

(9) Remove all dynamite and explosives of any kind from the vicinity of the levee.

f. Disaster relief. It is the responsibility of local, State and municipal authorities, supported by and/or working in connection with the American Red Cross to adopt measures for the relief of flood disaster victims. Relief measures can be undertaken by the Department of the Army through its Army Area Commander under existing Army Regulations; but such measures will be undertaken only as a last resort, in extreme cases and under compelling circumstances where local resources are clearly inadequate to cope with the situation.

g. Flood fight. After the above preliminary organization and precautions have been completed the "flood fight" itself commences. The methods of combating various defects in the earthen levee described in the following paragraphs have been proven effective during many years of use by the Department of the Army.

(1) Drainage of slopes. This work can be done economically while awaiting developments and will serve to make the levees more efficient. Crews should be organized to cut seep drains at all places on the levee when seepage appears. They should be V-shaped, no deeper than necessary, and never more than 6 inches deep. Care must be taken not to cut the sod unnecessarily. In all instances, drains should be cut straight down the levee slope or nearly so. Near the toe of the slope the small drains should be Y'd together and led into larger drains which, in general, should lead straight across the landside berm into the landside pits or nearest natural or artificial drains.

(2) Sand boils. These danger spots are serious if discharging material. The common method of controlling sand boils consists of walling up a watertight sack ring around the boil up to a height necessary to reduce the velocity of flow to a point at which material is no longer discharging from the boil (see Exhibit "D", Plate 1). The sack ring around the boil should be large enough to protect the defective area immediately surrounding the boil. If several boils of sufficient force to displace sand are observed, a sack sub-levee may be built around the entire nest of boils, rising to such a height that none of the boils will discharge with enough force to displace sand.

(3) Wave wash. The Superintendent and Sector Foreman should study the levee beforehand to determine the possibility of wave wash. All such reaches will be located well in advance; and for use in an emergency, a reserve supply of filled sacks and rolls of cotton bagging will be kept on board flats. If the slope is well sodded, a storm of an hour's duration should cause very little damage. During periods of high wind and high water, ample labor should stand by and experienced personnel should observe where washouts are beginning. Sections of cotton bagging should be placed over the washed areas, as shown on Exhibit "D", Plate 3. As an alternative, filled sacks should be placed in lieu of the bagging as soon as possible. The filled sacks should be laid in sections of sufficient length to give protection well above the anticipated rise. Bagging so laid must be thoroughly weighted down to be

effective. Exhibit "D", Plate 2, shows a moveable type of wash protection also used with good results. Its advantage is that it can readily be built at any convenient location and easily set in place on the job.

(4) Scours. A careful surveillance should be made of the riverside of the levee at all localities where high current velocities are observed. Trouble may be looked for at places where pipes, sewers, and other structures penetrate the levee. The approved method of construction to check scour on the slopes is to construct deflection dikes using brush, treetops, or lumber, driving stakes and wiring together, and filling in between with brush and filled sacks or stone.

h. Topping. Immediate consideration should be given to the grade line of each levee section by comparison of existing grades with those shown on Exhibit "B", Plates 2 through 10. If any reaches show grades below the constructed grade as shown on Exhibit "B", Plates 2 through 10, emergency topping should be undertaken as follows:

(1) Sack topping. Sack topping may be used to raise the crown of the levee about three feet. The sacks should generally be laid stretcherwise or along the levee for the first layer, crosswise for the second layer, and so on. Sacks should be lapped at least one-fourth either way and well mauled into place. When properly sacked and tamped, one sack will give about three to four inches of topping (see Exhibit "D", Plate 4).

(2) Lumber and sack topping. This is the most commonly used method of raising low reaches in emergencies. In putting on this topping, as well as other topping, a careful line of levels should be run and grade stakes set in advance. Two-inch by 4-inch by 6-foot long stakes should then be driven on the riverside of the crown six feet apart, and one inch by 12-inch boards nailed to the landside of the stakes. This wall, backed with a single tier of sacks, will hold out at least one foot of water. If an additional foot is necessary, the layers of sacks will have to be increased in number and reinforced. The stakes should be driven three feet in the ground, and should project out three feet; thus providing, in extreme cases, a three-foot topping if properly braced behind with sacks and earth. In some instances, it may be practicable to back up the planking with tamped earth obtained in the vicinity in lieu of the sacks shown in the drawing (see Exhibit "D", Plate 5).

i. Transportation. In instances where it is necessary to send equipment over roads that are impassable due to mud or sand, their passage may be provided by the use of a plank road or by means of steel or wire mats.

j. Check lists. The inspection list in Exhibit "C" may be used as a check list for inspections and also for use in making the required semiannual reports. This list should be used in each inspection to insure that no feature of the protective system is overlooked. Items requiring repairs should be noted thereon; if items are satisfactory, they should be indicated as such. Reproduction of the check lists is hereby authorized.

k. Liaison with District Engineer and use of Government plant. During periods of emergency, close liaison will be maintained with the Corps of Engineers, whose objective of maintaining the integrity of the flood control works will be attained by supporting local interests in their efforts or by assuming full charge of the flood fight when the problem is beyond the capacities of local interests. The District Engineer, U.S. Army Engineer District, San Francisco, is authorized to use or loan Government property and plant in cases of emergency where life is in danger and there is no opportunity to secure prior authority for such use. The authority also extends to saving of property where no suitable private equipment is available, provided that such use is without detriment to the Government.

l. Flood Emergency Manual. The most recent "Flood Emergency Manual" published by the U.S. Army Engineer District, San Francisco, should be used to supplement the information furnished in this Operation and Maintenance Manual.

Part 208—Flood Control Regulations

Sec.

208.10 Local flood protection works; maintenance and operation of structures and facilities.

§ 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 weeds, 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 displaced, 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 well 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

EXHIBIT A

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 replaced 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, buildings, 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 not to exceed one year. A record shall be kept showing the results of such tests. 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 tests 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.

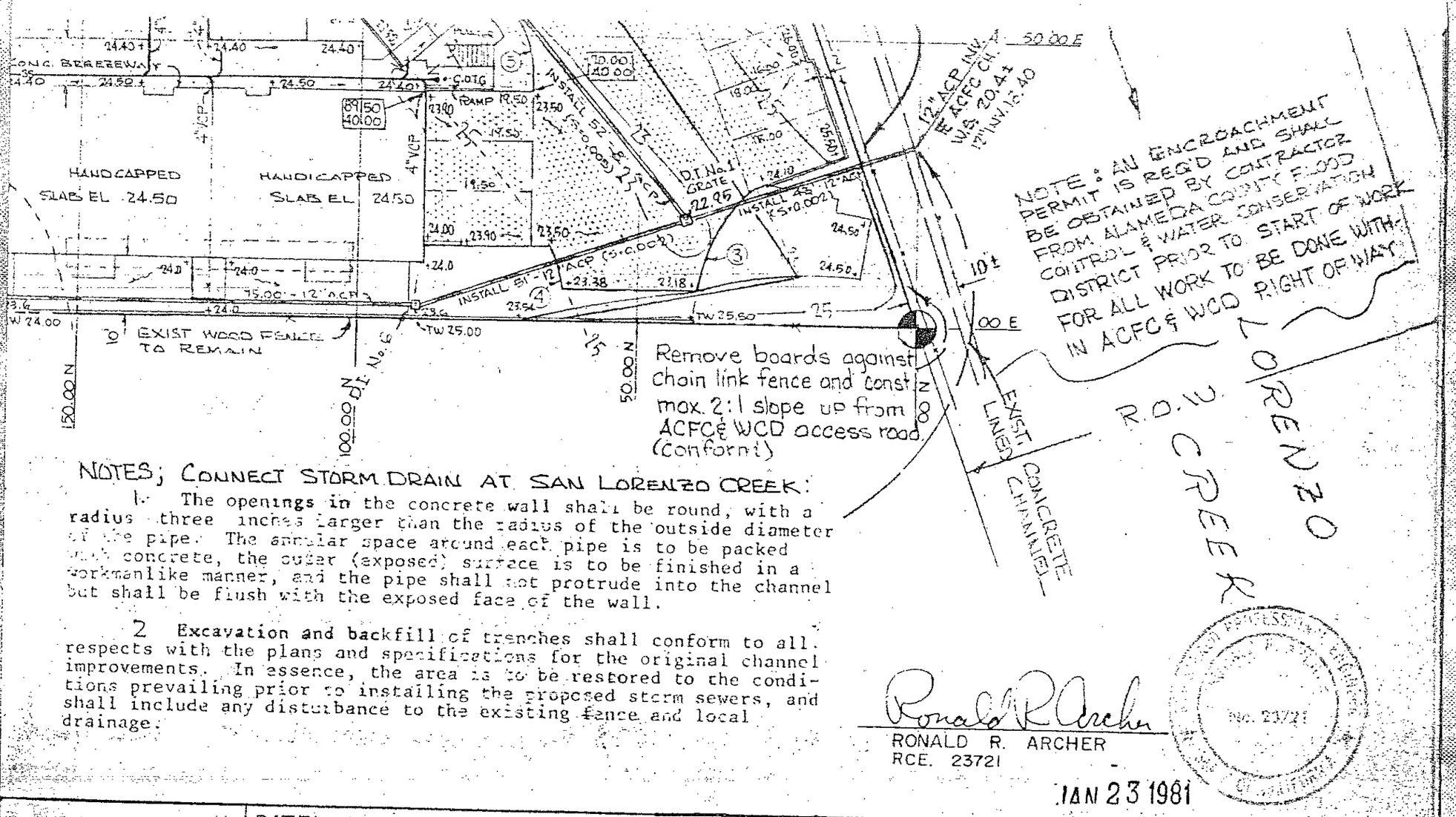
Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank 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 run-off 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, 10203]



NOTES; CONNECT STORM DRAIN AT SAN LORENZO CREEK:

1. The openings in the concrete wall shall be round, with a radius three inches larger than the radius of the outside diameter of the pipe. The annular space around each pipe is to be packed with concrete, the outer (exposed) surface is to be finished in a workmanlike manner, and the pipe shall not protrude into the channel but shall be flush with the exposed face of the wall.

2. Excavation and backfill of trenches shall conform to all respects with the plans and specifications for the original channel improvements. In essence, the area is to be restored to the conditions prevailing prior to installing the proposed storm sewers, and shall include any disturbance to the existing fence and local drainage.

Ronald R Archer

RONALD R. ARCHER
RCE. 23721

JAN 23 1981

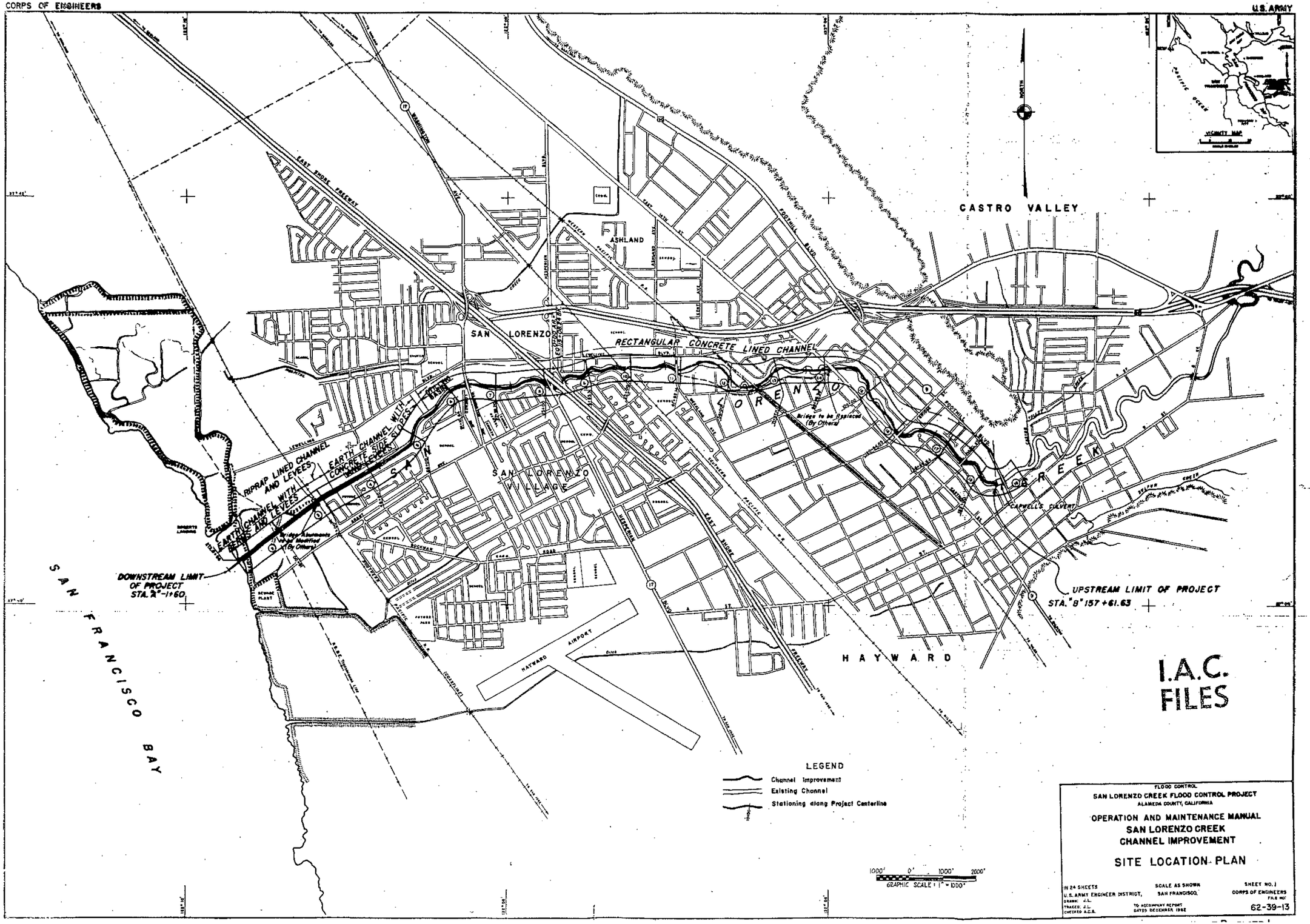
DATE: JANUARY, 1981
JOB No. 825
SCALE: 1" = 20'

RON ARCHER
CIVIL ENGINEER, INC.
CONSULTING · PLANNING · DESIGN · SURVEYING
205 Main Street, Suite E
Pleasanton, Ca. 94566

SHEET No. G-1 OF

CORPS OF ENGINEERS

U.S. ARMY



I.A.C. FILES

FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

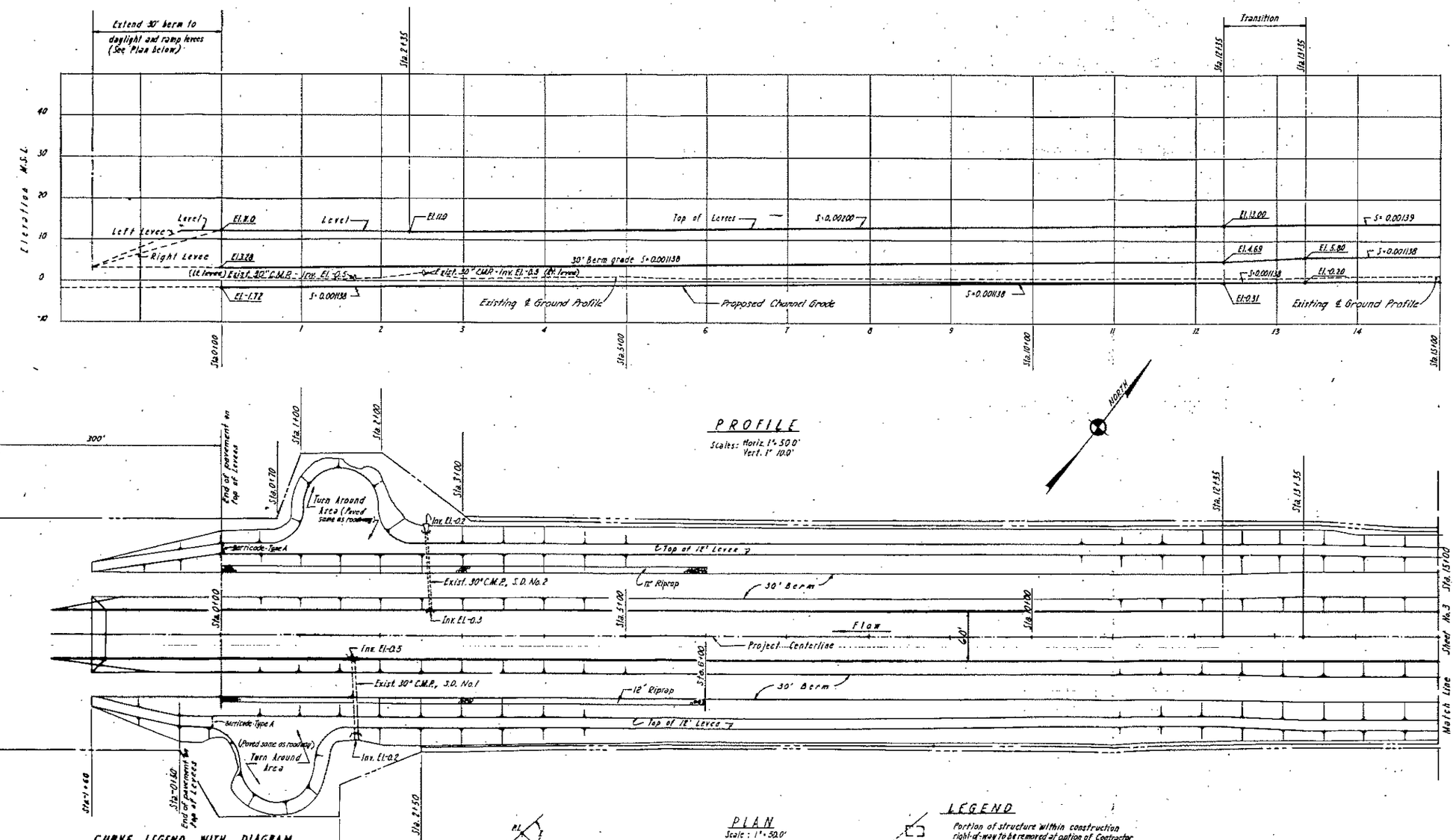
CHANNEL IMPROVEMENT

SITE LOCATION PLAN

IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 1
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO.		CORPS OF ENGINEERS FILE NO.
DRAWN A.L.	TO ACCOMPANY REPORT DATED DECEMBER 1962	62-39-13
TRACED A.L.		
CHECKED A.C.A.		

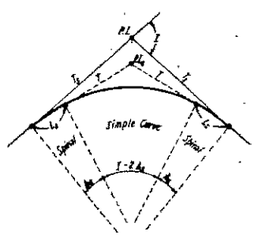
CORPS OF ENGINEERS

U. S. ARMY



CURVE LEGEND WITH DIAGRAM

P.I. = Point of intersection of primary tangents
P.I.$_s$ = Point of intersection of simple curve tangents
T.S. = Tangent-to-spiral. Beginning of spiral on primary tangent
S.C. = Spiral-to-curve. Point where spiral meets simple curve
C.S. = Curve-to-spiral. Point where simple curve meets spiral.
S.T. = Spiral-to-tangent. End of spiral on primary tangent
l_s = Distance from beginning of spiral or end of spiral to the P.I.
I = Deflection angle between primary tangents
Δ_s = Angle subtended by one spiral
R = Radius of simple curve
L_s = Distance along spiral from T.S. to S.C. and/or C.S. to S.T.
S.S. = Spiral to spiral



PLAN
Scale : 1"=50.0'

LEGEND

- Portion of structure within construction right-of-way to be removed at option of Contractor
- Structure to be removed by the Contractor
- Limits of construction right of way
- Limits of permanent right of way
- Flood channel walls
- Project centerline
- S.D. — Storm Drain - Existing Culvert or Storm Drain to be modified to discharge flow into channel.
- 6" Perforated subdrain
- Dr. Inv. — Drain Invert

Graphic Scale: 1"=10' (10' 0' 10' 20')

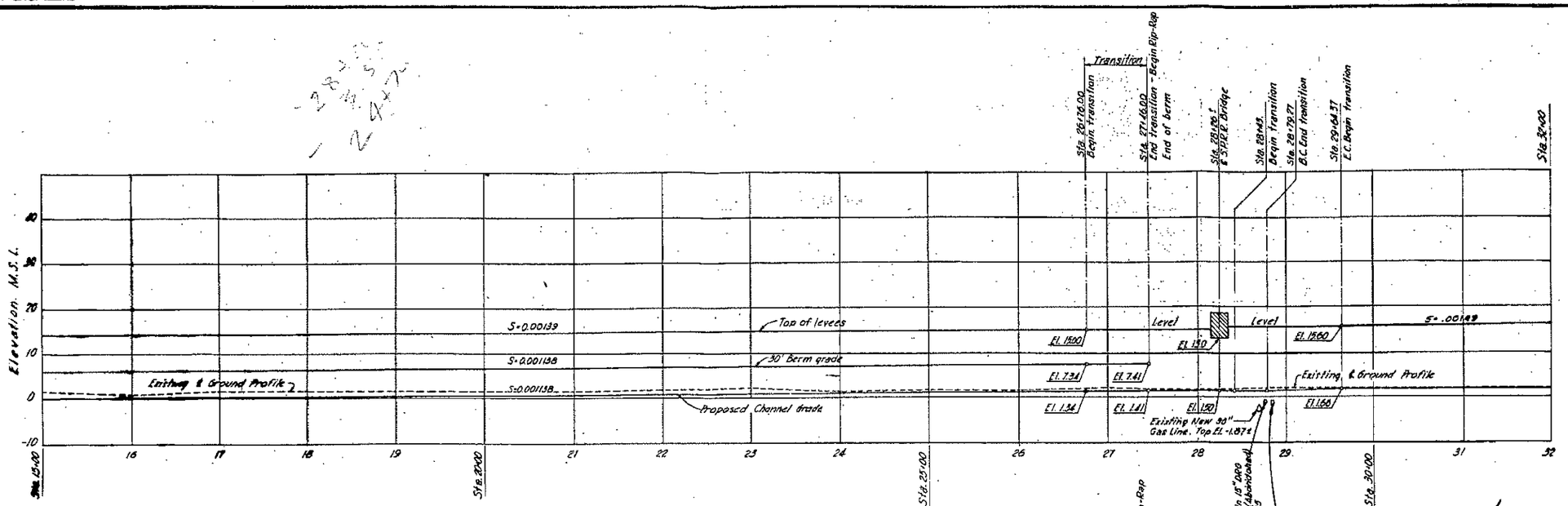
Graphic Scale: 1"=50' (50' 0' 50' 100')

FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT

PLAN AND PROFILE
STA. A 0+00 TO STA. A 15+00

IN 24 SHEETS | SCALE AS SHOWN | SHEET NO. 2
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS
DRAWN: J.L.
TRACED: J.L.
CHECKED: A.G.B.
TO ACCOMPANY REPORT DATED DECEMBER 1962
FILE NO.
62-39-13



FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT

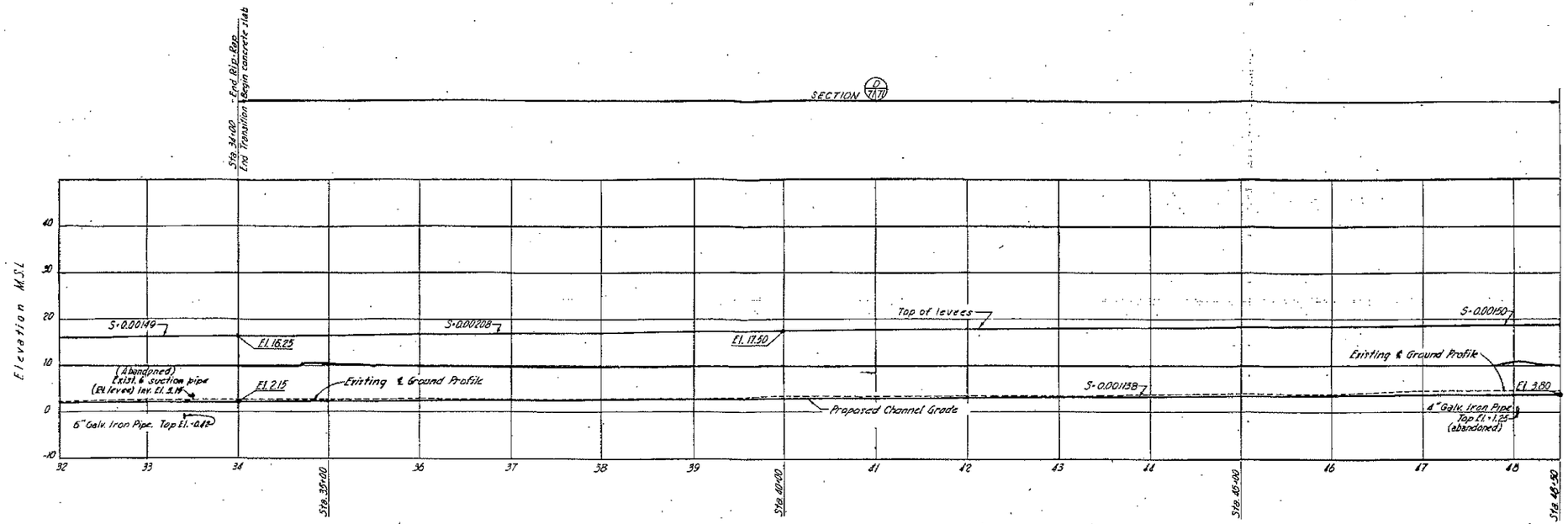
PLAN AND PROFILE
STA. A15+00 TO STA. A32+00

IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 3
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO		CORPS OF ENGINEERS FILE NO.
DRAWN: W.M. TRACED: W.M. CHECKED: A.C.B.	TO ACCOMPANY REPORT DATED DECEMBER 1968	62-39-13

EXHIBIT B PLATE 3

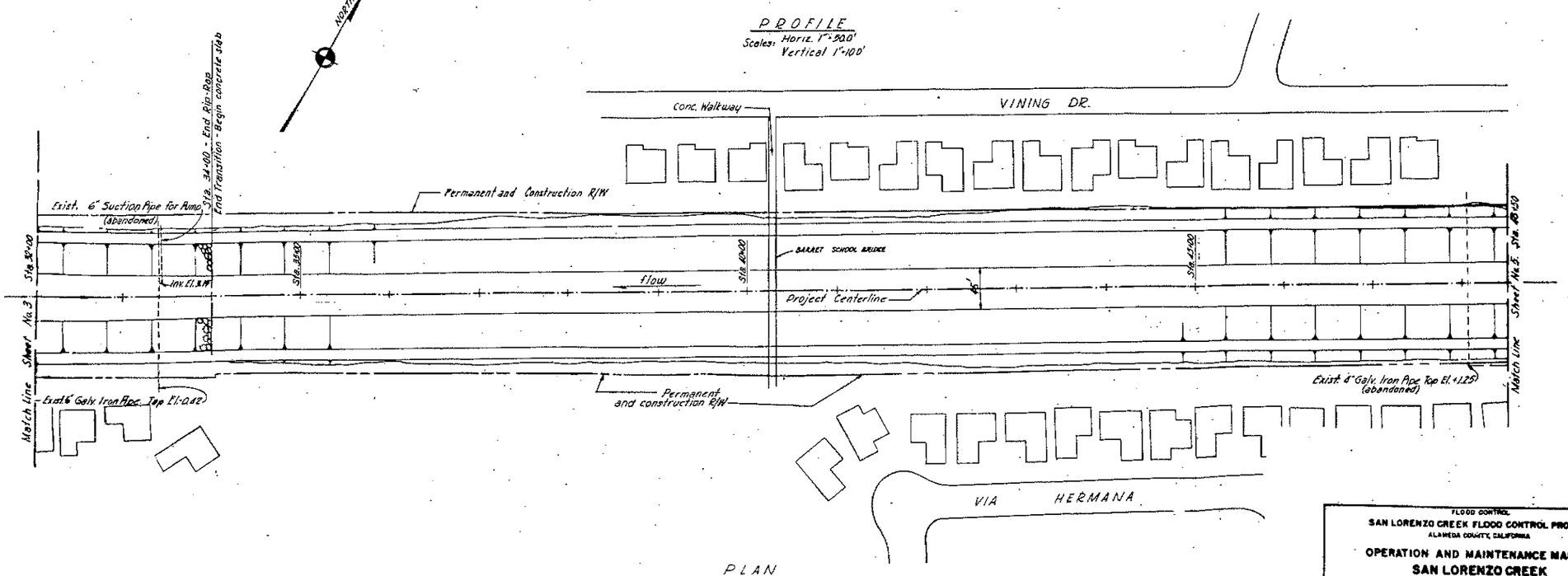
CORPS OF ENGINEERS

U. S. ARMY



PROFILE

Scales: Horiz. 1"=50.0'
Vertical 1"=100'



PLAN

Scale: 1"=50.0'

10' 0' 10' 20'
Graphic Scale 1"=10'

50' 0' 50' 100'
Graphic Scale 1"=50'

FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK CHANNEL IMPROVEMENT

PLAN AND PROFILE

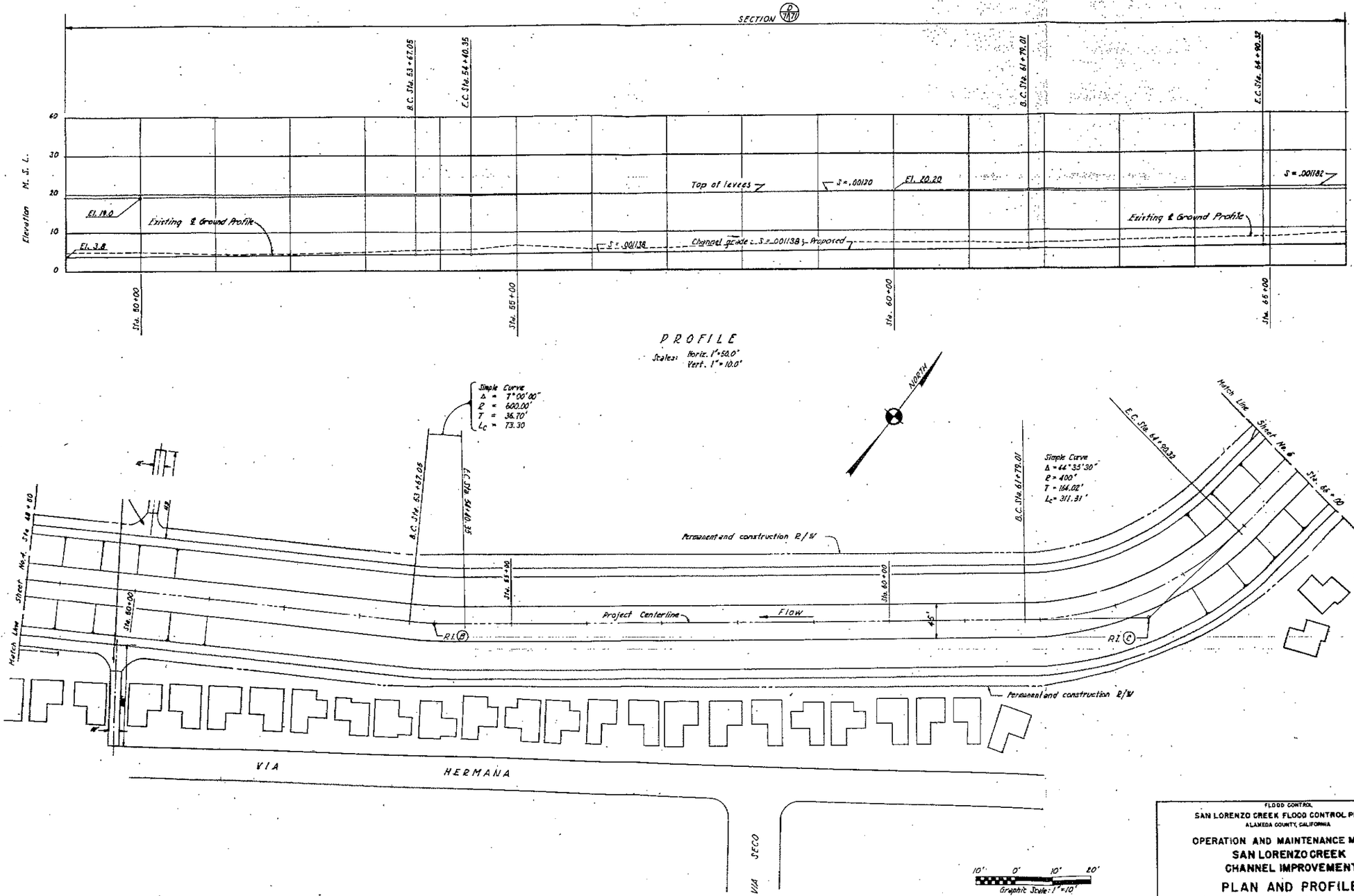
STA. A32+00 TO STA. A48+50

IN 24 SHEETS
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
DRAWN: W.M.
TRACED: W.M.
CHECKED: A.C.B.
SCALE AS SHOWN
TO ACCOMPANY REPORT DATED DECEMBER 1962
SHEET NO. 4
CORPS OF ENGINEERS
FILE NO.
62-39-13

EXHIBIT B PLATE 4

CORPS OF ENGINEERS

U. S. ARMY



FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

CHANNEL IMPROVEMENT

PLAN AND PROFILE

STA. A48+50 TO STA. A66+00

IN 24 SHEETS | SCALE AS SHOWN | SHEET NO. 5

U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS

DRAWN: M.Y.Q. | FILE NO.

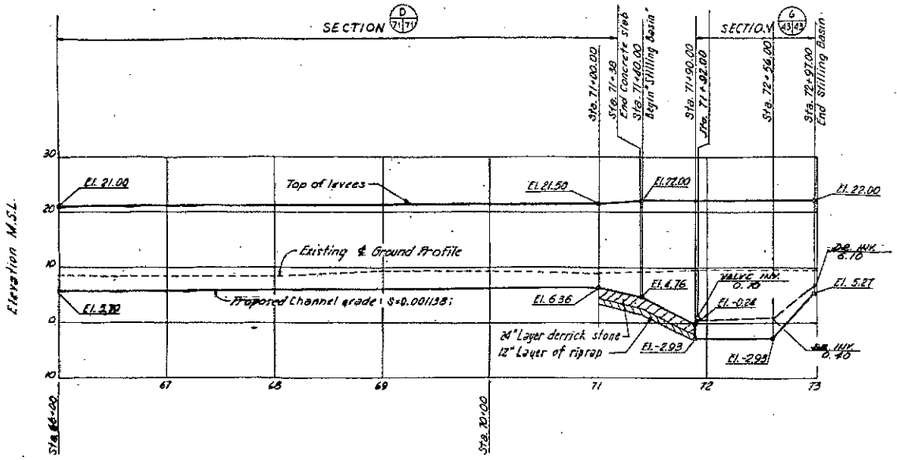
TRACED: M.Y.Q. | TO ACCOMPANY REPORT DATED DECEMBER 1982 | 62-39-13

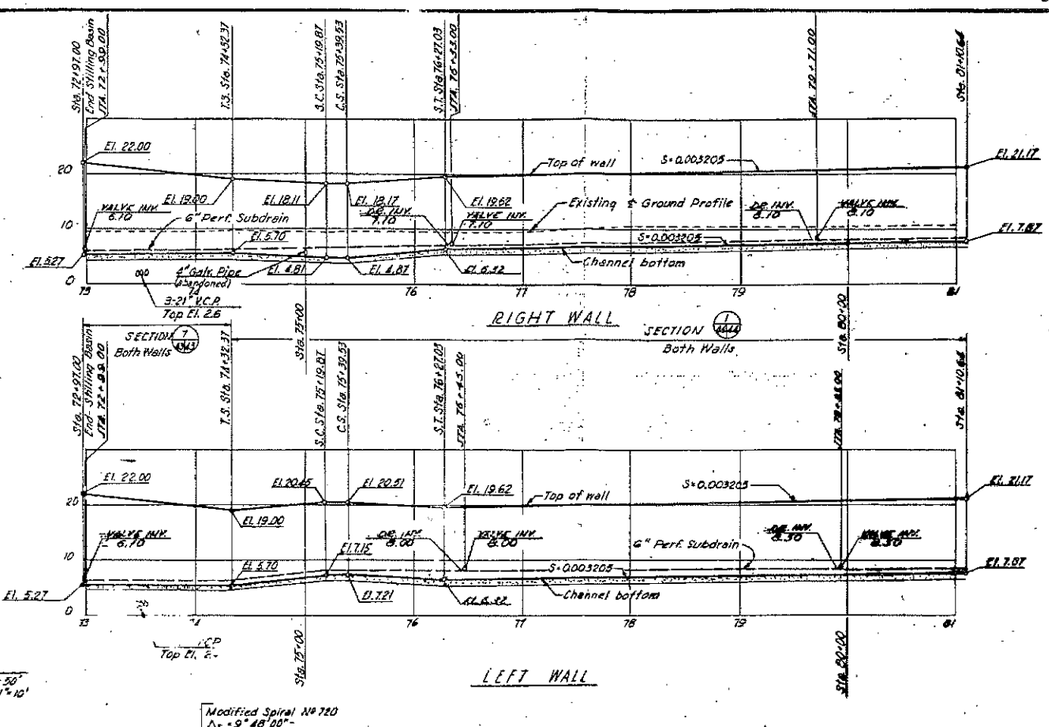
CHECKED: A.C.S.

EXHIBIT B PLATE 5

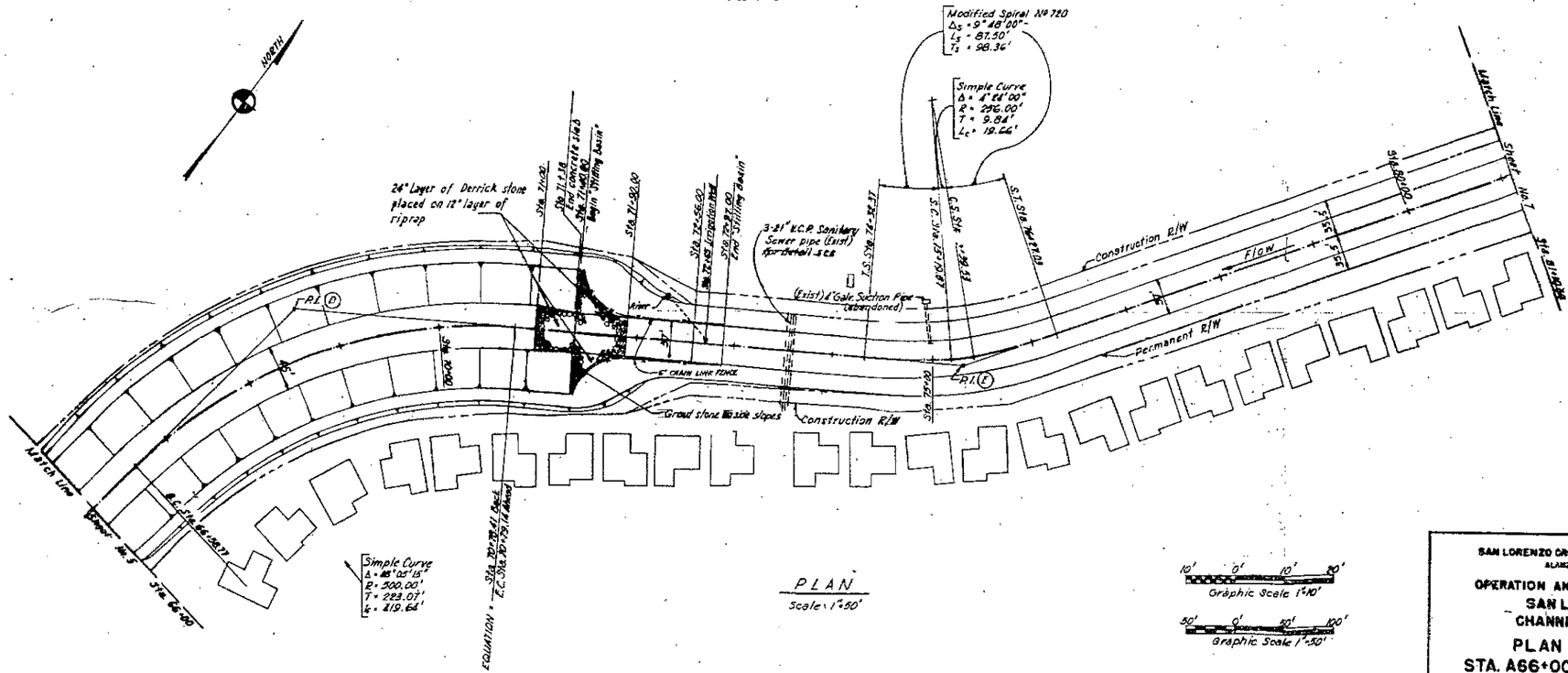
CORPS OF ENGINEERS

U. S. ARMY





PROFILE
Scale: Horiz. 1"=50'
Vertical 1"=10'



PLAN
Scale: 1"=50'

Graphic Scale 1"=10'

Graphic Scale 1"=50'

FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT

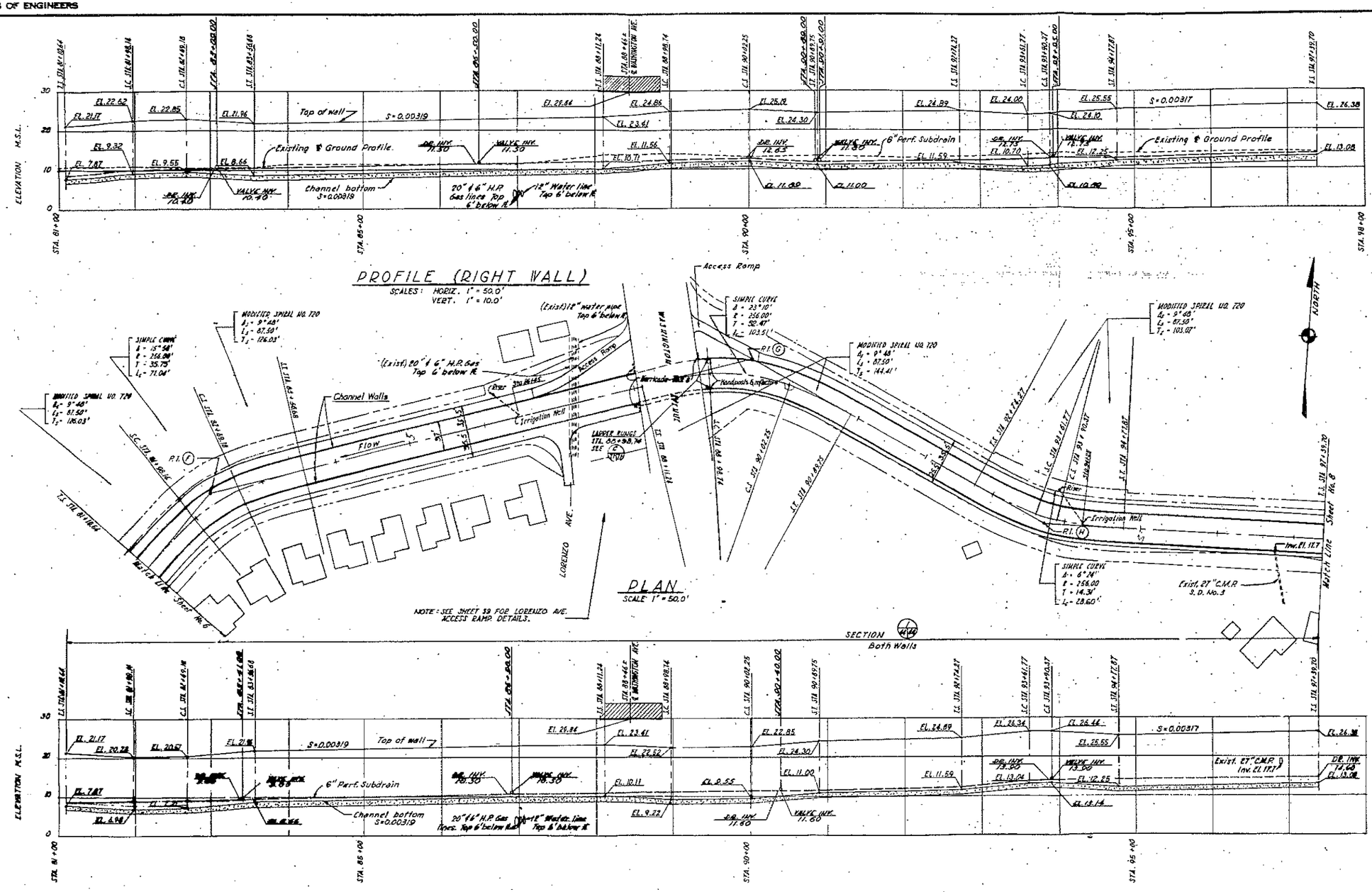
PLAN AND PROFILE
STA. A66+00 TO STA. A81+10.64

N 24 SHEETS	SCALE AS SHOWN	SHEET NO. 6
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO		CORPS OF ENGINEERS FILE NO.
DRAWN: W.M. TRACED: W.M. CHECKED: A.C.B.	TO ACCOMPANY REPORT DATED DECEMBER 1962	62-30-13

EXHIBIT B PLATE 6

CORPS OF ENGINEERS

U. S. ARMY



FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

CHANNEL IMPROVEMENT

PLAN AND PROFILE

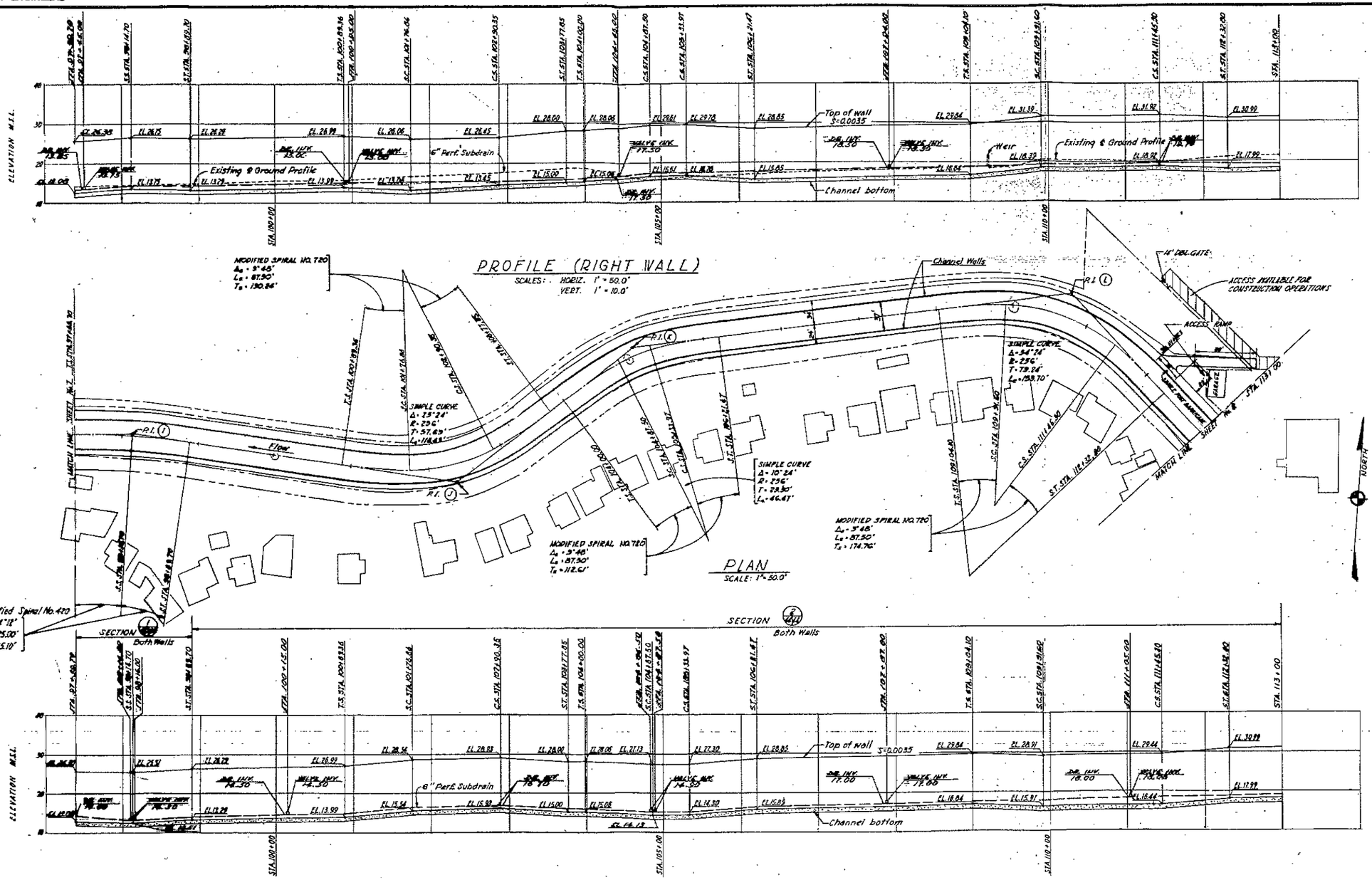
STA. A81+10.64 TO STA. A97+39.70

IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 7
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS		
DRAWN: M.Y.D.		FILE NO:
TRACED: M.Y.D.	TO ACCOMPANY REPORT DATED DECEMBER 1962	62-39-13
CHECKED: A.D.B.		

EXHIBIT B PLATE 7

CORPS OF ENGINEERS

U. S. ARMY



FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK CHANNEL IMPROVEMENT
PLAN AND PROFILE
STA. A97+39.70 TO STA. A113+00

IN 24 SHEETS

U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS

SCALE AS SHOWN

DRAWN: T.S.K.

TRACED: M.Y.G.

CHECKED: A.G.E.

TO ACCOMPANY REPORT DATED DECEMBER 1962

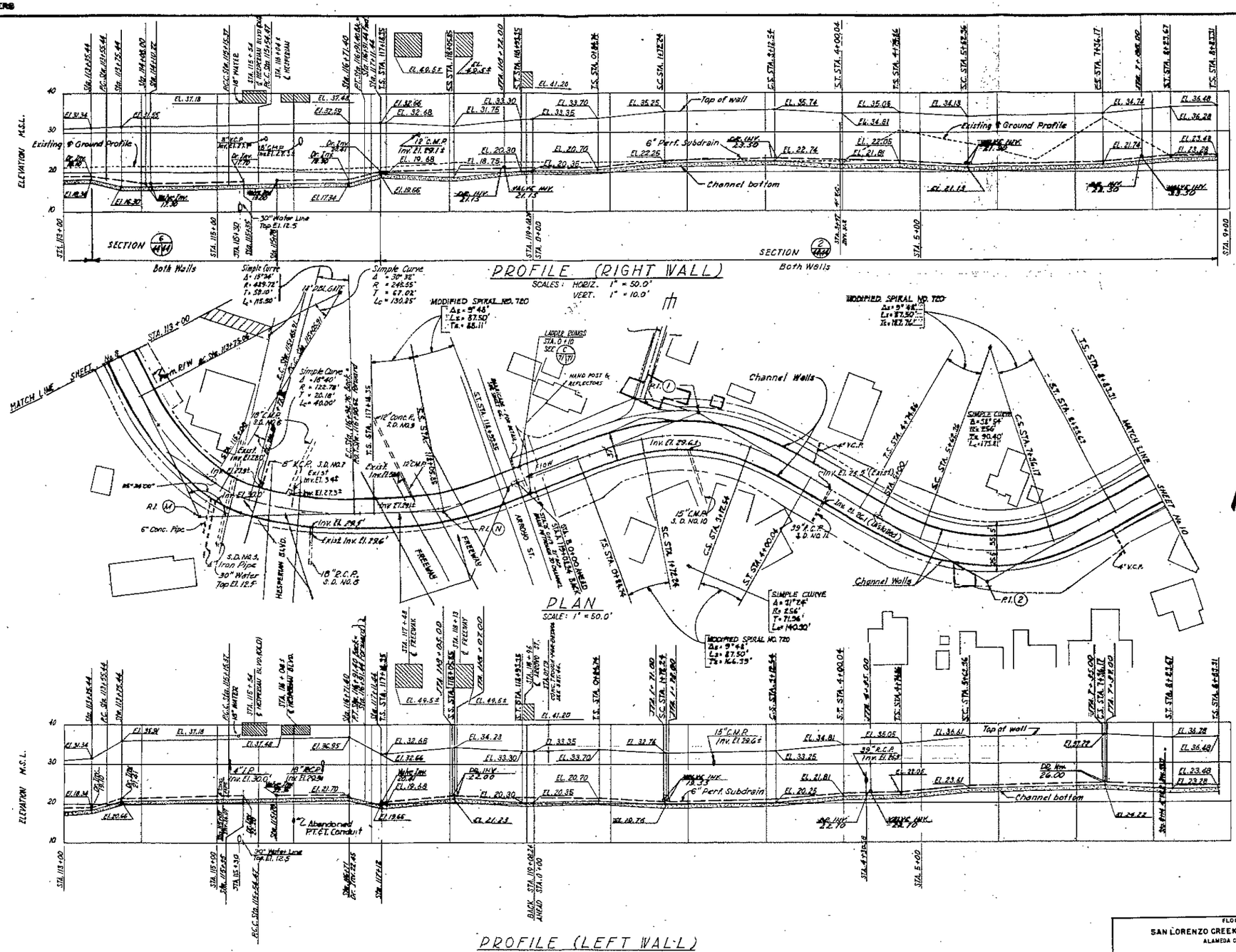
SHEET NO. 8

FILE NO: 62-39-13

EXHIBIT B PLATE 8

CORPS OF ENGINEERS

U. S. ARMY



FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

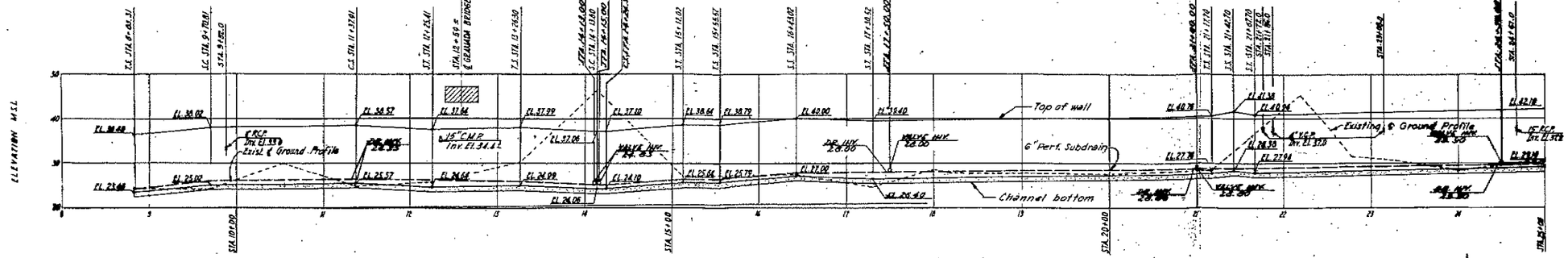
SAN LORENZO CREEK CHANNEL IMPROVEMENT

PLAN AND PROFILE

STA. A113+00 TO STA. B8+83.31

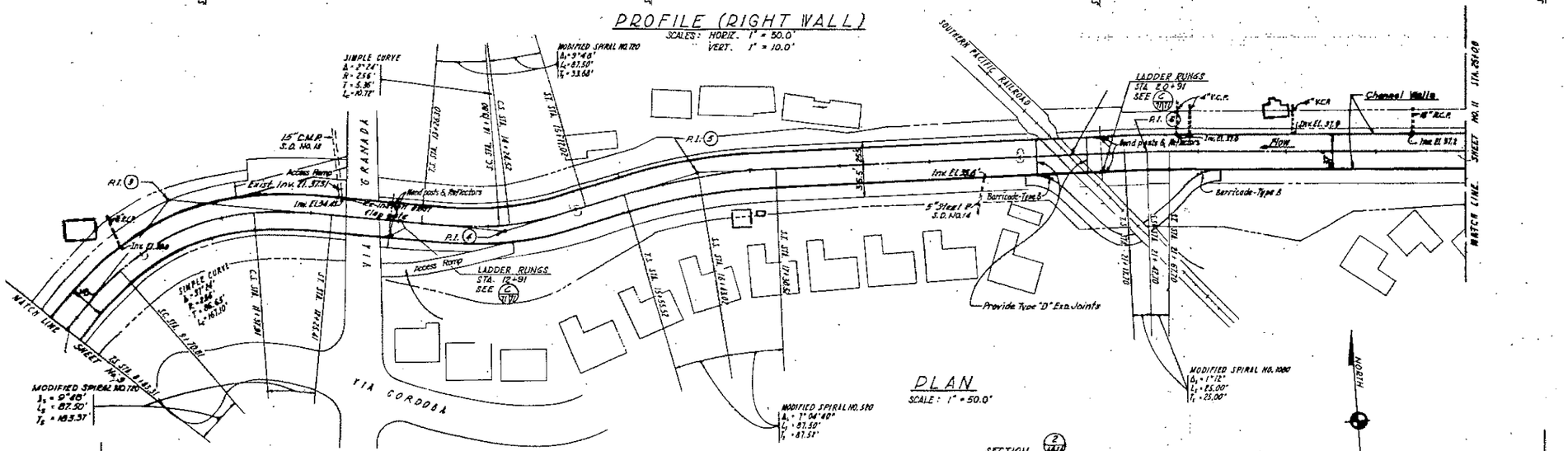
IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 9
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO,		CORPS OF ENGINEERS FILE NO:
DRAWN: H.Y.O.		
TRACED: H.Y.O.	TO ACCOMPANY REPORT DATED DECEMBER 1962	62-39-13
CHECKED: A.C.P.		

EXHIBIT B PLATE 9



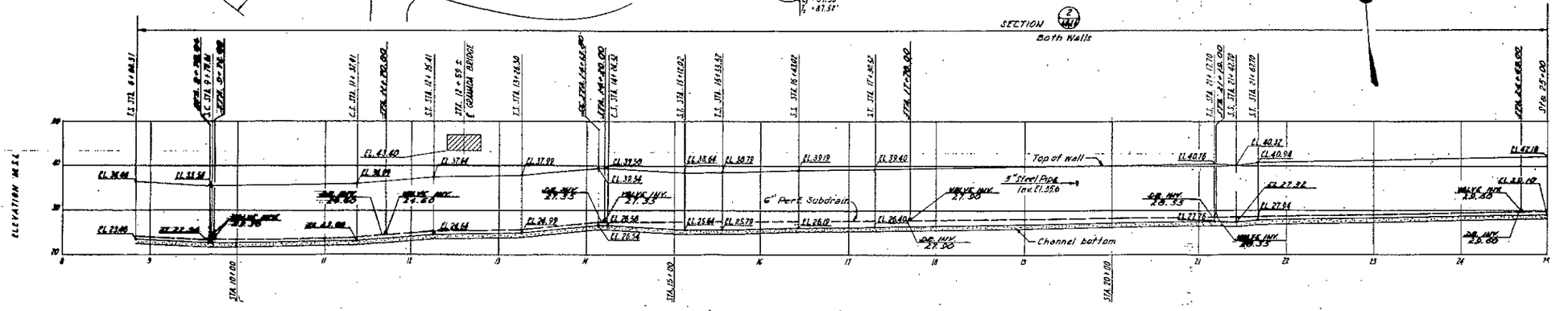
PROFILE (RIGHT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'



PLAN

SCALE: 1" = 50.0'



PROFILE (LEFT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'

10' 0' 10' 20'
Graphic Scale 1"=10'

50 0' 50' 100'
Graphic Scale 1"=50'

FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT

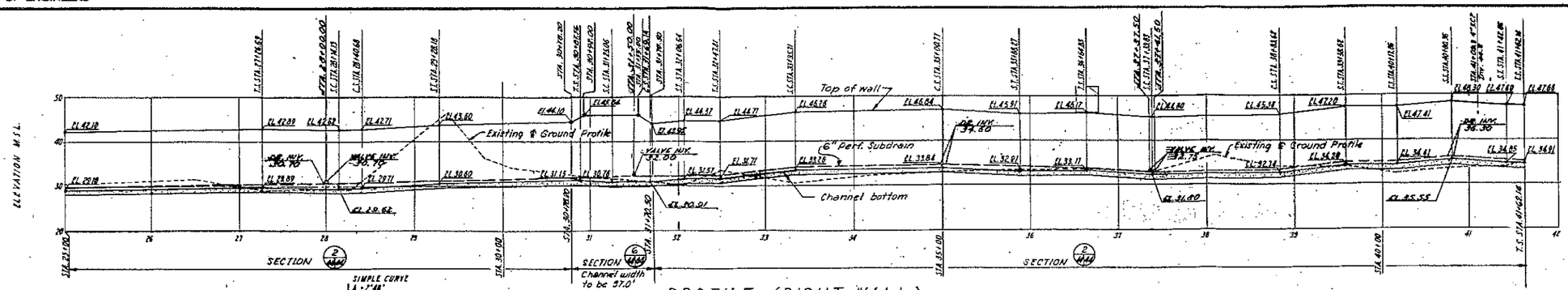
PLAN AND PROFILE
STA. B8+83.31 TO STA. B25+00

IN 24 SHEETS
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
DRAWN: W.M.
TRACED: T.S.K.
CHECKED: A.C.R.
SCALE AS SHOWN
TO ACCOMPANY REPORT DATED DECEMBER 1962
SHEET NO. 10
CORPS OF ENGINEERS FILE NO: 62-39-13

EXHIBIT B PLATE 10

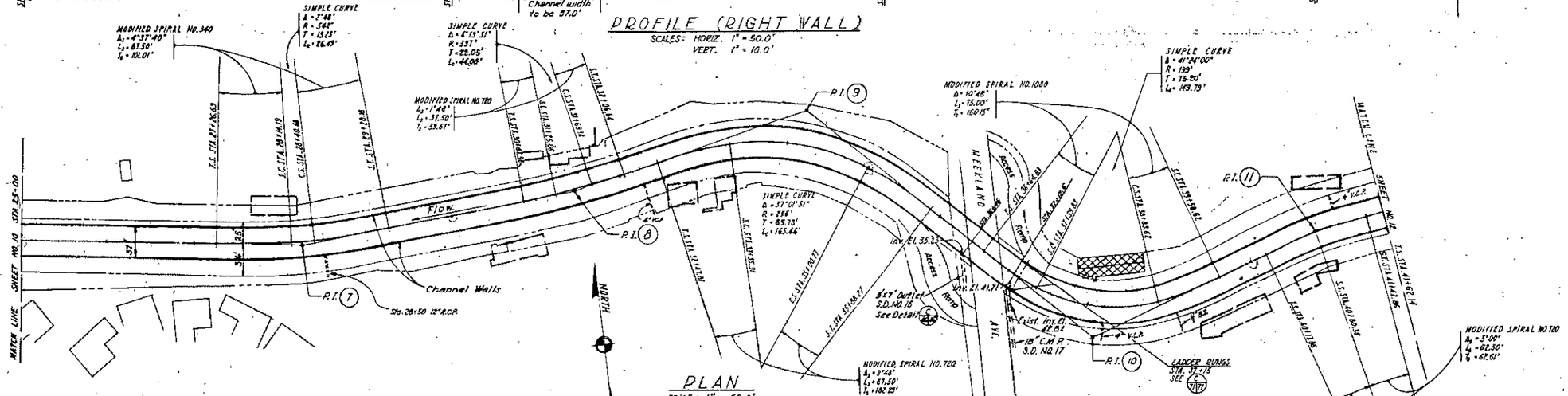
CORPS OF ENGINEERS

U. S. ARMY



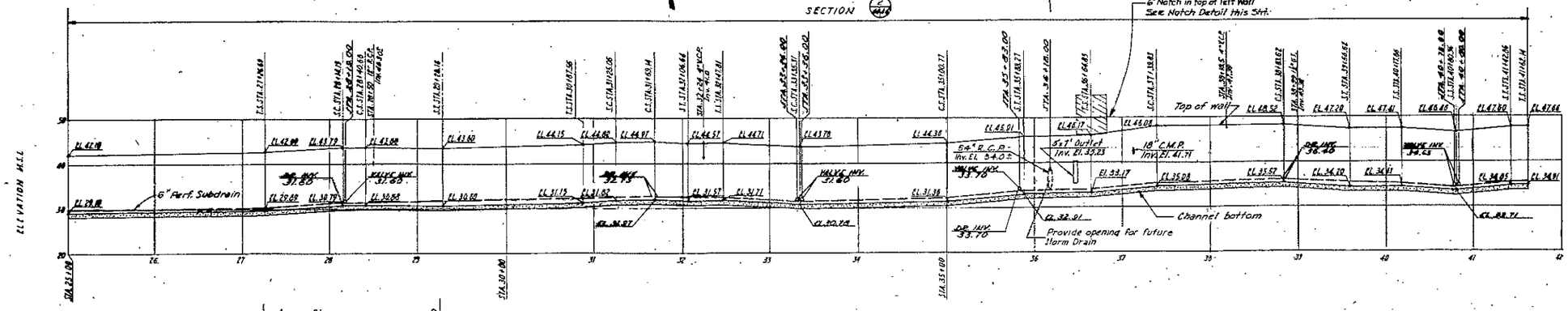
PROFILE (RIGHT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'



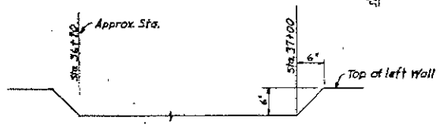
PLAN

SCALE: 1" = 50.0'



PROFILE (LEFT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'



NOTCH DETAIL

Construct 6' deep notch in top of left channel wall between approximate stations as indicated to provide clearance under Meekland Ave Bridge.

Graphic Scale: 1"=10'

Graphic Scale: 1"=50'

FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

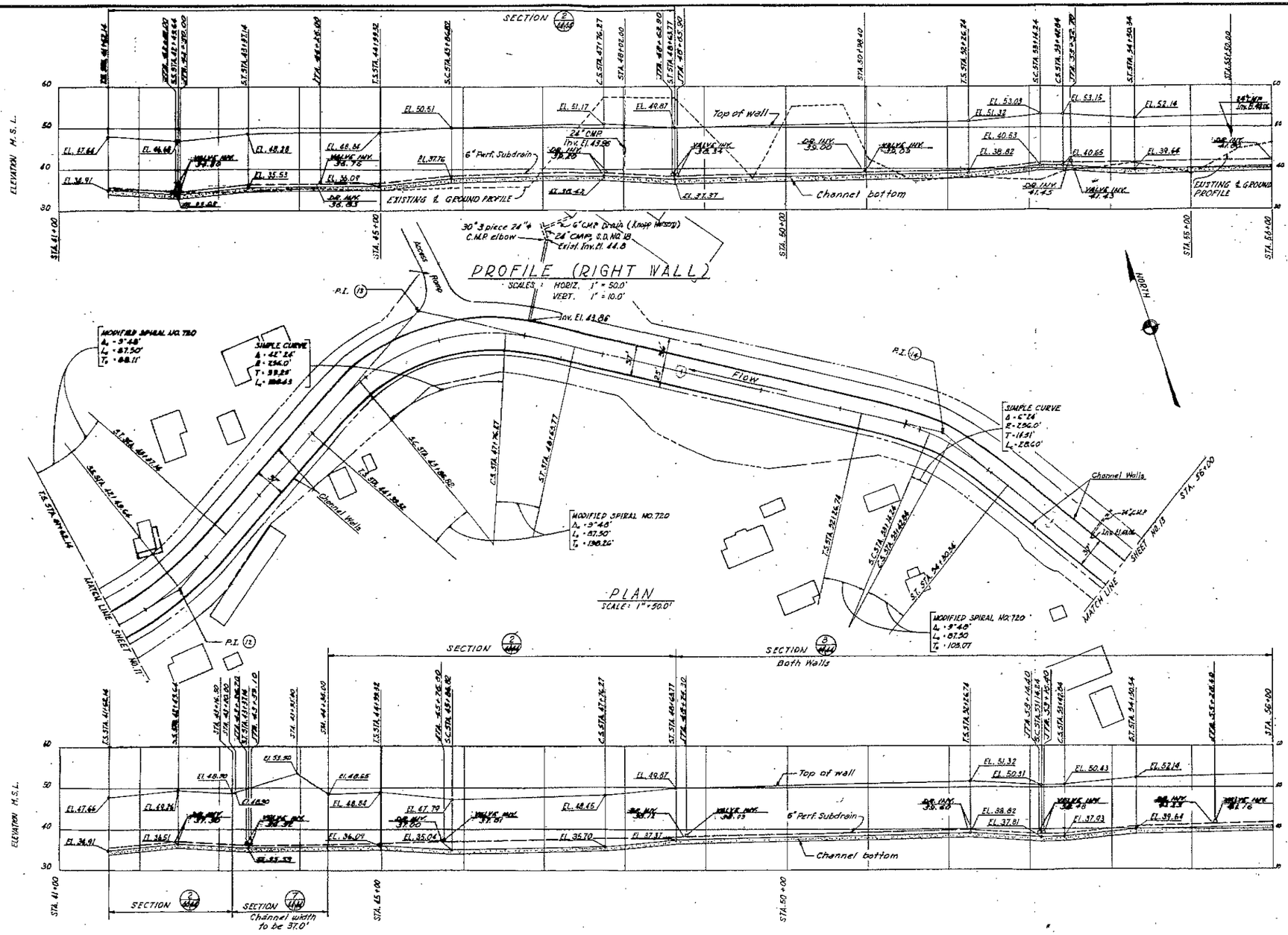
CHANNEL IMPROVEMENT

PLAN AND PROFILE

STA. B 25+00 TO STA. B 41+62.14

IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 11
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS		
DRAWN: T.B.K. TRACED: H.C.K. CHECKED: A.C.B.	TO ACCOMPANY REPORT DATED DECEMBER 1968	FILE NO. 62-39-13

EXHIBIT B PLATE 11



FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

CHANNEL IMPROVEMENT

PLAN AND PROFILE

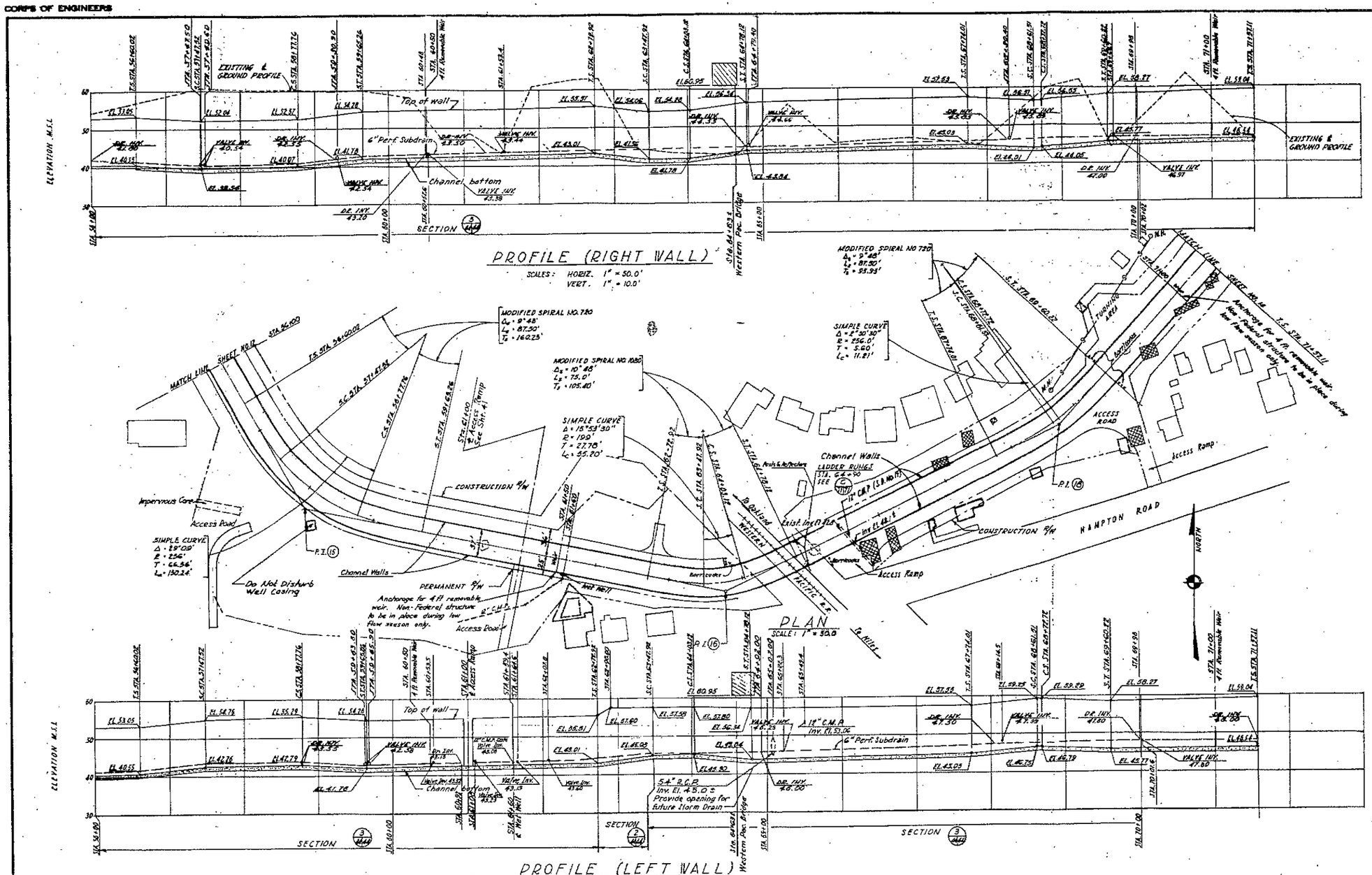
STA. B41+62.14 TO STA. B56+00

IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 12
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS		
DRAWN: M.Y.G.		FILE NO.
TRACED: M.Y.G.	TO ACCOMPANY REPORT DATED DECEMBER 1962	62-39-13
CHECKED: A.C.B.		

EXHIBIT B PLATE 12

CORPS OF ENGINEERS

U. S. ARMY



FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

CHANNEL IMPROVEMENT

PLAN AND PROFILE

STA. B 56+00 TO STA. B 71+57.11

IN 24 SHEETS | SCALE AS SHOWN | SHEET NO. 13

U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS

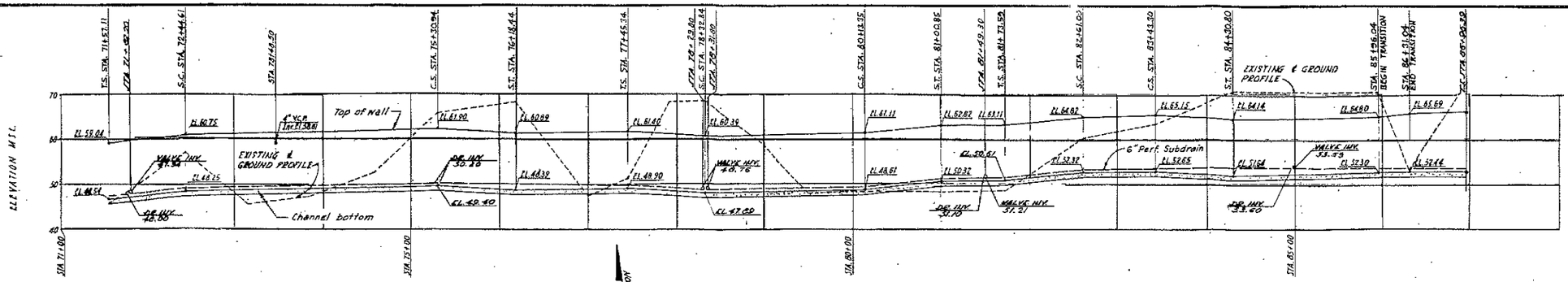
DRAWN: W.M. | TRACED: T.D.C. | CHECKED: A.C.S. | TO ACCOMPANY REPORT DATED: DECEMBER 1963 | FILE NO: 62-39-13

REVISED: MAY 1965

EXHIBIT B PLATE 13

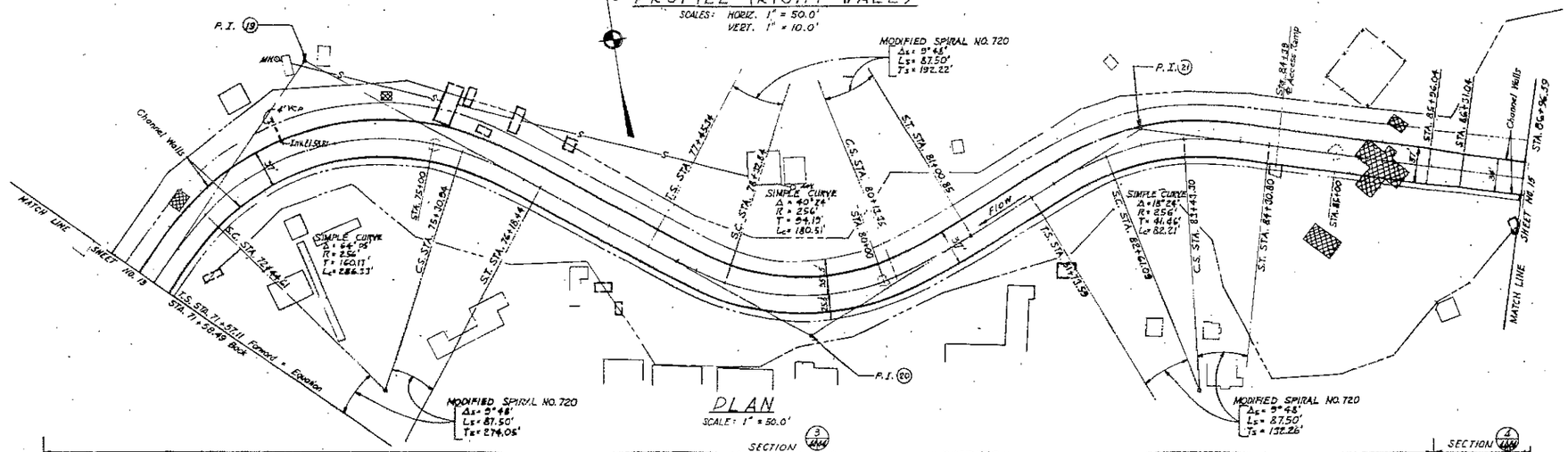
CORPS OF ENGINEERS

U. S. ARMY



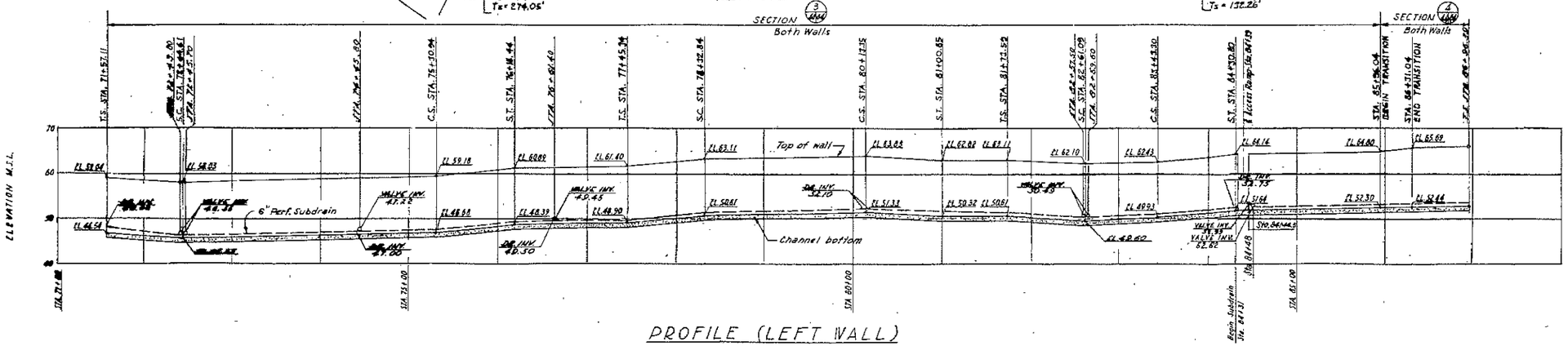
PROFILE (RIGHT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'



PLAN

SCALE: 1" = 50.0'



PROFILE (LEFT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'

Graphic Scale 1"=10'

Graphic Scale 1"=50'

FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT

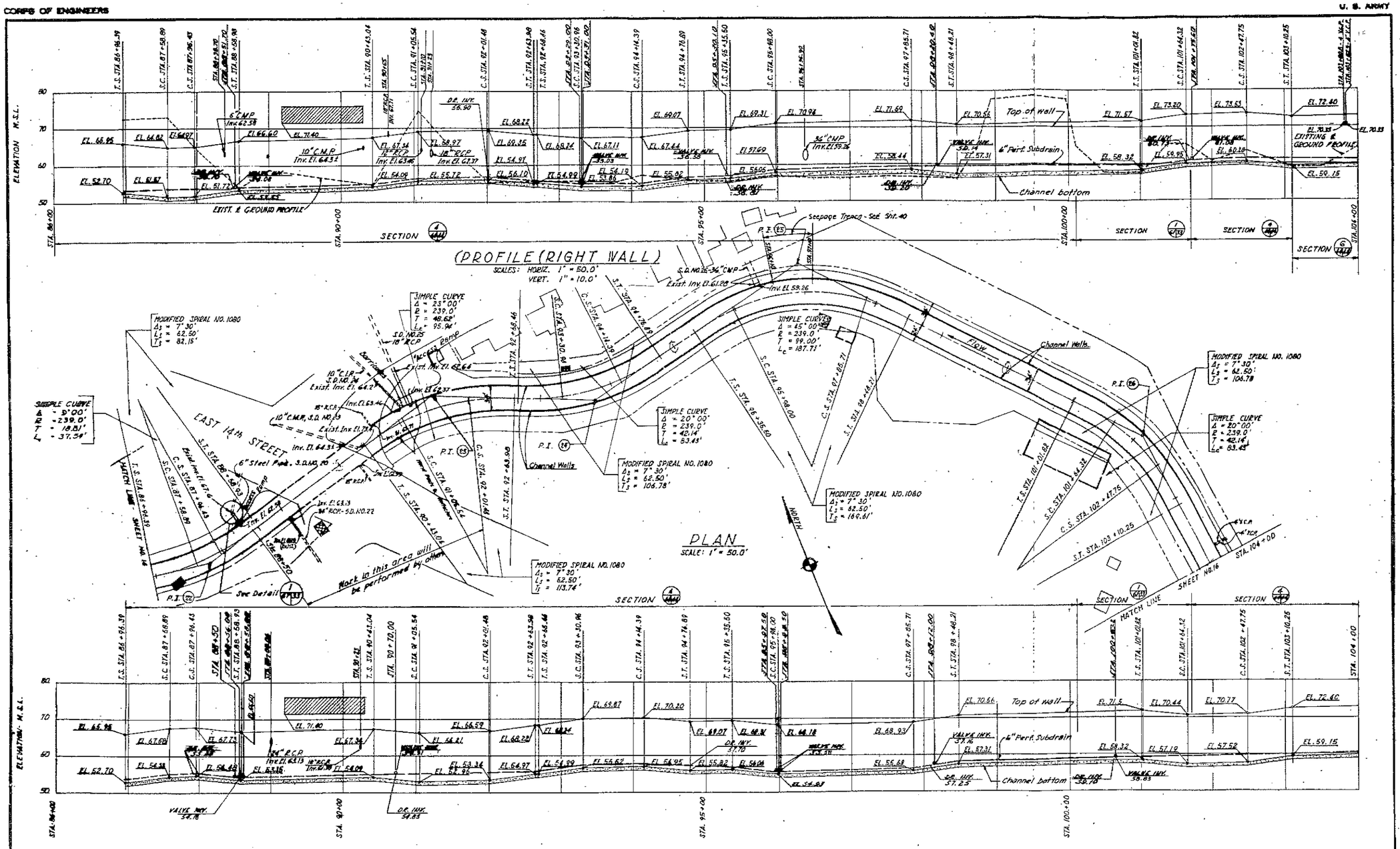
PLAN AND PROFILE
STA. B 71+57.11 TO STA. B 86+96.39

IN 24 SHEETS
SCALE AS SHOWN
SHEET NO. 14
U. S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS
DRAWN T.E.K.
TRACED N.Y.S.
CHECKED A.C.B.
TO ACCOMPANY REPORT DATED DECEMBER 1962
FILE NO. 62-39-13

EXHIBIT B PLATE 14

CORPS OF ENGINEERS

U. S. ARMY



(PROFILE (RIGHT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'

PLAN

SCALE: 1" = 50.0'

PROFILE (LEFT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'

Graphic Scale 1"-10'

Graphic Scale 1"-50'

FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT

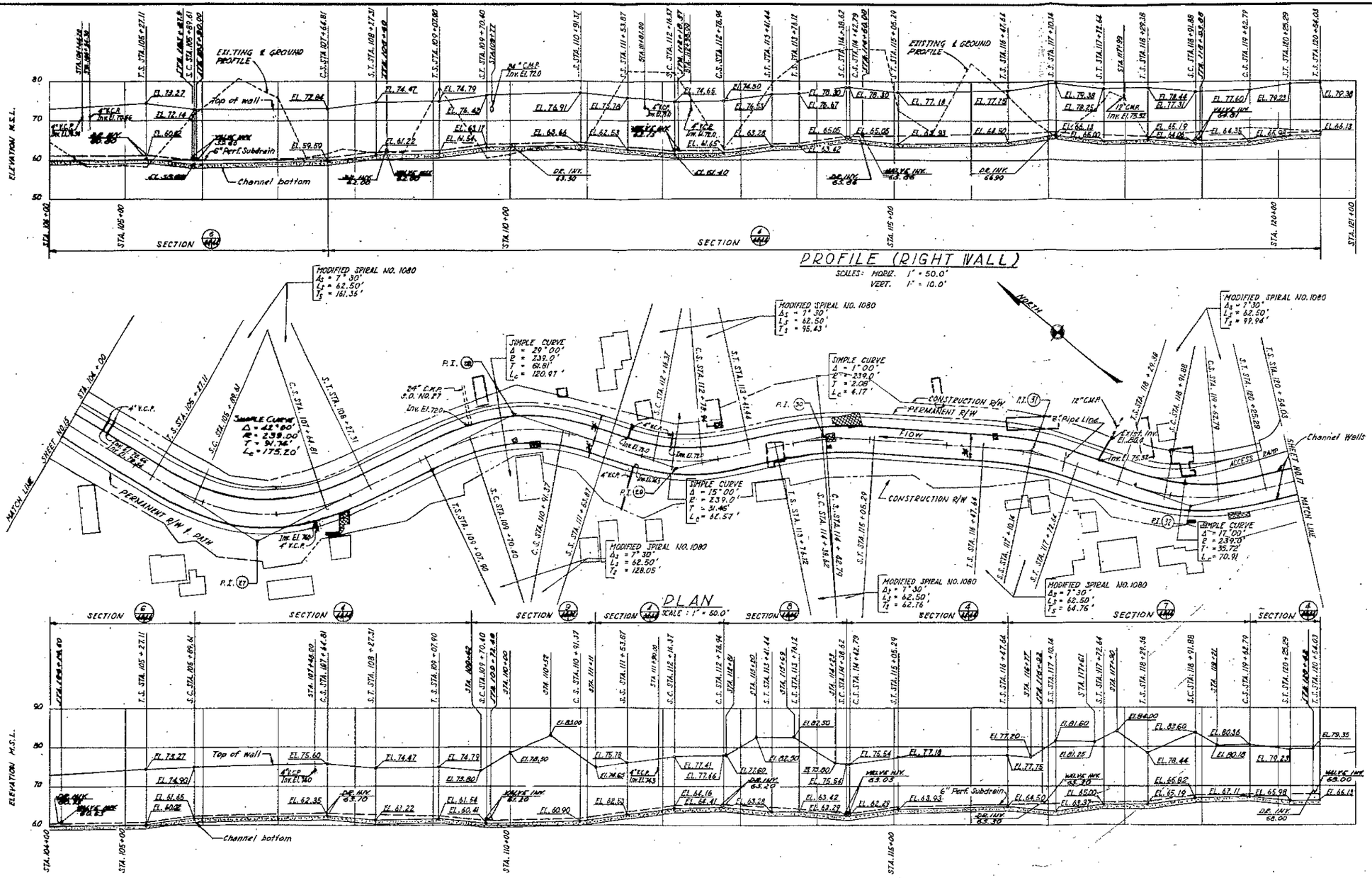
PLAN AND PROFILE
STA. B 86+96.39 TO STA. B 104+00

IN 24 SHEETS
SCALE AS SHOWN
SHEET NO. 15
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
FILE NO.
DRAWN: H.Y.G.
TRACED: H.Y.G.
CHECKED: A.C.B.
TO ACCOMPANY REPORT DATED DECEMBER 1982
62-39-13

EXHIBIT B PLATE 15

CORPS OF ENGINEERS

U. S. ARMY



FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

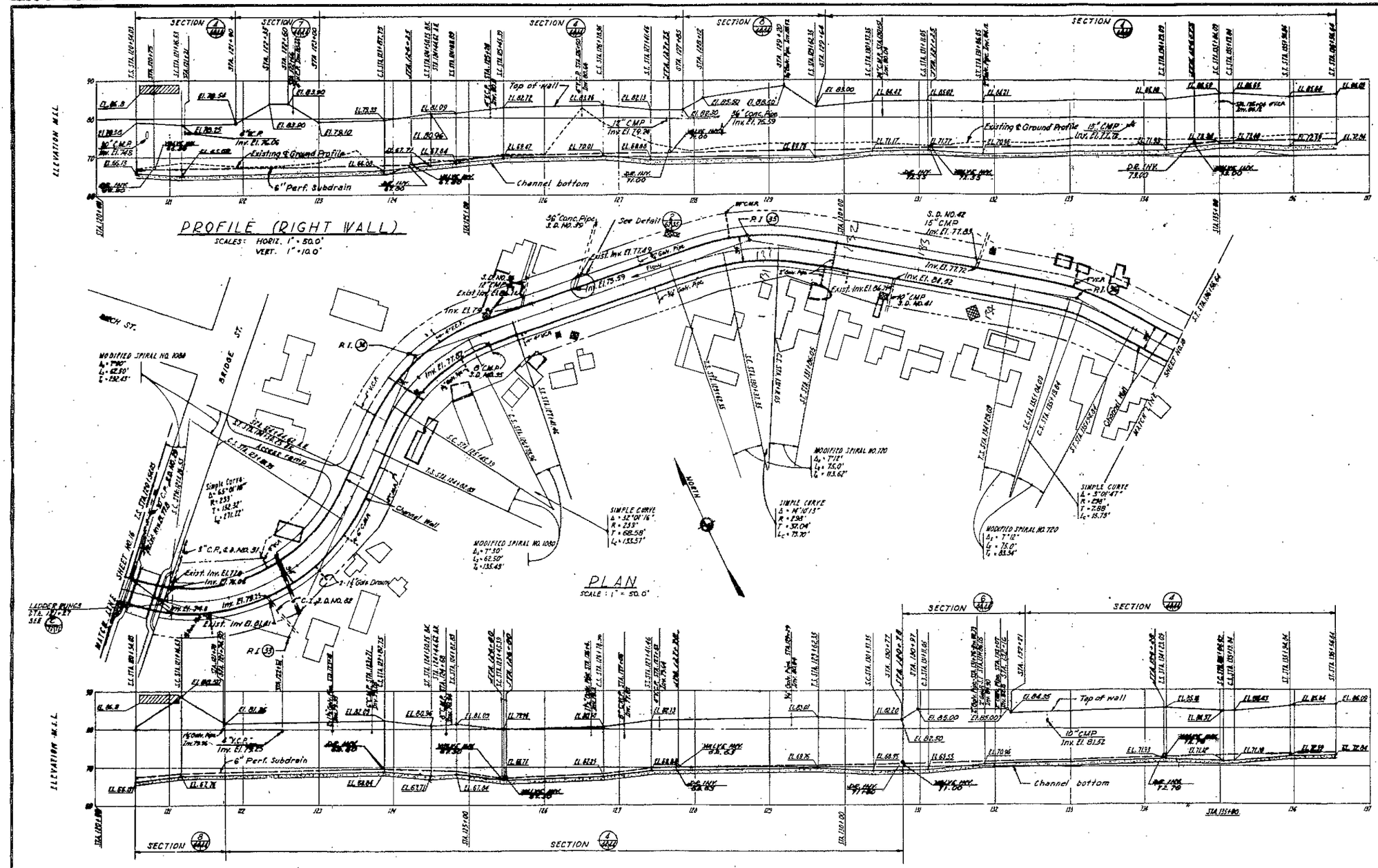
CHANNEL IMPROVEMENT

PLAN AND PROFILE

STA. B 104+00 TO STA. B 120+54.03

IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 16
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS		
DRAWN: W.M.		FILE NO.
TRACED: H.V.O.	TO ACCOMPANY REPORT DATED DECEMBER 1962	62-39-13
CHECKED: J.A.D.		

EXHIBIT B PLATE 16



FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

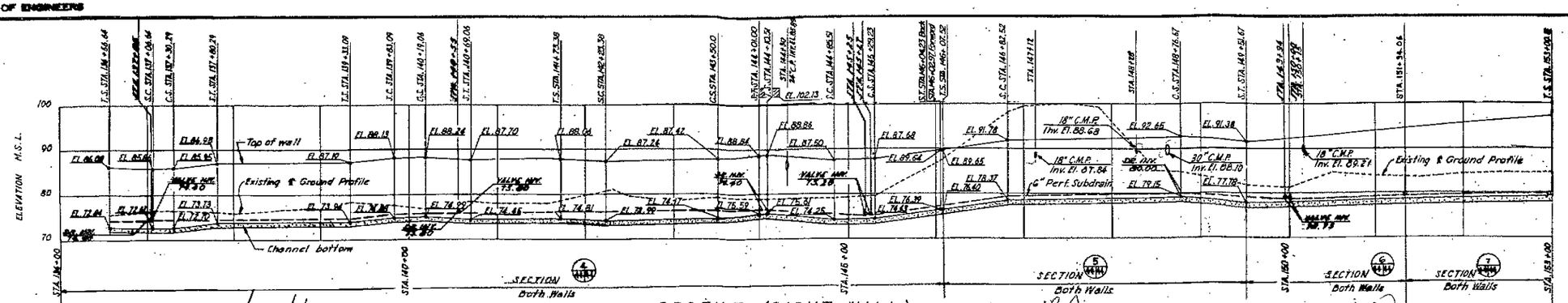
CHANNEL IMPROVEMENT

PLAN AND PROFILE

STA. B 120+54.03 TO STA. B 136+56.64

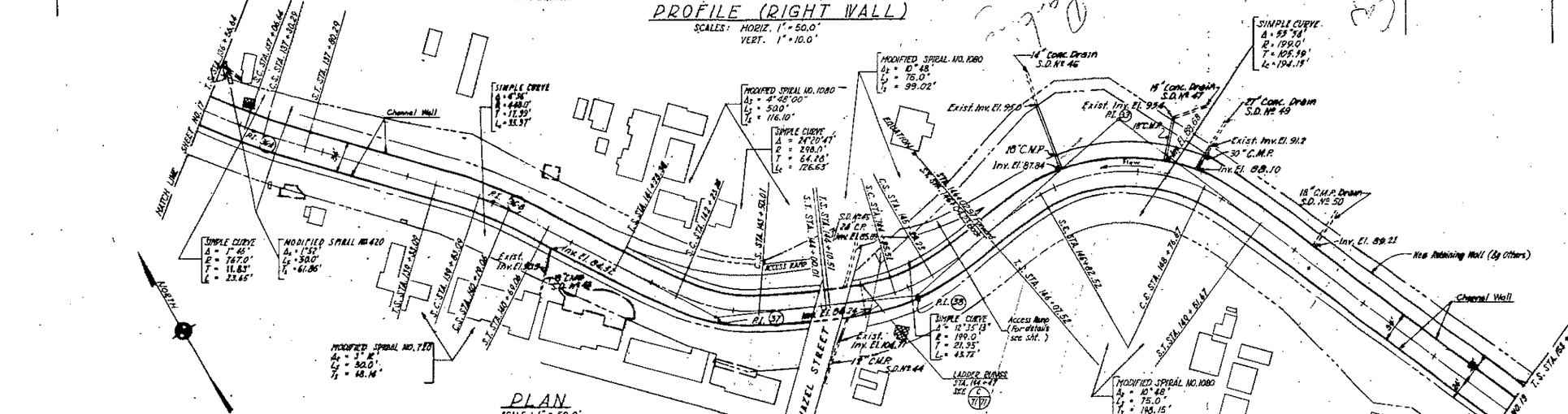
IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 17
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS		
DRAWN: B.L.L.		FILE NO:
TRACED: T.S.K.	TO ACCOMPANY REPORT	62-39-13
CHECKED: A.C.D.	DATED: DECEMBER 1962	

EXHIBIT B PLATE 17



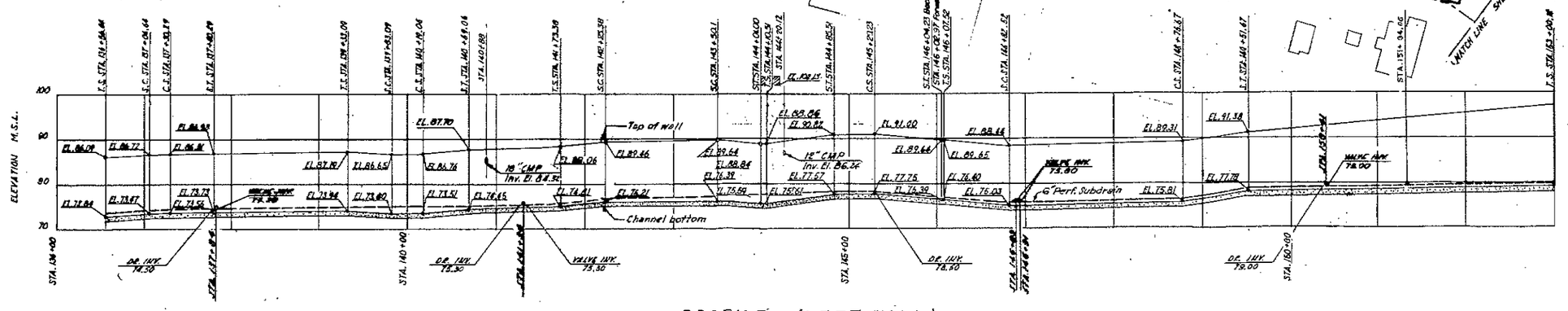
PROFILE (RIGHT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'



PLAN

SCALE: 1" = 50.0'



PROFILE (LEFT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'

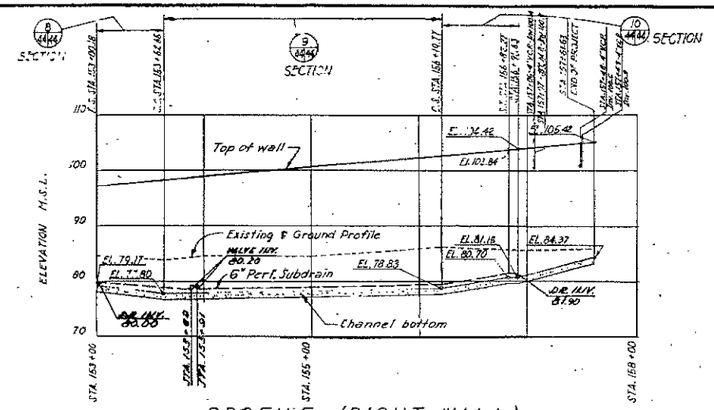
FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT

PLAN AND PROFILE
STA. B136+56.64 TO STA. B153+00

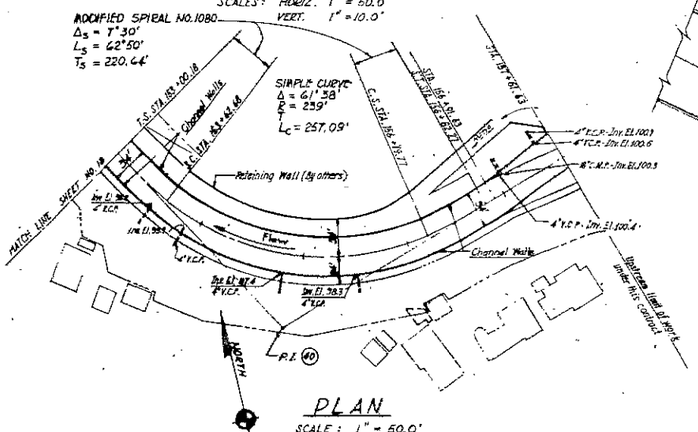
IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 18
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS		
DRAWN: M.T.O. TRACED: M.T.O. CHECKED: A.O.B.	TO ACCOMPANY REPORT DATED DECEMBER 1962	FILE NO. 62-39-13

EXHIBIT B PLATE 18



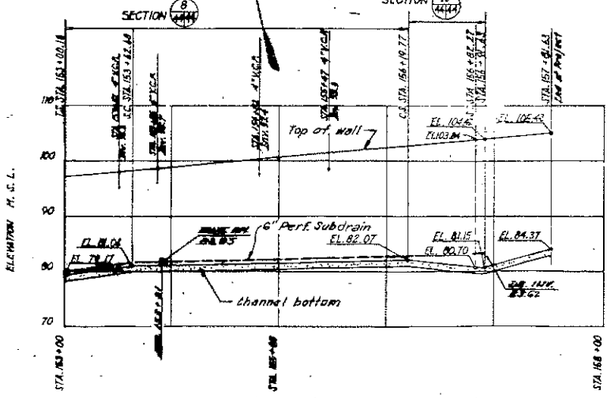
PROFILE (RIGHT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'



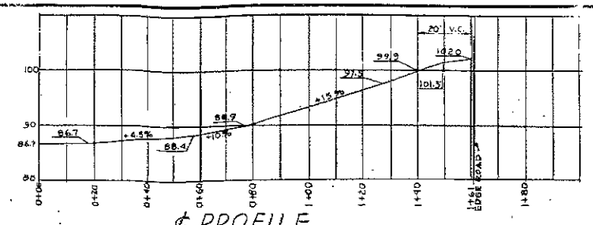
PLAN

SCALE: 1" = 50.0'



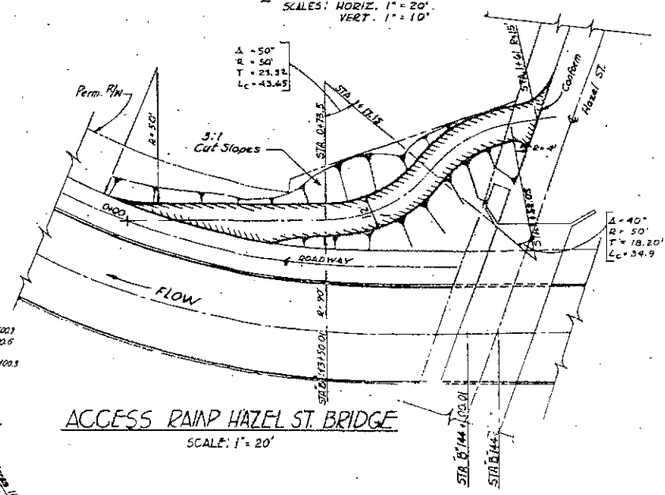
PROFILE (LEFT WALL)

SCALES: HORIZ. 1" = 50.0'
VERT. 1" = 10.0'



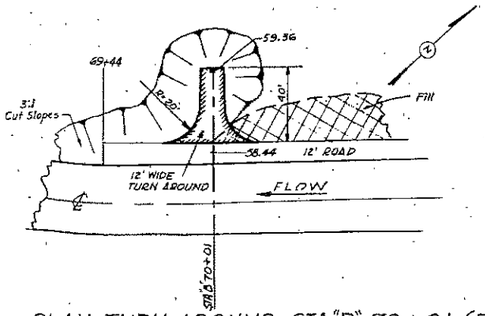
℄ PROFILE

SCALES: HORIZ. 1" = 20'
VERT. 1" = 10'



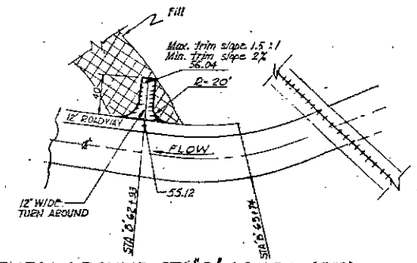
ACCESS RAMP HAZEL ST. BRIDGE

SCALE: 1" = 20'



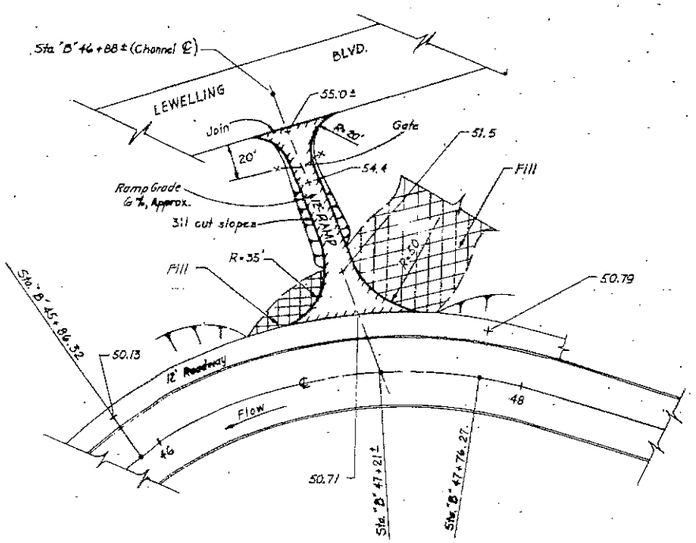
PLAN-TURN AROUND STA. "B" 70+01 (RT)

SCALE: 1" = 30'



PLAN- TURN AROUND STA. "B" 62+93 (RT)

SCALE: 1" = 50'



PLAN—ACCESS RAMP

STATION "B" 47+21 (RT)

SCALE: 1" = 30'

Graphic Scale 1"=10'

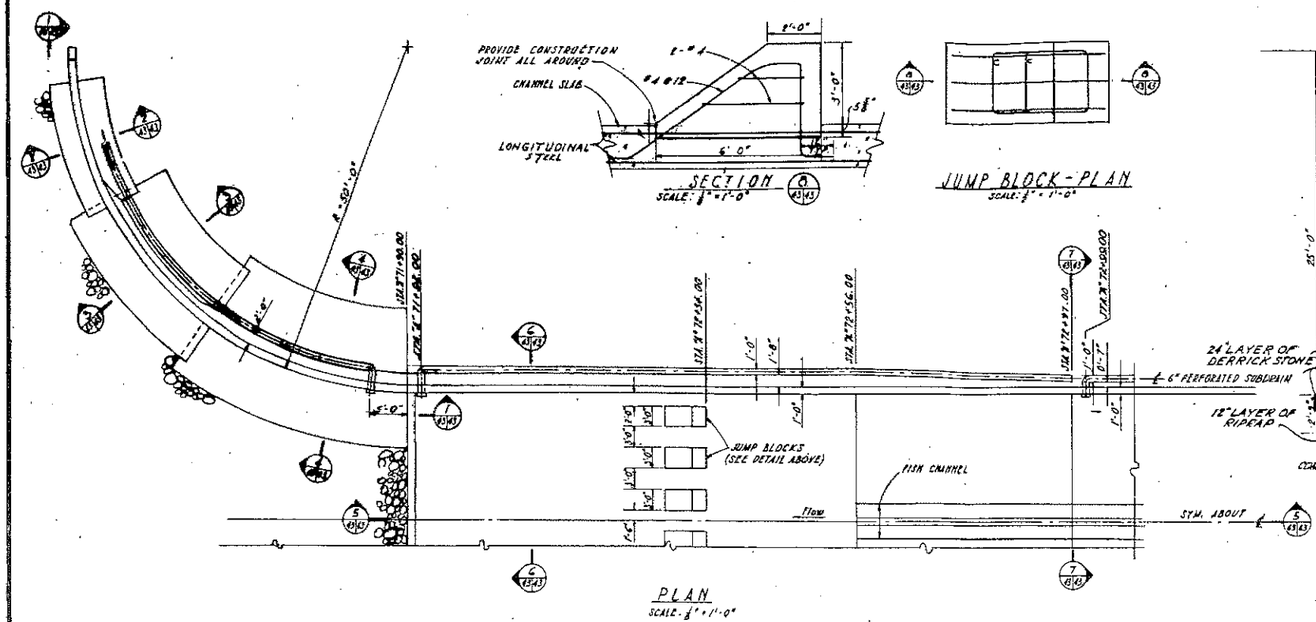
Graphic Scale 1"=50'

FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT
PLAN AND PROFILE
STA. B153+00 TO END OF PROJECT

IN 24 SHEETS | SCALE AS SHOWN | SHEET NO. 19
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS
DRAWN: M.Y.D. | FILE NO:
TRACED: M.Y.D.
CHECKED: A.C.B. | TO ACCOMPANY REPORT DATED DECEMBER 1965 | 62-39-13

EXHIBIT B PLATE 19



FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

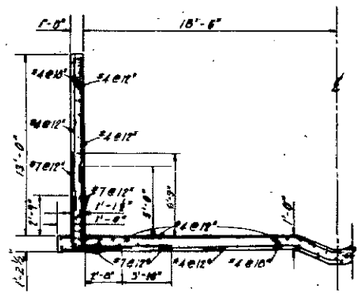
SAN LORENZO CREEK

CHANNEL IMPROVEMENT

TRANSITION AT STILLING BASIN

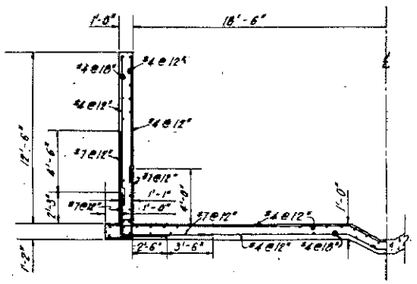
PLAN AND SECTIONS

W. 24 SHEETS	SCALE AS SHOWN	SHEET NO. 20
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS		
DRAWN: T.C.T.		FILE NO:
TRACED: T.C.T.	TO ACCOMPANY REPORT DATED DECEMBER 1962	62-39-13
CHECKED: A.C.B.		



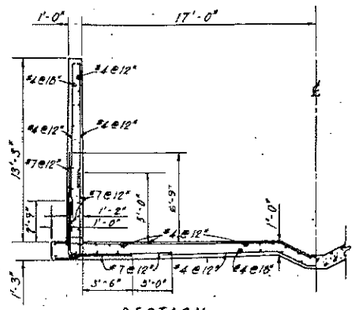
SECTION

SCALE: ½" = 1'-0"



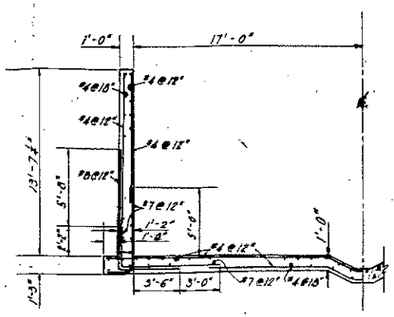
SECTION

SCALE: ½" = 1'-0"



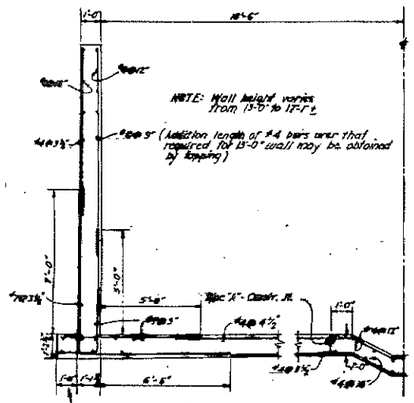
SECTION

SCALE: ½" = 1'-0"



SECTION

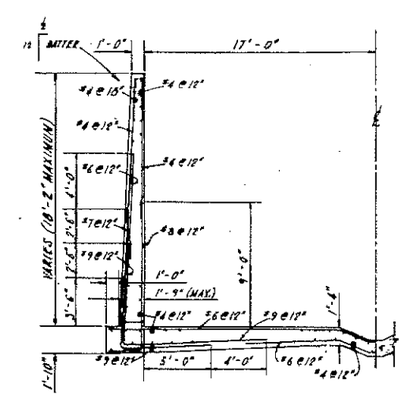
SCALE: ½" = 1'-0"



SECTION

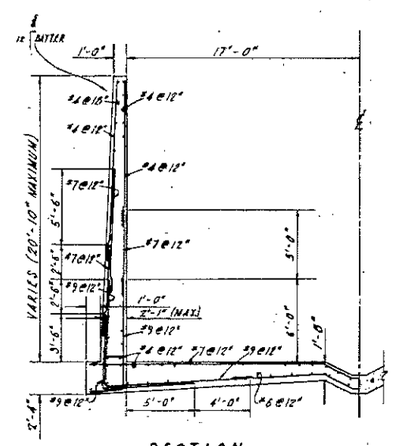
SCALE: ½" = 1'-0"

1'-0" projection may be omitted between Sta. "A" 115+35 and Sta. "A" 116+75 to facilitate construction under the Old Hesperian Bridge.



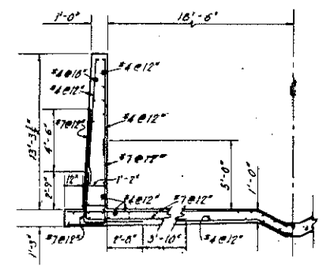
SECTION

SCALE: ½" = 1'-0"



SECTION

SCALE: ½" = 1'-0"

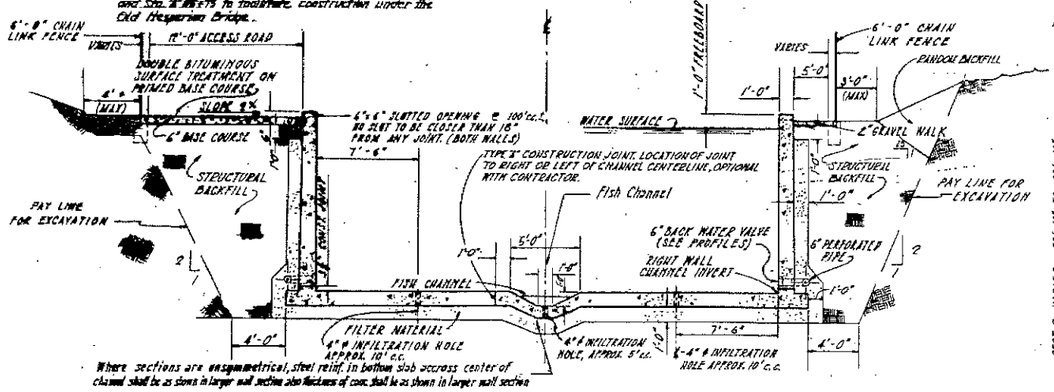


SECTION

SCALE: ½" = 1'-0"

GENERAL NOTES

1. Expansion Joints Shall Be Provided Where the Channel Structure Abuts On An Exist. Structure And As Noted On Drawings.
2. Construction Joints Shall Be Provided In The Channel Floor Slabs Wherever Concrete Pouring Is Stopped Periods Exceeding 45 Minutes.
3. Vertical Construction Joints Shall In General Be Provided At 50' Intervals On The Whole & Half Stations, Measured Along The Centerline Of Channel; However, The Minimum Shall Be No Less Than 30' From Other Joints And The Maximum Spacing Shall Not Exceed 60'. Vertical Construction Joints Shall Be Located To Coincide With Transverse Construction Joints.
4. ALL VERTICAL EXPANSION AND CONSTRUCTION JOINTS, EXCEPT TYPE "A", SHALL HAVE A ¾" CHAMFER AT EXPOSED FACES.
5. Station 119+00.24 = Equation: Sta "A" 119+00.24 Back = Sta "B" 0+00 Ahead
6. Stations Preceded By "A" Represent Lower Reach.
7. Stations Preceded By "B" Represent Upper Reach.

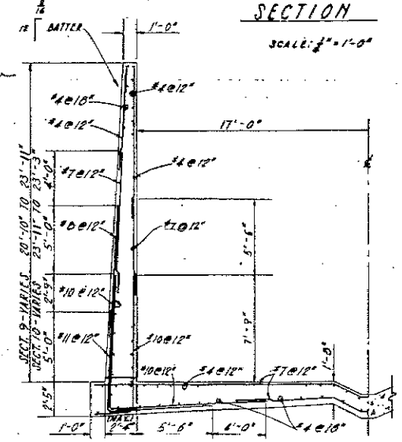


Where sections are unsymmetrical, steel reinf. in bottom slab across center of channel shall be as shown in larger wall section also thickness of conc. shall be as shown in larger wall section

TYPICAL SECTION

SCALE: ¼" = 1'-0"

NOTE: Infiltration holes shall be placed as shown from Sta. "A" 73+09 to Sta. "B" 136+87.



SECTION 23'-3" HIGH

SECTION 23'-8" HIGH

SCALE: ½" = 1'-0"

FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

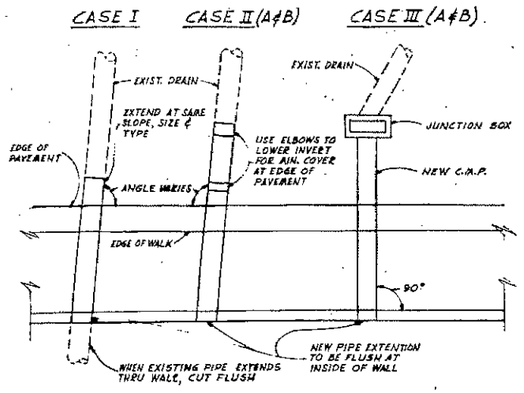
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK CHANNEL IMPROVEMENT

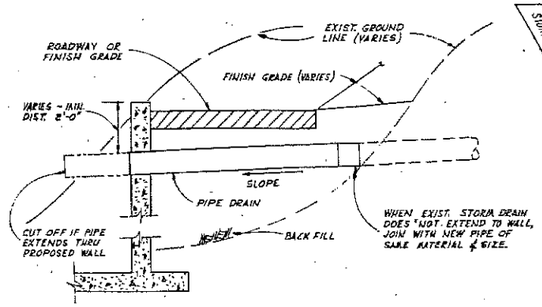
TYPICAL CHANNEL SECTIONS

IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 21
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO, CORPS OF ENGINEERS		FILE NO:
DRAWN: T.T. TRACED: R.L.J. CHECKED: A.C.B.	TO ACCOMPANY REPORT DATED DECEMBER 1962	62-39-13



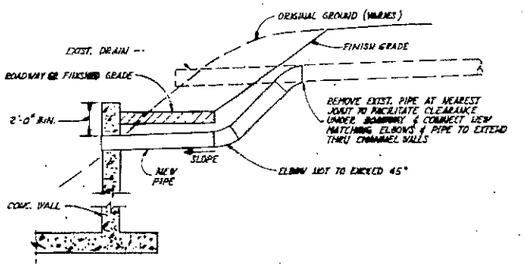
PLAN VIEW — TYPICAL EXTENSION CASES

(FOR SPECIFIC INSTALLATION CASE - SEE TABLE "A")



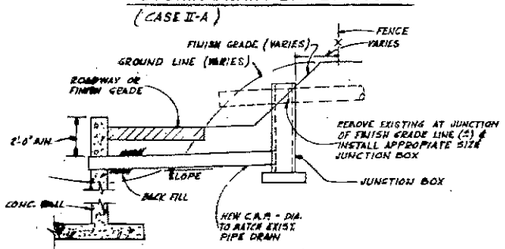
STORM DRAIN EXTENSION

(CASE I - ALL TYPES)



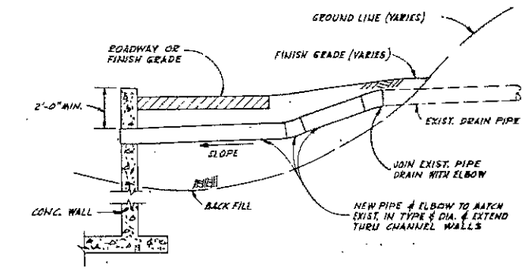
STORM DRAIN EXTENSION

(CASE II-A)



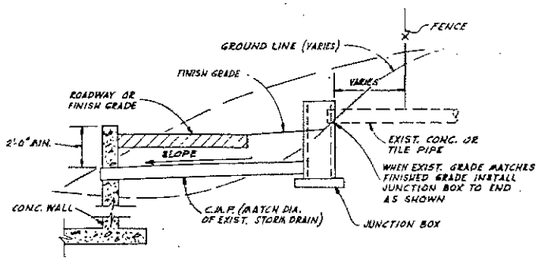
STORM DRAIN EXTENSION

(CASE II-A — CONC. PIPE OR TILE)



STORM DRAIN EXTENSION

(CASE II-B — C.M.P. STEEL OR IRON PIPE)



STORM DRAIN EXTENSION

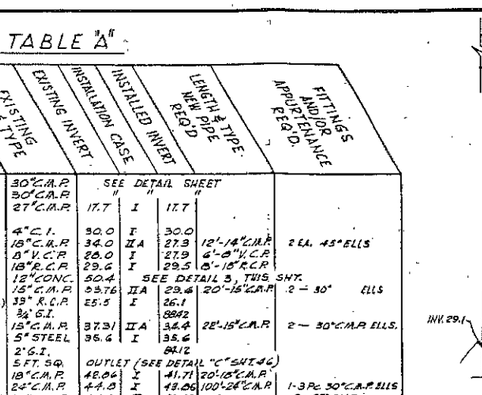
(CASE III-B — CONC. PIPE OR TILE)

TABLE "A"

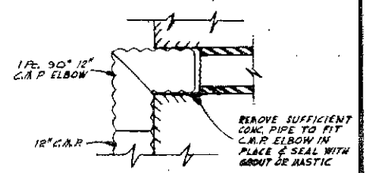
STORM DRAIN №	STATION	EXISTING SIZE & TYPE	EXISTING INVERT	INSTALLATION CASE	INSTALLED INVERT	LENGTH & TYPE NEW PIPE REQ'D	FITTINGS AND/OR APPURTENANCE REQ'D.
1.	A 1+67 (L)	30" C.M.P.	SEE DETAIL SHEET				
2.	A 2+61 (R)	30" C.M.P.	17.7	I	17.7		
3.	A 96+73 (L)	27" C.M.P.					
5.	A 115+18 (L)	4" C. I.	30.0	I	30.0		
6.	A 116+10 (R)	18" C.M.P.	34.0	II A	27.9	12'-14" C.M.P.	2 EA. 45° ELLS
7.	A 115+66 (R)	8" V.C.P.	28.0	I	27.9	6'-8" V.C.P.	
8.	A 116+36 (L)	18" R.C.P.	29.6	I	29.5	8'-18" R.C.P.	
9	A 117+68 (R)	12" CONC.	30.4	SEE DETAIL 3, THIS SHT.			
10.	B 2+93 (L)	15" C.M.P.	33.76	II A	29.6	20'-15" C.M.P.	2 — 30° ELLS
11.	B 4+36.58 (L)	33" R.C.P.	25.5	I	26.1		
	B 129+20 (R)	¾ G.I.			8842		
13.	B 12+36 (R)	15" C.M.P.	37.31	II A	36.4	28'-15" C.M.P.	2 — 30° C.M.P. ELLS.
14.	B 19+56 (L)	5" STEEL	36.6	I	35.6		
	B 131+86.05 (R)	2" G.I.			8812		
16	B 34+28 (L)	5 FT. SQ.	OUTLET (SEE DETAIL "C" SHT #6)				
17	B 37+12.5 (L)	18" C.M.P.	46.86	I	41.71	20'-18" C.M.P.	
18	B 49+02 (R)	24" C.M.P.	44.8	I	43.86	100'-24" C.M.P.	1-3 PC. 30° C.M.P. ELLS
19	B 65+49.2 (L)	12" C.M.P.	47.8	II	53.06	25'	2-45° ELLS
20	B 88+38.7 (R)	6" STEEL	67.5	I	62.58	20'-6" C.M.P.	SEE DETAIL, THIS SHT.
22	B 89+00.4 (L)	24" R.C.P.	65.9	I	63.13	28'-24" R.C.P.	} LIDT IN CONTRACT
23	B 90+82 (R)	10" C.M.P.	73.4	II A	64.3	30'-12" C.M.P.	
24	B 91+10 (R)	10" C. I.	64.2	I	63.46	48'-18" RCP.	
25	B 91+23, R)	18" R.C.P.	66.64	I	64.37	60'-18" R.C.P.	
26	B 94+36.9 (R)	96" C.M.P.	67.28	I	69.26	4'-36" C.M.P.	
27	B 109+77 (R)	24" R.C.P.	73.9	I	72.2	34" C.M.P.	
28	B 117+99 (R)	6" CONC.	80.4	II A	75.32	28'-12" C.M.P.	2-15° ELLS
29	B 120+69 (R)	30" CONC.	77.8	III B	74.8	20'-30" C.M.P.	J.B. TYPE II, 8' HIGH
	B 90+23 (L)	18" R.C.P.			61.99		
31	B 121+21 (R)	3" CONC.	77.8	I	76.02	10.4' V.C.P.	
32	B 122+51 (L)	4" C.I.	81.41	II A	79.25	20'-4" V.C.P.	2 - 15° ELLS
	B 90+65 (R)	18" R.C.P.			67.71		
	B 78+43.50 (R)	4" I.P.			58.61		
35	B 127+06 (L)	8" C.M.P.	79.6	I	77.01	38'-8" C.M.P.	
34	B 127+42 (R)	12" C.M.P.	86.14	II A	78.86	68'-18" C.M.P.	2- 25° ELLS
	B 28+50 (L)				40.30	12" R.C.P.	
	B 101+48 (L)	4" V.C.P.			74.0	12' 4" V.C.P.	
39	B 128+38 (R)	96" CONC.			75.59	SEE DETAIL 2, THIS SHT.	
	B 55+50 (R)	24" C.M.P.			90.06		
41	B 132+69 (L)	10" C.M.P.	86.7	II B	81.52	16'-10" C.M.P.	2 - 45° ELLS
42	B 133+85 (R)	15" C.M.P.	77.8	I	77.72	6'-15" C.M.P.	
43	B 140+38 (L)	18" C.M.P.	90.5	II B	84.32	30'-15" C.M.P.	2 - 30° ELLS
44	B 144+20 (L)	18" C.M.P.	104.7	II B	96.84	40'-15" C.M.P.	2 - 35° ELLS
45	B 144+30 (R)	24" C.M.P.			85.29	24" CONC.	
46	B 147+12 (R)	14" CONC.	95.0	II A	87.84	30'-15" C.M.P.	2 - 45° ELLS
47	B 148+28 (R)	15" CONC.	95.4	II A	89.68	50'-15" C.M.P.	2 - 30° ELLS
	B 0+19 (L)	21" R.C.P.	SEE DETAILS SHEET 4C				
49	B 148+62 (R)	27" CONC.	91.8	II A	88.10	30'-30" C.M.P.	2 - 45° ELLS
50	B 150+15 (R)	15" CONC.	95.0	II A	89.21	24'-18" C.M.P.	2 - 45° ELLS

NOTES:

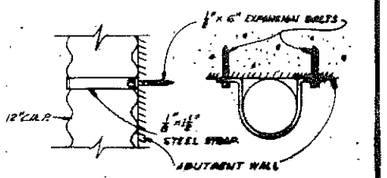
1. FOR TYPE "A & B" INSTALLATION OF STORM DRAINAGE PIPES, USE PIPE OF SAME SIZE AND TYPE UNLESS OTHERWISE INDICATED.
2. FOR TYPE "C" INSTALLATION OF STORM DRAINAGE PIPE USE C.M.P. ONLY FROM JUNCTION BOX TO CHANNEL WALL.
3. FOR JUNCTION BOX (J.B.) HEIGHT OF J.B. GIVEN IN TABLE "A" ARE APPROXIMATE.
4. MINIMUM COVER OF ALL STORM DRAINS EXTENSIONS SHALL BE NOT LESS THAN 12 INCHES.



ELEVATION



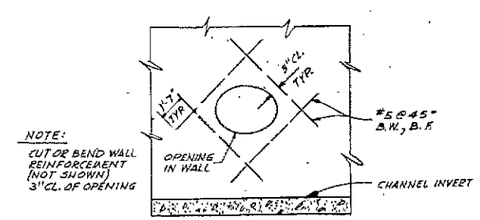
DETAIL "B"



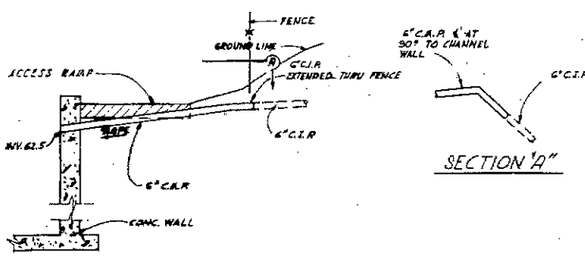
DETAIL "C"

DRAIN EXTENSION — CULVERT № 9

STA. "A" 117+60 (R+)

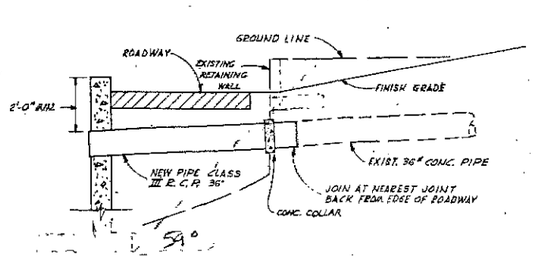


DIAGONAL REINFORCEMENT AT WALL OPENINGS



STORM DRAIN 20 (STA. "B" 88+38.7 (R)

SECTION "A"



DRAIN EXTENSION — CULVERT № 39 (STA. "B" 128+38 (R))

FLOOD CONTROL

SAN LORENZO CREEK FLOOD CONTROL PROJECT

ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

SAN LORENZO CREEK

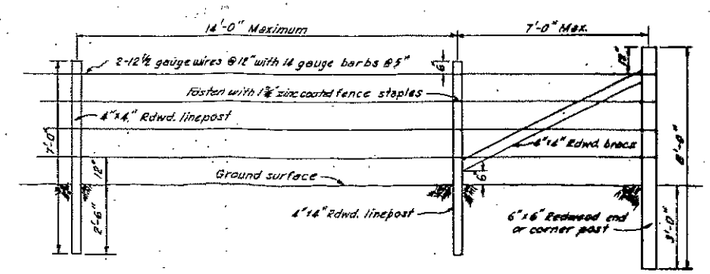
CHANNEL IMPROVEMENT

EXISTING STORM DRAINAGE MODIFICATIONS DETAILS.

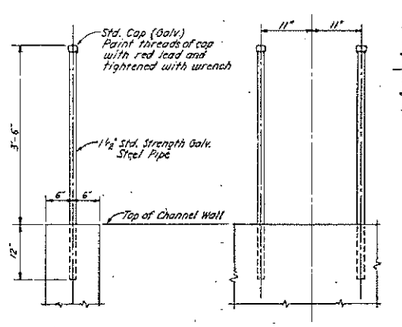
IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 22
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO,		CORPS OF ENGINEERS
DESIGNED W.C.B.		FILE NO.
TRACED W.C.B.	TO ACCOMPANY REPORT DATED DECEMBER 1962	62-39-13
CHECKED A.C.B.		

MODIFIED SPIRAL TABLE

SPIRAL NO.	CHORD	℄ L_s	$\triangle_s$	℄ X	℄ Y	℄ Chord	℄ U	℄ V	OFF-SET R=18.5' X	OFF-SET R=18.5' Y	OFF-SET R=18.5' Chord	OFF-SET R=18.5' U	OFF-SET R=18.5' V	OFF-SET R=18.5' X	OFF-SET R=18.5' Y	OFF-SET R=18.5' Chord	OFF-SET R=18.5' U	OFF-SET R=18.5' V	OFF-SET R=17.0' X	OFF-SET R=17.0' Y	OFF-SET R=17.0' Chord	OFF-SET R=17.0' U	OFF-SET R=17.0' V	OFF-SET R-17.0' X	OFF-SET R-17.0' Y	OFF-SET R-17.0' Chord	OFF-SET R-17.0' U	OFF-SET R-17.0' V
340	0-1	12.5	0°-05'-40"	12.50	0.01	12.50	6.25	6.25	12.53	0.02	12.53	6.27	6.26	12.47	0.01	12.47	6.23	6.23	12.53	0.01	12.53	6.26	6.26	12.47	0.01	12.47	6.23	6.24
	1-2	25.0	0°-22'-40"	25.00	0.06		15.62	9.38	25.12	0.06	12.60	15.68	9.44	24.88	0.06	12.41	15.56	9.32	25.11	0.06	12.58	15.68	9.43	24.89	0.06	12.42	15.56	9.33
	2-3	37.5	0°-51'-00"	37.50	0.20		24.31	13.19	37.77	0.20	12.65	24.44	13.33	37.22	0.19	12.35	24.17	13.05	37.75	0.20	12.64	24.43	13.32	37.25	0.19	12.36	24.19	13.06
	3-4	50.0	1°-30'-40"	50.00	0.45		32.82	17.19	50.48	0.46	12.71	33.06	17.43	49.51	0.45	12.29	32.58	16.95	50.44	0.46	12.70	33.04	17.41	49.55	0.45	12.30	32.60	16.97
	4-5	62.5	2°-21'-40"	62.49	0.88		41.26	21.25	63.25	0.89	12.77	41.64	21.63	61.73	0.86	12.23	40.88	20.87	63.19	0.89	12.75	41.61	21.60	61.79	0.86	12.25	40.91	20.90
	5-6	75.0	3°-24'-00"	74.97	1.50		49.65	25.36	76.07	1.54	12.83	50.20	25.91	73.88	1.47	12.16	49.10	24.81	75.98	1.53	12.81	50.16	25.86	73.96	1.47	12.19	49.14	24.85
	6-7	87.5	4°-37'-40"	87.44	2.38		58.06	29.48	88.93	2.44	12.90	58.61	30.23	85.95	2.32	12.10	57.31	28.73	88.81	2.43	12.86	58.75	30.17	86.07	2.32	12.14	57.37	28.79
480	0-1	12.5	0°-07'-00"	12.50	0.01		6.25	6.25	12.54	0.01	12.54	6.27	6.27	12.46	0.01	12.46	6.23	6.23	12.53	0.01	12.53	6.27	6.27	12.46	0.01	12.47	6.23	6.23
	1-2	25.0	0°-28'-00"	25.00	0.08		15.62	9.38	25.15	0.08	12.61	15.70	9.45	24.85	0.07	12.39	15.54	9.31	25.14	0.08	12.60	15.70	9.45	24.86	0.08	12.40	15.55	9.31
	2-3	37.5	1°-03'-00"	37.50	0.24		24.31	13.19	37.84	0.24	12.69	24.48	13.36	37.16	0.24	12.31	24.14	13.02	37.81	0.24	12.67	24.46	13.35	37.19	0.24	12.33	24.15	13.03
	3-4	50.0	1°-52'-00"	49.99	0.56		32.82	17.19	50.60	0.57	12.76	33.12	17.49	49.39	0.55	12.24	32.52	16.89	50.55	0.57	12.74	33.09	17.47	49.44	0.55	12.26	32.54	16.91
	4-5	62.5	2°-55'-00"	62.48	1.08		41.25	21.26	63.42	1.11	12.84	41.72	21.73	61.54	1.06	12.16	40.78	20.79	63.35	1.10	12.81	41.68	21.69	61.62	1.06	12.19	40.82	20.83
	5-6	75.0	4°-12'-00"	74.96	1.86		49.67	25.36	76.31	1.91	12.91	50.35	26.04	73.60	1.81	12.09	48.99	24.68	76.20	1.90	12.88	50.29	25.98	73.71	1.81	12.12	49.05	24.74
520	0-1	12.5	0°-08'-40"	12.50	0.02		6.25	6.25	12.55	0.02	12.55	6.27	6.27	12.45	0.02	12.45	6.23	6.23	12.54	0.02	12.54	6.27	6.27	12.46	0.02	12.46	6.23	6.23
	1-2	25.0	0°-34'-40"	25.00	0.09		15.62	9.38	25.19	0.10	12.64	15.71	9.47	24.81	0.09	12.36	15.53	9.29	25.17	0.10	12.63	15.71	9.46	24.83	0.09	12.37	15.53	9.29
	2-3	37.5	1°-18'-00"	37.50	0.30		24.30	13.20	37.92	0.30	12.73	24.51	13.41	37.08	0.29	12.27	24.09	12.99	37.88	0.30	12.71	24.49	13.39	37.11	0.29	12.29	24.11	13.01
	3-4	50.0	2°-18'-40"	49.99	0.69		32.81	17.19	50.74	0.71	12.83	33.19	17.56	49.25	0.68	12.17	32.43	16.82	50.68	0.71	12.80	33.15	17.53	49.31	0.68	12.20	32.46	16.85
	4-5	62.5	3°-30'-40"	62.47	1.34		41.26	21.26	63.24	1.38	12.92	41.84	21.84	61.31	1.30	12.08	40.68	20.68	63.14	1.37	12.89	41.80	21.80	61.40	1.30	12.11	40.72	20.72
	5-6	75.0	5°-12'-00"	74.94	2.30		49.67	25.37	76.61	2.38	13.01	50.51	26.21	73.26	2.22	11.99	48.83	24.53	76.48	2.37	12.97	50.44	26.14	73.40	2.23	12.03	48.90	24.60
	6-7	87.5	7°-04'-40"	87.36	3.64		58.08	29.51	89.64	3.78	13.10	59.22	30.65	85.08	3.49	11.89	56.93	28.37	89.46	3.77	13.06	59.13	30.56	85.27	3.51	11.94	57.03	28.46
720	0-1	12.5	0°-12'-00"	12.50	0.02		6.25	6.25	12.56	0.02	12.56	6.28	6.28	12.43	0.02	12.43	6.22	6.22	12.56	0.02	12.56	6.28	6.28	12.44	0.02	12.44	6.22	6.22
	1-2	25.0	0°-48'-00"	25.00	0.13		15.62	9.38	25.26	0.13	12.69	15.75	9.51	24.74	0.13	12.31	15.49	9.25	25.24	0.13	12.68	15.74	9.50	24.76	0.13	12.32	15.50	9.26
	2-3	37.5	1°-45'-00"	37.50	0.41		24.31	13.20	38.08	0.42	12.82	24.60	13.49	36.91	0.40	12.18	24.02	12.91	38.03	0.42	12.80	24.58	13.47	36.96	0.41	12.20	24.04	12.93
	3-4	50.0	3°-12'-00"	49.98	0.96		32.82	17.19	51.02	0.99	12.95	33.34	17.71	48.95	0.93	12.05	32.30	16.67	50.93	0.99	12.91	33.29	17.67	49.03	0.93	12.08	32.35	16.71
	4-5	62.5	5°-00'-00"	62.45	1.85		41.26	21.27	64.06	1.92	13.08	42.07	22.08	60.84	1.78	11.92	40.45	20.46	63.93	1.92	13.03	42.00	22.01	60.97	1.79	11.96	40.51	20.53
	5-6	75.0	7°-12'-00"	74.88	3.18		49.69	25.39	77.20	3.33	13.21	50.85	26.55	72.56	3.04	11.79	48.53	24.23	77.01	3.32	13.15	50.76	26.50	72.75	3.05	11.85	48.62	24.32
	6-7	87.5	9°-48'-00"	87.24	5.03		58.12	29.55	90.39	5.30	13.34	59.71	31.13	84.09	4.76	11.66	56.53	27.96	90.13	5.28	13.27	59.50	31.01	84.35	4.78	11.73	56.66	28.09
1080	0-1	12.5	0°-18'-00"	12.50	0.03		6.25	6.25	12.60	0.03	12.60	6.30	6.30	12.40	0.03	12.40	6.20	6.20	12.59	0.03	12.59	6.29	6.29	12.41	0.03	12.41	6.21	6.21
	1-2	25.0	1°-12'-00"	25.00	0.20		15.62	9.38	25.39	0.20	12.79	15.81	9.57	24.61	0.19	12.21	15.43	9.19	25.35	0.20	12.77	15.80	9.56	24.64	0.19	12.23	15.44	9.20
	2-3	37.5	2°-47'-00"	37.49	0.62		24.30	13.20	38.36	0.64	12.98	24.74	13.63	36.62	0.60	12.02	23.82	12.76	38.29	0.64	12.94	24.70	13.60	36.69	0.60	12.05	23.90	12.80
	3-4	50.0	4°-48'-00"	49.96	1.44		32.82	17.20	51.51	1.50	13.18	33.60	17.97	48.42	1.37	11.82	32.04	16.42	51.39	1.50	13.12	33.53	17.91	48.54	1.38	11.88	32.11	16.49
	4-5	62.5	7°-30'-00"	62.39	2.78		41.29	21.28	64.81	2.94	13.37	42.50	22.49	59.96	2.62	11.63	40.08	20.07	64.61	2.92	13.30	42.40	22.39	60.17	2.63	11.70	40.18	20.16
	5-6	75.0	10°-48'-00"	74.73	4.77		49.75	25.43	78.20	5.09	13.56	51.50	27.18	71.76	4.44	11.43	48.00	23.68	77.91	5.07	13.48	51.36	27.04	71.54	4.46	11.52	48.14	23.82

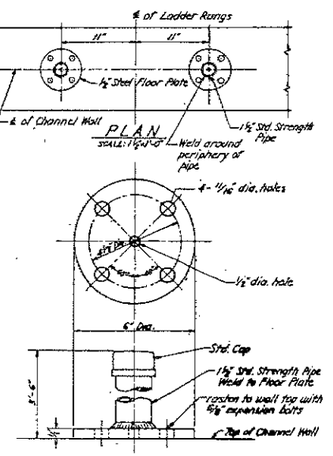


TYPICAL LINE, CORNER & END BARBED WIRE FENCE DETAIL
SCALE: 1½"=1'-0"



NOTE:
Hand Posts may be installed at time of wall construction or a 3" hole provided for separate installation. Hand Posts installed by separate installation shall be firmly and securely grouted in place with cap removed. Secure cap after grout sets.

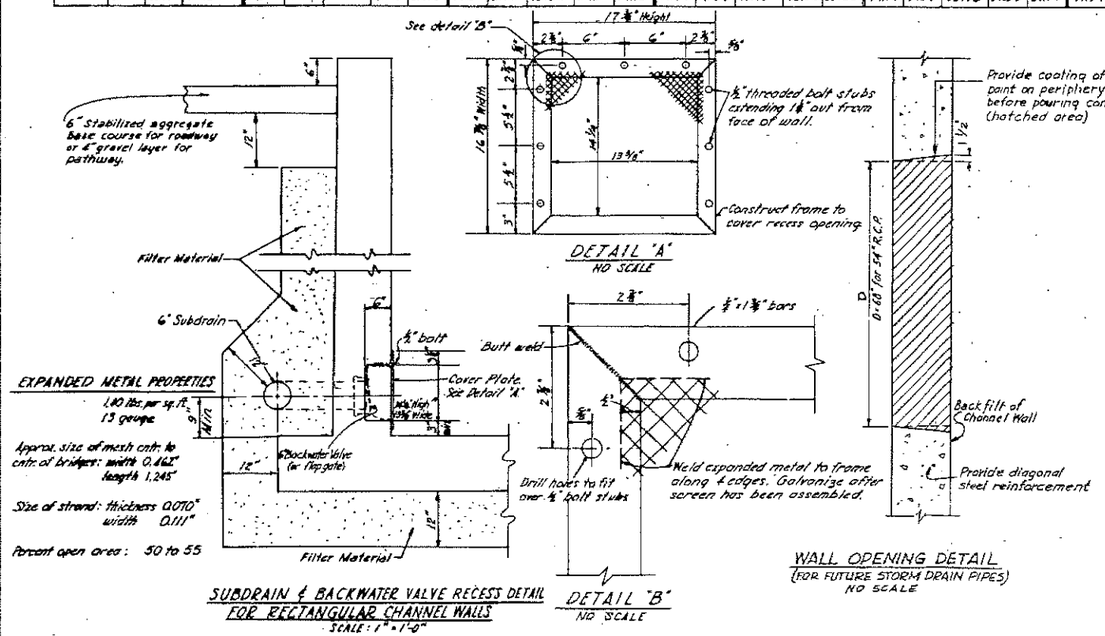
HAND POSTS DETAIL
For All Ladders Above Meekland Ave. (Sta. "B" 35+04)
SCALE: 1"=1'-0"

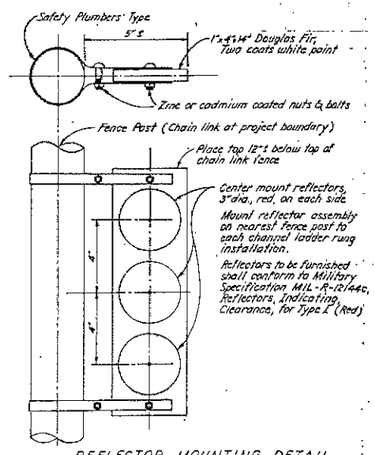


FLOOR PLATE DETAIL
SCALE: ½"=1'

NOTE: Hand Posts assembly to be hot dipped galv. after fabrication.

HAND POSTS DETAIL
For All Ladders Below Meekland Ave. (Sta. "B" 35+04)



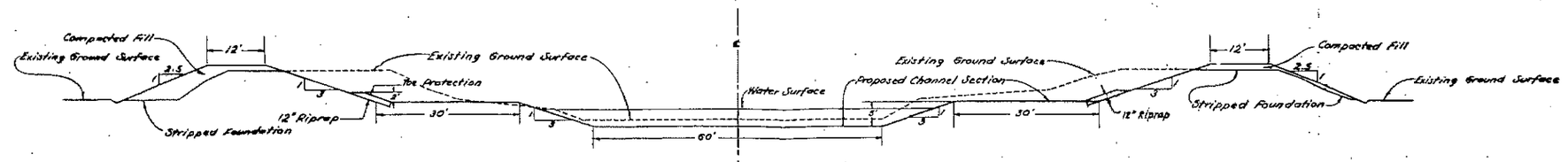


REFLECTOR MOUNTING DETAIL
NOT TO SCALE

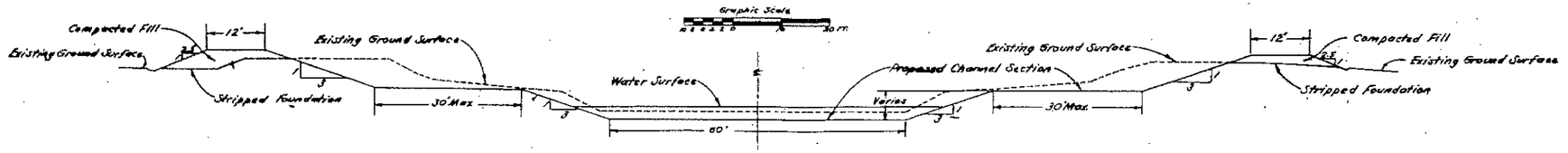
FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT
MODIFIED SPIRAL DATA, BARBED WIRE FENCE DETAILS, VERTICAL WALL, DRAINAGE WELLS.

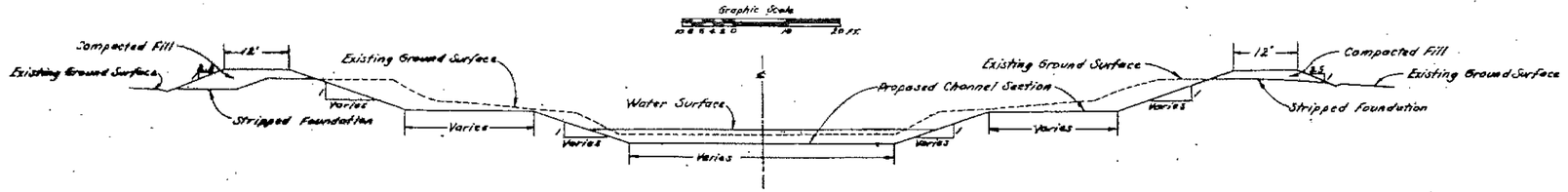
IN 24 SHEETS	SCALE AS SHOWN	SHEET NO. 23
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO,		CORPS OF ENGINEERS
DRAWN: W.M.		FILE NO:
TRACED: W.M.	TO ACCOMPANY REPORT	62-39-13
CHECKED: R.E.B.	DATED DECEMBER 1962	



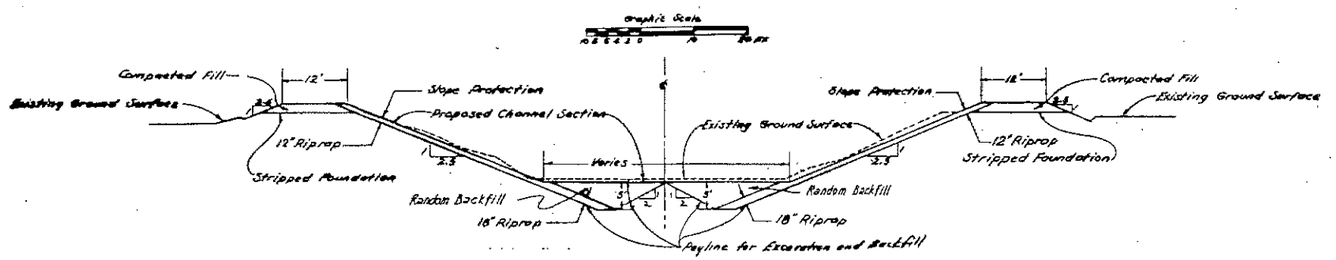
Sta. A 0+00 to Sta. A 6+00



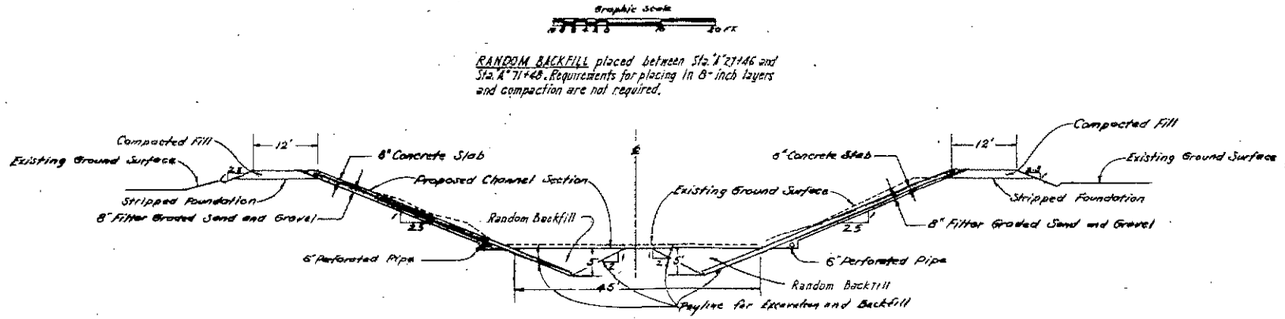
Sta. A 6+00 to Sta. A 26+76



Sta. A 26+76 to Sta. A 27+46



Sta. A 27+46 to Sta. A 34+00



Sta. A 34+00 to Sta. A 71+38

Graphic Scale

RANDOM BACKFILL placed between Sta. A 27+46 and Sta. A 71+48. Requirements for placing in 8-inch layers and compaction are not required.

FLOOD CONTROL
SAN LORENZO CREEK FLOOD CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

OPERATION AND MAINTENANCE MANUAL
SAN LORENZO CREEK
CHANNEL IMPROVEMENT

TYPICAL LEVEE SECTIONS

IN 24 SHEETS
U.S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
DRAWN: E.D.
TRACED: W.A.
CHECKED: R.C.M.
SCALE AS SHOWN
TO ACCOMPANY REPORT DATED DECEMBER 1962
SHEET NO. 24
CORPS OF ENGINEERS
FILE NO:
62-39-13

EXHIBIT B PLATE 24

CHECK LIST NO. 1

Date: _____

Report number of places requiring maintenance work opposite each item listed below. A separate report should be submitted describing the necessary maintenance work for each location.

SAN LORENZO CREEK LEVEES

Item No.	Description	Number of Places
1	Settlement, sloughing or loss of grade	
2	Caving on either sides of levee	
3	Seepage, saturated levee	
4	Drainage or toe ditches at landside and slope	
5	Riprap	
6	Channel siltation	
7	Protective planting (sod)	
8	Access roads and ramps	
9	Barricades on access roads	
10	Levee crown	
11	Authorized traffic	
12	Unauthorized encroachment on rights-of-way	
13	Unauthorized excavation	
14	Accumulations of drift, trash or debris	
15	Weeds or undesirable vegetation	
16	Inappropriate burning	
17	Damage by burrowing animals	
18	Conduits	
19	Flapgates	
20	Miscellaneous pipe crossings	

EXHIBIT C

CHECK LIST NO. 1b

Date _____

Report number of places requiring maintenance work opposite each item listed below. A separate report should be submitted describing the necessary maintenance work for each location.

CONCRETE LINED CHANNEL

Item No.	Description	Number of Places
1.	Settlement of walls	
2.	Cracks, chips or broken concrete	
3.	Subdrain and outlet wells	
4.	Subdrain flapgates and cover plates	
5.	Encroachment on channel	
6.	Riprap	
7.	Silt, trash and debris	
8.	Fish channel	
9.	Fish channel baffle plates	
10.	Infiltration holes	
11.	Access ladders	
12.	Access roads	
13.	Fencing, gates and padlocks	
14.	Walkways	

EXHIBIT C

GENERAL

1. What maintenance measures will be required during the next six months?

2. Are these repairs considered beyond the scope of local funds? (If yes, explain)

3. In your opinion, what can be done to improve maintenance and operation of the flood-control project?

   a. By your agency:

   b. By the United States:

EXHIBIT C

Concrete-Lined Channel (continued)

Feature	Date of Insp.	Location	Condition	Date Work Accomplished	Location or Extent	Equipment Used	Time required to Complete	Cost	No. of Personnel
Access ladders									
6-inch subdrain lines, flushing & debris removal									
Leaks or disrupted subdrain lines due to settlement									
6-inch flapgates									

REMARKS: (Include any pertinent information not reported above.)

EXHIBIT C

Levees (continued)

Feature	Date of Insp.	Location	Condition	Date Work Accomplished	Location or Extent	Equipment Used	Time required to Complete	Cost	No. of Personnel
Debris and silt removal									
Barricades									
Conduits									
Flapgates									
Drainage or toe ditches									

Concrete-Lined Channel

Cracked, chipped or broken concrete									
Debris and silt removal									
Fish channel and baffle plates									
Settlement and loss of backfill									
Fencing and gates									

EXHIBIT C

SEMI-ANNUAL REPORT
FOR

INSPECTION, MAINTENANCE AND OPERATION

OF
SAN LORENZO CREEK FLOOD-CONTROL PROJECT
ALAMEDA COUNTY, CALIFORNIA

Period From: _____

To: _____

Submitted by: _____

Date: _____

INSPECTION LEVEES MAINTENANCE

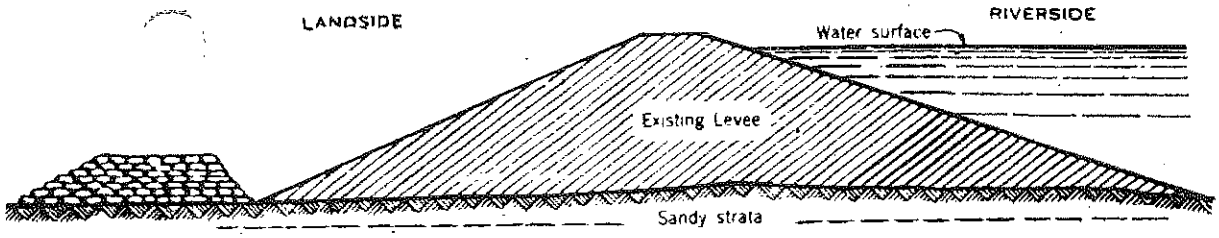
Feature	Date of Insp.	Location	Condition	Date Work Accomplished	Location or Extent	Equipment Used	Time required to Complete	Cost	No. of Personnel
Settlement, sloughing, or loss of grade									
Caving or erosion of levee slopes									
Dislodged or displaced riprap									
Roadway on levee crown									
Access ramps									

EXHIBIT C

Levees - (Continued)

Feature	Date of Insp.	Location	Condition	Date Work Accomplished	Location or Extent	Equipment Used	Time required to Complete	Cost	No. of Personnel
Unauthorized excavation									
Weeds or undesirable vegetation									
Animal burrows									
Seepage or sand boils									
Sod on levee slopes									
Inappropriate burning									
Unauthorized encroachment on rights-of-way									

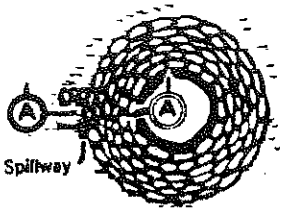
EXHIBIT C

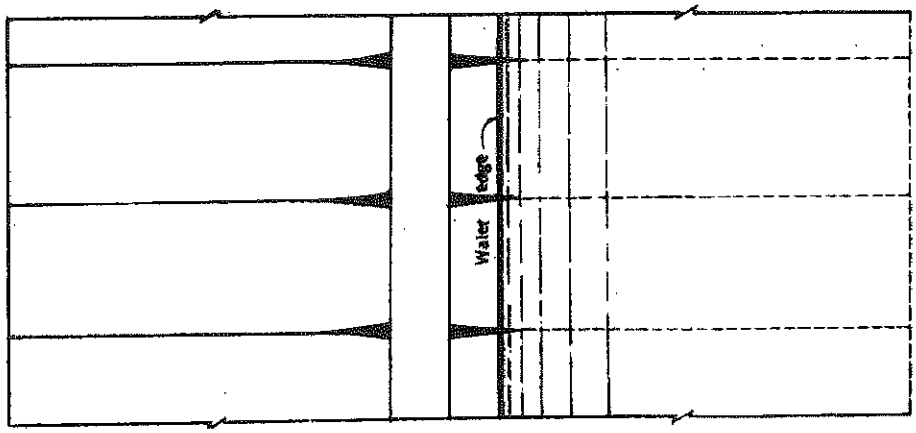


Note.
Bottom width to be no less than 1½ times height
Be sure to clear sand discharge
Tie into levee if boil is near toe.

ELEVATION

SECTION A-A





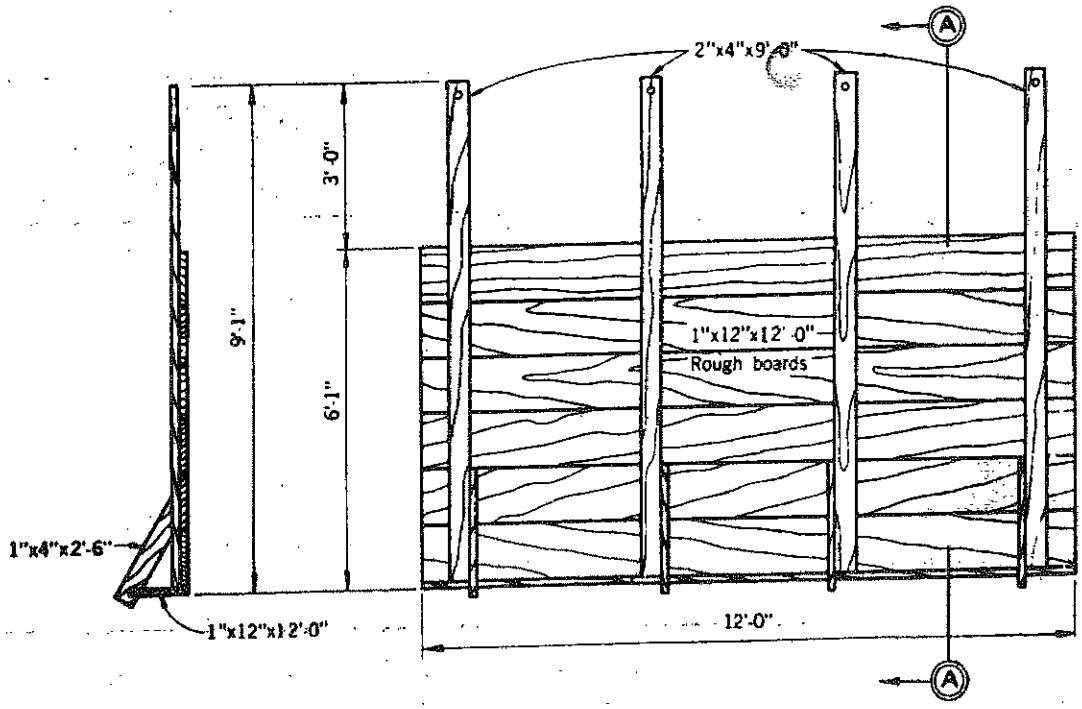
PLAN

Note:
Do not sack boil which does not put out material.
Height of sack loop or ring should be only sufficient to create enough head to slow down flow through boil so that no more material is displaced and boil runs clear.
Never attempt to completely stop flow through boil.

FLOOD EMERGENCY CONSTRUCTION

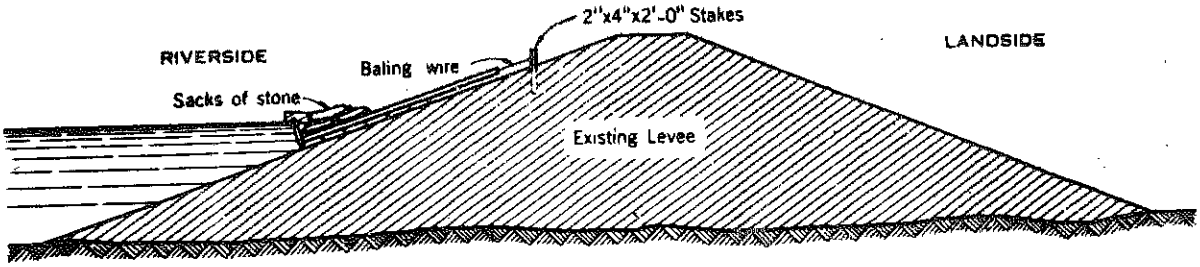
CONTROL OF SAND BOILS

U.S. ARMY ENGINEER DISTRICT SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA



SECTION A-A

PLAN



SECTION

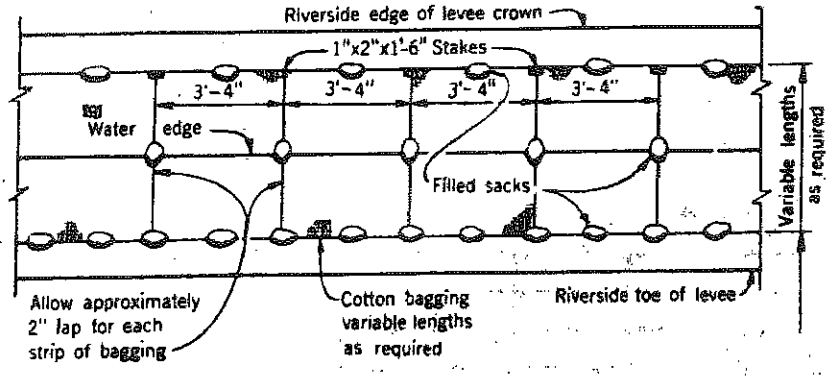
BILL OF MATERIAL FOR 100 FEET
LUMBER
56 pieces 1"x12"x12'-0" 32 pieces 1"x4"x2'-6" 32 pieces 2"x4"x9'-0" * 32 pieces 2"x4"x2'-0" * (Sharpened)
WIRE
200' baling wire
NAILS
4½ lbs. 8d nails

FLOOD EMERGENCY CONSTRUCTION

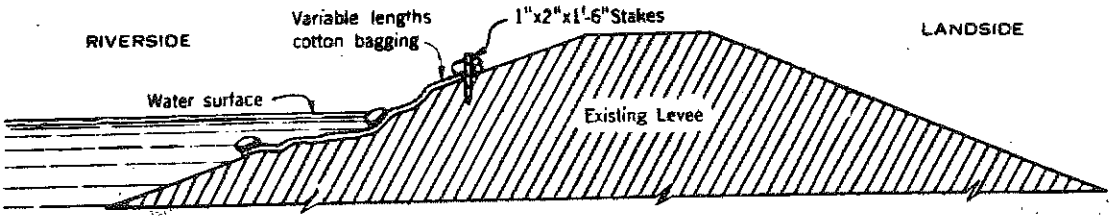
MOVABLE WAVE WASH PROTECTION

U.S. ARMY ENGINEER DISTRICT SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

EXHIBIT D - PLATE 2



PLAN



SECTION

Note:

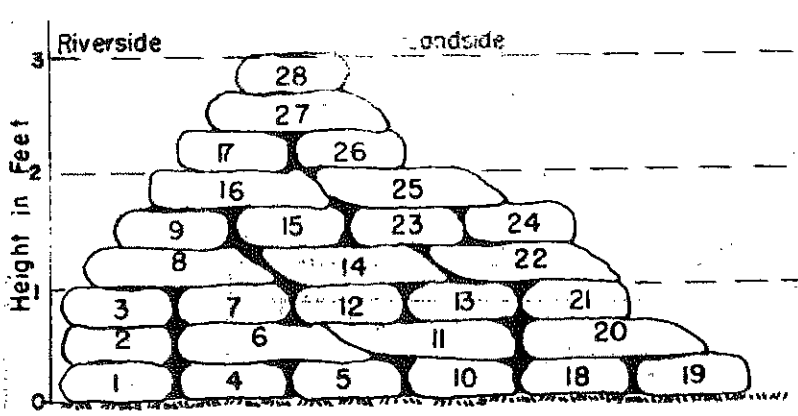
Lay lengths as required of cotton bagging approximately parallel with levee slope and across damaged section Weight top and edges of bagging with filled sacks as shown above The filled sacks should be wired or tied to each strip before laying in place. Stake the corners of each strip above water surface. Where cotton bagging is not available burlap sacking may be substituted.

MATERIAL REQUIRED FOR 100 LINEAR FEET OF LEVEE
LUMBER
30 Stakes 1"x2"x1'-6" (Sharpened)
SANDBAGS
120 sand bags Cotton bagging as required

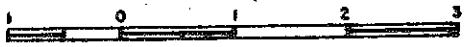
FLOOD EMERGENCY CONSTRUCTION

WAVE WASH PROTECTION

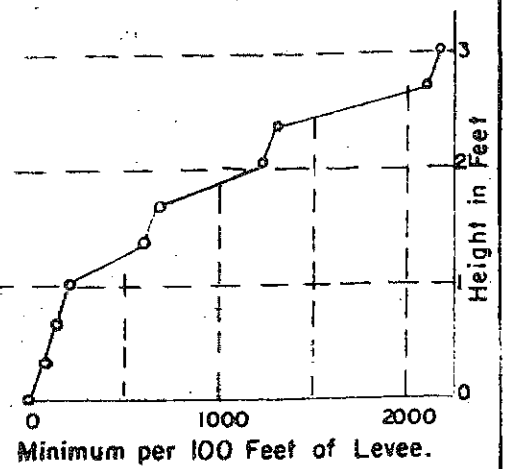
U.S. ARMY ENGINEER DISTRICT SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA



SANDBAG LEVEE CROSS SECTION



Scale in feet



Minimum per 100 Feet of Levee.

NUMBER OF SANDBAGS

Notes:

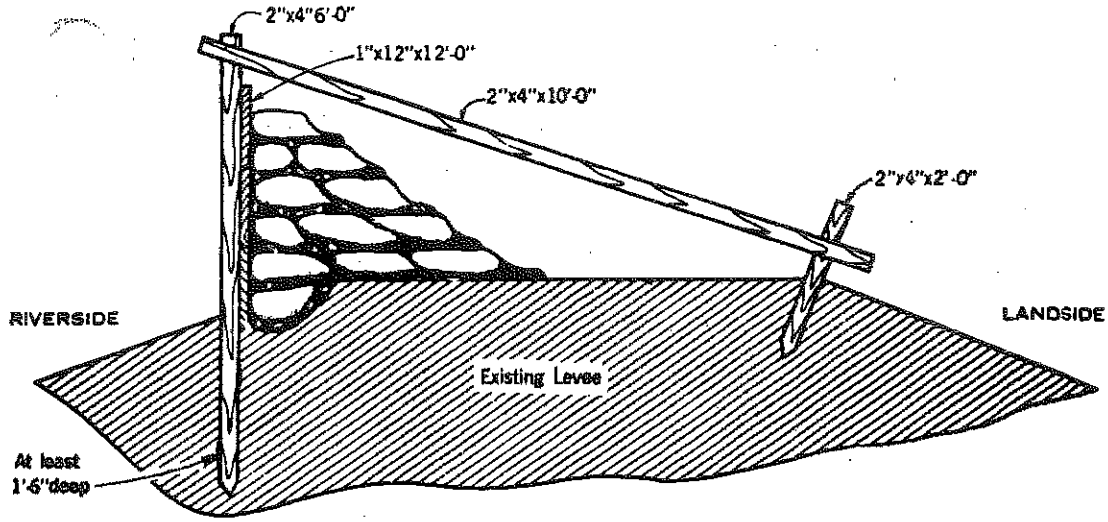
1. Entire base to be cleared and scarified.
2. Best material for filling sandbags is a fine sand or coarse silt. Avoid, as much as possible, the use of coarse gravel and heavy clays.
3. Fill sandbags 1/2 to 2/3 full, 50 to 60 pounds, and leave enough flap to turn under. Do not tie.
4. Numbers shown on the sandbags are for the general order of placing the sandbags to give the highest protection with the minimum number of sandbags.
5. When bags are placed, flatten out and fill voids by mashing bags with feet and vigorously tramping each course of the levee section. Provide a levee section as impervious to water as possible. Alternate direction of sacks and stagger joints wherever practical.
6. The above section is based upon an average in place sandbag section of 4" x 12" x 18".

FLOOD EMERGENCY CONSTRUCTION

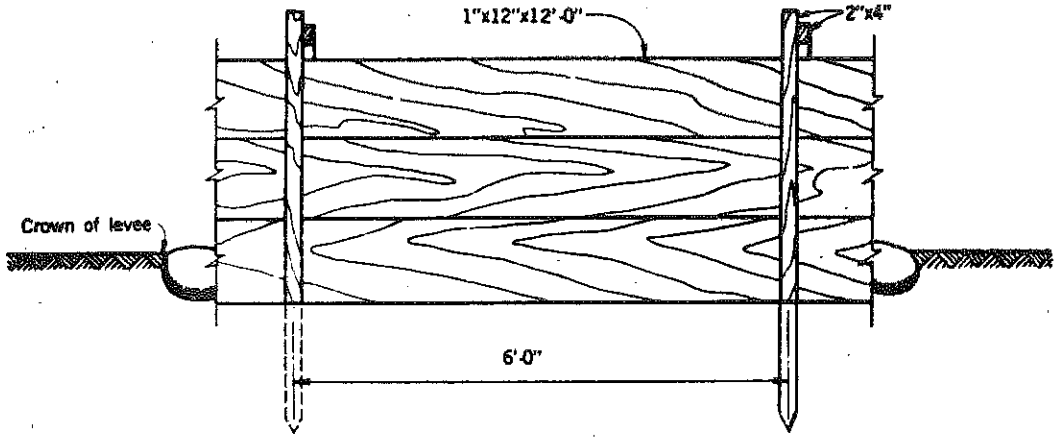
SACK TOPPING

U.S. ARMY ENGINEER DISTRICT SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO CALIFORNIA

EXHIBIT D - PLATE 4



SECTION



FRONT ELEVATION

BILL OF MATERIAL FOR 100 LINEAR FEET OF LEVEE
LUMBER
25 pieces 1"x12"x12'-0" 17 pieces 2"x4"x10'-0" * 17 pieces 2"x4"x6'-0" * 17 pieces 2"x4"x2'-0" * (Sharpened)
NAILS
1 lb. 8d nails 2 lbs. 16d nails
SANDBAGS
1100 bags

FLOOD EMERGENCY CONSTRUCTION

LUMBER AND SACK TOPPING

U.S. ARMY ENGINEER DISTRICT SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO, CALIFORNIA

EXHIBIT D - PLATE 5

COPY

BOARD OF SUPERVISORS

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RESOLUTION NO. 2544

WHEREAS, the San Francisco District Engineer, Corps of Engineers, U.S. Army, has advised this District that the Corps of Engineers' plans and specifications for improvement of San Lorenzo Creek, Alameda County, California, for Flood Control and Allied Purposes have been substantially completed; and

WHEREAS, the San Francisco District Engineer, Corps of Engineers, U.S. Army, has requested assurances satisfactory to the Secretary of the Army that local interests will meet the conditions of local co-operation on said project;

NOW, THEREFORE, BE IT RESOLVED that the Alameda County Flood Control and Water Conservation District will:

a. Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project;

b. Make all necessary vehicular bridge and utility alterations or replacements;

c. Contribute 2.6 per cent of the actual cost of the channel improvements, levees, and railroad bridge revisions, or perform the equivalent thereof in construction of such improvements;

d. Hold and save the United States free from damages due to the construction works;

e. Maintain and operate the project after completion in accordance with regulations prescribed by the Secretary of the Army; and

f. Prevent encroachment on the project channels which might interfere with their proper functioning for flood control.

I certify that the foregoing is a correct copy of a resolution adopted by the Board of Supervisors of the Alameda County Flood Control and Water Conservation District on Sept 28, 1958 19__. Attest Sept 28, 1958
JACK G. BLUE, County Clerk
By Yvonne Quan

EXHIBIT E

COPY

BOARD OF SUPERVISORS

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RESOLUTION NO. E. 2431

WHEREAS, the Alameda County Flood Control and Water Conservation District has agreed to provide all necessary rights of way for the Federal project for the improvement of San Lorenzo Creek; and

WHEREAS, certain parcels required for the said project have been acquired by the Alameda County Flood Control and Water Conservation District, either by grant, purchase, or condemnation; and

WHEREAS, the Alameda County Flood Control and Water Conservation District is now in a position to certify to the United States Army Corps of Engineers that those certain rights of way for the Federal project on San Lorenzo Creek have been acquired.

NOW, THEREFORE, BE IT RESOLVED that the Alameda County Flood Control and Water Conservation District hereby certifies to the United States Army Corps of Engineers that all rights of way necessary for the Federal Project on San Lorenzo Creek from San Francisco Bay upstream to Meekland Avenue, Hayward, have been acquired either by grant, purchase, or condemnation; and

BE IT FURTHER RESOLVED that the Alameda County Flood Control and Water Conservation District hereby authorizes the United States Army Corps of Engineers, its contractors, sub-contractors, agents and authorized personnel permission to enter immediately upon those parcels of land along San Lorenzo Creek from San Francisco Bay upstream to Meekland Avenue,

EXHIBIT E

Hayward, shown on drawings numbered RA1, Sheets 2 through 6 of 6; RB2, RF123, 124, 125, 126; FE 23, 24; RA10, Sheets 1, 2 and 3 of 11, incorporated herein and by reference made a part hereof, for the purpose of construction and inspection, during and after completion, of the San Lorenzo Creek Flood Control Project.

I certify that the foregoing is a correct copy of a resolution adopted by the Board of Supervisors of the Alameda County Flood Control and Water Conservation District on Aug 19 1958
19__. Attest Aug 19 1958
JACK G. BLUE, County Clerk
By _____ Deputy

COPY

BOARD OF SUPERVISORS

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RESOLUTION NO. 2791

WHEREAS, the Alameda County Flood Control and Water Conservation District has agreed to provide all necessary rights of way for the Federal project for the improvement of San Lorenzo Creek; and

WHEREAS, certain parcels required for the said project have been acquired by the Alameda County Flood Control and Water Conservation District, either by grant, purchase, or condemnation; and

WHEREAS, the Alameda County Flood Control and Water Conservation District is now in a position to certify to the United States Army Corps of Engineers that those certain rights of way for the Federal project on San Lorenzo Creek have been acquired.

NOW, THEREFORE, BE IT RESOLVED that the Alameda County Flood Control and Water Conservation District hereby certifies to the United States Army Corps of Engineers that all rights of way necessary for the Federal Project on San Lorenzo Creek from Meekland Avenue, Hayward, upstream to Bridge Street, Hayward, and from Hazel Street, Hayward, upstream to Foothill Boulevard, Hayward, have been acquired either by grant, purchase, or condemnation; and

BE IT FURTHER RESOLVED that the Alameda County Flood Control and Water Conservation District hereby authorizes the United States Army Corps of Engineers, its contractors, sub-contractors, agents and authorized

EXHIBIT E

personnel permission to enter immediately upon those parcels of land along San Lorenzo Creek from Meekland Avenue, Hayward, upstream to Bridge Street, Hayward, and from Hazel Street, Hayward, upstream to Foothill Boulevard, Hayward, shown on drawings numbered RA 10, Sheets 4, 5, 6, 7, 8, 9, and 11 of 11, incorporated herein and by reference made a part hereof, for the purpose of construction and inspection, during and after completion, of the San Lorenzo Creek Flood Control Project.

BE IT FURTHER RESOLVED that the Alameda County Flood Control and Water Conservation District hereby authorizes the United States Army Corps of Engineers, its contractors, sub-contractors, agents and authorized personnel permission to enter immediately upon the State Highway Property (Route IV-ALA-69-C) by the authority of the State of California Division of Highways Encroachment Permit No. 458-E-706, incorporated herein and by reference made a part hereof, for the purpose of construction and inspection, during and after completion, of the San Lorenzo Creek Flood Control Project.

BE IT FURTHER RESOLVED that the Alameda County Flood Control and Water Conservation District hereby authorizes the United States Army Corps of Engineers, its contractors, sub-contractors, agents and authorized personnel permission to enter immediately upon those parcels of land along San Lorenzo Creek at Meekland Avenue, at Washington Avenue, and on the area designated as "Maintenance Area," shown respectively on

drawings numbered RA 10, Sheet 3A of 11, RF 143, RF 144, RF 145 and RA 10, Sheets 4A and 5A of 11, incorporated herein and by reference made a part hereof, for the purpose of construction and inspection, during and after completion, of the San Lorenzo Creek Flood Control Project.

I certify that the foregoing is a correct copy of a resolution adopted by the Board of Supervisors of the Alameda County Flood Control and Water Conservation District on Jan 13 1959
19__. Attest Jan 13 1959
JACK G. BLUE, County Clerk
By /s/ Yvonne Quan, Deputy

EXHIBIT E

COPY

BOARD OF SUPERVISORS

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RESOLUTION NO. 2891

WHEREAS, the Alameda County Flood Control and Water Conservation District has agreed to provide all necessary rights of way for the Federal Project for the improvement of San Lorenzo Creek; and

WHEREAS, certain parcels required for the said project have been acquired by the Alameda County Flood Control and Water Conservation District either by grant, purchase, or condemnation; and

WHEREAS, the Alameda County Flood Control and Water Conservation District is now in a position to certify to the United States Army Corps of Engineers that those certain rights of way for the Federal Project on San Lorenzo Creek have been acquired.

NOW, THEREFORE, BE IT RESOLVED that the Alameda County Flood Control and Water Conservation District hereby certifies to the United States Army Corps of Engineers that all rights of way necessary for the Federal Project on San Lorenzo Creek from Bridge Street, Hayward, upstream to Hazel Street, Hayward, have been acquired either by grant, purchase, or condemnation; and

BE IT FURTHER RESOLVED that the Alameda County Flood Control and Water Conservation District hereby authorizes the United States Army Corps of Engineers, its contractors, sub-contractors, agents and authorized personnel permission to enter immediately upon those parcels of land along San Lorenzo Creek from Bridge Street, Hayward, upstream to Hazel Street,

EXHIBIT E

COPY

shown on drawings numbered RA 10, Sheets 9 and 10 of 11, incorporated herein and by reference made a part hereof, for the purpose of construction and inspection, during and after completion, of the San Lorenzo Creek Flood Control Project.

I certify that the foregoing is a correct copy of a resolution adopted by the Board of Supervisors of the Alameda County Flood Control and Water Conservation District on Feb 10 1959
19__. Attest Feb 10 1959
JACK G. BLUE, County Clerk
By /s/ C. Nitson, Deputy