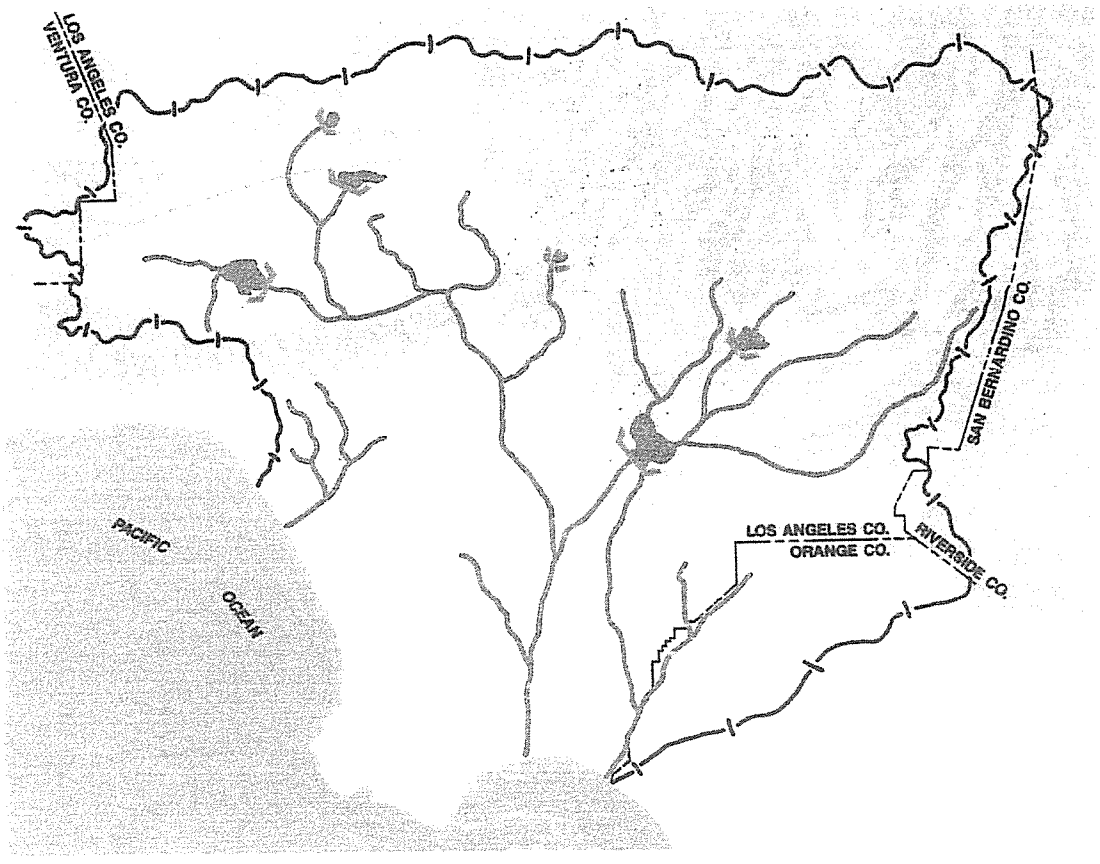
EXHIBIT "3"

US Army Corps
of Engineers
Los Angeles District

DECEMBER 1991

REVISED 2/92

LOS ANGELES COUNTY DRAINAGE AREA REVIEW



FINAL FEASIBILITY REPORT


LOS ANGELES COUNTY DRAINAGE AREA
Lopez Dam
Hansen Dam
Tujunga Wash
Sepulvada Dam
Los Angeles River
Devils Gate Dam
Arroyo Seco
Los Angeles
Santa Fe Dam
Whittier Narrows Dam
Rio Hondo
San Gabriel River
Los Angeles River

CESPD-PD-P (December 1991) (1105) 1st End Conley/tjm/415-705-1601
SUBJECT: Feasibility Report for Los Angeles County Drainage Area, California

DA, South Pacific Division, Corps of Engineers, 630 Sansome St., Room 720, San Francisco, CA 94111-2206 14 February 1992

FOR CDR USACE (CEWRC-WLR), KINGMAN BUILDING, FT. BELVOIR, VA 22060

I concur with the conclusions and recommendations of the District Commander.

ROGER F. VANKOUPE
Brigadier General, U.S. Army
Commanding

LOS ANGELES COUNTY DRAINAGE AREA REVIEW

FINAL FEASIBILITY STUDY

INTERIM REPORT

AND

ENVIRONMENTAL IMPACT STATEMENT

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
PLANNING DIVISION
WATER RESOURCES BRANCH
P.O. BOX 2711
LOS ANGELES, CA 90053

December 1991

Rev 1/92

LOS ANGELES COUNTY DRAINAGE AREA
REVIEW FEASIBILITY STUDY

SECTION ONE: EXECUTIVE SUMMARY

This is a partial interim report for the Los Angeles County Drainage Area (LACDA) Review studies conducted under authorization provided in the Senate Resolution dated 25 June 1969. It summarizes the findings of an extensive feasibility investigation of problems and opportunities related to flood control, water conservation, recreation, transportation, and environmental enhancement in the LACDA Mainstem System (the Los Angeles and San Gabriel Rivers, the Rio Hondo, and the Tujunga Wash) as depicted in Figure 1. The major findings of this investigation are:

1) While the LACDA Mainstem System of flood control reservoirs and channel improvements has provided effective protection to the urban communities of the basin for over 40 years, there are inadequacies in the system. Some reaches of the mainstem system provide only 25- to 50-year protection. In the lower Rio Hondo and Los Angeles River reaches that are protected by levees, there is a threat that floods exceeding the 25- to 40-year event could overtop the existing levees and cause these levees to fail with catastrophic results. The 500-year flood plain covers approximately 200 square miles (320,000 structures), mostly in the lower reaches of the basin; damages in this flood plain would total approximately $5.3 billion. The 100-year flood plain covers approximately 82 square miles; damages from the 100-year flood would be $2.3 billion.

2) The system inadequacies are the result of different factors. The various design storms formulated for the individual sections of the system over 50 years ago were based on a short period of record; based on a longer period of record, it now appears that the overall system was only designed to control a flood resulting from a storm with a 50-year recurrence interval.

Also, extensive urban development in the basin, combined with a comprehensive system of storm drains to carry local runoff into the mainstem system, has greatly accelerated runoff, particularly in the lower river basin areas. Thus peak flows have increased dramatically compared to those originally predicted for these reaches of the system.

3) Based on a thorough analysis of measures to correct the system inadequacies, it was concluded that only improvements to the lower basin channels themselves would be cost-beneficial solutions to the flooding problems identified. Other alternatives were found to be either excessive in cost (new channels, diversion alternatives, new reservoirs, modifying existing reservoirs) or ineffective in reducing peak flows through the critical project reaches in the lower basin (new reservoirs, non-structural measures, modifying existing reservoirs, modifying channel bridges, re-regulation of reservoirs). Modifications in upper basin reaches were found to have very low benefit-to-cost ratios, in part because the channels in most reaches of the upper basin provide nearly 100-year levels of protection; in areas with lower levels of protection, the overflow areas are limited and damages are not extensive. No economically justified alternatives were identified for increasing the level of protection in upper basin reaches.

Transfer of Whittier Narrows Dam releases from the Rio Hondo to the San Gabriel River was determined to be unjustified because this would require modifications to the San Gabriel River channel greater in cost than those contemplated for the Los Angeles River and Rio Hondo channels while having larger environmental impacts and still requiring improvements to the Los Angeles River. Modifying flood control releases to involve two distinct channels was not economically justified.

4) Given the nature and extent of the flooding problem identified in this study, it was determined that the focus of study should be on flood control improvements. Water conservation, recreation, transportation, and/or environmental enhancement opportunities would be studied within the

framework of the flood control improvements being investigated. This decision was made following an initial review of potential opportunities to pursue these objectives; this review indicated that opportunities were limited or constrained by the flood control solution and were therefore dependent on the nature of the flood control solution identified.

5) The plan selected to improve available flood protection in the lower Los Angeles Basin requires modification of the Rio Hondo from Whittier Narrows Dam to the Los Angeles River and continuing down the Los Angeles River to the Pacific Ocean. The modifications are as follows: (a) Raising the effective channel height by building parapet walls on 21 miles of existing levees; (b) raising or modifying 27 bridges to accommodate the parapet walls; (c) widening and converting to rectangular cross-section 1.5 miles of channel below the confluence with the Rio Hondo; (d) armoring the land side of the levees in four locations and (e) applying a concrete overlay in reaches with an existing rough grouted stone channel surface.

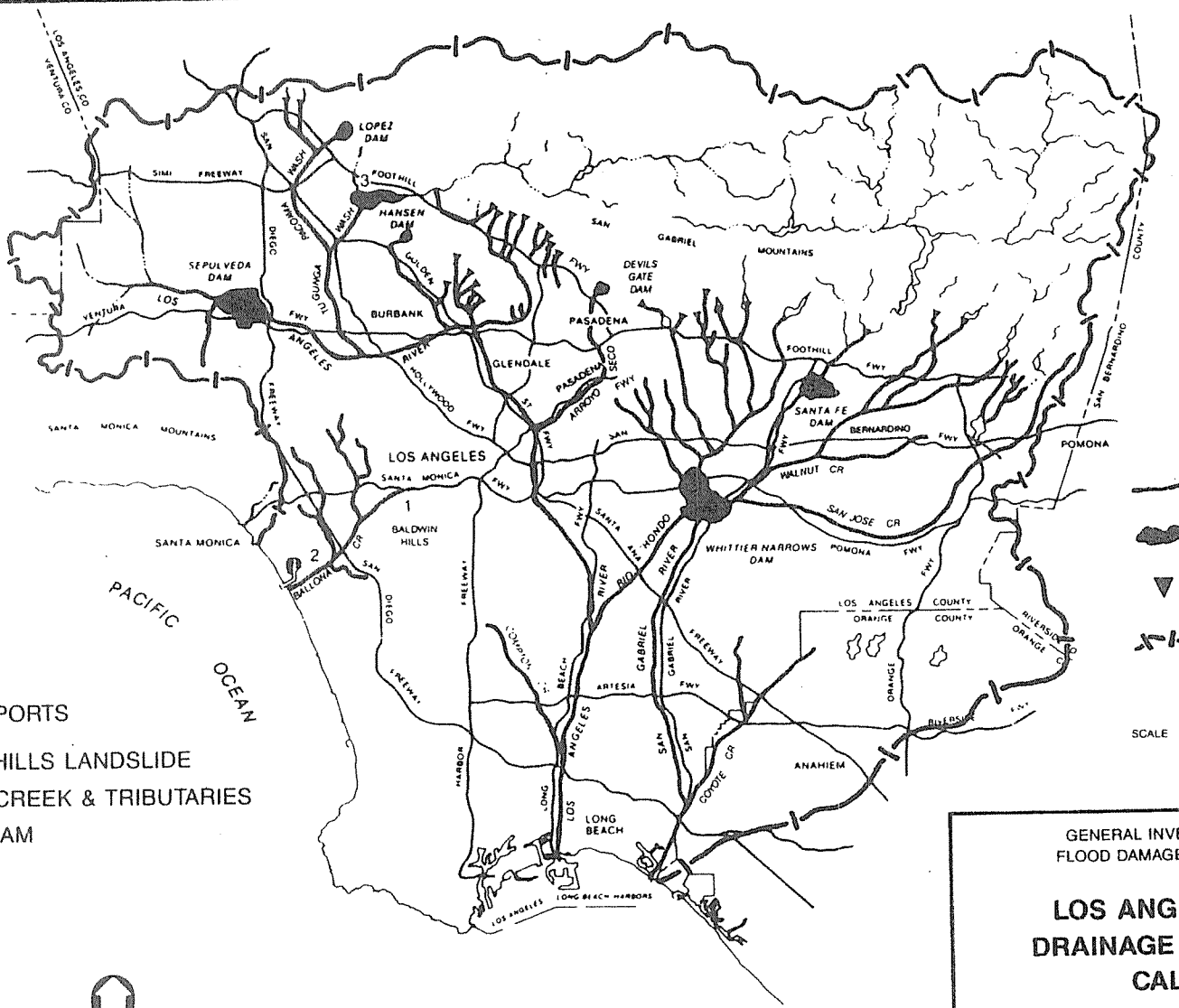
6) The optimum level of protection for the proposed plan was established based on National Economic Development (NED) criteria. The need to avoid raising the Artesia/Long Beach Freeway overcrossing was also considered in defining the NED level of protection. Modifications of channel walls may be made to convey the 133-year design flows for the lower reach of the Los Angeles River without requiring this overcrossing to be altered, thereby avoiding the expense and social impacts of freeway bridge modification. The ability of flood flow breakouts to spread over large areas makes the minimum level of protection provided in the proposed plan also the overall level of protection. The NED Plan provides between 100 and 133-year level of protection for the lower LACDA basin.

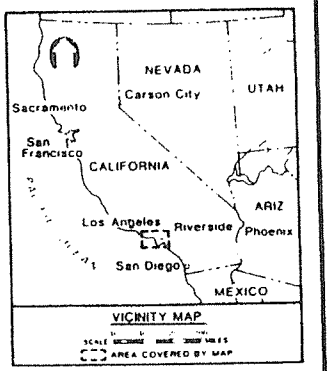
7) Cost and benefit estimates indicate the NED Plan would provide $58.7 million in annual flood damage reduction benefits at an annualized cost of $44.3 million. Net annual NED benefits from the plan are $14.4 million, and the project benefit-to-cost ratio is 1.3 to 1. A benefit summary is displayed in TABLE 22A on page 167 in the Main Report. The Federal share of the $364.1 million first costs would be $182.6 million (slightly more than 50 percent of the first costs); the local sponsor, the Los Angeles County Flood Control District, would bear the remaining cost of $181.5 million.

Based on these findings, the District Engineer recommends that improvements to the Los Angeles River and Rio Hondo channels in the lower reaches of the LACDA basin be constructed substantially in accordance with the plan outlined in this report.

U.S. ARMY ENGINEER DISTRICT

CORPS OF ENGINEERS





LEGEND

- CHANNEL
- DAM AND RESERVOIR
- DEBRIS BASIN
- STUDY AREA DRAINAGE BASIN BOUNDARY

SCALE 2 0 2 4 6 8 10 MILES

NOTE COYOTE CREEK IS PART OF SARBOC INTERIM III

INTERIM REPORTS

1 BALDWIN HILLS LANDSLIDE

2 BALLONA CREEK & TRIBUTARIES

3 HANSEN DAM

GENERAL INVESTIGATIONS-SURVEYS
FLOOD DAMAGE PREVENTION STUDIES

LOS ANGELES COUNTY DRAINAGE AREA (REVIEW) CALIFORNIA

LOS ANGELES DISTRICT
SOUTH PACIFIC DIVISION

FIGURE 1

LOS ANGELES COUNTY DRAINAGE AREA REVIEW

FEASIBILITY STUDY

FINAL INTERIM REPORT

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LOS ANGELES COUNTY DRAINAGE AREA
REVIEW FEASIBILITY STUDY

SECTION TWO: THE STUDY AND FEASIBILITY REPORT

A. STUDY AUTHORITY

This study was conducted in response to local concerns regarding the completeness and adequacy of flood control within the Los Angeles County Drainage Area (LACDA) and in response to local interest in the potential to increase water conservation, transportation, and recreation resources within LACDA. These interests led to the following congressional resolution:

Senate Resolution, approved 25 June 1969, reading in part:

"Resolved by the Committee on Public Works of the United States Senate, that the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby requested to review the report of the Chief of Engineers on the Los Angeles and San Gabriel Rivers and Ballona Creek, California, published as House Document Numbered 838, Seventy-sixth Congress, and other pertinent reports, with a view to determining whether any modifications contained therein are advisable at the present time, in the resources in the Los Angeles County Drainage Area."

B. PURPOSE AND SCOPE OF STUDY

This combined Feasibility Report and Environmental Impact Statement presents the study findings associated with the Los Angeles County Drainage Area (LACDA) Review Study, Los Angeles County, California. Its intent is to review the adequacy of flood control along

control along the mainstem systems of the Los Angeles and San Gabriel rivers, the Rio Hondo, and Tujunga Wash.

The focus of this study was originally quite broad, including investigations throughout the LACDA basin for flood control, water conservation, recreation, transportation, and environmental problems and opportunities. During the feasibility study phase, the magnitude of the flooding problem was recognized, and a greater effort was devoted to developing a solution to this problem. The other study purposes had shown only limited opportunities, and their implementation may have conflicted with potential flood control solutions. In order to accomplish this study, it was decided that other study purposes would be incorporated within the framework of the flood control solution if at all possible. The flood control solution ultimately focused on the three mainstem river systems for the following reasons:

1. **Previous Interim Reports addressed major issues.** Two previous interim reports have addressed problems and opportunities considered critical in areas outside of the mainstem system (Baldwin Hills and Ballona Creek). An additional study of Hansen Dam was also completed. Thus, the primary focus of this interim is appropriately on the mainstem. The previously completed interims are as follows.

   Interim 1: Ballona Creek and Tributaries. This study investigated possible inadequacies in flood protection on Ballona Creek and tributaries due to increases in runoff brought about by urbanization and storm drain installation. No economically justified plan for Federal implementation could be found. However, two bridges were identified on Ballona Creek that constricted flow and caused flooding.

   Interim 2: Baldwin Hills Landslide Study. This study addressed landslide, mudslide and related problems caused by the storms of 1978 and 1980 in the Baldwin Hills area of Los Angeles. No economically justified plan of improvement could be found.

Interim 3: Hansen Dam. This study investigated sedimentation problems and incidental water conservation and recreation opportunities. The study found that the ongoing excavation of reservoir material by sand and gravel contractors continues to maintain project capacity and provides an ongoing solution to sedimentation problems at this facility. Additional recreation was not found to be economically justified at this site. Because Hansen Dam is an integral part of the LACDA system, the report deferred analysis of flood control and water conservation to this mainstem report.

2. **Levels of protection on many tributaries were adequate.** A general analysis of numerous tributaries to the mainstem system concluded that levels of protection on these tributaries were adequate (100-year or higher). This conclusion was based on detailed analysis of data from stream gauges in the watershed. Compton Creek was found to provide slightly less than 100-year protection. While no analysis for Compton Creek was proposed, any relief the mainstem study could provide would be evaluated, and certainly, any impacts involved in a mainstem solution would be mitigated as part of the overall solution. Further study of Compton Creek may be undertaken at a later date. The effect of this analysis of tributaries was to reduce the scope of this study interim.

   In 1985, the Sierra Madre channel in eastern Los Angeles County was evaluated, but no improvements were recommended because the city council and local residents were generally opposed to alterations which would affect structures built up to the existing channel wall system. Los Angeles County subsequently requested that further analysis of the channel be suspended.

3. **Work on smaller, non-tributary drainages was not justified.** A post-1969 flood review of many small streams draining directly into the Pacific indicated that flood control improvements would be inappropriate for one or more of the following reasons: (a) the level of development within the flood plain was too sparse to justify a project; (b) local residents were opposed to alteration of the channel; (c) development was planned for the future, but existing levels were inadequate to support a project; (d) justification of a project would depend on

land enhancement benefits; (e) the overflow was contained within a well-entrenched channel; and/or (f) the scope of the problem was limited and its solution was appropriate for local action. Of 39 local streams surveyed, including some in the upper watershed areas for the LACDA mainstem system, only two were identified for which further study would be necessary to determine whether there was potential for a justifiable project: Topanga Canyon and Trifuno Creek.

In the absence of significant new development of the 100-year flood plain in many of these small watersheds, no project appeared to be feasible in 1969; the advent of flood plain management regulations several years later placed restrictions on flood plain development, which limited flood-prone development in many of these small streams. Increased public opposition to flood control measures such as channel improvements and dams also contributed to the conclusion that these smaller streams would not be appropriate for Federal action. Topanga Canyon and Trifuno Creek were eliminated from this study on the basis of these considerations.

4. **Problems identified by the local sponsor were studied and issues resolved.** In 1975, the Los Angeles County Flood Control District (LACFCD) identified six county priorities in addition to mainstem rivers and related facilities. Ballona Creek was one of these six potential projects. The other five (Arroyo Seco near Pasadena, Stone Canyon in West Los Angeles, Laguna Dominguez Channel near Dominguez Hills, Los Cerritos Channel near Long Beach, and Bee Canyon in the Santa Susana Mountains above the San Fernando Valley) were evaluated for flooding problems. Arroyo Seco was found to provide protection above the 100-year level. Devil's Gate Dam on this arroyo was found to be unsuitable for modification for system-wide flood control purposes. The Stone Canyon channel was found to provide 100-year protection. Laguna Dominguez Channel was subsequently studied by the Los Angeles County Department of Public Works and found to be adequate in all but the uppermost reach. The uppermost reach has been improved as a result of the Century Freeway construction project. Los Cerritos channel was found to provide near 100-year protection and thus became

a low priority. Outflow from the Bee Canyon watershed flows past the upper Van Norman Reservoir. Although there was concern that flood flows could contaminate the water supply system, this watershed was found to have an insignificant local flooding impact or impact within the overall system and, therefore, is a low study priority.

5. **The flood threat is greatest on the mainstem system.** Finally, the study was focused on the mainstem because subsequent to the floods of 1969, it was believed that the existing mainstem system might have insufficient capacity in some reaches. The February 16, 1980 flood, about a 40-year event, caused near-capacity channel flows in the lower Los Angeles River that deposited debris on the top of levees (see Figure 2) which had previously been thought to have 100+ year protection. The mainstem system carries substantially greater flows than the tributary system and crosses the areas of greatest urban density. Review of the mainstem system thus became a high priority for the entire basin.

The review of mainstem problems and opportunities included an analysis of the entire mainstem system from the upstream flood control reservoirs of the mainstem rivers to the mouth of the two river systems (Los Angeles-Rio Hondo and San Gabriel). Therefore, this report considers the following watercourses (Figure 1):

a) The Los Angeles River, from Sepulveda Dam to the Pacific Ocean;
b) The San Gabriel River, from Santa Fe Dam to the Pacific Ocean;
c) Tujunga Wash, from Hansen Dam to the Los Angeles River; and
d) Rio Hondo, from Whittier Narrows Dam to the Los Angeles River.

The report considers alternative solutions to the water and related land use problems on these watercourses and recommends a feasible solution to the problems for implementation. Consideration was given to economic, environmental, and social needs of the area.



FIGURE 2 Los Angeles River below Wardlow. High water marks from storm of February 16, 1980.

C. STUDY PARTICIPATION AND COORDINATION

The Corps of Engineers, Los Angeles District - which will be referred to in this document as the Corps - has been responsible for managing the LACDA Review Study; for plan formulation and evaluation; for coordinating the flood control planning process with other local, state, and Federal agencies and the public; and for report preparation.

The Los Angeles County Flood Control District (LACFCD), an element of the Los Angeles County Department of Public Works (LACDPW), is the local sponsor of the study. The County Department of Public Works consists of the former County Flood Control District, the former County Engineer, and the former County Department of Roads. The unification of these functions occurred in 1985. For purposes of this report, the local sponsor will be referred to as Los Angeles County, or simply the County. Throughout the study, and especially during problem analysis and plan formulation, Los Angeles County assisted the Corps in identifying areas which should receive priority in the study during plan formulation and in evaluating the acceptability of flood control measures.

There has been ongoing coordination with the U.S. Fish and Wildlife Service, who also cooperated in the investigation. They provided the Corps with a Planning Aid Letter and prepared the Coordination Act Report. Because no reservoir re-regulation was proposed, there was no need for a Habitat-Based Evaluation of the proposed improvements. Nearly all of the viable habitat in the flood control system is in the reservoir area behind the dams, since a majority of the channels in the LA River system are concrete lined from dam outlet to the ocean. No improvements are proposed for areas in which significant habitat for wildlife exists.

The general public has also been kept informed of the study, and public participation has been an important goal throughout this study. Public dissemination of information has been achieved through press releases, direct-mail brochures and newsletters, and public workshops and meetings. At these meetings, the public has had an opportunity to

participate in study scoping, problem identification, plan formulation, and alternative evaluation phases of the study.

A public meeting was held October 1, 1991 at the Carson Community Center in Carson, CA. The entire transcript from that meeting is provided in the Environmental Impact Statement (EIS) in Appendix (I). Public review comments and responses are also contained in the EIS in Appendix (J).

A complete list of agencies and representatives with which coordination has taken place may be found in Section 8 of the Environmental Impact Statement (EIS).

D. PRIOR REPORTS BY THE CORPS OF ENGINEERS AND OTHER AGENCIES

CORPS OF ENGINEERS

1. Flood Control in the Los Angeles County Drainage Area. LA District, Corps of Engineers, 1939.
2. Hydrology in the Los Angeles County Drainage Area. LA District, Corps of Engineers, 1939.
3. Hydrology, San Gabriel River and the Rio Hondo Above Whittier Narrows Flood Control Basin. LA District, Corps of Engineers, 1944.
4. DPR-Whittier Narrows Flood Control Basin. LA District, Corps of Engineers, 1945.
5. Operations and Maintenance Manual, Los Angeles County Drainage Area. LA District, Corps of Engineers, 1975.
6. Plan of Study, Review Report for Flood Control and Allied Purposes, Los Angeles County Drainage Area. LA District, Corps of Engineers, 1976.
7. Interim Report on Hydrology and Hydraulic Review of Design Features of Existing Dams for LACDA Dams. LA District, Corps of Engineers, 1978.
8. Report on Floods of February and March 1978 in Southern California. LA District, Corps of Engineers, 1978.

9. Reconnaissance Report on Landslide Study, Baldwin Hills Area, LA County, CA. LA District, Corps of Engineers, 1981.
10. Baldwin Hills, Los Angeles, CA: A Geotechnical Supplement to the Landslide Study. Portland District, Corps of Engineers, 1981.
11. Interim Feasibility Report for Landslide Study: Baldwin Hills, CA. LA District, Corps of Engineers, 1982.
12. Interim Feasibility Report for Ballona Creek and Tributaries. LA District, Corps of Engineers, 1982.
13. Hansen Dam Sediment Modeling Study. LA District, Corps of Engineers, 1983.
14. Hansen Dam Preliminary Formulation Report. LA District, Corps of Engineers, 1984.
15. Final Report, Review of Water Resources within the Los Angeles County Drainage Area. LA District, Corps of Engineers, 1985.

OTHERS

1. Reports of the Board of Engineers, Flood Control to the Board of Supervisors; LA County, CA. Los Angeles County, 1915.
2. Review Report and Environmental Assessment with Technical Appendices for the Los Angeles River Flood Prevention Program. US Department of Agriculture, Forest Service, Angeles National Forest, 1980.
3. Review Report for the Los Angeles River Flood Prevention Program. US Department of Agriculture, Forest Service, Angeles National Forest, 1982.

E. THE STUDY PROCESS AND THE CONTENT OF THIS REPORT

The Study Process

This feasibility study has been conducted in accordance with Corps Planning Regulations and Guidance (summarized in the Planning Guidance Notebook). It has been an iterative process; that is, there have been several phases of problem analysis/plan formulation and plan evaluation. The purpose of this iterative process has been to ensure that all problems have been given full consideration and all alternatives have been identified and evaluated.

The general flow of a feasibility study is to begin with the broadest possible scope within the constraints imposed by the authorization and Corps regulations and slowly narrow the scope by eliminating alternatives, using data developed during the study. Thus, an initial step is to formulate a very broad range of alternative measures which can be considered for solving problems. The general feasibility of these measures is evaluated, and those measures that are clearly infeasible or ineffective are eliminated after an initial review. A smaller number of measures are then evaluated in more detail. After the remaining measures have been evaluated, the scope of study shifts to evaluation of combinations of these measures (alternatives). Alternatives are evaluated in detail in terms of their completeness, acceptability, efficiency (cost-effectiveness), and environmental and socio-economic impacts. As the number of alternatives is narrowed, the level of detail of study increases. This iterative process is reflected in the plan formulation section of this report.

Feasibility Report Contents

This report can be viewed as containing two parts. Part I is the main report and the environmental impact statement (EIS). Part II consists of the technical documentation reports, as listed below. Note that only Part I is being circulated for public comment. The technical reports are too voluminous and generally too technical to justify their

general circulation. They are available for review at the Los Angeles District Office of the Corps of Engineers, 300 N. Los Angeles Street, Los Angeles, California, 90053. The appropriate telephone number is (213) 894-5461. For reference, the technical reports are:

A) **Hydrology**: This is a detailed discussion of storm history, predicted storm frequency and intensity, rainfall-runoff analysis combined with reservoir operations, and downstream floodrouting to define the resulting flood flow frequencies in the LACDA basin.

B) **Hydraulics**: This technical report provides an analysis of the projected overflows resulting from various-sized floods. It also provides an analysis of the existing channel capacities and the design analysis of the various alternatives.

C) **Design:** This technical report describes the various elements of the recommended design, and provides detailed materials and construction costs.

D) **Recreation:** This technical report identifies all existing recreation on the mainstem.

E) **Geotechnical:** This technical report describes the general site conditions and provides design and construction material considerations.

F) **Real Estate:** This technical report identifies real estate requirements and associated costs.

G) **Economics:** This technical report analyzes damages associated with the existing (baseline) condition and compares the costs and benefits of the alternatives. Support for the selection of the NED Plan is documented.

The main report summarizes the results of the feasibility study in a nontechnical manner, and presents the material on the NED Plan somewhat more technically. Following the Commander's recommendations at the end of the main report, the environmental impact statement describes the nature and scope of the environmental impacts of the NED Plan and evaluates the other alternative given consideration during the study process.

F. STUDY AREA DESCRIPTION

Location and Extent of Study Area

Los Angeles County, located in the South Coastal Basin of the Pacific slope, has varied terrain consisting of precipitous mountains, low-lying foothills, valleys, and coastal plains. A vast majority of urban development is found on flat alluvial plains and uplifted terraces which are surrounded by various mountain ranges. The area bounded by the Santa Susana and San Gabriel Mountains on the north, and on the east and southeast by the Chino, San Jose, and Puente Hills, is the area under study that is usually referred to as the Los Angeles County Drainage Area (LACDA) basin. See Figure 1 for a map of the LACDA basin.

Drainage Basin Description

The LACDA basin feeding the mainstem system covers 1,459 square miles, a large percentage of which is urbanized flatlands and valleys crossed by three major rivers: the Los Angeles, Rio Hondo, and San Gabriel. The remaining watersheds of the LACDA basin cover approximately 300 square miles.

The Los Angeles River is formed by the junction of the Calabasas and Bell Creeks in the Santa Monica Mountains. From the junction of these two creeks, the river flows into the Sepulveda Reservoir, a Corps flood control facility with a design capacity of 22,493 acre-feet. Tujunga Wash (flowing out of Hansen Dam, capacity 25,446 acre-feet), Pacoima Wash (flowing out of Lopez Dam, capacity 441 acre-feet), Burbank-Western, and smaller creeks draining the western San Gabriel Mountains join the river as it flows easterly along the San Fernando Valley. The river bends south around the Hollywood Hills, is joined by Verdugo Wash, and then flows south through the Los Angeles Narrows and onto the broad coastal plain. The river is joined by a number of tributaries, including Sycamore Canyon, Arroyo Seco, and the Rio Hondo. The Rio Hondo carries runoff from its own watershed and also runoff from the San Gabriel Basin, as transferred through Whittier Narrows Reservoir (capacity 34,947 acre-feet). From the Rio Hondo confluence, the Los Angeles River continues south another 12 miles and discharges into San Pedro Bay at the Long Beach Harbor. The Los Angeles River drains an area of 824 square miles, which includes 132 square miles of the Rio Hondo basin.

The San Gabriel River drains the eastern San Gabriel Mountains and portions of the Chino, San Jose, and Puente Hills. The river's upstream tributaries merge above Santa Fe Dam (capacity 32,109 acre-feet). Two major tributaries, Walnut and San Jose creeks, join the river before it reaches Whittier Narrows Reservoir. The San Gabriel and Rio Hondo combine flows at this reservoir. Flood control releases from Whittier Narrows Dam are made to the Rio Hondo (also referred to as the Rio Hondo Diversion Channel), which travels southwest and connects with the Los Angeles River. On the east side of Whittier Narrows Dam, the San Gabriel River exits in a southerly direction, is joined by Coyote Creek downstream, and finally discharges into Alamitos Bay, six miles east of the mouth of the Los Angeles River. The San Gabriel River drains an area of 635 square miles.

Whittier Narrows Reservoir receives flows from both the Rio Hondo and the San Gabriel River. Under normal operating conditions, primary flood control releases are made to the Rio Hondo, which has a capacity of 36,500 ft^3/s, and only 5,000 ft^3/s is released into the San Gabriel River. The San Gabriel River is intended to receive spillway overflow from Whittier Narrows in large flood events. There are no

uncontrolled spillway flows to the San Gabriel River for flood events of less than 100-year magnitude.

Study Reaches

Table 1 indicates the channel reach designations used throughout this study (see Figure 3). The reach designations are generally based on clearly definable geographic boundaries. Reaches generally begin at a reservoir or at the confluence of a major tributary; thus, a new reach may have significantly different hydraulic characteristics from the reach immediately upstream. For example, the upper Los Angeles River reach from Sepulveda Dam to Arroyo Seco confluence is an entrenched channel with an initial channel capacity of 16,900 ft^3/s. This capacity increases to 83,000 ft^3/s as tributaries join the river. At Arroyo Seco, the capacity increases to 104,000 ft^3/s to accommodate inflows from this major tributary. On the San Gabriel River, study Reach 7 begins at Imperial Highway, a major bridge crossing and a general transition point in topography for the watershed.

STUDY REACH DESIGNATIONS

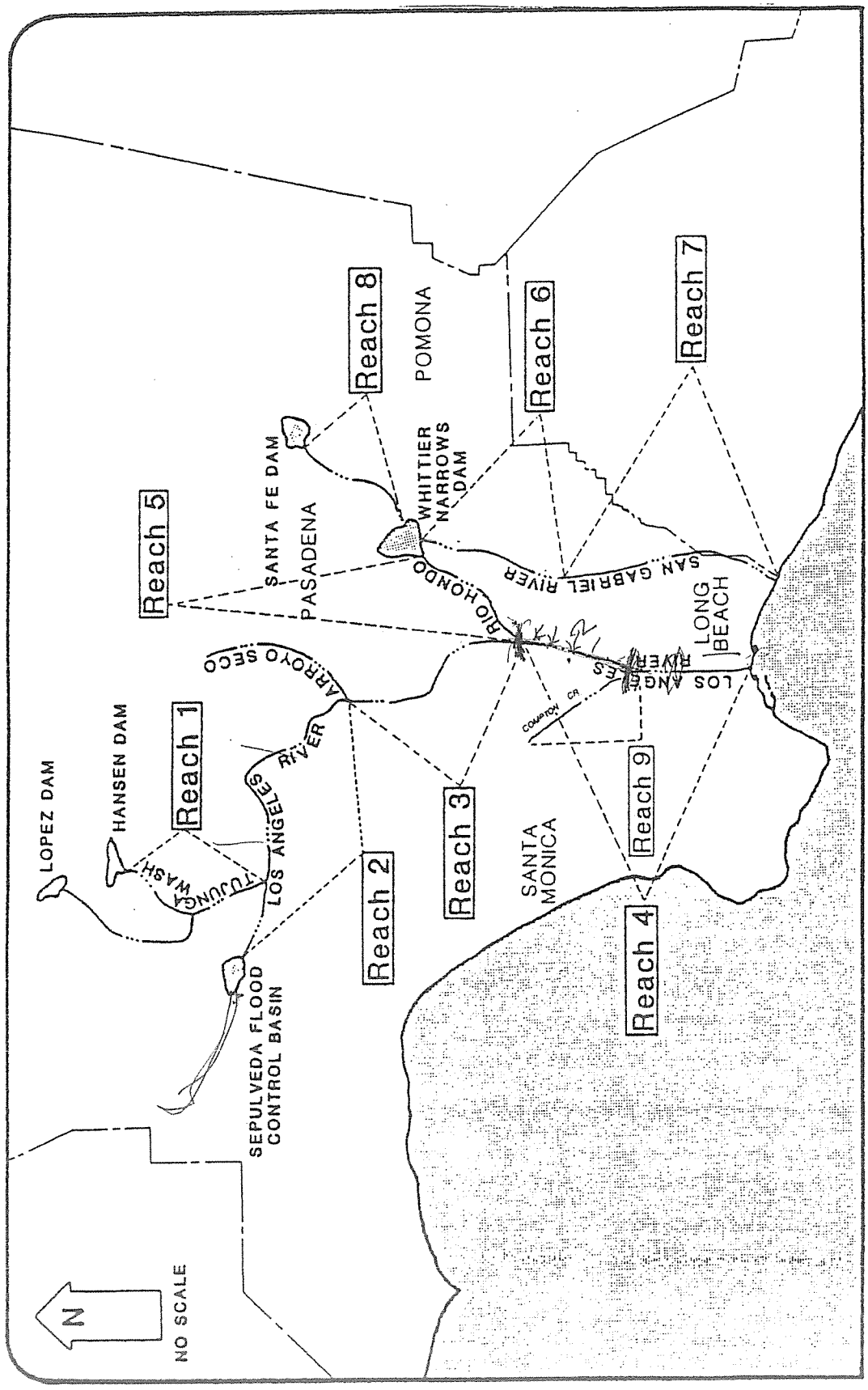


FIGURE 3

Table 1. Study Reaches, LACDA Mainstem.

Reach Number	Location	Channel Length (mi)
1	Tujunga Wash Channel from Hansen Dam to the Los Angeles River	9.3
2	Upper Los Angeles River from Sepulveda Dam to Arroyo Seco Confluence	19.2
3	Los Angeles River from Arroyo Seco to the Rio Hondo Confluence	12.0
4	Lower Los Angeles River from Rio Hondo Confluence to the Pacific Ocean	11.7
5	Rio Hondo Diversion Channel from Whittier Narrows Dam to Los Angeles River	11.9
6	San Gabriel River from Whittier Narrows Dam to Imperial Highway	9.2
7	San Gabriel River from Imperial Highway to the Pacific Ocean	13.2
8	San Gabriel River from Santa Fe Dam to Whittier Narrows Dam	7.0
9	Compton Creek Channel from Main Street to the Los Angeles River	7.9

Climate, Precipitation, Topography, Land Use, and Runoff

It is critical to understand the climate in Southern California in order to gain an appreciation of the nature of the flood threat facing Los Angeles. Flooding is caused by the interaction of climate, topography, and development.

In general, the Los Angeles area has a mild climate characterized by warm, dry summers and cool, wet winters. Both temperature and precipitation vary considerably with elevation, topography, and distance from the Pacific Ocean: a storm producing moderate rainfall on the coast (1" during a 24-hour period) may produce very heavy rainfall in the mountains (up to 10-20" during the same 24-hour period). Precipitation characteristically occurs in the form of localized cloudbursts and general heavy rains, although snow occurs in the higher elevations. In general, the quantity of precipitation increases with elevation. Flood flows, which normally occur during the period of November through March, are characterized by high peak flows and short durations. Precipitation and stream gauge locations for the Los Angeles drainage area are shown in Figures 4 and 5.

The physical characteristics of the drainage area serve to intensify precipitation. As storm clouds cross the basin and are forced over the mountains to the east, they lose a vast majority of their moisture content in the mountain areas. High rainfall rates, combined with the steep slopes in the upper reaches, can cause violent, debris-laden flows from local canyons. Once mountain soils are saturated, runoff is very rapid from the steep mountain slopes, creating a very fast rise in the level of rivers and streams. As these peak flows reach the flat developed plain, their velocity is reduced and sediment begins to settle out into the river bed. This can reduce channel capacity, and therefore a number of upper watershed debris basins have been constructed as a part of the LACDA system to control debris.

Rapid runoff and erosion of upper basin watershed areas is unimpeded by the sparse vegetative cover found in these areas of coarse, porous, and rocky soils. At very high altitude, well-developed forests of evergreens and oaks provide some stability to soils, and there are riparian bands along many stream courses. The remainder of the upper watershed is in chaparral and coastal sage vegetation which is susceptible to burning, particularly during dry periods in the late summer and early fall. In burned out areas, which may not have an opportunity to regrow before storms begin in late fall, high intensity rainfall runs off rapidly and causes massive erosion of the watershed, carrying mud and debris into the basin below.

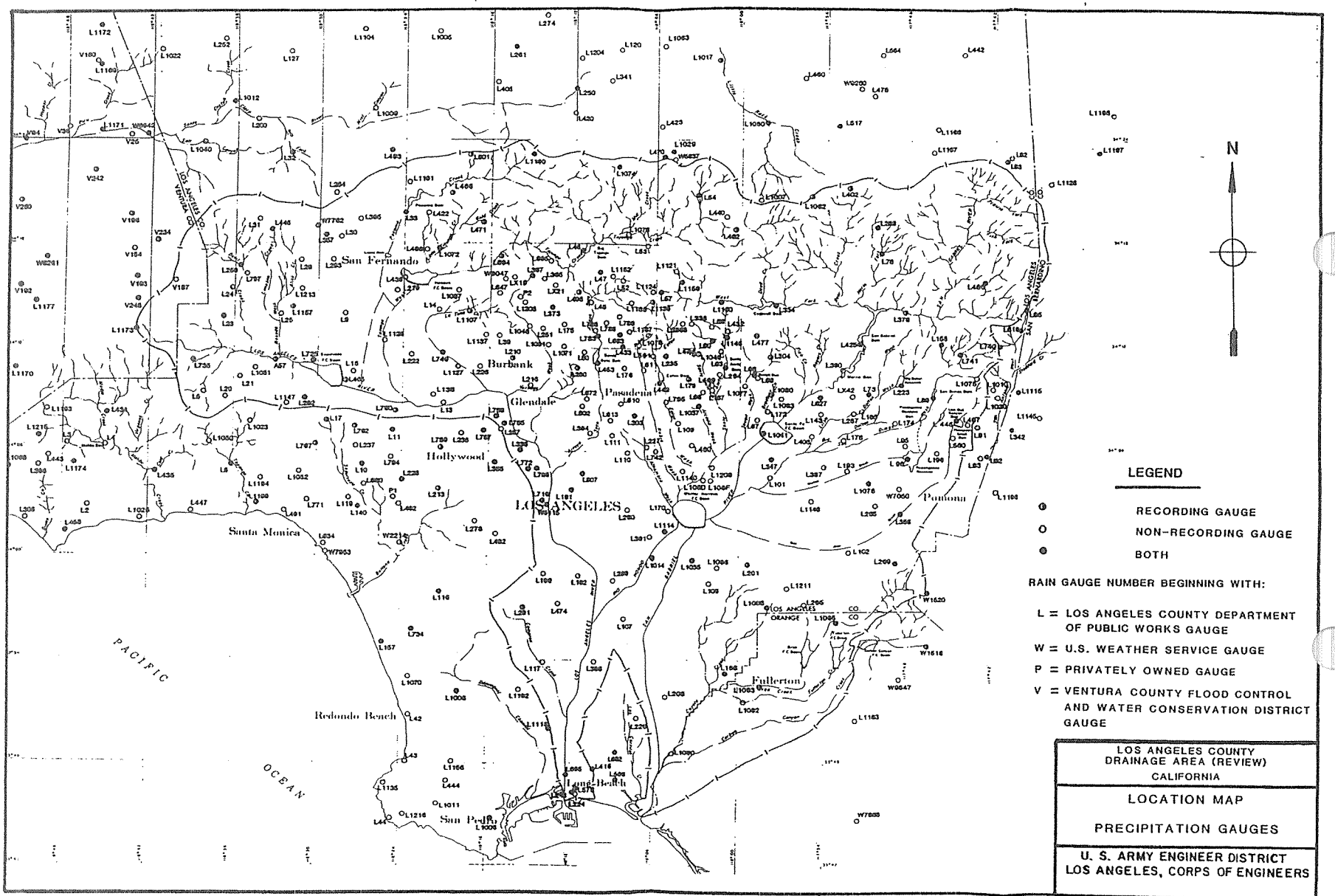

N
LEGEND
RECORDING GAUGE
NON-RECORDING GAUGE
BOTH
RAIN GAUGE NUMBER BEGINNING WITH:
L = LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS GAUGE
W = U.S. WEATHER SERVICE GAUGE
P = PRIVATELY OWNED GAUGE
V = VENTURA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT GAUGE
LOS ANGELES COUNTY DRAINAGE AREA (REVIEW)
CALIFORNIA
LOCATION MAP
PRECIPITATION GAUGES
U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
San Fernando
Burbank
Glendale
Pasadena
Hollywood
LOS ANGELES
Pomona
Santa Monica
Redondo Beach
Long Beach
Fullerton
PACIFIC
OCEAN
LOS ANGELES
VENTURA CO
ORANGE CO

FIGURE 4

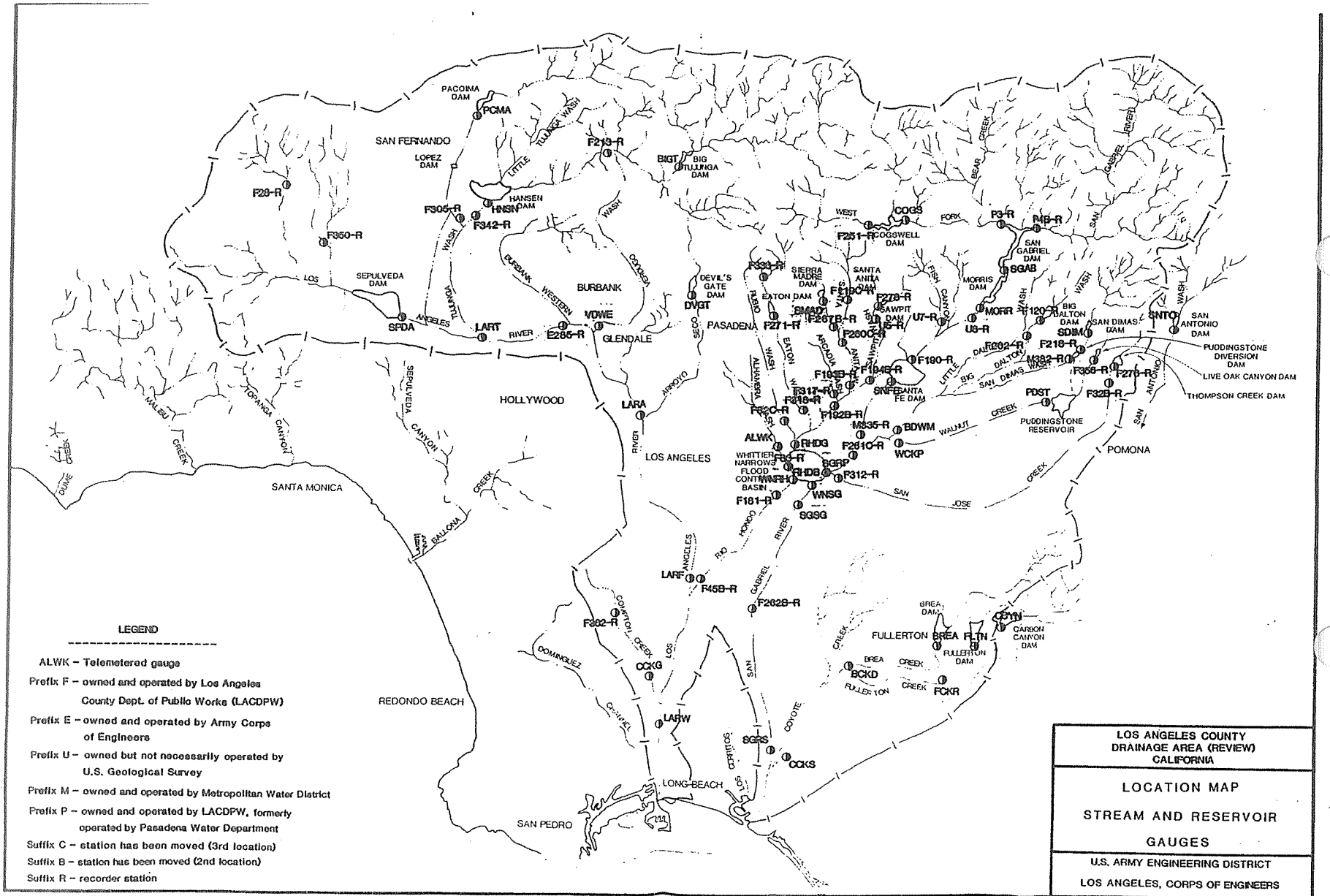

PACOIMA DAM
PCMA
SAN FERNANDO
LOPEZ DAM
F213-R
BIGT
BIG TUJUNGA DAM
HANSEN DAM
HNSN
F28-R
F305-R
F342-R
F350-R
SEPULVEDA DAM
SPDA
LARC
VDWE
E285-R
BURBANK
GLENDALE
DVGT
DEVIL'S GATE DAM
PASADENA
F271-R
HOLLYWOOD
LARA
LOS ANGELES
SANTA MONICA
REDONDO BEACH
LONG BEACH
SAN PEDRO
LARF
F459-R
F262B-R
F382-R
CCKG
LARW
SGRS
CCKS
F333-R
SIERRA MADRE DAM
SMAD
SANTA ANITA DAM
F190-R
F278-R
SAWPIT DAM
F267B-R
F280C-R
F271B-R
EATON DAM
COGS
COGSWELL DAM
F251-R
WEST FORK SAN GABRIEL RIVER
P3-R
P46-R
SGAB
SAN GABRIEL DAM
MORRIS DAM
MORR
F120-R
BIG DALTON DAM
SDMO
SAN DIMAS DAM
SNTO
SAN ANTONIO DAM
U7-R
U8-R
F202-R
F218-R
PUDDINGSTONE DIVERSION DAM
LIVE OAK CANYON DAM
THOMPSON CREEK DAM
M382-R
F356-R
F278-R
F328-R
PDST
PUDDINGSTONE RESERVOIR
POMONA
F190-R
F194B-R
F194E-R
SNFE
SANTA FE DAM
F317-R
F216-R
F22C-R
F102B-R
M335-R
BDWM
WCKP
F2810-R
ALWK
RHDG
F22-R
WHITTIER NARROWS FLOOD CONTROL BASIN
RHDB
SGRP
F312-R
WNSG
F181-R
SGSG
FULLERTON
BREA
BREA DAM
CBYN
CARBON CANYON DAM
FULLERTON DAM
BCKD
FCKR
LEGEND
ALWK – Telemetered gauge
Prefix F – owned and operated by Los Angeles County Dept. of Public Works (LACDPW)
Prefix E – owned and operated by Army Corps of Engineers
Prefix U – owned but not necessarily operated by U.S. Geological Survey
Prefix M – owned and operated by Metropolitan Water District
Prefix P – owned and operated by LACDPW, formerly operated by Pasadena Water Department
Suffix C – station has been moved (3rd location)
Suffix B – station has been moved (2nd location)
Suffix R – recorder station
LOS ANGELES COUNTY
DRAINAGE AREA (REVIEW)
CALIFORNIA
LOCATION MAP
STREAM AND RESERVOIR
GAUGES
U.S. ARMY ENGINEERING DISTRICT
LOS ANGELES, CORPS OF ENGINEERS

FIGURE 5

Local rainfall in developed areas also runs off quickly; the greater the development, the less opportunity there is for rainfall to soak into the ground. Runoff from roofs, parking lots, and streets builds rapidly, contributing to peak flows as it runs through local drainage systems to the main streams and rivers. Combined peak flows from the mountains and from local runoff may exceed channel capacity for a period of only six hours, but in this time they can cover a substantial area with debris-laden flow.

Flood History

The Los Angeles River has altered its point of discharge to the ocean numerous times in the distant past. This is consistent with the alluvial nature of the L.A. basin. The most recent relocation occurred in the mammoth flood of 1862 when the mouth of the LA River moved from Ballona Creek to its present location in Long Beach Harbor. Since 1900, significantly damaging flood flows occurred in 1914, 1934, 1938, 1952, 1969, 1980 and 1983. It can clearly be seen that large floods occur only infrequently in Los Angeles, but the magnitude of their destruction is enormous. Although a flood with a 100-year or greater frequency has not occurred in the 20th century, floods of near this magnitude have occurred in the past and caused extensive damages throughout the basin.

The February 1938 flood is the most damaging flood of record. It caused an estimated $40 million in damages ($795 million in 1990 dollars) throughout Los Angeles County and the loss of 49 lives. A large volume of floodwater, predominately originating in the San Gabriel Mountains, caused significant flooding in the cities of Glendale and Burbank. Extreme flood flows eroded the banks of the Tujunga Wash, damaging residential and commercial structures and washing out bridges and roads.

With the construction of the LACDA system, especially reservoirs and channel modifications, the magnitude and frequency of flooding in the area has been reduced. The floods of January and February 1969 were the most devastating to occur since 1938; and in some areas of the County, rainfall actually surpassed that experienced during the 1938 storm. Most notable was the channel flow on the lower half of the Los Angeles River which represented over 80% of the design capacity. However, the LACDA flood control system, which was 99% complete, protected the Los Angeles metropolitan area

from what otherwise would have been unprecedented damage. Most of the damages which did occur were caused by mudflows in the foothill areas or by local storm drain inadequacies. In the entire Los Angeles County, seventy-three lives were lost, and damages amounted to $31 million; $12 million in damages were sustained in the LACDA basin ($45 million in 1990 dollars).

The LACDA system was severely tested during the flood of 1980. Channel capacities were exceeded in the upper reaches of the Los Angeles River and the levee near the City of Long Beach was very nearly overtopped. If the levee had been overtopped and actually failed due to erosion of the back side of the levee, the resultant flooding could have caused a catastrophic loss of life in addition to the economic damages to the residential, commercial, and industrial properties in the City of Long Beach.

While the existing system has prevented a total of nearly $3.6 billion in flood damages since construction, there have, nevertheless, been flood damages experienced in recent years. Estimates of damages throughout the LACDA basin from floods of January-February 1969 totaled over $12 million ($45 million in 1990 dollars). Flooding in recent years has generated damages in localized areas, and the mainstem system has been seriously tested, but it has not failed catastrophically.

History of Flood Control Improvements in Los Angeles County

Prior to 1914, little attention had been directed to the problem of flood control within the basin. The principal land use was for agriculture, and farmers more or less accepted the occasional floods. The 1914 flood caused over $10 million worth of structural damages (approximately $470 million in 1990 dollars) and captured the attention of area residents. Flood control improvements were then recognized as necessary to protect the widespread developments in the foothills and flood plain. On June 12, 1915, the Los Angeles County Flood Control District was created by an Act of the California Legislature and was given the responsibility for flood control and water conservation in the Los Angeles County area. The original flood control plan called for the construction of reservoirs within the surrounding mountains. Between 1917 and

1939, the Flood Control District constructed 14 dams in the San Gabriel Mountains, numerous debris basins at canyon mouths, and some unrelated channel improvements.

By 1930 it became apparent that the construction program was barely keeping pace with the increase of storm water runoff resulting from the rapid urbanization of Los Angeles County. The Flood Control District began to prepare a comprehensive flood control plan which would protect the urban areas. However, extensive damages and loss of life caused by the 1934 flood mandated immediate construction of additional flood control improvements. In order to meet this urgent need, Congress appropriated nearly $14 million under the Emergency Relief Act of 1935 for construction of storm drains, permanent channel improvements, and debris basins.

The Flood Control Act of June 22, 1936, redefined the mission of the Army Corps of Engineers from that of providing emergency relief to the permanent supervision of future flood control plans. This Act authorized the construction of flood control facilities on the Los Angeles and San Gabriel Rivers at a Federal cost not to exceed $70 million. Under this authorization, the Corps of Engineers submitted a project plan for control of the Los Angeles River in 1936 and a general plan for the Rio Hondo and San Gabriel River in 1938. The Corps plan outlined the construction of debris basins at the base of the foothills, permanent channel improvements, and the construction of three additional flood control basins. These reservoirs were to be placed at strategic locations where the various streams merged and their flows could be controlled and regulated. Sepulveda and Hansen Dams were planned for the San Fernando Valley, and Santa Fe Dam for the San Gabriel River.

The 1938 flood demonstrated the need for additional flood control measures. It left 113 dead and $45 million in damaged property (1938 dollars, which is equivalent to approximately $795 million 1990 dollars). The previously constructed flood control works proved beneficial by preventing the tragedy from being worse. At the same time it was recognized that the tributaries of the Los Angeles and San Gabriel Rivers would have to be included in the overall plan. Under the Flood Control Act of June 28, 1938, the Corps of Engineers prepared a revised plan calling for over $230 million of construction for the entire Los Angeles County Drainage Area. Additional works

included construction of Lopez Dam on Pacoima Wash and Whittier Narrows Dam on the San Gabriel River.

The plan was approved by Congress in the Flood Control Act of August 8, 1941. It authorized construction of a comprehensive system consisting of the five major flood control basins previously mentioned; debris basins at the mouth of 31 tributary canyons; improvement of 93 miles of main channel and 147 miles of tributary channels; and reconstruction of 316 bridges on the Rio Hondo, Los Angeles, and San Gabriel Rivers.

Work on Hansen and Sepulveda basins, which began under the authorization of the three previous Flood Control Acts, was completed in 1941. Lopez Dam was completed in 1954 and regulates debris and streamflow from Pacoima Wash, a tributary of Tujunga Wash.

World War II temporarily brought a halt to the work on Santa Fe Dam, and it was finally completed in 1949. Whittier Narrows, the last of the five basins to be constructed, was completed in 1957. Construction of debris basins and permanent channel modifications, which had been progressing since 1935, was finally completed in 1970.

Existing Improvements

The LACDA project is one of the most extensive flood control systems ever built to protect a metropolitan area. It includes facilities on the Los Angeles and San Gabriel Rivers, Rio Hondo, Ballona Creek, and related tributaries (Figure 1). The system was built as a cooperative effort between the Los Angeles County Flood Control District and the Corps of Engineers. Flood control improvements to the LACDA system fall into four general categories, as follows:

1. Flood control reservoirs are designed to control and reduce streamflow so that downstream main channel capacities are not exceeded. The Corps operates four major reservoirs with a total combined capacity of over 110,000 acre-feet, and Lopez Dam with a capacity of 441 acre-feet. In

addition, there are two Corps dams on small tributaries of the San Gabriel River system, Brea Dam (capacity 4,020 acre-feet) and Fullerton Dam (764 acre-feet). These facilities ultimately drain into the San Gabriel River system but are located in Orange County and are covered by the Santa Ana River Basin and Orange County authority. They have no impact on the LACDA system problems and no impact on plan formulation for LACDA system improvements. Therefore they have not been discussed in this report. Locally operated facilities include 15 flood control and water supply reservoirs in the upper watershed areas of the LACDA basin. Combined, these local reservoirs have a maximum combined capacity of about 102,000 acre-feet, of which over half is reserved for flood control. Table 2 and Table 3 provide detailed information on Federal and Non-Federal dams.

2. Debris basins, found at the mouth of canyons, are designed to trap debris carried by floodwaters, leaving relatively clean water to flow unimpeded in downstream channels. There are currently 114 debris basins in the watershed of the Los Angeles and San Gabriel river systems. A listing is provided in Table 4. Their purpose is to reduce the amount of debris (mud, rock, sand) which reaches the lower basin reservoirs and channels.

3. Tributary channels, such as the Arroyo Seco and Compton Creek, are designed to pass local runoff and floodwaters efficiently into the main channels. There are improved channels on 37 major tributaries of the two river systems in the LACDA basin. One effect of these channels is to speed passage of flood flows through the local communities and into the mainstem river system, either draining into a flood control reservoir or directly into one of the two mainstem rivers.

4. Main channel improvements pass the controlled or partially controlled flows to the ocean. The two main river systems have over 100 miles of mainstem channel, the characteristics of which are identified, by reach, in Table 5 and Figure 6. The mainstem channels cross the generally flat,

heavily developed flood plain; to effectively contain peak floodflows, they must be hydraulically efficient to overcome the natural tendency for water to slow down as it crosses a flat plain. In the lower reaches of the basin, mainstem channels are at or near sea level and flow across very flat ground. To contain flows under such conditions, the natural channels are augmented by levee systems, which raise the maximum level of the river as much as 15 feet above the surrounding flood plain.

Each of these measures are combined in a unique manner to regulate flows on the Rio Hondo, Los Angeles, and San Gabriel Rivers. The major tributaries of the Los Angeles River are, in sequence proceeding downstream, Tujunga Wash, Burbank Western, Burbank Eastern, Verdugo Wash, Arroyo Seco, Rio Hondo, and Compton Creek. The tributaries are, for the most part, concrete-lined channels. Table 6 contains the LACDA channel improvements by system and includes completion sequence dates. Channel improvements for flood control include, but are not limited, to the following major tributaries:

LOS ANGELES RIVER	Owensmouth Avenue to Pacific Ocean
Major Tributaries	
Pacoima Wash	-Lopez Dam to Tujunga Wash
Tujunga Wash	-Hansen Dam to LAR
Burbank Western	-Stough Canyon Debris Basin to LAR
Verdugo Wash	-Verdugo Debris Basin to LAR
Compton Creek	-Main Street to LAR

RIO HONDO	Peck Road to LAR
Major Tributaries	
Alhambra Wash	-Roses Road to Rio Hondo
Arcadia Wash	-Carter Debris Basin to Rio Hondo
Eaton Wash	-Eaton Dam to Rio Hondo
Rubio Wash	-Melville Drive to Rio Hondo
Santa Anita Wash	-Santa Anita Debris Basin to Rio Hondo
Sawpit Wash	-Sawpit Debris Basin to Rio Hondo

SAN GABRIEL RIVER Mouth of San Gabriel Canyon to Pacific Ocean

Major Tributaries

Little Dalton Wash	-Lorraine Avenue to Big Dalton Wash
San Dimas	-Puddingstone Diversion Dam to Big Dalton Wash
Big Dalton Wash	-Little Dalton Debris Basin to Walnut Creek
Walnut Creek	-Covina Hills Road to SGR
San Jose Creek	-Thompson Creek Dam to SGR
Coyote Creek	-u/s of Rosecrans Avenue to SGR

Flows to the main channel of the Los Angeles River are regulated by Sepulveda and Hansen Dams which are operated and maintained by the Corps of Engineers. The river is improved for its entire reach below Sepulveda Dam, and the channel has a shape that fluctuates between trapezoidal and rectangular. The sides and invert are lined with either concrete or grouted rock, except for an ungrouted stone invert reach in the vicinity of Glendale and the reach from Willow Street to the Pacific Ocean where the channel is soft bottomed and the walls have rip-rap protection. The Los Angeles River is entrenched down to Atlantic Boulevard, and it becomes leveed from that point to the ocean.

The San Gabriel River originates in the San Gabriel Mountains where the East and West forks merge. The upstream watershed is controlled by three Los Angeles County dams: Cogswell, San Gabriel, and Morris. As it leaves the mountains, the river is regulated by Santa Fe Dam, which is operated by the Corps of Engineers. The river continues to flow in a southerly direction and is joined by Walnut Creek and San Jose Creek. The County operates six water control reservoirs on these tributaries, the largest of which is Puddingstone Dam. The San Gabriel River flows through Whittier Narrows, is joined downstream by Coyote Creek, and finally discharges into the ocean. The San Gabriel River primarily has rip-rapped channel sides with a soft-bottom invert to permit groundwater recharge. Seven miles downstream of Whittier Narrows Dam the river becomes a trapezoidal concrete-lined channel and remains so until it reaches the tidal influences of the ocean.

The third major watercourse of the system is the Rio Hondo. It originates in the San Gabriel Mountains and has a number of tributaries, including Eaton, Santa Anita, and Sawpit washes. The County operates four small water conservation dams in this region. The Rio Hondo flows through Whittier Narrows Reservoir, continues in a southwesterly direction, and then joins the Los Angeles River.

In addition, Los Angeles County has constructed a comprehensive underground storm drain system totaling approximately 2,000 miles. This system is very effective in delivering local runoff to the major flood control channels. The County also operates twenty-nine groundwater recharge basins totaling approximately 2,000 acres.

In total, the LACDA system has over 100 miles of mainstem channel, over 370 miles of tributary channels, 129 debris basins, 15 flood control and water conservation dams, and 5 flood control dams. In spite of the current projected flood threat, it is important to note that the existing system has prevented over $3.6 billion in damages since construction.

TABLE 2

PERTINENT DATA FOR FEDERAL DAMS

PROJECT			DAM					SPILLWAY			RESERVOIR							
PROJECT NAME	STREAM SYSTEM	DRAINAGE AREA (mi^2)	TYPE	HGT. (ft.)	CREST ELEV. (ft.NGVD)	OUTLET SILL (ft.NGVD)	TOP LENGTH (ft.)	TYPE	CREST ELEV. (ft.NGVD)	DESIGN CAPACITY (cfs)	PRIMARY PURPOSE	FLOOD CONTROL POOL (ft.NGVD)	MAX. DESIGN POOL (ft.NGVD)	FLOOD CONTROL POOL (ac-ft)	DESIGN SURCHARGE LEVEL (ac-ft)	DAM CREST (ac-ft)	MAX. SCHED. RELEASES	MAX.REL. INCLUD. SPILLWAY
BREA DAM	BREA CREEK	22	E	87.0	295.0	208.0	1765	U	279.0	14,000	FC	279.0	287.7	4020	1640	7420	1400	17,800
FULLERTON DAM	FULLERTON CREEK	5	E	46.0	307.0	261.0	575	U	290.0	3640	FC	290.0	298.4	764	630	2306	240	4230
HANSEN DAM	TUJUNGA WASH	147.4	E	97.0	1087.0	990.0	10,475	U	1060.0	99,700	FC	1060.0	1081.22	25,446	19,544	51,360	22,000	121,700
LOPEZ DAM	PACOIMA WASH	34	E	50.0	1298.9	1253.9	1330	U	1272.9	31,000	FC	1272.9	1292.82	441	1125	2028	450(EST)	31,000+
SANTA FE DAM	SAN GABRIEL RIVER	236	E	92.0	513.0	421.0	23,800	U	496.0	221,800	FC	496.0	508.4	32,109	14,603	53,088	41,000	262,800
SEPULVEDA DAM	LOS ANGELES RIVER	152	E	57.0	725.0	668.0	15,440	G	710.0	108,900*	FC	713.5	716.7	22,493	5070	44,727	16,500	125,400
WHITTIER NARROWS DAM	RIO HONDO / SAN GABRIEL RIVER	554	E	56.0	239.0	184.0	16,960	G	228.5	307,900	FC	228.5	238.9	34,947	31,755	67,060	40,000	347,900

* Gates in Raised Position

U - Ungated Spillway
G - Gated Spillway
E - Earthfill
FC - Flood Control

TABLE 3

PERTINENT DATA FOR NON-FEDERAL DAMS

PROJECT			DAM					SPILLWAY			RESERVOIR							
NAME OF DAM	STREAM SYSTEM	DRAINAGE AREA (mi^2)	TYPE	HGT. (ft.)	CREST ELEV. (ft.NGVD)	OUTLET SILL (ft.NGVD)	TOP LENGTH (ft.)	TYPE	CREST ELEV. (ft.NGVD)	DESIGN CAPACITY (cfs)	PRIMARY PURPOSE	MAX. NORMAL POOL (ft.NGVD)	MAX. DESIGN POOL (ft.NGVD)	MAX. NORMAL POOL (ac-ft)	DESIGN SURCHARGE LEVEL (ac-ft)	DAM CREST (ac-ft)	MAX. SCHED. RELEASES (cfs)	MAX.REL INCLUD. SPILL. (cfs)
BIG DALTON DAM	BIG DALTON CREEK	4.5	C,A,G	146.0	1711.0	1613.0	480.0	U	1706.0	5310	FC,WS	1706.0	1711.0	915.0	119.2	1037.0	888	6198
BIG TUJUNGA DAM	BIG TUJUNGA CREEK	82.3	C,A	200.0	2304.0	2160.0	505.0	U	2290.0	24,250	FC,WS	2290.0	2304.0	5750.0	1186.0	6906.0	2900	27,150
COGSWELL DAM	SAN GABRIEL R. - W. FORK	39.2	R	265.0	2405.0	2148.0	585.0	U	2385.0	29,500	FC,WS	2385.0	2398.0	8853.0	2031.0	N/A	8725	38,225
DEVIL'S GATE DAM	ARROYO SECO	31.9	C,A,G	100.0	1070.0	(S)958.8 (V)985.5	310.0	U	1054.0 1065.5	14,800 1000	FC,WS	1054.0 1065.5	1072.0	2869.0 4787.0	OT OT	2820.0 5683.0	5637	20,937
EATON WASH DAM	EATON CREEK	12.4	E	62.0	902.0	841.0	1525.0	U	887.5	33,500	FC,WS	887.5	897.5	721.0	457.0	N/A	5040	38,540
LIVE OAK DAM	LIVE OAK CREEK	2.3	C,A,G	70.0	1500.1	1429.8	303.0	U	1496.4 1497.0	2400 (COMB)	FC,WS	1496.4 1497.0	1500.0	239.0 245.0	6.5 N/A	282.3	368	2768
MORRIS DAM	SAN GABRIEL RIVER	217.0	C,G	245.0	1175.0	960.0	800.0	G	1152.0 1170.0	34,200 100,000	FC,WS	1175.0 (GR)	1175.0	22,758.0 N/A	N/A N/A	N/A	5280	100,000
PACOIMA DAM	PACOIMA CREEK	28.2	C,A,G	365.0	2015.0	1700.0	640.0	U	1950.0 1990.0	10,780	FC,WS	1950.0 1989.0	2025.0	3115.0 6589.0	5204.0 N/A	8981.0	1048	11,828
PUDDINGSTONE DAM	SAN DIMAS CREEK	33.1	E,C	147.0	982.0	882.1	2698.0 (COMB.)	U	970.0	6900	FC,WS	970.0	975.0	16,468.0	2504.0	N/A	850	7750
PUDDINGSTONE DIVERS. DAM	SAN DIMAS CREEK	19.9	E,C	33.5	1163.8	1145.5	825.5	U	1152.5	10,600	FC,WS DIV.	1152.5	1158.5	191.0	116.0	N/A	2180	14,100
SAN DIMAS DAM	SAN DIMAS CREEK	16.2	C,A,G	117.0	1470.3	(S)1358.0 (V)1369.0	340.0 (LS)	U	1462.0	27,455	FC,WS	1462.0	1470.0	1306.0	315.0	1630.0	2060	28,600
SAN GABRIEL DAM	SAN GABRIEL RIVER	202.7	E,R,C	310.0	1481.0	1205.8	1500.0	U	1453.0	92,000	FC,WS	1453.0	1466.0	44,226.0	7412.0	N/A	13,470	110,870
SANTA ANITA DAM	SANTA ANITA CREEK	10.8	C,A,G	224.8	1324.8	1161.2	612.0	U	1316.0 1324.8	2900	FC,WS	1316.0 1324.8	1324.8	776.5 905.7	129.2 N/A	905.7	647	3533
SAWPIT DAM	SAWPIT CREEK	3.2	C,A	147.0	1375.2	1375.7	527.0	U	1360.0 1375.2	1450 610	FC,WS	1360.0 1375.2	1375.2	354.0 506.6	152.6 N/A	506.6	457	2584
THOMPSON CREEK DAM	THOMPSON CREEK	3.5	C,GL	66.0	1648.0	1579.4	1500.0	U	1634.1	4520	FC,WS	1634.1	1645.0	543.0	369.7	N/A	320	4985

E - Earthfill, R - Rockfill, C - Concrete; A - Arch, M - Masonry, GL - Gravel; G - Gravity, S - Slide Gates, V - Valves; U - Ungated, G - Gated, GR - Gate Raised; Ws - Water Supply, FC - Flood Control, P - Power; OT - Overtop the Dam, LS - Less Spillway, COMB - Combined

TABLE 4

D E B R I S B A S I N - D E S I G N D A T A

Including 1990-1991 Season

Compiled by: Hydraulic and Water Conservation Division - Sedimentation Section
Date: October 1, 1991
FILE: DSA91.WK1

DATA SHEET A

DEBRIS BASIN	FIRST DEBRIS SEASON	UNCONTROLLED DRAINAGE AREA ABOVE BASIN SQ. MI.	BOTTOM ELEV. AT MAX CAP. FT.	ELEV PORT INVERT FT. (1)	ELEV. SPILLWAY CREST	WIDTH SPILLWAY FT.	ELEV. CREST. OF DAM FT.	MAX. DEB. CAP. CU. YDS.
Aliso	1970 - 71	2.77	1108.0	1108.4	1120.0	70.0	1134.0	41,700 (8)
Arbor Dell	1971 - 72	0.11	899.3	898.4	913.0	22.9	919.6	12,400
Auburn	1954 - 55	0.19	1263.9	1263.0	1275.0	30.0	1283.0	33,700
Bailey	1945 - 46	0.60	1122.5	1123.1	1155.0	30.0	1166.0	128,800
Beatty	1970 - 71	0.27	800.0	800.0	807.0	32.0	815.5	43,000
Bigbriar	1971 - 72	0.02	1898.3	1896.0	1910.0	14.0	1910.8	3,100
Big Dalton	1959 - 60	2.94	1102.0	1101.9 (3)	1131.5	116.0	1148.7	517,800
Blanchard	1968 - 69	0.47	2026.0	2026.0	2053.5	40.0	2065.0	74,500
Blue Gum	1968 - 69	0.19	2020.0	2020.0	2042.0	25.0	2053.0	39,600
Brace	1971 - 72	0.29	1189.7	1189.7	1194.5	20.0	1203.3	27,500
Bracemar	1971 - 72	0.01	1140.0	1140.0	1145.5	8.0	1148.0	700 (11)
Bradbury	1954 - 55	0.68	912.5	913.1	920.0	58.0	928.0	89,800
Brand	1935 - 36	1.04	859.0	860.0	890.0	60.0	903.0	166,000 (15)
ena Vista	1985 - 86	0.10	979	979	992.2	39.0	998	21,400 (18)
arriage House	1970 - 71	0.03	1350.3	1350.0	1362.9	15.0	1366.8	6,135
Carter	1954 - 55	0.12	1222.0	1223.2	1238.2	30.0	1245.0	18,700
Cassara	1976 - 77	0.21	1271.5	1271.5	1291.7	66.0	1295.4	36,700 (...
Chamberlain	1974 - 75	0.04	1084.6	1084.0	1097.5	20.0	1101.3	4,700
Childs	1963 - 64	0.30	1022.0	1022.0	1058.8	23.0	1071.0	50,400
Cloud Creek	1972 - 73	0.01	2347.2	2350.5	2360.0	(5)	2362.0	5,075 (15,
Cloudcroft	1973 - 74	0.21	313.9	315.0	329.5	36.0	329.5	34,700
/Cooks	1951 - 52	0.58	2058.0	2058.0	2082.9	48.0	2092.0	85,600
\Cooks M-1A	1975 - 76	(14)	(14)	(14)	(14)	(14)	(14)	(14)
Crestview	1983 - 84	0.03	864.4	864.0	886.2	20.0	891.7	5,900
Crocker	1983 - 84	0.67	1064.8	1064.2	1069.8	36.0	1077.0	19,300 (15)
Deer	1954 - 55	0.59	1185.4	1185.0	1201.0	56.0	1209.6	56,600
Denivelle	1976 - 77	0.18	1471.0	1471.0	1479.3	46.0	1483.3	8,200
Devonwood	1981 - 82	0.03	1899.0	1899.0	1915.8	22.0	1921.5	6,400 (19
Dry Canyon-South Fork	1978 - 79	0.49	1062.8	1062.5	1074.8	32.0	1079.3	7,900 (19)
Dunsmuir	1935 - 36	0.84	2228.0	2227.7	2257.2	60.0	2272.2	101,900 (18)
Eagle	1936 - 37	0.48	1848.3	1844.3	1880.2	60.0	1895.2	62,400
Elmwood	1964 - 65	0.31	912.0	911.5	938.0	22.0	952.0	66,400
Emerald-East	1964 - 65	0.32	1185.1	1181.1	1192.0	30.0	1204.0	13,200
Englewild	1961 - 62	0.44	1274.9	1275.0	1297.0	50.0	1300.0	50,400 (19)
Fair Oaks	1935 - 36	0.21	1544.0	1544.0	1561.9	(6)	1566.5	23,800
Fern	1935 - 36	0.31	1438.7	1462.4	1470.2	25.0	1480.5	30,600
Fieldbrook	1974 - 75	0.35	712.7	713.0	718.0	28.0	722.3	2,800
Golf Club Drive	1970 - 71	0.97	880.7	880.7	902.0	36.7	915.0	14,700 (19)
Gordon	1973 - 74	0.18	1075.7	1075.0	1088.0	22.0	1096.0	16,800
Gould	1947 - 48	0.36	1529.5	1528.2	1548.0	55.0	1548.0	49,600 (19)
Gould (Upper)	1976 - 77	0.18	1863.9	1863.9	1897.7	32.0 (16)	1901.0	52,300
Halls	1935 - 36	0.86	1641.6	1641.8	1661.3	131.0	1664.0	89,400
Harrow	1958 - 59	0.43	1254.8	1255.0	1269.0	40.0	1277.8	68,000
Hay	1936 - 37	0.20	1875.4	1901.0	1905.0	36.0	1915.0	34,400

TABLE 4

D E B R I S B A S I N - D E S I G N D A T A

Including 1990-1991 Season

Compiled by: Hydraulic and Water Conservation Division - Sedimentation Section
Date: October 1, 1991
FILE: DSA91.WK1

DATA SHEET A

DEBRIS BASIN	FIRST DEBRIS SEASON	UNCONTROLLED DRAINAGE AREA ABOVE BASIN SQ. MI.	BOTTOM ELEV. AT MAX CAP. FT.	ELEV PORT INVERT FT. (1)	ELEV. SPILLWAY CREST	WIDTH SPILLWAY FT.	ELEV. CREST. OF DAM FT.	MAX. DEB. CAP. CU. YDS.
Hillcrest	1962 - 63	0.35	863.5	863.5	885.0	18.0	901.0	57,800
Hog	1969 - 70	0.33	1520.3	1520.0	1535.0	32.0	1547.0	39,600 (19)
Hook East	1968 - 69	0.18	1197.5	1198.0	1210.9	37.0	1215.0	30,700
Hook West	1970 - 71	0.17	1144.8	1145.0	1158.9	40.0	1167.0	21,600 (18)
Inverness	1982 - 83	0.03	1253.0	1252.9	1256.7	20.0	1261.0	3,300
Irving Drive	1974 - 75	0.03	905.8	905.0	915.3	12.0	920.0	2,100
Kinneloa	1964 - 65	0.20	1370.0	1370.0	1388.0	40.0	1395.0	17,200
Kinneloa West Branch	1966 - 67	0.19	1384.9	1385.0	1400.0	22.0	1408.5	23,600 (19)
Lannan	1954 - 55	0.25	1016.0	1015.0	1035.8	14.0	1043.0	36,700
La Tuna	1955 - 56	5.34	1109.0	1110.0	1140.0	75.0	1157.0	495,300
Las Flores	1935 - 36	0.45	1685.1	(9)	1715.6	50.0	1726.4	57,600
Las Lomas	1983 - 84	0.07	895.4	896.0	906.6	24.0	911.0	9,300
Limekiln	1963 - 64	3.72	990.0	992.0	1003.0	77.0	1019.0	171,600
:oln	1935 - 36	0.50	1275.8	1276.0	1304.0	56.0	1322.5	38,400
Linda Vista	1970 - 71	0.37	979.5	979.5	989.8	40.0	995.7	3,200
Little Dalton	1959 - 60	3.31	1140.0	1139.5	1186.0	84.0	1200.2	660,500 (15)
Maddock	1954 - 55	0.25	888.6	891.8	901.0	36.0	904.0	45,000 (15)
Marston/Paragon	1988 - 89	0.20	1,456	1,456	1468.0	(10)	1466.0	13,000
May No. 1	1953 - 54	0.70	1665.9	1666.0	1684.0	60.0	1692.5	64,000
May No. 2	1953 - 54	0.09	1663.4	1663.5 (2)	1669.5	20.0	1674.0	10,000
Monument	1981 - 82	0.11	943.8	942.3	950.0	12.0	954.0	6,800
Morgan	1964 - 65	0.60	1135.0	1135.0	1158.0	45.0	1167.0	51,100
Mountbatten	1983 - 84	0.01	1136.2	1135.5	1140.9	20.0	1141.0	1,400
Mull	1973 - 74	0.15	1146.9	1147.0	1154.0	20.0	1165.0	16,000
Mullally (12)	1974 - 75	0.34	2420.0	2420.0	2435.4	42.0	2439.6	12,000
Nichols	1937 - 38	0.94	481.0	481.0	485.1	50.0	495.0	13,100 (19)
Oak	1975 - 76	0.05	2145.7	2145.7	2151.8	50.0	2156.2	8,700
Oakglade	1974 - 75	0.06	1274.6	1280.0	1290.0	20.0	1296.0	12,300
Oakmont View Drive	1984 - 85	0.02	1315.5	1315.5	1327.5	20.0	1327.5	3,400
Oliver	1989 - 90	0.18	1253.4	1253.4	1278.0	41.0	1283.3	32,100
Pickens	1935 - 36	1.50	1564.0	1564.0	1600.0	123.0	1613.0	125,115
Pinelawn	1973 - 74	0.02	2431.0	2430.5	2443.0	(7)	2448.5	3,200 (18)
Rowley	1953 - 54	0.21	1701.6	1703.6	1714.0	60.0	1722.0	43,100 (19)
Rowley (Upper)	1976 - 77	0.31	1926.0	1926.0	1946.0	42.0	1951.3	28,800
Rubio	1943 - 44	1.26	1582.1	1582.1	1608.3	59.0	1625.5	127,200
Ruby (Lower)	1955 - 56	0.28	810.8	809.6	828.0	45.0	833.0	28,600
Rye	1981 - 82	1.11	1073.9	1073.8	1077.7	58.2	1081.5	19,100
Saddleback	1988 - 89	0.04	1779.0	1779.3	1790.0	(10)	1796.0	27,000
'nta Anita	1959 - 60	1.70	748.5	748.5 (3)	774.7	160.0	796.0	394,600
Sawpit	1954 - 55	2.82	928.5	933.4	982.0	110.0	1000.0	635,700 (15,
Scholl	1945 - 46	0.16	950.0	950.0 (2)	956.0	76.0	966.0	9,300 (19)
Schoolhouse	1962 - 63	0.28	1459.6	1460.0	1478.5	20.0	1491.0	67,700
Schwartz	1976 - 77	0.25	1296.0	1294.7	1313.2	35.0	1319.0	45,400
Shields	1937 - 38	0.06	2030.0	2050.0	2058.1	30.0	2070.2	34,800 (19)

TABLE 4

DEBRIS BASIN - DESIGN DATA

Including 1990-1991 Season

Compiled by: Hydraulic and Water Conservation Division - Sedimentation Section
Date: October 1, 1991
FILE: DSA91.WK1

DATA SHEET A

DEBRIS BASIN	FIRST DEBRIS SEASON	UNCONTROLLED DRAINAGE AREA ABOVE BASIN SQ. MI.	BOTTOM ELEV. AT MAX CAP. FT.	ELEV PORT INVERT FT. (1)	ELEV. SPILLWAY CREST	WIDTH SPILLWAY FT.	ELEV. CREST. OF DAM FT.	MAX. DEB. CAP. CU. YDS.
Sierra Madre Dam (13)	1927 - 28	2.39	1119.5	1119.5	1172.5	62.5	1175.0	133,600
Sierra Madre Villa	1957 - 58	1.46	1069.2	1069.2	1088.9	48.0	1102.5	402,700
Snover	1936 - 37	0.21	1858.0	1874.4	1879.0	40.0	1893.7	23,400 (19)
Sombrero	1969 - 70	1.06	1539.6	1540.0	1564.8	45.0	1580.0	87,900
Spinks	1958 - 59	0.42	750.0	750.0	761.5	40.0	765.9	56,000
Starfall	1973 - 74	0.13	2428.0	2428.0	2441.5	30.0	2446.5	18,400
Stetson	1969 - 70	0.29	1556.0	1555.0	1570.0	32.0	1570.0	41,300
Stough	1940 - 41	1.65	1006.0	1005.8	1031.5 (4)	100.0	1043.5	181,200
Sturtevant	1967 - 68	0.03	975.0	971.0	983.6	8.0	990.0	2,300
Sullivan	1970 - 71	2.38	570.0	570.0	587.0	50.0	599.3	51,000
Sunnyside	1970 - 71	0.02	1290.0	1290.0	1299.5	15.0	1303.8	4,300
Sunset Canyon-Deer	1982 - 83	0.21	1382.4	1380.5	1401.8	24.0	1409.1	6,400 (19)
Sunset (Lower)	1963 - 64	0.45	1003.8	994.5	1040.0	40.0	1056.0	160,600 (19)
Sunset (Upper)	1928 - 29	0.44	1574.2	1574.0	1603.7	75.0	1610.1	15,900
Turnbull	1952 - 53	0.99	480.0	475.6	492.0	40.0	503.0	20,300
Upper Shields (12)	1976 - 77	0.20	2505.0	2502.0	2518.8	29.5	2524.0	5,600
Valley	1987 - 88	0.22	1351.0	(10)	(10)	31.0	1365.0	4,000
Verdugo	1935 - 36	3.09	1109.5	1110.0	1119.7	145.0	1131.0	131,000
Ward	1956 - 57	0.12	2021.8	2022.0	2043.0	58.0	2035.3	26,400
West Ravine	1935 - 36	0.25	1470.0	(9)	1501.9	20.0	1505.5	44,900 (15)
Westridge	1974 - 75	0.02	894.0	894.0	901.0	10.7	906.0	1,400
Wildwood	1967 - 68	0.65	1342.9	1342.9	1354.0	50.0	1360.0	20,700
William S. Hart Park	1983 - 84	0.09	1284.0	1280.0	1290.0	19.0	1293.0	2,400
Wilson	1962 - 63	2.58	1517.3	1493.0	1526.0	60.0	1543.0	313,100 (15)
Winery	1968 - 69	0.18	1920.0	1920.0	1935.0	20.0	1945.0	29,200
Zachau	1956 - 57	0.35	1803.4	1803.1	1820.5	44.0	1823.0	48,100

114 DEBRIS BASINS 7,602,125

TABLE 4

DEBRIS BASIN - DESIGN DATA

Including 1990-1991 Season

Compiled by: Hydraulic and Water Division - Sedimenta
Date: October 1, 1991

DATA SHEET A

(1) LOWEST CLEAR WATER OUTLET, NOT SPILLWAY.
(2) ELEVATION OF SPILLWAY NOTCH.
(3) FLOW LINE OF SLUICEWAY.
(4) ELEVATION OF SPILLWAY INTO OUTLET CHANNEL. ELEVATION OF OVERFLOW SPILLWAY 1036.9 FEET.
(5) ONE 30-INCH REINFORCED CONCRETE PIPE.
(6) FOUR 36-INCH CORRUGATED METAL PIPES.
(7) ONE 36-INCH REINFORCED CONCRETE PIPE. (ELEVATED INLET)
(8) DEBRIS CAPACITY AVAILABLE WITHIN RIGHT OF WAY LIMITS.
(9) PIT-TYPE BASIN.
(10) INFORMATION UNAVAILABLE.
(11) MAXIMUM CAPACITY MAY BE LESS THAN SHOWN AND IS BEING REVIEWED. FIELD INSPECTION SUGGESTS BASIN IS NEAR ITS FULLEST POSSIBLE CAPACITY.
(12) SPECIAL CLEANOUT REQUIRED DUE TO LIMITED STORAGE.
(13) CLEANOUT WHEN DEBRIS REACHES OR EXCEEDS ELEV. 1128.9 AGAINST FACE OF DAM.
(14) VALUES ARE COMBINED WITH COOKS DEBRIS BASIN
(15) VALUES ARE BASED ON RECENTLY APPROVED CUTPLANS
(16) SPILLWAY IS STREET
(17) CLEANED FALL OF 1991
(18) CAPACITY REDUCED FOR 5% MAX CONE SLOPE
(19) DRAINAGE AREA CORRECTED JUNE 1991

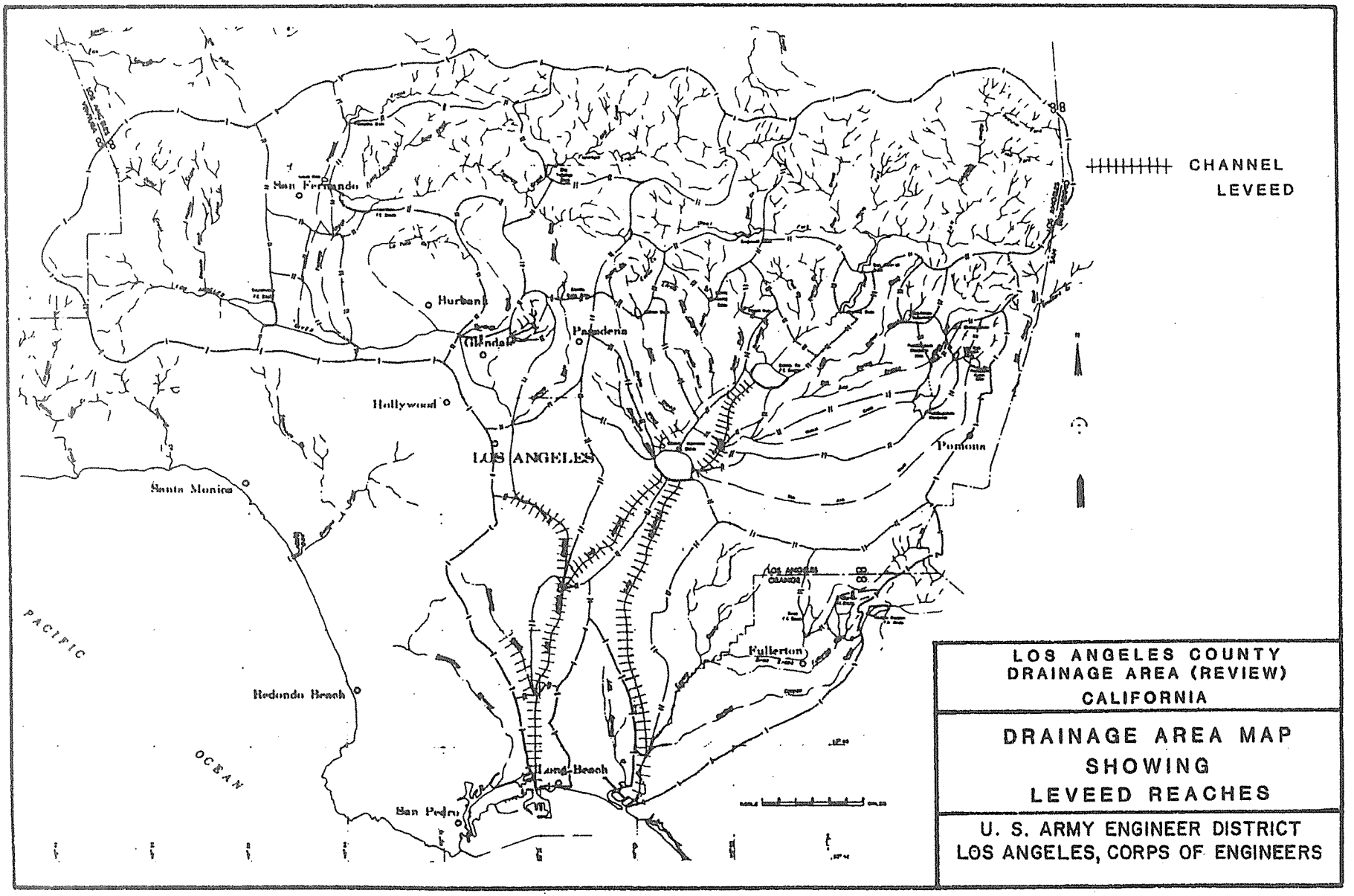

CHANNEL
LEVEED
San Fernando
Burbank
Glendale
Pasadena
Hollywood
LOS ANGELES
Pomona
Santa Monica
Fullerton
Redondo Beach
Long Beach
San Pedro
PACIFIC
OCEAN
LOS ANGELES COUNTY
DRAINAGE AREA (REVIEW)
CALIFORNIA
DRAINAGE AREA MAP
SHOWING
LEVEED REACHES
U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS

FIGURE 6

Table 5.
Channel characteristics of the Los Angeles and San Gabriel River Mainstem systems, existing conditions.

Reach	Level of Protection*	Lining	Leveed/Entrenched
1	70-150 year	Concrete	Entrenched
2	10-100+ year	Concrete	Entrenched
3	75-250 year	Concrete	Entrenched above Atlantic Blvd.
4	25-250 year	Concrete	Leveed and Rip-Rap
5	25 year	Concrete	Leveed
6	100+ year	Rip-rap and Concrete	Leveed
7	100+ year	Rip-rap and Concrete	Leveed and Entrenched
8	100+ year	Concrete	Entrenched
9	< 100 year	Rip-Rap and Concrete	Leveed

See Figure 3, page 15, reach designations

* Levels of protection are approximate and vary, depending on the particular stretch of channel in the reach. Thus there are different potential breakout points for floods of varying magnitude.

TABLE 6

LACDA CHANNEL IMPROVEMENTS -- COMPLETION SEQUENCE

RIVER SYSTEM	FINISH DATE
Los Angeles River	
Owensmouth Ave. to Corbin Ave.	Feb 58
Corbin Ave. to Reseda Blvd.	Jan 57
Reseda Blvd. to Sepulveda F.C.B.	Apr 55
Sepulveda Flood Control Basin	Dec 41
Sepulveda F.C.B. to Van Nuys Blvd.	Aug 53
Van Nuys Blvd. to Fulton Ave.	Feb 52
Fulton Ave. to Whitsett Ave.	Jan 51
Whitsett Ave. to Radford Ave.	Feb 50
Radford Ave. to Lankershim Blvd.	May 49
Lankershim Blvd. to Niagara St.	May 48
Niagara St. to Mariposa St.	Feb 39
Mariposa St. to Golden State Freeway	1939
Golden State Freeway to Doran St.	May 39
Doran St. to Los Feliz Blvd.	Nov 54
Los Feliz Blvd. to Hyperion Ave.	Nov 59
Hyperion Ave. to Blimp St.	Jul 56
Blimp St. to Golden State Freeway	Sep 56
Golden State Freeway to Pasadena Freeway	Jan 40
Pasadena Freeway to North Broadway	Jan 42
North Broadway to Alhambra Ave.	Feb 47
Alhambra Ave. to Santa Ana Freeway	May 47
Santa Ana Freeway to 4th St.	Sep 41
4th St. to Olympic Blvd.	Nov 41
Olympic Blvd. to Washington Blvd.	Dec 41
Washington Blvd. to Soto St.	Jan 39
Soto St. to Downey Rd.	Oct 59
Downey Rd. to Atlantic Blvd.	Oct 59
Atlantic Blvd. to Randolph St.	Oct 59
Randolph St. to Florence Ave.	Jan 57
Florence Ave. to Stewart & Gray Rd.	Dec 56
Stewart & Gray Rd. to Imperial Highway	Dec 51
Imperial Highway to Century Blvd.	Nov 51
Century Blvd. to Josephine St.	Mar 54
Josephine St. to Compton Blvd.	Jan 56
Compton Blvd. to Atlantic Ave.	Dec 56
Atlantic Ave. to 63rd St.	Nov 56
63rd St. to Dominguez St.	Jan 58
Dominguez St. to Carson St.	Dec 56
Carson St. to Wardlow Rd.	Jan 56
Wardlow Rd. to Willow St.	Jan 56
Willow St. to 20th St.	Dec 55
20th St. to 7th St.	May 55
7th St. to Pacific Ocean	Dec 53
Pacoima Wash	
Lopez F.C.B. to Paxton St.	Apr 54
Paxton St. to Tujunga Wash	Dec 53
Tujunga Wash	
Hansen Dam to Beachy Ave.	Feb 52
Beachy Ave. to Van Owen St.	Nov 51
Van Owen St. to Magnolia Blvd.	Jan 52
Magnolia Blvd. to Los Angeles River	May 50

TABLE 6

(cont.): LACDA CHANNEL IMPROVEMENTS – COMPLETION SEQUENCE

RIVER SYSTEM	FINISH DATE
Verdugo Wash	
Debris Basin to San Gabriel Ave.	Jan 68
San Gabriel Ave. to Glen Oaks Blvd.	Sep 37
Glen Oaks Blvd. to San Fernando Road (L.A. River)	Sep 37
Compton Creek	
Main St. to Lanzit Ave.	Dec 51
Lanzit Ave. to 122nd St.	Dec 51
122nd St. to Alondra Blvd.	1950
Alondra Blvd. to S.P. Railroad Yard	1950
S.P. Railroad Yard to Los Angeles River	Jun 37
Rio Hondo	
Peck Rd. to Lower Azusa Rd.	Nov 59
Lower Azusa Rd. to Valley Blvd.	Mar 59
Valley Blvd. to Whittier Narrows F.C.B.	Jun 57
Whittier Narrows Flood Control Basin	Mar 57
Whittier Narrows F.C.B. to Washington Blvd.	Mar 56
Washington Blvd. to Santa Ana Freeway	Dec 54
Santa Ana Fwy to S.P. Railroad Yard (L.A. River)	Feb 54
S.P. Railroad Yard to U.P. Railroad Yard	Dec 51
Sawpit Wash	
Debris Basin to Duarte Rd.	Jan 56
Duarte Rd. to Rio Hondo	Nov 60
Santa Anita Wash	
Debris Basin to A.T.S.F. Railroad Yard	Jan 60
A.T.S.F. Railroad Yard to Rio Hondo	Jan 59
Rubio Wash	
Melville Dr. to Rio Hondo	Jan 59
Eaton Wash	
Eaton Dam to Huntington Dr.	Apr 58
Huntington Dr. to Rosemead Blvd.	Feb 57
Rosemead Blvd. to Rio Hondo	Mar 56
Arcadia Wash	
Huntington Pl. to Rio Hondo	Jan 56

TABLE 6

(cont.): LACDA CHANNEL IMPROVEMENTS – COMPLETION SEQUENCE

RIVER SYSTEM	FINISH DATE
Alhambra Wash	
Roses Rd. to Valley Blvd.	Jun 38
Valley Blvd. to Rio Hondo	Jun 38
San Gabriel River	
Mouth of Canyon to Santa Fe F.C.B.	Dec 47
Santa Fe F.C.B. to Lower Azusa Rd.	Jan 61
Lower Azusa Rd. to Walnut Creek	Jan 61
Walnut Creek to Whittier Narrows F.C.B.	Jan 61
Whittier Narrows Flood Control Basin	Mar 53
Whittier Narrows F.C.B. to Washington Blvd.	Jun 68
Washington Blvd. to Cecilia St.	Jun 68
Cecilia St. to Fairton St.	Nov 66
Fairton St. to Del Amo Blvd.	Jan 66
Del Amo Blvd. to Coyote Creek	Nov 64
Coyote Creek to 7th St.	Nov 62
7th St. to Pacific Ocean	Apr 62
San Dimas Wash	
Puddingstone Diversion Dam to A.T.S.F. RY	Nov 62
A.T.S.F. Railroad Yard to Grand Ave.	Dec 60
Grand Ave. to Big Dalton Wash	Feb 59
Little Dalton Wash	
Loraine Ave. to Cullen Ave.	Jan 61
Cullen Ave. to 5th St.	Jan 61
5th St. to Big Dalton Wash	Jan 61
Big Dalton Wash	
Debris Basin to Alosta Ave.	Feb 60
Alosta Ave. to Barranca Ave.	Feb 60
Barranca Ave. to San Dimas Wash	Nov 59
San Dimas Wash to Los Angeles St.	Mar 59
Los Angeles St. to Walnut Creek	Jan 59
Walnut Creek	
Covina Hills Rd. to Charter Oaks Wash	Nov 62
Charter Oaks Wash to California Ave.	Jan 62
California Ave. to Big Dalton Wash	Jan 62
Big Dalton Wash to San Gabriel River	Feb 58

TABLE 6

(cont.): LACDA CHANNEL IMPROVEMENTS – COMPLETION SEQUENCE

RIVER SYSTEM	FINISH DATE
San Jose Creek - Thompson Creek	
Thompson Creek Dam to Mountain Ave.	May 67
Mountain Ave. to San Jose Creek	Feb 65
San Jose Creek to Nicholet St.	Mar 64
Nicholet St. to Benton Rd.	Dec 62
Benton Rd. to Anaheim-Puente Rd.	Feb 67
Anaheim-Puente Rd. to 6th Ave.	Feb 67
6th Ave. to San Jose Creek Diversion	Jan 65
San Jose Creek Div. to San Gabriel River	Mar 53
Coyote Creek	
Upstream of North Fork	Mar 67
N. Fork to Carson St.	Feb 65
Carson St. to San Gabriel River	Aug 64
Ballona Creek	
Redondo Blvd. to Washington Blvd.	1937
Washington Blvd. to La Salle Ave.	1939
La Salle Ave. to Vista Del Mar	1936
Vista Del Mar to Pacific Ocean	1939

Economic and Demographic Development

The Los Angeles area is one of the largest manufacturing, trade, financial, and service economies in the nation, with a gross product exceeding $100 billion annually. The economy is diversified and has sustained long-term growth for almost 70 years. The Los Angeles/Long Beach harbors form the largest harbor complex on the west coast of the United States, handling almost as much cargo as the three other major port complexes combined (San Francisco-Oakland, Seattle-Tacoma, and Portland). The region is a major trans-shipment point for Pacific Rim trade.

The economy is generally stable due to the steady net migration of residents and industry from other areas of the state and the nation: from 1980 to 1988, the population of the county increased from 7,477,400 to 8,407,400. The Southern California Association of Governments predicts a county population of 10,231,000 by the year 2010. An equal or greater percentage of growth in surrounding Ventura, San Bernardino, Riverside, and Orange counties is anticipated as well, and total southern California population (including San Diego) is projected to climb to over 23,000,000 by the year 2030. At the same time population has grown, unemployment has remained relatively low compared to urban areas in the east and midwest.

Demographically speaking, the area has always been multi-ethnic and multi-cultural. In recent years, the area has experienced a large immigration of peoples from central America and southeast Asia, as well as from other areas of the United States. Los Angeles is considered a stable, desirable location and is becoming an international city with numerous Pacific Rim corporations establishing major corporate headquarters in the area. This trend strengthens the economy of the region.

As a result of favorable economic conditions and this projected population increase, land use in the basin is intensive and property values are high and increasing rapidly. Within the 82 square-mile 100-year flood plain, there are 142,000 structures (123,000 residences) with a structure-contents value of $17.3 billion dollars. Within the 198-square-mile 500-year flood plain, there are 322,000 structures (278,000 residences) valued

at $40.2 billion. About 500,000 people reside in the 100-year flood plain with 1,200,000 people residing in the 500-year flood plain.

Development adjacent to mainstem channels ranges from heavy industry (power stations, manufacturing, railroad facilities, refineries) to residential. Since the channel system was completed, development has been permitted to abut the right of way for the channels.

Recent development within the area is dominated by conversion of existing low density areas to high density residential and commercial zones. Moderately priced detached homes are, for example, replaced with high density condominiums (usually with garage facilities on the lower floor) which increase population density and the number of vehicles in the flood plain. Low value shopping areas are, likewise, converted to multi-story office and commercial complexes. The value of the property within the LACDA overflow area is thus projected to increase. Assuming that preliminary FEMA maps are used as the basis for flood plain designations in the 1990's, new construction should be designed to reduce flood damage, and the losses expected from a flood event are not expected to increase in real dollar terms as a result of development.

Total employment in the Los Angeles-Long Beach Partial Metropolitan Statistical Area (PMSA), which covers approximately the same area as Los Angeles County, was 4,000,000 as of 1983. The largest employment category is the service sector with 2,850,000 jobs, followed by manufacturing with nearly 900,000 employed.

Urban Growth and Runoff Characteristics

Development affects runoff because impervious areas such as roads, buildings, parking lots, and similar structures have a rapid runoff response, filling local storm drains with flows which, prior to development, would have been absorbed into the soil. Urban growth was anticipated and indeed had already occurred in portions of the LACDA basin during the initial project design phases in the 1930's and 1940's. However, the effects of urbanization on runoff exceeded the expectations of design engineers and city

planners. Between 1940 and 1980, the population of Los Angeles County increased almost 270% to 7.5 million people.

Not only did this cause a greater amount of runoff from all of the impervious surfaces that now cover the basin, but it also necessitated the construction of an underground storm drain system to keep local runoff from building up in roads and low-lying areas of neighborhoods. This storm drain system concentrates and speeds flows directly into the main LACDA channels. The result of rapid runoff and a storm drain system which concentrates flows is a higher peak flow in the system. Thus, precipitation which would at one time have caused local flooding is now quickly carried to the mainstem channel where it contributes to an accumulation of flow that may break out and cause significant flooding in a more developed area downstream.

Current analysis of the LACDA system indicates that drainage from urban areas now results in larger contributions to the peak flow than predicted in original analyses. Especially evident are shortcomings in the Rio Hondo Diversion Channel and the lower Los Angeles River sizing for local stormwater inflow. The predicted and actual contributions of urban drainage to the mainstem flow of the Los Angeles River and Rio Hondo are compared in Table 7. As this table indicates, local drainage accounts for a substantial percentage of the increase in peak flows in the channels.

Table 7
Increased flow on the Los Angeles River and
Rio Hondo due to urbanization effects.

Location	Flow (ft^3/s)		
	Upstream	Downstream	Difference
Rio Hondo Diversion Channel			
Design Discharge	40,500	42,000	+1,500
50-year Computed	40,000	46,000	+6,000
1969 Flood*	38,800	46,900	+8,100
Lower Los Angeles River			
Design Discharge	110,000	146,000	+36,000
50-year Computed	100,000	148,000	+48,000
1969 Flood*	74,000	129,000	+55,000

* Observed by the Los Angeles County Department of Public Works.

To a lesser degree, urban growth in the drainage area above the flood control dams has also increased runoff, and peak runoff in particular. The increasingly impervious upstream drainage areas result in higher flow rates and quicker reactions to rainfall. These factors tend to reduce the size of the flood which can be controlled by the impoundment structure.

The impact of this urbanization is smaller in percentage terms than that in downstream reaches because the urbanized drainage area above the reservoirs is smaller in size than the urbanized drainage area in downstream areas. The reservoirs still provide significant peak flow reduction, but because the peak flow and the total inflow may have increased due to urbanization of the upper watershed, the level of protection afforded to downstream communities has been reduced. Two primary examples are Sepulveda Dam in the San Fernando Valley, which now provides just slightly less than 100-year protection, and Whittier Narrows Dam, which provides slightly greater than 100-year protection on the San Gabriel River. These facilities were originally designed for a significantly greater level of protection than they currently afford.

Environmental Resources

General

The Los Angeles area is heavily urbanized with many of the environmental quality problems associated with such an area: significant air pollution, water quality problems, crowding, urban blight, noise, toxic waste disposal problems including groundwater contamination, and very heavy traffic. Air pollution in the basin exceeds Federal clean air standards approximately 30-50 percent of the year. Water quality for human consumption is generally quite high because much of the water used is imported from the State Water Project, Owens Valley, or the Colorado River. Local water supplies from groundwater basins, which account for about 35% of all water used in the basin, are threatened by seawater intrusion and toxic waste spills. Recent plans by environmental regulatory agencies in the basin suggest that raising environmental quality would require significant government action; plans provide for significant restrictions on development, transportation, land use, and energy use.

Both water quality and water supply are issues of major concern to local agencies. Long-term projections of water supply and demand show a net deficiency in water supply for the entire southern California region by the period 2000-2010. Additional supplies are difficult to develop, and therefore conservation programs have a high priority in this region's long-range planning. There are also concerns that existing supplies may be lost due to contamination by toxic wastes.

The density of development in Los Angeles is increasing, and as a result, noise and traffic are increasing. Recent studies of the major transportation corridors indicate that there are some freeways where "rush hour" conditions exist for extended periods (as long as six hours in the morning and five hours in the afternoon). Adjacent surface streets are also crowded with traffic. These conditions affect commercial traffic and development as well as the general social environment. The quality of the human environment is generally perceived by residents to have declined in recent years, according to a 1989 Los Angeles Times survey.

Biological Resources

Below the major Corps flood control reservoirs, a majority of the mainstem channels have been modified to the extent that there are few environmental resources of significance in these reaches. In the upper reaches of the Los Angeles River, the channels are concrete lined with the exception of a six-mile reach of cobble-bottomed channel in the vicinity of Glendale, and at the downstream end of the river there is a 2.6-mile section of rip-rap lined channel with a natural invert. This channel section supports some aquatic vegetation and some fisheries resources which utilize its soft-bottomed reach. It provides feeding grounds for a variety of sea birds, including the brown pelican and the California least tern. This area is influenced by tidal forces, and vegetation and other resources are routinely scoured from the channel.

The San Gabriel River generally has a natural invert and concrete-lined channel walls for a stretch of seven miles downstream of Whittier Narrows Dam. This design was specified to allow incidental water conservation during late-season releases from the reservoir. Previously, during periods of low flow in the river, Los Angeles County contoured the channel invert into a series of terraced ponds to augment groundwater recharge. This activity used heavy machinery which effectively removed much of the vegetation which might otherwise grow in the unlined invert. Recently, seven rubber dams were installed in the channel, achieving the same water conservation goal.

Development along the right-of-way of the channels is generally heavy on the Los Angeles River from Sepulveda Dam to the river mouth. On the San Gabriel system, however, there are several large linear park systems abutting the channel levees, including a park near the San Diego Freeway crossing. This park system, along with the undeveloped area on the back side of the mainstem levees, may provide a limited corridor for some wildlife in the region, particularly coyotes and other animals which adapt well to urban environments.

Environmental resources in the reservoirs themselves and in the watershed above are significantly greater than in the mainstem channels. The reservoirs have been designed

to provide wildlife refuge areas as well as a wide range of recreation activities. As urbanization has surrounded these reservoir areas, they have become in some instances the largest areas of undeveloped land within the lower basins. The biological resources of the five main Corps reservoirs and upper watershed areas in the LACDA system are summarized below (see environmental documentation at the end of this report for more information):

1. Lopez Reservoir. This site has little biological value except as open space for wildlife habitat.

2. Hansen Dam. The reservoir provides diverse habitat for a wide variety of wildlife, potentially including an endangered bird species and an endangered plant species.

3. Sepulveda Dam. Outside of recreation areas, this reservoir contains some natural habitat areas. The reservoir area supports substantial numbers of wildlife year-round and migratory birds.

4. Santa Fe Dam. This reservoir has unique alluvial scrub areas with some areas of potential habitat for endangered species.

5. Whittier Narrows Dam. This large area has extensive riparian habitat in wildlife sanctuary areas with a wide variety of wildlife, including several endangered species.

6. Los Angeles River Channel. There is very little biological value as most of the channel is completely concrete lined, except in the area of Glendale and near the mouth of the river. The lower reach is where foraging habitat of value to two endangered species is found.

7. Rio Hondo Channel. Very little biological value due to the channel being completely lined with concrete.

8. San Gabriel River Channel. Below Whittier Narrows Dam there is a seven-mile stretch with extensive riparian habitat supporting a wide variety of wildlife. In the lower river, there is some emergent vegetation providing foraging area for native wildlife, including two endangered species of birds (brown pelican and the California least tern).

9. Compton Creek Channel. This reach has little habitat of value as it, like the mainstem LA River channel, flows through heavily developed urban area. There is soft-bottomed channel through this reach with minimal environmental value, although it is littered with refuse and is likely to be scoured on a regular basis during the rainy season.

The upper watershed areas of the LACDA system are rugged and relatively undeveloped in many areas, particularly in the San Gabriel mountain areas, which feed the Los Angeles and the San Gabriel rivers. In these areas, tributary streams provide a band of riparian vegetation leading into the mountains; local flood control and water conservation dams also provide water resources for wildlife. The tributary streams to the LACDA system, particularly unimproved reaches in the upper watershed, are a critically important environmental resource, being among the few remaining major areas of riparian habitat in the southern California area. A complete listing of plant and animal species in the reservoirs and upstream drainage areas is found in the EIS which follows this main report.

Cultural Resources

Within the immediate project location, the area of improved channels and existing reservoir facilities, cultural resources are limited to historic resources such as the many historic bridges across the Los Angeles River. There are a number of historic buildings near the channel rights-of-way for both rivers (most are in the LA River reaches).

Recreational Resources

The LACDA flood control system itself is a major recreational resource for the Los Angeles area. There are recreational areas at four of the five flood control reservoirs, with a total use of these facilities in 1988 estimated at over 5,000,000 visits. Recreation facilities include a velodrome (Sepulveda), recreation lakes, picnic grounds, hiking and riding trails, and playing fields of many types. These facilities are available for a majority of the year when the reservoirs are not in use for water storage.

The mainstem channels provide 49 total miles of hiking and bicycle trails. The trail on the Los Angeles River begins at the Pacific Ocean and connects with the Rio Hondo trail system, allowing passage through Whittier Narrows Reservoir into the San Gabriel Mountains. On the San Gabriel River trails, it is possible to travel by foot or bicycle from the mouth of the river, through Whittier Narrows and Santa Fe reservoirs, and into the San Gabriel Mountains. These trails are an important resource in an urban area where cycling on surface streets is dangerous and where few other cycling paths are available.

G. NATIONAL OBJECTIVES

The objective of Federal and federally assisted water and related land resources planning is to attempt to maximize national economic development. Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units, or increases in economic efficiency. Plans are formulated to alleviate problems and take advantage of opportunities in ways that contribute to the national economic development. By definition, the "NED Plan" is the one which maximizes the net national economic development benefits, consistent with the Federal objective.

The policy of the Corps of Engineers in identifying the NED plan is specified in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. This document states:

"The Federal objective of water and related land resources planning is to contribute to the national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements."

"Protection of the Nation's environment is to be provided by mitigation (as defined in 40 CFR 1508.20) of the adverse effects (as defined in 40 CFR 1508.8) of each alternative plan. Accordingly, each alternative should include mitigation determined to be appropriate by the Agency decision-maker."

For this type of multi-purpose study, the primary category of NED benefits evaluated is generally flood damage reduction benefits. Other benefits which may be considered include benefits from water conservation, benefits from increasing the value of project area lands, benefits from providing recreation, and benefits from enhancing the socio-economic conditions of the project area. Flood damage reduction benefits are the principal source of NED benefits evaluated in this study.

H. STUDY PROCEDURE

Within the context of these national objectives, the intent of this study was to review the adequacy of the existing LACDA mainstem system to protect the heavily urban areas of Los Angeles. A secondary purpose was to determine if there were water conservation, recreation, environmental enhancement, and transportation needs which could be addressed in conjunction with any flood control needs. Specific study objectives were:

1. Re-evaluate the estimates of potential rainfall and runoff for the LACDA basin (meteorology and hydrology review) in light of (a) the experience of the last 40 years and (b) scientific advances which make possible more accurate projections of rainfall and runoff.

2. Given revised rainfall and runoff projections, re-evaluate the capacity of the existing system to safely contain and convey flood flows from headwaters to the Pacific Ocean, using modern computer modeling techniques to determine the actual capacity of existing system elements, primarily channels.

3. Define the nature and extent of any flooding problem, and identify any related problems which could be addressed in conjunction with a solution to flood control problems.

4. Formulate and evaluate alternative measures for addressing problems and opportunities.

5. Identify the National Economic Development plan for solving identified flood control problems.

SECTION THREE: PLAN FORMULATION

A. FLOOD CONTROL PROBLEMS AND OPPORTUNITIES IN THE MAINSTEM LACDA SYSTEM

Causes of the Flooding Problem

The design of flood control channels and reservoirs is based on estimates of precipitation, runoff, and resulting flow in stream and river channels from storms of varying magnitude. It is the goal of the Corps to provide flood protection in the most cost effective manner possible. In urban areas where system failure could result in catastrophic damages and loss of life, it is often considered desirable to provide at least 100-year flood protection. A 100-year flood is an event that is likely to occur on average once in 100 years or, otherwise stated, has a 1 percent probability of occurring in any given year. The accuracy of precipitation, runoff, and channel flow frequency estimates is thus critical to the design of an effective system.

Since 1939, when the LACDA system was designed, there have been significant improvements in methods used for estimating the frequency and magnitude of potential floods. This is due in part to a longer period of record and in part to better analysis techniques. Applying more advanced analytical methods, and taking into account the significant changes in the development level within the LACDA basin, the estimated flow in most reaches of the Los Angeles, Rio Hondo, and San Gabriel rivers was determined for storms of various intensities. The conclusions of this review were that the existing mainstem system provided lower levels of protection than are appropriate for an urban area. This conclusion was based on the following findings:

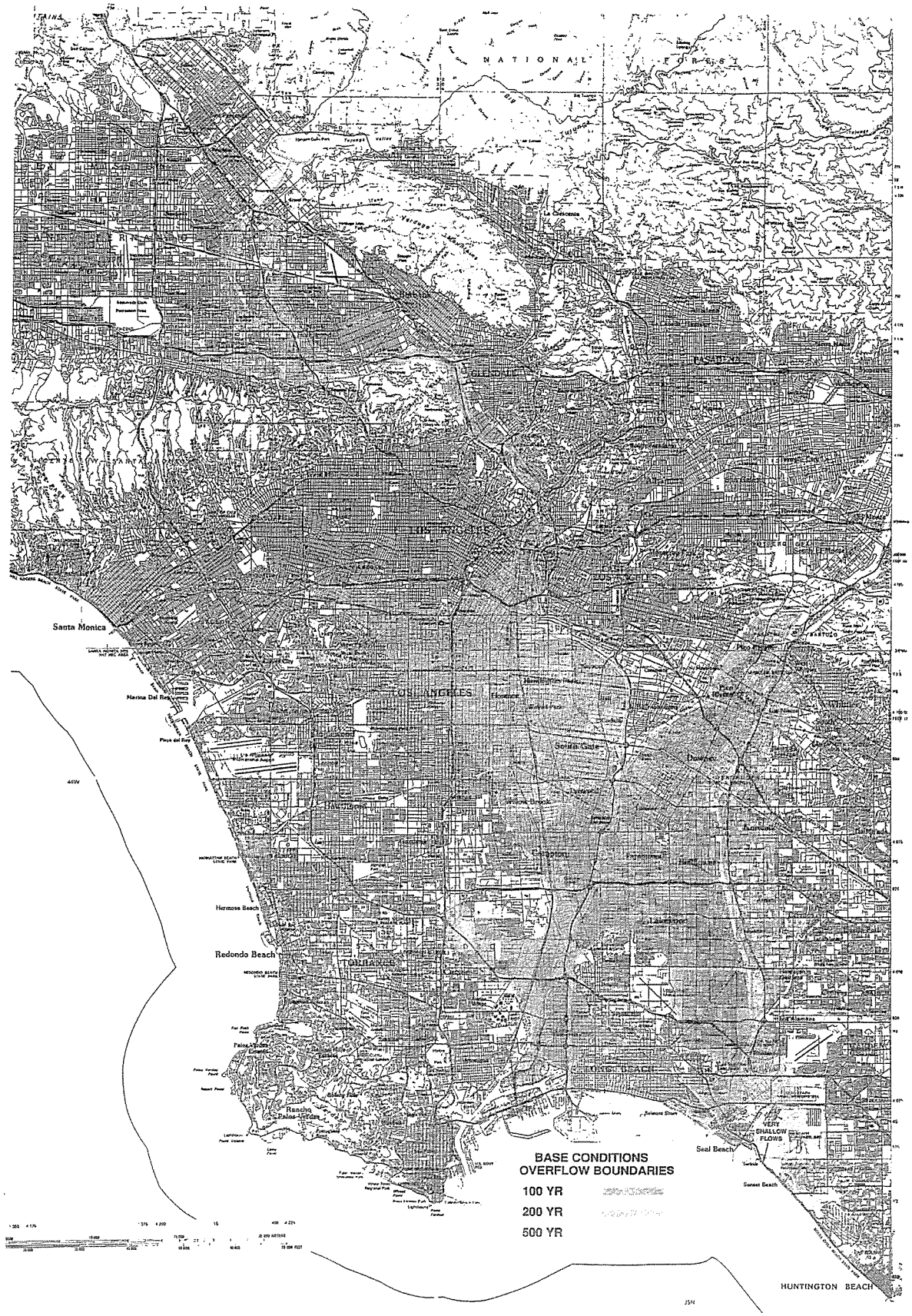
1. The storms used as the basis for designing LACDA features in early (1930's) hydrologic studies, the so-called "design-storms," were found to occur more often than once in 100-years. This conclusion was based on current analysis that includes an additional 50 years of storm records since the beginning of the LACDA system construction. Using the updated rainfall frequency statistics and more modern techniques of analysis, Corps hydrologic engineers have

determined that the basis of design for much of the LACDA system was a storm with a 50-year recurrence interval. A 100-year storm is estimated to produce significantly more precipitation, runoff, and flow in streams and river channels. Thus, the LACDA system does not provide 100-year protection in all reaches.

2. Increasing urban development has resulted in increased runoff because rapidly draining, impervious cover replaces runoff-retarding soils that support vegetation. The studies which led to the design of the LACDA system addressed future urban growth in the southern California area, however, the designers were unable to predict the impact of urbanization and the effectiveness of the local storm drain system at carrying this increased runoff into the main flood control channels.

Since 1939, local officials have constructed a comprehensive system of storm drains to prevent local flooding. These drains collect runoff and carry it to the mainstem river channels rapidly. They thus have the effect of concentrating local runoff; the effect on the flow in the mainstem channels is: (1) very rapid build up to peak flow and (2) peak flows higher than previously calculated. The system of flood control reservoirs designed to collect flood flows from the upper watershed areas does not, for the most part, control the runoff from urban areas, which are in the lower basin.

From Figure 7 it can be seen that some flooding occurs immediately below Corps flood control dams during the 100-year event. This excess channel flow is the result of local storm drain contributions to the mainstem channel. On the 23 mile length of channel from Whittier Narrows Dam to the Pacific Ocean (Reaches 4 and 5) there are at least 64 storm drains connecting to the mainstem channel and 12 pumping plants discharging to the river (see Figure 8). The pumping plants collect local surface runoff and pump it up over the levees into the river. On average there is local runoff added to the channel every third of a mile through its entire length. A listing of side drains and pump plants in the project area are shown in Table 8.


NATIONAL
FOREST
Santa Monica
Marina Del Rey
Playa del Rey
LOS ANGELES
Hermosa Beach
Redondo Beach
TORRANCE
LONG BEACH
Seal Beach
Sunset Beach
HUNTINGTON BEACH
BASE CONDITIONS
OVERFLOW BOUNDARIES
100 YR
200 YR
500 YR

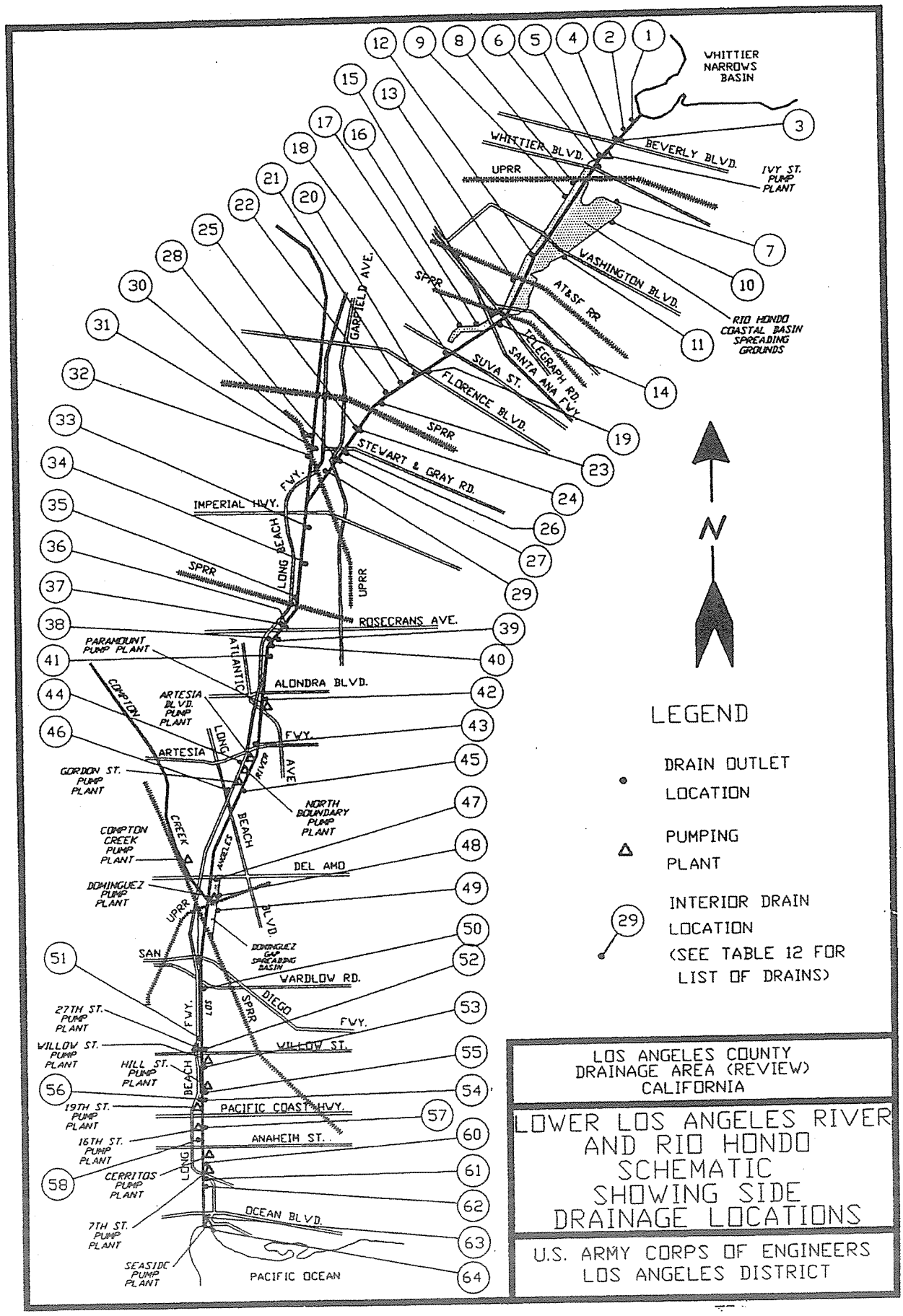

WHITTIER NARROWS BASIN
WHITTIER BLVD.
BEVERLY BLVD.
IVY ST. PUMP PLANT
UPRR
WASHINGTON BLVD.
SPRR
AT&SF RR
RIO HONDO COASTAL BASIN SPREADING GROUNDS
GARFIELD AVE.
TELEGRAPH RD.
SANTA ANA FWY.
SUVA ST.
FLORENCE BLVD.
SPRR
STEWART & GRAY RD.
FWY.
IMPERIAL HWY.
LONG BEACH
UPRR
SPRR
ROSECRANS AVE.
PARAMOUNT PUMP PLANT
ATLANTIC
ALONDRA BLVD.
COMPTON
ARTESIA BLVD. PUMP PLANT
FWY.
LONG BEACH
ARTESIA
GORDON ST. PUMP PLANT
NORTH BOUNDARY PUMP PLANT
COMPTON CREEK PUMP PLANT
COMPTON CREEK
LOS ANGELES RIVER
DEL AMO
DOMINGUEZ PUMP PLANT
UPRR
BLVD.
DOMINGUEZ GAP SPREADING BASIN
SAN DIEGO FWY.
SPRR
WARDLOW RD.
27TH ST. PUMP PLANT
WILLOW ST. PUMP PLANT
HILL ST. PUMP PLANT
WILLOW ST.
LONG BEACH
19TH ST. PUMP PLANT
PACIFIC COAST HWY.
16TH ST. PUMP PLANT
ANAHEIM ST.
CERRITOS PUMP PLANT
LONG BEACH
7TH ST. PUMP PLANT
OCEAN BLVD.
SEASIDE PUMP PLANT
PACIFIC OCEAN
N
LEGEND
DRAIN OUTLET LOCATION
PUMPING PLANT
INTERIOR DRAIN LOCATION
(SEE TABLE 12 FOR LIST OF DRAINS)
LOS ANGELES COUNTY DRAINAGE AREA (REVIEW) CALIFORNIA
LOWER LOS ANGELES RIVER AND RIO HONDO SCHEMATIC SHOWING SIDE DRAINAGE LOCATIONS
U.S. ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT

FIGURE 8

TABLE 8

LIST OF INTERIOR DRAINAGE FACILITIES
WITHIN THE RECOMMENDED PROJECT REACH

Rio Hondo Diversion Channel and Lower Los Angeles River

SIDE DRAINS

No.	Project	Size	Type	PB	Location	Remarks
1	Proj. 555	90" x 108"	RCB		Rio Hondo WB off Rio Del Sol Ave.	
2	Other				Rio Hondo WB south of Rancho Dr.	
3	PD 1296				Rio Hondo EB at Beverly Blvd.	
4	Other				Rio Hondo WB at Beverly Blvd.	
5	Proj. 9901				Rio Hondo WB nr Madison Ave.	
6	Other				Rio Hondo EB north of Whittier Blvd.	
7	Proj. 6301				Rio Hondo EB NE end of spdg. grounds	
8	Proj. 1109				Rio Hondo WB at Roosevelt Ave.	drain to spdg. grounds
9	DDI 23				Rio Hondo WB at Mines Ave.	drain to spdg. grounds
10	Proj. 553				RH EB E of spdg grnds nr Mines Ave.	
11	Other				Rio Hondo EB at Washington Blvd.	drain to spdg. grounds
12	Proj. 5701				Rio Hondo WB at Date St.	
13	MTD 663				Rio Hondo EB at Sycamore St.	drain to spdg. grounds
14	Other				Rio Hondo EB at Telegraph Rd.	
15	Telegraph Road Drain	72"	RCP		Rio Hondo WB south of Telegraph Rd.	drain to spdg. grounds
16	Proj. PD 622				Rio Hondo WB nr Zindell Ave. in park	drain to spdg. grounds
17	Proj. 2501 + Other				Rio Hondo WB at Greenwood Ave.	drain to spdg. grounds
18	Proj. 695	90"	RCP	FG	Rio Hondo off Bluff St.	
19	Proj. 20	96"	RCP		Rio Hondo EB at Florence	
20	Proj. MTD 573				Rio Hondo WB at Florence Ave.	
21	Proj. 539 Line A	114" x 132"	RCB		Rio Hondo off Scott	Double Box
22	Proj. 2001	72" x 132"	RCB	FG	Rio Hondo off E. Buell St. through John Anson Ford Park	
23	Proj. 3101	60"	RCP	FG	Rio Hondo off Dinwiddie St. at Rio Hondo Dr.	
24	Proj. 18	99" x 60"	RCB		Rio Hondo off Firestone Blvd.	Double Box
25	Proj. 539	69"	RCP		Rio Hondo off Firestone Blvd.	
26	Proj. RDD 302				Rio Hondo EB at Stewart & Gray Rd.	
27	Proj. MTD 391				Rio Hondo EB north of Garfield Ave.	

TABLE 8

LIST OF INTERIOR DRAINAGE FACILITIES
WITHIN THE RECOMMENDED PROJECT REACH

Rio Hondo Diversion Channel and Lower Los Angeles River

SIDE DRAINS

No.	Project	Size	Type	PB	Location	Remarks
28	Proj. MTD 369				Rio Hondo WB nr Garfield Ave.	
29	Proj. 7850 Line D	66"	RCP	FG	Rio Hondo off Miller Way	
30	Proj. 1	120" x 84"	RCB		Los Angeles R. WB at Southern Ave.	
31	DDI 23	3 - 90"	RCP		Los Angeles R. EB at RR Tracks	
	DDI 23	240" x 79"			Los Angeles R.	Double Box
	DDI 23				Los Angeles R.	Triple Box w/flap gates
32	Proj. 581				Los Angeles R. WB at Tweedy Blvd.	
33	Other				LAR EB north of Gardendale Ave.	
34	Proj. 19	90"	RCP	FG	Los Angeles R. EB at Hollywood Park	
35	Proj. 551	54"	RCP		Los Angeles R. off Willard Lane	
36	Proj. 19 Line 2	111" x 84"	RCB		Los Angeles R. at Rosecrans EB	Quad Box
37	Proj. 1210	72"	RCP		Los Angeles R. WB off Fertile St.	
38	Proj. 543	90"	RCP	FG	Los Angeles R. off San Carlos St.	
39	Proj. MTD 818				Los Angeles R. EB at San Vicente St.	
40	Other				Los Angeles R. EB at San Marcos St.	
41	Proj. 6101	81" x 120"	RCB		Los Angeles R. EB off Compton Blvd.	
42	Proj. 9003	42"	RCP	FG	LAR EB off 72nd St. & Atlantic Pl.	
43	Other				Los Angeles R. WB at Artesia Freeway	
44	Proj. 457				LAR west of Long Beach Freeway	
45	Proj. 129	90"	RCP		Los Angeles R. WB at Hullett St.	
46	Proj. 5108 + Other				LAR WB west of Long Beach Blvd.	
47	Other	6 - 48"	RCP	FG	LAR EB 1000' d/s of Del Amo	
48	Proj. 130	36"	RCP		Los Angeles R. off Arbor	Natural
49	Proj. MTD 89				LAR EB SE end of spreading grounds	drain to spdg. grounds
50	Proj. 5103	78" x 54"	RCB	FG	LAR EB off 25th St. at Deforest Ave.	Double Box
51	Proj. 126				Los Angeles R. WB south of 28th St.	
52	Other				Los Angeles R. EB at Willow St.	
53	Proj. 5109	54"	RCP	PB	LAR EB off 34th St. at Deforest Ave.	
54	Proj. 9036	4 - 42"	RCP	FG	LAR EB Hill St. at Deforest Ave.	
	" "	2 - 36"	RCP	FG	" " " " " " "	
55	Other				Los Angeles R. EB at 20th St.	
56	Proj. 127				LAR WB north of Pacific Coast Hghway	
57	Other				Los Angeles R. EB at 16th St.	
58	Proj. 451 + Other				LAR WB north of Anaheim St.	

TABLE 8

LIST OF INTERIOR DRAINAGE FACILITIES
WITHIN THE RECOMMENDED PROJECT REACH

Rio Hondo Diversion Channel and Lower Los Angeles River

SIDE DRAINS

No.	Project	Size	Type	PB	Location	Remarks
59	Long Beach Drainage Sys.	2 - 42"	RCP	FG	Los Angeles R. d/s of Anaheim St.	
60	Proj. 131	78"	RCP	FG	Los Angeles R. between Anaheim St. and 7th St.	
	Proj. 451	54"	RCP	FG	Inner Harbor at Channel No. 2	does not drain to LAR
61	Other				Los Angeles R. EB south of 7th St.	
62	Proj. 132				Los Angeles R. EB at 3rd St.	
63	Proj. 132	3 - 36"		FG	Los Angeles R. at Ocean Blvd.	
64	Proj. 132				Los Angeles R. EB at Pacific Ocean	

Other = maintained by other than LACDPW
RH = Rio Hondo
LAR = Los Angeles River
EB = East bank
WB = West Bank

PB = Protection Barriers
FG = Flap Gates
RCB = Reinforced Concrete Box
RCP = Reinforced Pipe

See plate 14 for locations of drains (use No. for identification)

TABLE 8
LIST OF INTERIOR DRAINAGE FACILITIES
WITHIN THE RECOMMENDED PROJECT REACH

Rio Hondo Diversion Channel and Lower Los Angeles River

PUMP PLANTS

No.	Project	D.A. (ac)	Location	Outlets No.	Outlets Size	Outlets Type	Max. Discharge (ft^3/s)	Ponding Area (AF)
	Compton Creek Pump Plant	682	Compton Creek EB north of Del Amo	3	30"	RCP	95	87.2
	Ivy Street Pump Plant		Rio Hondo EB at Ivy St.				.082	
	Paramount Pump Plant		Los Angeles R. EB at 72nd St.					
	Artesia Blvd. Pump Plant		Los Angeles R. at Artesia Blvd.					
	Nrth Boundary Pump Plant		Los Angeles R. near Adams St.					
	Gordon Street Pump Plant		Los Angeles R. at Gordon St.					
	Dominguez Gap Pump Plant	2530	Los Angeles R. at 48th St.	6	48"	RCP	586 Total	302
				2	36"	RCP		
				1	10"	SP		
	27th Street Pump Plant		Los Angeles R. at 27th St.					
	Willow Street Pump Plant		Los Angeles R. at Willow St.					
	Hill Street Pump Plant		Los Angeles R. at Hill St.					
	19th Street Pump Plant		Los Angeles R. at 19th St.					
	16th Street Pump Plant		Los Angeles R. at 16th St.					
	Cerritos Pump Plant	1243	Los Angeles R. EB south of 12th St. at Deforest Ave.	2	42"	SP	120 Total	
				1	10"	CI		
	7th Street Pump Plant	175	Los Angeles R. at 7th St.	3	36"	RCP	220	15.3 ac
	Seaside Pump Plant		Los Angeles R. near Seaside Way	1	8"	RCP		
	Rio Hondo Coastal Spreading Grounds		Rio Hondo below Whittier Blvd. to Santa Ana Freeway (EB & WB)					

EB = East bank
WB = West Bank

RCP = Reinforced Pipe
CI = Cast Iron Pipe
SP = Steel Pipe

See plate 14 for locations of pump plants.

The majority of the heavily urbanized watershed lies downstream of any flood control structure. The rainfall meets impervious surfaces such as buildings, parking lots and streets, and runs off into the local storm drain network. There are approximately 2000 miles of underground storm drains in Los Angeles County. These drains collect flows and efficiently convey it to the closest point of discharge, the mainstem flood control channels. This conveyance process responds very rapidly and provides little infiltration, storage or route down. The effectiveness of this system precludes any need to improve the storm drains on a wide scale basis.

Utilization of computer modelling techniques has allowed for a more detailed simulation and evaluation of the basin's drainage system performance than was previously possible. The numeric model used in the analysis is a complex single event simulation tool that provides insight on the magnitude and location of excess channel flow and as a result provides the basis for quantifying the overflow in the flood plain.

When the high velocity flood control channels were built in the 1930's there was little operational experience with this type of facility. Since that time the freeboard requirements for this type of channel have increased slightly due to the potential height of standing waves in the full flowing channel. This is only a minor consideration in determining how much flow will escape from the channel in a greater than design event.

Preliminary to modeling the mainstem channels in the LACDA study, the major tributaries of the system were evaluated using a generalized peak-area relationship. The levels of protection were found to be generally adequate or the extent of development in areas which might be flooded did not appear to be sufficient to justify further investigation.

The Without-Project Condition and the Flood Threat

For purposes of evaluating the need for increased flood protection, it is necessary to determine how often flooding would occur if no additional protection is provided, how widespread the flooding would be, and how much damage would be caused by the flooding. This is called the without-project condition. The without-project condition is

generally projected over the entire economic life of the proposed project (100 years for a major reservoir or channel project); that is, an effort is made to predict the changes which would occur in development in the project area over this period of time. This projection is made so that the costs and benefits of the project can be analyzed over the life of the project, and to accommodate the probability that development levels in a project area will increase. In the Los Angeles basin, however, there is extensive existing development. The effect of potential future development in areas of the basin tributary to the mainstem system was calculated and was determined to have little impact on peak flows in the lower basin. As a result, the without-project condition does not change markedly throughout the life of the project.

Based on the review of precipitation and runoff and on re-evaluation of system capacity, it was determined that the LACDA system does not adequately protect many areas; the potential for the system to fail is particularly serious in the lower river reaches. Figure 7 shows the without-project overflow areas evaluated during this study. The Los Angeles River lacks 100-year protection through about half of its length. In the most critical reaches, such as the leveed sections along the Rio Hondo and the lower end of the Los Angeles River, the level of protection is less than the 50-year level.

The estimated 500-year overflow area is approximately 200 square miles, of which nearly all may be considered a fully developed, urban landscape. The population residing within this 500-year overflow area is estimated to be about 1,200,000. Similarly, the 100-year overflow area covers approximately 82 square miles, with a population estimated to be about 500,000.

Table 9 gives the total number of structures and expected damages within the 100-year and 500-year overflow area. The total value of structures and contents in the 500-year flood plain is $40.2 billion. Should such a flood occur, expected damages would total $5.3 billion (13 percent). Of the 322,000 structures in the 500-year flood plain, approximately 278,000 (86%) are single-family residences. Similarly, the total value of structures and contents in the 100-year flood plain is $17.3 billion, of which expected damages would total $2.3 billion (13 percent). Of the 142,000 structures in the 100-year flood plain, approximately 123,000 (87%) are single-family residences.

Measurement of structure elevation for damage estimation was test sampled. To ensure that any measurement error was minimized, an analysis of the combined effects of hydrology and topography were applied. For this analysis a random sample of 1% of the data cells was selected. Hydrologic cross-sections were site visited with stucture elevations measured and corrected with street topography maps. Flood inundation damages under this analysis were compared to those generated by the study's partitioned cell method. The result of this comparison indicates differences in damages between the two methods were not significant. Since neither the economic justification nor the NED plan is affected, no changes were made in the estimates of damages avoided.

For the existing without-project condition, the potential for flooding and damage along the mainstem system of LACDA can be summarized as follows:

1) **Reach 1.** From Hansen Dam to the Los Angeles River, the Tujunga Wash flows through suburban and commercial districts of the San Fernando Valley. The channel itself is within a greenbelt area which contains several major water recharge spreading grounds and numerous recreational areas. A flood in this reach would thus inundate some development, but the most significant overflows would be confined to a largely undeveloped area. A majority of anticipated damages would be to residential structures and their contents.

2) **Reach 2.** From Sepulveda Dam to the Arroyo Seco confluence, the Los Angeles River flows in an entrenched channel through highly developed commercial and residential property. A significant flood could break out of the channel at a number of points, but the extent of a breakout would be limited by the slope of the land towards the channel. Very high value property such as several movie and television studios would be flooded, but flood depths would not be great. A similar flooding scenario would occur as the river flows out of the San Fernando Valley into the central Los Angeles Basin. Rail yards and some heavy industrial areas would be flooded, but impacts would be limited and of short duration.

3) **Reach 3.** From Arroyo Seco to the Rio Hondo confluence, the Los Angeles River passes through very heavily developed industrial and commercial areas. A 100-year flood would break out in an area between the Pasadena Freeway and the Santa Monica Freeway, inundating rail yards, blocking major roads and freeways, and flooding major shopping, commercial, and government buildings. A vast majority of damages would be to commercial and industrial structures and their contents. A 500-year flood would break out in the same general vicinity but would spread over a much larger area, flowing across much of central Los Angeles before returning to the mainstem channel downstream. Flow depths would be moderate over a majority of this area.

4) **Reach 4.** The most serious flood threat is to this Los Angeles River reach, from the Rio Hondo to the Pacific Ocean. Flows overtopping the levees (generally upstream from bridges) would rapidly erode the unprotected levee walls and inundate the relatively flat and very heavily developed areas in this lower basin. Structures in the immediate vicinity of the breakout would suffer heavy damage from very deep and fast moving flows. Damages would also be high in several large low-lying areas where flood waters would tend to accumulate. Development in this reach includes several major freeways, rail lines and rail yards serving the Ports of Los Angeles and Long Beach, major refineries and petroleum products storage facilities, large industrial complexes, and extensive residential and commercial developments.

5) **Reach 5.** The Rio Hondo reach, from Whittier Narrows Dam to the Los Angeles River confluence is also heavily developed. Breakouts from the Rio Hondo would also involve levee failure, and flows from a flood originating in this reach would eventually co-mingle with those from the Los Angeles River, exacerbating the flooding in the lower river basin.

6) **Reaches 6 and 7.** The San Gabriel River from Whittier Narrows Dam to the Pacific Ocean flows through predominantly residential and commercial areas, although there is some industrial development near the river. This section currently provides a minimum of 100-year protection, but levee failures on the

Rio Hondo during more frequent events can result in floodwaters along the western bank of the San Gabriel River.

7) **Reach 8.** From Santa Fe Dam to Whittier Narrows Dam the San Gabriel River flows through residential and commercial areas, but no significant overflows along this reach are anticipated. The channel provides 500-year protection levels because of the controlling presence of Santa Fe Dam. Inflows to the dam greater than the 200-year event would spill into nearby gravel pits which have relatively massive capacities (on the order of 100,000 acre-feet). There would be significant damages to gravel mining operations, but adequate flood warning should permit all personnel to be removed prior to a flood. Damages in this infrequent event could be severe to the gravel pits.

8) **Reach 9.** Compton Creek is included as a reach so that the effects of a mainstem solution could be mitigated. The creek itself does not provide 100-year protection and is more appropriately studied under a separate authority. Any future improvements to Compton Creek do not affect plan formulation on the mainstem Los Angeles River.

Channel inadequacies are most serious in the lower Rio Hondo and Los Angeles River reaches for several reasons. First, in these reaches the river is contained by levees which may be 10-15 feet above the surrounding ground. Flow over the top of these levees for a period of an hour or more would very likely erode the unprotected back face and cause the levee to fail. The result would be high velocity breakout from the channel which would do significant damage in the immediate vicinity of the breakout and would then spread out over a wide area. Second, in the lower basin, there are also low lying areas where flows would accumulate to depths of 10 feet or more, causing serious damage to structures in these areas. Third, the lower mainstem is carrying the collected flow from the hundreds of square miles of drainage area. This massive accumulated flow represents a greater flood threat in the event of a system failure than exists in the upper reaches.

Table 9.
Number of structures and estimated damages, by reach,
100-year and 500-year flood plains, Los Angeles River and Rio Hondo.

Reach		500-year Flood plain No. of Structures	500-year Flood plain Damages in $mill	100-year Flood plain No. of Structures	100-year Flood plain Damages in $mill
1	Tujunga Wash	17,948	249.4	3,605	100.3
2	LAR above Arroyo Seco	9,425	305.7	1,272	19.4
3	LAR above Rio Hondo	81,703	618.2	700	67.0
4	LAR above Pacific Ocean	71,093	2,109.8	58,248	1,661.4
5	Rio Hondo	}*44,900	242.0	}*24,108	441.0
6	San Gabriel below Whittier Narrows		678.2		0
7	San Gabriel above Pacific Ocean	96,711	1,118.2	**53,575	0
Total Project		***321,780	5,321.5	141,508	2,289.1

NOTES * Combined total for Reaches 5 and 6 (overflows originating in these reaches commingle)

** Some structures in this reach may experience flooding but the source of the overflow is not Reach 7, thus the damage is not attributed to Reach 7.

*** Damages in the upper San Gabriel River reach (Reach 8) were not estimated because this portion of the LACDA system was found to provide 500-year protection, with the exception of the gravel pits that receive spillway flow from Santa Fe Dam.

Damages from overflows along Compton Creek were not calculated. Compton Creek was included as a project reach only because of the potential for channel modifications on mainstem reaches to impact levels of protection at Compton Creek.

B. RELATED PROBLEMS AND OPPORTUNITIES

While exploring flood control problems and appropriate methods for solving them, it is also appropriate to identify related problems and opportunities which may be addressed as a part of a solution to the primary flood control problem. For example, in designing a channel to solve a flood problem, it may be possible to provide a recreation area adjacent to the channel at little additional cost. The problems and related planning opportunities identified in this study are discussed below.

Sediment Management

There are 114 debris basins, generally located at the mouth of the canyons in the San Gabriel Mountains. These facilities are nearly all owned and maintained by the County. Their purpose is to retain sediment and debris while passing the clearer runoff into the flatter gradient channels of the Los Angeles basin. Channels flowing with clear water are far more effective conveyors of runoff than when they are filled with sediment laden flows. The County also owns and maintains 15 multi-purpose dams in the LACDA basin, generally upstream from the Corps' facilities. At present, more than half of the space behind these dams is reserved for flood control and the remainder is reserved for water conservation purposes. These dams intercept most of the sediment from the watershed above them, effectively limiting the sediment load reaching the major Corps flood control facilities. The County is thus faced with a significant maintenance problem, as high sediment loads tend to reduce the capacity of these facilities for water conservation as well as flood control purposes. In the past the County has occasionally sluiced this sediment downstream as a part of an operation and maintenance activity. If the sediment reached a Corps facility and settled out, it was subsequently removed by the County. There are environmental impacts associated with sedimentation of downstream streambeds, and there are also associated short-term reductions in flood storage capacity when this material settles out in a flood control facility. Addressing future management of sedimentation may require greater expense and the development of alternative methods of collection and disposal.

At present, sedimentation is not a significant problem at any of the Corps flood control facilities because the upstream County dams and the system of debris basins in tributary watersheds effectively limit sediment inflow to the facilities. The exception of high sediment inflow at Hansen Dam has been effectively addressed through a commercial sand and gravel mining lease arrangement. As a result of these efforts, no sediment allowance at any LACDA mainstem reservoir is currently filled.

While sediment is not currently considered a major problem from a flood control perspective, sediment management was considered worthy of study. This feasibility study looked at upper watershed sediment control through erosion control and check dam construction.

Water Conservation

Given the outlook for population growth (and therefore for increased water demand) and the limited supply of water available in the semi-arid southwestern United States, major flood control reservoirs represent a potential water conservation resource of some importance. At such reservoirs, conservation programs involve capturing late storm season inflows (when the danger of a major storm and flood event is low) and releasing them slowly to downstream groundwater recharge basins. This action is always limited by the need to ensure against flood damages.

It may be possible to increase the amount of water conserved in this manner. Any increase would depend on a re-evaluation of the amount and timing of inflows and of the flood control capacity of downstream reaches of the mainstem system. If it were possible to safely begin to store water for conservation purposes earlier in the spring, then water now lost to the sea could be captured.

The key to such action is the capability of the downstream mainstem channel system to contain releases from the reservoirs. The greater the capacity of downstream channels (to an extent), the less risk there is in holding supplies behind the mainstem dams for water conservation. Thus, before water conservation could be studied in detail, it was

essential to evaluate the flooding problems on the mainstem system and develop solutions which would reduce the probability of significant flood damages.

This feasibility study explored the potential to increase water conservation by increasing delivery to spreading grounds, creating off-stream detention/conservation basins, and trading developable flood control space for existing water conservation storage. None of these measures were supportable on a flood control basis, and, as such, this report does not specifically address alternatives for water conservation. Once the flood control capability of the mainstem system is upgraded to appropriate levels, it will be possible to formulate and evaluate these and other water conservation measures. This analysis may be undertaken as a separate study on a system-wide basis or under the general operational review authority granted to each District Commander. The District Commander is authorized to revise the storage allocations and operating schedules for Corps reservoirs within specific limits, provided that the public has an opportunity for review and comment. The Corps currently cooperates closely with the County to conserve as much runoff as possible.

Transportation

The need for transportation improvements in southern California is documented in numerous local, state, and federal reports. Basin freeways currently experience long periods of congestion, as do many city arterials.

Numerous studies by other agencies have suggested that the flood control channel rights-of-way, and indeed the channels themselves, could be used as transportation corridors. The Los Angeles River channel, for example, runs parallel to the Long Beach Freeway for much of its length and passes from Long Beach to downtown Los Angeles through major industrial areas. From downtown it then proceeds northwest into the major industrial and commercial areas of the San Fernando Valley. The San Gabriel River channel parallels the San Gabriel River Freeway (I-605), passing from south Long Beach through commercial and residential districts into the San Gabriel Valley. In all

cases, these are heavily traveled routes. If the river channels could be adapted for transportation purposes, then a significant transportation benefit might be achieved.

In the late 1970's and early 1980's, the transportation problem was addressed to determine whether it should be carried forward for detailed study as a part of this report. Two studies were undertaken. First, the feasibility of using the existing Los Angeles River channel (concrete lined) as a busway was evaluated in a cooperative Corps-Southern California Rapid Transit District (SCRTD) test. The channel, without alterations, would not provide for short-haul service as there are no terminal facilities, and access to the channel is limited. However, SCRTD developed a test of the channel as a commute (express) busway. In this test, buses traveled the route from Long Beach to downtown Los Angeles both within the unobstructed channel (cleared of water and debris) and along local freeways.

The result of this SCRTD test was that local freeway routes were as efficient as use of the river channel. Although there was no traffic in the channel invert, the driving time between destination points via the channel right-of-way was equal to or greater than the driving time via existing roads.

Following this test, a conceptual study of potential roadways along the river channels was conducted. A number of busway and railway alternatives were evaluated. While several designs were found to be promising and technically feasible, two problems were identified which have a significant impact on project feasibility. First, designs involving single structures raised above channel level on piers placed in the center of the channel would raise the water level in the channel and would create significant turbulence and backwater, thereby increasing the risk of flooding. Second, all designs, including designs which provided for single-lane and double-lane corridors along each side of the channel, required numerous costly overpasses at bridge crossings along the river. The Los Angeles County Transportation Commission independently abandoned the Los Angeles River alignment of the San Fernando Valley light rail system in 1988.

The general conclusion of these studies was that effective use of the channel rights-of-way for transportation would have prohibitive costs. Furthermore, implementing

transportation within the existing channel right-of-way would constrain numerous flood control solutions being studied. Because of the magnitude of the flood damage potential, this was not considered an appropriate constraint.

For these reasons, transportation problems have not been included in the detailed analysis of flood control problems and alternatives for their solution on the mainstem system. However, recent proposals for transportation use of the channel invert from Long Beach to downtown Los Angeles have some potential for implementation. Use of the channel by trucks would, according to state officials, greatly reduce traffic on the Harbor and Long Beach Freeways, which are major commercial arteries from the harbor area to industrial and commercial centers in the basin. Transportation proposals may be evaluated separately by the Corps at a later date; nothing in the planned upgrade of the LACDA system appears at this time to preclude adaptation of the channel for such uses. The expectation of utilizing this facility as a transportation corridor must be tempered with the constraint that flood control operations cannot be hindered or diminished and that public safety is paramount in operating the flood control system. The channel will continue to be used as a bus driver training ground/motorcycle policeman practice location and a favorite set for the movie industry.

Recreation

Because the study area is a densely populated urban environment, recreation opportunities are limited and opportunities to improve recreation are important. Throughout this study, it was clear that an effort should be made to identify and pursue new recreation opportunities to complement the existing recreation network. Recreation opportunities explored during this study included the potential for recreation associated with any new reservoirs or channels. In considering channel alterations, the potential to create new linear urban parks was given consideration. Where an alternative would involve changes to an existing channel or reservoir, alterations to improve the existing recreation system could also be addressed.

Aesthetic Treatment

Within the mainstem channel system, there are numerous opportunities to enhance the environment; many alterations to the channel environment have been proposed by local, state, and federal agencies, including restoring the channel invert to a natural condition, removing asphalt from the channel levee crest and creating a greenbelt. A number of suggestions were evaluated for altering the channel configuration to provide off-channel basins for recreation and to improve channel aesthetics.

The general conclusions of early study of these proposals has been that (1) they would be difficult to implement within the highly constrained rights-of-way for the existing mainstem system and (2) the cost of expanding the rights-of-way to permit such alterations to the system would be prohibitive. For example, doubling the width of the right-of-way for the Los Angeles River to permit a greenbelt area to be developed would involve removal of a major railway line and switching/cargo transfer yard, removal of numerous major manufacturing and distribution facilities, and removal of hundreds of residences and small businesses. The cost of this action for the reach from Long Beach to downtown Los Angeles would be excessive.

Early in the study process, then, it was determined that only limited aesthetic treatment would be economically feasible within the LACDA mainstem system existing rights-of-way. The problems which could be addressed were (1) the potential to add greenbelt corridors in reaches where rights-of-way were not seriously constrained, and (2) in locations where no additional rights-of-way are available, improving the existing aesthetics with vegetation.

C. PLANNING CONSTRAINTS

Planning constraints are overriding concerns that must be considered in the development of plans. The following are planning constraints identified in this study.

Environmental Values

Although the County of Los Angeles and all of its attendant cities recognize the seriousness of the flood problem within the LACDA basin, it is very important that environmental and esthetic values be respected. Any proposed program for flood control must take these values into account.

Cultural Resources

The Corps of Engineers, pursuant to regulations of the Advisory Council on Historic Preservation implementing Section 106 of the National Historic Preservation Act (36 CFR Part 800), is responsible for identifying cultural resources that may be affected by the proposed project. The Corps must also evaluate the eligibility of such resources for listing in the National Register of Historic Places. An assessment is made in consultation with the California Historic Preservation Officer of the project effects on cultural resources that are determined to be eligible for inclusion in the National Register.

Rights-of-Way Requirements

Dense residential and commercial development currently borders the rights-of-way of existing channels. In general, while limited increases in rights-of-way may be acquired for flood control purposes at a cost consistent with economic feasibility, acquisition of large blocks of land would have very significant social and economic impacts. If other cost-effective methods for providing flood protection are available, it is imprudent to consider acquiring significant new rights-of-way. Such an approach has the effect of disrupting the communities and businesses which the flood control project is intended to protect.

While it must be recognized that many alternatives involve buying rights-of-way within the community, a widening plan that displaces miles and miles of people and

businesses is therefore unacceptable if an alternative can be formulated that would stay within the existing channel rights-of-way and provide similar benefits.

Displacement of People and Businesses

The Uniform Relocation Assistance and Real Property Law (Public Law 91-646, as amended) requires that any local sponsor acquiring land for a project involving the federal government must comply with provisions of this law. Specifically, this entitles people or businesses that are displaced or otherwise impacted by the project to proper compensation for their inconvenience, and to assistance in relocation if necessary. This assistance is in addition to any funds expended for actual purchase of property and improvements.

Groundwater Recharge

Recharge of the groundwater basins is extensive throughout the Los Angeles Basin, and is conducted by several Water Replenishment Districts. An overriding concern of both the local sponsor and the members of the Water Replenishment Districts is not to decrease the existing groundwater recharge. An example of an area that might be impacted is the stretch of the San Gabriel River that is currently soft bottom, in which water is frequently recharged. Accordingly, any flood control improvement along this reach of channel should not have an impervious bottom, or should make provision for the mitigation of loss of recharge area.

Bridges and Traffic

Automobile traffic in southern California currently strains the existing system of freeways, which have extended rush-hour periods. The freeways cross the Los Angeles, Rio Hondo, and San Gabriel rivers at numerous locations. Efforts to avoid impacts to these freeway overcrossings, and thus to traffic within the basin, were a significant

planning constraint. Plans which would involve disrupting a major freeway interchange were considered to have severe socio-economic impacts.

D. PLANNING OBJECTIVES

General

The water and related land resources problems and opportunities identified in this study are stated as specific planning objectives to provide a focus for the formulation of alternatives. These planning objectives are as follows.

To reduce the potential for human suffering and possible loss of life due to catastrophic failure of the flood control system, wherever feasible.

To reduce flood damages from the study reaches, wherever feasible.

To provide, where feasible, project-related water conservation, recreation development, sediment management, transportation, and environmental enhancement opportunities.

Selection of the National Economic Development (NED) Plan

A project for flood control involving federal funds must satisfy general economic criteria that have been developed to protect the Nation's investments. The following three items are used when evaluating alternatives.

a) A positive benefit-to-cost ratio must exist. That is, the annual dollar value of tangible benefits must exceed the project's annualized cost. The benefit/cost ratio must be at or above 1.0 for an alternative to be considered economically feasible.

b) The scale of the improvements should consider maximization of net benefits (benefits minus costs).

c) The stated result of the improvements must be accomplished with the most economic means available.

Principles and Guidelines for Federal water resources planning require that a plan be identified that produces the greatest contribution to the national economic development (NED). This plan, termed the NED plan, is defined as the plan providing the greatest net benefits as determined by subtracting annual charges from annual benefits. Further, the NED plan is to be selected as the recommended plan unless the Secretary of the Army grants an exception when there is some overriding reason for selecting another plan based on federal, state, local, or international concerns.

E. FORMULATION OF PRELIMINARY PLANS

Plans for rehabilitation and upgrade of the LACDA flood control system were formulated in accordance with the National Environmental Policy Act and the 1983 Water Resources Council Principles and Guidelines. Economic, environmental, and social impacts were considered throughout plan formulation.

Alternative Identification

Alternative solutions were identified in close cooperation with representatives of the Los Angeles County Department of Public Works and the U.S. Forest Service. County and Forest Service reports and plans were reviewed to avoid duplication of effort during the initial stages of plan formulation. Members of these agencies, as well as Corps representatives of the LACDA study team, held weekly plan formulation meetings over several months to address all possible alternatives. Recreation opportunities were discussed. Some potential opportunities existed but no local sponsor came forth at this time to cost share, therefore it was not pursued further. Flood control was the primary focus for alternative plan identification.

The alternative analysis was a logical outgrowth of the problem identification phase of the study. It was initially obvious that a system-wide review was appropriate, as opposed to a limited review which would only address problems in specified reaches of the LACDA system. With this initial direction established, it was possible to approach plan formulation from a broad point of view, examining measures which could be taken to improve system performance throughout the basin, including the areas upstream of major reservoirs, the channel system in place throughout the urbanized basin, and the features of the local drainage system.

Initial Stage of Plan Formulation: Review of Measures for Addressing Flooding and other Problems

The initial stage of plan formulation was a broad, strategic review of all potential measures which could reasonably be used to address flooding problems. The procedure for identifying these measures was, first, to generate a checklist of all possible strategies for flood damage reduction; and second, to use the checklist geographically by formulating possible solutions on each segment of the LACDA system. The analysis began with the upper watershed areas and worked downstream through the system. In this way, any downstream measures would be formulated with full understanding of the potential effects that upstream modifications might have on channel flow characteristics.

The flood damage reduction measures fit into four main categories:

1) Reduce inflow to the system (detain water),
2) Convey more water in the system (increase channel capacity),
3) Damage management (floodfighting, floodproofing, etc.), and
4) Alter the reservoir's current operating regulations.

Item 4, re-regulating reservoirs on a system-wide basis to coordinate releases and thereby reduce flows within the channels, was proposed and given an initial evaluation. Studies were conducted to optimize the current mode of reservoir operations.

It was concluded that reoperating reservoirs cannot eliminate the potential flooding problems in the Los Angeles Basin. It is possible to improve the level of protection on some channel reaches but this benefit is often offset by a decrease in the level of protection elsewhere in the system. The Reservoir Regulation Section of the Los Angeles District is constantly striving to improve the methods of reservoir operation. While some improvement can be expected over time, it cannot be guaranteed or quantified at present. Thus, the existing approved operation schedules are used as the basis for comparing alternatives.

The use of a "real-time" reservoir response procedure has also been evaluated. Real-time operation involves nearly instantaneous transmission of extensive field data to the District's operational center. This information is usually processed by computer model to aid in deciding on the most efficient reservoir operation plan. The LACDA system was evaluated to determine the applicablity of this process.

A real-time network of gages currently exists in the basin. The accompanying computer model was modified in order to minimize its run time but the shortest run time acheived was approximately one hour. Decisions must be made in a shorter time frame than this so the model was eliminated as a feasible tool. As an alternative, it can be assumed that the information can be received, evaluated and acted upon within 30 minutes. The time it then takes for a dam tender to complete a gate change can be 15 minutes or longer per gate. If, for example, the system location under stress was the confluence of the Los Angeles River and the Rio Hondo, the controlling dam would be Whittier Narrows Dam. The travel time for flows from Whittier Narrows Dam to the confluence is 30 minutes. Thus, an optimal real-time operation could have an influence on flows at the confluence 1-1/4 hours after knowledge of the threatening situation was received. This assumes that all gages and system elements are fully functional.

The basin's response time is usually an hour or less, especially in the urbanized portions of the lower Los Angeles River. As a result, it appears that an optimal real-time response cannot avoid adverse impacts should the floodwaters threaten to exceed channel capacity. While future refinements to the current operating plans may be expected, they are not adequate or reliable enough to preclude the need for structural

solutions to the flooding problem. These considerations led to the decision not to rely on re-regulation of the reservoirs as a solution to the downstream flooding problem. Having eliminated reservoir re-regulation as a measure under consideration, the remaining three categories of measures (Table 10) were examined for general appropriateness for each reach of the LACDA mainstem system.

Regional Applicability of Alternatives

Upper Watershed Areas

The first geographical areas to be explored were the watersheds above existing flood control reservoirs. Using previous Corps, County, and Forest Service studies, these watersheds were examined to determine which measures might reduce the inflow of floodwater to the existing LACDA system.
Measures considered included:

1) New dam construction in the upper canyons,
2) Vegetation and debris management measures, and
3) Modifications to the existing operating procedures of the County's upstream reservoirs (increase the storage space allocated for flood control).

Alterations to Existing Flood Control Reservoirs

Excavation of a reservoir to increase its flood storage potential and the capability of raising, re-gating, or otherwise altering the spillway elevation for the four major flood control reservoirs in the LACDA system was evaluated. Modifications that would increase the amount of flood control storage at existing dams by impounding water at a higher elevation are generally only possible where development around the reservoir's existing maximum storage boundary is sparse. The surrounding lands may then be available for purchase at an economically feasible price.

Mainstem Channel Areas Downstream from Major Reservoirs

During the analysis of the channels downstream from the major reservoirs, the focus of the plan formulation process shifted from retention of floodwater to quicker conveyance or short-term detention of channel flow. A wide variety of measures was considered in this evaluation, to include:

1) Deepen existing channels
2) Widen existing channels
3) Raise existing channel walls
4) Remove and replace or modify bridges constricting channel flow
5) Divert flows into tunnels for delivery to the ocean
6) Divert excess flows into new detention or groundwater recharge facilities
7) Alter the channel shape from trapezoidal to rectangular
8) Change the channel substrate and side wall material (from rock to concrete, for example)
9) Armor the back sides of earthen levees with non-eroding material to prevent catastrophic levee failure
10) Alter inlet structures and bridge piers to reduce turbulence in the channel
11) Floodproof and/or construct temporary walls on major roadways which would permit the diversion of floodwater for brief periods into these temporary channels

At the same time these measures were being considered, each reach of channel was evaluated to determine if damage management measures such as local flood walls, other flood proofing measures, or flood plain management might reduce the extent of damages. In addition, flood warning and evacuation plans were considered.

The result of this initial planning was a list of measures (Table 10) which might be appropriate for each distinct reach of the LACDA flood control system. These measures were screened to determine which measures would be carried forward for detailed feasibility analysis.

Table 10. Measures considered for flood damage reduction.

STRATEGY	SPECIFIC MEASURES CONSIDERED
1. Reduce Inflow to Mainstem System	
A. Integrate Flow Retarding Facilities into the System	Floodways
	Underground Aquifers
	Wetlands
	Vegetation/Debris Management
	New Dams
	Detention Basins
	Gravel Pits
B. Modify Existing Facilities	Modify Existing Dams
	Increase Height
	Excavate Material
	Change Gates/Outlets
2. Convey More Water in the Mainstem System	
A. Create New Conveyance Facilities	Pipelines/Diversions
	Tunnels
	New Channels/Aqueducts
B. Increase Existing Channel Efficiency	Alter Existing Channels
	Raise Channel Walls
	Widen
	Convert to Rectangular
	Deepen
	Increase Slope
	Armor Back Side of Levees
	Reduce Channel Roughness
	Reduce Bridge Obstructions
	Clear Span Bridges
	Modify Piers and Decks
3. Damage Management	Relocation
	Floodproofing
	Floodfighting
	Flood Plain Management/Insurance

Public Involvement

A complete initial planning effort involving local and other Federal governmental agencies was critical to ensure that the public was presented a thorough list of possible solutions. No measure which could reasonably be expected to contribute to the solution of the identified problem was eliminated during the initial phase of plan formulation. Thus, when the public presentations were formulated, no measures which were viable from an engineering standpoint and which could contribute to the solution of flood control problems had been eliminated. The public was presented with a broad spectrum of measures to consider and discuss.

The effort to formulate a public involvement program was complicated by the size and population of the affected area. There are over 750,000 households and businesses in the area directly affected by projected overflows from the existing LACDA system, and the population which would be affected by any project is well over 4 million. These people must be afforded the opportunity to comment on formulated solutions and to recommend measures, in addition to those addressed during the initial plan formulation process. To make this possible in such a densely populated region, multiple approaches were used for public involvement.

Personnel from the County Department of Public Works were involved in the planning from the beginning. Local officials were relied on to help guide the initial planning, pointing out where some measures might not be locally acceptable and explaining local perspectives on the problem. To inform other local officials at the city level, open-forum workshops were held to discuss issues, concerns, and other solutions. Also, the Los Angeles County Board of Supervisors, the governing body of the local sponsor, was kept informed of study progress.

Information about the general potential flooding problem for the drainage basin was made available to people through the local media, in particular through press releases and interviews in the major newspapers in the region. An initial problem analysis was

made available in mid-1985, prior to plan formulation, giving the general public an overview and an opportunity to communicate with Corps planners. There was an intensive publicity campaign that included a public mailing of informational brocures in 1987, and follow-up publicity about the project in spring of 1989.

Public presentations were made in October 1987 and again in March 1989. They were focused on the identified problem, including both overflow analysis and the economic assessment of damages and the array of formulated, corrective measures being considered. At least one such presentation was made in each affected area of the LACDA watershed. Presentations consisted of a general introduction and a detailed slide/video briefing, followed by an open question-and-answer period. An information bulletin was provided to all attendees. At the end of each briefing, response cards were handed out and a mailing list circulated to ensure that all interested in the study received future informational bulletins.

This open and active public involvement effort will be continued, to include review of this Feasibility Report and review of future design efforts.

F. EVALUATION OF PRELIMINARY ALTERNATIVES

The large number of preliminary alternatives considered were evaluated at several levels of detail. First, all alternatives were evaluated to determine if they showed promise of meeting project objectives. Numerous alternatives were eliminated on the basis of this initial analysis. Second, alternatives which showed some promise of meeting project objectives were subjected to a preliminary benefit-cost analysis. The screened alternatives are described in this section in the order they were presented in Table 10.

Strategy One: Reduce Inflow to Mainstem System

A. Integrate Flow Retarding Facilities into the System

Detention of water within the system of dams and channels is a primary strategy for reducing inflow to the mainstem system and improving flood control in urban areas. Detention can be achieved by capturing flows behind dams or by diverting flows into undeveloped areas such as gravel pits, groundwater spreading basins, floodways, wetlands, and other low-lying areas. In addition, a number of secondary options for reducing flows in the mainstem channels by increasing groundwater storage were considered, among them, injection wells and channels with holes in the invert and side slopes (perforated channels). Several detention strategies were eliminated after a cursory review. First, floodways were eliminated because there is simply no adequate undeveloped land for such floodways, and the massive amounts of water which would need to be diverted into the floodway would move with such force as to threaten to cause significant damage to any natural landform. A floodway susceptible to failure would thus merely transfer damages from one reach of the river to another, an unacceptable solution to the problem.

Second, storage in underground reservoirs, aquifers, or wetlands was eliminated because there are no undeveloped sites in the LACDA basin appropriate for these alternatives. Underground reservoirs would have to be capable of 10,000-20,000 acre-feet of storage and would cost perhaps hundreds of millions of dollars to construct. Injection of excess flow into aquifers would be too slow to affect peak flow significantly. And there are no wetland sites in the LACDA basin which could be used to store water; all wetlands remaining in the basin are near the coast. None of these options was found to have any appreciable impact on peak flows in the channels. Given only limited water conservation benefits from these options, and the potential for high costs and some impacts to flow rate in the channels (greater flow resistance and turbulence from perforated channels), they were eliminated from consideration early in planning.

Another option involves land management to reduce runoff and debris production in the upper watershed, thereby reducing peak flows. Management of vegetation is one

approach, but it is generally effective only where the slope of hillsides is moderate and substantial vegetation can be established. This is not feasible in the semi-arid mountains surrounding the Los Angeles Basin. The steep slopes and long hot, dry seasons mean that vegetative communities at most elevations are limited to coastal sage scrub, grasses, and chaparral. These communities burn off in the fire season with some regularity, and there is often little chance for significant growth prior to the start of the rainy season.

A second approach is construction of debris basins and check dams. There are already 129 major debris basins in the upper watershed areas, and effective sites for additional basins or check dams have generally been utilized. In addition, these structures are generally too small to significantly reduce peak flows to downstream areas; they fill quickly in early flood stages and have no capacity remaining when peak flows occur.

Erosion control and alteration of the watershed to improve retention of rainfall are both extremely difficult to accomplish. If they could be achieved, it is doubtful that they would have a significant impact on peak flooding because peak flows occur when thin soils have been saturated and there is no additional capacity in the soil. This approach is worth pursuing in the long term for the benefit of improved land management, but cannot presently be relied on to provide significant reductions in peak flows.

Upper watershed erosion control also does not address the problem of increases in lower basin local runoff, which cause the majority of the flooding problems in the basin. Therefore, there would be only minor benefits from programs that reduced upper watershed runoff and erosion. They were not pursued as primary solutions to the flooding problem.

New Dams

New dams in the canyons above existing Corps facilities were considered at the following locations:

1) The Los Angeles River basin above Sepulveda Dam,
2) Tujunga Wash above Hansen Dam,
3) Arroyo Seco watershed above Devil's Gate Dam, a local dam owned by the city of Pasadena, and
4) The watershed above the Santa Fe Flood Control Basin.

These locations were determined to have the largest potential capacity of all those surveyed.

Small dams have little effect on peak flood flows because they fill up very early in a flood and therefore have no capacity when peak flows arrive; the runoff they do capture arrives prior to peak flows and would therefore generally pass harmlessly within the main river channel to the ocean. Since they are spilling when peak flows occur, they do not reduce the flooding problem. To be effective, an upstream dam would require at least 10,000 acre-feet of storage.

Factors that needed consideration in an analysis of new dam sites include the following:

1) The environmental impacts associated with the construction of a new dam would require substantial mitigation.

2) The Forest Service would not favor dams unless they have public access and recreation areas.

3) Small dams would require costly debris removal while providing minimal benefits.

4) Many of the dam sites considered in the initial plan formulation stage were in relatively developed areas, and construction would require relocation of recreation facilities, roads and some homes.

5) If new flood control capacity were proposed, a reoperation analysis would need to address how the existing space would be incorporated into the existing system and what potential existed for increasing available water conservation space.

In the western upper watershed, the three sites were identified - north of Pipe Canyon, near Bill Lake Camp, and on the Little Tujunga - and evaluated to determine whether they would have a significant impact on flooding; that is, whether their maximum potential capacity would be adequate to affect peak flows. An analysis indicated that these reservoirs would be at or near capacity when peak inflows were experienced and, therefore, that they would have virtually no impact on peak flow into the major downstream reservoirs (Sepulveda and Hansen Reservoirs). In addition, their estimated costs were high, and there was potential for significant environmental and recreational impacts.

None of the new dam alternatives would have allowed outflows from Hansen or Sepulveda reservoirs to be reduced enough to have an effect on downstream flooding problems. For example, even a reduction in releases from Sepulveda Dam of 20% (3300 ft^3/s) would have only minor impacts on downstream flows because local runoff increases flow in the mainstem by as much as 40,000 ft^3/s.

A new reservoir was considered in the watershed above Devil's Gate Dam on Arroyo Seco. Such a reservoir would reduce flooding to some extent in the downtown Los Angeles area, but would not have a major impact on the lower Los Angeles River where the flooding problem is greatest. Thus there would be relatively high costs and environmental impacts without offsetting flood control benefits.

In the upper San Gabriel River watershed, several sites were evaluated. In this watershed, the major dam sites have already been used, and the remaining sites would have little storage and thus little impact on downstream flooding.

In short, new dams in the upstream canyons were found to have too little storage to provide significant flood control benefits. At the same time, they would have had high costs and potentially high environmental impacts.

New dams were also briefly considered below the existing major reservoirs, for example, on Tujunga Wash below Hansen Dam and on uncontrolled tributaries such as Compton Creek. A brief survey of the potential sites, none of which held much promise as dam locations, indicated that a facility large enough to have an effect on flows downstream would require acquisition and clearing of heavily urbanized areas. The cost of this would be prohibitive given the high value of commercial property in the potential storage areas. Therefore, new dams were eliminated from further study.

Detention Basins

Where adequate land is available, peak flows may be directed over a weir or through an inlet structure to detention basins. This effectively reduces the flow moving through downstream channel reaches and thus prevents channel capacity from being exceeded.

Several detention basin sites were identified in the upper reaches of the Los Angeles River system, and these were evaluated to determine the feasibility of diverting peak flows to them (Table 11).

Table 11. Detention basin sites/gravel pits considered.

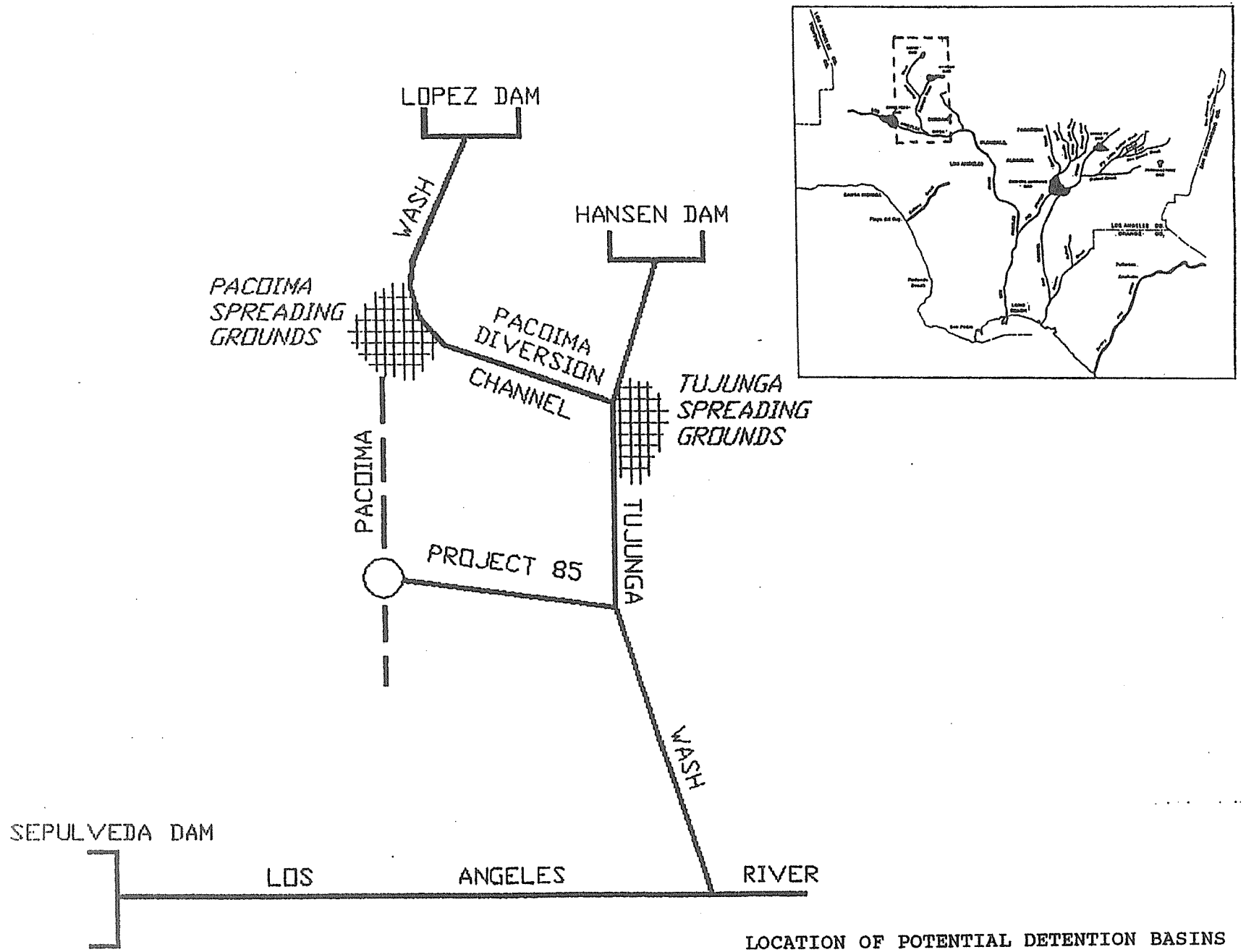
Project Reach	Detention Basin	Potential Size Acres	Storage	Conclusions
1	Pacoima Spreading Grounds	153	2,200 af	Not cost effective
1	Tujunga Wash Spreading Grounds	188	2,000 af	Not cost effective
2	Taylor Yard	200	5,200 af	Not cost effective
8	Livingston Gravel Pits	415	29,000 af	Not cost effective
8	Conrock Gravel Pits	365	30,000 af	Not cost effective

Pacoima Spreading Grounds. The Pacoima Spreading Grounds are a 153-acre site located off the Pacoima Wash in Reach 1 of the LACDA System (see Figure 9). During initial plan formulation, a weir to direct flow to the spreading basin was investigated which would require excavation of the existing grounds to a depth of 15 feet and would entail removal of approximately 4,600,000 yds^3 and provide storage of 2,200 acre-feet at a cost of almost $24,000,000 ($5/yd^3). Greater excavation depths are not feasible or consistent with water conservation operation of these areas. Initial evaluation of this alternative indicated a benefit-to-cost ratio of greater than one-to-one, but later evaluation determined that costs would greatly exceed benefits.

The more detailed review of this alternative determined that, to accommodate the peak flow and volume necessary to significantly reduce flooding downstream, a 2-mile weir would be required. Due to the fact that the site cannot accommodate a 2-mile weir, an inlet structure would need to be designed instead to intercept floodflows on the wash and deliver them to the basin at a rate of 9600 ft^3/s. This inlet structure raised estimated project costs significantly.

A second problem was the need to drain the detention basin rapidly after each flood event. The general winter storm pattern in southern California is often characterized by a series of storms sweeping out of the north or central Pacific at one- to five-day intervals. This occurs when the Pacific High locates to the south and east of the area, permitting a regular sequence of storms to penetrate to the south. Under such conditions, it is possible for one flood event to be followed relatively rapidly by another significant storm. To retain flood control capacity in dams and detention basins, it must be possible to draw them down within several days. Thus the detention basins would have to be connected to the local storm drainage system, which would require significant upgrading of the system. This requirement also added to the preliminary costs. Impacts, both positive and negative, to the existing water spreading activities were not evaluated in detail.

Finally, a detention basin in this reach would have only very limited benefits for the downstream Los Angeles River reaches where a majority of damages occur. Detention would have to be justified on the basis of Tujunga Wash flood control benefits alone.



LOCATION OF POTENTIAL DETENTION BASINS AFFECTING TUJUNGA WASH

FIGURE 9

Tujunga Wash Spreading Grounds. This 188-acre spreading ground is located south of the Highway 101 and Interstate 5 interchange several miles south of Hansen Dam (see Figure 9). The existing inlet works have a capacity of 400 ft^3/s, and the spreading grounds have a capacity of 390 acre-feet. Deepening this area by 11 feet by removing 2.5 million cubic yards of earth would increase this capacity to 2,000 acre-feet.

This alternative shared the disadvantages of the Pacoima Spreading Ground alternative: It was costly and would have a limited impact on peak flows. As a stand-alone alternative, it was eliminated from further consideration.

Pacoima/Tujunga Basins Combined. Although each spreading ground would, by itself, have little impact on flood flows, a combination could reduce peak flows (at least for a period of time) by at least 9,600 ft^3/s and provide off channel storage of over 4,000 acre-feet.

This combination was evaluated, with the following conclusions:

1) Partly because of the cost of inlet and drainage structures, the cost of the combined alternative would be quite high, even without considering complex drainage structures;

2) The reach of Tujunga Wash where benefits would be realized currently has 70-year protection;

3) Therefore, annual NED benefits from the project would be exceeded by annual costs, and the benefit to cost ratio of the alternative would be substantially less than one-to-one.

Taylor Yard Detention Facility. The Los Angeles River flows out of the San Fernando Valley through a low-lying area bounded on the west by the Golden State Freeway and on the east by San Fernando Road. In this area, there is a railroad yard and a number of aging commercial structures. If cleared, excavated, and used for off-channel

detention, this low-lying area could accommodate approximately 5200 acre-feet of storage. This would reduce peak flows into the downtown Los Angeles area.

Detention at this site would have only a minor impact on overall downstream flooding and minimal impact on damages because predicted depths in the downtown area which would be protected are not great and damage is estimated to be minor. It would not significantly reduce peak flows breaking out of the channel in the lower Los Angeles River; it would thus raise levels of protection only marginally. For this benefit to be achieved, a commercially valuable industrial and commercial area would have to be taken at significant cost. Weighed against the high social impact and the $60,000,000 cost of acquiring and excavating the basin (initial cost estimate), it would thus not be a justified project element.

Gravel Pits

Livingston and Conrock Sites. Gravel mining near Santa Fe Dam has created extensive gravel pits in the vicinity of the San Gabriel River. Two large, well situated pits have a combined capacity of over 59,000 acre-feet of storage. Mining operations at these pits are scheduled to be terminated after the turn of the century, and therefore they will be available for other uses. This is a significant potential off-channel storage area, given that the total capacity of the Corps flood control dams is about 120,000 acre-feet.

The gravel pits would have to be modified to be used for flood control. The existing quarries have nearly vertical walls which would have to be altered to a 2:1 (about a 33° angle) slope for stability. The poorly consolidated alluvium would be subject to slumping if the porous material surrounding the pits were saturated due to high groundwater or short-term flood water impoundment. The current walls are close to the San Gabriel River, the San Gabriel Freeway and local surface streets, any of which could be jeopardized by a significant wall failure.

Inlet weirs or pipelines would be constructed to divert flows into the gravel pits from the mainstem San Gabriel River. For these to be effective, they would have to be sized to accommodate flows of about 20,000 ft^3/s.

Additional modifications would have to be made to permit the gravel pits to drain rapidly following a major storm. This is necessary to restore storage capacity in anticipation of a subsequent storm event. Other major flood control facilities in the Los Angeles basin are designed to be drained in as little as two days; this is important because precipitation in southern California is often characterized in the winter by a series of storms, with storms arriving at intervals of one to five days. Modifying the gravel pits for drainage would require a tunnel to be constructed to a downstream point along the river below the grade of the gravel pit bottom; a long and costly tunnel would thus be a feature of this alternative. Other modifications might be needed, but these major features were considered in preliminary cost estimates.

Initial study indicated that the gravel pits would have a significant impact on volume inflow into Whittier Narrows Reservoir and could therefore reduce the scheduled releases from that facility to the Rio Hondo channel. The projected reduction in release to the Rio Hondo was up to 8,000 ft^3/s. This would eliminate the current inadequacy in channel capacity on the Rio Hondo but would not fully alleviate the flooding problem on the Los Angeles River. An initial decision was made to pursue this alternative further because of the high potential for both flood control and water conservation benefit. The cost of the storage was undefined at the time this decision was made. This alternative was not carried forward for detailed design and analysis, however, due to several factors:

1) There would be a significant cost in acquiring the rights to the gravel pits because current operators would have to be compensated for loss of potential income. The period of time projected for profitable operation is uncertain, but may extend well into the proposed flood control project's period of operation.

2) The City of Irwindale has developed plans for use of these gravel pits for other purposes, including filling the pits and developing them for commercial ventures. An area of existing groundwater would also be used for recreational purposes.

Use for flood control would complicate these plans and benefits from flood control use would have to be compared to the opportunity costs of more intensive development of the sites.

3) While reduction of inflows to Whittier Narrows Dam would possibly reduce the need to improve the Rio Hondo channel, it would have a less significant impact on the lower Los Angeles River because that problem is primarily a result of accumulated, uncontrolled drainage. Flood control benefits would thus be mainly limited to the Rio Hondo channel. The gravel pits are also located sufficiently upstream from the primary flood damage areas such that they do not provide an operationally flexible solution to downstream flooding compared to improvements closer to the inundated areas.

4) Grading to stabilize the gravel pits' side slopes would involve moving large quantities of material. Grading operations might require hauling material to other disposal sites or placement of any excess spoil in the pits themselves, thereby reducing the projected effective capacity of the pits. Movement of large quantities of material is generally very expensive.

5) Drainage of the pits within a short period of time would require a costly outlet works to be constructed. Pumps were initially considered but rejected because they cannot be relied on, especially given that they would remain idle for periods of 20-30 years. Tunneling was the preferred alternative, but the proposed tunnel would have to extend six miles to Whittier Narrows. An initial cost estimate of $100 million (excluding rights-of-way) raised total project costs significantly.

Based on an initial analysis, use of the gravel pits near Santa Fe Dam was not considered economically feasible.

Strategy One (A) Summary: Integrate Flow-Retarding Facilities Into the System

In part because of the nature of the flooding problem in the LACDA system and in part because of the lack of effective and cost-efficient sites for detention basins, no alternative involving new flow detaining facilities was carried forward for detailed analysis.

Strategy One: Reduce Inflow to Mainstem System

B. Modify Existing Facilities

Modify Existing Dams

Corps Facilities. There are a number of modifications possible at existing Corps flood control reservoirs: (1) increasing dam height and, as a result, reservoir capacity; (2) excavation of the basin to increase capacity; and (3) alteration of gates and spillways.

At Sepulveda and Whittier Narrows, raising the dam height was considered. Small increases in dam height at these sites would produce significant increases in storage because of the flat slope of the reservoir basin. This option was less attractive at Hansen and Santa Fe dams because those dams provide a satisfactory level of protection, and raising the dam would have only marginal impacts on total flood control storage. At the two potential sites, however, the cost of raising main embankments would be quite high because of the length of the embankments. In addition, development has occurred at the margins of the existing reservoirs, and raising the dams would mean that this urban development would be inundated during a significant flood. Acquisition of this property would be required, and this would not only be costly but disrupt existing communities. This option would be prohibitively costly and unacceptable, and it was therefore eliminated from further study.

Excavation in the reservoir to deepen it and thereby increase capacity was not considered at Sepulveda and Whittier Narrows reservoirs because of the extensive environmental and recreation development in these reservoir basins. It was considered at Santa Fe and Hansen Reservoirs where planned or existing excavation activities have

already impacted some of these resources and where there are large areas which would be excavated.

Excavation is an extremely costly approach to increasing reservoir storage. Costs may be as high as several dollars per cubic yard excavated, and there are additional costs for hauling to a disposal site. Removal of a significant amount of sediment, enough to have an impact on downstream flooding, would involve increasing storage by more than 10,000 acre-feet at one site. This is equivalent to approximately 16 million cubic yards, making costs for such a project exceed one hundred million dollars. This additional storage could not be below the existing grade of the outlet gates as it would not be drainable and would thus not be available for flood control. Providing new gates to solve this problem would be difficult and cost prohibitive. First, new gates constructed below the existing gate elevation could involve changes to the reservoir foundation. Second, new gate construction would be very costly, adding to the already high cost of sediment removal. Thus, excavation would have to occur in the upper elevations of the basin, away from gates and existing maintenance sediment removal operations.

Disposal of approximately 50 million cubic yards of spoil from this alternative would also have very significant costs. Available landfill sites are reaching capacity in Los Angeles, and the cost of hauling to sites outside of the basin would be prohibitive. It is unlikely that a suitable existing landfill site could be identified within an economical haul range. Creation of a site would have significant environmental consequences.

Sediment buildup behind the two dams in question is also an ongoing process. There are a number of factors which could cause massive sediment movement into the reservoirs prior to a significant flood event, which would therefore eliminate the excavated storage prior to peak flows. As such, this solution to flooding problems is not wholly reliable. Additionally, increasing storage in the upstream dams will not significantly affect the overall flooding condition. A reduction in reservoir releases of 4,000 ft^3/s during the 100-year event at Hansen Dam would require extensive excavation and yet would not compensate for the massive inflows to the system occurring from local drainage in downstream reaches.

Finally, Hansen Dam already provides control of the 200-year flood. Increasing its capacity would have very little effect on flooding on Tujunga Wash or reaches below because the flooding is a result of increased local drainage. Thus, excavation to increase reservoir capacity is cost prohibitive, ineffective, and potentially environmentally damaging at both the reservoir site and any disposal site. No excavation alternative was carried forward for final analysis.

Altering outlet structures may reduce net outflows from the reservoirs under some conditions and thereby somewhat reduce peak flows throughout the river system. This was initially considered at Sepulveda because its spillway design limits the ability to hold back flows from the reservoir. At this site, the gates and spillway could be modified to permit some reduction in outflow. However, significant reductions in outflow from the gates would not be possible because retaining additional water behind the dam to reduce peak flows early in a flood would increase the possibility of greater flooding later if inflow continued to exceed outflow.

In addition, gate/spillway alterations affect releases from the reservoirs only, and do nothing to solve the problem of increased local drainage flows in the lower river basins. Only a minor reduction in outflow is possible through gate/spillway modifications, and therefore there is only a very small benefit to be achieved. The cost of gate modifications is high as well.

Devil's Gate Dam. Devil's Gate dam on Arroyo Seco in Pasadena controls a watershed of approximately 32 mi^2. It is currently operated by Los Angeles County Department of Public Works under restrictions imposed by the State of California. Recent studies by the City of Pasadena and by the County have identified preliminary feasible rehabilitation proposals for the dam. The reservoir also has lost much of its capacity due to sediment build-up. Further studies are being planned by the County towards removing current operational restrictions and restoring reservoir capacity.

Reducing inflows to the Los Angeles River from this source would provide some additional protection to downtown Los Angeles. Reducing inflows from Arroyo Seco would mean that the reach of the Los Angeles River near downtown would be able to

accommodate more of the local drainage. However, modification to Devil's Gate Dam would not reduce flows on the lower Los Angeles River enough to compensate for the massive local drainage inflows in that reach, and would therefore have only a minor impact in the area of greatest potential flood damages. Therefore, modification or replacement of this facility was eliminated from further consideration.

Strategy One (B) Summary: Modify Existing Facilities

The impact of increasing upstream flood control storage does not result in significantly reduced flood flows downstream, due to inflow from uncontrolled, local drainage. As a result, no modification of existing reservoirs was found to make a significant contribution to a complete, cost-effective, acceptable plan for solving the flooding problem in the LACDA system.

Strategy Two: Convey More Water in the Mainstem System

A. Create New Conveyance Facilities

Pipelines

There are a number of ways of diverting flows from the LACDA system to reduce peak flows in the channels where capacity is too low to provide adequate protection. Transfer of water from one watershed to another via pumping stations/pipelines was initially given brief consideration, a possible alignment being from the LACDA basin to the Antelope Valley. This alternative, along with a diversion to Ballona Creek, was eliminated from consideration as a result of very high costs involved in moving the significant volumes of water needed to affect peak flooding. In addition, system maintenance costs would be extremely high because pumping facilities deteriorate when not in use.

Diversions of Rio Hondo releases to San Gabriel River

Transfer of flows at Whittier Narrows Dam from the Rio Hondo to the San Gabriel River was studied in somewhat greater detail. At present, the Rio Hondo is designed to receive all primary flood control releases from Whittier Narrows Dam. The original design of the Rio Hondo allowed for Whittier Narrows Dam flood control releases of 40,000 cfs. Due to increases in local inflow to the channel, the current maximum release rate into Rio Hondo is 36,500 cfs. The San Gabriel River below Whittier Narrows is essentially a spillway flow channel for Whittier Narrows Dam. Scheduled releases of 5,000 cfs are routinely made from Whittier Narrows Dam when the water surface elevation is between 200 ft and 228.5 ft NGVD (National Geodetic Vertical Datum). The gate invert on the Rio Hondo side is at elevation 184 ft and a pool 16 feet deep must be impounded before the San Gabriel outlet sill of 200 ft is reached. Above elevation 228.5 ft, the automatic spillway gates on the San Gabriel River outlet go into effect, and release rates escalate rapidly.

Initially, it appears that greater routine releases could be made to the San Gabriel River because the scheduled release of 5,000 cfs is lower than the receiving channel capacity of 13,500 cfs. This margin of 8,500 cfs is diminished in downstream locations by increasing local inflow. Above the confluence with Coyote Creek, the 100-year computed flow on the San Gabriel River is 17,200 cfs and the channel capacity is 20,000 cfs, leaving a margin of only 2,800 cfs. In order to convey substantially greater flood control releases, a significantly lower level of protection would be provided by the river channel, or it would require a structural upgrade to increase its capacity.

Expanding primary flood control releases to both the Rio Hondo and the San Gabriel River could shift flooding from one area to another, which would require extensive improvements to the San Gabriel system. It was not considered appropriate to solve a flooding problem by transferring the problem, and the associated damages, to another system. Therefore, in order to redirect some of the Rio Hondo flows, the San Gabriel River would most likely be converted from a soft-bottomed channel to a concrete invert channel and the channel capacity would have to be otherwise increased.

Immediately downstream from Whittier Narrows Dam the San Gabriel River is soft-bottomed channel for 7 miles. The remaining concrete channel is trapezoidal and extends 13.2 miles to the ocean. Converting the upstream reach to concrete channel would increase capacity from 13,500 ft^3/s to approximately 31,000 ft^3/s. This increase in capacity would have to be implemented through the remaining channel. Using parapet walls was determined to be the most cost-effective method of accomplishing this; this would require raising 22 bridges from 1.2 feet to 6.9 feet.

Increased San Gabriel River capacity would allow operation of Whittier Narrows Dam to be modified; the optimal theoretical use of the additional capacity in the San Gabriel River would mean filling the reservoir to 99% capacity during the 100-year event and limiting releases to the Rio Hondo channel to as little as 15,000 ft^3/s. This would eliminate the need to modify the Rio Hondo channel. There would still be significant flooding on the lower Los Angeles River, and protection would remain below the 100-year level. Furthermore, balancing releases to the two channels would require excellent field information and precise operational control, both of which are difficult to achieve during emergency operations.

The cost of improving the San Gabriel River would not be equally offset by reductions in costs on the Rio Hondo and Los Angeles River. In addition, the soft-bottomed reach of the San Gabriel River is a major environmental and groundwater recharge resource. Compensation for loss of groundwater recharge potential may require a 200+ acre parcel of land or provision of other, less expensive water supplies. Loss of any environmental resources would also require mitigation.

Finally, simultaneous work on the San Gabriel and lower Los Angeles Rivers would mean traffic impacts on two sets of bridges and general neighboorhood disruption in two areas rather than one. Given that the Rio Hondo-lower Los Angeles River channels are generally in a more disturbed urban (commercial and industrial) environment, the social impacts of construction in these areas would be lower than for the more residential San Gabriel River area.

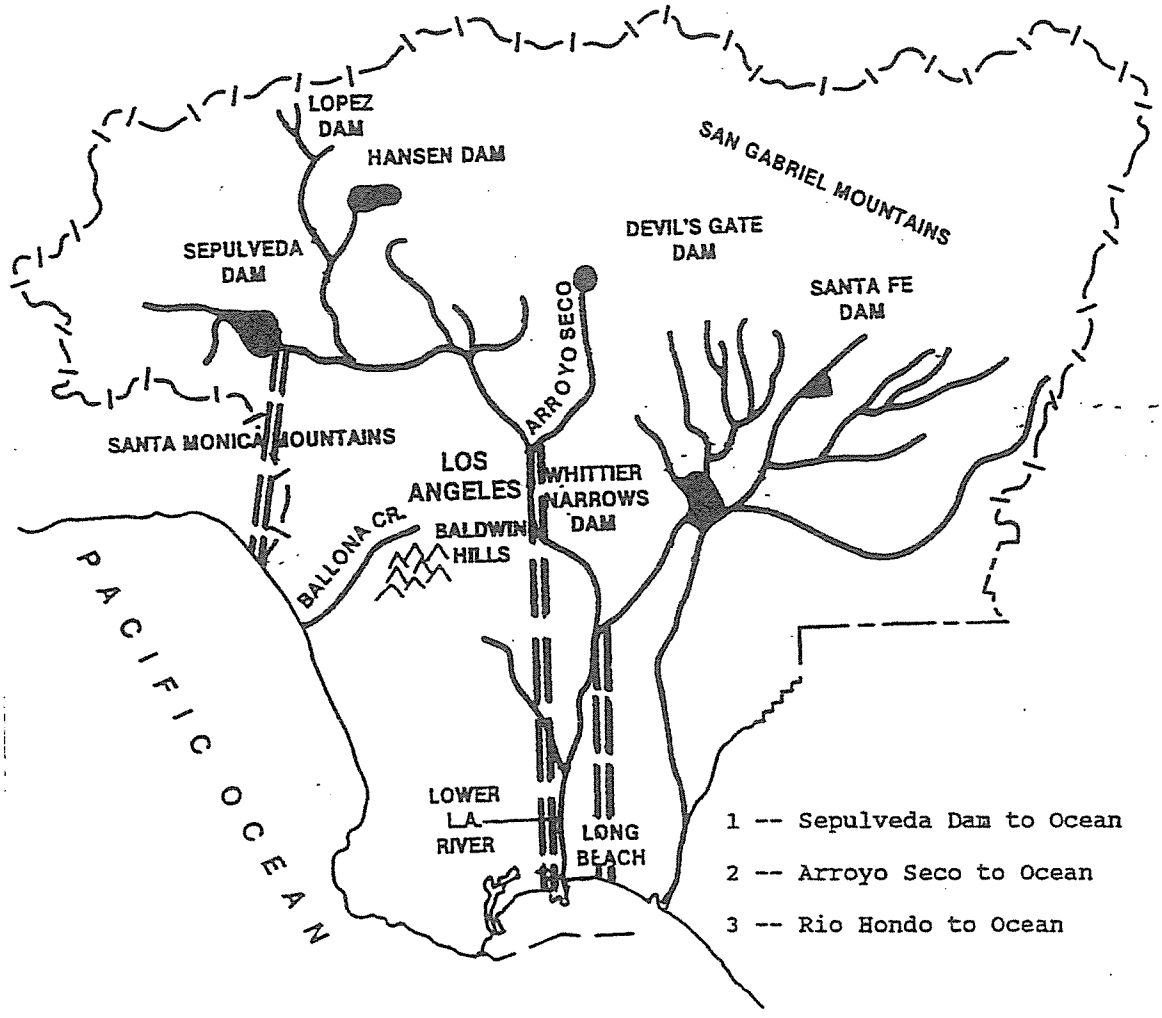
There would thus be no cost advantage to diverting releases to the San Gabriel River, and the channel modification impacts would be greater than those experienced on the Rio Hondo-lower Los Angeles River. For these reasons, diversion of flows to the San Gabriel River, with attendant channel alterations of any sort, were considered to be unjustifiable.

Tunnels

A tunnel could be constructed along three possible alignments to divert water from either reservoirs or the mainstem channel system (Figure 10). A tunnel from Sepulveda Dam could divert water through the hills separating the San Fernando Valley and the Los Angeles basin and from there into the Pacific Ocean. Alternately, flow could be diverted from Arroyo Seco across the basin to the ocean. These alignments could reduce inflows to the mainstem Los Angeles River by up to 20,000 ft^3/s. A third alignment would involve diversion of flows from the Rio Hondo to Long Beach, virtually paralleling the river alignment.

An initial benefits analysis indicated that there would be only marginal benefits (annual benefits of only $1,620,000 for a 20,000 ft^3/s tunnel) from a diversion of water from Sepulveda Dam, and this option was dropped from consideration as costs would clearly exceed benefits. Potential benefits resulting from a tunnel of this capacity from the Arroyo Seco or the Rio Hondo were much more significant and a preliminary cost estimate was made to determine if tunnels were worthy of detailed consideration. The screening analysis was conducted for tunnels of 5,000, 10,000, and 20,000 ft^3/s capacity. For purposes of simplifying the analysis, the tunnel with the shortest route (which would have the least cost) from the Rio Hondo was evaluated (Table 12).

A large tunnel from either diversion site would have a significant impact on flooding. However, construction costs would be extremely high. Costs for the estimates shown on Table 12 were developed using current construction cost data from the Los Angeles Metrorail project and thus represent costs associated with tunneling under existing development in the Los Angeles basin.



TUNNEL ALIGNMENTS

FIGURE 10

Table 12.

Tunneling alternatives, benefits and costs (1988 $1,000)

Alignment and Capacity	Average Annual Benefits and Costs			B/C Ratio
	Benefits	Costs	Net Benefit	
Rio Hondo[a]				
5,000 ft^3/s	$13,480	$34,015	<$20,535>	0.40
10,000 ft^3/s	$19,730	$41,689	<$21,959>	0.47
20,000 ft^3/s	$25,980	$65,458	<$39,478>	0.40

a. Tunnel diversions from two other locations were also considered: a tunnel from Sepulveda Dam to the ocean and from Arroyo Seco to the ocean. These tunnels would have been longer and more costly than a tunnel from the Rio Hondo; they would also likely have either comparable or lower benefits. The Rio Hondo tunnel alternative was thus considerd to have the greatest potential for net NED benefits. Given that this preliminary analysis indicated a very low benefit-to-cost ratio for this alternative, the other tunnel alignments were also eliminated from further consideration.

Based on this preliminary design/cost analysis, it was apparent that even the shortest, least-costly tunnel alternative could not be justified when considering first costs alone. Operation and maintenance costs would further reduce the benefit-to-cost ratio for such a project. The heavily developed nature of the flood plain which raises construction costs due to the difficulties of tunneling in a developed area, thus makes tunneling an impractical alternative. Finally, it was also clear that a tunnel would not fully address the need for flood control in the lower Los Angeles River; additional structural works would also be required. Tunnels were therefore not carried forward for more detailed analysis.

New Channels and Aqueducts

New channels and aqueducts were considered, but a review of the LACDA system indicated that there are few alignments which would not pass through heavily developed areas. The most effective alignment for additional conveyance capacity is on the lower Los Angeles River, where the most efficient river course is the existing alignment. The costs of rights-of-way for new channels along other alignments when combined with the construction costs for new channels make this alternative too costly. In addition, new channels would severely disrupt existing neighborhoods. New channels were therefore eliminated from consideration.

There were similar constraints on potential aqueduct alignments within the LACDA system. One alignment considered would divert water from Lopez Reservoir to an aqueduct along a utility right-of-way and empty into Hansen Dam. This would reduce releases from Lopez Dam down Pacoima Wash. The additional flow into Hansen would not critically affect its storage capacity, but further analysis revealed that diverting releases from Lopez would not significantly reduce flooding on Tujunga Wash.

Aqueducts which are constructed over uneven ground require grade adjustment and significant new rights-of-way. Construction costs are quite high for this type of structure. After a cursory review of possible aqueducts, they were rejected as infeasible.

Strategy Two (A) Summary: Create New Conveyance Facilities

Diversions, including greater use of the San Gabriel River for primary flood releases from Whittier Narrows Dam, were not considered viable alternatives. New channels are prohibitively expensive. No alternatives were carried forward from this strategy.

Strategy Two: Convey More Water in the Mainstem System

B. Increase Existing Channel Efficiency

Alter Existing Channels

Channels may be altered in a number of ways to meet various project objectives. In the initial stages of planning, alteration of the channels solely for water conservation and environmental enhancement purposes was considered briefly. Alternatives included removing concrete channel inverts and perforating the inverts to permit groundwater recharge through the channel bottom. This type of alternative would have net adverse impacts to flood protection, however, because it would reduce the rate of flow in the already inadequate channel. Small sections might be feasible, but costs would be high with only minimum water conservation benefits; such approaches would need to be a part of a flood control alternative and not a stand-alone alternative.

There are a number of specific ways to increase the net capacity of the channel: raising channel walls, widening the channel, converting the channel from trapezoidal to rectangular, deepening the channel, changing the channel slope, and removing obstructions from the channel area. All of these techniques share the basic purpose of increasing flow in the channel by changing cross-section and/or slope. This group of alternatives was carefully explored during initial screening to determine which approaches would be best to pursue in detailed studies.

Raise Channel Walls. There are several ways to raise channel walls. First, the entire levee embankment can be raised. To accomplish this, the paved crest of the levee is removed and additional fill is placed on the crest and the levee back slope to raise the embankment to the desired height and widen the levee for stability. The crest pavement is then replaced. In many locations, raising the levee requires bridges to be raised because the low point of the bridge structure is the top of the existing levee. The disadvantages of raising levee walls are cost, encroachment onto limited rights-of-way,

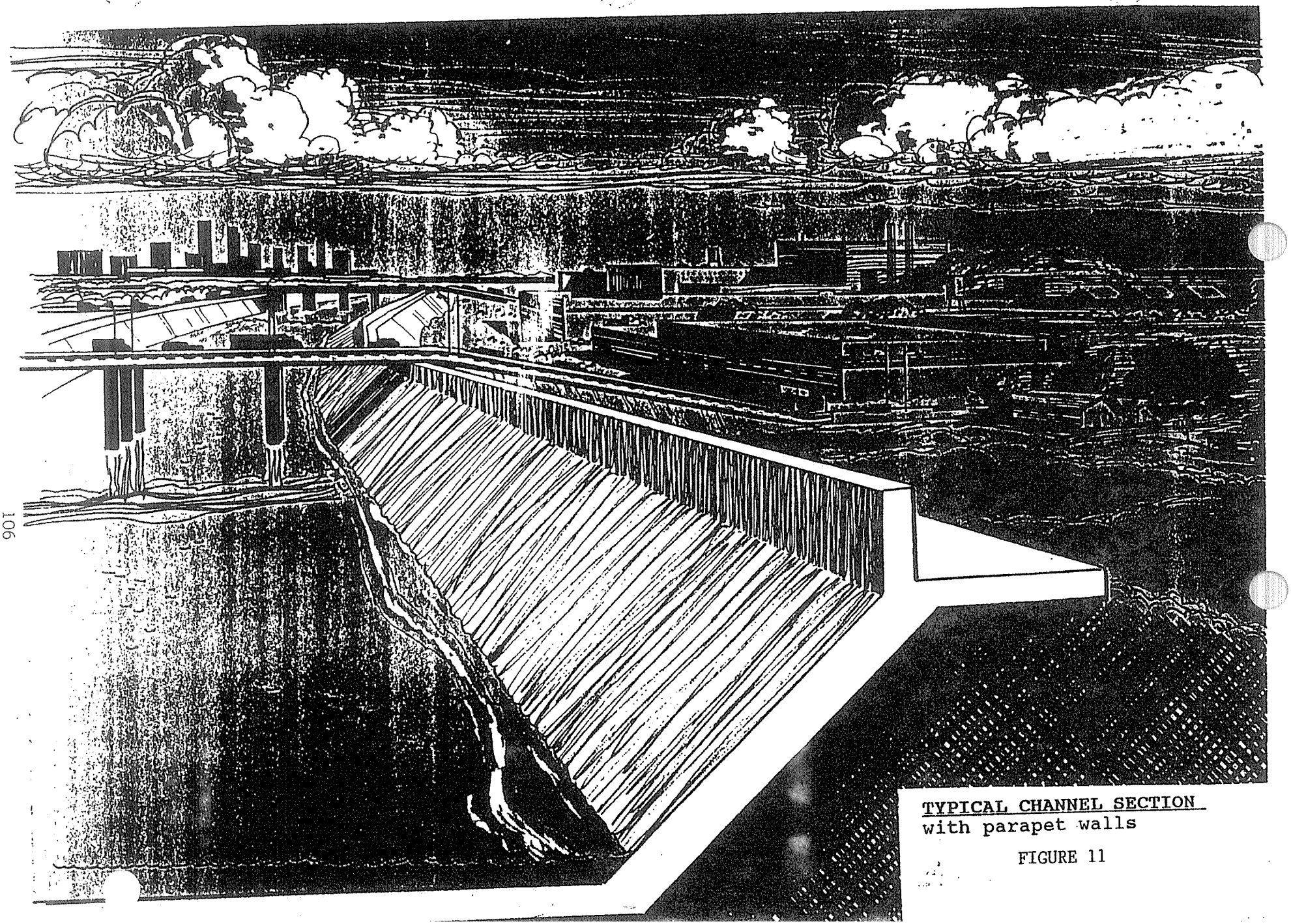
and change abutment and pier structures because the levee crest is shifted away from the center of the channel.

A second approach is to construct parapet walls along the inner (channel side) edge of the existing levee crest. To accomplish this, the paving at the edge of the channel is removed, and a reinforced concrete foundation and wall is poured (Figure 11). This option also requires many bridges to be raised but, for the most part, does not require as many alterations in bridge abutment and pier alignments. Therefore, parapet walls are a less costly approach to raising channel walls.

Raising channel walls was evaluated for Reaches 1-5 (Los Angeles River-Rio Hondo system). In initial planning two levels of protection were evaluated to give a preliminary indication of the feasibility of this alternative: 100-year and 200-year protection. In all reaches where the river is an entrenched channel and overflows are confined to relatively narrow corridors adjacent to the existing channel right-of-way (Reaches 1-3), raising channel walls was found to have costs far exceeding benefits. For these reaches, the best preliminary benefit-to-cost ratio estimated was 0.6 for 200-year protection for Reach 1, Tujunga Wash from Hansen Dam to the Los Angeles River. For other reaches, benefit-to-cost ratios ranged from 0.1 to 0.5.

In the lower reaches of the river where levee armoring for protection of the exposed back side of the levee was an added design element, the initial economic analysis indicated that raising channel walls would have significant net NED benefits. Preliminary benefit-to-cost ratios for Reaches 4, 5, and 9 ranged from 3.1 for 100-year protection up to 4.1 for 200-year protection. For these lower project reaches, then, raising channel walls appeared to be a promising alternative; this alternative was carried forward for further consideration.

Widen Channel. Another possible approach to modifying the channel cross-section is to widen the channel while retaining the trapezoidal cross section of the channel. Channels may be widened in a number of ways. The most direct method is to remove existing walls, excavate, and reconstruct the channel. Another method is to construct a high flow system of side channels which run parallel to the mainstem channel and take flow only



TYPICAL CHANNEL SECTION
with parapet walls

FIGURE 11

Conversion of trapezoidal channel to rectangular channel may, in some areas, permit channel capacity to be increased without affecting the bridges which span the river. This can be accomplished only if the conversion does not interfere with existing bridge piers and the abutment is set back from the edge of the channel. Some bridge abutments may be impacted by this alternative requiring reconstruction of the abutment.

An initial design and economic analysis indicated that the cost of constructing a rectangular channel would greatly exceed benefits except in the lower reaches of the Los Angeles River and along the Rio Hondo, where the project would include armoring of levee back slopes. In Reaches 4, 5, and 9 this conversion would be marginally justified with preliminary benefit-to-cost ratios of from 1.0 to 1.1. These benefit-to-cost ratios were substantially lower than those for lower-cost alternatives such as raising channel walls. This alternative would involve disposal of large amounts of concrete and excavated material taken from the old channel. Handling this material would be costly, and, given the limited availability of landfill sites in the Los Angeles basin, disposal might add significant cost if permits could not be obtained to use the nearest landfill sites. Nevertheless, the marginal justification of this approach in the lower reaches of the LACDA system resulted in a decision to carry channel conversion with armoring forward for further study.

Deepen Channels. In areas with adequate slope, it is often possible to deepen channels to increase the cross-section of the channel and therefore the channel capacity. Deepening, however, often has very high costs for several reasons. First, the existing channel slope must not vary too much or in such a way as to make this alternative impractical. Second, many existing utility lines run immediately beneath the channel invert and deepening thus requires extensive utility replacement. Third, deepening may require reconstruction of bridge piers and foundation works. Fourth, excavation and disposal of significant quantities of material is costly. For these reasons, deepening in most reaches of the LACDA system was not feasible. Deepening remained a consideration in Reach 4, the lower Los Angeles River.

In Reach 4, deepening of the downstream portion of the channel (Willow Street) to the Pacific Ocean) would not involve the high cost of removing concrete invert as the

channel is soft bottomed in this reach and protected by rip-rap. In addition, only seven bridges cross the channel in this reach. Thus construction costs were estimated to be in the $25,000,000 range for deepening this reach. Deepening this section would have uncertain impact on peak flows because the lower reaches of the channel have very little slope and seawater would move into the excavated channel area. Although the interaction of seawater with flood flows is not well understood hydraulically, additional net channel capacity would be expected from channel deepening. This alternative thus remained a viable option for further study, primarily in combination with other solution techniques.

Increase Channel Slope. Increasing flow velocity in the channel by increasing the channel slope has the effect of increasing total channel capacity. To effectively accomplish this, it must be possible to increase flow velocity throughout the entire reach from the initial point of channel slope modification to the ocean. If this cannot be done, it will be necessary to increase velocity through a developed reach where overflows would cause damages, and then make a compensating decrease in flow velocity in areas with greater channel capacity or increase the channel capacity to accommodate the higher water surface elevation. The uniform channel slope in the lower river (where most damages occur), makes this alternative infeasible. Increasing slope in an upper reach would merely increase problems in a lower reach. As a result, changing the slope of the channel was not given detailed consideration.

Armor Back Side of Levees. Under existing conditions, when flood waters in the leveed channel sections exceed the available channel capacity, water flows over the top of the levee and quickly erodes the unprotected, earthen levee back side. Levee failure leaves only the entrenched capacity of the channel to carry runoff to the ocean. The entrenched channel capacity is as much as 100,000 cfs less than the leveed channel capacity, causing the excess flow to pour into the flood plain. Armoring the back side of the existing levees was analyzed as an alternative that would protect against this catastrophic scenario.

Overflow areas were determined under the assumption that no levee failures occurred during events greater than channel capacity. Because armoring alone does not

increase the level of protection offered by leveed channel sections, reaches with inadequate channel capacity still experienced levee overtopping for significant periods of time during the 100-year event. The overtopping problem is exacerbated by the fact that many bridges go to pressure flow which severely curtails their hydraulic capacity and creates an elevated backwater that pushes high volumes of flood waters out onto the flood plain. As a result, the areal extent of flood plain inundation due to overtopping was similar to the overflow area occurring with levee failure, although inundation depths were reduced.

The benefit resulting from a reduced flood depth was analysed as a stand alone alternative. The preliminary cost of armoring just the lower Los Angeles River was $24 million and resulted in a significant net benefit. Unfortunately, the Rio Hondo's level of protection is unimproved and the 25-year event still generates damages throughout the basin.

Armoring the Rio Hondo below Whittier Narrows Dam and the lower Los Angeles River would cost approximately $40 million and result in a benefit-cost ratio of greater than 6-to-1, although the net benefits are only moderate when compared to other alternatives. The greatest drawback to this approach, aside from it's failure to improve the existing flood frequency protection, is the fact that damages are significantly worse in the 50-year event. This results from the conveyance of all the flows that would have broken out of the Rio Hondo into the lower Los Angeles River. There the flows overtop the levees in numerous places, rather than only one location under the lower Los Angeles River armoring alternative. The flood plain damage locations shift downstream and are more severe than the lower Los Angeles River levee armoring alternative where breakouts and flooding are more evenly distributed on the system and less catastrophic in nature.

Levee armoring as a stand alone solution was not pursued as a comprehensive alternative because a) it shifted damages within the flood plain, b) it did not increase protection levels, c) it did not provide the greatest net benefits among the array of alternatives, and d) there were significant residual damages remaining in the basin.

Instead, levee armoring was analysed as a design element in all channel modification alternatives.

Reduce Channel Roughness. Some sections of the mainstem system have soft-bottom or cobblestone inverts and/or grouted stone channel walls. Use of these construction materials results in a high channel roughness coefficient and in turn reduces the channel's conveyance capacity. Providing a smoother overlay in these locations was investigated.

Constructing a concrete channel to replace the soft-bottom section of the San Gabriel River below Whittier Narrows Dam was disscussed previously, under Pipelines/Diversions. In the cobblestone Glendale section of the Los Angeles River, the existing vegetation is expected to either lay down as a smooth mat or be removed through scour during high flows. In either case, the channel capacity is not significantly reduced. Utilizing a concrete channel would be difficult due to the local high groundwater and the resulting environmental impacts. Trapezoidal, grouted stone channel reaches along the Rio Hondo and lower Los Angeles River could receive a concrete overlay to reduce the channel roughness. While this did not provide large increases in channel capacity, it was considered an effective element when used in combination with other channel modification techniques.

Modify Bridges

Bridges have an adverse impact on channel flows due to the backwater effect of piers and are a significant flood control problem when their abutments and/or piers constrict flow in the channel, when the lower deck of the bridge encroaches on the channel, or when piers catch debris and create a channel blockage. As a result, flood breakouts frequently occur in areas just upstream from bridge constriction points.

Eliminating all obstructions by completely reconstructing bridges so that there is a clear, high span with no piers extending from the channel is the best way to remove flow

restrictions caused by bridges. This extremely costly alternative was not able to achieve an adequate level of protection in the mainstem channels. Upgrading of all bridges to clear span design as an overall flood control solution was eliminated from further consideration.

Less costly bridge modifications, such as raising spans and modifying bridge piers, were determined to be effective primarily in combination with other structural alternatives and were therefore carried forward as elements of other alternatives rather than as stand-alone approaches to flood damage reduction.

Strategy Two (B) Summary: Increase Existing Channel Efficiency

The cost and limited benefits of structural alterations to channels in the upper Los Angeles River system eliminated alternatives for these reaches. The existing adequate level of protection for the San Gabriel River and the very high cost and impacts associated with raising that level of protection eliminated structural alterations to the channel on this river system. Channel modifications, in particular raising channel walls and modifying the channel cross-section by either widening the channel or converting it to rectangular cross-section were found to have potentially large net benefits, either alone or in combination. Damage reduction measures that are limited in scope, but viable when combined with more comprehensive solutions include, deepening the Los Angeles River near its mouth, modifying bridges to improve conveyance, armoring levees to avoid catastrophic failure and providing grouted stone channel reaches with a concrete overlay.

Strategy Three: Damage Management

Non-structural or less centralized construction approaches are not generally effective in heavily developed urban areas with a large flood damage potential. They were given an evaluation, however, to determine if they could be useful components in an overall plan. The conclusions of this evaluation are listed below.

Relocation

Relocating structures threatened by flooding was considered in Reaches 1, 2, and 3 where the area flooded would be limited and relocations would be minimal. No relocation plan, however, had a benefit-to-cost ratio of greater than 0.04 (Tujunga Wash). This is due to the high cost of relocation, the value of the property in these areas, and the limited damages incurred. In downstream areas, relocation would be even less cost effective due to the very large area flooded.

Floodproofing

Floodproofing measures, such as raising structures above the flood plain, ring levees, and floodwalls, are too costly when applied to thousands of structures ranging from residences to major industrial plants to refineries. In addition, floodproofing is ineffective in areas such as the lower Los Angeles River basin where flood depths could exceed 10 feet and where flood flows from a failed levee would be extremely destructive in the vicinity of the levee break.

Floodfighting

To be effective, floodfighting efforts must be directed at preventing damage. Damage prevention requires adequate flood warning to permit evacuation and action to prevent major failure of the system. Given the short period of time - on the order of six hours - needed to reach peak flow and the many potential breakout points along the lower reaches of the LACDA system, it is not likely that breakout could be forecast precisely or that mobilization could occur rapidly enough to prevent overtopping of the levee system. In addition, flow over the levees in some locations could be several feet deep over a relatively long reach; a massive emergency response would be needed to respond to this magnitude of problem. Finally, there would be no assurance that floodfighting efforts would succeed.

Flood Plain Management/Insurance

There is significant damage potential within the existing flood plain. Continued efforts to avoid placing additional people and structures at risk will only marginally affect the current threat. The lower basin communities in the 100-year overflow area (except Downey and Bell Gardens) participate in a flood plain management program as part of the National Flood Insurance Program. While insurance coverage and risk assessment are appropriate endeavors in the flood plain, the magnitude of the flooding problem in the lower basin makes it imprudent to accept the potential flood threat. Prevention of damages is needed to ensure that major industrial areas are not severely damaged; the overall impact of flooding in the lower basin is too great for the entire region. Compensation for flood damages would also probably exceed several billion dollars following a major flood. This level of relief for damage which could be prevented at a much lower cost is unjustified.

Conclusions of Preliminary Screening

The primary conclusion of preliminary screening was that economically justified, effective flood damage reduction is limited to the Rio Hondo below Whittier Narrows Dam and the lower reaches of Los Angeles River. Measures in the upper basin either have an insignificant impact on the flooding problem downstream (caused by local runoff) or do not have adequate benefits within the upstream reaches to justify implementation. This is due to the nature of the problem on the LACDA system: rapid and massive local runoff swells the river at the point where it becomes a leveed system which can fail when overtopped. Also, it is not possible to constrain most structural approaches to a limited segment of the river channel where protection levels are low. Widening, deepening, and converting the channel from trapezoidal to rectangular all require increased conveyance capacity through the remaining downstream reaches. This raises the costs of an upstream alternative significantly. Because levee failure would

inundate large areas to depths that could exceed 10 feet, damages are severe in the lower basin, and therefore justify structural measures.

Problems are not as serious on other reaches such as the Los Angeles River above the downtown area, where levels of protection range from 70-year to over 100-year. In these areas, damages would occur less frequently and would result in relatively minor residual damages such that extensive structural work is not justified. Nor is it justified to transfer damages from the Rio Hondo-Los Angeles River system to the San Gabriel River system, both from a policy view and from an economic view.

Innovative measures such as diversion tunnels, off-channel storage, and pumping to another watershed (Antelope Valley) or channel (Ballona Creek) would have the desired effect of reducing flows in the critical reaches of the channel, but costs would be prohibitive and would far outweigh projected flood damage reduction benefits. Other innovative approaches such as non-structural measures and watershed management were found to have negligible benefits at relatively high costs.

The result of initial screening was to focus the detailed alternative analysis on Reaches 4 and 5, and on three methods of modifying the mainstem channel: widening, converting trapezoidal channel to rectangular channel, and raising levee walls with parapet walls. Selective levee back slope armoring was included as a design element of each of these alternatives along with bridge modifications and concrete overlays for grouted stone sections. Deepening the channel bottom on the Los Angeles River near the ocean might also have a role in a comprehensive solution.

G. ALTERNATIVES CONSIDERED FURTHER

On the basis of preliminary screening and economic evaluation, improvements were found to be justified only for Reaches 4 and 5. The improvements given detailed study took the form of three different alternatives. All involved altering the flow characteristics of the lower Los Angeles River, which would in turn affect the water

surface elevation along Compton Creek. Reach 9 was thus included in the detailed analysis of alternatives, with improvements in this reach generally limited to those that would be needed to compensate for impacts from the improvements on the mainstem system. All three alternatives carried forward for detailed consideration had two common elements:

1) Selected levee armoring in reaches where flows in excess of channel capacity were likely to break out of the channel.

2) Improvements to Compton Creek to compensate for potential impacts to this reach.

Each alternative was initially formulated at defined levels of protection, rather than optimized on a plan-by-plan basis to permit comparison on an equal basis. Given equal and already-defined levels of protection, it would be possible to evaluate plans almost entirely on the basis of cost. Environmental considerations would have a minimum impact on the cost or benefits from any project because all alternatives were confined to the existing channel rights-of-way or a thin strip of land immediately adjacent to the channel. Most of this land is already highly disturbed.

In addition, all alternatives would involve disruption of traffic and some utility relocations and service interruptions. Problems associated with issues such as disposal of materials excavated from the channel would be reflected in estimated project cost as well. None of the alternatives was thought to have a significant acceptability advantage compared to the other plans.

Given this approach, the least-cost alternative for a given level of protection would generally be the preferred alternative. This alternative could then be optimized to find the level of protection offering the greatest net NED benefits.

The alternatives evaluated (see Figure 12) in this final stage of plan development were:

1) Raising channel walls to provide 100/200-year protection.

2) Converting trapezoidal channel to rectangular channel in Reaches 4 and 5 to
3) Widening Reaches 4 and 5 to provide 100/200-year protection.provide 100/200-year protection.

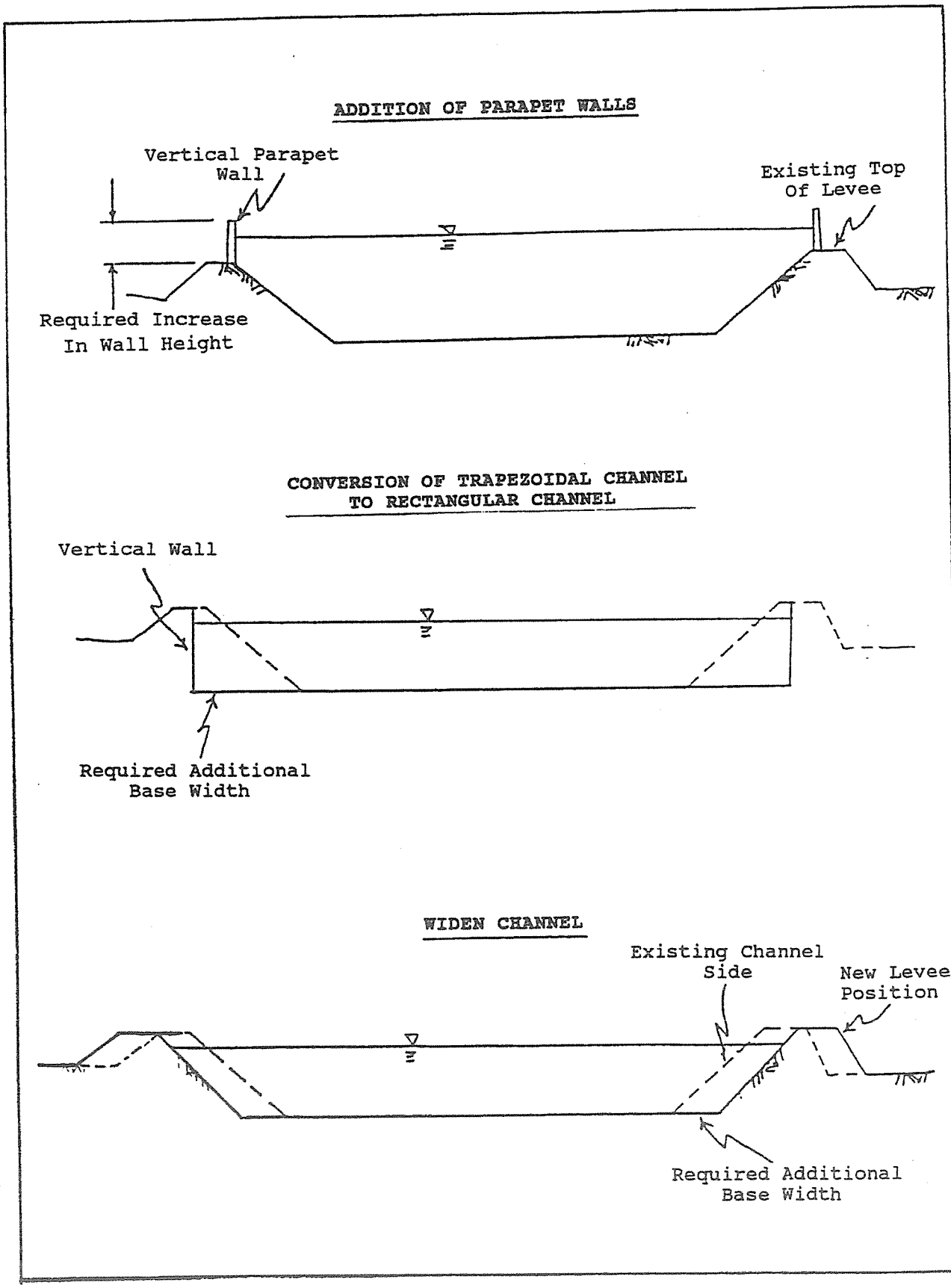


FIGURE 12 INCREASED CHANNEL CAPACITY ALTERNATIVES EVALUATED

H. EVALUATION OF ALTERNATIVES CONSIDERED IN DETAIL

ALTERNATIVE ONE: Raising Channel Walls in Reaches 4 and 5 100-year and 200-year Levels of Protection.

Placement of parapet walls along the crest of the existing channels (Figure 11) would effectively create a composite channel cross-section without requiring extensive demolition, excavation, and channel replacement. In most areas, walls would be raised only two to five feet to provide the desired level of protection. Raising the walls, however, means that all bridges currently built from the top of the existing levee or not providing adequate space to raise the channel height would need to be raised or otherwise modified. The considerable bridge-raising effort required for these alternatives is displayed in Tables 13 and 14 for the lower Los Angeles River and Rio Hondo, respectively. The economic question to be addressed, then, is whether cost savings for channel modification outweigh potential higher costs for bridge modifications.

As a part of this alternative, channel back slopes would be armored upstream of bridges and at the same potential breakout points in the Rio Hondo and lower Los Angeles River reach as provided for under other alternatives.

For these alternatives, an initial assumption was made that all bridges could be raised to any required level, including the freeway bridges (Santa Ana, Artesia, and San Diego Freeways). This assumption made it possible to evaluate levels of protection on the basis of cost alone.

TABLE 13 Preliminary estimates of affected bridges resulting from increased wall heights

Reach 4, Lower Los Angeles River

NO.	BRIDGE	100-YR ADD'L WALL HT	100-YR RAISE BRIDGE	200-YR ADD'L WALL HT	200-YR RAISE BRIDGE
1	IMPERIAL HWY	0.0	0.0	0.0	0.0
2	SPRR	4.2	5.8	6.0	7.6
3	STANDARD OIL UTIL	1.9	1.0	3.6	2.7
4	ROSECRANS	2.1	2.1	3.9	3.9
5	COMPTON	2.4	2.4	4.7	4.7
6	ALONDRA	2.3	0.3	4.0	2.0
7	ATLANTIC	2.4	2.4	4.6	4.6
8	ARTESIA FWY RAMP 1	4.2	0.0	6.0	0.0
9	ARTESIA FWY RAMP 2	4.0	2.0	5.8	3.8
10	ARTESIA FWY RAMP 3	4.0	0.0	5.8	0.0
11	ARTESIA FWY	3.5	0.0	5.3	0.0
12	ARTESIA FWY RAMP 4	3.4	0.0	5.2	1.4
13	ARTESIA FWY RAMP 5	3.2	1.2	5.0	3.0
14	ARTESIA BLVD	3.8	0.0	6.0	1.5
15	LONG BEACH	4.0	4.0	6.2	6.2
16	DEL AMO	3.3	2.3	5.6	4.6
17	UPRR	0.9	0.9	2.8	2.8
18	LA-LB LIGHT RAIL	2.7	1.7	4.9	3.9
19	SAN DIEGO FWY RAMP	1.8	0.0	3.7	0.0
20	SAN DIEGO FWY	2.1	0.0	4.0	0.7
21	SAN DIEGO FWY RAMP	2.1	0.0	4.0	0.0
22	UNION OIL UTIL	2.7	0.0	5.1	2.1
23	WARDLOW	3.2	0.0	5.5	0.0
24	TEXAS OIL UTIL	2.9	1.9	5.2	4.2
25	WILLOW	2.5	2.5	4.8	4.8
26	RICHFIELD OIL UTIL	2.7	2.7	4.5	4.5
27	PCH	2.8	1.3	5.2	3.7
28	ANAHEIM	3.0	0.0	5.4	1.4
29	7TH STREET	2.9	0.0	5.2	0.0
30	EDISON UTIL	2.9	1.2	5.2	3.5
31	PERR	2.8	2.3	5.1	4.6
32	OCEAN BLVD	1.1	0.0	2.7	0.0
TOTAL NUMBER OF BRIDGES TO BE RAISED:			17 *		23

* ASSUMES ALONDRA IS NOT RAISED 0.3 FT.

TABLE 14 Preliminary estimates of affected bridges resulting from increased wall heights

Reach 5, Rio Hondo

NO.	BRIDGE	100-YR ADD'L WALL HT	100-YR RAISE BRIDGE	200-YR ADD'L WALL HT	200-YR RAISE BRIDGE
1	BEVERLY	1.9	0.0	1.9	0.0
2	WHITTIER	0.0	0.0	0.0	0.0
3	U.P.R.R.	1.1	8.1	1.1	8.1
4	WASHINGTON	0.0	0.0	0.0	0.0
5	A.T. & S.F. RY	0.0	0.0	0.0	0.0
6	SLAUSON	1.5	1.5	1.7	1.7
7	P.E. RY	0.6	0.6	0.8	0.8
8	TELEGRAPH	1.4	0.0	1.6	0.0
9	SANTA ANA FWY	2.1	0.0	2.3	0.0
10	SUVA	1.4	1.4	1.5	1.5
11	FLORENCE	1.2	0.2	1.3	0.3
12	S.P.R.R.	2.5	2.5	2.8	2.8
13	FIRESTONE	3.2	3.2	3.5	3.5
14	STEWART & GRAY	3.7	0.3	4.0	0.6
15	GARFIELD	0.7	0.0	1.0	0.0
16	U.P.R.R.	1.6	4.0	2.0	4.4
TOTAL NUMBER OF BRIDGES TO BE RAISED:			7 *		8 *

* ASSUMES THE FOLLOWING:
- FLORENCE IS NOT RAISED 0.2 OR 0.3 FT
- STEWART & GRAY IS NOT RAISED 0.3 FT

A total of 23.6 miles of channel would be included in this alternative; not all reaches would require increased wall height, and walls would taper to the existing levee surface in some reaches. The initial estimates of wall height to provide 100-year and 200-year levels of protection indicated that 200-year protection on the Rio Hondo would require walls less than 0.5 foot higher than for the 100-year level of protection. This is because releases from Whittier Narrows Dam are at the maximum during the 100-year event and do not increase for the 200-year event. On the lower Los Angeles River, the higher level of protection would require parapet walls from 2 to 4 feet higher than for the 100-year level of protection. Average wall heights for the reach would be from 2 to 5 feet, with the maximum height being approximately 8 feet. Parapet walls would have to be extended 900 feet up Compton Creek from its confluence with the Los Angeles River to accommodate the increased water surface elevation in the Los Angeles River.

The parapet walls would be one-foot-thick reinforced concrete. They would be placed at the inner margin of the existing access road/bicycle trail and joined to the edge of the existing channel side slope to form a continuous channel wall. The footing of the parapet wall would extend across the top of the levee and would be keyed into the top of the levee to resist sliding forces. The top surface of this footing would also serve as bike trail and maintenance access road.

Environmental Considerations

The actual parapet wall construction would have fewer construction impacts to the local area compared to the other alternatives, and there would be no significant disposal of materials from demolition and/or excavation. Traffic impacts would be approximately equal to or slightly greater than those of other alternatives. The parapet walls would not alter the existing soft-bottomed reaches of the lower river, and therefore would have minimal adverse impact in these areas. There would be a temporary increase in noise and dust during construction.

It is probable that there would be some recreation and aesthetic impacts. The walls would raise levee heights by up to 8 feet; for those residing along the river channel, this

would further block views. In some areas, the walls would add to an existing 15-foot high obstruction. Where local residents have constructed fences or planted shrubs and trees to obscure the view of the channel, the parapet wall would constitute a new intrusion. Aesthetic treatments to mitigate for this impact are limited. Additional plantings on the levee are hard to implement because they leave the levee susceptible to root damage and make detection of levee seepage difficult. Aesthetic treatment of the wall itself would be limited to texturing and painting. It is likely that in many places the wall would become a target for graffiti. The walls could also lower the aesthetics of the channel for recreation purposes. In areas where the walls are high, there would be no view across the channel. Aesthetic impacts would be greatest for the 200-year level of protection. These aesthetic impacts are unavoidable consequences of this approach to increasing channel capacity. Aesthetic treatment plans would have to be developed in coordination with local communities.

Net Benefits

Based on preliminary designs, raising walls (plus armoring at selected sites) was found to be justified for the lower basin reaches, with benefit-to-cost ratios of from 3.1 (200-year) to 4.1 (100-year). On Reach 4 alone the benefit-to-cost ratios are 2.7 (200-year) to 4.0 (100-year). The greatest preliminary net annual benefits were for the sum of reaches 4, 5, and 9 with 100-year protection levels ($39,132,000). Estimated annual net benefits for this alternative were:

Reach 4:	100-year	= $24,810,000;
	200-year	= $23,250,000
Reaches 4, 5, and 9:	100-year	= $39,132,000;
	200-year	= $37,532,000

ALTERNATIVE TWO: Widening the Channel in Reaches 4 and 5 100-year and 200-year Levels of Protection.

This alternative is evaluated at two levels of protection, but there are relatively minor differences, so they may be described and evaluated together. The general technique involves removal of the existing leveed channel, setback of the existing levee, and reconstruction of the concrete trapezoidal channel. This also requires lengthening or raising numerous bridges and modification and realignment of bridge abutments and approach grades.

On the Rio Hondo, the 100-year channel design required up to an additional 56 feet in width; the 200-year, an additional 60 feet. The lower Los Angeles River 100-year channel design necessitates an additional 177 feet in the vicinity of the Century Freeway, the location needing the most widening. For the 200-year channel, an additional 237 feet in width is needed, and a longer stretch of channel is impacted. The wider 200-year-capacity channel also requires wider bridge spans and abutment modifications resulting in an increase in costs.

Two widening options were initially considered: widening along both sides of the channel and widening on one side only. Widening on one side was selected for detailed analysis because of the obvious cost advantages involved in having to remove only one channel wall. First, demolition costs would be reduced by one half. Second, the cost of channel wall replacement would be reduced by approximately 40 percent in most reaches due to a reduction in both quantities of materials and on-site preparation. In addition, the levee road on one side of the channel would remain intact and would thus not require replacement. Widening could affect bridge span length and approach slope and reconstruction of abutments would be necessary in some locations. Finally, many utility lines run parallel to the channel alignment and one-sided widening would reduce the number of utility line relocations, resulting in significant cost savings.

As a part of this alternative, channel back slopes would be armored upstream of bridges and at other potential breakout points in the Rio Hondo and lower Los Angeles River reach. Also, reaches that currently have grouted stone sidewalls would be overlaid with concrete to improve the hydraulic efficiency.

Environmental Considerations

There would be no significant long-term environmental, socio-economic, or cultural resource impacts as a result of the channel widening above station 157+83 (Willow Street). All channel reaches involved are currently concrete or lined with grouted stone except for the lower reaches of the Los Angeles River. In the lower river area, the channel would be widened, but the soft-bottomed, rip-rap channel would not otherwise be altered. There would be a temporary impact to the environment in this reach. There would be some short-term loss of soft-bottomed habitat in the lower channel during construction, but the biological communities of this reach could be expected to be restored in a relatively short time following construction. This alternative would not affect significant cultural resources, nor would there be long-term socio-economic impacts of an adverse nature. There would be temporary increases in noise and dust, and significant traffic delays, during construction. Recreational use of the bike trail would be disrupted for short periods.

Net Benefits

Based on preliminary designs, channel widening was found to be justified on Reach 4 alone and on Reaches 4, 5 and 9 in combination. The benefit-to-cost ratio on Reach 4 ranges from 2.2 (100-year) to 1.7 (200-year). The more comprehensive solution has benefit-to-cost ratios of 2.3 (100-year) and 2.0 (200-year).

Estimated annual net benefits for this alternative were:

Reach 4:	100-year = $18,299,000; 200-year = $15,442,000
Reaches 4, 5 & 9:	100-year = $29,319,000; 200-year = $28,010,000

ALTERNATIVE THREE: Conversion of Trapezoidal Channel to Rectangular Channel for Reaches 4 and 5 100-year and 200-year Levels of Protection.

The conversion alternative involves removal of the existing channel wall lining, excavation, and reconstruction of trapezoidal channel as concrete rectangular channel. This design has a greater cross-sectional area for a given top width than the trapezoidal channel. The design of the channel is similar for both levels of protection evaluated.

In some reaches, it was not necessary to convert the channel to a full rectangular cross-section to achieve the desired flood control; this was particularly true for the 100-year protection option. In these cases, a composite channel geometry was developed. A composite channel involves removal of the lower portion of the trapezoidal side slope and replacement of that section with a vertical wall section. The upper portion of the channel wall would remain trapezoidal, angling out from the top of the vertical section. Proposed channel characteristics for the 100-year and 200-year protection levels vary widely. On the Rio Hondo, the invert width of the trapezoidal channel is increased from the existing 100 feet to as much as 200 feet (fully rectangular cross-section) for both levels of protection. The lower Los Angeles River requires a rectangular cross-section as much as 200 feet wider for the 200-year design than the existing top width of the channel. The need for widening is greater on Reach 4, and in the 200-year as opposed to the 100-year design, but channel widening is necessary in numerous sections for both levels of protection.

As a result, this plan is essentially a channel widening alternative using a slightly different technique in construction. The additional channel widths needed in this alternative are not so great as those needed with the channel widening alternative, but significantly more earth would need to be excavated and removed. Also, in areas where a composite geometry is possible, breaking the concrete channel to construct the rectangular section would generally damage the remaining channel lining, and it would need to be completely replaced. Impacts to bridges are site specific, but an overall widening will necessitate bridge modifications and utility relocations.

As a part of this alternative, channel back slopes would be armored upstream of bridges and at other potential breakout points in the Rio Hondo and lower Los Angeles River reach.

Environmental Considerations

The conversion plans and channel widening plans have roughly equivalent impacts, except that there would be slightly less right-of-way required and thus a reduced need to impact additional lands along the channel alignment. Although there would be construction period noise, dust, air quality, and traffic impacts, there would be no long-term impacts from construction activities.

Net Benefits

Based on preliminary designs, conversion was found to be marginally justified with benefit-to-cost ratios ranging from 1.0 to 1.1. A detailed analysis of bridge and additional right-of-way costs is not included in these estimates; so more detailed net benefits may be expected to decreased somewhat.

Estimated annual net benefits for this alternative were:

Reach 4: 100-year = $1,469,000;
200-year = $ 455,000

Reach 5: 100-year = $4,895,000;
200-year = $3,467,000

ALTERNATIVE FOUR: NED PLAN

DETAILS OF THE PLAN IN SECTION 4, PAGE 140

I. COMPARISON OF DETAILED PLANS

Evaluation Criteria

The comparison between adding parapet walls, channel widening, and conversion to rectangular cross-section was focused on economic considerations because of the very limited environmental, socio-economic, cultural resource, and aesthetic/recreational resource considerations.

Environmental, Social, Cultural Resource, Recreation, and Aesthetic Impacts

The primary differences in the plans from these perspectives are summarized below:

1) Environmental. The marine-estuarine resources of the lower Los Angeles River would be impacted by Alternatives 2 and 3 which involve construction activities in the soft-bottomed channel. Raising channel walls and armoring the levee back slopes would not have these impacts. These differences are considered relatively minor because of the degraded nature of the habitat in the channel and the relatively short reach of vegetative growth along the margin of the channel.

2) Socio-economic. There are virtually no differences in the socio-economic impacts of the alternatives as all are effectively confined to the existing rights-of-way for the channel (with only minor increases in rights-of-way required at some locations). All alternatives will affect traffic during construction to some degree.

3) Cultural resources. There are virtually no cultural resources affected by any alternative except for some impacts due to a few bridge modifications. In Reach 5, it would be necessary to move the historical marker for the Battle of San Gabriel near Washington Blvd, an action with minor and only temporary effects.

4) Recreation/aesthetics. There are some differences among alternatives in terms of their impact on recreation use of the channel rights-of-way. Significant channel widening would reduce the rights-of-way available for recreational trails and open space. Conversion of the channel to rectangular concrete channel might pose a safety hazard, and additional fencing could be necessary. Parapet walls would, in some reaches, completely block the view of the channel; in other areas they would have only limited aesthetic impacts for those using the channel trails.

None of these differences was considered significant enough to affect plan formulation, although potential mitigation for environmental impacts in lower Reach 4 would add somewhat to the costs of the widening and conversion alternatives.

Comparison of Alternatives: Economics

Based on analysis of the net benefits from 100-year and 200-year levels of protection, the alternative of raising channel walls has the highest net benefits and the lowest cost of the alternatives evaluated. It is clearly the most efficient method of correcting the flooding problem, as seen on Table 15. These preliminary costs did not involve detailed analysis of bridge costs or right-of-way, but compared to the other alternatives carried forward, raising walls stands out as the alternative of choice.

Table 15

Net benefits comparison,

first iteration, for Reaches 4, 5, and 9. ($1000)

Alternative	Average Annual Benefits	Annual Cost	Net Benefits	B/C Ratio
Parapet Walls				
100-year	51,800	12,668	39,132	4.09
200-year	55,600	18,068	37,532	3.08
Widening				
100-year	51,800	22,481	29,319	2.30
200-year	55,600	27,590	28,010	2.02
Conversion				
100-year	51,800	46,905	4,895	1.10
200-year	55,600	52,133	3,467	1.07

Analysis of Alternative Combinations

Although parapet walls appeared to be the obvious choice as an overall solution, an effort was made to examine logical combinations of parapet walls with channel widening and conversion in certain reach segments to determine if an optimum combination could be identified. This was done because each of the many bridges in the project reach presents a unique set of design constraints, and in some locations bridge reconstruction costs might exceed the cost of channel widening, for instance, within the existing bridge. Furthermore, practical design considerations may not allow every bridge to be raised as high as initially formulated.

To develop optimizations, the following factors must be considered:

1) The availability and affordability of needed rights-of-way;
2) The available room between the levee top and bridge soffet, as well as additional room between bridge abutments;
3) The transportation impacts of raising or reconstructing bridges;
4) The cost and extent of channel improvements needed to avoid bridge modifications.

An alternative that optimized these considerations was developed. Reconstruction of bridges that required very expensive modifications was avoided by widening the channel instead. Because long transitions are necessary to effect a change in channel width, other bridges nearby were also spared extensive modifications.

At the time this plan was being designed, detailed cost estimates for specific bridge modifications were only partially defined, and total costs contained approximately 50 percent contingencies. As a result, it was not possible to confidently select channel widening in specific reaches as less expensive than bridge raising and parapet walls. Because raising channel heights with parapet walls incurs significantly less expense than any other construction technique on the channel itself, it made sense as the greatest net benefit alternative. A widely varying combination plan (channel widening in some locations and raised channel walls in others) could not be confidently supported as having a greater economic efficiency. Therefore, the parapet wall/bridge modification alternative for the Rio Hondo and lower Los Angeles River would remain as the framework for the recommended plan. Value engineering in the Preconstruction Engineering and Design Phase may indicate where minor improvements can be made in the plan.

Designation of the NED Plan

Because it provides the maximum net benefits, raising the channel height using parapet walls and modifying the necessary bridges is the NED alternative. An additional element of this alternative is levee armoring that prevents catastrophic levee failure during larger than design events to be implemented in selected locations. This

alternative covers the Rio Hondo from Whittier Narrows to the Los Angeles River, the Los Angeles River from the Rio Hondo confluence down to the ocean, and a portion of Compton Creek. In specific locations, should this solution be difficult to implement, alternatives will be evaluated during the Preconstruction Engineering and Design Phase.

This plan does not have major right-of-way requirements or environmental mitigation problems. It avoids significant construction modification of the existing channel while providing increased protection from flooding.

There are few aspects of this plan that lend themselves to other project purposes. No additional facilities are directly available for water conservation or increased recreation. Any impacts to existing recreation will be reversed so that all existing recreation elements remain intact. No opportunities for transportation or sediment management improvements are incorporated in this NED plan.

Optimization of the Level of Protection

Having selected the format of the NED plan, it then became necessary to optimize the level of flood control protection the plan would provide in order to maximize net NED benefits. The 100-year net benefits were initially only 4 percent greater than the 200-year net benefits. Because there was no knowledge of the characteristics of the net benefits curve between these two levels of protection, additional levels were analyzed.

This optimization analysis was performed only for Reach 4. The level of protection provided by Reach 5, the Rio Hondo, was not optimized independently. There were no anticipated breakpoints in the Rio Hondo net benefits curve. Because the outflow from Whittier Narrows Dam is a fixed maximum, increasing the level of protection on the Rio Hondo is possible with very small increases in construction costs. Because Reach 5 discharges into Reach 4, a significant portion of its total flow and Reach 4 must be able to accomodate any increase in design flows, Reach 5 is not considered a separable element. This simplified the analysis and resulted in compatible project elements. The

level of protection provided by the Rio Hondo was matched to the optimized level of protection provided by the lower Los Angeles River.

To optimize protection on Reach 4, additional hydrology, hydraulics, and design costs were developed for the 150-year, 250-year, and 300-year events. More refined cost estimates were developed for both the existing and new levels of protection. Damages avoided (i.e. benefits) for the varying levels of protection were developed by truncating the damage-probability curve at the assigned protection frequency. A new net benefit matrix was developed (Table 16), that included interest and amortization, and this information is displayed as a net benefits curve in Figure 13.

Table 16.
Incremental justification of raised parapet wall heights,
Reach 4, lower Los Angeles River ($1000).

Level of Protection	NED Net Benefits (For optimization only)	B/C Ratio
100-year	$30,271	4.5
150-year	30,523	4.1
200-year	29,541	3.5
250-year	28,914	3.3
300-year	28,479	3.1

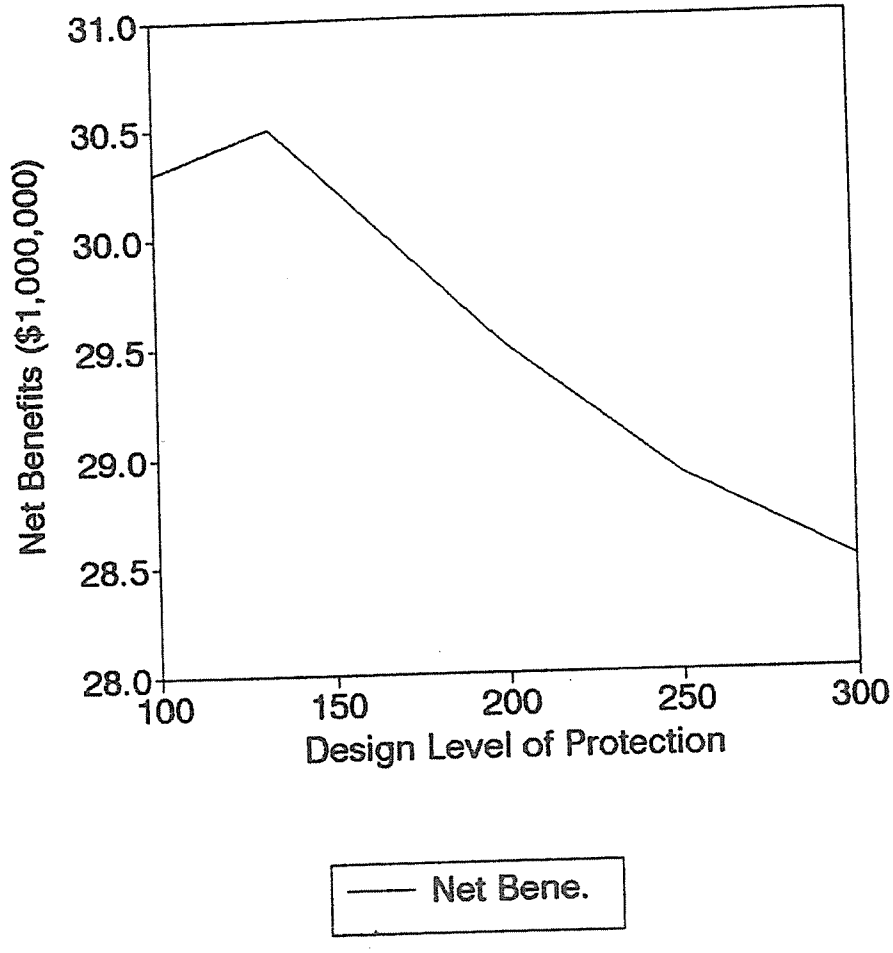


FIGURE 13 Net benefits curve for recommended alternative at various levels of protection.

As seen in Table 16, the 150-year levee provides the maximum net benefits. Because of the dense urban development, additional increments of protection generate significant benefits to offset increased construction costs. The net benefits maximize at a level of protection below the 200-year because otherwise the Artesia Freeway (91) requires considerable construction modifications. The cost of raising freeway access ramps is substantial enough to reduce the overall net benefits. The associated transportation and social impacts must be avoided in order for the plan to remain acceptable.

It is conceded that the increase in net benefits between the 100-year and 150-year plans is small, on the order of 1 percent. Nevertheless, the analysis was performed with consistent levels of detail, and the indication that the net benefits curve increases above the 100-year level of protection is justification for selecting the 150-year level in this optimization procedure.

Following this initial determination that the optimum level of protection would be the 150-year level, a more precise hydraulic analysis was performed for the Artesia Freeway overcrossing segment of the river to determine the exact flow which would pass under the existing bridge. This analysis indicated that the capacity would be 164,000 ft^3/s with raised parapet walls, and more precise analysis of magnitude/frequency relationships indicated that this would be a 133-year flood event. Since the added cost of raising the Artesia Freeway overcrossing had been determined to be a controlling factor in the net benefits analysis, the optimum level of protection for this reach was then re-defined to be the 133-year flood.

Redesignation of the level of protection (from the nominal 150-year level to the 133-year level) hardly altered the shape of the net benefits curve (Figure 13). It shifted the crown of the curve to the left slightly; thus slightly fewer net benefits accrued to greater levels of protection, but the peak in net benefits remained at the level established by the upper limit of flow capacity under the Artesia Freeway.

NED Plan Design Refinements

Having selected a recommended level of protection, the Rio Hondo component was added, and the following design refinements were incorporated into the NED plan.

1) From just above the confluence of the Rio Hondo and the Los Angeles River to just downstream from Century Boulevard (where the Century Freeway will cross the river), the Los Angeles River channel would be converted from trapezoidal to concrete rectangular channel and slightly widened. This change was made because detailed design analysis indicated that the Union Pacific Railroad bridge would need to be raised approximately four feet at its intersection with the Rio Hondo and then quickly returned to its original elevation in order to pass under the Long Beach Freeway. This design violated grade requirements for railways and, as such, warranted an alternative solution. By widening the channel downstream, the water surface elevation was lowered sufficiently to avoid modifications to the railroad bridge.

   This change would also improve hydraulic characteristics of the channel at a point where significant turbulence is expected due to the confluence of two flows. By converting to rectangular channel, the water surface is lowered downstream of the confluence as well. This action will require that levees be reconstructed, and the east abutment of Imperial Highway be rebuilt.

2) Back slopes of the levees would be armored in four locations where a potential for overtopping exists (see Figure 14). Two of the locations are where freeway overcrossings will not be altered by the project (the Artesia and the Century Freeways). Thus, the lower decks of these overcrossings will begin to block flows which exceed the 133-year level. Armoring along about two thirds of a mile of channel would protect the area downstream of the concrete rectangular section of channel and the area near the Artesia Freeway-Long Beach Freeway interchange. Levee armoring would also be required for the reach upstream from the Union Pacific Railroad bridge on the Rio Hondo, as this bridge also

would impede flows during events greater than the 133-year flood, creating a backwater. Compton Creek would be armored for approximately one mile upstream from its confluence with the Los Angeles River. These armored areas are the breakout points for flood levels greater than the design flood. Protection of the back slopes of the levee in these areas thus has the effect of eliminating the potential for levee failure throughout the project area. Levee armoring would be adequate to prevent levee failure during any event greater than the design event.

Adding the cost of these design refinements and including the Rio Hondo component provided a more comprehensive total project cost. The resulting benefit-to-cost ratios and net benefits for the project are different from those used to optimize the NED Plan level of protection. Updated costs and benefits are found in the description of the NED Plan.

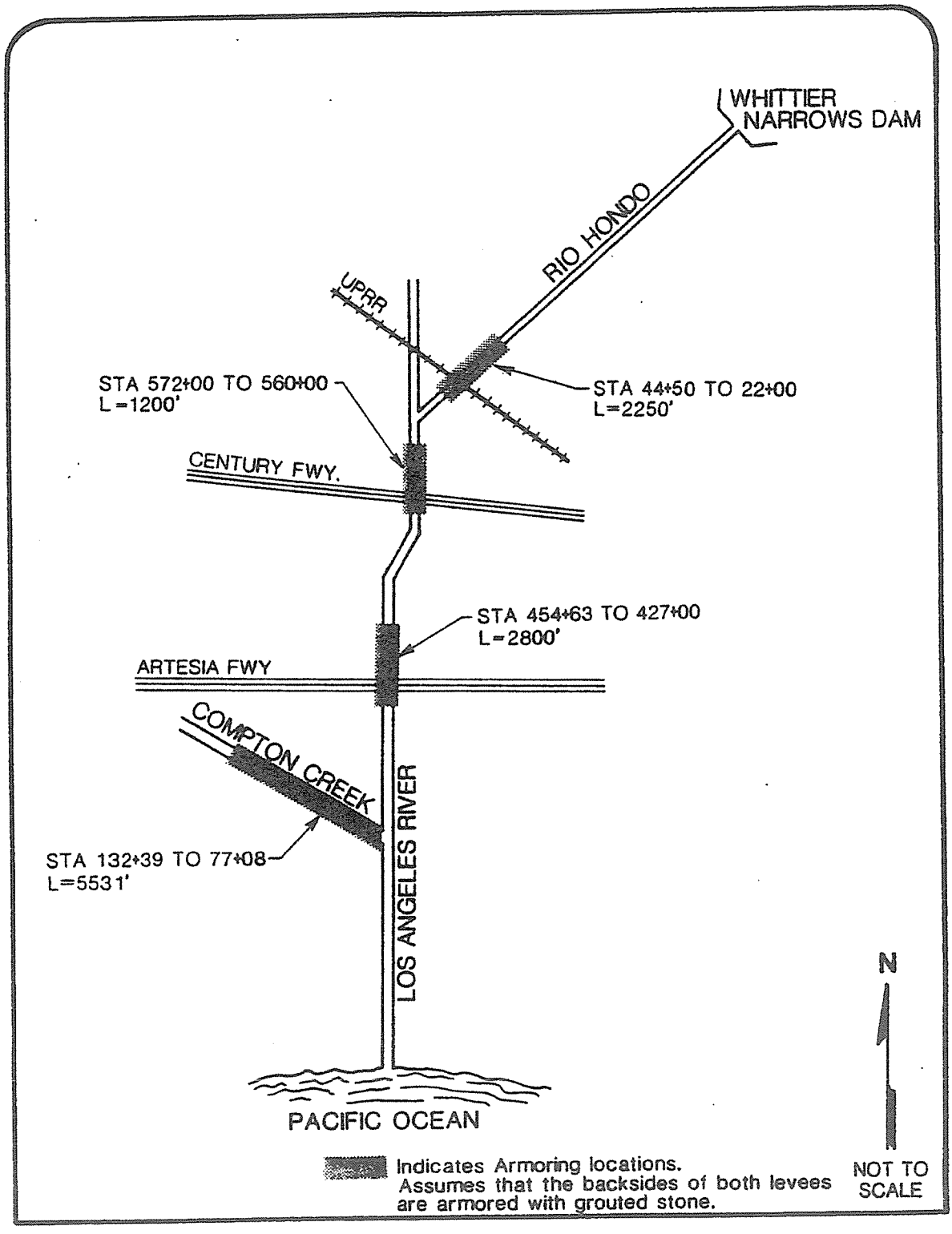


FIGURE 14 SELECTED LEVEE ARMORING LOCATIONS

SECTION FOUR: THE NATIONAL ECONOMIC DEVELOPMENT PLAN

A. THE NED PLAN

Plan Overview

The NED Plan addresses the area of most critical need in the LACDA System: the downstream reaches of the Los Angeles-Rio Hondo system. Improvements on reach 5 begin at Whittier Narrows Dam and extend downstream on the Rio Hondo to the confluence with the Los Angeles River. Improvements on the Los Angeles River (Reach 4) continue from the confluence with the Rio Hondo and extend downstream to the mouth of the river in Long Beach Harbor. A total of about 23 miles of channel is to be improved. Figure 19, page 182, shows a schematic of the recommended plan.

The objective of the improvements is to reduce the potential for damaging flood flows by providing increased levels of protection to the urbanized reaches of the Rio Hondo and lower Los Angeles River. The 133-year design level of protection was selected because of its maximum net benefits and the constraints on plan design imposed by the Artesia Freeway overcrossing. This level of protection was used as the basis for designing all plan elements for the NED Plan, with the exception of Compton Creek.

The following measures are employed individually and in combination to achieve this objective:

1) Vertical, reinforced concrete parapet walls of from two feet to eight feet in height would be constructed along the crest of the existing channel levees.

2) Conversion of 6950 feet of concrete trapezoidal to concrete rectangular channel would occur in the confluence area where parapet walls cannot be raised to the necessary height to provide adequate protection (at and just below the confluence of the Rio Hondo and the Los Angeles River).

3) Raise and/or modify bridges which currently are too low to permit 133-year flows to pass underneath them or which have other impacts on the hydraulic characteristics of the channel that make alteration of their design necessary. Twenty-seven of forty-three bridges in the project reach will be modified.

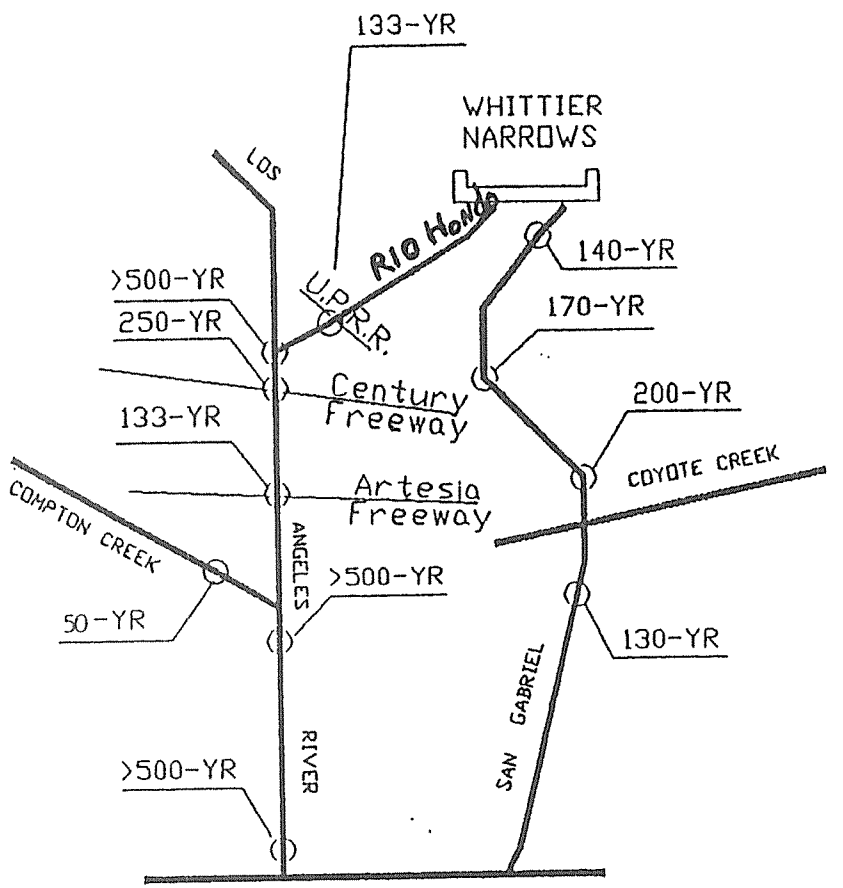
4) Armor the landward levee slope on both sides of the channel in selected locations (a total of about 2.2 channel miles in four separate areas) to prevent greater than design event overflows from eroding the earthen slope and subsequently causing the levee to fail.

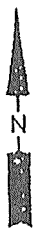
5) Apply a concrete overlay to the grouted stone channel walls in the vicinity of the Rio Hondo-Los Angeles River confluence.

Figure 15 indicates the estimated NED Plan levels of protection for various specific channel locations in reaches 4 and 5. While higher levels of protection are shown in some locations, it must be understood that breakout at any point will inundate a wide area, depending on the side of the channel which is overtopped. Therefore, while variations in level of protection exist throughout each reach, the flood protection provided by the NED Plan is defined by the lowest level of protection in that reach.

While no improvements are proposed for upsteam reaches of the Los Angeles River, breakouts occur just south of downtown Los Angeles for events greater than the 100-year flood. This water moves into the flood plain and spreads south along the western edge of the Los Angeles River. In the 133-year event, these inundations are expected to be very shallow, but their existence prevents the NED Plan from fully providing 133-year protection throughout the plan's area of influence. For this reason, the average level of protection provided by the NED Plan is considered to be between the 100 and 133-year level; residual damages are assumed in most locations contiguous to reaches 4 and 5 for floods which exceed the 133-year event, and in some areas west of reach 4, for events greater than the 100-year flood.

NOTE: Levels of protection above LAR-RHDC confluence unchanged





LEGEND

- DAM
- WATERCOURSE
- 200-YR — LEVEL OF PROTECTION

NOT TO SCALE

LEVELS OF PROTECTION INDICATE AT WHAT FREQUENCY FLOWS EXCEED CHANNEL CAPACITY AT SPECIFIC LOCATIONS

LOS ANGELES COUNTY
DRAINAGE AREA (REVIEW)
CALIFORNIA

NED PLAN

LEVELS OF PROTECTION

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

FIGURE 15

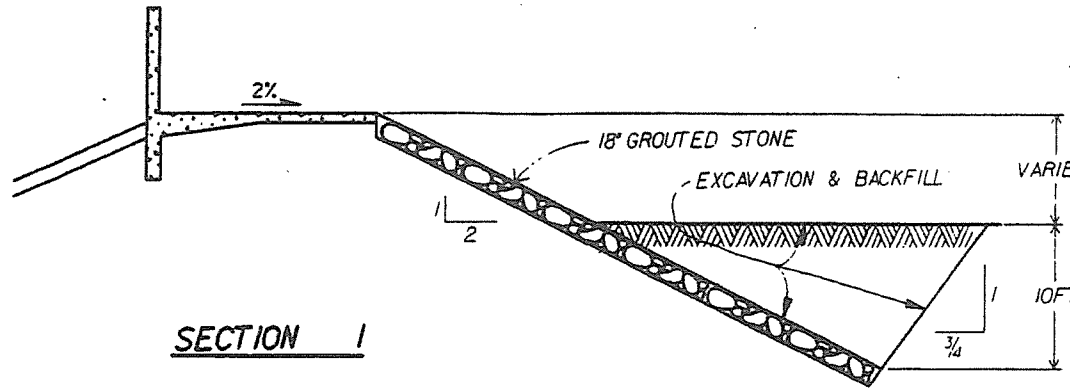
Plan Components

Parapet Walls

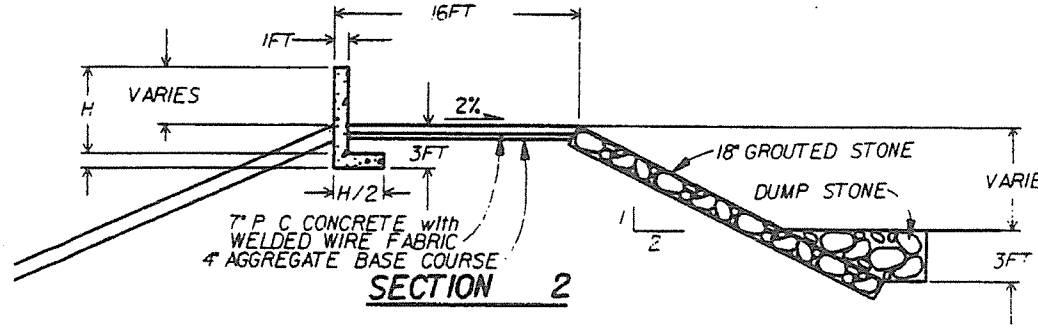
Parapet walls will be constructed of reinforced concrete one foot thick. Their height will vary from section to section to reflect the changing water surface requirements at the particular location. The minimum wall height will be two feet and the maximum will reach eight feet. Transitions from one parapet wall height to another will be accomplished with an instantaneous change in height. The walls will thus not have the appearance of a monolith, but will be perceived as distinct sections of varying heights, thereby reducing the visual impact of the parapet wall system. As Tables 12 and 13 indicate, wall heights will vary significantly and irregularly. In one 300-foot reach of the Rio Hondo system, for example, an 8-foot high section will be sandwiched between a 4-foot high section upstream and a 5-foot high section downstream. Only 300 feet further downstream, the wall height will be only 2 feet. In some reaches, where hydraulic analysis indicates wall heights would be less than 0.5 feet, no parapet walls will be required. The parapet walls will be constructed on the channel side of the existing access road/bicycle trail system to permit their continued use along this reach of the river.

The parapet wall design will vary, depending on wall height and whether the levee is being armored on the landward side. Details of the different wall configuration/levee armoring combinations are shown in Figure 16.

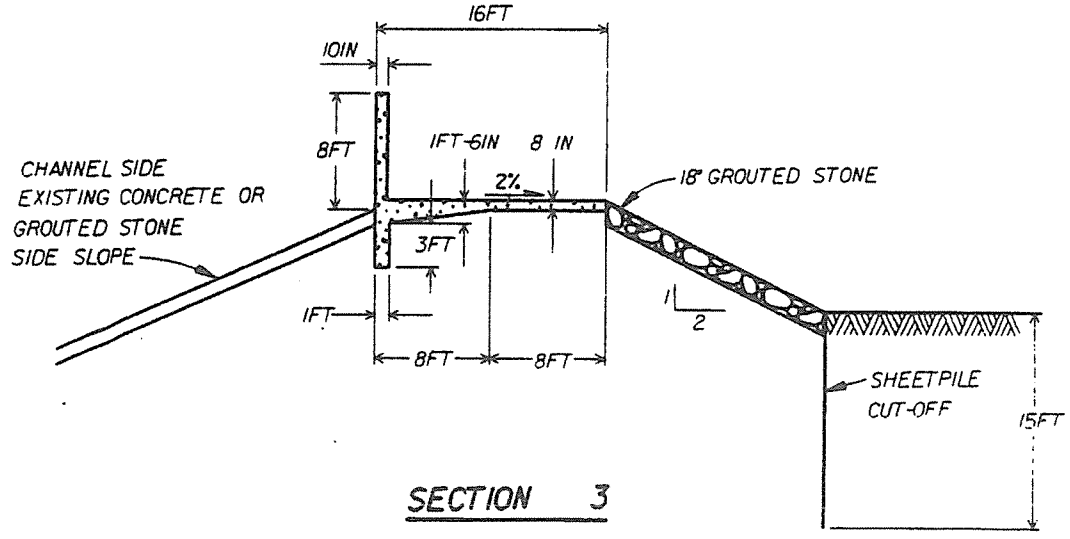
At most bridges, the existing access road/bicycle trail located on the top of the levee either veers channel-ward and dips under the bridge or it descends the outside of the levee and passes through a tunnel in the bridge approach before rejoining the levee top. In the case of the tunnel, the parapet walls will simply join the bridge abutment and continue on the other side of the abutment. Where the road goes under the bridge, as you approach the bridge, the road will gradually rise to meet the top of the parapet wall and then descend with the parapet wall to the land side of the road. The descending road will connect with the existing road as it passes under the bridge, while the



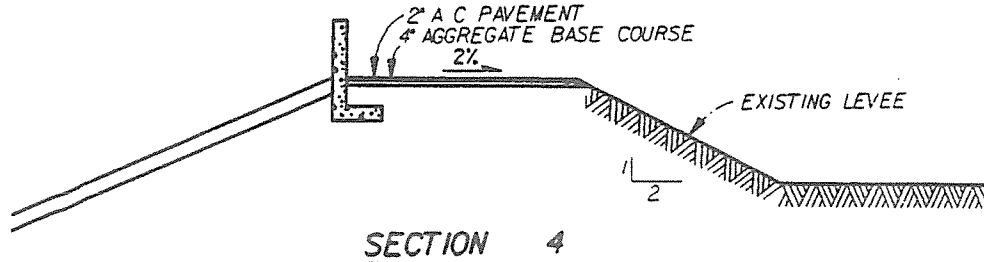
SECTION 1



SECTION 2



SECTION 3



SECTION 4

FIGURE 16

landward-side parapet wall joins the bridge abutment and continues again on the other side of the bridge.

The walls will alter the aesthetics of the system significantly when they exceed three to four feet in height, blocking some of the view across the river. For those living adjacent to the levee, the raised walls will further impinge on the visual landscape. To offset these impacts, the walls themselves may be treated with murals; a mural created and maintained by local community groups, such as the one in the Tujunga Wash channel, may be one option for improving the aesthetics of the parapet walls. Another possibility may involve the use of ivy to cover the walls.

Table 17.

Parapet Wall Height Ranges
Rio Hondo from Whittier Narrows to LA River Channel
133-year design

Miles from LA River Channel	Station	Bridge	Height To Raise Bridge (feet)	Parapet Wall Height Range (feet)	Length (feet)
8.3	437 + 23.71				
				0 - 2	2823.71
7.7	409 + 00.00				
				1 - 4	1200.00
7.5	397 + 00.00				
				5 - 8	300.00
7.5	394 + 00.00				
				1 - 6	1549.01
7.2	378 + 50.99	Whittier	5.0		
				0 - 1	3950.99
6.4	339 + 00.00				
				0 - 6	3060.00
5.8	308 + 40.00	Washington	4.8		
				3 - 8	4006.26
5.1	268 + 33.74	A.T.S.F. Railway	2.5		
				2 - 5	2442.49
4.6	243 + 91.25	Slauson	2.2		
				1	839.35
4.5	235 + 51.90	P.E. Railway	1.4		
				1 - 5	1706.90
4.1	218 + 45.00	Ped Xing	3.6		
				4 - 5	3844.56
3.4	180 + 00.44	Suva	5.2		
				1 - 6	2970.87
2.8	150 + 29.57	Florence	3.5		
				1 - 6	2579.57
2.4	124 + 50.00	Ped Xing	5.3		
				4 - 5	3844.56
1.8	94 + 95.56	S.P.R.R.	3.2		
				2 - 4	1340.64
1.5	81 + 54.92	Firestone	1.6		
				0 - 6	1926.49
1.2	62 + 28.43				
				1 - 4	2028.43
0.8	42 + 00.00				
				0	2028.43
0.2	9 + 13.99				

Table 18.

Parapet Wall Height Ranges
Lower Los Angeles River 133-year design

River Miles From Mouth	Station	Bridge	Height To Raise Bridge (feet)	Parapet Wall Height Range (feet)	Length (feet)
12.3	650 + 00.00			0 - 6	4000.00
11.5	610 + 00.00			6 - 8	3800.00
10.8	572 + 00.00			3 - 8	725.00
10.7	564 + 75.00			4 - 8	775.00
10.5	557 + 00.00			4	400.00
10.5	553 + 00.00			3 - 5	1562.00
10.2	537 + 38.00	Standard Oil Util.	3.4	3 - 4	464.47
10.1	532 + 73.53	Rosecrans	3.9	0 - 3	3070.14
9.5	502 + 03.39	Compton	2.7	0 - 4	4740.83
8.6	454 + 62.56	Atlantic	6.3	1	962.56
8.4	445 + 0.00			7	1040.00
8.2	434 + 60.00			3 - 4	1298.82
8.0	421 + 61.18			0 - 5	5811.22
6.9	363 + 49.96	Long Beach Blvd.	4.0	0 - 3	2649.96
6.4	337 + 00.00			0 - 5	2517.82
5.9	311 + 82.18	Del Amo	2.5	1 - 3	2421.63
5.4	287 + 60.55	U.P.R.R.	**	1 - 7	1160.55
5.2	276 + 00.00			4	1434.18
5.0	261 + 65.82	LA-LB Light Rail	3.3	5 - 7	865.82
4.8	253 + 00.00			5	1310.00
4.5	239 + 90.00			2 - 4	2245.01
4.1	217 + 44.99			3 - 7	844.99
4.0	209 + 00.00			6	1900.00
3.6	190 + 00.00			3 - 5	1915.17
3.2	170 + 84.83	Texas Oil Util.	2.8	0 - 5	1301.82
3.0	157 + 83.01	Willow	4.2	3 - 5	1320.93
2.7	144 + 62.08	Richfield Oil Util.	3.9	4 - 6	3965.82
2.0	104 + 96.26	Pacific Coast Hwy.	3.1	4 - 6	2621.96
1.5	78 + 74.30			4 - 5	2899.30
0.9	49 + 75.00	Edison Util.	1.6	3 - 4	2704.47
0.4	22 + 70.53				

Conversion of the Channel to Rectangular Concrete-lined Channel

At the confluence of the Rio Hondo and the Los Angeles River, construction of both parapet walls and conversion of the channel to concrete-lined rectangular is required to accommodate flood flows. In this 6950 foot reach, the anticipated flow of 158,000 ft^3/s is accommodated by converting the existing trapezoidal channel, with top width of approximately 390 feet, into a rectangular cross-section with a width of 420 feet. In addition to widening the channel approximately 30 feet, parapet walls as high as seven feet will be added to the sides of the Los Angeles River. The reduction in water surface elevation in the Rio Hondo is sufficient to avoid otherwise necessary modifcations to the Union Pacific Railroad bridge.

The channel modifications would require removal of the existing concrete in the channel and excavation of 560,000 yd^3 of earth. The vertical reinforced concrete walls will extend above the existing levee surface and will be cast in place. Because of the wider channel, the right (west) abutment of the Imperial Highway bridge will also need to be rebuilt.

Bridge Modifications

The bridge crossings in Reaches 4 and 5 are displayed in Figure 17. Twenty-seven of the forty-three total bridges would be affected: eighteen would be raised, one raised and modified, six modified only, one moved, and one removed to permit the design flow to pass underneath the bridge (Tables 19 and 20).

Raising of bridges will generally be accomplished by removal of the existing bridge and construction of a new bridge in its place. It had originally been thought that some bridges could be raised by elevating the bridge deck and adding height to the existing piers, but current seismic building codes make it necessary to replace the old piers.

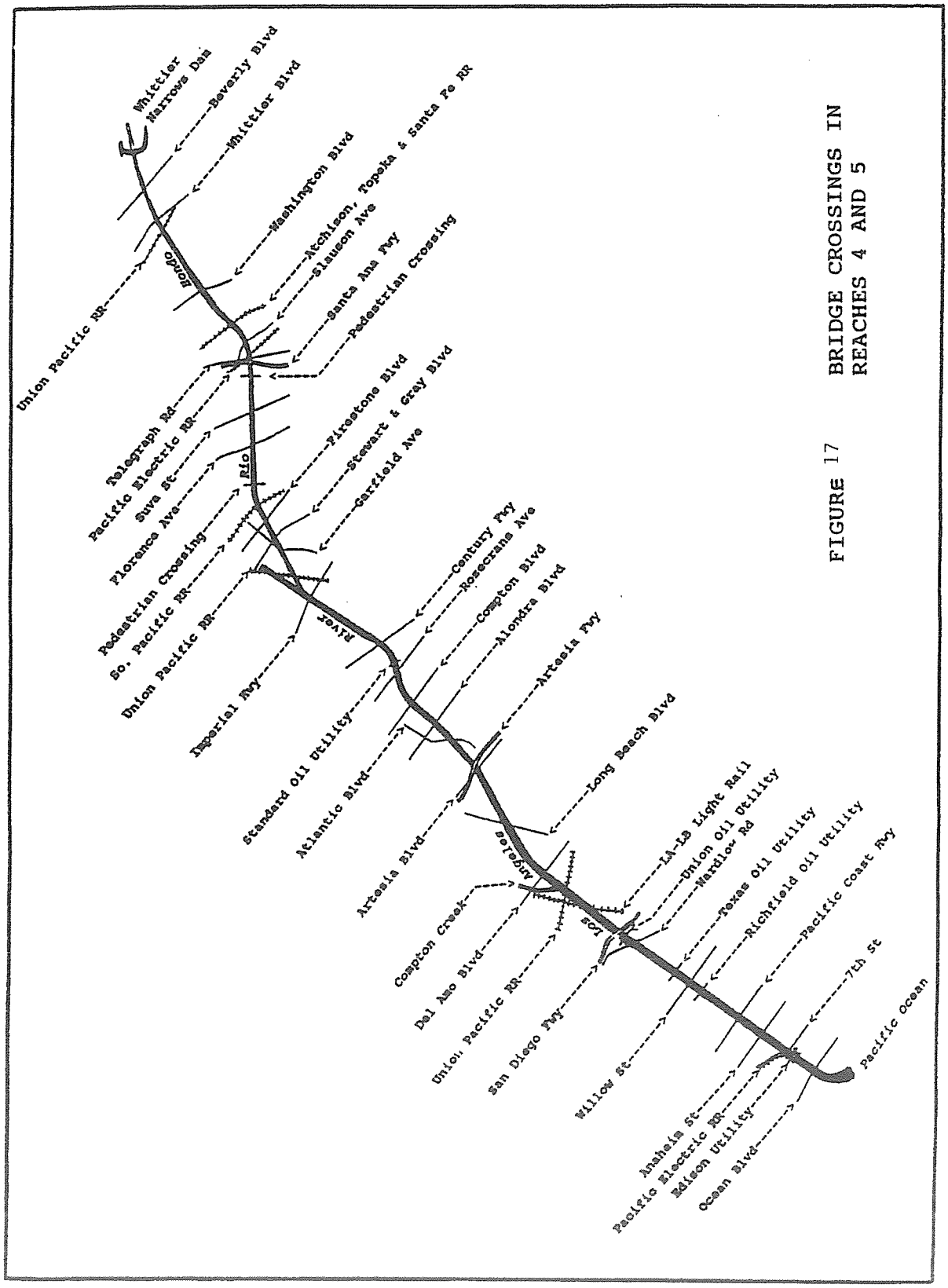


FIGURE 17 BRIDGE CROSSINGS IN REACHES 4 AND 5

TABLE 19 Los Angeles River Bridge Modifications

Bridge	Type	NED Plan Proposal
Lower Los Angeles River, moving downstream from Rio Hondo confluence		
Imperial Highway	Traffic	Reconstruct right abutment in conjunction with channel widening (trap. to rectangular channel) Traffic detour (requires lease of 1.7 acres)
Standard Oil	Utility	Raise 3.4 feet
Rosecrans Avenue	Traffic	Remove and reconstruct 3.9 feet higher Traffic detour required
Compton Boulevard	Traffic	Remove and reconstruct 2.7 feet higher Traffic detour (requires lease of 1.4 acres)
Atlantic Avenue	Traffic	Remove and reconstruct 6.3 feet higher Traffic detour (requires lease of 1.1 acres)
Long Beach Boulevard	Traffic	Remove and reconstruct 4 feet higher Traffic detour (requires lease of 1.0 acres)
Del Amo Boulevard	Traffic	Remove and reconstruct 5 feet higher Traffic detour (requires lease of 1.3 acres)
Union Pacific	Railroad	Remove and replace with two-pier, through-truss design Track detour (requires lease of 2.6 acres)
LA-Long Beach	Light Rail	Remove and reconstruct 3.3 feet higher Track detour (requires lease of 2.0 acres)
Texas Oil	Utility	Raise 2.8 feet
Willow Street	Traffic	Remove and reconstruct 4.2 feet higher Traffic detour (requires lease of 1.2 acres)
ARCO Oil	Utility	Remove and reconstruct 3.9 feet higher
Pacific Coast Highway	Traffic	Remove and reconstruct 3.1 feet higher Traffic detour (requires lease of 0.1 acre)
6th Street	Utility	Raise 1.6 feet
SPRR	Railroad	Remove and reconstruct 115 feet downstream

TABLE 20 Rio Hondo Bridge Modifications

Bridge	Type	NED Plan Proposal
Rio Hondo, moving downstream from Whittier Narrows Dam to Los Angeles River		
Whittier Boulevard	Traffic	Remove and reconstruct 5 feet higher Traffic detour (requires lease of 1.4 acres)
Union Pacific	Railroad	Replace deck girder with through girder bridge, rebuild piers and abutments Rail elevation remains unchanged Track detour (requires lease of 1.9 acres)
Washington Boulevard	Traffic	Remove and reconstruct 4.8 feet higher Traffic detour (requires lease of 2.2 acres)
AT&SF	Railroad	Preserve superstructure Construct new piers 2.5 feet higher and rebuild abutments Track detour (no leased land needed)
Slauson Avenue	Traffic	Remove and reconstruct 2.2 feet higher Traffic detour (requires lease of 2.2 acres)
SPRR	Railroad	Remove and reconstruct 1.4 feet higher Track detour (requires lease of 1.3 acres)
Steel Bridge Sta. 218+45)	Pedestrian	Owned by LA Co. Parks and Rec. Out of service. Remove. Additional 3.6 feet elevation needed
Suva Street	Traffic	Remove and reconstruct 5.2 feet higher Traffic detour required
Florence Avenue	Traffic	Remove and reconstruct 3.5 feet higher Track detour (requires lease of 0.7 acres)
Timber Bridge (Sta. 129+50)	Pedestrian	Raise 5.3 feet
SPRR	Railroad	Remove and reconstruct 3.2 feet higher Track detour (requires lease of 1.5 acres)
Firestone Boulevard	Traffic	Remove and reconstruct 1.6 feet higher Traffic detour (requires lease of 1.8 acres)

For a typical bridge site, the following schedule will prevail:

A. Set up and staging at site	1 month
B. Build detour bridge	5 months
C. Demolish existing bridge	3 months
D. Build new bridge	12 months
E. Demolish detour bridge	3 months
F. Site restoration	1 month
Total	25 months

The detour bridge will require concrete pier construction and will utilize leased bridge decking of a steel through-truss design.

Traffic over the bridges in question is generally in the range of 20,000 to 50,000 cars a day; it will therefore be necessary to construct a detour for both directions of traffic before bridge raising may be accomplished. Given the volume of traffic, it will probably be necessary to provide a minimum of three lanes and preferably four lanes with two in each direction to accommodate traffic flow; most of the roads crossing the Los Angeles River are essential, major traffic corridors. Speed reductions would be necessary at these bridge crossings. Detours would require a some construction right-of-way (approximately twenty-six acres total for twenty bridge sites); in some areas detours might impact existing structures.

An initial investigation for an impact analysis on traffic delays was governed by the goal to utilize existing transportation models and adapt them to reflect the impacts in the study area. The city of Long Beach utilizes a traffic simulation model to evaluate impacts on traffic flows of proposed roadwork. It is a trip based model of the Los Angeles Basin and upon input of a constraint it redistributes traffic to minimize the impact on the total system traffic time. The modified bridges that were input into the model are considered representative of the bridges that are affected along the entire LACDA project area. A base case was established and constraints were placed on Long Beach Boulevard, Pacific Coast Highway and Willow Street. Willow Street exhibited the most impact so it was used as a proxy for the estimation of delay times for the remaining

bridges by applying a proportionate ratio based on traffic counts. The detour delay time was assumed to be the difference between the time to travel the detour route under constrained conditions and the time to travel the original route under base conditions. The approximate delay time is estimated to be less than five minutes per vehicle during peak hours. The values associated with these traffic delays are considered to be NED costs and are included in the cost/benefit analysis.

Railway bridges and utility bridges will require less complex construction methods. The superstructures of railway bridges may be unfastened from piers and then removed as a unit by a crane while pier extensions are constructed. Detours may also need to be maintained for railroad traffic during construction. Utility bridges will be raised in a manner similar to raising rigidly framed bridges. Utility connections on either side of the bridge will be closed for a brief period of time while flexible connections are installed, then the bridge and the existing utility features will be raised simultaneously. The flexible connections will then be installed on a schedule to be coordinated with the various utilities involved.

Levee Armoring

As shown in Figure 14, there are four reaches totaling approximately 11,800 feet of channel that will receive protective armoring on the outer (landward) face of the levee on both sides of the channel. The objective of the armoring is to avoid erosion of the outer face of the earthen levee should an event greater than the design event occur. The armoring consists of an 18-inch-thick blanket of stones ranging from 4 to 18 inches in diameter. This blanket covers the earthen levee face and is grouted in place. The toe, or bottom edge, of the armoring needs to be protected because, otherwise, the force of the overtopping waters can erode under the armoring and still cause levee failure. To accomplish this, in areas of unconstrained right-of-way, the armoring will continue 10 feet below the ground surface as shown in Figure 16. Where adequate right-of-way is unavailable, dump stone or steel sheet piles would protect the toe of the armored levee.

Concrete Channel Overlay

Where the channel is currently grouted stone, predominantly in the vicinity of the Rio Hondo-Los Angeles River confluence, the channel roughness is not conducive to efficient conveyance of floodflows. These rougher areas will receive a smooth overlay consisting of a three-inch thick minimum concrete cover. The channel will be prepared by sandblasting, and then the concrete will be sprayed on the surface and smoothed.

Aesthetic Treatment Plan

The proposed aesthetic treatment plan consists of texturing parapet wall surfaces and limited landscape plantings. Concrete parapet walls will feature a textured surface with a vandal-resistant coating to improve aesthetic quality and prevent vandalism. In highly visible areas, walls will be either tinted or painted. Along portions of the channel, vines will be either planted in specially constructed concrete or other permanent planter boxes in a manner that would not impact the structural integrity of the walls. Other than vines, only trees will be used because the County of Los Angeles has requested that no grasses, groundcover, or small shrubs be used due to high maintenance costs and to minimize the potential for vandalism. Landscape treatment will be primarily provided at various bridge crossings, street nodes, and along portions of the channel where the rights-of-way allow. An estimated cost of this plan is $9,052,000 and is included in the project cost estimate.

Compton Creek

Improvements on the Los Angeles River will lower water surface elevations on Compton Creek and provide a slightly greater than 50 year level of protection. However, a backwater situation remains that would induce the creek to overflow its existing walls during the 100-year event. To mitigate this, levees may be raised slightly and parapet walls three feet in height would be added along 900 feet of channel. A modified "L" wall will be used for stability, and a concrete apron would be extended to the existing channel armoring. The back side of the levees would also be armored along 5530 feet of channel, 4630 feet of which would be upstream from the section protected by parapet walls. In a 133-year design flood, this armored section would act as a weir, allowing sheet flow to pass over the levee without resulting in levee failure.

Operation and Maintenance

The Corps' primary operation and maintenance responsibility in the LACDA mainstem system involves the five Corps reservoirs and the Los Angeles River from below Tujunga Wash to just upstream of the Rio Hondo confluence. Except for various minor features, Los Angeles County operates and maintains the rest of the LACDA system. The reaches affected by the NED Plan are all currently maintained by the County. Increased operation and maintenance costs of the proposed project will be minor. Additional channel cleanout and routine repair will cost approximately $20,000 annually. Should extreme effort be required to remove graffiti from the parapet walls, some of these monies will need to be redirected.

Recreation Features

The NED Plan does not significantly alter the cycling and hiking trail system along the Los Angeles River and the Rio Hondo, although the aesthetics of this area are affected by the addition of parapet walls in some reaches. However, for much of the affected reach, the aesthetic quality of the trails is minimal, as the river passes through commercial and industrial areas and along the Long Beach Freeway. The NED Plan will retain all existing recreation features that would be impacted by the project. Cycling and equestrian trails will

retain all existing recreation features that would be impacted by the project. Cycling and equestrian trails will be temporarily impacted by construction activities but will be returned to use in all of the reaches impacted by the plan.

B. PLAN ACCOMPLISHMENTS

The NED Plan will provide between 100 and 133 year protection to approximately 75 square miles of intensively developed urban area, providing average annual flood damage reduction benefits estimated as $58.7 million, and reducing the 100-year flood plain from 82 square miles to 7 square miles (Figure 18). Included in the total benefits are inundation reduction damages for structures and contents, $50,569,000; vehicles damages avoided, $6,249,000; emergency costs avoided, $1,109,000; flood insurance overhead costs avoided, $501,000 and freeboard benefits, $76,000. In addition, the plan will improve the safety of numerous bridges, many of which were designed prior to imposition of new seismic safety guidelines. Benefits from advanced replacement of bridges total $173,000 annually.

The traffic delays resulting from bridge construction may be considered a disbenefit and have been estimated and quantified in the project cost portion on page 160. They are estimated to be $1,648,000.

The performance of the NED Plan, i.e. the level of protection and benefits, is contingent upon the continued and future maintenance of all project facilities, including those owned and operated by the local sponsor (LACDPW). Maintenance shall be in accord with the hydrologic simulations developed in the hydrology report documentation.

Although no improvements are recommended for the upper reaches of the Los Angeles River or the San Gabriel River system, the LACDA system as a whole will provide post-project protection from floods ranging from the 10 to 140-year event (Table 21). In areas with less than 100-year protection such as those in the upper reaches below Sepulveda and Hansen Dams, outbreaks from the entrenched channel are not extensive enough to justify a federally supported remedy.

Table 21. Minimum levels of protection under the NED Plan
All reaches of the LACDA System
(Return period in years)

System Reach	Level of Protection Existing	Proposed
1. Tujunga Wash Hansen Dam to Los Angeles River	71	71
2. Los Angeles River Sepulveda Dam to Arroyo Seco	10	10
3. Los Angeles River Arroyo Seco to Rio Hondo	77	77
4. Los Angeles River Rio Hondo to Pacific Ocean	25	100
5. Rio Hondo Whittier Narrows to Los Angeles River	25	133
6. San Gabriel River Whittier Narrows to Imperial Hwy	100	140
7. San Gabriel River Imperial Highway to Pacific Ocean	111	130
8. San Gabriel River Santa Fe Dam to Whittier Narrows Dam	500	500
9. Compton Creek Main Street to Los Angeles River	25	50


NATIONAL
FOREST
Santa Monica
Marina Del Rey
Redondo Beach
Hermosa Beach
Rancho Palos Verdes
LONG BEACH
Seal Beach
HUNTINGTON BEACH
RESIDUAL OVERFLOW BOUNDARIES
OF THE RECOMMENDED PLAN
100 YR
200 YR
500 YR

C. RESIDUAL FLOODING

The NED Plan does not affect upper basin reaches, and residual flooding in these areas will be the same as for the without-project conditions. Since the NED plan consists of parapet walls throughout the protected reaches, along with existing or improved channels, the water surface is not raised by the selected plan for the same discharge and frequency. The with project water surface is only greater than the existing water surface for discharges greater than those which would fail the existing levees and inundate large areas alongside the channel. Any interior drainage problems remaining are much less than the flooding produced as a result of levee failures. There is approximately 31 square miles of interior area which drains by gravity or by pumping to the improved Los Angeles River. The total contribution of this interior drainage represents less than 5 percent of the design discharge. The current design will not preclude interior runoff (including open channel flow from Compton Creek) from entering the improved channel during the design event, should improvements to interior drainage facilities be made. At present there are no planned improvements to the existing interior drainage system as part of the project. During PED, if potential impacts to interior drainage surface, they will be evaluated on a case-by-case basis. Therefore, the NED Plan has minimal impact on interior drainage and does not induce interior flood problems. Instead, large areas of overflow from mainstem flooding due to levee failure are removed from the floodplain.

The NED Plan provides for between 100 and 133-year protection in the lower basin. For events of greater magnitude, flows would overtop the parapet walls and cascade down the levee back slopes in shallow sheet flow. The resulting flooding would be less destructive than under the without-project condition because (1) the drop from the vertical parapet wall to the pavement of the cycling trail-access road would act somewhat as a drop structure, reducing flow velocity, and (2) the levees in the protected sections would not fail during flood events greater than the 133-year flood. The post-project flood plain is shown for various storm recurrence intervals on Figure 18.

D. RISK AND UNCERTAINTY

The proposed level provides a margin of safety which may be needed if future improvements are made by local agencies in upstream system reaches. The final analysis of levels of protection for the lower Los Angeles River assumed that there would be some flooding in upper reaches of the river system, including downtown. This upstream breakout of flood flows has the effect of reducing the peak flow in the lower river for the short period when peak flows are anticipated in the LACDA system. The 133-year conveyance capacity assumes that there is no increase in the level of protection in the upstream reaches and that some of the peak flow which would otherwise reach the lower river is effectively "spread out" when the downtown area is flooded, albeit to a low depth and with only limited damages. If improvements are made in the future, then the level of protection provided by the NED Plan would be reduced by a small increment but not below the 100 year level of protection. Figure 13 on page 135 displays the net benefit curve for the recommended alternative at various levels of protection. The curve shows that the difference in net benefits between the 133 year level of protection and the 100 year level of protection is approximately $200,000. Therefore the impacts on benefits, if upstream improvements decrease the level of protection from 133 year to 100 year is minor.

E. FIRST COSTS

The cost estimates for the NED Plan have been prepared in accordance with guidance provided in the following documents: EC 1110-2-263, Civil Works Construction Cost Estimating; EC 1110-2-538, Civil Works Cost Estimating, Code of Accounts; and EC 1110-2-1302, Cost Estimates, Planning and Design Stages. The work to be completed for this project was broken down into line items according to the code of accounts. The estimate was developed using quantities, drawings, and other data obtained from the design team. Unit prices were developed using labor rates and site specific conditions. Overhead, bond, and profit were separately computed and distributed to the unit prices. Contingencies were determined based on current uncertainties with the design, quantities, and/or unit prices. Cost summary spreadsheets were prepared based on the

output from the M-CACES program in October 1991 price levels. The cost estimate by code of accounts for all the components of the NED Plan is presented in Table 22.

The estimated first cost of the NED Plan is $364,100,000, of which approximately $104.6 million is for improvements to the Rio Hondo channel and $215.9 million is for improvements of the Los Angeles River channel. Modifications to the confluence are estimated as $36.0 million. The interest during construction calculated at the FY 92 rate of 8-3/4 is added to the first cost to estimate a gross investment of $487,363,000. The annual cost amortized at 8-3/4 percent interest rate for a 100 year evaluation period is estimated as $42,654,000. The annual operation and maintenance costs are $20,000. Traffic delays costs attributed to bridge reconstruction are estimated to be $1,648,000 annually. Total annual costs of the recommended plan are $44,322,000.

Of the total first cost, approximately 62 percent is for bridge modifications (including railroad bridges) and utility relocations. A summary of cost apportionment is displayed in Table 23. The subtotal for the non-Federal share is estimated to be $181,525,000, slightly less than 50 percent of the total project costs. The cost sharing requirements and procedures as stated in the Water Resources Development Act of 1986, "Sec. 103 Flood Control and Other Purposes. (a) Flood Control (3) 50 Percent Maximum - The non-Federal share under paragraph (1) shall not exceed 50 percent of the cost of the project assigned to flood control".

Table 22

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
FEASIBILITY COST ESTIMATE (SUMMARY)
OCTOBER 1991 PRICE LEVEL

CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1991	CONTINGENCY PERCENT	ESCALATED TO MID POINT OF CONSTRUCTION	MID POINT OF CONSTRUCTION
	HIGHWAY BRIDGES RIO HONDO CHANNEL						
	FIRESTONE BLVD 81+55						
01----	LANDS & DAMAGES	114,597	22,919	137,516	20%	190,597	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	3,976,815	1,073,740	5,050,555	27%	7,000,069	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	863,030	129,454	992,484	15%	1,732,877	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	700,870	105,130	806,000	15%	1,407,276	JAN 00/1.746
	TOTAL COSTS 81+55	5,660,000	1,330,000	6,990,000	23%	10,330,000	
	FLORENCE AVE 150+30						
01----	LANDS & DAMAGES	73,226	14,645	87,871	20%	121,789	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	3,209,096	898,547	4,107,643	28%	5,693,193	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	670,435	100,565	771,000	15%	1,346,166	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	533,043	79,957	613,000	15%	1,070,298	JAN 00/1.746
	TOTAL COSTS 150+30	4,490,000	1,090,000	5,580,000	24%	8,230,000	
	SUVA STREET 180+00						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	1,607,369	578,653	2,186,022	36%	3,029,826	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	280,000	42,000	322,000	15%	562,212	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	225,217	33,783	259,000	15%	452,214	JAN 00/1.746
	TOTAL COSTS 180+00	2,110,000	650,000	2,770,000	36%	4,040,000	
	SLAUSON AVE 243+91						
01----	LANDS & DAMAGES	890,833	178,167	1,069,000	20%	1,481,634	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	4,094,159	1,105,423	5,199,582	27%	7,206,621	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	925,217	138,783	1,064,000	15%	1,857,744	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	701,739	105,261	807,000	15%	1,409,022	JAN 00/1.746
	TOTAL COSTS 243+91	6,610,000	1,530,000	8,140,000	23%	11,960,000	

Table 22

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
FEASIBILITY COST ESTIMATE (SUMMARY)
OCTOBER 1991 PRICE LEVEL

CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1991	CONTINGENCY PERCENT	ESCALATED TO MID POINT OF CONSTRUCTION	MID POINT OF CONSTRUCTION
	WASHINGTON BLVD 308+44						
01----	LANDS & DAMAGES	306,667	61,333	368,000	20%	510,048	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	5,617,372	1,460,517	7,077,889	26%	9,809,954	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,176,522	176,478	1,353,000	15%	2,362,338	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	225,217	33,783	259,000	15%	452,214	JAN 00/1.746
	TOTAL COSTS 308+44	7,330,000	1,730,000	9,060,000	24%	13,130,000	
	WHITTIER BLVD 378+51						
01----	LANDS & DAMAGES	1,360,833	272,167	1,633,000	20%	2,041,250	FEB 97/1.250
021---	TOTAL CONSTRUCTION COST	4,835,547	1,402,308	6,237,855	29%	7,797,319	FEB 97/1.250
30---	PLANNING, ENG, & DESIGN	949,565	142,435	1,092,000	15%	1,633,632	FEB 97/1.496
31---	CONSTRUCTION MANAGEMENT	794,783	119,217	914,000	15%	1,367,344	FEB 97/1.496
	TOTAL COSTS 378+51	7,940,000	1,940,000	9,880,000	24%	12,840,000	
TOTAL HWY BRIDGES RIO HONDO RVR		34,140,000	8,270,000	42,420,000	24%	60,530,000	
	HIGHWAY BRIDGES LOS ANGELES RIVER CHANNEL						
	PACIFIC COAST HWY 104+96						
01----	LANDS & DAMAGES	541,667	108,333	650,000	20%	812,500	FEB 97/1.250
021---	TOTAL CONSTRUCTION COST	7,368,129	1,915,713	9,283,842	26%	11,604,803	FEB 97/1.250
30---	PLANNING, ENG, & DESIGN	1,609,565	241,435	1,851,000	15%	2,769,096	FEB 97/1.496
31---	CONSTRUCTION MANAGEMENT	1,322,609	198,391	1,521,000	15%	2,275,416	FEB 97/1.496
	TOTAL COSTS 104+96	10,840,000	2,460,000	13,310,000	23%	17,460,000	
	WILLOW ST 157+83						
01----	LANDS & DAMAGES	96,667	19,333	116,000	20%	160,776	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	8,026,915	2,086,998	10,113,913	26%	14,017,883	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,733,913	260,087	1,994,000	15%	3,481,524	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	1,461,739	219,261	1,681,000	15%	2,935,026	JAN 00/1.746
	TOTAL COSTS 157+83	11,320,000	2,590,000	13,900,000	23%	20,600,000	

Table 22

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
FEASIBILITY COST ESTIMATE (SUMMARY)
OCTOBER 1991 PRICE LEVEL

CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1991	CONTINGENCY PERCENT	ESCALATED TO MID POINT OF CONSTRUCTION	MID POINT OF CONSTRUCTION
	DEL AMO BLVD 311+82						
01----	LANDS & DAMAGES	93,333	18,667	112,000	20%	155,232	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	5,451,177	1,471,818	6,922,995	27%	9,595,271	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,195,652	179,348	1,375,000	15%	2,400,750	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	1,000,870	150,130	1,151,000	15%	2,009,646	JAN 00/1.746
	TOTAL COSTS 311+82	7,740,000	1,820,000	9,560,000	24%	14,160,000	
	LONG BEACH BLVD 363+50						
01----	LANDS & DAMAGES	510,000	102,000	612,000	20%	848,232	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	13,033,625	3,258,406	16,292,031	25%	22,580,755	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	2,921,739	438,261	3,360,000	15%	5,866,560	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	2,413,043	361,957	2,775,000	15%	4,845,150	JAN 00/1.746
	TOTAL COSTS 363+50	18,880,000	4,160,000	23,040,000	22%	34,140,000	
	ATLANTIC AVE 454+63						
01----	LANDS & DAMAGES	336,667	67,333	404,000	20%	559,944	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	8,635,587	2,245,252	10,880,839	26%	15,080,843	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,931,304	289,696	2,221,000	15%	3,877,866	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	1,564,348	234,652	1,799,000	15%	3,141,054	JAN 00/1.746
	TOTAL COSTS 454+63	12,470,000	2,840,000	15,300,000	23%	22,660,000	
	COMPTON BLVD 502+03						
01----	LANDS & DAMAGES	464,167	92,833	557,000	20%	772,002	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	4,396,194	1,186,972	5,583,166	27%	7,738,268	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	974,783	146,217	1,121,000	15%	1,957,266	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	766,087	114,913	881,000	15%	1,538,226	JAN 00/1.746
	TOTAL COSTS 502+03	6,600,000	1,540,000	8,140,000	23%	12,010,000	

Table

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
FEASIBILITY COST ESTIMATE (SUMMARY)
OCTOBER 1991 PRICE LEVEL

CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1991	CONTINGENCY PERCENT	ESCALATED TO MID POINT OF CONSTRUCTION	MID POINT OF CONSTRUCTION
	ROSECRANS AVE 532+74						
01----	LANDS & DAMAGES	580,000	116,000	696,000	20%	964,656	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	8,578,457	2,316,183	10,894,640	27%	15,099,971	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,928,696	289,304	2,218,000	15%	3,872,628	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	1,560,870	234,130	1,795,000	15%	3,134,070	JAN 00/1.746
	TOTAL COSTS 532+74	12,650,000	2,960,000	15,600,000	23%	23,070,000	
	IMPERIAL HWY 634+04						
01----	LANDS & DAMAGES	231,667	46,333	278,000	20%	385,308	JAN 00/1.386
021---	TOTAL CONSTRUCTION COST	6,505,357	1,886,554	8,391,911	29%	11,631,189	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,459,130	218,870	1,678,000	15%	2,929,788	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	1,172,174	175,826	1,348,000	15%	2,353,608	JAN 00/1.746
	TOTAL COSTS 634+04	9,370,000	2,330,000	11,700,000	25%	17,300,000	
TOTAL HWY BRIDGES LA RVR		89,870,000	20,700,000	110,550,000	23%	161,400,000	
	RAILROAD BRIDGES RIO HONDO RIVER CHANNEL						
	SOUTHERN PACIFIC 94+96						
01----	LANDS & DAMAGES	103,542	20,708	124,250	20%	172,211	JAN 00/1.386
022---	TOTAL CONSTRUCTION COST	2,047,784	552,902	2,600,686	27%	3,604,551	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	416,522	62,478	479,000	15%	836,334	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	333,913	50,087	384,000	15%	670,464	JAN 00/1.746
	TOTAL COSTS 94+96	2,900,000	690,000	3,590,000	24%	5,280,000	
	SOUTHERN PACIFIC 235+52						
01----	LANDS & DAMAGES	135,000	27,000	162,000	20%	224,532	JAN 00/1.386
022---	TOTAL CONSTRUCTION COST	2,107,686	526,921	2,634,607	25%	3,651,565	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	453,913	68,087	522,000	15%	911,412	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	364,348	54,652	419,000	15%	731,574	JAN 00/1.746
	TOTAL COSTS 235+52	3,060,000	680,000	3,740,000	22%	5,520,000	

Table 22

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
FEASIBILITY COST ESTIMATE (SUMMARY)
OCTOBER 1991 PRICE LEVEL

CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1991	CONTINGENCY PERCENT	ESCALATED TO MID POINT OF CONSTRUCTION	MID POINT OF CONSTRUCTION
	A.T. & SANTA FE 268+34						
01----	LANDS & DAMAGES	125,000	25,000	150,000	20%	207,900	JAN 00/1.386
022---	TOTAL CONSTRUCTION COST	3,585,842	932,319	4,518,161	26%	6,262,171	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	759,130	113,870	873,000	15%	1,524,258	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	603,478	90,522	694,000	15%	1,211,724	JAN 00/1.746
	TOTAL COSTS 268+34	5,070,000	1,160,000	6,240,000	23%	9,210,000	
	UNION PACIFIC 369+04						
01----	LANDS & DAMAGES	166,667	33,333	200,000	20%	277,200	JAN 00/1.386
022---	TOTAL CONSTRUCTION COST	4,558,563	1,413,155	5,971,718	31%	8,276,801	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,228,696	184,304	1,413,000	15%	2,467,098	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	988,696	148,304	1,137,000	15%	1,985,202	JAN 00/1.746
	TOTAL COSTS 369+04	6,940,000	1,780,000	8,720,000	26%	13,010,000	
TOTAL RRD BRIDGES RIO HONDO RVR		17,970,000	4,310,000	22,290,000	24%	33,020,000	
	RAILROAD BRIDGES LOS ANGELES RIVER CHANNEL						
	SOUTHERN PACIFIC 37+04						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 00/1.386
022---	TOTAL CONSTRUCTION COST	5,072,413	1,369,552	6,441,965	27%	8,928,563	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,291,304	193,696	1,485,000	15%	2,592,810	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	1,051,304	157,696	1,209,000	15%	2,110,914	JAN 00/1.746
	TOTAL COSTS 37+04	7,420,000	1,720,000	9,140,000	23%	13,630,000	
	LA-LB LIGHT RAIL 262+46						
01----	LANDS & DAMAGES	311,677	62,335	374,012	20%	518,381	JAN 00/1.386
022---	TOTAL CONSTRUCTION COST	6,585,872	1,646,468	8,232,340	25%	11,410,023	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,405,217	210,783	1,616,000	15%	2,821,536	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	1,141,739	171,261	1,313,000	15%	2,292,498	JAN 00/1.746
	TOTAL COSTS 262+46	9,440,000	2,090,000	11,540,000	22%	17,040,000	

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
FEASIBILITY COST ESTIMATE (SUMMARY)
OCTOBER 1991 PRICE LEVEL

CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1991	CONTINGENCY PERCENT	ESCALATED TO MID POINT OF CONSTRUCTION	MID POINT OF CONSTRUCTION
	UNION PACIFC 287+61						
01----	LANDS & DAMAGES	494,167	98,833	593,000	20%	821,898	JAN 00/1.386
022---	TOTAL CONSTRUCTION COST	5,056,045	1,365,132	6,421,177	27%	8,899,751	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	1,151,304	172,696	1,324,000	15%	2,311,704	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	923,478	138,522	1,062,000	15%	1,854,252	JAN 00/1.746
	TOTAL COSTS 287+61	7,620,000	1,780,000	9,400,000	23%	13,890,000	
TOTAL RRD BRIDGES LA RVR		24,480,000	5,590,000	30,080,000	23%	44,560,000	
	UTILITY BRIDGES LOS ANGELES RIVER CHANNEL						
	SIXTH ST 47+55						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 99/1.339
022---	TOTAL CONSTRUCTION COST	1,351,362	513,518	1,864,880	38%	2,497,074	JAN 99/1.339
30---	PLANNING, ENG, & DESIGN	341,739	51,261	393,000	15%	655,524	JAN 99/1.668
31---	CONSTRUCTION MANAGEMENT	278,261	41,739	320,000	15%	533,760	JAN 99/1.668
	TOTAL COSTS 47+55	1,970,000	610,000	2,580,000	31%	3,690,000	
	ATLANTIC RICHFLD 145+11						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 99/1.339
022---	TOTAL CONSTRUCTION COST	2,184,417	830,078	3,014,495	38%	4,036,409	JAN 99/1.339
30---	PLANNING, ENG, & DESIGN	338,261	50,739	389,000	15%	648,852	JAN 99/1.668
31---	CONSTRUCTION MANAGEMENT	275,652	41,348	317,000	15%	528,756	JAN 99/1.668
	TOTAL COSTS 145+11	2,800,000	920,000	3,720,000	33%	5,210,000	
	TEXAS OIL 171+68						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 99/1.339
022---	TOTAL CONSTRUCTION COST	1,151,739	414,626	1,566,365	36%	2,097,363	JAN 99/1.339
30---	PLANNING, ENG, & DESIGN	286,087	42,913	329,000	15%	548,772	JAN 99/1.668
31---	CONSTRUCTION MANAGEMENT	231,304	34,696	266,000	15%	443,688	JAN 99/1.668
	TOTAL COSTS 171+68	1,670,000	490,000	2,160,000	29%	3,090,000	

Table 22

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
FEASIBILITY COST ESTIMATE (SUMMARY)
OCTOBER 1991 PRICE LEVEL

CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1991	CONTINGENCY PERCENT	ESCALATED TO MID POINT OF CONSTRUCTION	MID POINT OF CONSTRUCTION
	STANDARD OIL 537+38						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 99/1.339
022---	TOTAL CONSTRUCTION COST	755,429	256,846	1,012,275	34%	1,355,436	JAN 99/1.339
30---	PLANNING, ENG, & DESIGN	179,130	26,870	206,000	15%	343,608	JAN 99/1.668
31---	CONSTRUCTION MANAGEMENT	143,478	21,522	165,000	15%	275,220	JAN 99/1.668
	TOTAL COSTS 537+38	1,080,000	310,000	1,380,000	29%	1,970,000	
TOTAL UTILITY BRIDGES LA RVR		7,520,000	2,330,000	9,840,000	31%	13,960,000	
	PEDESTRIAN BRIDGES RIO HONDO RIVER CHANNEL						
	PEDESTRIAN BRIDGE 124+50						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 99/1.339
023---	TOTAL CONSTRUCTION COST	157,381	34,624	192,005	22%	257,095	JAN 99/1.339
30---	PLANNING, ENG, & DESIGN	32,174	4,826	37,000	15%	61,716	JAN 99/1.668
31---	CONSTRUCTION MANAGEMENT	24,346	3,652	28,000	15%	46,704	JAN 99/1.668
	TOTAL COSTS 124+50	210,000	40,000	260,000	19%	370,000	
	PEDESTRIAN BRIDGE 218+45						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 99/1.339
023---	TOTAL CONSTRUCTION COST	139,721	30,739	170,460	22%	228,246	JAN 99/1.339
30---	PLANNING, ENG, & DESIGN	36,522	5,478	42,000	15%	70,056	JAN 99/1.668
31---	CONSTRUCTION MANAGEMENT	28,696	4,304	33,000	15%	55,044	JAN 99/1.668
	TOTAL COSTS 218+45	200,000	40,000	250,000	20%	350,000	
TOTAL PED BRIDGES RIO HONDO RVR		410,000	80,000	510,000	20%	720,000	

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
FEASIBILITY COST ESTIMATE (SUMMARY)
OCTOBER 1991 PRICE LEVEL

CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1991	CONTINGENCY PERCENT	ESCALATED TO MID POINT OF CONSTRUCTION	MID POINT OF CONSTRUCTION
	CHANNEL MODIFICATIONS						
	COMPTON CREEK CHANNEL						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 96/1.208
0902B	ESTHETIC TREATMENT	295,000	59,000	354,000	20%	427,632	JAN 96/1.208
09---	TOTAL CONSTRUCTION COST	4,199,511	965,887	5,165,398	23%	6,239,801	JAN 96/1.208
30---	PLANNING, ENG, & DESIGN	986,957	148,043	1,135,000	15%	1,602,620	JAN 96/1.412
31---	CONSTRUCTION MANAGEMENT	808,696	121,304	930,000	15%	1,313,160	JAN 96/1.412
	TOTAL COSTS	6,290,000	1,290,000	7,580,000	21%	9,580,000	
	LOS ANGELES RIVER CHANNEL						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 00/1.386
0902B	ESTHETIC TREATMENT	3,546,627	709,325	4,255,952	20%	5,898,749	JAN 00/1.386
09---	TOTAL CONSTRUCTION COST	28,588,861	11,435,544	40,024,405	40%	55,473,825	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	6,879,130	1,031,870	7,911,000	15%	13,812,606	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	5,628,696	844,304	6,473,000	15%	11,301,858	JAN 00/1.746
	TOTAL COSTS	44,640,000	14,020,000	58,660,000	31%	86,490,000	
	RIO HONDO RIVER CHANNEL						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 00/1.386
0902B	ESTHETIC TREATMENT	2,660,946	532,189	3,193,135	20%	4,425,685	JAN 00/1.386
09---	TOTAL CONSTRUCTION COST	19,351,730	7,547,175	26,898,905	39%	37,281,882	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	4,457,391	668,609	5,126,000	15%	8,949,996	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	3,648,696	547,304	4,196,000	15%	7,326,216	JAN 00/1.746
	TOTAL COSTS	30,120,000	9,300,000	39,410,000	31%	57,980,000	

Table 22

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
FEASIBILITY COST ESTIMATE (SUMMARY)
OCTOBER 1991 PRICE LEVEL

CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1991	CONTINGENCY PERCENT	ESCALATED TO MID POINT OF CONSTRUCTION	MID POINT OF CONSTRUCTION
	CONFLUENCE MODIFICATION						
01----	LANDS & DAMAGES	0	0	0	0%	0	JAN 00/1.386
09---	TOTAL CONSTRUCTION COST	18,217,627	9,108,813	27,326,440	50%	37,874,446	JAN 00/1.386
30---	PLANNING, ENG, & DESIGN	4,146,957	622,043	4,769,000	15%	8,326,674	JAN 00/1.746
31---	CONSTRUCTION MANAGEMENT	3,382,609	507,391	3,890,000	15%	6,791,940	JAN 00/1.746
	TOTAL COSTS	25,750,000	10,240,000	35,990,000	40%	52,990,000	
	LA RIVER CHANNEL DEWATER						
01----	LANDS & DAMAGES	0	0	0	0%	0	FEB 99/1.339
09---	TOTAL CONSTRUCTION COST	4,020,802	1,246,448	5,267,250	31%	7,052,848	FEB 99/1.339
30---	PLANNING, ENG, & DESIGN	756,522	113,478	870,000	15%	1,451,160	FEB 99/1.668
31---	CONSTRUCTION MANAGEMENT	529,565	79,435	609,000	15%	1,015,812	FEB 99/1.668
	TOTAL COSTS	5,310,000	1,440,000	6,750,000	27%	9,520,000	
TOTAL CHANNEL MODIFICATIONS		112,110,000	36,290,000	148,390,000	32%	216,560,000	
TOTAL PROJECT COST		286,500,000	77,570,000	364,100,000	27%	530,800,000	

NOTES:
1. SEE M-CACES PRINTOUT FOR A DETAILED BREAKDOWN.
2. ALL 1991 REAL ESTATE COSTS ARE NEW AND BASED ON THE MOST CURRENT APPRAISAL.

08/10/02

Table 22A
ECONOMIC SUMMARY
October 1991 Price Levels, 8-3/4% Interest Rate

Inundation Reduction Benefits	
Structures and Contents	$50,569,000
Vehicle Damages	6,249,000
Emergency Costs Avoided	1,109,000
Advanced Replacement of Bridges	173,000
Flood Insurance Overhead	501,000
Freeboard	76,000
Total Annual Benefits	$58,677,000
Annual Costs	$42,654,000
Annual Maintenance	20,000
Traffic Delay Costs	1,648,000
Total Annual Costs	$44,322,000
Net Benefits	$14,355,000
B/C Ratio	1.3

TABLE 22

FEASIBILITY COST ESTIMATE		OCT 1990 PRICE LEVEL			LACDA		
CODE OF ACCTS	DESCRIPTION	COST WITHOUT CONTINGENCY	CONTINGENCY	COST WITH CONTINGENCY OCT 1990	CONTINGEN PERCENT	COST WITH CONTINGENCY OCT 1991	FOOT NOTE
	LA RIVER CHANNEL DEWATE						
01----	LANDS & DAMAGES	0	0	0	0%	0	
02----	RELOCATIONS	0	0	0	0%	0	
09---	TOTAL CONSTRUCTION COST	4,528,691	2,264,346	6,793,037	50%	7,725,000	
30---	PLANNING, ENG, & DESIGN	543,443	135,861	679,304	25%	870,000	
31---	CONSTRUCTION MANAGEMENT	380,410	95,103	475,513	25%	609,000	
	TOTAL COSTS	5,450,000	2,500,000	7,950,000	46%	9,204,000	
	TOTAL PROJECT COST	270,710,000	63,640,000	334,300,000	24%	389,600,000	

NOTES:

1. SEE M-CACES PRINTOUT FOR A DETAILED BREAKDOWN.
2. ALL 1991 REAL ESTATE COSTS ARE NEW AND BASED ON THE MOST CURRENT APPRAISAL.

10.02.02

TABLE 22A

ANNUAL COST/BENEFIT SUMMARY TABLE

October 1991 Price Levels, 8-3/4% Interest Rate

Inundation Reduction Benefits	
Structures and Contents	50,569,000
Vehicle Damages	6,249,000
Emergency Costs Avoided	1,109,000
Adv Replacement of Bridges	173,000
Flood Insurance Overhead	501,000
Freeboard	76,000
Total Benefits	$58,616,000
Annual Costs	44,894,000
Annual Maintenance	70,000
Traffic Delay Costs	1,318,000
Total Costs	$46,282,000
Net Benefits	12,334,000
Benefit/Cost Ratio	**1.3**

TABLE 23
COST APPORTIONMENT

ITEM	FEDERAL	NON-FEDERAL
Lands, Easements, ROW Relocations & Disposal areas		
All bridges, except Railroad		$163,320,000
Compton Creek		0
Los Angeles River		(120,390,000)
Rio Hondo		(42,930,000)
Channels	200,760,000	
Compton Creek	(7,580,000)	
Los Angeles River	(95,490,000) [1]	
Rio Hondo	(61,700,000) [2]	
Confluence	(35,990,000)	
Five Percent Cash Contribution	(18,205,000)	18,205,000
Total	182,555,000 [3]	$181,525,000

---

[1]includes $35,860,000 for Railroad Bridge Modifications

[2]includes $30,080,000 for Railroad Bridge Modifications

[3]50% is equal to $182,050,000; Fed. share is 50.14%

F. DESIGN AND CONSTRUCTION SCHEDULE

The present schedule consists of a 3 year Preconstruction, Engineering and Design phase (PED) lasting from March 1992 until January 1995. The General Construction period would last about eight years, from January 1995 until December 2002.

(1.) Immediately commencing with the initiation of PED, these work items will be scheduled for completion; LCA negotiations, mapping and surveying, geotechnical investigations, materials investigations, environmental mitigation analyses, economic validations, real estate and other acquisition plans, and hydrology and hydraulic studies.

(2.) The second phase of the construction package consists of parapet walls and levee armoring along Compton Creek and the first set of final plans and specifications that mark the end of the PED phase and the beginning of the construction phase of the project. The work along Compton Creek will be based on a Basis of Design document that will address only the technical data pertinent to Compton Creek. Construction of the improvements to Compton Creek is expected to last about 18 months.

(3.) The third phase of the construction schedule is the Physical Model at the Waterways Experiment Station (WES). However, preliminary design and preparation for the model began in July 1991. Due to several unstable flow regimes along the project length, considerable factors of safety in the form of increased height were added to some of the bridges spanning the Los Angeles River and Rio Hondo Channel. The mathematical models used to predict the project flowlines are particularly ill-suited for these hyraulic discontinuities. The WES model will be used to determine if any of the factors of safety employed may be reduced or perhaps preclude the modification of one or more of the bridges along the project length. The model construction will begin prior to initiation of PED.

(4.) The fourth phase of construction includes modification to utility and pedestrian bridges. These modification may be accomplished with no additional rights-of-way, no traffic impacts, and at a low cost. Construction of these modifications is expected to take approximately 15 months.

TABLE 23 COST APPORTIONMENT

ITEM	FEDERAL	NON-FEDERAL
HIGHWAY BRIDGES-LOS ANGELES		$124,366,000
RAILROAD BRIDGES	$ 35,754,000	
UTILITY BRIDGES		10,655,000
CHANNEL MODIFICATIONS		
COMPTON CREEK	8,666,000	
LOS ANGELES RIVER	54,634,000	
DEWATER LA RIVER	9,204,000	
TOTAL LOS ANGELES RIVER WITH COMPTON CREEK FEATURES	$108,258,000	$135,021,000
HIGHWAY BRIDGES-RIO HONDO		$ 45,873,000
RAILROAD BRIDGES	$ 26,840,000	
PEDESTRIAN BRIDGES		728,000
CHANNEL MODIFICATIONS	$ 36,096,000	
TOTAL RIO HONDO PORTION	$ 62,936,000	$ 46,601,000
CONFLUENCE MODIFICATION	$ 36,744,000	
SUBTOTAL BOTH PORTIONS	$207,938,000	$ 181,622,000
INITIAL 5% CASH CONTRIBUTION	- 19,479,000	$ 19,479,000
SUBTOTAL	$188,459,000	$ 201,101,000
OFFSETTING COST (AS PER WRDA 86 SEC 103)	$ 6,321,000	$ - 6,321,000
TOTAL COST APPORTIONMENT	$194,780,000	$ 194,780,000

TABLE 23 COST APPORTIONMENT

ITEM	FEDERAL	NON-FEDERAL
HIGHWAY BRIDGES-LOS ANGELES		$124,366,000
RAILROAD BRIDGES	$ 35,754,000	
UTILITY BRIDGES		10,655,000
CHANNEL MODIFICATIONS		
COMPTON CREEK	8,666,000	
LOS ANGELES RIVER	54,634,000	
DEWATER LA RIVER	9,204,000	
TOTAL LOS ANGELES RIVER WITH COMPTON CREEK FEATURES	$108,258,000	$135,021,000
HIGHWAY BRIDGES-RIO HONDO		$ 45,873,000
RAILROAD BRIDGES	$ 26,840,000	
PEDESTRIAN BRIDGES		728,000
CHANNEL MODIFICATIONS	$ 36,096,000	
TOTAL RIO HONDO PORTION	$ 62,936,000	$ 46,601,000
CONFLUENCE MODIFICATION	$ 36,744,000	
SUBTOTAL BOTH PORTIONS	$207,938,000	$ 181,622,000
INITIAL 5% CASH CONTRIBUTION	- 19,479,000	$ 19,479,000
SUBTOTAL	$188,459,000	$ 201,101,000
OFFSETTING COST (AS PER WRDA 86 SEC 103)	$ 6,321,000	$ - 6,321,000
TOTAL COST APPORTIONMENT	$194,780,000	$ 194,780,000

F. DESIGN AND CONSTRUCTION SCHEDULE

The present schedule consists of a 3 year Preconstruction, Engineering and Design phase (PED) lasting from March 1992 until January 1995. The General Construction period would last about eight years, from January 1995 until December 2002.

(1.) Immediately commencing with the initiation of PED, these work items will be scheduled for completion; LCA negotiations, mapping and surveying, geotechnical investigations, materials investigations, environmental mitigation analyses, economic validations, real estate and other acquisition plans, and hydrology and hydraulic studies.

(2.) The second phase of the construction package consists of parapet walls and levee armoring along Compton Creek and the first set of final plans and specifications that mark the end of the PED phase and the beginning of the construction phase of the project. The work along Compton Creek will be based on a Basis of Design document that will address only the technical data pertinent to Compton Creek. Construction of the improvements to Compton Creek is expected to last about 18 months.

(3.) The third phase of the construction schedule is the Physical Model at the Waterways Experiment Station (WES). However, preliminary design and preparation for the model began in July 1991. Due to several unstable flow regimes along the project length, considerable factors of safety in the form of increased height were added to some of the bridges spanning the Los Angeles River and Rio Hondo Channel. The mathematical models used to predict the project flowlines are particularly ill-suited for these hyraulic discontinuities. The WES model will be used to determine if any of the factors of safety employed may be reduced or perhaps preclude the modification of one or more of the bridges along the project length. The model construction will begin prior to initiation of PED.

(4.) The fourth phase of construction includes modification to utility and pedestrian bridges. These modification may be accomplished with no additional rights-of-way, no traffic impacts, and at a low cost. Construction of these modifications is expected to take approximately 15 months.

(5.) The fifth phase of work includes the first group of highway bridge modifications for the Los Angeles River and the Rio Hondo Channel. These would be the bridges mentioned in the WES work phase that would have a relatively high likelihood of not requiring extensive modification. Construction of all highway bridges would be phased so that no more than two bridges on either river would be modified at the same time. At no time will two adjacent bridges be modified at the same time. Due to this constraint, the construction period may be as long as 7 years.

(6.) The second set of highway bridge modifications may have a construction period of approximately 6 years due to the same constraints as the first group of bridges

(7.) The channel work construction for the Rio Hondo, Los Angeles River and their confluence will proceed by seperate contract and construction will last approximately 3 years.

(8.) The final phase consists of the Federal responsibility of modification of seven railroad bridges. The construction period for all seven bridges would span approximately 5 years.

Table 24. Summary of Design and Construction Schedule

Phase	Start	Finish	Years
Design	1992	1995	3
Construction			
1. Channel Modifications Compton Creek	1995	2001	6
2. Utility and Pedestrian Bridges	1995	1996	1
3. Highway Bridges	1995	2000	6
4. Highway Bridges	1997	2002	5-1/2
4. Railroad Bridges	1997	2002	6
5. Channel Modifications	1996	1999	2-1/2

G. PLAN IMPLEMENTATION

Institutional Requirements

Under the Water Resources Development Act (WRDA) of 1986, the local sponsor for a project is responsible for:

1) Paying 5 percent of the cost of the project assigned to flood control during construction of the project,

2) Provide without cost to the United States all lands, easements, and rights of way, including suitable borrow and dredged material disposal areas necessary for construction, operation, maintenance, repair, replacement and rehabilitation of the project,

3) Accomplish without cost to the United States, all necessary alterations and relocations to roads, railroads, bridges (except existing railroad bridges), pipelines, cables and other facilities, including interior drainage facilities, required for construction of the project;

4) Hold and save the United States free from damages due to the construction, operation, maintenance, repair, replacement and rehabilitation of the project, except for damages which are caused by the fault or negligence of the United States or its contractors.

All project costs for the NED Plan are attributable to flood control. Los Angeles County, as local sponsor, is required to provide all lands easements, rights-of-way and relocations (LERR) in support of the project. The WRDA of 1986 assigns all highway relocation costs to non-Federal interests. Therefore, the local sponsor responsibility includes the highway, utility and pedestrian bridge modifications and the five (5) percent requirement, as stated above. As stated in EC 1165-2-147 (15 March 1988), paragraph 3b, betterments desired by non-Federal interests that are related to the basic project and that can be accommodated in the construction of the basic project, may be approved for implementation,

as part of the project, if non-Federal interests agree to provide any additional costs incurred by the Federal government, as they are incurred. Costs of such betterment are not included in the project cost or economic evaluation.

Paragraph 13 f. Design Standards for Bridge and Highway Relocations states that "Total project costs for flood control projects and separable elements, and relocation credit to non-Federal sponsors, will reflect only that portion of the cost necessary to construct substitute bridges and roads to State design standards." The recommended plan reflects only that portion of the costs necessary to construct bridges and roads to State design standards. The Water Resources Development Act of 1986, as referenced on page 160, states that the ceiling on the sponsor fiscal participation is 50 percent.

The local sponsor may be expected to waive application of the ability-to-pay test.

H. NON-FEDERAL SPONSOR RESPONSIBILITIES

The local sponsor for the project is the Los Angeles County Flood Control District. The presently estimated non-Federal share of the total first cost is $181,525,000.

Requirements of local cooperation are specified below:

(1) Pay five percent of the cost of the project assigned to flood control during construction of the project, presently estimated at $18,205,000.

(2) Provide without cost to the United States all lands, easements, and rights of way, including suitable borrow and dredged material disposal areas necessary for construction, operation, maintenance, repair, replacement and rehabilitation necessary for construction, operation, maintenance, repair, replacement and rehabilitation of the project.

(3) Accomplish without cost to the United States, all necessary alterations and relocations to roads, railroads, bridges (except existing railroad bridges), pipelines, cables and other facilities, including interior drainage facilities, required for construction of the project;

(4) Operate, maintain, repair, replace and rehabilitate the complete project in accordance with regulations prescribed by the Federal government.

(5) Hold, and save the United States free from damages due to construction, operation, maintenance, repair, replacement and rehabilitation of the project, except for damages which are caused by the fault or negligence of the United States or its contractors.

(6) Prescribe and enforce regulations to prevent obstruction or encroachment on flood control works that would reduce their flood-carrying capacity or hinder construction, operation, maintenance, repair, replacement and rehabilitation of the project.

(7) Comply with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646), as amended.

(8) Comply with the requirement of Section 221 of the Flood control Act of 1970, (Public Law 91-611) as amended, in executing a written agreement with the Federal Government to furnish its required cooperation.

(9) Publicize flood plain information in the areas where structural measures were not found justified and provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise development in the flood plain.

(10) No less than once each year, the non-Federal interest shall inform affected interests of the limitations of the protection afforded by the project.

Perform environmental investigations as are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive

Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601-9675 on all lands necessary for project construction, operation and maintenance.

Assume complete financial responsibility for all costs incurred in cleanup of hazardous materials located on project lands and regulated under CERCLA and be responsible for operating, maintaining, repairing, replacing and rehabilitating the Project in a manner so that liability will not arise under CERCLA.

SECTION FIVE: PUBLIC COORDINATION

Public coordination for this feasibility phase of the LACDA study included a series of public workshops in October 1987 at five locations in the LACDA basin. At these workshops, study staff, staff from LACDPW, and staff from the Federal Emergency Management Agency (FEMA) briefed over 150 workshop participants, including community leaders and members of the press. In addition, there have been regular comprehensive newspaper articles to ensure that the purpose and scope of the study has been adequately known to LACDA basin residents. Public review and comment of the proposed project was considered in formulation of the array of alternatives screened, as well as in evaluating alternatives.

The public was presented with a full array of alternatives to be considered, and their comments on these alternatives were given full consideration during all phases of the planning process.

Public meetings were able to reach only a small fraction of the basin's over 4 million residents; a public involvement program for an area so densely populated thus involved a number of other approaches.

First, personnel from the Los Angeles County Department of Public Works were involved in the planning effort from the beginning. Local officials, likely to be aware of local concerns and attitudes, were able to help guide the planning process toward measures which would be acceptable to the local communities.

Second, information about the project was made available to the public through the media. An initial problem analysis was made available in 1985, prior to plan formulation. A number of other press releases concerning the potential flooding problem and potential alternative solutions were made over a period of about four years.

Third, public presentations of the data in this report were made in various geographical areas of the LACDA basin. They provided those with an intense interest in the project with an opportunity to comment in detail. These meetings were attended by representatives of the local press and the discussions in these meetings were locally reported. Therefore the meetings informed a broad cross-section of the community about the various points of view related to the project. Presentations consisted of general introductions to the problem and the planning process, a detailed slide/video presentation, and an open question-and-answer period. An informational brochure was available to all who attended the meetings and/or are currently on the project mailing list.

A record of public involvement efforts and the views of the public are on file in the Los Angeles District Office. For summary purposes, major issues raised during public involvement to date are listed and briefly described below:

1) The Need for Upgrading the LACDA System. Those present at public workshops did not initially understand the need for the upgrade of the system. There are several reasons for this. First, the LACDA system components have performed quite well over the past 40-50 years; during this time there has not been a flood exceeding current capacity. Thus the public perceives the system as highly reliable. Second, the concept of flood magnitude-frequency relationships is often difficult to grasp. Third, recent drought periods have focused public attention on problems caused by periods of low precipitation, rather than on infrequent flood periods. These issues have been successfully addressed in both public meetings and newspaper articles.

2) Factors influencing flooding. There were many questions regarding the interaction of factors which affect protection levels. Factors of apparent greatest concern were debris, releases from major reservoirs, and problems with trash and debris in the channels.

3) Project costs. There were numerous questions regarding the costs of the proposed project and community responsibility to cost share.
4) Alternatives. The primary concern regarding alternatives appeared to be their relative cost.
5) Local financing. There was concern over full participation of all affected communities in the project area.
6) Safety of the LACDA system. Concern over system safety focused on the potential for dam failure, which was explained as being very small, on precise identification of areas likely to be subject to levee failure, and on adequate flood fighting and evacuation programs.
7) Project delay. There was concern that a project might not be in place due to delays in project study and construction.
8) Specific project areas. There were a number of individual concerns related to resources and problems of specific features of the LACDA system. In particular, there was concern that upper basin environmental resources should not be impacted by a project. Specific safety issues were also raised.
9) Flood insurance. There were many questions regarding the cost and availability of flood insurance.
10) Local flooding problems. There were a number of questions regarding local street flooding and the potential for a project to solve these problems.

A public meeting was held on October 1, 1991 in Carson, CA to discuss the recently completed studies for improving the flood control channels. The official transcript of this meeting is contained in Appendix I of the EIS. Additionally, public comments on the Main Report and EIS were accepted during the 45 day public review period. The public comments and responses are also contained in the EIS in Appendix J. It is important to note that the opposition to the proposed channel improvements in the areas under consideration have mainly focused on improving water quality, increasing recreation opportunities and aesthetic enhancement. There are interests which oppose the continued use of concrete channels, preferring to return the existing channels to their natural state. This would necessitate a wider channel. Limited rights-of-way and numerous relocations would result in extremely high costs which make this alternative unfeasible.

SECTION SIX: CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The District Engineer finds that the existing LACDA system lacks adequate capacity to prevent catastrophic flooding in the lower reaches of the Rio Hondo from Whittier Narrows Dam to the confluence with the Los Angeles River, and the Los Angeles River from this confluence downstream to the Pacific Ocean. Upgrade of the system capacity has been identified as a vital concern to communities in the lower LACDA basin. In addition, the District Engineer finds:

1) The primary cause of the existing system inadequacies is a substantial increase in local runoff from developed areas into an improved storm drain system.

2) Improved analysis methods and 50 years of additional hydrologic records also indicate that the design storms for portions of the LACDA system have a recurrence interval of only about 50 years (2% chance each year), and that therefore the system is not able to provide the desired level of performance expected from flood control facilities in highly developed urban areas.

3) The LACDA system has provided protection from major flooding in the basin for a period of almost 50 years but has an inadequate capability to protect the LACDA basin communities in the future.

4) The San Gabriel River element of the LACDA system provides 100-year or greater levels of protection and thus does not require upgrade.

5) There are no feasible sites for new reservoirs in the system watershed which could be utilized to reduce flooding in the LACDA system in a cost-beneficial manner. This is because the flooding is the result of local runoff in the downstream basin areas.

6) Modification of existing Corps and local dams in the upper basin is not feasible due to high costs and lack of effectively controlling flooding.

7) There are no cost-effective diversion, off-channel storage, or non-structural measures which could be implemented to solve all or a portion of the flooding problem.

8) Transfer of flows from the Rio Hondo-Los Angeles River system to the San Gabriel system by diversion at Whittier Narrows Reservoir is not a cost-effective approach to the identified problems because it would require equally costly improvements to the San Gabriel River system channel in conjunction with needed improvements on the lower Los Angeles River.

9) Channel modifications in the upper LACDA basin areas are not justified economically because there is already a relatively high level of protection in these reaches of the LACDA system and because overflows in these reaches do not cause damages justifying the available costly solutions.

10) The most cost-efficient approach to modifying the existing channels in the lower LACDA basin is to raise the height of leveed sections of the river from two to eight feet using reinforced concrete parapet walls. This requires modification of twenty-seven bridges, primarily to accomodate the height of the parapet walls.

11) A 133-year conveyance capacity is optimum in the Rio Hondo and lower Los Angeles River reaches because higher levels of protection would require raising of major freeway overcrossings, including the interchange of the Long Beach and Artesia-Riverside Freeways, and a railroad overcrossing which passes beneath an existing freeway overcrossing. These actions would significantly raise costs for a project and would create massive socio-economic dislocations due to traffic interruptions.

B. RECOMMENDATIONS

I recommend that the plan described herein for flood control be authorized for implementation as a Federal project, with such modifications as in the discretion of the Chief of Engineers may be advisable, and subject to cost sharing, financing and other applicable requirements of Public Law 99-662 for this kind of project and as otherwise provided by law. The total first cost of the flood protection project at October 1991 price levels is $364,100,000. The Federal share is currently estimated at $182,600,000. This recommendation is made with the provision that the non-Federal interest will, prior to implementation, agree to the following:

1. Pay 5 percent of the costs of the project assigned to flood control during construction of the project.

2. Provide all lands, easements, rights-of-way, and dredged material disposal areas required only for flood control and perform all related necessary relocations.

3. Payment of additional funds during construction of the project in order to pay a minimum of 25 percent of the total project cost. In accordance with the Water Resources Development Act of 1986 (PL 99-662), the non-Federal share of the project cost shall not exceed 50 percent of the project cost assigned to structural flood control.

4. Maintain and operate without cost to the United States, all project facilities after completion in accordance with regulations prescribed by the Secretary of the Army.

5. Hold and save the United States free from damages due to construction, operation, and maintenance of the project, excluding damages due to the fault or negligence of the United States or its contractors, and free from water rights claims caused by construction and operation of the project.

6. Prior to installation or construction, prescribe and enforce regulations to prevent obstruction or encroachment on flood control works that would reduce their flood-carrying capacity or hinder maintenance and operation.

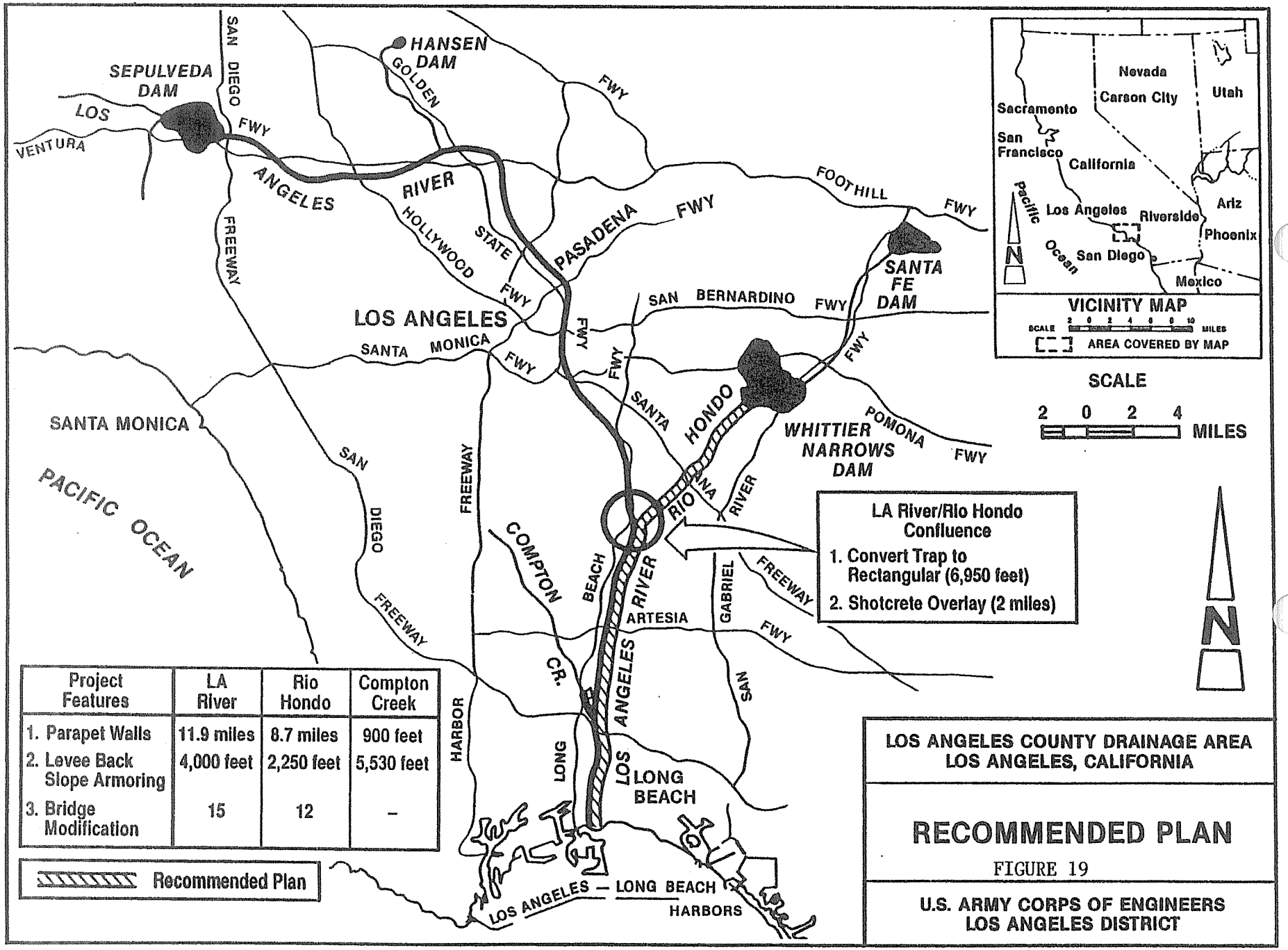
7. Comply with the applicable requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (PL 91-646).

8. Comply with Section 221 of the Flood Control Act of 1970.

9. Publicize flood plain information in the areas concerned and provide this information to zoning and other regulatory agencies for their guidance and leadership on preventing unwise development in the flood plain.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding.

Charles S. Thomas
Colonel, Corps of Engineers
District Engineer



Project Features	LA River	Rio Hondo	Compton Creek
1. Parapet Walls	11.9 miles	8.7 miles	900 feet
2. Levee Back Slope Armoring	4,000 feet	2,250 feet	5,530 feet
3. Bridge Modification	15	12	–

LOS ANGELES COUNTY DRAINAGE AREA
LOS ANGELES, CALIFORNIA

RECOMMENDED PLAN

FIGURE 19

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (818) 458-5100

THOMAS A. TIDEMANSON, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O.BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

December 16, 1991

IN REPLY PLEASE REFER TO FILE: P-4

Colonel Charles Thomas
District Engineer
U. S. Army Corps of Engineers
Los Angeles District
300 North Los Angeles Street
Los Angeles, California 90012

Dear Colonel Thomas:

LOS ANGELES COUNTY DRAINAGE AREA FEASIBILITY REPORT
LETTER OF INTENT AND FINANCIAL CAPABILITY

The Los Angeles County Department of Public Works (LACDPW) has reviewed the Draft Feasibility Report and Environmental Assessment for the Los Angeles County Drainage Area Review Study and supports the recommended plan. The plan selected to improve available flood protection in the lower Los Angeles basin requires modification of the Rio Hondo from Whittier Narrows Dam to the Los Angeles River and continuing down the Los Angeles River to the Pacific Ocean. The modifications are as follows: (a) raising the effective channel height by building parapet walls on 21 miles of existing levees; (b) raising or modifying bridges to accommodate the parapet walls; (c) widening and converting to rectangular cross-section 1.5 miles of channel below the confluence with the Rio Hondo; (d) armoring the land side of the levees in four locations; and (e) applying a concrete overlay in reaches with an existing rough grouted stone channel surface.

By means of this Letter of Intent, we want to assure you of our intent to participate in this Flood Control project subject to the appropriations of funds by the Los Angeles County Board of Supervisors during annual budget hearings. We understand that the LACDPW shall provide, during the period of construction, a cash contribution of 5 percent of the total Flood Control costs. If the value of lands, easements, rights of way and 5 percent contribution represents less than 25 percent of the total Flood Control costs, LACDPW shall provide during the period of construction an additional cash contribution in the amount necessary to make its total contribution equal to 25 percent of the total Flood Control cost. Presently, since the value of lands, easements, rights of way, relocations, and the 5 percent contribution represents more than 50 percent of total Flood Control cost, the fiscal responsibility of project costs is divided evenly (50/50).

We understand the specific requirements of local cooperation are:

1. To provide all lands, easements, and rights of way and all alterations and relocations of utilities, streets, highways, bridges, buildings, storm drains, and other structures and improvements.

2. To provide a cash or in-kind construction or land contribution towards reasonable fish and wildlife mitigation features in an amount equal to the same percentage as the non-Federal share of Flood Control costs as required by the then current rules and regulations.

3. To hold and save the United States free from water rights claims caused by construction and operation of the project.

4. To prescribe and enforce regulations to prevent obstruction or encroachment of Flood Control works that would reduce their flood-carrying capacity or hinder maintenance and operation.

5. Comply with applicable requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

6. Comply with Section 221 of the Flood Control Act of 1970.

7. Assume operation and maintenance of the works after completion in accordance with regulations prescribed by the Secretary of the Army.

We also understand that recreation development proposed by us in conjunction with the project will need to be justified and cost-shared on a 50 percent/50 percent basis with the Corps of Engineers.

In transmitting this Letter of Intent, it is mutually understood that the local financial responsibility will not be committed until Congress appropriates funds for construction of the projects and Board of Supervisors approval is obtained.

The current annual operating budget for the Flood Control portion of the LACDPW is $163 million. Of the $163 million, approximately $55 million is available for Flood Control construction on a discretionary basis.

In addition, the State of California Subvention Program reimburses local sponsors for up to 70 percent of the local's share of lands, easements, rights of way, and relocations on Corps of Engineers' projects. Assuming the Los Angeles County Drainage Area report is approved and construction is authorized, we currently anticipate that adequate local funds would be available for funding our share of the construction costs.

If you have any questions, please contact Mr. Carl L. Blum of my staff at (818) 458-4300.

Very truly yours,

T. A. TIDEMANSON
Director of Public Works

MSA:mv
35

cc: Each Supervisor

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (818) 458-5100

THOMAS A. TIDEMANSON, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O.BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: P-4

February 6, 1992

Colonel Charles Thomas
District Engineer
U.S. Army Corps of Engineers
Los Angeles District
300 North Los Angeles Street
Los Angeles, CA 90012

Dear Colonel Thomas:

LOS ANGELES COUNTY DRAINAGE AREA FEASIBILITY REPORT

On December 16, 1991, we presented our letter of intent, financial capability, and support for the recommended LACDA Plan. We understand that the project includes cost sharing for any proposed aesthetic treatment of the proposed parapet walls.

We also understand that any recreation development that may be identified in the future, in conjunction with the Master Plan that the County is currently preparing for the Los Angeles River, will not be a part of this project. However, we may separately request Federal participation in the implementation of our Plan.

If you have any questions, please contact Mr. Carl L. Blum of my staff at (818) 458-4300.

Very truly yours,

T. A. TIDEMANSON
Director of Public Works

DC:mv
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LOS ANGELES COUNTY DRAINAGE AREA REVIEW

FINAL FEASIBILITY STUDY

INTERIM REPORT

AND

ENVIRONMENTAL IMPACT STATEMENT

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
PLANNING DIVISION
WATER RESOURCES BRANCH
P.O. BOX 2711
LOS ANGELES, CA 90053

December 1991

Revised 2/92

LOS ANGELES COUNTY DRAINAGE AREA (LACDA) REVIEW STUDY
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Lead Agency: U.S. Army Corps of Engineers, Los Angeles District.

Cooperating Agency: County of Los Angeles, Department of Public Works.

ABSTRACT:

The LACDA Review Study is a system-wide approach to identifying means for improving the Los Angeles County Drainage Area flood control system. During the 40 years since its construction, its ability to provide a high level of protection has diminished. This is the result of an increase in surface runoff and an associated increase in flow from additional storm drains.

The proposed plan provides for the construction of concrete parapet walls along the existing channels of the lower Rio Hondo, Los Angeles River and Compton Creek. Selected areas of levee armoring are also part of the proposed action. Additionally, implementation of this project would necessitate the raising of numerous bridges crossing the channel.

Other alternatives were considered and found to be not feasible from an engineering, economic and/or environmental perspective.

Comments on this Draft EIS should be sent to:

THE OFFICIAL CLOSING DATE FOR THE RECEIPT OF COMMENTS IS 45 DAYS FROM THE DATE ON WHICH THE NOTICE OF AVAILABILITY OF THIS DRAFT EIS APPEARS IN THE FEDERAL REGISTER.

U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, California
90053-2325
Attention - Mr. Ron Ganzfried
Phone: 213-894-6088

Note: Information, displays, maps, etc. discussed in the LACDA Feasibility Study are incorporated by reference in this EIS.

DRAFT
LOS ANGELES COUNTY DRAINAGE AREA (LACDA) REVIEW STUDY
ENVIRONMENTAL IMPACT STATEMENT

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LOS ANGELES COUNTY DRAINAGE AREA (LACDA)
REVIEW ENVIRONMENTAL IMPACT STATEMENT

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SUMMARY

S.1 MAJOR FINDINGS AND CONCLUSIONS

Several alternative and plans were considered for improvement of the Los Angeles County Drainage Area (LACDA) to reduce the current flood potential in some portions of the system. Preliminary engineering and environmental analysis resulted in the screening out of all but two, plus the No Action alternative.

Continued flooding potential in portions of the LACDA system, particularly in the lower Rio Hondo and the lower Los Angeles rivers would be the consequense of implementation of the No Action alternative although there would be no environmental consequenses.

The proposed plan, consists of construction of parapet walls ranging in height from 2 to 8 feet along the top of the existing levee. This plan would necessitate the raising of numerous bridges along the Rio Hondo and Los Angeles rivers. Environmental impacts associated with the implementation of this alternative center around construction-related impacts, including noise and dust generation, traffic impacts and temporary disruption of bicycle and equestrian trails. Aesthetic impacts are also anticipated in conjunction with construction of the walls. It should be noted that the plan would reduce the flooding potential on the lower Los Angeles and Rio Hondo rivers, but would not correct the less severe upstream flooding potential.

The Modified Cross-section Alternative is a composite of Alternatives Two and Three in the Main Report, and consists of either converting existing trapezoidal channels into rectangular channels through construction of vertical retaining walls along the lower Rio Hondo and Los Angeles rivers, widening the existing trapezoidal channel, or a combination of both actions. This alternative would also include dredging the lower 2.5 miles of the Los Angeles River channel to a maximum of an additional 5 feet. Minimal bridge reconstruction would be involved with this alternative. Impacts associated with

this alternative include the potential loss of approximately 6 acres of wetland, sedimentation impacts associated with construction and dredging, as well as noise and traffic related impacts. There would be additional public safety impacts associated with bike and equestrian trails along the river. Similar to the proposed plan, this alternative would increase flood protection in the lower Rio Hondo and Los Angeles Rivers, but afford no improvements in the upper Los Angeles River.

S.2 AREAS OF CONTROVERSY

Based upon public input at the March 1989 public scoping meetings, two areas of potential controversy are presented below. Other issues discussed at the scoping meetings are identified in Section 5.1 of this EIS.

S.2.1 Areawide Planning and Growth Management

Many communities in the flood plain, including the City of Los Angeles, are attempting to implement various growth control strategies, and concern has been expressed that the magnitude of the proposed project may not be in line with other basin planning activities.

More specifically, the flow simulation model used by the Corps in designing the required improvement contains certain assumptions regarding development of currently undeveloped lands within the basin. It has been suggested that the proposed Corps project may be growth inducing as a result of these design assumptions and the "capacity" which is built in to handle flows from future areas of potential development.

Two aspects are important to note on this issue. The first has to do with what is considered growth inducing. The Corps model assumes a developed condition for certain currently undeveloped lands in the drainage area. The percentage of flow increase attributed to this development is about 2 percent of the total flow handled by the system, which makes little difference in the magnitude of improvements proposed. The basin is

considered already fully developed. Further, flood control structures, or lack thereof, do not limit growth in the manner that lack of water or sewer service would limit growth. Lack of flood control facilities has not been an important factor historically in stopping development activity.

The second aspect of the growth-inducement issue is the fact that the prime areas for potential development exist in the drainage area headwaters, and the proposed system improvements are located in the lower, downstream area of the drainage system. The present flood control inadequacies in the lower Los Angeles River and Rio Hondo need to be addressed. No upstream projects can alleviate the need to provide downstream solutions. An incrementally larger downstream solution can provide improved protection in a cost-effective manner. Additional improvements upstream are not effective from a flood control, economic, or environmental point of view.

S.2.2 Project Economics

The economic impact of the project on the cities within the 100-year flood plain was an issue of concern on the part of several participant representatives of local communities. The main issue was whether they would have to pay any costs of the project.

The cost of the project will be shared among the principal local, state, and Federal entities. The Federal government, through the Army Corps of Engineers, is responsible for between 50 and 75 percent of the total project costs. Non-federal interests are, therefore, responsible for between 25 and 50 percent of the total project costs. The local sponsor, the Los Angeles County Department of Public Works, will be responsible for paying this portion. It is possible that the State of California will reimburse up to 70 percent of the local outlay through its subvention program. The local sponsor's funds would come from the flood control budget and would be sufficient to cover project costs. Cities and communities within the lower river flood plain will benefit from the improvements, but will not be required to pay for any construction or maintenance.

S.3 UNRESOLVED ENVIRONMENTAL ISSUES

There are no unresolved environmental issues with the proposed plan.

S.4 RELATIONSHIP TO ENVIRONMENTAL QUALITY STATUTES AND OTHER ENVIRONMENTAL REQUIREMENTS

During the initial project planning and engineering process for the proposed action, consideration was given to the applicable environmental regulations and statutes affecting the environment. Table S.1-1 lists the statutes and indicates the degree of compliance achieved for each alternative. The applicable statutes are also briefly discussed below.

National Environmental Policy Act. This Environmental Impact Statement (EIS) has been prepared in accordance with the National Environmental Policy Act (NEPA) and the Army Corps of Engineers' Procedures For Implementing NEPA, dated March 1988. This EIS contains all sections of content required by NEPA, including a description of the alternatives under consideration as well as a description of environmental resources affected by the proposed alternatives. A description of the public involvement process is also included.

Fish and Wildlife Coordination Act. In compliance with this act, the Corps of Engineers initiated early coordination with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (Appendix G). Through these consultations and associated field studies, it was determined that the proposed action would not require the use of a Habitat Evaluation Procedure (HEP). The channels of the Los Angeles and Rio Hondo drainages support little wildlife, except at the ocean interface. Also, the alternatives evaluation process determined that alternatives which would affect the biotic resources within flood control basins were infeasible. Consultation with these agencies will remain ongoing throughout the EIS process.

Endangered Species Act of 1973, as amended. The Endangered Species Office identified four species that are endangered or threatened in the area of the proposed action. The mouth of the Los Angeles River supports resident California least tern populations, and the area is also known foraging habitat for the California brown pelican. The other two listed species are the Nevins barberry and San Fernando Valley spine-flower. After assessing proposed impacts, the Corps has determined, through the Biological Assessment (see Appendix C), that there will be no effect on the endangered species. As a result, formal consultation pursuant to the Endangered Species Act was not required.

Executive Order 11988, Flood Plain Management. The proposed action is itself a project to maintain the integrity of the flood plain and to improve the capacity of the existing flood conveyance system. Achieving these goals, the proposed project complies with this Executive Order.

Executive Order 11990, Protection of Wetlands. Wetlands protection has been considered. No wetlands are affected by the construction remain.

National Historic Preservation Act of 1966, as amended. The Corps is in full compliance with this Act to date. Determinations of eligibility to the National Register of Historic Places (NRHP) for all of the bridges which will be modified have yet to be made. The State Historic Preservation Officer has been consulted in regard to the need for additional studies (36 CFR 800.4). These studies will be completed during the Preconstruction Engineering and Design phase and coordinated to continue full compliance through the design and construction phase.

Clean Air Act of 1972, as amended. The South Coast Air Quality Management District (SCAQMD) is the agency with jurisdiction to enforce the Clean Air Act regulations and other relevant local air quality regulations. The project construction emissions have been compared to the threshold limits which trigger New Source Review Rules as defined by the Clean Air Act. The project does not exceed these threshold limits and therefore can be considered in compliance with the act. However, dust abatement measures have been proposed so that project construction operations will comply with SCAQMD Local Rule 403.

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Clean Water Act of 1977, as amended. In compliance with the guidelines at the 40 CFR 230.10(c) (promulgated by the EPA under Section 404(b) of the Clean Water Act), no discharge of dredged or fill material due to this project shall be permitted which will cause or contribute to significant degradation of the waters of the United States. The Section 404(b)(1) Evaluation required by the Act appears as Appendix D. It concludes that the proposed discharge sites for the discharge of dredged or fill materials are specified as complying with the requirements of the guidelines, with the inclusion of appropriate and practical conditions that could be developed during the period of analysis to minimize pollution or adverse effects on the aquatic ecosystem.

Coastal Zone Management Act of 1972, as amended. Federal consistency review is required when Federal actions may have a direct effect on the coastal zone as defined by the subject act, the California Coastal Act and, specifically, the California Coastal Management Plan. A coastal consistency determination is provided in EIS Appendix E as is the letter of concurrence from the Commission in Appendix J. The Commission found the project to be consistent to the maximum extent practicable with the California Coastal Management Program.

Estuary Protection Act. In planning for use or development of water and land resources, all Federal agencies shall give consideration to estuaries and their natural resources and their importance for commercial and industrial developments. (16 U.S.C. 1224).

All project plans and reports affecting estuaries and their natural resources that are submitted to Congress shall contain a discussion by the Secretary of the Interior concerning the estuaries and their resources and effects of the project on them and his

recommendation thereon. Ninety days are allowed after receipt of plans and reports for recommendations to be made. (16 U.S.C. 1224).

The proposed action and alternatives do not affect an estuary.

Land and Water Conservation Fund Act of 1965, as amended. No financial assistance may be given under any other Federal program for any project with respect to which such assistance to a State has been given or promised under this statute. (16 U.S.C. 4601-8(f)(1)).

No property acquired or developed with assistance from the Land and Water Conservation Funds shall, without the approval of the Secretary of the Interior, be converted to other than outdoor recreation uses. (16 U.S.C. 4601-8(f)(1)).

In order to assure consistency of policies and actions under this Act with other related Federal programs and activities and to assure coordination of planning, acquisition and development assistance to states under the Act with other related Federal programs and activities, the President may issue regulations. (16 U.S.C. 4601-8(g)). There are no lands associated with the proposed project or alternatives that would be purchased with Land and Water Conservation Funds.

Federal Water Project Recreation Act, as amended. It is policy of the Congress and the intent of the Act that:

1. In planning any Federal navigation, flood control, hydroelectric, or multiple-purpose project, full consideration shall be given to the opportunities afforded by the project for outdoor recreation and fish and wildlife enhancement;

2. Planning for development of the recreational potential of Federal projects shall be based on coordination of use with existing and planned Federal, state, and local public recreation developments; and,

3. Construction agencies shall encourage non-Federal administration of project lands and water areas for recreation and fish and wildlife enhancement except where areas or facilities are proposed for certain situations including national recreation areas, national forests, and wildlife conservation areas. (16 U.S.C. 4601-12).

Some facilities within flood control basins and channels have been developed with Federal Water Project Recreation Act funds. None of these uses will be significantly altered or affected by the proposed project. The Secretary of the Interior will be consulted regarding the effect of the development.

Marine Protection, Research and Sanctuaries Act of 1972, (Ocean Dumping). This act regulates the dumping of material into ocean water and strictly limits dumping of material which would adversely affect human health, welfare or amenities, or the marine environment, ecological systems or economic potentialities.

Disposal of dredged material associated with the modified channel cross-section alternative (Main Report Alternatives Two and Three) has not been fully addressed in terms of quantifying toxicity of the material to be disposed. This would be required prior to disposal of this material to an ocean disposal site. This is not the recommended alternative for construction. The NED plan does not require ocean disposal.

Wild and Scenic Rivers Act, as amended. This drainage basin has been highly altered over most of it's area for many years. None of the streams in the area of study are suitable for designation under this act.

Table S.1-1

RELATIONSHIP OF PLANS TO ENVIRONMENTAL PROTECTION STATUTES AND OTHER ENVIRONMENTAL REQUIREMENTS

Federal Statutes	Corps NED Plan Alternative
FEDERAL STATUTES	
Clean Air Act	Full
Clean Water Act	Full
Endangered Species Act	Full
Fish and Wildlife Coordination Act	Full
National Historic Preservation Act	Full
National Environmental Policy Act	Full
Coastal Zone Management Act	Full
Estuary Protection Act	N/A
Federal Water Project Restoration Act	Full
Land and Water Conservation Fund Act	Full
Marine Protection, Research and Sanctuaries Act	N/A
EXECUTIVE ORDERS	
Floodplain Management (E.O. 11988)	Full
Protection of Wetlands (E.O. 11990)	Full
STATE AND LOCAL POLICIES	
California Coastal Act of 1976	Full

Notes:

Full = Full Compliance. Having met all requirements of the statute, E.O. or other environmental requirements for the current stage of planning (either pre- or post-authorization).

Partial = Partial Compliance. Not having met some of the requirements that normally are met in the current stage of planning.

S.5 PREVIOUSLY PREPARED DOCUMENTS

A substantial number of reports have been prepared specifically relating to the LACDA system. These reports are referenced in Section 8. NEPA documents have been prepared for various aspects of specific portions of the LACDA system and are listed below.

Army Corps of Engineers, Los Angeles District

1981 Sepulveda Basin Master Plan and Final Environmental Impact Report/Statement.

n.d. Draft Environmental Assessment, Routine Operations and Maintenance within the Los Angeles County Drainage Area (LACDA). In preparation.

n.d. Hansen Dam Sediment Removal, Supplemental Environmental Assessment. In preparation.

n.d. Hansen Dam Recreation Master Plan, Environmental Impact Statement. In preparation.

SECTION 1 - NEED FOR AND OBJECTIVES OF THE ACTION

1.1 STUDY AUTHORITY

Under congressional authority, the Los Angeles District of the U.S. Army Corps of Engineers is conducting a flood control study of the Los Angeles County Drainage Area (LACDA) project. The existing flood control system was constructed by the Corps of Engineers and the Los Angeles County Flood Control District (now part of the Department of Public Works) from the 1930s through the 1960s to protect the City of Los Angeles and other metropolitan areas in coastal Los Angeles County from flood damage. Increased urbanization resulting in increased runoff as well as changes in design criteria have resulted in an inadequate level of flood protection afforded by the LACDA system. The purpose of the study is to determine potential methods of increasing the level of flood control protection as well as assessing the environmental effects of modifying facilities. Figure 1.1-1 identifies the general project area.

Prior to 1914, little attention had been directed to the problem of flood control within the LACDA area. The Los Angeles County Flood Control District maintained exclusive authority for flood control from 1916 to 1935. A major flood in 1934 prompted Congress to pass the Emergency Relief Act of 1935 for construction of storm drains, permanent channel improvements and debris basins. The Flood Control Act of June 22, 1936 refined the mission of the Corps of Engineers from that of providing emergency relief to the permanent supervision of future flood control plans which permitted construction of flood control facilities on the Los Angeles and San Gabriel rivers. The Flood Control Act of June 28, 1938, and subsequent Flood Control Acts in 1941, 1944, 1946, 1950, 1954, and 1958 allowed for the completion of the LACDA system.

1.2 PUBLIC CONCERNS

Based on the public scoping meetings held on March 9, 1989, as well as prior meetings, the following are considered major public concerns:

- Potential impact to wildlife, including areas behind the various dams; the aquatic vegetation in a small portion of the lower Los Angeles River; and potential impact to the California least tern.

- Potential aesthetic impacts both from the parapet walls as well as from graffiti that the walls may invite.

- Cumulative impacts associated with development within the LACDA area.

- Potential impacts to recreation, including bicycle and equestrian trails.

- Safety concerns associated with the LACDA system.

- Economic concerns relative to the cost and funding share for LACDA improvements.

- Concern over the NED plan and the feasibility of other alternatives.

1.3 PLANNING OBJECTIVES

The planning objectives of the LACDA Feasibility Study are as follows:

- To reduce the potential for human suffering and possible loss of life due to catastrophic failure of the flood control system, wherever feasible;

- To reduce flood damages originating from the study reaches by increasing the level of flood protection, wherever feasible;

- To provide, where feasible, project-related water conservation, recreation development, sediment management, transportation, and environmental enhancement opportunities.

A number of factors have gradually increased the flood threat to Los Angeles County. Analyses indicate that flood events as frequent as 25 years may exceed the capacity of the flood control channels and inundate certain urban areas, especially in the lower Los Angeles River (Reach 4). The low level of protection is attributable to the following factors.

- The original design storm for portions of the LACDA system is based on hydrology that now translates to an approximately 50-year flood;

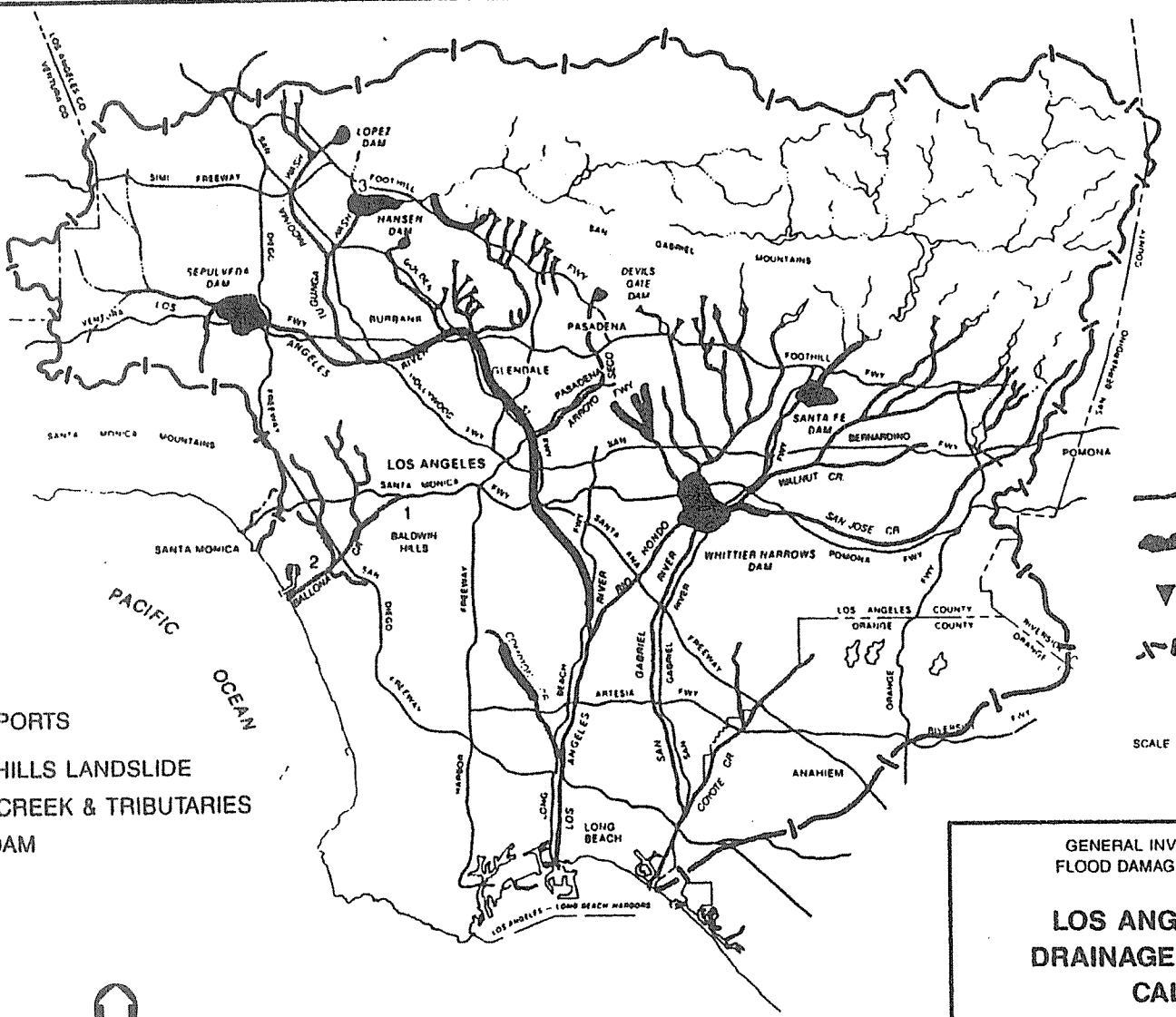
- Intensive urbanization in the last fifty years has significantly increased the runoff response of the watershed, thereby increasing the maximum peak flow of water the system must handle during a major storm event;

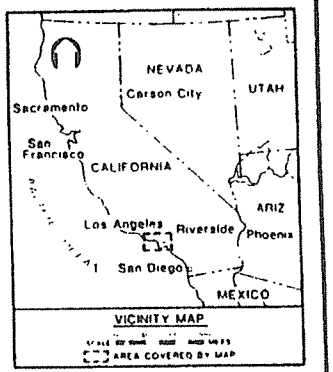
- Greater understanding of freeboard requirements in leveed channel sections has lowered the calculated safe conveyance capacity of some portions of the LACDA channels below original design capacities;

This environmental impact statement describes and assesses the environmental impacts of the alternatives associated with various levels of flood protection within the LACDA system.

U.S. ARMY ENGINEER DISTRICT

CORPS OF ENGINEERS





LEGEND

- CHANNEL
- DAM AND RESERVOIR
- DEBRIS BASIN
- STUDY AREA DRAINAGE BASIN BOUNDARY

SCALE 2 0 2 4 6 8 10 MILES

NOTE: COYOTE CREEK IS PART OF SARROC INTERIM III

INTERIM REPORTS

1 BALDWIN HILLS LANDSLIDE

2 BALLONA CREEK & TRIBUTARIES

3 HANSEN DAM

GENERAL INVESTIGATIONS-SURVEYS
FLOOD DAMAGE PREVENTION STUDIES

LOS ANGELES COUNTY DRAINAGE AREA (REVIEW) CALIFORNIA

LOS ANGELES DISTRICT
SOUTH PACIFIC DIVISION
1 JANUARY 1987

SECTION 2 - ALTERNATIVES

2.1 PLANS ELIMINATED FROM FURTHER CONSIDERATION

A range of solutions to reduce the flood threat along the Los Angeles River and the Rio Hondo has been considered by the Corps of Engineers during the initial plan formulation phase of the study. Two stages of analysis were conducted to determine the most feasible alternatives. The first step entailed a general screening and preliminary analysis of many varied alternatives which were listed under the heading of "Strategies" in the main report (Table 10). Several plans were considered and initially rejected. Those passing the primary screening process were analyzed in a more intensive manner. Those passing the second screening were analyzed in further detail. Table 2.1-1 summarizes the various factors used to reject these alternatives from further consideration.

2.1.1 Plans Considered and Initially Rejected

2.1.1.1 Integrate Flow Retarding Facilities into the System

Providing flow retarding facilities other than new flood control dams was eliminated from consideration. This alternative would involve providing additional flood detention facilities in the form of underground reservoirs or aquifers, designation and maintenance of floodways, or discharge of flood flows to wetlands. All of these possibilities have major drawbacks. Underground reservoirs are very expensive and could not be built large enough to be effective. Use of aquifers requires that surface recharge areas be provided. Significant new recharge areas are scarce in the Los Angeles area. Also, recharge does not occur rapidly and is not responsive to rapid runoff events. Designation of floodways is not feasible in urban Los Angeles since development occurs directly adjacent to channels and rivers. Discharge to wetlands is not feasible since an insignificant amount of wetlands exists in the locations where discharging would be most effective.

Table 2.1-1

SUMMARY OF ALTERNATIVES CONSIDERED

Plans Initially Rejected	Ability to Meet Objective	Feasibility	Environmental Factors	Cost/Benefit Ratio	Reason for Rejecting
PLANS INITIALLY REJECTED					
Flow Retarding Facilities	Will not meet objective	Not feasible	Positive	Not computed, but very low	Not effective or implementable
Construct New Dams	May meet objective	No feasible sites found	Major environmental impacts	Not computed but very low	Not feasible plus major environmental impact
Detention Basins	Would not accomplish objective	May be feasible	Soil disposal impacts	Low benefit-to-cost ratio	Not cost effective
Gravel Pits	May meet objective	Questionable feasibility; will require tunnel or pumps	Some impacts anticipated	Low benefit-to-cost ratio	High cost/ availability of sites
Increase Height of Existing Dams	May partially accomplish objective	Feasibility questionable	Possible substantial biological impact; land acquisition impact	Not computed	Environmental impact and may not be feasible
Increase Volume of Existing Dams	May partially accomplish objective	Is not feasible	Significant biological impacts	Not computed	Feasibility and environmental impacts
Modify Gates and Outlet Design in Existing Dams	Will not accomplish objective by itself	Feasible, but will not achieve objective	May create significant impact	Not computed	Will not accomplish objective
Renovate Devils Gate Dam	Would not accomplish objective	May not be feasible	May create significant impact; historic implications	Not computed, but very low	Will not accomplish objective, not feasible
Reoperate Existing Dams	Will not accomplish objective	May be feasible	Potential significant biological impact	Not computed	Environmental and feasibility considerations
New Flood Conveyance Facilities	May meet objectives	Probably not feasible	May have substantial impacts	Not computed but very low	Feasibility/cost and impacts
Expand Capacity of San Gabriel	May partially accomplish objective	Feasibility questionable	Will eliminate soft bottom	Low compared to NED project	Feasibility/greater construction impacts/potential

Table 2.1-1 (Continued)

SUMMARY OF ALTERNATIVES CONSIDERED

Plans Initially Rejected	Ability to Meet Objective	Feasibility	Environmental Factors	Cost/Benefit Ratio	Reason for Rejecting
Deeping Existing Channels	May partially meet objectives	Feasibility questionable	May create substantial impacts/soil disposal,utility disruptions	Low compared to NED project	High cost/soil disposal/utility problems
Damage Management	Will not accomplish objective	Not feasible	No additional impacts from present	Not computed	Will not accomplish objectives
PLANS CONSIDERED FURTHER					
Raise Channel Walls and Modify Bridges	Will accomplish objective	Feasible	Construction impacts significant, especially bridges	B/C = 1.3	Studied in detail
Modification of Channel Cross-Section	May accomplish objective	Feasible	Construction impacts significant	Not computed Greater than unity	Studied in detail

2.1.1.2 New Dams

In order to reduce peak flood flows on the Rio Hondo and Los Angeles rivers, it may be possible to construct an additional flood control dam(s). This would have the effect of providing an additional major flood flow detention facility which could reduce peak flows in channels downstream. From an economic standpoint, land acquisition and construction of a new major flood control dam would be very expensive. No feasible site has been identified in a location which would provide effective flow detention for the Rio Hondo and Los Angeles River. Also, the inevitable conversion of existing uses to that of flood control would not have a high level of public acceptance even though some recreational benefits are possible. Alternatives involving construction of new dams were not considered feasible and were eliminated from further consideration.

2.1.1.3 Detention Basins

Pacoima Spreading Grounds. Adaptation of the existing Pacoima spreading grounds at the confluence of the Pacoima Diversion Wash and Pacoima Wash was considered to accommodate occasional flood flows. The existing spreading grounds, which contain approximately 153 acres (62 ha), would be excavated to a uniform 15-foot (4.6 m) depth creating a volume of 2,200 acre-feet (2.7 million m^3). Control works for the Pacoima Wash would inlet water directly to the detention facility. The outlet works would include a gated outlet delivering flow to Pacoima Wash. This alternative would only influence portions of Tujunga Wash. Due to the limited flood damage reduction, this is not a cost-effective flood control solution. It was therefore dropped from further consideration.

Tujunga Wash Spreading Grounds. This is a similar facility to the Pacoima Spreading Grounds. It is located at the confluence of the Pacoima Diversion Channel and Tujunga Wash. It is not a cost-effective solution to local flood control and is not considered further.

Taylor Yard Detention Facility The existing Taylor Railroad Yard contains approximately 200 acres (81 ha) and is located in the Los Angeles Narrows area generally south of the Glendale Freeway between the Los Angeles River and San Fernando Road. The site was considered for use as a temporary flood flow detention

facility. All existing facilities would be removed and the site would be excavated to a uniform 29 feet (9 m) in depth providing approximately 4,500 acre-feet (5.5 million m^3) of detention storage capacity. The site might double as a spreading ground during non-detention periods. New inlet/outlet works would be provided.

This alternative was rejected primarily on a cost-benefit basis as the upstream modifications would be very costly while only creating moderate benefits, and since projected flooding in the downtown Los Angeles area would only create relatively low levels of property damage. There would also be substantial impacts associated with extensive excavations and the disposal of large quantities of earth. Furthermore, the availability of the Taylor Yard is questionable since a development proposal has recently been submitted to local planning authorities.

2.1.1.4 Gravel Pits

Two possible gravel pit sites that could be used as off-channel flood storage were identified in the Irwindale area. The Livingston-Graham-El Monte pit has an approximate potential volume of 40,000 acre-feet (49.4 million m^3) with a surface area of approximately 415 acres (168 ha). The Conrock-Durbin pit has an approximate volume of 41,000 acre-feet (50.6 million m^3) with a total surface area of 365 acres (148 ha).

An inlet to the detention pits would be taken directly from the San Gabriel River channel either as a side flow weir or as a valved, operable reinforced concrete inlet. The amount of water that would be diverted would depend on the frequency of event for which this element is used.

The existing vertical walls of the quarries would need to be worked to create more gradual side slopes (2:1) and/or stabilized to preclude slippage. Water conservation is a side benefit of this element, either as direct infiltration or by recharge when subsequently returned to the river.

This alternative was rejected from further consideration due to the high cost involved with acquiring the gravel pits, as well as the costs involved with construction of a tunnel or a series of high volume pumps for evacuation. Since the sites are still used for gravel extraction, the Corps would be required to pay for the cost of the unused sand and gravel resources as well as for the costs of the pits themselves. These sites are also proposed for redevelopment by the City of Irwindale, and their acquisition for flood control would impair these plans.

2.1.1.5 Modify Height of Existing Dams

Increasing the capacity of existing flood regulating reservoirs by adding height to the structure was considered. By increasing capacity at major basins, peak flows in channels can be reduced, but not to a wholly satisfactory level. Increasing the height of the dams means that the flood pool elevation and surface coverage would also increase. The additional acreage covered would have to be acquired and managed by the Corps. Land acquisition costs would be significant. Also, the two dams that have the greatest potential benefits from increased capacity, Sepulveda and Whittier Narrows, are most problematical from the standpoint of acquisition of additional land. Increasing the height of existing dams would require expensive structural upgrades, including possible modification of gates and outlet structures. The alternative of increasing the height of existing dams is not considered feasible and is eliminated from further consideration.

2.1.1.6 Modify Volume of Existing Dams

This alternative increases the capacity of existing flood regulating reservoirs by excavation and deepening. Preliminary engineering has determined that the excavation of a significant flood-reducing volume at existing dams has questionable cost effectiveness and feasibility. The excavations currently underway at Hansen Dam and planned for Santa Fe Dam will remove millions of cubic yards of silt and gravel. These maintenance excavations do not increase the capacity of the flood control system, but retain space in the debris pool for future incoming sediment. Disposal of the material may be problematical, and future sediment inflow could render this alternative ineffective. In addition, most of the basins now contain significant biological resources

which would be impacted by any major excavation project. Thus it appears that only maintenance-oriented silt removal is feasible at flood control dams and that excavation within flood control dams is not a viable method of increasing system capacity. This alternative will not be considered further in this study.

2.1.1.7 Modify Gates and Outlet Design in Existing Dams

This alternative attempts to reduce peak flood flows through modification of the gate and outlet works at flood control basins. Of the five major flood control dams, Sepulveda has been identified as the most likely candidate for such modifications because of its unique spillway design. The main disadvantage of this alternative is that gate modifications alone cannot effect significant reduction in peak flow volumes. The channels downstream of dams were designed in conjunction with the existing outlets, and discharge flows from the dams can be modified only to a certain degree without making changes to the channels as well. In addition, structural improvements modifying gate and outlet works would be expensive relative to the benefit received. For these reasons, modification of gates and outlet design at existing dams will not be considered further in this study.

2.1.1.8 Renovate Devil's Gate Dam

This alternative calls for the renovation of the existing Devil's Gate Dam on Arroyo Seco. Although this alternative would have no appreciable flood control benefit for the lower Los Angeles River, it may provide an increment of protection for downtown Los Angeles. However, structural renovation was considered to be too expensive. The dam is also considered to have historical significance which must be considered in any renovation project. This alternative has been eliminated from further consideration since it does not alleviate any flood threat in target areas of the lower Los Angeles River, and its feasibility and cost effectiveness is questionable.

2.1.1.9 Re-operation of Existing Dams

Re-operation (or re-regulation) of existing dams involves changing the basic operating criteria of the dams during the rainy season in an effort to change the peak runoff volumes discharged to the channels. This alternative cannot eliminate flooding inadequacies in the LACDA basin. Implementation may reduce the flood threat in some locations but has the potential to increase the flood threat elsewhere as a result. Furthermore, the rapid response time of flood events in the LACDA system would require accurate and prompt transmission of field data and immediate operational response to the information. These constraints jeopardize the viability and reliability of the alternative. As a result, this alternative will not be considered further in this study.

2.1.1.10 Construct New Conveyance Facilities

Options to convey additional flood flows include construction of new aqueducts, pipelines, tunnels and/or channels. Overland options such as channels and aqueducts have the major problem of the high cost of obtaining new rights-of-way. The construction of underground options would also be very costly and construction limitations would probably not allow the building of structures large enough to handle a sufficient capacity. The costliness of these options makes them infeasible, and therefore the construction of new conveyance facilities will not be considered further.

2.1.1.11 Expand Capacity of San Gabriel River

As an option to constructing improvements to the Los Angeles River channel, flood conveyance capacity of the San Gabriel River channel could be expanded instead, and flows could be diverted from Los Angeles River to San Gabriel River through re-regulation of Whittier Narrows Dam. This option has low feasibility from both policy and technical perspectives. Improvements would have to be constructed along San Gabriel River similar to those proposed for the Los Angeles River. Modification of the

San Gabriel River channel would not be easier or less costly than modifications of the Los Angeles River. Additional improvements would call for eliminating extensive areas of soft bottom along the San Gabriel, involving attendant water rights implications. Significant environmental mitigation would also be required. Thus, benefit-to-cost considerations actually would be less favorable compared to improving the lower Los Angeles River.

Currently, the San Gabriel River provides more than 100-year protection to the flood plain, which is significantly better than the lower Los Angeles River provides. Improving the San Gabriel River channel and burdening it with additional flows is not considered desirable or feasible and will not be considered further.

2.1.1.12 Alter Existing Channels

As an option to increasing the existing channel efficiency, it is possible to excavate and deepen channels to increase flood conveyance capacity. This alternative would have very high costs, perhaps comparable to construction of new channels. Existing concrete channel inverts would be removed, the channels deepened, and new concrete inverts placed. Those sewer pipelines and other utilities which presently run beneath the channel invert would have to be relocated at great expense, and extension and possibly reconstruction of bridge piers would be necessary. Earth moving/hauling would be an extensive undertaking which could only be accomplished during non-rainy months. This option has a low benefit-to-cost relationship and has been eliminated from further consideration.

2.1.1.13 Damage Management Alternative

This alternative would focus on measures to reduce the extent of property damage rather than improving the flood control system. These measures would focus upon four basic features including relocation, flood-proofing, flood-fighting and flood plain management/insurance.

Relocation is impractical in the lower reaches of the LACDA basin due to the extensive area impacted. On upper reaches such as Tujunga Wash, this alternative has a poor benefit-to-cost ratio due to the high value of real estate and relatively low flood damage potential.

Flood-proofing would involve the use of dikes and other structures to reduce the extent of damage to structures. Other measures would involve the raising of structures above flood plain levels and the use of materials to minimize damage on ground floors of buildings.

Flood-fighting would involve the use of sandbagging and other emergency measures to reduce the extent of flooding during a major event storm. This could reduce the magnitude of an event but relies on having sufficient warning time in order to respond effectively.

Flood plain management and insurance are currently in place in the majority of the LACDA basin. This does not diminish the existing flood threat but provides for future regulation of flood plain development and an opportunity for financial recovery in the event of flood damage. In a significant flood event, the insurance payout could be in the billions of dollars.

These alternatives were not considered feasible nor did they achieve the study objective. They were no longer considered in this study.

2.2 NO-ACTION ALTERNATIVE

Under the No Action Alternative, no modifications to the LACDA system other than that associated with general operation or maintenance will be provided. There will continue to be a flood threat on portions of the LACDA system, most notably in the lower Los Angeles River near the City of Long Beach where flood protection of only a 40-year level is provided in some areas.

This alternative would involve no new construction and therefore cause no construction-related environmental impacts. In the event of flood flows exceeding the capacity of the system, the levees would be overtopped and could fail due to erosion on the back side of the levee. This would cause general flooding within the City of Long Beach and adjacent areas which would have the potential for loss of life and severe property damage to residential, industrial and commercial properties as well as public facilities. It is estimated that property damage could exceed $2 billion for a 100-year flood.

There would be severe disruption of transportation systems and the potential for toxic material spills and other water quality impacts. There would also be considerable expenditure of energy and other non-renewable resources associated with the rebuilding of flood damaged areas.

2.3 ALTERNATIVES CONSIDERED IN DETAIL

This section provides a description of the alternatives that can accomplish the project objectives and that will be analyzed in detail in this EIS. The action which is contemplated by the Corps has multiple objectives which include:

- Reducing peak flood flows in target areas of the LACDA system,
- Increasing system flow capacity and/or reducing flood-related damage in areas subject to flooding.

The physical and operational aspects of the alternatives which meet these objectives are described below.

2.3.1 NED Plan of Improvements (Main Report Section 4)

The National Economic Development (NED) Plan alternative would provide between 100- and 133-year protection for the Rio Hondo and lower Los Angeles Rivers through the implementation of various physical and structural improvements. The proposed improvements fall into the following categories of modification: (1) construction of parapet walls of various heights along the tops of channel levees; (2) raising or modifying traffic, railroad, utility and pedestrian bridges to accommodate higher channel walls; (3) miscellaneous armoring of the levees with stone to prevent wash out;
(4) channel widening at the confluence of the Rio Hondo and Los Angeles rivers; and (5) overlaying some existing grouted stone channel sides with concrete. It is anticipated that the overall project will require approximately nine years to construct.

2.3.1.1 Parapet Walls (NED Plan)

Parapet walls would be provided on the tops of existing levees on the Rio Hondo Channel and lower Los Angeles River for nearly the entire length of the reaches from Whittier Narrows to the Pacific Ocean. Wall heights would range in height from two to eight feet (0.7 to 2.4 m). Figure 16, p. 144 lists typical section detail for parapet walls. Tables 2.3-1 and 2.3-2 provide information on the location and extent of proposed parapet walls for the lower Los Angeles River and Rio Hondo, respectively. Figures 2.3-1, 2.3-2 and 2.3-3 provides a schematic of the maximum parapet wall height by area for each major segment. Concrete would be supplied by batch plants in the area with aggregate coming from the Irwindale area.

2.3.1.2 Raising of Existing Bridges (Main Report NED Plan)

In order to provide parapet walls continuously along the channels, many of the vehicle, railroad and utility bridges which cross the channels must be raised in height. The required height adjustments range from 1.6 to 6.3 feet (0.5 to 1.9 m) for the lower Los Angeles River, and 1.4 to 5.3 feet (0.4 to 1.6 m) along the Rio Hondo.

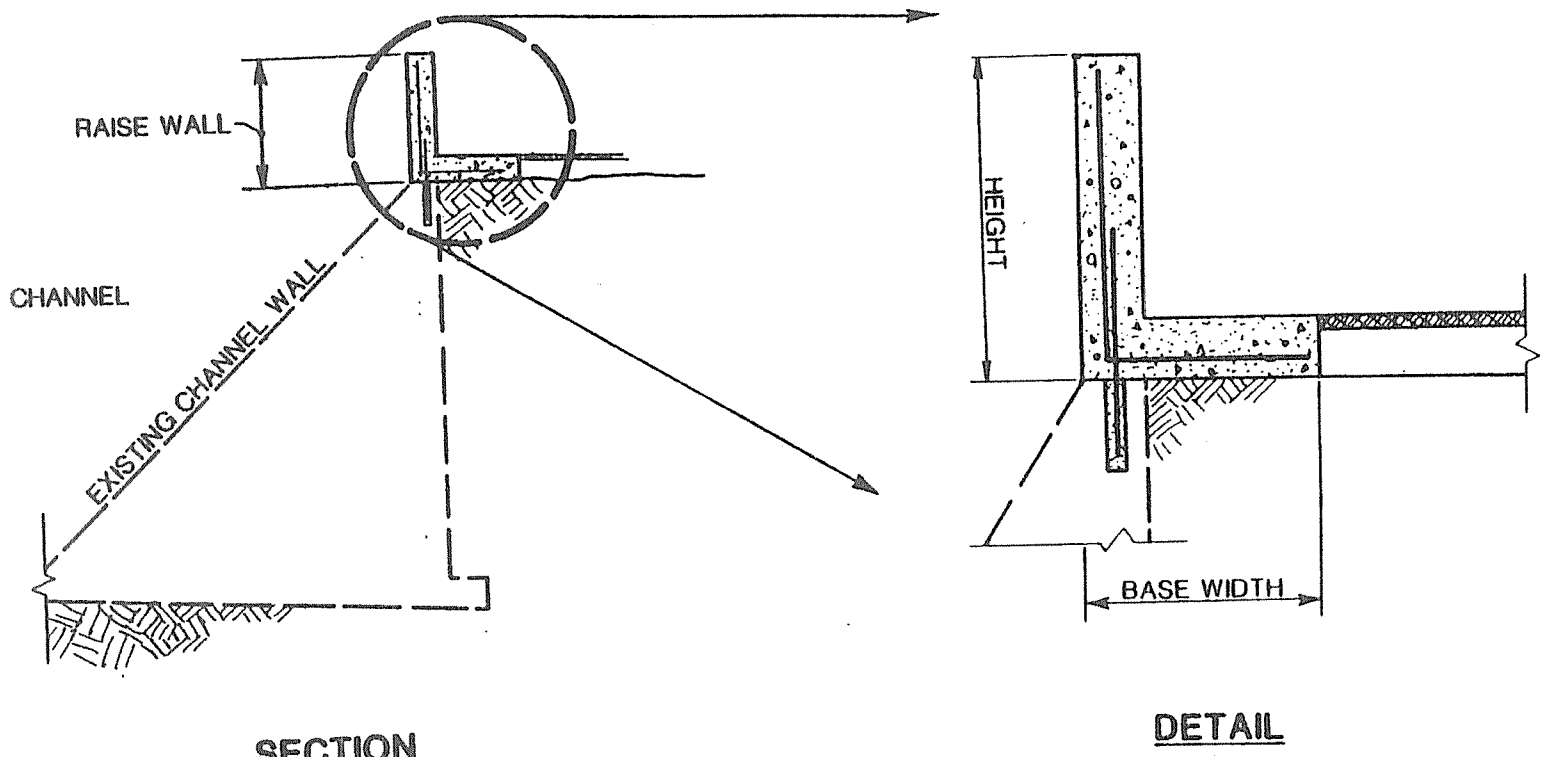


FIGURE 2.3-1

TYPICAL SECTION DETAIL FOR PARAPET WALL

Of the 25 bridges which cross the lower Los Angeles River, 15 need to be significantly modified. Twelve of the 18 bridges over the Rio Hondo are proposed to be significantly modified. Table 2.3-3 lists the bridges that must be raised and the required height increase for the lower Los Angeles and Rio Hondo. Figures 2.3-5 and 2.3-6 delineate the approximate location of each of these bridges. Raising of these bridges would entail closure for up to an 18-month period. Detours will be provided at most bridges in order to lessen the impact to traffic during the construction period. The proposed detours are summarized in Table 2.3-3. In general, temporary roadway bridges of at least four lanes will be constructed immediately upstream or downstream of the existing bridge. Construction of these bridges may require use of right-of-way in the vicinity of the bridge, as shown in Table 2.3-4. Temporary railroad bridges will also be constructed in a similar manner. Pipeline bridges are not anticipated to require temporary replacement since the construction period to raise these bridges will be much shorter than for railroad and roadway bridges. The bridges are proposed to be constructed in five phases to reduce the intensity of cumulative and adjacent bridge closures.

2.3.1.3 Levee Armoring (NED Plan)

Existing levees would be strengthened by armoring the back slope at selected locations with grouted stone. The specific reaches to receive armoring are shown in Figure 2.3-4. In each location shown on Figure 2.3-4, it is assumed that back sides of both levees will be armored to prevent erosion of the back of the earthen levee in case they are overtopped. Approximately 21,000 cubic yards (15,960 m^3) of grouted stone will be required for the armoring operation. Stone armoring would be delivered by truck from the San Gabriel Rock quarry.

Table 2.3-1

PARAPET WALL HEIGHT RANGES
LOWER LOS ANGELES RIVER MED DESIGN

River Miles From Mouth	Station	Bridge	Height To Raise Bridge (feet)	Parapet Wall Height Range (feet)	Length (feet)
12.3	650 + 00.00			0 - 6	4000.00
11.5	610 + 00.00			6 - 8	3800.00
10.8	572 + 00.00			3 - 8	725.00
10.7	564 + 75.00			4 - 8	775.00
10.5	557 + 00.00			4	400.00
10.5	553 + 00.00			3 - 5	1562.00
10.2	537 + 38.00	Standard Oil Util.	3.4	3 - 4	464.47
10.1	532 + 73.53	Rosecrans	3.9	0 - 3	3070.14
9.5	502 + 03.39	Compton	2.7	0 - 4	4740.83
8.6	454 + 62.56	Atlantic	6.3	1	962.56
8.4	445 + 0.00			7	1040.00
8.2	434 + 60.00			3 - 4	1298.82
8.0	421 + 61.18			0 - 5	5811.22
6.9	363 + 49.96	Long Beach Blvd.	4.0	0 - 3	2649.96
6.4	337 + 00.00			0 - 5	2517.82
5.9	311 + 82.18	Del Amo	2.5	1 - 3	2421.63
5.4	287 + 60.55	U.P.R.R.	**	1 - 7	1160.55
5.2	276 + 00.00			4	1434.18
5.0	261 + 65.82	LA-LB Light Rail	3.3	5 - 7	865.82
4.8	253 + 00.00			5	1310.00
4.5	239 + 90.00			2 - 4	2245.01
4.1	217 + 44.99			3 - 7	844.99

Table 2.3-1 (Continued)

PARAPET WALL HEIGHT RANGES
LOWER LOS ANGELES RIVER MED DESIGN

River Miles From Mouth	Station	Bridge	Height To Raise Bridge (feet)	Parapet Wall Height Range (feet)	Length (feet)
4.0	209 + 00.00			6	1900.00
3.6	190 + 00.00			3 - 5	1915.17
3.2	170 + 84.83	Texas Oil Util.	2.8	0 - 5	1301.82
3.0	157 + 83.01	Willow	4.2	3 - 5	1320.93
2.7	144 + 62.08	Richfield Oil Util.	3.9	4 - 6	3965.82
2.0	104 + 96.26	Pacific Coast Hwy.	3.1	4 - 6	2621.96
1.5	78 + 74.30			4 - 5	2899.30
0.9	49 + 75.00	Edison Util.	1.6	3 - 4	2704.47
0.4	22 + 70.53				

Table 2.3-2

PARAPET WALL HEIGHT RANGES
RIO HONDO RIVER
FROM WHITTIER NARROWS TO LA RIVER CHANNEL MED DESIGN

Miles from LA River Channel	Station	Bridge	Height To Raise Bridge (feet)	Parapet Wall Height Range (feet)	Length (feet)
8.3	437 + 23.71			0 - 2	2823.71
7.7	409 + 00.00			1 - 4	1200.00
7.5	397 + 00.00			5 - 8	300.00
7.5	394 + 00.00			1 - 6	1549.01
7.2	378 + 50.99	Whittier	5.0	0 - 1	3950.99
6.4	339 + 00.00			0 - 6	3060.00
5.8	308 + 40.00	Washington	4.8	3 - 8	4006.26
5.1	268 + 33.74	A.T.S.F. Railway	2.5	2 - 5	2442.49
4.6	243 + 91.25	Slauson	2.2	1	839.35
4.5	235 + 51.90	P.E. Railway	1.4	1 - 5	1706.90
4.1	218 + 45.00	Ped Xing	3.6	4 - 5	3844.56
3.4	180 + 00.44	Suva	5.2	1 - 6	2970.87
2.8	150 + 29.57	Florence	3.5	1 - 6	2579.57
2.4	124 + 50.00	Ped Xing	5.3	4 - 7	2954.44
1.8	94 + 95.56	S.P.R.R.	3.2	2 - 4	1340.64
1.5	81 + 54.92	Firestone	1.6	0 - 6	1926.49
1.2	62 + 28.43			1 - 4	2028.43
0.8	42 + 00.00			0	2028.43
0.2	9 + 13.99				

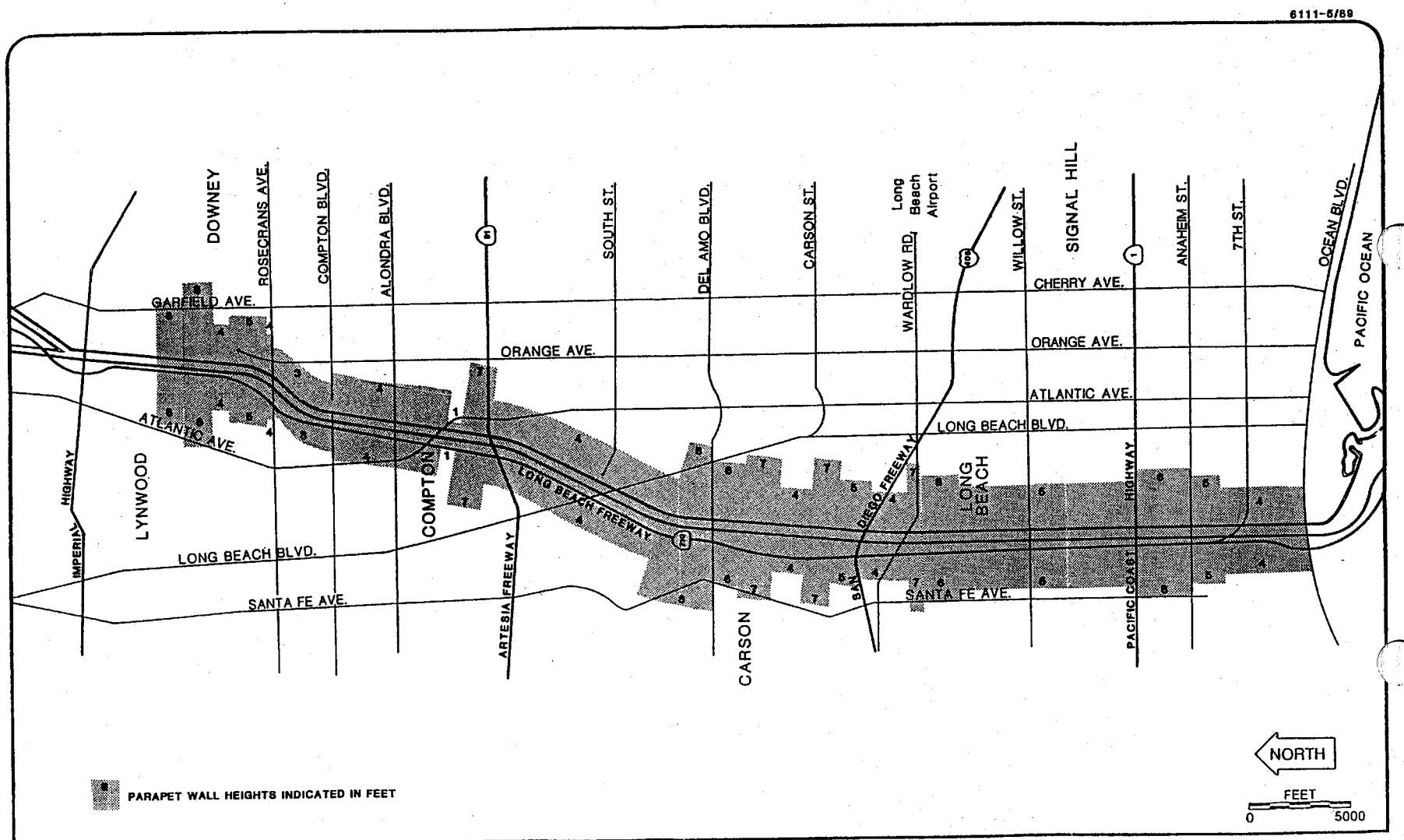
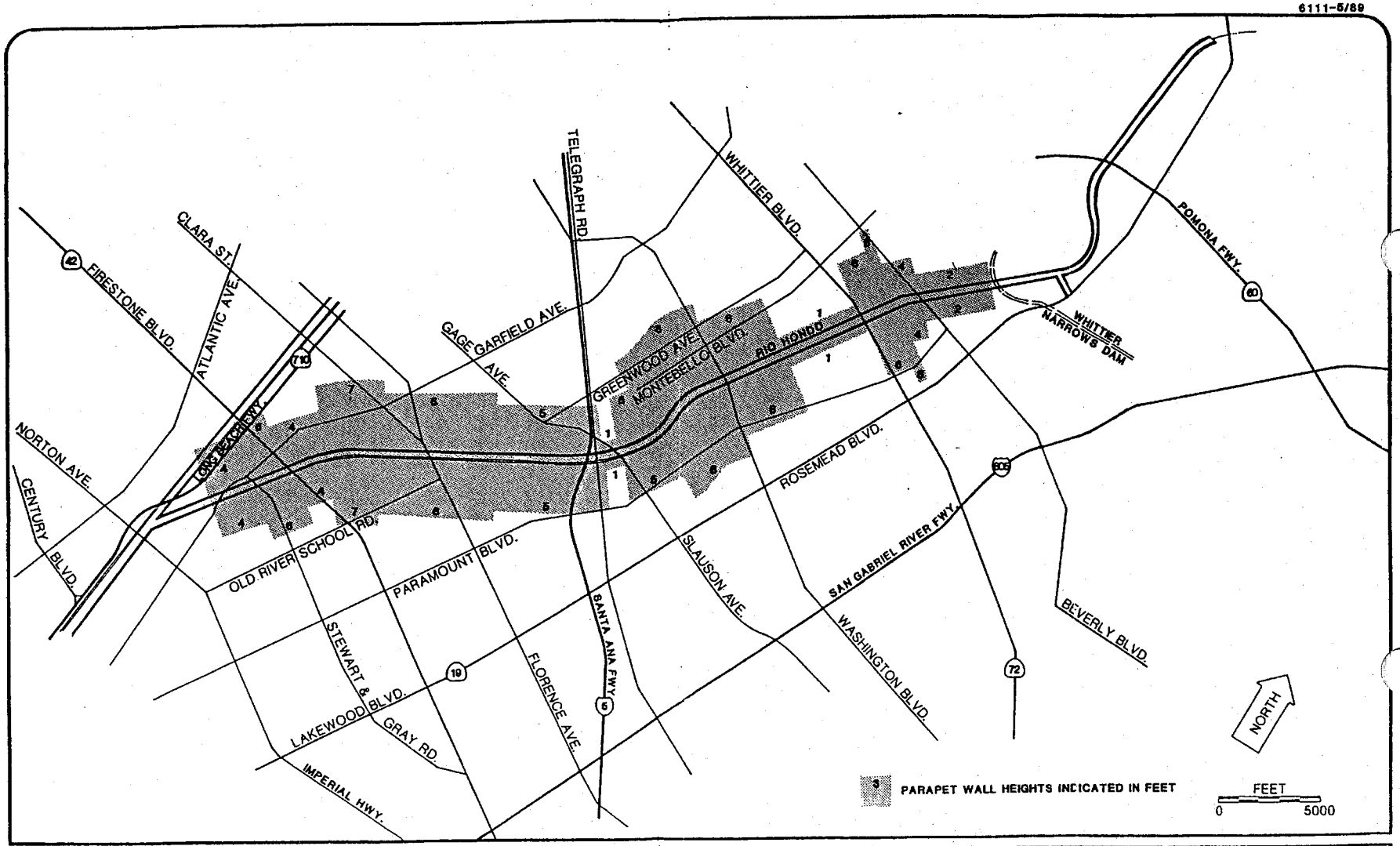


FIGURE 2.3-2

MAXIMUM PARAPET WALL HEIGHTS PROPOSED FOR LOWER LOS ANGELES RIVER



MAXIMUM PARAPET WALL HEIGHTS PROPOSED FOR RIO HONDO CHANNEL

FIGURE 2.3-3

Table 2.3-3

RAISE BRIDGE ANALYSIS
LOWER LOS ANGELES RIVER 133-YEAR DESIGN

No.	Bridge	Station	Height To Raise Bridge	Detours
1	Imperial Hwy	634 + 04	0.0[1]	Not required
2	Standard Oil Util	537 + 38	3.4	Not required
3	Rosecrans	532 + 74	3.9	4-lane bridge
4	Compton	502 + 03	2.7	4-lane bridge
5	Atlantic	454 + 63	6.3	4-lane bridge
6	Long Beach	363 + 50	4.0	4-lane bridge
7	Del Amo	311 + 82	5.0	4-lane bridge
8	UPRR	287 + 61	0.0	Temporary bridge
9	LA-LB Light Rail	262 + 48	3.3	Two-track bridge
10	Texas Oil Util	170 + 85	2.8	Not required
11	Willow	157 + 83	4.2	4-land bridge
12	Richfield Oil Util	144 + 62	3.9	Not required
13	Pacific Coast Hwy	104 + 96	3.1	6-lane bridge
14	Edison Util	49 + 75	1.6	Not required
15	PERR	37 + 04	0.0[2]	Not required

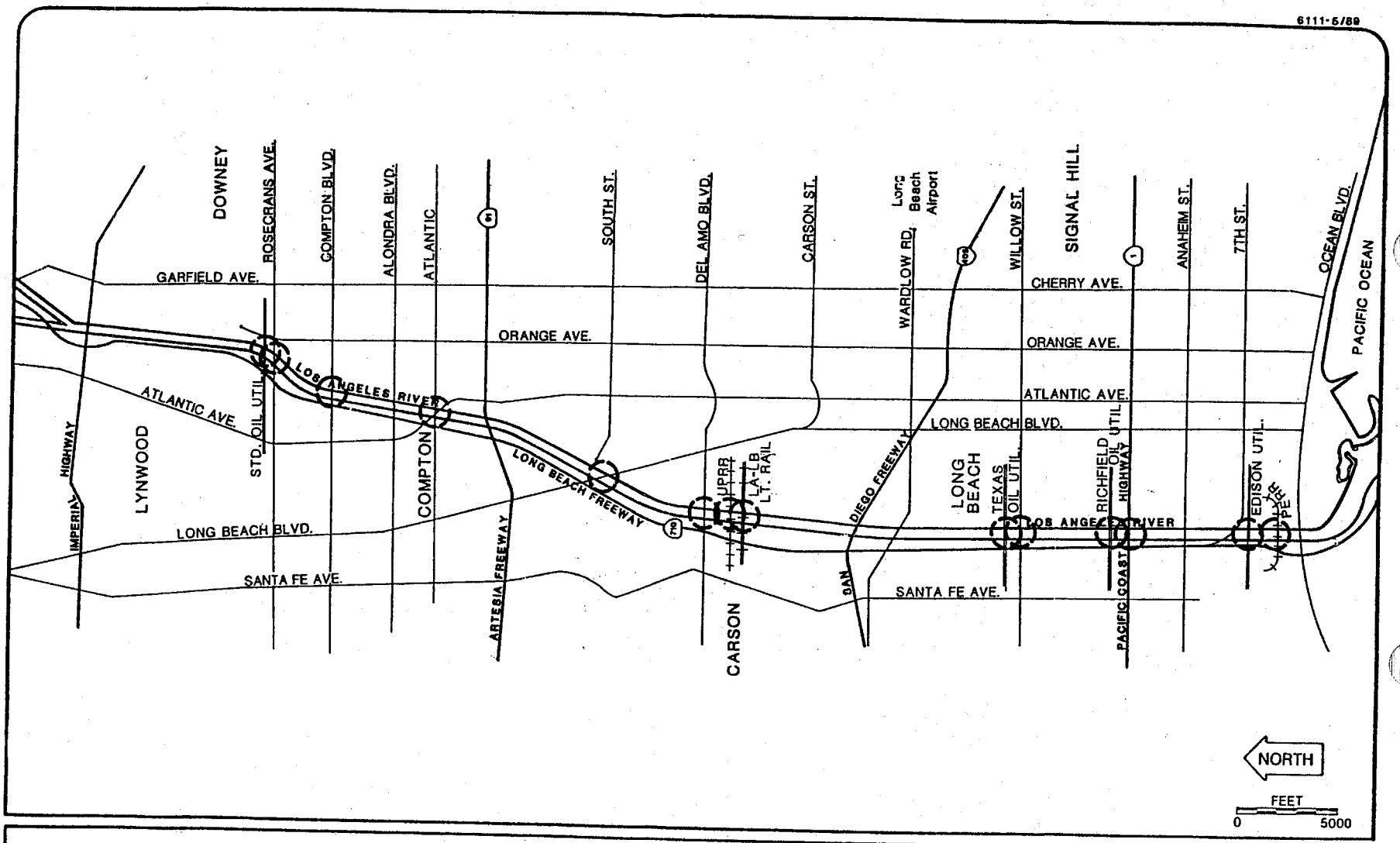
[1] Rebuild right abutment
[2] Move bridge 115 feet downstream.

Table 2.3-4

RAISE BRIDGE ANALYSIS
RIO HONDO CHANNEL 133-YEAR DESIGN

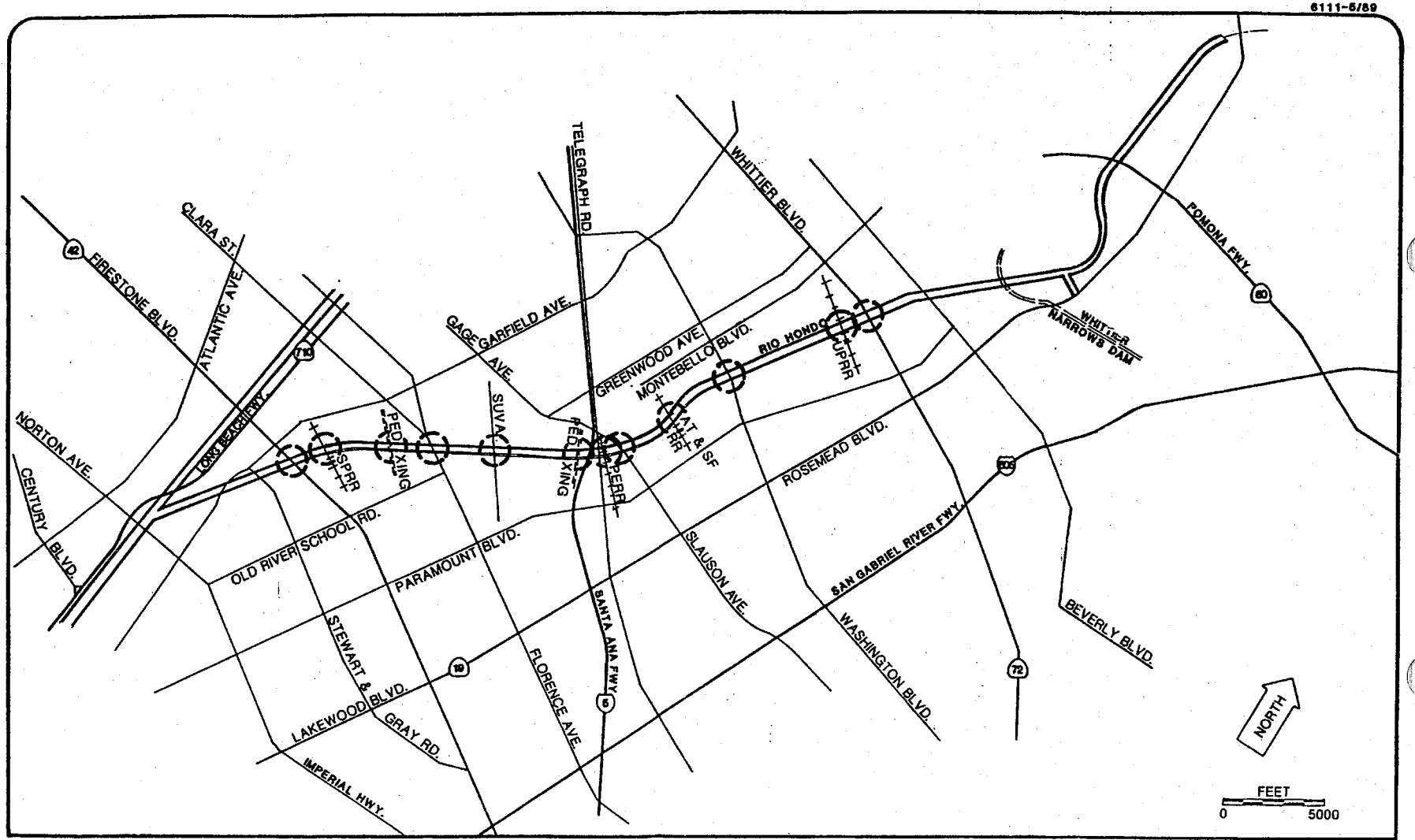
No.	Bridge	Station	Height To Raise Bridge	Detours
1	Whittier	378 + 50.99	5.0	4-lane bridge
2	U.P.R.R.	369 + 03.79	0.0'	Temporary bridge
3	Washington	308 + 43.86	4.8	4-lane bridge
4	A.T. & S.F. Railway	268 + 33.74	2.5	Temporary bridge
5	Slauson	243 + 91.25	2.2	4-lane bridge
6	P.E. Railway	235 + 51.90	1.4	Temporary bridge
7	Pedestrian Xing	218 + 45.00	3.6	Not proposed
8	Suva	180 + 00.44	5.2	Not proposed
9	Florence	150 + 29.57	3.5	4-lane bridge
10	Pedestrian Xing	124 + 50.00	5.3	Not proposed
11	S.P.R.R.	94 + 95.56	3.2	Temporary bridge
12	Firestone	81 + 54.92	1.6	4-lane bridge

' Modify bridge design from plate support to truss type



BRIDGES TO BE RAISED ALONG LOWER LOS ANGELES RIVER

FIGURE 2.3-4



BRIDGES TO BE RAISED ALONG RIO HONDO CHANNEL

FIGURE 2.3-5

Table 2.3-4a

TEMPORARY RIGHT-OF-WAY NEEDED FOR BRIDGE CONSTRUCTION

Location of Bridge	Location and Type of Property *Right Bank	*Left Bank
Rio Hondo		
Whittier Blvd.	Warehouse bldg. & paved parking area	Junk yard
UPRR Bridge, so. of Whittier Blvd.	Low-lying land one movable bldg.	Industrial land, misses building
Washington Blvd.	motel at street level; 1 story office bldg.	unused land only
Slauson Ave.	Industrial land parking only no buildings	Weiner Steel Works, includes main bldg., scrap steel, fence
RR Bridge No. of Telegraph Rd.	Industrial yard with ass'td stored materials	North end of Weiner Steel, fencing and stored materials
Florence Ave	Partial take of fenced, paved industrial area w/ misses bldg.	Affects single-lane dirt access road but misses power tower
RR Bridge No. of Firestone Blvd.	Low-lying land only, misses poles	Vacant land; some bushes no bldgs
Firestone Blvd.	Former Jeep Eagle yard area for storage and sale of new autos	Nursery operations and cover structure improvements under power towers; some bare land
Los Angeles River		
Imperial Highway	County park land, paved roads, no structures	Nursery storage, cyclone fencing, dirt roadway

* Looking downstream.

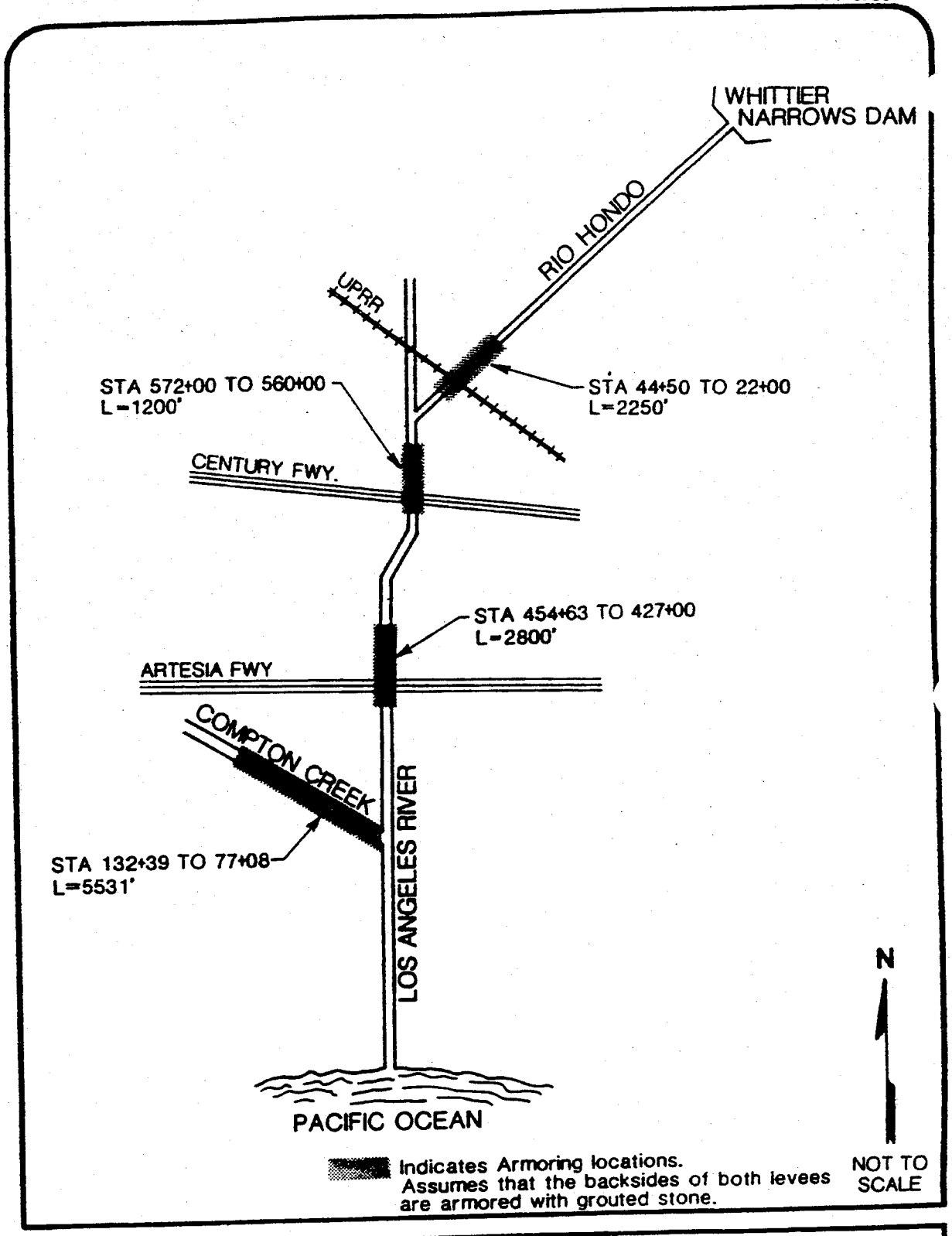
Table 2.3-4a (continued)

TEMPORARY RIGHT-OF-WAY NEEDED FOR BRIDGE CONSTRUCTION

Location of Bridge	Location and Type of Property *Right Bank	*Left Bank
Los Angeles River		
Compton Blvd.	Paved truck and trailer parking lot, no buildings	Compton 3-par golf course incl. fence, grass, access road, the main bldg.
Atlantic Ave.	Industrial land, 3 buildings and paved area	Horse stables, fencing, open paddock area. No stables in take
Long Beach Blvd.	Small area betw. power towers and on/off ramp	Trailer park, incl. 7 trailer spaces and improvements
Del Amo Blvd.	Small area betw. power line towers & on/off ramp	Portion of Sutter school yard, no buildings
Willow Street	No private land	Small area of Long Beach City Park incl. grass and some trees
Pacific Coast Hwy.	Interchange onto PCH	Corner lot with 3-unit building / 4 car garage & parking lot

* Looking downstream.

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FIGURE

LEVEE ARMORING LOCATIONS

2 3-6

Table 2.3-5

ESTIMATED PERSONNEL FOR RED ALTERNATIVE

Category	Number
Wall Construction	
Supervisors	2
Surveyors	3
Equipment Operators	12
Laborers	10
Truck Drivers	5
Armoring	
Supervisors	2
Surveyors	2
Equipment Operators	8
Truck Drivers	5
Laborers	6
Bridge Construction	
Supervisors	3
Surveyors	4
Heavy Equipment Operators	14
Laborers	20
Truck Drivers	15
Traffic Control	8

2.3.1.4 Widening Channel at Confluence (NED Plan)

At and just downstream of the Rio Hondo-Los Angeles River confluence, a 7000 foot section of the Los Angeles River would be converted from trapezoidal to rectangular cross-section and widened 30 feet. Parapet walls would be constructed on the rebuilt channel walls. Approximately 453,000 cubic yards of excavated material would need to be transferred to a landfill disposal site, probably in the Puente Hills landfill.

2.3.1.5 Application of Concrete Overlay (NED Plan)

The existing grouted stone channel walls in the vicinity of the Rio Hondo-Los Angeles River confluence will be overlaid with concrete to reduce hydraulic friction and improve channel flow characteristics.

2.3.1.6 Construction (NED Plan)

Overall, construction of the NED alternative will require approximately nine years. Bridge modifications will be accomplished prior to parapet wall construction so that the wall construction can proceed smoothly. Each bridge modification could take from eighteen to thirty months to complete. Tables 2.3-5 and 2.3-6 summarize the personnel and equipment required for construction of this alternative. It should be noted that these are estimates only. An individual contractor may modify the equipment and personnel use.

Table 2.3-6

ESTIMATED EQUIPMENT FOR MED ALTERNATIVE

Category	Number
Wall Construction	
Backhoe	2
Survey trucks	3
Drilling rigs	2
Compressors	4
Concrete trucks	4
Flatbed trucks	1
Soil compactors	2
Motorized Grader	2
Bulldozer	1
Light duty trucks	4
Medium duty trucks	3
Heavy duty trucks	3
Armoring	
Backhoe	2
Bulldozer	2
Compactor	2
Water truck	1
Grout pump and truck	1
Light duty trucks	3
AC Paver	1
Heavy duty truck	4
Bridge Construction	
Backhoe	5
Bulldozer	3
Compactors	5
Light duty trucks	6
Medium duty trucks	7
Heavy duty trucks	8
Generators	4
Compressors	3
Concrete trucks	5
AC paver	1
Motorized grader	3
Drill	4
Crane	3

2.3.1.7 Additional Flood Protection (NED Plan)

An additional level of flood protection (up to 250-year protection) could be provided to the flood plain on the lower Los Angeles and Rio Hondo rivers by adding height to the proposed parapet walls and raising additional bridges. In most cases, parapet walls could be increased in height by less than two feet (compared to the NED protection levels) to accomplish the additional protection.

A major drawback of this alternative would be the necessity of closing bridge ramps over the Los Angeles River on the Artesia Freeway (Freeway 91). The NED plan (100- to 133-year level of protection) represents the greatest level of flood protection without necessitating the raising of the Artesia Freeway bridges.

2.3.2 Modified Channel Cross-section Plan of Improvement (Main Rpt. Alts. 2 and 3)

This alternative would entail the widening and/or converting from trapezoidal to rectangular cross-section of the Los Angeles and Rio Hondo channels in the same reaches as the NED project rather than the construction of the parapet walls. The alternative would involve reconstruction of the trapezoidal channel to a rectangular channel along most of the reaches. The last approximately 2.5 miles (4 km) of the Los Angeles River (from Willow Street to the river mouth) would be dredged out to a maximum of five feet below the current channel bottom (invert). The general characteristics of this alternative are described below. The entire project construction would last an estimated six years.

2.3.2.1 Reconstruction of Channel Walls (Main Report Alternatives 2 and 3)

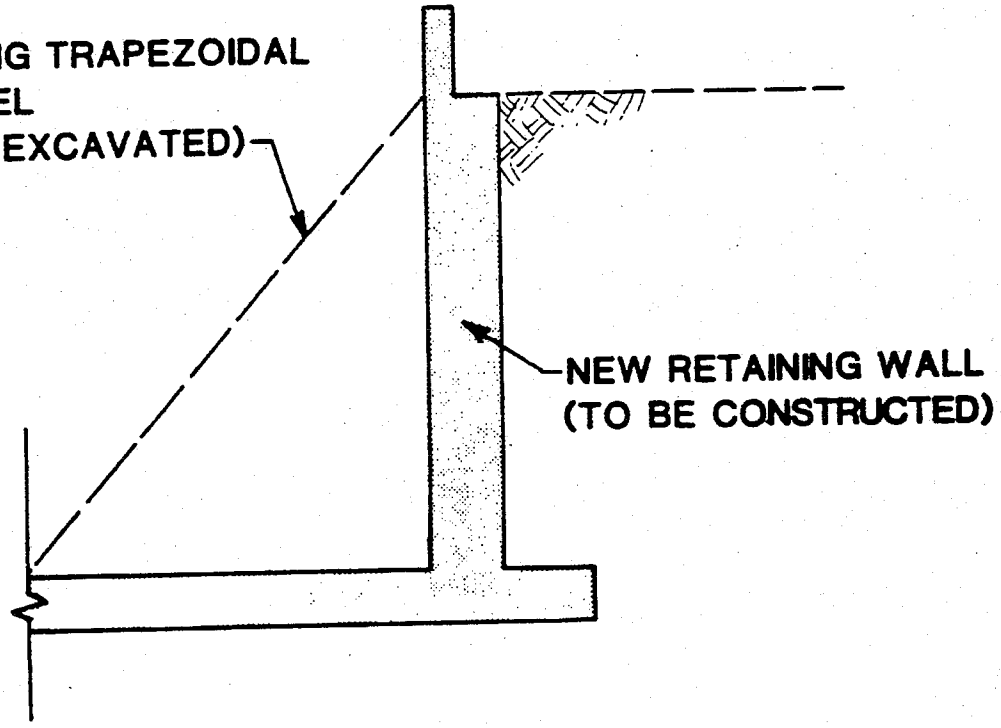
Under this alternative, the existing concrete trapezoidal channel walls would be removed on one side or possibly both sides of the channel. The concrete, as well as a portion of the existing levee, would be removed. A vertical concrete retaining wall would be poured in place. Additionally, a parapet wall of a maximum of 3 feet (0.9 m) would be placed on top of the wall in some locations. Bicycle and other trail systems would

remain in approximately the same location as present. Figure 2.3-7 provides a conceptual drawing of the anticipated design.

Equipment required for this aspect of construction would include cranes, excavators and jackhammers for concrete removal. Bulldozers and wheeled loaders would be required to fill up to 100 trucks per day of concrete and other material. These would be hauled away from the site for disposal. Depending upon the location, some of this material could be placed behind the existing levee, but most would be hauled to a landfill or Pier J in Long Beach Harbor. It is anticipated that up to 100 ready-mix concrete trucks would be required on a daily basis for construction of the new vertical retaining wall. Construction activities at any one location would last up to one year.

Although some modifications of bridge supports may be required, it is not anticipated that many bridges would have to be raised. Therefore, most existing bridges would not require reconstruction and would remain in operation throughout the proposed project. It is also anticipated that only a few additional feet behind the existing footprint of the levee would be required for channel modifications.

Approximately the same amount of armoring as described for the NED project would be required. The locations for channel armoring may vary from the NED project. Exact locations for armoring would be determined during final engineering design.



NOT TO SCALE

CONCEPTUAL DESIGN OF CHANNEL WIDENING ALTERNATIVE

FIGURE
2.3-7

2.3.2.2 Dredging Operations (Main Report Alternatives 2 and 3)

The 2.5 mile (4 km) segment of the Los Angeles River from the river mouth to Willow Street would be dredged rather than widened. Although precise dredging requirements are not now known, the maximum depth of dredging would be 5 feet (1.5 m). A diesel-powered dredge would be used in the channel. Removed material would be either loaded on barges and disposed of at a deep water disposal area (probably LA-2 or LA-3) or loaded onto trucks and transported to approved onshore disposal areas such as Pier J in Long Beach. Assuming that removal of the 5 feet (1.5 m) of material were required for all portions of the reach, up to 560,000 cubic yards (425,600 m^3) of material would be dredged and require disposal.

2.4 COMPARATIVE IMPACTS OF ALTERNATIVES

Project impacts are presented in table format in Table 2.4-1 to provide a comparison of the project alternatives.

2.5 ENVIRONMENTAL COMMITMENTS (MITIGATION COMMITMENTS)

Mitigation measures proposed for the project alternatives are as follows:

2.5.1 Land Use

2.5.1.1 No Action Alternative

No Impacts.

Table 2.4-1

COMPARISON OF ALTERNATIVES

Impacts	Alternative		
	No Action	NED Plan	Mod. Chan. X-sec
Ability to Meet Objectives	No	Yes	Yes
Land Use	No impact	Possible significant temp. impact various locations (Table 2.3-7)	Indirect impact to other resources
Air Quality	No impact	Adverse during constr, but not significant	Adverse during constr, but not significant
Water Quality	No impact flood potential remains	Sedimentation impacts not significant flood potential reduced in lower river	Significant impacts associated with dredging. Flood potential reduced in lower river.
Noise	No impact	Significant impact in localized areas during constr	Significant impact in localized areas during constr
Vegetation	No impact	No signficant impact	Temporary loss of approx. 6 acres of wetland habitat.
Wildlife/Aquatic Resources	No impact	No significant impact	Temp. impact to aquatic resources. Impact to species in wetland.

Table 2.4-1 (continued)

COMPARISON OF ALTERNATIVES

Impacts	Alternative		
	No Action	NED Plan	Mod. Chan. X-sec
Threatened/Endangered Species	No impact	No adverse effect on the existence of least tern/ brown pelican	No adverse effect on the existence of least tern/ brown pelican
Cultural Resources	No impact	Potential impact if NRHP properties are present	No impact
Traffic	No impact	Significant impacts during construction	Potential impacts during construction
Recreation/Aesthetics	No impact	Temp. signif. recreational impact. Sig loss of aesthetics at wetlands area. Impacts from graffiti. LCP impacts.	Temp. signif. recreational impacts. Sig loss of aesthetics at wetlands area. Impacts from graffiti. LCP impacts.
Public Safety	Potential impacts from channel embankment failure	Impacts to trail users during construction. Traffic safety impacts.	Impacts to trail users and general traffic during construction. Impacts from vertical channel walls.
Utilities	No impact	Potentially significant temp. impacts	Potentially significant temp. impacts

2.5.1.2 NED Plan Alternative (Main Report)

Mitigation for use of the various properties identified in Table 2.3-4 would include financial compensation and full replacement of the site after construction activity has ceased.

2.5.1.3 Modified Channel Cross-section Alternative (Main Report Alts. 2 and 3)

Mitigation measures for activities which encroach upon adjacent uses are presented under other resource sections within this document, including noise, air quality and traffic.

2.5.2 Air Quality

2.5.2.1 No Action Alternative

No Impacts.

2.5.2.2 NED Plan Alternative (Main Report)

- Frequent watering of the construction area to limit dust emissions from on-site equipment and off-site trucks accessing the project,

- Provisions for terminating operations during strong Santa Ana wind conditions,

- Good maintenance, involving proper tuning of off-road heavy equipment to reduce combustion source air emissions (especially NOx),

- Control of diesel fuel quality (low sulfur content),

- Site activity control/termination during Stage II smog episodes,

- Contractor participation in the AQMD mandatory rideshare program (Regulation XV).

2.5.2.3 Modified Channel Cross-section Alternative (Main Report Alts. 2 and 3)

Mitigation measures are the same as listed above in Section 2.5.2.2.

2.5.3 Water Quality

2.5.3.1 No Action Alternative

No Impacts.

2.5.3.2 NED Plan Alternative (Main Report)

Whenever possible, work within the channel will be confined to low flow periods. Downstream sediment basins will be constructed in order to trap sediments from construction operations. Refueling of equipment near the channel will be limited and closely monitored.

2.5.3.3 Modified Channel Cross-section Alternative (Main Report Alts. 2 and 3)

Sedimentation basins will be constructed downstream of construction activities. A hydraulic cutterhead dredge will be used to minimize turbidity in the channel. Use of these methods should reduce impacts to insignificant levels.

2.5.4 Noise

2.5.4.1 No Action Alternative

No Impacts.

2.5.4.2 NED Plan Alternative (Main Report)

- A line-of-sight break between noise sources and the nearest sensitive receptors is a the critical factor in maintaining project activity noise impacts at unobtrusive levels. This would be accomplished by placement of a temporary berm to shield residences and other receptors from construction activity. In areas where land is accessible and available, a large berm would reduce noise levels by as much as 20 dB.

- In areas of extreme noise conditions where berms are not feasible, either construction of temporary walls to serve as noise barriers or additional limits on work hours will be warranted to protect these sensitive receptors.

- Smaller, and therefore less noisy, construction equipment will be evaluated for use in the preconstruction engineering design phase in some sensitive construction areas such as parapet walls near sensitive noise receptors.

- Because of the increased noise sensitivity during quiet hours, time limits on allowable on-site equipment operations are normally made a condition on construction permits. No on-site activities would be permitted before 7:00 AM weekdays and not before 8:00 AM on Saturdays, and not at all on Sundays or holidays because the noise background is lower on those days and project impacts will become more distinct when they are not blended into the background noise environment. No construction activities would occur after 7:00 PM.

- No effective mitigation is available for the use of pile drivers.

2.5.4.3 Modified Channel Cross-section Alternatives (Main Rpt. Alts. 2 and 3)

Noise mitigation measures are identical to those described in Section 2.5.4.2 for the NED Alternative except that pile drivers are eliminated and as such, there are no concerns of mitigation for that equipment.

2.5.5 Biological Resources

2.5.5.1 No Action Alternative

No Impacts.

2.5.5.2 NED Plan Alternative (Main Report)

- The wetland areas in the lower most portion of the Los Angeles river will not be destroyed by construction activities. This area will be monitored to assure that no activities or materials are discharged in this area.

- In order to prevent impacts to nesting birds in the wetland as well as not to disturb foraging activities of the least tern and brown pelican, activities will not be conducted from April through September in the last one-mile reach of the river near the river mouth. This would result in no adverse effects on the species.

2.5.5.3 Modified Channel Cross-section Alternative (Main Report Alts. 2 and 3)

- Disturbance to the wetland area can be mitigated through replacement of habitat near the channel area. Mitigations as described under the NED Plan would result in no adverse effect on the species.

- A hydraulic cutterhead dredge will be used to reduce the degree of turbidity. If chemical testing indicates that dredge specimens are highly contaminated, dredging operations would be restricted to periods of slack tide and low or no river flow. Contaminated sediments would be disposed of at an approved facility and/or site.

2.5.6 Cultural Resources

2.5.6.1 No Action Alternative

No Impacts.

2.5.6.2 NED Plan Alternative (Main Report)

o The Corps shall complete compliance with Section 106 of the National Historic Preservation Act prior to the initiation of construction.

o Prior to implementation of the project, an evaluation and determination of National Register of Historic Places eligibility for all bridges which will be modified must be made. This step has been partially completed. There are still four bridges on the Rio Hondo that must be evaluated by a qualified historian and results coordinated with the State Historic Preservation Officer and the Advisory Council on Historic Preservation.

o If any bridges are determined to be NRHP eligible which would be modified, mitigation would be required. It is assumed that mitigation would consist of HABS/HAER recordation. These mitigation measures would have to be agreed to in a Memorandum of Agreement between the Corps, the California State Historic Preservation Officer and the Advisory Council on Historic Preservation. Execution and implementation of the MOA would constitute compliance with Section 106 of the National Historic Preservation Act.

2.5.6.3 Modified Channel Cross-section Alternative (Main Report Alts. 2 and 3)

No Impacts.

2.5.7 Transportation

2.5.7.1 No Action Alternative

There is no change; therefore, mitigation is not an issue.

2.5.7.2 NED Plan Alternative (Main Report)

- Schedule construction traffic to off-peak hours;
- Utilize the river channel for construction vehicle traffic and vehicle staging whenever possible;
- Avoid reducing traffic capacity on two adjacent bridges simultaneously, if possible;
- Utilize signing and flagmen where construction equipment interface with public traffic;
- Institute public information programs to enable motorists to avoid congested areas:
  - Place large signs far enough in advance of potentially impacted roadway segments to allow motorists opportunity to alter their routes,
  - Place public notices in local newspapers and cable TV bulletin boards,
  - Distribute mailers in the project area.

2.5.7.3 Modified Channel Cross-section Alternative (Main Report Alts. 2 and 3)

- o Schedule construction traffic to off-peak hours;
- o Utilize the river channel for construction vehicle traffic and vehicle staging whenever possible;
- o Establish an on-site batch plant to mix concrete.
- o Utilize an ocean dredged material disposal site, if possible;
- o Utilize signing and flagmen where construction equipment interface with public traffic.

2.5.8 Recreation and Aesthetics

2.5.8.1 No Action Alternative

No Impacts.

2.5.8.2 NED Plan Alternative (Main Report)

- o No equally satisfactory alternative exists for mitigation of the rerouting of recreational trails during construction. While construction occurs on the bike path, the possibility exists of using the west side of the levee and surface streets for bicyclists, although this is less appealing due to the presence of automobiles. No mitigation exists for equestrian users. This impact is temporary for the duration of construction (approximately one year) between recreational trail access points.

- No loss of aesthetic views will occur except for the potential loss of wetlands areas. General mitigation measures include the design of trails on the levee top such that views are provided of the land areas to the outside of the channels. This could also include the planting of shubbery in accessible areas and the possible development of additional strip park areas. The development of additional park areas could serve to provide additional recreational resources within communities adjacent to the channel and could be developed under a joint agreement with those communities. As an alternative, mitigation could be provided by the strategic setting of areas of large potted plants or built-in planters and designed seating areas/rest stops at areas along the trails. These measures would improve aesthetic conditions over existing conditions. These options may be evaluated during the Preconstruction Engineering and Design phase when the final project designs and the availability of local fiscal support are known.

- Mitigation measures for the problem of graffiti on the parapet walls includes coating the walls with a material such that clean up is easier and possibly incorporating a routine graffiti removal program into maintenance activities at a later date. Concrete tining will not be used since it weakens wall integrity. There is also a possiblity that murals, not a plan component, could be painted on some walls.

2.5.9 Public Safety

2.5.9.1 No Action Alternative

No changes are being made; therefore, mitigation is not an issue.

- Mitigation for the loss of aesthetic views includes the design of trails on the levee top such that views are provided of the land areas to the outside of the channels. This could also include the planting of shubbery in accessible areas and the possible development of additional strip park areas. The development of additional park areas could serve to provide additional recreational resources within communities adjacent to the channel and could be developed under a joint agreement with those communities. As an alternative, mitigation could be provided by the strategic setting of areas of large potted plants or built-in planters and designed seating areas/rest stops at areas along the trails. These measures would result in aesthetic conditions which are improved over existing conditions. These options will be evaluated during the Preconstruction Engineering and Design phase when the final project designs and the availability of local fiscal support are known.

- Mitigation measures for the problem of graffiti on the parapet walls include coating the walls with a material such that clean up is easier and incorporating graffiti removal into maintenance activities. There is also a potential that murals could be painted in some areas by the local sponsor(s).

- Mitigation measures include determining whether a temporary bike path can be routed so that access to the coast is still available to recreation users.

2.5.8.3 Modified Channel Cross-section Alternative (Main Report Alts. 2 and 3)

- As described in Section 2.5.8.2, no safe, feasible mitigation exists for the rerouting of recreational trails during construction. The possibility exists of using surface streets for bicyclists, although safety hazards exist for accidents with automobiles. No mitigation exists for equestrian users. This impact is temporary for the duration of construction between recreational trail access points.

2.5.9.2 NED Plan Alternative (Main Report)

- Mitigation for safety impacts along trails at channel levees requires that the trails be closed between trail access points for the duration of construction along that segment. No equally satisfactory alternative exists for the rerouting of recreational trails during construction. Surface streets provide a less appealing alternative for bicyclists. No mitigation exists for equestrian users. This impact is temporary for the duration of construction between recreational trail access points.

- Mitigation includes that fencing and barriers be placed around areas of construction and that construction equipment be placed in areas at night that are secured from the general public. Also, warning signs will be placed in appropriate locations to warn pedestrians and motorists of potential safety hazards.

- Mitigation for trucks delivering materials to and taking materials from construction sites includes the limitation of activity during peak traffic hours and during hours when children are traveling to and from school. Additionally, signs and flagmen will be used in areas to direct traffic where necessary.

- The potential for release of toxic material is also reduced if flood potential is reduced.

2.5.9.3 Modified Channel Cross-section Alternative (Main Report Alts. 2 and 3)

- Mitigation for safety impacts along trails at channel levees requires that the trails be closed between trail access points for the duration of construction along that segment. No equally satisfactory alternative exists for the rerouting of recreational trails during construction. Surface streets provide a less appealing alternative for bicyclists. No mitigation exists for equestrian users. This impact is temporary for the duration of construction between recreational trail access points.

- Mitigation for the vertical drop of the channel walls includes placing a chain-link or other fencing on top of parapet walls to a minimum combined height of seven feet (2.1 m). This will provide for safe use of the trail system. An alternative would be to build the parapet walls to a height of seven feet (2.1 m), although this results in a "closed-in" feeling, reduces aesthetics and provides more opportunity for graffiti on solid walls.

- Mitigation for trucks delivering materials to and taking materials from construction sites includes the limitation of activity during peak traffic hours and during hours when children are traveling to and from school. Additionally, signs and flagmen will be used in areas to direct traffic where necessary.

2.5.10 Utilities

2.5.10.1 No Action Alternative

No Impacts.

2.5.10.2 NED Plan Alternative (Main Report)

Close coordination with the pertinent utilities will help mitigate any impacts. Disruption to service will be minimized.

2.5.10.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. 2 and 3)

Mitigation includes that affected utility lines be moved or replaced in conjunction with construction activities. Disruption to service will be minimized.

SECTION 3 - AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This section describes existing environmental conditions relative to areas affected by the proposed action of the NED Plan and modified channel cross-section alternative. The project study area is composed of two distinct sub-areas, and affected environment descriptions have been provided for these two areas, as appropriate. One study subarea is the existing flood overflow area. This includes both the 500-year and 100-year flood plains (or overflow areas). The 100-year flood plain is important since this subarea will be almost entirely eliminated by the alternatives to the proposed action. The existing conditions in the flood plains are covered to a general level of detail. The lower Los Angeles and Rio Hondo Rivers were analyzed more intensively since any impacts would occur in these areas.

3.2 STUDY AREA OVERVIEW AND FLOOD OVERFLOW AREA DEFINITION

The area of primary interest for the LACDA Review Study includes the major interconnected channels within the LACDA flood control system. Specifically, this general area includes all of the Los Angeles River below Sepulveda Dam, its Tujunga Wash tributary below Hansen Dam, the Rio Hondo between Whittier Narrows Dam and the confluence with Los Angeles River, the San Gabriel River below Santa Fe Dam, and Compton Creek. The reach designations for LACDA channels of interest to this study are shown on Figure 3.2-1 and listed in Table 3.2-1.

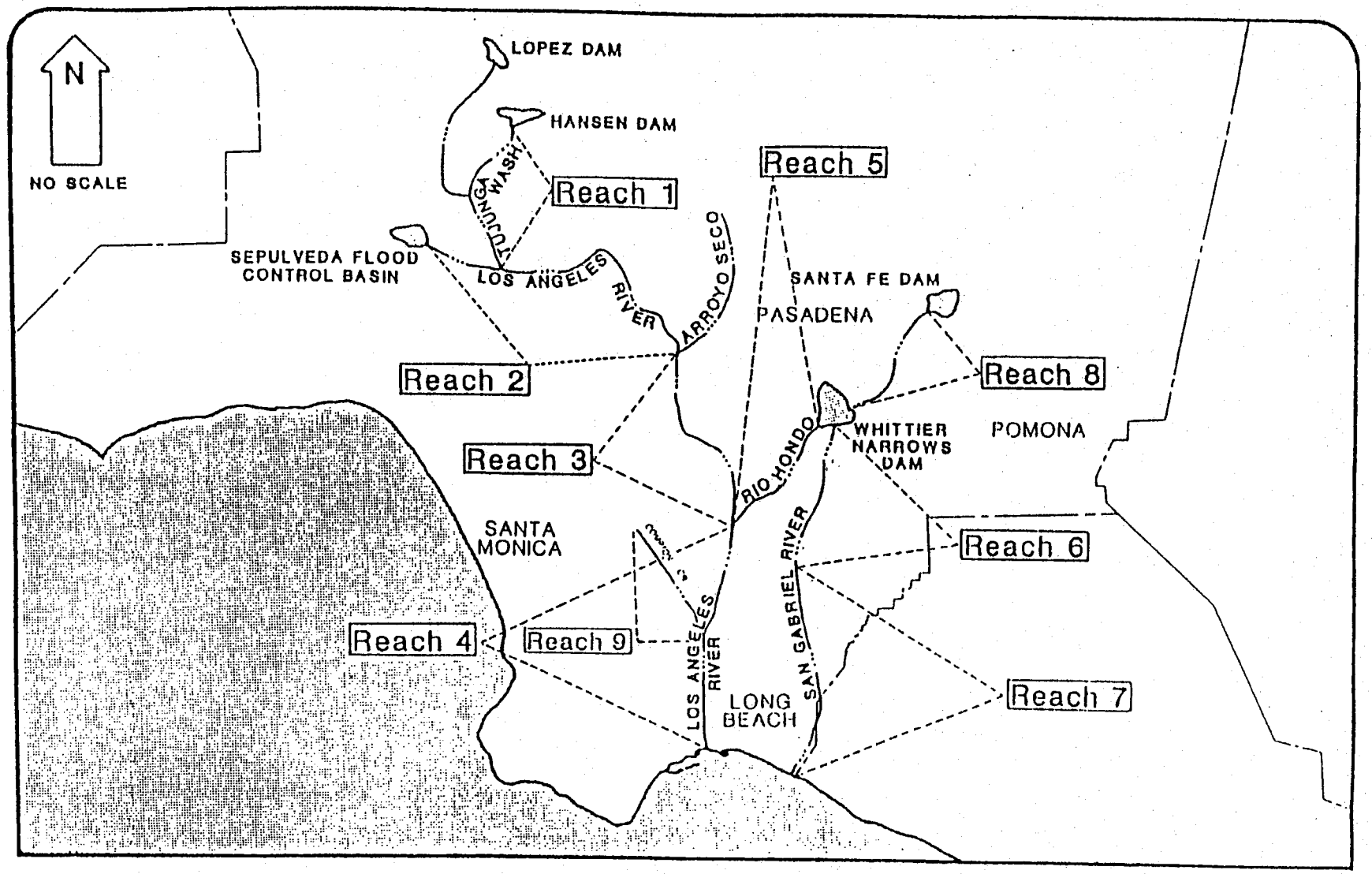


FIGURE 3.2-1 STUDY REACH DESIGNATIONS

Table 3.2-1

REACH DESIGNATIONS FOR LACDA SYSTEM MAIN CHANNELS

Reach	Location
1	Tujunga Wash Channel - Hansen Dam (499+88.27) to the Los Angeles River (7+00)
2	Upper Los Angeles River - Sepulveda Dam (969+88.83) to Arroyo Seco Confluence (1273.10)
3	Los Angeles River - Arroyo Seco Confluence (1273+10) to Rio Hondo Confluence (614+52.50)
4	Lower Los Angeles River - Rio Hondo Confluence (641+52.50) to Pacific Ocean (16+00)
5	Rio Hondo Channel - Whittier Narrows Dam (442+23.71) to Los Angeles River (7+00)
6	San Gabriel River - Whittier Narrows Dam to Imperial Highway
7	San Gabriel River - Imperial Highway to Pacific Ocean
8	San Gabriel River - Santa Fe Dam to Whittier Narrows Dam
9	Compton Creek

Flood size predictions are made by the Corps of Engineers based on potential rainfall and runoff rates. Floods are also categorized in terms of their statistically projected frequency. A 10-year flood has a 10 percent chance of happening every year, while a 100-year flood has a one percent chance of occurrence every year, and a 500-year flood has a 0.2 percent chance of occurrence every year. However, flood risk increases over long periods of time. A 50-year flood has an 85 percent chance of occurring one or more times over a 100-year period. A 100-year storm has a 65 percent chance of occurring once in 100 years.

Presently, portions of the LACDA system do not have the capacity to prevent flooding from the 100-year flood. The majority of the flood control system was built in the 1930s and 1940s. Since that time, there has been substantial urbanization within the study area with accompanying increases in storm water runoff to channels. This is a result of an increase in impervious surfaces and the increased effectiveness of the storm drain system. Several key portions of the flood control system within the study area could overflow during a 50-year flood.

The 100-year flood overflow area is delineated on Figure 3.2-2. The overflow from a 100-year flood would cover approximately 82 square miles (212 km^2) and would affect developed areas in the San Fernando Valley near the Los Angeles River and Tujunga Wash, downtown Los Angeles near the Los Angeles River, and a large area bordering the Los Angeles River and the Rio Hondo that encompasses parts of Bellflower, Burbank, Carson, Cerritos, Compton, Downey, Glendale, Lakewood, Long Beach, Lynwood, Montebello, Paramount, Pico Rivera, and South Gate, in addition to some Los Angeles County territory. In some localized areas, flood waters could be as deep as eight to ten feet (2.4 to 3.1 m). Most areas, however, could experience flooding of one to four feet (0.3 to 1.2 m).

The 500-year overflow area also is delineated on Figure 3.2-2. The overflow from a 500-year flood would cover nearly 200 square miles (518 km^2), virtually all of which is urban development. A 500-year flood would cover all of the areas affected by the 100-year flood and, in addition, would cover a large area of central Los Angeles, additional areas

in the San Fernando Valley and large portions of the cities of Artesia, Bell, Cudahy, Hawaiian Gardens, Huntington Park, Maywood, Norwalk, Santa Fe Springs, Seal Beach, Vernon and Whittier. There are 26 cities, some Los Angeles County territory, and some Orange County territory within the 500-year overflow area.

Table 3.2-2 provides an estimate of the area covered by flood flows in each major channel reach within the study area for both the 100-year and 500-year floods.

3.3 LAND USE AND SOCIAL CONCERNS

3.3.1 Flood Overflow Areas

The 100- and 500-year flood overflow areas overlay a highly diverse urban environment. The total population within Los Angeles County in 1989 was approximately 8,700,000 persons. The Corps of Engineers estimates that 1,200,000 people reside in the 500-year overflow area, or about 15 percent of the County population. Total employment in the Los Angeles-Long Beach Partial Metropolitan Statistical Area (PMSA), which covers approximately the same area as Los Angeles County, as of 1983 was 4,000,000. The highest employment category is the service sector, with 1,090,000 jobs, followed by manufacturing, with nearly 900,000 employed. Los Angeles County is projected to continue growing through the year 2000. Population and employment trends for the 500-year flood overflow area will be similar to those of the PMSA as a whole; thus population within the 500-year overflow area could reach 1,800,000 by the year 2000.

Land use within the 500-year overflow area is highly diverse with residential, commercial, industrial and public uses spread throughout the area. However, there are high concentrations of particular property categories. Downtown Los Angeles is highly commercial, while there is a concentration of industrial facilities in the area of the lower Los Angeles River below the Compton Creek confluence. The San Fernando Valley is predominantly residential with corridors and pockets of commercial and industrial activity. The area of the San Gabriel River below Imperial Highway is largely residential.

Overall, the total value of improvements within the 500-year flood plain is approximately $40 billion, of which about 50 percent is attributable to single-family residences.


NATIONAL FOREST
Santa Monica
Marina Del Rey
Hermosa Beach
Redondo Beach
TORRANCE
LONG BEACH
Seal Beach
HUNTINGTON BEACH
VERY SHALLOW FLOWS
BASE CONDITIONS
OVERFLOW BOUNDARIES
100 YR
200 YR
500 YR

Table 3.2-2

SUMMARY OF AREA FLOODED
(in square miles)

Reach	500-Year Flood	100-Year Flood
Reach 1	11.1	2.0
Reach 2	7.2	1.8
Reach 3	52.6	1.7
Reach 4	46.2	38.5
Reach 5	12.3	12.3
Reach 6	18.2	0.0
Reach 7	50.4	25.7
TOTAL	198.0	82.0

NOTES: Reach definitions are indicated in Figure 3.2-1 and described in Section 2.

Reach 7, 500-year flood includes 4.8 square miles of shallow flows over Seal Beach U.S. Naval Weapons Station and Seal Beach National Wildlife Refuge.

There is not a significant amount of open space in the flood overflow area since the bulk of the area is highly developed. Most open space is associated with recreational facilities such as parks, golf courses and sport fields. Other substantial open space which occurs in the flood plain includes the major water spreading grounds, i.e., the coastal grounds along Rio Hondo and the San Gabriel grounds along the San Gabriel River, and includes the wetlands areas in Seal Beach under control of the U.S. Navy.

The Corps of Engineers has conducted land use surveys in the 500-year overflow area and has tallied the number of damageable structures in each land use category. The inventoried flood plain land use improvement categories included residential use (single-family, multi-family and mobile homes); commercial uses (including retail outlets, hotels and privately-owned offices); industrial uses (including manufacturing plants, research and engineering facilities, warehouses, business parks and construction yards); and public use (including schools, hospitals, churches, public organizations and offices, and police and fire stations). Tables 3.3-1 and 3.3-2 provide data on the number of damageable units by channel reach for the 500-year and 100-year overflow areas respectively.

3.3.2 Land Use Adjacent to Channel Reach Construction Reaches

3.3.2.1 Lower Los Angeles River

The generalized land uses adjacent to this reach are shown in Figure 3.3-1. The predominant use within 2,000 feet (610 m) on either side of the channel is residential. Industrial uses are also prevalent along this reach. Public parks, golf courses and public structures occur throughout the channel study zone; however, many of these features are linear and border the channel. There are six schools whose property is either wholly or partially within 2,000 feet (610 m) of the channel. No churches or hospitals are located within this zone.

3.3.2.2 Rio Hondo Channel

The generalized land uses along the Rio Hondo, Reach 5, are shown in Figure 3.3-2. As with most areas of the LACDA, the uses are mixed, with residential and industrial being the predominant types. There is a substantial amount of public-controlled land in this reach, primarily due to the large spreadings grounds at mid-reach. Three schools are located within 2,000 feet (610 m) of the channel, and no churches or hospitals were identified in this area near construction zones.

Table 3.3-1

NUMBER OF DAMAGEABLE UNITS BY PROPERTY TYPE
(500-YEAR OVERFLOW AREA)

Property Type	Reach 1	Reach 2	Reach 3	Reach 4	Reaches 5 and 6	Reach 7	Total Project
Residential							
Single-Family	13,803	7,622	67,984	60,941	40,167	87,502	278,019
Mobile Homes	269	12	605	4,349	796	2,971	9,002
Multi-Family	2,533	1,168	4,867	1,798	1,166	3,400	14,932
Commercial	886	454	4,519	1,828	504	1,444	9635
Industrial	335	106	2,411	1,417	679	359	5,307
Public	122	63	1,317	760	1,588	1,035	4,885
TOTAL	17,948	9,425	81,703	71,093	44,900	96,711	321,780

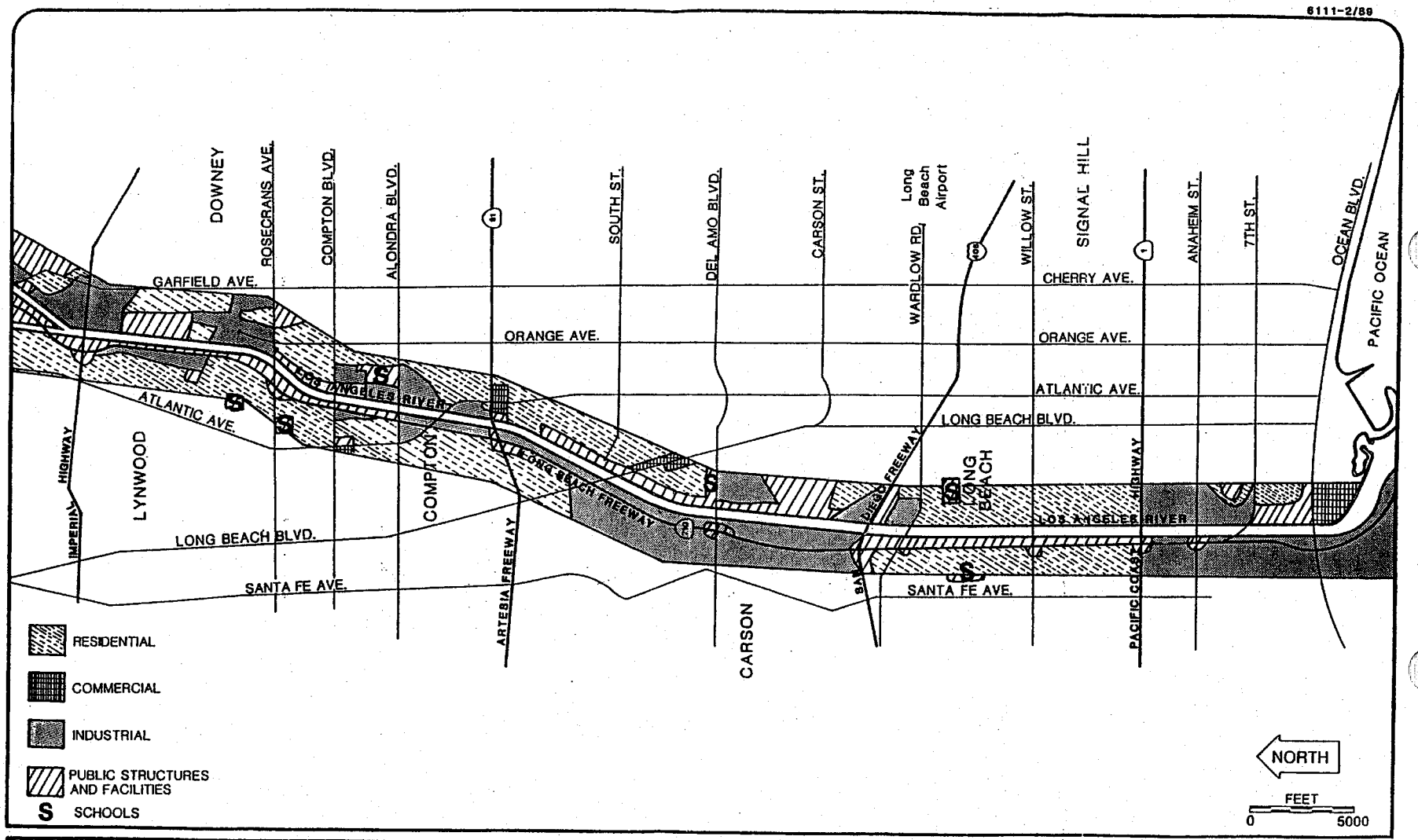
Table 3.3-2

NUMBER OF DAMAGEABLE UNITS BY PROPERTY TYPE
(100-YEAR OVERFLOW AREA)

Property Type	Reach 1	Reach 2	Reach 3	Reach 4	Reaches[1] 5 and 6	Reach[2] 7	Total Project
Residential							
Single-Family	2,616	1,020	74	48,568	21,639	48,680	122,615
Mobile Homes	100	0	0	4,336	234	1,637	6,307
Multi-Family	664	144	56	1,618	809	1,649	4,940
Commercial	66	37	335	1,710	264	776	3,188
Industrial	135	64	138	1,380	286	212	2,215
Public	24	7	97	618	876	621	2,243
TOTAL	3,605	1,272	700	58,248	24,108	53,575	141,508

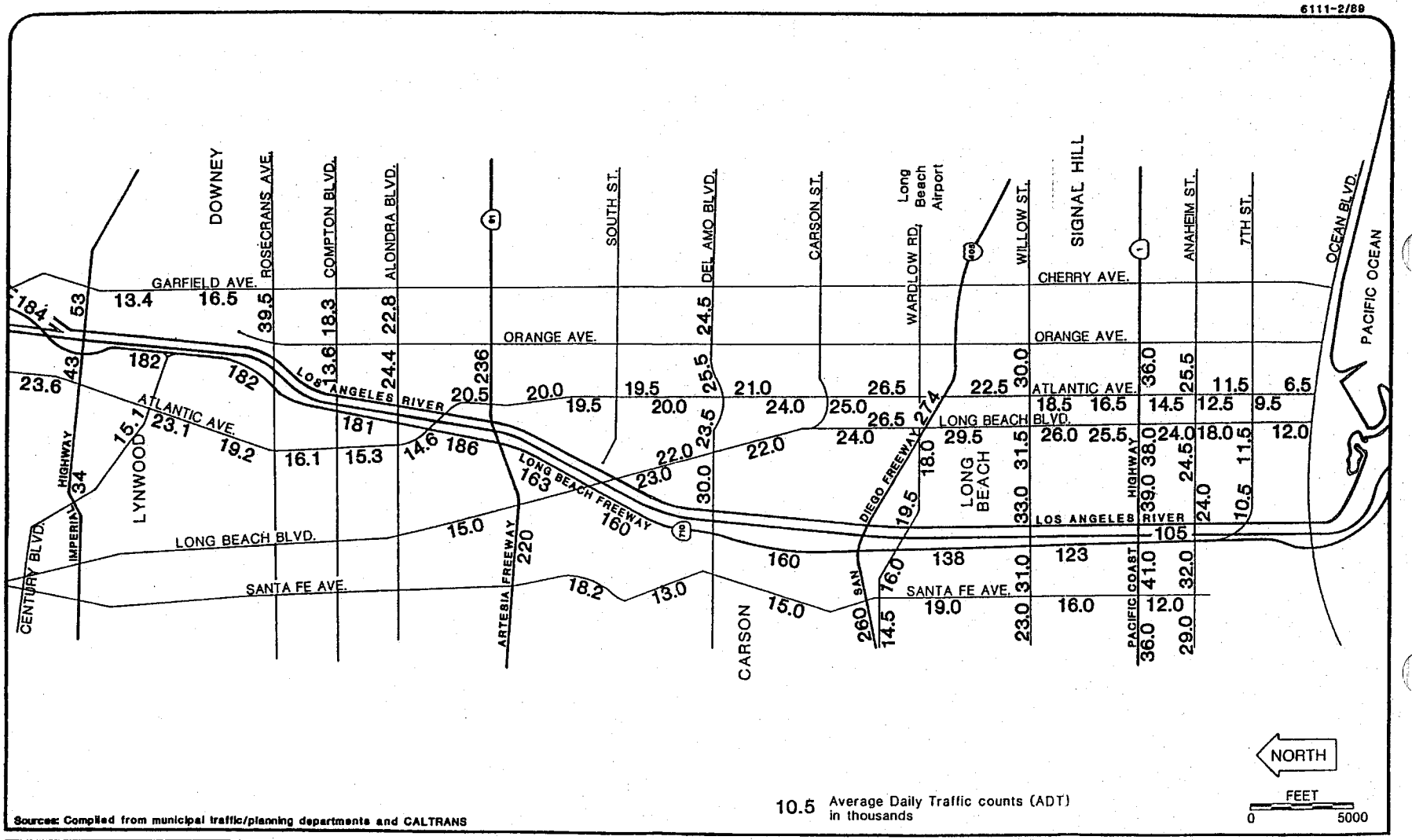
NOTES: [1]All units are within Reach 5.

[2]Units are located in Reach 7, but damaging flows originate from breakouts on Reach 5.



LOWER LOS ANGELES RIVER – REACH 4 GENERALIZED ADJACENT LAND USE

FIGURE 3.3-1



10.5 Average Daily Traffic counts (ADT) in thousands

Sources: Compiled from municipal traffic/planning departments and CALTRANS

LOWER LOS ANGELES RIVER – REACH 4 AVERAGE DAILY TRAFFIC COUNTS

FIGURE 3.9–1

Public Works projects currently underway or proposed for the near future which have the potential to affect traffic in the area include construction of the Century freeway (105), which crosses the Los Angeles River Channel south of Imperial Highway and is scheduled for completion in the fall of 1993; the Los Angeles to Long Beach Light Rail, which crosses the channel north of the San Diego Freeway and is also scheduled for completion in 1993; and a joint Port of Long Beach-City of Long Beach project to improve Long Beach Freeway offramps to Ocean Boulevard and Harbor Scenic Drive near the outlet of the Los Angeles River in Long Beach Harbor, scheduled for completion the summer of 1990 (Doug Failing, CALTRANS, February 9, 1989).

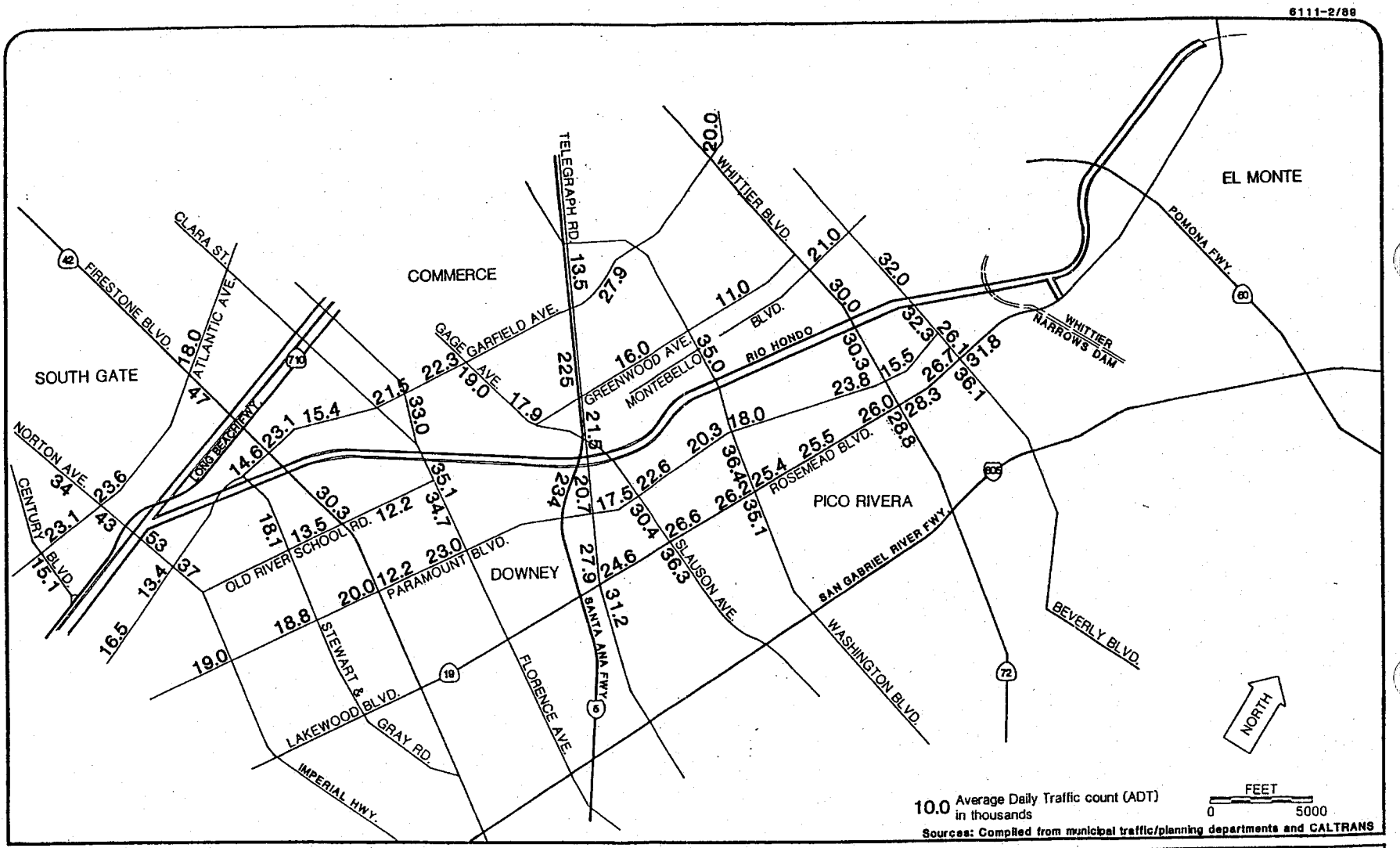
Future traffic conditions in the lower Los Angeles River area are expected to be worse than at present. Improvements to surface streets will do little more than maintain the current level of service. At this time there are no plans to increase the capacity of the Long Beach Freeway, the major thoroughfare for commuter traffic in the area (Doug Failing, CALTRANS, February 9, 1989).

3.9.2.2 Rio Hondo Channel

The Rio Hondo Channel improvement area extends from Whittier Narrows Dam southwest to the Los Angeles River. This reach of the LACDA study area passes through the cities of Montebello, Pico Rivera, Bell Gardens, Downey, and South Gate.

From Beverly Boulevard southwest to the Los Angeles River, ten roadways, one freeway, and five railway bridges cross the Rio Hondo Channel.

The existing traffic counts (ADT) for the major roadways and freeways crossing, or in the vicinity of, the Rio Hondo Channel are shown in Figure 3.9-2. Traffic in this highly urbanized area is heavy, with congestion and backups common at major street intersections during peak periods.



RIO HONDO CHANNEL - REACH 5 AVERAGE DAILY TRAFFIC COUNTS

FIGURE 3.9-2

The Santa Ana Freeway (5), which is the only freeway that crosses the channel, is a heavily utilized commuter link from Los Angeles County to Orange County. Average daily traffic counts are 225,000 vehicles north of the channel and 234,000 vehicles south of the channel. During peak periods, traffic on this freeway is usually heavy.

The volume of traffic in the vicinity of the Rio Hondo Channel is expected to increase. Restrictions to traffic capacity due to construction (or other projects), would aggravate existing situations and increase the level of congestion and vehicle slowing or stopping.

3.10 RECREATION AND AESTHETICS

3.10.1 Flood Plain Overview

Recreation activities within the identified project area include a large variety of parks, community recreation centers and country clubs, public and private golf courses, tennis and racquet facilities, picnic and camping, ballfields, and equestrian facilities. Park areas range from small, local community park/playgrounds to large city and regional parks such as Griffith and Elysian Parks which border the Los Angeles River; El Dorado Park bordering the San Gabriel River; as well as other major recreational park facilities located within the 100-year flood plain.

Bike/pedestrian and equestrian trails and wildlife trails also run through most of the length of the channels and meander through the dam facilities. Trail systems such as the San Gabriel River Trail and Lario Trail include bike paths which use the service roads on top of the channel levees. Equestrian trails also follow these systems separated, where possible, from the bike path, though sometimes only by a narrow unpaved strip of earth. Often the equestrian trails end at undercrossings and horses must share the path at that point with bikes and pedestrians. In many areas the equestrian and bike trails share the same black-topped trail.

Recreational access to the channel bike and equestrian trails is mostly via crossing streets which intersect the channel. A gate in the fencing provides access. Most gates include a bar across the gate which prohibits motorized vehicles from entering the area. Many park and other recreational facilities abut the channel; yet direct access to the channel is mostly very limited. Direct access to the channel is provided by gated access points or from connecting trails.

The general public typically has views of the channel only from freeways and cross streets. At ground level, embankments rise up to the elevation of either bike/pedestrian or maintenance roads on the sides of the channel, effectively blocking views of the channel and structures on the far side of the channel. Only the tops of structures across the channel are sometimes visible. Several power line easements with high towers and lines also parallel the channel in some areas.

Some homes have back fence lines which abut the bike trails with no separation or buffers. These homes either have chain-link or block wall fences. The homes are located at an elevation such that no views of the channel or bike path exist for one-story homes with block walls. Only those homes which are two-story or have chain-link fencing may have some view of the bike path and channel.

3.10.2 Recreation and Access Considerations Along Channel Construction Reaches

A detailed study has been prepared for the purpose of identifying recreation facilities bordering the LACDA flood control system (see LACDA Review Study Technical Documentation Report for Recreation). This inventory describes in detail all facilities located within the basins and channels, including constructed elements that make up each facility. Recreational access (bike and equestrian) routes and links between the system and neighboring facilities are identified and located on detailed maps in the review.

A Final Design Memorandum was also prepared which details the aesthetics and designs for equestrian and bike recreational facilities for the length of the Lario San Gabriel river trail system. This system includes the upper and lower San Gabriel River, the

upper and lower Rio Hondo Channel and the lower Los Angeles River systems. Specific design criteria and plans are laid out for not only trails but also access ramps and bridges, rest areas and appropriate landscaping. Some of this design work has been implemented and is shown in the Recreation Technical Documentation Report.

Recreational facilities for those channel corridors and portions of corridors which will be affected by channel construction improvements are in the LACDA Recreation Review study. These activities will primarily affect the lower Los Angeles River (Reach 4) and the Rio Hondo Channel (Reach 5). These facilities are provided in map form in Figures 3.10-1 and 3.10-2.

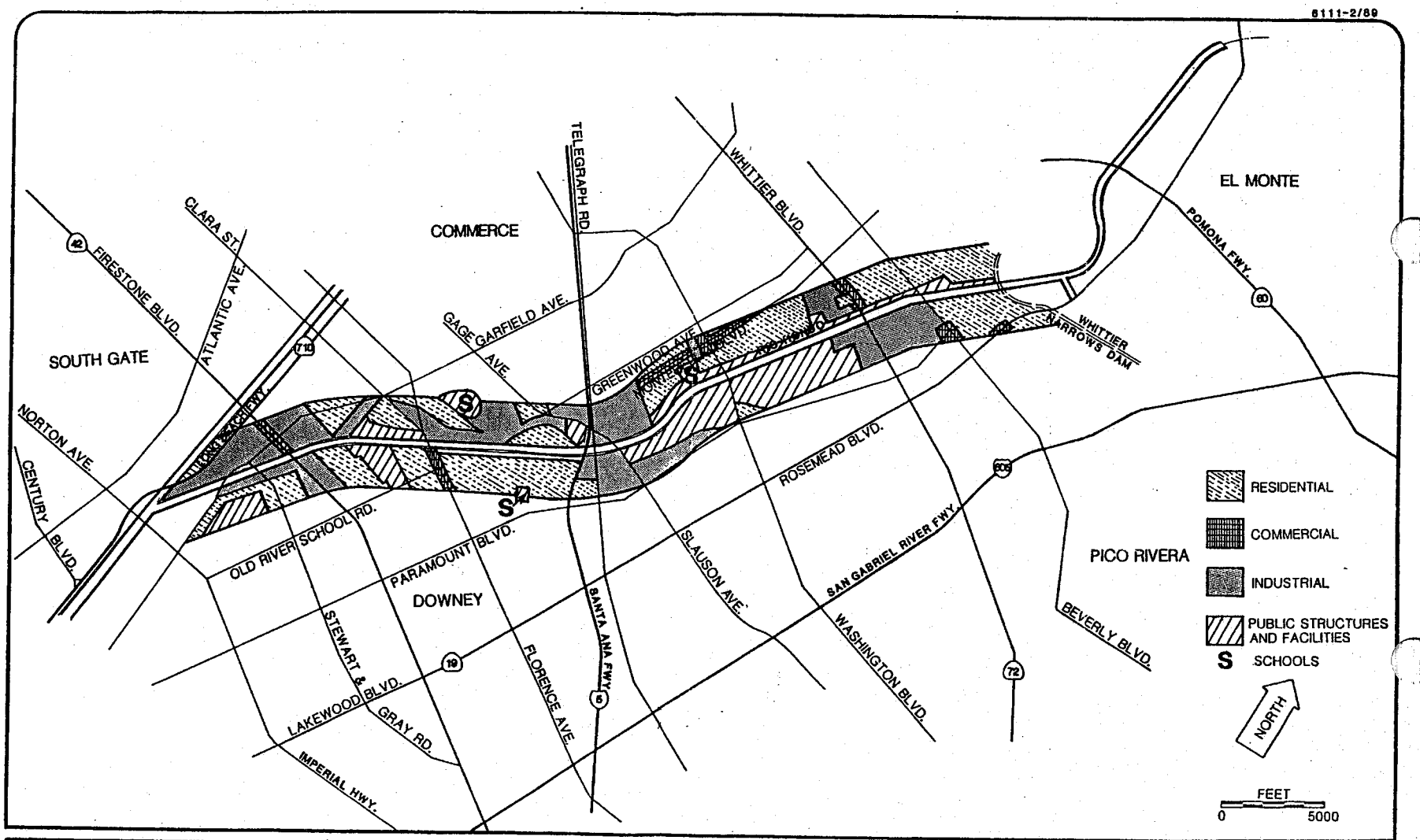
3.10.2.1 Lower Los Angeles River

The lower Los Angeles River is characterized as a concrete-lined channel surrounded by a highly urbanized/industrialized area. Vegetation in the channel is sparse with only small patches of weeds appearing at cracks or joints in the channel. The exception to this is a wetlands area in the channel from Willow Street south to Anaheim Street.

Bordering the channel is a mix of residential, commercial, industrial areas contrasted with established parks, equestrian facilities and golf courses. The parks, equestrian facilities and golf courses are located primarily along the east border, some having direct access to the bike and equestrian trails.

The bike and equestrian trails run the length of Reach 4, actually extending from the Pacific Ocean north to the confluence with Rio Hondo Channel. North of the Rio Hondo Channel the trails continue on the west levee of the Los Angeles River.

Concrete bike/pedestrian and dirt equestrian paths run along the top of the east levee from Willow Street north. Only a bike trail abuts the channel from the ocean north to Willow Street. Both the bike path and west levee top provide access for maintenance of the channels. The entire channel reach boundary is chain-link fence except where public access to the trail and adjacent facilities is provided.



RIO HONDO CHANNEL – REACH 5 GENERALIZED ADJACENT LAND USE

FIGURE 3.3–2

3.4 AIR QUALITY

3.4.1 Climatic and Ambient Air Quality Factors

The project is located within the South Coast Air Basin, which is monitored by the South Coast Air Quality Management District (SCAQMD). The distinctive climate of the basin is determined by its terrain and geographical location. The basin is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant, and with high mountains forming the remainder of the perimeter. The general region lies in the semi-permanent high pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. This usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, and Santa Ana winds.

The SCAQMD and the California Air Resources Board (CARB) maintain a network of air quality monitoring stations within the basin. The stations monitor the surrounding air for the presence of ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), suspended particulate matter (PM_{10}), lead (Pb), sulfate (SO_4), and nitrate (NO_3). Excepting nitrate, these are pollutants for which the State and Federal governments have established air quality standards and, in some cases, episode criteria. Table 3.4-1 contains current Federal and State air quality standards.

Existing levels of air quality near the project channel and in 100-year and 500-year flood overflow areas can be inferred from ambient air quality measurements from seven air quality monitoring stations located in reasonable proximity. These stations include Los Angeles, West Los Angeles, Long Beach, Reseda, Burbank, Azusa and Lynwood. Data is summarized in Table 3.4-2.

The South Coast Air Basin remains a non-attainment area for all State and Federal ambient air standards except lead and sulfur dioxide. Ozone and particulate standards are exceeded throughout the Basin, carbon monoxide standards in about one-fourth of the Basin, and nitrogen dioxide and sulfate standards only in specific portions of Los Angeles.

Table 3.4-1

STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS AND EPISODE CRITERIA

AMBIENT AIR QUALITY STANDARDS, 1987

AIR POLLUTANT	CALIFORNIA		FEDERAL		
	CONCENTRATION	DISTRICT METHOD	PRIMARY (>)	SECONDARY (>)	METHOD[a]
Ozone	0.10 ppm, 1-hr. avg. >= *	U.V. photometry	0.12 ppm, 1-hr avg.	0.12 ppm, 1-hr avg.	Chemiluminescence
Carbon Monoxide	9.0 ppm, 8-hr avg. >[b] 20 ppm, 1-hr avg. >	Non-dispersive Infra-red Spectrophotometry	9 ppm, 8-hr avg.[e] 35 ppm, 1-hr avg.	9 ppm, 8-hr avg. 35 ppm, 1-hr avg.	Non-dispersive Infra-red Spectrophotometry
Nitrogen Dioxide	0.25 ppm, 1-hr avg. >[g]	Gas Phase Chemiluminescence	0.053 ppm,ann avg [f]	0.053 ppm,ann avg [f]	Gas Phase Chemiluminescence
Sulfur Dioxide	0.05 ppm, 24-hr avg. >= with ozone >= 0.10 ppm,1-hr avg or TSP >= 100 ug/m³, 24-hr avg. 0.25 ppm, 1-hr. avg. > [c]	Ultraviolet Fluorescence	0.03 ppm,ann. avg. 0.14 ppm,24-hr avg.	0.50 ppm,3-hr avg.	Para-rosaniline
Suspended Particulate Matter (PM10)	30 ug/m³, ann. geometric mean > 50 ug/m³, 24-hr average >[d] **	Size Segregated Inlet High Volume Sampling	50 ug/m³, annual [h] arithmetic mean 150 ug/m³, 24-hr avg.	50 ug/m³, annual [h] arithmetic mean 150 ug/m³,24-hr avg	
Sulfates	25 ug/m³, 24-hr avg. >=	High Vol. Sampling Methylthymol Blue			
Lead	1.5 ug/m³, 30-day avg. >=	High Vol. Sampling Atomic Absorption	1.5 ug/m³,calendar quarter	1.5 ug/m³,calendar quarter	High Volume Sampling Atomic Absorption
Hydrogen Sulfide	0.03 ppm, 1-hr avg. >=	Cadmium Hydroxide Stractan			
Vinyl Chloride	0.010 ppm, 24-hr avg. >=	Gas Chromatography			
Visibility Reducing Particles	In sufficient amount to reduce the prevailing visibility to less than 10 miles at relative humidity less than 70%, 1 obs.				

a) Reference method as described by the federal government. An equivalent method of measurement may be used as approved by the federal government.
b) Effective December 15, 1982. The standards were previously 10 ppm, 12-hour average and 40 ppm, 1-hour average.
c) Effective October 5, 1984. The standard was previously .5 ppm, 1-hour average.
d) Effective August 19, 1983. The standards were previously 60 ug/m³ TSP, annual geometric mean, and 100 ug/m³ TSP, 24-hour average.
e) Effective September 13, 1985, standard changed from > 10 mg/m³ (>= 9.5 ppm) to > 9 ppm (>= 9.5 ppm).
f) Effective July 1, 1985, standard changed from > 100 ug/m³ (> .0532 ppm) to > .053 ppm (> .0534 ppm).
g) Effective March 9, 1987, standard changed from >= .25 ppm to > .25 ppm.
h) Effective July 1, 1987. The standards were previously:
Primary - Annual geometric mean TSP > 75 ug/m³, and 24-hour average TSP > 260 ug/m³.
Secondary - Annual geometric mean TSP > 60 ug/m³, and 24-hour average TSP > 150 ug/m³.

* ppm = parts per million by volume.
** ug/m³ = micrograms per cubic meter.

EPISODE CRITERIA

AIR POLLUTANT	SCAQMD AND CALIFORNIA			FEDERAL		
	STAGE 1	STAGE 2	STAGE 3	STAGE 1	STAGE 2	STAGE 3
Ozone	0.20 ppm, 1-hr. avg.	0.35 ppm, 1-hr. avg.	0.50 ppm, 1-hr. avg.	-	-	0.50 ppm, 1-hr. avg.
Carbon Monoxide	40 ppm, 1-hr. avg. 20 ppm, 12-hr. avg.	75 ppm, 1-hr. avg. 35 ppm, 12-hr. avg.	100 ppm, 1-hr. avg. 50 ppm, 12-hr. avg.	15 ppm, 8-hr. avg.	30 ppm, 8-hr. avg.	40 ppm, 8-hr. avg.
Nitrogen Dioxide	-	-	-	0.60 ppm, 1-hr. avg. 0.15 ppm, 24-hr. avg.	1.20 ppm, 1-hr. avg. 0.30 ppm, 24-hr. avg.	1.50 ppm, 1-hr. avg. 0.40 ppm, 24-hr.avg.
Sulfur Dioxide	0.50 ppm, 1-hr. avg. 0.20 ppm, 24-hr. avg.	1.00 ppm, 1-hr. avg. 0.70 ppm, 24-hr. avg.	2.00 ppm, 1-hr. avg. 0.90 ppm, 24-hr. avg.	-	-	-
Sulfur Dioxide/ Particulate Matter Combined	-	-	-	65,000*, 24-hr.avg.	261,000*, 24-hr.avg.	393,000*, 24-hr.avg.
Particulate Matter	-	-	-	375 ug/m³, 24-hr.avg.	625 ug/m³, 24-hr.avg.	875 ug/m³, 24-hr.avg.
Sulfates**	25 ug/m³, 24-hr. avg. combined with ozone > 0.20 ppm, 1-hr. avg.			-	-	-
Actions to be Taken	Health advisory to a) Persons with respiratory and coronary disease. b) School officials in order to curtail students participation in strenuous activities. First steps in abatement plan.	Intermediate Stage. Abatement actions taken to reduce concentration of pollutant at issue.	Mandatory abatement measures. Extensive actions taken to prevent exposure at indicated levels. State can take action if local efforts failed.	Open burning prohibited. Reduction in vehicle operation requested. Industrial curtailment.	Incinerator use prohibited. Reduction in vehicle operation required. Further industrial curtailment.	Vehicle use prohibited. Industry shut down or curtailment. Public activities ceased.

*Product of sulfur dioxide (ppm), particulate matter (ug/m³) and a factor (2620).
**Episodes based upon these criteria are not classified according to stages.

Source: South Coast Air Quality Management District, April 1987.

Table 3.4-1

STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS AND EPISODE CRITERIA

AMBIENT AIR QUALITY STANDARDS, 1987

	CALIFORNIA		FEDERAL		
AIR POLLUTANT	CONCENTRATION	DISTRICT METHOD	PRIMARY (>)	SECONDARY (>)	METHOD[a]
Ozone	0.10 ppm, 1-hr. avg. >= *	U.V. photometry	0.12 ppm, 1-hr avg.	0.12 ppm, 1-hr avg.	Chemiluminescence
Carbon Monoxide	9.0 ppm, 8-hr avg. >[b] 20 ppm, 1-hr avg. >	Non-dispersive Infra-red Spectrophotometry	9 ppm, 8-hr avg.[e] 35 ppm, 1-hr avg.	9 ppm, 8-hr avg. 35 ppm, 1-hr avg.	Non-dispersive Infra-red Spectrophotometry
Nitrogen Dioxide	0.25 ppm, 1-hr avg. >[g]	Gas Phase Chemiluminescence	0.053 ppm,ann avg [f]	0.053 ppm,ann avg [f]	Gas Phase Chemiluminescence
Sulfur Dioxide	0.05 ppm, 24-hr avg. >= with ozone >= 0.10 ppm,1-hr avg or TSP >= 100 ug/m³, 24-hr avg. 0.25 ppm, 1-hr. avg. > [c]	Ultraviolet Fluorescence	0.03 ppm,ann. avg. 0.14 ppm,24-hr avg.	0.50 ppm,3-hr avg.	Para-rosaniline
Suspended Particulate Matter (PM10)	30 ug/m³, ann. geometric mean > 50 ug/m³, 24-hr average >[d] **	Size Segregated Inlet High Volume Sampling	50 ug/m³, annual [h] arithmetic mean 150 ug/m³, 24-hr avg.	50 ug/m³, annual [h] arithmetic mean 150 ug/m³,24-hr avg	
Sulfates	25 ug/m³, 24-hr avg. >=	High Vol. Sampling Methylthymol Blue			
Lead	1.5 ug/m³, 30-day avg. >=	High Vol. Sampling Atomic Absorption	1.5 ug/m³,calendar quarter	1.5 ug/m³,calendar quarter	High Volume Sampling Atomic Absorption
Hydrogen Sulfide	0.03 ppm, 1-hr avg. >=	Cadmium Hydroxide Stractan			
Vinyl Chloride	0.010 ppm, 24-hr avg. >=	Gas Chromatography			
Visibility Reducing Particles	In sufficient amount to reduce the prevailing visibility to less than 10 miles at relative humidity less than 70%, 1 obs.				

a) Reference method as described by the federal government. An equivalent method of measurement may be used as approved by the federal government.
b) Effective December 15, 1982. The standards were previously 10 ppm, 12-hour average and 40 ppm, 1-hour average.
c) Effective October 5, 1984. The standard was previously .5 ppm, 1-hour average.
d) Effective August 19, 1983. The standards were previously 60 ug/m³ TSP, annual geometric mean, and 100 ug/m³ TSP, 24-hour average.
e) Effective September 13, 1985, standard changed from > 10 mg/m³ (>= 9.3 ppm) to > 9 ppm(>= 9.5 ppm).
f) Effective July 1, 1985, standard changed from > 100 ug/m³ (> .0532 ppm) to > .053 ppm (> .0534 ppm).
g) Effective March 9, 1987, standard changed from >= .25 ppm to > .25 ppm.
h) Effective July 1, 1987. The standards were previously:
Primary - Annual geometric mean TSP > 75 ug/m³, and 24-hour average TSP > 260 ug/m³.
Secondary - Annual geometric mean TSP > 60 ug/m³, and 24-hour average TSP > 150 ug/m³.

* ppm = parts per million by volume.
** ug/m³ = micrograms per cubic meter.

EPISODE CRITERIA

	SCAQMD AND CALIFORNIA			FEDERAL		
AIR POLLUTANT	STAGE 1	STAGE 2	STAGE 3	STAGE 1	STAGE 2	STAGE 3
Ozone	0.20 ppm, 1-hr. avg.	0.35 ppm, 1-hr. avg.	0.50 ppm, 1-hr. avg.	-	-	0.50 ppm, 1-hr. avg.
Carbon Monoxide	40 ppm, 1-hr. avg. 20 ppm, 12-hr. avg.	75 ppm, 1-hr. avg. 35 ppm, 12-hr. avg.	100 ppm, 1-hr. avg. 50 ppm, 12-hr. avg.	15 ppm, 8-hr. avg.	30 ppm, 8-hr. avg.	40 ppm, 8-hr. avg.
Nitrogen Dioxide	-	-	-	0.60 ppm, 1-hr. avg. 0.15 ppm, 24-hr. avg.	1.20 ppm, 1-hr. avg. 0.30 ppm, 24-hr. avg.	1.60 ppm, 1-hr. avg. 0.40 ppm, 24-hr.avg.
Sulfur Dioxide	0.50 ppm, 1-hr. avg. 0.20 ppm, 24-hr. avg.	1.00 ppm, 1-hr. avg. 0.70 ppm, 24-hr. avg.	2.00 ppm, 1-hr. avg. 0.90 ppm, 24-hr. avg.	-	-	-
Sulfur Dioxide/ Particulate Matter Combined	-	-	-	65,000*, 24-hr.avg.	261,000*, 24-hr.avg.	393,000*, 24-hr.avg.
Particulate Matter	-	-	-	375 ug/m³, 24-hr.avg.	625 ug/m³, 24-hr.avg.	875 ug/m³, 24-hr.avg.
Sulfates**	25 ug/m³, 24-hr. avg. combined with ozone > 0.20 ppm, 1-hr. avg.			-	-	-
Actions to be Taken	Health advisory to a) Persons with respiratory and coronary disease. b) School officials in order to curtail students' participation in strenuous activities. First steps in abatement plans.	Intermediate Stage. Abatement actions taken to reduce concentration of pollutant at issue.	Mandatory abatement measures. Extensive actions taken to prevent exposure at indicated levels. State can take action if local efforts failed.	Open burning prohibited. Reduction in vehicle operation requested. Industrial curtailment.	Incinerator use prohibited. Reduction in vehicle operation required. Further industrial curtailment.	Vehicle use prohibited. Industry shut down or curtailment. Public activities ceased.

*Product of sulfur dioxide (ppm), particulate matter (ug/m³) and a factor (2620).
**Episodes based upon these criteria are not classified according to stages.

Source: South Coast Air Quality Management District, April 1987.

Table 3.4-2

AIR QUALITY MONITORING DATA FOR CHANNEL AREAS

Monitoring Stations	Suspended Particulates PM_{10} No. of Samples Exceeded		Standard % Exceeded (AAM)	Standard % Exceeded (AGM)	Sulfate No. Samples Exceeded	Carbon Monoxide* Number Days Exceeded		Ozone Number Days Exceeded		Nitrogen Dioxide No. Days Exceeded
	Federal	State	Federal	State	State	Federal	State	Federal	State	State
Los Angeles	1	36	13.2	68.7	0	1	1	36	91	4
West Los Angeles	NM	NM	NM	NM	0	0	0	16	58	1
Long Beach	0	18	1.0	52.7	0	0	1	4	11	1
Reseda	NM	NM	NM	NM	NM	1	2	60	121	0
Burbank	0	36	20.4	78.9	0	9	11	76	130	1
Azusa	2	38	36.4	95.7	0	0	0	111	163	0
Lynwood	NM	NM	NM	NM	0	40	47	11	24	1

*For 8-hour standard.
NM = Not measured
SOURCE: SCAQMD, 1987

All monitoring stations in the study area recorded frequent exceedances of the ozone standard. Only the west Los Angeles, Long Beach and Azusa stations did not exceed the Federal carbon monoxide standard. Suspended particulate concentrations were particularly severe at the Los Angeles, Burbank and Azusa stations (Reaches 3, 2 and 6, respectively).

Although the study area has notoriously unhealthful air quality, there is an encouraging improvement trend. The number of second stage alerts for ozone (1 hour >0.35 ppm) has decreased dramatically from a recent high of 23 in 1978 to only one episode in 1988.

3.4.2 Air Quality in Channel Reach Construction Zones

3.4.2.1 Lower Los Angeles River

A major source of localized air pollution along this reach is the Long Beach Freeway. The freeway parallels the river for the entire length of Reach 4 (from the ocean to the confluence with Rio Hondo). Other important air pollutant generators include miscellaneous industrial uses, agricultural operations and the numerous unpaved lots that are used for equipment storage and other unauthorized uses.

3.4.2.2 Rio Hondo Channel

Vehicular sources contribute to localized air quality degradation along this reach, however, not to the extent that occurs along Reach 4. In addition to industrial uses, the unpaved and unvegetated spreading grounds are a major source of suspended particulates.

3.5 WATER QUALITY

3.5.1 Flood Plain Area

3.5.1.1 Surface Water

The flood plain area is located within the urban environment with the LACDA system serving as the principal drainage for the area. Water quality in the region is generally poor due to mixing of the runoff with contaminants on roadways and other areas. Grease, heavy metals and other particulates are of substantial concern.

3.5.1.2 Groundwater

Total dissolved solids (TDS) are high in portions of the Coastal Plain as a result of seawater intrusion. The West Coast Basin has the highest average TDS; in 1982, it averaged 1441 mg/l. TDS in the Santa Monica-Hollywood and Central Basins averaged 924 and 407 mg/l, respectively (LACFCD, 1982). Because these figures are averages over entire basins, they may not be representative of the water actually used. For example, the high TDS for the West Coast Basin is probably partly due to seawater intrusion in some wells.

Iron and manganese occasionally exceed standards in some wells. This sporadic problem is not a health hazard. High iron and manganese tend to precipitate as hydroxides and stain laundry and porcelain fixtures and can cause the taste and color of water to be objectionable.

In addition to the general contaminants, the groundwater is subjected to many contaminants associated with hazardous waste from underground storage tanks and other sources.

3.5.2 Los Angeles, Rio Hondo and Compton Creek Channels

3.5.2.1 Surface Water

The Los Angeles River receives substantial contribution from urban sources during rainy periods. The main channel through the coastal plain is primarily impervious, which reduces groundwater recharge.

Recent water quality data for the Los Angeles River collected during dry weather flow conditions is shown in Table 3.5-1. It shows average water quality data for Firestone Boulevard and Wardlow Street in Long Beach. Of the constituents measured, coliforms and heavy metals tended to vary the most from one sample to the next. Since the Los Angeles River system drains the heavily urbanized portion of the basin, runoff to channels will sometimes contain significant levels of oil, grease and other hazardous residues. Field visits to LACDA facilities have confirmed that surface flows have contained an oil sheen, and some silts and debris removed from channels have had a black tar-like color even after being dewatered. This problem is especially prevalent in the Los Angeles River channel and in the Compton Creek channel.

Phosphorus concentrations are not significantly elevated at the downstream locations being measured but can be presumed to be higher to those upstream portions of the Los Angeles River receiving treatment plant effluent. Some of the phosphorus and nitrogen content is expected to be assimilated by the existing vegetation in the cobbled section of the river near Glendale/Atwater.

The Compton Creek channel experiences additional water quality problems due to dumping of oils and other toxics into the channel by illegal dischargers. Maintenance personnel have noted considerable oil and other contaminants within this area.

Table 3.5-1

WATER QUALITY, LOS ANGELES RIVER (DRY WEATHER RUNOFF)
MEAN ANNUAL VALUES FOR THE PERIOD 5/88 TO 2/90
(FROM: LACDPW, 1990)

Parameter mg/l	● Firestone Boulevard	● Wardlow Street
Temperature (° F)	63	66
Specific Conductance	1,041	1,067
pH	8.1	8.5
TDS	651	662
Total Hardness	252	272
Calcium	64.7	66.3
Magnesium	21.9	25.8
Sodium	110.4	114.4
Potassium	13.7	13.4
Alkalinity	163	175
Sulfate	163	160
Chloride	119	125
Fluoride	0.53	0.53
Nitrate-Nitrogen	3.84	3.1
Ammonium NH_3+NH_4	4.53	3.0
Phosphate	2.3	1.9
Boron (ug/1)	467	449
BOD	4	8.3
org/100ml		
Total Coliform	149,845	29,808
Fecal Coliform	23,042	7,841
KF Streptococcus	1,643	1,591
Enterococcus (MPN/100ml)	1,031	1,410
ug/l		
Arsenic	20	10
Barium	37	69
Cadmium	<10	<10
Chromium IV	<20	<20
Copper	<10	13.7
Manganese	46	39
Lead	<10	28
Mercury	< 1	< 1
Nickel	16	14
Selenium	< 5	< 5
Zinc	156	62

3.5.2.2 Groundwater

The groundwater within the immediate vicinity of the channel approximates groundwater characteristics for the entire basin. Since most of the channel has a paved bottom, the recharge from the river is minimal.

3.6 NOISE

3.6.1 Flood plain Noise Considerations

3.6.1.1 Noise Standards

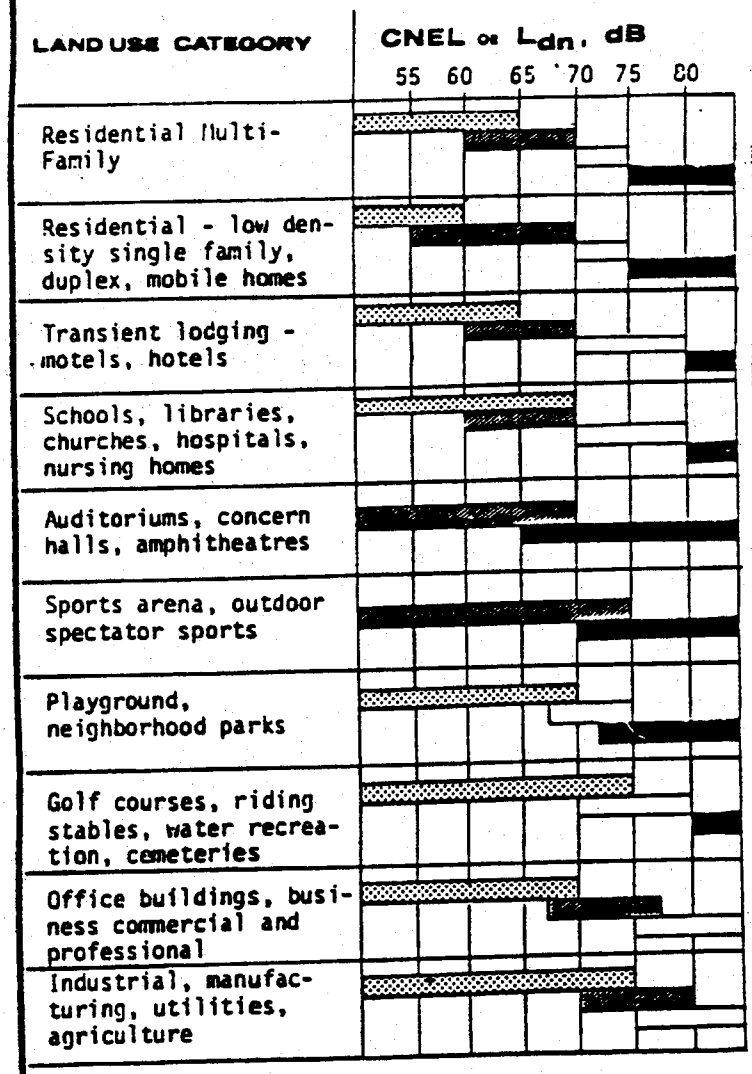
Time variations in noise exposure are typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called Leq), or, alternately, as a statistical description of the sound level that is exceeded over some fraction (10, 50 or 90 percent -- called L10, L50 and L90, respectively) of a given observation period. Finally, because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that for planning purposes, an artificial dB increment be added to quiet time noise levels to create a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL). Some communities use a different 24-hour noise descriptor called day-night average level, or Ldn. CNEL and Ldn are statistically similar and usually are calculated to within 1 dB of one another.

A maximum interior CNEL of 45 dB(A) is mandated for multiple family dwellings, and is considered a desirable noise exposure for single family dwelling units as well. Since typical noise attenuation through residential structures with closed windows is 20 dB or more, an exterior noise exposure of 60 dB CNEL is thus typically the design exterior noise for new residential dwellings in California. Because commercial or industrial uses are not occupied on a 24-hour basis, the same exterior noise exposure standard generally does not apply for these less noise-sensitive land uses.

The interior noise exposure guideline and its relationship to acceptable exterior structural noise loading forms the basis for the noise elements or zoning and noise ordinances from the various jurisdictions in the study area. The Southern California Association of Governments (SCAG) has developed a noise/land use compatibility matrix applicable to the study area (see Figure 3.6-1). The land-use compatibility guidelines are exactly that; i.e., they are advisory guidelines.

Noise ordinances generally have specific noise emissions standards on individual sources, and therefore apply most directly to the proposed project elements. Such standards apply at the nearest point of normal site occupancy in outdoor areas or at the closest window/door to the adjacent noise source. Controlling noise emission rates, maintaining an adequate distance buffer between the source and the nearest sensitive receptor, and use of physical line-of-sight breaks are all potential measures by which the standards can be maintained along the project corridor.

However, it should be noted that most communities do not regulate the noise emissions from construction except through controls on the hours of operation. The lack of such standards, plus the fact that the LACDA channels form a boundary between several jurisdictions where it should be difficult to allocate impact responsibility to only one community, suggest the use of SCAG noise/land use compatibility guidelines as a more appropriate source of noise standards for the project noise impact assessment.



INTERPRETATION

NORMALLY ACCEPTABLE

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE

New construction or development should generally not be undertaken.

SOURCE: In part taken from "Aircraft Noise Impact Planning Guidelines for Local Agencies", U.S. Dept. of Housing and Urban Development, TE/HA-472, November 1972.

LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

FIGURE 3.6-1

3.6.1.2 Noise Characteristics in Flood Overflow Areas

The channels within the LACDA system are characterized by a wide diversity of ambient noise. Adjacent freeways, railroad crossings, quarry and industrial operations, commercial, residential areas and parks and golf courses run adjacent to the channels. Strong variations in noise levels will occur over relatively short distances as these land uses change. However, even with all these land uses, the primary existing noise source along the flood control channels is almost exclusively from vehicular noise throughout the greater urbanized area. There are some portions of channels which experience high noise levels from traffic as well as other sources. These include the commercial/industrial areas such as Compton Creek, and areas in close proximity to aircraft noise such as channels near Hansen Dam and Sepulveda Dam, which are near local airfields.

The quietest areas in the Los Angeles River system are in the most remote locations such as along the edge of Griffith Park or in Haines Canyon. Areas adjacent to residential areas, and parks and golf courses also tend to have quieter noise levels. However, most of these areas are not much quieter than background noise levels in developed areas in the general vicinity of the channels.

The range of noise levels will vary from 45 dB within the quiet park setting to about 74 dB for those areas adjacent to freeways. Given the logarithmic nature of the decibel scale, the areas near the freeways are 30 times noisier than in the riverbank locations away from intensive traffic noise sources (Mitech, 1988).

3.6.2 Noise Characteristics in Channel Reach Construction Zones

3.6.2.1 Lower Los Angeles River

The most significant noise generator along Reach 4 is the Long Beach Freeway, which traverses adjacent to the river on the west side. Several major arterial streets cross the channel as does the San Diego (Interstate 405) and Artesia (Highway 91) freeways.

These are considered secondary sources of noise. There are also two active railroad bridges which cross Reach 4. Noise levels along the river in proximity to roadways will range from 70 dBA to 75 dBA Ldn.

For purposes of this study, all residential uses and public uses such as schools, hospitals and churches are considered sensitive to noise generation. These uses are mapped on Figure 3.3-1 (see Section 3.3) and occur throughout the reach.

3.6.2.2 Rio Hondo Channel

Major noise generators along Reach 5 include traffic on major arterials which cross the channel and railroad operations which cross Reach 5 at four locations. Traffic is particularly loud in the vicinity of the Santa Ana Freeway (Interstate 5), which crosses the channel. Somewhat more quiet than Reach 4, noise levels are expected to range from 64 to 69 Ldn along this reach.

Land uses adjacent to the reach within sound range of construction activities are mapped on Figure 3.3-2. Numerous residential areas and three schools are considered sensitive noise receptors.

3.7 BIOLOGICAL RESOURCES

3.7.1 Overview of LACDA System

The LACDA system consists of a series of dams and a flood control system that protects the greater metropolitan Los Angeles area. Key components of the system include Lopez, Hansen, Sepulveda, Santa Fe and Whittier Narrows Dams and the Los Angeles, San Gabriel, Rio Hondo and Ballona Channels. The Corps of Engineers (COE/LAD 1986) as well as the U.S. Fish and Wildlife Service (USFWS 1984, USFWS 1987) have inventoried the resources of the entire LACDA system. The purpose of the discussion in this section is to provide a summary of the biological resources of the entire system.

Table 3.7-1 provides an inventory of the listed and candidate plant and animal species known to occur within the LACDA system. The species of most notable concern is the least Bell's vireo, which occurs or potentially occurs at Hansen Dam, Whittier Narrows Dam and Santa Fe Dam, as well as in a portion of the San Gabriel River Channel.

3.7.1.1 Lopez Dam

Lopez Dam is the smallest of the dams within the LACDA system and has undergone considerable siltation. Other than functioning as an open space wildlife habitat, the area has little biological value.

3.7.1.2 Hansen Dam

Hansen Dam contains a rather diverse assemblage of vegetation communities, including willow riparian, riparian scrub, alluvial scrub, coastal sage scrub, oak woodland and old field habitats. The area supports a rather diverse assemblage of wildlife and is an excellent wildlife habitat even though significant portions of the area have been disturbed by sand and gravel extraction activities. The area is a known nesting habitat for the endangered least Bell's vireo and is potential habitat for the endangered slender-horned spineflower.

3.7.1.3 Sepulveda Dam

The Sepulveda Dam basin serves primarily as a recreation area. The area does contain old field habitats and some riparian habitat. It serves as a good open space wildlife habitat and supports many avian species as well as other species adapted to urban influenced environments. The area serves as a wintering area for the Canada goose and also supports populations of the candidate tri-colored blackbird.

Table 3.7-1

SUMMARY OF THREATENED, ENDANGERD AND CANDIDATE SPECIES
IN LACDA SYSTEM

Species	Status	Facility						
		Lopez Dam	Hansen Dam	Sepulveda Dam	Sante Fe Dam	Whittier Narrows Dam	Los Angeles River	San Gabriel River
San Diego Horned Lizard	C	P	P		K			
Least Bell's vireo	E		K		P	K		K1
California least tern	E						P2	P2
Tri-colored blackbird	C							
California brown pelican	E						P2	P2
Black-tailed gnatcatcher	C	P	P		P			
Slender-horned spineflower	E		P		P			
Nevin's barberry	C		P					
San Fernando Valley spineflower	C		P					

KEY - STATUS

C = Candidate species
E = Endangered species
PE = Proposed endangered species

KEY - FACILITY

P = Potentially occurs
K = Known to occur

Notes: [1]Occurs downstream of Whittier Narrows Dam.

[2]Foraging areas only.

Source: U.S. Fish and Wildlife Service

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3.7.1.4 Santa Fe Dam

The Santa Fe Dam basin contains a rather unique assemblage of alluvial scrub -- a brushland area that has adapted to periodic flooding and scouring. The area also contains a small riparian area and old field and turfed areas. A small portion of the basin is potential habitat for the endangered least Bell's vireo and slender-horned spineflower and the candidate San Diego coast horned lizard and black-tailed gnatcatcher.

3.7.1.5 Whittier Narrows Dam

The Whittier Narrows Dam basin consists of rather extensive riparian development due primarily to revegetation efforts within the wildlife sanctuary areas. This area supports a wide variety of avian species and functions as a good wildlife area. The area is known nesting habitat for the least Bell's vireo as well as potential habitat for the candidate black-tailed gnatcatcher and tri-color blackbird.

3.7.1.6 Los Angeles River System

With the exception of the mouth of the river at the Pacific Ocean and a reach near Glendale, the majority of the 55 miles of the Los Angeles River from Sepulveda Basin to the Pacific Ocean contains concrete-lined channels surrounded by urbanized areas. These sections contain only weedy species growing within cracks or joints of the channel. Included in the Los Angeles River system is Compton Creek. This creek contains a soft-bottomed section upstream of its confluence with the Los Angels River.

The soft (unpaved) channel bottom of Compton Creek is characterized by degraded riparian association dominated by bulrush along with groundcover composed of ruderal weed species. Arroyo willow saplings are widely scattered through this strip. Since public access is possible, the vegetation shows sign of continual trampling. Furthermore, heavy accumulations of trash and debris dropped into the channel by illicit dumpers have

collected in the vegetation. The willow canopy and understory components necessary for least Bell's vireo habitat are not evident, and there are no potential vireo sites in this reach. Other avian species occupying the channel were shorebirds and some raptors.

The Glendale reach of the Los Angeles River channel is alternately cobblestone and concrete invert. This reach is dominated vegetatively by a highly degraded riparian association, primarily a combination of cattails and bulrush with numerous patches of giant reed. Arboreal vegetation is primarily made up of a few of Gooding's willow, which together do not form an overstory. Mulefat is present but not sufficient to form an understory. Ground cover is a dense mat of grasses, forbs and ruderal species which generally cover the alluvial sediments which support them. In most areas, the riparian habitat community is very narrow with a ribbon of a single width of trees. In some instances, such as in the channel adjacent to Ralphs Grocery Warehouse, the vegetative mantle covers the alluvial deposit so thickly and completely as to obscure the concrete invert along that reach. Here, as in other places, this vegetation is transitory, unable to withstand moderate channel flows. Ability to see the concrete invert is further masked by substantial trash deposits.

Since soft bottom channels are prone to significant scour, a majority of this vegetation would be lost during years with frequent high steam flows. During years when only low to moderate flows occur, this vegetation can become dense.

The area also serves as a wildlife habitat for shore birds and other species. The lower portion of the river is potential foraging habitat for the brown pelican and California least tern.

3.7.1.7 San Gabriel River Channel

The majority of the San Gabriel River channel is paved and therefore contains little in the way of biological resources. An approximately five-mile (8 km) stretch of the river from Santa Fe Dam to Valley Boulevard has a soft bottom but is cobbly and supports only scattered vegetation. An approximately seven-mile (11.3 km) stretch below Whittier

Narrows Dam contains rather dense riparian vegetation in some areas and supports native wildlife, potentially including the endangered least Bell's vireo. An area in the lower San Gabriel River between Westminster Avenue and the San Diego Freeway supports emergent vegetation of a rather low density. As with the lower Los Angeles River, the lower San Gabriel River is potential foraging habitat for the endangered brown pelican and California least tern.

3.7.2 Biological Resources Within the 100-Year Flood plain of the Los Angeles River

The flood plain within the Los Angeles River is primarily urbanized and contains little native vegetation. The dominant vegetation form includes landscaped areas containing turf and ornamental trees and shrubs. These are associated with landscaping around parks, homes and commercial establishments. Some areas near the riverbed and under power line easements are still in agriculture and grow a variety of ornamental plants and cash crops.

This area supports wildlife typical of urban areas, including such species as English sparrow, starling, crow, blackbirds, mocking bird and domestic pigeon. The larger open space areas near the river could support such species as the American kestrel and burrowing owl.

No threatened or endangered or candidate plant or animal species are expected to occur in this area.

3.7.3 Biological Resources Within the Channel Reach Construction Zones

3.7.3.1 Lower Los Angeles River

Vegetation

With the exception of an approximately 2.5-mile (4 km) section near the mouth of the river, the entire stretch of river is completely channelized, including pavement of the river bottom. With the exception of an occasional plant growing within cracks as well as ruderal species growing adjacent to the levees, the area is essentially void of vegetation.

An approximately 1.5-mile (2.4 km) stretch of the river from Anaheim Street to Willow Street contains areas along both sides of the banks where siltation has taken place, allowing a 10- to 15-foot (3.1 to 4.6 m) wide belt of vegetation to grow. This area contains rushes, cattail, willow and mulefat, as well as many ruderal species such as castor bean.

Compton Creek is tributary to the lower Los Angeles River. Almost all of Compton Creek, with the exception of a two-mile segment of the creek, is channelized and contains very little, if any, vegetation. The soft-bottom portion of the channel contains both ruderal species such as castor bean and Arundo (giant reed) and some scattered riparian species such as mulefat, bulrush, and a few small willow.

The Glendale reach alternates cobblestone and concrete invert for approximately six miles. These areas are dominated by species common to degraded riparian associations, including cattails, bulrush and Arundo (giant reed). There are scatterings of native sycamores and some willow.

Wildlife

In general the Los Angeles River channel has only low value for wildlife. It serves as an open space area for wildlife and provides resting habitat for shore birds. The edges of the area in some locations may provide limited foraging for raptor species. The channel may function somewhat as a wildlife movement corridor. The vegetated area near the mouth is nesting habitat for such species as red-wing blackbirds and is considered of moderate to high wildlife value. It may also support shore birds and some riparian obligate species since some cover is afforded in that area.

Most of the Compton Creek Channel and Glendale reach have very low wildlife value. The area with the cobblestone bottom has moderate wildlife value and would be expected to provide habitat for species generally adapted to an urban environment.

The portion of the lower Los Angeles River that has an unlined, soft substrate bed extends from Willow Street to the mouth of the river at Queensway Bay in Long Beach. This area is influenced by tidal waters entering the mouth of the river and fresh water flowing from upriver sources. At high tides the seawater extends upriver to an area approximately midway between Pacific Coast Highway and Willow Street.

Aquatic Resources

The salinity in this section of the river would range from fresh water just below Willow Street to varying degrees of brackish water further down river depending on the amount of fresh water input and the height of the tide.

No recent biological sampling of the area has occurred; however, through discussions with local experts and individuals conducting other scientific studies in the area and from a study of the Santa Ana River, a prediction of the likely aquatic species can be made.

The area of the river near the mouth would be expected to have many of the same fish species found in the adjacent Queensway Bay. These include Engraulis mordax (northern anchovy), Seriphus politus (Queenfish), Genyonemus lineatus (white croaker), Anchoa delicatissima and Anchoa compressa (slough and deep-body anchovys), Paralabrax nebulifer (barred sand bass), Cymatogaster aggregata (shiner surfperch), and young Paralichthys californicus (California halibut). Invertebrates living on the rip-rap rock sides of the channel near the mouth would probably include sea urchins (Strongylocentrotus purpuratus), snails, and barnacles (Balanus spp.), as well as various species of algae. Polychaete worms, clams, anemones, and tunicates would be expected on the soft bottom.

Further upriver where salinities are more varied, Atherinops affinis (topsmelt), Leptocottus armatus (Pacific staghorn sculpin), Clevelandia ios (arrow goby), Gillichthys mirabilis (longjaw mudsucker), and Hypsopsetta guttulata (diamond turbot) would be likely fish species in addition to E. mordax, C. aggregatta, and P. californicus.

Between Pacific Coast Highway and Willow Street where the river is predominantly freshwater, fish species from upriver could be found. These freshwater and brackish water tolerant species include Ictalurus spp. (catfish and bullhead), Cyprinus carpio (carp), Gambusia affinis (mosquitofish) and Tilapia spp. The presence of these species would depend on the flow volume of the river. After heavy rain storms when the volume in the river is large, it is likely that most freshwater species would be washed out to sea.

Threatened and Endangered Species

The lower river and mouth of the river may be foraging habitat for the endangered brown pelican and California least tern. With these exceptions, no other listed or candidate species is expected to occur in the area.

No threatened, endangered, or candidate plant or wildlife species are known or expected to occur in Compton Creek.

3.7.3.2 Rio Hondo

Vegetation

This section of the Rio Hondo (Reach 5) is channelized with a paved bottom. Except for plants growing in concrete cracks, little vegetation is present.

The spreading grounds adjacent to the channel also contain some ruderal species; however, frequent weed abatement activities tend to limit this vegetation.

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Wildlife

The channel area tends to have very limited wildlife value and functions, at best, as an open space wildlife habitat. The spreading grounds may serve as fair habitat for shorebirds when water is present.

Aquatic Resources

Since the entire channel is paved, no aquatic resources exist in the channel.

Threatened and Endangered Wildlife Species

No threatened, endangered, or candidate plant or animals species are known or have a potential to occur in this area.

3.8 CULTURAL RESOURCES

3.8.1 Flood Overflow Areas

The general flood overflow areas were not surveyed as a part of this study. The area is urbanized, and most cultural resources would have been substantially disturbed. Historic buildings and other structures do exist in the area.

3.8.2 Cultural Resources in Lower Channel Areas

3.8.2.1 Lower Los Angeles River

The portion of the Los Angeles River from Imperial Highway to the Pacific Ocean was surveyed for the presence of historic and cultural resources in 1976 (Stickel 1976). Prior to the field survey, a literature search was conducted through a number of local institutions and individuals. The entire route of the Los Angeles River from the Pacific Ocean to the Rio Hondo was examined in the field by a team of surveyors. No historic resources were identified in this inventory effort.

A records search was conducted in 1984 for this area as part of an overall records search for Los Angeles County Drainage Area (Cottrell et al. 1985). The records search through the UCLA Archaeological Survey revealed that no additional studies had been conducted in this area. An historic records search conducted as part of the LACDA Review Study (Van Wormer 1985) identified no historic properties in the area. As part of the LACDA feasibility study, Hatheway (1986) conducted an architectural and historic assessment of the Southern Pacific "Horseshoe" Bridge in Long Beach and the Union Oil Suspension Pipeline near the 405 Freeway which cross the river in this area. Both of these structures were determined to be too new to be potentially eligible for the National Register.

No properties eligible for the National Register were found to be present along the levees where impacts from flood wall construction would occur. An assessment of the bridges to be affected by the project concluded that none of the 14 bridges to be affected were eligible for listing in the National Register. All of these bridges are less than 50 years old. A field survey was conducted by the Corps of Engineers in 1989 along Compton Creek. No historic properties were encountered along the reach, which is to undergo levee armoring.

3.8.2.2 Rio Hondo Channel

A number of previous studies have been conducted for this stretch of the Rio Hondo (Reach 5). The Rio Hondo channel (a 100-foot [30.5 m] wide corridor along the channel) was surveyed in 1976 (Stickel 1976) with negative results. A historic overview of the Whittier narrows basin revealed that the Battle of the San Gabriel was fought

along this stretch of the Rio Hondo (Lindsey and Schiesl 1976). A records search was conducted in 1984 for this area as part of an overall records search for LACDA (Cottrell et al. 1985). The records search through the UCLA Archaeological Survey revealed that no additional studies had been conducted in this area. An historic records search conducted as part of the LACDA Review Study (Van Wormer 1985) identified two historic properties in the area. These are the Whittier Narrows Dam and the Whittier Road Bridge. As part of the LACDA Feasibility Study, Hatheway (1986) conducted an architectural and historic assessment of the Union Pacific Railroad bridge which crosses the Rio Hondo.

An additional records search conducted as part of the current study identified the Rio Hondo Spreading Grounds as an historic property. In addition, the Gabrielino village of Chokishnga was identified as possibly having been located in the vicinity.

For the present study, an archaeological and historic survey was conducted on January 17, 1989, by Stephen Dibble and Steven Schwartz, both archaeologists employed by the U.S. Army Corps of Engineers, Los Angeles District. The survey was accomplished by both surveyors walking along each levee and surveying the levee and any open land located adjacent to the levee. For most of the stretch, the levee was abutted by the right-of-way fence, which did not allow for much area beyond the levee to be inspected. However, in a few places, as much as 100 additional feet (30.5 m) were surveyed.

Each of the previously identified sites, as well as those discovered as part of the present survey, are described by site number.

RH-1 Site of the Battle of San Gabriel River

On January 8, 1847, the battle of the Rio San Gabriel was fought between American forces commanded by Captain Robert F. Stockton, U.S. Navy, Commander in Chief; Brigadier General Stephen W. Kearney, U.S. Army; and Californios commanded by General Jose Maria Flores. American troops, after securing northern California, landed in San Diego and headed north to connect with the northern units and secure the state.

This was the final battle between American and Mexican forces before Los Angeles was captured by the Americans. The site is listed as California Historical Landmark No. 385. A monument has been placed at Washington Boulevard and Bluff Road. The battle actually appears to have occurred about two miles north of the marker on and below the bluffs between Whittier Boulevard and Mines Avenue.

RH-2 Rio Hondo Spreading Grounds

The spreading grounds are listed as a Landmark of the American Society of Civil Engineers. The Landmark covers all 29 spreading grounds of the Los Angeles County Flood Control District. They are designed to retain and conserve thousands of acre feet of spring runoff annually and return it to the underground water table. The various spreading grounds were constructed beginning in 1917.

RH-3 Union Pacific Rio Hondo Bridge (No. PTD 10.77)

The structure consists of three steel girder spans which rest on two concrete piers spaced equidistant within the channel. The structure is of well deck design, and wooden sleepers rest on steel girders. On either side of the single track there is a wooden plank walkway. Each end of the structure rests on concrete abutments which are located at the top of the adjacent levees. The structure is in good condition and appears to be altered only by the addition of two oil pipelines which are welded to the side of the structure. The bridge was evaluated by Hatheway in 1986 for the Corps of Engineers. Hatheway concluded that, "This structure is not a rare example of its type, nor does it exhibit any unusual features relating to workmanship, design, scale/span, or materials." Therefore, this structure is not a significant historic property.

RH-4 Firestone Boulevard Bridge

This is a concrete highway bridge across the Rio Hondo. It has the date of 1932 impressed in the concrete of the west abutment. It consists of a concrete roadway on concrete arches. This bridge has yet to have been evaluated as to its National Register eligibility.

RH-5 Southern Pacific Railroad Bridge

The structure is of well deck design with the girder both above and below the deck, with squared ends. The structure has three spans on concrete piers spaced equidistant within the channel. The structure supports a single railroad track. This Bridge has yet to have been evaluated as to its National Register eligibility.

RH-6 Southern Pacific Railroad Bridge

The structure is of plate girder above deck design with squared ends. The structure consists of three spans on concrete piers spaced equidistant within the channel. Bridge has "P.E. Ry." painted on it, perhaps indicating it was at one time part of the Pacific Electric Railway system. This Bridge has yet to have been evaluated as to its National Register eligibility.

RH-7 Atchison Topeka and Santa Fe Railroad Bridge

Steel plate girder above-and-below deck structure with one rounded and one squared end. The structure is supported on three concrete piers placed equidistant within the channel. This Bridge has yet to have been evaluated as to its National Register eligibility.

RH-8 Union Pacific Railroad Bridge

This is a steel plate girder below-deck structure. It consists of six spans with two approaches. It has one track and a steel grate walkway on either side. It is supported on concrete piers placed in the channel and in the spreading basins to the west.

RH-9 Whittier Boulevard

This structure is composed of four spans of steel truss with a concrete deck. The structure was evaluated by CalTrans (California Bridge Inventory; Route 72, Bridge 4), who determined it ineligible for the National Register of Historic Places (Category 5). Therefore, this structure does not represent a significant historic property.

RH-10 Beverly Boulevard Bridge

This is a steel girder bridge, the center span of which has been replaced with a concrete arch. It is supported on wooden pilings which have concrete reinforcements at the base. It has an asphalt-over-wood deck supporting four lanes of traffic. The integrity of this structure has been significantly compromised. The center span of the bridge is now concrete, and concrete reinforcements have been added to the piers. Due to the compromised integrity, it is unlikely that this structure represents a significant historic property.

RH-11 Chokishnga

The village of Chokishnga has been associated with the site of the Jaboneria (Spanish soap factory) (Reid: Letter 1; Kroeber 1925), however, it is unclear as to the location of the Jaboneria. Johnston (1962:84) lists Chokishnga as an historic Gabrielino village on the west side of the present Rio Hondo, just a little south of Telegraph Road. This village would be in the general vicinity of the study area.

3.9 TRANSPORTATION

3.9.1 Flood Overflow Areas

3.9.1.1 100-Year Overflow Area

Traffic within the LACDA boundaries is notoriously heavy. Peak-hour traffic on major roadways and freeways is usually congested, with stoppages occurring frequently on freeways and traffic backed up at surface street intersections.

The LACDA 100-year flood plain includes areas of heavy urbanization and major roadway and freeway thoroughfares. Some areas wholly or partially contained in the flood plain include the San Fernando Valley, Los Angeles, Pico Rivera, Downey, Lynwood, Compton, Paramount, Bellflower, Lakewood, Carson, and Long Beach. Most Los Angeles area freeways, including Ventura (101, 134), Golden State/Santa Ana (5), Santa Monica (10), Pomona (60), Long Beach (710), Artesia (91), and San Diego (405) cross or run through the 100-year flood plain.

Table 3.9-1 gives the major roadways and freeways that cross or are within the 100-year flood plain, by city. Each of the roadways and freeways listed are heavily utilized, especially during peak-hour commuter traffic. Most freeways are at capacity with no plans for expansion. As the population of the Los Angeles area continues to increase, the volume of traffic and amount of roadway and freeway congestion will also increase. Since flood control channels parallel major freeways (Ventura, Golden State, Long Beach, San Gabriel), potential flood conditions could restrict freeway access from the major roadways which enter these freeways, creating a severe traffic problem.

Table 3.9-1

MAJOR ROADWAYS AND FREEWAYS
IN CITIES INFLUENCED BY THE 100-YEAR FLOODPLAIN

City	Major Roadways	Freeways
Panorama City	Roscoe Boulevard	
Van Nuys	Sherman Way Burbank Boulevard Coldwater Canyon Avenue	
North Hollywood	Riverside Drive	Ventura Freeway (101)
Studio City	Laurel Canyon Boulevard	
Burbank		Ventura Freeway (134)
Glendale	Victory Boulevard	Ventura Freeway (134) Golden State Freeway (5)
Los Angeles	Spring Street Main Street Macy Street First Street Whittier Boulevard Alameda Street	Golden State Freeway (5) Pasadena Freeway (110) Hollywood Freeway (101) Santa Monica Freeway (10) Pomona Freeway (60)
Pico Rivera	Whittier Boulevard Beverly Boulevard Rosemead Boulevard Washington Boulevard Paramount Boulevard Slauson Avenue	
Downey	Telegraph Road Paramount Boulevard Florence Avenue Firestone Boulevard Lakewood Boulevard Imperial Highway Garfield Avenue	Santa Ana Freeway (5)
Lynwood	Atlantic Avenue	Long Beach Freeway (710)
Hollydale	Paramount Boulevard Garfield Avenue	

Table 3.9-1 (Continued)

MAJOR ROADWAYS AND FREEWAYS
IN CITIES INFLUENCED BY THE 100-YEAR FLOODPLAIN

City	Major Roadways	Freeways
Compton	Rosecrans Avenue Long Beach Boulevard Alondra Boulevard Compton Boulevard Alameda Street	
Paramount	Atlantic Avenue Rosecrans Avenue Compton Boulevard Alondra Boulevard Garfield Avenue Paramount Boulevard Lakewood Boulevard Downey Avenue	Long Beach Freeway (710) Century Freeway (105) Artesia Freeway (91)
Bellflower	Alondra Boulevard Artesia Bouevard Downey Avenue Woodruff Avenue	Artesia Freeway (91)
Lakewood	Lakewood Boulevard Downey Avenue Del Amo Boulevard Paramount Boulevard	
Carson	Avalon Boulevard Carson Street Santa Fe Avenue Del Amo Boulevard Wardlow Road Wilmington Avenue	Long Beach Freeway (71) San Diego Freeway (405)
Long Beach	Artesia Boulevard Atlantic Avenue Long Beach Boulevard Del Amo Boulevard Wardlow Road Willow Street Pacific Coast Highway Anaheim Street Ocean Boulevard Cherry Avbenue Lakewood Boulevard Woodruff Avenue Los Coyotes Diagonal Studebaker Road Seventh Street	Artesia Freeway (91) Long Beach Freeway (710) San Diego Freeway (405) San Gabriel Freeway (605)

3.9.1.2 500-Year Overflow Area

The area affected by the LACDA 500-year flood plain includes all of the 100-year flood plain, plus additional areas mainly in Van Nuys, Sherman Oaks, Los Angeles, Norwalk, Los Alamitos, and Seal Beach. Additional areas of freeway covered by the 500-year flood plain include portions of the Hollywood (170), Harbor (110), Santa Monica (10), and San Gabriel (605) freeways.

The number of major roadways and the size of the areas affected is considerably higher within the 500-year flood plain boundaries. These roadways are predominantly located in developed, heavily urbanized areas, and traffic flow is heavy during peak-hour periods.

The additional major roadways and freeways that cross, or are within the 500-year flood plain, are listed in Table 3.9-2. These additional areas are centered around portions of the Hollywood Freeway, Harbor Freeway and San Gabriel Freeway, and any impairment to vehicle access in these areas would create traffic backups and congestion, especially during the commuter rush hour.

3.9.2 Traffic Conditions Within Channel Reaches

3.9.2.1 Lower Los Angeles River

Six freeway overpasses, eleven roadway bridges and three railroad bridges cross the Los Angeles River from Imperial Highway south to Ocean Boulevard.

Average Daily Traffic counts (ADT) for major roadways and freeways in the vicinity of the Los Angeles River Channel, both crossing the channel and adjacent to it, are shown on Figure 3.9-1. This figure illustrates the heavy amount of existing traffic in this highly urbanized area. During peak traffic hours, the freeways and most major roadways in the area are heavily congested with little, if any, excess traffic carrying capacity available. Traffic speeds on the Long Beach freeway (710) during peak hours are estimated at

35-37 mph, with stoppages and backups commonly occurring in the event of an accident or stopped vehicle (Gus Martin, Information Officer, CALTRANS, February 9, 1989).

Table 3.9-2

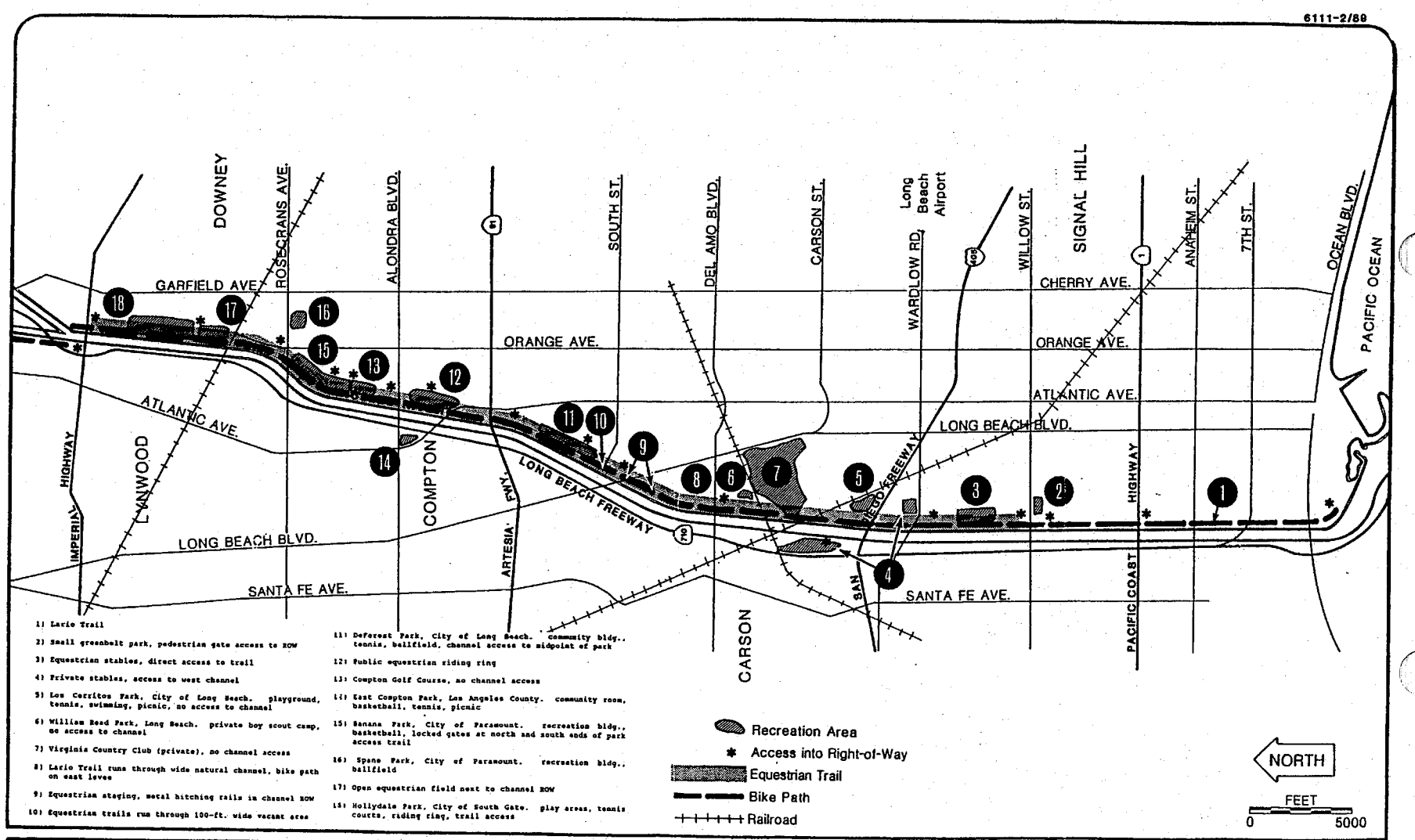
ADDITIONAL MAJOR ROADWAYS AND FREEWAYS IN CITIES INFLUENCED BY THE 500-YEAR FLOOD PLAIN

City	Major Roadways	Freeways
North Hollywood	Laurel Canyon Boulevard Burbank Boulevard Victory Boulevard Sherman Way Roscoe Boulevard Vineland Avenue Lankershim Boulevard	Hollywood Freeway (170)
Sherman Oaks	Van Nuys Boulevard Ventura Boulevard Riverside Drive Woodman Avenue Coldwater Canyon Ave	Ventura Freeway (101)
Burbank	Riverside Drive	
Los Angeles	Olympic Boulevard Washington Street Soto Street Central Avenue San Pedro Street La Cienega Boulevard La Brea Avenue Crenshaw Boulevard Western Avenue Vermont Avenue Jefferson Boulevard Rodeo Road Exposition Boulevard Santa Barbara Avenue Figueroa Street Broadway Hill Street Vernon Avenue Slauson Avenue Florence Avenue Manchester Avenue Century Boulevard Imperial Highway	Harbor Freeway (110)
Gardena	Artesia Boulevard Vermont Avenue	San Diego Freeway (405) Harbor Freeway (110)

Table 3.9-2 (continued)

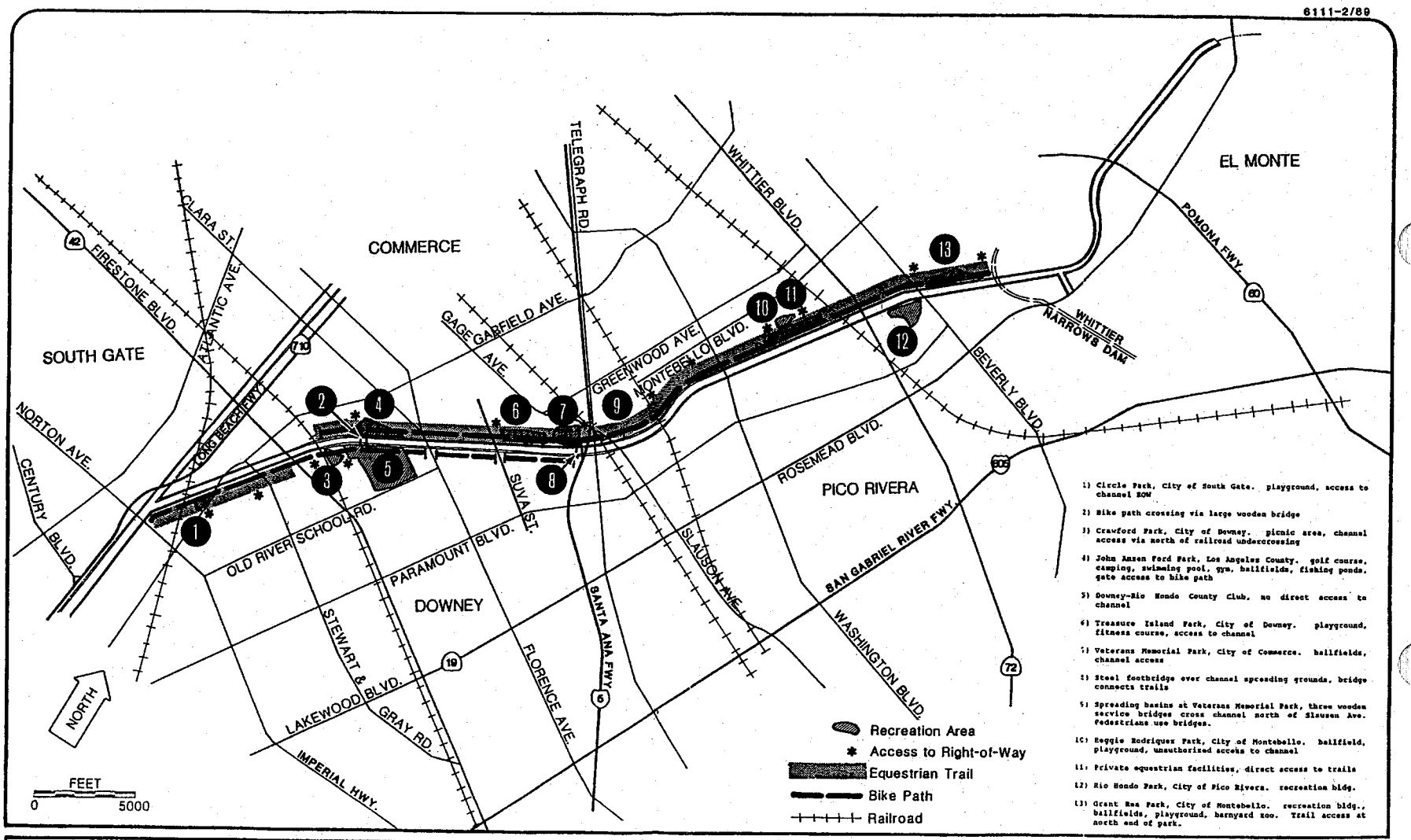
ADDITIONAL MAJOR ROADWAYS AND FREEWAYS IN CITIES INFLUENCED BY THE 500-YEAR FLOOD PLAIN

City	Major Roadways	Freeways
Torrance	Vermont Avenue Torrance Boulevard	Harbor Freeway (110)
Santa Fe Springs	Whittier Boulevard Washington Boulevard Slauson Avenue Telegraph Road Firestone Boulevard	San Gabriel Freeway (605) Santa Ana Freeway (5)
Norwalk	Imperial Highway Rosecrans Avenue Pioneer Boulevard Norwalk Boulevard Artesia Boulevard Alondra Boulevard	San Gabriel Freeway (605) Artesia Freeway (91)
Cerritos	Norwalk Boulevard Pioneer Boulevard South Street Bloomfield Avenue Carson Street	San Gabriel Freeway (605)
Los Alamitos	Cerritos Avenue Los Alamitos Boulevard	San Diego Freeway (405) San Gabriel Freeway (605)
Seal Beach	Westminster Ave Los Alamitos Boulevard	



LOWER LOS ANGELES RIVER - REACH 4 RECREATION FACILITIES

FIGURE 3.10-1



RIO HONDO CHANNEL - REACH 5 RECREATION FACILITIES

FIGURE
3.10-2

Some key elements of the lower Los Angeles River which have direct access to the trail system include a small greenbelt park and DeForest Park in Long Beach, East Compton Park, Banana Park in Paramount, Hollydale Park in South Gate and four equestrian facilities. In addition, equestrian staging areas and wide open equestrian fields are located at the midpoint and at the upper end of this reach. Additional access points are provided at cross streets in the area.

Trail users are primarily visually exposed to the concrete channel and surrounding land uses. Except for the wetlands area in the channel between Willow Street and Anaheim Street, areas of aesthetic value include strip park areas abutting the channel to the east such as DeForest Park.

The lower segment of the lower Los Angeles River between Anaheim Street and Ocean Boulevard is within the coastal zone. As such, the proposed project must be reviewed with regard to impacts to recreational use and access to coastal areas, as well as consistency with the Coastal Act. The bike trails provide access to coastal recreation areas, and small boats, and bank fisherman take advantage of the resources of the lower Los Angeles River.

3.10.2.2 Rio Hondo Channel

The Rio Hondo Channel is also characterized as a concrete-lined channel surrounded by a highly urbanized/industrialized area. Weeds are the only vegetation within the channel and typically grow between cracks and joints in the channel. The channel is bordered by a mix of land uses, including residential, commercial, industrial as well as recreational. Spreading basins are located just north of the Santa Ana Freeway on the west side of the channel.

Bike, equestrian and pedestrian trails (Lario Trail system) run most of the length of the Rio Hondo system. Concrete bike and some dirt equestrian trails run on the east side of the channel from the confluence with the Los Angeles River to the Santa Ana Freeway, and bike and equestrian trails run on the west side of the channel from north of

Firestone Boulevard to Whittier Narrows Dam. Between the Southern Pacific Railroad bridge (north of Firestone Boulevard) and the Santa Ana Freeway, the trails run on both sides of the channel. Two bike/pedestrian/equestrian bridges connect the trails with a large wooden bridge at the south end and a steel footbridge just south of the freeway on the north end.

Access to the parks and recreational facilities along the channel are provided through numerous ramps from park areas as well as cross streets. Maintenance vehicles enter the reach at many of the numerous cross streets and use both sides of the channel, including the trails, for maintenance. Maintenance vehicle access to the channels can also be obtained from Whittier Narrows Dam.

Recreational areas having access to Reach 5 include Circle Park in South Gate; Crawford Park and Treasure Island Park in Downey; John Anson Ford Park, under the County of Los Angeles jurisdiction; Veterans Memorial Park in Commerce; and Grant Rea Park in Montebello. Private equestrian facilities near the north end of Reach 5 also access the trails. These areas provide pleasing aesthetics along the trails in addition to being available to trail users as places to relax.

3.11 PUBLIC SAFETY

3.11.1 Flood Plain Overview

The potential of a 100-year and 500-year flood occurring was previously described in Section 3.2. Presently, portions of the LACDA system do not have the capacity to prevent flooding from even a 100-year flood. Large floods occur infrequently, but their magnitude of destruction is enormous. A tabulation of damagable units is presented as Tables 3.3-1 and 3.3-2 in Section 3.3. for the 100- and 500-year events.

Although a flood with a 100-year or greater frequency has not occurred in the 20th Century, there remains a one-in-a-hundred chance that it may be equalled or exceeded in any single year. Such an event could impact almost 82 square miles (212 km^2) with flood

waters in localized areas as deep as 8 to 10 feet (2.4 to 3.1 m). Most areas could experience flooding of from 1 to 4 feet (0.3 to 1.2 m).

Significant impacts exist for public safety if a 100-year event were to occur. Potential dangers include being trapped in structures or automobiles, being swept into flood waters, or aftereffects of a major event such as inaccessibility to food and water, and effects of standing water, including the spread of mosquitoes and other pests and disease.

Additional significant public safety and health problems could occur from toxic and hazardous materials being washed into the environment. A large number of industrial facilities are located within the flood plain and at locations adjacent to the channels. Many of the facilities have materials stored in drums or use potentially hazardous materials in their operations.

3.11.2 Public Safety Considerations Along Channel Construction Reaches

The trail systems provide for the safety of recreational users in that the trails separate the users from automobile traffic. Bike trails run along the top levee parallel to the channel with crossings provided underneath roadways and freeways. In general, there is no fencing or protection provided for users riding or falling down the embankments to the channel bottom. This condition has the potential to result in injury to the trail user.

Occasionally, maintenance vehicles will obstruct the trail, causing trail users to have to go around such vehicles. Trails are sometimes closed for major maintenance and construction activity.

In some areas of the trail systems, equestrian as well as bicyclists and pedestrians share the same pathways. While some of the equestrian trails are separated, even if only by narrow strips of earth, most equestrian trails end at undercrossings and share the same pathways with bikes and pedestrians.

No specific issues of traffic safety on surface streets have been noted. Traffic on surface streets in the areas of proposed construction are comparable to other areas of Los Angeles.

As mentioned above, large numbers of industrial facilities are located adjacent to the channels. Many of the facilities contain materials which may be toxic or hazardous if released.

3.12 PUBLIC UTILITIES

The study area is highly developed, and contains a great diversity of utility systems including natural gas, potable water, electrical lines (above and underground), telephone lines, petroleum lines, and similar utilities. These lines cross the river under the channel, on roadway and highway bridges and on special pipeline bridges. A detailed, comprehensive inventory of all utilities crossing the river has not been conducted. Each of the bridges have vaults which are expected to contain all or most all utilities. Additionally, utilities cross under the channel throughout the two reaches.

SECTION 4 - ENVIRONMENTAL EFFECTS

(A table of environmental commitments, Table 4.11, can be found at the end of this section.)

4.1 LAND USE AND SOCIAL CONCERNS

Land use impacts are considered significant if the construction activity or completed project is inconsistent with land use policy or planning. The plans include relevant zoning ordinances, general plans, resource management plans, recreation master plans, water supply master plans and redevelopment agency plans. Significant impacts will also occur if a proposed use is inconsistent with existing adjacent land uses in the area, even if both are allowed.

4.1.1 No Action Alternative

4.1.1.1 Impacts

The No Action Alternative will result in no land use impacts to the lower Los Angeles River and Rio Hondo areas. Land use will remain the same as present with no impact on land use planning or policies.

4.1.1.2 Mitigation Measures

No impacts are anticipated so no mitigation is required.

4.1.2 NED Plan Alternative (Main Report NED Plan)

4.1.2.1 Impacts

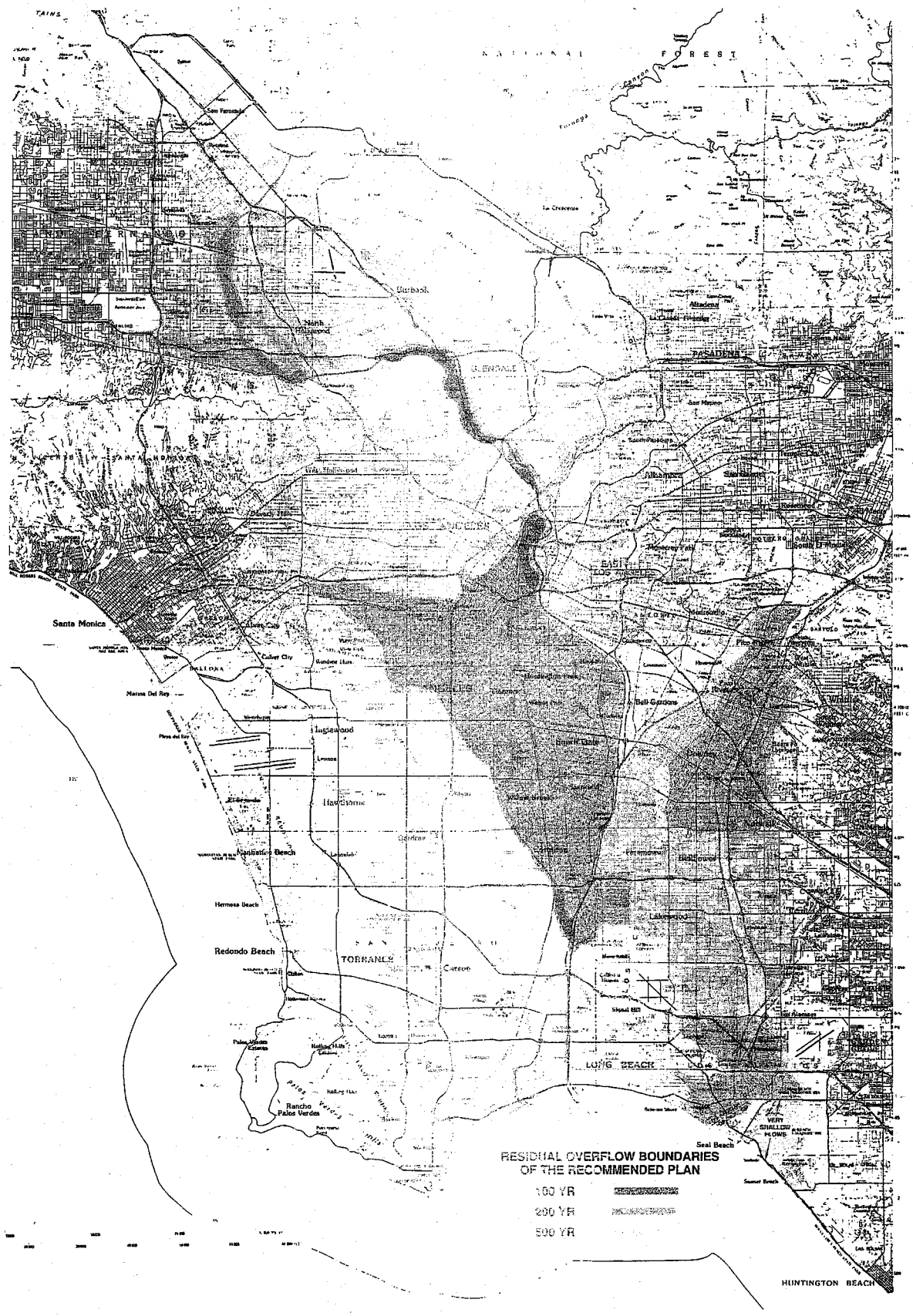
Flood Overflow Areas (Main Report NED Plan)

The NED Alternative will have no effects on existing or proposed land use policy or planning. Regarding future planning, including a potential growth management plan, even though project hydrology assumes that some candidate urban areas that are not presently developed will be developed, these areas contribute only 2 percent of the total flow in the project area. This 2 percent figure is considered insignificant from the standpoint of channel design; thus no land use impacts from area development are anticipated.

This alternative will not reduce the area of inundation or the frequency of occurrence of a 500-year flood event, nor will it effect more frequent flooding events in the upper reaches of LACDA. It may, however, reduce the potential depth of inundation of various areas subject to deep flood waters. The NED alternative will nearly eliminate the 100-year area of inundation in Reaches 4 and 5 (Figure 4.1-1). Elimination of the 100-year area of inundation will save 135,931 structures out of a total of 141,508 presently existing within the 100-year overflow area (see Table 3.3-2).

Land Use Adjacent to Channel Construction Reaches (Main Report NED Plan)

Construction activity will be limited to existing right-of-way property where possible. A list of bridge detour locations that may require use of adjacent land is presented in Table 2.3-7. These uses of land are inconsistent with present uses and may result in potential safety impacts. This incompatible land use occurs due to the necessity of providing mitigation for traffic impacts.


NATIONAL FOREST
Burbank
North Hollywood
GLENDALE
PASADENA
Altadena
Santa Monica
Culver City
Marina Del Rey
Inglewood
Hawthorne
Manhattan Beach
Hermosa Beach
Redondo Beach
TORRANCE
Rancho Palos Verdes
LONG BEACH
EAST LOS ANGELES
Bell Gardens
Seal Beach
HUNTINGTON BEACH
RESIDUAL OVERFLOW BOUNDARIES
OF THE RECOMMENDED PLAN
100 YR
200 YR
500 YR

Construction activity may also encroach upon certain residential areas, and especially commercial/industrial areas, where the back fences of these properties are directly adjacent to the levees. Construction activity, including the use of heavy equipment and loud equipment, will result in a temporary land use which is inconsistent with adjacent uses. Resultant impacts may include noise, air quality and traffic impacts. The specific impacts and mitigations for these encroachment activities are presented in the appropriate resource sections within this document.

4.1.2.2 Mitigation Measures

Mitigation for use of the various properties for the temporary construction of a traffic detour includes full financial compensation and replacement of the sites after construction activity ceases.

4.1.3 Modified Channel Cross-section Alternative (Main Rpt Alts. Two and Three)

4.1.3.1 Impacts

Flood Overflow Areas

Impacts are identical to those presented for the NED Alternative in Section 4.1.2.1 above. No impacts will occur to land use planning or policy. This alternative will eliminate the 100-year area of inundation in the lower LACDA basin.

Land Use Adjacent to Channel Construction Reaches

Construction activity will generally be limited to available right-of-way property. Construction activity may, however, encroach upon certain residential and commercial/industrial areas, especially where the back fences of these properties are directly adjacent to the levees. Construction activity, including the use of heavy

equipment and loud equipment, will result in a temporary land use which is inconsistent with adjacent uses. Resultant impacts may include noise, air quality and traffic impacts. The specific impacts and mitigations for these encroachment activities are presented in the appropriate resource sections within this document.

4.1.3.2 Mitigation Measures

Mitigation measures for activities which encroach upon adjacent uses are presented under other resource sections within this document, including noise, air quality and traffic.

4.2 AIR QUALITY

Air quality impacts are considered significant if one or more of the following criteria are exceeded:

- Emissions result in exceedance of state or Federal air quality standards;
- Emissions at or greater than 1 percent of emissions for a potential pollutant within the subarea of the South Coast Air Basin;
- Release of hazardous non-critical pollutants into the atmosphere;
- Generation of dust exceeding SCAQMD Rule 403.

4.2.1 No Action Alternative

4.2.1.1 Impacts

equipment operates at 60 percent of maximum load. Construction employee commuting and light-duty pickup use was not included, but emissions from these activities are generally much less than on-site heavy equipment and off-site trucks. Based on preliminary calculations, the impacts of the increased traffic congestion on the following key pollutants would be: increase in tons/day of CO - .0004; increase in tons/day of NOx - .001; increase in tons/day of TOG - .0004 over basin total.

The No Action alternative would not cause any direct impacts to the existing air quality in the project area.

4.2.1.2 Mitigation Measures

No mitigation is required.

4.2.2 NED Plan Alternative (Main Report NED Plan)

4.2.2.1 Impacts

All air impacts are short term and construction related. No significant long-term, permanent impacts are expected to occur as a result of this project.

Impacts to air quality from the NED alternative could come from dust generated during construction activities and pollutants released from internal combustion engines of on- and off-site construction equipment.

The major sources of dust include soil disturbance, travel on unpaved surfaces, and loading/unloading of dusty material. These scattered sources of particulates, referred to as fugitive dust, are difficult to quantify. Therefore, the impact on the surrounding areas is not easily assessed. If regular watering of potential dust-generating areas is performed, impacts from construction activities should be minimal. However, during Santa Ana wind conditions, construction activities could potentially generate significant levels of suspended dust particles.

Internal combustion engines will produce combustion pollutants from on-site heavy equipment and off-site trucks hauling material and delivering concrete. The daily equipment combustion emissions during a maximum 12 hour workday from project-related mobile source emissions have been calculated in Table 4.2-1. These calculations were based on an estimated equipment list (see Table 2.3-6) which assumes that all

Table 4.2-1

MOBILE SOURCE COMBUSTION EQUIPMENT EMISSIONS
MAXIMUM INTENSITY DAY
(pounds/day)

Equipment	Daily Work Hours	CO	ROG	NOx	SOx	TSP
On-highway trucks	70	38.8	13.6	79.7	15.3	14.8
Off-highway trucks	164	295.2	31.2	683.1	74.5	42.0
Wheeled tractors	70	250.4	13.1	88.9	6.3	9.5
Bulldozer	47	84.6	9.0	195.8	16.5	7.8
Motor grader	39	5.9	1.6	2.1	3.3	2.3
Compactor	70	126.0	13.4	291.7	24.5	11.7
Miscellaneous	172	116.3	26.3	291.0	24.6	23.9
Total (lb/day)		917.2	108.2	1632.3	165.0	112.0
Total (tons/day)		0.46	0.05	0.82	0.08	0.06
SRA 4+5+11+12 (tons/day)		1132.2	213.6	213.0	-	-
Project Share of SRAs		0.04%	0.02%	0.38%	-	-

Source: Values based on information in "Air Quality, Noise and Traffic Study for the Santa Ana River Project", MITECH 1988; and SCAQMD, Air Quality Handbook, 1983 Edition.

Total daily emissions range from about 100 to 150 pounds (45 to 67.5 kg) per day for exhaust particulates, hydrocarbons, and SO_2, to close to 1,000 pounds (450 kg) per day for carbon monoxide and over 1,500 pounds (675 kg) per day for NOx. A large portion of these emissions are from hauling materials such as concrete and other materials. These emissions could be dispersed over a larger area, depending on where material trucked to the site originates from and where material removed will be disposed.

A comparison with existing subregional emissions from AQMD Source Receptor Areas (SRA) 4, 5, 11, and 12 (Long Beach, Whittier, Pico Rivera, and Lynwood, respectively), indicates that the project contribution to the CO, ROG, and NOx burden is adverse, yet below the level of significance (1 percent of the subarea total).

4.2.2.2 Mitigation Measures

Discretionary mitigation measures to control project emissions center primarily on fugitive dust control not amenable to standard dust control technology. Mitigation measures for inclusion in project planning include:

- Frequent watering of the construction area to limit dust emissions from on-site equipment and off-site trucks accessing the project,

- Provisions for terminating operations during strong Santa Ana wind conditions.

In addition to dust control measures, there are mitigation measures from non-particulate sources that will be implemented, and thus should be given consideration where appropriate. Such measures include:

- Good maintenance, including proper tuning of off-road heavy equipment, to reduce combustion source air emissions (especially NOx),

- Control of diesel fuel quality (low sulfur content),

- Site activity control/termination during Stage II smog episodes,

- Contractor participation in the AQMD mandatory rideshare program (Regulation XV).

4.2.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. Two and Three)

4.2.3.1 Impacts

All air quality impacts are short term and construction related. No significant long-term, permanent impacts are expected as a result of this project.

Excavation of excess material during conversion or widening, travel on unpaved surfaces, and other construction elements have traditionally been associated with dust generation which may create localized dust nuisances near the activity. Improved control technology, however, in conjunction with emission rules and restrictions on certain operations developed by the AQMD, has led to a substantial reduction in emission levels. The major source of emissions from controlled construction activities is therefore from scattered sources not amenable to control (called fugitive emissions).

Dust emissions associated with the proposed project include a wide variety of activities such as excavating the material from the channel sides, moving material to a disposal site, and constructing the new channel walls. In addition to fugitive dust, project activities will entail the generation of combustion emissions from mobile equipment to extract the material, haul material to a disposal site, and bring concrete to construct channel walls. Soft-bottom river sediments will be dredged from the last 2.5 mi (4 km) of the lower Los Angeles River. The diesel dredge employed for this project will contribute additional combustion emissions as will haul trucks or barges used to transport the dredged material to a suitable disposal site.

The daily equipment combustion emissions during a maximum intensity workday from estimated project-related mobile source emissions have been calculated in Table 4.2-2.

These calculations were taken from the analysis of a similar project proposed on the Santa Ana River (MITECH 1988) with the addition of the dredging activities which are based on emission factors published by the EPA in its "Compilation of Air Pollution Emissions Factors - AP-42", assuming a worst-case scenario of using haul trucks for dredged material disposal.

Total daily emissions range from about 250 pounds (112.5 kg) per day for exhaust particulates, hydrocarbons, and SO_2 to over 800 pounds (360 kg) per day for CO and just under 2,000 pounds (900 kg) per day for NOx. The majority of these emissions are from vehicles used for hauling material. Emission values could possibly be reduced somewhat if dredged material were barged to an ocean disposal site, depending on the distance to that site. Also, emissions could be reduced if an electric dredge can be utilized.

Comparison with existing subarea emissions (SRAs 4, 5, 11, and 12) indicates that the contribution from the project to the CO and NOx burden, while adverse, is below the level of significance (1 percent of the subarea total).

4.2.3.2 Mitigation Measures

The dredging operations associated with modifying the channel cross-section will require an air quality permit from the South Coast AQMD which will establish control limits on emissions. Discretionary mitigation measures to control project emissions center primarily on fugitive dust control not amenable to standard dust control technology. Mitigation measures to be considered for inclusion in project planning include:

- Frequent watering of the construction area to limit dust emissions from on-site equipment and off-site trucks accessing the project,

- Provisions for terminating operations during strong Santa Ana wind conditions.

Table 4.2-2

MODIFIED CHANNEL CROSS-SECTION ALTERNATIVE
MOBILE SOURCE COMBUSTION EQUIPMENT EMISSIONS
MAXIMUM INTENSITY DAY
(pounds/day)

Equipment	Daily Work Hours	CO	ROG	NOx	SOx	TSP
On-highway trucks	932	516.3	180.8	1060.6	203.2	197.6
Off-highway trucks	128	230.5	24.4	533.1	58.1	32.7
Wheeled loaders	28	16.0	7.0	53.0	5.1	4.8
Compactor	8	14.4	1.5	33.3	2.8	1.3
Dredge	10	32.9	10.7	151.4	5.7	10.8
Miscellaneous	12	8.1	1.8	20.3	1.7	1.7
Total (lb/day)		818.2	226.2	1851.7	276.6	248.9
Total (tons/day)		0.41	0.11	0.93	0.14	0.12
SRA 4+5+11+12 (tons/day)		1132.2	213.6	213.0	-	-
Project Share of SRAs		0.04%	0.02%	0.44%	-	-

Source: Values based on information in "Air Quality, Noise and Traffic Study for the Santa Ana River Project", MITECH 1988; SCAQMD, Air Quality Handbook, 1983 Edition, and EPA AP-42, Compilation of Air Pollution Emission Factors 1985.

In addition to dust control measures, there are mitigation measures from non-particulate sources that may possibly be implemented, and thus should be given consideration where appropriate. Such measures include:

- o Good maintenance, including proper tuning of off-road heavy equipment, to reduce combustion source air emissions (especially NOx),
- o Control of diesel fuel quality (low sulfur content),
- o Site activity control/termination during Stage II smog episodes,
- o Contractor participation in the AQMD mandatory rideshare program (Regulation XV).

4.3 WATER QUALITY AND FLOOD POTENTIAL

Impacts to water quality are considered significant if activities result in a violation of existing water quality standards, result in substantial release of toxic materials or exacerbate existing water quality problems.

Impacts are also considered significant if the project results in an increase in flood potential in a particular reach of the river.

4.3.1 No Action Alternative

4.3.1.1 Impacts

Implementation of the No Action Alternative will result in no increase in sedimentation or creation of any additional water quality impact. The Los Angeles and Rio Hondo

4.3.2.2 Mitigation Measures

Whenever possible, work within the channel will be confined to low flow periods. Downstream sediment basins will be constructed in order to trap sediments from construction operations. Refueling of equipment near the channel will be limited and closely monitored. Dewatering operations would be done behind temporary sheet pile coffer dams (to be removed after construction) and piers from bridge being replaced would be removed to compensate for construction of piers for new bridge.

4.3.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. Two and Three)

4.3.3.1 Impacts

Implementation of this alternative will result in potential significant sedimentation impacts asssociated with both construction of new channel walls and dredging in the downstream portion of the Los Angeles River. Of particular concern is the potential impact of this sedimentation on aquatic resources within the portion of the river near its mouth. This impact is described in Section 4.5.

Depending upon the disposal method employed, there would be a potential impact to water quality if ocean disposal in LA-2 or LA-3 were to occur. Assuming this material meets standards for ocean disposal, no significant impact is anticipated. Permits would be obtained from the California Regional Water Quality Control Board for 401 certification prior to any dewatering activities.

As with the NED project, this alternative will contain the 100-year flood plain within the channel of the lower Los Angeles and Rio Hondo rivers. Flood potential within the upper portion of the Los Angeles River will not be changed. No wetlands shall be affected as a result of this alternative.

4.3.3.2 Mitigation Measures

rivers would continue to experience water quality problems associated with urban runoff and illegal discharge of toxic materials. No wetlands shall be affected as a result of this alternative.

If the No Action Alternative were implemented, the existing flood potential in the lower Los Angeles and Rio Hondo rivers would continue.

4.3.1.2 Mitigation Measures

Other than continuing flood warning programs and the potential use of upstream retention basins, no mitigation is proposed.

4.3.2 NED Plan Alternative (Main Report NED Plan)

4.3.2.1 Impacts

Since most of the construction activities are proposed to take place on top of the existing channel walls, there would be no sedimentation impacts associated with parapet wall construction. Where channel widening would occur as well as wall construction possibly at bridges, there would be a potential for significant sedimentation impacts associated with excavation and movement of materials. This impact could become significant during moderate river flows. There is also a potential that toxic material such as diesel fuel, engine oil, or other motor fluids could be accidentally discharged by construction equipment and operations. This impact could also be significant. There is also the possibility that a bridge relocation in the lower reach of the Los Angeles River could occasion dewatering operations for construction of pier foundations.

Implementation of this alternative would result in the 100-year flood plain being contained to the lower Los Angeles River channel and the channel of the Rio Hondo river. There would be no change in upstream flood potential. No wetlands shall be lost as a result of this alternative.

Sedimentation basins will be constructed downstream of construction activities. A hydraulic cutterhead dredge will be used to minimize turbidity in the channel. Use of these methods will reduce impacts to insignificant levels.

Chemical testing and/or bioassays of sediments will be conducted as necessary to assure all materials meet ocean disposal or other disposal standards.

4.4 NOISE

Noise impacts are considered significant if they exceed established noise exposure standards, or if there are unique, noise-sensitive receptors within the zone of primary project activity noise impacts.

Because most communities do not regulate noise from construction except through controls on hours of operation, noise/land use compatibility guidelines are used as the standard for the project noise impact assessment (see Section 3.6.1.1).

4.4.1 No Action Alternative

4.4.1.1 Impacts

The No Action Alternative results in no construction activity occuring along the LACDA system. Noise levels remain as in existing conditions with no construction impacts occuring.

4.4.1.2 Mitigation Measures

No mitigation measures are required.

4.4.2 NED Plan Alternative (Main Report NED Plan)

4.4.2.1 Impacts

Land use in the vicinity of the channel corridors proposed for construction were described in Land Use (Section 3.3). Figures 3.3-1 and 3.3-2 show general land uses along the reaches and identify sensitive receptors. Six schools are within 2,000 feet (610 m) of the channel in the lower Los Angeles River, while three schools are within 2,000

feet (610 m) of the channel along Rio Hondo Channel. No hospitals or churches were identified along either reach. No wetlands shall be effected as a result of this alternative.

A listing of equipment estimated for use for construction of this alternative is presented in Table 2.3-6. Equipment is presented for the various activities of parapet wall construction, armoring and bridge construction.

Parapet Wall Construction (Main Report NED Plan)

The worst-case condition arises from construction activity immediately adjacent to homes and sensitive receptors along the levees. It is assumed that parapet wall construction will occur in phases along the length of the channel on both sides. Construction will entail the drilling and use of a backhoe to form a trench in the levee for a foundation for the wall. While this effort moves to the next section, forming of the wall and placing concrete will occur at the former location. Thus, construction can occur on a continuous basis along the reach. Wall construction in any one location should take several weeks.

Because the number of vehicles that will be working in one section at one time is not exactly determined, an average exposure level of 85 dB for heavy equipment at 50 feet (15.3 m) from the source, and an 80 dB source strength at 50 feet (15.3 m) for haul trucks and ready-mix concrete mixers will be used for analysis. In an assumed situation where two pieces of heavy equipment and two trucks are working in sufficiently close proximity such that they could be considered as a single point source emissions source, then it would take about 3,000 to 4,000 feet (915 to 1,220 m) of normal noise propagation before the construction noise would blend into the environment, depending on other background noise. Noise contours from intensive on-site construction activities are as follows:

Sound Level	Distance from Source
89 dB	50 feet (15.3 m)
83 dB	100 feet (30.5 m)
77 dB	200 feet (61 m)
65 dB	800 feet (244 m)
63 dB	1,000 feet (305 m)
59 dB	1,470 feet (448 m)
57 dB	1,770 feet (540 m)
55 dB	2,090 feet (637 m)
49 dB	3,140 feet (958 m)

Impacts will vary from being significant adverse impacts to being adverse impacts depending on the specific activity ongoing at any one time and the level of background noise in the immediate area. Significant impacts will occur in areas where residential back fencelines are directly adjacent to the levee. Impacts will be reduced near freeway overcrossings due to the high background levels. Dwellings near the Golden State Freeway (Interstate 5) for example, experience noise intrusion which exceeds noise land use compatability standards without project implementation.

Armoring (Main Report NED Plan)

Noise sources associated with levee armoring activities include bulldozers, backhoes and grout pump trucks in addition to various other equipment and trucks. Noise impacts from armoring will be similar to other construction activities but confined to the specific armoring areas as shown in Figure 2.3-4.

Impacts from armoring will be less adverse at the locations proposed near the Artesia and Century Freeways due to the high background concentration of noise existing in the area from freeway noise and construction noise, respectively. It is possible that impacts will blend in with background noise such that no impacts occur from armoring operations

in these two locations. Impacts from armoring will be more adverse along the Rio Hondo, although, again, not as intrusive as construction of parapet walls, due to shielding by channel embankments.

Bridge Construction (Main Report NED Plan)

Bridge construction encompasses the raising of existing structures and total replacement in some locations. Bridge raising could take as much as 2-1/2 years for each bridge. This entails construction of a temporary bridge to be used as a detour while the existing structure is being demolished and rebuilt. A temporary bridge will most likely be constructed by standard construction techniques except that it will have a temporary, unfinished surface which can be lifted and moved for use in another temporary bridge downstream.

Bridge construction requires the use of large cranes, backhoes, bulldozers, other heavy equipment as presented in Table 2.3-6, and pile drivers for support of the piers. Pile drivers will be required for anchoring of temporary bridges and the widening and anchoring of existing supports for bridges being raised.

Impacts will vary with the level of background noise and land use in the area of bridge construction. Residential areas will experience the greatest impact from bridge construction. The combined impact of several pieces of heavy equipment will raise existing noise levels by 5 to 10 dB during hours of operation adjacent to residential areas. Atop this general noise increase will be a steady "thunk-thunk" when pile drivers are in operation. Pile driver noise will reach 75 dB with each drop of the drive hammer. Such noise is highly irritating because of its repetitive nature.

4.4.2.2 Mitigation Measures

All noise impacts are short term and construction related. No significant long-term, permanent impacts are expected to occur from this project. Mitigation for construction impacts include incorporation of the following measures:

- A line-of-sight break between noise sources and the nearest sensitive receptors is the critical factor in maintaining project activity noise impacts at unobtrusive levels. This could be accomplished by placement of a temporary berm to shield residences and other receptors from construction activity. In areas where land is accessible and available, a large berm could reduce noise levels by as much as 20 dB.

- In areas of extreme noise conditions where berms are not feasible, either construction of temporary walls to serve as noise barriers or additional limits on work hours may be warranted to protect these sensitive receptors.

- Smaller, and therefore less noisy, construction equipment will be evaluated for use in sensitive construction areas such as parapet walls during the Preconstruction Engineering and Design phase.

- Because of the increased noise sensitivity during quiet hours, time limits on allowable on-site equipment operations are normally made a condition on construction permits. No on-site activities will be permitted before 7:00 AM weekdays, not before 8:00 AM on Saturdays, and not at all on Sundays or holidays because the noise background is lower on those days and project impacts will become more distinct when they are not blended into the background noise environment. No construction activities will occur after 7:00 PM.

No effective mitigation is available for the use of pile drivers.

4.4.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. Two and Three)

4.4.3.1 Impacts

Reconstruction of Channel Walls (Main Report Alternatives Two and Three)

Under this alternative, the existing trapezoidal walls will be removed from one or both sides of the channels. Either the trapezoidal shape will be retained, but widened, or the shape will be converted from trapezoidal to rectangular. Equipment required includes cranes, excavators and jackhammers for concrete removal. Bulldozers and wheel loaders would be required to fill up to 100 trucks per day with concrete and other material to be hauled away from the site for disposal. Depending on the location, some of this material could be placed behind the existing levee, but most would require trucking off site. It is estimated that up to 100 ready-mix concrete trucks would be required on a daily basis for construction of new vertical walls. Construction would last in any one location for up to one year.

Bridges are not required to be raised; however, modification to some bridge supports will be required.

The impact of any single piece of equipment will not be substantial, but the combined noise effects of a large number of pieces of equipment working in the channel at one time will be significant, raising the existing noise levels behind quiet residential areas by 5 to 10 dB during hours of operations. The impact will lessen for construction operations operating in areas where background levels are already high or already exceed community noise ordinance levels, such as near freeways.

Dredging Main Report Alternatives Two and Three)

The 2.5-mile (4 km) segment of the Los Angeles River from the river mouth to Willow Street would be dredged a maximum of five feet (1.5 m). A diesel-powered dredge should be used in the channel. Removed material will be either loaded on barges and disposed of at a deep water disposal area or loaded onto trucks and hauled off site. An alternative disposal site for material unsuitable for ocean siposal is Pier J at Long Beach Harbor. This site could be used to completely contain any materials away from exposure to the environment.

Dredging operations will not create significant noise impacts from the Pacific Coast Highway to the ocean mouth. Most land use in this area is industrial. A background humming sound will result from the operation. Impacts from Pacific Coast Highway north to Willow Street will be more noticable to the residential areas bordering the channel. Again, a backgound humming will emanate from the channel. However, trucking operations hauling material off site will result in noise impacts within residential neighborhoods. Impacts will vary in significance with the distance of the receptor from the site and the routing of the trucks.

4.4.3.2 Mitigation Measures

Noise mitigation measures are identical to those described in Section 4.4.2.2 for the NED Alternative except that pile drivers should not be needed and, therefore, there are no concerns of mitigation for that equipment.

4.5 BIOLOGICAL RESOURCES

Impacts to biological resources are considered significant if they result in loss of one or more acres (0.4 ha) of wetland habitat, cause mortality in aquatic organisms or adversely affect the continued existence of an endangered, threatened or candidate species.

4.5.1 No Action Alternative

4.5.1.1 Impacts

Implementation of the No Action Alternative will result in no impact to biological resources since no activites in the channel areas will take place.

4.5.1.2 Mitigation Measures

No mitigation measures are required.

4.5.2 NED Plan Alternative (Main Report NED Plan)

4.5.2.1 Impacts

Vegetation

Since the construction activities will be primarily limited to the river channels, no impact to vegetation is anticipated with construction of the concrete walls.

There will also be potential disturbance to vegetation on the outside of the river channel due to bridge raising, levee armoring and other construction activities. Because this vegetation is either landscaped or ruderal areas, no significant impact is anticipated assuming that landscaped areas are replaced. There will be an adverse, but not significant, impact to the Compton Creek Channel since this area contains rather sparse and, primarily, introduced species.

Wildlife

No significant adverse direct impacts to wildlife resources are anticipated through the implementation of the alternative since no productive wildlife habitat will be affected. Additionally, noise from construction operations may affect breeding bird species.

Aquatic Resources

Since work in the channel will be limited, no impact to aquatic resources is anticipated as a result of implementation of the alternative from actual construction. If diesel fuel or other toxic material is spilled, impacts in downstream areas could be adverse.

Threatened and Endangered Species

No loss of foraging habitat of the California least tern and California brown pelican are anticipated. Noise and other activities on the levee walls in the lower portion of the Los Angeles River could affect foraging patterns of these species. This impact is potentially significant, but can be reduced to insignificant (i.e. no threat to continued existence of the species) through conducting activities in the lower channel from September to March on the last one-mile reach of the Los Angeles River. See Appendix C for the biological assessment.

4.5.2.2 Mitigation Measures

The wetland areas in the lower most portion of the Los Angeles River will not be destroyed by construction activities. Construction zones will be monitored to assure that no activites or materials are discharged in this area.

In order to prevent impacts to nesting birds in the wetland as well as not to disturb foraging activities of the least tern and brown pelican, activities will not be conducted from April through September in the last one-mile reach of the river. This would reduce any impact that would adversely affect the species to no effect.

To avoid discharges of pollutants to the stream from refueling and maintenance work on equipment, refueling will be limited near the channel and closely monitored if it must be accomplished adjacent to the channel.

4.5.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. Two and Three)

4.5.3.1 Impacts

Vegetation

Implementation of this alternative may result in the loss of approximately six acres (2.4 ha) of wetland habitat along the lower portion of the Los Angeles River due to dredging activities. This impact is considered significant. Other than loss of ruderal species in the Compton Creek Channel, no other adverse impact is anticipated to vegetation.

Wildlife

There may be a significant impact to wildlife species associated with the loss of the wetland within the lower portion of the Los Angeles River. No other adverse impact is anticipated to wildlife resources.

Aquatic Resources

Removal of sediment from the lower Los Angeles River will create short-term impacts due to dredging. The most direct impact is the destruction of soft-bottom benthic organisms associated with the disturbed sediments. Once dredging is completed, recolonization of the affected area would commence. Field studies of dredged areas have shown that recolonization occurs within two weeks to three years after the dredging stops (McCauley, Parr, and Hancock 1977; Oliver et al. 1977; Rosenberg 1977). It is expected that the benthic community will recover at the shorter end of this range. Oliver et al. (1977) found that shallow water communities inhabiting highly variable and frequently disrupted physical environments rebounded or recovered in less time from experimental disturbances than those found in less variable and more benign conditions.

The impact to the benthic organisms, although adverse, would be short term and insignificant.

Fishes occupying the proposed dredging area would be impacted, especially those who utilize the benthic environment for foraging. The loss of habitat, physical disruption, and environmental disturbance could cause stress and mortality. Fish and other mobile organisms should, however, avoid the dredging area and relocate to undisturbed areas. Therefore, impacts to fish are considered short term and insignificant.

Potential changes in water quality in the form of pollutants, toxic materials, and trace metals may result due to resuspension of bottom sediments during dredging activities. Temporary increases in turbidity and suspended solids levels, along with associated decreases in dissolved oxygen may also occur. Any appreciable increase in turbidity may cause clogging of gills and feeding appendages of fish and filter feeders. If a cutterhead dredge is utilized for removal of sediment, turbidity should be confined to within 200 to 500 feet (61 to 153 m) of the dredge unless a strong current exists, which would extend the range of turbidity. Should it be necessary to use a clamshell dredge, turbidity could be more extensive.
The greatest potential for impact generally lies with the resuspension of materials that are toxic or harmful to organisms, either directly or through bioaccumulation. Because the dredging that is proposed in conjunction with this alternative is for an active river bed, potentially harmful suspended material could be discharged to the ocean waters surrounding the river mouth.

Bioassays and bioaccumulation tests were recently performed on sediments located at the mouth of the Los Angeles River in conjunction with possible dredging and disposal at the LA-2 offshore dredged material disposal site (Marine Bioassay Laboratories 1988). Results of these analyses indicated that copepods exposed to elutriates of sediments showed statistically elevated mortalities, while test organisms exposed to sediments during the solid phase bioassay showed no significant mortality. However, bioaccumulation tests on organisms exposed to sediments for a 20-day period revealed elevated levels of cadmium, lead, and zinc in their tissues.

Sediments proposed for dredging under the modified channel cross-section alternative should be similar to the sediments tested from the river mouth. Consequently, the effects of resuspension of material in the sediments should be similar to the effects noted during the bioassay analyses. Increased mortality to copepods and bioaccumulation of certain metals by benthic invertebrates could be expected. Use of a cutterhead dredge could be used to reduce the amount of material resuspended.

Although similar to sediments from the river mouth, bioassays of the sediments from the lower Los Angeles River would be necessary to determine their proper disposal. If these analyses indicated a higher level of contamination, dredging operations could be limited to periods of slack tides and low or no river flow to further reduce the potential impacts of resuspension of contaminants. An alternative exists to dispose of contaminated material at Pier J in Long Beach where it could be completely contained and segregated from the environment.

Threatened and Endangered Species

Dredging activities will have a potential to affect foraging habitat for the California least tern and California brown pelican. Habitat will remain after dredging; however, this impact is considered to be significant but mitigable to insignificant levels (no effect) by conducting dredging operations between late September and March on the last one-mile reach of the Los Angeles River. See Appendix C for the biological assessment.

4.5.3.2 Mitigation Measures

Loss of the wetland area can be mitigated through restoration of habitat near the channel area. Although soft bottom habitat will remain after dredging, the channel will be lowered so that this wetland may not be re-established. Therefore, creation of small pockets of wetlands adjacent to the channel that would support small areas of marsh and/or riparian vegetation would replace wildlife habitat lost by dredging.

A hydraulic cutterhead dredge should be used to reduce the degree of turbidity. If further bioassays indicate that dredge specimens are highly contaminated, dredging operations should be restricted to periods of slack tide and low or no river flow.

The possibility of adversely affecting the least tern can be reduced to no effect through restriction of dredging operations to September through March in the last one-mile reach of the river.

4.6 CULTURAL RESOURCES

Impacts to cultural resources are considered significant if project implementation results in the loss of a historic, prehistoric or paleontologic resource without proper testing and evaluation.

4.6.1 No Action Alternative

4.6.1.1 Impacts

No impact to cultural resources will occur since construction activites would not occur with this option.

4.6.1.1 Mitigation Measures

No mitigation is required.

4.6.2 NED Plan Alternative (Main Report NED Plan)

4.6.2.1 Impacts

No impact to cultural resources on the Los Angeles River or Compton Creek will occur since no National Register sites are present.

Twelve bridges along the Rio Hondo Channel will have to be modified, which would have an adverse effect on any property eligible for the National Register. The Corps of Engineers has yet to determine the National Register eligibility of four of the bridges. The Corps' eligibility determination will have to be provided to the State Historic Preservation Office (SHPO) for their concurrence pursuant to Section 106. An evaluation will be done by a historian during the Preconstruction Engineering and Design phase.

4.6.2.2 Mitigation Measures

If any bridges are determined to be National Register eligible, mitigation measures will be developed in consultation with the California State Historic Preservation Officer and the Advisory Council on Historic Preservation pursuant to Section 106 of the National Historic Preservation Act (36 CFR 800). These measures would be agreed to in a Memorandum of Agreement. This will be done during the Preconstruction Engineering and Design phase and in place prior to construction.

4.6.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. Two and Three)

4.6.3.1 Impacts

Since construction activities will be limited to the channel, no impact to bridges or other cultural resources will be affected.

4.6.3.2 Mitigation Measures

No mitigation is required.

4.7 TRANSPORTATION

Some traffic delays on surface streets will occur during raising of the roadway bridges shown in Figures 2.3-5 and 2.3-6. The proposed schedule and estimated impact duration is shown below:

DRAINAGE AREA	BRIDGE	IMPACT DURATION
Rio Hondo	Whittier Blvd.	Mar 1996 to Mar 1997
	Slauson Blvd.	Mar 1996 to Mar 1997
	Florence Blvd.	Mar 1996 to Mar 1997
	Firestone Blvd.	Jun 1997 to Jun 1998
	Washington Blvd.	Jun 1997 to Jun 1998
	Suva Blvd.	Jun 1997 to Jun 1998
Los Angeles R.	Willow Street	Apr 1996 to Apr 1997
	Imperial Hwy.	Apr 1996 to Apr 1997
	Long Beach Blvd.	Apr 1996 to Apr 1997
	Compton Blvd.	Apr 1996 to Apr 1997
	Pacific Coast Hwy.	Mar 1998 to Mar 1999
	Del Amo Blvd.	Mar 1998 to Mar 1999
	Atlantic Blvd.	Mar 1998 to Mar 1999
	Rosecrans Ave.	Mar 1998 to Mar 1999

This schedule reflects a staggering of construction times for adjacent bridges, to insure that if a motorist does decide to detour to the next nearest bridge it will not have an impacted traffic flow. Bridge work and detouring patterns will vary according to the local conditions. Proposed detours are summarized in Tables 2.3-3 and 2.3-4. Table 2.3-7 lists the land uses that may be effected by detours.

All traffic impacts are construction related and temporary. It is estimated that actual construction time for each bridge will not exceed twelve (12) months. The maximum length of time for traffic delays in crossing these bridges have been calculated to amount to less than 5 minutes per vehicle, compared to non-construction traffic flow. None of the freeways that cross these drains will need to be modifided for this project.

The railroad bridge crossings scheduled for modification will have temporary structures built to accomodate traffic during construction. The utility crossings of the river will be dealt with, where necessary, by the owner. In all cases the construction process will be handled so that commerce can be carried across the river in an expeditious manner.

Two (2) pedestrian bridges are scheduled to be raised, with construction taking approximately one week. Impacts will be negligible.

4.7.1 No Action Alternative

4.7.1.1 Impacts

If the No Action Alternative is chosen, there would be no significant impacts to traffic directly resulting from the project. No bridges would be closed and no detours imposed. This alternative would not increase the amount of construction vehicles in the area that could add to and increase the level of congestion on surface streets and freeways.

However, indirect impacts to transportation could result from the No Action Alternative. Since no improvements to the LACDA system would be made, the occurrence of flood conditions above the current capacity would result in flooding to a large portion of the Los Angeles Basin (see Figure 3.2-2). This flooding would cause major short-term transportation impacts in addition to other serious damage. Not only would traffic be severely restricted during flood conditions, but the cleanup and reconstruction of damages would prolong the impacts.

4.7.1.2 Mitigation Measures

Mitigation includes flood management planning which, as discussed in Section 2.1.1.13, is not effective enough to prevent major property damage, possible loss of life and serious disruption to traffic patterns. Also it is not practical to incorporate a major flood proofing program in an area as heavily developed as Los Angeles.

4.7.2 NED Plan Alternative (Main Report NED Plan)

4.7.2.1 Impacts

Parapet Walls (Main Report NED Plan)

Parapet walls would be constructed on the tops of the existing levees for nearly the entire lengths of Reach 4 and Reach 5. Construction vehicles required for this project would typically include backhoes, bulldozers, drilling rigs, graders, concrete trucks, compactors, and water trucks, as well as various light duty trucks (see Tables 2.3-5 and 2.3-6). Significant impacts to existing traffic conditions could result from construction vehicle traffic increasing the level of congestion during the peak traffic periods. This impact could be reduced if construction vehicles traveled to and from the sites during off-peak hours and avoided the use of major commuter thoroughfares whenever possible.

Construction vehicles would access the levees via the bike/ pedestrian trails and service roads which are located on top of the levees. A concrete bike/pedestrian trail runs along the entire length of the east levee on Reach 4 and on parts of the east and west levees of Reach 5, while concrete and dirt service roads are present in areas without bike trails (see Section 3.10.2.1). Access to the service roads is available adjacent to most roadway overpasses, and to the bike/pedestrian trails at irregular intervals along each reach (see Figures 3.10-1 and 3.10-2). Impacts to existing traffic could occur if construction related vehicles blocked traffic lanes on major streets while waiting to enter service road entrances. This can be minimized through the use of signs and signalmen. The bike/ pedestrian trails are accessed from smaller noncommuter roads, often in proximity to recreational facilities. Impacts to existing traffic from vehicles utilizing the bike/pedestrian trails would be adverse but not significant. Impacts to recreational facilities are discussed in Section 4.8.

As noted in Section 2.3.1.3, conversion of the channel from trapezoidal to rectangular to widen the channel would occur only along a short reach. This would involve removal of the concrete lining, excavation of earthen material, and pouring of a vertical concrete retaining wall. This would require the use of jackhammers, earthmoving equipment,

trucks to haul out the material, and concrete trucks. As stated above, these construction vehicles could cause traffic impacts unless truck traffic was restricted to off-peak hours and the riverbed utilized whenever possible. The project site could be accessed from the bike/pedestrian trails and service roads on the levees and entrances leading into the channels. Under normal non-flood conditions, vehicles could travel along the concrete-lined channels, restricting the area of traffic impacts to the entrance/exit locations of the channels.

Levee Armoring (Main Report NED Plan)

Impacts to traffic as a result of levee armoring would be similar to those for parapet wall construction. Various construction vehicles (see Tables 2.3-5 and 2.3-6) would access the levees from the bike/pedestrian trails and service roads. These would include trucks hauling numerous loads of rock rip-rap. A significant impact to existing traffic could result from construction vehicle commuting during peak-hour periods. Restriction of construction traffic to off-peak hours and utilization of the river channel for construction traffic would reduce impacts to a level of insignificance.

Modification of Existing Bridges (Main Report NED Plan)

The modification of 15 bridges crossing the lower Los Angeles River and 12 spanning the Rio Hondo will cause significant impacts to the traffic flow for a large area surrounding each bridge under construction. Temporary bridges of at least four lanes will be provided as detours for most bridges requiring modification (see Tables 2.3-3 and 2.3-4). Impacts to traffic could occur during the construction of detour bridges, raising of the existing bridges, and removal of the detour bridges.

During construction of the temporary detour bridges, construction vehicle traffic could increase the level of congestion, significantly impacting the existing traffic conditions. This impact could be lessened by restricting construction traffic to off-peak hours and making use of the river channels to move vehicles whenever possible. Additional impacts

could occur from incidental slowing as drivers observe the construction process. This type of vehicle slowing, referred to as "rubbernecking", could affect traffic several intersections back if the level of congestion is already high, as during peak commuter periods.

The demolition and reconstruction of a bridge will create similar impacts from construction vehicle traffic as did constructing the temporary bridges. Vehicles coming to and from the site during peak periods could add to the already-congested conditions. Although detour bridges will allow a continuation of the traffic flow, lanes will be narrower and vehicles will have to make an abrupt jog to the side of the existing bridges as they follow the detour, both of which will cause vehicle slowing. This impact will be most severe during heavy traffic periods, with traffic affected several intersections away and on cross streets in the vicinity. The Long Beach (710), Artesia (91), and Santa Ana (5) freeways could be affected since several streets requiring bridge modifications have offramps from one of these freeways. Backups of traffic onto the freeways could occur if the streets are too congested to accommodate the flow of traffic.

After bridge modification is complete and traffic resumes the normal route, the temporary detour bridges will be removed. Construction vehicles associated with this process could impact existing traffic if congestion increases due to their presence. These impacts are similar to construction of the temporary bridges.

As discussed in Section 2.3.1.4, it will take approximately 2-1/2 years to modify each bridge, and construction of bridges will be in three phases to reduce the intensity of cumulative bridge closures. If two or more adjacent bridges were modified simultaneously, impacts to traffic would be greatly increased. Impairment of traffic capacity on two adjacent bridges at the same time will be avoided if possible.

4.7.2.2 Mitigation Measures

Mitigation measures proposed to lessen potential traffic impacts of the proposed NED alternative include:

- o Construct adequate detour bridges;
- o Schedule construction traffic to off-peak hours, where possible;
- o Utilize the river channel, or other off street routes, for construction vehicle traffic and vehicle staging, whenever possible;
- o Avoid reducing traffic capacity on two adjacent bridges simultaneously, if possible;
- o Utilize signing and flagmen where construction equipment interface with public traffic;
- o Restrict the availability of left turn options, and other traffic restricting behaviors, near the construction area;
- o Institute public information programs to enable motorists to avoid congested areas:
  - Place large signs far enough in advance of potentially impacted roadway segments to allow drivers the opportunity to alter their routes BEFORE entering the construction area,
  - Place public notices in local newspapers and on cable TV bulletin boards,
  - Distribute mailers in the project area.

4.7.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. Two and Three)

4.7.3.1 Impacts

Reconstruction of Channel Walls (Main Rpt. Alts. Two and Three)

Widening or conversion of the channel walls will require heavy construction equipment, including cranes, excavators, jackhammers, bulldozers, and loaders, as well as haul trucks and concrete trucks. As stated in Section 2.3.2.1, up to 100 haul trucks per day would be required to remove the concrete and other material from the project, and the same number of ready-mix concrete trucks per day could be necessary to construct the new walls. Construction vehicle traffic could significantly impact existing traffic, most notably during the peak commuter periods.

Construction vehicles confined to the channel, bike/pedestrian trails and service roads should not impact adjacent street traffic. However, haul trucks removing material from the site and concrete trucks delivering material to the site could potentially impact traffic in the area. These impacts would be in the form of increased congestion, causing backups at intersections and freeway onramps, and would add to the high level of congestion currently present on most major roads in the project area. Restricting haul and concrete truck traffic to off-peak hours would lessen the impacts. Establishment of an on-site batch plant for mixing concrete would also reduce the number of construction vehicle trips. It might add no more than 55-60 db CNEL exterior noise exposure to surrounding communities.

Levee armoring would occur at certain sections of the channel. The impacts on traffic would be similar to those listed for armoring in the NED alternative (Section 4.7.2).

Dredging Operations (Main Report Alternatives Two and Three)

The impact to traffic from dredging operations depends on the mode of sediment disposal. If dredged spoil is loaded on a barge and disposed at an approved offshore dump site, no significant impacts to existing traffic should occur. However, if dredged material is loaded in trucks for disposal at an approved landfill, impacts to existing traffic could occur from the increased congestion from haul trucks. If land disposal is required, haul trucks could be restricted to off-peak hours to reduce impacts to traffic.

Mitigation measures proposed to lessen potential traffic impacts of the proposed alternative to widen and dredge the channel include:

- o Schedule construction traffic to off-peak hours, where possible;
- o Utilize the river channel for construction vehicle traffic and vehicle staging whenever possible;
- o Establish an on-site batch plant to mix concrete and haul aggregate to the site at night, eliminate cross-town hauls, minimize air quality impacts;
- o Utilize an ocean-dredged material disposal site, if possible;
- o Utilize signing and flagmen where construction equipment interface with public traffic.

4.8 RECREATION AND AESTHETICS

Recreation impacts are considered significant if construction activity interferes with or causes closure of recreational facilities or poses a safety hazard to recreational users, resulting in the need to close a facility.
Visual impacts are considered significant if construction of walls for flood control block existing visually sensitive areas. The problem of constructed walls serving as a potential surface for graffiti is considered an adverse impact in areas of public viewing. An aesthetic treatment plan has been formulated to provide tree lined paths and texture-coated wall surfaces to reduce vandalism.

4.8.1 No Action Alternative

4.8.1.1 Impacts

Under the No Action Alternative, no impacts will occur from construction activities to rec. users. There will be no need to close sections of the trails. No visual

impacts will occur, and the wetlands will remain in their present condition in the lower area of the Los Angeles River. There will be no potential for graffiti on parapet walls, as these walls will not be built.

Also, no additional improvements to recreational or visual resources will occur under this alternative, but there may be impacts from the exposure to flooding.

4.8.1.2 Mitigation Measures

No recreational or visual impacts will occur; thus no mitigation measures are required.

4.8.2 NED Plan Alternative (Main Report NED Plan)

4.8.2.1 Impacts

Construction of proposed improvements require that construction vehicles and equipment have access to the channel. In areas where parapet walls will be provided along the tops of existing levees, construction will occur on the levees on both sides of the channel and will require that recreational trails be closed in areas of construction for the duration of construction. This results in significant recreational impacts during the construction period.

Within Reach 4, the wetlands area existing between Willow Street and Anaheim Street will no longer be visible as parapet walls will be constructed along both reaches. This will result in the loss of viewing the wetlands area and is considered a significant visual impact. Parapet walls over three feet (0.9 m) in height will restrict bicyclists' views, and walls over five feet (1.5 m) in height will restrict pedestrian views of the channel and areas across the channel. This also results in an adverse significant impact for a worst-case assumption that views are aesthetically pleasing in and across the channel. Wall construction also results in a loss of the sense of openness or the production of a "closed-in" feeling to trail users. Other visually sensitive areas such as park areas abutting and

outside of the channel, will be visible from the trails after construction, and no impacts will occur.

The potential exists for adverse impacts from graffiti on constructed parapet walls along the proposed areas of construction. This will be visible from homes and business along areas of the reach and to users of highways and streets crossing the channel.

Construction activities in the lower area of the lower Los Angeles River will result in policy impacts with the Local Coastal Plan. The inconsistency of the project with the Local Coastal Plan results from problems with recreational access to the coastal recreation areas. These include the temporary impacts that construction activity will have on the closure of the bike path along the river channel and the resultant inaccessibility to the coast by this avenue.

4.8.2.2 Mitigation Measures

No equally satisfactory mitigation exists for the rerouting of recreational trails during construction. While construction occurs on the bike path, the possibility exists of using the west side of the levee and surface streets for bicyclists, although this is less appealing due to the presence of automobiles. No mitigation exists for equestrian users. This impact is temporary for the duration of construction between recreational trail access points.

The proposed Aesthetic Treatment Plan consists of texturing parapet wall surfaces and limited landscape plantings. Concrete parapet walls will feature a textured surface with a vandal-resistant coating to improve aesthetic quality and prevent vandalism. In highly visible areas, walls will be either tinted or painted. Along portions of the channel, vines will be planted in specially constructed concrete or other permanent planter boxes in a manner that would not impact the structural integrity of the walls. Other than vines, only trees would be used because the County of Los Angeles has requested that no grasses, groundcover, or small shrubs be used due to high maintenance costs and to minimize the potential for vandalism. Landscape treatment will be primarily provided

at various bridge crossings, street nodes, and along portions of the channel where rights of way allow.

Mitigation measures for the problem of graffiti on the parapet walls include providing a textured surface on the walls, coating the walls with a material such that clean up is easier and incorporating a routine graffiti removal program into maintenance activities.

Mitigation includes that a temporary bike path be determined and routed such that access to the coast is still available to recreation users.

4.8.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. Two and Three)

4.8.3.1 Impacts

The conversion of the channel cross-section results in the construction of three-foot (0.9 m) high parapet walls along the channel levees. This construction will result in closure of the recreation trails between major access points and is a significant recreational impact during construction.

Parapet walls of up to three-foot (0.9 m) heights will not block views; therefore, no aesthetic impacts will result. However, safety impacts (see Section 4.11.3) require an additional three to four feet (0.9 to 1.2 m) of chain-link fencing on top of the parapet walls. While this will be adverse, it will not result in significant aesthetic impacts. This alternative does, however, eliminate the wetlands area near Anaheim Street, which results in a significant visual impact. Other visually sensitive areas such as park areas abutting and outside the channel will be visible from the trails after construction, and no impacts will occur.

The potential exists for adverse impacts from graffiti on constructed parapet walls along the proposed areas of construction. This will be visible from homes and business along areas of the reach and to users of highways and streets crossing the channel.

Project differences with the Local Coastal Plan is the same as that described for the NED Plan Alternative in Section 4.8.2 with the additional, if temporary, impacts from dredging operations which will occur to fisherman and small-craft boaters who use the mouth of the river for fishing and recreation.

4.8.3.2 Mitigation Measures

As described in Section 4.8.2.2, no equally satisfactory alternative exists for mitigation for the rerouting of recreational trails during construction. The possibility exists of using surface streets for bicyclists, although this is less appealing due to the presence of automobiles. No mitigation exists for equestrian users. This impact is temporary for the duration of construction between recreational trail access points.

No loss of esthetic views will occur except for loss of view of wetlands areas. General mitigation measures include the design of trails on the levee top such that views are provided of the land areas to the outside of the channels. This could also include the planting of shubbery in accessible areas and the possible later development of additional strip park areas. The development of additional park areas could serve to provide additional recreational resources within communities adjacent to the channel and could be developed under a joint agreement with those communities. As an alternative, mitigation could be provided by the strategic setting of areas of potted plants or built-in planters and designed seating areas/rest stops at areas along the trails. These measures would improve aesthetic conditions over existing conditions. These options will be evaluated in the Preconstruction Engineering and Design (PED) phase when the final designs are available.

Mitigation measures for the problem of graffiti on the parapet walls include providing a textured surface on the walls, coating the walls with a material such that clean up is easier and incorporating a routine graffiti removal program into maintenance activities.

Mitigation measures for inconsistency with the Local Coastal Plan are the same as described above in Section 4.8.2.2.

4.9 PUBLIC SAFETY

Safety impacts are considered significant if construction activity poses a safety hazard to the general public. Safety impacts also are considered significant if the completed structure poses a safety hazard to recreation users and the general public.

4.9.1 No Action Alternative

4.9.1.1 Impacts

Flood Overflow Areas

The area of inundation included within the 100- and 500-year flood events includes a great number of waste and hazardous waste materials which could be released into the environment during an event. This is especially true for the lower Los Angeles River inundation area which includes a great number of industrial areas adjacent to the channel. A significant safety impact could result from release of toxic substances.

Safety Adjacent to Channel Construction Reaches

Safety impacts along the recreational trails include the existing hazard of having no barrier on the trails for the steep trapezoidal embankment and the sharing of some portions of the trails by both bicyclists and equestrian users. No other safety impacts occur in the area.

4.9.1.2 Mitigation Measures

Mitigation for the release of toxic materials in flood overflow areas can be partially accomplished by flood prevention planning. The impact remains significant, however.

Mitigation of the safety impacts of having no barriers along recreational trails could be eliminated by construction of parapet walls or incorporation of fencing along the levees and the separation of bicycle and equestrian trails by redesign and widening. This would result in an improvement in safety on the existing recreational trails.

4.9.2 NED Plan Alternative (Main Report NED Plan)

4.9.2.1 Impacts

Flood Overflow Areas

The NED Alternative will result in the elimination of the 100-year area of inundation that results from channel failure along Reaches 4 and 5. This will result in the elimination of hazardous and toxic materials being released into the environment during a 100-year or less event. This results in a beneficial impact to public safety.

Safety Adjacent to Channel Construction Reaches

Construction activities which are proposed to occur along the levees on the sides of the channel where recreational trails exist will result in significant safety impacts to trail users during construction.

The existing hazard of having no barrier on the trails along the steep trapezoidal embankment will be eliminated by construction of the parapet walls. This results in an improvement in safety features on the recreational trails.

Safety aspects related to the raising of bridges include impacts to vehicular and pedestrian traffic in the vicinity of construction. Vehicular traffic rerouting to the temporary bridges will be slowed to the point that no significant safety impacts should occur. Construction activity will be primarily confined to existing right-of-way, with the exception of the detour at Del Amo Boulevard where a portion of a school yard will be

required. Potential significant safety impacts could occur from children trying to cut across construction areas.

Trucks hauling materials in and out of construction areas also pose potential safety hazards to the general public. A significant safety risk may result in areas of residential neighborhoods and around schools.

4.9.2.2 Mitigation Measures

Mitigation for safety impacts along trails at channel levees requires that the trails be closed between trail access points for the duration of construction along that segment. No equally satisfactory alternative exists for the rerouting of recreational trails during construction. Surface streets provide a less appealing alternative for bicyclists. No mitigation exists for equestrian users. This impact is temporary for the duration of construction between recreational trail access points.

Mitigation includes that fencing and barriers be placed around areas of construction and that construction equipment be placed in areas at night that are secured from the general public. Also, warning signs should be placed in appropriate locations to warn pedestrians and motorists of potential safety hazards.

Mitigation for trucks delivering materials to and taking materials from construction sites includes the limitation of activity during peak traffic hours and during hours when children are traveling to and from school. Additionally, signs and flagmen will be used in areas to direct traffic where necessary.

While not a project impact, an additional measure could be incorporated into project design which would provide for separation of bicycle and equestrian trails. This would further serve as a safety feature for trail users and will be evaluated during the next phase of study.

4.9.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. Two and Three)

4.9.3.1 Impacts

Flood Overflow Areas

The widening and conversion alternative will result in the elimination of the 100-year area of inundation. This will result in the elimination of hazardous and toxic materials being released into the environment during a 100-year or less event. This results in a beneficial impact to public safety.

Safety Adjacent to Channel Construction Reaches

Reconstruction of channel walls and construction of three-foot (0.9 m) high parapet walls proposed for this alternative will result in significant safety impacts to trail users during construction.

With conversion, the vertical concrete walls which will replace the existing trapezoidal walls pose a significant increase in safety hazards to users of the trail. Instead of an angular drop upon which someone could roll down, there will be a straight drop down. This is combined with only a three-foot (0.9 m) high parapet wall, which is not high enough to provide safety to bicycle or equestrian users. This combination results in a significant adverse safety impact.

There would be no increase in safety hazards in areas of channel widening.
No impacts are expected from channel dredging activity.

Trucks hauling materials in and out of construction areas also pose potential safety hazards to the general public. A significant safety risk may result in areas of residential neighborhoods and around schools.

4.9.3.2 Mitigation Measures

Mitigation for safety impacts along trails at channel levees requires that the trails be closed between trail access points for the duration of construction along that segment. No equally satisfactory alternative exists for the rerouting of recreational trails during construction. Surface streets provide a less appealing alternataive for bicyclists. No mitigation exists for equestrian users. This impact is temporary for the duration of construction between recreational trail access points.

Mitigation for the vertical drop of the channel walls associated with conversion includes placing a chain-link or other fencing on top of parapet walls to a minimum combined height of seven feet (2.1 m). This will provide for safe use of the trail system. An alternative would be to build the parapet walls to a height of seven feet (2.1 m), although this results in a "closed-in" feeling, reduces aesthetics and provides more opportunity for graffiti on solid walls.

Mitigation for trucks delivering materials to and taking materials from construction sites includes the limitation of activity during peak traffic hours and during hours when children are traveling to and from school. Additionally, signs and flagmen will be used in areas to direct traffic where necessary.

While not a project impact, an additional measure could be incorporated into project design which would provide for separation of bicycle and equestrian trails. This would further serve as a safety feature for trail users and will be evaluated during the next phase of study.

4.10 UTILITIES

Impacts to public utilities are considered significant if the project results in the replacement or transference of utility lines.

4.10.1 No Action Alternative

4.10.1.1 Impacts

This alternative will require no construction activity, thus no displacement or replacement of utilities is required. No impacts will occur other than those associated with periodic flooding in the flood plain.

4.10.1.2 Mitigation Measures

No mitigation is required.

4.10.2 NED Plan Alternative (Main Report NED Plan)

4.10.2.1 Impacts

The NED Alternative requires the raising of bridges which includes several utility lines. A listing of identified bridges was presented in Tables 2.3-3 and 2.3-4 in Section 2. Not all utilities have been identified for the reaches proposed for construction. Significant impacts will occur due to the requirement that these lines be moved. Some temporary disruption of service may result.

4.10.2.2 Mitigation Measures

Mitigation includes that the lines be raised or moved in conjunction with the raising of the automobile bridges. Disruption to service will be minimized.

4.10.3 Modified Channel Cross-section Alternative (Main Rpt. Alts. Two and Three)

4.10.3.1 Impacts

Potential impacts may occur to utilities if such utilities are buried within the trapezoidal portions to be widened or removed from the channels. Significant impacts will occur due to the requirement that the lines be moved. Some temporary disruption of service may result.

4.10.3.2 Mitigation Measures

Mitigation includes that the lines be moved or replaced in conjunction with construction activities. Disruption to service will be minimized.

TABLE 4.11

ENVIRONMENTAL COMMITMENTS
LACDA FEASIBILITY STUDY

RESOURCE IMPACTED	COMMITMENT (NED)	ACTION	WHEN ACTION TO OCCUR	SOURCE OF COMMITMENT
Land Use/Social Concerns	Traffic detour	Financial compensation & restoration to various properties used for detour.	After Constr ceases	S.C.A.G. Local
Air quality	A. Dust control	1. Frequent watering of constr area to limit dust.	During Constr	S.C.A.Q.M.D.
		2. Terminate oprns during strong Santa Ana winds.	During Constr	
	B. Control of nonparticulates	1. Proper maintenance of heavy equipment to reduce combustion emissions		
		2. Use of low slulfur diesel fuel.		
		2. Termination during Stage II smog episodes.		
		4. Participate in AQMD mandatory rideshare program		
Water Quality & Flood Potential	A. Minimize sediment impacts.	1. Confine work to low flow periods.	During Constr	R.W.Q.C.B.
		2. Trap sediments in downstream sed. basins.		
	B. Avoidance of accidental discharge of pollutants.	3. Limit and monitor refueling of equipment near channel.		

TABLE 4.11 (continued)

ENVIRONMENTAL COMMITMENTS
LACDA FEASIBILITY STUDY

RESOURCE IMPACTED	COMMITMENT (NED)	ACTION	WHEN ACTION TO OCCUR	SOURCE OF COMMITMENT
Noise	Minimize noise to sensitive receptors	1. Berm or construct temporary walls. 2. Confine activities 7am - 7pm M-F and 8am - 7pm Saturday.	Construction	Local Governments
		3. Evaluate use of smaller equipment.	PED Phase	
Biological Resources (NED)	A. Protect wetlands.	Monitor construction activities. Defer activities during Apr. - Sept. in last one-mile reach of Los Angeles River.	Construction	U.S.F.W.S. Cal Fish & Local Agencies
	B. Avoid stream pollution.	Limit and monitor refueling of equipment near channel.	Construction	
Cultural Resources		1. Conduct evaluation of bridges for Nat. Register 2. Develop mitigation measures w/Advisory Council in event that bridges are determined eligible.	PED Phase prior to constr	SHPO Advisory Council
Transportation	Lessen potential traffic impacts.	1. Construct adequate detour bridges. 2. Schedule constr traffic to off-peak hours.	Prior to constr	CALTRANS Local Governments

TABLE 4.11 (continued)

ENVIRONMENTAL COMMITMENTS
LACDA FEASIBILITY STUDY

RESOURCE IMPACTED	COMMITMENT (NED)	ACTION	WHEN ACTION TO OCCUR	SOURCE OF COMMITMENT
		3. Utilize the river channel for construction vehicle traffic and vehicle staging where possible. 4. Establish on-site batch plant to mix concrete at site, if possible. 5. Utilize flagmen and signing where construction equipment interfaces with public traffic. 6. Avoid reducing capacity on two adjacent bridges simultaneously, if possible. 7. Institute public information program on congested areas using mass media.		
Recreation & Aesthetics	A. Keep trails open. B. Aesthetic Treatment Plan.	Evaluate the Following: 1. Phased rerouting of rec. t rails. 2. Use surface streets for bicyclists. 3. Trails designed on top of levee to provide views outside channel. 4. Tree planting, concrete boxes, where ROW allows	Construction	CAL Coastal Comm./Local Governments

TABLE 4.11 (continued)

ENVIRONMENTAL COMMITMENTS
LACDA FEASIBILITY STUDY

RESOURCE IMPACTED	COMMITMENT (NED)	ACTION	WHEN ACTION TO OCCUR	SOURCE OF COMMITMENT
		5. Texture coating of walls to prevent vandalism		
Public Safety	Maintain public safety.	1. Close trail access points. 2. Fences and barriers around construction and construction equipment. 3. Placement of warning signs to warn motorists of hazards. 4. Limitations of delivery during peak hours. 5. Use of signs and flagmen where construction and public interface.	Construction	CALTRANS Local Governments
Utilities	Minimize disruption to service	1. Lines to be raised and/ or moved with raising of auto bridges.	Duration of Construction	Local Agencies

SECTION 5 - PUBLIC INVOLVEMENT

5.1 PUBLIC INVOLVEMENT PROGRAM

The Corps of Engineers has conducted several public workshops as well as formal scoping meetings to inform the general public and various agencies of the proposed action and to solicit their comments. A Notice of Intent to prepare an EIS was published in the Federal Register (Appendix B) which requested comments from all parties on the proposed project.

Early in the design process, the Corps of Engineers and the Los Angeles County Department of Public Works hosted a series of public workshops to acquaint the public with the LACDA Review Study. Approximately 150 people attended five workshops held over a three-week period in October of 1987. The meetings were held in Glendale, Studio City, Downey, Carson and Long Beach. A representative of the Federal Emergency Management Agency (FEMA) was present at each meeting to discuss the Federal Flood Insurance Program. A summary of the questions and answers provided at the workshops is included in the Appendix A of this EIS.

On March 9, 1989, the Army Corps of Engineers and the Los Angeles County Department of Public Works held two environmental scoping meetings to give the public an update on the progress of the study and to provide the attendees with an opportunity to identify and comment on potential environmental impacts of the proposed action or alternatives that the Corps should consider in preparing the EIS.

Approximately 60 representatives of Federal, State and local agencies and the general public at large attended the meetings that were held in Los Angeles and Lakewood. A list of persons attending, as well as a summary of the comments made at these scoping meetings, is contained in Appendix A of this EIS.

Public comments received at the scoping meetings centered around four topical areas which included environmental concerns; economic concerns; the National Economic

Development, or NED, Plan; and miscellaneous questions. The Corps of Engineers provided an answer to most of the comments at the meeting and a brief is provided where necessary in Appendix A. In addition, the comments have been considered and information incorporated as appropriate into the various environmental issue sections of the EIS. Comments about project economics and details of the NED Plan have been addressed in the description of the proposed action and in discussion of alternatives considered in the EIS.

Two new alternatives were suggested at the scoping meetings. One alternative involved the injection of polymers into the channels at strategic locations to change the flow of water, possibly avoiding the need to raise bridges. This technology has not been proven on the scale of flows within the Los Angeles River and is not considered feasible.

The other alternative involved construction of a large tunnel to carry flows, as opposed to constructing surface facilities. Tunneling has been considered as a possible component of alternatives involving flow diversion. The disadvantages of tunneling compared to the alternative of parapet walls has to do with magnitude of the construction project and construction cost. To carry the significant portion of the flow of the L.A. River flow, a tunnel would have to be tens of meters in diameter, which would be excessively costly and of questionable feasibility. It would also take much longer to build than most surface alternatives considered and would be more difficult to maintain.
Qualitatively, this alternative has an unfavorable benefit-cost relationship and is considered not feasible.

5.2 REQUIRED COORDINATION

The Corps of Engineers staff has coordinated both formally and informally with various agencies to obtain pertinent information, to inform them of the proposed action and to solicit from them informal comments relative to their areas of jurisdiction or expertise. In some cases, contacts were by letter and represent formal consultations required by various Federal statutes and legislation. Other contacts were informal and done by telephone at the staff level. Contacts were made with the following agencies informally:

- o U.S. Department of Agriculture
- o California Regional Water Quality Control Board
- o California Coastal Commission
- o South Coast Air Quality Management District
- o Los Angeles County Department of Public Works
- o Los Angeles County Department of Parks and Recreation

The Corps is consulting with the following agencies relative to the proposed action:

- o U.S. Fish and Wildlife Service
- o National Marine Fisheries Service
- o California State Historic Preservation Office
- o California Department of Fish and Game

Formal coordination of the EIS with the many involved public agencies will continue throughout the EIS review and approval process.

The scoping process and meetings, as described in the previous section, is another element of the required coordination that has been conducted by the Corps. Additionally, the Notice of Intent to prepare an EIS was published in the Federal Register on Monday, February 13, 1989 (See EIS Appendix B for a copy of this notice and the responses received to date).

5.3 STATEMENT RECIPIENTS

EIS Appendix F contains a list of Draft EIS recipients.

5.4 PUBLIC VIEWS AND RESPONSES

This are found in Appendix I and Appendix J in this document,

SECTION 6 - LIST OF PREPARERS

The following persons participated in the preparation of this document.

Preparer	Discipline	Experience	Role in EIS Preparation
Corps of Engineers Staff			
Pat Luvender	Economics	10 yrs	Project Manager
Jon Sweeten	Engineering	5 yrs	Project Manager
Ira Arzt	Engineering	10 yrs	Project Manager
Ronald Lockmann	Geography	7 yrs	Environmental Coordinator
Marie Campbell	Geography	2 yrs	Environmental Coordinator
Kathleen Kunyz	Geography	5 yrs	Environmental Coordinator
Brian Whelan	Geography	8 yrs	Geographer
Patricia Martz	Archaeology	12 yrs	Senior Archaeologist
D.Stephen Dibble	Archaeology	3 yrs	Archaeologist
Bradley Sturm	Archaeology	3 yrs	Archaeologist
Steven Schwartz	Archaeology	7 yrs	Archaeologist
Ron Ganzfried	Landscape Architecture	10 yrs	Reviewer
Terrance Breyman	Ecology	17 yrs	Reviewer
Michael Noah	Ecology	8 yrs	Reviewer
Thomas Keeney	Ecology	12 yrs	Project Biologist
Roberta Soltz	Ecology	4 yrs	Project Biologist
Chambers Group Staff			
John Westermeier	Biologist	15 yrs	Project Manager Project Description Water Quality Biological Resources Cultural Resources
Tom Ryan	Environmental Analyst	15 yrs	Project Description Public Involvement
Linda Brody	Environmental Analyst	9 yrs	Land Use Noise Recreation/Aesthetics Public Safety Public Utilities
Pam Morris	Environmental Analyst	2 yrs	Air Quality Transportation

			Water Quality
Robert Kuehn	Environmental Analyst	16 yrs	Project Description Traffic

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SECTION 8 - PERSONS CONTACTED AND REFERENCES CITED

8.1 PERSONS CONTACTED

During preparation of the Draft EIS, various agencies and individuals were contacted to determine issues relative to each agency's area of responsibility. A list of the agencies and individuals contacted is included below.

1. State of California
   Regional Water Quality Control Board, Los Angeles Region
   Mr. Mike Sowby

2. California Coastal Commission
   Coastal Consistency
   Mr. Jim Raives

3. South Coast Air Quality Management District
   Office of Planning and Analysis
   Mr. Brian Farris

4. U.S. Department of Agriculture
   Soil Conservation Service
   Mr. Richard L. Campbell

5. County of Los Angeles
   Department of Public Works
   Mr. Larry Ammon
   Mr. Donald Jordan
   Mr. Mike Anderson

6. County of Los Angeles
   Department of Parks and Recreation

Mr. Tom Dittmar

7. City of Los Angeles
Department of Recreations and Parks
Mr. Dave Attaway

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APPENDIX A

PUBLIC COMMENTS AND QUESTIONS AND ANSWERS ON LACDA

Questions and Answers
Los Angeles County Drainage Area Study
LACDA

Introduction

In October 1987, the Los Angeles District of the U.S. Army Corps of Engineers (Corps) and the Los Angeles County Department of Public Works (County) hosted a series of public workshops to acquaint the public with the Corps' Los Angeles County Drainage Area (LACDA) Flood Control Study currently underway. A representative of the Federal Emergency Management Agency (FEMA) was present at each meeting to discuss the Federal Flood Insurance Program.

Approximately 150 people attended five workshops held over a three-week period in Glendale, Studio City, Downey, Carson, and Long Beach. Workshop participants were invited to ask questions and express their concerns, ideas, and wishes about what planners should consider in designing improvements to the LACDA system.

This summary presents the questions and answers discussed during the five workshop series, as well as other commonly-asked questions that have been posed to the Corps, County, or FEMA representatives since the workshops occurred.

We first present LACDA study issues of general interest, followed by those concerning particular communities, then by those related to FEMA issues. The material is presented in the form of Questions and Answers or Comments and Responses.

The Need for the Current Study

Q. How did the Corps get involved in this study?

A. The County requested Corps participation in a study to find ways to upgrade the current system. In doing so, the County became the local sponsor of the study. This means that the County and the Corps are study partners, and the Corps coordinates with the County on all aspects of the planning process.

Q. Why is the upgrade necessary?

A. The Corps and the County built the existing flood control system to control the largest flood likely to strike the basin, as predicted in the 1930's, based on the information they had available at that time. Since then, we have accumulated much more data relating to flood size and frequency. In addition, conditions that affect flooding have changed over the years, and the system is no longer capable of protecting large areas of the basin. There are several reasons for this:

- Development over the past 50 years has steadily increased floodwater runoff.
- New storm drains that serve this development discharge into the flood control system and increase peak flows in the flood control channels.
- Trapped sediment flowing into the 20 reservoirs is decreasing their flood control capacity.

Q. How much of the land in the basin is now impermeable, and how is this determined?

A. About 40 percent of the land is considered impermeable. Man-induced impermeability is a result of how the land is used. The more developed an area is, the greater the impermeability. Tables have been developed which assign a percent impermeability to various types of land use. Summing the fractions of the various land uses in the basin results in 40 percent impermeability of the overall area.

Q. How do you know that runoff has actually increased?

A. For many years, we have had rain gauges throughout the basin to measure precipitation and stream gauges in the Los Angeles River to measure flows. Data has been recorded since the late 1800's. Since that time, we have seen a 40 percent increase in runoff created by the same amount of rainfall.

Q. What is a 100-year flood? a 500-year flood?

A. Analysts describe floods of different sizes in terms of their statistically projected frequency. For example, a 100-year flood is the size flood that has a 1 percent chance of occurring each year; a 500-year flood has a 0.2 percent chance of happening in any year.

Q. Is it possible to have two 100-year floods in a single year?

A. Yes. Flooding is caused by a combination of factors: where the storms are located, how many storms there are, how closely together they occur, and the saturation level of the ground prior to the storm. Therefore, although the probabilities are against it, it is possible to have multiple 100-year floods in a single year.

Q. What was the size of the 1938 storm? the 1980 storm?

A. At the time of the 1938 flood, the statistical theory on frequency had not yet been applied to floods. However, based on historical data, we estimate that it was probably about a 50-year flood. The 1980 storm was about a 40-year flood in the downstream portions, and about a 70-year flood in the upper reaches.

Q. Would the water during a 500-year flood be deeper or more shallow than in a 100-year flood?

A. A 500-year flood would be slightly deeper than a 100-year flood and would cover a greater area.

Q. What is the current release rate from LACDA dams?

A. There is no set rate of release. The LACDA system is very complex, with four flood control dams interacting with and impacting on each other. The amount of water released depends on, among other things, which of the four flood control dams is being considered, the amount of water in the dam, the rate at which additional runoff is coming into the dam, and weather forecasts.

Q. What are current channel capacities?

A. The channel below Sepulveda Dam can convey 17,000 cubic feet of water per second (cfs); in the area of downtown Los Angeles, the channel capacity is 110,000 cfs; at the mouth of the Los Angeles River, the capacity is 130,000 cfs.

Q. What are the flow rates for 100-year and 500 year floods?

A. The 100-year flow rate out of Sepulveda Dam is 17,000 cfs; the 500-year flow rate, 77,600 cfs. In downtown Los Angeles, the 100-year flow rate is 118,000 cfs; the 500-year flow rate, 177,000. At the mouth of the Los Angeles River, the 100-year flow rate is 174,000 cfs; the 500-year flow rate, 227,000 cfs.

Velocities in the channel are approximately 15 to 20 miles per hour; outside the channel, the velocities are minimal.

Q. Why can't you just clean the silt and debris out of the reservoirs—especially at Hansen Dam?

A. Although it is relatively easy to remove large pieces of debris from the reservoirs (something that is done as needed), removing the silt is a slow and costly job. The Corps has issued permits to several sand and gravel companies to mine the silt at Hansen Dam.

Q. Why were the reservoirs built with only a 50-year life in the first place?

A. A project has two kinds of "lives": an economic life and a structural life. The structural life of a dam is indefinite, given a reasonable amount of upkeep and maintenance. The economic life is the period of time used to calculate the economic usefulness of the project. It is a factor in determining the benefit/cost ratio when assessing construction feasibility.

When engineers design a dam, they allow space in the reservoir for the accumulation of sediment over time. The amount of time it takes to fill the sediment storage space in a dam is the economic life. If a longer economic life is desired, a larger sediment storage area is needed, and the cost of building the project is increased. So the economic life has to be a period of time that is practical and yet cost effective. An economic life for dams of 50 years is considered the most efficient for this purpose although in some circumstances a 100-year economic life can be justified.

Hansen Dam, which was built in 1938, is now reaching the end of its economic design life of 50 years. This only means that the sediment storage area is almost full; the reservoir itself is not full. The space in the reservoir reserved for flood control is still fully intact.

Q. How much of the flooding can be attributed to obstructions such as bridge supports?

A. About 90 percent of the overflow can be indirectly related to bridge structures affecting channel flows.

Q. What kind of debris can be expected from a 100-year flood? boulders? houses?

A. Due to the numerous debris basins in the foothills, as well as the flood control dams themselves, very little sediment gets into the channels. Even if there were significant overland flow, its low velocity would carry very little debris into the channels.

Q. Could the debris back up to create its own dam?

A. If there were large enough chunks of debris such as that which would result if a bridge collapsed, yes, the debris could create its own dam. However, this is extremely unlikely. Under normal flooding conditions, there is no chance that debris would build up in the main channels to form a dam, and the chances are very slight on the unregulated streams.

Q. Might some of the debris get all the way to the ocean, creating the need for dredging?

A. As very little debris gets into the channels, there is no concern that a dredging problem will be created at the ocean due to channel flow. However, overland flow from a large flood would pick up a significant amount of trash and debris, which would be carried to the harbor. Whether this would create a need for dredging would depend on the size of the flood and the amount of debris.

Q. Is it possible to remove debris during flood conditions?

A. Yes. However, due to the difficulties involved, the disadvantages far exceed the advantages except in extraordinary circumstances. At the dams, cranes have been used to remove debris from the trash racks if it affects the outflow of water during flood releases.

Q. Are some of the dams in the system not under Corps control?

A. All of the single-purpose flood control dams are under Corps control. The County dams were built for water supply; however, a certain amount of space is reserved for flood control.

Q. Some County dams—for example, Morris and Cogswell—are silting up. What effect does that have on the current level of protection?

A. The silting up of the County dams has no effect on the flood control capacity of the LACDA system because the space for flood control storage is reserved. It is the water conservation storage space that is being impacted.

Q. In 1980 did anyone actually see water up to the top of the channels, or did they see only the debris?

A. There were numerous reports by residents living along the upper channels stating that they did see water to the top of the channels. Along the lower channels, our best evidence is the location of the debris.

Q. Is some of the LACDA system simply in need of repair?

A. Some of the channels do need maintenance, and the County has

a repair program under way. The Corps is also working to repair channels under our LACDA Rehabilitation Project. However, these repairs are really just part of ongoing operation and maintenance and have nothing to do with the need for the overall system improvements to provide a greater level of protection.

Q. It seems that the acceptable level of damage in Los Angeles is much lower than for other parts of the country that experience major floods almost every year. Does Los Angeles just have higher standards than the rest of the nation?

A. The Corps cannot build a project unless it has a favorable benefit/cost (B/C) ratio. In other words, the benefits of building a project have to be equal to or greater than the cost. The cost of building a given flood control project are about the same throughout the country, but due to the Los Angeles area's dense urbanization and the resultant high land values, favorable B/C ratios are more common than in less-developed areas.

Q. Do you assess damages based on standing or running water?

A. Damages are assessed based on a composite of the depth of the standing water and the velocity of the running water.

Project Costs and Cost-Sharing

Q. How much will this project cost?

A. The cost of the project could range from $50 million to $450 million, depending on the plan selected.

Q. Do you take inflation into account in doing your cost estimates?

A. Yes. We use a weighted average of the Consumer Price Index for the benefits, and we update the costs from the Engineering News Record Construction Cost Index.

Q. What share will be paid by the local sponsor?

A. As a part of the Water Resources Development Act of 1986, Congress has established new guidelines for cost sharing on water resources projects. Non-Federal interests must now pay at least 25 percent, but not more than 50 percent, of the flood control costs of the project. Costs associated with recreation are shared equally between the Federal government and the local sponsor.

To determine the 25 to 50 percent non-Federal share, the guidelines say that local interests must pay for 5 percent of total project costs and for all lands, easements, and rights-of-way, dredged material disposal areas, and relocations, up to a total share of 50 percent.

Q. Where does the local sponsor get its money?

A. The local sponsor may provide its share through use of existing general revenue funds, through reimbursement from the state, or through benefit assessments.

Q. Could money for the project be raised by the sale of air rights over the channels?

A. The issue of whether the Federal Government will consider leasing or selling air rights over the channels will not be addressed until this overview study is completed. Also, the amount of funds that could be raised by this means would be insignificant compared to the total cost.

Q. Is the Federal funding already in place?

A. The Corps has funding to continue its study through 1989. Once the study is completed, the Corps will submit a report recommending solutions. The report will go first to the Corps' South Pacific Division Office in San Francisco, then on to the Office of the Chief of Engineers, the Secretary of the Army, and, finally, to Congress for authorization and funding. It is a long process, and the earliest date at which funding for construction would be available is in the mid-1990's. As such, there are no funds already earmarked for construction.

The Study Itself and Alternatives Under Consideration

Q. What is most economical: widening or deepening the channel?

A. It has been determined that deepening the channel would not be cost efficient due to the fact that the utility lines are located not far beneath the surface. Therefore, raising the levees is being considered, which would have the same practical effect as deepening the channel.

Current estimates are that it would cost $370 million to raise the levees and at least $600 million to widen the channel.

Q. How much higher or wider would the channels be?

A. At this stage in the study, it looks as though we would have to raise the levees from 2 to 8 feet, depending on the area. The average increase in height would be between 2 and 4 feet.

We would probably need to widen the channels from 0 to between 300 and 400 feet—again depending on the area.

Q. How much capacity would you gain by strengthening the walls of the channels?

A. The capacity of the channels, or volume of water they can carry, is not determined by the strength of the walls—it is strictly a problem of channel size.

Q. Will all of the channels be completely concrete?

A. The channels will not be changed from whatever they are now—that is, concrete-bottom channels remain concrete, and soft-bottom (dirt) channels will remain so.

Q. Does the Corps look at high tide and offshore wind to determine how much water goes over the levees during each?

A. Due to the fact that the Los Angeles and San Gabriel river channels slope such that the water almost falls into the ocean at the rivers' mouths, high tides and strong offshore winds do not impede the flow into the ocean.

Q. If the levees are raised, will the pumping flow change?

A. Yes. With the rise in height, pumps with a greater capacity will be needed to raise the water the increased distance.

Why isn't a tunnel feasible? It appears that $2.5 billion in benefits should justify a $700 million expenditure.

A. $2.5 billion is the **total** damages that would result from the design flood. The tunnel would not prevent all of the damages, only about $300 million worth. Benefits of $300 million versus costs of $700 million provide a B/C ratio of only 0.4.

What is a baffle block?

A. Baffle blocks are concrete blocks arranged in a checkerboard pattern intended to dissipate the flow energy of the water's potentially destructive force.

The Public Utilities Commission and California Department of Transportation should be involved in this study.

R. Both the Public Utilities Commission and the California Department of Transportation will be involved, when appropriate, during the study, detailed design, and construction phases of the project.

Some areas of the basin have groundwater located only 2 feet below the surface. The Corps should consider this when estimating runoff.

R. Increased runoff in areas with groundwater close to the surface is not really a factor that needs to be considered. Much of the basin already impervious, resulting in flood flows running off immediately. But even in areas that are not impervious, the water runs off when the soil's infiltration capacity is exceeded. The level of the groundwater only marginally affects the soil's infiltration capacity and would therefore have no effect on the peak flow.

Does the Corps look at tributary areas to assess the potential impacts of runoff and debris? Can any of that be controlled before it reaches the basin?

A. There are 87 debris dams in the foothills surrounding the Los Angeles basin. These debris dams, combined with the county's water supply dams and the Corps' flood control dams, trap almost all of the sediment being contributed by the tributary areas. A very small percentage of the debris reaches the channels.

Regarding runoff, the channels in the tributary areas currently provide 100-year protection. Appropriate sites to further control tributary flow into the rest of the system are already developed. In addition, most of the downstream flooding problem results from uncontrolled inflow from the urban drainage system into the central L.A. basin.

The Corps should also take into account the inadequacy of the storm drain system and how that increases flows into the LACDA system.

R. Actually, it is the **efficiency** of the storm drain system, not its inadequacy, that contributes to the flooding problem on the mainstem channels of the LACDA system. If the storm drain system were less efficient, less water would be conveyed to the channels, and there would be localized ponding in the streets and other poor drainage areas—much like what occurred prior to the upgrading of the storm drain system in the 1960's. At that time, even small storms caused street flooding all over the city.

What control does the Corps have over land use on right-of-way lands, including air rights?

A. The Corps has the ultimate say as to the use of the rights-of-way adjacent to and above the channel.

How long will it take to complete the project once it is begun?

A. Depending on the selected plan, 5 to 7 years.

What if Congress does not authorize the plan?

A. The Corps will identify the most economical plan. If Congress does not authorize the plan, no Federal funds would be available for construction.

If the City of Los Angeles disapproves the plan, but the County, other affected cities, and Congress approve it, would you go ahead with the project?

A. The Corps coordinates with the County of Los Angeles, who is the local sponsor for the project. The County, in turn, coordinates with all the local elements that would be affected by the project and makes sure that their concerns are addressed during planning of the project. This coordination should ensure that the resulting plan is acceptable to all.

How can individuals facilitate the approval process?

A. The best way for individuals to help the planning process along is to continue to make the Corps aware of public desires and concerns at the public workshops it will hold throughout the study and at the formal public meeting that takes place when the Corps issues its draft report.

The public can influence the approval process by letting local and Federal Government representatives know of the importance of the project to their constituents.

Can the public go to the Corps offices and get tracings of the overflow maps?

A. Yes, with an appointment.

Environmental and Recreational Issues

Is the Corps doing an Environmental Impact Statement (EIS) on this project?

A. Yes. We are conducting our environmental studies concurrently with our engineering studies, and our study report will include an EIS.

Will there be continuous bike trails from the dams to the ocean? How much coordination is the Corps doing with the cities along the river and the Bike Advisory Committee on this issue?

A. It is uncertain at this time. Any new recreation would have to be cost shared 50-50 by the local sponsor. Any impacts to existing bike trails due to channel improvement would be mitigated.

Will there be any equestrian trails along the channels?

A. The situation regarding equestrian trails is the same as with bike trails.

Social Impacts and Public Safety

C. We are concerned about inverse condemnation of our property between the time the new FEMA maps come out and the time the Corps completes its upgrade.

R. Inverse condemnation results when part of a person's lot is condemned by a public agency for a public works project under that agency's power of eminent domain, causing the remaining part of the property to be reduced in value. Neither FEMA (who is merely delineating new flood control maps) nor the Corps (who is only modifying existing channels) expect to be condemning any land.

People may be concerned that the value of their property will decrease—if it is going to be located in the floodplain on the new maps—between the time the maps come out and the LACDA project is completed. Contrary to what one might expect, case studies show that changes in floodplain delineations do not significantly affect property values.

Are property values near the channels lower than in surrounding areas?

A. According to real estate surveys, there is no noticeable difference in property values between houses near channels and those that are not.

Q. When large predominantly concrete structures such as freeway overpasses and flood control channels and bridges are built in a residential or retail store area, does the area tend to change to primarily industrial use?

A. There is no indication that the area will change its character, unless the zoning laws are changed.

Q. Will the Corps' report include evacuation plans?

A. No. However, the Corps will work with city and county governments, providing information on potential flooding so that local authorities can develop plans for their areas. South Gate, for example, already has a disaster preparedness plan, as does the County Sheriff's Department.

Q. Will the Corps be involved in mobilization during a flood emergency?

A. Yes. The Corps Emergency Operations Center will coordinate with the Sheriff's Department and local police and fire agencies; assist in sandbag and evacuation efforts; and provide technical expertise.

Q. How much advance warning can we expect, and what kind of warning system is there?

A. Due to the hydrology of the L.A. area, the warning time for a major flood would be very short—3 to 6 hours. It is the responsibility of the local government entities, with the help of the Corps, to develop their flood warning systems.

Q. Has the Corps looked at possible seismic activity resulting from the storage of water behind the dams?

A. Yes. Computer modeling and studies have been conducted indicating that, theoretically, retaining water behind a dam can induce seismic activity. However, the amount of water would have be very great (water depth greater than 200 feet), and it would have to be impounded behind the dam for many months. Even then, the size of the quakes would be small—3 to 4 on the Richter scale.

Q. How safe are the dams in the event of a large earthquake while they are full of water?

A. Seismic analyses have been done on all of the dams. The criteria of each analysis include the following conditions: water up to the spillway crest and the maximum credible earthquake for the particular fault (8.5 on the San Andreas, 6.5 on the Whittier-Elsinore faults). The result of the analysis in all cases was that negligible damage to the dam would result under these conditions, with no failure taking place.

C. We are concerned that massive releases of water from the dams could seriously threaten Long Beach.

R. If there is a very large flood event, the dams would spill over the top, and, yes, it is probable that certain areas of Long Beach would be flooded.

Q. What is the difference between dam spillover and dam failure?

A. All dams are designed to include a spillway over which water will flow if the dam's gates cannot let water out of the reservoir as quickly as it is flowing in and the reservoir becomes too full. The spillway is there to protect the dam itself and to help guide excess water into flood control channels (the channels themselves, of course, may be full at that time). Dam failure occurs when the embankment of the dam breaks and water pours uncontrolled and unguided from the reservoir. This event is **extremely** unlikely. In fact, no dam built by the Corps of Engineers has ever failed.

Q. Can you determine where levees are likely to be breached?

A. The levees would most likely be breached at bridge-sites where the bridge structures themselves could restrict the flow. This would occur, for example, with some of the older bridges that extend downward into the channel area. On the other hand, debris could get caught on a bridge pier in an unpredictable manner and in turn catch more debris, thereby restricting flow and causing an overflow condition. The location of this cause of overflow is impossible to identify.

Q. Since the threat from levee failure is so great, why don't you armor them right now?

A. The Corps must wait for authorization and funding from Congress before it can proceed with any structural improvements on the LACDA system. And, as previously stated, there are many steps, including the completion of an EIS, that we must complete before Congress will give its approval.

Q. If alternative sources of funding can be found, could the levees be armored now? From whom would permission be required?

A. If local funds were raised, the levees could be armored by either (1) the Corps through our *Work for Others* program, or (2) the County, using the Corps plan or securing Corps approval of a County plan.

Q. Is the Corps looking at companies in the overflow area that store hazardous waste to determine how well protected they are?

A. Yes. This is a major concern to us. However, determining these companies' locations and how they are situated with respect to flooding is a local responsibility. Currently, the local fire departments are charged with the duty of inventorying these companies.

Q. Is the Corps considering in its benefits assessment the loss of land use if land is poisoned by chemical or other hazardous waste?

A. Yes, we are addressing this issue. We are identifying toxic waste dumps within the floodplain and plan to discuss potential damages from their flooding in the Final Report in qualitative terms. It would be very difficult, if not impossible, to try to put this problem into quantitative terms.

Q. What if the system is under construction when a flood occurs?

A. The Corps develops its construction schedules to minimize risk. For example, we schedule construction for the non-flood season (late spring and summer).

Q. Will the Corps' plan include security measures to prevent people from using the channels for recreational purposes (for example, rafting on the river during flood flows)?

A. All of the Corps channels, with the exception of trapezoidal channels used for recreation, are lined with chain-link fence for safety purposes.

Individual Areas of Concern

Sepulveda Basin

Q. How will construction within the Sepulveda Basin—for example, the proposed arts park and the sanitation facility—affect the storage capacity of the reservoir?

A. The impact of building these structures within the basin will be estimated, and any loss of flood control capacity will be compensated through excavation of another part of the basin.

Q. In the event of a flood, is the sanitation facility a threat to groundwater?

A. No. In the event of a flood, the treatment plant will return the untreated material to the main trunk sewer line, which leads to the Hyperion treatment plant.

Glendale Area

Q. Will the levee at Atwater be raised?

A. No.

C. The residents of Elysian Valley are concerned about protecting the natural environment of the area.

R. It is unlikely that this area will be affected by any plan.

Q. Currently, the channel fills up with junk like old shopping carts and appliances, as well as with boulders left by flood waters. This is especially true around the Figueroa Street bridge. Will maintenance improve after new construction?

A. At this time, due to manpower constraints, the Corps can clean up the channels only once a year in the late spring or summer before the flood season starts or if there is a special complaint. The LACDA project will not affect this situation; only allocation of additional funds for maintenance can change it.

Whittier Narrows Dam

Q. What level of protection does Whittier Narrows Dam provide?

A. A dam and its downstream channels are designed to work together as a unit. The dam holds back flood water and then releases it at a rate that the channel can handle. But the dam itself cannot be described as providing a particular level of protection. It can hold a certain volume of water. When that level is exceeded, water begins flowing over the spillway. At that time, the release rate becomes uncontrolled because there are no gates or valves on the spillways. Spillway flow will begin when the dam is full. Although this may result in some flooding downstream, it protects the dam from failing catastrophically.

Q. What damage might be caused by increasing the capacity of the dam?

A. More rights-of-way would be required, creating the need for an acquisition process. However, this alternative is no longer under consideration because of cost considerations.

Q. There is no protection on the east side of the dam. Could the ban erode?

A. There is potential for some small amount of erosion, but the impacts would be so slight that they would not significantly affect the protection provided by the dam.

Q. How much warning time would there be in the event of an overspill or failure of the dam?

A. If the dam were to overspill, there would probably be a warning time of one to three hours, depending on the rate the dam was filling. If the dam failed all at once, there would be no warning. If it failed in stages, there would be more time, depending on the rate of failure. However, the probability of the dam failing is very remote—no Corps dam has ever failed.

Q. What is the significance of cleaning 780,000 cubic feet of sediment out of the dam?

A. Relative to flood control, this is nc a significant amount of sedimen However, the County is interested in increasing the size of the water conservation pool, thereby increasing the amount of water that could be conserved.

San Gabriel and Rio Hondo Rivers

Q. Is the Corps studying Rio Hondo and San Gabriel rivers as part of this study?

A. Although the San Gabriel River is part of the LACDA system, it is not a major part of the study because it currently provides 100-year protection. The Rio Hondo, however, is currently being considered for improvements.

Q. Why was surplus land along the San Gabriel River first bought for right-of-way and then sold for development?

A. When a project was first being considered for LACDA, it was thought that the channels would need to be significantly wider. Therefore, the County purchase rights-of-way based on what wa deemed to be needed at that time. With the subsequent scaling down

of the project, the County is returning the extra right-of-way to private use.

South Gate

Q. What is the purpose of the railing along the levees in the South Gate area?

A. The railings are there for safety purposes.

Long Beach

Q. The Long Beach Freeway often floods. Will the project solve that problem?

A. No. The flooding of the Long Beach Freeway is due to local drainage problems and is therefore a local problem.

Q. Because Long Beach is at greatest risk from flooding, will the most money be spent there?

A. Because the damages are highest in Long Beach, providing protection there produces the greatest benefits. Therefore, more costly solutions can be justified for Long Beach compared to other areas.

Carson

Q. There is a lot of street flooding in this area in places not included on the Corps' map. What will be done about that problem?

A. Localized street flooding is a local (county, city) issue. However, in developing its plans, the Corps will make certain that nothing it does will increase the problems of localized street flooding.

Suggested Alternatives

Meeting attendees made the following suggestions for alternatives they want the Corps to consider during its study:

- Reforestation as one way to reduce the flow of sediment into the reservoir.
- The use of polymers to increase flow capacities in existing channels.
- Corps and County coordination with communities in the floodplain to limit development and encourage increased use of open space.
- Incorporation of new spreading grounds and reservoirs into the project to add to the local groundwater supply, as well as to keep some of the runoff from flowing into the flood control channels.
- Rerouting the Los Angeles River to its original path.
- Using freeways as floodways since they are already armored.
- Building another earthen dam out of dredged material from Hansen Dam.
- Coordinating flood control with the sewer system to allow the outflow of some flood water through the sewers to the Hyperion treatment plant.
- Increasing the slope of the channel to increase flows.
- Helping cities develop local flood control plans compatible with the overall Corps plan that local governments can undertake immediately.

The Corps is already looking at some of these alternatives as part of its study. It will consider other suggestions from a cost-benefit standpoint as it must with all alternatives. It appears, for example, that rerouting the Los Angeles River to its original path would be prohibitively expensive because of the enormous amount of development that has taken place along that route.

FEMA and the National Flood Insurance Program

Q. What is the relationship between the Corps and FEMA studies and why don't they use the same overflow maps?

A. They are two independent studies. The Corps produces maps to show **average** flood depths for relatively large areas **only** in order to estimate dollar damage—an essential calculation in evaluating the cost effectiveness of alternative flood control improvements under study.

On the other hand, FEMA prepares Flood Insurance Rate Maps (FIRM Maps). These maps consider more **specific** flood depths for smaller areas in order to make certain that the rates you pay are consistent with the risks you face.

Q. Will the FEMA maps be accurate enough to identify individual land parcels?

A. The FEMA maps will have a scale of 1"= 500', not detailed enough to identify individual parcels. It is possible to gain exemption from paying higher risk insurance rates if an individual parcel is actually higher in elevation than the general area FEMA maps indicate. It is up to the parcel owner to know or find out what the elevation of his property is if this exemption is desired.

Q. Why can't the Corps use the FEMA maps?

A. The FEMA maps will not be completed in time for the Corps to use them in its study.

Q. Is flood insurance required?

A. Flood insurance is required if your local community participates in the National Flood Insurance Program (NFIP) and if you take out a Federally insured loan to buy, refinance, or remodel a structure that is in the 100-year floodplain.

Q. Is it as expensive as earthquake insurance?

A. Flood insurance can cost anywhere from **10¢** to **$5.00** per $100 of property value based on which zone the property is located in and how much coverage is desired. By comparison, earthquake insurance generally costs about $2.00 per $1,000 dollars of property insured.

Q. Are insurance companies required to provide flood insurance?

A. No. The insurance companies are not providing the insurance; the NFIP is. The insurance companies simply write the policies and claims and send in the paperwork to the NFIP so that it doesn't have to hire its own policy writers and claims people. The insurance companies charge the NFIP a fee for policy and claim processing.

Q. Who is eligible to participate in the National Flood Insurance Program?

A. Only those people living in a community that is a participant in the program.

Q. Which cities in the LACDA area are *not* participants?

A. Bell Gardens and Downey are not participating today. However, it is likely that they will participate once a the revised FIRM maps have identified a flood threat. The final versions of the maps are due out by early 1991, although the process of reviewing draft revisions will begin during 1989.

2. **Have all non-participating cities been notified about the program?**
   A. FEMA sends information about the program to non-participating cities once a year.
2. **What must cities do to become participants?**
   A. They must agree to institute zoning and permit regulations that reduce future flood risk. For example, they must agree that all new buildings be elevated 1 foot above the 100-year floodplain.
2. **Must both residential and commercial property be elevated 1 foot? That could be very expensive for people building a large structure.**
   A. All new construction, both residential and business, must be 1 foot above the 100-year floodplain.

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Response Summary

Public Environmental Scoping Meetings
on the
Los Angeles County Drainage Area
Review Study

March 9, 1989

On March 9, 1989, the U.S. Army Corps of Engineers, Los Angeles District, and the Los Angeles County Department of Public Works held two environmental scoping meetings to give the public an opportunity to learn more about a proposed flood control improvement plan for the **Los Angeles County Drainage Area (LACDA)** and to identify and comment on potential environmental impacts from that plan and its alternatives that the Corps should consider in preparing the study **Environmental Impact Statement (EIS)**.

Approximately 60 representatives of Federal, state, and local governments and the public at large attended the meetings that were held in Los Angeles and Lakewood.

Public comments and questions were on the following topics:

- **Environmental concerns - areawide planning, wildlife, aesthetics, recreation, safety, groundwater recharge, and public involvement**
- **Economic concerns**
- **The National Economic Development (NED) Plan**
- **General Questions**

Corps responses, where appropriate, appear in brackets [ ].

Environmental Concerns

Areawide Planning

Meeting attendees pointed out the following areawide planning and study issues that the Corps should consider in its environmental analyses:

- Potential environmental impacts throughout the LACDA system, not just in the areas to be improved - especially how protection of downstream areas might affect areas upstream.
- The impact of a potential new City of Los Angeles growth management plan on environmental effects examined by the Corps - including the possibility of scaling down the Corps plan if it becomes evident that projected development will not be allowed to take place.
- The interrelation of all development plans in the basin (especially in the constantly changing west San Fernando Valley), so that the assessment of impacts for each plan is not considered in a vacuum.
- Possible changes to Corps findings based on changes brought about by other types of projects.
- The potential for development in the mountains that comprise the LACDA watershed and that potential's effect on Corps environmental findings.
- Long-developed lower reaches of the basin having to bear the impacts of construction instead of the San Fernando Valley where more recent development has overstressed the system.

[The proposed plan addresses an existing system deficiency, and the project design is not affected by potential future development. Other concerns will be addressed, where possible, in the EIS/Final Report.]

Wildlife

Some people, expressing concern that construction near the mouth of the Los Angeles River would have negative effects on the endangered least tern, asked the Corps to address that possibility in its EIS.

[The least tern will not be significantly impacted.]

Aesthetics

Representatives of several cities said that the proposed parapet walls might invite graffiti both during and after construction.

[Unfortunately, this is probably true.]

Some also wondered how visible the walls would be from local homes, businesses, and streets.

[Visibility would depend on location.]

Representatives of Downey expressed hope that the project would in some way help in their plans to limit growth and provide additional open space.

Recreation

The primary recreation interest people have is in preserving (and perhaps enhancing) the existing equestrian and bicycle trails along the Los Angeles River.

[The project will preserve existing trails.]

Safety

Representatives of cities in the downstream area along the Los Angeles River recommended:

- There be an early warning system in place in the event of a major flood.

  [One is already in place and is continually upgraded.]

- The parapet walls be reinforced and the levees armored to prevent catastrophic failure in the event of overtopping.

  [This is part of the proposed design.]

- The project be designed and built with the potential for a major earthquake in mind.

  [Existing design standards regarding safety during earthquakes have been met.]

An additional safety issue concerned the need for periodic checks of the Sepulveda Dam when the Corps' new water control plan goes into affect.

[The Corps routinely monitors the performance of all of its dams.]

Groundwater Recharge

One person suggested that detention basins built for the project double as groundwater recharge basins.

[This will be done where feasible.]

Public Involvement

Some people expressed dismay that so few members of the public or representatives of special interest and environmental groups had attended the March 9 scoping meetings.

They asked that the Corps be certain that groups such as the Sierra Club be informed when the draft EIS becomes available.

> [They are on the Corps' mailing list and receive notices. If anyone has names of groups or individuals who would be interested, they will be added to the mailing list.]

Economic Concerns

Several people asked about the financial impact the project would have on cities in the 100-year floodplain. Their questions were:

- How much would the cities have to pay as part of the federal/local sponsor cost-sharing agreement?

> [The current county flood district tax levee will be sufficient to pay 30% of the local share. The remaining percentage of the local share would come from a state grant program.]

- What relief from Federal Emergency Management Agency (FEMA) flood insurance costs would the completed project provide?

> [The 100-year floodplain, as officially designated by FEMA in 1990, would essentially be eliminated and structures designated in this area of the floodplain would no longer be required to carry flood insurance.]

A representative of the Los Angeles County Department of Public Works explained the cost-sharing arrangements:

- Local interests would be responsible for at least 25 percent, but not more than 50 percent, of the total project cost. That amount would include purchase of all needed lands and rights-of-way.

- Of the local share, 70 percent would be paid by the State of California.

- The remaining 30 percent of the local share would come from Los Angeles County flood control funds.

Some people at the meetings expressed concern that using the county funds would limit the amount of new construction or repair work the county would be able to do on such things as storm drains.

> [The County will not reduce its maintenance efforts and will allocate this project significant resources but will still pursue a variety of construction projects.]

Others said they expected it to be difficult to get the state and Federal funding.

> [Funding is always difficult.]

The other main economic issue dealt with the 100-year flood overflow areas identified by new FEMA maps. Participants stated a great deal of concern about the cost of meeting Federal flood insurance requirements in areas newly identified as at risk. People representing cities in the floodplain encouraged the Corps to move toward construction as quickly as possible and said that they would contact their local Congressional representatives to voice support for the project. One person said that if funding was slow in coming, the Corps should stage its construction to maximize the flood protection achieved in each stage.

[This will be considered in construction scheduling.]

The National Economic Development (NED) Plan

People detailed a number of concerns and asked several question about the potential plan presented by the Corps (the NED plan) and other alternatives.

Expressing preference for the the tunnel alternative, one participant questioned how the Corps arrived at a negative benefit-to-cost ratio for the tunnel when the cost of tunneling would be so much less than the $2-1/2 billion in damages that would be prevented.

[It was explained that benefits and costs have to be annualized for each size flood that could occur. This method results in the cost of tunneling being significantly higher than the benefits provided.]

Another person stated that the Corps plan should be developed to solve the flooding problem permanently--not just for another 50 years or so.

[The Corps has considered probable development in the future.]

People suggested that the Corps consider the following issues in developing the recommended plan:

- The possibility of injecting polymers in selected areas to help pass water more quickly at problem spots.

  [This is not a practical solution. First, it is untested methodology and the logistics of when and how the polymers would be injected have not been determined. In addition, the polymers would eventually flow out to the ocean, generating pollution.]

- Whether the new bridges on the Artesia and Century freeways would be high enough.

  [Yes, they will be.]

- Whether the light-rail track being built between Los Angeles and Long Beach is above the floodplain.

  [It will be after the project is completed.]

- The use of bridges as dikes by sandbagging or otherwise fortifying their bases.

  [Due to hydraulic considerations, this is not a viable alternative.]

- In calculating flood flows and project life, the siltation of upstream dams, including who is responsible for maintenance of those dams.

  [This is considered during plan formulation.]

- The possibility of assigning air rights over the channel, especially in the Long Beach area where space for housing and new businesses is becoming scarce.

  [Because this limits channel access and future channel improvement possibilities, it is discouraged as a large-scale concept.]

Questions about the potential project included the following:

- What would be the total project cost?

  [Approximately $300 million first cost.]

- Would the project have any effect on the Lakewood storm drain system that is nearing capacity?

  [No. Storm drains are local systems.]

- Why is there no plan for improvements to the San Gabriel River?

  [This river doesn't have a deficiency. It is basically used as a relief system from Whittier Narrows Dam.]

- How much additional right-of-way would be needed through Paramount?

  [None is currently anticipated.]

- What would be done in the Rosecrans/Freeway 91 area?

  [Parapet walls would be raised to the full extent possible and the levees armored.]

- Would all bridges have to be completely rebuilt in order to raise them?

  [Newer bridges are built in a modular fasion and can be jacked up in one piece. Older bridges would have to be rebuilt, however.]

- What is the projected flow capacity at Firestone Avenue and Imperial Highway?

  [The existing capacity, in cubic feet per second, is as follows:

	Existing	Proposed
Firestone @ LAR	110,000	110,000
Firestone @ RH	36,500	50,300
Imperial @ LAR	132,000	164,000]

General Questions: the LACDA System and Corps Policy

- Are the mouths of the Los Angeles and San Gabriel rivers the same height above sea level?

  [They are both at sea level.]

- Is the 100-year flood elevation higher than the gates on the Sepulveda Dam?

  [Water does flow over the spillway gates during a 100-year event but in an anticipated and controlled fasion.]

- Does the Corps hire outside contractors to do its construction work?

  [Yes, they do.]

ATTENDANCE LIST

LACDA SCOPING MEETINGS
March 9, 1989 - 1:00p.m. & 7:30p.m.

Terry Fassbender
Willdan Asscciates
290 Anaheim Blvd.
Anaheim, CA 90801

Rudy Monarrez
Battalion Chief
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Signal Hill, CA 90806

Joseph A. Hoesher
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Cerritos, CA 90701-6608

Joyce L. Lawrence
Commissioner
City of Downey Planning Comm.
9627 Cheddar St.
Downey, CA 90242

Penny Costlen
Southern Calif. Gas Co.
1600 Corporate Center Drive
Monterey Park, CA 91754

Feroze Kanga, Sr. Eng.
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Los Angeles, CA 90055

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Glendale, CA 91203

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Juan F. Balanay
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Chon Cervantes, Director of Building Office
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Councilman, City of South Gate
8650 California Ave.
South Gate, CA 90280-3075

Richard W. Burtt
City Engineer
3031 Torrance Blvd.
Torrance, CA 90503

Lewis Mac Adams
Friends of the Los Angeles River
2414 Moreno Drive
Los Angeles, CA 90039

INTERESTED PARTIES
NOT IN ATTENDANCE

Polly Ward
Studio City Residents Ass.
12303 Hillslope St.
Studio City, CA 91604

Homeowners of Encino
P.O. Box 453
Encino, CA 91426

Elysian Valley Property Owners, Renters & Businessmen's Ass.
2335 Gatewood St.
Los Angeles, CA 90031

Glenn Bailey
5926 Hesperia Ave.
Encino, CA 91316

The Federation of Hillside & Canyon Associations
4128 Morro Drive
Woodland Hills, CA 91364

APPENDIX B

FEDERAL REGISTER NOTICE OF PROJECT

Office of the Secretary

Defense Science Board Task Force on Technological and Operational Surprise; Closed Meeting

ACTION: Notice of Advisory Committee Meetings.

SUMMARY: The Defense Science Board Task Force on Technological and Operational Surprise in the U.S.-Soviet Military Competition will meet in closed session on March 2–3, 1989 at the DIAC Building, Bolling AFB, Washington, DC.

The mission of the Defense Science Board is to advise the Secretary of Defense and the Under Secretary of Defense for Acquisition on scientific and technical matters as they affect the perceived needs of the Department of Defense. At this meeting the Task Force will evaluate the potential for technological and operational surprise in the U.S.-Soviet military competition.

In accordance with section 10(d) of the Federal Advisory Committee Act, Pub. L. 92–463, as amended (5 U.S.C. App. II (1982)), it has been determined that this DSB Task Force meeting, concerns matters listed in 5 U.S.C. 552b(c)(1) (1982), and that accordingly this meeting will be closed to the public.

February 7, 1989.

Linda M. Bynum,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 89–3297 Filed 2–10–89; 8:45 am]

BILLING CODE 3810-01-M

Defense Science Board Task Force on Strategic Force Modernization Program; Meeting

ACTION: Change in Date of Advisory Committee Meeting Notice.

SUMMARY: The meeting of the Defense Science Board Task Force on Strategic Force Modernization Program scheduled for March 2–3, 1989 as published in the Federal Register (Vol. 53, No. 248, Page 52213, Tuesday, December 27, 1988. FR Doc. 88–29659) will be held on March 28–29, 1989.

February 7, 1989.

Linda M. Bynum,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 89–3298 Filed 2–10–89; 8:45 am]

BILLING CODE 3810-01-M

Special Operations Policy Advisory Group, Closed Meeting

The Special Operations Policy Advisory Group (SOPAG) will meet on 17 February 1989 in the Pentagon, Arlington, Virginia to discuss sensitive, classified topics.

The mission of the SOPAG is to advise the Office of the Secretary of Defense on key policy issues related to the developments and maintenance of effective Special Operations Forces.

In accordance with section 10(d) of P.L. 92–463, the "Federal Advisory Committee Act," and section 552b(c)(1) of Title 5, United States Code, this meeting will be closed to the public.

Linda M. Bynum,

Alternate OSD Federal Register Liaison Department of Defense.

February 7, 1989.

[FR Doc. 89–3299 Filed 2–10–89; 8:45 am]

BILLING CODE 3810-01-M

Corps of Engineers, Department of the Army

Intent To Prepare a Draft Environmental Impact Statement (DEIS) for the Los Angeles County Drainage Area (LACDA) Review Study, Los Angeles County, CA

AGENCY: U.S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: This study is designed to develop a system-wide approach to identifying means for improving the capabilities of the Los Angeles County Drainage Area flood control system. During the 40 years since its construction, the ability of the system to provide a very high level of protection has diminished. This has resulted from an increase in surface runoff, loss of groundwater percolation and associated increases in contributory flow from additional storm drains.

FOR FURTHER INFORMATION CONTACT: Questions about the proposed action and Draft Environmental Impact Statement can be answered by Ronald F. Lockmann, CESPL–PD–RN, P.O. Box 2711, Los Angeles, California 90053–2325, (213) 894–5414.

SUPPLEMENTARY INFORMATION:

1. Proposed Action

The tentatively selected plan for flood control in the Los Angeles County Drainage Area system, Los Angeles County, California, consists of the following: Levee armoring and raising channel walls along the Rio Hondo, the Los Angeles River (LAR) from Atlantic Boulevard to the Ocean; and Compton Creek; armoring the backside (outside) of the LAR from Atlantic Blvd. to Pacific Ocean, Rio Hondo (entire) and Compton Creek from Willowbrook to the LAR would avoid catastrophic failure of the levees if they are overtopped. The linear distance of the armoring would be about 28 miles. Accessibility to the channel would not be Impacted. Raising the channel walls would also include channel conversion to trapezoidal where necessary and extension of bridge piers where possible. environmental enhancement, habitat improvement, or mitigation will not be included in this plan.

2. Alternatives

Alternatives considered during the planning process include 2 plans with detention or spreading ground possibilities (that of deepening Tujunga and Pacoima Spreading grounds; that of using Santa Fe gravel pit as a detention basin).

3. Scoping Process

A scoping meeting will be held to obtain community input to assure that all concerns are identified and addressed in the EIS/EIR. A separate public scoping notice will be sent to the public to identify time and location of the meeting and to solicit public comment. The specific date, time and meeting location will be published in local newspapers. The Corps has initiated coordination efforts with appropriate federal, state and local agencies to resolve potential problems relating to involved biological resources communities.

4. Future Public Meetings

A public meeting will be scheduled to discuss and obtain public comment.

5. Publication of DEIS

The Draft Environmental Impact Statement is expected to be available to concerned agencies and the interested public for review and comment in mid-1989.

Date: January 19, 1989.

Tadahiko Ono,

Colonel, Corps of Engineers, District Engineer.

[FR Doc. 89–3243 Filed 2–10–89; 8:45 am]

BILLING CODE 3710-KF-M

Office of The Secretary

Per Diem, Travel And Transportation Allowance Committee

AGENCY: Department of Defense.

ACTION: Publication of changes in per diem rates.

SUMMARY: The Per Diem, Travel and Transportation Allowance Committee is publishing Civilian Personnel Per Diem

APPENDIX C

BIOLOGICAL ASSESSMENT

BIOLOGICAL ASSESSMENT

I. Introduction

The Los Angeles District of the Army Corps of Engineers (COE), has determined that the proposed Los Angeles County Drainage Area Review will not adversely affect any species listed pursuant to the Endangered Species Act. Those species that occur in the study area include least Bell's vireo, California least tern, California brown pelican and the slender-horned spineflower.

The purpose of a biological assessment is to evaluate the potential effects of a Federal action (project) on listed and proposed listed species and designated and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the Federal action (project). The biological assessment is also used in determining whether formal consultation or a conference is necessary {Federal Register 51(106): Section 402.12(a), pg. 19960, 3 June 1986}. The contents of the biological assessment are at the discretion of the Federal agency and are dependent on the nature of the Federal action.

II. Project Description

Under congressional authority, the Los Angeles District of the U.S. Army Corps of Engineers is conducting a flood control study of the Los Angeles County Drainage Area (LACDA) project. The existing flood control system was constructed by the Corps of Engineers and the Los Angeles County Flood Control District (now part of the Department of Public Works) from the 1930s through the 1960s to protect the City of Los Angeles and other metropolitan areas in Los Angeles County from flood damage. Increased urbanization resulting in increased runoff, as well as changes in design criteria, has resulted in an inadequate level of flood protection afforded by the LACDA system.

The NED Plan (proposed alternative) addresses the area of most critical need in the LACDA: the downstream reaches of the Los Angeles-Rio Hondo system. Planned improvements begin at Whittier Narrows Dam and extend downstream on the Rio

Hondo to the confluence with the Los Angeles River. Improvements on the Los Angeles River continue from the confluence with the Rio Hondo and extend downstream to the mouth of the river in Long Beach Harbor. A total of about 23 miles of channel is to be improved.

The NED plan consists of five elements: 1) parapet walls, 2) raising bridges, 3) levee armoring, 4) widening a portion of the Rio Hondo and Los Angeles rivers at their confluence, and 5) application of a concrete overlay.

A. Parapet Walls

Parapet walls would be provided on the tops of existing levees on the Rio Hondo Channel and lower Los Angeles River for nearly the entire length of channel from Whittier Narrows to the Pacific Ocean. Wall heights would range from 2 to 8 feet (0.7 to 2.4 m).

B. Raising Existing Bridges

In order to provide parapet walls along the channels, many of the vehicle, railroad and utility bridges which cross the channels must be raised in height. The required height adjustments range from 1.6 to 6.3 feet (0.5 to 1.9 m) for the lower Los Angeles River, and 1.4 to 5.3 feet (0.4 to 1.6 m) along the Rio Hondo.

Of the 25 bridges which cross the lower Los Angeles River, 15 need to be modified. Twelve of the 18 bridges over the Rio Hondo are proposed to be modified.

C. Levee Armoring

Existing levees would be strengthened by armoring the back slope at selected locations with grouted stone. The back sides of levees will be armored to prevent erosion of the earthen levee in case they are overtopped.

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INTENDED FOR FUTURE REVISION

D. Widening Channel at Confluence

At and just downstream of the Rio Hondo-Los Angeles River confluence, a 7000 foot section of the Los Angeles River would be converted from trapezoidal to rectangular cross-section and widened 30 feet. Parapet walls would be constructed on the rebuilt channel walls.

E. Application of Concrete Overlay

The existing grouted stone channel walls in the vicinity of the Rio Hondo-Los Angeles River confluence will be overlaid with concrete to reduce hydraulic friction and improve channel flow characteristics.

III. Species Accounts

A. Slender-Horned Spineflower

1. Natural History

a. Distribution

Dodecahema (Centrostegia) leptoceras (CELE) is a very rare species, known to occur in only four small, isolated populations which together occupy less than 4 hectares (10 acres; U.S. Fed. Reg. 1986). These sites are: 1) near Devore, 2) 1.5 miles east of Valle Vista, 3) Temescal Canyon, and 4) near Highland in the Santa Ana River Wash, and 5) in Bautista Canyon (found by the U.S. Forest Service in 1987).

b. Habitat Requirements/Life History

CELE is generally found on sandy, old-formation benches that are free from introduced annual grasses and lack evidence of surface disturbance (Reveal and Krantz 1979). CELE is most commonly associated with mature soft chaparral or in association with a sparse cover of dwarf annuals, mosses, liverworts, and lichens.

2. "No Effect" Determination

Currently the only location where CELE potentially could occur is behind Hansen Dam in the LACDA system. The proposed alternative does not modify operations or uses in the Hansen Dam basin, so the with-project and without-project conditions are identical. Given no changes or impacts and no known populations, the COE has determined there would be no adverse effect to CELE.

B. California Least Tern

1. Natural History

a. Distribution

The California least tern (Sterna antillarum browni) is sparsely distributed in small colonies from San Francisco Bay to the Mexican border with additional small groups along the west coast of Baja California.

b. Habitat Requirements/Life History

The State and Federally endangered California least tern is a migratory, water-associated bird which returns to coastal California from Central America to breed between April and September. It is dependent upon undisturbed, sandy, open areas near coastal embayments or river mouths for suitable nesting habitat. The embayments, river mouths, and areas upstream of the river mouths within an approximate two mile range of nests serve as primary foraging habitat for least terns during nesting.

2. "No Effect" Determination

The California least tern has been identified as potentially foraging in the project area in association with the Los Angeles River and the San Gabriel River. There were no known or potential nesting sites identified within the study area. The currently proposed project

could potentially impact the least tern due to some upstream turbidity associated with bridge raising and noise associated with the construction of the parapet walls in the areas where least terns potentially forage. The COE has determined that the proposed project alternative would have no adverse effect on the California least tern due to a commitment to restrict construction in the lower reaches of the Los Angeles River. Construction would only occur from September to March on the last one-mile reach of the Los Angeles River. The proposed project alternative does not modify the San Gabriel River and as such there will be no adverse effect on the species.

C. California Brown Pelican

1. Natural History

a. Distribution

The California brown pelican (Pelecanus occidentalis californicus) ranges from southern British Columbia to Central America. A major segment of the population of this subspecies occupies the coast from central Baja California to northern California.

b. Habitat Requirements/Life History

The California brown pelican is associated with beaches, bays, and tidal estuaries and only rarely with fresh water. It feeds exclusively on fish. The brown pelican is at its highest numbers along the coast of California from late summer to late fall during the nonbreeding season. The brown pelican nests primarily on offshore islands (e.g. Channel Islands).

2. "No Effect" Determination

The California brown pelican has been identified as potentially foraging in the project area in association with the Los Angeles and San Gabriel Rivers. Foraging is the only activity that could be affected. The potential effects would be the possibility of increased turbidity from construction upstream and noise from construction of

the parapet walls. The COE has determined that the proposed project alternative would have no adverse effect on the California brown pelican due to a commitment to restrict construction in the lower reaches of the Los Angeles River. Construction would only occur from September to March on the last one-mile reach of the Los Angeles River. The proposed project alternative would not disturb any important brown pelican roosts. The San Gabriel River is not a part of the proposed alternative; hence, there would be no adverse effect on pelican foraging in the area.

D. Least Bell's Vireo

1. Natural History

a. Distribution

The least Bell's vireo (vireo bellii pusillus) is a small migratory bird whose breeding range is restricted to two localities in the Salinas River Valley; one locality along the Amargosa River; numerous small populations in southern California south of the Tehachapi Mountains; and in northwestern Baja California, Mexico.

b. Habitat Requirements/Life History

The least Bell's vireo arrives in its breeding habitat in mid-March to early April and departs in late August and September for its wintering range in Mexico. Least Bell's vireos are known to nest primarily in willows but also use a variety of shrubs, trees and vines. These passerine birds forage in riparian and adjoining chaparral habitat. In addition to loss of habitat, species decline is severely accelerated by nest parasitism by the brown-headed cowbird.

2. "No Effect" Determination

The least Bell's vireo has been identified as being present or possibly present at Hansen Dam, Santa Fe Dam, Whittier Narrows Dam, and in the San Gabriel River downstream of Whittier Narrows Dam. The proposed project alternative for LACDA would not cause any change in the conditions behind the dams or on the San Gabriel

River; hence not impacting any species present.

APPENDIX D

404B(1) DETERMINATION

THE EVALUATION OF THE EFFECTS
OF THE DISCHARGE OF DREDGED OR FILL MATERIAL
INTO THE WATERS OF THE UNITED STATES
LACDA REVIEW PROJECT

THE EVALUATION OF THE EFFECTS
OF THE DISCHARGE OF DREDGED OR FILL MATERIAL
INTO THE WATERS OF THE UNITED STATES
LACDA REVIEW PROJECT

I. INTRODUCTION. The following evaluation is provided in accordance with Section 404(b)(1) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) as amended by the Clean Water Act of 1977 (Public Law 95-217). Its intent is to succinctly state and evaluate information regarding the effects of discharge of dredged or fill material into the waters of the U.S. As such, it is not meant to stand alone and relies heavily upon information provided in the environmental document to which it is attached.

II. PROJECT DESCRIPTION

A. Location: Los Angeles County Drainage Area (LACDA). Construction is proposed in the lower portion of the Los Angeles River, the portion of the Rio Hondo River below Whittier Narrows and the lower portion of Compton Creek.

B. General Description: Material to be discharged includes sediment from excavated material in the lower Los Angeles River (channel widening alternative only). Other discharges will be incidental to construction activities in the channels.

The National Economic Development (NED) project alternative consists of construction of parapet walls on top of existing levees within the lower Los Angeles River, Rio Hondo Channel and lower Compton Creek. Limited channel widening and extensive bridge modifications will be required for this alternative. No dredging is proposed.

C. Authority and Purpose: Sections 1.1 and 1.3 of the EIS provide a description of the authority and purpose of the proposed action. The authority includes the Emergency Relief Act of 1935 and the Flood Control Acts of June 22, 1936 and August 8, 1941.

D. General Description of Dredged or Fill Material: In case of excavation, the material would consist of soft sediments in the lower Los Angeles River. These sediments may be contaminated from urban

runoff. Section 4.5.3 of the EIS discusses these impacts.

E. Description of Proposed Discharge Site: The exact method of disposal has not been determined, if excavation were done. It is assumed that the material meeting ocean disposal standards will be disposed of in a deep water disposal site (LA-2 or LA-3). Any material not conforming to standards will be disposed of at an approved onshore disposal site.

F. Description of Disposal Method: It is anticipated that any material would be transported to offshore disposal sites via barge and then dumped directly from the barge. On-land disposal would be via truck delivery to approved disposal facilities.

III. FACTUAL DETERMINATATION

A. Disposal Site Physical Substrate Determinations:

1. Substrate Elevation and Slope:

Impact: __X_ N/A ____ Insignif. _____ Signif.

2. Sediment Type:

Impact: __X_ N/A ____ Insignif. _____ Signif.

3. Dredged/Fill Material Movement:

Impact: __X_ N/A ____ Insignif. _____ Signif.

4. Physical Effects on Benthos (burial, changes in sediment type, composition, etc.):

Impact: ____ N/A __X_ Insignif. _____ Signif.

This material will be disposed of in an approved site where previous environmental documents have been prepared.

5. Other Effects

Impact: __X_ N/A ____ Insignif. _____ Signif.

6. Actions taken to Minimize Impacts

Needed? __X_ YES _____ NO

If Needed, Taken:

__X_ YES _____ NO

Specific measures to reduce turbidity are proposed.

B. Effect on Water Circulation, Fluctuation, and Salinity Determinations:

1. Effect on Water. The following impacts were considered:

a. Salinity	___N/A	_X_Insignif.	___Signif.
b. Water Chemistry (pH, etc.)	___N/A	_X_Insignif.	___Signif.
c. Clarity	___N/A	_X_Insignif.	___Signif.
d. Color	___N/A	_X_Insignif.	___Signif.
e. Odor	___N/A	_X_Insignif.	___Signif.
f. Taste	___N/A	_X_Insignif.	___Signif.
g. Dissolved gas levels	___N/A	_X_Insignif.	___Signif.
h. Nutrients	___N/A	_X_Insignif.	___Signif.
i. Eutrophication	_X_N/A	___Insignif.	___Signif.
j. Others	_X_N/A	___Insignif.	___Signif.

2. Effect on Current Patterns and Circulation. The potential of discharge or fill on the following conditions were evaluated.

k. Current Pattern and Flow	___N/A	___Insignif.	_X_Signif.
l. Velocity	___N/A	_X_Insignif.	___Signif.
m. Stratification	___N/A	_X_Insignif.	___Signif.
n. Hydrology Regime	___N/A	_X_Insignif.	___Signif.

3. Effect on Normal Water Level Fluctuations. The potential of discharge or fill on the following were evaluated.

o. Tide	_X_N/A	___Insignif.	___Signif.
p. River Stage	_X_N/A	___Insignif.	___Signif.

4. Action Taken to Minimize Effects:

None Required

C. Suspended Particulate/Turbidity Determinations at the Disposal Site

1. Expected Change in Suspended Particulate and Turbidity Levels in Vicinity of Disposal Site

Impact: ___N/A _X_Insignif. ___Signif.
Documentation: Increases of suspended sediments and turbidity will be short term during discharge of dredged material. These levels are expected to return to pre-project levels almost immediately.

2. Effects (degree and duration) on Chemical and Physical Properties of the Water Column:

a. Light Penetration	___N/A	_X_Insignif.	___Signif.
b. Dissolved Oxygen	___N/A	_X_Insignif.	___Signif.
c. Toxic Metals and Organics	_X_N/A	___Insignif.	___Signif.
d. Pathogen	_X_N/A	___Insignif.	___Signif.
e. Esthetics	___N/A	_X_Insignif.	___Signif.
f. Others	_X_N/A	___Insignif.	___Signif.

3. Effects of Turbidity on Biota: The following affects of turbidity on biota were evaluated:

g. Primary Productivity	___N/A	_X_Insignif.	___Signif.
h. Suspension/ Filter Feeders	___N/A	_X_Insignif.	___Signif.
i. Sight Feeders	___N/A	_X_Insignif.	___Signif.

4. Actions Taken to Minimize Impact: Potential for dredging only after slack tide.

D. Contaminant Determination

The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material.

3. Physical characteristics X

4. Hydrography in relation to known or anticipated sources of contaminants X

5. Results from previous testing of any material or similar material in the vicinity of the project X

6. Known, significant, sources of contaminants (e.g. pesticides) from land runoff or percolation ..... --

7. Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances ..... --

8. Other public records of significant introduction of contaminants from industries, municipalities or other sources X

9. Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities X

10. Other sources (specify) ..... --

An evaluation of the appropriate information above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to constraints. The material meets the testing exclusion criteria.

_X_ YES ___ NO

Impact: ___N/A _X_Insignif. ___Signif.

A. Effect on Aquatic Ecosystem and Organization Determinations. The following ecosystem effects were evaluated:

1.	On Plankton	___N/A	_X_Insignif.	___Signif.
2.	On Benthos	___N/A	_X_Insignif.	___Signif.
3.	On Nekton	___N/A	_X_Insignif.	___Signif.
4.	Food Web	___N/A	_X_Insignif.	___Signif.
5.	Sensitive Habitats:			
	a. Sanctuaries, refuges	_X_N/A	___Insignif.	___Signif.
	b. Wetlands	_X_N/A	___Insignif.	___Signif.
	c. Mudflats	_X_N/A	___Insignif.	___Signif.
	d. Eelgrass beds	_X_N/A	___Insignif.	___Signif.
	e. Riffle and Pool Complexes	_X_N/A	___Insignif.	___Signif.
6.	Threatened & Endangered Species	___N/A	_X_Insignif.	___Signif.
7.	Other Wildlife (grunion)	___N/A	_X_Insignif.	___Signif.

8. Actions to Minimize Impacts
None necessary as impacts will be short-term.

B. Proposed Disposal Site Determinations. Is the mixing zone for each disposal site confined to the smallest practicable zone?
___N/A _X_Insignif. ___Signif.

C. Determination of Cumulative Effects of Disposal or Fill on the Aquatic Ecosystem.
Impacts: ___N/A _X_Insignif. ___Signif.

D. Determination of Indirect Effects of Disposal or Fill on the Aquatic Ecosystem.
Impacts: ___N/A _X_Insignif. ___Signif.

IV. FINDING OF COMPLIANCE

A review of the proposed project indicates that:

a. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose

_X_ YES ___ NO

b. The activity does not appear to: 1) violate applicable state water quality standards or effluence standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally listed endangered or threatened species or their habitat; and 3) violate requirements of any Federally designated marine sanctuary.

_X_ YES ___ NO

c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages or organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values;

_X_ YES ___ NO

d. Appropriate and practicable steps have been taken to potential adverse impacts of the discharge on the aquatic ecosystem.

_X_ YES ___ NO

---

1 A negative response indicates that the proposed project does not comply with the guidelines.

APPENDIX E

COASTAL CONSISTENCY DETERMINATION

APPENDIX E - COASTAL CONSISTENCY DETERMINATION

This appendix provides the information necessary to determine the proposed action's consistency with the provisions of the California Coastal Act of 1976. Federal consistency review provisions are provided in the Federal Coastal Zone Management Act.

I. TYPE AND DESCRIPTION OF THE PROPOSED ACTION

The Army Corps of Engineers proposes to improve the flood conveyance capabilities of the Los Angeles County Drainage Area flood control system. The proposed NED Plan includes construction of concrete parapet walls along the existing channel levees of the Rio Hondo, the lower Los Angeles River and Compton Creek. Selected areas of levee armoring are also associated with the proposed action. Implementation of the NED Plan would also necessitate the raising of numerous street bridges crossing the affected channels.

The coastal zone boundary with respect to the proposed action covers the area from Ocean Boulevard upstream to Anaheim Street. This area is under the jurisdiction of the Port of Long Beach for coastal permitting.

Under the NED Plan alternative, the only modifications made to the Los Angeles River channel within the coastal zone area would be the construction of parapet walls on both channel levees for the entire reach. Wall heights would range between 3 and 5 feet.

The proposed action is considered a direct Federal activity for purposes of coastal consistency determination. Specific details of the proposed action and alternatives, with appropriate illustrations, are included in Section 2 of the main body of this EIS.

II. COASTAL RESOURCE PLANNING AND MANAGEMENT POLICIES

The coastal resource planning and management policies applicable to the proposed action are listed below along with an analysis of the relationship to proposed alternatives.

A. Public Access

1. Section 30211

Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Relationship to Policy

NED Plan Alternative - This alternative will not physically interfere with public access to the sea within the coastal zone. Construction of parapet walls along river levees could temporarily restrict use of bicycle trails which provide access to the coastal area. These trails will be fully restored after construction and no long-term effects will occur. Also, efforts will be made to route bicycle traffic around construction areas utilizing existing, available bike trails on streets. This alternative will not significantly impact public access to the coastal zone.

B. Recreation

1. Section 30220

Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

Relationship to Policy

NED Plan Alternative - This alternative will not affect the amount of area devoted to water-oriented recreation.

2. Section 30223

Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible.

Relationship to Policy

NED Plan Alternative - The bicycle trail along the eastern Los Angeles River levee is used as an important point of non-vehicular access to the coastal zone recreation resources. Bike trails will be temporarily impacted by parapet wall construction, and will be fully restored after construction. As stated previously, efforts will be made route bicycle traffic around construction areas using existing available bike trails on local streets.

C. MARINE ENVIRONMENT

1. Section 30230

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of the coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Relationship to Policy

NED Plan Alternative - This alternative would not involve any disturbance to marine resources.

2. Section 30231

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Relationship to Policy

NED Plan Alternative - No alteration of wetlands will occur as a result of the implementation of this alternative.

3. Section 30233

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(5) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.

Relationship to Policy

NED Plan Alternative - The proposed project has public service purposes in providing flood control protection to a significant portion of the population within the Los Angeles basin. Use of the existing channel for flood control modifications is necessary in that there are no feasible alternatives that could be implemented which would not utilize the channel. (See also Section 2.1 of the EIS for a description of other alternatives considered but eliminated from consideration.)

(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable long shore current systems.

Relationship to Policy

NED Plan Alternative - No dredge spoil disposal is required under this alternative.

4. Section 30236

Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible, and be limited to (1) necessary water supply projects, (2) flood control projects where no other method for protecting existing structures in the floodplain is feasible

and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat.

Relationship to Policy

NED Plan Alternative - This alternative is a necessary component of the flood protection system for the greater Los Angeles County Drainage Area. The action involves modification of an existing flood control channel.

5. Land Resources

Land Resource policies are not applicable since no land resources within the coastal zone will be affected by project alternatives.

6. Development

The proposed action is not considered new development, thus the policies in this article do not apply.

7. Industrial Development

The proposed action is not considered industrial development thus the policies of this article do not apply.

III. CONSISTENCY DETERMINATION AND CERTIFICATION

It has been determined by the Los Angeles District Corps of Engineers that, based on a review of the applicable sections of the Coastal Zone management, the proposed Los Angeles County Drainage Area Study is consistent with the applicable sections of the

California Coastal Act of 1987 to the maximum extent practicable. The Corp has determined that the proposed plan, the NED plan, is the most feasible alternative and that feasible mitigation measures have been included to minimize adverse environmental effects. This finding is based on the attached Draft Environmental Impact Statement (DEIS) for the Los Angeles County Drainage Area study, appendixes, and coordination.

APPENDIX F

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APPENDIX G

FISH AND WILDLIFE COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
SOUTHERN CALIFORNIA FIELD STATION
Laguna Niguel Office
Federal Building, 24000 Avila Road
Laguna Niguel, California 92656

In Reply Refer To:
FWE/SCFS-LNO

March 11, 1992

Colonel Charles Thomas
District Engineer
Corps of Engineers, Los Angeles District
P.O. Box 2711
Los Angeles, California 90053

Attn: Ruth Villalobos, Chief, Environmental Resources Branch

Re: Fish and Wildlife Coordination Act Report for the Los Angeles County Drainage Area (LACDA) Review Study, Los Angeles County, California

Dear Colonel Thomas:

Enclosed is our Fish and Wildlife Coordination Act Report on the referenced project. This report has been prepared under the authority of, and in accordance with, provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. et seq.). This report is intended to assist your agency in the preparation of the Feasibility Study for this project.

Sincerely,

Brooks Harper

Brooks Harper
Office Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
SOUTHERN CALIFORNIA FIELD STATION
Carlsbad Office
2730 Loker Avenue West
Carlsbad, California 92008

TAKE PRIDE IN AMERICA

April 23, 1992

Colonel Charles Thomas, District Engineer
Los Angeles District, Corps of Engineers
P.O. Box 2711
Los Angeles, California 90053-2325

Attn: Ron Lockman, Environmental Resources Branch

Re: Los Angeles County Drainage Area (LACDA), Final Feasibility Study and Environmental Impact Statement

Dear Colonel Thomas:

The U.S. Fish and Wildlife Service (Service) has reviewed the Biological Assessment (Appendix C) of the referenced document dated December 1991. The Corps of Engineers has determined that the proposed Federal action will not affect any Federal listed endangered species. After our review of the referenced document, we concur in your finding of no effect.

Sincerely,

for Brooks Harper
Office Supervisor

1-6-92-I-163

FISH AND WILDLIFE COORDINATION ACT REPORT
LOS ANGELES COUNTY DRAINAGE AREA
(LACDA) REVIEW STUDY
Los Angeles County
California

Prepared for the

CORPS OF ENGINEERS
LOS ANGELES DISTRICT
Department of the Army
Los Angeles, California

by the

FISH AND WILDLIFE SERVICE
U.S. Department of the Interior
Laguna Niguel Field Office

Brooks Harper, Office Supervisor
John Hanlon, Project Biologist and Author

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LETTER OF CONCURRENCE

California Department of Fish and Game

PREFACE

This document constitutes the U.S. Fish and Wildlife Service's (Service) report on the Los Angeles County Drainage Area (LACDA) Review Study, Los Angeles County, California. It is being prepared under the authority of the Fish and Wildlife Coordination Act, P.L. 85-624, Section 2(b) and in keeping with the spirit and intent of the National Environmental Policy Act.

The goals of the Service in its study involvement are, (1) to evaluate the impact of the principal alternative on fish and wildlife resources, their habitat and their utilization by the public, (2) to identify and evaluate the least environmentally damaging alternative, and (3) to recommend methods for preserving, compensating, and enhancing fish and wildlife resources.

In assessing the environmental conditions, as well as the needs and opportunities for fish and wildlife that would exist under the various alternatives analyzed, the Service employed its best professional judgment, using available research reports and literature.

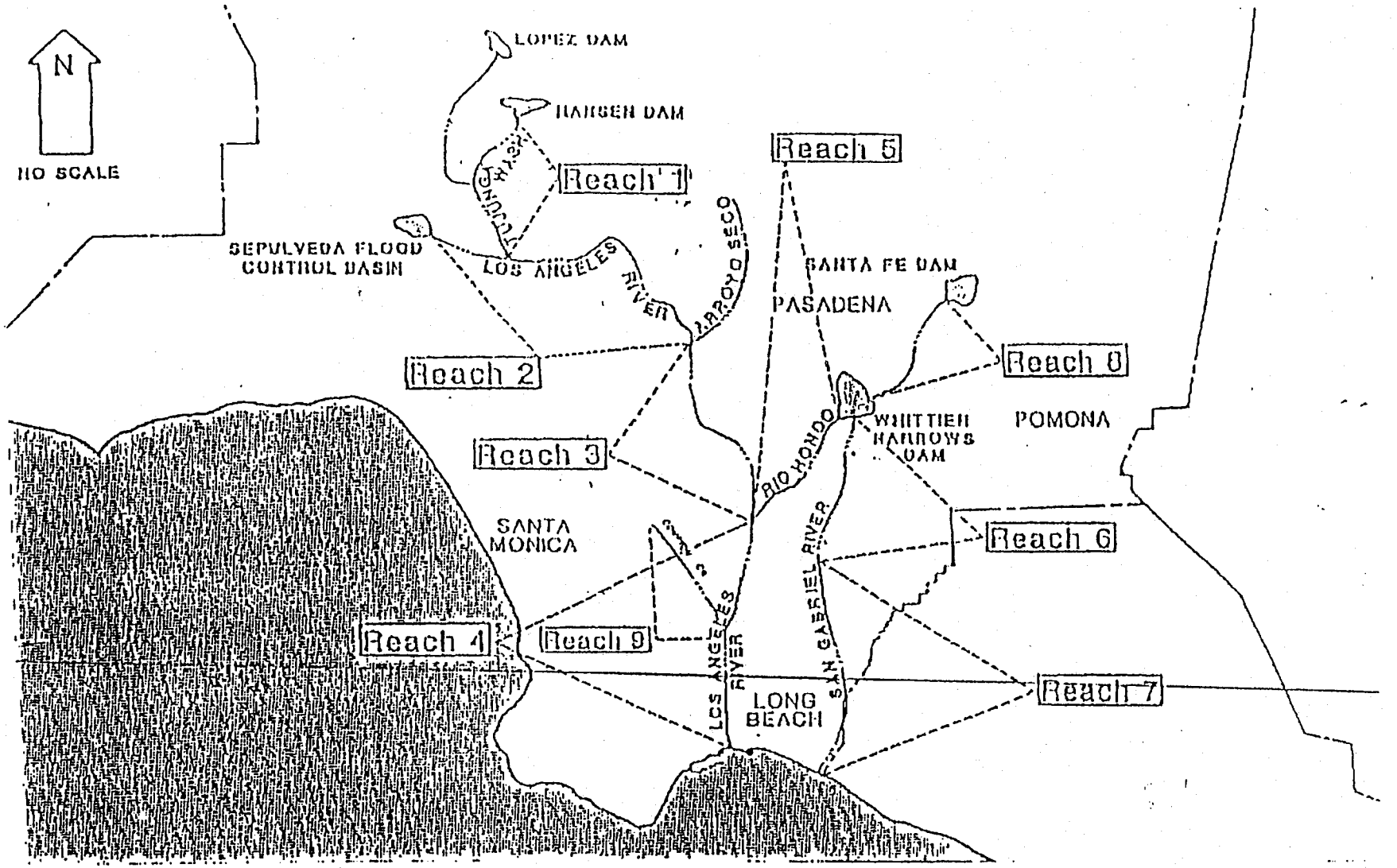

N
NO SCALE
LOPEZ DAM
HANSEN DAM
TUJUNGA WASH
Reach 1
Reach 5
SEPULVEDA FLOOD CONTROL BASIN
LOS ANGELES RIVER
ARROYO SECO
SANTA FE DAM
PASADENA
Reach 2
Reach 8
WHITTIER NARROWS DAM
POMONA
RIO HONDO
Reach 3
SANTA MONICA
SAN GABRIEL RIVER
Reach 6
Reach 4
Reach 9
LOS ANGELES RIVER
LONG BEACH
Reach 7

Figure: 1

A. GENERAL DESCRIPTION OF THE PROJECT AREA AND INTRODUCTION

The Los Angeles Drainage Area (LACDA) encompasses approximately 2,000-square miles. Components of the LACDA system include 5 Corps of Engineers' flood control basins, 16 Los Angeles County flood control basins, and 4 natural sections of streams. Except for the lower reaches of the San Gabriel River, all the components of the LACDA system lie in the San Gabriel Mountains or in the floodplain directly below them. Figure 1 shows the LACDA system. Ultimately, all the water flows into the Los Angeles or San Gabriel Rivers and empties into the Pacific Ocean at Long Beach Harbor.

The LACDA Review is a study for flood control. Protection of environmental values within the project area is also to be considered. The LACDA system, built between 1940 and 1960, has been described by the Corps of Engineers (Corps) as outmoded and no longer adequate to meet existing conditions. Urban development has resulted in a decrease in groundwater percolation as ground surfaces were altered and became impervious. This resulted in increased surface runoff into the system and heightened the potential for flooding.

B. PROJECT DESCRIPTION

The Corps originally considered 5 alternatives to address the flood control problem: 1) structural modifications to existing structures (drains and channels); 2) re-regulation of the existing reservoirs; 3) re-regulation of and structural modifications to the existing reservoirs; 4) re-regulation of existing structures and construction of new structures; and 5) re-regulation and modifications to existing structures and construction of new structures.

Alternative 1, structural modifications to existing drains and channels, is the selected alternative. This alternative addresses the downstream reach of the Los Angeles - Rio Hondo system. Improvements will begin at the Rio Hondo outlet from Whittier Narrows and extend the entire length of the Rio Hondo Channel. Improvements on the Los Angeles River begin at the confluence with the Rio Hondo Channel and extend to the mouth of the river in Long Beach Harbor. A total of about 23 miles of channel are to be modified.

The objective of the structural improvements is to provide greater flood protection to the urbanized reaches of the Rio

Hondo and lower Los Angeles River. The 133-year level of protection was selected because of its maximum net benefits and the constraints on plan design imposed by the Artesia Freeway overcrossing. Three measures are used individually and in combination to achieve this objective:

1) Vertical reinforced-concrete parapet walls of from 2.0 feet to 8.0 feet in height constructed along the crest of the existing channel levees.

2) Conversion of 6950 feet of concrete trapezoidal to concrete rectangular channel in a reach where parapet walls cannot be raised to the necessary height to provide adequate protection (at and just below the confluence of the Rio Hondo and the Los Angeles River).

3) Raising and modifying bridges which currently are too low to permit 133-year flows to pass underneath them or which have other impacts on the hydraulic characteristics of the channel which make alteration of their design necessary. Twenty-four of forty-one bridges in the project reach will be modified.

4) Armoring of the landward levee slope on both sides of selected reaches (a total of about 2.2 miles) to prevent overflows from eroding the levee.

PLAN COMPONENTS

Parapet Walls

Parapet walls will be constructed of one foot thick reinforced concrete. Their height will vary from reach to reach to reflect the changing requirements of the system. Transitions from one reach to another will be accomplished with an instantaneous change in height. In some reaches, where hydraulic analysis indicates wall height would be less than 0.5 feet, no parapet walls will be constructed. The parapet walls will be constructed on the channel side of the existing access road/bicycle trail system to permit continued recreation use along this reach of the river.

The parapet wall system will pass beneath or abut against all bridges. The existing bicycle trails veer channelward and dip into the channel as they pass below many of the bridges. The parapet walls will necessitate that the trails be elevated to the level of the top of the parapet walls to pass over them.

This will be located far enough from the bridge overpasses that the bicycle trail can reconnect with the existing underpass configuration.

Parapet walls would be constructed by connecting the new walls at the immediate junction of the existing channel wall and the asphalt-paved access road and bicycle trail. Walls will be reinforced with 3/4-inch diameter steel dowels sunk nine inches into the existing levee on 4-1/2 foot centers.

Conversion of the Channel to Rectangular Concrete-lined Channel

At the confluence of the Rio Hondo and the Los Angeles River, both parapet walls and the conversion of the channel from trapezoidal to rectangular is required to accommodate flood flows. In this approximately 7,000 foot reach, the anticipated flow of 158,000 ft^3/s is accommodated by converting the existing trapezoidal channel, with a top width of approximately 390 feet, into

a rectangular cross-section with a width of 420 feet. In addition to widening the channel approximately 30 feet, parapet walls as high as seven feet will be added to the channel sides.

This reduces the water surface elevation in the Rio Hondo sufficiently to avoid otherwise necessary modifications to the Union Pacific Railroad bridge.

Bridge Modifications

Twenty-four bridges must be either raised (21), raised and modified (1), modified (1), or moved (1) to permit the design flow to pass underneath the bridge. Only one of these structures has historic value - the railroad bridge near the mouth of the Los Angeles River which will be moved 115 feet downstream but will otherwise not be altered.

Raising of bridges will generally be accomplished in two ways. First, some bridges are suitable for raising using jacks to raise the entire bed while pier extensions are placed beneath them. Some bridges must be demolished and then replaced. The primary criteria for making this decision was the construction of the existing bridge and whether the bridge needed to be raised more than 10 percent of pier height to achieve project objectives. Raising a bridge to a greater height is not considered feasible for structural reasons.

C. EXISTING CONDITIONS AND FUTURE WITHOUT THE PROJECT

The present environment of the project area consists entirely of concrete-lined channels with access roads and bike trails along one or both sides. No natural habitat exists. It is anticipated that without the project there will be no increase in natural habitats or wildlife values.

D. ANALYSIS OF IMPACTS AND FUTURE WITH THE PROJECT

No fish, wildlife, and habitat impacts are anticipated with the project. Presently there are no natural habitats nor fish and wildlife resources in the project impact area.

E. SUMMARY OF IMPACTS

Due to the fact that there are no fish and wildlife resources nor natural habitats in the project's impact area, there are no ecological impacts.

F. MITIGATION PLAN

Since there are no fish, wildlife, and habitat impacts in the project's impact area, no mitigation is required.

G. RECOMMENDATIONS FOR THE RECOMMENDED ALTERNATIVE

The Service has no recommendations to offer since there are no ecological values to the existing environment and that the project would not enhance nor degrade the existing environment.

Brooks Harper
~~Office Supervisor~~

3/13/92
Date

Hondo and lower Los Angeles River. The 133-year level of protection was selected because of its maximum net benefits and the constraints on plan design imposed by the Artesia Freeway overcrossing. Three measures are used individually and in combination to achieve this objective:

1) Vertical reinforced-concrete parapet walls of from 2.0 feet to 8.0 feet in height constructed along the crest of the existing channel levees.

2) Conversion of 6950 feet of concrete trapezoidal to concrete rectangular channel in a reach where parapet walls cannot be raised to the necessary height to provide adequate protection (at and just below the confluence of the Rio Hondo and the Los Angeles River).

3) Raising and modifying bridges which currently are too low to permit 133-year flows to pass underneath them or which have other impacts on the hydraulic characteristics of the channel which make alteration of their design necessary. Twenty-four of forty-one bridges in the project reach will be modified.

4) Armoring of the landward levee slope on both sides of selected reaches (a total of about 2.2 miles) to prevent overflows from eroding the levee.

(PLAN COMPONENTS)

Parapet Walls

Parapet walls will be constructed of one foot thick reinforced concrete. Their height will vary from reach to reach to reflect the changing requirements of the system. Transitions from one reach to another will be accomplished with an instantaneous change in height. In some reaches, where hydraulic analysis indicates wall height would be less than 0.5 feet, no parapet walls will be constructed. The parapet walls will be constructed on the channel side of the existing access road/bicycle trail system to permit continued recreation use along this reach of the river.

The parapet wall system will pass beneath or abut against all bridges. The existing bicycle trails veer channelward and dip into the channel as they pass below many of the bridges. The parapet walls will necessitate that the trails be elevated to the level of the top of the parapet walls to pass over them.

This will be located far enough from the bridge overpasses that the bicycle trail can reconnect with the existing underpass configuration.

Parapet walls would be constructed by connecting the new walls at the immediate junction of the existing channel wall and the asphalt-paved access road and bicycle trail. Walls will be reinforced with 3/4-inch diameter steel dowels sunk nine inches into the existing levee on 4-1/2 foot centers.

Conversion of the Channel to Rectangular Concrete-lined Channel

At the confluence of the Rio Hondo and the Los Angeles River, both parapet walls and the conversion of the channel from trapezoidal to rectangular is required to accommodate flood flows. In this approximately 7,000 foot reach, the anticipated flow of 158,000 ft^3/s is accommodated by converting the existing trapezoidal channel, with a top width of approximately 390 feet, into a rectangular cross-section with a width of 420 feet. In addition to widening the channel approximately 30 feet, parapet walls as high as seven feet will be added to the channel sides.

This reduces the water surface elevation in the Rio Hondo sufficiently to avoid otherwise necessary modifications to the Union Pacific Railroad bridge.

Bridge Modifications

Twenty-four bridges must be either raised (21), raised and modified (1), modified (1), or moved (1) to permit the design flow to pass underneath the bridge. Only one of these structures has historic value - the railroad bridge near the mouth of the Los Angeles River which will be moved 115 feet downstream but will otherwise not be altered.

Raising of bridges will generally be accomplished in two ways. First, some bridges are suitable for raising using jacks to raise the entire bed while pier extensions are placed beneath them. Some bridges must be demolished and then replaced. The primary criteria for making this decision was the construction of the existing bridge and whether the bridge needed to be raised more than 10 percent of pier height to achieve project objectives. Raising a bridge to a greater height is not considered feasible for structural reasons.

C. EXISTING CONDITIONS AND FUTURE WITHOUT THE PROJECT

The present environment of the project area consists entirely of concrete-lined channels with access roads and bike trails along one or both sides. No natural habitat exists. It is anticipated that without the project there will be no increase in natural habitats or wildlife values.

D. ANALYSIS OR IMPACTS AND FUTURE WITH THE PROJECT

No fish, wildlife, and habitat impacts are anticipated with the project. Presently there are no natural habitats nor fish and wildlife resources in the project impact area.

E. SUMMARY OF IMPACTS

Due to the fact that there are no fish and wildlife resources nor natural habitats in the project's impact area, there are no ecological impacts.

F. MITIGATION PLAN

Since there are no fish, wildlife, and habitat impacts in the project's impact area, no mitigation is required.

G. RECOMMENDATIONS FOR THE RECOMMENDED ALTERNATIVE

The Service has no recommendations to offer since there are no ecological values to the existing environment and that the project would not enhance nor degrade the existing environment.

_____
Office Supervisor

_____
Date of Final Report

APPENDIX H

STATE HISTORIC PRESERVATION OFFICE LETTER

STATE OF CALIFORNIA – THE RESOURCES AGENCY

GEORGE DEUKMEJIAN, *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
POST OFFICE BOX 942896
SACRAMENTO, CALIFORNIA 94296-0001
(916) 445-8006

25 October 1989

Reply to: CoE 891010A

Robert S. Joe
Chief, Planning Division
US Army Corps of Engineers
P.O. Box 2711
Los Angeles, California 90053

Re: Flood Control Project Along Compton Creek, Rio Hondo, and Los Angeles Rivers

Dear Mr. Joe:

Thank you for consulting with us under 36 CFR 800.4.

The project as envisioned consists of raising and armoring existing levees along the Rio Hondo and Los Angeles Rivers. This will require raising, or in a few cases moving, 26 bridges.

Some of the bridges have been evaluated under CalTrans' bridge survey, others still require significance evaluations. We suggest you contact Steve Mikesell of Caltrans at (916) 920-7671 concerning bridge evaluations.

Most of the planned levee armoring appears to be taking place along Compton Creek, but little other information is included. Assuming at least some of this area is relatively undisturbed, you should conduct an identification of archaeological resources in areas within the APE likely to yield them.

If you have any questions, please contact Nicholas Del Cioppo, State Archaeologist II, at (916) 322-4419.

Sincerely,

Kathryn Gualtieri
State Historic Preservation Officer

APPENDIX I

Summary of Public Comments on the Draft Environmental Impact Statement Held on October 1, 1991

ORIGINAL

PUBLIC HEARING FOR THE

LOS ANGELES COUNTY DRAINAGE AREA

DRAFT FEASIBILITY STUDY

ENVIRONMENTAL IMPACT STATEMENT

TUESDAY, OCTOBER 1, 1991
7:00 P.M.
CARSON COMMUNITY CENTER
3 CIVIC PLAZA
CARSON, CALIFORNIA

SPONSORED BY THE U.S. ARMY CORPS OF ENGINEERS
300 NORTH LOS ANGELES STREET
LOS ANGELES, CALIFORNIA 90017
COL. CHARLES THOMAS, DISTRICT ENGINEER

REPORTED BY LILLIAN G. HOPKINS, CSR NO. 8722

MR. BLUM: GOOD EVENING, EVERYBODY. WELCOME HERE THIS EVENING TO THE PUBLIC MEETING OF THE LOS ANGELES COUNTY DRAINAGE AREA REVIEW FEASIBILITY STUDY DRAFT INTERIM REPORT AND ENVIRONMENTAL IMPACT STATEMENT.

MY NAME IS CARL BLUM. I'M THE ASSISTANT DEPUTY DIRECTOR OF THE LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS, AND I'M HERE AS THE LOCAL SPONSOR FOR THIS FEDERAL PROJECT.

WE HAVE BEEN WORKING WITH THE CORPS OF ENGINEERS FOR OVER 50 YEARS HERE IN THE LOS ANGELES AREA, AND AS A RESULT OF THIS PARTNERSHIP, I BELIEVE WE'VE BUILT ONE OF THE FINEST URBAN FLOOD CONTROL SYSTEMS IN THE COUNTRY. HOWEVER, WE ARE AWARE OF SOME PROBLEMS WITH THE SYSTEM, AND WE'VE BEEN WORKING WITH THE CORPS OF ENGINEERS ON THIS PROJECT.

WE STRONGLY SUPPORT WHAT THEY'RE PROPOSING HERE TONIGHT, AND TO EXPLAIN THE PROJECT TO YOU AND TO ANSWER QUESTIONS YOU MAY HAVE, I'D LIKE TO TURN THIS OVER TO COLONEL CHARLES THOMAS, DISTRICT ENGINEER, THE LOS ANGELES DISTRICT, U.S. ARMY CORPS OF ENGINEERS.

COLONEL THOMAS.

COL. THOMAS: THANKS, CARL.

THIS HAS BEEN A LONG AND PROUD AND CLOSE PARTNERSHIP BETWEEN THE COUNTY AND THE U.S. ARMY CORPS OF

ENGINEERS. IT'S KIND OF AN ANACHRONISM THAT WE CALL THIS A FEDERAL PROJECT STILL BECAUSE SINCE THE WATER RESOURCES DEVELOPMENT ACT OF 1986, IT HAS BEEN A TRUE PARTNERSHIP IN PLANNING AND IN COST SHARING, AND THE COUNTY WILL SHARE 50/50 WITH US. AND WE'VE HAD A REAL SUCCESSFUL AND ENDURING RELATIONSHIP WITH THE COUNTY'S PEOPLE.

I'D LIKE TO INTRODUCE TO YOU SOME OF MY STAFF MEMBERS WHO ARE HERE TODAY.

DAN YOUNG IS MY ASSISTANT CHIEF OF PLANNING; THEY'RE RESPONSIBLE FOR PRODUCING THIS REPORT.

HIS STUDY MANAGER HAS BEEN PAT LUVENDER. PAT -- SHE'S THE ONE THAT WROTE WHATEVER I'M GOING TO SAY. I OPEN MY MOUTH, AND PAT'S WORDS COME OUT.

RICHARD SCHUBEL IS CHIEF OF PLANNING SECTION A, PAT'S DIRECT BOSS.

STUART BREHM IS THE PROJECT MANAGER WHO WILL REALLY TAKE OVER MANAGEMENT OF THE PROJECT AFTER FEASIBILITY; THEY HAVE A HANDOFF HERE. HE'S ACTIVE IN IT NOW.

SCOTT STONESTREET IS HERE FROM HYDRAULIC ENGINEERING, AND RON LOCKMANN FROM THE ENVIRONMENTAL SECTION.

THIS IS AN OFFICIAL PUBLIC MEETING. LILLIAN HOPKINS IS A COURT REPORTER, AND SHE'LL TAKE DOWN A VERBATIM TRANSCRIPT OF WHAT GOES ON TODAY.

WHEN YOU ARRIVED, WE ASKED YOU TO FILL OUT A CARD, ATTENDANCE CARD THAT LOOKED LIKE THIS. I HOPE YOU'LL ALL DO THAT. IF YOU'D LIKE TO SPEAK, THERE'S A BOX TO CHECK, AND ONE OF MY HELPERS, ONE OF MY STAFF MEMBERS WILL BRING THOSE TO ME SO I CAN CALL ON YOU.

WHEN WE GET TO THE END, I'LL OFFER EACH A CHANCE TO SPEAK, EVEN IF YOU HAVEN'T INDICATED ON THIS CARD. BUT I'LL ASK THOSE WHO DID THAT FIRST, STARTING WITH MAYOR OF PICO RIVERA, AND FEMA, AND THEN MORE OR LESS RANDOM ORDER ANYONE ELSE WHO INDICATED THEY WOULD LIKE TO SPEAK, AND THEN ANYONE ELSE WHO FEELS MOTIVATED BY WHAT THEY'VE HEARD.

I GUESS THAT'S IT FOR INTRODUCTORY REMARKS. WHO'S GOT A HANDLE ON THE LIGHTS? JIM MYRTETUS IS ANOTHER STAFF MEMBER. HI, JIM. THANK YOU FOR HELPING.

I WANT TO MAKE SURE, THERE'S A LOT OF IMPORTANT INFORMATION FOR ME TO TELL YOU TODAY, AND SO I'D LIKE TO START WITH SOME FORMAL REMARKS THAT I'LL READ, AND THEN WE'LL GO ON TO QUESTIONS AND ANSWERS AND ANYTHING THAT YOU'D LIKE TO DISCUSS.

WE STUDIED FLOOD PROBLEMS AND POTENTIAL SOLUTIONS ON THE COUNTY'S MAINSTEM FLOOD CONTROL SYSTEM. THE CURRENT STUDY RECOMMENDATION IS TO INCREASE FLOOD PROTECTION ALONG 23 MILES OF THE RIO HONDO RIVER AND THE LOS ANGELES RIVER FROM WHITTIER NARROWS DAM DOWN TO THE

PACIFIC OCEAN.

TO SUPPORT THIS RECOMMENDATION, I'D LIKE TO HIGHLIGHT FOR YOU A FEW FACTS: THE FLOODING PROBLEM AND THE REASONS THE CURRENT FLOOD CONTROL SYSTEM IS NO LONGER ADEQUATE, THE GOALS WE ESTABLISHED AND THE CONSTRAINTS WE FACED IN DEVELOPING SOLUTIONS TO THE FLOODING PROBLEMS, THE TYPES OF SOLUTIONS WE LOOKED AT, THE PLAN I INTEND TO RECOMMEND, AND WHAT THE ENVIRONMENTAL IMPACTS OF THIS PLAN ARE.

LET'S FIRST TURN TO THE FLOODING.

IS THERE A FLOODING PROBLEM IN LOS ANGELES COUNTY? IN A WORD, YES.

MANY OF YOU REMEMBER THE STORM OF 1980 THAT THREATENED PORTIONS OF LONG BEACH. WEATHER FORECASTERS WERE PREDICTING TWO TO FOUR INCHES OF RAIN, AND SIX SUCCESSIVE HAD ALREADY ROLLED THROUGH AND THE LOS ANGELES RIVER WAS FULL AND TO ITS MAXIMUM. THE LOS ANGELES RIVER CHANNEL WAS CLOSE TO CAPACITY.

WE HAVE FOUND FLOOD FLOW DEBRIS FROM THE SIX STORMS AT THE TOP OF THE RIVER LEVEE AT WARDLOW ROAD. YOU CAN SEE RIGHT UP THERE AT THE TOP. THERE WAS DEBRIS AT THE TOP.

AND THE SEVENTH STORM NEVER HIT. BUT IF IT HAD, FLOOD FLOWS WOULD CERTAINLY HAVE THRUST WATER OVER THE WALLS OF THE LEVEE AND DESTROYED IT. THE WATER WOULD

HAVE POURED INTO THE STREETS AND BUILDINGS, BRINGING CATASTROPHIC DAMAGES WITH IT.

LARGE FLOOD FLOWS ARE RARE IN SOUTHERN CALIFORNIA. WHEN THEY OCCUR, HOWEVER, THEY CAN BE DEVASTATING, AS THIS PICTURE NEAR GRIFFITH PARK SHOWS. SINCE 1900, SIGNIFICANTLY DAMAGING FLOWS IN LOS ANGELES COUNTY HAVE OCCURRED IN 1914, 1934, 1938, 1952, '69, '80, AND '83.

THE MOST DESTRUCTIVE FLOOD IN THIS PERIOD WAS IN FEBRUARY OF 1938. 49 PEOPLE DIED, AND THE FLOOD CAUSED WHAT WOULD BE TODAY ABOUT $800 MILLION IN DAMAGES.

HERE'S SOME PHOTOS OF THIS DEVASTATING FLOOD, FIRST AT RIVERSIDE DRIVE, ELYSIAN PARK, AND TUJUNGA, AND GLENDALE.

A FLOOD IN THE WINTER OF 1861-62 WAS SO GIGANTIC THAT THE LOS ANGELES RIVER MOUTH MOVED FROM THE BALLONA CREEK OUTLET IN MARINA DEL REY TO THE LONG BEACH HARBOR WHERE IT IS TODAY.

FLOOD DAMAGES WOULD BE EVEN GREATER IF IT WEREN'T FOR THE CURRENT FLOOD CONTROL SYSTEM. THE CORPS AND LOS ANGELES COUNTY BUILT THIS SYSTEM FROM THE LATE 1930'S THROUGH THE '60'S; AND TO DATE, IT HAS PREVENTED ALMOST $4 BILLION IN DAMAGES, WE ESTIMATE.

THE SYSTEM COMBINES 470 MILES OF IMPROVED MAIN AND CONTRIBUTORY CHANNELS, 20 FLOOD CONTROL DAMS,

AND 129 DEBRIS BASINS, WHICH ARE SMALLER DAMS THAT COLLECT THE SAND, SILT, AND DEBRIS AND KEEP THE WATER FLOWING CLEAN.

OUR FEASIBILITY STUDY FOUND THAT THE SYSTEM IS NO LONGER ADEQUATE. ENGINEERS DESCRIBE FLOOD FLOWS OF DIFFERENT SIZES BASED ON THEIR STATISTICAL PROBABILITY OF OCCURRING IN ANY ONE YEAR. SO WHEN I TALK ABOUT A 100-YEAR FLOOD, THAT'S A FLOOD THAT IN ANY PARTICULAR YEAR STATISTICALLY HAS A ONE PERCENT CHANCE OF HAPPENING. ONE IN ONE HUNDRED. THAT DOESN'T MEAN THAT IF IT HAPPENS ONCE, IT WON'T HAPPEN FOR ANOTHER HUNDRED YEARS. IT MAY NEVER HAPPEN IN 100 YEARS; IT MAY HAPPEN SEVERAL TIMES IN 100 YEARS. BUT STATISTICALLY, OVER THE TIME PERIOD WE HAVE, THERE'S A ONE PERCENT CHANCE IN ANY PARTICULAR YEAR IT COULD OCCUR. AND A 100-YEAR STORM IS VERY BIG.

TODAY, A 100-YEAR FLOOD IN THE LOS ANGELES COUNTY MAINSTEM SYSTEM WOULD INUNDATE ABOUT 82 SQUARE MILES; IT WOULD CAUSE ABOUT $2.3 BILLION IN DAMAGE. AND THIS MAP SHOWS THAT 100-YEAR FLOODPLAIN IN YELLOW. THE LARGEST DAMAGES WOULD OCCUR ON THE RIO HONDO RIVER AND ON THE LOWER LOS ANGELES RIVER.

THE RIVER COLLECTS AND CARRIES THE FLOOD FLOWS FROM HUNDREDS OF SQUARE MILES OF URBAN DRAINAGE. THE OVERFLOW AREA INCLUDES PORTIONS OF BELL GARDENS, PARAMOUNT, BELLFLOWER, LAKEWOOD, SIGNAL HILL, LONG BEACH

AND CARSON. OVER 500,000 PEOPLE NOW LIVE IN THE 100-YEAR FLOODPLAIN. ABOUT 87 PERCENT OF THE STRUCTURES IN THIS FLOODPLAIN ARE SINGLE-FAMILY RESIDENCES.

FLOOD WATERS WOULD BE ABOUT TWO TO FOUR FEET DEEP IN MOST AREAS. PONDING COULD BE AS DEEP AS 10 FEET IN SOME PLACES. MUD AND WATER COULD WEAKEN STRUCTURES. THE FLOW WOULD COVER THE FLOOR OF THOUSANDS OF HOMES, BUSINESSES, AND PUBLIC FACILITIES. IT WOULD DAMAGE FURNITURE, FLOOR COVERINGS, EQUIPMENT, AND OTHER POSSESSIONS. FLOODING WOULD MAKE ROADS AND RAIL LINES IMPASSABLE. IT WOULD BREAK COMMUNICATION AND POWER LINES.

WHY DO WE HAVE THESE PROBLEMS TODAY? THE MAIN REASON IS THAT RAPID URBAN DEVELOPMENT HAS TAKEN PLACE ON THIS MASSIVE LOS ANGELES BASIN FLOODPLAIN. URBAN DEVELOPMENT MAKES FLOODING WORSE: BUILDING STREETS AND OTHER PAVED SURFACES CAN'T ABSORB THE RAINFALL. INSTEAD, THE RAIN RUNS OFF INTO STORM DRAINS AND EVENTUALLY INTO THE CREEKS AND RIVERS.

BASED ON INFORMATION THEY HAD, THE EARLY FLOOD CONTROL PLANNERS BELIEVED THE SYSTEM THEY DESIGNED WOULD CONTROL THE RUNOFF FROM THE URBAN DEVELOPMENT. BUT THE POPULATION OF LOS ANGELES HAS INCREASED 5 MILLION SINCE 1940, AND THE CURRENT FLOOD CONTROL CHANNEL SIMPLY CAN'T PASS ALL THE ADDITIONAL RUNOFF.

FACED WITH THE FLOODING PROBLEM I'VE JUST DESCRIBED, WE DEVELOPED TWO MAJOR PLANNING GOALS TO GUIDE US IN FORMULATING ALTERNATIVE SOLUTIONS. FIRST, TO REDUCE THE POTENTIAL LOSS OF HUMAN LIFE AND SUFFERING; AND SECOND, TO REDUCE THE DAMAGES TO BUILDINGS AND STRUCTURES.

WE HAD SEVERAL PLANNING CONSIDERATIONS IN TRYING TO INCREASE FLOOD PROTECTION. FIRST, WHILE THE FLOODING PROBLEM WAS SERIOUS, WE MUST RESPECT ENVIRONMENTAL AND CULTURAL RESOURCES.

SECOND, WE MUST BE SENSITIVE TO PUBLIC CONCERNS ABOUT ALTERNATIVES THAT WILL REQUIRE PURCHASING LAND. DENSE RESIDENTIAL AND COMMERCIAL DEVELOPMENT BORDERS THE RIGHTS OF WAY OF ALL EXISTING CHANNELS. A CHANNEL-WIDENING PLAN, FOR EXAMPLE, WOULD FORCE MANY PEOPLE TO MOVE. FORCING MANY PEOPLE TO MOVE WOULD DISRUPT THE VERY COMMUNITIES AND BUSINESSES WE INTEND THE FLOOD CONTROL PROJECT TO PROTECT.

WE SHOULD NOT CONSIDER ANY PLAN THAT WOULD CAUSE THIS DISRUPTION IF OTHER COST-EFFECTIVE FLOOD PROTECTION METHODS ARE AVAILABLE; AND, OF COURSE, THEY ARE.

THIRD, WE TRIED TO AVOID ANY SOLUTION THAT WOULD DECREASE ANY EXISTING GROUNDWATER RECHARGE OPERATIONS. FOR EXAMPLE, ONE STRETCH OF THE SAN GABRIEL

RIVER HAS A SOFT BOTTOM WHERE RECHARGE FREQUENTLY OCCURS; MAKING THE BOTTOM CONCRETE WOULD DECREASE THIS ACTIVITY.

GIVEN OUR GOALS AND CONSIDERATIONS, I WANT TO SUMMARIZE THE TYPES OF SOLUTIONS WE CONSIDERED IN OUR FORMULATION PROCESS. BASICALLY, WE COULD REDUCE FLOOD FLOWS BY EITHER HOLDING WATER BACK, BY MOVING MORE WATER, OR BY MANAGING THE DAMAGE.

HOLDING THE WATER BACK LET US CONSIDER POTENTIAL SOLUTIONS INDIVIDUALLY AND IN COMBINATION SUCH AS BUILDING NEW DAMS ABOVE SEPULVEDA AND HANSEN; RAISING THE HEIGHTS OF HANSEN AND SEPULVEDA AND WHITTIER NARROWS DAMS, OR MODIFYING THEIR OUTLET WORKS; USING THE GRAVEL PITS BELOW SANTA FE DAM, OR BUILDING DETENTION BASINS ALONG TUJUNGA WASH AND THE UPPER LOS ANGELES RIVER.

MOVING MORE WATER WOULD ENCOMPASS SUCH MEASURES AS BUILDING NEW FLOOD CONTROL CHANNELS, BUILDING FLOOD DIVERSION TUNNELS OR IMPROVING EXISTING CHANNELS TO INCREASE THEIR CAPACITY, AND THAT'S THE SOLUTION WE'RE FOCUSING ON.

THE LAST SOLUTION WE CONSIDERED, IT DID INCLUDE SUCH MEASURES AS MOVING STRUCTURES OUT OF THE FLOODPLAIN OR FLOOD-PROOFING STRUCTURES, RELYING ON FLOOD FIGHTING, BUT THESE KINDS OF MEASURES JUST AREN'T EFFECTIVE IN LOS ANGELES WITH THE VERY DENSE POPULATION, HIGH REAL ESTATE VALUES, AND PEOPLE LIVING RIGHT NEXT TO

THE CHANNELS.

OUR TECHNICAL, ECONOMIC, AND SOCIAL EVALUATION PRODUCED THREE IMPORTANT CONCLUSIONS THAT HAS HELPED NARROW THE SOLUTION. FIRST, NEW OR MODIFIED DAMS AND DETENTION BASINS AND NEW CHANNELS AND TUNNELS AREN'T ECONOMICALLY OR SOCIALLY POSSIBLE. THEY ALL REQUIRE NEW LAND; AND IN LOS ANGELES COUNTY, THE COST IS JUST TOO HIGH.

SECOND, WE MAKE THE SOUNDEST INVESTMENT BY WORKING WITH EXISTING FLOOD CONTROL CHANNELS. IT AVOIDS BOTH PROHIBITIVE LAND COSTS AND UNACCEPTABLE RELOCATIONS.

THIRD, WE CANNOT JUSTIFY STRUCTURAL IMPROVEMENTS TO THE PORTION OF THE LOS ANGELES RIVER SYSTEM ABOVE THE RIO HONDO AND ON THE SAN GABRIEL RIVER. FLOODING FROM VERY LARGE STORMS WOULD STILL OCCUR IN UPPER LOS ANGELES RIVER, ON THE TUJUNGA WASH, AND THROUGH PARTS OF DOWNTOWN LOS ANGELES. THE DAMAGES WILL NOT BE ENOUGH, HOWEVER, TO OFFSET THE HIGH COSTS OF ANY TECHNICALLY SOUND ALTERNATIVE. OVERFLOW DEPTHS IN GENERAL WILL BE LOW TO MODERATE AND WILL NOT LAST VERY LONG.

THE MAJOR FLOOD THREAT ON THE SAN GABRIEL RIVER IS FROM POTENTIAL LEVEE FAILURES ON THE RIO HONDO, AND WE WILL REMOVE THAT THREAT.

OUR RECOMMENDED PLAN, THEN, IS TO IMPROVE

THE RIO HONDO FROM WHITTIER NARROWS DAM TO THE LOS ANGELES RIVER, AND THE LOS ANGELES RIVER FROM THE RIO HONDO TO THE OCEAN.

THE MAIN PROJECT FEATURE IS TO RAISE THE CHANNEL HEIGHT. WE WOULD ERECT ONE-FOOT-THICK PARAPET WALLS ON TOP OF THE CURRENT LEVEES. THE HEIGHT OF THE WALL VARIES FROM SECTION TO SECTION DUE TO CHANGING WATER SURFACES. THE MINIMUM HEIGHT IS TWO FEET, THE MAXIMUM IS EIGHT FEET, AND MOST SECTIONS ARE TWO TO FOUR FEET HIGH.

OVER ON YOUR RIGHT ARE A COUPLE OF POSTER BOARDS THAT SHOW SCHEMATICALLY WHERE THE PARAPET WALLS ARE TWO, FOUR, SIX, EIGHT, DIFFERENT HEIGHTS.

A SECOND PROJECT FEATURE IS ALONG ABOUT 1.3 MILES OF THE LOS ANGELES RIVER JUST DOWNSTREAM FROM ITS CONFLUENCE WITH THE RIO HONDO. WE WOULD CONVERT THE CURRENT TRAPEZOIDAL CHANNELS TO RECTANGULAR. WE WOULD ALSO WIDEN THIS CHANNEL BY 30 FEET, AND ERECT PARAPET WALLS UP TO SEVEN FEET HIGH ON TOP OF THE WALLS. THIS PROJECT FEATURE LOWERS THE WATER SURFACE ELEVATION ENOUGH TO AVOID RAISING THE UNION PACIFIC BRIDGE OVER THE RIO HONDO IN VIOLATION OF RAILWAY GRADE REQUIREMENTS.

A THIRD PROJECT FEATURE IS TO ARMOR THE LANDWARD SIDE OF ABOUT 2.2 MILES OF LEVEES IN FOUR PLACES TO PREVENT EROSION AND LEVEE FAILURE FROM EXTREMELY MASSIVE FLOODS GREATER THAN EVEN THESE DESIGNED FLOODS.

THIS WOULD BE A GROUTED STONE BLANKET.

AND THE FOURTH FEATURE IS TO LAY A CONCRETE COVER ON THE TOP OF THE CURRENT GROUTED STONE CHANNEL WALLS OF THE LOS ANGELES RIVER NEAR ITS CONFLUENCE WITH THE RIO HONDO.

THE RECOMMENDED PLAN REQUIRES RAISING 27 BRIDGES THAT CROSS THE TWO RIVERS. THIS WOULD ACCOMMODATE THE PARAPET WALLS AND REMOVE BRIDGE OBSTRUCTIONS FROM THE FLOW.

THE PROJECT FOR FLOOD CONTROL INVOLVING FEDERAL FUNDS MUST, IN VIRTUALLY EVERY CASE, BE THE ALTERNATIVE THAT PRODUCES THE LARGEST NET ECONOMIC BENEFITS; IN OTHER WORDS, THE NET ECONOMIC BENEFITS THAT EXCEED THE COSTS BY THE GREATEST AMOUNT. THAT'S CALLED THE N.E.D. PLAN, AND THAT'S WHAT I JUST DESCRIBED TO YOU. ITS BENEFIT-COST RATIO IS 1.3 TO 1, OR THERE'S ABOUT $1.30 OF ESTIMATED BENEFITS, FLOOD-PROTECTION BENEFITS, FOR EVERY DOLLAR SPENT IN CONSTRUCTION.

TODAY THE LEVEL OF PROTECTION IN THE LOWER LOS ANGELES COUNTY BASIN IS ABOUT 25 YEARS. THE N.E.D. PLAN INCREASES THE LEVEL OF PROTECTION TO 133 YEARS ALONG THE RIO HONDO RIVER AND 100 YEARS ALONG THE LOS ANGELES RIVER FROM THE RIO HONDO TO THE OCEAN. IT ALSO INCREASES THE LEVEL OF PROTECTION ALONG THE SAN GABRIEL RIVER FROM WHITTIER NARROWS TO THE OCEAN.

BUILDING THE RECOMMENDED PLAN WOULD SHRINK THE 100-YEAR FLOODPLAIN IN THE LOWER LOS ANGELES BASIN BY 91 PERCENT AND REDUCE THE FLOOD DAMAGES IN THIS AREA BY 92 PERCENT. AGAIN, THE 100-YEAR FLOOD AREA IS SHOWN IN YELLOW. YOU GET A LITTLE OF IT DOWN BY COMPTON CREEK, BUT MOST OF IT'S GONE. THE 500-YEAR IS PRETTY MUCH UNCHANGED.

I'D LIKE TO TURN NOW TO THE PROBABLE IMPACTS FROM IMPROVING THE CHANNELS. THE MOST POSITIVE IMPACT IS IT WILL SUBSTANTIALLY REDUCE THE FLOOD THREAT TO OVER 500,000 PEOPLE IN THE LOWER BASIN. AN ADDITIONAL BENEFIT ASSOCIATED WITH BRIDGE RECONSTRUCTION IS THAT THE BRIDGE RECONSTRUCTION WILL BRING ALL THOSE BRIDGES INTO COMPLIANCE WITH CURRENT EARTHQUAKE STANDARDS. AS THEY'RE REBUILT, THEY WILL BE REBUILT TO THE CURRENT EARTHQUAKE CODES.

THE PLAN IMPLEMENTATION ALSO HAS NEGATIVE IMPACTS, SOME LONG TERM; MOSTLY SHORT TERM, DURING CONSTRUCTION. THE MAIN LONG-TERM IMPACT IS AESTHETIC. THE PARAPET WALLS WOULD RESTRICT THE VIEW OF TRAIL USERS, ESPECIALLY IN THE AREA WHERE IT'S AS HIGH AS EIGHT FEET, AND PROBABLY CREATE A CLOSED-IN FEELING. THE WALLS MIGHT ALSO ATTRACT GRAFFITI.

TOGETHER WITH THE COUNTY, WE'RE LOOKING AT POTENTIAL MEASURES TO LESSEN THESE IMPACTS. OUR

REGULATIONS ALLOW US TO SPEND ONE PERCENT OF THE TOTAL LOCAL AND FEDERAL PROJECT COSTS FOR AESTHETIC KINDS OF MEASURES. AND SO WE'LL BE WORKING WITH THE COUNTY TO DETERMINE, AND WE'LL LISTEN TO YOUR COMMENTS TO DETERMINE WHAT WILL BE THE MOST EFFECTIVE WAYS OF USING THAT ONE PERCENT.

THE PLAN AVOIDS LONG-TERM IMPACTS TO BIOLOGICAL RESOURCES BY CONFINING IMPROVEMENTS TO THE CHANNEL.

THE MAJOR SHORT-TERM IMPACTS DEAL WITH AIR QUALITY, NOISE, TRANSPORTATION, AND RECREATION ASSOCIATED WITH THE CONSTRUCTION. CONSTRUCTION CAUSES DUST, AND CONSTRUCTION EQUIPMENT ENGINES EMIT POLLUTANTS. WE WILL REQUIRE THE CONTRACTOR TO OBTAIN LOCAL AND STATE PERMITS TO COMPLY WITH AIR QUALITY REGULATIONS. HE WILL WATER VERY FREQUENTLY. HE'LL BE REQUIRED TO MAINTAIN HIS EQUIPMENT, OF COURSE, AND WE'LL DO EVERYTHING WE CAN TO MITIGATE THOSE IMPACTS, KEEP THEM AS SMALL AS POSSIBLE.

HEAVY CONSTRUCTION EQUIPMENT IS ALSO LOUD. THE NOISE WOULD BE MOST INTRUSION TO SCHOOLS AND BUSINESSES AND HOMES NEAR THE CHANNEL. THE CHANNEL WORK WILL TAKE PLACE IN ANY ONE LOCATION ONLY OVER RELATIVELY SHORT PERIODS OF TIME, ALTHOUGH CHANGES TO A SINGLE BRIDGE WOULD TAKE LONGER.

THE CONSTRUCTION STAGING AREAS WILL BE

LOCATED AS BEST WE CAN TO MINIMIZE THE NOISE AND DUST EFFECT TO THE NEIGHBORHOOD. WE WOULD NORMALLY LIMIT CONSTRUCTION TO 7:00 A.M. TO 7:00 P.M. TO LEAVE THE NIGHTTIME MORE CALM.

TRAFFIC ON LOCAL STREETS WOULD INCREASE BECAUSE OF CONSTRUCTION VEHICLES AND BRIDGE WORK. WE WOULD TRY TO LIMIT THE IMPACTS BY MOVING THE EQUIPMENT, AS MUCH OF THE EQUIPMENT WORK AS WE COULD, TO OFF-PEAK HOURS.

CONSTRUCTION ON 27 BRIDGES WOULD BE MORE DISRUPTIVE. WE WOULD TRY TO MINIMIZE THE INCONVENIENCE TO PEOPLE USING THE BRIDGES BY INSTALLING DETOUR BRIDGES, USING THE RIVER CHANNEL AS MUCH AS WE CAN, AVOIDING THE RECONSTRUCTION OF TWO ADJACENT BRIDGES AT THE SAME TIME, INSTALLING TRAFFIC CONTROL MEASURES, AND DOING OUR BEST TO CONDUCT THE PUBLIC MEETINGS AND KEEP THE PEOPLE INFORMED ABOUT THE BEST WAY TO GET FROM ONE POINT TO ANOTHER DURING THIS PERIOD OF CONSTRUCTION.

NOW, I KNOW THAT MANY PEOPLE WANT MORE RECREATION OPPORTUNITIES, AND OUR RECOMMENDED PLAN RETAINS CYCLING, HIKING, AND EQUESTRIAN TRAIL SYSTEM ALONG THE LOS ANGELES RIVER AND THE RIO HONDO. CONSTRUCTION ACTIVITY WILL INTERRUPT IT BRIEFLY.

WE ARE NOT NOW PROPOSING ANY NEW RECREATION FEATURES. HOWEVER, WE CAN CONSIDER RECREATION FEATURES

AS THE PROJECT DEVELOPS IF THERE IS A LOCAL SPONSOR WILLING TO ENTER INTO A 50/50 COST SHARING.

PUBLIC SAFETY WOULD REQUIRE US TO CLOSE THE RECREATION TRAILS ALONG THE RIVER DURING CONSTRUCTION. WHEN WORKING ON THE BIKE PATH ITSELF, WE WOULD TEMPORARILY REROUTE BICYCLISTS AROUND THE CONSTRUCTION SITE ONTO THE SURFACE STREETS. FOR THE EQUESTRIANS, THE DISRUPTION IS TEMPORARY ONLY AT BRIDGE CONSTRUCTION SITES. AS I MENTIONED EARLIER, HOWEVER, WE WOULD REOPEN ALL TRAILS FOLLOWING CONSTRUCTION.

TO SUMMARIZE, THE RECOMMENDED PLAN WILL REDUCE A MASSIVE FLOOD PROBLEM FOR OVER HALF A MILLION PEOPLE. THE IMPROVEMENTS WILL HAVE A STRONG ENGINEERING BASE. THE ECONOMIC BENEFITS GREATLY EXCEED THE COST, AND THE PLAN PROTECTS THE ENVIRONMENT.

THE ESTIMATED PROJECT COST IN OCTOBER 1990 DOLLARS IS ABOUT $340 MILLION. THE FEDERAL GOVERNMENT AND THE COUNTY OF LOS ANGELES WOULD SHARE THIS COST EQUALLY.

THE SPECIFIC PROJECT DESIGN AND CONSTRUCTION SCHEDULE DEPENDS ON HIGHER LEVEL APPROVAL FROM BOTH THE ADMINISTRATIVE SIDE OF THE HOUSE, MY HIGHER HEADQUARTERS, UP TO THE ASSISTANT SECRETARY OF THE ARMY FOR CIVIL WORKS, AND IN CONGRESS. THE PROJECT HAS BEEN AUTHORIZED SUBJECT TO A FAVORABLE REPORT THAT WE'RE PREPARING NOW,

BUT IT WOULD STILL REQUIRE AN APPROPRIATIONS ACT TO FUND IT.

OUR CURRENT SCHEDULE REQUIRES A THREE-YEAR PRECONSTRUCTION ENGINEERING AND DESIGN PHASE, THREE YEARS TO FINISH THE DESIGN; AND AN EIGHT-YEAR CONSTRUCTION PERIOD, IF EVERYTHING FLOWS SMOOTHLY, BETWEEN 1995 AND THE YEAR 2002.

THE LEADERS AND STAFF OF THE LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS AND THE CORPS HAVE COMMITTED THEMSELVES TO CARRY OUT THIS RECOMMENDED PLAN.

THAT CONCLUDES MY FORMAL REMARKS. I WANT TO MAKE IT POSSIBLE FOR YOU TO GIVE ME YOUR COMMENTS. THAT WILL REQUIRE A LITTLE SHUFFLING AROUND, AND SO I'M JUST GOING TO MOVE THIS MICROPHONE OUT, AND I'LL TAKE A SEAT. AND WHEN YOU COME TO THE MICROPHONE, I'D APPRECIATE IT IF YOU'D IDENTIFY YOURSELF, THE AGENCY YOU REPRESENT IF YOU'RE REPRESENTING AN AGENCY, AND JUST GIVE ME YOUR COMMENTS.

I'D LIKE TO START BY INVITING MAYOR GARDNER OF THE CITY OF THE PICO RIVERA AND THE LACDA ALLIANCE TO SPEAK TO US.

MAYOR GARDNER.

MAYOR GARDNER: THANK YOU, COLONEL. WE APPRECIATE THE OPPORTUNITY TO BE HERE AND BE HEARD, AND INCIDENTALLY, I DID APPRECIATE YOUR PRESENTATION.

I AM MAYOR GARTH GARDNER OF THE CITY OF PICO RIVERA REPRESENTING MY COMMUNITY AND THE LOS ANGELES COUNTY DRAINAGE AREA ALLIANCE. ON BEHALF OF PICO RIVERA AND THE ALLIANCE, I APPRECIATE THE OPPORTUNITY TO PARTICIPATE IN THIS HEARING ON THE DRAFT FEASIBILITY REPORT AND DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE LOS ANGELES COUNTY DRAINAGE AREA PROJECT AND SPEAK IN FAVOR OF THE PROJECT.

THE ALLIANCE WAS ORGANIZED IN JUNE 1991 BY SEVERAL CITIES IN THE FLOODPLAIN OVER SERIOUS CONCERN REGARDING THE REVISION OF THE FLOOD INSURANCE RATE MAPS FOLLOWING THE RESULTS OF THE 1987 HYDROLOGIC ANALYSIS CONDUCTED BY THE ARMY CORPS OF ENGINEERS AND THE POTENTIAL ADVERSE ECONOMIC IMPACT OF IMPLEMENTATION OF THE NATIONAL FLOOD INSURANCE PROGRAM.

THE ALLIANCE WHICH I AM REPRESENTING CONSISTS OF FIVE CITIES IN SOUTHEAST LOS ANGELES COUNTY; BELLFLOWER, DOWNEY, LAKEWOOD, PARAMOUNT, AND MY CITY, PICO RIVERA. THERE ARE ELEVEN COMMUNITIES IN THE FLOODPLAIN AREA.

THE ALLIANCE IS WORKING WITH THE SIX COMMUNITIES NOT REPRESENTED BY THE ALLIANCE TO ENCOURAGE THEIR PARTICIPATION. THE CHAMBERS OF COMMERCE REPRESENTING THE BUSINESS COMMUNITIES IN THE SIX CITIES SUPPORT THE OBJECTIVES OF THE ALLIANCE AND ARE

COOPERATING WITH THE ALLIANCE IN PURSUIT OF THOSE OBJECTIVES.

THE LEGISLATIVE STRATEGY DEVELOPED BY THE ALLIANCE ADDRESSES THE IMPLEMENTATION OF TWO IMPORTANT OBJECTIVES: ONE, MINIMIZE THE ADVERSE ECONOMIC IMPACT OF THE NATIONAL FLOOD INSURANCE PROGRAM ON ALLIANCE COMMUNITIES; AND, TWO, SUPPORT THE LACDA FLOOD CONTROL PROJECT, INCLUDING SUPPORTING FULL-CAPABILITY APPROPRIATIONS FOR THE LACDA PROJECT AND IDENTIFYING OPPORTUNITIES FOR EXPEDITING THE PROJECT ITSELF.

ONCE THE REVISED FIRM IS ADOPTED, CURRENTLY SCHEDULED FOR SEPTEMBER 1992, VAST AREAS WILL BE REQUIRED FOR THE FIRST TIME TO PARTICIPATE IN THE NATIONAL FLOOD INSURANCE PROGRAM. PROPERTY OWNERS MUST PAY FLOOD INSURANCE PREMIUMS, AND LOCAL GOVERNMENTS MUST ADOPT RESTRICTIVE FLOOD ZONE CONSTRUCTION ORDINANCES.

UNDER THE FLOOD MAPS CURRENTLY BEING REVISED BY FEMA, 30 TO 90 PERCENT OF THE LAND AREA OF THE ALLIANCE CITIES WILL BE CONSIDERED FLOOD PRONE, SUBJECTING THOSE COMMUNITIES TO ONEROUS FLOODPLAIN BUILDING REQUIREMENTS UNTIL THE FLOOD CONTROL IMPROVEMENTS REACH 50 PERCENT COMPLETION. THIS WOULD APPEAR TO OCCUR IN APPROXIMATELY 1998. I THINK YOUR MAPS SHOW A LITTLE LATER THAN THAT.

THE IMPOSITION OF THE MANDATORY FLOODPLAIN

MANAGEMENT REGULATIONS IS EXPECTED TO HAVE A CHILLING IMPACT ON NEW DEVELOPMENT: AT BEST, POSTPONING IMPROVEMENTS FOR SEVERAL YEARS; AT WORST, THE REGULATIONS WOULD ADD SUFFICIENT SIGNIFICANT COSTS TO PROJECTS, MAKING THEM ECONOMICALLY UNFEASIBLE, POSSIBLY RESULTING IN THE PERMANENT LOSS OF THOSE DEVELOPMENT OPPORTUNITIES. BILLIONS OF DOLLARS WORTH OF COMMUNITY IMPROVEMENTS ARE AT RISK.

THERE ARE CURRENTLY OVER $758 MILLION OF NEW RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL DEVELOPMENT IN PRE-DEVELOPMENT PLANNING IN THE SIX COMMUNITIES COMPRISING THE ALLIANCE. THESE ARE THREATENED BY PROPOSED MANDATORY FLOODPLAIN MANAGEMENT REGULATIONS.

MANY OF THESE DEVELOPMENTS ARE REDEVELOPMENT PROJECTS CRITICAL TO THE EFFORTS OF ALLIANCE CITIES TO REVITALIZE THEIR COMMUNITIES AND STRENGTHEN AND BALANCE THEIR TAX BASES. AS FULLY DEVELOPED COMMUNITIES, REDEVELOPMENT REPRESENTS ONE OF THE FEW KEY OPPORTUNITIES TO IMPROVE THE TAX BASE.

ADDITIONALLY, THE BUILDING REGULATIONS WOULD THREATEN THE HUNDREDS OF HOMES THAT ARE REMODELED EVERY YEAR, RESULTING IN MILLIONS OF DOLLARS BEING LOST OTHERWISE IN HOME IMPROVEMENTS. GIVEN THE COST OF HOUSING IN TODAY'S MARKET, REMODELING IS ONE OF THE ONLY WAYS FAMILIES CAN MEET THEIR HOUSING NEEDS AT AN

AFFORDABLE COST. FURTHERMORE, HOUSING REHABILITATION IS AN IMPORTANT ELEMENT OF ANY COMMUNITY'S NEIGHBORHOOD PRESERVATION EFFORT.

IN MY COMMUNITY OF PICO RIVERA, UNDER THE REVISED FEMA FLOODPLAIN, THIS MAP SHOWS THAT 80 PERCENT OF THE CITY WOULD HAVE A THREE-FOOT MINIMUM FLOODING CONDITION IN THE EVENT OF A MAJOR FLOOD, CONSEQUENTLY PRECLUDING ALL MAJOR PROJECTS CURRENTLY IN THE PIPELINE.

RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL REDEVELOPMENT PROJECTS WITH AN ESTIMATED DEVELOPMENT VALUE OF NEARLY APPROXIMATELY $240 MILLION WOULD BE AT RISK. ADDITIONALLY, FIVE INFILL DEVELOPMENTS WITH A COMBINED PROJECTED DEVELOPMENT VALUE OF $25 MILLION GENERATING $6 MILLION IN REVENUE TO THE CITY IS THREATENED.

GIVEN THE POTENTIAL DEVASTATING IMPACT OF THESE REGULATIONS, THE ALLIANCE HAS COMMISSIONED AN ECONOMIC IMPACT STUDY BY THE PLANNING INSTITUTE AT THE UNIVERSITY OF SOUTHERN CALIFORNIA. PRELIMINARY STUDY RESULTS ARE EXPECTED IN LATE OCTOBER. THE ALLIANCE WILL USE THE STUDY TO SUPPORT ITS CASE WITH CONGRESS THAT SOME RELIEF FROM FEMA REQUIREMENTS IS WARRANTED AND THAT THE PROJECT MUST BE FULLY FUNDED AND EXPEDITED.

WHILE THE ALLIANCE IS EXPLORING LEGISLATIVE REMEDIES FOR ELIMINATING OR MINIMIZING THE ADVERSE

ECONOMIC IMPACT OF MANDATORY FLOODPLAIN MANAGEMENT REGULATIONS, THE ONE THING THAT IS CERTAIN IS THE NEED TO COMPLETE THE PROJECT AS EXPEDITIOUSLY AS POSSIBLE.

ONCE THE FLOOD PLAIN AND THE FLOOD CONTROL IMPROVEMENTS ARE 50 PERCENT COMPLETE, THE FLOODPLAIN MAPS WILL BE REVISED AGAIN, RELEASING MOST AREAS FROM REQUIREMENTS OF THE FLOOD CONTROL INSURANCE AND FLOODPLAIN CONSTRUCTION STANDARDS.

HOWEVER, ALTHOUGH THERE IS STRONG FEDERAL AND LOCAL SUPPORT FOR THE PLANNED FLOOD CONTROL IMPROVEMENTS, AND ALTHOUGH THE CORPS HAS PLACED THE PROJECT ON A "FAST TRACK," IT WILL BE SEVERAL YEARS BEFORE THE 50 PERCENT THRESHOLD IS REACHED AND THE RELIEF IS FORTHCOMING.

IT APPEARS THAT IN THE LONG TERM THE PROPOSED PROJECT ALTERNATIVE IS THE MOST COST-EFFECTIVE SOLUTION TO THE POTENTIAL FLOODING. PRIOR TO THE EXPIRATION OF THE COMMENT PERIOD, THE ALLIANCE WILL FORWARD ADDITIONAL SPECIFIC COMMENTS ITS CITIES MAY HAVE ON THE PROPOSED ALTERNATIVE.

THE ALLIANCE SUPPORTS THE PROJECT AND IS PREPARED TO WORK WITH ALL RESPONSIBLE PARTIES TO ENSURE ITS IMPLEMENTATION. THE ALLIANCE HAS COMMITTED ITSELF TO SUPPORT THE TIMELY FUNDING OF THE PROJECT. ADDITIONALLY, THE ALLIANCE PROPOSES TO WORK WITH THE CORPS AND THE

FLOOD CONTROL DISTRICT TO IDENTIFY OPPORTUNITIES FOR EXPEDITING THE PROJECT.

SHOULD THE PROPOSED PLAN BE IMPLEMENTED, THE ALLIANCE PROPOSES TO WORK WITH THE CORPS AND THE FLOOD CONTROL DISTRICT DURING PRECONSTRUCTION, ENGINEERING, AND DESIGN TO IDENTIFY NEEDED TRAFFIC CAPACITY ENHANCEMENTS FOR THOSE BRIDGES THAT WILL REQUIRE RECONSTRUCTION.

FINALLY, THE ALLIANCE PROPOSES TO WORK WITH THE CORPS AND THE DISTRICT TO IMPROVE THE AESTHETICS OF PARAPETS AND OTHER CONSTRUCTION ELEMENTS OF THE PROJECT.

I THANK YOU FOR THE OPPORTUNITY TO COMMENT ON THE PROJECT ON BEHALF OF THE CITY OF PICO RIVERA AND THE ALLIANCE. THE ALLIANCE LOOKS FORWARD TO WORKING WITH THE ARMY CORPS OF ENGINEERS AND THE FLOOD CONTROL DISTRICT IN SECURING FUNDING COMMITMENTS FOR THIS PROJECT, EXPEDITING ITS CONSTRUCTION, AND WORKING ON TRAFFIC-CAPACITY ENHANCEMENTS AND AESTHETIC IMPROVEMENTS.

WITH THAT, GENTLEMEN, WE WISH YOU GODSPEED BECAUSE THERE IS SUCH A FANTASTIC IMPACT ON THE ELEVEN CITIES THAT YOU'VE IDENTIFIED. WE COMPLEMENT YOU FOR WHAT YOU'VE DONE, AND SURE AS HELL WISH THAT THIS GETS DONE QUICKER THAN YOU'VE ANTICIPATED.

THANK YOU FOR THE OPPORTUNITY TO BE HEARD.

COL. THOMAS: THANK YOU, MAYOR GARDNER.

LET ME SAY THAT SINCE THE FIRST TIME I GOT

HERE AS DISTRICT ENGINEER -- I GREW UP IN VAN NUYS, BUT I CAME BACK A LITTLE BIT MORE THAN TWO YEARS AGO -- ONE OF THE FIRST THINGS I FOUND WAS THE CITY OF PICO RIVERA AND MANY OTHER CITIES STRONGLY IN SUPPORT OF THIS PROJECT.

IT'S CALLED A FEDERAL PROJECT, BUT THAT'S AN ANACHRONISM. THE FORMER ASSISTANT SECRETARY OF THE ARMY FOR CIVIL WORKS, MR. PAGE, USED TO SAY, "EVERY PROJECT NEEDS A SPONSOR, BUT IT CAN'T BE THE CORPS OUT THERE MUDDLING EVERYTHING UP." AND IT'S REALLY YOUR PROJECT.

WE'RE HERE TO DESIGN, MONITOR INSTRUCTION, PROVIDE FEDERAL FUNDS, BUT IT'S YOUR STRONG SUPPORT THAT EITHER MAKES IT OR BREAKS IT, AND I CAN ONLY SAY THAT I FELT VERY STRONG SUPPORT. I DON'T THINK ANYONE IN THE ADMINISTRATION DOUBTS THE LOCAL SUPPORT FOR THE PROJECT. SO THANK YOU FOR THAT. IT'S A STRONG ALLIANCE.

MAYOR GARDNER: COLONEL, LET ME ADD TO THAT WITHOUT THE MICROPHONE. I WORKED WITH CARL BLUM MANY YEARS AGO; I'M A RETIREE FROM THE FLOOD CONTROL DISTRICT, AND I ORIGINALLY STARTED DOWN WHEN THE CORPS OF ENGINEERS WAS LOCATED AT EIGHTH AND FIGUEROA, THAT GOES BACK -- I'M NOT GOING TO MENTION HOW LONG.

NEVERTHELESS, I WAS THE SENIOR RIGHT-OF-WAY AGENT THAT WAS OUT ACQUIRING THE LAND, AND I AT THAT TIME REPRESENTED TO EACH ADJACENT PROPERTY OWNER THAT THE FLOOD CONTROL PROJECT ENHANCEMENT CONSTRUCTED BY THE

CORPS OF ENGINEERS WOULD PROVIDE 100-YEAR FLOOD PROTECTION. I HATE TO SAY THAT IT'S GOING TO BE AFTER THIS NEXT PROJECT THAT MY WORDS WOULD THEN BE MADE TRUE.

RIGHT NOW, AS YOU POINTED OUT, SOME OF THESE AREAS ONLY HAVE A 25-YEAR PROJECTION, UNFORTUNATELY. SO LET'S DO THIS AS QUICK AS POSSIBLE SO BOTH OF US CAN FACE OUR PEERS, OR SHOULD WE SAY CONSTITUENTS, AND GET THAT PROTECTION IN.

COL. THOMAS: THANK YOU.

I'D NOW LIKE TO CALL ON MR. JOHN ELDRIDGE OF FEMA, REGION 9, WHO WOULD LIKE TO TALK TO YOU A LITTLE BIT ABOUT THE FEMA PROGRAM TO HELP YOU UNDERSTAND THAT, WHAT THE LAW REQUIRES THEM TO DO.

MR. ELDRIDGE: THANK YOU.

MY NAME IS JACK ELDRIDGE. I REPRESENT THE NATIONAL FLOOD INSURANCE PROGRAM, WHICH IS A PART OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

THE CORPS HAS IDENTIFIED A PREVIOUSLY UNRECOGNIZED FLOOD THREAT ALONG THIS AREA, AND THE FUNCTION OF THE NATIONAL FLOOD INSURANCE PROGRAM IS TO COME IN AFTER THEIR INITIAL RECOGNITION AND DO A DETAILED REMAPPING OF THE FLOOD THREAT POTENTIAL IN THAT AREA FOR THE PURPOSES OF IMPLEMENTING THE FLOODPLAIN MANAGEMENT REGULATIONS AND THE FLOOD INSURANCE REQUIREMENTS THAT WILL BE IN EFFECT FOR THE DURATION OF THE THREAT UNTIL

THE PROJECT IS COMPLETED AND THE AREA HAS ITS FLOOD PROTECTION RESTORED.

THIS MAPPING AND REMAPPING OF THE NATION'S FLOODPLAINS IS A NORMAL AND ROUTINE COURSE OF BUSINESS FOR THE FLOOD INSURANCE. IN THE AVERAGE YEAR, WE REMAP OR REVISE PORTIONS OF N.F.I.P. MAPS IN ABOUT 3,000 COMMUNITIES NATIONWIDE. MAPPING IS ESSENTIAL TO ESTABLISH THE LOCATIONS OF HIGH- AND LOW-RISK FLOOD ZONES. REMAPPING IS REQUIRED TO ACCOUNT FOR ANY MANMADE OR NATURAL CHANGES THAT HAVE OCCURRED SINCE THE ORIGINAL MAPS WERE PREPARED.

THE MAPS THAT WE ARE IN THE PROCESS OF PRODUCING WILL SHOW SIGNIFICANTLY INCREASED FLOOD HAZARD AREAS IN THE CITIES OF BELL, BELLFLOWER, BELL GARDENS, CARSON, COMPTON, DOWNEY, GARDENA, LAKEWOOD, LONG BEACH, LOS ANGELES, LYNWOOD, MONTEBELLO, PARAMOUNT, PICO RIVERA, SOUTH GATE, AND SOME UNINCORPORATED PORTIONS OF LOS ANGELES COUNTY. THAT'S 16, IF MY ARITHMETIC IS CORRECT.

THE MAPS AND STUDIES WILL REFLECT THE FACT THAT THE FLOOD CONTROL STRUCTURES ALONG THE 23-MILE REACH OF THE LOS ANGELES RIVER AND THE 8-MILE REACH OF THE RIO HONDO NO LONGER PROVIDE 100-YEAR LEVEL OF PROTECTION ALONG THAT AREA.

CONGRESS ESTABLISHED THE NATIONAL FLOOD

INSURANCE PROGRAM BACK IN 1968. THE N.F.I.P. IS A FEDERAL PROGRAM ALLOWING HOMEOWNERS TO PURCHASE ACTUARIALLY SOUND FLOOD INSURANCE WHICH IS GENERALLY NOT AVAILABLE TO PRIVATE SECTOR COMPANIES, AND IS DESIGNATED TO REDUCE THE ESCALATING COSTS OF PROPERTY DAMAGE CAUSED BY FLOODS AND REDUCE MUCH OF THE BURDEN ON THE U.S. TREASURY WHEN COSTLY FEDERAL DISASTER ASSISTANCE IS NEEDED BY FLOOD VICTIMS. THE N.F.I.P. IS BASED ON A PARTNERSHIP AGREEMENT WITH THE LOCAL COMMUNITIES AND THE FEDERAL GOVERNMENT.

IF A COMMUNITY WILL IMPLEMENT PROGRAMS TO REDUCE FUTURE FLOOD RISKS, THE FEDERAL GOVERNMENT WILL MAKE FLOOD INSURANCE AVAILABLE WITHIN THE COMMUNITY AS FINANCIAL PROTECTION AGAINST FLOOD LOSSES THAT DO OCCUR. TODAY MORE THAN 18,000 COMMUNITIES PARTICIPATE IN THE NATIONAL FLOOD INSURANCE PROGRAM, WHICH IS A SELF-SUSTAINING, NONTAXPAYER-FUNDED FEDERAL PROGRAM.

IN SUPPORT OF THIS PROGRAM, FEMA HAS UNDERTAKEN A MASSIVE PROGRAM OF FLOOD-HAZARD IDENTIFICATION AND MAPPING TO PRODUCE FLOOD HAZARD BOUNDARY MAPS AND FLOOD INSURANCE RATE MAPS FOR USE BY NATIONAL FLOOD INSURANCE PROGRAM.

SEVERAL AREAS OF FLOOD HAZARDS ARE COMMONLY IDENTIFIED ON THESE MAPS. ONE OF THESE AREAS IS THE SPECIAL FLOOD HAZARD AREAS WHICH IS DEFINED AS AN AREA OF

LAND THAT WOULD BE INUNDATED BY A FLOOD HAVING A 1 PERCENT CHANCE OF OCCURRING IN ANY GIVEN YEAR. THAT IS ALSO REFERRED TO AS A BASE FLOOD OR THE 100-YEAR FLOOD.

DEVELOPMENT CAN TAKE PLACE WITHIN THESE SPECIAL FLOOD HAZARD AREAS PROVIDING IT COMPLIES WITH ALL THE FLOODPLAIN ORDINANCES WHICH MEET CERTAIN MINIMUM FEDERAL STANDARDS. FLOOD INSURANCE IS REQUIRED FOR INSURABLE STRUCTURES WITHIN THE SPECIAL FLOOD HAZARD AREA IN ORDER TO PROTECT FEDERAL FINANCIAL INVESTMENTS AND ASSISTANCE FOR ACQUISITION AND/OR CONSTRUCTION PURPOSES WITH THE COMMUNITIES PARTICIPATING IN THE NATIONAL FLOOD INSURANCE PROGRAM.

NATIONAL FLOOD INSURANCE PROGRAM MAPS ARE USED BY LOCAL OFFICIALS IN THE ISSUANCE OF PERMITS TO ASSURE THAT NEW CONSTRUCTION OR SUBSTANTIAL IMPROVEMENT OF EXISTING CONSTRUCTION IS PROPERLY SITED AND ELEVATED.

IT'S USED BY MORTGAGE LENDERS TO DETERMINE IF THE MANDATORY FLOOD INSURANCE PURCHASE REQUIREMENT APPLIES, BY INSURANCE COMPANIES AND AGENTS TO DETERMINE THE PROPER INSURANCE PREMIUM TO CHARGE, AND BY PRIVATE SECTOR LAND DEVELOPMENT COMPANIES AND INDIVIDUALS TO MAKE INFORMED DECISIONS ABOUT WHERE TO BUILD OR PURCHASE LAND AND BUILDINGS.

IN THE PAST, THE NATIONAL FLOOD INSURANCE HAS PRODUCED MAPS FOR THESE AREAS THAT HAVE SHOWN THE

FLOOD HAZARDS. BECAUSE AT THE TIME THOSE MAPS WERE PREPARED THE SYSTEM OF FLOOD PROTECTION THAT WAS IN PLACE WAS BELIEVED TO BE ADEQUATE, THOSE MAPS SHOWED THE AREAS ADJACENT TO THIS PROJECT AS BEING NOT AT RISK TO FLOOD HAZARDS.

MOST RECENT MAPS WERE PRODUCED IN THE LATE '70'S AND EARLY '80'S FOR THE MAJORITY OF THESE COMMUNITIES; AND AGAIN, WHEN THESE WERE DONE, BECAUSE OF THE ABSENCE OF INFORMATION INDICATING THE 100-YEAR FLOOD DISCHARGE HAD DRAMATICALLY INCREASED, LEVEES PREVIOUSLY ACCREDITED ON THE EARLIER MAPS CONTINUED TO BE ACCREDITED ON THE FLOOD INSURANCE RATE MAPS PRODUCED FOR MOST OF THESE COMMUNITIES.

AS A CONSEQUENCE OF THE CORPS' DETERMINATION IN 1987 THAT THE LACDA PROJECT NO LONGER PROVIDED 100-YEAR PROTECTION, FEMA INITIATED A FLOOD INSURANCE RESTUDY FOR THE IMPACTED AREA DURING FY87. THIS RESTUDY WAS CONDUCTED TO DETERMINE THE EXTENT OF THE INUNDATION TO THE 100-YEAR FLOOD ELEVATIONS AND INSURANCE RATE ZONES.

AT PRESENT, THE DETAILED FLOOD INSURANCE RESTUDY INITIATED DURING FY87 HAS BEEN COMPLETED BY THE STUDY CONTRACTOR AND REVIEWED BY OUR TECHNICAL EVALUATION CONTRACTOR. THOSE MAPS CURRENTLY ARE BEING RELEASED AND MAILED TO BOTH OUR REGIONAL OFFICE AND THE COMMUNITIES

THIS WEEK.

UPON RECEIPT OF THE MAPS, THE REGION WILL GIVE THE COMMUNITIES, AS IS CUSTOMARY, TWO TO THREE WEEKS TO REVIEW THOSE MAPS TO GENERATE ANY QUESTIONS OR COMMENTS THEY MAY HAVE. AND THEN AT THE END OF OCTOBER, WE WILL HOLD A PUBLIC OFFICIALS MEETING, A COMBINED PUBLIC OFFICIALS MEETING FOR REPRESENTATIVES FROM ALL THOSE COMMUNITIES TO DISCUSS IN WHATEVER DETAIL THEY WISH THE IMPACT OF THE MAPS AND THEIR LONG-TERM EFFECTS.

FOLLOWING THAT PUBLIC MEETING, BY REGULATION, THERE WILL BE TWO PUBLIC NOTICES PUBLISHED IN EACH OF THE LOCAL JURISDICTION'S NEWSPAPERS. UPON PUBLICATION OF THE SECOND NOTICE, THE STATUTORY 90-DAY APPEAL PROCESS WILL BEGIN THAT ALLOWS ANYONE WHO HAS SCIENTIFIC OR TECHNICAL BASIS TO APPEAL THE ACCURACY OF THE MAPS TO FURTHER ADJUST THEM OR FURTHER IMPROVE THEM; WE ENCOURAGE THEM TO SUBMIT APPEALS THROUGH THE COMMUNITY TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY. ALL APPEALS WILL BE COLLECTED AND REVIEWED.

IT'S UNKNOWN, DEPENDING ON THE NUMBER AND COMPLEXITY OF THE APPEALS, HOW LONG THAT REVIEW PERIOD WOULD TAKE. WHEN THE REVIEWS OF THE APPEALS ARE COMPLETED, A FINAL LETTER OF APPEAL RESOLUTION WOULD BE ISSUED TO EACH OF THE COMMUNITIES NOTING WHAT THE FINAL BASE FLOOD ELEVATIONS ARE TO BE ON THE FINAL MAPS.

SIX MONTHS FOLLOWING THE DATE OF THE APPEALS RESOLUTION LETTER, THE FINAL MAPS WILL BE PUBLISHED AND DISTRIBUTED TO ALL, INCLUDING LOCAL JURISDICTIONS, STATE AGENCIES, LENDERS, INSURANCE AGENTS, AND ALL OTHERS IN THE PUBLIC SECTOR THAT USE THEM.

THE NATIONAL FLOOD INSURANCE PROGRAM PLANS TO WORK WITH THE COMMUNITIES TO CONDUCT AN EXTENSIVE PUBLIC AWARENESS CAMPAIGN FOLLOWING THAT JOINT PUBLIC OFFICIALS MEETING AT THE END OF OCTOBER. THE LOCAL OFFICIALS WILL BE ENCOURAGED TO CALL UPON MEMBERS OF OUR STAFF WORKING WITH THE CORPS TO BE PRESENT WITH THEM AT LOCAL MEETINGS FOR OTHER PUBLIC OFFICIALS AND/OR THE GENERAL PUBLIC TO MAKE SURE THAT THE INFORMATION NECESSARY GETS ACROSS.

IT IS ANTICIPATED THAT THE MAPS, IF THE CURRENT PROCESS IS FOLLOWED, THE LIKELIHOOD IS THAT THE MAPS WOULD BECOME FINAL APPROXIMATELY DECEMBER OF 1992, GIVE OR TAKE A MONTH.

THE BASIC IMPACTS INCLUDE THE ESTABLISHMENT OF PROPOSED BASE FLOOD ELEVATIONS AND DELINEATION OF SPECIAL FLOOD HAZARD AREAS IN THE IMPACTED COMMUNITIES USING THE 100-YEAR FLOOD AS THE MINIMUM LEVEL OF FLOOD PROTECTION WHICH THESE COMMUNITIES SHOULD ACHIEVE FOR NEW CONSTRUCTION IN ORDER TO CONTINUE THEIR PARTICIPATION.

IN SUMMARY, WHEN THE MAPS BECOME EFFECTIVE,

THE KEY IMPACTS WILL BE THE FOLLOWING THREE: ONE, NEW CONSTRUCTION AND SUBSTANTIALLY IMPROVED EXISTING CONSTRUCTION MUST BE ELEVATED OR FLOOD-PROOFED TO THE BASE FLOOD ELEVATIONS SHOWN ON THE MAPS IN ACCORDANCE WITH THE PROVISIONS OF THE LOCAL FLOODPLAIN ORDINANCES;

TWO, FLOOD INSURANCE FOR NEW CONSTRUCTION AND SUBSTANTIALLY IMPROVED EXISTING CONSTRUCTION WILL BE ACTUARIALLY RATED USING THE ELEVATION OF THE LOWEST FLOOR RELATIVE TO THE ESTABLISHED BASE FLOOD ELEVATIONS;

THIRD, THE PURCHASE OF FLOOD INSURANCE WILL BECOME MANDATORY AS A CONDITION FOR ANY DIRECT FEDERAL FINANCING, V.A., F.H.A. LOANS, OR FINANCING FOR FEDERALLY REGULATED OR FEDERALLY INSURED LENDING INSTITUTIONS FOR PROPERTIES LOCATED IN THE SPECIAL FLOOD HAZARD AREAS OF THE IMPACTED COMMUNITIES.

TO FINISH, I CAN ONLY WHOLEHEARTEDLY SUPPORT THE PREVIOUS HOPE AND EXPECTATION THAT THE FLOOD PROTECTION WILL BE PUT IN PLACE AS QUICKLY AS POSSIBLE.

THANK YOU.

COL. THOMAS: THANK YOU.

DAVID RYAL?

MR. RYAL: YES. THANK YOU FOR THE OPPORTUNITY TO BE HERE THIS EVENING.

MY NAME IS DAVID RYAL, AND I AM THE GENERAL MANAGER FOR THE DOWNEY CHAMBER OF COMMERCE. AND AS THE

MAYOR OF PICO RIVERA HAS ALREADY INDICATED, THE CHAMBERS WITHIN THE ALLIANCE ARE WORKING WITH OUR CITY, AND WE SUPPORT THE PROJECT WHICH YOU HAVE PRESENTED AND THE SOLUTION THAT YOU ARE WORKING TOWARDS.

AGAIN, WE WANT TO SUPPORT THEM IN THAT WE HOPE THAT THE PROJECT GETS DONE AS SOON AS POSSIBLE. AND LIKE THEM, WE WILL BE WANTING YOU TO STOP THE BUILDING REGULATIONS FROM GOING INTO EFFECT.

BECAUSE WORKING WITH THE BUSINESS COMMUNITY, WE'RE IN A SITUATION, AS YOU HAVE SEEN ON THE MAPS THAT YOU HAVE PRESENTED TO US, THAT THERE ARE A NUMBER OF CITIES THAT SURROUND US THAT ARE NOT AFFECTED BY THE 100-YEAR FLOOD. AND IF OUR COSTS GO UP A GREAT DEAL, DEVELOPERS, INSTEAD OF COMING TO DOWNEY OR PICO RIVERA OR LONG BEACH, WILL GO TO CERRITOS, NORWALK, OUT TO ORANGE COUNTY, OR TO THE WEST.

AND IF WE LOSE A NUMBER OF OUR BUSINESSES, THEN IF WE DO HAVE A 100-YEAR FLOOD, IT MAY BE GOING THROUGH BARREN LAND IF EVERYBODY HAS VACATED THE AREA. SO WE DO DEFINITELY WANT TO ENCOURAGE YOU TO MOVE THIS PROJECT AS FAST AS POSSIBLE, AND ANY SUPPORT THAT YOU CAN GIVE THE ALLIANCE IN STOPPING THE REGULATIONS FROM GOING IN WOULD BE GREATLY APPRECIATED.

COL. THOMAS: THANK YOU.

CHRISTINE PERALA.

MS. PERALA: GOOD EVENING.

MY NAME IS CHRISTINE PERALA, AND I REPRESENT THE FRIENDS OF LOS ANGELES RIVER. I AM THE CHAIR OF THE TECHNICAL ADVISORY BOARD.

I AM SPEAKING WITH THE VIEW OF THE ENTIRE LOS ANGELES RIVER WATERSHED. I SUGGEST THAT THE CORPS DID NOT RECENTLY IDENTIFY THE PROBLEM OF INADEQUACY OF THE FLOOD CONVEYANCE CHANNEL. THE L.A. RIVER FLOOD SYSTEM WAS OBSOLETE THE DAY IT WAS FINISHED CONSTRUCTION. WE HAVE BEEN LUCKY THAT THE 100-YEAR FLOOD EVENT HAS NOT RAINED DOWN ON THE LOS ANGELES BASIN SINCE THE CHANNEL WAS BUILT.

THE ORIGINAL DESIGN DID NOT TAKE INTO ACCOUNT THE EXPANSIVE DEVELOPMENT OF THE VALLEY FLOOR IN THE LOS ANGELES BASIN. RAPID DEVELOPMENT HAS EXCEEDED ALL EXPECTATIONS. NO ONE EVER EXPECTED THAT THE FLOOD FLOOR WOULD BE SO HIGHLY PAVED. IN FACT, INCREASING THE AMOUNT OF FLOOD FLOWS GOING INTO THE CHANNEL.

THE CHANNEL IS TOO NARROW TO CONTAIN THE KNOWN HISTORICAL FLOOD FLOWS. THIS IS TRUE THROUGHOUT NEARLY ALL OF THE VALLEY FLOOR.

UNFORTUNATELY, THE HISTORY OF FLOOD CONTROL THROUGHOUT THE UNITED STATES, NOT ONLY THE CORPS BUT OTHER AGENCIES AS WELL, THE HISTORY OF THIS HAS BEEN SINGLE-PURPOSE PROJECTS. UNFORTUNATELY, ACCOMPLISHING

MASSIVE DESTRUCTION OF THE NATURAL HERITAGE OF THE UNITED STATES.

IN CALIFORNIA WE HAVE LOST OVER 95 PERCENT OF THE ORIGINAL WILDLIFE HABITAT, THE RIPARIAN VEGETATION ALONG RIVERS, PRIMARILY FOR FLOOD CONTROL AND WATER DIVERSION. DEVELOPMENT OF LOS ANGELES COUNTY, MEANWHILE, HAS FAILED TO SET ASIDE ADEQUATE OPEN SPACE. IN FACT, LOS ANGELES COUNTY HAS THE SMALLEST AMOUNT OF PARK SPACE PER CAPITA OF ANY CITY IN THE UNITED STATES. THIS IN A REGION THAT PEOPLE FLOCK TO BECAUSE OF THE WEATHER. IS THIS NOT IRONIC THAT WE HAVE FAILED TO PLAN FOR THE NEEDS OF DEVELOPMENT AND THE NEEDS OF THE CITY WHILE REMOVING THE BEAUTY OF THE RIVER?

DEMOGRAPHIC STUDIES HAVE CLEARLY CORRELATED HIGH JUVENILE CRIME RATES AND DRUG RATES WITH LACK OF PARKS AND PARK PROGRAMS. WHEN YOUNG PEOPLE HAVE NO PLACE TO GO, IT IS NOT A SURPRISE THEY TURN TO CRIME AND DRUGS.

FRIENDS OF LOS ANGELES RIVER SUGGESTS TO YOU THAT THERE IS A RELATIONSHIP BETWEEN THE CONDITION OF THE RIVER AND THE HEALTH OF THE PEOPLE OF LOS ANGELES COUNTY. WE HOLD THAT THE HIGH CRIME RATES IN LOS ANGELES ARE DEFINITELY TIED TO THE LACK OF OPEN SPACE.

LADIES AND GENTLEMEN, I SUGGEST THAT WE ARE AT A HISTORIC MOMENT IN THE PLANNING, NOT ONLY OF THE LOS ANGELES RIVER, BUT OF THE LOS ANGELES COUNTY AS A

WHOLE. AND I ASK YOU TO STEP ASIDE FOR A MOMENT FROM THE UTTER PRESSING URGENCY OF THE INADEQUACY OF FLOOD PROTECTION GIVEN BY THE PRESENT CONVEYANCE SYSTEM TO TAKE A LOOK AT THE BIGGER PICTURE. LOOK AT THE LOS ANGELES RIVER WATERSHED AS A WHOLE AND SOME OF THE GREATER NEEDS OF OUR POPULACE.

FOR EXAMPLE, THE WATER QUALITY OF THE RIVER IS GROSSLY INADEQUATE. STORM WATER COMING THROUGH STORM DRAINS DOES NOT AND CANNOT MEET THE E.P.A. STANDARDS FOR NONPOINT SOURCE POLLUTION UNDER N.P.D.E.S. THE POSSIBILITY OF APPROACHING THE PLANNING OF THE LOS ANGELES RIVER ALLOWS US TO THINK IN NEW WAYS, AND I ASK YOU TO CONSIDER THAT THERE IS ANOTHER SOLUTION RATHER THAN YET ANOTHER SINGLE-PURPOSE PROJECT POURING YET MORE CONCRETE WITH ONLY FLOOD CONTROL AS ITS GOAL.

WE NEED TO APPROACH THE PLANNING OF THE LOS ANGELES RIVER FROM THE STANDPOINT OF THE POSSIBILITY OF PARK SPACE, IMPROVEMENT OF WATER QUALITY, TRANSPORTATION LINES, PLACES FOR YOUNG PEOPLE, PLACES FOR COMMUNITIES AND ETHNIC DIFFERENCES TO BE WORKED OUT, PLACES FOR COMMUNITY, FOR WILDLIFE HABITAT, FOR STORM WATER QUALITY IMPROVEMENT. ALL OF THESE THINGS CAN BE ADDRESSED IF WE TAKE THE TIME TO STEP BACK NOW AND LOOK AT THE PLANNING OF THE WHOLE SYSTEM. WHILE IT MAY TAKE A LITTLE BIT LONGER, WE KNOW THAT FLOOD CONTROL CAN'T BE

ACCOMPLISHED RIGHT AWAY.

THE SINGLE-PURPOSE PROJECT AS IT IS PROPOSED IS EXTREMELY DIFFICULT TO FUND. IT HAS ONLY ONE PURPOSE; THEREFORE, ONLY ONE FUNDING SOURCE. YET IF WE APPROACH THE AMELIORATION OF FLOOD CONTROL WITH MANY GOALS IN MIND: PARKS, WILDLIFE, OPEN SPACE, WATER QUALITY, TRANSPORTATION, ET CETERA, AIR QUALITY, THEN WE HAVE MULTIPLE SOURCES OF FUNDING FOR APPROACHING A WIDE VARIETY OF GOALS. IF THE ARMY CORPS OF ENGINEERS INDEED INTENDS TO BECOME THE ENVIRONMENTAL ENGINEERS OF THE UNITED STATES, AS THE MANAGEMENT OF THE CORPS HAS SUGGESTED THAT IT DO, THEN THE LOS ANGELES RIVER IS THE PRIME PLACE TO TAKE A STAND TO BEGIN REALLY PLANNING FOR THE ENVIRONMENT AND FOR THE NEEDS OF PEOPLE ON THE LOS ANGELES RIVER.

THANK YOU.

COL. THOMAS: THANK YOU.

HARRY PILAR, P-I-L-A-R. DID I SAY THAT RIGHT?

S. ROBERT -- IS IT CASSO?

MR. CASSO: YES, SIR.

COL. THOMAS: PLEASE.

MR. CASSO: ROBERT CASSO, 600 EAST OCEAN BOULEVARD, LONG BEACH.

I WANT TO SPEAK EXTEMPORANEOUSLY BUT COVER

SEVERAL POINTS FROM VARIOUS PERSPECTIVES. I'M A COMMUNITY PLANNER BY PROFESSION, CONSULTANT, CITIZEN OF LONG BEACH, A YEAR-ROUND SWIMMER AT THE OCEAN AT EITHER THE END OF SEAL BEACH OR IN THE QUEENSBAY AREA, AND I'M A PLANNING CONSULTANT TO THE WEST SIDE REDEVELOPMENT PROJECT AREA COMMITTEE WHICH REPRESENTS ABOUT 400 BUSINESSES ON THE WEST SIDE OF THE RIVER BETWEEN P.C.H. AND NINTH STREET.

NO PARTICULAR ORDER, BUT THE FIRST TWO SPEAKERS, MAYOR GARDNER AND MR. ELDRIDGE, CONFIRMED THE SANCTION BEHIND THIS REASON FOR GETTING THIS PROJECT ON THE ROAD. I GUESS THERE'S NOTHING LIKE A HANGING IN THE MORNING TO GET SOMEBODY'S ATTENTION, PARTICULARLY IF THE SANCTIONS OF INCREASED RATES AND BUILDING RESTRICTIONS ARE TO OBTAIN. ON THAT ISSUE, WE'LL WORK THROUGH OUR LOCAL PUBLIC WORKS DEPARTMENT, GET OURSELVES UP TO SPEED AS TO WHAT THAT WOULD DO TO OUR AREA.

I WANTED TO JUST GENERALLY TOUCH ON SOME OTHER ISSUES. I'VE BEEN WATCHING WITH INTEREST OVER THE YEARS WHAT THE CORPS OF ENGINEERS HAS BEEN TRYING TO DO ABOUT KEEPING THE MISSISSIPPI IN TOW, AND WE KNOW THAT SOMEWHERE ALONG THE LINE, MISSISSIPPI IS GOING TO DECIDE TO LEAVE NEW ORLEANS AND GO SOMEWHERE ELSE. AND I WAS INTERESTED IN COLONEL THOMAS'S REMARKS ABOUT THE L.A. RIVER USED TO GO THROUGH MARINA DEL REY, AND I GUESS YOU

CAN BE ABLE TO STOP THAT FROM HAPPENING THE OTHER WAY AROUND.

BUT THERE ARE A COUPLE OF GENERAL ISSUES. THE LAST LADY THAT SPOKE TOUCHED ON AN ISSUE THAT, AS A PLANNER, I'M INTERESTED IN. 15 YEARS AGO OR MORE WHEN I WAS DIRECTOR OF ENVIRONMENTAL STUDIES IN THE CITY OF LONG BEACH, A COLLEAGUE OF MINE HEARD FROM A PERSON WHO SAID, "HOW COME YOU CAN'T PROVIDE MEGASTRUCTURE DEVELOPMENT OVER THE LOS ANGELES RIVER CHANNEL?" I'LL RETURN TO THAT IN A MOMENT.

ANOTHER ISSUE THAT'S RELATING IS THE ALAMEDA TRANSPORTATION CORRIDOR AGENCY HAS RESERVED SOME FUNDS FOR LOOKING AT THE FLOOR OF THE RIVER FOR SOME TRAFFIC USE. THE PREVIOUS SPEAKER ALLUDED TO AN ISSUE THAT HAD BEEN RAISED BY, I BELIEVE, A COUNCILMAN UP IN L.A. ABOUT USING THE RIVERBED AS A RECREATIONAL RESOURCE. THE COLONEL, IN HIS OPENING REMARKS, REFERRED TO RECREATION; BUT I THINK THAT WAS MORE ON THE SHOULDER SIDE OF THE RIVER.

WE, OF COURSE, ARE CONCERNED ABOUT CATASTROPHE OF A 100-YEAR FLOOD; AND WHAT I'M LOOKING AT IS THIS SIDE OF A CATASTROPHE, WHAT WOULD BE GAINED BY THE CHANNEL. AS A SWIMMER, I'D BE INTERESTED IN KNOWING HOW WELL WE WOULD BE CONTROLLING THE DEBRIS THAT OCCURS AFTER EACH AND EVERY STORM WE HAVE, MODEST THOUGH IT

MIGHT BE. THAT COMES OUT OF THE SAN GABRIEL AND L.A. YOU CAN'T GO NEAR THE WATER DEPENDING ON THE GRAVITY OF THE STORM FOR SEVERAL DAYS AT A TIME.

THE MAP OVER THERE, THE GRAPHICS ARE NOT CLEAR. AND AS A PLANNER, I'M GUILTY OF THE SAME EXERCISE. WE MAKE THESE NICE-LOOKING PLANS, AND WE (INAUDIBLE) WELL, ARE THOSE EXISTING OR PROPOSED IN TERMS OF THOSE PARAPETS. I'D LIKE TO KNOW NOW, AND MAYBE YOU CAN TALK TO ME ABOUT THAT.

ONE OF THE THINGS I DID WANT TO FOCUS ON WAS FUNDING, FUNDING SOURCE. WE HAVE THE BLUE LINE CROSSING THE RIVER, THE TROLLEY LINE. WE HAVE THE LONG BEACH FREEWAY, WHICH IS DUE TO BE INCREASED TO ANOTHER LANE ALONG ITS ALIGNMENT, THE 710. WE HAVE THE ALAMEDA TRANSPORTATION CORRIDOR WHICH I ALLUDED TO A MOMENT AGO.

IN LONG BEACH, ANOTHER CONSIDERATION -- SERIOUSLY OR NOT -- BUT SERIOUSLY IS THE PROPOSED DISNEY SEA PROJECT WHICH THE LATEST PLAN MEANS MOVING THE QUEEN MARY UP A FEW HUNDRED FEET. IF WE'RE GOING TO HAVE A SEVERE FLOOD FLOW COME DOWN THE RIVER AND WE'VE TAKEN CARE OF THE CHANNEL, I'M JUST WONDERING IF WE COULD HAVE A REVERSE TSUNAMI COMING DOWN THE RIVER, BLOWING EVERYTHING OUT OF THE WATER, INCLUDING THE QUEEN MARY AND ANY PROPOSED DEVELOPMENT THERE.

I'M NOT SPEAKING IN ANY POSITION WAY, BUT

JUST TO ELUCIDATE SOME COMMENTS I THOUGHT MIGHT BE RESPONDED TO AT SOME LEVEL.

TO CLOSE MY REMARKS, I'D LIKE TO JUST FOCUS ON THIS AIR-RIGHT SITUATION FOR A MOMENT. TO MAKE THIS PROJECT MORE THAN MONEY-FUNCTIONAL, IF YOU WILL, IF THAT'S A WORD, IS IT CONCEIVABLE, GIVEN A 600-FOOT CROSS-SECTION, MORE OR LESS, OF THE CHANNEL AND USING SOME SIGNIFICANT PRECAUTIONS WITH REGARD TO CONCRETE CONSTRUCTION AND SO FORTH, TO ACTUALLY VAULT OVER THE RIVER AT STRATEGIC POINTS, USE THAT CONSTRUCTION AS A PLATFORM AND VARIOUS CONFIGURATIONS FOR MIXED-USE DEVELOPMENT, INCLUDING RECREATION ACCESSIBLE FROM EITHER THE TROLLEY OR THE FREEWAY, AND GENERATE SOME INCOME THAT MIGHT BE USED TO FUND OVER AND BEYOND JUST TAKING CARE OF FEMA AND THE ISSUES THAT THE MAYOR AND THE OTHER GENTLEMAN REFERRED TO.

THAT'S IN MY MIND, GOING INTO THE NEXT CENTURY, AND THE KIND OF THING I'D LIKE TO SEE HAPPEN. YOU PROBABLY WOULDN'T HAVE THAT OPPORTUNITY ON THE MISSISSIPPI RIVER, WHICH IS A LITTLE WIDER; BUT IT SEEMS TO ME THAT THERE'S SOMETHING THAT COULD HAPPEN WITH SOME INNOVATIVE INPUT AND MAYBE GETTING A WAY OF FISCALLY LETTING IT HAPPEN.

THANK YOU.

COL. THOMAS: THANK YOU. HARRY GIBBENS?

MR. GIBBENS (THROUGH ASL INTERPRETER): MY NAME IS HARRY GIBBENS. I LIVE IN THE FLOOD ZONE AREA ON LOUISE AVENUE NEAR CENTURY BOULEVARD. IT IS NEAR HAMM PARK.

THE REPORTER: EXCUSE ME. I CAN'T GET THIS ON THE RECORD BECAUSE I CAN'T HEAR YOU. I NEED YOU TO STAND OVER ON THIS SIDE.

MR. GIBBENS: I WILL USE NO VOICE. OKAY?

I HAVE MY OWN EXPERIENCE SINCE GROWING UP IN THE AREA NEAR. I SAW THE FLOOD IN 1980 AND '81. THAT WAS UNEXPECTED.

DID IT COME FROM THE LOS ANGELES RIVER? NO. IT WAS FROM THE STORM DRAIN AND THE STREETS. IT CAME OUT FROM THE STREETS, AND IT FLOODED. IT WAS UNEXPECTED.

HOW DO YOU SOLVE THAT PROBLEM? NO ONE IN THE CITY IN LYNWOOD COULD STOP THE WATERS FROM RISING AND BEING DRAWN BACK INTO THE STORM DRAIN ONCE MORE AND TO GO BACK INTO THE LOS ANGELES RIVER.

WE FOUND OUT THAT. THE NEIGHBORS IN THE AREA, THEY WERE ANGRY. WHY COULDN'T IT BE STOPPED? BECAUSE IT WAS OUT OF CONTROL, IT DAMAGED A LOT OF PROPERTIES AND THINGS ALONG WITH THE HOME PROPERTY DAMAGE.

AFTER THE FLOOD, A FEW MONTHS LATER, I TRIED TO STOP AT THE IMPERIAL FLOOD DISTRICT NEAR MY HOME. I ASKED THEM WHY IT HAPPENED.

THEY ADMITTED THAT THE FLOOD WAS BLOCKED BY DEBRIS UNDERNEATH THE STORM DRAIN BELOW HAMM PARK. I FELT THAT FOR A LONG TIME IT MUST BE POSSIBLE THAT IT WILL HAPPEN AGAIN IN THE 100-YEAR FLOOD PLAN.

PROBABLY, IT'S BETTER TO HAVE ANOTHER SECOND PLAN ON THE SURFACE STREETS AND THE FLOOD-DRAIN SYSTEM. THAT MAY HELP TO REDUCE THE FLOW AND DAMAGE TO THE AREA. I FEEL THAT IT WILL BE BETTER. IT'S UP TO THE UNITED STATES ARMY CORPS OF ENGINEERS TO DECIDE WHAT IS BEST FOR ALL THE COMMUNITY.

I LOOKED AT THE FLOODPLAIN SYSTEM, AT THE MAP, AND I'VE READ THE INFORMATION. I NOTICE THAT IN MY HOMETOWN IN LYNWOOD, IN THE MIDDLE, AND SOUTH (INAUDIBLE) AND DOWNEY, THE ELEVATION OF THE CITY IS HIGHER THAN MY HOME TOWN OF LYNWOOD, 100 FEET ABOVE SEA LEVEL. PARAMOUNT, THE CITY IN THAT AREA IS LOWER THAN MY HOME CITY: 68 FEET ABOVE SEA LEVEL.

I FEEL THAT WHAT PROBABLY COULD BE DONE TO ENLARGE THE LOS ANGELES RIVER CHANNEL TO MAKE IT DEEPER. THAT MAY HELP TO REDUCE THE FLOOD OVERFLOW LEVELS. WHAT DO YOU THINK?

I UNDERSTAND IT COSTS A LOT TO THINK ABOUT THE FUTURE AND THE GENERATIONS. I FEEL THAT A LITTLE BETTER TO START BUILDING DEEPER EXCAVATION CHANNELS INSTEAD OF BUILDING ADDITION TO THE LEVEL AND MAKING IT

HIGHER ABOVE THE SURFACE OF THE LAND.

I FEEL THAT I TRIED TO TALK WITH MY HOMETOWN IN THE CITY OF LYNWOOD, THE PUBLIC WORKS DEPARTMENT AND THE PLANNING DEPARTMENT. THE PLANNING DEPARTMENT WORKED WITH ME PRETTY GOOD, BUT THE PUBLIC WORKS, CITY OF LYNWOOD, DID NOT COOPERATE VERY WELL DUE TO THE PROBLEM OF COMMUNICATION. THERE WAS A LOT OF MISUNDERSTANDING. I'M NOT SURE. SO THAT I WAS VERY GRATEFUL. I RESPONDED TO THE LOS ANGELES COUNTY PUBLIC WORKS. THEY GAVE ME MORE CLEAR EXPLANATIONS OF ALL ABOUT THE LOS ANGELES FLOOD BASIN AND SO FORTH.

I WILL CONTINUE TO HELP MY COMMUNITY AND MY NEIGHBORHOOD AREA FROM LIVING IN THE FLOOD ZONE. I AM VERY CONCERNED ABOUT THAT AREA. THAT HAS TO BE, AND THAT AREA, THE MAIN FLOOD ZONE, IT CAN BE CORRECTED IN SOME WAYS, WE ALL KNOW.

I WILL GIVE MY WRITTEN INFORMATION TO YOU AFTER THE MEETING.

THANK YOU.

COL. THOMAS: I SHOULD TAKE THAT DOWN. THANK YOU, SIR.

YOU BROUGHT UP A LOT OF GOOD ISSUES, AND IT SOUNDS LIKE YOU'RE WORKING WITH THE RIGHT PEOPLE. OUR JOB IS TO TRY TO KEEP THE MAIN FLOWS IN THE RIVER. THE CITY AND COUNTY MAINTAIN THE LOCAL DRAINAGE.

WE WILL BE HAPPY TO PROVIDE YOU A COPY OF OUR FEASIBILITY STUDY. IF YOU HAVE MORE QUESTIONS, WE'LL BE HAPPY TO TRY TO ANSWER THOSE. WE HAVE AN EXTENSIVE STUDY OF LOCAL DRAINAGE. BUT WE'LL BE HAPPY TO GIVE YOU ALL THOSE DOCUMENTS AND ANYONE ELSE WHO IS INTERESTED.

AND THE LAST CARD I HAVE IS GREG VLASIK.

MR. VLASIK: THANK YOU. MY NAME IS GREG VLASIK. I'M A PRIVATE CITIZEN FROM LONG BEACH.

IT OCCURRED TO ME AS THE TWO GENTLEMEN REPRESENTING THE CITIES OF PICO RIVERA AND DOWNEY WERE SPEAKING THAT IN THE TALK OF LAMENTING THE EXODUS OF DEVELOPMENT AND BUSINESS AND COMMERCE IN THEIR AREAS, IF THIS PLAN DOESN'T GO THROUGH, IT OCCURRED TO ME THAT PERHAPS THERE'S A SOLUTION THERE. IF IN FACT THE NO-PROJECT OPTION IS TAKEN AND DOWNEY AND PICO RIVERA BECOME COMPLETELY VACATED BY THE POPULACE, WE HAVE AN EXCELLENT OPPORTUNITY FOR A NEW SPREADING GROUND. THAT'S NOT SERIOUS, OBVIOUSLY.

I CURRENTLY RESIDE ABOUT A HALF A MILE FROM THE L.A. RIVER. MY WIFE AND I GO THERE ABOUT THREE OR FOUR TIMES A WEEK EITHER CYCLING, HIKING, JOGGING, BIRD WATCHING, WHAT HAVE YOU. AND WE DO ENJOY THE RECREATIONAL OPPORTUNITIES THAT IT PROVIDES.

POINT OF INFORMATION: ARE YOU ABLE TO ANSWER MY QUESTIONS OR ADDRESS MY QUESTIONS, OR SHALL I

KIND OF PHRASE THEM AS COMMENTS? THERE ARE JUST SOME POINTS I WOULD LIKE TO HAVE CLARIFIED ABOUT YOUR PRESENTATION.

COL. THOMAS: OKAY. WE'LL TRY.

MR. VLASIK: THE GENTLEMAN WHO SIGNED HIS TESTIMONY RAISED A VERY INTERESTING POINT ABOUT THE DRAIN HEIGHTS IN THESE SURROUNDING AREAS. DOES, IN FACT, THE CONSTRUCTION OF THE PARAPETS AT THE TOP OF THE RIVER REALLY, SINCE THAT HAS NO EFFECT ON THE SURROUNDING DRAIN HEIGHTS, DOES THAT REALLY REDUCE THE KIND OF FLOODING THAT HE INDICATED HE HAS ALREADY EXPERIENCED AND OTHER AREAS OF THE BASIN HAVE ALREADY EXPERIENCED IN LOWER FLOODS? AND THAT'S ONE POINT, IF YOU COULD ADDRESS.

COL. THOMAS: I KNOW THAT'S A BIG CONCERN. WE'VE STUDIED THAT; IT DOESN'T MAKE IT ANY WORSE. THEY'RE STILL ABLE TO GET THE WATER FROM THE STREETS INTO THE CHANNEL. OUR STUDIES SHOW THAT THE PEAK IN THE CHANNEL HITS AT A DIFFERENT TIME THAN THE PEAK IN THE STREETS; SO THE SAME MECHANISM STILL WORKS. IT'S JUST THAT IF YOU GET UP ON THE PARAPETS, INSTEAD OF THE WATER FLOWING OVER THE SIDES AND INTO THE STREETS, IT STAYS IN THE CHANNEL.

I'LL BE HAPPY TO SHARE THAT WITH YOU. THAT WILL BE LOOKED AT AGAIN DURING DETAILED DESIGN. WE LOOKED AT THAT.

MR. VLASIK: NEXT QUESTION I HAVE, AND FOR MY OWN

PURPOSES IT HAS TO DO WITH THE LONG BEACH AREA, BUT AS FAR AS CONSTRUCTION OF THE PARAPETS THAT YOU'RE PROPOSING, WOULD THOSE THEN PRECLUDE ACCESS TO THE RIVER FOR RECREATIONAL USE; IN OTHER WORDS, FOR WALKING DOWN BY THE ACTUAL WATER SIDE OR FOR CYCLING OR WALKING ALONG THE RIVER? IS THE PARAPET GOING TO BE RIGHT AT THE EDGE TO WHERE IF YOU'RE WALKING OR CYCLING ALONG, YOU WON'T EVEN SEE THE RIVER, YOU'LL JUST SEE THE CONCRETE WALL, OR HOW IS THAT PHYSICALLY SET UP?

COL. THOMAS: YES. THAT'S THE WAY IT WOULD BE WHERE IT'S SO HIGH. THE HEIGHT VARIES FROM TWO TO EIGHT FEET, OR TWO TO TEN FEET, MAYBE. AND WHERE IT'S HIGH ENOUGH TO BLOCK YOUR VIEW, IT WOULD BLOCK YOUR VIEW. IT WOULD BE RIGHT NEXT TO --

MR. VLASIK: OKAY.

COL. THOMAS: WE ARE LOOKING AT WAYS TO TRY TO MITIGATE THAT. AND IT'S ALSO NOT JUST A PROBLEM FOR RECREATION; IT'S ALSO A PROBLEM FOR MAINTENANCE AND VIEWING THE SITUATION AS THE FLOOD FLOWS GO DOWN THE RIVER. SO THERE'S SOME RECREATION AND FLOOD CONTROL INTEREST IN DEALING WITH THAT SITUATION. WE DON'T HAVE A SOLUTION YET, BUT WE KNOW IT'S A PROBLEM.

MR. VLASIK: ONE MORE QUESTION. REGARDING RECREATION, YOU MENTIONED IN TERMS OF RECREATIONAL ENHANCEMENT THAT THE CORPS IS WILLING TO WORK WITH LOCAL

AGENCIES OR SPONSORS, 50/50 COST-SHARING BASIS TO ENHANCE RECREATION ALONG THE RIVER. HAS ANY AGENCY STEPPED FORWARD OFFERING UP ANY AMOUNT OF MONEY TO PROVIDE THAT TYPE OF RECREATIONAL ENHANCEMENT TO YOUR KNOWLEDGE?

MR. BLUM: AT THIS POINT WE HAVE NOT ADDRESSED RECREATIONAL ASPECTS OTHER THAN WHAT EXISTS THERE TODAY. FLAT OUT NO, NOT AT THIS POINT.

AS WE GET INTO MORE DETAILED DESIGN, WE WILL LOOK INTO MORE SPECIFICS OF HOW TO DO THAT, AND THERE ARE A NUMBER OF CITIES UP AND DOWN THE RIVER THAT WE DO NEED TO DEAL WITH THAT. I THINK MR. GARDNER MAY HAVE ALLUDED TO THE ALLIANCE THAT IS WORKING TOGETHER ON SOME OF THESE THINGS, AND I THINK THERE EXISTS THE POSSIBILITY TO PURSUE THAT FURTHER.

MR. VLASIK: I APPRECIATE THAT INFORMATION.

I GUESS MY ONLY GENERAL COMMENT IS THAT IT'S VERY UNFORTUNATE THAT THE COUNTY PLANNING AND THE LOCAL PLANNING PROCESS HAS ALLOWED THE DEVELOPMENT SITUATION TO DETERIORATE TO THE POINT WHERE WE DON'T HAVE ENOUGH WATER PERCOLATING INTO THE GROUNDWATER AND IT'S ALL GOING TO THE FLOOD CONTROL SYSTEM THAT NECESSITATES THIS SORT OF BAND-AID SURGERY TO THE FLOOD CONTROL SYSTEM.

I GUESS OVERALL, MY IMPRESSION IS PERSONALLY IS I'M INCLINED TO AGREE WITH THE SPEAKER FROM THE FRIENDS OF THE LOS ANGELES RIVER THAT THERE IS A LOT OF

RECREATIONAL VALUE TO THE RIVER, AND I THINK THAT ANYTHING THAT TAKES AWAY THAT RECREATIONAL BENEFIT WOULD BE UNACCEPTABLE FROM MY STANDPOINT, FROM MANY MEMBERS OF THE COMMUNITY WHO PARTAKE OF THOSE BENEFITS.

ALL DISCUSSION HERE TONIGHT HAS BEEN VERY ENLIGHTENING PERSONALLY FOR ME BECAUSE I REALLY HADN'T GIVEN MUCH THOUGHT TO WHAT ALL THE DIFFERENT PERSPECTIVES ARE INVOLVED IN THIS ISSUE.

IT DOES REMIND ME OF ONE OF THE EARLIEST SONGS THAT I LEARNED IN BIBLE SCHOOL AT THE AGE OF ABOUT FIVE YEARS OLD, SOMETHING TO THE EFFECT OF THE WISE MAN BUILT HIS HOUSE UPON THE ROCK AND THE FOOLISH MAN BUILT HIS HOUSE UPON THE SAND. AND I WOULD MAKE THE OBSERVATION THAT THE PROJECT PROPOSED HERE THIS EVENING MAY WELL APPEAL TO THE WISE MAN; IT WILL CERTAINLY APPEAL TO THE FOOLISH MAN.

THANK YOU VERY MUCH.

COL. THOMAS: THANK YOU VERY MUCH. YOUR HOUSE IS WHERE? ARE YOU ON THE FOOLISH SIDE?

MR. VLASIK: I'M IN BIXBY KNOLLS AREA.

COL. THOMAS: YOU'RE UP. SO YOU CAN SWIM TO THE RIVER, THEN. THANK YOU.

THAT'S THE LAST OF THOSE WHO ASKED TO SPEAK ON THE CARD. I'D LIKE TO OPEN IT UP NOW TO ANYONE ELSE WHO WOULD LIKE TO LET US HEAR YOU.

YES, SIR.

MR. EAST: GOOD EVENING. I'M DAVID EAST, AND I'M WITH THE CITY OF BELL. AND THE CITY WOULD LIKE TO KNOW, BECAUSE THERE IS APPROXIMATELY TWO MILES OF THE L.A. RIVER THAT GOES PAST BELL, IS THERE GOING TO BE ANY KIND OF -- WHAT TYPE IMPACT IS THIS PROJECT GOING TO HAVE ON THE CITY?

COL. THOMAS: WE CAN TALK ABOUT THAT. THERE WOULD BE -- MOST OF THE IMPACT WOULD BE DURING CONSTRUCTION, AND WE CAN LOOK AT THE MAP AND SEE HOW MUCH THE WALLS WOULD BE RAISED AND TALK MORE SPECIFICALLY ABOUT BELL, IF YOU'D LIKE TO AFTERWARDS, ANY ONE OF THE FOLKS HERE CAN HELP YOU THAT REALLY KNOWS WHAT'S GOING ON.

MR. EAST: OKAY. THANK YOU.

COL. THOMAS: YES, SIR.

MR. WALKER: JOHN WALKER, 8104 ARRINGTON AVENUE, PICO RIVERA. I'M A RETIRED PLANNING DIRECTOR WITH THE CITY OF PICO RIVERA AND ELSEWHERE AND WORKED WITH THE WATER CONSERVATION DISTRICT IN THE PAST AND SOME ENGINEERING BACKGROUND.

I HAVE VIVID MEMORIES OF THE 1938 FLOOD. I'M HERE TONIGHT SIMPLY AS A PRIVATE CITIZEN, BUT I'M STILL ASTOUNDED AT THE PAUCITY OF PUBLIC PARTICIPATION.

THERE HAVE BEEN PREVIOUS MEETINGS THAT I ATTENDED SOME FOUR OR FIVE YEARS AGO, AND THE MATTER OF

FEMA AND THE FLOOD CONTROL -- NATIONAL FLOOD INSURANCE PROGRAM HAS BEEN AROUND FOR MANY YEARS, AND THE QUESTION HAS BEEN (INAUDIBLE). AND I AM DISTURBED TO NOTE THAT THE PUBLIC AT LARGE IS INCREASINGLY RELUCTANT TO ACCEPT ENGINEERING DATA AND TECHNICAL INFORMATION, AND THE TRAGIC EXPERIENCES IN THE SCIENTIFIC WORLD IN THE LAST FEW YEARS SEEMS TO REINFORCE THAT. THE PUBLIC ISN'T HERE TONIGHT, WITH SOME SMALL EXCEPTION, I SUGGEST.

I'M AWARE THAT THE LOS ANGELES DEPARTMENT OF WATER AND POWER MANY YEARS AGO PROPOSED AN ATOMIC PLANT FOR THE PRODUCTION OF ELECTRICITY UP THE MALIBU COAST. THE PUBLIC DIDN'T RESPOND VERY QUICKLY, BUT SUDDENLY THE PUBLIC FOUND OUT THAT THAT PLANT WAS TO BE ESTABLISHED ON A HERETOFORE UNMAPPED AND PREVIOUSLY ONLY INFERRED EARTHQUAKE FAULT. AND THAT WENT DOWN THE DRAIN, AND OTHER PROJECTS HAVE GONE DOWN THE DRAIN.

I THINK IT IS IMPERATIVE THAT THIS FLOOD CONTROL MEASURE BE CARRIED FORWARD. I SUPPORT IT WHOLEHEARTEDLY, BUT I THINK IT WILL BE CARRIED FORWARD UNLESS THE PUBLIC RESPONDS IN A VERY POSITIVE SENSE. THE CORPS AND THE PUBLIC WORKS DEPARTMENT OF THE LOS ANGELES COUNTY HAS BEEN CONFRONTED MANY TIMES WITH PLANS THAT HAVE GONE AWRY BECAUSE THE PUBLIC HAS NOT SUPPORTED IT, ESPECIALLY THOSE THAT REQUIRE BONDING AND PUBLIC FINANCE.

THERE HAS TO BE, I THINK, AN EFFORT MADE AT

THESE PUBLIC MEETINGS AND OTHERS, AS SUGGESTED PREVIOUSLY, THAT LESS EMPHASIS BE GIVEN TO GENERAL GRAPHICS AND TO A DESCRIPTION OF THE PROGRAM, AND THERE HAS TO BE A NITTY-GRITTY EARTH LANGUAGE PRESENTATION.

FURTHERMORE, TECHNICAL MISTAKES IN REPORTS AND IN THE SUBJECT MATTER SOMETIMES CAN COME BACK TO HAUNT ONE. A MINOR TECHNICAL FLAW IN AN OTHERWISE PERFECT ENGINEERING REPORT MAY BE THE THING THAT A SHARP ATTORNEY MAY HIT UPON.

I NOTE, FOR EXAMPLE, AND THIS IS NOT INTENDED TO BE CRITICAL, BUT I THINK IT IS NEVERTHELESS IMPORTANT. IN THE PUBLICATION THAT WE RECEIVED IN THE MAIL -- MY WIFE, BECAUSE SHE IS WITH THE LEAGUE OF WOMEN VOTERS, SHE RECEIVES LOTS OF INFORMATION OF THIS KIND. IN THE LITTLE NOTICE, THERE'S A DESCRIPTION OF HOW FLOODS ARE MEASURED, AND THERE IS A DESCRIPTION THERE OF CUBIC FOOT OF WATER. AND IT'S DESCRIBED AS CONTAINING ABOUT 8.5 GALLONS OF WATER. AND FOR ALL YEARS THAT I WORKED WITH THE FIGURE IT'S ABOUT 7.47, .48 -- 7.5.

NOW, THAT'S A MINOR POINT. BUT LET SOMEONE PICK UP ON IT, AND YOU CAN LOSE A LOT OF YOUR EMPHASIS. AND PEOPLE DON'T TRUST ENGINEERS VERY MUCH. AND I JUST WANT TO SUGGEST THAT THOSE KINDS OF THINGS BE REALLY CAREFULLY LOOKED AT AND NOT REPEATED. THANK YOU.

COL. THOMAS: THANK YOU. I WANT TO MAKE SURE HE

GETS A COPY OF THE FEASIBILITY REPORT. APPRECIATE THAT.

ANY OTHERS? YES, SIR.

A YES. I'M FRED BRINKMAN; I LIVE IN DOWNEY.

I DON'T MEAN TO BE CRITICAL ABOUT THIS. I LEFT NORWALK AT QUARTER AFTER 6:00, AND I GOT HERE ABOUT 7:35. NOW, THAT WASN'T ANYONE'S FAULT, AND I HOPE NOT MY OWN, EXCEPT I GOT IN SOME TRIANGLE OVER IN THE SHOPPING CENTER, AND LITERALLY I'VE BEEN SENT THAT WAY AND THIS WAY, AND THEN I CROSSED THE FREEWAY AND THEN I CROSSED THE FREEWAY. FINALLY SOME LITTLE GIRL IN THE AUTO PARTS SHOP POINTED THE WAY AND TOLD ME HOW TO GET HERE. IT WOULD HAVE BEEN HELPFUL TO ME IF YOU HAD JUST SAID ON THE CORNER OF CARSON AND AVALON IN YOUR MAP.

I ATTENDED YOUR MEETINGS HELD IN DOWNEY APPROXIMATELY A YEAR AGO, AND I REALLY THINK IF YOU WANT THE INPUT OF THE PEOPLE -- NOW, MAYBE YOU WANT THE INPUT OF THE OFFICIALS IN OTHER TOWNS; I'M NOT SURE WHAT YOUR OBJECTIVES OF THIS MEETING ARE. BUT I THINK IF YOU WANT THE INPUT OF THE PEOPLE, THE CLOSER YOU HOLD THE MEETING TO THE PEOPLE, THE MORE YOU'RE GOING TO GET THEIR RESPONSE. AND THEN, OF COURSE, IT WOULDN'T GET ME THAT LONG TO FIND THE PLACE.

I WANTED TO COMMEND YOU ON YOUR PRESENTATION AND YOUR BOOKLETS THAT YOU MADE AVAILABLE. THEY'RE VERY, VERY CLEAR.

I HAVE JUST ONE QUESTION, THOUGH, AND I WANT TO BE CAREFUL THAT THIS DOESN'T DETERIORATE INTO A LEVEL OF HOW ARE WE GOING TO LOCATE THE CHAIRS IN THE TITANIC. BUT I OWN SOME PROPERTY IN SANTA ANA AS WELL AS IN LOS ANGELES COUNTY, AND AS I GET THE WATER BILL, AND OCCASIONALLY GET SOMETHING ABOUT A 100-YEAR FLOOD; SO THEY'RE WORKING ON IT.

I'M SORRY I COULDN'T FIND ANYTHING, BUT I'M NOT QUOTING THEM, BUT IF I LISTEN TO OR READ ACCURATELY WHAT THEY SAY, THE SANTA ANA RIVER IS PROBABLY THE MOST DANGEROUS RIVER IN THE UNITED STATES. AND I WONDER, ULTIMATELY WHEN IT COMES TIME FOR FUNDING THIS, IS THIS GOING TO BE A POLITICAL FOOTBALL, OR IS IT GOING TO BE BASED ON LOGIC AND REASON AND FACTS?

THAT GETS BACK TO REARRANGING THE CHAIRS ON THE TITANIC BECAUSE IF WE'RE GOING TO SPIN OUR WHEELS IN THE FUNDING, IF THAT'S NOT GOING TO BE DECIDED BY ANY FACTS THAT YOU PEOPLE ARE PUTTING TOGETHER -- OR HAS THERE BEEN ANY COMMITMENT ON THE PART OF ANYONE AS TO HOW THIS IS GOING TO BE FUNDED?

COL. THOMAS: I CAN TELL YOU HOW IT WILL BE FUNDED. LET ME DEAL WITH THE COMMITMENT, FIRST.

CONGRESS HAS SHOWN THE COMMITMENT BY TAKING A FAIRLY UNUSUAL ACT TO AUTHORIZE THIS SUBJECT TO A FAVORABLE REPORT. NORMAL PROCESS IS TO AUTHORIZE A

PROJECT AFTER A REPORT HAS BEEN COMPLETED. SO ON THE AUTHORIZATION SIDE OF THE CONGRESS, THEY'VE SHOWN A COMMITMENT.

NOW, THAT'S EASY BECAUSE YOU DON'T HAVE TO PUT DOLLARS NEXT TO IT. IT STILL WILL HAVE TO BE APPROPRIATED, AND MY EXPERIENCE IS THAT ONCE A PROJECT GETS ITS FIRST APPROPRIATION FOR THE FIRST ELEMENT OF CONSTRUCTION ON THE FEDERAL SIDE, THAT CONGRESS IS GOOD ABOUT CONTINUING THAT FUNDING.

IT WILL BE A POLITICAL ISSUE TO GET FUNDING BECAUSE THE SANTA ANA RIVER PROJECT IS NOW UNDER CONSTRUCTION. IT WILL BE UNDER CONSTRUCTION UNTIL THE YEAR 2000 OR 2001, THE SAME TIME THAT THIS PROJECT SHOULD BE UNDER CONSTRUCTION. SO THEY WILL BE COMPETING FOR FUNDS.

THAT'S A LOT OF MONEY FLOWING TO LOS ANGELES OUT OF ONE BILL, THE WATER RESOURCES DEVELOPMENT BILL, AND SO IT WILL BE A CHALLENGE FOR THE ELECTED REPRESENTATIVES TO GET THIS FUNDED. BUT THAT DOES HAPPEN IN CONGRESS. THAT'S WHY THE PUBLIC SUPPORT IS VERY IMPORTANT.

MR. BRINKMAN: THANK YOU VERY MUCH.

COL. THOMAS: YOU KNEW THAT, DIDN'T YOU?

ANYONE ELSE LIKE TO SPEAK?

WELL, THANK YOU VERY MUCH FOR YOUR KIND

ATTENTION. YOU'RE GREAT AMERICAN CITIZENS FOR PARTICIPATING IN THIS MOST IMPORTANT DECISION-MAKING PROCESS. I APPRECIATE YOUR BEING HERE. WE WILL MAKE SURE THAT YOU GET ALL FUTURE INFORMATION BECAUSE YOU'VE GIVEN US A CARD NOW, AND WE HAVE YOUR ADDRESS SO YOU'RE ON OUR MAILING LIST. AND I THANK YOU, AND I'LL ADJOURN THE MEETING.

(HEARING WAS ADJOURNED AT 8:30 P.M.)

* * *

STATE OF CALIFORNIA)
) SS
COUNTY OF LOS ANGELES)

I, LILLIAN G. HOPKINS, CERTIFIED SHORTHAND REPORTER NO. 8722, DECLARE:

THAT SAID TRANSCRIPT WAS TAKEN BEFORE ME AT THE TIME AND PLACE THEREIN SET FORTH AND WAS TAKEN DOWN BY ME IN SHORTHAND AND THEREAFTER TRANSCRIBED UNDER MY DIRECTION AND SUPERVISION, AND I HEREBY DECLARE THAT THE FOREGOING TRANSCRIPT IS A TRUE AND CORRECT TRANSCRIPT OF MY SHORTHAND NOTES SO TAKEN.

I FURTHER DECLARE THAT I AM NEITHER COUNSEL FOR NOR RELATED TO ANY PARTY TO SAID ACTION NOR IN ANYWISE INTERESTED IN THE OUTCOME THEREOF.

I DECLARE UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING IS TRUE AND CORRECT.

IN WITNESS WHEREOF, I HAVE HEREUNTO SUBSCRIBED MY NAME THIS 1ST DAY OF NOVEMBER, 1991.

LILLIAN G. HOPKINS, CSR NO. 8722

APPENDIX J

Public Letter Comments on the Draft Environmental Impact Statement and Responses

1. Jesse Moorman and Raymond Towne, Oct. 24, 1991, p.J4
2. Friends of the Los Angeles River, Oct. 21; Nov. 25; Nov.30, 1991, p. J11
3. California Regional Water Quality Control Board, Oct. 15, 1991, p. J18.
4. County of Los Angeles Department of Parks and Recreation, Oct. 18, 1991, p. J20
5. City of Paramount, Oct. 23, 1991, p. J22
6. Julius Warren, Oct. 1991, p. J25
7. Public Health Service, Sept. 26, 1991, p. J27
8. City of Lakewood, Oct. 7;Oct. 24, 1991, p.J32
9. City of Long Beach, Sept. 26, 1991, p. J35
10. City of Pico Rivera, Oct. 25, 1991, p. J38
11. Los Angeles County Transportation Commission, Oct. 25, 1991, p.J40
12. City of Montebello, Oct. 30, 1991, p. J42
13. City of Downey, Oct. 24, 1991, p. J46
14. Mark Giles, Oct. 26, 1991, p. J50
15. Heal the Bay, Oct. 31, 1991, p. J55
16. Tree People, Oct. 24, 1991, p. J59
17. Environmental Protection Agency, Region IX, Nov. 21,1991, p. 67
18. Southern California Association of Governments, Nov. 21, 1991, p.J72
19. County of Los Angeles Department of Public Works, Oct. 24, 1991, p. J74
20. City of Lynwood, Chamber of Commerce, Nov. 11, 1991, p. J76
21. Linda and Thomas Brayton, Nov. 26, 1991, p. J78
22. Shiela Ard, Nov. 23, 1991, p. J81
23. California Coastal Commission, Dec. 11, 1991, p. J83

Jesse A. Moorman
Raymond L. Towne
808 N. Spring Street, Suite 622
Los Angeles, CA 90012

October 24, 1991

Ms Patricia Luvender
Los Angeles District
Corps of Engineers
Planning Division, WRB
P.O.Box 2711
Los Angeles, CA 90053

Dear Ms Luvender:

Please accept our comments on the September 1991 Los Angeles County Drainage Area (LACDA) Review Feasibility Study and EIS.

(1)

Significance of intermittent blue-line streams for flood control

Intermittent blue-line streams are classified as wetlands. 33 CFR § 328.3(b). The Corps of Engineers has jurisdiction over wetlands. 33 CFR § 328.3(a). Wetlands are important in flood control.

We are especially concerned about the role that the many intermittent blue-line streams in foothill areas of Southern California play in mitigating the flooding effects of heavy rainfall. These small but numerous watersheds also provide natural inlets to groundwater basins, wildlife habitat and recreation opportunities. We hope that any project ultimately adopted will take note of the fundamental role of these watersheds in the long-term effectiveness of the LACDA flood-control system.

(2)

Protection of blue-line streams a vital element of any NED plan

At pages 55-56 the Study notes that the three hallmarks of a national economic development (NED) plan are a positive benefit-to-cost ratio, a maximization of net benefits (benefits minus costs) and use of the most economic means available to accomplish a stated result. The proposed parapet alternative (page 114) may well be superior to the channel-widening plan and the rectangular conversion plan. Nevertheless, the Study contains a fundamental misconception: that LACDA will always be able to spend its way out of runoff problems exacerbated by urbanization.

Future loss of blue-line streams may frustrate current NED plan (3)

We believe that preservation of surviving small watersheds in foothill areas must be an integral part of any genuine NED plan. Those watersheds provide a cost-effective and perhaps irreplaceable component of flood management. Once rendered impervious by urban development, their restoration to a natural and functional state would require expenditures comparable to those contemplated in the current Study, and a degree of social dislocation the current NED plan is able to avoid. If flood-control policy does not begin to protect these watersheds, it is quite possible that the straightforward parapet solution currently advanced will be rendered obsolete, unsuitable for further refinement, by higher flood risks in the future.

The Study does note at pages 27-28 that, "the effects of urbanization on runoff exceeded the expectations of design engineers and city planners," as County population increased 270% between 1940 and 1980. The Study is silent, however, on future expectations of engineers and planners with respect to further urbanization.

The Study notes at page 29 that urban growth in the drainage areas above flood-control dams has increased runoff, especially peak runoff. Unfortunately, the Study does not specifically discuss the amount of watershed lost to urbanization in the 1940 to 1980 period or current loss trends.

Range of future NED plan options may decrease when most needed (4)

We submit that those foothill areas still allowing local flows to percolate into the soil must be preserved as part of a comprehensive flood control policy. Any assumption that further urbanization will not substantially increase the impervious area and downstream flood risk overlooks the rapid loss of foothill areas to residential development. In the long run, the failure to limit foothill development in intermittent blue-line stream areas will be a failure of flood control policy, because the loss of these small watersheds will limit the variety of options available to control flood hazard.

For example, at some future date further application of the parapet concept could be constrained by the Artesia Freeway overcrossing (see Study pages 122, 142). Also, at pages 93-94 the Study concludes that reconstructing all bridges to eliminate piers extending from the channel is impracticable, and that raising spans and modifying bridge piers is effective primarily in combination with other structural alternatives. We express concern that, based on facts set forth in the Study, the

continued loss of small watersheds could foreclose the future use of certain structural alternatives.

Finally, at pages 129-134, the Study details substantial and disruptive effects of the NED parapet plan alternative on 18 of 43 bridges Los Angeles River bridges; at page C-2 the EIS notes modification of 27 of 43 Los Angeles River and Rio Hondo bridges. At page 2-15 the EIS notes that these 27 bridges would have to be closed, in successive phases, for up to 18 months each. The Study warns (at page 89) that the channel-widening alternative would effect even greater social disruption, expense and bridge modification. Further loss of intermittent blue-line streams may force such unattractive alternatives on the Corps of Engineers and the local citizenry.

A note on Devil's Gate Dam (5)

With respect to Devil's Gate Dam, the Study implies at page 79 that "the need for operational restrictions" (presumably seismic conditions) forecloses rehabilitation as opposed to demolition and reconstruction; this is not necessarily the case, depending on the relative feasibility of arch-dam versus gravity-dam designs. Since rehabilitation would be cheaper than replacement, an increase in its perceived feasibility would improve its cost-benefit ratio and perhaps restore it to consideration. Its role in regulating flows into the Los Angeles River could justify a substantial investment by the Corps of Engineers.

Thank you for your attention to these comments.

Very truly yours,

Jesse A. Moorman
Raymond L. Towne

JAM/RLT:eyh

RESPONSE TO COMMENTS

From Jesse Moorman and R. Towne, October 24, 1991.

1. The Corps maintains regulatory authority over "waters of the United States" under Section 404 of the Clean Water Act. The management of the local watersheds surrounding the flood control structures of the LACDA system is managed directly by a number of other federal, state and local agencies. The flows and sediment production from the watersheds are recognized as crucial inputs to the water control system and have been managed as such.

2. The study has sought to attain a cost minimization solution consistent with engineering and environmental considerations. The proposed project is intended to accomodate the system to the increase in paved surface over the decades since it was originally completed. Although the Los Angeles region is projected to continued its population growth, it is unlikely that future growth will be characterized by the same rate of increase of impervious surfaces (now already built) that the previous decades have witnessed.

3. Many, if not most, of the smaller watershed basins are currently managed by various agencies or municipalites which have constructed several hundred check dams and debris basins to control flows of flood waters as well as sediments.

4. Your concerns are recognized.

5. Devil's Gate Dam is currently operated by Los Angeles County Department of Public Works under restrictions imposed by the State of California. Recent studies by the City of Pasadena and by the County have identified preliminary feasible rehabilitation proposals for the dam. The reservoir has lost much of its capacity from the accumulation of sediment. Further studies are planned by the County regarding the removal of current operational restrictions and the restoration of reservoir capacity. As stated in the report, however, "modification to Devil's Gate dam would not reduce flows on the lower Los Angeles River enough to compensate for the massive local drainage inflows in that reach ". It would therefore exert a minor impact on the area of greatest flood damages and have no consequesces on plan formulation.

Friends of the Los Angeles River

21 October 1991
Friends of Los Angeles River
Technical Advisory Board
P.O. Box 292134
Los Angeles,CA 90025

U.S.Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, CA 90053-2523
Attention - Mr. Ron Ganzfried

Dear Mr. Ganzfried,

This document is in response to the LACDA Feasibility Study Draft Interim Report and EIS issued September, 1991.

Our review of the project feasibility study raises many questions we wish to put forward for a response from the Corps. We concur with the Corps' findings that the existing channel is inadequate to carry the projected storm waters calculated for the Los Angeles basin. However, we have significant questions about the adequacy of the solution proposed by the Corps.

1. Why was the public comment period only 45 days? This project was authorized in June, 1969, and the DEIS was released in September, 1991. It took the Corps more than 21 years to produce this document. Friends of Los Angles River (FOLAR) maintains that this 45 day review period is too short, and we request an additional 120 day comment period to enable us to review the technical documents in addition to the DEIS.

2. Why was the study limited only to flood control considerations in sections such as Water Conservation (Draft EIS p.48-49) and Recreation (p. 51)? Why was not a dual- or multi-purpose approach given greater consideration? We question the economic feasiblity of a single-purpose project in an era of projected long-term government fiscal limitations. We find no justification for the exclusion of spreading basins and public-use open space to be combined with groundwater recharge and sediment debris controls for increased security against sediment loads causing downstream waters to go to subcritical flows. A multi-purpose project could proceed much faster with wider multi-jurisdictional appeal. FOLAR requests that the Corps reconsider the need for groundwater recharge in its economic analysis in the planning for control of stormwaters in the Los Angeles basin.

FoLAR P.O. Box 292134 Los Angeles, CA 90029 213.663.7331

3. Why did the Biological Resources Section (DEIS 3-27) fail to map existing vegetation on the Los Angeles River? NEPA clearly requires federal agencies to use all existing expertise to assess biological resources, yet not the California Native Plant Society, the LA County or National Audubon Society nor Friends of the Los Angeles River (FOLAR) were consulted in preparation of the study.

Why was the California Native Plant Society Sensitive Plant Species List not reviewed for this study? Why was not the Los Angeles County Museum of Natural History consulted with regard to impacts to vertebrate animals? Why is there no mention of Sensitive or Threatened Bird species such as the Ash-Throated Flycatcher, Bewick's Wren or the Golden Eagle? Why is there no mention of Sensitive Amphibians, Fresh-water Fish or Bats? Why is there no study of the importance of the tidal prism section near the mouth of the river for the migration of shore and passerine birds?

FOLAR does not accept the Corps' decision that the soft-bottom sections of the river have moderate or low wildlife values. The fact that urbanized Los Angeles has little native vegetation makes these areas even more critical for the survival of both local and migratory birds, bats and insect fauna. The Corps must demonstrate much greater committment to accurate environmental assessment before the impact of the proposed project on the biological resources of the Los Angeles River can be determined and before NEPA and CEQA can be considered satisfied.

4. In the analysis of alternatives to the proposed project, the Corps considered the option of widening side channels to increase floodwater capacity of the system, and rejected this alternative (p. 89). FOLAR questions the economic analysis used to assess this alternative. Why didn't the analysis consider many potential benefits from needed park land, open space, wildlife habitat, air quality enhancement, ground water recharge, aesthetic enhancement and other benefits? We believe the incorporation of these benefits will drastically change the cost -benefit ratios. We consider this biased analysis in violation of NEPA.

5. How will the maintenance of the channel be conducted when 21 miles of concrete parapets restrain the sides of the channel? How will sediment removal be carried out? No mention of sediment removal exists in the feasibility study, yet this routine practice is critical for the adequate performance of the design of the channel. The feasibility study mentions only new bridge maintenance of $50,000 annually (p.136). What are the cost increases for maintenance of the channel associated with the raised walls? How will trucks carry sand and gravel out of the river bed? How will the vegetation removal be conducted? How will trash and other urban debris be removed from the channel? By what means will maintenance trucks gain access to the lower reaches of the system?

6. Why did not the Corps consider the use of soft-bottom channel design for scouring to increase the capacity of the system ? How will a concrete bottom channel perform under inevitable heavy sediment loads compared with a soft-bottom channel that allows for scour to increase stormwater volume capacity? Would a soft-bottom channel assist in groundwater recharge and reduce maintenance costs by permitting some sediment movement through the system? Why was the use of side channels to enhance channel flood control performance dismissed? Where is the Corps' pledge to become "the Environmental Engineers for the Nation" ?

7. How will the proposed project assist Los Angeles County to meet the federal NPDES stormwater pollution guidelines? NEPA requires analysis of impacts on other federal agencies. What guarantees does the Corps offer that this project will not aggravate existing stormwater pollution conditions? How does the Corps justify economically a project that has no stormwater pollution mitigation features? FOLAR requests additional review period to examine the technical documents on file with regard to project impacts to existing stormwater discharges and toxicity levels.

8. What analysis has been performed to assess the long-term costs of this project for reduced future options? This is a violation of NEPA. The proposed project eliminates future options for environmental enhancement of the lower reaches of the Los Angeles River for park land, open space, bike and hiking trails, wildlife habitat, constructed wetlands for water quality improvement, aesthetic improvement and non-automotive transportation. These represent lost economic and resource opportunities which must be factored into current costs of the project.

9. Why did the Corps of Engineers reject $750,000 of the $1 million funding (Rep. Beilensen, Aug. 1991) for recreation on the Los Angeles river when the feasibility study acknowledges the need for additional funding for recreation facilities (p.137) for the river area? Why are the recreation and social needs of the local communities not factored into the costs of this project when the construction of the project will impact these communitites for a more than a decade?

How can the Corps justify that "no loss of aesthetic views will occur except for the potential losss of wetland areas" (EIS p.2-42)? What other aesthetic losses can there be in this heavily urbanized area? Why create the need for more mitigation when other agencies are looking for mitigation sites? What are the long-term costs in maintaining areas of "large potted plants or built-in planters" as a mitigation for the loss of wetlands which do not need formal landscape maintenance? What economic values were assigned to wetlands in calculating for their loss? FOLAR requests a copy of the economic analysis of wetland values as these values were used in the benefit-cost ratio analysis for this study.

10. What are the cumulative impacts to the environment when the channel is used as a permanent transportation corridor (pp. 49-51)? This study clearly encourages this use of the channel (1st paragraph, p.51), but does not assess the long-term cumulative impacts, such as air and water quality, to which this project is contributing. This is a violation of NEPA. How can a flood control channel be considered for a permanent transportation corridor without violating the primary intent of the flood conveyance system?

11. What planning has the Corps done to increase permeability in the greater Los Angeles basin since reduced infiltration due to paving is a major aggravation to the capacity of the flood conveyance system (p. 27)? What study has been made to reduce peak inflow to the mainstem channel by slowing waters through the use of small, local retention basins? In other urban areas, such basins have been put to use as parks and open space for summer months. Was this option considered for the Los Angeles River?

12. FOLAR questions the technical viability of the design of the vertical wall concrete channel. After major flood events on Corte Madera Creek and San Lorenzo River, this basic design was shown to be deficient in meeting fundamental criteria such as sufficient freeboard during subcritical flow, a condition the channel was supposed to prevent. What precautions have been taken to correct this design deficiency on the Los Angeles River? Have the effects of sediment and flood debris on supercritical flow been adequately accounted for? Has this study addressed the possibility of breakout during the 101 year storm event overtopping vertical walls raised an additional 12 feet? How has the increased public safety hazard been addressed? FOLAR requests a public presentation event to answer these fundamental questions.

We look forward to the response of the Army Corps of Engineers to our questions. We will have many years to work with the Corps on the many complex issues regarding the future of the Los Angeles River. But, we insist that NEPA and CEQA guidelines and regulations be strictly followed. Thank you for the opportunity to comment on this draft study.

Cordially Yours,

Christine Perala

Christine Perala
Chair, Technical Advisory Board
Friends of Los Angeles River

Friends of the Los Angeles River

PO Box 292134
Los Angeles, CA 90029
November 25, 1991

Ms. Pat Luvendar
Planning Division, US Army Corps of Engineers
300 N Los Angeles Street
Los Angeles, CA 90053

Dear Ms. Luvendar:

The Friends of Los Angeles River wish to thank you and the Planning Division Chief, Mr. Bob Joe, for extending the comment period in the DEIS for the LACDA study.

We would like to bring to the attention of the Corps' planning staff the federal regulations found in the 1990 amendment of the Water Resources Development Act. Section 306 addresses the Environmental Protection Mission which directs Corps' planning activities. This section states as follows:

> "The Secretary shall include environmental protection as one of the primary missions of the Corps in planning, designing, constructing, operating and maintaining water resource projects."

We would like to ask: how does the LACDA project include environmental protection as one of its primary missions? What are the environmental protection features?

For example, how is native vegetation, such as the area along Compton Creek, protected? What design features protect the avian feeding grounds found in the channel? Does the Corps know where these valuable feeding areas are located? What ecosystem features support the aquatic flora and fauna which provide the food base for local, migratory and marine avifauna? How does the LACDA project protect the remaining wetlands in the project area?

We look forward to receiving your response to these and our other questions. Thank you again for the opportunity to comment on this study.

Cordially yours,

Christine Perala

Christine Perala
Chair, Technical Advisory Board
Friends of Los Angeles River

Friends of the Los Angeles River

Nov. 30 '91

U.S. Army Corps of Engineers
Los Angeles District
P.O.B. 2711
Los Angeles CA 90053-2523
Attn: Ms. Pat Luvendar

Dear Ms. Luvendar,

This letter is an additional response to FoLAR's Oct. 21st letter in response to the LACDA Feasibility Study Draft Interim Report and EIS.

It is clear that that the Corps of Engineers has only given the most cursory and elemental look at a number of alternatives to raising the parapet walls and bridges along the lower Los Angeles River. We have asked for and have yet to see, and are still asking to see the complete economic calculations that went into rejecting the alternatives of selectively widening the river along its length, including buying land to be used as a combination of parkland and flood control basin; and removing "soft-bottoming" sections of the river to increase the river's flodd control capacity. In addition, we have asked for and have yet to see a cost-benefit analysis of the effects of large urban riverside parks on real estate values; i.e., the socioenvironomics of parkland creation. Where are these calculations? Until such calculations are made public for thoughtful analysis, FoLAR can only conclude that in fact the Corps has been derelict in its analysis; and we therefor insist that the Corps' EIS be rejected as inadequate.

Sincerely,

Lewis MacAdams
Friends of the Los Angeles River

FoLAR P.O. Box 292134 Los Angeles, CA 90029 213.663.7331

RESPONSE TO COMMENTS

Three letters

From Friends of the Los Angeles River, October 21, 1991

1. A 45-day public review period is normally requested as standard practice consistent with the National Environmental policy Act. An additional 30 days response was granted by the Los Angeles District and is acknowledged in your letter of November 25, 1991.

2. The Corps coordinates and cooperates with ancillary agencies whose primary responsibility is, as in the case of Los Angeles County, groundwater recharge. The proposed project has been "multi-jurisdictional" from its inception.

3. The River has been surveyed and mapped many times and numerous authorities have been consulted. The evaluation of moderate or low wildlife values is from the FWS and is used in a broad comparative sense with respect to other habitat zones in and around the southern California region. See Appendix G, . Coordination Act Report and species list.

4. Sections VII and VIII of the "Economics Technical Report" for the LACDA Review Study - available for perusal at Corps Los Angeles District headquarters offices - explains the economic analysis and concomitant federal requirements for the formulation of cost and benefit analyses. Benefits are defined by these regulations as increases in the economic value of the goods and services that result directly from a project. Therefore, those additional benefits recommended in your letter were precluded from assessment.

5. Channel maintenance will not change from the present where the Los Angeles County Department of Public Works perform maintenance on the channel segments in the proposed project area. Access to the channel inverts will either be the same as pre-project or improved compared to pre-project conditions. In general, the ramps will simply be extended high enough to allow vehicles to drive over the parapet walls.

6. An overflow analysis of the major watercourses in the los Angeles County Drainage Area system was conducted to establish the extent of inundation that would occur under the present operating plans at the LACDA reservoirs. The analyses included with- and without project overflow analyses, preliminary alternative formulation and design, and the final feasibility level of design of the project. They are summarized in the LACDA "Hydraulic Technical Report".

To date, the existing concrete channels in the LACDA system have generally functioned as designed. In general, sediment loads are not significantly high due to

the presence of over 100 debris basins and the flood control basins located upstream which trap most of the heavy sediment loads. Hence, the channels function as designed being relatively free of bed-load material.

In general, soft bottom designs were not considered feasible due to the extremely high costs associated with acquiring sufficient right-of-ways. Other considerations include the following.
Assuming that the existing basins remain in place, a soft bottom design would tend to scour in some areas, possibly increasing the channel capacity, and aggrade in others. However, the net sediment budget of the system would not be in equilibrium since sediment eroded from the bed would be flushed out to sea with very little replenishment from upstream sources. This could lead to failure of the channel sideslopes (e.g., riprap, concrete, gabions,) and bridge failure due to pier scour which could result in extremely hazardous conditions.

Specifically, many of the existing bridges were designed to function with a concrete invert. Removing the concrete invert would result in pier scour and possible failure of these bridges with dire consequences. This issue was clearly demonstrated during the 1938 flood where several bridges along the Los Angeles River failed due to excessive pier scour.

A soft bottomed channel may assist in ground water recharge as is currently done along the San Gabriel and Santa Ana Rivers. However, opportunities for additional recharge are severely constrained within the existing right of way. Water quality may be an issue since the most toxic flows (i.e., the first runoff event of each storm season) would pass through these ground water recharge zones.

7. National Pollution Discharge Elimination Standards (NPDES) - a component of the amended Clean Water Act - is a program administered by the Environmental Protection Agency (EPA) to require permits from those operations which release water from a point source through the Regional Water Quality Control Board. The RWQCB issued a NPDES permit to Los Angeles County for initiating the compliance process for monitoring and improvement of Los Angeles River discharges by July 1992.

8. The environmental and benefit cost analyses performed for this study are consistent with NEPA and Federal planning guidelines. The proposed flood protection improvements do not preclude future options for environmental enhancement. Resource agencies have concurred with this conclusion.

9. The funding from Rep. Bielenson, Aug. 1991, has been placed in a separate study authorization, the Los Angeles Watercourse Study which will assess issues in LACDA. The funding Recreation plans are the responsibility of the local sponsor. Since wetlands are not impacted by the proposed project no consequent mitigation or economic analyses undertaken. "Potted plants or built-in planters" would not be used to mitigate for any wetland losses.

10. The main report acknowledges that local writers have long advocated the use of the channel for auto/truck transit. It does not advocate that use as reflected in the final alternative set in compliance with NEPA. This study does not consider the Los Angeles River as a permanent transportation corridor.

11. The Corps has had no control over, or responsibility for, the increasing permeability of the Los Angeles Basin. Some 100 sediment and detention basins controlled by Los Angeles County Department of Public Works currently reduce flows into the system as suggested by the letter. Any basin/park construction - in addition to the ones already in place - would be the responsibility of a local sponsor.

12. The technical viability of rectangular concrete flood control channels has been repeatedly demonstrated by channels located throughout the Los Angeles District including the LACDA system. This basic design, in combination with debris control upstream, is very efficient at conveying flood flows through steep areas in which insufficient right-of-way exists for wider, more natural channel alternatives. For the proposed project, the vertical parapet walls would be located at the top of existing trapezoidal walls. This configuration forms a composite cross section in which most of the flow is contained within the existing trapezoidal section.

In the LACDA system, a series of over 100 debris basins and several flood control basins (i.e., Sepulveda Dam) trap most of the bed-load material before it reaches the concrete sections of the Los Angeles River. Therefore, no design deficiency exists. This is further substantiated by the performance record of the River.

The effects of flood debris and sediment have been adequately accounted for in the existing and proposed designs. The effects of debris loading on bridge piers is included in the hydraulic computations performed to determine the water surface elevations. These water surface elevations are used to design channel wall heights and minimum elevations of bridge crossings.

The effect of sediment is also included in the hydraulic computations. Upstream sediment control (i.e. debris and flood control basins) trap most of the bed-load material before it reaches the mainstem channels. Thus, the hydraulic roughness is not significantly increased due to transport of bed-load material. However, the concrete invert does experience some abrasion by sand during small flood events. This "sediment induced" roughness of the concrete is accounted for in the roughness value used for the hydraulic computations.

Current research in the area of hydraulic roughness in supercritical flow due to bed-load transport is presently being conducted by the U.S. Army Engineer District, Los Angeles and the Corps of Engineers Waterways Experiment Station. Initial results of this research indicate that the increase in hydraulic roughness, in supercritical flow, is a function of the bed-load material concentration. In general, bed-load concentrations in the Los Angeles River are not sufficiently large enough to have an effect on the hydraulic roughness of the channel.

The proposed design discussed in the feasibility report will increase the capacity of the project reaches to approximately the 133-year level of protection. Hence, a 101-year flood event would not overtop the walls of the channel in the project reaches. However, a flood slightly larger than the design flood, for example the 135-year flood, may exceed the capacity of the proposed project by overtopping the parapet walls.

The current level of protection of the system ranges from between 25- and 40-years. Since the proposed project would increase the level of protection to about the 133-year level, public safety would be increased, not decreased. This increase in safety would be due to less frequent flooding and decreased flood stages (in the flood plain) during greater than design events. Additionally, the proposed plan includes protecting the levees from catastrophic failure by overtopping flood waters.

The current design calls for construction of parapets walls ranging in height from 0.1 to 9.3 feet. The highest walls, ranging from 8 to 10 feet, would be constructed on the Rio Hondo for a distance of 3150 feet on each side of the channel representing only about 3.5 percent of the total 89,900 feet of parapet walls to be constructed for the overall project. The highest walls proposed for the Los Angeles River are about 7.8 feet high and there are no plans to construct parapet walls 12 feet high.

Letter of November 25, 1991

The primacy of environmental protection as an institutional mission is carried out by compliance with the federal legislation such as W.R.D.A. 1990 and the Fish and Wildlife Coordination Act. Please refer to Appendix G (the FWS's Coordination Act Report), which assesses pertinent ecological and biological concerns and concluds that this project has no significant impacts on natural communities.

Letter of November 30, 1991

During the preliminary plan formulation phase several alternatives were identified in close coordination with representatives from the Los Angeles County Department of Public Works and the U.S. Forest Service. At the same time, non-structural measures were evaluated, i.e., local flood walls, flood proofing measures and flood plain management. The non-structural approaches and watershed management were found to have negligible benefits at relatively high costs. Public and open forum workshops were held in October 1987 and March 1989 to discuss issues, concerns and potential solutions. All alternatives were evaluated to first meet the project objective and some were eliminated from further consideration based on this initial analysis. The remainder of the alternatives which appeared promising were subjected to a preliminary benefit-cost analysis. Measures such as diversion tunnels, off-channel storage, and pumping water to another watershed were found to reduce flows to the critical reaches of the channel but costs would be prohibitive and would far outweigh the projected flood damage reduction benefits. Detention of

flood waters in gravel pits, groundwater spreading basins, floodways, wetlands and other low-lying areas were considered. It was found that no undeveloped sites exist in the LACDA basin that could accommodate the storage (10,000-20,000 acre feet) necessary to impact the peak flows in the channel. These plans were eliminated from consideration. The annual benefits and costs associated with some of the alternatives are provided in Tables 7 and 10 of the main report. The categories of benefits are limited to what is contained in the National Economic Development Procedures Manual and the Engineering Regulation 1105-2-100, "Guidance for Conducting Civil Works Planning Studies".

There was no cost benefit analysis conducted on the effects of large urban riverside parks on real estate values because such effort is outside the scope of the study. The primary benefits evaluated were related to inundation reduction.

STATE OF CALIFORNIA PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
LOS ANGELES REGION
101 CENTRE PLAZA DRIVE
MONTEREY PARK, CA 91754-2156
(213) 266-7500

October 15, 1991 File: 700.135

Charles S. Thomas, Colonel
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, CA 90053-2325

DRAFT INTERIM REPORT AND ENVIRONMENTAL IMPACT STATEMENT - FLOOD CONTROL IN LOS ANGELES COUNTY DRAINAGE AREA. U.S. ARMY CORPS OF ENGINEERS.

We have reviewed the subject document regarding the proposed project and have the following comments:

1) Construction activities should be kept out of the flows in the Rio Hondo, Los Angeles River, and Compton Creek to the extent possible in order to minimize impacts to water quality. In addition to the proposed downstream sediment basins, methods should be implemented to eliminate the entry of non-sediment debris into the waterways as the result of construction operations.

2) No refueling of equipment should occur in the channels. Methods to eliminate oil and gasoline spills into the channels should be implemented.

3) Impacts to aquatic habitats, including wetlands, should be avoided.

4) Access to the channels should not be blocked by the parapet walls in order to enable agencies to conduct water quality monitoring and respond to spills and leaks.

5) Consideration should be given to investigate the possibility of controlling and utilizing the sediment load in flood flows, such as for use in the backfill of no longer used sand and gravel pits in order to minimize groundwater intrusion.

6) Any dredging activities would be subject to Waste Discharge Requirements issued by the Los Angeles Regional Water Quality Control Board. A Report of Waste Discharge should be submitted to this office at least 120 days prior to the commencement of this project.

Thank you for this opportunity to review your document. Should you have any questions, please contact Lauma Jurkevics at (213) 266-7607.

J. MICHAEL LYONS
Environmental Specialist IV

RESPONSE TO COMMENTS

Letter from CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, Oct. 15, 1991.

Thank you for your letter. The Selected plan for the Los Angeles County Drainage Area is committed to the six points made in your letter. During construction, in order to minimize sediment impacts and avoid accidental discharge of pollutants, work will be confined to low flow periods, sediments will be trapped using sheet pile double wall coffer dam enclosures at each bridge pier location, and refueling of equipment near the channel will be limited and monitored.

COUNTY OF LOS ANGELES
DEPARTMENT OF PARKS AND RECREATION

433 South Vermont Avenue - Los Angeles, California 90020-1975 - (213) 738-2961

Rodney E. Cooper . . . . Director

October 18, 1991

COUNTY OF LOS ANGELES
BOARD OF SUPERVISORS

Gloria Molina
First District

Kenneth Hahn
Second District

Edmund Edelman
Third District

Deane Dana
Fourth District

Mike Antonovich
Fifth District

PARK AND RECREATION COMMISSION

James Bishop

Arturo Chayra

George Ray

Douglas Washington

Ms. Patricia Luvender
U.S. Army Corps of Engineers
Los Angeles District
(CESPL-PD-WA)
P.O. Box 2711
Los Angeles, CA 90053

Dear Ms. Luvender:

LOS ANGELES COUNTY DRAINAGE AREA REVIEW
DRAFT FEASIBILITY REPORT

The Department has reviewed the subject report and finds the analysis related to recreation and aesthetics, specifically mitigation for potential bicycle and equestrian trail impacts, to be acceptable.

We appreciate the opportunity to review the document. If you have any questions or need any additional information, please contact me at (213) 738-2965.

Sincerely,

Jim Park

Jim Park
Chief, Planning Division

CVR

PARKS ARE FOR PEOPLE

RESPONSE TO COMMENTS

Letter from LOS ANGELES COUNTY DEPARTMENT OF PARKS AND RECREATION, Oct. 18, 1991.

Thank you for your letter.

GERALD A. MULROONEY
Mayor
ELVIRA AMARO
Vice Mayor
ESTHER C. CALDWELL, Ed. D.
Councilmember
MANUEL E. GUILLEN
Councilmember
HENRY HARKEMA
Councilmember

CITY OF PARAMOUNT

Administrative Services
(213) 220-2027

October 23, 1991

Ms. Patricia Luvender
Corps of Engineers
Los Angeles District (CESPL-PD-LUA)
P.O. Box 2711
Los Angeles, CA 90053-2325

Dear Ms. Luvender:

Re: LACDA Project Support

The City of Paramount strongly supports the recently completed draft feasibility report for the Los Angeles County Drainage Area Review. The report recommends the construction of parapet walls on the sides of the Los Angeles and Rio Hondo Rivers. This project will protect surrounding cities from the damages of major floods.

The project already has a local sponsor, the Los Angeles County Flood Control District, which has pledged 50% of the project construction costs. In addition, our local congressional delegation has obtained a planning and design appropriation of $3,000,000.

Failure to construct the LACDA project will have devastating impacts on one of the most populus and economically viable regions in California, the United States, and perhaps the world.

This project is urgently needed and Paramount strongly supports it.

CITY OF PARAMOUNT

Gerald A. Mulrooney

Gerald Mulrooney
Mayor

RESPONSE TO COMMENTS

Letter from CITY OF PARAMOUNT, Oct. 18, 1991.

Thank you for your letter; your comments are noted.

NOTES

I will not be able to Attend the Meeting, I Agree with the U.S. Army Corps of Engineers on the Flood Control District, that the L.A. River and the Rio Hondo. All of the Drainage should be Improved and Brought up to date then if we Every have any Big Flash Flood we will be Ready for them. All of our Drainage here in Compton, they need Cleaning out. People Throw Every type of Junk-Tire Everything you Can Name is Floating in the Lower Bed Drainage in 1949. I Bought my Home Here in Compton, from Central Ave to Wilmington, out, Elegunds Blvd was a Dirt Road, at that Ave on Elegunds, was a Water Drain Ditch. Every Car that Come through would get Stuck in the mud, So later on the Build the Los Angeles River Channels Drainage, I saw a Drainage Canal that was Building in Long Beach Calif, in the County of Mescott Ave in 1960 later on they Paved Concrete in it, I know I seen Drainage the Built all over Calif, I know They Cost Millions of Dollars. But We All need them when it Rain Hard, I Hope they will Build more Debris Basins that will Catch all of the Big Debris, and Let Water only, Drain in the Ocean. I Retired from the part of T.A Harbor Dept, We operate a Large Boat to Clean up all Debris that Floated in the Wilmington Calif, Drainage when water is High from Rain the Big Drainage Doors Would open up, and Come Tree's Trees Tires Fruit, Pilings, Sign, Dead Dogs, goats Everything that would Float, Come out Dra to ocean.

Your Name (optional): Julius M. Warren

Address (optional): 2000 N. Wilmington Ave, Compton, Calif, 90222

15



Drainage Canal, Compton Calif.
Dwight Ave & Rosecrans Ave

All of the Drainage Canal, All over Compton an L.A. Calif. Are Filled up With Debries. I See People Dumping oil, An oil Filter from their Automobels, old Hous Stoves An Sofass An old Refrerators People Drive their trucks full of trash up to the Canal an Dump their trash in it, You Can Report them to Police, They won't do Anything to them; most of this Debris an oil kill the Fish in the Harbor when it Reaches there from Rain. The County an State goverment, Should have Guards day & night to protect these Canals,

RESPONSE TO COMMENTS

Letter from Julius Warren,

The segment of the Los Angeles River channel from Southern Ave. to Lankershim Blvd. is operated and maintained by the Corps of Engineers by periodic inspections. The remainder of the channel is operated and maintained by the Los Angeles County Department of Public Works. Their maintenance is on an annual basis but may be more frequent when problems are brought to their attention. Any decision to patrol or police the river channels to prevent illict dumping would have to come from the cities or other agencies which control frontage along them.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333

September 26, 1991

U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, California 90053-2325

Dear Sir:

We have completed our review of the Los Angeles County Drainage Area (LACDA) Review Study/Draft Environmental Impact Statement (DEIS). We are responding on behalf of the U.S. Public Health Service.

We have reviewed the Draft EIS for potential adverse impacts on human health. We concur that the proposed NED Plan Alternative will result in a beneficial impact to public safety. This alternative will result in the elimination of the 100-year flood threat, and will eliminate the potential release of hazardous and toxic materials being released into the environment during such a flood event. We believe impacts associated with the levee construction, raising of the bridges, and other aspects of the preferred alternative have been adequately addressed, including appropriate mitigation plans.

Thank you for the opportunity to review and comment on this document. Please ensure that we are included on your mailing list to receive a copy of the Final EIS, and future EIS's which may indicate potential public health impact and are developed under the National Environmental Policy Act (NEPA).

Sincerely yours,

Kenneth W. Holt

Kenneth W. Holt, M.S.E.H.
Special Programs Group (F29)
National Center for Environmental
Health and Injury Control

RESPONSE TO COMMENTS

Letter from PUBLIC HEALTH SERVICE, September 26, 1991.

Thank you for your letter; your comments are noted.

CITY OF LAKEWOOD
CALIFORNIA
Robert G. Wagner
Mayor

October 7, 1991

Ms. Patricia Luvender
Los Angeles District, Corps of Engineers
Planning Division, WRB
P.O. Box 2711
Los Angeles, California 90053

SUBJECT: Support for LACDA Project

Dear Ms. Luvender:

Please include these remarks by Mayor Robert Wagner of Lakewood in your record of the Corps of Engineers public hearing, held October 1.

Lakewood strongly believes that quick action on the LACDA plan is needed to shield residents and business owners from what Governor Wilson aptly calls a "de facto building moratorium" in the Los Angeles River drainage area.

Mayor Gardner of Pico Rivera, as spokesperson for the Drainage Alliance, called for swift action on implementing the plan. Lakewood is in full accord with Mayor Gardner and his assessment of the destructive effects of the draft FIRM.

Mayor Wagner's remarks also emphasize our support for the steps already taken by the Corps of Engineers.

Thank you for this opportunity to amplify our position.

Sincerely,

Howard L. Chambers
City Administrator

acv

Enclosure

Lakewood
5050 N. Clark Avenue, Lakewood, CA 90712 • (213) 866-9771 • (213) 773-2964 • Fax (213) 866-0505

Mark Tittl
Vice Mayor

Joseph Esquivel
Council Member

Robert G. Wagner
Mayor

Wayne Piercy
Council Member

Larry Van Nostran
Council Member

October 24, 1991

COL Charles S. Thomas
District Engineer
Department of the Army
P. O. Box 2711
Los Angeles, California 90053-2325

Dear Colonel Thomas:

Enclosed is the Resolution adopted by the Lakewood City Council in support of the LACDA study.

Sincerely,

Charles K. Ebner, AICP
Director of Community Development

CKE:pcu

Enclosure

Lakewood

5050 N. Clark Avenue, Lakewood, CA 90712 • (213) 866-9771 • (213) 773-2964 • Fax (213) 866-0505

RESOLUTION NO. 91-82

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LAKEWOOD CONFIRMING SUPPORT FOR THE LOS ANGELES COUNTY DRAINAGE AREA PROJECT

THE CITY COUNCIL OF THE CITY OF LAKEWOOD DOES HEREBY RESOLVE AS FOLLOWS:

WHEREAS, the U.S. Army Corps of Engineers has analyzed the adequacy of the existing major flood control facilities in the Los Angeles County Drainage Area (LACDA); and

WHEREAS, the LACDA study has found that inadequacies exist in the existing storm drain system and that some portions of the mainstem system provide only 25- to 50- year protection; and

WHEREAS, it is estimated that flood damages from a 100-year storm could total $2.3 billion and cover an 82-square-mile area housing 625,000 people; and

WHEREAS, to mitigate the flood threat of the Los Angeles River, the Corps of Engineers is proposing to:

Increase the effective channel height by building parapet walls on 21 miles of existing levees;

Raise or modify 27 bridges along the Los Angeles River to accommodate the parapet walls;

Widen and convert to rectangular cross-section 1.5 miles of channel below the confluence with the Rio Hondo channel;

Armoring of the land side of the levees in four locations;

Applying a concrete overlay in reaches with an existing rough grouted stone channel surface.

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Lakewood:

SECTION 1. In order to mitigate the flood threat of the Los Angeles River and to provide for the safety of the residents within the Los Angeles basin, this City Council strongly urges Congress to approve the LACDA project, fully fund the project during the preconstruction, engineering, and design phase, and authorize construction of the remedial work on the LACDA system at the earliest possible date.

SECTION 2. That the Clerk of the City Council shall certify the adoption of this resolution and deliver a certified copy to Senators Cranston and Seymour and Congressman Anderson.

ADOPTED AND APPROVED this 22nd day of October, 1991.

Mayor

ATTEST:

City Clerk

RESPONSE TO COMMENTS

Letter from CITY OF LAKEWOOD, Oct. 7 and 24th, 1991.

Thank you for your letter; your comments are noted.

CITY OF LONG BEACH
OFFICE OF THE CITY MANAGER
333 WEST OCEAN BOULEVARD • LONG BEACH, CALIFORNIA 90802 • (213) 590-6711
FAX (213) 590-6107

JAMES C. HANKLA
CITY MANAGER

September 26, 1991

Ms. Patricia Luvender
U.S. Army Corps of Engineers
Los Angeles District (CESPL-PD-WA)
P. O. Box 2711
Los Angeles, CA 90053

Subject: National Economic Development Plan
Proposed Los Angeles County Drainage Area
Feasibility Study Environmental Impact Statement

Thank you for the opportunity to review the Draft Feasibility Report and the draft Final Environmental Impact Statement relating to the Los Angeles County Drainage Area.

The National Economic Development (NED) Plan proposal offers the citizens of Long Beach much needed protection from both the projected 50 and 100 year flood levels. Consequently, we support the proposal. However, based upon the material provided, it appears that the plan will cause significant economic and environmental impacts to the City of Long Beach:

Economic Concerns

The report indicates (p. 141) that the NED Plan will result in the need for additional storm water detention storage or increased pumping capacity for the storm drain pump stations operated by Long Beach. These improvements will be extremely costly. Yet, a review of the project cost (pp. 144-150) suggests that project funding does not include these improvements. This issue must be addressed in the report. Further, we request that project funding be expanded to include the upgrade of these facilities.

The parapet walls will be subject to a high incidence of graffiti. Graffiti removal is likely to be very costly and will be necessary on a regular basis. The report (p. 127) suggests the installation of murals and/or landscaping as a means of mitigating aesthetic impacts. These expenditures, which are likely to be considerable and necessary on a regular basis, should be addressed in the report. We request that this be included in the project maintenance budget.

Environmental Effects

Currently the bicycle trail experiences a high incidence of crime against persons and property. This is due primarily to the reduced visibility and surveillance capabilities of the existing trails. The parapet walls will further reduce visibility and will likely serve to increase the policing problem.

The impact upon reduced public safety and the mitigation should be addressed in the Environmental Impact Statement.

The parapet walls will cause view blockage and will result in generally unattractive areas. The report should include specific feasible measures to mitigate these effects.

In summary, the City of Long Beach supports the National Economic Development Plan proposal, but we are concerned about the hidden local costs as well as likely environmental impacts.

Sincerely,

for James C. Hankla
City Manager

JCH:jm

RESPONSE TO COMMENTS

Letter from City of Long Beach, September 26, 1991.

Thank you for letter. Your comments are noted and addressed below.

Economic Concerns

With regard to your comment that a statement in Section IV, Part C (p.141) of the Main Report indicates that an increased need for storm water detention storage or increased pumping capacity by City-operated storm water pumping plants, please note the following. The statement in the draft report may be misleading and has been modified to reflect that it is inappropriate to evaluate the effect of the project on flooding in the City of Long Beach using the difference in pump tailwater elevation alone. The real impact of the project is the difference in water surface elevations on the landward side of the levee. The reason that the tailwater elevations may be higher with-project is that water which formerly inundated the city from extensive upstream breakouts will be kept in the river, thus greatly reducing the amount of water the pumps will have to move. A review of the base condition without project overflows reveals that flooding for the without-project condition is significantly worse than any residential interior from the City of Long Beach. Without-project depths of mainstem flooding range from approximately 2 to 14 feet in Long Beach. This can be compared to with-project interior flooding which is expected to be limited to nuisance street flooding. During a 100-year flood without-project, the pump plants would be overwhelmed by the mainstem breakouts and would have little effect reducing the extent of flooding. With the project in place during a 100-year flood, the conditions at the pump plants would be considerably improved since only locally generated runoff would need to be pumped and/or stored. The NED plan will improve conditions in the flood plain and more specifically, improve conditions at the existing pump plants. An annual maintenance amount has been estimated and included in project costs.

Environmental Effects

The County and the Corps may consider backfilling the maintenance road/bike path during the next stage of planning, engineering and design efforts.

City of Pico Rivera

P. O. BOX 1016 · 6615 PASSONS BOULEVARD · PICO RIVERA, CALIF. 90660
CITY COUNCIL (213) 801-4371 · CITY MANAGER (213) 801-4368
FAX (213) 949-7606

October 25, 1991

Ms. Patricia Luvender
Corps of Engineers
Los Angeles District (CESPL-PD-LUA)
P.O. Box 2711
Los Angeles, CA 90053-2325

Dear Ms. Luvender:

The City of Pico Rivera is greatly encouraged by the draft feasibility report for the Los Angeles County Drainage Area Review recently prepared by the Army Corps of Engineers. This project to provide a significant level of protection to this community from the damage and devastation of a potential incident for major flooding offers our residents a significant measure of safety and reassurance.

As the local project sponsor, the Los Angeles County Flood Control District has indicated its willingness to pledge 50% of project costs. This City and other municipalities participating in the LACDA Alliance have been further encouraged by the announcement that our local Congressional delegation has obtained a $3 million planning and design federal appropriation. This represents another strong indication of the widespread support being given to the proposal to construct parapet walls on the sides of the Rio Hondo and Los Angeles rivers.

Your staff has already been apprised of the deep concerns previously expressed by the City of Pico Rivera and other cities of the LACDA Alliance should restrictive building regulations contained in the National Flood Insurance Program become effective January 1993 following adoption of the revised Flood Insurance Rate Maps. These building regulations called for from that time forward would certainly impede, if not prevent, further development in this City.

The adverse economic impact upon Pico Rivera could well trigger a significant negative fallout to cloud this City's growth and progress far into the future. Imposition of mandatory floodplain management regulations would present a formidable barricade to new development and, at best, cause any improvements to be derailed and postponed for several years.

The proposed regulations clearly would force project costs to escalate to a point where they may become economically unfeasible and we may possibly suffer the permanent loss of those development opportunities. This raises a specter of longtime loss of community improvements and valuable tax base increases while placing local employment opportunities at risk.

Many of these developments are redevelopment projects, critical to the efforts of Alliance cities to revitalize their communities and strengthen and balance their tax bases. As a fully developed community, redevelopment for Pico Rivera represents one of the few key opportunities to improve our tax base.

Additionally, the building regulations would threaten the dozens of homes being remodeled by local residents every month which represents several hundreds of thousands of dollars in home improvements. Given housing prices in today's market, remodeling is one of the only ways Pico Rivera families can meet their housing needs at an affordable cost.

Nearly all of Pico Rivera's single-family homes were built during the 1940s, through the 1950s and early 1960s. Housing rehabilitation is certainly an essential element of this community's neighborhood preservation efforts.

In conclusion, it has been determined by comprehensive studies that the parapet wall alternative for improving levees along the Rio Hondo and Los Angeles rivers provides the vest overall value because (1) it provides the needed protection, (2) it has relatively low cost, (3) it doesn't require extra land, and (4) it has limited environmental impacts.

For these and other significant reasons, the City of Pico Rivera is enthusiastically endorsing the proposal for construction of parapet walls. This is clearly the best alternative to minimize the adverse economic impact of mandatory floodplain management regulations which threaten the continued success of our City's future.

Yours very truly,

Garth G. Gardner

Garth G. Gardner
Mayor

GGG:WAS:mij

RESPONSE TO COMMENTS

Letter from CITY OF PICO RIVERA, Oct. 25th, 1991.

Thank you for your letter; your comments are noted.

October 25, 1991

Ms. Patricia Luvender
U.S. Army Corps of Engineers
Los Angeles District
CESPL-PD-WA
P.O. Box 2711
Los Angeles, CA 90053

Dear Ms. Luvender:

Thank you for providing us with a copy of the Draft Feasibility Report and Draft Final Environmental Impact Statement for the Los Angeles County Drainage Area(LACDA) Review Feasibility Study. Out comments are brief since we did not receive the report until October 22.

The LACTC study and EIS should recognize the LACTC proposal to develop a truck facility on the portion of the Los Angeles River south of the Arroyo Seco, which overlaps with the area in the LACDA study form the Rio Hondo to the Long Beach harbor area. While the LACTC has not formally acted on the proposal, and any actions will require significant additional engineering, hydrological, and environmental study, the fact that this is being given serious consideration should be recognized in the LACDA documents. If we do move ahead, there may be some ability to share the costs of bridge raising and construction of the parapet walls to allow the increase in capacity for both existing flood protection and truckway improvements on the channel bottom.

Thank you for your consideration on this issue.

Sincerely,

ROBERT CASHIN
South Bay Area Director

RDC:vk
LACDA1

RESPONSE TO COMMENTS

Letter from LOS ANGELES COUNTY TRANSPORTATION COMMISSION, Oct. 25, 1991

Thank you for your letter; your comments are noted. In June and in September 1991 the Corps submitted its draft and final comments by letter to you regarding your Conceptual Engineering Analysis of Potential Transportation in the Los Angeles River and Tujunga Wash Channels. Proposed transportation uses of the Los Angeles River channel are addressed in the LACDA Main Report. However, flood control solutions are primary in the LACDA Feasibility Report and nothing in the planned upgrade of the system precludes adaptation of the channel for such uses. Transportation proposals may be evaluated at a later date when and if the necessary Congressional authorization and appropriation of funds are obtained. At that time, an extensive transportation analysis governed by principles mandated by Federal regulations would need to be conducted. The transportation use would need to contribute to the National Economic Development consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders and other Federal planning requirements.

City of Montebello

ALL AMERICA CITY

1600 W. BEVERLY BOULEVARD
MONTEBELLO, CA 90640

October 30, 1991

Ms. Patricia Luvender
Office of the Chief Water
Resources Branch
U.S. Army Corps of Engineers
L.A. District CESPL-PD-WA
P. O. Box 2711
Los Angeles, CA 90053

Subject: Los Angeles County Drainage Review Feasibility Study Draft Interim Report and Environmental Impact Statement.

Dear Ms. Luvender:

The City of Montebello would like to recommend that when the reconstruction of Washington Boulevard and the Whittier Boulevard bridges are accomplished that the bridges be widened to safely accommodate vehicles, pedestrians and bicycles.

In reference to the appendices schedule from the Feasibility Study Draft on page xi, we could not find the appendices that are listed on this page. Also, on page EIS 3-40 of the Environmental Impact Report, Section 3.8.2.2; Rio Hondo Channel, we were not able to find the map locating sites.

Please let us know where these items can be found. It will be appreciated. You may contact me at (213) 887-1465 for any additional questions or information that you may have.

Sincerely yours,

CLARK SIEGMEYER
Assistant City Engineer

CES:CD:amr

RESPONSE TO COMMENTS

Letter from CITY OF MONTEBELLO, Oct. 30th, 1991.

Thank you for your letter; your comments are noted and also forwarded to the Los Angeles County Department of Public Works for their consideration. Changes have been made in the report and EIS.

City of Downey
FUTURE UNLIMITED

CITY COUNCIL
BARBARA J. HAYDEN
MAYOR
DIANE P. BOGGS
MAYOR PRO TEM
ROBERT G. CORMACK
COUNCIL MEMBER
ROBERT S. BRAZELTON
COUNCIL MEMBER
RICHARD D. CARTER
COUNCIL MEMBER

CITY MANAGER
GERALD M. CATON

CITY CLERK-TREASURER
JUDITH E. McDONNELL

October 24, 1991

Charles S. Thomas
Colonel, Corps of Engineers
District Engineer
Department of the Army
P.O. Box 2711
Los Angeles, CA 90053-2325

RE: DRAFT FEASIBILITY REPORT - LOS ANGELES COUNTY DRAINAGE AREA

Dear Colonel Thomas:

The City of Downey has completed its review of the Draft Feasibility Report for the Los Angeles County Drainage Area. As an active member of the LACDA Alliance, the City of Downey supports this much needed flood control project. The timely and successful project completion is key to the economic health of our community and the surrounding areas. Absent the project, our communities will be forced to impose drastic floodproofing measures, such as raising heights of new construction of homes and businesses. Absent the project, costly flood insurance will be imposed further adversely impacting our local economies.

The City has specific comments and suggestions which should be addressed in the Draft Feasibility Report and the Environmental Impact Statement.

Vehicular Bridge Reconstruction - Downey is identified for several bridge reconstructions along the Rio Hondo River. The description of the bridge work is very general. Detour bridges for Florence Avenue and Firestone Boulevard (State Route 42) should be constructed to offer a minimum of two lanes of traffic in each direction. Currently, Firestone Boulevard has five travel lanes. Suva Street is a local connection and ~~two~~ one lanes in each direction should be sufficient for a detour.

The detours should be designed to minimize impacts on the local street network. It is also important that not both Florence Avenue and Firestone Boulevard be reconstructed at the same time. We request the Corps and the local project sponsor, the Los Angeles County Flood Control District, work carefully with the City during detour design and implementation, bridge design and the reconstruction process.

11111 BROOKSHIRE AVENUE POST OFFICE BOX 607 DOWNEY, CALIFORNIA 90241-0607 (213) 869-7331

Both the Florence Avenue and Firestone Boulevard bridges are located near residences and businesses. These residences and businesses may be affected by the noise from demolition and construction. The report should address noise impacts and detail how noise will be mitigated.

The Firestone Boulevard bridge will require widening, resulting in three travel lanes in each direction. Both the cities of South Gate and Downey are impacted from the current substandard bridge. The congestion at Firestone Boulevard and Garfield Avenue impacts the Long Beach Freeway (State Route 710) at peak commute times. Currently, Firestone Boulevard, listed on the Los Angeles County Congestion Management Plan, identifies this as a significant traffic congestion problem. The City is interested in working with Corps, County and other agencies in the widening of the Firestone Boulevard bridge during this project.

Pedestrian Bridge Reconstruction

The report identifies two pedestrian bridges along the Rio Hondo River in Downey. The pedestrian bridge at Station 218+45 (Treasure Island) will not be replaced. The City has no objections to this. We would also like to include the pedestrian bridge at Station 129+50 (Rio Hondo Country Club) for removal, not to be replaced. Both of these bridges are used as escape routes for persons burglarizing/vandalizing homes and businesses located adjacent to the river. The Rio Hondo Country Club bridge will be the site of a reclaimed water line. Currently, the Central Basin Municipal Water District is constructing a reclaimed water system serving schools, parks and golf courses in this area. The line should be identified in the report, as well as the method of spanning the river channel.

Parapet Walls

According to the report, the parapet walls will range in height throughout Downey to two to eight feet, depending on the location. Graffiti has been a significant problem in Downey and surrounding communities. These walls have other aesthetic problems, especially as they are increased in height. The City suggests that the outer surface of the walls be cast with a texture or pattern. The texture could serve to mitigate aesthetic impacts, while providing a surface in which graffiti can easily be removed.

Recycling Construction Materials

The project should incorporate reuse of excavated paving and bridge materials. Portland Cement Concrete could be crushed to provide stone for armoring of the levees. Pieces too small to be used as stone could be crushed and mixed with earth to provide base material for new paving on the levees. Existing Asphaltic Cement Concrete could also be crushed and mixed with excavated earth to provide a base for paving or fill for the new approaches to the bridges.

The City of Downey appreciates the opportunity to respond to the Draft Feasibility Report and Environmental Impact Statement for the LACDA Project. We request a copy of the Final Report and Environmental Impact Statement when completed.

Please do not hesitate to contact me if you have any questions or concerns regarding these issues.

Sincerely,

Gerald M. Caton
City Manager

GMC/dt

cc: Mayor and Council
Ken Farfsing
Richard Redmayne
Art Rangel
Carl Blum
Patricia Luvender

gc3/corpeir.rsp

RESPONSE TO COMMENTS

Letter from City of Downey, October 24, 1991

Thank you for your letter. Your comments concerning vehicular bridge reconstruction and pedestrian bridge reconstruction have been forwarded to the Los Angeles County Department of Public Works for their consideration. As requested, the Corps and County expect to continue working with the City during detour design and implementing bridge design and the reconstruction process. Noise mitigation measures will be implemented to the extent practicable by restricting hours of operation and regulating use of equipment. Your suggestions concerning the parapet walls surface texturing and recycling of construction materials are appreciated and will be considered in the preliminary engineering and design phase of the project.

October 26, 1991

Mark Giles
12030 Goshen Avenue #6
Los Angeles, Ca. 90049
(213) 477-3014

Patricia Luvender
Department of the Army
Los Angeles District, Corps. of Engineers
P.O. Box 2711
Los Angeles, Ca. 90053

Dear Ms. Luvender:

Enclosed you will find a draft of my thesis statement that gives a general overview of my intentions for the Los Angeles River. Since our discussion, the LACDA Study has arrived and has provided me with a wealth of information. In addition, I spoke with Diego Cadena at the Department of Public Works and he provided me with more information. It seems that the idea of using the spreading basins as a possible site is not feasible because of the constant presence of water in the basins. After my discussion with Mr. Cadena and Reinaldo Rodriguez from the Hydraulic/Water Conservation Division ,the Taylor Yard Site, seems to be the most appropriate and plausible site for my thesis.

I am to meet with Friends of the Los Angeles River next week and that will provide me with more information on their intentions and ideas concerning the Los Angeles River. I am familiar with their feelings with the Taylor Yard and the Corps. of Engineers concern for controlling the flood waters. I hope I can provide a solution for both parties.

If any information becomes available, I would appreciate receiving a copy. Thank you for your assistance.

Sincerely,

Mark Giles

Mark Giles
September 16 , 1991

Thesis Intention Statement:

The Ability for Architecture/Landscape to Re-create/Rejuvenate Site.

Statement:
Currently in our society there is a destruction of the natural environment. There is no concern for land use in our cities and with the methods of construction. The intent is to explore a relationship between site and architecture/landscape. Is it possible for architecture and landscape to inform the public about the nature and history of the site? Can architecture re-create/rejuvenate a site into its natural context and inform society about the environment? The thesis relates to to the nature of site and the creation of place through "Green" architecture. "Green" goes beyond the obvious and relates to the forces that exist between architecture, man, and his surroundings. The thesis intends to reconcile the opposing forces inherent in our society: destruction and re-creation/rejuvenation.

Exploration:
Through the cycle of growth, renewal, and death the site and the building will be explored. This concept, inherent in nature, will be applied in the design process. Through a review of past successes and failures following a similar cycle, then the building can be developed. There needs to be a close relationship between the building and the land. The aspects of the site (drainage, slope, vegetation, context, existing structures, and future use) will be explored to determine location. The building itself should not be viewed as a permanent structure, but as one that again will be eventually re-created and rejuvenated. This is not recyclable architecture, but an understanding of the needs of the site and of greater Los Angeles. The form and function of the building must be able to adapt to the forces of nature and the city. There will be an exploration that accounts for past ideas and future needs. The design will only advance once all the constituent parts have been assembled and re-evaluated. This process insures that there is a greater understanding between the initial idea and subsequent stages of design.

Building Type:
The intended building type will be ecological museum/testing center. There will be an exploration of the site and Los Angeles through the museum and the ability to test ideas through the center. The building itself will explore environmental concepts in the use of solar energy, natural ventilation/light, and earth insulation/shelter. In addition, the building must be able to adapt itself as the nature of the site fluctuates. Preliminary program components:

Museum: exhibition hall, lecture rooms, exploratorium, classrooms, offices, studios, observation rooms, library, gallery, information centers, and an ecological park.

Testing Center: irrigation ponds, test sites, water reclamation plant, production fields, offices, workshops, studios.

Site:
The intended site is a Los Angeles River Flood Control Basin in either Long Beach or Glendale. The site criteria is based upon the nature of the site. In their existing contexts, the sites perform a specific function for the man-made environment. The course of the L.A. River has been changed by the growth of Los Angeles. Once the life of Los Angeles, the river has become a sewer, forced to travel a path formed by concrete. This is not a natural situation. The building could encompass the need of the entire Los Angeles River system. The sites allow for flood waters to drop debris before continuing through the channel. The need for these basins has been created by man and the need to control the L.A. River.

RESPONSE TO COMMENTS

Letter from Mark Giles, Oct. 26, 1991

Thank you for your letter; your thesis is appreciated.

Heal the Bay

1640 FIFTH STREET, SUITE 112
SANTA MONICA, CA 90401
213-394-4552 (fax) 213-395-6878

October 31, 1991

Ms. Luvendar
Los Angeles District
Corps of Engineers
Planning Division, WRB
P. O. Box 2711
Los Angeles, CA 90053-2533

VIA FAX: 213-894-5312

RE: Public Comment on LACDA
Final Report/EIS - Draft

Dear Ms. Luvendar:

Heal the Bay is a 10,000 plus member, non-profit, environmental group dedicated to achieving a swimmable, surfable, fishable Santa Monica Bay through public education, outreach and active interaction with Governmental, private and quasi administrative entities to achieve our goals. Urban runoff which presently flows directly into the ocean is of paramount concern to us. Consequently, Heal the Bay's Comments will focus primarily on water quality issues rather than engineering issues.

In light of the projected 100 year life span of the LACDA proposal, we suggest that failure to address flood water quality in conjunction with flood water conveyance issues is a serious shortcoming of both the Feasibility Report and the EIS. This oversight may ultimately lead to delays in initiating the project and significant unbudgeted future costs (cost overruns). Moreover, we will have missed an important opportunity to significantly reduce pollutants presently discharged into the ocean by the system.

We agree with your conclusion that water quality throughout the flood plain is poor (EIS, Section 3.5.1.1, Pg. EIS 3-20). Section 3 of the feasibility study identifies two primary findings which support the conclusion that the lower basin LACDA system must be upgraded (Feasibility Report, section 3; Plan formulation, Causes of The Flooding Problem P. 37-38). We cannot comment at present on the sufficiency of the "Design Storm" Model used by the Corps (Pg. 37 - Feasibility Draft) but are in complete agreement with your concerns as to urban runoff (P. 38, Feasibility Draft) and increased flow resulting from an increase in impervious cover in the Los Angeles Basin.

Heal the Bay

Public Comment on LACDA
Final Report/EIS - Draft
October 31, 1991

WE OFFER THE FOLLOWING CONSTRUCTIVE COMMENTS:

1.) The flood control improvements needed for the basin offer a tremendous opportunity to improve urban runoff water quality. The implementation of Best Management Practices ("BMP") in the region is required by the 1987 Clean Water Act ~~("CCWA")~~ CWA Reauthorization. We can utilize funds for reducing flood risk and improving water quality by implementing BMP'S that increase permeable areas, diverting flows to permeable areas and increase recharge to local aquifers. The effect of retrofitting impervious cover with runoff retarding systems, such as French Drains and Detention Basins, should reduce flood water volume and improve the quality of its content. The impact of these flood damage reduction measures on impervious cover is not assessed. There is no benefit analysis on the "unpaving" of Los Angeles vis a vi increased open space, more trees, a reduction in "heat island" effect.

2.) The feasibility study states that there are no sites in the lower basin for wetlands construction or aquifer recharge areas (Feasibility Study, P. 64). It should be noted that the Los angeles river flows even during the dry season. Too little consideration is given to expansion of presently existing wetlands, and "Greenstrips" along Dominguez Channel and elsewhere. The use of wetlands by the Arcata, CA Sanitation District may be a model wetland system which can be used to improve water quality significantly, especially during the "First Flush" component of a storm.

3.) Present and future cost to benefit ratios not considered include high beach maintenance costs resulting from solid waste ~~debris~~ carried by the system in dry weather, "First Flush" during normal storm periods and flood periods. The benefit to natural resources, ocean related business (tourism and other commercial activities), and human health resulting from lower pollutant loadings (eg. petroleum hydrocarbons, and heavy metals) needs to be assessed. Compliance with the Environmental Protection Agency's NPDES guidelines (requirements) should be incorporated into the analysis. fecal waste

4.) Upstream reduction in flow is insufficiently addressed under National Economic Development Standards. (Feasibility Study, P. 64, et. seq.). In 1980 the primary flooding costs resulted from upstream soil erosion and mudslides. Please

Heal the Bay.

Public Comment on LACDA
Final Report/EIS - Draft
October 31, 1991

incorporate our comments under our point one in refiguring cost to benefit ratios of upstream flood damage reduction measures.

5.) Seismic integrity of the favored concrete system is not compared with more porous alternatives such as spreading grounds, wetlands, etc., in the cost to benefit analysis.

6.) Discrepancies in actual figures exist between the feasibility study and EIS. For example, existing wetlands' size is identified in some parts as 2.6 acres and elsewhere as 6 acres.

CONCLUSION

The Clean Water Act urban runoff requirements for implementing Best Management Practices are not adequately addressed. Water quality from storm drain discharge presents a significant public safety issue. This is a great opportunity to improve storm water quality. It appears that a far more efficient use of tax dollars would occur if CEQA Requirements concerning adequate analysis were complied with. The expenditure of $350 million dollars on raising walls alone is of insufficient benefit compared to less expensive alternatives which would improve water quality and still provide public protection from flood water volume.

Increasing permeable areas within the lower basin was not adequately considered from the benefit standpoint (particularly the newer concept of retrofitting presently impermeable areas to make them more porous.)

Finally, I would like to express my personal appreciation to you for your courtesy and your assistance in providing me with a circulating copy of the LASCDA Feasibility Draft/EIS. Please do not hesitate to contact me for clarification or amplification of any of the foregoing points.

Heal the Bay

Public Comment on LACDA
Final Report/EIS - Draft
October 31, 1991

This comments have been reviewed in rough draft only by Mark Gold, Staff Scientist, at Heal the Bay.

Best Regards,

David Lederer, Esq.
Heal the Bay Legal Committee

11/4/91

ERRATA

PAGE 2, POINT THREE, LINE 3, PLEASE DELETE THE WORD "DEBRIS" AND SUBSTITUTE THE PHRASE "SOLID WASTE".

PAGE 2, POINT THREE, LINES 6&7, PLEASE ADD "HUMAN FECAL WASTE" TO THE EXAMPLES OF HUMAN HEALTH BENEFITS RESULTING FROM ENHANCED WATER QUALITY. SEE PARENTHETICAL COMMENT FOLLOWING THE PHRASE, "LOWER POLLUTANT LOADINGS".

PAGE 2, POINT THREE, LAST LINES, PLEASE ADD THE FACT THAT NPDES "GUIDELINES" ARE ACTUALLY REQUIREMENTS, AND ALSO CONSIDER THAT THE REGIONAL WATER QUALITY CONTROL BOARDS PROMULGATE NPDES REQUIREMENTS.

PAGE 2, POINT FOUR, PLEASE ALSO CONSIDER INCREASED VEGETATIVE COVER AND ITS BENEFITS TO UPSTREAM AREAS IN YOUR COST TO BENEFIT ANALYSIS. ADDITIONALLY, MAINTENANCE COSTS OF STORM DRAIN SEDIMENT REMOVAL AND HARBOR DREDGING ARE NOT CONSIDERED IN THE EIS.

RESPONSE TO COMMENTS

Letter from Heal the Bay, October 31, 1991

Thank you for your letter. The responses to your comments follow.

1. The effect of retrofitting impervious cover with runoff retarding systems, such as French drains and additional detention basins were considered in the early stages of plan formulation but not incorporated in the final plan owing to cost of conversion. There was no benefit analysis on the "unpaving" of the River with increased open space, more trees and reduction of the "heat island" effect. While the potential merit of these measures is recognized, these categories are not easily monetarily quantified in average annual dollars for federal flood control projects.

2. The flows in the Los Angeles River during the dry season originate, in large part, from secondary treated water from the City of Los Angeles's Tillman Wastewater Treatment facilty in the Sepulveda basin. The project does not propose the use of any wetlands and expansion of greenbelt parks along right-of-ways would be at the initation of the Los Angeles County Department of Public Works, which, in this case, controls the land adjacent to the channel throughout much of the LACDA system.

3. The Regional Water Quality Control Board issued an NPDES permit to Los Angeles County for initiating the compliance process for monitoring and improvement of the Los Angeles River discharges by July 1992. Your concern about the cost of beach maintenance is appreciated; however significant, it is considered to be an incidental cost and was not assessed in detail. The Federal commitment to project water quality standards include compliance with Federal regulatory standards which require that any work within the channel be confined to low flow periods and no construction would take place during the wet season. Most of the construction activities are proposed to take place on top of the existing channel walls so there would be no impacts associated with parapet wall construction.

4. The goal of this study was to reduce peak flows to downstream areas that were recognized as having a serious flood hazard. Hydrologic and hydraulic studies determined that lower basin runoff causes the majority of flooding problems in the lower reach of the river. Upstream reduction in flow would not have a major impact on the lower Los Angeles River where the flooding problem is the greatest. Preliminary hydrologic and hydraulic screening analysis determined that flooding problems in the upstream reaches are not as serious because levels of protection range from 70 year to 100 year. In these areas, damages would occur less frquently and would result in relatively minor residual damages such that spending federal dollars isnot economically justified.

5. The technical viability of supercritical, rectangular concrete flood control channels has been repeatedly demonstrated by channels located throughout the Los Angeles District including the LACDA system. Soft bottom designs were not considered feasible due to the high costs associated with acquiring sufficient right-of-ways. Assuming that the existing basins remain in place, a soft bottom design would tend to scour in some areas, possibly increasing the channel capacity, and aggrade in others; however, the net sediment budget of the system would not be in equilibrium since sediment eroded from the bed would be flushed out to sea with very little replenishment from upstream sources. This could lead to failure of the channel sideslopes (e.g., riprap, concrete, gabions,) and bridge failure due to pier scour and result in hazardous flood conditions.

6. The figures on wetlands acreages have been changed and now agree.

7. It is recognized that water quality, public safety, and BMPs continue to be important issues that must be addressed by responsible public and private interests in related but separate efforts. The County and Corps will work to achieve full compliance with all applicable Federal and non-Federal environmental laws, regulations and policy to the maximum extent practicable in actions associated with the propose project.

TREEPEOPLE

Thursday, October 24, 1991

U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, California 90053-2325
Via FAX: 213-894-5312 or 894-0243

Attention - Mr. Ron Ganzfried or Patricia Luvender

TreePeople has reviewed the Draft Environmental Impact Statement for the Los Angeles County Drainage Area (LACDA) Review Study and we find it inadequate.

The LACDA Study addresses the cumulative result of the mismanagement of the Los Angeles area watershed, but fails entirely to address proper management or the retrofitting of the watershed as a viable and appropriate alternative.

Increased flood threat is only one of several results of mismanagement of the watershed. Aside from flooding, other significant problems include the degradation of the Santa Monica Bay by toxins carried in stormwater, and water supply issues and their resulting problems such as the draining of Mono Lake and the Owens Valley to meet irrigation needs.

Conversely, in addressing the watershed management issues, it is possible to address and help solve the above mentioned and several other significant environmental issues which face the entire Los Angeles area. Given that the current study anticipates significant economic impacts on local governments, it is imperative that those local governments have an opportunity to maximize the use of their funds to solve a multiplicity of their problems.

TreePeople has contacted the U.S. Forest Service and other watershed management experts who concur that a combination of techniques could provide the desired level of flood protection. Those techniques include substantial reforestation--both in the mountains and in the city, retrofitting existing paving with permiable materials, micro collection and storage of rainfall for irrigation use and even wide-scale use of mulch.

It is imperative that you expand the study to include watershed management as an alternative. TreePeople is ready to assist you in both evaluating that alternative and in implementing some the solutions it entails. We are leaders in the field of Urban Forestry, which is a major component of watershed management. We work in partnership with numerous agencies and organizations that have skills and resources that are vital to this issue. That list of partners includes The U.S. Forest Service, the City of Los Angeles, the California Department of Forestry, Heal the Bay and others.

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Facsimile 818 753-4625
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In this era of limited government funding and high need for solutions to environmental problems, we can no longer afford to only consider singular solutions which may result in further deterioration of the environment. If we are to solve the critical problems facing the Los Angeles area, we must look for integrated ecosystematic solutions that improve the quality of life for all citizens. Pouring more concrete to expand the river appears to be an out-of-date approach -- one of those singular steps which misses the opportunity for lasting solutions.

Thank you for your consideration in this matter. We look forward to hearing from you.

Sincerely,

Andy Lipkis
President

RESPONSE TO COMMENTS

Letter from Tree People, October 24, 1991

Thank you for your letter and your offer of assistance to help in the evaluation of a possible "retrofitting" of the southern California watershed as potential flood control solution. The Los Angeles County Department of Public Works controls more than 100+ check dams and controls discharge in the main LACDA flood control basins. That agency and the U.S. Forest Service are directly responsible for the land use management of the watershed. The Corps' proposed LACDA flood protection improvement is not adjacent to that watershed, but occupies the lower 20+miles of the system.

The primary purpose of this study is to reduce peak flows to the downstream areas that were recognized as having a serious flood hazard. Preliminary screening of various alternatives indicated that watershed management would not have a significant impact on reducing the peak flows to lower reaches. Peak flows occur when thin soils have been saturated and there is no additional capacity in the soil. The concept of and need for improved watershed management clearly would be beneficial and should be encouraged and pursued in separate efforts, but cannot be presently relied upon to provide significant reductions in peak flows in the lower reach. Increases in lower basin local runoff, causes the majority of flooding problems in the lower basin. The phased retrofitting of the channel with permeable materials, including mulch, entails a more costly project overall and also brings about the possibility of increased resistance to channel flow and consequent increased flood hazard.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

Colonel Charles Thomas
District Engineer
Los Angeles District
U.S. Army Corps of Engineers
ATTN: Ron Ganzfried
Environmental Resources Branch
Box 2711
Los Angeles, California 90053-2325

Dear Colonel Thomas:

The Environmental Protection Agency (EPA) has reviewed the U.S. Army Corps of Engineers' (Corps) Draft Feasibility Report and Draft Environmental Impact Statement entitled **Los Angeles County Drainage Area (LACDA) Review.** Our review of the document is provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality NEPA Implementation regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

The flood control system constructed approximately 40 years ago, consists of a series of flood control dams, retention basins, and flood conveyance systems. Since the time of its initial construction, the system has provided diminishing flood protection due to increased surface runoff, loss of groundwater percolation and increases in contributory flow from storm drains, all as a result of ongoing urbanization in the upper reaches of the LACDA. The Corps contends that protection based on the original design is now being afforded only for a 50 year flood and that their analyses suggest that even 25 year flood events could exceed the capacity of the existing channels and inundate portions of the lower reaches of the drainage area.

For the purpose of providing much needed flood protection specifically within the lower Rio Hondo and lower Los Angeles River portions of the LACDA, the Corps considered several enhancements to the flood control system. Although initially contemplated, most of the alternatives were eliminated from

detailed analysis, and only two alternatives, in addition to no action, were considered in detail in this document.

The preferred (NED) alternative consists of armoring and adding parapets (2-8 ft. in height) to the existing concrete channel walls along sections of Rio Hondo, Compton Creek, and the Los Angeles River. Implementation of this alternative would require significant modifications to 27 bridges crossing either Rio Hondo or the Los Angeles River. These modifications would take the form of raising, reconstructing or relocating the bridges. Channel widening at the confluence of the Rio Hondo and Los Angeles Rivers would also be necessary. Construction activities would last approximately 9 years.

The second alternative, identified as the "Modified Channel X-Section alternative" involves converting sections of the existing trapezoidal channel to a rectangular channel, armoring sections of the wall, and dredging five feet of sediment from the final 2.5 miles of the Los Angeles River. Parapet walls (3 ft. in height) would also be used in various locations, and "some" bridges would require structural modification. Construction would last approximately 6 years.

Our review found that the document presented a good overview of the proposal but lacked specificity in many instances where detailed information would be helpful in assessing impacts and in developing impact mitigation strategies. We have rated the DEIS as category EC-2, Environmental Concerns - Insufficient Information. Our rating is based primarily on concerns with:

- air quality impacts, including incomplete information concerning potential air emissions from various project operations;
- vague discussions of several critical issues which should be clarified;
- no analysis of the growth management plan under development by the City of Los Angeles, as it relates to the proposed action, and;
- limited details on several wetlands and dredging issues which we feel should be discussed more comprehensively.

A detailed description of EPA's rating categories and our specific comments are attached.

We appreciate the opportunity to comment on the proposed project and would like to express our appreciation for allowing an extended comment period. Please send three copies of the FEIS to this office at the same time it is filed with our Washington,

DC Headquarters. If you have any questions, please do not hesitate to contact Dr. Jacqueline Wyland, Chief, Office of Federal Activities at 415-744-1510, or your staff may contact Mr. David Farrel at 415-744-1574. For questions about development of an appropriate sediment testing plan, please have your staff contact Allan Ota at (415) 744-1164 or Brian Ross at (415) 744-1979.

Sincerely,

Deanna M. Wieman

Deanna M. Wieman, Director
Office of External Affairs

Enclosures

REGION IX COMMENTS ON THE PROPOSED LOS ANGELES COUNTY DRAINAGE AREA REVIEW STUDY DRAFT EIS AND FEASIBILITY REPORT

GENERAL

The analysis of alternative combinations on page 114 of the Draft Feasibility Report (DFR) briefly discusses the economics of bridge modification but does not address the economics associated with the potential environmental impacts. From the discussion presented in the DFR and the EIS as well, it is unclear why channel widening under existing bridges was not considered further - as an alternative to removing and/or replacing bridges. (1)

Overall, the discussion of bridge removal and/or replacement efforts needs more detail. For example, who is going to do the construction and what are the specific impacts related to this construction? (2)

It is unclear whether the existing bridge pilings are designed to withstand projected maximum flows should the project be implemented. The FEIS should describe any structural reinforcements that may be needed to offset stress from increased flows. This should also include a discussion of environmental impacts which could result from related construction efforts. (3)

It is unclear from the discussion in the DEIS whether or not the basin is "fully developed." For example, the discussion on page S-2 implies that there are undeveloped lands in the basin, yet on S-3, the DEIS states that "the basin is considered fully developed." The FEIS should clarify this point. (4)

Table S.1-1 indicates only "partial compliance" with several of the Federal and state statutes listed - for the NED alternative and modified channel alternative as well. The FEIS should reflect full compliance in the table supplemented with documentation which provides the basis for the presentation in the table. (5)

Figure 2.3-1 is referenced on page 2-14 but the figure is not included in the document. (6)

We recommend that the FEIS include a brief discussion of geologic hazards to specifically include a discussion of any hazards which might be exacerbated by constructing parapet walls. The discussion should also address any special construction efforts required to meet safety code requirements. (7)

1

The discussion on channel wall reconstruction provided on page 2-30 of the DEIS is very vague. The FEIS should provide more specificity to the discussion. For example, the text suggests that "...**some** modifications of bridge supports may be required...**most** existing bridges would not require reconstruction...(and) only a **few** additional feet would be required for channel modifications." In this instance the FEIS should clearly define some, most, and few. Project proponents should be aware that NEPA requires that "information (provided in the EIS) must be of high quality" [40 CFR 1500.1(b)]. We recommend that the FEIS provide additional details on all alternatives considered, in accord with the intent of NEPA. (We assume your reference to the "Main Report" is the Feasibility Report attached to the DEIS. If so, we recommend you change the reference from "Main Report" to "Feasibility Report" to avoid confusion.) (8) (9) (10)

The FEIS should consider and describe the potential for noise impacts (and associated mitigation) from using an on-site batch plant as suggested on page 4-39. (11)

On page 5-3, the document makes reference to Appendix B, specifically to responses received from the February 13, 1989 Notice of Intent (NOI). The responses were however, not included in the appendix. The FEIS should append all responses received on the Notice of Intent to prepare an EIS on this proposal. (12)

It is suggested in Appendix A of the DEIS that the City of Los Angeles is in the process of implementing a new growth management plan, which could have a bearing on the scale of your proposal. We recommend that the provisions of the plan be discussed in the FEIS in terms of its relationship to the scale of the Corps proposal. Specifically, we recommend the Corps seriously consider incorporating provisions of the plan to downscale the current proposal if feasible. In any case, the FEIS should provide a discussion of the plan and its implications on the proposed project. Within a NEPA framework, this would relate to §1502.13 (establishing a need for the project) and §1508.25 (discussing related actions within the scope of an EIS). (13)

AIR

The DEIS suggests that increases in traffic congestion would result from detours, etc. during reconstruction of several bridges. It is unclear whether the emissions increases from the forced congestion and traffic re-routes are taken into account in the data presented in the DEIS. A full range of mitigation requirements to minimize the congestion is also not evident in (14)

the DEIS. For example, could construction hours be offset to minimize disruption during commute hours? It is also unclear whether emissions from batch plants referred to on page 2-14 are taken into account in the data presented in the DEIS.

On page 407, the DEIS discounts emissions from construction employee commuting and light duty pickup use from mobil-source emissions characterizations. Granted, as you contend, "these activities are generally much less than on-site heavy equipment use," however, they do impact overall air quality. The EIS does not provide details on the number of workers, length of commute, frequency of trips, etc. nor does the EIS consider that such impacts would take place to some degree, over the entire time-span (six-nine years) of the project. The FEIS should factor-in such emissions into table 4.2-1 and provide supporting discussion in the text of the document. (15)

The FEIS should include expanded discussions on the possibility and/or feasibility of using an electric dredge and the potential for airborne releases of toxics from dredge spoils, including a synopsis of the toxic constituents of the dredge materials. A discussion of PM-10 emissions should also be included in the FEIS. (16)

In general, the FEIS should recognize that major amendments to the Federal Clean Air Act (CAA) were enacted into law in 1990. The CAA prohibits any Federal agency from taking any action which does not conform to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. The definition of conformity under §176 mandates that a Federal project must not - (17)

> (i) cause or contribute to any new violation of any standard in any area;
> (ii) increase the frequency or severity of any existing violation of any standard in any area; or
> (iii) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

Section 176 goes on to state that "(t)he determination of conformity shall be based on the most recent estimates of emissions, and such estimates shall be determined from the most recent population, employment, travel and congestion estimates as determined by the metropolitan planning organization or other agency authorized to make such estimates." The FEIS should clearly demonstrate that each of the alternatives would fully conform to these stringent requirements.

WATER

It is apparent from the discussion on S-8 of the DEIS that ocean disposal and/or land disposal (Page 2-33) are being considered as options to dispose of materials that could be dredged from the channel. Regardless of whether dredging is part of the Corps preferred alternative, data should be provided concerning the toxicity of the (anticipated) dredged material (refer also to our subsequent comment regarding page 4-15). We recommend that you contact and work closely with Region IX EPA's ocean disposal and section 404 staffs to ensure the level of information provided in the FEIS meets program requirements. The Corps should prepare a detailed sediment sampling plan and a bathymetric condition survey of the entire areas proposed for dredging. EPA would like to work closely with the LA District to design a sediment sampling plan. This applies to ocean disposal subject to §103 of the Marine Protection, Research, and Sanctuary Act (MPRSA) or confined disposal under §404 of the Clean Water Act (CWA). (16)

The discussion on page 2-37 states that for the NED alternative, "wetland areas in the lower most portion of the LA River will not be destroyed (highlight added) by construction activities." It is unclear however, if the wetlands would be adversely affected at all...and to what degree. The DEIS, on the same page suggests that "disturbance to the wetland area (for the Channel Modification Alternative) can be mitigated through replacement of habitat near the channel area." We assume that 1) wetlands would be adversely affected from this action, and 2) there is adequate and appropriate opportunity for mitigation near the channel area. The FEIS should include an expanded discussion on the extent of disruption anticipated for both the NED and Channel Modification Alternative as well, and a more detailed description of the wetlands and habitat replacement areas. In addition, commitments to specific mitigation should be made in the FEIS. We recommend that you coordinate with our section 404 staff to determine additional specifics and the extent of information on wetlands-related issues which should be included in the FEIS. (19)

The DEIS suggests (page 4-15) that "no significant impact is anticipated...**assuming** (emphasis added) (the dredged material) meets standards for ocean disposal." Continuing on page 4-15 (and duplicated on page 4-16), the DEIS states that "chemical testing and/or bioassays of sediments will be conducted as necessary to assure all materials meet ocean disposal or other disposal standards." The FEIS should include the sediment testing results and a thorough discussion about dredging and disposal operations at the proposed LA River site and the disposal site.

RESPONSE TO COMMENTS

Letter #17

ENVIRONMENTAL PROTECTION AGENCY

1. Channel widening under existing bridges would affect bridge span length and approach slope and reconstruction of abutments would also be necessary. Channel widening would reduce the rights-of-way available for recreation trails and open space. Based on internal analysis of net benefits, raising channel walls has the highest net benefits and the lowest cost of any widening alternatives. Raising channel walls also has the least adverse environmental consequences.

2. Bridge removal and/or replacement, is the non-Federal sponsor's total responsibility. Not all involved agencies have decided which bridges are to be removed or replaced at this time. Also see response number 3 to letter number 15 (Heal the Bay).

3. The detailed bridge construction plans will be developed during preliminary engineering and design and after the physical modeling is complete (sometime after September 1992). The construction methodology will vary with each bridge type, existing bridge construction and use. The possible alternatives for bridge pilings are:

Highway Bridges

(1) Bridge will be raised using existing piers. The piers will need to be enforced for seismic standards. This may be accomplished by driving additional piles outside of existing piers. This method may be detrimental to hydraulic performance.

(2) If a bridge needs to be reconstructed because a different span length is necessary then new bridge piers may need to be constructed at locations other than where the existing piers are located. In this case, the number of piers might be reduced.

Railroad Bridges

Pier extension or replacement of railroad bridges is much simpler. All RR bridges within the project area employ "simple plan" superstructures which could be unfastened from the piers and abutments, removed as a unit, and placed aside using several high capacity cranes. After pier midification or reconstruction, the superstructures would be lifted into place and reconnected.

It is recommended that test excavations be conducted to determine the condition of the existing bridge piles. Prediction of the condition of an older pile system for the anticipated life of a new structure, however, would be difficult even if the piles presently appear sound.

4. Confusion perhaps arose from the intent to point out the virtual absence of large tracts of land in the region suitable for development while recognizing that not all parcels contain structures and could thus be modified (e.g., placing multi-unit dwellings on them with larger roofs and larger paved parking areas) in the future to increase the net runoff from the urban area. Attempts have been made to clarify the text.

5. Table S.1-1 has been revised to properly reflect compliance.

6. The correction has been made.

7. Corps geotechnical staff indicated that no geological hazards exist in the Quaternary alluvial floodplain surface relating to construction. Consequently, there would be no special construction efforts required to meet anything other than existing design standard and safety code requirements.

8. The channel wall reconstruction is among the plans considered but initially rejected and for that reason more detailed analysis was not undertaken.

9. As suggested, details have been added to alternatives considered in the EIS.

10. The term "feasibility" report is used in a comprehensive sense; the "main" report is a component and is therefore not synonymous with the term "feasibility" as used in the documentation.

11. Text has been expanded to better address noise impacts and mitigation.

12. Appendix I (Summary of Public Comments on the Draft Enviuronmental Statement held on Oct 1, 1991) and Appendix J (Public Comments on the Draft Environmental Impact Statement and Responses) have been added.

13. The new growth management plan has not yet been released, therefore, not implemented by the City of Los Angeles. It is entitled the Citywide General Framework and is expected to be released in 1992. The proposed project is an scaled down version of an originally comprehensive rehabilitation of LACDA flood control facilities.

14. A full range of mitigation requirements to minimize congestion are provided in Table 4.11.

15. Figures regarding the impact of bridge reconstruction on traffic delay provided in the Traffic Delay Analysis Supplement to the Economics Technical Report.

16. PM-10 emissions are summarized for the region on Table 3.4-2.
Use of electric dredge would be an appropriate choice, should dredging be initiated in a later phase.

4.2.1.

18. As regards the potential toxicity of (anticipated) dredged materials, testing will be done in a later phase should dredging be employed.

19. Text has been modified to reflect the project's non-impact on wetlands.

Env. Copy

SCAG
SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS
818 West Seventh Street, 12th Floor • Los Angeles, California 90017-3435 □ (213) 236-1800 • FAX (213) 236-1825

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Palm Desert

November 21, 1991

Ms. Patricia Luvender
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, CA 90053-2325
Via FAX: 213-894-5312 or 894-0243

RE: LOS ANGELES COUNTY DRAINAGE AREA REVIEW

Dear Ms. Luvender:

Thank you for providing us with a copy of the Los Angeles County Drainage Area Review which includes a Feasibility Study and a Draft Interim Report/Environmental Impact Statement. As areawide clearinghouse for regionally significant projects, SCAG assists cities, counties, state and federal agencies to review projects and plans for consistency with the Regional Housing Needs Assessment (RHNA), Regional Mobility (RMP), Growth Management (GMP), and Air Quality Management (AQMP) Plans, all of which are included in the State Implementation Plan (SIP).

You have stated that the plan selected to improve available flood protection in the lower Los Angeles Basin requires modification of the Rio Hondo from Whittier Narrows Dam to the Los Angeles River and continuing down the Los Angeles River to the Pacific Ocean. The modifications would be as follows: (a) Raising the effective channel height by building parapet walls on 21 miles of existing levies; (b) raising or modifying 27 bridges to accommodate the parapet walls; (c) widening and converting to rectangular cross-section 1.5 miles of channel below the confluence with the Rio Hondo; (d) armoring the land side of the levies in four locations and (e) applying a concrete overlay in reaches with an existing rough grouted stone channel surface.

We note that the estimated cost of these improvements is $337,400,000. The local government share would be $168,700,000 (50%) and the Federal share would be $168,700,000 (50%).

On the benefit side, the selected plan would provide between 100- and 133-year protection to approximately 75 square miles of intensively developed urban area, and reduce the 100-year flood plain from 82 square miles to 7 square miles. In addition, the plan would improve the safety of numerous bridges, many of which were designed prior to imposition of new seismic safety guidelines.

ALTERNATES

Imperial County o Sam Sharp, *Supervisor* • Los Angeles County o Ed Edelman, *Supervisor* and Kenneth Hahn, *Supervisor* • Orange County o Gaddi Vasquez, *Supervisor* • Riverside County o Patricia Larson, *Supervisor* • San Bernardino County o Larry Walker, *Supervisor* • Ventura County o Vicky Howard, *Supervisor* • Cities of Imperial County o Victor Sanchez, Jr., *Mayor*, Westmorland • Cities of Los Angeles County o Abbe Land, *Councilmember*, West Hollywood • Cities of Orange County o Ruthelyn Plummer, *Councilmember*, Newport Beach • Cities of Riverside County o (Vacant) • Cities of San Bernardino County o Elmer Digneo, *Mayor Pro Tem*, Loma Linda • Cities of Ventura County o (Vacant) • City of Los Angeles o Richard Alatorre, *Councilmember* o Rita Walters, *Councilmember* o Michael Woo, *Councilmember* • Long Beach 2nd position o Jeffrey Kellogg, *Vice Mayor* • At Large o Kathy Salazar, *Mayor Pro Tem*, Montebello o Fred Aguiar, *Mayor*, Chino o Robert Lewis, *Mayor Pro Tem*, Thousand Oaks

17. We recognize the concerns regarding air quality, further consideration will be made in subsequent NEPA analyses during the next stage of planning, engineering and design.

18. As regards the potential toxicity of any excavated materials, testing will be done in a later phase.

19. Text has been modified to reflect the project's non-impact on wetlands.

Env. Copy

SCAG SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

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November 21, 1991

Ms. Patricia Luvender
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, CA 90053-2325
Via FAX: 213-894-5312 or 894-0243

RE: LOS ANGELES COUNTY DRAINAGE AREA REVIEW

Dear Ms. Luvender:

Thank you for providing us with a copy of the Los Angeles County Drainage Area Review which includes a Feasibility Study and a Draft Interim Report/Environmental Impact Statement. As areawide clearinghouse for regionally significant projects, SCAG assists cities, counties, state and federal agencies to review projects and plans for consistency with the Regional Housing Needs Assessment (RHNA), Regional Mobility (RMP), Growth Management (GMP), and Air Quality Management (AQMP) Plans, all of which are included in the State Implementation Plan (SIP).

You have stated that the plan selected to improve available flood protection in the lower Los Angeles Basin requires modification of the Rio Hondo from Whittier Narrows Dam to the Los Angeles River and continuing down the Los Angeles River to the Pacific Ocean. The modifications would be as follows: (a) Raising the effective channel height by building parapet walls on 21 miles of existing levies; (b) raising or modifying 27 bridges to accommodate the parapet walls; (c) widening and converting to rectangular cross-section 1.5 miles of channel below the confluence with the Rio Hondo; (d) armoring the land side of the levies in four locations and (e) applying a concrete overlay in reaches with an existing rough grouted stone channel surface.

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On the benefit side, the selected plan would provide between 100- and 133-year protection to approximately 75 square miles of intensively developed urban area, and reduce the 100-year flood plain from 82 square miles to 7 square miles. In addition, the plan would improve the safety of numerous bridges, many of which were designed prior to imposition of new seismic safety guidelines.

SCAG would concur in the necessity to take precautions that will reduce the loss of lives and property damage which is apt to occur as a result of major storms in this area. Our GMP projects additional growth and development in the threatened flood areas.

However, we are also in receipt of a copy of a letter addressed to you concerning this project which was written by Andy Lipkis, President of the TreePeople. Mr. Lipkis suggests expanding your study to include watershed management as an alternative (see attachment). Watershed management would involve substantial reforestation--both in the mountains and in the city, retrofitting existing paving with permeable materials, micro collection and storage of rainfall for irrigation use and even wide-scale use of mulch. This proposal is also consistent with the Growth Management Plan and its policies.

Our conclusion is that both types of solutions are necessary: additional flood protection structural improvements and also better watershed management. We request that the U.S. Corps of Engineers in cooperation with the County of Los Angeles take steps to identify the agencies which should be involved and obtain the funding necessary to undertake both programs simultaneously. Better watershed management is a longer term solution which should reduce the need for the more costly flood protection "hardware" in future years.

If you have any questions about the above comments, please contact Glenn Blossom (213) 236-1876, or Jim Birckhead, (213) 236-1915. They will be happy to work with you to address the comments presented herein.

Sincerely,

ANNE BAKER
Director of Environmental Planning
AB:GB627

Attachment

818 W. Seventh Street,12th Floor • Los Angeles, CA 90017-3435 □ (213) 236-1800 • FAX (213) 236-1825

RESPONSE TO COMMENTS

Letter from SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS, Nov. 24th, 1991.

Thank you for your letter; your comments are noted. The Tree People letter of Oct. 24, 1991 which you cite (and enclose) is letter number 16 in this document and you are referred to those responses regarding regional watershed management.

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (818) 458-5100

THOMAS A. TIDEMANSON, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O.BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

October 24, 1991

IN REPLY PLEASE REFER TO FILE P-4

Col. Charles S. Thomas
U.S. Army Corps of Engineers
P.O. Box 2711
Los Angeles, CA 90053-2325

Dear Colonel Thomas:

LOS ANGELES COUNTY DRAINAGE AREA (LACDA)

Thank you for the opportunity to review and comment on your draft Feasibility Report for the LACDA Study. Our comments will be discussed with your staff at our next scheduled monthly work group meeting on November 5, 1991.

As the local sponsoring agency, we would like to reiterate our strong support and commitment for the project and look forward to a timely construction of this much-needed flood control improvement.

Very truly yours,

Donald L Wolfe

T. A. TIDEMANSON
Director of Public Works

DC:mv
9

RESPONSE TO COMMENTS

Letter from LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS, Oct. 24, 1991.

Thank you for your letter; your comments are noted.

COPY

Lynwood CHAMBER OF COMMERCE

P.O. Box 763, Lynwood, California 90262 (213) 537-6484

November 12, 1991

Ms. Patricia Luvender
Corps of Engineers
Los Angeles District (CESPL-PD-LUA)
P.O. Box 2711
Los Angeles, CA 90053-2325

Dear Ms. Luvender:

The Lynwood Chamber of Commerce would like to express its support for the LACDA Project. Based on the information we have, we feel that the construction of parapet walls on the sides of the Los Angeles and Rio Hondo Rivers is the best and most feasible relief to the potential 100 year flood.

We heartily support expiditing this project. The economic stability of Lynwood, and our neighboring affected cities, is at stake. We cannot afford restrictive flood insurance requirements nor flood plain management ordinances. If they are put in place, they must be removed as soon as possible.

Thank you for your attention to this matter.

Sincerely,

Bernard H. Lake
Executive Director
Lynwood Chamber of Commerce

BHL: bd

RESPONSE TO COMMENTS

Letter from LYNWOOD CHAMBER OF COMMERCE, Nov. 12, 1991.

Thank you for your letter; your comments are noted.

November 26, 1991
5141 Patterson St.
Long Beach, California 90815

U. S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, California 90053-2523

Attention: Ms. Pat Luvendar

Dear Ms. Luvendar:

We are writing this letter in response to LACDA Feasibility Study Draft Interim Report and EIS of September 1991.

We have one major question for the Corp and request a response. The Corp states that the Los Angeles river's intertidal zone "was of little biological value." **Why was there not an independent study or accounting done of the existing wildlife in this area?**

We would suggest any array of groups could provide such an accounting. You could begin with the biological sciences departments at any local of our universities.

It is our fear that the Corps may see one Great Blue Heron (*there is at least one*) in this area or only one Common Egret pair (*there is at least one pair*) south of Willow in Long Beach and conclude that there is, therefore, "insignificant biological value" present.

However, an argument based on the numerosity of individual species alone is ultimately short-sighted and fails to recognize that the depletion and diminution of habitat in general increases the significance of the remaining wild life in this channel.

It is our sincere hope that you will continue to look at this study and recognize that the Corps may not be the best objective source to study the effect of their project on what many find to be an unintentioned, but nevertheless valuable and essential habitat for wildlife.

Thank you for the chance to state our concerns about your study. We look forward to your response.

Sincerely,

Linda D. Brayton — Thomas J. Brayton

Linda D. Brayton
Members - Friends of the Los Angeles River

c:folar

RESPONSE TO COMMENTS

Letter from Linda D. Brayton and Thomas J. Brayton, Nov. 26, 1991

The Corps of Engineers, in compliance with the National Environmental Policy Act (NEPA), has consulted with the appropriate resource agencies, U.S. Fish and Wildlife Service and the California Department of Fish and Game during the span of the plan formulation of this study. The judgement "of little biological value" is theirs and was stated merely as a comparison with the species richness and diversity of other habitat zones in the region (i.e., flood control basins, national forest and other open spaces). Please review the USFWS Coordination Act Report (Appendix G) which expands the on the discussion of biological and ecological resources in the study area. The preferred alternative, or NED plan, was determined not to reduce existing habitat for the species living in or passing over the project area.

November 23, 1991

U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, CA 90053-2523
Attention - Ms. Pat Luvendar

Dear Ms. Luvendar:

It was with great interest I learned of the results of the LACDA Feasibility Study Draft Interim Report and EIS of September 1991.

Because it took the Corps nearly a quarter of a century to determine that the existing channel is too small to carry the largest flood waters that might occur in the L.A. River Basin, I have some significant questions I would like addressed:

1. Does the cost of the project reflect today's dollars and take into account future devaluation of the dollar?

2. Why does the project reflect only a single-purpose approach to the river? Our difficult economic times and fact that we're in a drought cycle (again) would suggest a multi-purpose approach to be more cost effective. We should be engineering ways to capture runoff instead of shunting it off to the ocean even more quickly.

I request a copy of the economic analysis of wetland values as they were used in the benefit-cost ratio analysis for the study. While creating spreading basins to replenish groundwater supplies, you would also be creating wetlands, wildlife habitat, improved air quality, recreational opportunities and thus, a host of social, economic and esthetic benefits--if a multi-purpose plan were devised.

NEPA requires an analysis of the long-term costs of the project with respect to future resource and recreational options; the Corps is in violatiion of this requirement by not factoring in the cost of these lost future economic and resource opportunities.

3. What will it cost to maintain the channel, to remove sediment, trash, vegetation, gravel and accumulated debris? How will vehicles get in and out to accomplish maintenance?

4. What consideration was given to the social and recreational needs of those local communities that the project will impact for a period of over ten years?

5. Why didn't the Corps map the existing vegetation and use all available expertise to catalogue plant and animal biological resources of the river as required by NEPA? I've walked the river and marvelled at the abundant life--spectacular flocks of wading birds particularly.

By not meeting NEPA requirements, the Corps may be putting rare and/or endangered animals and/or plants at risk.

6. How does the Corps plan to meet NPDES stormwater pollution guidelines?

7. If flood control is the main purpose for the channel, how can it simultaneously be considered as a permanent transportation corridor--unless that's boat transportation?

8. Who is responsible for allowing the construction of human dwellings on a flood plain? Does the Corps have any say?

I look forward to your informative reply. Only by meeting and/or exceeding NEPA and CEQA guidelines and regulations will the Corps give credence to its stated desire to be "the Environmental Engineers for the Nation."

Cordially yours

Sheila Ard

Sheila Ard
1450 El Mirador Dr.
Fullerton, CA 92635

RESPONSE TO COMMENTS

Letter from Shiela Ard, Nov. 23, 1991

1. The cost of the flood control project that was distributed for public review and stated in Table 18, p. 144, reflects October 1990 price levels. The revised final report will reflect updated project costs in October 1991 price levels. According to our regulations the costs (which include interest during the construction costs) are amortized at the mandated current Federal interest rate of 8 3/4 percent over a 100 year life of the project.

2. The primary purpose of this study is to upgrade the flood control capability of the LACDA mainstem system and to reduce peak flows to downstream areas that were recognized as having a serious flood hazard. Therefore, flood damage reduction benefits are the principal source of benefits evaluated in this study. This study explored the potential to increase water conservation by increasing delivery to spreading grounds, creating off-stream detention/conservation basins, and trading developable flood control space for existing water conservation storage. None of these measurescontributed significantly to alleviating the downstream flood hazard. Once the flood control capability of the mainstem system is upgraded to appropriate levels, it will be possible to formulate and evaluate these and other water conservation measures.
This analysis may be undertaken as a separate study on a system wide basis or under the general operational review authority granted to each Corps District Engineer. The District Engineer is authorized to revise the storage allocations and operating schedules for Corps reservoirs within specified limits, provided that the public has an opportunity for review and comment. The Corps currently cooperates closely with Los Angeles County to conserve as much runoff as possible.
There were no wetland values developed for this study nor were any included in the cost benefit analysis. The selected plan does not affect any existing wetlands. If any additional recreation is desired by the local sponsor, an evaluation of recreation needs will be conducted and the public would be involved in developing recreation plans, cost sharing would be determined.

3. The maintenance cost of the upgraded channel is a non-Federal responsibility and has been estimated to be $70,000 annually. Maintenance vehicle access is not restricted with the upgraded plan. They will use the same access routes will be used as are in current use.

4. The recreational needs of the local communities are coordinated by Los Angeles County, which is the local sponsor of this flood control project. Local community officials were instrumental in guiding the planning process of the project so that it would be acceptable to the local communities.

5. There has been on-going coordination with the U. S. Fish and Wildlife

Service. They have provided the Corps with a Planning Aid Letter and have prepared the Coordination Act Report (See Appendix G). The Service was contracted by the Corps to provide an accounting of existing wildlife and its habitat in the project area.

6. The Regional Water Quality Control Board issued an NPDES permit to Los Angeles county for initiating the compliance process for monitoring and improvement of the Los Angeles River discharges by July 1992. The Federal commitment to project water quality standards include compliance to Federal regulatory standards which include that any work within the channel be confined to low flow periods and no construction would take place during the wet season. Most of the construction activities are proposed to take place on top of the existing channel walls so there would be no significant impacts associated with parapet wall construction.

7. Transportation uses of the channel were not evaluated because using the channel as a transit corridor would constrain the flood control solutions that are being studied. Any proposed use of the River as a transportation facility must be evaluated with the understanding that flood control operations cannot be hindered or diminished and that public safety is paramount in operating the flood control system. Any proposed use of the channel for transportation would be evaluated in separate studies by others with regard to engineering/structural and hydraulic concerns, safety/liability, and environmental requirements.

8. Local planning agencies are responsible for allowing structures in the floodplain. Once a floodplain is mapped by the Federal Emergency Management Agency (FEMA) and a community is enrolled in the flood insurance program, any new structures or additions to existing structures must be built on fill above the estimated 100-year water surface elevation. It is the responsibility of the local government to monitor these restrictions when issuing building permits. Generally, the Corps is therefore not involved in floodplain development decisions. However, pursuant to Executive Order 11988 (Floodplain Management), the Corps encourages the avoidance of actions which directly or indirectly induce growth in the floodplain or adversely affect natural floodplain values.

STATE OF CALIFORNIA—THE RESOURCES AGENCY

PETE WILSON, Governor

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200

December 18, 1991

Ron Lockmann
CESPL-PD-RN
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 2711
Los Angeles, CA 90053-2325

RE: CD-74-91 (Army Corps, L.A. River Flood Control)

Dear Mr. Butler:

On December 11, 1991, by a vote of six in favor and five opposed, the California Coastal Commission concurrred with the above referenced consistency determination for construction of parapet walls atop the existing levees of the Los Angeles River, Los Angeles County. The Commission found the project to be consistent to the maximum extent practicable with the California Coastal Management Program.

Sincerely,

Mark Delaplaine

MARK DELAPLAINE
Federal Consistency Supervisor

cc: Long Beach District
NOAA Assistant Administrator
Assistant Counsel for Ocean Services
OCRM
Nadel Gayou
Governor's Washington D.C. Office
EPA

MD/prb
1587p