EXHIBIT "4"

FLOOD PLAIN ISSUES

in

SOUTHEAST LOS ANGELES COUNTY

LACDA Alliance

Cities of Bellflower, Carson, Downey,
Lakewood, Paramount, Pico Rivera and South Gate

TABLE OF CONTENTS

The Los Angeles County Drainage Area Alliance

(LACDA Alliance)

I.

The Los Angeles County Drainage Area (LACDA) Alliance

Established in 1991, the LACDA Alliance is a coalition of seven cities: Bellflower, Carson, Downey, Lakewood, Paramount, Pico Rivera and South Gate in southeast Los Angeles County. The Alliance was organized over concerns regarding the revision of the Flood Insurance Rate Maps, following the result of an Army Corps of Engineers' hydrologic analysis that determined the LACDA system does not provide 100 year level of flood protection, and the potential adverse economic impact of the implementation of the National Flood Insurance Program. The Alliance represents seven of the ten cities (675,000 residents) which have significant acreage in the 82 square mile floodplain area.

PROPERTY AT RISK (PAR)

RIO HONDO/LOS ANGELES RIVER OVERFLOW

COMMUNITY	%SFHA	TOTAL # STRUCTURES	STRUCTURES IN SFHA
BELLFLOWER	90	24,117	21,700
CARSON	40	22,501	9,000
COMPTON	50	31,327	15,700
DOWNEY	50	22,953	11,500
LAKEWOOD	50	27,136	13,600
LONG BEACH	50	172,915	70,000
LYNWOOD	90	11,748	10,600
PARAMOUNT	90	11,075	10,000
PICO RIVERA	85	16,850	14,200
SOUTH GATE	5	22,946	1,200
	TOTALS	362,895	177,500

General Overview
Concerning Flooding
In Southeast Los Angeles County

II.

FACT SHEET

GENERAL OVERVIEW, BACKGROUND, BENEFITS
Los Angeles County Drainage Area Project

PROJECT OVERVIEW

1. Los Angeles County Department of Public Works and the U.S. Army Corps of Engineers are proposing to improve portions of the County flood control system to provide greater protection against flooding in the event of a major rain storm.

2. Improvements would include constructing parapet walls two to eight feet high on top of existing levees, raising 11 bridges by up to six feet, modifying 14 other bridges, armoring the back sides of the levees along portions of the project reaches, widening the confluence of the Channel and River, and related improvements.

BACKGROUND

1. These proposed improvements are the result of a study that began in 1969 to evaluate the need for additional flood control in the County's system.

2. In 1992, the LACDA Feasibility Report was published, which included an Environmental Impact Statement.

3. In June of 1994, an agency scoping meeting and two public scoping meetings were held and comments received at those meetings were taken into account in preparing the Master Environmental Statement.

4. A Master Environmental Impact Statement was prepared and is being distributed to federal, state, regional, and local agencies.

PROJECT BENEFITS

1. The original design of the County's storm drainage system was based on old, incomplete information.

2. Experts now understand that significant portions of Los Angeles County's population face serious threat of devastating economic and social losses in the event of a major storm and resulting flooding. Damage from a flood in the 500-year flood plain is estimated at $5.3 billion and in the 100-year plain at $2.3 billion.

PROJECT BENEFITS (continued)

3. Because much of the population in affected areas are of low-to-moderate incomes, they would be most adversely impacted not only in the event of a flood, but by the ***de facto*** building and rehabilitation moratorium that exists in the absence of the Project, due to the requirements of the National Flood Insurance Program.

4. The LACDA Review, authorized by an act of Congress, thoroughly examined all possible alternatives, finding that the proposed Project is the only viable solution to acknowledged problems. During the review process, all interested parties were given ample opportunity for input.

5. Potential impacts of the Project on land use and planning, water quality, air quality, biological resources, cultural resources, transportation, recreation, aesthetics, public health and safety, public services and utilities, hydrogeology, geology and soils, hazardous materials and waste management, and surface hydrology, have all been carefully analyzed and, where necessary, mitigation measures have been planned.

6. In the absence of the Project, insurance costs in affected areas will be higher; costs of development and construction will be higher due to more restrictive building regulations; economic growth in the affected areas will be stifled; industries and jobs will migrate to other parts of the state or to other states.

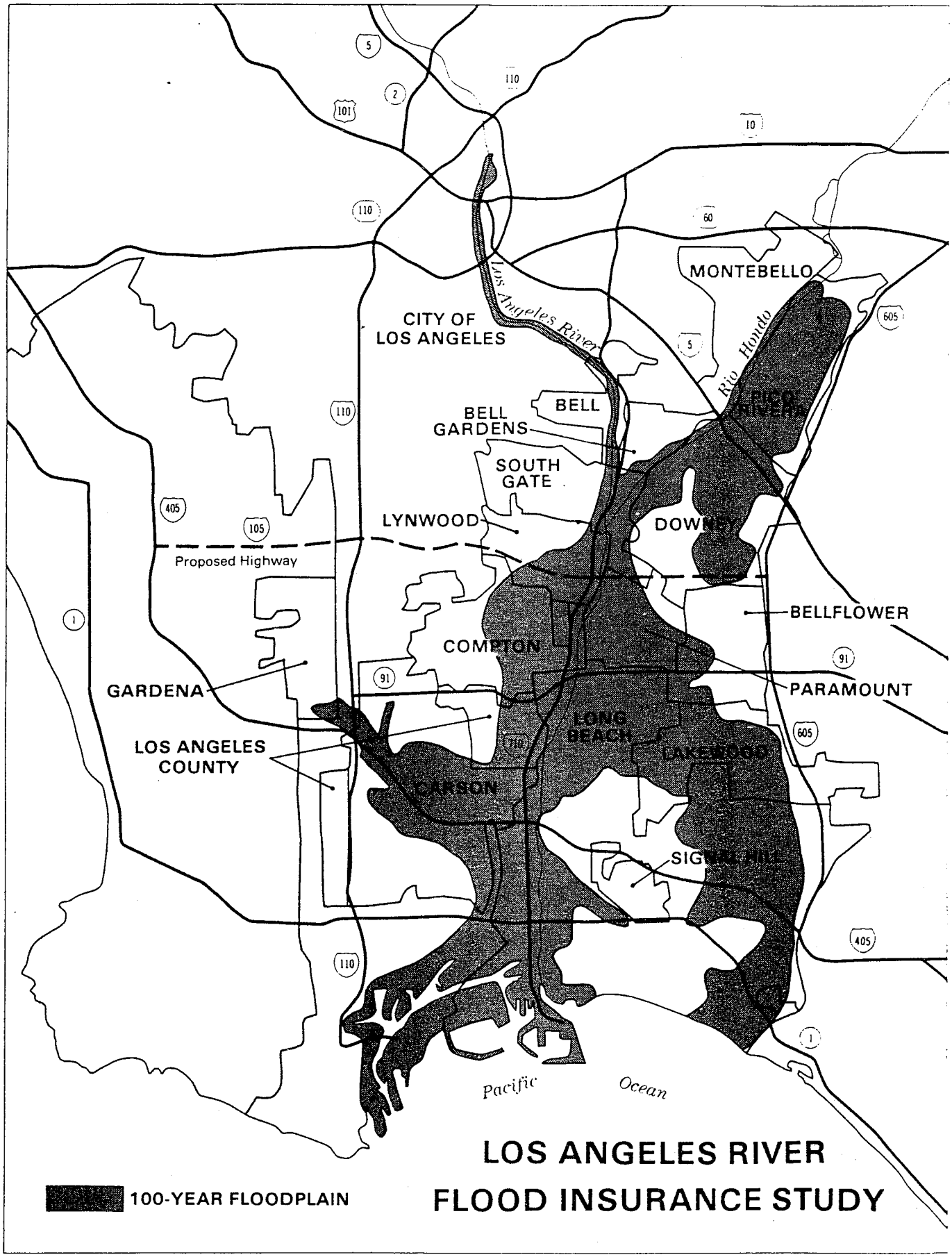
7. Failing to complete the Project will result in environmental harm as major flooding will mobilize trash, debris, and hazardous wastes which could find their way into Santa Monica Bay and groundwater resources.

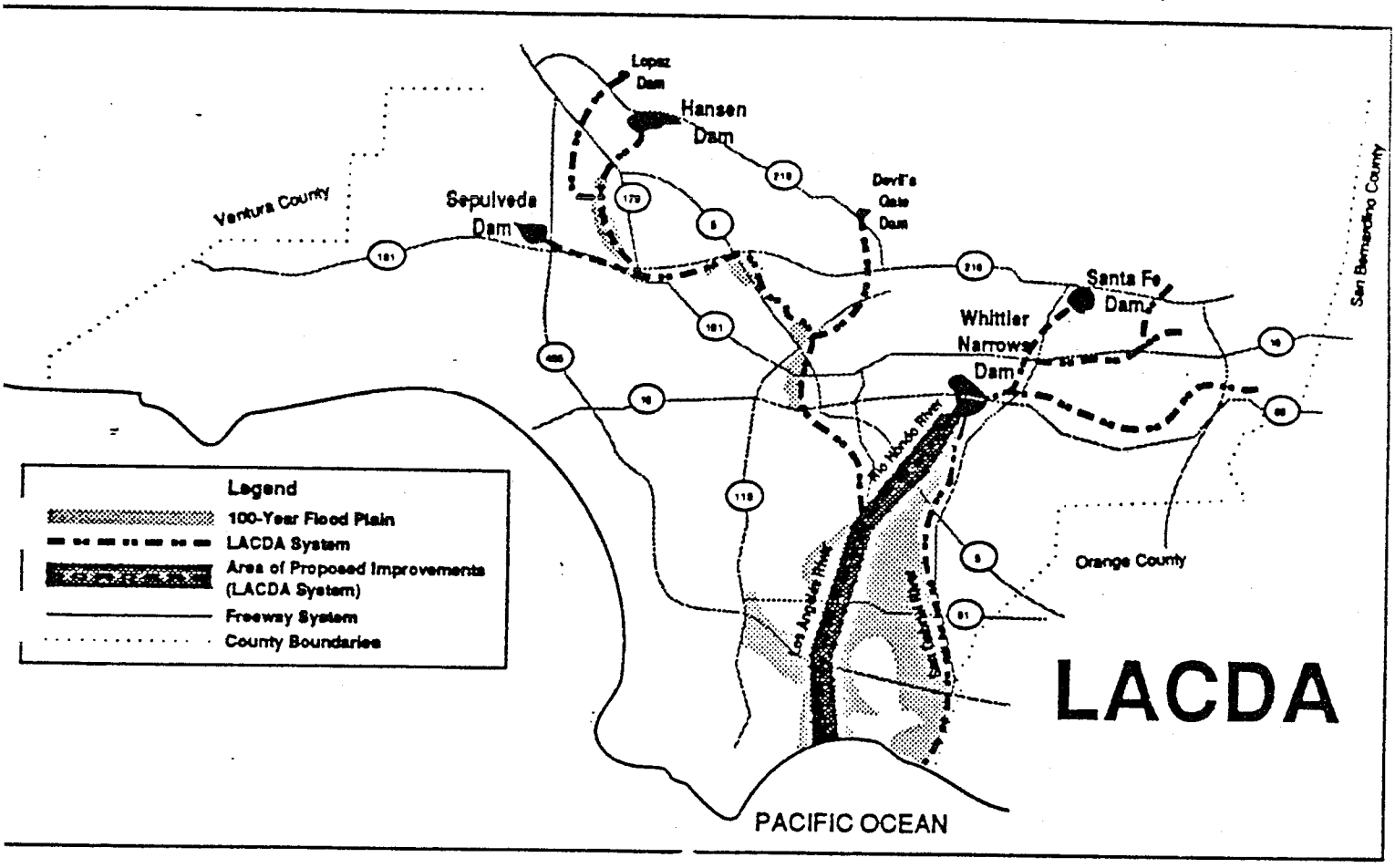
8. Construction of the project, expected to span from seven to nine years, will bring jobs and other economic benefits to the region, during and after construction.

PROJECT LOCATION

1. The project area is in the lower portion of the LACDA basin. The project area includes the Rio Hondo Channel, from Whittier Narrows Dam south to its confluence with the Los Angeles River; the Compton Creek from Route 91 to its confluence with the River, and the River, from its confluence with the Channel south to the Pacific Ocean.

2. See the location map on the following page.


MONTEBELLO
CITY OF LOS ANGELES
Los Angeles River
Rio Hondo
BELL
BELL GARDENS
PICO RIVERA
SOUTH GATE
LYNWOOD
DOWNEY
Proposed Highway
BELLFLOWER
COMPTON
GARDENA
PARAMOUNT
LONG BEACH
LOS ANGELES COUNTY
LAKEWOOD
CARSON
SIGNAL HILL
Pacific Ocean
100-YEAR FLOODPLAIN
LOS ANGELES RIVER
FLOOD INSURANCE STUDY



CHANNELS TO BE PROTECTED, LA RIVER AND RIO HONDO

The U.S. Army Corps of Engineers' Proposed Solution to Flooding In Southeast Los Angeles County

III.

FACT SHEET

PROJECT FEATURES
Los Angeles County Drainage Area Project

PURPOSE

1. Purpose of the LACDA project is to reduce the flood potential in the areas adjacent to the Rio Hondo Channel, Compton Creek and the lower portions of the Los Angeles River.

2. The flood potential in these areas was underscored when, in 1980, a flood event caused near-capacity channel flows in the River and deposited debris on top of the levees.

3. Existing levels of flood protection within the project currently range from about 25 to 40 years, and thus are 60 to 75% deficient in meeting the generally accepted standard of 100 years.

4. It is estimated that as much as 82 square miles in the lower LACDA Basin would be flooded in a 100-year storm, affecting about 500,000 people and about 177,000 structures in 10 cities, and causing up to $2.3 billion in flood damages.

FEATURES

1. Parapet Walls

Parapet walls would be constructed on the tops of existing levees along most of the project reaches. The wall would be two to eight feet high. Adjacent access roads also would be raised for parapet walls higher than four feet, so that the net height of the parapet wall from the backside of the levee would not exceed four feet.

2. Bridges

Some of the vehicle, railroad, and utility bridges which cross the project reaches would be raised in height. Bridges would be modified prior to parapet wall construction. Nine of the 27 bridges that cross the River would be raised by 1.6 to 6.3 feet. Two of the 18 bridges crossing the Rio Hondo Channel also would be raised by 1.4 to 5.3 feet, and one bridge would be relocated. An additional seven bridges across the Channel and six bridges across the Channel would be modified, but not raised.

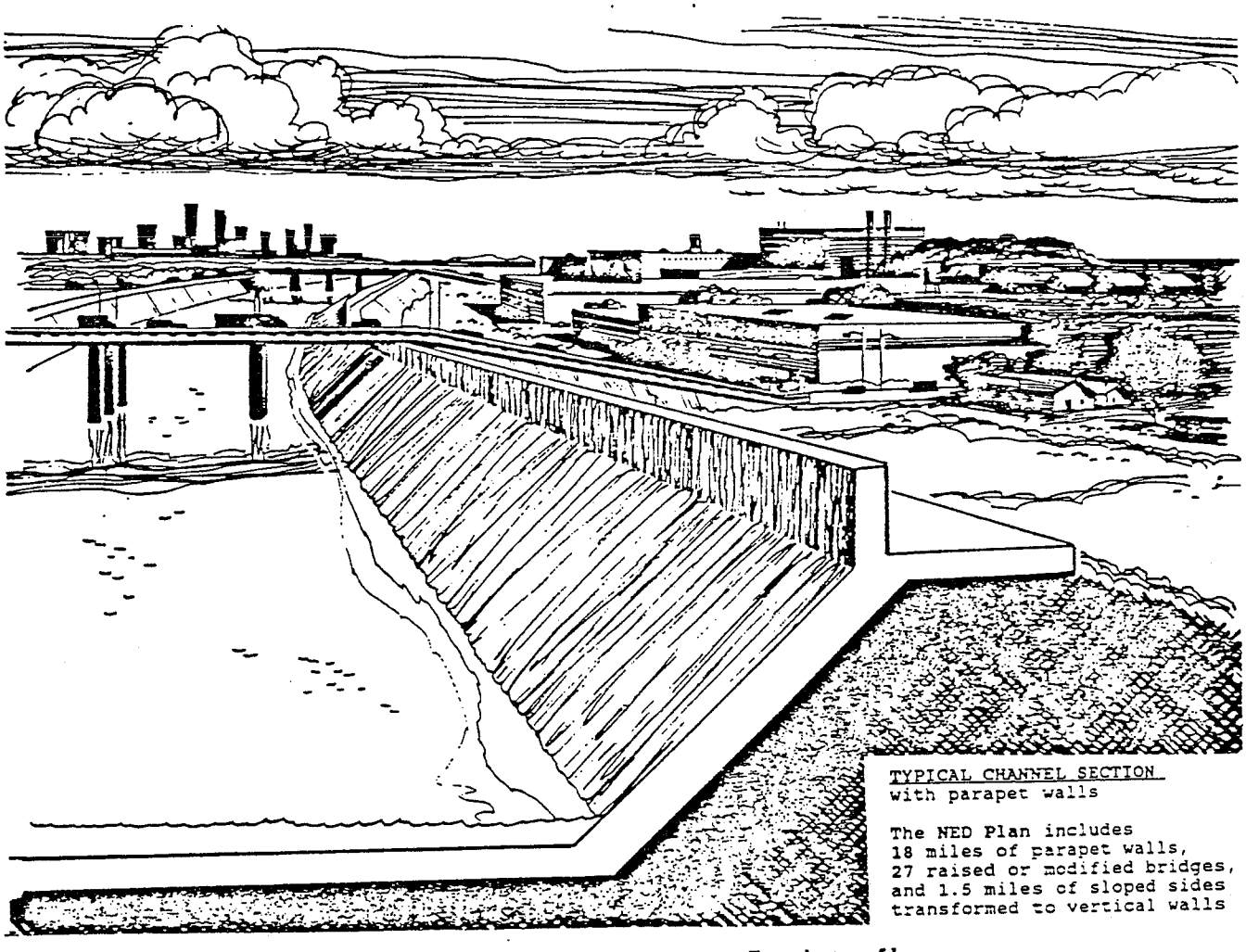
FEATURES (continued)

3. **Levee Armoring**

Grouted stone would be used to armor the back slopes of existing levees at several locations along the project reaches. Armoring is intended to prevent erosion of the backsides of the existing earthen levees at those locations where the levees and walls are expected to be overtopped by floodwaters.

4. **Widening Channel at Confluence**

A 7,000-foot section of the River, located at and just downstream of the confluence of the Rio Hondo Channel and the River, would be converted from a trapezoidal to a rectangular cross-section, and would also be widened by 30 feet.



TYPICAL CHANNEL SECTION
with parapet walls

The NED Plan includes
18 miles of parapet walls,
27 raised or modified bridges,
and 1.5 miles of sloped sides
transformed to vertical walls

The recommended plan, typical parapet wall on the top of levee.

THE PLAN

Improve the levees with parapet walls

The alternative which provides the best overall value is the parapet wall alternative:

- It provides the needed protection
- It has relatively low cost
- It doesn't take extra land
- It has limited environmental impacts

How many miles of channel will be protected?

Map 2 shows that significant flooding occurs downstream from downtown LA. In areas upstream from downtown LA, the channel is mostly "entrenched." That means the top of the channel is below ground level. When this occurs, floods do not spread out; they stay within the channel area. So, it doesn't make economic sense to raise the channel walls in these entrenched sections.

The parapet walls will be constructed along 21 miles of the lower Los Angeles River and the Rio Hondo to carry flows safely through south central Los Angeles, Compton, Willowbrook, Lakewood, Carson, Pico Rivera, Downey, Paramont, Bellflower, Lynwood, South Gate, Seal Beach, and Long Beach

U.S. Army Corps of Engineers Proposed
1996 Fiscal Year Budget - LACDA Project

PROJECT	Type of Project	SURVEYS		PRECONSTRUCTION ENGINEERING & DESIGN		CONSTRUCTION		Operation & Maintenance
California - Partial List		Total Program*	Budget Request	Total Program*	Budget Request	Total Program*	Budget Request	
LACDA Water Cons & Sup (Whittier Narrows & Santa Fe Dams)	SPE	460,000	460,000					
Los Angeles-Long Beach Harbor Model	N							160,000
Los Angeles County Drainage Area	**FC**					**11,367,000**	**11,367,000**	**3,413,000**
Los Angeles Harbor	N					100,000	100,000	
Malibu Coastal Area	SP	200,000	200,000					
Marin Co. Shoreline/San Clemente Crk.	FDP	234,000	234,000					
Marina Del Rey/Ballona Creek	N	200,000	200,000					
Martis Creek Lake, NY & CA (see NV)								
Marysville/Yuba City Levee Reconstrc.	FC					6,000,000	6,000,000	
Merced County Stream Group	FC							172,000
Merced County Streams	FC					700,000	700,000	
Mojave River Dam	FC							217,000
Morro Bay Harbor	N					124,000	124,000	2,580,000
Moss Landing Harbor	N							845,000
N CA Streams, Cache Creek Environmental Restoration	FDP	200,000	200,000					
N CA Streams, Sacramento River Fish Migration	FDP	300,000	300,000					
N CA Streams, Winters & Vicinity	FDP	200,000	200,000					

Economic Impacts of FEMA Flood Plain Management Regulations on Southeast Los Angeles County

IV.

FACT SHEET

CONSEQUENCES OF DELAY
Los Angeles County Drainage Area Project

What will happen if we don't build the LACDA Project or delay its start? Here are a few of the potential consequences of such a course of action:

The 100-Year Flood

A 100-year flood would overflow the banks of the Los Angeles River in two general locations. First, in the upper basin, there would be limited overflows where the River flows eastward along the north slope of the Hollywood Hills. Second, there would be extensive flooding in the lower basin, beginning just upstream from the confluence with the Rio Hondo. On the Rio Hondo itself, floods could break out anywhere downstream from Whittier Narrows Dam. In the lower basin, approximately 75 square miles would be flooded by the 100-year flood.

Federal Flood Plain Regulations

In the mid-1980s, the Federal Emergency Management Agency (FEMA) found that people and property along the lower reaches of the Rio Hondo and Los Angeles River no longer have the minimum level of flood protection required by the federal government. As a result, FEMA is remapping the region to reflect the hazard. When the map and accompanying regulations are issued and go into effect, perhaps as early as October 1995, thousands of local property owners will find themselves subject to mandatory flood insurance and building restrictions.

Impacts

- The average cost of flood insurance is about $222 per year for every $100,000 of property value. After a flood hazard has been determined, the annual cost would jump to approximately $412.

- Annual flood insurance premiums for homeowners in the ten cities along the river could top $84 million. Households will also indirectly pay the additional cost of $31 million per year in apartment building insurance and $16 million in business insurance coverage.

- FEMA regulations will compel property owners to raise room additions and new business construction higher than the possible high-water mark in a 100-year flood. This could be as much as 15 feet above current foundations in parts of Long Beach. Even in cities further from the River, FEMA will require foundations to be raised 3 to 9 feet.

Impacts (continued)

- City officials fear that these onerous restrictions will mean a virtual end of new business construction and major home remodeling in their communities. The effect would be a ***de facto*** construction moratorium for the region.

- The end of new business construction will have an even greater fiscal impact. Many flood plain cities depend heavily on sales tax receipts for municipal revenues. These revenues pay for law enforcement programs, recreation activities, and social services.

- Job losses in the ten cities within the flood plain could be as high as 120,000 by the year 2005, as a result of investment moving away to cities not affected by the FEMA regulations. The employment sectors with the greatest job losses will be retailing, professional services, manufacturing, food service, and business and residential construction.

Summary of Economic Impacts*
of FEMA Flood Plain Management Regulations

One measure of the impact of FEMA flood plain regulations combines the higher cost of development with the value of development deterred as a result. This is a measure of the "output losses" caused by the FEMA regulations.

Output Losses 1992 - 2005			
Year	10-City Area	LA County	Region
1992	$801.10 million	$1.15 billion	$1.33 billion
1998	1.22 billion	1.76 billion	2.04 billion
2005	6.19 billion	9.00 billion	10.46 billion
1992-2005	21.20 billion	30.80 billion	35.70 billion

Another measure of economic impact is job flight from areas where businesses will not expand or locate because of FEMA flood regulations.

Lost Jobs 1992 - 2005			
Year	10-City Area	LA County	Region
1992	5,588	10,346	12,926
2005	120,225	153,130	171,243

FEMA regulations will also impose mandatory flood insurance. Insurance premiums will drain additional purchasing power from the area.

Yearly Insurance Premium Costs In The 10-City Area	
Homeowner Premiums	$84 million
Rental Housing Premiums	31 million
Business Premiums	16 million
Total Annual Premiums	$131 million

* Data are taken from *The Economic Impact of FEMA Flood Protection and Insurance Requirements on Ten Cities in the Los Angeles County Flood Plain*, a report of the Planning Institute, University of Southern California, December 31, 1991

Zone AR Amendment

V.

ZONE AR AMENDMENT
SECTION 928 - TITLE IX
HOUSING AND COMMUNITY DEVELOPMENT ACT OF 1992

Sec. 918 FLOOD CONTROL RESTORATION ZONE.

Section 1307 of the National Flood Insurance Act of 1968 is amended by adding the following new subsection:

"(f) Notwithstanding any other provision of law, this subsection shall only apply in a community which has been determined by the Director of the Federal Emergency Management Agency to be in the process of restoring flood protection afforded by a flood protection system that had been previously accredited on a Flood Insurance Rate Map as providing 100-year frequency flood protection but no longer does so. Except as provided in this subsection, in such a community, flood insurance shall be made available to those properties impacted by the disaccreditation of the flood protection system at premium rates that do not exceed those which would be applicable to any property located in an area of special flood hazard, the construction of which was started prior to the effective date of the initial Flood Insurance Rate Map published by the Director for the community in which such property is located. A revised Flood Insurance Rate Map shall be prepared for the community to delineate as Zone AR the areas of special flood hazard that result from the disaccreditation of the flood protection system. A community will be considered to be in the process of restoration if---

"(1) the flood protection system has been deemed restorable by a Federal agency in consultation with the local project sponsor;

"(2) a minimum level of flood protection is still provided to the community by the disaccredited system; and

"(3) restoration of the flood protection system is scheduled to occur within a designated time period and in accordance with a progress plan negotiated between the community and the Federal Emergency Management Agency.

Communities that the Director of the Federal Emergency Management Agency determines to meet the criteria set forth in paragraphs (1) and (2) as of January 1, 1992, shall not be subject to revised Flood Insurance Rate Maps that contravene the intent of this subsection. Such communities shall remain eligible for C zone rates for properties located in zone AR for any policy written prior to promulgation of final regulations for this section. Floodplain management criteria for such communities shall not require the elevation of improvements to existing structures and shall not exceed 3 feet above existing grade for new construction, provided the base flood elevation based on the disaccredited flood control system does not exceed five feet above existing grade, or the remaining new construction in such communities is limited to infill sites, rehabilitation of existing structures, or redevelopment of previously developed areas.

The Director of the Federal Emergency Management Agency shall develop and promulgate regulations to implement this subsection, including minimum floodplain management criteria, within 24 months after the date of enactment of this subsection.".

SIGNIFICANT ASPECTS OF THE ZONE AR RULE

How communities can apply for the Zone AR designation:

A community will be considered to be eligible for the Zone AR designation if the flood protection system has been deemed restorable by a Federal agency in consultation with the local project sponsor; if a minimum level of flood protection is still provided to the community by the disaccredited system; and if restoration of the flood protection system is scheduled to occur within a designated time period and in accordance with a progress plan negotiated between the community and FEMA.

How communities with Zone AR will be mapped:

After the community meets the application requirements, FEMA will prepare a revised Flood Insurance Rate Map showing the areas of Zone AR flooding that result from the disaccredited flood protection system. If the Zone AR areas are within an existing Special Flood Hazard Area, then the areas will be designated as a dual flood insurance rate zone.

Floodplain management criteria for Zone AR:

Regulations will not require the elevation of improvements to existing structures. New construction will not be required to be elevated by more than 3 feet above existing grade, provided that the base flood elevation based on the disaccredited flood control system does not exceed 5 feet above the existing grade. When new construction is limited to infill sites, rehabilitation of existing structures, or redevelopment of previously developed areas, structures will be required to be elevated a maximum of 3 feet above the existing grade regardless of the flood depth.

Zone AR insurance requirements:

Mandatory flood insurance purchase requirements will apply in Zone AR. Insurance rates for structures located within Zone AR will not exceed the unnumbered Zone A rate if the structure is build in compliance with Zone AR floodplain management regulations.

How communities will become eligible for removal of the Zone AR floodplain designation:

To remove the Zone AR designation and show the restored flood control system as providing 100-year flood protection, communities will be required to have completed restoration or to have shown adequate progress toward completion as defined in Section 61.12 of the regulations. If FEMA determines that adequate progress toward restoration was made, then FEMA will revise the Flood Insurance Rate Map to remove the Zone AR designation and remap the areas as Zone A99.

LOS ANGELES RIVER
FLOOD INSURANCE STUDY
COMMUNITIES

COMMUNITY	Community Number	(Original) FIRM Date	Regular Program Entry Date
Bellflower	060102	NSFHA	04/30/79
Carson	060107	NSFHA	09/29/78
Compton	060111	NSFHA	03/30/79
Downey	060645	NSFHA	09/30/91
Gardena	060119	NSFHA	04/21/78
Lakewood	060130	NSFHA	04/15/79
Long Beach	060136	09/15/83	09/15/83
Los Angeles	060137	12/02/80	12/02/80
L. A. County	065043	12/02/80	12/02/80
Lynwood	060635	04/15/80	04/15/80
Montebello	060141	03/18/80	03/18/80
Paramount	065049	NSFHA	02/20/79
Pico Rivera	060148	NSFHA	04/15/79
South Gate	060163	NSFHA	04/15/79

NSFHA -- No Special Flood Hazard Areas are identified for the community. There are no map panels printed.

(MAY94)

Floodplain Building and Flood Insurance

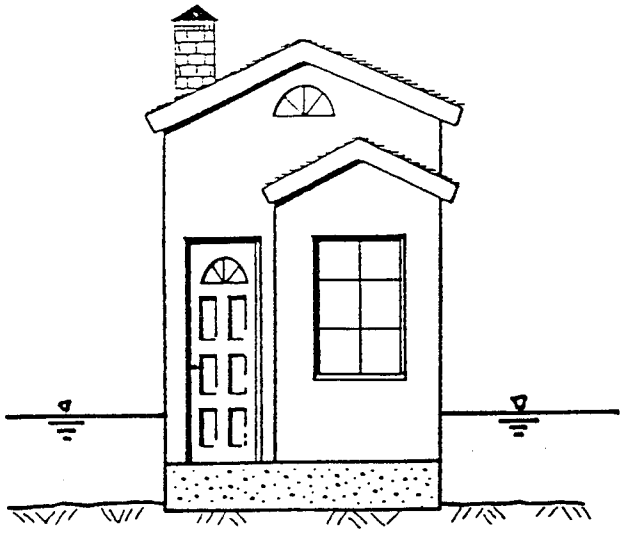
Case # 1 : This building is in violation of the local floodplain ordinance if it was built or substantially improved after the Flood Insurance Rate Maps (FIRMs) were produced. If the building was granted a variance by the jurisdiction under the floodplain ordinance it would not be violation but would still be at high risk. It is subject to extremely high flood insurance rates due to the obvious potential for severe damage. If it was constructed without a legitimate permit the jurisdiction can request FEMA to declare it ineligible for flood insurance.

Case # 2 : The building is constructed so that the first floor is at or above the Base Flood Elevation (BFE) also called the 100 year or 1% flood level. This building meets the minimum federal requirement and the local floodplain ordinance unless the jurisdiction has set a higher standard. Although it is legal, the building will still require flood insurance because a portion of the structure (the above ground foundation) is exposed to the 100 year flood waters.

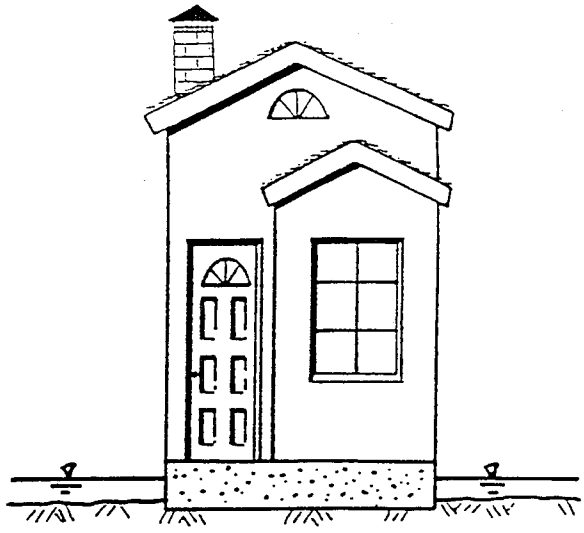
Case # 3 : Here the first floor is well above the 100 year flood level and meets federal and local requirements. However, the building still requires flood insurance because part of the foundation (the above ground portion of the piers) is still exposed to the 100 year flood waters.

Case # 4 : The first floor is above the 100 year flood level and thus meets federal and local requirements. This time, because the structure sits on top of an island of compacted earth, there is no exposed portion of the building that is touched by the 100 year flood waters. This building is eligible for a Letter of Map Amendment (LOMA) or a Letter of Map Revision (LOMR). If the owner or builder applies for and receives a LOMA or LOMR that document from FEMA will officially change the FIRM by removing the structure from the 100 year floodplain. That letter will also remove the federal requirement for flood insurance from the building.

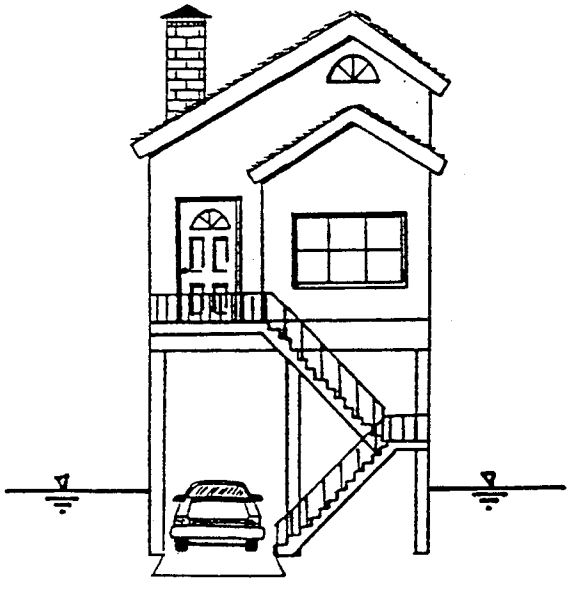
100 Year Flood Elevations



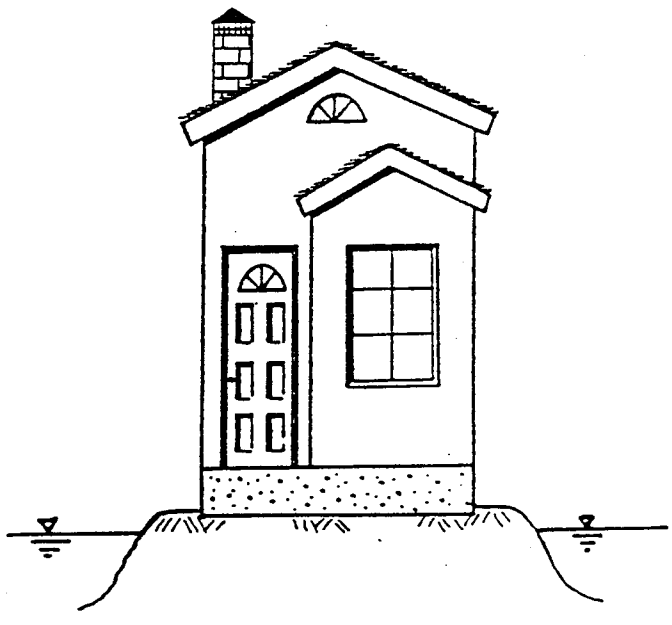
CASE 1



CASE 2



CASE 3



CASE 4

University of Southern California
Economic Study
of
Federal Emergency Management Agency
Flood Protection and Insurance Requirements
On Ten Cities in
Southeast Los Angeles County

VI.

THE ECONOMIC IMPACT OF FEMA FLOOD PROTECTION AND INSURANCE REQUIREMENTS ON TEN CITIES IN THE LOS ANGELES COUNTY FLOODPLAIN

A Report of the Planning Institute
University of Southern California

December 31, 1991

Investigators:
Harry W. Richardson, Peter Gordon and Myung-Jin Jun

THE ECONOMIC IMPACT OF FEMA FLOOD PROTECTION AND INSURANCE REQUIREMENTS ON TEN CITIES IN THE LOS ANGELES COUNTY FLOODPLAIN

EXECUTIVE SUMMARY

This report examines the local and regional economic impacts of the imposition of FEMA (Federal Emergency Management Agency) new construction regulations and flood insurance requirements on ten cities in the Los Angeles County floodplain (Bellflower, Bell Gardens, Carson, Compton, Downey, Lakewood, Long Beach, Paramount, Pico Rivera and South Gate). The goal of FEMA requirements is to protect against the effects of a "100 year flood", i.e. a catastrophic flood that has a 1 percent probability of occurring in any year.

The economic repercussions are analyzed over the period 1992-2005 under three headings: construction (both residential and non-residential) in the AE zone (flood risk > 3 ft. depth) that is deterred because of the controls (the higher construction costs make building in the AE zone so uncompetitive with other locations in the region that either it does not take place at all or it is diverted to other locations outside the floodplain); development in the AO zone (flood risk > 1 ft. depth) that is assumed to take place, but at a higher cost because of flood protection requirements (these additional costs are a stimulus to the economy, but they are counterbalanced by reduced consumer spending on other goods and services); and flood insurance premiums that also drain resources from other forms of spending, in part offset by a stimulus to the insurance industry.

The economic impacts are measured by feeding final demand changes through a highly disaggregated (494 economic sectors) input-

output model, generating direct, indirect (i.e. impacts on supplying industries) and induced (i.e. secondary consumption) output and employment effects. The Southern California Planning Model (SCPM) allocates these sectoral impacts over 213 geographical zones in the Southern California Association of Governments (SCAG) six-county region. The economic impacts include both the short-term construction impact and the cumulative flows of output (e.g. servicing of mortgages and rent payments, utilities, insurance, and purchases of furniture and household equipment for dwelling units and the value of goods and services produced by non-residential buildings functioning as workplaces).

The deterred development scenario examines the case where development not undertaken in the AE zones within the ten cities either does not take place at all or takes place at locations outside the region. Output losses for the ten cities as a whole amount to $801.1 million in 1992 (construction impact only), $1,215.8 million in 1993 (the first year showing an output flow impact) rising to $6,191.8 million by 2005 (the terminal year). The ten cities account for three-fifths of the regional economic impact (the regional output losses are $1,333.4 million in 1992, $2,035.7 million in 1993 and $10,463.2 million in 2005), and more than one-quarter of the regional economic impact occurs in Los Angeles County outside the ten cities. The net present value of these output losses is $52.9 billion for the region and $31.4 billion for the ten cities at a 5 percent discount rate, or $35.7 billion and $21.2 billion respectively at a 10 percent discount rate.

The economic impact can also be expressed in terms of jobs. Job losses in the ten cities rise from 5,588 in 1992 to 120,225 by the year 2005; the corresponding numbers for Los Angeles County (including the ten

cities) are 10,346 and 153,130 and for the region as a whole are 12,926 and 171,243. The ten-cities' share in regional job losses rises from 43.2 percent in 1992 to 70.2 percent by the year 2005. Aggregating over 14 years, the total employment loss measured in person-years is 880.7 thousand for the ten cities, 1,144.3 thousand for Los Angeles County and 1,289.2 thousand for the region as a whole. The major sectors affected in rank order are: retailing (624,000 in the region), professional and personal services (205,600), manufacturing (111,400), entertainment, hotels and restaurants (95,500) and construction (80,000). The fact that construction is ranked fifth underlines the importance of the output flow relative to the construction impact as well as the sizeable role of indirect and induced effects in any economic impact analysis.

These results do not take into account the possibility that the absence of redevelopment in the AE zone may actually preserve some output flows from existing homes and businesses that would otherwise have been demolished and replaced. However, the total offset in terms of output and jobs from these preserved structures would be rather modest.

The other extreme from the deterred development scenario is that all the AE-zone construction that does not take place in the ten cities takes place elsewhere in the region (the relocation scenario). Analysis of this scenario shows that the compensating feedback effects on the ten cities are relatively small: the output loss in the ten cities is reduced by 13.9 percent and the job loss is reduced by 21.4 percent. The net present value of output losses remains huge, $45.6 billion in the region as a whole ($23.3 billion in the ten cities) at a 5 percent discount rate and $30.7 billion for the region ($18.25 billion for the ten cities) at a 10 percent discount rate.

Our analysis of the flood insurance requirements by FEMA assumes that all affected parties have to take out flood insurance, although a recent national study revealed that only 25 percent of them actually did. As enforcement increases, this proportion will presumably rise. The net economic impact of flood insurance premiums is moderate because of the compensating stimulus given to the insurance industry: the combined annual regional output loss from residential and non-residential insurance premiums is only $66 million, while the regional employment loss is only 1,064 jobs. Most of these losses (97 percent) are restricted to the ten cities. Although the net economic impacts are mild, households suffer a sizeable economic burden on their spending power. Annual flood insurance premiums for homeowners amount to $84 million, and households indirectly pay for part of the $30.9 million of flood insurance premiums for apartments and $16 million for businesses.

The adverse economic impacts on the ten cities in the floodplain of FEMA flood protection and insurance requirements are massive. The net present value of output losses is *at least* $18.25 billion in the ten cities ($30.7 billion in the region) in the relocation scenario and $21.2 billion ($35.7 billion) in the deterred development scenario. This is very high relative to the estimated $325 million capital cost of the Los Angeles County Drainage Area Project (LACDAP) and even relative to the maximum estimated $5 billion damage from the 100-year flood. On the other hand, flood insurance has a modest economic impact; the burden on households of an annual bill of about $107 million for flood insurance may be justifiable if the 100-year flood is capable of causing as much as $5 billion of damage.

THE ECONOMIC IMPACT OF FEMA FLOOD PROTECTION AND INSURANCE REQUIREMENTS ON TEN CITIES IN THE LOS ANGELES COUNTY FLOODPLAIN

Introduction

Several cities in the Los Angeles metropolitan region are located in the floodplain considered vulnerable to a "100 year flood", i.e. a catastrophic flood that has a 1 percent probability of occurring in any one year. To protect against the effects of such a flood, FEMA (Federal Emergency Management Agency) has proposed new construction regulations and insurance requirements as part of the National Flood Insurance Program. If individual cities choose not to participate in this Program, they will be deprived of federal funding, including a prohibition of mortgages from federally insured loan institutions. This course of action would be very radical because the lack of access to normal channels of mortgage funding would devastate property values in the affected cities. The third alternative is a flood control project (the Los Angeles County Drainage Area Project [LACDAP]) to raise the height of the river levees, a project estimated to cost more than $325 million and to take more than a decade to complete; this would require federal funding.

The purpose of this report is to analyze the economic impacts of FEMA flood insurance requirements, to aid the affected cities to make a more informed choice about the options facing them and to evaluate how the costs of flood protection and insurance compare to the capital costs of LACDAP. The analysis focusses on the economic repercussions of FEMA requirements under three headings: construction (both residential and non-

residential) that is deterred because of the controls (either it does not take place at all or it is diverted to other locations outside the flood plain); development that occurs at higher cost because of flood protection requirements (these additional costs are, in fact, a stimulus to the economy, but they are counterbalanced by reduced consumer spending on other goods and services); and flood insurance premia that also drain resources from other forms of spending, in part offset by a stimulus to the insurance industry.

The analysis is limited to ten cities in Los Angeles County: Bellflower, Bell Gardens, Carson, Compton, Downey, Lakewood, Long Beach, Paramount, Pico Rivera, and South Gate. However, because of indirect spillovers to supplying industries and induced spillovers in secondary consumption spending, the repercussions are felt beyond the cities themselves in other parts of Los Angeles County and even in the other counties of the region.

Although there are many land use zone classifications in flood insurance rate tables, the three key ones used in this analysis are:

Zone AE: flood risk > 3ft. depth;

Zone AO: flood risk between 1 and 3 ft. depth;

Zone C: subject to minimal, shallow flooding.

Any analysis of the overall impact of flood insurance requirements depends ultimately on the assumptions underpinning the analysis. We have made certain assumptions based on discussions with planning agencies, architects

and developers, and property insurers. Different assumptions would generate different quantitative results. However, we believe that the qualitative results would hold, namely that flood insurance requirements do have major economic impacts (many of them adverse) under all plausible sets of assumptions.

The key elements in our assumptions are:-

i. Meeting the flood control requirements of new development within the AE zone are too expensive. Developers would build elsewhere, either outside the region as a whole or elsewhere in the region (defined here as the 5-county area of Los Angeles, Orange, San Bernardino, Riverside and Ventura); both alternatives are examined in this report. Yet another option is that development intentions may be unaffected, but that the higher costs of development within AE zones would be fully capitalized in lower land values. This option is not explicitly examined in detail in this report, but the gross economic impacts would also be of a high order of magnitude.

ii. Development within the AO zone would continue, but at a higher cost. Several technological solutions are possible, but all of them imply using landfill to build at a higher flood base elevation (FBE) plus other flood-proofing and -protecting techniques. These higher costs have a positive impact on economic development, but this is offset by reductions in consumer and business final demand. The net aggregate effect is a modest stimulus (because construction impact multipliers tend to be somewhat higher than multipliers in other sectors). However, there are significant distributional consequences on the sectoral and geographical composition of economic activity.

iii. Development in the C zone is unaffected, either in terms of cost or level of activity. However, households and firms within the C zone are required to take out flood insurance. Our results are based on the assumption that all households and firms within the floodplain area pay for flood insurance. This is an upper-bound estimate, because it is unclear how effectively banks and savings and loan institutions enforce the flood insurance requirements, except when property changes hands. One 1989 national estimate was that only 25 percent of eligible homeowners carried flood insurance, but enforcement has increased in the past two years.

Although flood insurance premiums are a drain on the resources of households and firms (and hence can be represented - directly and indirectly - as a reduction in household final demand), they also provide a stimulus to the final demand of the insurance industry. However, the impact of this stimulus is much reduced if insurance claims are low. Although for most types of insurance, payments from the insurance companies to claimants are about 65 percent of premiums, in a normal year in a semi-desert terrain such as the Los Angeles Basin payoffs will be minimal for flood damage. Accordingly, our estimates assume no payments. Obviously, in the year of the 100-year flood the economic impact associated with flood compensation would be massive, although offset by tremendous property damage.

Specific Assumptions

The analysis here covers five types of development, two residential (single family homes and multiple dwellings) and three non-residential (commercial, industrial and institutional). It also covers new construction and (where appropriate) remodeling and alterations. In fact, remodels

account for a substantial proportion (often more than 50 percent) of construction activity in the ten cities (see Appendix A).

The projections of development in the absence of FEMA flood insurance regulations are based on the construction levels of 1987-90. In earlier research using the same model applied to a different situation (i.e. growth controls in Pasadena), we attempted to forecast the ups and downs of the construction cycle. In this research, we have used the same *average* projection for each year, not an accurate representation of reality but less vulnerable to projection errors compared with the cyclical forecast and quite acceptable if the goal is to measure 1992-2005 aggregate impacts. Also, we have not built any upward trend into the projections, justifiable if we had used each year of the 1990s as the basis for future projections, but inconsistent with current assessments that construction activity in the 1990s will not be more boisterous than in the 1980s.

The assumed ratios of square feet of structure to square feet of lot size were: 0.4 for single-family homes, 0.5 for multiple dwellings, 0.3 for commercial (i.e. retail and office) development, 0.5 for industry and 0.4 for institutional buildings. The ratios may appear high for single-family homes and somewhat low for commercial development. However, lot sizes in the ten study cities are rather small and there are some two-story houses so that, on the average, this ratio is not the same as the covered area proportion. Also, the commercial development ratio is low compared with the expected FAR (floor-area ratio), because retail dominates offices and because a large proportion of the commercial buildings in the ten-city area are one-storey, reflecting height restrictions and moderate (by Los Angeles' standards) land values.

Although there is some vacant land in each of the ten cities, the cities are very much built out. Accordingly, we assumed that all construction (apart from remodels) is based on replacement demand. We chose a replacement rate of 3 percent per annum for residential dwellings, 7 percent for commercial and industrial buildings, and 2.5 percent for institutional buildings. To the extent that there is new development on vacant land, our estimates for residential and institutional construction are underestimates, because it is reasonable to assume that any vacant land would be developed by the year 2005 (implying a construction rate of at least 7 percent of this land per year).

In terms of costs, we assumed that single-family-home construction cost $75 per sq. ft. for a typical 1500 sq. ft. home, multiple dwellings cost $65 per sq. ft. for a 900 sq. ft. unit, commercial and institutional construction cost $80 per sq. ft., and industrial construction cost $45 per sq. ft. We also assumed that flood protection in the AO zone (where construction continues) cost an additional $12,000 for a single family home and $18 per sq. ft. for all other types of construction. We further assumed that 65 percent of the future remodels in the AE zone would not be undertaken; some would, because modest remodels do not require flood protection for the whole building. AO remodels were assumed to be unaffected.

The Southern California Planning Model (SCPM)

The model used to examine the impacts of FEMA flood requirements is a spatial-sectoral economic impact model developed by the Planning Institute of the University of Southern California, called the Southern California Planning Model (SCPM). Changes in final demand are fed

through a highly disaggregated (494 economic sectors) input-output model to generate direct, indirect (i.e. impacts on supplying industries as a result of interindustry purchases by the sectors experiencing the final demand changes), and induced (i.e. secondary consumption effects resulting from workers' purchases of goods and services) output and employment effects. These sectoral impacts are then allocated over the six-county region into 213 geographical zones: direct impacts are allocated exogenously; indirect impacts are allocated in proportion to the distribution of employment by zone and by sector; and induced impacts are traced back from the worplace to the residential site via a journey to work matrix and from the residential site to the place of purchase and/or consumption via a journey to services matrix. For the purposes of geographical allocation the 494 input-output sectors are collapsed into 12 sectors. More detail on the technical aspects of the model is provided in Appendix B.

Construction Impact Vs. Output Flow

When development is deterred, the economic impacts are not restricted to the direct, indirect and induced effects of the lost construction. Both residential and non-residential buildings generate an annual flow of goods and services that contributes to the region's economic output. In the case of dwellings, this annual flow includes services associated with mortgage and rent payments, utilities, insurance and purchases of furniture and household equipment. Non-residential buildings primarily function as workplaces; the annual flow of services includes the value of the goods and services that these establishments sell to final demand and the employment associated with their production. Moreover, whereas the construction impact is a one-shot injection, the effect of these output flows is

cumulative. Hence, in the case of development deterred, the output flow impact soon begins to dominate the construction impact. This is especially the case with non-residential development. Once the workplaces are lost, they are lost forever along with the output and jobs that they create. In this report, we have not separated the construction impact from the output flow by type of development, city and year, but over the projection period as a whole (1992-2005), the output flow accounts for 77.4 percent of the total impact.

The Projection Period

We selected the period 1992-2005 for the economic impact projections. The choice of 1992 as the starting point is obvious, the first full year of implementation of the new FEMA rules. The year 2005 was chosen as the terminal date reflecting the fact that even if a decision were taken very soon to construct the Los Angeles County Drainage Area Project, the project would not be completed until around 2005. If the project is not implemented, of course, the economic impacts would stretch even further into the future. However, the evaluation method we have adopted, i.e. the net present value of lost output, implies that the discounted value of impacts felt after the year 2005 will progressively become quite small.

The Deterred Development Scenario

As pointed out above (pp. 2-3), the core features of our analysis are that no development will take place in the AE zone as a result of the imposition of FEMA flood protection requirements, that development in the AO zone continues but at a much higher cost (AE and AO net acreages by land use and city are given in Appendix C), and that development in the C zone is unaffected (although both households and firms are required to pay for flood insurance). The argument for no AE zone development is based on the hypothesis that developers in the Southern California region operate in a highly competitive environment and that the additional construction costs of conforming to AE zone development would destroy any prospects for profitability (in other words, demand within any subset of cities within the region is highly elastic). With the minor exception of some institutional construction (e.g. city offices presumably have to be built within the municipal boundaries), developers have no monopoly power within the ten study cities because both households and firms can buy (or lease) properties outside the city boundaries at more competitive prices. As a result, residential, commercial and industrial development are all footloose.

However, our core scenario takes the argument a little further. We assume that the AE zone development denied in the ten cities will not take place anywhere within the five-county region. Why do we adopt this position? The explanation is that the FEMA flood protection requirements are yet another additional obstacle in the way of profitable real estate development in Southern California on top of the lengthy and expensive permit process, the burden of impact fees, the constraints of growth

management controls, the costs of meeting the air quality rules and regulations of the South Coast Air Quality Management District, high taxes and other unfavorable aspects of the regulatory and policy environment. Moreover, in contrast with the past, an increasing number of developers are now mobile, willing to switch activities from one region to another, even across State lines, as local real estate markets wax and wane. In these circumstances, it seems reasonable that the AE zone regulations could deter development from taking place at all, at least within the region. The argument is strengthened by the fact that most of the development would be replacements or additions rather than new construction on vacant land; this type of development can easily disappear altogether in the face of much higher costs. We call this the deterred development scenario.

However, it is important to point out that our conclusions that the FEMA requirements will have massive adverse impacts on the ten cities are not dependent on the assumptions of the deterred development scenario. We subsequently explore the other extreme, where *all* the development that does not occur in the ten cities is undertaken at other locations within the five-county region (the relocation scenario), and we find that the negative impacts on the ten cities are almost as severe. Obviously, many other scenarios are possible, involving alternative assumptions about the proportions of development not taking place in the ten cities i. being undertaken elsewhere in the region and ii. not taking place at all (or taking place in other regions). These scenarios would generate output and job losses intermediate between those of the deterred development scenario and the relocation scenario.

Appendix D presents the output losses by city, county, region and sector as a result of final demand changes in each city for 1992, 1993 and

2005; Appendix E shows the aggregate output losses over all cities while Appendix F shows the same results city by city (in terms of final demand changes). These amounts include:- the direct, indirect and induced output impacts of residential and non-residential construction not undertaken in the AE zone because of prohibitive costs; the direct, indirect and induced output impacts of the lost annual output flows associated with the reduction in housing services (e.g. mortgage servicing, property management, household furniture and equipment) and in the sales and receipts from missing workplaces (i.e. the non-residential construction not built).

Table 1 extracts from Appendix E the results for 1992 (construction impact only), 1993 (the first year showing an output flow impact) and 2005 (the terminal year of the projection). In the first year (1992), the regional output loss totals $1,333.4 million, of which $801.1 million (or 60 percent) occurs in the ten cities (ranging from $3.9 million in Compton to $296.1 million in Long Beach). In 1993, the regional output loss is $2,035.7 million while the ten-city loss climbs to $1,215.8 million (59.7 percent of the total). By the year 2005, the losses balloon up to $10,463.2 million for the region and $6,191.8 million (59.2 percent of the total) for the ten cities. Thus, as a generalization, three-fifths of the economic impacts remain within the ten cities while the remaining two-fifths spill over into the rest of the region (with two-thirds of this spillover remaining within Los Angeles County).

Interpreting the magnitude of annual output losses over a 14-year period is difficult because the future value of a given dollar amount is not the same as its present value (not because of inflation, given that all our impacts are expressed in terms of constant prices). To assess dollar values at different points of time in terms of a common denominator, we have to

discount future streams of output losses back to the present. The net present value concept enables us to make a direct comparison between future and present values. It is particularly useful in this context because it permits us to weigh the net present value of output losses associated with flood protection requirements over the 1992-2005 period against the capital costs of a decision to undertake the Los Angeles County Drainage Area Project now and against the economic destruction of the 100-year flood were it to occur today.

The main problem with the net present value concept is the choice of an appropriate discount rate. Table 1 shows the net present value results for two discount rates (5 percent and 10 percent) derived from Appendix G. The 5 percent rate is more in line with current interest rates (particularly because the social rather than the private discount rate should be used), while the 10 percent rate is more consistent with standard discounting conventions and may be closer to a more realistic long-term rate. As Table 1 shows, the net present value of the output losses in the region as a whole is about $52.9 billion at a 5 percent discount rate and $35.7 billion at a 10 percent discount rate. Moreover, as the data in Appendix G reveals, the net present value of *annual* output losses with a 10 percent discount rate stabilize in the $2.73 -$2.95 billion range over the period 1997 to 2005; in other words, the discounting procedure tends to cancel out the annual growth in output losses. Again, three-fifths of the output losses occur within the ten-city floodplain.

Economic impacts expressed in terms of jobs rather than dollars of output are often more comprehensible, especially to laypersons. Table 2 presents the annual job losses resulting from FEMA flood protection requirements for each year from 1992 to 2005 derived from Appendix I

(Appendix H presents the employment losses by city, county and region for each city's final demand change in 1992, 1993 and 2005 corresponding to the output losses of Appendix D, while Appendix J disaggregates the data of Appendix I for each city's final demand change). Job losses in the ten cities rise from 5,588 in 1992 to 120,225 by the year 2005; Los Angeles County job losses (including the ten cities) rise from 10,346 in 1992 to 153,130 in the year 2005, while regional job losses grow from 12,926 in 1992 to 171,243 in the year 2005. The ten-cities' share in regional job losses rises from 43.2 percent in 1992 to 70.2 percent by the year 2005.

A useful way of expressing the employment impact is to aggregate over jobs and years to obtain a measure in terms of person-years. Table 3 (derived from Appendix K) shows that the aggregate employment impact over the 1992-2005 period amounts to 880.7 thousand person-years of employment, of which more than 185,000 (21.0 percent) are lost in Long Beach, 161.5 thousand (18.3 percent) in Compton, 153.7 thousand (17.4 percent) in Carson, 104.1 thousand (11.8 percent) in Downey and 99.8 thousand (11.3 percent) in Lakewood. The other five cities in the aggregate account for about 176.6 thousand person-years, or 20.1 percent of the total. As shown in Table 4, the ten-city person-years of employment loss account for about 77 percent of the losses in Los Angeles County and for 68.3 percent of the region's losses.

Table 4 (also derived from Appendix K) shows the sectoral breakdown of these person-years of employment losses. Although construction (as expected) accounts for a sizeable number of the losses (more than 63,000 in the ten cities and 80,000 in the region as a whole), its share is small compared to retailing (624,000 in the region as a whole), professional and personal services (205.6 thousand), manufacturing (111.4

thousand) and entertainment, hotels and restaurants (95.5 thousand). These numbers underline the importance of indirect and induced effects in any economic impact analysis.

Replacement Impacts

Most of the development that would occur in the ten cities in the absence of FEMA flood protection requirements consists of redevelopment. Existing structures (houses, apartment buildings, factories, shops, warehouses, offices, etc.) would be demolished or substantially altered. Under the assumptions of our analysis, structures in the AE zone with the FEMA requirements applied would not be replaced. They would either remain in use or wear out according to the natural rate of obsolescence. To the extent that they remained in use there would continue to be a flow of output services and jobs associated with them. Our estimates suggest that over the ten cities as a whole about 50.7 percent of jobs and 23.3 percent of dwelling units are located within the AE zone. This amounts to 153,000 jobs and 80,900 housing units.

We have assumed replacement rates of 3 percent for housing units, 7 percent for commercial and industrial buildings, and 2.5 percent for institutional buildings. According to standard economic principles, these structures should wear out in 33.3, 14.3 and 40 years respectively. When they become obsolete there should no longer be any flows of output or jobs associated with them. On the other hand, there may be a difference between economic obsolescence and physical obsolescence. When a building is replaced, it may be occupied rather than vacant. In the unrealistic limiting case (i.e. no obsolescence), almost 150,000 jobs could be destroyed by redevelopment over the 14-year period (153,000 x 14 x

0.07) and almost 34,000 housing units (80,900 x 14 x 0.03), generating an annual *direct* output flow of more than $100 million, would be replaced. At the other extreme (i.e. full obsolescence), there would be output or job losses associated with redevelopment (i.e. structures would be fully depreciated, in effect, worn out). We have no basis for choosing the most likely point between these two extremes. However, in the absence of construction in the AE zone at least some of the structures may continue in use after the date when they technically become obsolete. Any output flows and jobs associated with such continued use have not been accounted for in our estimates of the overall output and job losses resulting from FEMA flood protection requirements.

The Relocation Scenario

An alternative scenario to the deterred development hypothesis is where the levels of future construction remain the same as in the absence of the FEMA requirements but the development occurs outside the floodplain in other parts of the region. We call this the relocation scenario. In the example discussed here, we assume that the development that does not take place in the ten cities is redistributed throughout the rest of the five-county region in proportion to each zone's share of regional employment. The indirect and induced effects of this development are regionwide in scope, and some of them will spill back into the ten cities.

The key question is whether these positive economic impacts are sizeable relative to the negative economic impacts associated with the development deterred. Table 5 (derived from Appendices L and M) displays the results for 1993. The output increases in the ten cities can be compared to the output losses of the deterred development scenario shown

in Table 1, while the job expansion can be compared with the 1993 job loss in Table 2. The relocation scenario generates a compensating increase of output in the ten cities of $168.57 million, only 13.9 percent of the $1,215.76 million output decline in the ten cities when development leaves the region altogether. The employment estimates are a little better, with 3,084 jobs created in the relocation scenario, a 21.4 percent offset of the 1993 loss of 14,407 jobs in the deterred development scenario. Of course, by the year 2005 the numbers have substantially increased because of the cumulative effects of the output flow impact, but the proportions remain the same: $858.5 million of output and 25,740 jobs in the relocation scenario compared to $6,191.8 million of output and 120,225 jobs in the deterred development scenario.

The bottom line of this analysis is that the positive feedbacks of the relocation scenario do not alter the overall conclusion that the FEMA requirements inflict a huge economic burden on the ten study cities in the floodplain, regardless of where the deterred development takes place. The net present value of the output losses, even under the relocation scenario, are $45.58 billion at a 5 percent discount rate or $30.72 billion at a 10 percent discount rate.

Insurance Premium Effects

Table 6 (derived from Appendices N,O,P and Q) shows the annual economic impact of pre-FIRM insurance premiums, both residential and non-residential. We have not attempted to calculate the effects of post-FIRM insurance rates as new development occurs under the new FEMA requirements. The key reason is that although post-FIRM insurance rates are lower, new buildings are likely to be larger (as high land prices

enforce higher densities on small lots), and the lower rates will largely be offset by higher square footage. Accordingly, we do not expect the impact of flood insurance premiums to change very much from year to year over the 1992-2005 period.

The data in Table 6 suggest that the *net* economic impact of flood insurance premiums is quite modest. The *combined* annual output loss of residential and non-residential insurance premiums is only $66 million while the employment loss is only 1,064 jobs. The explanation is that the economic burden of flood insurance payments (largely the repercussions of reduced consumer spending on other goods and services) is counterbalanced by the direct, indirect and induced stimuli to the insurance industry.

Three other features merit comment. First, most of the negative impacts (about 97 percent) are confined to the ten cities, with very modest repercussions on the rest of the region. Second, both output and jobs increase in Los Angeles County *outside* the ten floodplain cities, primarily because of the concentration of the benefiting insurance companies there. Third, the impact of non-residential insurance is very small relative to residential insurance impacts (only about 10 percent of the latter's size), reflecting the fact that most of the study cities are much more residential than commercial or industrial communities. However, it is possible that the non-residential insurance premiums have been somewhat underestimated because they are based on estimates of the number of establishments as given in the 1987 Economic Censuses, which are subject to an undercount.

Although the flood insurance premiums are not strongly deleterious to the performance of the regional economy, they nevertheless impose a

sizeable burden on the incomes of households living in the ten cities. Annual residential flood insurance premiums in the ten cities amount to $114.855 million, of which $83.966 million are paid by homeowners, with the balance paid by apartment landlords (although some of these additional premiums will be passed forward to tenants). This represents a significant loss of consumer purchasing power. Moreover, annual non-residential flood insurance premiums, although smaller than residential, amount to $15.982 million, an additional cost to local businesses.

Conclusions

The conclusions of this analysis are clear-cut:-

1. Under any plausible scenario, the adverse economic impacts on the ten cities in the floodplain of FEMA flood protection and insurance requirements are massive.
2. If AE-zone development does not take place within the ten cities, the net present value of output losses (at a 10 percent discount rate) is in the range $18.25 - 21.2 billion in the ten cities and $30.7 - 35.7 billion in the region as a whole, depending upon the choice between the relocation scenario and the deterred development scenario. The net present value would, of course, be higher at lower discount rates. If part of the diverted development takes place elsewhere within the region and part is either not undertaken at all or is undertaken in other regions, the net present values will be somewhere within the above ranges.
3. These output losses expressed in net present value terms are very high relative to the estimated $325 million capital cost of the Los Angeles County Drainage Area Project (LACDAP). Moreover, significant output losses are suffered in Los Angeles County outside the floodplain (net

present value of $9.6 billion at a 10 percent discount rate in the deterred development scenario) so that residents and jurisdictions outside the floodplain have a strong interest in supporting the flood control project. Furthermore, the net present value of output losses is even high relative to the maximum estimated $5 billion damage from the 100-year flood. These comparisons underline the onerous impact of the FEMA requirements.

4. The job losses amount to 880.7 thousand person-years of employment in the ten cities over the 1992-2005 period and 1,289.2 thousand in the region as a whole in the deterred development scenario, and 692.2 thousand person-years in the ten cities and 1,013.3 thousand in the region as a whole in the relocation scenario.

5. These results depend upon the assumption that AE-zone development will be too expensive under the regime of the new FEMA construction regulations. An alternative assumption, that higher AE-zone construction costs would be capitalized in lower land values rather than deter development, would also result in severe adverse impacts on the economies of the ten cities, although the distributional impact would be somewhat different. The only scenario that might generate a different set of results would be if AE-zone development was unaffected *and* if there were no land value capitalization effects. However, this scenario is not very plausible given the competitive environment of scores of independent jurisdictions in the region; no developers exercise monopoly power at any specific location.

6. Although flood insurance requirements have only a modest economic impact (because reduced consumer spending power is offset by the boost to the insurance industry), they nevertheless impose a significant burden on households, $84 million per year for homeowners plus some fraction of the

$47 million of insurance premiums for apartments and businesses. Even so, the insurance requirements may be justifiable if the risk of $5 billion of flood damage is realistic.

TABLE 1
Lost Output by City and County ($m)

Area	1991	1993	2005	NPV 1992-2005 (5% discount rate)	NPV 1992-2005 (10% discount rate)
Bellflower	22.015	34.401	183.038	918.412	618.000
Bell Gardens	73.676	96.377	368.785	2,013.101	1,378.143
Carson	107.777	184.741	1,108.315	5,419.475	3,626.288
Compton	3.864	77.390	959.702	4,196.423	2,734.258
Downey	74.480	116.651	622.704	3,122.186	2,100.588
Lakewood	67.596	107.225	582.769	2,910.260	1,956.313
Long Beach	296.128	392.703	1,551.602	8,392.946	5,735.490
Paramount	47.508	61.183	225.285	1,243.646	853.229
Pico Rivera	48.808	62.49	226.681	1,256.935	863.079
South Gate	59.240	82.599	362.906	1,907.431	1,296.022
City Total	801.092	1,215.761	6,191.786	31,380.814	21,161.412
Rest of LA County	353.001	541.983	2,809.776	14,181.917	9,555.105
Los Angeles County	1,154.093	1,757.744	9,001.562	45,562.731	30,716.517
Orange	99.438	154.304	812.684	4,087.133	2,751.594
Riverside	26.092	40.167	209.065	1,054.259	710.171
San Bernardino	37.058	57.648	304.726	1,531.258	1,030.711
Ventura	15.289	23.656	124.069	624.565	420.564
Imperial	1.446	2.188	11.094	56.286	37.964
Region	1,333.416	2,035.707	10,463.201	52,916.232	35,667.552

TABLE 2
Lost Jobs by City, County and Year, 1992-2005

TOTAL ECONOMIC IMPACTS (1992-2005)--WORKERS ALL CITIES

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
BELLFLOWER	-149	-430	-710	-990	-1271	-1551	-1832	-2112	-2393	-2673	-2954	-3234	-3515	-3795
BELL GARDENS	-223	-807	-1392	-1976	-2561	-3145	-3730	-4315	-4899	-5484	-6068	-6653	-7237	-7822
CARSON	-717	-2296	-3874	-5453	-7031	-8609	-10188	-11766	-13344	-14923	-16501	-18080	-19658	-21236
COMPTON	-642	-2318	-3994	-5671	-7347	-9023	-10699	-12376	-14052	-15728	-17404	-19080	-20757	-22433
DOWNEY	-435	-1511	-2588	-3665	-4742	-5818	-6895	-7972	-9049	-10125	-11202	-12279	-13356	-14432
LAKEWOOD	-394	-1429	-2465	-3500	-4536	-5572	-6607	-7643	-8678	-9714	-10750	-11785	-12821	-13856
LONG BEACH	-1898	-3640	-5381	-7123	-8864	-10606	-12347	-14089	-15830	-17572	-19313	-21055	-22796	-24538
PARAMOUNT	-382	-583	-785	-986	-1188	-1389	-1590	-1792	-1993	-2194	-2396	-2597	-2799	-3000
PICO RIVERA	-389	-642	-895	-1149	-1402	-1655	-1908	-2162	-2415	-2668	-2922	-3175	-3428	-3682
SOUTH GATE	-360	-750	-1140	-1530	-1921	-2311	-2701	-3091	-3481	-3871	-4261	-4651	-5041	-5431
CITY TOTAL	-5588	-14407	-23225	-32043	-40861	-49680	-58498	-67316	-76134	-84953	-93771	-102589	-111407	-120225
IMPERIAL COUNTY	-20	-28	-37	-45	-53	-61	-70	-78	-86	-94	-103	-111	-119	-127
LOS ANGELES COU	-10346	-21330	-32313	-43296	-54280	-65263	-76246	-87230	-98213	-109196	-120180	-131163	-142146	-153130
ORANGE COUNTY	-1373	-2015	-2657	-3299	-3941	-4583	-5225	-5867	-6509	-7151	-7793	-8435	-9077	-9720
RIVERSIDE COUNT	-393	-571	-748	-926	-1103	-1281	-1459	-1636	-1814	-1992	-2169	-2347	-2524	-2702
SAN BERNARDINO	-563	-824	-1085	-1346	-1608	-1869	-2130	-2391	-2653	-2914	-3175	-3436	-3698	-3959
VENTURA COUNTY	-231	-337	-443	-548	-654	-760	-865	-971	-1077	-1183	-1288	-1394	-1500	-1605
REGION TOTAL	-12926	-25104	-37282	-49461	-61639	-73817	-85995	-98174	-110352	-122530	-134708	-146886	-159065	-171243

TABLE 3
Person-Years Lost by City, 1992-2005 Inclusive

City	Person-Years
Bellflower	27,609
Bell Gardens	56,312
Carson	153,677
Compton	161,524
Downey	104,068
Lakewood	99,750
Long Beach	185,054
Paramount	23,674
Pico Rivera	28,491
South Gate	40,539
TOTAL	880,698

TABLE 4
Sectoral Composition of Person -Years Lost, 1992-2005 Inclusive

	Ten Cities	Rest of LA County	LA County	Orange	Riverside	San Bernardino	Ventura	Imperial	Total
Agriculture	1,058	3,874	4,932	1,611	847	1,516	695	19	9,622
Mining	850	1,824	2,674	849	81	234	168	3	4,008
Construction	63,320	9,693	73,013	3,950	1,074	1,338	549	41	79,966
Manufacturing	65,911	30,259	96,170	8,924	2,086	2,989	1,110	108	111,389
Transportation	11,315	13,145	24,460	2,741	773	1,229	582	48	29,836
Wholesaling	3,329	21,282	24,611	5,569	1,430	20,129	792	66	34,490
Retailing	501,795	75,440	577,235	25,585	6,936	10,066	4,001	306	624,131
Finance	21,384	26,004	47,388	7,708	1,993	2,858	1,142	131	61,222
Business	4,221	15,956	20,177	4,296	912	1,250	507	72	27,216
Entertainment	40,424	37,398	77,822	8,861	2,752	4,284	1,699	111	95,530
Professional	164,998	26,018	191,016	6,999	2,508	3,535	1,465	111	205,640
Public Admin.	2,080	2,752	4,832	547	268	329	145	15	6,139
TOTAL	880,698	263,634	1,144,332	77,645	21,665	31,650	12,856	1,032	1,289,181

TABLE 5
Total (Direct, Indirect and Induced) Economic Impacts
by City and County: Relocation Scenario, 1993

Area	Output ($m)	Jobs
Bellflower	4.163	103
Bell Gardens	2.651	36
Carson	19.619	403
Compton	11.580	153
Downey	22.006	324
Lakewood	6.673	163
Long Beach	66.556	1,336
Paramount	13.987	199
Pico Rivera	5.075	228
South Gate	16.259	139
City Total	168.569	3,084
Rest of LA County	1,373.717	17,143
LA County	1,542.286	20,227
Orange	427.383	5,215
Riverside	99.573	1,306
San Bernardino	115.747	1,542
Ventura	42.723	658
Imperial	2.728	37
REGION	2,230.440	28,985

TABLE 6

Annual Economic Impact of Flood Insurance Premiums

Area	Residential Insurance		Non-Residential Insurance	
	Output ($m)	Jobs	Output ($m)	Jobs
Bellflower	-2.858	-47	-0.237	-4
Bell Gardens	-1.187	-19	-0.180	-3
Carson	-4.569	-75	-0.482	-8
Compton	-2.313	-38	-0.307	-5
Downey	-5.743	-94	-0.539	-9
Lakewood	-5.203	-85	-0.297	-5
Long Beach	-27.573	-449	-2.967	-49
Paramount	-1.748	-28	-0.415	-7
Pico Rivera	-3.479	-57	-0.185	-3
South Gate	-2.919	-47	-0.364	-6
City Total	-57.593	-938	-5.972	-99
Rest of LA County	+5.712	+66	+0.068	+7
LA County	-51.881	-872	-5.292	-92
Orange	-4.364	-45	-0.455	-5
Riverside	-1.156	-14	-0.120	-2
San Bernardino	-1.742	-22	-0.180	-2
Ventura	-0.716	-9	-0.074	-1
Imperial	-0.048	-1	-0.005	0
REGION	-59.907	-963	-6.126	-101