CITY OF SACRAMENTO

DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION

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May 20, 1986

Transportation and Community Development Committee
Sacramento, California

Honorable Members In Session:

SUBJECT: Report on Levee System Protecting the City of Sacramento

SUMMARY

This report discusses the level of flood protection afforded the Sacramento Area by existing major flood control facilities, and briefly outlines possible alternates for increasing this level of protection.

BACKGROUND

Much of the Sacramento Valley, in which the City of Sacramento is located, consists of a reclaimed flood plain. The construction of dams, levees, channels, weirs and flood bypasses has over the years provided a measure of protection from flooding, therefore permitting the establishment and growth of productive farming areas and urban development. This report was prepared from information obtained from various publications of the Federal Bureau of Reclamation, the State Department of Water Resources, and from conversations with various State, Federal and local officials.

The facilities which provide flood protection to the City of Sacramento, are part of the Federal Central Valley project, which includes facilities extending from Kern County in the south to Shasta Dam in the north. The Central Valley project provides benefits from the standpoint of water supply, electric power generation, flood control, recreation, and wildlife preservation.

The water flow down the Sacramento River is partially controlled by the Shasta, Oroville, Whiskeytown Dams, and others. A significant amount of flow into the Sacramento River enters through presently uncontrolled tributaries. Because of this large uncontrolled flow the Sacramento River flow is reduced by diverting a portion of the flow into flood bypasses, the most well known of which is the Yolo Bypass, westerly of the City of Sacramento.

The flow in the American River is controlled by Folsom and other smaller dams. Folsom Dam was completed in 1956 and was at that time estimated to provide flood protection against a storm which might occur once in 1000 years. This estimate has since been revised to provide flood protection

of once in an average of only 120 years. This revised flood recurrence interval prompted the Federal Corps of Engineers to propose a new dam in the north fork of the American River at Auburn in 1971. This additional dam, in conjunction with Folsom Dam, was to provide flood protection from a storm estimated to occur on an average of once in 350 years.

The levee system protecting the Sacramento area was constructed over a period of time by the Corps of Engineers utilizing, for the most part, Federal funds. Additional levees have been constructed by various local agencies including reclamation districts, American River Flood Control District, the City and the County of Sacramento. The levees protecting this area from flooding are maintained by five (5) different agencies. The State Reclamation Board maintains the levees on the north side of the American River east of Ethan Way and the east side of the Sacramento River from 25th Avenue south. The City of Sacramento maintains the east levee of the Sacramento River from the American River south to 25th Avenue as well as secondary levees and the so called Beach Lake Levee at the South City Limits. The American River Flood Control District maintains the easterly levee of Natomas East Main Drain, the Dry Creek Levee, the Arcade Creek Levee west of Marysville Boulevard, the north side of the American River from the Sacramento River easterly to Ethan Way and the south side of the American River east of the Sacramento River to Mayhew Road. Reclamation District 1000 maintains the west levee of the East Main Drain and the east levee of the Sacramento River from the American River north to the Natomas Cross Canal located above the Sacramento County line.

The State Department of Water Resources evaluates all levee maintenance by each jurisdiction in the Central Valley system and publishes a yearly report rating of the jurisdictions on the basis of a number of criteria. All the jurisdictions in the City's sphere of influence received a "good" to "outstanding" rating in 1984. Such ratings, however, are no guarantee that the levees could not fail under abnormally high flows.

The hazards to an area protected by levees can be placed into two general categories. The levees can be overtopped due to a high volume release from the various dams providing flow control, or a catastrophic failure of a levee such as occurred during the February 1986 storm at the town of Linda, near Marysville.

Overtopping of the levees can occur when releases exceed the capacity of a channel due to runoff that the existing dams are not able to store. In the case of the Sacramento River, the "desirable" maximum flow is approximately 110,000 cu. ft./sec. In the case of the American River, the "desirable" flow is 115,000 cu. ft./sec. In both cases, these flows will provide approximately five feet of freeboard to the top of the levee. Excess flows are diverted into the Yolo Bypass which can accommodate approximately 500,000 cu. ft./sec. These flows are estimated to occur on an average of once in 120 years and assume an 80 percent

"efficiency" in forecasting precipitation and runoff and timing dam releases to obtain optimum benefit from the flood storage behind the dams. Although the flow in the American River during the February 1986 storm was approximately 130,000 C.F.S., the general runoff occurred as a result of a storm estimated, on a preliminary basis by the U.S. Bureau of Reclamation, at a one in one hundred year event. The actual runoff exceeded estimates made by the Federal Bureau of Reclamation during the storm, therefore the flood storage in Folsom Dam may not have been utilized at maximum efficiency due to errors in the weather forecasts.

In 1982, in connection with the studies of the Auburn Dam, an estimate was developed by the Corps of Engineers for possible overtopping of the levees on the American River, assuming no levee failures occurred. This estimate is reproduced below.

	Area	Flow below Folsom Dam (1,000 ft./sec)	Average Frequency of Occurrence (years)
1.	Right bank above North Sacramento levee, including Hidden River Vista	160	130
2.	Above area, plus Sierra Oaks Vista	180	150
3.	Above area, plus North Sacramento	200	170
4.	Above area, plus Sacramento Industrial Tract	240	200
5.	Above area, plus River Park College Tract	260	210
6.	Above area, plus City of of Sacramento	280	230

The attached drawing graphically portrays the areas described above. It should be noted, however, that many engineers familiar with the levee system anticipate that a severe levee failure or failures would occur before any levee overtopping would take place; thus the average frequency of flooding shown above can be considered maximum. For instance, the 130,000 C.F.S. flows in the American River during the February 1986 floods raised some fears that the levee in the River Park-Sacramento State University area might fail because of the saturation of the earth levees from continued high flow.

In 1982 the State Department of Water Resources prepared a preliminary study entitled "Flood Control Alternatives on the Lower American River". These alternatives to the construction of Auburn Dam included reconstruction of the Folsom Dam, reconstruction of the levee systems and even constructing the existing Auburn Dam Cofferdam to a permanent facility. None of these alternatives were considered to be as cost effective as the Auburn Dam Project. There is some question, however, as to whether Auburn Dam will be constructed in the forseeable future; therefore, consideration of alternate flood control measures is warranted.

With respect to the City's levees, the State Department of Water Resources and the U.S. Bureau of Reclamation have requested that the Corps of Engineers initiate a study of the entire levee system to determine the degree of safety actually provided and to recommend improvement projects to increase the level of safety. This study, if funded by the Federal Government, will take about three years to complete. Work has proceeded, however, on a number of river levee improvement projects and sediment removal projects in the bypasses as an ongoing maintenance effort.

Due to high cost and area-wide benefit of increasing the level of safety afforded the Sacramento area from the dam and levee systems, such work must be undertaken by the State and/or Federal Governments on an area-wide basis. If the City wishes to proceed in this direction, it should request our State and Federal legislators to complete all pending studies, choose a course of action, and fund the necessary construction projects at the earliest possible date.

FINANCIAL

None.

RECOMMENDATION

It is recommended that the City Council direct the Department of Public

Works to continue to actively pursue improvement of the City's flood protection system, and to report to the Council periodically when significant new information becomes available.

Respectfully submitted,

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Recommendation Approved:

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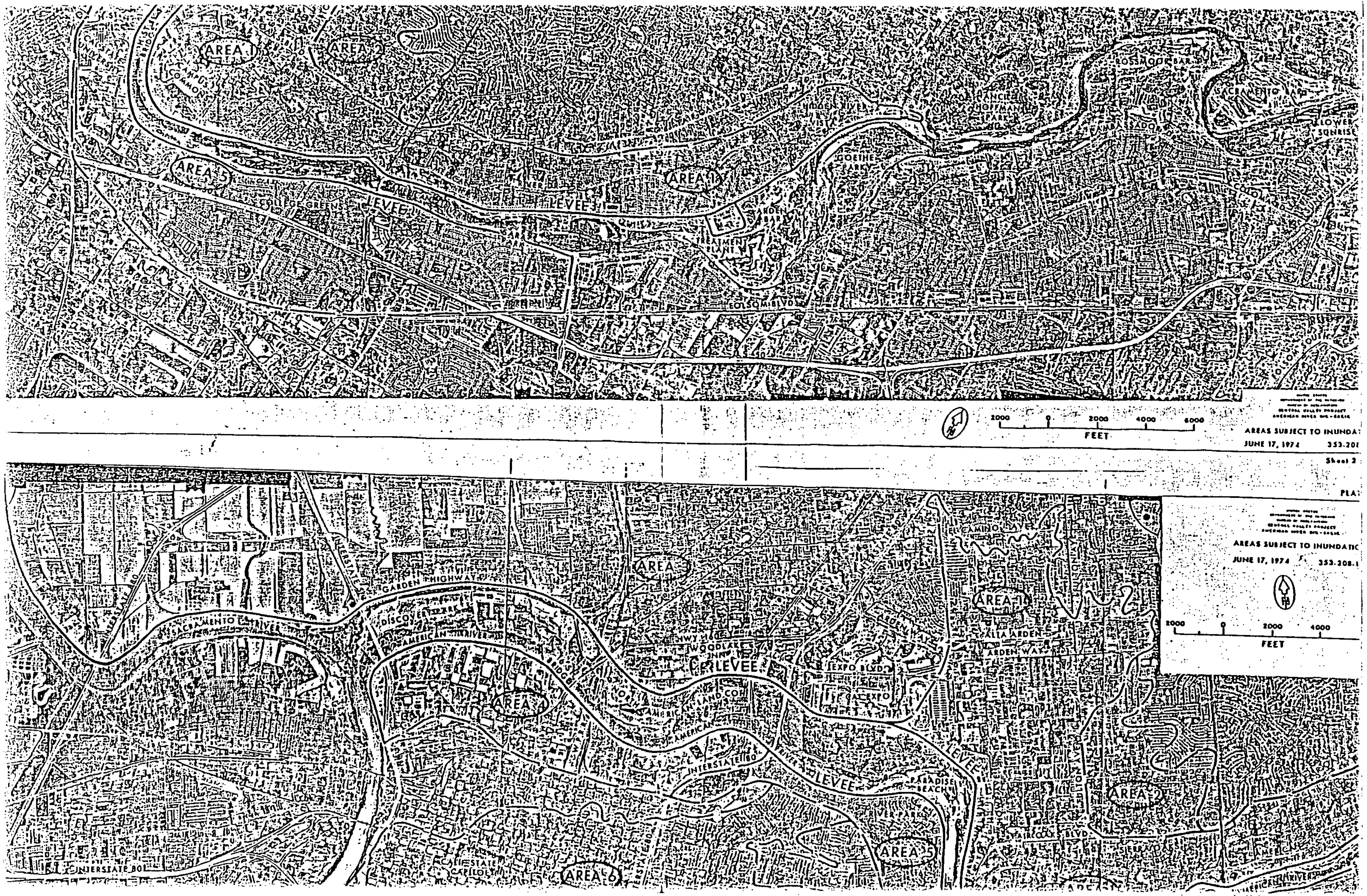
May 20, 1986
All Districts



AREA 1
AREA 2
AREA 5
AREA 1
COLLEGE GREEN
LEVEE
GOETHE PARK
ANCIL HOFFMAN PARK
ROSSMOOR BAR
SACRAMENTO
LOWER SUNRISE
FOLSOM BLVD
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AREAS SUBJECT TO INUNDATIC
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FEET
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SACRAMENTO RIVER
AMERICAN RIVER
DISCOVERY PARK
AREA 3
AREA 1
AREA 4
LEVEE
WOODLAKE INN
EXPO BLVD
CAL EXPO
ARDEN WAY
ALTA ARDEN
AMERICAN RIVER
INTERSTATE 80
PARADISE BEACH
AREA 2
AREA 5
AREA 6
CAL STATE
CAPITOL
INTERSTATE 80
FAIR OAKS BLVD