

**RIVERSIDE COUNTY FLOOD CONTROL AND  
WATER CONSERVATION DISTRICT  
RIVERSIDE, CALIFORNIA**

**MASTER DRAINAGE PLAN  
FOR  
THE SAN JACINTO AREA**

**ZONE FOUR**

**JAN 1982**

**KENNETH L. EDWARDS  
CHIEF ENGINEER**

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## PURPOSE

The purpose of this report is to investigate and evaluate the drainage problems of the San Jacinto area and to develop an economical drainage plan which provides flood protection for both existing and future development.

The San Jacinto area is comprised of the City of San Jacinto, a small portion of the City of Hemet and the adjoining County area. The watershed is roughly bounded by the San Jacinto River on the north, Meridian Street on the east, Florida Avenue on the south and Sanderson Avenue on the west. Three other District master drainage plans have portions of their boundaries coincident with this plan. They are the Little Lake, Hemet, and West Hemet Master Drainage Plans, which border on the east, south and west boundaries respectively.

The plan presented herein will provide adequate flood protection to the community when implemented and will serve as a guide for the long term construction scheduling of the primary drainage facilities. The plan will also act as a planning guide for the location and sizing of local drainage facilities to be constructed by developers and others within the area.

It should be noted by the reader that the cover of this report clearly states it is a master plan, and therefore, should be read and used with this in mind. Simply stated, this plan is an overview; a study of the drainage problems that exist in a specific geographical area, and a conceptual solution to those problems. As stated elsewhere in this report, the selection of the facilities presented in this plan is based on engineering and economic considerations and is by no means the only solution.

The alignment and location of the facilities proposed in this Master Drainage Plan are general; precise facility locations will be dictated by conditions and other factors existing at the time of design. Similarly, the sizing information shown on the enclosed map, is preliminary. A more detailed analysis performed at the design stage will determine final sizing.

## SCOPE

The drainage area covered by this plan is approximately 12 square miles in size. For the most part, it consists of moderately flat valley terrain sloping gently to the northwest. The extent of the studies establishing this master plan includes:

1. Determination of the quantity and points of concentration of storm runoff in the area.
2. Preparation of a drainage area map.
3. Determination of the location, size and capacity of the proposed drainage structures.
4. Investigation of alternate routes and methods as a basis for selecting the most economically and engineeringly sound plan.
5. Preparation of preliminary design plans and supporting cost estimates.

## GENERAL DISCUSSION

This report provides a Master Drainage Plan for the San Jacinto area. The plan consists of two retention basins, (one of which, the Parkhill Basin, currently exists) open channels and a network of underground storm drains. The proposed system will carry storm runoff through this developing community to outlet in either the San Jacinto River or into the existing flood plain northwest of the San Jacinto Reservoir.

At present, during periods of runoff, floodwaters, silt and other debris impact a wide area of prime agricultural land and the developing community, causing property damage and leaving roads and highways impassable. Subdivision activity within the plan area has increased substantially within the last several years. As development continues to escalate, so will the drainage problems of the area, thus requiring a greater need for flood protection.

The Master Drainage Plan presented herein provides an economical method of collecting and conveying storm runoff through the study area. The proposed drainage structures will also provide an outlet for local drainage facilities built by developers and others as growth occurs in the area. When completed, the facilities will provide the area with improved drainage and protection from the once in 100 year flood.

## CRITERIA

All underground storm drains proposed in this plan are intended to collect local urban runoff and, with few exceptions, are located either in existing or proposed street rights of way. Runoff from a 10 year frequency storm is allowed to accumulate in the streets until it reaches the top of the curb. At this point, the plan proposes the initiation of an underground drain which will intercept and convey the entire 10 year storm runoff to an outlet downstream. Flows exceeding the 10 year frequency storm will generally be carried within street rights of way and the combination of both the street and the underground storm drain provides 100 year protection.

Open channels are proposed when the discharge is large and the construction and right of way costs for a channel prove to be less than the cost of an underground storm drain. Where open channels are provided, they are designed to carry the runoff from a 100 year frequency storm.

In a few instances, circumstances have dictated that an underground drain be sized for the full 100 year flow instead of only the 10 year capacity.

The alignments of all drains and channels are based on hydraulic efficiency, the ability to drain tributary areas, and economics.

## HYDROLOGY

Two methods of hydrology were used in this plan to determine design discharges. For smaller tributary areas, up to 500 acres in size, the Modified Rational Hydrology Method was used. The Synthetic Unit Hydrograph Method was used for larger areas. The design discharges used in sizing all future appurtenant facilities in the study area should be determined by one of these two methods.

Methodology and supportive data for the rational and synthetic hydrology can be found in "The Riverside County Flood Control and Water Conservation District Hydrology Manual" dated April 1978.

Future land use assumptions used throughout the plan were based on "The Hemet-San Jacinto Area General Plan" which is currently used by both the County of Riverside and the City of San Jacinto.

## EXISTING FACILITIES

Presently, there are two major flood control facilities located within the study area, and one forming

the northeastern boundary. They are the Parkhill Retention Basin and Outlet, the San Jacinto Drain, and the San Jacinto River Levee.

#### Parkhill Retention Basin

Construction of the Parkhill Retention Basin and its outlet drain was completed in 1980. However, at present, major flows entering the basin do so in an overland fashion. This plan proposes a system of drains designed to deliver flows to the basin in a more controlled manner. In addition, the plan proposes a continuation of the outlet drain to the proposed Buena Vista Retention Basin. The drain presently outlets just south of Menlo Avenue.

#### San Jacinto Drain

The District's San Jacinto Drain was completed in early 1975. The channel, which is less than a mile in length, is an unlined interim facility beginning at State Street and outletting westerly at Seventh Street midway between Palm Avenue and Lyon Avenue. This Master Plan proposes not only to concrete line the facility, but also to extend it both upstream several hundred feet to the Buena Vista Retention Basin and downstream to the vicinity of the San Jacinto Reservoir.

#### San Jacinto River Levee

This report does not attempt to deal with the San Jacinto River. Instead, the assumption is made that the flows will be fully contained by either existing facilities, or those facilities proposed by the United States Army Corps of Engineers, or by those proposed in the District's "Master Plan, San Jacinto River Basin" published in 1975. The San Jacinto River flood plain that is shown on the map enclosed at the back of this report is for informational purposes only.

#### RECOMMENDED IMPROVEMENTS

The recommended improvements discussed briefly below are shown on the enclosed map found at the back of this report. Supporting data for all proposed facilities is available at the Riverside County Flood Control and Water Conservation District office. Costs shown on the enclosed map include right of way and 30% for engineering, administration and contingencies (see Table I, Cost Summary). This map not only shows proposed alignments, but pertinent preliminary size information as well as design flow rates.

The design engineer should be aware that during preparation of preliminary plan and profile drawings, a detailed utility search was not completed. This means that, while major known facilities were dealt with, a more thorough search may discover utilities that will necessitate minor alignment or size changes, or utility relocation.

#### OPEN CHANNELS

The open channels proposed in this plan consist of two types; lined and unlined. In general, a lined channel is a trapezoidal shaped facility with concrete paving on the sides and bottom. The sides slope upward from the bottom at a rate of one foot vertically for every 1.5 feet horizontally. The lined channels in this plan range in size from a bottom width of 2 feet to 15 feet and in depth from 3 feet to 8 feet.

Unlined facilities are similarly shaped, except for the exclusion of the concrete paving. Also, the unlined channels have flatter side slopes running 2 feet horizontally for every 1 foot of rise. Usually, an unlined channel is less costly to construct, but District policy restricts the use of an unlined section (as an ultimate channel) to instances where flow velocities are found to be nonerosive. In this plan, only at the downstream ends of the facilities is the slope mild enough to reduce velocities to the nonerosive range.

The outletting of a channel is usually accomplished by discharging the channel into an adequate outlet such as a major channel or floodway. This is not economically feasible with Line E of this plan. The only "adequate" outlet in the vicinity is the San Jacinto River, but slope limitations would force an increase of several miles in the length of the channel to effect a confluence. Therefore, it became necessary to outlet the channel in the proximity of the San Jacinto Reservoir. When flows that have been contained or concentrated are released, provisions must be made to insure that the "after" condition is approximately equal to the "before" condition. With Line E, this is accomplished by a gradual reduction in channel capacity from a point just north of Cottonwood Avenue to the channel's downstream terminus.

In most cases, where open channels are proposed, (lined or unlined) the right of way required will accommodate the channel as well as one or two maintenance roads.

## UNDERGROUND STORM DRAINS

The underground drains proposed in the plan consist of, for the most part, reinforced concrete pipe (RCP). In some cases, where special circumstances dictate, a drain may be a reinforced concrete box (RCB), but this is usually a considerably more expensive alternate and avoided when possible.

During the preparation of the construction plans for a particular line, the design engineer may consider the use of cast-in-place pipe (CIP) in lieu of RCP. The District would not be opposed to this concept as long as field conditions (trench stability, traffic flow, utilities, etc.) are favorable.

All underground drains in this plan are proposed within existing or assumed future street rights of way.

## BUENA VISTA RETENTION BASIN

The purpose of the Buena Vista Retention Basin is, by the use of temporary storage, to reduce fairly high inflow rates to substantially lesser outflow rates. In addition, the mitigation effect offered by the basin by reducing flow rates may allow further urbanization of the upper watershed without the need for the immediate construction of an entire downstream system.

## FLOOD PLAIN

The flood plain shown on the master plan map is the combination of two flood plains, indicated by the two different directions of cross hatching. The more northerly of the two flood plains represents the San Jacinto River flows. As stated elsewhere in the report, this plan assumes full containment of these flows.

The second flood plain is the result of the runoff generated in the San Jacinto area only. It should be pointed out that this southern flood plain exists with or without the construction of the proposed master plan facilities. The only difference will be the extent of the area subject to inundation. With the completion of the master plan, especially Lines H and J and the Buena Vista Retention Basin, the flow rate into this flood plain will be reduced to a level below present day flow rates.

## ALTERNATE STUDIES

In developing this Master Drainage Plan a number of alternates were developed and studied for their feasibility, both hydraulically and economically.

When the Master Plan was first conceived, the Buena Vista Retention Basin was not a part of the original layout. However, as work continued on the plan, the possible advantages of using the retention basin were recognized and preliminary costs were computed for both alternates. Neither alternate demonstrated a clear-cut advantage as far as construction costs were concerned; however, the retention basin alternate would have the advantage of allowing more staged construction. For this reason the decision was made to incorporate the retention basin as part of this plan.

A second major alternate involved the alignment of Line J. An attempt was made to take Line J in a more westerly direction, but current levels of development forced large portions of the line to be an underground facility with capacity for 100 year flows. This, in turn, pushed the cost of the line far above that of the selected alternate.

Similarly, an alignment alternate was considered for Line H. One alignment, following the Ramona Expressway westerly to Potter Street, presented two major difficulties. First, the alternate was somewhat longer and thus more costly than the selected one and second, there was a question of possible diversion without an "adequate" outlet. This is not a problem with the final alignment chosen for this report.

In addition to those discussed above, a number of other alternates were studied and eventually disregarded as either being too costly or not providing adequate protection.

In short, the San Jacinto Area Master Drainage Plan as presented herein is the coalescence of the best alternatives explored.

## CONCLUSIONS

Based on the studies and investigations made for this report, it is concluded that:

1. The San Jacinto area has experienced serious flooding problems in the past. As this area converts from primarily agricultural uses to more urban uses, these damages are expected to increase. A more orderly growth pattern can safely occur with the construction of these proposed facilities.
2. A drainage system is required to safely convey storm runoff through the area with the least interruption to public services. The Master Drainage Plan

presented in this report is such a system and is the most economical of the alternatives studied.

3. The proposed plan lends itself to stage construction as funds become available.
4. The total cost of the recommended improvements, including right of way, engineering, contingencies, and administration is estimated to be \$27,289,000.

#### RECOMMENDATIONS

It is recommended that:

1. The Master Drainage Plan as set forth herein be adopted by the San Jacinto City Council and the Hemet City Council as part of the overall master plans for the respective Cities and be approved by the Riverside County Flood Control and Water Conservation District's Board of Supervisors as part of the overall master plan for the County.
2. The Master Drainage Plan as set forth herein be used as a guide for all future developments in the study area and that such developments be required to conform to the plan insofar as possible.
3. The right of way required for the plan be protected from encroachment.

TABLE I  
SAN JACINTO AREA MASTER DRAINAGE PLAN  
COST SUMMARY

FACILITY	CONSTRUCTION COST*	RIGHT OF WAY	MASTER PLAN COST
Line A	\$1,498,000	\$ 72,000	\$ 1,570,000
Line A-1	158,000	-0-	158,000
Line A-2	183,000	-0-	183,000
Line A-3	121,000	-0-	121,000
Line B	659,000	32,000	691,000
Line B-1	327,000	-0-	327,000
Line C	3,043,000	165,000	3,208,000
Line C-1	564,000	-0-	564,000
Line C-2	99,000	-0-	99,000
Line C-3	31,000	-0-	31,000
Line C-4	815,000	-0-	815,000
Line C-5	83,000	-0-	83,000
Line D	1,127,000	55,000	1,182,000
Line D-1	374,000	-0-	374,000
Line D-2	233,000	-0-	233,000
Line D-3	140,000	-0-	140,000
Line D-4	207,000	-0-	207,000
Line E	2,155,000	322,000	2,477,000
Line E-1	138,000	23,000	161,000
Line E-2	1,316,000	-0-	1,316,000
Line E-2a	95,000	-0-	95,000
Line E-3	287,000	22,000	309,000
Line F	1,622,000	-0-	1,622,000
Line F-1	285,000	-0-	285,000
Line F-2	219,000	-0-	219,000
Line G	1,297,000	99,000	1,396,000
Line G-1	741,000	-0-	741,000
Line G-2	216,000	-0-	216,000
Line G-3	791,000	93,000	884,000
Line G-3a	348,000	-0-	348,000

TABLE I (Con't)

SAN JACINTO AREA MASTER DRAINAGE PLAN

COST SUMMARY

FACILITY	CONSTRUCTION COST*	RIGHT OF WAY	MASTER PLAN COST
Line H	1,069,000	168,000	1,237,000
Line H-1	200,000	-0-	200,000
Line J	1,395,000	288,000	1,683,000
Line J-1	254,000	-0-	254,000
Line J-2	316,000	-0-	316,000
Line J-3	289,000	55,000	344,000
Line K	176,000	25,000	201,000
Facility L	152,000	450,000	602,000
Facility M	210,000	330,000	540,000
Buena Vista Basin	1,407,000	450,000	1,857,000
TOTAL	\$24,640,000	\$2,649,000	\$27,289,000

\* Includes 30% for engineering, administration, and contingencies.