

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

**REVISED  
MASTER DRAINAGE PLAN  
FOR THE  
PALM SPRINGS AREA  
ZONE SIX**

NOV. 1982

**KENNETH L. EDWARDS  
CHIEF ENGINEER**

REVISED MASTER DRAINAGE PLAN

FOR THE

PALM SPRINGS AREA

CONTENTS

	<u>Page</u>
Purpose	1
Background	1
Scope	2
General Discussion	3
Criteria	4
Hydrology	4
Existing Facilities	5
Tahquitz Creek Flood Control Project	7
Recommended Improvements	7
Open Channels	8
Underground Storm Drains	8
Retention Basins	9
Alternative Studies	11
Conclusions	14
Recommendations	14

TABLE

Number

1 Master Drainage Plan for the Palm Springs Area - Cost Summary	15
--	----

MAPS

Revised Master Drainage Plan for the Palm Springs Area	Envelope
Boundary Map	

RIVERSIDE COUNTY FLOOD CONTROL  
AND WATER CONSERVATION DISTRICT  
Riverside, California

REVISED

MASTER DRAINAGE PLAN  
FOR THE  
PALM SPRINGS AREA  
ZONE SIX

November 1982

KENNETH L. EDWARDS  
Chief Engineer

## PURPOSE

The purpose of this report is to investigate and evaluate the drainage problems of the Palm springs area and to develop an economical drainage plan that considers flood protection of both existing development and potential future development.

The Palm Springs area consists primarily of the City of Palm Springs, the westerly portion of the City of Cathedral City and portions of the County of Riverside. The plan boundary is roughly the toe of the San Jacinto mountains on the west, the Chino Canyon Levee and Whitewater River on the north, the Whitewater River on the east and Palm Canyon Levee on the south to Highway 111, and the foothills south of Highway 111 easterly thereof.

It should be noted by the reader that this report 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 plates for this report and on the enclosed map, is preliminary. A more detailed analysis performed at the design stage will determine final sizing.

## BACKGROUND

In October 1966 the consulting firm of Alderman and Swift under the direction of the Riverside County Flood Control and Water Conservation District, completed a study and published a report entitled, "Master Plan of Flood Control and Drainage, City of Palm Springs, California." Since its completion no elements of that master plan have been constructed.

In 1979 the City of Palm Springs, having undergone tremendous growth during the 1970's, began to experience serious local drainage problems and recognized the need for implementation of a master drainage plan. Realizing that the existing plan was nearly 15 years old, concerns arose relative to its adequacy and therefore, the City requested that the District reevaluate the old plan.

In addition, to the area covered in the 1966 plan, this restudy was expanded to include a large area east of the Highway 111 bridge at Palm Canyon Wash to the Cathedral Canyon Channel. The current and future land use assumptions of the old plan were reevaluated, and various alternatives were investigated. The objective was to develop an economical plan that would offer an acceptable level of protection to the City of Palm Springs and the surrounding community.

With a strong emphasis toward implementation of a master drainage plan, the City of Palm Springs began laying the groundwork in the fall of 1980 to develop a mechanism whereby new development would be required to pay drainage fees. Monies collected from such fees would be used to construct key elements of the master plan.

In the spring of 1981, drainage fees were imposed by the City in the area north of Vista Chino. In the late summer, fees were added in other areas of the City covered by the 1966 master plan. Because fees were determined on the basis of the old master plan, with 1966 costs inflated to current levels, the City was very anxious to have the restudy completed with accurate and up to date costs. The District began this task in July 1981 and this Revised Master Drainage Plan for the Palm Springs Area is the culmination of the study.

#### SCOPE

The drainage area covered by this plan is approximately 26.5 square miles in size (see Map 2/2 at the rear of the report). For the most part, it consists of moderately flat valley terrain sloping generally to the east. Steep mountainous terrain dominates the westerly portion of the drainage area. 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 boundary map.
3. Determination of the location, size and capacity of the proposed drainage structures.
4. Investigation of alternatives 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 Revised Master Drainage Plan for the Palm Springs Area. The plan consists primarily of a network of underground storm drains and several open channels. Also included in the plan are four retention basins and a combination debris - retention dam. The proposed system will carry storm runoff through the community to outlet into either the Whitewater River, Chino Canyon Channel, Tahquitz Creek, Palm Canyon Wash or Cathedral Canyon Channel.

At present, during periods of runoff, floodwaters, silt and debris impact significant portions of the City and the developing community, causing property damage and leaving streets 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 a high level of protection.

## 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. (Where curbs do not presently exist, 8 inch curbs were assumed.) 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 a high level of protection. 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.

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.

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 approximately 200 to 400 acres in size, the Modified Rational Hydrology Method was used. The Synthetic Unit Hydrograph Method was used for larger areas and in all instances where storm volume was needed. 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.

All discharge rates were determined on the basis of ultimate development. Future land use assumptions were based on the following:

The General Plan - City of Palm Springs  
April 24, 1974

Palm Hills General Plan  
September 11, 1972

Palm Springs Tramway Area General Plan  
July 1966

Cove Communities General Plan  
June 13, 1979

Palm Springs Municipal Airport Master Plan  
Tentative

#### EXISTING FACILITIES

Presently, there are several major flood control facilities located within the study area, and several others at the plan boundary. These facilities are: Palm Canyon Levees, Whitewater River Levee, Baristo Channel, Tachevah Dam and Outlet Drain, Tahquitz Creek Channel, Chino Canyon Levee and Cathedral Canyon Channel.

##### Palm Canyon Levees

Palm Canyon Wash approaches the City of Palm Springs from the south and drains a watershed that encompasses an area in excess of 100 square miles. Its flows are controlled by a levee system that extends from South Palm Canyon Drive, near Arenas Canyon, downstream to the confluence with Tahquitz Creek Wash. The levees continue downstream from this confluence (near Bogie Road) and lie within the boundary and jurisdiction of the Coachella Valley County Water District. The concrete faced levee system upstream of Bogie Road was constructed by Riverside County Flood Control and Water Conservation District in the mid 1950's.

##### Whitewater River Levee

The Whitewater River and its levees lie entirely within the jurisdiction of the Coachella Valley County Water District. This sand levee in its various stages of improvement, offers some protection to the City's north and east boundary. The 100 year flow in the Whitewater River is approximately 50,000 cfs.

### Baristo Channel

This concrete lined trapezoidal channel was constructed by the District in 1962. Under existing conditions the drainage area contributing to the upstream end of the channel is approximately 1.5 square miles and is bounded by Alejo Road, Ramon Road, Indian Avenue and the steep foothills to the west. The channel outlets into Tahquitz Creek Wash near Sunrise Way.

### Tachevah Dam and Outlet Drain

This detention reservoir and its outlet drain were constructed by the U. S. Army Corps of Engineers in 1965. The earth fill dam is approximately 40 feet high and 3600 feet long. A storage volume of 900 acre feet is available for controlling both storm runoff and debris from a 3.2 square mile drainage area. The outlet storm drain varies in size from 54 inches to 72 inches in diameter. There is residual capacity in the drain to accommodate some local runoff. The outlet of the drain is Baristo Channel at Avenida Caballeros.

### Tahquitz Creek Channel

The existing improvements on Tahquitz Creek are limited to a reach between Palm Canyon Drive and Sunrise Way. In the late 1940's, a private developer improved the banks of the wash by paving the side slopes with asphaltic concrete. In the mid 1960's the District replaced portions of the existing paving with concrete slope paving. The District owns and maintains these improvements today and currently has plans for major improvements in this area. (See further discussion on the Tahquitz Creek Flood Control Project.)

### Chino Canyon Levee and Channel

Constructed in 1971 by the U. S. Army Corps of Engineers, the Chino Canyon Levee and Channel controls a rugged 9 square mile watershed and prevents flows from impacting the most northwesterly portion of the City.

### Cathedral Canyon North Channel

This concrete lined trapezoidal channel, a lateral of the Cathedral Canyon Channel, was constructed by a developer in two stages in 1977 and 1979. The total drainage area contributing to the channel is approximately 3.5 square miles with a 100 year design discharge of 2300 cfs.

## TAHQUITZ CREEK FLOOD CONTROL PROJECT

The proposed Tahquitz Creek Flood Control Project in the City of Palm Springs will consist of the construction, operation and maintenance of a debris basin with emergency spillway and outlet channel. The project will also construct two new bridges, one for pedestrians at Camino Real and a roadway bridge on Sunrise Way. The existing bridge at Palm Canyon Drive would be utilized without substantial modification.

The debris basin will be located on the Tahquitz Creek alluvial cone below the mouth of the Tahquitz Canyon. The basin will consist of an earth embankment in front of an excavated depression and will cover approximately 20 acres. It is designed to work in conjunction with a levee extending to the west to intercept flood flows emanating from Tahquitz Creek and to cause rock and sediment being carried by these flood flows to be deposited behind the embankment.

Runoff from the basin will flow easterly to Camino Real in a rock lined trapezoidal channel. From Camino Real downstream to Sunrise Way the channel side slopes will be lined with ungrouted rock and the existing sand channel bottom will remain. A graded earth channel will extend downstream of Sunrise Way and transition into the natural flood plain at the end of the project upstream of Farrell Drive.

## RECOMMENDED IMPROVEMENTS

The recommended improvements discussed briefly below are shown on the enclosed map found at the back of this report, as well as on the preliminary plan and profile plates which are bound as a separate document. 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.

During the preparation of plan and profile drawings utility information was gathered on all high pressure gas lines and on all 12 inch and larger sanitary sewers and water mains. As design proceeds 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 trapezoidal channels in this plan range in size from 3 feet to 20 feet in bottom width and in depth from 6 feet to 10 feet. Several short reaches of rectangular concrete channel are also proposed in the plan.

There are several unlined facilities within the plan. They are trapezoidal in cross section, and have flatter side slopes than lined channels and are generally less costly. Unlined sections can only be proposed where velocities are nonerosive. To help stabilize these channels against the threat of erosion, rock riprap is proposed in selected areas.

### 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 constructed as a reinforced concrete box (RCB), but this is usually a considerably more expensive alternate and avoided whenever possible.

All underground drains in this plan are proposed within existing or assumed future street rights of way, or in storm drain easements to be obtained prior to construction.

The outletting of storm drains into major washes such as Palm Canyon Wash and the Whitewater River becomes a special problem when the ground elevation on both sides of a levee is the same, or the wash, into which the drain is outletting, is a very broad, shallow flood plain. The assumption has been made that the drain will pass under the levee and/or into the flood plain and then turn sharply to parallel the direction of flow. At this point the drain will be terminated and a flap gate installed to prevent back flow from the main channel. A small daylight ditch will be excavated downstream at a minimum slope of .002 feet/foot until the daylight ditch and main channel flow lines meet. An additional feature, a low, parallel levee will be built to protect the daylight ditch from main stream flows. This levee will taper upstream of the pipe terminus to join the main levee or edge of flood plain (see Plate 198).

## Retention Basins

The inclusion of regional retention basins in the Revised Palm Springs Master Drainage Plan has significantly reduced the overall cost of the plan and in several instances enhances the possibility of stage construction. Five basins are proposed in the plan. The use of a retention basin allows runoff to be temporarily stored, usually less than 36 hours, and released at a significantly lesser rate than it arrived. This lessening of the flow rate requires smaller and less costly downstream facilities. All basins, with the exception of the Eagle Debris and Retention Basin, are sized for a 10 year frequency storm, and will safely pass the 100 year storm flows without threatening the integrity of the facility. A certain degree of flexibility exists with respect to the shape of all the basins (excluding Eagle Basin) as long as the required storage volume and outlet depth are provided. To ensure the maximum recreational use of those retention basins located within existing or proposed park sites, low flow by-pass systems may be incorporated into the final design.

### Victoria Retention Basin

This basin provides below ground storage (no embankment required) at the City owned Victoria Park on the corner of Via Miraleste and Racquet Club Road. Approximately 4.8 acres of the site will be excavated to a maximum depth of 7 feet to provide nearly 20 acre feet of flood storage. The incoming flow rate of 615 cubic feet per second (cfs), delivered via Line 7, will be reduced to a peak outflow rate of 55 cfs. Costs have been included for relandscaping the basin so as to not lose the site's primary function of serving as a neighborhood park.

### Farrell Retention Basin

The total peak flow delivered to this basin by Lines 5 and 6 is 1430 cfs. Without the proposed basin this flow would have to be conveyed in a very large and costly facility, for a distance greater than one mile, to the Whitewater River. The 8 acre, 15 foot deep Farrell Retention Basin has a peak discharge of only 43 cfs. Costs have been included in the plan for landscaping the basin. Further development of the site for recreational use, i.e., baseball fields, tennis courts, general park use, or other compatible uses would be encouraged.

### Ruth Hardy Retention Basin

This retention basin also lies within a city park and is very similar to the proposed Victoria Basin. Line 12 and 13 deliver a peak flow of 765 cfs to this 6.7 acre site on the northwest corner of Tamarisk Road and Avenida Caballeros. The basin is 7 feet deep at the outlet and has a total storage volume of 25 acre feet. The maximum outflow rate of 61 cfs is conveyed a short distance down Avenida Caballeros to Alejo Road where it drains into the existing Tachevah Outlet Drain.

### Airport Retention Basin

Located on a 5.5 acre site within the Palm Springs Municipal Airport, near the northwest corner of Bogie Road and Ramon Road, this proposed basin primarily controls storm runoff from airport property. The 16 foot deep basin, having 45 acre feet of storage, reduces the peak inflow rate of 550 cfs to an outflow rate of 25 cfs. This flow is then carried in a storm drain, east in Ramon Road, to the Whitewater River.

One assumption that was made relative to the inflow into the basin is that the strip of land lying between the existing runway and taxiway will contribute no runoff to the basin. To assure compliance with this assumption, it is incumbent upon the airport to provide local retention at various points within this strip of land.

### Eagle Retention and Debris Basin

This basin differs substantially from the others proposed within the plan, in that it is the only basin, by virtue of its size, that will fall within the jurisdictional purview of the California Department of Water Resources, Division of Safety of Dams. The presently undeveloped watershed of 1.75 square miles produces a controlling 100 year, 6 hour storm peak of 1180 cfs. The peak outflow rate, through a 48 inch outlet, is 285 cfs. The crest of the earth fill dam is 55 feet above the outlet flow line and has a 60 foot wide, over the crest spillway, set 9 feet below the top of the dam. The spillway is capable of passing the 1000 year, 1 hour storm peak of 2900 cfs with a residual freeboard of 2.7 feet. Forty acre feet of debris storage has also been provided within the basin.

## ALTERNATE STUDIES

In developing this Master Drainage Plan a number of alternates were developed and studied for both their hydraulic and economic feasibility.

The basis for comparison in most cases was the original 1966 master plan. Many of the alignments and concepts presented in that plan have been preserved in the revised plan. An attempt will be made here to discuss some of the major alternatives that were investigated.

One far reaching alternative that would affect the whole plan would be the construction of a system of 2 year capacity storm drains, rather than the 10 year system proposed in the plan. An analysis indicated that a cost savings of approximately one third would be realized by decreasing the system's capacity to a 2 year storm. However, the capacity of the less costly 2 year system would theoretically be exceeded 50 times in 100 years, whereas the 10 year system would only be exceeded 10 times. The District is of the opinion that the cost saving inherent in the 2 year system is not sufficient to offset the inconvenience and damages resulting from the numerous times the system will be exceeded; therefore, the 10 year criterion was pursued as the minimum level of protection.

From the outset of the restudy of the master plan, the use of the regional retention basins was of prime consideration. Without exception, the basins proposed in the Revised Master Drainage Plan are the most cost effective approach to the drainage problems within their specific area of influence. For instance, the total cost of the Victoria Basin and Line 6 leading to Farrell Basin is \$2,682,000. If the Victoria Basin were eliminated the cost of Line 6 would be approximately \$3,300,000. The inclusion of the Victoria Basin thus saves in excess of \$600,000. Similarly, the inclusion of the Farrell Basin results in a cost saving of approximately \$500,000, when compared to the cost of carrying the 1430 cfs design flow at Farrell Drive and Vista Chino, to the Whitewater River.

One alternative considered at the Victoria Basin site was an enlargement of the basin and the diversion of flows from Line 3 (San Rafael) to the basin. In the final analysis this alternative was not cost effective.

The Ruth Hardy Basin greatly enhances the ability to implement that portion of the master plan draining the "Las Palmas" area (Lines 12 and 13). In the original master plan these flows were carried over a very lengthy and circuitous route, finally to outlet at Farrell Drive and Tahquitz Creek Wash. Early in the restudy, it was discovered that the Tachevah Outlet Drain did not have sufficient residual capacity to convey the flow directed to it by the original master plan, particularly in the area west of Avenida Caballeros. Lines 12 and 13 will draw off some of the tributary flows to the drain, pass them through the Ruth Hardy Basin and then introduce them via Line 11, at a reduced rate, into the Tachevah Outlet Drain.

A retention basin was investigated at the City maintenance yard on Civic Drive that would have received flows from Line 20, Lateral 20F and Lateral 20C. City plans for expansion at the site and the inability to demonstrate any cost saving, resulted in the basin being excluded from the plan.

Several alternatives to the Airport Retention Basin were considered during the development of the plan. One, similar to the original master plan, took the bulk of the flow from the airport, southerly to Tahquitz Creek Wash at Vella Road. The flow at Bogie and Ramon Roads was conveyed east in Ramon Road to the Whitewater River in an underground drain. Another alternative investigated for this area proposed that Lines 35 and 36 assume essentially the same alignments shown on the master plan. Downstream from their confluence at Bogie and Ramon Roads the flow would be carried to the Whitewater River, on the south side of Ramon Road, in an unlined channel similar that proposed for a portion of Line 41. Inclusion of the Airport Retention Basin results in significant savings when compared to the two alternatives above.

The southeastern portion of the plan was not included in the original 1966 master plan boundary. The two largest problems in this area are the Eagle Canyon watershed and the problem of how to convey significant flow through the existing mobile home parks that exist north of Highway 111 on the easterly extension of Jones Road. This latter situation resulted in the investigation of several alternatives.

The 100 year flow approaching the mobile home parks is in excess of 2300 cfs (assuming the existence of the Eagle Canyon Basin). A large 10.5 acre retention basin near the southeast corner of Palm Hills Drive (Broadmoor) and Highway 111 was studied for its peak reducing effect on the high rate of flow. Even though the inflow rate of 1970 cfs was reduced to an outflow of 50 cfs, sufficient additional drainage area exists between the basin and the mobile home parks to bring the design flow up to 700 cfs on the westerly edge of the parks. The total cost of this alternative was approximately \$1,000,000 higher than the master plan proposal for this area.

Numerous alternatives were investigated for the reach of Line 41 passing through the aforementioned mobile home parks. Unfortunately, the temporary and in some cases the permanent removal of some of the units cannot be avoided. The costs for such relocations has been included in the cost of Line 41.

Eagle Canyon Debris and Retention Basin was at one point investigated only as a debris basin. The cost of the debris basin was about half of the cost of the combination debris-retention basin but the difficulty was what to do with the unmitigated 100 year flow peak of 2000 cfs after it had passed through the basin. Because of the degree of development existing downstream of the basin site, an acceptable open channel alignment could not be found. The cost of conveying such a high rate of flow in an underground facility would prove to be cost prohibitive.

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

In short, the Revised Palm Spring 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 Palm Springs area has experienced serious flooding problems in the past. As the area continues to urbanize, 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 Revised 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 \$71,482,000.

## RECOMMENDATIONS

It is recommended that:

1. The Revised Master Drainage Plan, as set forth herein, be adopted by the respective City Councils of Palm Springs and Cathedral City, as part of the overall master plan for their 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

MASTER DRAINAGE PLAN FOR THE PALM SPRINGS AREA

COST SUMMARY

<u>FACILITY</u>	<u>CONSTRUCTION COST</u>	<u>30% ENGINEERING &amp; ADMINISTRATION</u>	<u>RIGHT OF WAY</u>	<u>MASTER PLAN COST</u>
1	\$ 35,000	\$ 11,000	\$ -	\$ 46,000
2	1,557,000	467,000	51,000	2,075,000
2A	95,000	28,000	4,000	127,000
2B	230,000	69,000	-	299,000
3	2,063,000	619,000	63,000	2,745,000
3A	292,000	87,000	-	379,000
3B	363,000	109,000	-	472,000
3C	347,000	104,000	-	451,000
3D	384,000	115,000	-	499,000
3E	417,000	125,000	-	542,000
3F	38,000	12,000	-	50,000
3G	158,000	47,000	-	205,000
4	909,000	273,000	-	1,182,000
4A	167,000	50,000	-	217,000
5	1,159,000	348,000	-	1,507,000
5A	82,000	25,000	-	107,000
5B	355,000	106,000	-	461,000
5C	323,000	97,000	-	420,000
6	1,647,000	495,000	-	2,142,000
6A	311,000	94,000	-	405,000
6B	917,000	275,000	-	1,192,000
6BA	447,000	134,000	-	581,000
6BAA	94,000	29,000	-	123,000
6C	189,000	57,000	-	246,000
6D	140,000	42,000	-	182,000
7	815,000	245,000	-	1,060,000
7A	259,000	78,000	-	337,000
7B	142,000	42,000	3,000	187,000
7C	247,000	74,000	-	321,000

TABLE I (con't)

MASTER DRAINAGE PLAN FOR THE PALM SPRINGS AREA

COST SUMMARY

<u>FACILITY</u>	<u>CONSTRUCTION COST</u>	<u>30% ENGINEERING &amp; ADMINISTRATION</u>	<u>RIGHT OF WAY</u>	<u>MASTER PLAN COST</u>
8	\$ 1,726,000	\$ 518,000	\$ -	\$ 2,244,000
8A	302,000	91,000	-	393,000
8B	137,000	41,000	-	178,000
8C	88,000	27,000	-	115,000
8D	356,000	107,000	-	463,000
9	158,000	48,000	-	206,000
10	84,000	25,000	-	109,000
11	154,000	46,000	-	200,000
12	504,000	151,000	-	655,000
13	1,263,000	379,000	-	1,642,000
13A	116,000	35,000	-	151,000
13B	194,000	59,000	-	253,000
13C	149,000	45,000	-	194,000
14	128,000	39,000	-	167,000
15	1,117,000	335,000	-	1,452,000
15A	210,000	64,000	-	274,000
15B	284,000	86,000	-	370,000
15BA	79,000	23,000	-	102,000
15C	132,000	39,000	-	171,000
16	873,000	262,000	-	1,135,000
16A	342,000	102,000	-	444,000
16B	96,000	28,000	-	124,000
17	181,000	55,000	-	236,000
17A	167,000	50,000	-	217,000
18	233,000	70,000	-	303,000
19	698,000	210,000	-	908,000
19A	14,000	4,000	-	18,000

TABLE I (con't)

MASTER DRAINAGE PLAN FOR THE PALM SPRINGS AREA

COST SUMMARY

<u>FACILITY</u>	<u>CONSTRUCTION COST</u>	<u>30% ENGINEERING &amp; ADMINISTRATION</u>	<u>RIGHT OF WAY</u>	<u>MASTER PLAN COST</u>
20	\$ 3,248,000	\$ 975,000	\$ -	\$ 4,223,000
20A	167,000	50,000	-	217,000
20B	95,000	28,000	-	123,000
20C	1,042,000	313,000	-	1,355,000
20CA	185,000	56,000	-	241,000
20CB	79,000	24,000	-	103,000
20CC	89,000	27,000	-	116,000
20D	130,000	39,000	-	169,000
20E	391,000	118,000	-	509,000
20EA	108,000	32,000	-	140,000
20F	219,000	66,000	-	285,000
20G	387,000	116,000	-	503,000
20H	102,000	31,000	-	133,000
21	51,000	16,000	-	67,000
22	670,000	201,000	-	871,000
22A	154,000	46,000	-	200,000
23	841,000	252,000	-	1,093,000
23A	103,000	31,000	-	134,000
24	4,000	1,000	12,000	17,000
25	841,000	252,000	-	1,093,000
26	634,000	190,000	-	824,000
27	3,202,000	961,000	2,000	4,165,000
27A	305,000	92,000	-	397,000
27B	425,000	128,000	-	553,000
27C	391,000	118,000	-	509,000
27D	242,000	73,000	-	315,000
27E	201,000	60,000	-	261,000
28	2,497,000	749,000	-	3,246,000
28A	315,000	95,000	-	410,000
28B	138,000	41,000	9,000	188,000
28C	152,000	46,000	-	198,000
28D	121,000	36,000	-	157,000
28E	163,000	49,000	-	212,000
28EA	53,000	16,000	-	69,000
29	203,000	61,000	-	264,000

TABLE I (con't)

MASTER DRAINAGE PLAN FOR THE PALM SPRINGS AREA

COST SUMMARY

<u>FACILITY</u>	<u>CONSTRUCTION COST</u>	<u>30% ENGINEERING &amp; ADMINISTRATION</u>	<u>RIGHT OF WAY</u>	<u>MASTER PLAN COST</u>
30	\$ 209,000	\$ 63,000	\$ -	\$ 272,000
31	1,048,000	314,000	-	1,362,000
32	469,000	141,000	-	610,000
33	91,000	28,000	-	119,000
34	720,000	216,000	-	936,000
34A	322,000	97,000	-	419,000
35	356,000	107,000	-	463,000
35A	378,000	114,000	-	492,000
35AA	40,000	12,000	-	52,000
36	308,000	93,000	-	401,000
36A	9,000	3,000	-	12,000
37	1,249,000	375,000	-	1,624,000
38	177,000	53,000	-	230,000
39	82,000	25,000	-	107,000
40	41,000	12,000	1,000	54,000
41	1,925,000	578,000	873,000	3,376,000
41A	149,000	44,000	15,000	208,000
41B	95,000	29,000	5,000	129,000
41BA	116,000	34,000	1,000	151,000
41BAA	118,000	36,000	-	154,000
41C	240,000	72,000	136,000	448,000
41D	27,000	8,000	4,000	39,000
41E	26,000	8,000	-	34,000
42	213,000	64,000	75,000	352,000
42A	129,000	39,000	-	168,000
43	657,000	197,000	19,000	873,000
43A	59,000	17,000	3,000	79,000

TABLE I (con't)

MASTER DRAINAGE PLAN FOR THE PALM SPRINGS AREA

COST SUMMARY

<u>FACILITY</u>	<u>CONSTRUCTION COST</u>	<u>30% ENGINEERING &amp; ADMINISTRATION</u>	<u>RIGHT OF WAY</u>	<u>MASTER PLAN COST</u>
TACHEVAH OUTLET	\$ 137,000	\$ 41,000	\$ -	\$ 178,000
AIRPORT BASIN	229,000	68,000	-	297,000
EAGLE BASIN	786,000	236,000	83,000	1,105,000
FARRELL BASIN	503,000	151,000	727,000	1,381,000
RUTH HARDY BASIN	324,000	97,000	-	421,000
VICTORIA BASIN	224,000	68,000	-	292,000
TOTAL	\$53,371,000	\$16,025,000	\$2,086,000	\$71,482,000