RIVERSIDE COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT
RIVERSIDE, CALIFORNIA

MASTER DRAINAGE PLAN
FOR THE
PERRIS VALLEY AREA

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JULY 1987
REVISED JUNE 1991

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MASTER DRAINAGE PLAN

for the

PERRIS VALLEY AREA

April 1987

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PERRIS VALLEY

MASTER DRAINAGE PLAN

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PERRIS VALLEY

MASTER DRAINAGE PLAN

SECTION I - PURPOSE

The purpose of this report is to investigate and evaluate the drainage problems of the Perris Valley area and prepare an updated master drainage plan. Currently, there are two master plans servicing this area, and they are Lower Perris Valley Master Drainage Plan adopted in May 1985 and Perris Valley Master Drainage Plan adopted in July 1987. For simplicity, these plans are replaced by this updated master plan.

Presently, Perris Valley area is subject to inundation during medium size storm events. A major task in this study is to develop a drainage system plan that will allow orderly development within the study area. The plan considers existing physical barriers, existing contour directions, and ultimate land uses in developing the size of the storm drain facilities.

The plan will serve as a guide to long term construction scheduling of primary drainage facilities and assist in the locating and sizing of local drainage facilities to be constructed by developers and others within the area. It is believed that this plan presents a reasonable method of transporting projected flows to the only major collection facility available, the Perris Valley Channel.

Until all of the facilities proposed in this plan are constructed and the Perris Valley Channel is upgraded from an interim channel to its ultimate size as shown in the Master Drainage Plan for the Perris Valley Channel, the current flood plain limit designations presented in Flood Insurance Rate Maps (FIRM) should still be considered when proposed developments encroach in those areas. Those developments should still be required to provide adequate floodproofing measures.

SECTION II - SCOPE

The tributary drainage area covered by this plan consists of approximately 38 square miles, with topographical relief ranging from steep mountain terrain to very mild sloping valley terrain. The scope of this Master Drainage Plan includes:

1. Determination of the quantity and points of concentration of storm runoff in the area.

2. The preparation of drainage area maps.

3. Determination of the location, size, and capacity of the proposed drainage facilities.

4. Investigation of alternative routes and methods as a basis for selecting the most effective plan.

5. Preparation of supporting cost estimates.

The tributary drainage area is located in the unincorporated portions of Riverside County and within both the City of Perris and the City of Moreno Valley city limits (see Exhibit A).

SECTION III - GENERAL DISCUSSION

The proposed drainage plan will involve the construction of a retention basin, major open channels and a network of underground storm drains. The system will transport flows that develop west of the Atchinson Topeka and Santa Fe Railroad (AT&SF RR) tracks and flows generated east of the I-215 Freeway to the Perris Valley Channel. The latter facility will then transport this stormwater along with other tributary flows southerly to the San Jacinto River.

Currently, only a few facilities are proposed to service the area west of the I-215 Freeway. However, rapid development in this area has necessitated additional facilities. Also the recent adoption of the Master Drainage Plan for the Perris Valley Channel has allowed for the inclusion of facilities adjacent to the channel.

Future improvements to the Perris Valley Channel and the San Jacinto River will eliminate the existing flood plain north of Nuevo Road in addition to lowering the flood elevation south of Nuevo Road along the Perris Valley Channel. These future limits are used as hydraulic controls throughout this study. (See Figure No. 1.)

A diversion of flows at the easterly intersection of I-215 and San Jacinto Avenue is incorporated in this Master Plan. This facility is indicated on Exhibit A and will be a part of the planned San Jacinto River improvements. Those flows historically traveling along San Jacinto Avenue will be captured at this point and diverted southerly.

Line "B" was extended under the 1987 study and will be a major collector of flows occurring north of Oleander Avenue. Alternative studies concerning the alignment of Line "B" along the I-215 were done to identify impacts of two (2) existing property owners-March Air Force Base (AFB) and the Arlington National Cemetery (Veterans Administration).

Due to a future air museum project along the east side of the I-215 and associated restrictions with air space around the landing strips on March AFB, the proposed channel was aligned west of the I-215 and adjacent to the AT&SF RR. Two alternatives for this

facility encompass, (1) a rectangular channel section through the VA property and connecting to a major crossing at the I-215 Freeway, and (2) a rectangular and trapezoidal channel section through the VA property to the latter crossing. The second alternative was chosen for this Master Plan.

Large portions of the study area between the I-215 Freeway and the Perris Valley Channel are susceptible to flooding during periods of medium storm activity. This is attributed to the relatively flat terrain and sheet flow condition that presently exists.

Current interest in developing the area has led to increasing concerns by existing residents and by the City of Perris in how to best direct projected storm runoffs to adequate facilities. The lack of such facilities has greatly hampered the development of the area and any increase in subdivision activity may subject the existing community to serious flooding.

The Master Drainage Plan presented herein provides a method of collecting and conveying storm runoff through the study area. This proposed Plan will also enable the City of Perris and Moreno Valley to develop drainage projects which could be supported by prospective developers or by other available funding sources.

SECTION IV - CRITERIA

Most of the underground storm drains proposed in this plan are located in existing or proposed street rights-of-way. Runoff from a 10-year storm is allowed to accumulate in the streets until it reaches projected top of curb elevations. From this point, the plan proposes to collect water in an underground drain to convey at least the 10-year storm runoff to a 100-year outlet downstream.

Streets are allowed to carry 100-year flows to projected right-of-way limits. If flows exceeded this criteria, the residual amount over the right-of-way limit was included in the accompanying underground drain. However, 100-year flows are to be included in the underground drain wherever local sumps are proposed in order to meet the minimum street grade.

Open channels are proposed to carry a collective portion of the 100-year storm runoff and eventually discharges them into the Perris Valley Channel. All open channels were assumed to be concrete-lined in generating conservative travel time information. Channel alignments were established within vacant land areas as much as possible and would correspond to existing and proposed developments within the study area. The bisecting of vacant property was avoided as much as possible so that full use could be realized. Wherever feasible, proposed facilities have been placed underground.

The alignments of all storm drains and open channels are based on existing developments, existing street patterns, hydraulic efficiency, the ability to drain tributary areas, and future land uses. Minor realignments of the drainage facilities may be possible during final design stages.

SECTION V -HYDROLOGY DEVELOPMENT

The hydrologic development for the study area consisted of two methods, the unit hydrograph method and the rational method.

The rational method was used to determine the 10-year and 100-year peak discharges generated from small watersheds. This method was used primarily for sizing local underground facilities. Synthetic unit hydrographs were utilized for large areas that were tributary to the proposed drainage facilities. Methodology and supportive data for the rational and synthetic unit hydrograph hydrologies can be found in the "Riverside County Flood Control and Water Conservation District Hydrology Manual", dated April 1978.

Projected land uses for the study area were based on the District's assumed development patterns and data obtained from the City of Perris Planning Department, the County of Riverside Planning Department, and the City of Moreno Valley. The ultimate land use assumptions used throughout the plan can be viewed at the Riverside County Flood Control and Water Conservation District office. If development varies substantially from the indicated land uses, revisions to the drainage plan may become necessary. If, however, development continues as predicted with only minor deviations, the runoff quantities and approximate facility locations should prove to be adequate.

SECTION VI - EXISTING DRAINAGE FACILITIES

There are relatively few existing drainage facilities within the study area and they consist mainly of culvert crossings and earthen channels.

Numerous culvert crossings under the I-215 Freeway and railroad tracks transmit flows overland to the Perris Valley Channel. Due to the limited capacity of these culverts, they were generally ignored in system planning. Instead, fewer but larger culverts were proposed for the ultimate system. In doing so, the number of major collection channels required were minimized in providing a cost effective plan. It was assumed that local collection drains on the westerly side of the freeway, in the form of open channels and/or underground drains, would intercept flows tributary to those culverts and transmit them to major collection channels easterly of the freeway.

SECTION VII - RECOMMENDED DRAINAGE IMPROVEMENTS

The recommended improvements are shown on the enclosed map in the back of report. Supporting data for the facilities shown herein are available for review upon request.

SECTION VIII - ALTERNATIVE STUDIES

Several alternatives were developed and studied during the generation of the Perris Valley Master Drainage Plan. Those alternatives considered the use of underground pipes and boxes rather than open concrete and grass channels; different alignment schemes for open channel systems; and hydraulic considerations.

SECTION IX - ESTIMATED COSTS

The Master Plan presented herein is an accumulation of the preferred features of all of the alternatives studied. This Plan presents an economical drainage facility system while creating the least impact on the existing character of development within the study area.

The majority of underground facilities are proposed to be within existing or proposed street rights-of-way. Right-of-way acquisitions will be required for any proposed open channels constructed on private land.

Storm drain facility costs were developed from current construction data from the Riverside County Flood Control District.

All prices tabulated herein were adjusted to reflect present 1991 cost levels and are shown in Table I, "COST SUMMARY". These costs include right of way and 31% for engineering, administration and contingencies.

SECTION X - CONCLUSIONS

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

1. The Perris Valley area has suffered distinct flooding problems in the past, and the damages incurred are expected to increase as much of the area converts from predominately agricultural uses to industrial and residential uses.

2. A drainage system is required to safely convey storm runoff through the area to the Perris Valley Channel.

3. The existing flood plain designation along the Perris Valley Channel should be considered intact until such a time that the latter is improved to ultimate conditions.

4. The proposed Plan indicated herein will lend itself to a stage construction program as funds are available.

5. The total cost of the recommended improvements, including right-of-way, engineering, contingencies, and administration is estimated to be $142,832,000.

SECTION XI - RECOMMENDATIONS

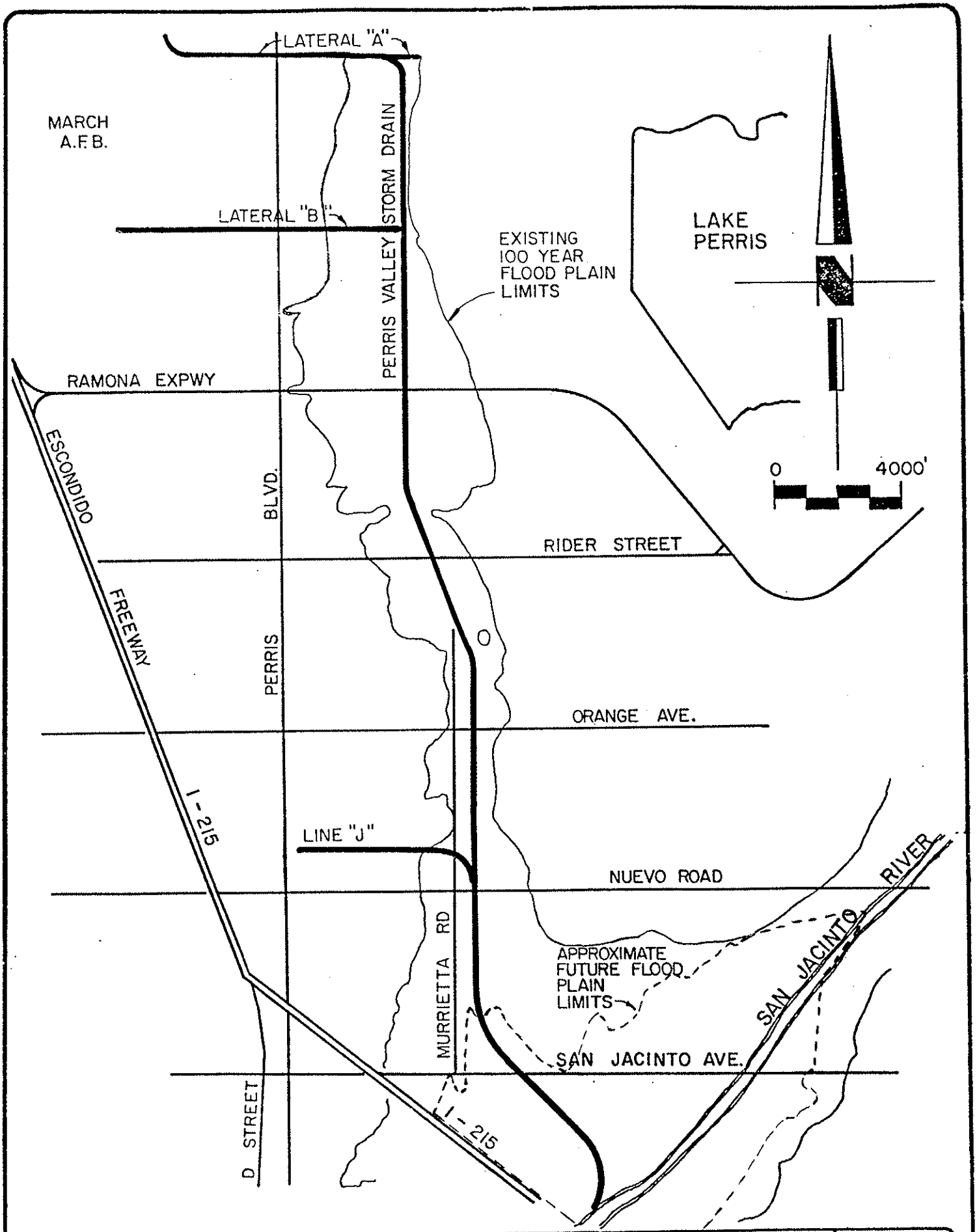
It is recommended that:

1. The Perris Valley Master Drainage Plan, as set forth herein, be adopted by the Perris City Council and the Riverside County Flood Control and Water Conservation District's Board of Supervisors.

2. The Perris Valley Master Drainage Plan, as set forth herein, shall replace the currently adopted Lower Perris Valley Master Drainage Plan.

3. 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 much as possible.

4. The right-of-way required for the Plan be protected from encroachment.



J. F. DAVIDSON ASSOCIATES CIVIL ENGINEERS - SURVEYORS - PLANNERS	PERRIS VALLEY STORM DRAIN FLOOD PLAIN LIMITS	FIGURE 1

Perris Valley Master Drainage Plan

Table I: Cost Summary

Facility Designation	Construction Cost	Right of Way Cost	Total Cost
Lateral A-1	120,000	--0--	120,000
Line B	9,669,000	3,193,000	12,862,000
Line B-1	601,000	295,000	896,000
Line B-2	1,363,000	636,000	1,999,000
Line B-3	820,000	477,000	1,297,000
Lateral B-1	1,648,000	--0--	1,648,000
Lateral B-1.1	3,63,000	--0--	363,000
Lateral B-1.2	314,000	--0--	314,000
Lateral B-2	1,212,000	--0--	1,212,000
Lateral B-2.1	298,000	--0--	298,000
Lateral B-2.2	205,000	--0--	205,000
Lateral B-3	1,086,000	--0--	1,086,000
Lateral B-3.1	637,000	--0--	637,000
Lateral B-3.2	444,000	--0--	444,000
Lateral B-3.3	488,000	--0--	488,000
Lateral B-5	1,421,000	--0--	1,421,000
Lateral B-5.1	371,000	--0--	371,000
Lateral B-6	568,000	--0--	568,000
Lateral B-6.1	308,000	--0--	308,000
Lateral B-7	932,000	--0--	932,000
Lateral B-7.1	268,000	--0--	268,000
Lateral B-7.2	110,000	--0--	110,000
Lateral B-8	611,000	--0--	611,000
Lateral B-9	138,000	--0--	138,000
Line C	861,000	495,000	1,356,000
Line D	2,520,000	904,000	3,424,000
Lateral D-1	281,000	--0--	281,000
Lateral D-2	299,000	--0--	299,000
Lateral D-3	299,000	--0--	299,000

Perris Valley Master Drainage Plan

Table I: Cost Summary

Facility Designation	Construction Cost	Right of Way Cost	Total Cost
Line E	5,222,000	2,666,000	7,888,000
Lateral E-1	315,000	--0--	315,000
Lateral E-2	309,000	--0--	309,000
Lateral E-3	262,000	--0--	262,000
Lateral E-4	751,000	--0--	751,000
Lateral E-5	243,000	--0--	243,000
Lateral E-6	464,000	--0--	464,000
Lateral E-7	451,000	--0--	451,000
Lateral E-8	908,000	178,000	1,086,000
Lateral E-9	618,000	--0--	618,000
Lateral E-9.1	338,000	--0--	338,000
Lateral E-10	1,708,000	--0--	1,708,000
Lateral E-11	268,000	--0--	268,000
Lateral E-12	492,000	--0--	492,000
Lateral E-13	424,000	--0--	424,000
Line F	3,559,000	--0--	3,559,000
Lateral F-1	670,000	--0--	670,000
Lateral F-2	703,000	--0--	703,000
Lateral F-3	857,000	--0--	857,000
Lateral F-3.1	264,000	--0--	264,000
Lateral F-4	653,000	--0--	653,000
Line G	875,000	689,000	1,564,000
Lateral G-1	2,370,000	--0--	2,370,000
Lateral G-2	730,000	--0--	730,000
Line H	3,839,000	1,155,000	4,994,000
Lateral H-1	927,000	--0--	927,000
Lateral H-2	98,000	--0--	98,000
Lateral H-3	358,000	--0--	358,000
Lateral H-4	100,000	--0--	100,000
Lateral H-5	973,000	--0--	973,000
Lateral H-6	122,000	--0--	122,000
Lateral H-7	240,000	--0--	240,000
Lateral H-8	596,000	--0--	596,000

Perris Valley Master Drainage Plan

Table I: Cost Summary

Facility Designation	Construction Cost	Right of Way Cost	Total Cost
Lateral H-9	156,000	--0--	156,000
Lateral H-10	1,017,000	--0--	1,017,000
Lateral H-10.1	312,000	--0--	312,000
Lateral H-11	1,229,000	--0--	1,229,000
Lateral H-11.1	547,000	--0--	547,000
Lateral H-12	2,488,000	--0--	2,488,000
Line J	3,010,000	227,000	3,237,000
Lateral J-1	1,503,000	--0--	1,503,000
Lateral J-2	132,000	--0--	132,000
Lateral J-3	212,000	--0--	212,000
Lateral J-4	119,000	--0--	119,000
Lateral J-5	108,000	--0--	108,000
Lateral J-6	751,000	--0--	751,000
Lateral J-7	934,000	--0--	934,000
Lateral J-7.1	240,000	--0--	240,000
Lateral J-8	663,000	--0--	663,000
Lateral J-9	2,340,000	--0--	2,340,000
Lateral J-9.1	535,000	--0--	535,000
Lateral J-9.2	115,000	--0--	115,000
Line K	2,392,000	736,000	3,128,000
Lateral K-3	541,000	--0--	541,000
Lateral K-6	931,000	--0--	931,000
Lateral K-13	188,000	--0--	188,000
Lateral K-14	1,168,000	--0--	1,168,000
Lateral K-15	330,000	--0--	330,000
Lateral K-16	214,000	--0--	214,000
Lateral K-17	122,000	--0--	122,000
Lateral K-18	127,000	--0--	127,000
Lateral K-19	276,000	--0--	276,000
Lateral K-20	891,000	--0--	891,000
Lateral K-21	352,000	--0--	352,000
Lateral K-22	430,000	--0--	430,000

Perris Valley Master Drainage Plan

Table I: Cost Summary

Facility Designation	Construction Cost	Right of Way Cost	Total Cost
Lateral K-23	223,000	--0--	223,000
Lateral K-24	114,000	--0--	114,000
Line L	692,000	--0--	692,000
Lateral L-1	124,000	--0--	124,000
Line M	911,000	32,000	943,000
Lateral M-1	366,000	--0--	366,000
Lateral M-2	268,000	--0--	268,000
Lateral M-2.1	216,000	--0--	216,000
Lateral M-3	209,000	--0--	209,000
Line N	1,511,000	--0--	1,511,000
Lateral N-1	117,000	--0--	117,000
Lateral N-2	108,000	--0--	108,000
Line O	1,080,000	--0--	1,080,000
Line P	231,000	--0--	231,000
Lateral P-1	69,000	--0--	69,000
Lateral P-2	373,000	--0--	373,000
Lateral P-3	650,000	--0--	650,000
Lateral P-4	508,000	--0--	508,000
Lateral P-5	534,000	--0--	534,000
Line Q	703,000	413,000	1,116,000
Lateral Q-2	806,000	--0--	806,000
Lateral Q-3	719,000	--0--	719,000
Line R	1,663,000	--0--	1,663,000
Line S	3,306,000	--0--	3,306,000
Lateral S-3	707,000	--0--	707,000
Line T	1,753,000	216,000	1,969,000

Perris Valley Master Drainage Plan

Table I: Cost Summary

Facility Designation	Construction Cost	Right of Way Cost	Total Cost
Lateral T-2	752,000	--0--	752,000
Lateral T-3	652,000	--0--	652,00
Line U	1,670,000	834,000	2,504,000
Lateral U-1	278,000	--0--	278,000
Lateral V-1	1,404,000	--0--	1,404,000
Lateral V-2	695,000	--0--	695,000
Lateral V-3	509,000	--0--	509,000
Lateral V-5	266,000	--0--	266,000
Line A-A	818,000	--0--	818,000
Line A-B	911,000	--0--	911,000
Line A-C	550,000	--0--	550,000
Line A-D	167,000	--0--	167,000
Line A-E	228,000	--0--	228,000
Line A-F	137,000	--0--	137,000
Line A-G	142,000	--0--	142,000
Line A-H	778,000	--0--	778,000
Line A-J	2,437,000	--0--	2,437,000
Line A-K	1,130,000	--0--	1,130,000
Line A-L	838,000	--0--	838,000
Line A-M	730,000	--0--	730,000
Line A-N	2,314,000	--0--	2,314,000
Line A-O	1,051,000	--0--	1,051,000
Line A-P	572,000	--0--	572,000
Line A-Q	785,000	--0--	785,000
Line A-R	905,000	--0--	905,000
Line A-S	902,000	192,000	1,094,000
Line A-T	347,000	--0--	347,000
Seaton Basin	1,855,000	4,375,000	6,230,000
Total Master Plan Cost	$125,119,000	$17,713,000	$142,832,000

1. Construction cost includes 31% for engineering and contingency