

V. DESCRIPTION OF RECOMMENDED FLOOD CONTROL MASTER PLAN FACILITIES

A. Description of Primary Drainage Course Improvements

The regional, secondary, and local flood control MPD facilities proposed for the Town of Yucca Valley are listed and shown in plan on Figure 2. The approximate dimensions and other characteristics for these facilities are indicated in more detail on the plan and profile Figures 5 through 42. Seven detention/debris basins are recommended to reduce peak flows and manage sediments. Refer to paragraph B below for descriptions of these basins.

The use of floodplain management has been recommended in natural water courses where appropriate. The use of native rock for channel stabilization has also been emphasized for recommended channel improvements.

The primary drainages and recommended facilities are described below.

1. *Yucca Wash (Facility No. Y01)*

Yucca Wash is an existing graded earth flood control channel for the majority of its length. Significant changes are not proposed for Yucca Wash. Except for the most westerly reach, Yucca Wash will remain a soft bottom trapezoidal channel with grade stabilizers and side slope revetment. The most westerly reach between Deer Trail and Apache Trail will be a concrete lined channel with improved culverts at street crossings. A concrete lined channel is necessary for this reach because of the limited right-of-way. Some of the soft bottom reaches are being enlarged to convey the 100-year peak flows with freeboard. All weather street crossings are proposed for State Route 62, Sage Avenue, and Old Woman Springs Road.

The proposed detention basins will reduce the peak flow rate and debris in Yucca Wash. Because of the reduction in debris to Yucca Wash, the need for grade stabilizers will be required. Stabilization will be provided in several locations by existing street crossings of the wash flow line, and through improved at-grade culvert crossings.

2. *Piñon Creek (Facility No. P01)*

Piñon Creek is an existing graded earth flood control channel. The channel is very steep and debris is effectively transported to an area adjacent to the Blues Skies Country Club. Debris movement in Piñon Creek has minimized streambed scour and the at-grade street crossings appear to be helping to control headcut. There is, however, evidence of lateral erosion along the banks of Piñon Creek in a few locations. The channel banks will be repaired where they have eroded and they will be revetted to prevent future erosion. Grade stabilization will be provided through improved culvert crossings and an additional intermediate stabilizer structure.

3. *Camino del Cielo Street (Facility No. P01-01)*

The natural wash tributary to Camino del Cielo street has concrete slope protection along the north side where it is adjacent to existing development. The remainder of the wash is a natural floodplain. Additional improvements to the existing wash are not needed to protect existing development.

Camino del Cielo street currently functions as a flood control channel. It has high curbs and carries considerable flow during storms. This flood control function will be maintained and debris removal after storms will be necessary.

4. *La Honda Drain and Debris Control Inlet (Facility No. K01-01)*

The La Honda Drain is one of a few underground storm drains recommended in the Master Plan. This drain will have a debris control inlet to prevent it from becoming obstructed with debris. The La Honda

Drain will reduce the flooding of State Route 62 on the west end of the Town and provide flood protection for development near the Blue Skies Country Club. This drain will confluence with the Kickapoo Drain and discharge near the Blue Skies Country Club.

5. *Kickapoo Drain and Detention/Debris Basin (Facility No. K01)*

The Kickapoo Drain will carry the runoff that currently flows in and adjacent to Kickapoo Trail. A detention/debris basin is recommended at the inlet to the drain to reduce the peak flow rate and remove the debris. The Kickapoo Storm Drain will confluence with the La Honda Drain and carry the flow under State Route 62 and discharge near the Blue Skies Country Club. These facilities along with the La Honda Drain will reduce the flooding of State Route 62 and protect the development near the Blue Skies Country Club.

6. *Inca Trail Wash Storm Drain (Facility No. K01-03)*

The Inca Storm Drain will carry the flows from the west end of Santa Fe Trail (Facility No. Y01-03) under State Route 62. The slope on this drain will be hydraulically steep so that any debris that does not settle out in Santa Fe Trail before entering the storm drain will be transported through the drain. This storm drain provides additional flood protection to State Route 62 and the properties adjacent to Inca Trail, and Bencia Trail near the Blue Skies Country Club.

7. *Santa Fe Trail (Facility No. Y01-03)*

The topographic location of this street and the adjacent development necessitate the use of this street for conveying storm flows. High curbs and an inverted crown will be necessary to safely carry the peak 100-year flows. While existing debris problems will be reduced with the Kickapoo Detention/Sediment Basin, some debris removal after storms will be necessary.

8. *Water Canyon Channel and Detention/Debris Basin (Facility No. Y12)*

The Water Canyon Channel will carry flows from Water Canyon to Yucca Wash. Water Canyon is one of the largest tributaries to Yucca Wash. A detention/debris basin at the mouth of Water Canyon just outside of the Town limits is recommended. This basin will substantially reduce the peak flows from Water Canyon. The channel will be a revetted soft bottom for a distance of approximately 3000 feet downstream of the basin. From this point downstream the channel will be rock lined.

9. *Church Channel (Local Drain Tributary to Y01)*

The area tributary to the Church Channel will be reduced as a result of the proposed Acoma Detention/Sediment Basin and Channel (Facility No. Y10). The runoff from the local area will be carried in the existing soft bottom channel. The at-grade street crossings will provide stabilization as well as access to the channel for maintenance.

10. *Palm Avenue Drain (Local Drain Tributary to Y01 Upstream of Y07)*

This storm drain will carry flow under State Route 62 and into Yucca Wash. The slope will be hydraulically steep to assure that most debris in the flow will be transported to Yucca Wash.

11. *Acoma and Deer Channels (Facility Nos. Y10 and Y11)*

Acoma, Deer and a local tributary to Deer are channels tributary to the proposed Acoma Basin. They run adjacent to Elk Trail, Deer Trail, and Acoma Trail. These channels have been excavated and are currently unlined. It is recommended that these channels be rock revetted from Golden Bee northerly to Desert Gold Drive. Upstream of Golden Bee it is recommended that these drainage courses be managed floodplains.

12. *Acoma Detention/Debris Basin and Outlet Channel (Facility No. Y-10)*

The flows collected in the Deer and Acoma Channels will be routed through the recommended Acoma Basin. This basin will reduce the peak flow rate and debris generated from the tributary area. The outflow will

be carried to the Hospital Channel, Facility No. Y-09, in a rock lined channel. This basin and channel will significantly reduce the flooding for a large, relatively densely developed area, north of the basin. The outlet channel will be rock lined since the basin outflow will have little debris and will be erosive.

13. *Hospital Channel (Facility No. Y09)*

The Hospital Channel upstream of Onaga Trail is currently a soft bottom channel. Due to high velocity flows, it is recommended that this channel be rock lined from its confluence with Long Canyon Channel, Facility No. Y-07, upstream to Golden Bee Drive. From this point upstream it is recommended that the drainage course be a managed floodplain.

Sediment control facilities are not proposed for the Hospital Channel drainage area. The steepness of the channel will assure transport of debris to Yucca Wash.

14. *High School Channel (Facility Nos. Y09-01)*

This channel is currently a soft bottom channel with improved culverts at selected street crossings. It is recommended that the channel be rock lined from its confluence with Hospital Channel, Facility No. Y09, upstream to Onaga Trail. From this point upstream the facility will be a soft bottom channel.

15. *Long Canyon Detention/Debris Basin and Channel (Facility No. Y07)*

It is recommended that the existing Long Canyon Detention Basin be enlarged to control the runoff from all of the upper Long Canyon area. Runoff from the portion of the tributary drainage area which currently bypasses the basin to the west will be routed through the basin substantially reducing the flood peak downstream. All of the basin outflow will discharge into the Long Canyon Channel.

From the existing basin upstream to Golden Bee, it is recommended that Long Canyon be a rock lined channel. From this point upstream, it is recommended that the drainage course be a managed floodplain. A rock

lined channel is also recommended for Long Canyon Channel between the basin and its confluence with High School Channel. Long Canyon Channel from its confluence with High Scholl Channel to Yucca Wash is currently a concrete lined channel.

16. *Burnt Mountain Wash, Detention/Debris Basins, and Channels*
(Facility Nos. Y02 and Y03)

Burnt Mountain Wash has two main drainages courses that flow around Burnt Mountain and confluence near Yucca Trail. These drainages are the West and East Burnt Mountain Washes. Detention/debris basins are proposed for each of these drainages.

Two alternative basin sites were identified for the East Burnt Mountain Detention/Debris Basin during the Phase I study. Because of the faulting and ground breakage which occurred near the easterly site during the Landers Earthquake, the geotechnical feasibility of constructing a dam embankment is questionable. For this reason the easterly alternative basin site is not recommended.

West Burnt Mountain Wash will consist of soft bottom and rock lined conveyances from its confluence with Yucca Wash to the detention basins. From the Yucca Wash confluence upstream to Sunnyslope Drive, a revetted soft bottom channel is recommended. From Sunnyslope Drive to the West Burnt Mountain Detention Basin, a rock lined channel is recommended. Culvert crossings at SR62, Yucca Trail and Joshua Lane are also recommended. From the basin upstream to just downstream of Warren Vista Avenue, the drainage course will be floodplain managed. For the reach from Warren Vista Avenue upstream to San Andreas Road, a rock revetted soft bottom channel is recommended. Floodplain management of the local drainage course upstream of San Andreas Road is recommended.

East Burnt Mountain Wash will consist of concrete box and rock lined channel facilities from its confluence with West Burnt Mountain Wash to the detention basin. An underground concrete box is recommended in Lucerne Vista from the confluence to Onaga Trail to convey the 100-year

desilted detention basin outflow. From Onaga Trail upstream to the detention basin, and from the detention basin upstream to Joshua Drive, a rock lined channel is recommended. From Joshua Drive upstream to San Andreas road a rock revetted soft bottom channel is recommended. Upstream of San Andreas Road, floodplain management of the drainage course is recommended.

17. *Buena Vista Wash (Facility No. Y05)*

Buena Vista Wash will consist of soft bottom channel and street flow conveyances from the Yucca Wash confluence of Palm Avenue, a soft bottom channel is recommended. From Palm Avenue upstream, a soft bottom channel and street flow conveyances are recommended. This wash will confluence with Sage Channel (Facility No. Y06) prior to discharging into Yucca Wash.

18. *Sage Channel (Facility No. Y06)*

Sage Channel will collect the runoff from the canyon at the north end of Sage Avenue. Currently the runoff splits with a portion flowing down Sage Avenue and the other flowing down Barberry and Crestview. A rock lined channel is recommended for Sage Channel which conflues with Buena Vista Wash (Facility No. Y05) prior to discharging into Yucca Wash.

19. *Old Woman Springs Drainage Channels (Facility Nos. Y04, Y04-01, Y04-02)*

The existing Old Woman Springs Debris Basin has a rock lined inlet channel. Tributary to this inlet channel are two main washes, San Rafael Wash/Old Woman springs Wash (Facility Nos. Y04-02, Y04), and Farello Wash (Facility No. Y04-01). It is recommended that the upstream portion of San Rafael Wash/Old Woman Springs Wash (Facility No. Y04) adjacent to Old Woman springs Road be a rock lined channel. The rock lined channel continues within reach Y04-02 until the drainage course heads north westerly away from Old Woman Springs Road. From this point to approximately 1,000 feet upstream, a rock revetted soft bottom

channel is recommended. The drainage course upstream of this point is to be floodplain managed.

It is recommended that Farello Wash be maintained as a soft bottom channel. At-grade street crossings will provide access to the channel and control invert scour. The culvert under old Woman springs Road will be enlarged to carry the 100-year peak flow.

20. *Covington Wash (Facility Nos. C01, C02, C03, C03-01)*

Covington Wash and its tributaries, Black Rock Wash (C03) and Carmelita Wash (C03-01); are proposed to be maintained as managed floodplains with the exception of the reach from SR62 to La Contenta Road. Within this reach a rock revetted soft bottom channel is recommended. A rock lined levee inlet structure is recommended just upstream of SR62 to collect 100 peak flows and direct them into a culvert crossing under SR62.

A rock lined levee is also recommended for a short reach on the west side of Covington Wash upstream of Avalon Avenue and Arcadia Trail. This levee will protect against flow breakout during severe flood events.

21. *La Contenta Wash (Facility Nos. C04, C04-01)*

It is recommended that La Contenta Wash be maintained as a managed floodplain from La Contenta Road to its upstream limits.

22. *Skyline Ranch Wash (Facility Nos. S01, S01-01, S02, S02-01)*

There is limited development adjacent to the Skyline Ranch Wash and its tributaries. It is recommended that the wash and its tributaries be maintained as managed floodplains.

23. *Sierra Vista Wash, Chipmunk Wash and Hillcrest Wash (Facility Nos. V01, V01-01, V01-02, V01-03)*

It is recommended that V01, V01-02 be maintained as managed floodplains except for approximately an 800-foot reach of a rock revetted

soft bottom channel and approximately a 250-foot reach of as a soft bottom channel. These reaches of channel are in the vicinity of the Sierra Wash, Chipmunk Wash and Hillcrest Wash confluences. It is also recommended that Chipmunk Wash (Facility No. V01-01), and Hillcrest Wash (Facility No. V01-03), be maintained as managed floodplains.

B. Description of Detention/Debris Basins

Seven detention and/or debris basins are included in the recommended MPD. The purpose of these basins is to reduce peak 100-year peak inflows and manage sediment. The basins allow the use of smaller drainage facilities downstream because of reduced flow rates and the elimination of the need to apply debris bulking factors. Five of the seven basins are new facilities. One existing basin, the Long Canyon Detention Basin, will be enlarged, and a second existing basin, the Old Woman Springs Basin, will be maintained in its existing configuration for sediment management purposes.

With the exception of the Old Woman Springs Basin, all basins were sized to store the 100-year debris yield as determined using the U. S. Army Corps of Engineers Method. The 100-year inflow hydrographs were calculated based on a watershed antecedent moisture condition [AMC] of III. The use of an AMC III is conservative since the resulting hydrographs contain the maximum runoff volume for conservative basin sizing. Flood routing through the basins was performed assuming the 100-year debris yield was in storage at the beginning of the storm.

All of the detention basins are of a size and storage capacity to be under the jurisdiction of the State of California, Division of Safety of Dams, except for the Old Woman Springs Basin. Consequently, these facilities will subject to the Division's review during the design and construction phases. In addition, the Division will exercise periodic oversight and levy an annual fee to cover its regulation and inspection costs.

The following paragraphs summarize the physical data for each of the recommended basins. Total basin costs are listed for each basin site. Refer to Table 9 for a detailed breakdown of costs for each detention basin.

Water Canyon Basin

The Water Canyon Basin is located approximately 1.3 miles north of Twenty Nine Palms Highway adjacent to Pioneer Town Road. The basin is located on the northeasterly side of Pioneer Town Road. Refer to Figures 2 and 37. The physical and hydrologic characteristics of the basin are:

Tributary Area, square miles	3.4
Storage Capacity, acre-feet	438
Debris Capacity, cubic yards	126,000
Peak Inflow, cfs	6398
Peak Outflow, cfs	1419
Percent Peak Reduction	77
Basin Footprint, acres	35
Embankment Height, feet	38

The estimated cost of the basin in 1997 dollars, including land and facility construction, is \$3,750,000.

Kickapoo Basin

The Kickapoo Basin is located approximately one half mile south of Twenty Nine Palms Highway on the west side of Kickapoo Trail between Navaho Trail and Mountain View. Refer to Figures 2 and 38. The physical and hydrologic characteristics of the basin are;

Tributary Area, square miles	0.8
Storage Capacity, acre-feet	32
Debris Capacity, cubic yards	26,500
Peak Inflow, cfs	1178
Peak Outflow, cfs	290
Percent Peak Reduction	75
Basin Footprint, acres	8
Embankment Height, feet	22

The estimated cost of the basin in 1997 dollars, including land and facility construction, is \$643,000.

Acoma Basin

The Acoma Basin is located approximately one mile south of Twenty Nine Palms Highway immediately west of Acoma Trail between Highland Trail and Desert Gold. Refer to Figures 2 and 39. The physical and hydrologic characteristics of the basin are:

Tributary Area, square miles	1.9
Storage Capacity, acre-feet	90
Debris Capacity, cubic yards	57,000
Peak Inflow, cfs	2744
Peak Outflow, cfs	596
Percent Peak Reduction	78
Basin Footprint, acres	10
Embankment height, feet	41

The estimated cost of the basin in 1997 dollars, including land and facility construction, is \$1,140,000.

Long Canyon Basin

The Long Canyon basin is located approximately one mile south of Twenty Nine Palms Highway immediately south of Joshua Drive between Joshua Lane and Sage Avenue. Refer to Figures 2 and 40. It is intended to expand the existing basin easterly, westerly, and southerly to achieve the required capacity. The physical and hydrologic characteristics of the expanded basin are:

Tributary Area, square miles	3.4
Storage Capacity, acre-feet	130
Debris Capacity, cubic yards	108,000
Peak Inflow, cfs	4846
Peak Outflow, cfs	1462
Percent Peak Reduction	70
Basin Footprint, acres	15
Embankment Height, feet	26

The estimated cost of the basin in 1997 dollars, including land and facility construction, is \$1,750,000.

East Burnt Mountain Basin

The East Burnt Mountain Basin is located approximately 3000 feet south of Yucca Trail immediately adjacent to and south of Onaga Trail between Warren Vista and Hilton Avenue. Refer to Figures 2 and 41. The physical and hydrologic characteristics of the basin are:

Tributary Area, square miles	1.9
Storage Capacity, acre-feet	194
Debris Capacity, cubic yards	39,000
Peak Inflow, cfs	1919
Peak Outflow, cfs	238
Percent Peak Reduction	88
Basin Footprint, acres	20
Embankment Height, feet	32

The estimated cost of the basin in 1997 dollars, including land and facility construction, is \$1,510,000. Refer to Table 9 for a detailed breakdown of the basin costs.

West Burnt Mountain Basin

The West Burnt Mountain Wash is located approximately 1.3 miles south of Twenty Nine Palms Highway immediately east of Joshua Lane. Refer to Figures 2 and 42. The physical and hydrologic characteristics of the basin are:

Tributary Area, square miles	1.7
Storage Capacity, acre-feet	96
Debris Capacity, cubic yards	50,000
Peak Inflow, cfs	2309
Peak Outflow, cfs	284
Percent Peak Reduction	88
Basin Footprint, acres	20
Embankment Height, feet	23

The estimated cost of the basin in 1997 dollars, including land and facility construction, is \$1,160,000.