



**FINAL DRAINAGE STUDY**

**INDIAN BEND WASH MULTI-USE PATH**

**SITE 1**

**CAMELBACK ROAD TO CHAPARRAL ROAD**

**PROJECT NO. P1705**

Prepared for  
City of Scottsdale

Prepared by  
CRSS Civil Engineers, Inc.



June 1994



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Property of  
Flood Control District of MC Library  
Please Return to  
2801 W. Durango  
Phoenix, AZ 85009

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## Introduction

The Indian Bend Wash multi-use path is being reconstructed and widened from Camelback Road on the South to approximately 1000 feet west of Hayden Road on McCormick Parkway on the North. This project has been broken out into three sites, which they will be referred to:

Site 1 - The section from south of Camelback Road to South of Chaparral Road.

Site 2 - The section from Indian Bend Road to McCormick Parkway.

Site 3 - The section from south of Chaparral Road to Indian Bend Road.

This study discusses drainage impacts of the improvements for Site 1 only.

Site 1 is a half mile reach from Camelback Road to Chaparral Road, Figure 1. The existing eight feet wide multi-use path runs parallel to Hayden Road on the west side and passes under Camelback Road through the most easterly bent of the Camelback Road Structure. This reach of path is constructed mainly on the east bank of the low flow channel of the Indian Bend Wash. The design includes reconstructing and widening the existing path with slight modifications of the horizontal and vertical alignment for the underpass at Camelback road to provide maximum safety.



## Hydrology

The multi-use path for Site 1 is located within the low flow channel of the Indian Bend Wash. This reach of the Indian Bend Wash is part of the 4.5 mile urban greenbelt floodway from McDonald Drive to 1200 feet North of Van Buren Street. Under normal conditions, Indian Bend Wash is dry. It provides conveyance of flows from an area subject to high intensity rainfall that, in combination with steep gradients in the mountains, causes flash flooding on the Indian Bend Wash. The floodway and floodway fringe within the greenbelt conveys the 100-year design flood of 30,000 cfs. The low flow channel is located on the west side of Hayden Road. Site 1 low flow channel is used by Villa Monterey Golf Course to provide recreational golf during no flow periods. The capacity of the low flow channel for Site 1 is designed for the 10-year event conveying 4,000 cfs. The low flow channel is typically a trapezoidal channel with the following parameter:

Bottom Width = 120 feet

Side slope = 4H to 1V

Slope = 0.0015 '/ft

Roughness "n" = 0.025

Average Velocity = 6 ft/s.

Hydrologic Information is taken from:

Gila River Basin, Arizona, Indian Bend Wash, Design Memorandum No. 1,  
General Design Memorandum Phase II, Project Design for Indian Bend Wash,  
Prepared by: Los Angeles District, U.S. Army Corps of Engineers, January 1995.

## Impacts/Modifications to the Existing Channel

The Indian Bend Wash multi-use path is being reconstructed and widened from 8 feet to 10 feet. Presently, the cross slope of the path is towards the low flow channel and runoff from the path flows to the channel. The additional 2 feet of impervious paving will have no significant impact on additional flows to the channel and since the path is relatively high on the east bank of the channel, it will have no impact on the conveyance. The removal of the 2 foot width from the channel area will increase the water surface less than 0.5 inches (See Calculations). There are only minor changes in both the horizontal and vertical alignments of the proposed path in relation to the existing path.

Following is a discussion of specific drainage features within the reach that are affected.

### Path Crossing Under Camelback Road

The horizontal and vertical alignments have been straightened and flattened slightly as the path dips under Camelback Road. The vertical alignment maintains the same elevations at the sag and the crests. The slopes of the tangent sections of the path have been flattened for path users safety and rideability. These changes are minimal, being 0.5 feet or less (vertically) and have no significant impact to the channel conveyance (Figure 2). The effective flow area at the bridge opening is unchanged. This change also requires the removal of some grouted riprap and slope paving concrete protecting the Camelback structure and path from the flows in the low flow channel. This protection will be replaced with a similar type of slope paving.

### Storm Drain

The sag in the vertical profile underneath Camelback Road is drained by an existing 15 inch gravity storm drain outletting on the southeast corner of Hayden Road and Camelback Road to the Indian School Park baseball field in the Indian Bend Wash main channel. The sag of the reconstructed path will maintain this low point to maintain similar drainage patterns.

### Scupper

At Hayden Road Station 45+53 there is a depressed curb section about 2.5 feet wide allowing roadway on-site drainage into the low flow channel. A concrete apron provides conveyance of the flows to the channel without erosional problems. This apron will be replaced in kind to the present conditions.

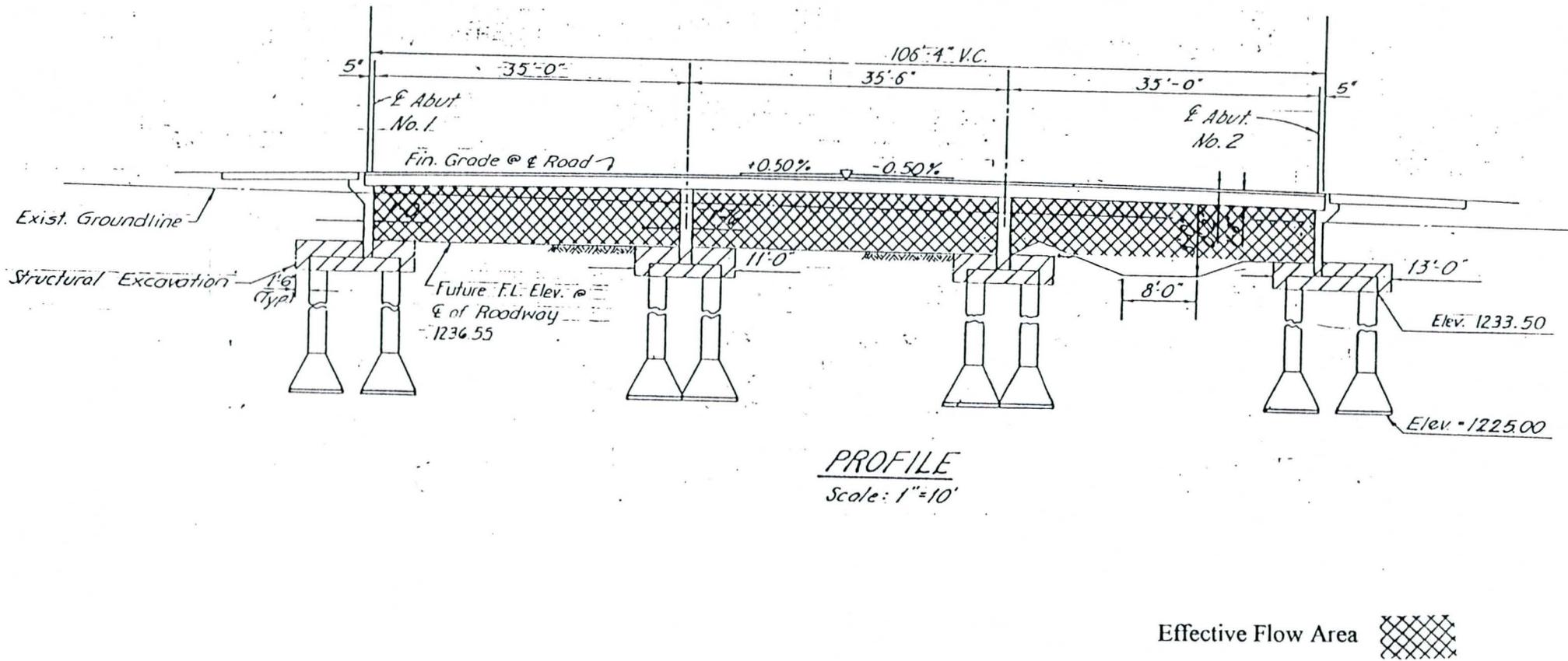


Figure 2.  
 Indian Bend Wash Low-Flow Channel  
 Camelback Road  
 Effective Flow Area

### Roadway Barrier

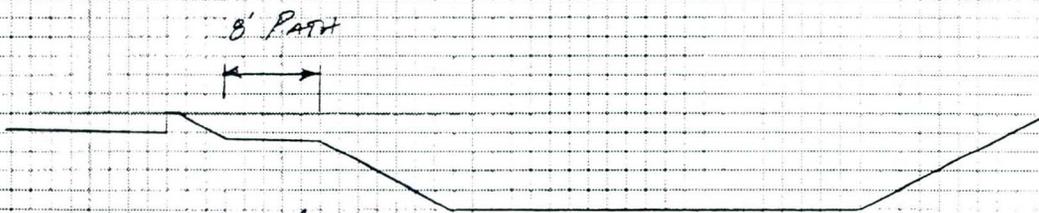
In order to provide safety to the multi-use path users, a barrier is provided between Hayden Road and the path. The barrier type is ADOT Standard Detail C-10.04, Block Out W Beam (Timber Post). This Barrier has timber posts at 6.25 feet on center with a clearance of almost 15 inches between the W beam and the ground. This height clearance should provide adequate flow passage if the low flow channel capacity is exceeded and flows need to overtop Hayden road.



PROJECT	MULTI-USE PATH
CLIENT	City of Scottsdale
SUBJECT	SITE 1

JOB NO		NO. 1 1 OF
DESIGNED BY	DATE	
JFM	6/2/94	
CHECKED BY	DATE	
ME	6/6/94	

EXISTING

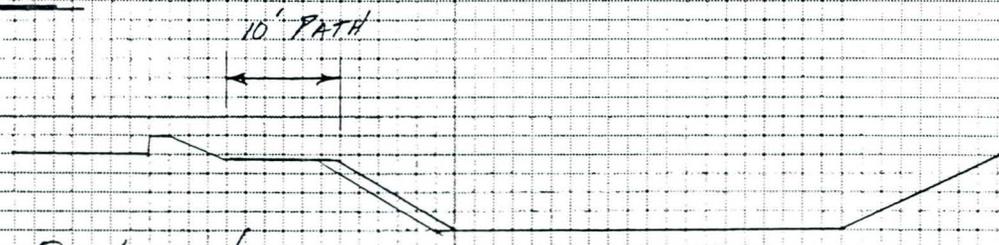


Normal depth Calculations

Bw = 120'

$Q = 4,000$  cfs  
 $z = 4:1$   
 $S = 0.0015$   
 $n = 0.025$   
depth = 4.80'  
velocity = 6.0 ft/s  
FR = 0.48

PROPOSED



$Q = 4,000$  cfs  
 $z = 4:1$   
 $S = 0.0015$   
 $n = 0.025$   
depth = 4.84'  
velocity = 6.0 ft/s  
FR = 0.48

Bw = 118'