FINAL DRAINAGE STUDY

INDIAN BEND WASH MULTI-USE PATH

PHASE II
SITE 3

CHAPARRAL ROAD TO INDIAN BEND ROAD

PROJECT NO. P1705

Prepared for
City of Scottsdale

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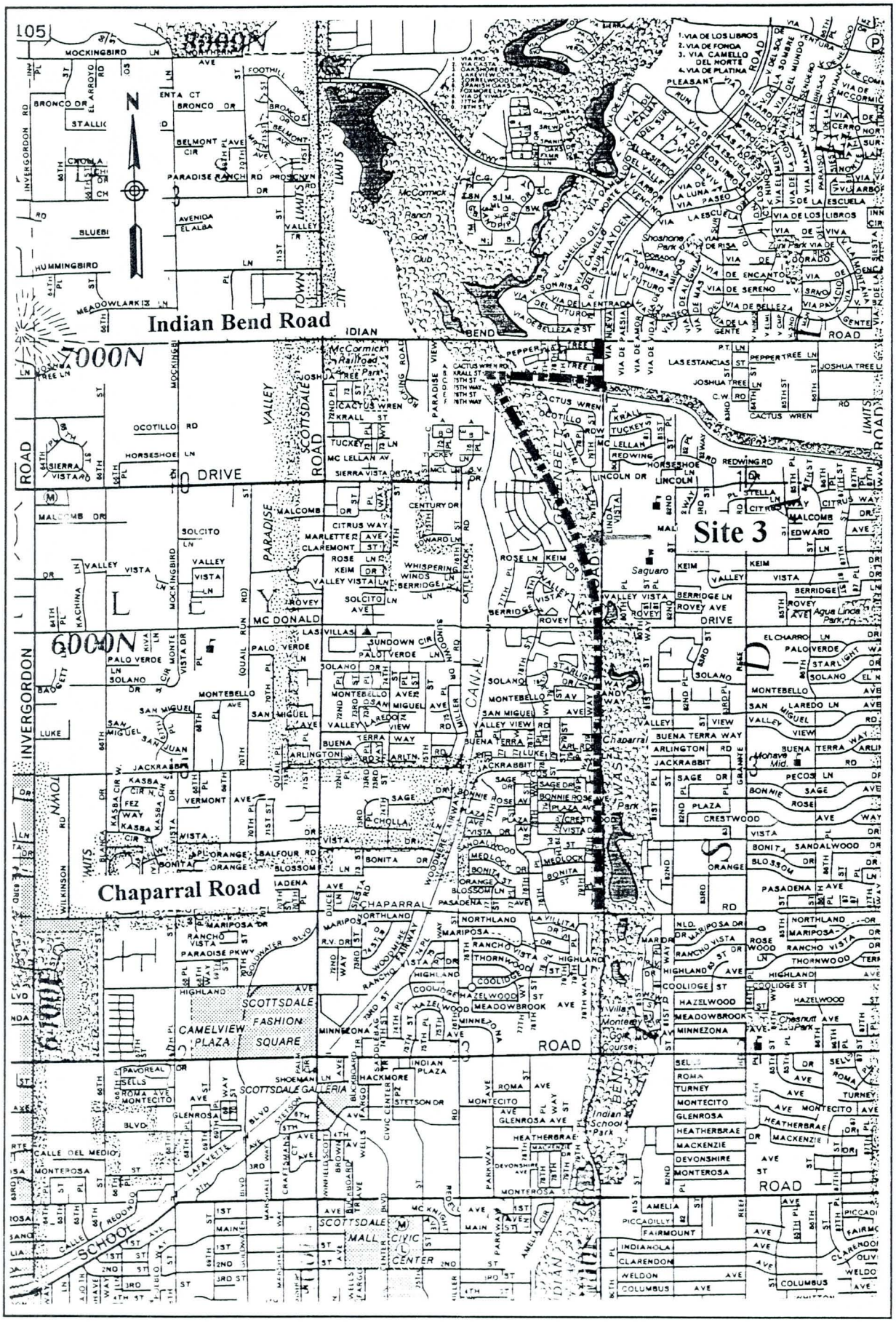
Introduction

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 will be referred to as:

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 3 only.

Site 3 path begins just south Chaparral Road and extends north to the northwest corner of Indian Bend Road (Figure 1). The existing path is not continuous for this reach. The path south of McDonald Drive is within the Indian Bend Wash Low Flow Channel, and north of McDonald is within what as been designated as the Inlet Channel of the Indian Bend Wash. The existing eight-feet-wide concrete multi-use path meanders through the low flow channel along Hayden Road from Chaparral Road north to Medlock Drive and from Starlight Way to approximately 1,000 feet north of McDonald Drive. From the Low Flow Channel the path climbs the west bank of the Inlet Channel and continues as a ten-foot-wide asphaltic concrete path to the CAP Canal with a break at Lincoln Drive. The existing path then begins again on the north bank of the Interceptor Channel at the northeast corner of the confluence of the Indian Bend Wash Inlet Channel and the Interceptor Channel. The path continues east to Hayden Road and then north to Indian Bend Road.



LOCATION MAP

FIGURE 1

Hydrology

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 wash is designed to convey the 100-year design flood of 30,000 cfs. The channel hydraulic characteristics are listed below.

Design Discharge = 30,000 cfs
Bottom Width = 460 - 1,000 feet
Side slope = 4H to 1V
Slope = .0012'/ft to .0060'/ft
Roughness "n" = 0.030 - 0.035
Velocity = 5 to 10 ft/sec
Depth = 7 to 15 feet

The multi-use path for Site 3 is located within two distinct sections of the Indian Bend Wash; the Inlet Channel and the Greenbelt. These two sections are described below.

Inlet Channel

The Inlet Channel has been designated as the part of the Indian Bend Wash between Indian Bend Road on the north and McDonald Drive on the south. This channel is an entrenched, unmowed turf-lined trapezoidal section that extends for 1.3 miles from Indian Bend Road downstream to McDonald Drive. The McDonald Road Bridge over the Wash limits flows continuing south to 4,000 cfs in the low flow channel of the Greenbelt section. Flow in excess of this amount is diverted east across Hayden Road in a dip in the roadway section.

Low Flow Channel

The Indian Bend Wash Greenbelt is a 4.5 mile urban greenbelt floodway from McDonald Drive to 1200 feet north of Van Buren Street. Hayden Road separates the flows in the Greenbelt from the main channel and the low flow channel. These flows are separated due to the capacity restriction of the McDonald Drive Bridge. The low flow channel is located on the west side of Hayden Road. The proposed multi-use path is located within the low flow channel. This project (Site 3) is only concerned with the low flow channel of the Greenbelt from Chaparral Road to McDonald Drive.

The capacity of the low flow channel for Site 3 below McDonald Drive is designed for the ten-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.

Multi-use Path

A continuation of the Site I multi-use path will be constructed northward from the south side of Chaparral Road Bridge to McDonald Drive within the low flow channel, and further north to Indian Bend Road on the west bank of the Inlet Channel and north bank of the Interceptor channel. The path alignment in the channel is new from Medlock Drive to Starlight Way. The path follows the basic alignment of the existing path with some variation. The new path alignment from Medlock Drive to Starlight Way meanders through the Low Flow Channel. The path diverts from its original course north of McDonald Drive. It enters the western-most bridge section on McDonald Drive and after several hundred feet climbs out of the channel on the west bank of the Inlet Channel. The path alignment follows along the west bank of the Inlet Channel to the confluence of the Interceptor Channel with the Inlet Channel. It crosses the wash at the Arizona Canal Siphon location and climbs the north bank of the Interceptor Channel. The path remains on the north bank of the channel until it meets Hayden Road.

The proposed path is mostly ten-feet wide but increases in width near scupper crossings to as much as 14 feet. The path cross slope is 1.5 percent in the direction of the channel. Following is a discussion of the major drainage features within each of the two defined reaches; low-flow channel and inlet channel.

Hydraulic Concerns Impacts to the Low-Flow Channel

Chaparral Road

The clearance under the existing Chaparral bridge crossing the low flow channel is limited to 4.2 feet. A new underpass structure east of the existing bridge structure allows for passage by lowering the invert 6.1 feet below the channel invert. The integrity of the channel is not jeopardized by maintaining the east bank height with retaining walls. This not only maintains flow conditions around the existing bridge but also limits flow into the dip section of the new path alignment. The low point at the sag is at station 12+07.4 and elevation 1338.59. This low point is below the channel invert and requires the use of a pumping facility to remove the water collected from local runoff or when the low flow channel capacity is exceeded.

Indian Bend Wash Grade Control Structure

A grade control structure in the low flow channel exists about one-quarter mile upstream from the Chaparral Road bridge. This structure extends from the west bank of the low

flow channel to Hayden Road. The structure consists of a concrete cut-off wall with gabions on the downstream side. The structure looks to be in good shape except for a few scour holes on the upstream side. Headcutting at the perimeter of these holes is propagating upstream and laterally. It is our recommendation to fill these with riprap and cover with dirt to be revegetated.

Extend 18" RGRCP and fill in depressed area

An 18 inch RGRCP drains into a depressed area in the low flow channel near Arlingtion Road. The pipe will be extended roughly 40 feet and the depressed area affected will be partially filled. The alignment across the depressed area is required to avoid removal of trees and maintain a required 50-foot clearance from the path to the development.

Scupper at San Miguel Avenue

Runoff from San Miguel Avenue drains down into the low-flow channel by a lined, 3.5-foot-wide spillway chute. The proposed path alignment would cross this flow path. A scupper is proposed at this location to allow flows to go under the path to the channel.

Scupper at south side of Starlight Way

A scupper at Starlight Way conveys flows from the street to the Indian Bend Low Flow Channel via a ten-foot-wide rectangular concrete lined-channel. This channel is between two properties and outlets into the channel about 400 south of Starlight Way. A ten-foot wide scupper is proposed for this location.

Scupper at north side of Starlight Way

An 18-inch corrugated metal pipe (CMP) exists under Starlight Way to allow small nuisance flows to cross the road without disturbing traffic. In the channel bottom north of Starlight Way, a swale carries flows to this cmp. The multi-use path crosses from the east side of the channel bottom to the west side just north of Starlight Way crossing this swale. A double eight-inch PVC pipe under the path at this location allows the nuisance flows access to the CMP under Starlight Way.

Hydraulic Concerns to the Inlet Channel

Proposed Path Over Lincoln Drive

The multi-use path is elevated over Lincoln Drive by a concrete-arched bridge. The path at this location is on the west bank of the low flow channel. The Lincoln Drive overpass will have no impact on the flows in the channel.

Extend existing 12"RCP, near Arizona Canal

South of Indian Bend Road, the Arizona Canal crosses the Indian Bend Wash. This is done by a siphon of the Arizona Canal underneath the Wash. A gravel maintenance road provides access across the Wash from the siphon inlet to the siphon outlet. The Proposed multi-use path is offset from this alignment crossing the Wash. An existing 12-inch CMP that carries nuisance water under the existing road will be extended to the north to allow for improvements.

Inlet Channel and Interceptor Channel Confluence

The path alignment climbs the north bank of the Interceptor Channel at the confluence of the Interceptor Channel with the Inlet Channel (Figure 2). The slope of the path will be flatter than the existing side slope of the channel banks. The ten-foot-wide path will have to be cut into the existing channel bank side slope. Because of this cut section, the north side slope above the path will be steeper (2H:1V) and tie into the existing 4H:1V side slope. The steeper slope will require a slope protection such as shotcrete.

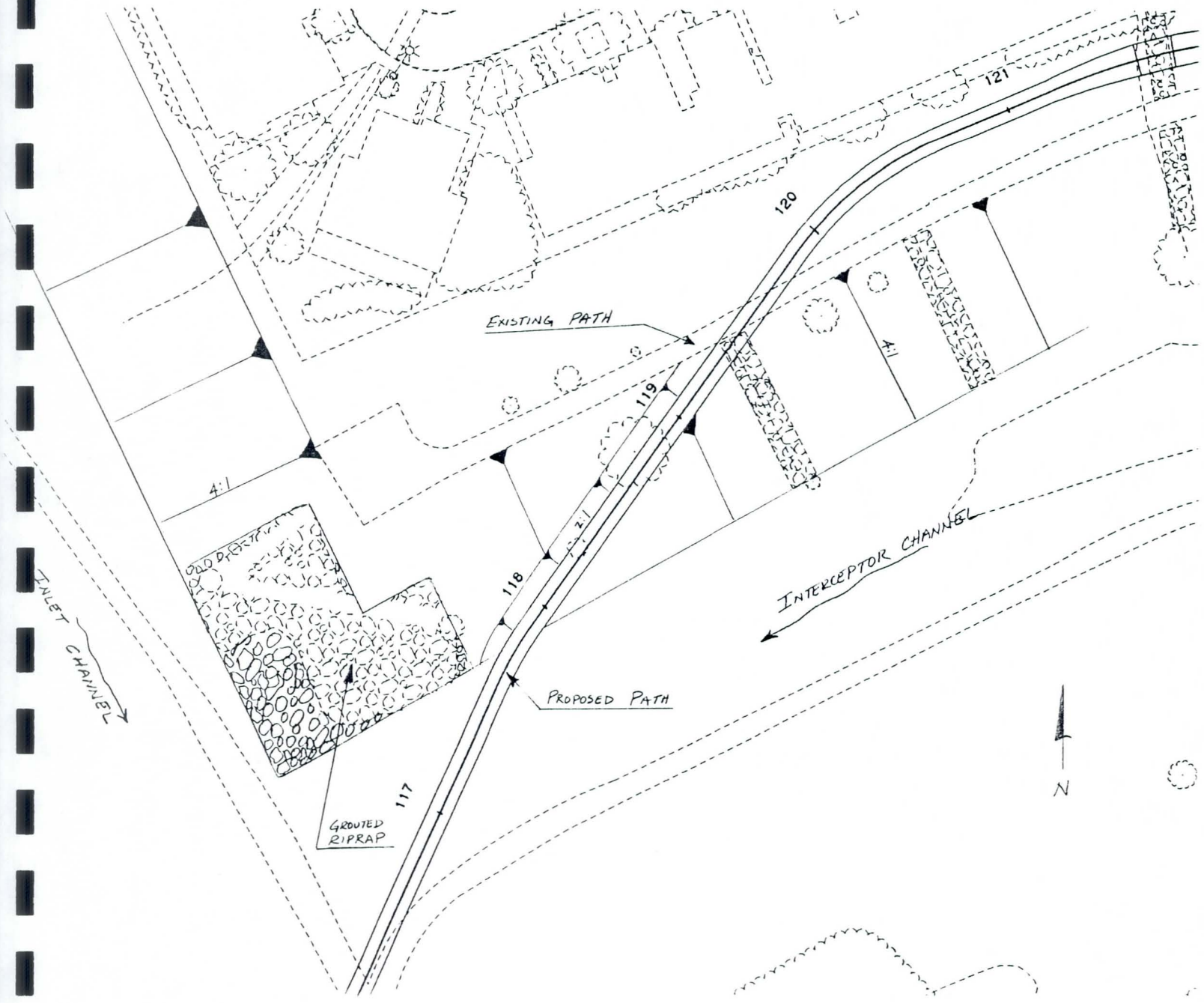
Scuppers at 77th Place, 78th Place and between 79th St. and 79th Place

Three lined chutes located on the north bank of the Interceptor Channel near the confluence with the Indian Bend Wash convey street runoff from nearby streets to the Interceptor Channel. The existing multi-use path crosses these chutes. Conveyance of flows are allowed through multi PVC pipe or concrete scuppers. With the improvements to the path, these scuppers will be reconstructed with a similar size opening in accordance with MAG Scupper details. The path and bank will be lowered 18 inches to address citizens' privacy concerns.

Results and Conclusions

The addition and modifications of a multi-use path in the Indian Bend Wash will have no impact in the conveyance or capacity of the existing low flow channel. The path north of McDonald Drive is located mainly on the banks of the Inlet Channel and will have no impact on flows.

FIGURE 2


121
120
EXISTING PATH
119
4:1
4:1
2:1
118
INTERCEPTOR CHANNEL
INLET CHANNEL
PROPOSED PATH
117
GROUTED RIPRAP
N

The new underpass at Chaparral Road will have no impact to flows approaching or flows under the existing Chaparral Road Bridge. The path at this location rolls over the existing east bank of the low flow channel at both the north and south ends.