

**SEC PINNACLE PEAK & SCOTTSDALE ROAD
SCOTTSDALE, ARIZONA
MIXED-USE PROJECT
DRAINAGE ANALYSIS**

May 5, 2005

WP #042309 02

Prepared for

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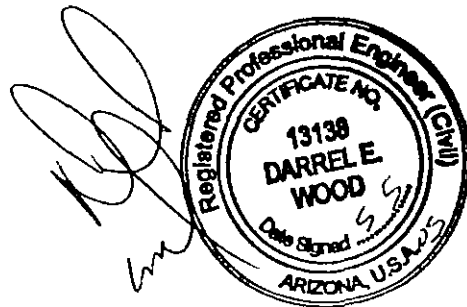


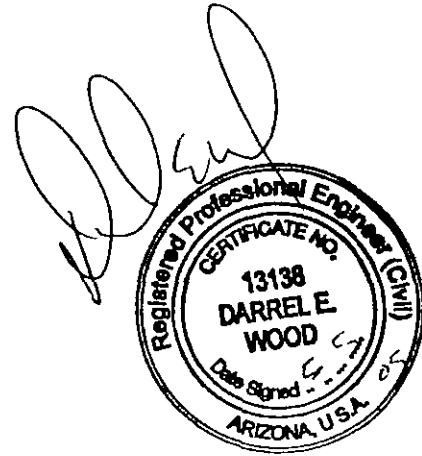
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EXHIBITS

- Exhibit 1 Vicinity Map
- Exhibit 2 FEMA Map
- Exhibit 3 Proposed Rawhide Wash Solution

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10 INTRODUCTION

The proposed mixed-use project consists of approximately 160 acres located at the southeast corner of Pinnacle Peak Road and Scottsdale Road, Arizona (see Exhibit 1) The project site currently is known as Rawhide, a western theme park

2 0 **RAWHIDE WASH**

The site is part of a high desert watershed with slopes over 1% from the northeast to the southwest. The watershed extends approximately 4 miles north of the project site. Runoff from the watershed in a large rainfall runoff event results in an alluvial fan type flood event. Portions of the watershed north of the project site are channelized reportedly for the 100-year flood event estimated at 10,900 cfs. Rawhide Wash is the name applied to the overall floodplain and the portion of the floodplain that has been channelized. Directly upstream of this project's north boundary (Pinnacle Peak Road) is a proposed channelization segment of the Rawhide Wash from a project currently under construction (an office condominium project) and is believed to be capable of conveying the 100-year event.

3 0 FEMA FLOODPLAIN

The Federal Emergency Management Agency (FEMA) has published a 100-year floodplain per Flood Insurance Rate Map (FIRM) Panel 1235 of 4350, Map Number 04013C1235F, dated July 19, 2001, with a flood zone labeled "AO-Depth 1 Foot, Velocity 4FPS"

Zone "AO-Depth 1 Foot" is defined by FEMA as follows

"Special flood hazard area inundated by 100-year flood depths 1 to 3 feet (usually sheet flow on sloping terrain), average depths determined For area of alluvial fan flooding, velocities also determined "

As displayed on the FEMA FIRM panel, the floodplain delineation includes a large portion of land, in addition to this project site (see Exhibit 2)

It is the understanding of Wood, Patel & Associates, Inc (Wood/Patel), based on past experience and interpretations of Scottsdale's floodplain ordinance that development of land within a FEMA Zone AO is acceptable as long as, in general, basements do not occur and floor elevations are above the anticipated 100-year water surface elevations No problems are anticipated with developing the overall 160-acre parcel in accordance with Scottsdale's floodplain ordinance

40 WASH SOLUTION

To accommodate development at the proposed project site, a desert type channel system is proposed to receive runoff at the existing Pinnacle Peak Road low flow crossing and convey to a location along Scottsdale Road (see Exhibit 3). The initial channel will be designed to receive runoff from Pinnacle Peak Road's low flow crossing as well as the culvert system currently proposed by the City of Scottsdale in their Capital Improvement Program.

The proposed channel will be designed to convey the estimated 100-year flood event of 10,900 cfs. This peak discharge is understood to represent the entire 100-year flood event of Rawhide Wash.

A channel top width of approximately 330 feet overall is estimated as necessary to convey the 10,900 cfs (see Exhibit 3). The channel will terminate at Scottsdale Road where a box culvert or similar bridge type structure will be necessary to convey floodwaters below Scottsdale Road, unless a roadway dip section is desired by the City. The channel can be designed with the goal of accommodating multi-uses like a trail system and the U.S. Army Corps of Engineers' Section 404 "Waters of the U.S." By benching the channel a low flow channel system can be designed to convey more frequent rainfall runoff events, thus allowing portions of the channel to stay dry for its multi-uses.

This proposed solution is believed to be of value to the City of Scottsdale. The proposed trail system can be used by community citizens. The wash and any associated improvements (including, but not limited to any required roadway and drainage improvements) are a regional solution to historic flooding and damaging problems associated with Rawhide Wash in this area of the City.

5 0 **RETENTION**

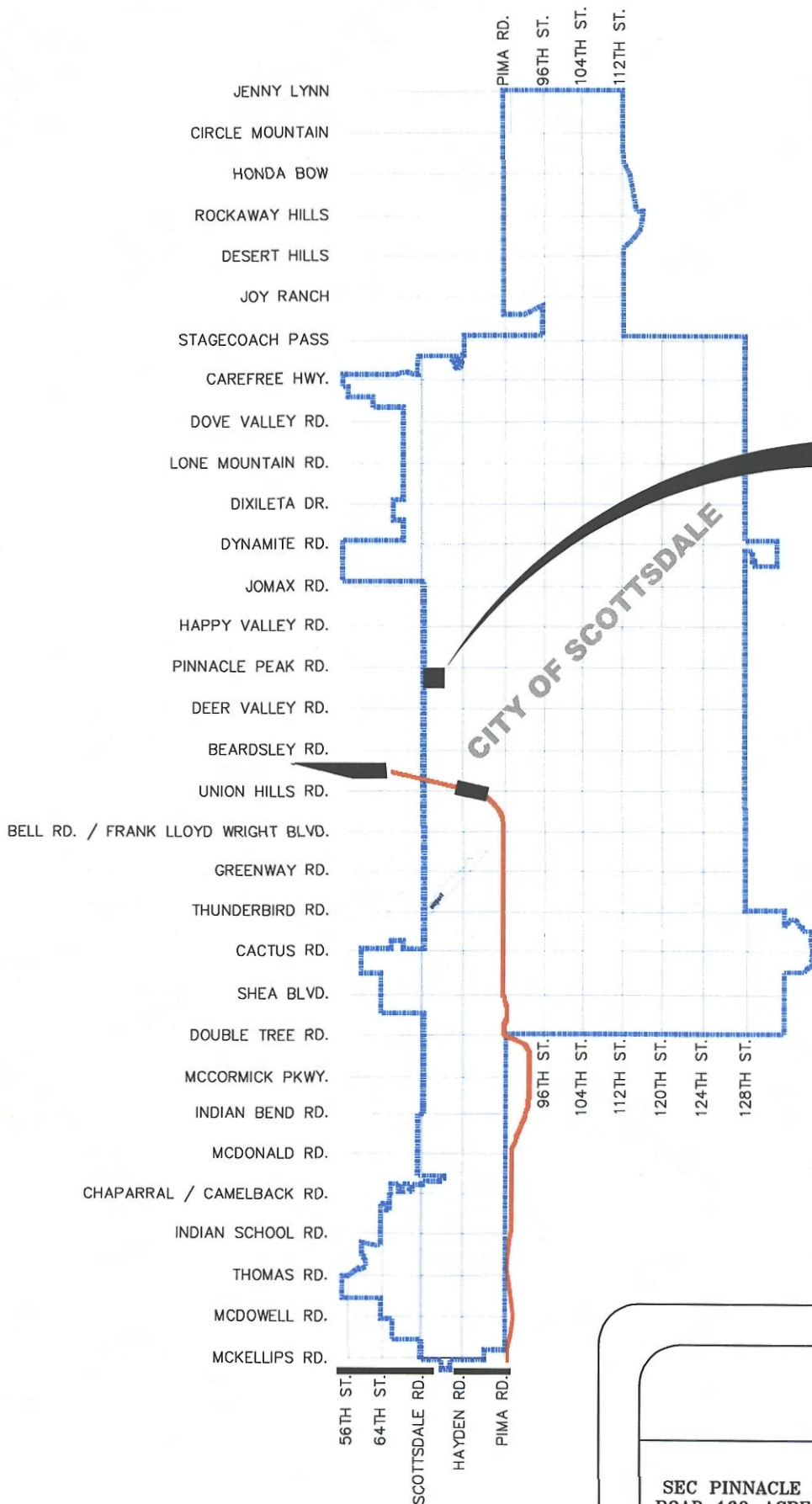
It is requested that onsite retention not be required for any portion of the project site that can be designed to gravity drain to the proposed channel system. Unless an alternate retention/detention system is designed, the portion of the 160-acre project site that cannot gravity drain to the proposed channel will provide onsite retention in accordance with Scottsdale's criteria at the time of final development.

60 CONCLUSIONS

The project site consisting of approximately 160 acres as presented herewith is believed to be capable of full development with regard to onsite and offsite drainage. The project's major drainage highlights are as follows:

- A wash is proposed by the developer to convey the entire 100-year peak discharge of Rawhide Wash (10,900 cfs)
- The project site is in a FEMA designated 100-year floodplain (Zone AO-Depth 1) in both pre- and post-development conditions
- No retention is proposed for the onsite areas that can be designed to gravity drain to the proposed wash. Unless an alternate retention/detention system is designed, areas that cannot gravity drain to the wash will provide onsite retention
- The proposed wash lends itself to multi-uses (i.e. trails and open space) and contributes to a regional solution with Rawhide Wash

EXHIBIT 1
Vicinity Map



**160-acre MIXED
USE PROJECT**

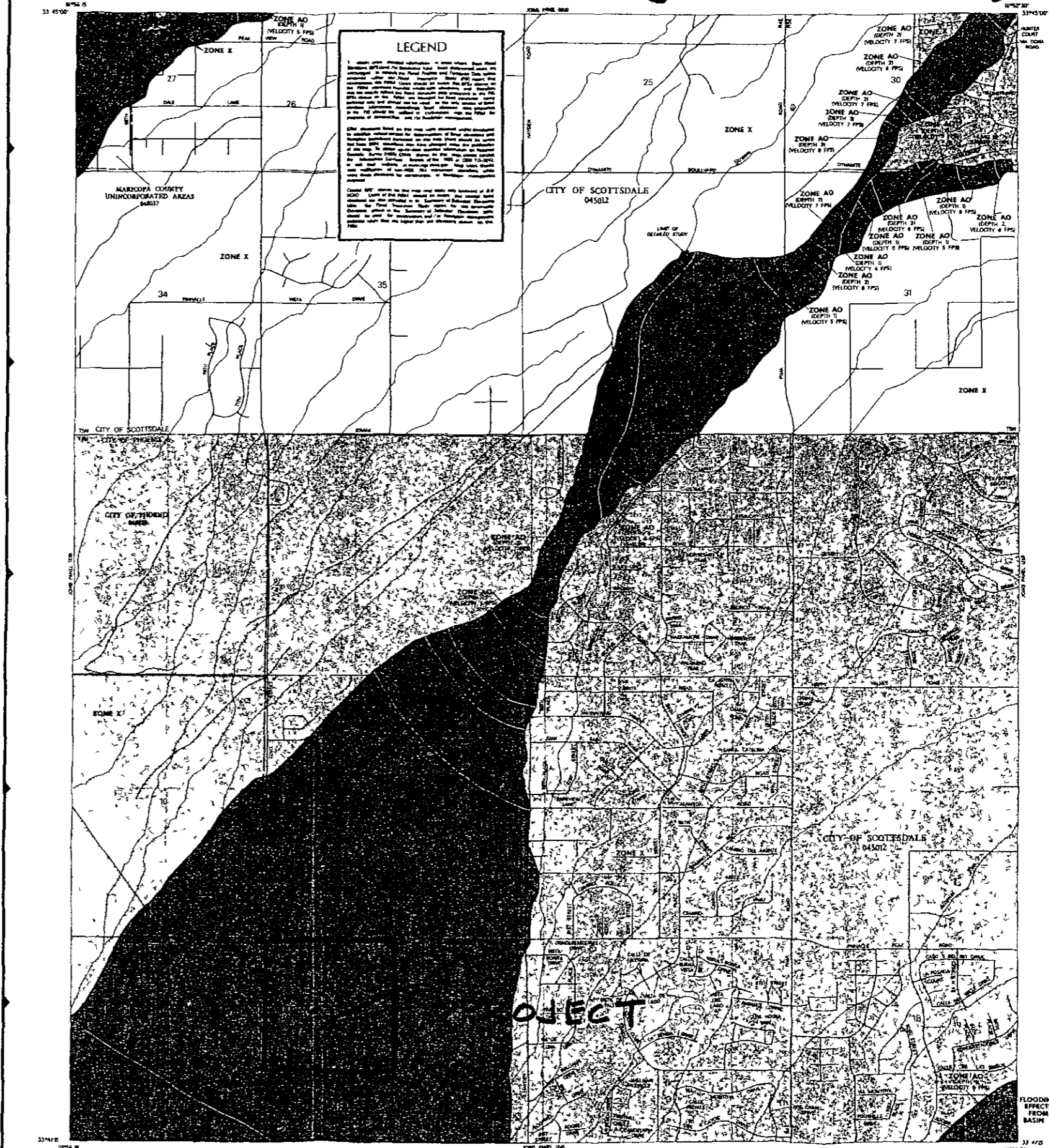
CITY OF SCOTTSDALE

VICINITY MAP

**SEC PINNACLE PEAK & SCOTTSDALE
ROAD 160-ACRE MIXED USE PROJECT**

**WOOD/PATEL &
ASSOCIATES**
Civil Engineers
Hydrologists
Land Surveyors
Construction Managers
(602) 335-8500

EXHIBIT 2
FEMA Map



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE AO Special Flood Hazard Areas determined by the Flood Insurance Rate Study.

ZONE X Zone X flood depths of 1 to 1.5 feet based on analysis of hydrological studies. Zone X areas are shown on the map as areas where the water depth is expected to be 1 to 1.5 feet based on analysis of hydrological studies.

Other Flood Hazard Areas

Zone I Zone I flood depths of 1 to 1.5 feet based on analysis of hydrological studies.

Zone II Zone II flood depths of 1.5 to 3 feet based on analysis of hydrological studies.

Zone III Zone III flood depths of 3 to 4 feet based on analysis of hydrological studies.

Zone IV Zone IV flood depths of 4 to 6 feet based on analysis of hydrological studies.

Zone V Zone V flood depths of 6 to 12 feet based on analysis of hydrological studies.

FLOODWAY AREAS IN ZONE AO

OTHER FLOOD AREAS

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UNDEVELOPED COASTAL BARRIERS

Zone I Zone I flood depths of 1 to 1.5 feet based on analysis of hydrological studies.

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NOTES

The map is intended for use in determining the Special Flood Hazard Insurance Program... (text continues with details of the insurance program and map usage instructions)

MAP REPORTS

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EFFECTIVE DATE OF COUNTRYWIDE FLOOD INSURANCE RATE MAP: APRIL 6, 1988

EFFECTIVE DATE OF REVISIONS TO THIS PANEL: DECEMBER 2, 1988

APPROXIMATE SCALE IN FEET

0 500 1000

OBJECT

EXHIBIT 2 FEMA MAP

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY ARIZONA AND INCORPORATED AREAS

PANEL 1235 OF 4350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

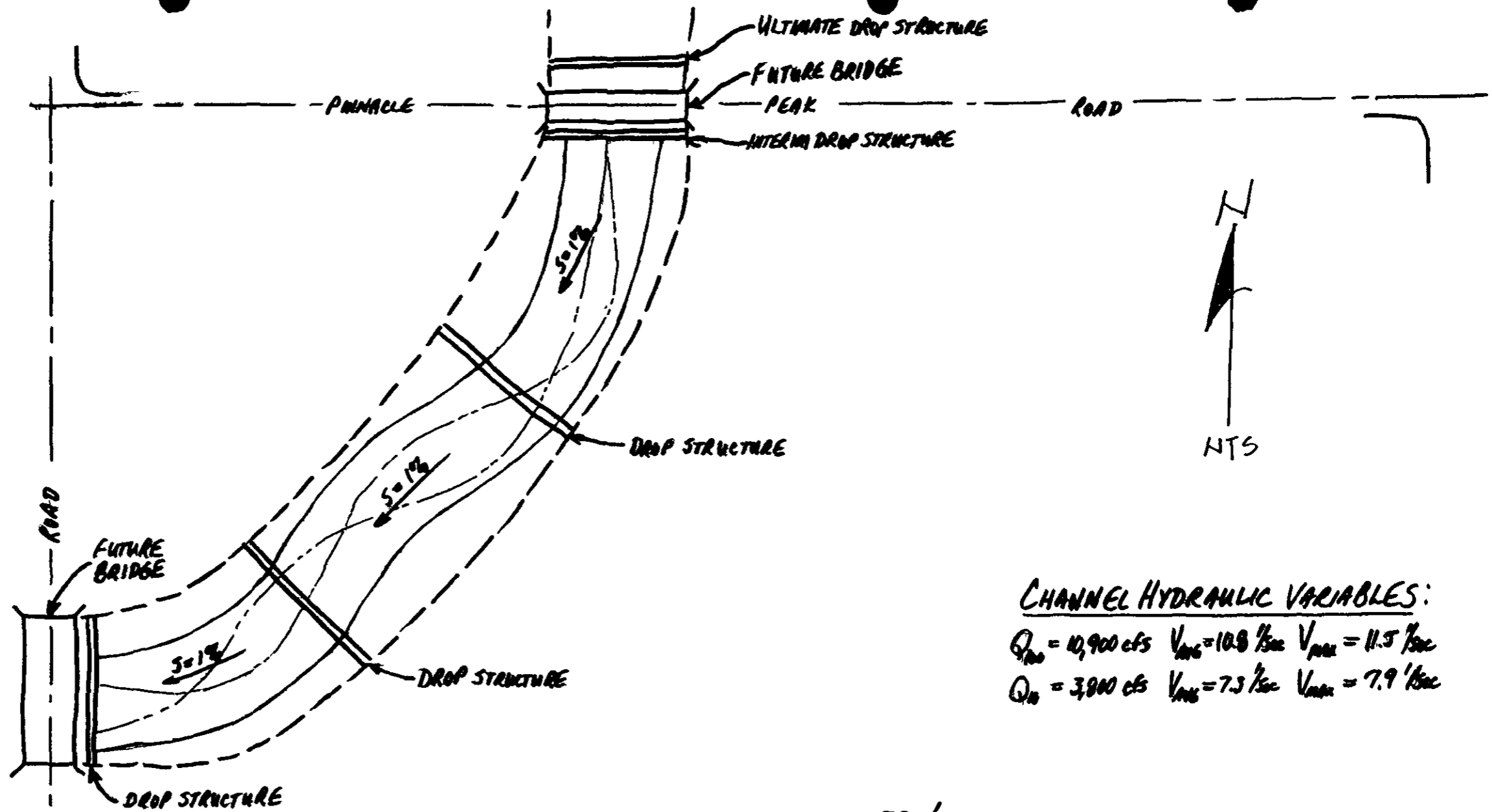
COUNTY	NAME	PANEL	NO.
MARICOPA COUNTY	INCORPORATED AREAS	1235	1
MARICOPA COUNTY	UNINCORPORATED AREAS	1235	1

MAP NUMBER 0403C1235 F

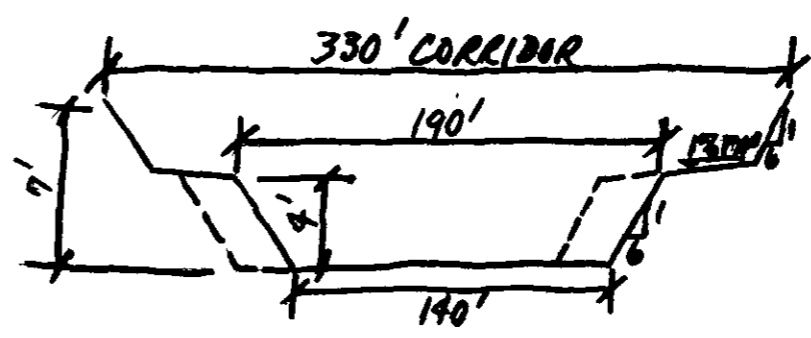
MAP REVISED JULY 19 2001

Federal Emergency Management Agency

EXHIBIT 3
Proposed Rawhide Wash Solution



CHANNEL HYDRAULIC VARIABLES:
 $Q_{100} = 10,900 \text{ cfs}$ $V_{avg} = 10.8 \text{ fsec}$ $V_{max} = 11.5 \text{ fsec}$
 $Q_{10} = 3,800 \text{ cfs}$ $V_{avg} = 7.3 \text{ fsec}$ $V_{max} = 7.9 \text{ fsec}$



PRELIMINARY
 NOT FOR CONSTRUCTION
 OR RECORDING

EXHIBIT 3
 PROPOSED CHANNEL SOLUTION

RAWHIDE WASH CORRIDOR CONCEPT

WOOD/PATEL
 3/17/05

WP# 042309