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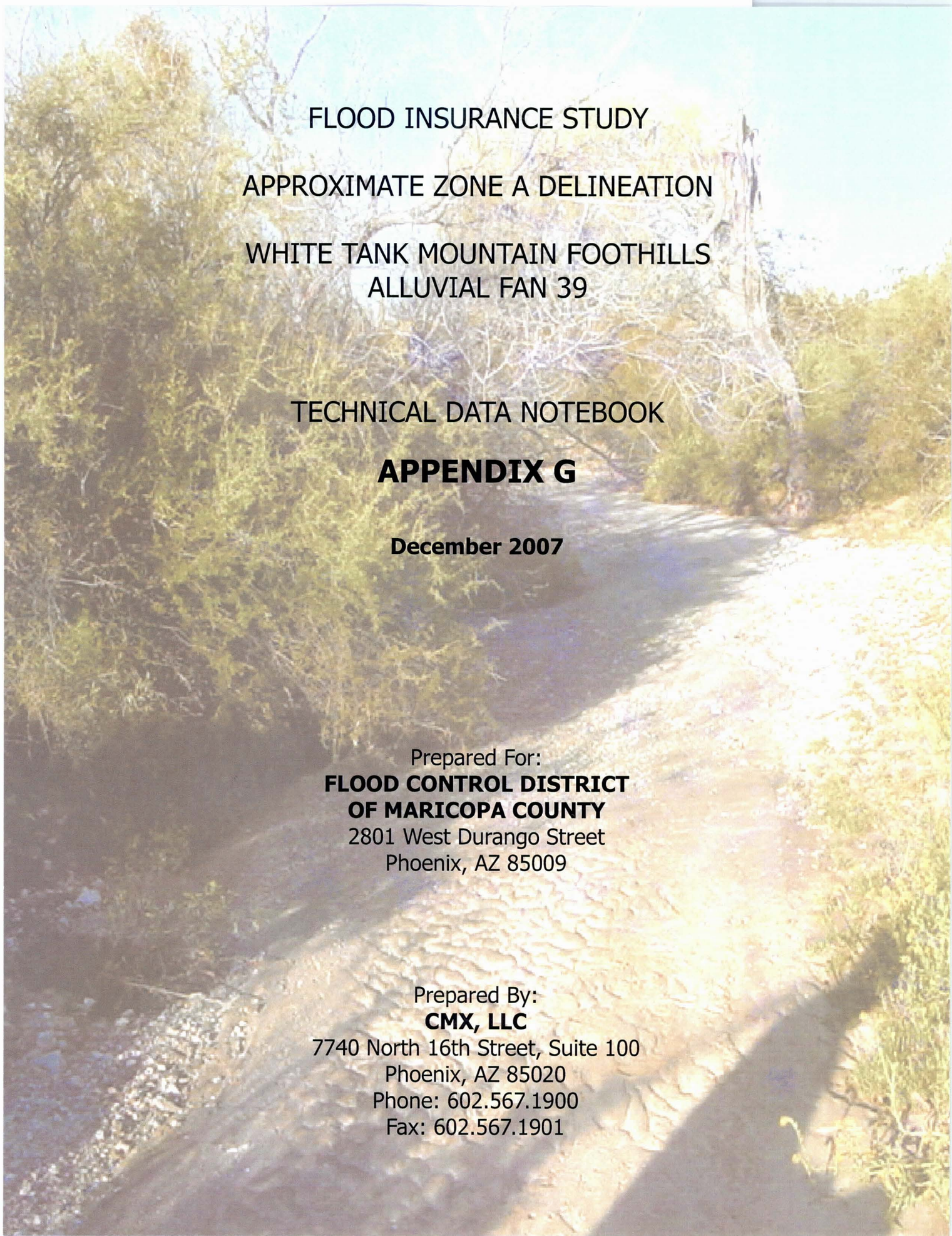

FLOOD INSURANCE STUDY

APPROXIMATE ZONE A DELINEATION

WHITE TANK MOUNTAIN FOOTHILLS ALLUVIAL FAN 39

TECHNICAL DATA NOTEBOOK

APPENDIX G

December 2007

Prepared For:
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APPENDIX G

GEOMORPHIC EVALUATION AND LANDFORM STABILITY ASSESSMENT

BUCKEYE/ SUN VALLEY AREA DRAINAGE MASTER STUDY

Prepared By: Ayres Associates, May 2005

FINAL REPORT

Geomorphic Evaluation and Landform Stability Assessment
Buckeye/Sun Valley Area Drainage Master Study

Contract No. FCD 2002C027

Prepared for:

Flood Control District of Maricopa County
2801 West Durango Street
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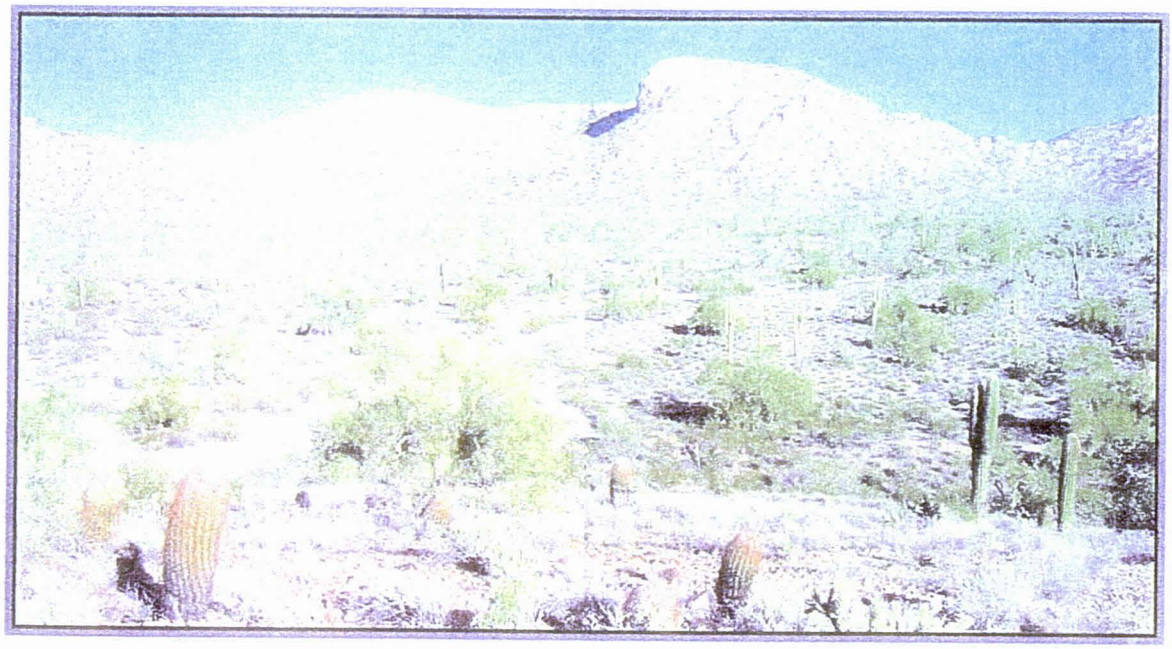

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May 2005

Geomorphic Evaluation and Landform Stability Assessment
Buckeye/Sun Valley Area Drainage Master Study

Contract No. FCD 2002C027

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1. PURPOSE

This report is submitted to the Flood Control District of Maricopa County (District) by Ayres Associates in support of Subtask 2.6.6 of the Buckeye/Sun Valley (BSV) Area Drainage Master Study (ADMS) Scope of Work (Contract FCD 2002C027).

The Buckeye/Sun Valley ADMS is being performed for the Flood Control District of Maricopa County and the Town of Buckeye. The purpose of the Buckeye/Sun Valley ADMS is to quantify the extent of drainage, flooding, and erosion problems, sources, and hazards in the Buckeye/Sun Valley area, and develop preliminary solutions to mitigate the identified concerns. Arizona Revised Statutes Title 48, Chapter 21, requires the Board of Directors to identify flood control problems and prepare plans that, when implemented, will eliminate or minimize flooding problems.

Task 2.6 represents the Geomorphic Evaluation and Landform Stability Assessment portion of the Scope of Work (SOW). The purpose of Task 2.6 is to provide a qualitative assessment of potential erosion and sedimentation hazards of primary washes, lateral and vertical stream instability, and piedmont landform stability within the drainage networks of Area 3 (Buckeye Structures) and Area 4 (North Sun Valley) of the Buckeye/Sun Valley ADMS watershed (**Figure 1.1**).

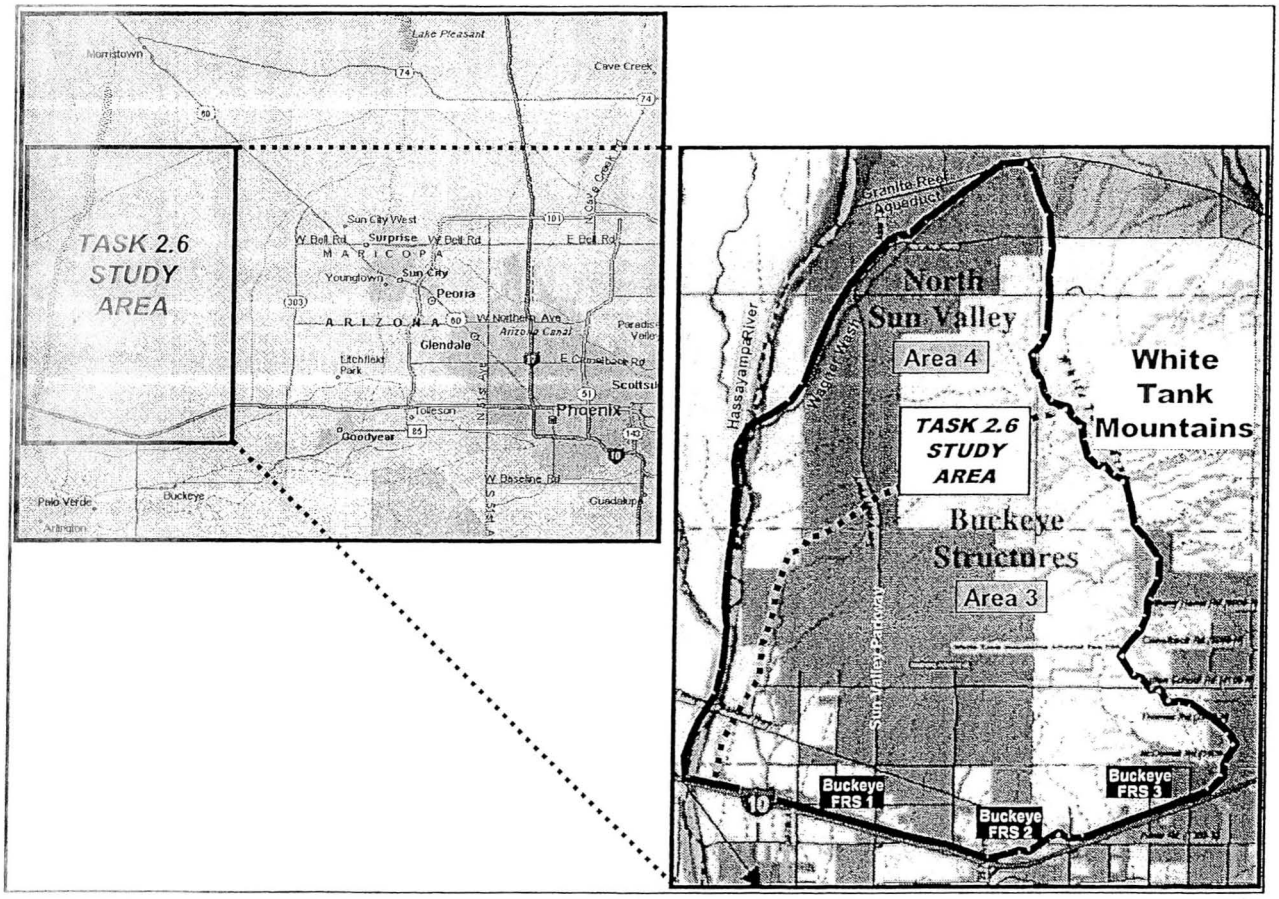

Figure 1.1. Location map for Areas 2 and 3 of the Buckeye/Sun Valley ADMS.

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2. SCOPE OF WORK

This report is a combination of three technical memos previously submitted to the District in fulfillment of Subtasks 2.6.2, 2.6.3, and 2.6.4 of the BSV ADMS Scope of Work. The following report documents the methodology and factors measured by Ayres Associates using the Stage 1 and 2 Analyses of the Piedmont Flood Hazard Assessment For Flood Plain Management User's Manual (PFHAM) (Hjalmarson 2003) per SOW Subtasks 2.6.2 and 2.6.3, and documents the qualitative assessment of the existing conditions for 46 primary washes within Areas 3 and 4 per SOW Subtask 2.6.4. Also included is supporting documentation for the Stage 1 and 2 analyses with examples of the various measurements used to identify each landform and unstable area and the conditions along each wash.

The PFHAM Stage 1 methodology provides guidelines for delineating the lateral limits of the various piedmont landforms (Subtask 2.6.2.1). The results of the Stage 1 analysis and mapping included in this report are submitted in fulfillment of Subtask 2.6.2.2. A field verification using the factors listed in the PFHAM was conducted on 2 representative sites for each landform under Subtask 2.6.2.3. Preliminary maps (original scale = 1:18,000) delineating the lateral limits of the piedmont landforms in Areas 3 and 4 are also included as attachments (**Appendix A, Plates 1 through 5**).

The PFHAM Stage 2 methodology provides guideline for assessing piedmont landform stability and delineating unstable landforms (Subtask 2.6.3.1). The results of the Stage 2 analysis and mapping included in this report are submitted in fulfillment of Subtask 2.6.3.2. A field verification using the factors listed in the PFHAM was conducted at sites where unstable landforms were identified under Subtask 2.6.3.3. Preliminary maps (1:18,000) delineating the lateral limits of the stable and unstable landforms in Areas 3 and 4 are also included as attachments (**Appendix B, Plates 1 through 5**).

The primary washes assessed under SOW Subtask 2.6.4 are defined as those intermittent streams and washes delineated by a combination dot and dash blue line on the USGS 7.5-minute topographic quadrangle maps for the study area. All primary washes including White Tank Wash and its primary tributaries are included in the assessment and are shown on Plate 1 of **Appendix C**. The washes covered under the White Tank Fan study (Wood, Patel & Associates 2001) and the Skyline Fan study (DEI-HEC 1997), Wagner Wash and its right bank (northern) tributaries, and the primary streams north of the Granite Reef Aqueduct are not included in the assessment. The total length of the 46 primary washes that were assessed is approximately one hundred and sixty one (161) miles. The assessment was conducted using field investigations, aerial photographs, maps, and existing studies and reports. Detailed subsurface or geotechnical analyses are not part of this subtask. Preliminary maps (original scale = 1:18,000) delineating the stable and unstable landforms were submitted as Plates 1 through 5 in Appendix B and include the unstable channel reaches identified in Areas 3 and 4.

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3. PROJECT BACKGROUND

Piedmonts are the broad, gently sloping and low relief plains that are located between mountains and axial drainages. Much of Maricopa County is piedmont landforms. The Stage 1 Analysis methodology of the PFHAM was used for delineating the lateral limits of the various piedmont landforms. There is a three-stage process in defining and assessing piedmont landforms provided by the PFHAM:

- Stage 1 - Recognizing and characterizing the kind and extent of piedmont landforms and showing these landforms on a map. The four main landforms on piedmonts of Maricopa County requiring identification and delineation are pediments, relict fans, alluvial fans and alluvial plains. Procedures for identifying piedmont landforms are described in Chapter 2 of the PFHAM.
- Stage 2 - Defining the nature of the piedmont landform environment, identifying unstable and stable components of the piedmont, and showing those areas subject to various flood hazards on a map. For example, flood hazards of alluvial fan landforms in Maricopa County consist of fans with stable flow paths and fans with unstable flow paths. Procedures for identifying unstable and stable components of the piedmont are described in Chapter 3 of the PFHAM.
- Stage 3 - Identifying and applying methods for defining and characterizing areas affected by the 100-year flood and showing these areas on a map. Realistic methods for definition of 100-year flood hazards are discussed in Chapter 4 of the PFHAM.

For the purposes of Task 2.6 of the SOW, only Stage 1 and Stage 2 analyses were performed. This report provides a summary of the Stage 1 Piedmont Landform Delineation (per SOW Subtask 2.6.2) and Stage 2 Piedmont Landform Stability Assessment (per SOW Subtask 2.6.3). The PFHAM Stage 1 and 2 methodologies provide the procedures for identifying the nature and location of flood hazards on the four major piedmont landforms.

The PFHAM defines *Stable Areas* as those in which "the relative state of the location, geometry and roughness of a channel, network of channels, or landform where any changes of flow path, geometry, and roughness during floods are likely to be minor and can be set aside in realistic assessments of flood risk." Common stable areas are hillsides, relict fans, pediment areas, and inactive alluvial fans.

The PFHAM defines *Unstable Areas* as those in which "the relative state of the location, geometry and roughness of a channel, network of channels, or landform where major changes of flow path, geometry, and roughness are possible during floods and cannot be set aside in realistic assessments of flood risk." Common unstable areas are active alluvial fans, some multi-channel (distributary) areas below active alluvial fans, alluvial plains with active sedimentation, split or braided flow channels where flow is wide and shallow, and areas of recent sediment deposition and erosion.

The assessment of the existing conditions of the primary washes was conducted in conjunction with the Stage 1 and Stage 2 analyses. Discussions for both the Stage 1 and Stage 2 analyses in the PFHAM provide some general information and guidance for assessing the stability of the primary washes that drain these landforms. However, an extensive knowledge of fluvial geomorphology, and more specifically the geomorphic characteristics of desert washes, is necessary for accurately conducting this task.

3.1 Piedmont Landform Delineation

The four principle landforms delineated under the PFHAM methodology are relict fans, pediments, alluvial fans, and alluvial plains. A *relict fan* is the erosion remnant of an old alluvial fan formed in a previous epoch and hardened by cementation. A broad, flat or gently sloping, rock-floored erosion surface located at the base of an abrupt mountain front or plateau escarpment is a *pediment.* An *alluvial fan* is a fan-shaped (either partially or fully extended) sediment deposit located at a topographic break, such as a mountain front, that is made up of stream flow and/or debris flow sediments. A nearly flat or gently sloping area or a slightly rolling land surface produced by deposition of sediment is an *alluvial plain.* Alluvial plains are generally located adjacent to a river that occasionally overflows its banks and might be on a floodplain, a delta, or at the toe of an alluvial fan.

Each of the landforms has distinctive topographic, surface, and soil characteristics, and the landforms can be reliably identified using several combined criteria. The identification and delineation of these characteristics are discussed in detail in Chapter 2 and the Appendices of the PFHAM (Hjalmarson 2003). In general, distinctive characteristics that assist in delineating pediments and relict fans are the products of erosion, and distinctive characteristics that assist in delineating alluvial plains and many alluvial fans are the products of sediment accumulation. A summary of the general characteristics of the four principle piedmont landforms is listed in **Table 3.1** and the steps required for the identification of the landforms are provided in **Table 3.2**.

3.2 Landform Stability Assessment

The procedures in Chapter 3 (Stage 2 methodology) of the PFHAM (Hjalmarson 2003) use many of the readily observable indicators described in Chapter 2 (Stage 1 methodology) of the PFHAM to assess landform stability. These indicators are used to delineate areas of potential flooding on each of the landforms. Many of the stability indicators are simple measures of relative surface age and weathering like desert pavement and rock. Most of the indicators used to identify the type of landform such as surface texture, surface geology, rock varnish, desert pavement, cementation of deposits, drainage pattern and channel shape are also used to identify stable and unstable areas. Specifically, the following indicators are used to define stable and unstable areas:

- Flow path movement
- Surface geology
- Desert pavement and varnish
- Surface texture
- Channel capacity
- Degree of flood hazard
- Soils (carbonate zones)
- Soil surveys
- Surface color
- Drainage pattern
- Channel shape
- Vegetation
- Bed material size
- Donoring
- Shear stress
- Drainage basin

Table 3.3 shows several selected indicators of stable and unstable areas. **Table 3.4** provides select characteristics of stable and unstable flood hazards of piedmont landforms.

Table 3.1. Principle Landforms, Common Soil Types, Typical Geologic Map Units, and Significant Characteristics of Piedmonts in Maricopa County (Hjalmarson 2003).

Landform	Component Landform (common soil types)[1] *(typical geologic units)*[4]	Significant characteristics[2]
Relict Fan	Erosion Fan remnant (Mohall-Contine, Gunsight-Chuckawalla- Rillito, Pinamt, Tremant-Ebon- Momoli-Carefree, Eba-Pinaleno, Laveen, Mohave-Continental) *(Qo, Qmo, Qm)*	Typically incised channels in cemented conglomerate of cobbles and boulders. Drainage typically is tributary but small pockets of distributary channels may occur. Some relict fans have a ridge-valley morphology. Incised throughflow streams typically are more than 10 ft. deep and less than 20 ft. deep with steep banks. Desert pavement and rock varnish are common on flat interfluves. General slope typically is 1-6 percent.
	Inset Alluvial Fan (Carrizo, Gilman, Antho, Estrella, Glenbar) *(Qy, Qy2, Qy1)*	Generally small and confined between relict fan remnants. Fluvial deposit that can act like a floodplain with high potential for scour and fill. Much of the alluvial fan material may be from gulling of the relict fan and such material may be bouldery.
Pediment	Bedrock remnant (Gran-Rock outcrop, Gran-Wickenburg complex, Cherioni-Rock outcrop association) *(various bedrock units)*	Incised channels generally formed in bedrock and old soils. Drainage typically is tributary but distributary channels may be present especially on lower slopes. There are many first order tributary channels. Parent rock typically is granite with large granite boulders on the upper slopes near the mountains. The crests of transverse slopes are small and shoulders are steep. General slope typically 2-5 percent.
	Inset Alluvial Fan (Anthony-Arizo complex, possibly Eba-Pinaleno and Carrizo) *(Qy, Qy2, Qy1)*	Generally small alluvial fan confined between pediment. Fan typically widens like a partially opened fan and lower part typically narrows as distributary channels rejoin. Fluvial deposit that typically is actively aggrading and eroding with possible balance of sediment over past few hundred years.
Alluvial Fan	Active Alluvial Fan (Carrizo, Gilman, Antho, Brios, Estrella, Glenbar, Coolidge, Valencia, Torrifluvents, Maripo) *(Qy, Qyc, Qy2, Qy1)*	Fluvial deposits with little, if any, calcium carbonate development. Fan shaped in plan view with hydrographic apex at topographic break. Typically no desert varnish. Stream channels are wide with little incision or channels are very small. Active portions of alluvial fans in Maricopa County typically are a small part of an alluvial fan that is mostly inactive. General slope 1-10 percent.
	Inactive Alluvial Fan (Laveen, Anthony, Antho, Momoli, Mohave, Pinamt, and other soils of relict fans) *(Qm, Qm1, Qm2, Ql, Qly)*	Fluvial deposits with much carbonate in K soil horizon. Fan shaped typically with distributary network of incised-throughflow channels. Transverse slopes of interfluves are flat. Interfluves typically drained by small channels that are tributary to throughflow streams. Interfluve slopes are stable and throughflow streams typically are incised less than 3 ft.. General slope typically 1.5 - 4 percent.
Alluvial Plain	Piedmont Toe (Gilman, Estrella[3], Glenbar, Momoli, Denure, Antho, Contine, Mohall, Avondale) *(Qy, Qy2, Qy1, Qyf)*	Aggrading or rather stable fluvial deposit with little transverse relief and small throughflow channels. Channels typically are less than 1 ft. deep. Few tributary channels head on the surface. Little, if any, rock varnish but possibly some desert pavement. Can be channel incision of a few feet where there has been general head cutting of base- level stream. General slope is 0-3 percent.

[1] Soil complexes on NRCS maps include one or more of the soil types associated with the indicated landform.
[2] These characteristics may be observed on topographic maps, aerial photographs and by field inspection.
[3] Some of this soil is associated with alluvial fans by Camp (1986) and with alluvial plains in this manual. This soil is associated with alluvial plains for this manual because Estrella loam (Soil type 50) typically is at the toe of piedmonts, the slope is small and the landform does not meet the criteria for alluvial fans (NRC, 1996). This is an example of a few minor inconsistencies between this manual and NRCS soil surveys that have no effect on the reliability of the method.
[4] Surficial geologic map units commonly used by AZGS geologists to describe deposits associated with the various landforms.

Table 3.2. Steps for Identification of Piedmont Landforms (Hjalmarson 2003).

Recognizing landforms	Data information source
1. Define general setting (Geology, tectonics, soils, surficial geology, relief)	Geologic, topographic, aerial photos, soil maps. General reference.
Type of landform.	Detailed surficial geology maps, soil maps and geology maps
2. Define physical setting and type of landform.	
Geomorphology of source area (relief, slopes, feeder channel geometry, vegetation distribution, size of source area, drainage pattern)	Topographic maps, aerial photographs.
Geomorphology of piedmont (size, relief, slopes, channel geometry, vegetation type and distribution, surface color and soil)	Topographic maps, soil maps, aerial photographs.
Location of landform (Is there a topographic break? Is it at a mountain front? Is it at an isolated remnant or *inselberg*? Is it inset on a larger landform?)	Topographic maps and aerial photographs.
3. Verify and refine landform characteristics and boundaries.	Field work using geologic maps and soil survey maps.
Composition and age (bedrock or a sedimentary deposit, soil development, desert varnish, desert pavement, surface color and caliche)	
Morphology (plan view shape, drainage pattern and spacing, channel incision and geometry, ridges and valleys)	Field work using topographic maps and aerial photographs.
Location of landform (Is it at a topographic break? Is it at a mountain front? Is it an isolated remnant or *inselberg*? Is it inset on a larger landform?)	Fieldwork using topographic maps and aerial photographs.

Table 3.3. Selected Indicators of Stable and Unstable Areas (Hjalmarson 2003).

INDICATOR	LANDFORM AGE[1]	LANDFORM STATE[2]	FLOOD FREQUENCY[3]	SIGNIFICANCE FOR IDENTIFYING LANDFORM AND STABILITY (TYPICAL)
Morphology				
ridge & valley	O	S	--	On relict fans and pediments.
Throughflow Channels[4]				
incised > 10 ft.	O	S	> Q_{100}	On relict fan surfaces where side-slope shoulders are convex and foot slopes are smooth and concave.
incised < 3 ft.	I	S	> Q_5	On inactive fans where transverse foot slopes are steep and shoulders are smooth and convex and summits between channels are smooth and flat.
incised < 2 ft.	Y	U	Q_2	On unstable surfaces where banks are steep and channel width-depth ratio > 10 at bank full stage.
incised <1 ft.	Y	?	any	On alluvial plains with smooth surfaces and very little cross-drainage relief
Drainage pattern				
tributary				
parallel channels	O	S	> Q_{50}	On relict fans and pediments where ridges between first and second order streams are parallel.
dendritic channels	I	S	> Q_{10}	On relict fans and pediments and inactive areas of alluvial fans.
distributary	I,Y	?	--	On active and inactive alluvial fans and, in places, on granite or granite-like pediments
faint with wide areas between flow paths	Y	U	any	On alluvial plains where the slope is not great enough to override any influence of minor topographic irregularities.
Vegetation				
Creosote bush	O	S	> Q_{50}	Predominant vegetation on stable calcium carbonate rich soil.
	I,Y	?	any	Not the predominant plant.
Saguaro	O	S	> Q_{50}	On stable surfaces.
Desert trees	I,O	MS, S	> Q_5	Along channel banks.
	Y	U	any	Scattered over area.
Soil development				
Reddish color	I,O	MS	?	On pediments, relict fans, inactive alluvial fans and alluvial plains and may indicate the surface is stable.
B horizon	O	S		May indicate the surface is stable.
Weak B horizon	I	S		Can form in a few thousand years.
Calcic horizon	O	S		Crystals on gravel indicates surface has been stable for hundreds of years
Desert varnish				
None	?	?	?	May indicate the surface is unstable. Does not form on granite or limestone and where ground cover vegetation is dense.
Some	O, I	MS, S	> Q_{10}	Varnished rocks may be reworked from older upslope surfaces such as bedrock. Also, surface may be removed by erosion.
Much	O	S	> Q_{100}	Varnished boulders and larger cobbles with few varnished smaller stones.
Desert pavement	O	S	> Q_{50}	Dense "pavement" with smooth surface.

1 Y=young (<300 years), I = intermediate (>300 and <10,000 years), O = old (>10,000 years) and ? = inconsistent indicator of age.
2 S = stable (flow paths not expected to change over regulatory period), MS = moderately stable (flow paths may change in places during regulatory period of 100 years), U = unstable (flow paths expected to change in places during large floods) and ? = not a consistent indicator of state.
3 Approximate recurrence interval at bank full level. May include small adjacent overflow areas.
4 Values are for drainage basins less than 5 mi^2.

Table 3.4. Selected Characteristics of Stable and Unstable Flood Hazards of Piedmont Landforms (Hjalmarson 2003).

Landform	Component Landform (State)	Significant stability and flood characteristics
Relict Fan	Erosional Fan remnant (Stable)	Remnants of broad coalescent plains or bajadas that have been incised by streams for thousands of years. The presence of large areas of varnished desert pavement and soils with substantial clay or carbonate suggests the surface of this landform is very stable in many places and flood flow has been conveyed past these stable areas for thousands of years. The 100-year flood is confined to throughflow channels and small over bank areas adjacent to the defined channels.
	Inset Alluvial Fan (Unstable)	These typically bouldery fluvial deposits can have a great aggradation and erosion potential and are unstable. The 100-year flood can spread over much of these areas.
Pediment	Bedrock remnant (Stable)	Nearly all of these landforms are eroding and stable. Relatively small areas along larger channels subject to scour and fill. The 100-year flood typically is confined to defined channels of throughflow streams and streams that head on the pediment.
	Inset Alluvial Fan (Unstable)	These fluvial deposits resemble flood plains except the inset fan may be subject to more erosion and deposition than typical flood plains. Inset deposits of sediment can be the "apex" of distributary channels.
Alluvial Fan	Active Alluvial Fan (Unstable)	Fluvial deposit with little or no calcium carbonate soil development, no insitu rock varnish development, and seldom any desert pavement. The surface typically is a light tan or grey color that is indicative of recent abrasion of the weathered surface during sediment transport. Some areas not recently eroded or that have received sediment may be darkened by weathering. Typical channels are poorly defined with large width-to-depth ratios and may have a braided pattern in addition to a general radiating pattern below the hydrographic apex. Typical clasts are angular, sorted and unweathered. Both the maximum and average clast size of the sediment deposits decreases rapidly down fan. Deposits are mounded across the fan unless there has been erosion and/or co-mingling with adjacent alluvial fans.
	Inactive Alluvial Fan (Stable)	Fluvial deposit with much carbonate in K soil horizon, reddish upper soil horizon, desert pavement, rock varnish, incised throughflow channels, trees along the throughflow channels and developed tributary drainage systems that head on the fan surface. Very old inactive alluvial fans that have lost their shape are relict fans.
Alluvial Plain	Piedmont Toe (Generally stable but some areas may be unstable.)	Rather stable or possibly aggrading fluvial deposit with little transverse relief except where channels are incised as the result of lowering of base-level stream. Floodwater of the 100-year flood may spread over large areas like that shown in Appendix G. Areas with low slopes, lack of flow confinement, little aggradation and developed caliche soil that resists erosion are stable. Areas may be unstable where there is much aggradation. Where channels are incised the gully walls may be unstable and head cutting may progress upslope.

3.3 Existing Conditions Assessment of Primary Washes

During an extensive field investigation, the existing geomorphic characteristics were documented and stream reaches that could be problematic with regard to lateral and vertical instability under existing and future developed conditions were identified. The existing conditions assessment identified and focused on, but was not limited to, the following:

- Identify and delineate stream reaches that have undergone historic and/or recent degradation or aggradation.
- Identify and delineate stream reaches that have undergone historic and/or recent lateral instability.
- Identify and delineate stream reaches at bridges, dip crossings, and existing hydraulic structures that have existing sedimentation problems.
- Identify and delineate historic and recent stream responses to development in the watershed and along the primary watercourses.
- Identify and delineate points of natural grade control.
- Identify and delineate existing sediment sources within the watershed.

3.3.1 Caliche (Calcic Soils)

Caliche is exposed along most of the washes in the study area and, as such, requires some discussion of its development and occurrence within the landscape. The term 'caliche' has been broadly applied to deposits of secondary calcium carbonate ($CaCO_3$) of various origins, but is generally associated with soil carbonate. Soils having significant accumulations of secondary calcium carbonate are defined as calcic soils. For the purposes of this report, caliche will be considered synonymous with calcic soils.

Calcic soils form widely in unconsolidated sediments over periods of a few thousand years to as much as several million years. Calcic soils are commonly developed in sediments throughout the arid and semiarid parts of the southwestern United States and vary regionally in their content of secondary calcium carbonate. The formation of calcic soils is believed to occur mainly by subaerial precipitation of carbonate that is derived from Ca^{++} dissolved in rainwater and that is leached from airborne carbonate (Machette 1985; Birkeland 1984). Calcium carbonate is leached from the ground surface and upper soil horizons and subsequently precipitates and accumulates in lower soil horizons at a depth controlled by soil moisture and texture (McFadden and Tinsley 1985).

Calcic soil horizons generally increase in degree of $CaCO_3$ morphology, concentration of $CaCO_3$, and thickness with age and are strongly influenced by the character of the soil's parent material. As carbonate accumulates in the soil, recognizable morphological stages progressively develop that are reflected in enriched carbonate content, increased bulk density, and calcic horizon thickening. Soil studies in the southwest by Gile et al. (1966) and Bachman and Machette (1977) have led to the recognition of 6 stages of carbonate morphology (**Table 3.5**).

Table 3.5. Stages of Calcium Carbonate Morphology in Calcic Soils (from Birkeland 1984).

Stage	Gravelly Parent Material	Non-gravelly Parent Material
I	Thin discontinuous clast coatings; some filaments; matrix can be calcareous next to stones; about 4% $CaCO_3$	Few filaments or coatings on sand grains; <10% $CaCO_3$
I+	Many or all clast coatings are thin and continuous	Filaments are common
II	Continuous clast coatings; local cementation of few to several clasts; matrix is loose and calcareous enough to give somewhat whitened appearance	Few to common nodules; matrix between nodules is slightly whitened by carbonate (15-50% by area), and the latter occurs in veinlets and as filaments; some matrix can be noncalcareous; about 10-15% $CaCO_3$ in whole sample, 15-75% in nodules
II+	Same as Stage II, except carbonate in matrix is more pervasive	Common nodules; 50-90% of matrix is whitened; about 15% $CaCO_3$ in whole sample
Continuity of Fabric High in Carbonate		
III	Horizon has 50-90% K fabric with carbonate forming an essentially continuous medium; color mostly white; carbonate-rich layers more common in upper part; about 20-25% $CaCO_3$	Many nodules, and carbonate coats so many grains that over 90% of horizon is white; carbonate-rich layers more common in upper part; about 20% $CaCO_3$
III+	Most clasts have thick carbonate coats; matrix particles continuously coated with carbonate or pores plugged by carbonate; cementation more or less continuous; >40% $CaCO_3$	Most grains coated with carbonate; most pores plugged; >40% $CaCO_3$
Partly or Entirely Cemented		
IV	Upper part of K horizon is nearly pure cemented carbonate (75-90% $CaCO_3$) and has a weak platy structure due to the weakly expressed laminar depositional layers of carbonate; the rest of the horizon is plugged with carbonate (50-75% $CaCO_3$)	
V	Laminar layer and platy structure are strongly expressed; incipient brecciation and pisolith (thin, multiple layers of carbonate surrounding particles) formation	
VI	Brecciation and recementation, as well as pisoliths, are common	

Initially, carbonate coats the undersides of coarse particles or occurs as thin filaments in fine-grained materials. Over time, carbonate deposition fills the pore spaces and voids in the soil horizon and greatly restricts the percolation of water through the horizon. The laminated part of the upper calcic soil horizon forms as a result of solution and re-precipitation induced by the periodic collection of water over the plugged portion of the horizon. Over time, the calcic horizon builds upward and so is younger in that direction. However, the highest stage attained is usually near the top of the carbonate-enriched horizon and changes to progressively lesser stages with depth (Birkeland 1984). Caliche is easily identified by its effervescence when hydrochloric acid is applied.

The buildup of calcium carbonate is more rapid in coarse-grained sediments than in non-gravelly material because coarse sands and gravels have less pore space and surface area to coat with carbonate than do silts and clays. Thus, a calcic horizon in silt and another in gravel of the same age and locale can have different stages of carbonate morphology, different concentrations, and different thicknesses, and may appear quite dissimilar (Machette 1985). For this reason, coarse-grained calcic soils appear stronger in outcrop than fine-grained calcic soils. In addition, the difference in texture between gravelly and non-gravelly parent materials significantly influences the time required to form Stage I, II, III, and IV morphologies (Table 3.1). Field investigations of the primary washes in the study area reveal that the morphology of the caliche along these channels is no greater than about Stage III. In most areas, the caliche appears to have Stage II morphology.

Extensive streambed and bank cementation can occur through the process of case hardening. Lattman (1973, 1977) suggests that case hardening results from surface water flowing over vertical or steeply sloping alluvial and colluvial deposits, causing solution of calcareous fines and redeposition as cement. Case hardening can occur rapidly and is most strongly developed at the surface and decreases in development inward from the surface (Lattman and Simonberg 1971). However, the studies of case hardening and gully-bed cementation by Lattman and Simonberg (1971) and Lattman (1973, 1977) were conducted in areas that are rich in limestone (rock composed entirely of calcium carbonate) alluvium and colluvium, and where groundwater calcretes (highly cemented calcic soils formed by laterally flowing $CaCO_3$-rich groundwater) have been pedogenically modified (Machette 1985). Since the Buckeye/Sun Valley study area does not contain any significant sources of limestone or groundwater calcrete, case hardening is not considered to be a factor in the stability of the primary washes in this area.

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4. METHODOLOGY

4.1 Landform Identification, Delineation, and Mapping

The Stage 1 methodology for identification and delineation of the characteristics of piedmont landforms are described in detail in Chapter 2 and the Appendices of the PFHAM (Hjalmarson 2003). Chapter 3 (Stage 2 methodology) of the PFHAM provides the methodology used in this project for identification of stable and unstable flood hazard areas of piedmont landforms. The described procedure is complementary to the procedure used to identify landform types in Chapter 2 of the PFHAM.

ArcGIS was the Geographic Information System (GIS) software used for the piedmont landform delineation, the landform stability assessment, the stability assessment of the primary washes, and the associated mapping. Ten-foot contour topography and 2003 MrSID orthophotography were obtained from the District and overlaid in ArcGIS. The soils mapping from the National Resources Conservation Service (NRCS), in the form of a GIS shapefile, was then used to guide the initial in-house landform mapping and delineation. **Appendix D** provides an example of the typical NRCS soils maps and soil descriptions for the BSV area. The landform mapping was based on the soil associations related to each landform (PFHAM). The aerial photography and the 2003 topographic maps (10-ft contour interval) provided by the District were then examined in detail to refine the landforms and assist in identifying stable and unstable areas.

Compared to color photography, black and white orthophotography was more difficult to use in identifying subtle differences in surface color and tone. However, the black and white photography was still useful in viewing the lighter active alluvial fans and other unstable areas, the ground surface texture, and drainage patterns. The 10-foot contours from the 2003 District contour maps provided a better picture of the drainage patterns, allowed calculation of the drainage texture in the relict fans and inactive fans, assisted in defining topographic breaks, and provided a clearer view of the relative depths of channel incision.

The Arizona Geological Survey (AZGS) surficial geology mapping (Field and Pearthree 1991) and flood hazard mapping (Field and Pearthree 1992) for the White Tank Mountains area were then used to refine the landforms even further. Both the surficial geology maps (**Appendix E**) and the flood hazard maps (**Appendix F**) were scanned and converted to digital images. These images were then registered in ArcGIS using the USGS 7.5-minute topographic quadrangle maps and the 2003 aerial photography as the base system. Once these maps were georeferenced, the maps could be viewed with the soils, topography, and delineated landforms overlain on them.

Two primary methods were used to assess current conditions on the primary washes. One method required the comparison of historic and contemporary aerial photography to identify reaches and areas of potential and existing stream instability. The other method was to conduct an on-site field reconnaissance of each of the primary washes whereby unstable reaches could be identified and delineated in real-time in the field using the portable GPS unit. Both methods were used to identify, delineate, and verify stability problems along the primary washes.

4.2 Aerial Photography Analysis

A comparison of sequential aerial photography can identify potentially dangerous landforms and stream reaches that are stable or unstable or that have changed significantly in planform due to aggradation, degradation, or migration as a result of major events, especially if a major event

has occurred sometime between subsequent photos or immediately prior to a photo date. In the case of the Buckeye/Sun Valley area, a major storm event that occurred in 1951 created significant changes in the landscape and to reaches of some of the primary washes within the project area.

The 1951 storm event is identified in precipitation records for the Buckeye weather gage (NCDC COOP station number 021026), which is located in the town of Buckeye to the south and has been in operation since 1893. The largest single day precipitation recorded at the gage since 1907 occurred on August 28, 1951. The total volume on that day was 2.6 inches and the total recorded precipitation from August 27 to the August 30, 1951, was more than 4.6 inches. Although 1951 was not an unusually wet year, the monthly total for August of that year was 6.89 inches, which is the wettest month on record (**Figure 4.1**). In comparison, the mean monthly precipitation for August is only 1.13 inches. Thus, aerial photographic coverage that encompasses this date or was taken immediately after that year will be valuable in assessing changes that occurred then and subsequently.

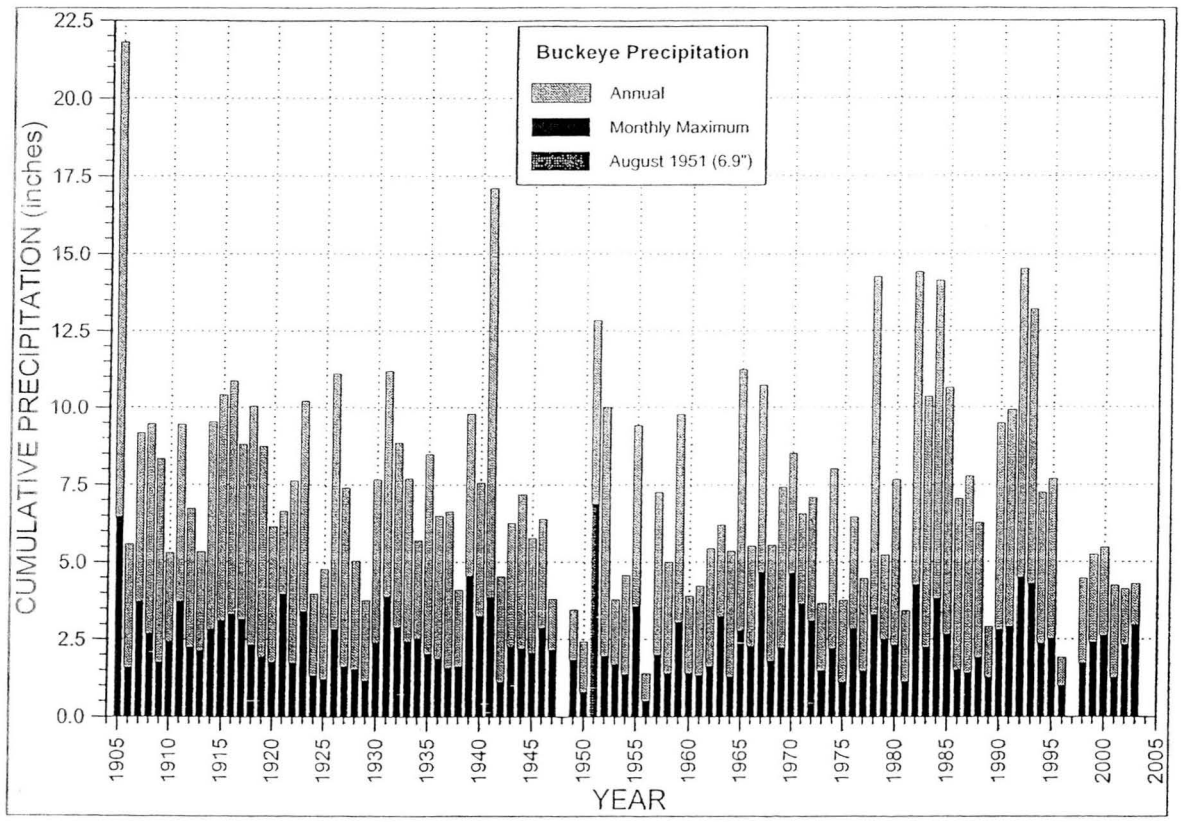

Figure 4.1. Annual and monthly maximum precipitation (1905-2003) for Buckeye, Arizona.

There are no aerial photos taken of the study area prior to 1949 that were available. With regard to the 1951 event, black and white aerial photography taken in 1949 is available for areas a short distance north of the Buckeye Flood Retarding Structures (FRS), but coverage for most of the project area north of the structures is not available in the 1949 aerial photography. However, black and white 1953 aerial photographic coverage is available for the entire study area. In addition, 1973, 1992, 1997, 1999, and 2003 aerial photographic coverage is available.

The digital versions of the 1973 aerial photos are of poor quality and the 1997 and 1999 aerial photos show no major changes compared to the 1992 and 2003 aerial photos. Only the 1949, 1953, and 2003 aerial photographs were used in this study for comparative purposes since there have been no storm events that have produced any identifiable changes in the study area after 1951.

The active alluvial fans and other unstable areas that were identified and mapped using the aerial photo comparison are included in the GIS database submitted to the District as part of this report.

4.3 Field Reconnaissance

All-Terrain-Vehicles (ATVs) with utility racks were the main mode of transportation used in the field reconnaissance and verification of the piedmont landforms and the areas of instability, and the assessment of the existing conditions of each of the primary washes (**Figure 4.2**). The ATVs were used because of the large extent and relative inaccessibility of the study area, and allowed for quick and efficient movement across the landscape to verify landforms and check uncertain or questionable areas in a short amount of time. Having less travel time allowed for more time to accurately verify landform types and boundaries.

The Trimble GeoXT, which is shown mounted on an ATV in **Figure 4.3**, is part of the Trimble GeoExplorer CE Series, a handheld Windows CE device with an integrated Trimble GPS receiver. The GPS system uses the Wide Area Augmentation System (WAAS) for free real-time connections. The WAAS was created by the Federal Aviation Administration (FAA) as a free-to-air differential correction service. With Windows CE, the device is capable of incorporating mobile GIS field software. ESRI's ArcPad 6.0, which is the mobile form of ArcGIS with GPSCorrect, was used for this project.

Using ArcPad with the georeferenced aerial orthophotography and the pre-defined landforms GIS files, the Trimble GeoXT enabled quick navigation to a verification site or questionable feature and proper identification and delineation of the boundaries and location of the landform or feature. The Trimble GeoXT provides the accuracy of a survey grade GPS with the portability of a fully editable mobile GIS database.

The portability of the Trimble GeoXT for use with the ATVs was accomplished using a GPS mount placed on the front utility rack of the ATV. The mounted GPS was readily visible and allowed for easy tracking of the current location and navigation to a specific site.

Field verification of the areas of instability was accomplished by configuring the Trimble handheld GPS to display the boundaries of the unstable area previously delineated in the office. With the mapped boundaries visible on the ATV-mounted GPS, the mapped boundaries were verified by tracking the boundary using the ATVs and observing the path using the GPS track log. Verification of the boundaries required knowledge of the specific characteristics unique to stable and unstable landforms and any deviation of the mapped boundary from the location of the observed true boundary in the field was edited in real time in the ATV-mounted GPS. The correct boundary was delineated by driving the ATV with the GPS along the correct location of the boundary and recording the path of the ATV as a new track log. Where changes or corrections to the boundaries were necessary, the new ATV track log was used to guide and document alteration of the original mapping.

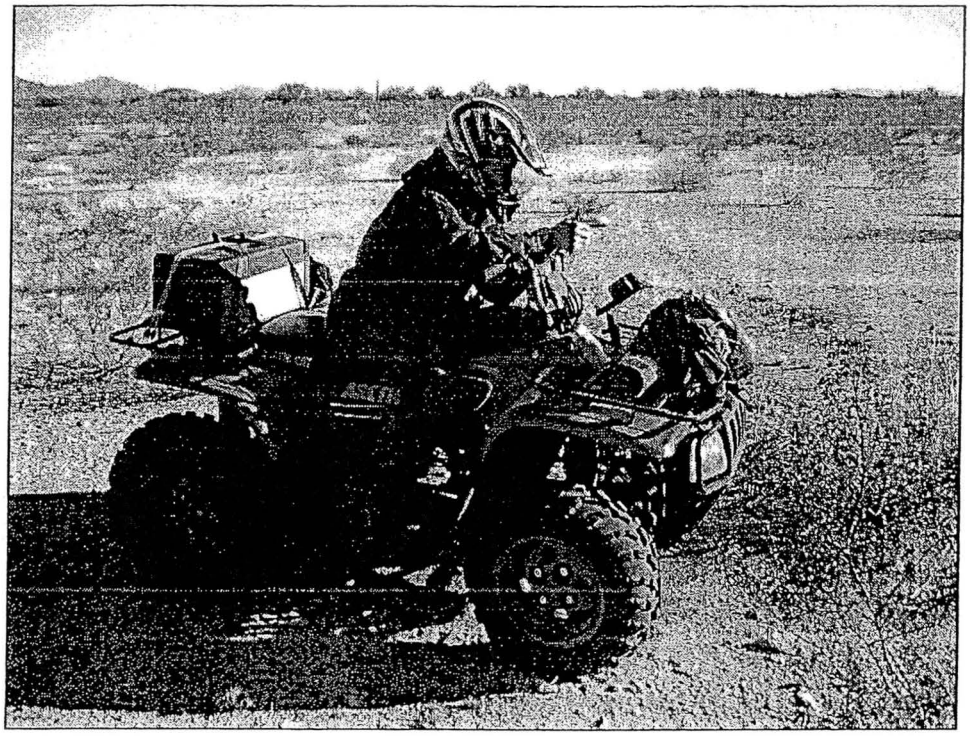

Figure 4.2. All-Terrain-Vehicle (ATV) used for field verification of piedmont landforms, identification of stable and unstable areas, and primary wash assessments.

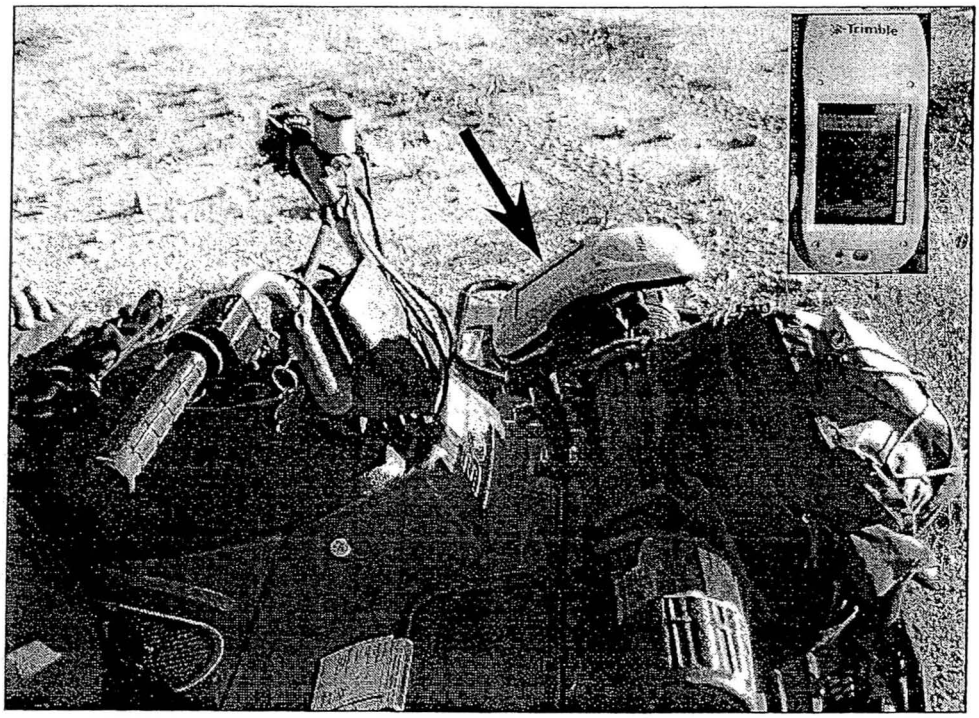

Figure 4.3. Trimble GeoXT handheld GIS-based GPS unit (arrow) mounted on an ATV.

Real-time identification and delineation of areas of instability and other features along the washes was accomplished by recording the track log of the travel path and recording waypoints in the Trimble handheld GPS at specific features or boundaries. Each waypoint record included a feature designation, identifying notation, and photo record that are included in the GIS database.

The field reconnaissance as part of the assessment of the primary washes was conducted by traversing the entire length of each wash on ATVs until a point was reached where travel along the wash was no longer possible because it was completely obstructed by bedrock or some other feature, there was a loss of capacity or flow confinement as the wash disappeared, or the wash joined with another primary wash. It should be noted that the reconnaissance attempted to follow the path defined by the designated stream location on the USGS topographic maps. However, in a few cases, the primary flow path was not the one defined on the USGS topographic maps. Since the SOW called for conducting a field assessment of those channels defined by the USGS mapping, the assessed stream reaches were primarily those specifically defined on the USGS topographic maps. Nonetheless, the final maps submitted under this contract do include unstable reaches of non-primary washes that are identified in the aerial photo comparison later in this report.

During the field assessment of the primary washes, a track log was maintained as the ATVs were driven along the bed of the wash. The track log included not only the coordinates of track points recorded at 5 to 10 second intervals, but also the approximate elevation of those points. Since the Trimble GPS unit was maintained at a constant height on the ATVs while traversing the washes, it was intended that the final track log could be used to produce a general or rough channel profile. However, in a number of instances, the ATV had to be driven out of the channel because of obstructions, they became too narrow, or because the banks were too high to exit from the wash. The vertical accuracy of the Trimble GPS unit is generally ±3m (±10 feet). Discrepancies were noted when comparing the track log elevations and the elevations of the contour mapping and it was determined that the track log elevations were unreliable for use in developing the channel profiles of the primary washes. Therefore, the channel profiles provided in this report (Appendix C) are compiled from the 10-foot contour mapping provided by the District. In many cases, knickzones, headcuts, or bedrock falls were noted in the field, but may not be defined on the profiles because the large contour interval is not conducive to delineating anything less than 20 feet high. Therefore, these features were identified on the profiles and an approximate elevation change is included.

In addition to maintaining a track log and assessing the channel conditions, field data sheets were filled out at various locations along the wash. The field data sheets included a cartoon sketch of the channel cross section, the waypoint and location of the cross section, a record of the presence, absence, and dimensions of various geomorphic features, vegetation types and density, the proximity to headcuts and knickzones where present, the presence or absence of caliche (see Section 7) in the channel bed, bedrock control, and a photograph log at each site. Where the washes were crossed by Sun Valley Parkway, culvert data sheets with similar information were also filled out. The streambed profiles, field data sheets, culvert data sheets, and the appropriate photos taken at each cross section for each of the primary washes are compiled in Appendix C.

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5. PIEDMONT LANDFORM DELINEATIONS AND VERIFICATION

Although the District has performed full piedmont landform delineation and stability assessments on a number of piedmont surfaces prior to this study using the methodology provided in the current version of the PFHAM (Hjalmarson 2003), the methodology has not been used to conduct assessments on areas similar in size to the combined area of Areas 3 and 4 of the BSV ADMS (184 mi^2). Therefore, the District determined that verification sites would be an appropriate means of fully evaluating and documenting in detail the characteristics of specific representative sites for each type of landform found on the piedmont. The detailed characteristics documented for each type of landform should be essentially similar for the same landform types found within the watershed.

Based on the District's requirements under Subtask 2.6.2.2, eight locations, two for each landform, were chosen as landform verification sites. The verification sites were chosen because there were discrepancies or contradictions in the characteristics that generally define the landform, several characteristics were not common to the landform, or the boundaries were not easily delineated or clearly definable. These sites were initially identified during the mapping effort in the office. For the verification sites that were mapped or delineated incorrectly, the landform or site was correctly identified based on the defining characteristics identified in the PFHAM, and the boundaries were properly delineated in the field by making the appropriate real-time corrections to the GIS database stored in the Trimble GeoXT handheld GPS unit.

Table 5.1 provides the description of each site and landform designation, including the latitude and longitude of each site. **Table 5.2** shows how each site was mapped relative to surficial geology (Field and Pearthree 1991), flood hazards (Field and Pearthree 1992), and soils (Hartman 1977). **Table 5.3** provides the drainage pattern and texture, the desert pavement and varnish development, and the vegetation for each verification site.

Table 5.1. Landform Verification Sites: Description, Landform, Latitude, and Longitude (Northing and Easting Coordinates are in State-Plane Arizona Central zone).

Site #	Description	Landform	Northing (ft)	Easting (ft)
1	Active alluvial fan south of the White Tank Fan (USGS Site 36)	Alluvial Fan	907260.60	484461.72
2	Inactive alluvial fan immediately south of Sun Valley Parkway	Alluvial Fan	966329.56	480823.51
3	Site is south of southern intersection of Sun Valley Parkway and Wagner Wash	Alluvial Plain	958546.01	464198.14
4	Site is south of Wagner Wash at the Hassayampa River	Alluvial Plain	942661.37	456163.98
5	Site is immediately south of USGS Site 39	Relict Fan	925808.36	474959.37
6	Site is west of Sun Valley Parkway, southwest of USGS Sites 38 & 39	Relict Fan	904417.67	460790.10
7	Site is southwest of north edge of White Tank Mountains, east of Sun Valley Parkway	Pediment	950524.26	478971.90
8	Site is north of the end of Buckeye FRS #2	Pediment	893537.00	491246.42

Table 5.2. Representative Landform Sites: Mapped Surficial Geology (Field and Pearthree 1991), Flood Hazards (Field and Pearthree 1992), and Soils (Hartman 1977).

Site #	Surficial Geology Mapping	Flood Hazard Mapping	NRCS Soils
1	Y2 – Late Holocene	H1 - Very High Hazard	Antho-Carrizo-Maripo Complex
2	Y2 - Late Holocene	H2 - Moderate Flood Hazard	Tremant Gravelly Loams
3	Y – Undifferentiated Holocene	I – Intermediate Flood Potential	Gilman Loams
4	Y1 – Late to early Holocene	Not Mapped	Antho Gravelly Sandy Loams
5	M1b – Mid to Late Pleistocene	L2 - Very Low Flood Potential	Carrizo Very Gravelly Sands
6	M1b – Mid to Late Pleistocene	L2 - Very Low Flood Potential	Pinamt-Tremant Complex
7	TK - Tertiary or Cretaceous intrusive and volcanic rocks	L2 - Very Low Flood Potential	Vaiva Very Gravelly Loams
8	X - Early Proterozoic gneiss and granite	B - Bedrock	Gunsight-Pinamt Complex

Table 5.3. Representative Landform Sites: Drainage Texture, Drainage Pattern, Desert Pavement and Varnish Development, and Vegetation.

Site #	Landform	Drainage Texture	Drainage Pattern	Desert Pavement and Varnish	Vegetation
1	Alluvial Fan	NA (indefinable on topo maps)	Distributary	None	Stippled pattern, scattered desert bushes and trees throughout
2	Alluvial Fan	Relatively constant	Distributary	None	Desert trees along main channels, abundant desert bushes, scattered saguaros
3	Alluvial Plain	NA	Tributary	None	Desert trees along small channels, abundant scattered desert bushes
4	Alluvial Plain	NA	Tributary	None	Desert trees along small channels, abundant scattered desert bushes
5	Relict Fan	Decreasing upslope	Tributary	Moderately Developed	Relatively sparse desert trees and bushes only concentrated along channels
6	Relict Fan	Decreasing upslope	Tributary	Well Developed	Desert trees and bushes only concentrated along channels, no saguaros, abundant creosote
7	Pediment	NA (indefinable on topo maps)	Tributary	NA	Desert trees and bushes concentrated along entrenched channels
8	Pediment	NA (insufficient contours)	Tributary	Not Observed*	Desert trees and bushes concentrated along entrenched channels

*Site #8 – not accessible for field verification

5.1 Verification Site #1

Verification Site #1 (Appendix A, Sheet 5) is an alluvial fan region located south of the White Tank Fan (USGS Site 36). **Figure 5.1** provides a view looking downstream from the hydrographic apex of the active portion of the alluvial fan. The site has all the characteristics of an active alluvial fan including multiple unconfined flow paths, extensive sedimentation, and little to no soil development or desert pavement.

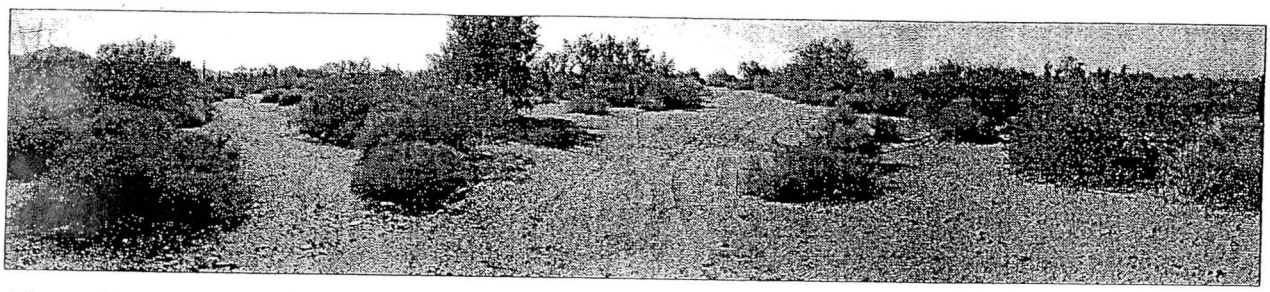

Figure 5.1. View looking downstream at Verification Site #1 south of USGS Site 36 alluvial fan.

5.2 Verification Site #2

Verification Site #2 (Appendix A, Sheet 1) is an alluvial fan region located in the northern part of Area 4 just south of Sun Valley Parkway (**Figure 5.2**). Initially this region was mapped as an alluvial fan, but then changed to relict fan because the topography appeared to have deeper drainage incision than that usually associated with alluvial fan areas. However, this was again reversed and mapped as an alluvial fan based on the surficial geology map showing this area as being late Holocene in age and having a relatively constant drainage texture (**Figure 5.3**).

The field verification of Site #2 also confirmed the presence of the weakly developed Tremant soil, a lack of significant desert pavement (**Figure 5.4**), and areas of confined and sheet flow. The Tremant Series is a weakly developed gravelly loam soil that is slightly effervescent and is found on fan terraces, stream terraces or relict basin floors.

5.3 Verification Sites #3, #4, and #5

Verification Site #3 (Appendix A, Sheet 1) is an alluvial plain region that is immediately south of the southern intersection of Wagner Wash and Sun Valley Parkway. Verification Site #4 (Appendix A, Sheet 2) is an alluvial plain region that is south of Wagner Wash near the Hassayampa River. These sites have the characteristic flat relief, little or no desert pavement, small or poorly defined throughflow channels, and a stippled vegetative pattern resulting from regularly spaced creosote bushes.

Verification Site #5 (Appendix A, Sheet 2) is a relict fan region that is immediately south of USGS Site 39. The drainage texture (contour crenulations versus elevation) for Verification Site #5 is shown in **Figure 5.5**. This site has the characteristics typical of a relict fan including entrenched throughflow streams, desert pavement and desert varnish on interfluves, well-developed soils, and abundant cactuses.

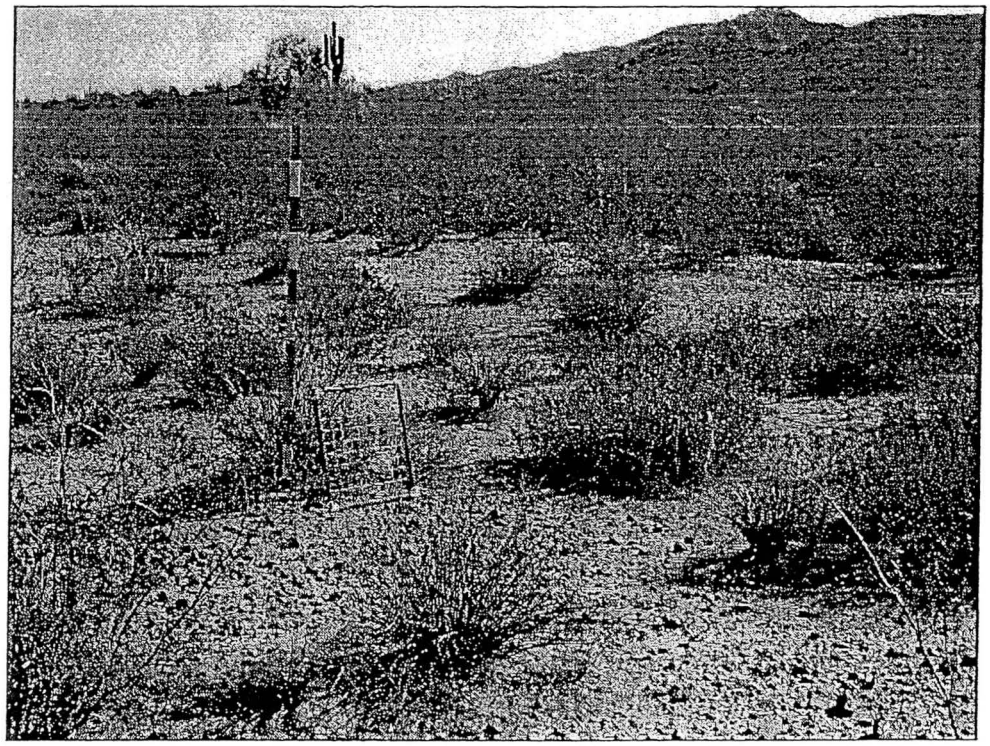

Figure 5.2. View looking east showing inactive fan surface of Verification Site #2.

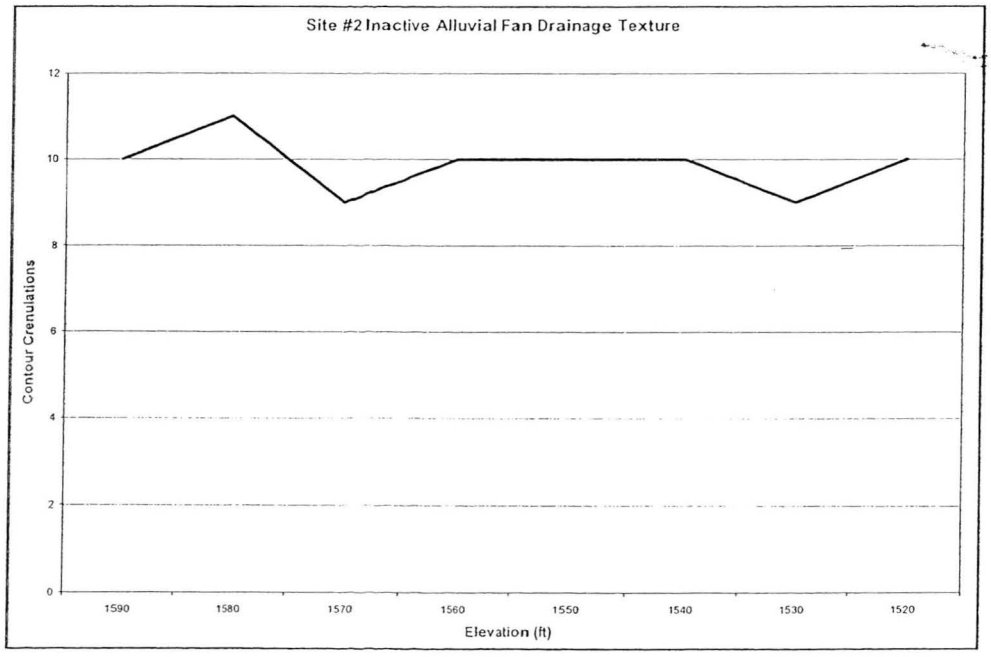

Figure 5.3. Drainage texture of Verification Site #2.

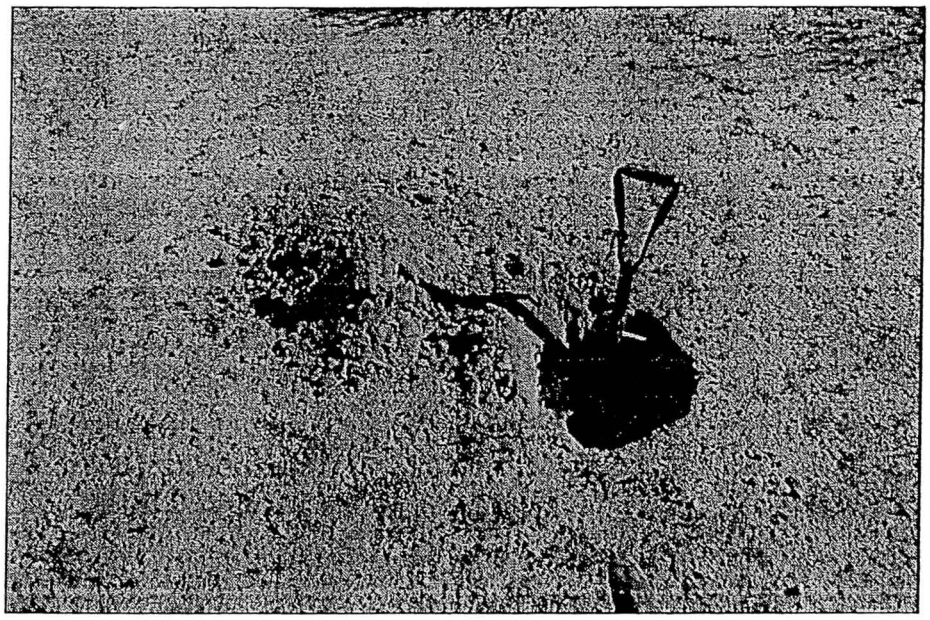

Figure 5.4. Tremant soils of the inactive alluvial fan at Verification Site #2.

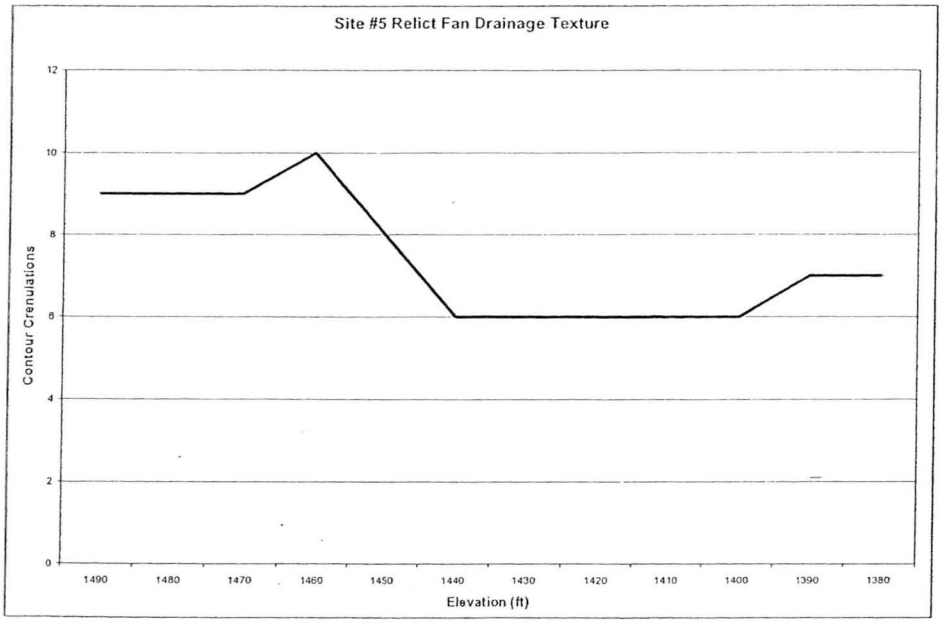

Figure 5.5. Drainage texture at Verification Site #5.

5.4 Verification Sites #6, #7, and #8

Verification Site #6 (Appendix A, Sheet 4) is a relict fan region that is west of Sun Valley Parkway and southwest of USGS Sites 38 and 39. The drainage texture of Site #6 is shown in **Figure 5.6**. This site has the characteristics typical of a relict fan including entrenched throughflow streams, desert pavement and desert varnish on interfluves, well-developed soils, and abundant cactuses. **Figure 5.7** shows the well-developed desert pavement in this area. **Figure 5.8** provides a close-up of the desert pavement on the relict fan surface, as well as some stones coated with well-developed desert varnish.

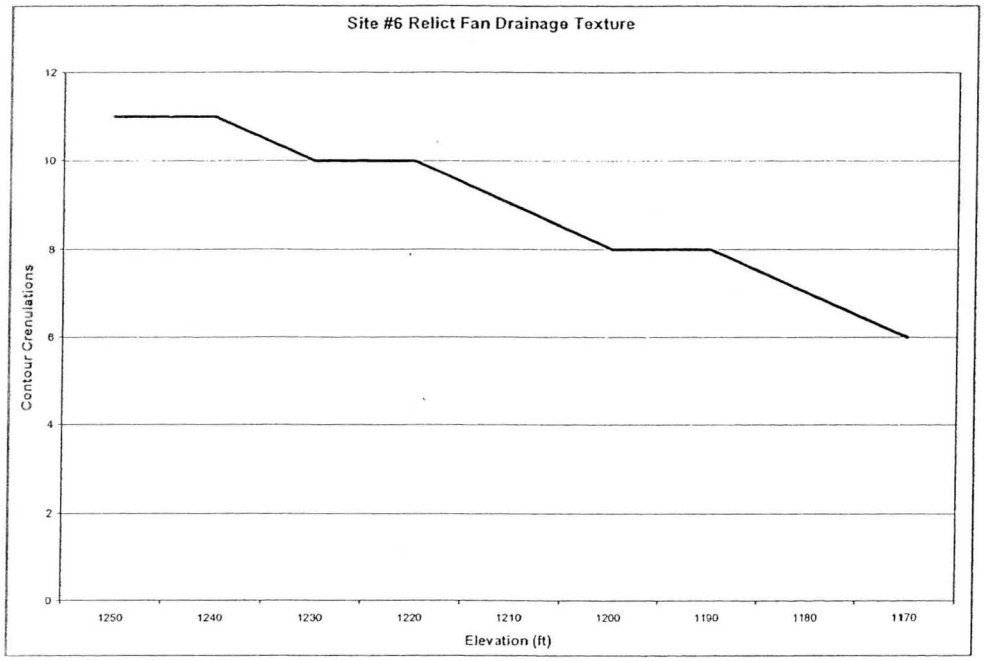

Figure 5.6. Drainage texture at Verification Site #6.

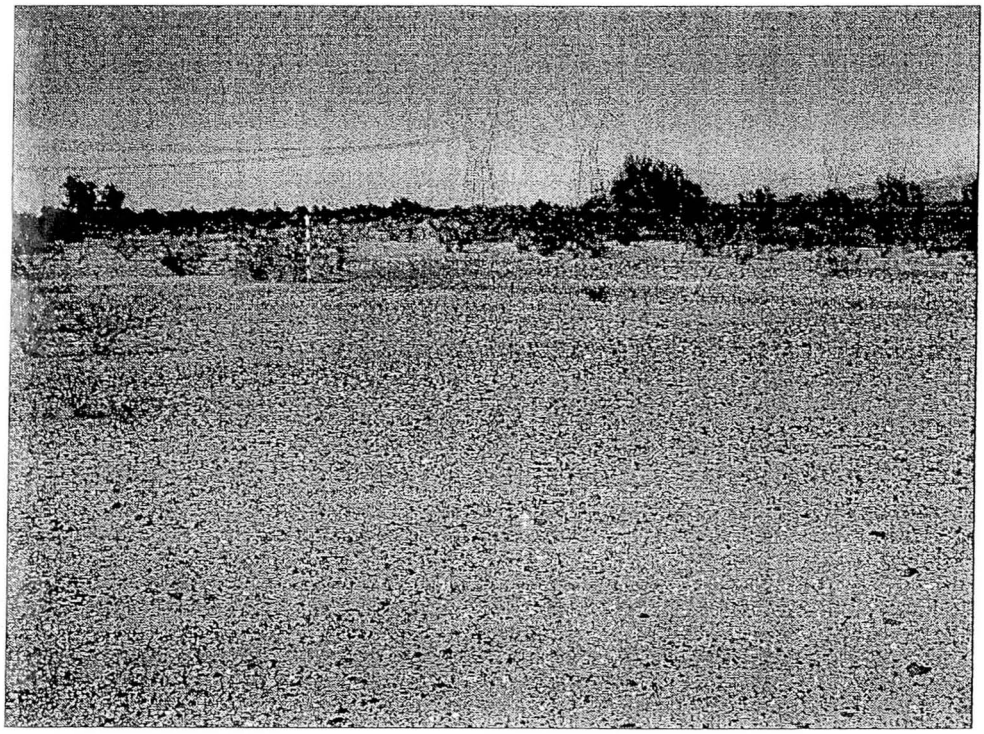

Figure 5.7. Well-developed desert pavement and desert varnished stones on a relict fan surface (Verification Site #6).

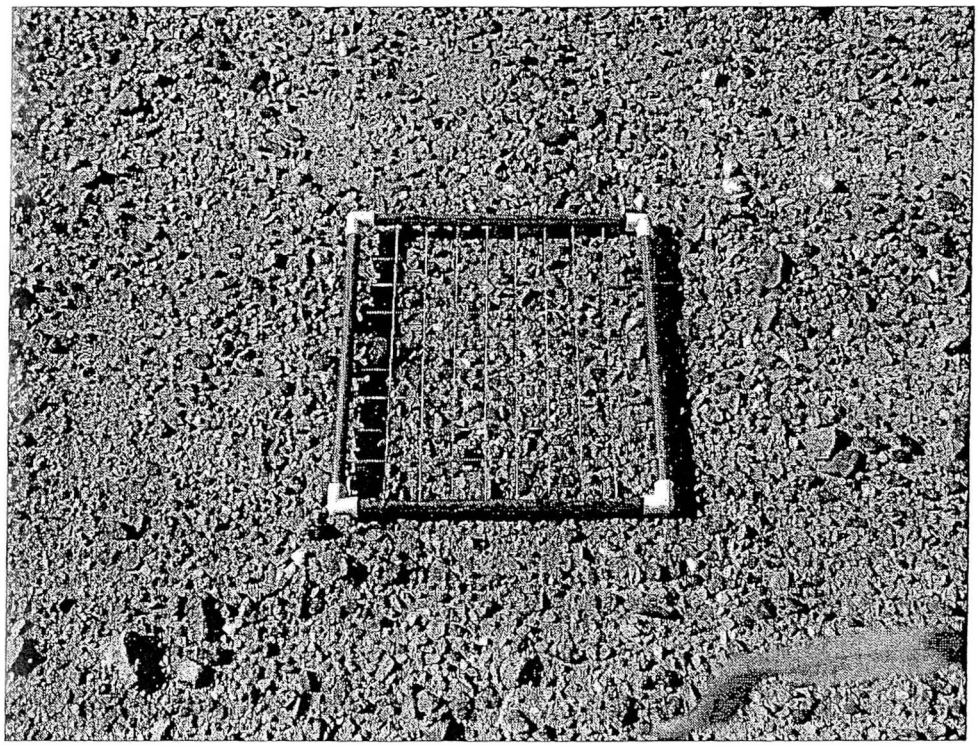

Figure 5.8. Close-up of desert pavement and stones with well-developed desert varnish on a relict fan surface (Verification Site #6). Internal grid squares are 2-inch square.

Verification Site #7 (Appendix A, Sheet 1) is a pediment region that is east of Sun Valley Parkway and southwest of the north edge of the White Tank Mountains (**Figure 5.9**). Verification Site #8 (Appendix A, Sheet 5) is a pediment region that is north of the west end of Buckeye FRS #2. Both sites have the typical characteristics of pediments including extensive shallow bedrock mantled with a thin and discontinuous veneer of alluvium, exposed bedrock along deeply entrenched tributary channels, extensive desert pavement and varnish on interfluves, and abundant cactuses.

5.5 Summary

The lateral limits of the four principle piedmont landforms were delineated for the Buckeye/Sun Valley area using the Stage 1 Analysis defined in the PFHAM (Hjalmarson 2003). The landforms were identified and mapped in-house using geologic, flood hazard, topographic, and soils maps as well as aerial photography. A total of eight landform sites were identified for verification, two from each landform type. Seven of the sites were visited in the field to document and verify the characteristics for each landform type. Where there were discrepancies or contradictions in the characteristics that generally define the landform, where several characteristics were not common to the landform, or where the boundaries were not easily delineated or clearly definable, the landform or site was correctly identified based on the defining characteristics identified in the PFHAM, and the boundaries were properly delineated in the field and changes were made to the GIS database. Of the 184 mi^2 of total area mapped, 4.46 mi^2 are mapped as pediment surfaces, 34.6 mi^2 are mapped as alluvial plains, 38.26 mi^2 are mapped as alluvial fan surfaces, 79.14 mi^2 are mapped as relict fan surfaces, and 27.49 mi^2 are mapped as bedrock. The landform mapping has been provided to the District in ArcGIS format and is included as Appendix A of this report.

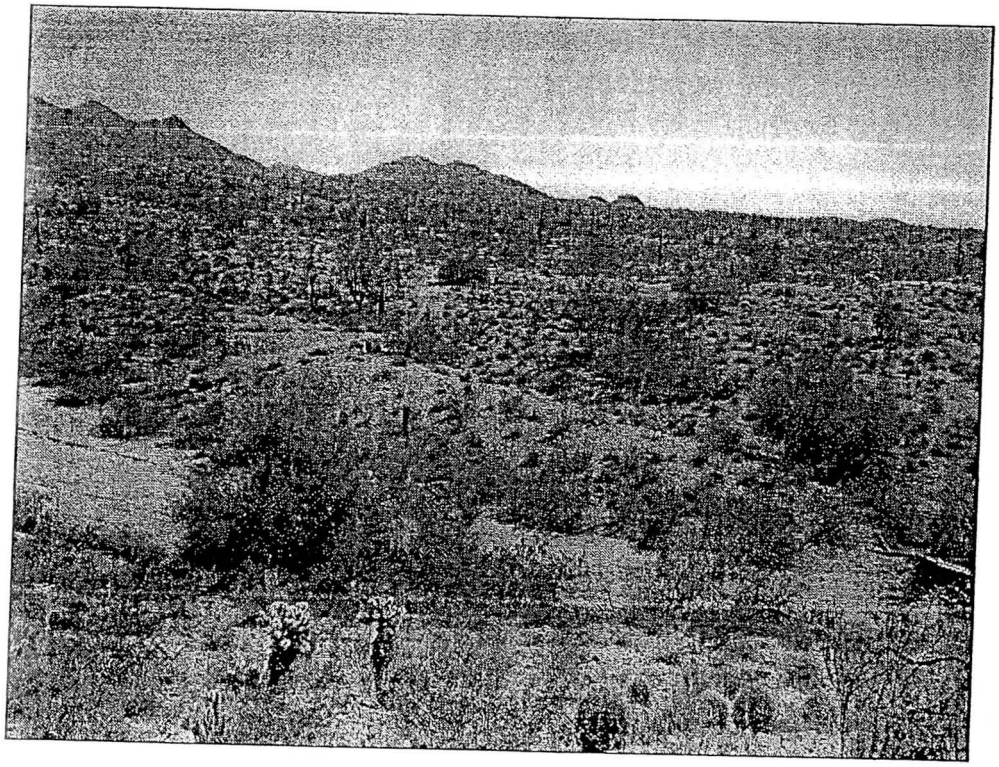

Figure 5.9. View looking south showing the pediment surface at Verification Site #7.

6. LANDFORM STABILITY ASSESSMENT

Under the PFHAM Stage 2 methodology, the nature and location of flood hazards on the four major piedmont landforms are to be identified and classified as either *stable* or *unstable* hazards. The SOW states that stable and unstable areas of the piedmont landforms will be defined using the PFHAM Stage 2 analysis. Common areas identified as stable under the PFHAM Stage 2 methodology are:

- Hillsides
- Relict fans
- Pediment
- Inactive alluvial fan
- Throughflow channel with a movable bed
- Some sheet flow and split flow areas

Common unstable areas identified under the PFHAM Stage 2 methodology are:

- Active alluvial fans
- Some multi-channel areas below active alluvial fans
- Alluvial plain with active sedimentation
- Multi-channel pocket along a throughflow cannel
- Area of recent sediment deposition and erosion
- Split flow channel where flow is wide and shallow
- Areas of low relief where minor development such as roads can divert floodwater and cause significant erosion in areas otherwise not susceptible to flood hazard

It should be noted that, although the PFHAM distinguishes between active alluvial fans and other unstable areas, they are lumped together under the *unstable* designation. Although the SOW states that "potentially unstable areas include active or inset alluvial fans with unstable channel reaches as well as areas with high potential for avulsion or significant shift," the SOW does not specifically state that active fans should be mapped separately from other unstable areas. However, we have accommodated the District's request to map the active fans separately. As a result, the mapping effort includes the delineation of active alluvial fans separately from other unstable areas, and the other unstable areas are reaches of washes that we have further delineated and classified as having a moderate or high geomorphic hazard. This more detailed delineation is not defined or included in the PFHAM Stage 2 methodology. The plates in Appendix B show the unstable areas mapped in red. Areas in solid red represent active alluvial fans and open areas outlined in red represent other unstable areas.

6.1. Active Alluvial Fans

Numerous areas were identified as being unstable, active alluvial fans. **Table 6.1** provides the location of the hydrographic apex for each identified site in northing-easting (State Plane NAD83) and latitude-longitude coordinates. **Table 6.2** displays the direction of flow and the area of instability in acres for each of the unstable areas. Studies were previously completed on the White Tank Fan (Hjalmarson and Kemna 1991; Hjalmarson 1994; Wood-Patel 2000), also known as USGS Site 36, and the Skyline Wash Fan and tributaries (DEI-HEC 1997). Other previously identified active fans include USGS Sites 37, 38, and 39 (Hjalmarson and Kemna 1991; Hjalmarson 1994). Although a discussion of these areas will not be included in this document, they were examined and their characteristics were field checked during the field verification of unstable areas.

Table 6.1. Location of the Hydrographic Apex for each Mapped Unstable Area.

Unstable Site	Description	North (ft)	East (ft)	Lat. (dd)	Long. (dd)
BSV Site 1	Small fan north of the White Tank Mountains (Eastern Area 4)	960445	487493	33.638	112.615
BSV Site 2	Small fan north of the White Tank Mountains (Eastern Area 4)	959472	490774	33.636	112.604
BSV Site 3	Fan in southern part of Area 4, SE of Wagner Wash	956199	482420	33.626	112.631
BSV Site 4	Small fan north of BSV Site 6	940436	472030	33.583	112.665
BSV Site 5	Inset fan north of USGS Site 39	939479	478896	33.580	112.643
BSV Site 6	Small fan on east side of Sun Valley Parkway and NW of USGS Site 39	929797	468825	33.554	112.675
BSV Site 7	Small fan south of USGS Site 36	907676	484235	33.493	112.624
BSV Site 8	Small fan southeast of BSV Site 7	901188	486927	33.475	112.615
BSV Site 9	Small inset fan near the start of Buckeye FRS #1	886736	489291	33.436	112.607
BSV Site 10	Small fan near middle of Buckeye FRS #2	889640	496686	33.444	112.583
BSV Site 11	Small fan east of BSV Site 10 near middle of Buckeye FRS #2	889831	498447	33.444	112.577
BSV Site 12	Small fan south of BSV Site #8 and north of BSV Site #9	893687	487162	33.455	112.615
BSV Site 13 E	Small fan north of BSV Site #3 and east of BSV Site #13 West	958787	482281	33.634	112.632
BSV Site 13 W	Small fan north of BSV Site #3 and west of BSV Site #13 East	958834	481148	33.634	112.636
BSV Site 14	Small fan SW of USGS Site 39, west of Sun Valley Parkway	920817	464522	33.529	112.689
BSV Site 15	Small Fan west of BSV #16, southwest of USGS Site 38	914052	465260	33.510	112.687
USGS Site 36 (White Tank Fan)	Hassayampa Tributary #1	914760	484982	33.513	112.622
USGS Site 37	Hassayampa Tributary #2	918160	484049	33.522	112.625
USGS Site 38	Hassayampa Tributary #3	920143	475736	33.527	112.653
USGS Site 39	Hassayampa Tributary #4	926491	476428	33.545	112.650
Skyline Wash Fan	Skyline Wash	900475	504260	33.474	112.559
Skyline Wash Tributary Fan	East Tributary to Skyline Wash Fan	897517	512488	33.466	112.532

Table 6.2. Direction of Flow on the Active Alluvial Fan and the Area of Instability of Each Region.

Unstable Region	Direction of Fan	Area of Instability (Acres)
BSV Site 1	S to N	93.94
BSV Site 2	S to N	37.03
BSV Site 3	E to W	142.23
BSV Site 4	NE to SW	59.36
BSV Site 5	E to W	129.27
BSV Site 6	NE to SW	27.32
BSV Site 7	N to S	200.76
BSV Site 8	NE to SW	72.55
BSV Site 9	NW to SE	10.40
BSV Site 10	NW to SE	51.93
BSV Site 11	NW to SE	24.97
BSV Site 12	N to S	26.20
BSV Site 13 E	SE to NW	16.42
BSV Site 13 W	SE to NW	27.15
BSV Site 14	NE to SW	50.93
BSV Site 15	NE to SW	24.12
USGS Site 36 (White Tank Fan)	NE to SW	898.64
USGS Site 37	NE to SW	466.22
USGS Site 38	NE to SW	348.17
USGS Site 39	NE to SW	394.09
Skyline Wash Fan	NW to SE	546.66
Skyline Wash Tributary Fan	NW to SE	61.95

6.1.1 BSV Site 1

The active alluvial fan at BSV Site 1 is located at the northwest end of the White Tank Mountains and just south of Sun Valley Parkway. It is 93.9 acres in size and extends from south to north roughly two-thirds of a mile. **Figure 6.1** shows the fan area downstream of the hydrographic apex. **Figure 6.2** shows the upper (southern) portion of the active fan area.

Although mapped as a high flood hazard in the AZGS flood hazard mapping (Field and Pearthree 1992), this area, including BSV Site 3, is part of a larger region that is mapped as a young surface (late-Holocene) in the AZGS surficial geology mapping (Field and Pearthree 1991). The aerial photography shows a lighter colored surface texture in this area as well as distributary and uncertain flow paths. The topography indicates a relatively undissected surface with very little, if any, incision in the small channels. The vegetation on the aerial photography in this small area has a "salt-and-pepper" appearance and the field investigation verified that there are abundant desert bushes, scattered desert trees, and the occasional saguaro cactus. The soils were poorly developed, which is also indicative of a youthful surface.

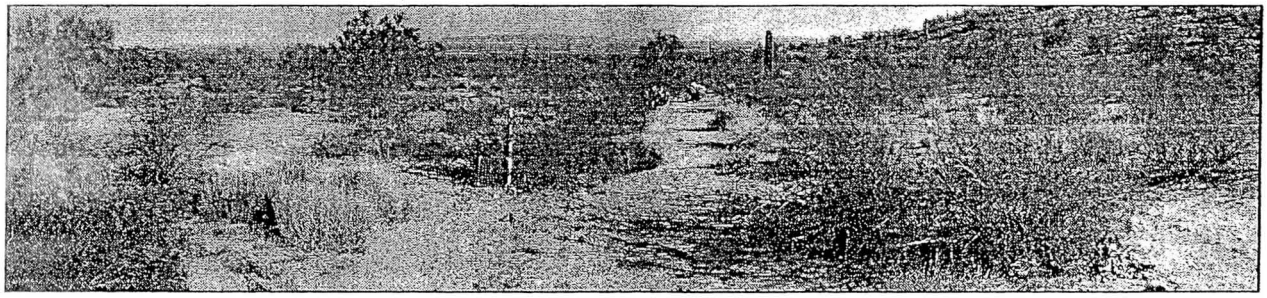

Figure 6.1. View looking downstream from the apex of the active alluvial fan at BSV Site 1.

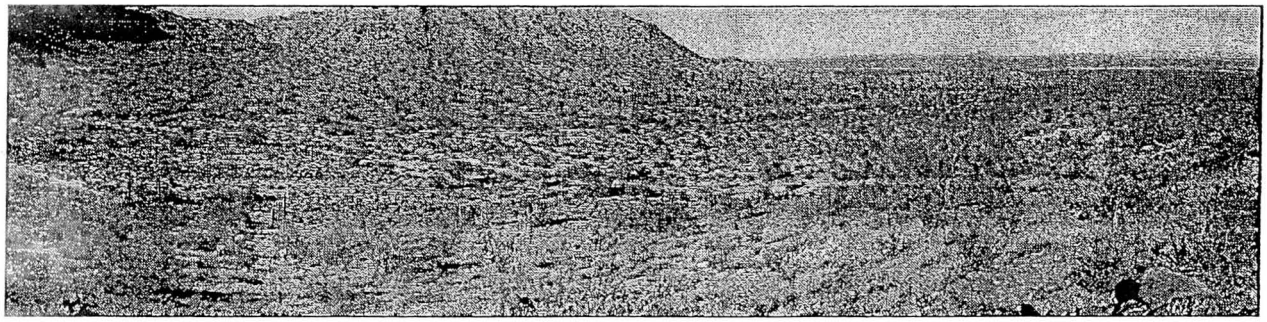

Figure 6.2. Panoramic view to northwest from hill overlooking BSV Site 1. Flow is left to right.

6.1.2 BSV Site 2

The active alluvial fan at BSV Site 2 is also located at the northwest end of the White Tank Mountains and just south of Sun Valley Parkway, but is directly southeast of BSV Site 1. It is 37 acres in size and extends roughly two-thirds of a mile from south to north. **Figure 6.3** shows the fan area looking downstream from the middle of the unstable zone.

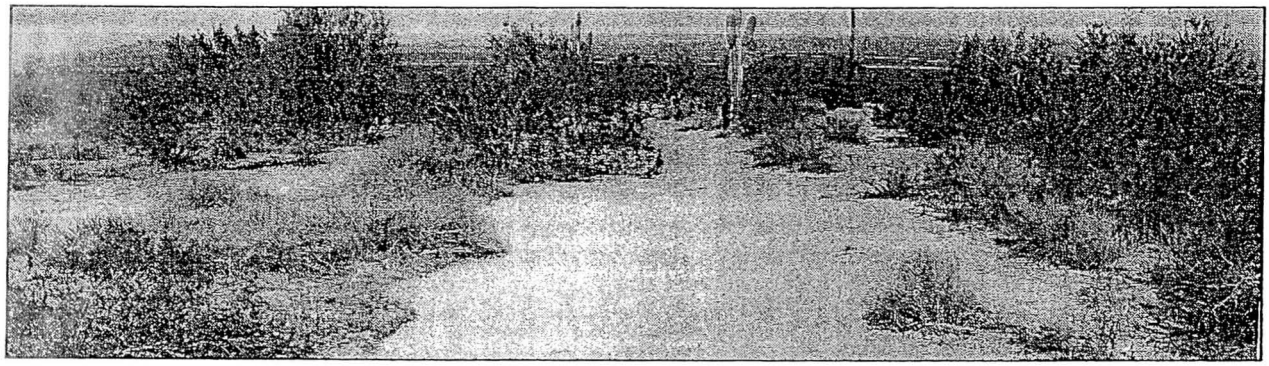

Figure 6.3. View looking downstream from the middle of BSV Site 2.

The BSV Site 2 area is mapped as a high flood hazard in the AZGS flood hazard mapping (Field and Pearthree 1992). Part of the larger area discussed above, this area is mapped as a young surface (late-Holocene) in the AZGS surficial geology mapping (Field and Pearthree 1991). The aerial photography shows a lighter colored surface texture in this area as well as a zone of uncertain flow paths. The topography indicates a relatively undissected surface with almost no

incision of the main channel. The vegetation has the salt and pepper appearance on the aerial photography. The trees are denser near the upstream half (upstream of the road), whereas the trees north (downstream) of the road are more highly concentrated along the few small channels. Saguaros are scattered throughout the downstream portion, north of the road. The field examination of the site indicated that the downstream boundary was too far north; therefore, it was shifted farther south. Downstream (north) of the adjusted boundary, the channels are well defined and there is a noticeable change in the vegetation that delineates the edge of the unstable area.

6.1.3 BSV Site 3

The active alluvial fan at BSV Site 3 is located southeast of Wagner Wash and east of Sun Valley Parkway near the northwestern margins of the White Tank Mountains. The area is 142.2 acres in size and extends over a mile from east to west. **Figure 6.4** shows the fan downstream of the hydrographic apex.

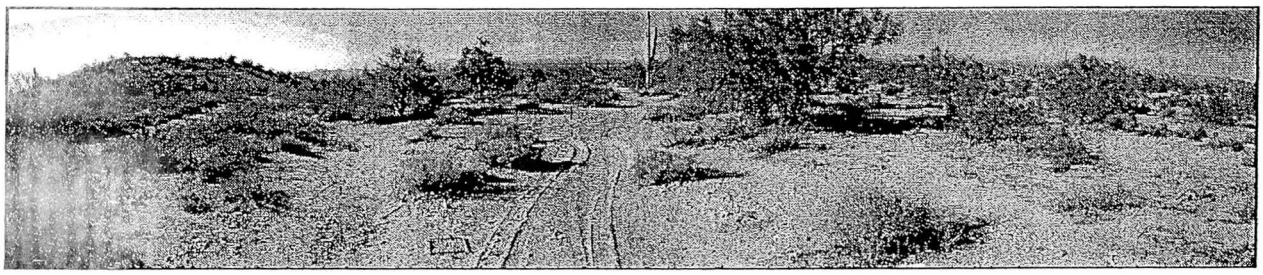

Figure 6.4. View looking downstream from the hydrographic apex of BSV Site 4.

The BSV Site 3 is an area of undifferentiated Holocene surfaces (Field & Pearthree 1991) indicating a young surface that may be subject to frequent flooding. The upper portion is mapped as a high flood hazard (Field and Pearthree 1992) while the two downstream-most (western) arms of the active area are in a region that is rated as an intermediate flood hazard. The downstream areas show no evidence of recent flooding, but could potentially become flood prone with a few minor changes in channel configuration. The topographic analysis and site visit revealed no apparent incision in the area that is delineated as active. The active area originally was mapped with the lower left (southern) arm extending farther downstream and converging with the main region of activity, but the field reconnaissance revealed that this arm is entrenched where it skirts the south side of a large hill. At the northwestern edge of the active area, the active portion was extended further west because of the extent of the uncertain flow paths and a re-evaluation of the region following a review of the aerial photography.

6.1.4 BSV Site 4

The active alluvial fan at BSV Site 4 is located less than a mile east of the north-south extension of the Sun Valley Parkway and half a mile north of BSV Site 5. The area is 59.4 acres in size and extends roughly two-thirds of a mile from northeast to southwest. **Figure 6.5** shows the fan looking downstream from the middle of the active zone. This is an area mapped as middle-Pleistocene (Field and Pearthree 1991), which is indicative of an older surface. The area is also mapped as a very low flood hazard (Field and Pearthree 1992). The soils maps did not indicate an active area, since it was mapped as Carrizo-Gunsight. However, an analysis of the aerial photography and the topography indicated that this small area should be delineated as

unstable. The aerial photography reveals uncertain flow paths, stippled vegetation and scattered desert trees in the active zone, as well as very little incision of the main channel. This site represents a problem area because the surficial and flood hazard mapping, as well as the soils mapping, do not match with the aerial photography and topographic indicators or the results of the field investigation. It is possible that the relatively small size of the area precluded sufficiently detailed mapping that would have delineated the site during previously conducted mapping, particularly since the area is along a soils boundary.

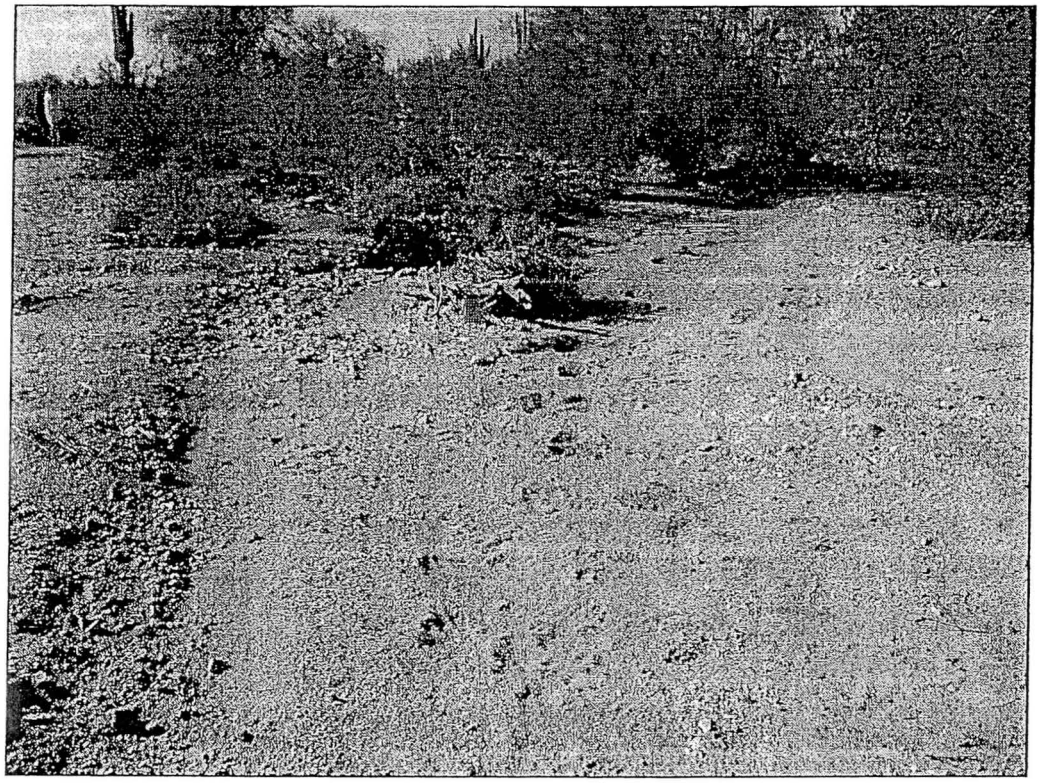

Figure 6.5. View looking downstream from the middle of the active zone of BSV Site 4.

During the field investigation, the downstream boundary of the active area was extended further west and the area downstream of the active area was reclassified as an inactive alluvial fan as opposed to relict fan. **Figure 6.6** shows the middle portion of the unstable area with abundant desert bushes and scattered trees, as well as a lack of well-defined flow paths.

6.1.5 BSV Site 5

The active alluvial fan at BSV Site 5 is located a mile and a half east of Sun Valley Parkway and less than a half mile south of BSV Site 4. It is 129.3 acres in size and extends about a mile and a half from northeast to southwest. **Figure 6.7** shows the fan downstream of the hydrographic apex. The BSV Site 5 area is an active fan that could be classified as an inset alluvial fan since it is relatively entrenched within its active boundaries.

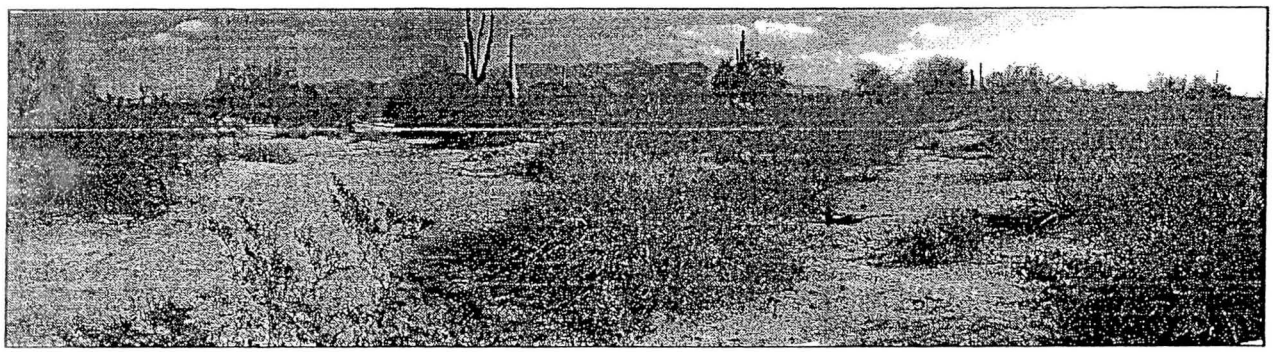

Figure 6.6. View looking upstream from the middle of BSV Site 4.

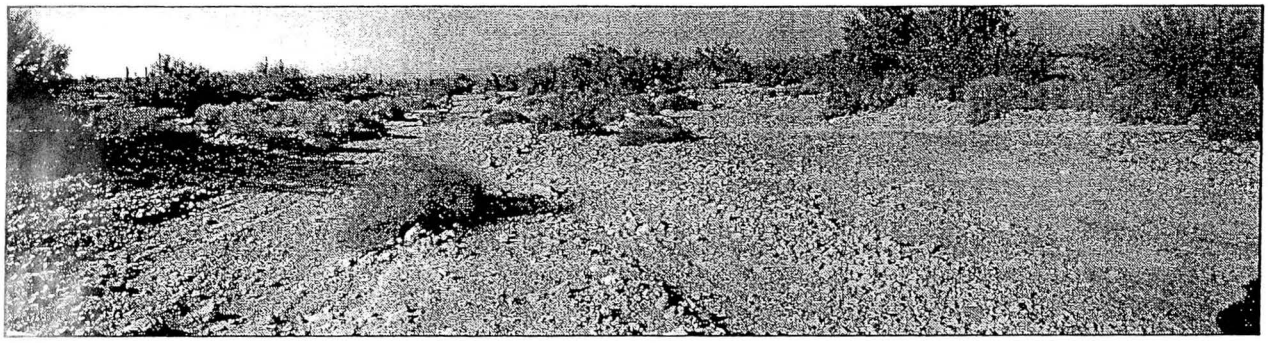

Figure 6.7. View looking downstream from the hydrographic apex of the fan at BSV Site 5.

The active zone has two main branches around a bedrock formation that causes the flow split. **Figure 6.8** provides a view from the main diffluence looking downstream. The main flow branches north and south of the bedrock formation are mapped as a high flood hazard (Field and Pearthree 1992). Both main branches were also classified as late Holocene in the surficial geology mapping (Field and Pearthree 1991). Initially the south branch was delineated as inactive and stable downstream of the eastern bedrock formation. Although there was some uncertainty in the flow path and the flood hazard and soils maps suggested a potentially unstable zone along the south branch, the site investigation revealed that the south branch contains an entrenched channel downstream of the bedrock formation and that portion of the south branch remained classified as inactive and stable. An analysis of the aerial photography confirmed the uncertain flow paths and revealed scattered desert trees and bushes throughout the north branch.

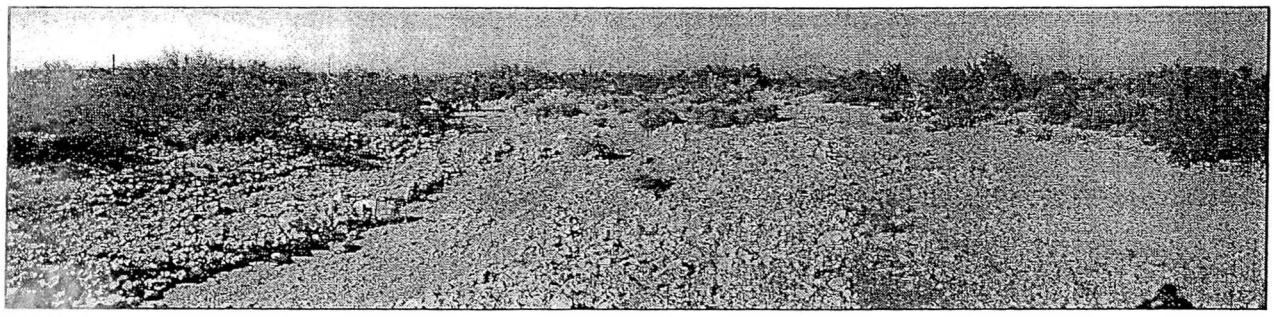

Figure 6.8. View looking downstream from the main diffluence of the inset fan at BSV Site 5.

6.1.6 BSV Site 6

The active alluvial fan at BSV Site 6 is located on the east side of the Sun Valley Parkway and about one and a half miles northwest of USGS Site 39. It is 27.3 acres in size and extends about one-third of a mile from northeast to southwest and is on the upper end of White Tank Wash. **Figure 6.9** shows the fan upstream of the Sun Valley Parkway crossing.

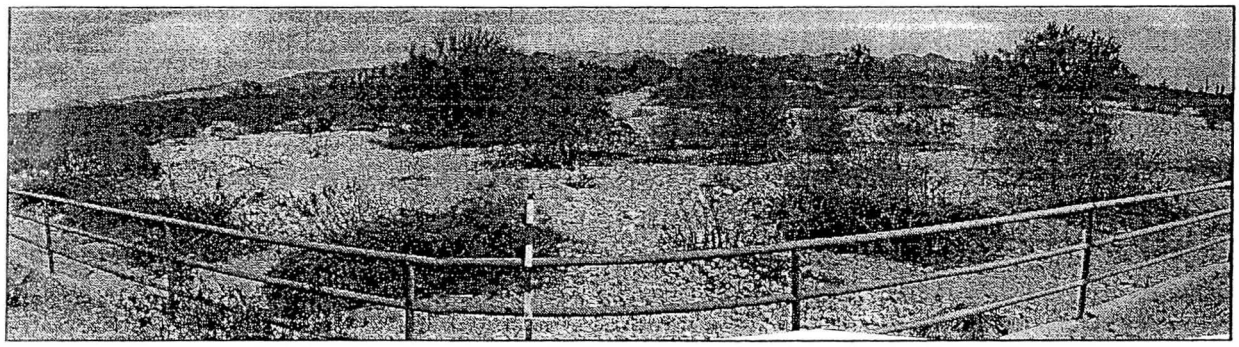

Figure 6.9. Panoramic view looking upstream from the Sun Valley Parkway culvert crossing showing the active fan at BSV Site 6.

The BSV Site 6 area is mapped as a high flood hazard (Field and Pearthree 1992) and late Holocene in age (Field and Pearthree 1991), which is indicative of a younger surface. The fan is relatively small compared to other fans in the area. The aerial photography (**Figure 6.10**) clearly shows the fan shape of the active area and the significant difference in the vegetation patterns relative to the bounding relict fan surfaces. Vegetation is densest along the north side of the fan and where a small tributary intersects the north side of the fan near the highway. Two culverts pass flows from the fan under the Sun Valley Parkway.

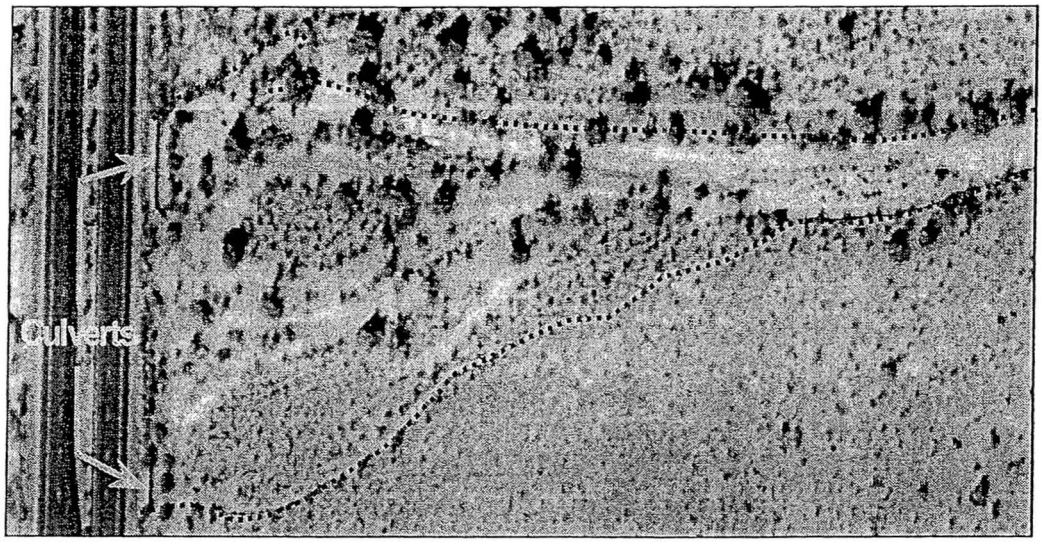

Figure 6.10. Aerial photo (2003) of the active alluvial fan of BSV Site 6 on the upstream side of Sun Valley Parkway. Site is bound by an inactive fan to the south and a relict fan to the north.

This area was initially mapped as an inactive fan, but the site classification was revised to active alluvial fan. The active fan of BSV Site 6 is creating significant sedimentation problems at the culvert. Five of the six 3-ft high by 10-ft wide barrels of the culvert are currently nearly half full with sediment (**Figure 6.11**). The bed level of the wash about 100 feet upstream is at approximately the same elevation as the top of the culvert.

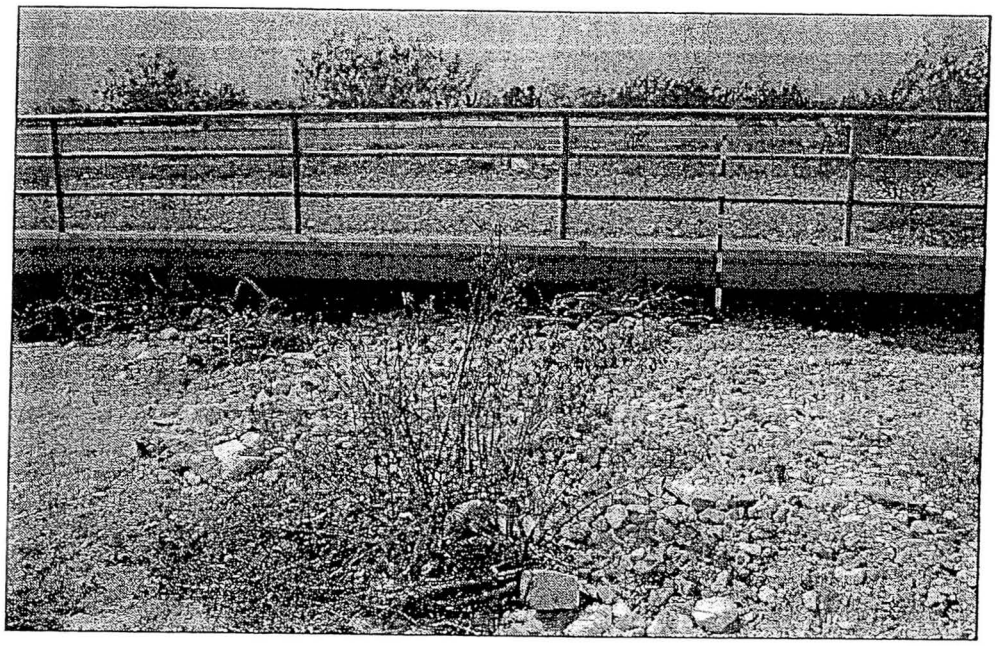

Figure 6.11. View looking downstream toward the Sun Valley Parkway culvert crossing showing the extensive aggradation of the culvert barrels from the active fan at BSV Site 6.

6.1.7 BSV Site 7

The active alluvial fan BSV Site 7 is located nearly three miles east of Sun Valley Parkway and south of the hydrographic apex of USGS Site 36 (White Tank Fan). The fan, which has three branches, is 200.8 acres in size and extends about a mile from north to south down the east branch, two-thirds of a mile down the middle branch, and a mile down the west branch. **Figure 6.12** shows the fan downstream of the hydrographic apex.

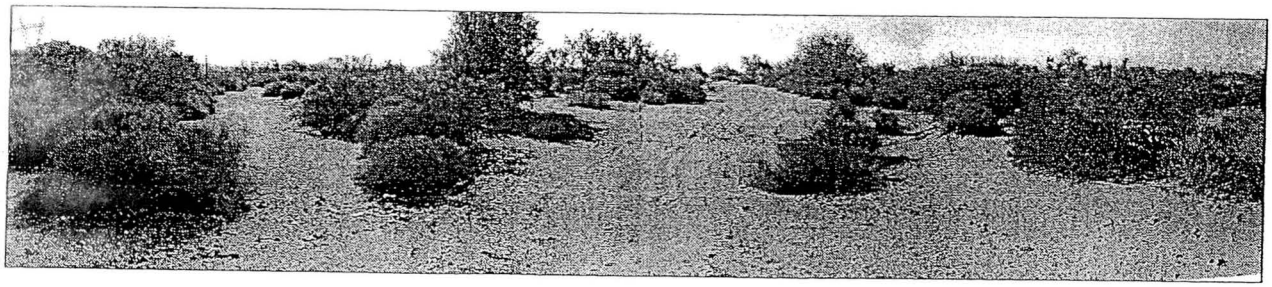

Figure 6.12. View looking downstream from the hydrographic apex at BSV Site 7.

The BSV Site 7 area has three branches running north to south. It is mapped as a high flood hazard (Field and Pearthree 1992) at the upstream region near the hydrographic apex, mapped as a moderately high flood hazard in the west and east branches, and as an intermediate flood hazard in the smaller middle branch. The BSV Site 7 area is mapped as a mix of late Holocene and undifferentiated Holocene in age (Field and Pearthree 1991). The area is very young and extremely prone to unconfined flooding. The topographic analysis indicates almost no incision of the channels and very few contour crenulations. Vegetation is scattered desert trees and bushes with numerous saguaros near the downstream ends of the western and eastern branches.

Following the field investigation, the mapped eastern branch was modified at the southeast corner and along the western side since the channels in these areas were incised and the land surfaces were higher in elevation relative to the mapped active areas. The aerial photography was then re-examined to further assist in the adjustment to the boundaries. Following the site investigation, the central and western branches were adjusted slightly based on a re-examination of the aerial photography.

6.1.8 BSV Site 8

The active alluvial fan at BSV Site 8 is located roughly one and a half miles south of BSV Site 7. It is 72. 5 acres in size and extends about a half mile from northeast to southwest. **Figure 6.13** shows the fan downstream of the hydrographic apex.

Figure 6.13. View looking downstream from the hydrographic apex at BSV Site 8.

The BSV Site 8 area is mapped as a high flood hazard along the upstream outer boundaries and a moderately high flood hazard in the central portion of the unstable area (Field and Pearthree 1992). The entire unstable zone is classified as undifferentiated Holocene (Field and Pearthree 1991). The field investigation of the area confirmed these characteristics, as well as also containing a mix of small, very young but inactive surfaces. The topographic analysis indicates a very smooth and undissected surface with no incision of the channels. However, there are significant elevation changes and large, identifiable islands in the area that the 10-foot contour mapping does not show. The fan-shaped area, which has a lighter shading than the surrounding areas, is clearly visible in the aerial photography. The aerial photography shows a lack of well-defined flow paths and a speckled vegetation pattern with scattered trees. This area was delineated as being active and unstable, but the field investigation identified a mix of unstable and stable areas.

6.1.9 BSV Site 9

The active alluvial fan at BSV Site 9 is a very small unstable area that terminates at Buckeye FRS #1 approximately one-quarter mile west of the eastern end of the structure. The site is only 10.4 acres in size and extends about 1,000 feet from northwest to southeast. **Figure 6.14** shows the inset fan downstream of the hydrographic apex, as viewed from a hill on the western side of the fan, where it expands out into Buckeye FRS #1.

Figure 6.14. View east-southeast from a hill overlooking the inset fan at BSV Site 9.

The inset fan of BSV Site 9 is one of the smallest active areas identified during the mapping effort. The fan is mapped as having a very high flood hazard (Field and Pearthree 1992) and is classified as late to early Holocene in age (Field and Pearthree 1991). The aerial photography shows the associated dense vegetation and the lighter colored, distinct wedge-shape of the fan. The abundant desert bushes are evident in Figure 4.16, but there are very few trees on the fan except along the edge. This area is also bounded by old alluvial fan surfaces giving it the inset appearance. The active zone is bounded on the right (southwest) by bedrock.

6.1.10 BSV Site 10

The active alluvial fan at BSV Site 10 is an unstable area that terminates at Buckeye FRS #2 approximately one mile east of the western end of the structure. The site is 51.9 acres in size and extends roughly one half mile from northwest to southeast. See **Figure 6.15** shows the fan downstream of the hydrographic apex.

The BSV Site 10 area is mapped as a high flood hazard (Field and Pearthree 1992) and late Holocene in age (Field and Pearthree 1991). The fan is relatively small compared to most of the active areas to the north. The aerial photography clearly shows the fan shape of the active area and the significant difference in the vegetation patterns relative to the bounding relict fan surfaces; the vegetation within the relict fan area is sparse except along the channel margins, whereas the vegetation in the active zone of BSV Site 10 is abundant and scattered. Two main channels form the east and west boundaries and the distributary and undefined flow paths between the two channels are evident in the aerial photography. The topographic analysis indicates very few visible contour crenulations with little or no incision of the channels except the eastern channel.

Figure 6.15. View looking downstream from the hydrographic apex at BSV Site 10.

6.1.11 BSV Site 11

The active alluvial fan at BSV Site 11 is an unstable area that terminates at Buckeye FRS #2 directly east of BSV Site 10. The BSV Site 11 area shares part of its western boundary with the BSV Site 10 area. The BSV Site 11 area is 25 acres in size and extends roughly one-third mile from northwest to southeast. **Figure 6.16** shows the fan downstream of the hydrographic apex.

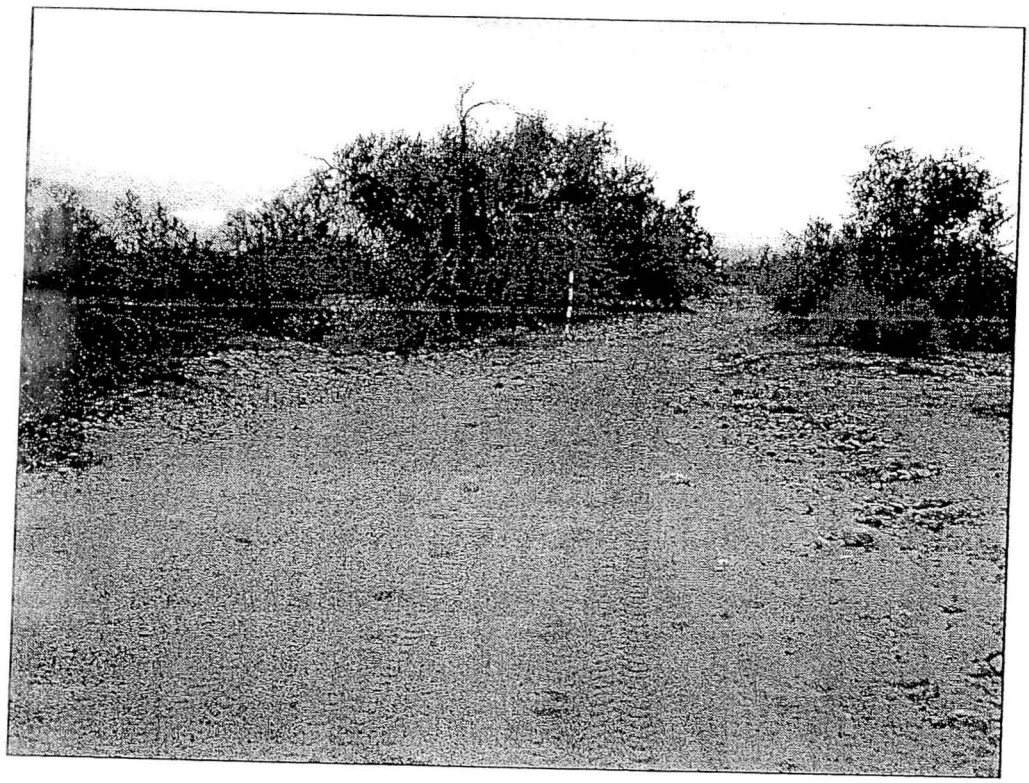

Figure 6.16. View looking downstream from the hydrographic apex at BSV Site 11.

BSV Site 11 is mapped as a high flood hazard (Field and Pearthree 1992) and late Holocene in age (Field and Pearthree 1991). The BSV Site 11 fan is smaller and similar in appearance to the BSV Site 10 fan. The aerial photography also shows the fan shape of the active area and the significant difference in the speckled pattern and abundance of the vegetation. Like BSV Site 10, there are two main channels that form the east and west boundaries of the area and the undefined flow paths between the two channels are readily apparent in the aerial photography. The topographic analysis identified no contour crenulations across the active area except those associated with the incised bounding channels.

6.1.12 BSV Site 12

The small active alluvial fan at BSV Site 12 is an unstable area that is located on the same primary wash as BSV Site 9 and is situated approximately half way between BSV Site 8 and BSV Site 9. The BSV Site 12 area is only 26.2 acres in size and extends roughly a half-mile from north to south.

BSV Site 12 is mapped as a very low flood hazard (Field and Pearthree 1992) and middle- to late-Pleistocene in age (Field and Pearthree 1991). The BSV Site 12 fan is smaller and similar in appearance to the BSV Site 4 fan. The elongate fan shape of the active area and the significant difference in the speckled pattern and abundance of the vegetation is evident on aerial photography. Like many of the other active fan sites, there are two main channels that form the east and west boundaries of the area and the undefined flow paths between the two channels is readily apparent in the aerial photography. The topographic analysis identified no contour crenulations across the active area except those associated with the incised bounding channels.

6.1.13 BSV Site 13 West

The small active alluvial fan at BSV Site 13 West is an unstable area that is east of Wagner Wash, south of Sun Valley Parkway, and just north of BSV Site 3. The designation of this site as an active alluvial fan is considered borderline because it does not have all the characteristics of an active fan nor for active alluvial fan flooding. The active fan designation will remain until further detailed studies are conducted to determine if the site is indeed an active alluvial fan.

BSV Site 13 West is just west of BSV Site 13 East. BSV Site 13 East connects to BSV Site 13 West along the north arm (**Figure 6.17**). The BSV Site 13 West area is 27.1 acres in size and extends roughly one-half mile from southeast to northwest.

The majority of BSV Site 13 West is mapped as undifferentiated Holocene surfaces (Field and Pearthree 1991) indicating a young surface that may be subject to frequent flooding. The very upper portion is mapped as a low flood hazard (Field and Pearthree 1992) while the rest of downstream portion of the active area is in a region that is rated as an intermediate flood hazard. **Figure 6.18** shows the channel reach downstream of the hydrographic apex as viewed from a hill overlooking the active fan. In the field, the down-fan and cross-fan profiles appeared convex in shape.

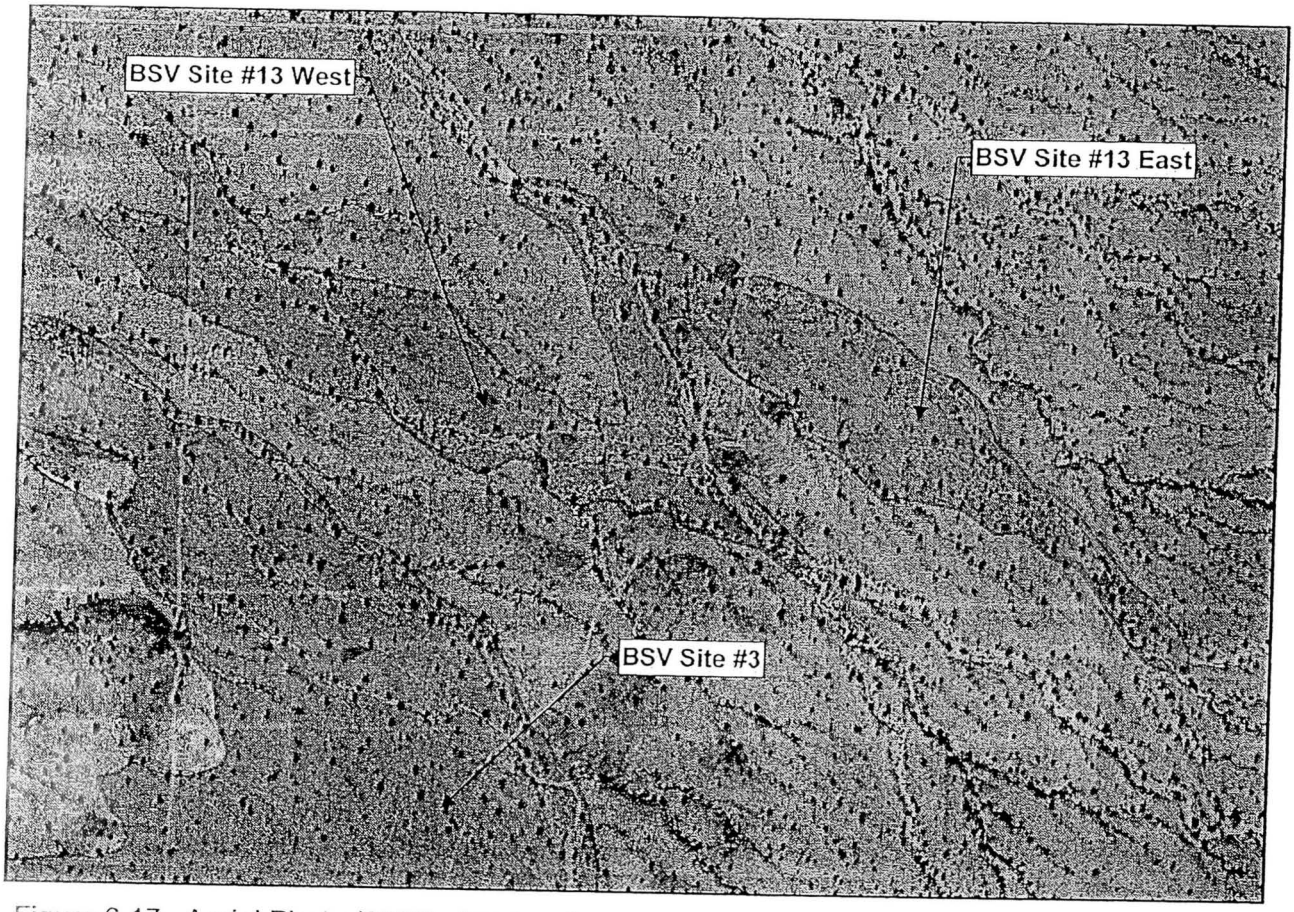

Figure 6.17. Aerial Photo (2003) showing the active fan areas of BSV Sites 13 West and East.

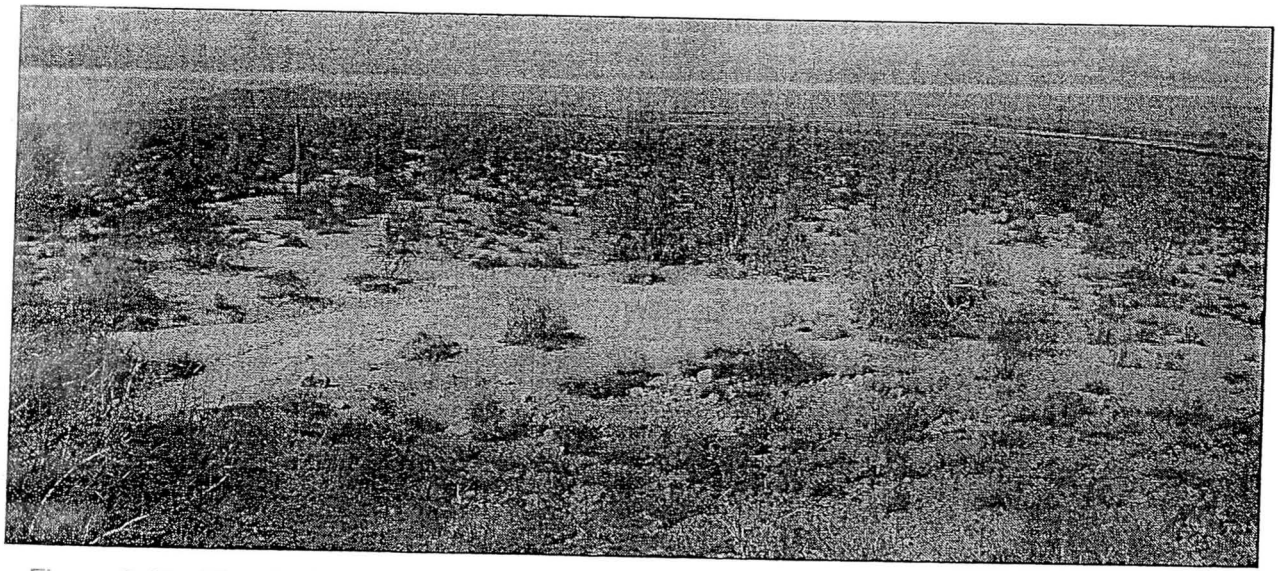

Figure 6.18. View looking west from a hill overlooking the downstream end of the active fan at BSV Site 13 West.

6.1.14 BSV Site 13 East

The small active alluvial fan at BSV Site 13 East is an unstable area that is east of Wagner Wash, south of Sun Valley Parkway and northeast of BSV Site 3. The designation of this site as an active alluvial fan is considered borderline because it does not have all the characteristics of an active fan nor for active alluvial fan flooding. The active fan designation will remain until further detailed studies are conducted to determine if the site is indeed an active alluvial fan.

BSV Site 13 East is just east of BSV Site 13 West. BSV Site 13 East connects to BSV Site 13 West's north arm (Figure 6.17). The BSV Site 13 East area is 16.4 acres in size and extends roughly one-half mile from southeast to northwest.

The area of BSV Site 13 East is mapped as a middle- to late-Pleistocene surface (Field and Pearthree 1991) indicating an older surface that is typically a relict fan landform. The upper portion is mapped as a low flood hazard (Field and Pearthree 1992) while a small part of the downstream portion of the active area is in a region that is classified as an intermediate flood hazard. **Figure 6.19** shows the channel area looking downstream from the hydrographic apex of the active fan. In the field, the down-fan and cross-fan profiles appeared convex in shape.

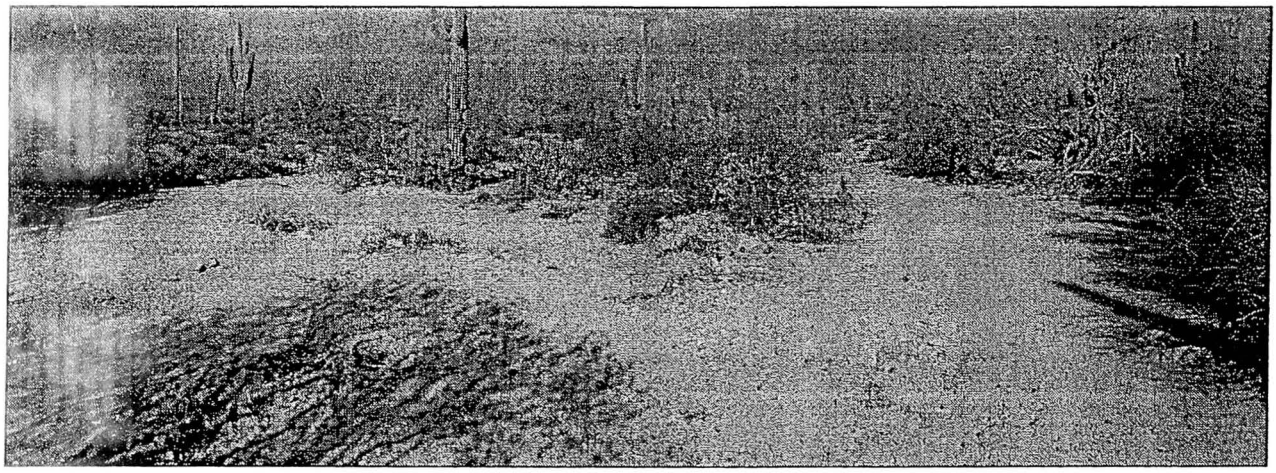

Figure 6.19. View looking downstream from the hydrographic apex of BSV Site 13 East fan.

6.1.15 BSV Site 14

The small active alluvial fan at BSV Site 14 is an unstable area that is located west of Sun Valley Parkway and one mile southwest of USGS Site 39. The BSV Site 14 area is 50.9 acres in size and extends roughly 4,300 feet from northeast to southwest.

BSV Site 14 is mapped as a very high flood hazard (Field and Pearthree 1992) and late Holocene in age (Field and Pearthree 1991). Although the area was originally mapped as an inactive alluvial fan surface surrounded by relict fan surfaces, an examination of the 1953 aerial photo (**Figure 6.20**) indicates that the area was an active fan at that time, probably as a result of the major storm event of 1951. The current aerial photography shows the elongate fan shape of the active area, which also still shows minor signs of continued active alluvial fan processes. A field reconnaissance later confirmed that this area is an active alluvial fan. **Figure 6.21** is a view looking downstream from near the apex of the active fan.

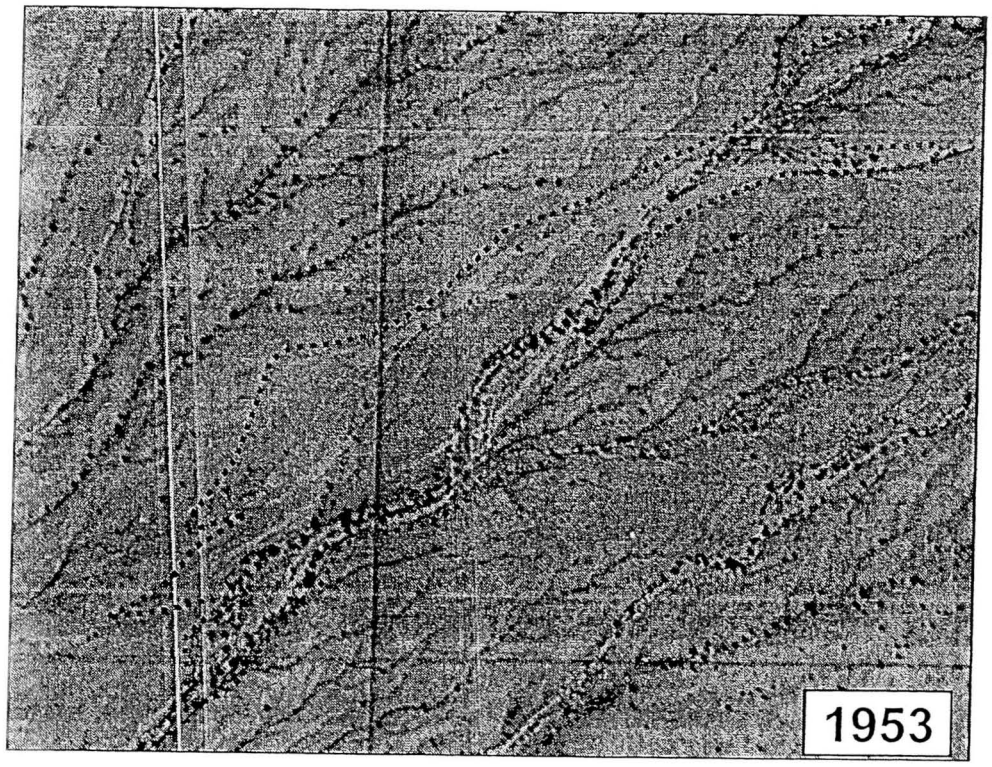

Figure 6.20. Aerial photograph from 1953 showing the active fan area of BSV Site 14.

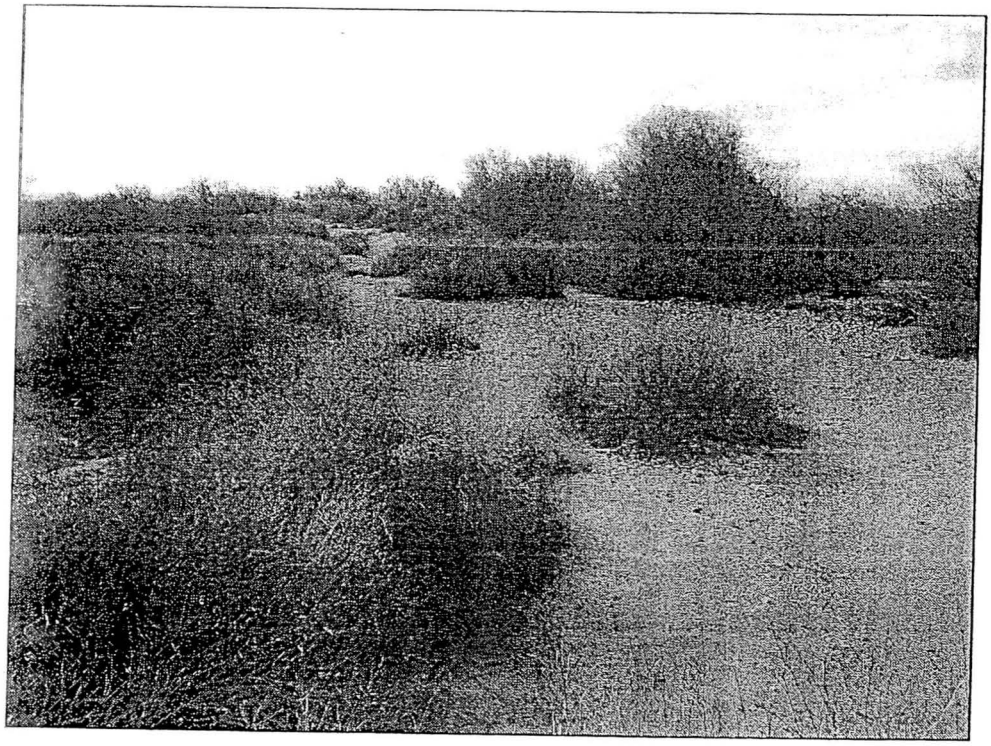

Figure 6.21. View downstream from the apex of the active fan at BSV Site 14.

6.1.16 BSV Site 15

The small active alluvial fan at BSV Site 15 is an unstable area that is located west of Sun Valley Parkway, just west of BSV Site 16, and one mile southwest of USGS Site 38. The BSV Site 15 area is 23.6 acres in size and extends roughly 3,000 feet from northeast to southwest.

BSV Site 15 is mapped as a very high flood hazard (Field and Pearthree 1992) and late Holocene in age (Field and Pearthree 1991). Although the surface encompassing this area was originally mapped as an inactive alluvial fan surface, an examination of the 1953 aerial photo (**Figure 6.22**) indicates that the area was an active fan at that time, probably as a result of the major storm event of 1951. The current aerial photography shows the elongate fan shape of the active area, which contains numerous well defined flow paths, but also still shows a few signs of continued active alluvial fan processes. A field reconnaissance later confirmed that this area is an active alluvial fan. **Figure 6.23** is a view looking downstream from near the apex of the active fan.

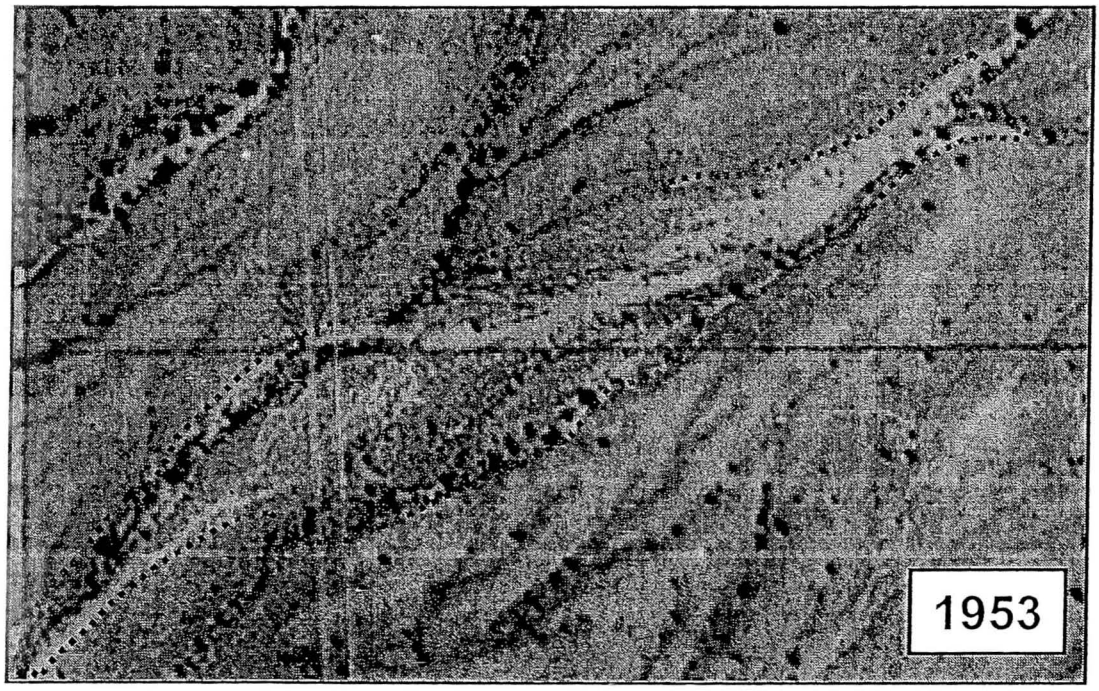

Figure 6.22. Aerial photograph from 1953 showing the active fan area of BSV Site 15.

6.1.17 USGS Site 36 (White Tank Fan)

The USGS Site 36 active alluvial fan, also known as the White Tank Fan, is an unstable area that is located directly south of USGS Site 37 and is three miles east of Sun Valley Parkway. The White Tank Fan has been mapped in detail and its characteristics have been well documented in an approximate floodplain delineation study conducted by Wood-Patel (2001). The fan is the largest active fan in the area at more than 898.6 acres in size and it extends about two miles from northeast to southwest. **Figure 6.24** shows the fan downstream of the hydrographic apex.

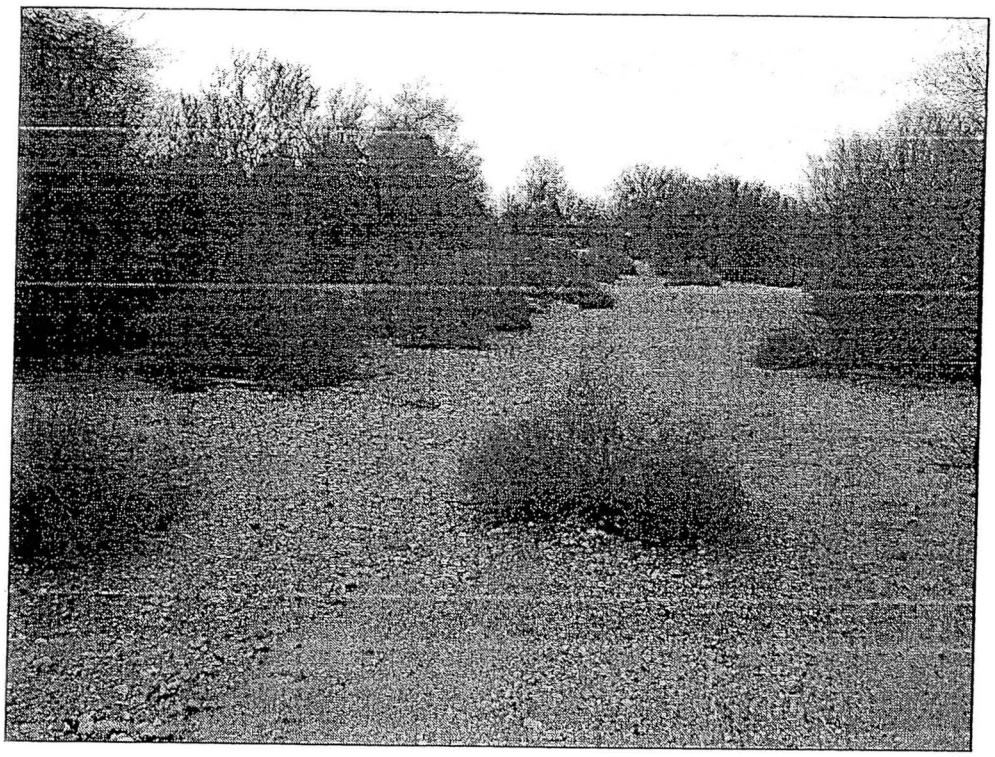

Figure 6.23. View downstream from the apex of the active fan at BSV Site 15.

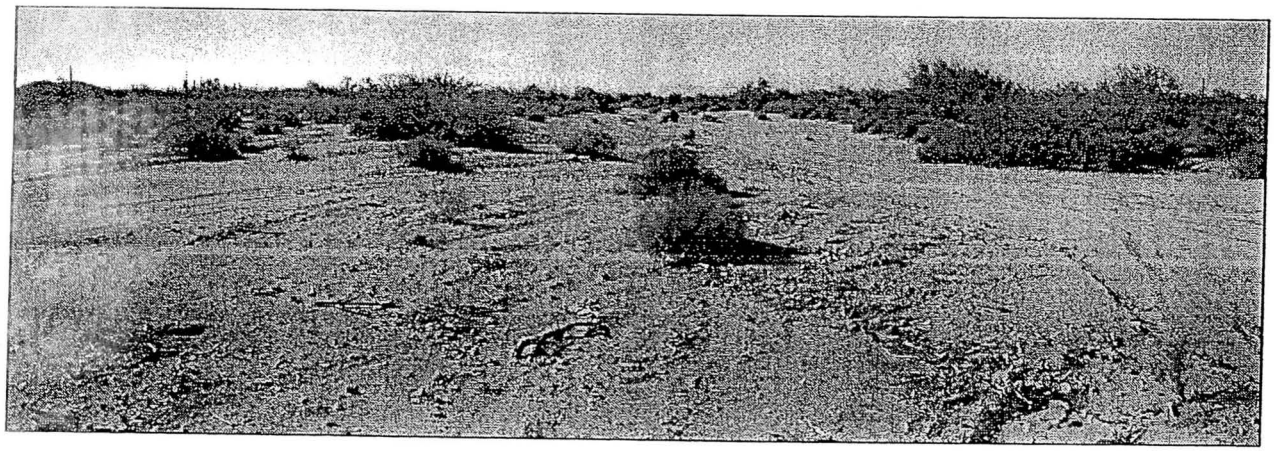

Figure 6.24. View looking downstream from the hydrographic apex of the active White Tank Fan (USGS Site 36).

6.1.18 USGS Site 37

The USGS Site 37 active alluvial fan is an unstable area that is located directly north of the White Tank Fan (USGS Site 36) and is three miles east of Sun Valley Parkway. The USGS Site 37 fan was previously identified as Hassayampa Tributary #2 (Hjalmarson and Kemna 1991; Hjalmarson 1994). The site extends about two miles from northeast to southwest. **Figure 6.25** shows the fan downstream of the hydrographic apex.

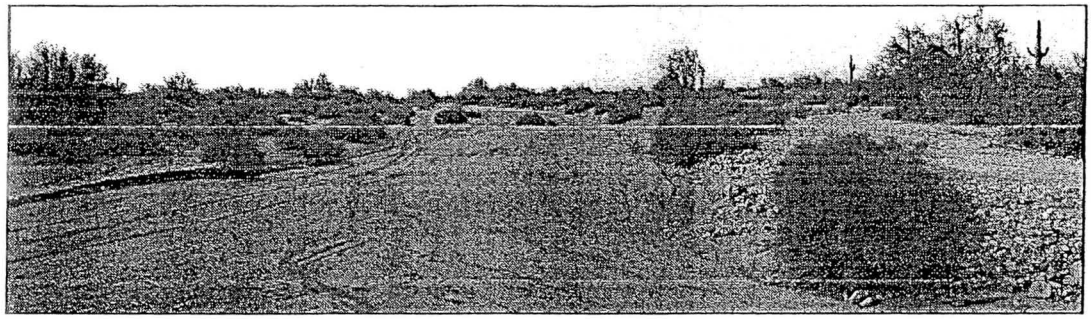

Figure 6.25. View looking downstream from the hydrographic apex at USGS Site 37.

The USGS Site 37 active area is the third largest active site in this area spanning 466.2 acres. Only the Skyline Wash Fan and the White Tank Fan are larger. The area is mapped almost entirely as a late Holocene surface, except for two smaller areas that are mapped as late to early Holocene (Field and Pearthree 1991). USGS Site 37 is also mapped almost entirely as a high flood hazard except for the areas mapped as late to early Holocene, which are classified as an intermediate flood hazard (Field and Pearthree 1992). The distributary flow pattern and undefined flow path areas are readily visible on the aerial photography. The topographic analysis reveals a wide, undissected landscape with very few contour crenulations and almost no channel incision. There are two main arms of instability at the lower end of the active area.

6.1.19 USGS Site 38

The USGS Site 38 active alluvial fan is an unstable area that is located northwest of USGS Site 37 and terminates to the west at the Sun Valley Parkway. The apex of the site is one and one half miles east of the Sun Valley Parkway. The USGS Site 38 fan was previously identified as Hassayampa Tributary #3 (Hjalmarson and Kemna 1991; Hjalmarson 1994). The site is 466.2 acres in size and extends almost two miles from northeast to southwest. **Figure 6.26** shows the fan downstream of the hydrographic apex.

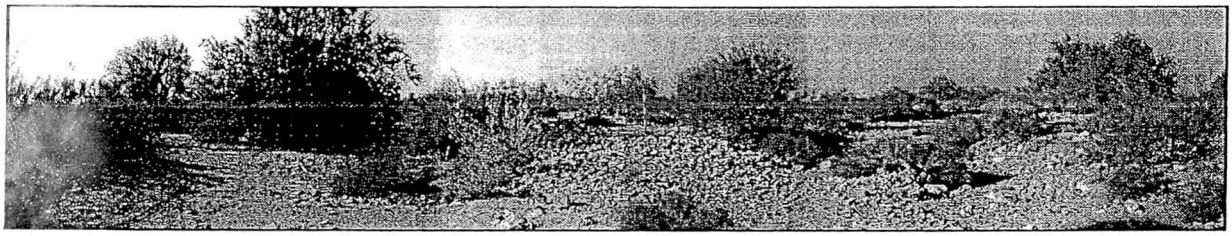

Figure 6.26. View looking downstream from the apex of USGS Site 38.

The unstable portion of USGS Site 38 covers 348.2 acres. Except for two smaller areas that are mapped as late to early Holocene in age, most of the area is mapped as late Holocene in age (Field and Pearthree 1991). The USGS Site 38 area is split by the Sun Valley Parkway with an eastern portion and a western portion that is split into two branches (**Figure 6.27**). In the upstream (eastern) portion, the northwest half of the area is delineated as late Holocene in age, while the southeast half is delineated as late to early Holocene in age (Field and Pearthree 1991). The two downstream (western) branches are mapped as late Holocene in age (Field and Pearthree 1991). Relative to the flood hazard mapping (Field and Pearthree 1992), in the upstream (eastern) portion, the northwest half of the area is mapped as a high flood hazard, while the southeast half of the area is mapped as an intermediate flood hazard. The two downstream (western) branches are mapped as high flood hazards (Field and Pearthree 1992).

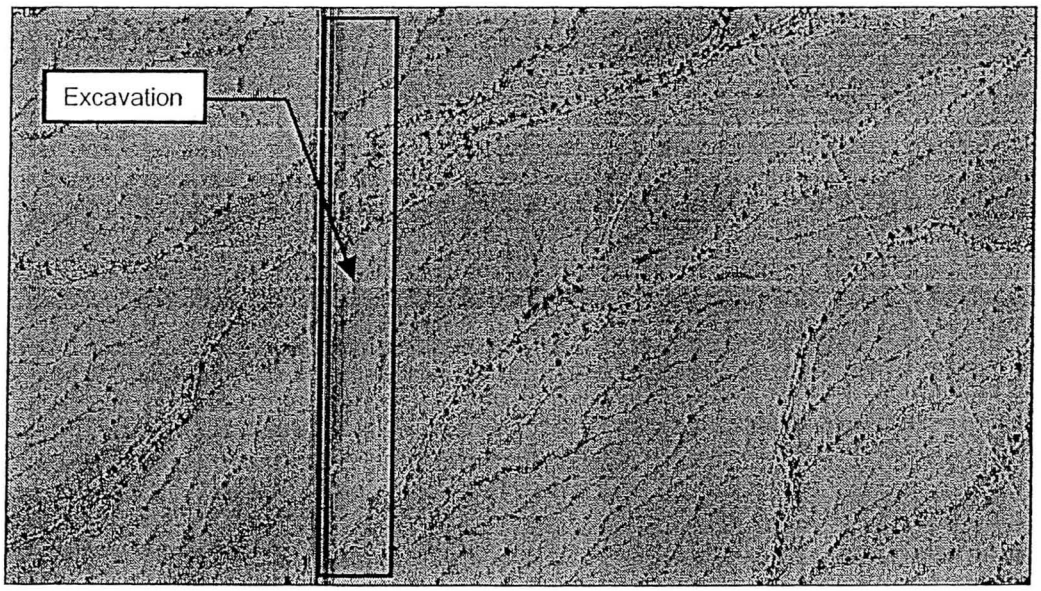

Figure 6.27. Aerial photo (2003) showing the mapped active fan (purple), inactive fan (green), and relict fan (orange) areas at USGS Site 38. Note the apparent excavation area along the east side of Sun Valley Parkway.

The unstable area of the USGS Site 38 active alluvial fan appears to have a narrower active zone relative to the other USGS sites in the current aerial photography (2003), with desert trees confined mainly to the margins of the primary channels. The site is a distributary flow zone with areas of undefined flow paths, but the channels are slightly more incised than those at other sites. The vegetation patterns are identifiably different from the areas delineated as relict fan and as inactive areas that surround the active area. The active area appears slightly lighter on the black and white aerial photography and the desert bushes appear more patchy and scattered. The boundary along the south edge of the north branch was adjusted northward in the field with less active area than was initially mapped. A small part of the area originally mapped as active appeared during the field investigation to be slightly higher in elevation than the rest of the active area and had a different surface texture composed of poorly developed desert pavement.

There appears to have been some recent shallow excavation (or surface scraping) along the east side of the Sun Valley Parkway at the western ends of the active areas of USGS Site 38 as defined by the lighter rectangular area visible in Figure 6.27. The reason for the excavation is unknown.

6.1.20 USGS Site 39

The USGS Site 39 active alluvial fan is an unstable area that extends roughly two miles from northeast to southwest, is located directly north of USGS Site 38, and terminates at the Sun Valley Parkway. The hydrographic apex of the site is one and two-thirds miles east of Sun Valley Parkway. The USGS Site 39 fan was previously identified as Hassayampa Tributary #4 (Hjalmarson and Kemna 1991; Hjalmarson 1994). **Figure 6.28** shows the fan downstream of the hydrographic apex.

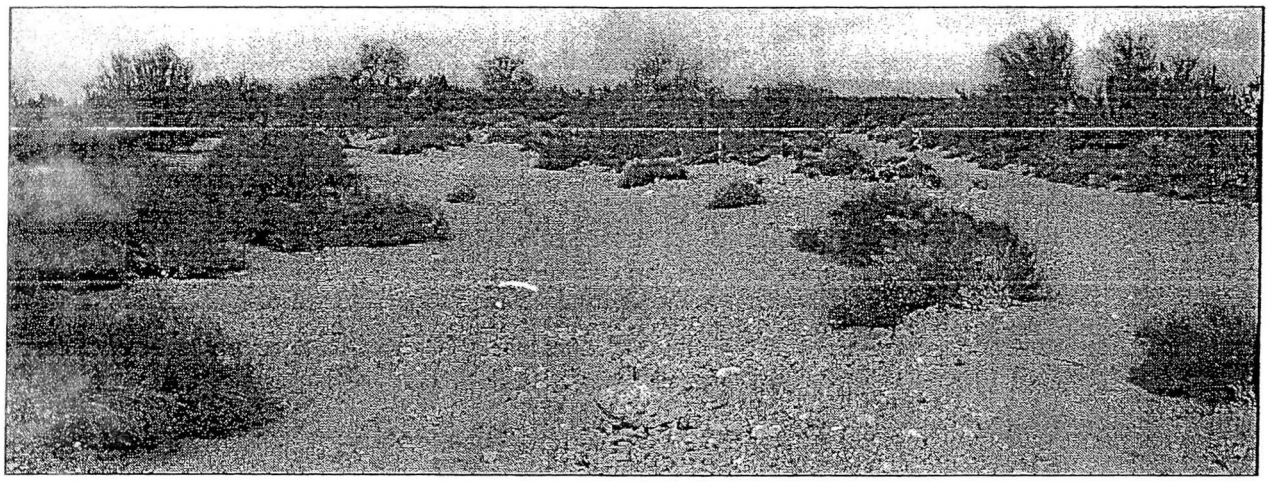

Figure 6.28. View looking downstream from the hydrographic apex at USGS Site 39.

The USGS Site 39 area, which covers 394.1 acres, is the fourth largest active area in the study region, smaller in size only to the White Tank Fan, the Skyline Wash Fan and USGS Site 37. Nearly the entire area is mapped as a late Holocene surface, but there are a few small patches mapped as late to early Holocene in age (Field and Pearthree 1991). The USGS Site 39 area is mapped almost entirely as a high flood hazard (Field and Pearthree 1992). Areas of distributary flow and undefined flow paths are readily visible on aerial photography. Desert trees are abundant, especially in the upstream portion near the first major diffluence. The lack of saguaros visible in the unstable area during the field investigation is typical of the active zone. The topographic analysis revealed very few contour crenulations except where there has been some incision of the two channels that run along the northern and southern boundaries.

The northwest area of the southern branch near the Sun Valley Parkway was extended northward during the field investigation to account for an area of instability that is larger than was previously mapped. The surficial geology and flood hazard mapping supports the location of the revised boundary, but an initial examination of the aerial photography did not indicate that the area is active since there was sparse vegetation visible in the aerial photography and the main flow path appeared to bypass the area. However, during the field investigation this area was noted as being at approximately the same elevation as the initially mapped active area and there were fewer desert trees. **Figure 6.29** shows the vegetation and unconfined flow paths in the area that was adjusted.

6.1.21 Skyline Wash Fan

The Skyline Wash Fan is an unstable area encompassing 546.7 acres that extends roughly two miles from northwest to southeast. It is located directly north of and terminates at Buckeye Flood Retarding Structure #3. The hydrographic apex of the site is about three quarters of a mile north of the end of Watson Road about 2 miles north of Interstate 10. The active alluvial fan was mapped in detail and its characteristics have been well documented in an approximate floodplain delineation study conducted by DEI-HEC (1997).

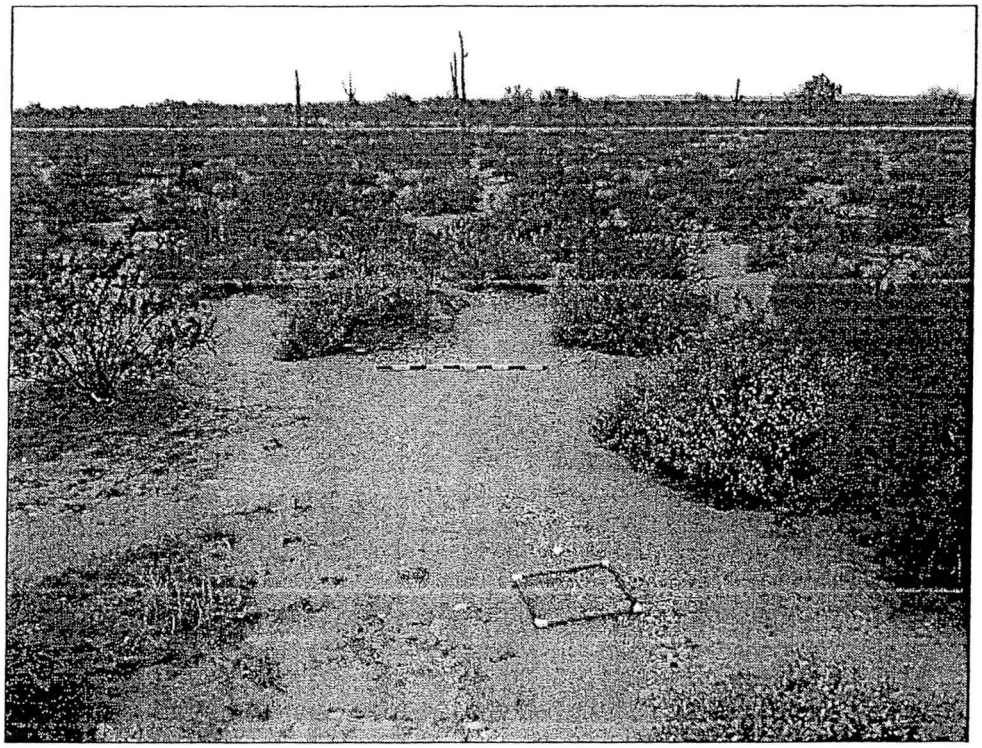

Figure 6.29. View looking west from the southern branch of the USGS Site 39 active alluvial fan in the area that was revised during the field investigation.

6.1.22 Skyline Wash Tributary Fan

The Skyline Wash tributary fan is an unstable area encompassing about 62 acres that extends roughly 2,200 feet from north to south and is located at the southeast corner of the Skyline Wash Fan and directly north of Buckeye Flood Retarding Structure #3 where it ends. The active alluvial fan was mapped as part of the approximate floodplain delineation study conducted by DEI-HEC (1997).

6.2 Other Unstable Areas

There are a number of other non-active alluvial fan areas that can be considered conditionally unstable. These areas were identified as part of Task 2.6.4 (Existing Conditions Assessment of Primary Washes), but a brief discussion of these areas is provided here.

The conditionally unstable areas are outlined in red on the attached plates (Plates 1 through 5). Most of the areas are located along washes, floodways, or through-flow channels that are confined or entrenched within relict or inactive fan surfaces. They may be identified as inset active alluvial fans, but in most cases they are the result of any number of causes such as a loss of conveyance or channel braiding due to changes in slope or localized aggradation, flow deflection around obstructions, a reduction in stream gradient associated with extensive shallow or exposed caliche or bedrock across the floodway, a natural widening of an entrenched floodway that allows for lateral adjustments, or localized backwater sedimentation associated with sharp downstream bends, dense vegetation, or severe floodway constrictions.

Most of the conditionally unstable areas are reaches containing multiple channels or defined flow paths that produce a braided or anastomosed pattern, whereby flow passes through a given confined reach along one or more paths (**Figure 6.30**). Although these reaches are considered as being unstable areas under the PFHAM methodology, they pose little hazard outside the confining margins of the defined floodway since it is likely that most of these areas would be contained within the 100-year flood boundary. However, in some cases, evidence exists that indicates flow breakouts along low-lying areas have occurred in the past or may occur in the future.

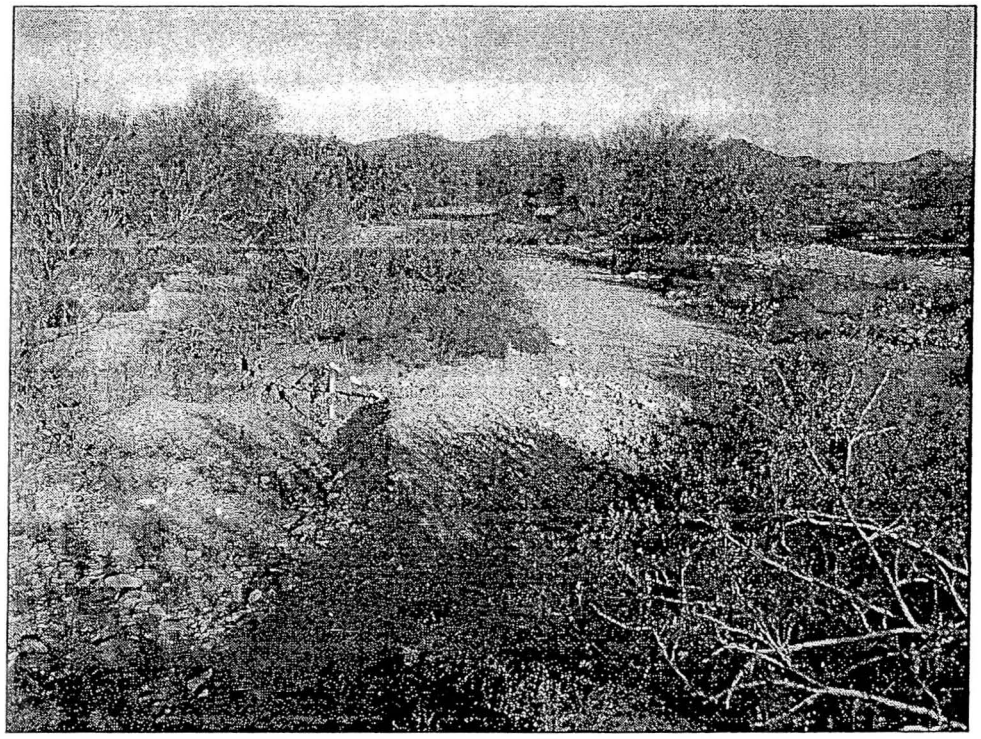

Figure 6.30. View looking upstream showing the braided pattern of a wash entrenched into a relict fan. The left bank area is a low terrace that is being dissected by overbank flows.

The conditionally unstable throughflow channel reaches generally fall into one of three categories: (1) individually confined split or distributary flow paths, (2) multiple split or braided flow paths confined within a single reach, and (3) confined localized aggradational reaches with split, braided, or undefined flow paths. The first category is associated with well-defined throughflow channels that may diverge or split into numerous smaller channels, which may rejoin, while still remaining well confined (**Figure 6.31**). The second type of channel reach is one that has a confined braided or multiple channel appearance similar to that shown in **Figure 6.32**. The third type of channel is one that bifurcates or diverges into two or more flow paths as a result of localized aggradation, possibly associated with an obstruction in the flow path, but is still generally confined within a well-defined boundaries (**Figure 6.33**). This type of channel reach is sometimes described as an inset active alluvial fan, although it is technically not an alluvial fan.

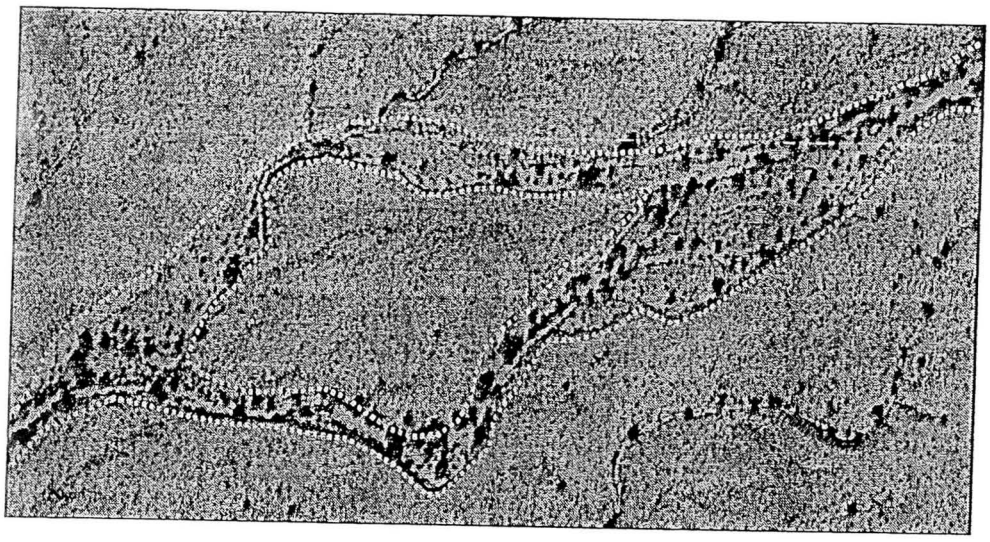

Figure 6.31. View of a well defined throughflow channel that diverges into two primary channels and several smaller channels. The confined flow split converges downstream.

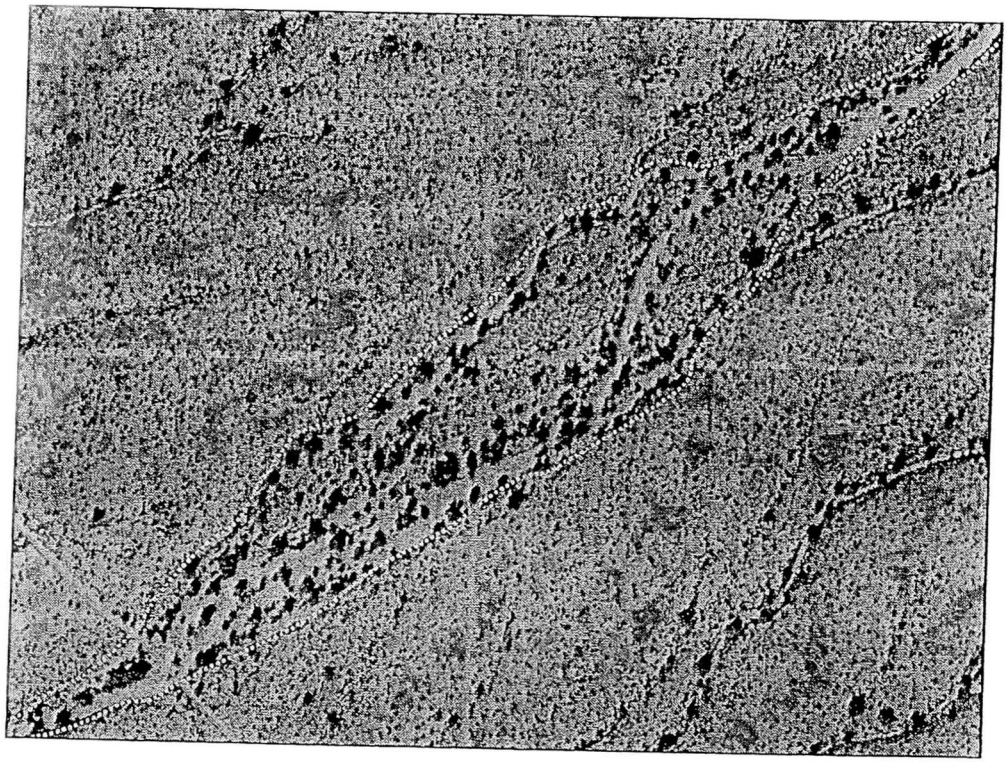

Figure 6.32. View of a throughflow channel that diverges into multiple braided channels, but still confined within well-defined boundaries (yellow lines) before converging downstream.

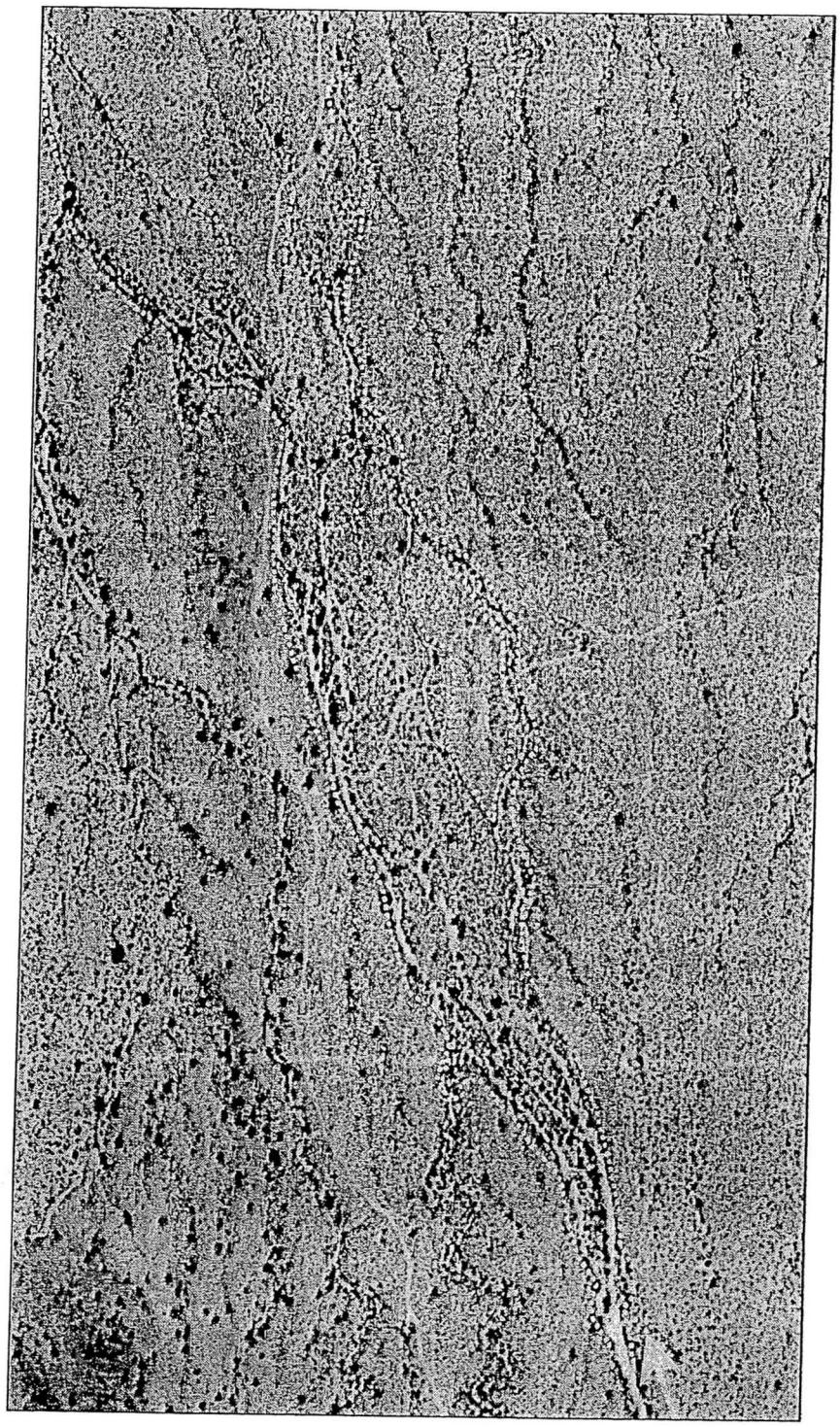

Figure 6.33. View of a throughflow channel that diverges into braided and undefined flow paths as a result of localized aggradation, loss of channel capacity, and anthropogenic changes. Most of the reach is still confined within relatively well-defined boundaries (yellow lines).

In several locations within the BSV ADMS study area, there are inset or entrenched conditionally unstable areas of anastomosed flow distribution, which are defined by oval-shaped multiple braided or split flow zones that have a diffluence at their upstream ends (**Figure 6.34**). The braided or split flow pattern within the individual zones is likely caused by stream capture, avulsions, obstructions, flow ramping, and/or localized aggradation at the diffluence points. The oval shape is attributed to flow path divergence at the upstream end followed by flow path convergence at the downstream end (**Figure 6.35**). Although these areas may be identified as active inset alluvial fans, for the purposes of this report they are mapped as being conditionally unstable – high hazard (see Section 7).

The flow patterns and characteristics of the conditionally unstable areas are similar to those discussed by Wertz (1963 1966) for steep, ephemeral, mountain stream channels in southern and southwestern Arizona. Ayres Associates (1996) identified similar patterns, characteristics, and process along Yuma Wash near Yuma, Arizona. Although most of Wertz's work deals with mountain stream channels that exit onto a gently sloping piedmont, many of the processes he describes may be applicable to the channels in the BSV study area.

In a number of other locations, conditionally unstable areas are areas or reaches where the primary flow path, which is situated on an inactive alluvial fan and alluvial plain surface and is not entrenched or well confined, loses capacity and flow is distributed across the ground surface along undefined flow paths (**Figure 6.36**). These are not active alluvial fan areas because the channel does not transport any appreciable sediment into the unconfined zoned, and the sediment that is deposited in the unconfined zone is deposited in a thin veneer over a very limited area. In almost all cases, the upstream channel capacity is very small and the amount of flow transported in these reaches is minimal. The predominant hazard associated with these areas is from sheet flooding and poorly defined, shallow surface flow generally much less than 1 foot deep. Several of the small channels located on the inactive alluvial fan surfaces at the southwest end of Area 3, in area 4 south and east of the Sun Valley Parkway (**Figure 6.37**), and on the north side of the urbanized area just north of Buckeye FRS #1 terminate in this way.

6.3 Summary

Historic aerial photography, topographic maps, surface geology maps, flood hazard maps, soils maps, the PFHAM Stage 1 landform delineations, and the PFHAM Stage 2 methodology were used to identify, delineate, and map the areas of landform instability. Unstable areas were verified in the field using a handheld GIS-based GPS receiver. Common unstable areas include active alluvial fans, some multi-channel areas below active alluvial fans, alluvial plain with active sedimentation, multi-channel pocket along a throughflow channel, areas of recent sediment deposition and erosion, split flow channel where flow is wide and shallow, and areas of low relief where minor development such as roads can divert floodwater and cause significant erosion in areas otherwise not susceptible to flood hazard. A total of 16 new active alluvial fans were identified in addition to the three identified by the USGS and the previously studied White Tank and Skyline Wash fans. Since the exact boundaries of the three USGS fans (Sites 37, 38, and 39) were not delineated as part of previous studies, their boundaries were delineated as part of this project.

The areas of instability are identified on the accompanying mapping as those areas delineated in red. The solid red areas on the mapping represent areas of extreme hazard associated with active alluvial fans. The open areas outlined in red on the maps represent other unstable areas. The other unstable areas are further defined in Section 7 as being either a moderate or high hazard depending on the features associated with the area.

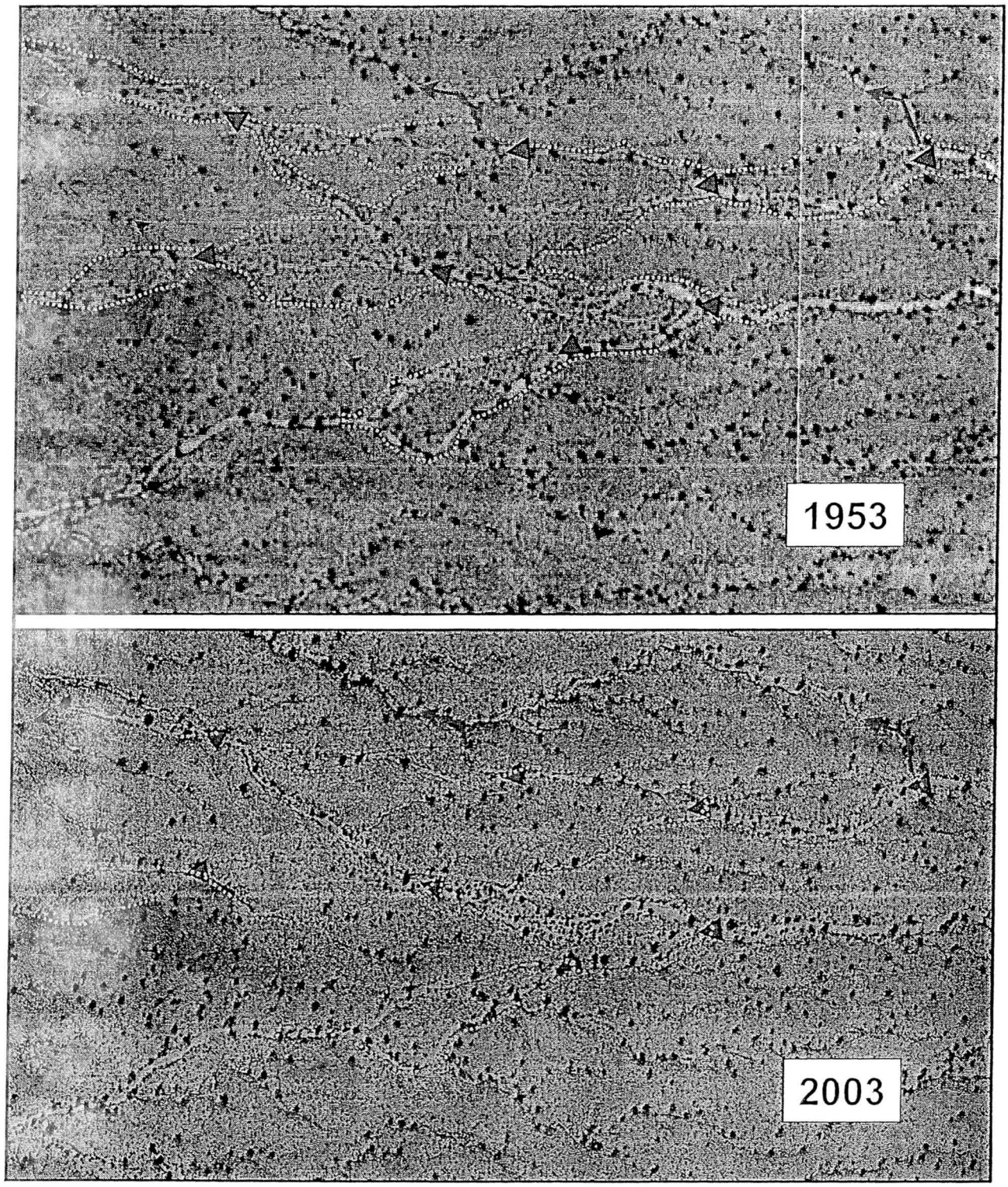

Figure 6.34. Aerial photos from 1953 and 2003 showing area of anastomosed flow distribution (yellow boundaries) with zones of braided and split flow (orange boundaries). Diffluence of individual zones marked by red triangles. Solid red arrows show additional flow distribution and dotted red arrows show locations of past or potential future flow breakout points.

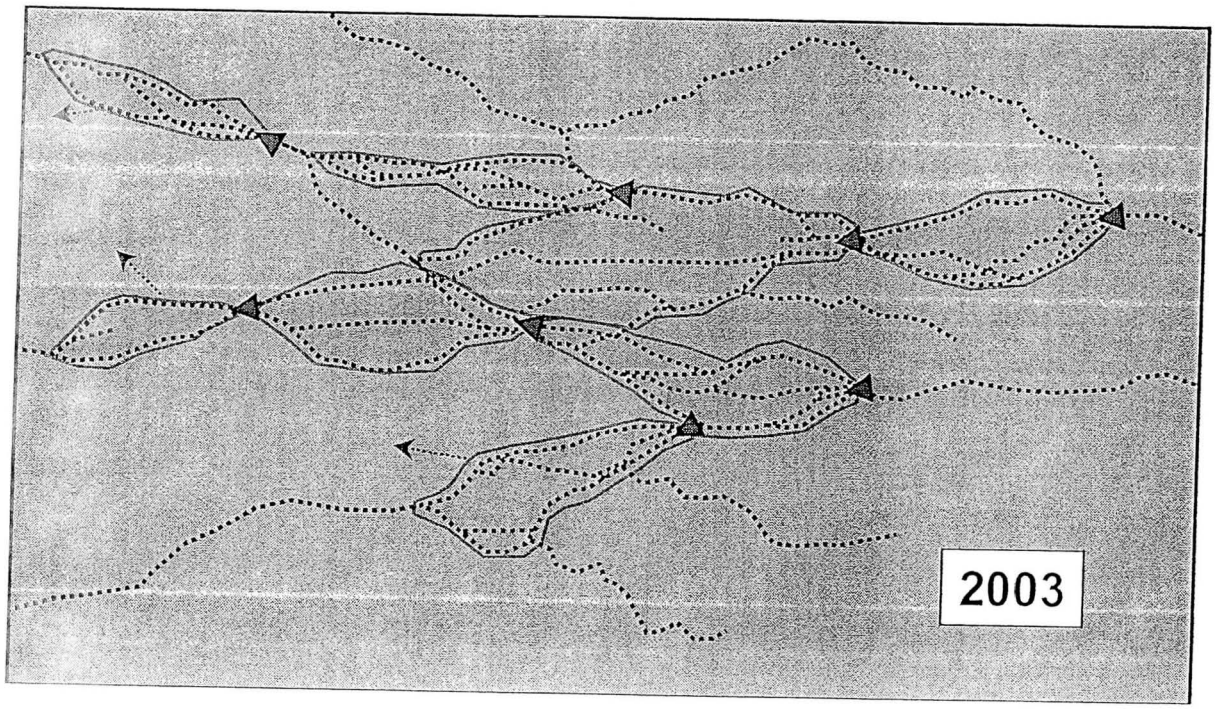

Figure 6.35. Schematic of 2003 aerial photo from Figure 5.5 showing area of anastomosed flow distribution with zones of braided and split flow (orange boundaries). The blue lines represent well-defined flow paths identified on the photos. Major diffluences are marked by red triangles.

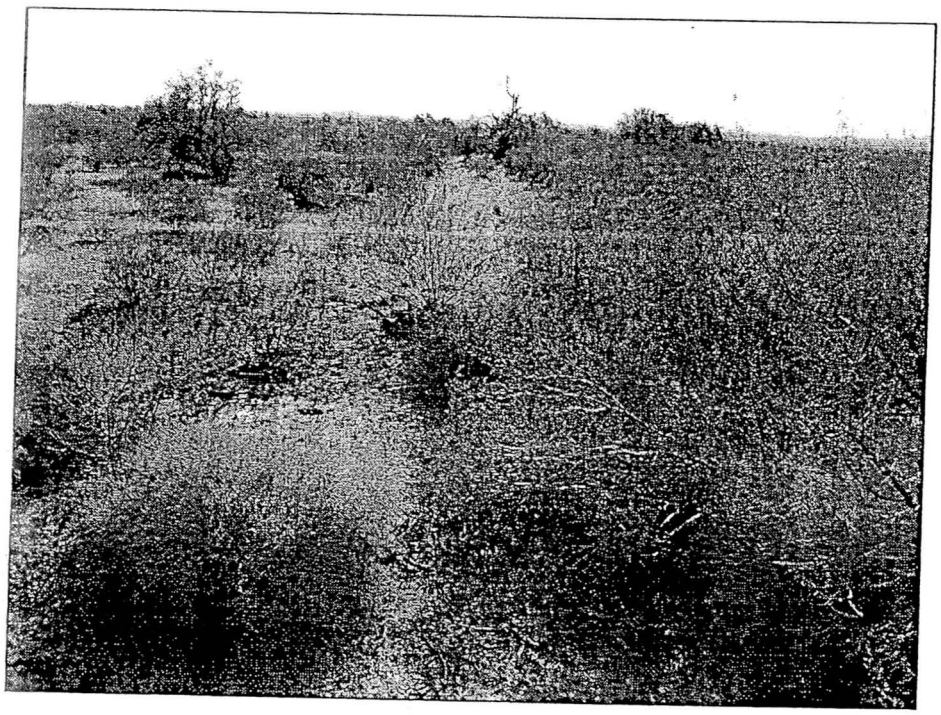

Figure 6.36. View looking upstream showing the loss of channel capacity and undefined overland flow on an inactive alluvial fan surface.

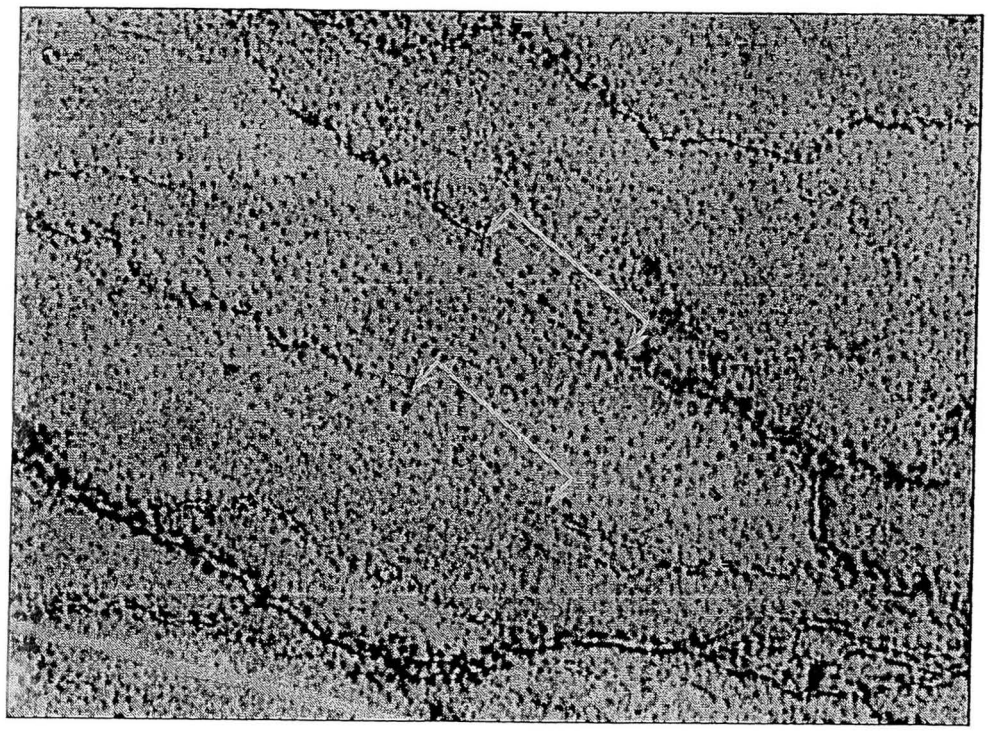

Figure 6.37. Aerial view of the loss of channel capacity and undefined overland flow on an inactive alluvial fan surface in Area 4 just east of Sun Valley Parkway and Wagner Wash.

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7. EXISTING CONDITIONS ASSESSMENT OF PRIMARY WASHES

The locations of each of the primary washes examined as part of Task 2.6.4 are shown on Plate 1 of Appendix C. Two primary methods were used to assess current conditions on the primary washes. One method required the comparison of historic and contemporary aerial photography to identify reaches and areas of potential and existing stream instability. The other method was to conduct an on-site field reconnaissance of each of the primary washes whereby unstable reaches could be identified and delineated in real-time in the field using the portable GPS unit. Both methods were used to identify, delineate, and verify stability problems along the primary washes.

7.1 Flow Splits, Braiding, and Multiple Flow Paths

Most of the conditionally unstable areas identified on aerial photos and in the field are reaches containing multiple channels or defined flow paths that produce a braided or anastomosed pattern, whereby flow passes through a given confined reach along one or more paths. In some cases, evidence exists that indicates flow breakouts along low-lying areas have occurred in the past or may occur in the future. As previously discussed, the conditionally unstable throughflow channel reaches generally fall into one of three categories: (1) individually confined split or distributary flow paths, (2) multiple split or braided flow paths confined within a single reach, and (3) confined localized aggradational reaches with split, braided, or undefined flow paths.

In several locations within the BSV ADMS study area, there are inset or entrenched conditionally unstable areas of anastomosed flow distribution, which are defined by oval-shaped multiple braided or split flow zones that have a diffluence at their upstream ends. The braided or split flow pattern within the individual zones is likely caused by stream capture, avulsions, obstructions, flow ramping, and/or localized aggradation at the diffluence points. The oval shape is attributed to flow path divergence at the upstream end followed by flow path convergence at the downstream end.

7.2 Aerial Photography Analysis

A number of sites were identified as being conditionally unstable in the comparison of historic aerial photos. For the purposes of the following discussion, several sites of conditional instability were identified as being a moderate hazard (yellow), a high hazard (orange), or and extreme hazards (red). Throughflow channels, flow paths, and floodways with well defined boundaries that were not mapped as conditionally unstable are still considered a fluvial hazard because the areas within their boundaries are still susceptible to common fluvial process such as bank erosion, localized sedimentation or bar development, and meander bend migration. **Table 7.1** provides a description of the factors that define the degree of hazard for conditionally unstable areas. The moderate and high hazard areas described below are located in areas of low, intermediate, and high flood potential as mapped by Field and Pearthree (1992).

A comparison of the 1953 and 2003 aerial photographs for a portion of Primary Wash #3 (**Figure 7.1**) shows an area of high hazard due to the presence of multiple shallow, but relatively well-defined, distributary channels. The interfluve areas between the distributary channels may be subject to flooding during major storm events. Another portion of Primary Wash #3 and the associated distributary flow paths downstream of the BSV Site #1 active alluvial fan is shown in **Figure 7.2**. Most of the areas shown in Figures 7.1 and 7.2 are mapped by Field and Pearthree (1992) as having a high flood potential.

Table 7.1. Factors Associated with Degree of Hazard for Conditionally Unstable Areas.

Moderate Hazard (Yellow)	High Hazard (Orange)	Extreme Hazard (Red)
Instability primarily associated with fluvial processes such as erosion, sedimentation, and meander migration. Primarily composed of well defined flow splits and distributary channels, and minor braided reaches where flow paths confined in narrow, short segment of throughflow channel.	Instability associated with numerous shallow distributary channels; generally confined areas with poorly defined flow paths; areas of significant braiding of throughflow channel; reaches of throughflow channel with characteristics of inset alluvial fan; and areas exhibiting significant out-of-bank flow or avulsions. Includes inactive fan areas downstream of active alluvial fans.	Primarily associated with active alluvial fans.

Areas of moderate and high hazard on portions of Primary Washes 6 and 7 just south of Sun Valley Parkway are shown in **Figure 7.3**. The areas of moderate hazard are associated with either a narrow, confined area of land encompassing the channels that is probably subject to flooding or areas of split flow, where the split flow channels are well defined and separated by interfluves that may be subject to potential flooding. Primary Wash 6 is located in a high flood hazard area (BSV Site #2) whereas Primary Wash 7 is in a low flood hazard area as mapped by Field and Pearthree (1992).

The area to the north of BSV Site #3 (**Figure 7.4**) that encompasses Primary Washes 9 and 10 and a major non-primary wash and several smaller non-primary washes is composed of both moderate and high hazard areas and the active alluvial fans of BSV Sites 13 East and West. The soils, geologic mapping, topography, and field reconnaissance indicate that this area contains multiple poorly defined flow paths and overbank flow in places in conjunction with active alluvial fans. The intersection of Primary Washes 9 and 10 is defined by the hydrographic apex of the active alluvial fan at BSV Site 13 West. This area may be a youthful stream capture or avulsion site. The abrupt change in flow direction due to the flow split results in a loss of transport capacity, deposition of sediment at the split, and ramping of flow and sediment into the intervening downstream area between the split flow channels. Downstream, most of the overbank flow quickly returns to the main throughflow channels bounding the zone as seen in Figure 7.4. In addition, another active alluvial fan, BSV Site 13 East, intersects the north arm of the BSV Site 13 West fan along Primary Wash 9. There are small portions within the boundaries of both fans that are well above the fan surfaces that are identified as relict fan surfaces. The remaining areas of moderate hazard to the north of BSV Sites 13 East and West are associated with confined zones of fairly well defined split flow channels and interfluve areas that could potentially be subject to flooding.

A comparison of the 1953 and 2003 aerial photos for parts of Primary Washes 13 and 14 showing unstable areas of moderate (yellow) hazard is provided in **Figure 7.5**. The moderate hazard areas are associated with confined flow splits in the throughflow channels and potential flooding of the interfluves. The orange arrow in the figure shows the location of a channel avulsion that occurred after 1953. The entire area in the figure is mapped as having an intermediate to low flood potential by Field and Pearthree (1992).

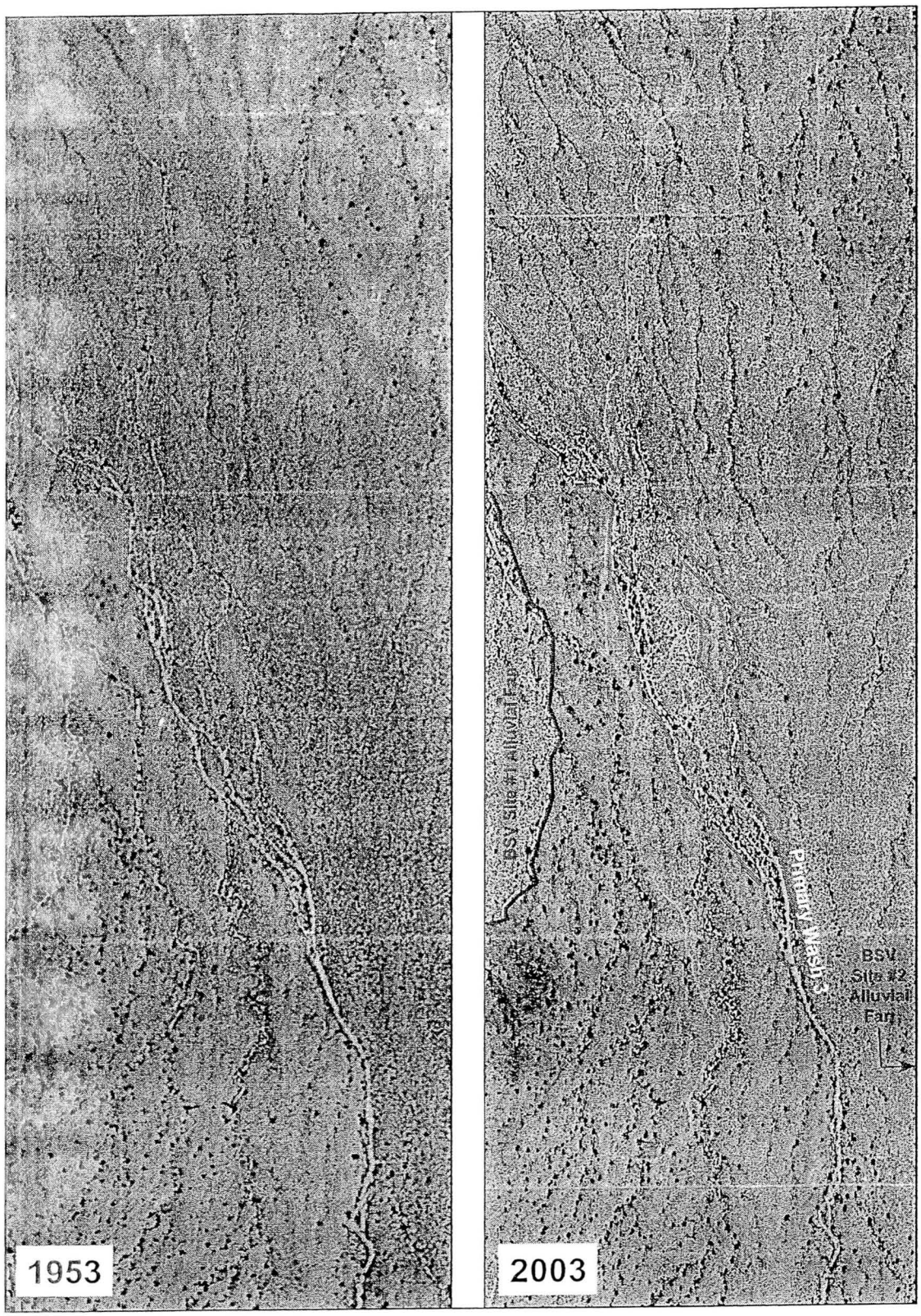

Figure 7.1. Comparison of 1953 and 2003 aerial photos for area around Primary Wash 3 between BSV Site #1 and BSV Site #2 active alluvial fans (red) showing unstable areas of high (orange) hazard.

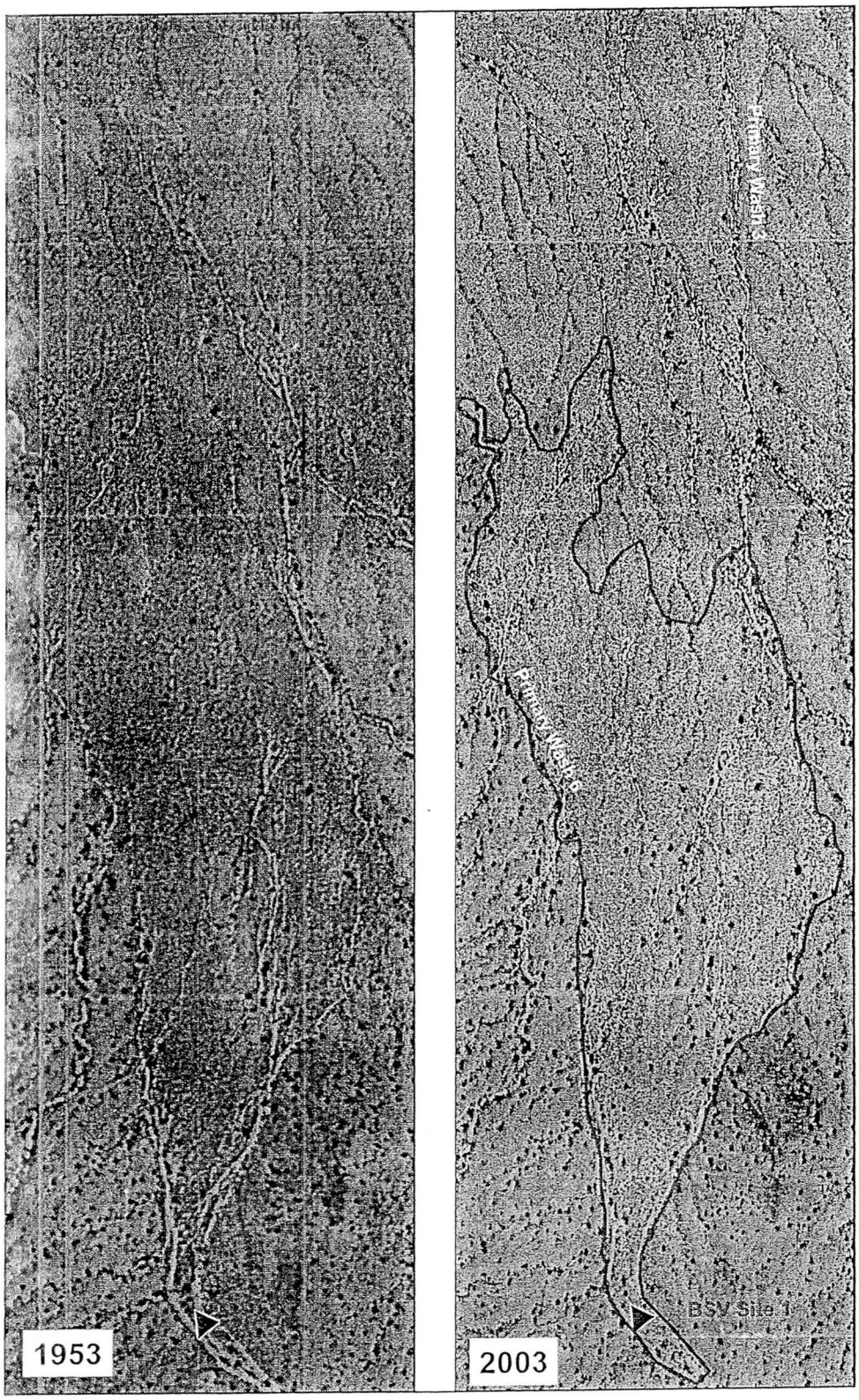

Figure 7.2. Comparison of 1953 and 2003 aerial photos for area around Primary Wash 3 downstream of the BSV Site #1 active alluvial fan (red) showing unstable areas of high (orange) hazard.

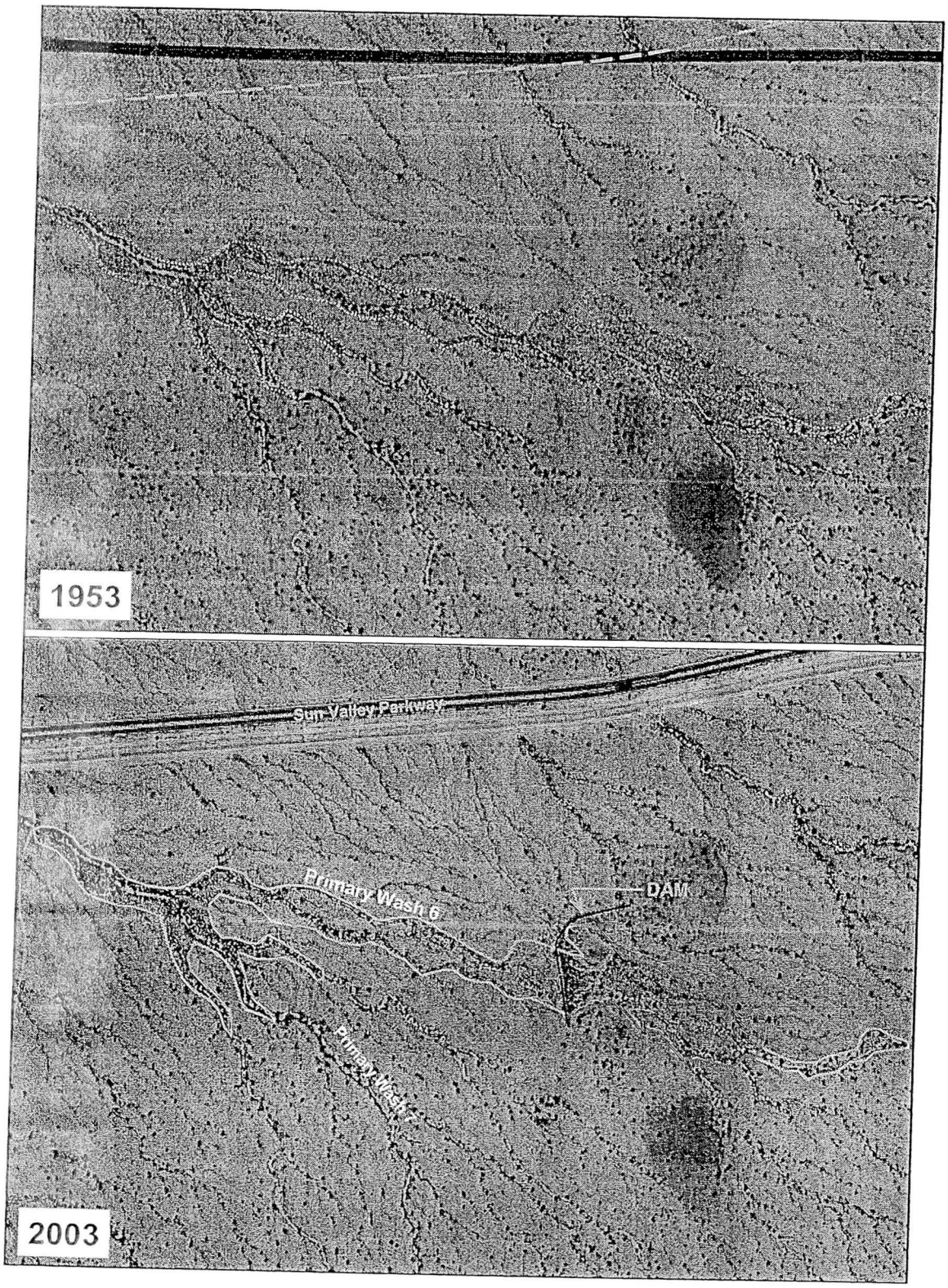

Figure 7.3. Comparison of 1953 and 2003 aerial photos for parts of Primary Washes 6, 7, and 7 East showing unstable areas of moderate (yellow) and high (orange) hazard and a dam on Primary Wash 6.

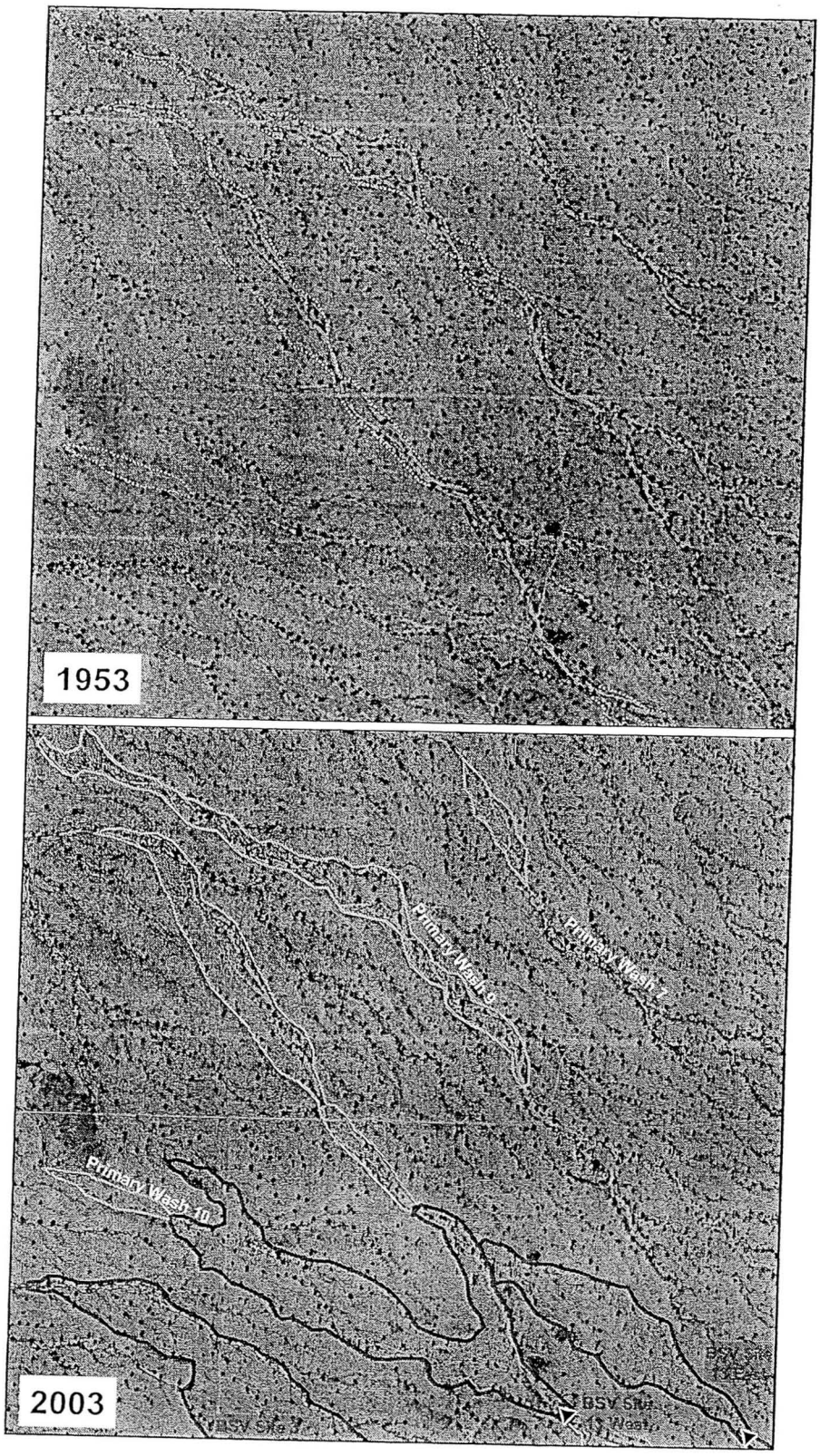

Figure 7.4. Comparison of 1953 and 2003 aerial photos for parts of Primary Washes 7, 9, and 10 showing unstable areas of moderate (yellow), high (orange), and extreme (red) hazard.

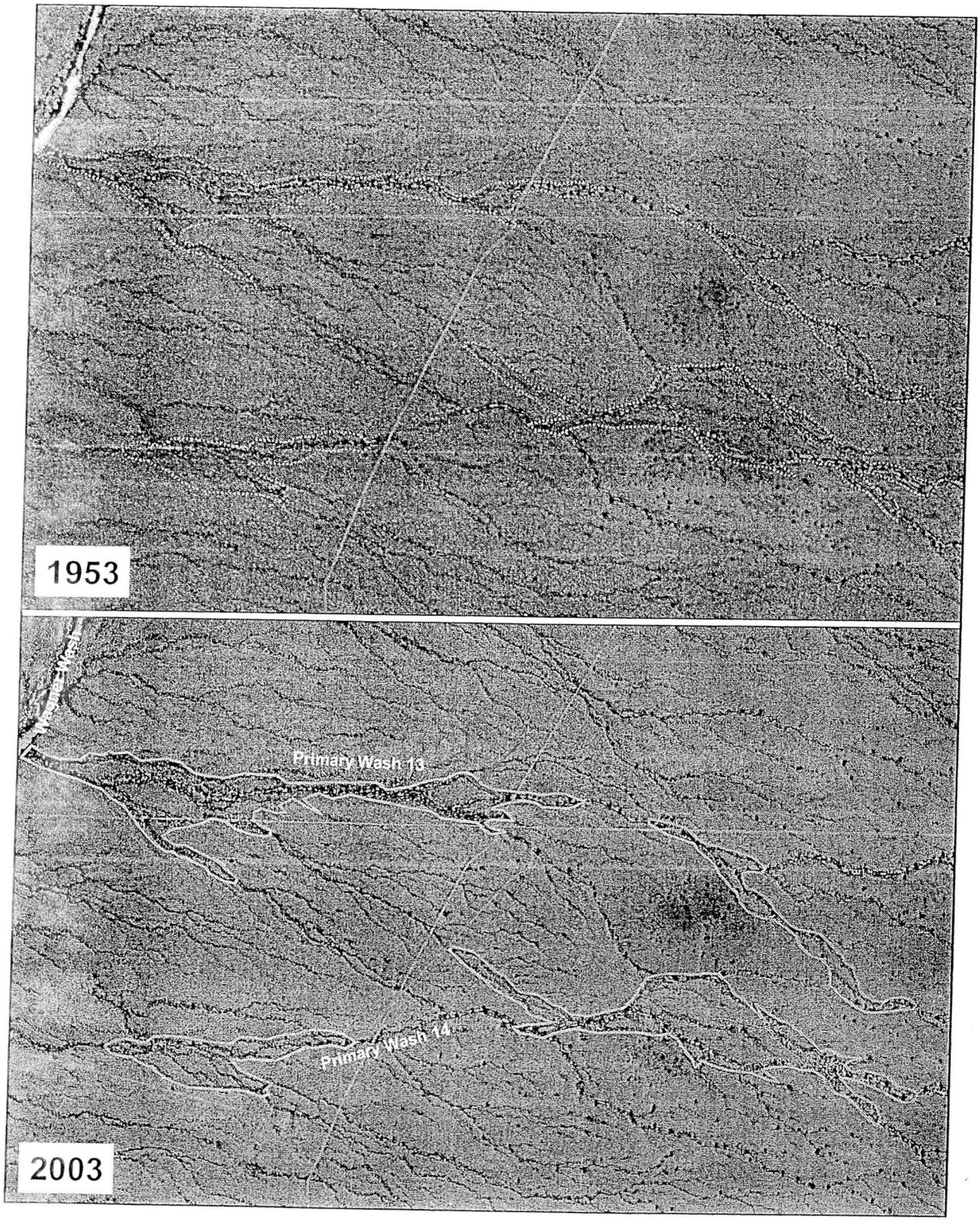

Figure 7.5. Comparison of 1953 and 2003 aerial photos for parts of Primary Washes 13 and 14 showing unstable areas of moderate (yellow) hazard.

Figure 7.6 provides a comparison of the 1953 and 2003 aerial photos for parts of Primary Washes 16 and 17 showing unstable areas of moderate (yellow) and high (orange) hazard. The moderate hazard areas are associated with distributary flow splits and joins. The high hazard areas are composed of multiple flow splits and joins as well as braided reaches and there is a high potential for flooding of the interfluve areas and potential avulsions. The dotted red line and arrow in Figure 7.6 represent significant bank retreat at the confluence of Primary Wash 16 with Wagner Wash after 1953.

Primary Wash 16 and other nearby washes east of Sun Valley Parkway are shown in **Figure 7.7**. The main unstable areas are of moderate hazard associated primarily with flow splits and wider, shallow flow zones of the confined throughflow channels. Also shown in the figure is a wing dam that was installed after 1953. The area is mapped by Field and Pearthree (1992) as having a very low flood potential.

A comparison of the 1953 and 2003 aerial photos for parts of Primary Washes 16 just south of BSV Site #3 is provided in **Figure 7.8**, which shows unstable areas of moderate (yellow) and high (orange) hazard. The moderate hazard areas are associated with distributary flow splits and joins. The high hazard area is composed of multiple flow splits and joins as well as unconfined and poorly defined flow path areas indicative of a possible alluvial fan. However, the unconfined and poorly defined flow path areas are relatively small because unconfined flow is rapidly captured by fairly well defined channels a short distance down valley from the breakout point. There is a high potential for flooding of the interfluve areas and avulsions within the high hazard zone. In contrast, Field and Pearthree (1992) mapped this area as having a very low flood potential. The unstable areas of moderate hazard are associated primarily with flow splits and wider, shallow flow zones of the confined throughflow channels.

A comparison of the 1953 and 2003 aerial photos for parts of Primary Washes 17 just east of Sun Valley Parkway is provided in **Figure 7.9**, which shows unstable areas of moderate (yellow) and high (orange) hazard. The moderate hazard areas are associated with distributary flow splits and joins. The high hazard area is composed of multiple flow splits and joins as well as a small area of unconfined and poorly defined flow. However, flow from the unconfined and poorly defined flow path areas is rapidly captured by fairly well defined channels a short distance down valley from the breakout point. There is a high potential for flooding of the interfluve areas and avulsions within the high hazard zone. In contrast, Field and Pearthree (1992) mapped this area as having a very low flood potential. The unstable areas of moderate hazard are associated primarily with flow splits and wider, shallow flow zones of the confined throughflow channels.

Figure 7.10 provides a comparison of the 1953 and 2003 aerial photos for parts of Primary Washes 18 and 19 and other intervening washes between the Hassayampa River and Sun Valley Parkway showing unstable areas of moderate (yellow) hazard and the small area of extreme (red) hazard associated with an active alluvial fan. The small alluvial fan has developed in an area where Primary Wash 18 has breached a high ridge of relict fan deposits and spreads out onto the alluvial plain of a wash to the north. The moderate hazard areas are associated with distributary flow splits and joins and wider, shallow flow zones of the confined throughflow channels.

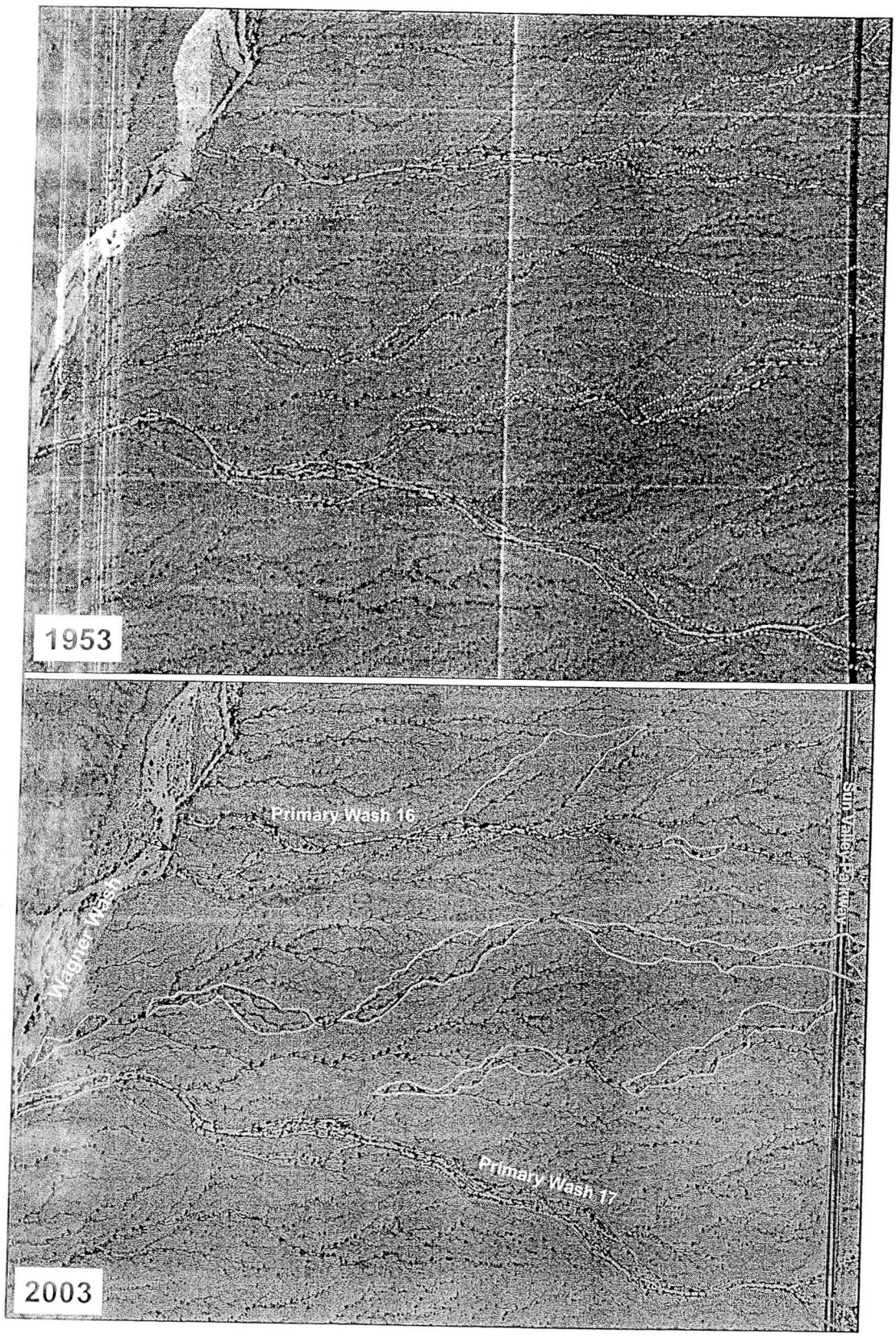

Figure 7.6. Comparison of 1953 and 2003 aerial photos for parts of Primary Washes 16 and 17 showing unstable areas of moderate (yellow) and high (orange) hazard.

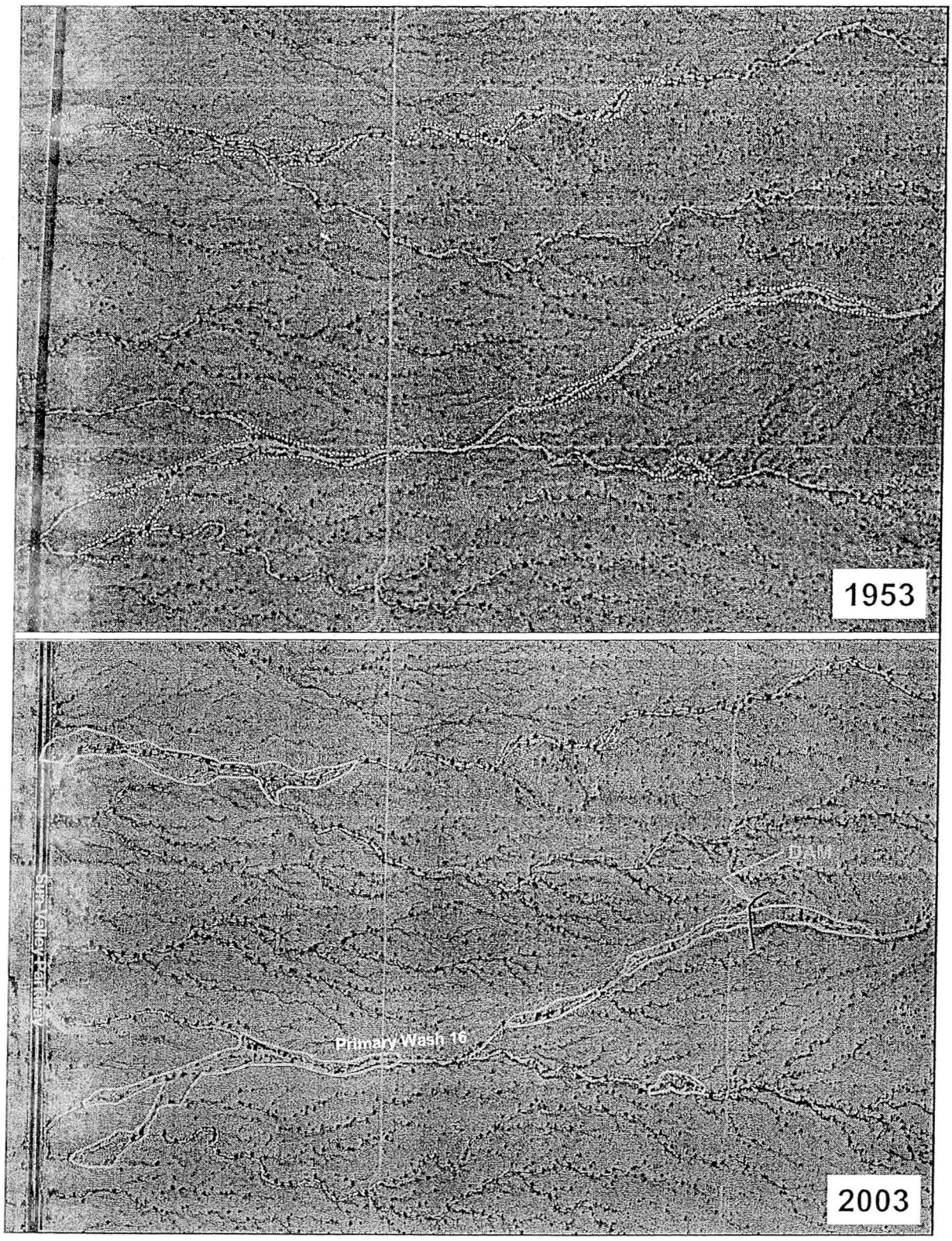

Figure 7.7. Comparison of 1953 and 2003 aerial photos for parts of Primary Wash 16 and surrounding areas showing unstable areas of moderate (yellow) hazard and wing dam.

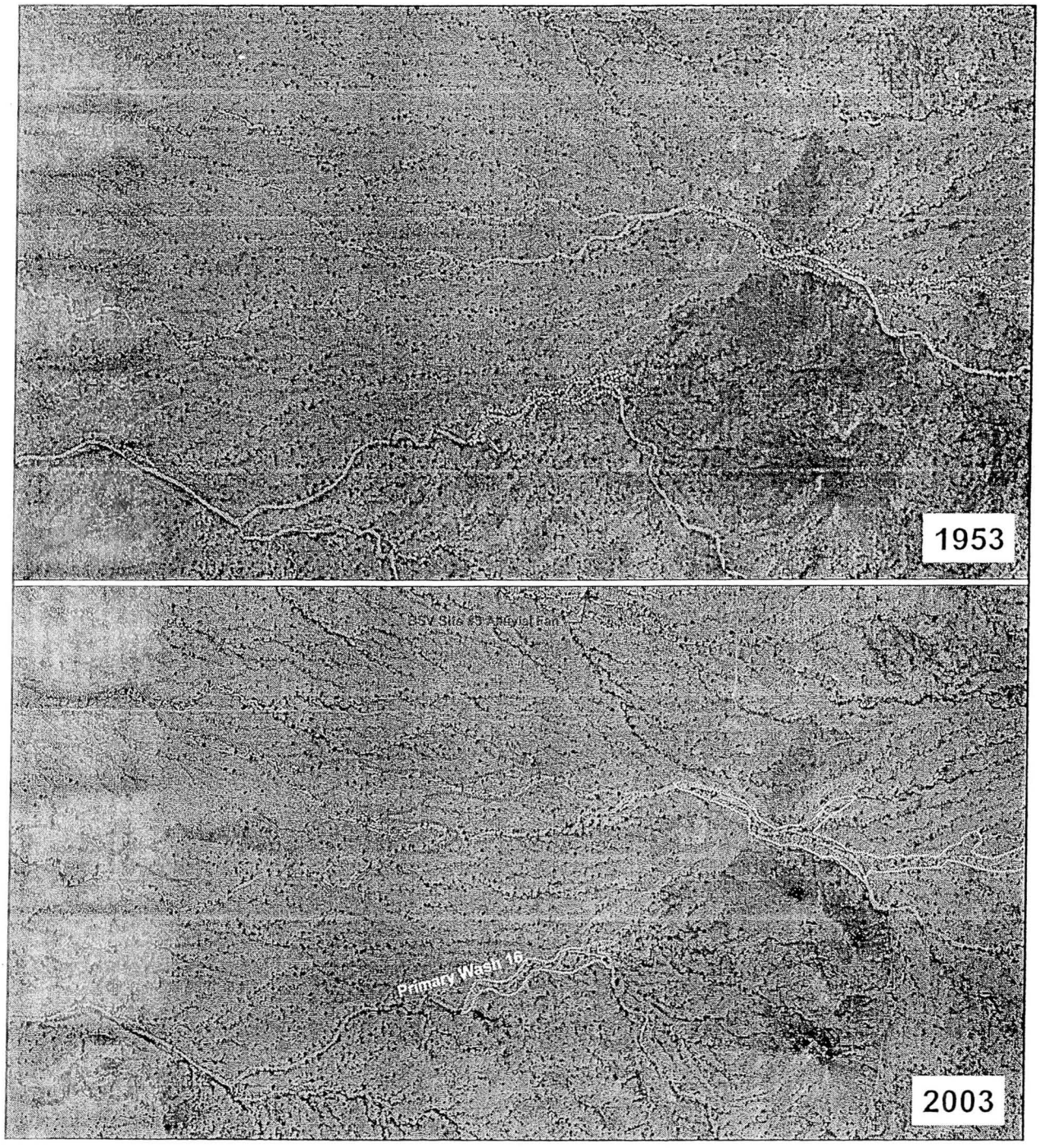

Figure 7.8. Comparison of 1953 and 2003 aerial photos for parts of Primary Wash 16 and surrounding areas showing unstable areas of moderate (yellow) and high (orange) hazard.

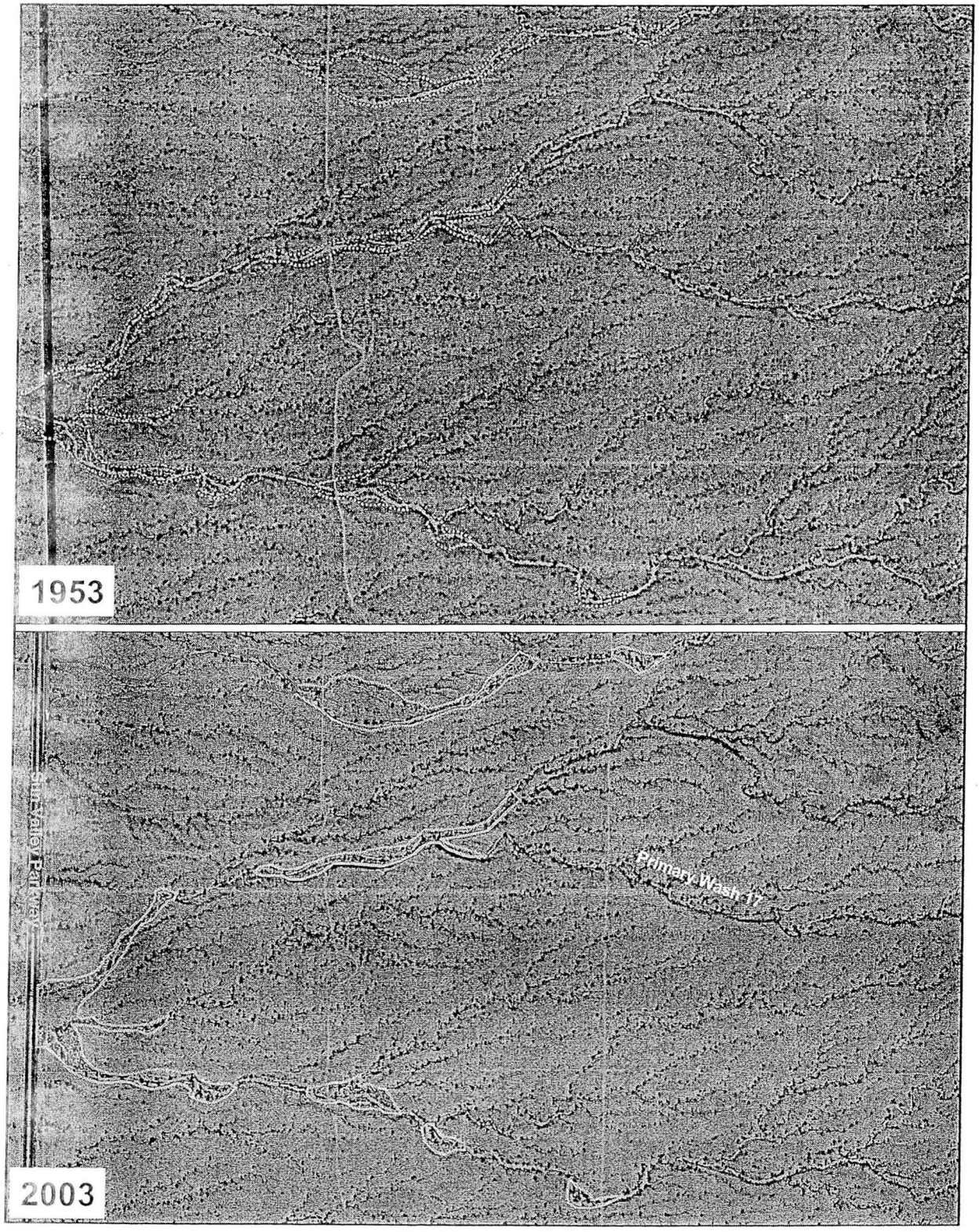

Figure 7.9. Comparison of 1953 and 2003 aerial photos for parts of Primary Washes 17 and 17T and surrounding areas showing unstable areas of moderate (yellow) and high (orange) hazard.

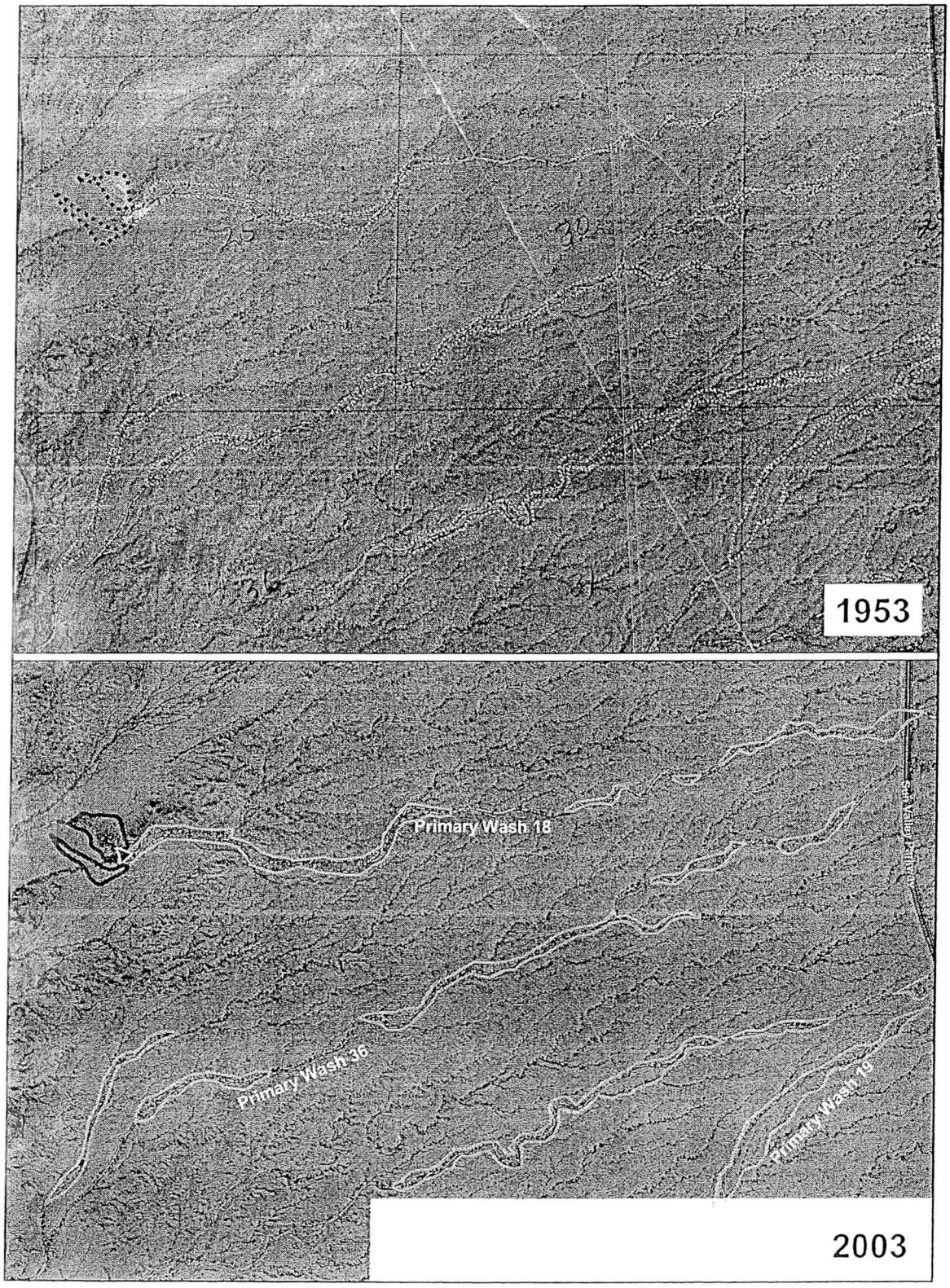

Figure 7.10. Comparison of 1953 and 2003 aerial photos for parts of Primary Washes 18 and 19 and surrounding areas showing unstable areas of moderate (yellow), high (orange), and extreme (red) hazard.

Figure 7.11 provides a comparison of the 1953 and 2003 aerial photos for parts of Primary Washes 18 and 19 and other intervening washes east of Sun Valley Parkway showing unstable areas of moderate (yellow), high (orange), and extreme (red) hazard. The areas of extreme (red) hazard are associated with the active alluvial fans at BSV Sites #4 and #5. The high hazard areas are composed of multiple flow splits and joins, braided reaches, and unconfined and poorly defined flow path areas indicative of possible inset alluvial fans. However, the unconfined and poorly defined flow path areas are relatively small because unconfined flow is rapidly captured by fairly well defined channels a short distance down valley from the breakout point. There is a high potential for flooding of the interfluve areas and avulsions within the high hazard zone. The unstable areas of moderate hazard are associated primarily with flow splits and wider, shallow flow zones of the confined throughflow channels. Field and Pearthree (1992) mapped the areas north and south of Primary Wash 18, including the BSV Site #4 active alluvial fan, as having a very low flood potential, whereas the area including and bordering Primary Wash 18 and BSV Site #5 are mapped as having a very high flood potential.

A comparison of the 1953 and 2003 aerial photos for parts of Primary Wash 19 just east of the Hassayampa River is provided in **Figure 7.12**, which shows unstable areas of moderate (yellow) and high (orange) hazard. The moderate hazard areas are associated with distributary flow splits and joins. The high hazard area is composed of multiple flow splits and joins as well as braided reaches and there is a high potential for flooding of the interfluve areas and potential avulsions. A comparison of the 1949 and 1953 aerial photos for this area indicates that an avulsion and new channel developed during this period at the downstream end of Primary Wash 19. The unstable areas of moderate hazard are associated primarily with flow splits and wider, shallow flow zones of the confined throughflow channels. Field and Pearthree (1992) mapped these moderate and high hazard areas as having a very high flood potential.

A comparison of the 1953 and 2003 aerial photos for parts of Primary Wash 21 and White Tank Wash just west of Sun Valley parkway is provided in **Figure 7.13**, which shows the unstable area of extreme (red) hazard on Primary Wash 21 in the 1953 aerial photo as being a high (orange) hazard in the 2003 aerial photo. This is a function of construction of Sun Valley Parkway. The extreme hazard area in 1953 was the result of active alluvial fan flow path development associated with the USGS Site 39 alluvial fan. Once the highway was constructed, the culvert and highway embankment cut off unconfined alluvial fan flooding and associated processes downstream of the highway. With the construction of the highway culverts, downstream flow is now forced into channels and the supply of sediment from upstream is trapped upstream of the culverts and is slowly released to the downstream reaches, thus causing some downstream channel degradation. The previously extreme hazard area is now classified as a high hazard area since unconfined flooding of the interfluves is still possible.

The unstable area of high hazard is composed of multiple flow splits and joins, as well as braided reaches, with a high potential for flooding of the interfluve areas and potential avulsions. The unstable areas of moderate (yellow) hazard are associated primarily with flow splits and wider, shallow flow zones of the confined throughflow channels. Field and Pearthree (1992) mapped these moderate and high hazard areas as having a high flood potential.

Figure 7.14 provides a comparison of the 1953 and 2003 aerial photos for parts of Primary Wash 22 and other intervening washes just west of Sun Valley Parkway showing unstable areas of moderate (yellow), high (orange), and extreme (red) hazard. The areas of extreme (red) hazard are associated with the active alluvial fans at BSV Sites #14, #15, and #16. The high hazard areas are composed of multiple flow splits and joins, braided reaches, and unconfined and poorly defined flow path areas immediately upstream and downstream of the extreme hazard areas associated with the active alluvial fans. There is a high potential for flooding of the interfluve areas and avulsions within the high hazard zone areas. The unstable areas of moderate hazard are associated primarily with flow splits and wider, shallow flow zones of the confined throughflow channels. Field and Pearthree (1992) mapped most of these unstable areas, including the BSV Sites #14, #15, and #16 active alluvial fans, as having a very high flood potential.

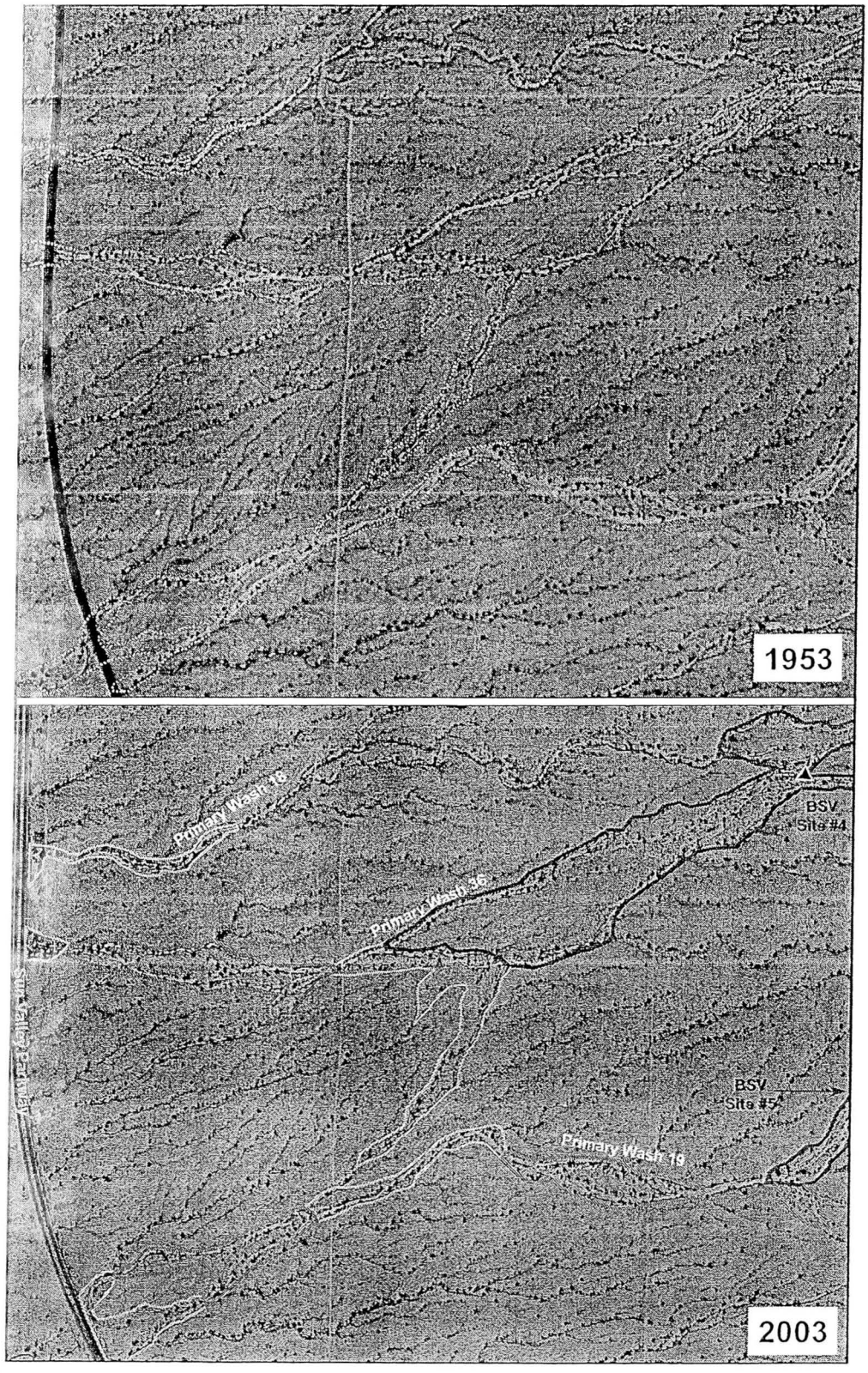

Figure 7.11. Comparison of 1953 and 2003 aerial photos for parts of Primary Washes 18 and 19 and surrounding areas showing unstable areas of moderate (yellow), high (orange), and extreme (red) hazard.

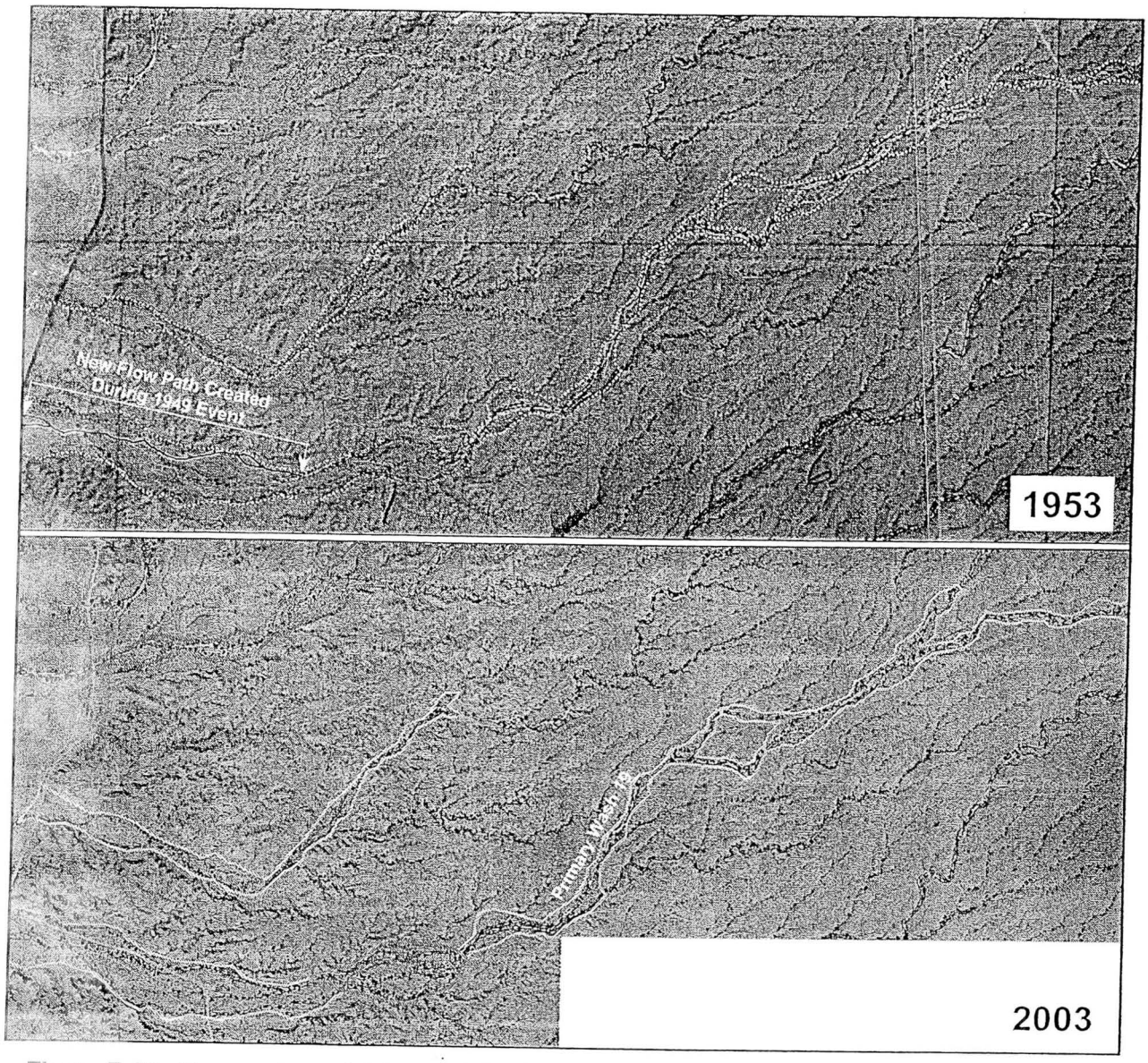

Figure 7.12. Comparison of 1953 and 2003 aerial photos for parts of Primary Wash 19 and surrounding areas showing unstable areas of moderate (yellow) and high (orange) hazard.

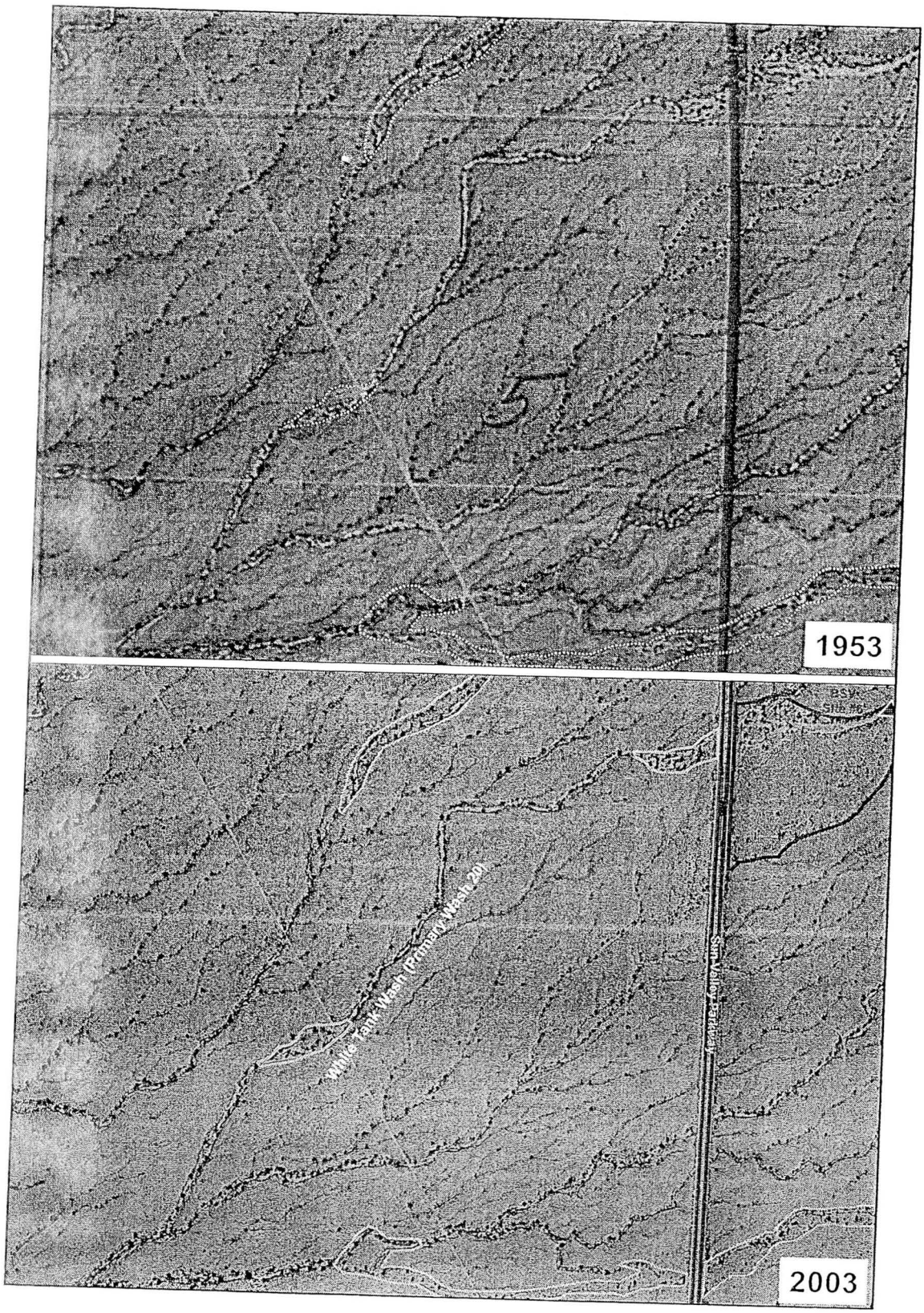

Figure 7.13. Comparison of 1953 and 2003 aerial photos for parts of Primary Wash 21 and surrounding areas showing unstable areas of moderate (yellow), high (orange), and extreme (red) hazard.

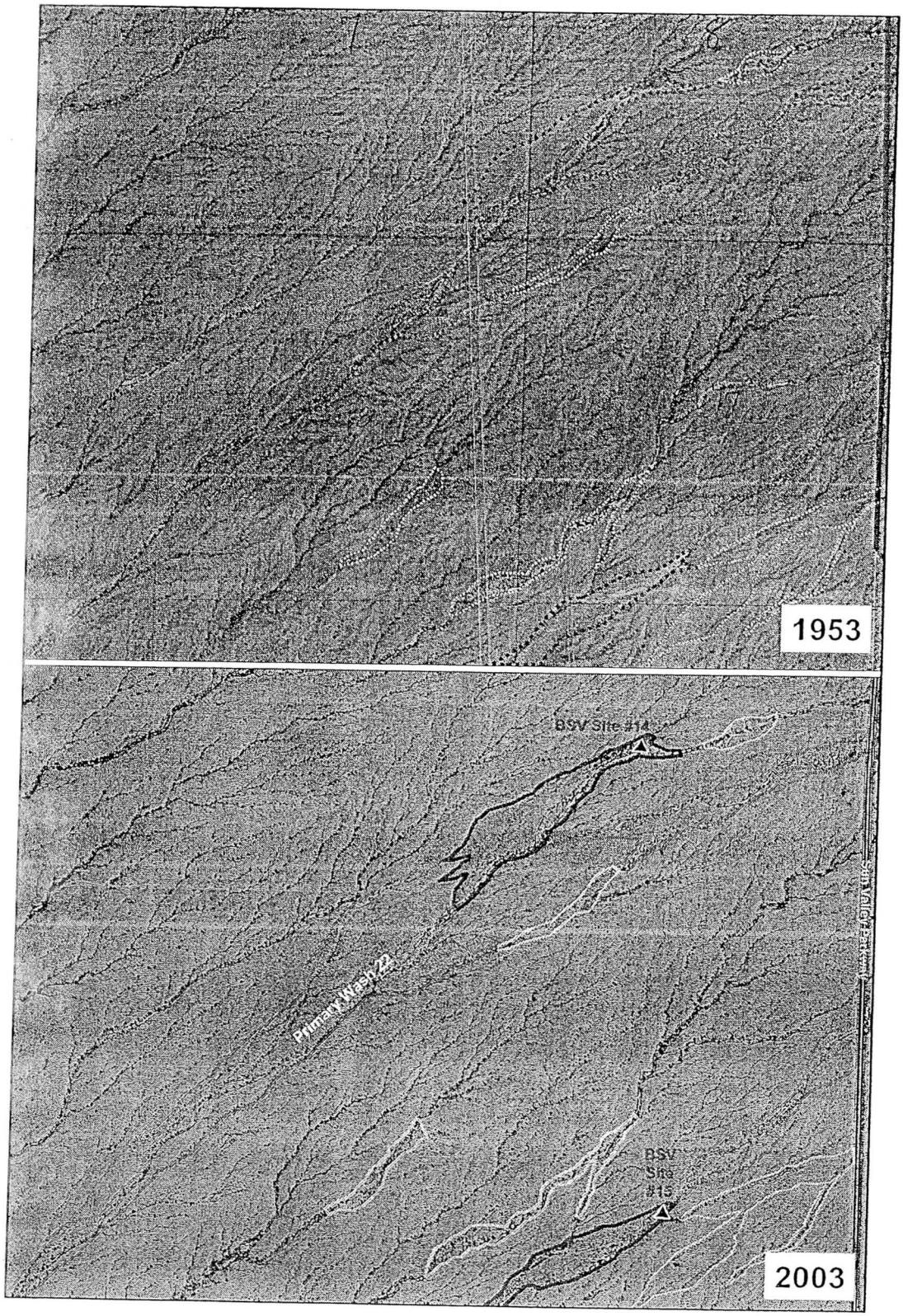

Figure 7.14. Comparison of 1953 and 2003 aerial photos for parts of Primary Wash 22 and surrounding areas showing unstable areas of moderate (yellow), high (orange), and extreme (red) hazard.

A comparison of the 1953 and 2003 aerial photos for parts of Primary Washes 23, 24, and 25 just west of Sun Valley parkway is provided in **Figure 7.15**, which shows the unstable areas of extreme (red) hazard in the 1953 aerial photo as being moderate (yellow) and high (orange) hazards in the 2003 aerial photo. This is also a function of construction of Sun Valley Parkway. The extreme hazard areas in 1953 were the result of active alluvial fan flow path development associated with USGS Sites 37 and 38 alluvial fans. As discussed above, once the highway was constructed, the culverts and highway embankment cut off unconfined alluvial fan flooding and associated processes downstream of the highway. The previously extreme hazard areas are now primarily moderate and high hazard areas. The unstable areas of high hazard are composed of multiple flow splits and joins, as well as braided reaches, with a high potential for flooding of the interfluve areas and potential avulsions. The unstable areas of moderate hazard are associated primarily with flow splits and wider, shallow flow zones of the confined throughflow channels. Field and Pearthree (1992) mapped these moderate and high hazard areas as having a high flood potential.

A comparison of historic photos for White Tank Wash, also denoted as Primary Wash 20, shows significant changes occurring between 1949 and 1953, coincident with the 1951 storm event. **Figures 7.16** through **7.19** show comparisons for sections of the wash, from upstream at the confluence with Primary Wash 22 to downstream where it intersects Buckeye Flood Retarding Structure (FRS) #1. Figures 7.16 and 7.17 show a comparison of the 1953 and the 2003 aerial photos. The 1953 aerial photos show fairly fresh erosion and sedimentation and out-of-bank flow indicative of the impacts of the 1951 storm event. Of particular interest is the comparison of the 1949 and 1953 aerial photos shown in Figures 7.18 and 7.19. The 1949 photos show a fairly narrow channel bound by trees and other vegetation. However, the 1953 photos show the much wider flow path that resulted from flooding induced by the 1951 storm event. In many places, flood flows were well outside the boundaries of the 1949 channel and in some places a new flow path was created (Figure 7.17). In all of the figures, the 2003 channel has reestablished vegetation along its margins and developed a narrower flow path comparable to the width of the 1949 channel. As is described in Delineation of Erosion Hazard Zone technical memo (Ayres Associates 2005), the flooding and changes that occurred during the 1951storm event are well within the boundaries of the mapped 100-year floodplain.

In addition to the changes that occurred naturally as a result of the 1951 storm event, there have also been significant changes associated with development in the area, especially north of Buckeye FRS #1 and west of Sun Valley Parkway. **Figure 7.20** provides a comparison of the 1949, 1953, 1992, and 2003 aerial photos for the area bound by Sun Valley Parkway to the east, the West Tonopah-Salome Highway to the north, White Tank Wash to the west, and Buckeye FRS #1 to the south. As seen in Figure 7.20, there are numerous first and second order drainages and primary channels that dissect the area from north to south. As identified in the 1973 aerial photos, roads were being constructed in the area, and by 1992 homes and other buildings was being constructed. By 2003, many of the first and second order drainages were obliterated by ongoing development and many of the primary and secondary washes had been modified, rerouted, or built-over by landowners and developers.

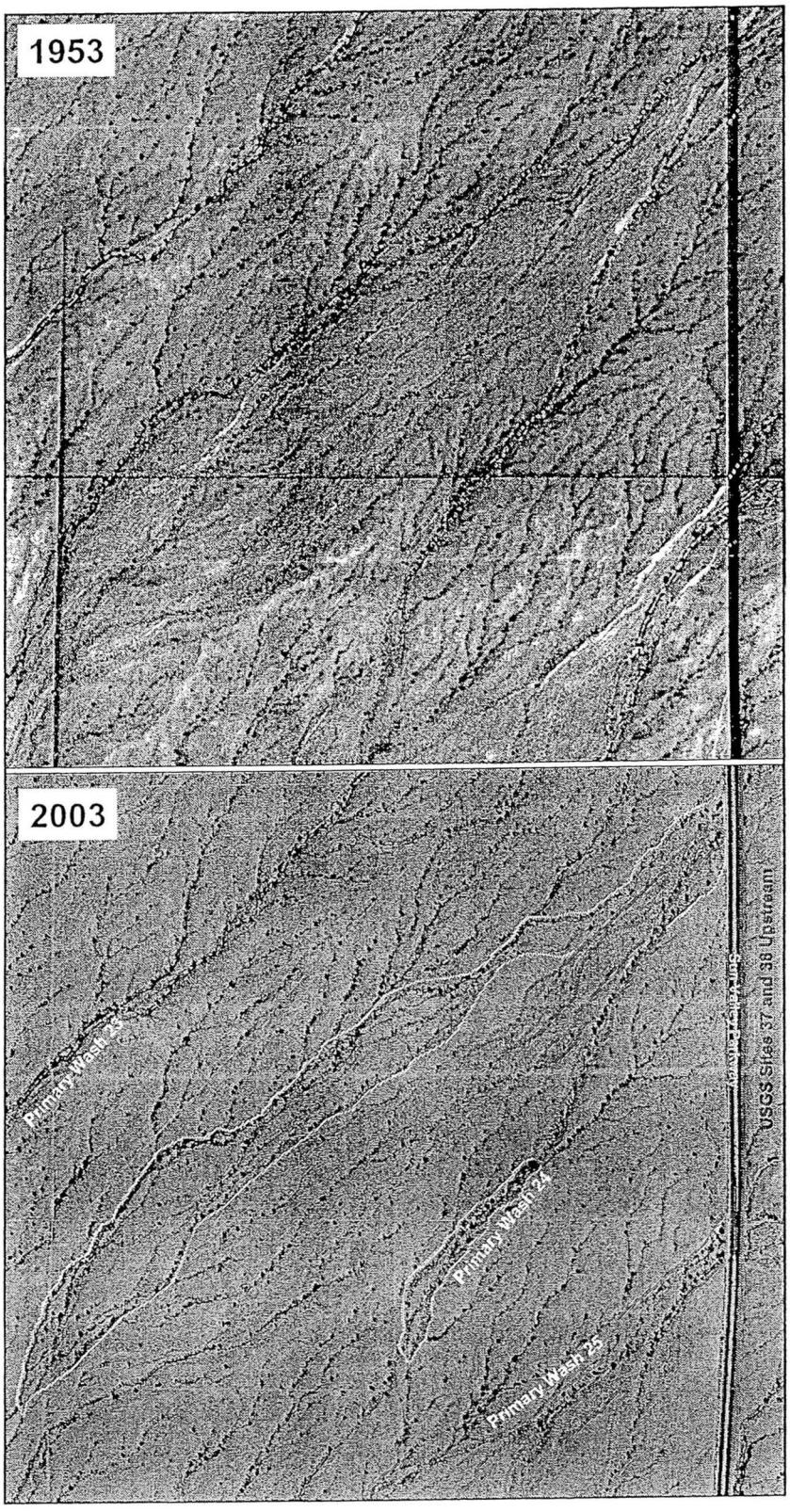

Figure 7.15. Comparison of 1953 and 2003 aerial photos for parts of Primary Washes 23, 24 and 25 and surrounding areas showing unstable areas of moderate (yellow) and high (orange) hazard.

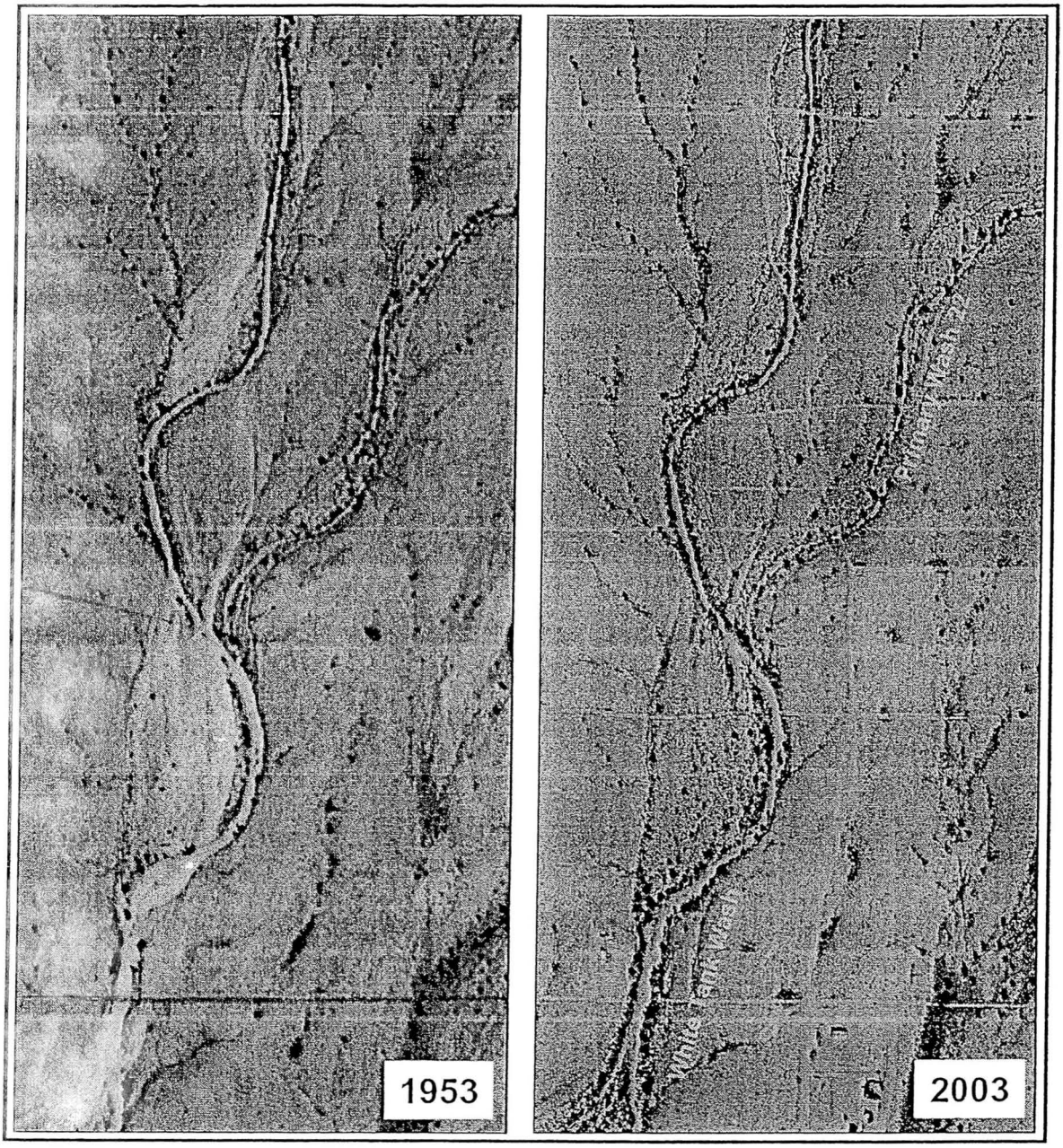

Figure 7.16. Comparison of 1953 and 2003 aerial photos for White Tank Wash (Primary Wash 20) at the confluence with Primary Wash 22.

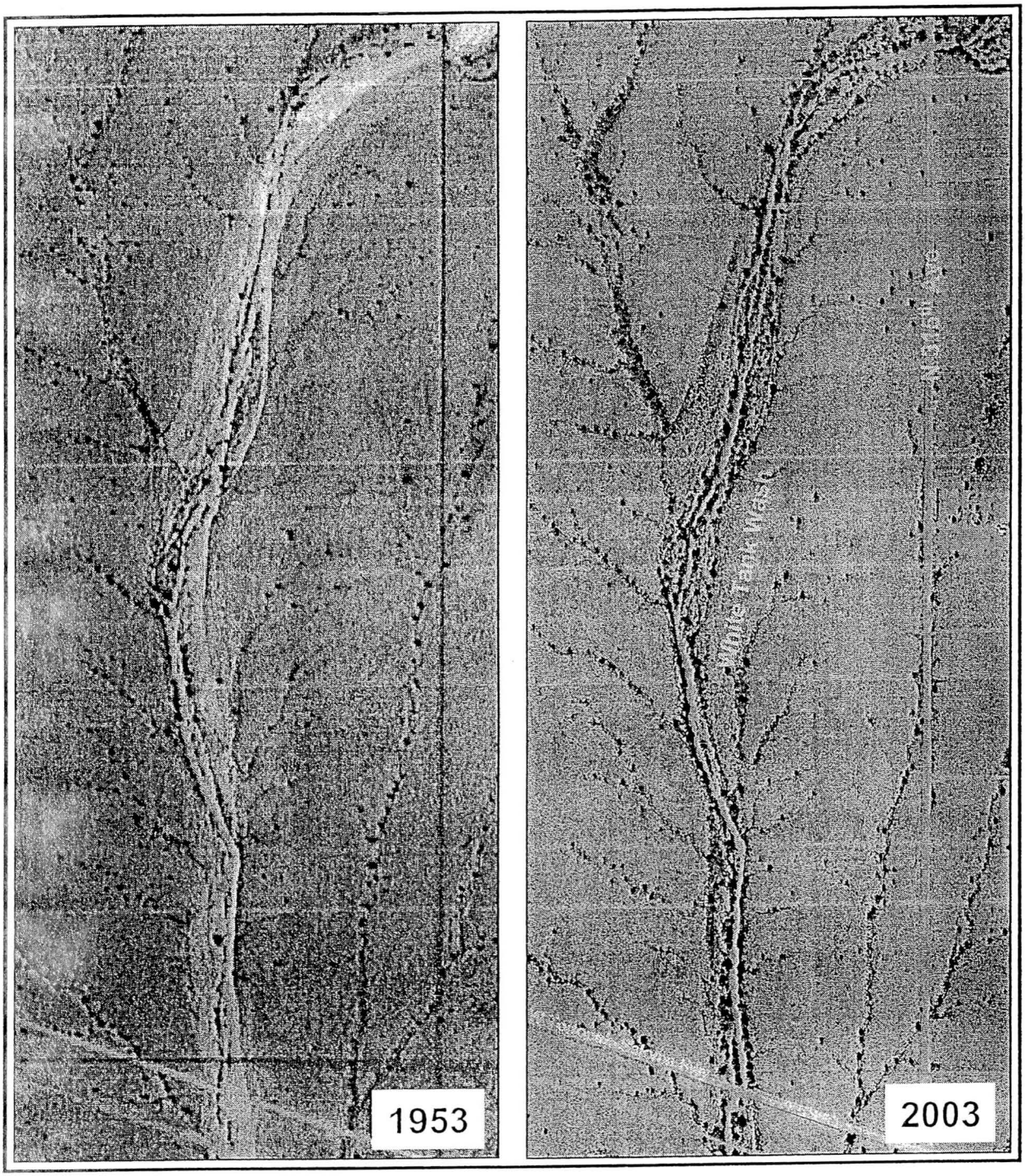

Figure 7.17. Comparison of 1953 and 2003 aerial photos for White Tank Wash (Primary Wash 20) upstream of the West Tonopah-Salome Highway.

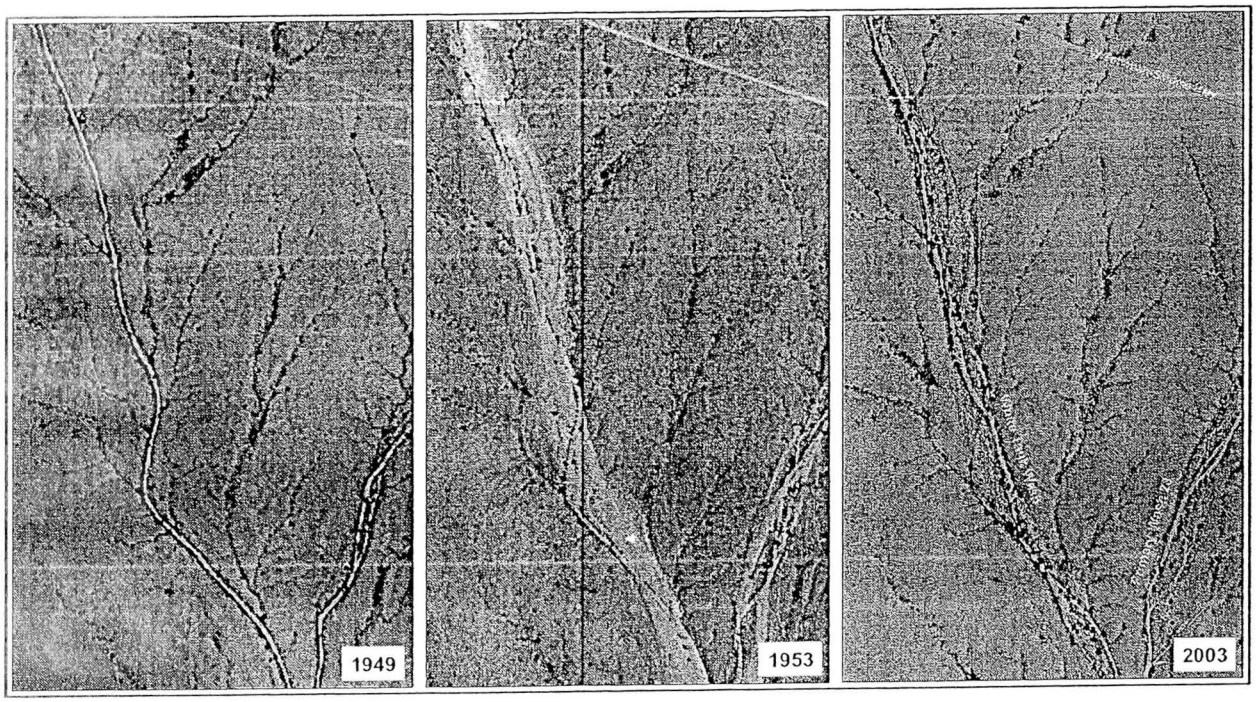

Figure 7.18. Comparison of 1949, 1953, and 2003 aerial photos for White Tank Wash (Primary Wash 20) downstream of the West Tonopah-Salome Highway.

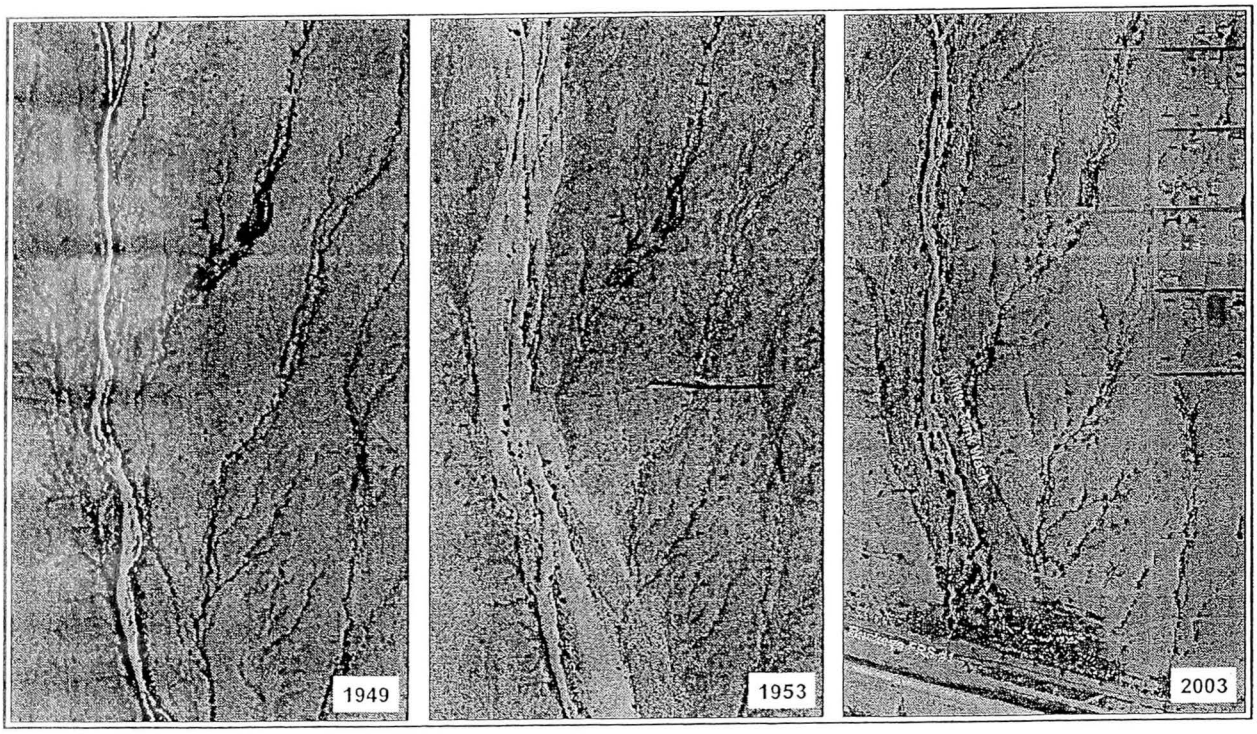

Figure 7.19. Comparison of 1949, 1953, and 2003 aerial photos for White Tank Wash (Primary Wash 20) upstream of Buckeye FRS #1.

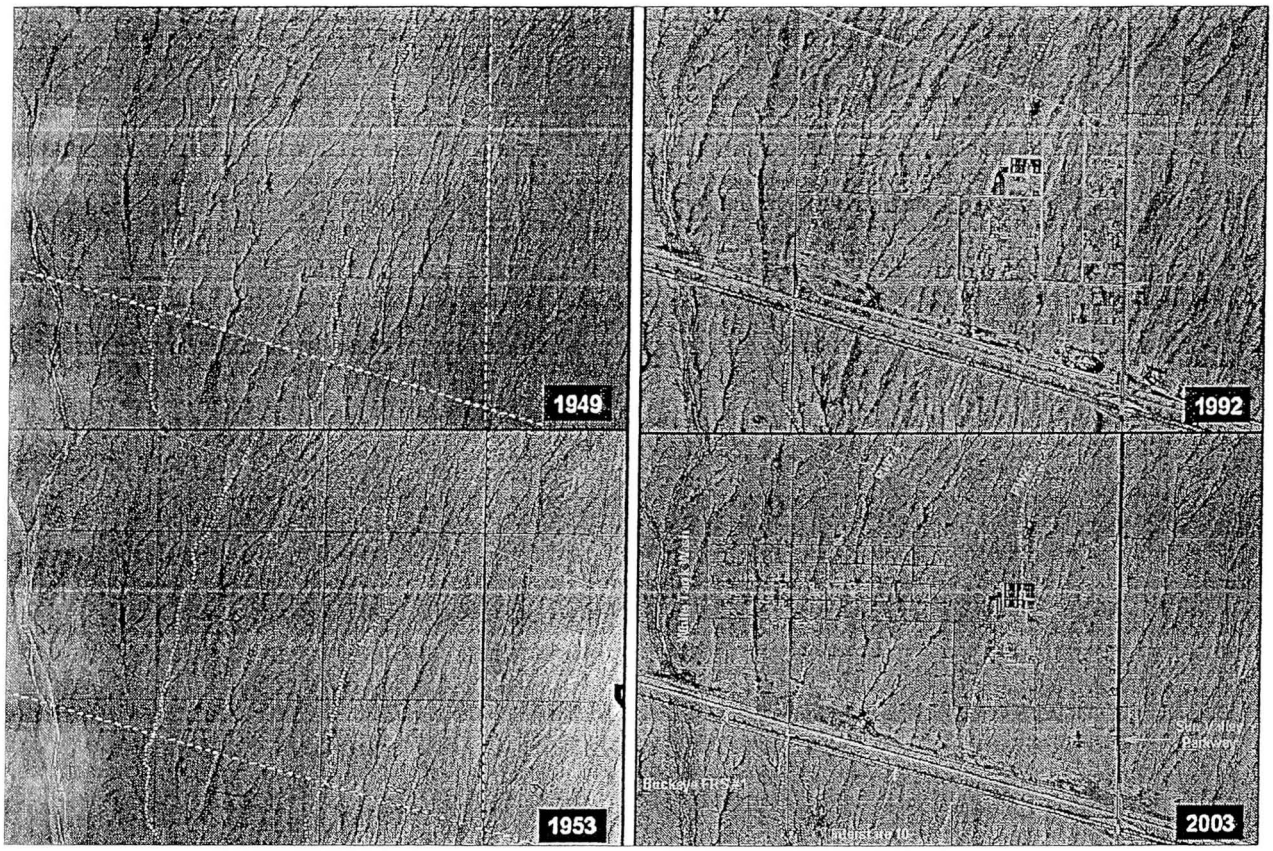

Figure 7.20. Comparison of 1949, 1953, 1992, and 2003 aerial photos for the area bound by White Tank Wash (Primary Wash 20), Sun Valley Parkway, the West Tonopah-Salome Highway, and Buckeye FRS #1.

As seen in **Figure 7.21**, Primary Wash 24, where it once traversed the developed area, has been rerouted at least twice. The first rerouting was a short distance to the east probably to allow for construction of N. 305th Ave. The channel actually crosses over W. Bellview St. and W. Latham St. and has deposited sediment on the pavement. At the intersection of W. Latham St. and N. 305th Ave. the flow follows the roadway for a short distance to the south were it then drops back into its old channel. The most recent rerouting of the channel occurs at the back of a property just north of W. Lynwood St. The current position of the channel runs from east to west along the back of a residential property and intersects another wash several hundred feet to the west. The owner of the property just west of the previous course appears to have diverted the channel to the west by constructing a low sediment berm along the back of his property, capturing the smaller flows and diverting them to the west. It should be noted that this wash is a primary drainage that carries flow and sediment from portions of the USGS Site 37 and 38 active alluvial fans. Although the culverts and embankment of Sun Valley Parkway may control the flow of water and sediment to this area, it is highly likely that the highway could be overtopped during a major event, especially if sediment from the alluvial fans blocks the highway culverts. This could result in significant flooding of the properties along Primary Wash 24 downstream of the highway.

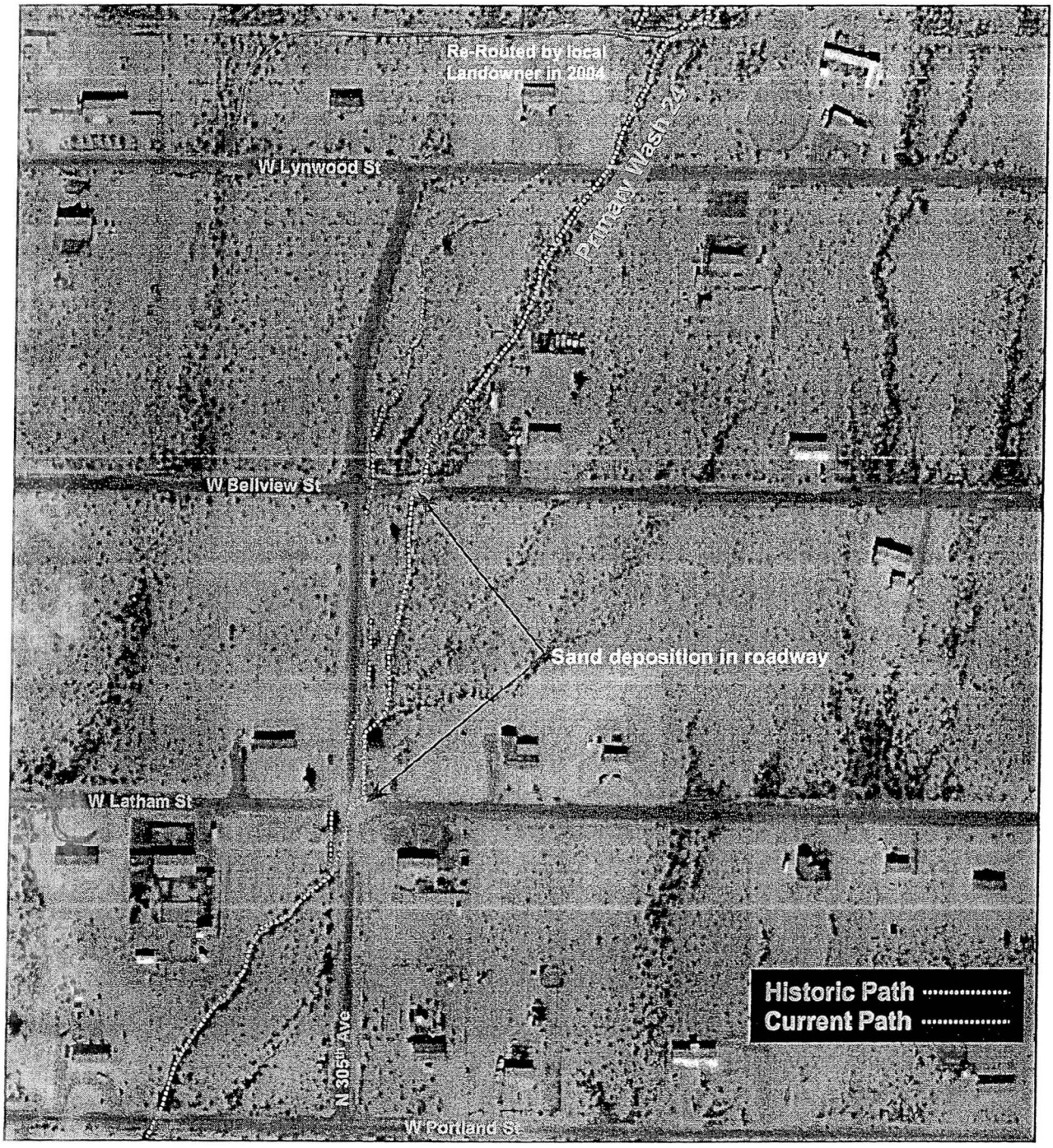

Figure 7.21. Magnified 2003 aerial photo of the development along Primary Wash 24 shown in Figure 7.20.

Similar conditions exist along Primary Wash 25 west of Sun Valley Parkway. As seen in **Figure 7.22**, the wash is obstructed and obliterated by a large dairy farm. Development to the south of the farm has also significantly modified or destroyed what remained of the wash. Major flood flows from the wash will likely become unconfined at the farm structures to the north of the main dairy and flow will be diverted around or through the dairy farm. Serious flooding of the farm and the properties to the south could occur as a result. As discussed above, Sun Valley Parkway could capture and control much of the flow of water and sediment coming from the White Tank (USGS Site 36) alluvial fan, but obstruction of the culverts could result in overtopping of the highway and unpredictable flood flow routes downstream.

7.3 Field Reconnaissance

A detailed examination of the primary washes was conducted in the field using GPS, field data collection sheets, and photo documentation. As part of Task 2.6.4 of the Scope of Work, knickzones, headcuts, natural and man made grade controls, sources of sediment, and areas of significant erosion along the washes were to be identified. These sites were identified by recording a waypoint in the field at each location and documenting the feature and its characteristics. These features are identified on the channel profiles and on the field data sheets in Appendix C. **Table 7.2** lists the locations and approximate dimensions of knickzones identified in the field. The locations and approximate dimensions of headcuts (developed either in caliche or as bedrock falls) that were identified in the field are provided in **Table 7.3**.

The principle stability issues on most of the primary washes are associated with the processes of active alluvial fans where they traverse the fan or immediately downstream of the fan, headcutting and gullying where the primary washes intersect the FRSs, and sediment blockage at culvert crossings that could result in overtopping of the highway with concomitant downstream flooding and channel degradation. The stability issues of the primary washes where they traverse active alluvial fans have been addressed previously in this report. The headcutting (**Figure 7.23**) and gullying (**Figure 7.24**) at the FRSs is associated with a significant grade change from the natural bed elevation of the wash to the base elevation of the FRS over a very short distance. The gullying and headcutting is migrating upstream and could pose a potential threat to any property in close proximity to the FRSs. Headcuts and gullying are common at all the washes that do not have a smooth grade transition from their bed to the base level of the FRSs. In many cases, the headcutting and gullying has created a small alluvial fan within the FRS basin immediately downstream of the confluence of the wash.

As discussed above, the culvert crossings of Sun Valley Parkway on the Primary Washes were examined in detail as well. Primary Washes 1 through 8 were intercepted by a concrete and grouted riprap lined channel on the south side of and parallel to the east-west portion of the highway at the north end of the study area. The engineered channel also contained low drop grade control structures. The channel drained flow from these and other washes to the south into Wagner Wash where the highway turns to the southwest. There is a large rock drop structure on Wagner Wash immediately downstream of the confluence of the engineered channel. The rock grade control structure appears to have intercepted about 4 to 5 feet of degradation on Wagner Wash. The degradation downstream of the structure is causing 3 to 4 feet of incision at the lower end of Primary Wash 9.

Primary Washes 9 through 14 drain directly to Wagner Wash where it flows to the southwest along the east side of the highway. Once the highway turns southward, the primary washes south of Primary Wash 15 and north of Primary Wash 20 must pass through culverts under the highway before emptying into the Hassayampa River. Primary Washes 20 through 25 and those washes just south of Primary Wash 25 pass through culverts under the highway and then drain to Buckeye FRS #1. The culverts for the primary washes that pass under the highway and were examined in detail are on Primary Washes 15 through 25.

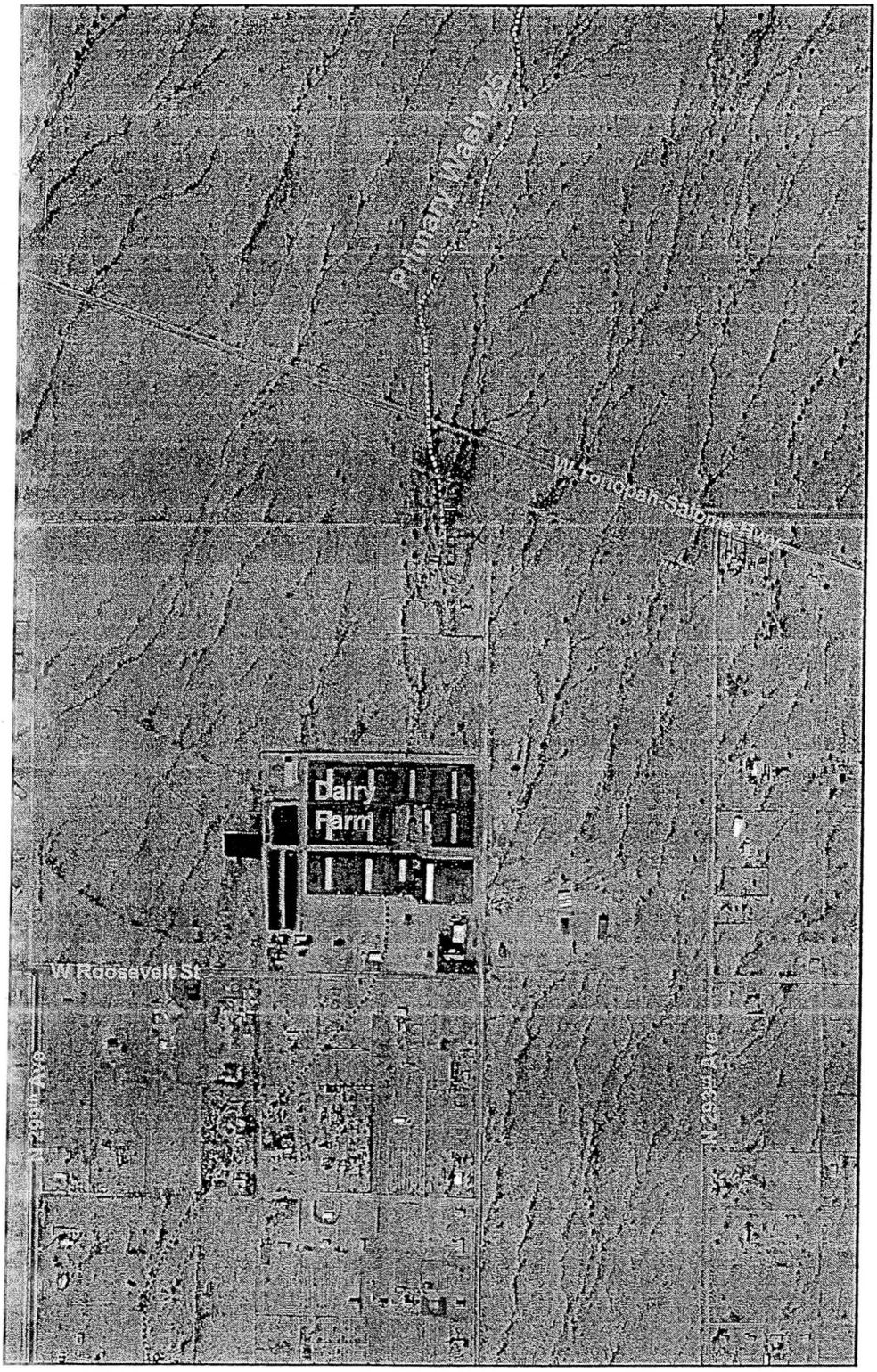

Figure 7.22. Magnified 2003 aerial photo of the development and dairy farm along Primary Wash 25 as shown in Figure 7.20. The yellow line is the current active path and the blue line is the nearly obliterated historic path.

Table 7.2. Knickzones on Primary Washes.

Primary Wash	Upstream Easting (ft)	Upstream Northing (ft)	Downstream Easting (ft)	Downstream Northing (ft)	End Waypoints	Length (ft)	Comments
34	504843	895155	504889	895051	6-7	114	upstream of headcut
33	---	---	502659	894453	12	100	
33	501400	891818	501374	891664	14-15	156	zone of mult. flow paths
32	500032	889508	500048	889399	17-18	110	
32	499822	890592	499963	890202	20-21	415	
32	499279	891318	499449	890972	24-25	385	in caliche
27	479134	889874	478627	889180	79-80	859	in caliche
25	476739	914331	476596	914201	100-101	193	in caliche
25	475885	913520	475695	913380	102-103	236	in caliche
25	465956	901828	---	---	109	50	in caliche, 3 ft drop
22	467648	921536	467415	921535	171-172	233	in caliche
22	466985	921390	466947	921363	174-175	47	in caliche
21	461559	923019	461410	922984	189-190	153	in caliche
20	468615	929816	468418	929851	216-217	200	in caliche
20	470201	930258	470071	930189	219-220	147	in caliche
20 North	467278	932124	467247	932006	239-240	122	
18	471909	940537	471789	940573	272-273	125	in caliche
16	464526	950304	464476	950296	329-330	51	in caliche
13	476956	958606	476878	958671	362-363	101	in caliche
9	471668	967092	471476	967066	366-367	195	4 ft drop to confluence
9	472457	966478	---	---	369	40	1.5 ft drop
7	476550	967324	476408	967321	393-394	142	in caliche
7 East	480320	964060	480250	964480	398-399	426	in caliche, d/s of headcut
6	486489	964903	486408	965019	406-407	142	in caliche
3	488831	962828	488604	963285	412-413	510	in caliche
3	486529	968115	486408	968232	416-417	168	

Table 7.3. Headcuts on Primary Washes.

Primary Wash	Easting (ft)	Northing (ft)	Waypoint	Height (ft)	Comments
36	479944	940722	261	10-12	bedrock falls
34	504890	895052	2	4	in caliche
30	489932	893255	48	10-12	bedrock falls
25	488146	921546	92	10-12	bedrock falls
25	467298	904897	107	1-2	in caliche
25	462827	890907	428	3	in caliche
24	461691	903225	119	1.5	in caliche, downstream of sheet flow
20	467626	932363	238	2-3	in caliche
17	477959	947683	297	3-4	bedrock falls
14	485647	953168	342	12	bedrock falls
7 East	480320	964060	398	3	in caliche

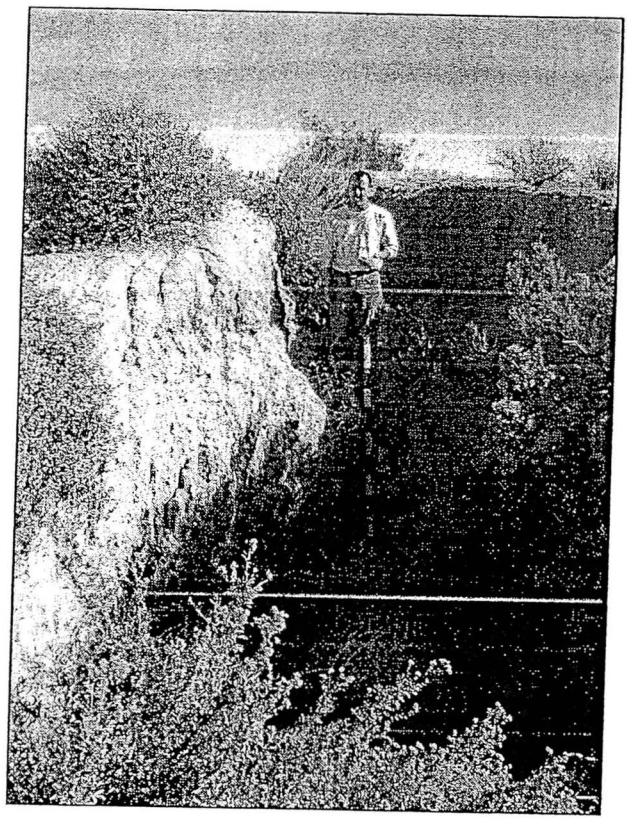

Figure 7.23. View looking upstream showing a 3-foot high headcut at the confluence of Primary Wash 25 with Buckeye FRS #1. Note the 3.5-foot deep incised channel upstream.

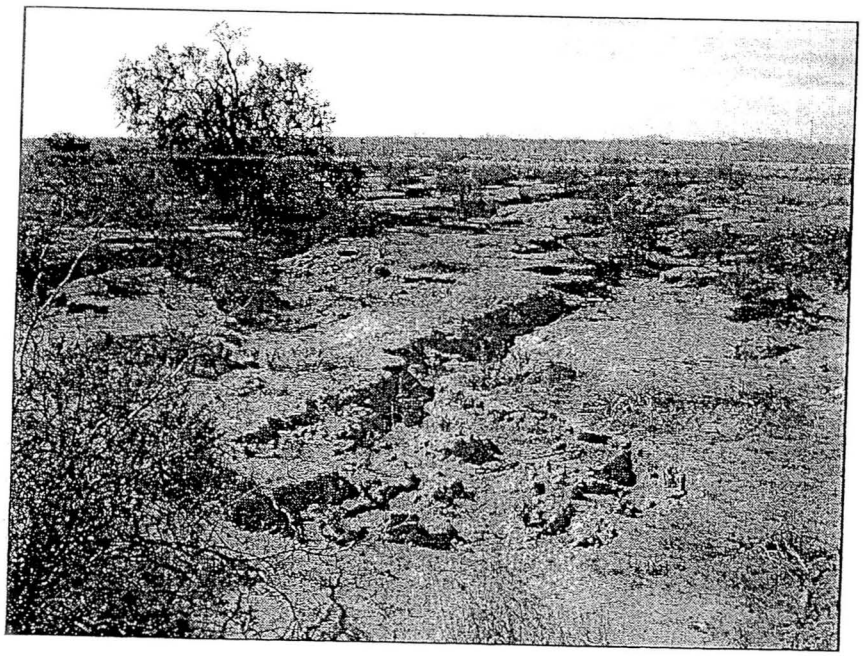

Figure 7.24. View looking downstream on Primary Wash 25 toward Buckeye FRS #1 showing the extensive gullying upstream of the incised channel reach of the wash.

Several culverts were examined on primary washes that drain from active alluvial fans. As a result, many of these culverts are experiencing severe blockage from sediments derived from the fans and areas below the fans. **Table 7.4** provides a listing of the primary wash culverts that were examined, their size, skew, and slope, the degree of blockage, sediment depth, and design flow associated with each. At least 2 of the primary washes examined had culverts that were more than half full of sediment and four others had culverts that were nearly half full of sediment. Continued sediment deposition at the partially blocked culverts, especially during major flow events, could lead to complete blockage of the culverts, backwater flooding upstream of the road embankment, overtopping of the roadway embankment, and uncontrolled and unconfined downstream flooding.

Table 7.4. Sun Valley Parkway Bridge Culvert Data (Upstream Side).

Primary Wash	SVP Highway Sta.	RCBC # Barrels and Size	Skew (deg.)	Slope (%)	Max. Sed. Depth in Barrel (ft)	% Obstruction of Upstream Barrels	Design 100-yr Q (cfs)	Downstream Headcut Height (ft)	Comments
25	161+67	6 - 10'x3'	23.00	0.37	0	0	1,067	0	Downstream of USGS Site 37 Active Alluvial Fan
25 North	172+93	2 - 8'x3'	39.00	0.36	---	---	369	---	Downstream of USGS Site 37 Active Alluvial Fan
24	227+85	2 - 10'x3'	30.00	0.36	0.3	5	200	0	Downstream of USGS Sites 37 & 38 Active Alluvial Fans (on borders)
24 North	230+27	2 - 10'x3'	40.00	0.24	0.5	17	280	0	Downstream of USGS Site 38 Active Alluvial Fan (on north border)
23	266+49	6 - 10'x4'	25.50	0.24	2.5	50	1,575	0	Downstream of USGS Site 38 Active Alluvial Fan
22	333+84	3 - 10'x4'	8.50	0.39	1.75	42	739	0	Downstream of USGS Site 39 Active Alluvial Fan
21	360+44	4 - 10'x4'	15.50	0.32	2.5	55	1,031	0	Downstream of USGS Site 39 Active Alluvial Fan
20	415+81	6 - 10'x3'	39.55	0.35	1.75	44	1,080	1.5	Downstream of BSV Site #6 Active Alluvial Fan
20 North	443+33	1 - 8'x4'	37.13	1.72	0	0	232	0.75	
19	480+10	6 - 10'x5'	0.00	0.35	2.4*	43*	6,723 Total	3	*South bridge downstream of BSV Site #5 Active Alluvial Fan (on north border)
	481+03	6 - 10'x5'	6.03	0.35	0	0			
	482+43	3 - 12'x5'	30.00	0.30	0	0			
18	518+50	6 - 12'x5'	19.42	0.40	1	1	2,449	2.5	
17 Trib	577+40	3 - 10'x5'	22.62	0.70	0.3	3	1,123	2.5	
17	580+28	3 - 12'x6'	32.52	0.91	0.2	3	1,538	0	
16	630+89	4 - 10'x3'	30.58	0.58	1.75	44	910 Each	0	1.1 miles downstream of wing dam
	632+08	3 - 12'x5'	6.48	0.30	1.75	32			
15	718+02	3 - 10'x4'	10.52	0.35	0	0	unknown	0	
(Sun Valley Parkway constructed 1988-1991)									

Bank erosion and bank failures can also be significant hazards that can affect future development. Major areas of bank erosion and bank failure are found primarily along the lower reaches of washes where channel capacity is greater (**Figure 7.25**) or in the entrenched relict fan areas near the mountain front where channel depth or entrenchment is sufficient to produce conditions conducive to large mass failures of the banks and valley walls (**Figure 7.26**). Channel incision (**Figure 7.27**) and abrupt changes in flow path (**Figure 7.28**) can also induce bank erosion and bank failure. There are also locations where the channel is constricted or where an obstruction occurs such that sediment deposition may occur within the channel and flow is diverted around the sedimentary deposit. In these cases, flow may impinge on the toe of a high bank or valley wall producing undercutting of the bank and subsequent gravity failure of the bank. Large blocks of failed material may exacerbate or enhance the further undercutting and failure of the bank and adding the deposition in the channel (**Figure 7.29**). At these locations, channel widening occurs at and upstream of the obstruction and oversteepening of the channel occurs downstream until the obstruction and sedimentary deposits are either bypassed or eroded away. Major floods that pass through these locations can erode the sediment deposits at the obstruction and can produce a significant wedge of sediment that is transported downstream into the lower reaches where it can create additional obstructions at road crossings or induce further bank erosion.

7.4 General Descriptions of Primary Washes

The following descriptions of the existing conditions of the primary washes are based on the field reconnaissance and the aerial photo analysis. The location of each primary wash is shown on Plate 1 of Appendix C. Profile plots, annotated cross sections, and cross section photos for each of the channels are provided in Appendix C as well and should be referred to during the following discussions. Additional ground photos were taken at strategic locations along the washes and are linked to georeferenced points delineated in the ArcGIS mapping database that was provided to the District. The primary washes are numbered in ascending order from north to south, with Primary Wash #1 at the northeast end and Primary Wash 34 at the southeast end of the study area.

Primary Wash #1 – Approximately 2.5 miles of this wash were examined in the field. Upstream (south) of Sun Valley Parkway, the wash is a small, stable channel that passes under the roadway via a culvert. Downstream of the roadway, channel capacity decreases and the channel becomes undefined on the inactive fan surface.

Primary Wash #2 – A total of about 1.34 miles of this wash were examined in the field. This wash is located entirely north of Sun Valley Parkway. The channel is poorly defined or nonexistent until approximately 200 feet upstream of the confluence with Wagner Wash where it becomes one of many small gullies feeding the upstream end of Wagner Wash.

Primary Wash #3 – A total of about 4.62 miles of this wash were examined in the field, 2.65 miles of which are south of the Sun Valley Parkway. The wash begins at the northern end of the White Tank Mountains and is intercepted by an engineered drainage channel along Sun Valley Parkway. The remains of the cutoff lower portion of the wash are present between the roadway and Wagner Wash. As discussed in the previous section, the wash upstream of the parkway is an area of high hazard due to the presence of multiple shallow, but relatively well-defined, distributary channels (Figures 7.1 and 7.2). The interfluve areas between the distributary channels may be subject to flooding during major storm events. The channel just upstream of the confluence with the parkway drainage channel is incised and is actively widening. The ongoing incision and widening are producing sedimentation at the energy dissipation structure at the confluence with the parkway drainage channel.

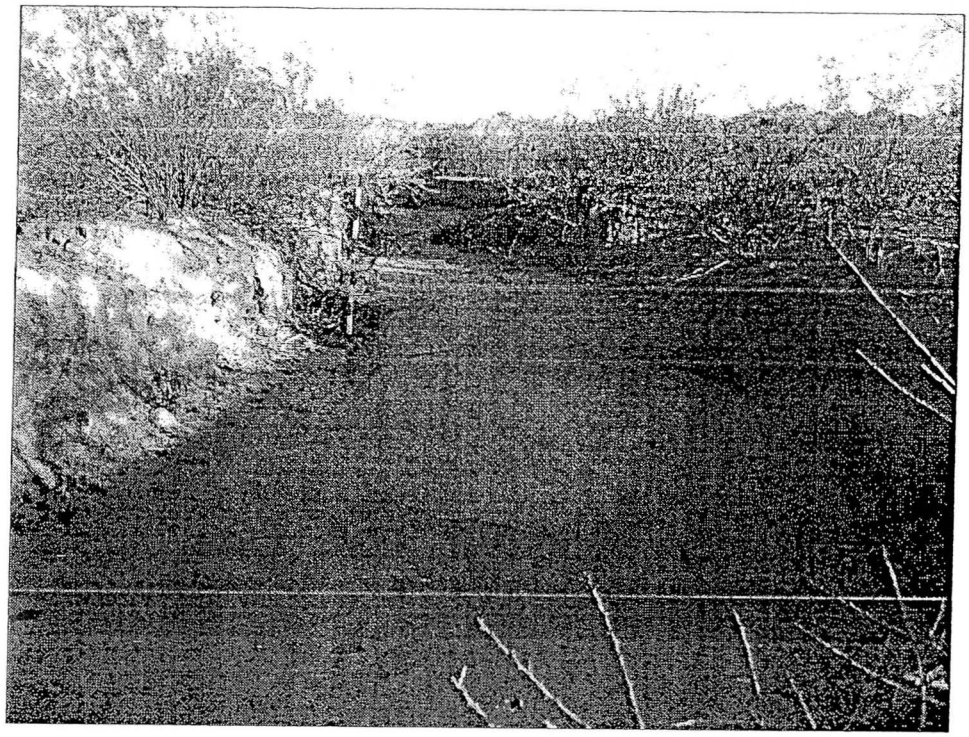

Figure 7.25. View looking upstream showing eroding banks on Primary Wash #3.

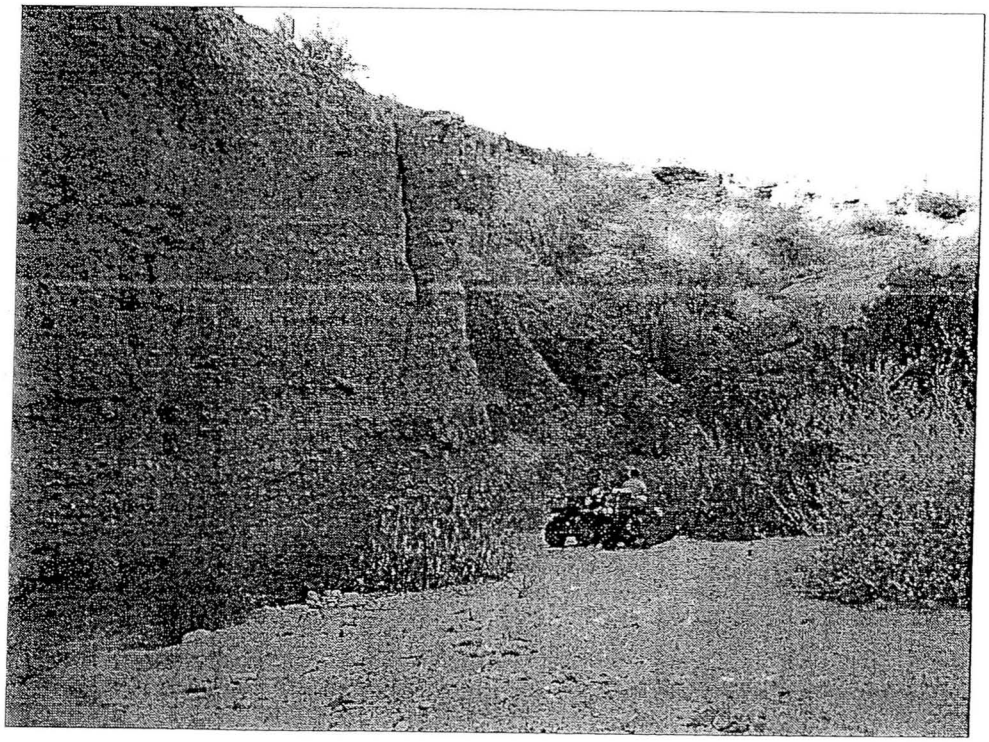

Figure 7.26. View upstream showing high cutbank in relict fan deposits of right valley wall on Primary Wash #21.

Figure 7.27. View looking upstream showing bank undercutting and failure associated with channel incision on Primary Wash #9.

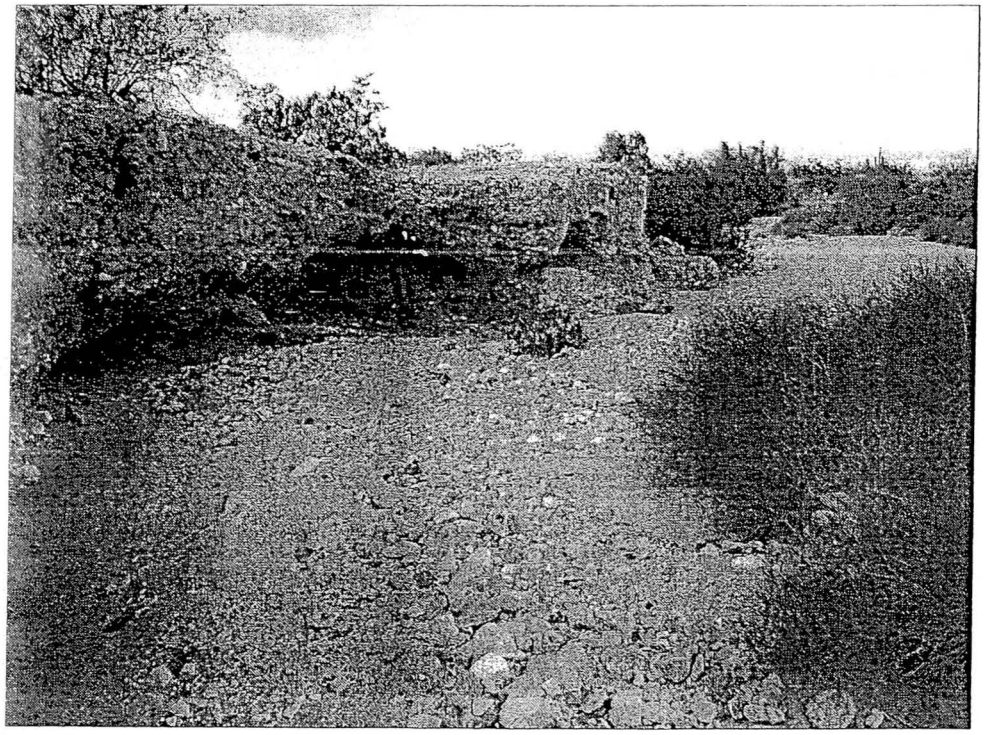

Figure 7.28. View looking downstream showing undercut bank in caliche on left bank of Primary Wash #23 due to abrupt change in flow path.

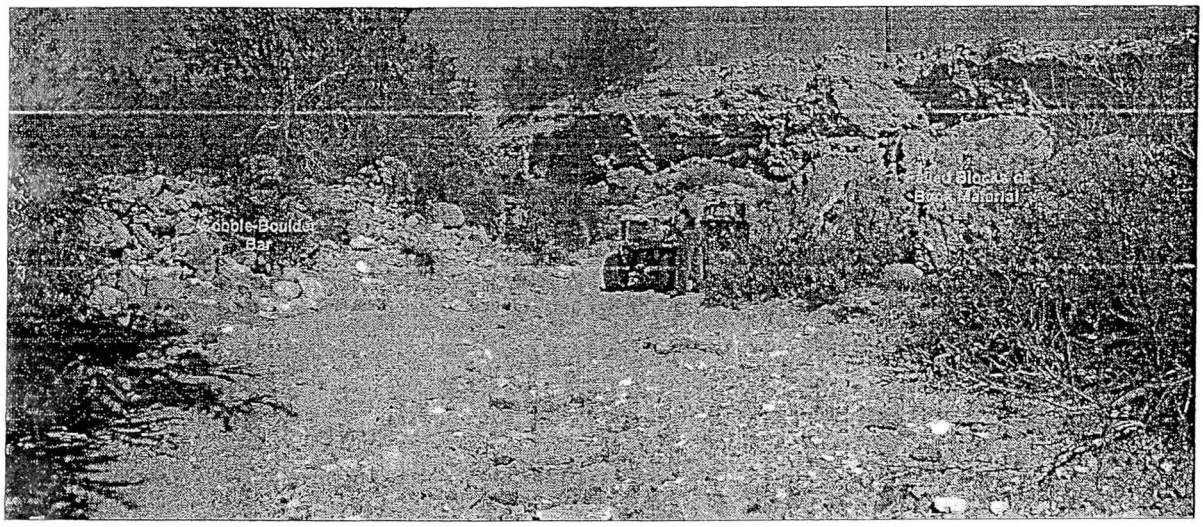

Figure 7.29. View looking upstream on Primary Wash #25 showing high, undercut left bank in relict fan deposits due to flow deflection around sediment and debris deposits (bar) in channel along right bank. Note high, steep slip face on the cobble-boulder bar on the left side of photo. Bar is forcing flow into left bank causing bank to be undercut and inducing mass failure of the bank material. Note the large blocks of failed bank material at the toe of the left bank.

Primary Wash #4 – A total of about 1.86 miles of this wash were examined in the field, 0.63 miles of which are south of the Sun Valley Parkway. The wash begins just south of Sun Valley Parkway and ends at Wagner Wash. However, the upper part of the wash is captured by the drainage channel that runs along the south side of the parkway. Downstream of the parkway, there is no well-defined channel until about 200 feet downstream. Flows from the parkway feed the channel downstream of the roadway. At about 700 feet downstream of the parkway, there is bedrock control in the channel bed. Caliche is present in the bed between 3,000 and 4,500 feet upstream of the confluence with Wagner Wash. The channel eventually peters out at a point about 2,300 feet upstream of the confluence and downstream flow becomes primarily unconfined sheet flow. The channel does not redevelop until several hundred feet upstream of the confluence with Wagner Wash where it becomes one of many small gullies feeding the upstream end of Wagner Wash.

Primary Wash #5 – A total of about 0.54 miles of this wash, which is north of the Sun Valley Parkway, were examined in the field. This wash is deeply incised at its confluence with Wagner Wash. Wagner Wash is also deeply incised at this location. Much of the area around the confluence of this wash with Wagner Wash is heavily dissected with gullies and may represent one of the larger, well-defined gullies.

Primary Wash #6 – A total of about 3.11 miles of this wash were examined in the field. This wash begins in the northern end of the White Tank Mountains and flows from south to north until the northern end of the mountains, at which point it turns due west. The wash drains the active alluvial fan at BSV Site #2 over much of its north-south route (Figure 7.2). The downstream end of the fan is marked by localized bedrock control and a short knickzone in the channel bed. Once the channel turns to the west, it becomes confined and well defined. At a point about 2 miles downstream of where it turns to the west, the wash is intercepted by the Primary Wash #7. The wash passes between inselbergs about 3,000 feet upstream of the confluence. Just

downstream of the inselbergs, the channel is intercepted by a large tank with an earthen wing dam (Figure 7.3). The wash is intercepted by Primary Wash #7 with the confluence marked by a knickzone in caliche in the bed. The channel at and upstream of the confluence is deeply incised with active bank erosion. The reach here and downstream along Primary Wash #7 appears to have undergone about 3 to 4 feet of recent incision, probably in response to construction of the parkway drainage channel.

Primary Wash #7 – A total of about 2.46 miles of this wash were examined in the field, 2.04 miles of which are upstream if the Sun Valley Parkway. This wash begins in the northwestern part of the White Tank Mountains and is intercepted by the constructed drainage channel along the south side of Sun Valley Parkway (Figure 7.3). The abandoned reach north of the parkway, including the confluence with Wagner Wash, provides drainage to Wagner Wash only for part of the north side of the parkway and a small area of land in between. The confluences of Primary Wash #7 East and Primary Wash #6 are located at about 2,600 feet upstream of the parkway. Caliche in the bed of the channel from about 6,000 to 7,200 feet upstream of the parkway is controlling the grade of the channel at that location and may be the cause of the distributary flow paths located at the upstream end of the reach. The same situation exists at about 5,000 feet upstream of the parkway. A short reach just upstream of the parkway drainage channel is also defined by a knickzone.

Primary Wash #7 East – A total of about 0.79 miles of this wash were examined in the field. This wash begins in the northwestern part of the White Tank Mountains and is intercepted by Primary Wash #7 near the confluence with Primary Wash #6 (Figure 7.3). Caliche outcrops in the bed of the channel provide some temporary grade control at about 2,450 and 2,900 feet upstream of the confluence. A knickzone is present at about 3,200 feet upstream and ends at a 3-foot headcut in caliche at about 3,600 feet upstream of the confluence.

Primary Wash #8 – A total of about 1.72 miles of this wash were examined in the field, 1.28 miles of which are upstream of the Sun Valley Parkway. This wash begins on the relict fan area south and west of Primary Wash #7 and is intercepted by the constructed drainage channel along the south side of Sun Valley Parkway. The abandoned reach north of the parkway, including the confluence with the abandoned portion of Primary Wash #7, provides drainage to Primary Wash #7 only for part of the north side of the parkway and a small area of land in between. Some incision (approximately 1.0-1.5 feet) is readily apparent upstream of the parkway with sediment eroded from the upstream channel deposited at the confluence with the parkway drainage channel.

Primary Wash #9 – A total of about 2.95 miles of this wash were examined in the field. This wash begins in the northwestern part of the White Tank Mountains and drains to Wagner Wash. The confluence lies just downstream of the Sun Valley Parkway crossing of Wagner Wash. The confluence area of the wash is deeply incised (up to 4 feet) as a result of active degradation on Wagner Wash. The wash for more than 200 feet upstream is actively incising and widening as indicated by the active bank erosion and knickzone in caliche along this reach. There are a number of locations along the remaining upstream channel where caliche outcrops in the bed of the channel. There are also several reaches of distributary flow along the wash. The confluence of Primary Wash #9 South is located about 1,700 feet upstream and the confluence of Primary Wash #9 East is located about 12,500 feet upstream.

Primary Wash #9 East – A total of about 0.53 miles of this wash were examined in the field. The wash begins in the northwestern part of the White Tank Mountains and drains to the upper end of Primary Wash #9. Only about the lower half mile of this channel was examined in detail since much of the wash is bedrock controlled.

Primary Wash #9 South – A total of about 0.59 miles of this wash were examined in the field. This wash is relatively small with loss of flow confinement about 1,300 feet upstream of the confluence with Primary Wash #9. Sheet flow and multiple, poorly defined distributary flow paths occur for several hundred feet downstream of this point. Bedrock control is present in the channel about 2,500 feet upstream of the confluence.

Primary Wash #10 – A total of about 3.48 miles of this wash were examined in the field. This wash begins in the White Tank Mountains and drains to Wagner Wash about midway between the 2 crossings of Sun Valley Parkway over Wagner Wash. The wash is the principal supply to the active fan at BSV Site #13 West. The active fan is located between 11,000 and 14,000 feet upstream of the confluence. The active fan and wash pass between several inselbergs. In addition to the inselbergs, outcrops in the bed of the channel between 9,600 and 10,500 feet upstream represent intermittent bedrock control of the channel.

Primary Wash #11 – A total of about 1.23 miles of this wash were examined in the field. This wash drains to Wagner Wash about midway between the 2 crossings of Sun Valley Parkway over Wagner Wash. Distributary flow from Primary Wash #10 contributes to the flow on this wash.

Primary Wash #12 – A total of about 1.08 miles of this wash were examined in the field. This short wash drains to Wagner Wash about midway between the 2 crossings of Sun Valley Parkway over Wagner Wash. A major flow split into 2 well-defined, entrenched channels occurs between about 1,500 and 2,500 feet upstream of the confluence.

Primary Wash #13 – A total of about 2.46 miles of this wash were examined in the field. The wash drains to Wagner Wash and its confluence is located about 2,000 feet upstream of the lower Sun Valley Parkway crossing over Wagner Wash. The confluence of Primary Wash #13 North is located about a mile upstream of the confluence. A large inselberg is also located just south of the Primary Wash #13 North confluence area. Caliche is present in the channel bed around 4,500 feet upstream. Another long reach with caliche present in the bed is located between 11,500 and 12,100 feet upstream and the reach also contains a 100-foot long knickzone. Localized caliche is present in the bed at the upper end of the channel as well. Some distributary flow is present in the lower reach of the channel just upstream of Wagner Wash.

Primary Wash #13 North – A total of about 0.44 miles of this wash were examined in the field. Although this wash was defined on the USGS topographic maps for this short distance, the well-defined upstream reaches of the wash continues for another mile to the east and intersects the northern arm of the active alluvial fan at BSV Site #3. This wash appears to be a major distributary channel of the fan.

Primary Wash #14 – A total of about 4.73 miles of this wash were examined in the field. The wash drains from the White Tank Mountains and empties into Wagner Wash just upstream of the lower Sun Valley Parkway crossing of Wagner Wash. The wash is the principal drainage through the BSV Site #3 active alluvial fan, both of which pass between a number of inselbergs. The downstream end of the active portion of the fan is located about 13,400 feet upstream and

the hydrographic apex is located about 20,200 feet upstream. The channel upstream of the hydrographic apex is bedrock controlled with a short bedrock drop at about 21,600 feet upstream and a 12-foot high bedrock falls within the mountains at about 24,800 feet upstream of the confluence.

Primary Wash #15 – A total of about 1.04 miles of this wash were examined in the field. The confluence with Wagner Wash is located on the downstream side of at the lower Sun Valley Parkway crossing of Wagner Wash. This wash is predominantly composed of distributary flow paths with poorly defined channels that are generally less than 1 foot deep and 1-2 feet wide.

Primary Wash #16 – A total of about 5.0 miles of this wash were examined in the field. The wash drains from the west side of the White Tank Mountains, passes between several large inselbergs surrounded by pediment surfaces, crosses under the Sun Valley Parkway, and merges with Wagner Wash about 1.3 miles west of the parkway. The bed and or banks of the upper 2.2 miles of the channel are partially or completely controlled by bedrock associated with the inselbergs and pediment (Figure 7.9). A large wing dam and stock tank are located on the channel about 1.1 miles upstream (east) of the parkway crossing (Figure 7.7). Major distributary flow zones are located at about 8,600 and 20,300 feet upstream of the confluence. The reach between the parkway and the confluence is defined by several major flow splits and some distributary flow (Figure 7.6).

Primary Wash #17 – A total of about 5.51 miles of this wash were examined in the field. The wash drains from the west side of the White Tank Mountains, passes between several large inselbergs surrounded by pediment surfaces, crosses under the Sun Valley Parkway, and merges with Wagner Wash about 1.6 miles west of the parkway. The bed and or banks of the upper 2.2 miles of the channel are partially or completely controlled by bedrock associated with the inselbergs and pediment. A 4-foot high bedrock fall in the channel provides grade control at about 22,100 feet upstream of the confluence. The wash upstream of the parkway is defined by a single, well-defined entrenched channel except between 11,900 and 12,600 feet upstream, which marks a distributary flow zone. The reach between the parkway and the confluence is defined by minor flow splits and some distributary flow (Figure 7.6).

Primary Wash #17 Trib – A total of about 1.91 miles of this wash were examined in the field. The wash drains from the pediment area west side of the White Tank Mountains and merges with Primary Wash #17 at Sun Valley Parkway. The bed and or banks of the upper 1,800 feet of the channel are partially or completely controlled by bedrock associated with the inselbergs and pediment. Small, well-confined distributary flow zones are present for a short distance upstream of the parkway.

Primary Wash #18 – A total of about 6.44 miles of this wash were examined in the field. The wash drains from the pediment area west side of the White Tank Mountains, passes between several large inselbergs surrounded by pediment surfaces, crosses under the Sun Valley Parkway, and merges with a non-primary wash tributary to the Hassayampa River about 2.8 miles west of the parkway. The confluence is located along an alluvial plain surface associated with the tributary and the river. The bed and or banks of the upper 3,000 feet of the channel are partially or completely controlled by bedrock associated with the inselbergs and pediment. There are a number of locations where caliche crops out in the bed and several areas of distributary flow both upstream and downstream of the parkway. In addition, the upstream end of the active alluvial fan at BSV Site #4 appears to capture some of the flow from this wash at about 21,800 feet upstream. The wash that is the principal drainage for BSV Site #4 passes in close proximity to Primary Wash #18 (Figure 7.11). Because of the close proximity of these two

washes, it appears that part of the flow from Primary Wash #18 avulses into this unnamed wash and may have been the principal cause of the development of the BSV Site #4 active alluvial fan.

Primary Wash #19 – A total of about 8.71 miles of this wash were examined in the field. The wash drains from the west side of the White Tank Mountains, passes to the north of 2 inselbergs as part of the BSV Site #5 active alluvial fan, crosses under the Sun Valley Parkway, and merges with the Hassayampa River about 3.88 miles southwest of the parkway crossing. The bed and or banks of the upper 7,500 feet of the channel are partially or completely controlled by bedrock. A small tributary, Primary Wash #19 Trib, merges with this wash at about 37,000 feet upstream. At the upstream end of the active fan of BSV Site #5, flow splits around and rejoins at the downstream (west) end of the inselbergs. A short distance downstream of the fan area, the throughflow channel splits forming a narrow, entrenched split flow zone for a short distance. At about a half mile upstream of the parkway, a distributary channel from the downstream end of the BSV Site #4 alluvial fan merges with this wash. At the confluence of the distributary channel, Primary Wash #19 divides into two flow paths that pass under the parkway and remain divided on the downstream side (Figure 7.11). The southern channel is Primary Wash #19. There are additional flow splits and divides downstream between the confluence and the parkway (Figure 7.12).

Primary Wash #19 Trib – A total of about 1.21 miles of this wash were examined in the field. The wash drains from the west side of the White Tank Mountains and is intercepted by Primary Wash #19 about a half mile upstream (east) of the hydrographic apex of the BSV Site #5 alluvial fan. There is intermittent bedrock control along the wash with a 10-foot high bedrock falls located about 2,300 feet upstream of the confluence.

Primary Wash #20 (White Tank Wash) – A total of about 14.2 miles of this wash were examined in the field. The wash drains from the west side of the White Tank Mountains, passes through the small BSV Site #6 active alluvial fan on the upstream side of the Sun Valley Parkway, passes under the parkway, turns due south about 8 miles above the confluence, and empties into the Buckeye FRS #1 basin about 2 miles east of the Hassayampa River. Primary Washes #20 North, #21, #22, and #23 are tributary to the wash at 6.63, 5.4, 3.4, and 0.8 miles upstream of the FRS, respectively. There are a number of relatively confined distributary and braided flow zones and caliche outcrops in the bed along the length of the wash. Small knickzones are present at the upstream and downstream ends of the BSV Site #6 alluvial fan.

Primary Wash #20 North – A total of about 2.8 miles of this wash were examined in the field. The wash drains from the relict fan area just east of Sun Valley Parkway to Primary Wash #20. The wash is fairly well entrenched with no distributary split flow areas. The channel immediately downstream of the parkway is incised about 2 feet as seen in the 2-foot high headcut in caliche about 50 feet downstream of the concrete apron of the parkway bridge. The headcut represents the upstream end of a short knickzone. Another small knickzone is located about 700 feet downstream of the parkway.

Primary Wash #21 – A total of about 7.77 miles of this wash were examined in the field. The wash drains from the west side of the White Tank Mountains, passes between several inselbergs, is the primary wash for the USGS Site #39 active alluvial fan, crosses under the Sun Valley Parkway, and merges with White Tank Wash (Primary Wash #20) about 3 miles downstream of the parkway. The upper 1.71 miles of the channel are deeply entrenched and are partially or completely controlled by bedrock. The wash is the primary supply to the USGS Site #39 active alluvial fan with the wash being the northern boundary of the fan over most of its

length. The confluence of Primary Wash #21 North is located a few hundred feet downstream of the hydrographic apex. Caliche is exposed intermittently in the channel bed and banks for about 800 feet upstream of the parkway. Prior to construction of the parkway, the active portions of alluvial fan extended well downstream of the parkway area (Figure 7.13). However, with the construction of the roadway the upper and lower parts of the fan are now disconnected, and Primary Wash #21 downstream of the parkway is currently less affected by the processes on the fan. Although there is still a braided pattern to the channel for some distance downstream of the parkway, the active distributary flow paths downstream of the roadway appear to be less active now. Narrow, well confined split flow and distributary flow zones are present further downstream.

Primary Wash #21 North – A total of about 1.7 miles of this wash were examined in the field. The wash runs generally north to south and drains relict fan surfaces and the west side of several inselbergs between Primary Washes #20 and #21. The confluence of this wash with Primary Wash #21 is located about 1,500 feet downstream of the USGS Site #39 fan hydrographic apex. The wash is well defined and well entrenched.

Primary Wash #22 – A total of about 5.23 miles of this wash were examined in the field. This wash is tributary to White Tank Wash. The wash begins on the relict fan surface about a mile east of the Sun Valley Parkway, but a significant portion of the flow of water and sediment at the parkway crossing is supplied by the USGS Site #39 active alluvial fan. Although the wash only passes through the fan area for a short distance at the southern end of the fan where it intersects the parkway, there is a significant volume of water and sediment supplied to the wash by the fan. The wash passes through 2 short knickzones in caliche a short distance downstream of the parkway. At about 2,000 feet downstream of the parkway, the wash intercepts another small tributary wash from the north and the combination has produced a small active alluvial fan known as BSV Site #14 (Figure 7.14). A number of flow splits and confined distributary flow paths are present along this wash downstream of the active portion of BSV Site #14.

Primary Wash #23 – A total of about 10.92 miles of this wash were examined in the field. The wash drains from the west side of the White Tank Mountains, passes between several inselbergs, is the primary wash for the USGS Site #38 active alluvial fan, crosses under the Sun Valley Parkway, and merges with White Tank Wash (Primary Wash #20) less than a mile north of Buckeye FRS #1. The upper part of the channel east of the inselbergs is deeply entrenched and passes through a major relict fan embayment in the mountains. The inselbergs between which the wash passes are located between 8.5 to 9 miles upstream of the confluence. The wash is the primary supply to the USGS Site #38 active alluvial fan with flow from the wash being distributed over the fan surface. The wash maintains a relatively well-defined, shallow course as it passes through the central part of the fan. Caliche is exposed in the channel bed in places as the wash passes over the fan. The wash passes under the parkway about 4.55 miles upstream of the confluence. Minor distributary/split flow zones and caliche outcrops in the bed of the channel are present downstream of the parkway. Primary Wash #23 Trib merges with this wash at about 2.4 miles upstream of the confluence.

Primary Wash #23 Trib – A total of only about 1.23 miles of this wash were examined in the field. This small wash is well entrenched into the relict fan area west of the parkway and is tributary to Primary Wash #23.

Primary Wash #24 – A total of about 7.69 miles of this wash were examined in the field. The wash drains a portion of a major relict fan embayment on the west side of the mountains, passes through the southern limb of the USGS Site #38 active alluvial fan before turning southwest and crossing under the parkway. The wash crosses under the parkway at about 4.24 miles upstream of its confluence with Buckeye FRS #1. The wash becomes oversteepened for about 300 feet immediately upstream of the intersection of the wash with the southern boundary of the USGS Site #38 alluvial fan. There is a major flow split at the intersection and the primary flow path of the wash follows the northwest channel. Flow that avulses to the south of the wash at the intersection is recaptured by the wash once it turns due south about a half mile from the Sun Valley Parkway. However, further downstream the channel redistributes flow through a series of distributary channels and flow paths before reaching the parkway. Downstream of the parkway, there is a long, wide depositional area along the channel that may be a remnant of the USGS Site #38 alluvial fan processes prior to construction of the parkway. At about 13,200 feet upstream of the confluence, the channel appears to become oversteepened, loses capacity, and flow is delivered downstream via sheetflow. A1.5-foot high headcut marks the downstream end of sheetflow where some of the flow is collected back into a small, well-defined channel. However, a short distance further downstream at about 11,700 feet upstream of the confluence, the channel loses capacity and flow spreads out again as sheetflow. A few hundred feet further downstream, the sheet flow becomes confined and is creating multiple gullies that eventually feed to a main channel again at about 10,000 feet upstream of the confluence. The wash crosses McDowell Road at about 8,200 feet upstream. At about 6,000 feet upstream, the channel intersects a developed area and, as a result, the original channel has been rerouted and the old channel has been abandoned. As described above, the wash through the developed are is not well confined and future flows could pose a significant flood hazard to the homes in the area (Figure 7.21). The lower reach of the wash just north of the FRS is marked by sheetflow and poorly defined flow paths that eventually converge to form a series of shallow gullies that then converge to reform the main wash just north of the FRS. The intersection of the shallow gullies and the main wash with the FRS basin is marked by channel incision and headcutting due to a significant change in base level at the FRS.

Primary Wash #25 – A total of about 11.08 miles of this wash were examined in the field. The wash drains from the White Tank Mountains, passes through a portion of a major relict fan embayment on the west side of the mountains, is the primary contributor to and flow path through the USGS Site #37 active alluvial fan, crosses under the parkway at about 3.08 miles upstream, and then turns south and drains into Buckeye FRS #1. The upper 1.6 miles is bedrock controlled. At about 46,000 feet upstream, the channel passes through a bedrock constriction created by the pediment that underlies the relict fan surface in the area. At about 44,000 feet upstream, the channel passes over a 10 to 12 foot high bedrock falls created by the pediment. The wash is the principal contributor to the USGS Site #37 active alluvial fan with the hydrographic apex located at about 38,300 feet upstream of the confluence. A large proportion of the flow and sediment from the wash is distributed over the fan surface. The wash traverses the central part of the fan, the active part of which ends at about 28,000 feet upstream of the confluence. For about a mile upstream of the Sun Valley Parkway, the wash is defined by a narrow zone of braided and distributary flow before passing under the parkway at about 16,200 feet upstream. About 1,000 feet downstream of the parkway, the channel splits into a series of small distributary channels with 1 to 2 foot high headcuts. At about 7,500 feet upstream the channel crosses the unpaved West Tonopah-Salome Highway (dirt road) and then loses confinement and definition at a ranch on the south side of the road. The remaining length of wash is indefinable because of obliteration by a dairy farm and home sites south of the highway (Figure 7.22) as described above. The wash does not redevelop until about 2,000 feet north of the Buckeye FRS #1. The lower reach of the wash just north of the FRS is marked by sheetflow

and poorly defined flow paths that eventually converge to form a series of shallow gullies that then converge to reform the main wash just north of the FRS (Figure 7.24). The intersection of the main wash with the FRS basin is marked by channel incision and a 3-foot high headcut due to the change in base level at the FRS.

Primary Wash #26 – A total of about 1.97 miles of this wash were examined in the field. This well-defined wash, which flows north to south near the east side of the Hassayampa River, is confined by and drains the relict fan surface to the north of the west end of the Buckeye FRS #1. The wash drains into the FRS basin.

Primary Wash #27 – A total of about 6.9 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains. Once the wash exits the mountain front, it turns southward, passing between several large inselbergs, is the primary contributor to and flow path through the BSV Site #7 active alluvial fan, and empties into the eastern part of the Buckeye FRS #1. The upper mile of channel is deeply entrenched and bedrock controlled. Between 28,000 and 31,000 feet upstream of the FRS, where the channel turns southward, there are several tributaries draining from the north that are contributing a significant volume of sediment to the wash. The sediment contribution at this location has resulted in a wider entrenched reach of channel with multiple flow paths. At about 25,400 feet upstream, the wash loses capacity (hydrographic apex) and creates the BSV Site #7 active alluvial fan. The wash is somewhat defined until about a half mile downstream of the hydrographic apex where it becomes poorly defined and difficult to follow. South of the fan, flow follows multiple small, shallow, poorly defined paths until the unpaved West Tonopah-Salome Highway crossing. Downstream of the roadway, multiple flow paths combine to form a better-defined channel. At about 3,500 feet downstream of the highway, flow from this channel is captured by a dirt track that follows a north-south fence line. The track has developed into a channel and carries flow southward until it intersects the FRS basin levee. At the FRS levee, the channel turns due west and runs along the levee for about 1,250 feet where it spills into the FRS basin with another major wash that drains part of the White Tank Fan (USGS Site #36). The reach from about 1,700 feet upstream to about 5,000 feet upstream of the confluence appears to be oversteepened and the channel flows across extensive exposures of caliche in the bed. A 2-foot high bedrock drop related to a heavily weathered and poorly exposed inselberg is present in the channel bed at about 5,300 feet upstream of the confluence.

Primary Wash #28 – A total of about 4.55 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains and empties into the eastern part of the Buckeye FRS #1. The upper 2,000 feet of the channel is controlled by bedrock. At about 20,000 feet upstream of the confluence, the channel intersects the southern portion of the east limb of the BSV Site #7 active alluvial fan and provides the eastern boundary for the active part of the fan for less than 1,000 feet. From about 14,000 feet to about 16,100 feet upstream of the confluence, the wash provides the western boundary for much of the length of the BSV Site #8 active alluvial fan. At the downstream end of the fan, the wash loses capacity and flow is distributed predominantly along multiple, poorly defined flow paths. The wash does not become well defined until about 6,400 feet upstream of the confluence where it crosses the unpaved West Tonopah-Salome Highway below which it redistributes flow into a number of poorly defined distributary channels again.

Primary Wash #28 East – A total of about 1.55 miles of this wash were examined in the field. The wash is tributary to Primary Wash #28. The wash drains part of the southwestern end of the White Tank Mountains with the upper 4,500 feet of the channel being controlled by bedrock. Between about 1,900 and 2,300 feet upstream of the confluence, the channel has aggraded

along a narrow entrenched section and might be considered as an inset alluvial fan. The hydrographic apex for the BSV Site #8 active alluvial fan is about 1,400 feet upstream of the confluence. The wash is the primary supply to the fan and provides the northwestern boundary of the fan until the confluence.

Primary Wash #29 – A total of about 3.98 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains and empties into the east end of the Buckeye FRS #1. Much of the area through which the channel passes is partially or completely controlled by bedrock that is associated with inselbergs and numerous other larger remnants of the retreating mountain front. The wash is the primary supply to and passes through the BSV Site #12 and BSV Site #9 active alluvial fans. The reach of channel within BSV Site #12 active fan is from 6,700 to 8,800 feet upstream of the confluence and the BSV Site #9 active fan is located at the confluence with the FRS. There appears to be ongoing aggradation within the entrenched channel upstream of the hydrographic apex of BSV Site #12. In addition, the wash crosses the West Tonopah-Salome Highway three times between 3,200 and 5,100 feet upstream of the confluence. The Primary Wash #29 East and #29 Trib confluences are located at 14,000 and 15,800 feet upstream of the FRS.

Primary Wash #29 East – A total of about 1.23 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains including areas of pediment and relict fan before joining Primary Wash #29. Bedrock control is present in parts of the lower reaches.

Primary Wash #29 Trib – A total of about 0.47 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains including areas of pediment and relict fan before joining Primary Wash #29. Some bedrock control is present.

Primary Wash #30 – A total of about 1.31 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains including areas of pediment and relict fan before emptying into the west end of Buckeye FRS #2. Bedrock control is present along much of the channel. A 12-foot high bedrock falls is present at about 6,000 feet upstream.

Primary Wash #31 – A total of about 3.56 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains including areas of pediment and relict fan before emptying into Buckeye FRS #2. Bedrock control is present along most of the upper 8,500 feet of channel. A 12-foot high bedrock falls is present at about 6,000 feet upstream. Constrictions are present at about 5,000 and 8,800 feet and the channel is actively aggrading at about 6,500 feet upstream of the confluence. The wash is the primary supply to and provides the western boundary for the BSV Site #10 active alluvial fan, which empties into the FRS. The hydrographic apex of the fan is located at about 2,000 feet upstream of the FRS.

Primary Wash #32 – A total of about 1.61 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains including areas of pediment and relict fan before emptying into Buckeye FRS #2. Bedrock control is present along most of the upper 4,000 feet of channel. Three long knickzones developed in caliche are present in the lower 2,500 feet of the wash. In addition, the channel appears to be actively aggrading between 1,600 and 2,000 feet upstream of the FRS.

Primary Wash #33 – A total of about 1.8 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains including areas of pediment and relict fan before emptying into Buckeye FRS #2. Bedrock control is present at the upper end of the wash and at about 4,300 feet upstream where it passes around a small inselberg. Short knickzones are present at about 3,200 and 6,600 feet upstream of the FRS. In addition, there are multiple small distributary flow paths associated with the lower knickzone.

Primary Wash #34 – A total of about 1.63 miles of this wash were examined in the field. The wash drains part of the southwestern end of the White Tank Mountains including areas of pediment and relict fan just west of the Skyline Wash Fan before emptying into the west end of Buckeye FRS #3. Bedrock control is present at the upper end of the wash down to about 6,000 feet upstream of the FRS where the channel moves away from the mountain front. A 4-foot high headcut and short upstream knickzone are present just downstream of the Watson Road crossing and about 4,100 feet upstream of the confluence. The headcut is developed in caliche, but because it is less than 100 feet downstream of Watson Road, it still poses a significant threat to the road crossing. A few hundred feet downstream of the headcut, the channel becomes constricted and deeply entrenched.

7.5 Summary

A total of 161 miles on 46 primary washes were examined in detail through historic aerial photo comparisons and by conducting a field reconnaissance of each wash. Conditions along the washes were documented using a handheld GPS unit with portable GIS capabilities. Access along the washes was accomplished using ATVs. Field data sheets and photo documentation were used to collect data at representative cross sections along the washes. Waypoints were recorded in the washes at major features that included headcuts, knickpoints, caliche and bedrock outcrops, braiding or distributary flow, and other areas of existing or potential instability.

Several headcuts and knickzones were identified in the field. The locations were identified with GPS using waypoints and the heights were approximated. Most were associated with caliche or bedrock in the channel bed. The highest headcuts were associated with bedrock outcrops forming large falls because of their close proximity to the mountain front. Headcuts in caliche were generally no higher than 3 or 4 feet. Most of the knickzones were formed in caliche as well and had drops of less than three feet over a distance of more than one hundred feet. Although not documented in detail, many of the washes emptying into the Buckeye Flood Retarding Structures contained large headcuts or knickzones at their confluences with the FRS basins because of the major change in base level associated with excavation of the basins.

Culvert crossings were also examined and potential problems were noted and documented using field data sheets and ground photos. Several of the culvert crossings lie downstream of active alluvial fans and as a result have serious blockage problems due to aggradation at the upstream ends of the culverts. Many of these same sites also have degrading reaches and associated headcuts immediately downstream of the culverts because of clear water scour attributable to upstream deposition and flow confinement at the culvert.

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8. REFERENCES

Ayres Associates Inc., 1996. *Geomorphic, Hydrologic, and Vegetation Characterization and Base-line Conditions of Yuma Wash, Yuma Proving Grounds, Arizona*, Report prepared for Waterways Experiment Station, Legacy Resources management Program, Contract No. DACA39-93-C-0000.

Ayres Associates Inc., 2005. *Buckeye/Sun Valley ADMS Delineation of Erosion Hazard Zones*, Technical Memorandum FCD 2002C027-T2.6.5, Prepared for Flood Control District of Maricopa County, Phoenix, AZ, Contract No. FCD 2002C027.

Bachman, G.O., and Machette, M.N. 1977. *Calcic soils and calcretes in the southwestern United States*, U.S. Geological Survey Open-File Report 77-794, 163 p.

Birkeland, P.W., 1984. *Soils and Geomorphology*, New York, Oxford University Press, 372 p.

Bull, W. B., 1997. *Discontinuous ephemeral streams*, Geomorphology, Vol. 19, pp. 227-276.

DEI Professional Services and Hoskin Engineering Consultants (DEI-HEC), 1997. *Skyline Wash & Tributaries Floodplain Delineation Study*, Report prepared for Flood Control District of Maricopa County, AZ, FCD Contract No. 96-08.

Field, J., 2001. *Channel avulsion on alluvial fans in southern Arizona*, Geomorphology, Vol. 37, pp. 93-104.

Field, J.J., and Pearthree, P.A., 1991. *Surficial Geology Around the White Tank Mountains, Central Arizona*, Arizona Geological Survey, Open-File Report 91-8.

Field, J.J., and Pearthree, P.A., 1992. *Geologic Mapping of Flood Hazards in Arizona: An Example From the White Tank Mountains Area, Maricopa County*, Arizona Geological Survey, Open-File Report 91-10.

Gile, L.H., Peterson, F.F., and Grossman, R.B., 1966. *Morphological and genetic sequences of carbonate accumulation in desert soils*, Soil Science, Vol. 101, P. 347-360.

Hartman, G.W., 1977. *Soil Survey of Maricopa County, Arizona, Central Part*, USDA Soil Conservation Service (SCS).

Hjalmarson, H.W., 1994. *Potential Flood Hazards and Hydraulic Characteristics of Distributary-Flow Areas in Maricopa County, Arizona*, US Geological Survey, Water-Resources Investigations Report 93-4169.

Hjalmarson, H.W., 2003, *Piedmont Flood Hazard Assessment for Flood Plain Management for Maricopa County, Arizona*, User's Manual, Version: April 2003, Prepared for Flood Control District of Maricopa County, Phoenix, AZ.

Hjalmarson, H.W., and Kemna, S.P., 1991. *Flood Hazards of Distributary-Flow Areas in Southwestern Arizona*, US Geological Survey, Water-Resources Investigations Report 91-4171.

Lattman, L.H., 1973. *Calcium carbonate cementation of alluvial fans in southern Nevada*, Geological Society of America Bulletin, Vol. 84, P. 3013-3028.

Lattman, L.H., 1977. *Weathering of caliche in southern Nevada*, in: Doehring, D.O. (ed.), Geomorphology in Arid Regions, Proceedings Volume of the Eight Annual Geomorphology Symposium, Binghamton, New York, p 221-229.

Lattman, L.H., and Simonberg, E.M., 1971. *Case-hardening of carbonate alluvium and colluvium*, Spring Mountains, Nevada, Journal of sedimentary Petrology, Vol. 41, No. 1, p. 274-281.

Machette, M.N., 1985. *Calcic soils of the southwestern United States*, in: Weide, D.L. (ed.), Soils and Quaternary Geology of the Southwestern United States, Geological Society of America Special Paper 203, p.1-21.

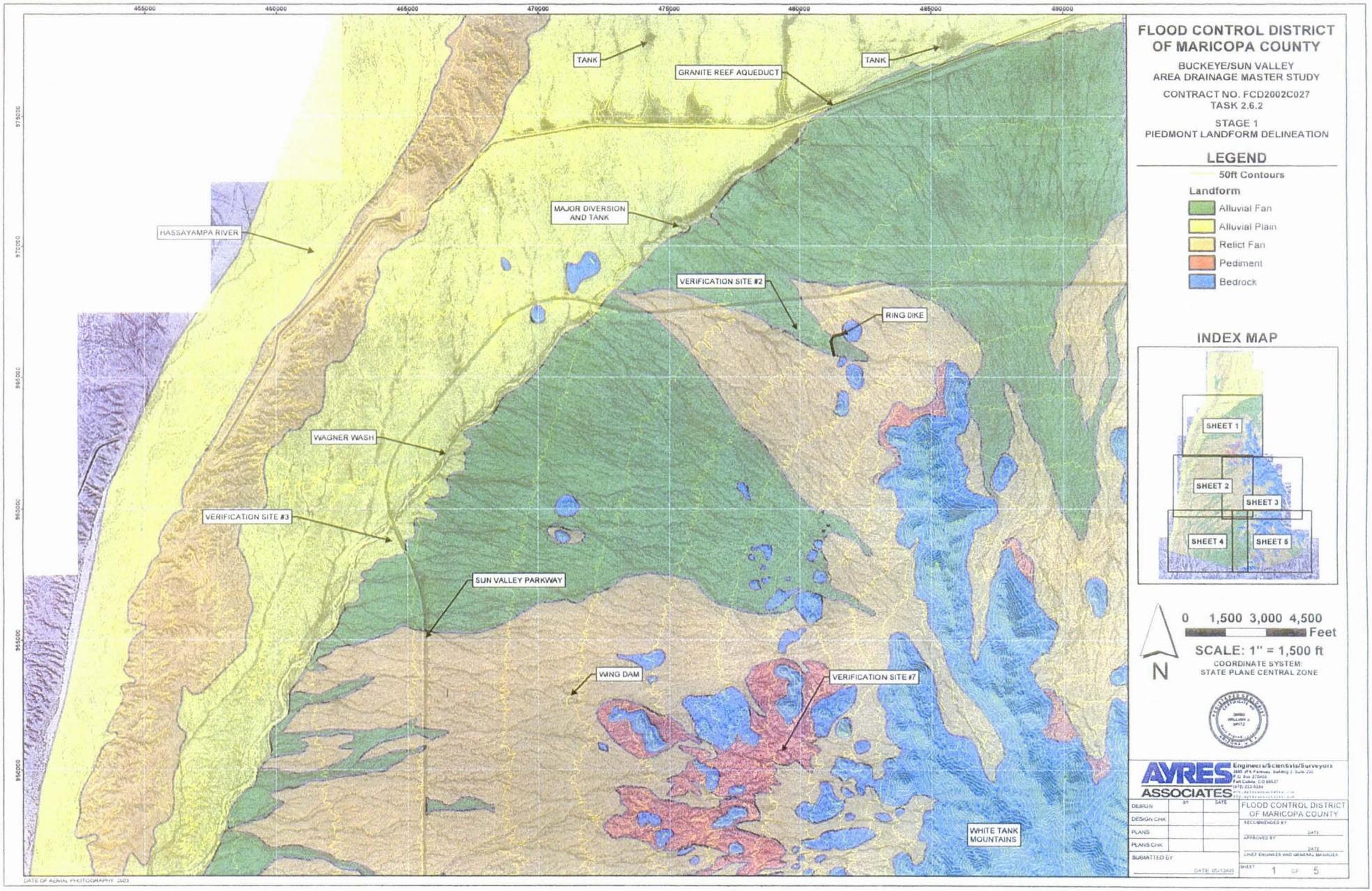
McFadden, L.D., and Tinsley, J.C., 1985. *Rate and depth of pedogenic carbonate accumulation in soils: Formulation and testing of a compartment model*, in: Weide, D.L. (ed.), Soils and Quaternary Geology of the Southwestern United States, Geological Society of America Special Paper 203, p. 23-41.

Pelletier, J.D. and DeLong, S., 2004. *Oscillations in arid alluvial-channel geometry*, Geological Society of America Geology, Vol. 32, No. 8, pp. 713-716.

Wertz, J.B., 1963. *Mechanisms of Erosion and Deposition Along Channelways*, Journal of the Arizona Academy of Science, Vol. 2, No. 4, pp. 146-163.

Wertz, J.B., 1966. *The Flood Cycle of Ephemeral Mountain Streams in the Southwestern United States*, Annals of the Association of American Geographers, Vol. 56, No. 4, pp. 598-633.

Wood, Patel & Associates, Inc. (Wood-Patel), 2001. *Approximate Floodplain Delineation Study for White Tank Fan*, Report prepared in association with JE Fuller Hydrology & Geomorphology, Inc. for Flood Control District of Maricopa County, AZ, FCD Contract No. 99-02.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BUCKEYE/SUN VALLEY
AREA DRAINAGE MASTER STUDY

CONTRACT NO. FCD2002C027
TASK 2.6.2

STAGE 1
PIEDMONT LANDFORM DELINEATION

LEGEND

50ft Contours

Landform

- Alluvial Fan
- Alluvial Plain
- Relict Fan
- Pediment
- Bedrock

INDEX MAP

N

0 1,500 3,000 4,500 Feet

SCALE: 1" = 1,500 ft

COORDINATE SYSTEM:
STATE PLANE CENTRAL ZONE

AYRES ASSOCIATES
Engineers/Scientists/Surveyors

	BY	DATE
DESIGN		
DESIGN CHK		
PLANS		
PLANS CHK		
SUBMITTED BY		

DATE: 05/12/25

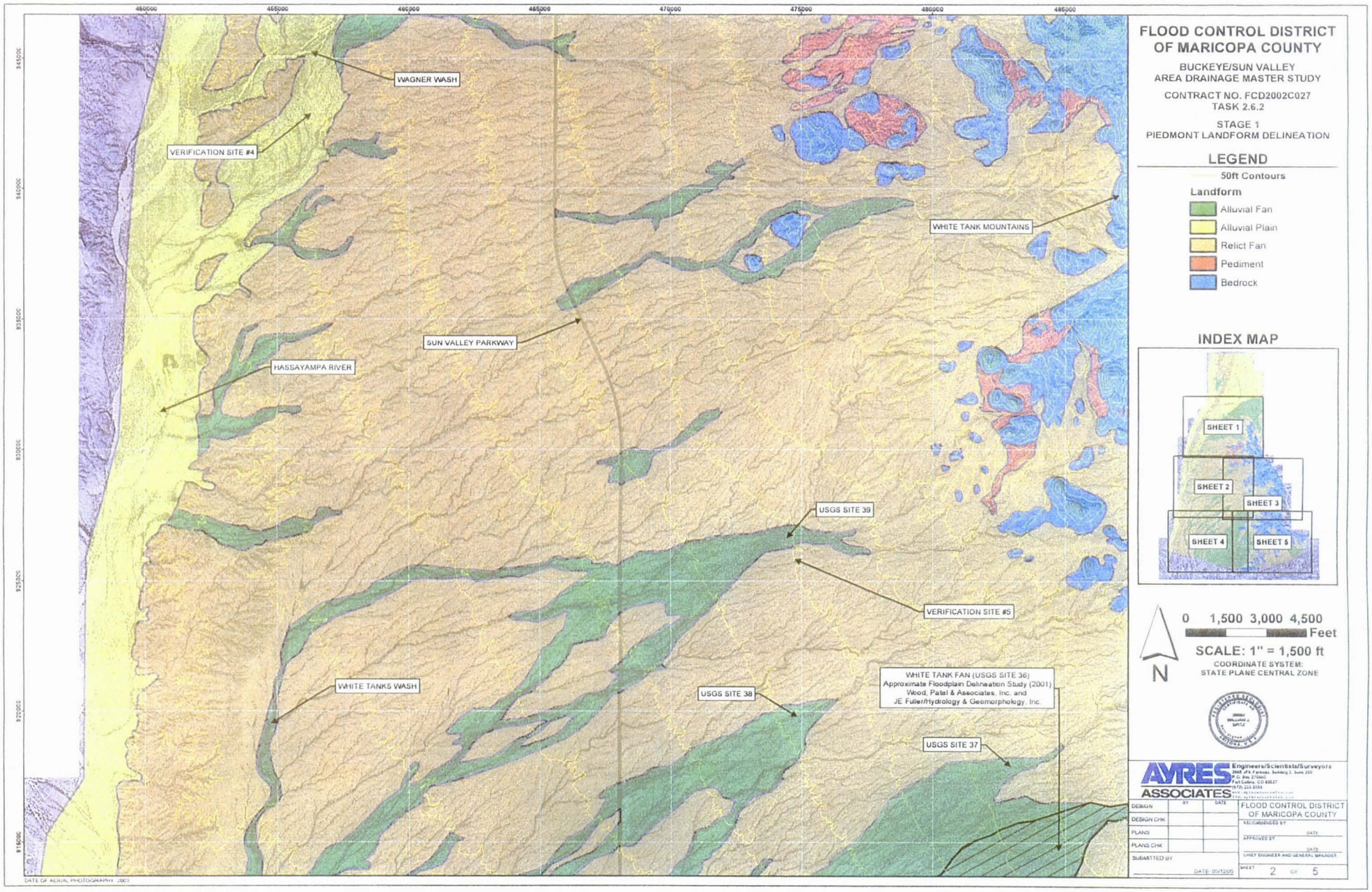
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY _____ DATE _____

APPROVED BY _____ DATE _____

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 5



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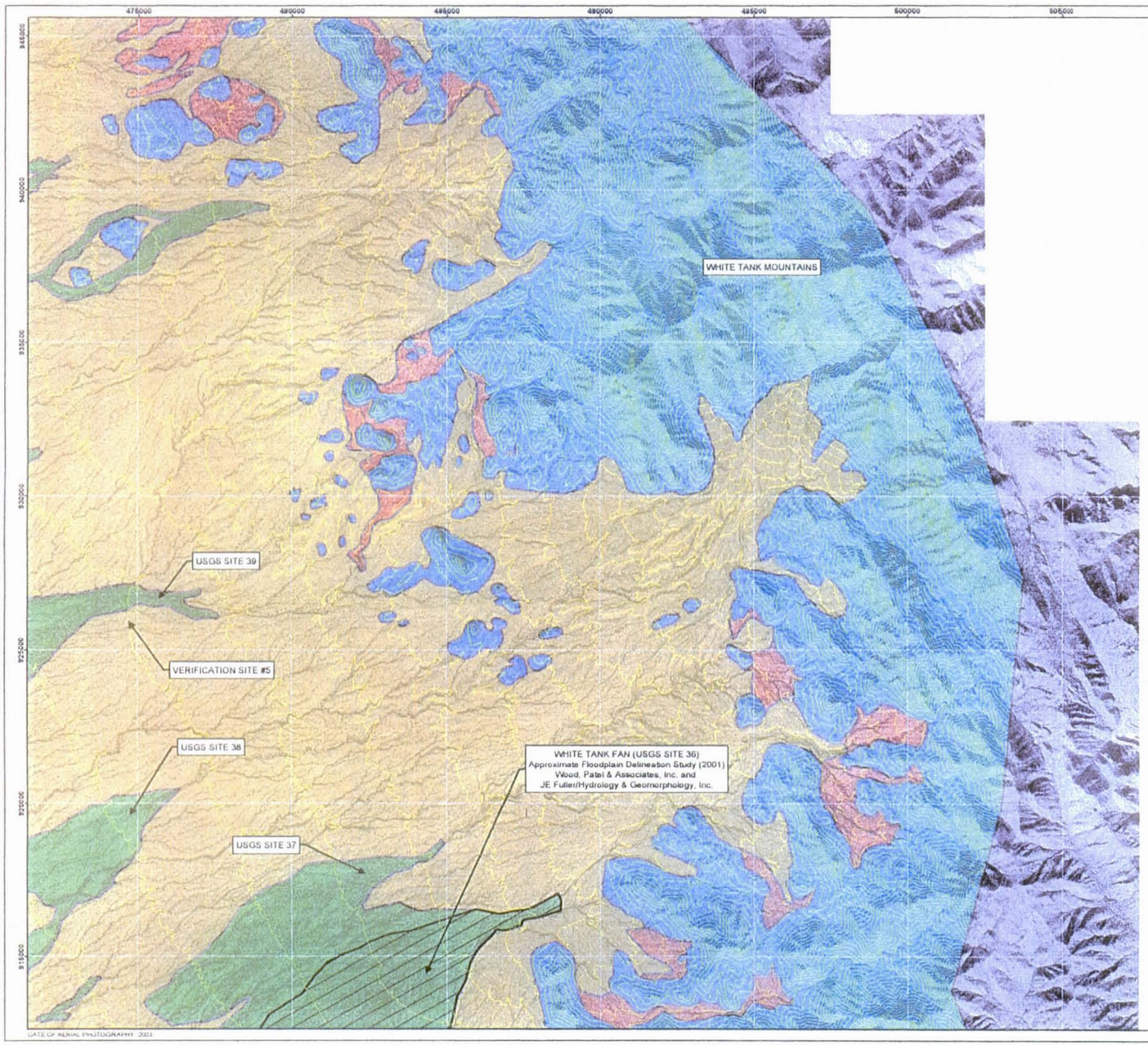
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 2 OF 5



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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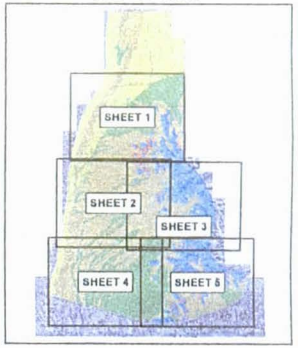

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AYRES ASSOCIATES
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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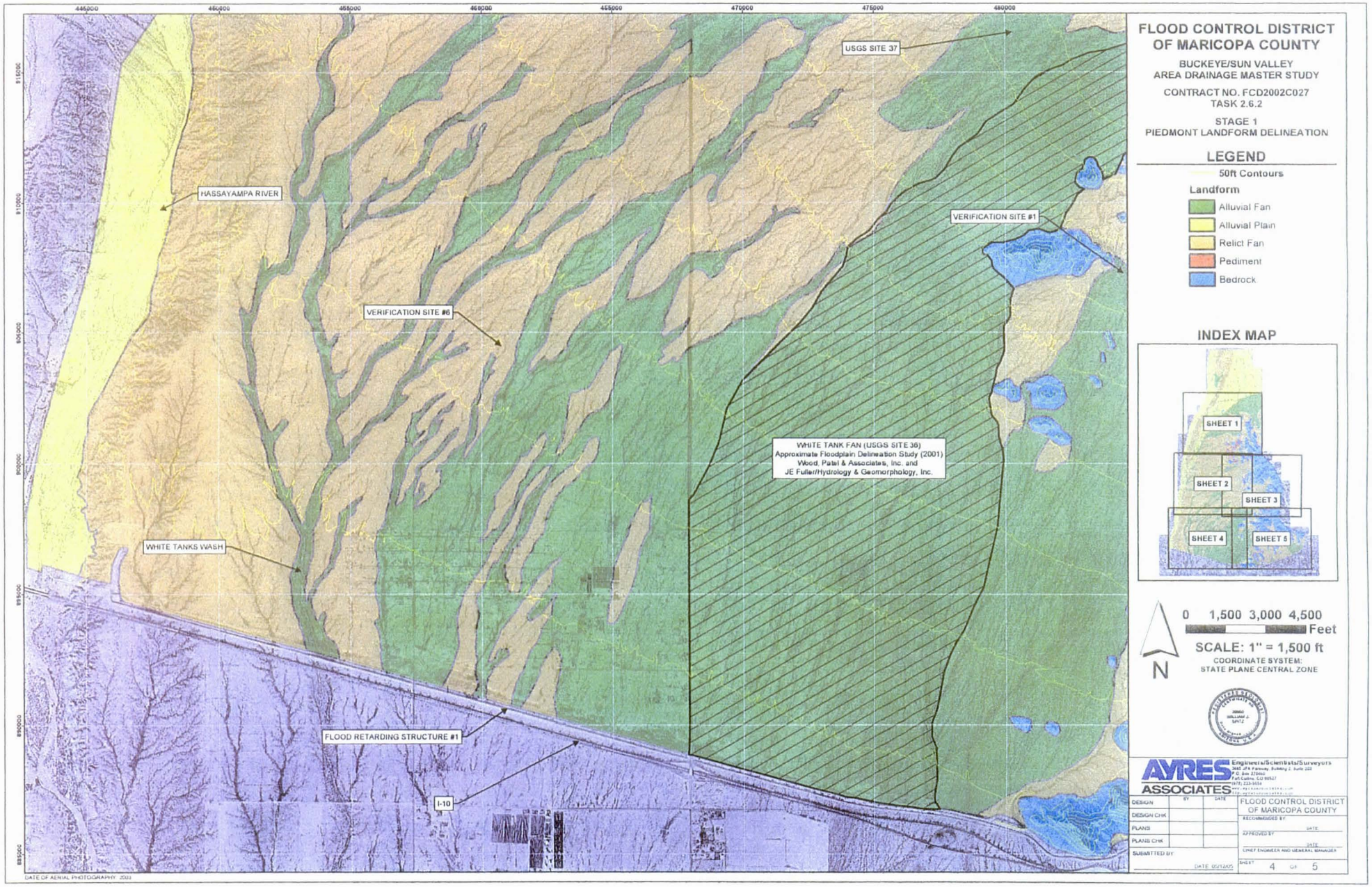
DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 3 OF 5



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BUCKEYE/SUN VALLEY
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CONTRACT NO. FCD2002C027
TASK 2.6.2

STAGE 1
PIEDMONT LANDFORM DELINEATION

LEGEND

50ft Contours

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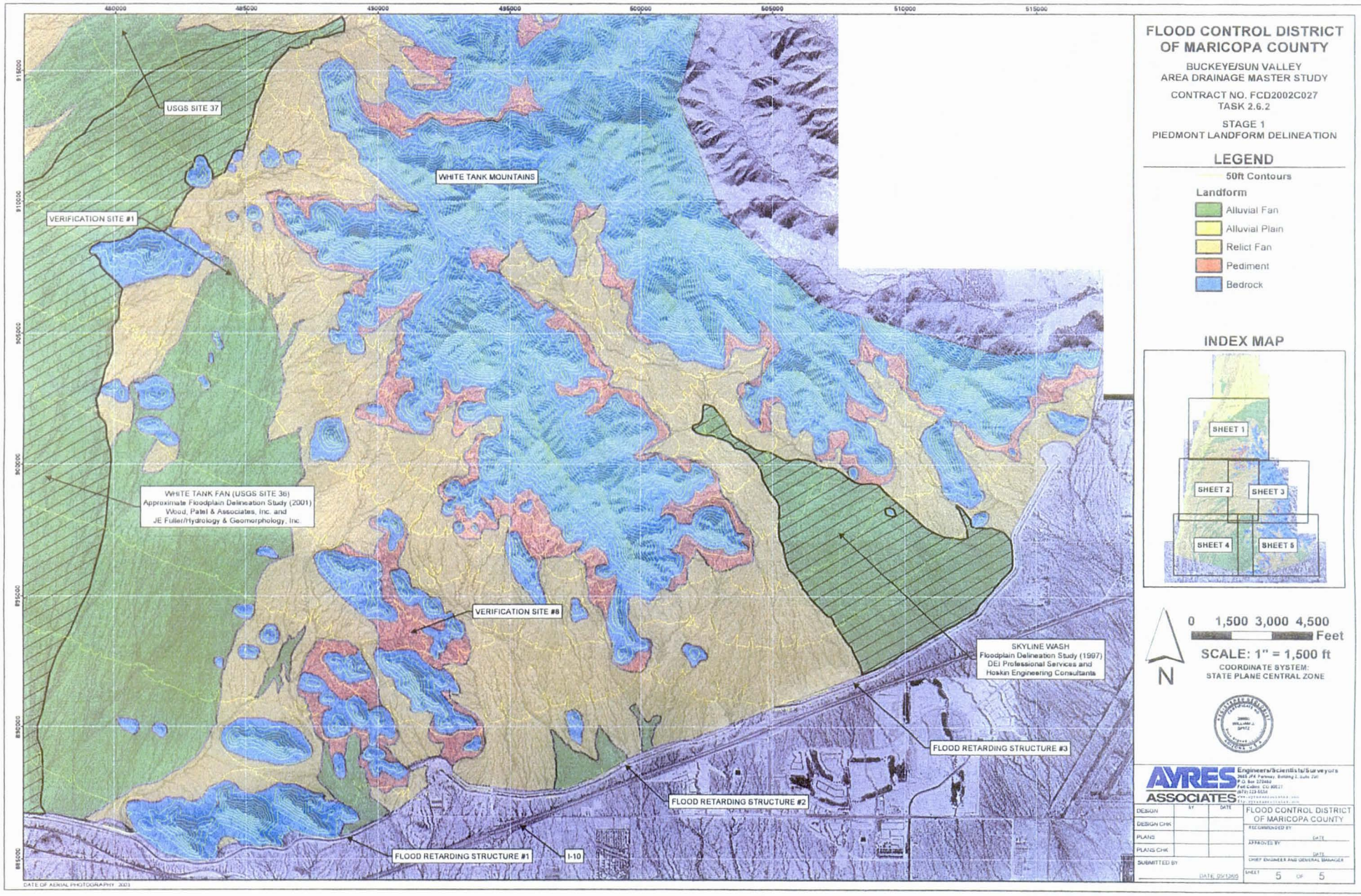
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 4 OF 5



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BUCKEYE/SUN VALLEY
AREA DRAINAGE MASTER STUDY

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STAGE 1
PIEDMONT LANDFORM DELINEATION

LEGEND

- 50ft Contours

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SCALE: 1" = 1,500 ft

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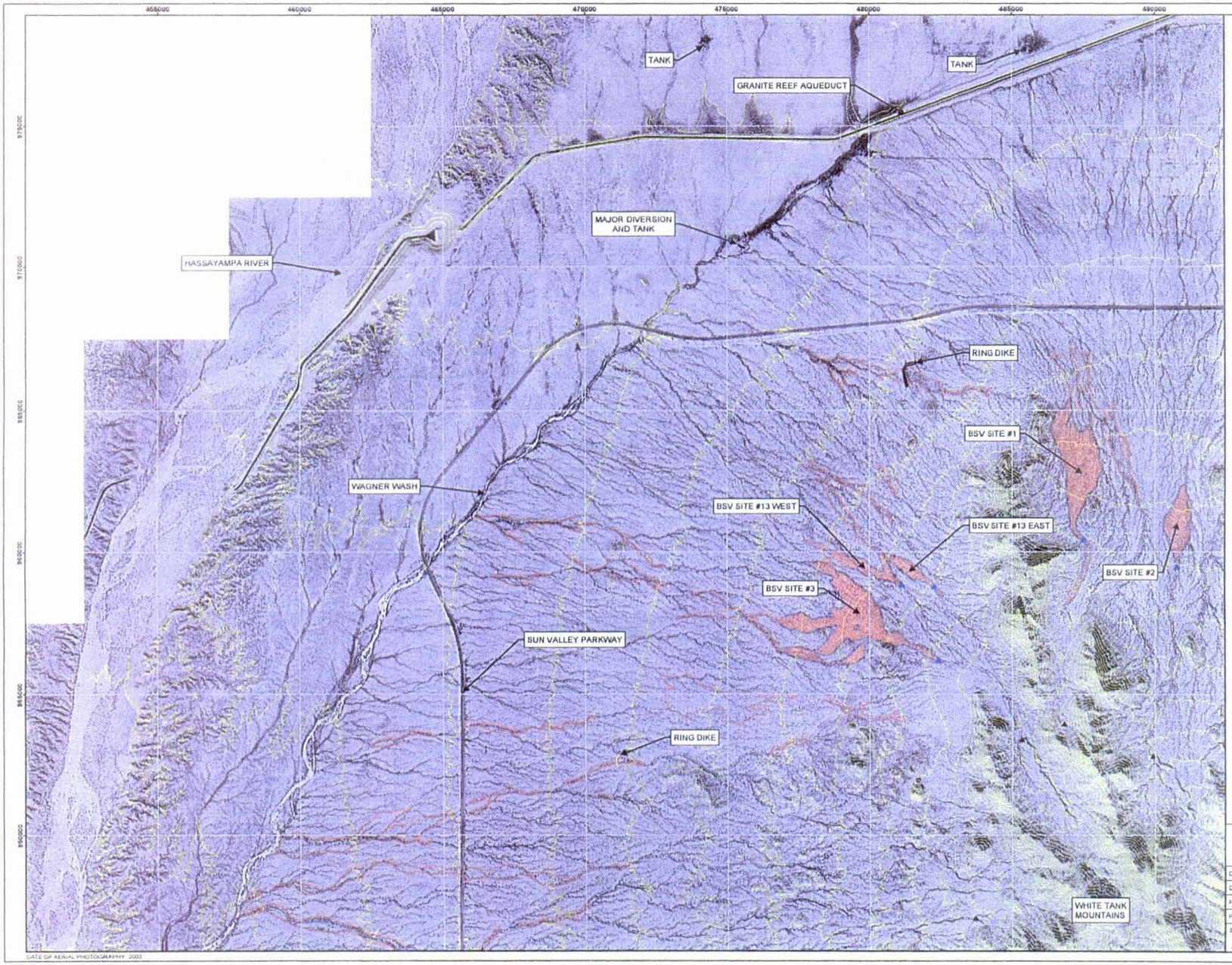


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BUCKEYE/SUN VALLEY
AREA DRAINAGE MASTER STUDY

CONTRACT NO. FCD2002C027
TASK 2.6.3

STAGE 2
PIEDMONT LANDFORM STABILITY ASSESSMENT

LEGEND

50ft Contours

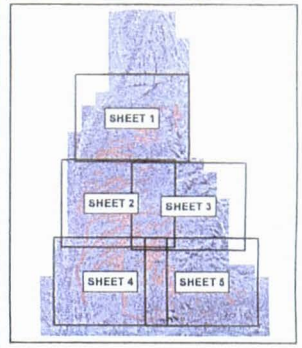
Apex

- Hydrographic
- Topographic

Landform Stability Assessment

- Unstable, Active Alluvial Fan
- Conditionally Unstable

INDEX MAP



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SCALE: 1" = 1,500 ft

COORDINATE SYSTEM:
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AYRES ASSOCIATES
Engineers/Scientists/Surveyors

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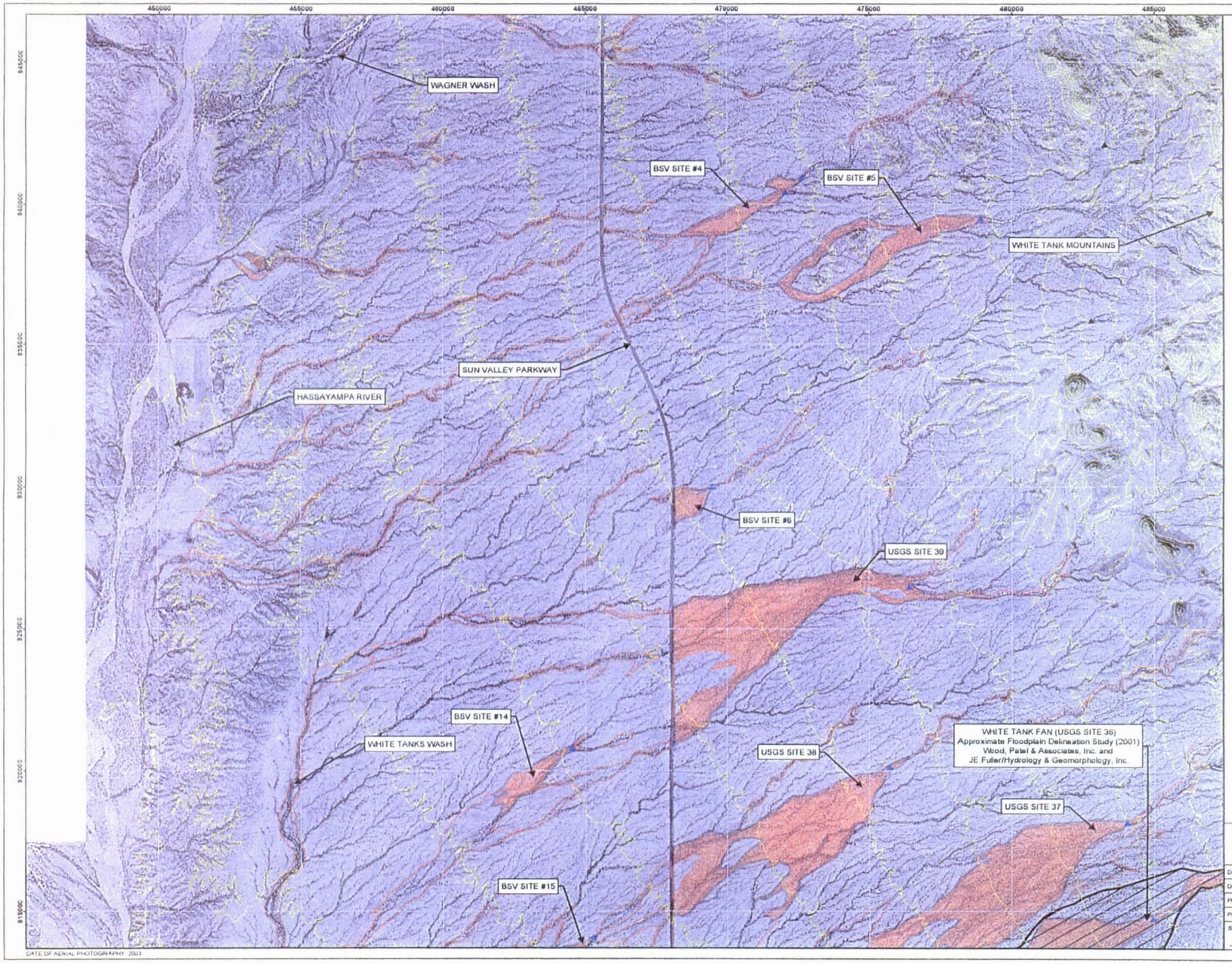
SHEET 1 OF 5



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BUCKEYE/SUN VALLEY
AREA DRAINAGE MASTER STUDY

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TASK 2.6.3

STAGE 2
PIEDMONT LANDFORM STABILITY
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50ft Contours

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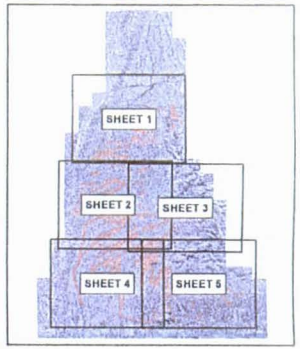

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SCALE: 1" = 1,500 ft

COORDINATE SYSTEM:
STATE PLANE CENTRAL ZONE

AYRES ASSOCIATES
Engineers/Scientists/Surveyors

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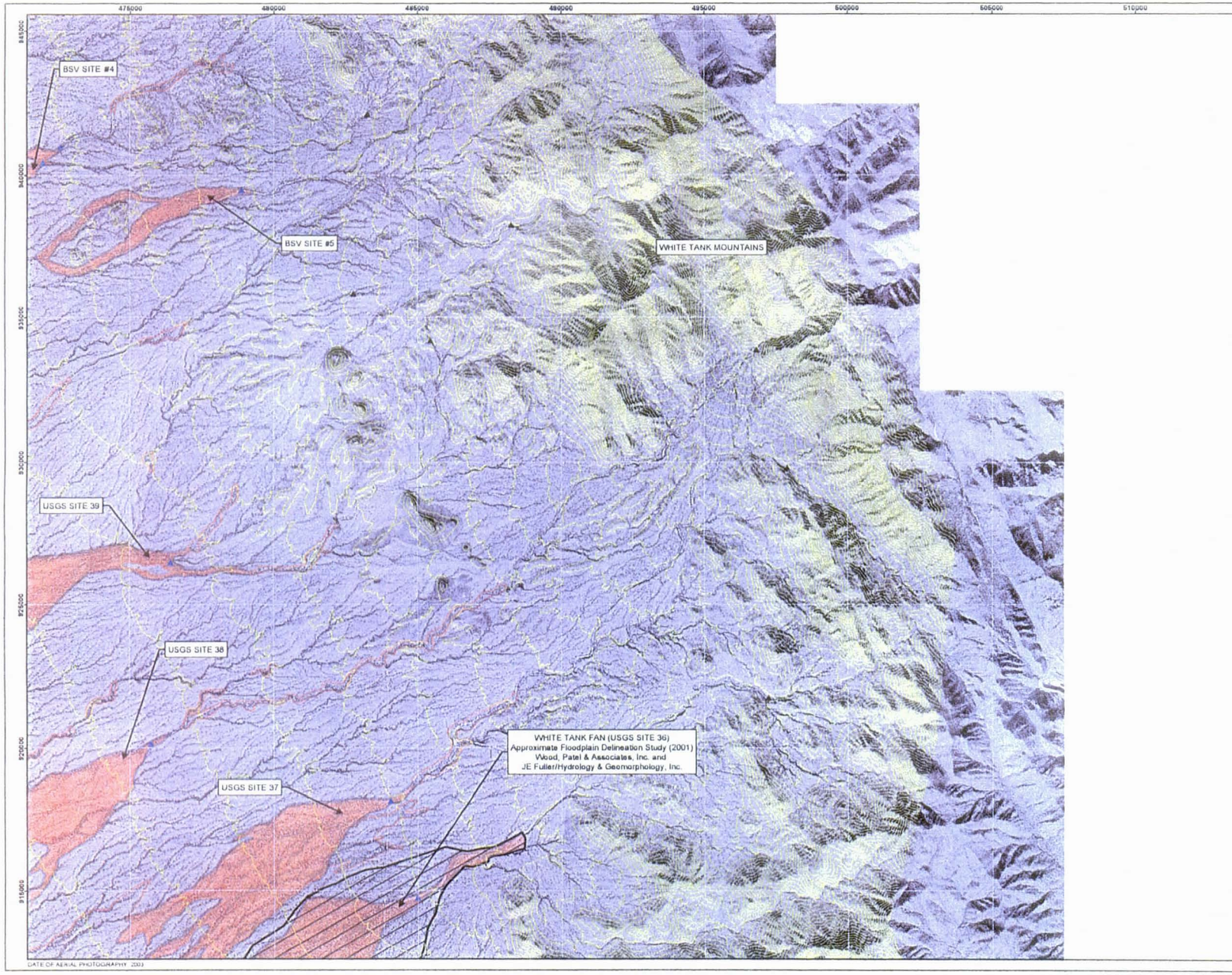
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 2 OF 5



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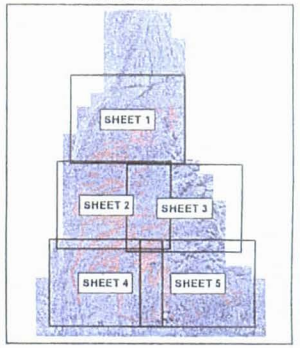

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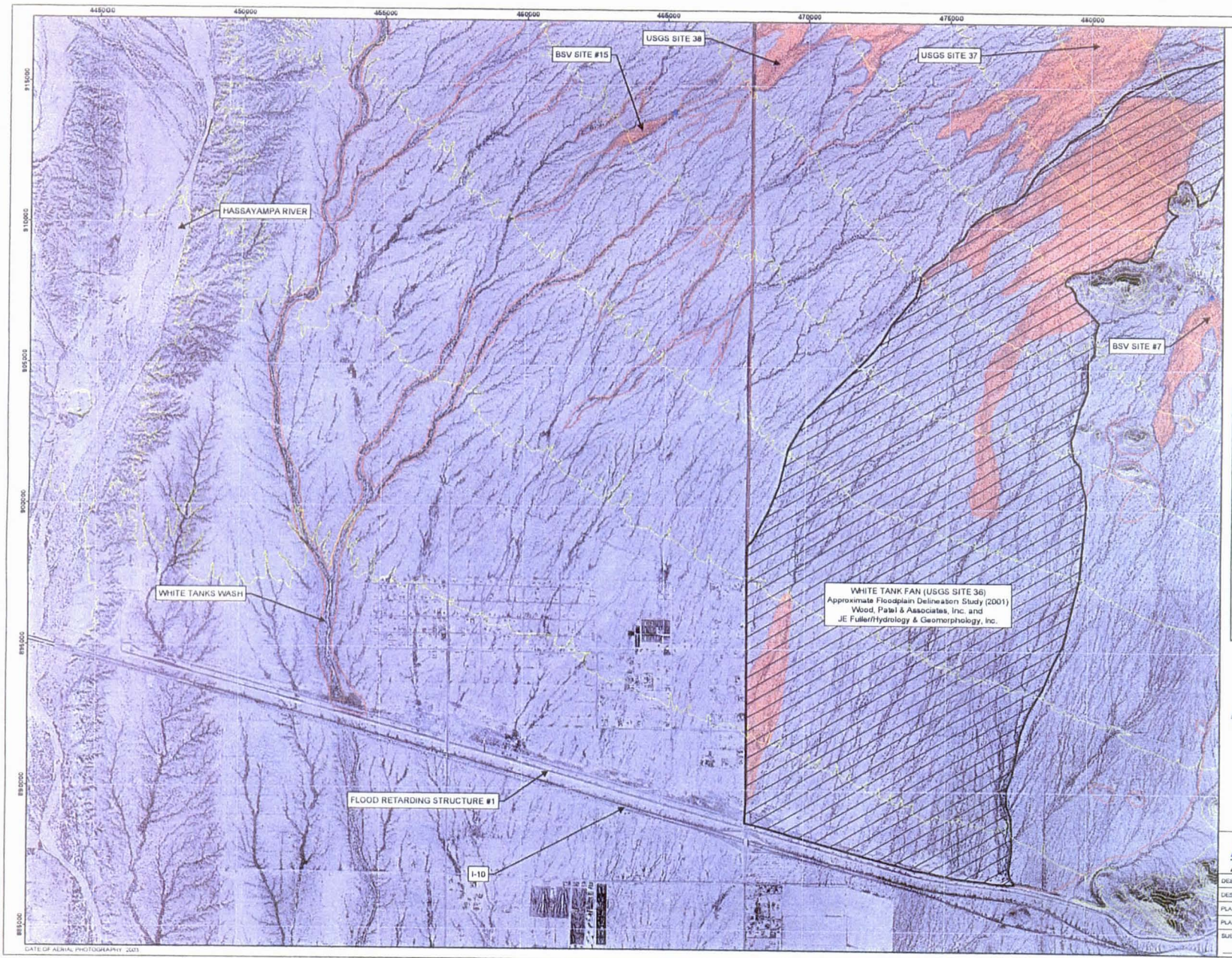
SHEET 3 OF 5



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BUCKEYE/SUN VALLEY
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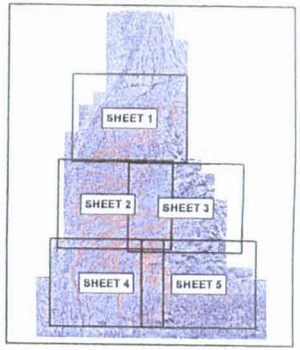

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AYRES ASSOCIATES
Engineers/Scientists/Surveyors

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SUBMITTED BY		

DATE 05/12/05

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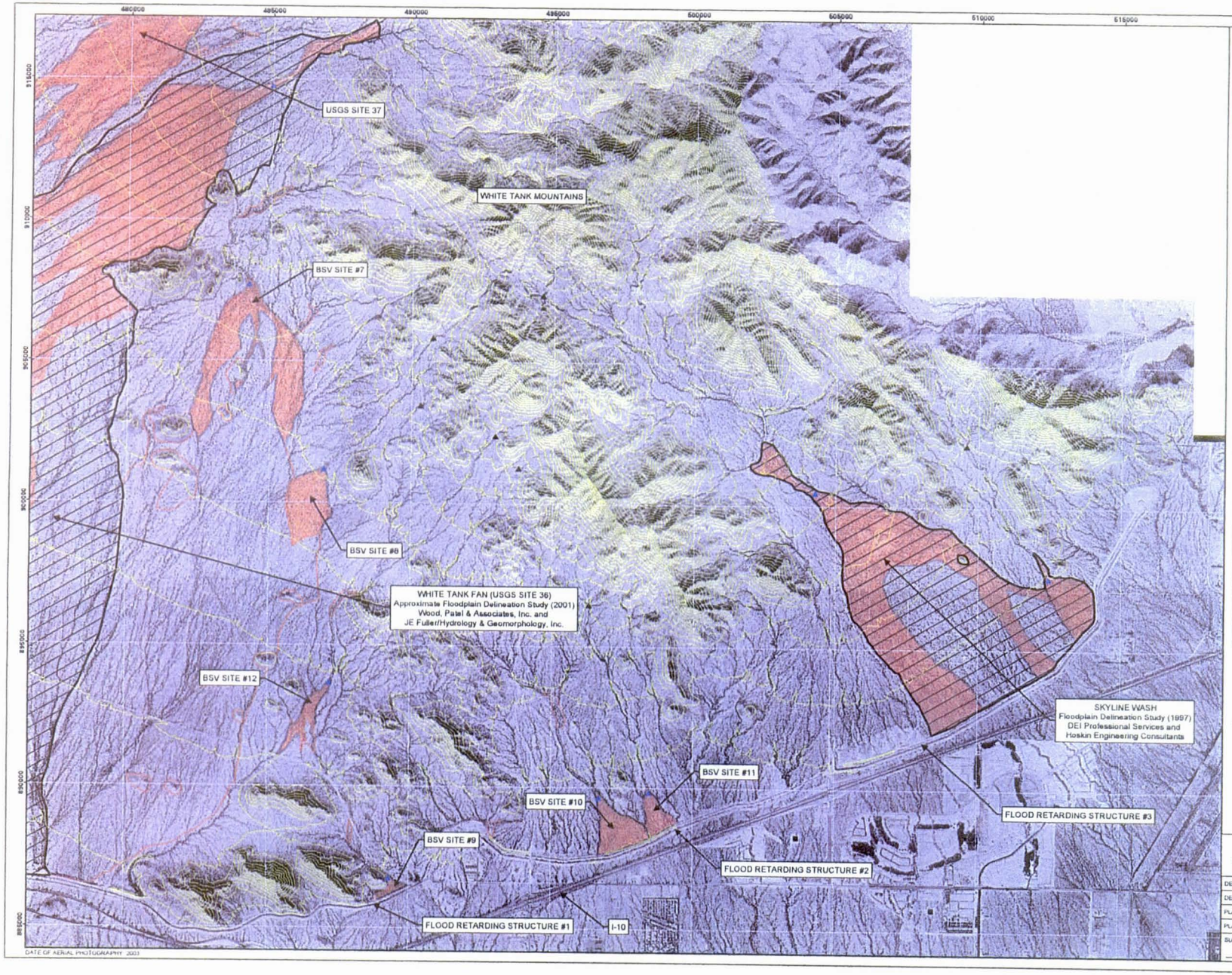
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 4 OF 5



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BUCKEYE/SUN VALLEY
AREA DRAINAGE MASTER STUDY

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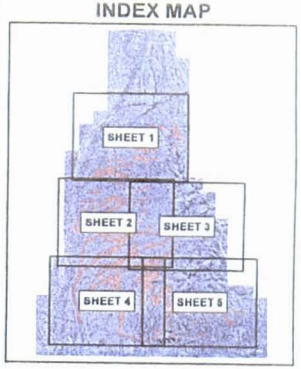

N

0 1,500 3,000 4,500 Feet

SCALE: 1" = 1,500 ft

COORDINATE SYSTEM:
STATE PLANE CENTRAL ZONE

AYRES ASSOCIATES
Engineers/Scientists/Surveyors
3665 JFK Parkway, Building 2, Suite 200
P.O. Box 272460
Fort Collins, CO 80527
(970) 223-5556

	BY	DATE
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SUBMITTED BY:		

DATE: 05/12/03

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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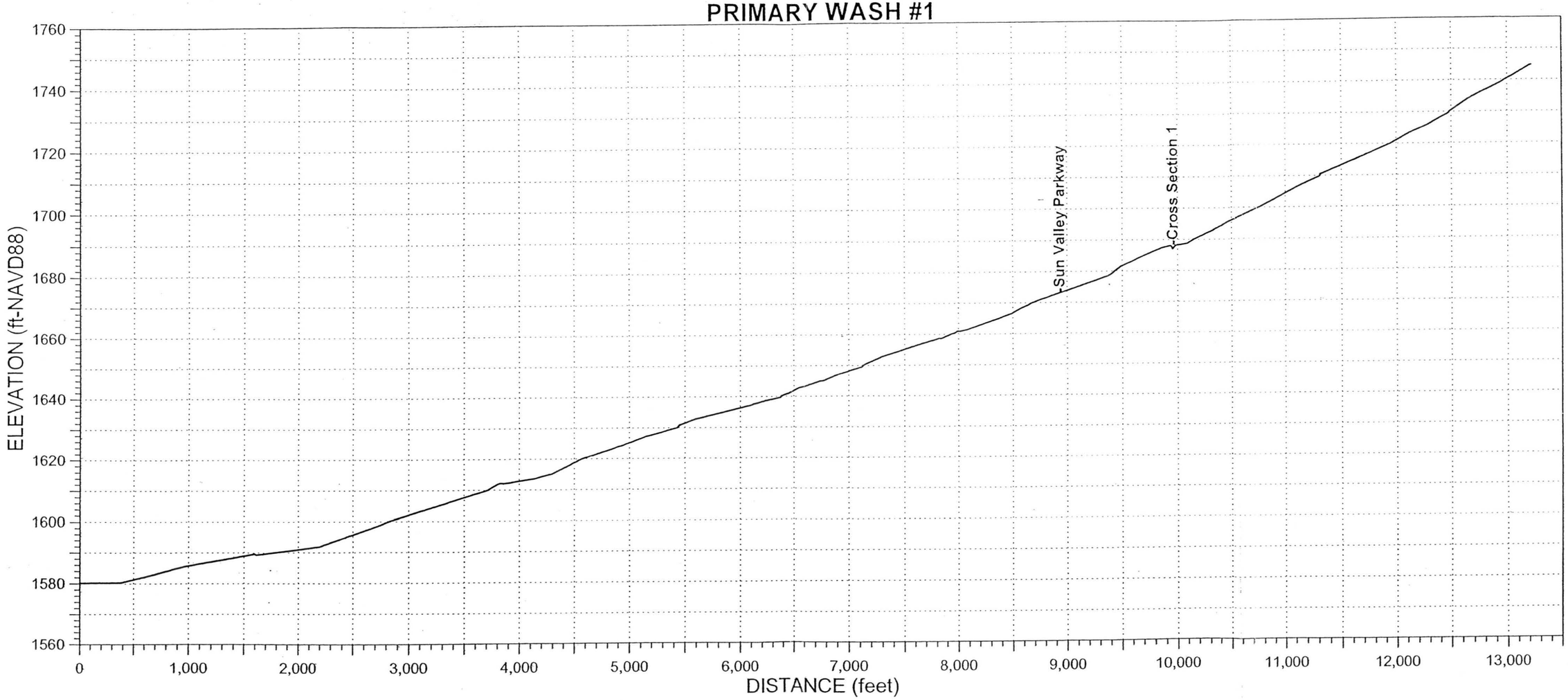
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 5 OF 5

PRIMARY WASH #1



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW1	1	418	March 17, 2004

North: 967688.1 m
East: 489123.1 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		vertical	1.5-2 ft	Sand X	Gravel X
Channel	X	Multiple	X	Right Bank		vertical	1.5-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde		
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.	X	
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	1 ft	1+ ft
Right Bank	1 ft	1+ ft
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:

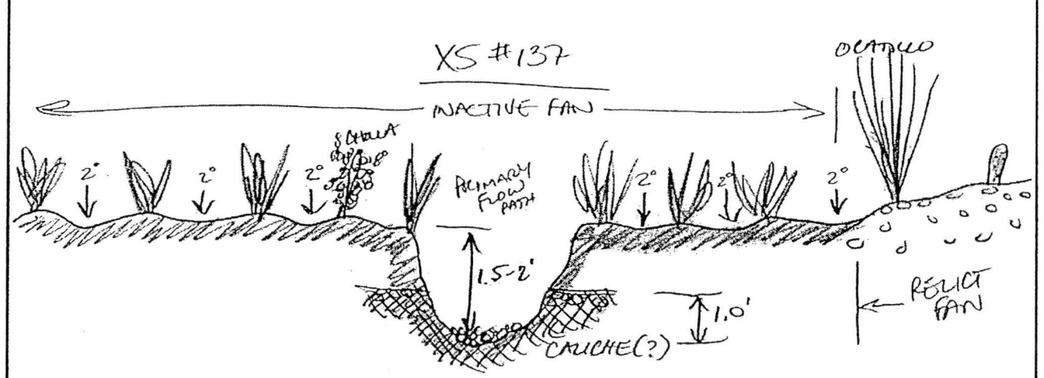
CRYPTOBIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	**Inactive Fan**	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #137



Notes:

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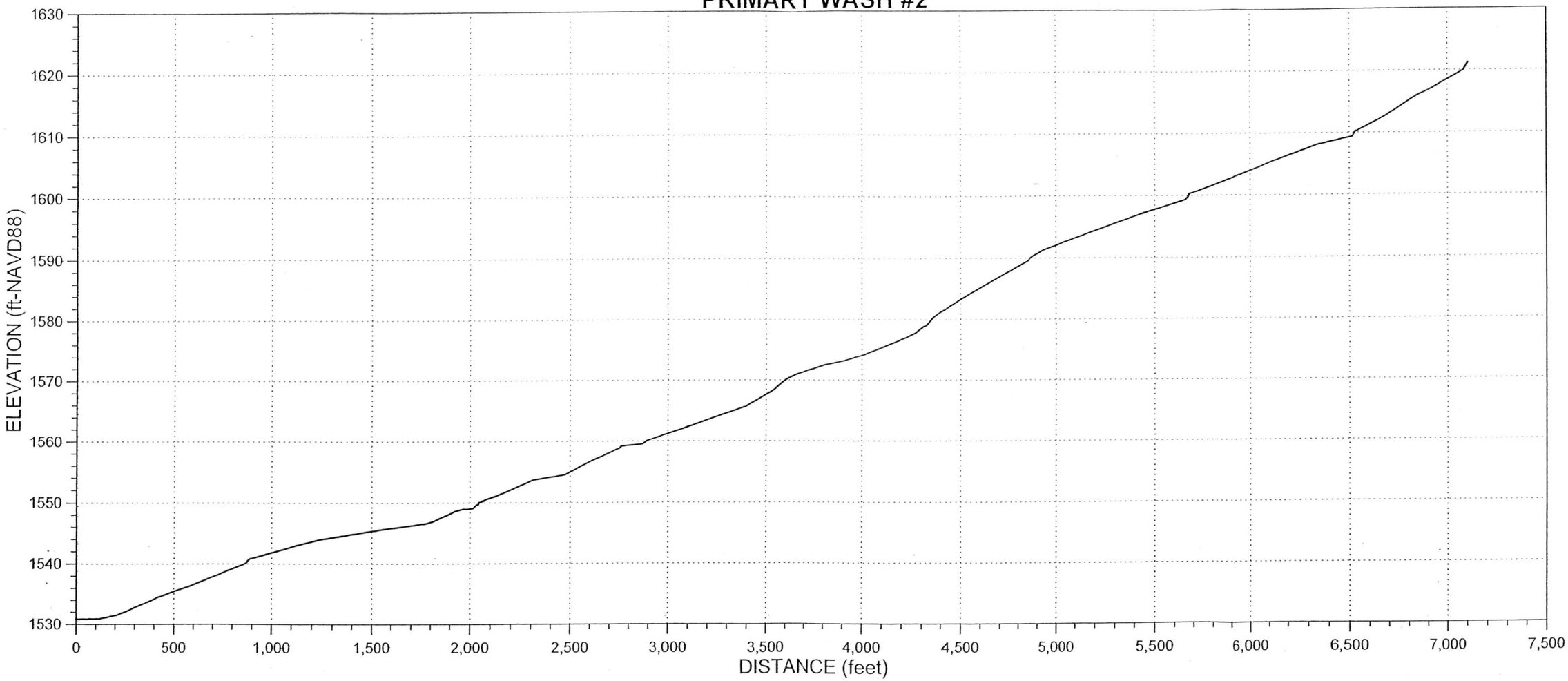
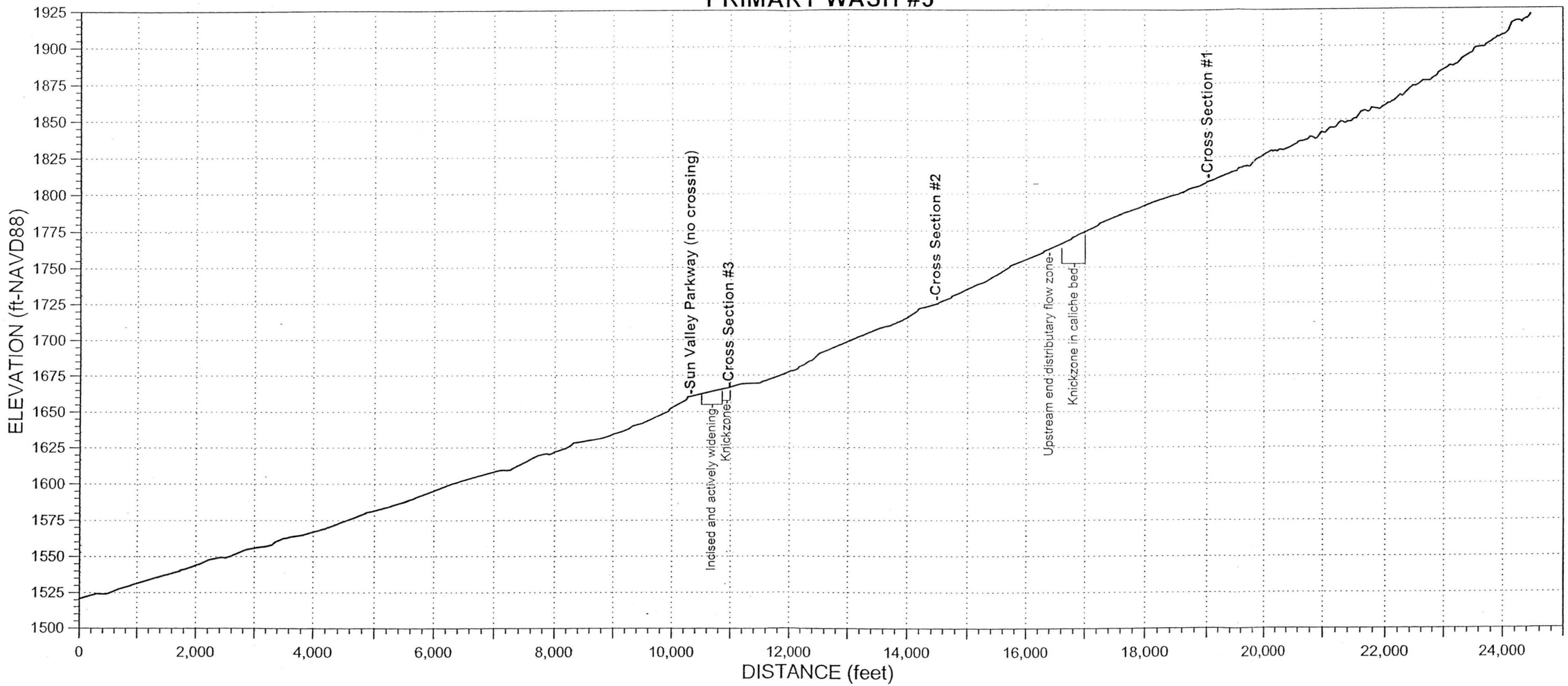
PRIMARY WASH #2



PRIMARY WASH #3



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW3	1	411	March 17, 2004

North: 961139.6 m
East: 489519.6 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

VEGETATION		INSET F/P
In-channel		
Marginal	X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

TERRACES (height-ft)		
Left Bank		
Right Bank		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank	full bank	
Right Bank	full bank	
Channel	DS	

PHOTOS & DESCRIPTION:
P10/20 - View downstream

CRYPTO-BIOTIC CRUST (floodway):
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

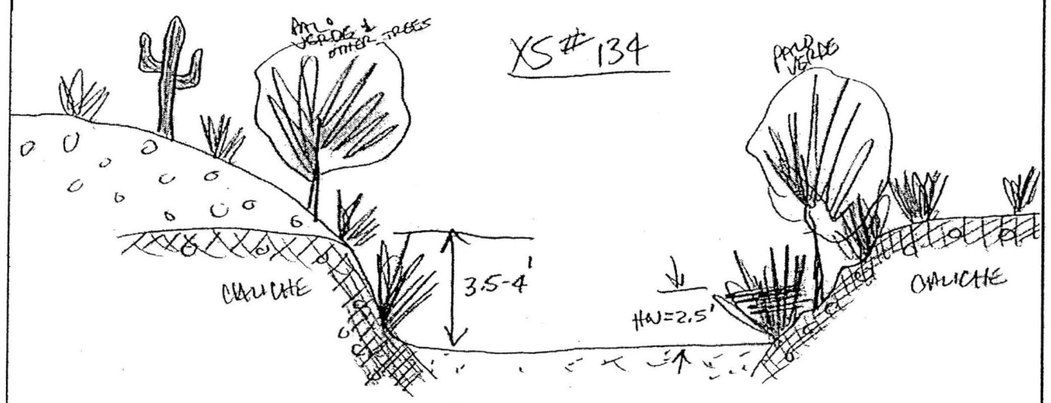
BANKS	Erosion
Left Bank	
Right Bank	

H:V	Height	BED MATERIAL	
<1:1	6-10 ft	Sand__X__	Gravel__X__
3:1	4 ft	Cobble____	Bldrs____

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	2-2.5 ft	2-2.5 ft	3 ft

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #134



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW3	2	415	March 17, 2004

North: 965123.1 m
East: 487662.7 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	
Channel		Multiple	X	Right Bank	

VEGETATION		INSET F/P
In-channel		
Marginal	X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	–
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

TERRACES (height-ft)		
Left Bank		
Right Bank		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

PHOTOS & DESCRIPTION:
P10/19 - View downstream, note highwater debris in snag

CRYPTO-BIOTIC CRUST (floodway):
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

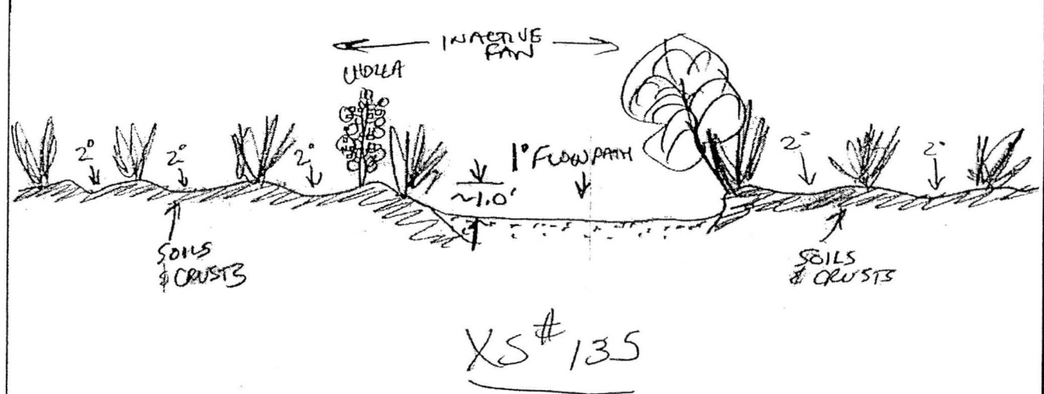
BANKS	Erosion
Left Bank	
Right Bank	

H:V	Height	BED MATERIAL	
1:1	1 ft	Sand__X__	Gravel__X__
1:1	1 ft	Cobble____	Bldrs____

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #135



Notes:

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AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW3	3	416	March 17, 2004

North: 968142.3 m
East: 486424.8 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single	X	Left Bank	X
Channel	X	Multiple	X	Right Bank	X

H:V	Height	BED MATERIAL	
vertical	3.5-4 ft	Sand X	Gravel X
vertical	3.5-4 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal			Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA		
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness
			Left Bank		
Palo Verde			Right Bank		
Creosote	X		Channel	in bed	
Brittlebush	X				
Bursage	X				
Mormon Tea					
Tamarisk					
Saguaro C.					
Cholla C.					
Barrel C.					
Prickly Pear					
X-mas C.					
Hedgehog C.					
Fishhook C.					
Ocotillo					

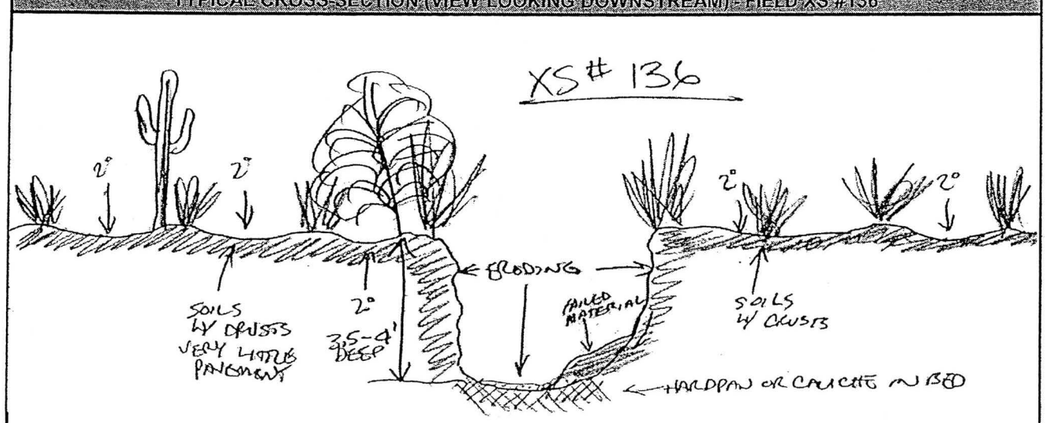
HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent						
Spotty						
Extensive						

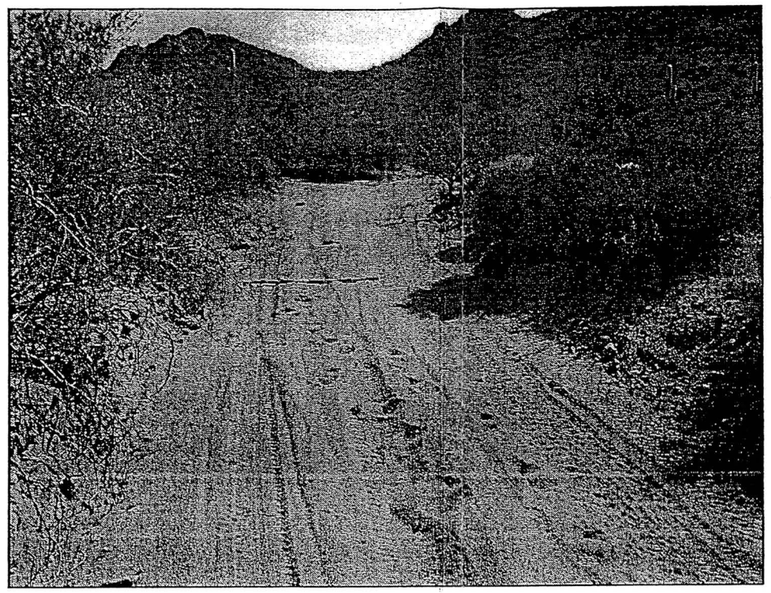
NICKZONE: At Location	HEADCUT:
Caliche Present: YES	Caliche Present:
Dimensions: This XS is at US end of incising reach to DS road drain	Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #136

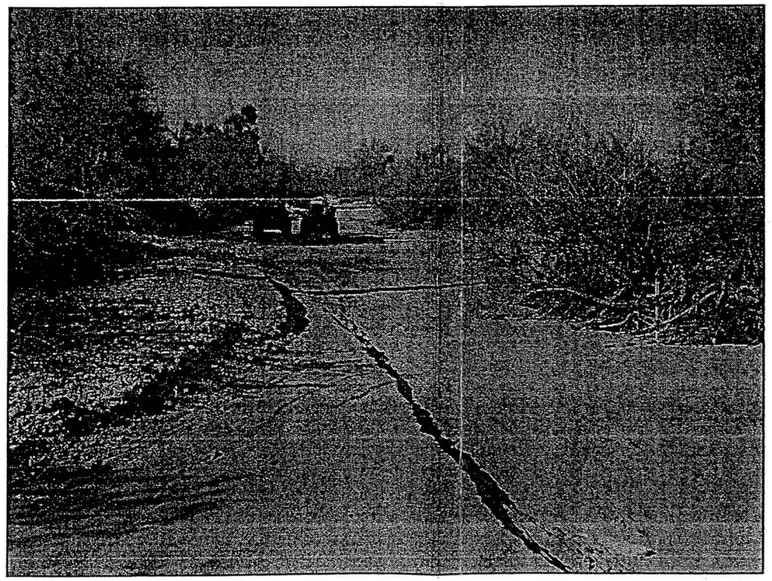


Notes:

AYRES ASSOCIATES

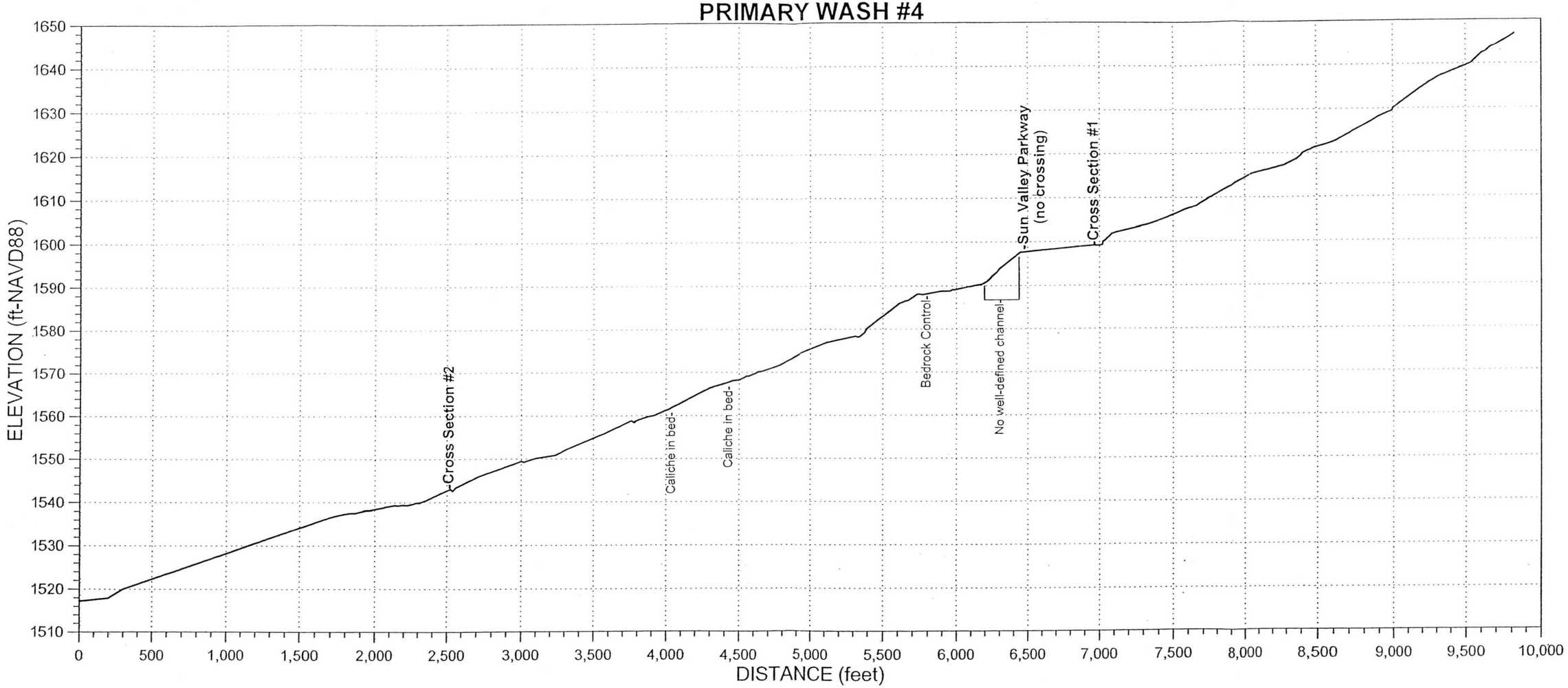


P10/19 Cross Section #1 - view looking downstream



P10/20 Cross Section #2 - view looking downstream

PRIMARY WASH #4

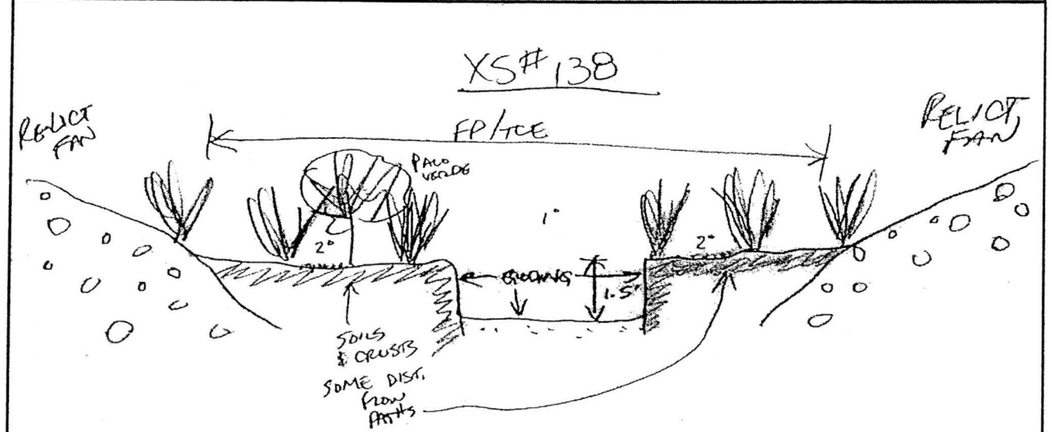


AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW4	1	419	March 17, 2004
	North: 967979.6 m East: 481779.0 m	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		vertical	1.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		vertical	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)			Height (top)	Above Bed	Thickness	Soils			X
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P10/26 - View upstream showing incised (1 ft deep) channel						
Mormon Tea			P10/27 - View downstream showing incision at fence concrete						
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #138



Notes:	Just upstream of Sun Valley Parkway.

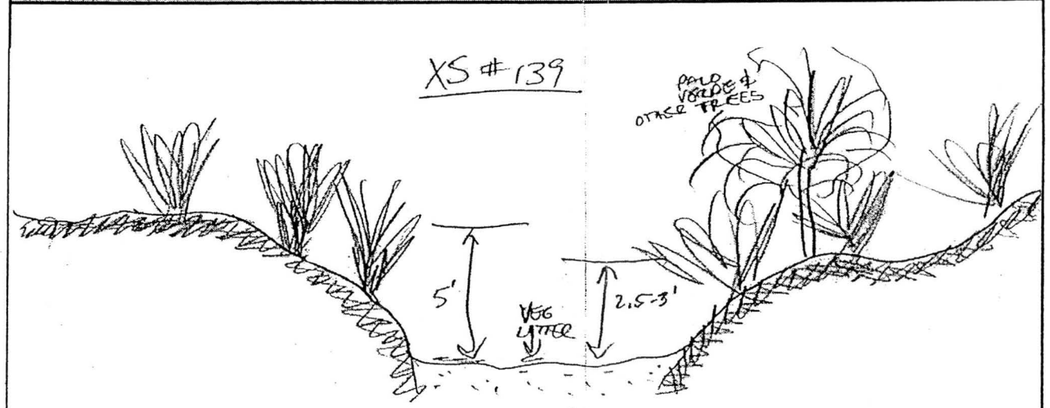
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW4	2	423	March 18, 2004
	North: 969905.2 m East: 478056.3 m	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		3:1	2.5-3 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		3:1	2.5-3 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)			Height (top)	Above Bed	Thickness	Soils			X
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde			Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote			Channel						
Brittlebush			PHOTOS & DESCRIPTION:						
Bursage			P11/1 - View downstream, vegetation litter in bottom indicative of lack of flow.						
Mormon Tea									
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #139

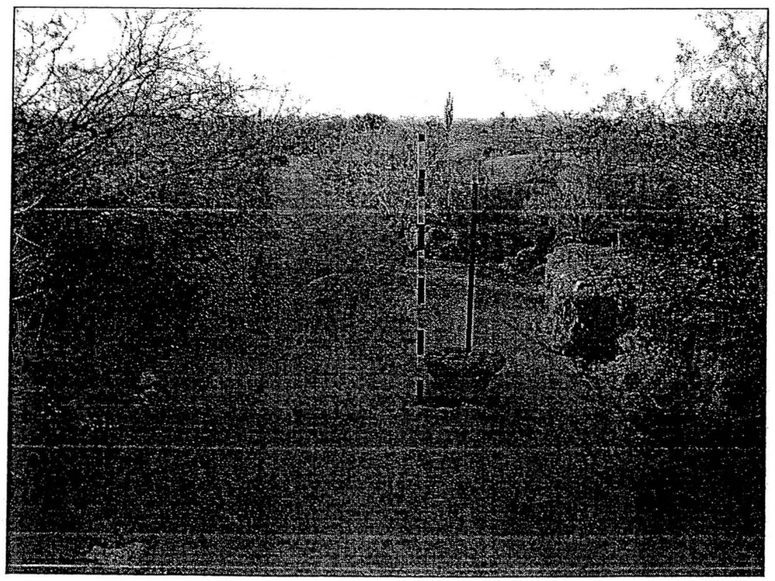


Notes:	Downstream (north) of Sun Valley Parkway. No flow from headwaters area upstream of Sun Valley Parkway. Only get localized drainage and runoff from roadway.

AYRES ASSOCIATES

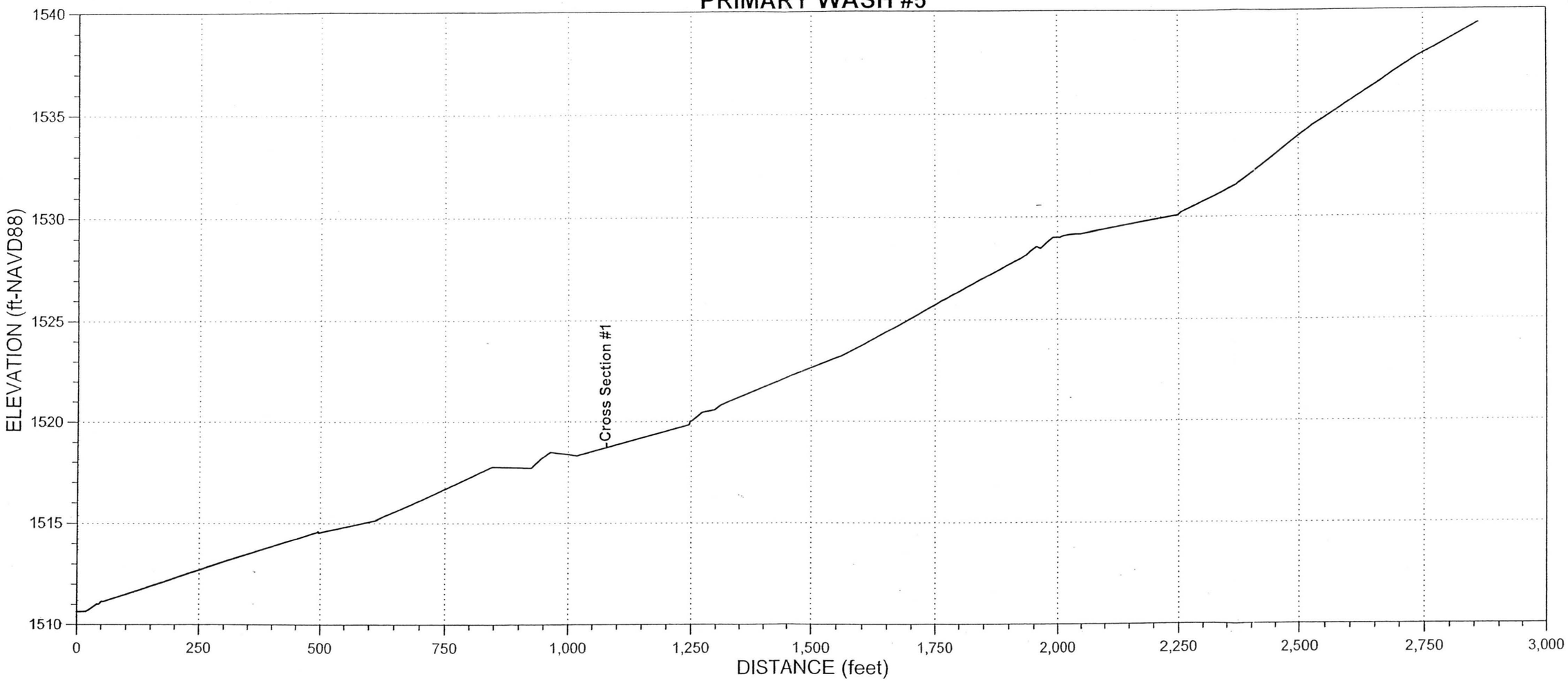
P10/26 Primary Wash #4 - Cross Section #1 – View upstream

P10/27 Primary Wash #4 - Cross Section #1 – View downstream



P11/1 Primary Wash #4 - Cross Section #2 – View downstream

PRIMARY WASH #5



AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW5	1	425	March 18, 2004
	North: 970491.7 m East: 476088.7 m	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	4.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	4.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
	Left Bank	Right Bank	Channel
Ht. Above Thalweg	<0.5 ft	<0.5 ft	

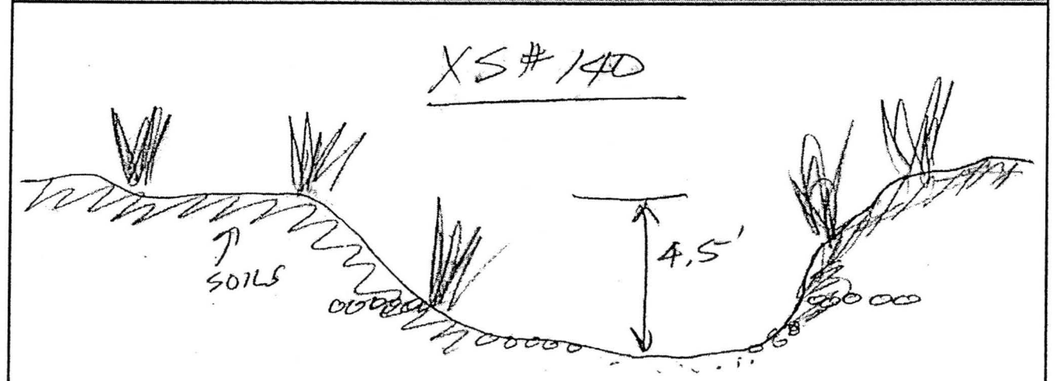
PHOTOS & DESCRIPTION:
P11/6 - View upstream

CRYPTO-BIOTIC CRUST (floodway):
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

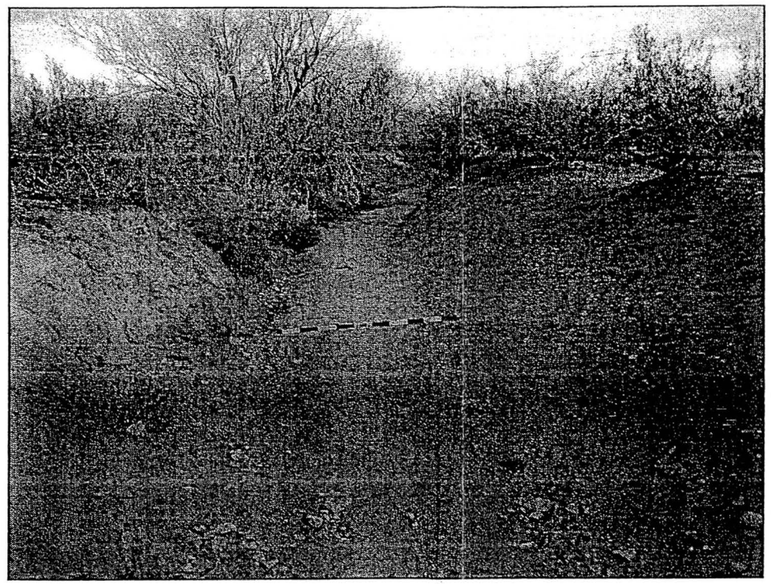
NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #140



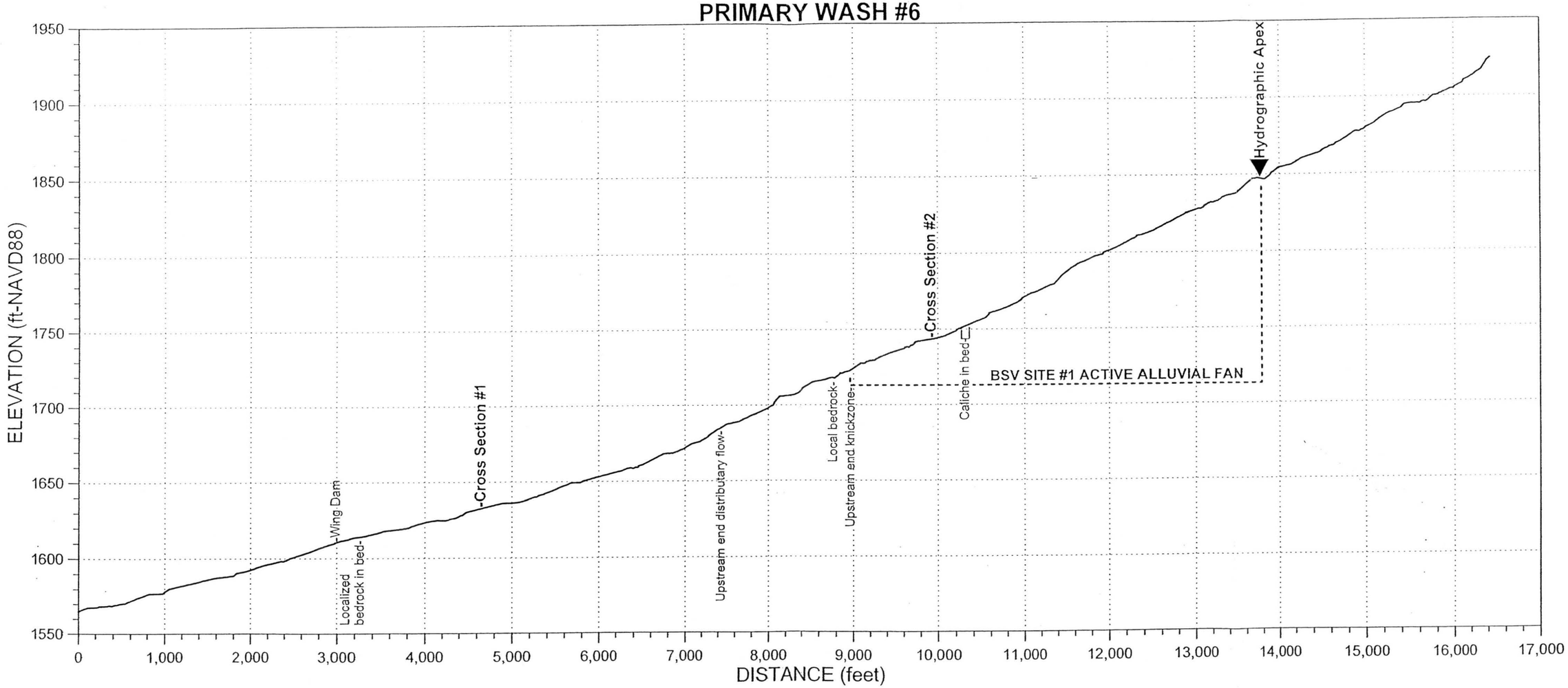
Notes:

AYRES ASSOCIATES



P11/6 Primary Wash #5 - Cross Section #1 – View upstream

PRIMARY WASH #6



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW6	1	404	March 17, 2004

North: 965711.8 m
East: 482777.7 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank		>6:1	<2 ft	Sand__X__	Gravel__X__
Channel		Multiple	X	Right Bank		>6:1	<1 ft	Cobble_____	Bldrs_____

VEGETATION		INSET F/P
In-channel		
Marginal	X	
VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

TERRACES (height-ft)		
Left Bank		
Right Bank		
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

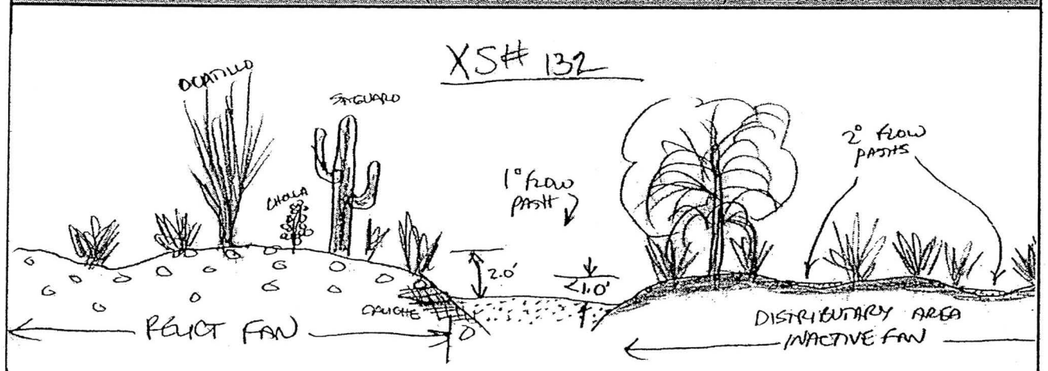
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	top of bank		

PHOTOS & DESCRIPTION:

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #132



Notes: Flow from this and other nearby channels are captured by stock tank located about 1500 ft downstream, so channels downstream of tank see little flow except due to localized runoff.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW6	2	408	March 17, 2004

North: 964005.0 m
East: 486493.7 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank	X	vertical	1.5-2 ft	Sand__X__	Gravel__X__
Channel	X	Multiple	X	Right Bank	X	vertical	1.5-2 ft	Cobble_____	Bldrs_____

VEGETATION		INSET F/P
In-channel		
Marginal	X	
VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

TERRACES (height-ft)		
Left Bank		
Right Bank		
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

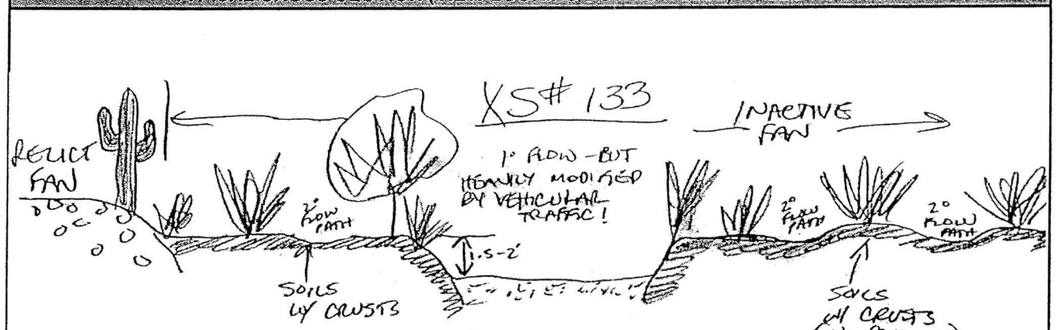
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P10/18 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #133



Notes: Flow paths heavily modified and controlled by off-road vehicle traffic.

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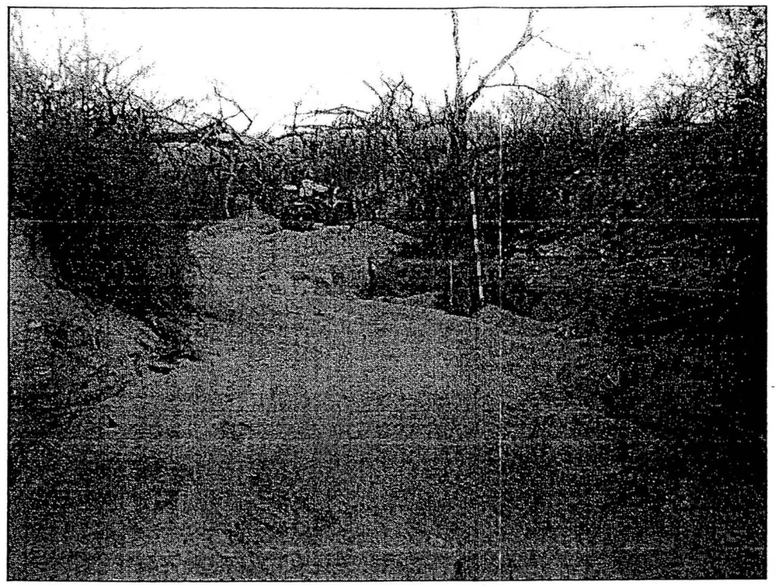
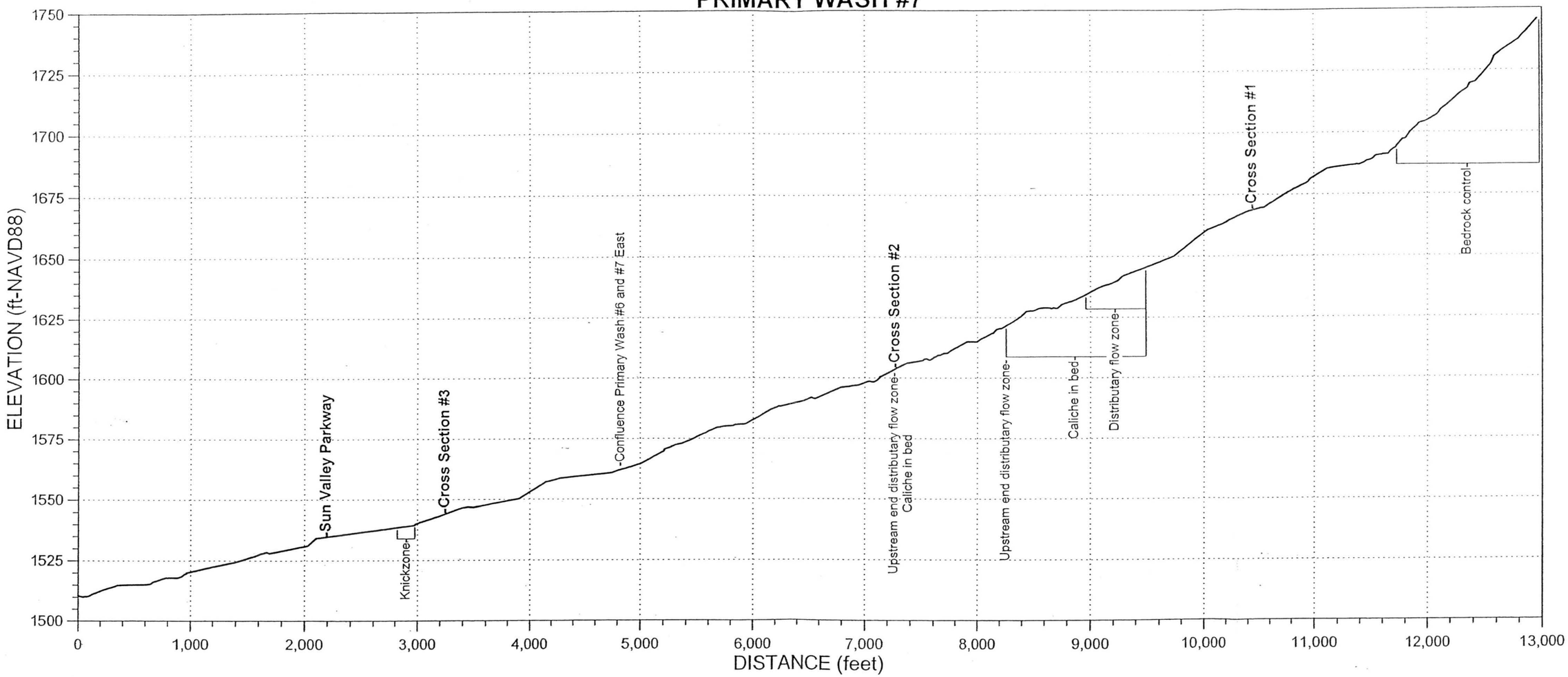
P10/18 Primary Wash #6 - Cross Section #1 – View upstream



P10/28 Primary Wash #6 - View looking upstream above confluence with Sun Valley Parkway drainage channel

PRIMARY WASH #7



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW7	1	385	March 17, 2004

North: 962069.3 m
East: 480848.6 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	
Channel		Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
>6:1	<1 ft	Sand X	Gravel X
>6:1	<1 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		X
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.	X	
Cholla C.	X	
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

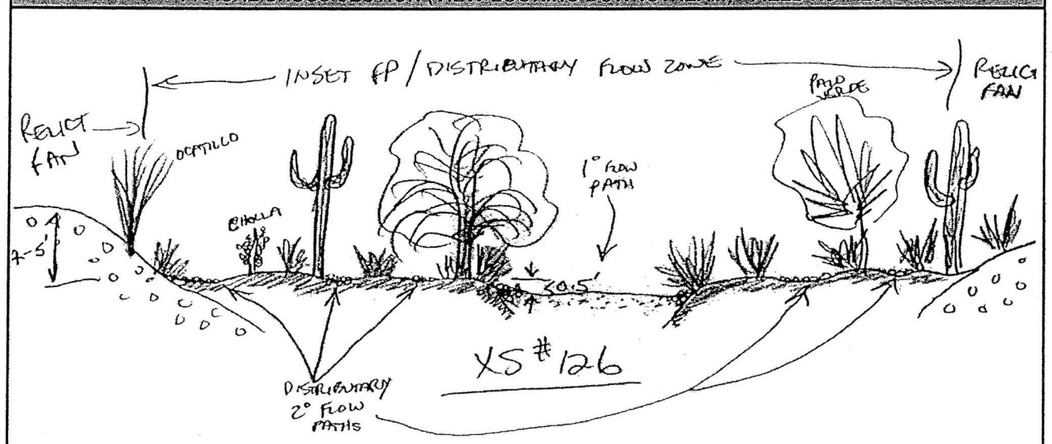
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	top bank	top bank	

PHOTOS & DESCRIPTION:
P10/9,10,11 Pan - View left bank to right bank looking downstream showing upstream end active distributary flow zone.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #126



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW7	2	390	March 17, 2004

North: 964606.0 m
East: 479342.6 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel		Multiple		Right Bank	

H:V	Height	BED MATERIAL	
4:1	1.5-2 ft	Sand X	Gravel X
4:1	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal		

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.	X	
Barrel C.	X	
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

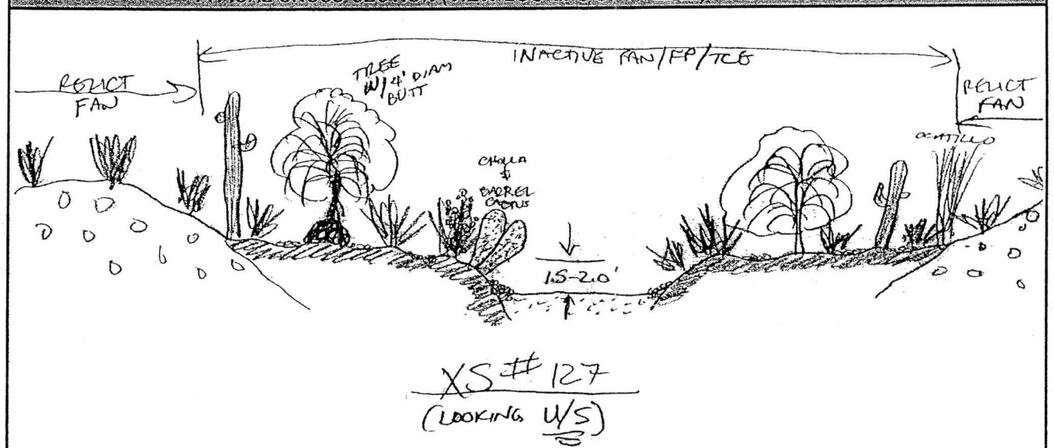
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	0.5 ft	0.5 ft	

PHOTOS & DESCRIPTION:
P10/12 - View looking upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING UPSTREAM) - FIELD XS #127



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW7	3	392	March 17, 2004

North: 967243.3 m
East: 476944.5 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	3.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	3.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1-1.5 ft	1-1.5 ft	

PHOTOS & DESCRIPTION:
P10/13 - View upstream, note sand bar on right bank up to 1.5 ft high on bank

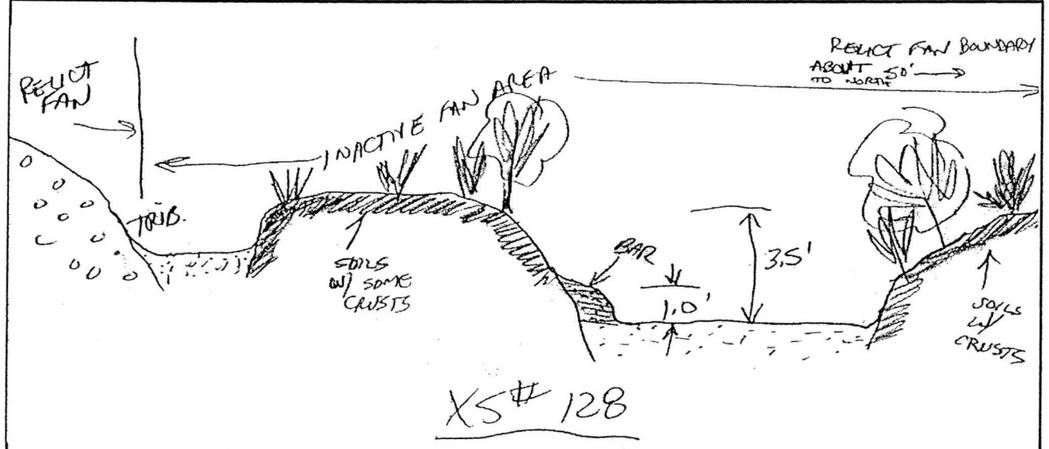
CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	**Relict Fan**	Active Fan	**Inactive Fan**	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	**Inactive Fan**	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

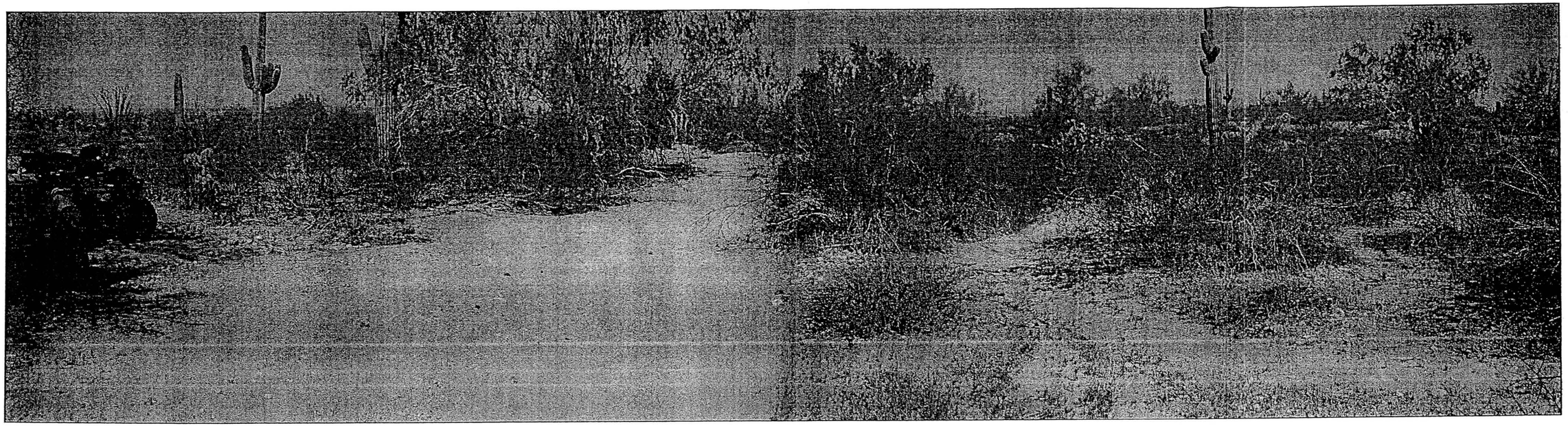
HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #128

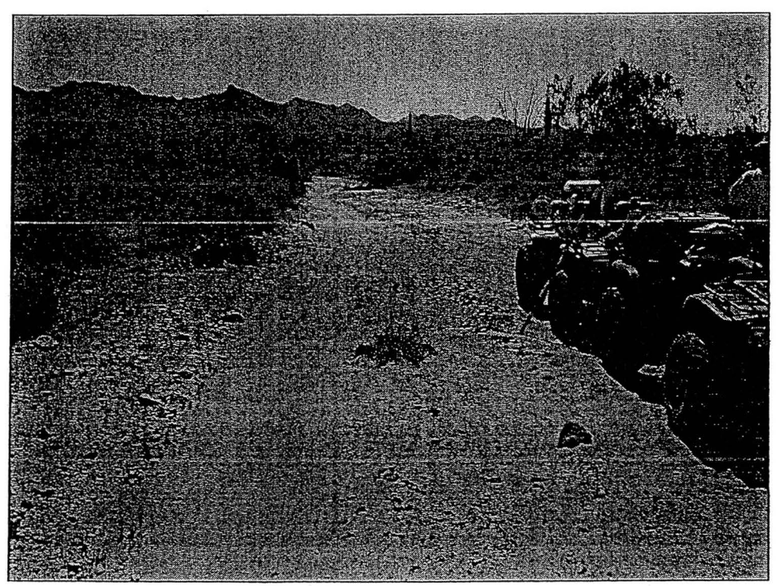


Notes:

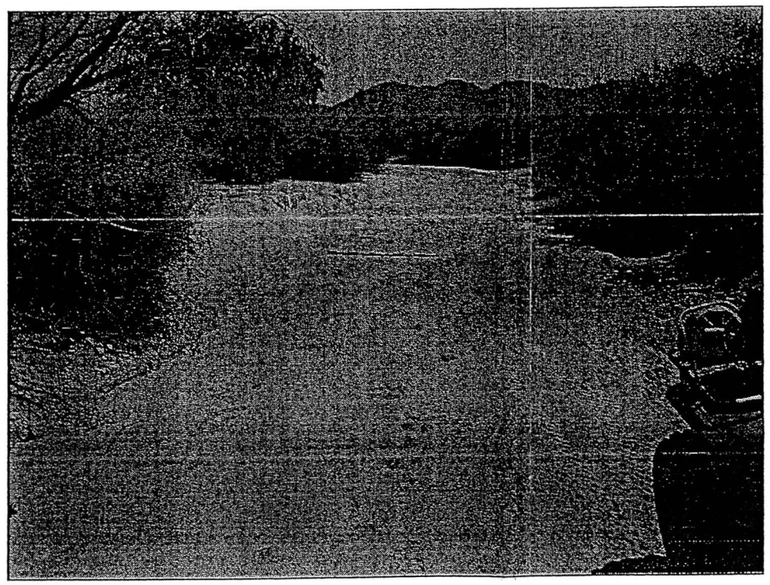
AYRES ASSOCIATES



P10/9,10,11 Primary Wash #7 - Cross Section #1 – Panorama looking downstream

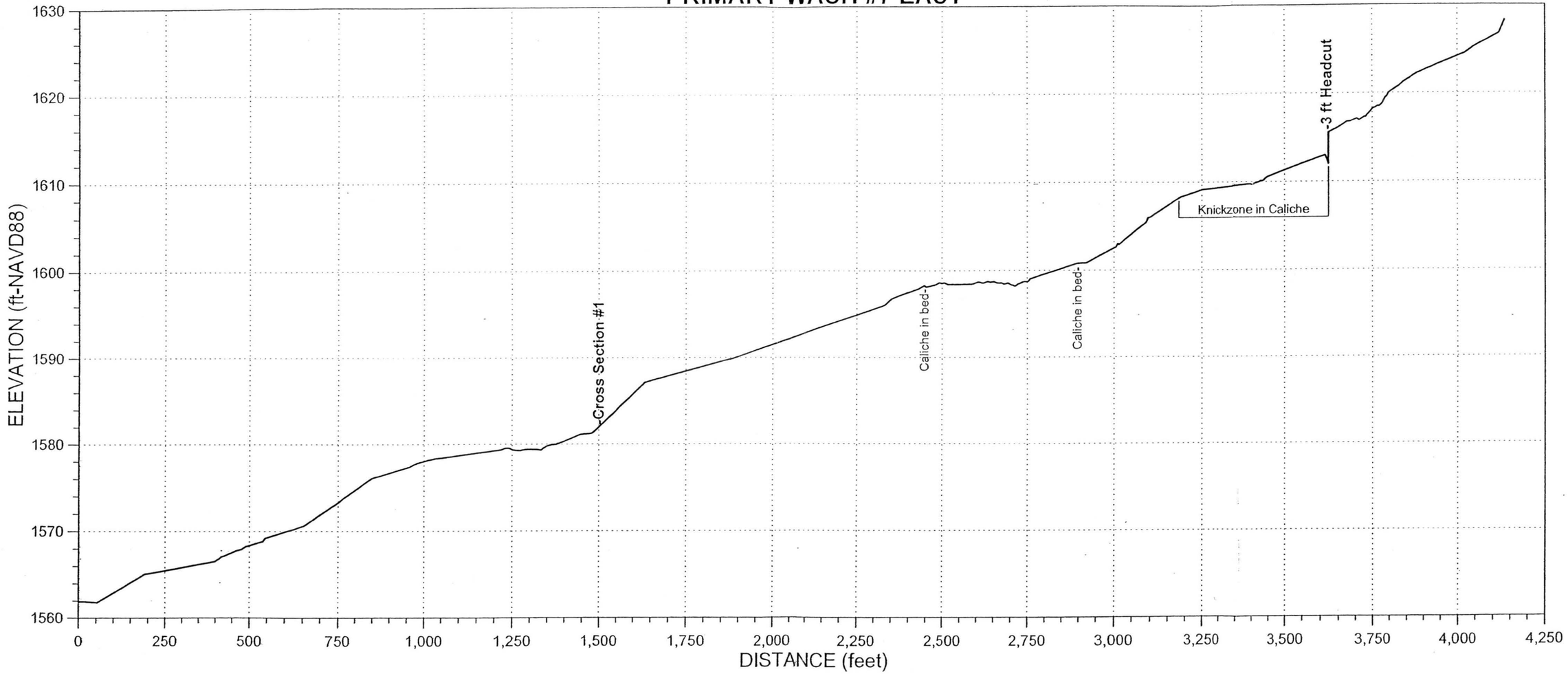


P10/12 Primary Wash #7 - Cross Section #2 – View looking upstream



P10/13 Primary Wash #7 - Cross Section #3 – View looking upstream

PRIMARY WASH #7 EAST



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW7East	1	402	March 17, 2004

North: 965957.3 m
East: 479485.1 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1;1	6 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	8-10 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	whole bank	
Right Bank	whole bank	
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1.5 ft	1.5 ft	

PHOTOS & DESCRIPTION:
P10/17 - View downstream

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

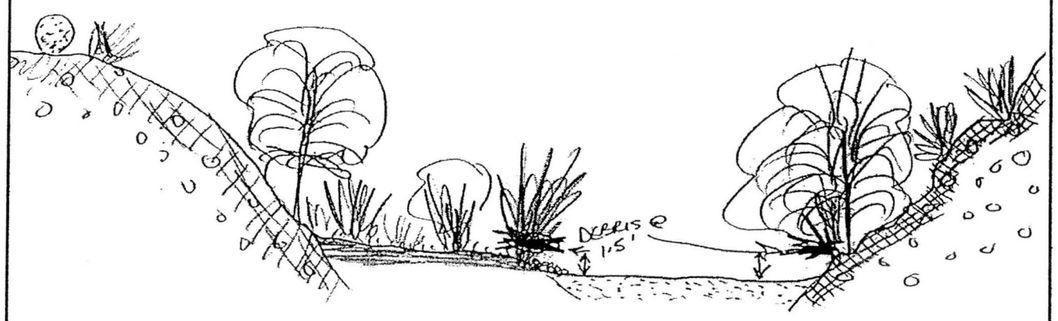
PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

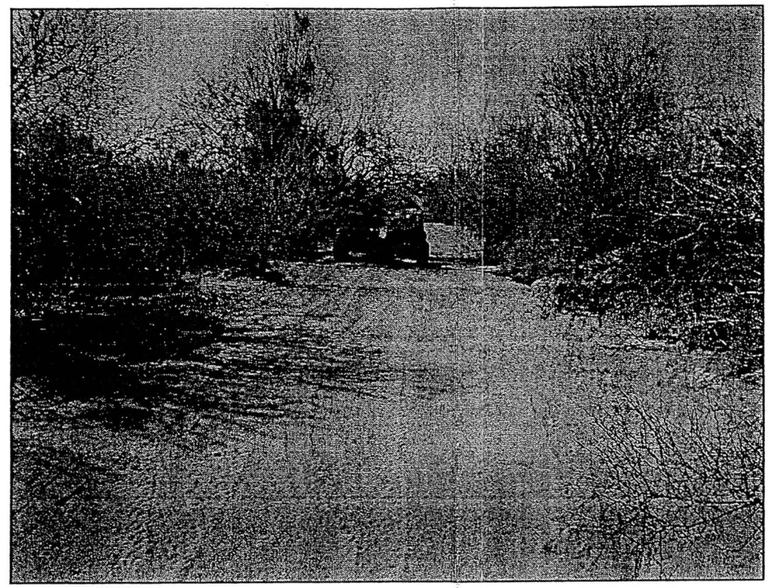
TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #131

XS#131



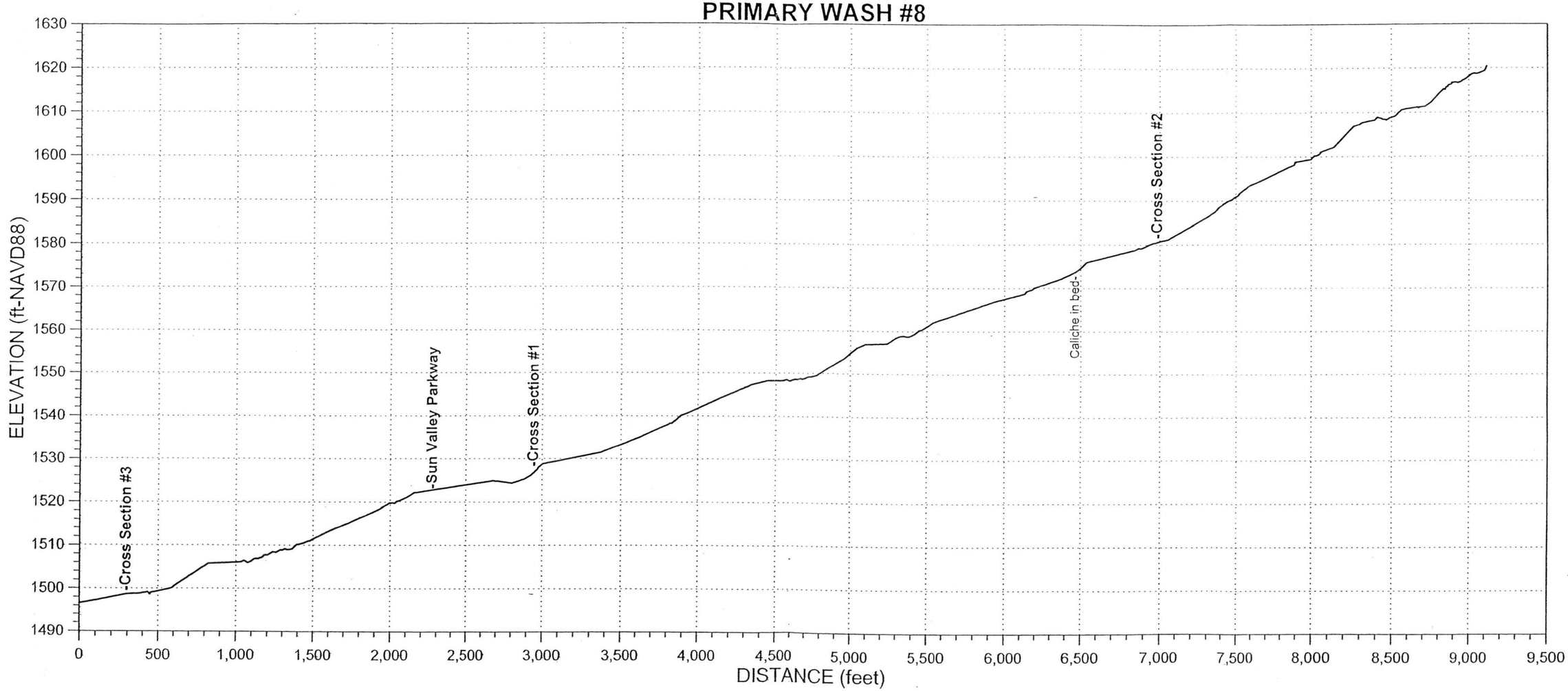
Notes:

AYRES ASSOCIATES



P10/17 Primary Wash #7 East - Cross Section #1 – View looking downstream

PRIMARY WASH #8



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW8	1	395	March 17, 2004

North: 966976.2 m
East: 475127.8 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
1:1	4-5 ft	Sand X	Gravel X
1:1	4-5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

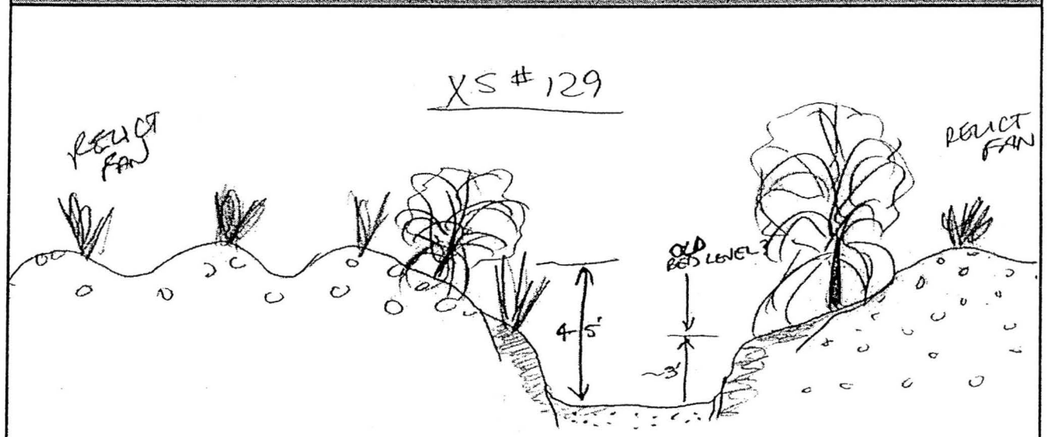
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P10/14 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present: Dimensions:			HEADCUT: Caliche Present: Dimensions:		
Spotty						
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #129



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW8	2	397	March 17, 2004

North: 964545.0 m
East: 477826.1 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
1:1	1.5 ft	Sand X	Gravel X
1:1	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

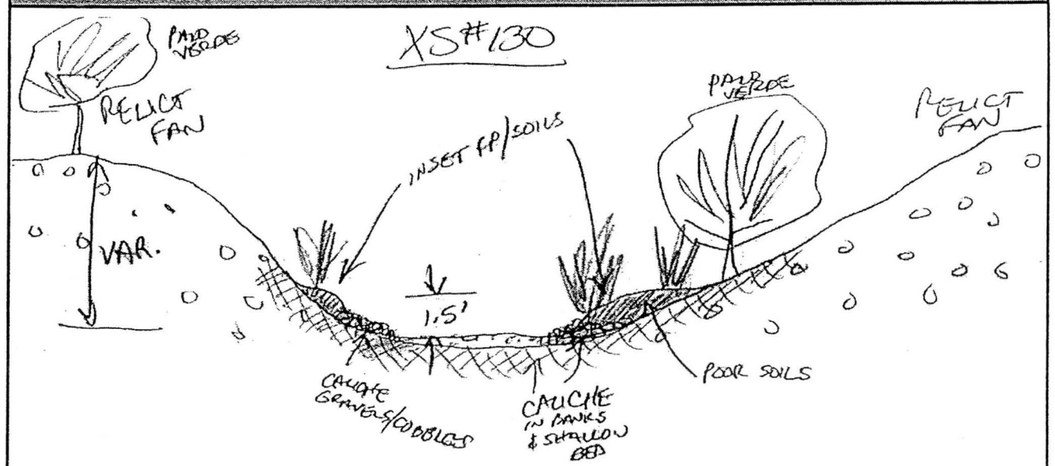
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank	<1 ft	1+ ft
Right Bank	<1 ft	1+ ft
Channel	shallow	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P10/15 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present: Dimensions:			HEADCUT: Caliche Present: Dimensions:		
Spotty						
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #130



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW8	3	426	March 17, 2004

North: 968399.9 m
East: 472928.1 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P11/7 - View upstream

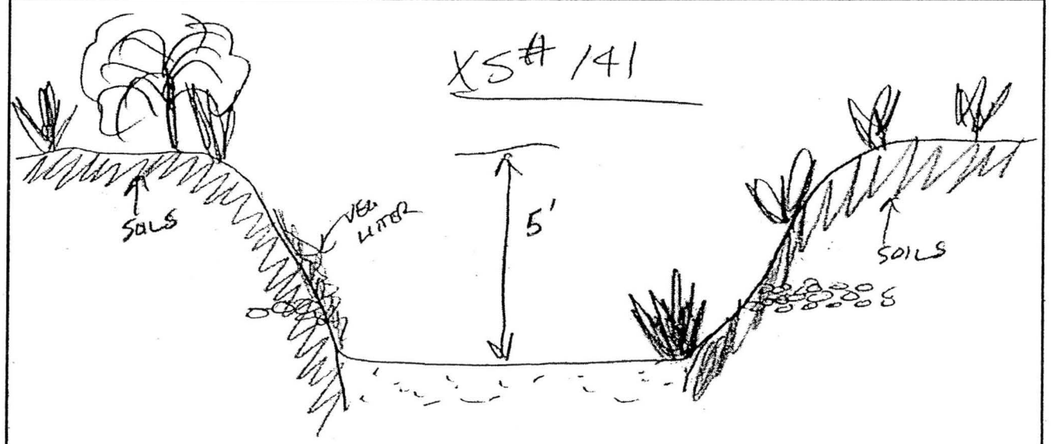
CRYPTO-BIOTIC CRUST (floodway): **Absent** / Spotty / Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

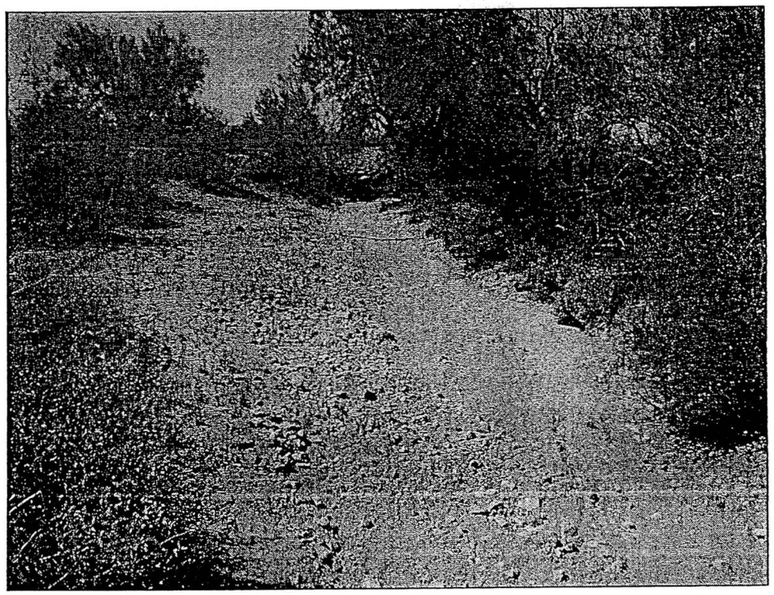
HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #141

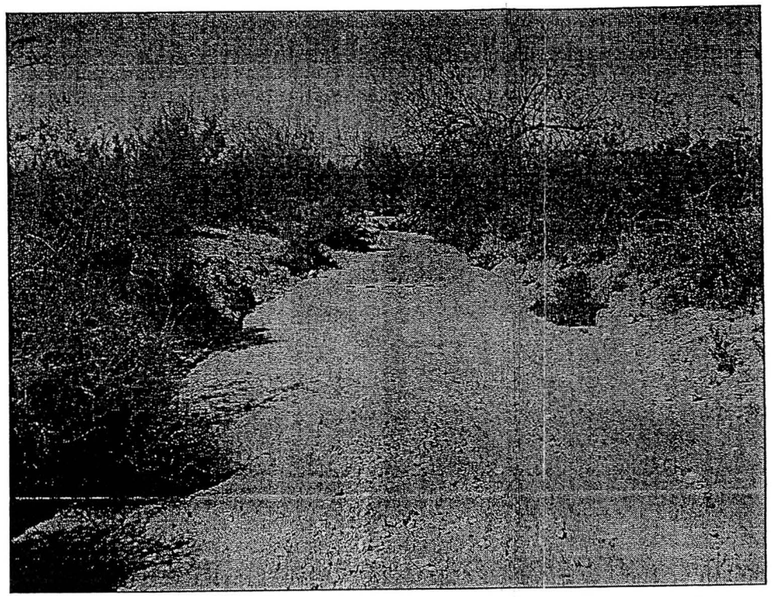


Notes:

AYRES ASSOCIATES



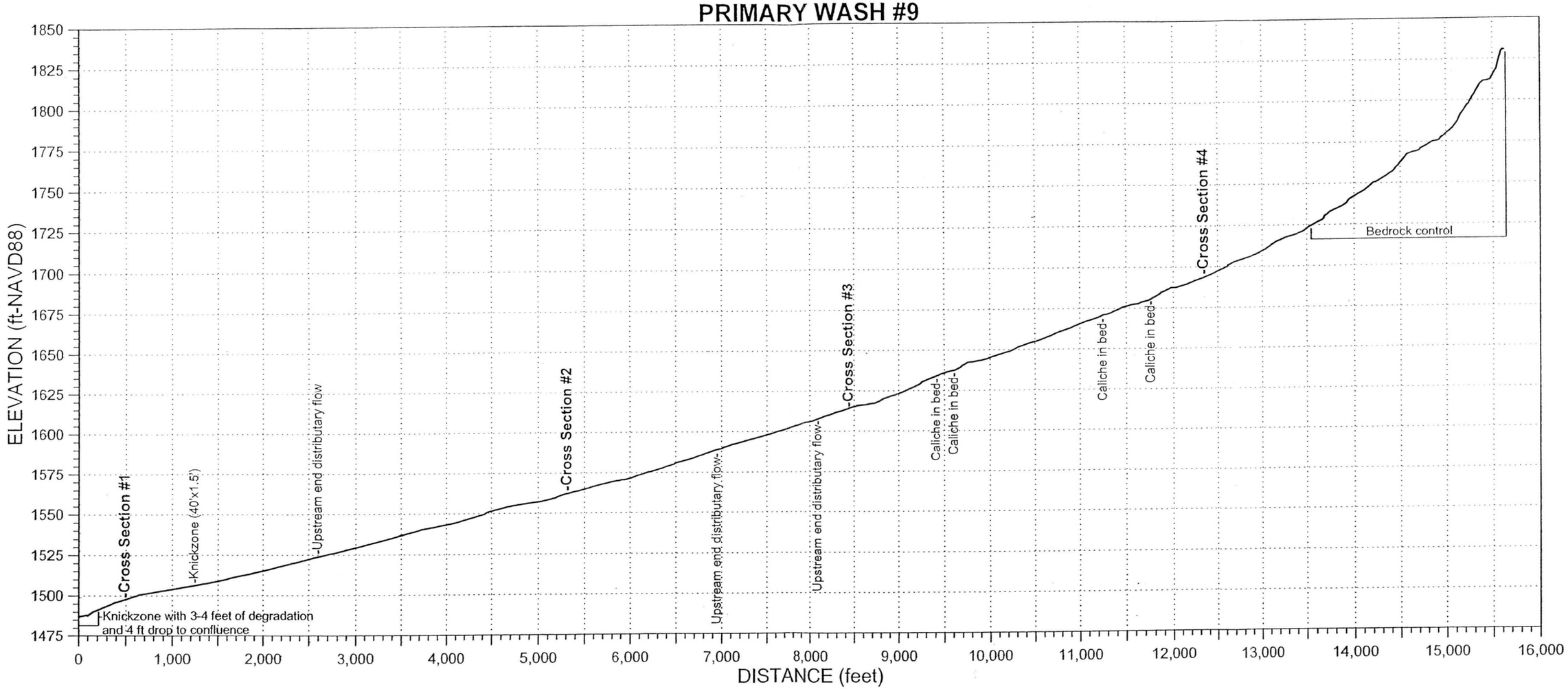
P10/14 Primary Wash #8 - Cross Section #1 – View looking downstream



P10/15 Primary Wash #8 - Cross Section #2 – View looking downstream

P11/7 Primary Wash #8 - Cross Section #3 – View looking upstream

PRIMARY WASH #9



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW9	1	368	March 17, 2004

North: 966920.2 m
East: 471892.8 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank	X	<1:1	2.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank	X	<1:1	2.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde	X	
Creosote	X	
Brittlebush		
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

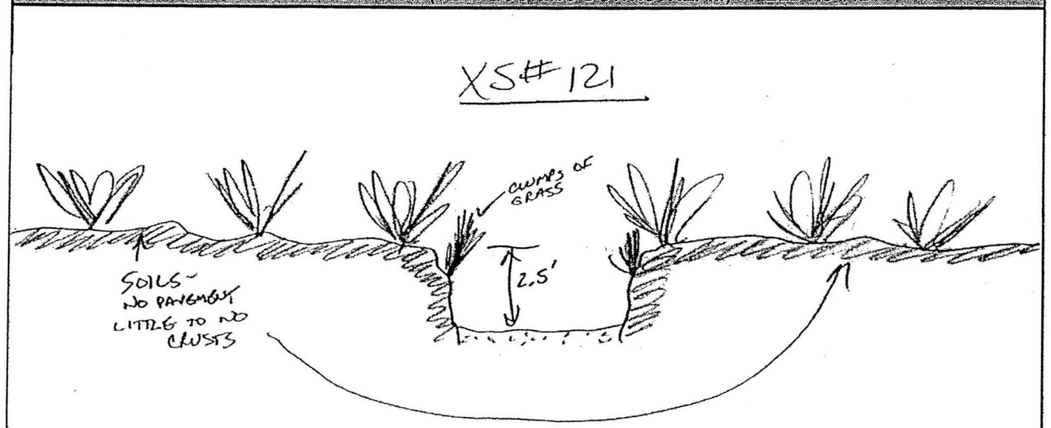
CALICHE STRATA	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	<0.5 ft	<0.5 ft	

PHOTOS & DESCRIPTION:
P10/4 - View downstream, note grass clump by stadia stick.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present: Dimensions:			HEADCUT: Caliche Present: Dimensions:		
Spotty						
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #121



Notes: Extensive clumps of prairie grasses.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW9	2	372	March 17, 2004

North: 964156.5 m
East: 475567.6 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank		1:1	1.5 ft	Sand X	Gravel X
Channel		Multiple	X	Right Bank		1:1	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

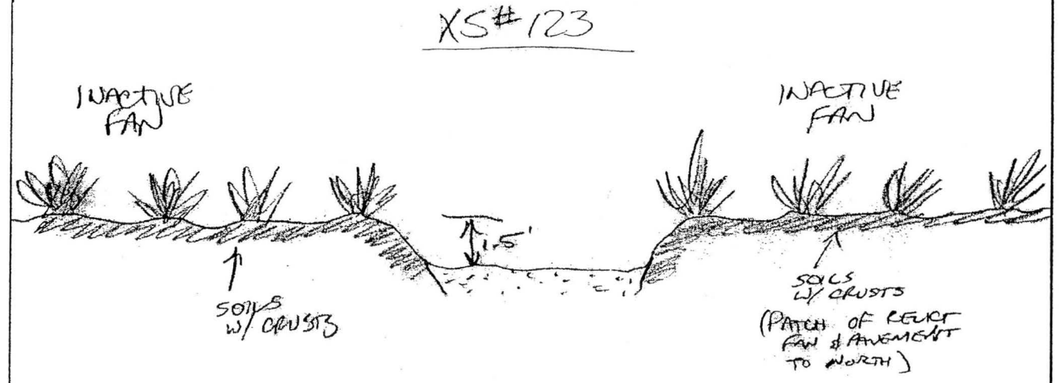
CALICHE STRATA	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	0.5 ft	0.5 ft	

PHOTOS & DESCRIPTION:
P10/6 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present: Dimensions:			HEADCUT: Caliche Present: Dimensions:		
Spotty						
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #123



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW9	3	375	March 17, 2004

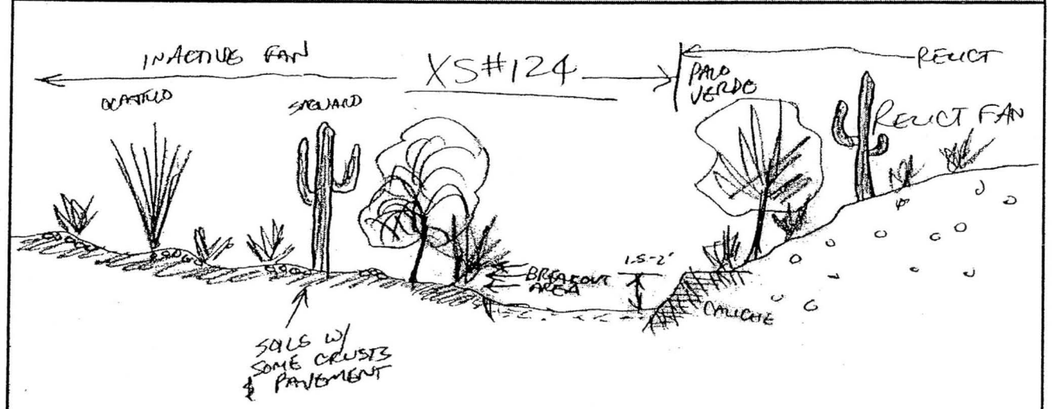
North: 962817.3 m
East: 478323.9 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	1.5 ft	Sand X	Gravel X
Channel		Multiple		Right Bank		1:1	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank	1.5 ft	1.5+ ft	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P10/7 - View downstream showing breakout (ramping) area along left bank.						
Mormon Tea									
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				**Left Bank**	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Prickly Pear				**Right Bank**	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.				NICKZONE:			HEADCUT:		
Hedgehog C.			Absent	Caliche Present:			Caliche Present:		
Fishhook C.			**Spotty**	Dimensions:			Dimensions:		
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #124



Notes: Get overbank flows due to ramping/breakout along low, poorly defined left bank just downstream of cross section.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW9	4	380	March 17, 2004

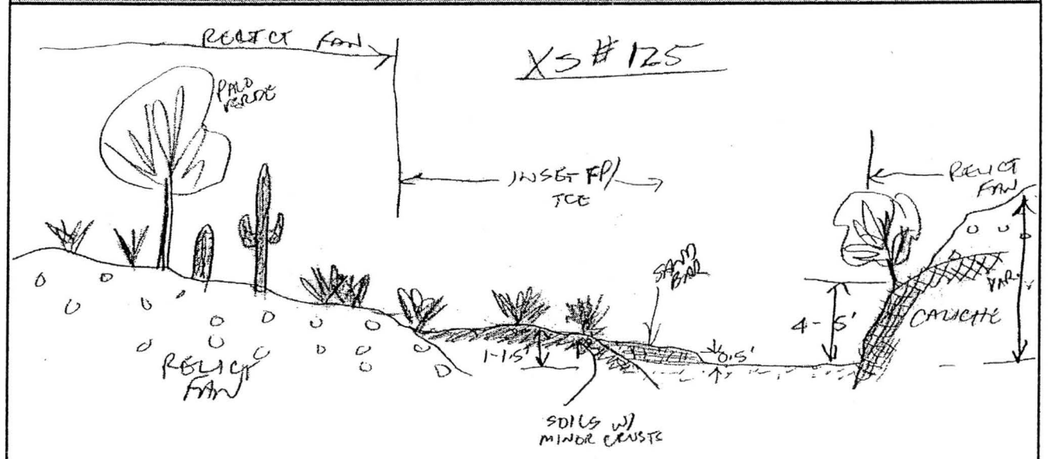
North: 960733.5 m
East: 481008.9 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		>6:1	1-1.5 ft	Sand X	Gravel X
Channel		Multiple		Right Bank		1:1	4-5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel		X	Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils		X	
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank	4-5 ft	4-5+ ft	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				0.5 ft	0.5 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X								
Mormon Tea									
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				**Left Bank**	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				**Right Bank**	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.				NICKZONE:			HEADCUT:		
Hedgehog C.			Absent	Caliche Present:			Caliche Present:		
Fishhook C.			**Spotty**	Dimensions:			Dimensions:		
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #125



Notes:

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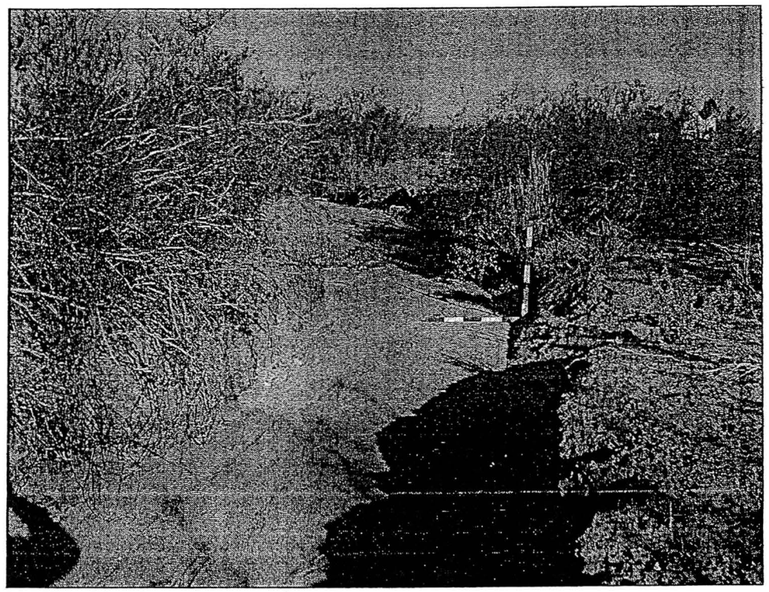
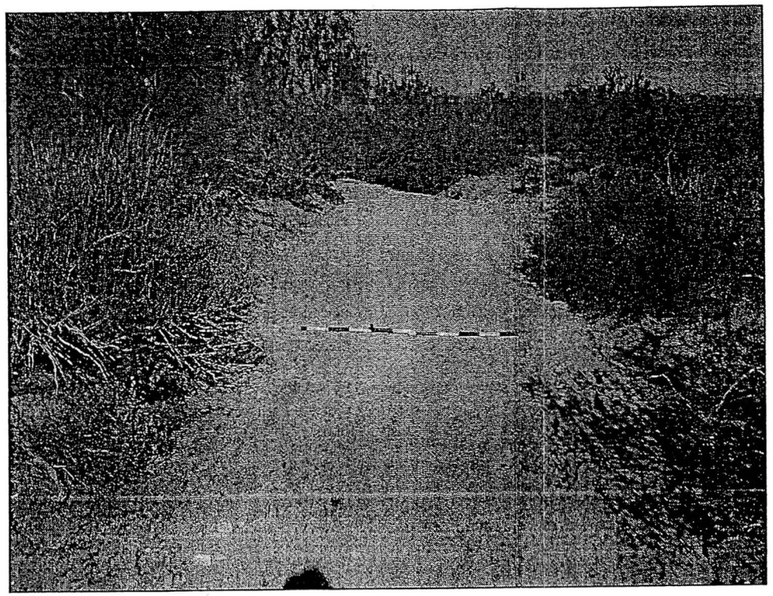


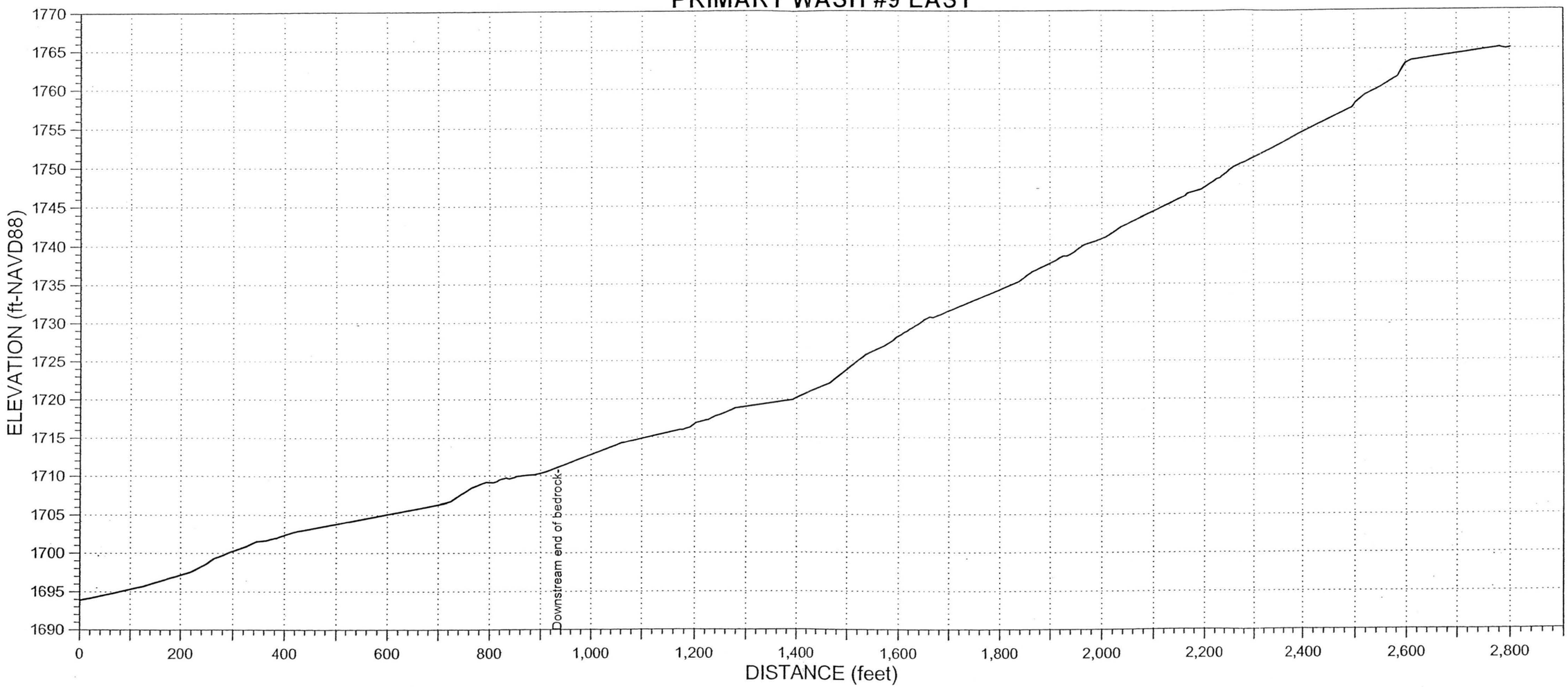
P10/4 Primary Wash #9 - Cross Section #1 – View looking downstream



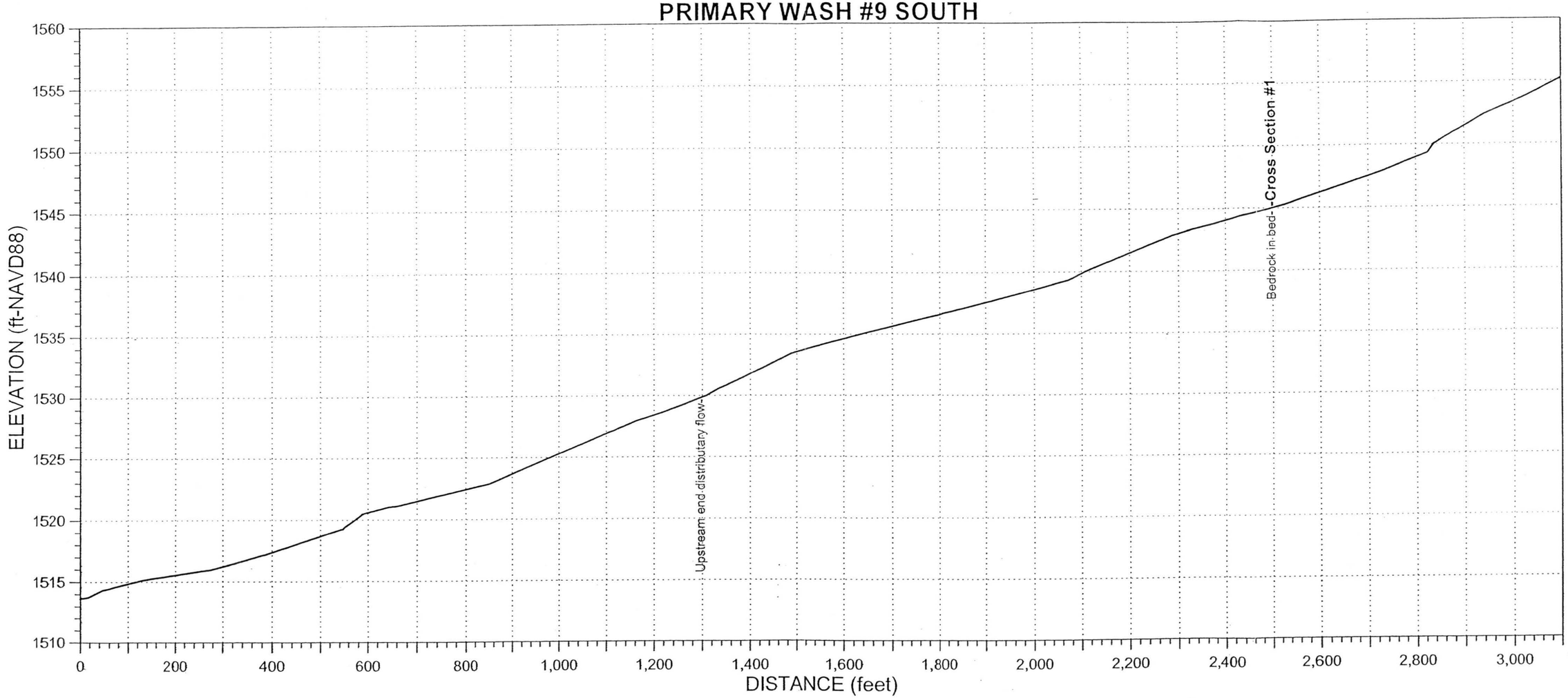
P10/6 Primary Wash #9 - Cross Section #2 – View looking downstream

P10/7 Primary Wash #9 - Cross Section #3 – View looking downstream

PRIMARY WASH #9 EAST



PRIMARY WASH #9 SOUTH



AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW9South North: 963904.0 m East: 474283.2 m	1	371	March 17, 2004
		Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	2 ft	Sand X	Gravel X
Channel		Multiple		Right Bank		>6:1	0.5-1 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

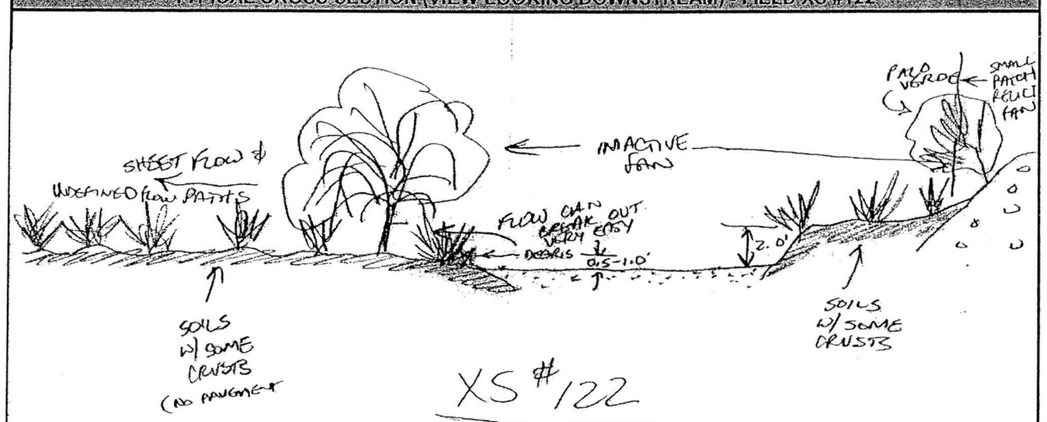
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P10/5 - View looking upstream, note flow breakout points along left bank

CRYPTO-BIOTIC CRUST (floodway):	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	**Relict Fan**	Active Fan	**Inactive Fan**	Alluvial Plain
	Right Bank	Pediment	**Relict Fan**	Active Fan	**Inactive Fan**	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #122



Notes:

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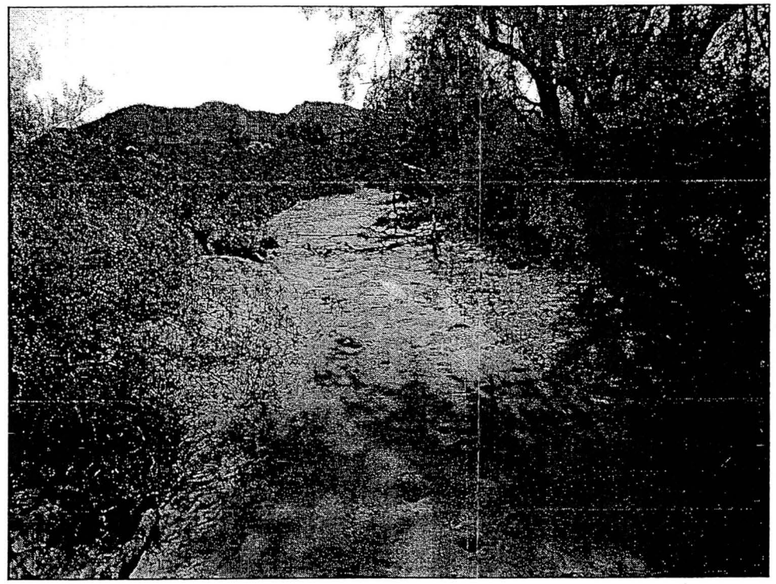
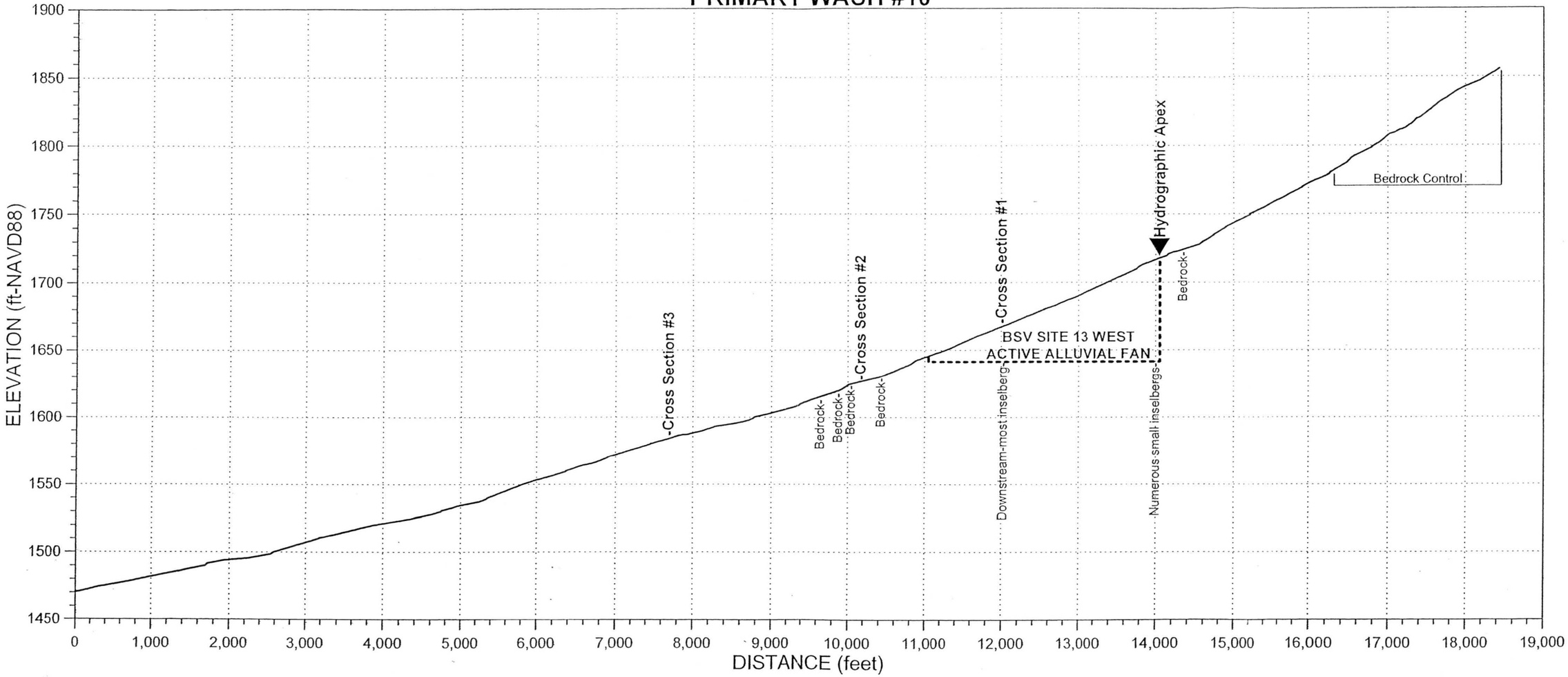


P10/5 Primary Wash #9 South - Cross Section #1 – View looking upstream

PRIMARY WASH #10



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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW10	1	347	March 16, 2004

North: 959866.3 m
East: 495150.9 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	
Channel		Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
?	?	Sand X	Gravel X
?	?	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal		

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils		X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.	X	
Cholla C.	X	
Barrel C.	X	
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P9/16 - View downstream showing distributary flow paths, note lack of well-defined channel.

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	**Active Fan**	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	**Active Fan**	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #NA

Site at last downstream inselberg
Distributary Flow Paths
(no well defined-flow channels so no XS shown)

Notes: ***CROSS SECTION IS LOCATED ON BSV SITE 13 WEST ACTIVE ALLUVIAL FAN***

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW10	2	349	March 16, 2004

North: 960685.3 m
East: 477645.4 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
3:1	1.5 ft	Sand X	Gravel X
3:1	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.	X	
Cholla C.	X	
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<0.5 ft	< 0.5 ft	

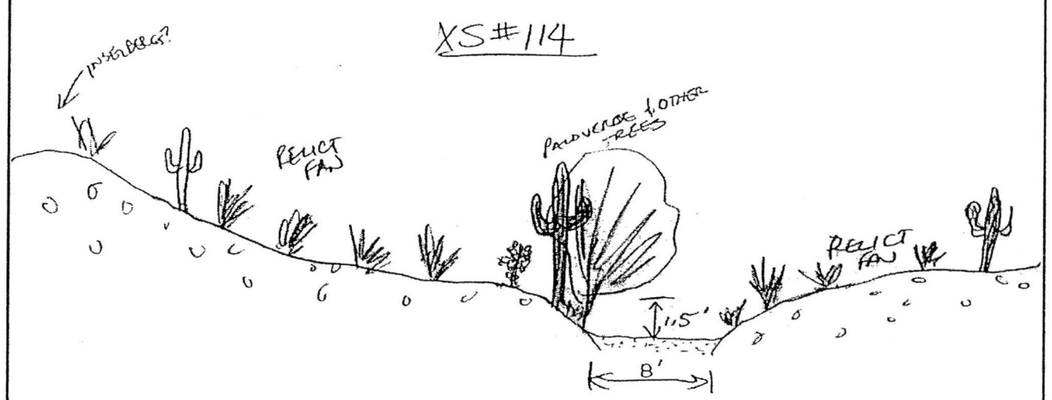
PHOTOS & DESCRIPTION:
P9/17 - View upstream looking at XS location, note hills

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #114



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW10	3	353	March 16, 2004

North: 961797.8 m
East: 475484.0 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	1.5-2 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	1.5-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage		
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<0.5 ft	<0.5 ft	<0.5ft

PHOTOS & DESCRIPTION:
P9/18 - View upstream.

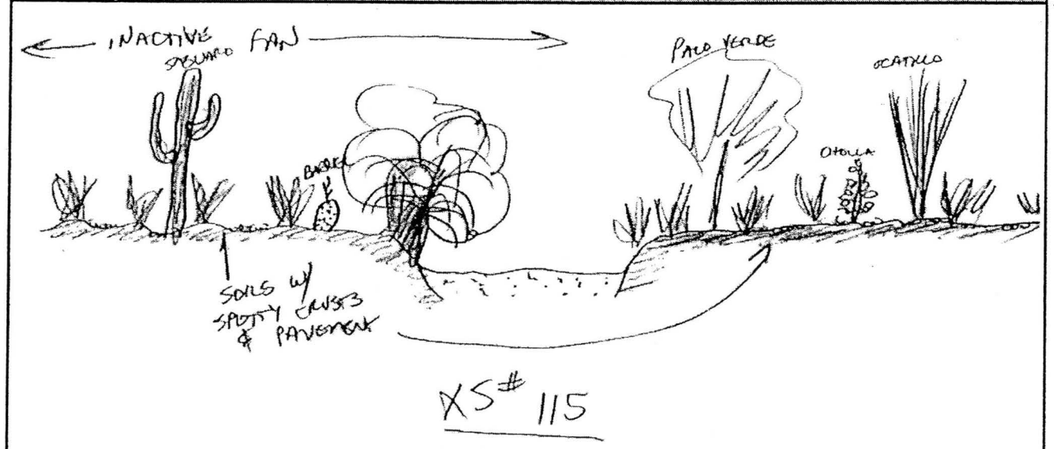
CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #115



Notes:

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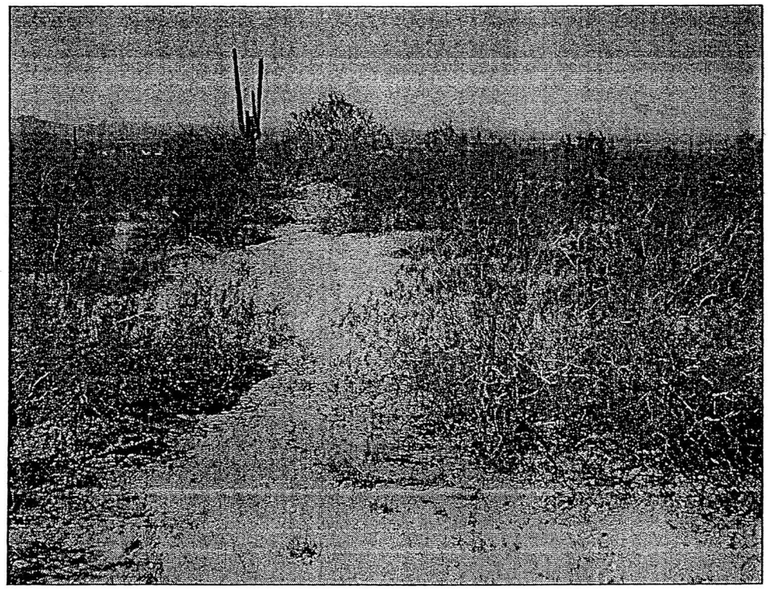
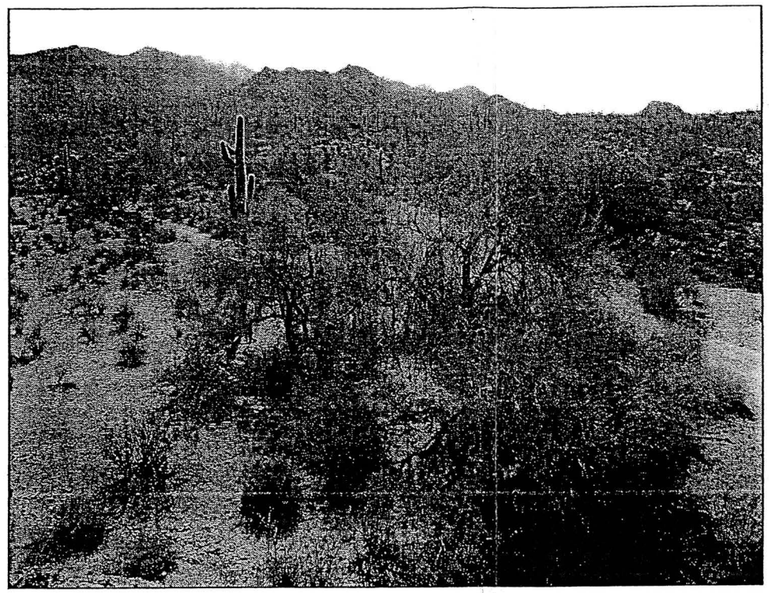
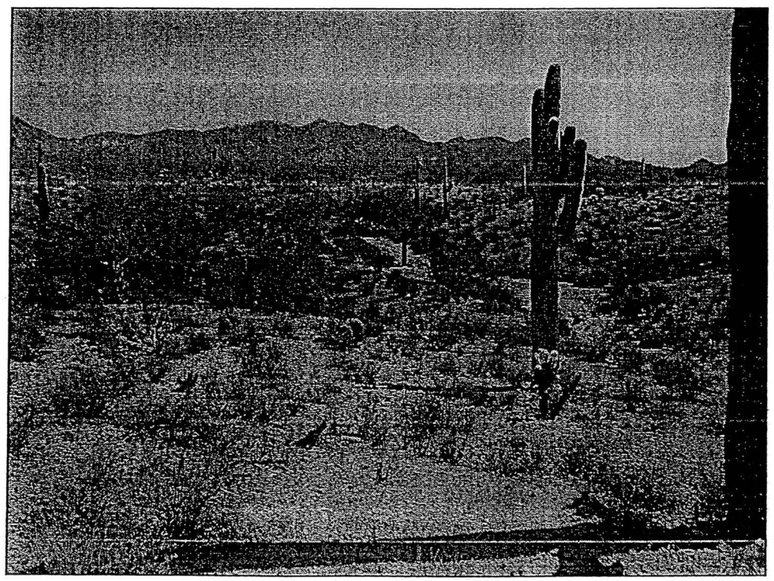


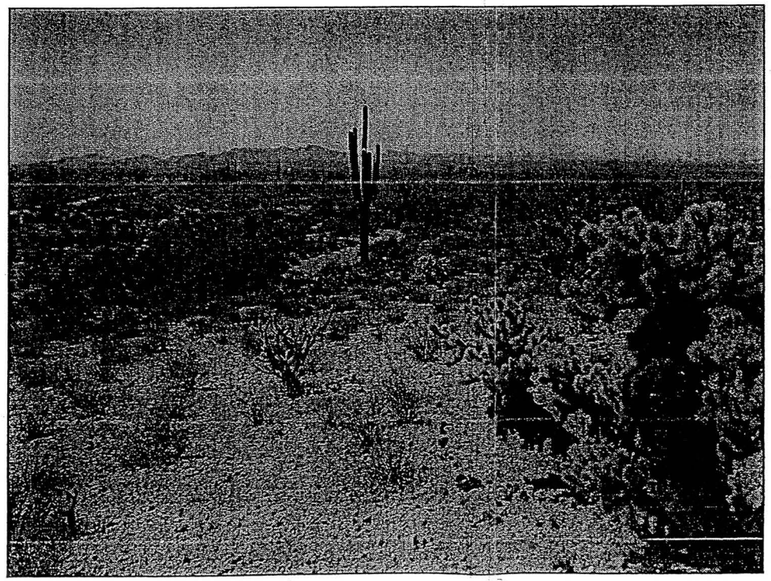
P9/16 Primary Wash #10 - Cross Section #1 – View looking downstream



P23/14 Primary Wash #10 - BSV Site 13 West – View looking upstream toward hydrographic apex

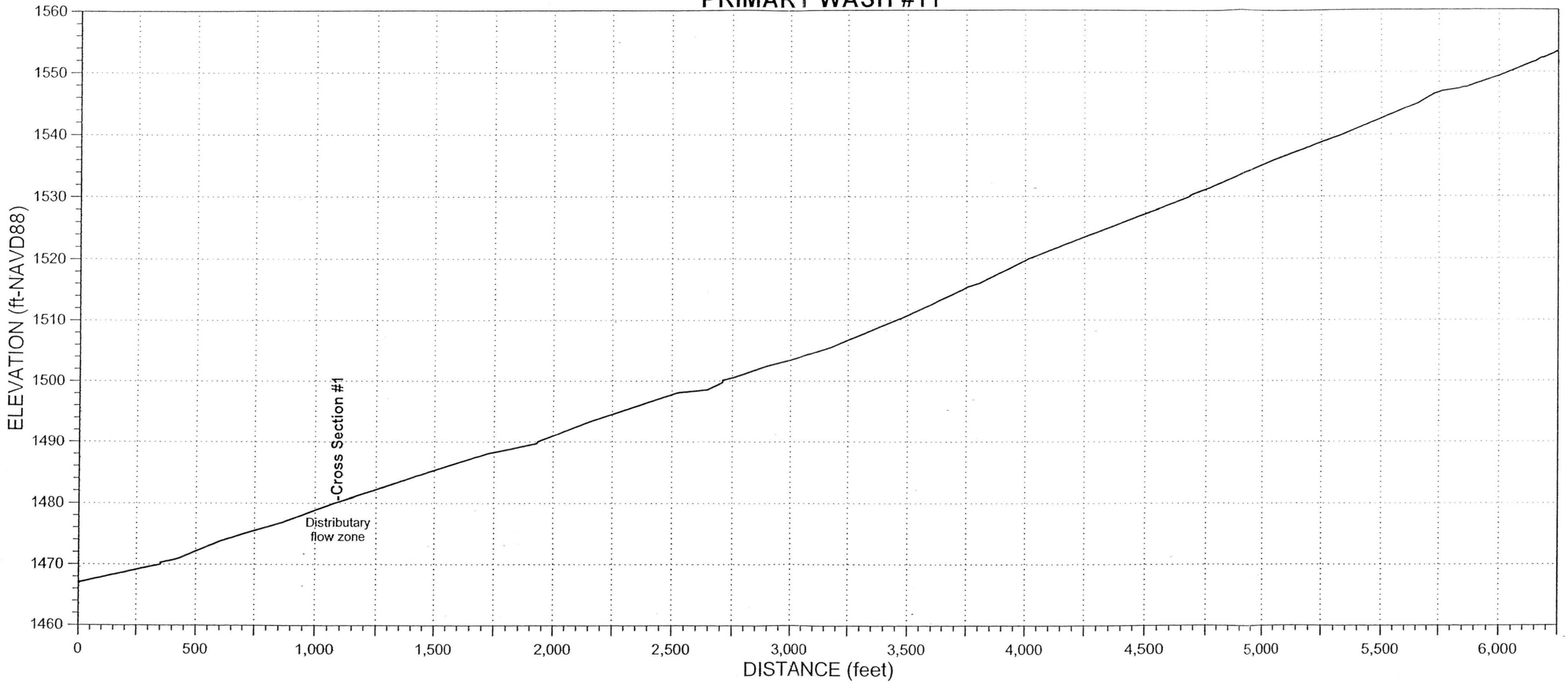


P9/17 Primary Wash #10 - Cross Section #2 – View looking upvalley



P9/18 Primary Wash #10 - Cross Section #3 – View looking downvalley

PRIMARY WASH #11



AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW11 North: 963554.0 m East: 469289.0 m	1	354	March 16, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	1.5-2 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	1.5-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P9/19 - View upstream

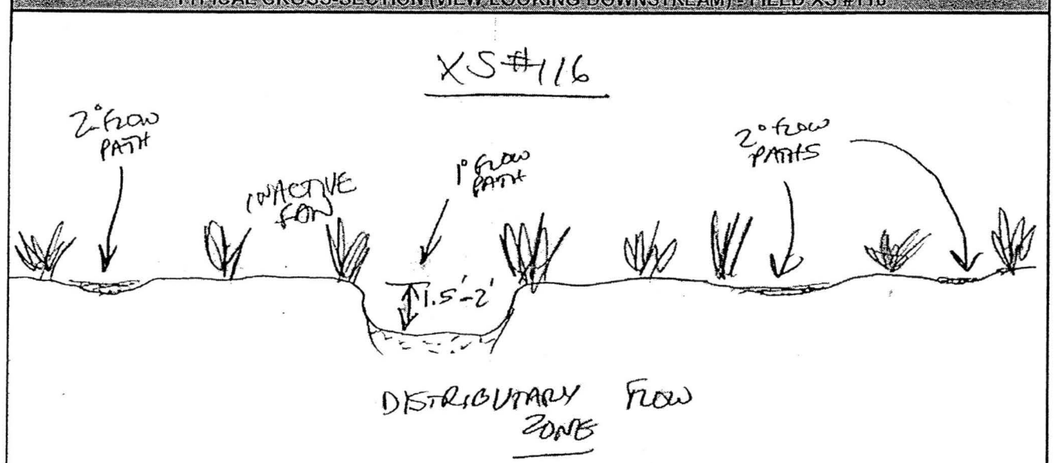
CRYPTO-BIOTIC CRUST (floodway): Absent / Spotty / Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain

NICKZONE: Caliche Present: Dimensions:

HEADCUT: Caliche Present: Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #116



Notes: Distributary flow zone.

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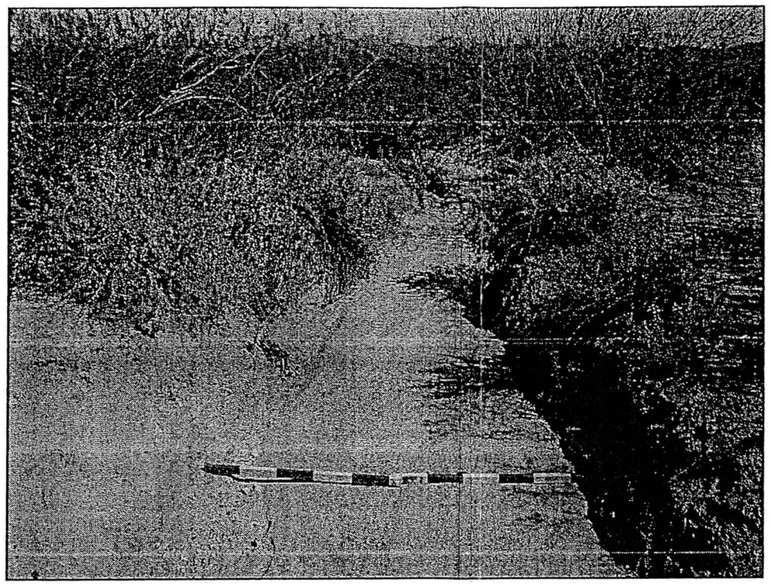
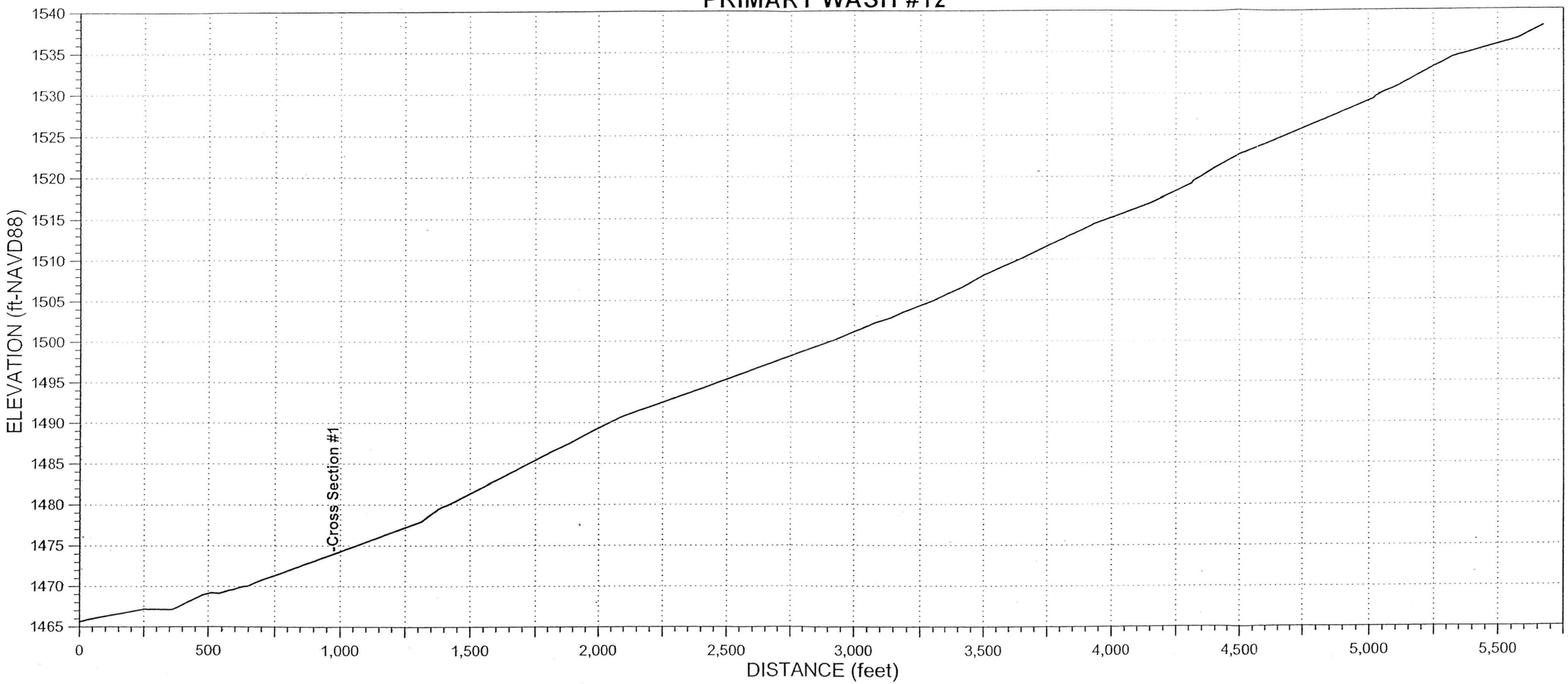


P9/19 Primary Wash #11 - Cross Section #1 – View looking upstream

PRIMARY WASH #12



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW12	1	355	March 16, 2004

North: 963103.2 m
East: 468709.6 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	1-1.5 ft	1-1.5+ ft
Right Bank	1-1.5 ft	1-1.5+ ft
Channel		

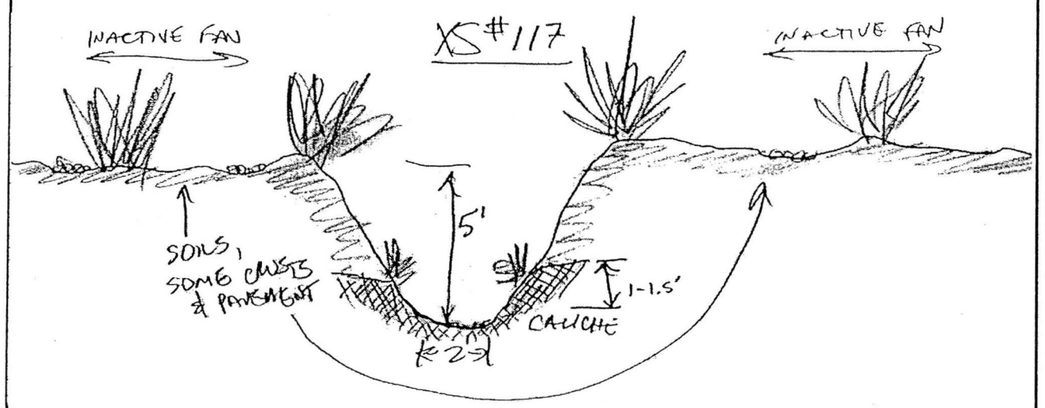
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

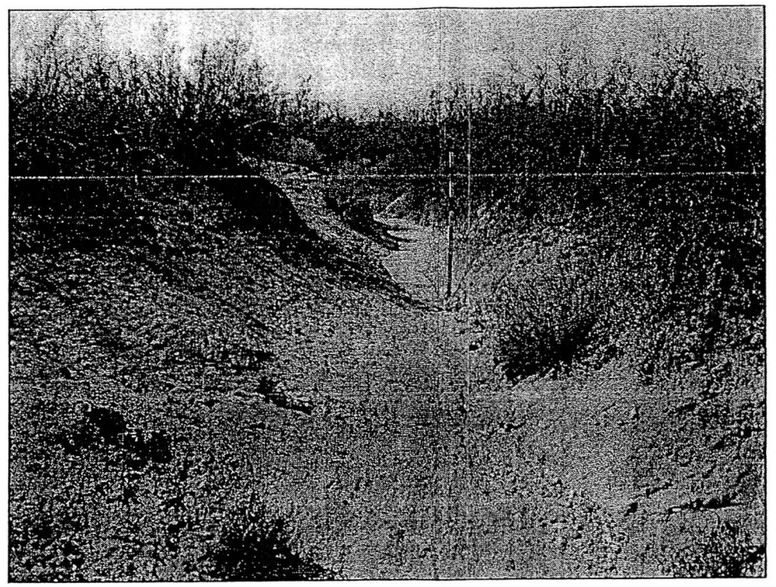
PHOTOS & DESCRIPTION:
P9/20 - View looking downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #117

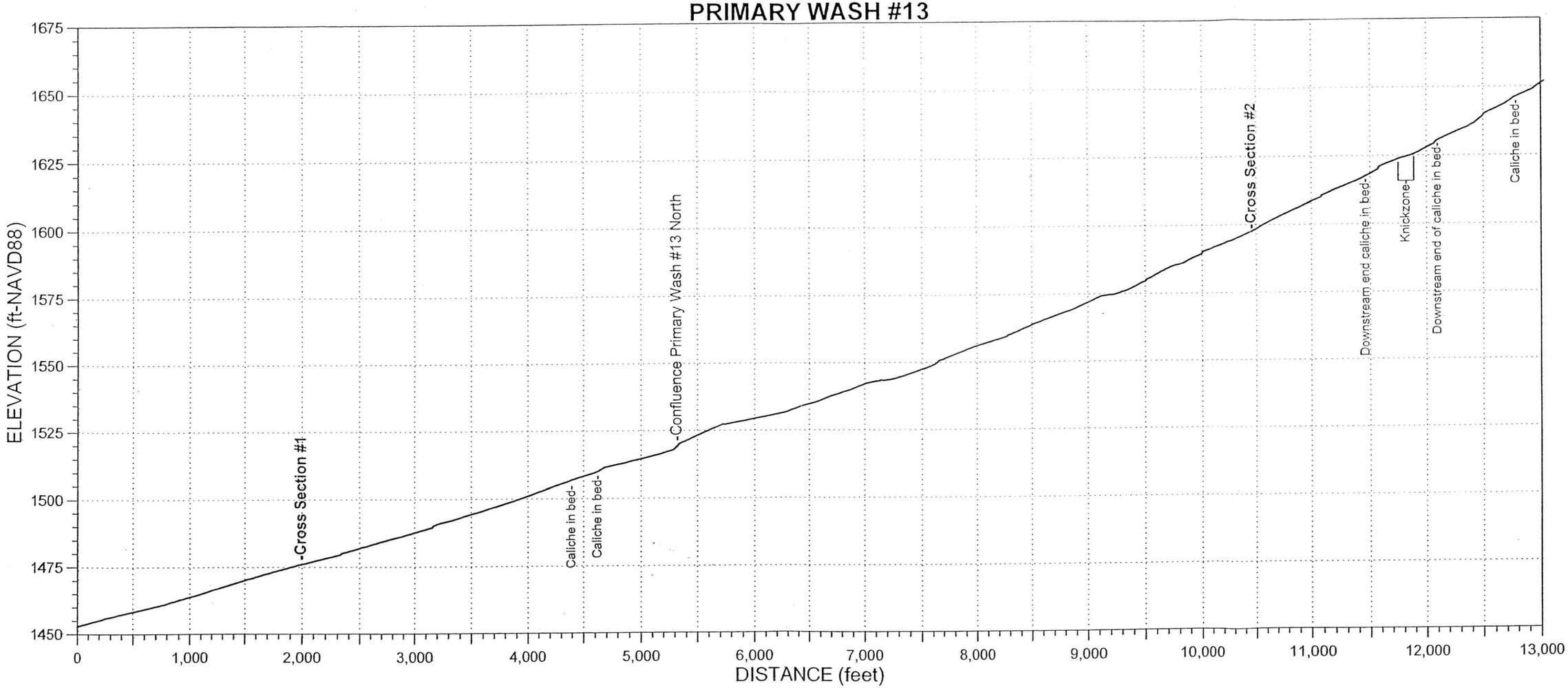


Notes:



P9/20 Primary Wash #12 - Cross Section #1 – View looking downstream

PRIMARY WASH #13



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW13	1	356	March 16, 2004

North: 961042.9 m
East: 468060.3 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank		1:1	1.5-2 ft	Sand X	Gravel X
Channel	X	Multiple	X	Right Bank		1:1	1.5-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel	in bed DS	

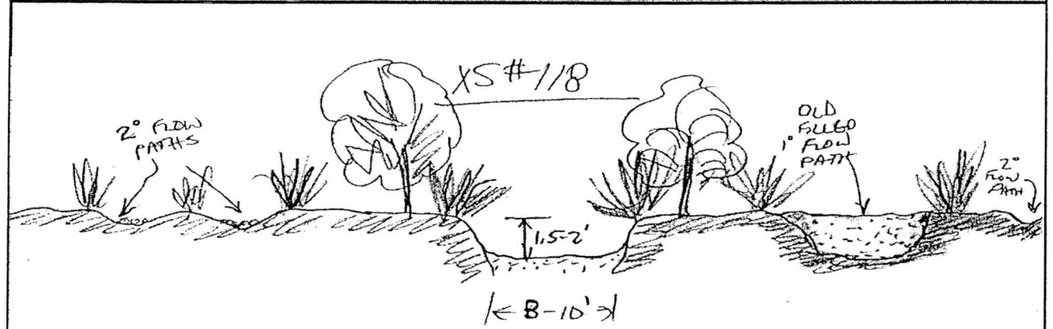
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P9/21 - View looking upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #118



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW13	2	365	March 16, 2004

North: 959388.5 m
East: 475734.4 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		>6:1	1 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		>6:1	2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

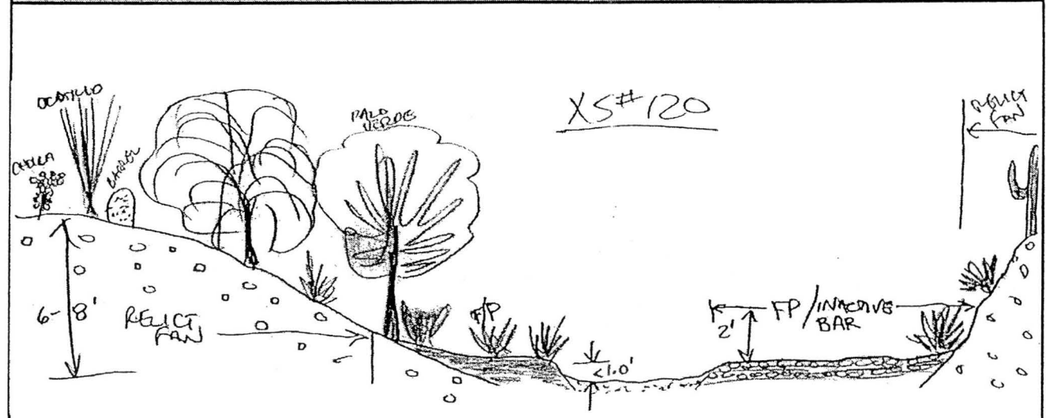
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<0.5 ft	<0.5 ft	

PHOTOS & DESCRIPTION:
P9/23 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #120



Notes:

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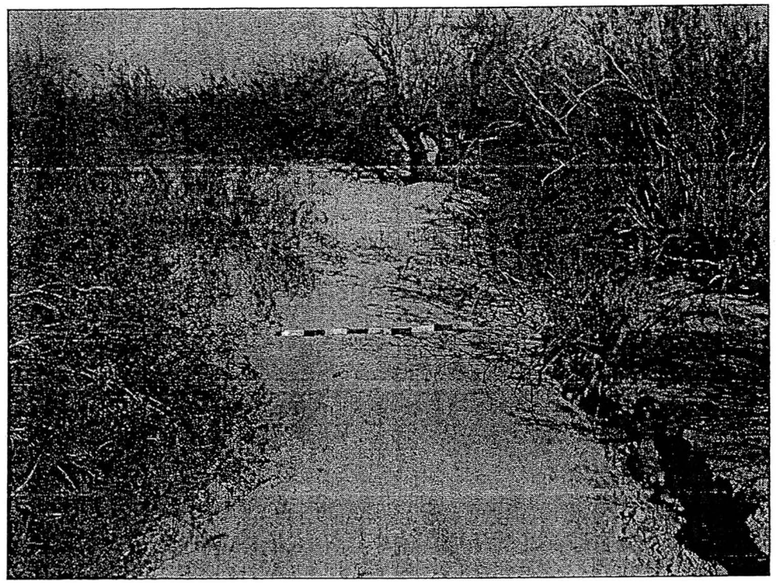
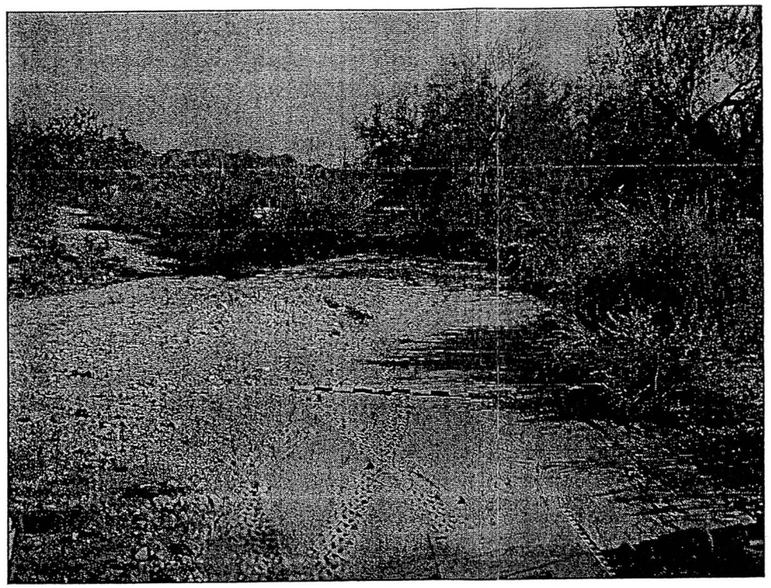
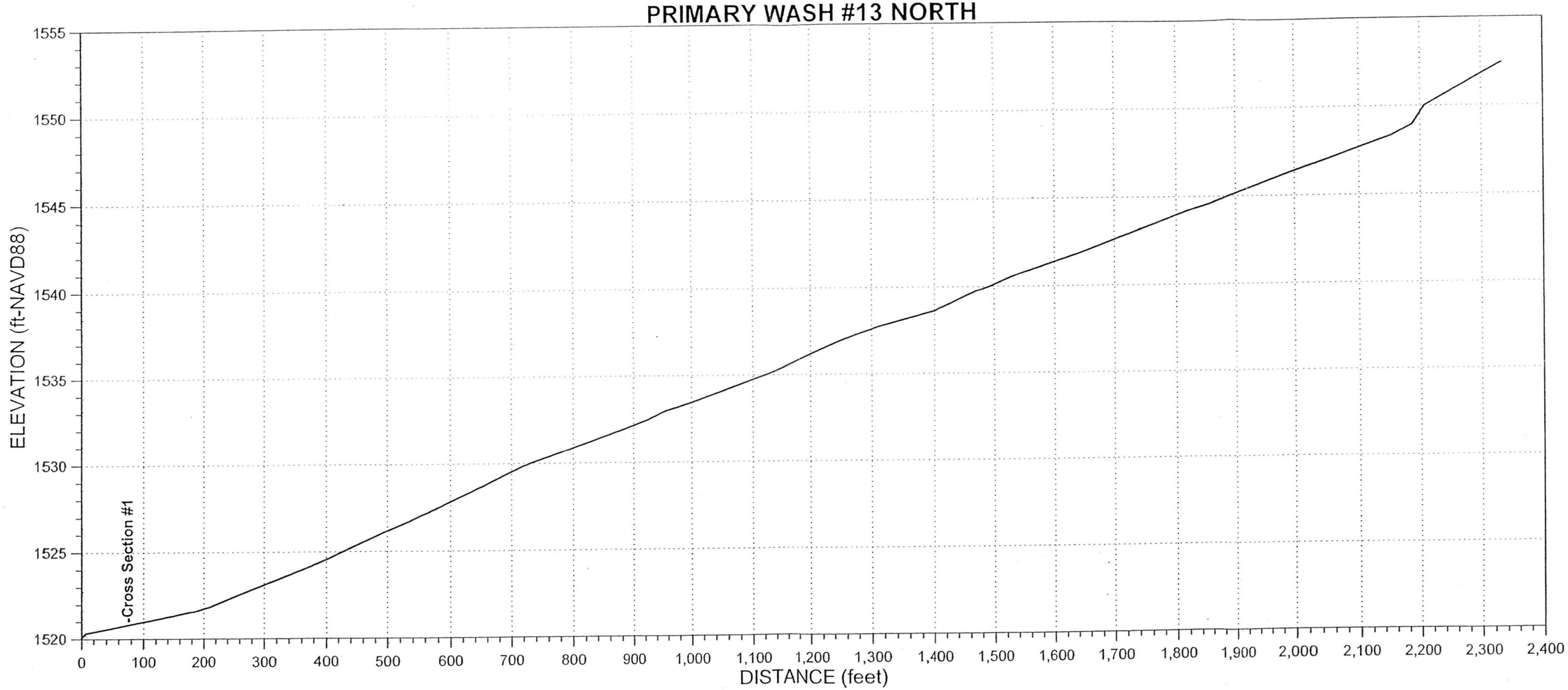


P9/21 Primary Wash #13 - Cross Section #1 – View looking upstream



P9/23 Primary Wash #13 - Cross Section #2 – View looking upstream

PRIMARY WASH #13 NORTH



AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW13North North: 960640.0 m East: 471428.8 m	1	359	March 16, 2004
		Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	3.5-4 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	3.5-4 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA		
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness
Palo Verde	X		Left Bank		
Creosote	X		Right Bank		
Brittlebush	X		Channel		
Bursage	X				
Mormon Tea					
Tamarisk					
Saguaro C.					
Cholla C.					
Barrel C.					
Prickly Pear					
X-mas C.					
Hedgehog C.					
Fishhook C.					
Ocotillo					

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

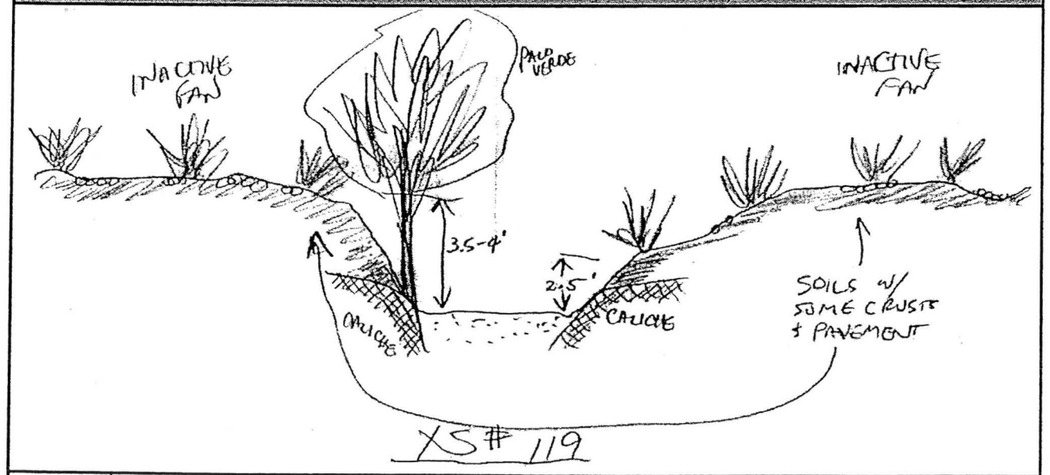
HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P9/22 - View upstream

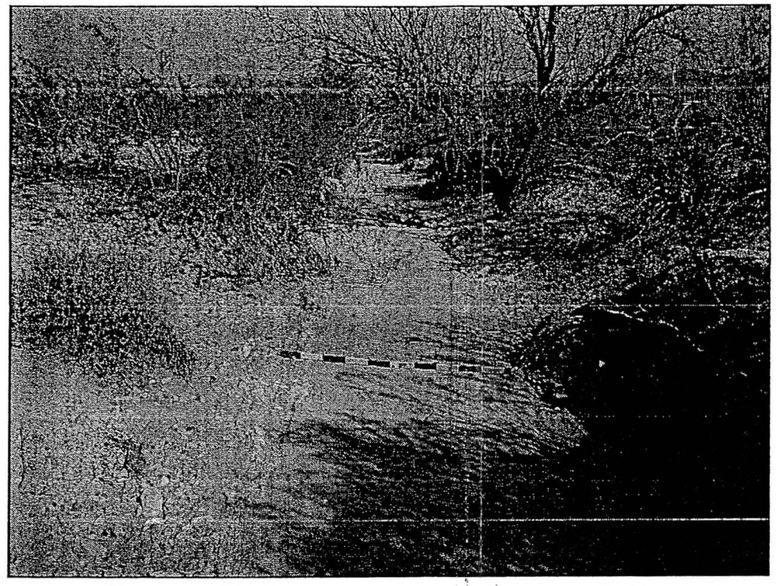
CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Absent	Caliche Present:	Caliche Present:
Spotty	Dimensions:	Dimensions:
Extensive		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #119

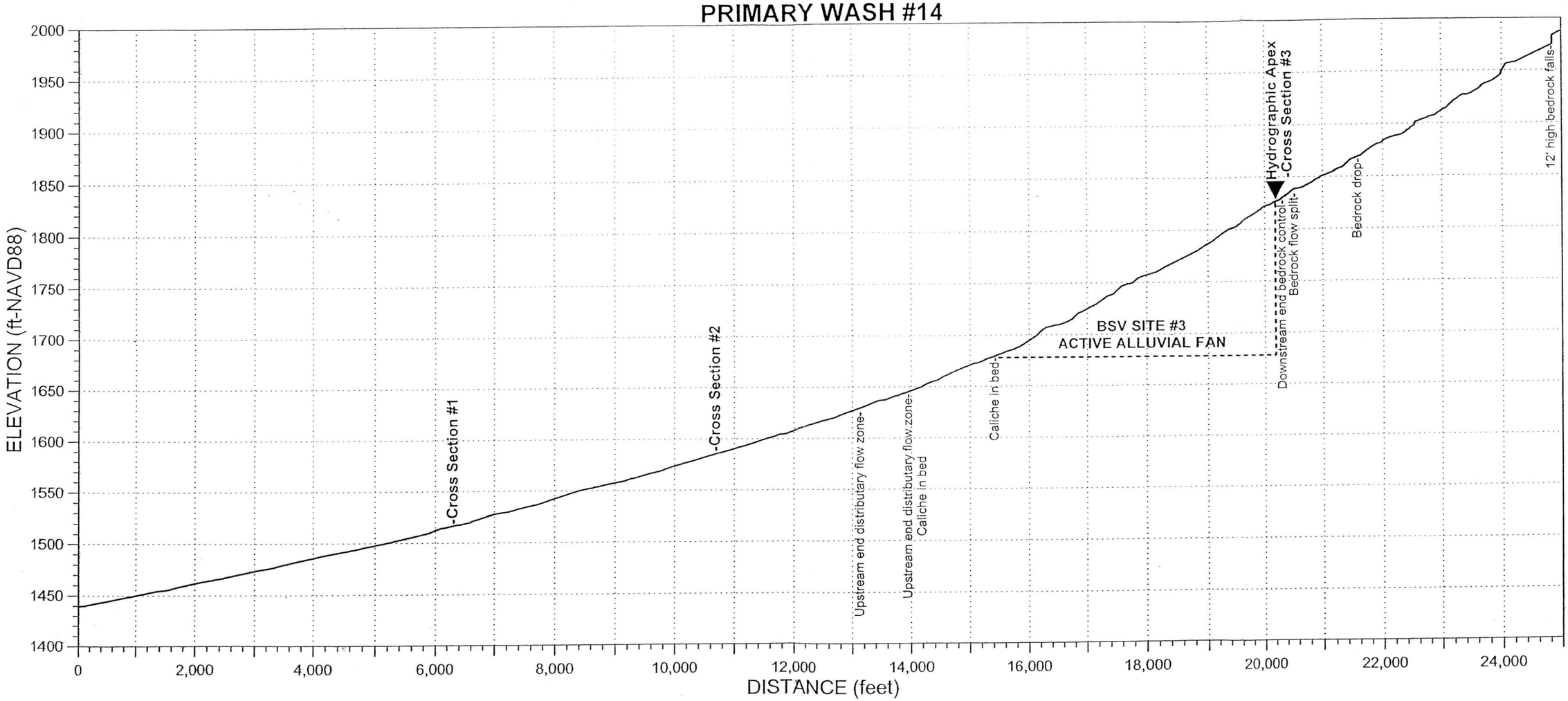


Notes:



P9/22 Primary Wash #13 North - Cross Section #1 – View looking upstream

PRIMARY WASH #14



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW14	1	333	March 16, 2004

North: 959513.6 m
East: 470667.6 m

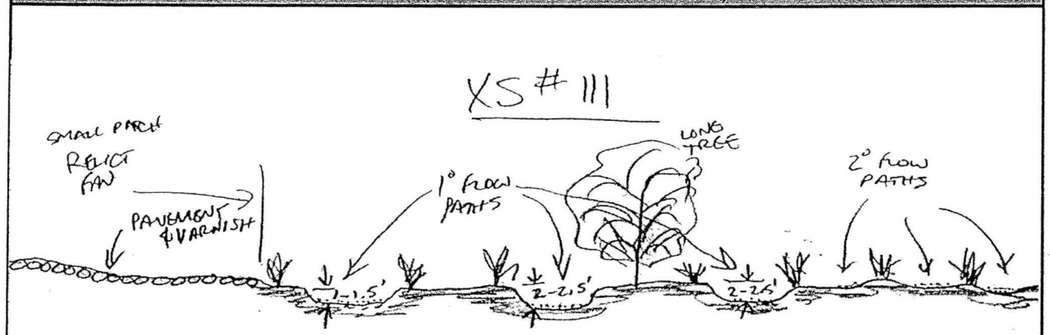
Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank		1:1	2-2.5 ft	Sand X	Gravel X
Channel		Multiple	X	Right Bank		1:1	2-2.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
							Extensive	Spotty	Absent
In-channel			Left Bank						
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde			Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel						
Brittlebush			PHOTOS & DESCRIPTION:						
Bursage			P9/7 - View downstream						
Mormon Tea									
Tamarisk									
Saguaro C.									

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #111



Notes: Channels get smaller and flow paths get more numerous in downstream direction.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW14	2	334	March 16, 2004

North: 958333.3 m
East: 474666.2 m

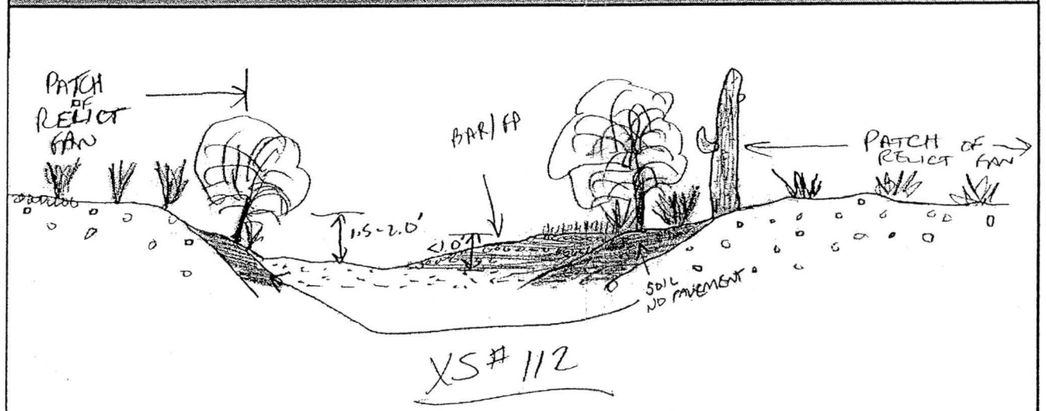
Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		>6:1	1-1.5 ft	Sand X	Gravel X
Channel		Multiple		Right Bank		>6:1	1-1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
							Extensive	Spotty	Absent
In-channel		X	Left Bank						
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils			X
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1 ft	1 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P9/8 - View downstream						
Mormon Tea	X								
Tamarisk									
Saguaro C.									

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #112



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW14 North: 956163.0 m East: 482995.8 m	3	339	March 16, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		>6:1	1.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		>6:1	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

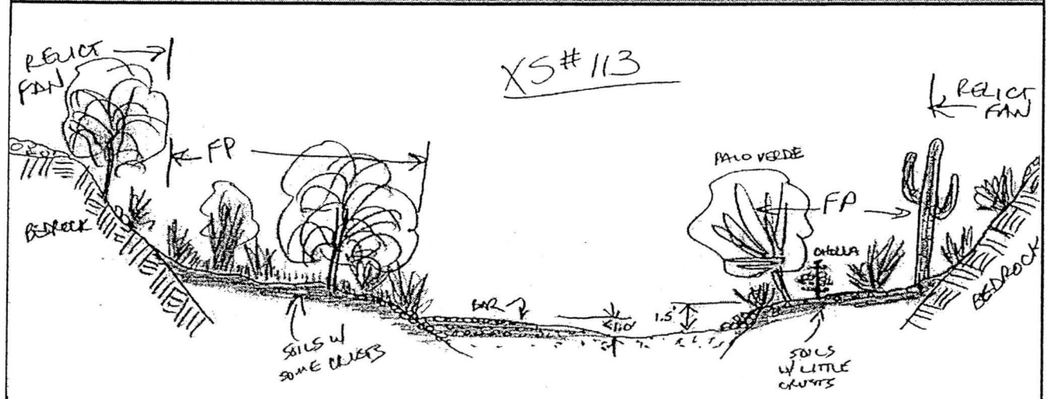
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	1 ft

PHOTOS & DESCRIPTION:
P9/9 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #113



Notes: Area and cross section is just upstream of hydrographic apex of BSV Site 3 active fan.

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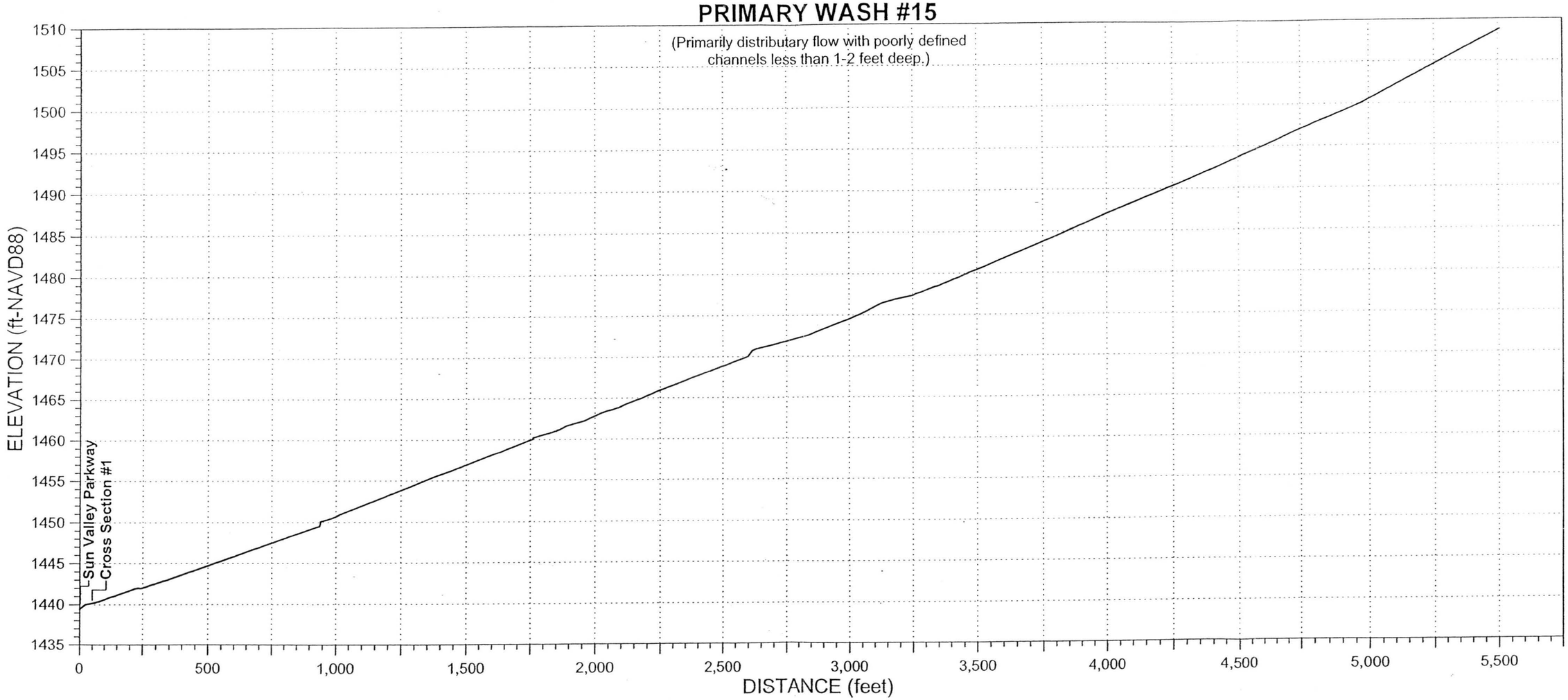
P9/7 Primary Wash #14 - Cross Section #1 – View looking downstream

P9/8 Primary Wash #14 - Cross Section #2 – View looking downstream

P9/9 Primary Wash #14 - Cross Section #3 – View looking downstream

PRIMARY WASH #15

(Primarily distributary flow with poorly defined channels less than 1-2 feet deep.)



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW15	1	NONE	March 16, 2004

North:
East:

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	
Channel		Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
	0-1.5 ft	Sand X	Gravel X
	0-1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA		
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness
			Left Bank		
Palo Verde			Right Bank		
Creosote	X		Channel		
Brittlebush			PHOTOS & DESCRIPTION:		
Bursage					
Mormon Tea					
Tamarisk					
Saguaro C.					
Cholla C.					
Barrel C.					
Prickly Pear					
X-mas C.					
Hedgehog C.					
Fishhook C.					
Ocotillo					

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

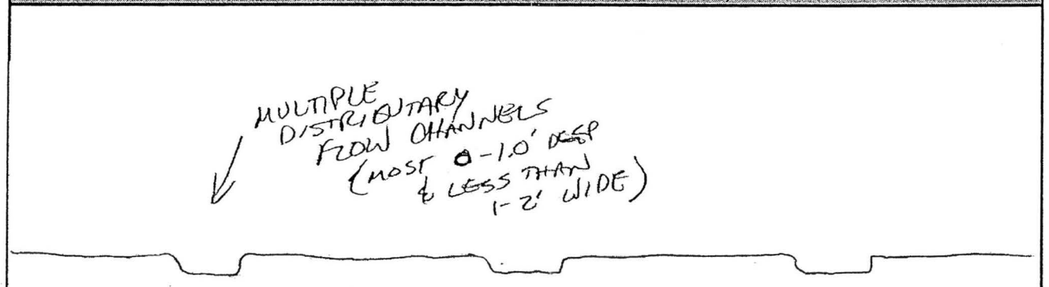
CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE: At / US / DS
Caliche Present: Yes No
Dimensions:

HEADCUT: At / US / DS
Caliche Present: Yes No
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #NA



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	DATE:	WAYPOINT:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW15	March 16, 2004	D/S Face: U/S Face: 332
		Field Crew: W.J. Spitz, A.B. Alvarado	

ROAD CROSSING - CULVERT DATA

CMP___ RCP___
RCBC_X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	959285.85	---	3	4 ft	10 ft	US: 0 ft	DS: 0 ft		U/S: 0
Easting	464526.24	---	Depth of D/S Incision: 0 ft			#		No	D/S: 0

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	No	Left bank	No			Sand__X__	Gravel__X__
Channel	No	Multiple	Yes	Right bank	No			Cobble_____	Bldrs_____

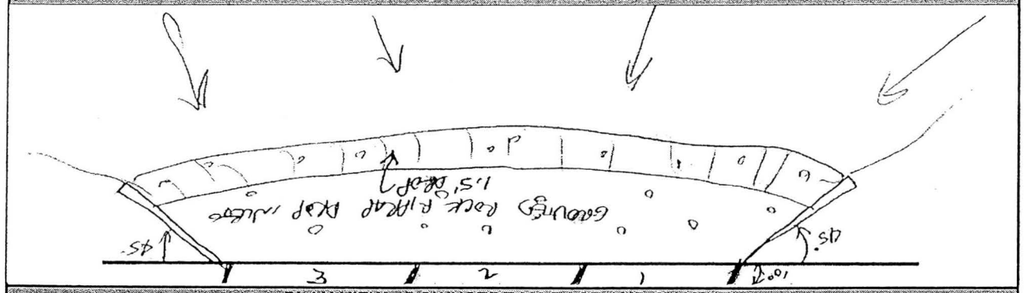
DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	No	Left bank	No			Sand__X__	Gravel__X__
Channel	No	Multiple	No	Right bank	No			Cobble_____	Bldrs_____

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel <0.5 ft	Ht. above Invert	In Barrel <0.5 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel ---	Ht. above Invert	In Barrel ---
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

PLAN VIEW - UPSTREAM FACE AND CHANNEL



PLAN VIEW - DOWNSTREAM FACE AND CHANNEL

PHOTO #		NOTES: Dominant upstream channel - mainly multiple small ones
U/S Face	9-6	View south
View U/S		
D/S Face		
View D/S		
Other		

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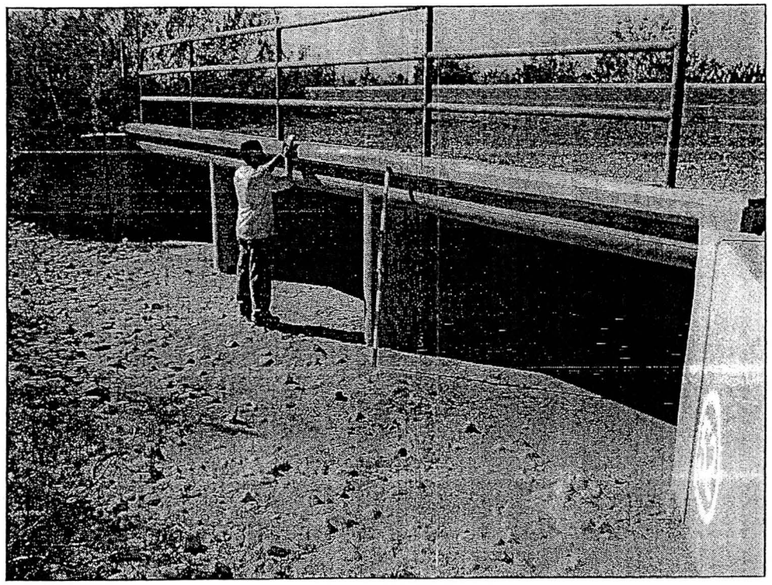
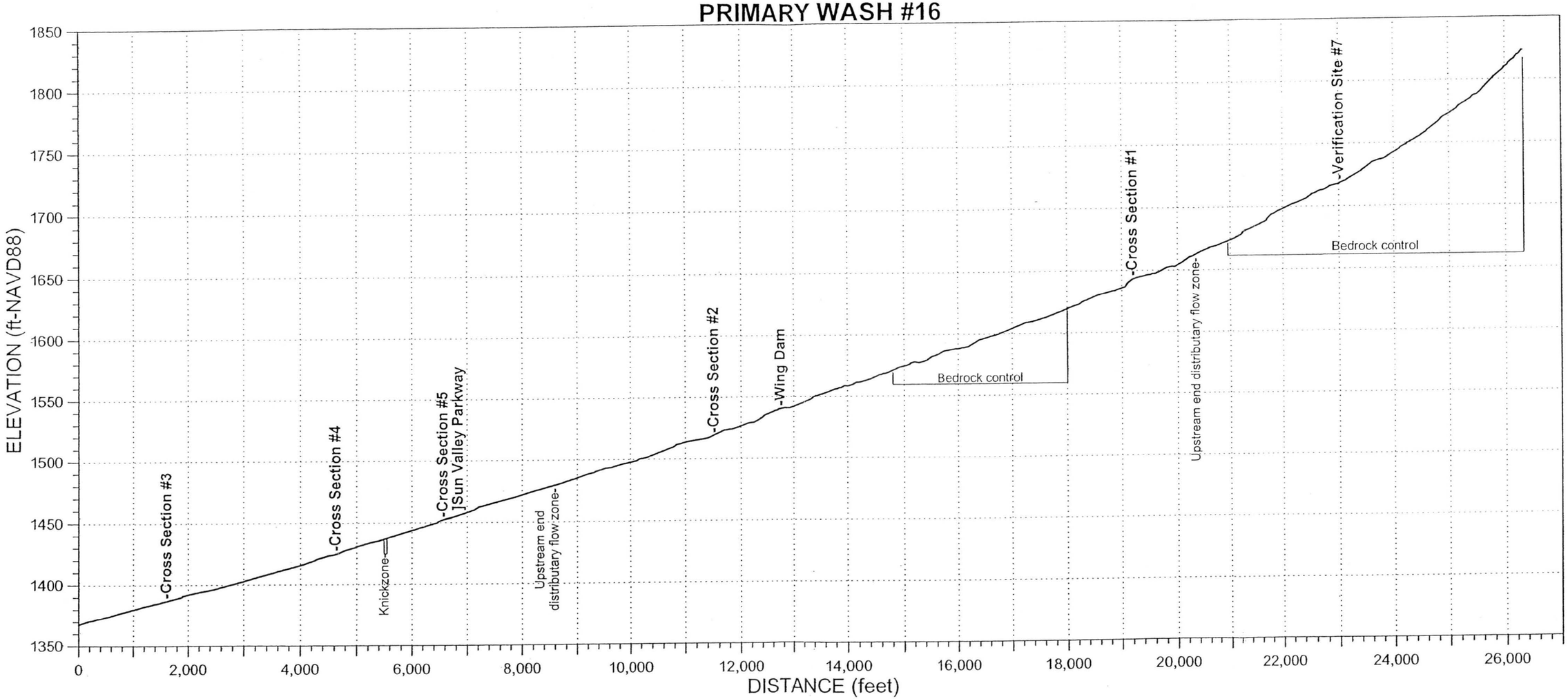


P9/6 Primary Wash #15 – Sun Valley Parkway Bridge Culvert
Upstream Face - View looking downstream

PRIMARY WASH #16



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW16	1	304	March 15, 2004

North: 953152.9 m
East: 476902.9 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	1.5 ft	Sand__X__	Gravel__X__
Channel		Multiple		Right Bank		1:1	1.5 ft	Cobble_____	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.	X	
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	X-?	
Right Bank	X-?	
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	0.5 ft	0.5 ft	

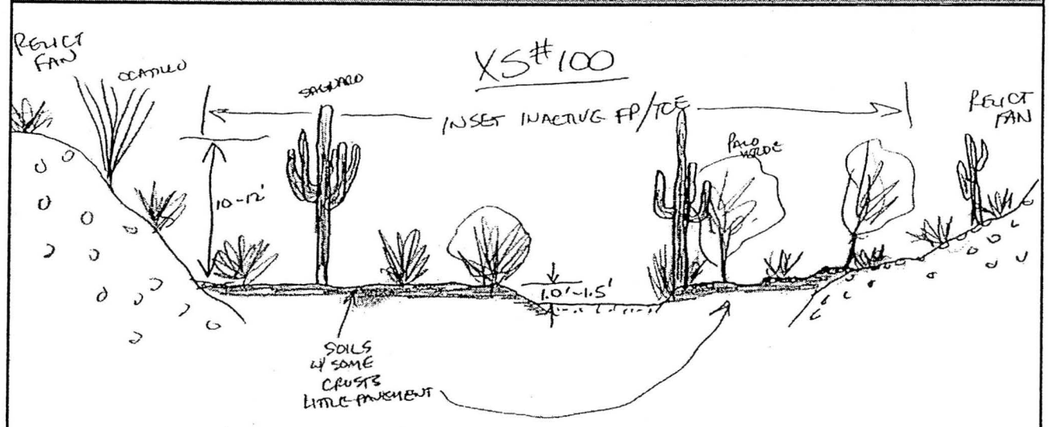
PHOTOS & DESCRIPTION:
P8/35,36 Pan - View left to right bank looking upstreamshowing cross section.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

Absent
Spotty
Extensive

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #100



Notes: Stock tank and ring dike located on channel about 1/4 miles downstream.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW16	2	308	March 15, 2004

North: 952152.0 m
East: 469996.5 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		>6:1	1 ft	Sand__X__	Gravel__X__
Channel		Multiple		Right Bank		>6:1	1 ft	Cobble_____	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X		Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde	X	
Creosote	X	
Brittlebush		
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

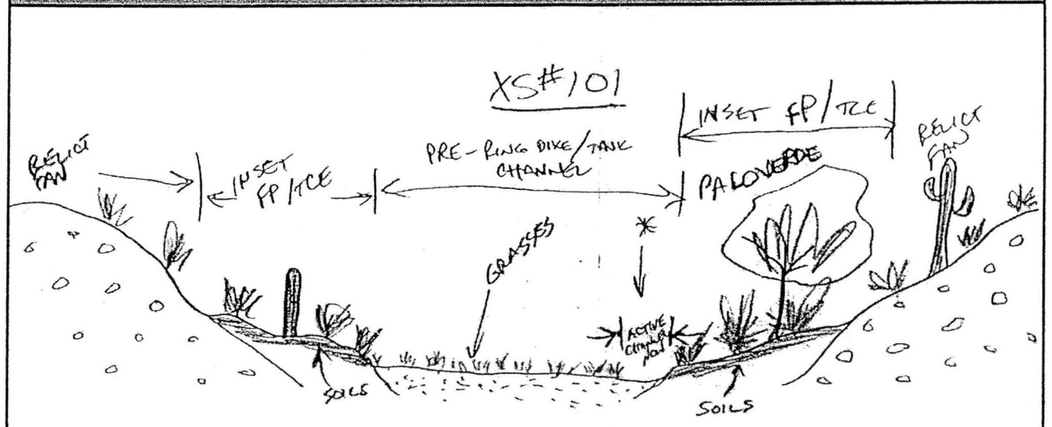
PHOTOS & DESCRIPTION:
P8/42 - View upstream, note green grassed channel below

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

Absent
Spotty
Extensive

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #101



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW16	5	331	March 16, 2004

North: 950796.8 m
East: 465407.7 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		3:1	2.5-3 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	2.5-3 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde		
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

TERRACES (height-ft)		
Left Bank		
Right Bank		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	1 ft	1+ ft
Right Bank	1 ft	1+ ft
Channel	bed	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

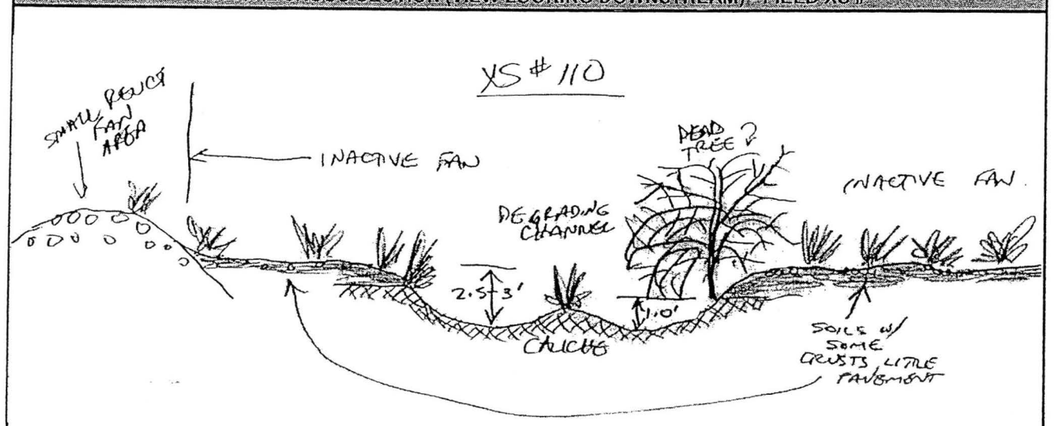
PHOTOS & DESCRIPTION:
P9/5 - View upstream, note degradation in caliche bed and culvert upstream.

CRYPTO-BIOTIC CRUST (floodway)

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

	NICKZONE:	HEADCUT:
Absent	Caliche Present:	Caliche Present:
Spotty	Dimensions:	Dimensions:
Extensive		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	DATE:	WAYPOINT:
PW16	March 15, 2004	D/S Face: 311 U/S Face: 310

Field Crew: W.J. Spitz, A.B. Alvarado

ROAD CROSSING - CULVERT DATA

CMP____ RCP____ RCBC X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	950917.44	950895.41	7	4=3', 3=5'	4=10',3=12'	US:1.75 ft	DS: 1.2 ft		U/S: 0
Easting	465709.17	465575.12	Depth of D/S Incision: 0 ft			# 3 & 7	# 2	No	D/S: 0

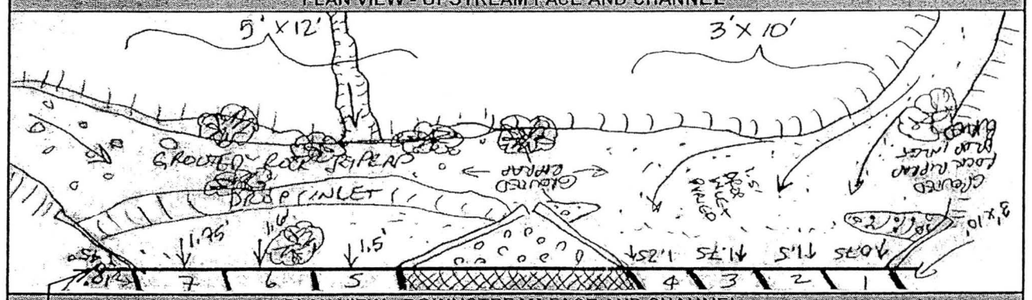
UPSTREAM CHANNEL									
ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	No	Left bank	No			Sand X	Gravel X
Channel	No	Multiple	Yes	Right bank	No			Cobble X	Bldrs

DOWNSTREAM CHANNEL									
ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	Yes	Left bank	No		var.	Sand X	Gravel X
Channel	No	Multiple	No	Right bank	No		var.	Cobble	Bldrs

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel 0.5 ft	Ht. above Invert	In Barrel 0.5 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel 1.0 ft	Ht. above Invert	In Barrel 1.0 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

PLAN VIEW - UPSTREAM FACE AND CHANNEL



PLAN VIEW - DOWNSTREAM FACE AND CHANNEL

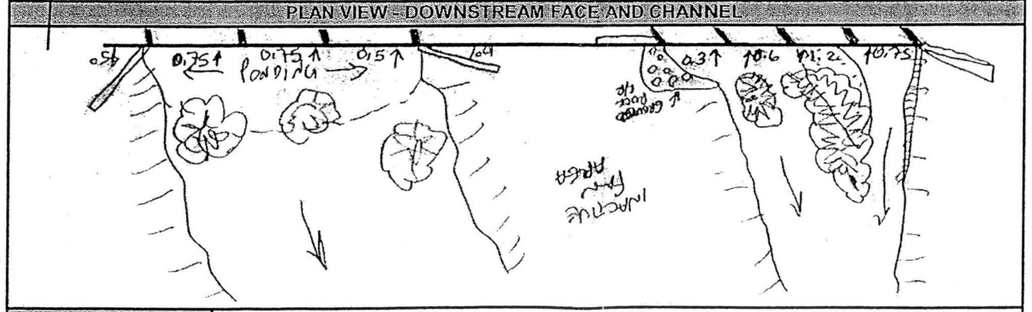


PHOTO #		NOTES:
U/S Face	8-43,45	Left bank side looking north; looking south on right bank side
View U/S	8-44,46	Upstream at degrading left bank channel; upstream at right bank channel
D/S Face	8-48,49	Looking south on left bank side; looking north on right bank side
View D/S	8-47	Downstream at right bank side
Other		

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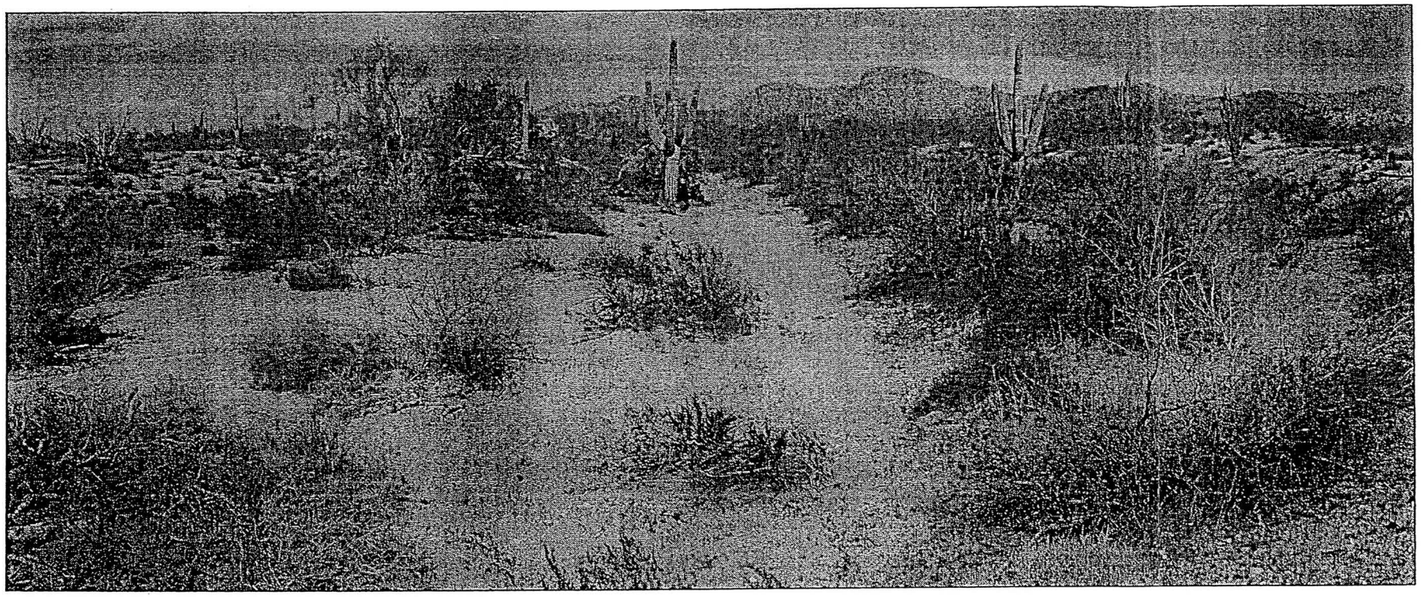
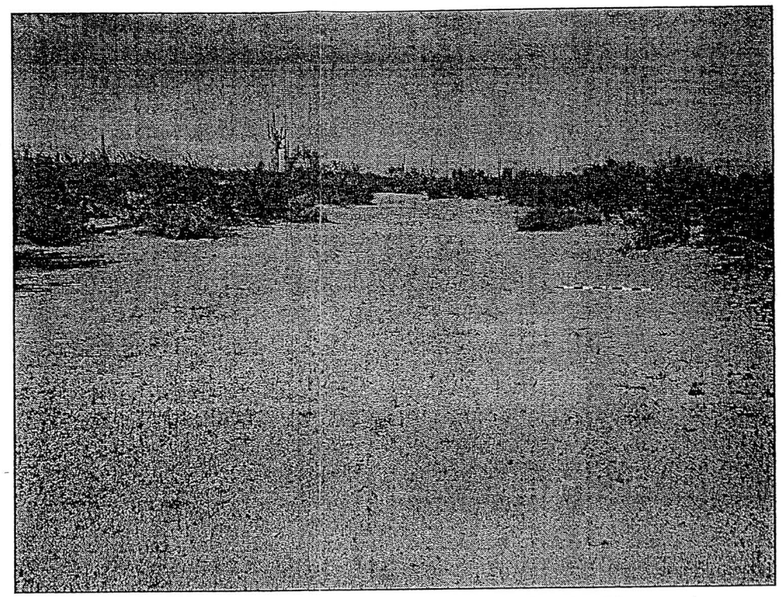
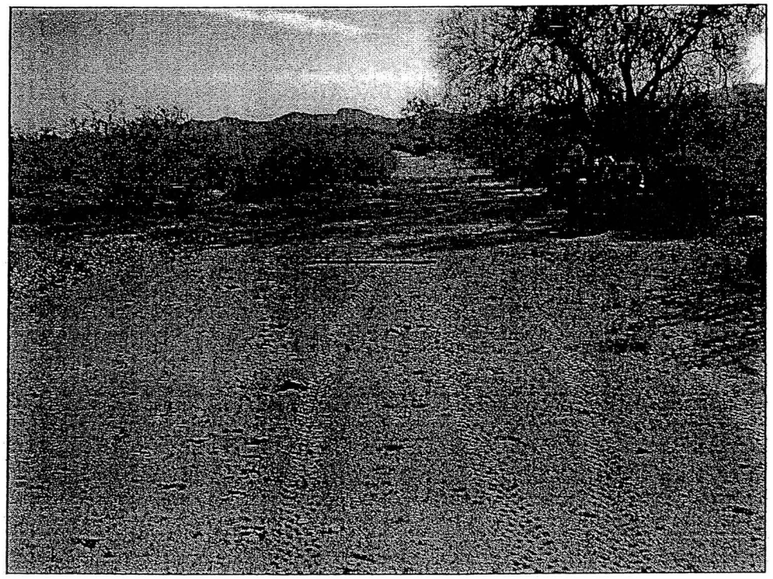


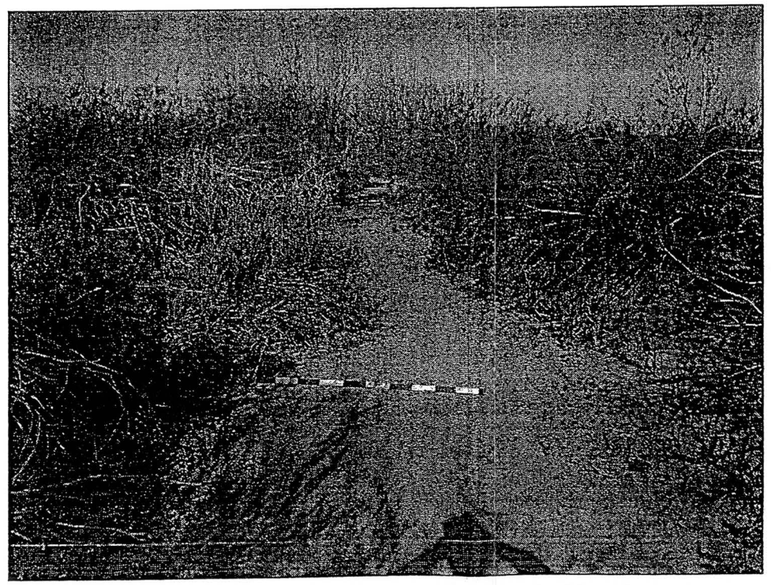
P8/35-36 Primary Wash #16 - Cross Section #1 – Panorama view looking upstream



P8/42 Primary Wash #16 - Cross Section #2 – View looking upstream

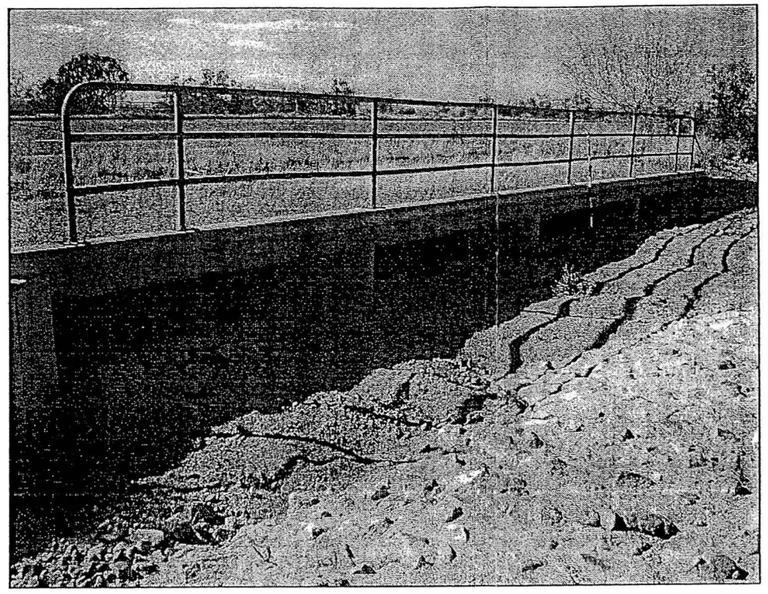


P9/3 Primary Wash #16 - Cross Section #3 – View looking upstream

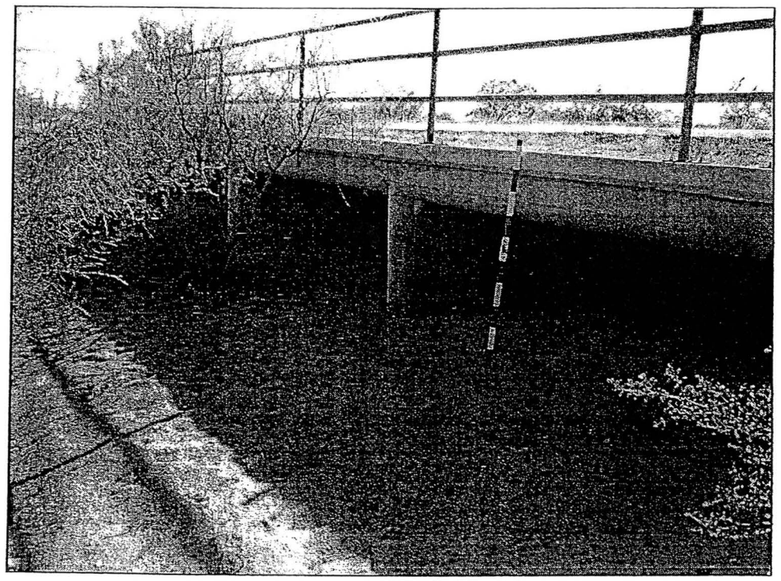


P9/4 Primary Wash #16 - Cross Section #4 – View looking downstream

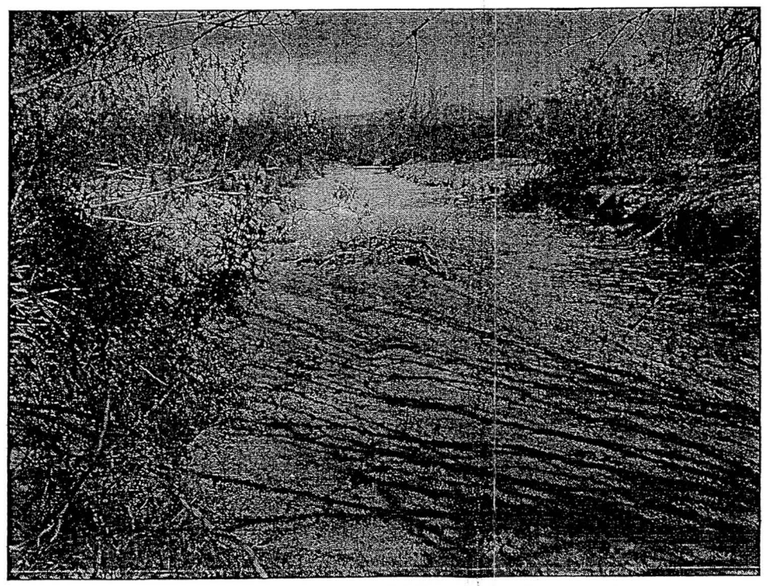
P9/5 Primary Wash #16 - Cross Section #5 – View looking upstream



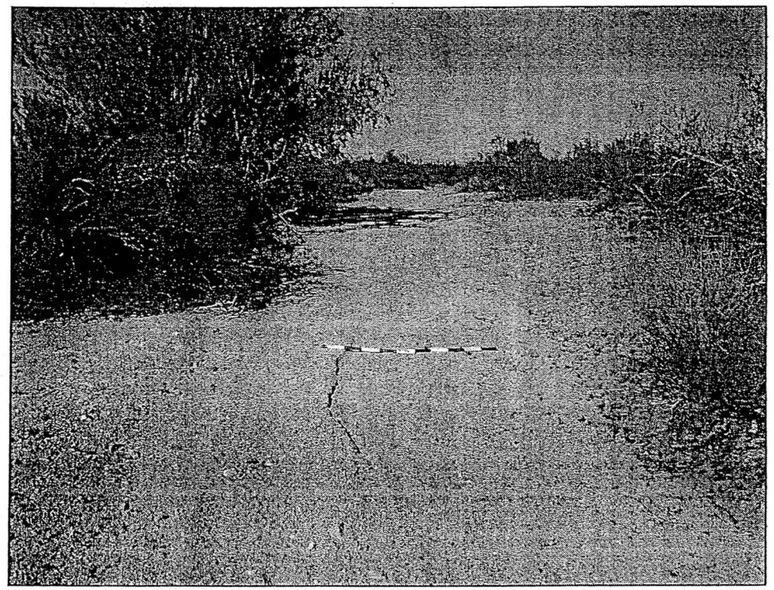
P8/43 Primary Wash #16 – Sun Valley Parkway Bridge Culvert
Looking north at upstream face of left channel bridge



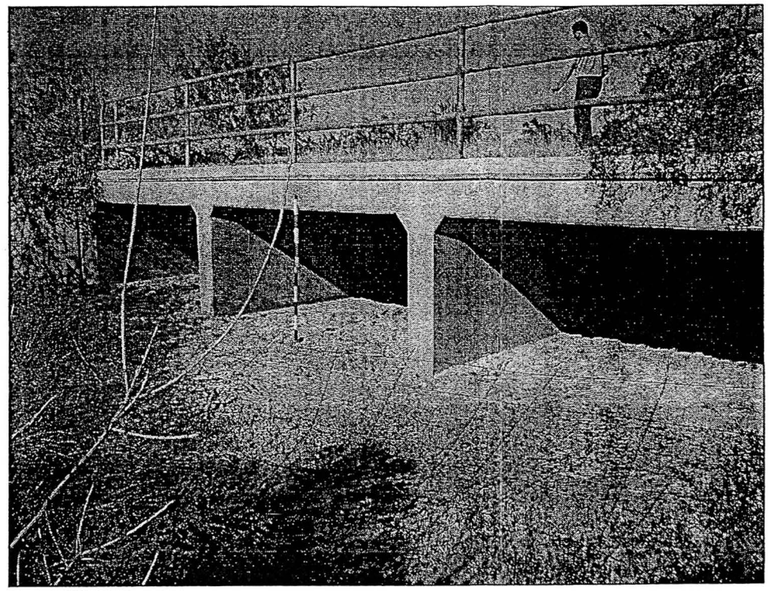
P8/45 Primary Wash #16 – Sun Valley Parkway Bridge Culvert
Looking south at upstream face of right channel bridge



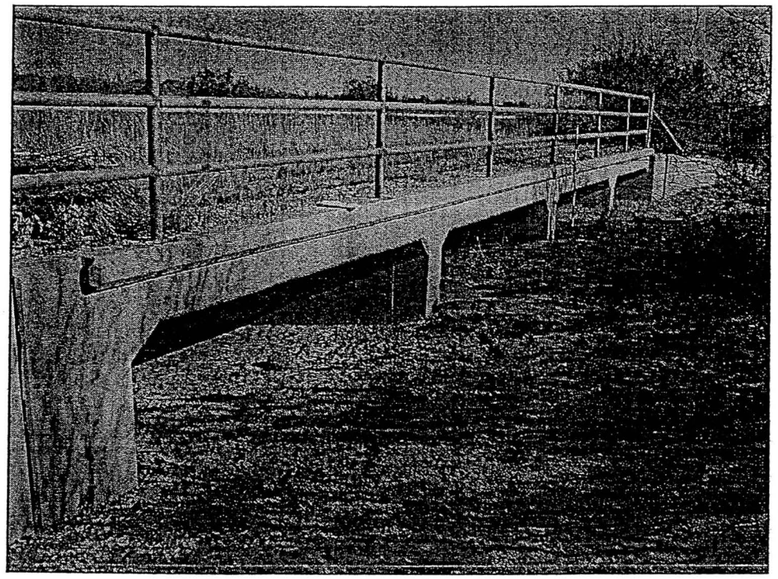
P8/44 Primary Wash #16 – Sun Valley Parkway Bridge Culvert
Looking upstream at upstream left (south) channel



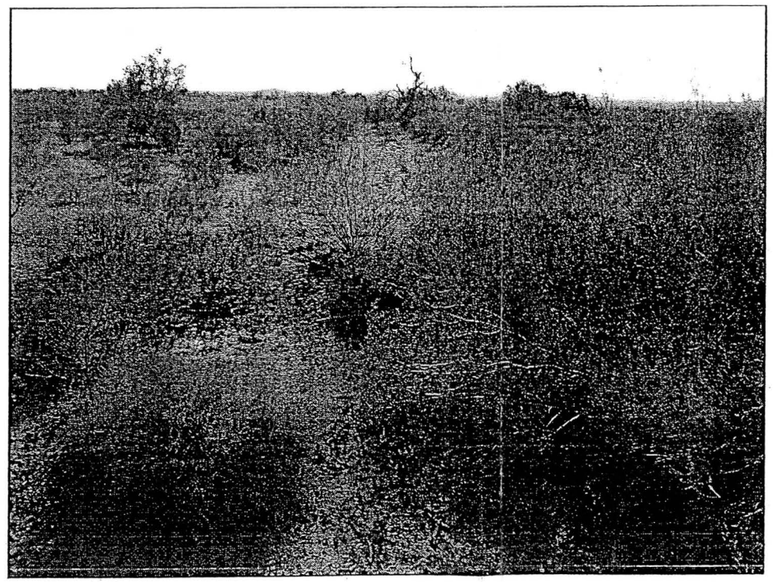
P8/46 Primary Wash #16 – Sun Valley Parkway Bridge Culvert
Looking upstream at upstream right (north) channel



P8/49 Primary Wash #16 – Sun Valley Parkway Bridge Culvert
Looking north at downstream face of right (north) channel bridge

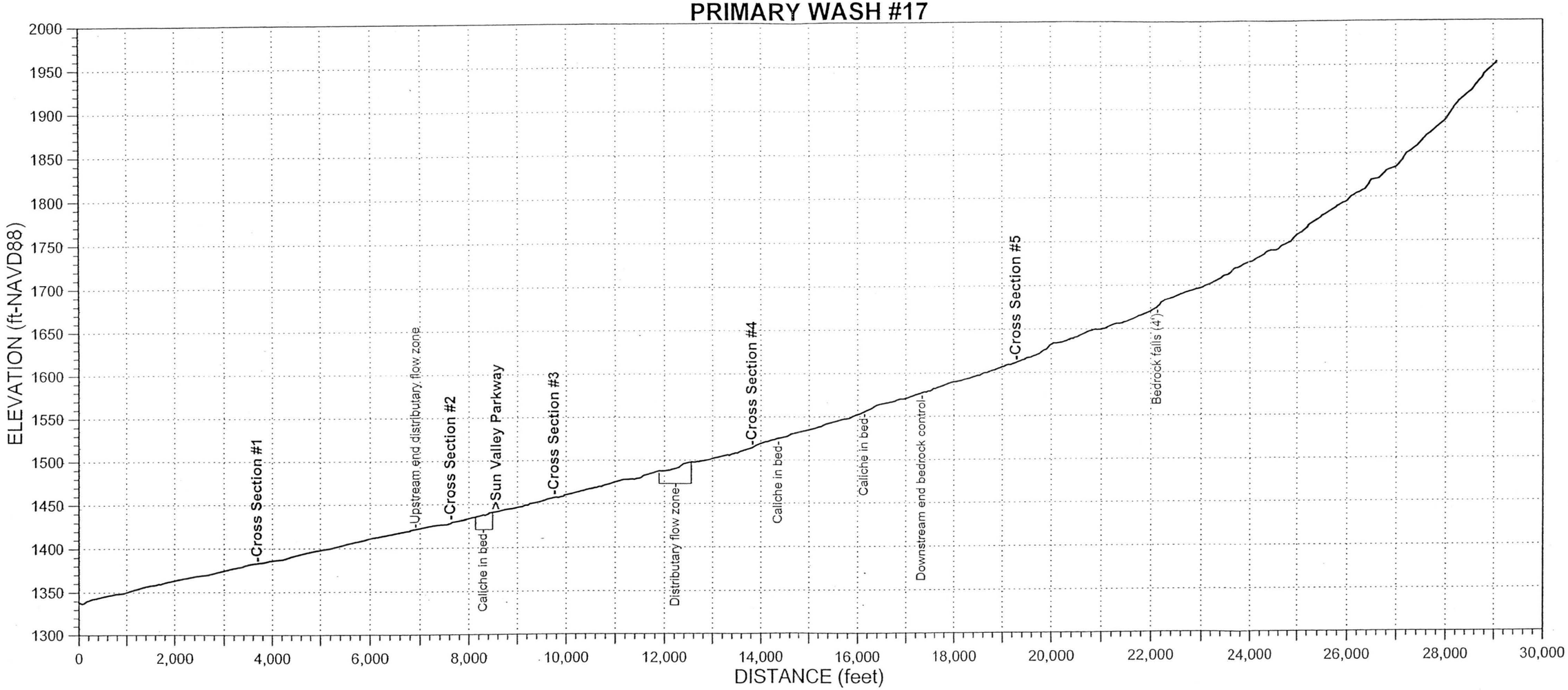


P8/48 Primary Wash #16 – Sun Valley Parkway Bridge Culvert
Looking south at downstream face of left (south) channel bridge



P8/47 Primary Wash #16 – Sun Valley Parkway Bridge Culvert
Looking downstream at downstream right (north) channel

PRIMARY WASH #17



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW17	1	326	March 16, 2004

North: 946929.2 m
East: 461081.3 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	
Channel	X	Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
1:1	3-3.5 ft	Sand X	Gravel X
6:1	2.5-3 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P9/2 - View downstream showing major flow split

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

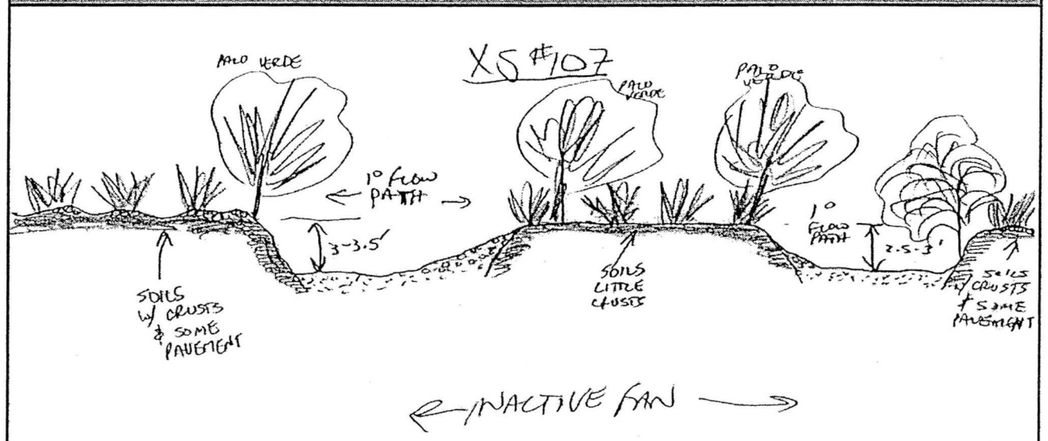
PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #107



Notes: Large flow split just downstream of cross section.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW17	2	324	March 16, 2004

North: 945637.8 m
East: 464739.9 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
>6:1	3-3.5 ft	Sand X	Gravel X
1:1	3-3.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		X
Marginal	X	

TERRACES (height-ft)		
Left Bank	3-3.5 ft	
Right Bank	3-3.5 ft	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P9/1 - View looking downstream

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

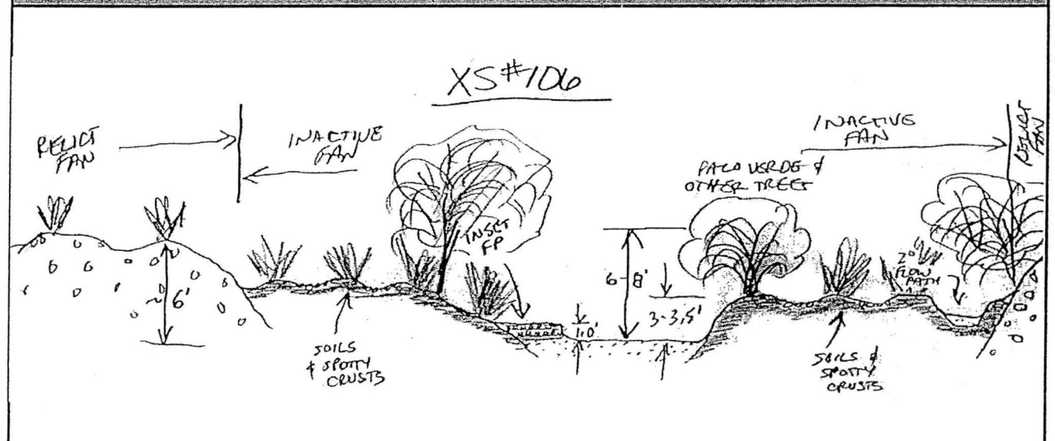
PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #106



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW17	3	289	March 15, 2004

North: 946359.8 ft
East: 466562.2 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS	
Floodway	X	Single	X
Channel		Multiple	

BANKS	Erosion
Left Bank	
Right Bank	

H:V	Height	BED MATERIAL	
1:1	2-4 ft	Sand X	Gravel X
1:1	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		X
Marginal	X	

TERRACES (height-ft)		
Left Bank	2-3 ft	
Right Bank	2-3 ft	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	1.5-2 ft	1.5-2+ ft
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P8/25 - View upstream

CRYPTO-BIOTIC CRUST (floodway):
Absent
Spotty
Extensive

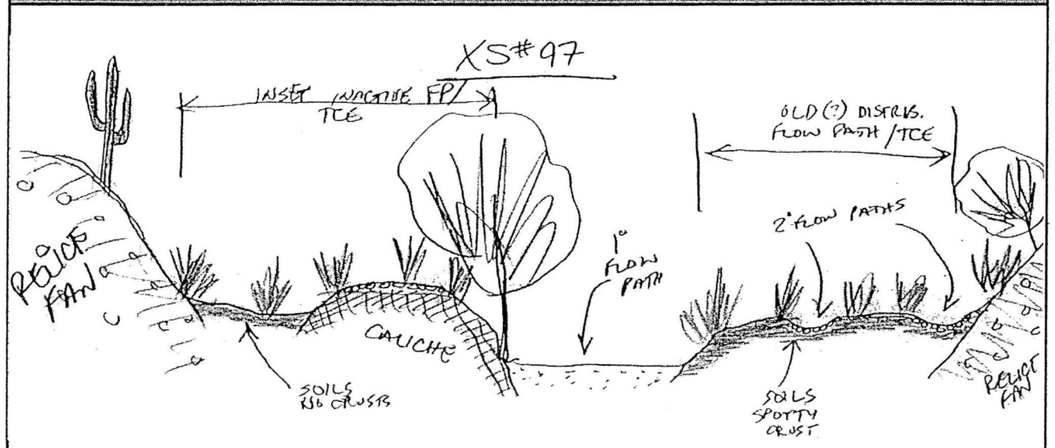
PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #97



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW17	4	292	March 15, 2004

North: 947112.1 ft
East: 470292.4 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS	
Floodway	X	Single	X
Channel		Multiple	

BANKS	Erosion
Left Bank	
Right Bank	

H:V	Height	BED MATERIAL	
1:1	1.5-2 ft	Sand X	Gravel X
1:1	1 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel	X	X
Marginal	X	

TERRACES (height-ft)		
Left Bank	1.5 ft	
Right Bank	1.5 ft	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank	X-?	?
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P8/26 - View looking upstream, note low flow debris lines on sides of channel

CRYPTO-BIOTIC CRUST (floodway):
Absent
Spotty
Extensive

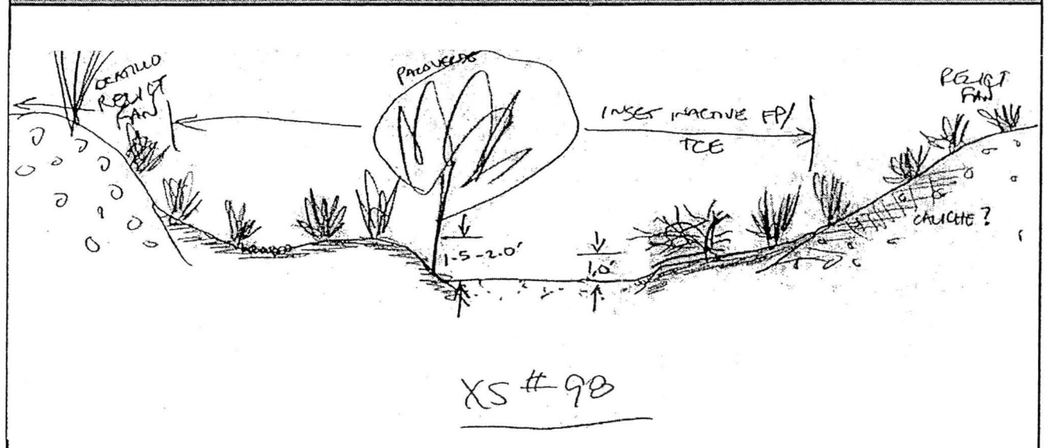
PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #98



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW17	5	296	March 15, 2004

North: 947011.4 ft
East: 475371.4 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		>6:1	1 ft	Sand X	Gravel X
Channel		Multiple		Right Bank		vertical	>18 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank	1.5 ft	
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.	X	
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo	X	

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY:			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils		X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	0.5 ft	1 ft	

PHOTOS & DESCRIPTION:
P8/27 - View upstream

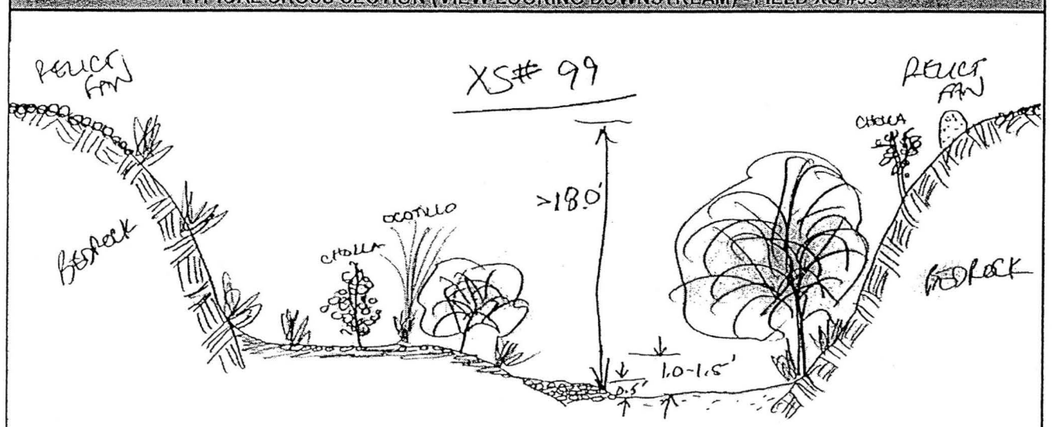
CRYPTO-BIOTIC CRUST (floodway):
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment?	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment?	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #99



Notes: Banks composed of pediment bedrock overlain by thin veneer of relict fan deposits.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	DATE:	WAYPOINT:
PW17	March 15, 2004	D/S Face: 287 U/S Face: 288

Field Crew: W.J. Spitz, A.B. Alvarado

ROAD CROSSING - CULVERT DATA

CMP ___ RCP ___ RCBC X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	945768.69	945681.69	3	6 ft	12 ft	US: 0.2 ft	DS: 0.2 ft		U/S: 0
Easting	465668.42	465521.17	Depth of D/S Incision: 2.5 ft			# 1	# 1	No	D/S: 0

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	No	>6:1	1-2 ft	Sand X	Gravel X
Channel	No	Multiple	No	Right bank	No	>6:1	1-2 ft	Cobble	Bldrs

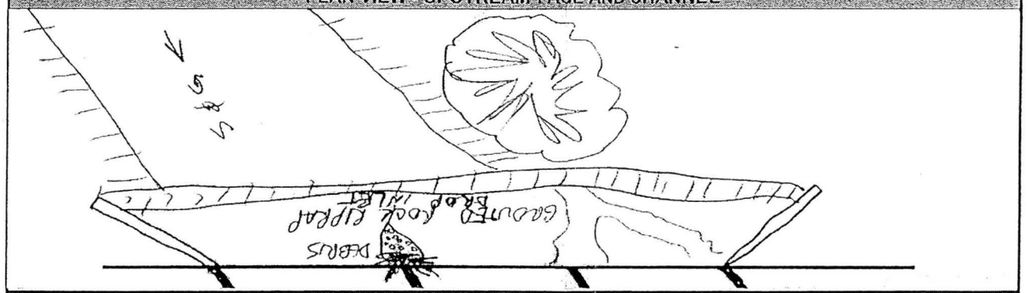
DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	Yes	1:1	2.5-3 ft	Sand X	Gravel X
Channel	Yes	Multiple	No	Right bank	Yes	1:1	2.5-3 ft	Cobble	Bldrs

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain		<1 ft		<1 ft

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain		0.5 ft		0.5 ft

PLAN VIEW - UPSTREAM FACE AND CHANNEL



PLAN VIEW - DOWNSTREAM FACE AND CHANNEL

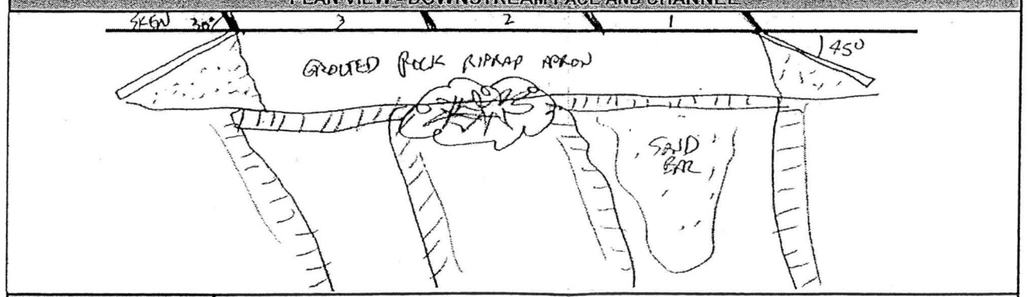


PHOTO #		NOTES:
U/S Face	8-23	
View U/S	8-24	
D/S Face	8-22	Note undermining and degradation
View D/S	8-21	View downstream showing incising channel
Other		

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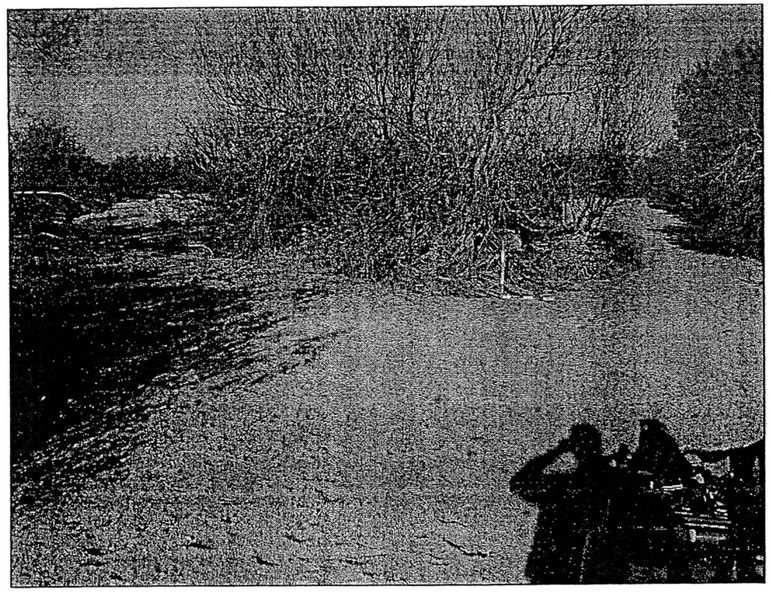
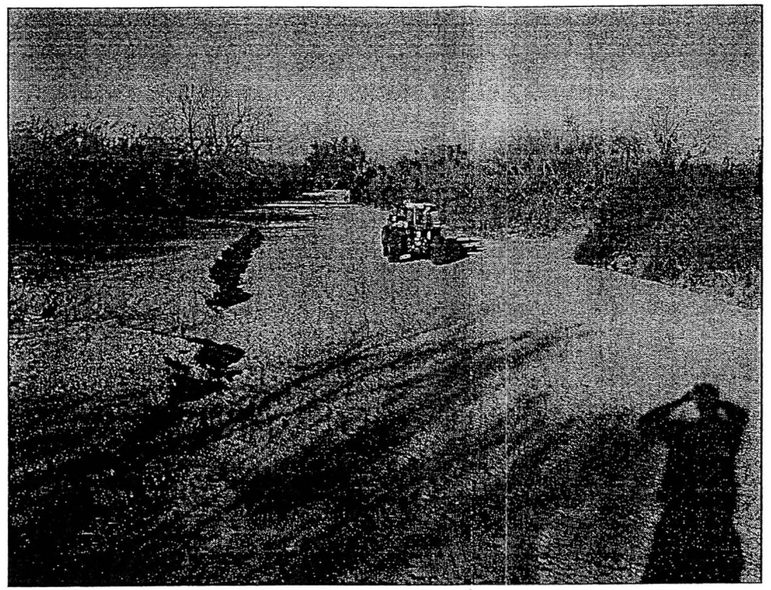
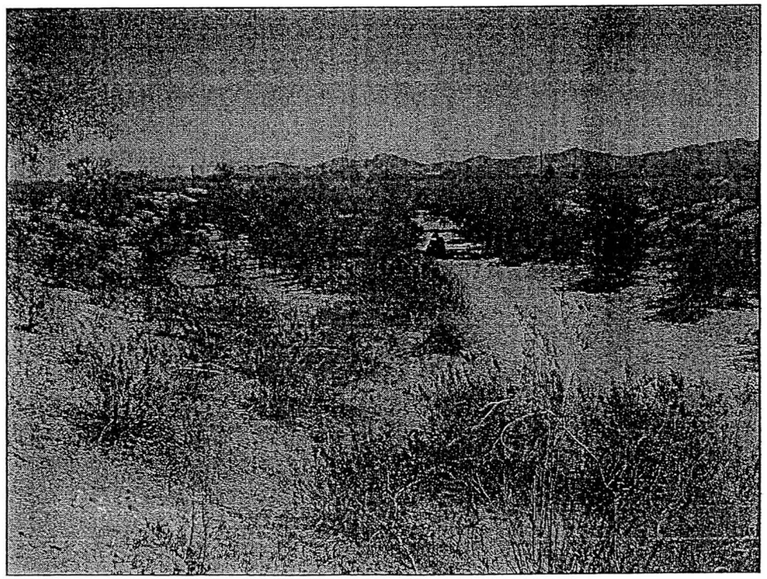


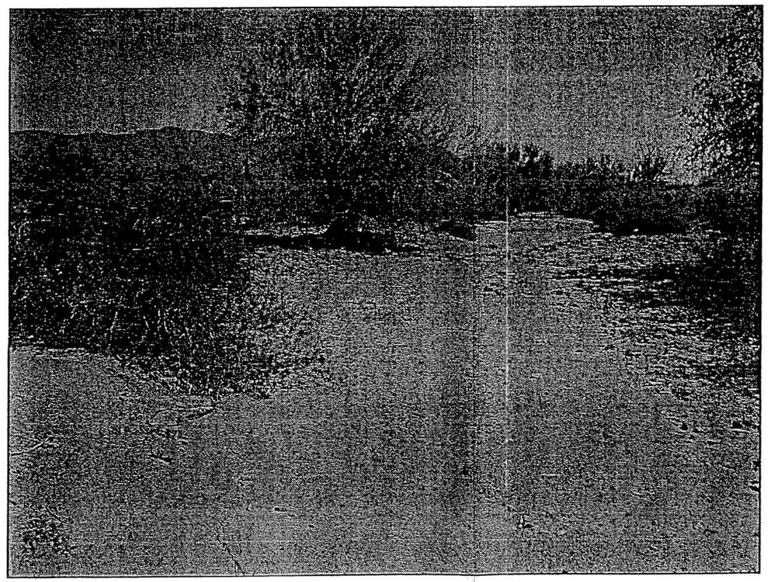
P9/2 Primary Wash #17 - Cross Section #1 – View looking downstream



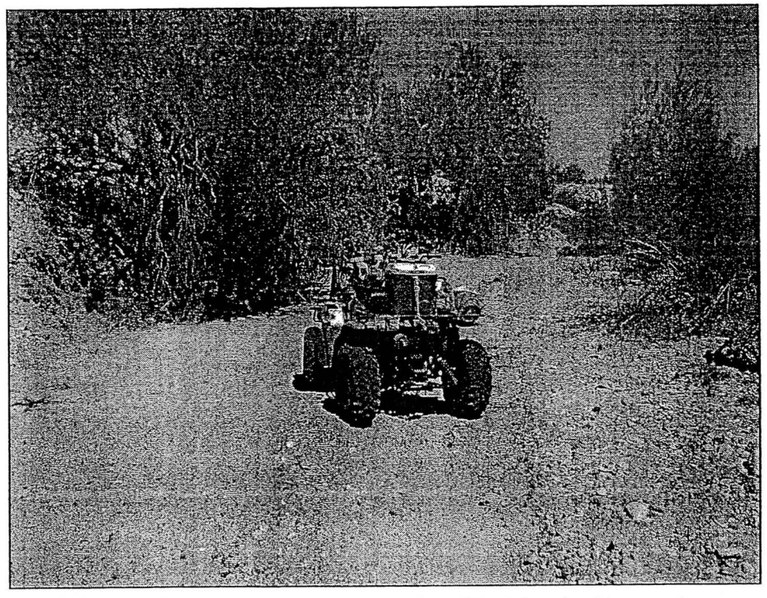
P9/1 Primary Wash #17 - Cross Section #2 – View looking downstream



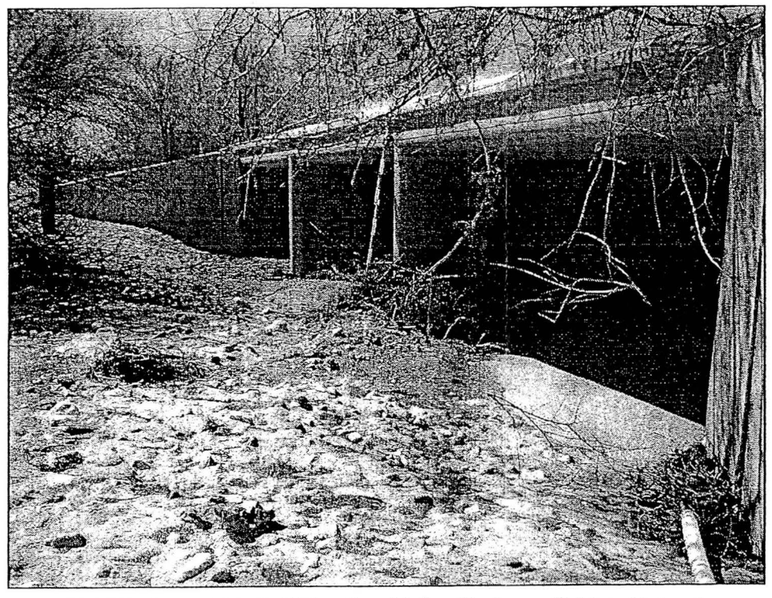
P8/25 Primary Wash #17 - Cross Section #3 – View looking upstream



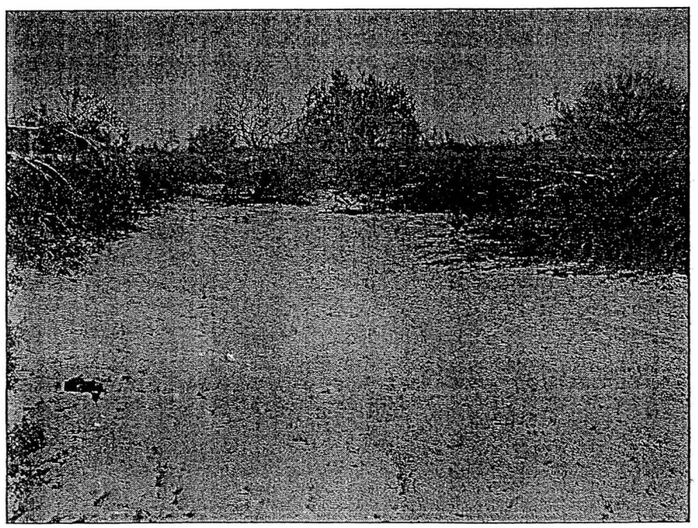
P8/26 Primary Wash #17 - Cross Section #4 – View looking upstream



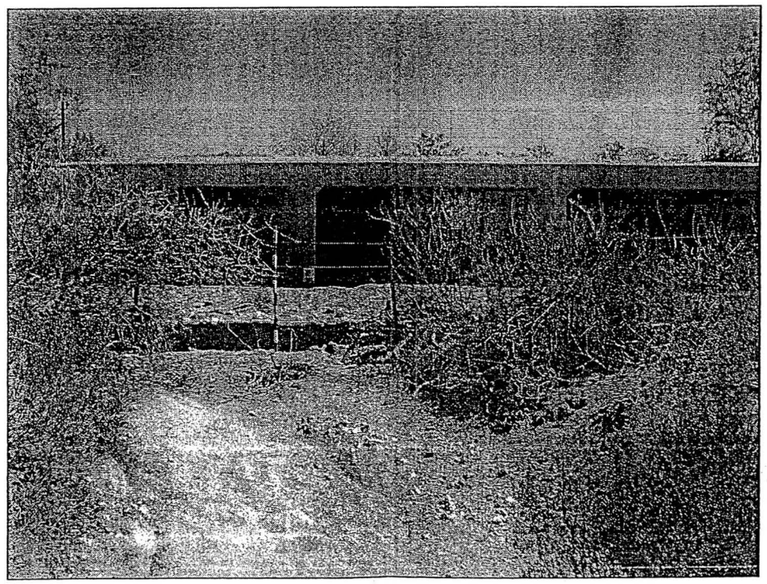
P8/27 Primary Wash #17 - Cross Section #5 – View looking upstream



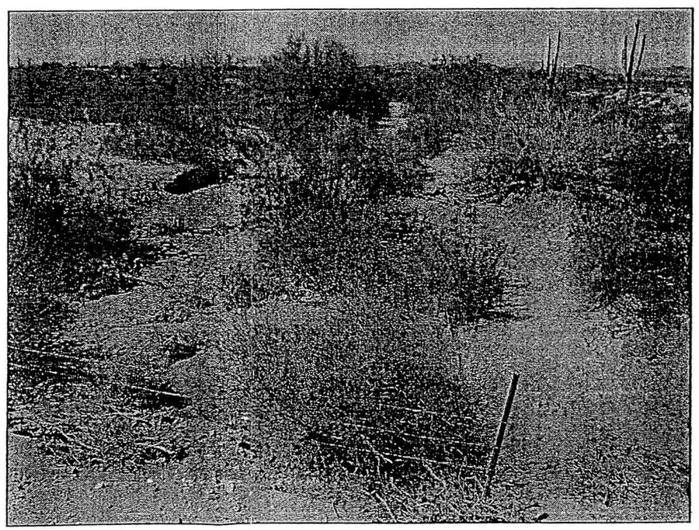
P8/23 Primary Wash #17 – Sun Valley Parkway Bridge Culvert
Looking south at upstream face of bridge



P8/24 Primary Wash #17 – Sun Valley Parkway Bridge Culvert
Looking upstream at upstream channel

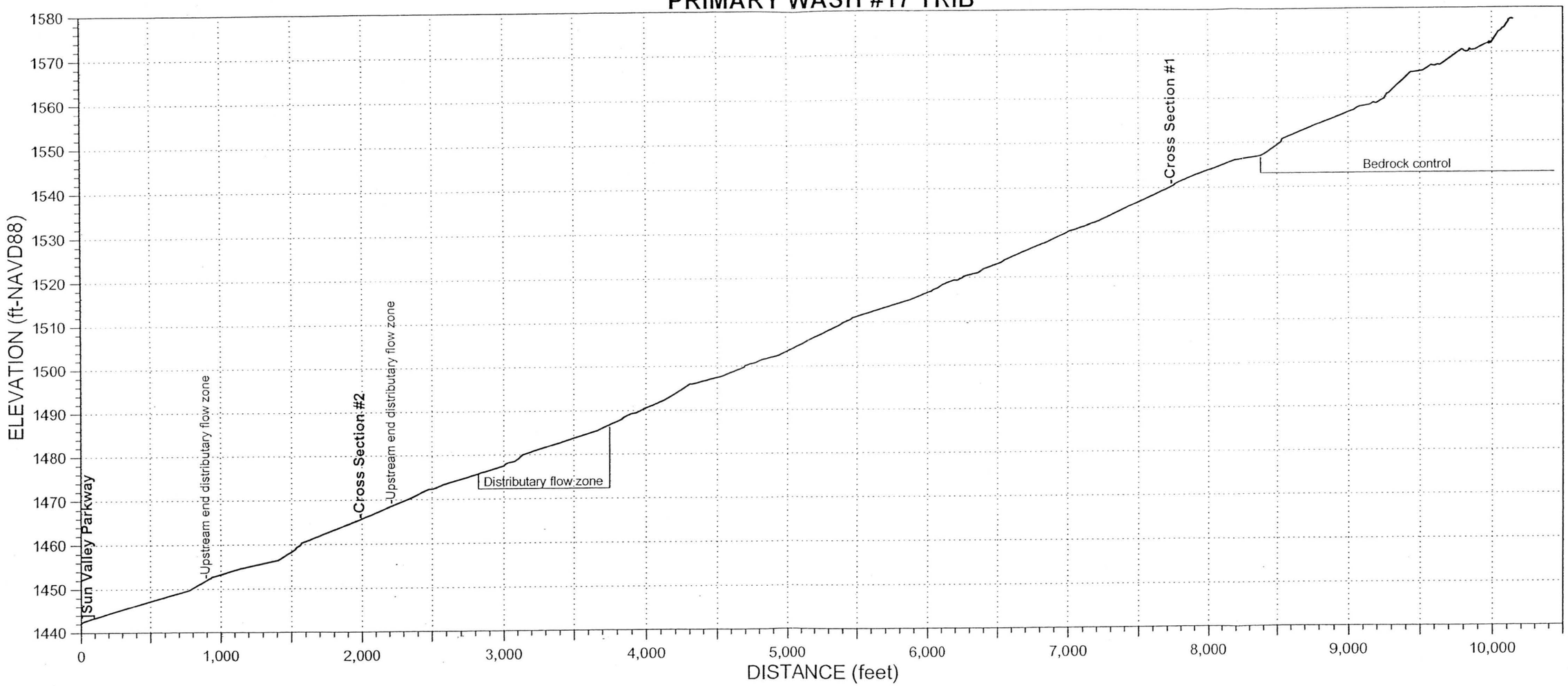


P8/22 Primary Wash #17 – Sun Valley Parkway Bridge Culvert
Looking upstream at downstream face of bridge



P8/46 Primary Wash #17 – Sun Valley Parkway Bridge Culvert
Looking downstream at downstream channel

PRIMARY WASH #17 TRIB



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW17 Trib	1	279	March 15, 2004

North: 943992.6 m
East: 472330.9 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		>6:1	1-1.5 ft	Sand X	Gravel X
Channel		Multiple		Right Bank		>6:1	2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	X-?	?
Right Bank	X-?	?
Channel		

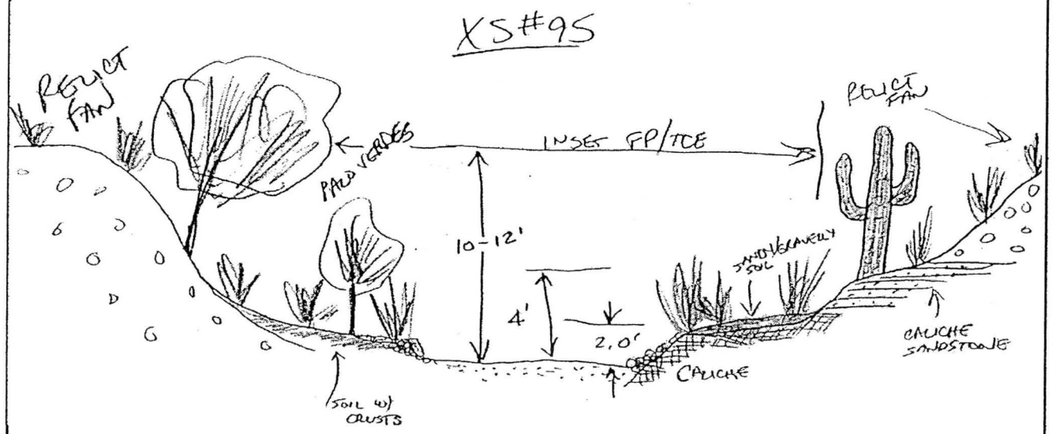
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P8/13 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present: Dimensions:			HEADCUT: Caliche Present: Dimensions:		
Spotty						
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #95



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW17 Trib	2	283	March 15, 2004

North: 944765.6 m
East: 467196.8 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single		Left Bank		1:1	1-3 ft	Sand X	Gravel X
Channel		Multiple	X	Right Bank		1:1	1-3 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank	3-4 ft	
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

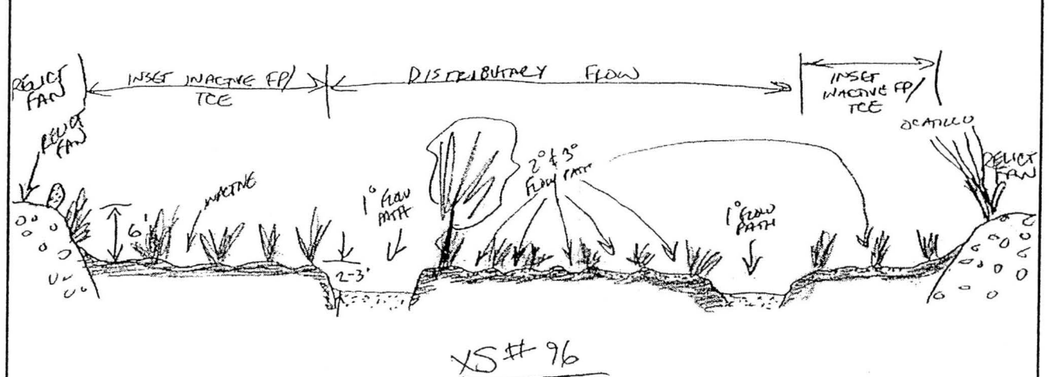
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P8/14,15,16 Pan - View from left bank to right bank looking downstream showing distributary flow.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present: Dimensions:			HEADCUT: Caliche Present: Dimensions:		
Spotty						
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #96



XS #96

Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL: PW17 Trib

DATE: March 15, 2004

WAYPOINT: D/S Face: 286 U/S Face: 285

Field Crew: W.J. Spitz, A.B. Alvarado

ROAD CROSSING - CULVERT DATA

CMP___ RCP___ RCBC__X__

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	945406.05	945473.03	3	5 ft	10 ft	US: 0.3 ft	DS: 0		U/S: 0
Easting	465661.25	465528.05	Depth of D/S Incision: 2.5 ft			# 3	#	No	D/S: 0

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	No	>6:1	1-2 ft	Sand__X__	Gravel__X__
Channel	No	Multiple	No	Right bank	No	>6:1	1-2 ft	Cobble_____	Bldrs_____

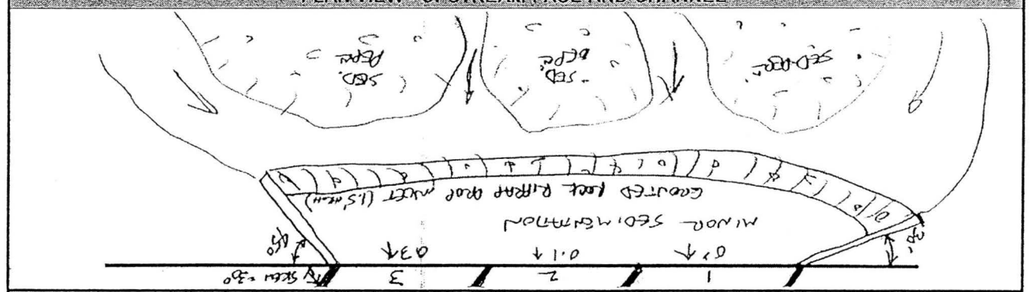
DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	Yes	Vert.	2.5 ft	Sand__X__	Gravel__X__
Channel	Yes	Multiple	No	Right bank	Yes	Vert.	2.5 ft	Cobble__X__	Bldrs_____

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel 0.5 ft	Ht. above Invert	In Barrel 0.5 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel 1.0 ft	Ht. above Invert	In Barrel 1.0 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

PLAN VIEW - UPSTREAM FACE AND CHANNEL



PLAN VIEW - DOWNSTREAM FACE AND CHANNEL

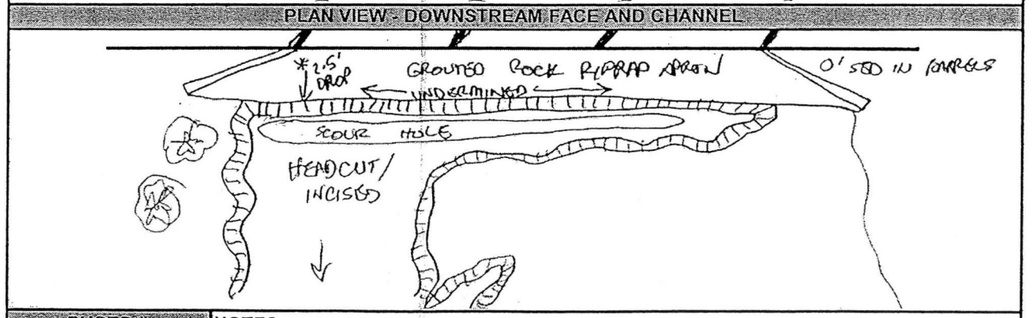


PHOTO #		NOTES:
U/S Face	8-18	
View U/S	8-17	
D/S Face	8-20	View upstream showing downstream face and incision (2.5 ft) and undermining of apron
View D/S	8-19	View downstream showing incising channel
Other		

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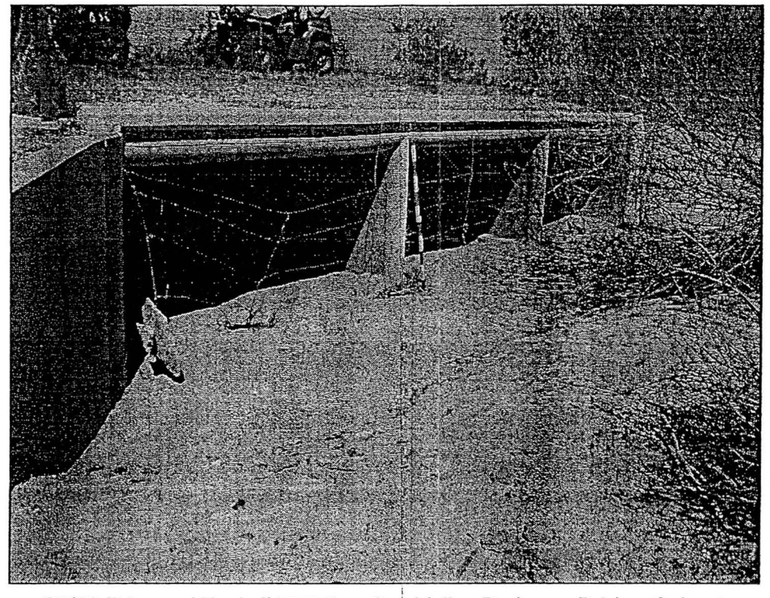
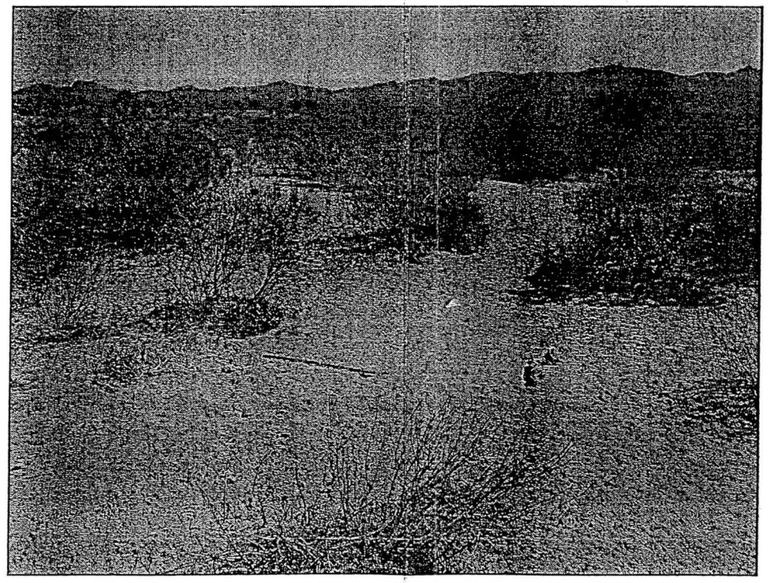
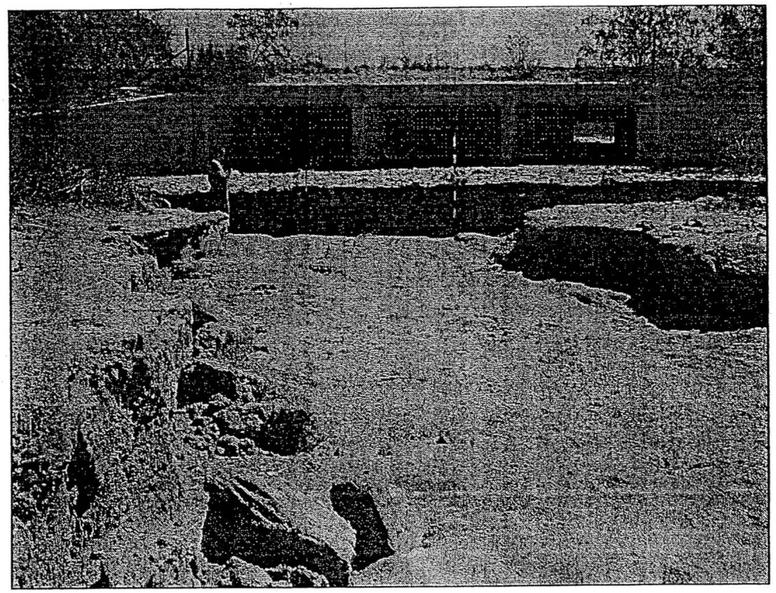


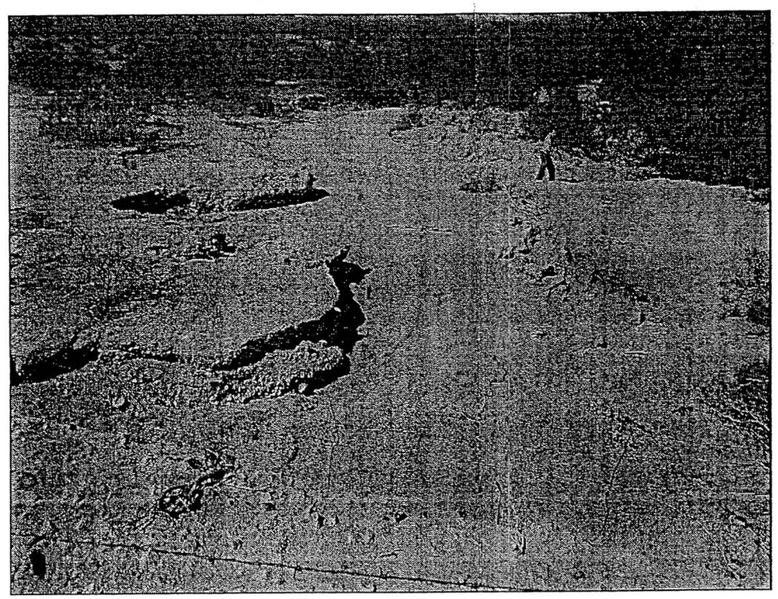
P8/18 Primary Wash #17 Trib – Sun Valley Parkway Bridge Culvert
View looking at upstream face



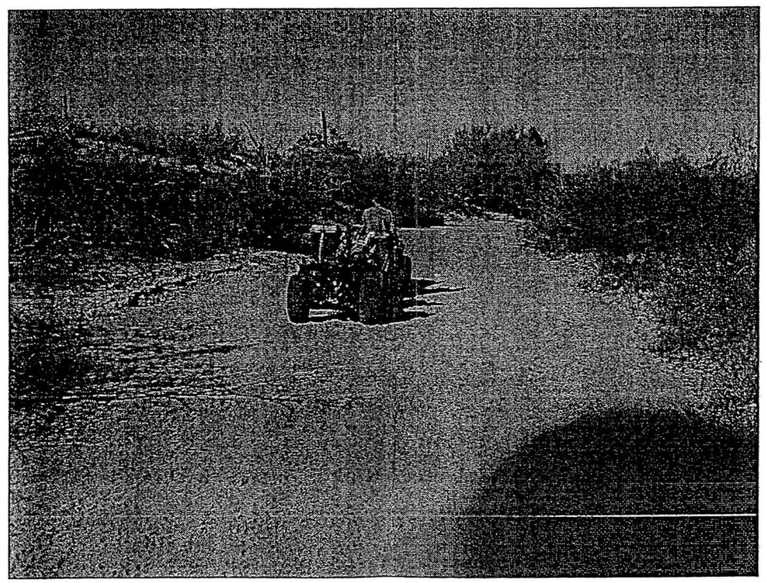
P8/17 Primary Wash #17 Trib – Sun Valley Parkway Bridge Culvert
View looking upstream at upstream channel



P8/20 Primary Wash #17 Trib – Sun Valley Parkway Bridge Culvert
View looking upstream at downstream face



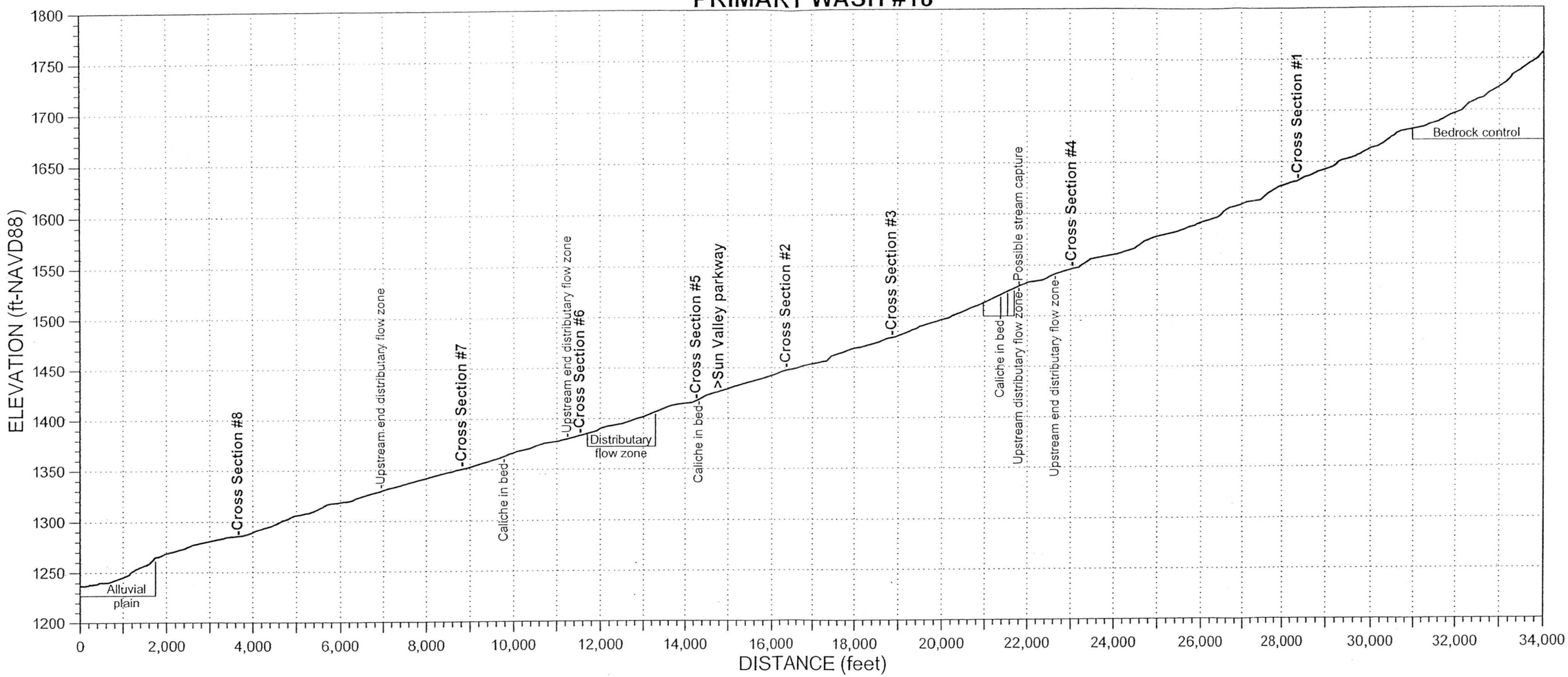
P8/20 Primary Wash #17 Trib – Sun Valley Parkway Bridge Culvert
View looking downstream at downstream channel



P8/13 Primary Wash #17 Trib - Cross Section #1 – View looking downstream

P8/14,15,16 Primary Wash #17 Trib - Cross Section #2 – Panorama view looking downstream

PRIMARY WASH #18



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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW18	1	265	March 14, 2004

North: 943654.5 ft
East: 476983.9 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel		Multiple		Right Bank	

VEGETATION		INSET F/P
In-channel		X
Marginal	X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

TERRACES (height-ft)		
Left Bank		
Right Bank		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

H:V	Height	BED MATERIAL	
>6:1	1-1.5 ft	Sand__X__	Gravel__X__
>6:1	1.5-2 ft	Cobble_____	Bldrs_____

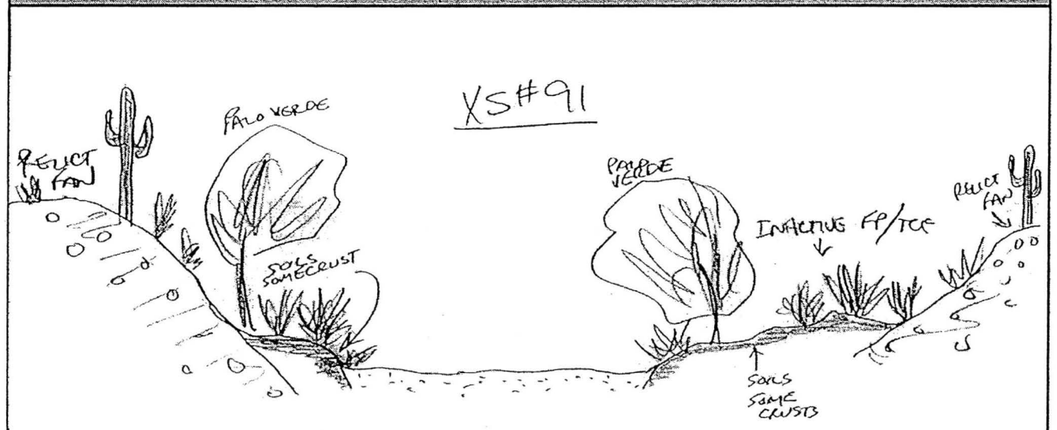
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P7/28 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #91



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW18	2	268	March 15, 2004

North: 939857.1 ft
East: 467043.2 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel		Multiple		Right Bank	

VEGETATION		INSET F/P
In-channel		X
Marginal	X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

TERRACES (height-ft)		
Left Bank		
Right Bank		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

H:V	Height	BED MATERIAL	
3:1	1.5-2 ft	Sand__X__	Gravel__X__
3:1	1.5-2 ft	Cobble_____	Bldrs_____

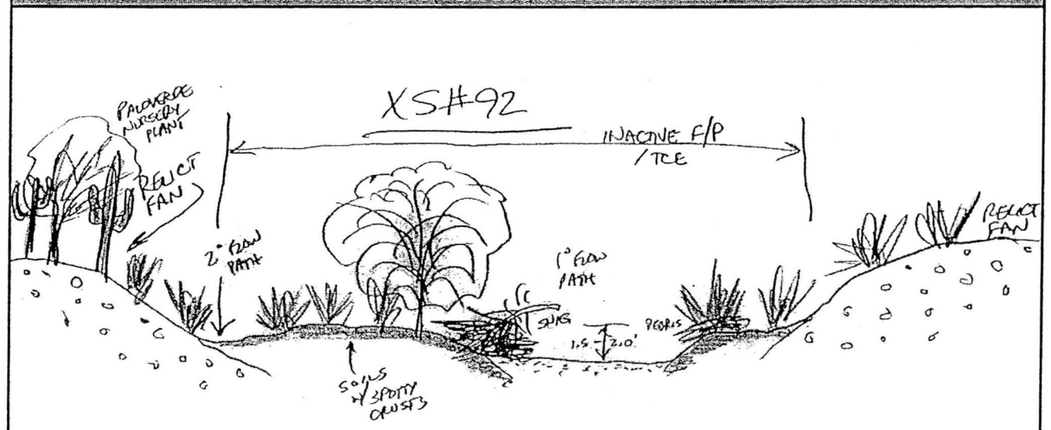
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1-1.5 ft	1-1.5 ft	

PHOTOS & DESCRIPTION:
P8/7 - View looking upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #92



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW18	3	269	March 15, 2004

North: 940641.3 ft
East: 469305.4 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	X
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
<1:1	9-10 ft	Sand X	Gravel X
1:1	9-10 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA	Above Bed	Thickness
Height (top)		
Left Bank	5-6 ft	5-6 ft
Right Bank	5-6 ft	?
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	1-1.5 ft	1-1.5 ft	

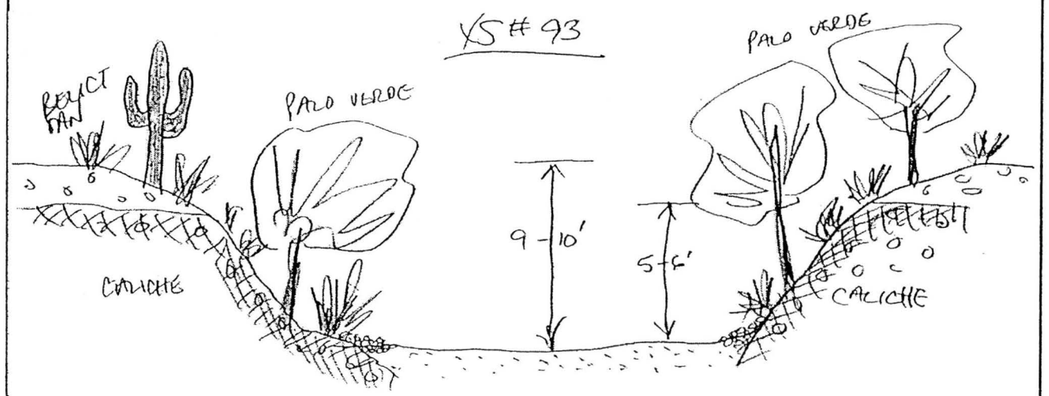
PHOTOS & DESCRIPTION:
P8/8 - View downstream

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #93



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW18	4	276	March 15, 2004

North: 941310.6 ft
East: 473039.2 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single		Left Bank	
Channel		Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
>1:1	1-2 ft	Sand X	Gravel X
>1:1	1-2 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA	Above Bed	Thickness
Height (top)		
Left Bank		
Right Bank	3 ft	3 ft
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	<1 ft	<1 ft	

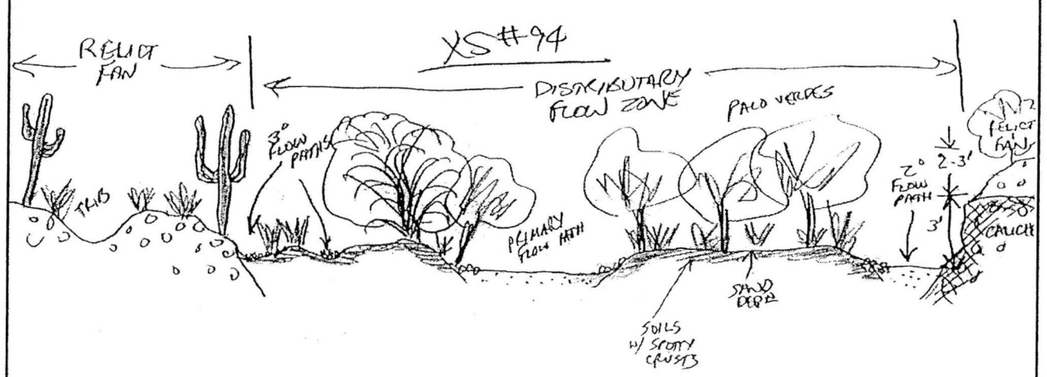
PHOTOS & DESCRIPTION:
P8/9 - View downstream
P8/10 - View upstream

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #94



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW18	5	313	March 15, 2004

North: 939499.6 ft
East: 465124.9 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS	
Floodway	X	Single	X
Channel	X	Multiple	

BANKS	Erosion
Left Bank	X
Right Bank	X

H:V	Height	BED MATERIAL	
vertical	2 ft	Sand X	Gravel X
vertical	2.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank	2 ft	
Right Bank	2.5 ft	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:

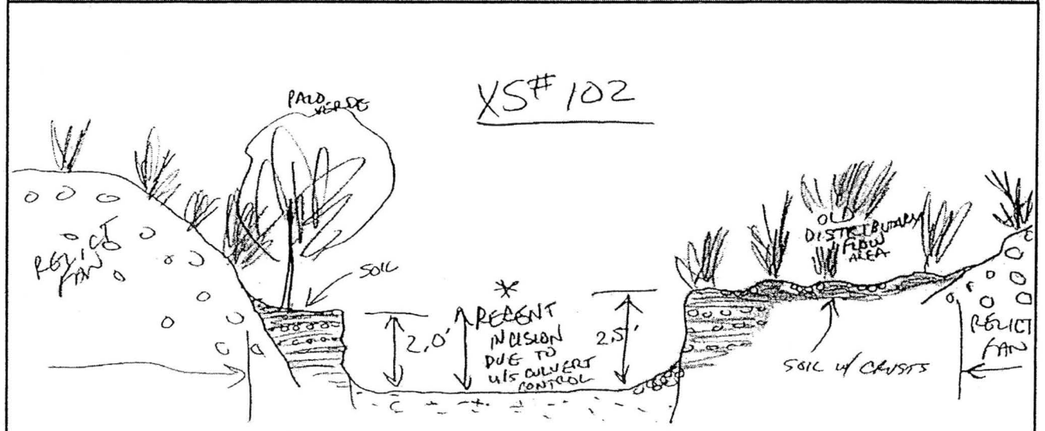
CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT: Upstream at Bridge
Caliche Present: YES
Dimensions: 2.5 ft at DS side of culvert at apron

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #102



Notes: Recent downstream incision due to upstream culvert at Sun Valley Parkway crossing.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW18	6	316	March 15, 2004

North: 939029.1 ft
East: 462536.7 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS	
Floodway	X	Single	X
Channel	X	Multiple	

BANKS	Erosion
Left Bank	
Right Bank	

H:V	Height	BED MATERIAL	
1:1	1.5-2 ft	Sand X	Gravel X
2:1	1.5-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		X
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P8/51 - View upstream

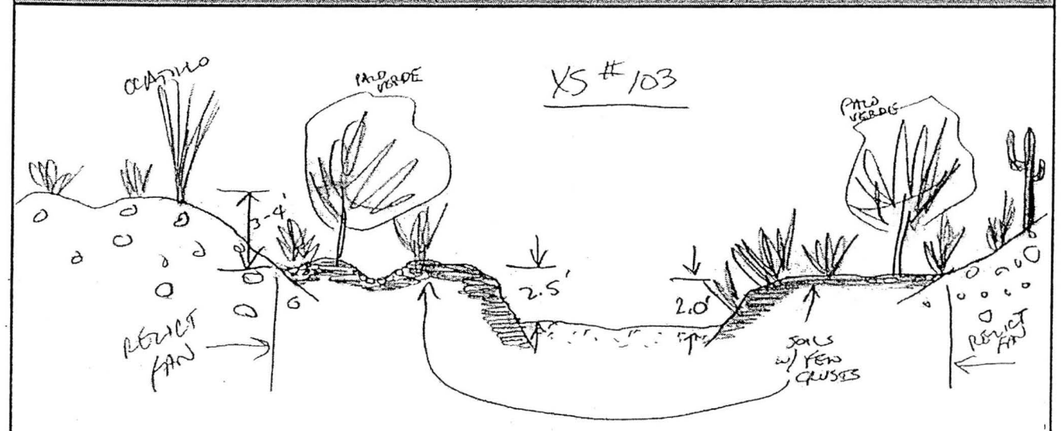
CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #103



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW18	7	319	March 15, 2004

North: 938305.1 ft
East: 460220.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
<1:1	8-10 ft	Sand X	Gravel X
1:1	3.5-4 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank	1 ft	1+ ft
Right Bank	1 ft	1+ ft
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P8/52 - View upstream

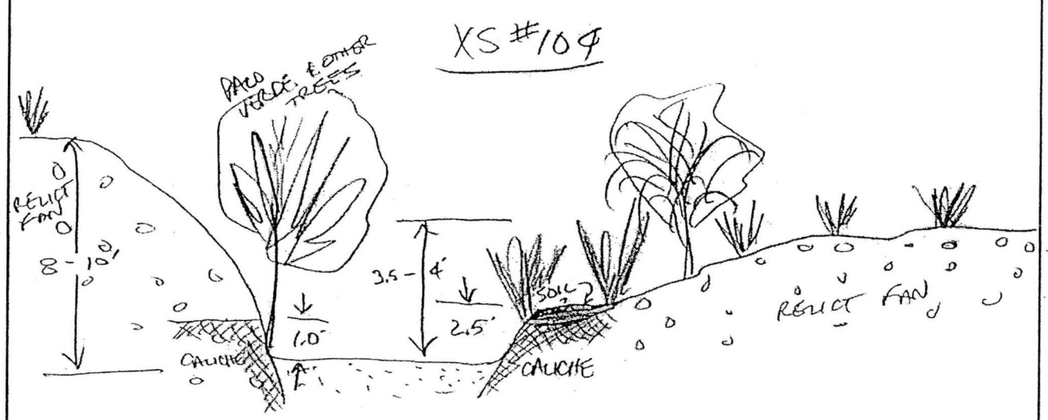
CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

Absent
Spotty
Extensive

NICKZONE: Caliche Present: Dimensions:

HEADCUT: Caliche Present: Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #104



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW18	8	321	March 15, 2004

North: 937834.5 ft
East: 455532.5 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single		Left Bank	X
Channel	X	Multiple	X	Right Bank	X

H:V	Height	BED MATERIAL	
1:1	2-3 ft	Sand X	Gravel X
1:1	2-3 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		X
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P8/53 - View looking upstream from right bank

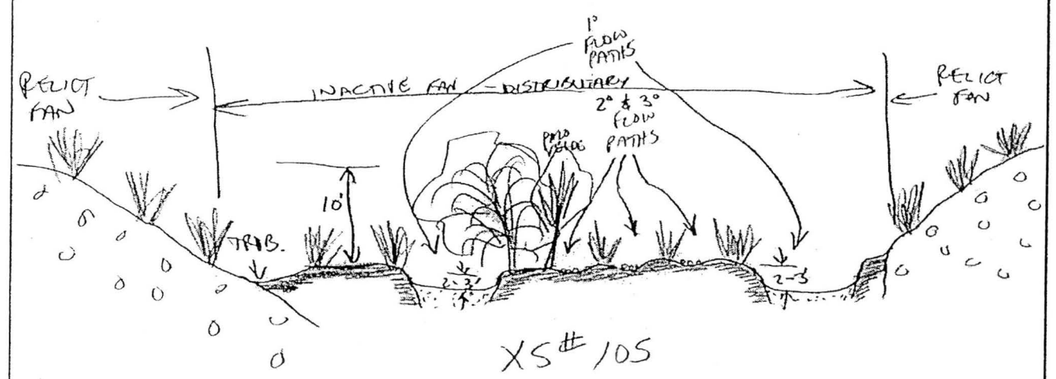
CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

Absent
Spotty
Extensive

NICKZONE: Caliche Present: Dimensions:

HEADCUT: Caliche Present: Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #105



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	DATE:	WAYPOINT:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW18	March 15, 2004	D/S Face: 266 U/S Face: 267
		Field Crew: W.J. Spitz, A.B. Alvarado	

ROAD CROSSING - CULVERT DATA

CMP ___ RCP ___ RCBC X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	939555.02	939523.83	6	5 ft	12 ft	US: 1.0 ft	DS:<0.1 ft		U/S: 0
Easting	465620.08	465485.59	Depth of D/S Incision: 3-4 ft			# 6	# All	No	D/S: 0

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	No	Left bank	No		1.5-2 ft	Sand X	Gravel X
Channel	No	Multiple	Yes	Right bank	No		1.5-2 ft	Cobble X	Bldrs ___

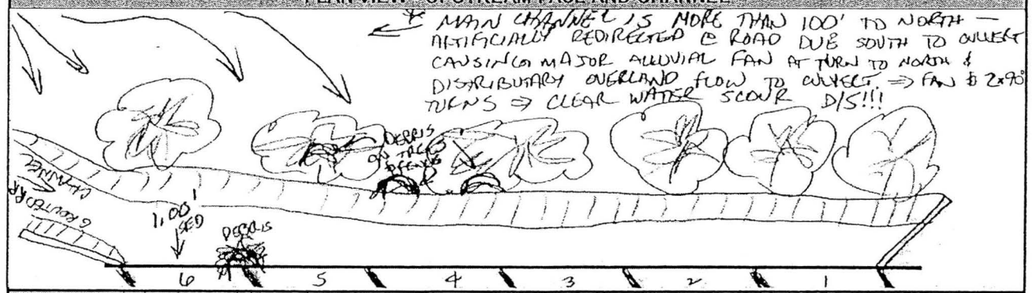
DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	Yes	Vert.	3-4 ft	Sand X	Gravel X
Channel	Yes	Multiple	No	Right bank	Yes	Vert.	3-4 ft	Cobble X	Bldrs ___

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel 1.5-2 ft	Ht. above Invert	In Barrel 1.5-2 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel <1 ft	Ht. above Invert	In Barrel <1 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

PLAN VIEW - UPSTREAM FACE AND CHANNEL



PLAN VIEW - DOWNSTREAM FACE AND CHANNEL

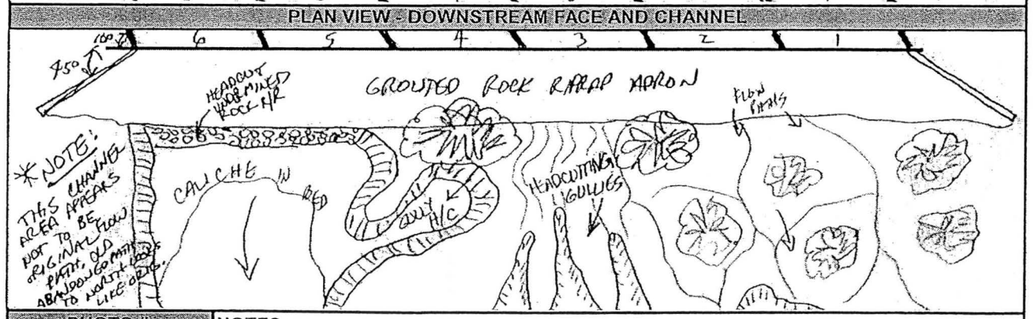
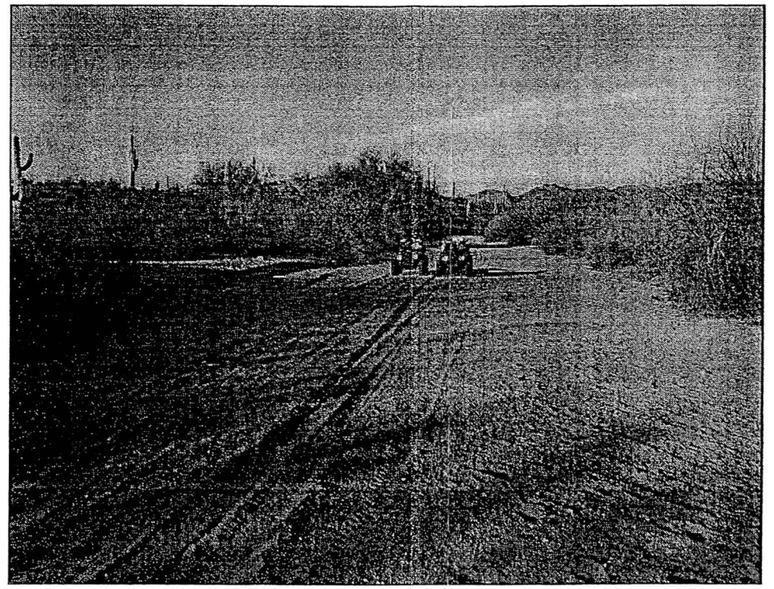


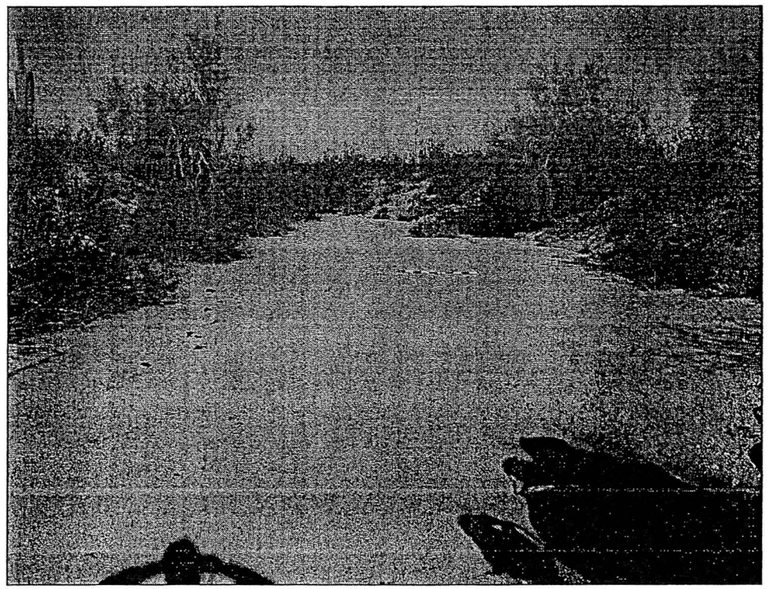
PHOTO #		NOTES:
U/S Face	8-5,6	View downstream along grouted riprap channel section; View south showing upstream face
View U/S	8-4	View upstream of fan delta at road embankment at 90 degree turn to north of culvert
D/S Face	8-3	View south
View D/S	8-2	View of incising channel downstream
Other	8-1	View upstream showing undermined DS apron and barrels 4, 5, and 6

AYRES ASSOCIATES

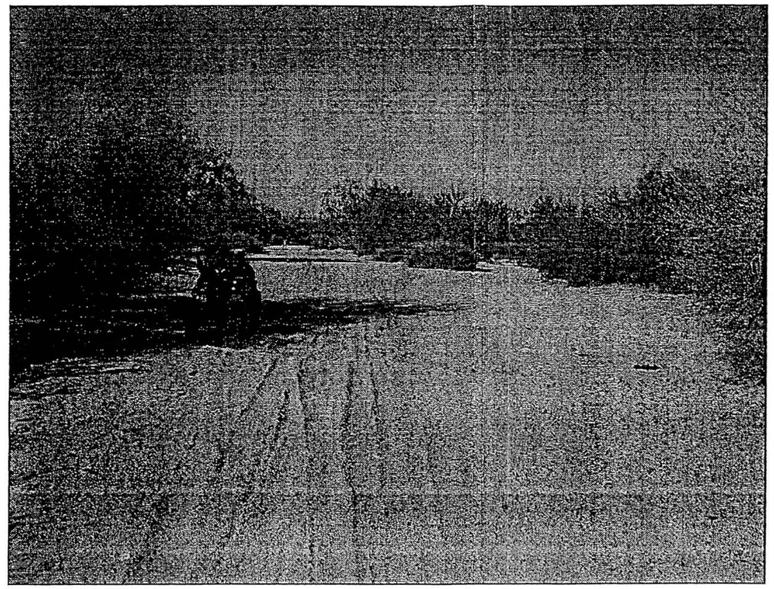


P7/28 Primary Wash #18 - Cross Section #1 – View looking upstream

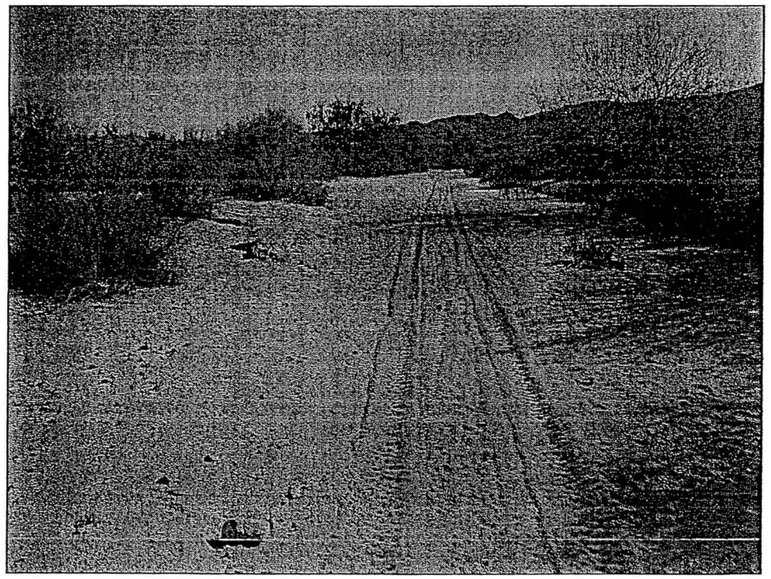
P8/7 Primary Wash #18 - Cross Section #2 – View looking upstream



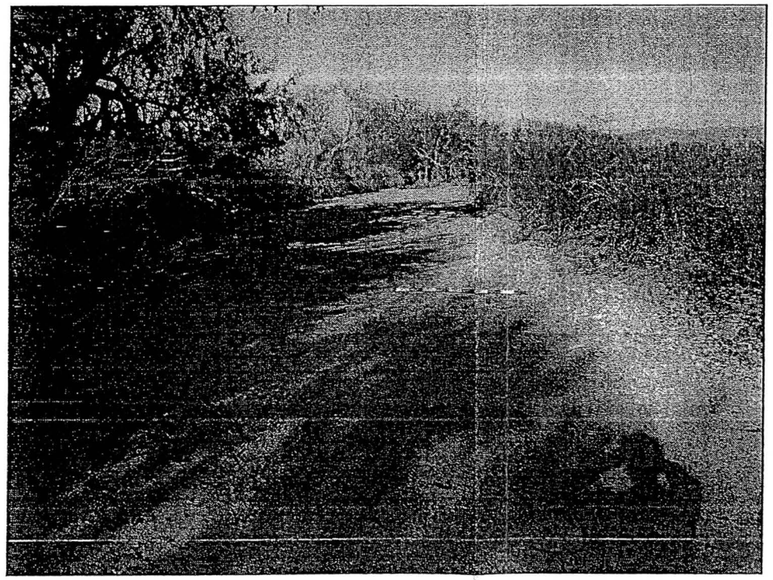
P8/8 Primary Wash #18 - Cross Section #3 – View looking downstream



P8/9 Primary Wash #18 - Cross Section #4 – View looking downstream

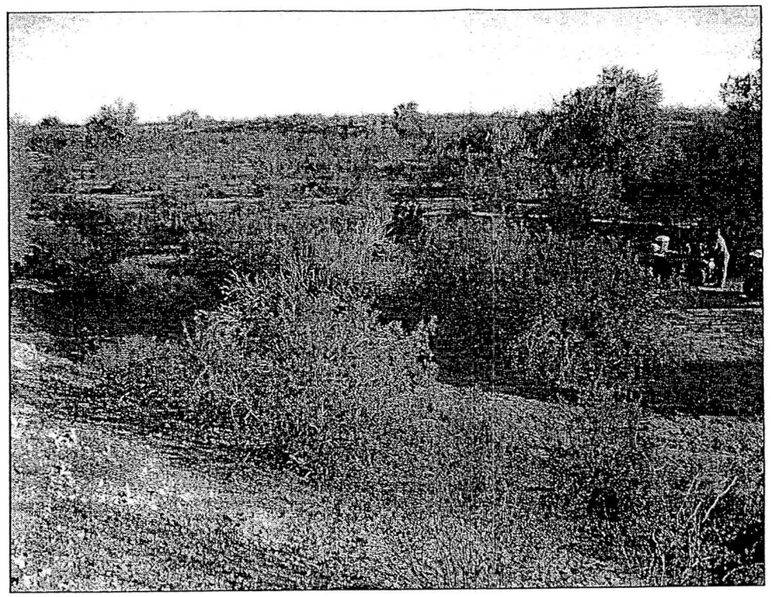


P8/10 Primary Wash #18 - Cross Section #4 – View looking upstream

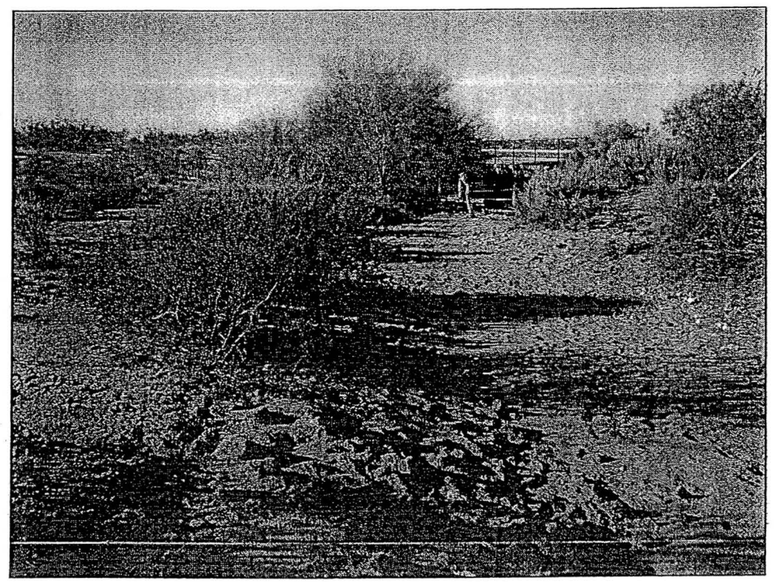


P8/51 Primary Wash #18 - Cross Section #6 – View looking upstream

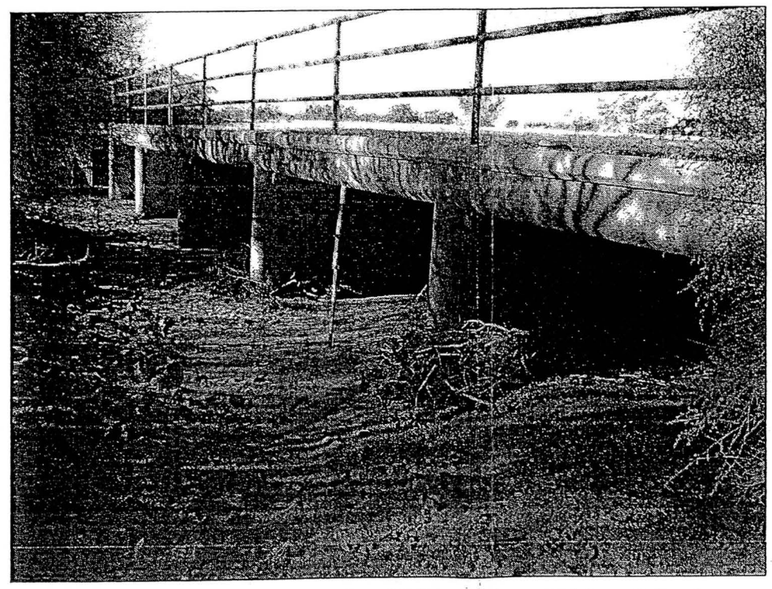
P8/52 Primary Wash #18 - Cross Section #7 – View looking upstream



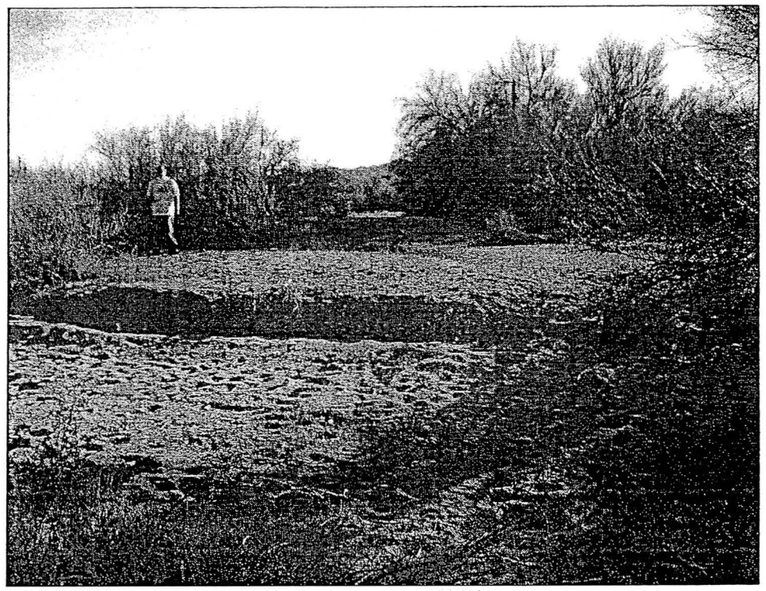
P8/53 Primary Wash #18 - Cross Section #8 – View looking upstream



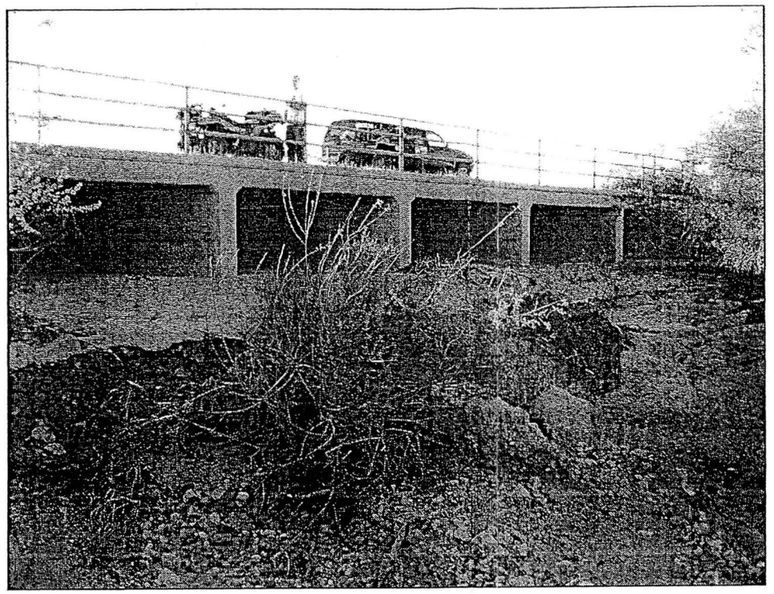
P8/6 Primary Wash #18 – Sun Valley Parkway Bridge Culvert
View looking downstream at upstream bridge face



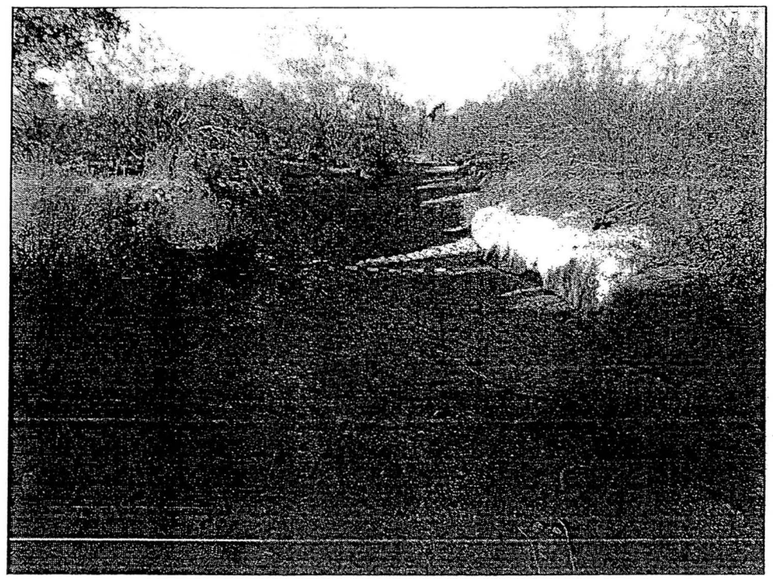
P8/5 Primary Wash #18 – Sun Valley Parkway Bridge Culvert
View looking south at upstream face and grouted riprap inlet



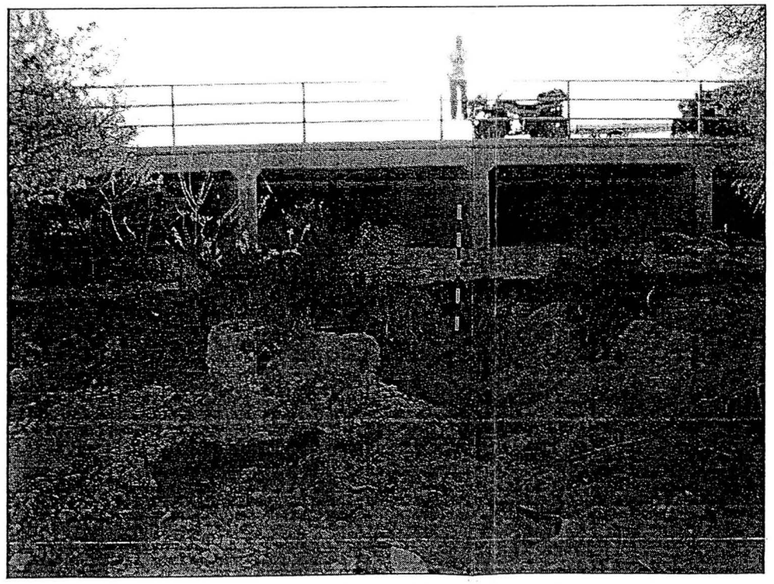
P8/4 Primary Wash #18 – Sun Valley Parkway Bridge Culvert
View looking upstream at upstream channel and delta at road embankment



P8/3 Primary Wash #18 – Sun Valley Parkway Bridge Culvert
View looking upstream and south at downstream face

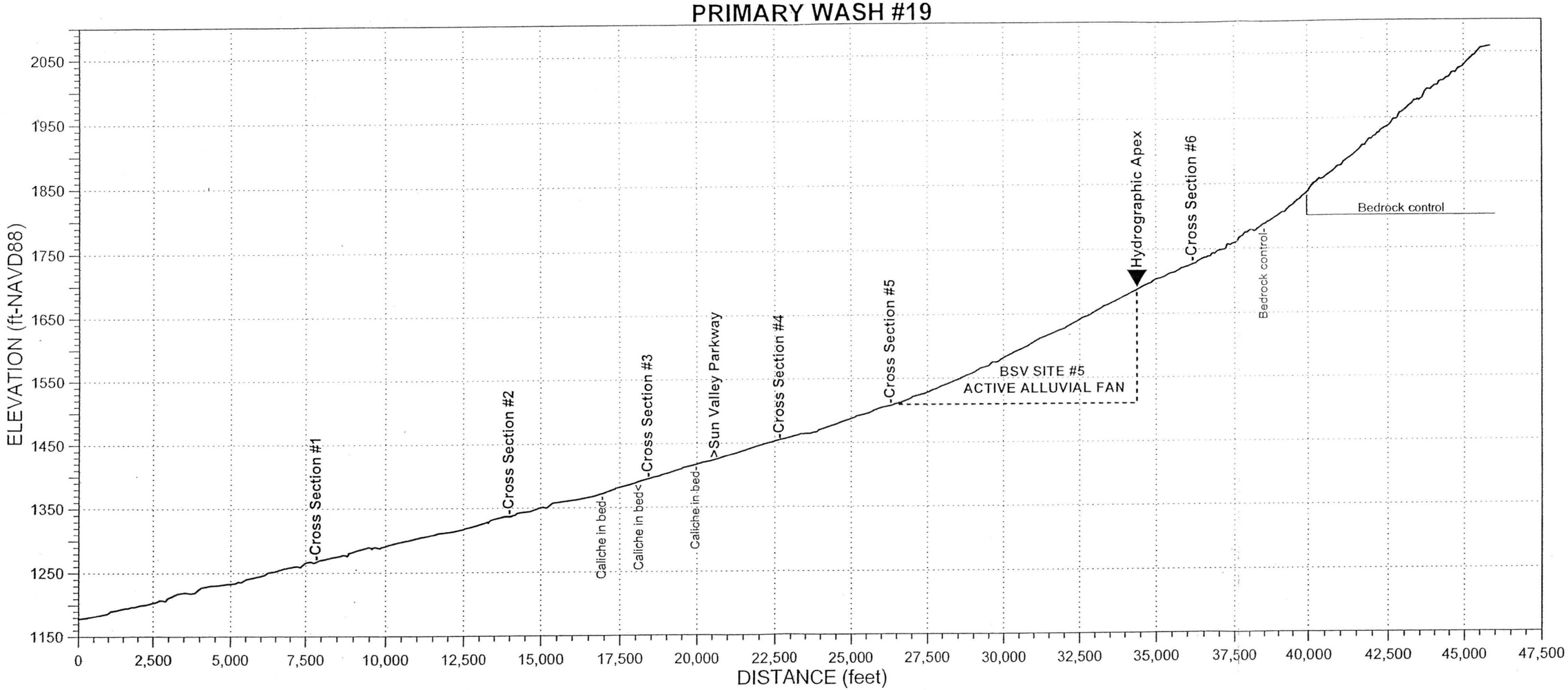


P8/2 Primary Wash #18 – Sun Valley Parkway Bridge Culvert
View looking downstream at downstream channel



P8/1 Primary Wash #18 – Sun Valley Parkway Bridge Culvert
View looking upstream at undermined downstream grouted riprap apron

PRIMARY WASH #19



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW19	1	244	March 14, 2004

North: 927889.4 ft
East: 457579.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	4.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		3:1	4.5 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank	4.5 ft	
Marginal	X		Right Bank	4.5 ft	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank	1.5-2 ft	>1.5-2 ft
Right Bank	1.5-2 ft	>1.5-2 ft
Channel		

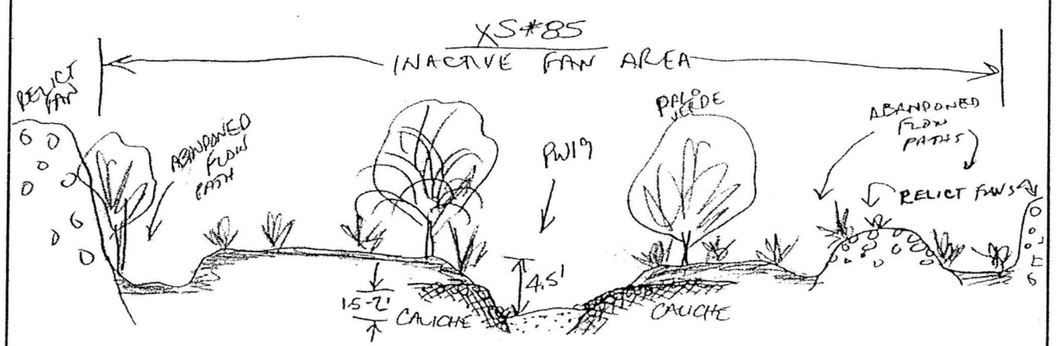
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P7/10 - View looking downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #85



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW19	2	245	March 14, 2004

North: 931605.4 ft
East: 461909.5 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single		Left Bank		1:1	2-3 ft	Sand X	Gravel X
Channel	X	Multiple	X	Right Bank		1:1	2-3 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA	
Height (top) Above Bed	Thickness
Left Bank	
Right Bank	
Channel	

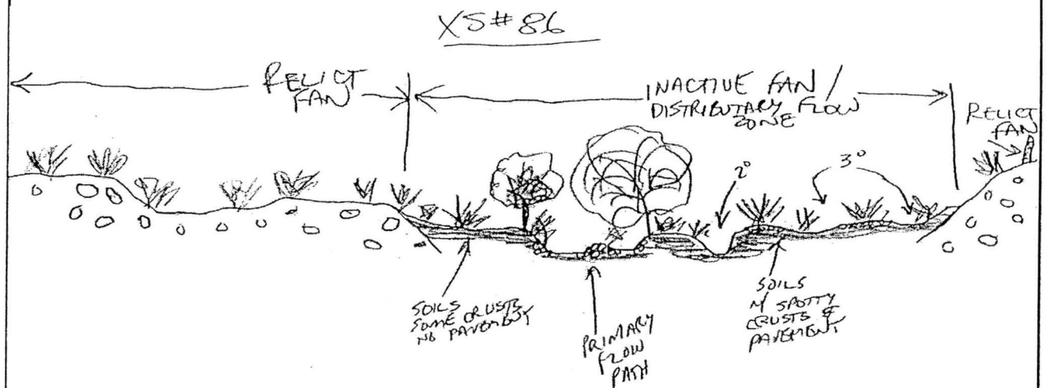
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
pP7/11 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #86



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW19	3	249	March 14, 2004

North: 936552.5 ft
East: 466277.3 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single		Left Bank	
Channel	X	Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
1:1	7 ft	Sand X	Gravel X
4:1	4 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde		
Creosote		
Brittlebush		
Bursage		
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	4-5 ft	4-5 ft
Right Bank	2-3 ft	2-3 ft
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P7/12 - View downstream

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

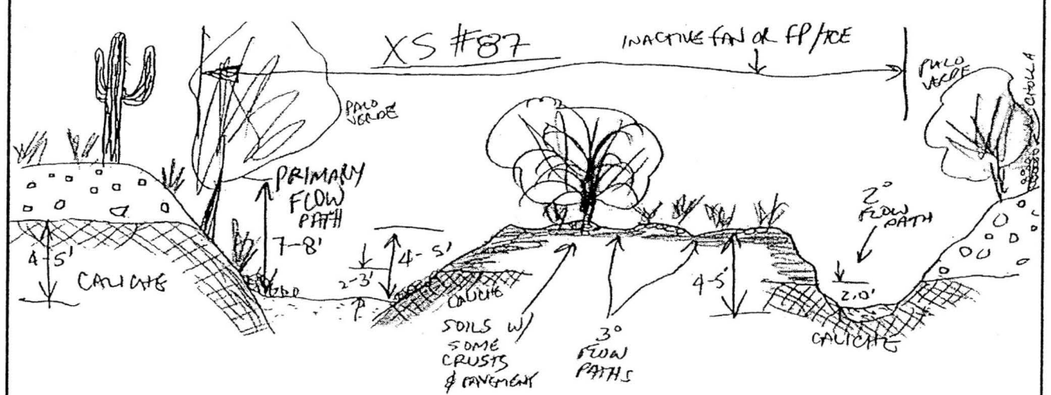
PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #87



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW19	4	254	March 14, 2004

North: 936946.0 ft
East: 468421.7 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
2:1	8 ft	Sand X	Gravel X
3:1	3 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank	3 ft	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	6 ft	6 ft
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1-1.5 ft	1-1.5 ft	

PHOTOS & DESCRIPTION:
P7/21 - View upstream, note left bank caliche

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

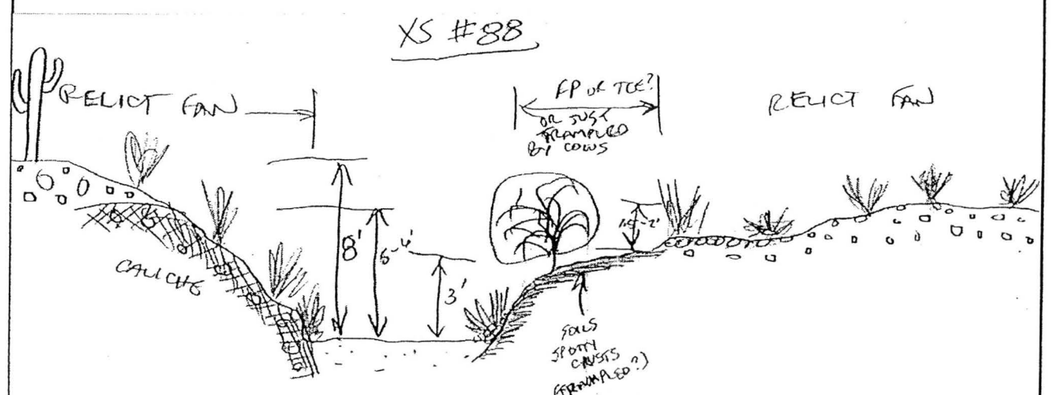
PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #88



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW19 North: 937162.2 ft East: 471772.3 ft	5	2551	March 14, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		4:1	6-8 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		4:1	8-10 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X		Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X	Height (top)	Above Bed	Thickness	Soils		X	
			Left Bank	X	?	HIGH WATER MARKS/DEBRIS			
Palo Verde	X	X	Right Bank	X	?	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X	X	Channel				1 ft	1 ft	1 ft
Brittlebush	X	X	PHOTOS & DESCRIPTION:						
Bursage	X	X	P7/22 - View looking downstream						
Mormon Tea	X	X	P7/23 - View upstream showing flow split below active inset fan						
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.				NICKZONE:			HEADCUT:		
Hedgehog C.			Absent	Caliche Present:			Caliche Present:		
Fishhook C.			Spotty	Dimensions:			Dimensions:		
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #89

Notes: ***Downstream of BSV Site #5 active fan***

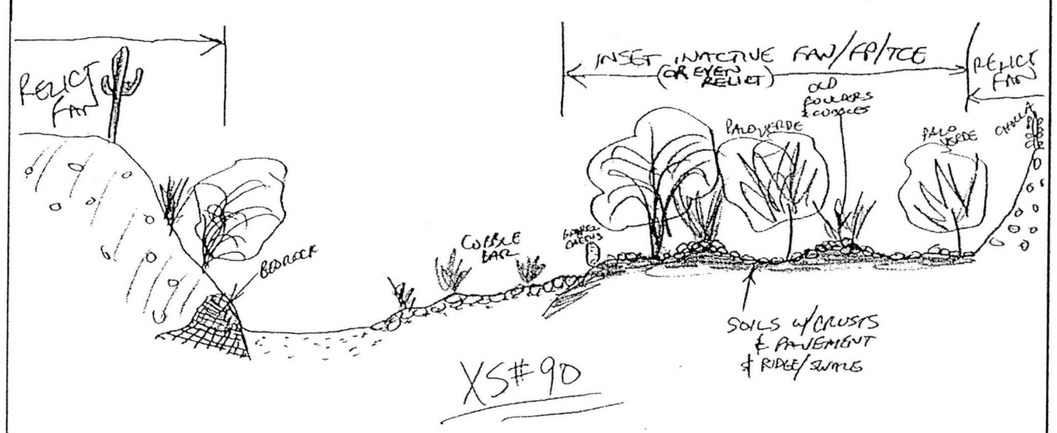
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW19 North: 939768.9 ft East: 480570.0 ft	6	2552	March 14, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		<1:1	12 ft	Sand X	Gravel X
Channel		Multiple		Right Bank		1:1	12 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X		Left Bank				Extensive	Spotty	Absent
Marginal	X	X	Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement	X		
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils	X		
			Left Bank	?	?	HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank	?	?	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X	X	Channel				1.5-2 ft	1.5-2 ft	
Brittlebush	X	X	PHOTOS & DESCRIPTION:						
Bursage	X	X	P7/26 - View downstream						
Mormon Tea	X	X	P7/27 - View upstream						
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.				NICKZONE:			HEADCUT:		
Hedgehog C.			Absent	Caliche Present:			Caliche Present:		
Fishhook C.			Spotty	Dimensions:			Dimensions:		
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #90



Notes: ***Upstream of BSV Site #5 active fan***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	DATE:	WAYPOINT:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW19 (New Alignment of PW19 plus other tribs.)	March 14, 2004 Field Crew: W.J. Spitz, A.B. Alvarado	D/S Face: 252 U/S Face: 253

ROAD CROSSING - CULVERT DATA

CMP ___ RCP ___ RCBC X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	935832.49	935776.16	15	6 ft	10' (3 at 12')	US: 2.25ft	DS: 2.25ft		U/S: 40%
Easting	466228.79	466109.53	Depth of D/S Incision: 1.5-2 ft			# 2,3,4,6	# 6	Yes	D/S: 30%

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	No	Left bank	No	3:1	7-8 ft	Sand X	Gravel X
Channel	Yes	Multiple	Yes	Right bank	No	3:1	7-8 ft	Cobble X	Bldrs ___

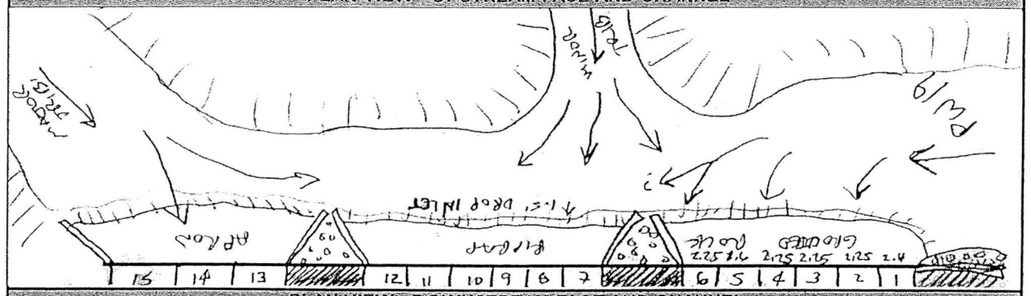
DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	No	Left bank	Yes	Vert.	3-3.5 ft	Sand X	Gravel X
Channel	Yes	Multiple	Yes	Right bank	Yes	Vert.	3-3.5 ft	Cobble X	Bldrs ___

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel ~1 ft	Ht. above Invert	In Barrel ~1 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel >1 ft	Ht. above Invert	In Barrel >1 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

PLAN VIEW - UPSTREAM FACE AND CHANNEL



PLAN VIEW - DOWNSTREAM FACE AND CHANNEL

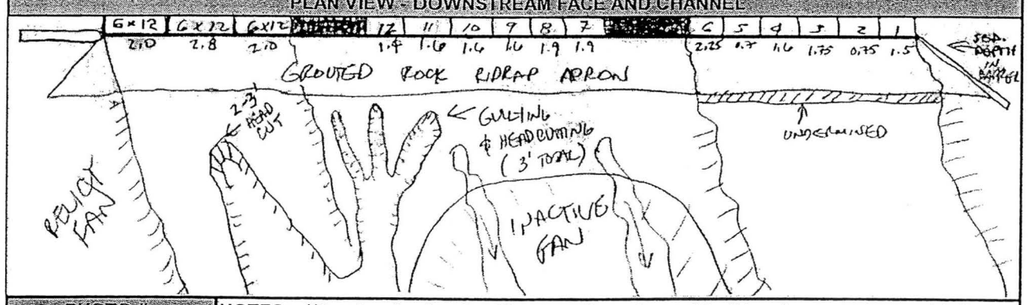
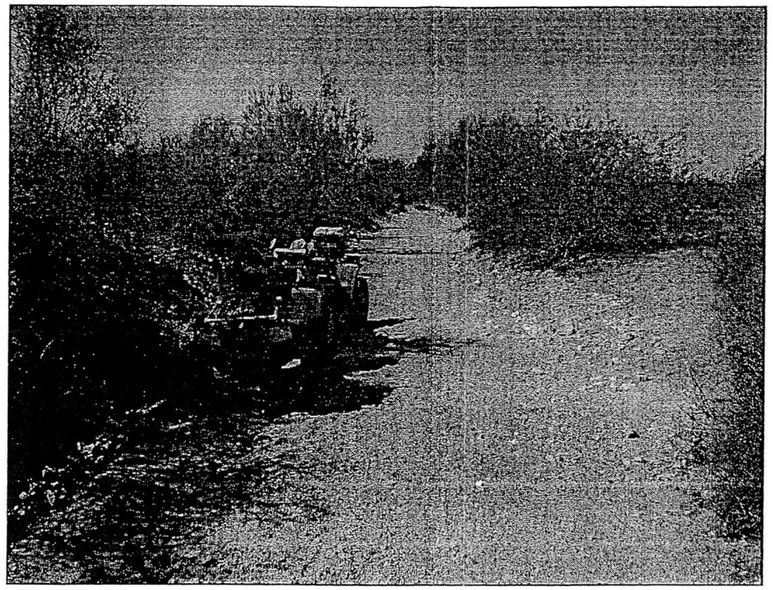
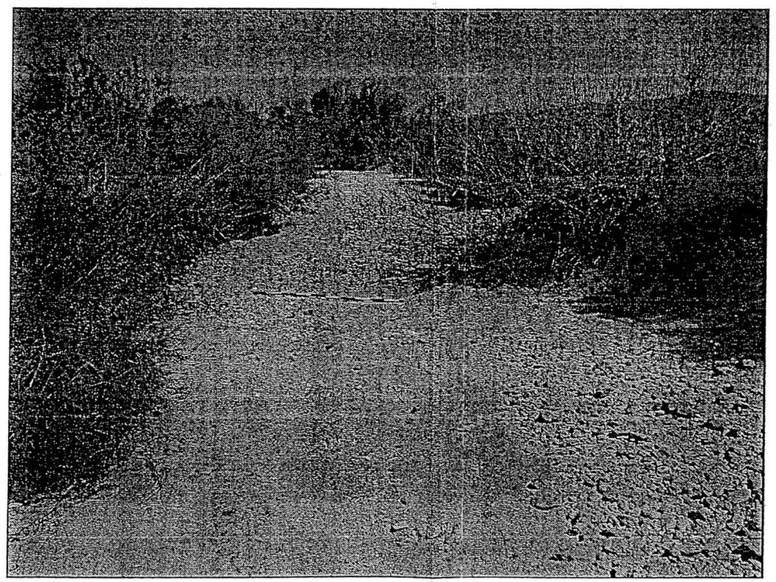


PHOTO #:		NOTES: **3 sets of culverts with separating wingwall bulkheads on upstream side**
U/S Face	7-19	View downstream showing left bank and middle culvert
View U/S	7-18	View upstream toward new re-routed PW19 channel along road
D/S Face	7-15,16	View of PW19 culverts
View D/S	7-17	Note incised channel downstream and undermined apron
Other	7-20	View US at diversion point; fill and road on right; erosion of road embankment

AYRES ASSOCIATES

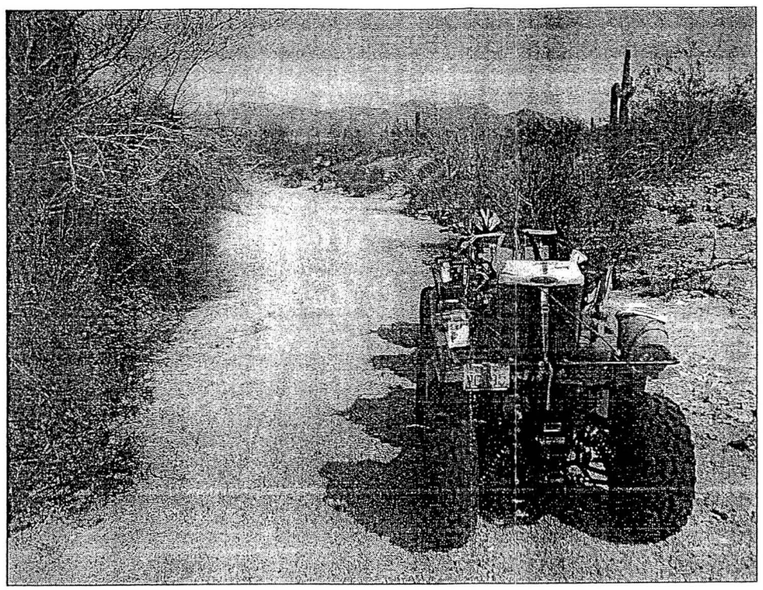


P7/10 Primary Wash #19 - Cross Section #1 – View looking downstream

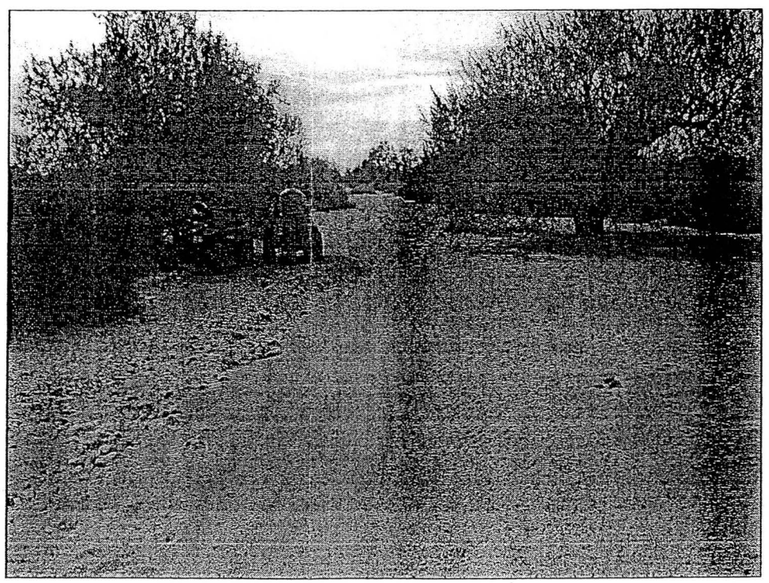


P7/11 Primary Wash #19 - Cross Section #2 – View looking upstream

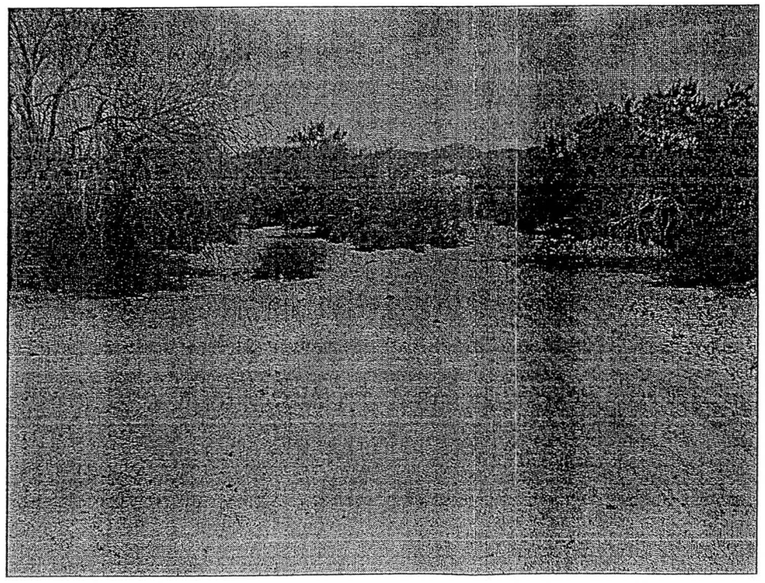
P7/12 Primary Wash #19 - Cross Section #3 – View looking downstream



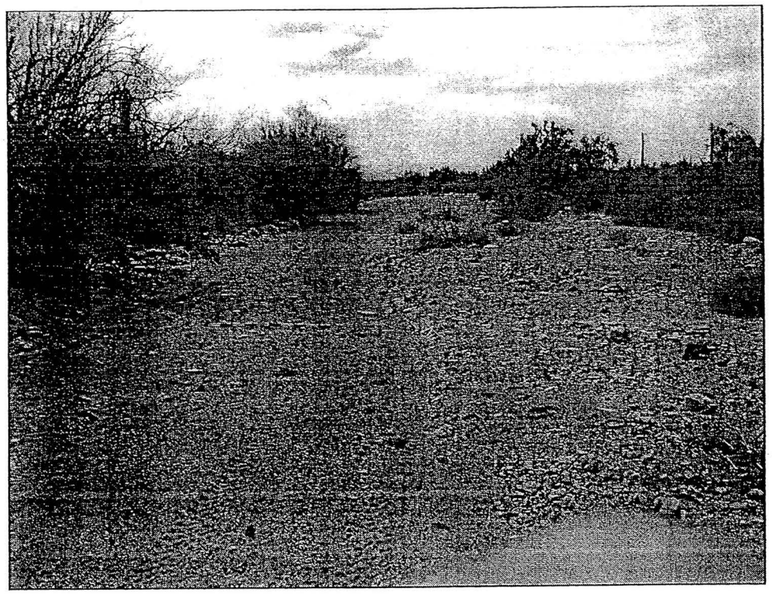
P7/21 Primary Wash #19 - Cross Section #4 – View looking upstream



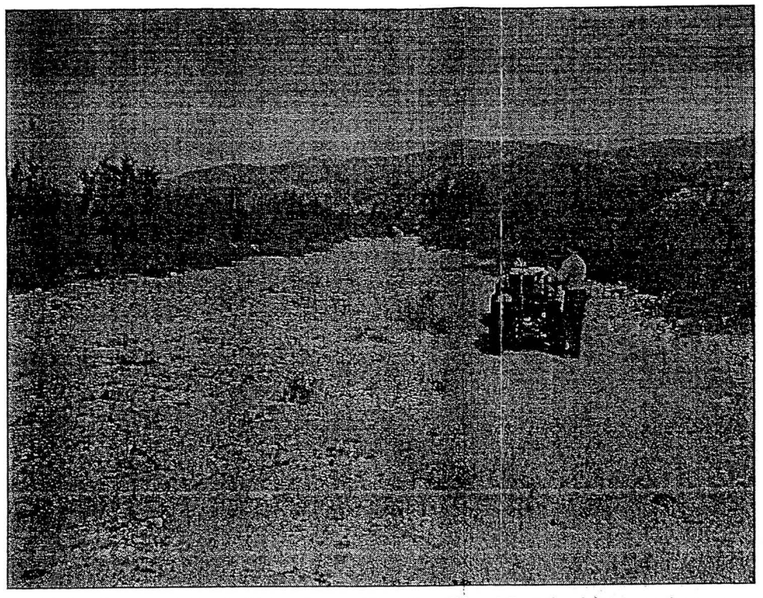
P7/22 Primary Wash #19 - Cross Section #5 – View looking downstream



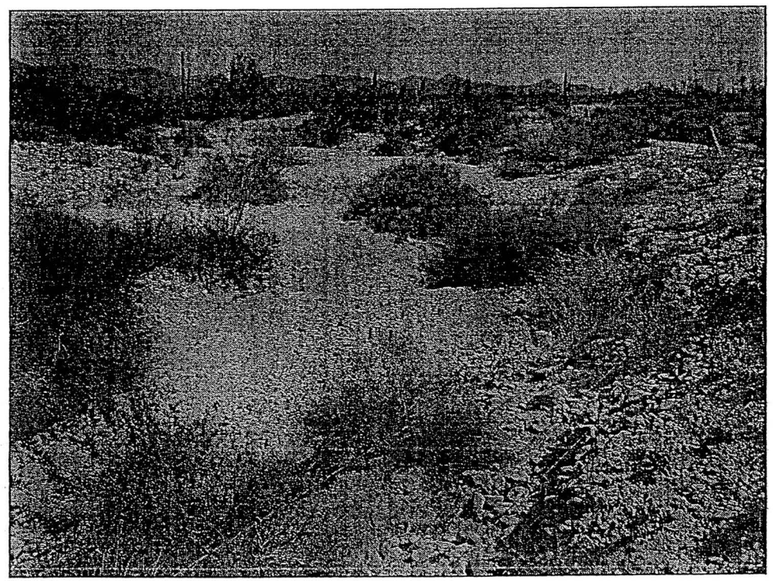
P7/23 Primary Wash #19 - Cross Section #5 – View looking upstream



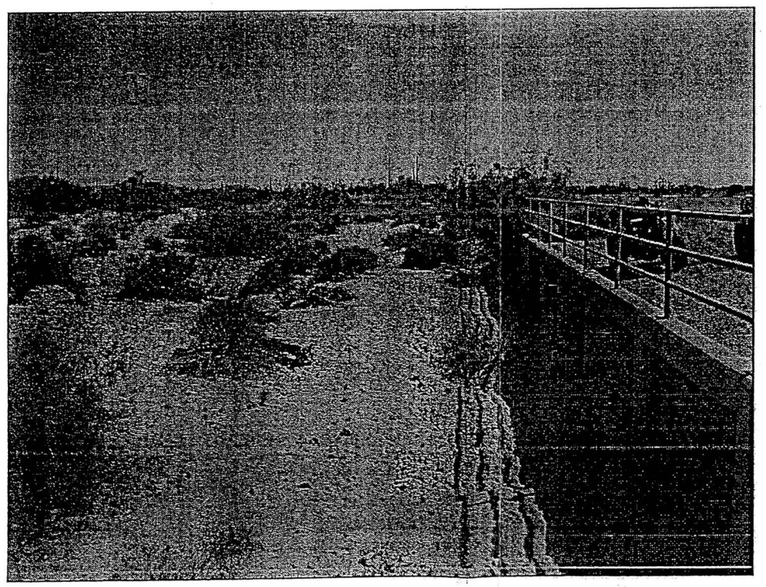
P7/26 Primary Wash #19 - Cross Section #6 – View looking downstream



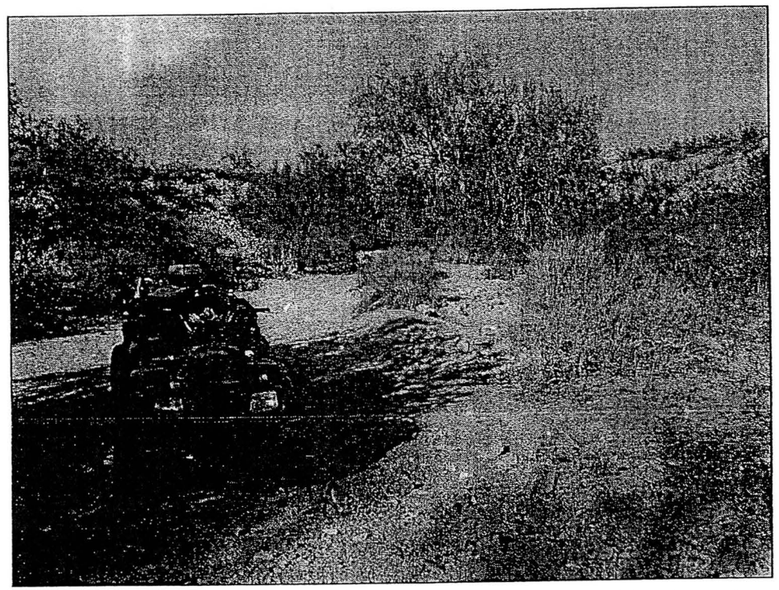
P7/27 Primary Wash #19 - Cross Section #6 – View looking upstream



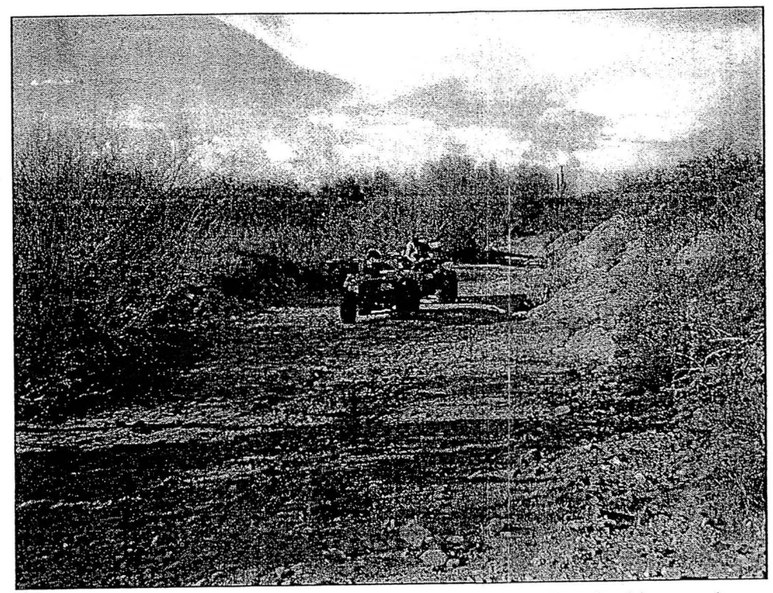
P7/20 Primary Wash #19 – Sun Valley Parkway Bridge Culvert
View looking upstream at upstream channel where re-routed to north



P7/18 Primary Wash #19 – Sun Valley Parkway Bridge Culvert
View looking upstream/south at new re-routed channel and southern culverts

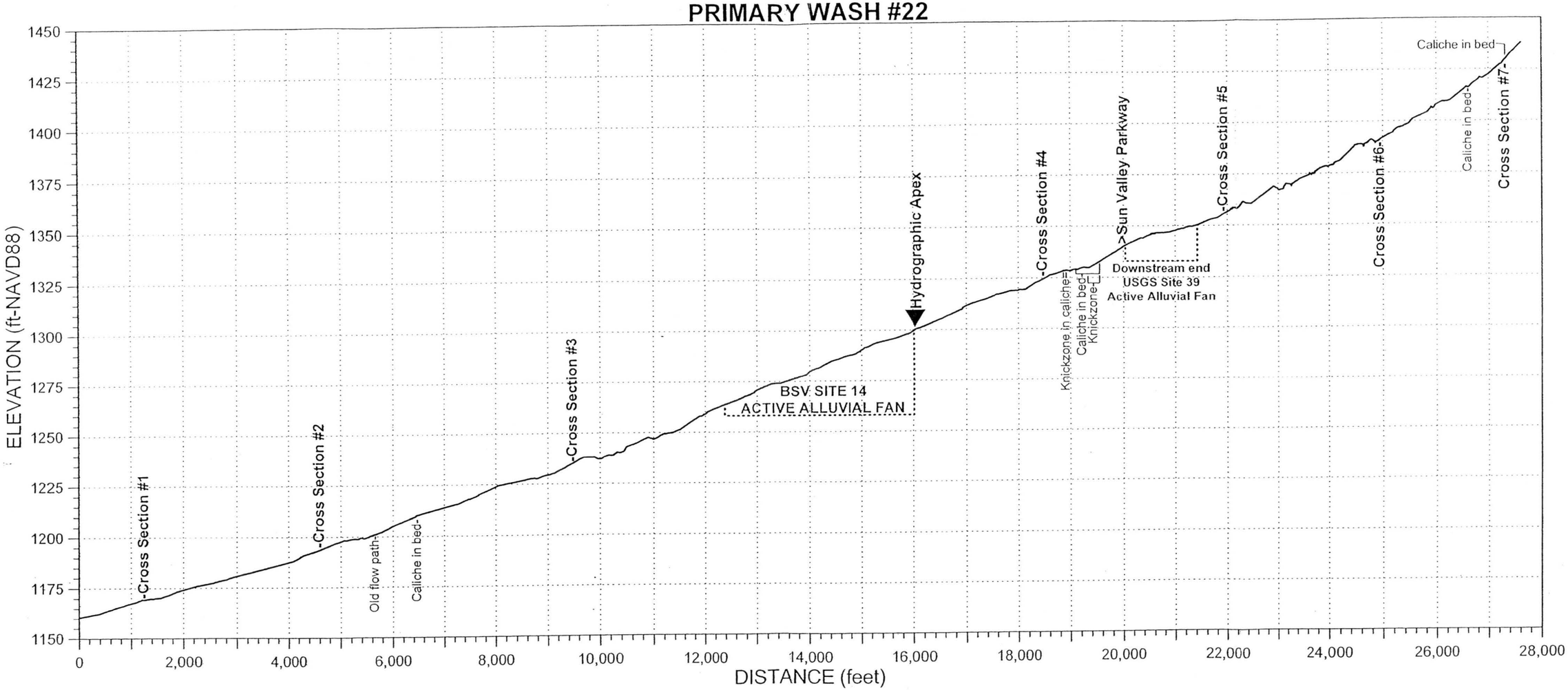


P6/38 Primary Wash #21 North - Cross Section #1 – View looking downstream



P6/39 Primary Wash #21 North - Cross Section #2 – View looking upstream

PRIMARY WASH #22



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW22	1	164	March 11, 2004

North: 910798.5 ft
East: 453821.6 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank	X	2:1	4 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank	X	2:1	4 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	0.5 ft	0.5 ft	

PHOTOS & DESCRIPTION:
P5/18 - View upstream

CRYPTO-BIOTIC CRUST (floodway)
- Absent
- Spotty
- Extensive

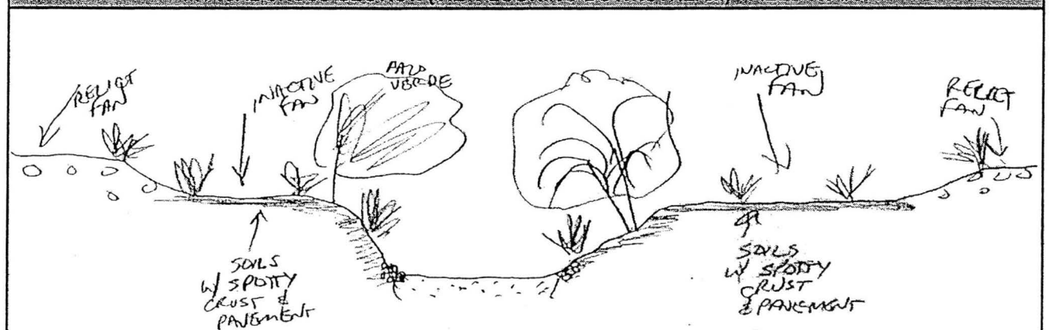
PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #57



XS#57
(CUT XS FROM FEMA MAPS)

Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW22	2	165	March 11, 2004

North: 913097.3 ft
East: 456146.6 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank		1:1	1.5-2 ft	Sand X	Gravel X
Channel		Multiple	X	Right Bank		>6:1	1.5-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P5/19 - View upstream

CRYPTO-BIOTIC CRUST (floodway)
- Absent
- Spotty
- Extensive

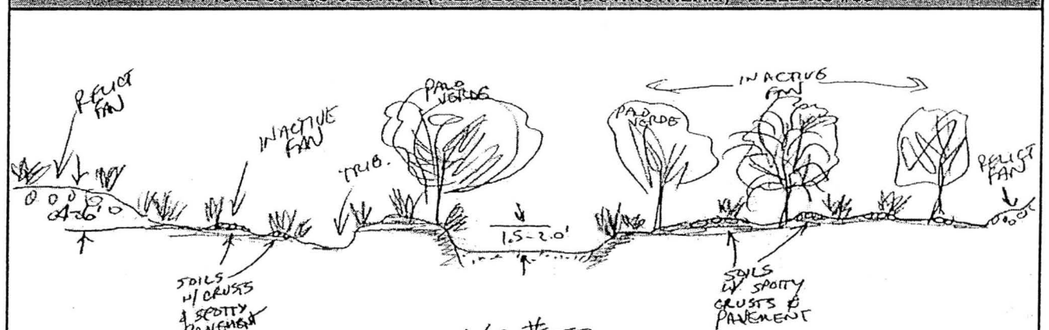
PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #58



XS #58
(CUT XS FROM FEMA MAPS)

Notes:

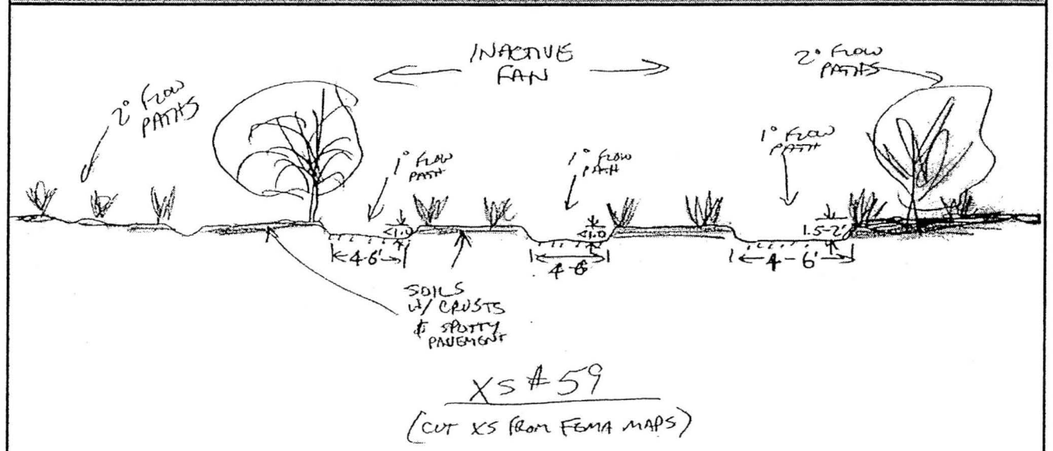
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW22	3	168	March 11, 2004
	North: 916258.3 ft East: 459647.1 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank				Sand__X__	Gravel__X__
Channel		Multiple	X	Right Bank				Cobble____	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X		Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P5/20 - View from right bank to left bank showing multiple shallow flow paths						
Mormon Tea									
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				**Left Bank**	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Prickly Pear				**Right Bank**	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
X-mas C.				NICKZONE:			HEADCUT:		
Hedgehog C.			Absent	Caliche Present:			Caliche Present:		
Fishhook C.			**Spotty**	Dimensions:			Dimensions:		
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #59



Notes:	Flow is split into 2 separate flow paths, other path is to NW.

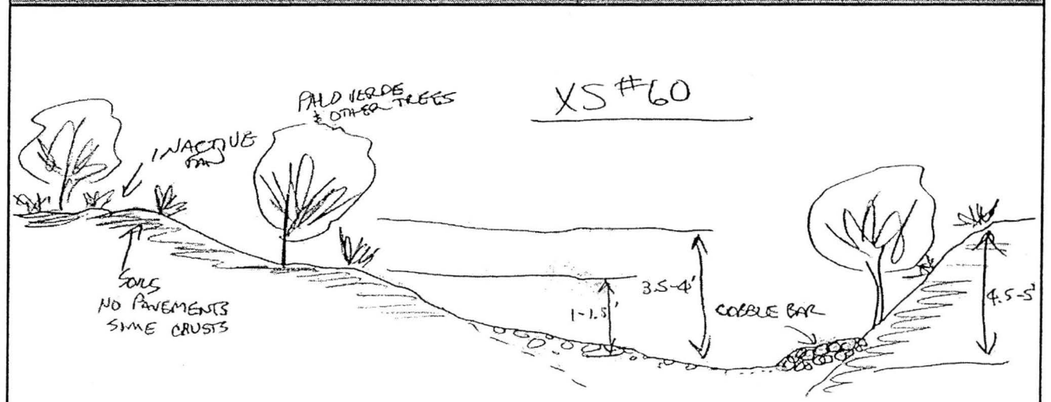
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW22	4	176	March 11, 2004
	North: 921330.9 ft East: 466686.3 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	US	Left Bank		>6:1	3.5 ft	Sand__X__	Gravel__X__
Channel	X	Multiple	DS	Right Bank	X	2:1	4.5 ft	Cobble__X__	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils			X
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1-1.5 ft	1-1.5 ft	1.5-2 ft
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P5/26 - View looking downstream showing wide shallow split flow area.						
Mormon Tea	X		P5/27 - View upstream showing channel						
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				**Left Bank**	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Prickly Pear				**Right Bank**	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
X-mas C.				NICKZONE: Upstream			HEADCUT:		
Hedgehog C.			**Absent**	Caliche Present: YES			Caliche Present:		
Fishhook C.			Spotty	Dimensions: several + 1x3-4ftx200 ft;			Dimensions:		
Ocotillo			Extensive	1x2-3ftx30-40ft					

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #60



Notes:	

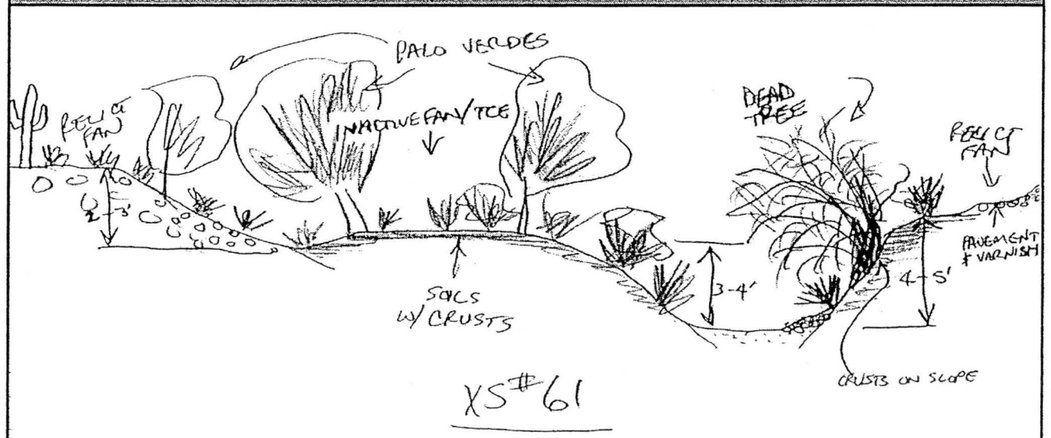
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW22	5	177	March 11, 2004
	North: 921884.8 ft East: 469847.6 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		3:1	2.5-3 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		2:1	3.5-4 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X		Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1-1.5 ft	1-1.5 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P5/28 - View downstream						
Mormon Tea									
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway):	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #61



Notes:

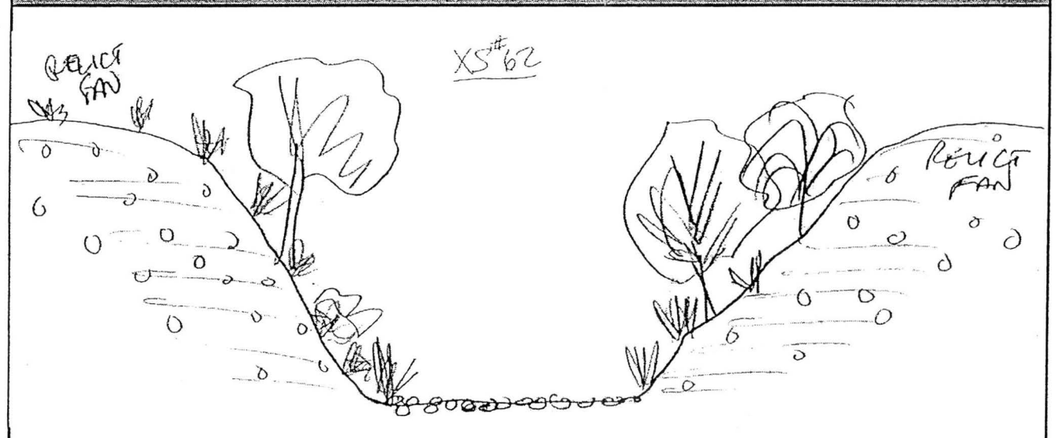
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW22	6	178	March 11, 2004
	North: 922660.9 ft East: 475769.3 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	12-14 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	12-14 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils			X
			Left Bank	?		HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank	?		Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1.5 ft	1.5 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P5/29 - View upstream showing area upstream of road crossing						
Mormon Tea									
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway):	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #



Notes: Locaiton is just downstream of road and power line crossing.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW22	7	181	March 11, 2004
	North: 923761.8 ft East: 474638.0 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank				Sand X	Gravel X
Channel	X	Multiple		Right Bank				Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde		
Creosote		
Brittlebush		
Bursage		
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	X	
Right Bank	X	
Channel	X	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

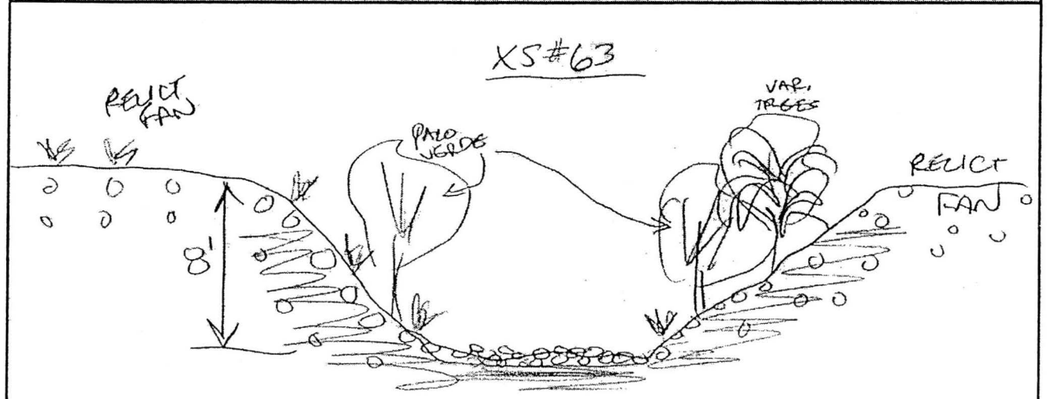
PHOTOS & DESCRIPTION:
P5/30 - View looking upstream to flow split, upstream channels get small

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

Absent
Spotty
Extensive

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #63



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	DATE:	WAYPOINT:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW22	March 11, 2004	D/S Face: 169 U/S Face: 170
		Field Crew: W.J. Spitz, A.B. Alvarado	

ROAD CROSSING - CULVERT DATA

CMP ___ RCP ___ RCBC X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	921544.68	921582.30	3	4 ft	10 ft	US:1.75 ft	DS:1.75 ft		U/S: 0
Easting	468129.35	467996.32	Depth of D/S Incision: 1-3 ft			# 2	# 1	Yes	D/S: 25 %

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	No	6:1	3-4 ft	Sand X	Gravel X
Channel	Yes	Multiple	No	Right bank	No	6:1	3-4 ft	Cobble X	Bldrs

DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	No	6:1	2-3 ft	Sand X	Gravel X
Channel	No	Multiple	No	Right bank	No	6:1	2-3 ft	Cobble X	Bldrs

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above	Channel	Ht. above	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Thalweg	<1.0 ft	Invert	2.0 ft

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above	Channel	Ht. above	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Thalweg		Invert	?

PLAN VIEW - UPSTREAM FACE AND CHANNEL

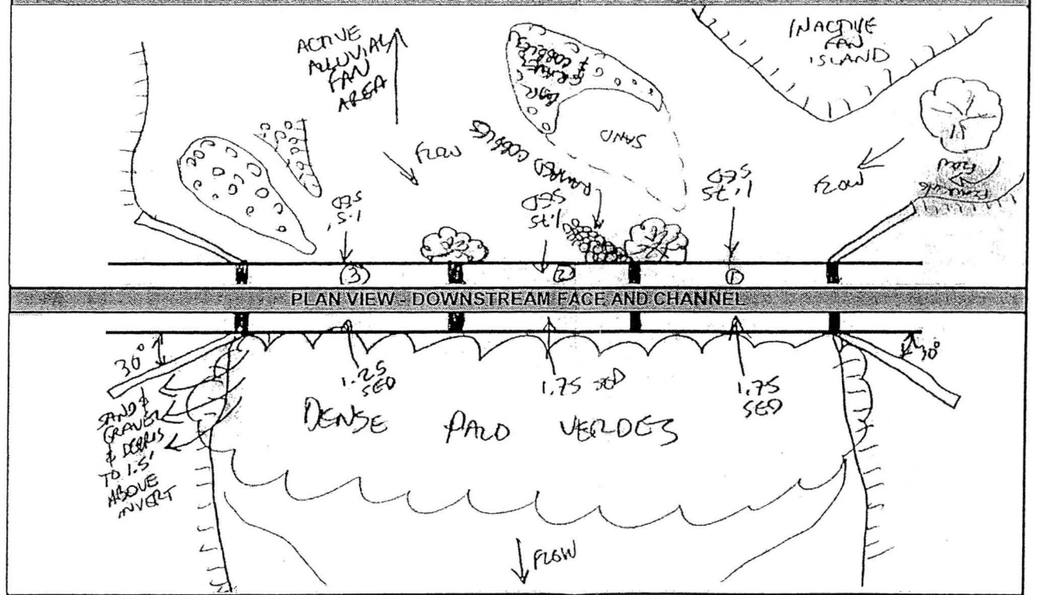


PHOTO #:		NOTES: Downtream channel appears to be degrading
U/S Face	5-22	View of face
View U/S	5-23	View upstream - note upstream active alluvial fan area
D/S Face	5-21	View south (TR to TL) showing barrels
View D/S	5-24	View downstream in area cleared of trees below power line crossing
Other		

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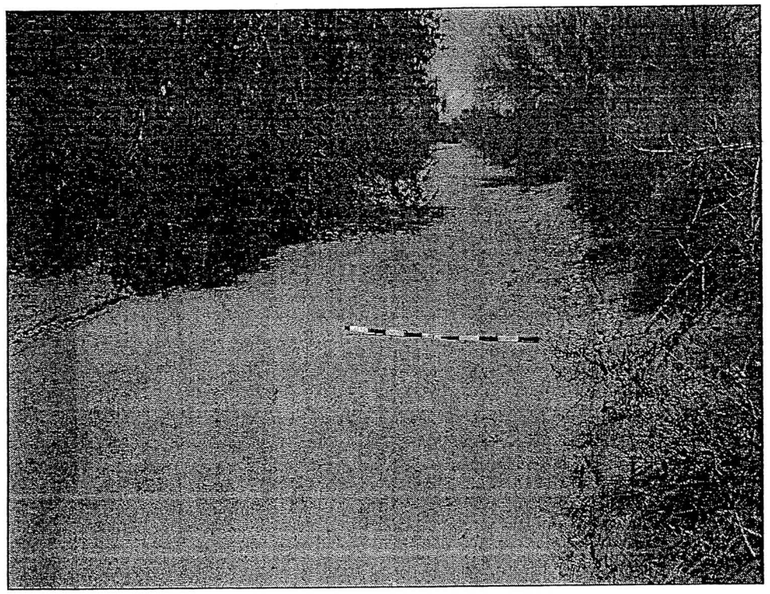
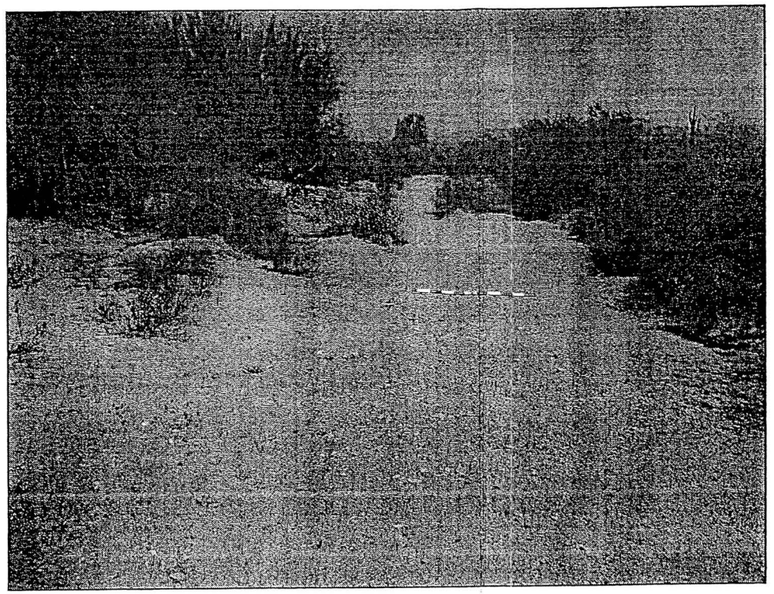
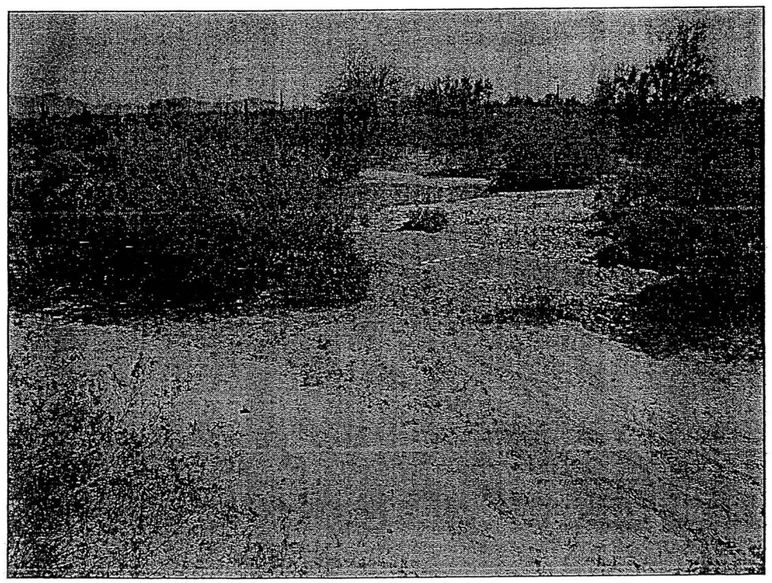


P5/18 Primary Wash #22 - Cross Section #1 – View looking upstream

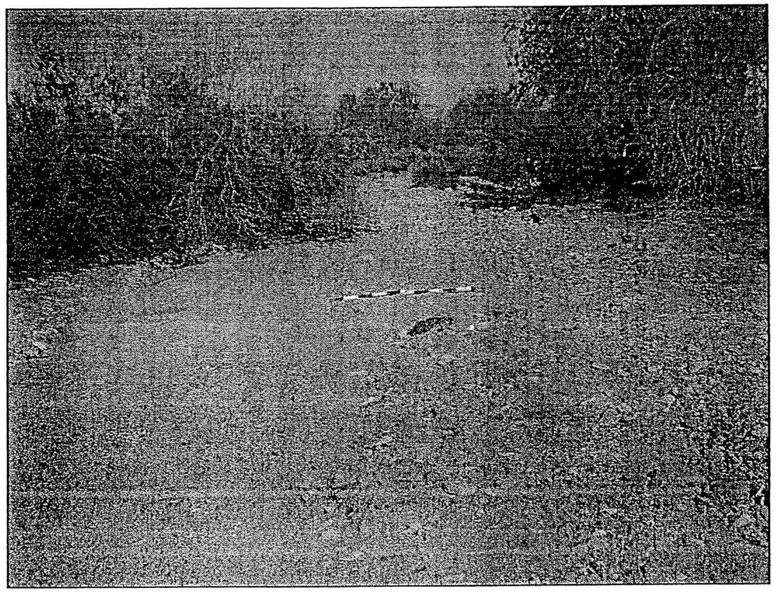


P5/19 Primary Wash #22 - Cross Section #2 – View looking upstream



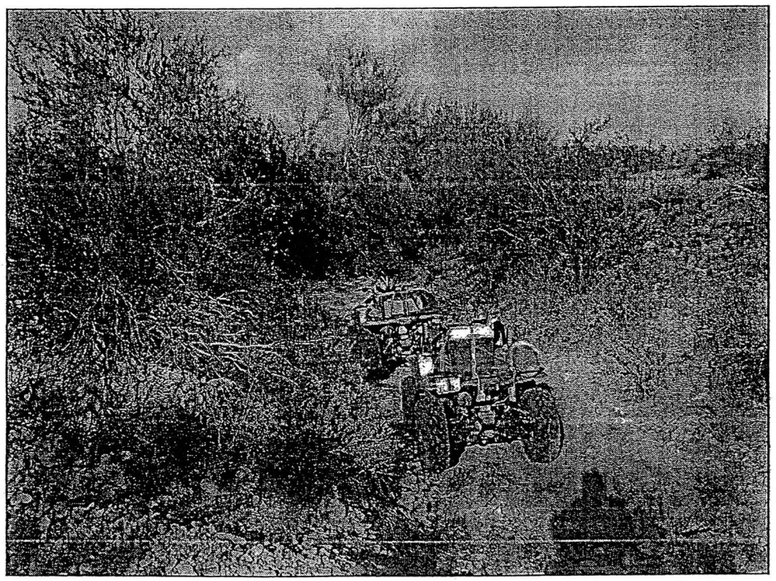
P5/20 Primary Wash #22 - Cross Section #3 – View looking upstream from right bank to left bank

P5/26 Primary Wash #22 - Cross Section #4 – View looking downstream

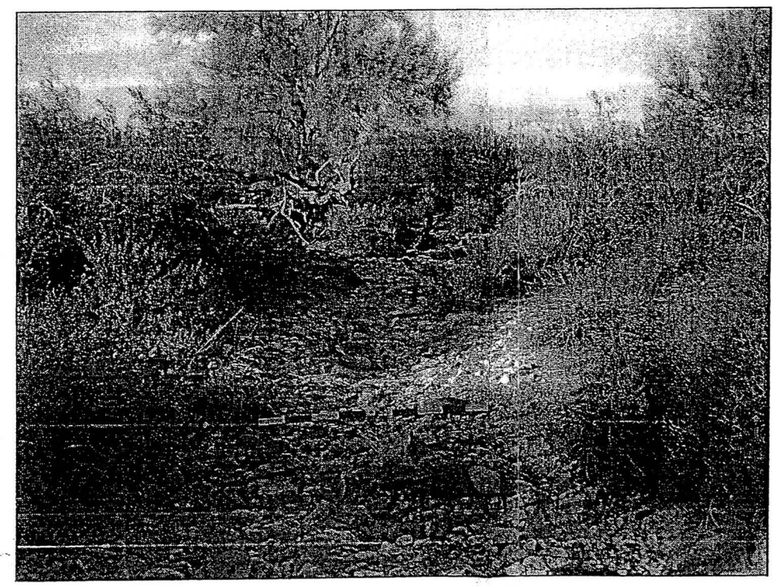


P5/27 Primary Wash #22 - Cross Section #4 – View looking upstream

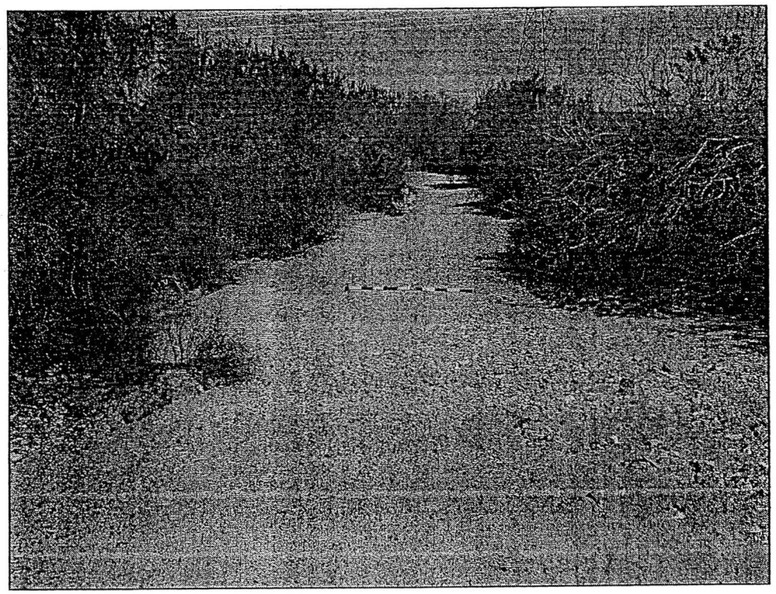
P5/28 Primary Wash #22 - Cross Section #5 – View looking downstream



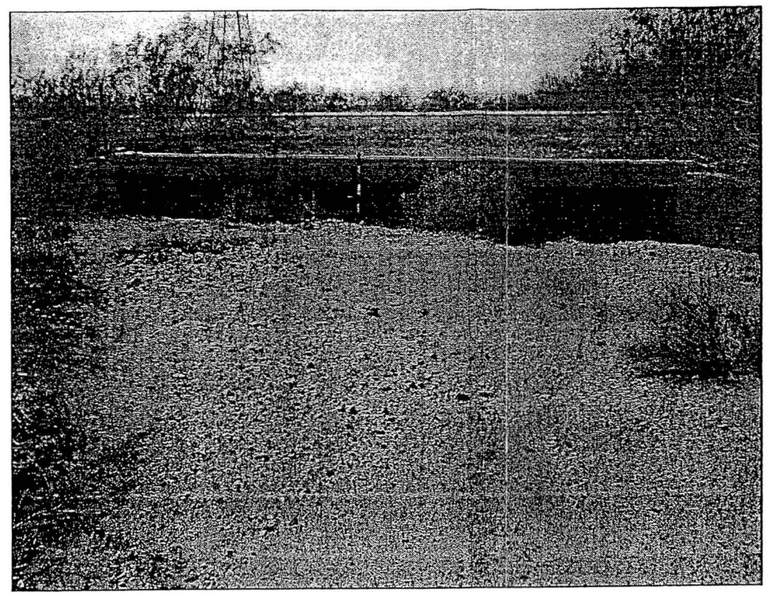
P5/29 Primary Wash #22 - Cross Section #6 – View looking upstream



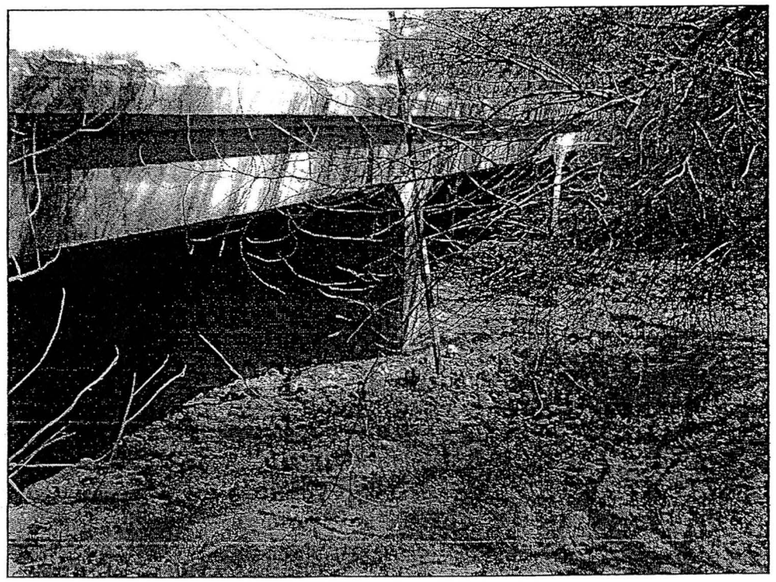
P5/30 Primary Wash #22 - Cross Section #7 – View looking upstream



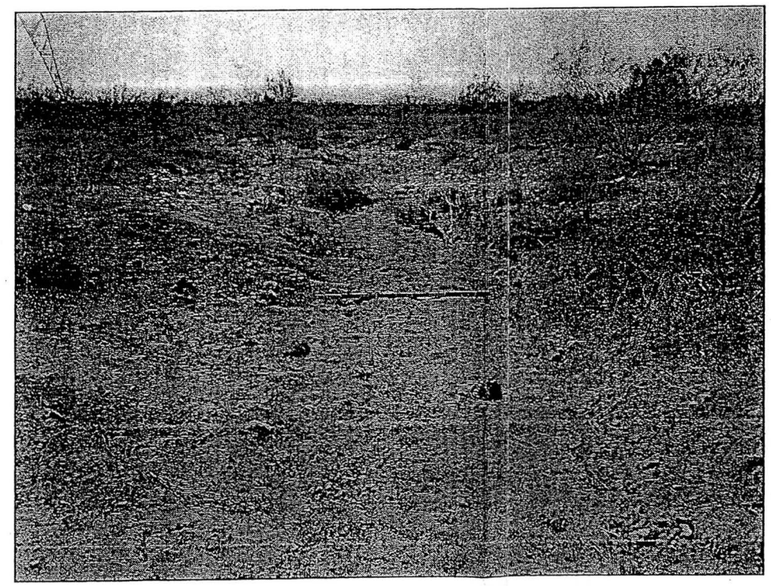
P5/23 Primary Wash #22 – Sun Valley Parkway Bridge Culvert
View looking upstream at channel upstream of bridge



P5/22 Primary Wash #22 – Sun Valley Parkway Bridge Culvert
View looking downstream/west at upstream bridge face

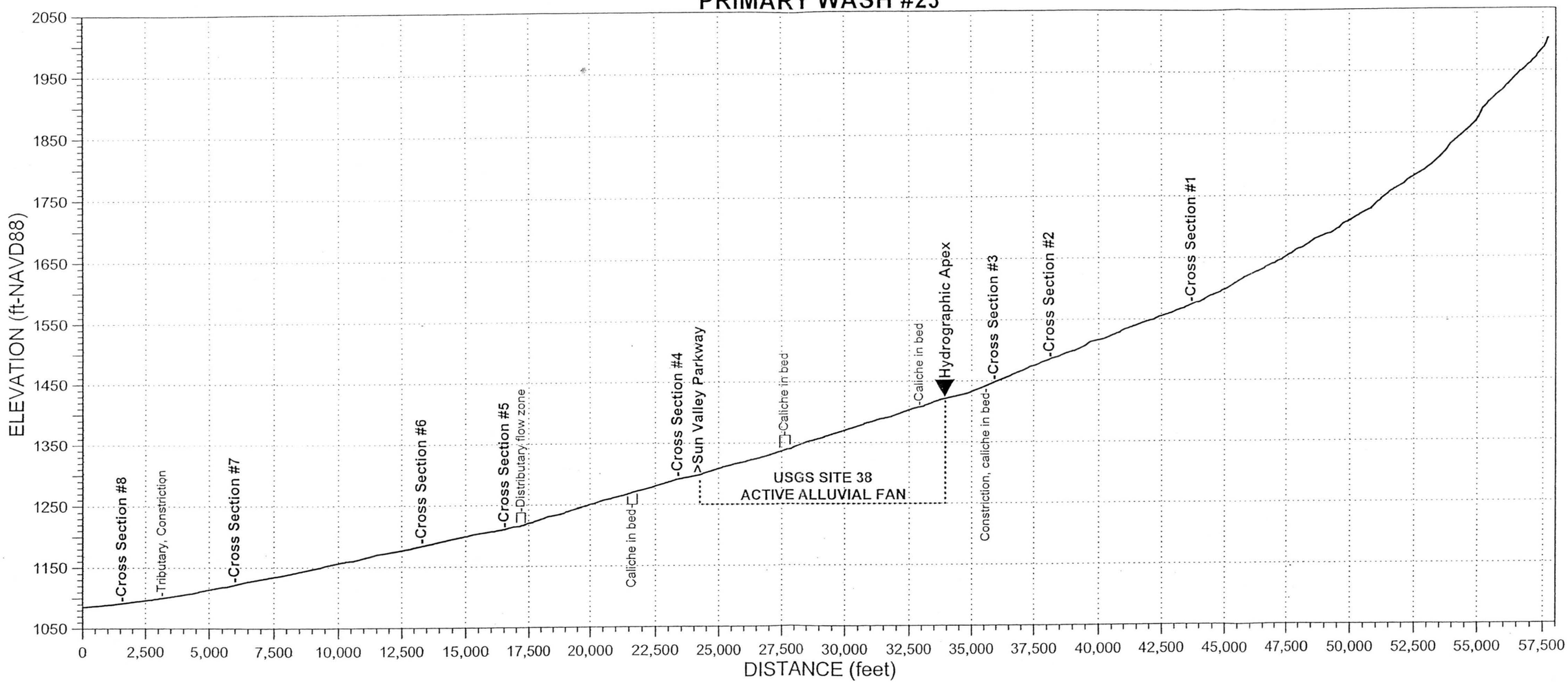


P5/21 Primary Wash #22 – Sun Valley Parkway Bridge Culvert
View looking upstream/south at downstream bridge face



P5/24 Primary Wash #22 – Sun Valley Parkway Bridge Culvert
View looking downstream at downstream channel

PRIMARY WASH #23



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW23	1	138	March 10, 2004

North: 923349.1 ft
East: 483924.2 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	10 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	30-35 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
							Extensive	Spotty	Absent
In-channel	X	X	Left Bank			Varnish			X
Marginal	X		Right Bank	4-5 ft		Pavement			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Soils		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	HIGH WATER MARKS/DEBRIS			
			Left Bank	full bank		Ht. Above Thalweg	Left Bank	Right Bank	Channel
Palo Verde	X		Right Bank	full bank					1-3 ft
Creosote	X		Channel						

PHOTOS & DESCRIPTION:
P4/34 - View upstream
P4/35 - View downstream

Brittlebush	X
Bursage	X
Mormon Tea	X
Tamarisk	
Saguaro C.	
Cholla C.	
Barrel C.	
Prickly Pear	
X-mas C.	
Hedgehog C.	
Fishhook C.	
Ocotillo	

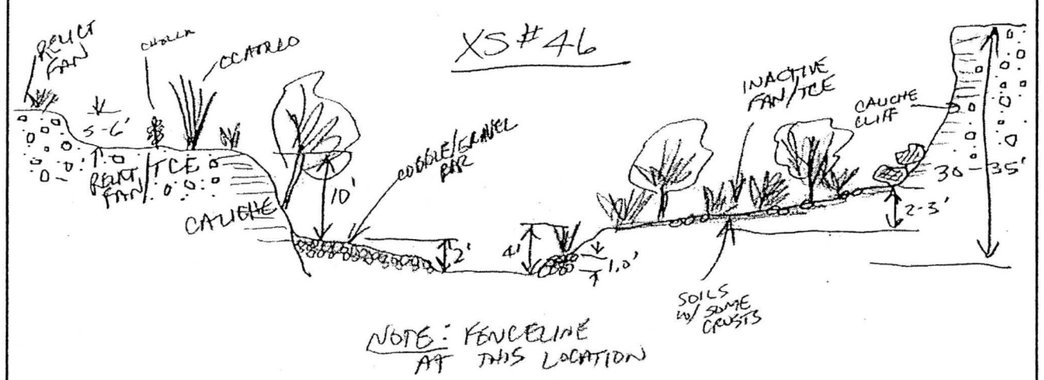
CRYPTO-BIOTIC CRUST (floodway): Absent / **Spotty** / Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE: Caliche Present: / Dimensions:
HEADCUT: Caliche Present: / Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #46



Notes: Fenceline at this location. The channel upstream and downstream is steep with boulder/cobble bed and oversteepened areas. Boulder terraces along reach control grade.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW23	2	139	March 10, 2004

North: 921636.8 ft
East: 479484.6 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		3:1	3.5-4 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		4:1	12 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
							Extensive	Spotty	Absent
In-channel	X		Left Bank	4 ft		Varnish			X
Marginal	X		Right Bank			Pavement			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Soils		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	HIGH WATER MARKS/DEBRIS			
			Left Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Palo Verde	X		Right Bank	full bank					
Creosote	X		Channel						

PHOTOS & DESCRIPTION:
P4/36 - View upstream
P4/37 - View downstream

Brittlebush	X
Bursage	X
Mormon Tea	X
Tamarisk	
Saguaro C.	
Cholla C.	
Barrel C.	
Prickly Pear	
X-mas C.	
Hedgehog C.	
Fishhook C.	
Ocotillo	

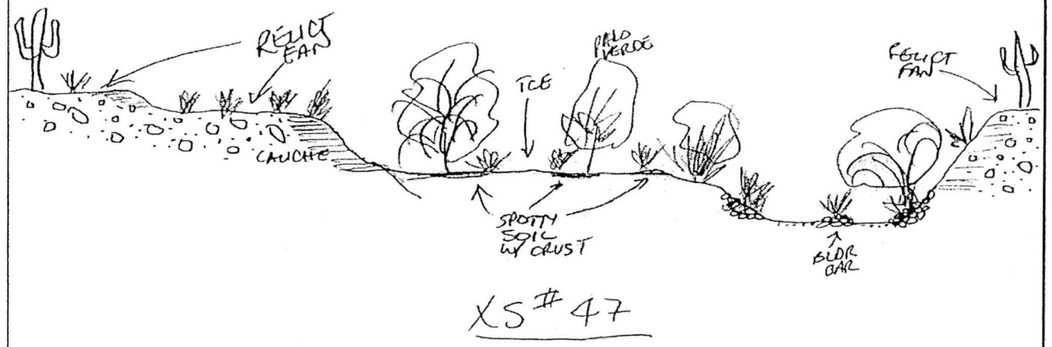
CRYPTO-BIOTIC CRUST (floodway): Absent / **Spotty** / Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE: Caliche Present: / Dimensions:
HEADCUT: Caliche Present: / Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #47



Notes: Very steep upstream and downstream with boulder bars on banks and in bed - overtopped terraces in places due to debris/boulder deposits.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW23	3	140	March 10, 2004

North: 921192.3 ft
East: 477486.9 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel		Multiple		Right Bank	

H:V	Height	BED MATERIAL	
2:1	6 ft	Sand X	Gravel X
>6:1	4-5 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X		Left Bank	6 ft	
Marginal	X		Right Bank	4 ft	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

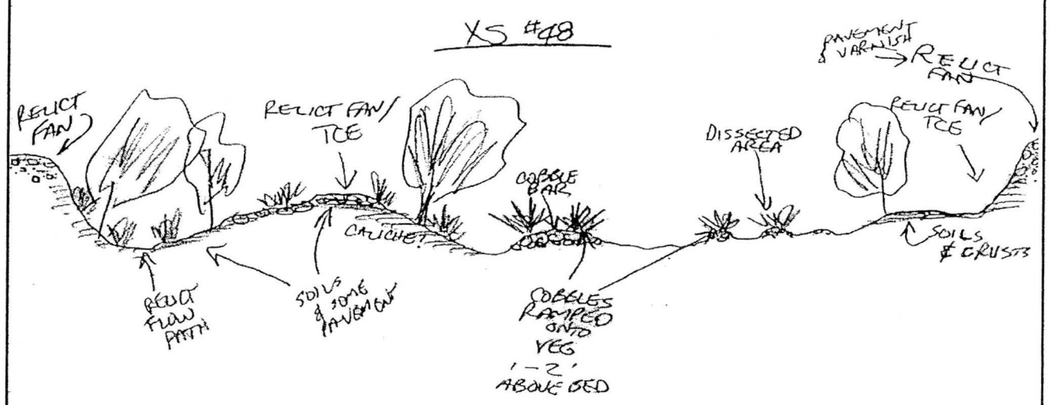
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed	Thickness
Palo Verde	X		Left Bank	
Creosote	X		Right Bank	
Brittlebush	X	X	Channel	
Bursage	X	X		
Mormon Tea	X	X		
Tamarisk				
Saguaro C.				
Cholla C.				
Barrel C.				
Prickly Pear				
X-mas C.				
Hedgehog C.				
Fishhook C.				
Ocotillo				

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1.5- 2 ft	1.5-2 ft	2-3 ft

PHOTOS & DESCRIPTION:
P4/38 - View upstream
P4/39,40,41 Pan - Looking downstream; note boulder bars, sediment ramping, and bar dissection.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #48



Notes: Located about 1/4 mile upstream of hydrographic apex of fan at USGS Site 38. Just downstream from cross section have boulder bar/deposition that is being dissected.

AYRES ASSOCIATES

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW23	4	148	March 11, 2004

North: 914260.1 ft
East: 467439.4 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single	X	Left Bank	
Channel		Multiple		Right Bank	

H:V	Height	BED MATERIAL	
3:1	1.5-2 ft	Sand X	Gravel X
3:1	1.5-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

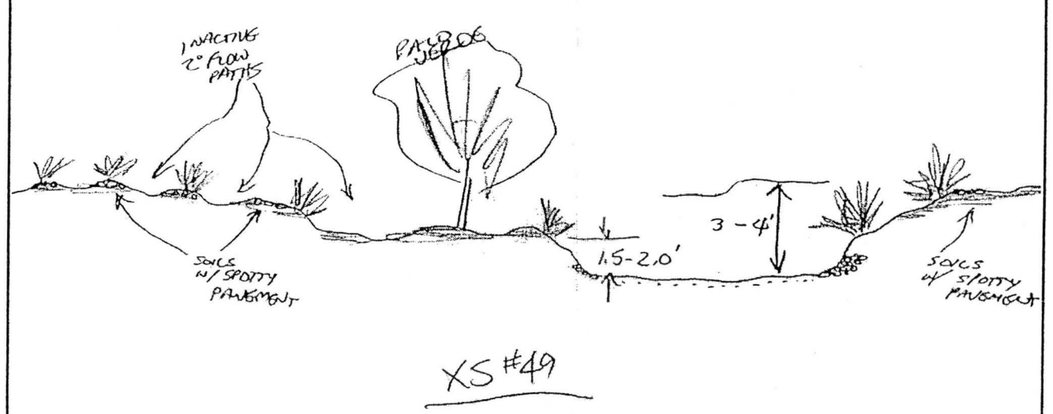
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed	Thickness
Palo Verde	X		Left Bank	
Creosote	X		Right Bank	
Brittlebush	X		Channel	
Bursage	X			
Mormon Tea				
Tamarisk				
Saguaro C.				
Cholla C.				
Barrel C.				
Prickly Pear				
X-mas C.				
Hedgehog C.				
Fishhook C.				
Ocotillo				

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P5/1 - View upstream
P5/2 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #49



Notes: Reach/cross section is about 300 feet downstream of downstream end of eroding reach below Sun Valley Parkway culvert.

AYRES ASSOCIATES

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW23	5	154	March 11, 2004

North: 909297.4 ft
East: 462949.3 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
1:1	5 ft	Sand__X__	Gravel__X__
4:1	3 ft	Cobble__X__	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal			Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

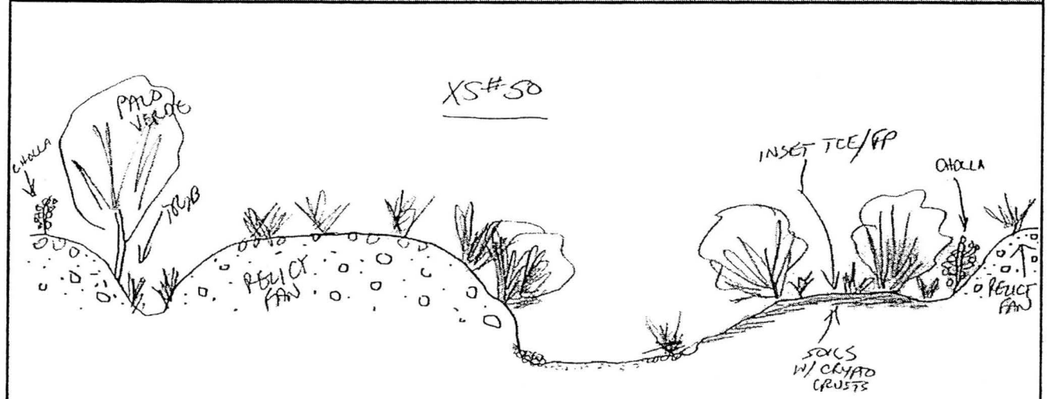
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed	Thickness
			Left Bank	
Palo Verde			Right Bank	
Creosote	X		Channel	
Brittlebush	X			
Bursage	X			
Mormon Tea				
Tamarisk				
Saguaro C.				
Cholla C.				
Barrel C.				
Prickly Pear				
X-mas C.				
Hedgehog C.				
Fishhook C.				
Ocotillo				

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1.5 ft	1-1.5 ft	1-1.5 ft

PHOTOS & DESCRIPTION:
P5/3 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #50



Notes: Upstream to next cross section - channel has extensive divided flow and flow splits within entrenched floodway.

AYRES ASSOCIATES

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW23	6	156	March 11, 2004

North: 907767.5 ft
East: 460385.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single		Left Bank	
Channel	X	Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
1:1	4-5 ft	Sand__X__	Gravel__X__
1:1	4-5 ft	Cobble__X__	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal			Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

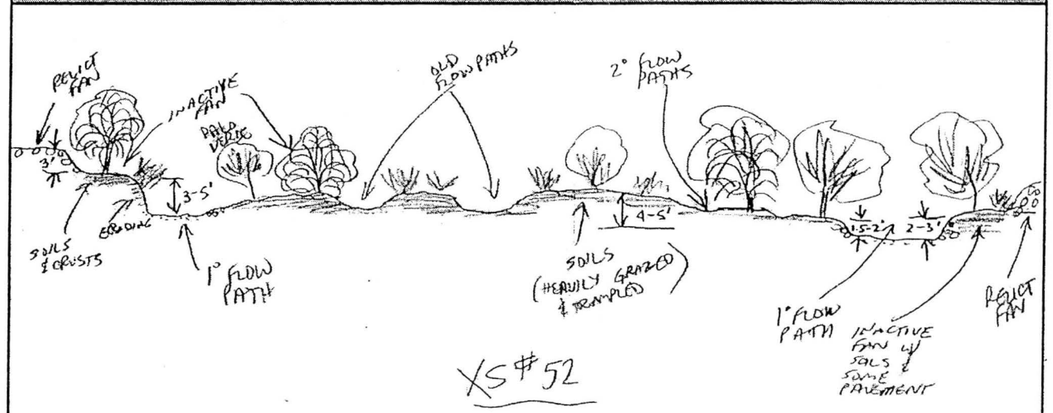
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed	Thickness
			Left Bank	
Palo Verde	X		Right Bank	
Creosote	X		Channel	
Brittlebush	X			
Bursage	X			
Mormon Tea				
Tamarisk				
Saguaro C.				
Cholla C.				
Barrel C.				
Prickly Pear				
X-mas C.				
Hedgehog C.				
Fishhook C.				
Ocotillo				

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P5/5 - View looking downstream on left bank primary flow path
P5/6 - View looking upstream on right bank primary flow path

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #52



Notes:

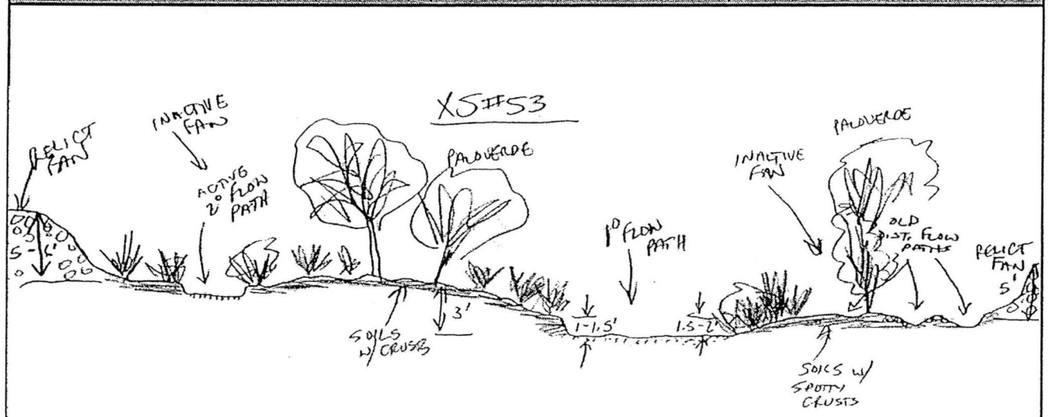
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW23	7	157	March 11, 2004
	North: 901922.6 ft East: 456352.6 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single		Left Bank		>3:1	1.5-2 ft	Sand X	Gravel X
Channel	X	Multiple	X	Right Bank		>6:1	1.5-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel		X	Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				<1 ft	<1 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P5/7 - View looking downstream showing another flow split around vegetation						
Mormon Tea	X	X	P5/8 - View upstream						
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #53



Notes:

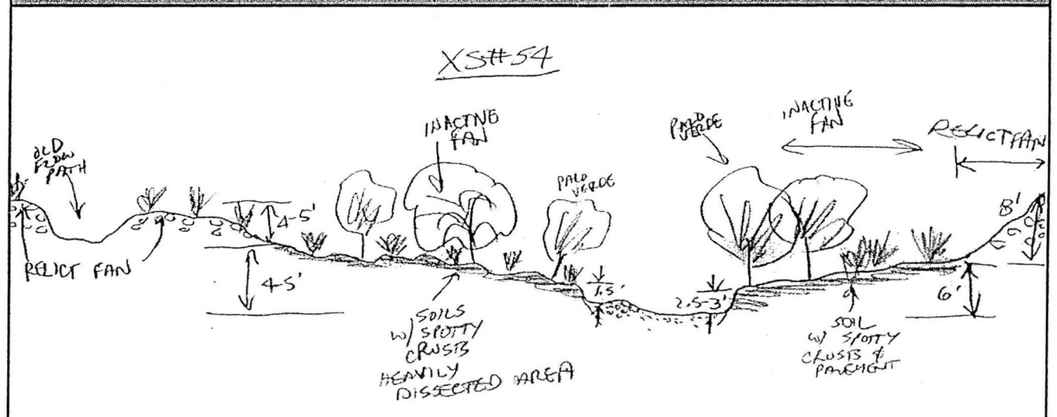
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW23	8	159	March 11, 2004
	North: 898800.5 ft East: 453588.4 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	1.5-2 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		2:1	2.5-3 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel		X	Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1-1.5 ft	1-1.5 ft	1-1.5 ft
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P5/10 - View downstream, note snag on left bank side of channel						
Mormon Tea	X	X	P5/11 - View upstream toward right bank tributary confluence						
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #54



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	DATE:	WAYPOINT:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW23 (Downstream of USGS Site 38 Alluvial Fan)	March 10, 2004	D/S Face: 147 U/S Face: 146
		Field Crew: W.J. Spitz, A.B. Alvarado	

ROAD CROSSING - CULVERT DATA

CMP ___ RCP ___ RCBC X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in	% Blockage
Northing	914860.48	914793.34	6	4 ft	10 ft	US:2.75 ft	DS:1.4 ft	Barrels	U/S: 75%
Easting	468079.72	467949.08	Depth of D/S Incision: 0 ft			# 2	# 6	Yes	D/S: 30%

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	No	Left bank	No	---	---	Sand X	Gravel X
Channel	No	Multiple	Yes	Right bank	No	---	---	Cobble X	Bldrs ___

DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	Yes	Left bank	No	>6:1	1-2 ft	Sand X	Gravel X
Channel	No	Multiple	No	Right bank	No	>6:1	1-2 ft	Cobble X	Bldrs X

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				>2.75 ft

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain		1-1.5 ft		2.75 ft

PLAN VIEW - DOWNSTREAM FACE AND CHANNEL

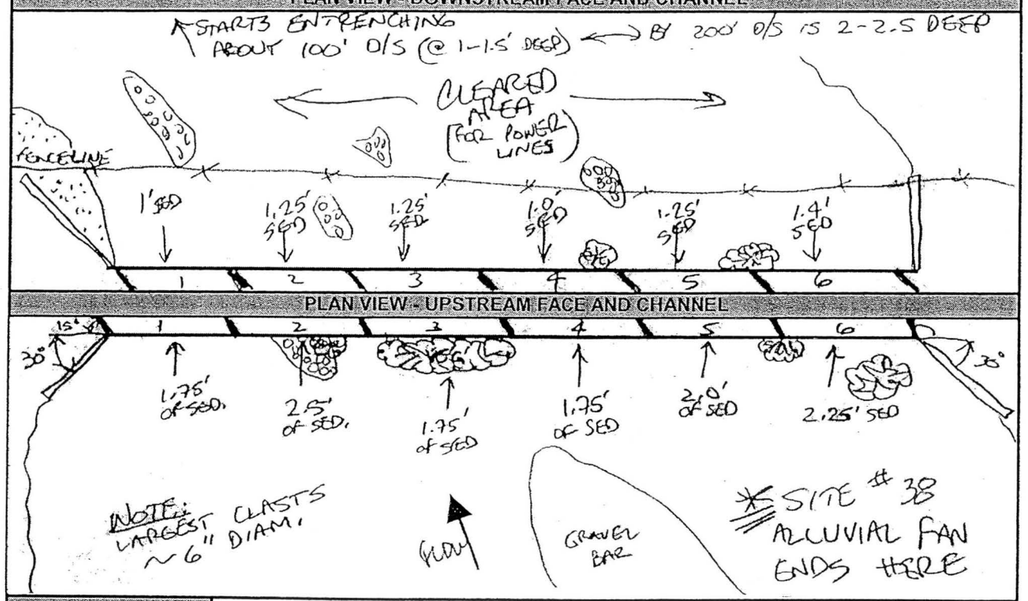
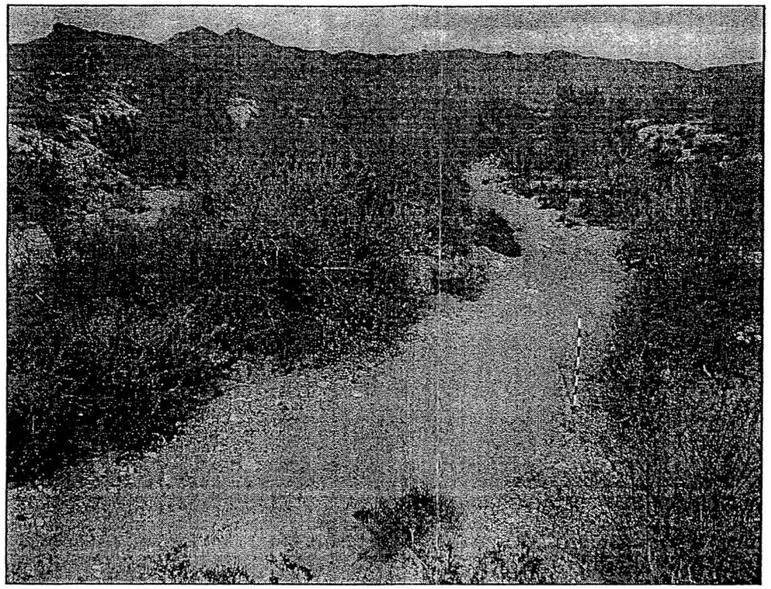
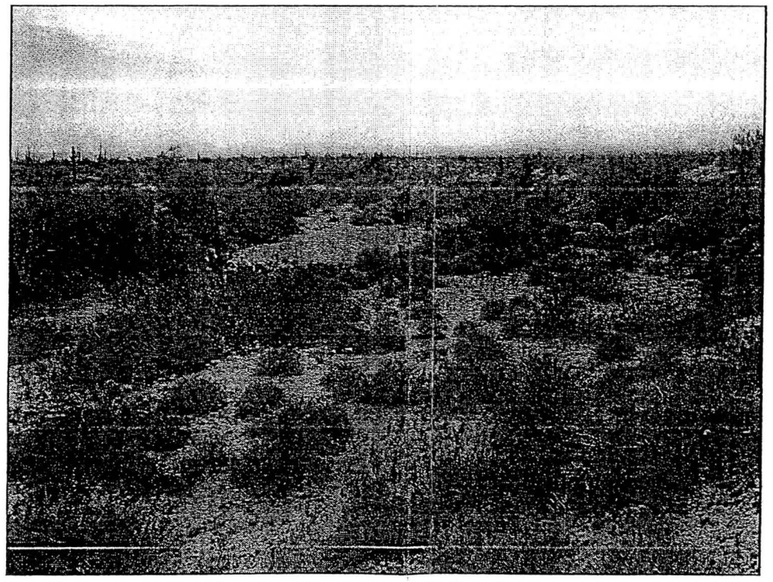


PHOTO #		NOTES: Tree clearing downstream below power lines
U/S Face	4-43,44	View north, View downstream
View U/S	4-45	View upstream
D/S Face	4-47	View north
View D/S	4-46	View downstream - numerous Palo Verde trees cut down and removed - note apparent incision depth

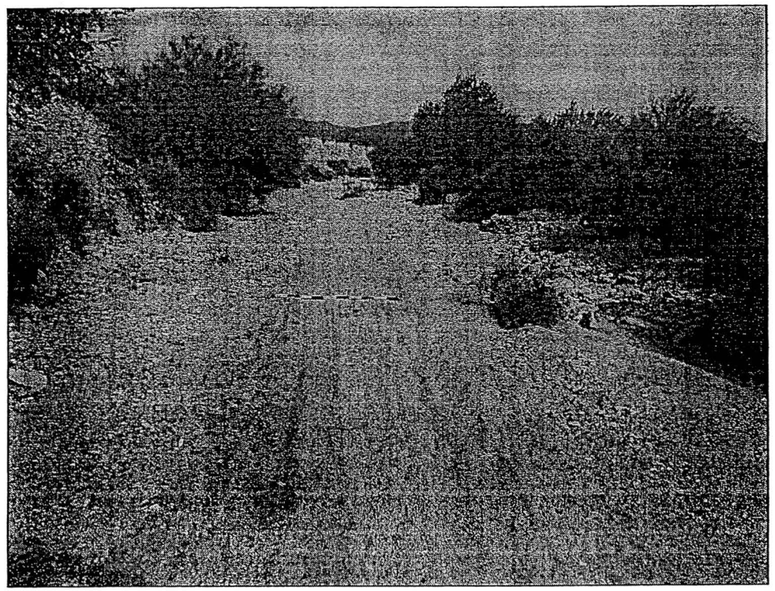
AYRES ASSOCIATES



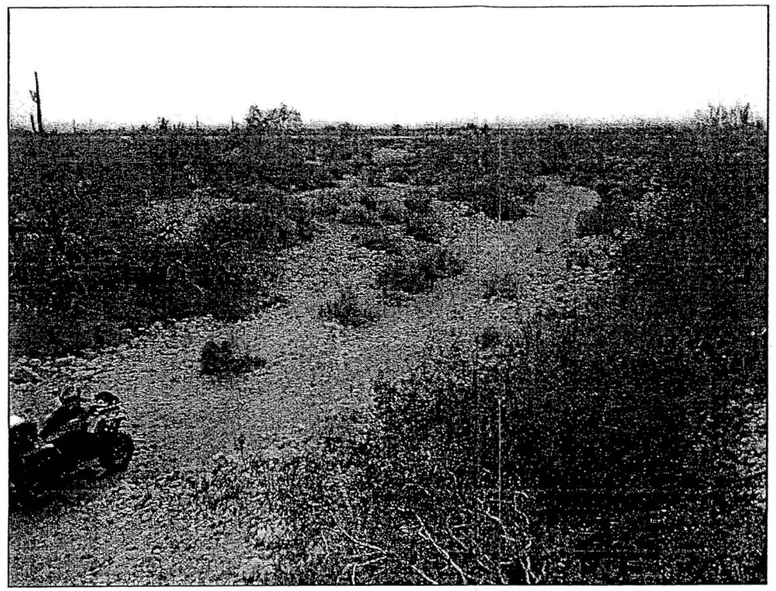
P4/34 Primary Wash #23 - Cross Section #1 – View looking upstream



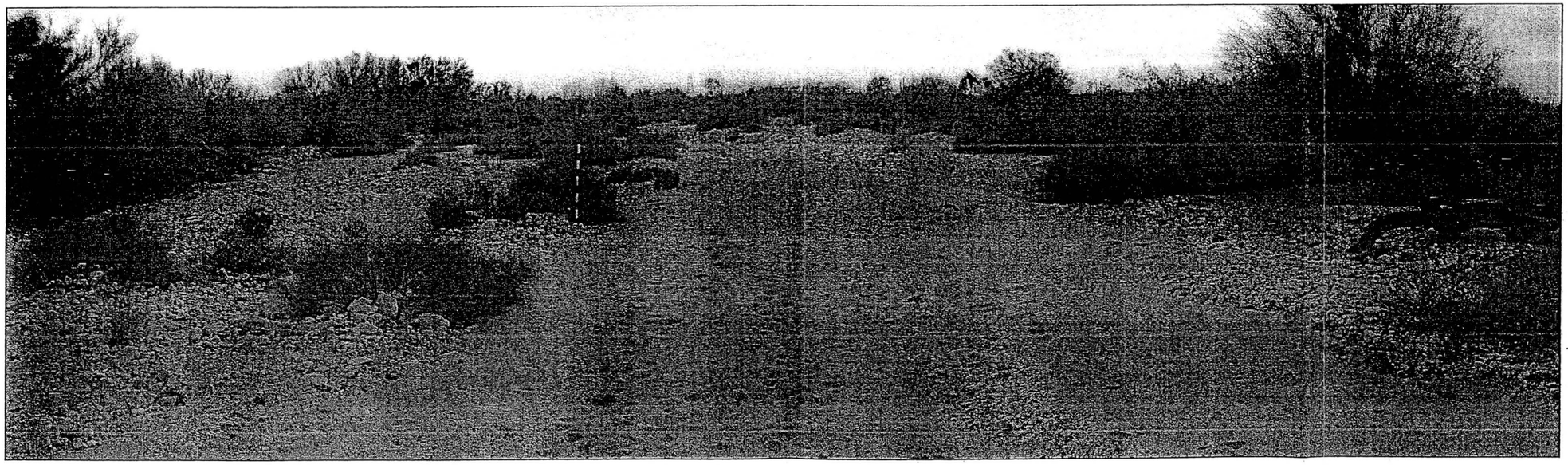
P4/35 Primary Wash #23 - Cross Section #1 – View looking downstream



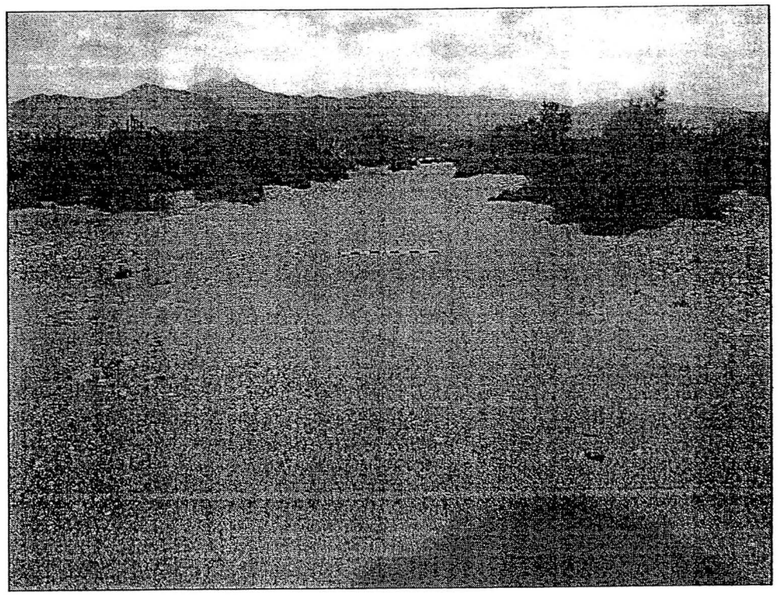
P4/36 Primary Wash #23 - Cross Section #2 – View looking upstream



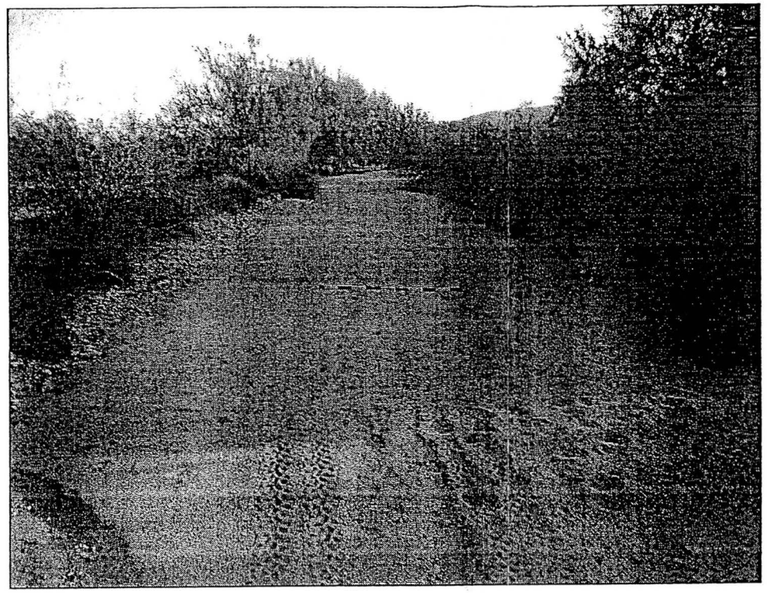
P4/37 Primary Wash #23 - Cross Section #2 – View looking downstream



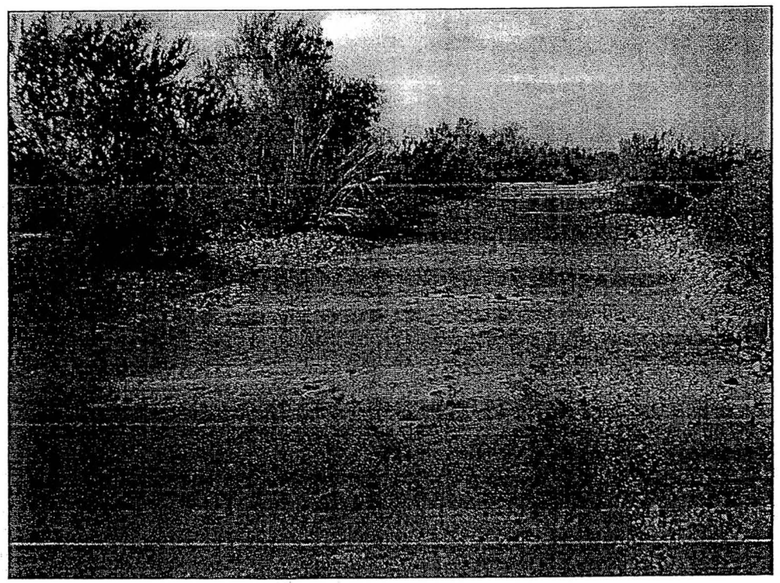
P4/39,40,41 Primary Wash #23 - Cross Section #3 – Panorama view looking downstream



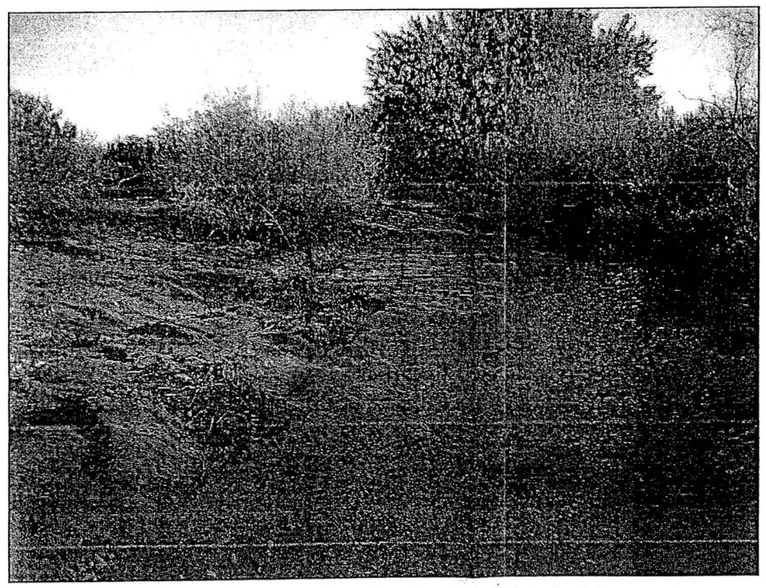
P4/38 Primary Wash #23 - Cross Section #3 – View looking upstream



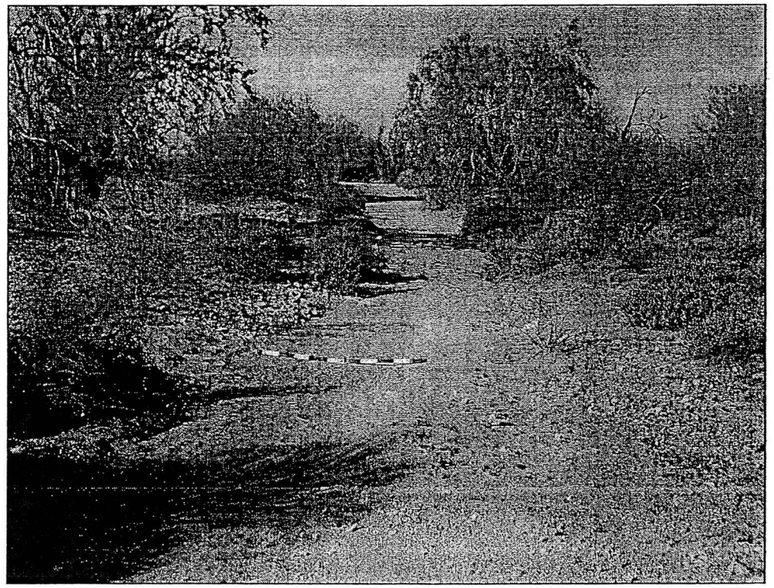
P5/1 Primary Wash #23 - Cross Section #4 – View looking upstream



P5/2 Primary Wash #23 - Cross Section #4 – View looking downstream

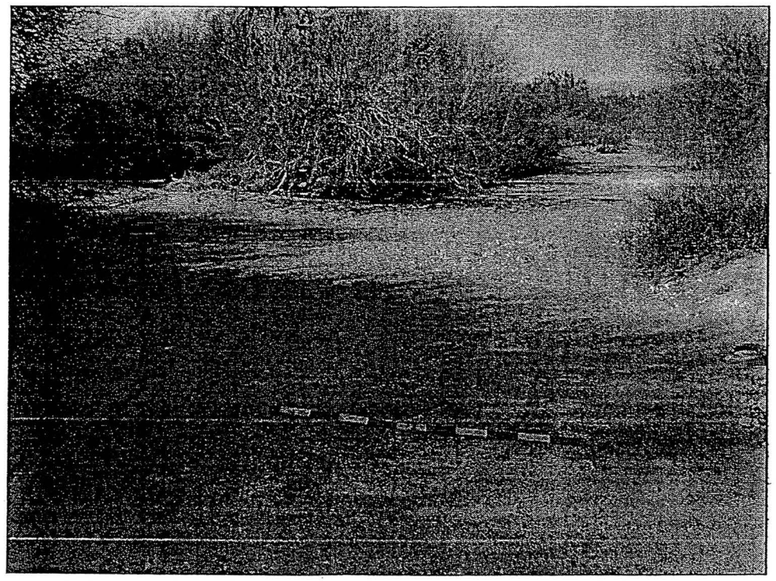


P5/3 Primary Wash #23 - Cross Section #5 – View looking upstream

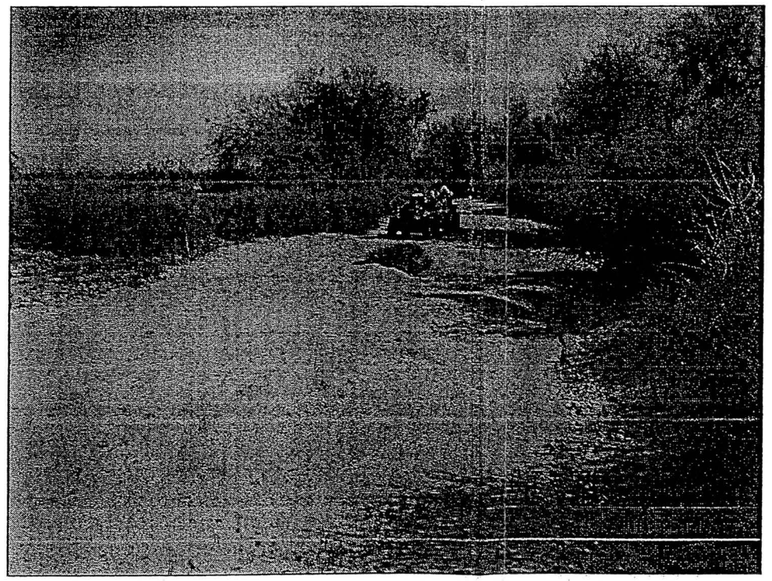


P5/5 Primary Wash #23 - Cross Section #6 – View looking downstream

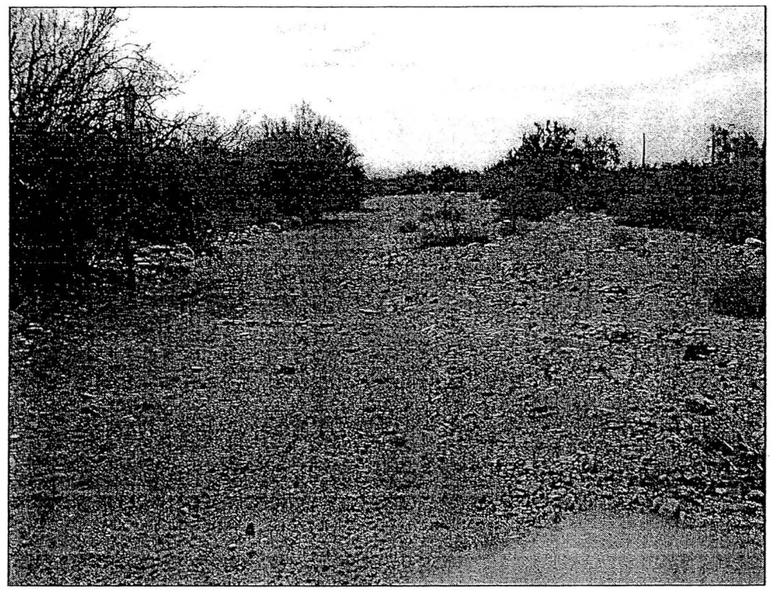
P5/6 Primary Wash #23 - Cross Section #6 – View looking upstream



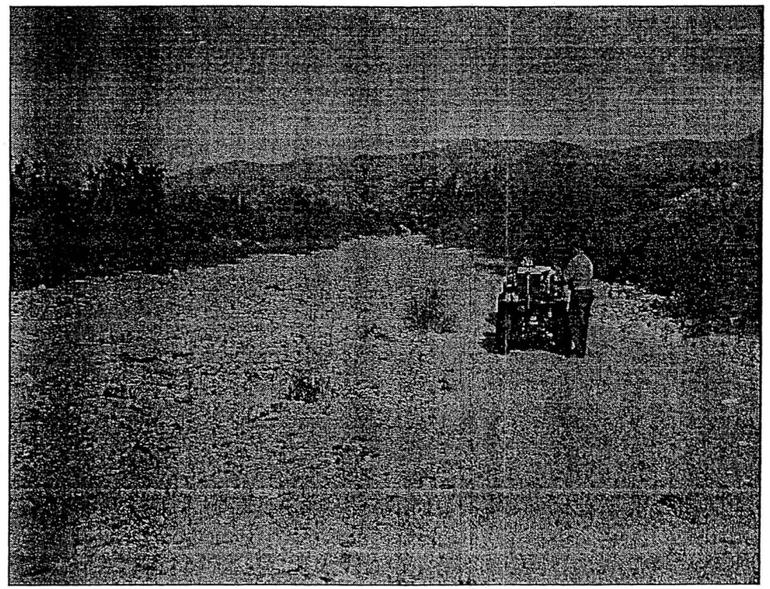
P5/7 Primary Wash #23 - Cross Section #7 – View looking downstream



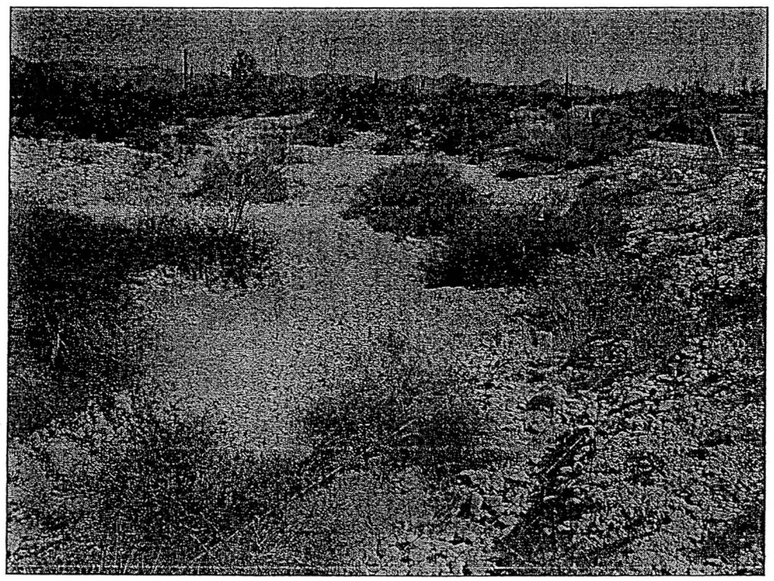
P5/8 Primary Wash #23 - Cross Section #7 – View looking upstream



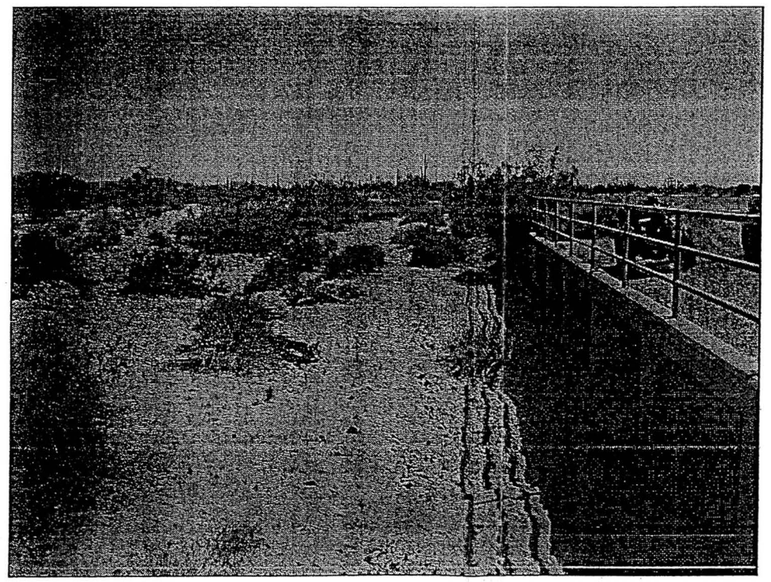
P7/26 Primary Wash #19 - Cross Section #6 – View looking downstream



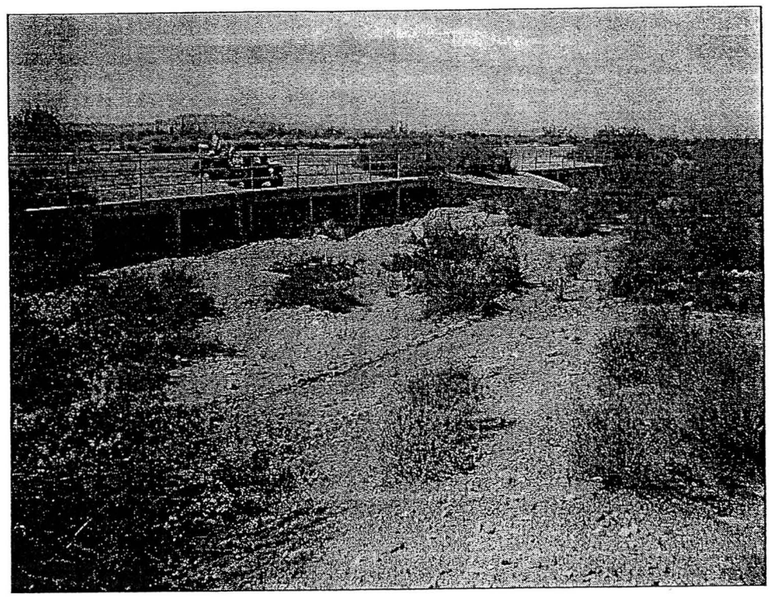
P7/27 Primary Wash #19 - Cross Section #6 – View looking upstream



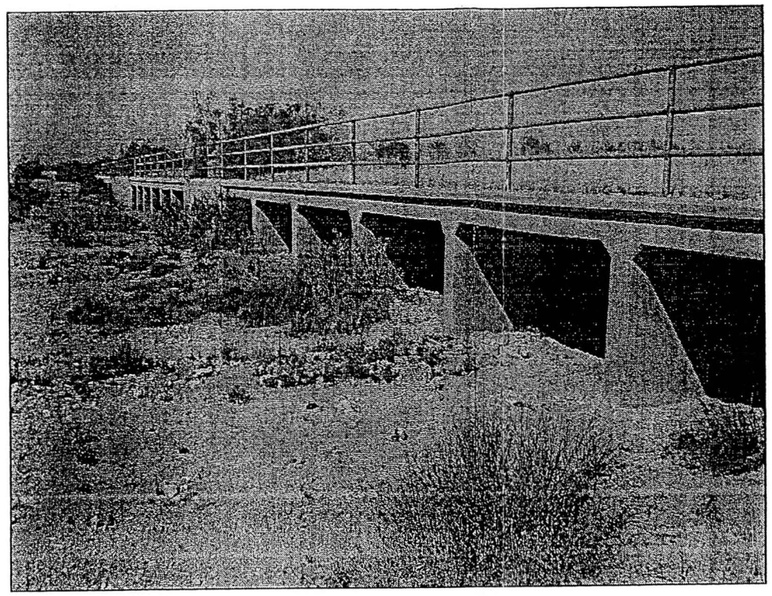
P7/20 Primary Wash #19 – Sun Valley Parkway Bridge Culvert
View looking upstream at upstream channel where re-routed to north



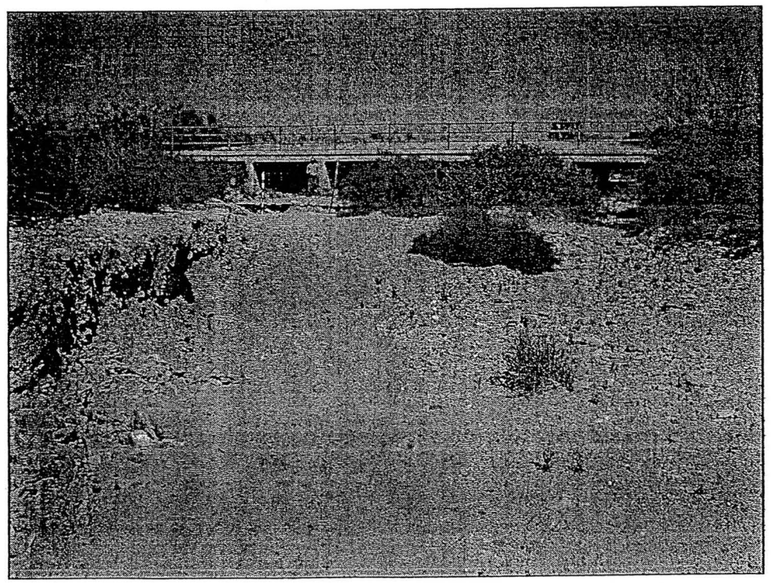
P7/18 Primary Wash #19 – Sun Valley Parkway Bridge Culvert
View looking upstream/south at new re-routed channel and southern culverts



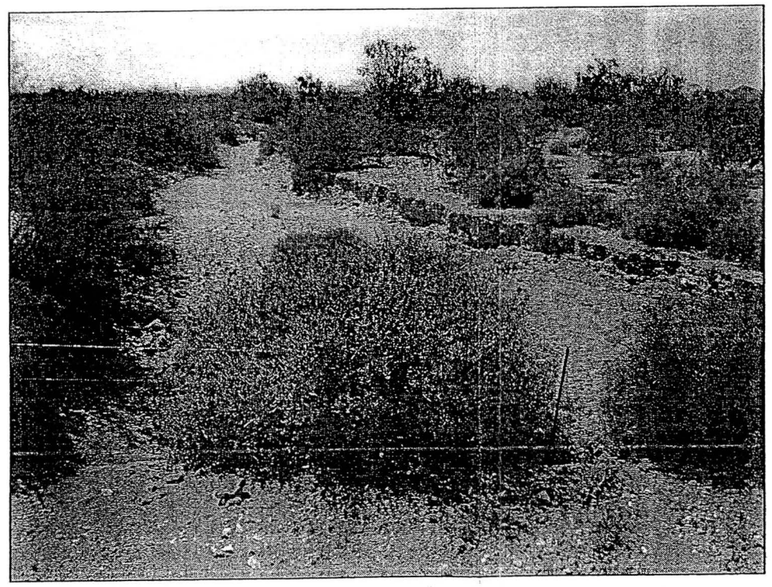
P7/19 Primary Wash #19 – Sun Valley Parkway Bridge Culvert
View looking downstream at upstream face of southern and middle set of culverts



P7/15 Primary Wash #19 – Sun Valley Parkway Bridge Culvert
View looking north at downstream face of bridge culverts

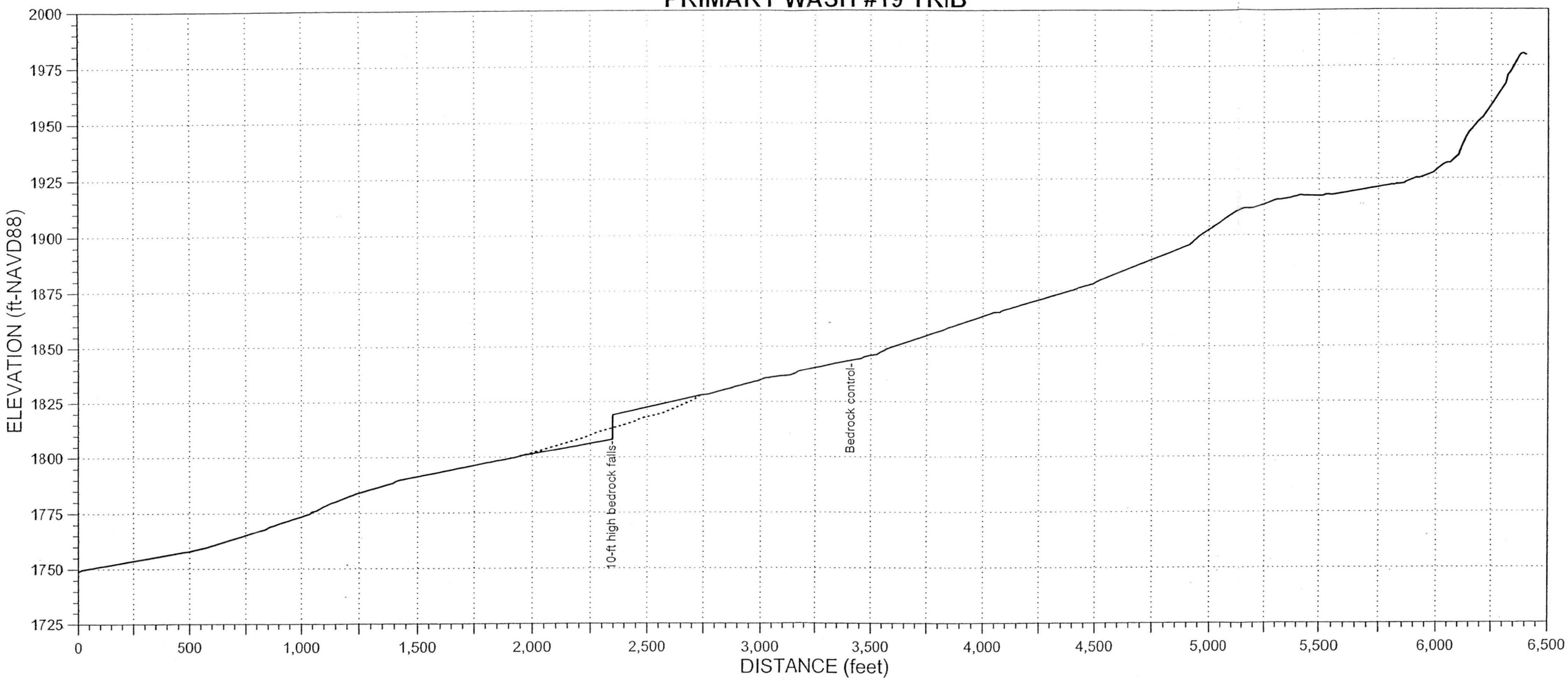


P7/16 Primary Wash #19 – Sun Valley Parkway Bridge Culvert
View looking upstream at upstream face and undermined downstream grouted rock riprap apron

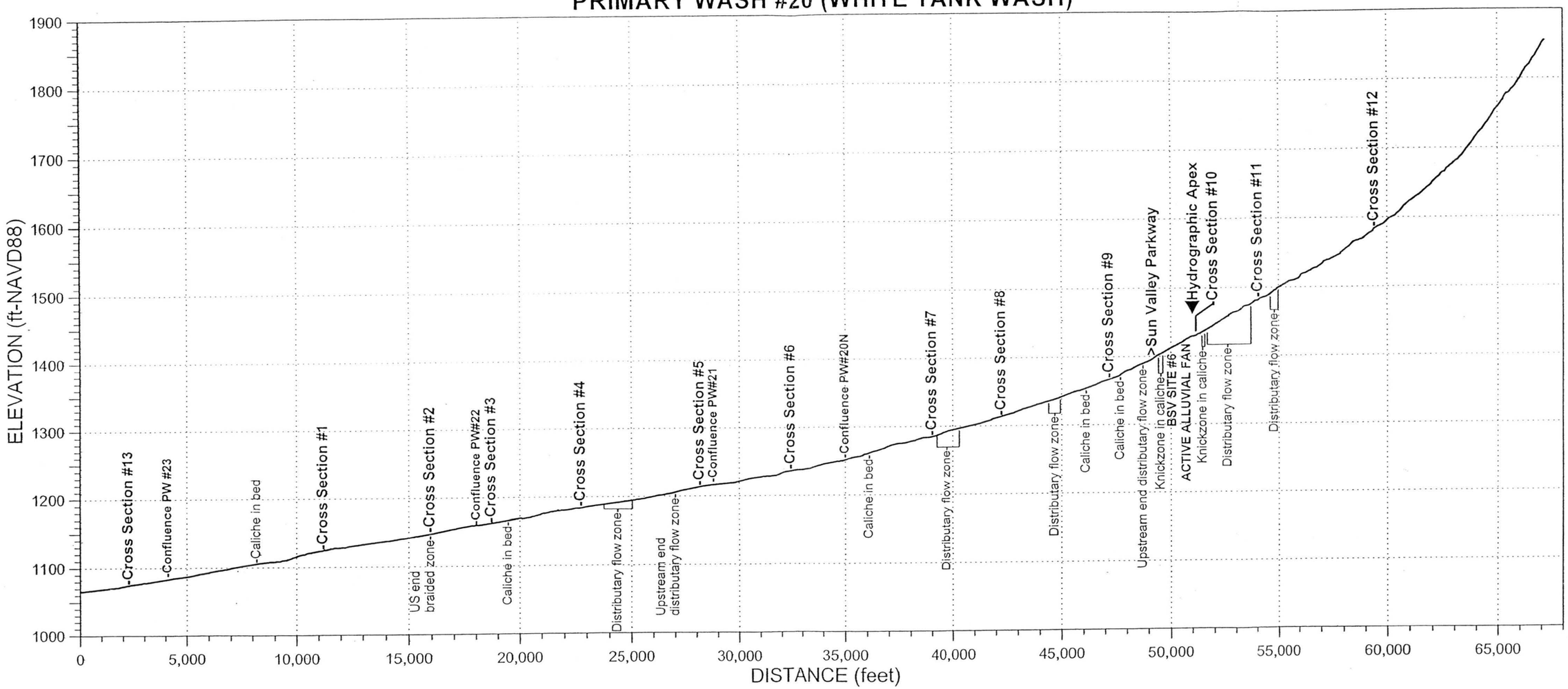


P7/17 Primary Wash #19 – Sun Valley Parkway Bridge Culvert
View looking downstream at incised downstream channel

PRIMARY WASH #19 TRIB



PRIMARY WASH #20 (WHITE TANK WASH)



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW20	1	162	March 11, 2004

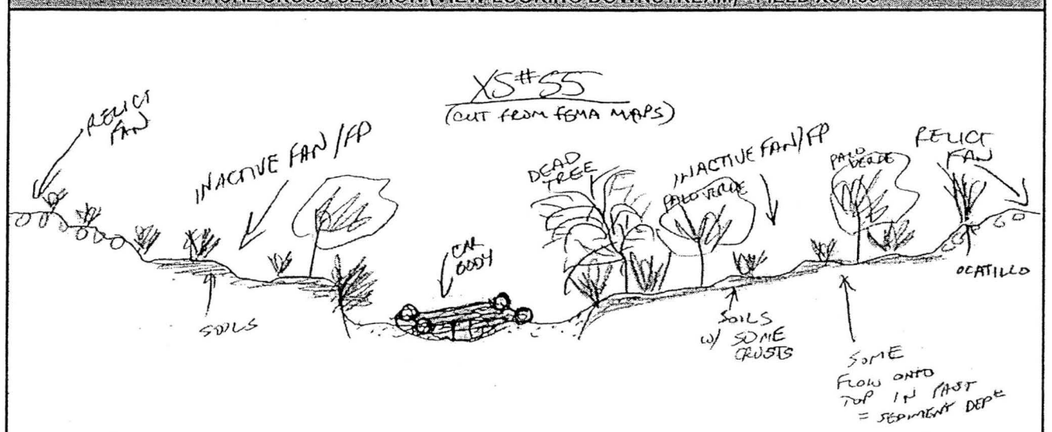
North: 903848.3 ft
East: 451201.2 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	2-2.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		3:1	2.5-3 ft	Cobble minor	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel		X	Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	Soils		X	
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				2-2.5ft	2.5-3 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P5/14 - View downstream at bend, note car body and eroding right bank in bend						
Mormon Tea	X		P5/15 - View upstream, note flow split around vegetation						
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #55



Notes:	***WHITE TANK WASH***
Cross section is about 1 mile from PW22 confluence.	

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW20	2	163	March 11, 2004

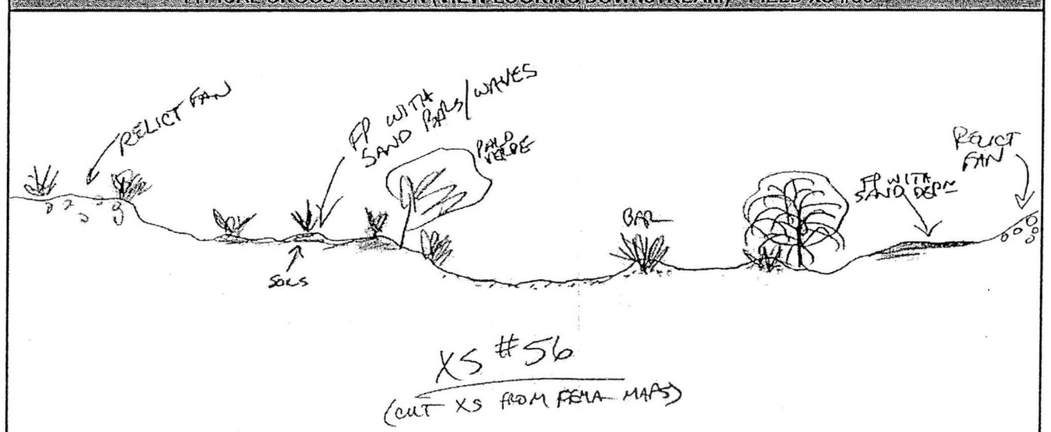
North: 907995.1 ft
East: 452598.3 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single		Left Bank		>4:1	1-2 ft	Sand X	Gravel X
Channel		Multiple	X	Right Bank		>4:1	1-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X	X	Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	Soils		X	
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1-1.5 ft	1-1.5 ft	1-1.5 ft
Brittlebush	X	X	PHOTOS & DESCRIPTION:						
Bursage	X	X	P5/16 - View downstream						
Mormon Tea		X	P5/17 - View upstream						
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #56



Notes:	***WHITE TANK WASH***
Cross section at upstream end of braided reach with heavy sand and gravel load. Upstream reach is single channel.	

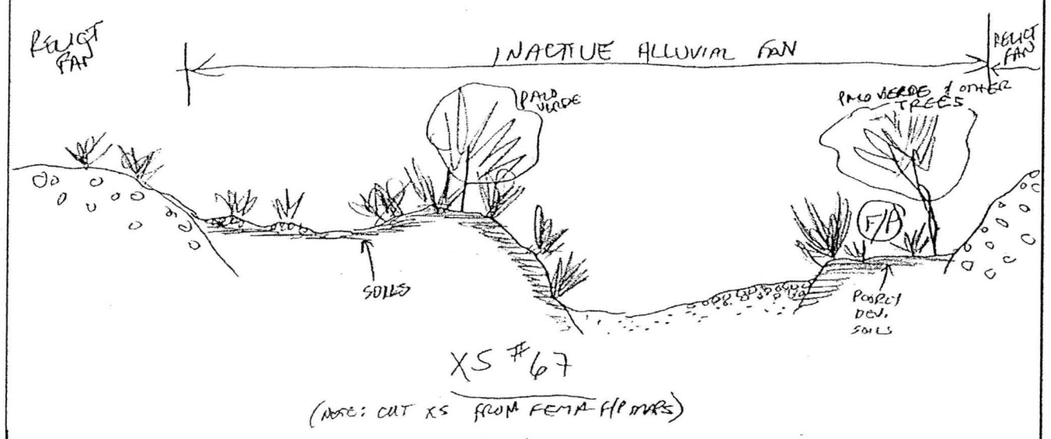
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW20 North: 910364.8 ft East: 452790.0 ft	3	194	March 13, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	5 ft	Sand__X__	Gravel__X__
Channel	X	Multiple		Right Bank		6:1	10 ft	Cobble__X__	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
							Extensive	Spotty	Absent
In-channel		X	Left Bank			Varnish			X
Marginal	X		Right Bank			Pavement		X	
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Soils		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	HIGH WATER MARKS/DEBRIS			
			Left Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Palo Verde	X		Right Bank				2-2.5 ft	2-2.5 ft	
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P6/9 - View downstream						
Mormon Tea	X								
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #67



Notes:	***WHITE TANK WASH***

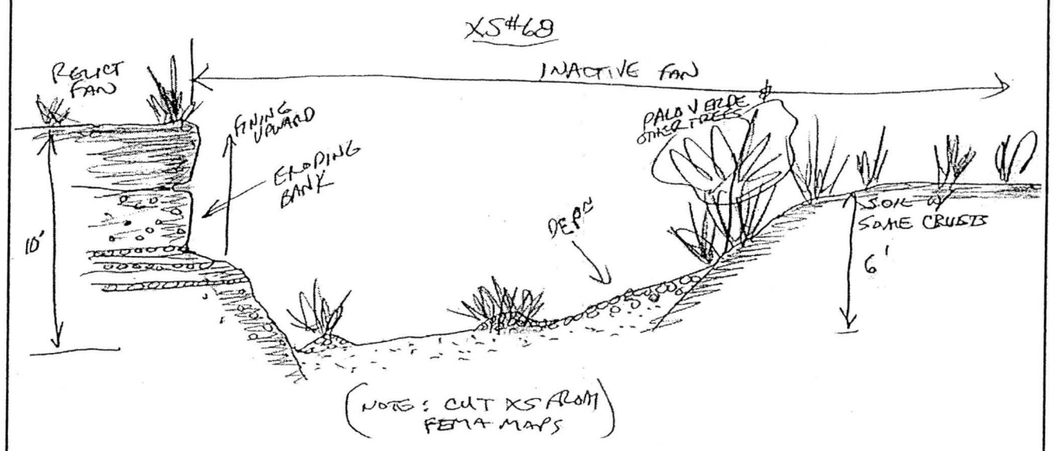
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW20 North: 913783.7 ft East: 454284.0 ft	4	196	March 13, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank	X	<1:1	10 ft	Sand__X__	Gravel__X__
Channel	X	Multiple		Right Bank		>6:1	6 ft	Cobble__X__	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
							Extensive	Spotty	Absent
In-channel	X		Left Bank			Varnish			X
Marginal	X		Right Bank			Pavement			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Soils			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	HIGH WATER MARKS/DEBRIS			
			Left Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Palo Verde	X		Right Bank						
Creosote	X		Channel						
Brittlebush	X	X	PHOTOS & DESCRIPTION:						
Bursage	X	X	P6/10 - View looking downstream, note eroding bank						
Mormon Tea	X	X							
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #68



Notes:	***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW20	5	200	March 13, 2004

North: 918432.2 ft
East: 454398.0 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		3:1	3-3.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		6:1	3-3.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde		
Creosote		
Brittlebush		
Bursage		
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

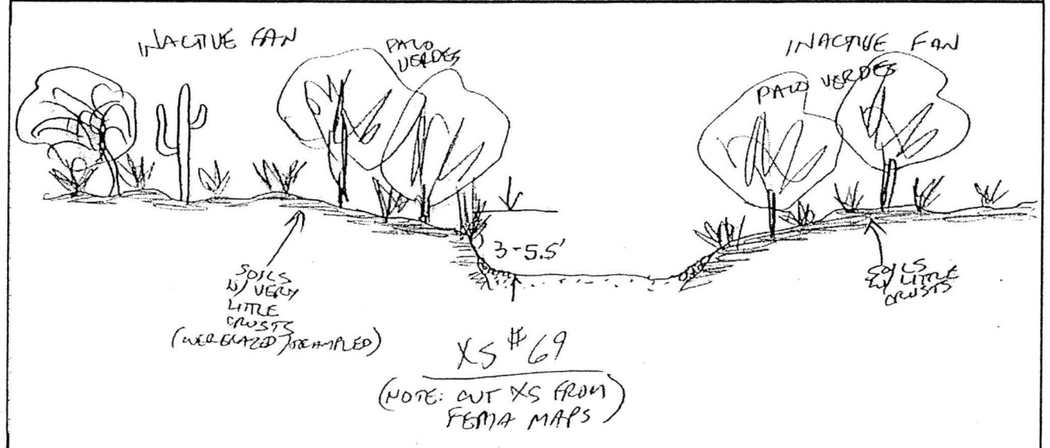
CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1.5-2 ft	1.5-2 ft	

PHOTOS & DESCRIPTION:
P6/11 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #69



Notes: ***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW20	6	201	March 13, 2004

North: 922519.1 ft
East: 455234.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank	X			Sand X	Gravel X
Channel	X	Multiple		Right Bank				Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde		
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

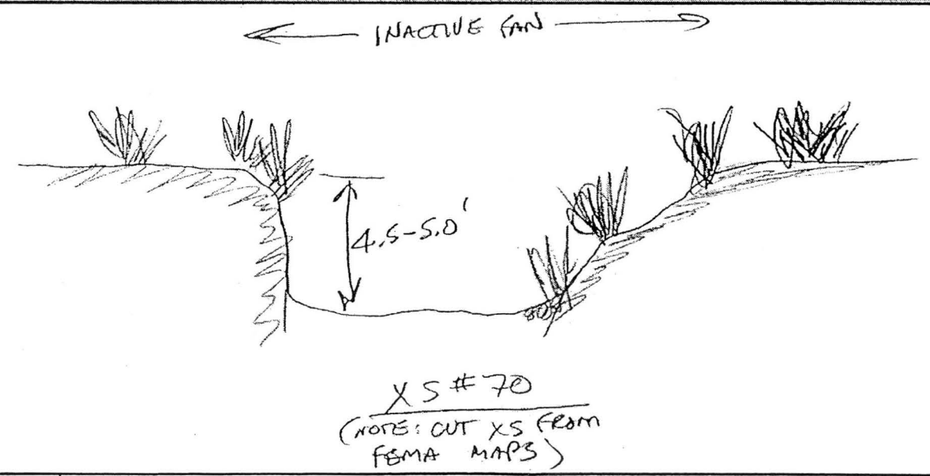
CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P6/12 - View downstream.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #70



Notes: ***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW20	7	203	March 13, 2004

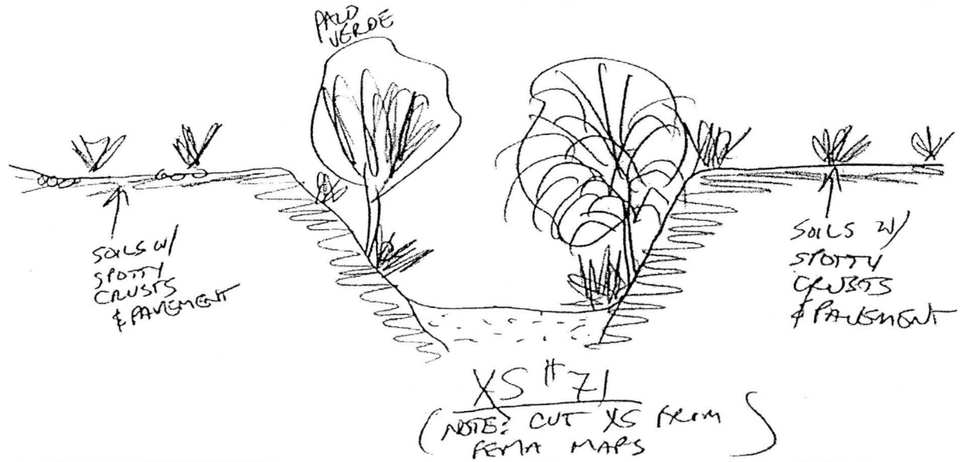
North: 925423.5 ft
East: 460458.3 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
							Extensive	Spotty	Absent
In-channel			Left Bank						
Marginal			Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	Soils			X
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				<1 ft	<1 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P6/13 - View upstream						
Mormon Tea	X								
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #71



Notes: ***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW20	8	207	March 13, 2004

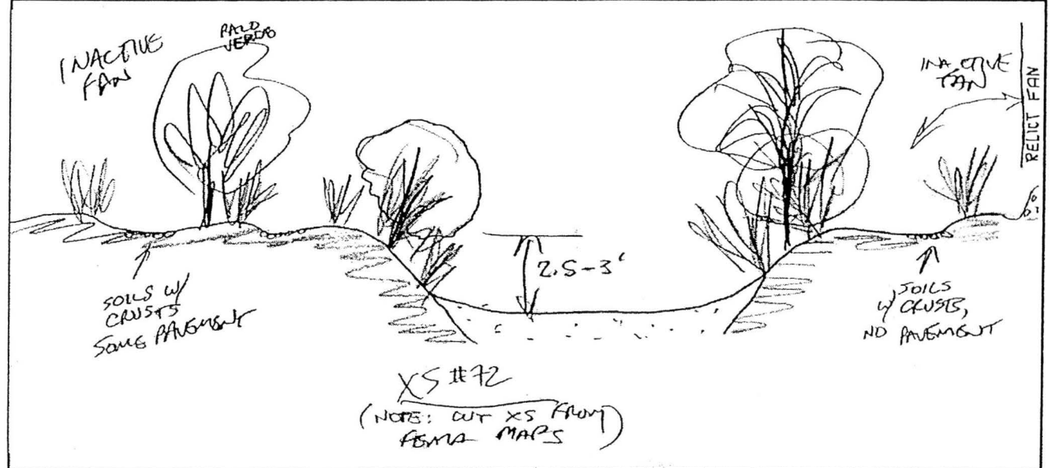
North: 925559.8 ft
East: 463483.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	2.5-3 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	2.5-3 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
							Extensive	Spotty	Absent
In-channel			Left Bank						
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	Soils			X
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				<1 ft	<1 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P6/14 - View downstream						
Mormon Tea	X								
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #72



Notes: ***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW20	9	211	March 13, 2004

North: 929146.2 ft
East: 466369.0 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
<1:1	6 ft	Sand X	Gravel X
>6:1	4 ft	Cobble X	Bldrs small

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

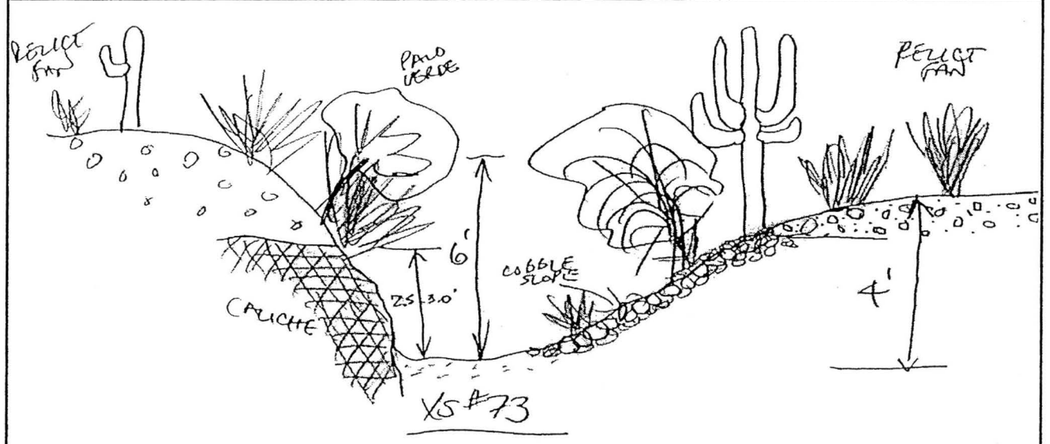
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA		
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness
Palo Verde	X		Left Bank	2-2.5 ft	2-2.5 ft
Creosote	X		Right Bank	?	?
Brittlebush	X		Channel		
Bursage	X				
Mormon Tea	X				
Tamarisk					
Saguaro C.					
Cholla C.					
Barrel C.					
Prickly Pear					
X-mas C.					
Hedgehog C.					
Fishhook C.					
Ocotillo					

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft		

PHOTOS & DESCRIPTION:
P6/15 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #73



Notes: ***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW20	10	218	March 13, 2004

North: 930082.2 ft
East: 469491.5 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
>6:1	5 ft	Sand X	Gravel X
4:1	3.5 ft	Cobble X	Bldrs few

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

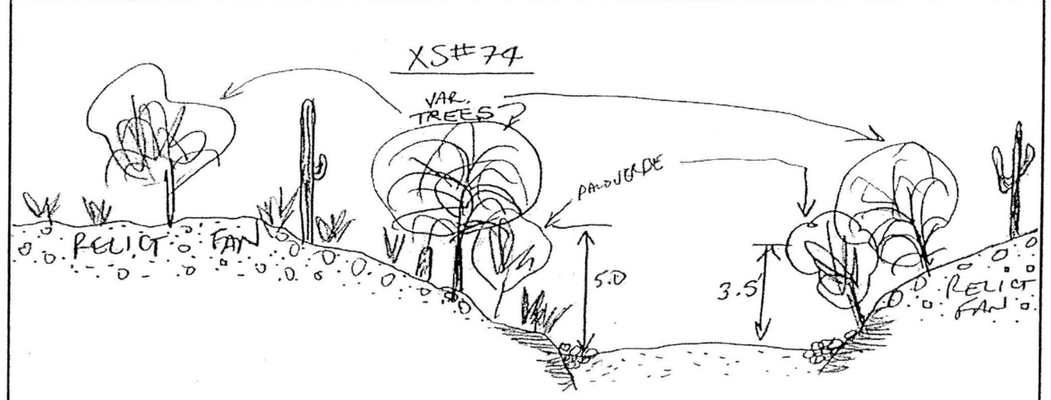
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA		
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness
Palo Verde	X		Left Bank		
Creosote	X		Right Bank		
Brittlebush	X		Channel		
Bursage	X				
Mormon Tea	X				
Tamarisk					
Saguaro C.					
Cholla C.					
Barrel C.					
Prickly Pear					
X-mas C.					
Hedgehog C.					
Fishhook C.					
Ocotillo					

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1-1.5 ft	1 ft	

PHOTOS & DESCRIPTION:

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #74



Notes: ***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW20 North: 932098.8 ft East: 472056.5 ft	11	223	March 13, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	6-7 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	10 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	3-4 ft	3-4 ft
Right Bank	5-6 ft	4-5 ft
Channel		

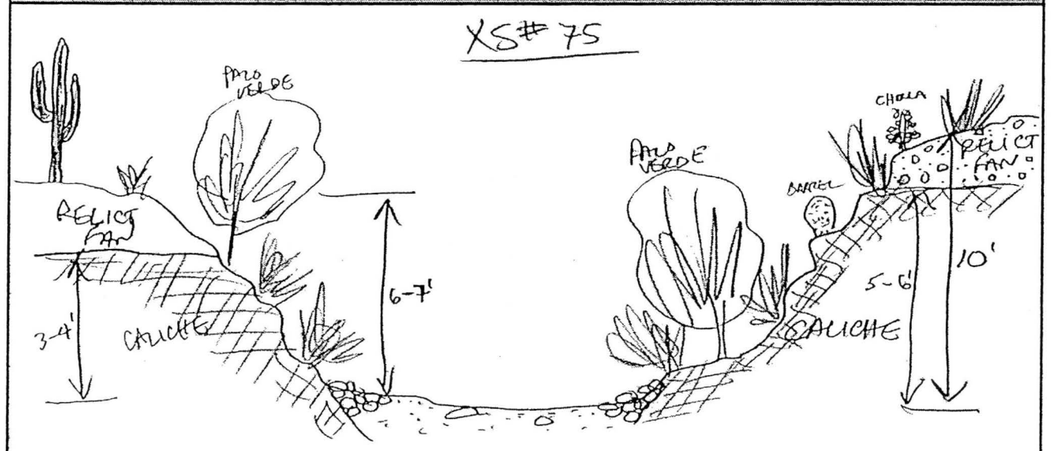
WITHIN FLOODWAY:			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1-1.5 ft	1-1.5 ft	

PHOTOS & DESCRIPTION:
P6/32 - View upstream, note caliche control of both banks

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #75



Notes: ***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW20 North: 934310.0 ft East: 476496.7 ft	12	226	March 13, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank	X	<1:1	16-18 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		>6:1	2.5-3 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea	X	X
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	7-8 ft	3-4 ft
Right Bank	?	?
Channel		

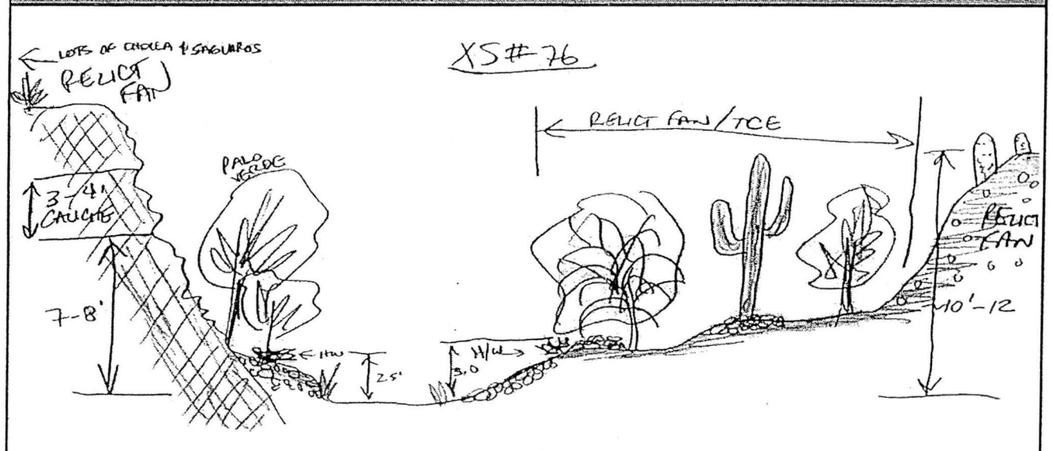
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	2-2.5 ft	2.5-3 ft	

PHOTOS & DESCRIPTION:
P6/34 - View looking downstream
P6/35 - View of top of left bank relict fan surface, looking E-SE

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #76



Notes: ***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW20 North: 895453.0 ft East: 453146.2 ft	13	430	March 19, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		<1:1	6 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		>6:1	4-5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
							Extensive	Spotty	Absent
In-channel	X	X	Left Bank	6 ft		Varnish			X
Marginal	X		Right Bank	4-5 ft		Pavement			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
	Height (top) Above Bed	Thickness
Left Bank		
Right Bank	?	?
Channel		

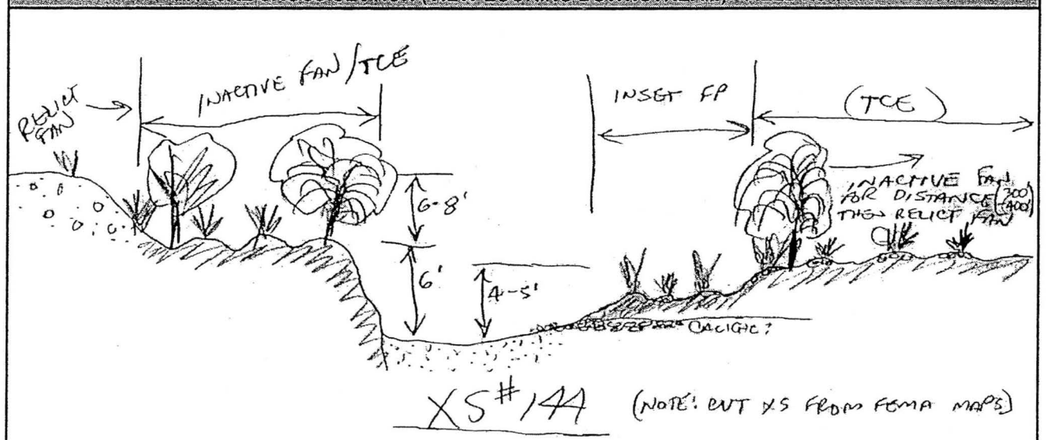
Soils		X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	2 ft	2 ft	

PHOTOS & DESCRIPTION:
P12/5 - View looking downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #144



Notes: ***WHITE TANK WASH***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	DATE:	WAYPOINT:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW20 (White Tank Wash)	March 13, 2004 Field Crew: W.J. Spitz, A.B. Alvarado	D/S Face: 214 U/S Face: 215

ROAD CROSSING - CULVERT DATA

CMP ___ RCP ___ RCBC X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	919813.09	929702.46	6	3 ft	10 ft	US:1.75 ft	DS: 0.3 ft		U/S: 75%
Easting	468173.63	468039.14	Depth of D/S Incision: 1-1.5 ft			# 2 & 3	# 5	Yes	D/S: 0

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	No	Left bank	No	>6:1	1-2 ft	Sand X	Gravel X
Channel	No	Multiple	Yes	Right bank	No	>6:1	1-2 ft	Cobble X	Bldrs X

DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	Yes	Left bank	No	1:1	3-4 ft	Sand X	Gravel X
Channel	Yes	Multiple	No	Right bank	Yes	1:1	3-4 ft	Cobble X	Bldrs X

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain		1.0 ft		3.0 ft

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain		>1.0 ft		~1.0 ft

PLAN VIEW - UPSTREAM FACE AND CHANNEL

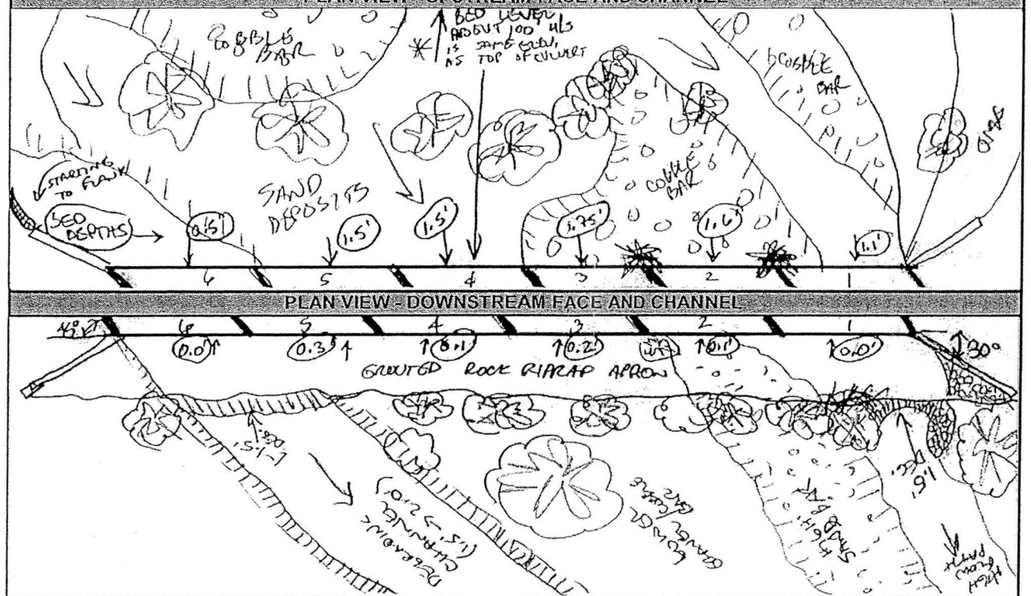
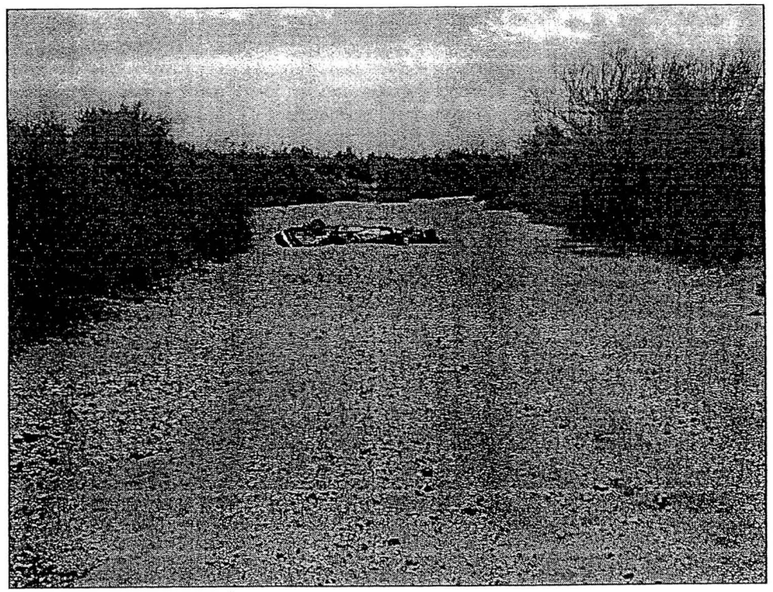
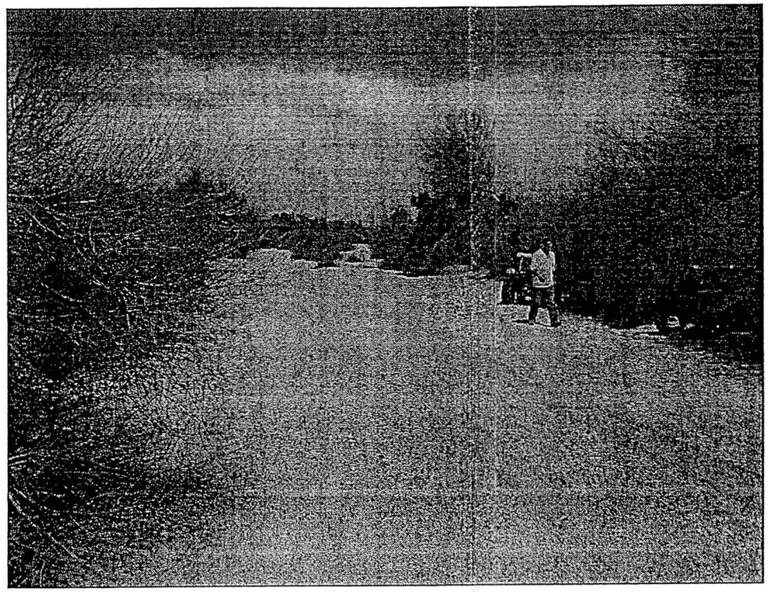


PHOTO #		NOTES: ****CULVERT IS IN TROUBLE!****
U/S Face	6-25,26	View looking north (TL to TR) and view downstream looking at barrels 2 and 3
View U/S	6-22,23,24	Pan TR to TL looking upstream showing extensive sediment trapping upstream of culvert
D/S Face	6-21	View TR to TL to south
View D/S	6-20	View downstream showing degrading channel
Other	6-19	View of 1.5 ft of undermining of downstream bridge apron at barrel 1

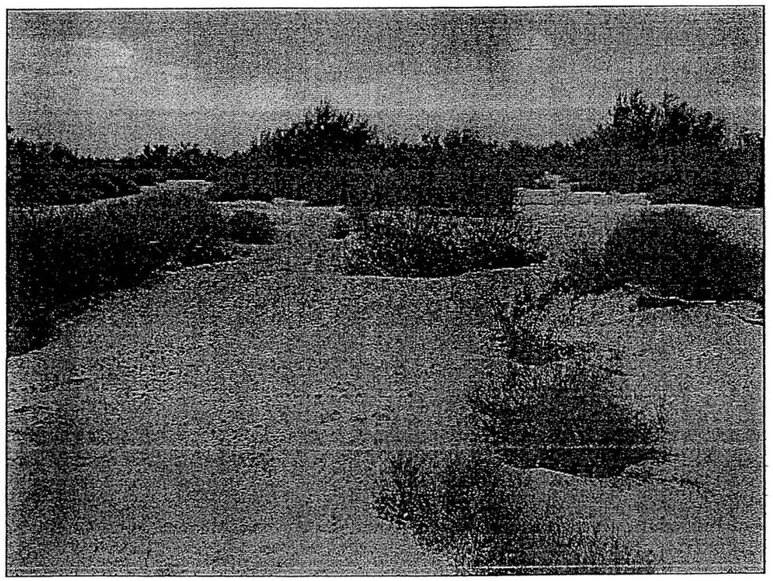
AYRES ASSOCIATES



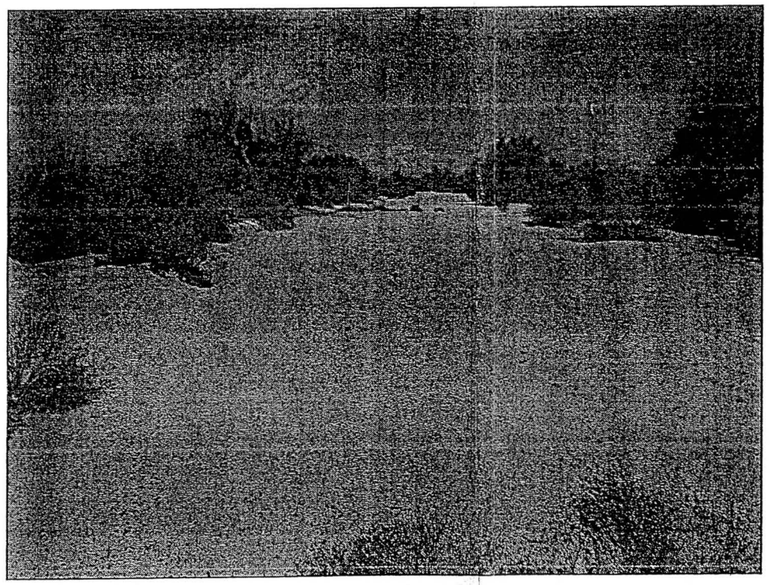
P5/14 Primary Wash #20 (White Tank Wash) - Cross Section #1
View looking downstream



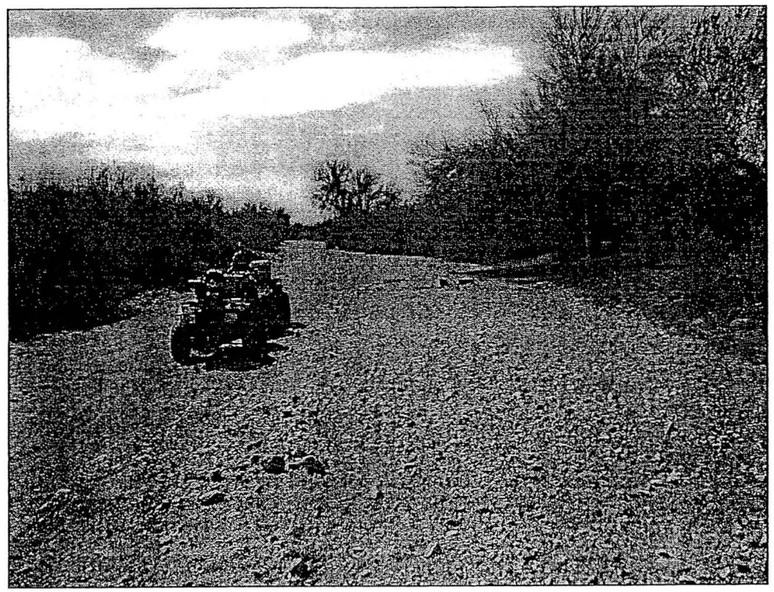
P5/15 Primary Wash #20 (White Tank Wash) - Cross Section #1
View looking upstream



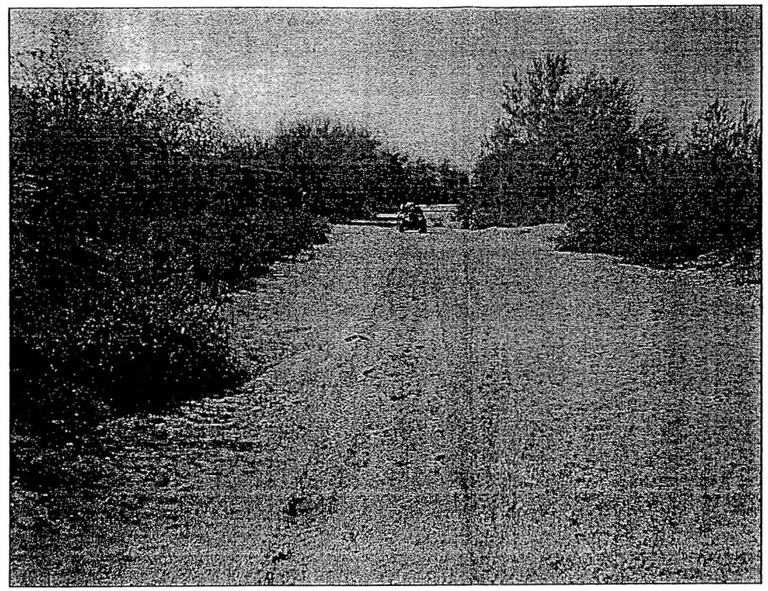
P5/16 Primary Wash #20 (White Tank Wash) - Cross Section #2
View looking downstream



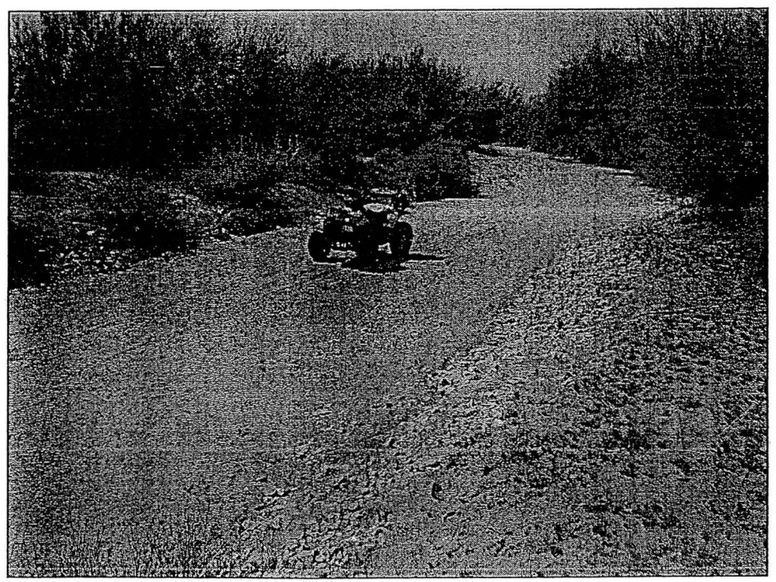
P5/17 Primary Wash #20 (White Tank Wash) - Cross Section #2
View looking upstream



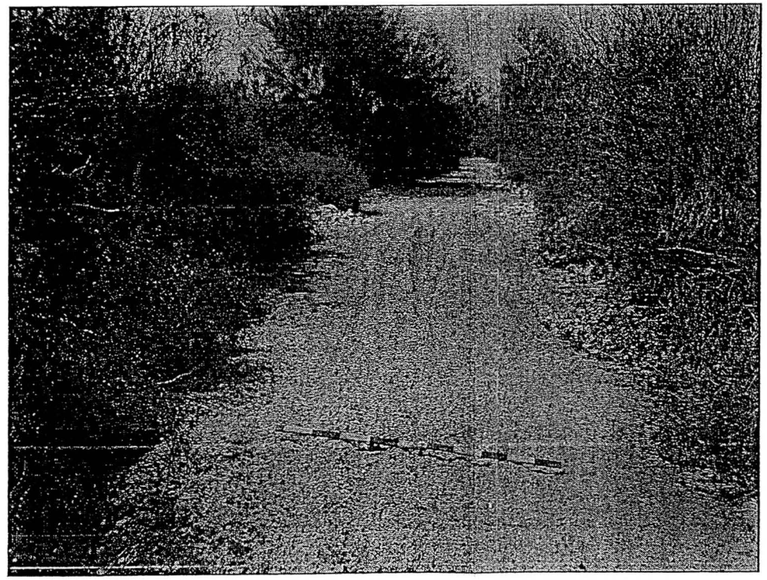
P6/9 Primary Wash #20 (White Tank Wash) - Cross Section #3
View looking downstream



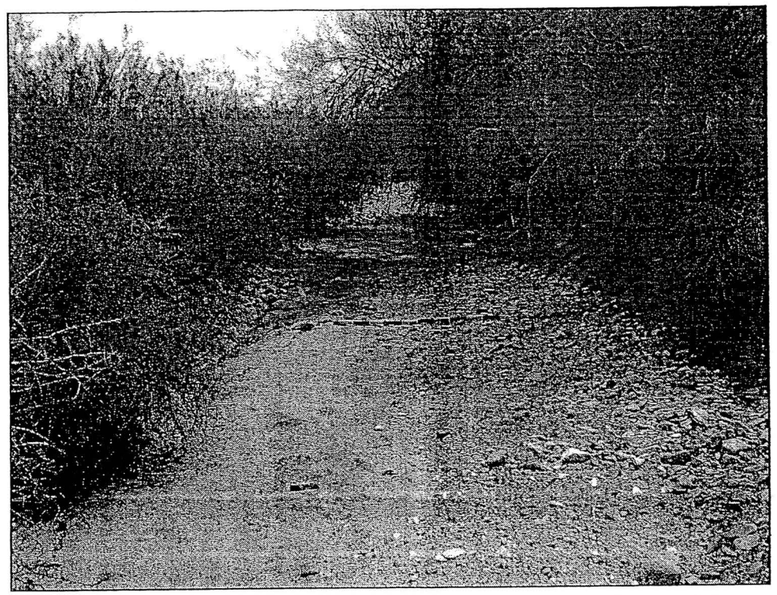
P6/10 Primary Wash #20 (White Tank Wash) - Cross Section #4
View looking downstream



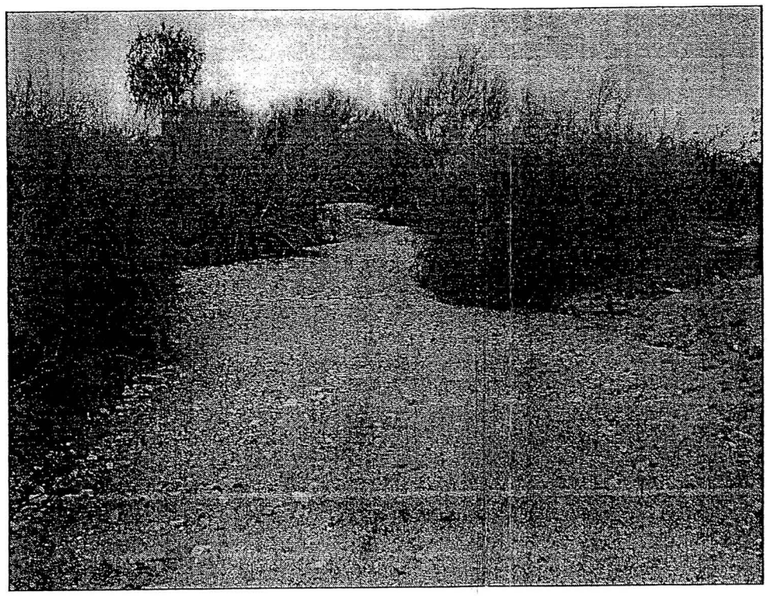
P6/11 Primary Wash #20 (White Tank Wash) - Cross Section #5
View looking downstream



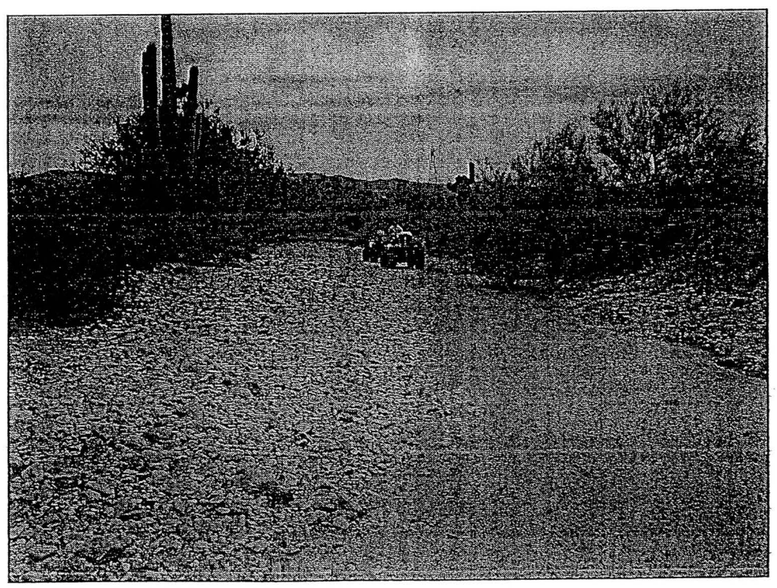
P6/12 Primary Wash #20 (White Tank Wash) - Cross Section #6
View looking downstream



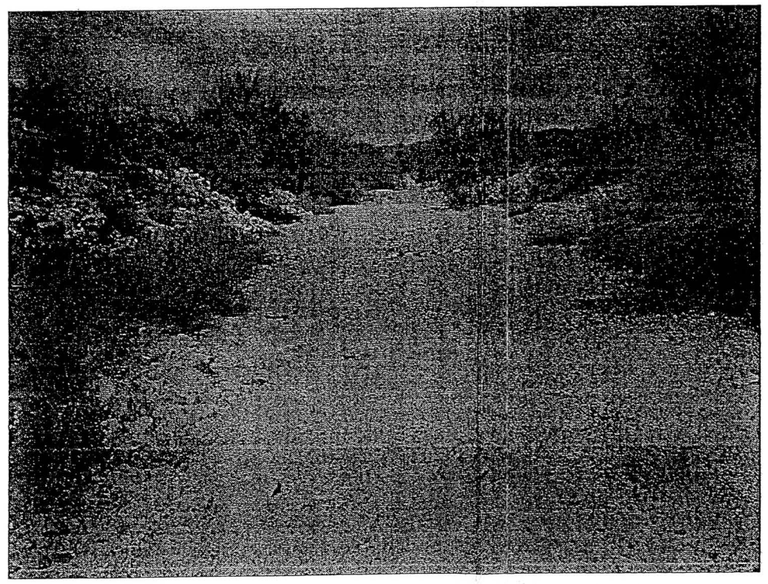
P6/13 Primary Wash #20 (White Tank Wash) - Cross Section #7
View looking upstream



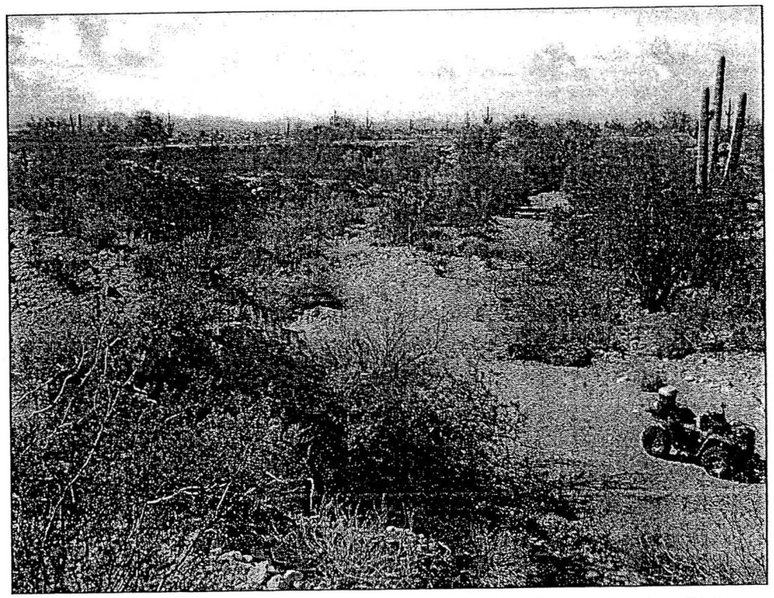
P6/14 Primary Wash #20 (White Tank Wash) - Cross Section #8
View looking downstream



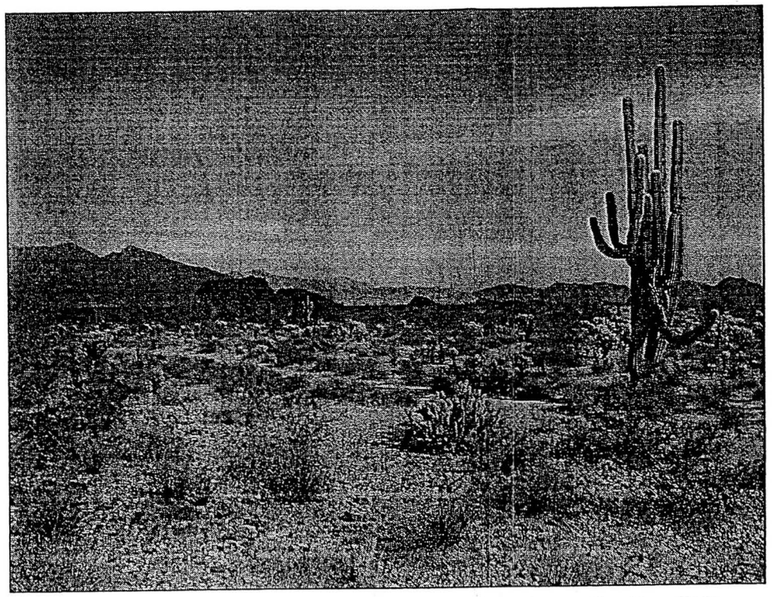
P6/15 Primary Wash #20 (White Tank Wash) - Cross Section #9
View looking upstream



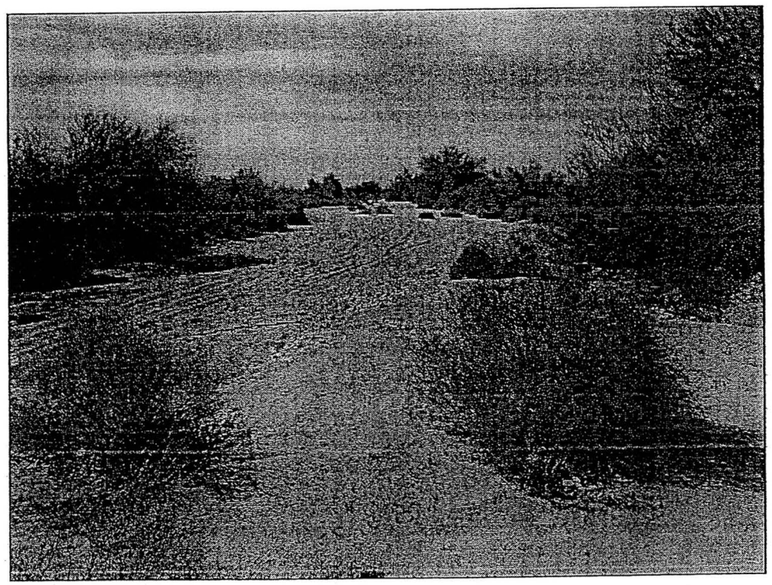
P6/32 Primary Wash #20 (White Tank Wash) - Cross Section #11
View looking upstream



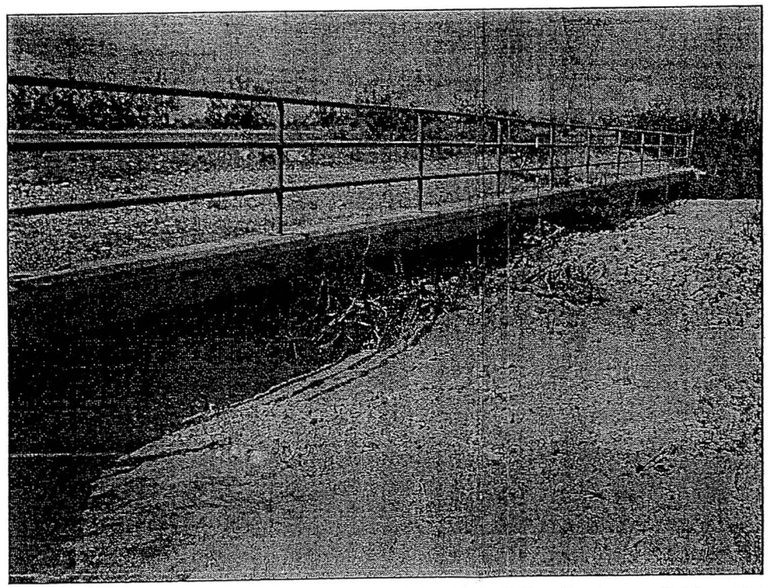
P6/34 Primary Wash #20 (White Tank Wash) - Cross Section #12
View looking downstream



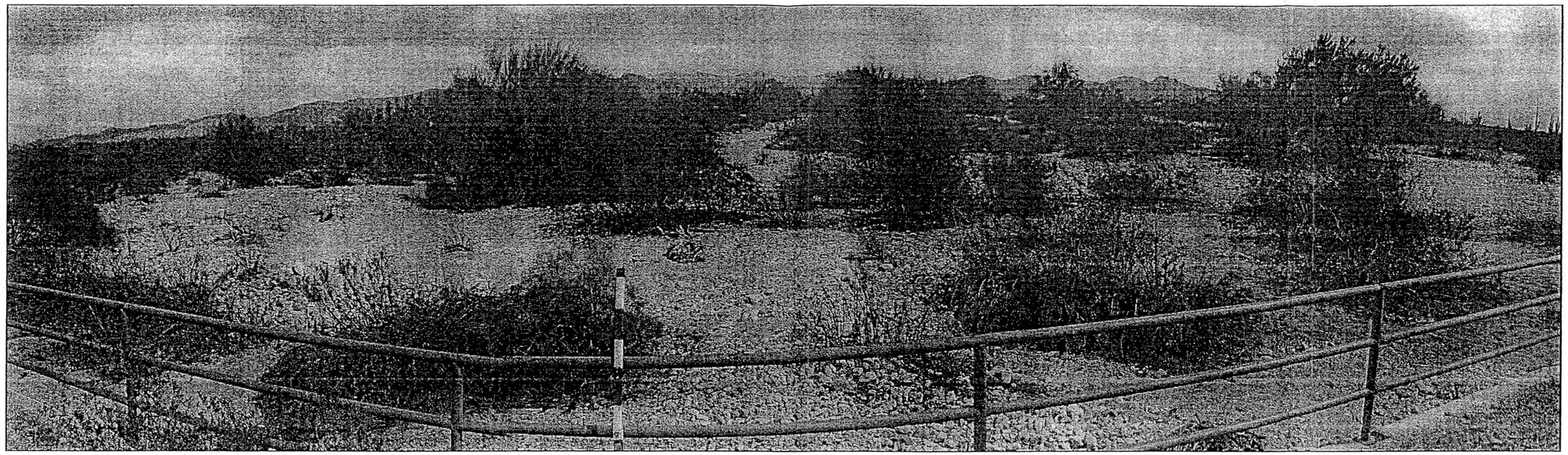
P6/5 Primary Wash #20 (White Tank Wash) - Cross Section #12
View looking south-southeast from top left bank



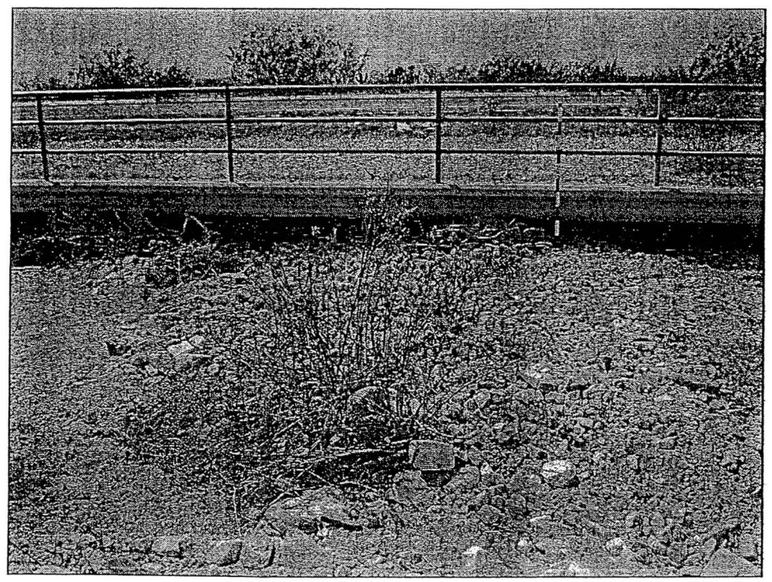
P12/5 Primary Wash #20 (White Tank Wash) - Cross Section #13
View looking downstream



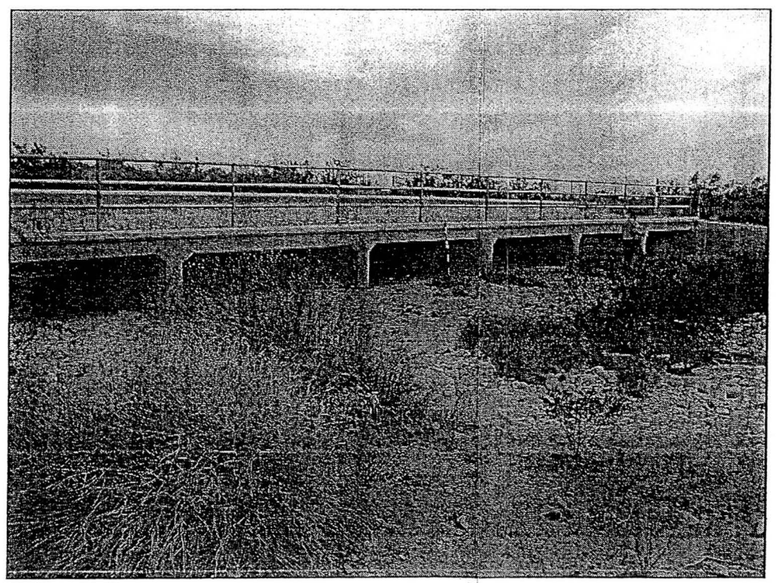
P6/25 Primary Wash #20 (White Tank Wash) – Sun Valley Parkway Bridge Culvert
View looking downstream/north at obstructed upstream face of bridge



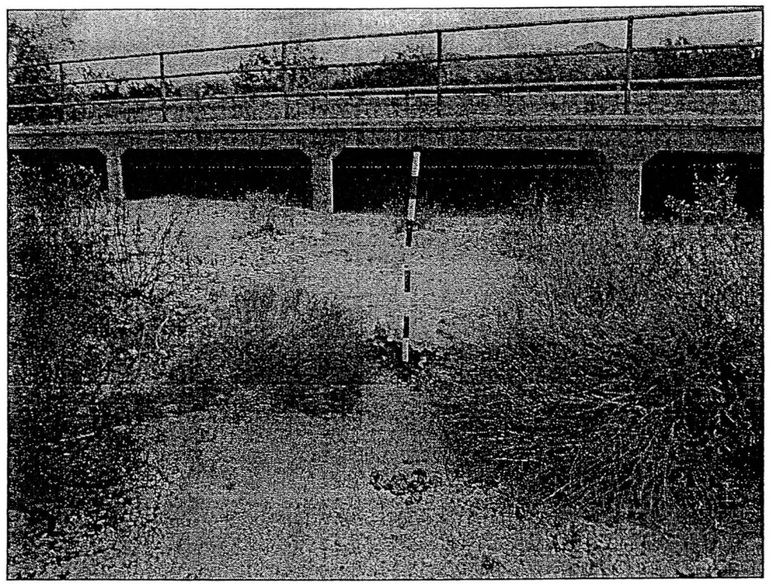
P6/22,23,24 Primary Wash #20 (White Tank Wash) – Sun Valley Parkway Bridge Culvert
Panorama view looking upstream at upstream channel and BSV Site#6 active alluvial fan area upstream of bridge



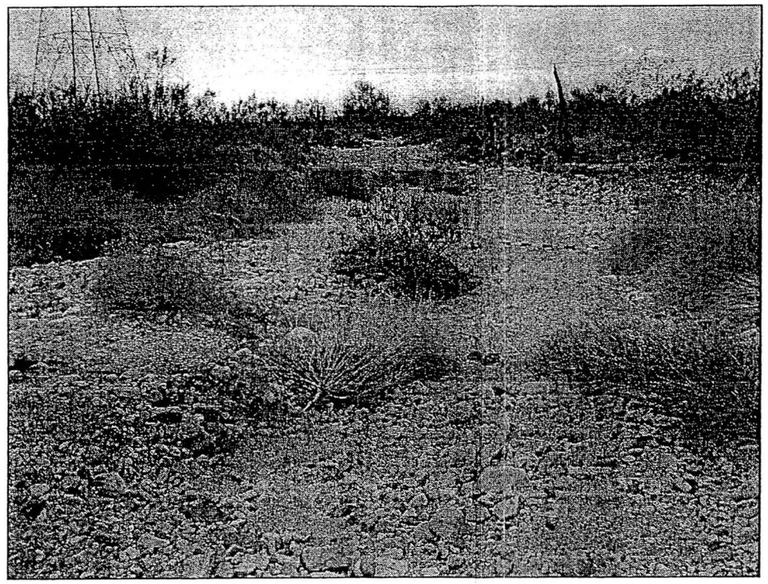
P6/26 Primary Wash #20 (White Tank Wash) – Sun Valley Parkway Bridge Culvert
View looking downstream at obstructed upstream face of bridge at barrels 2 and 3



P6/21 Primary Wash #20 (White Tank Wash) – Sun Valley Parkway Bridge Culvert
View looking upstream/south at partially silted-in downstream face of bridge

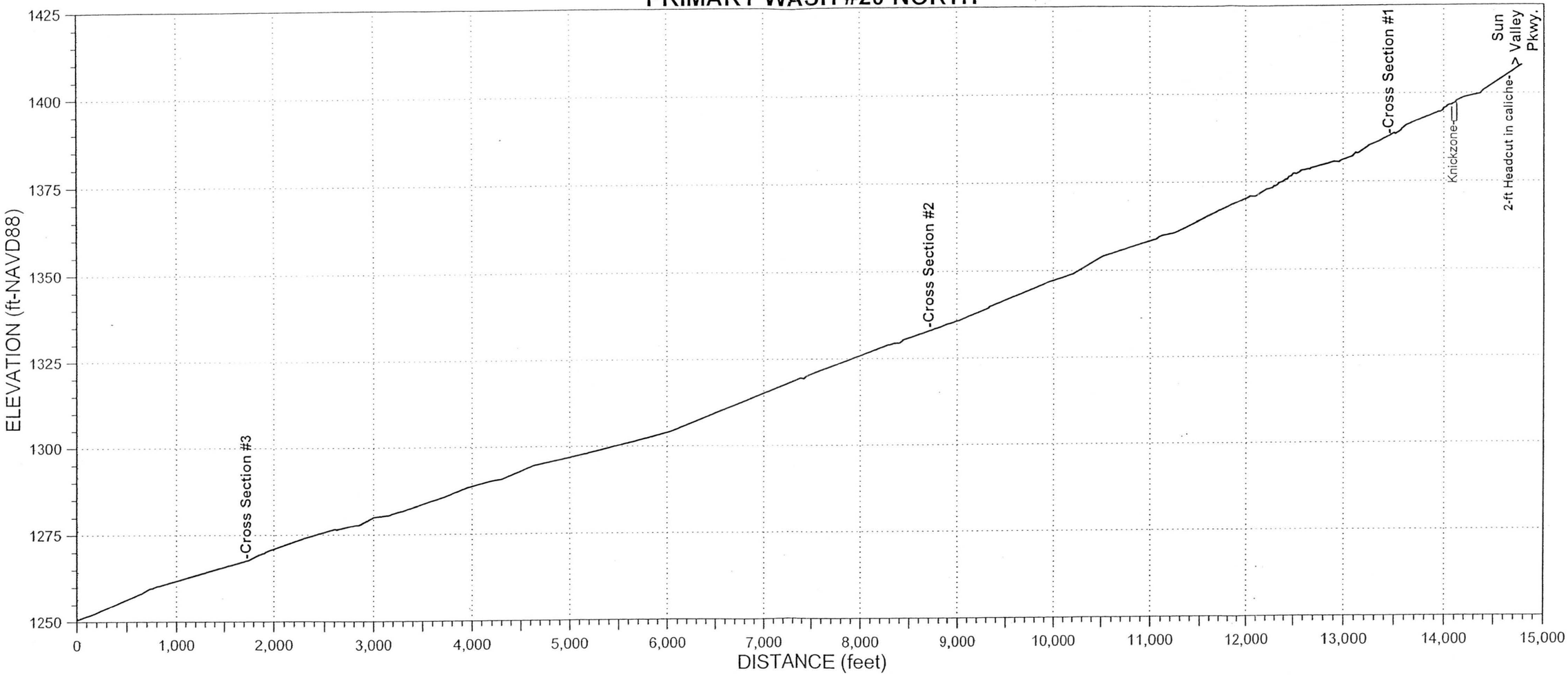


P6/19 Primary Wash #20 (White Tank Wash) – Sun Valley Parkway Bridge Culvert
View looking upstream at downstream face of bridge and undermined grouted rock riprap apron



P6/20 Primary Wash #20 (White Tank Wash) – Sun Valley Parkway Bridge Culvert
View looking downstream at degrading downstream channel

PRIMARY WASH #20 NORTH



AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW20North	1	241	March 14, 2004
	North: 931807.3 ft East: 466797.0 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank	X	<1:1	12 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	3 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	3 ft	3 ft
Right Bank	3 ft	3 ft
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	<1 ft

PHOTOS & DESCRIPTION:

P7/6 - View upstream

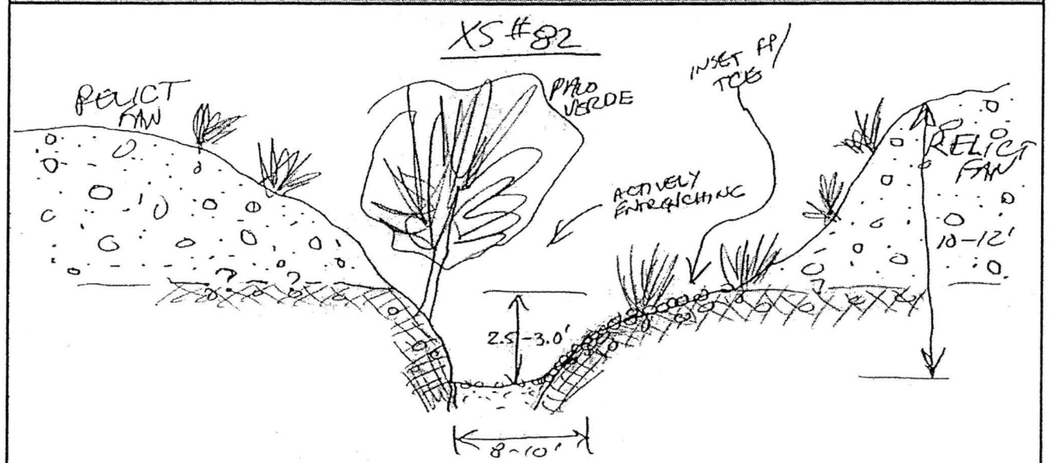
CRYPTO-BIOTIC CRUST (floodway)
- Absent
- Spotty
- Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #82



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW20North	2	242	March 14, 2004
	North: 929810.0 ft East: 462813.6 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	12 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	3-4 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank	3-5 ft	entrenched meanders
Marginal	X		Right Bank	3-5 ft	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	3 ft	3 ft
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:

P7/7,8 Pan - View looking upstream from right bank

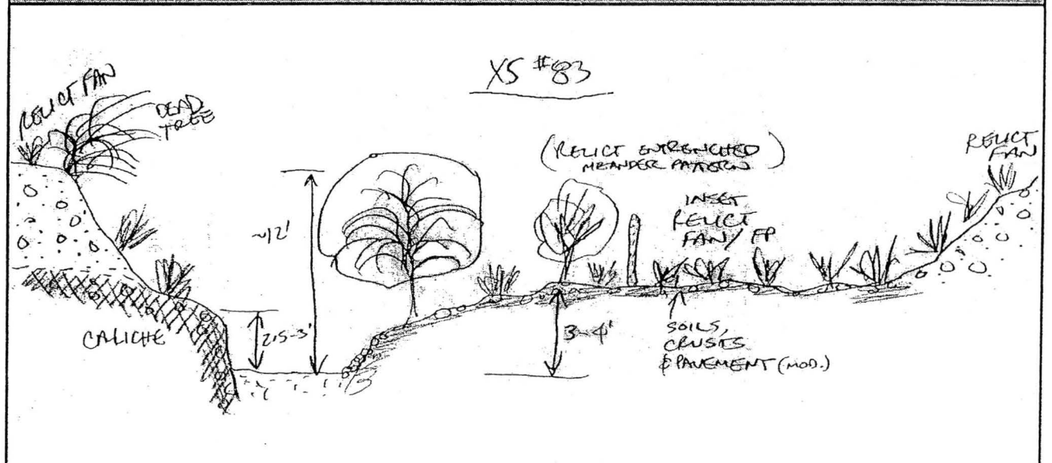
CRYPTO-BIOTIC CRUST (floodway)
- Absent
- Spotty
- Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #83



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW20North	3	243	March 14, 2004

North: 925349.5 ft
East: 457923.0 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		3:1	3 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		3:1	3 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel		X	Left Bank	3-3.5 ft			Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X

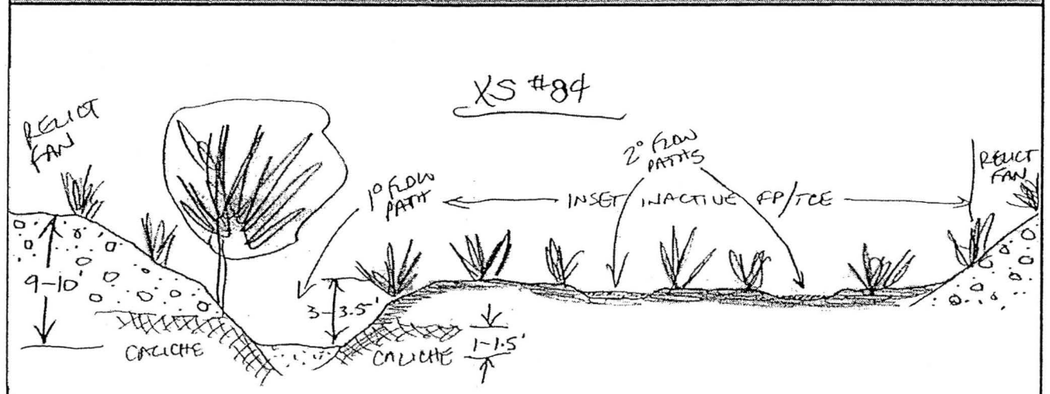
VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA			Pavement				
Height (top)	Above Bed	Thickness	Soils	X			
Left Bank	1-1.5 ft	>1-1.5 ft	HIGH WATER MARKS/DEBRIS				
Right Bank	1-1.5 ft	>1-1.5 ft	Ht. Above Thalweg	Left Bank	Right Bank	Channel	
Channel	shallow						

PHOTOS & DESCRIPTION:
P7/9 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #84



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	DATE:	WAYPOINT:
PW20 North	March 14, 2004	D/S Face: 236 U/S Face: 237

Field Crew: W.J. Spitz, A.B. Alvarado

ROAD CROSSING - CULVERT DATA

CMP ___ RCP ___ RCBC X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	932536.23	932393.29	1	4 ft	8 ft	US: 0 ft	DS: 0 ft		U/S: <10%
Easting	467727.27	467654.99	Depth of D/S Incision: 1-1.5 ft			#	#	Yes	D/S: 0

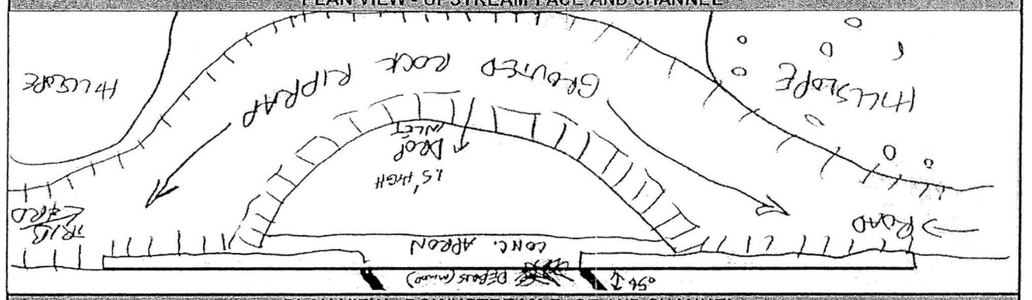
UPSTREAM CHANNEL									
ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	No	1:1	10 ft	Sand X	Gravel X
Channel	Yes	Multiple	No	Right bank	No	1:1	10 ft	Cobble X	Bldrs

DOWNSTREAM CHANNEL									
ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	Yes	1:1	2.5-3 ft	Sand X	Gravel X
Channel	Yes	Multiple	No	Right bank	Yes	1:1	2.5-3 ft	Cobble X	Bldrs

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel 0.5 ft	Ht. above Invert	In Barrel 0.5 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel 0.5 ft	Ht. above Invert	In Barrel 0.5 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

PLAN VIEW - UPSTREAM FACE AND CHANNEL



PLAN VIEW - DOWNSTREAM FACE AND CHANNEL

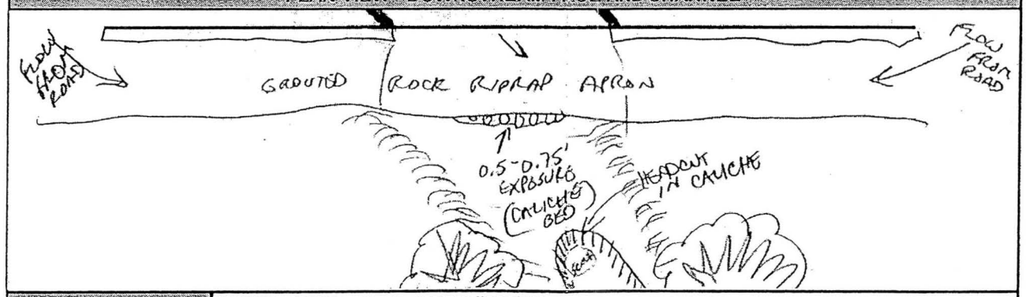


PHOTO #:		NOTES: ****Headcut at WPT #238****
U/S Face	7-2	View looking downstream
View U/S	7-3	View looking east - not much sediment in channel (banks = caliche)
D/S Face	7-5	View looking upstream showing culver and headcut
View D/S	7-4	View looking downstream - note Anthony standing in headcut in caliche
Other		

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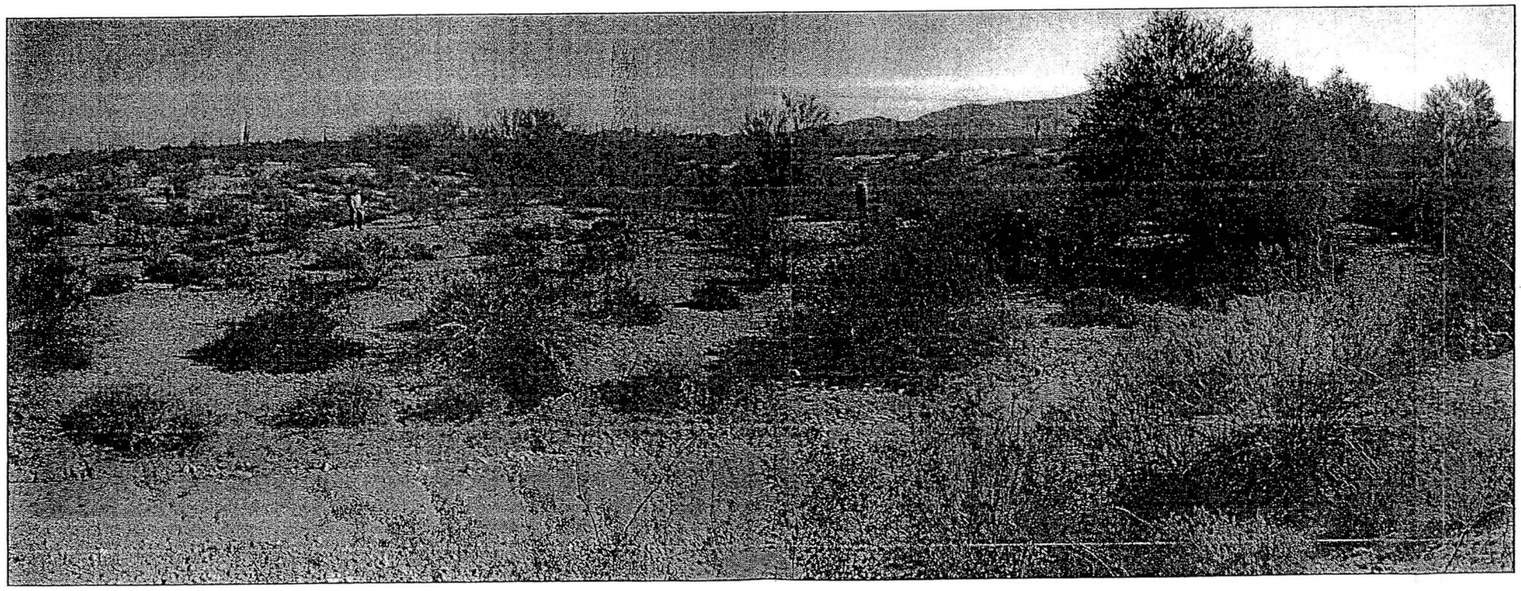
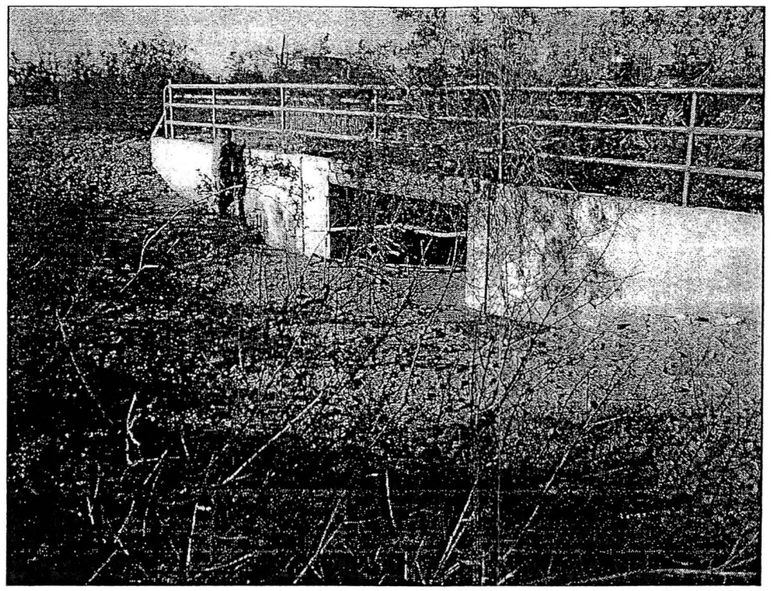
P7/6 Primary Wash #20 North - Cross Section #1 – View looking upstream

P7/9 Primary Wash #20 North - Cross Section #3 – View looking upstream

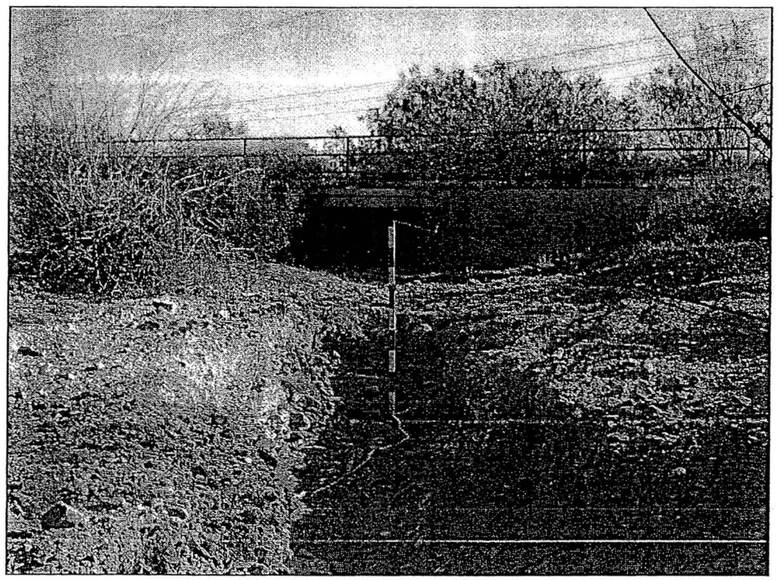


P7/7 & 8 Primary Wash #20 North - Cross Section #2 – Panorama view looking upstream

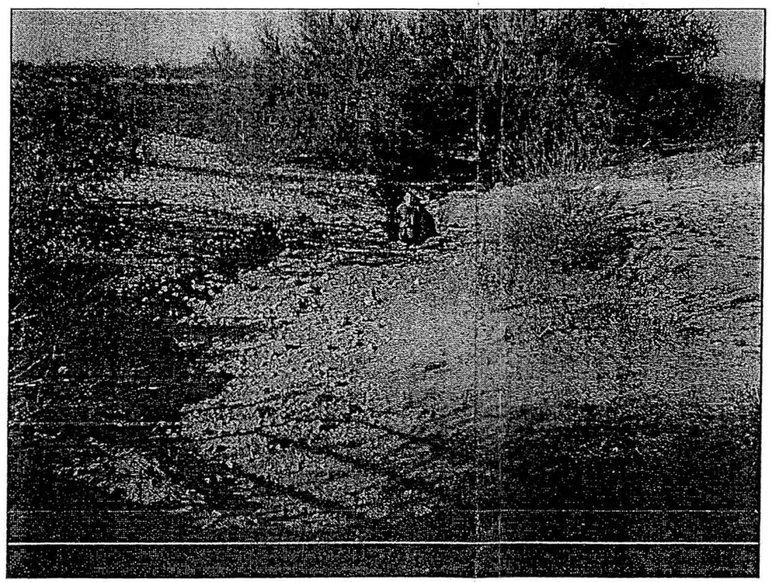
P7/3 Primary Wash #20 North – Sun Valley Parkway Bridge Culvert
View looking upstream at channel upstream of bridge



P7/2 Primary Wash #20 North – Sun Valley Parkway Bridge Culvert
View looking downstream/south at upstream bridge face



P7/5 Primary Wash #20 North – Sun Valley Parkway Bridge Culvert
View looking upstream at downstream bridge face, apron and 2' headcut



P7/4 Primary Wash #20 North – Sun Valley Parkway Bridge Culvert
View looking downstream at downstream channel and person at headcut

AYRES ASSOCIATES, INC.	CHANNEL:	DATE:	WAYPOINT:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW21	March 13, 2004	D/S Face: 183 U/S Face: 182
		Field Crew: W.J. Spitz, A.B. Alvarado	

ROAD CROSSING - CULVERT DATA

CMP___ RCP___ RCBC__X__

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in	% Blockage
Northing	924238.60	468085.38	4	4 ft	10 ft	US: 2.5 ft	DS: 2.0 ft	Barrels	U/S: 50 %
Easting	924207.17	467954.94	Depth of D/S Incision: 0 ft			# 3	# 3	Yes	D/S: 0

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	Yes (at bridge)	Left bank	No	>3:1	3-4 ft	Sand__X__	Gravel__X__
Channel	Yes	Multiple	Yes (US)	Right bank	No	>3:1	3-4 ft	Cobble__X__	Bldrs_____

DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	Yes (DS)	Left bank	No	>6:1	2-3 ft	Sand__X__	Gravel__X__
Channel	No	Multiple	Yes (at bridge)	Right bank	No	>6:1	2-3 ft	Cobble__X__	Bldrs_____

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel 1.5-2 ft	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel 1-2 ft	Ht. above Invert	In Barrel 2-3 ft
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

PLAN VIEW - UPSTREAM FACE AND CHANNEL

PLAN VIEW - DOWNSTREAM FACE AND CHANNEL

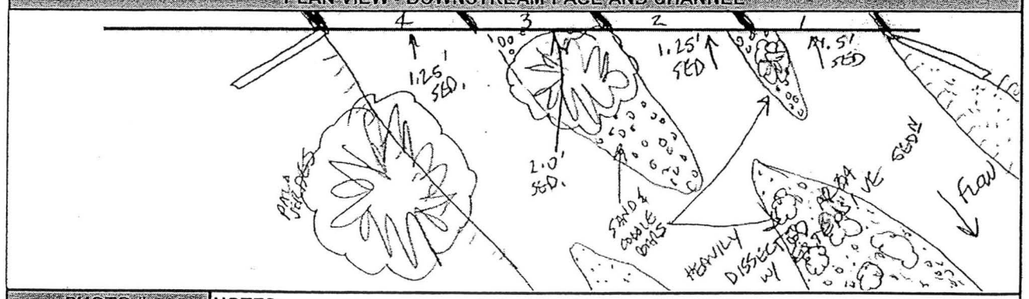


PHOTO #:		NOTES:
U/S Face	6-1	View to south - note debris in barrel 1
View U/S	6-2	View upstream showing downstream end of USGS Site 39 alluvial fan
D/S Face	6-4	View looking upstream - note veg and sediment
View D/S	6-3	View looking downstream - downstream channel appears to be incising even though there is significant sediment dposits immediately below bridge

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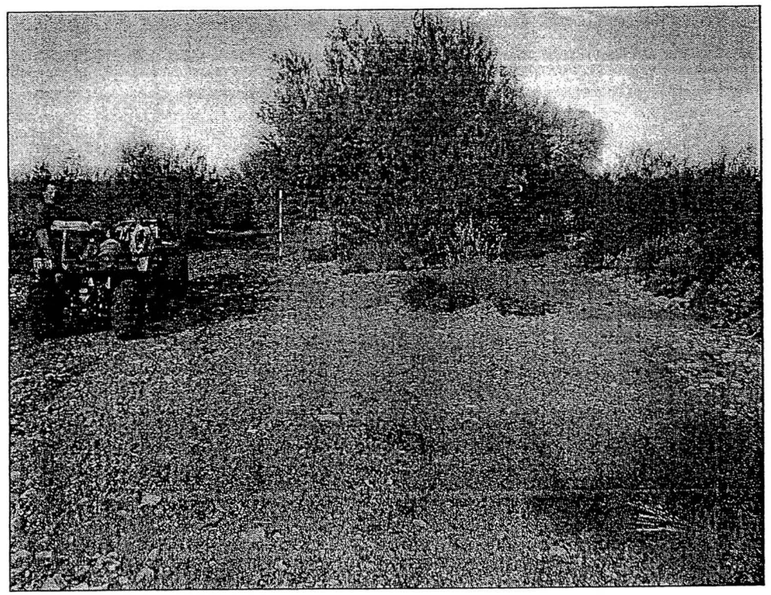


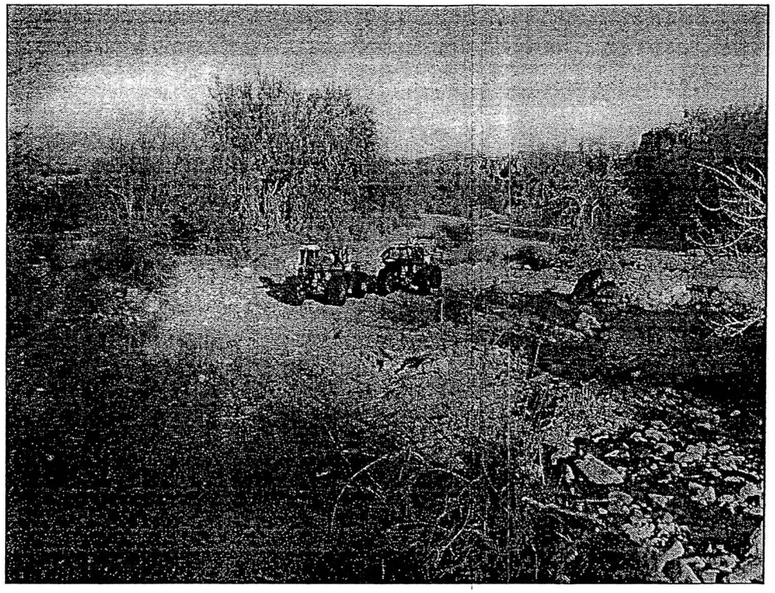
P6/5 Primary Wash #21 - Cross Section #1 – View looking downstream

P6/6 Primary Wash #21 - Cross Section #1 – View looking upstream

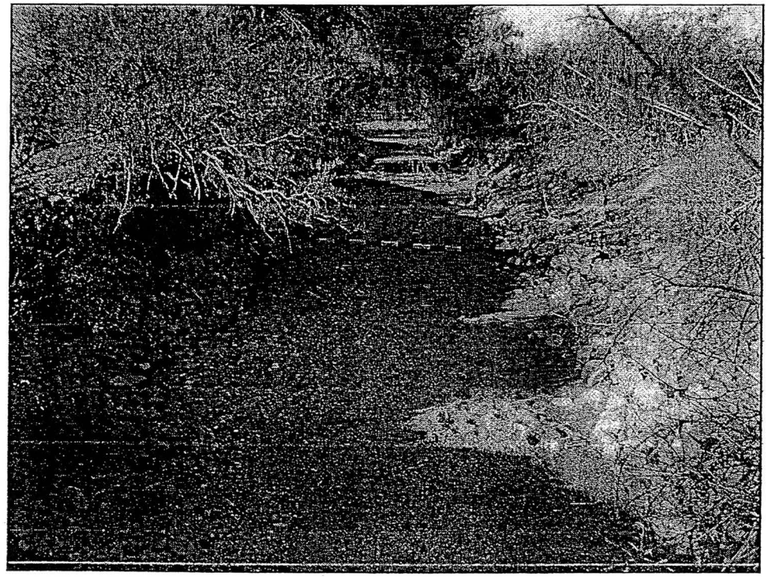
P6/7 Primary Wash #21 - Cross Section #2 – View looking upstream

P6/8 Primary Wash #21 - Cross Section #3 – View looking upstream

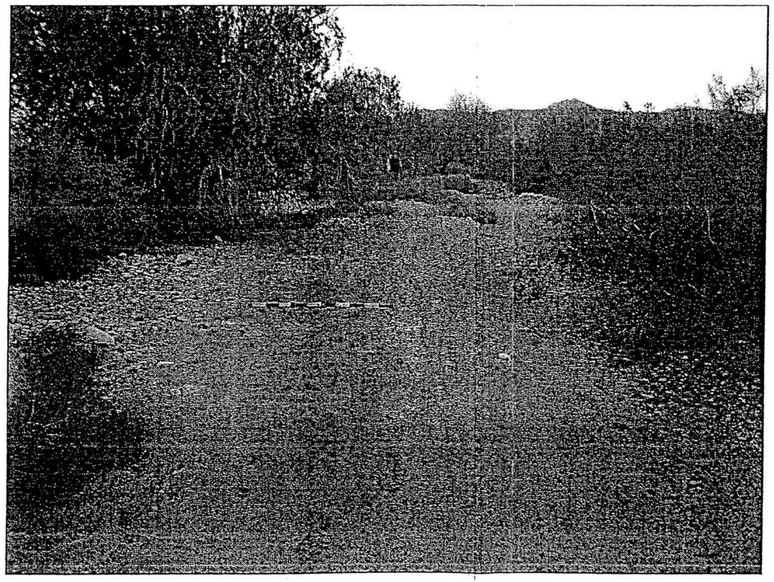
P6/40 Primary Wash #21 - Cross Section #4 – View looking upstream



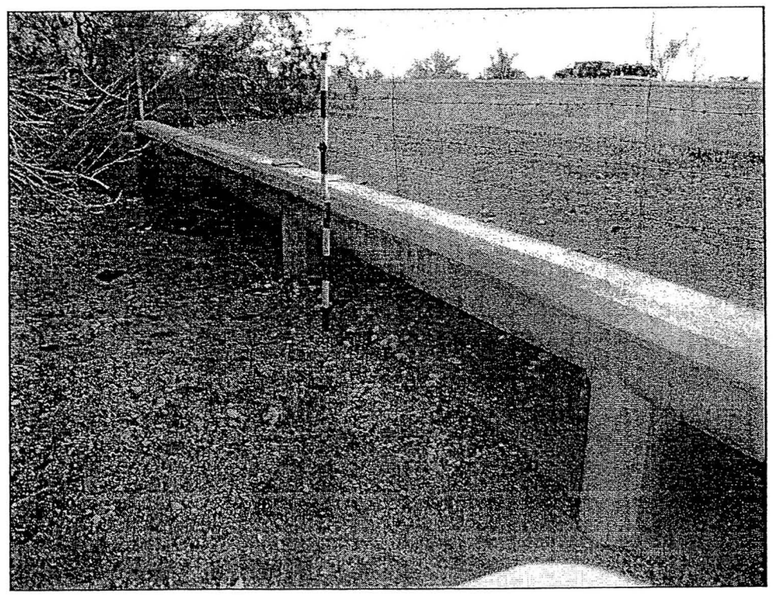
P6 /41Primary Wash #21 - Cross Section #5 – View looking upstream



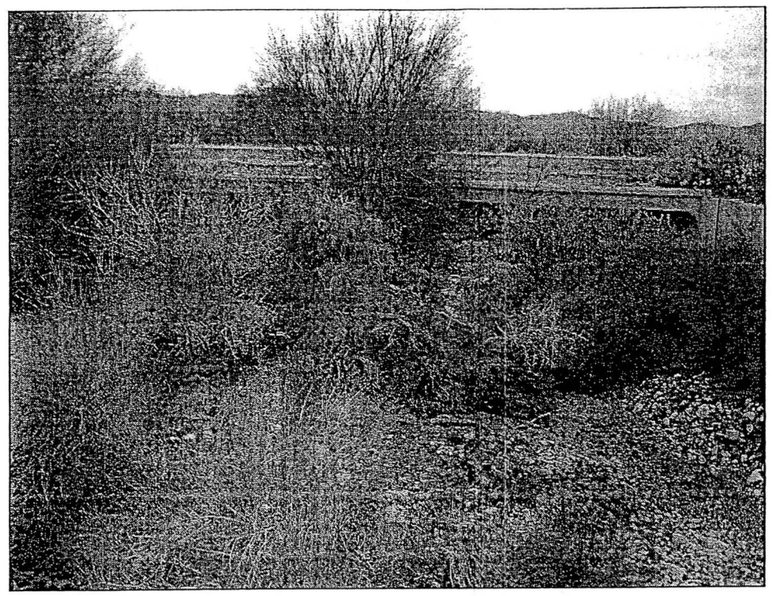
P7/1 Primary Wash #21 - Cross Section #6 – View looking upstream



P6/2 Primary Wash #21 – Sun Valley Parkway Bridge Culvert
View looking upstream at channel upstream of bridge



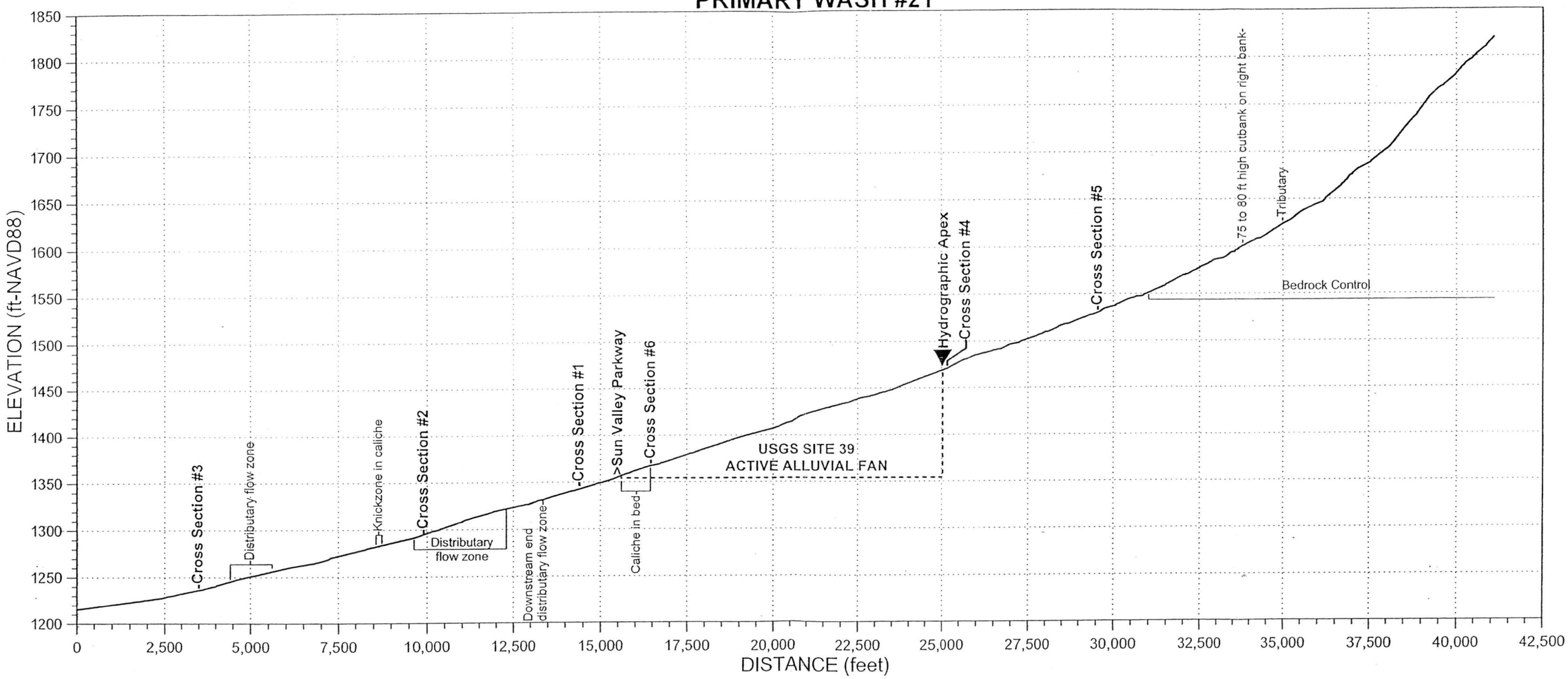
P6/1 Primary Wash #21 – Sun Valley Parkway Bridge Culvert
View looking downstream/south at upstream bridge face



P6/4 Primary Wash #21 – Sun Valley Parkway Bridge Culvert
View looking upstream at downstream bridge face

P6/3 Primary Wash #21 – Sun Valley Parkway Bridge Culvert
View looking downstream at downstream channel

PRIMARY WASH #21



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW21	1	184	March 13, 2004

North: 924054.9 ft
East: 466970.2 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		3:1	3 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	3 ft	Cobble minor	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal			Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde	X	
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		X
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

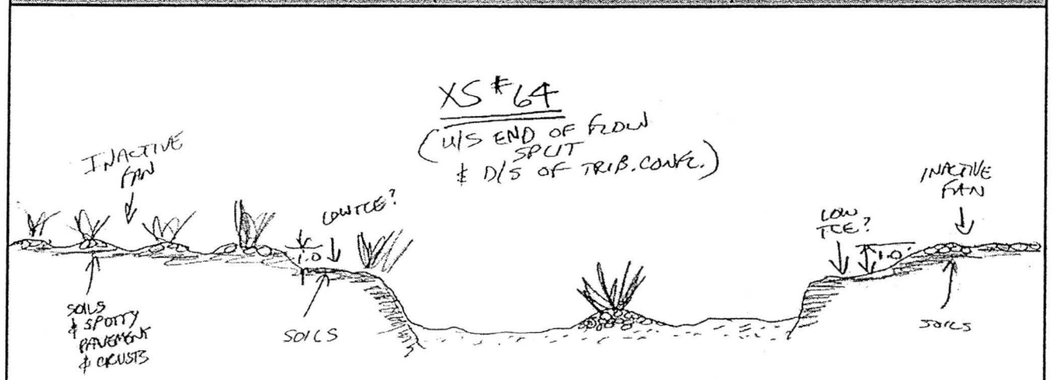
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
			1 ft

PHOTOS & DESCRIPTION:
P6/5 - View downstream showing flow split
P6/6 - View upstream showing distributary channel confluence

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present: Dimensions:			HEADCUT: Caliche Present: Dimensions:		
Spotty						
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #64



Notes: ***DOWNSTREAM OF USGS SITE 39 ALLUVIAL FAN***

Cross section at upstream end of flow split and downstream of tributary confluence.

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AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW21	2	187	March 13, 2004

North: 923229.8 ft
East: 462595.4 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank		1:1	1-3 ft	Sand X	Gravel X
Channel	X	Multiple	X	Right Bank		1:1	1-3 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

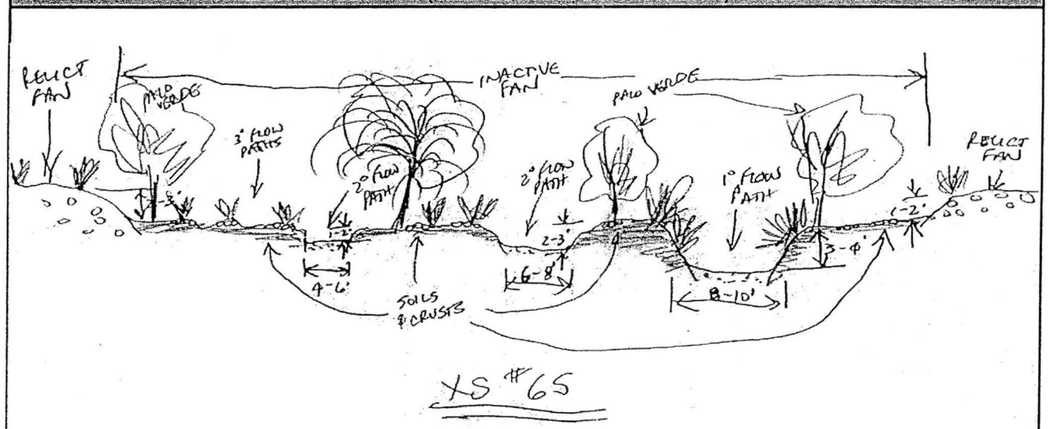
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P6/7 - View upstream showing split flow confluence of primary and secondary channels.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present: Dimensions:			HEADCUT: Caliche Present: Dimensions:		
Spotty						
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #65



Notes: ***DOWNSTREAM OF USGS SITE 39 ALLUVIAL FAN***

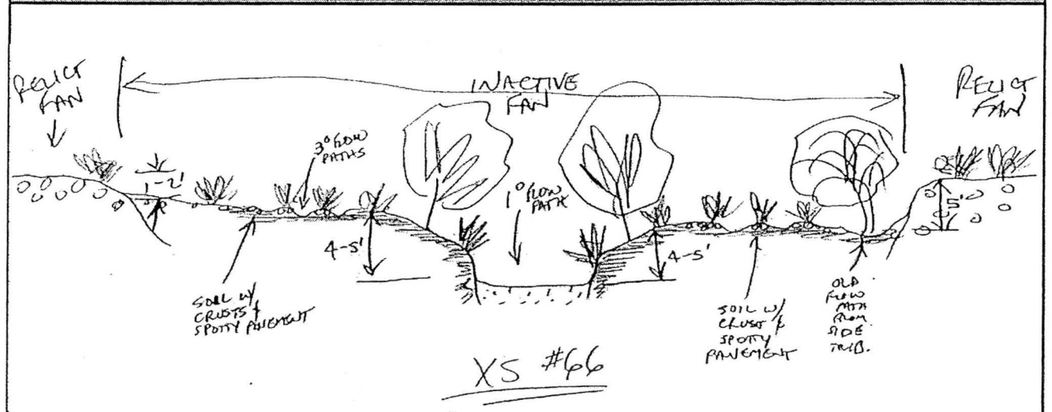
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW21	3	193	March 13, 2004
	North: 920703.4 ft East: 456967.4 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	4-5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	4-5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				<1 ft	<1 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P6/8 - View upstream						
Mormon Tea	X								
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.				NICKZONE:			HEADCUT:		
Hedgehog C.			Absent	Caliche Present:			Caliche Present:		
Fishhook C.			**Spotty**	Dimensions:			Dimensions:		
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #66



Notes:	***DOWNSTREAM OF USGS SITE 39 ALLUVIAL FAN***

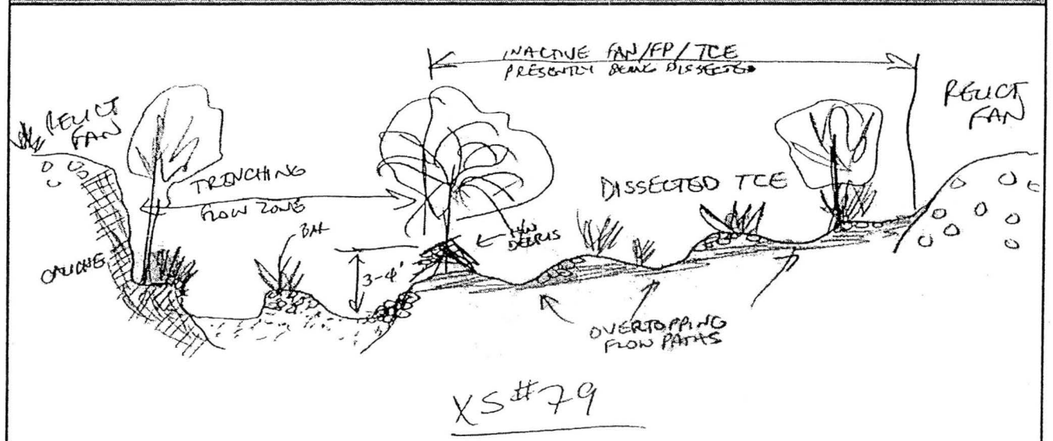
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW21	4	229	March 13, 2004
	North: 926340.4 ft East: 476581.3 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single		Left Bank	X	<1:1	6 ft	Sand X	Gravel X
Channel	X	Multiple	X	Right Bank		3:1	3-4 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X	X	Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X	Height (top) Above Bed		Thickness	Soils			X
			Left Bank	6 ft	6 ft	HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X	X	Channel				2-3 ft	3-4 ft	
Brittlebush	X	X	PHOTOS & DESCRIPTION:						
Bursage	X	X	P6/41 - View upstream showing entrenchment and dissection of inner terrace.						
Mormon Tea	X	X							
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.				NICKZONE:			HEADCUT:		
Hedgehog C.			**Absent**	Caliche Present:			Caliche Present:		
Fishhook C.			Spotty	Dimensions:			Dimensions:		
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #79



Notes:	***DOWNSTREAM OF USGS SITE 39 ALLUVIAL FAN***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW21	5	230	March 13, 2004

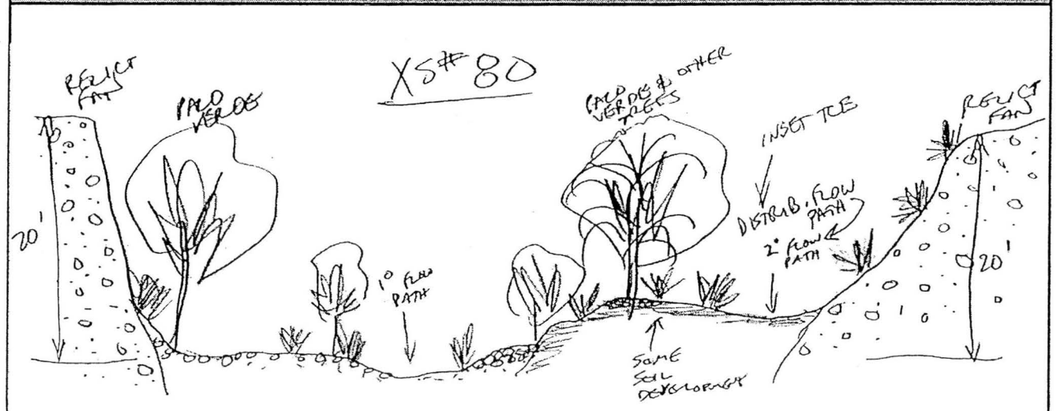
North: 926216.5 ft
East: 480764.9 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank	X	<1:1	20 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank	X	<1:1	20 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X	X	Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils			X
			Left Bank	X	?	HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank	X	?	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X	X	Channel				2-3 ft	2-3 ft	
Brittlebush	X	X	PHOTOS & DESCRIPTION:						
Bursage	X	X	P6/42 - View upstream						
Mormon Tea	X	X							
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #80



Notes: ***DOWNSTREAM OF USGS SITE 39 ALLUVIAL FAN***

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW21	6	235	March 14, 2004

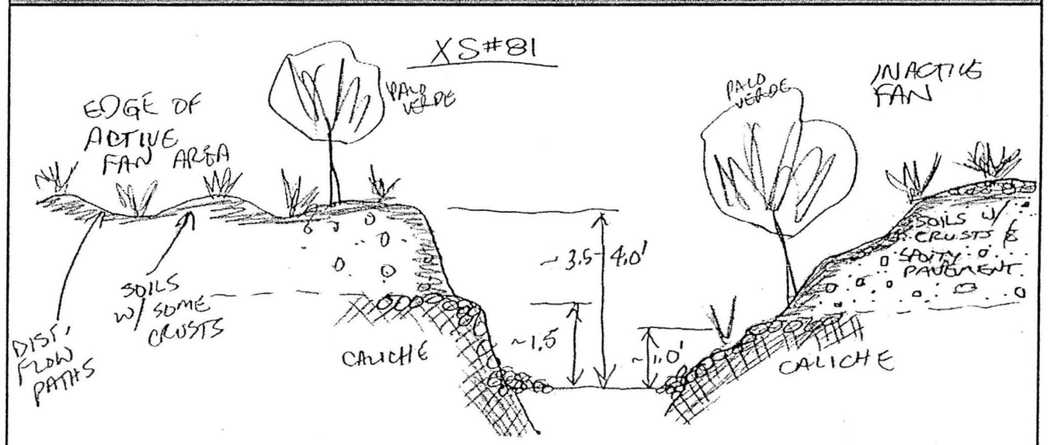
North: 924649.1 ft
East: 468885.3 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank	X	<1:1	3.5-4 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank	X	<1:1	3.5-4 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils			X
			Left Bank	1.5 ft	1.5 ft	HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank	1 ft	1 ft	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1.5 ft	1.5 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P7/1 - View looking downstream						
Mormon Tea									
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

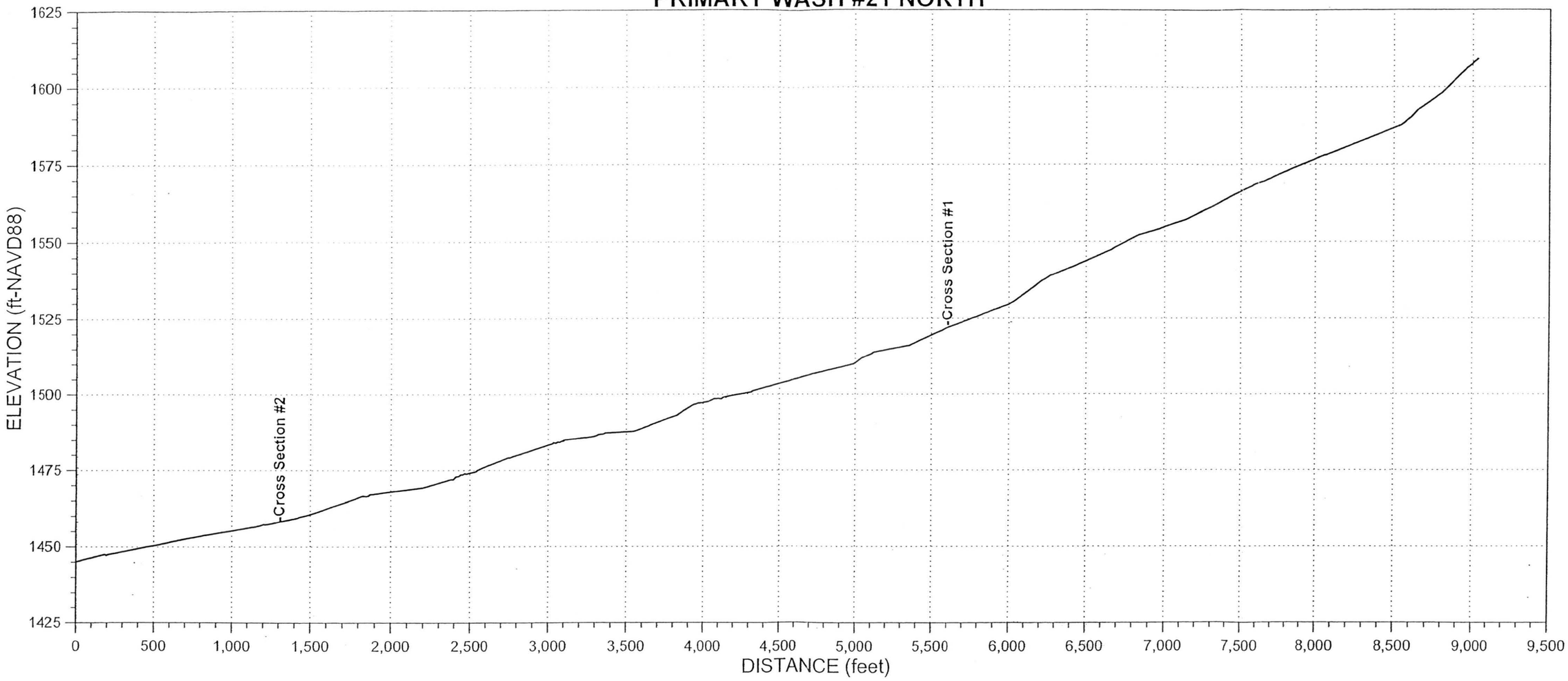
TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #81



Notes: ***DOWNSTREAM OF USGS SITE 39 ALLUVIAL FAN***

AYRES ASSOCIATES

PRIMARY WASH #21 NORTH



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW21North	1	227	March 13, 2004

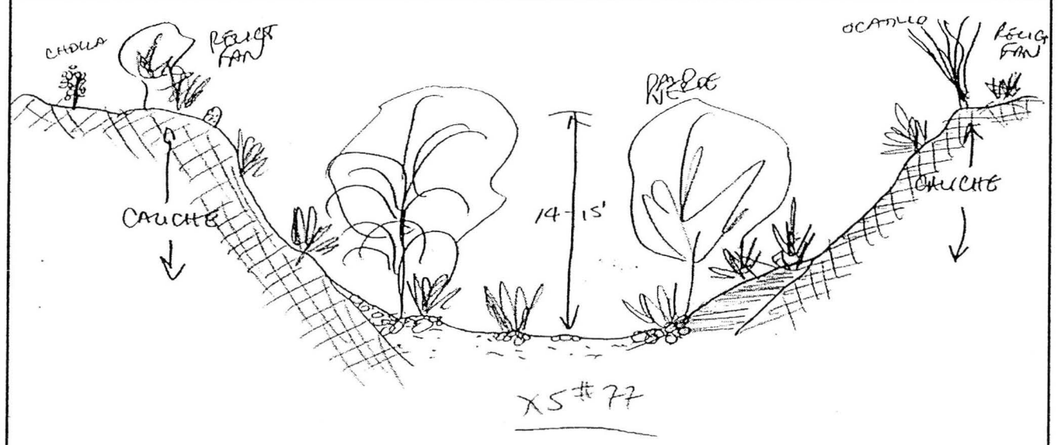
North: 931794.9 ft
East: 476250.9 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	14-15 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	14-15 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X		Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X	Height (top)	Above Bed	Thickness	Soils			X
			Left Bank	X	?	HIGH WATER MARKS/DEBRIS			
Palo Verde	X	X	Right Bank	X	?	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X	X	Channel						1 ft
Brittlebush	X	X	PHOTOS & DESCRIPTION:						
Bursage	X	X	P6/38 - View looking downstream						
Mormon Tea	X	X							
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #77



Notes:

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW21North	2	228	March 13, 2004

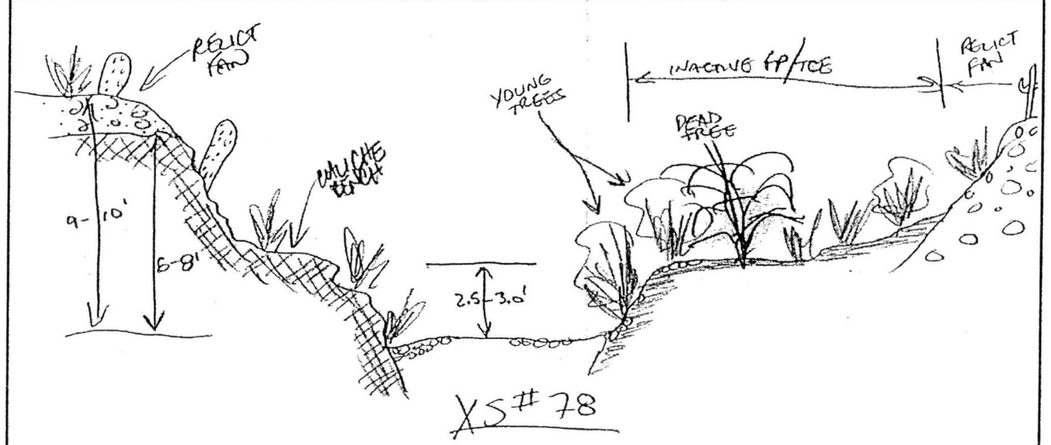
North: 928221.5 ft
East: 475065.7 ft

Field Crew: W.J. Spitz, A.B. Alvarado

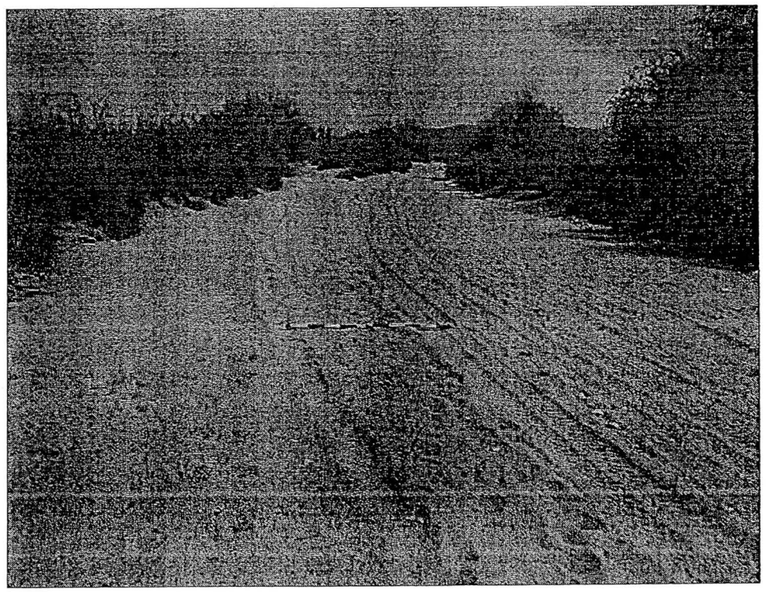
ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single		Left Bank		1:1	9-10 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		2:1	2.5-3 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank	2.5-3 ft		Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils			X
			Left Bank	6-8 ft	6-8 ft	HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel					<1 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P6/39 - View upstream						
Mormon Tea									
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

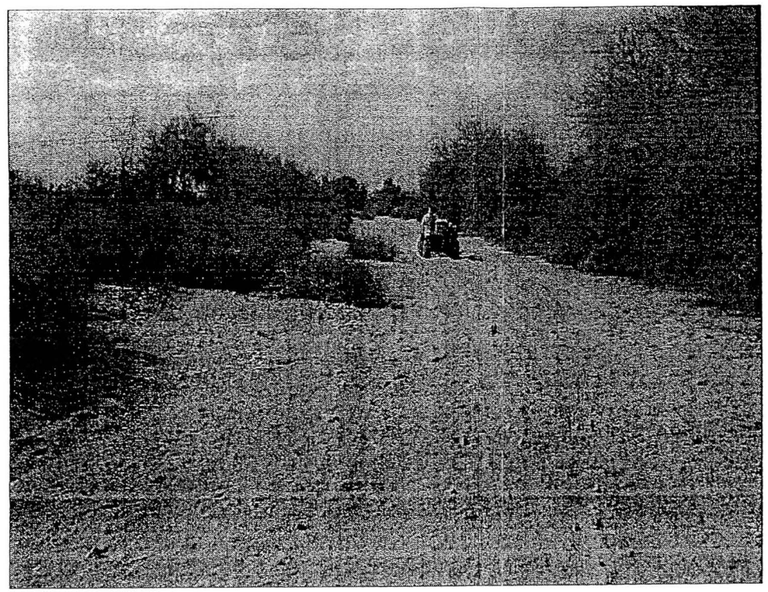
TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #78



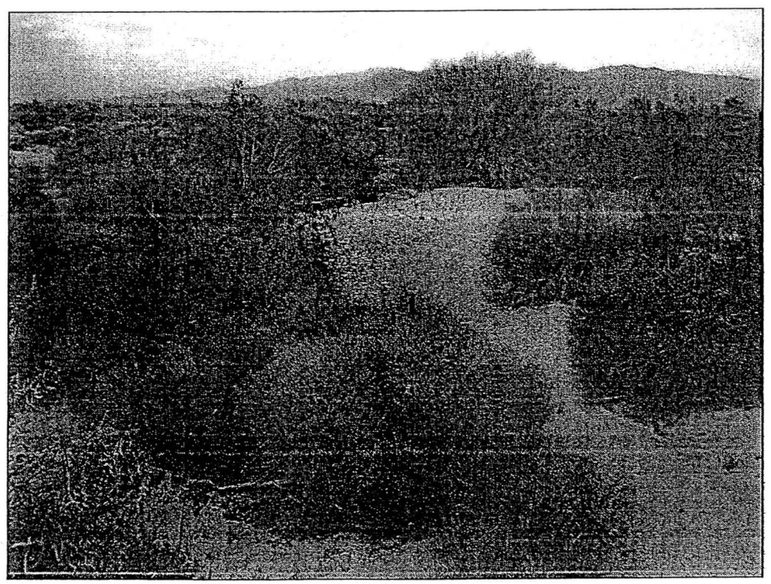
Notes:



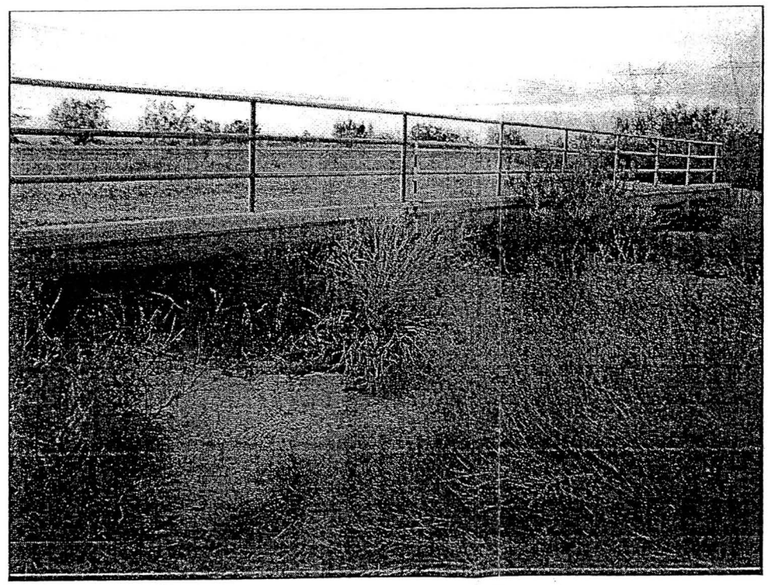
P5/10 Primary Wash #23 - Cross Section #8 – View looking downstream



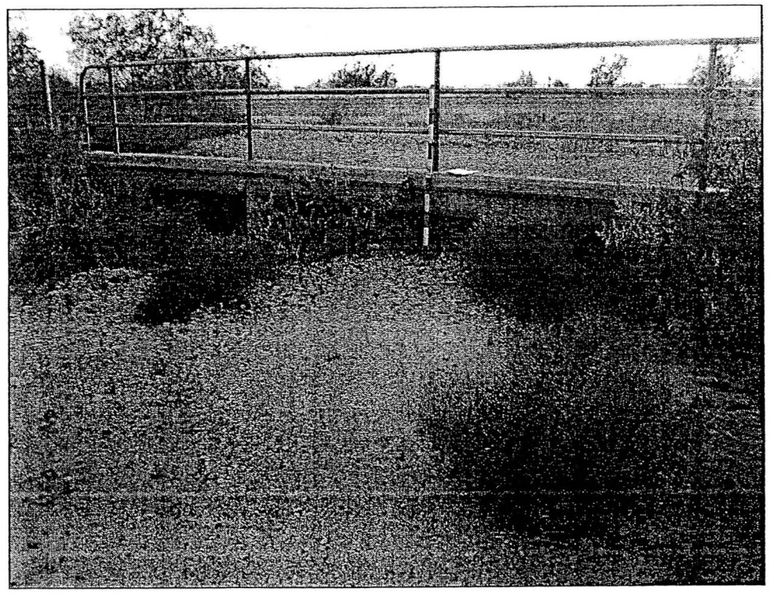
P5/11 Primary Wash #23 - Cross Section #8 – View looking upstream



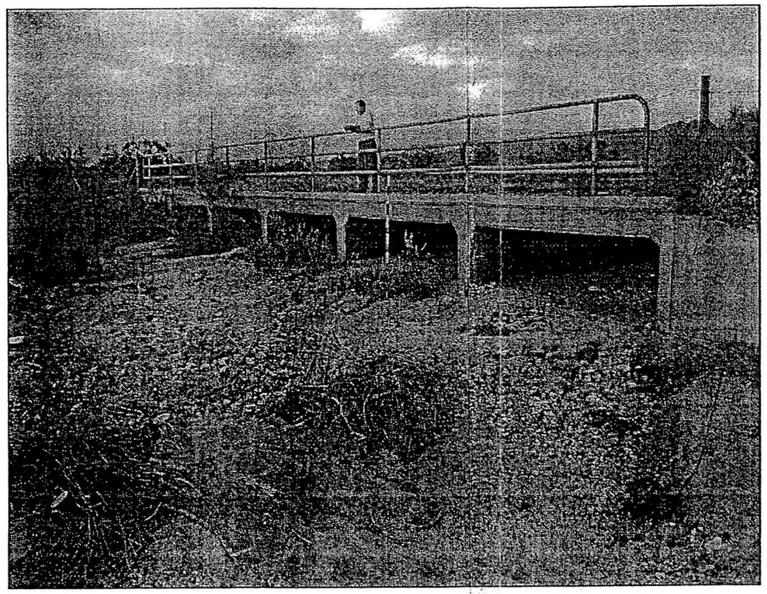
P4/45 Primary Wash #23 – Sun Valley Parkway Bridge Culvert
View looking upstream at channel upstream of bridge



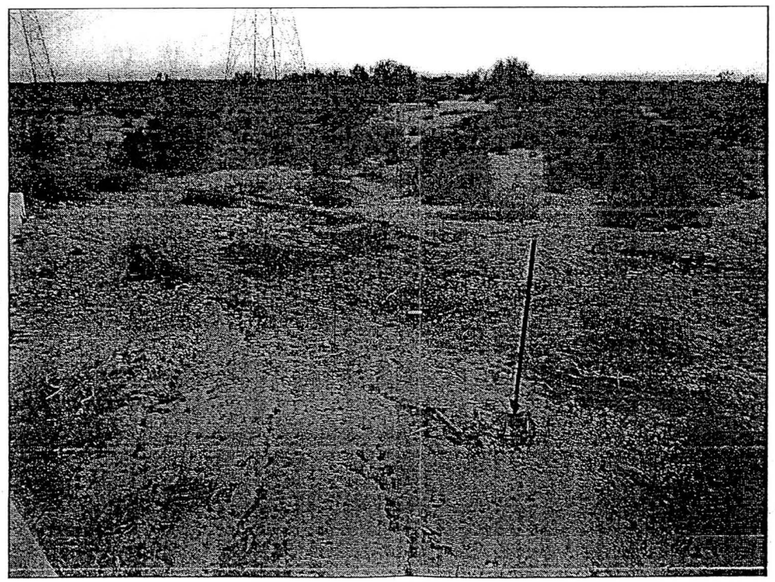
P4/43 Primary Wash #23 – Sun Valley Parkway Bridge Culvert
View looking downstream/north at upstream bridge face



P4/44 Primary Wash #23 – Sun Valley Parkway Bridge Culvert
View looking downstream/south at upstream bridge face at south end

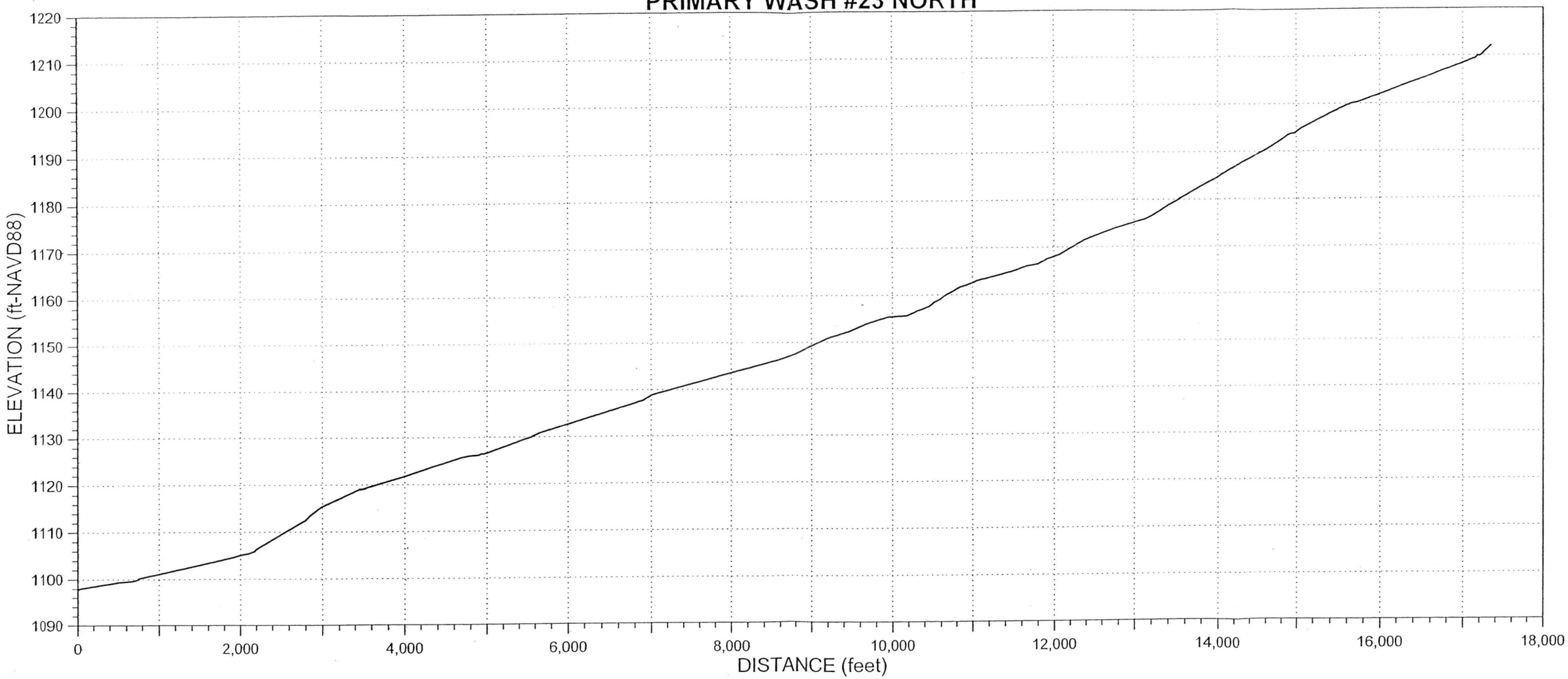


P4/47 Primary Wash #23 – Sun Valley Parkway Bridge Culvert
View looking upstream/north at downstream bridge face

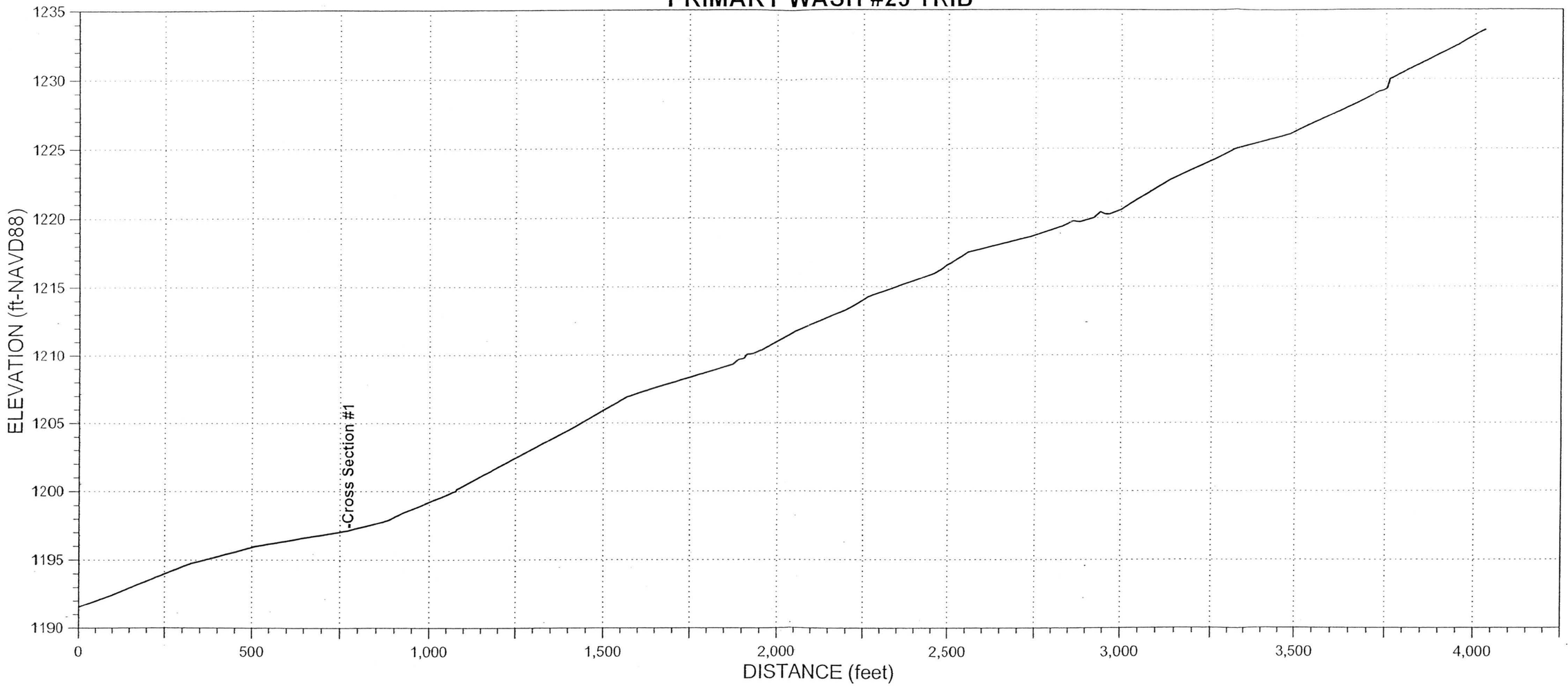


P4/46 Primary Wash #23 – Sun Valley Parkway Bridge Culvert
View looking downstream at downstream channel

PRIMARY WASH #23 NORTH



PRIMARY WASH #23 TRIB



AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW23Trib	1	155	March 11, 2004
	North: 907439.1 ft East: 459973.2 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank	X	<1:1	4.5-5 ft	Sand__X__	Gravel__X__
Channel	X	Multiple		Right Bank	X	<1:1	4.5-5 ft	Cobble_____	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P5/4 - View upstream

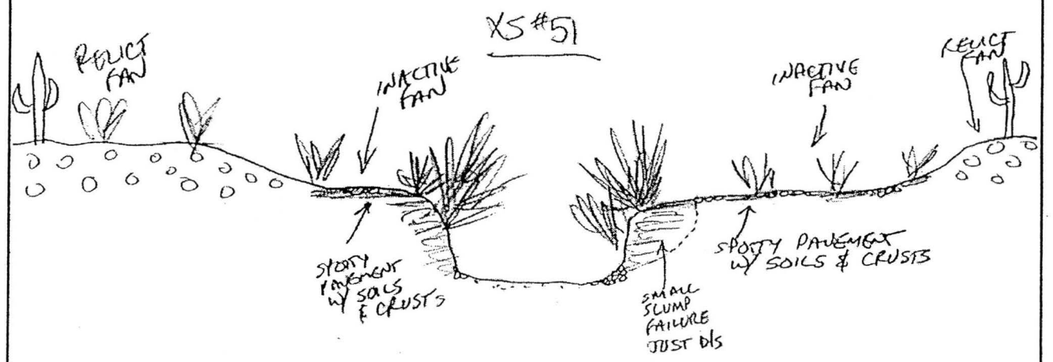
CRYPTO-BIOTIC CRUST (floodway):
- Absent
- Spotty
- Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #51

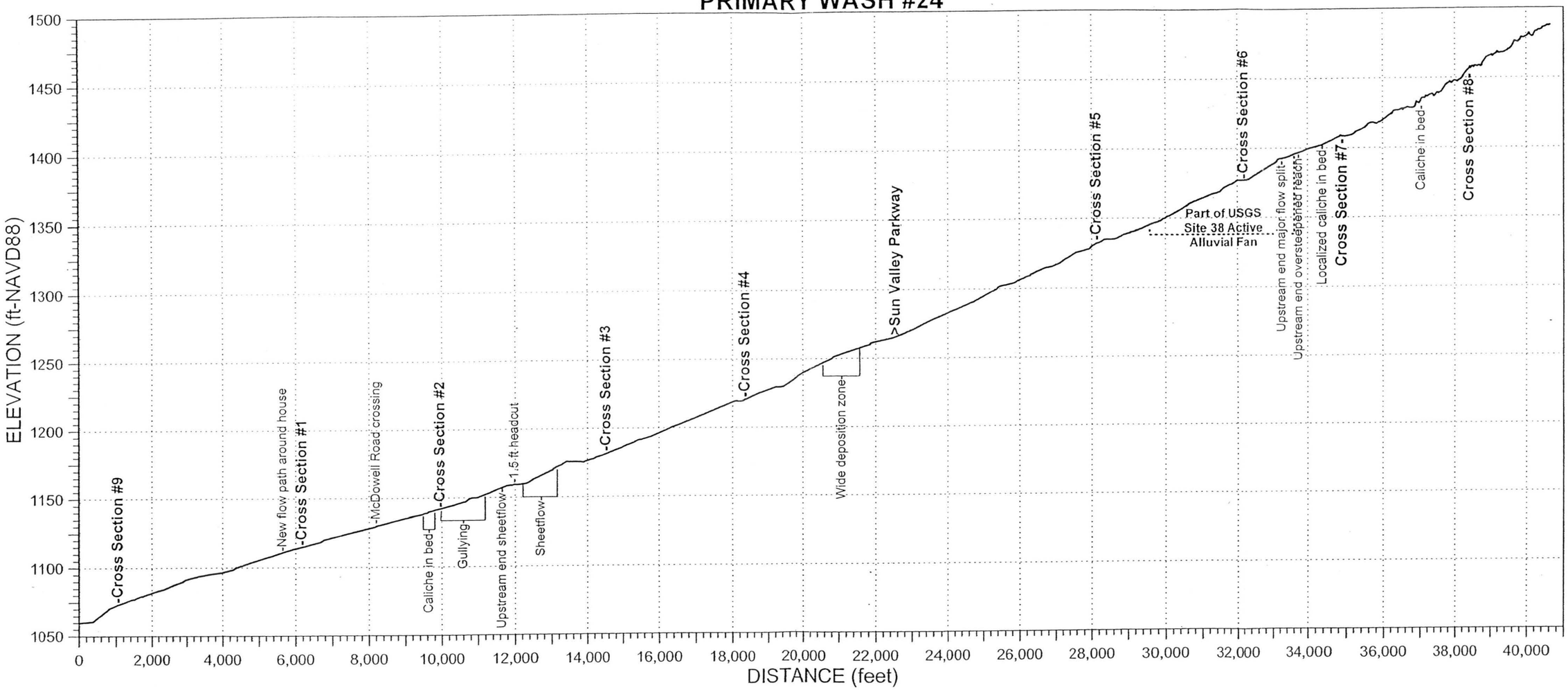


Notes:

AYRES ASSOCIATES

P5/4 Primary Wash #23 Trib - Cross Section #1 – View looking upstream

PRIMARY WASH #24



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW24	1	112	March 10, 2004

North: 897941.3 ft
East: 459360.0 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	
Channel	X	Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
<1:1	1.5-2 ft	Sand X	Gravel X
<1:1	1.5-2 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde	on Inactive Fan surfaces	
Creosote		
Brittlebush		
Bursage		
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

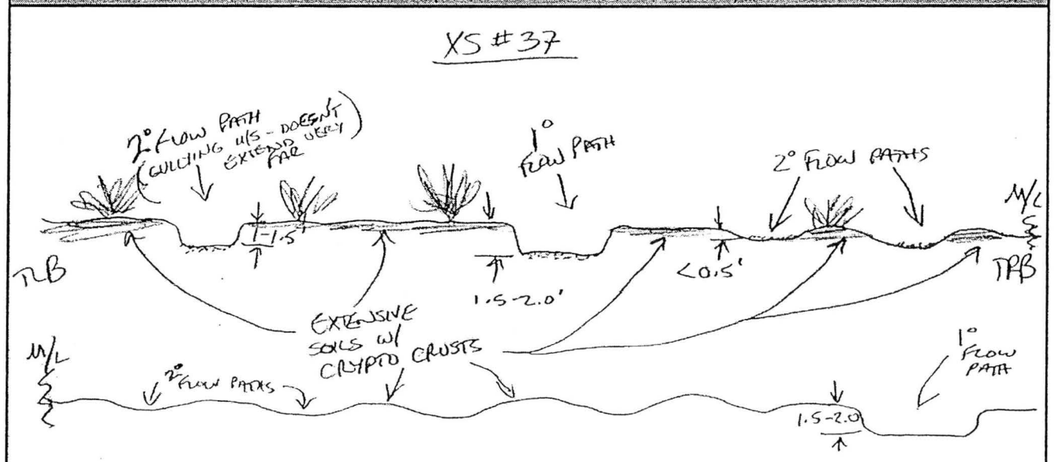
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P4/3 - View upstream showing headward extent of secondary flow path gullies.
P4/4 - View upstream on primary flow path.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #37



Notes: Cryptobiotic crusts extensive on Inactive Fan surfaces.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW24	2	116	March 10, 2004

North: 901354.2 ft
East: 460490.5 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	X
Channel	X	Multiple	X	Right Bank	X

H:V	Height	BED MATERIAL	
1:1	3 ft	Sand X	Gravel X
1:1	3 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

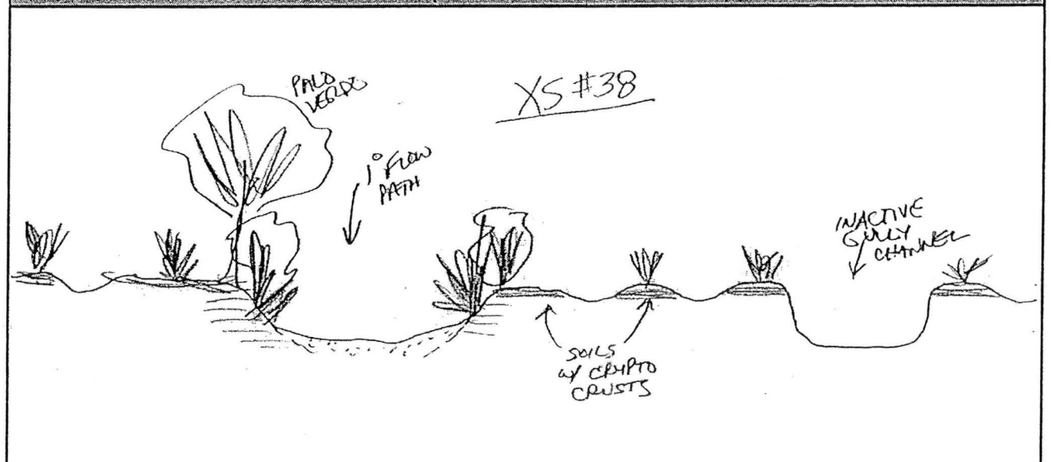
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P4/6 - View looking upstream showing major (inactive) gullying
P4/7 - View downstream showing primary channel

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Downstream			HEADCUT:		
Spotty	Caliche Present: Yes			Caliche Present:		
Extensive	Dimensions: 2-3 feet drop over aabout 200-300 feet			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #38



Notes: Cryptobiotic crusts extensive on Inactive Fan surfaces.

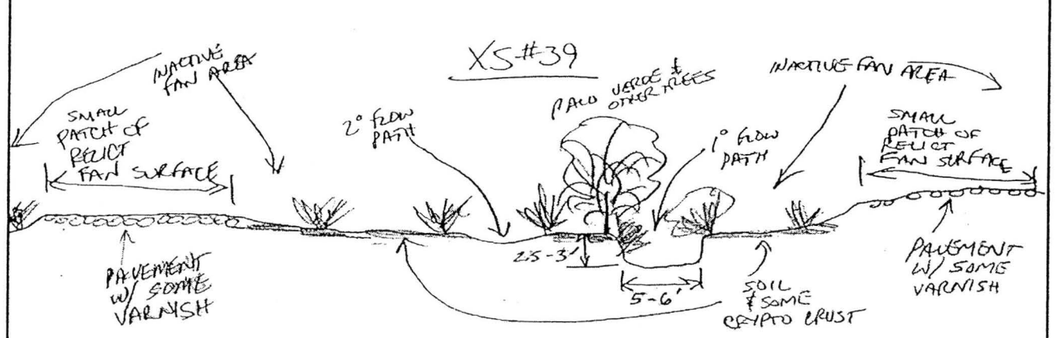
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW24	3	121	March 10, 2004
	North: 904511.0 ft East: 463455.4 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		1:1	2.5-3 ft	Sand__X__	Gravel__X__
Channel	X	Multiple		Right Bank		1:1	2.5-3 ft	Cobble_____	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	Soils			X
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P4/13 - View downstream (flow splits just upstream)						
Mormon Tea									
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #39



Notes: Cryptobiotic crusts extensive on Inactive Fan surfaces.

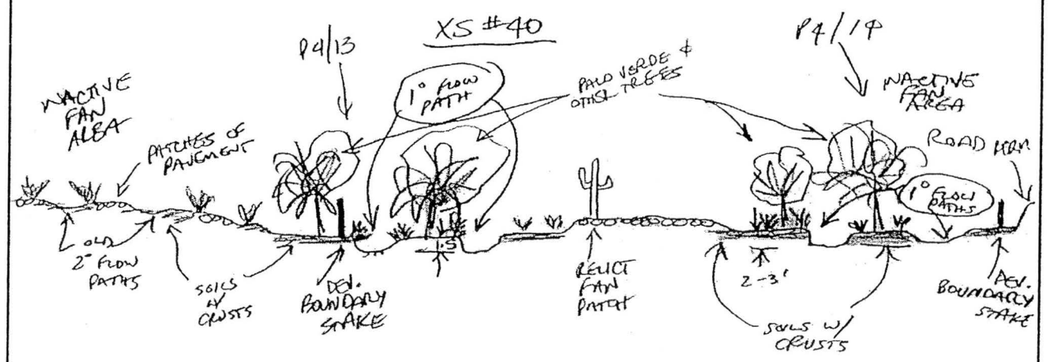
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW24	4	122	March 10, 2004
	North: 907497.2 ft East: 465801.7 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank	X			Sand__X__	Gravel__X__
Channel	X	Multiple	X	Right Bank	X			Cobble_____	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish		X	
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P4/14 - View upstream on left side of multiple flow paths showing relationship of						
Mormon Tea			channel to boundary stake.						
Tamarisk			P4/15 - View looking downstream showing same as P4/13 on right side of						
Saguaro C.			multiple flow paths (note boundary stake).						
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #40



Notes: Cryptobiotic crusts extensive on Inactive Fan surfaces.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW24	5	130	March 10, 2004
	North: 915417.6 ft East: 470878.7 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	
Channel		Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
>4:1	2.5-3 ft	Sand__X__	Gravel__X__
>4:1	2.5-3 ft	Cobble____	Bldrs____

VEGETATION		INSET F/P
In-channel	X	
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA	
Height (top) Above Bed	Thickness
Left Bank	
Right Bank	
Channel	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	~1 ft	~1 ft	

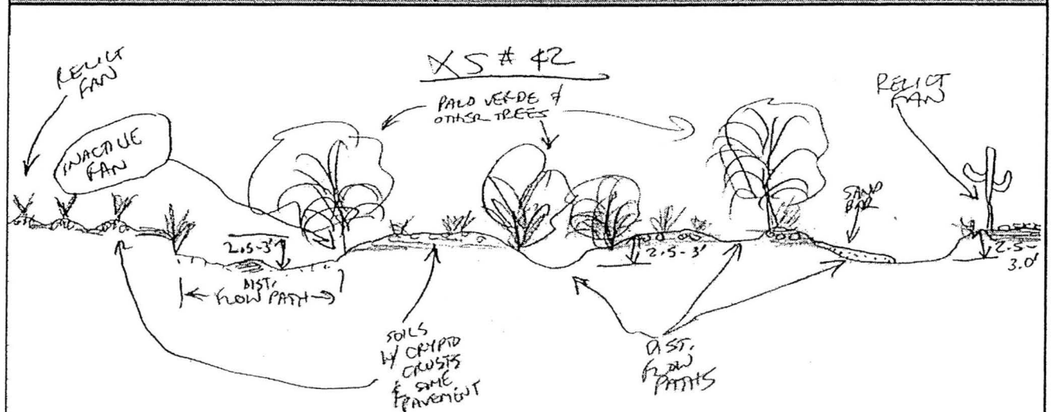
PHOTOS & DESCRIPTION:

P4/25 - View downstream, left primary channel, note flow split around vegetation

P4/26 - View downstream, right primary channel, note flow split around vegetation

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #42



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW24	6	131	March 10, 2004
	North: 917704.5 ft East: 473515.2 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single	X	Left Bank	
Channel		Multiple		Right Bank	

H:V	Height	BED MATERIAL	
>6:1	2-3 ft	Sand__X__	Gravel__X__
>6:1	2-3 ft	Cobble__X__	Bldrs__X__

VEGETATION		INSET F/P
In-channel	X	
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA	
Height (top) Above Bed	Thickness
Left Bank	
Right Bank	
Channel	

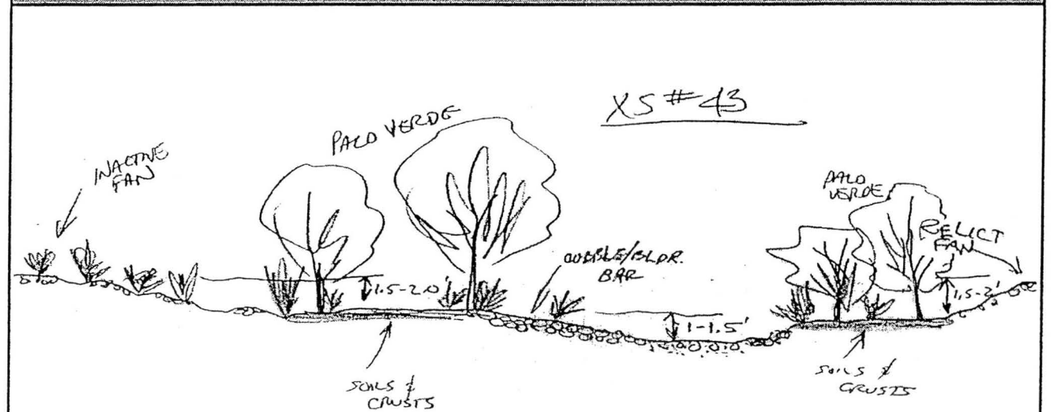
HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1-1.5 ft	1-1.5 ft	1-1.5 ft

PHOTOS & DESCRIPTION:

P4/27,28 - Pan looking downstream, note cobble/boulder bar and ramped cobbles/boulders onto Palo Verde trees on right, also note veg debris.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #43



Notes: This cross section is approximatley on line with USGS Site 37 active fan to north. Downstream of here channel is wide and shallow with extensive cobbles and boulders and split flow = high energy reach or steep slope?

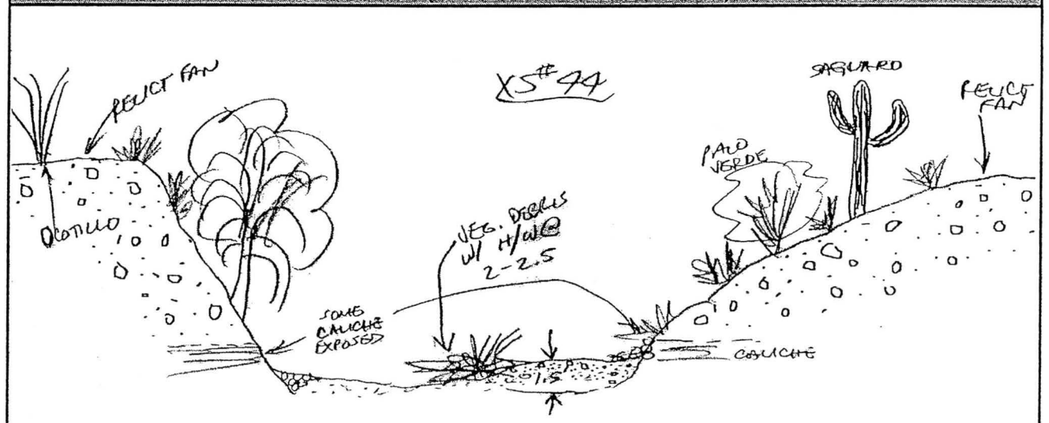
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW24	7	135	March 10, 2004
	North: 918200.6 ft East: 476031.6 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	10-12 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		3:1	10-12 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils			X
			Left Bank	?		HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank	1.5-2 ft	?	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1.5-2 ft	1.5-2 ft	2-2.5 ft
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P4/29 - View downstream, note caliche on left and deris and bar on right.						
Mormon Tea	X		P4/30 - View upstream.						
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #44



Notes:

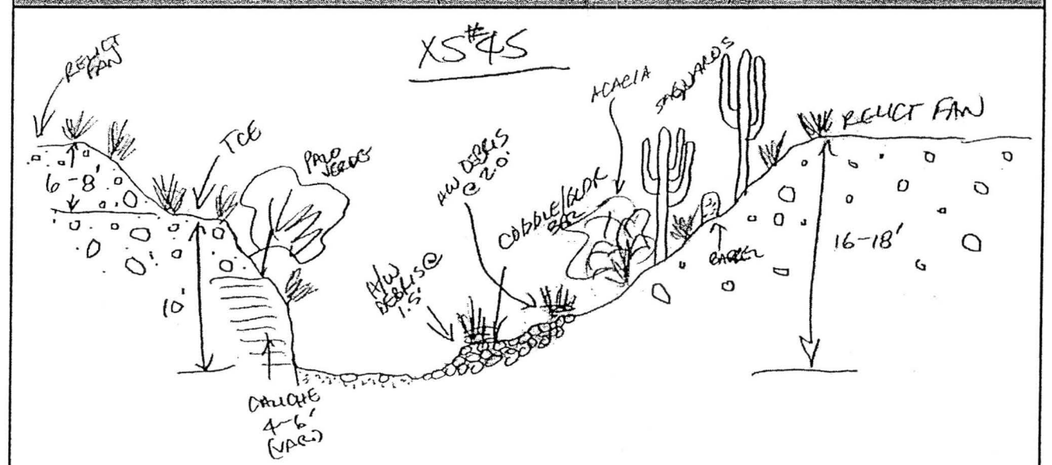
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW24	8	137	March 10, 2004
	North: 918655.2 ft East: 479262.8 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		<1:1	17-18 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	17-18 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank	10 ft			Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils			X
			Left Bank	4-6 ft	4 ft(?)	HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank	?	?	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1 ft	1.5-2 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P4/32 - View upstream						
Mormon Tea	X								
Tamarisk									
Saguaro C.	on slopes								
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.	on slopes		Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #45



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW24	9	429	March 19, 2004
	North: 893166.5 ft East: 457716.2 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank	X	<1:1	3 ft	Sand__X__	Gravel__X__
Channel	X	Multiple	X (D/S)	Right Bank	X	<1:1	3 ft	Cobble_____	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank	10 ft	
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.	X	
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.	X	
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

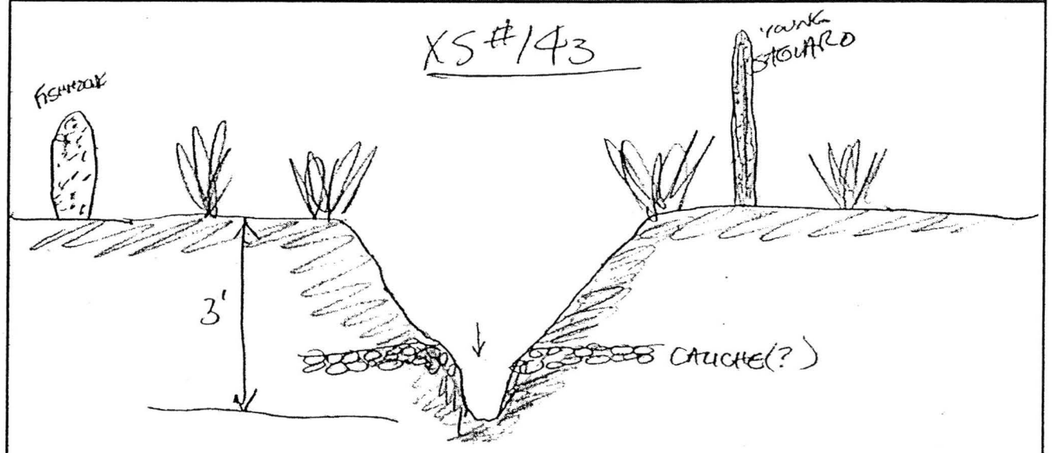
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P12/4 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #143



Notes: Area just downstream is gullied. This channel reach is incising slowly.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	DATE:	WAYPOINT:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW24	March 10, 2004	D/S Face: 128 U/S Face: 127
		Field Crew: W.J. Spitz, A.B. Alvarado	

ROAD CROSSING - CULVERT DATA

CMP____ RCP____ RCBC__X__

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	911001.15	910924.07	2	3 ft	1.0 ft	US: 1.0 ft	DS: 1.0 ft		U/S: 30%
Easting	468096.30	467964.79	Depth of D/S Incision: 0 ft			# 2	# 2	No	D/S: 30%

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	No	1:1	1.5-2 ft	Sand__X__	Gravel__X__
Channel	Yes	Multiple	No	Right bank	No	1:1	1.5-2 ft	Cobble__X__	Bldrs_____

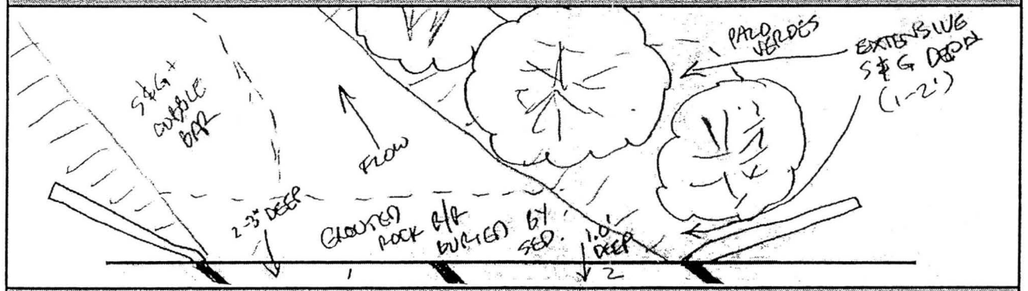
DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	No	>3:1	1-3 ft	Sand__X__	Gravel__X__
Channel	No	Multiple	No	Right bank	No	>3:1	1-3 ft	Cobble__X__	Bldrs_____

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain		1.0 ft		>1.0 ft

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain		1.0 ft		>1.0 ft

PLAN VIEW - DOWNSTREAM FACE AND CHANNEL



PLAN VIEW - UPSTREAM FACE AND CHANNEL

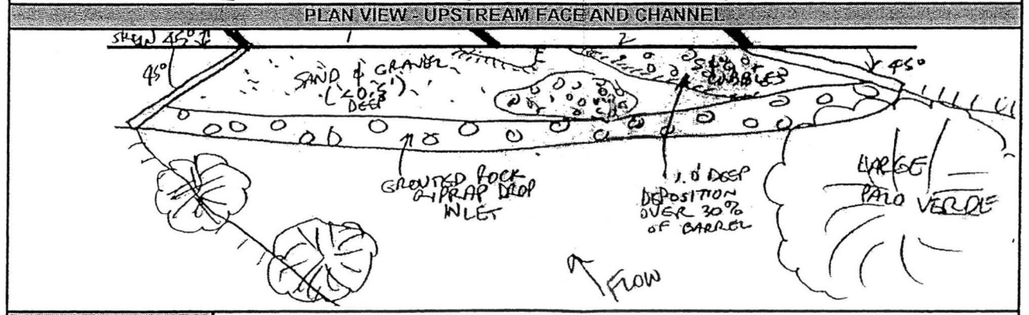
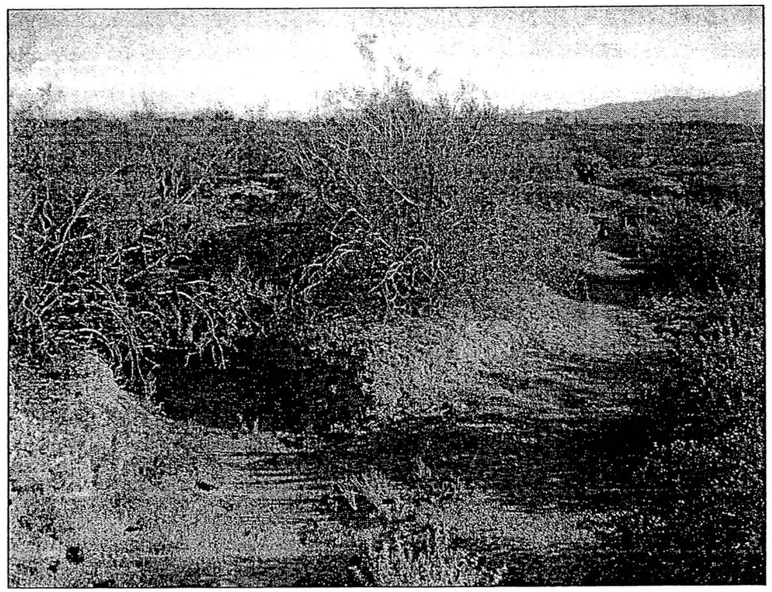
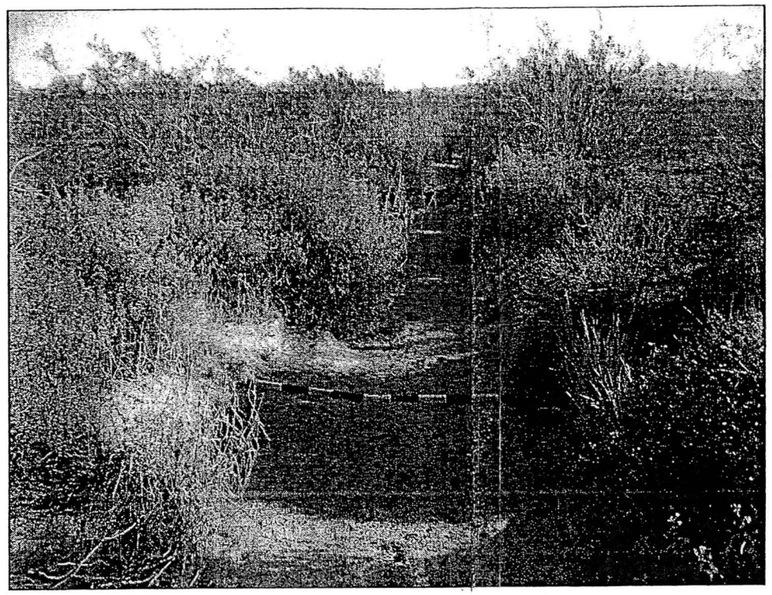


PHOTO #		NOTES:
U/S Face	4-20	Looking north - note sediment in barrel.
View U/S	4-21	Looking upstream
D/S Face	4-22	View looking north - note sediment in barrel
View D/S	4-23	View looking downstream
Other		

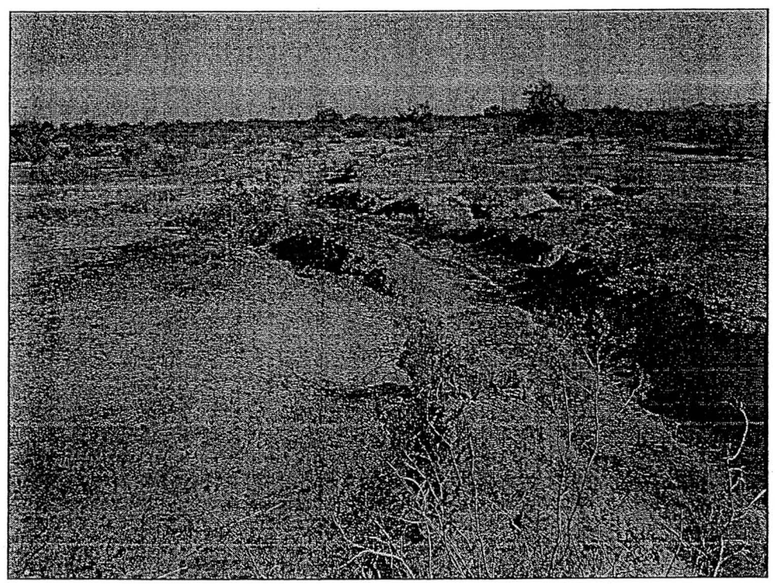
AYRES ASSOCIATES



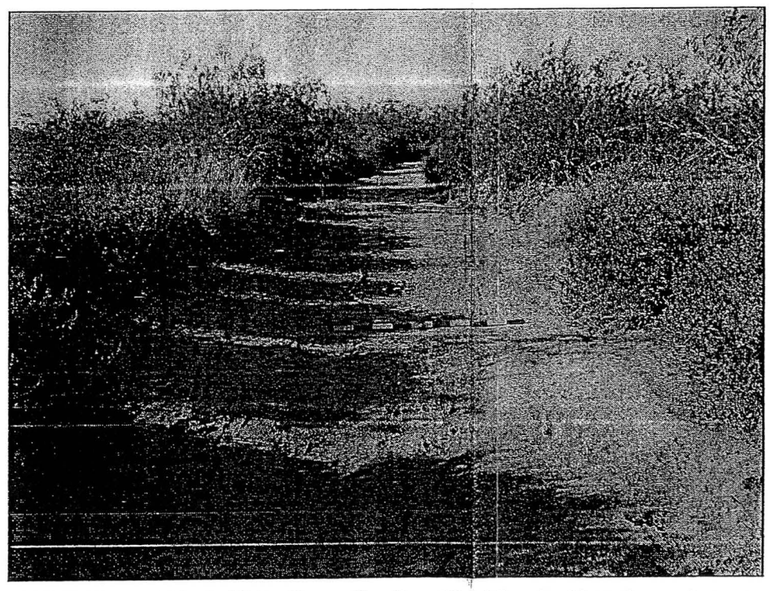
P4/3 Primary Wash #24 - Cross Section #1 – View looking upstream secondary flow paths



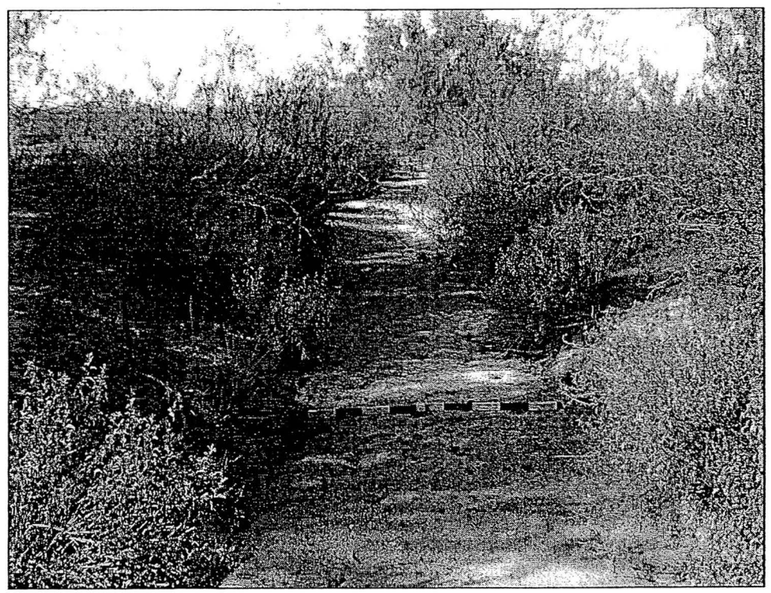
P4/4 Primary Wash #24 - Cross Section #1 – View looking upstream primary flow path



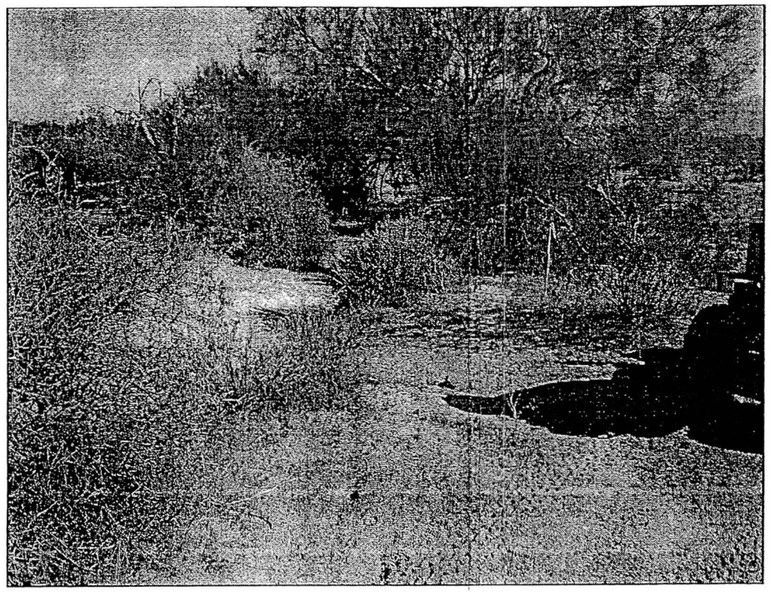
P4/6 Primary Wash #24 - Cross Section #2 – View looking upstream



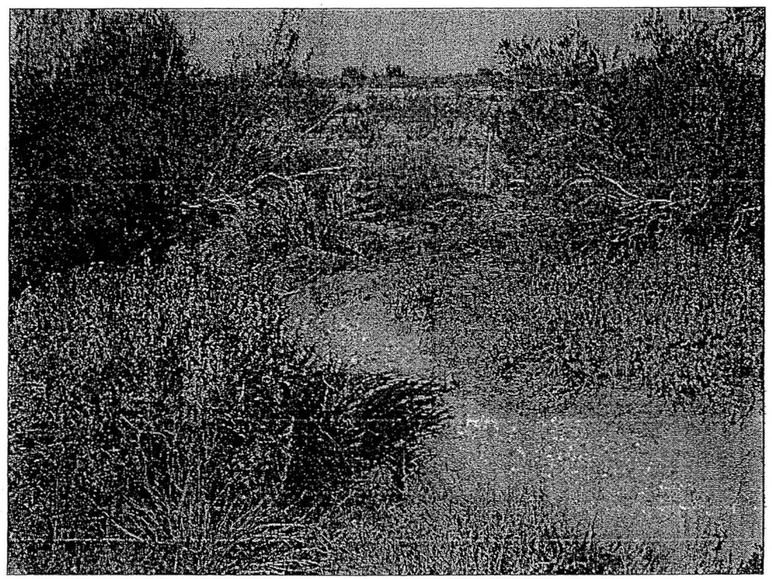
P4/7 Primary Wash #24 - Cross Section #2 – View looking downstream



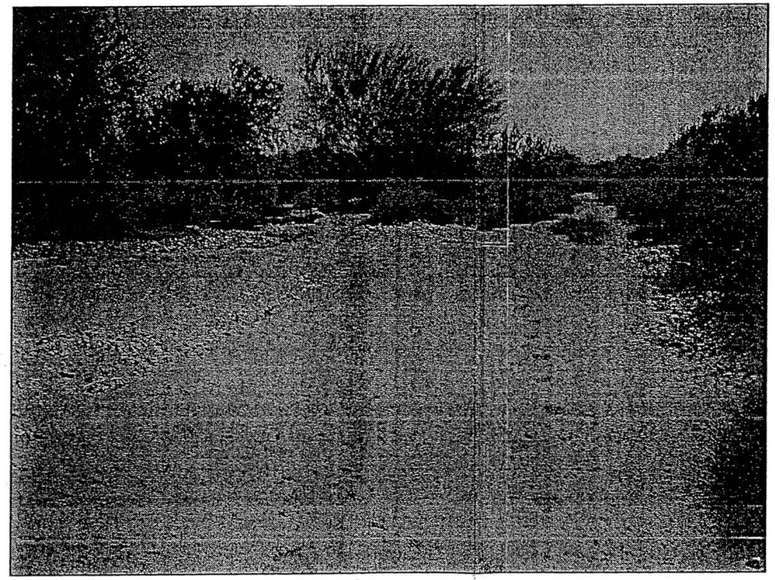
P4/13 Primary Wash #24 - Cross Section #3 – View looking downstream



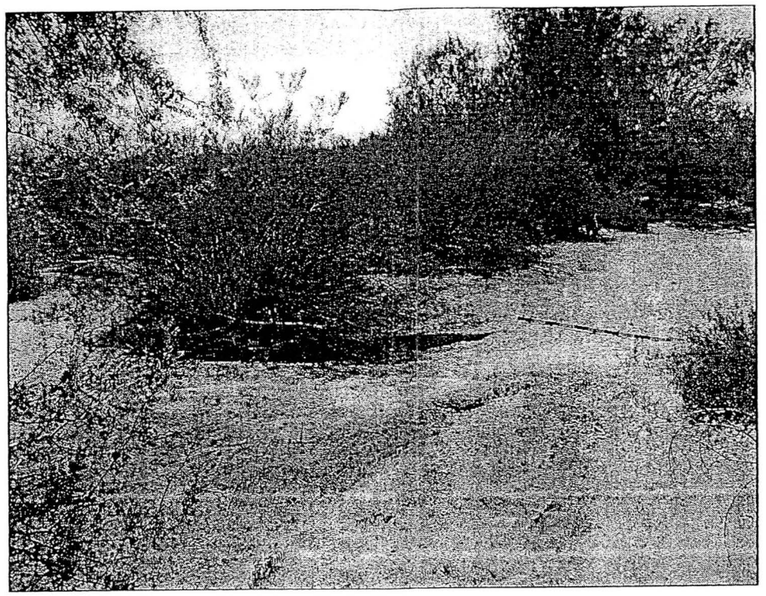
P4/14 Primary Wash #24 - Cross Section #4 – View looking upstream



P4/15 Primary Wash #24 - Cross Section #4 – View looking downstream

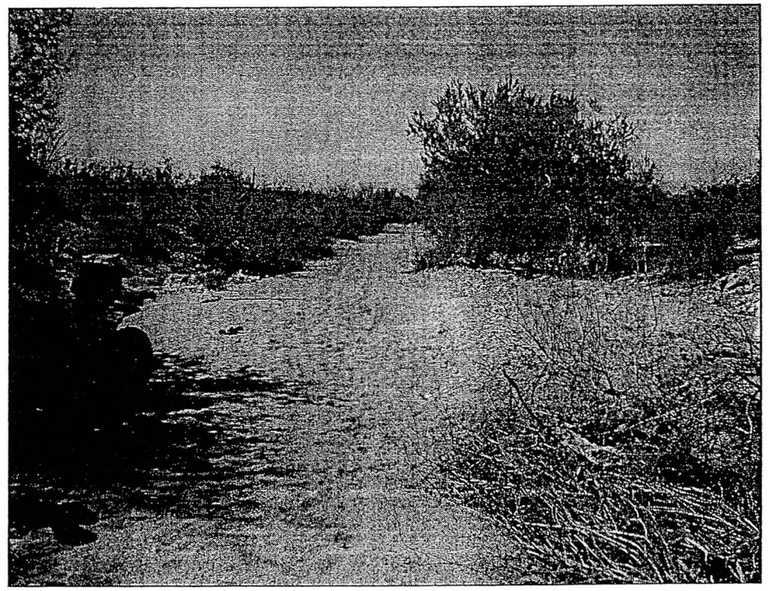


P4/25 Primary Wash #24 - Cross Section #5 – View looking downstream

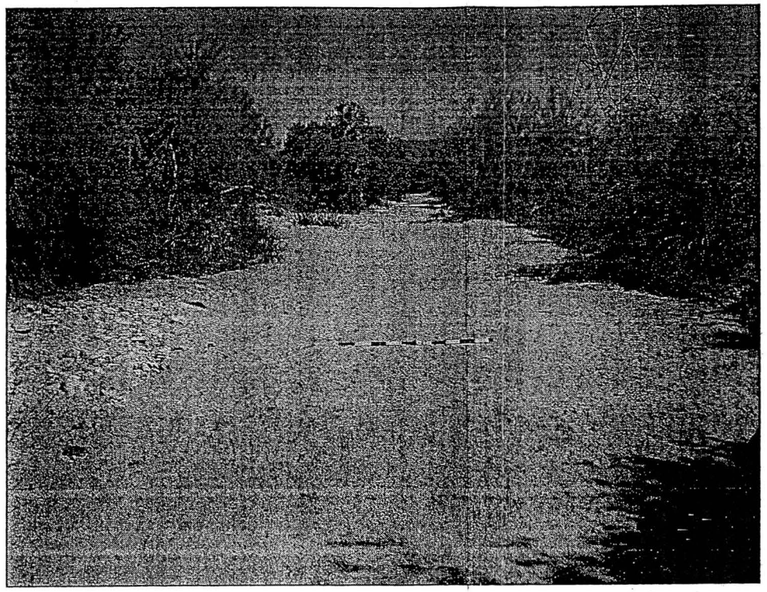


P4/26 Primary Wash #24 - Cross Section #5 – View looking downstream

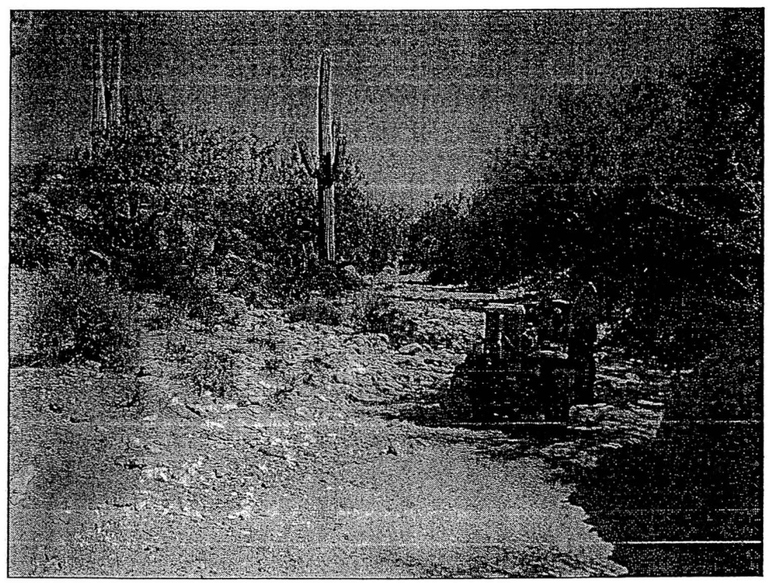
P4/27 & 28 Primary Wash #24 - Cross Section #6 – Panorama view looking downstream



P4/29 Primary Wash #24 - Cross Section #7 – View looking downstream



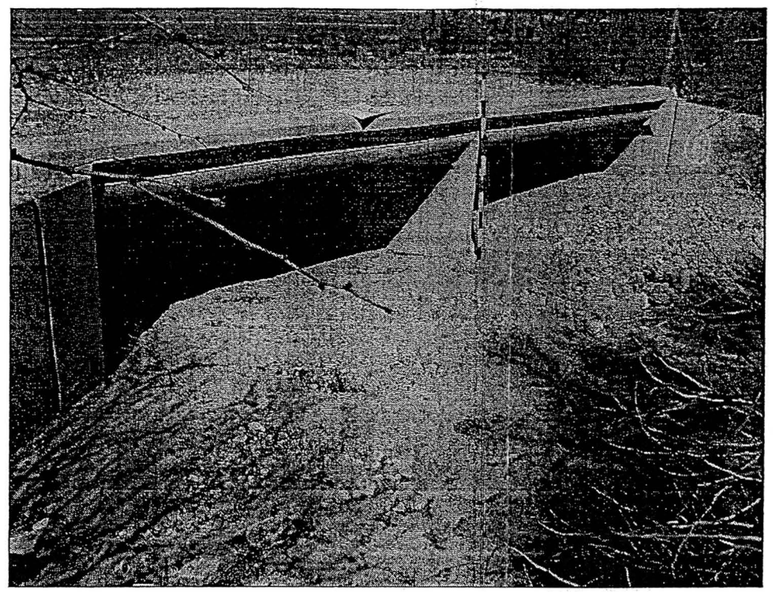
P4/30 Primary Wash #24 - Cross Section #7 – View looking upstream



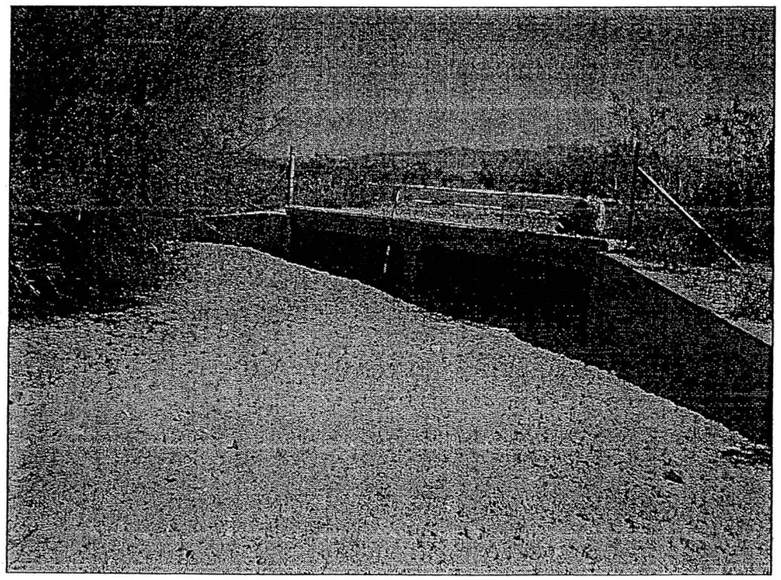
P4/32 Primary Wash #24 - Cross Section #8 – View looking upstream

P12/4 Primary Wash #24 - Cross Section #9 – View looking downstream

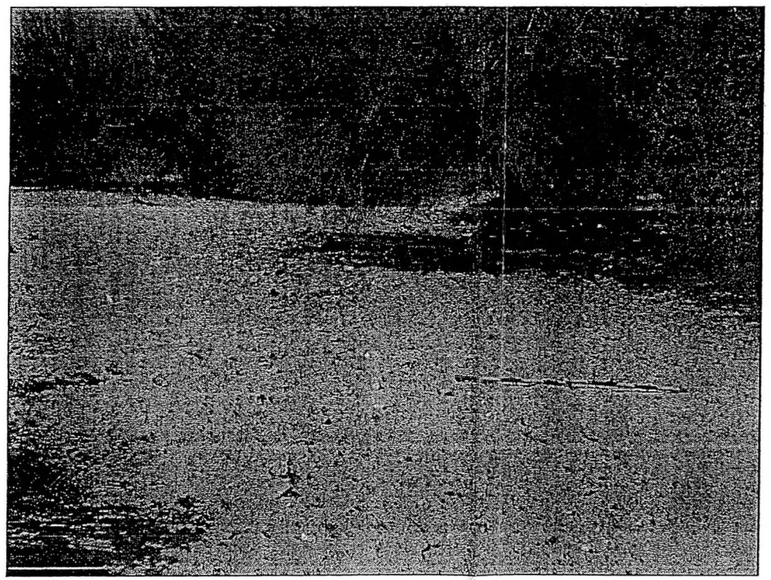
P4/21 Primary Wash #24 – Sun Valley Parkway Bridge Culvert
View looking upstream at channel upstream of bridge



P4/20 Primary Wash #24 – Sun Valley Parkway Bridge Culvert
View looking downstream/south at upstream bridge face

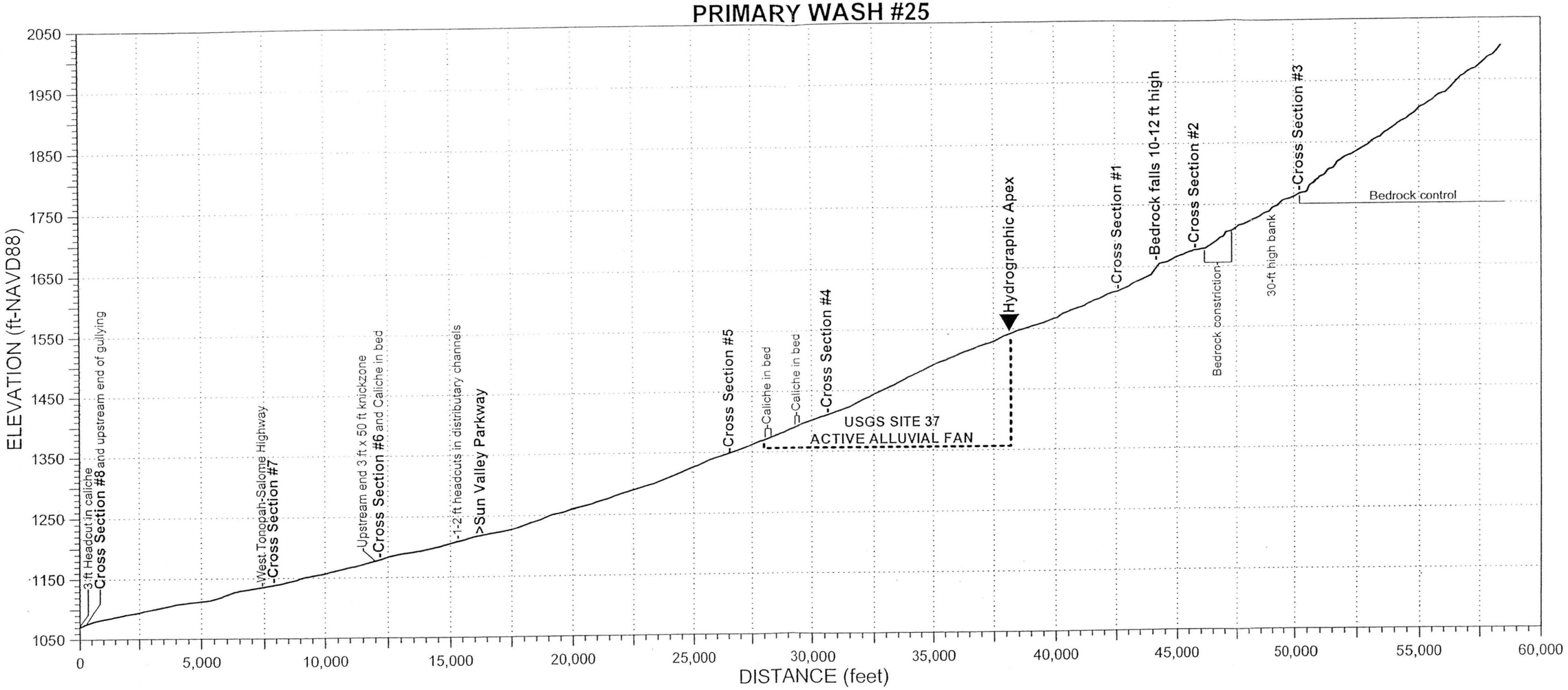


P4/22 Primary Wash #24 – Sun Valley Parkway Bridge Culvert
View looking upstream/north at downstream bridge face



P4/23 Primary Wash #24 – Sun Valley Parkway Bridge Culvert
View looking downstream at downstream channel

PRIMARY WASH #25

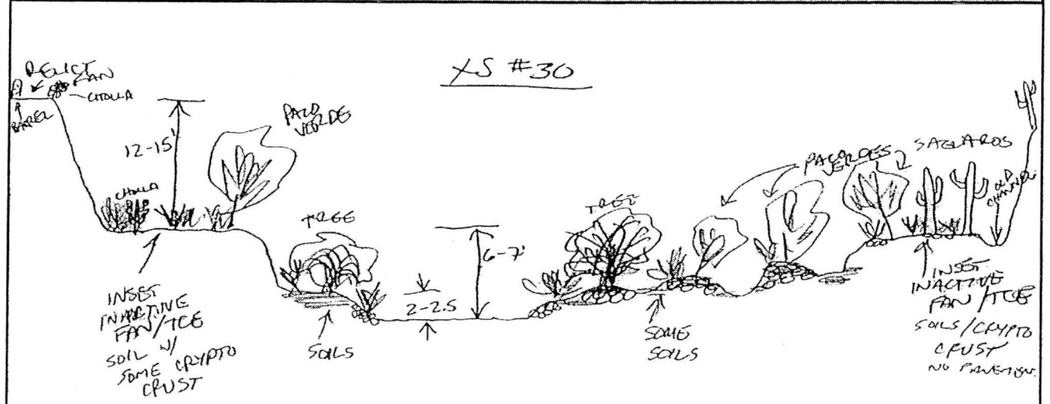


AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW25 North: 920964.5 ft East: 486943.3 ft	1	93	March 9, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	2-3 ft	Sand__X__	Gravel__X__
Channel	X	Multiple		Right Bank		1:1	2-3 ft	Cobble__X__	Bldrs__X__

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X	X	Left Bank	6.5 ft			Extensive	Spotty	Absent
Marginal	X		Right Bank	6.5-8 ft		Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X	Height (top) Above Bed		Thickness	Soils		X	
			Left Bank	X	?	HIGH WATER MARKS/DEBRIS			
Palo Verde	X	X	Right Bank	X	?	Ht. Above	Left Bank	Right Bank	Channel
Creosote	X	X	Channel			Thalweg	2-2.5 ft	2-3 ft	
Brittlebush	X	X	PHOTOS & DESCRIPTION:						
Bursage	X	X	P3/28 - View looking downstream from left bank						
Mormon Tea	X	X	P3/29,30 - Pan looking upstream showing cross section area.						
Tamarisk									
Saguaro C.	X								
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #30



Notes:

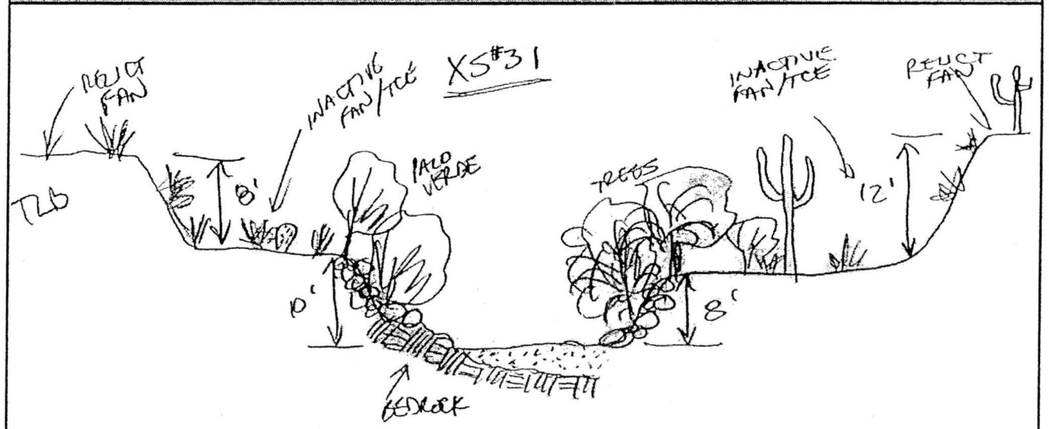
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW25 North: 922600.4 ft East: 489286.9 ft	2	94	March 9, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank				Sand__X__	Gravel__X__
Channel	X	Multiple		Right Bank				Cobble__X__	Bldrs__X__

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X		Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	Soils	On terraces		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above	Left Bank	Right Bank	Channel
Creosote	X		Channel			Thalweg	1-1.5 ft	1-1.5 ft	
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P3/31 - View upstream showing bedrock constriction and bedrcok in toe of left						
Mormon Tea	X		bank and bed upstream.						
Tamarisk			P3/32 - View downstreamshowing alluvial bed, channel, and Terraces (unpaired?).						
Saguaro C.	On terraces								
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.	On terraces		Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #31



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW25 North: 925120.4 m East: 491921.2 m	3	98	March 9, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		<1:1	25 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		<1:1	30 ft	Cobble X	Bldrs Lots

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal			Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea	X	X
Tamarisk		
Saguaro C.	On side slope	
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	1-3 ft	1.5 -2 ft	

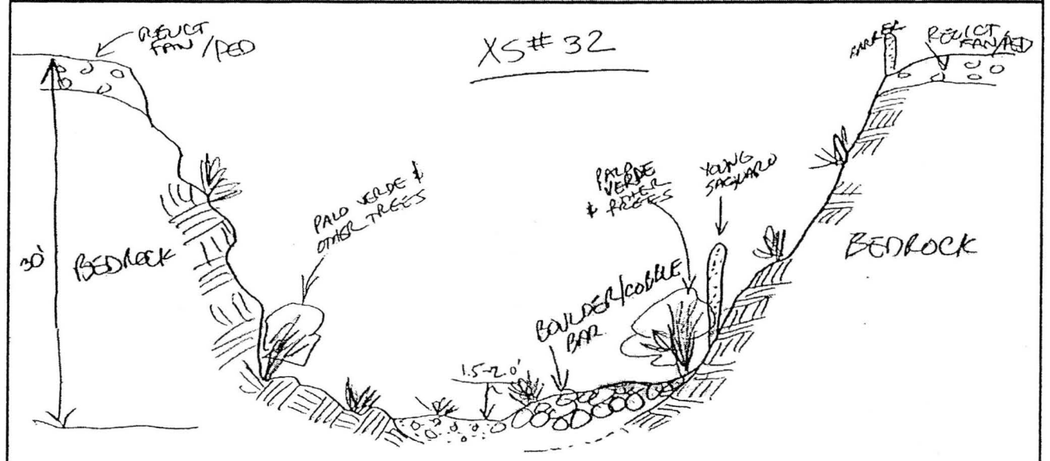
PHOTOS & DESCRIPTION:
P3/36 - View downstream
P3/37 - View upstream, note bedrock and boulders in channel bed.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

Absent
Spotty
Extensive

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #32



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW25 North: 915047.7 m East: 477576.4 m	4	99	March 9, 2004 Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		2:1	3-4 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		2:1	3-4 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal			Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde		
Creosote	X	
Brittlebush		
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank	2 ft	2 ft+
Right Bank		
Channel		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	1 ft		

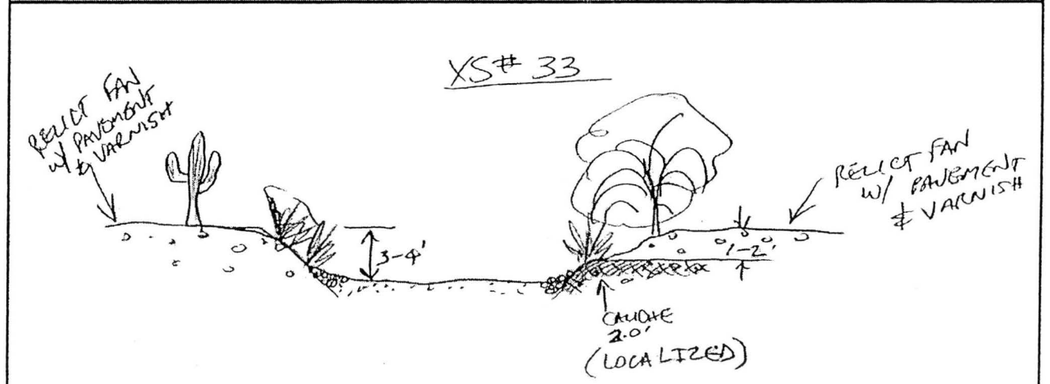
PHOTOS & DESCRIPTION:
P3/38 - View upstream, note caliche in toe of left bank
P3/39 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

Absent
Spotty
Extensive

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #33



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW25	5	104	March 9, 2004

North: 912145.0 m
East: 474839.6 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
		Sand X	Gravel X
		Cobble few	Bldrs

VEGETATION		INSET F/P
In-channel		X
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

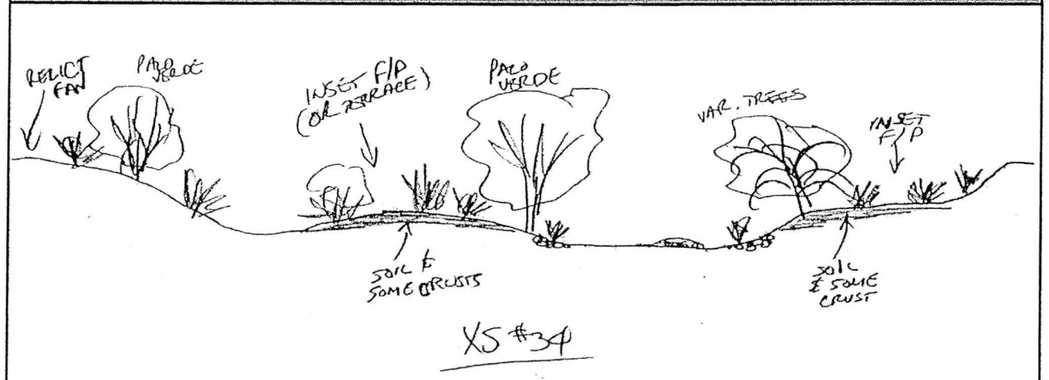
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P3/40 - View upstream
P3/41 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #34



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW25	6	108	March 9, 2004

North: 902167.2 m
East: 465851.6 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single	X	Left Bank	X
Channel	X	Multiple		Right Bank	X

H:V	Height	BED MATERIAL	
1:1	3-4 ft	Sand X	Gravel X
1:1	3-4 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde		
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

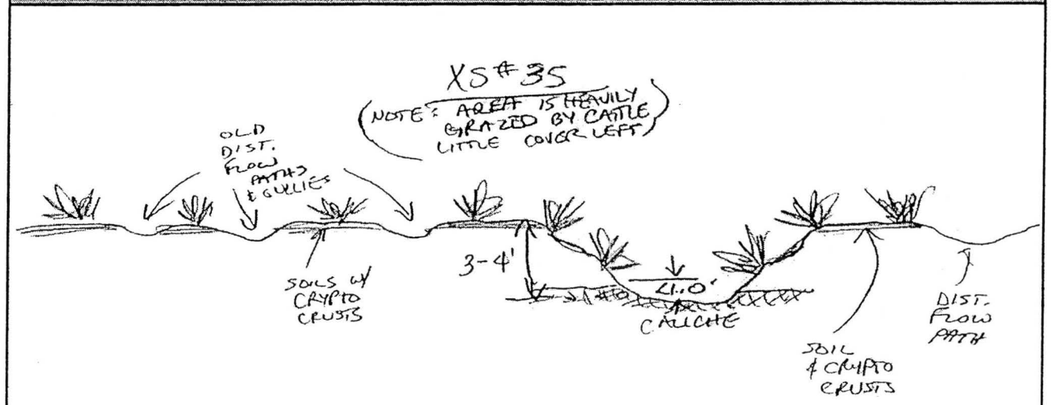
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank	<1 ft	<1 ft
Right Bank	<1 ft	<1 ft
Channel	X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P3/49 - View upstream, note caliche in chanel bed.
P3/50 - View downstream, note end of calich in channel bed.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: At Location			HEADCUT:		
Spotty	Caliche Present: Yes			Caliche Present:		
Extensive	Dimensions: 1-2 feet drop over 30-40 feet			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #



Notes: Area is heavily grazed by cattle, little ground cover is left.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW25	7	110	March 9, 2004

North: 898257.3 m
East: 464827.5 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank	X	<1:1	3-4 ft	Sand__X__	Gravel__X__
Channel	X	Multiple		Right Bank	X	<1:1	3-4 ft	Cobble_____	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde		
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea	X	X
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

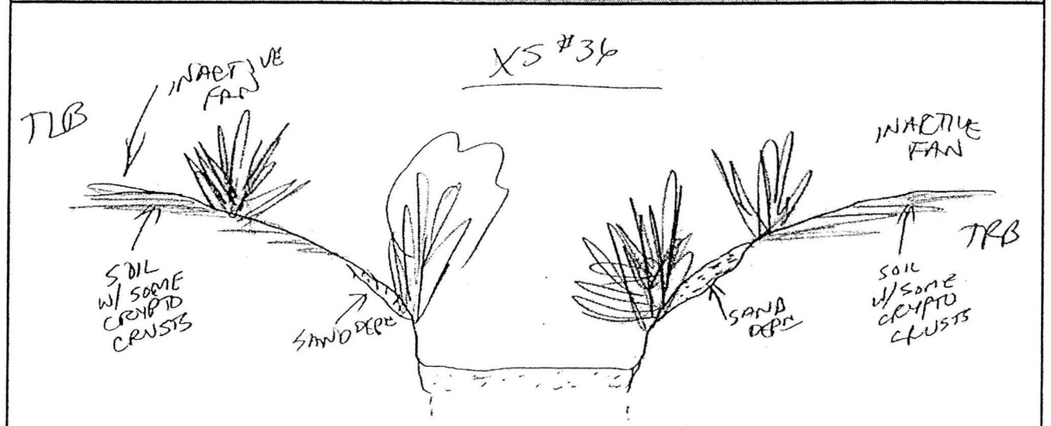
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	sed at 2 ft	sed at 2 ft	

PHOTOS & DESCRIPTION:
P3/51 - View downstream
P3/52 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #36



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW25	8	427	March 19, 2004

North: 991244.3 m
East: 462774.2 m

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank	X	1:1	<1 ft	Sand__X__	Gravel__X__
Channel	X	Multiple	X	Right Bank	X	1:1	<1 ft	Cobble_____	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

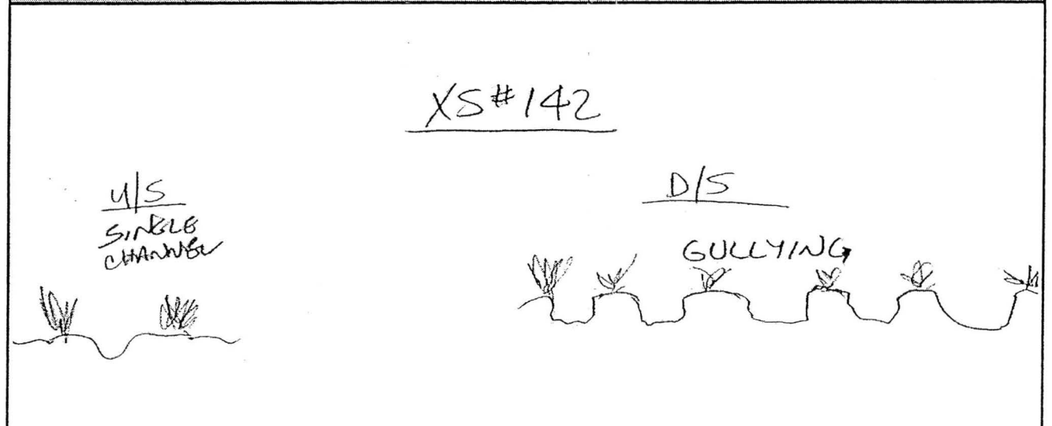
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	sed at 2 ft	sed at 2 ft	

PHOTOS & DESCRIPTION:
P12/1 - View upstream = 4ft high headcut & 4ft deep incised channel at FRS.
P12/2 - View downstream toward FRS#1 showing headward gullying due to perched confluence at FRS detention basin.
P12/3 - View of single swaled channel upstream of gullying.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #142



Notes: Headcut at FRS at Wpt. #428.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	DATE:	WAYPOINT:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW25	March 9, 2004	D/S Face: 106 U/S Face: 105
		Field Crew: W.J. Spitz, A.B. Alvarado	

ROAD CROSSING - CULVERT DATA

CMP ___ RCP ___ RCBC X

LOCATION	US Wpt.	DS Wpt.	# Barrels	Height	Width/Dia.	Max Sed Depth/ Barrel		Debris in Barrels	% Blockage
Northing	905526.54	905421.83	2	3 ft	8 ft	US: 0 ft	DS: 0 ft		U/S: 0
Easting	467992.11	467992.38	Depth of D/S Incision: 0 ft			#	#	No	D/S: 0

UPSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	No	Single	Yes	Left bank	No	6:1	3-4 ft	Sand X	Gravel X
Channel	No	Multiple	No	Right bank	No	6:1	3-4 ft	Cobble ___	Bldrs ___

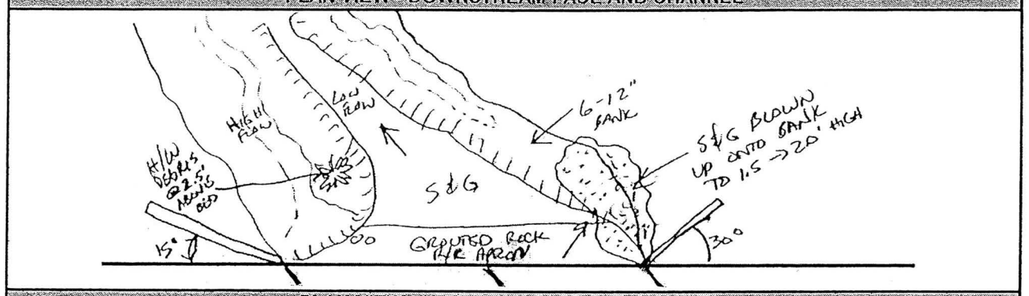
DOWNSTREAM CHANNEL

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	Yes	Single	Yes	Left bank	No			Sand ___	Gravel ___
Channel	No	Multiple	No	Right bank	No			Cobble ___	Bldrs ___

UPSTREAM PIEDMONT LANDFORMS						UPSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain		<1.0 ft		

DOWNSTREAM PIEDMONT LANDFORMS						DOWNSTREAM HIGH WATER MARKS			
Left bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain	Ht. above Thalweg	Channel	Ht. above Invert	In Barrel
Right bank	Pediment	Relict Fan	Active Fan	Inact. Fan	Alluvial plain				

PLAN VIEW - DOWNSTREAM FACE AND CHANNEL



PLAN VIEW - UPSTREAM FACE AND CHANNEL

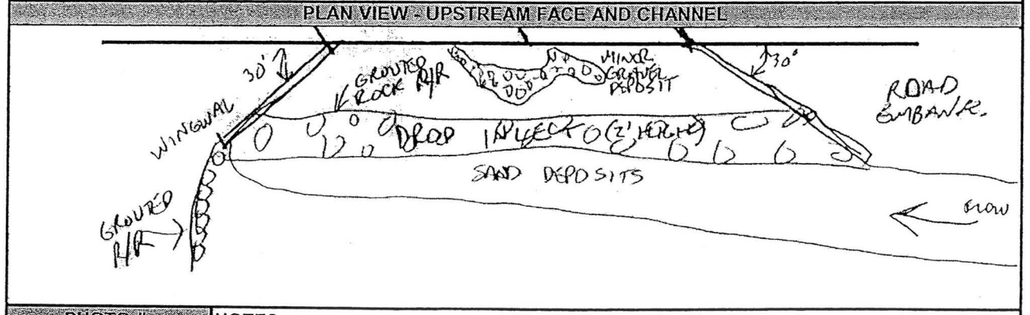


PHOTO #:		NOTES:
U/S Face	3-42	View north/upstream showing grouted rock riprap drop inlet
View U/S	3-43	Upstream channel - note highwater debris at 1.5-2.0 ft
D/S Face	3-44	View north
View D/S	3-45	Note highwater debris
Other		

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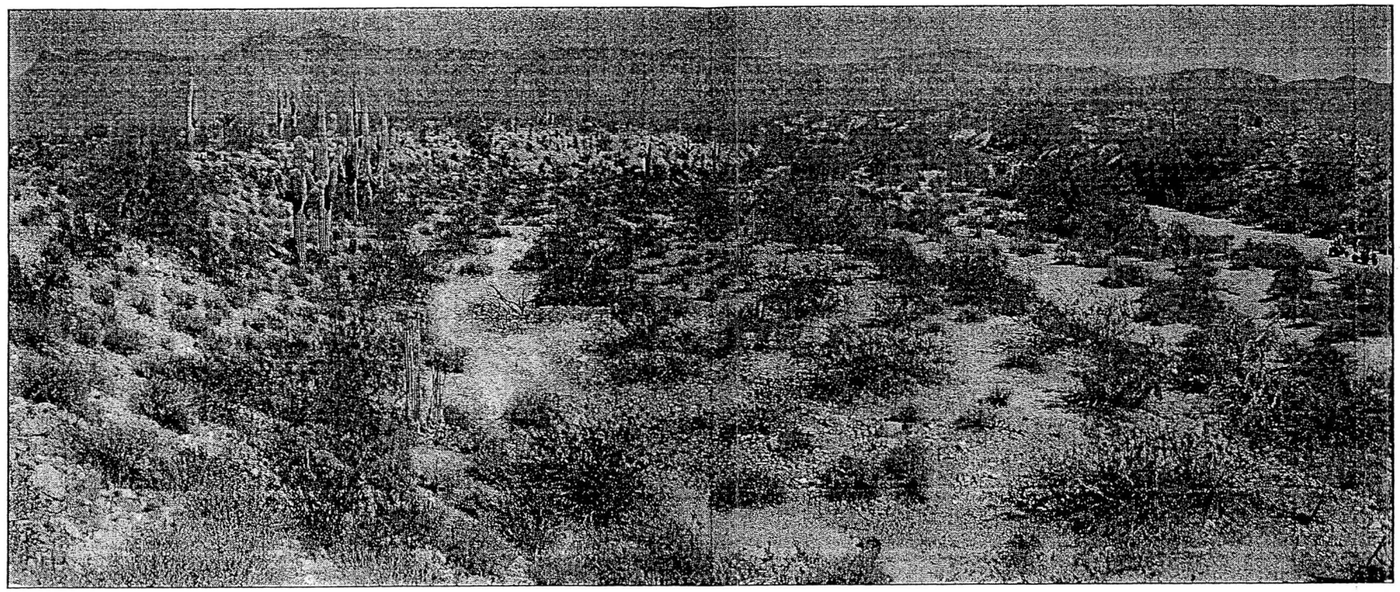
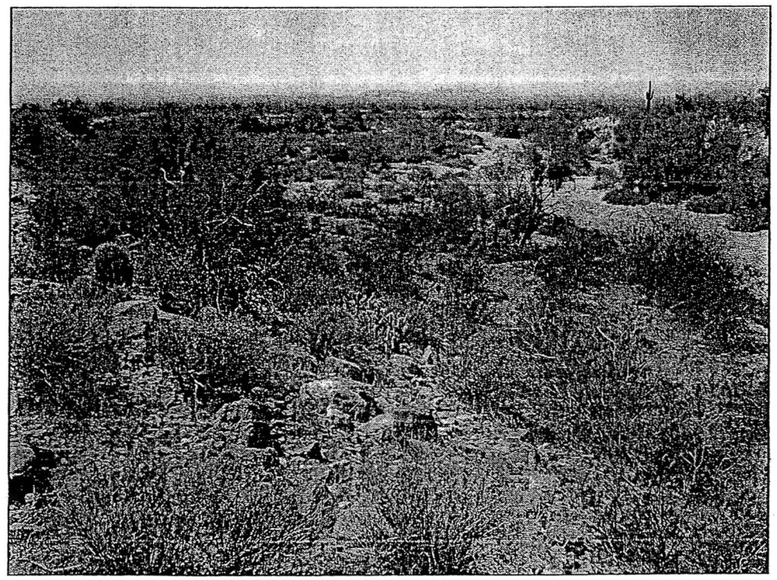
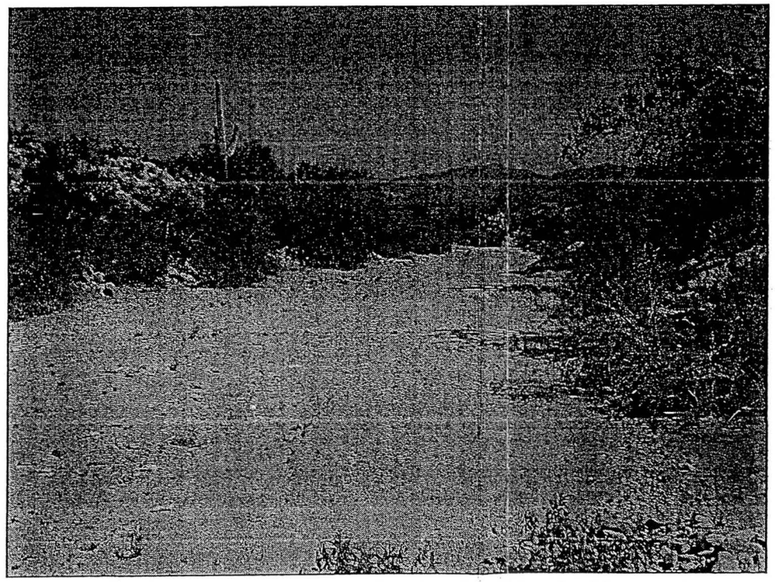


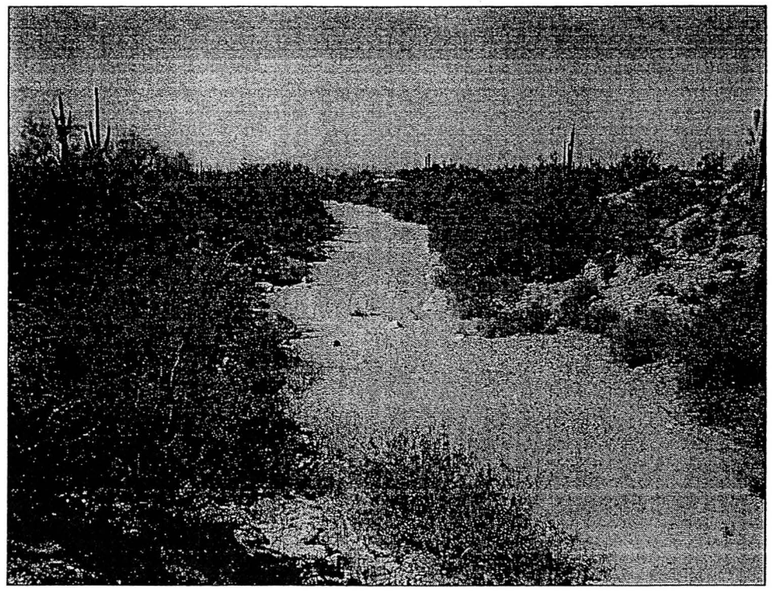
P3/29 & 30 Primary Wash #25 - Cross Section #1 – Panorama view looking upstream



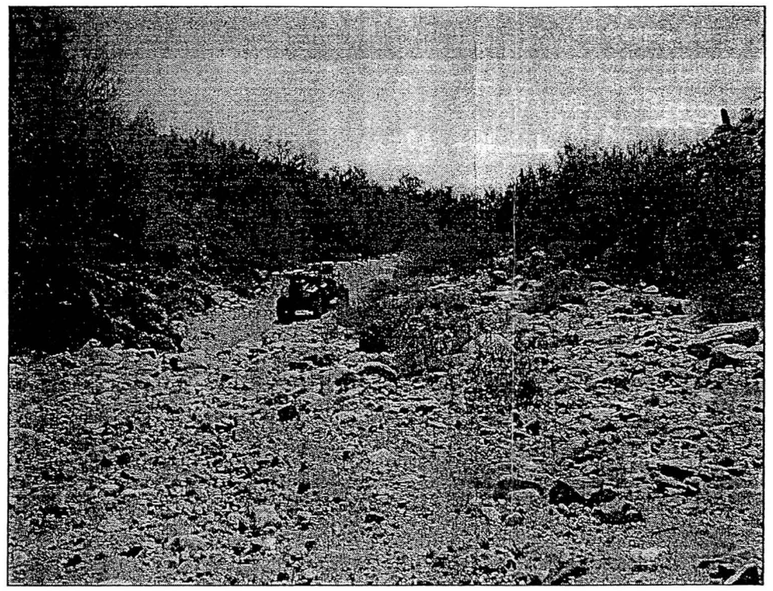
P3/28 Primary Wash #25 - Cross Section #1 – View looking downstream



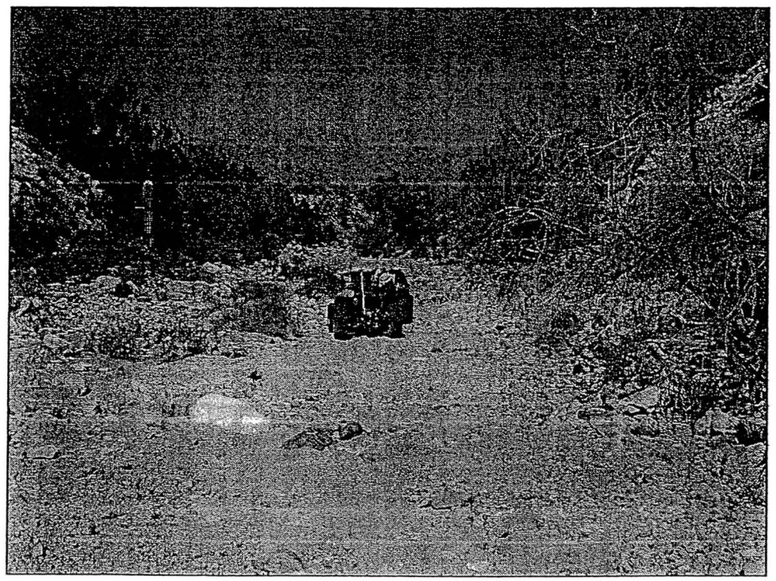
P3/31 Primary Wash #25 - Cross Section #2 – View looking upstream



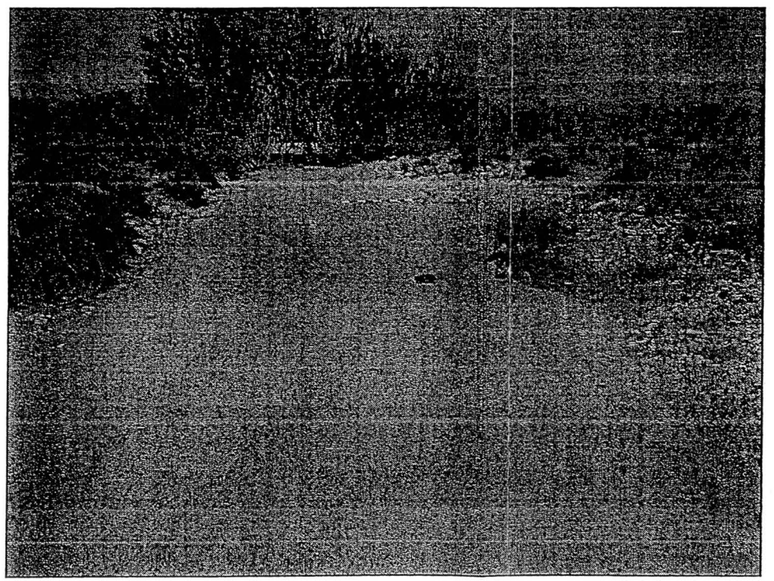
P3/32 Primary Wash #25 - Cross Section #2 – View looking downstream



P3/36 Primary Wash #25 - Cross Section #3 – View looking downstream

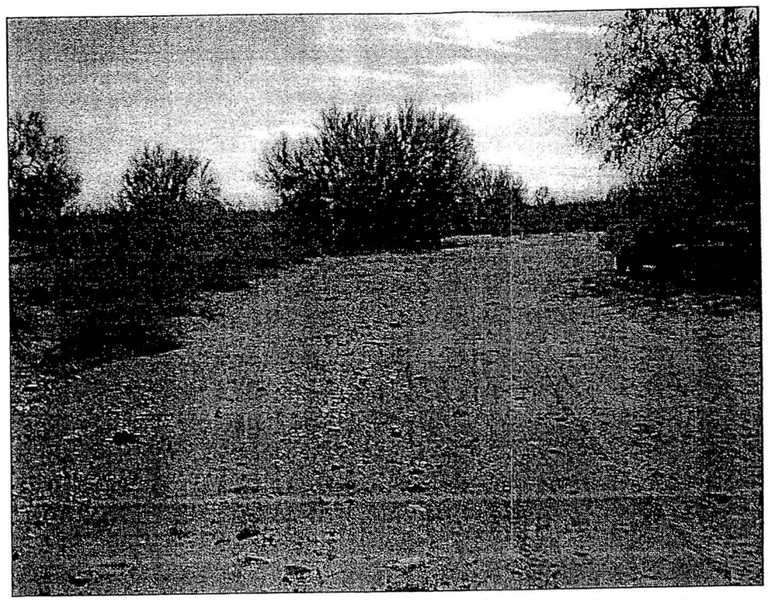


P3/37 Primary Wash #25 - Cross Section #3 – View looking upstream

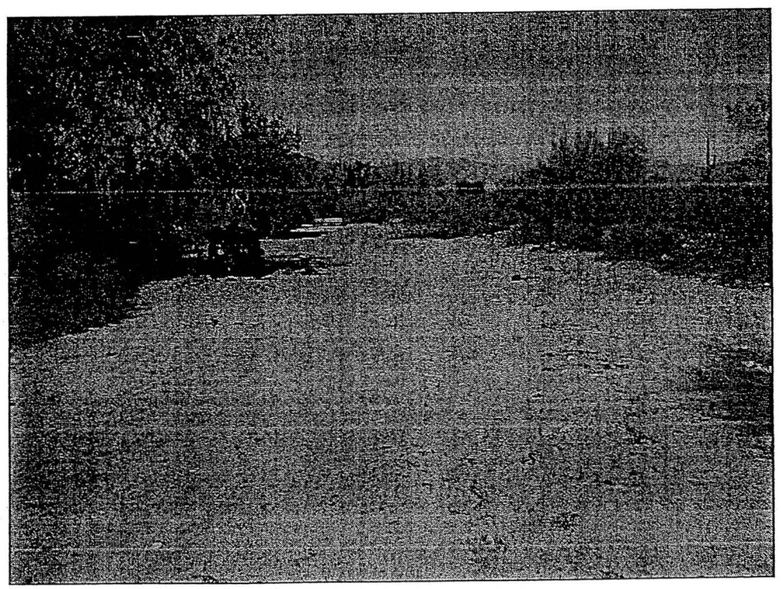


P3/38 Primary Wash #25 - Cross Section #4 – View looking upstream

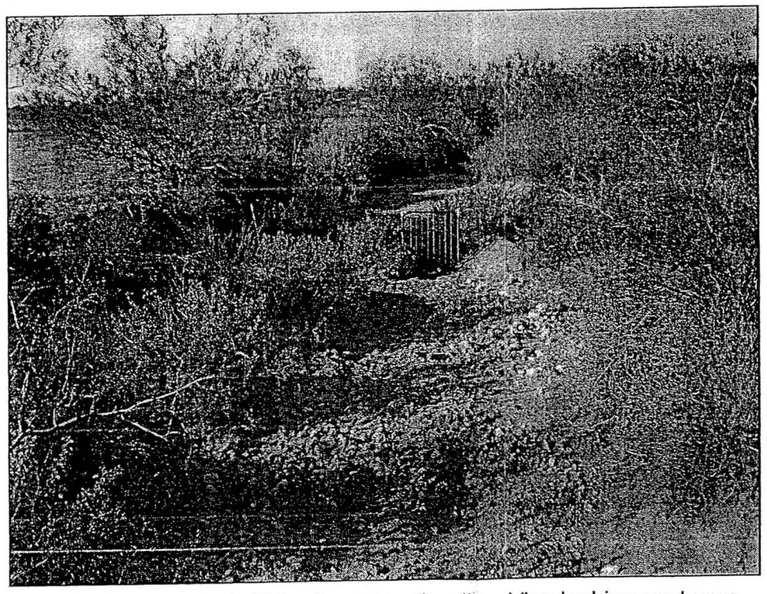
P3/39 Primary Wash #25 - Cross Section #4 – View looking downstream



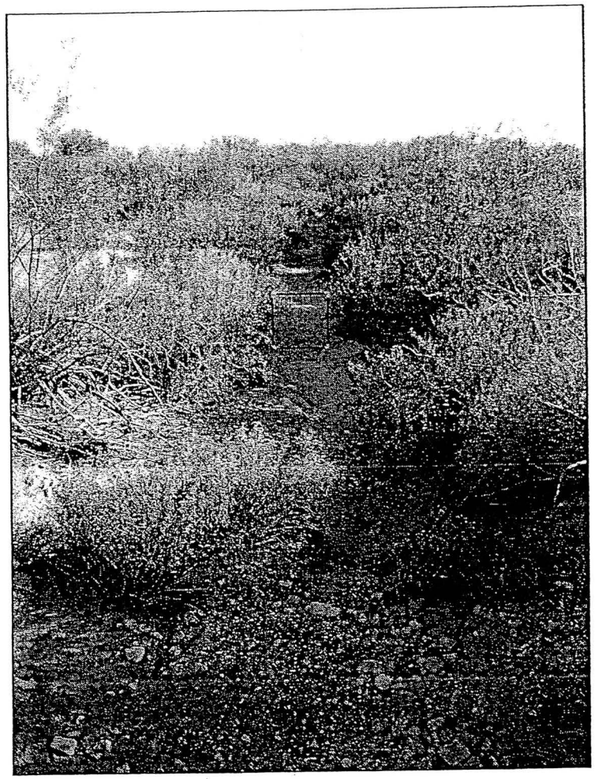
P3/40 Primary Wash #25 - Cross Section #5 – View looking upstream



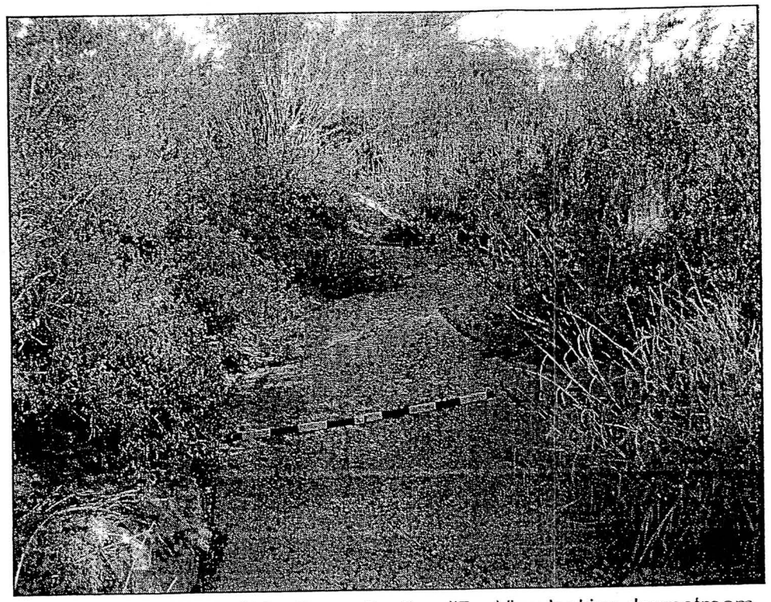
P3/41 Primary Wash #25 - Cross Section #5 – View looking downstream



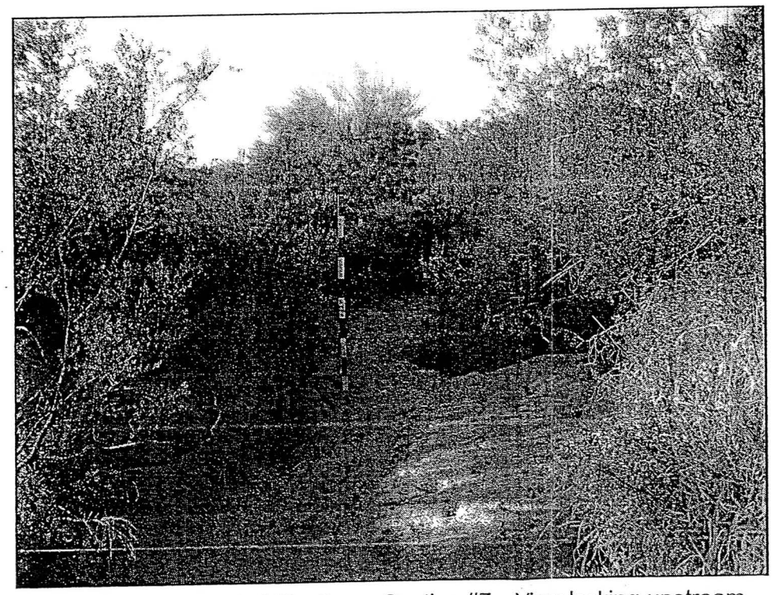
P3/49 Primary Wash #25 - Cross Section #6 – View looking upstream



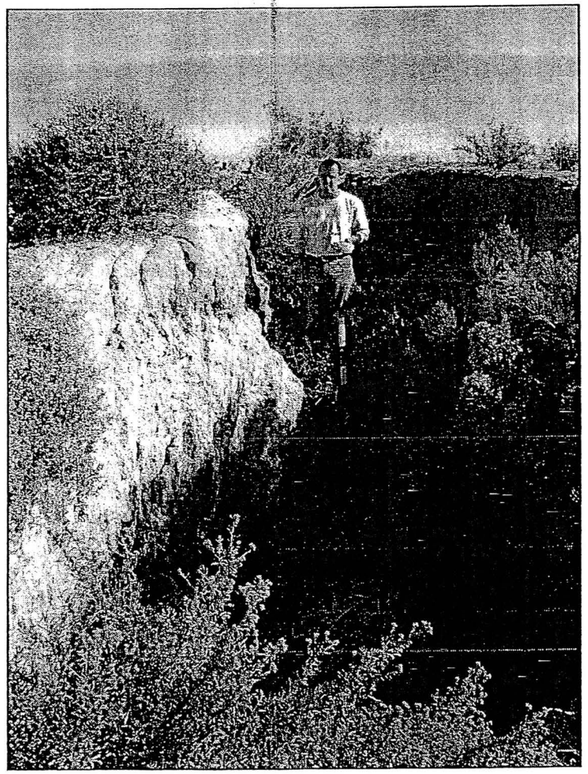
P3/50 Primary Wash #25 - Cross Section #6 – View looking downstream



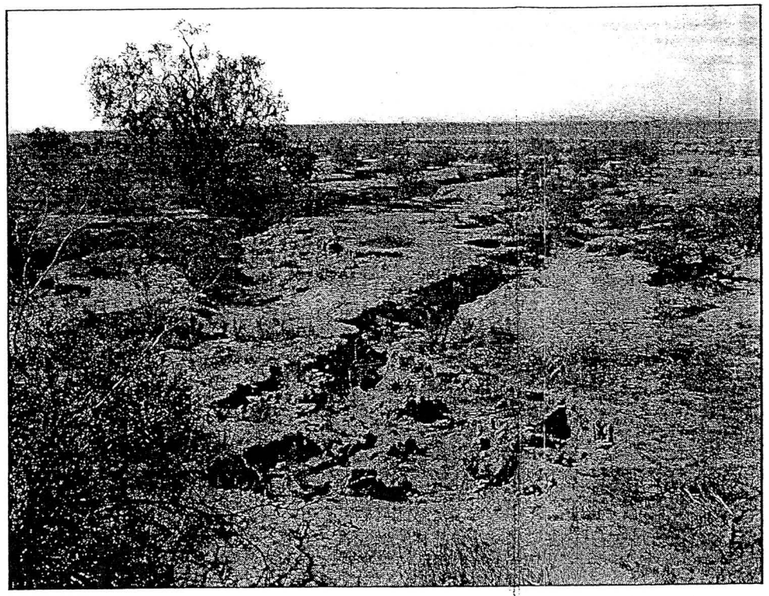
P3/51 Primary Wash #25 - Cross Section #7 – View looking downstream



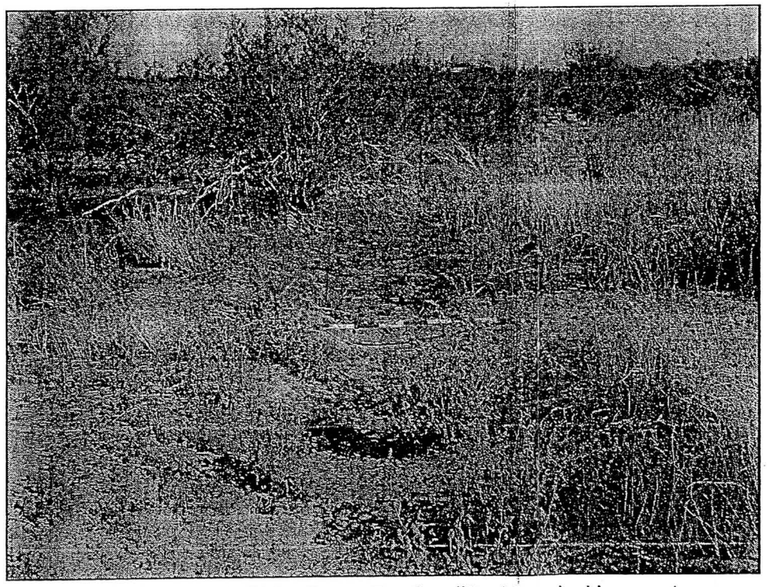
P3/52 Primary Wash #25 - Cross Section #7 – View looking upstream



P12/1 Primary Wash #25 – downstream of Cross Section #8
View looking upstream from Buckeye FRS #1

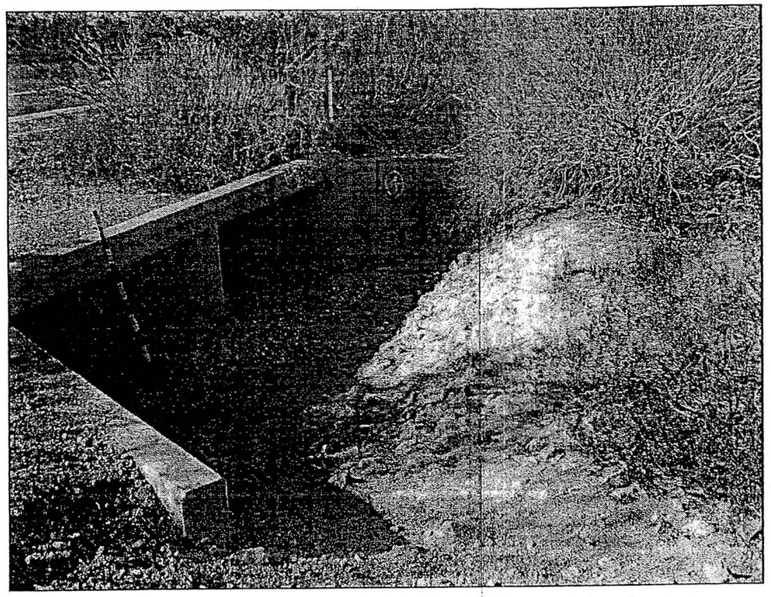


P12/2 Primary Wash #25 - Cross Section #8 – View looking downstream

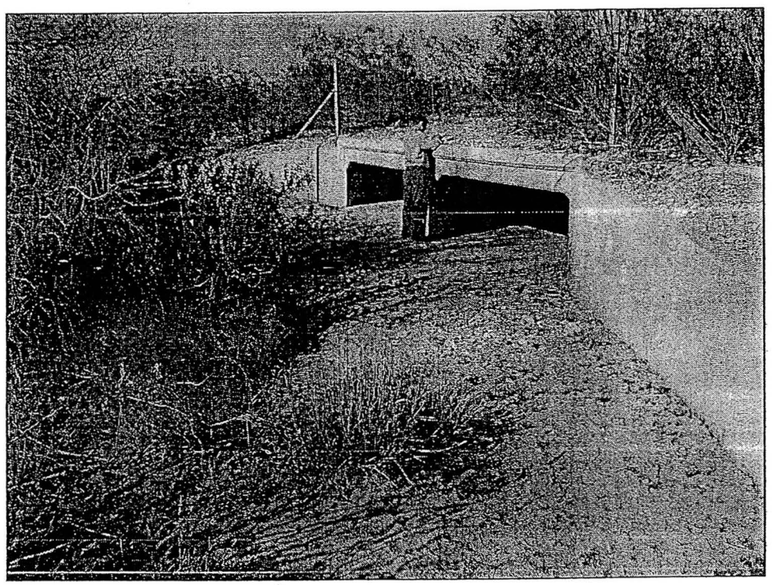


P12/3 Primary Wash #25 - Cross Section #8 – View looking upstream

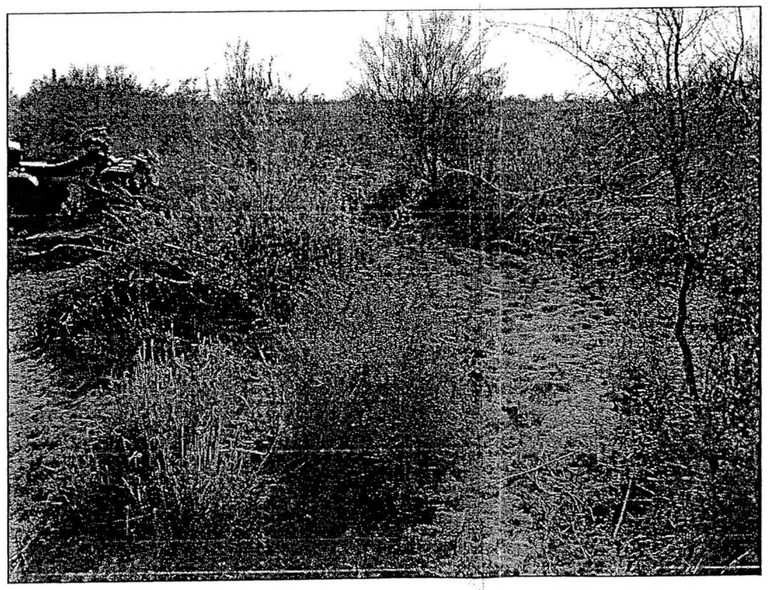
P3/43 Primary Wash #25 – Sun Valley Parkway Bridge Culvert
View looking upstream at channel upstream of bridge



P3/42 Primary Wash #25 – Sun Valley Parkway Bridge Culvert
View looking downstream/south at upstream bridge face

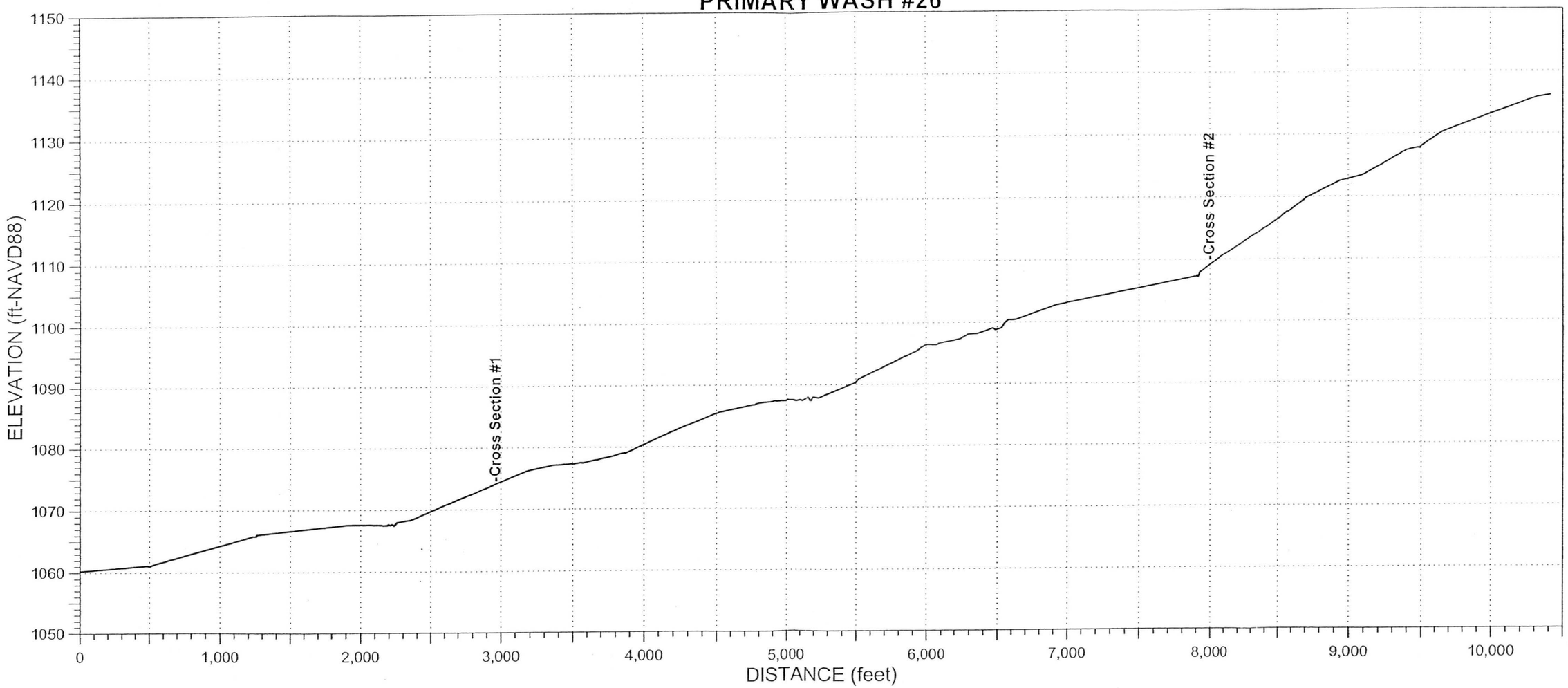


P3/44 Primary Wash #25 – Sun Valley Parkway Bridge Culvert
View looking upstream/north at downstream bridge face



P3/45 Primary Wash #25 – Sun Valley Parkway Bridge Culvert
View looking downstream at downstream channel

PRIMARY WASH #26



P12/6 Primary Wash #25 - Cross Section #1 – View looking downstream

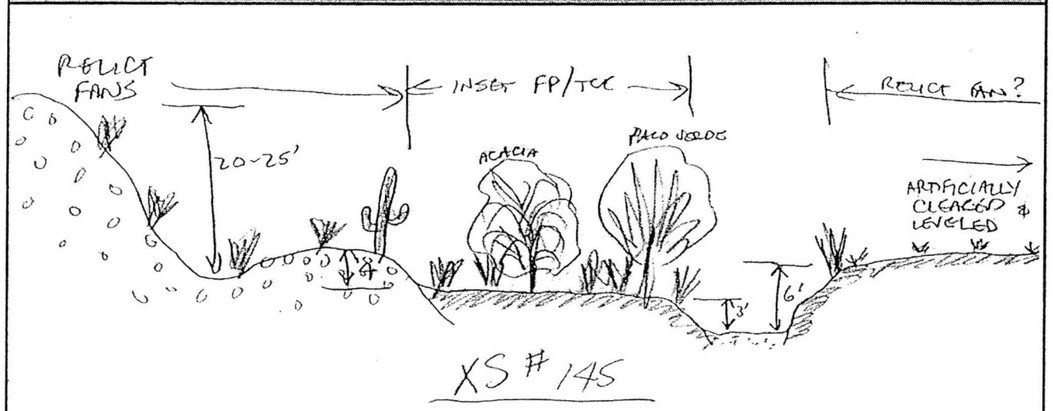
P12/7 Primary Wash #25 - Cross Section #2 – View looking downstream

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW26	1	431	March 19, 2004
	North: 897363.7 ft East: 447268.6 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	3 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	3 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel		X	Left Bank	3 ft			Extensive	Spotty	Absent
Marginal	X		Right Bank	6 ft		Varnish			X
						Pavement			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Soils	X		
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	HIGH WATER MARKS/DEBRIS			
			Left Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Palo Verde	X		Right Bank				2-2.5 ft	2.5 ft	
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P12/6 - View downstream						
Mormon Tea	X								
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #145



Notes: Channel and floodway upstream to next cross section is choked with dense grassy vegetation.

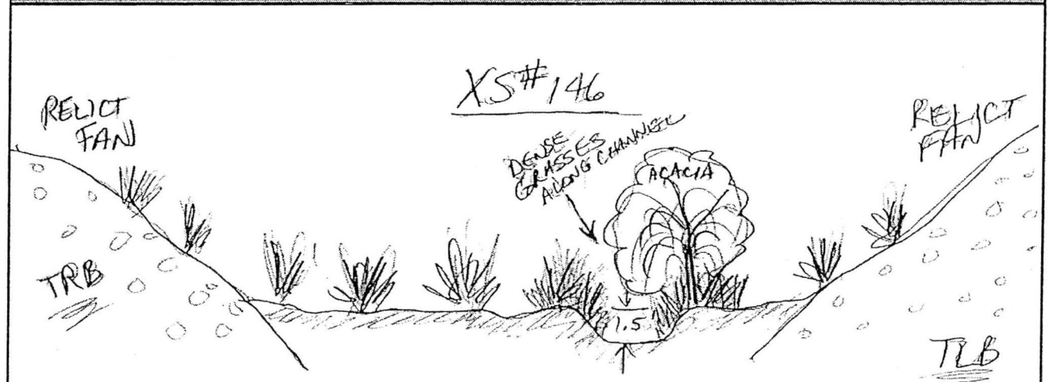
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW26	2	432	March 19, 2004
	North: 902022.4 ft East: 448612.5 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	1.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel		X	Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
						Pavement			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Soils	X		
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	HIGH WATER MARKS/DEBRIS			
			Left Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Palo Verde	X		Right Bank						
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P12/7 - View downstream						
Mormon Tea	X								
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.			Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
Prickly Pear			Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain	
X-mas C.			NICKZONE:			HEADCUT:			
Hedgehog C.			Absent	Caliche Present:		Caliche Present:			
Fishhook C.			Spotty	Dimensions:		Dimensions:			
Ocotillo			Extensive						

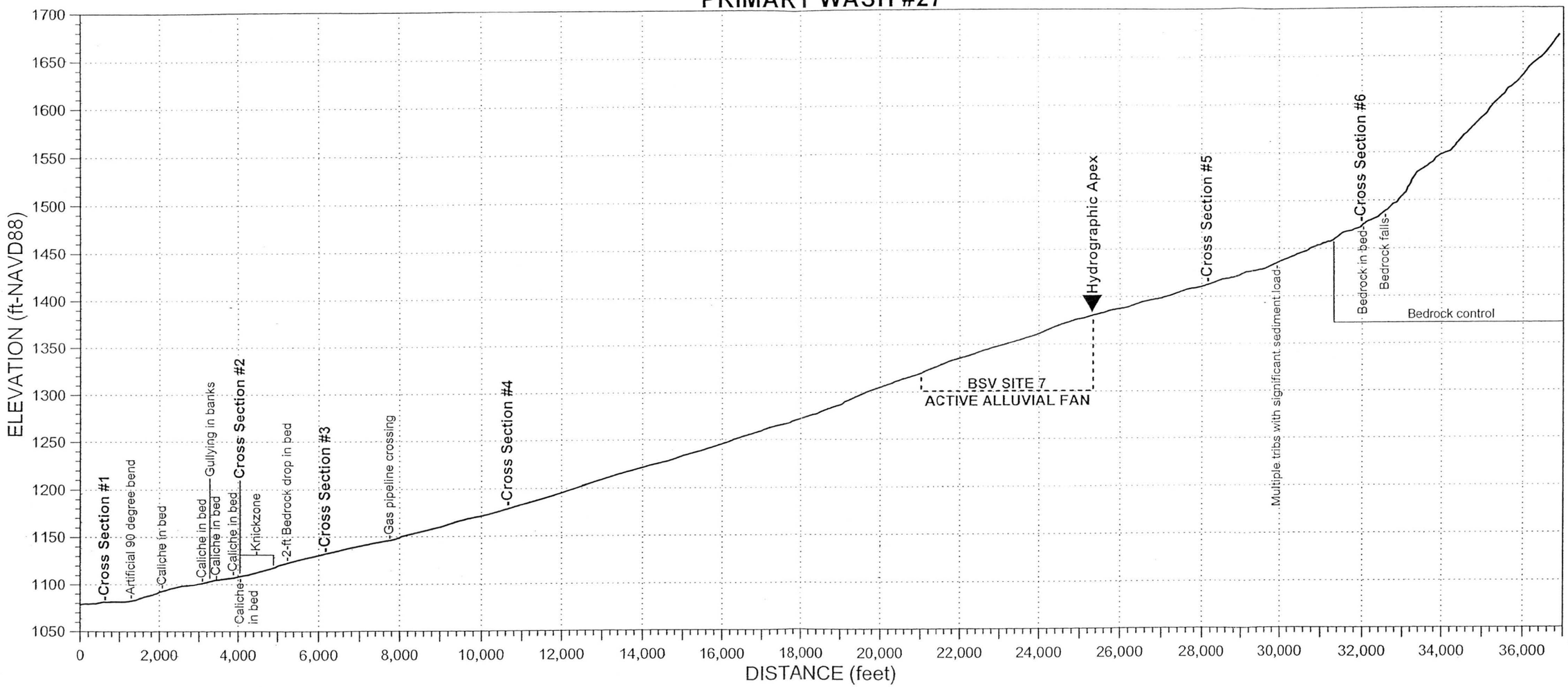
TYPICAL CROSS-SECTION (VIEW LOOKING UPSTREAM) - FIELD XS #146



Notes: Channel and floodway is choked with dense grassy vegetation.

AYRES ASSOCIATES

PRIMARY WASH #27



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW27	1	72	March 9, 2004

North: 886739.1 ft
East: 477764.2 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	1.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		3:1	1 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

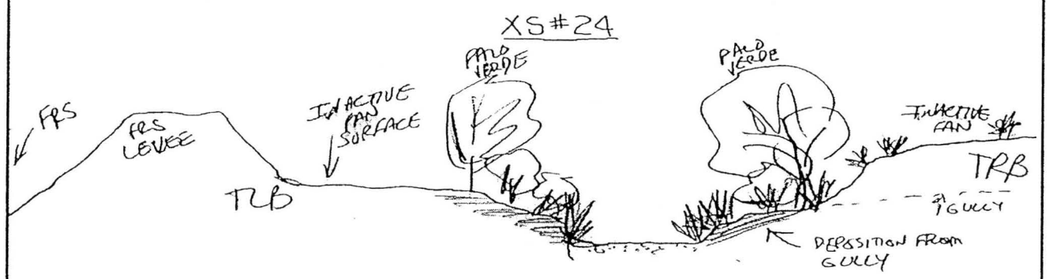
CALICHE STRATA	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P3/1 - View looking downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #24



Notes: Located on upstream side levee separating channel from FRS.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW27	2	79	March 9, 2004

North: 889179.1 ft
East: 478608.7 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank	X	<1:1	5.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank	X	<1:1	5.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

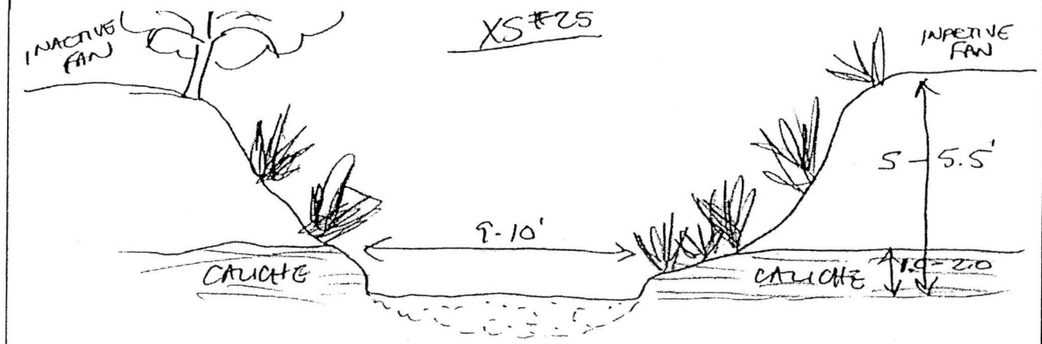
CALICHE STRATA	Height (top) Above Bed	Thickness
Left Bank	1-2 ft	1-2 ft
Right Bank	1-2 ft	1-2 ft
Channel	US	

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P3/5 - View downstream showing entrenched channel
P3/6 - View upstream showing knickzone in caliche

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Downstream			HEADCUT:		
Spotty	Caliche Present: Yes			Caliche Present:		
Extensive	Dimensions: 3-4 feet drop over about 300 feet			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #25



Notes: Knickzone is just upstream. Extenxive gullying on both banks along upstream knickzone.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW27	3	82	March 9, 2004

North: 890863.3 ft
East: 479855.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single	Main	Left Bank	
Channel	X	Multiple	Secondary	Right Bank	

H:V	Height	BED MATERIAL	
		Sand X	Gravel X
		Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<0.5 ft	<0.5 ft	

PHOTOS & DESCRIPTION:
P3/8 - View downstream
P3/9 - View upstream

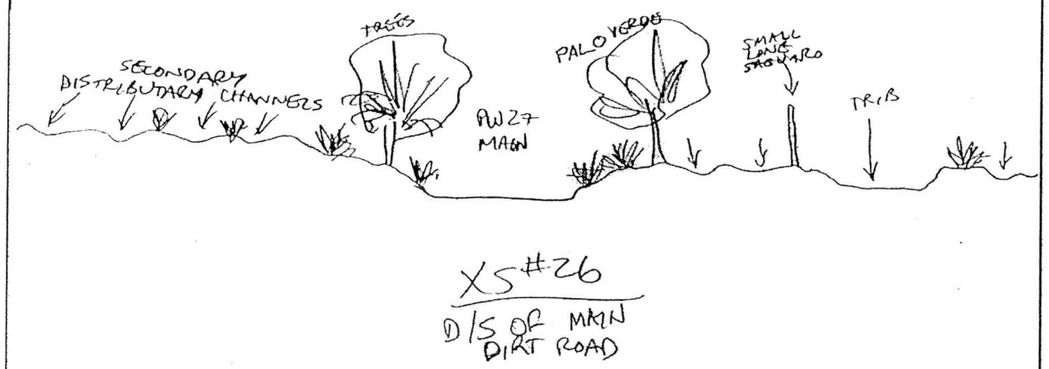
CRYPTO-BIOTIC CRUST (floodway):
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #26



Notes: Downstream of main dirt road.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW27	4	84	March 9, 2004

North: 895047.2 ft
East: 480836.5 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	
Channel		Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
	<1 ft	Sand X	Gravel X
	<1 ft	Cobble	Bldrs

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde	X	
Creosote	X	
Brittlebush		
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.	Spotty	
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P3/11 - View to west showing multiple small distributary flow paths.

CRYPTO-BIOTIC CRUST (floodway):
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	**Inactive Fan**	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #27

XS #27

Multiple distributary flow paths.

Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW27	5	85	March 9, 2004

North: 909844.2 ft
East: 483478.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	2-2.5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank	X	1:1	8-9 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel		X	Left Bank	2-2.5 ft	3-4 ft		Extensive	Spotty	Absent
Marginal	X		Right Bank	8-9 ft		Varnish			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.	On terrace	
Cholla C.	On terrace	
Barrel C.	On terrace	
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank	8-9 ft	8-9 ft
Channel		

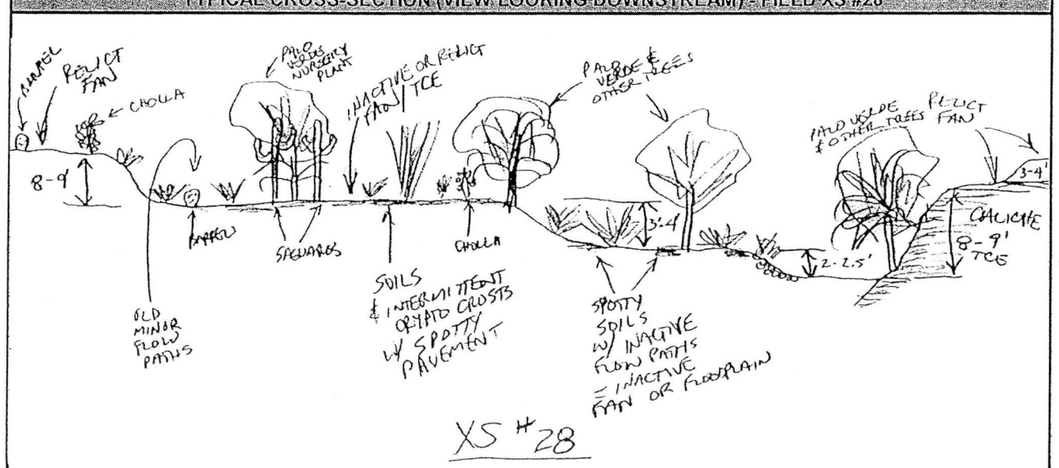
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P3/12 - View downstream
P3/13 - View upstream
P3/14 - View right bank to left bank showing terraces/inset inactive fan/floodplain.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present:			HEADCUT: Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #28



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW27	6	91	March 9, 2004

North: 911251.9 ft
East: 486526.6 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		<1:1	>20 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		<1:1	>20 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage		
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.	on rock bank	
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

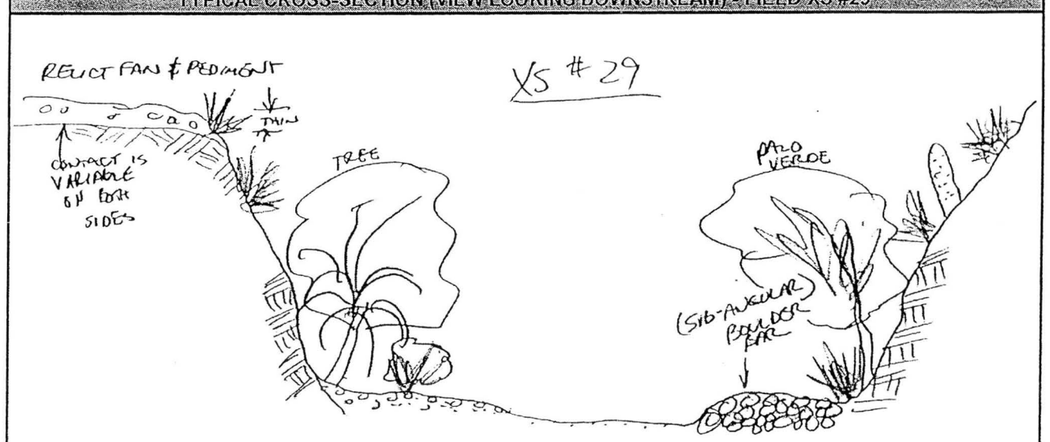
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1-1.5 ft	

PHOTOS & DESCRIPTION:
P3/18 - View upstream, note 90 degree bend at bedrock
P3/17 - View downstream showing bedrock bound channel, not subangular boulders in right bank bar.

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Caliche Present:			HEADCUT: Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #29



Notes:

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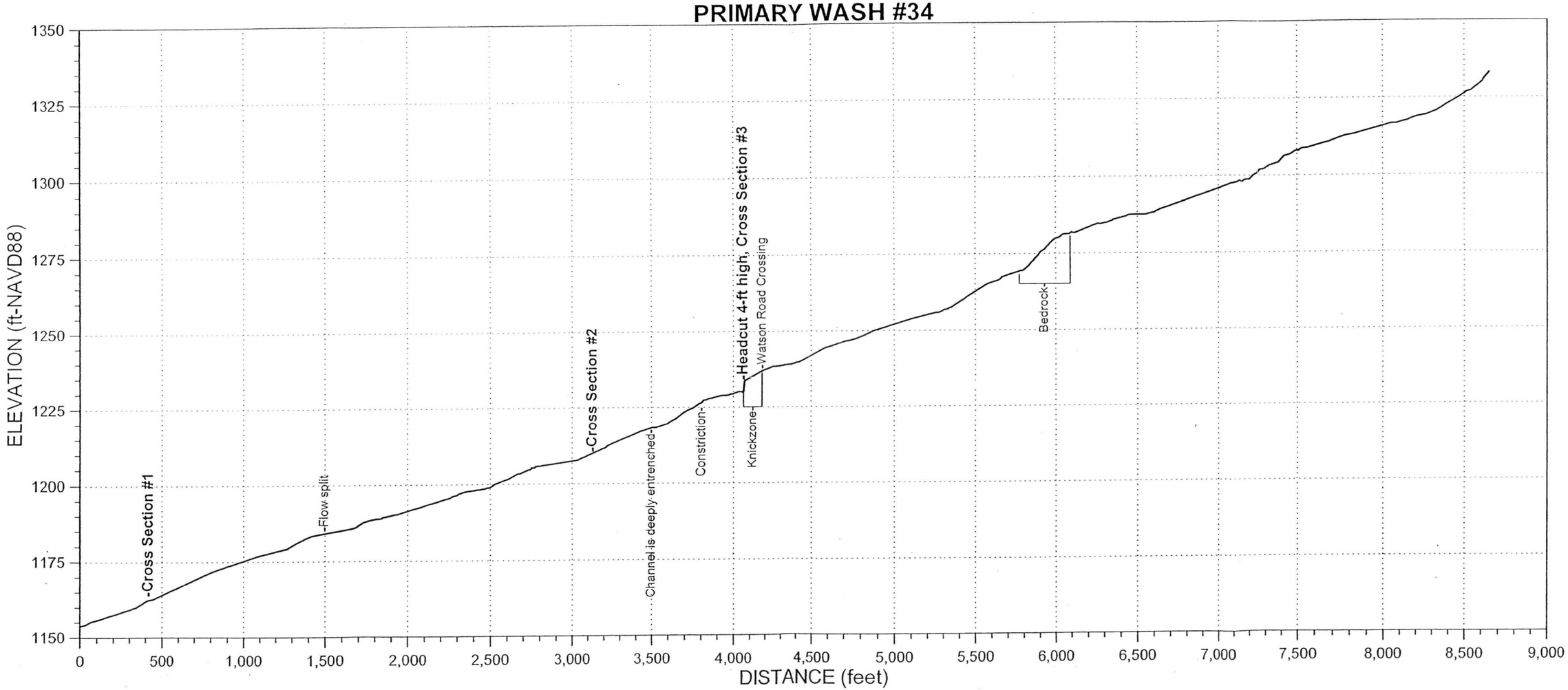
PRIMARY WASH #34



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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW34	1	1	March 7, 2004

North: 890987.6 ft
East: 506206.8 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single		Left Bank	X
Channel	X	Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
1:1	3-4 ft	Sand__X__	Gravel__X__
6:1	3-4 ft	Cobble__X__	Bldrs_____

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	Yes	Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA		
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X	Height (top) Above Bed		Thickness
Palo Verde	X	X	Left Bank		
Creosote	X	X	Right Bank		
Brittlebush			Channel		
Bursage	X				
Mormon Tea					
Tamarisk					
Saguaro C.	X				
Cholla C.					
Barrel C.					
Prickly Pear					
X-mas C.					
Hedgehog C.					
Fishhook C.					
Ocotillo					

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1.0 ft		

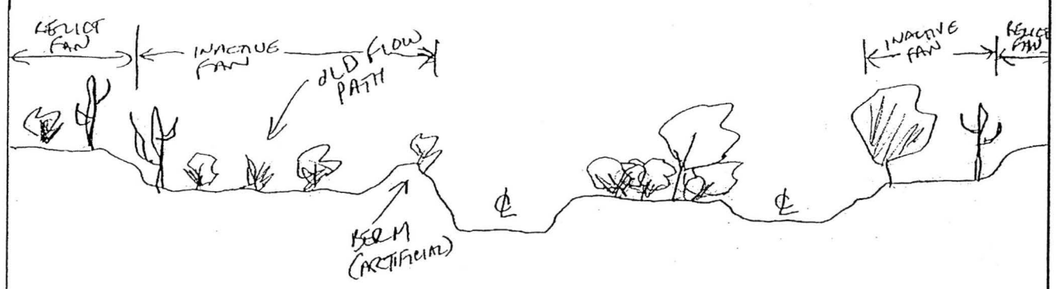
PHOTOS & DESCRIPTION:
P1/1 - View downstream (fan and FRS)
P1/2 - View upstream = split flow

CRYPTOBIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKPOINT: Downstream	HEADCUT: None
Caliche Present:	Caliche Present:
Dimensions: 5-6 feet drop over 150-200 feet	Dimensions:

Absent / Spotty / Extensive

TYPICAL CROSS-SECTION (view looking DOWNSTREAM) - FIELD XS #



U/S END OF MULTIPLE FLOWPATHS IN INSET FLOODWAY @ WPT. #2 ⇒ U/S END KNICKZONE?

Notes: Flow path was on left bank side until FRSs were put in. Built a berm, then channel entrenched after FRSs went in. Oversteepened at FRS confluence - downstream has a small fan into FRS. Multiple flow paths upstream, but in inset floodway.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW34	2	3	March 7, 2004

North: 892546.7 ft
East: 507150.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
3:1	~12 ft	Sand__X__	Gravel__X__
1.5:1	~12 ft	Cobble__X__	Bldrs__X__

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA		
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness
Palo Verde	X		Left Bank	0-5 ft	?
Creosote	X		Right Bank	0-5 ft	5 ft
Brittlebush	X	X	Channel		
Bursage					
Mormon Tea					
Tamarisk					
Saguaro C.					
Cholla C.					
Barrel C.					
Prickly Pear					
X-mas C.					
Hedgehog C.					
Fishhook C.					
Ocotillo					

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1.0 ft		

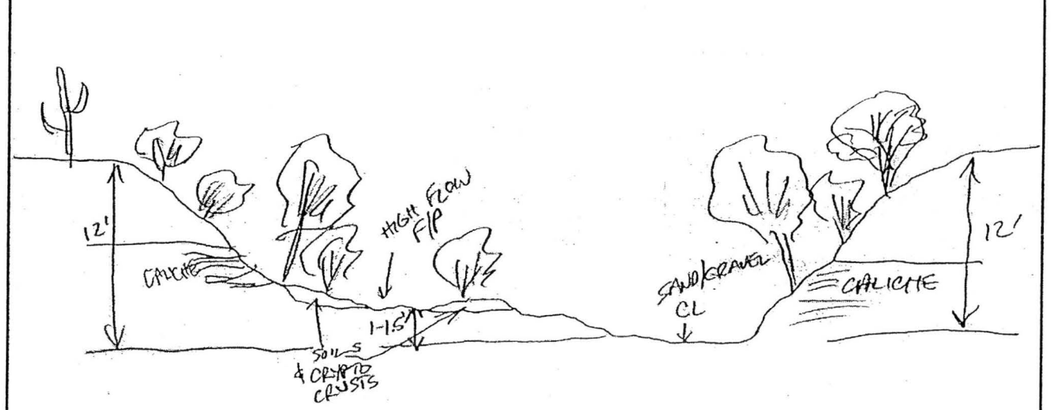
PHOTOS & DESCRIPTION:
P1/3 - View downstream
P1/4 - View upstream
P1/5 - View of right bank caliche

CRYPTOBIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKPOINT: None	HEADCUT: None
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

Absent / **Spotty** / Extensive

TYPICAL CROSS-SECTION (view looking DOWNSTREAM) - FIELD XS #1



Notes:

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW34	3	6, 7	March 7, 2004

North: 895051.5 ft
East: 504889.5 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS	
Floodway		Single	X
Channel	X	Multiple	

BANKS	Erosion
Left Bank	X
Right Bank	X

H:V	Height	BED MATERIAL	
1:1	5-6 ft	Sand X	Gravel X
1:1	5-6 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P
In-channel		
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank	1-2 ft	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)		
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage		
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel	X	4-5 ft

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:

P1/7 - View downstream of headcut (HC)
P1/8 - View upstream at headcut and knickzone (Kz)

CRYPTOBIOTIC CRUST (floodway): Absent / Spotty / Extensive

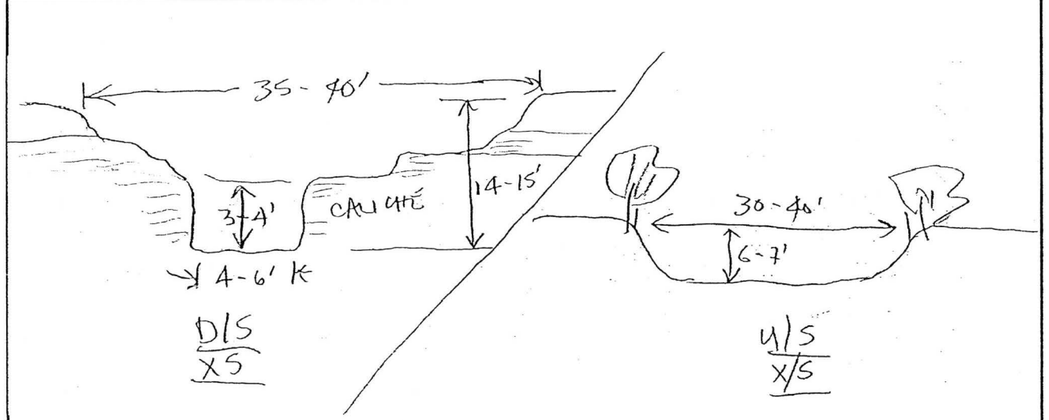
PIEDMONT LANDFORMS (marginal to channel/floodway)

Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE: At Location (Wpt 7)
Caliche Present: Yes
Dimensions: Starts at headcut, 4 feet drop over ~100 feet

HEADCUT: At Location (Wpt 6)
Caliche Present: Yes
Dimensions: 4 feet high with scour hole below

TYPICAL CROSS-SECTION (view looking DOWNSTREAM) - FIELD XS #



Notes:

****Waypoint 6 is on downstream side of headcut (HC); Waypoint 7 is in upstream knickzone (Kz)****

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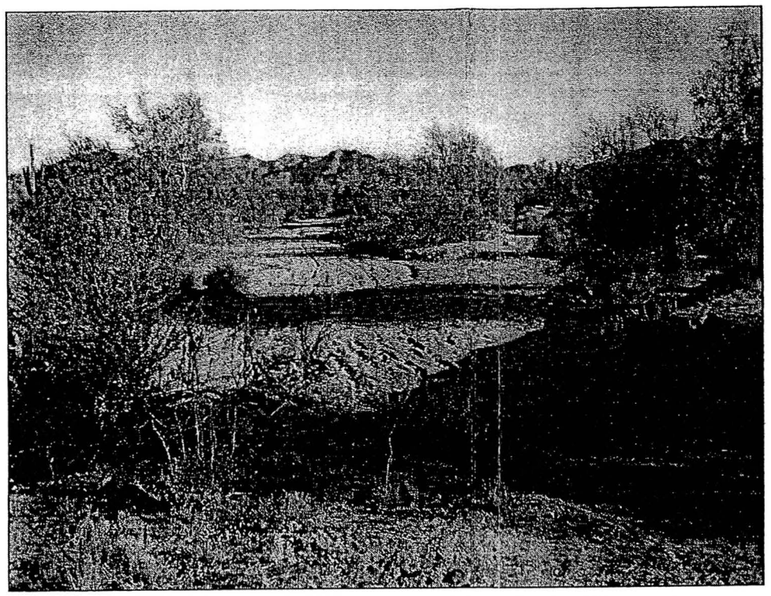
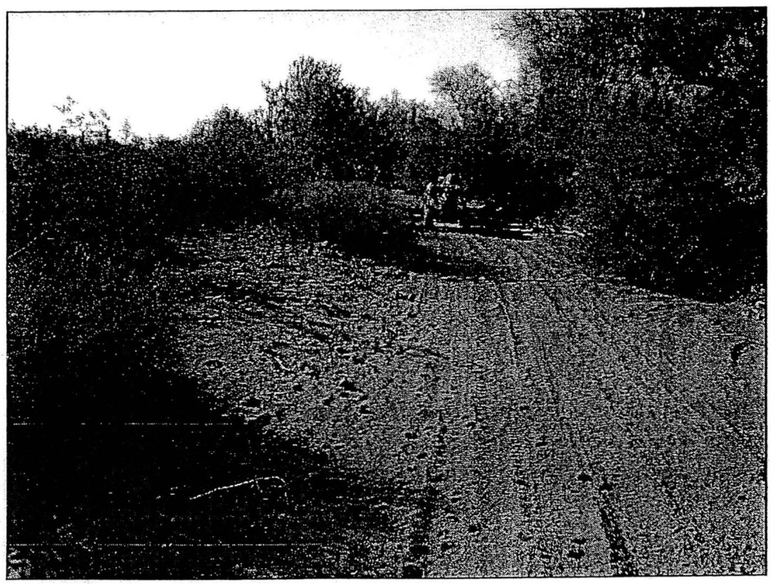
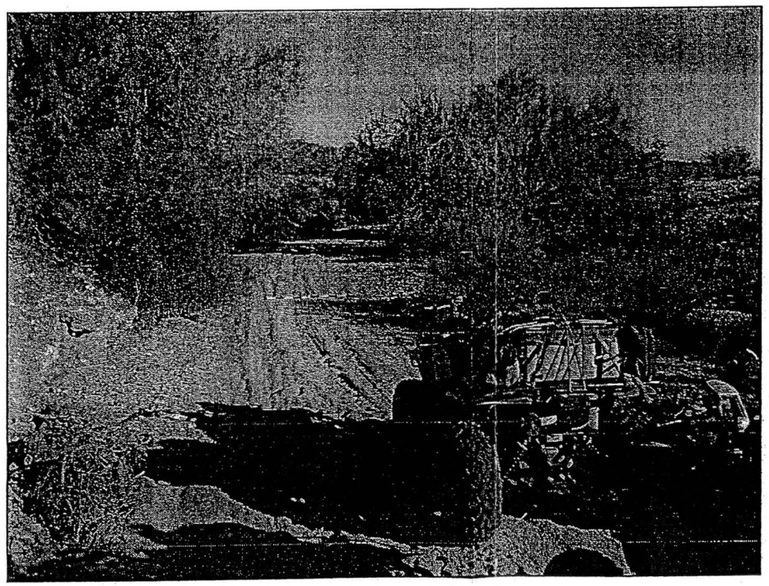
P1/1 Primary Wash #34 - Cross Section #1 – View looking downstream



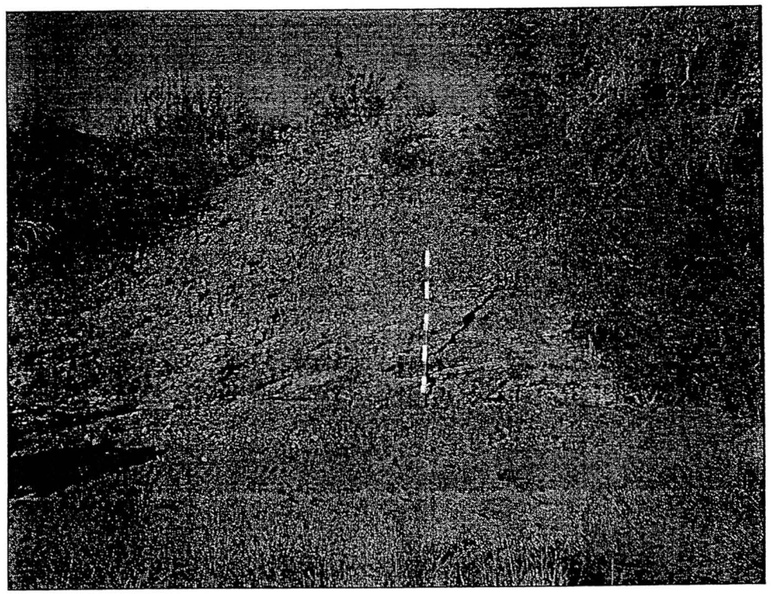
P1/2 Primary Wash #34 - Cross Section #1 – View looking upstream



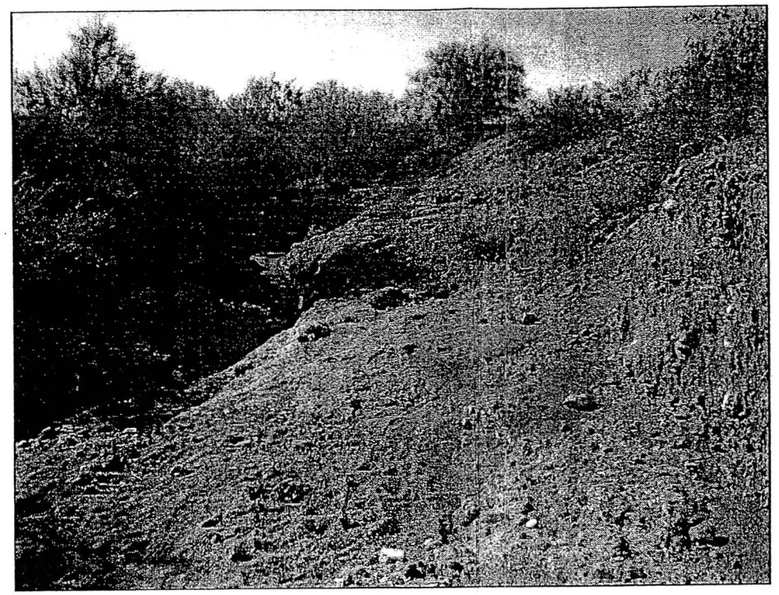
P1/3 Primary Wash #34 - Cross Section #2 – View looking downstream



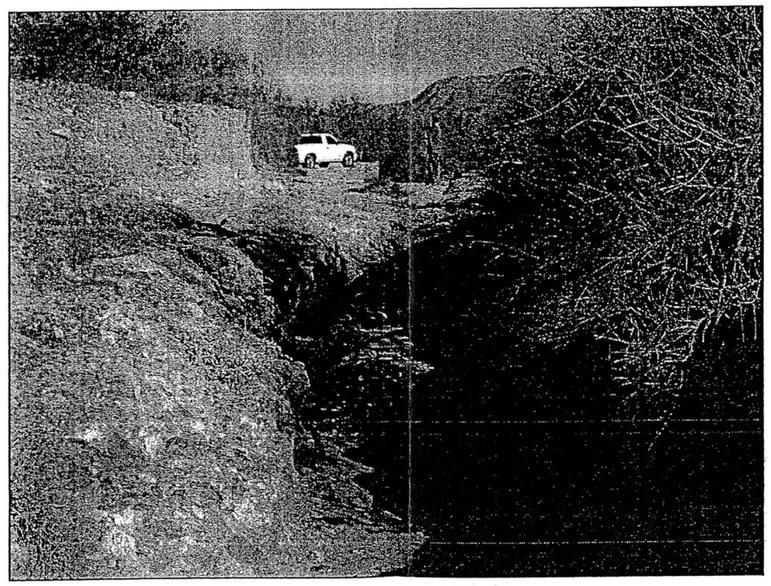
P1/4 Primary Wash #34 - Cross Section #2 – View looking upstream



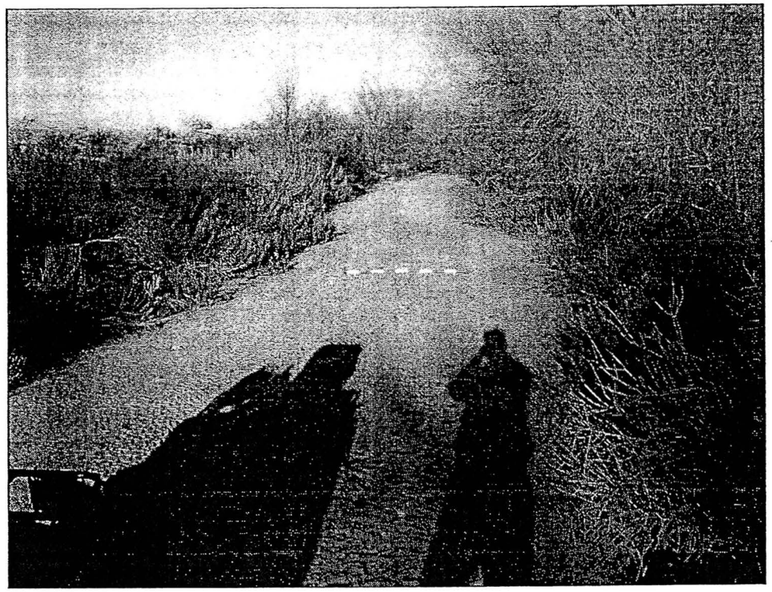
P1/5 Primary Wash #34 - Cross Section #2 – View of right bank caliche



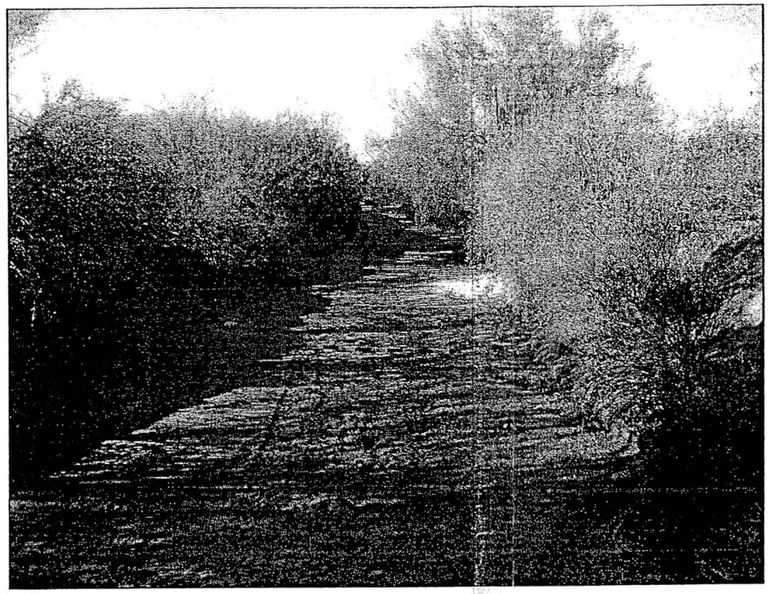
P1/7 Primary Wash #34 - Cross Section #3 – View looking downstream toward 4' headcut in caliche



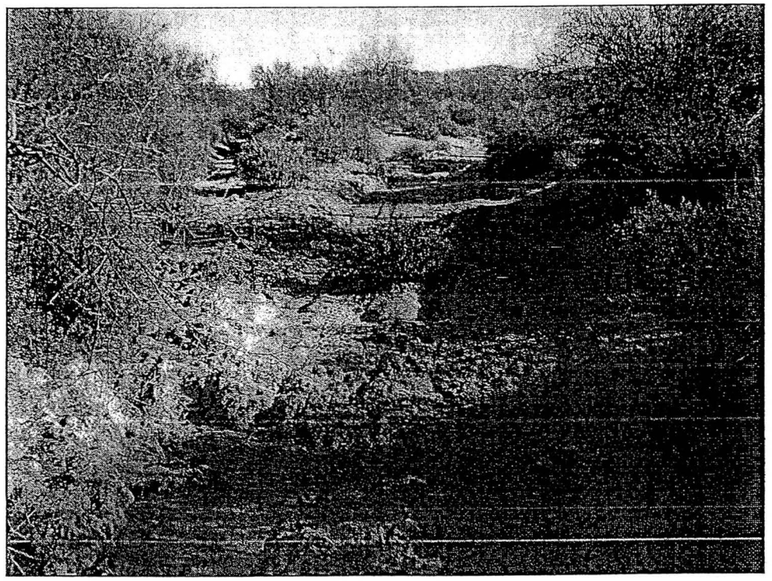
P1/8 Primary Wash #34 - Cross Section #3 – View looking upstream toward 4' headcut in caliche



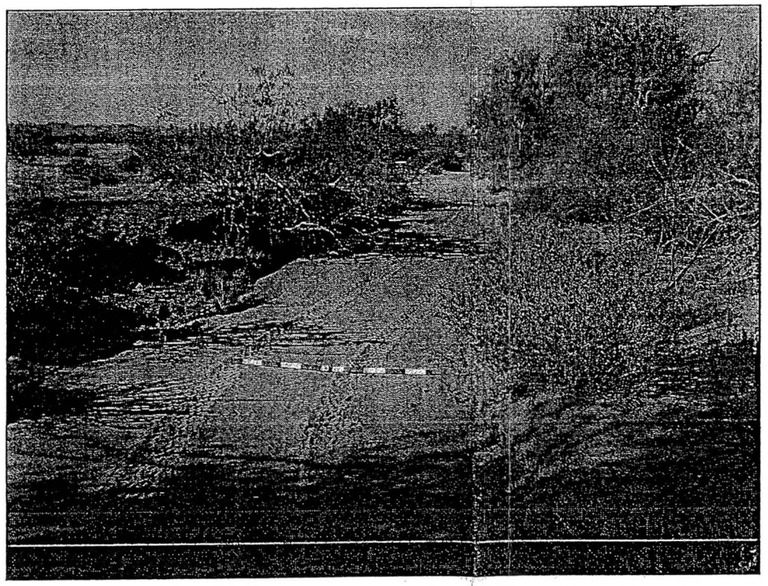
P3/1 Primary Wash #26 - Cross Section #1 – View looking downstream



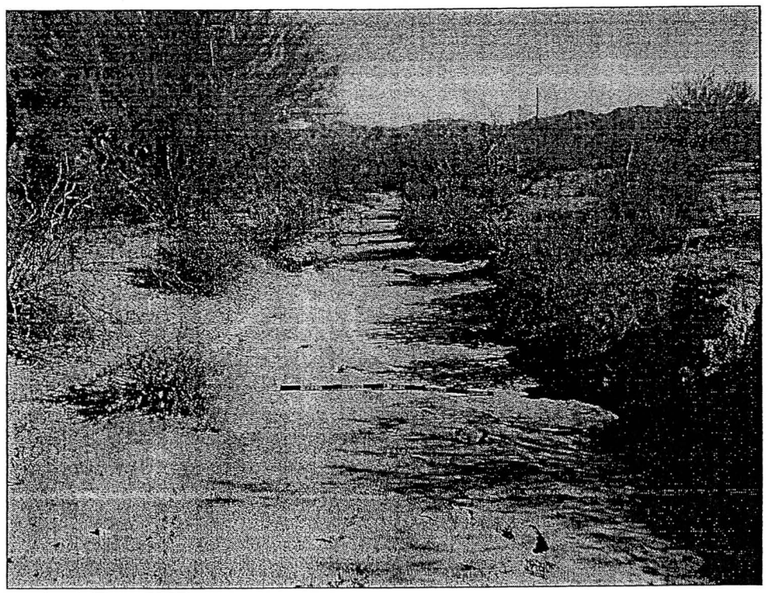
P3/5 Primary Wash #26 - Cross Section #2 – View looking downstream



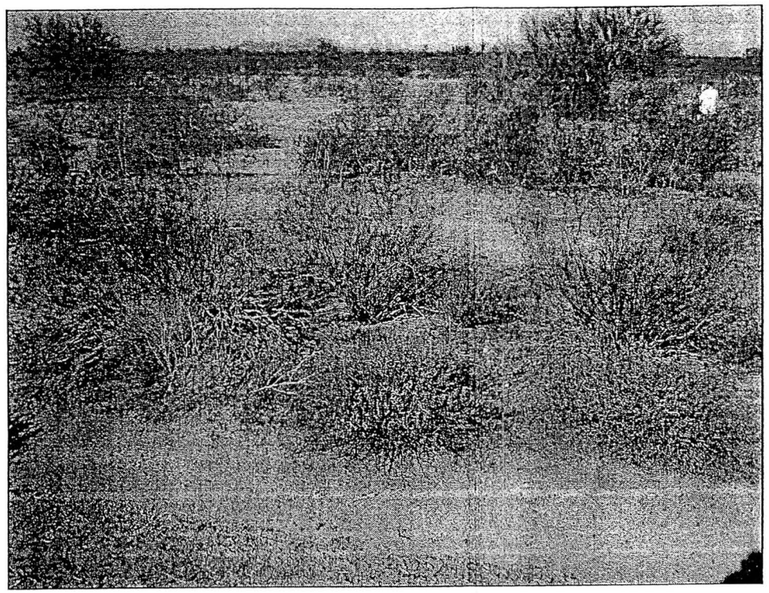
P3/6 Primary Wash #26 - Cross Section #2 – View looking upstream



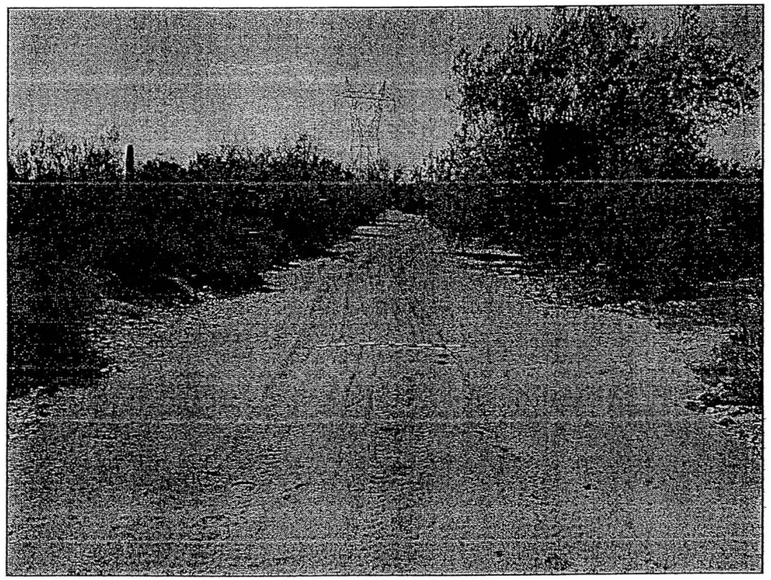
P3/8 Primary Wash #26 - Cross Section #3 – View looking downstream



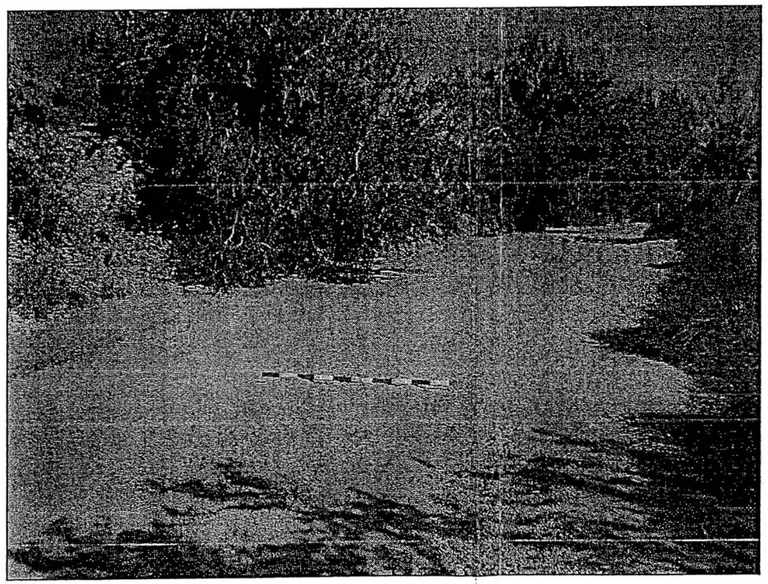
P3/9 Primary Wash #26 - Cross Section #3 – View looking upstream



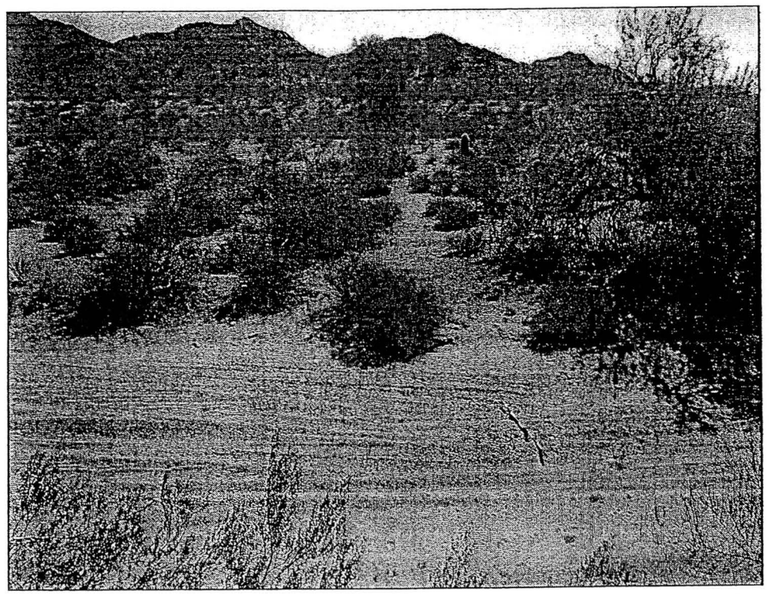
P3/11 Primary Wash #26 - Cross Section #4 – View looking to west and downstream



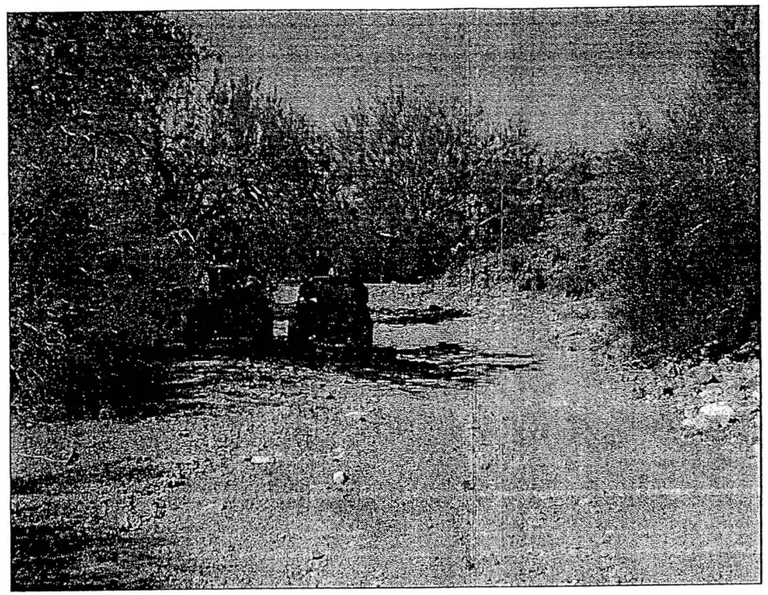
P3/12 Primary Wash #26 - Cross Section #5 – View looking downstream



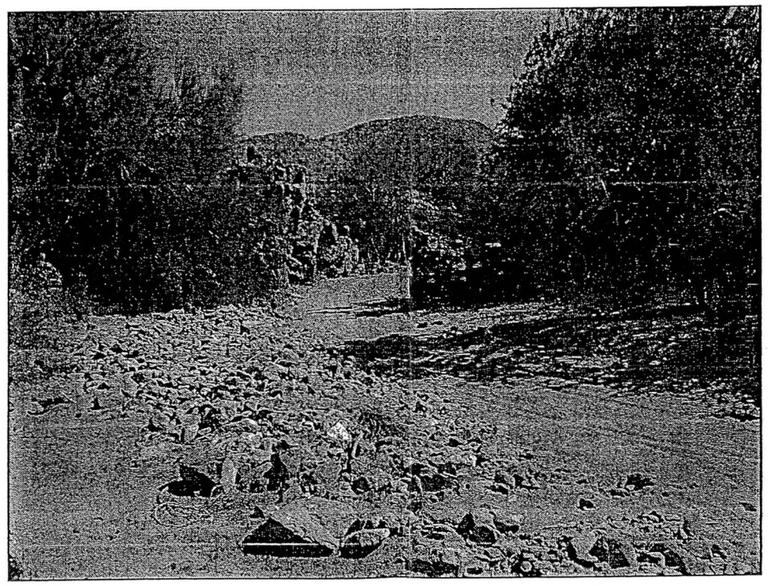
P3/13 Primary Wash #26 - Cross Section #5 – View looking upstream



P3/14 Primary Wash #26 - Cross Section #5 – View looking right bank to left bank (southeast)

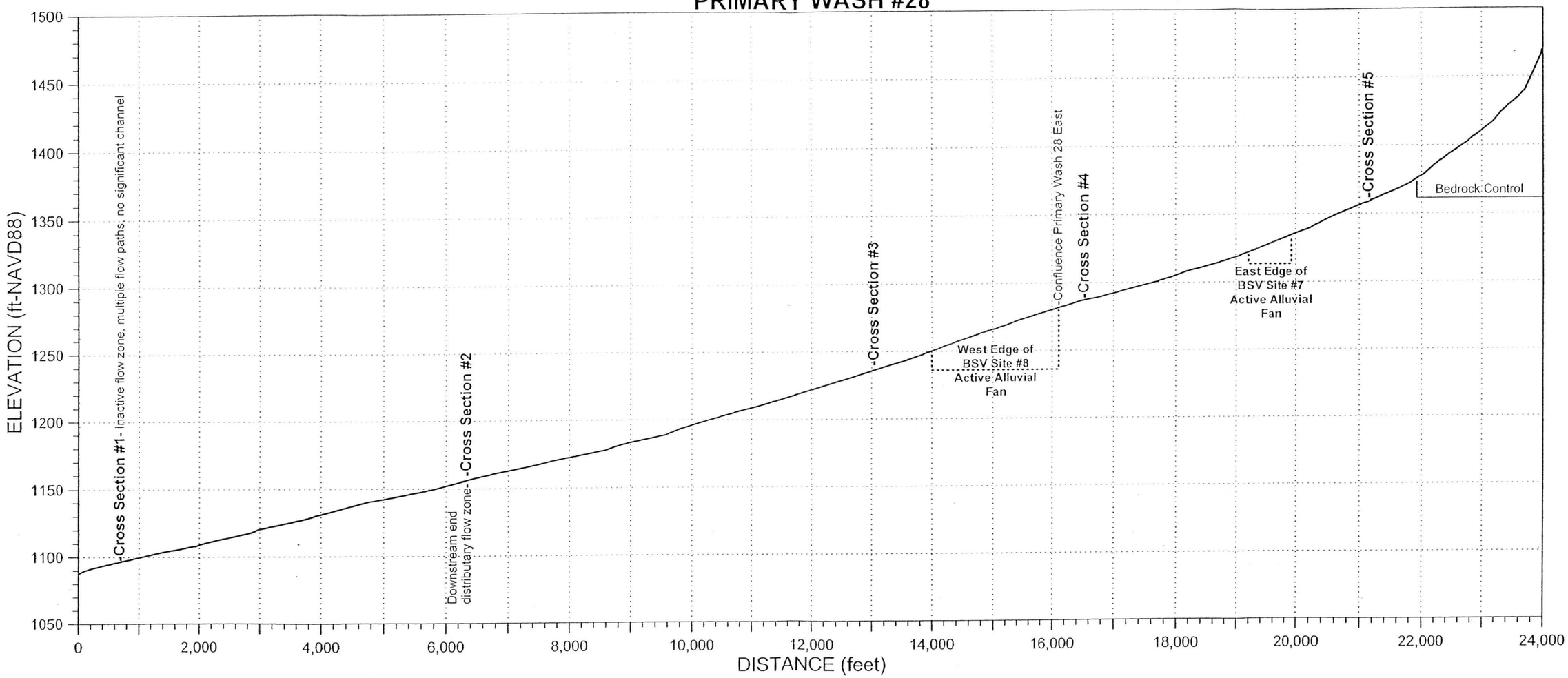


P3/18 Primary Wash #26 - Cross Section #6 – View looking upstream



P3/17 Primary Wash #26 - Cross Section #6 – View looking downstream

PRIMARY WASH #28



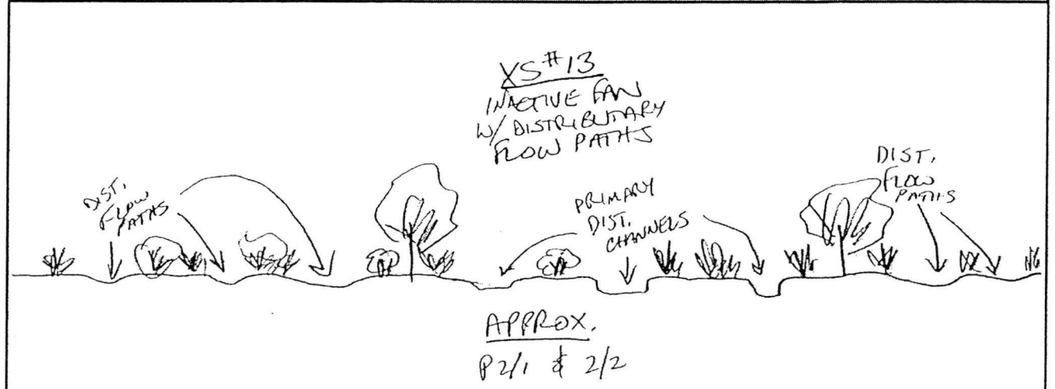
AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW28	1	49	March 8, 2004
	North: 887110.0 ft East: 480009.9 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank		1:1	<1 ft	Sand X	Gravel X
Channel		Multiple	X	Right Bank		1:1	<1 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P2/1 - View upstream showing distributary channel (one of primary ones) that is						
Mormon Tea			only about 2.5-3 feet wide and about 1 foot deep. Note convergence upstream.						
Tamarisk			P2/2 - View downstream showing split flow zone.						
Saguaro C.	Occasional								

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #13



Notes: Multiple distributary flow paths, several poorly defined, most <0.5 feet deep, few are 0.5-1.0 feet deep.

AYRES ASSOCIATES

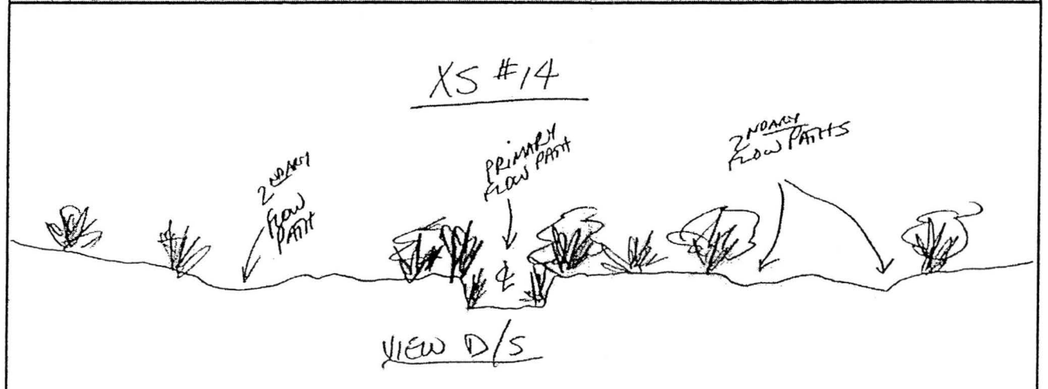
AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW28	2	50	March 8, 2004
	North: 892122.1 ft East: 482157.4 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single		Left Bank		1:1	<1-1.5 ft	Sand X	Gravel X
Channel		Multiple	X	Right Bank		1:1	<1-1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel			Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement		X	
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top)	Above Bed	Thickness	Soils	X		
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel						
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P2/3 - View downstream showing flow divergence; PW28 goes left and main flow						
Mormon Tea			goes right to PW27.						
Tamarisk			P2/4 - View upstream showing primary channel PW28.						
Saguaro C.	Occasional								

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	NICKZONE:			HEADCUT:		
Absent	Caliche Present:			Caliche Present:		
Spotty	Dimensions:			Dimensions:		
Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #14



Notes: Flow diverges just downstream of cross section with main flow going to PW27.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW28	3	51	March 8, 2004
	North: 897941.3 ft East: 485359.1 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single		Left Bank	
Channel		Multiple	X	Right Bank	

H:V	Height	BED MATERIAL	
1:1	<1 ft	Sand X	Gravel X
1:1	<1 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal			Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	Few	
Palo Verde	Few	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.	Occasional	
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.	Occasional	
Fishhook C.		
Ocotillo		

CALICHE STRATA	Above Bed	Thickness
Height (top)		
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg			

PHOTOS & DESCRIPTION:

P2/5 - View upstream showing multiple flow paths.

P2/6 - View downstream showing multiple flow paths.

CRYPTO-BIOTIC CRUST (floodway): Absent / Spotty / **Extensive**

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE: Caliche Present: / Dimensions:

HEADCUT: Caliche Present: / Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #15

XS #15

No Cross Section
Multiple distributary flow paths
(shallow - <0.5 to 1.0 feet deep)

Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW28	4	52	March 8, 2004
	North: 901241.4 ft East: 485564.2 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway		Single	X	Left Bank	
Channel	X	Multiple	minor	Right Bank	

H:V	Height	BED MATERIAL	
3:1	1.5 ft	Sand X	Gravel X
3:1	1.5 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea	X	
Tamarisk		
Saguaro C.	X	
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA	Above Bed	Thickness
Height (top)		
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg			

PHOTOS & DESCRIPTION:

P2/7 - View downstream on primary channel, note high water debris 1.5 feet up on tree base.

P2/8 - View upstream showing primary channel.

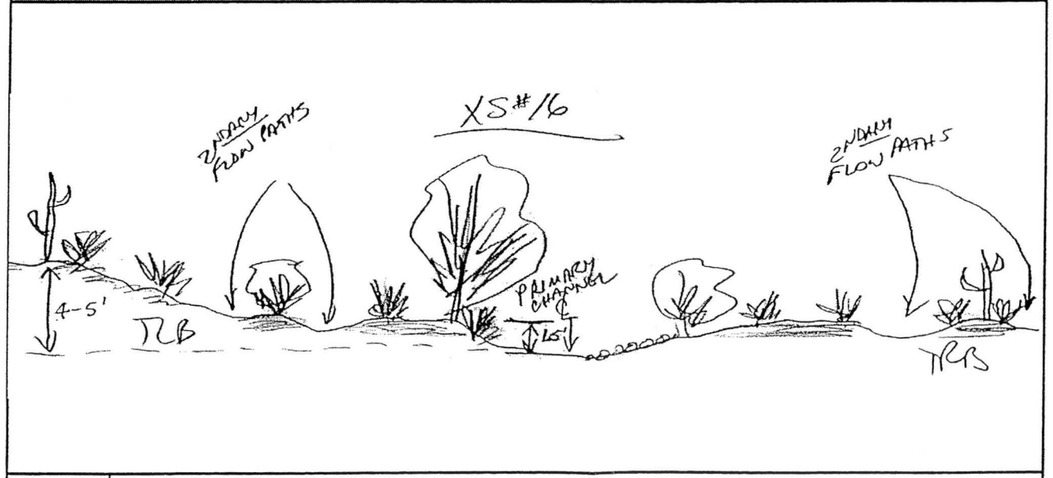
CRYPTO-BIOTIC CRUST (floodway): Absent / **Spotty** / Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE: Caliche Present: / Dimensions:

HEADCUT: Caliche Present: / Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #16



Notes: Channel appears to steepen up here.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW28	5	53	March 8, 2004

North: 905490.1 ft
East: 486990.5 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		3:1	5 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		2:1	5 ft	Cobble spots	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA	Above Bed	Thickness
Height (top)		
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg			

PHOTOS & DESCRIPTION:
P2/9 - View downstream
P2/10 - View upstream, note flow split.

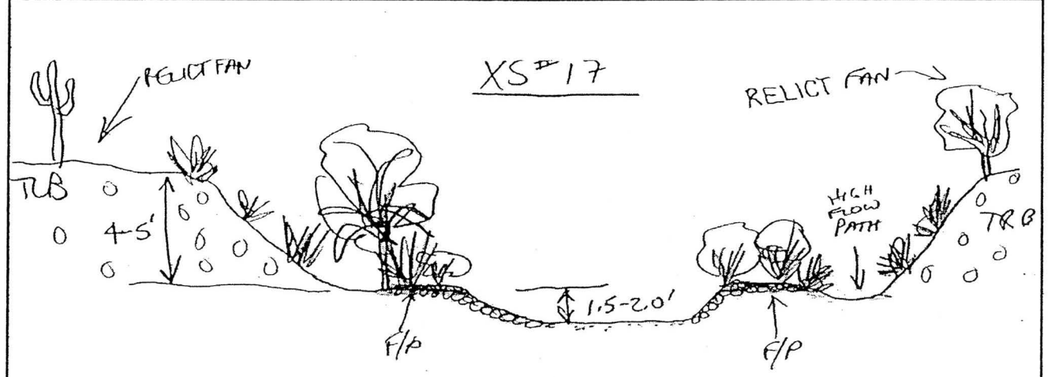
CRYPTO-BIOTIC CRUST (floodway):
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

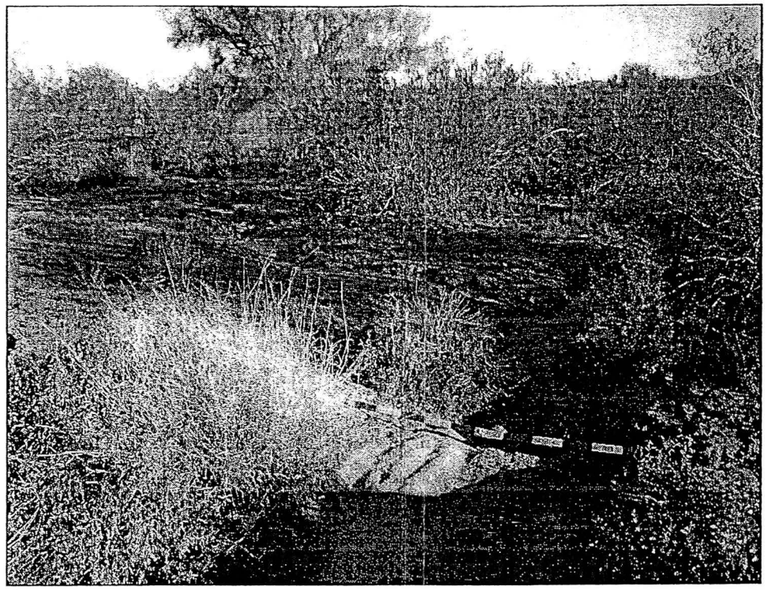
HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #17

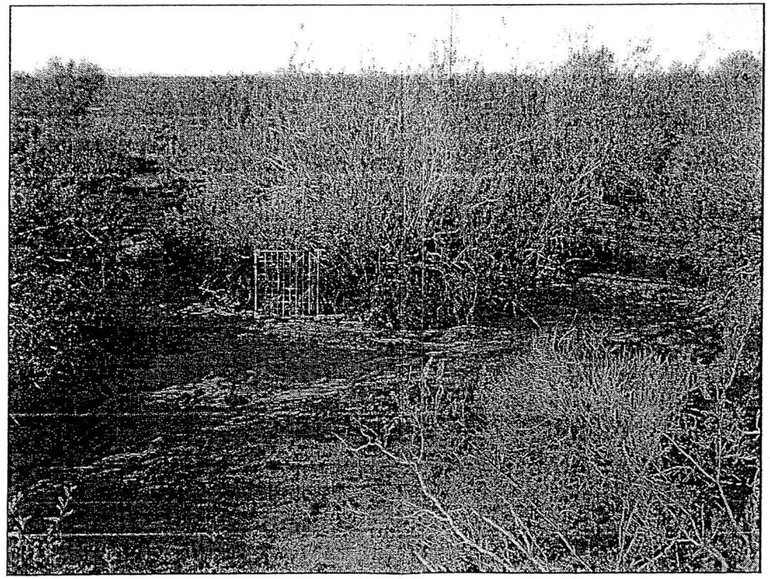


Notes: Channel starts to become entrenched a few hundred feet downstream of this cross section.

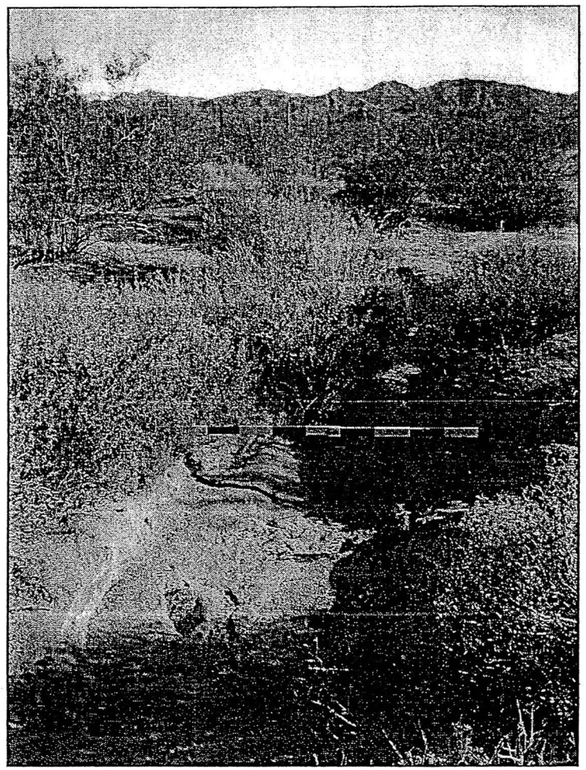
AYRES ASSOCIATES



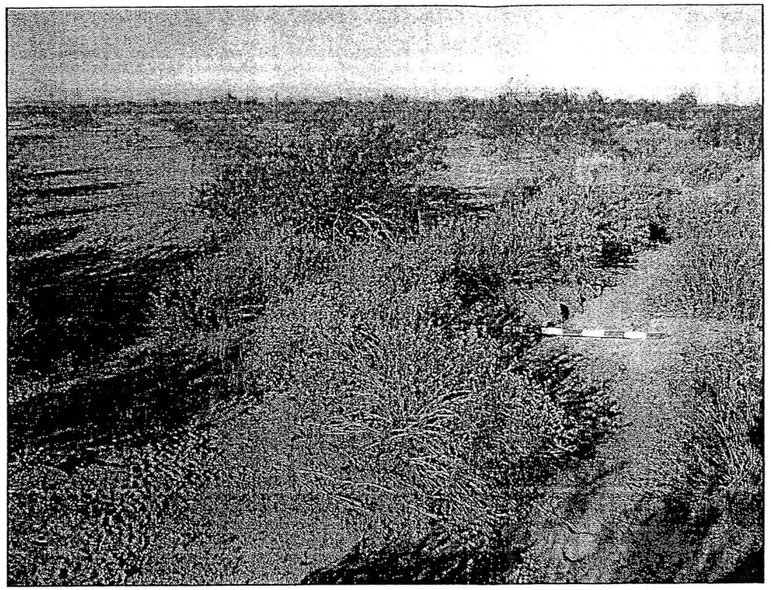
P2/1 Primary Wash #28 - Cross Section #1 – View looking upstream



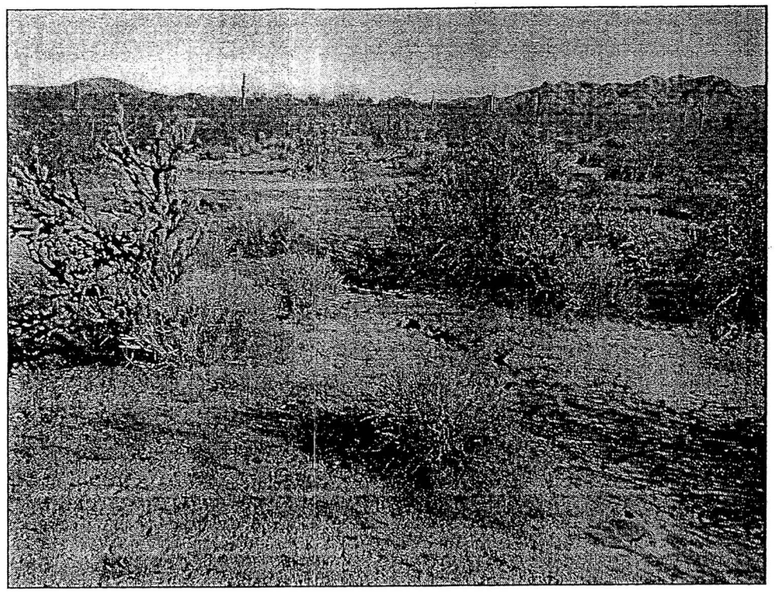
P2/2 Primary Wash #28 - Cross Section #1 – View looking downstream



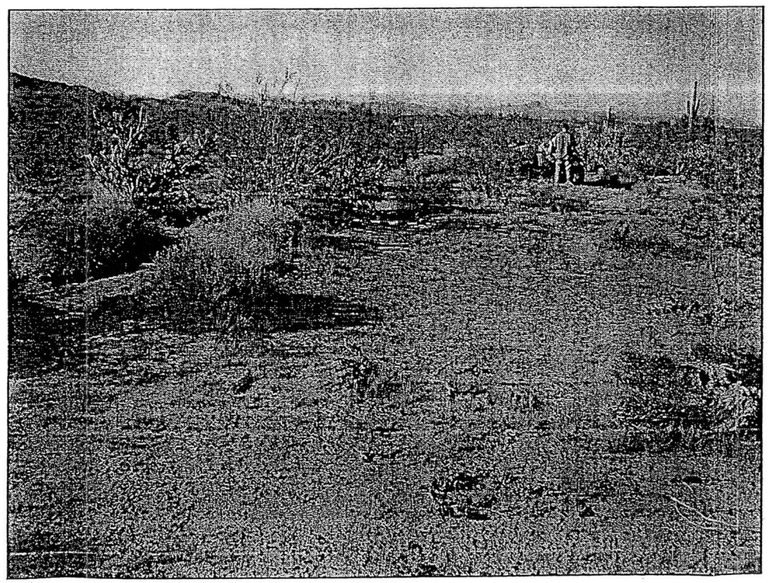
P2/3 Primary Wash #28 - Cross Section #2 – View looking downstream



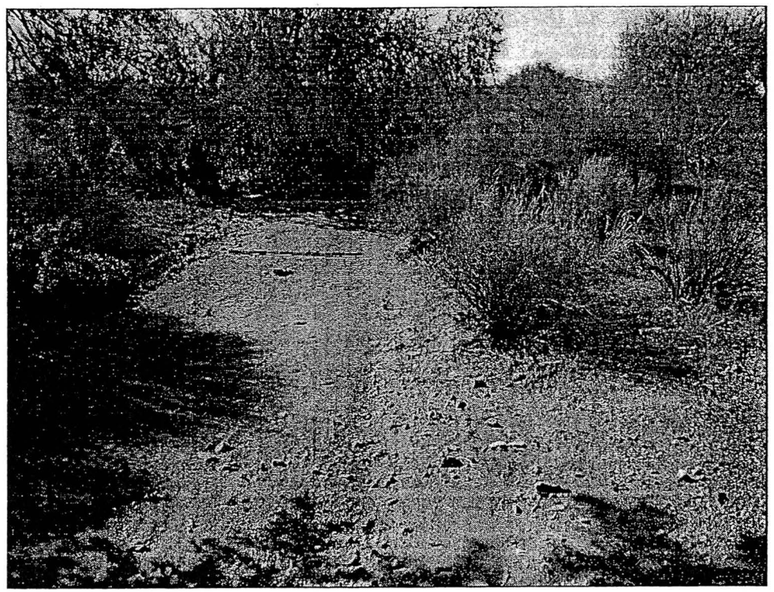
P2/4 Primary Wash #28 - Cross Section #2 – View looking upstream



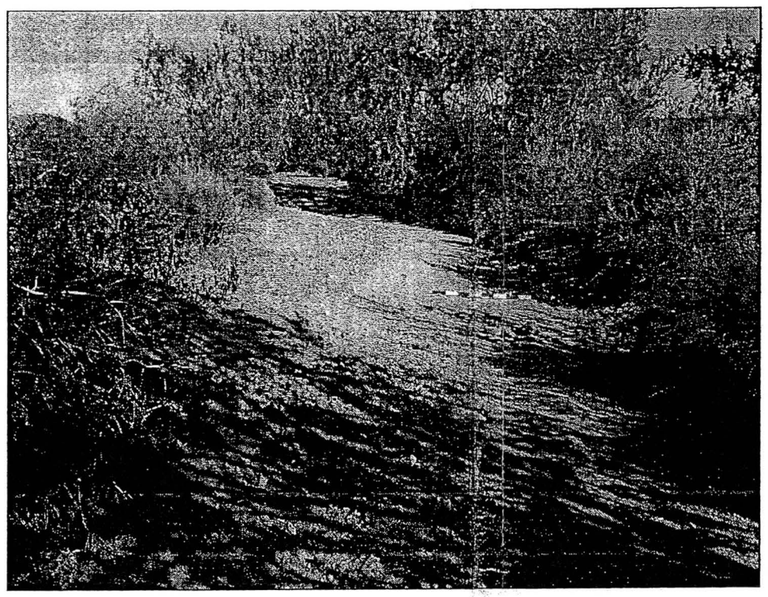
P2/5 Primary Wash #28 - Cross Section #3 – View looking upstream



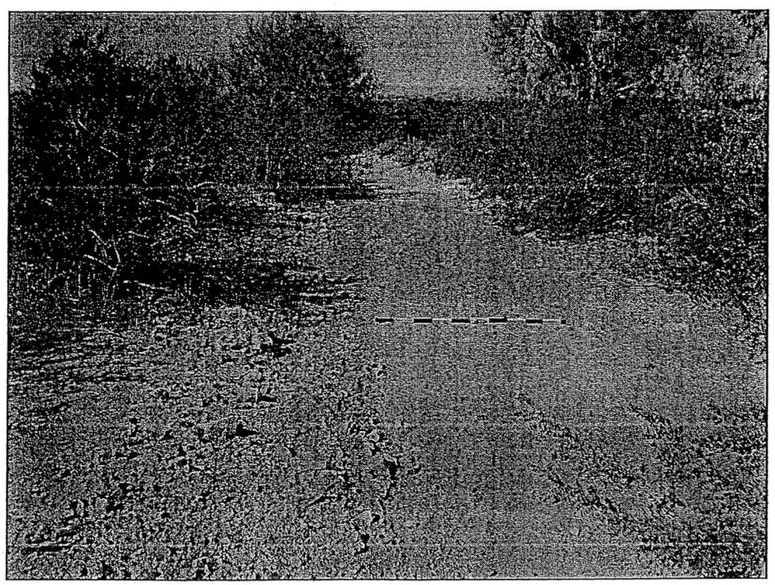
P2/6 Primary Wash #28 - Cross Section #3 – View looking downstream



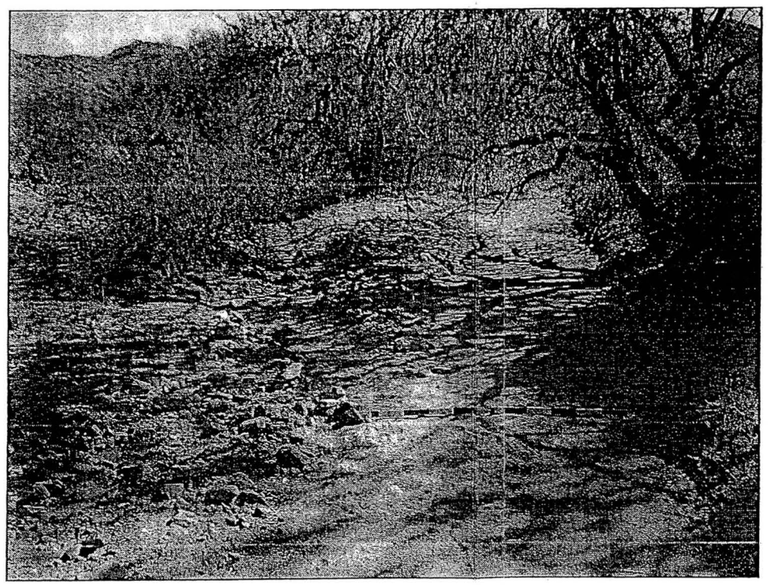
P2/7 Primary Wash #28 - Cross Section #4 – View looking downstream



P2/8 Primary Wash #28 - Cross Section #4 – View looking upstream

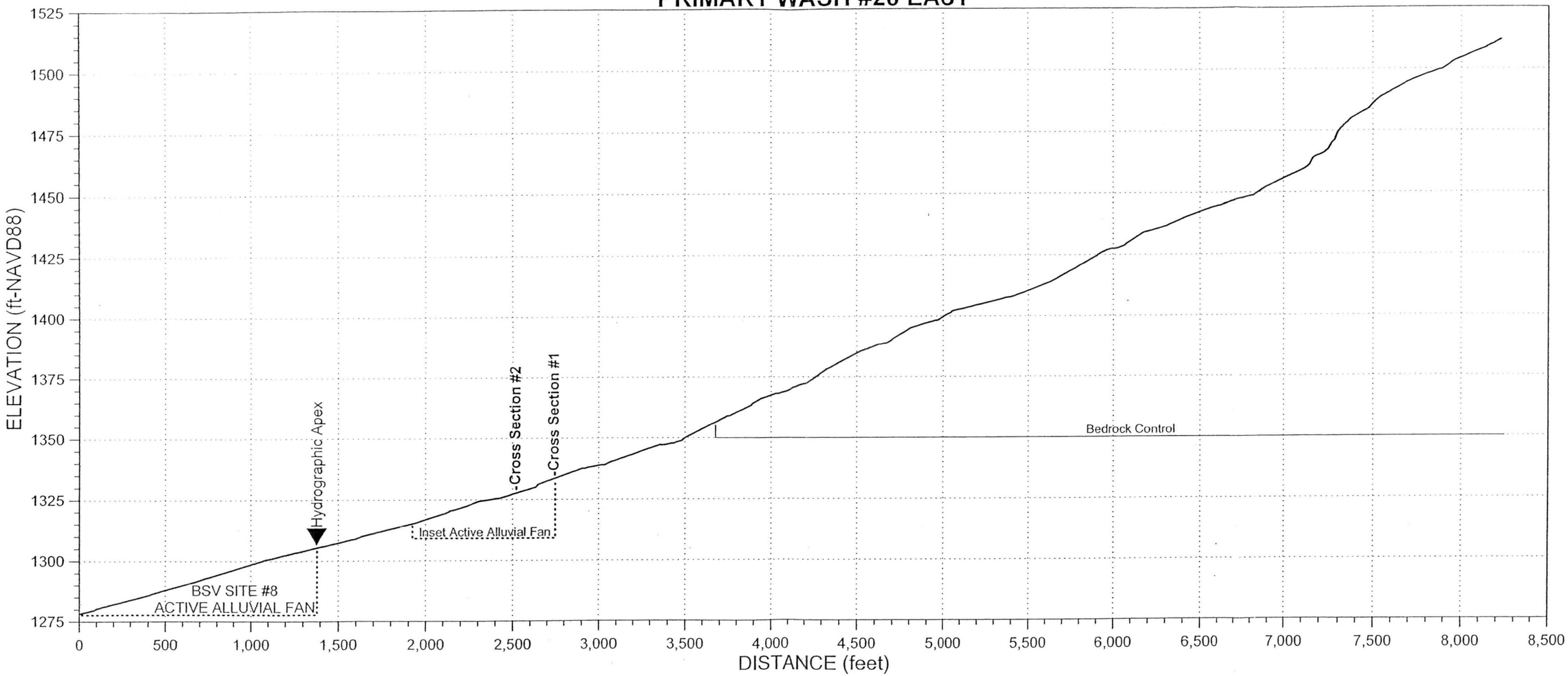


P2/9 Primary Wash #28 - Cross Section #5 – View looking downstream



P2/10 Primary Wash #28 - Cross Section #5 – View looking upstream

PRIMARY WASH #28 EAST

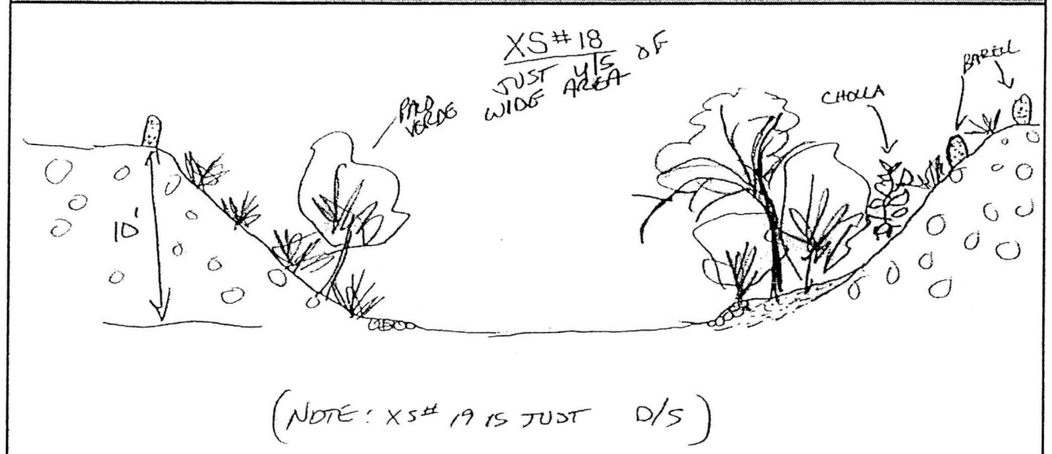


AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW28 East	1	57	March 8, 2004
	North: 902091.2 ft East: 487809.9 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank	X	1:1	10 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	10 ft	Cobble X	Bldrs minor

VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X		Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X		Height (top) Above Bed		Thickness	Soils			X
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X		Right Bank			Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X		Channel				1-1.5 ft	1-1.5 ft	<1 ft
Brittlebush	X		PHOTOS & DESCRIPTION:						
Bursage	X		P2/12 - View upstream						
Mormon Tea	X		P2/13 - View downstream showing inset depositional area						
Tamarisk									
Saguaro C.									
Cholla C.	On banks		CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.				NICKZONE:			HEADCUT:		
Hedgehog C.			Absent	Caliche Present:			Caliche Present:		
Fishhook C.			Spotty	Dimensions:			Dimensions:		
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #18



Notes: Cross section is located upstream of wide inset depositional zone (downstream end of zone at **Wpt. #56**).
Cross section 19 is located just downstream.

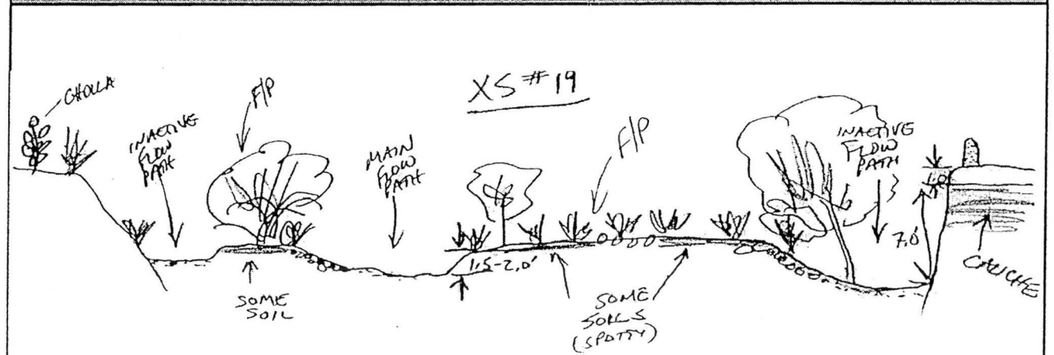
AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW28 East	2	58	March 8, 2004
	North: 901939.4 ft East: 487597.5 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single		Left Bank		1:1	6 ft	Sand X	Gravel X
Channel		Multiple	X	Right Bank	X	vert.	8 ft	Cobble X	Bldrs X

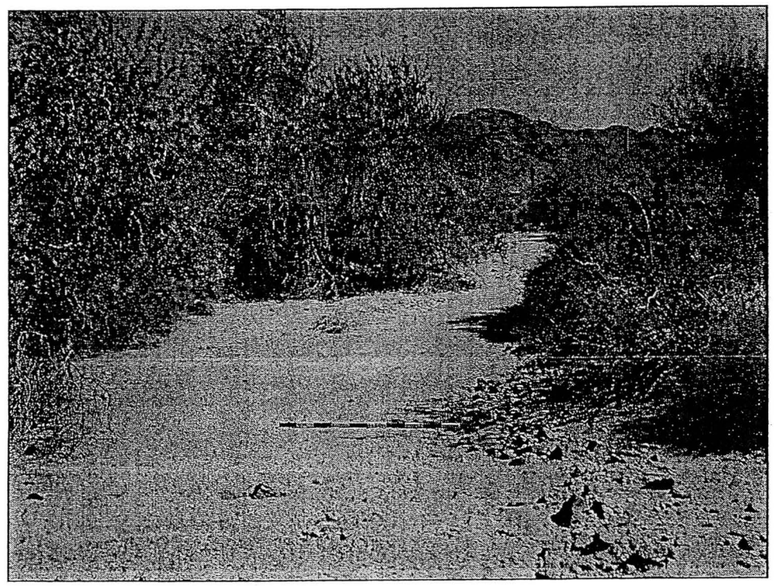
VEGETATION		INSET F/P	TERRACES (height-ft)			WITHIN FLOODWAY			
In-channel	X	X	Left Bank				Extensive	Spotty	Absent
Marginal	X		Right Bank			Varnish			X
VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA			Pavement			X
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X	Height (top) Above Bed		Thickness	Soils		X	
			Left Bank			HIGH WATER MARKS/DEBRIS			
Palo Verde	X	X	Right Bank	6-7 ft	6-7 ft	Ht. Above Thalweg	Left Bank	Right Bank	Channel
Creosote	X	X	Channel						
Brittlebush	X	X	PHOTOS & DESCRIPTION:						
Bursage	X	X	see P2/13 at cross section 1						
Mormon Tea	X	X							
Tamarisk									
Saguaro C.									
Cholla C.			CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
Barrel C.				Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Prickly Pear				Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
X-mas C.				NICKZONE:			HEADCUT:		
Hedgehog C.			Absent	Caliche Present:			Caliche Present:		
Fishhook C.			Spotty	Dimensions:			Dimensions:		
Ocotillo			Extensive						

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #19

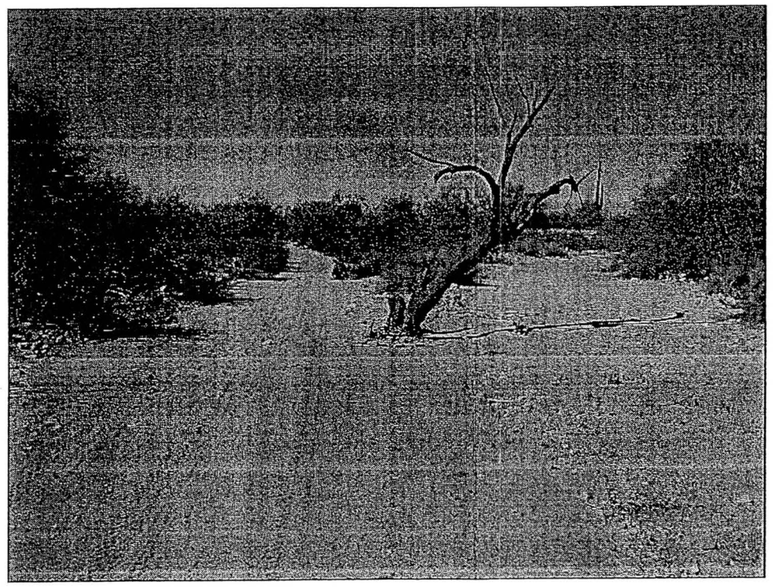


Notes: Located downstream of Wpt. #57

AYRES ASSOCIATES

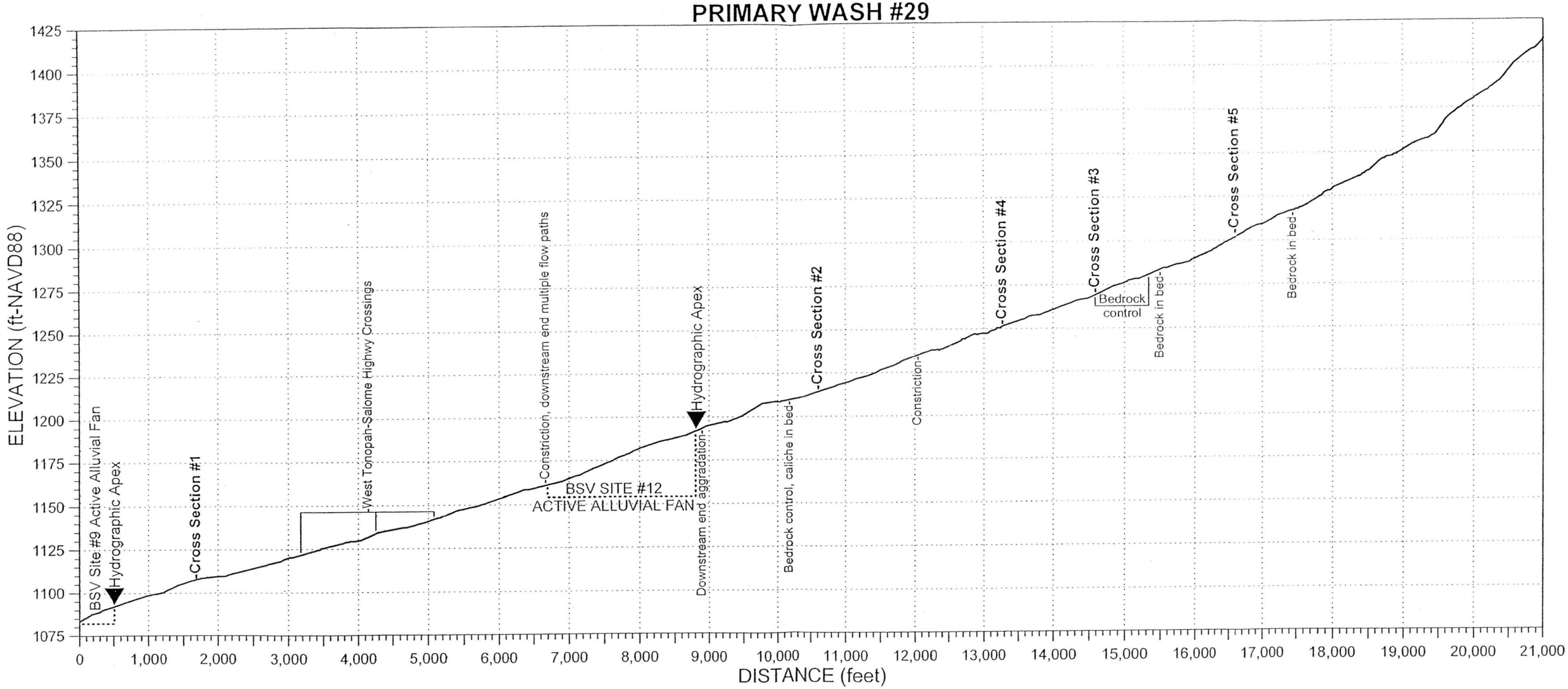


P2/12 Primary Wash #28 East - Cross Section #1 – View looking upstream



P2/13 Primary Wash #28 East - Cross Section #2 – View looking downstream

PRIMARY WASH #29



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW29	1	34	March 7, 2004

North: 887519.0 ft
East: 488141.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
1:1	3 ft	Sand X	Gravel X
1:1	3 ft	Cobble minor	Bldrs minor

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank	3-4 ft	
Marginal	X		Right Bank	3-4 ft	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement		X	
Soils	X	(on TCE)	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

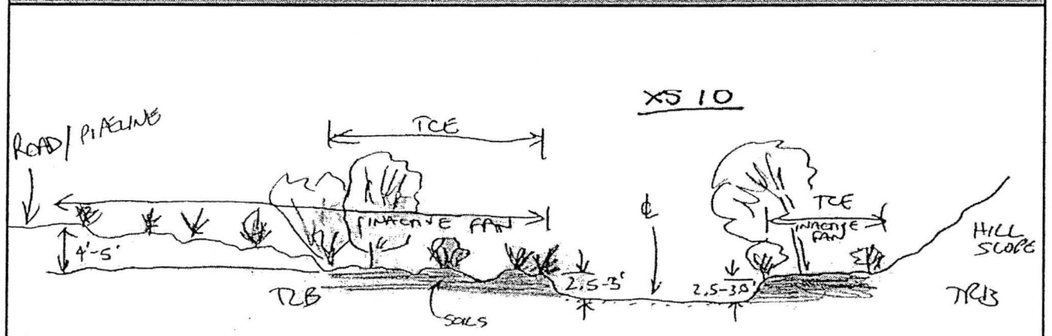
CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1.5 ft		

PHOTOS & DESCRIPTION:
P1/34 - View looking downstream
P1/35 - View looking upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive*	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #10



Notes: Reach is upstream of Active Inset Alluvial Fan and FRS.

* Cryptobiotic crusts extensive on terraces.

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW29	2	41	March 7, 2004

North: 895496.6 ft
East: 487262.7 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	X
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
1:1	8 ft	Sand X	Gravel X
6:1	8 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde	X	
Creosote	X	
Brittlebush	X	
Bursage	X	
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

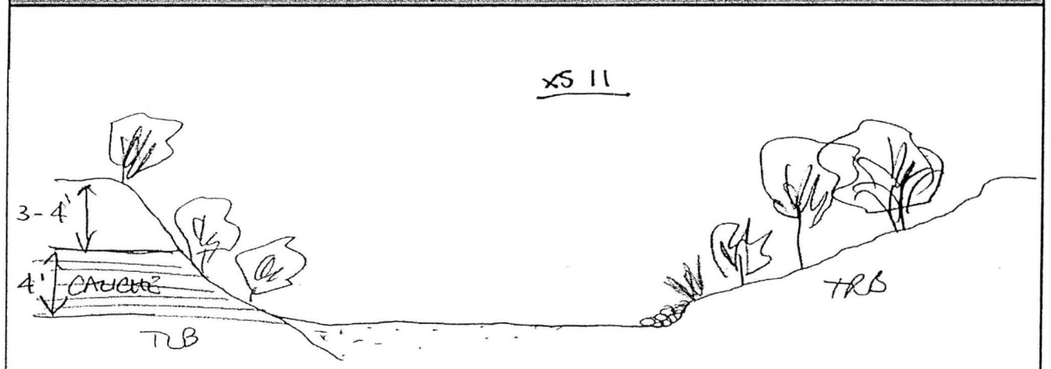
CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	4 ft	4 ft
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft		

PHOTOS & DESCRIPTION:
P1/36 - View looking downstream
P1/37 - View looking upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #11



Notes:

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW29	3	66	March 8, 2004
	North: 898317.01 ft East: 489171.45 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	16-17 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	16-17 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde	X	X
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

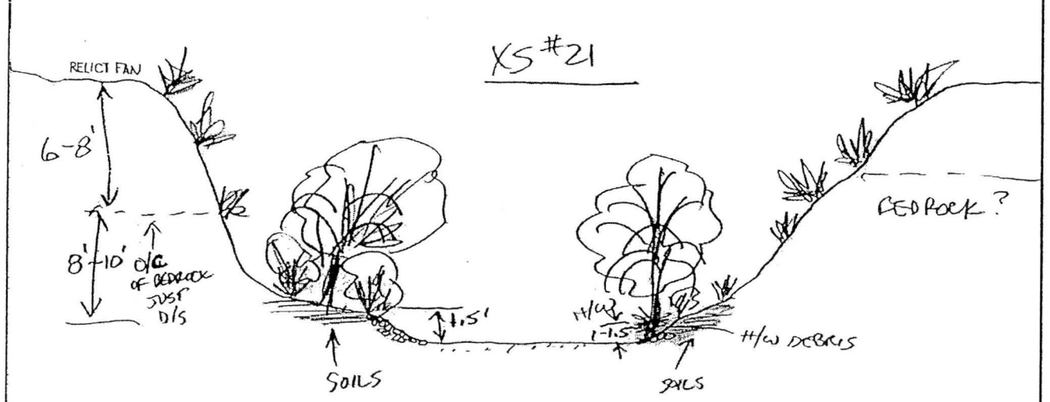
PHOTOS & DESCRIPTION:

P2/17 - View looking upstream, note bedrock

P2/18 - View looking downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #21



Notes: Bedrock control in banks ends just downstream. For short distance here and upstream have intermittent bedrock in banks.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW29	4	70	March 8, 2004
	North: 897235.7 ft East: 488475.1 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		1:1	11-12 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	11-12 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde	X	X
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		
Tamarisk		
Saguaro C.	X	
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
	Height (top) Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	<1 ft

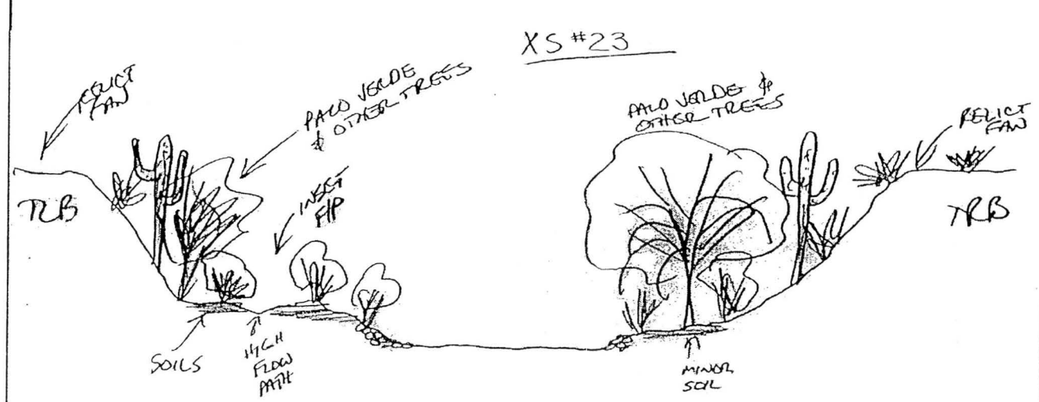
PHOTOS & DESCRIPTION:

P2/21 - View downstream

P2/22 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #23



Notes: Bedrock control in banks ends just downstream. For short distance here and upstream have intermittent bedrock in banks.

AYRES ASSOCIATES

AYRES ASSOCIATES, INC.	CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
BUCKEYE/SUN VALLEY ADMS Task 2.6.4 - Existing Conditions Assessment of Primary Washes	PW29	5	61	March 8, 2004
	North: 899693.9 ft East: 492985.5 ft	Field Crew:	W.J. Spitz, A.B. Alvarado	

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		<1:1	16-18 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		<1:1	16-18 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde		
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
	Height (top) Above Bed	Thickness
Left Bank	8-10 ft	4-6 ft
Right Bank	8-10 ft	4-6 ft
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	<1 ft

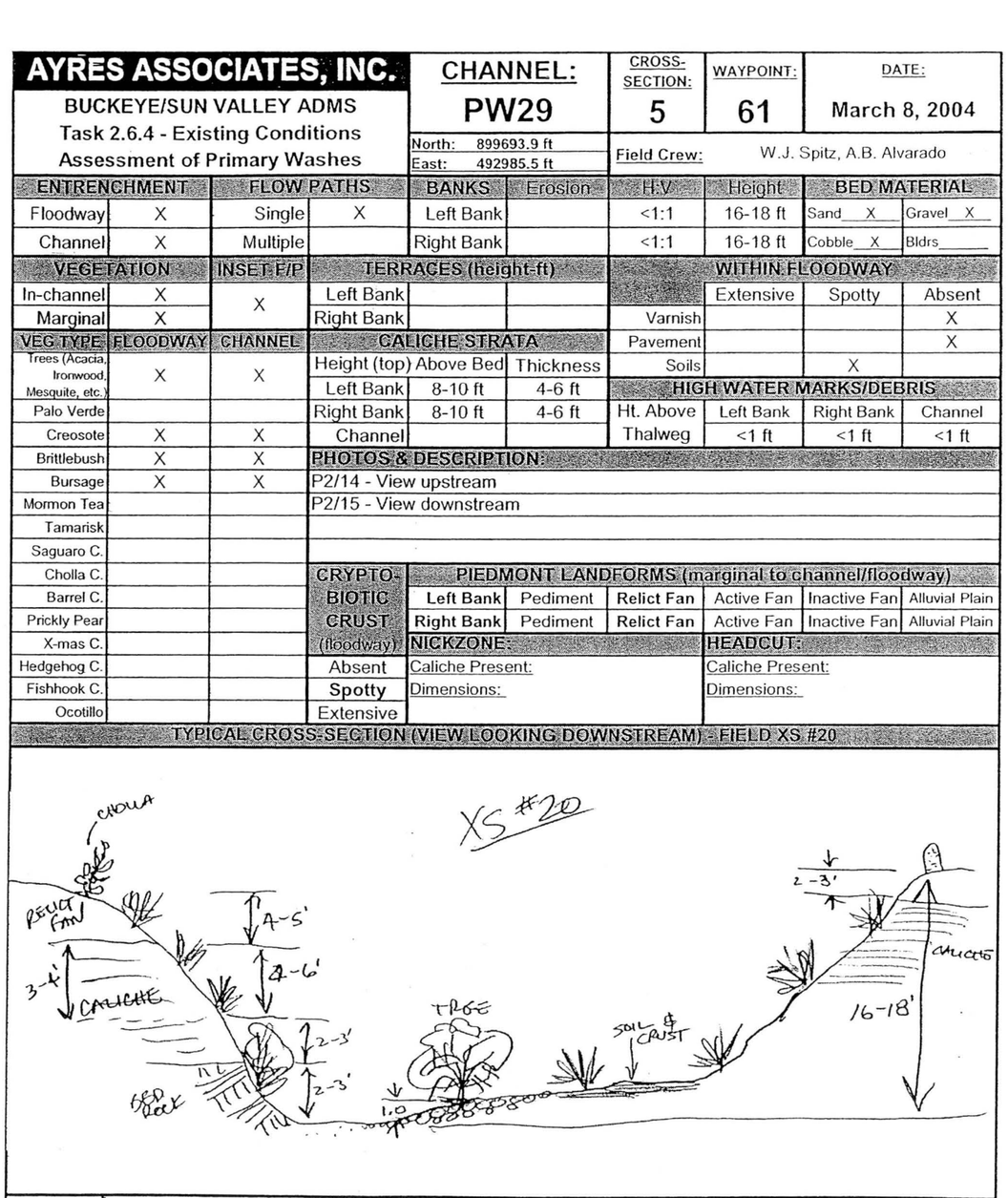
PHOTOS & DESCRIPTION:
P2/14 - View upstream
P2/15 - View downstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

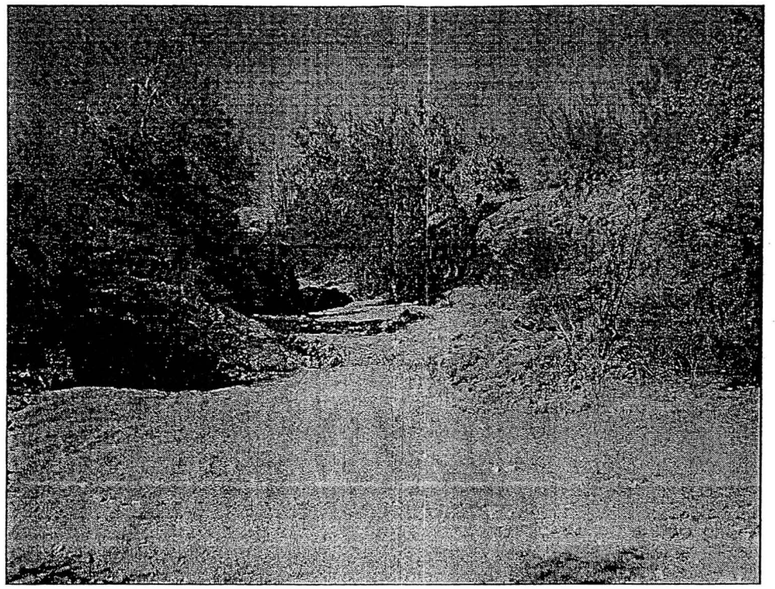
NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

- Absent
- Spotty
- Extensive

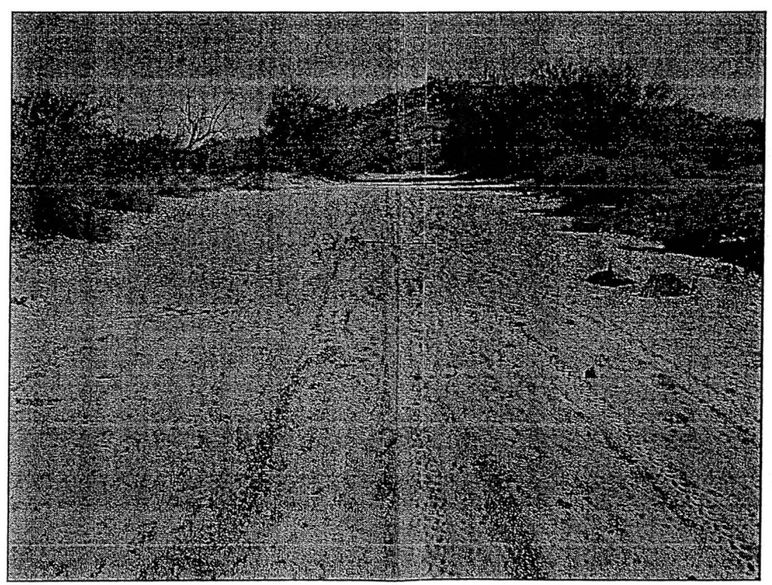
TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #20



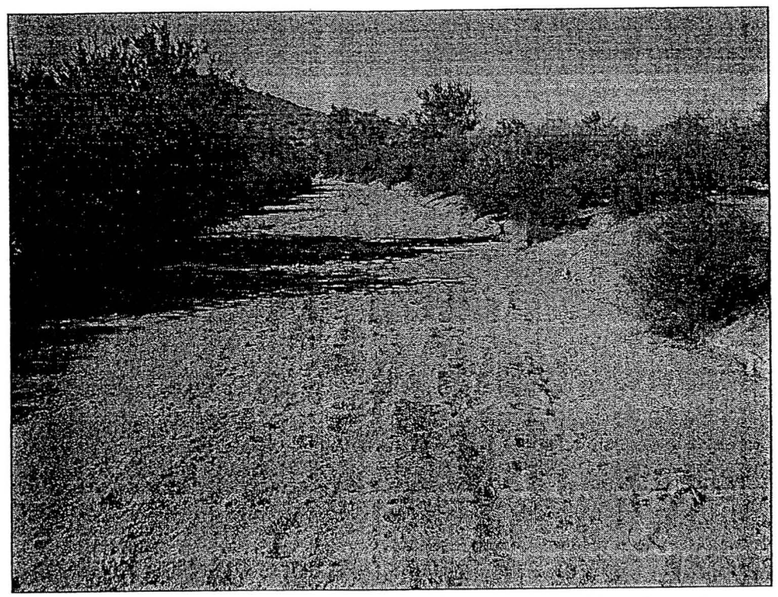
Notes:



P1/34 Primary Wash #29 - Cross Section #1 – View looking downstream

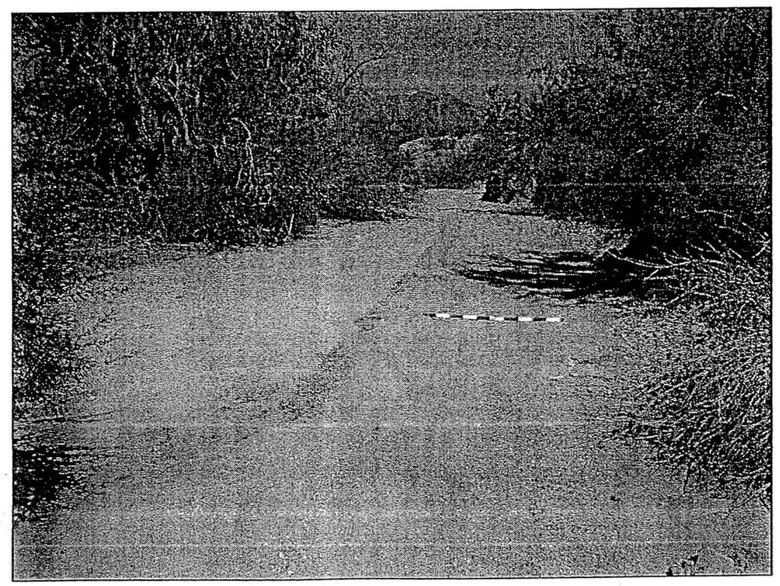


P1/35 Primary Wash #29 - Cross Section #1 – View looking upstream

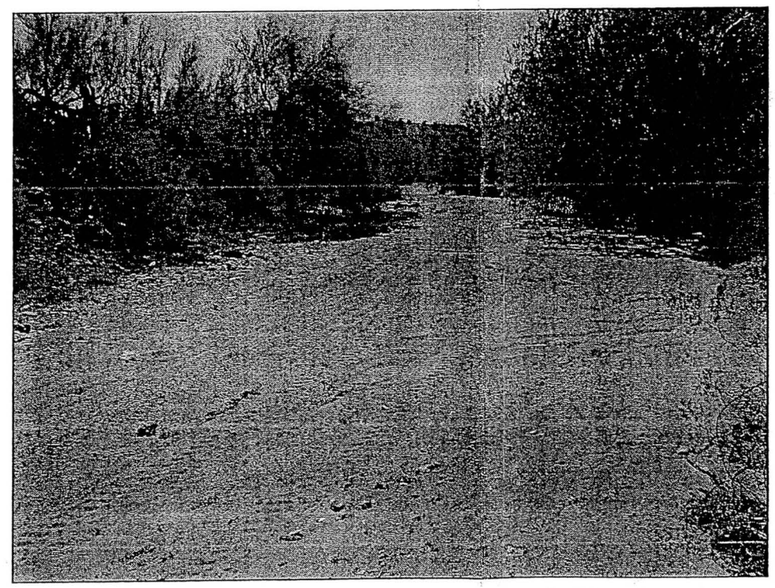


P1/36 Primary Wash #29 - Cross Section #2 – View looking downstream

P1/37 Primary Wash #29 - Cross Section #2 – View looking upstream

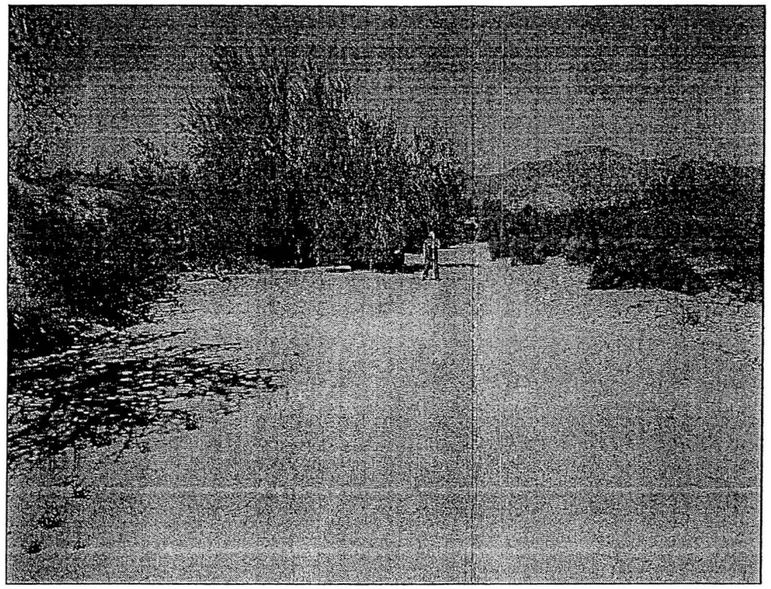


P2/17 Primary Wash #29 - Cross Section #3 – View looking upstream

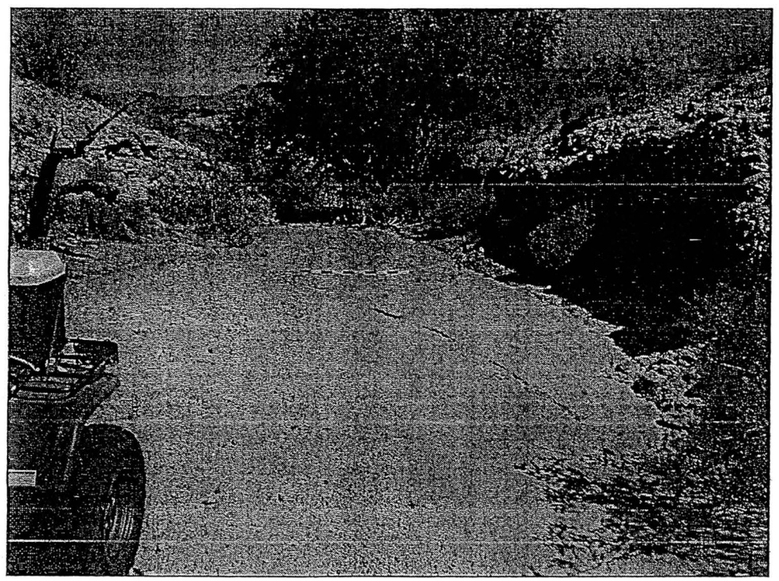


P2/18 Primary Wash #29 - Cross Section #3 – View looking downstream

P2/21 Primary Wash #29 - Cross Section #4 – View looking downstream



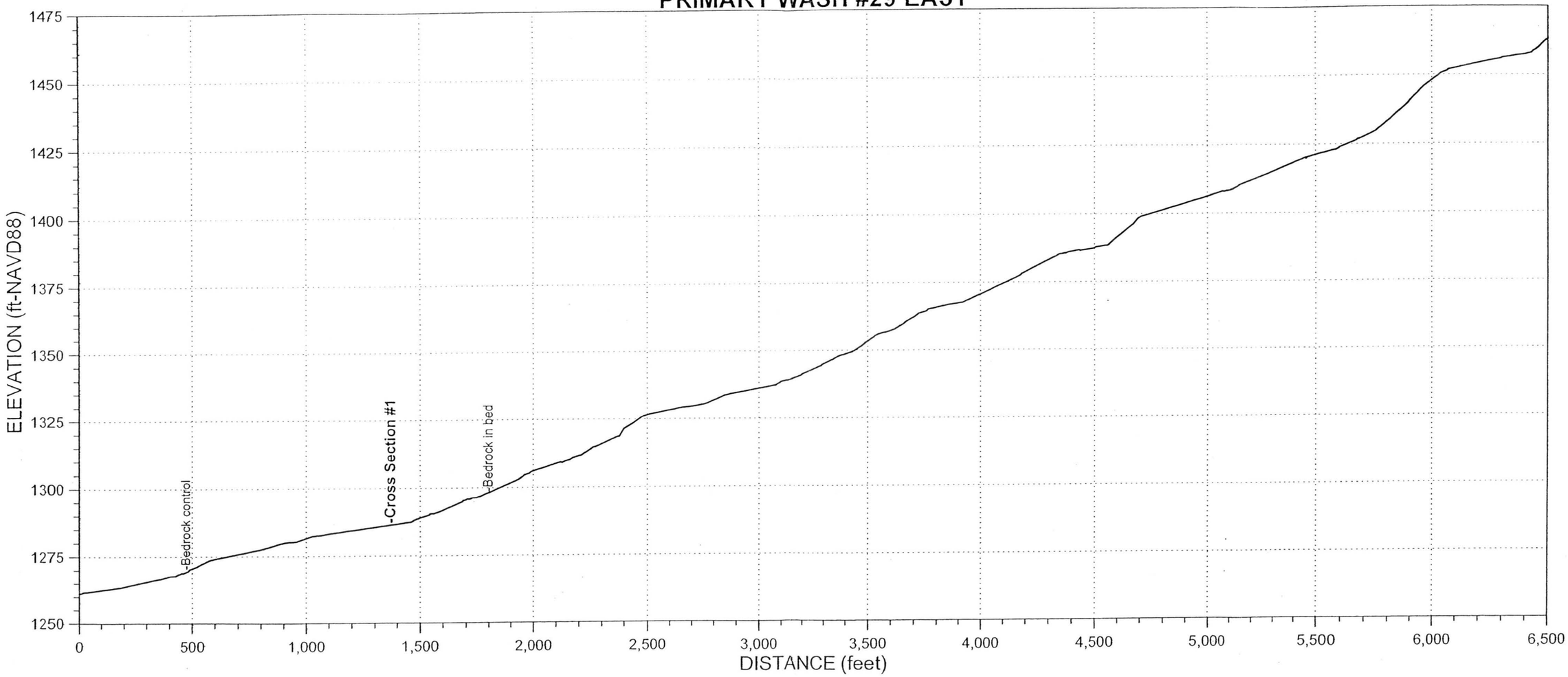
P2/22 Primary Wash #29 - Cross Section #4 – View looking upstream



P2/14 Primary Wash #29 - Cross Section #5 – View looking upstream

P2/15 Primary Wash #29 - Cross Section #5 – View looking downstream

PRIMARY WASH #29 EAST



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW29 East	1	68	March 8, 2004

North: 898455.3 ft
East: 490098.3 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		<1:1	18 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		<1:1	18 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal			Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde	X	X
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	

PHOTOS & DESCRIPTION:
P2/19 - View downstream.
P2/20 - View upstream, note cobble/boulder low floodplain along toe of left bank.

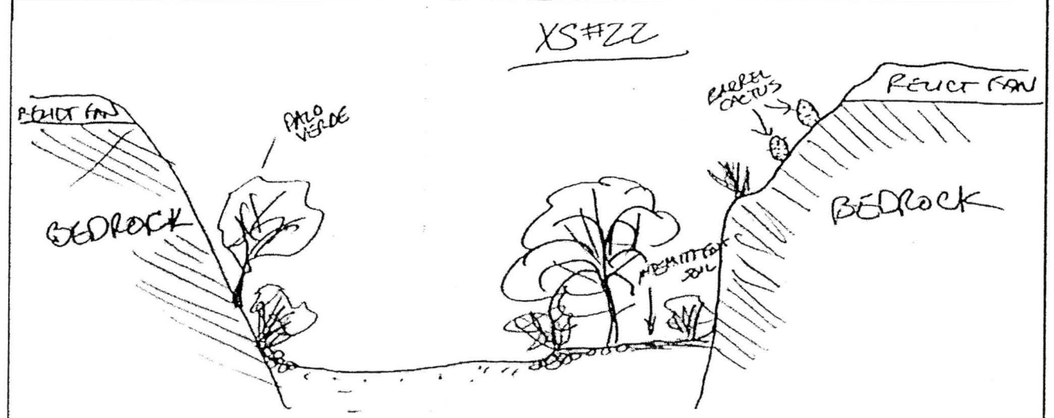
CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #22



Notes: Bedrock is intermittent in banks downstream of here.

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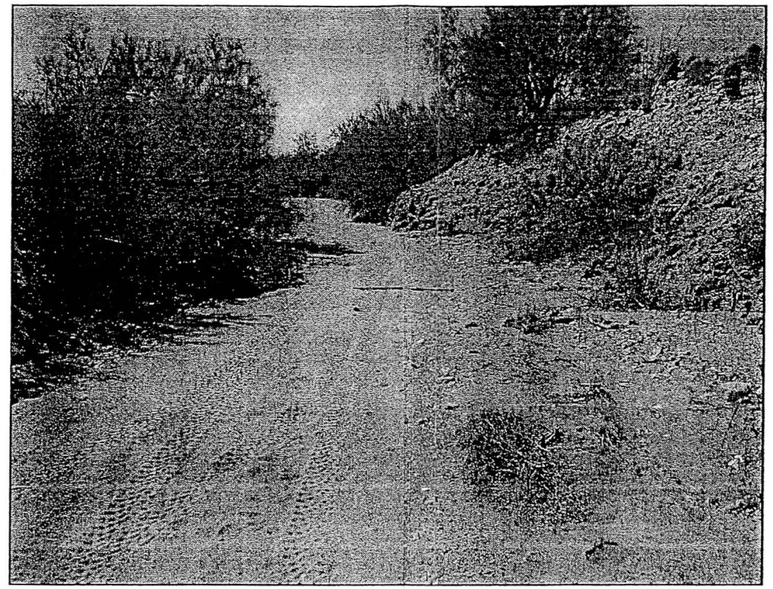
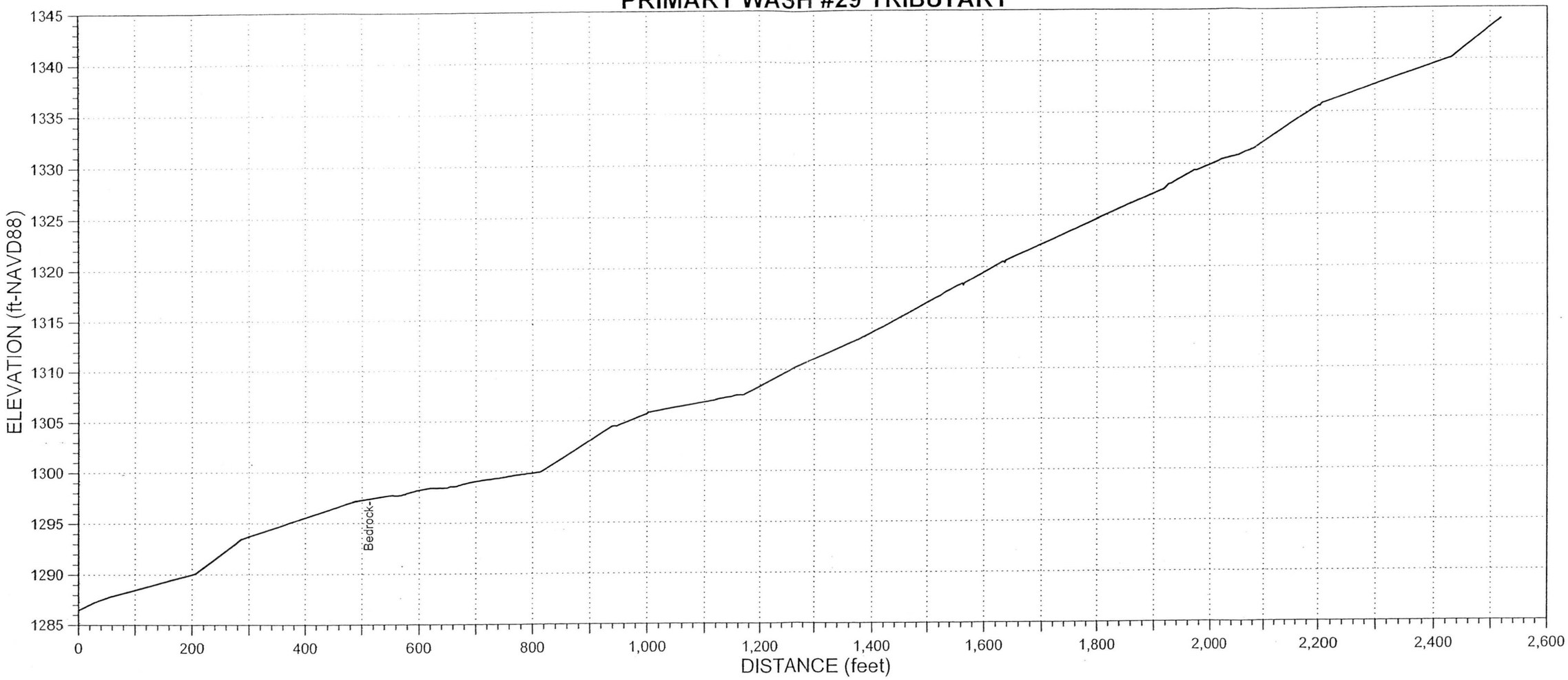


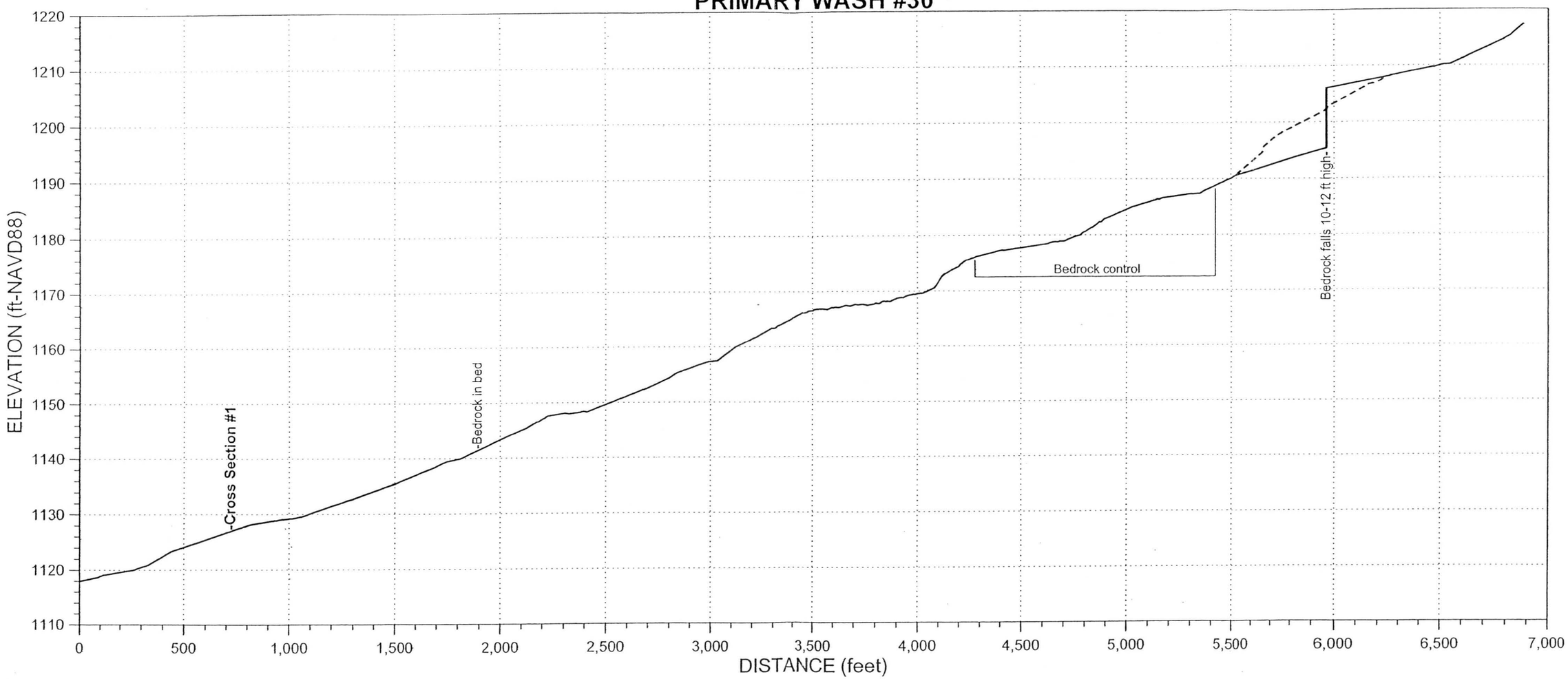
P2/19 Primary Wash #29 East - Cross Section #1 – View looking downstream

P2/20 Primary Wash #29 East - Cross Section #1 – View looking upstream

PRIMARY WASH #29 TRIBUTARY



PRIMARY WASH #30



AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW30	1	44	March 7, 2004

North: 889196.8 ft
East: 491041.2 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		3:1	8 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		1:1	8 ft	Cobble minor	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel		X	Left Bank		
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL	CALICHE STRATA		
Trees (Acacia, Ironwood, Mesquite, etc.)	Along margins		Height (top)	Above Bed	Thickness
Palo Verde			Left Bank		
Creosote			Right Bank		
Brittlebush			Channel		
Bursage					
Mormon Tea					
Tamarisk					
Saguaro C.					
Cholla C.					
Barrel C.					
Prickly Pear					
X-mas C.					
Hedgehog C.					
Fishhook C.					
Ocotillo					

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1.5-2 ft		

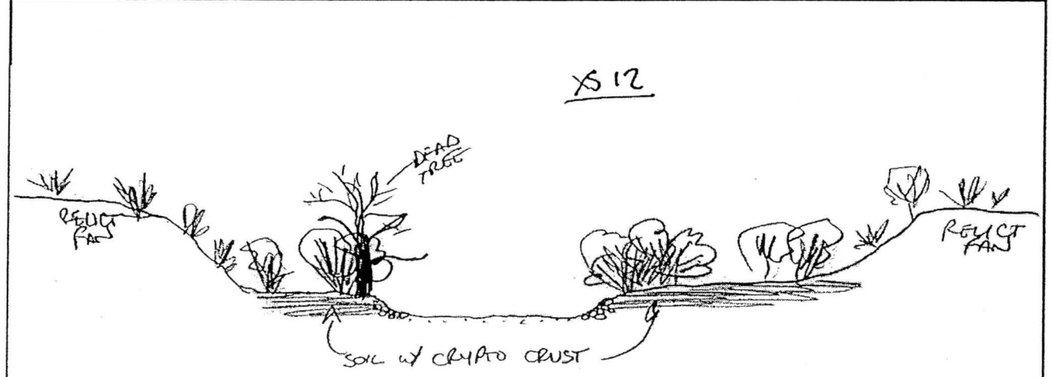
PHOTOS & DESCRIPTION:
P1/39 - View downstream
P1/40 - View upstream

CRYPTO-BIOTIC CRUST (floodway): Absent / Spotty / **Extensive**

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE: Caliche Present: / Dimensions:
HEADCUT: Caliche Present: / Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #12



Notes:

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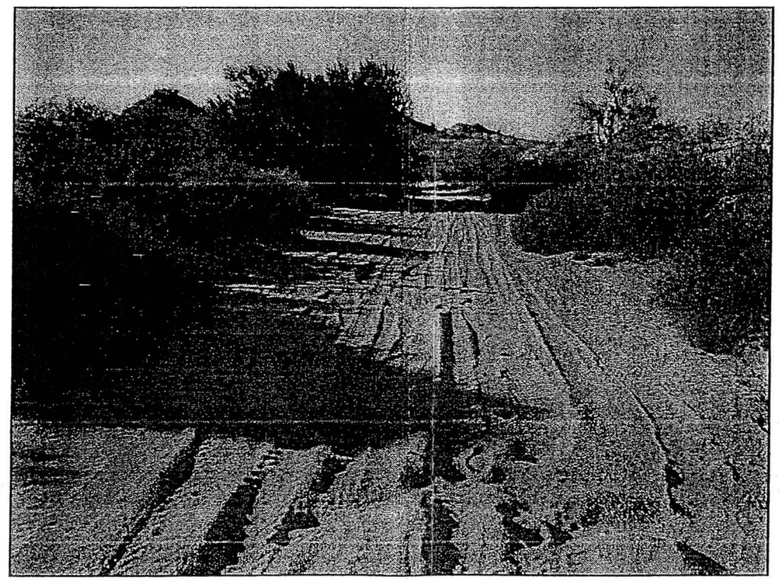
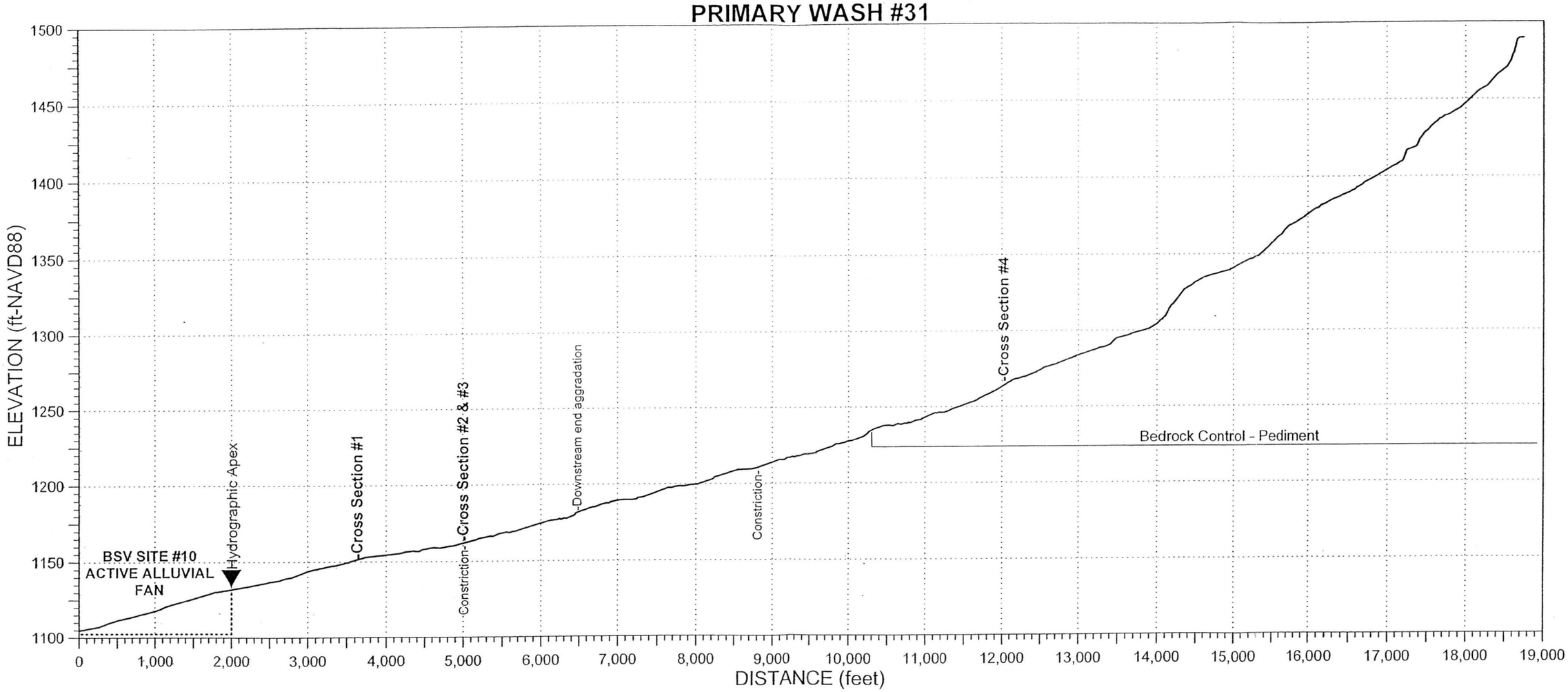
P1/39 Primary Wash #30 - Cross Section #1 – View looking downstream



P1/40 Primary Wash #30 - Cross Section #1 – View looking upstream


PRIMARY WASH #31
ELEVATION (ft-NAVD88)
1500
1450
1400
1350
1300
1250
1200
1150
1100
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
11,000
12,000
13,000
14,000
15,000
16,000
17,000
18,000
19,000
DISTANCE (feet)
BSV SITE #10
ACTIVE ALLUVIAL
FAN
Hydrographic Apex
Cross Section #1
Constriction-
Cross Section #2 & #3
Downstream end aggradation
Constriction-
Cross Section #4
Bedrock Control - Pediment

AYRES ASSOCIATES, INC.

BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW31	1	28	March 7, 2004

North: 890716.0 ft
East: 495308.3 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	
Channel	X	Multiple		Right Bank	

H:V	Height	BED MATERIAL	
>4:1	6 ft	Sand X	Gravel X
2:1	6 ft	Cobble minor	Bldrs minor

VEGETATION		INSET F/P
In-channel		X
Marginal	X	

TERRACES (height-ft)		
Left Bank	2.5 ft	
Right Bank	2.5 ft	

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde	X	X
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1.5 ft	1.5 ft	1.5 ft

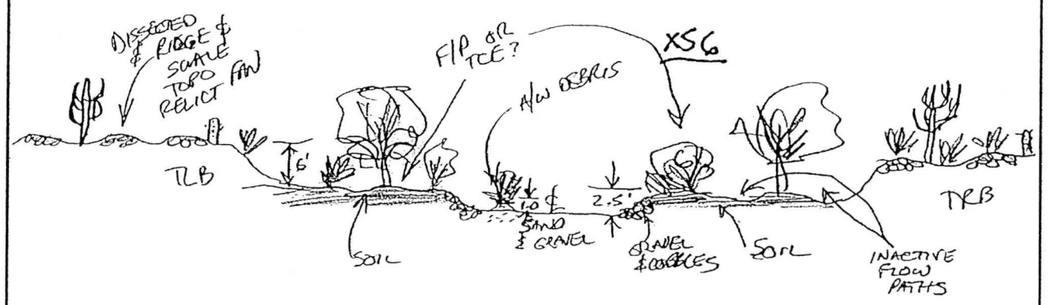
PHOTOS & DESCRIPTION:
P1/28 - View looking downstream
P1/29 - View looking upstream

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #6



Notes: ***Area is just upstrem of ACTIVE ALLUVIAL FAN***

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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW31	2, 3	29	March 7, 2004

North: 892082.7 ft
East: 495170.3 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	DS	Left Bank	
Channel	X	Multiple	US	Right Bank	

H:V	Height	BED MATERIAL	
1:1	12 ft	Sand X	Gravel X
1:1	12 ft	Cobble X	Bldrs

VEGETATION		INSET F/P
In-channel	X	X
Marginal	X	

TERRACES (height-ft)		
Left Bank		
Right Bank		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde	X	X
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA	
Height (top) Above Bed	Thickness
Left Bank	
Right Bank	
Channel	

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

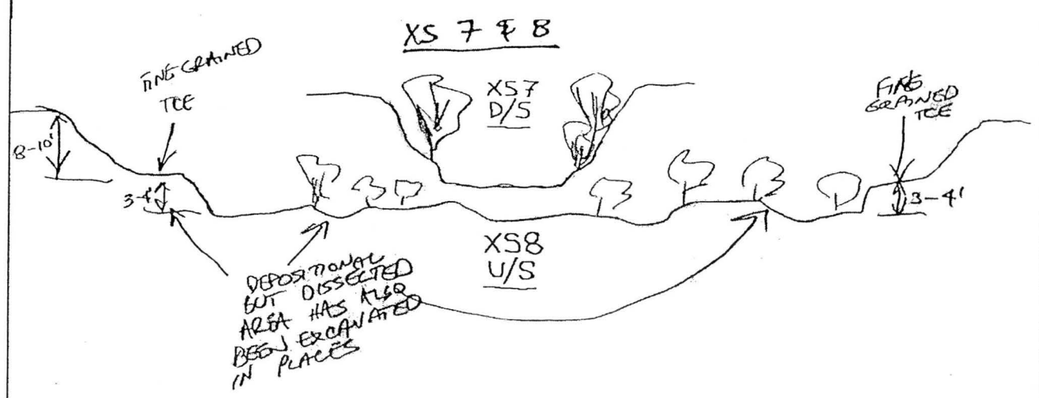
PHOTOS & DESCRIPTION:
P1/30 - View looking downstream showing narrow inset channel downstream of constriction.
P1/31,32 Pan upstream to downstream - View looking upstream showing wide depositional area upstream of constriction.

CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	**Relict Fan**	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:	HEADCUT:
Caliche Present:	Caliche Present:
Dimensions:	Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #7(DS), #8(US)



Notes: This area is a natural (?) constriction with upstream deposition. May have been dammed naturally or artificially at times.

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Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW31	4	33	March 7, 2004

North: 896564.3 ft
East: 491217.2 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway		Single	X	Left Bank		<1:1	15-18 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank		<1:1	15-18 ft	Cobble	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	Along mid and lower bank position	
Palo Verde		
Creosote		
Brittlebush		
Bursage		
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.	Along steep banks	
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.	Along steep banks	
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel

PHOTOS & DESCRIPTION:
P1/33 - View looking downstream showing dedrock confined channel.
P1/34 - View looking upstream showing bedrock confined channel.

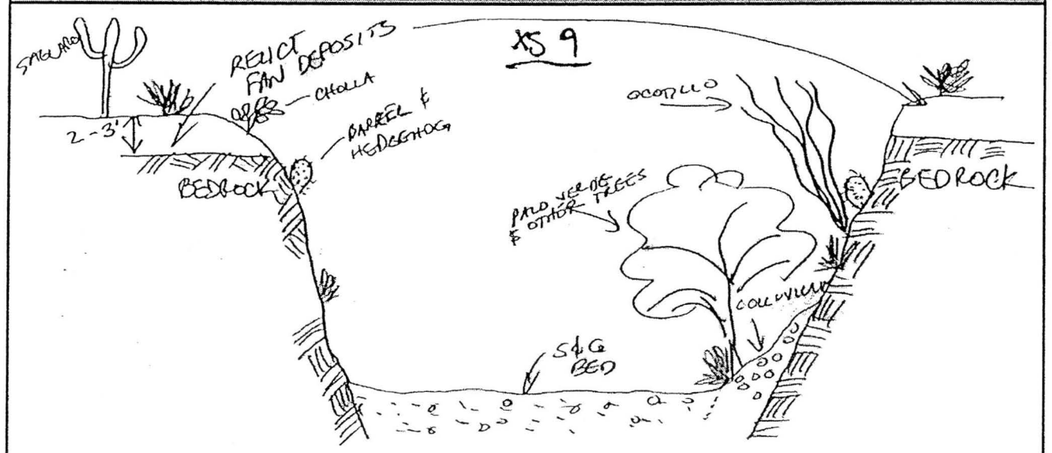
CRYPTO-BIOTIC CRUST (floodway)
Absent
Spotty
Extensive

PIEDMONT LANDFORMS (marginal to channel/floodway)					
Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain

NICKZONE:
Caliche Present:
Dimensions:

HEADCUT:
Caliche Present:
Dimensions:

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #9



Notes: Channel is deply entrenched into PEDIMENT surface with thin veneer of RELICT FAN deposits on top.

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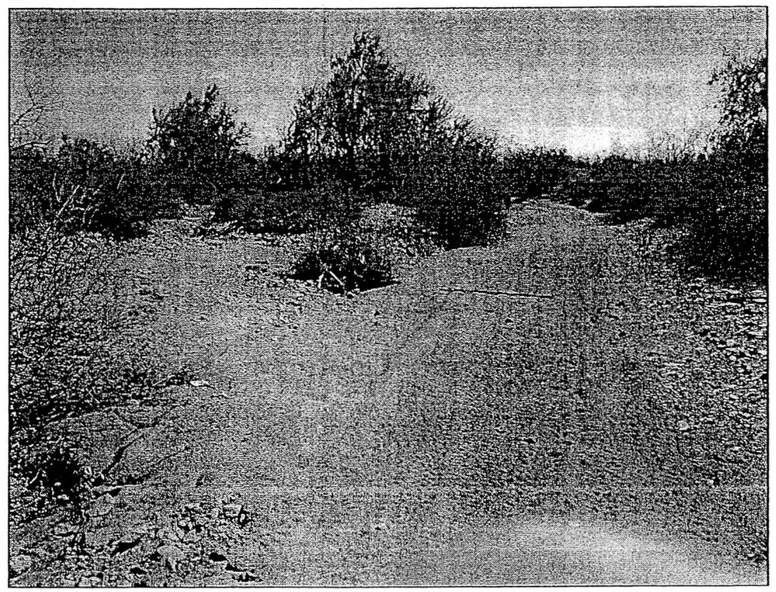
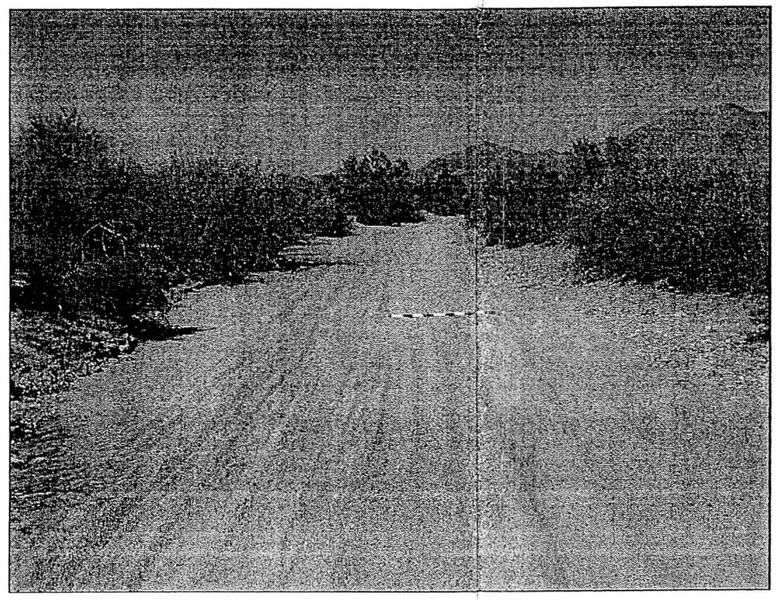
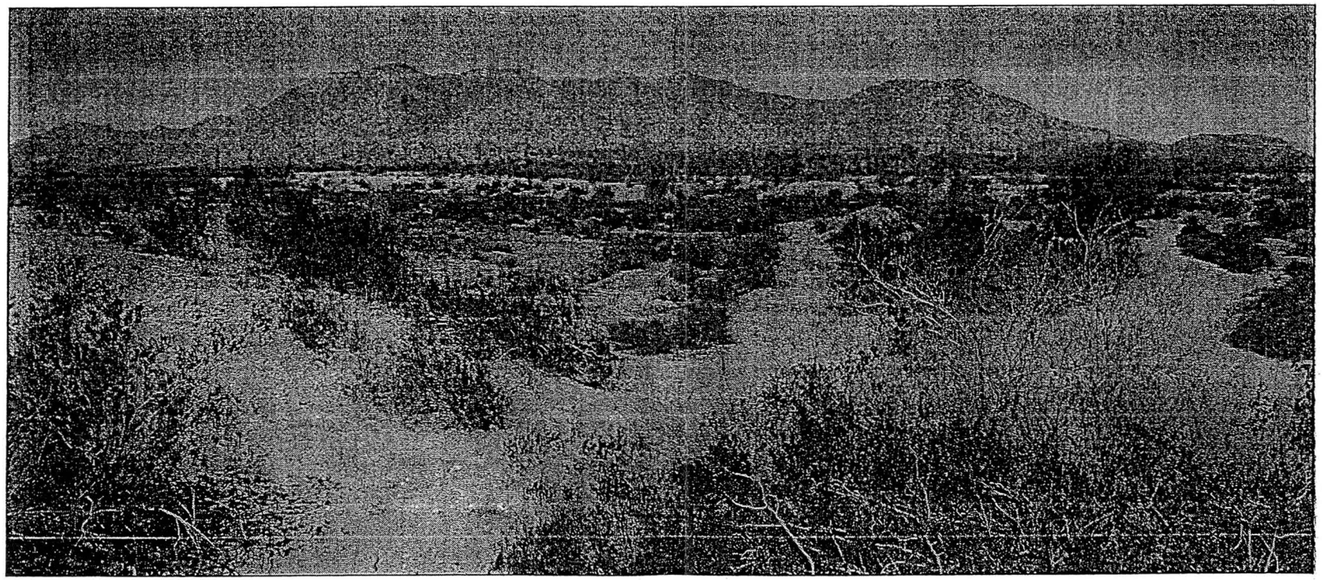


P1/28 Primary Wash #31 - Cross Section #1 – View looking downstream

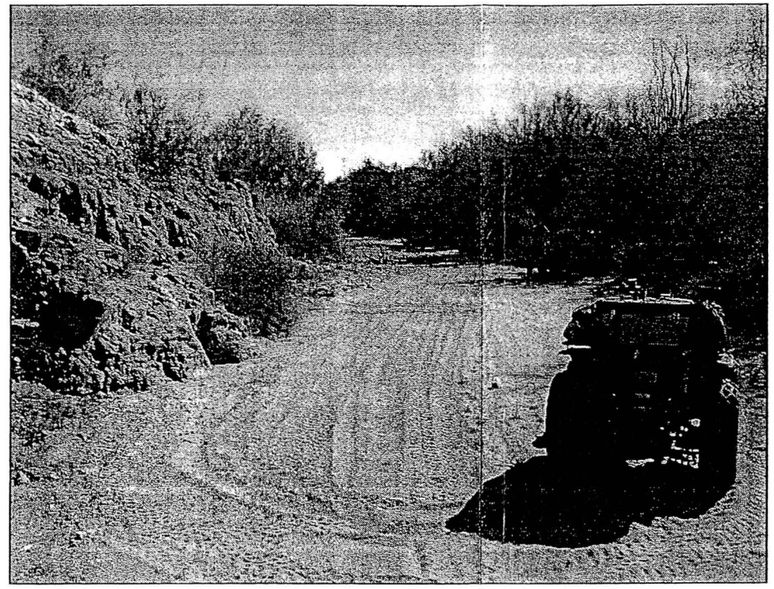


P1/29 Primary Wash #31 - Cross Section #1 – View looking upstream

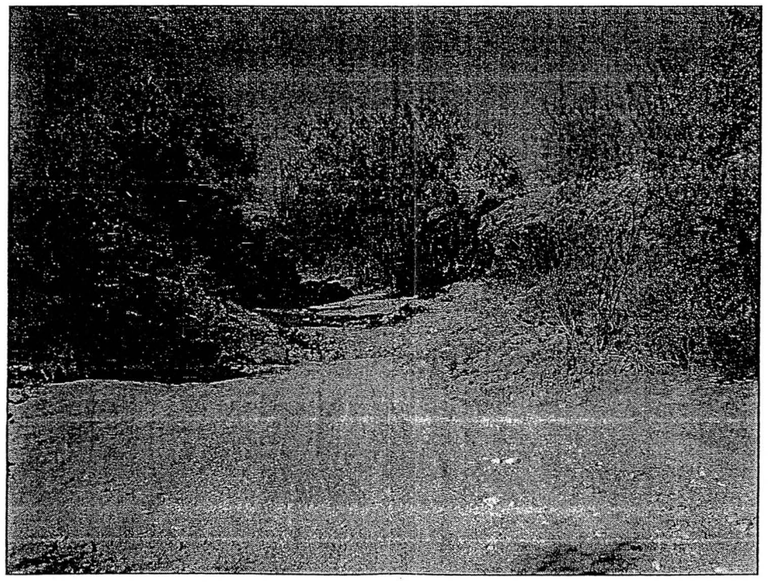


P1/231 & 32 Primary Wash #31 - Cross Sections #2 & 3 – Panorama view looking upstream

P1/30 Primary Wash #31 - Cross Sections #2 & 3 – View looking downstream

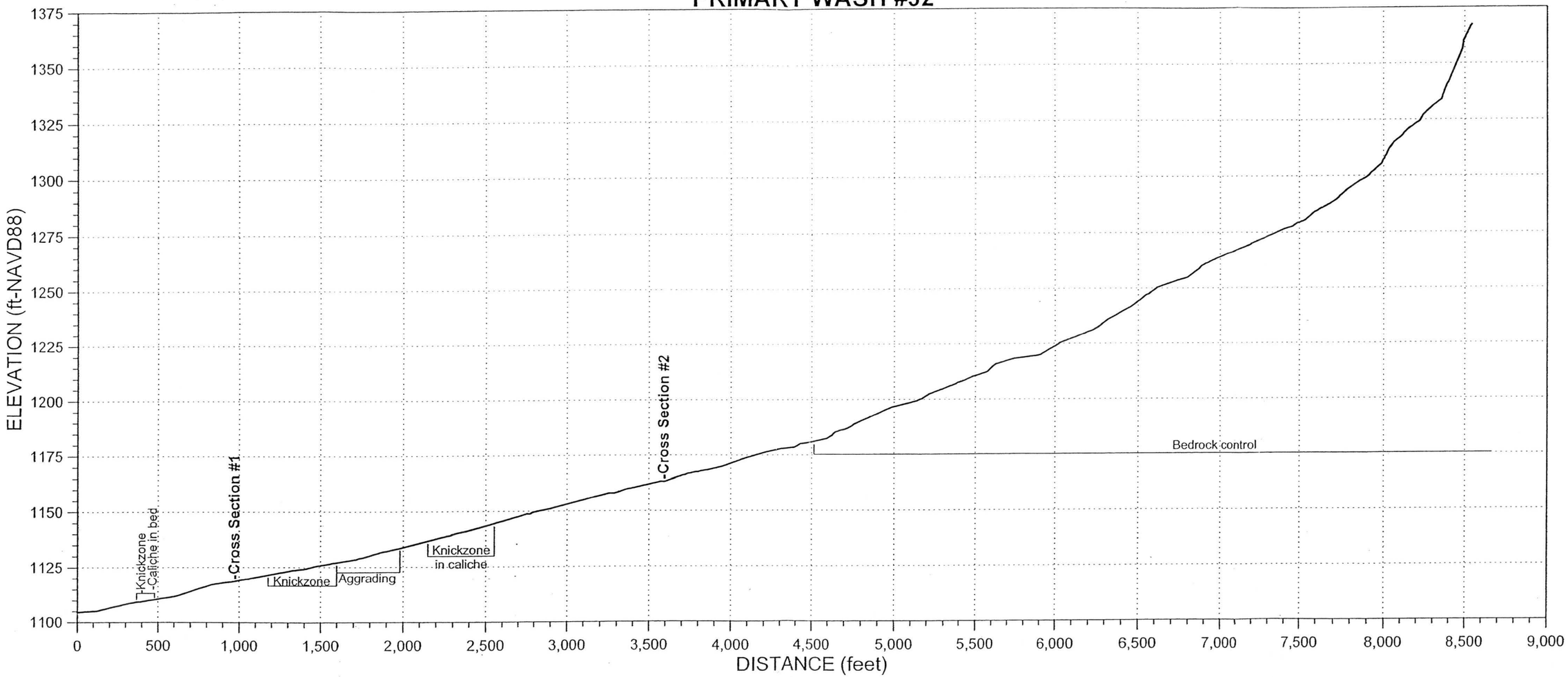


P1/33 Primary Wash #31 - Cross Section #4 – View looking downstream



P1/34 Primary Wash #31 - Cross Section #4 – View looking upstream

PRIMARY WASH #32



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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW32	1	19	March 7, 2004

North: 890018.6 ft
East: 500031.6 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank		6:1	1-1.5 ft	Sand X	Gravel X
Channel		Multiple		Right Bank		6:1	1-1.5 ft	Cobble X	Bldrs

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde	X	X
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank		
Right Bank		
Channel		

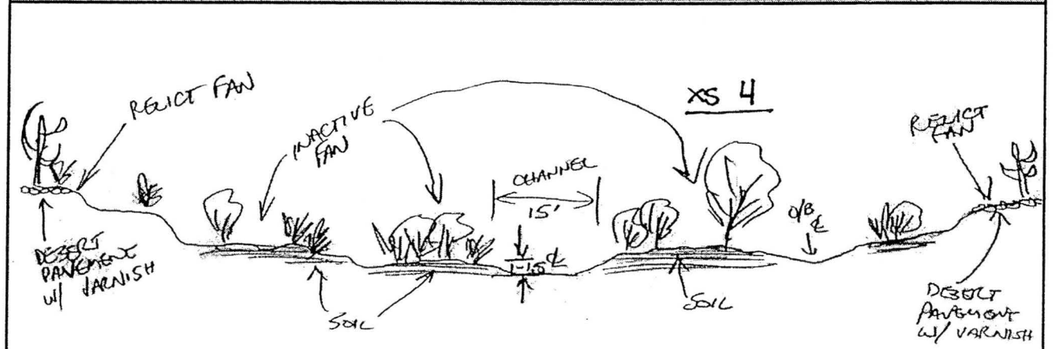
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils	X		

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	<1 ft	<1 ft	~1.5 ft

PHOTOS & DESCRIPTION:
P1/22 - View downstream
P1/23 - View upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #4



Notes:
Area on both sides of floodway mapped as INACTIVE FAN but looks more like RELICT FAN.

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Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW32	2	26	March 7, 2004

North: 892244.9 ft
East: 498816.1 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion	H:V	Height	BED MATERIAL	
Floodway	X	Single	X	Left Bank	X	1:1	~12 ft	Sand X	Gravel X
Channel	X	Multiple		Right Bank	X	1:1	~12 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal	X		Right Bank		

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	
Palo Verde		
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

CALICHE STRATA		
Height (top)	Above Bed	Thickness
Left Bank	6 ft	3-4 ft
Right Bank	6 ft	3-4 ft
Channel		

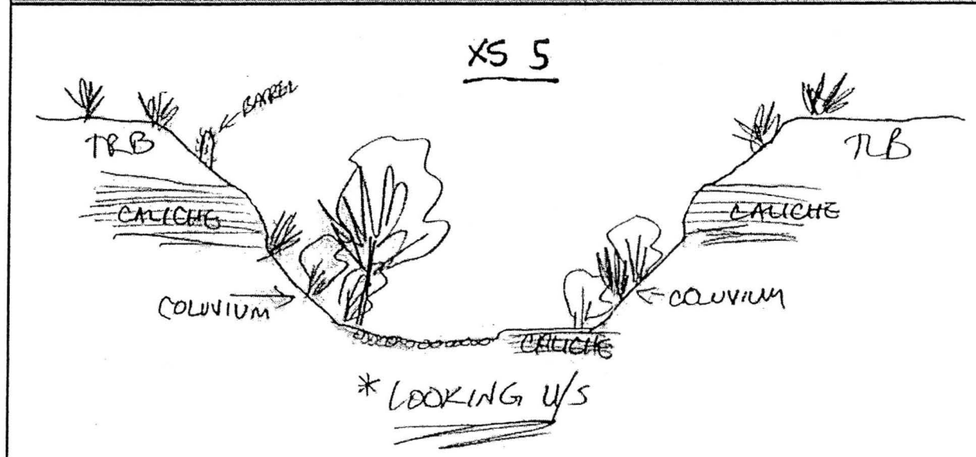
WITHIN FLOODWAY			
	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils			X

HIGH WATER MARKS/DEBRIS			
Ht. Above Thalweg	Left Bank	Right Bank	Channel
	1 ft	1 ft	

PHOTOS & DESCRIPTION:
P1/26 - View looking downstream
P1/27 - View looking upstream

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE:			HEADCUT:		
Spotty	Caliche Present:			Caliche Present:		
Extensive	Dimensions:			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #5



Notes:

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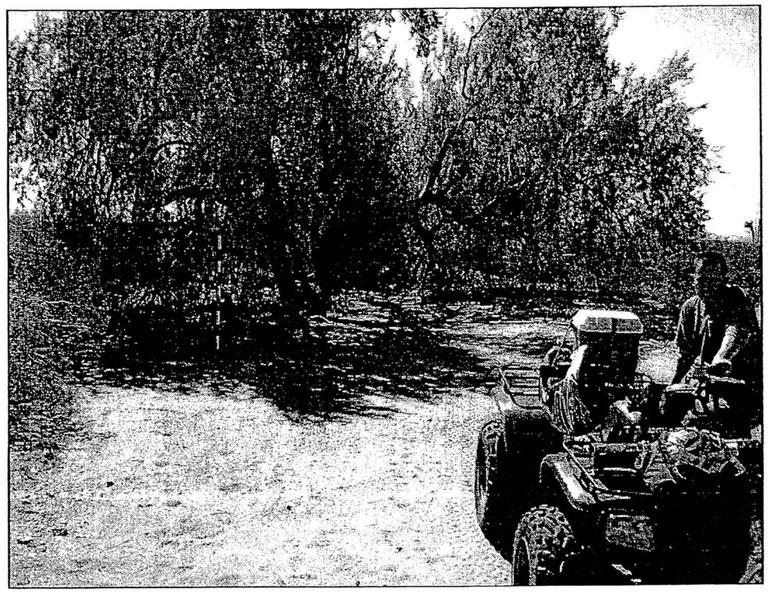
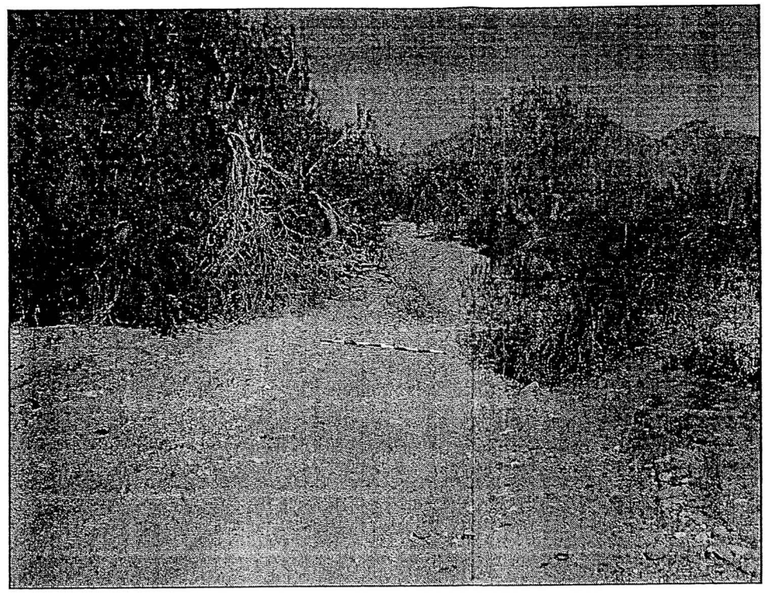
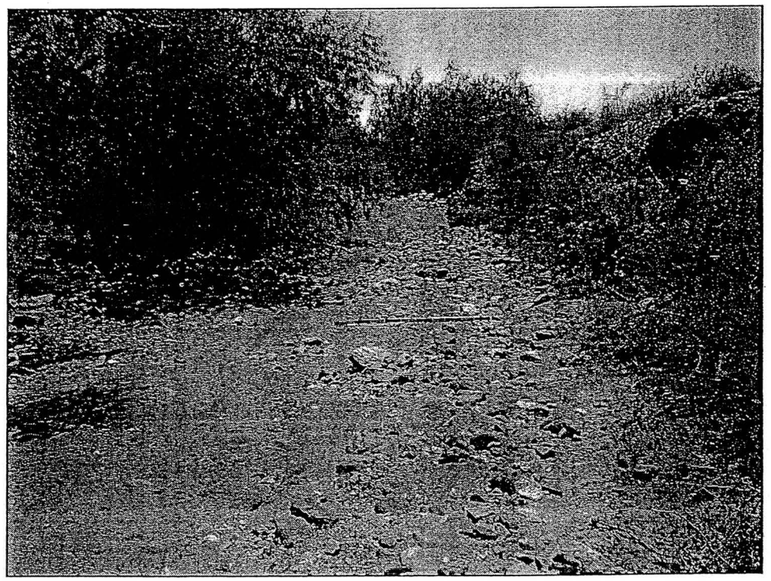


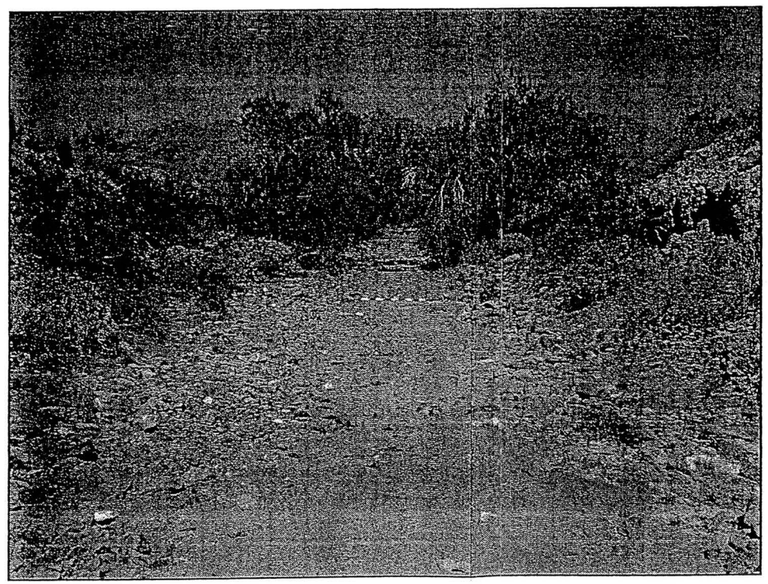
P1/22 Primary Wash #32 - Cross Section #1 – View looking downstream



P1/23 Primary Wash #32 - Cross Section #1 – View looking upstream

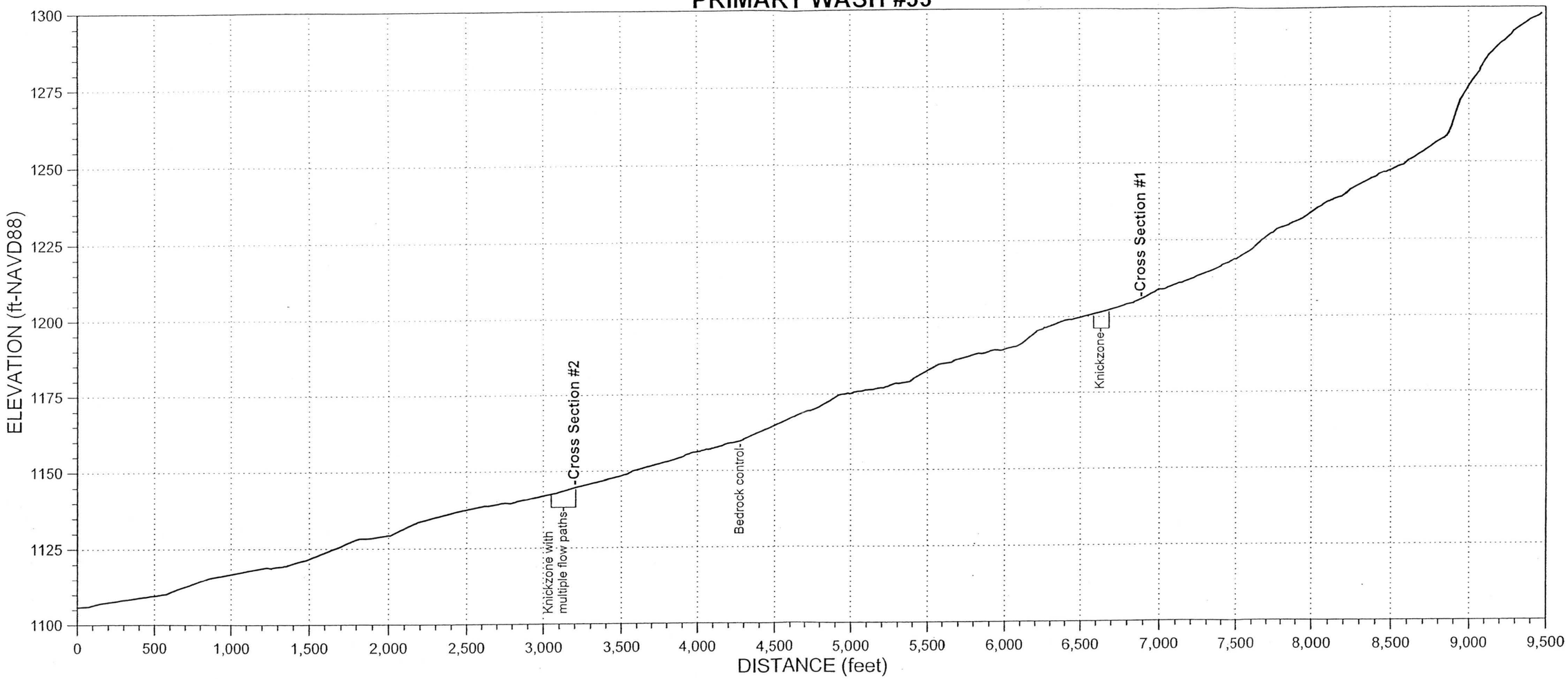


P1/26 Primary Wash #32 - Cross Section #2 – View looking downstream



P1/27 Primary Wash #32 - Cross Section #2 – View looking upstream

PRIMARY WASH #33



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BUCKEYE/SUN VALLEY ADMS
Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW33	1	11	March 7, 2004

North: 894590.8 ft
East: 502690.4 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	X	Left Bank	X
Channel	X	Multiple		Right Bank	X

H:V	Height	BED MATERIAL	
1:1	9-10 ft	Sand X	Gravel X
1:1	15 ft	Cobble X	Bldrs small

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel	X	X	Left Bank	9-10 ft	
Marginal	X		Right Bank		

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde	X	X
Creosote	X	X
Brittlebush	X	X
Bursage		
Mormon Tea		
Tamarisk		
Saguaro C.	X	X
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

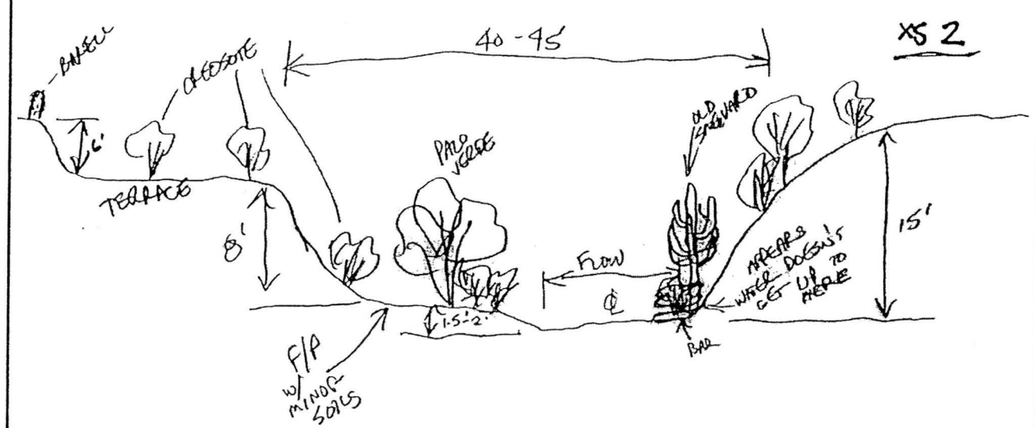
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg	<1.0	<1.0	

PHOTOS & DESCRIPTION:
P1/14 - View downstream; note saguaro cactus along right edge of channel
P1/15 - View upstream; note small flow wplit around trees

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: At Location			HEADCUT:		
Spotty	Caliche Present: Yes			Caliche Present:		
Extensive	Dimensions: 4 feet drop over about 100 feet, WPT #12 at DS end			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #2



Notes: Upstream of here, get inset meandering floodway (old meanders) with inset straight channel.
Short knickzone (100 ft) located just downstream - downstream end at WPT #12.

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Task 2.6.4 - Existing Conditions
Assessment of Primary Washes

CHANNEL:	CROSS-SECTION:	WAYPOINT:	DATE:
PW33	2	14	March 7, 2004

North: 891814.9 ft
East: 501395.5 ft

Field Crew: W.J. Spitz, A.B. Alvarado

ENTRENCHMENT		FLOW PATHS		BANKS	Erosion
Floodway	X	Single	US	Left Bank	
Channel	X	Multiple	DS	Right Bank	

H:V	Height	BED MATERIAL	
2:1	9-10 ft	Sand X	Gravel X
2:1	9-10 ft	Cobble X	Bldrs X

VEGETATION		INSET F/P	TERRACES (height-ft)		
In-channel			Left Bank		
Marginal			Right Bank	1.5 ft	

WITHIN FLOODWAY	Extensive	Spotty	Absent
Varnish			X
Pavement			X
Soils		X	

VEG TYPE	FLOODWAY	CHANNEL
Trees (Acacia, Ironwood, Mesquite, etc.)	X	X
Palo Verde	X	X
Creosote	X	X
Brittlebush	X	X
Bursage	X	X
Mormon Tea		
Tamarisk		
Saguaro C.		
Cholla C.		
Barrel C.		
Prickly Pear		
X-mas C.		
Hedgehog C.		
Fishhook C.		
Ocotillo		

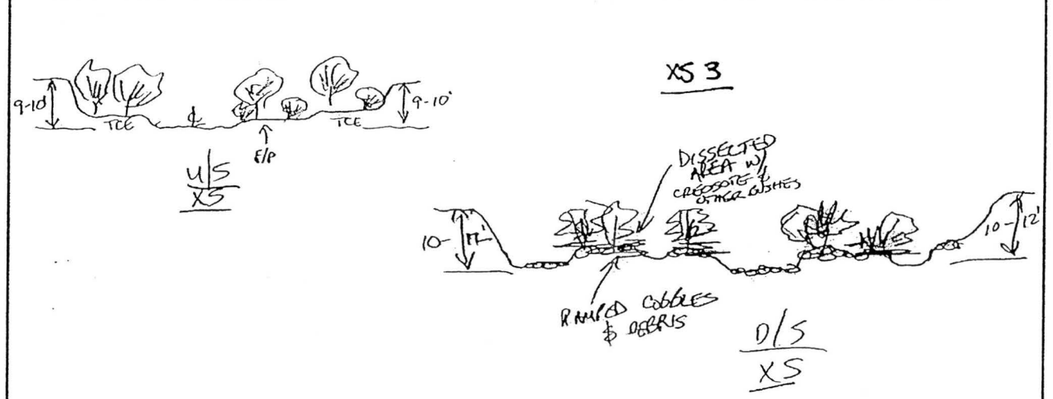
CALICHE STRATA		
Height (top) Above Bed		Thickness
Left Bank		
Right Bank		
Channel		

HIGH WATER MARKS/DEBRIS	Left Bank	Right Bank	Channel
Ht. Above Thalweg			

PHOTOS & DESCRIPTION:
P1/17 - View downstream showing multiple flow paths over steep DS reach
P1/18 - View of single channel upstream with low inset floodplain

CRYPTO-BIOTIC CRUST (floodway)	PIEDMONT LANDFORMS (marginal to channel/floodway)					
	Left Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
	Right Bank	Pediment	Relict Fan	Active Fan	Inactive Fan	Alluvial Plain
Absent	NICKZONE: Downstream			HEADCUT:		
Spotty	Caliche Present: No			Caliche Present:		
Extensive	Dimensions: 4-5 feet drop over ~100 feet, mainly oversteepened reach			Dimensions:		

TYPICAL CROSS-SECTION (VIEW LOOKING DOWNSTREAM) - FIELD XS #3



Notes:

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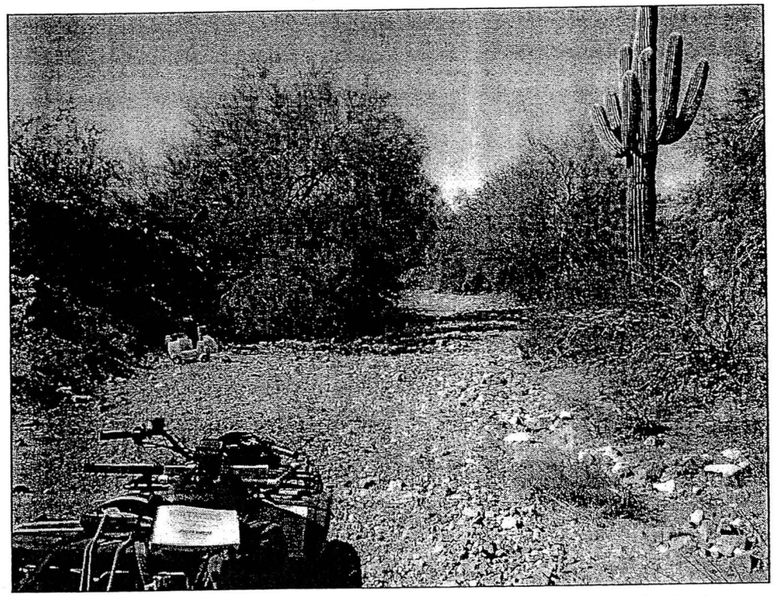
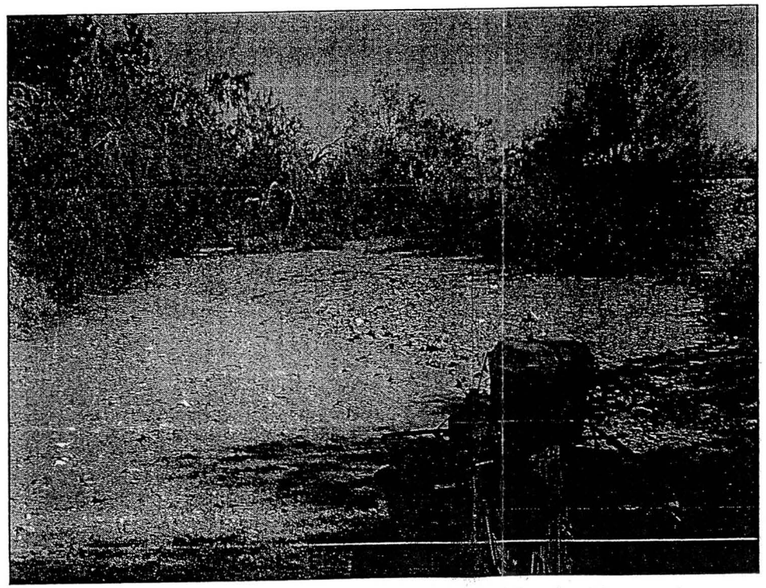


P1/14 Primary Wash #33 - Cross Section #1 – View looking downstream

P1/15 Primary Wash #33 - Cross Section #1 – View looking upstream

P1/17 Primary Wash #33 - Cross Section #2 – View looking downstream



P1/18 Primary Wash #33 - Cross Section #2 – View looking upstream

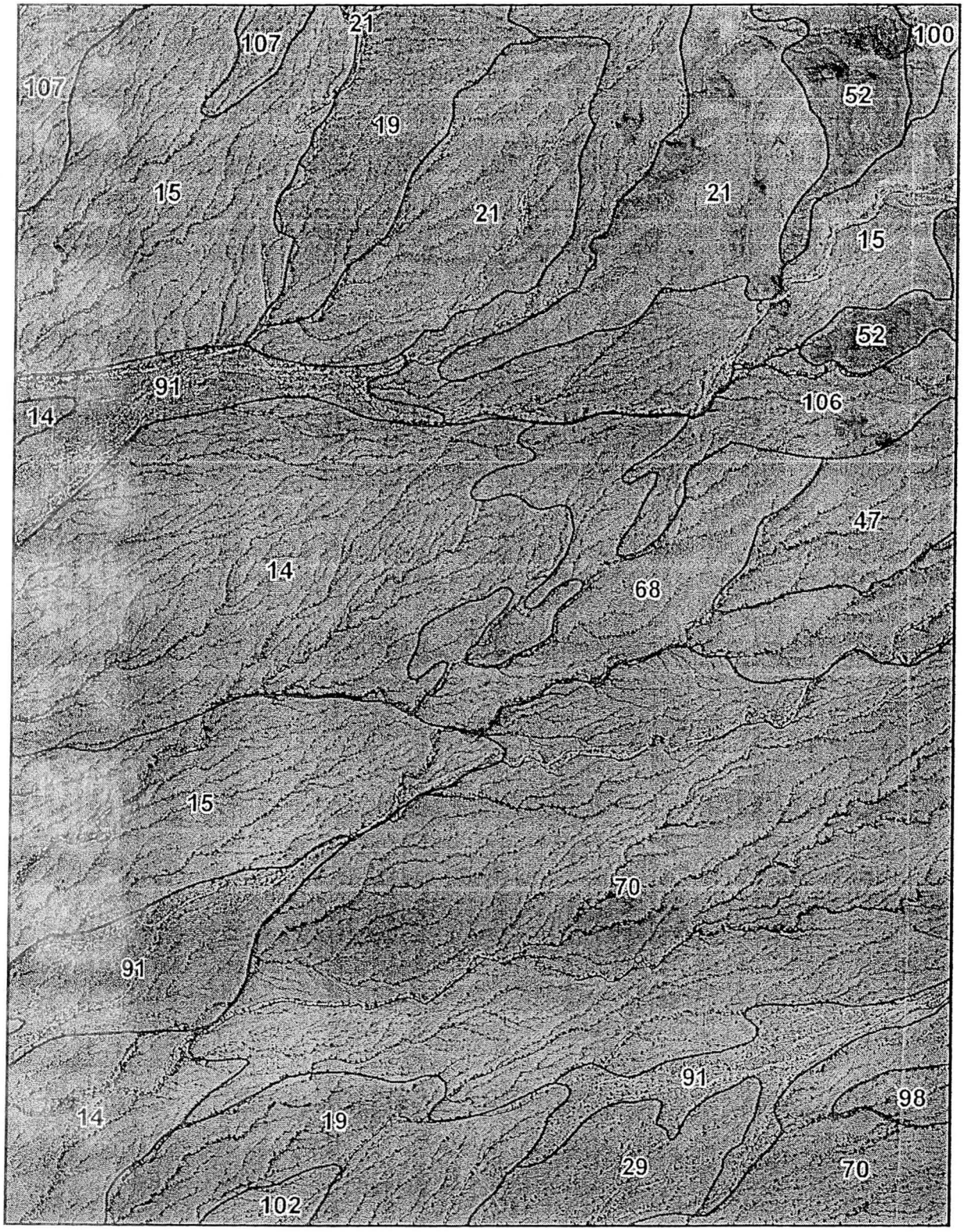


Figure D-1. Excerpt of soils mapping from part of Area 3 of the BSV ADMS study area overlain on 2003 aerial photo. Numbers represent soil types shown in Table D-1.

Table D-1. Soils for Area 3 of BSV ADMS.

TYPE #	SOIL DESCRIPTION
1	Antho sandy loams
2	Antho gravelly sandy loams
3	Antho-Carrizo-Maripo complex
4	Antho-Carrizo-Maripo complex, low precipitation
7	Anthony-Arizo complex, low precipitation
999	Blank/Unknown/Uncertain
10	Brios-Carrizo complex, 1 to 5 percent slopes
11	Brios-Carrizo complex, low precipitation, 1 to 5 percent slopes
13	Carefree-Beardsley complex
14	Carrizo very gravelly sand
15	Carrizo-Gunsight complex, 1 to 5 percent slopes
18	Cheriono-Rock outcrop complex, 5 to 60 percent slopes
19	Chuckawalla-Gunsight complex, 1 to 8 percent slopes
20	Chuckawalla-Gunsight complex, low precipitation, 1 to 8 percent slopes
21	Cipriano very gravelly loam
23	Contine clay
22	Contine clay loam
24	continental clay loam, 0 to 3 percent slopes
29	Denure-Momoli-Carrizo complex
30	Denure-Momoli-Carrizo complex, low precipitation
31	Dixaleta-Rock outcrop complex, 25 to 65 percent slopes
32	Dixaleta-Rock outcrop complex, low precipitation, 25 to 65 percent slopes
33	Eba very gravelly loam, 1 to 8 percent slopes
35	Eba very gravelly loam, low precipitation, 8 to 20 percent slopes
36	Eba-Continental complex, 1 to 8 percent slopes
38	Eba-Continental-Cave association, low precipitation, 3 to 20 percent
39	Eba-Nickel-Cave association, 3 to 25 percent slopes
43	Eba-Pinaleno complex, low precipitation, 20 to 40 percent slopes
42	Eba-Pinaleno complex, low precipitation, 3 to 20 percent slopes
44	Ebon very gravelly loam, 1 to 8 percent slopes
45	Ebon very gravelly loam, 8 to 20 percent slopes
46	Ebon-Contine complex, 1 to 8 percent
47	Ebon-Gunsight-Cipriano association, 3 to 25 percent slopes
49	Ebon-Pinamt complex, 20 to 40 percent slopes
48	Ebon-Pinamt complex, 3 to 20 percent slopes
50	Estrella loams
52	Gachado-Lomitas-Rock outcrop complex, 7 to 55 percent slopes
57	Gilman clay loam
55	Gilman loams
56	Gilman loams, low precipitation
58	Gilman-Momoli-Denure complex

Table D-1 (cont.). Soils for Area 3 of BSV ADMS.

60	Glenbar loams
63	Gran-Wickenburg-Rock outcrop complex, 1 to 7 percent slopes
64	Gran-Wickenburg-Rock outcrop complex, low precipitation, 10 to 65 percent slopes
66	Greyeagle-Suncity Variant complex, 1 to 7 percent slopes
68	Gunsight-Cipriano complex, 1 to 7 percent slopes
69	Gunsight-Cipriano complex, low precipitation, 1 to 7 percent slopes
70	Gunsight-Rillito complex, 1 to 25 percent slopes
71	Gunsight-Rillito complex, low precipitation, 1 to 40 percent slopes
73	Lehmans-Rock outcrop complex, low precipitation, 8 to 65 percent slopes
74	Luke-Cipriano association, 1 to 15 percent slopes
78	Mohall clay loam, calcareous solum
75	Mohall loam
76	Mohall loam, calcareous solum
80	Mohall-Tremant complex, 1 to 8 percent slopes
81	Mohall-Tremant complex, low precipitation, 1 to 8 percent slopes
91	Momoli-Carrizo complex
92	Momoli-Carrizo complex, low precipitation
94	Nickel-Cave complex, low precipitation, 8 to 30 percent slopes
95	Ohaco gravelly loam
96	Pinaleno-Tres Hermanos complex, 1 to 10 percent slopes
97	Pinaleno-Tres Hermanos complex, low precipitation, 1 to 10 percent slopes
99	Pinamt-Tremant complex, low precipitation, 1 to 10 percent slopes
53	Quilotosa-Momoli-Carrizo complex, 1 to 15 percent slopes
54	Quilotosa-Rock outcrop complex, 15 to 55 percent slopes
100	Quilotosa-Vaiva-Rock outcrop complex, 20 to 65 percent slopes
102	Rillito gravelly loam, 1 to 8 percent slopes
105	Rock outcrop-Lehmans complex, low precipitation, 15 to 65 percent slopes
106	Sal-Cipriano complex, 1 to 10 percent slopes
107	Sal-Cipriano complex, low precipitation, 1 to 10 percent slopes
110	Suncity-Cipriano complex, 1 to 7 percent slopes
113	Tremant gravelly loams
114	Tremant gravelly loams, low precipitation
112	Tremant gravelly sandy loams
115	Tremant-Antho complex, 1 to 5 percent slopes
116	Tremant-Gunsight-Rillito complex, 1 to 5 percent slopes
117	Tremant-Gunsight-Rillito complex, low precipitation, 1 to 5 percent slopes
119	Tremant-Suncity complex, 1 to 8 percent slopes
121	Tres Hermanos-Anthony complex, 1 to 5 percent slopes
123	Vaiva very gravelly loam, 1 to 20 percent slopes
124	Valencia sandy loams

Table D-2. Soils for Area 2 and southern part of Area 3 of BSV ADMS.

TYPE	SOIL DESCRIPTION
Aa	Agualt loam
AbA	Anthosandy loam, 0 to 1 percent slopes
AbB	Antho sandy loam, 1 to 3 percent slopes
Ac	Antho sandy loam, saline-alkali
AdA	Antho gravelly sandy loam, 0 to 1 percent slopes
AdB	Antho gravelly sandy loam, 1 to 3 percent slopes
Ae	Antho-Brios sandy loams
AfA	Antho-Carrizo complex, 0 to 1 percent slopes
AfB	Antho-Carrizo complex, 1 to 3 percent slopes
AGB	Antho-Carrizo complex, 0 to 3 percent slopes
AHC	Antho-Tremant complex, 1 to 5 percent slopes
AkB	Antho-Tremant-Mohall complex, 1 to 5 percent slopes
AL	Antho association
AM	Antho-Valencia association
An	Avonda clay loam
Ao	Avondale clay loam
Ap	Avondale clay loam, saline-alkali
BPI	Borrow pit
Br	Brios loamy sand
Bs	Brios sandy loam
Bt	Brios loam
CA2	Calciorthids and Torriorthents, eroded
Cb	Carrizo gravelly sandy loam
CF	Carrizo and Brios soils
Cg	Casa Grande Sandy loam
Ch	Casa Grande loam
Cm	Casa Grande-Leveen complex, alkali
Cn	Cashion clay, saline-alkali
CO	Cheriono-Rock outcrop complex
Cp	Coolidge sandy loam
CrB	Coolidge gravelly sandy loam, 1 to 3 percent slopes
CV	Coolidge-Laveen association
EPD	Ebon-Pinamt complex, 0 to 10 percent slopes
Es	Estrella loam
Et	Estrella loam, saline-alkali
Gb	Gadsden clay loam
Gc	Gadsden clay
Gd	Gadsden clay, saline-alkali
Ge	Gilman fine sandy loam
Gf	Gilman fine sandy loam, saline-alkali
GgA	Gilman loan, 0 to 1 percent slopes

Table D-2 (cont.). Soils for Area 2 and southern part of Area 3 of BSV ADMS.

GgB	Gilman loam, 1 to 3 percent slopes
Gh	Gilman loam, saline-alkali
GM	Gilman-Antho association
GN	Gilman-Laveen association
Go3	Gilman,Antho and Glenbar soils, severely eroded
Gp	Gilman loam, clayey subsoil variant, moderately saline
GPI	Gravel pit
Gr	Glenbar loam
Gs	Glenbar loam, saline-alkali
Gt	Glenbar clay loam
Gu	Glenbar clay loam, saline-alkali
Gv	Glenbar clay
GWD	Gunsight-Pinal complex, 1 to 10 percent slopes
GxA	Gunsight-Rillito complex, 0 to 1 percent slopes
GxB	Gunsight-Rillito complex, 1 to 3 percent slopes
GYD	Gunsight-Rillito complex, 0 to 10 percent slopes
HAB	Harqua complex, 0 to 3 percent slopes
HAC	Harqua complex, 3 to 8 percent slopes
HLC	Harqua-Gunsight complex, 0 to 5 percent slopes
HrB	Harqua-Rillito complex, 1 to 3 percent slopes
Lb	Laveen sandy loam
LcA	Laveen loam, 0 to 1 percent slopes
Ld	Laveen loam, saline-alkali
Le	Laveen clay loam
LEV	Man-made levee
Ma	Maripo sandy loam
Mo	Mohall sandy loam
Mr	Mohall clay loam
MTB	Mohall-Tremant complex, 0 to 3 percent slopes
Pa	Perryville sandy loam
Pb	Perryville loam, saline-alkali
PeA	Perryville gravelly loam, 0 to 1 percent slopes
PeB	Perryville gravelly loam, 1 to 3 percent slopes
PRB	Perryville-Rillito complex, 0 to 3 percent slopes
PsB	Pinal loam, 1 to 3 percent slopes
PT	Pinal gravelly loam
PWB	Pinal-Suncity complex, 0 to 3 percent slopes
PYD	Pinamt-Tremant complex, 1 to 10 percent slopes
RaA	Rillito sandy loam, 0 to 1 percent slopes
RaB	Rillito sandy loam, 1 to 3 percent slopes
RbA	Rillito loam, 0 to 1 percent slopes
RbB	Rillito loam, 1 to 3 percent slopes

Table D-2 (cont.). Soils for Area 2 and southern part of Area 3 of BSV ADMS.

RhB	Rillito-Harqua complex, 1 to 3 percent slopes
RpE	Rillito-Perryville complex, 5 to 20 percent slopes
RS	Rock outcrop-Cherioni complex
Ta	Toltec loam
TB	Torrifluvents
Tc	Torriorthents
TD	Torripsamments and Torrifluvents, frequently flooded
Te	Tremant loam
TrA	Tremant-Rillito complex, 0 to 1 percent slopes
TrB	Tremant-Rillito complex, 1 to 3 percent slopes
TSC	Tremant-Rillito complex, 0 to 5 percent slopes
Tu	Tucson loam
Va	Valencia sandy loam
Vb	Valencia sandy loam, saline-alkali
Vg	Vint loamy fine sand
Vh	Vint fine sandy loam
Vk	Vint loam
Vn	Vint clay loam
W	Lakes, ponds, reservoirs - perennial
Wg	Wintersburg complex

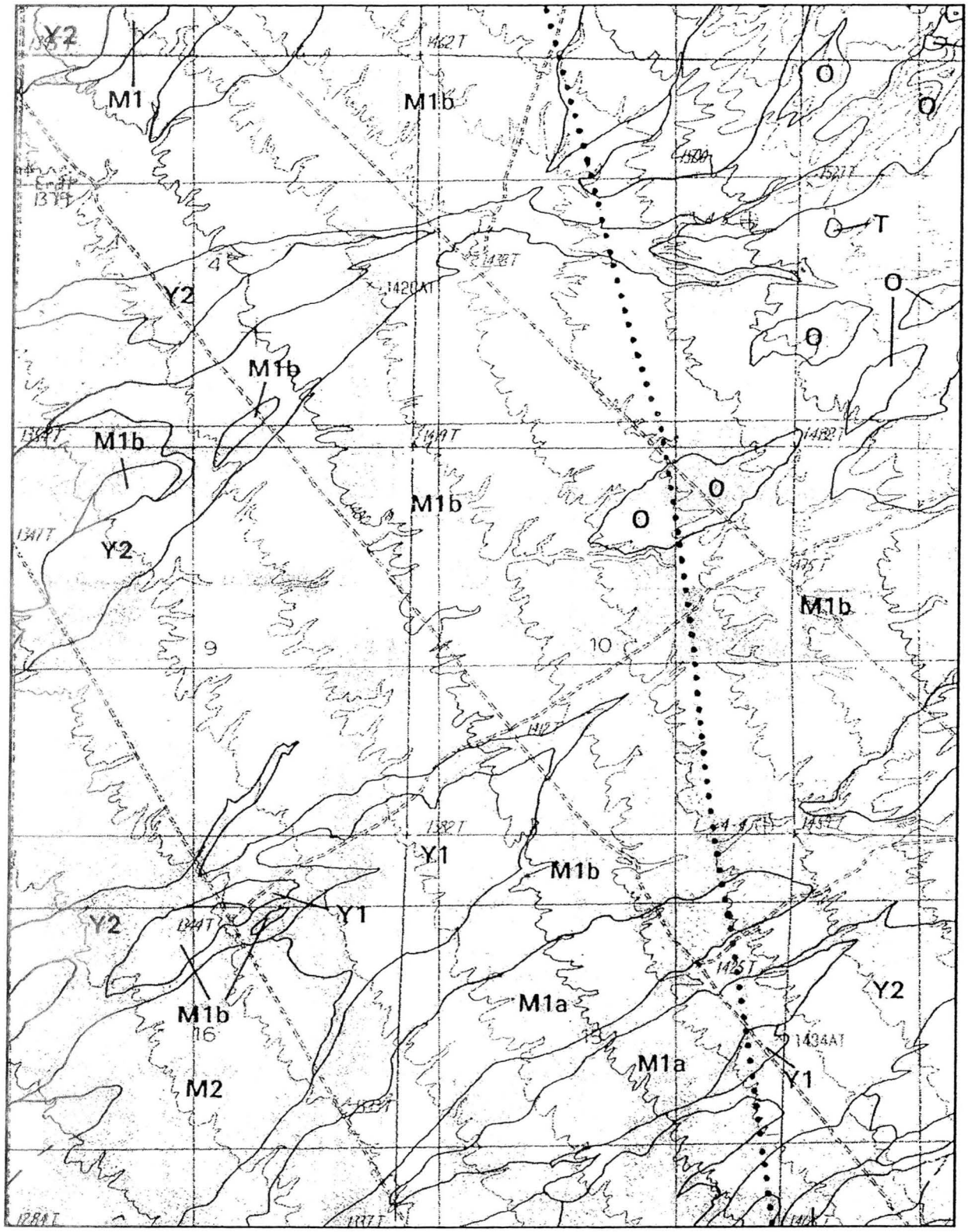


Figure E-1. Excerpt of surficial geology map for part of Area 3 of the BSV ADMS study area (from Field and Pearthree 1991). Descriptions of geologic units provided in Table E-1.

Table E-1. Geologic Map Units of the BSV ADMS study area (Field and Pearthree 1991)

Unit	Geologic Age and Surface	Age*
Y2	Late Holocene alluvial fans, low terraces, and active stream channels	< 3 ka
Y1	Late to early Holocene alluvial fans and terraces	1 to 10 ka
Y	Undifferentiated Holocene alluvial surfaces	0 to 10 ka
M2	Latest to late Pleistocene alluvial fans	10 to 150 ka
M1b	Middle to late Pleistocene alluvial fans	150 to 300 ka
M12	Middle to late Pleistocene distal alluvial fans	10 to 300 ka
M1a	Middle to early Pleistocene alluvial fans	300 to 1,000 ka
M1	Middle Pleistocene alluvial fans	1500 to 1,000 ka
O	Early Pleistocene to late Pliocene alluvial fans	> 1,000 ka

*ka = kilo-annum (1,000 years before present)

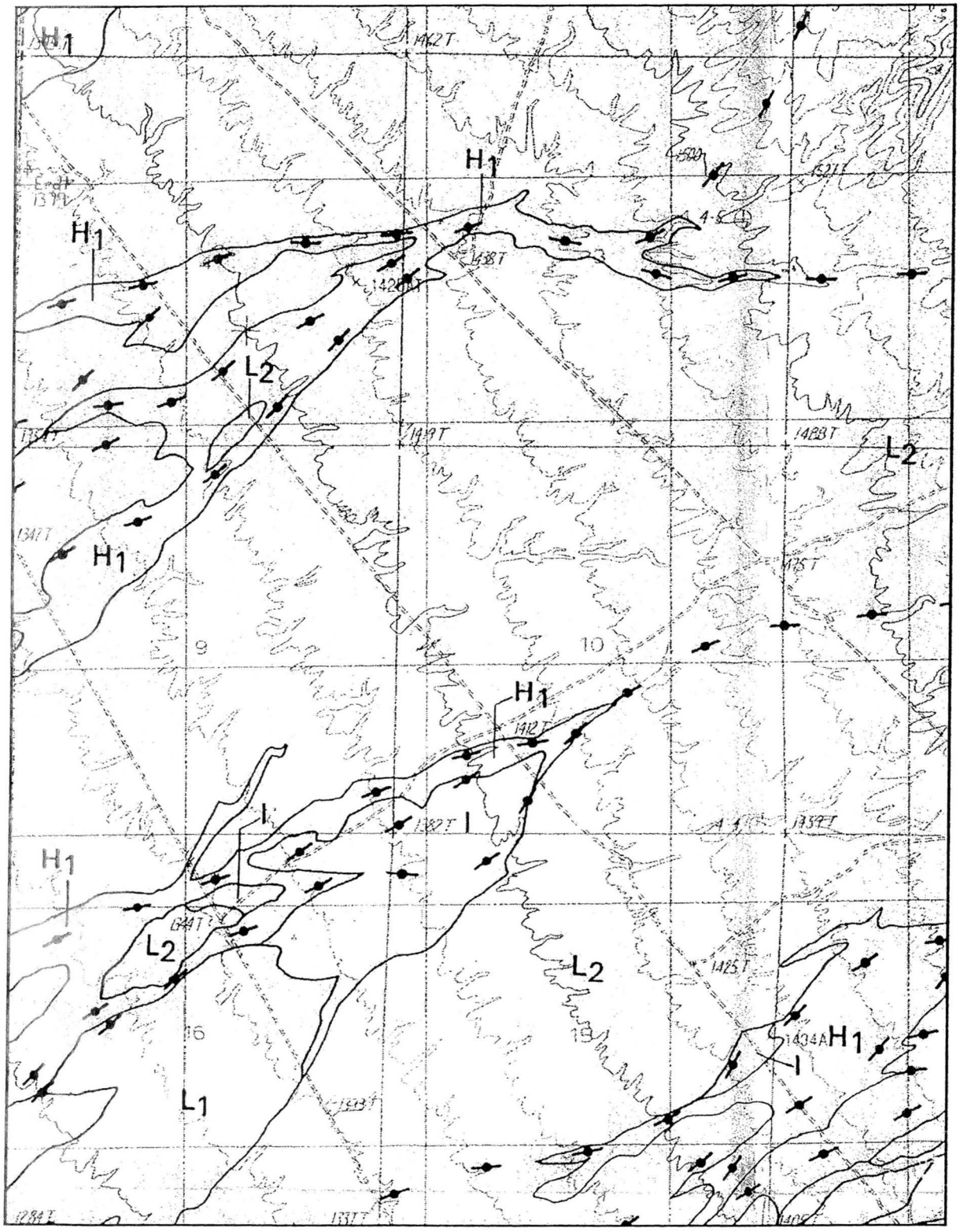


Figure F-1. Excerpt of flood hazards map for part of Area 3 of the BSV ADMS study area (from Field and Pearthree 1992). Descriptions of flood hazard designations provided in Table F-1.

Table F-1. Flood hazard designations for BSV ADMS study area (Field and Pearthree 1992).

Zone	Hazard Rating	Distribution
H1	Very High Flood Potential	Entrenched reaches of major drainages and distributary flow areas on middle and upper piedmont
H2	High Flood Potential	Restricted to lower piedmont and small drainages heading on the piedmont
I	Intermediate Flood Potential	Adjacent to H1 and H2 in distributary flow areas and on lower piedmont
L1	Relatively Low Flood Potential	Downslope from and adjacent to distributary flow areas on middle and lower piedmont
L2	Very Low Flood Potential	Upper and middle piedmont and adjacent to Hassayampa River
M	Flood Hazard Unknown	Mechanized disturbance
B	Low Flood Potential	Bedrock outcrops with localized slope wash and debris flows possible in steepest areas