

FLOOD PROTECTION METHODS

Descriptions and photo examples
for use in
Scenery and Recreation
Resource Assessments of Context Sensitivity.



Scenery and Recreation Resource Assessment
for
Maricopa County

Prepared by
Landscape Architecture Branch
Flood Control District of Maricopa County
November 6, 2006



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Introduction

Preservation of the natural landscapes of Maricopa County and protection of local community character are primary objectives of the Flood Control District's Board approved Policy for Landscaping and Aesthetic Treatment of Flood Control Facilities. These objectives are accomplished by planning and designing flood protection facilities to complement the positive visual characteristics of the landscape settings in which they are located.

The District routinely evaluates and implements a variety of non-structural and structural methods for providing flood protection in Area Drainage and Watercourse Master Planning, Project Pre-Design and Final Design. Listed below are six of the most commonly applied methods by the Flood Control District of Maricopa County.

- Non-Structural Method
- Soft Structural Method
- Semi-Soft Structural Method
- Hard Structural Method with Aesthetic Treatment
- Semi-Hard Structural Method
- Hard Structural Method

These flood protection methods vary in their physical and visual characteristics and their relative ability to complement or enhance the visual character of the landscape settings found in Maricopa County. The above flood protection methods are arrayed as a spectrum according to their visual character and potential for achieving context

Sensitivity with the landscapes of Maricopa County (refer to Tables 1 and 2).

Table 1

Flood Protection Methods	Level of Landscape Modification	Effect on Landscape Character	Potential for Context Sensitivity
Non Structural	Not Present (None)	Preserved	Highest  Lowest
Soft Structural	Not Evident	Retained	
Semi-Soft Structural	Slightly Evident	Partially Retained	
Hard with Aesthetic Treatment	Evident*	Modified	
Semi Hard Structural	Strongly Evident (Visually Dominant)	Strongly Modified	
Hard Structural	Very Strong Evident (Drastic Alteration)	Drastically Modified	

The identification and selection of flood protection methods that have the potential to complement the visual character of the landscape settings in which they will be constructed, therefore, is a key first step towards developing flood protection solutions that will be context sensitive with the visual environment and meet the goals of the District's aesthetic treatment policy.

Following are brief descriptions and photo examples for each of the flood protection methods identified above. They are presented here to provide a better understanding of their visual characteristics, potential to achieve context sensitivity with the visual environments of Maricopa County, and their use in flood protection method landscape compatibility assessments.

Table 2

Flood Protection Methods	Super Structure				Structural Components				
	None	Earthen		Hard		None	Concealed or Buried	Aesthetic Treatment Applied	Standard Engineering Design
		With Aesthetic Treatment	Without Aesthetic Treatment	With Aesthetic Treatment	Without Aesthetic Treatment				
Non Structural	X					X			
Soft Structural		X					X		
Semi-Soft Structural		X						X	
Hard Structural Method with Aesthetic Treatment				X				X	
Semi-Hard Structural			X						X
Hard Structural					X				X



Non-Structural Method



Soft Structural Method



Semi-Soft Structural Method



Hard Structural Method
with Aesthetic Treatment



Semi-Hard Structural Method



Hard Structural Method

Non-Structural Method

The non-structural method of flood protection employs the use of regulatory mechanisms such as erosion control setback zones and zoning regulations as mechanisms for providing flood protection. This method is characterized by an absence of structural elements or features for flood protection. Exceptions may include provision of low standard road facilities for carrying out flood control monitoring, operations and maintenance activities. Natural drainage features such as rivers, washes, and arroyos perform the function of storm water conveyance. Interior valleys and playas perform the function of storm water storage and natural ridges sometimes perform the function of flood water retardation and containment. The existing character of the landscape is usually preserved under this method. This method will usually complement and achieve context sensitivity with the visual character of most landscape settings.



Waterman Wash



Gila River



Gila River



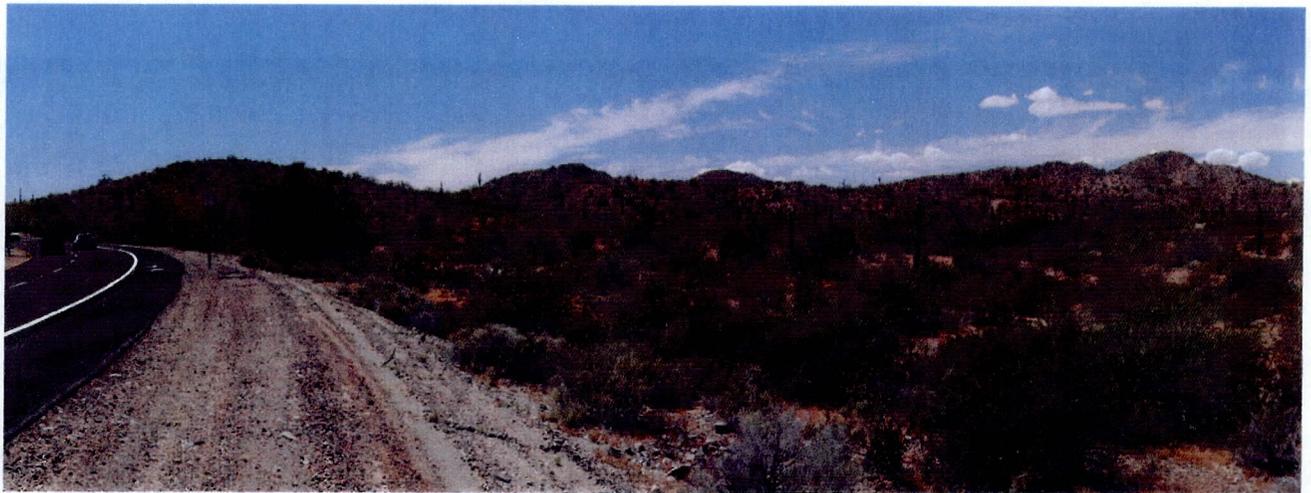
Agua Fria River



Gila River



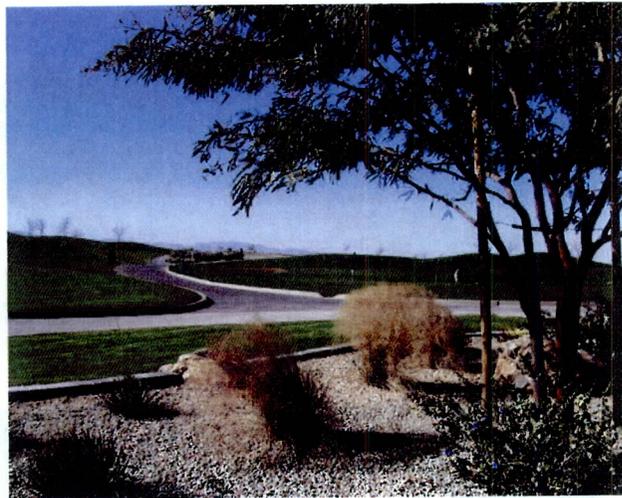
Estrella Ranch Natural Upland Basin



Ridge Line along Estrella Parkway

Soft-Structural Method

The soft structural method includes construction of large scale flood protection structures such as conveyance channels, storage basins and flood retarding structures. The superstructure is constructed of earthen materials and the overall form of the structure is designed to emulate the character of natural landforms found in the surrounding landscape (Character Type). Hard structural components are either absent, buried, concealed or designed to blend with and minimize their visibility in the landscape. Additionally, the soft structural method incorporates landscape architectural design themes, features and materials that are designed to complement the valued character of natural, pastoral, rural and suburban landscape settings in which these structures are located and includes right of way for landscape setbacks and other features to enable the structure to visually blend with and complement adjacent land use areas. This method also offers significant potential for enhancing heavily built environments such as the suburban, urban and industrial landscape settings through the preservation or introduction of natural features within these settings.



Falcon Dunes Golf Course Detention Basin



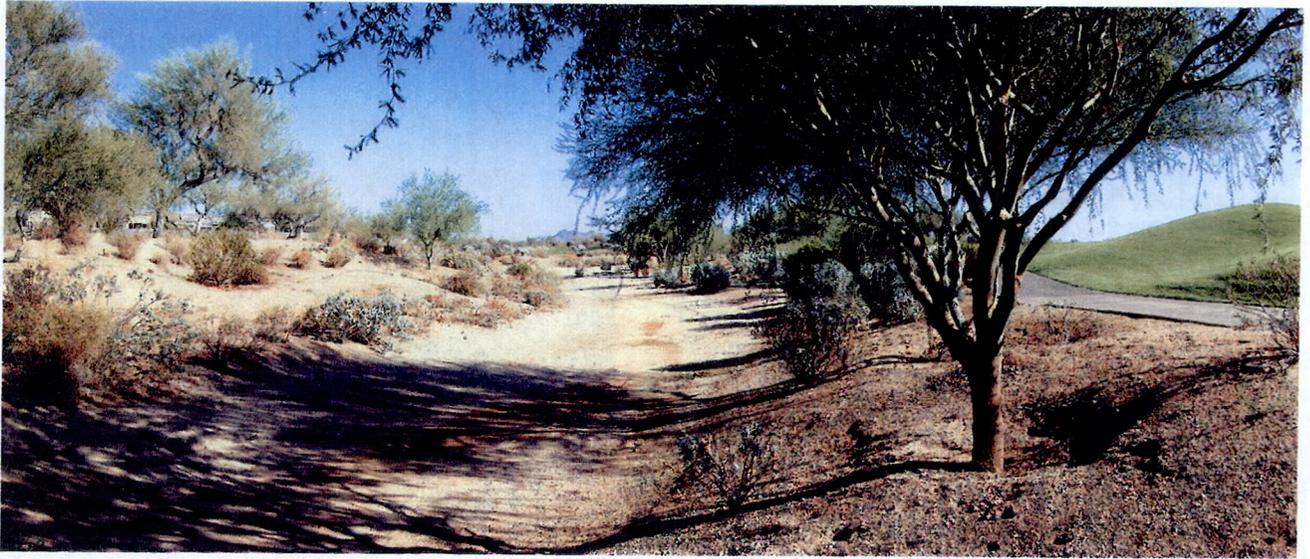
Oak Basin



Arizona Biltmore Basin



Freestone Park Basin



Wildfire Golf Course Conveyance Channel



Old Cross Cut Channel



Stone Creek Golf Course, Indian Bend Wash Channel



Guadalupe Flood Retarding Structure



White Tanks Flood Retarding Structure #3 (Simulation)

Semi-Soft Structural Method

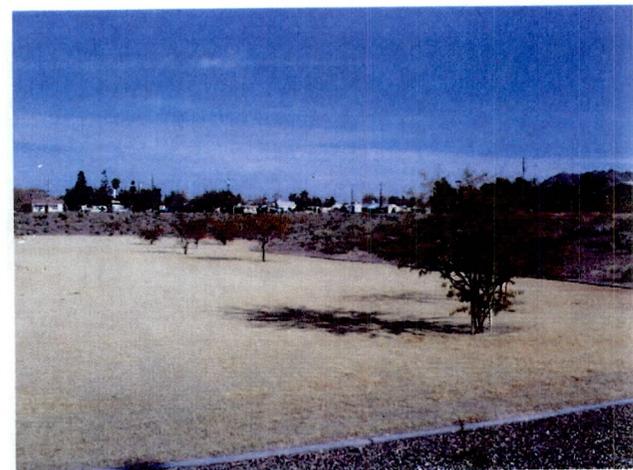
The semi-soft structural method includes construction of large scale flood control facilities constructed predominantly of earthen materials. The overall form of the superstructure is designed to emulate the character of natural landforms found in the surrounding landscape (Character Type). Structural components such as grade control structures, energy dissipaters, low flow features, inlets and outlets may be visually evident but their overall form, color, texture and materials usage is designed to remain visually subordinate to and complement the valued character of the landscape settings in which they are located through careful placement, materials usage, and landscape architectural design. This method also incorporates landscape architectural design themes, features and materials that complement the valued character of the settings in which flood control structures are located and includes right of way to provide landscape setbacks and other features to enable the structure to visually blend with and complement adjacent land use areas. As a result, this method can complement and achieve context sensitivity with a wide range of landscape settings in Maricopa County, including natural, pastoral, rural, suburban and urban landscapes. The semi-soft method also has a large potential for introducing positive variety into and enhancing heavily built environments.



Upper East Fork Cave Creek & Paradise Valley Detention Basin



El Dorado Park - Indian Bend Wash



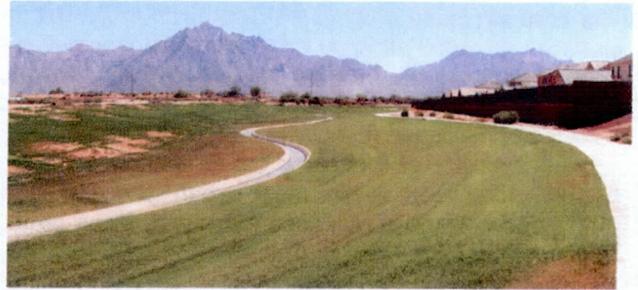
10th Street Basin



43rd Ave & Southern Detention Basin



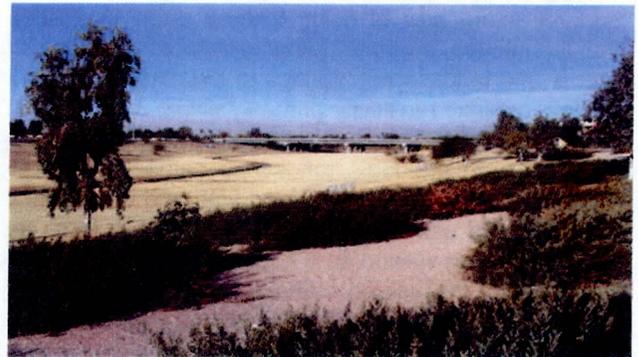
Wildfire Golf Course Conveyance Channel



Laveen Area Conveyance Channel



Vista Del Camino Park - Indian Bend Wash



Thunderbird Paseo Conveyance Channel



Bethany Home Outfall Channel



El Dorado Park - Indian Bend Wash



Guadalupe Flood Retarding Structure

Hard Structural Method with Aesthetic Treatment

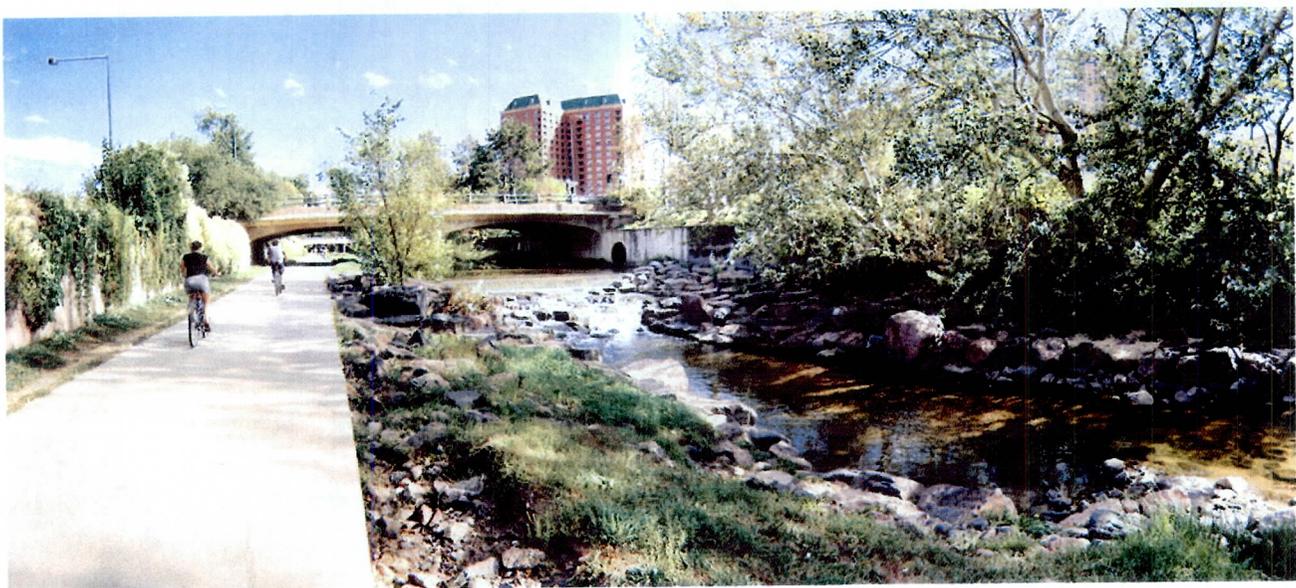
The hard structural method with aesthetic treatment includes construction of large scale flood control structures with superstructures that are fully or partially concrete lined. Structural components are also typically constructed of hardened (concrete) materials. This method produces structures that stand out as visually dominant feature attractions within most urban and industrial landscape settings in Maricopa County. It incorporates landscape design themes, features and materials that complement the valued character of urban and industrial landscape settings. Examples of aesthetic treatments include gracefully meandering the overall form of the superstructure, use of color, textural patterns, rustication techniques, urban art, other architectural embellishments and landscape plantings to establish visual and cultural context sensitivity primarily within urban and industrial settings. This method also includes right of way to provide an adequate landscape setback to enable these structures to visually blend with and complement adjacent land use areas. This method has a large potential for being viewed as a negative deviation that can detract from the valued character of natural, pastoral, rural and many suburban landscape settings.



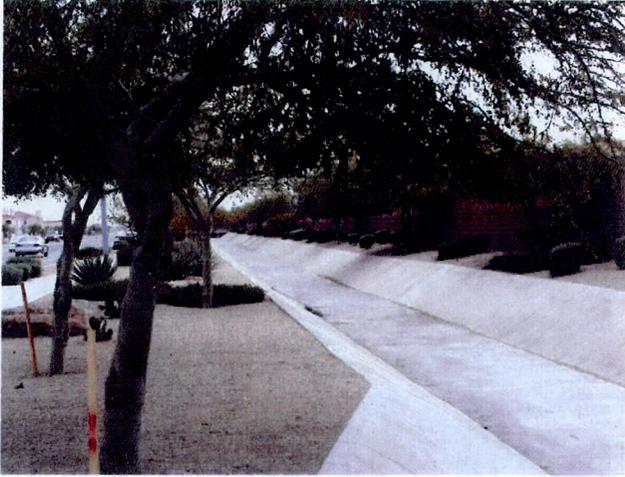
Double Tree Ranch Channel



Cherry Creek Conveyance Channel - Denver, Colorado



Cherry Creek Conveyance Channel - Denver, Colorado



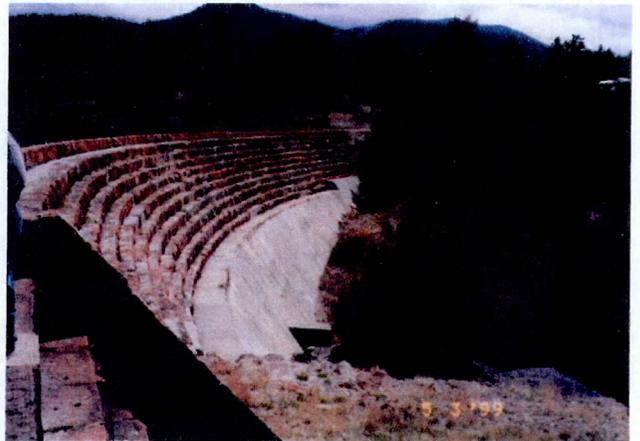
Crismon Development Channel



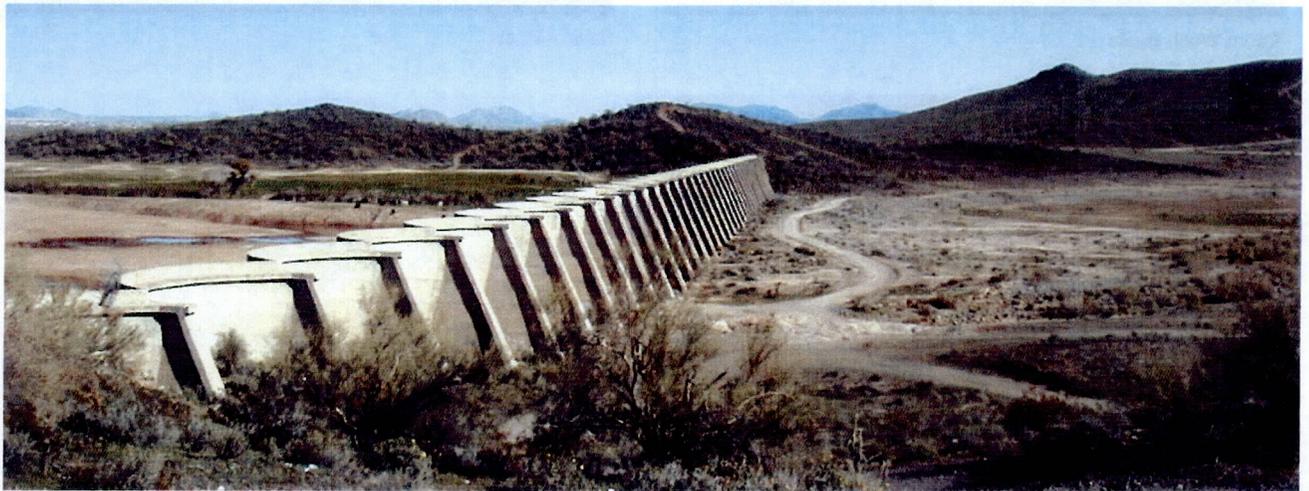
Arizona Canal Diversion Channel



Arizona Canal Diversion Channel



Santa Fe Dam



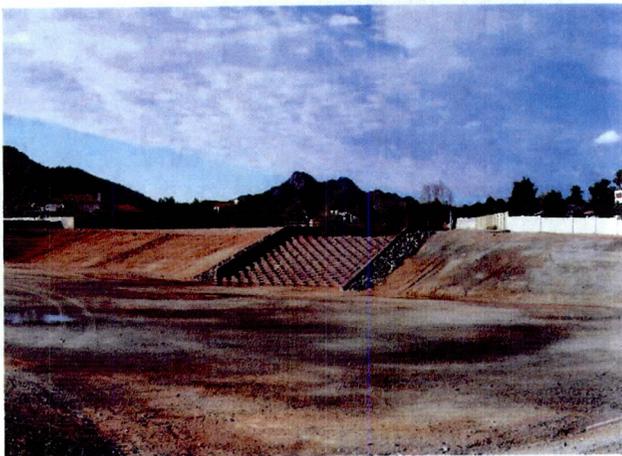
Cave Creek Dam

Semi-Hard Structural Method

The semi-hard structural method includes construction of large scale flood control structures constructed predominantly with earthen materials. These structures typically employ standard civil engineering design practices without inclusion of landscape architectural design or aesthetic features. The superstructure typically contains a geometric form, with uniform side slopes, bottom (invert) and over-bank areas. Component structures for grade control, energy dissipation inlets and outlets are characteristically standard engineering designs that do not incorporate landscape architectural design or aesthetic features. Vegetation treatments are typically limited to those required for erosion and dust control or for meeting USACE 404 permitting requirements. Right of way for establishing a landscape setback is typically not included with this method. Except for rural and industrial landscapes, this method generally lacks the ability to complement the visual character of and achieve context sensitivity with natural, pastoral, suburban and urban landscape settings in Maricopa County.



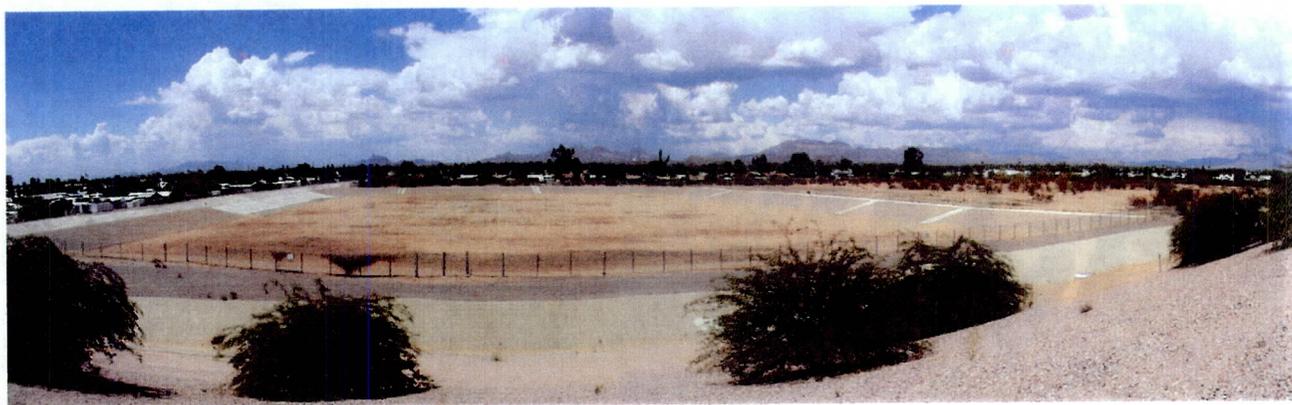
Sunny Cove Riser Structure Dam



Tatum Wash Basin



Sunset Basin



Sossaman Basin



McMicken Outlet Channel



East Maricopa Floodway Channel



Guadalupe Flood Retarding Structure (Downstream Slope)



McMicken Dam



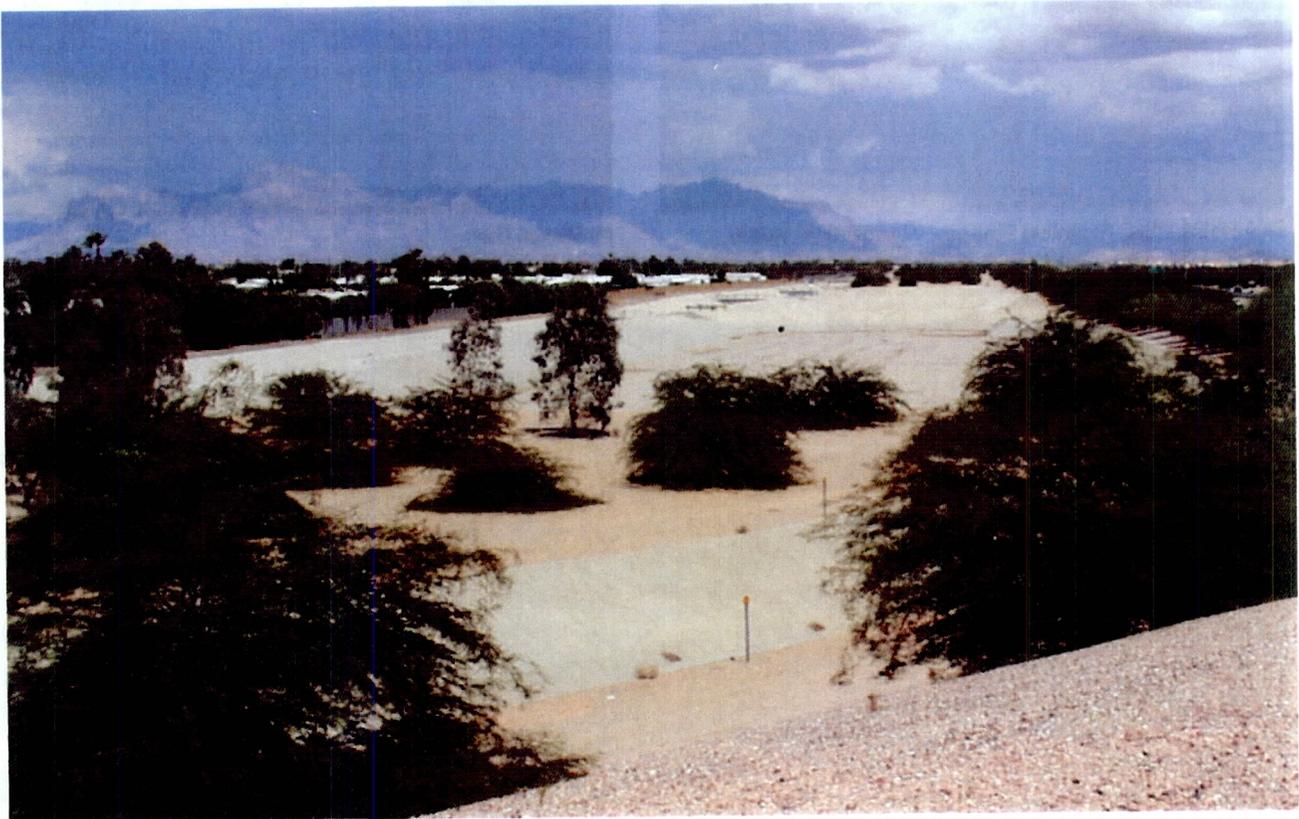
White Tanks Flood Retarding Structure #3

Hard Structural Method

The hard structural method includes the construction of heavily armored large scale flood control structures and component structural features. The superstructure and component structures typically employ standard civil engineering design practices without inclusion of landscape architectural design or aesthetic treatments. The superstructure typically contains a strongly geometric form, with uniform profile, side slopes, bottom (invert) and over-bank areas. Component structures for grade control, energy dissipation, inlets and outlets are also characteristically standard engineering designs that have a strongly geometric appearance. Vegetation planting is typically limited to the over-bank and/or perimeter area around the structure and only to the extent required for dust and erosion control or USACE 404 permitting requirements. Right of way for establishing a landscape setback is typically not included with this method. The hard structural method is usually complementary to and achieves context sensitivity only with heavy industrial landscape settings within Maricopa County. Within other settings, this method has a large potential to introduce very strong negative deviations that will detract from the valued landscape character.



Spookhill Flood Retarding Structure Conveyance Channel



US 60 Arizona Department of Transportation Basin



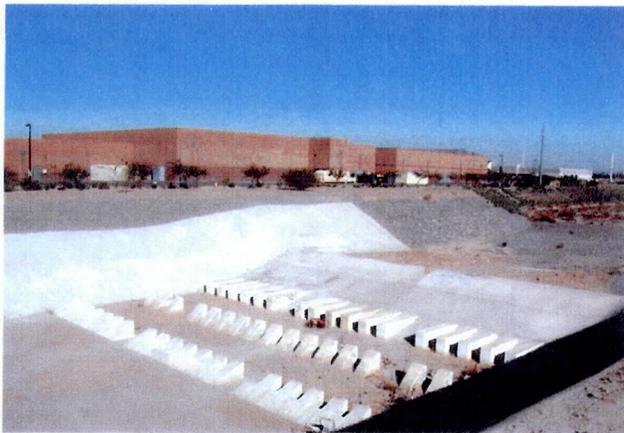
White Tanks 4 Inlet Conveyance Channel



Dysart Drain Conveyance Channel



City of Mesa Conveyance Channel



Skunk Creek 4 Drop Structure



City of Williams Dam