

**NEW RIVER CHANNEL IMPROVEMENT
GRAND AVENUE TO SKUNK CREEK
ADDENDUM NO.1**

**FCD Contract 98-24
Assignment No. 4**

March 6, 2001

Authorization:

Preparation of this addendum for the Candidate Assessment Report for the referenced project, prepared by Willdan and finalized January 20, 2000, was authorized by the Flood Control District of Maricopa County on January 4, 2001.

Purpose:

Based on discussions between the City of Peoria and the Flood Control District, the preference for channel lining has shifted from loose rip-rap contained in the report's recommended alternative to either soil-cement or gabion treatment. This addendum will present revised cross-section concepts, detail excavation/embankment sketches and revised cost estimates for construction to include both the areas requiring channel lining only and a section requiring lining and levee near the Freedom Care Center, with a treatment concept for the Thunderbird Wash confluence.

Discussion:

Variations from the recommended alternative presented in the final report that are desired by the City and the District include placing the recreational trail at the top of the bank. This eliminates the option of placing it at a lower level to obtain separation from residential development discussed at public meetings during preparation of the Middle New River Master Plan. Benefits obtained would include reduced construction cost and complexity. Some mitigation could be obtained with landscape treatments and top bench widening.

Another variation desired included narrowing the bank armoring options to either soil-cement or gabions. Although the stable side slopes for either option can vary from 0.5:1 to 2:1 depending on soil conditions, required conveyance area, desired aesthetics and other factors, a reasonable slope of 1:1 was chosen for both options in this analysis. A second factor to be considered, because the existing banks have a nominal 5:1 slope, is the location to place the slope to obtain either balanced earthwork or relocate the toe outward to obtain additional channel capacity. Although such a detailed analysis is beyond the scope of this assignment, a preliminary review shows the following advantages to relocating the toe outward:

- Additional channel capacity reduces the height of soil cement or gabions required.
- Additional capacity should also reduce velocity, resulting scour depth and required toe-in depth.

- Moving the toe outward will also allow for a wider trail, which is particularly critical in the area north of Thunderbird Road for neighborhood acceptance.
- A large portion of the soil generated can be used for construction of a levee needed on both the east and west banks between the Freedom Care Center and the existing soil-cement bank protection north of Grand Avenue. The balance could be placed behind the levee to prevent ponding.

As shown on the report Figure 7 “Public vs. Private Ownership Map”, the channel north of Grand Avenue, which connects to existing soil cement bank lining, northward toward the Freedom Care Center is subject to inundation from the 100-year flood. Although some uncontrolled fill has been placed in the area south of the Freedom Care Center, natural ground is sufficiently low enough to require construction of a levee for flood protection. A 2000 foot levee is shown at this location on Figure 8. Since the completion of the original New River CAR, an apartment complex has been constructed on the east New River bank, south of Thunderbird Road, which included some bank protection. Visual observation of the project indicated that the rip-rap placed extended from the top of the bank to approximately 2/3 down the slope. It was not apparent if the rip-rap extended further or included a toe-in. It may be possible to incorporate this work into future improvements if a review of the design and construction documents show it to meet the standard design criteria.

The confluence with several tributary channels including the Thunderbird wash, detention basin outlets from Freedom Care Center, a discharge channel from Sun City and Loop 101 drainage channels will present challenges to design and construction but are not insurmountable. The detention basin and Loop 101 discharges may be direct discharge or may require a flap gate to prevent backflow with higher river flows. The exact design will be determined during final design based on flood elevations versus discharge invert elevations. The Thunderbird wash discharge, however, is envisioned to be an unregulated, direct discharge with a gabion weir. The weir will be required to protect an existing high voltage electric transmission tower, restore the wash invert to a higher elevation, and prevent future erosion in the discharge vicinity. A concept with cross-section and front view is provided in Exhibit 3.

Estimate of Construction:

Physical parameters:

- Total channel length = 8,660 feet
- Levee length required = 2,000 feet
- Drainage/discharge confluences = 4
- Detention basin discharges = 3

Soil Cement -

	(8' depth)(8660' length)(2 sides)(37.5' width)(\$35/cy)/(27 cf/cy)	= \$6,736,000
Earthwork -	cut (450 sf)(6660')/(27 cf/cy)(2 sides) = -222,000cy @ \$2/cy	= 440,000
	fill (9 sf)(6660')/(27 cf/cy)(2 sides) = + 4,500cy @ \$3/cy	= 13,500
levee	fill (690 sf)(2000')/(27 cf/cy)(2 sides) = +102,500cy @ \$3/cy	= 307,500
	Excess -115,000cy	= \$7,101,000

Cost saving for additional channel area reducing soil cement required:
 (8' depth)(8660' length)(2 sides)(3' width)(\$35/cy)/(27cf/cy) = \$ -539,000
 Landscaping - (8,660 ' length)(2 sides)(30'/side)(\$2/SF) = \$1,040,000
 Total Construction = \$ 7,602,000
 10% contingency = \$ 760,000
 Design & Inspect. = \$1,254,000
Total Project Cost = \$9,616,000

Gabions - (3' depth)(8660' length)(2 sides)(37.5' width)(\$70/cy)/(27 cf/cy) = \$5,052,000
 Earthwork - cut (450 sf)(6660')/(27 cf/cy)(2 sides) = -222,000cy @ \$2/cy = 440,000
 fill (9 sf)(6660')/(27 cf/cy)(2 sides) = + 4,500cy @ \$3/cy = 13,500
 levee fill (690 sf)(2000')/(27 cf/cy)(2 sides) = +102,500cy @ \$3/cy = 307,500
 Excess -115,000cy = \$5,813,000

Cost saving for additional channel area reducing gabions required:
 (3' depth)(8660' length)(2 sides)(3' width)(\$70/cy)/(27cf/cy) = \$ - 405,000
 Landscaping - (8,660 ' length)(2 sides)(30'/side)(\$2/SF) = \$1,040,000
 Total Construction = \$ 6,448,000
 10% contingency = \$ 645,000
 Design & Inspect. = \$ 1,064,000
Total Project Cost = \$ 8,157,000

Conclusion:

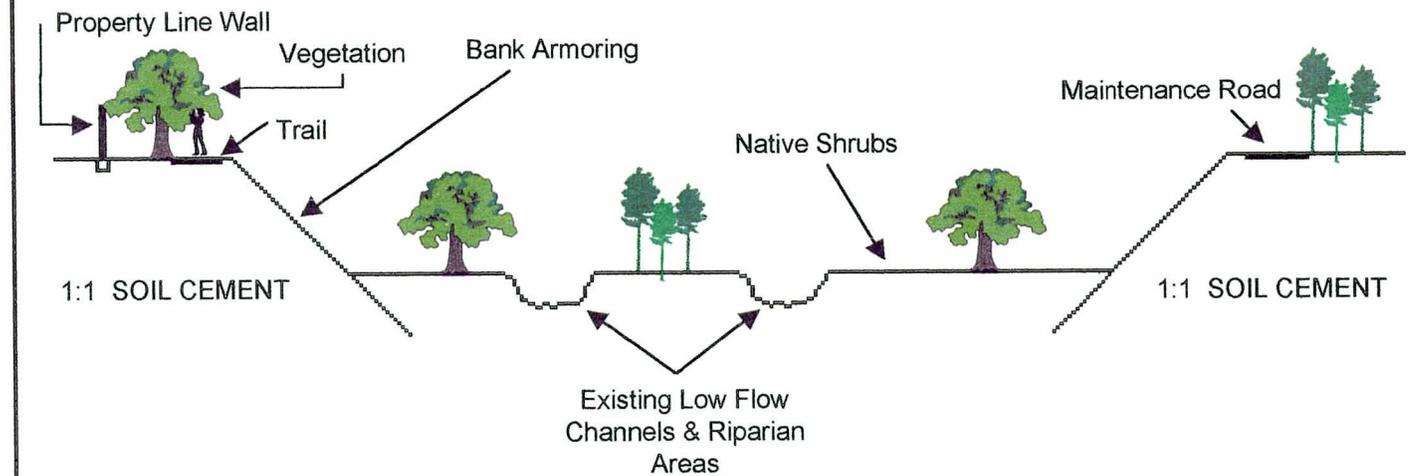
Based on the above analysis, the use of gabions for slope protection is the preferred alternative from both a cost and aesthetic standpoint. Detailed hydraulic and geotechnical analysis should be performed as part of the final design to determine the optimum combination of slope toe-in and cross section parameters.

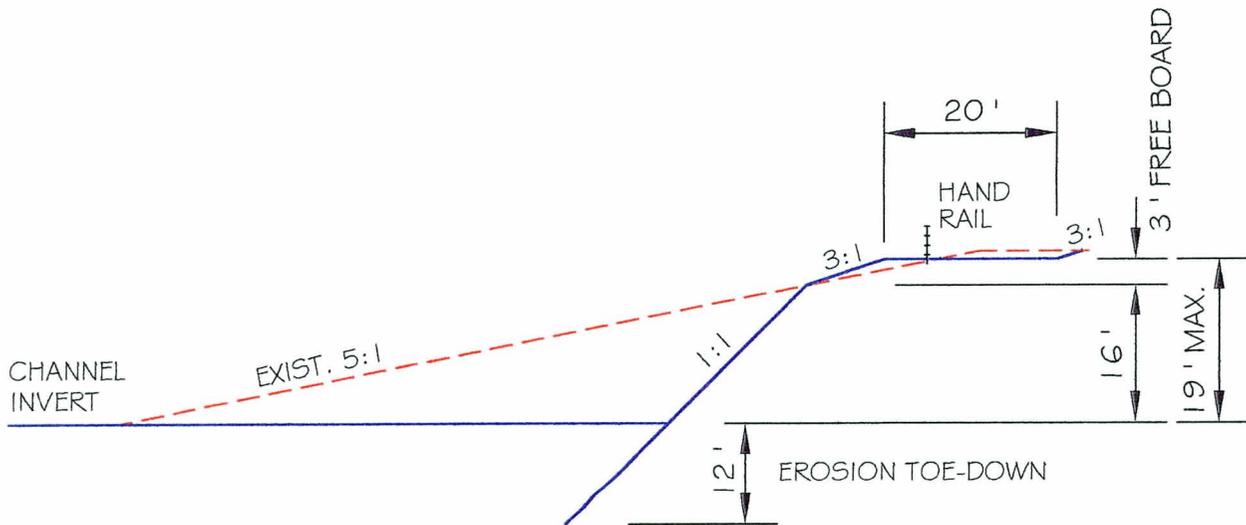
WILLDAN

Bruce Canavan
 Bruce Canavan, P.E.
 Senior Engineer

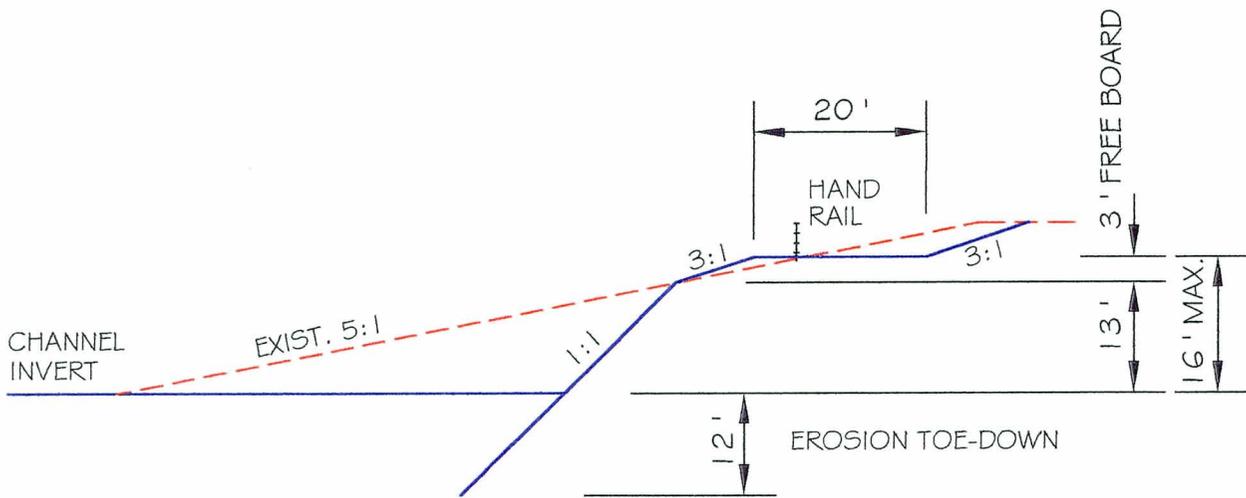


NEW RIVER GRAND AVENUE TO SKUNK CREEK Structural Type Trapezoidal Section





THUNDERBIRD ROAD SOUTH TO LEVEE



THUNDERBIRD ROAD NORTH TO SKUNK CREEK

Scale: 1"=20'



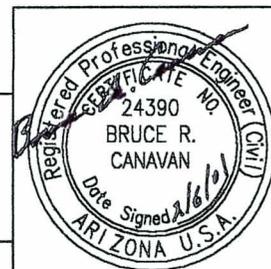
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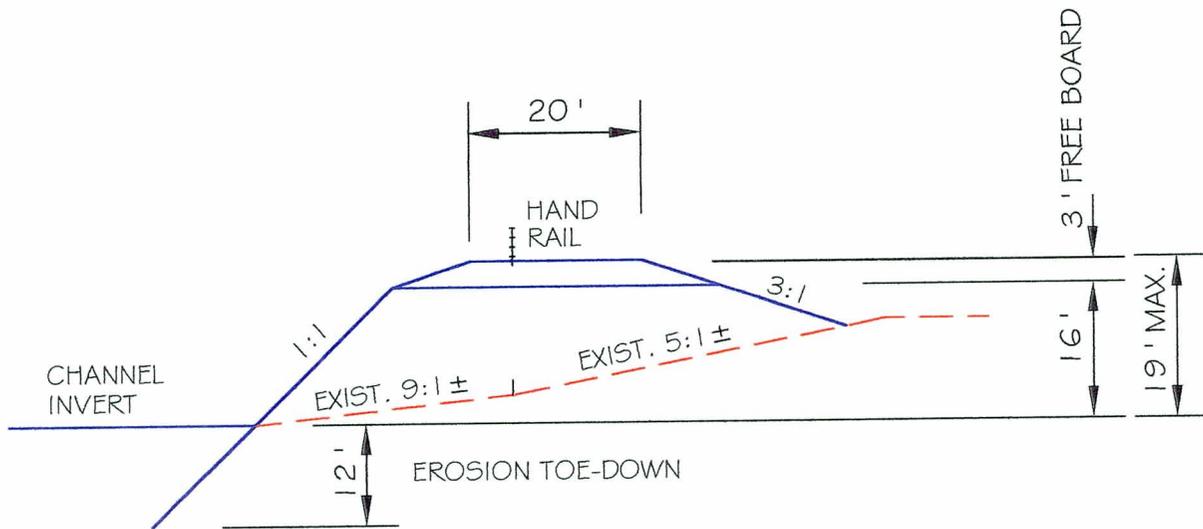
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ADDENDUM #1 - FIGURE 1

REFERENCE SHEET NUMBER: N/A

DATE: 2-8-01





EXISTING SOIL CEMENT NORTH TO
FREEDOM CARE CENTER

Scale: 1"=20'



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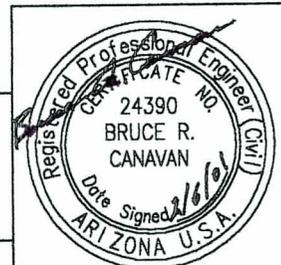
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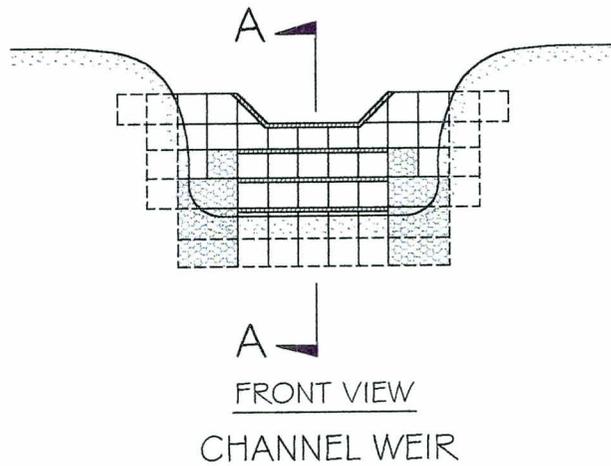
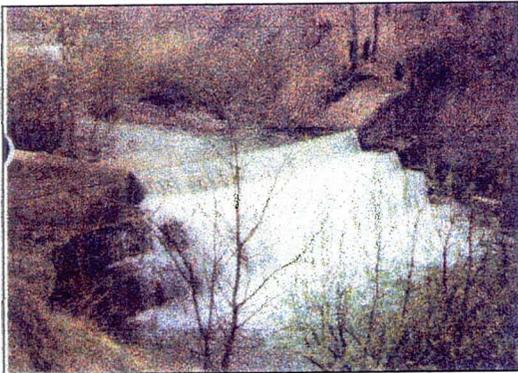
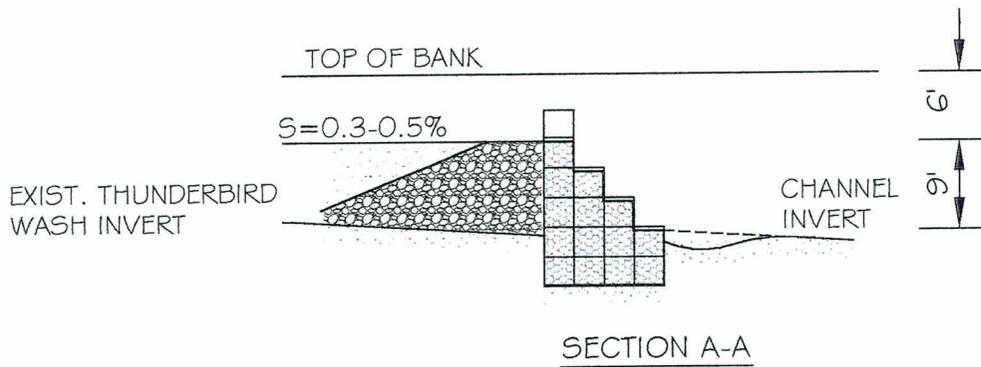
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ADDENDUM #1 - FIGURE 2

REFERENCE SHEET NUMBER: N/A

DATE: 2-8-01





THUNDERBIRD WASH / NEW RIVER CONFLUENCE CONCEPT

Scale: 1"=20'



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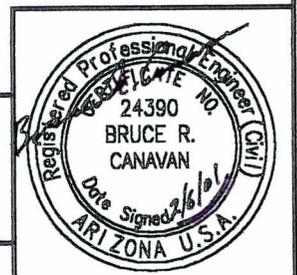
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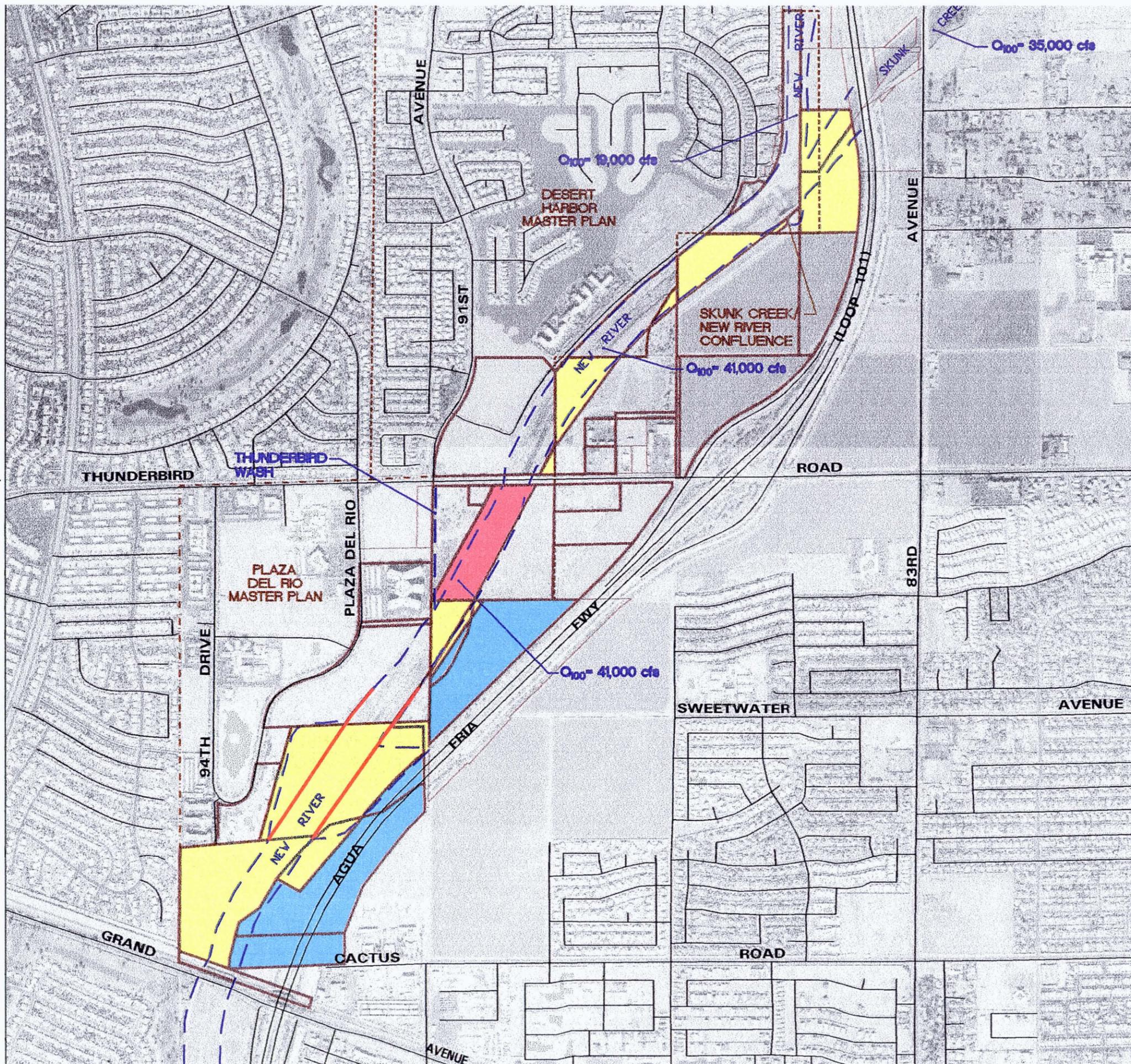
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ADDENDUM #1 - FIGURE 3

REFERENCE SHEET NUMBER: N/A

DATE: 2-8-01





BOUNDARY LEGEND

- - - - - 100 Year Floodplain Limits
- - - - - Drainage Channel Boundary Limits
- - - - - Desert Harbor Master Plan Limits
- - - - - Plaza Del Rio Master Plan Limits
- - - - - Parcel Boundary
- - - - - Levee Limit Line

- Maricopa County Flood Control District Land
- Arizona Department of Transportation Land
- City of Peoria Land
- Private Land

PUBLIC vs. PRIVATE OWNERSHIP MAP