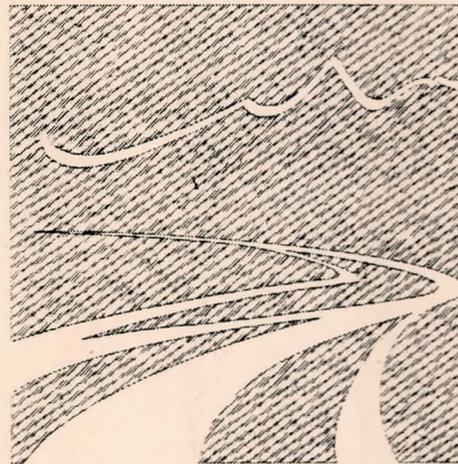


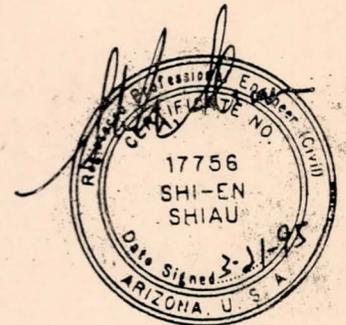
**CITY OF SCOTTSDALE
DESERT GREENBELT PROJECT**

**Upper Realta Pass Wash
Preferred Alternative**

by: The Greiner Team



The Desert Greenbelt
SCOTTSDALE, ARIZONA



MARCH 1995

A680.950

**CITY OF SCOTTSDALE
DESERT GREENBELT PROJECT**

PREFERRED ALTERNATIVE REPORT

Introduction

Scottsdale enjoys a wealth of natural beauty, history and Arizona culture that is embodied in its rugged mountains and desert environment. In keeping with its image, the City made the decision to implement a policy to effectively manage stormwaters, on a regional basis while providing passive recreational opportunities for the community in a natural desert setting. The concept of the Desert Greenbelt offers North Scottsdale the opportunity to blend effective flood control and open space amenities within the environmentally sensitive desert landscape, while balancing homeowner concerns, development objectives, public safety, public landholder requirements and City-wide goals.

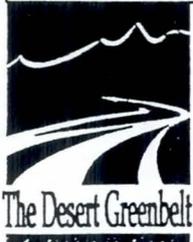
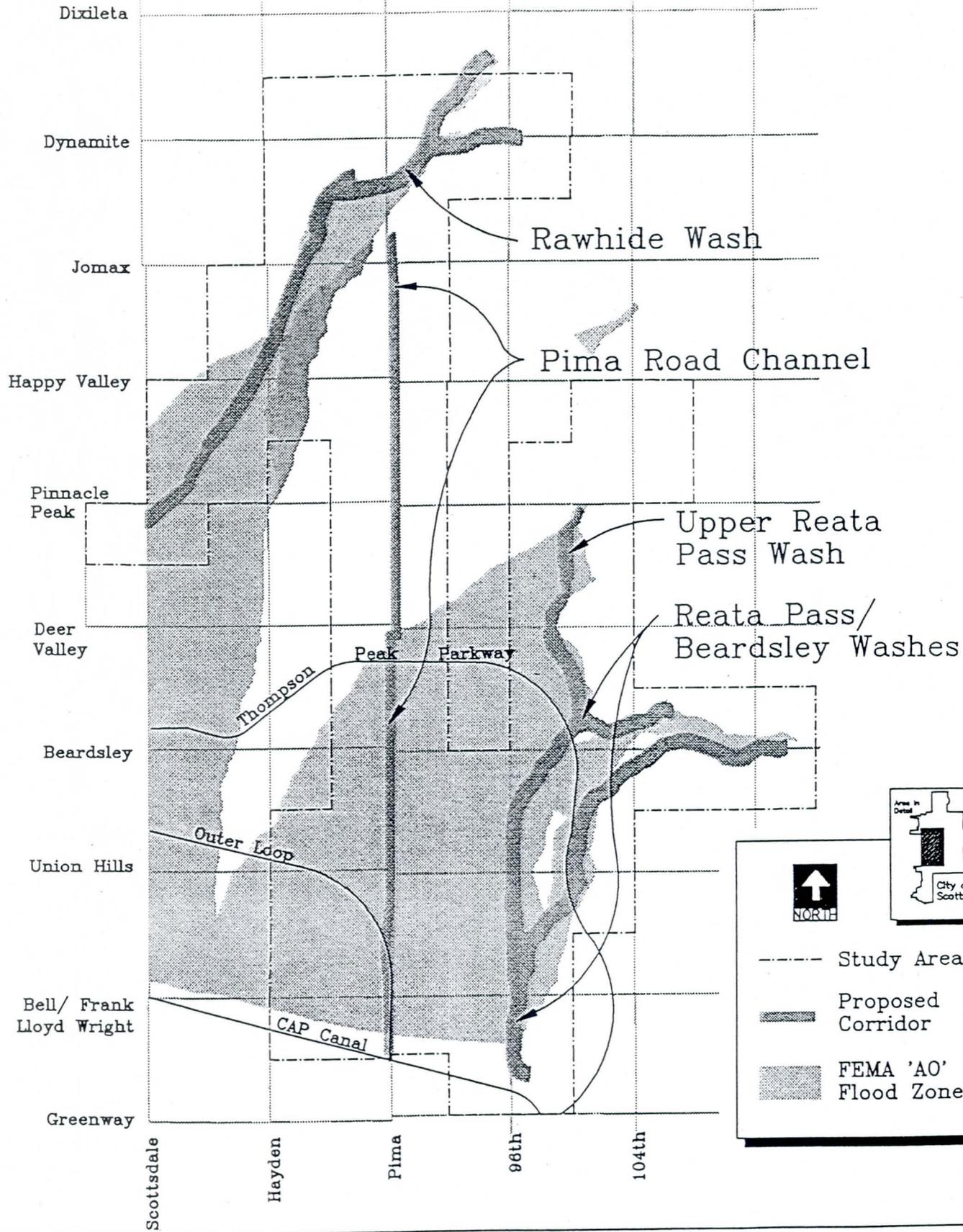
In November 1992, the Scottsdale City Council adopted an amendment to the Drainage Element of the *General Plan* which established the Desert Greenbelt concept and the proposed corridors. The Desert Greenbelt will use natural washes wherever possible and preserve the rugged character of the surrounding desert environment. The Desert Greenbelt system for this project is being designed to contain the 100-year alluvial fan flood hazard which currently exists in Scottsdale north of the CAP Canal.

In July, 1993, the City retained the Greiner Team to perform the *Desert Greenbelt Preliminary Design and Analysis*. The study includes three individual project corridors: Rawhide Wash, Pima Road Channel and Reata Pass/Beardsley Wash, which includes the Upper Reata Pass Wash (Figure I-1). The project has included four phases: Identifying the Concepts; Developing the Concepts; Consolidating the Concepts; and Final Refinement/Preliminary Design. Each phase includes Public Participation; Environmental Analysis; Visual, Multi-Use Recreation and Land Use Evaluation; Hydrology/Hydraulic Engineering; and Funding Alternatives. These phases included:

- Identifying Concepts - data gathering, survey/mapping, review of various treatments and alternatives (see Snapshot Report)
- Developing the Concepts - full-scale alternatives developed, integrated public concerns, refined hydrologic/hydraulic analyses (see Specific Option Report)
- Consolidating the Concepts - identified specific issues and remedies, presented specific recommendations regarding identifiable environmental, aesthetic, planning, land-use, recreational and hydraulic issues

- Final Refinement/Preliminary Design - preliminary 10-percent design drawings; final environmental analysis and mitigation plan; address public involvement issues; estimates of capital, operation and maintenance costs and funding mechanisms.

This Preferred Alternative Report along with its accompanying addenda represents the culmination of this effort. Upon receiving final public comment on these documents, the final 10-percent Preliminary Design Drawings will be completed and presented to Council, providing direction for the full implementation of the **Scottsdale Desert Greenbelt Projects**.



Principal Washes and Channels

Scale: 1"=6000'
 City of Scottsdale and Greiner, Inc.

Figure I-1

**UPPER REATA PASS WASH
PREFERRED ALTERNATIVE REPORT**

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**CITY OF SCOTTSDALE
DESERT GREENBELT PROJECT**

**UPPER REATA PASS WASH
PREFERRED ALTERNATIVE REPORT**

Definition of the Alternative

The alluvial fan apex was originally identified as the upstream extent of the Upper Reata Pass Wash project. In response to further engineering analysis performed by a City consultant, the point of Desert Greenbelt project construction required for floodwater containment has been moved further upstream to include the proposed Pinnacle Peak Road bridge (Station 19+50). The proposed major improvements above the apex (Station 32+00) consist of stabilization of erodible banks. A levee (west of Station 33+00) was positioned to contain the southwest flow from the apex. Beginning at the apex, a low-flow channel is designed to revert flows to the south along a secondary wash. Between Stations 30+00 and 48+00, improvements consist of the low-flow channel with overbank floodwalls. Transition to the Foothills Drive bridge begins at Station 48+00. A major feature in this area is the transition from the low-flow channel with natural overbanks to a full-cut cross-section. The constructed flow-line returns to the natural flow-line at Station 61+00. On the west bank from Station 58+00 to 63+00, erosion protection is necessary although natural containment exists. The east bank is naturally contained and protected by the rocky mountain slopes from Station 60+00 to 76+36.77. Natural containment on the west bank is lost at Station 64+50. A combination expanded channel width and levee will provide containment from this point south. Although the Upper Reata Pass Wash designation ends at Station 76+36.77, the channel improvement and levee will be extended south to connect with a ridge on the Reata/Beardsley Wash as part of a phased approach. The plan sheets for the Upper Reata Pass Wash are Sheets UR1, UR2, and UR3.

Selection Rationale

Station 13+00 to 40+00 (See Sheet UR1)

Objectives/Issues

- ▶ A bridge is proposed at the Pinnacle Peak Road crossing which will convey the floodwaters to provide access for residents to the east and containment at the west
 - A floodwall/levee training dike is required to cut-off the western breakout overtopping at Pinnacle Peak Road
 - Trail clearance is required under the bridge
 - Relocate the existing channel grade drop from south of Pinnacle Peak Road to north of Pinnacle Peak Road

- Design drop structure to accommodate multi-use trail users
- In the vicinity of the bridge, roadway approaches may need to be raised
- ▶ Recreational features are limited to the portion of wash upstream of Station 36+00
 - A multi-use trail is the only recreation feature included in Upper Reata Pass Wash
 - The multi-use trail transitions, from easements to the southwest, into the Desert Greenbelt System near Station 33+00
- ▶ The need and selected technique for slope stabilization
 - The existing slope and bank condition is highly erodible
 - Existing facilities require protection
 - Due to the Pinnacle Peak Road crossing and the multi-use trail, the area is highly visible
 - Recommend subsurface bank protection with revegetation
- ▶ Containment of flow at the apex
 - Provide levee along the west side of the channel to tie together existing ridges which cuts off flow to the southwest
 - Protect slope of levee against scour and erosion
 - Through contouring and revegetation blend engineered structure into the natural ridges
 - Combined trail/maintenance access is to be provided across the levee

Hydrology and Hydraulics Summary

- ▶ With the exception of the potential breakout at the Pinnacle Peak Road crossing, the wash is naturally contained upstream of the apex
- ▶ The supercritical flow of 11,236 cubic feet per second (cfs) is shallow (up to 3 to six feet in depth) and wide (200 to 400 feet) with velocities of 16 to 22 feet per second (fps)

Constraints/Public Comment

- ▶ Upstream of Station 27+00 decrease corridor width due to physical constraints of mountain ridges and existing structures
 - High flows impact infrastructure and existing structures on unprotected erodable banks
 - Homeowners east of the wash are endangered by road flooding restricting access
 - Owners of impacted structures request bridge and other improvements to eliminate flooding of property.
 - Aesthetics of improvements are of prime concern
 - Trail corridor delineation to encourage travel on designated trails only

Benefits/Impacts

- ▶ Containment of the 100-year storm event within the designated drainage corridor eliminates Federal Emergency Management Agency (FEMA) designated flood hazard areas outside the channel
- ▶ An all-weather crossing for residents east of the wash
- ▶ Stabilization of banks provides erosion protection to structures
- ▶ Grade separation of trail crossing at Pinnacle Peak Road

Sections 30+00 to 48+00 (See Sheets UR1 and UR2)

Objectives/Issues

- ▶ Retain character of existing braided broad washes
 - Preserve maximum amount of existing vegetation practicable
 - Select containment method with least impact
- ▶ Containment
 - Combination of levee and flood wall preferred

- Avoid impacting existing vegetation
- Blend with natural features
- ▶ Facilitate flow/sediment movement
 - Deepen and widen existing wash bottom
 - Stabilize nose of vegetation islands (only as needed, due to erosion potential)

Hydrology/Hydraulics Summary

- ▶ The majority of flow is within the low-flow channel
- ▶ Depths within the low-flow channel are up to 6 to 7 feet with velocities near 25 fps in the supercritical regime
- ▶ The overbank area conveys 1 to 2 feet of flow depth at lower velocities of near 10 fps

Constraints/Public Comment

- ▶ Downstream of Station 31+00, construction of a low-flow channel is necessary
 - The proposed alignment follows existing sandy bottom wash
 - Selected alignment will minimize impact to existing vegetation
- ▶ Adjacent property owners desire retention of existing desert wash character
 - Access is required for residents and wildlife across floodwall/levee
 - The lowest possible height of floodwall/levee is preferred

Benefits/Impacts

- ▶ Building envelopes on adjacent lots remain fully usable
- ▶ Most vegetation and overall wash character will remain
- ▶ Widening of sandy bottom wash to accommodate low-flow channel will have some adverse visual impact
- ▶ Containment of the 100-year storm event within designated drainage corridor eliminates FEMA designated flood hazard areas outside the channel

Station 48+00 to 61+00 (See Sheet UR2)

Objectives/Issues

- ▶ A full-cut channel is required in this high-ground area to link upstream and downstream natural wash segments
 - A bridge will be provided at the Foothills Drive crossing
 - Channel capacity will contain the 100-year storm event
- ▶ The proposed channel joins an existing wash at Station 61+00
 - The flow-line of the proposed channel must meet the existing natural wash
 - Accommodate the flow from the existing natural wash
- ▶ The need and selected technique for slope stabilization
 - The existing soils are highly erodible
 - Existing public and private structures require protection
 - Due to the Foothills Drive crossing, the area is highly visible
 - Recommend high level of armoring on side slopes due to high velocities

Hydrology/Hydraulics

- ▶ The supercritical flow is totally contained within the full-cut channel
- ▶ Depths are up to 7 feet with velocities near 27 fps

Constraints/Public Comment

- ▶ The proposed channel alignment impacts two existing vacant lots north of Foothills Drive and highly impacts three to the south
 - It is desired to retain viable building envelopes on as many lots as feasible
 - Neighborhood desires lots and envelopes to retain similar sizes in conjunction with the subdivision

- ▶ Proposed channel alignment has been refined in response to comments from adjacent neighbors, and is intended to minimize viewshed and environmental impacts while providing the required engineering criteria
- ▶ The neighborhood desires erosion control techniques which blend with the natural desert character

Benefits/Impacts

- ▶ Provision of all-weather access on Foothills Drive for residents to the east
- ▶ Retention of viable building envelopes on four of the five impacted lots
- ▶ Containment of the 100-year storm event within designated drainage corridor eliminates FEMA designated flood hazard areas outside the channel

Stations 61+00 to 76+36.77 (See Sheets UR2 and UR3)

Objectives/Issues

- ▶ Protect existing erodible banks
- ▶ Provide containment downstream of Station 65+00
 - Widen natural channel where necessary to minimize height of floodwall
- ▶ Retain existing tree masses to extent practicable
 - Stabilize nose of vegetation islands as necessary
- ▶ Provide transition downstream of Station 76+36.77 to the Reata/Beardsley Wash
 - Containment downstream of Station 76+36.77 is lacking
 - Construction of approximately 1500 feet of floodwall below Station 76+36.77 along the western overbank will provide containment by linking the floodwall in Upper Reata pass Wash with a ridge to the south, adjacent to a natural channel
- ▶ Northbound multi-use path/trail users from Reata/Beardsley Wash will be delivered to western routes south of Station 76+36.77

Hydrology/Hydraulics Summary

- ▶ The supercritical flow of 11,746 cfs is naturally contained at the upstream end of this section
- ▶ A combination of channel widening and floodwall/levees provide containment along the downstream end of this section
- ▶ Maximum depths range from 6 to 8 feet with velocities from 15 to 20 fps

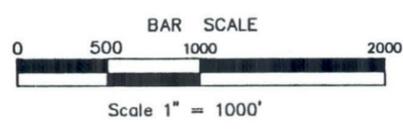
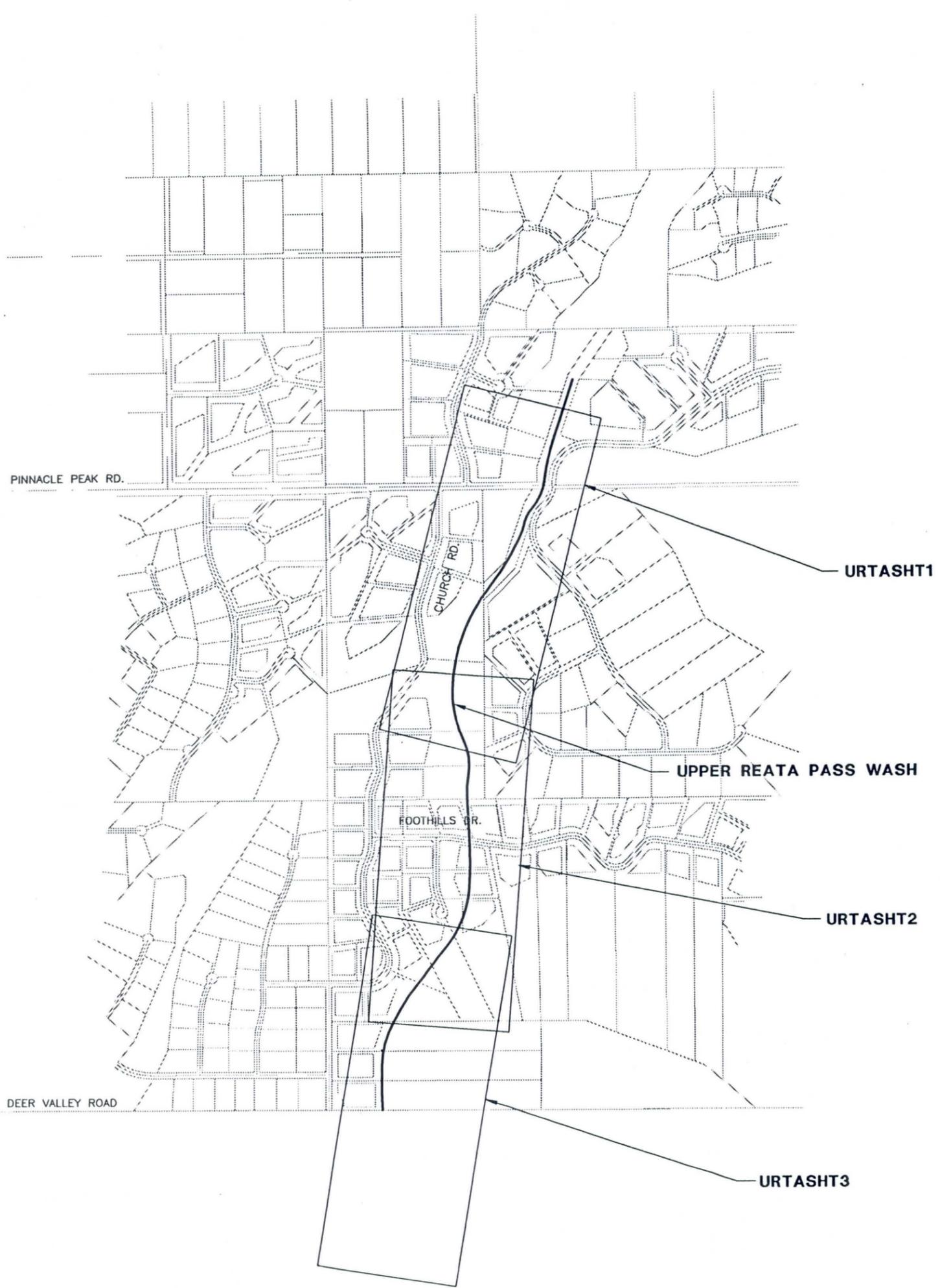
Constraint/Public Comment

- ▶ Natural undulating character of the wash requires several design concepts
- ▶ Retaining viable building envelopes on adjacent lots
- ▶ Preserve existing vegetation in natural wash to extent practicable
- ▶ Control direction of flow below Station 0+00 to prevent increased flood hazard to the southwest
- ▶ Design of multi-use trail/path to south should insure users to be aware of no access through this portion of the wash

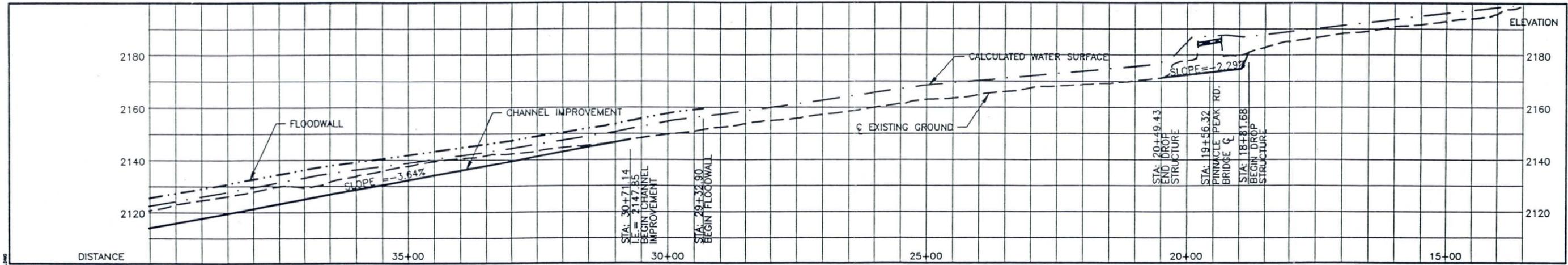
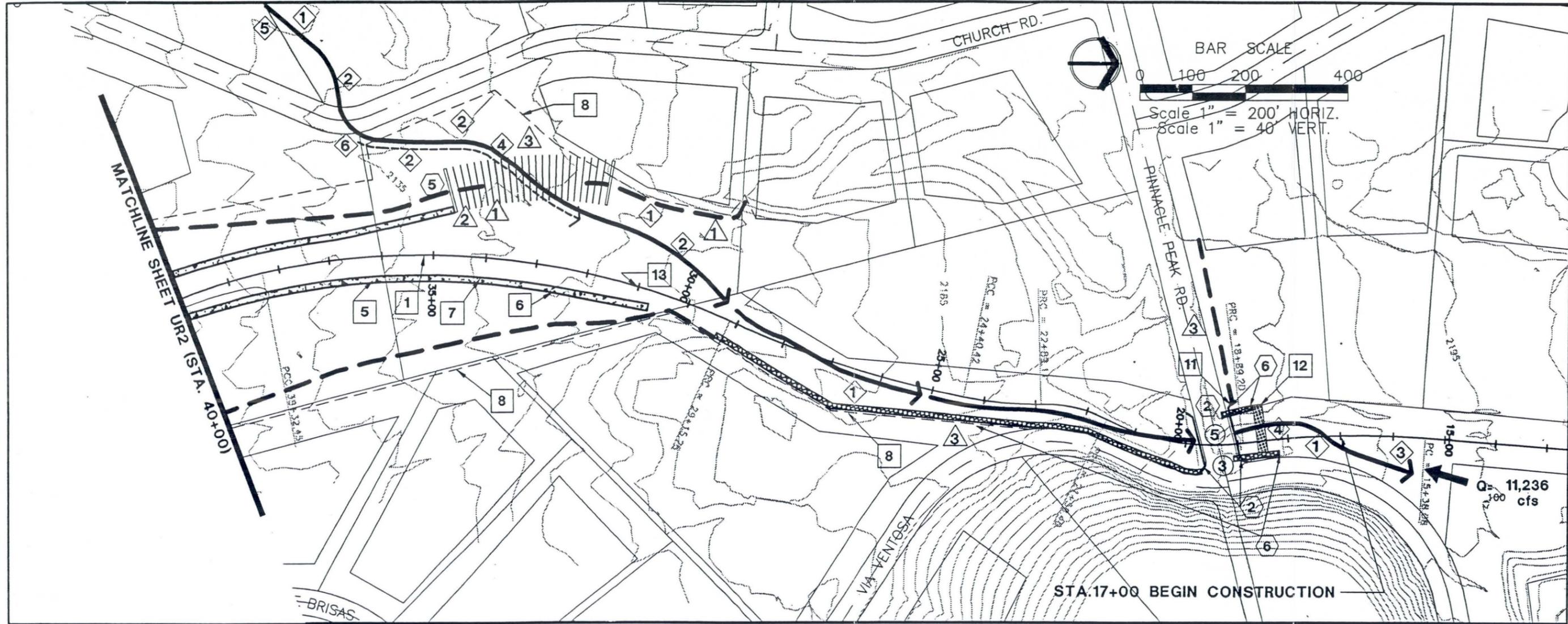
Benefits/Impacts

- ▶ Vacant lots along western side of channel are fully developable
- ▶ Containment of the 100-year storm event within designated drainage corridor eliminates FEMA designated flood hazard areas outside the channel

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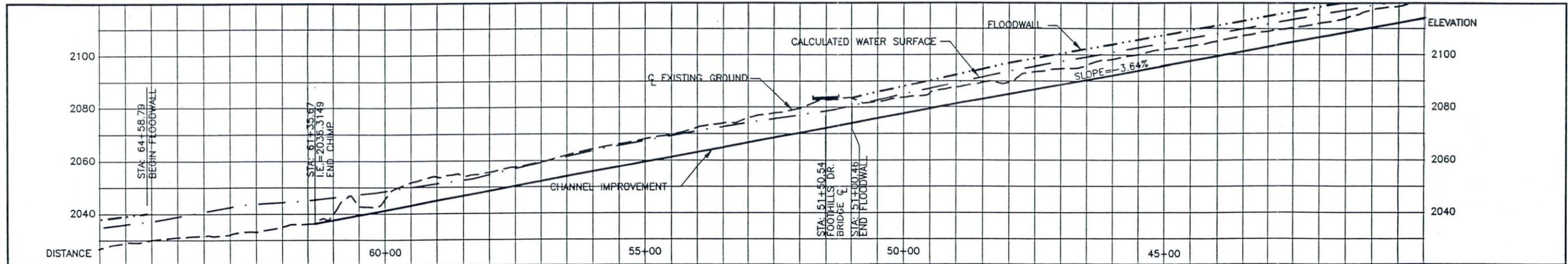
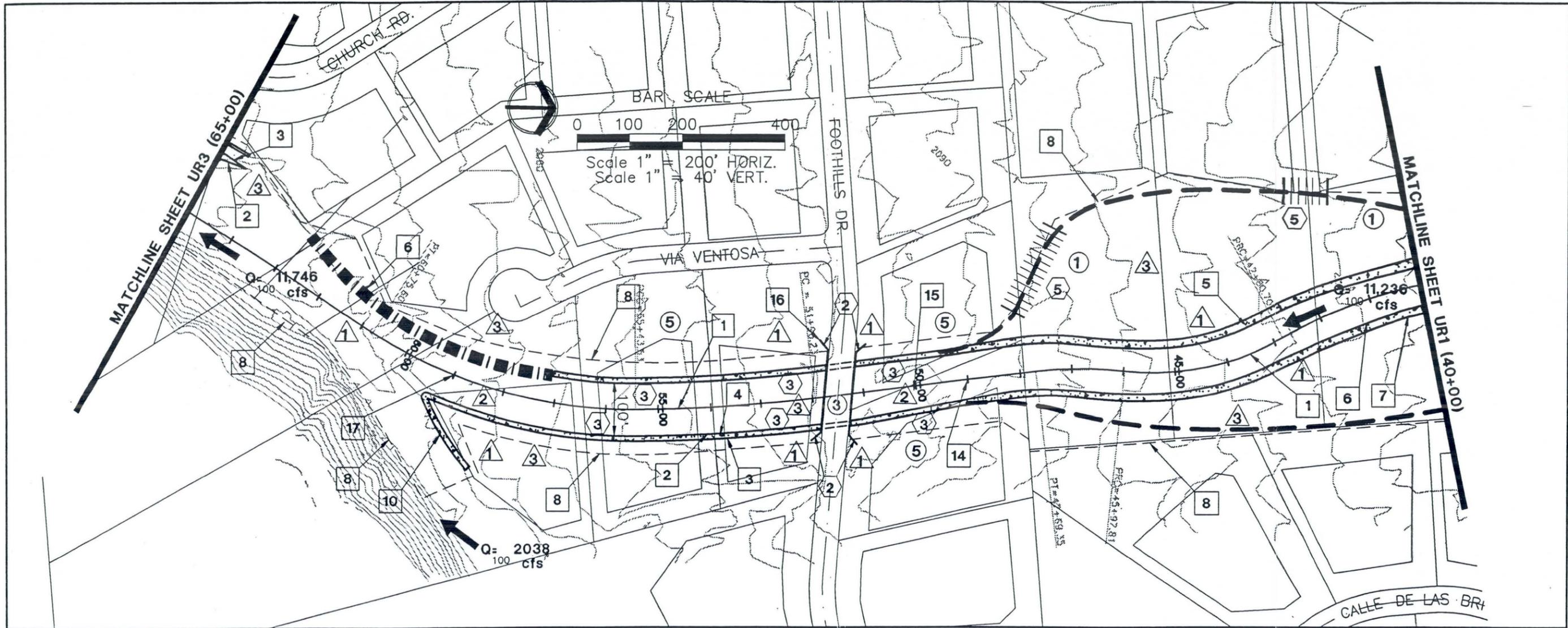


	PROJECT TITLE Upper Reata Pass Wash	ENGINEERS SEAL	PROJ. NO. E029102 JOB NO. DESIGN W.C.L. DRAWN M.T.C. CHECKED R.E.P.	DATE	REVISIONS	BY	AUTH.
	DRAWING TITLE Preliminary 10% Plans		 Greiner, Inc. Phoenix, AZ Engineers, Architects	SCALE: AS NOTED			



<p>CHANNEL IMPROVEMENTS</p> <ol style="list-style-type: none"> 1. CHANNEL CENTERLINE 5. 2:1 SIDE SLOPE (TYP.) 6. TOP OF LOW-FLOW SIDE SLOPE, VARIES. (TYP.) 7. TOE OF LOW-FLOW SIDE SLOPE, VARIES. (TYP.) 8. DRAINAGE RIGHT OF WAY/EASEMENT. 11. PINNACLE PEAK RD. BRIDGE/CULVERT. (DESIGNED BY OTHERS) 12. STA. 17+80, CONSTRUCT 5' DROP STRUCTURE OF REINFORCED CONCRETE WITH ENERGY DISSIPATOR. 13. STA. 31+00, BEGIN LOW FLOW CHANNEL. 	<p>PATHS / TRAILS</p> <ol style="list-style-type: none"> 1. TRAILS TO FOLLOW LOW-FLOW CHANNELS OR NATURAL WASHES. 2. INSTALL SIGNAGE TO DIRECT TRAIL USERS. 3. LINKAGE OF EXISTING MULTI-USE TRAIL INTO A REGIONAL SYSTEM. 4. TRAIL ACCESS OVER FLOODWALL/LEEVE. 5. TRAIL WITHIN EASEMENTS. 6. LOCATE ROAD CROSSING FOR OPTIMUM SIGHT LINES. 	<p>LAND USE</p> <ol style="list-style-type: none"> 1. IMPROVEMENTS DESIGNED TO FACILITATE WASH ACCESS FOR ADJACENT PROPERTY OWNERS. 3. BRIDGE/BOX CULVERT PROVIDES AN ALL WEATHER CROSSING. 5. GRADE SEPARATED MULTI-USE TRAIL CROSSING. 	<p>MITIGATION</p> <ol style="list-style-type: none"> 1. FLOODWALL/LEEVE DESIGNED TO MINIMIZE IMPACT ON EXISTING VEGETATION. 2. FLOOD PROTECTION WALLS DESIGNED FOR 100 YR. EVENT STORM. 3. COLOR, FORM, AND TEXTURE BLEND W/ THE DESERT SETTING. 	<p>AESTHETIC APPLICATIONS</p> <ol style="list-style-type: none"> 2. EXTENDED WING WALL. 5. SOIL RAMP OVER FLOODWALL. 6. FAUX ROCK. 	<p>LEGEND</p> <ul style="list-style-type: none"> MULTI-USE TRAIL MAINTENANCE ACCESS BANK PROTECTION DROP STRUCTURE CONCRETE FLOODWALL LEEVE CHANNEL RIGHT OF WAY 5' CONTOURS
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REVISIONS	DATE	PROJ. NO. E029102	JOB NO.	DESIGN W.C.L.	DRAWN M.T.C.	CHECKED R.E.P.	SCALE: AS NOTED
BY	AUTH						
ENGINEERS		SEAL					
Upper Reata Wash		Preliminary 10% Plans					
DRAWING TITLE		DRAWING NO. UR1 of UR3					
PROJECT NAME		 Greiner Greiner, Inc. Phoenix, AZ Engineers, Architects and Planners					



<p>CHANNEL IMPROVEMENTS □</p> <ol style="list-style-type: none"> 1. CHANNEL CENTERLINE 2. TOE OF CHANNEL IMPROVEMENT. 3. TOP OF CHANNEL IMPROVEMENT. 4. 1:1 SIDE SLOPE. 5. 2:1 SIDE SLOPE (TYP.) 6. TOP OF LOW-FLOW SIDE SLOPE, VARIES. (TYP.) 7. TOE OF LOW-FLOW SIDE SLOPE, VARIES. (TYP.) 8. DRAINAGE RIGHT OF WAY. 9. SUBSURFACE SCOUR CUT OFF WALL. 10. WRAP CUT CHANNEL SIDE SLOPE INTO TRIBUTARY BANK. 14. AT STATION 49+00, BEGIN TRANSITION TO FULL CUT CHANNEL. 15. AT STATION 50+00, END TRANSITION. 16. CONSTRUCT BRIDGE AT FOOTHILLS DRIVE. 17. AT STATION 59+00, END FULL CUT CHANNEL. 	<p>PATHS / TRAILS ◇</p> <p>LAND USE ○</p> <ol style="list-style-type: none"> 1. IMPROVEMENTS DESIGNED TO FACILITATE WASH ACCESS FOR ADJACENT PROPERTY OWNERS. 3. BRIDGE/BOX CULVERT PROVIDES AN ALL WEATHER CROSSING. 5. GRADE SEPARATED MULTI-USE TRAIL CROSSING. 	<p>MITIGATION △</p> <ol style="list-style-type: none"> 1. FLOODWALL/LEVEE DESIGNED TO MINIMIZE IMPACT ON EXISTING VEGETATION. 2. FLOOD PROTECTION WALLS DESIGNED FOR 100 YR. EVENT STORM. 3. COLOR, FORM, AND TEXTURE BLEND W/ THE DESERT SETTING. 	<p>AESTHETIC APPLICATIONS ⬡</p> <ol style="list-style-type: none"> 2. EXTENDED WING WALL 3. BENCHING INTO SLOPE. 5. SOIL RAMP OVER FLOODWALL 	<p>LEGEND</p> <ul style="list-style-type: none"> ▨ BANK PROTECTION ▩ BURIED FLOODWALL ▧ CONCRETE ▬ FLOODWALL ▮ LEVEE - - - CHANNEL RIGHT OF WAY ⋯ 5' CONTOURS
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PROJ. NO. E029102	DATE
JOB NO.	DESIGN W.C.L.
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SCALE AS NOTED	

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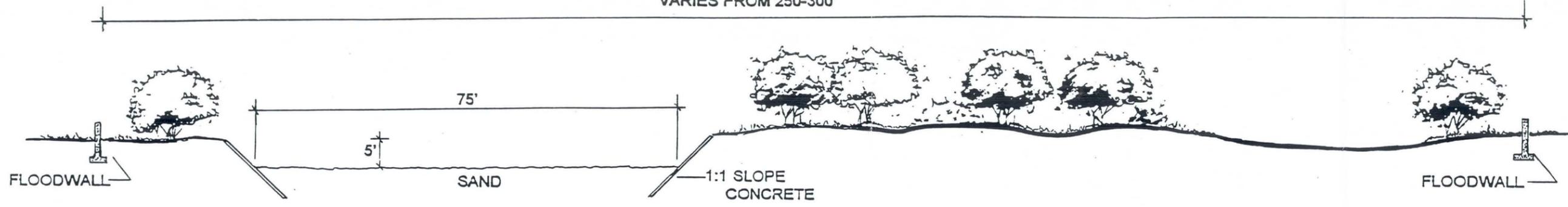
Greiner
Greiner, Inc.
Phoenix, AZ
Engineers, Architects
and Planners

Upper Reata Wash
Preliminary 10% Plans

DRAWING NO. UR2 of UR3

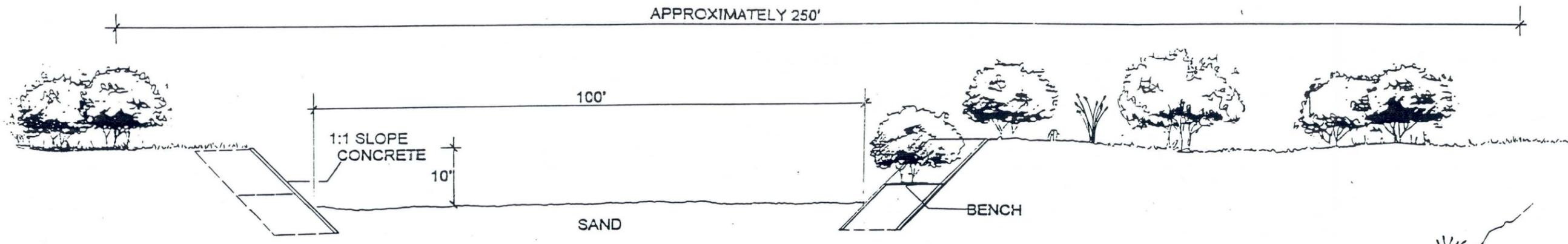
CHANNEL NORTH OF FOOTHILLS DRIVE

VARIES FROM 250-300'



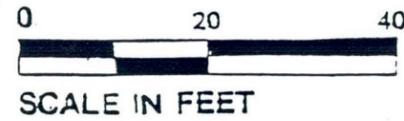
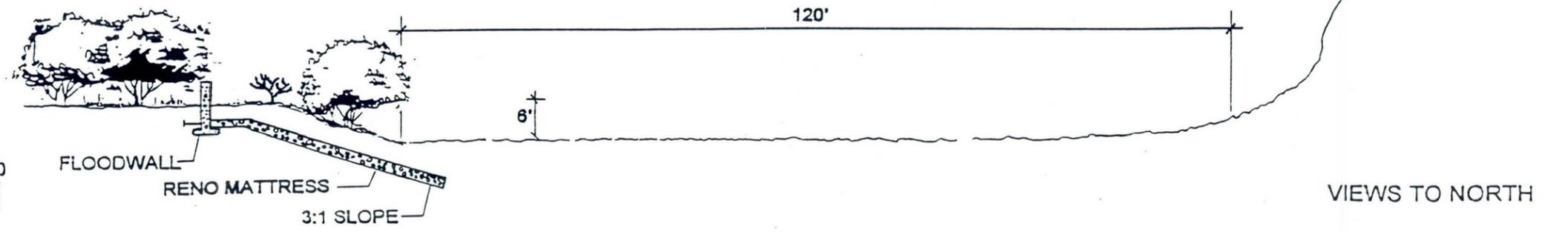
CHANNEL SOUTH OF FOOTHILLS DRIVE

APPROXIMATELY 250'



CHANNEL NORTH OF DEER VALLEY ROAD ALIGNMENT

120'



VIEWS TO NORTH

CROSS SECTIONS OF UPPER REATA CHANNEL

