CITY OF SCOTTSDALE
DESERT GREENBELT PROJECT

Rawhide Wash
Preferred Alternative

by: The Greiner Team

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The Desert Greenbelt

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Date Signed 5/8/95
ARIZONA U.S.A.

May 1995

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 Central Arizona Project (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; Hydrologic/Hydraulic Engineering; and Funding Alternatives. These phases included:

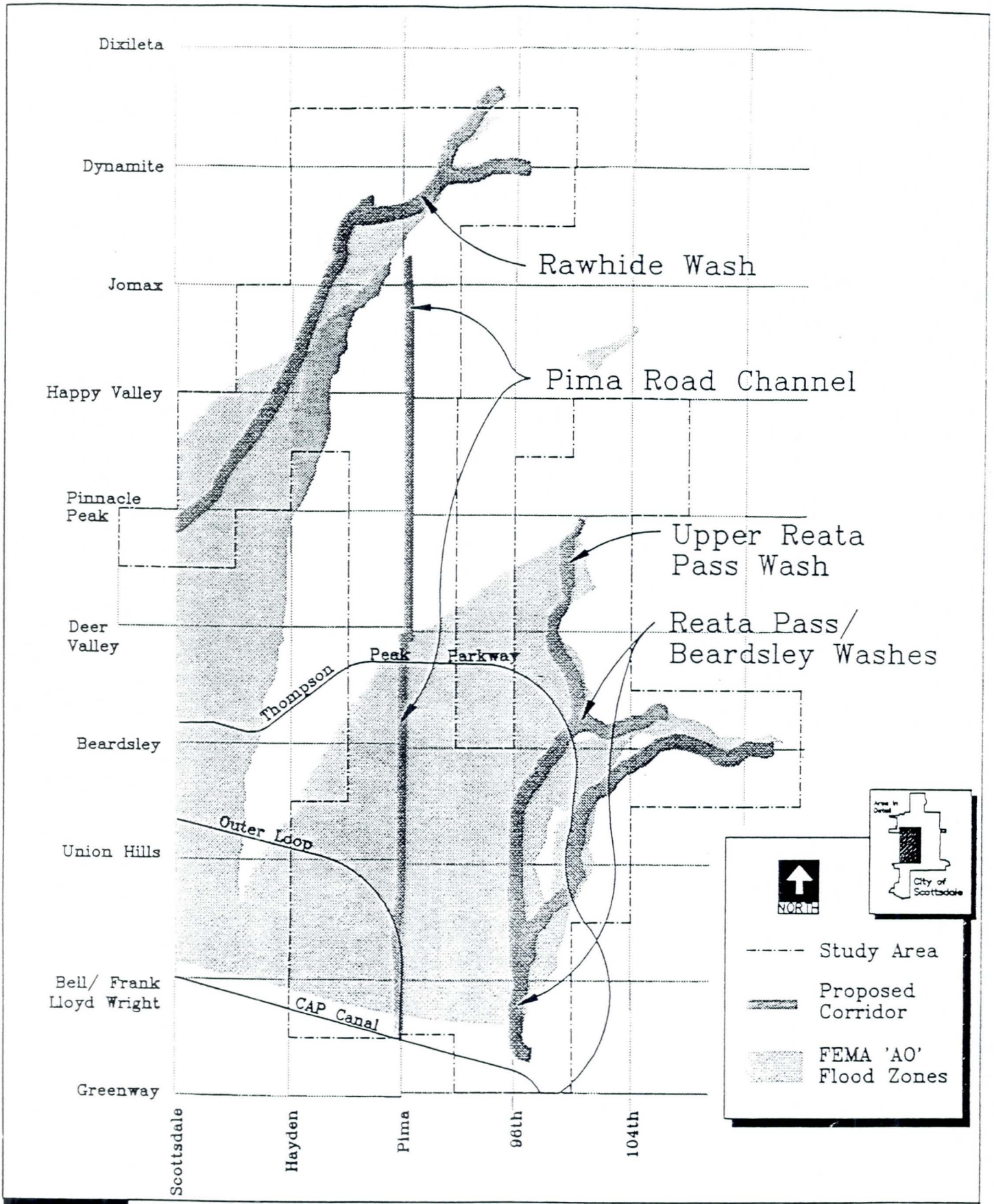
- Identifying Concepts - data gathering, survey/mapping, review of various treatments and alternatives (see Snapshot Report).

- Developing the Concepts - development of full-scale alternatives, integration of pubic concerns, refinement of hydrologic/hydraulic analyses, development of the Snapshot Study (see Specific Option Reports).

- Consolidating the Concepts - identification of specific issues and remedies; presentation of specific recommendations regarding identifiable environmental, aesthetic, planning, land-use, recreational and hydraulic issues, development of the Specific Option Reports.

- 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, represent 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 Project**.



Scale: 1" = 6000'

Principal Washes and Channels

City of Scottsdale
and
Greiner, Inc.

Figure I-1

The Desert Greenbelt

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Scottsdale D.G.
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RAWHIDE WASH
PREFERRED ALTERNATIVE REPORT

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CITY OF SCOTTSDALE
DESERT GREENBELT PROJECT

RAWHIDE WASH PREFERRED ALTERNATIVE

Definition of the Alternative

The Rawhide Wash is a natural drainage corridor. Natural containment is lacking in the southern portion of the corridor (Station 19+00 to Station 133+00). The upper portion of the corridor (above Station 133+00), although braided, is naturally contained. Below Pinnacle Peak Road (Station 31+50), alignment resolution will require input from public and private landowners and agencies. The project outlet is into Arizona State Land Department property within the City of Phoenix at Station 19+00. Between Pinnacle Peak Road and Jomax Road (Station 151+50), much of the land in and adjacent to the wash has been subdivided or developed for residential use. The existing development will require special considerations. Above the main apex (Station 120+00), the primary improvements are short floodwalls to connect natural features and direct flow into the main channel. Bridges are proposed at Scottsdale Road, Pinnacle Peak Road, Happy Valley Road, Jomax Road and Pima Road. The low-flow channel will be bridged at Los Portones.

Selection Rationale

<u>Station 19+00 to Station 63+00 (See Sheets RH1 and RH2)</u>

<u>Objectives/Issues</u>

- Numerous constraints are associated with the corridor alignment and outlet south of Pinnacle Peak Road:
  - For the outlet west of Scottsdale Road, natural containment does not exist for the 100-year event flow.
  - Between Scottsdale Road and Pinnacle Peak Road the channel is undefined.
    - City of Phoenix participation in identifying an outlet location.
    - Rawhide Theme Park participation in identifying alignment and design through their property.
  - The resolution of the outlet and channel alignment will require coordination between various groups including the Cities of Scottsdale and Phoenix, the State Land Department and the Flood Control District of Maricopa County.

- Development of the State Land west of Scottsdale Road is affected by the resolution of this issue.
- The details of this issue will have to be resolved before final design can begin.

- Adjacent commercial developments are impacted by corridor design.
  - Aesthetics are a priority due to high visibility from both roadways and commercial developments.
  - The Scottsdale Road bridge location should consider adjacent land use issues.
    - Access to properties on both sides of Scottsdale Road could be impacted.
    - Location is contingent upon intersection design and land use issues.
  - The corridor alignment will impact the Rawhide Theme Park parking lot and access.
  - The Pinnacle Peak Road bridge location is restricted on the west due to existing delivery access to the adjacent commercial development.
- The channel section from Pinnacle Peak Road to the outlet is a manmade cut trapezoidal channel with short levees on the overbank.
  - Erosion protection is necessary on the side slopes.
- Above Pinnacle Peak Road, the low-flow channel will be widened downstream from Station 38+00 to transition the channel under the bridge.
- Temporary flood control protection is in place from Stations 38+00 to 63+00 for existing residential developments on the west channel bank.
  - The existing development to the east, between Stations 45+00 and 61+00, is currently planning to construct a 100-year event floodwall to Federal Emergency Management Agency (FEMA) standards.
  - Investigations have determined that the existing flood protection to the west is inadequate for FEMA standards.
  - In addition to constructing a low-flow channel, the Desert Greenbelt will need to provide bank protection and floodwall improvements on the west.

    - The east floodwall must be provided by the Desert Greenbelt (with assessment) if the development does not construct as planned.

- Two issues are associated with the Los Portones Drive crossing:

  - To minimize both nuisance flow and maintenance requirements, a single span bridge has been selected to convey higher frequency storms such as the 10-year storm which will be contained within the low-flow channel.

    - Larger event storms will allow little freeboard under the low chord.

  - Existing elevations of Los Portones Drive at levee crossings (approaches to wash) are below the elevation required for containment of the 100-year event storm.

    - To meet FEMA requirements, regrading and provision of structural flood control at drive approaches to the wash will be necessary.

Hydrology/Hydraulics Summary

- Within the cut channel, velocities are up to 20 feet per second (fps) with flow depths of nearly five feet.

- Above the low-flow channel expansion at Pinnacle Peak Road, velocities within the overbanks are near nine fps with depths between one and three feet.

Constraints/Public Comment

- Owner concerns regarding alignment and stabilization treatments were registered by

  - Residential (Los Portones)

  - Commercial Properties at northeast and southeast corners of Scottsdale and Pinnacle Peak Roads

- Future resolution of the outlet location.

- Existing utilities within Scottsdale Road and Pinnacle Peak Road rights-of-way.

- Below Station 33+00, existing development severely limits channel alignment.

- Retention of the existing natural wash character.

Benefits/Impacts

- Containment of the 100-year storm event within designated drainage corridor eliminates FEMA designated flood hazard areas outside of the channel.

- Major roads will have all-weather crossings.

- Continuation of the multi-use path/trail system in conjunction with the General Plan.

- Grade separation for multi-use path/trail crossings.

- Protection of existing high risk residences and infrastructure from storm damage.

Station 63+00 to Station 133+00 (See Sheets RH3 to RH5)

Objectives/Issues

- A wet crossing will be provided for Miller Road (Station 63+00).

  - To meet FEMA requirements, regrading and provision of structural flood control at roadway approaches to the wash will be required.

- Levees or floodwalls are required north from Miller Road to the main apex (Station 120+00) on each side of the channel.

- An unlined trapezoidal low-flow channel will be constructed to provide conveyance along the alignment of existing sandy bottom wash braids.

- The Happy Valley Road crossing will be bridged.

  - A drop structure will provide additional channel depth for the bridge and clearance for multi-use path/trail.

  - The cut channel will contain the 100-year event flow downstream of the drop through the bridge.

  - The bridge deck will be about four feet above the existing grade.

- The minor tributary (Station 125+00) transitions into the main channel.

  - The eastern levee wraps to the east to contain the tributary flow.

- The construction of the levees will impact adjacent land use.

  - To the extent practicable, viable developable parcels should be retained.

- Remnant parcels may be left as open space to buffer existing residences or minimally developed as rest stops for multi-use path/trail users.

Hydrology/Hydraulics Summary

- Downstream of the drop structure at Happy Valley Road, maximum water depths are 13 feet above the low-flow channel invert elevation.
  - Low-flow channel invert cuts below existing grade average six to seven feet, with a maximum of 10 feet.
    - Velocities approach 16 fps within the low-flow channel.
  - Water depths within the overbanks range from two to four feet with velocities near eight fps.
- Upstream of the drop structure, depths range from three to five feet with velocities near eight fps.

Constraints/Public Comment

- Retention of the existing natural wash character.
- Continuation of pedestrian access from adjacent homes.
- The multi-use trail will remain in the sandy bottom wash.
- The location of the multi-use path between Happy Valley and Jomax Roads will not follow the natural channel alignment.

Benefits/Impacts

- Containment of the 100-year storm event within designated drainage corridor eliminates FEMA designated flood hazard areas outside of the channel.
- Grade separation for multi-use path/trail crossings.
- Major roads will have all-weather crossings.
- Continuation of the multi-use path/trail system in conjunction with the General Plan.
- Protection of infrastructure from storm damage.

Station 133+00 Upstream (See Sheets RH6 to RH12)

Objectives/Issues

- Construct containment necessary to direct all flows to the main channel and to the Pima Road bridge.
  - Recommend a low floodwall to reduce impact to surrounding environment
- Training dikes direct the flow through a bridge at Jomax Road.
- Due to the shallow channel, a grade separated crossing other than the bridge is necessary to accommodate multi-use path/trail.

Hydrology/Hydraulics Summary

- Within the main channel, depths are from three to five feet with velocities near eight fps.
- In the eastern tributary, depths are at three feet with velocities near seven fps.
  - Flow is braided across about 300 feet.

Constraints/Public Comment

- Maximize use of existing wash corridor.
- Retain natural desert wash character.

Benefits/Impacts

- Containment of the 100-year storm event within designated drainage corridor.
- Grade separation for multi-use path/trail crossings.
- Major roads will have all-weather crossings.
- Continuation of the multi-use path/trail system in conjunction with the General Plan.
- Protection of infrastructure from storm damage.

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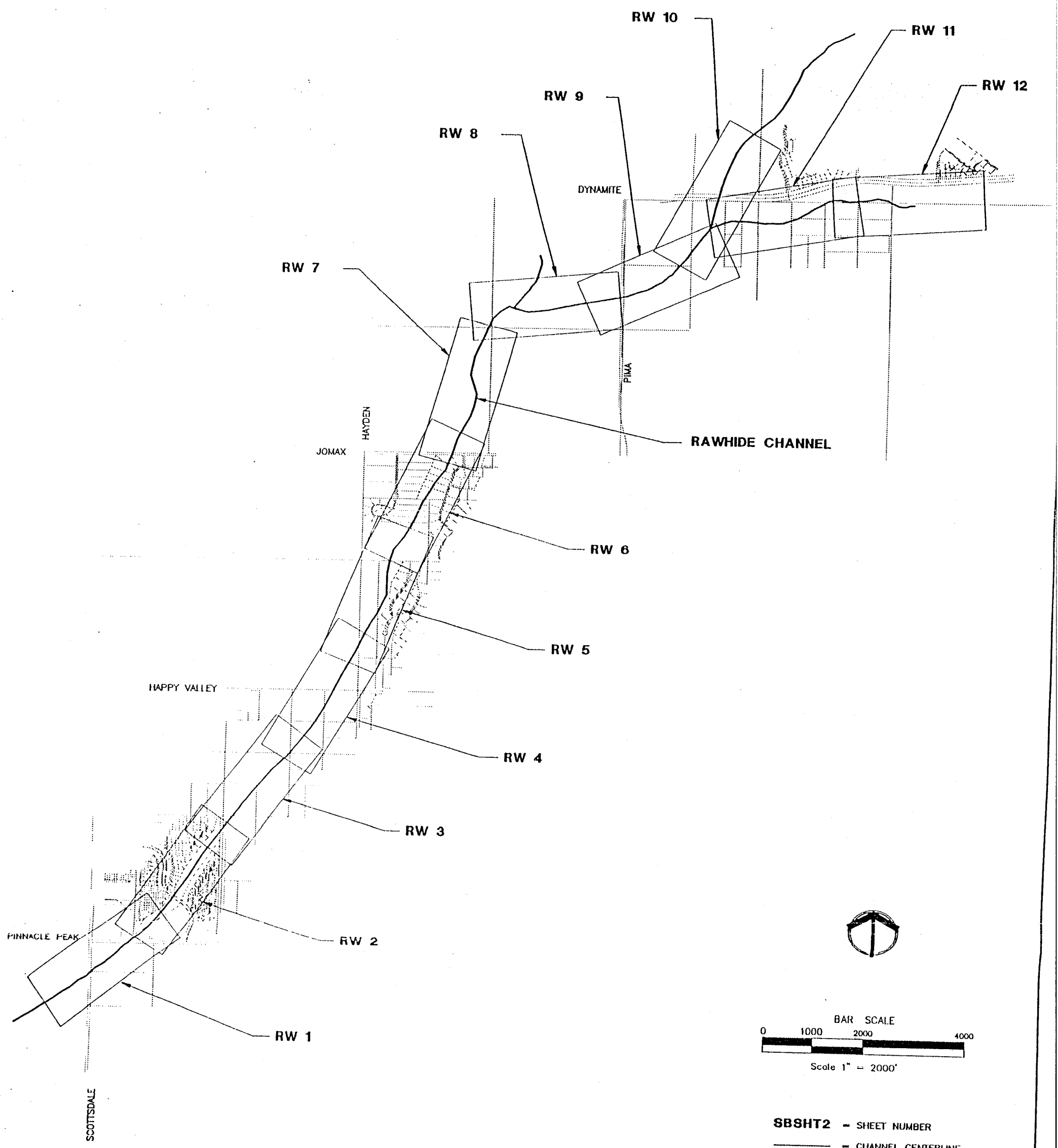


DRAWING NO. Key1 of Key1

PROJECT NAME
Rawhide Wash Channel

DRAWING TITLE
Preliminary 10% Plans

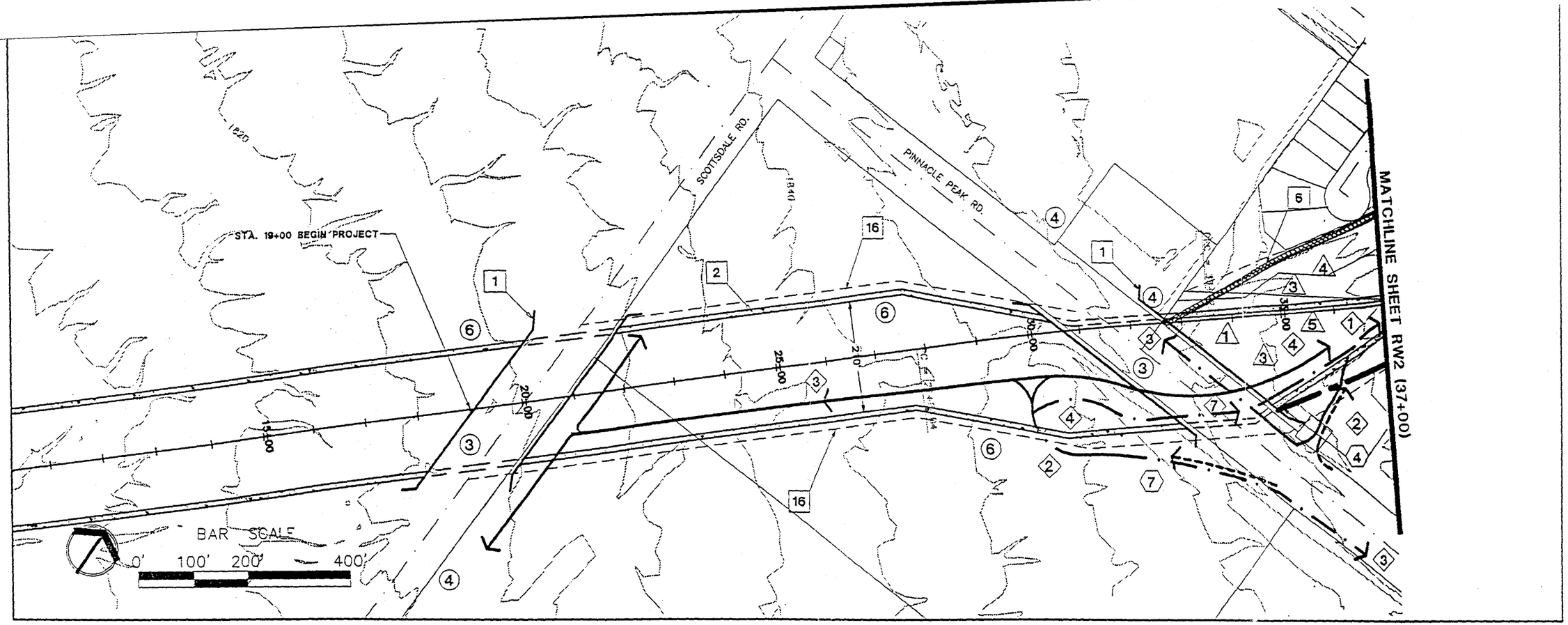
Greiner
Greiner, Inc.
Phoenix, AZ
Engineers, Architects

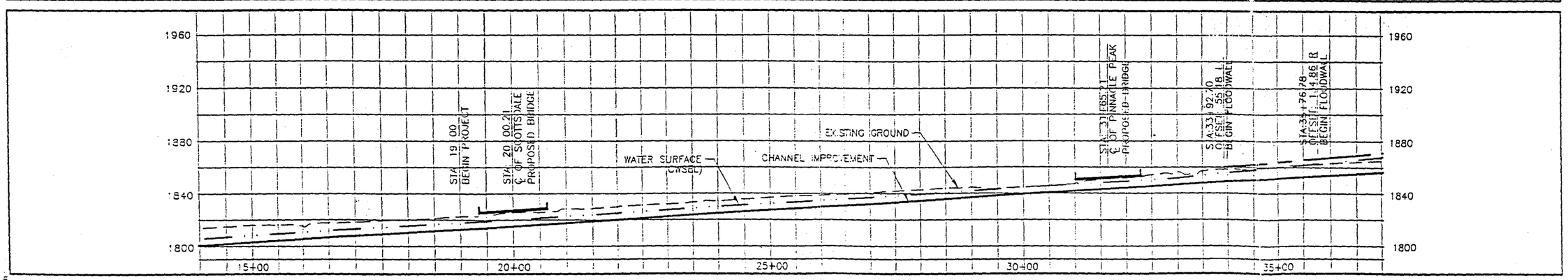
ENGINEERS

SEAL

PROJ. NO. E029102
JOB NO.
DESIGN W.C.L.
DRAWN M.T.C.
CHECKED R.E.P.
SCALE: AS NOTED

DATE	REVISIONS	BY	AUTH





CHANNEL IMPROVEMENTS

1. CONSTRUCT BRIDGE. (100YR. STORM)
2. CONCRETE SIDE SLOPE, 1:1 (TYP.)
6. IMPROVE EXISTING SIDE SLOPE AND FLOODWALL.
16. RIGHT OF WAY.

PATHS / TRAILS

1. PATH/TRAIL TO FOLLOW LOW FLOW CHANNELS OR NATURAL WASHES.
2. INSTALL SIGNAGE TO DIRECT PATH/TRAIL USERS.
3. LINKAGE OF MULTI-USE PATH/TRAIL INTO REGIONAL SYSTEM
4. PATH/TRAIL ACCESS OVER FLOODWALL/LEVEE.
7. SEPARATED CROSSING.

LAND USE

3. BRIDGE/BOX CULVERT PROVIDES AN ALL WEATHER CROSSING.
4. RETAIN ACCESS TO & FROM EXISTING DEVELOPMENT.
5. ADJACENT LAND USE IMPACTED BY FINAL ALIGNMENT.

MITIGATION

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.
4. RETAIN EXISTING VEGETATION TO EXTENT PRACTICABLE.
5. SALVAGE VEGETATION IMPACTED BY CONSTRUCTION.
6. REVEGETATE DISTURBED AREAS WHERE PRACTICABLE.

AESTHETIC APPLICATIONS

4. FILL OVER SOIL CEMENT LEVEE
7. INTERPRETIVE ART

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING

PROJ. NO.	E029102
JOB NO.	
DESIGN	W.G.L.
DRAWN	M.T.C.
CHECKED	S.E.S.
SCALE	AS NOTED

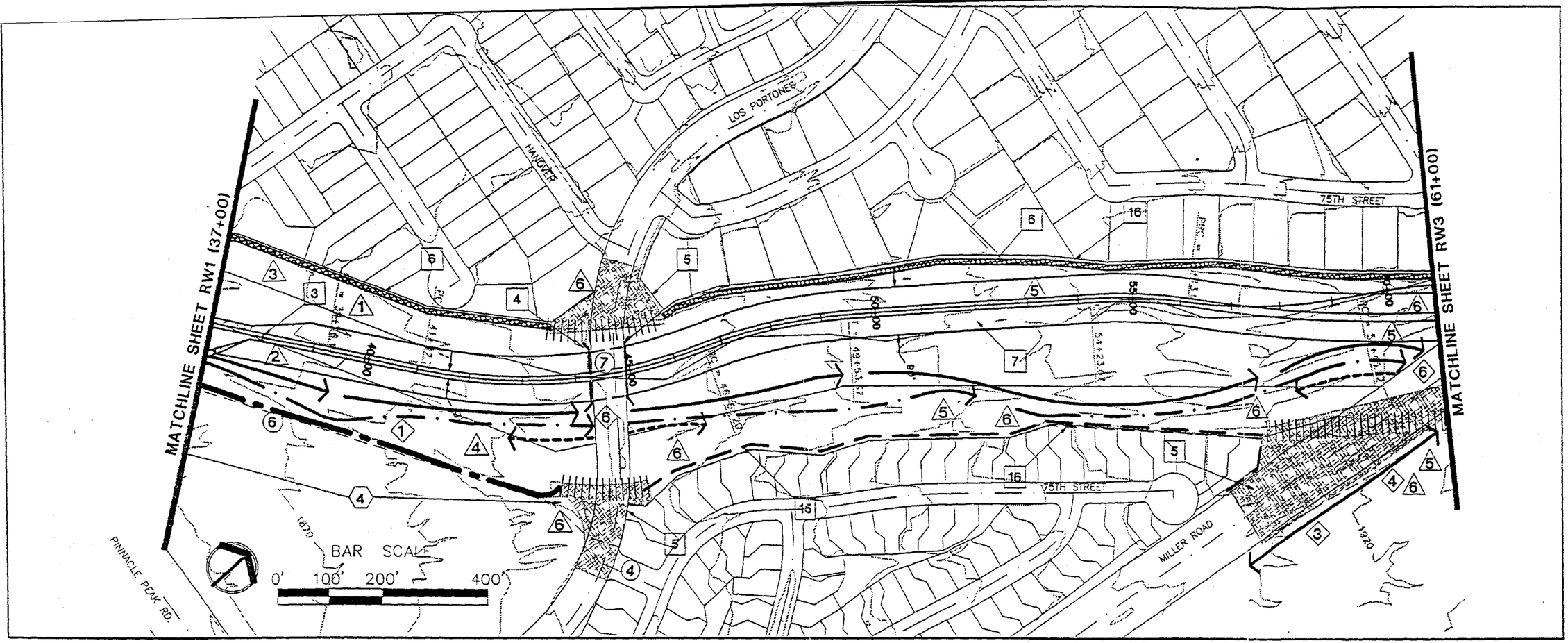
ENGINEERS

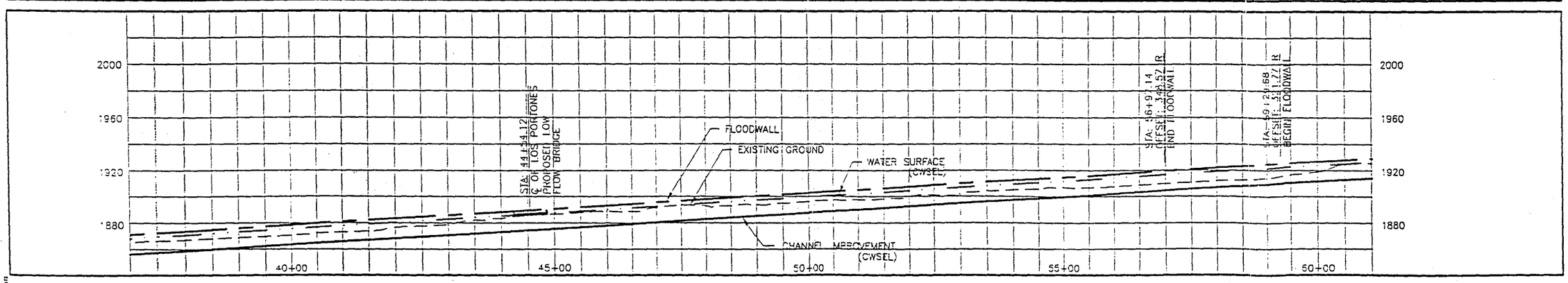
Greiner
Greiner, Inc.
Phoenix, AZ

PROJECT NAME: Rawhide Wash Channel

DRAWING TITLE: Preliminary 10% Plans

DRAWING NO. RW1 of RW1





CHANNEL IMPROVEMENTS

3. AT STA. 38+00 EXPAND LOW FLOW CHANNEL.
4. CONSTRUCT BRIDGE OVER LOW FLOW CHANNEL.
5. REGRADE ROADWAY APPROACH.
6. PROTECT/ARMOR EXISTING SIDE SLOPE AND FLOODWALL.
7. REVEGETATE SIDE SLOPE, 3:1. (TYP.)
15. FLOODWALL TO BE CONSTRUCTED BY ADJOINING SUBDIVISION DEVELOPERS.
16. RIGHT OF WAY.

PATHS / TRAILS

1. PATH/TRAIL TO FOLLOW LOW FLOW CHANNELS OR NATURAL WASHES.
2. INSTALL SIGNAGE TO DIRECT PATH/TRAIL USERS.
3. LINKAGE OF EXISTING MULTI-USE PATH/TRAIL INTO A REGIONAL SYSTEM.
4. PATH/TRAIL ACCESS OVER FLOODWALL/LEVEE.
6. LOCATE ROAD CROSSING FOR OPTIMUM SIGHT LINES.
7. MULTI-USE PATH/TRAIL GRADE SEPERATED CROSSING REQUIRES SEPARATE STRUCTURE.

LAND USE

4. RETAIN ACCESS TO & FROM EXISTING DEVELOPMENT.
6. ADJACENT LAND USE IMPACTED BY FINAL ALIGNMENT.
7. LOW FLOW CHANNEL IS BRIDGED.

MITIGATION

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.
4. RETAIN EXISTING VEGETATION TO EXTENT PRACTICABLE.
5. SALVAGE VEGETATION IMPACTED BY CONSTRUCTION.
6. REVEGETATE DISTURBED AREAS WHERE PRACTICABLE.

AESTHETIC APPLICATIONS

4. FILL OVER SOIL CEMENT LEVEE

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- CHANNEL CENTERLINE AND STATIONING (10+00)

REVISIONS	DATE	BY	AUTH

ENGINEERS

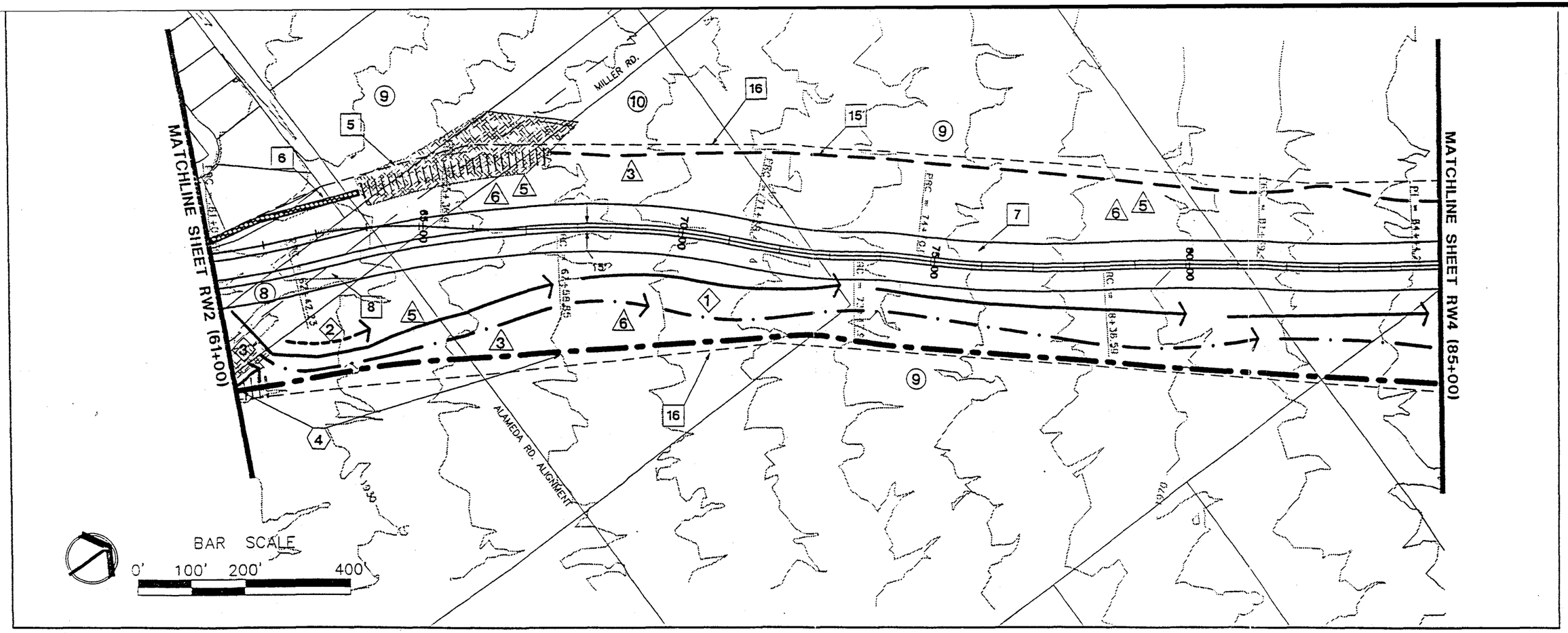
PROJ. NO. E029102
JOB NO.
DESIGN. W.C.L.
DRAWN. M.T.C.
CHECKED S.E.S.
SCALE: AS NOTED

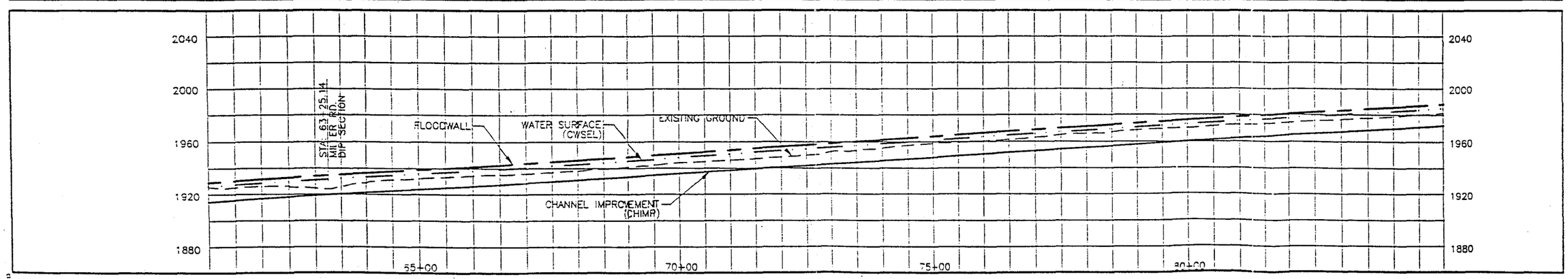
Greiner
Greiner, Inc.
Phoenix, AZ

PROJECT TITLE: Rawhide Wash Channel

DRAWING TITLE: Preliminary 10% Plans

DRAWING NO.
RW2 of RW1





CHANNEL IMPROVEMENTS

5. REGRADE ROADWAY APPROACH.
6. IMPROVE EXISTING SIDE SLOPE AND FLOODWALL.
7. REVEGETATE SIDE SLOPE, 3:1. (TYP.) (BACKSIDE OF LEVEE FOR AESTHETICS)
8. CONSTRUCT DIP CROSSING.
15. FLOODWALL TO BE CONSTRUCTED BY ADJOINING SUBDIVISION DEVELOPERS.
16. RIGHT OF WAY.

PATHS / TRAILS

1. PATH/TRAIL TO FOLLOW LOW FLOW CHANNELS OR NATURAL WASHES.
2. INSTALL SIGNAGE TO DIRECT PATH/TRAIL USERS.
3. LINKAGE OF EXISTING MULTI-USE PATH/TRAIL INTO REGIONAL SYSTEM.

LAND USE

8. WET CROSSING WILL BE UNUSABLE WHEN FLOODED.
9. RETAIN VIABLE DEVELOPABLE PARCEL TO EXTENT PRATICABLE.
10. DETERMINE MOST APPROPIATE USE REMNANT PARCEL.

MITIGATION

3. COLOR, FORM, AND TEXTURE BLEND W/ THE DESERT SETTING.
5. SALVAGE VEGETATION IMPACTED BY CONSTRUCTION.
6. REVEGETATE DISTURBED AREAS WHERE PRACTICABLE.

AESTHETIC APPLICATIONS

4. FILL OVER SOIL CEMENT LEVEE

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING
- 5' CONTOURS

REVISIONS	DATE	BY	APP

PROJ. NO. E029102
JOB NO.
DESIGN W.G.L.
DRAWN M.T.G.
CHECKED S.C.S.
SCALE: AS NOTED

ENGINEERS

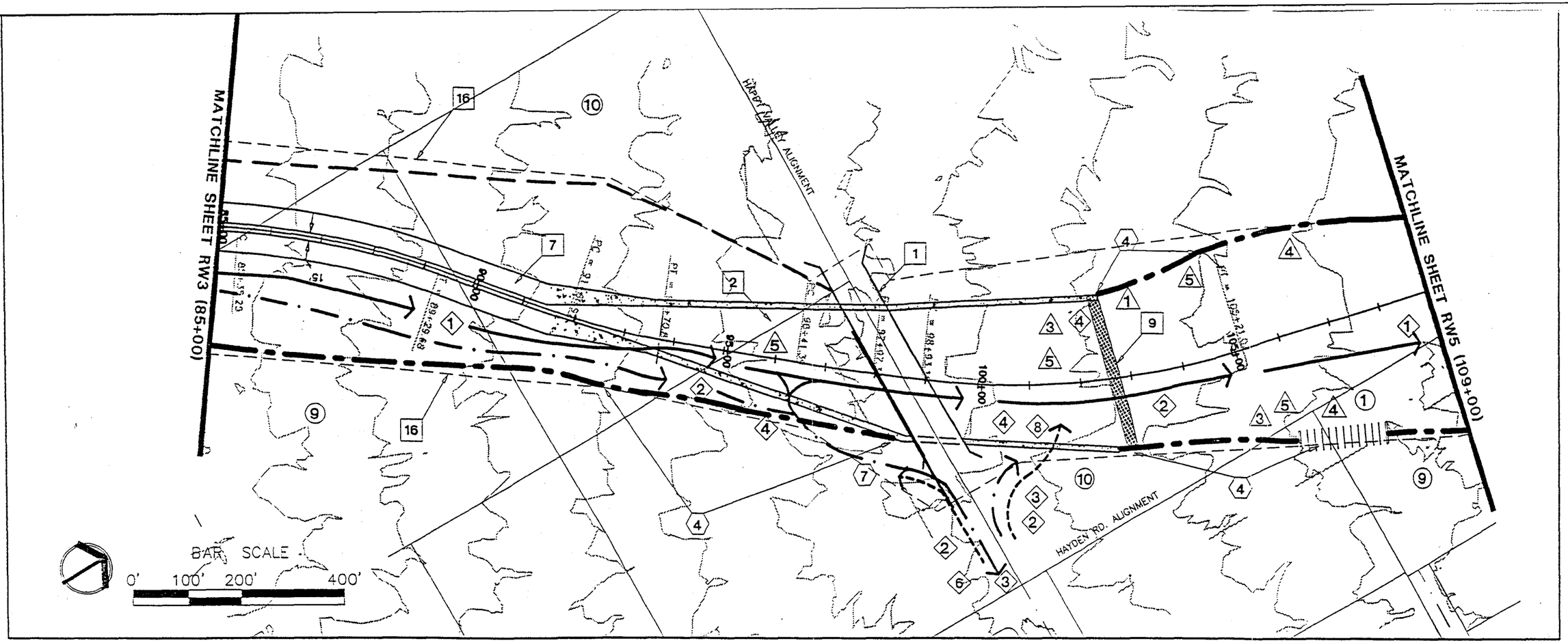
SEAL

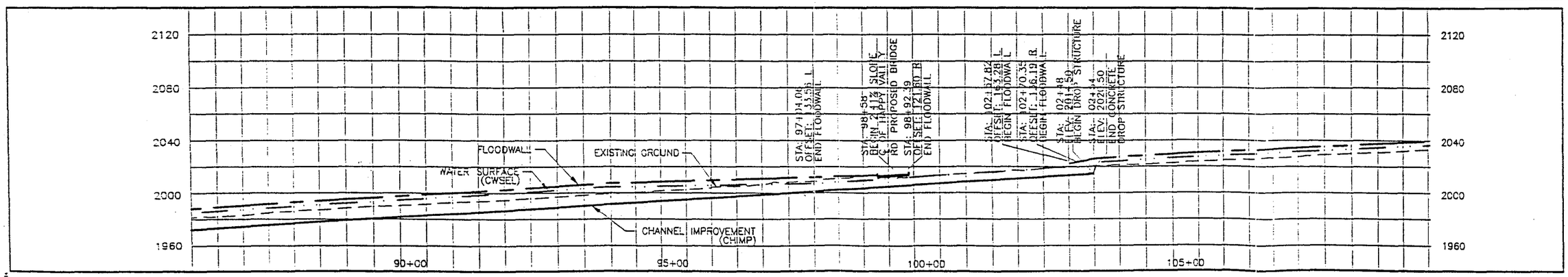
Greiner
Greiner, Inc.
Phoenix, AZ

PROJECT NAME
Rawhide Wash Channel

Preliminary 10% Plans

DRAWING NO.
RW3 of RW





CHANNEL IMPROVEMENTS

1. CONSTRUCT BRIDGE. (100YR. STORM)
2. CONCRETE SIDE SLOPE, 1:1. (TYP.)
7. REVEGETATE SIDE SLOPE, 3:1. (TYP.)
9. CONCRETE DROP STRUCTURE.
16. RIGHT OF WAY.

PATHS / TRAILS

1. PATH/TRAIL TO FOLLOW LOW FLOW CHANNELS OR NATURAL WASHES.
2. INSTALL SIGNAGE TO DIRECT PATH/TRAIL USERS.
3. LINKAGE OF EXISTING MULTI-USE PATH/TRAIL INTO A REGIONAL SYSTEM.
4. PATH/TRAIL ACCESS OVER FLOODWALL/LEVEE.
6. LOCATE ROAD CROSSING FOR OPTIMUM SIGHT LINES.
8. MULTI-USE PATH CURRENTLY UNDER STUDY IN GENERAL PLAN AMENDMENT.

LAND USE

1. IMPROVEMENTS DESIGNED TO FACILITATE WASH ACCESS TO ADJACENT PROPERTY OWNERS.
9. RETAIN VIABLE DEVELOPABLE PARCEL TO EXTENT PRACTICABLE.
10. DETERMINE MOST APPROPIATE USE OF REMNANT PARCEL.

MITIGATION

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.
4. RETAIN EXISTING VEGETATION TO EXTENT PRACTICABLE.
5. SALVAGE VEGETATION IMPACTED BY CONSTRUCTION.

AESTHETIC APPLICATIONS

4. FILL OVER SOIL CEMENT LEVEE
7. INTERPRETIVE ART

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING
- 5' CONTOURS

REVISIONS	DATE	BY	AUTH

ENGINEERS

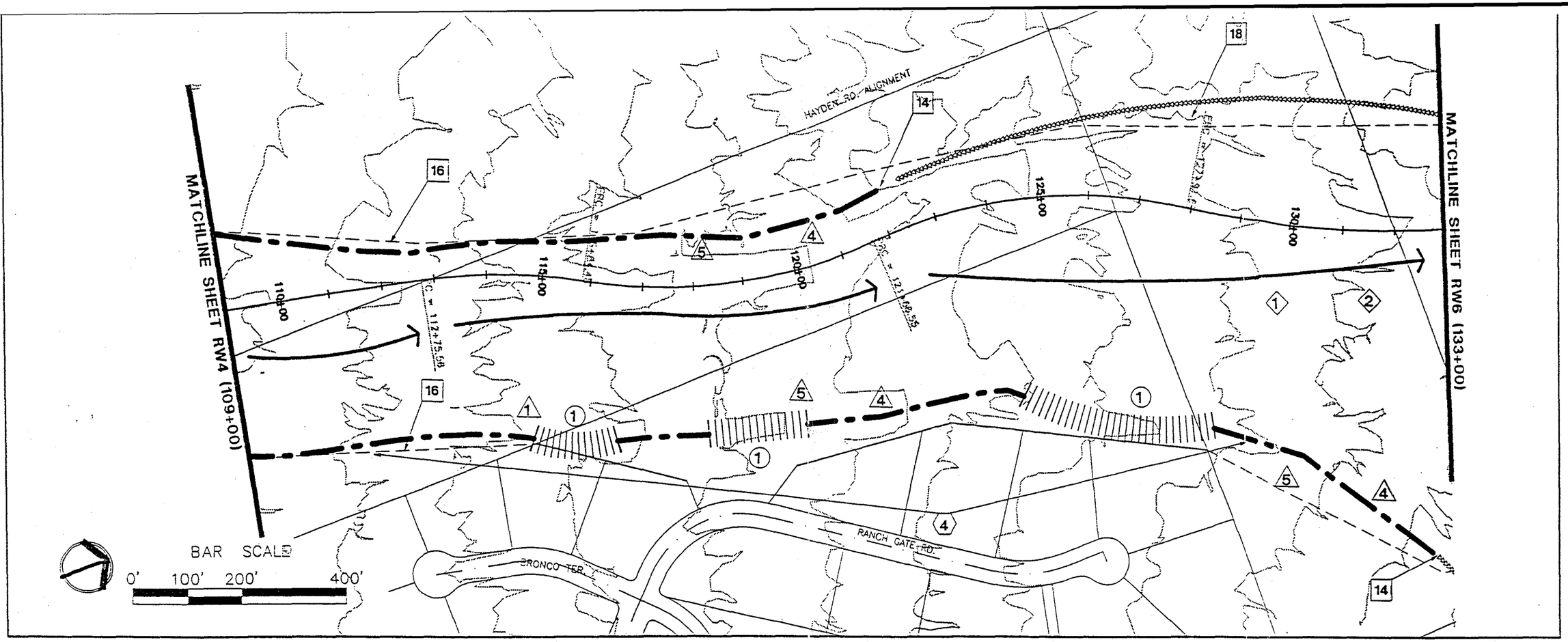
PROJ. NO. E029102
JOB NO.
DESIGN W.G.L.
DRAWN M.T.G.
CHECKED S.E.S.
SCALE: AS NOTED

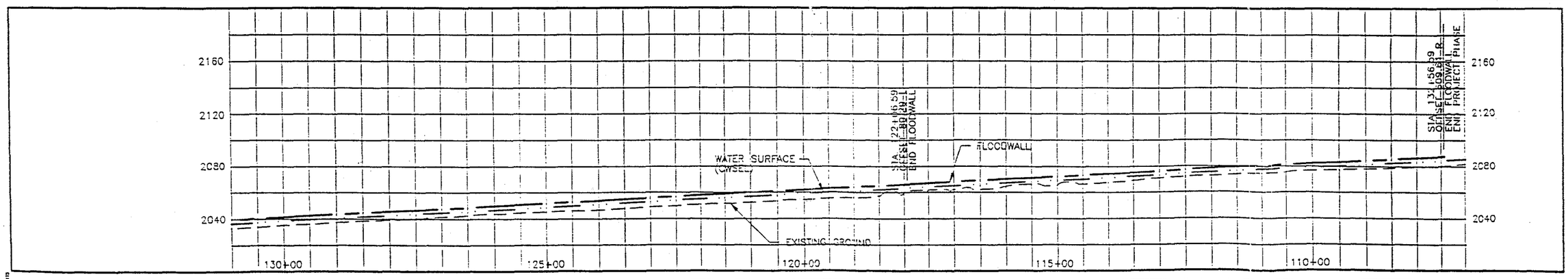
Greiner
Greiner, Inc.
Phoenix, AZ

PROJECT NAME: Rawhide Wash Channel

DRAWING TITLE: Preliminary 10% Plans

DRAWING NO.
RW4 of RW





CHANNEL IMPROVEMENTS

14. TIE INTO EXISTING BANK/ NATURAL CONTAINMENT.
16. RIGHT OF WAY.
18. RIGHT OF WAY IS AT 100-YEAR FLOODPLAIN.

PATHS / TRAILS

1. TRAILS TO FOLLOW LOW-FLOW CHANNELS OR NATURAL WASHES.
2. INSTALL SIGNAGE TO DIRECT TRAIL USERS.

LAND USE

1. IMPROVEMENTS DESIGNED TO FACILITATE WASH ACCESS FOR ADJACENT PROPERTY OWNERS.

MITIGATION

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.
4. RETAIN EXISTING VEGETATION TO EXTENT PRACTICABLE.
5. SALVAGE VEGETATION IMPACTED BY CONSTRUCTION.

AESTHETIC APPLICATIONS

4. FILL OVER SOIL CEMENT LEVEE

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING
- 5' CONTOURS

AUTH	BY	REVISIONS	DATE

ENGINEERS

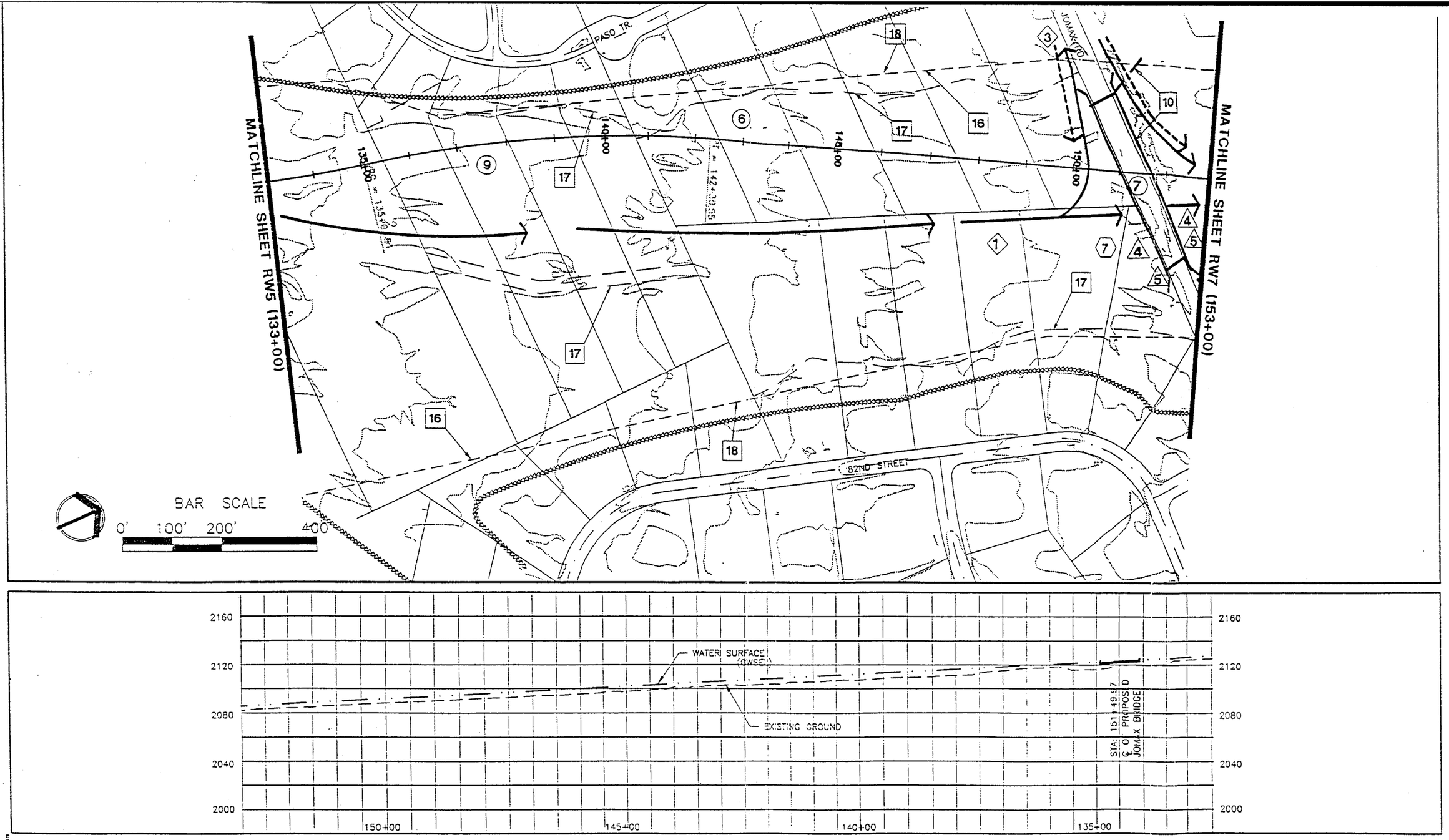
PROJ. NO. E029102
JOB NO.
DESIGN W.C.L.
DRAWN M.T.C.
CHECKED S.E.S.
SCALE AS NOTED

Greiner
Greiner, Inc.
Phoenix, AZ

PROJECT PHASE: Preliminary 10% Plans

DRAWING TITLE: Rawhide Wash Channel

DRAWING NO.
RW5 of RW



CHANNEL IMPROVEMENTS

10. CONSTRUCT BRIDGE AND TRAINING DIKES. (FUTURE N.P.O.T.P.)
16. RIGHT OF WAY.
17. EXISTING DRAINAGE EASEMENT.
18. RIGHT OF WAY IS AT 100-YEAR FLOODPLAIN

PATHS / TRAILS

1. TRAILS TO FOLLOW LOW-FLOW CHANNELS OR NATURAL WASHES.
3. LINKAGE SIGNAGE TO DIRECT PATH/TRAIL USERS

LAND USE

6. ADJACENT LAND USE IMPACTED BY FINAL ALIGNMENT
7. LOW FLOW CHANNEL IS BRIDGED.
9. RETAIN VIABLE DEVELOPABLE PARCEL TO EXTENT PRACTICABLE

MITIGATION

4. RETAIN EXISTING VEGETATION TO EXTENT PRACTICABLE.
5. SALVAGE VEGETATION IMPACTED BY CONSTRUCTION.

AESTHETIC APPLICATIONS

7. INTERPRETIVE ART

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING
- 5' CONTOURS

REVISIONS | DATE | BY

PROJ. NO. E029102
JOB NO.
DESIGN W.C.L.
DRAWN M.T.C.
CHECKED S.E.S.
SCALE: AS NOTED

ENGINEERS

Greiner
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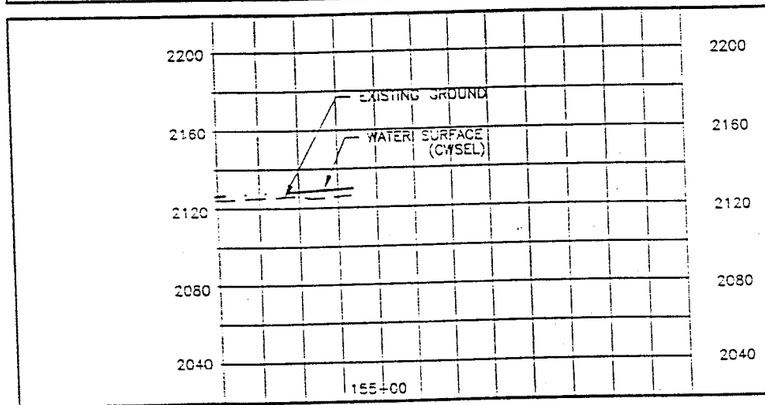
Phoenix, AZ
Authorization No. 12

PROJECT NAME: Rawhide Wash Channel

DRAWING TITLE: Preliminary 10% Plans

DRAWING NO. RW6 of RW



CHANNEL IMPROVEMENTS

13. EXACT LOCATION OF CONTAINMENT FEATURE TO BE DETERMINED VIA MASTER PLAN OF PROPERTY.
16. RIGHT OF WAY.
19. FUTURE IMPROVEMENTS NECESSARY TO DIRECT FLOWS UNDER JOMAX BRIDGE

PATHS / TRAILS

1. TRAILS TO FOLLOW LOW-FLOW CHANNELS OR NATURAL WASHES.
3. LINKAGE OF EXISTING MULTI-USE PATH/TRAIL INTO A REGIONAL SYSTEM
8. MULTI-USE PATH ALIGNMENT CURRENTLY UNDER STUDY IN GENERAL PLAN AMENDMENT

LAND USE

MITIGATION

AESTHETIC APPLICATIONS

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING
- 5' CONTOURS

REVISIONS | DATE | BY

PROJ. NO. E029102
JOB NO
DESIGN W.C.L.
DRAWN M.T.C.
CHECKED S.L.S.
SCALE: AS NOTED

ENGINEERS

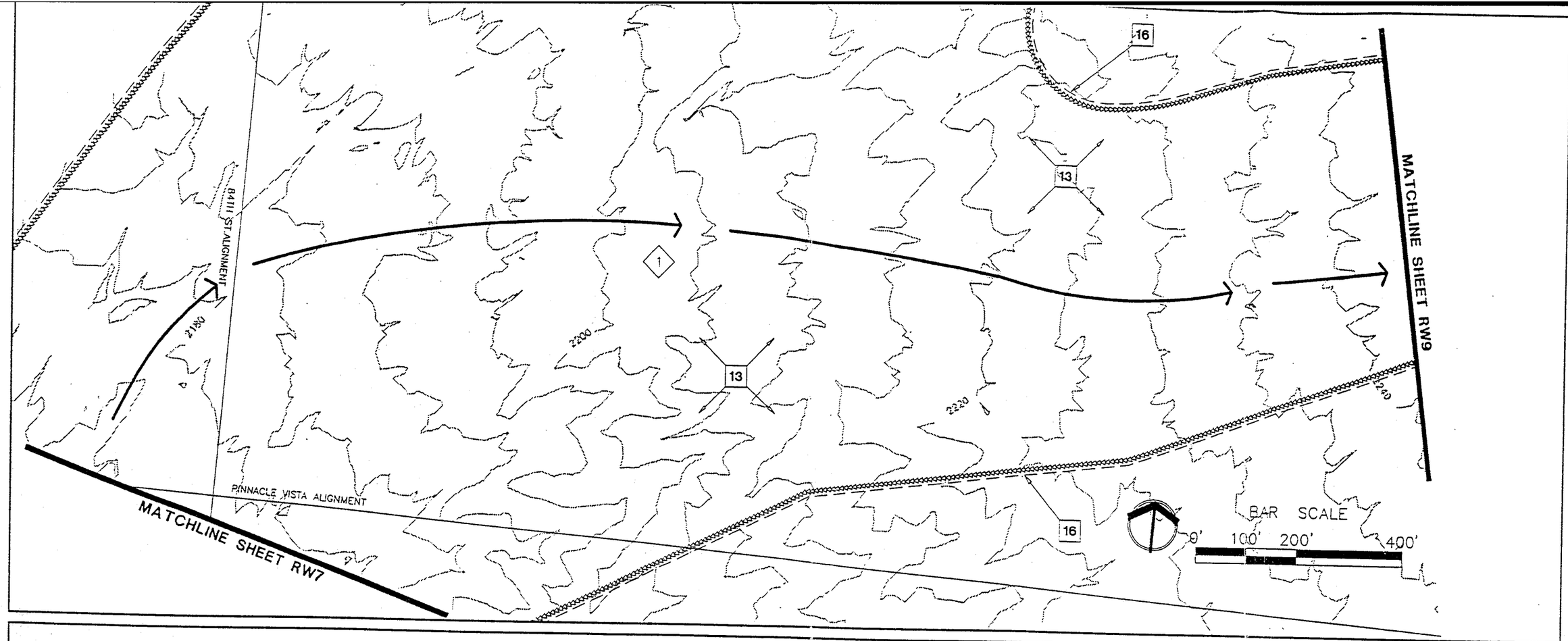
SEAL

Greiner
Greiner, Inc.
Phoenix, AZ

PROJECT TITLE: Rawhide Wash Channel

DRAWING TITLE: Preliminary 10% Plans

DRAWING NO.
RW7 of R



CHANNEL IMPROVEMENTS

13. EXACT LOCATION OF CONTAINMENT FEATURE TO BE DETERMINED VIA MASTER PLAN OF PROPERTY.
16. RIGHT OF WAY.

PATHS / TRAILS

1. TRAILS TO FOLLOW LOW-FLOW CHANNELS OR NATURAL WASHES.

LAND USE

MITIGATION

AESTHETIC APPLICATIONS

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING

REVISIONS	DATE	BY	APPD

PROJ. NO. E029102
JOB NO.
DESIGN W.C.L.
DRAWN M.T.C.
CHECKED S.E.S.
SCALE AS NOTED

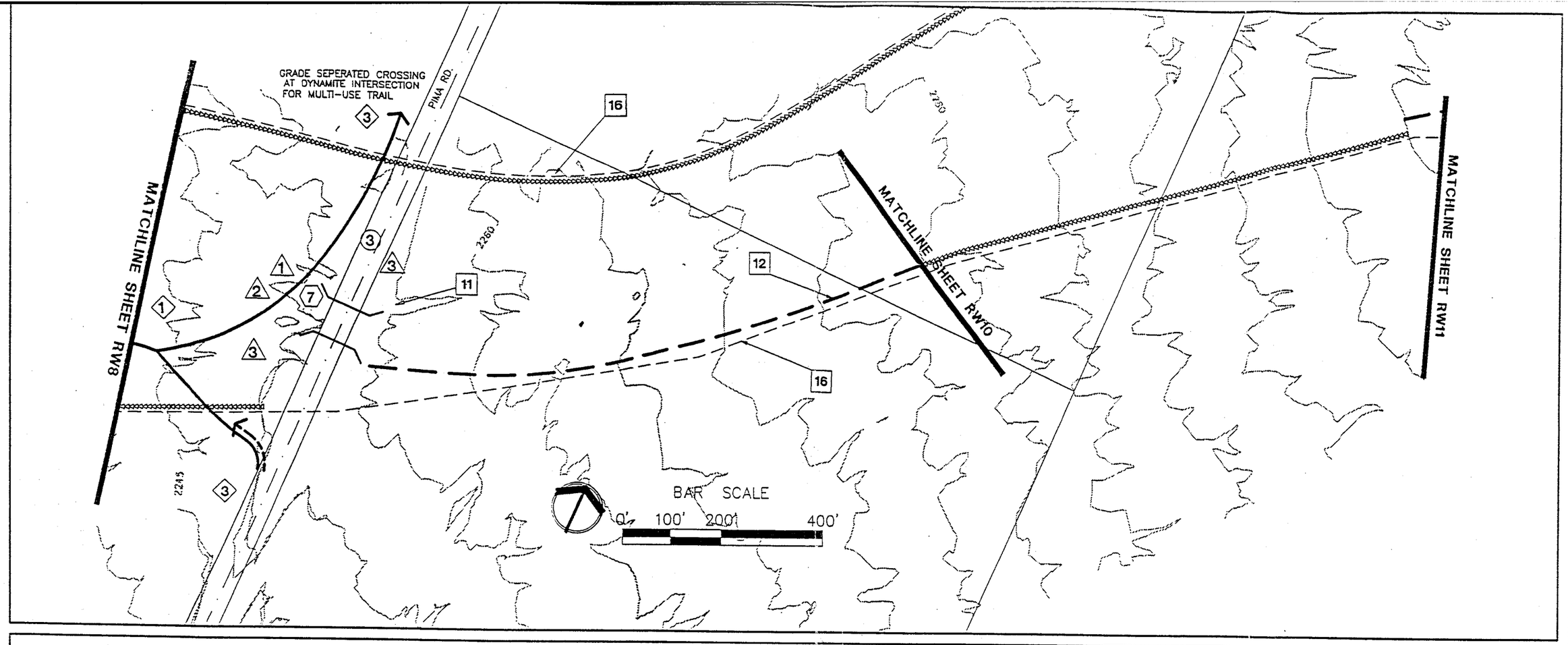
ENGINEERS

Greiner
Greiner, Inc.
Phoenix, AZ

PROJECT NAME Rawhide Wash Channel

Drawing TITLE Preliminary 10% Plans

DRAWING NO.
RW8 of RW



CHANNEL IMPROVEMENTS

11. CONSTRUCT BRIDGE. (BOX SERIES)
12. CONSTRUCT OVERBANK FLOODWALL TO CONTAIN BREAKOUT FLOW.
16. RIGHT OF WAY.

PATHS / TRAILS

1. TRAILS TO FOLLOW LOW-FLOW CHANNELS OR NATURAL WASHES.
3. LINKAGE OF EXISTING MULT-USE PATH/TRAIL INTO A REGIONAL SYSTEM
4. TRAIL ACCESS OVER FLOODWALL/LEVEE.
7. MULTI-USE PATHS / TRAILS GRADE SEPERATED CROSSING REQUIRES SEPARATE STRUCTURE.
8. MULTI-USE PATH ALIGNMENT CURRENTLY UNDER STUDY IN GENERAL PLAN AMENDMENT

LAND USE

3. BRIDGE/BOX CULVERT PROVIDES AN ALL WEATHER CROSSING.

MITIGATION

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.

AESTHETIC APPLICATIONS

7. INTERPRETIVE ART

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING

REVISIONS	DATE	BY	APPD

ENGINEERS

PROJ. NO. E029102
JOB NO.
DESIGN W.C.L.
DRAWN M.T.C.
CHECKED S.E.S.
SCALE AS NOTED

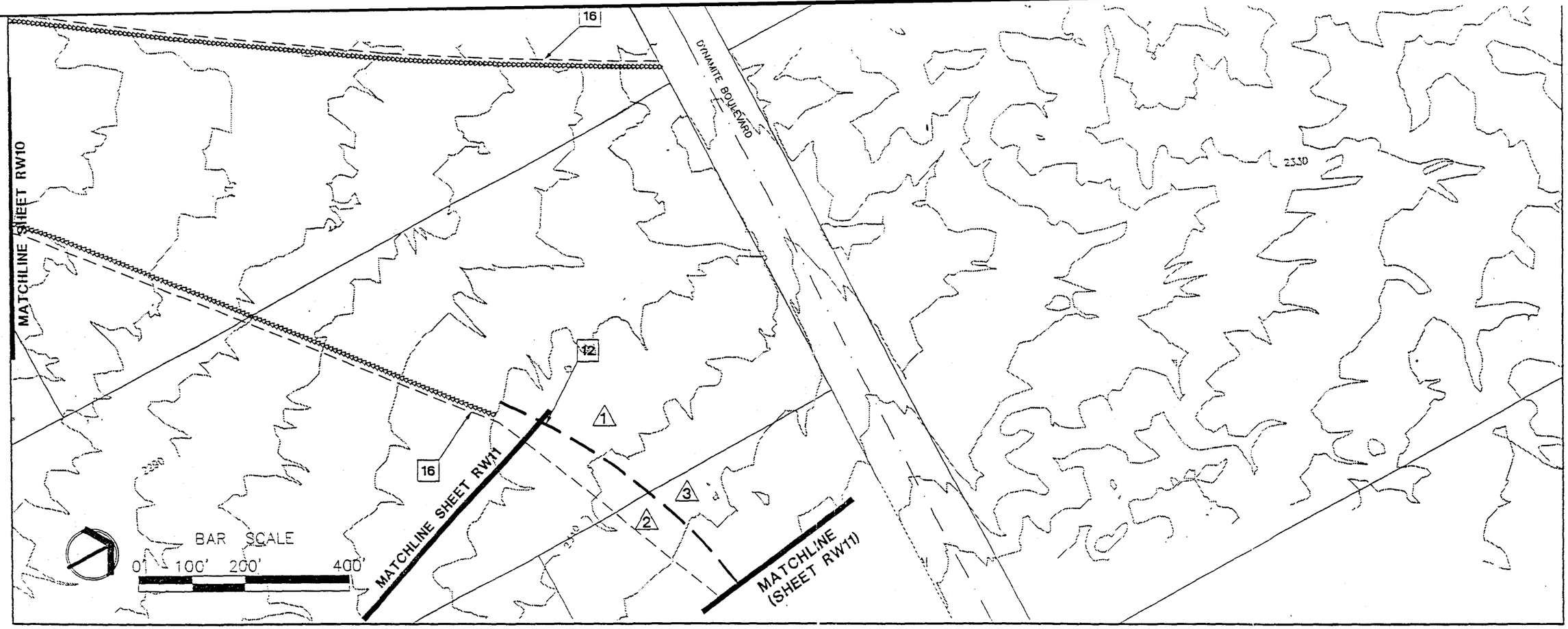
SEAL

Greiner
Greiner, Inc.
Phoenix, AZ
Engineers, Architects

PROJECT TITLE
Rawhide Wash Channel

DRAWING TITLE
Preliminary 10% Plans

DRAWING NO.
RW9 of RW11



CHANNEL IMPROVEMENTS

12. CONSTRUCT OVERBANK FLOODWALL TO CONTAIN BREAKOUT FLOW.
16. RIGHT OF WAY.

PATHS / TRAILS

LAND USE

MITIGATION

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.

AESTHETIC APPLICATIONS

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING
- 5' CONTOURS

REVISIONS	DATE	BY	APP'D

ENGINEERS

PROJ. NO. E029102
JOB NO.
DESIGN W.C.L.
DRAWN M.T.C.
CHECKED S.E.S.
SCALE: AS NOTED

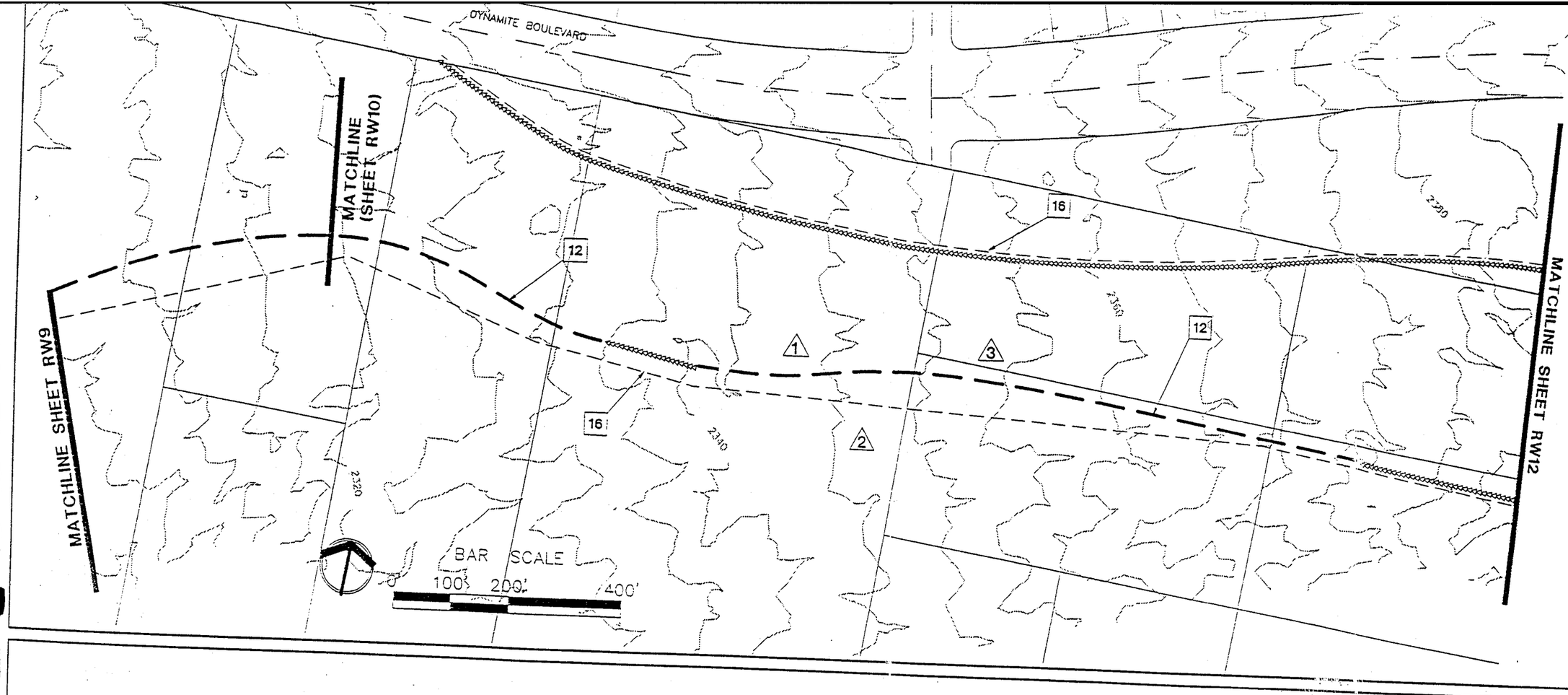
SEAL

Greiner
Greiner, Inc.
Phoenix, AZ
Engineers Architects

PROJECT TITLE
Rawhide Wash Channel

DRAWING TITLE
Preliminary 10% Plans

DRAWING NO.
RW10 of RW1



CHANNEL IMPROVEMENTS

12. CONSTRUCT OVERBANK FLOODWALL TO CONTAIN BREAKOUT FLOW.
16. RIGHT OF WAY.

PATHS / TRAILS

LAND USE

MITIGATION

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.

AESTHETIC APPLICATIONS

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING

ENGINEERS

SEAL

PROJ. NO. E029102
JOB NO.
DESIGN W.C.L.
DRAWN M.T.C.
CHECKED S.E.S.
SCALE AS NOTED

DATE

REVISIONS

BY

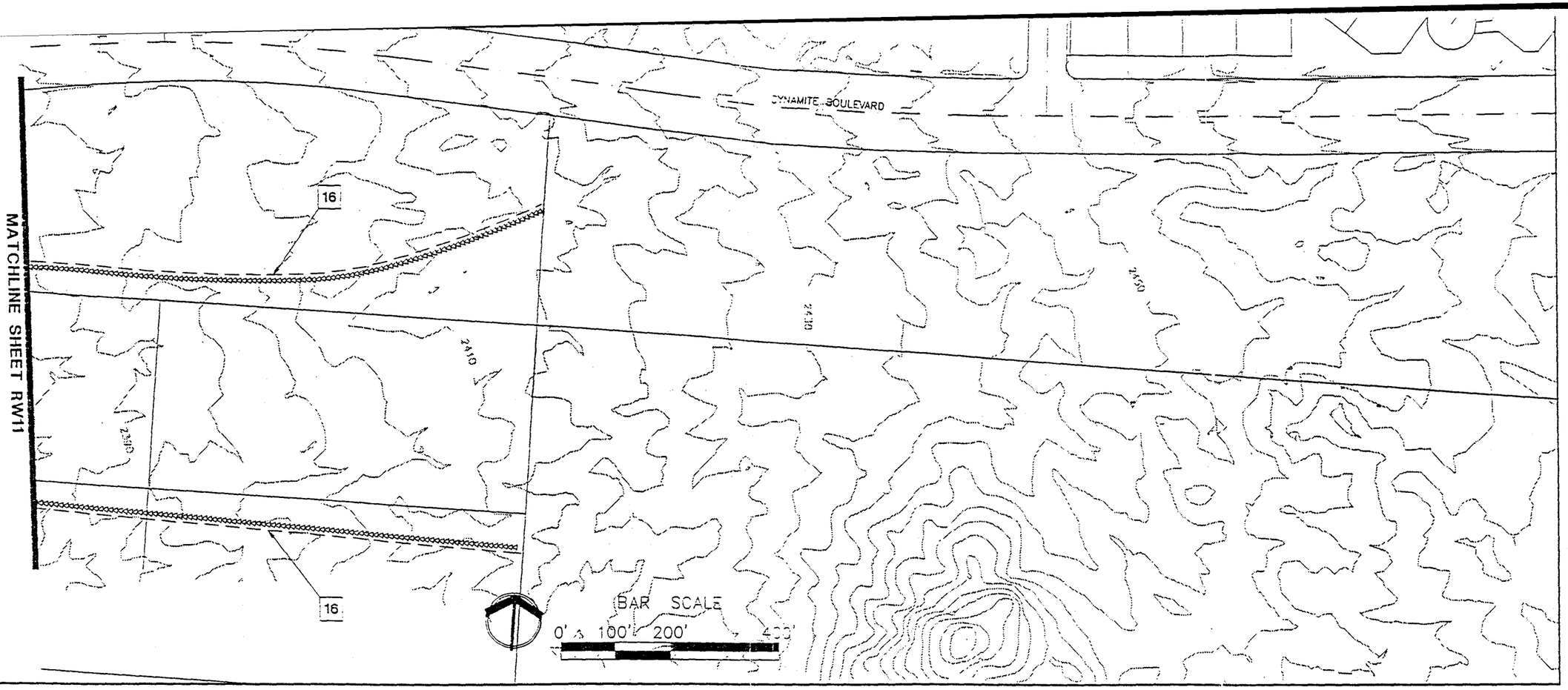
AUTH

Greiner
Greiner, Inc.
Phoenix, AZ

PROJECT NAME
Rawhide Wash Channel

DRAWING TITLE
Preliminary 10% Plans

DRAWING NO.
RW11 of RW



CHANNEL IMPROVEMENTS

16. RIGHT OF WAY.

PATHS / TRAILS

LAND USE

MITIGATION

AESTHETIC APPLICATIONS

LEGEND

- MULTI-USE TRAIL
- MAINTENANCE ACCESS
- PATH
- FLOODWALL
- CHANNEL RIGHT OF WAY
- SOIL CEMENT LEVEE
- NATURAL CONTAINMENT
- ACCESS LEVEE
- CONCRETE SLOPE
- BANK PROTECTION
- REGRADE
- DROP STRUCTURE
- GRADE CUT
- 10+00 CHANNEL CENTERLINE AND STATIONING
- 5' CONTOURS

REVISIONS | BY | APP

ENGINEERS

PROJ. NO. E029102
JOB NO.
DESIGN W.G.L.
DRAWN M.L.C.
CHECKED S.L.S.
SCALE: AS NOTED

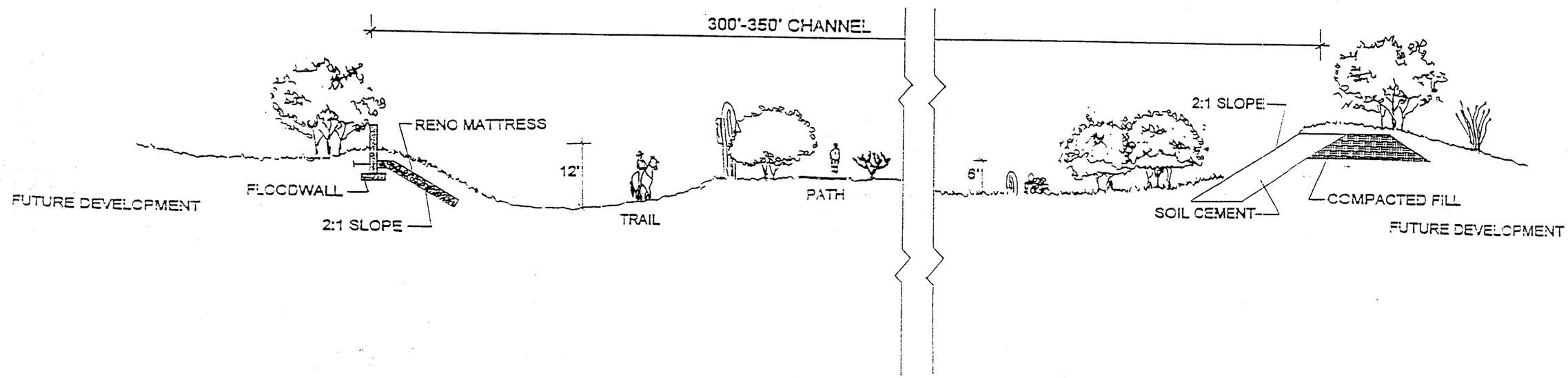
Greiner
Greiner, Inc.
Phoenix, AZ

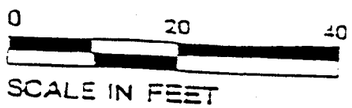
PROJECT NAME: Rawhide Wash Channel

DRAWING TITLE: Preliminary 10% Plans

DRAWING NO.
RW12 of RW

RAWHIDE CHANNEL FROM MILLER ROAD TO HAPPY VALLEY ROAD

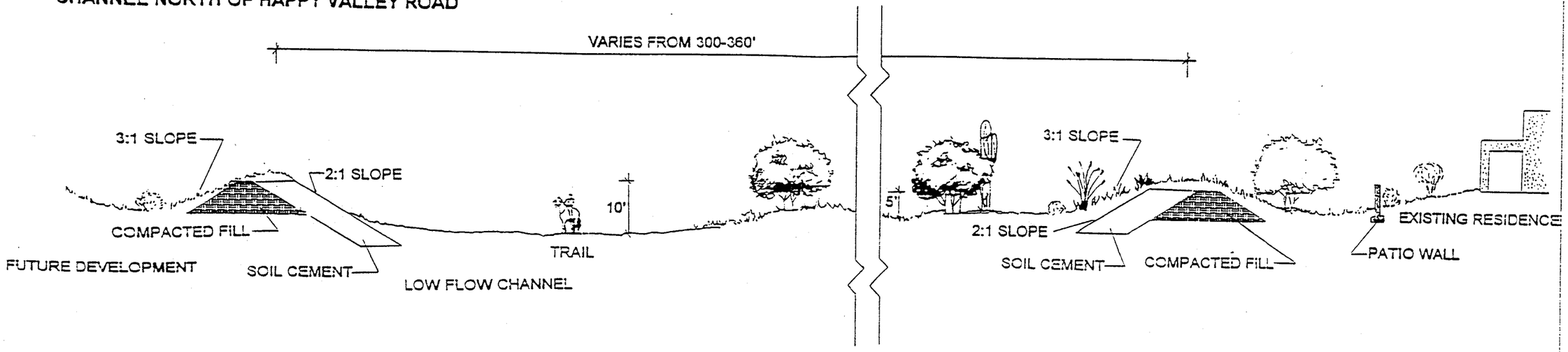




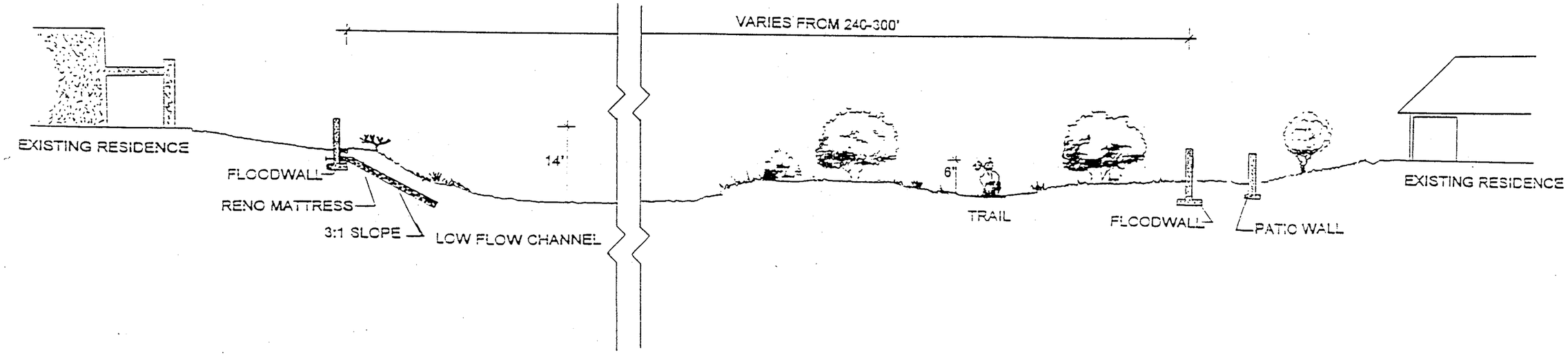
VIEWS TO NORTH

The Desert Greenbelt

CHANNEL NORTH OF HAPPY VALLEY ROAD



CHANNEL SOUTH OF ALAMEDA DRIVE ALIGNMENT



0 20' 40'

SCALE: 1" = 20'

VIEWS TO NORTH

CROSS SECTIONS OF RAWHIDE CHANNEL

The Desert Greenbelt