

SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

EXECUTIVE SUMMARY AND CONCEPT PLANS

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**Prepared by:
Stanley Consultants, Inc.**

**In Association With:
Logan Simpson Design, Inc.**

SCI # 15586

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City of Phoenix



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

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Appendices

Appendix A Concept Plans

Other Documentation: (Under Separate Cover)

Final Report
 Technical Volume 1 – Hydrology Analysis
 Technical Volume 2 – Hydraulic Analysis
 Technical Volume 3 – Survey
 Existing Right-of-Way and Easement Data
 Class I Cultural Resource Report
 Preliminary Initial Site Assessment Report (PISA Report)





SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

1.0 Introduction

The purpose of the Scottsdale Road Corridor Drainage Master Plan is to assess the magnitude, frequency and extent of regional flooding that occurs along Scottsdale Road, the 71st Street Channel and the Berneil Ditch and to develop a concept level plan to mitigate this flooding.

This study was originally requested by the City of Scottsdale to focus on flooding within the Scottsdale Road corridor. The original focus area of the study based on the City of Scottsdale's request consisted of the area from a few blocks east to a few blocks west of Scottsdale Road from Thunderbird Road on the north to Mountain View Road on the south. This corridor included the 71st Street Channel.

It was perceived by both Scottsdale and Flood Control District staff for some time prior to the study request that there were still a number of flood prone locations along the Scottsdale Road corridor despite all of the drainage and flood control improvements that had been constructed in the study area over the years. There were still drainage facilities that represented "weak links" in the overall system, that were not up to par with adjacent drainage facilities upstream and downstream, that were unsafe or that were not performing to their desired potential both from a drainage and a multi-use standpoint.

In the mid-1970's, the Flood Control District and City of Scottsdale teamed together to study the flooding problems in this region and from that study, constructed a number of regional detention basins, channels and storm drains. The study was called the Paradise Valley, Scottsdale, Phoenix Study or "PVSP" Study. The City of Scottsdale and the Flood Control District have again formed a partnership in an attempt to address the remaining regional drainage and flooding issues along the Scottsdale Road corridor. The

Scottsdale Road Corridor Drainage Master Plan is the result of that partnership.

During the initial phases of the Scottsdale Road Corridor Drainage Master Plan study, the original focus area was expanded to include the Berneil Ditch in the Town of Paradise Valley. The Berneil Ditch was added because it serves as the primary outfall for drainage from the Scottsdale Road corridor and it was found early in the study that it too had the potential to overflow its banks and cause flooding of a regional nature.

The Scottsdale Road Corridor Drainage Master Plan encompasses portions of the City of Scottsdale, Town of Paradise Valley and the City of Phoenix. The limits of the study were established on the basis of contributing drainage area. It comprises all of the area tributary to the Berneil Ditch at its confluence with the Indian Bend Wash. Figure 1 on the following page indicates the study boundary and vicinity of the Scottsdale Road Corridor Drainage Master Plan along with the major drainage features found within the study area.

The Scottsdale Road Corridor Drainage Master Plan study area comprises just under 10 square miles of area. The focus area within the study is just under one square mile in size.

The focus area for the Scottsdale Road Corridor Drainage Master Plan evolved as the study progressed. The study team refined this focus area over the course of the study's existing condition analysis and the alternative formulation and evaluation steps. This focus area consists essentially of the Scottsdale Road drainage corridor from Thunderbird Road to Mountain View Road, the 71st Street Channel from Cactus Road to the Berneil Ditch and the Berneil Ditch from Scottsdale Road to Double Tree Ranch Road. Because of their

integral nature and close proximity to these drainage features, the regional detention basins within Cactus and Mescal Parks were also included within the focus area.

The drainage facilities that exist in the focus area are both regional and local in nature. They generally include an interconnected system of streets, culverts, open channels, storm drains and stormwater detention basins. These drainage facilities have evolved in a time span of over 50 years based on a variety of design storm and hydraulic criteria. Their design and function have been influenced significantly by budget considerations and numerous physical and jurisdictional constraints. The primary emphasis of this study within the focus area relates to the size and function of the drainage facilities found within it. This study is intended to deal with drainage and flooding on a regional basis.

The upper reach of the 71st Street Channel between Cortez Street and Sunnyside Drive is by far the most under-sized regional drainage facility in the focus area. Even minor runoff events are capable of exceeding the very limited capacity of the channel in this reach. The Berneil Ditch has overflowed its banks in at least two locations in the past 10 years. And the existing Scottsdale Road Channel along the east side of Scottsdale Road from Sutton Drive to Sweetwater Avenue has long been considered a safety hazard and a weak hydraulic link as well as a sub-optimized aesthetic and multi-use facility.

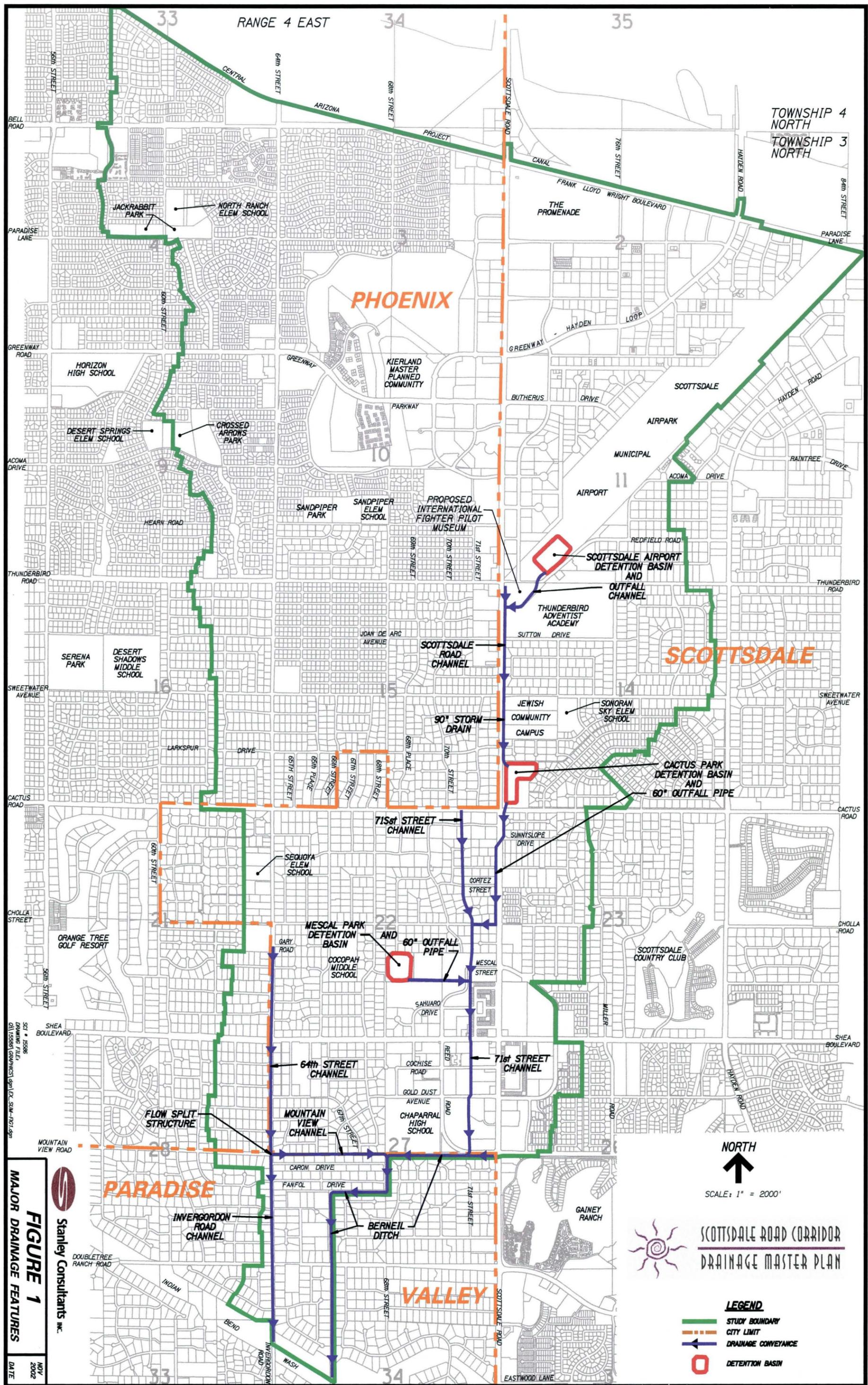


FIGURE 1
MAJOR DRAINAGE FEATURES
 Stanley Consultants Inc.
 DATE: NOV 2002

LEGEND

- STUDY BOUNDARY
- - - CITY LIMIT
- ← DRAINAGE CONVEYANCE
- ◻ DETENTION BASIN

SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

1.1 History, Participation, Coordination and Authorization

The City of Scottsdale submitted a request to the Flood Control District of Maricopa County for a capital improvement drainage project for the Scottsdale Road corridor. The District did not feel that this request included enough information so the District had a Candidate Assessment Report (CAR) conducted for the Scottsdale Road corridor. The CAR concluded that certain recommendations from a previous regional drainage study, the Paradise Valley, Scottsdale, Phoenix (PVSP) Study completed in 1978 had not been followed. As a result, there was a significant potential for drainage and flooding problems at certain locations in the study area.

The original request by the City of Scottsdale was to provide 100-year flood protection to approximately 417 acres of developed residential and commercial properties along the Scottsdale Road corridor from Thunderbird Road to the Berneil Ditch. Specific requests by the City of Scottsdale included the following:

- 1) Upgrading the conveyance on the east side of Scottsdale Road from Thunderbird Road to Gary Road.
- 2) Improvement of the 71st Street Channel to provide 100-year level of protection from Sunnyside Drive to the Berneil Ditch consisting of a storm drain and/or open channel system.
- 3) Prevent overtopping and stormwater migration west of Scottsdale Road toward the 71st Street Channel

The City also requested the integration of environmental quality and recreational enhancements into the project including recreational corridors such as bicycle, equestrian and multi-use trails, enhancements to existing parks, improvements to water quality, groundwater recharge and storage, and landscaping within the existing PVSP theme.

The core of the study team for the Scottsdale Road Corridor Drainage Master Plan was made up of representatives from the Control District of Maricopa County, the City of Scottsdale, the Town of Paradise Valley, the City of Phoenix, primary consultant Stanley Consultants, and Stanley's sub-consultant Logan Simpson Design. The Scottsdale Road Corridor Drainage Master Plan is a local study project that was requested by the City of Scottsdale and funded by the Flood Control District of Maricopa County. The Scottsdale Road Corridor Drainage Master Plan study is authorized under Contract FCD 2000C030. This contract was accepted and approved by the Flood Control District of Maricopa County Board of Directors on February 21, 2001. The effective notice to proceed date for this contract was March 5, 2001.

1.2 Public Involvement

There were three major public involvement steps incorporated into the study and the evaluation of alternatives. The first step involved an initial meeting to introduce the study to the public, to explain the study's objectives and to solicit comments from residents and landowners about their perspective on drainage and flooding. The first meeting was held on May 17, 2001. The second public involvement step came after the study team had formulated alternatives that would potentially meet the study objectives in dealing with the drainage and flooding problems. These alternatives were presented to the public for comment at the second meeting, held on March 19, 2002. The third and final meeting was to present the results of the alternative evaluation process and to introduce the recommended alternative to the public for comment. The third meeting was held on June 19, 2002.

Each of the public meetings was preceded by notification that took a variety of forms. First, there was a website for the study. The website included general background about the study, a progress report and a schedule of up-coming events and meetings. The website address was www.scottsdaleroadcdmp.com. Second, there was an advertisement placed in the Scottsdale Tribune newspaper and in the regional edition of the Arizona Republic newspaper specifically announcing the up-coming public meeting. Third, a flyer announcing the meeting was produced for distribution to the public. The primary distribution of the flyer is accomplished by door hanger service to all properties in the flood problem areas where drainage improvements are anticipated. Copies of the flyer were also distributed to various municipal and community service facilities that are frequented by the public.

Both the newspaper advertisements and the flyer provide reference to the website and provide phone numbers and email addresses for the Flood Control District's and Stanley Consultants' project managers. Fourth, the City of Scottsdale included a brief update about the study and a time, date and location for up-coming public meetings in their capital improvement projects (CIP) Newsletter for CIP Zone 2, in which this study is located.

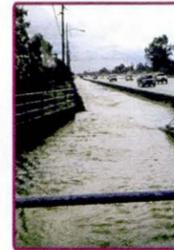


SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

The notification described above was typically conducted for each of the three public involvement meetings as a baseline minimum. Additional notification was conducted for the second and third meetings. For example, the meeting announcement flyer for the second public meeting was directly mailed to all persons who attended the study's first public meeting. And similarly, for the third public meeting, a direct mailer was sent to all attendees to the first and second meetings. Other additional notification efforts specific to the second and third public meetings were also conducted including direct mailing to those property owners that might be directly impacted by proposed improvements.

Meetings were typically organized using a hosted open house format with refreshments provided and various study exhibits and maps on display. Handouts were provided to attendees at the second and third public meetings to present the alternatives and to summarize findings from previous study steps. Meetings typically started with a brief introduction by the Flood Control District's project manager followed by a general question and answer session. Attendees were then given the opportunity to ask one-on-one questions, break down into smaller discussion groups or individually meet with members of the study team. The first and second public meetings were held at the Sonoran Sky Elementary School. The third public meeting was held at the Scottsdale Airport.

SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN



Looking South Along Scottsdale Road From Sutton Drive - October 2000

The Flood Control District of Maricopa County in cooperation with:

STUDY PURPOSE

The Flood Control District (District) of Maricopa County has coordinated with the Cities of Scottsdale, and Phoenix, and the Town of Paradise Valley to prepare a Drainage Master Plan (DMP) for the Scottsdale Road Corridor. The purpose of the Scottsdale Road Corridor DMP is to:

- identify the extent of flooding problems along the Scottsdale Road Corridor
- provide flood protection and public safety for the residents and property owners in this area and for Scottsdale Road's traveling public

This will be accomplished by identifying conceptual flood control features and/or measures within the study area to reduce potential damages to property or loss of life from storm runoff. The focus of the Scottsdale Road Corridor DMP study is the area that is subject to flooding along the 71st Street channel from Mountain View Road to Cactus Road and along Scottsdale Road from Mountain View Road to Thunderbird Road.

STUDY GOALS

- * Develop a comprehensive list of known flooding problems along the Scottsdale Road corridor.
- * Develop a plan, including conceptual flood control features and/or measures, to eliminate the flooding from the 10-year storm and if possible eliminate the 100-year flooding within the Scottsdale Road corridor.

STUDY BACKGROUND

The Scottsdale Road Corridor DMP study area has experienced significant development in recent years. The current drainage system is undersized to provide the required level of flood protection for the existing land uses. This study will identify conceptual flood control features that may be implemented based on scheduling, funding, and cost sharing.

STUDY AREA

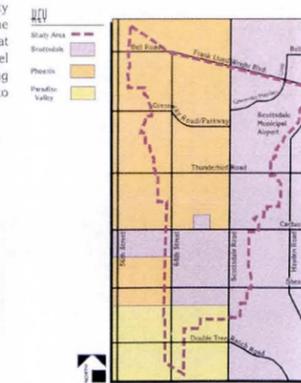


FIGURE 2 PUBLIC INVOLVEMENT FLYER

PUBLIC MEETING - MAY 17

Thursday, May 17, 2001
6:30 p.m. - 8:00 p.m.
Sonoran Sky Elementary School
12990 North 75th Street
Scottsdale, Arizona 85260



The first public meeting is scheduled for May 17th, 2001 at 6:30 p.m. A brief overview of the project will be presented at 6:45 p.m. The purpose of this meeting is to inform the community about the project and seek your input. We hope you can attend this initial meeting and give us your comments on the Scottsdale Road Corridor Drainage Master Plan.



Mescal Park/Stormwater Detention Basin, City of Scottsdale

GET INVOLVED

We invite you to get involved in the study process. There will be an opportunity to give your initial comments at the first public meeting. If you have questions about this study, please contact:

Afshin Ahourajyan, Project Manager
Flood Control District of Maricopa County
Phone: (602) 506-1501
E-mail: afa@mail.maricopa.gov

or
Scott Buchanan
Stanley Consultants Inc.
Phone: (602) 912-6500
E-mail: buchanscott@stanleygroup.com

Para información en Español, comuníquese con:
Ivonne Smith, Logan Simpson Design Inc.
Phone: (480) 967-1343
E-mail: ismith@lsdz.com

The Flood Control District of Maricopa County has a web site with routinely updated project information. Please visit us at:
www.scottsdaleroadCDMP.com



71st Street Channel Near Mescal Street



71st Street Channel Near Cholla Street

| STUDY SCHEDULE | 2001 | | | | | | | | | | | | 2002 | | | |
|------------------------------|------|-----|-----|------|------|-----|------|-----|-----|-----|-----|-----|------|-----|-----|--|
| | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | |
| Data Collection | | | | | | | | | | | | | | | | |
| Environmental Considerations | | | | | | | | | | | | | | | | |
| Alternatives Development | | | | | | | | | | | | | | | | |
| Alternatives Evaluation | | | | | | | | | | | | | | | | |
| Recommended Alternative(s) | | | | | | | | | | | | | | | | |
| Implementation Plan | | | | | | | | | | | | | | | | |
| Public Involvement | | | | | | | | | | | | | | | | |

● = Public Meetings



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

2.0 Existing Condition Hydrology

The primary objective of the hydrologic analysis in this study was to establish baseline hydrology for existing conditions within the study area for both the 10- and 100-year return frequency storms. The total contributing drainage area corresponding to the study boundary is 9.81 square miles. Hydrology for this study was modeled using the U.S. Army Corps of Engineers HEC-1 computer program. All of the HEC-1 models in this study assume a fully developed future land use condition. The Flood Control District of Maricopa County (FCDMC) Drainage Design Management System for Windows (DDMSW) computer program was used to calculate certain HEC-1 data.

Both the 6-hour and 24-hour duration precipitation patterns were considered and incorporated in the initial hydrologic analysis. The 6-hour precipitation pattern(s) yielded slightly higher peak flows for both the 10- and 100-year storms compared to the 24-hour patterns. All final HEC-1 models utilize a 6-hour pattern. The 10- and 100-year, 6-hour rainfall point depths are 2.03" and 3.20", respectively. Aerial reduction of rainfall was incorporated in all HEC-1 models in accordance with Section 2.3, Depth-Area Relation, Flood Control District of Maricopa County Hydrology Manual. Other than the rainfall input, sub-basin times of concentration (Tc), sub-basin storage coefficients (R) and the cumulative drainage area, there is essentially no difference between the 10-year and 100-year HEC-1 models.

Regional detention basins are modeled as level pool routing steps. Typically, private onsite detention/retention basins are not reflected in the HEC-1 models except for the larger basins just south of Frank Lloyd Wright Boulevard between Scottsdale Road and the Greenway-Hayden Loop. These basins are protected by recorded

drainage easements. There are literally hundreds of small detention/retention basins on private property in the Scottsdale Airport area. Based on preliminary HEC-1 models, it was found that discharges would be about 25% to 50% less in the area tributary to the Cactus Park detention basin if the smaller private basins were reflected in the hydrology. However, only about 1/3 of these private basins are situated in recorded drainage easements and the study team was concerned that they would not be maintained. Therefore, they are not reflected in final hydrology.

The 100-year, 6-hour HEC-1 unit discharges for the overall study area and for individual sub-basins within the study were compared with unit discharges from regional studies. The HEC-1 unit discharge for the overall project area is approximately 350 cfs/sq mi. This compares favorably with the Federal Emergency Management Agency (FEMA) unit discharge of 360 cfs/sq mi for the Indian Bend

Wash watershed upstream from Scottsdale Road. Sub-basin unit discharges from the HEC-1 model were also compared with sub-basin unit discharges calculated by the Arizona Department of Transportation (ADOT) Indirect Method No. 2 – USGS Data for Arizona. The average HEC-1 unit discharge for individual sub-basins is 2,079 cfs/sq mi. which compares favorably with the average ADOT Method individual sub-basin unit discharge of 2,303 cfs/sq mi.

Table 1 summarizes key HEC-1 data related to the level pool detention basin routing steps in the study. Figures 3 and 4 display HEC-1 peak discharges and peak times at various key locations throughout the study for the 10- and 100-year, 6-hour events, respectively. Also included with Figure 4 are the 100-year peak discharges estimated at various locations from previous hydrologic studies.

**TABLE 1 HEC-1 SUMMARY DATA AT REGIONAL STORMWATER
DETENTION BASINS**

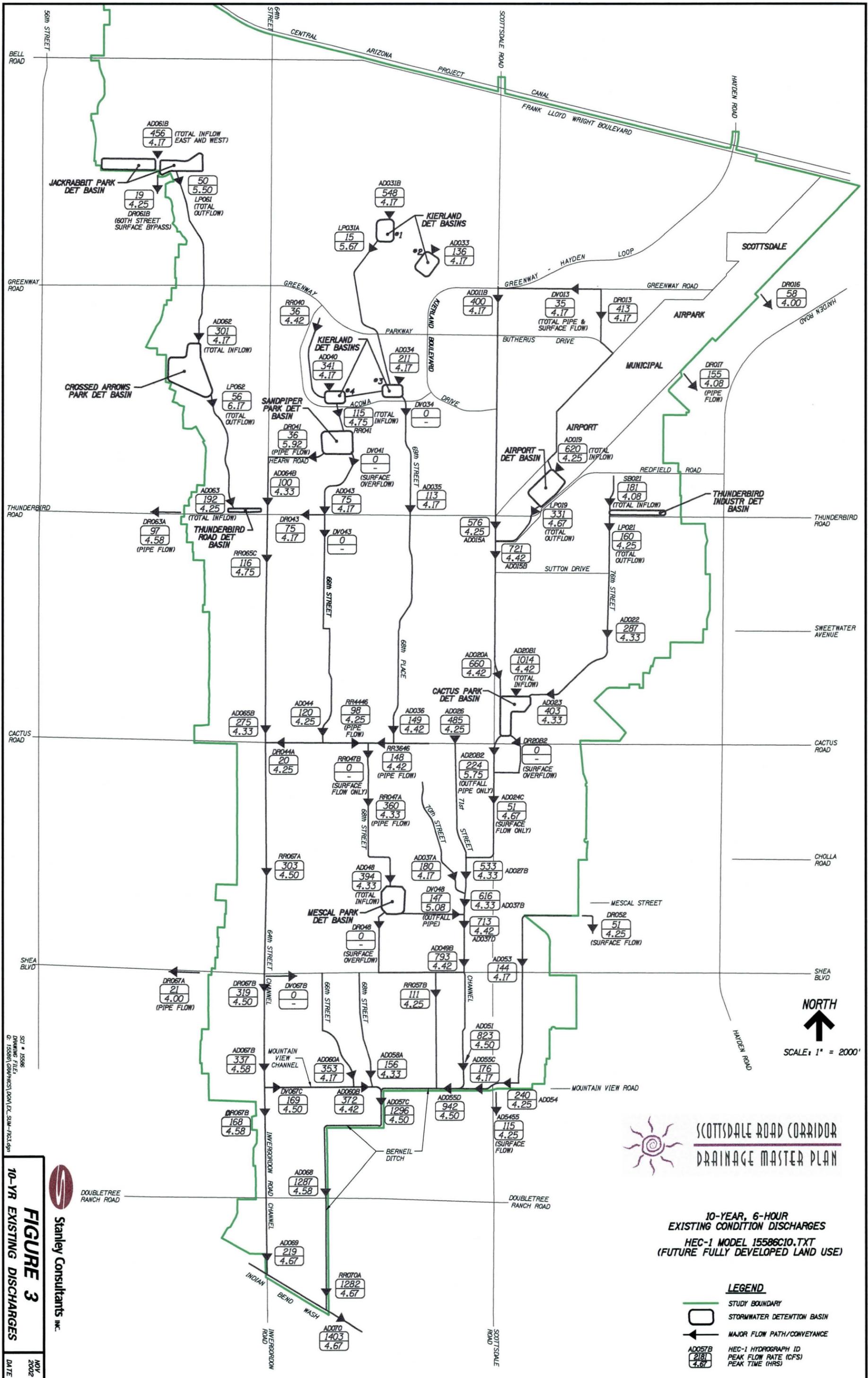
| HEC-1 ID | Basin Name | Low Elevation (ft) | Overflow Elevation (ft) | Storage Volume at Overflow Elevation (ac-ft) | Total 6-Hr Peak Inflow (cfs) | | Total 6-Hr Peak Outflow (cfs) | | Peak Stage (ft) | | Volume in Storage at 6-Hr Peak Stage (ac-ft) | |
|----------|------------------------|--------------------|-------------------------|--|------------------------------|-------|-------------------------------|-------|-----------------|--------|--|--------------|
| | | | | | 100-Yr | 10-Yr | 100-Yr | 10-Yr | 100-Yr | 10-Yr | 100-Yr | 10-Yr |
| LP019* | Airport | 1426.7 | 1432.0 | 33.6 | 1307 | 620 | 587 | 331 | 1432.1 | 1429.9 | 33.6 | 16.4 |
| LP021*^ | Thunderbird Industrial | 1426.0 | 1430.0 | 4.4 | 355 | 181 | 339 | 160 | 1430.7 | 1430.3 | 5.6 | 4.9 |
| LP020B* | Cactus | 1370.0 | 1387.8 | 92.2 | 1823 | 830 | 749 | 40 | 1388.9 | 1385.9 | 92.2 | 69.7 |
| LP031A | Kierland #1 | 54.5 | 76.0 | 57.9 | 1142 | 548 | 108 | 15 | 75.0 | 69.0 | 50.9 | 16.9 |
| LP033 | Kierland #2 | 35.0 | 65.0 | 230.0 | 320 | 136 | ** | ** | 42.5 | 40.5 | 25.6 | 17.3 |
| LP034 | Kierland #3 | 32.0 | 42.0 | 26.0 | 401 | 211 | 120 | 18 | 40.9 | 38.0 | 23.0 | 14.7 |
| LP040 | Kierland #4 | 31.0 | 40.0 | 20.6 | 857 | 341 | 578 | 116 | 39.7 | 38.1 | 19.1 | 12.1 |
| LP041* | Sandpiper | 25.0 | 33.5 | 29.4 | 583 | 119 | 56 | 36 | 33.6 | 29.6 | 29.4 | 6.2 |
| LP048* | Mescal | 1354.5 | 1363.5 | 38.1 | 713 | 394 | 338 | 147 | 1363.7 | 1360.6 | 38.1 | 21.3 |
| LP061* | Jackrabbit | 1463.0 | 1470.0 | 41.6 | 901 | 456 | 121 | 50 | 1470.7 | 1469.0 | 41.6 | 29.4 |
| LP062* | Crossed Arrows | 1432.0 | 1438.0 | 25.8 | 662 | 301 | 236 | 56 | 1438.3 | 1437.1 | 25.8 | 18.4 |
| LP063*^ | Thunderbird Road | 1412.0 | 1417.0 | 5.1 | 412 | 192 | 386 | 137 | 1417.9 | 1417.1 | 5.1 | 5.4 |
| | | | | | 604.7 | | | | | | 390.0 | 232.7 |

*Basins that overflow for the 100-year, 6-hour event

^Basins that overflow for the 10-year, 6-hour event

**No outflow except by small diameter bleedoff pipe

Note: Approximate Total Volume of 100-yr, 6-hr Hydrograph at AD070 = 660 ac-ft
Approximate Total Volume of 10-yr, 6-hr Hydrograph at AD070 = 340 ac-ft
Hydrograph AD070 represents the total runoff from the entire study area contributing to the Indian Bend Wash.



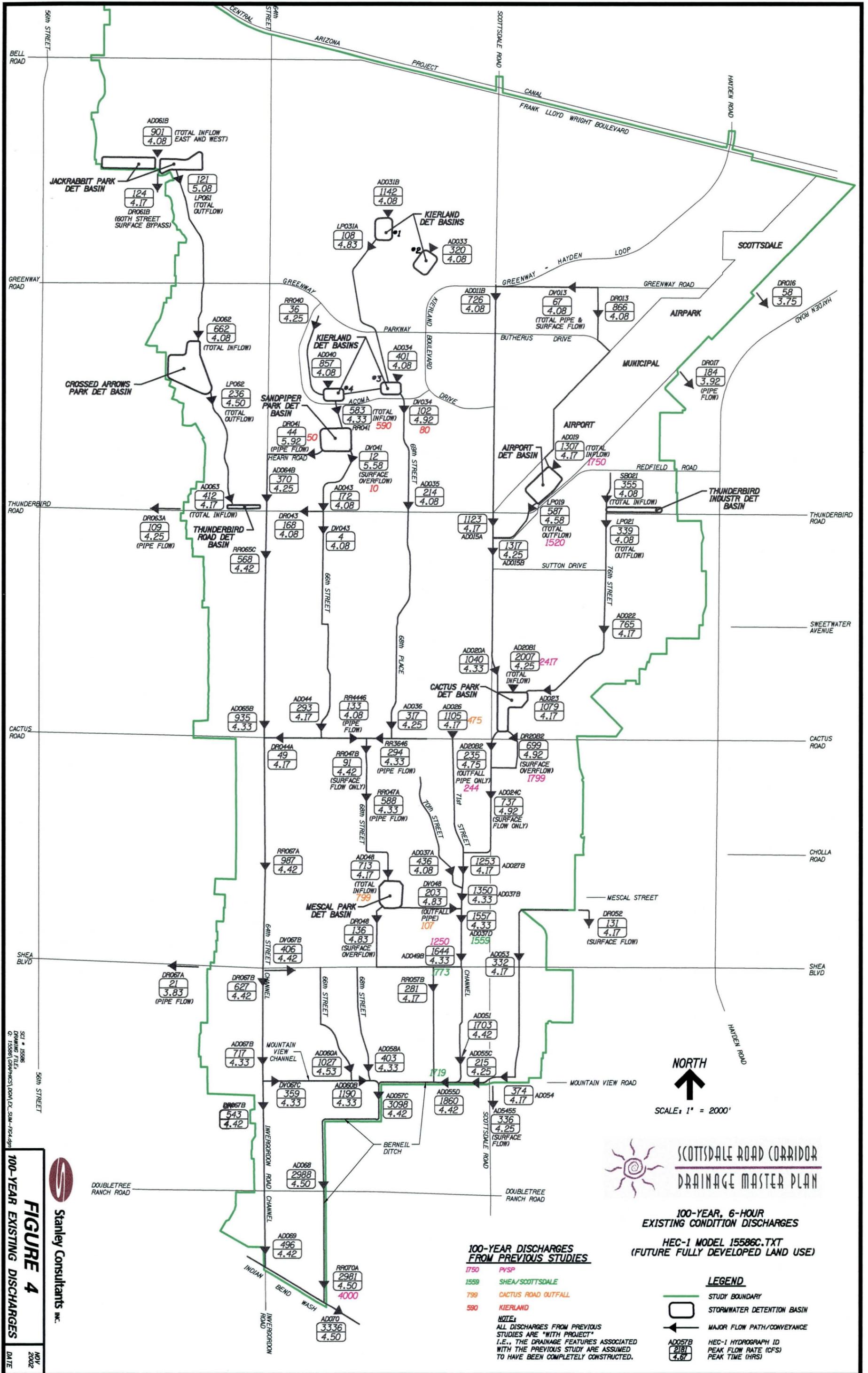
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 PLOT DATE: 11/13/02

Stanley Consultants INC.
FIGURE 3
10-YR EXISTING DISCHARGES
 DATE: NOV 2002


SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

10-YEAR, 6-HOUR
 EXISTING CONDITION DISCHARGES
 HEC-1 MODEL 15586C10.TXT
 (FUTURE FULLY DEVELOPED LAND USE)

- LEGEND**
-  STUDY BOUNDARY
 -  STORMWATER DETENTION BASIN
 -  MAJOR FLOW PATH/CONVEYANCE
 -  HEC-1 HYDROGRAPH ID
PEAK FLOW RATE (CFD)
PEAK TIME (HRS)



SCI 15596
 DRAWING FILE: D:\15596\G0V\H05\DWG\PL-SUM-F04.dgn
 DATE: NOV 2002

Stanley Consultants INC.

FIGURE 4
 100-YEAR EXISTING DISCHARGES

SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN
 100-YEAR, 6-HOUR
 EXISTING CONDITION DISCHARGES
 HEC-1 MODEL 15586C.TXT
 (FUTURE FULLY DEVELOPED LAND USE)

LEGEND
 STUDY BOUNDARY
 STORMWATER DETENTION BASIN
 MAJOR FLOW PATH/CONVEYANCE
 HEC-1 HYDROGRAPH ID
 PEAK FLOW RATE (CFS)
 PEAK TIME (HRS)

100-YEAR DISCHARGES FROM PREVIOUS STUDIES
 1750 PVSP
 1559 SHEA/SCOTTSDALE
 799 CACTUS ROAD OUTFALL
 590 KIERLAND

NOTE:
 ALL DISCHARGES FROM PREVIOUS STUDIES ARE "WITH PROJECT" I.E., THE DRAINAGE FEATURES ASSOCIATED WITH THE PREVIOUS STUDY ARE ASSUMED TO HAVE BEEN COMPLETELY CONSTRUCTED.

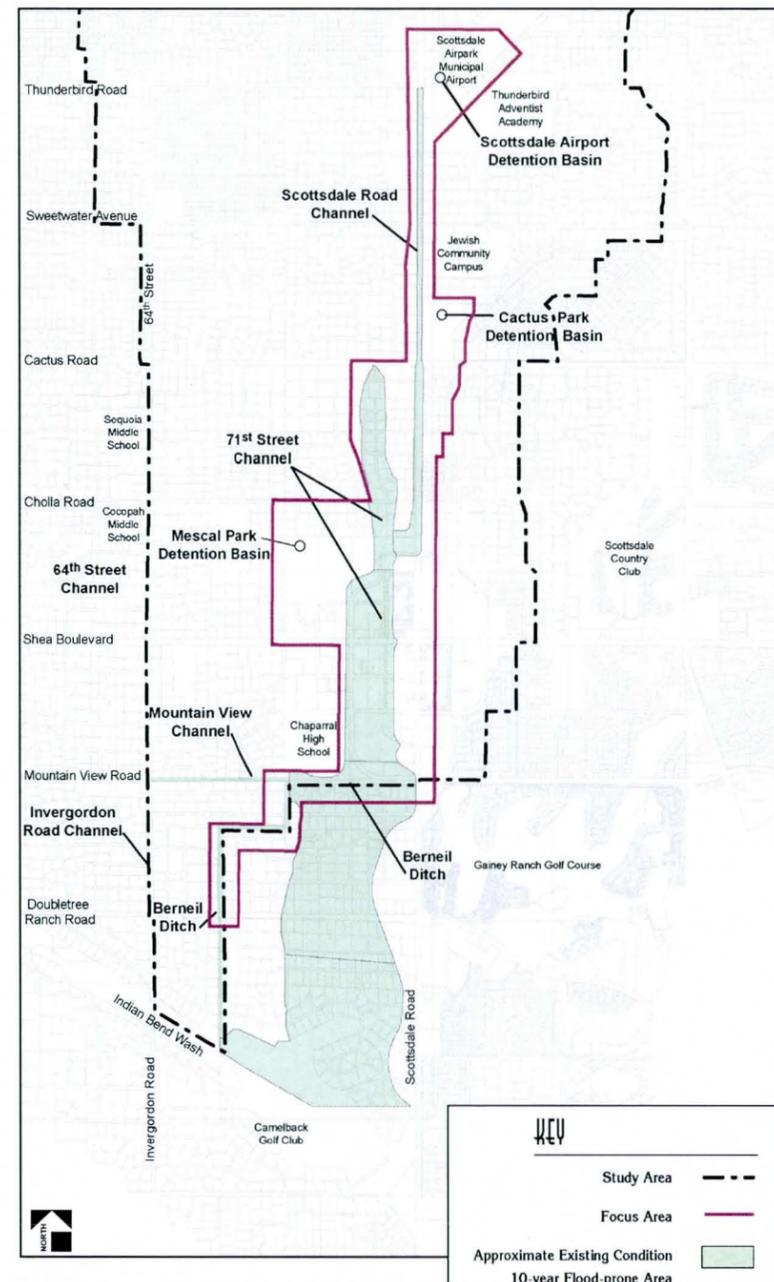


SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

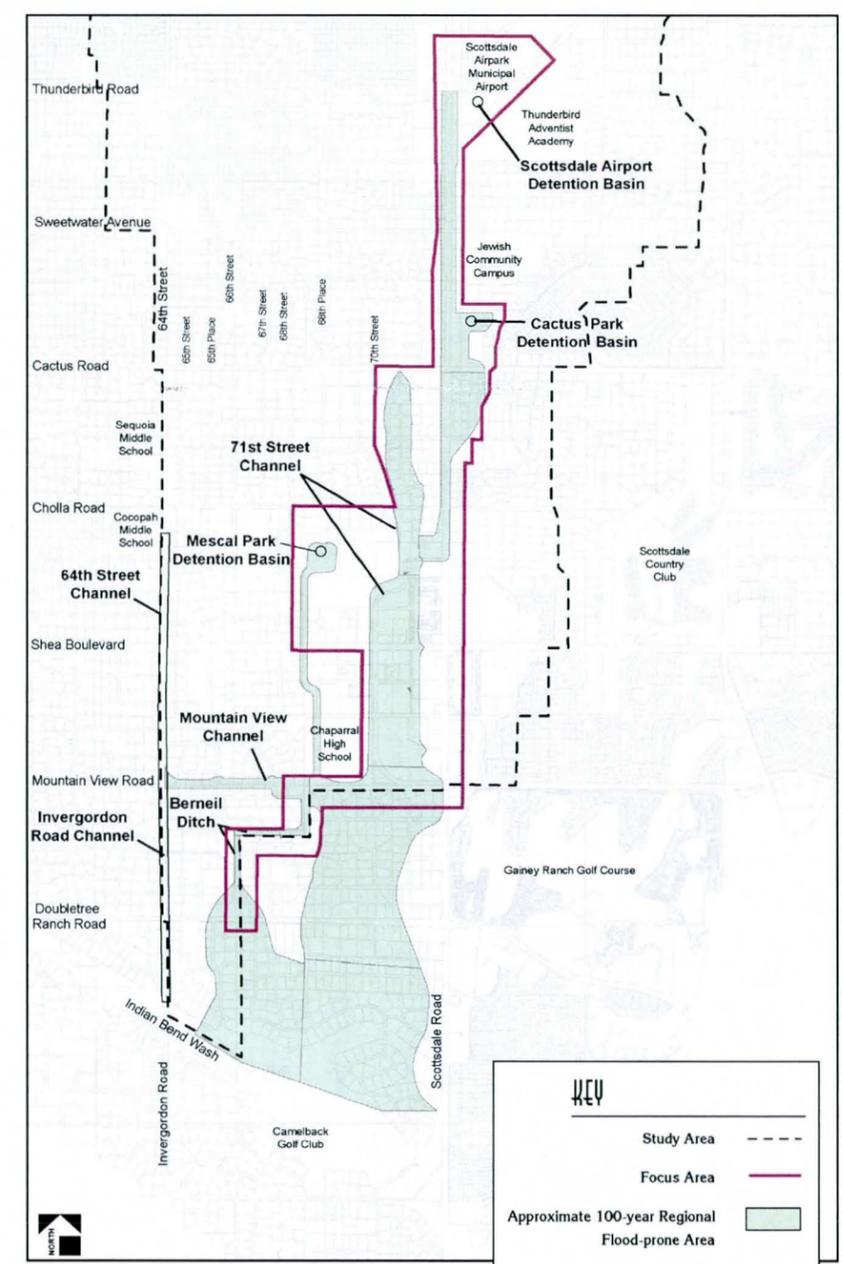
2.1 Existing Condition Hydraulics

Hydraulic analysis was performed for the Scottsdale Road Corridor Drainage Master Plan in support of the hydrologic analysis and to evaluate the extent of flooding for both the 10- and 100-year runoff events. Representative flow characteristics for the Berneil Ditch, Mountain View Channel and 71st Street Channel were modeled using the U.S. Army Corps of Engineers' HEC-RAS computer program Version 2.2. Many of the smaller drainage corridors in the Scottsdale Road Corridor Drainage Master Plan study area that are tributary to the Berneil Ditch, Mountain View Channel and 71st Street Channel were analyzed using simple normal depth and culvert hydraulics.

Figures 5 and 6 indicate the approximate 10-year and 100-year existing condition flood prone areas (respectively) associated with the Scottsdale Road Channel, 71st Street Channel, Berneil Ditch and Mountain View Channel. The flood prone areas indicated on Figures 4 and 5 are based on a compilation of historic flooding accounts, interpretation of HEC-RAS results and review of the Flood Insurance Rate Map for Maricopa County. There was no overall topographic survey available along the HEC-RAS channel reaches that would be suitable to delineate accurate limits of overflow. The backwater analysis was not intended to establish any floodplain limit for flood insurance or floodplain management purposes. Figures 5 and 6 are intended only to approximate the area that might be impacted by a severe flood so that the value of potential alternatives could be judged.



**FIGURE 5 APPROXIMATE EXISTING CONDITION
10-YEAR FLOOD PRONE AREA**



**FIGURE 6 APPROXIMATE EXISTING CONDITION
100-YEAR FLOOD PRONE AREA**



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

2.2 Multi Use Inventory and Environmental Justice

An inventory and analysis was performed to evaluate existing regional bikeways, trails and pathways and regional parks and open space within and adjacent to the Scottsdale Road Corridor Drainage Master Plan study area. This task focused primarily on existing facilities but also included improvements that were anticipated in the future. The information generated through this task was used as a basis for identifying multi use opportunities and constraints in the future alternatives formulation step.

There is an extensive array of trails, paths, open spaces and parks within the study area that could potentially be used to enhance the objectives of anticipated alternative flood control features. Opportunities to link local multi use paths and trails to either existing or proposed regional systems were investigated. Opportunities to link local trail facilities together to increase their connectivity were also investigated.

Population and racial demographics were investigated to determine sensitive populations in order to prevent the exclusion of persons or populations from participation, denying persons or populations of the benefits of any proposed action/activity, or subjecting person of populations to discrimination because of race, color or national origin.

2.3 Existing Visual Characteristics and Aesthetic Inventory of Drainage Features

The purpose of the visual analysis of the Scottsdale Road Corridor Drainage Master Plan was to establish the existing visual resources of the landscape within the study area. This analysis was subsequently used in consideration of flood control alternatives that protect and enhance the local community's character and create

aesthetic value. The study area was divided into 12 different visual character units that were then evaluated for distinct features, visual conditions, scenic corridors and parkways, disturbed areas and views/viewpoints.

An aesthetic inventory of 35 representative drainage facilities within the study area, including all of the major regional drainage and flood control facilities was conducted to evaluate their level of intactness. This information was used in identifying opportunities and constraints in the alternatives formulation step of the study. Incorporating aesthetic features was an integral part of the planning, design and construction of flood control projects. Aesthetic treatment for any of the alternative flood control structural measures must be compatible with the prevailing features of the surrounding area.

2.4 Ecological Planning Considerations

Ecological issues within the study area were evaluated to provide the project team with information regarding any sensitive vegetation communities, habitat or animal species. Another ecological issue that was considered included avoiding any enhancement to wildlife habitat near the Scottsdale Airport to minimize any impact to aircraft safety. The possible need for Clean Water Act Section 404 permits for any of the proposed flood control alternatives was also considered.

The ecological investigation concluded that, since the study area is almost completely urbanized, there is not likely to be any significant impact to vegetation, habitat or wildlife and that this would not be a significant consideration in the formulation and evaluation of structural flood control alternatives. If a 404 permit is required for any of the alternatives, additional site-specific surveys may be necessary prior to final design.

3.0 Alternative Formulation

The alternative formulation process for the Scottsdale Road Corridor Drainage Master Plan was conducted in three steps referred to as Levels I, II and III. The Level I step involved the identification of regional drainage and flood problem locations within the study area and formulating initial alternatives that would address the specific problem at each location. The Level II step consisted of the development and expanded analysis of each initial alternative. And the Level III step was the assembly of location-specific initial alternatives into groups of system-wide regional solutions.

The Level I alternative formulation involved input from a wide cross section of individuals, stakeholders and agencies that each had specific interest in the identification and development of Scottsdale Road Corridor Drainage Master Plan alternatives. Preliminary hydrology and hydraulics for the overall study area were available for the Level I step but generally, no specific hydrologic or hydraulic computations were conducted in support of any initial alternative formulation. An all day "brainstorming" meeting was held in the New River conference room at the Flood Control District of Maricopa County on September 24, 2001 to initiate the alternatives formulation process. Nearly 25 individuals attended this meeting. They represented various disciplines and backgrounds such as:

- Hydrology, hydraulics, drainage and civil engineering;
- Recreation and land use planning;
- Landscape architecture and aesthetics;
- Biology, archaeology, environmental planning and permitting;
- Drainage planning and floodplain administration;
- Capital improvements programs; and
- Maintenance and operations.



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A planning and strategy meeting was held prior to the Alternatives Formulation Meeting to organize the material that would be presented, to develop the roles of each of the meeting presenters and to work out meeting logistics. Another meeting was held prior to the Alternatives Formulation Meeting with staff from the Flood Control District, Stanley Consultants and Logan Simpson Design that was focused specifically on the study area's visual character, aesthetic inventory and recreational and multi-use facilities and opportunities. Based on the study's preliminary hydrology, a number of seed concept ideas had been suggested and discussed by various members of the study team prior to the Alternatives Formulation Meeting.

Each of the drainage and flooding problem areas that had been identified prior to the meeting was reviewed and the attendees were broken into groups, each group taking one of four sub-areas in which the focus area had been divided. A total of 15 initial alternatives were developed at the brainstorming meeting. These alternatives typically addressed drainage and flooding problems at specific locations but there were initial efforts toward the end of the meeting to combine the location specific alternatives into system-wide sets of alternatives. Preliminary criteria for prioritizing and evaluating the initial alternatives were also developed at the brainstorming meeting.

The purpose of the Level II analysis was to develop the initial alternatives identified in the Level I Alternative Formulation step and explore the strengths and weaknesses of each. Preliminary existing condition hydrology and hydraulic modeling that was available at the time of the Alternatives Formulation Meeting was finalized in Level II. Initial alternatives were reviewed in light of the final hydrology and hydraulics. As a result, new drainage and flooding problem locations were identified, initial alternatives from Level I were modified as

necessary and a few new initial alternatives were added. Altogether, there were a total of 20 initial alternatives that were formulated between the Level I and Level II steps.

The amended set of initial alternatives was screened on a multi-level basis and a few of these alternatives with obvious technical flaws or very marginal benefit were eliminated. Each of the remaining individual location-specific alternatives was then further analyzed and conceptually developed with a preliminary level of hydrology, hydraulics, aesthetics, utility and easement investigations and construction cost estimates.

Multi-use and aesthetic opportunities and constraints were also considered at each location in the development of initial alternatives. Multi-use and aesthetic features were typically reflected in the preliminary cost estimates at each location where they were identified. Wherever possible, the development of alternative solutions considered the aesthetic character of the surrounding area and the multi-use recreational needs of the community.

Initial alternatives were screened on the basis of both quantitative and qualitative considerations. The primary criterion used in this initial screening process included hydrologic and hydraulic performance (technical feasibility) but also included cost issues, property acquisition needs, public safety, and community and agency (stakeholder) support. Alternatives that required acquisition of property, especially whole residential parcels, were not considered desirable but were not completely eliminated from consideration, at least initially. Initial location-specific alternatives having more of a local drainage benefit and not significantly helping to reduce regional flooding in the Scottsdale Road Corridor were also under consideration to be eliminated.

Generally, those alternatives involving an increase in stormwater conveyance, such as channel improvements or the addition of storm drain trunk lines, had little or no effect on the hydrology of the overall system in either an upstream or downstream direction. Therefore, that set of initial alternatives was essentially independent from each other in a hydrologic sense. On the other hand, the initial location-specific alternatives that involved re-directing discharges, improving existing regional detention basins and constructing new regional detention basins had a real potential for improving hydrology by reducing discharges downstream from the proposed improvement.

A preliminary utility location investigation was conducted for all of the initial alternatives that remained after the preliminary screening process. This investigation utilized the City of Scottsdale GIS database, as-built drawings that had been collected in the initial phase of the study and field reconnaissance. Also, preliminary drainage easement and property ownership investigation was conducted for each remaining initial alternative along the Scottsdale Road Channel, the 71st Street Channel and the Berneil Ditch.

Preliminary unit costs for construction cost estimates were obtained from Flood Control District of Maricopa County (FCDMC) bid tabulations that covered a wide range of projects. An additional mark-up cost was added to the construction cost of each alternative. The mark-up cost was typically 35 percent of the construction costs and was intended to account for the following:

- 5% for construction cost contingency;
- 5% for utility relocation;
- 5% for mobilization, permitting and traffic control;
- 15% for design, and construction survey; and
- 5% for inflation.



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Each of the alternatives that remained after the initial screening was evaluated on the potential for the drainage improvements to provide new multi-use opportunities. Additionally, these improvements were evaluated to determine if they could incorporate features to increase accessibility to, or linkage between existing facilities. Based on both the quantitative and qualitative results of the Level II development step, the remaining initial alternatives that did not appear to meet at least a majority of study objectives were eliminated from further consideration. The remaining initial alternatives were then assembled for the next step in the formulation process, Level III. This involved organizing the location-specific alternatives into sets of system-wide groups.

After a great deal of consideration and discussion, it was decided by the study team to form system-wide alternatives from the location-specific alternatives using two primary approaches:

- level of flood protection; and,
- best fit.

The “level of flood protection” approach would use the 100- and 10-year storms as the basis for design, essentially without regard to cost, impact and available right-of-way. The 100- and 10-year system-wide alternatives target only those regional facilities that do not presently provide the 100- and 10-year levels of protection. Since the regional detention basins in Cactus and Mescal Parks can both handle a 10-year storm, neither was included in a 10-year system-wide alternative. The “best fit” approach had no specific storm return frequency associated with it and was made up of location-specific alternatives that typically represented lesser cost, impact and right-of-way needs than the 100- and 10-year system-wide alternative solutions.

In summary, there were a total of four structural system-wide alternatives developed in Level III. The term “structural” means they would each require construction of regional facilities such as drainage channels and detention basins. Many of the structural alternatives require some amount of land acquisition at certain locations, as well as permanent drainage and temporary constructions easements. Temporary traffic impacts occur for all construction involving streets. In addition, there are also temporary noise impacts during construction of any of the structural alternatives. While the four structural alternatives represent a traditional approach to flood control, a non-structural alternative was added in place of the typical “do nothing” alternative that is usually compared to structural alternatives in drainage master plans. A non-structural solution addresses drainage concerns without any physical modifications/improvements within the study area.

4.0 Alternative Selection

The foundation for the alternative selection process was established in the Level II alternatives analysis and the Level III system-wide alternatives formulation described in Section 3.0. One of the keys to successful alternative selection is to have an adequate group of distinct, well developed, clearly displayed alternatives from which to choose. Ideally, these alternatives should represent a diversity of approach, theme and level of protection. They should minimize impacts and maximize benefits. They should be presented in a way that can be easily understood by a diverse cross section of people. The consequences of not selecting an alternative should be understood as thoroughly as the benefits associated with selecting it.

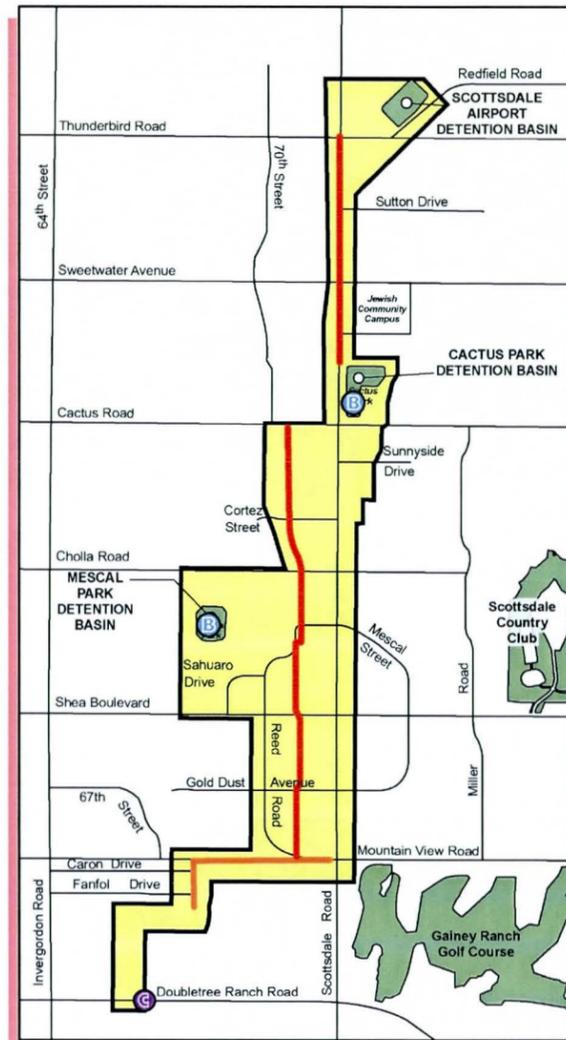
The alternative selection process for the Scottsdale Road Corridor Drainage Master Plan really began with planning and conducting the second of three public involvement meetings. This meeting was held

on March 19, 2002. Once this meeting was held, the public feedback it generated was reviewed and incorporated into a matrix evaluation process that was developed by the study team. The matrix evaluation served as the primary basis for the selection of the recommended alternative.

Each of the five system-wide alternatives from Level III was illustrated on oversized color exhibit boards for the second public involvement meeting. The information from these exhibits consisted of a physical description of the proposed features, a map showing the proposed structural improvements, a list of benefits and constraints, and preliminary construction costs. The same information was also incorporated into the study’s web site. Reduced copies of the exhibit boards are included as Figures 7 through 11 on the following pages. These figures are followed by a summary table comparing the system-wide alternatives (Figure 12).



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KEY

- Focus Area
- Parks/Recreation
- Proposed Pipe/Box
- Proposed Channel Improvement
- Proposed Basin Improvement
- Proposed Culvert Improvement

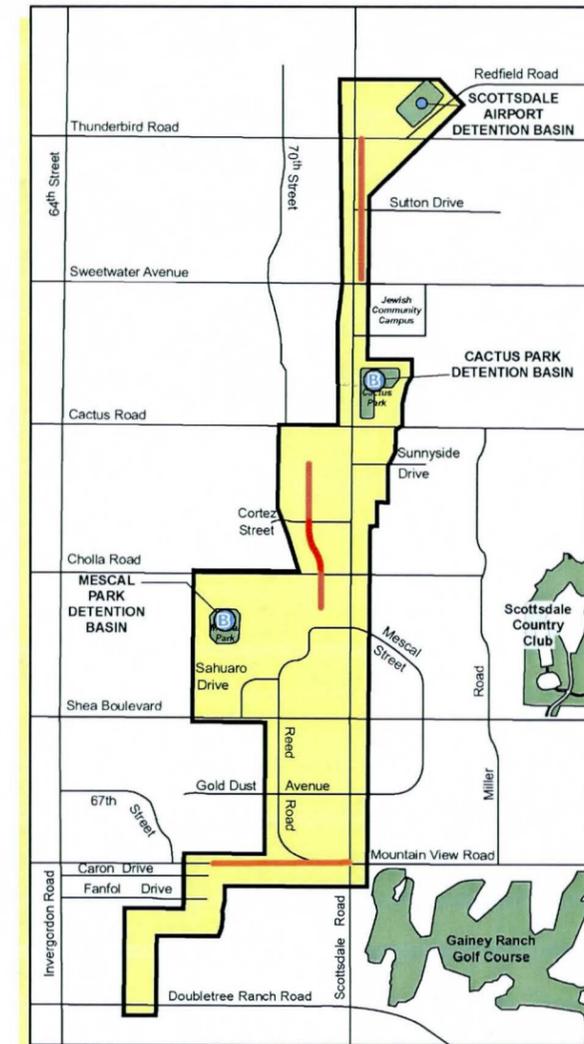
**FIGURE 7 RED ALTERNATIVE
100-YEAR STRUCTURAL SOLUTION**



KEY

- Focus Area
- Parks/Recreation
- Proposed Pipe/Box
- Proposed Channel Improvement
- Proposed Basin Improvement
- Proposed Culvert Improvement

**FIGURE 8 ORANGE ALTERNATIVE
10-YEAR STRUCTURAL SOLUTION**



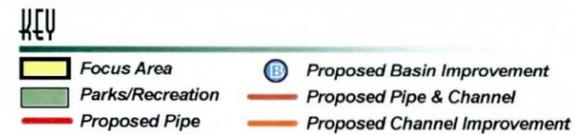
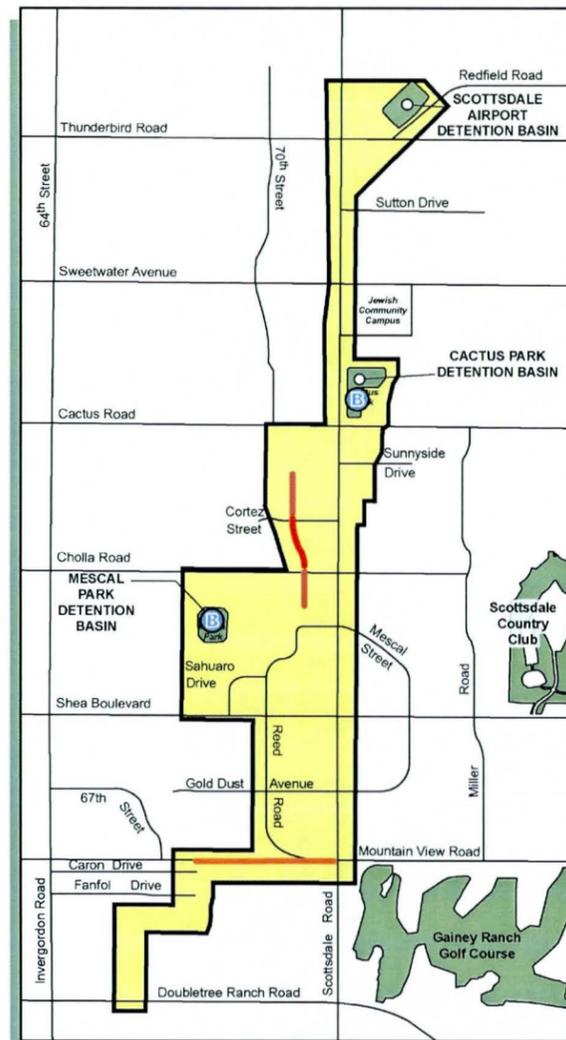
KEY

- Focus Area
- Parks/Recreation
- Proposed Pipe & Channel
- Proposed Channel Improvement
- Proposed Basin Improvement
- Proposed Pipe

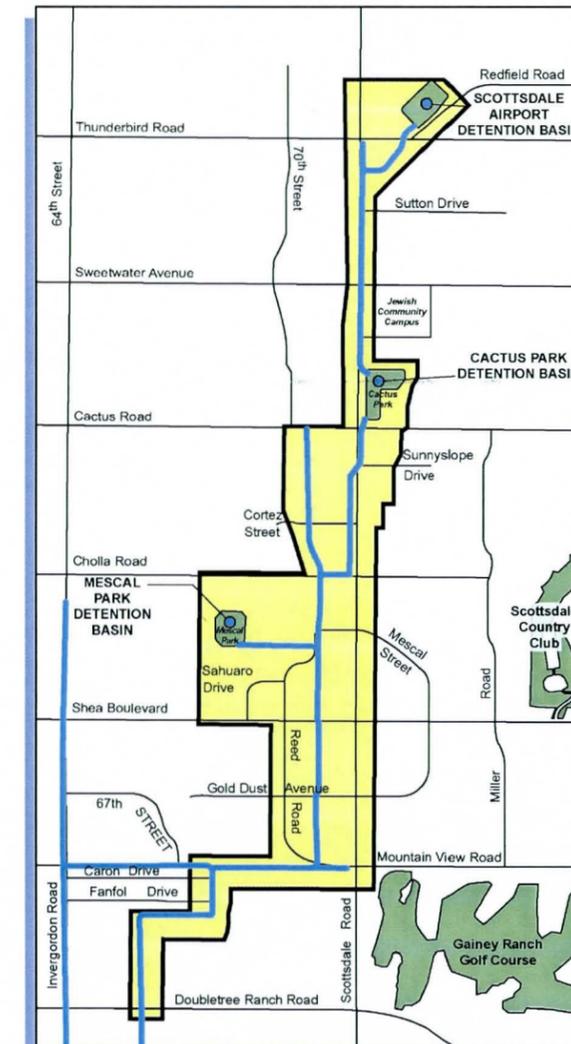
**FIGURE 9 YELLOW ALTERNATIVE
LOW-IMPACT STRUCTURAL SOLUTION**



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**FIGURE 10 GREEN ALTERNATIVE
MINIMAL STRUCTURAL SOLUTION**



**FIGURE 11 BLUE ALTERNATIVE
NON-STRUCTURAL SOLUTION**



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

COMPARISON OF PRELIMINARY ALTERNATIVES

| Description | Red Alternative | Orange Alternative | Yellow Alternative | Green Alternative | Blue Alternative |
|--|--|--|---|--|--|
| Level of Protection | <ul style="list-style-type: none"> 100- year. | <ul style="list-style-type: none"> 10-year. | <ul style="list-style-type: none"> Nearly 10-year. | <ul style="list-style-type: none"> Higher level than existing. | <ul style="list-style-type: none"> No added protection. |
| Scottsdale Road Channel | <ul style="list-style-type: none"> Construct an additional underground storm drain south of Sweetwater Avenue. Extend existing underground storm drain north of Sweetwater Avenue. | <ul style="list-style-type: none"> Extends existing underground storm drain north of Sweetwater Avenue. | <ul style="list-style-type: none"> Extends existing underground storm drain north of Sweetwater Avenue. | <ul style="list-style-type: none"> No improvements proposed. | <ul style="list-style-type: none"> No improvements. |
| 71 st Street Channel | <ul style="list-style-type: none"> Constructs new underground storm drain from Cactus Road to the Berneil Ditch. | <ul style="list-style-type: none"> Constructs new underground storm drain from Cactus Road to Cholla Road. Enlarges existing surface channel between Sahuaro Drive and Mescal Street. Reconstructs culvert crossings at Cochise Road and Sahuaro Drive. | <ul style="list-style-type: none"> Constructs new underground storm drain from Sunnyside Drive to a section of Cholla Road. | <ul style="list-style-type: none"> Constructs new underground storm drain from Sunnyside Drive to south of Cholla Road. | <ul style="list-style-type: none"> No improvements. |
| Cactus Park Detention Basin | <ul style="list-style-type: none"> Raises existing emergency spillway. Adds additional outlet pipe. | <ul style="list-style-type: none"> No improvements proposed. | <ul style="list-style-type: none"> Raises existing emergency spillway. Adds additional outlet pipe. | <ul style="list-style-type: none"> Raises existing emergency spillway. | <ul style="list-style-type: none"> No improvements. |
| Mescal Park Detention Basin | <ul style="list-style-type: none"> Constructs new emergency spillway. Enlarges basin capacity. | <ul style="list-style-type: none"> No improvements proposed. | <ul style="list-style-type: none"> Constructs new emergency spillway. | <ul style="list-style-type: none"> Constructs new emergency spillway. | <ul style="list-style-type: none"> No improvements. |
| Berneil Ditch | <ul style="list-style-type: none"> Enlarges existing channel for 0.75 mile. Moves access/multi-use road to channel bottom. Constructs 1-to-2-foot-high flood wall. Increases capacity at Doubletree Ranch Road culvert crossing. | <ul style="list-style-type: none"> Enlarges existing channel for 0.75 mile. Moves access/multi-use road to channel bottom. Constructs 1-to-2-foot-high flood wall. | <ul style="list-style-type: none"> Enlarges existing channel for 0.5 mile. Moves access/multi-use road to channel bottom. | <ul style="list-style-type: none"> Enlarges existing channel for 0.5 mile. | <ul style="list-style-type: none"> No improvements. |
| Properties Directly Impacted | <ul style="list-style-type: none"> 84 parcels. | <ul style="list-style-type: none"> 56 parcels. | <ul style="list-style-type: none"> 26 parcels. | <ul style="list-style-type: none"> 25 parcels. | <ul style="list-style-type: none"> None. |
| Stormwater Contained Within Scottsdale Road Right-of-way | <ul style="list-style-type: none"> Yes. | <ul style="list-style-type: none"> Yes. | <ul style="list-style-type: none"> No. | <ul style="list-style-type: none"> No. | <ul style="list-style-type: none"> No. |
| Improves Driver Safety Along Scottsdale Road | <ul style="list-style-type: none"> Yes. | <ul style="list-style-type: none"> Yes. | <ul style="list-style-type: none"> Yes. | <ul style="list-style-type: none"> No. | <ul style="list-style-type: none"> No. |
| Construction Impacts to Parks | <ul style="list-style-type: none"> Minimal at Cactus Park. May require temporary closure of Mescal Park. | <ul style="list-style-type: none"> None. | <ul style="list-style-type: none"> Minimal at both Cactus and Mescal Parks. | <ul style="list-style-type: none"> Minimal at both Cactus and Mescal Parks. | <ul style="list-style-type: none"> None. |
| Permanent Impacts to Multi-use Facilities | <ul style="list-style-type: none"> Trail at Mescal Park moves to bottom of basin. Trail along Berneil Ditch moves to bottom of channel. | <ul style="list-style-type: none"> Trail along Berneil Ditch moves to bottom of channel. | <ul style="list-style-type: none"> Trail along Berneil Ditch moves to bottom of channel. | <ul style="list-style-type: none"> None. | <ul style="list-style-type: none"> None. |
| Reduces Ponding in Parks | <ul style="list-style-type: none"> Yes. | <ul style="list-style-type: none"> No. | <ul style="list-style-type: none"> Yes. | <ul style="list-style-type: none"> No. | <ul style="list-style-type: none"> No. |
| Multi-use Opportunities | <ul style="list-style-type: none"> High. | <ul style="list-style-type: none"> Moderate. | <ul style="list-style-type: none"> Low. | <ul style="list-style-type: none"> Low. | <ul style="list-style-type: none"> None. |
| Aesthetic Improvement Opportunities | <ul style="list-style-type: none"> High. | <ul style="list-style-type: none"> Moderate. | <ul style="list-style-type: none"> Low. | <ul style="list-style-type: none"> Low. | <ul style="list-style-type: none"> None. |
| Traffic Impacts During Construction | <ul style="list-style-type: none"> High. | <ul style="list-style-type: none"> Moderate. | <ul style="list-style-type: none"> Moderate. | <ul style="list-style-type: none"> Low. | <ul style="list-style-type: none"> None. |
| Cost | \$41.05 - 45.16 million | \$10.36 - 11.40 million | \$6.54 - 7.20 million | \$3.89 - 4.29 million | No structural costs |

FIGURE 12

COMPARISON OF PRELIMINARY ALTERNATIVES



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The study team conducted a number of meetings subsequent to the second public involvement meeting to discuss and develop a means by which the five alternatives could be appropriately evaluated. This evaluation was intended to result in the selection of an alternative that would adequately address the needs of the study area. The first step in the process was to develop the evaluation criteria. The second step was to develop a matrix format. A draft matrix of evaluation criteria and alternatives was developed and distributed to the study team/stakeholders for comment.

Following the completion of the alternatives evaluation matrices, the results of the rankings were reviewed and extensively discussed by the study team. The team now had two different ways to evaluate the proposed alternatives. The results of the matrix rankings were broken down and reviewed in a number of different ways. To ensure that there was no inappropriate skew to the results, numerical scores were grouped as follows and reviewed by the study team:

- Composite total score by all 12 respondents.
- Composite scores by respondents representing both engineering and non-engineering discipline groups.
- Composite scores by city, town and agency stakeholder groups.
- Composite scores of consultant/sub-consultant.

Tables 2 and 3 on the following pages represent the final matrices.

The study team conducted a field review meeting on April 23, 2002 to review all of the features that were under consideration in the field. The selection of the recommended alternative was made in the final week of April 2002. After considerable evaluation and discussion,

the study team tentatively concluded that the most appropriate selection was the "Orange" (10-year) structural alternative for channel and storm drain conveyance measures along Scottsdale Road, the 71st Street Channel and the Berneil Ditch. This selection was combined with those structural features from the "Yellow" alternative at Cactus and Mescal Parks that would provide 100-year capacity for the detention basins at those two locations.

Although the "Orange" alternative was not a clear choice based on matrix points and public opinion, it did seem to provide the best balance of flood protection versus cost and impacts. In the end, the "Orange" alternative received the strongest overall stakeholder support. The "Orange" alternative also presented some moderate aesthetic and multi-use opportunities. The "Orange" alternative would provide the opportunity to improve the aesthetic conditions and intactness of several drainage features that rated low or moderate. Specifically, major portions of the channel along Scottsdale Road from Sweetwater Avenue to Thunderbird Road and several reaches along the 71st Street Channel and Berneil Ditch currently provide no particular visual interest and do not form a cohesive pattern in the landscape.

The preliminary inclusion of the Cactus and Mescal Park detention basin improvements in the recommended alternative was based on the following considerations:

- Neither of the two detention basins had any discernable provisions to handle emergency overflows.
- The proposed improvements had a relatively small cost and construction impact.

- The potential flood hazard and failure risk was relatively high if overflow occurred.
- The improvements had a relatively large local benefit, especially at Cactus Park.
- The study team perceived that the public placed a relatively large value on providing a 100-year solution.
- The inclusion of these two locations would provide a more comprehensive regional solution.



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TABLE 2. LOCATION-SPECIFIC MATRIX

| | | Evaluation Criteria* | | | | | | | | | | Total Weighted Score | | |
|------------------------------|-----------------------------|----------------------------------|------------------|----------------------|-------------------------|-------------------|----------------------|---------------------|-------------------------|---------------|------------------------|----------------------|-------|-------|
| | | Implementation Cost/Funding | Maintenance Cost | Construction Impacts | Aesthetic Opportunities | Agency Acceptance | Community Acceptance | Level of Protection | Multi-Use Opportunities | R.O.W. Issues | Access During Flooding | | | |
| Individual Criteria Weight → | | 0.19 | 0.01 | 0.03 | 0.11 | 0.09 | 0.17 | 0.24 | 0.04 | 0.05 | 0.07 | | | |
| Location Alternatives | Scottsdale Rd | Scottsdale Rd Red | Rank | 12 | 16 | 12 | 21 | 13 | 21 | 23 | 20 | 12 | 23 | 18.38 |
| | | | Weighted Score | 2.28 | 0.16 | 0.36 | 2.31 | 1.17 | 3.57 | 5.52 | 0.80 | 0.60 | 1.61 | |
| | Scottsdale Rd Orange/Yellow | Rank | 24 | 19 | 23 | 15 | 23 | 15 | 13 | 16 | 24 | 13 | 17.58 | |
| | | Weighted Score | 4.56 | 0.19 | 0.69 | 1.65 | 2.07 | 2.55 | 3.12 | 0.64 | 1.20 | 0.91 | | |
| | Cactus Park | Cactus Park Red/Yellow | Rank | 13 | 16 | 13 | 18 | 18 | 22 | 24 | 19 | 15 | 23 | 19.24 |
| | | | Weighted Score | 2.47 | 0.16 | 0.39 | 1.98 | 1.62 | 3.74 | 5.76 | 0.76 | 0.75 | 1.61 | |
| | Cactus Park Green | Rank | 23 | 20 | 23 | 18 | 18 | 14 | 12 | 17 | 21 | 13 | 16.76 | |
| | | Weighted Score | 4.37 | 0.20 | 0.69 | 1.98 | 1.62 | 2.38 | 2.88 | 0.68 | 1.05 | 0.91 | | |
| | Mescal Park | Mescal Park Red | Rank | 15 | 19 | 15 | 25 | 17 | 31 | 33 | 27 | 17 | 35 | 25.34 |
| | | | Weighted Score | 2.85 | 0.19 | 0.45 | 2.75 | 1.53 | 5.27 | 7.92 | 1.08 | 0.85 | 2.45 | |
| | | Mescal Park Yellow | Rank | 26 | 26 | 27 | 25 | 32 | 25 | 25 | 26 | 25 | 24 | 25.86 |
| | | | Weighted Score | 4.94 | 0.26 | 0.81 | 2.75 | 2.88 | 4.25 | 6.00 | 1.04 | 1.25 | 1.68 | |
| | | Mescal Park Green | Rank | 31 | 27 | 30 | 22 | 23 | 16 | 14 | 19 | 30 | 13 | 20.80 |
| | | | Weighted Score | 5.89 | 0.27 | 0.90 | 2.42 | 2.07 | 2.72 | 3.36 | 0.76 | 1.50 | 0.91 | |
| | 71st Street Channel | 71st Street Channel Red | Rank | 20 | 26 | 16 | 30 | 14 | 29 | 32 | 28 | 16 | 36 | 26.15 |
| | | | Weighted Score | 3.80 | 0.26 | 0.48 | 3.30 | 1.26 | 4.93 | 7.68 | 1.12 | 0.80 | 2.52 | |
| | | 71st Street Channel Orange | Rank | 24 | 24 | 25 | 24 | 31 | 26 | 24 | 25 | 24 | 24 | 25.04 |
| | | | Weighted Score | 4.56 | 0.24 | 0.75 | 2.64 | 2.79 | 4.42 | 5.76 | 1.00 | 1.20 | 1.68 | |
| | | 71st Street Channel Yellow/Green | Rank | 28 | 22 | 31 | 18 | 27 | 17 | 16 | 19 | 32 | 12 | 20.81 |
| | | | Weighted Score | 5.32 | 0.22 | 0.93 | 1.98 | 2.43 | 2.89 | 3.84 | 0.76 | 1.60 | 0.84 | |
| | Berneil Ditch | Berneil Ditch Red | Rank | 12 | 36 | 12 | 29 | 33 | 44 | 56 | 33 | 12 | 56 | 35.92 |
| | | | Weighted Score | 2.28 | 0.36 | 0.36 | 3.19 | 2.97 | 7.48 | 13.44 | 1.32 | 0.60 | 3.92 | |
| | | Berneil Ditch Orange (Concrete) | Rank | 27 | 50 | 27 | 25 | 50 | 42 | 47 | 36 | 29 | 49 | 38.43 |
| | | | Weighted Score | 5.13 | 0.50 | 0.81 | 2.75 | 4.50 | 7.14 | 11.28 | 1.44 | 1.45 | 3.43 | |
| Berneil Ditch Orange (Earth) | | Rank | 35 | 23 | 36 | 50 | 43 | 41 | 37 | 49 | 34 | 35 | 39.29 | |
| | | Weighted Score | 6.65 | 0.23 | 1.08 | 5.50 | 3.87 | 6.97 | 8.88 | 1.96 | 1.70 | 2.45 | | |
| Berneil Ditch Yellow | | Rank | 48 | 33 | 46 | 42 | 35 | 29 | 26 | 39 | 47 | 26 | 35.50 | |
| | | Weighted Score | 9.12 | 0.33 | 1.38 | 4.62 | 3.15 | 4.93 | 6.24 | 1.56 | 2.35 | 1.82 | | |
| Berneil Ditch Green | | Rank | 53 | 38 | 58 | 34 | 19 | 21 | 14 | 23 | 58 | 14 | 29.37 | |
| | | Weighted Score | 10.07 | 0.38 | 1.74 | 3.74 | 1.71 | 3.57 | 3.36 | 0.92 | 2.90 | 0.98 | | |

| Engineering Weighted Score | Non-Eng. Weighted Score | PV Weighted Score | Sdale Weighted Score | FCD Weighted Score | LSD Weighted Score | Stanley Weighted Score | | |
|----------------------------|-------------------------|-------------------|----------------------|--------------------|--------------------|------------------------|----------------------------------|---------------------|
| 8.87 | 8.08 | 1.43 | 2.64 | 7.96 | 3.09 | 3.26 | Scottsdale Rd Red | Scottsdale Rd |
| 9.13 | 6.88 | 1.57 | 3.36 | 7.00 | 2.91 | 2.74 | Scottsdale Rd Orange/Yellow | Scottsdale Rd |
| 9.91 | 7.90 | 1.43 | 3.47 | 7.76 | 3.32 | 3.26 | Cactus Park Red/Yellow | Cactus Park |
| 8.09 | 7.10 | 1.57 | 2.53 | 7.24 | 2.68 | 2.74 | Cactus Park Green | Cactus Park |
| 13.66 | 9.82 | 1.86 | 4.28 | 10.68 | 3.94 | 4.58 | Mescal Park Red | Mescal Park |
| 12.97 | 10.59 | 2.30 | 5.09 | 10.03 | 4.35 | 4.09 | Mescal Park Yellow | Mescal Park |
| 9.37 | 9.59 | 1.84 | 2.63 | 9.29 | 3.71 | 3.33 | Mescal Park Green | Mescal Park |
| 13.56 | 10.73 | 1.86 | 4.32 | 11.16 | 4.29 | 4.52 | 71st Street Channel Red | 71st Street Channel |
| 12.18 | 10.56 | 2.30 | 4.00 | 10.27 | 4.38 | 4.09 | 71st Street Channel Orange | 71st Street Channel |
| 10.26 | 8.71 | 1.84 | 3.68 | 8.57 | 3.33 | 3.39 | 71st Street Channel Yellow/Green | 71st Street Channel |
| 17.65 | 15.43 | 2.84 | 4.73 | 16.95 | 5.49 | 5.91 | Berneil Ditch Red | Berneil Ditch |
| 21.47 | 13.75 | 3.21 | 8.56 | 14.50 | 5.65 | 6.51 | Berneil Ditch Orange (Concrete) | Berneil Ditch |
| 17.85 | 18.16 | 3.28 | 4.91 | 17.24 | 7.11 | 6.75 | Berneil Ditch Orange (Earth) | Berneil Ditch |
| 17.94 | 14.72 | 2.84 | 6.72 | 13.99 | 6.23 | 5.72 | Berneil Ditch Yellow | Berneil Ditch |
| 15.09 | 11.96 | 2.32 | 5.08 | 11.37 | 5.49 | 5.11 | Berneil Ditch Green | Berneil Ditch |

*Evaluation Criteria development based on Scottsdale Road Corridor DMP Brainstorming Meeting held 09/24/01, later finalized 4/11/02.

Total Weighted Score - From all participants
 Engineering Weighted Score - Schalk, Buchanan, Johnson, Lund, Ahouraiyan, Ruman, Mead
 Non-Engineering Weighted Score - Simpson, de Cordre, Fowler, Hoppmann
 Shaded Cell - Indicates winning alternative

Matrix Participants: Ruman, Hoppmann, Lund, de Cordre, Pinto, Ahouraiyan, Johnson, Schalk, Fowler, Buchanan, Simpson, Mead

Not Responding: Mushtaq



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

TABLE 3. SYSTEM-WIDE MATRIX

| | | Evaluation Criteria* | | | | | | | | | | Total Weighted Score | |
|-----------------------------------|--------------------|-----------------------------|------------------|----------------------|-------------------------|-------------------|----------------------|---------------------|-------------------------|---------------|------------------------|----------------------|-------|
| | | Implementation Cost/Funding | Maintenance Cost | Construction Impacts | Aesthetic Opportunities | Agency Acceptance | Community Acceptance | Level of Protection | Multi-Use Opportunities | R.O.W. Issues | Access During Flooding | | |
| Individual Criteria Weight -----> | | 0.19 | 0.01 | 0.03 | 0.11 | 0.09 | 0.17 | 0.24 | 0.04 | 0.05 | 0.07 | | |
| System-Wide Alternatives | Red Alternative | Rank | 16 | 22 | 16 | 54 | 21 | 51 | 52 | 56 | 12 | 56 | 39.48 |
| | | Weighted Score | 3.04 | 0.22 | 0.48 | 5.94 | 1.89 | 8.67 | 12.48 | 2.24 | 0.60 | 3.92 | |
| | Orange Alternative | Rank | 31 | 31 | 30 | 44 | 49 | 46 | 45 | 42 | 27 | 48 | 41.36 |
| | | Weighted Score | 5.89 | 0.31 | 0.90 | 4.84 | 4.41 | 7.82 | 10.80 | 1.68 | 1.35 | 3.36 | |
| | Yellow Alternative | Rank | 37 | 35 | 34 | 41 | 52 | 43 | 39 | 41 | 37 | 38 | 40.41 |
| | | Weighted Score | 7.03 | 0.35 | 1.02 | 4.51 | 4.68 | 7.31 | 9.36 | 1.64 | 1.85 | 2.66 | |
| | Green Alternative | Rank | 44 | 40 | 47 | 28 | 39 | 27 | 27 | 28 | 47 | 25 | 33.05 |
| | | Weighted Score | 8.36 | 0.40 | 1.41 | 3.08 | 3.51 | 4.59 | 6.48 | 1.12 | 2.35 | 1.75 | |
| | Blue Alternative | Rank | 52 | 52 | 53 | 13 | 19 | 13 | 17 | 13 | 57 | 13 | 25.70 |
| | | Weighted Score | 9.88 | 0.52 | 1.59 | 1.43 | 1.71 | 2.21 | 4.08 | 0.52 | 2.85 | 0.91 | |

| Engineering Weighted Score | Non-Eng. Weighted Score | PV Weighted Score | Sdale Weighted Score | FCD Weighted Score | LSD Weighted Score | Stanley Weighted Score | |
|----------------------------|-------------------------|-------------------|----------------------|--------------------|--------------------|------------------------|--------------------|
| 18.66 | 17.57 | 3.25 | 4.48 | 17.63 | 6.87 | 7.25 | Red Alternative |
| 20.19 | 16.90 | 4.27 | 7.29 | 16.59 | 6.91 | 6.30 | Orange Alternative |
| 21.59 | 16.01 | 2.81 | 8.52 | 15.78 | 6.41 | 6.89 | Yellow Alternative |
| 16.44 | 13.75 | 2.86 | 5.63 | 13.84 | 5.40 | 5.32 | Green Alternative |
| 13.12 | 10.77 | 1.81 | 4.08 | 11.16 | 4.41 | 4.24 | Blue Alternative |

*Evaluation Criteria development based on Scottsdale Road Corridor DMP Brainstorming Meeting held 09/24/01, later finalized 4/11/02.

Total Weighted Score - From all participants
 Engineering Weighted Score - Schalk, Buchanan, Johnson, Lund, Ahouraiyan, Ruman, Mead
 Non-Engineering Weighted Score - Simpson, de Cordre, Fowler, Hoppmann
 Shaded Cell - Indicates winning alternative

Matrix Participants: Ruman Hoppmann
 Lund de Cordre
 Pinto Ahouraiyan
 Johnson Schalk
 Fowler Buchanan
 Simpson Mead

Not Responding: Mushtaq



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

5.0 RECOMMENDED SYSTEM-WIDE ALTERNATIVE

The study team concluded the selection process for the recommended alternative the first week in May 2002. The recommended system-wide alternative would consist of the following primary sets of features:

- Channel improvements along the upper Berneil Ditch and regional storm drain improvements for the upper 71st Street Channel and the Scottsdale Road Channel that would provide for a continuous, comprehensive regional system capable of conveying at least a 10-year storm.
- Improvements to the regional detention basins at Cactus and Mescal Parks that would contain a 100-year storm without overflow and that would establish formal overflow spillways that were capable of passing a design storm in excess of a 100-year event without the basin containment failing.

The third public involvement meeting was held on Wednesday, June 19, 2002. The goal of the third public involvement meeting was to present the recommended system-wide plan to the public and to obtain their feedback regarding specific features and considerations that could be incorporated into the concept plans and reflected in preliminary cost estimates. Figure 13 on the following page illustrates the recommended system-wide alternative as presented in the handout for the third public involvement meeting. Immediately following Figure 13 is Figure 14 which depicts the approximate flood prone area for the "with recommended alternative" condition compared to the existing condition 10-year flood prone area.

After selection of the recommended alternative, the hydrology and hydraulics for the study were finalized and a number of minor adjustments were made to specific features of the recommended plan to reflect the final hydrology and hydraulics. Concept plans were then prepared and the need for temporary construction easements was evaluated. Construction quantity and cost estimates were also prepared. These costs include the cost of temporary construction easements and a "markup" of 35% to account for contingency costs, utility relocations, traffic control, final design and survey, and inflation.

Concept plans are found in Appendix A. Table 4 summarizes the temporary construction easements (TCE) that are anticipated for the recommended alternative. These TCEs are also illustrated in plan view and cross section details in the concept plans. There is no permanent fee title right-of-way acquisition anticipated for the recommended alternative. Quantity and cost estimates are summarized in Tables 5 through 10.

Landscape themes were developed at each of the recommended alternative feature locations to go along with the concept design plans. These landscape themes are included at the end of the concept plans in Appendix A. Recommended improvements along Scottsdale Road are in an area designated by the City of Scottsdale as a scenic corridor and will need to be designed to comply with the "suburban" classification of streetscape design. Landscape improvements within Cactus and Mescal Parks will need to preserve the high level of scenic and aesthetic quality that is currently there. Proposed improvements at the Berneil Ditch and the 71st Street Channel represent opportunities to improve the visual character and the level of connectedness along those locations. The cost estimates in Table 4 reflect the cost of anticipated landscaping.

Environmental impacts were considered and evaluated with regard to the concept plans for the recommended alternative. No significant environmental impacts or concerns have been identified. However, the completion of a Phase I Environmental Site Assessment during the design phase is recommended to identify any recognized environmental concerns.

Impacts to wildlife habitat would be negligible since the study area is essentially all urbanized. Existing protected native plants such as mesquite and palo verde trees that are present along portions of the 71st Channel would be salvaged with the implementation of the recommended system-wide alternative in accordance with the City of Scottsdale's "Native Plant Ordinance" (Ordinance Number 2262 Section 7.500). No impacts are anticipated to any properties that are on the National Register of Historic Places. The recommended alternative does not conflict with any known hazardous materials concerns.

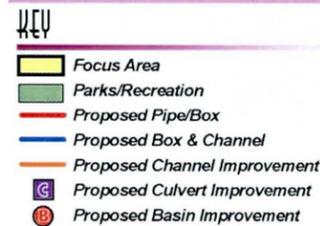
Impacts to "waters" of the United States may require permit(s) from the U.S. Army Corps Engineers and mitigation as part of the requirements of Sections 404 and 401 of the Clean Water Act. A jurisdictional delineation would need to be completed during final design to determine the type, if any, of permit required by the U.S. Army Corps of Engineers. The need for 401 Water Quality Certification would also be determined during final design. Some deterioration of air quality may be expected during construction due to the operation of construction equipment combined with the slower traffic speeds associated with construction zones. This localized condition would be discontinued when the project is completed. Dust generated from construction activities will need to be controlled and minimized.



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FIGURE 13 RECOMMENDED SYSTEM-WIDE ALTERNATIVE

RECOMMENDED DRAINAGE ALTERNATIVE (10-YEAR REGIONAL PROTECTION)



DESCRIPTION

- 1. Scottsdale Road Channel**
 - Extends the existing large-diameter storm drain pipe north from Sweetwater Avenue to Thunderbird Road, replacing the existing surface channel and the culvert at Sutton Drive and providing a 10-year capacity.
 - Constructs a shallow landscaped channel over the extended storm drain pipe to carry local stormwater.
 - Constructs additional storm drain catch basins in Scottsdale Road from Thunderbird Road to Sweetwater Avenue to drain stormwater from the road into the new storm drain pipe.
- 2. Cactus Park Detention Basin**
 - Raises the overflow spillway along Cactus Road approximately two feet to provide additional storage volume and prevent the overflow from a 100-year storm.
- 3. 71st Street Channel**
 - Constructs an underground storm drain from just north of Sunnyside Drive to a point about 600 feet south of Cholla Road.
 - Replaces the existing surface channel from Sunnyside Drive to Cortez Street with a slightly deeper hard-surfaced channel to convey local stormwater. 71st Street from Cortez Street to Cholla Road and the existing 71st Street Channel for a distance of about 600 feet south of Cholla Road will remain essentially unchanged. The combined surface conveyance and storm drain will have a 10-year flow capacity.
 - Replaces the existing surface channel from just south of Mescal Street to Sahuaro Drive with a slightly deeper hard-surfaced channel to increase its capacity
 - Improves the capacity of the existing culvert at Sahuaro Drive by adding or reconstructing existing culvert barrels.
- 4. Mescal Park Detention Basin**
 - Enlarges the size of the existing basin to increase the stormwater storage volume and prevent the overflow from a 100-year storm.
 - Reconstructs the emergency overflow spillway to eliminate the existing potentially hazardous overflow condition.
- 5. Berneil Ditch**
 - Reconstructs the existing earth channel from Scottsdale Road west to the southwest corner of Chaparral High School to provide greater capacity. The new channel would be about one foot deeper and have a hardened surface with a uniform bottom and sides. The existing dirt road along the south side of the channel would essentially remain as-is and there would be no modifications to the channel south of Chaparral High School.
 - Constructs a floodwall about one foot in height along the south bank of the Berneil Ditch opposite where the 71st Street Channel

BENEFITS

- Increases stormwater conveyance where necessary to at least a 10-year capacity, thus providing improved regional flood protection.
- Provides a more complete and continuous regional outfall system and creates a better opportunity for smaller, local storm drain and drainage improvements to be constructed in the future.
- Covers the existing open channel along Scottsdale Road from Thunderbird Road to Sweetwater Avenue and reduces the present motorist and pedestrian safety hazards.
- Provides an opportunity to construct catch basins in Scottsdale Road where presently there are none from Thunderbird Road to Sweetwater Avenue, reduces flooding in Scottsdale Road from Sutton Drive to Sweetwater Avenue, and improves the wet-weather driving safety of Scottsdale Road.
- Provides opportunity for landscape aesthetics and multi-use path enhancements along Scottsdale Road.
- Significantly improves the capacity of the 71st Street Channel from Sunnyside Drive to just south of Cholla Road while essentially containing the structural improvements within the existing drainage corridor.
- Provides an opportunity to improve the aesthetic condition of a portion of the Berneil Ditch.
- Eliminates the potentially hazardous overflow condition at the Cactus and Mescal Park detention basins by improving their capacity to handle up to a 100-year event.

CONSTRAINTS

- This alternative has a significant total cost but it is much less than the cost of the system-wide 100-year alternative.
- This alternative may have some drainage easement and/or temporary construction easement acquisition requirements along the upper 71st Street Channel.
- Construction impacts, while not as severe or extensive as the system-wide 100-year alternative, are still significant along the Berneil Ditch, upper 71st Street Channel, Scottsdale Road, and Cactus and Mescal Parks.
- Construction impacts would temporarily restrict use of the multi-use paths and sidewalks along Scottsdale Road and the Berneil Ditch and at Cactus and Mescal Parks.

PRELIMINARY COST ESTIMATE

- Scottsdale Road Channel from Thunderbird Road to Sweetwater Avenue: \$1,300,000 - \$1,600,000
- Cactus Park Detention Basin: \$100,000 - \$125,000
- 71st Street Channel from north of Mescal Street to Sunnyside Drive: \$2,000,000 - \$2,500,000
- Mescal Park Detention Basin: \$175,000 - \$225,000
- Berneil Ditch from Scottsdale Road to south of Chaparral High School: \$1,300,000 - \$1,625,000

TOTAL ESTIMATED COST RANGE: \$4,875,000 - \$6,075,000

Channel - An open conveyance of surface stormwater having a bottom and sides in a linear configuration. Channels can be natural or man made. Channels can have levees or dikes along their sides to build up their depth. Constructed channels can be plain earth, landscaped, or lined with concrete, stone, or other hard surface to resist erosion and scour.

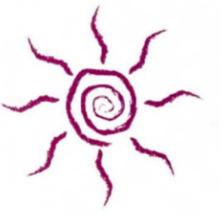
10-year Level of Protection - Protects against the size of storm that has a 10 percent chance of occurring each year.

Culvert - A relatively short conduit that conveys surface stormwater through a raised embankment or under a roadway from one side to the other. Culverts can have single or multiple barrels and can consist of concrete, metal or plastic pipe, or reinforced concrete box structures.

Spillway - A grate or mesh, usually metal, located at the primary outlet of a detention basin, at a culvert, or at the entrance to a storm drain that is designed to prevent blockage of the structure by debris.

Storm Drain - A closed underground conduit that conveys stormwater for some distance.

Floodwall - An above-ground man made structure usually situated along the bank of a channel to provide extra conveyance capacity. Floodwalls can be of varying height and length and are usually made of reinforced concrete or masonry block in such a way as to resist the force of the stormwater they are designed to resist.



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

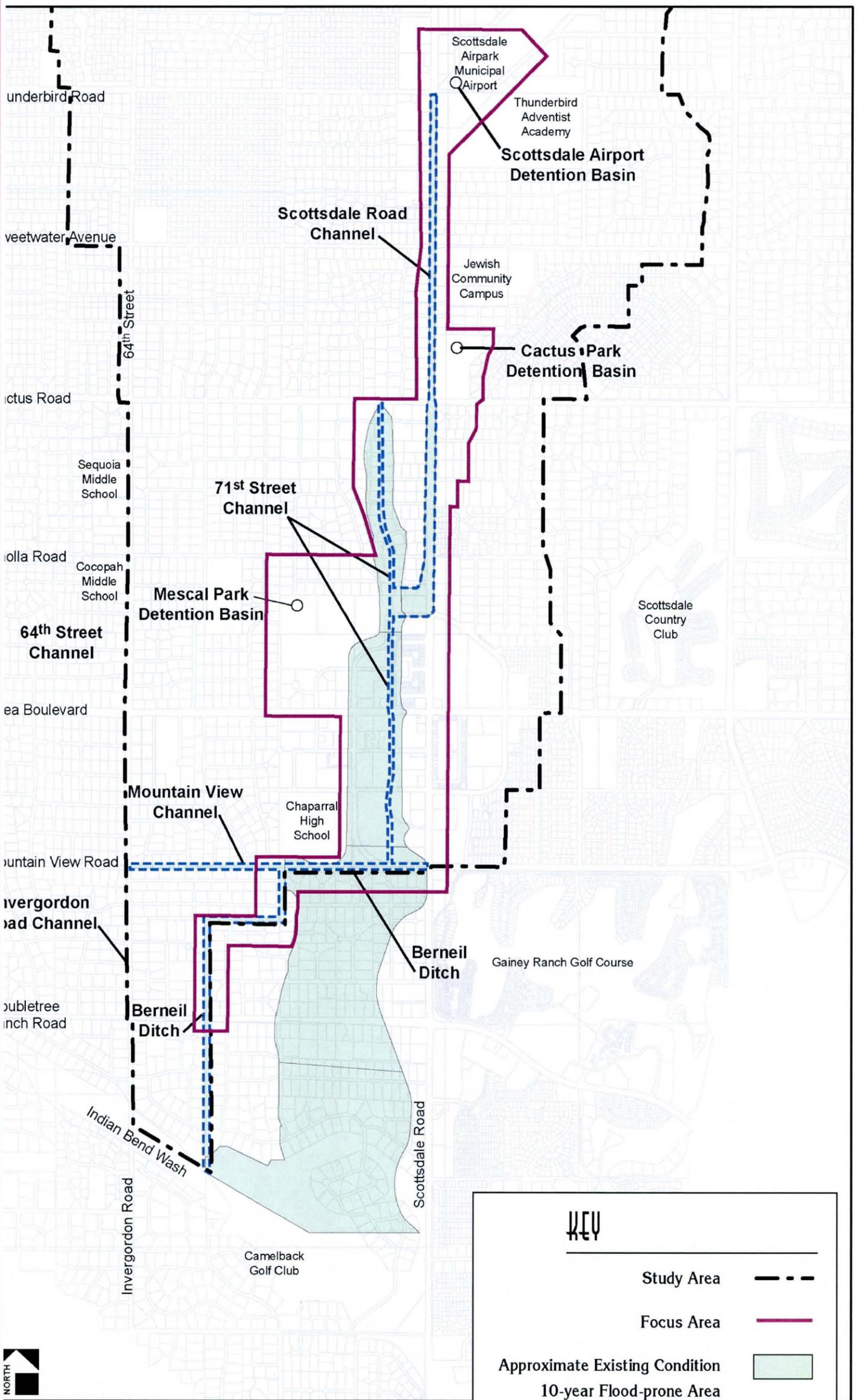


FIGURE 14
APPROXIMATE 10-YEAR FLOOD PRONE AREA COMPARISON FOR THE "WITH RECOMMENDED ALTERNATIVE" CONDITION AND THE EXISTING CONDITION



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

TABLE 4. TEMPORARY CONSTRUCTION EASEMENTS FOR THE RECOMMENDED ALTERNATIVE

| Berneil Ditch | | | | |
|----------------------------------|-------------|------------|---|--------------|
| Location | Length (ft) | Width (ft) | Description | Area (sq ft) |
| Station 163+00 to Station 163+65 | 65 | 10 | For reconstruction of existing hard surface drainage apron within Chaparral High School | 650 |
| Station 170+15 to Station 170+60 | 45 | 10 | For reconstruction of existing hard surface drainage apron within Chaparral High School | 450 |

| 71st Street Channel | | | | |
|----------------------------------|-------------|------------|--|--------------|
| Location | Length (ft) | Width (ft) | Description | Area (sq ft) |
| Station 346+70 to Station 352+70 | 600 | 4 | East side of exist 30' drainage easement from approx 300' north of Mescal Street to just south of Cholla Street (from property line to exist fence line) | 2400 |
| Station 363+05 to Station 370+65 | 760 | 4 | 2' each side of exist 30' drainage R/W from Cortez Street to Sunnyside Drive (from R/W line to exist fence line) | 3040 |

| Scottsdale Road Channel | | | | |
|----------------------------------|-------------|-------------------|--|--------------|
| Location | Length (ft) | Width (ft) | Description | Area (sq ft) |
| Station 516+35 to Station 520+17 | 382 | Varies 17' to 56' | At Seventh Day Adventist Church from south of south driveway to north of north driveway, outside of existing drainage easement to reconstruct driveways and perform grading and landscaping. | 8100 |
| Station 500+38 to Station 512+90 | 1252 | 10 | From east side of 10' drainage easement to rear yard fences from Sweetwater Avenue to Sutton Drive | 12520 |

| | |
|--------------------|-----------|
| TOTAL AREA (sq ft) | 27160 |
| \$ PER SQ FT | \$5.00 |
| TOTAL COST | \$135,800 |

Notes:

1. Refer to concept plans in Appendix A for stations and locations.
2. No temporary construction easements are anticipated at Cactus and Mescal Parks.
3. The temporary construction easement along the Scottsdale Road channel from Sweetwater Avenue to Sutton Drive is currently a 10' wide utility and sidewalk easement and may require acquisition as a landscape easement to construct the aesthetic improvements that are part of the recommended alternative.

TABLE 5. TOTAL CONCEPT COST ESTIMATE

| Recommended Alternative Location | Concept Cost Estimate |
|----------------------------------|-----------------------|
| Berneil Ditch | \$1,655,066 |
| 71st Street Channel | \$1,693,913 |
| Scottsdale Road Channel | *\$2,255,040 |
| Cactus Park Detention Basin | \$155,318 |
| Mescal Park Detention Basin | \$312,458 |
| Total | *\$6,071,795 |

* Note: To meet future FCDMC hydraulic design criteria, the Scottsdale Road Channel cost and total cost would increase to \$2,623,200 and \$6,411,605, respectively. See Table 7 and discussion in Section 6.1.



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

TABLE 6. 71st STREET CHANNEL CONCEPT COST ESTIMATE

| 71st Street Channel from Sta 334+08 to 339+80 | | | | | |
|---|--|------|----------|------------|-----------|
| Item No. | Description | Unit | Quantity | Unit Price | Cost |
| 1 | Channel Earthwork | CY | 950 | \$10 | \$9,500 |
| 2 | Hard Surfaced Channel Lining | CY | 400 | \$300 | \$120,000 |
| 3 | Reconstruct Exist 18" Diam SD Outlet | LS | 1 | \$1,500 | \$1,500 |
| 4 | Landscaping | SF | 10500 | \$1 | \$10,500 |
| 71st Street Channel from Sta 343+39 to 346+25 | | | | | |
| Item No. | Description | Unit | Quantity | Unit Price | Cost |
| 1 | Channel Grading | CY | 200 | \$10 | \$2,000 |
| 2 | Landscaping | SF | 25000 | \$2 | \$50,000 |
| 71st Street Channel from Sta 346+25 to 352+70 | | | | | |
| Item No. | Description | Unit | Quantity | Unit Price | Cost |
| 1 | Reconstruct Access Barrier | LS | 1 | \$5,000 | \$1,000 |
| 2 | Reconstruct Energy Dissipator | CY | 5 | \$400 | \$2,000 |
| 3 | Reconstruct Headwall and Wingwalls | CY | 10 | \$400 | \$4,000 |
| 4 | Remove Exist Channel Lining | SF | 13100 | \$1 | \$13,100 |
| 5 | New Hard Surface Channel Lining | CY | 250 | \$300 | \$75,000 |
| 6 | Reconstruct Existing Driveway | EA | 2 | \$1,000 | \$2,000 |
| 7 | 72" Diam Storm Drain Pipe | LF | 645 | \$200 | \$129,000 |
| 8 | Temporary Construction Easement | SF | 2400 | \$5 | \$12,000 |
| 71st Street Channel from Sta 352+70 to Sta 352+90 | | | | | |
| Item No. | Description | Unit | Quantity | Unit Price | Cost |
| 1 | Remove 25 LF of Existing 60" Diam Pipe | LS | 1 | \$2,000 | \$2,000 |
| 2 | Remove Exist Channel Lining | SF | 2700 | \$1 | \$2,700 |
| 3 | New Hard Surface Channel Lining | CY | 50 | \$300 | \$15,000 |
| 4 | Reinforced Concrete Junction Structure | CY | 45 | \$450 | \$20,250 |
| 71st Street Channel from Sta 352+90 to Sta 371+53 | | | | | |
| Item No. | Description | Unit | Quantity | Unit Price | Cost |
| 1 | 84" Diam Storm Drain Pipe | LF | 1863 | \$300 | \$558,900 |
| 2 | Pavement Replacement | SY | 2200 | \$20 | \$44,000 |
| 3 | Remove Existing Slotted Drain and Lateral Pipe | LS | 1 | \$2,000 | \$2,000 |
| 4 | Catch Basin and Lateral Pipe | EA | 1 | \$3,000 | \$3,000 |
| 5 | Grated Inlet and Lateral Pipe | EA | 2 | \$3,000 | \$6,000 |
| 6 | Remove Exist Channel Lining | SF | 11100 | \$1 | \$11,100 |
| 7 | New Hard Surface Channel Lining | CY | 350 | \$300 | \$105,000 |
| 8 | Temporary Construction Easement | SF | 3040 | \$5 | \$15,200 |
| 9 | Landscaping | SF | 5000 | \$1 | \$5,000 |

TABLE 6 CONTINUED

| 71st Street Channel from Sta 371+53 to 371+80 | | | | | |
|---|--|------|----------|------------|--------------------|
| Item No. | Description | Unit | Quantity | Unit Price | Cost |
| 1 | Sawcut/Remove 27 LF Exist Concrete Channel | LS | 1 | \$10,000 | \$10,000 |
| 2 | Reinforced Concrete Inlet Structure | CY | 40 | \$450 | \$18,000 |
| 3 | Inlet Grate | EA | 1 | \$5,000 | \$5,000 |
| Subtotal | | | | | \$1,254,750 |
| Mark-up @ 35% | | | | | \$439,163 |
| Total | | | | | \$1,693,913 |

- Mark-up:
- 5% Contingency Costs
 - 5% Utility Relocation
 - 5% Permit/Partner/Mobilize/Traffic
 - 15% Design/Construction Survey
 - 5% Inflation
 - 35% TOTAL



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TABLE 7. SCOTTSDALE ROAD CHANNEL CONCEPT COST ESTIMATE

| Scottsdale Road Channel from Sta 500+38 to Sta 512+89 | | | | | | |
|---|--|------|----------|------------|--------------------|---------------------|
| Item No. | Description | Unit | Quantity | Unit Price | Cost | |
| 1 | Remove Exist Headwall, Wingwalls and Inlet | LS | 1 | \$10,000 | \$10,000 | |
| 2 | Remove Exist Conc/Gabion Channel | SF | 32500 | \$1 | \$32,500 | |
| 3 | 90" Diam Storm Drain Pipe | LF | 1241 | \$400 | \$496,400 | |
| *3A | 114" Diam Storm Drain Pipe | LF | 1241 | \$600 | \$744,600 | |
| 4 | Grated Inlet | EA | 2 | \$3,000 | \$6,000 | |
| 5 | Catch Basin | EA | 8 | \$3,000 | \$24,000 | |
| 6 | 24" Diam SD Pipe Lateral (incl pvmt replace) | LF | 404 | \$100 | \$40,400 | |
| 7 | Fill and Finish Grading | CY | 3200 | \$10 | \$32,000 | |
| 8 | Landscaping | SF | 34000 | \$2 | \$68,000 | |
| 9 | 8 ft Wide Meandering Sidewalk | SF | 10000 | \$2 | \$20,000 | |
| 10 | Temporary Construction Easement | SF | 12500 | \$5 | \$62,500 | |
| 11 | Reinforced Concrete Transition Structure | EA | 1 | \$10,000 | \$10,000 | |
| Scottsdale Road Channel from Sta 512+89 to Sta 520+69 | | | | | | |
| Item No. | Description | Unit | Quantity | Unit Price | Cost | |
| 1 | Remove 4 - 8' x 3' RCB, Head and Wingwalls | LS | 1 | \$15,000 | \$15,000 | |
| 2 | 12' x 5' RCB | CY | 1150 | \$350 | \$402,500 | |
| 3 | Extend Exist SD Lateral Pipes | EA | 4 | \$1,000 | \$4,000 | |
| 4 | Grated Inlet | EA | 3 | \$3,000 | \$9,000 | |
| 5 | Catch Basin | EA | 2 | \$3,000 | \$6,000 | |
| 6 | 24" Diam SD Pipe Lateral (incl pvmt replace) | LF | 160 | \$100 | \$16,000 | |
| 7 | Fill and Finish Grading | CY | 3000 | \$10 | \$30,000 | |
| 8 | Landscaping | SF | 40000 | \$2 | \$80,000 | |
| 9 | Remove Exist 5' Sidewalk | SF | 3900 | \$1 | \$3,900 | |
| 10 | 8 ft Wide Meandering Sidewalk | SF | 6300 | \$2 | \$12,600 | |
| 11 | Remove Exist Private Driveway | SF | 6200 | \$1 | \$6,200 | |
| 12 | New Pavement @ Private Driveway | SF | 6200 | \$2 | \$12,400 | |
| 13 | Temporary Construction Easement | SF | 8100 | \$5 | \$40,500 | |
| Scottsdale Road Channel from Sta 520+69 to Sta 525+44 | | | | | | |
| Item No. | Description | Unit | Quantity | Unit Price | Cost | |
| 1 | Remove Exist Headwall and Wingwalls | LS | 1 | \$5,000 | \$5,000 | |
| 3 | Remove Exist Concrete Channel Lining | CY | 300 | \$10 | \$3,000 | |
| 2 | 8' x 5' RCB | CY | 510 | \$350 | \$178,500 | |
| *2A | 10' x 5' RCB | CY | 580 | \$350 | \$203,000 | |
| 4 | Fill and Finish Grading | CY | 1200 | \$10 | \$12,000 | |
| 5 | Catch Basin | EA | 2 | \$3,000 | \$6,000 | |
| 6 | 24" Diam SD Pipe Lateral (incl pvmt replace) | LF | 160 | \$100 | \$16,000 | |
| 7 | Reinforced Concrete Transition Structure | EA | 1 | \$10,000 | \$10,000 | |
| Subtotal | | | | | \$1,670,400 | *\$1,943,100 |
| Mark-up @ 35% | | | | | \$584,640 | *\$680,100 |
| Total | | | | | \$2,255,040 | *\$2,623,200 |

Note: It is assumed that sidewalk and landscaping will be constructed with the International Fighter Pilot Museum from Sta 520+69 to Sta 525+44.

*Note: Revised quantity and cost to meet future FCDMC hydraulic design criteria. (See discussion in Section 6.1).

Mark-up:

- 5% Contingency Costs
- 5% Utility Relocation
- 5% Permit/Partner/Mobilize/Traffic
- 15% Design/Construction Survey
- 5% Inflation
- 35% TOTAL



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

TABLE 8. BERNEIL DITCH CONCEPT COST ESTIMATE

| Berneil Ditch from Sta 161+20 to Sta 185+70 | | | | | |
|---|---------------------------------------|------|----------|------------|--------------------|
| Item No. | Description | Unit | Quantity | Unit Price | Cost |
| 1 | Sawcut/Remove Channel Lining/Spillway | SF | 14000 | \$1 | \$14,000 |
| 2 | Channel Earthwork | CY | 7950 | \$10 | \$79,500 |
| 3 | Hard Surfaced Channel Lining | CY | 3550 | \$300 | \$1,065,000 |
| 4 | Temporary Construction Easement | SF | 1100 | \$5 | \$5,500 |
| 5 | Reconstruct Exist 36" Diam SD Outlet | LS | 1 | \$2,000 | \$2,000 |
| 6 | Reconstruct Exist 18" Diam SD Outlet | LS | 1 | \$1,500 | \$1,500 |
| 7 | Flood Wall | CY | 18.5 | \$350 | \$6,475 |
| 8 | Landscaping | SF | 52000 | \$1 | \$52,000 |
| Subtotal | | | | | \$1,225,975 |
| Mark-up @ 35% | | | | | \$429,091 |
| Total | | | | | \$1,655,066 |

TABLE 9. MESCAL PARK DETENTION BASIN CONCEPT COST ESTIMATE

| Mescal Park Detention Basin | | | | | |
|-----------------------------|---|------|----------|------------|------------------|
| Item No. | Description | Unit | Quantity | Unit Price | Cost |
| 1 | Reinforced Concrete Spillway | CY | 40 | \$350 | \$14,000 |
| 2 | Hardened Slope Protection | CY | 75 | \$300 | \$22,500 |
| 3 | 1/4" Minus Granite Backfill | CY | 30 | \$80 | \$2,400 |
| 4 | Basin Excavation - Includes Clearing and Finish Grading | CY | 1775 | \$5 | \$8,875 |
| 5 | Basin Perimeter Fill | CY | 1775 | \$5 | \$8,875 |
| 6 | Inlet Access Barrier/Trash Rack | LS | 1 | \$5,000 | \$5,000 |
| 7 | Reconstruct Equestrian Trail | SF | 17300 | \$1 | \$17,300 |
| 8 | Reconstruct Asphalt Path | SF | 2500 | \$1 | \$2,500 |
| 9 | Landscaping | SF | 75000 | \$2 | \$150,000 |
| Subtotal | | | | | \$231,450 |
| Mark-up @ 35% | | | | | \$81,008 |
| Total | | | | | \$312,458 |

TABLE 10. CACTUS PARK DETENTION BASIN CONCEPT COST ESTIMATE

| Cactus Park Detention Basin | | | | | |
|-----------------------------|------------------------------------|------|----------|------------|------------------|
| Item No. | Description | Unit | Quantity | Unit Price | Cost |
| 1 | Remove Exist Masonry Wall | LS | 1 | \$10,000 | \$10,000 |
| 2 | Reinforced Concrete Retaining Wall | CY | 110 | \$350 | \$38,500 |
| 3 | Excavation for Riprap Splash Apron | CY | 610 | \$5 | \$3,050 |
| 4 | Riprap Splash Apron, D(50) = 12" | CY | 500 | \$80 | \$40,000 |
| 5 | Fill and Finish Grade Above Riprap | CY | 300 | \$5 | \$1,500 |
| 6 | Landscaping | SF | 11000 | \$2 | \$22,000 |
| Subtotal | | | | | \$115,050 |
| Mark-up @ 35% | | | | | \$40,268 |
| Total | | | | | \$155,318 |

Mark-up:

- 5% Contingency Costs
- 5% Utility Relocation
- 5% Permit/Partner/Mobilize/Traffic
- 15% Design/Construction Survey
- 5% Inflation
- 35% TOTAL



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

Construction activities adjacent to roadways would slow traffic movement and inconvenience motorists. Motorists would most likely take alternative routes to avoid the construction zone, which may result in an increase in cut-through traffic on residential streets. Construction of the portion of the proposed storm drain underneath 71st Street between Cortez Street and Cholla Street would disrupt local traffic patterns. Access to properties must be provided at all times, and roads and driveways would remain open to traffic during construction except during brief periods of time to move equipment or large construction material.

The contractor should place signs prior to the start of construction along Scottsdale Road, and at Cactus and Mescal Parks according to current agency standards to notify motorists and park users so that they are not surprised by the potential delays and inconveniences. The equestrian and pedestrian paths at Mescal Park would not be accessible at all times. Portions of the paths may be closed while work is being done at that specific location of the basin. Property owners adjacent to the Scottsdale Road Channel, the 71st Street Channel and the Berneil Ditch should be individually notified by the contractor in addition to the placement of signs prior to the start of construction.

6.0 Implementation, Phasing and Maintenance

6.1 Implementation

With the completion of the final hydrology and hydraulics, there were a number of design and phasing issues that came to light and further adjustments were made to the recommended system-wide alternative. Many of these design and phasing issues were resolved and reflected in the concept plans for the recommended alternative that are included in Appendix A of this executive summary. The following sub-sections highlight the more significant issues from the final report

6.1.1 Berneil Ditch

Transitions from the typical bottom width and side slope will be necessary. Side slopes flatter than 2H to 1V are desirable if the 10-year conveyance objective can be met. It may be possible to reduce the typical bottom width of 40 feet upstream from the 71st Street Channel confluence if it is concluded that no freeboard is needed in that sub-reach. Two additional desirable features would be to incorporate a maintenance access ramp into the channel and a cross slope on the channel bottom.

6.1.2 Mescal Park Detention Basin

The material needed to raise the perimeter of the basin will be excavated laterally from the basin's northeast corner. It is assumed that the material at this location will be suitable for that purpose. Because of the significant equestrian use in the park, it would be desirable to cover the hardened surface of the new overflow spillway with soil or turf. In final design, every effort should be made to position the overflow spillway so that it does not impact the larger existing established trees. The recommended trash rack / access barrier at the basin outlet should be designed with sloping bars that are out and away from the existing headwall.

6.1.3 71st Street Channel

The recently extended 12' x 9' concrete box culvert from Shea Boulevard to Sahuaro Drive allows the deletion of the proposed improvements to (or replacement of) the existing culvert at Sahuaro Drive that was part of the recommended system-wide alternative. The objective of the storm drain features in the recommended alternative was clarified. The completed storm drain system is intended to convey the entire 10-year discharge below ground.

Manholes and access for maintenance of the new storm drain should be incorporated in final design at the new structures just south of Cholla Street and just north of Sunnyside Drive and at the inlets near Cortez Street and Jenan Drive. In the residential area north of Cholla Street, relocations of existing water lines will be required. If sewer were constructed to serve this area in the future, the existing sewer trunk line in Scottsdale Road should provide a deep enough outfall to avoid profile conflicts with the new 84" diameter storm drain.

The pavement removal that is anticipated for the new storm drain under 71st Street from Cholla to Cortez Street would be from the centerline of the street to the lip of the west gutter, thus leaving the east side of the street open for traffic. Access to homes during construction of this reach is critical. South of Cholla Street, the existing channel doubles as a paved alley that provides access to at least two adjacent properties. Final design must accommodate this access. To construct the new storm drain south of Cholla Street, it may only be necessary to remove the bottom and east side slope of the existing channel lining. However, to achieve a desirable aesthetic design for the new surface channel, it is anticipated that the entire lining will need to be replaced.



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

Also in the reach south of Cholla Street, the overhead utility poles along the east side of the easement may crowd the available space for the new pipe. Based on the original construction plans for the existing 60" diameter pipe and on field observations of existing surface conditions, there is enough lateral room for the new 72" diameter pipe per the typical section in the concept drawings. This conclusion and the exact position of the easement limit should be confirmed through survey, as-built and/or pothole prior to final design. There should also be caution exercised during construction due to the overhead electric lines.

In final design, it may be advisable to consider incorporating a maintenance access ramp into the 71st Street Channel somewhere near the Mescal Park detention basin outfall pipe. Another maintenance access ramp could also be considered just north of Mescal Street.

6.1.4 Cactus Park Detention Basin

The improvements proposed to the overflow spillway at the Cactus Park Detention basin may need to be modified slightly if future roadway improvements planned by the City of Scottsdale to Cactus Road and its intersection with Scottsdale Road are constructed first. These future roadway improvements may expand the number of lanes and push the existing curb and sidewalk on the north side of Cactus Road further north toward the new overflow spillway. It may be desirable to combine the future roadway and overflow spillway improvements in one construction package.

The typical section for the overflow spillway in the concept plans is, as implied, conceptual. There are other ways to accomplish the desired objectives at Cactus Park. It may be possible to modify or add to the existing wall along the north side of Cactus Road. Or this

wall may need to be removed entirely, depending on how it was designed and constructed. Instead of a retaining wall, the objective of a raised, hardened overflow section could be achieved with fill material and a buried concrete sill or with soil cement or with rock filled wire mattresses, etc.

6.1.5 Scottsdale Road Channel

It is anticipated that a concrete box storm drain will replace the existing Scottsdale Airport detention basin channel when the International Fighter Pilot Museum (IFPM) site is developed at the southeast corner of Scottsdale and Thunderbird Roads. This future box has been tentatively sized at 12' x 5' and it has been assumed the cost to design and construct it will be carried by the IFPM project. The horizontal alignment of the storm drain box north of Sutton Drive was chosen in an attempt to minimize conflict with existing native trees on the Thunderbird Adventist property.

There are two potential sewer conflicts with the new storm drain, an 8" main at Sutton Drive and a 4" service tap from the old fire station building on the IFPM site. Both feed the regional 24" sewer trunk line in Scottsdale Road that is roughly 20 feet below pavement. This depth may afford the potential to lower both the 8" and 4" sewer lines below the new storm drain. Although it may be feasible to lower the 8" sewer main at Sutton Drive, a worst-case approach was chosen at this location as if the 8" line must remain in place and conflict with the new storm drain must be avoided. In final design, it is recommended that this approach be re-visited including consideration of any future regional needs to sewer additional areas to the east that are presently serviced by septic tanks. If the 8" line at Sutton Drive can be lowered, it would be desirable to continue the storm drain extension to the north with 90" diameter pipe instead of a concrete box. This would reduce cost as well as shorten the construction time.

Near the end of the Scottsdale Road Corridor Study, after the concept plans had been developed, the study team became aware that the Flood Control District might be amending its storm drain design criteria. The new criteria may place an upper limit of 15 feet per second on storm drains and also require that the energy grade line be contained below the gutter grade in cases where the flow is supercritical. An increase in the size of the new storm drain extension may need to be reconsidered in final design to meet the new criteria. To address this, the study team mutually agreed to leave the concept plans as they were but investigate and document an increase in size for the new storm drain extension to meet future design criteria but amend the quantity and cost estimate to reflect the larger conveyance.

With the currently anticipated IFPM development schedule, it is possible that both of the box storm drains on the IFPM site may be constructed in advance of the recommended alternative storm drain improvements downstream. If this happens, the downstream end of the new storm drain will more than likely be well below grade and a temporary daylight drain would need to be constructed south through the Thunderbird Adventist property. Maintenance access into the recommended storm drain can be accomplished through the surface grate inlets that are reflected in the concept plans. The need for any additional access should be evaluated in final design.

Final design should carefully consider the local runoff that approaches the existing sump on Sutton Drive just east of Scottsdale Road from the east, its outfall overflow elevation out to the Scottsdale Road drainage corridor, the reconstructed Sutton Road profile and the finished floor elevation of the existing residence at the southeast corner of Sutton and Scottsdale Roads. This is a critical location because this residence has nearly been flooded in the past.



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

6.2 Phasing and Feature Prioritization

Because of the overall cost of construction, budget constraints, timing of other planned projects in the City of Scottsdale, etc., it is anticipated that the five primary recommended alternative features will need to be constructed in several phases. To minimize traffic congestion during construction and to take advantage of construction and budget optimization opportunities, the timing of construction with the following projects in the City of Scottsdale and Town of Paradise Valley should be considered:

- International Fighter Pilot Museum (IFPM) and associated drainage and roadway improvements at the southeast corner of Scottsdale and Thunderbird Roads;
- Future roadway widening improvements on Thunderbird Road / Redfield Road between Scottsdale Road and Hayden Roads;
- Future drainage channel and roadway improvements along Hayden Road from Redfield Road to Cactus Road;
- Future turn lane additions at the intersection of Scottsdale and Cactus Roads;
- Future roadway widening and storm drain improvements in Scottsdale Road from Gold Dust Avenue to Indian Bend Road;
- Future roadway and drainage channel improvements along Invergordon Road in the Town of Paradise Valley.

There is a significant range in cost among the five primary features of the recommended alternative. Although each feature is part of an overall plan, there is no physical need for all features to be constructed at once or in any particular order. The flood hazard that is mitigated by each of the primary features also varies significantly,

both in extent and nature. These factors should also be considered when prioritizing budgets, schedules and construction. Typically, construction of drainage and flood control improvements should be phased from the downstream end to the upstream end of the project. From a hydrologic standpoint, however, there is very little connection or inter-dependence between the primary features of the recommended alternative.

With all issues considered, it is recommended that the combined storm drain and channel improvements associated with the upper reach of the 71st Street Channel receive a high priority. The recommended improvements to the 71st Street Channel between Mescal Street and Sahuaro Drive rate a much lower priority.

The recommended improvements at Cactus Park could probably be considered a lower priority since the detention basin there has greater than 10-year capacity, has never been overtopped since it was constructed and if it were overtopped, has little or no risk of catastrophic failure. At the Mescal Park detention basin, however, there is a risk of sudden failure for about the upper three feet of storage if the basin is overtopped. Because of this, it is recommended that the improvements at Mescal Park receive a higher priority than at Cactus Park, even though the improvements are more extensive and the construction costs are greater.

The upper reach of the Berneil Ditch has overflowed its south bank at more than one location in the past 10 years causing shallow flooding in several homes. The upper reach of the Berneil Ditch has less than a 10-year capacity. The study team recommends that the Berneil Ditch improvements be considered a high priority.

The existing drainage system along Scottsdale Road has a fairly high level of performance compared to other features in the recommended alternative. No homes or businesses have been flooded along Scottsdale Road, to the Study Team's knowledge. The recommended Scottsdale Road improvements rate a moderate priority compared to the other recommended features.

6.3 Maintenance Considerations

Maintenance responsibilities for the completed flood control improvements will need to be established through intergovernmental agreements between the Flood Control District of Maricopa County and the City of Scottsdale and the Town of Paradise Valley. Maintenance may also include other arrangements involving private parties. Currently, it is anticipated that the completed improvements will not be maintained by the Flood Control District but will be turned over for maintenance by local jurisdictions and / or private entities.

The Berneil Ditch is essentially situated entirely in the Town of Paradise Valley on a tract of land owned by the Town. It is anticipated that the Town of Paradise Valley will continue maintaining the Berneil Ditch after the recommended improvements are made. City of Scottsdale Parks and Recreation staff currently maintains all of the flood control, drainage, landscape and multi use improvements in Cactus and Mescal Parks. The completed improvements for the recommended alternative within these two parks will be very minor and very low in maintenance. It is anticipated that the City of Scottsdale will continue to perform this function for the new improvements.

It is anticipated that new storm drain and hard surface channel improvements in the 71st Street Channel would be maintained by the City of Scottsdale while landscape improvements would continue to



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

be maintained by the private property owners. The study team anticipates that the City of Scottsdale will continue their current maintenance practices related to all hard drainage improvements along Scottsdale Road. It is anticipated that landscape improvements along Scottsdale Road will be maintained as follows:

- Sweetwater Avenue to Sutton Drive – City of Scottsdale
- Sutton Drive to the IFPM site – Thunderbird Adventist property owner
- IFPM site – IFPM sponsor through agreement with City of Scottsdale

Table 11 presents the annual maintenance costs anticipated for the recommended alternative improvements. The unit cost (cost per 1000 feet) used in Table 11 to maintain open channels is based on recent maintenance and operations data from the Flood Control District of Maricopa County for their representative projects with similar size and function. This maintenance cost covers the time, materials, vehicles and equipment used to perform vegetation, sediment and debris removal and to do minor repairs and remove graffiti. The cost does not include any major replacements, reconstruction or reconditioning.

The unit cost to maintain storm drains was simply estimated to be half that of the open channel maintenance cost. Again, this would cover routine maintenance and includes incidental items such as catch basins, inlets, lateral pipes, grates and access barriers. The cost of maintaining landscaping was estimated to be 5 percent of the cost of the original landscape construction per square foot per year. There is no maintenance cost included in Table 11 for the recommended improvements in Cactus and Mescal Parks because this cost would be minor and incidental to the cost of maintenance already covered by the City of Scottsdale.

Table 11 Estimated Annual Maintenance Costs for the Recommended Alternative

| Feature | Unit Cost | Quantity | Annual Cost |
|---------------------------------------|--------------|----------|-------------|
| Berneil Ditch | | | |
| • Open channel | \$560/1000' | 2.45 | \$1,370 |
| • Storm drain | N/A | N/A | N/A |
| • Landscape | \$0.05/sq ft | 52,000 | \$2,600 |
| 71st Street Channel | | | |
| • Open channel | \$560/1000' | 1.90 | \$1,060 |
| • Storm drain | \$280/1000' | 2.55 | \$710 |
| • Landscape | \$0.10/sq ft | 25,000 | \$2,500 |
| • Landscape | \$0.05/sq ft | 15,500 | \$780 |
| Scottsdale Road | | | |
| • Open channel | N/A | N/A | N/A |
| • Storm drain | \$280/1000' | 2.5 | \$700 |
| • Landscape | \$0.10/sq ft | 85,000 | \$8,500 |
| Total Cost | | | \$18,220 |



SCOTTSDALE ROAD CORRIDOR

DRAINAGE MASTER PLAN

Appendix A

Concept Plans



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONCEPTUAL PLANS FOR THE SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

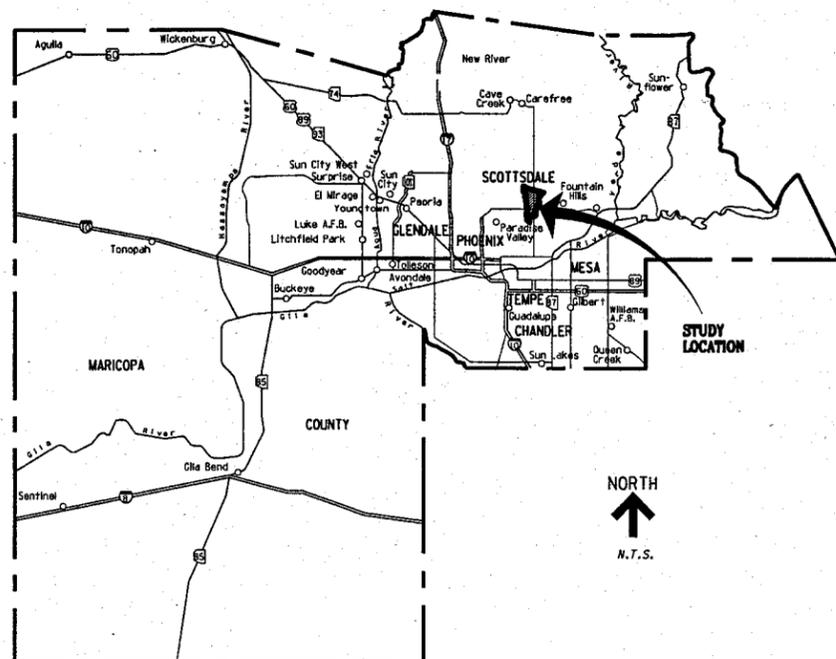
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NOVEMBER, 2002

SHEET/DRAWING INDEX

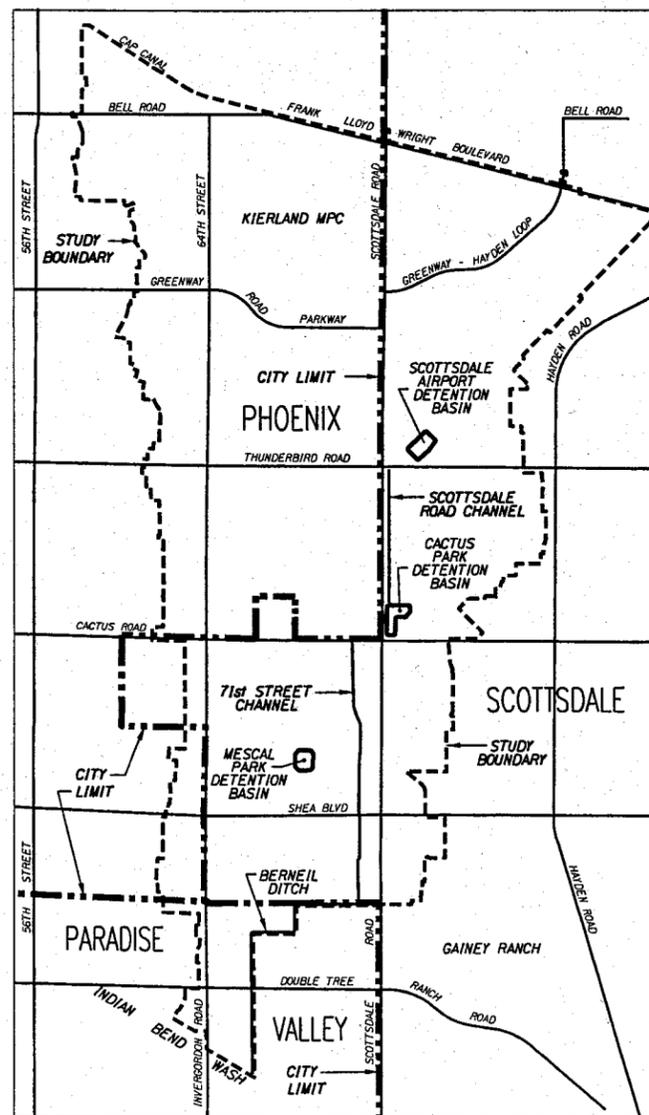
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|-------|---------|-------------------------------------|
| 1 | - | COVER SHEET |
| 2 | G1 | SHEET LOCATION AND RECOMMENDED PLAN |
| 3-11 | D1-D9 | CROSS SECTION DETAILS |
| 12-15 | P1-P4 | BERNEIL DITCH |
| 16-17 | P5-P6 | MESCAL PARK DETENTION BASIN |
| 18-23 | P7-P12 | 71ST STREET CHANNEL |
| 24 | P13 | CACTUS PARK DETENTION BASIN |
| 25-28 | P14-P17 | SCOTTSDALE ROAD CHANNEL |
| 29-32 | L1-L4 | LANDSCAPE DESIGN THEMES |

LEGEND

- PROPERTY LINE
- CENTER LINE
- MONUMENT LINE
- RIGHT-OF-WAY LINE
- DIRECTION OF FLOW
- FLOW LINE
- CROSS SECTION OR DETAIL
- LOCATED ON SHEET NUMBER
- TOP OF EXISTING SLOPE
- TOE OF EXISTING SLOPE



MARICOPA COUNTY
NOT TO SCALE



STUDY BOUNDARY AND VICINITY MAP
NOT TO SCALE

BENCHMARKS:

- CITY OF SCOTTSDALE GPS POINT 3272
SHEA BOULEVARD AND SCOTTSDALE ROAD
COS BC IN HH, DOWN 0.4'
NORTHING (FT) 939336.42568
EASTING (FT) 697149.923
NAVD 88 ELEV (FT) 1351.261
- CITY OF SCOTTSDALE GPS POINT 3212
CACTUS ROAD AND 64TH STREET
COS BC IN HH, DOWN 0.66'
NORTHING (FT) 944658.74817
EASTING (FT) 691881.76024
NAVD 88 ELEV (FT) 1383.561

NOTES:

- PROPERTY, EASEMENT AND RIGHT-OF-WAY LINES DEPICTED HEREIN ARE APPROXIMATE. THEY ARE BASED ON GIS ELECTRONIC DATA FILES FROM MARICOPA COUNTY AND THE CITY OF SCOTTSDALE AND WERE NOT ESTABLISHED FROM BOUNDARY SURVEY.
- THE SOURCE OF AERIAL PHOTOGRAPHY DEPICTED IN PLAN VIEW FOR ALL PROJECT FEATURES IN THE CITY OF SCOTTSDALE IS FROM THE CITY OF SCOTTSDALE'S GIS DATA BASE. THE AERIAL PHOTO FOR BERNEIL DITCH IS FROM THE MARICOPA COUNTY GIS DATA BASE AND IS DATED JANUARY, 2000.
- ALL 10-YEAR AND 100-YEAR DISCHARGES SHOWN ON THESE PLAN SHEETS (INDICATED $Q_{10} =$, $Q_{100} =$) ARE BASED ON 6-HOUR DURATION STORMS AND REPRESENT "WITH RECOMMENDED ALTERNATIVE" CONDITIONS.

SHEET 1

COUNTY BOARD OF DIRECTORS

DON STAPLEY - CHAIRMAN

- | | |
|------------|------------------|
| DISTRICT 1 | FULTON BROCK |
| DISTRICT 2 | DON STAPLEY |
| DISTRICT 3 | ANDY KUNASEK |
| DISTRICT 4 | MAX WILSON |
| DISTRICT 5 | MARY ROSE WILCOX |

PREPARED BY:



CONCEPT PLANS
NOT FOR CONSTRUCTION

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SCOTTSDALE ROAD CHANNEL RECOMMENDED PLAN

1. EXTEND EXISTING STORM DRAIN NORTH FROM SWEETWATER AVENUE TO THUNDERBIRD ROAD.
2. CONSTRUCT SHALLOW LANDSCAPED CHANNEL OVER EXTENDED STORM DRAIN.
3. CONSTRUCT ADDITIONAL CATCH BASINS IN SCOTTSDALE ROAD.

CACTUS PARK RECOMMENDED PLAN

1. RAISE THE SIDE OF THE DETENTION BASIN ALONG CACTUS ROAD APPROXIMATELY TWO FEET AND CONSTRUCT A HARDENED EMERGENCY OVERFLOW SPILLWAY AT THAT LOCATION.

MESCAL PARK RECOMMENDED PLAN

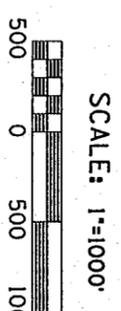
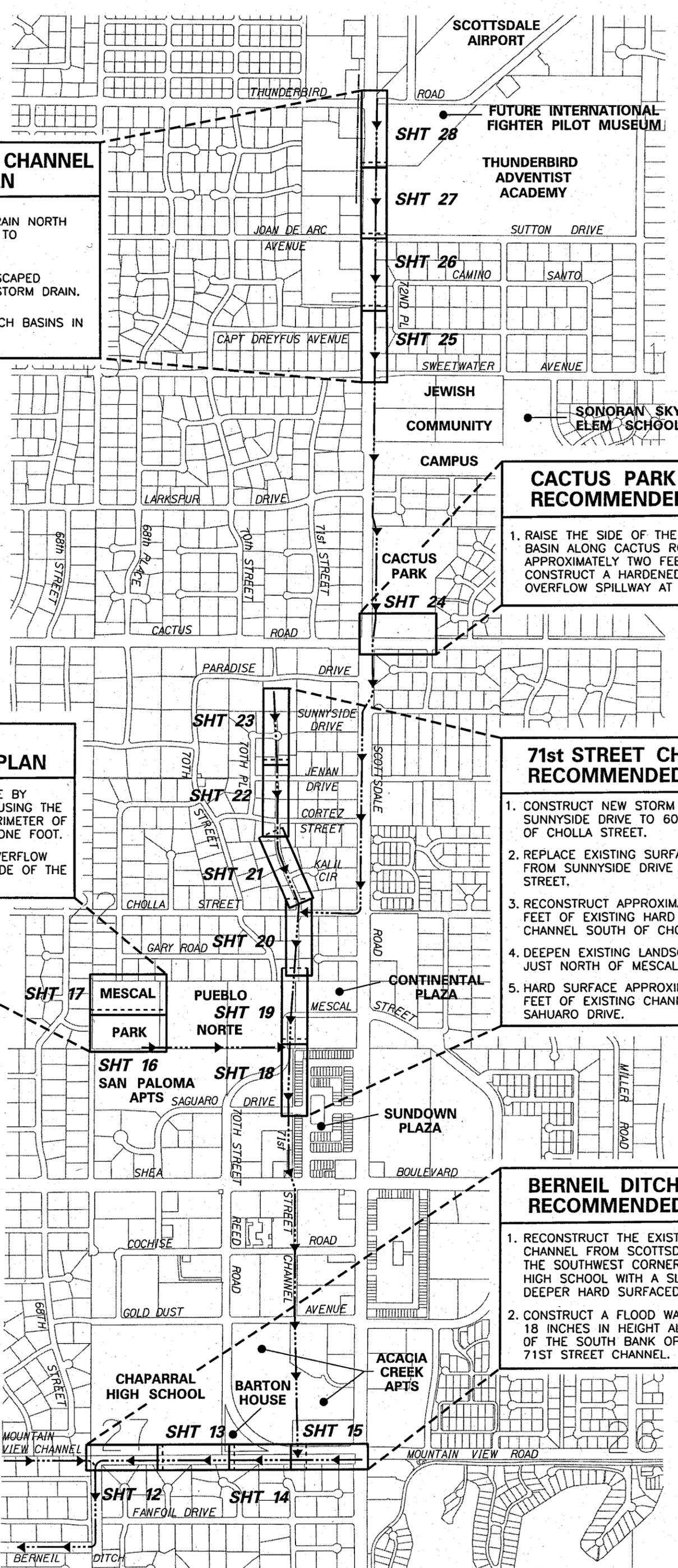
1. ENLARGE THE BASIN VOLUME BY EXCAVATING THE SIDE AND USING THE MATERIAL TO RAISE THE PERIMETER OF THE BASIN APPROXIMATELY ONE FOOT.
2. CONSTRUCT A HARDENED OVERFLOW SPILLWAY ON THE SOUTH SIDE OF THE BASIN.

71st STREET CHANNEL RECOMMENDED PLAN

1. CONSTRUCT NEW STORM DRAIN FROM SUNNYSIDE DRIVE TO 600 FEET SOUTH OF CHOLLA STREET.
2. REPLACE EXISTING SURFACE CHANNEL FROM SUNNYSIDE DRIVE TO CORTEZ STREET.
3. RECONSTRUCT APPROXIMATELY 600 FEET OF EXISTING HARD SURFACED CHANNEL SOUTH OF CHOLLA STREET.
4. DEEPEN EXISTING LANDSCAPED CHANNEL JUST NORTH OF MESCAL STREET.
5. HARD SURFACE APPROXIMATELY 600 FEET OF EXISTING CHANNEL NORTH OF SAHUARO DRIVE.

BERNEIL DITCH RECOMMENDED PLAN

1. RECONSTRUCT THE EXISTING EARTH CHANNEL FROM SCOTTSDALE ROAD TO THE SOUTHWEST CORNER OF CHAPARRAL HIGH SCHOOL WITH A SLIGHTLY DEEPER HARD SURFACED CHANNEL.
2. CONSTRUCT A FLOOD WALL ABOUT 18 INCHES IN HEIGHT ALONG THE TOP OF THE SOUTH BANK OPPOSITE THE 71ST STREET CHANNEL.



PREPARED BY:
Stanley Consultants
 2929 EAST CAMELBACK ROAD,
 SUITE 130
 PHOENIX, ARIZONA 85016
 (602) 517-5550

CONCEPT PLANS NOT FOR CONSTRUCTION

| | |
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| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | CSB |



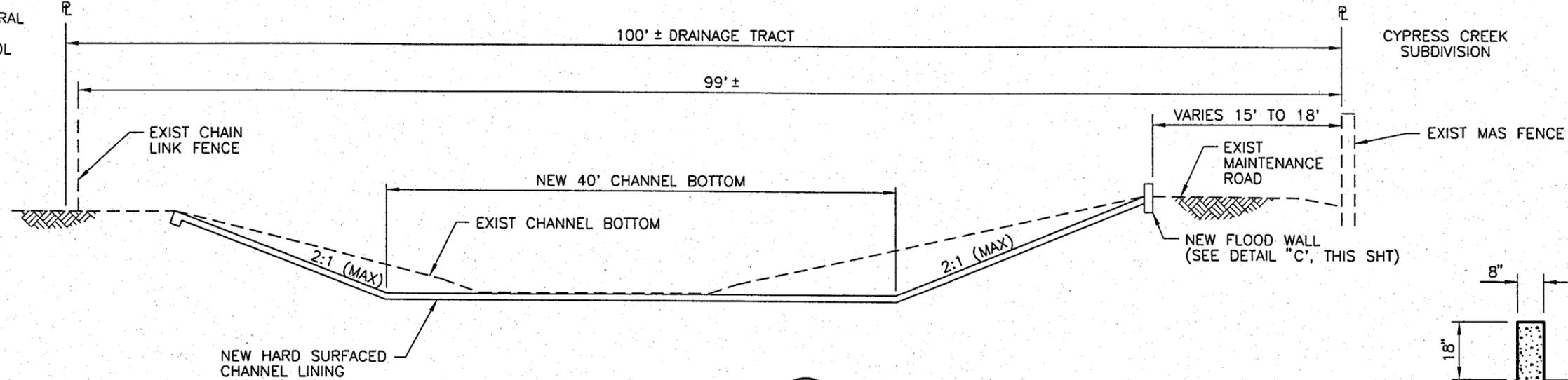
SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

NOVEMBER, 2002

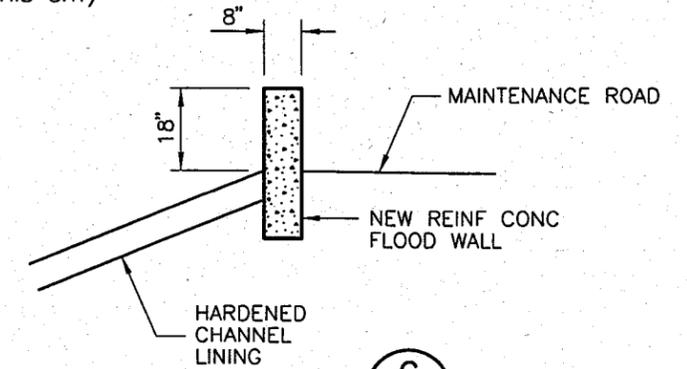
SHEET LOCATION AND RECOMMENDED PLAN

CITY OF SCOTTSDALE ← TOWN OF PARADISE VALLEY

CHAPARRAL HIGH SCHOOL



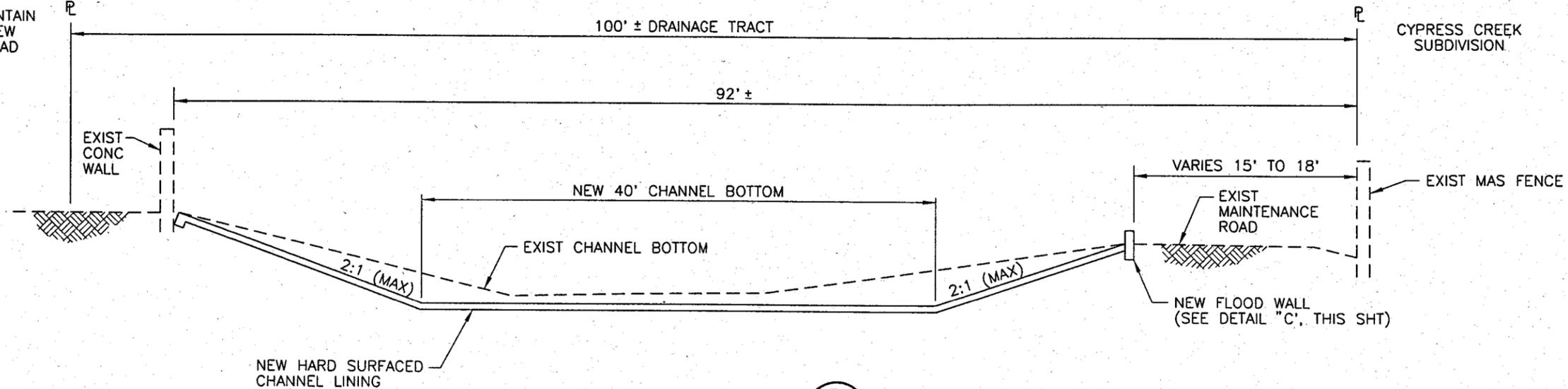
CROSS SECTION DETAIL A
13
BERNEIL DITCH
STA 161+20 TO STA 179+20
DOWNSTREAM FROM 71st STREET CHANNEL
N.T.S.



DETAIL C
3
BERNEIL DITCH FLOOD WALL
STA 177+25 TO STA 179+75
(SOUTH BANK ONLY)
N.T.S.

CITY OF SCOTTSDALE ← TOWN OF PARADISE VALLEY

MOUNTAIN VIEW ROAD



CROSS SECTION DETAIL B
15
BERNEIL DITCH
STA 179+20 TO STA 185+70
UPSTREAM FROM 71st STREET CHANNEL
N.T.S.

CONCEPT PLANS
NOT FOR CONSTRUCTION

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SUITE 130
PHOENIX, ARIZONA 85016
(602) 912-8500

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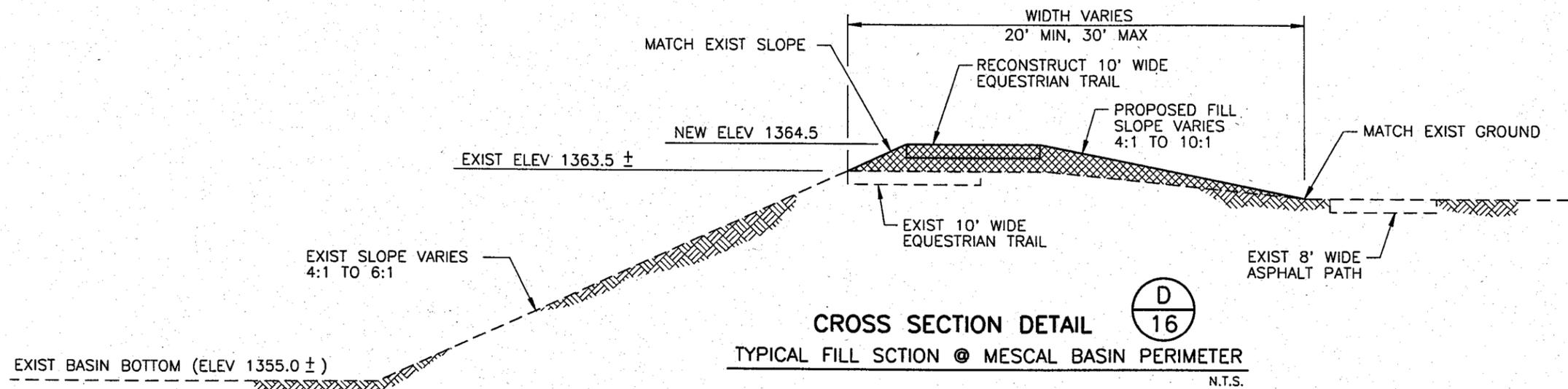


SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

**BERNEIL DITCH
DETAILS**

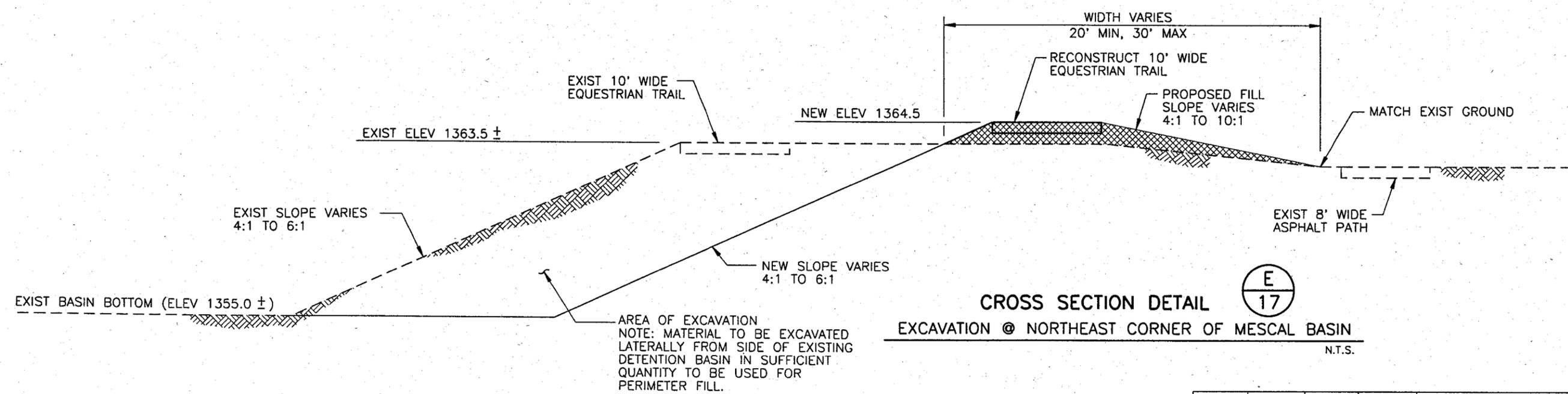
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CROSS SECTION DETAIL D
16
 TYPICAL FILL SECTION @ MESCAL BASIN PERIMETER
 N.T.S.

NOTE: MATERIAL FOR PROPOSED FILL AT PERIMETER OF DETENTION BASIN TO BE EXCAVATED FROM NORTHEAST CORNER OF BASIN AS DEPICTED IN SECTION "E" THIS SHEET.



CROSS SECTION DETAIL E
17
 EXCAVATION @ NORTHEAST CORNER OF MESCAL BASIN
 N.T.S.

AREA OF EXCAVATION
 NOTE: MATERIAL TO BE EXCAVATED LATERALLY FROM SIDE OF EXISTING DETENTION BASIN IN SUFFICIENT QUANTITY TO BE USED FOR PERIMETER FILL.

NOVEMBER, 2002

CONCEPT PLANS
 NOT FOR CONSTRUCTION

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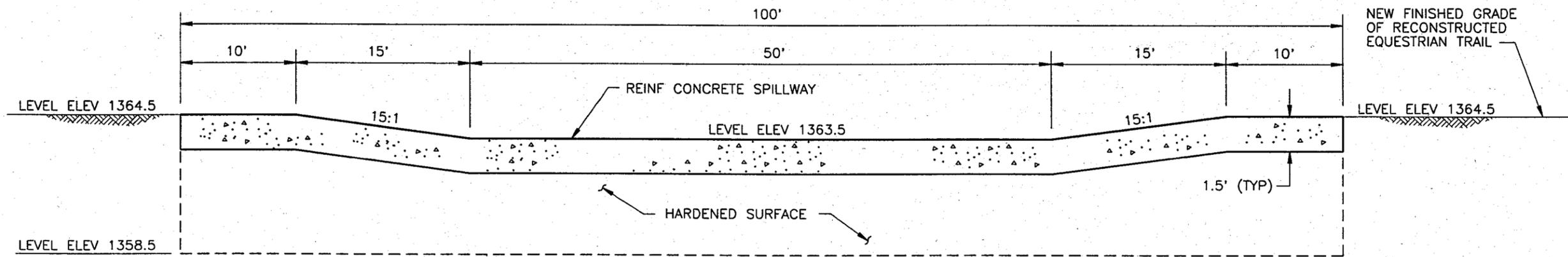
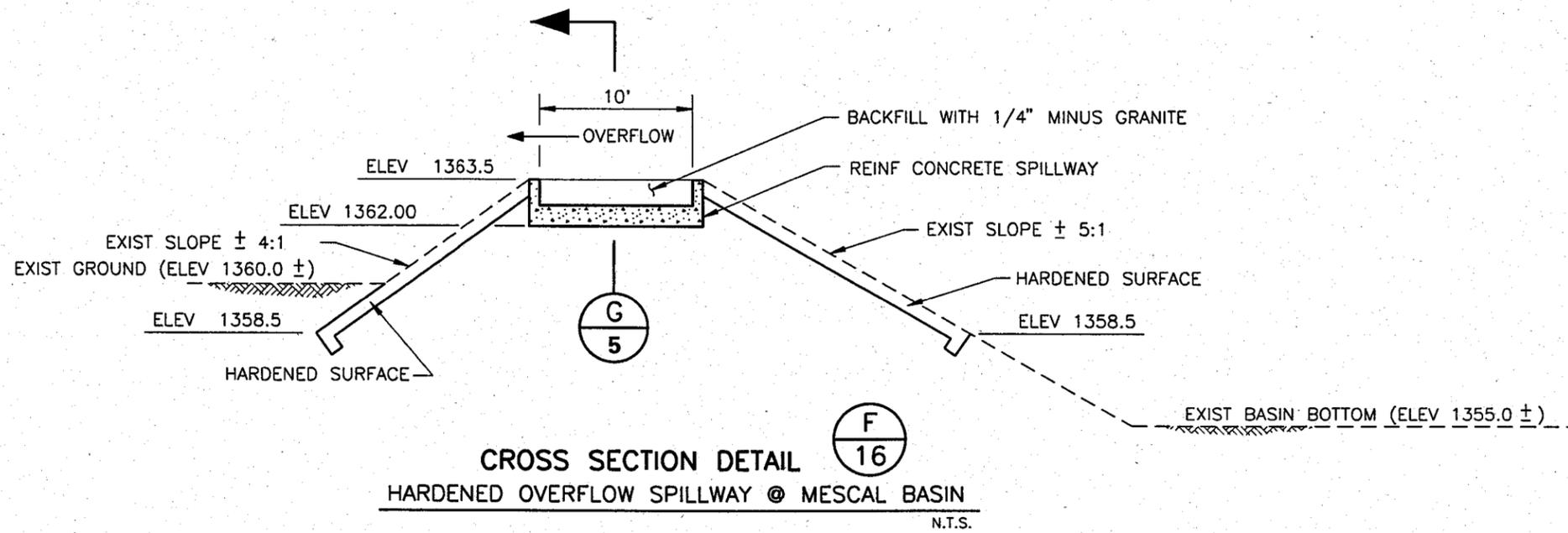
 Stanley Consultants Inc.
 2929 EAST CAMELBACK ROAD,
 SUITE 130
 PHOENIX, ARIZONA 85016
 (602) 912-6500

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SCOTTSDALE ROAD CORRIDOR
 DRAINAGE MASTER PLAN
**MESCAL PARK
 DETAILS**

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| SHEET NUMBER | 4 |



NOVEMBER, 2002

CONCEPT PLANS
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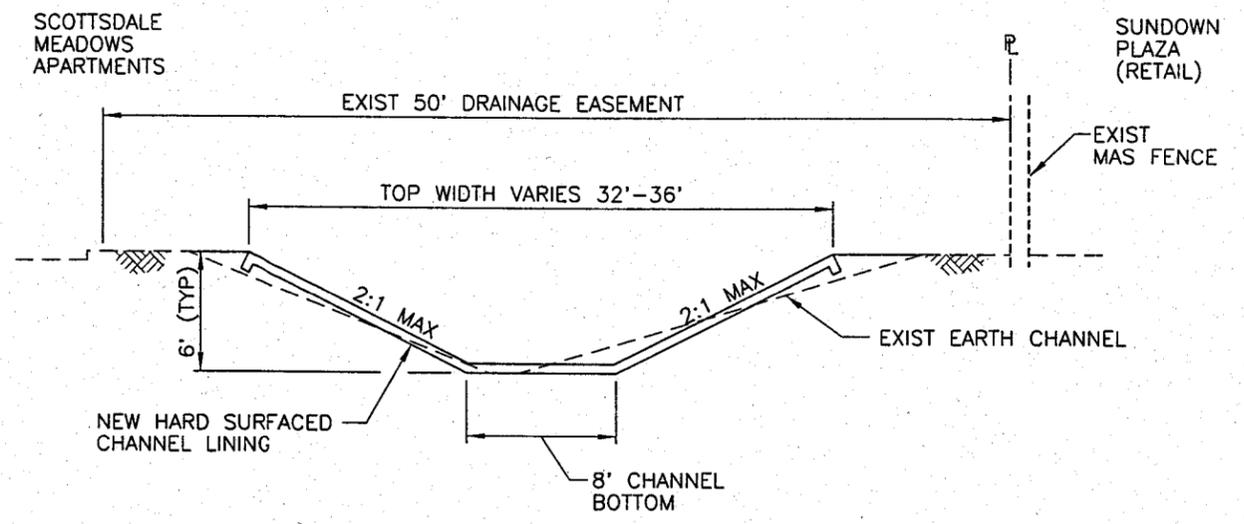
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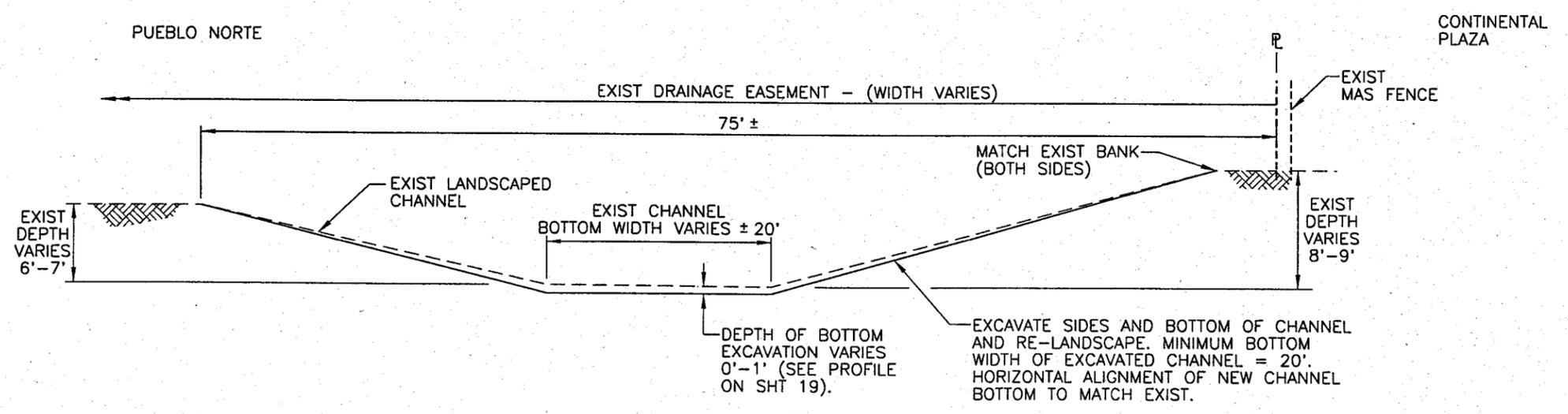
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

**MESCAL PARK
DETAILS**

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| DRAWING NUMBER | D3 |
| SHEET NUMBER | 5 |



H
CROSS SECTION DETAIL
 71ST STREET CHANNEL
 STA 334+08 TO STA 339+80 (NORTH OF SAHUARO DRIVE)
 N.T.S.



J
CROSS SECTION DETAIL
 71ST STREET CHANNEL
 STA 343+39 TO STA 346+25 (NORTH OF MESCAL STREET)
 N.T.S.

NOVEMBER, 2002

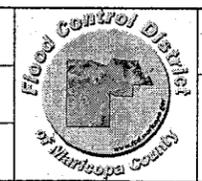
CONCEPT PLANS
NOT FOR CONSTRUCTION

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Stanley Consultants inc.
2929 EAST CAMELBACK ROAD,
SUITE 130
PHOENIX, ARIZONA 85018
(602) 912-8500

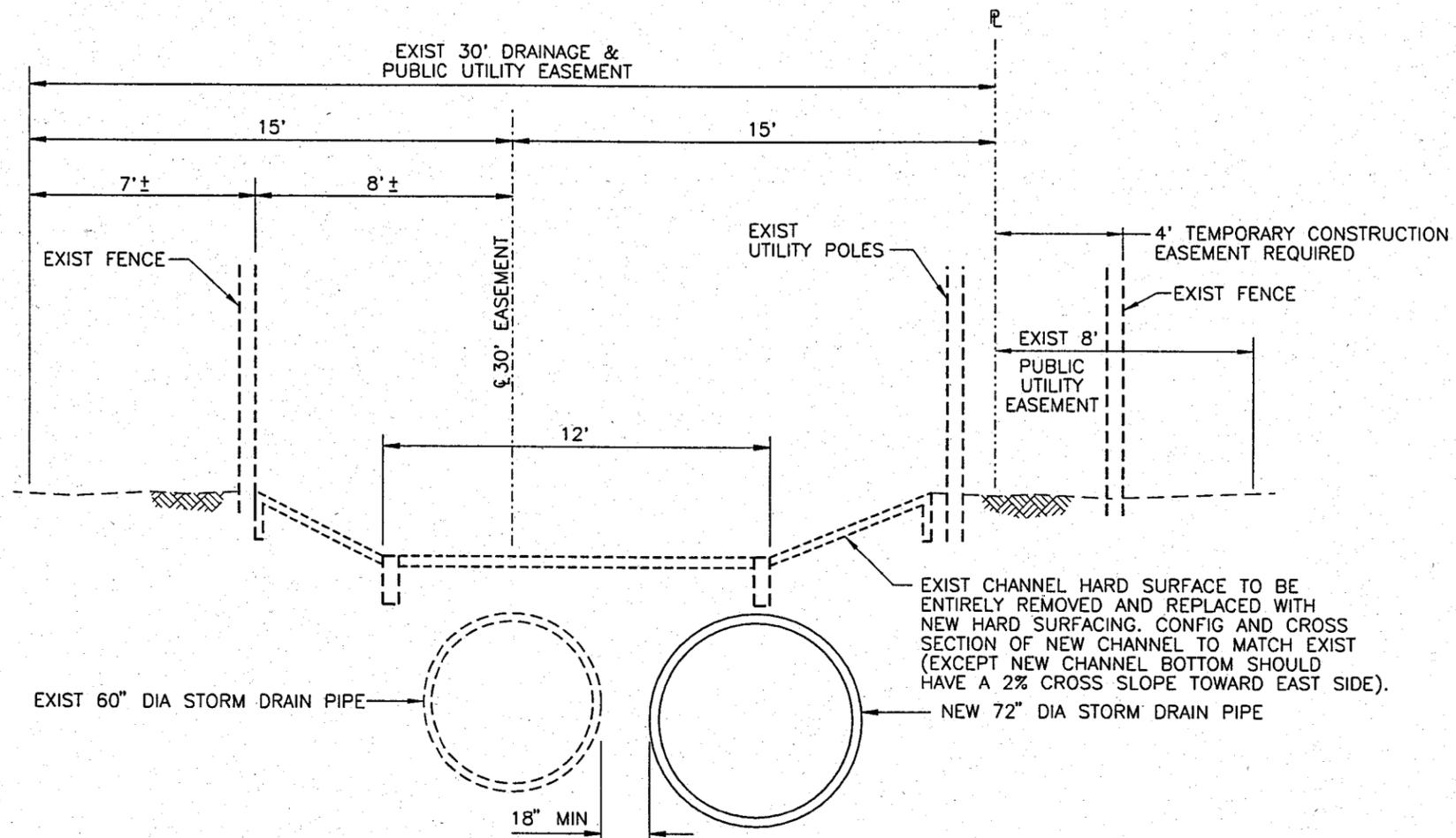
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| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |



SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

**71ST STREET CHANNEL
DETAILS**

| | |
|----------------|----|
| DRAWING NUMBER | D4 |
| SHEET NUMBER | 6 |



K
20
CROSS SECTION DETAIL
 71ST STREET CHANNEL
 STA 346+75 TO STA 352+70 (SOUTH OF CHOLLA STREET)
 N.T.S.

NOVEMBER, 2002

**CONCEPT PLANS
NOT FOR CONSTRUCTION**

SCI * 15586
DRAWING FILE:
q:\15586\graphics\dgn\71st_det02.dgn

PREPARED BY:

Stanley Consultants inc.
2929 EAST CAMELBACK ROAD,
SUITE 130
PHOENIX, ARIZONA 85016
(602) 912-6500

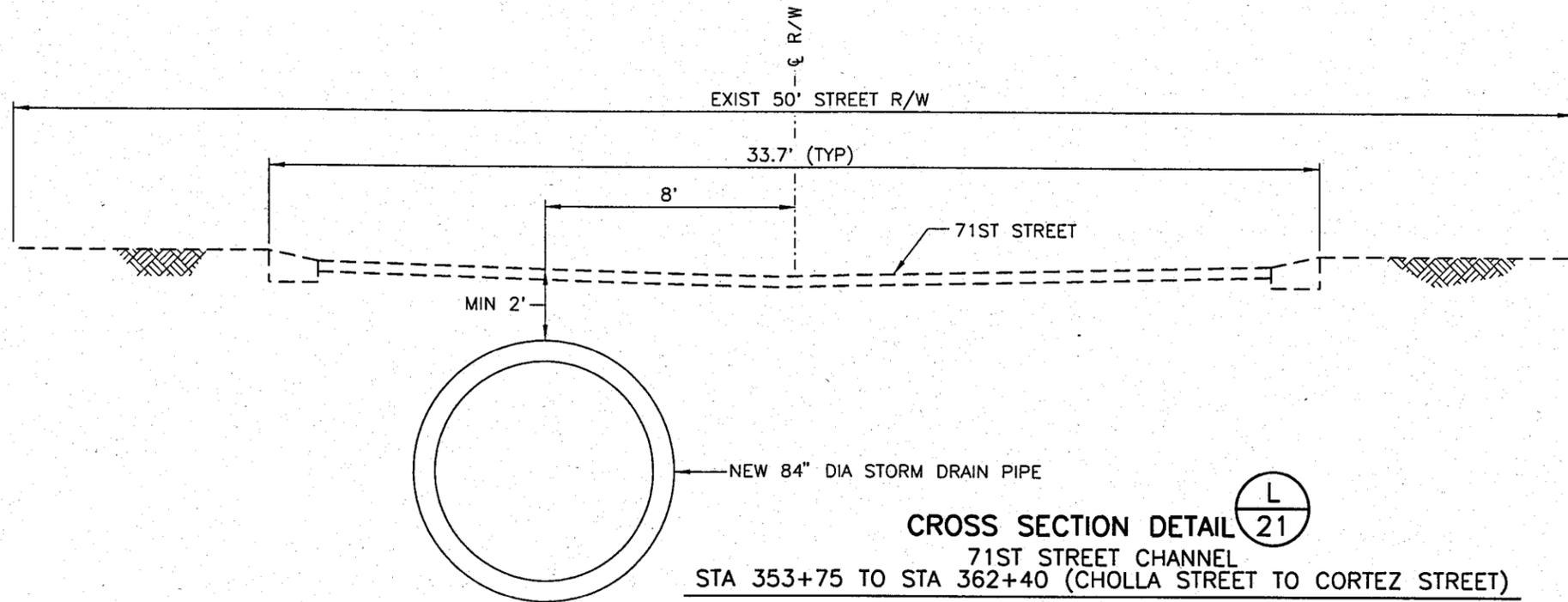
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| DESIGN | BNS |
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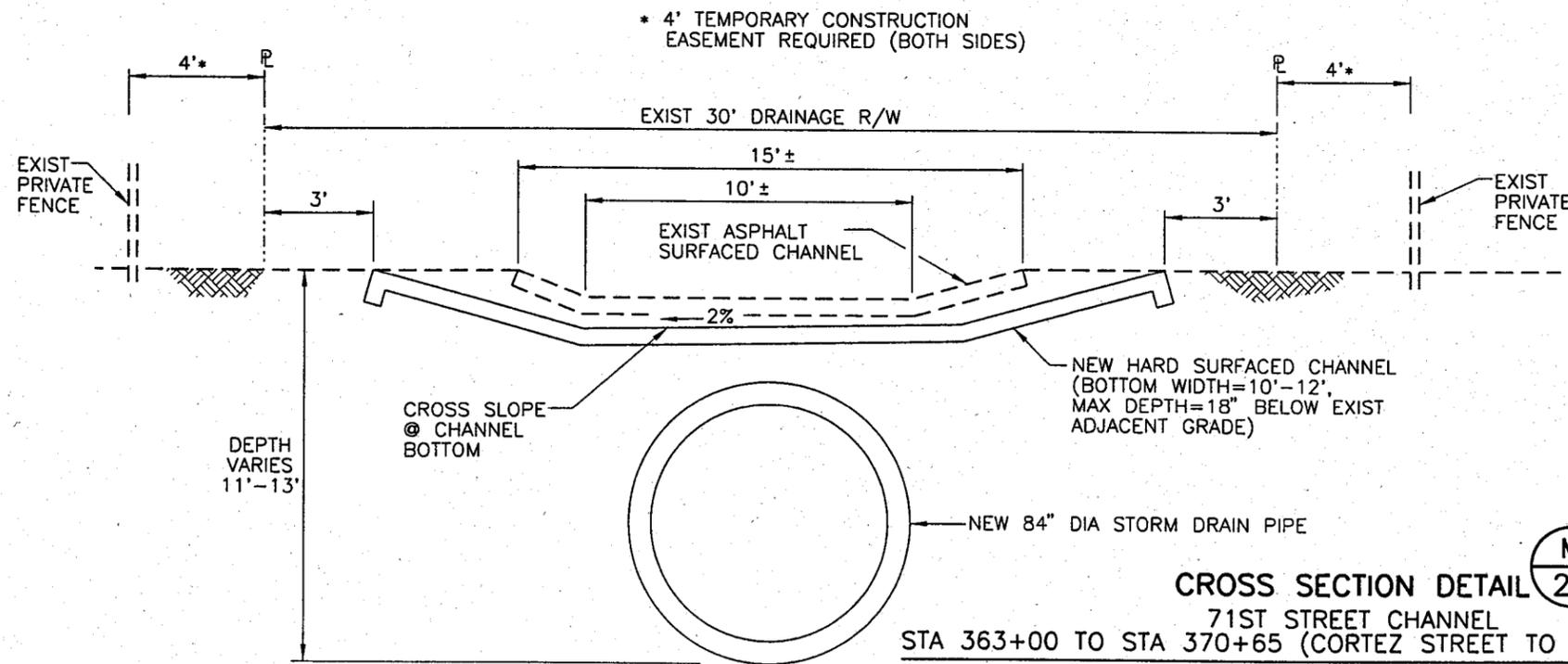
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

**71ST STREET CHANNEL
DETAILS**

| | |
|----------------|-----------|
| DRAWING NUMBER | D5 |
| SHEET NUMBER | 7 |



CROSS SECTION DETAIL 21
 71ST STREET CHANNEL
 STA 353+75 TO STA 362+40 (CHOLLA STREET TO CORTEZ STREET)
 N.T.S.



CROSS SECTION DETAIL 23
 71ST STREET CHANNEL
 STA 363+00 TO STA 370+65 (CORTEZ STREET TO SUNNYSIDE DRIVE)
 N.T.S.

NOVEMBER, 2002

CONCEPT PLANS
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SCI • 15586
 DRAWING FILE: q:\15586\graphics\dgn\71st_det103.dgn

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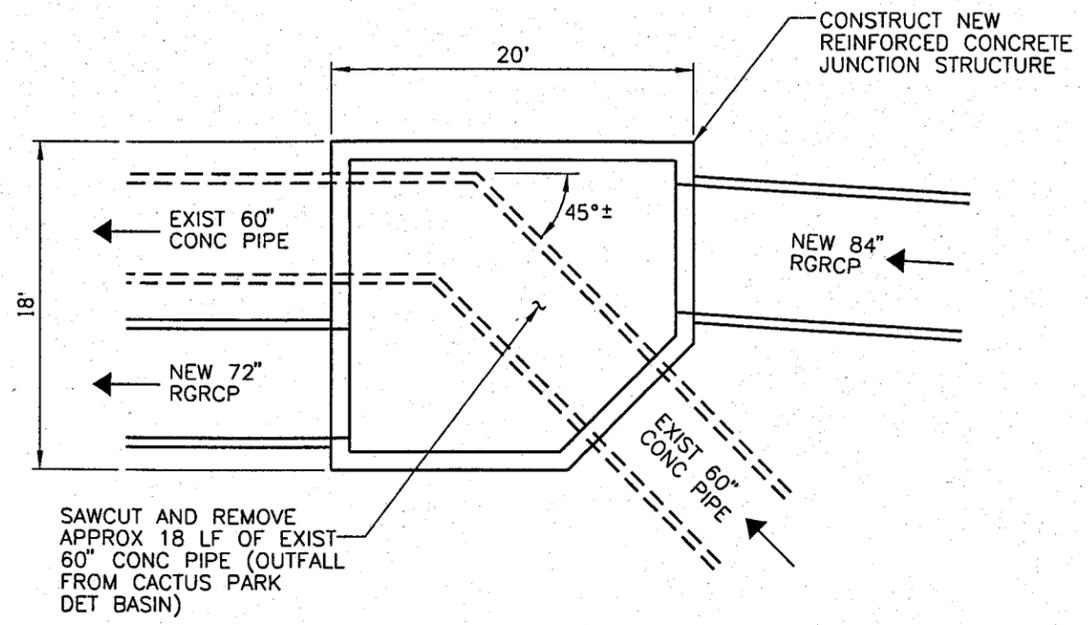
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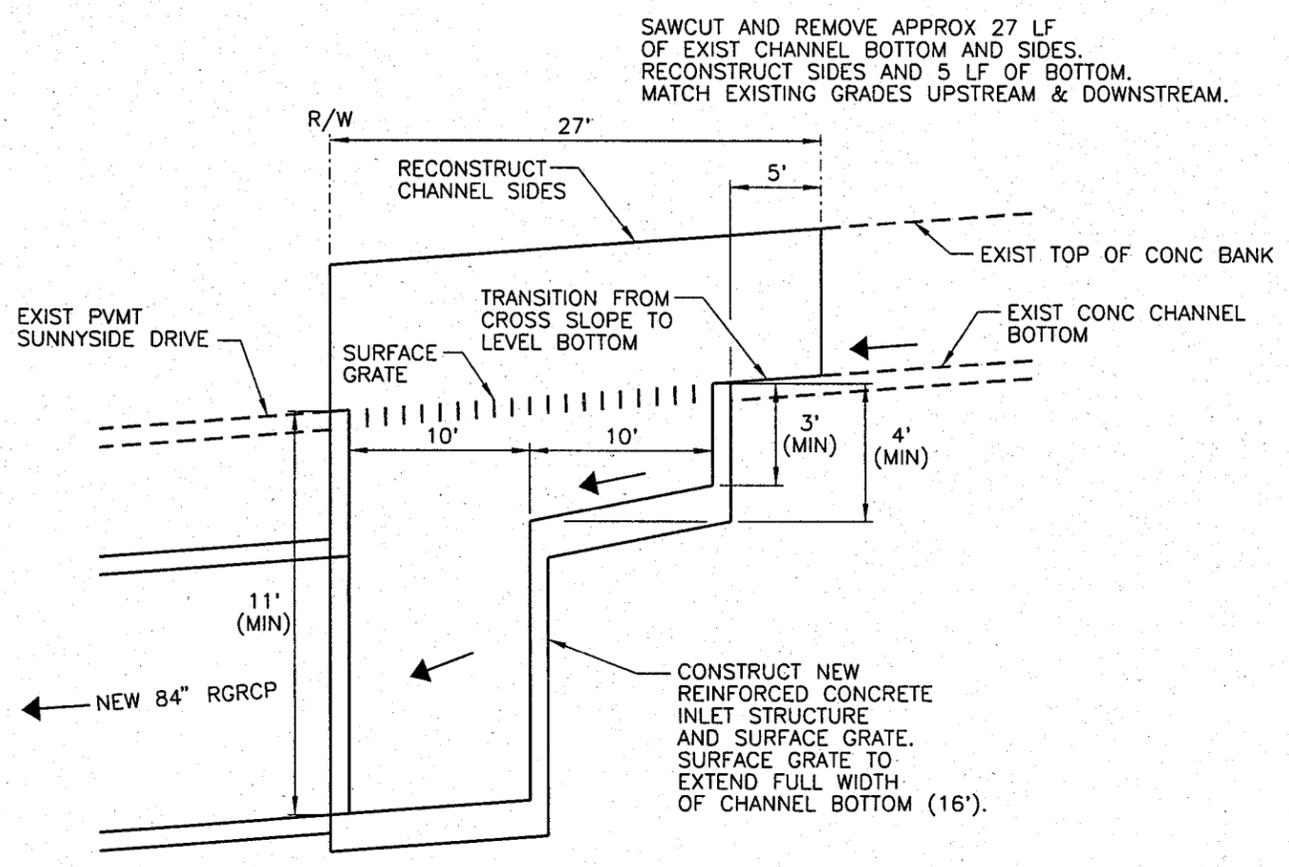
SCOTTSDALE ROAD CORRIDOR
 DRAINAGE MASTER PLAN

**71ST STREET CHANNEL
 DETAILS**

DRAWING NUMBER
D6
 SHEET NUMBER
8



PLAN VIEW DETAIL N
20
 71ST STREET CHANNEL
 STORM DRAIN JUNCTION STRUCTURE
 @ CHOLLA STREET
 N.T.S.



PROFILE DETAIL P
23
 71ST STREET CHANNEL
 INLET STRUCTURE @ SUNNYSIDE DRIVE
 N.T.S.

NOVEMBER, 2002

CONCEPT PLANS
 NOT FOR CONSTRUCTION

SCI • 15586
 DRAWING FILE:
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PREPARED BY:

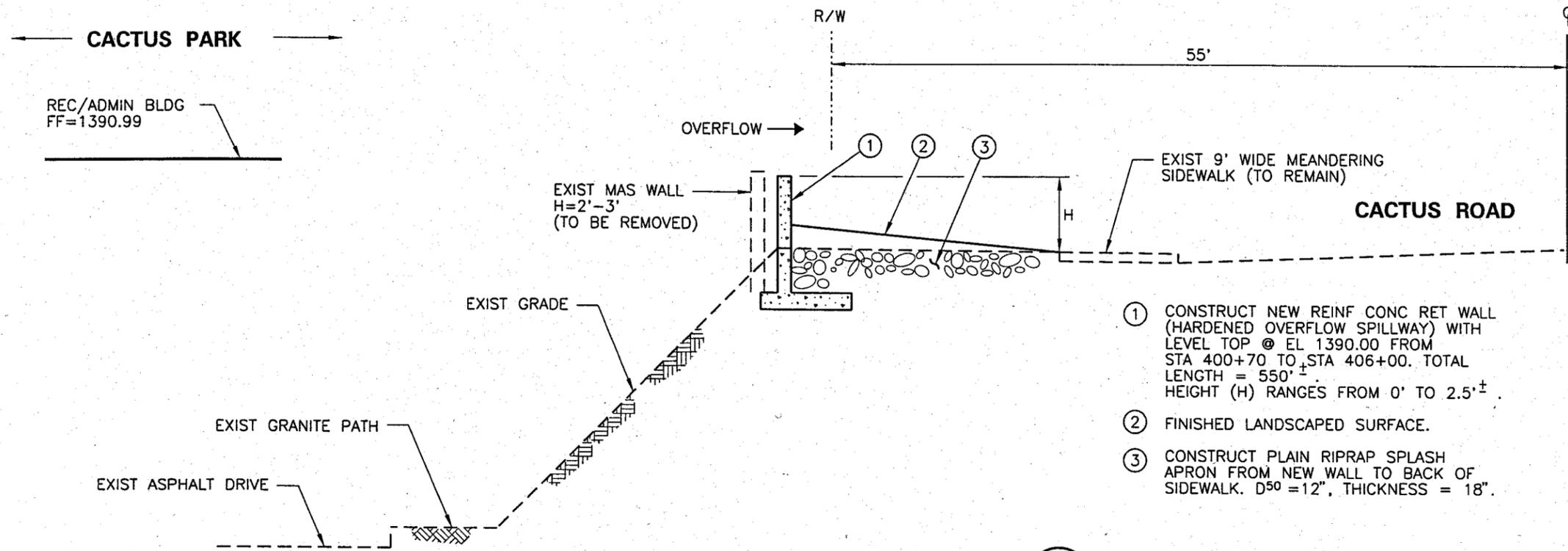
 Stanley Consultants Inc.
 2929 EAST CAMELBACK ROAD,
 SUITE 130
 PHOENIX, ARIZONA 85016
 (602) 912-6500

| | |
|---------|-----|
| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |



SCOTTSDALE ROAD CORRIDOR
 DRAINAGE MASTER PLAN
**71ST STREET CHANNEL
 DETAILS**

| | |
|----------------|-----------|
| DRAWING NUMBER | D7 |
| SHEET NUMBER | 9 |



- ① CONSTRUCT NEW REINF CONC RET WALL (HARDENED OVERFLOW SPILLWAY) WITH LEVEL TOP @ EL 1390.00 FROM STA 400+70 TO STA 406+00. TOTAL LENGTH = 550'±. HEIGHT (H) RANGES FROM 0' TO 2.5'±.
- ② FINISHED LANDSCAPED SURFACE.
- ③ CONSTRUCT PLAIN RIPRAP SPLASH APRON FROM NEW WALL TO BACK OF SIDEWALK. D⁵⁰ = 12", THICKNESS = 18".

CROSS SECTION DETAIL Q
24

HARDENED OVERFLOW SPILLWAY @ CACTUS PARK BASIN
N.T.S.

NOVEMBER, 2002

CONCEPT PLANS
NOT FOR CONSTRUCTION

SCI • 15586
DRAWING FILE:
q:\15586\graphics\dgn\cactus_dai07.dgn

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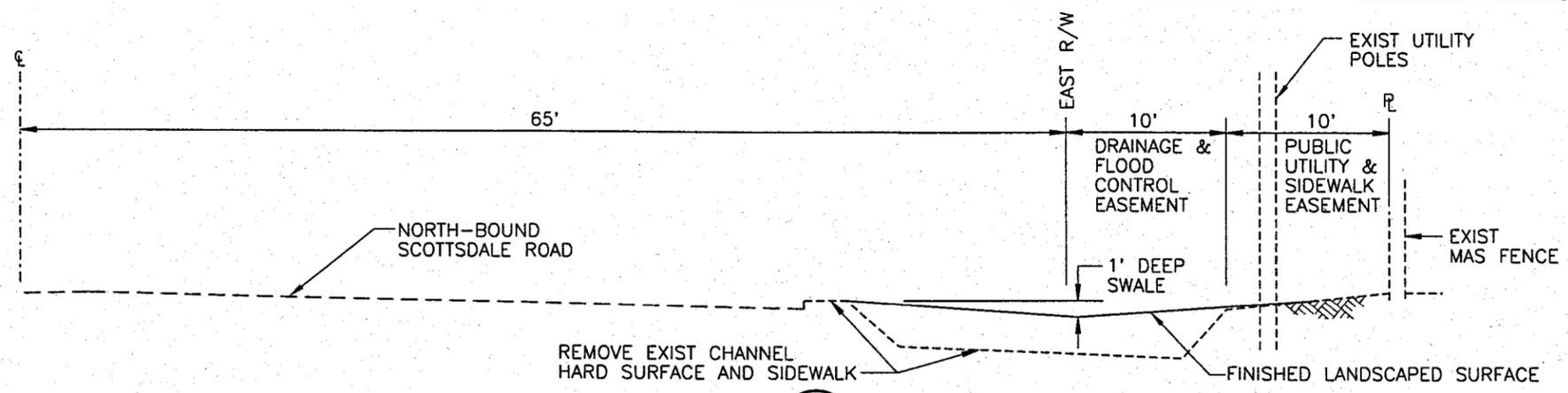
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| DRAWN | LRj |
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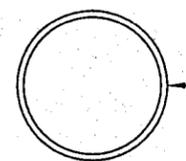
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

**CACTUS PARK
DETAILS**

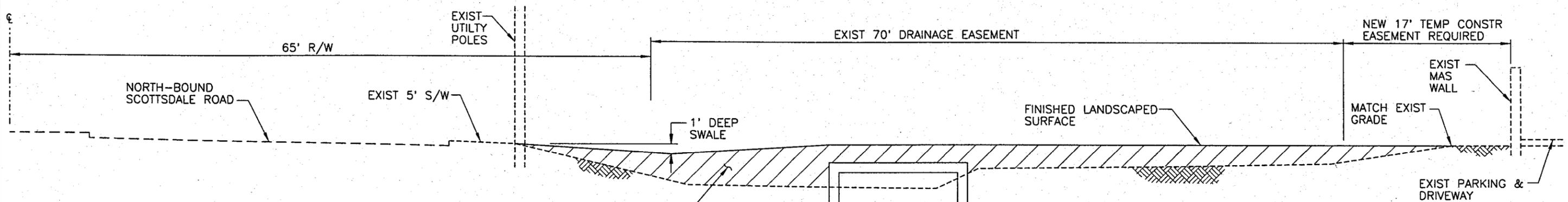
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| DRAWING NUMBER | D8 |
| SHEET NUMBER | 10 |



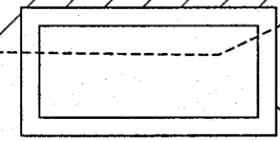
CROSS SECTION DETAIL R/25
 SCOTTSDALE ROAD CHANNEL
 (SWEETWATER AVENUE TO SUTTON DRIVE)
 N.T.S.



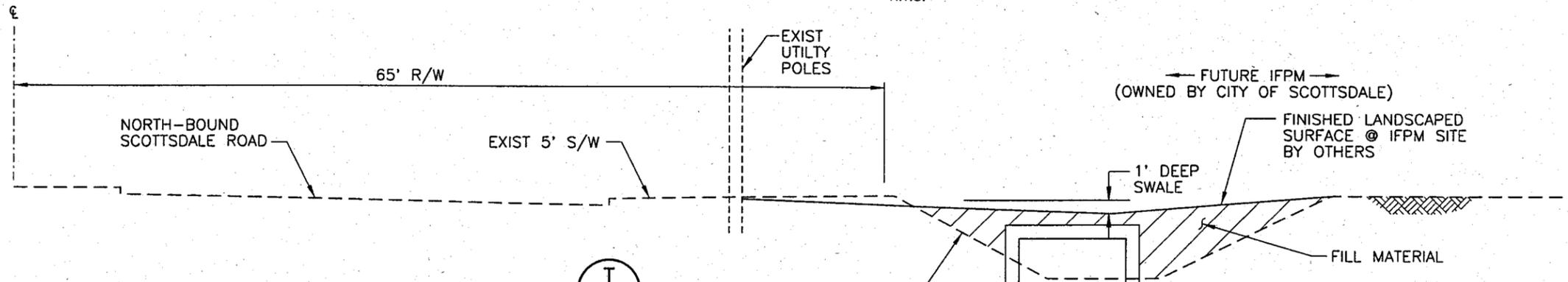
NEW 90" DIA STORM DRAIN PIPE
 (SEE PLAN VIEW FOR OFFSET FROM ϵ)



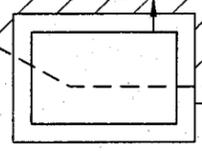
CROSS SECTION DETAIL S/27
 SCOTTSDALE ROAD CHANNEL
 (@ SEVENTH DAY ADVENTIST PROPERTY)
 N.T.S.



NEW 12'x 5' RCBC
 (SEE PLAN VIEW FOR OFFSET FROM ϵ)



CROSS SECTION DETAIL T/28
 SCOTTSDALE ROAD CHANNEL
 (@ FUTURE INTERNATIONAL FIGHTER PILOT MUSEUM SITE)
 N.T.S.



NEW 8'x 5' RCBC
 (SEE PLAN VIEW FOR OFFSET FROM ϵ)

CONCEPT PLANS
 NOT FOR CONSTRUCTION

SC1 - 15586
 DRAWING FILE:
 q:\15586\graphics\dgn\scotts_de106.dgn

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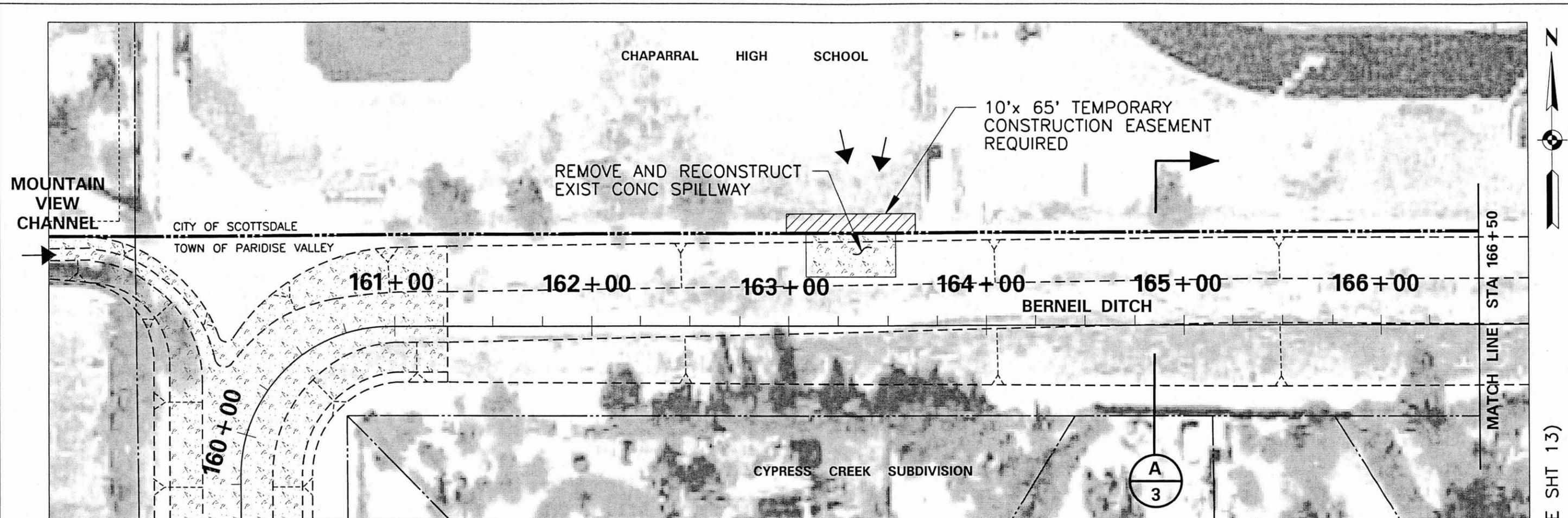
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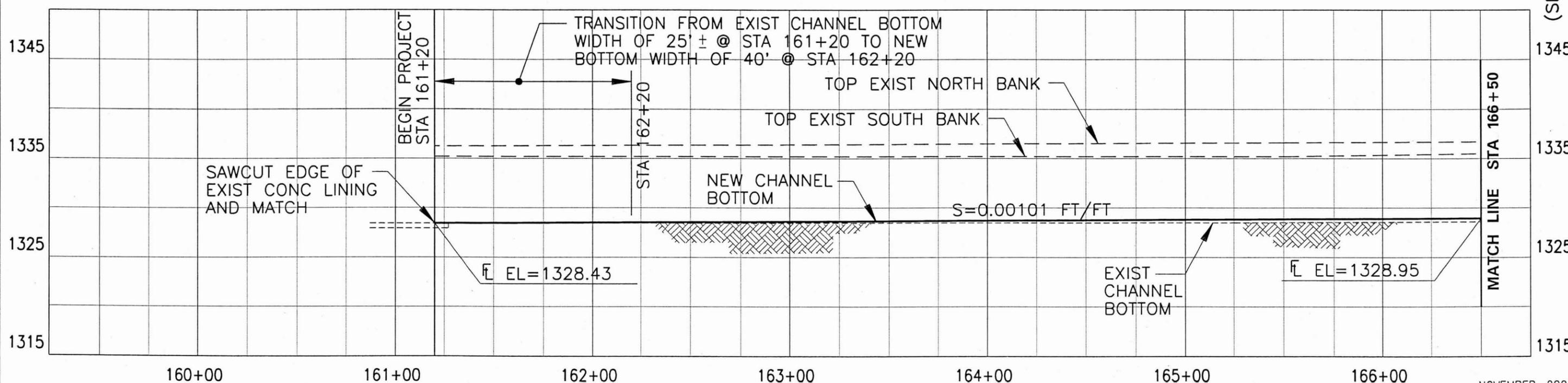
SCOTTSDALE ROAD CORRIDOR
 DRAINAGE MASTER PLAN
**SCOTTSDALE ROAD CHANNEL
 DETAILS**

NOVEMBER, 2002

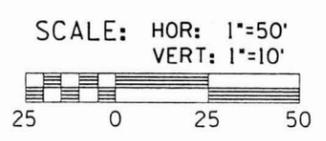
| | |
|----------------|----|
| DRAWING NUMBER | D9 |
| SHEET NUMBER | 11 |



(SEE SHT 13)



NOTE:
BERNEIL DITCH STA 100+00 IS @ CONFLUENCE
WITH APPROX Q OF INDIAN BEND WASH



CONCEPT PLANS
NOT FOR CONSTRUCTION

SCI - 15586
DRAWING FILE:
Q:\15586\GRAPHICS\DCN\PP14.dgn

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(602) 912-5500

| | |
|---------|--|
| DESIGN | |
| BNS | |
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| CHECKED | |
| GSB | |

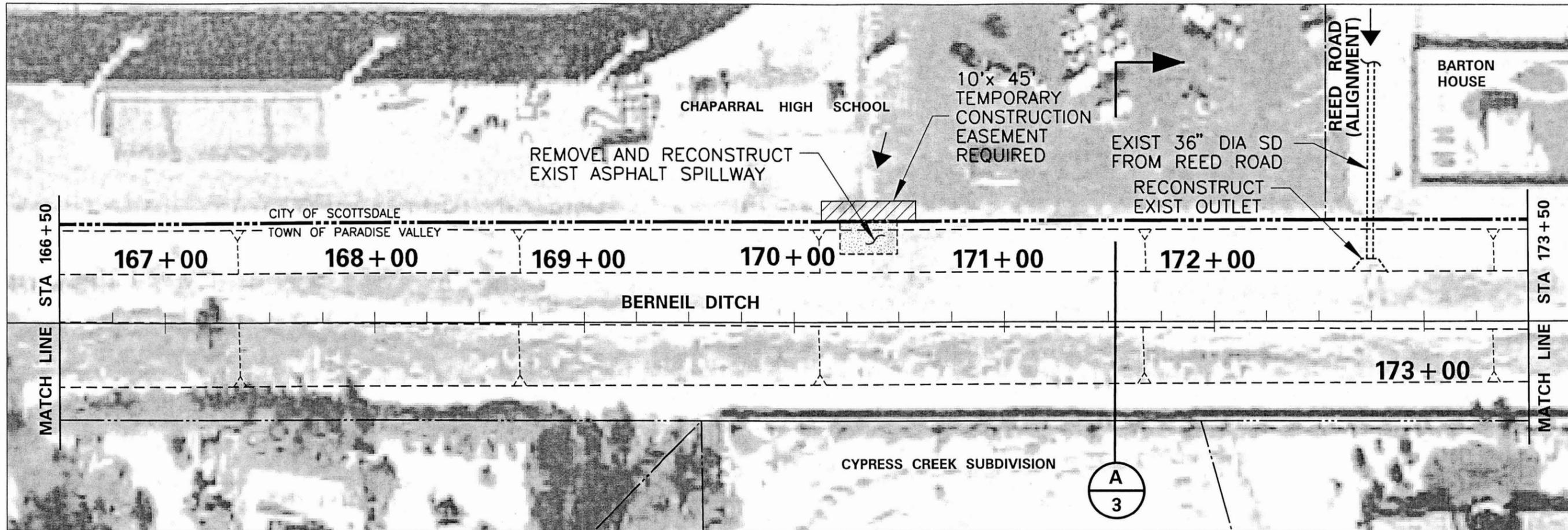


SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

BERNEIL DITCH

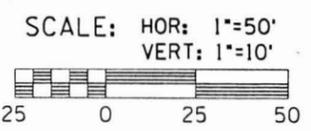
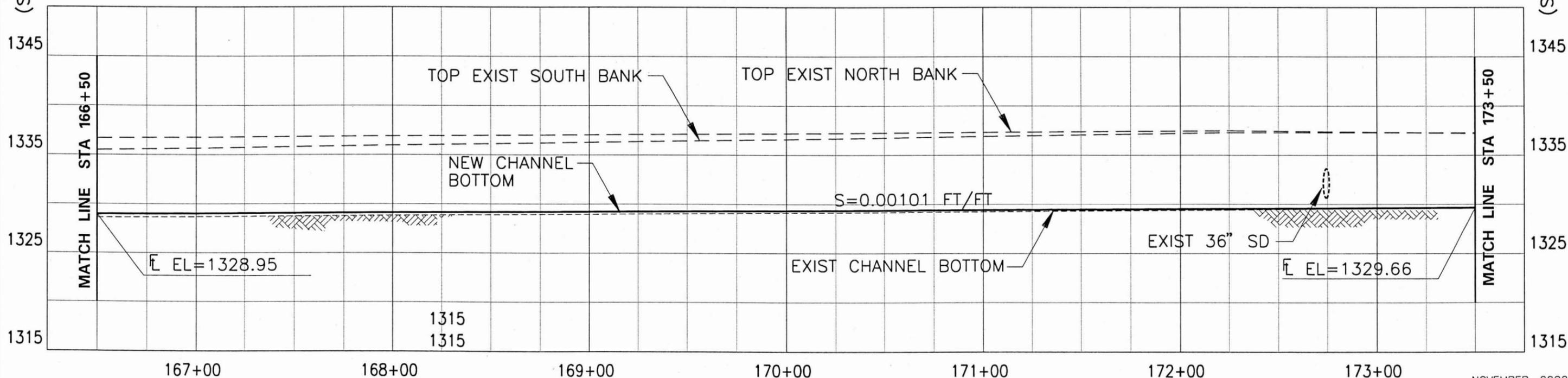
NOVEMBER, 2002

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| DRAWING NUMBER | P1 |
| SHEET NUMBER | 12 |



(SEE SHT 12)

(SEE SHT 14)



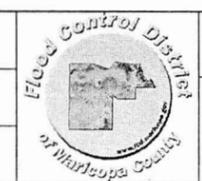
CONCEPT PLANS
NOT FOR CONSTRUCTION

SCJ • 15586
DRAWING FILE:
Q:\15586\GRAPHICS\DWG\PP15.dgn

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PHOENIX, ARIZONA 85016
(602) 912-6500

| | |
|---------|-----|
| DESIGN | BNS |
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| CHECKED | |
| GSB | |

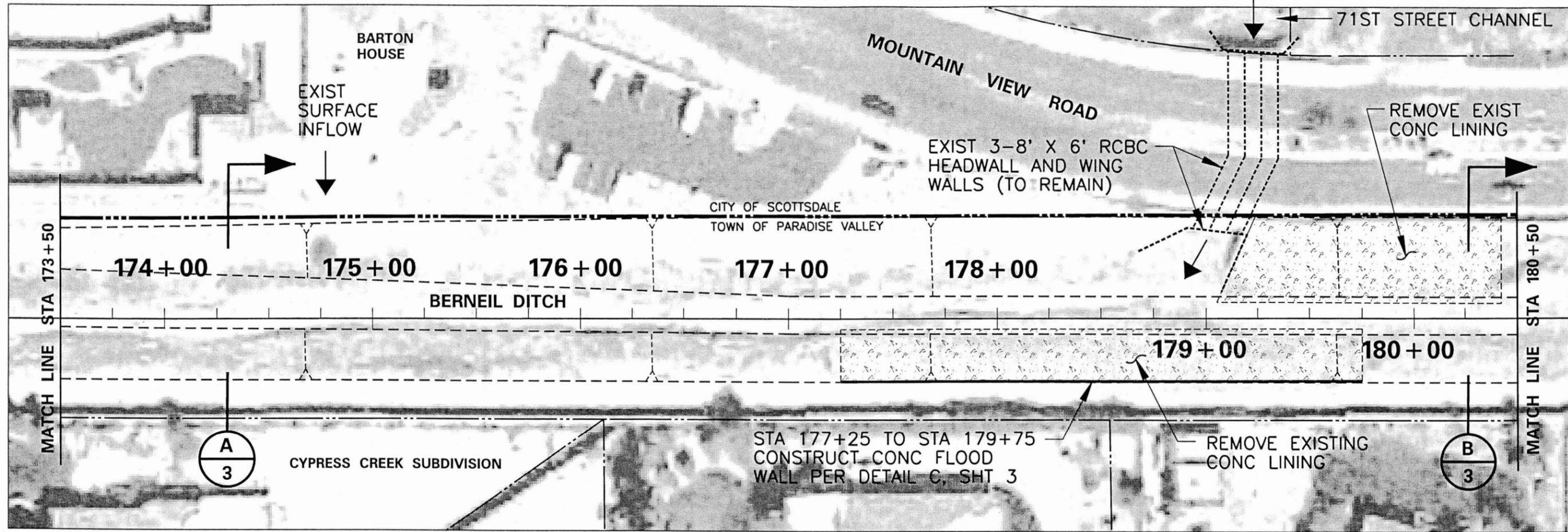


SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

BERNEIL DITCH

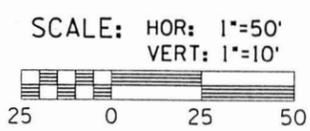
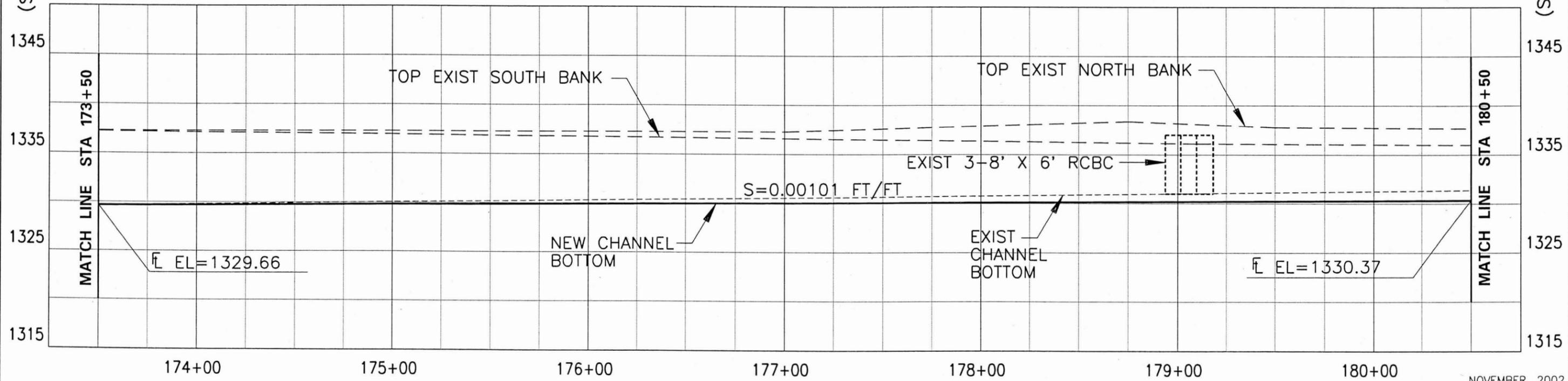
NOVEMBER, 2002

| | |
|----------------|----|
| DRAWING NUMBER | P2 |
| SHEET NUMBER | 13 |



(SEE SHT 13)

(SEE SHT 15)



CONCEPT PLANS
NOT FOR CONSTRUCTION

SC1 • 15586
DRAWING FILE:
Q:\15586\GRAPHICS\DM\PP16.dgn

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SUITE 130
PHOENIX, ARIZONA 85016
(602) 912-6500

| | |
|---------|-----|
| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |

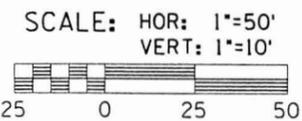
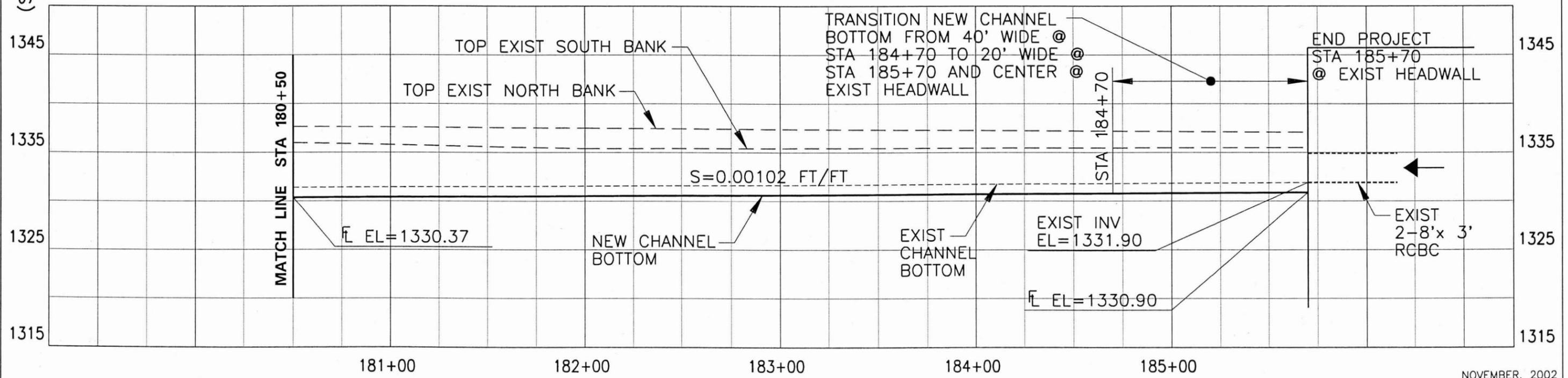
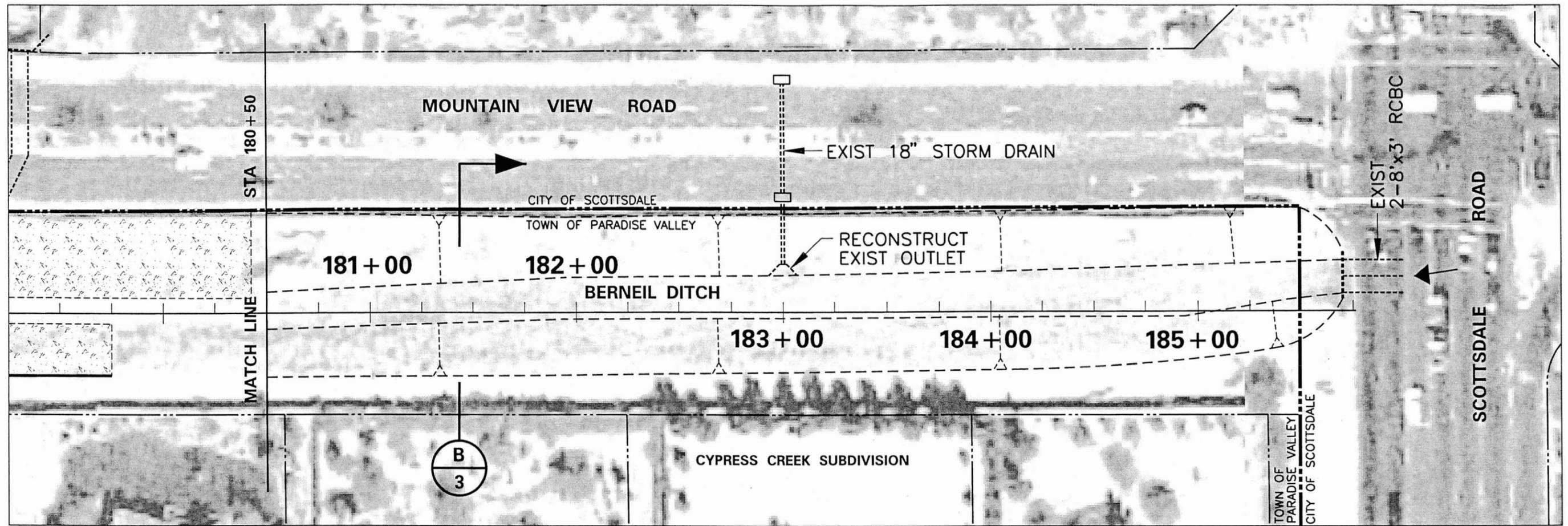


NOVEMBER, 2002
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

BERNEIL DITCH

| | |
|----------------|----|
| DRAWING NUMBER | P3 |
| SHEET NUMBER | 14 |

(SEE SHT 14)



CONCEPT PLANS
NOT FOR CONSTRUCTION

SCI 15586
DRAWING FILE:
Q:\15586\GRAPHICS\DWG\PP17.dgn

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| | |
|---------|-----|
| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |



SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

BERNEIL DITCH

NOVEMBER, 2002

| | |
|----------------|----|
| DRAWING NUMBER | P4 |
| SHEET NUMBER | 15 |

MATCH LINE (SEE SHEET 17)

MESCAL PARK

APPROX TOE OF SLOPE

D
4

E
5

CONSTRUCT HARDENED OVERFLOW SPILLWAY

CONSTRUCT NEW INLET ACCESS BARRIER AND TRASH RACK

EXIST EQUESTRIAN ARENA

SURFACE OVERFLOW

GATE

GATE

EXIST 60" OUTLET PIPE

PIPE OUTFLOW

TO 71ST STREET CHANNEL

SAN PALOMA APARTMENTS

MESCAL STREET

PARK BDY

68TH PLACE

SURFACE OUTFALL TO 68TH PLACE



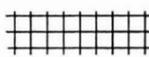
LEGEND

EXISTING 8' WIDE ASPHALT PATH



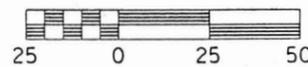
AREA OF PROPOSED FILL

EXISTING 10' WIDE EQUESTRIAN TRAIL



HARDENED OVERFLOW SPILLWAY

SCALE: 1"=50'



CONCEPT PLANS NOT FOR CONSTRUCTION

SC1 * 15586
DRAWING FILE:
q: 15586\graphics\dgn\pp12.dgn

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SUITE 130
PHOENIX, ARIZONA 85016
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| | |
|---------|-----|
| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |



SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN

MESCAL PARK

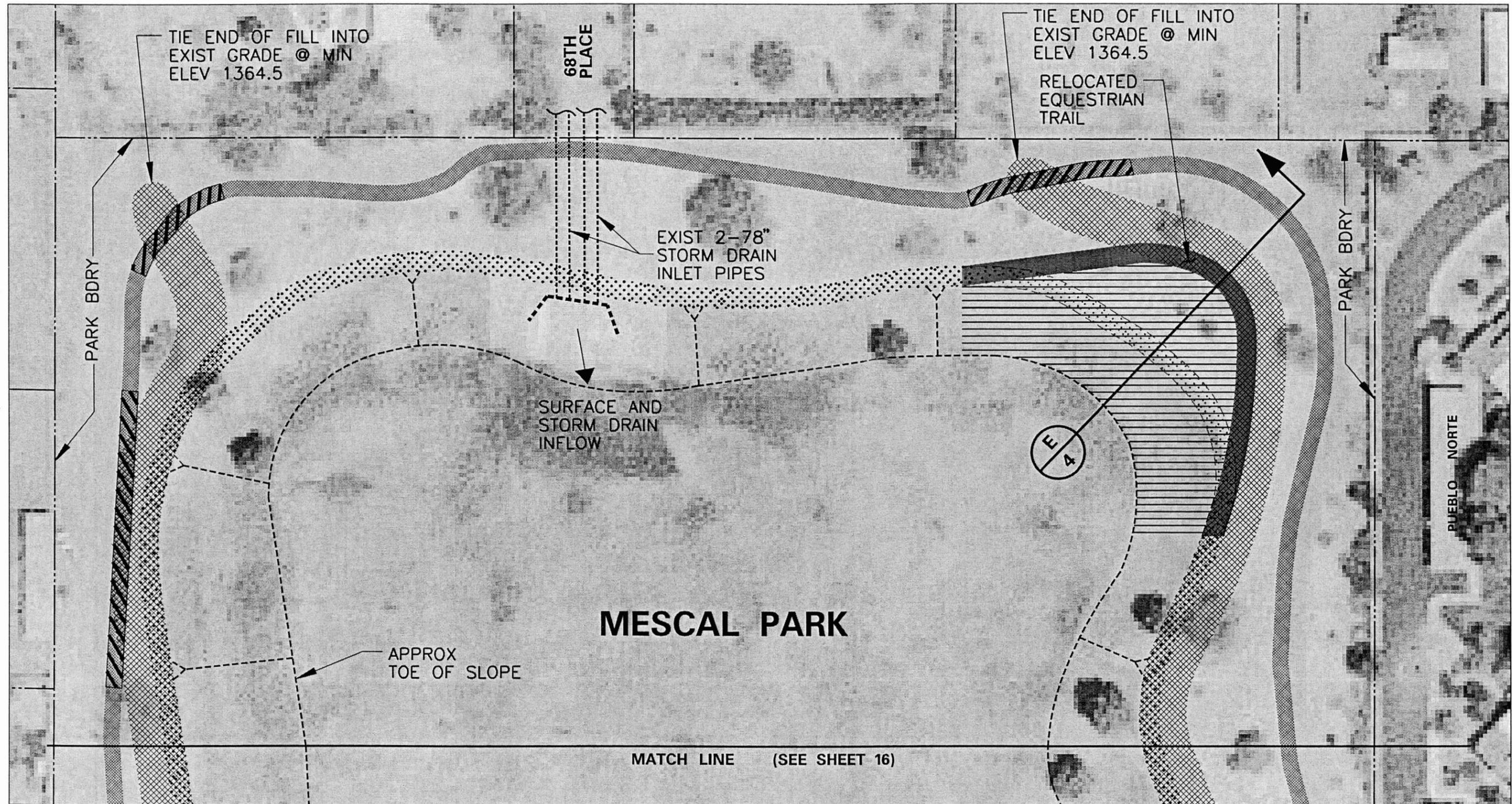
NOVEMBER, 2002

DRAWING NUMBER

P5

SHEET NUMBER

16

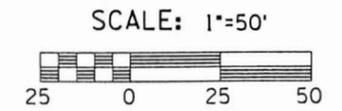


MESCAL PARK

MATCH LINE (SEE SHEET 16)

LEGEND

- | | | | | | |
|---|------------------------------------|---|---|---|---|
|  | EXISTING 8' WIDE ASPHALT PATH |  | AREA OF PROPOSED BORROW EXCAVATION |  | RECONSTRUCTED ASPHALT PATH AT PROPOSED FILL |
|  | EXISTING 10' WIDE EQUESTRIAN TRAIL |  | EXISTING EQUESTRIAN TRAIL TO BE RELOCATED |  | RELOCATED EQUESTRIAN TRAIL |
|  | AREA OF PROPOSED FILL | | | | |



CONCEPT PLANS
NOT FOR CONSTRUCTION

SC1 * 15586
DRAWING FILE:
q:\15586\graphics\dgn\pp13.dgn

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| | |
|---------|-----|
| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |

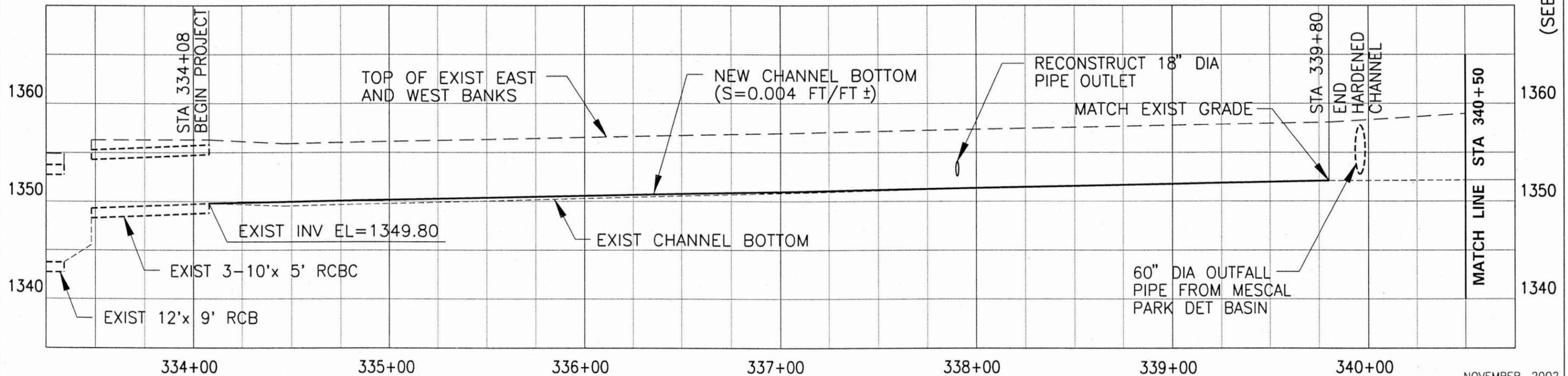
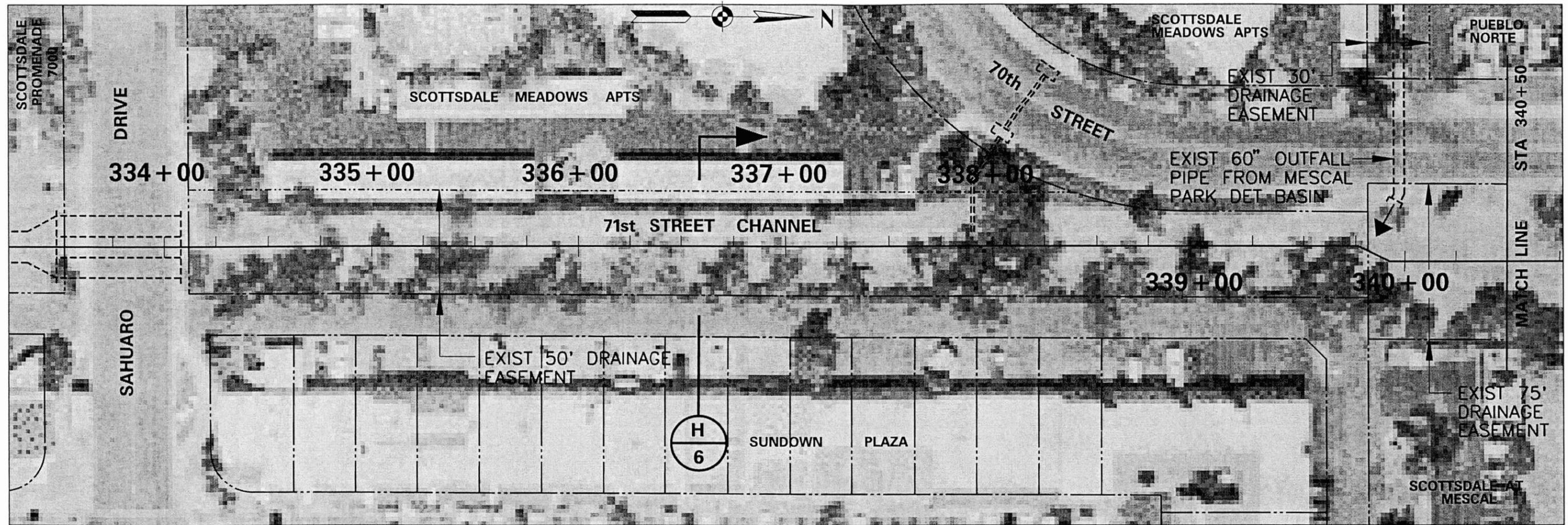


NOVEMBER, 2002

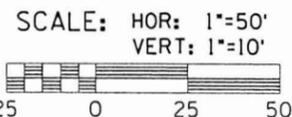
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

MESCAL PARK

| | |
|----------------|----|
| DRAWING NUMBER | P6 |
| SHEET NUMBER | 17 |



NOTE:
71st CHANNEL STA 300+00 IS @
CONFLUENCE WITH \bar{C} OF BERNEIL DITCH.



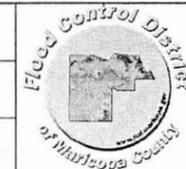
CONCEPT PLANS
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SCT * 15586
DRAWING FILE:
q:\15586\graphics\dgn\pp06.dgn

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| | |
|---------|-----|
| DESIGN | BNS |
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| CHECKED | GSB |



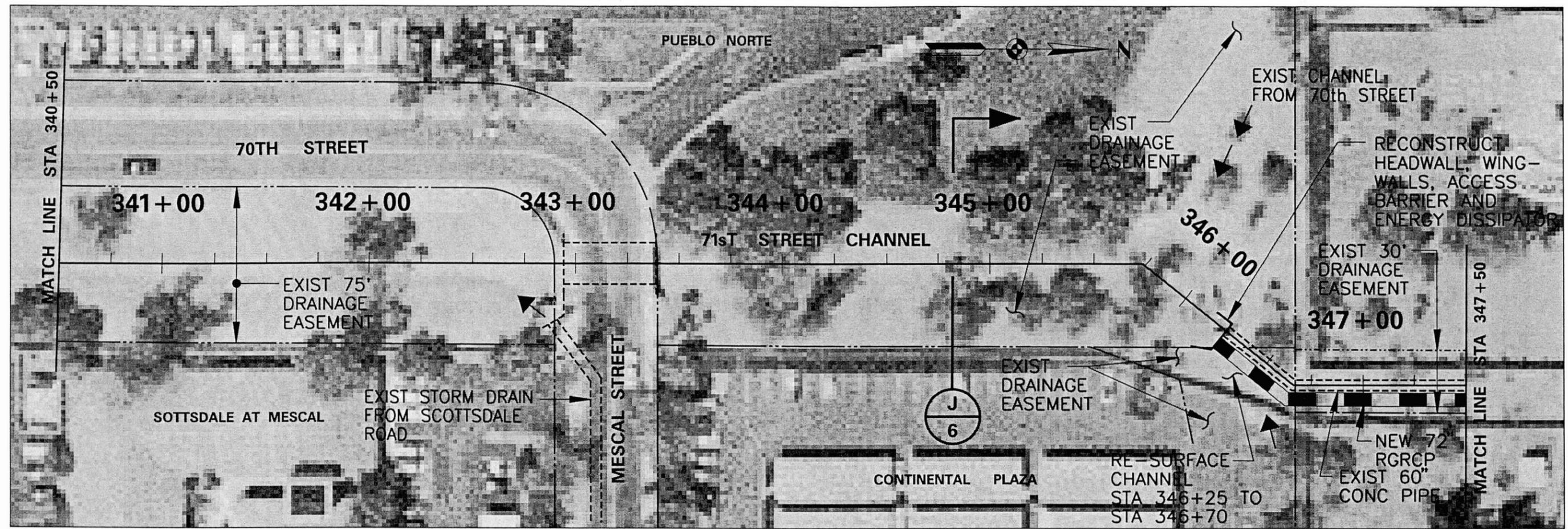
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN
71ST STREET CHANNEL

NOVEMBER, 2002

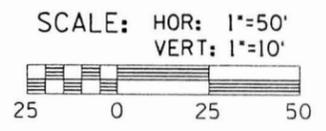
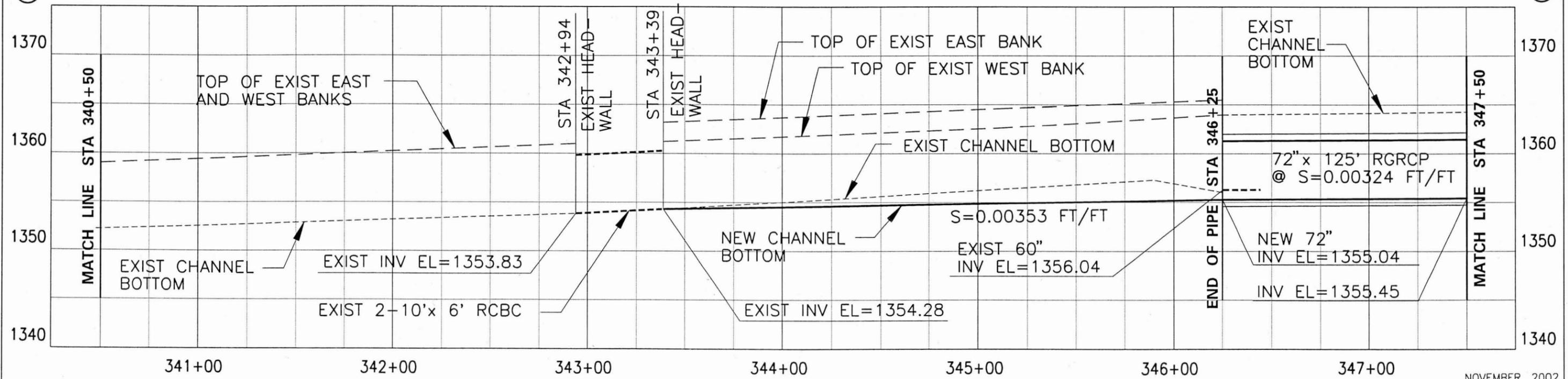
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P7
SHEET NUMBER
18

(SEE SHT 19)

(SEE SHT 18)



(SEE SHT 20)



CONCEPT PLANS
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| | |
|---------|-----|
| DESIGN | BNS |
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| CHECKED | GSB |

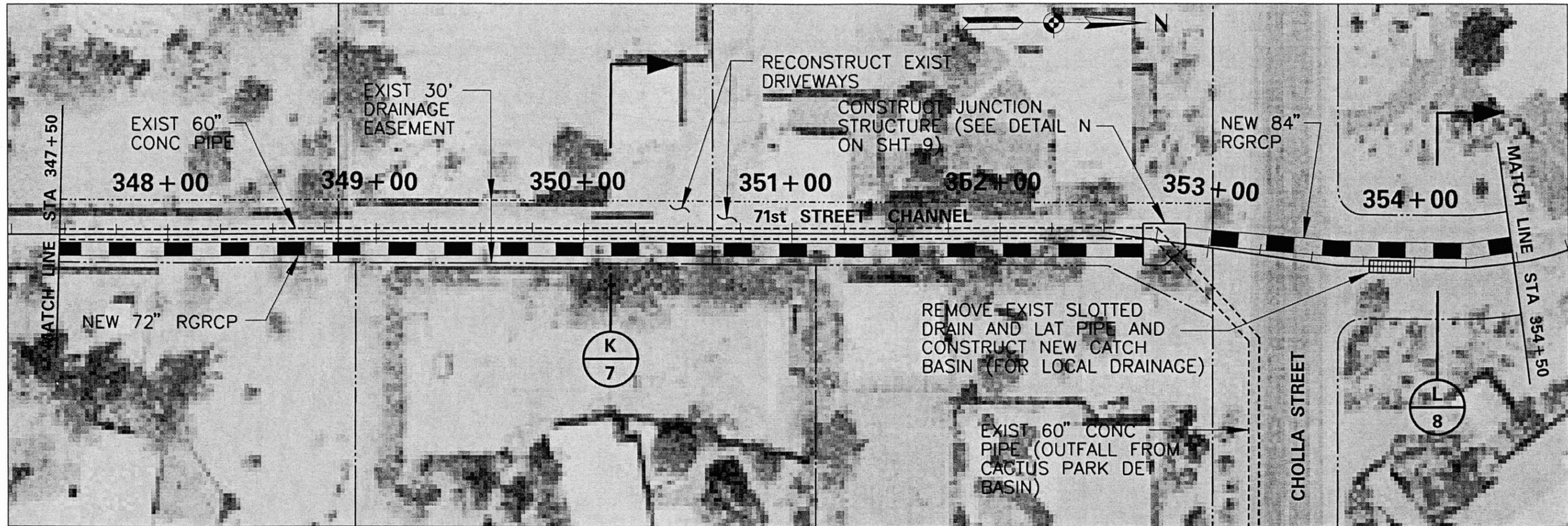


SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

71ST STREET CHANNEL

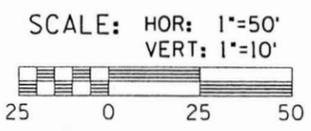
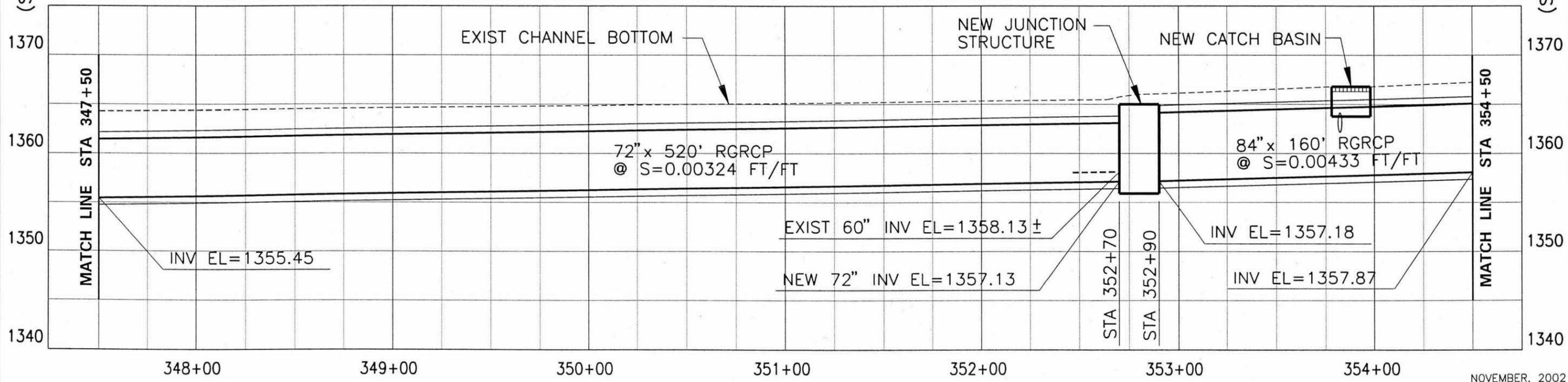
NOVEMBER, 2002

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| DRAWING NUMBER | P8 |
| SHEET NUMBER | 19 |



(SEE SHT 19)

(SEE SHT 21)



CONCEPT PLANS
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SC1 - 15586
DRAWING FILE:
q:\15586\graphics\dgn\pp08.dgn

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| | |
|---------|-----|
| DESIGN | BNS |
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| CHECKED | GSB |

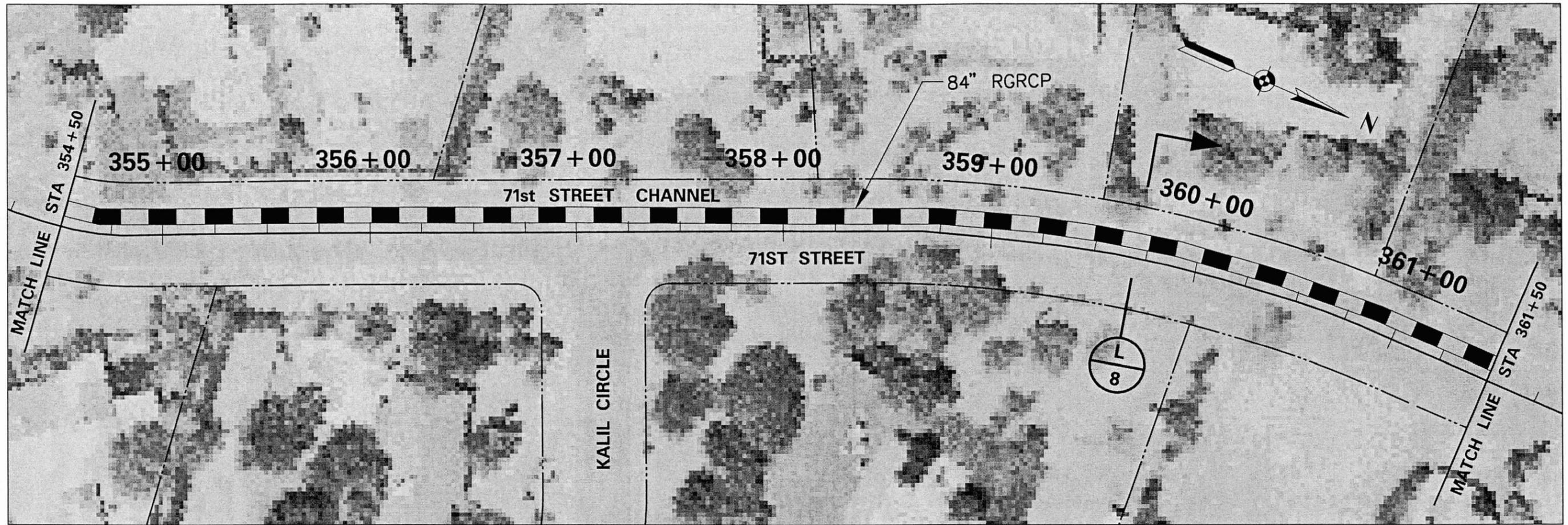


SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

71ST STREET CHANNEL

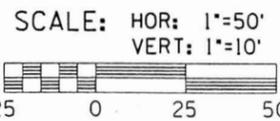
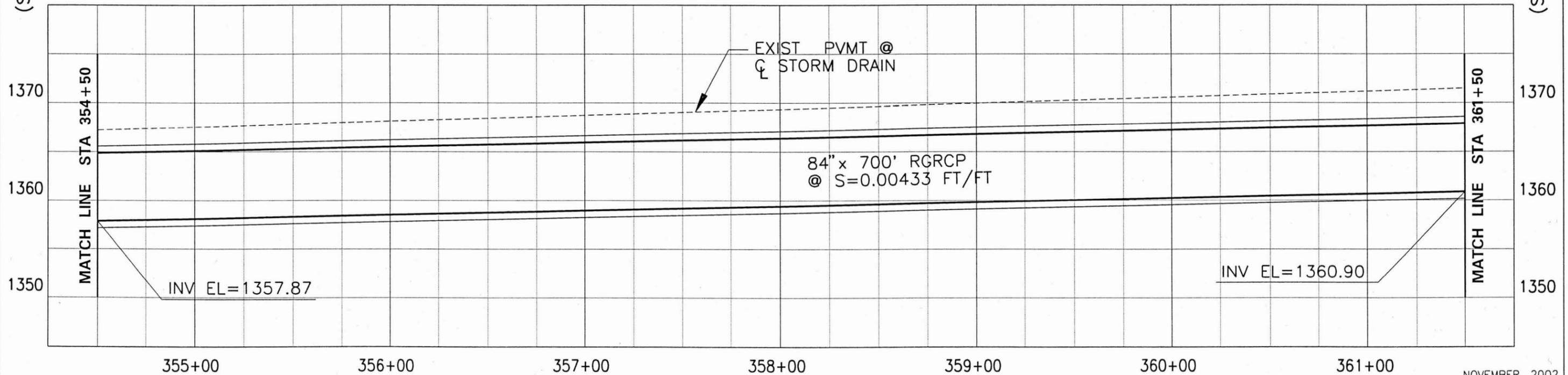
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|----------------|----|
| DRAWING NUMBER | P9 |
| SHEET NUMBER | 20 |

NOVEMBER, 2002



(SEE SHT 20)

(SEE SHT 22)



CONCEPT PLANS
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SC1 - 15586
DRAWING FILE:
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| | |
|---------|-----|
| DESIGN | BNS |
| DRAWN | LRj |
| CHECKED | GSB |



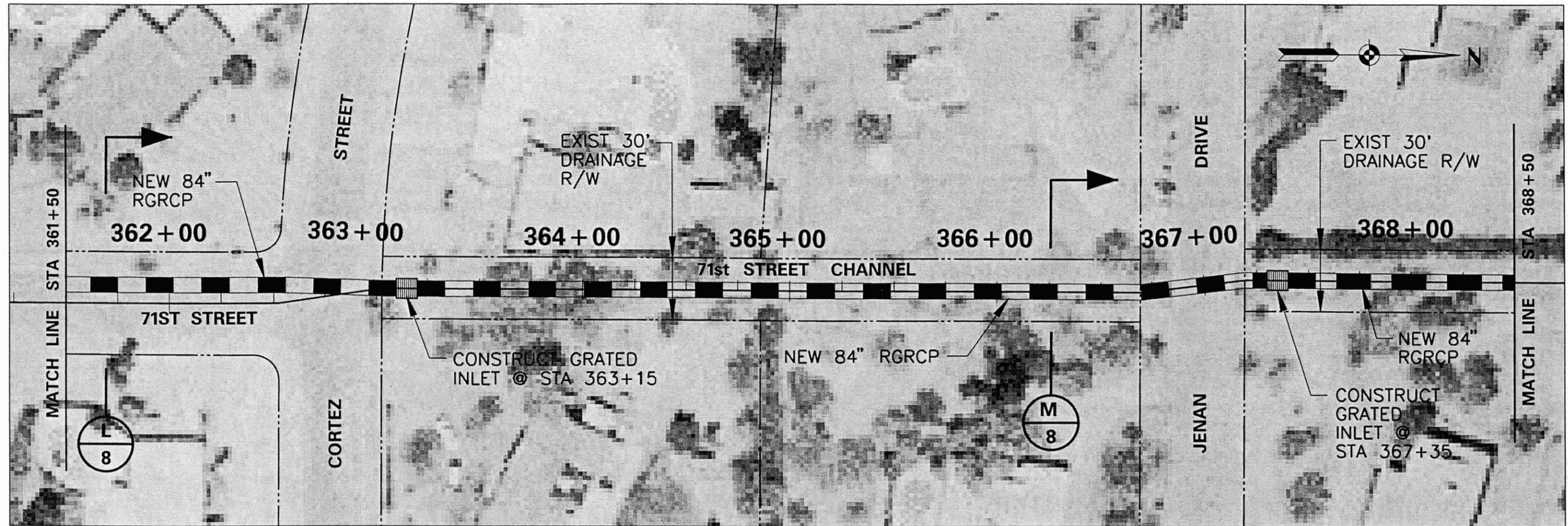
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

71ST STREET CHANNEL

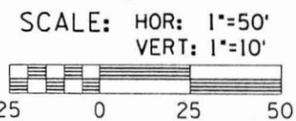
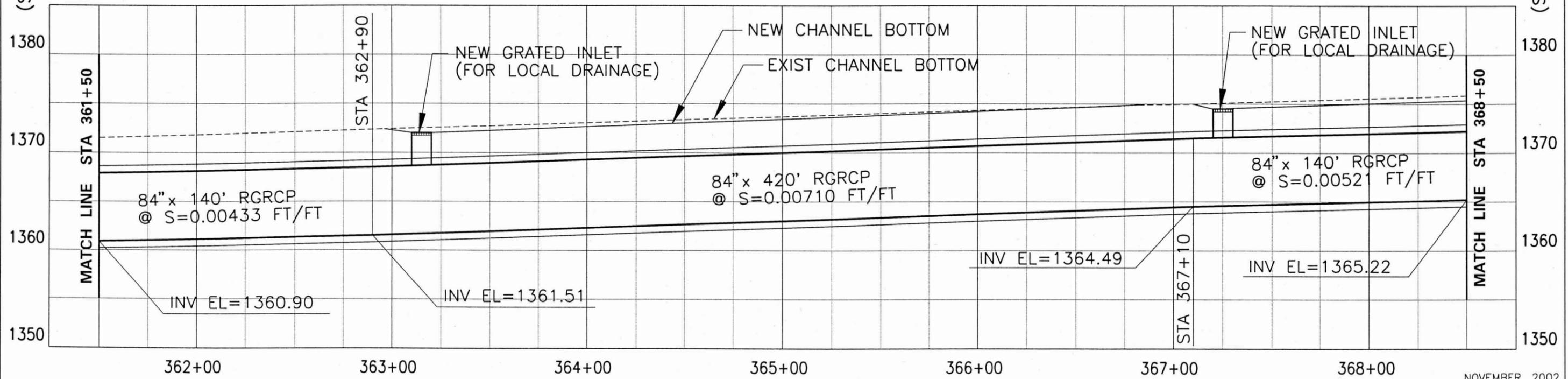
NOVEMBER, 2002

DRAWING NUMBER
P10
SHEET NUMBER
21

(SEE SHT 21)



(SEE SHT 23)



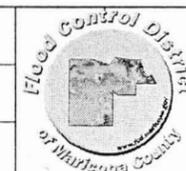
CONCEPT PLANS
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SUITE 130
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(602) 912-8500

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| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |



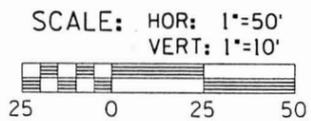
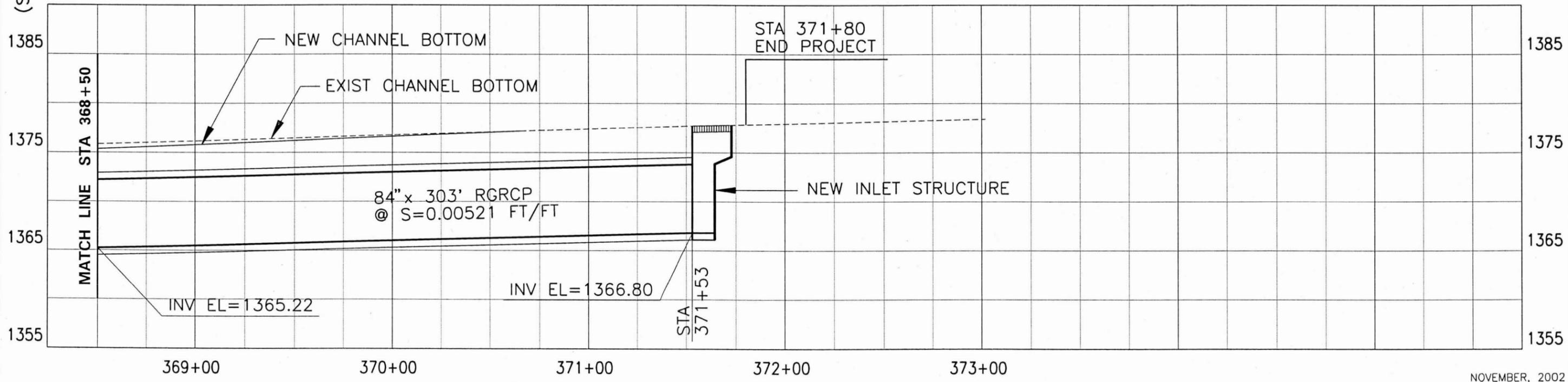
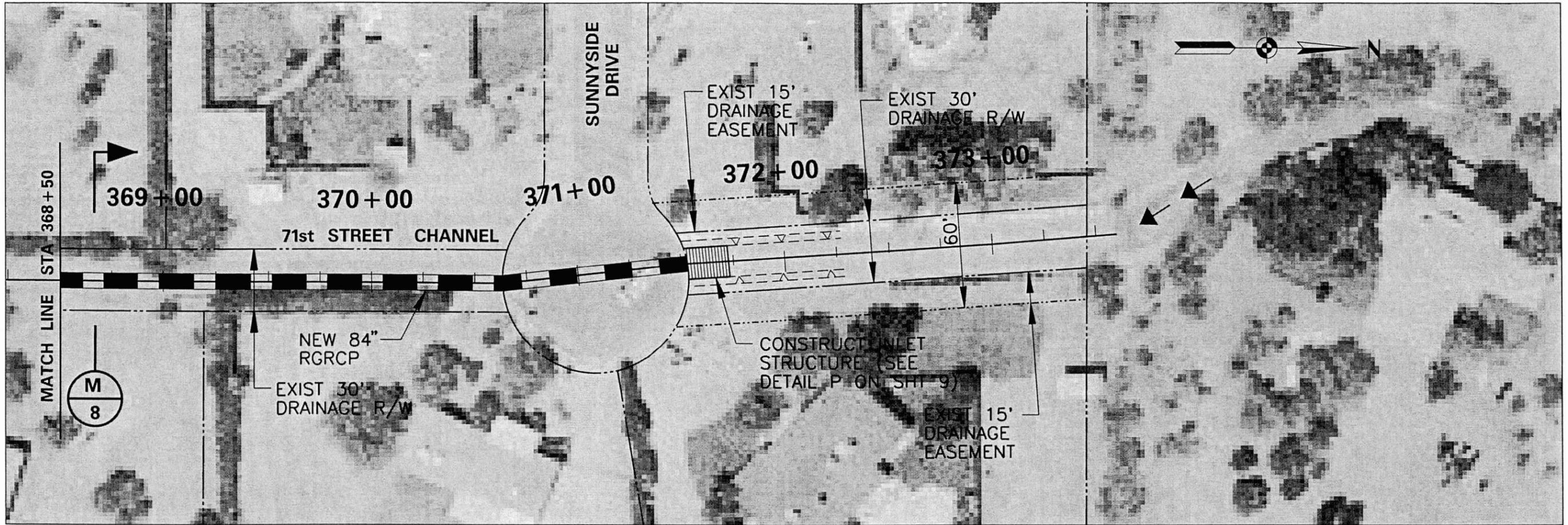
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

71ST STREET CHANNEL

NOVEMBER, 2002

| | |
|----------------|-----|
| DRAWING NUMBER | P11 |
| SHEET NUMBER | 22 |

(SEE SHT 22)



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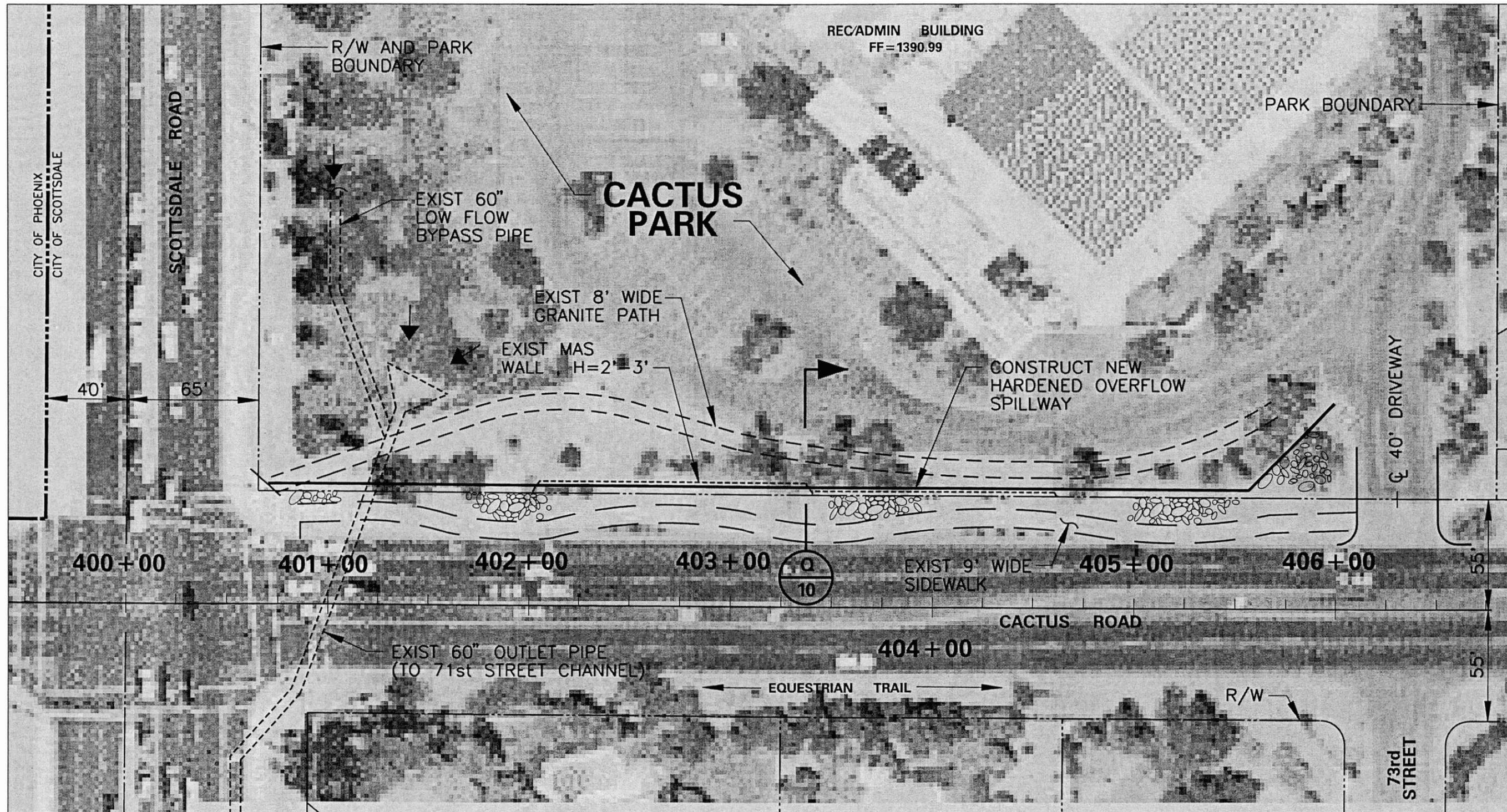
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| DESIGN | BNS |
| DRAWN | LRj |
| CHECKED | GSB |



NOVEMBER, 2002
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

71ST STREET CHANNEL

| | |
|----------------|------------|
| DRAWING NUMBER | P12 |
| SHEET NUMBER | 23 |



REC/ADMIN BUILDING
FF=1390.99

CACTUS PARK

R/W AND PARK BOUNDARY

PARK BOUNDARY

EXIST 60" LOW FLOW BYPASS PIPE

EXIST 8' WIDE GRANITE PATH

EXIST MAS WALL H=2'-3'

CONSTRUCT NEW HARDENED OVERFLOW SPILLWAY

40' DRIVEWAY

400+00

401+00

402+00

403+00



405+00

406+00

EXIST 9' WIDE SIDEWALK

CACTUS ROAD

404+00

EXIST 60" OUTLET PIPE (TO 71st STREET CHANNEL)

EQUESTRIAN TRAIL

R/W

73rd STREET



NOVEMBER, 2002

SCALE: 1"=50'



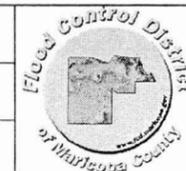
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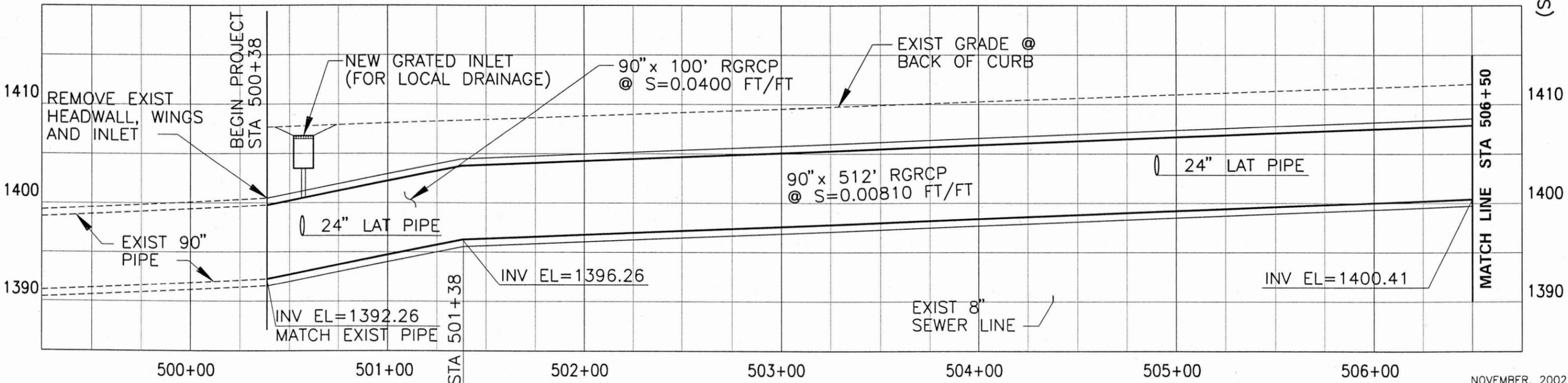
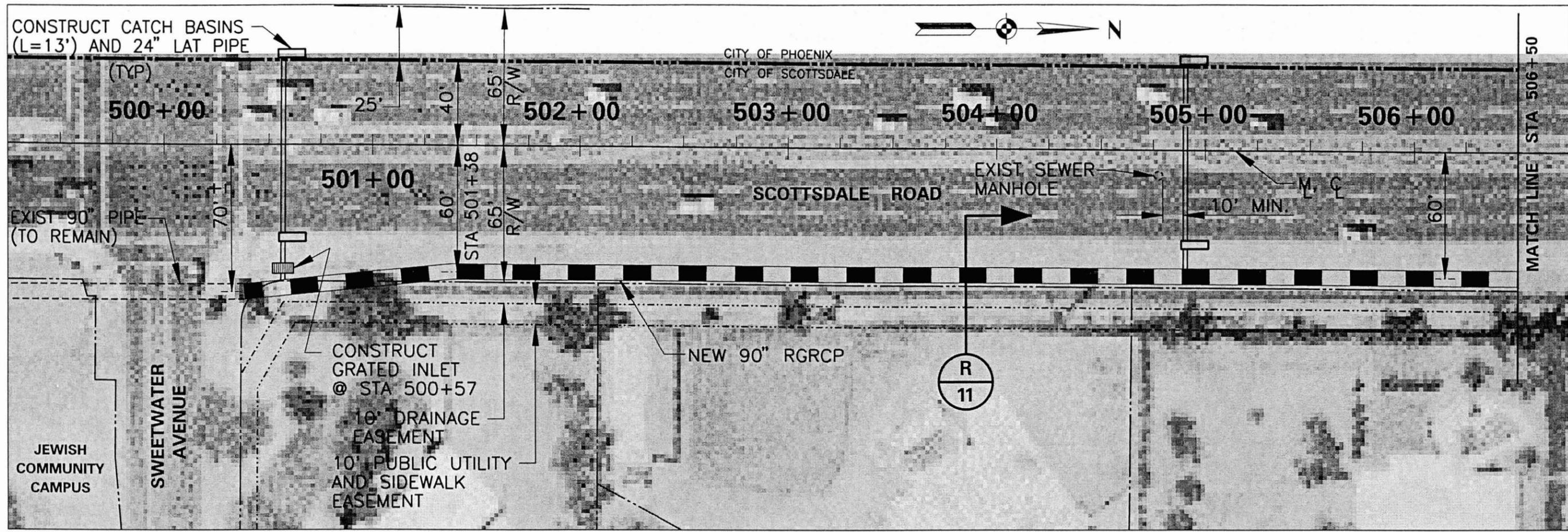
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| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |



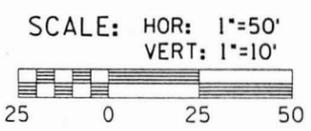
SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

CACTUS PARK

| | |
|----------------|------------|
| DRAWING NUMBER | P13 |
| SHEET NUMBER | 24 |



NOTE:
SCOTTSDALE ROAD CHANNEL STA 500+00
IS @ APPROX $\frac{1}{2}$ OF SWEETWATER AVENUE.



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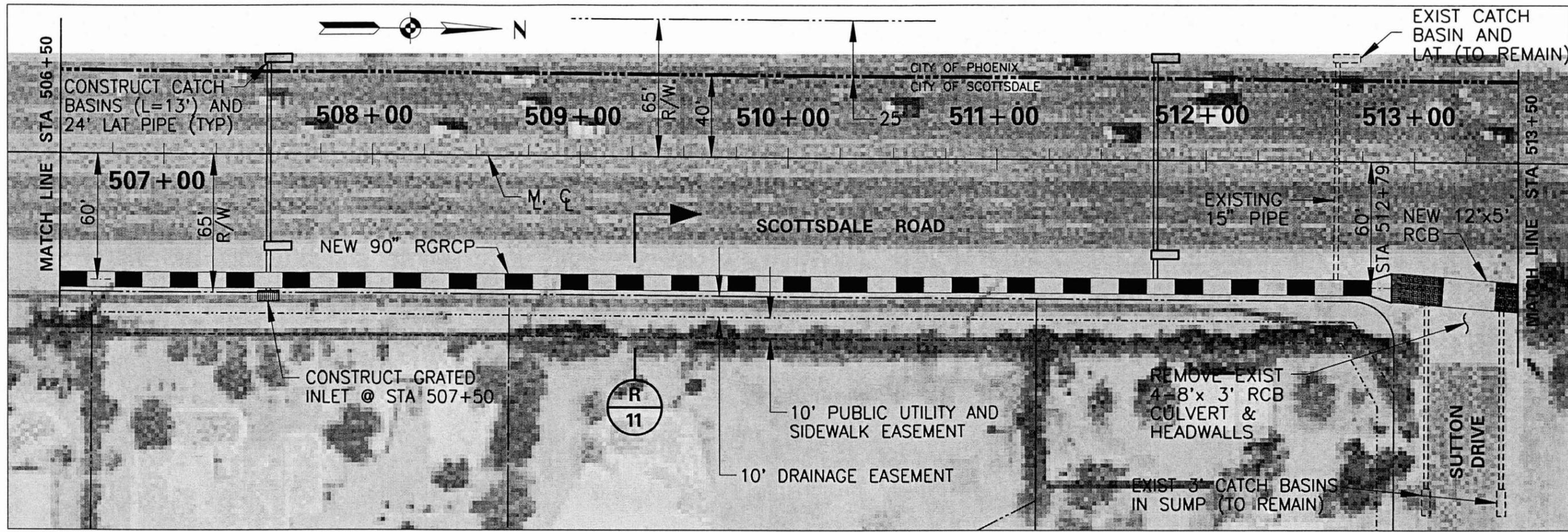
NOVEMBER, 2002

SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

SCOTTSDALE ROAD CHANNEL

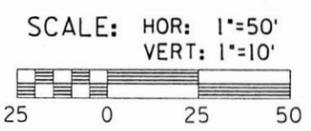
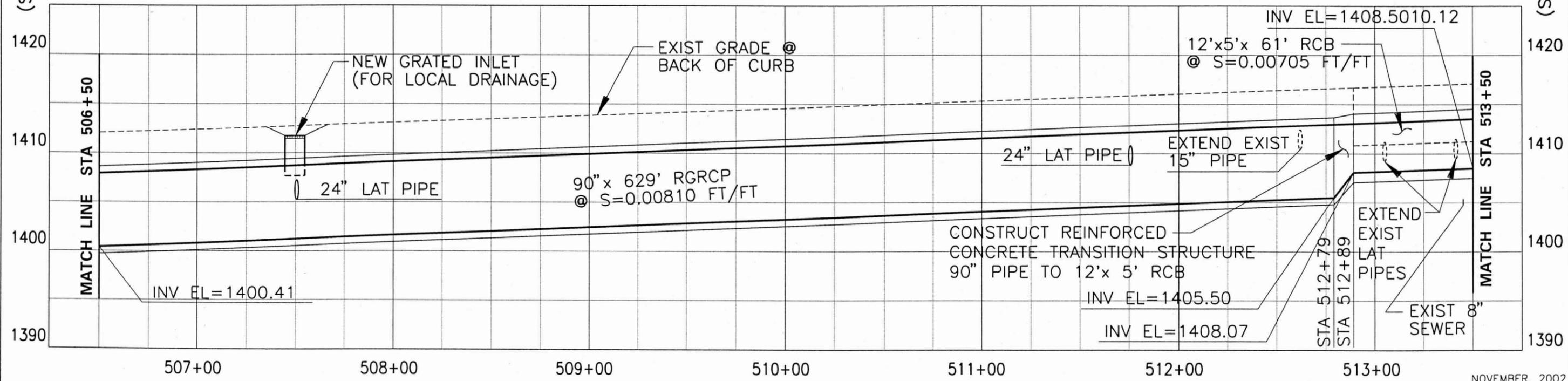
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| DRAWING NUMBER | P14 |
| SHEET NUMBER | 25 |

(SEE SHT 26)



(SEE SHT 25)

(SEE SHT 27)



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| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |

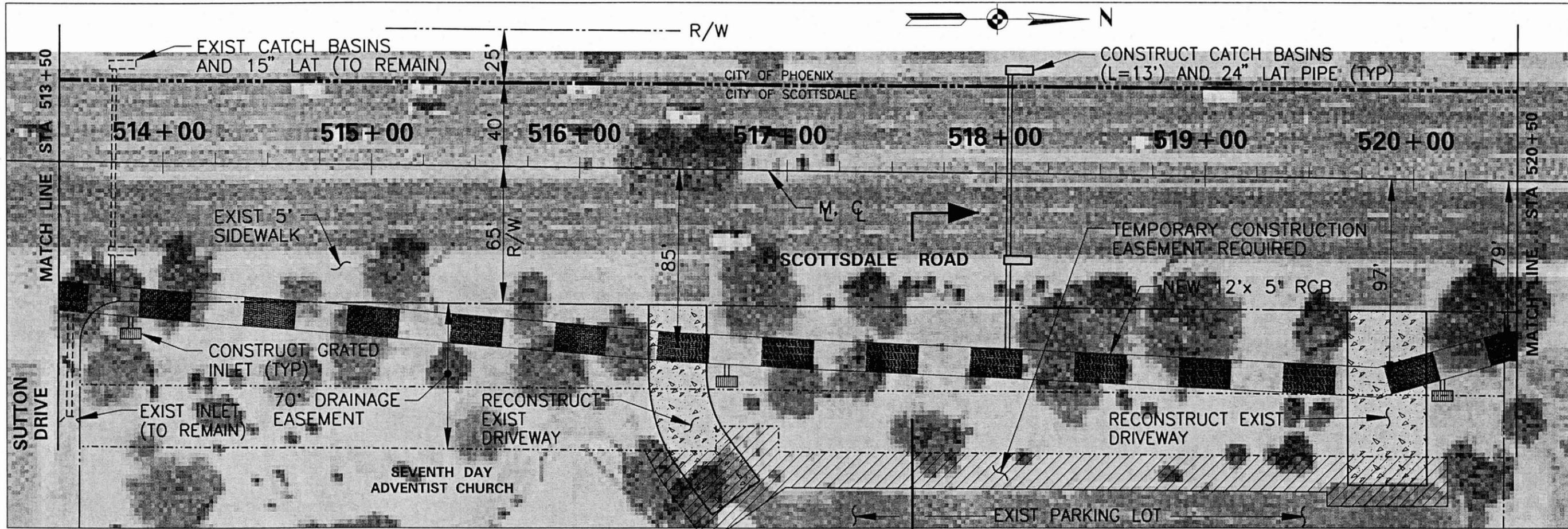


SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

SCOTTSDALE ROAD CHANNEL

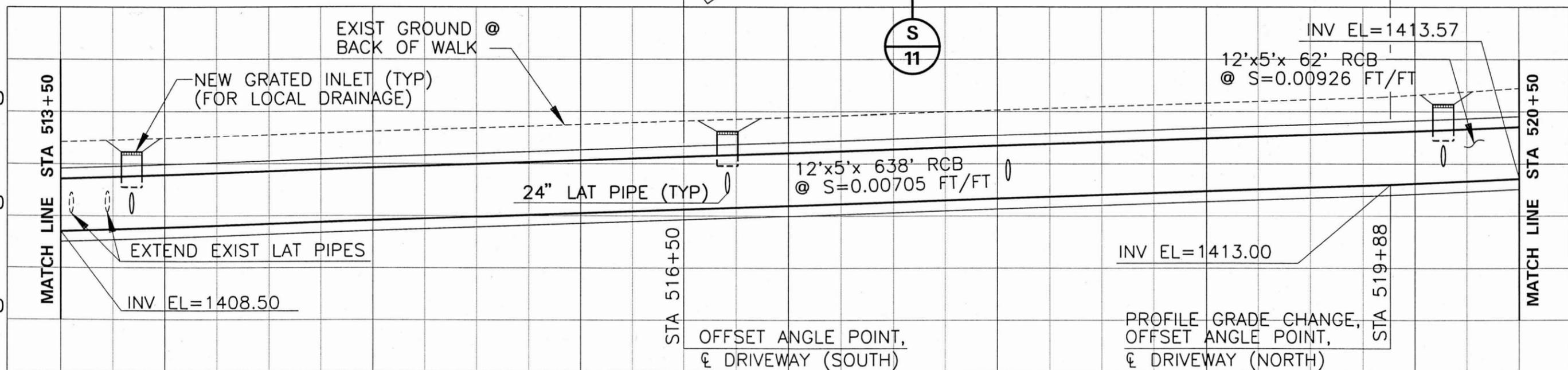
NOVEMBER, 2002

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| SHEET NUMBER | 26 |

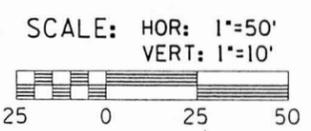


(SEE SHT 26)

(SEE SHT 28)



514+00 515+00 516+00 517+00 518+00 519+00 520+00



CONCEPT PLANS
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DRAWING FILE:
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| DESIGN | BNS |
| DRAWN | LRj |
| CHECKED | GSB |

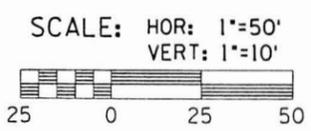
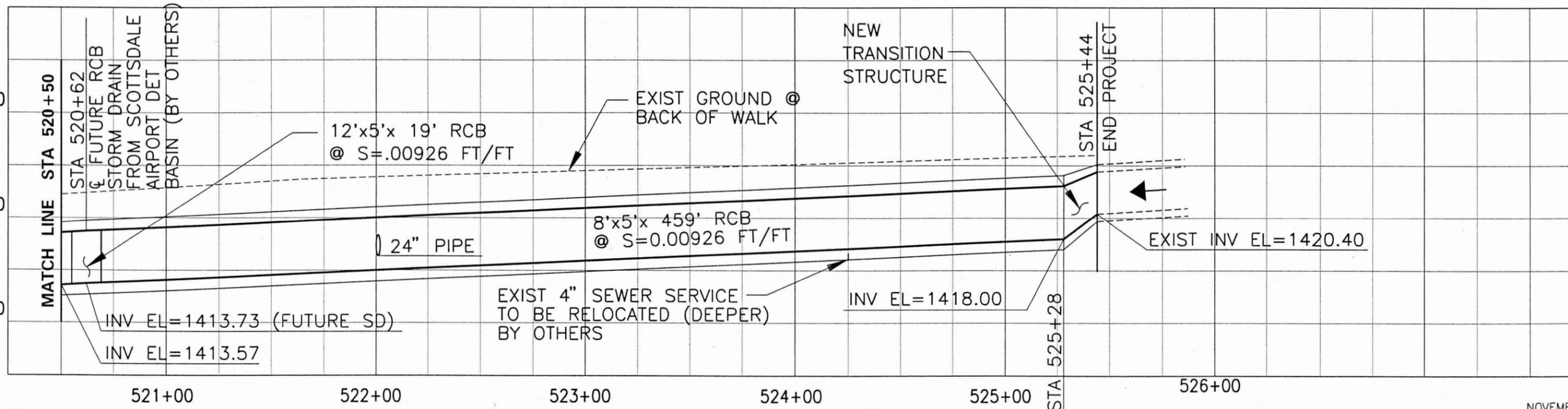
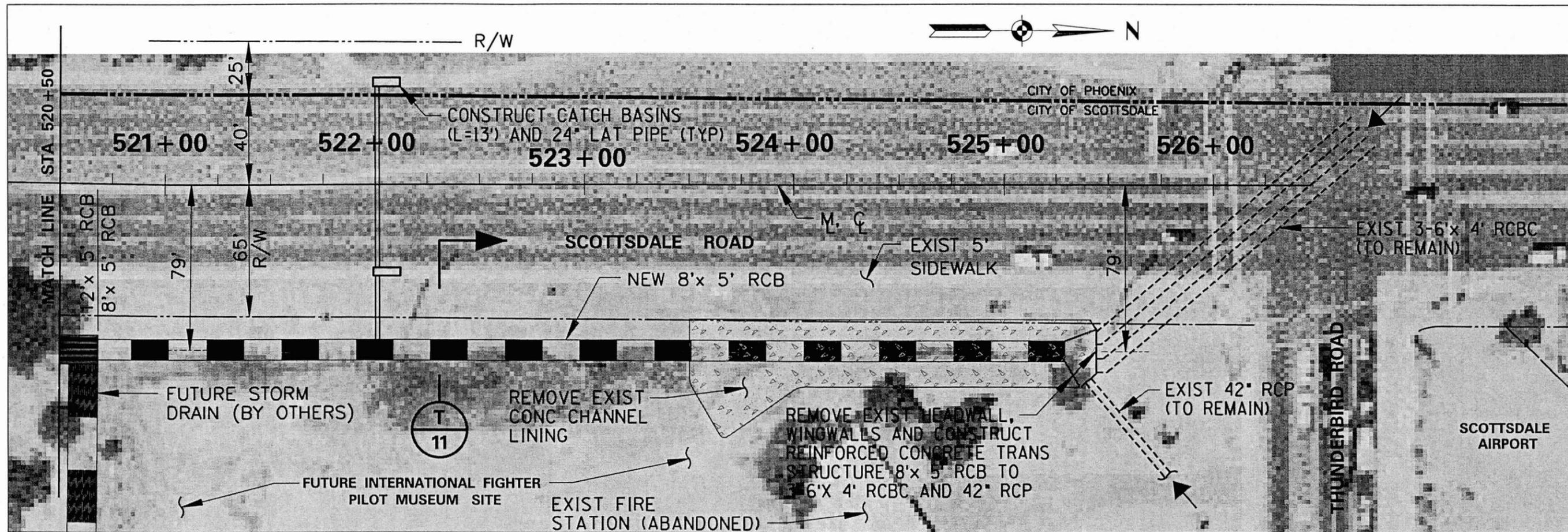


SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

SCOTTSDALE ROAD CHANNEL

NOVEMBER, 2002
DRAWING NUMBER
P16
SHEET NUMBER
27

(SEE SHT 27)



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| | |
|---------|-----|
| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |



NOVEMBER, 2002

SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

SCOTTSDALE ROAD CHANNEL

DRAWING NUMBER
P17

SHEET NUMBER
28

Berneil Ditch Landscape Design Theme

Landscape Design Theme: to create a hard-surface channel as a sculptural land graphic that relates to the character of the setting.

Applicable to: Berneil Ditch

Channel Criteria:

1. Configuration

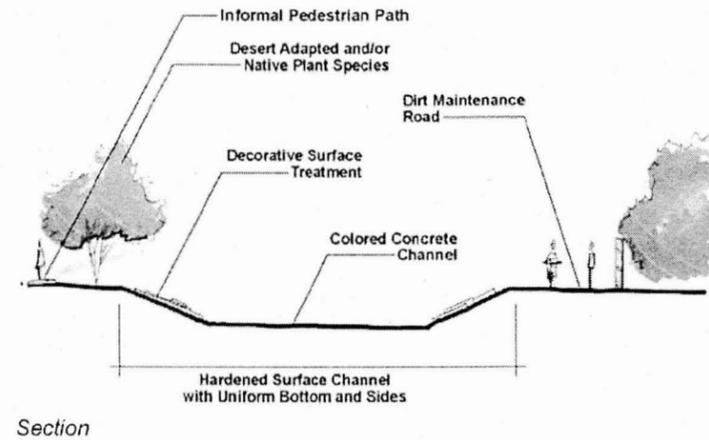
- Use integral colored material and surface treatments that would create a sculptural land graphic.
- Place landscape area with informal pedestrian path between the channel and Chaparral High School.

2. Vegetation

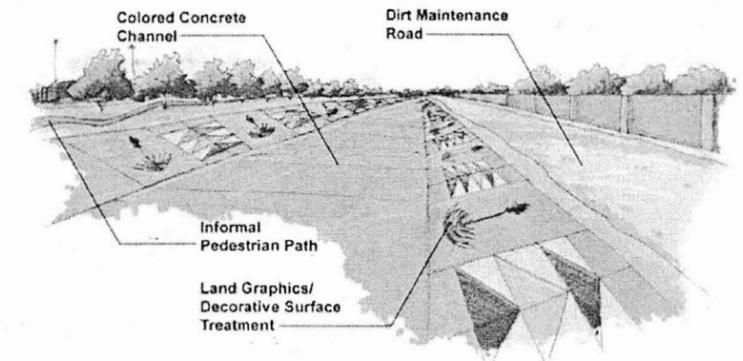
- Select plant material from the plant list in the City of Scottsdale's Suburban Character Area plant palette.
- Plant trees in a pattern to mimic the form, line, and density of trees associated with natural washes in the project vicinity.
- Install irrigation system to maintain and establish plant material.
- Existing trees will be protected or salvaged for transplant.

3. Materials

- Use surface material that complements the character of the adjacent land use.



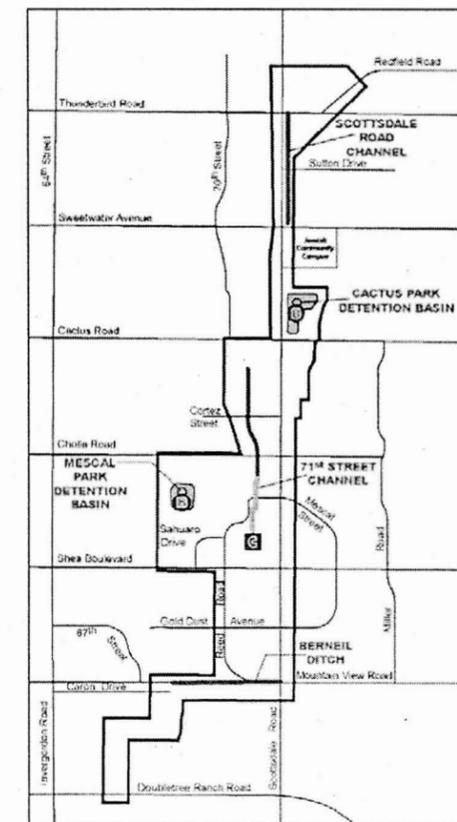
Section



Conceptual Sketch



Existing Conditions



Location Map

NOVEMBER, 2002

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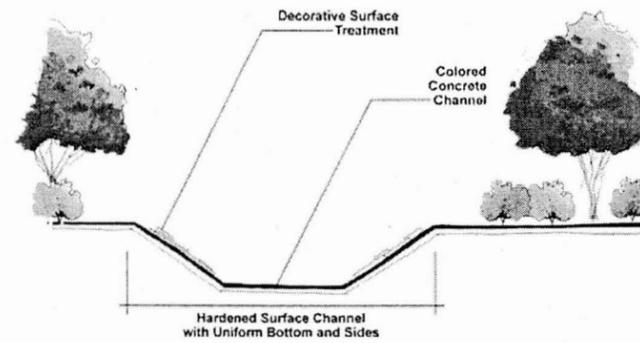
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| DESIGN BNS | | SCOTTSDALE ROAD CORRIDOR DRAINAGE MASTER PLAN | DRAWING NUMBER L1 |
| DRAWN LRJ | | BERNEIL DITCH LANDSCAPE DESIGN THEME | SHEET NUMBER 29 |
| CHECKED GSB | | | |

71st Street Channel Landscape Design Theme

Landscape Design Theme: to create an informal pattern of unifying elements that incorporates an informal pedestrian path where feasible and low-density indigenous plant material to integrate the drainage facility with the surrounding commercial and residential neighborhood.

Channel Criteria:

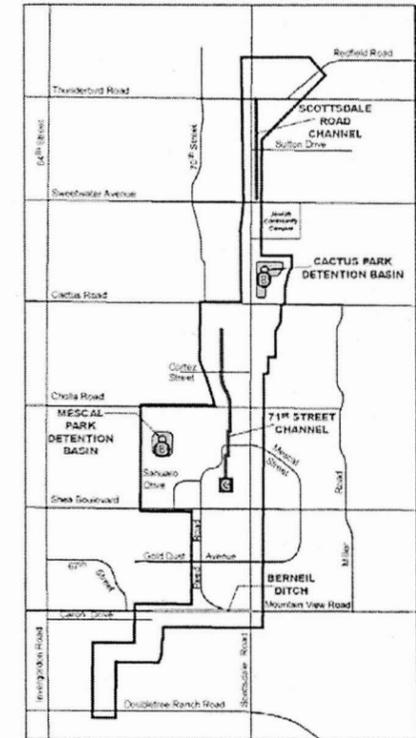
1. Configuration
 - Create an overall channel form that is more informal in character rather than rectangular and uniform.
 - Meander channel alignment in an irregular pattern.
 - Vary channel sides slope ratios asymmetrically from 2:1 to 4:1 along the length of the channel.
 - Round channel banks at the top.
2. Vegetation
 - Select plant material from the plant list in the City of Scottsdale's Suburban Character Area plant palette.
 - Place shrubs and trees in an irregular pattern along top of the banks.
 - Use vegetation to fill-in voids and complement the adjacent landscape.
 - Plant trees in a pattern to mimic the form, line, and density of trees associated with the project vicinity.
 - Install irrigation system to maintain and establish plant material.
 - Select plant material to provide seasonal color and interest in either form or texture. Avoid using plant material with notable thorns or those plants considered hazardous to pedestrians.
3. Materials
 - Use a hard-surfaced material for the informal meandering pedestrian path with texture surface, integral color, or other visual interesting treatment of the path surface.
 - Use pattern concrete or other textured material for channel side slopes.
 - Channel bottom kept smooth for residential access to property.



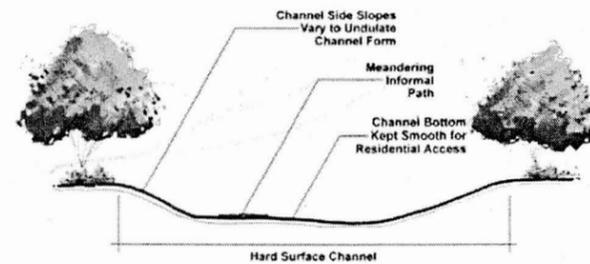
Section North of Shea Boulevard



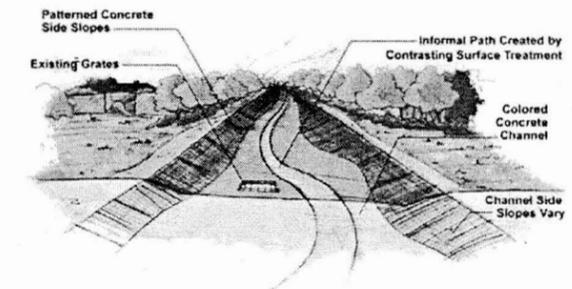
Existing Conditions North of Shea Boulevard



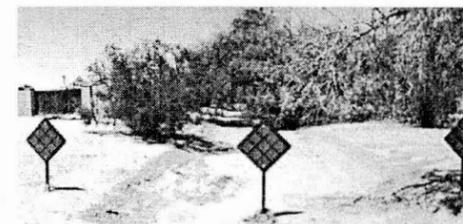
Location Map



Section North of Cortez Street



Conceptual Sketch North of Cortez Street



Existing Conditions North of Cortez Street

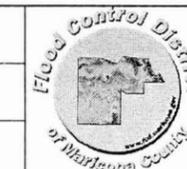
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| DESIGN | BNS |
| DRAWN | LRJ |
| CHECKED | GSB |



SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

**71ST STREET CHANNEL
LANDSCAPE DESIGN THEME**

NOVEMBER, 2002

| | |
|----------------|----|
| DRAWING NUMBER | L2 |
| SHEET NUMBER | 30 |

Scottsdale Road Channel Landscape Design Theme

Landscape Design Theme: to create a comfortable suburban pedestrian environment with a meandering path and appropriately scaled indigenous plant material that is visually and physically separated from Scottsdale Road.

Channel Criteria:

1. Configuration

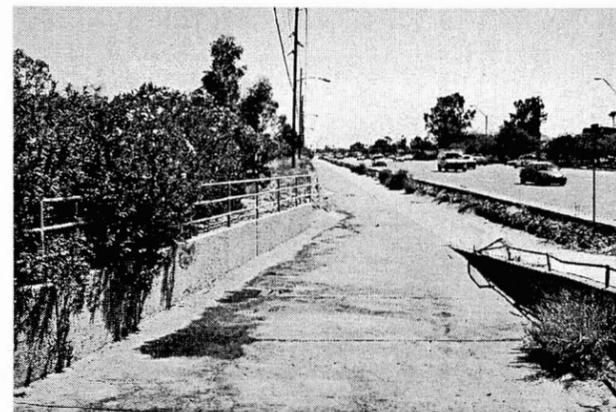
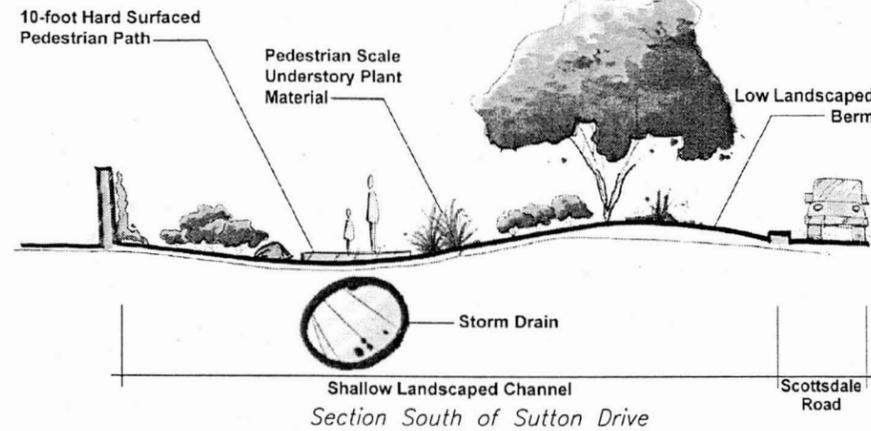
- Create an overall channel form that is more organic and less geometric.
- Meander channel alignment in an irregular pattern.
- Vary channel sides slope ratios asymmetrically from 4:1 to 8:1 along the length of the channel.
- Low landscaped berm adjacent to street.
- Round channel banks at the top.
- Pathway should be placed at least 15 feet from edge of roadway curb.

2. Vegetation

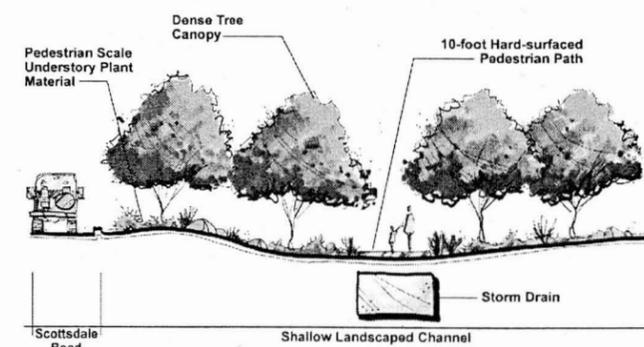
- Select plant material from the plant list in the City of Scottsdale's Suburban Character Area plant palette.
- Prune trees to allow for pedestrians to pass underneath their canopies. Use trees as accents in order to not block panoramic views of surrounding mountains. Use no more than three different species of tree along any one street venue. Select specific 'street tree(s)' that fits with the adjacent landscape in terms of form, color, and texture for each street.
- Place shrubs, ground covers, rocks, and boulders in an irregular pattern along the sides and top of the banks.
- Install irrigation system to maintain and establish plant material.
- Select plant material to provide seasonal color and interest in either form or texture. Avoid using plant material with notable thorns or those plants considered hazardous to pedestrians.

3. Materials

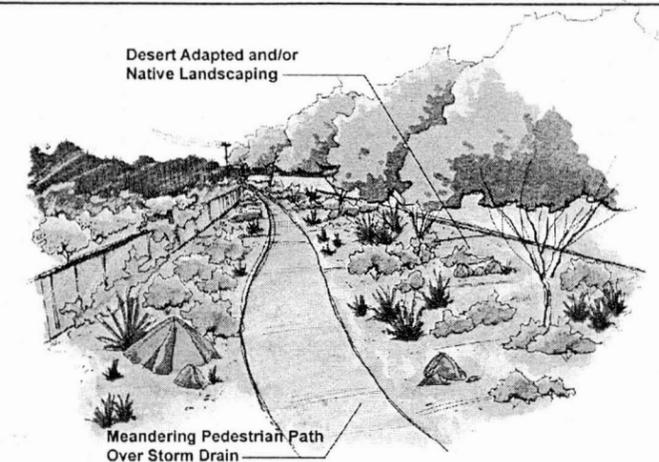
- Use a hard-surfaced material for the pedestrian path with texture surface, integral color, or other visual interesting treatment of the path surface.
- Railings and poles should use a consistent desert sensitive color palette.



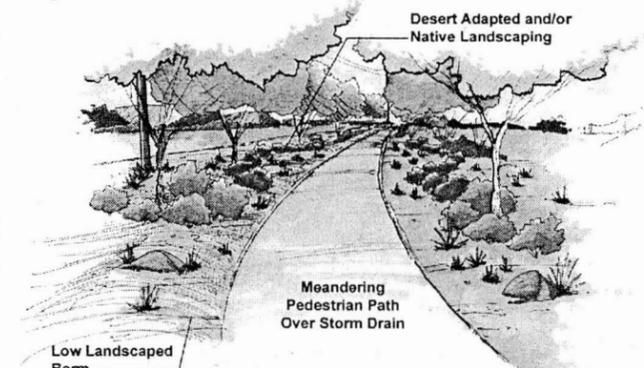
Existing Conditions South of Sutton Drive



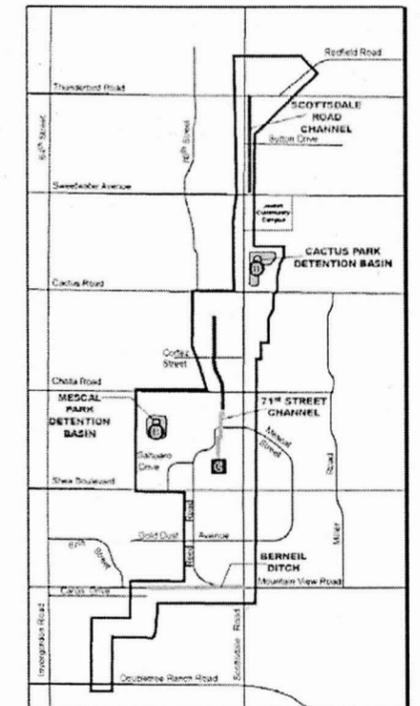
Section North of Sutton Drive



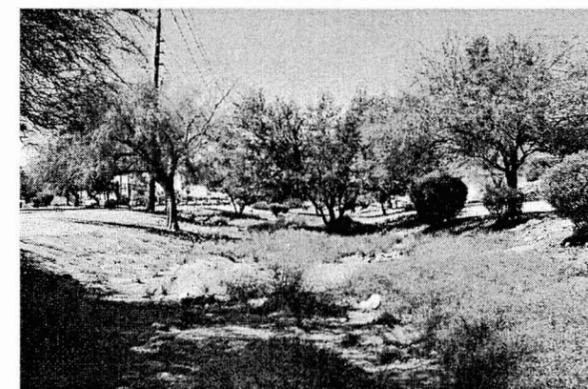
Conceptual Sketch South of Sutton Drive



Conceptual Sketch North of Sutton Drive



Location Map



Existing Conditions North of Sutton Drive

NOVEMBER, 2002

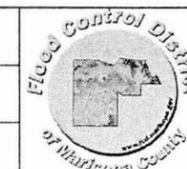
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SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

SCOTTSDALE ROAD CHANNEL
LANDSCAPE DESIGN THEME

DRAWING NUMBER
L3
SHEET NUMBER
31

Detention Basin Landscape Design Theme

Landscape Design Theme: to minimize any disturbance to the turfed open space and perimeter trees and maintain the character and use of the public park.

Applicable to: Cactus and Mescal Parks

Basin Criteria:

1. Configuration

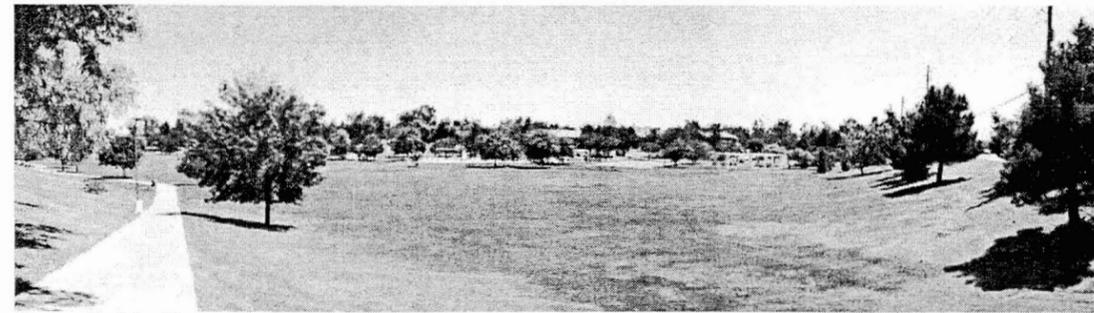
- Enhance an overall basin form that is more informal in character rather than rectangular and uniform.
- Vary sides slope ratios asymmetrically throughout the basin.
- Round top of basin side slopes.
- Maintain a separation of pedestrian and equestrian paths.

2. Vegetation

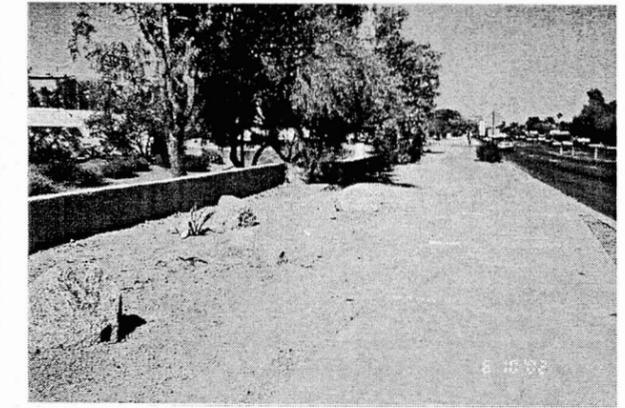
- Plant new trees in a pattern to mimic the form, line, and density of trees associated with the existing basin.
- Protect-in-place existing trees.
- Turf basin slopes to match existing conditions at Mescal Park.

3. Structural Components

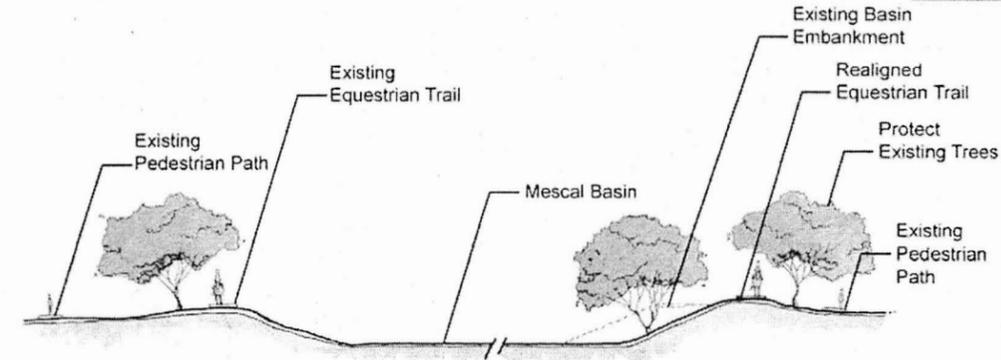
- Use materials, shapes, and colors to blend in with the surroundings for the spillways and outlets. Paint structural features in keeping with character of the basin.
- New emergency spillway at Mescal Park will be covered with grass to maintain the character of the park. Exposed concrete surfaces should be textured or stained.



Cactus Park looking south



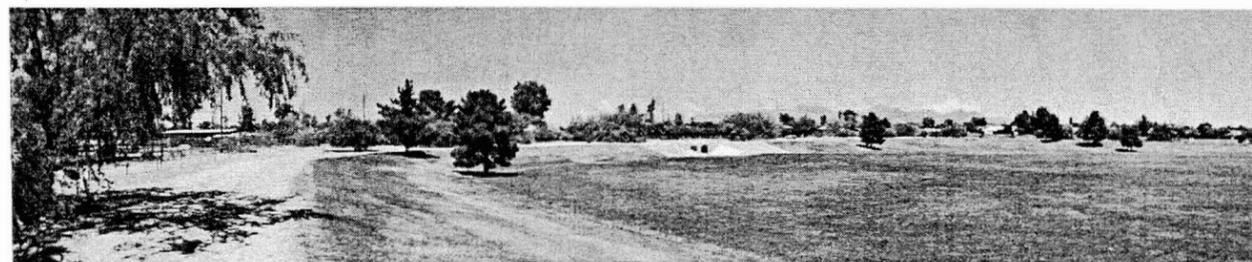
Cactus Park along Cactus Road



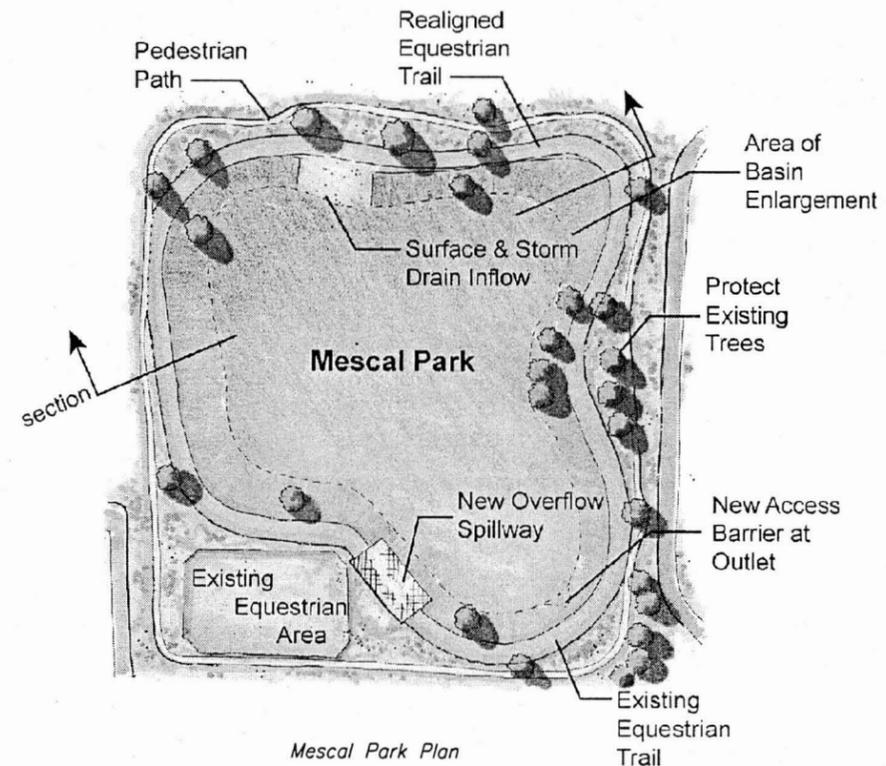
Section of Mescal Park



Mescal Park Outlet Structure looking south



Mescal Park and Inlet Structure looking north



Mescal Park Plan

NOVEMBER, 2002

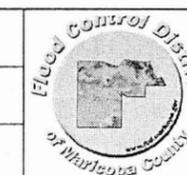
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SCOTTSDALE ROAD CORRIDOR
DRAINAGE MASTER PLAN

DETENTION BASINS
LANDSCAPE DESIGN THEME

DRAWING
NUMBER

L4

SHEET
NUMBER

32