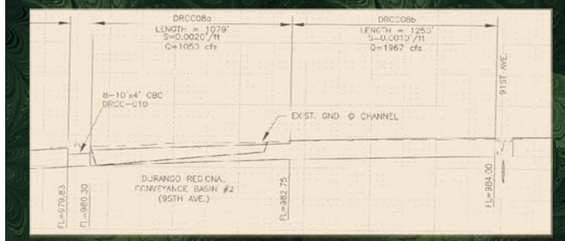
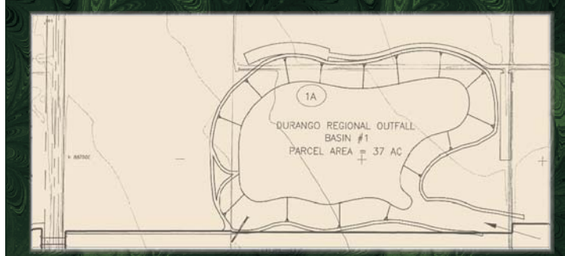
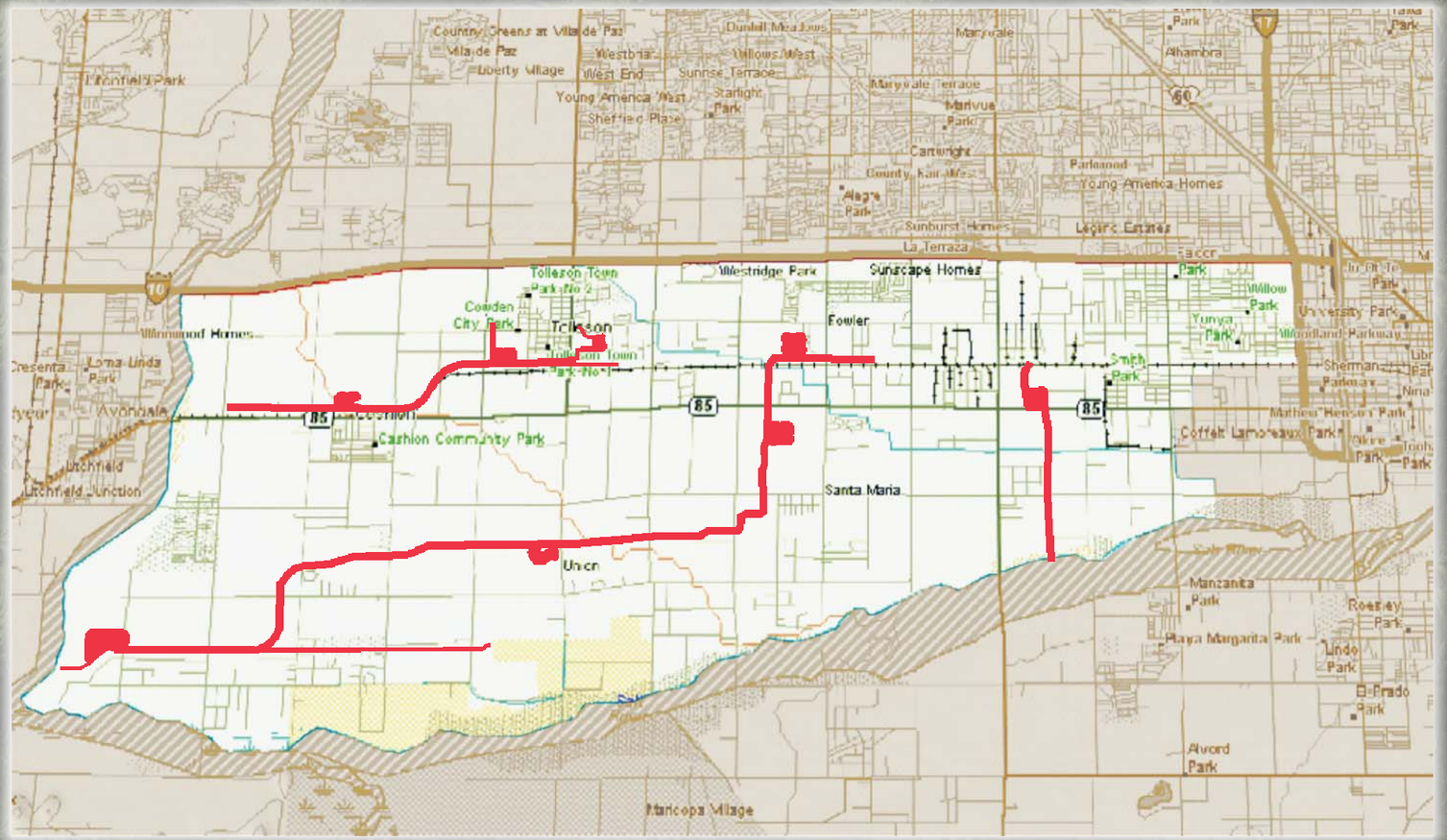




Durango Area Drainage Master Plan
Recommended Design Report
FCD #99-41

Prepared for:

Flood Control District of Maricopa County



Prepared by:

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

In Cooperation With:

McCloskey • Peltz, Inc.
LANDSCAPE ARCHITECTS

SWCA Inc. Environmental Consultants

October, 2002

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October 2002

DURANGO AREA DRAINAGE MASTER PLAN
RECOMMENDED DESIGN REPORT

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D. Northeast Area Alternatives Analysis
E. Tres Rios Interior Drainage Study
F. Public Involvement Documentation
G. Retention Basin Aesthetics and Multi-Use Evaluation
H. 75th Avenue Preliminary Storm Drain Study
I. Summary of Utility Pothole Results

ABBREVIATIONS

ADA - Americans with Disabilities Act
ADMP - Area Drainage Master Plan
APS - Arizona Public Service
BFC - Buckeye Feeder Canal
BID - Buckeye Irrigation District
cfs - cubic feet per second
CIP - Capital Improvement Program
DDMSW - Drainage Design Management System for Windows
DOE - Department of Energy
FCDMC - Flood Control District of Maricopa County
FEMA - Federal Emergency Management Agency
FIRM - Flood Insurance Rate Map
IGA - Inter-Governmental Agreement
MAG - Maricopa Association of Governments
MCDOT - Maricopa County Department of Transportation
NAMU - Natural Appearing Multi-Use
NPDES - National Pollutant Discharge Elimination System
RID - Roosevelt Irrigation District
RRS - Roads of Regional Significance
SRP - Salt River Project
UPRR - Union Pacific Railroad

I. INTRODUCTION

A. Objective

This Recommended Design Report has been prepared for the Flood Control District of Maricopa County (FCDMC) as part of the Durango Area Drainage Master Plan (ADMP). The study area location is shown on **Figure I-1**. The purpose of the project is to quantify the extent of flooding problems and develop alternative solutions to identified flooding problems. The ADMP process evaluates the drainage area, identifies structural and non-structural alternatives, and develops a preferred solution. The ADMP identifies preliminary costs, alignments, typical sections, right-of-way requirements, utility conflicts, environmental issues, landscape design concepts, and potential project participants for the preferred alternative. The recommended plan of the ADMP addresses mitigation of flooding along the Buckeye Feeder Canal (BFC), the Roosevelt Irrigation District (RID) Canal, and the Union Pacific Railroad (UPRR). This project includes the delineation of the 100-year floodplain for the BFC associated tributaries, from the Agua Fria River eastward to approximately 105th Avenue and an extension of the Tolleson floodplain delineation along the UPRR extending from 69th Avenue to 35th Avenue. The new floodplain delineations are documented in the *Durango ADMP Floodplain Delineation, Final Report and Technical Data Notebook*.

B. Study Area Location

The study area is within Maricopa County and includes portions of the City of Phoenix, the City of Tolleson, the City of Avondale, and unincorporated Maricopa County. The jurisdictional boundaries are depicted on **Figure I-2**. The study area encompasses approximately 53 square miles bounded by the Interstate 10 freeway on the north, the Salt and Gila Rivers on the south, the Agua Fria River on the west, and the Interstate 17 freeway on the east. The study area has been divided into three geographic areas.

The ***Northern Study Area*** extends the full width of the study area from the Agua Fria River eastward to I-17 and from I-10 southward to the UPRR at approximately Buckeye Road. The ***Southwest Study Area*** extends from the Agua Fria River eastward to approximately 83rd Avenue and from the UPRR southward to the Gila River. The ***Southeast Study Area*** extends from approximately 83rd Avenue eastward to I-17 and from the UPRR southward to the Salt River.

C. Existing Reports

The Durango area has been previously studied in other master plans and studies. These plans and studies are discussed in the *Durango ADMP Alternatives Analysis Report*, dated March 2001. Improvements identified in this report are based on preliminary information contained in the *Alternatives Analysis Report*, and the *Durango ADMP Data Collection Report*, dated March 2000. The reader is referred to the *Alternatives Analysis Report* for additional background information on the alternatives considered and the selection process.

D. Project Coordination

A Review Committee was established by the FCDMC to provide coordination and input throughout the project. The Review Committee consisted of representatives of the agencies that will be impacted by the project and have an interest in its outcome. The Review Committee met for the following meetings:

1. Project kick-off meeting.
2. Brainstorming meeting to identify drainage problems and alternative solutions.
3. Potential Alternatives meeting to confirm the drainage alternatives identified by the consultant to be developed in detail for the alternatives evaluation.
4. Preferred alternative meeting to evaluate the alternatives and select a preferred alternative for further design development.
5. Project Prioritization Meeting to determine the appropriate priority of each project throughout the study area.

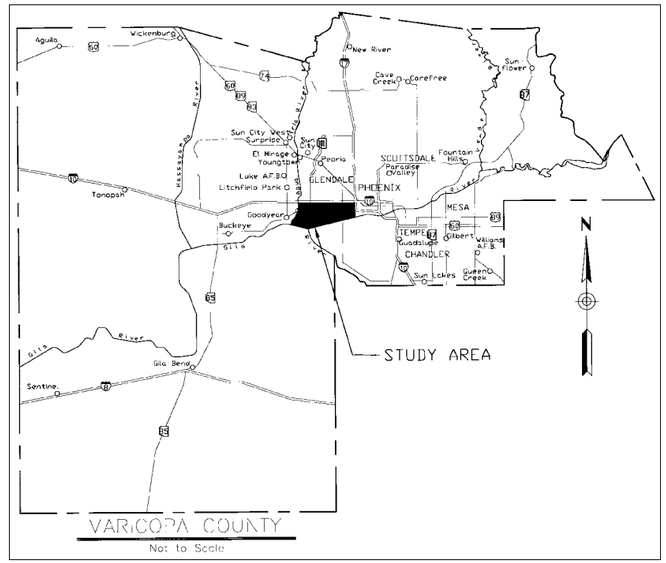


Figure I-1. - Study Area Location

The Review Committee consisted of the following members:

REVIEW COMMITTEE

Agency	Representative
City of Avondale	Mr. Jim Mitchell
Flood Control District of Maricopa County	Multiple Members
Maricopa County Dept of Parks & Recreation	Mr. Dave Konopka
Maricopa County Dept of Planning & Dev.	Mr. Neil Urban / Mr. Matthew Holmes
Maricopa County Dept of Transportation	Mr. Mike Smith
City of Phoenix	Mr. Hasan Mushtaq / Mr. Raimundo Dovalina / Ms. Chris Hood
Roosevelt Irrigation District	Mr. Stan Ashby
Salt River Project	Mr. Steven Tanis / Mr. Bill Phillips
City of Tolleson	Mr. Woody Scoutten / Mr. Manuel Dominguez
U.S. Army Corps of Engineers	Mr. Mike Ternak / Mr. John Drake
Buckeye Irrigation District	Mr. Jackie Meck

Dysart Rd
El Mirage Rd
115th Ave
107th Ave
99th Ave
91st Ave
83rd Ave
75th Ave
67th Ave
59 Ave
51st Ave
43rd Ave
35th Ave
27th Ave
I-17 Freeway

Papago Diversion Channel
I-10 Freeway

NORTH STUDY AREA
Van Buren St
Existing Agua Fria Levee
UPRR
RID Canal
NORTH STUDY AREA
UPRR
POWER STATION
Buckeye Rd
RID Canal
TOLLESON WWTP
SOUTHWEST STUDY AREA
SOUTHEAST STUDY AREA
Lower Buckeye Rd
POWER SUB-STATION
Agua Fria River
Feeder Canal
Buckeye Feeder Canal
Broadway Rd
AVONDALE WWTP
91ST AVENUE WWTP
Southern Ave
Salt River
Gila River

Proposed Tres Rios Levee
Existing Holly Acres Levee (113th Ave to El Mirage Rd)
Proposed Tres Rios Levee

LEGEND
- Phoenix
- Maricopa County
- Tolleson
- Avondale
- Avondale Annexation Limits
- Phoenix Annexation Limits
- Tolleson Annexation Limits
- Geographic Areas

N

2500 0 2500 5000 7500
SCALE IN FEET

FIGURE 1-2

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
STUDY AREA MAP
07/24/02

E. Public Involvement

1. Public Meetings

In addition to the Review Committee, public input was solicited at five sets of public open house meetings held in the project study area. Each set of public open house meetings was held at two locations within the study area, one in Phoenix for residents in the eastern portion of the study area, and the other in Avondale for residents in the western portion of the study area. The first set of public open house meetings was held early in the project to allow public input to be incorporated into the entire planning process and to present the proposed alternatives of the ADMP. The second set of public open house meetings was held just after the selection of the preferred alternative to allow opportunity for comment on the selected alternative. A third set of public open house meetings was held to show the preliminary results of the floodplain delineations from the study. A fourth set of public open house meetings was held after a draft of this Recommended Design Report was completed to give the public the opportunity to see the preliminary results of the study. A fifth public open house meeting was held at the completion of the project to present the overall recommended plan to the public.

The public was notified of the open house meetings via newspaper advertisements, flyers in the City of Tolleson water bills, direct notification to developers and the City of Phoenix Estrella Planning Committee, and direct mailings to property owners along the alignments of the preferred alternative and within floodplain areas. Copies of the public meeting invitation brochures and community questionnaires can be found in **Appendix F**.

2. Estrella Village Planning Committee

Input from the City of Phoenix Estrella Village Planning Committee was instrumental in developing the Recommended Plan. Representatives from the Committee were invited to participate in all of the project meetings and actively express ideas for the project based on the City of Phoenix General Plan. As a result, many of the project facilities are located on sites that can become amenities to the community. Additionally, two presentations were made to the Estrella Village Planning Committee on May 2nd and September 5th of 2000 to provide an overview of the project and to inform the committee of the progress of the plan.

F. Deliverables

The project consisted of five phases resulting in an implementation plan with estimated costs for a recommended plan to address the drainage issues within the study area. The five project phases are summarized as follows:

	Phase	Products
1.	Data Collection	Data Collection Report Survey & Mapping
2.	Level I Analysis	Potential Alternatives Submittal
3.	Level II Analysis	Alternatives Analysis Report
4.	Level III Analysis	Preliminary Recommended Design Report Preliminary Design Plans
5.	Implementation	Final Submittal Recommended Design Report w/ Maintenance Plan

Public Meeting, September 20, 2001

This Recommended Design Report is the final deliverable for the Level III analysis documenting the preliminary design and engineering of the recommended plan as well as development of landscape themes and multiple use opportunities to be incorporated into the plan.

G. Acknowledgments

The completion of this report was made possible by many individuals whose assistance and cooperation are gratefully acknowledged. We especially wish to thank the staff of the FCDMC, all of the members of the Review Committee, and the participation of concerned citizens of this area.

H. Consultant Project Team

Dibble and Associates is the prime consultant on the project. The following individuals from Dibble and Associates are responsible for completion of this project: Mr. Richard Perry, P.E., Principal in Charge, Mr. Brian Fry, P.E., Project Manager, Mr. Jason Mikkelsen, P.E., Mr. Dan Frank, P.E., Mr. Joshua Papworth, P.E., and Mr. Ezra Page, EIT, Project Engineers.

Dibble and Associates was assisted by McCloskey-Peltz, Inc. (MPI) for landscape analysis and by SWCA, Inc. Environmental Consultants for environmental analysis. Individuals from MPI who have contributed to the project include: Ms. Diane McCloskey, RLA, Principal. Individuals from SWCA who have contributed to the project include: Mr. Ken Houser, Project Manager, Ms. Melissa Keane, and Mr. Mike List.

II. HYDROLOGY

A. Introduction

The hydrology for this study was developed based on existing conditions hydrology from the *Floodplain Delineation of the Tolleson Area* (Project FCD 95-26). The hydrology was updated as part of this project to reflect changes in land-use and routing which have occurred since the original study. The reader is encouraged to review the full ***Durango Area Drainage Master Plan Hydrology Report***, dated June 2001, for additional details not presented here.

The updated existing conditions hydrology was then revised to model the improvements of the recommended plan reflecting routing changes due to the proposed channels, storm drains, and detention basins.

B. Methodology

The U.S. Army Corps of Engineers, *HEC-1 Flood Hydrograph Package* (HEC-1) computer program was used for the development of this model. Guidance is given in the *Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology* (Hydrology Manual) for application of the HEC-1 program within Maricopa County. Additionally, the computer program *Drainage Design Management System for Windows* (DDMSW), developed by the District, was used to modify drainage sub-basin and routing parameters which changed due to the proposed improvements. The revised drainage sub-basin boundaries and routing are shown on **Figure II-1**.

C. Hydrologic Criteria

The preliminary design hydrology is based on providing 100-year flood protection under existing watershed conditions. Both the 6-hr and the 24-hr storms were evaluated for the 100-year event. The higher of the 6-hr and 24-hr peak discharges was used as the design discharge in each reach. Retention and detention basins for the recommended plan were sized based on the 24-hr storm event. A table summarizing the 6-hr and 24-hr peak discharge comparison is contained in **Appendix A**.

D. Drainage Area Characteristics

Three features that play a significant role in defining the drainage patterns in the watershed are the RID Main Canal, the UPRR and the BFC. The RID Canal and the UPRR are elevated through the watershed. Roadways that cross these features typically rise to meet the elevated grades and proceed over the top. This causes water to form ponding "cells" behind these features. Runoff will continue to pond until it either overtops the railroad/canal, or until it overtops the sag portion of the crossing roadways. Overtopping flows are then directed westerly along the railroad or canal, or are directed southerly over the railroad or canal, or a combination of the two. Flooding of this type occurred along the RID Canal and UPRR in a documented 1966 flood in the City of Tolleson, around 91st Avenue and Van Buren Street. Photos of this event are presented in the ***Durango ADMP Alternatives Analysis Report***, dated March 2001.

The BFC is the dominant drainage feature in the southwest portion of the watershed. The BFC is an SRP owned and operated irrigation tailwater ditch. The BFC was not designed to convey storm water. However, the BFC is located at the low point in the terrain and receives runoff during storm events. During storm events that exceed the channel capacity, runoff spreads beyond the limits of the canal and flows in an overland flow fashion causing shallow flooding of the adjacent agricultural fields. Flooding of homes and businesses has been reported along the BFC in the vicinity of 115th Avenue.

Other features that define the flow pattern are roads and local irrigation ditches. Low flows accumulate along roadways and ditches, converging at road intersections at the northeast corner of each road intersection. Higher flows accumulating along roadways and ditches may overtop the roadway or ditch and proceed in the direction of the predominant land slope.

E. Build-Out Conditions Hydrology

Hydrology for the area was updated for fully developed watershed conditions at build-out using a combination of aerial photography and Maricopa Association of Governments (MAG) land use projections. The MAG projections are used exclusively except where aerial photographs show that existing development has already occurred that is contradictory to the MAG projections. The build-out conditions land use is shown on **Figure II-2**. The build-out conditions modifications were limited to changes in land use on a sub-basin basis. Hydrograph routing changes were only made for ADMP proposed elements. The impact of a developer constructing a channel through their site to convey off-site runoff through the development is not modeled. Overland routing in areas with no ADMP channel is unchanged from the existing conditions.

The build-out conditions hydrology is further refined to account for future on-site retention. This is accomplished by applying the FCDMC's retention requirement according to how the sub-basin is projected to develop with respect to the amount of developable land. The effective retention volume is considered to be 80% of the required volume to account for inefficiencies in the system. The results of these calculations along with a table summarizing the 6-hr and 24-hr build-out peak discharges are found in **Appendix B**. Retention is modeled in HEC-1 as a divert that is limited to the effective retention volume and is not returned.

In general, there was no distinct conclusion about how the build-out conditions affected the peak flows. The Peak flows both increased and decreased in different areas of high future development. The overall cost difference is negligible for the whole plan, however individual projects may derive cost savings from designing for build-out conditions.

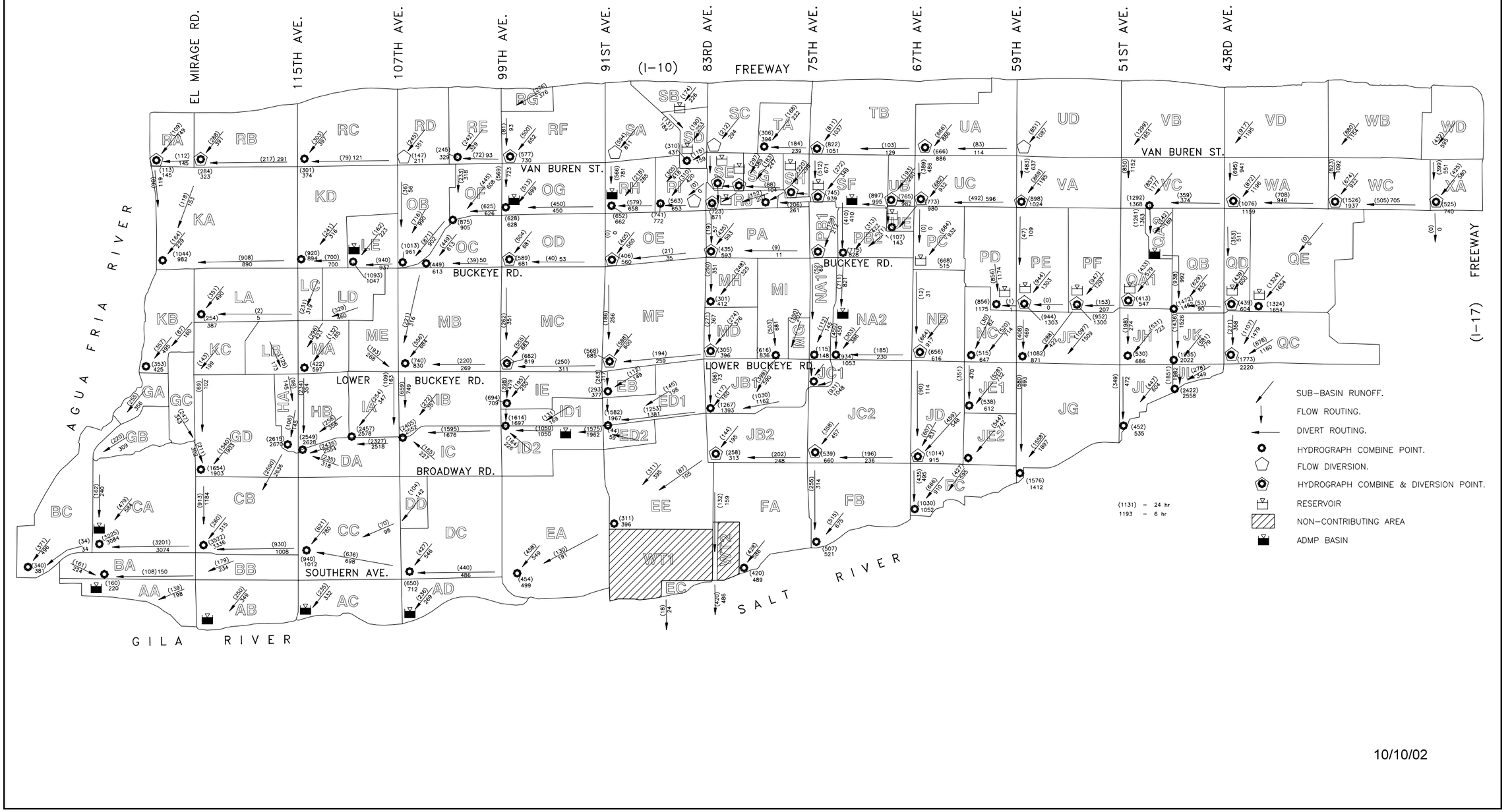


Figure II-1. - Improved Conditions Drainage Sub-Area Boundaries

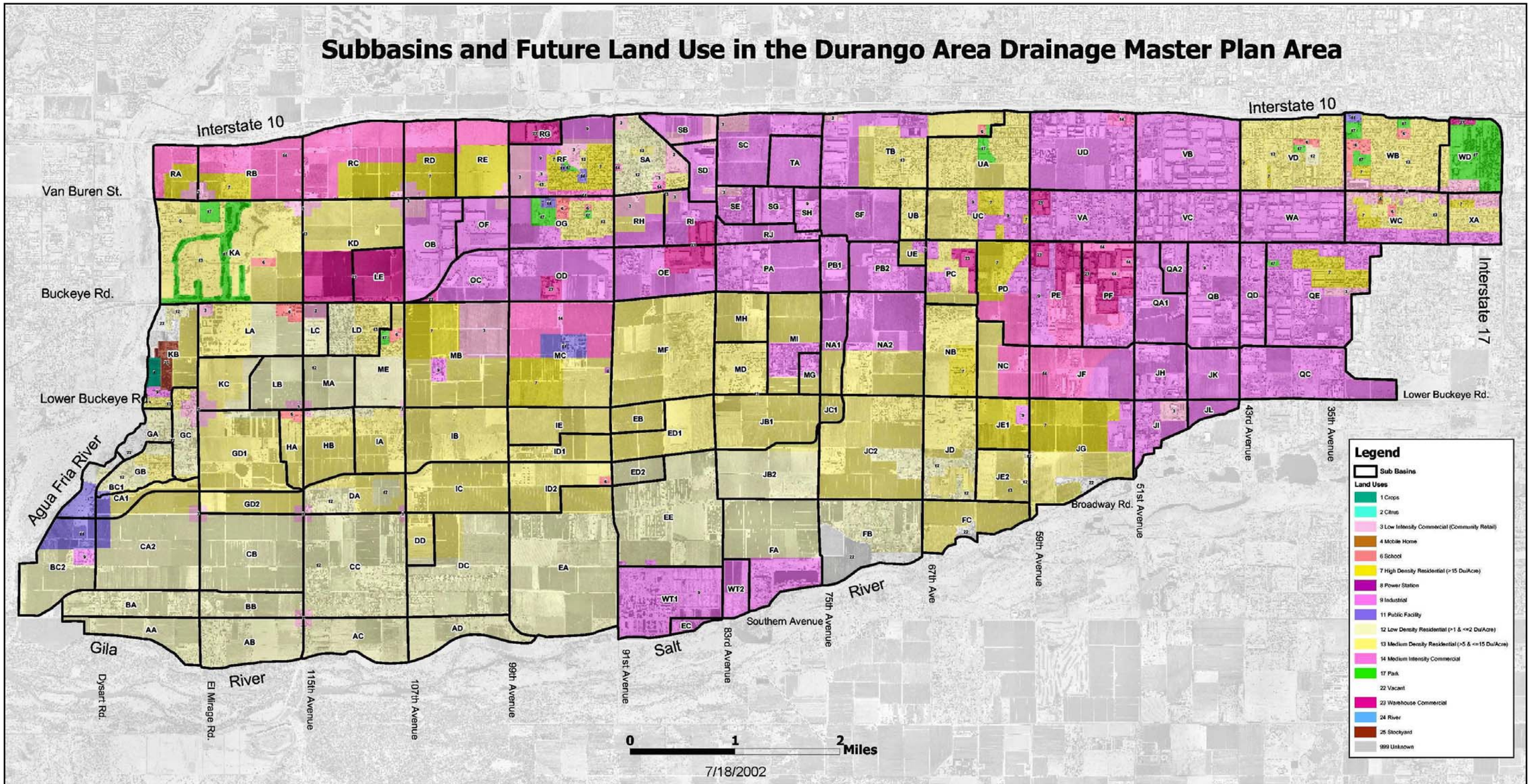


Figure II-2. - Build-Out Conditions Land Use

III. DESIGN CRITERIA & OBJECTIVES

A. Introduction

This section describes the criteria for open channel, box culvert, and detention basin design and the computational procedures used for preliminary design and recommended for final design.

B. Design Criteria

Drainage design for hydraulic structures in Maricopa County is governed by criteria presented in *Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics*, January 28, 1996 (Hydraulics Manual.) In addition to the criteria from the Hydraulics Manual, additional criteria are adopted for preliminary design. The criteria listed below are used as a guideline during design development and are intended to be followed during final design development.

1. Open Channels

Channel Section - The maximum side slope is 2:1 for concrete channels and 4:1 for earth channels. The design side slope for earth channels is 6:1 where sufficient right of way is available. A minimum bottom width of 4 feet is required. The design channel lining depth is the normal flow depth plus freeboard. Required freeboard is 0.25 times the sum of depth plus velocity head with a minimum of 1 foot for sub-critical flow and 2 feet for super-critical flow conditions.

Manning's n - The following Manning's n values are used in development of the channel design: n=0.014 for concrete, n=0.030 for earth, n=0.040 for landscaped earth, n=0.040 for grass, and n=0.040 for riprap.

Froude Number - Froude numbers for channel design are to be less than or equal to 0.86 for sub-critical flow. In most cases channels are designed for sub-critical flow. Drop structures are provided, if necessary, to flatten the grade to achieve sub-critical flow conditions. Although no super-critical reaches are anticipated, super-critical flow may be allowed in special circumstances, such as where right-of-way is limited. Super-critical flow channels, if used, are to have Froude numbers greater than 1.13 and less than 2.0.

Longitudinal Slope - Extremely flat slopes are avoided for constructability reasons. Specific slope criteria are not provided because slopes will generally be dictated by the Froude number or velocity criteria. Slopes are set to approximate the existing ground slope within the limitations of the channel material maximum allowable velocity and the limitation on Froude number.

Drop Structures and Channel Profile - When the natural ground slope is steeper than the maximum allowable longitudinal channel slope, drop structures are provided. The size and spacing of drop structures are established based on a minimum drop height of 3 feet, and a maximum drop height of 6 feet. Additionally, the top of channels should project no more than 2 feet above adjacent existing ground (fill situations) and the top of channels should be incised no more than 3 feet below adjacent existing ground (cut situations).

Channel Alignment - Horizontal curves are designed with a minimum radius equal to 3 times the flow topwidth.

River Outfalls - The downstream water surface at channel outfalls into the Salt, Gila, and Agua Fria Rivers is assumed to be low enough to not create a backwater effect that would reduce the outfall channel capacity. It is recognized that the outfall channels may not have 100-year capacity during a coincident 100-year flow event in the rivers. However, the outfall channels should have 100-year capacity with a coincident 10-year water surface in the rivers. In cases where the 10-year water surface elevation in the river is higher than the water surface at the outfall of the channel, additional freeboard is added to the channel upstream of the outfall, to compensate for the backwater effect from the river and allow positive drainage of the channel.

Side Drainage - Surface runoff entering the channel from the side should be directed to enter the channel at planned locations with side spillways. This will prevent rill erosion for earth channels and undermining at the concrete-soil interface for concrete channels.

Auxiliary Drainage Facilities - Where the top of channel projects above the adjacent existing ground (fill situations), a parallel channel or swale should be used to convey runoff to a planned channel inflow point. Additional right of way may be required in these areas. The parallel auxiliary drainage channel should generally be a v-shaped swale.

Maintenance Access Road - The channel cross-section allows for a 16-foot wide maintenance road on each side of the channel. Where the channel is adjacent to a public street, or an existing canal maintenance road, the street or existing road serves as one of the maintenance roads. New maintenance roads should have a 2% cross slope, away from the main channel. At specified locations, the maintenance road should be dipped to allow side drainage to enter the main channel. A stabilized decomposed granite surface is required on the maintenance road.

Some areas with existing development adjacent to an unimproved channel do not have adequate right of way to allow maintenance roads. The District should be involved in decisions to provide either dry weather access only, along the channel bottom, or to obtain additional right of way for all weather access roads.

Fence - Due to the multiple use objective in the channel design new fencing is not provided along the channel. Existing private fences along the alignment are suggested to be protected in place during construction or replaced in kind.

Concrete Lining - For planning purposes, concrete channel lining includes 6-inch thick concrete lining with reinforcing steel using #4 bars at 12 inch center spacing each way. The final concrete channel section design should be based on recommendations from a future geotechnical investigation.

2. Box Culverts

Height & Cover Requirements - A minimum height of 4 feet shall be provided for maintenance purposes. A minimum of 1 foot of cover is planned for a full roadway structural section. If one foot of cover cannot be provided, traffic should drive directly on the box culvert top slab. Approach slabs shall be included for box culverts with no cover.

Design Flow - Culverts constructed with channels shall be designed for the same 100-year design discharge as used for the channel. Inlet control is desired for the culverts.

3. Detention Basins

Side Slopes - Side slopes of 6:1 are normally used for the inside basin side slopes. Maximum inside side slopes of 4:1 can be used when required to achieve the required volume within the available site. Fill embankments are avoided for detention basins except to provide freeboard. Side slopes on fill embankments outside the basin are limited to a maximum of 3:1, with 4:1 or flatter desired if site constraints permit.

Basin Longitudinal Slope - Minimum slopes of 0.5% are used for grass or earth low-flow channels or swales within the basin. A minimum slope of 0.2% and a maximum slope of 0.5% is used for concrete low-flow channels within the basin.

Basin Cross Slope - A 1% minimum cross slope is used for sheet flow runoff surfaces. Surfaces are graded to drain toward the low-flow channel or outlet pipe.

Maintenance Road - A 16-foot wide maintenance access road is provided around the top of the basin. To minimize rill erosion, maintenance roads should have a 2% cross slope away from the top of basin. At specified locations, the maintenance road should be dipped, or other provision made, for side drainage to enter the basin. The maintenance road will include a stabilized decomposed granite surface. Provision should be made in final design for maintenance access to the basin floor by providing one or more access ramps.

Principal Outlet Pipe - Principal outlet pipes consist of a concrete pipe or box culvert, designed to operate under inlet or pipe control. The minimum allowable outlet pipe size is 24-inches. The outlet pipe invert is typically set 12 inches below the basin floor to facilitate complete draining of the basin and to prevent soggy areas near the outlet. For planning purposes, the outlet pipes are modeled in HEC-1 as orifices with an orifice coefficient of 0.62. A more detailed analysis of the outlet is recommended for the final design.

Emergency Spillway - The basins are proposed to be constructed in excavation conditions only, thus emergency spillways are not required. However, a planned overflow location shall be designed to direct overtopping flows to a suitable outfall location.

Freeboard - No freeboard is required, due to the basins being constructed in excavation conditions only. However, additional capacity is recommended to be provided during final design to account for volume lost to sedimentation, landscaping, or some other purpose, based on the specific site conditions at the time of final design.

Safety Features - All inflow and outflow pipes will be equipped with access barrier grates. The grates shall have adequate open area to limit design flow velocities through the grate to 3 feet per second (ft/s) or less with a plugging factor of 50% applied to the clear opening area. A maximum clear opening of 4 inches is allowed between grate bars.

Off Line Storage basins - Off line detention basin concepts are utilized in this master plan. Planning level estimates are provided for the inflow weir length based on an average depth of flow of 1 ft over the weir. More detailed analysis will be required for the final design to ensure proper functioning of side weirs.

C. Design Calculations

New open channels, box culverts, and detention basins are sized based on projected peak runoff rates under existing development conditions. The existing conditions hydrology model is updated to reflect the design channel cross sections and slopes and the detention basin stage-storage-discharge relationships and then rerun. The resulting updated flows are used to update the design calculations. Through this process the hydrologic routing effects of the proposed improvements are included in the design discharges. The design calculations for each project element are presented on the facing page of each preliminary plan sheet in the back of this report.

1. Open Channels

Open channels are sized using Manning's equation. The maximum allowable longitudinal slope is determined based on the Froude number criteria and the maximum allowable velocity for the channel material. The design slope is then fit into the profile using the preliminary plan and profile sheets. The freeboard requirement is computed from the hydraulic parameters and added to the normal flow depth to determine the channel lining depth and top width. The required right-of-way width for each channel is computed by adding the required channel top width, increased by ten percent to allow for a buffer area, plus 32 feet to allow for 16 foot maintenance roads on both sides of the channel.

Earth Channel Stability - The recommended channels are planned as grass and "decomposed granite" lined channels. The preliminary design calculations contained in this report are based on these linings being in-place. As a result, the linings should not be considered as simply landscape enhancements, but as an integral part of the channel design. The channel slopes and cross-sections presented in these plans and the resulting velocities in unlined, unlandscaped channels, may not be stable for the in-place soils present within the study area without protection.

During final design, the Manning's n values should be reviewed for the actual proposed lining and a tractive shear approach should be used to develop the final design channel cross-section and slope. For grass to be considered as a reliable channel lining, permanent irrigation must be provided. For "decomposed granite" channels, a fractured rock should be considered instead of the smaller, conglomerate granites typically used in landscape applications.

The channel design calculations are tabulated on the facing page of each channel plan and profile sheet in the *Preliminary Design Plans* section of this report. The headings in the "Channel Properties" portion of the facing page calculations are defined as follows:

Col No.	Heading	Description
1	I.D.	Reach identifier from plans.
2	HEC-1 I.D.	Identifier from HEC-1 output.
3	Design Q100	Design discharge from HEC-1 output corresponding to HEC-1 I.D.
4	Comp. Capacity	Computed channel capacity from parameters in table (should match Design Q100)
5	DS Invert El.	Invert El. at downstream end of reach.
6	US Invert El.	Invert El. at upstream end of reach.
7	Length	Length of channel reach.
8	Comp. Invert Slope	Natural ground slope.
9	Design Invert Slope	Design channel invert slope.
10	Total Vert. Drop	Vertical drop from difference in natural
11	No. Of Drops	and design invert slopes.
12	Vertical Drop	Number of drop structures in reach
13	Material Type	Height of each drop structure
14	Manning's n	Channel lining material code
15	Bottom Width	N-value for lining material
16	Depth of Flow	Channel design bottom width
17	SS Left	Design normal depth of flow
18	SS Right	Channel side-slope left
19	Area	Channel side-slope right
20	Perimeter	Flow cross-sectional area
21	Froude No.	Wetted perimeter of flow
22	Type of Flow	Froude no based on hydraulic depth
		Flow regime; sub-critical, transition, or super-critical.
23	Velocity	Average channel flow velocity
24	Freeboard	Required freeboard
25	Design Depth	Channel flow depth plus freeboard.
26	Channel Topwidth	Topwidth at design depth.
27	Total ROW Width	Total Right-of-Way Width Required

2. Box Culverts

New culverts are sized using standard culvert design methodology considering inlet or outlet control as presented in Federal Highway Administration, Hydraulic Design Series No. 5, *Hydraulic Design of Highway Culverts*, September 1985. The calculations check for inlet control, pipe barrel (friction), or tail water control. The condition resulting in the highest computed headwater elevation controls.

The culvert design calculations are also tabulated on the facing page of each channel plan and profile sheet in the *Preliminary Design Plans* section of this report. The headings in the "Culvert Properties" portion of the facing page calculations are defined as follows:

Col No.	Heading	Description
1	I.D.	Reach identifier from plans.
2	HEC-1 I.D.	Identifier from HEC-1 output.
3	Design Q100	Design discharge from HEC-1 output corresponding to HEC-1 I.D.
4	Comp. Capacity	Computed culvert capacity from parameters in table (should match Design Q100)
5	Length	Length of culvert
6	Inlet Invert	Invert El. at culvert inlet.
7	Outlet Invert	Invert El. at culvert outlet.
8	Slope	Culvert barrel slope.
9	Mat/Barrel type	Culvert material code (C=concrete).
10	Manning's n	N-value for culvert material.
11	No. of barrels	Number of culvert barrels.
12	Culv. Dia./Height	Diameter of pipes or height of boxes.
13	Unit	Units for "12"; in. for pipes, ft. for boxes.
14	Width	Width for box culvert barrels.
15	Barrel Material	RCBC for box, RCP for pipes
16	Entrance	Wingwall, Headwall, or Project.
17	Tailwater depth	Tailwater depth of downstream channel.
18	Comp. headwater	U.S. ponding depth at culvert inlet.
19	Comp. HW/D	Ratio of headwater depth to culvert height.
20	Control	Flow control condition; IC, Pipe, TW

3. Detention Basins

Detention basins are sized by developing a preliminary grading plan that optimizes the volume available at each site based on the design constraints presented in Section B. "Design Criteria" and the physical constraints presented at each site. Twenty percent of the site is not used for the basin to allow for buffers and other uses. The site constraints include existing topography and land slope, existing development, outfall pipe elevation limits to "daylight," and inflow capture requirements.

Opportunities for an off-line basin concept are first explored. Off-line basins allow for a more effective use of the available basin volume by passing low flows by the basin without occupying any storage volume. This preserves more available storage volume for attenuating the flow peaks when they arrive at the basin. Opportunities for off-line basin concept development exist when the inflow can be channelized. When runoff to be captured in the basin presents itself in an overland flow condition or in many small channels, an off-line concept may not be feasible. In these cases a flow-through basin concept is utilized. Storage volume can be preserved for peak flows in flow-through basins by providing a low flow channel and by depressing the outlet. A depressed outlet allows a hydraulic head to build up on the outlet before a significant area within the basin is inundated. The low flow channel conveys low flows to the depressed outlet without ponding.

Following development of the optimum grading plan for the site and determining off-line or flow-through concept, the basin inlet and outlet structures are sized to accommodate the design inflow hydrograph. In an off-line basin, a flow-by discharge is selected that allows the basin to be fully utilized with the runoff diverted into the basin. The total diverted flow is retained in the basin and drained through a small outlet pipe following the storm. In a flow-through basin, the outlet pipe size is adjusted until the available basin volume is used.

The side spillway for an off-line basin is then sized for the flow in excess of the flow-by discharge. Side spillways are sized using the broad crested weir equation using the average flow depth over the side spillway. The grading plan is input into the surface modeling software to determine the stage-storage relationship. The stage-discharge relationship is determined by inputting the outlet pipe size and invert elevation. The HEC-1 model develops the stage-discharge relationship using the orifice equation.

IV. EXISTING UTILITIES & PLANNING CONSTRAINTS

A. Introduction

This section describes the existing utilities within the project limits and constraints that impacted the preliminary design.

B. Existing Utilities

Major existing and planned utilities within the study area are shown on **Figure IV-1**. Utility conflicts crossing each planned project are shown in profile on the *Preliminary Design Plans*. Utility providers with facilities within the study area are listed in **Table 1** with the name and phone number of the local representative contacted during the study.

1. Water, Sanitary Sewer, and Reclaimed Water

The **Cities of Phoenix**, **Tolleson**, and **Avondale** provide *water* and *sanitary sewer* service within the study area. Sewer service is provided in cooperation with the Sub-Regional Operating Group (SROG)

The *water* distribution system within the **City of Phoenix** consists of water mains constructed on section line roads. Existing primary water distribution corridors include Van Buren Street, 35th Avenue, 51st Avenue, and 67th Avenue, which contain 16 to 48 inch lines. The water distribution systems within the city limits of **Avondale** and **Tolleson** are limited and somewhat fragmented due to the relatively small sizes of the Cities. Water lines within both Cities fall below 16 inches in diameter, with primary service corridors along 99th, 91st , and 83rd Avenues, and Buckeye Road.

Within the **City of Phoenix**, existing primary *sanitary sewer* corridors include 43rd, 47th, 51st, 59th, 67th, 75th, and 83rd Avenues, and Lower Buckeye Road, with lines ranging from 18 to 87 inches in diameter. Within the **City of Avondale** a single primary sanitary sewer corridor exists at El Mirage Road, with smaller lines branching out to developing areas. This 36" inch primary transmission line ties into the Avondale wastewater treatment plant at Dysart Road, 1/4 mile south of Broadway Road. The sanitary sewer service system within the **City of Tolleson** centers around the Tolleson Wastewater Treatment Plant, 1/4 mile south of Buckeye Road and 1/4 mile west of 91st Avenue. A primary sewer system corridor consisting of lines ranging in size from 24 inch to 60 inch extends north from this plant, crossing the UPRR, and then traveling along the north side of the railroad until reaching 99th Avenue, where it turns north and away from the study area.

The **Palo Verde Nuclear Generating Station** operates a 114 inch effluent line that passes through the study area. This line follows the mid-section line between Broadway Road and Southern Avenue, Beginning at the City of Phoenix 91st Avenue Waste Water Treatment Plant, and leaving the study area at the Agua Fria River.

2. Natural Gas

Natural gas service within the study area is provided by **El Paso Natural Gas Company** and **Southwest Gas Corporation**. A number of long distance transmission lines operated by **El Paso Natural Gas Company** exist within the study area. Corridors are Buckeye Road, 115th Avenue, and 47th Avenue.

3. Electric Power

Electric power service within the study area is provided by **Salt River Project** (SRP), **Arizona Public Service** (APS), and **The Department of Energy** (DOE). A number of high voltage overhead transmission corridors exist within the study area. An east-west 230 KV DOE overhead transmission corridor exists along the mid-section line between Lower Buckeye Road and Broadway Road. This line ties into a north-south corridor at 47th Avenue, where it turns south and crosses the Salt River. Also present within the 47th Avenue corridor is a 115 KV DOE line extending to the Power Station located at 47th Avenue and the UPRR. Two 230 KV SRP lines exist along an east-west corridor at Broadway Road. This corridor begins at the western limit of the study area and extends to a substation at 59th Avenue. A north-south 230 KV SRP overhead transmission corridor exists along El Mirage Road, ending at a substation at Broadway Road. An additional 500 KV SRP corridor exists at the mid-section line between Broadway Road and Southern Avenue, turning south and crossing the Salt River at 83rd Avenue. Finally, a 230 KV DOE line extends west from the power station at 47th Avenue and the UPRR to 83rd Avenue, where it turns north-west and away from the study area. A number of proposed high voltage overhead lines are planned within the study area as well. A 230 KV APS line is proposed for the east-west corridor at the mid-section line between Lower Buckeye Road and Broadway Road mentioned above. At it's west end, this line will turn north and extend out of the project area along the existing El Mirage road corridor mentioned above. At it's east end, this proposed line turns north at 47th Avenue, ending at the 47th Avenue power station. In addition to overhead electrical lines, underground electrical lines exist throughout the study area, with corridors following existing roadways along section lines.

4. Cable TV

Cable TV service is provided by **Cox Communications**. Cable TV lines are not shown on the *Preliminary Design Plans*. Standard Cable TV lines are not considered a critical utility conflict, however Cox Communications is in the process of upgrading to fiber optic lines, which will need to be identified at the time of final design.

5. Telephone

Telephone lines owned by **Qwest** (formerly U.S. West) are found within the study area. Additionally, long haul fiber optic lines provided by **Qwest, MCI Worldcom**, **Sprint**, and **AT&T** are known to be located within the study area. Major duct banks and fiber optic lines are considered critical utility conflicts.

The City of Phoenix has received multiple requests by several companies to install fiber optic cables over the last several years and is

continuing to receive such requests at a rapid rate. The requests and associated approvals have been generated at such a high rate that the City has not been able to keep accurate records of all the facilities for future referencing. Therefore, individuals within the permit department at the City have been provided with copies of the Recommended Plan in an effort to notify the permitees to design any new facilities around the proposed channels. For instance, in the areas of a proposed channel, the contractor will be asked to install new fiber optic cables at a minimum depth of 10 feet from the surface.

6. Irrigation

SRP Irrigation is the primary irrigation provider within the study area. The **RID** owns and operates a delivery canal that passes through the study area for ultimate irrigation delivery west of the Agua Fria River.

7. Petroleum

There is a **Kinder/Morgan** long-distance petroleum line that provides fuel to a number of users within Arizona, including Luke Air Force Base, Sky Harbor International Airport, and Williams Gateway Airport. A number of critical fuel lines extend out from a petroleum plant at 51st Avenue and Van Buren Street, including lines owned by **Dyn-Air** and **APS**. The most critical of these lines include a 20 inch line, extending west and adjacent to the UPRR, and a 12 inch line, also extending west and adjacent to Buckeye Road. Substantial effort has been made to design away from these high pressure fuel lines.

Table 1 - Utility Company Contacts

Utility	Representative	Telephone No.
City of Phoenix - Water, Sanitary Sewer, & Reclaimed Water	Ray Dovalina	602-262-4026
City of Avondale - Water, Sanitary Sewer, & Reclaimed Water	Scott Zipprich	623-932-1909
City of Tolleson - Water, Sanitary Sewer, & Reclaimed Water	Woody Scoutten	602-993-5686
Southwest Gas Corporation	Geraldo Lopez	602-484-5306
El Paso Natural Gas Co.	John McNealy	915-496-5562
Salt River Project - Power	Cindy Scott	602-236-0684
Arizona Public Service	Steve Goodman	602-371-6965
Salt River Project - Irrigation	Bonnie Garcia	602-236-6179
Sprint	Collin Sword	602-419-0970
AT&T	David Blackburn	602-228-9461
MCI Worldcom	Rick Thomas	623-734-1273
UPRR (Union Pacific RR)	John Clarke	520-343-4563
Cox Communications	Walter Coombs	623-322-7288
Qwest - Telephone	Gary Legumina	602-604-4804
Palo Verde Nuclear Station	Gary Gene	623-393-1951
Kinder / Morgan	Don R. Quinn	714-560-4940

8. Utility Locating

Several utilities were identified for pothole locating to determine the elevation where they may cross a channel alignment. Typical potholed utilities include sanitary sewer lines, natural gas lines, petroleum lines, and fiber optic lines. Most of the requested utilities were able to be located and an elevation identified. These utilities are shown and designated on the *Preliminary Design Plans* in the **Exhibits** section of this report with known elevations. Due to discrepancies in utility records and/or an inability to obtain permission from the utility and land owners, some of the requested utilities were not able to be located. These utilities are shown with assumed locations and elevations based on the best available information at the time of design. The complete data set for all of the utilities potholed as part of the project is on file with the FCDMC. A summary of the pothole results is located in **Appendix I**.

Dysart Rd
El Mirage Rd
115th Ave
107th Ave
99th Ave
91st Ave
83rd Ave
75th Ave
67th Ave
59th Ave
51st Ave
43rd Ave
35th Ave
27th Ave
I-17 Freeway
Papago Diversion Channel
I-10 Freeway
2-15'x10' CBC
Van Buren St
METERED CITY PHOENIX, PEORIA, GLENDALE 12 MGD CAP
DIVERSION STRUCT.
RID Canal
FO RID Canal
UPRR
Buckeye Rd
TOLLESON WWTP
Lower Buckeye Rd
Buckeye Feeder Canal
Broadway Rd
Southern Ave
AVONDALE WWTP
91ST AVENUE WWTP
Agua Fria River
Gila River
Salt River
SOUTH MOUNTAIN FREEWAY
PROPOSED
PETROLEUM PLANT
POWER STATION
POWER SUB-STATION
Prop APS/SRP Substation
2-230KV (SRP)
Prop 230KV (APS)
230KV (DOE)
500 KV (SRP)
500KV (SRP)
114" EFFL (ANPP)
FO
12"W
16"W
20"W
24"W
30"W
42"W
48"W
54"W
6"PET
8"PET
12"PET
20"PET
12"S
15"S
18"S
24"S
27"S
30"S
36"S
42"S
45"S
48"S
54"S
60"S
66"S
72"S
81"S
87"S
90"S
96"SD
84"SD
72"SD
60"SD
54"SD
48"SD
42"SD
36"SD
30"SD
24"SD
18"SD
12"SD
12"FM
20"G
16"G
10.75"G
2-72"S
LEGEND
Water Line
Sanitary Sewer
Effluent Line
Fiber Optic
Natural Gas
Overhead Electric
Petroleum Pipeline
Storm Drain
Papago Diversion Channel
N
0 600 1200 2400 3600 4800
SCALE IN FEET
PROJECT TITLE: DURANGO AREA DRAINAGE MASTER PLAN PROJECT NO. FCD 99-41
CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS
EXHIBIT TITLE: EXISTING & PLANNED UTILITIES 08/15/02
FIGURE IV-1

C. Existing Drainage Features

Few drainage facilities exist within the study area. The drainage pattern is predominantly overland in a northeast to southwest direction accumulating along the RID Canal and along the UPRR, eventually reaching the Salt and Gila Rivers on the south and the Agua Fria River on the west.

1. Papago Diversion Channel

The ADOT Papago Diversion Channel drains to the west along the north side of Interstate 10 and defines the north limit of the study area. This channel captures flow from the north and diverts it west to the Agua Fria River. Most of the storm drains from the north tie into the channel, although two pipes at 27th and 43rd Avenues pass to the south un-intercepted.

2. Irrigation Canals

Other facilities receive and convey runoff by virtue of the fact that they are within the path of the runoff even though they are not designed for drainage. Such existing features that receive runoff are the BFC, and several small SRP irrigation ditches along agricultural properties. All of the canals in the project area are designed for irrigation delivery rather than storm drainage. This results in flooding when runoff exceeds the capacity of the canals. Runoff that is intercepted by the railroad embankment makes its way westerly along the face of the embankment. Runoff flowing west along the embankment ponds behind section line roads that have raised profiles to pass over the railroad. The flow breaks out to the south when the ponding elevation exceeds the height of the embankment. None of the cross-roads have culverts of adequate size to convey major flows through the roadway embankment without ponding.

3. Agua Fria Levee

The Agua Fria East Bank Levee extends from north of Interstate 10 south to Buckeye Road near the UPRR. The levee is designed to convey the Standard Project Flood (SPF) flow in the river without overtopping the banks. Additional flowage easements extend from the end of the levee to the Gila River to complete this system.

4. Holly Acres Levee

The Holly Acres Levee is an existing bank protection project on the Salt / Gila Rivers, extending from 113th Avenue downstream to El Mirage Road. The levee was designed to accommodate 115,000 cubic feet per second (cfs), approximately a 35-year flow, with three feet of freeboard. However at approximately 100,000 cfs, approximately a 30-year flow, the river flows over the north bank at 99th Ave and around the Holly Acres Levee. The levee is not in danger of being overtopped since it is outflanked before the river level rises high enough. The outflanking is not likely to cause damage to the levee, as it is armored with stones on both sides.

D. Planned Private Development

The study area, particularly the southwest area, is developing at a rapid pace. Planned developments are identified on **Figure IV-2**. The planned developments shown were identified by the staff from the Cities of Phoenix, Tolleson, and Avondale, and from Maricopa County. The Durango ADMP development and timing of implementation is constrained by the developments shown on **Figure IV-2**.

E. Planned Public Improvements

1. Proposed Tres Rios project

The Tres Rios project is a proposed multi-purpose project in the Salt/Gila River which includes flood control and restoration of critical riparian and wetland habitats. The project extends from approximately the 91st Ave wastewater treatment plant to just west of Dysart Road. A Feasibility Report has recently been completed identifying potential benefits for flood control, including bank protection levees. The proposed Tres rios levee location is shown on **Figure I-2**.

2. South Mountain Freeway (Loop 202)

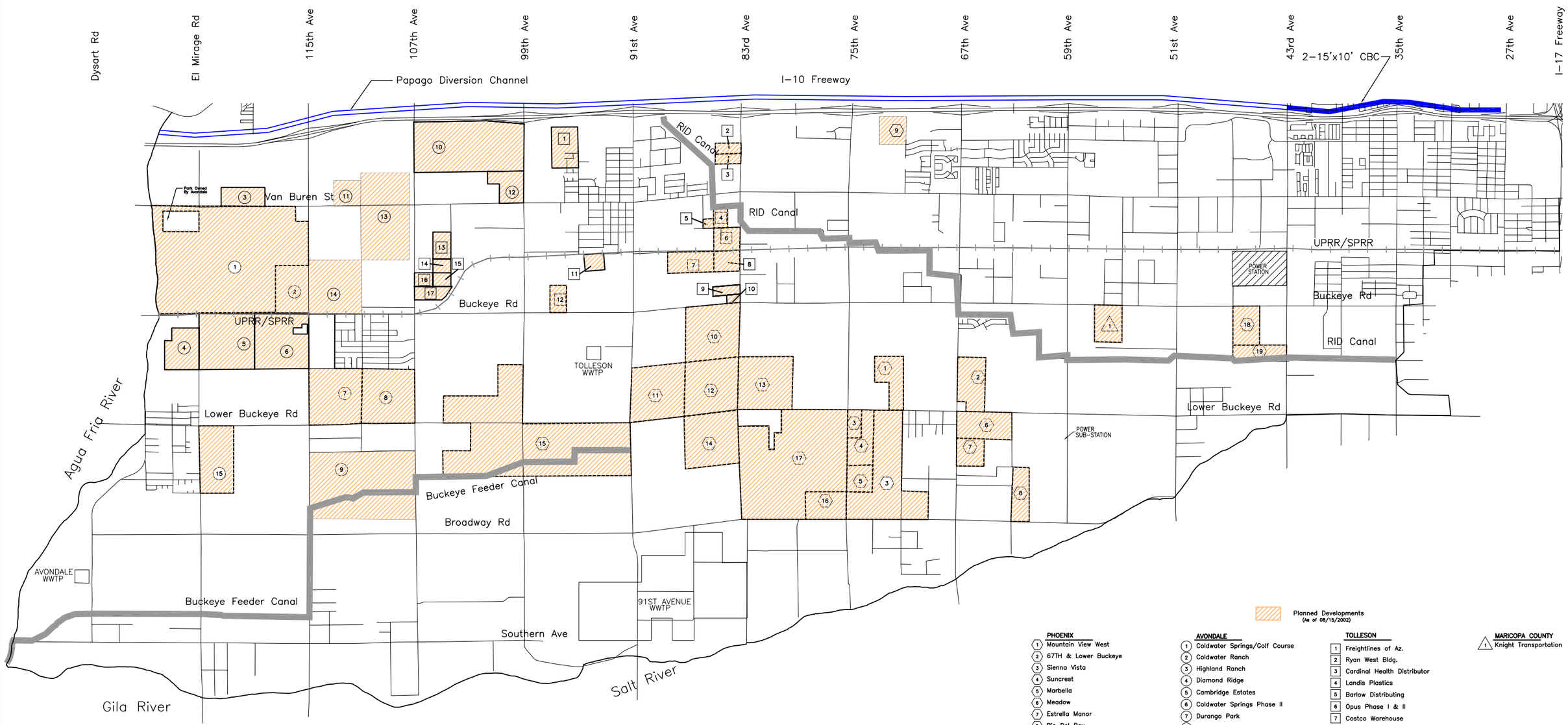
The possibility exists for a future Loop 202 Freeway extension to the south, approximately along the 59th Ave alignment, which may block westerly drainage within the study area. It is anticipated that the design for the freeway will include collector channels and basins to intercept the runoff, retain the flows, and drain south to the Salt River.

3. 115th Avenue - McDowell Road to Buckeye Road (MC85)

MCDOT has plans to improve 115th Avenue from McDowell Road to MC85. This project will cross the proposed Durango Regional Outfall Channel alignment at the UPRR north of Buckeye Road. The MCDOT design should incorporate the box culvert from the Recommended Plan.

4. 75th Avenue Widening

The City of Phoenix and MCDOT are planning to widen 75th Avenue from the Interstate 10 freeway to MC 85 (Buckeye Road). This project is planned to include major drainage improvements and offers an opportunity to cooperate with the District to provide drainage facilities in support of the Recommended Plan of this study.



Planned Developments
(As of 08/15/2002)

PHOENIX

1. Mountain View West
2. 67TH & Lower Buckeye
3. Sienna Vista
4. Suncrest
5. Marbella
6. Meadow
7. Estrella Manor
8. Rio Del Ray
9. Arnon Distribution Center
10. 83rd & Buckeye
11. 91st Ave. & Lower Buckeye
12. Heritage Point
13. Sundance Ranch
14. 83rd & Lower Buckeye
15. Country Place
16. Estrella Village Manor
17. Tuscano
18. Buzz Oates Distribution Center
19. Consolidated Freightways

AVONDALE

1. Coldwater Springs/Golf Course
2. Coldwater Ranch
3. Highland Ranch
4. Diamond Ridge
5. Cambridge Estates
6. Coldwater Springs Phase II
7. Durango Park
8. The Sanctuary at Avondale
9. Shadow Ridge
10. Avondale Crossing-Auto Mall
11. Waterford Square
12. Fiesta Travel Plaza
13. Anderson 300 acres
14. CW Ranch
15. 73 EL Mirage Properties

TOLLESON

1. Freightlines of Az.
2. Ryan West Bldg.
3. Cardinal Health Distributor
4. Landis Plastics
5. Barlow Distributing
6. Opus Phase I & II
7. Costco Warehouse
8. Willamette Industries
9. Transpacific Dist. Center
10. Convenience Store
11. MBCI/DBCI Expansion
12. Mesa Cold Storage
13. Quaker Oats Warehouse
14. States Logistics Warehouse
15. Elan Manufacturing
16. Utility Trailer Sales
17. Roads West Truck Depot

MARICOPA COUNTY

1. Knight Transportation

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

SHEET TITLE:
PLANNED PRIVATE DEVELOPMENT
08/15/02

FIGURE IV-2

V. RECOMMENDED PLAN

A. Introduction

The Recommended Plan is shown on **Figure V-1**. The plan elements are shown in plan and profile on the *Preliminary Design Plans* at the end of this report. This section is intended to be used with the *Preliminary Design Plans* to further describe the planned improvements, project costs, and special issues to be considered during final planning and design. The project elements are described as well as environmental considerations, right-of-way requirements, and utility conflicts. In addition, the area benefitting from the project is described, and the agencies with an interest in the project are identified as possible participants in project implementation.

B. Floodplain Impacts

A number of floodplains were delineated as a part of this study. These delineations identify areas of potential flooding due to stormwater runoff from within the study area. The areas identified include the UPRR from 69th Avenue to 35th Avenue, the BFC from the confluence with the Agua Fria River to approximately 105th Avenue, and the Sunland Avenue Tributary to the BFC from the confluence with the BFC to 91st Avenue. After the floodplain delineations were completed and the Preliminary Recommended Plan was developed, the residual floodplains were delineated with the intent to show the floodplain reduction benefit derived from the ADMP projects. The existing and residual floodplains are shown on **Figure V-2**.

1. Southwest Area Re-Study

After evaluation of the residual floodplains, based on the Preliminary Recommended Plan, the southwest portion of the study area was determined to receive a less than desired benefit due to the quantity of stormwater runoff generated by the local sub-basins. The southwest area was then re-analyzed to determine if there was a better solution which would have a greater impact on reducing the residual floodplains. The *Southwest Area Alternatives Analysis Report* can be found in **Appendix C**. The results of the preferred alternative have been incorporated into this final Recommended Plan.

2. Northeast Area Re-Study

The northeast area was also found to have minimal reduction in the floodplain from the Preliminary Recommended Plan improvements. Additional analysis was performed to determine the feasibility and cost of a flood control solution in the northeast portion of the study area to remove existing homes and businesses from the floodplain. A solution for this area had not been identified in the previous alternatives analysis due to the high cost of constructing open channels in the high density, highly developed and populated area. Typically, industrial businesses are too close to the railroad and to each other to allow an open channel to be constructed in a continuous path.

Upon further investigation, it was determined that a large concrete box culvert storm drain system could be constructed in local east-west roadways, approximately 1/4 mile north of the railroad with laterals in the north-south streets to capture runoff from the sub-basins. Exhibits of the analyzed system are shown in **Appendix D**. In order to analyze the cost versus benefit of the box culvert storm drain system, three alternatives were formulated to convey runoff from the 10-year, 50-year and 100-year storms. The three alternatives all used the same alignment, but were sized according to the storm they were intended to convey. The residual floodplain along the railroad due to the 100-year storm was then analyzed for each of the alternatives.

The costs of the three different alternatives ranged from $68.6 million dollars to $99.4 million dollars. The residual floodplain benefit of the alternatives is described based on the area of impact:

69th Avenue to 57th Avenue
- No residual floodplain with 10-yr, 50-yr, or 100-yr system

57th Avenue to 51st Avenue
- Very minor benefit with any system in place

51st Avenue to 43rd Avenue
- Minor benefit with any system in place

43rd Avenue to 31st Avenue
- No residual floodplain with 100-yr system
- Very minor benefit with 10-yr or 50-yr system

The greatest benefit occurred between 69th and 57th Avenues because the greatest number of residences were removed from the residual floodplain. Most of the other areas received very little benefit with any system in place. It was found that the spurs and obstructions along the railroad cause such a large ponding effect, that conveyance of the runoff does not occur with even the smallest amount of flow. Therefore, even the local runoff within the sub-basin was causing nearly as much flooding due to ponding regardless of whether the box culvert storm drain system was in place 1/4 mile north. The only way to completely alleviate flooding along the railroad is to provide a system of conveyance immediately adjacent to the railroad, allowing runoff to flow under the spurs and other obstructions. This is infeasible due to the number of existing buildings so close to the tracks and the number of high-cost utilities that would have to be relocated within the railroad right-of-way.

In lieu of providing a complete box culvert storm drain system, a portion of the analyzed alternatives was incorporated into the recommended plan to provide a significant benefit to a majority of the residences which are located between 69th and 57th Avenues. A section of vertical concrete open channel at grade was identified along the railroad from the east edge of the previously identified retention basin (DRC Basin #4) at 69th Avenue, east to approximately the 63rd Avenue alignment. This section of channel connects to the bypass channel of

the DRCC and is part of the overall DRCC system. The result of this design can be seen on the *Preliminary Design Plans*, Sheets 23 and 24 of 38.

C. Traffic

There are two roads which bisect the study area that are classified by Maricopa County as Roads of Regional Significance (RRS). These roads are generally 7 lanes wide, 3 lanes each way with a center turn lane/raised median. The two roads which fall under this classification are Buckeye Road (MC 85) and 99th Avenue. ADMP improvements for the Buckeye Feeder Diversion Channel cross these roads at two locations. The Durango Regional Outfall Channel crosses 99th Avenue at one location and the 99th Avenue Lateral is parallel to 99th Avenue for ½-mile.

Generally, in developing the preliminary design plans, culverts are placed at ½-mile intervals unless channels are adjacent to a RRS which require access points at 1/8-mile intervals. Additionally, access to all parcels must be maintained. If a channel prevents access to an adjacent parcel, a culvert or access road is provided to restore access to that parcel. Farm access roads are also maintained or shared by the channel maintenance road.

D. Durango Regional Outfall Channel
(Sheets 3-7 of 38)

1. Location: Adjacent to and north of the UPRR, beginning ½ mile west of 83rd Avenue and ending ½- mile west of 115th Avenue, discharging into the Coldwater Springs Golf Course Channel.

2. Purpose: To collect runoff accumulating along the upstream side of the UPRR and convey it to the Coldwater Springs Channel. The channel will contain and eliminate the FEMA designated floodplain.

3. Project elements: Channels within this reach will be lined with irrigated turf. New concrete box culverts will be constructed at 115th, 107th, and 99th Avenues and at intermediate channel crossings. A ½ - mile long section of box culvert will be installed from 95th Avenue to 91st Avenue.

4. Environmental Considerations:
   a. Environmental Resources: Possible interaction with historic sites (Cashion Station, Cowden Station, and Jean Station) along UPRR corridor. There are no prehistoric sites. Also, a small portion of this channel (on the western end) runs adjacent to historic State Route 80. The Durango channel is located in the central and western sections of the project area, this area consists of agricultural fields that do not contain Sonoran desert habitat. Potential environmental concern site #308, listed as a Leaking Underground Storage Tank site, is located immediately adjacent to the proposed channel. Current alignment is not designed to impact any sites considered to be a potential environmental concern.
   b. 404 Permitting: Construction of this channel would require coordination with the UPRR in addition to obtaining all permits discussed in Section VI, Environmental Permits and Approvals such as a NPDES permit for construction. Since this channel is terminating in the Coldwater Springs Golf Course, it is anticipated that no Section 404 permit will be required.

5. Right-of-Way: The channel is intended to parallel the UPRR corridor. The requirement shown on the plans is the ROW for the channel and access road.

6. Utility Conflicts: The following utilities are in direct conflict with the proposed alignment and require relocation as of 08/15/2002.

   - 20" Natural Gas line, 42" irrigation piped lateral, and 42" irrigation piped drain at 115th Avenue.
   - Irrigation open lateral at 111th Avenue.
   - Irrigation open lateral 1/8 mile west of 107th Avenue.
   - Overhead SRP high voltage electric line, and (2) underground telephone lines at 107th Avenue.
   - 12" waterline, 12" waterline, and underground SRP electric line 1/4 mile north of Buckeye Road and the SPRR.
   - Underground electric line (SRP) and (2) 24" irrigation piped laterals 3/8 mile north of Buckeye Road and the UPRR.
   - 12" water line, irrigation open lateral, and buried telephone line at 99thAvenue.
   - 12" water line and 10" sewer line at approximately 97th Avenue.
   - 12" water line and irrigation open lateral at 95th Avenue.
   - 4" water line, 12" water line, 3" gas line (SWG), (2) underground telephone lines, 6" water line, and irrigation open lateral at 91st Avenue.

7. Benefitted Area: From the Agua Fria River to approximately 87th Avenue, immediately adjacent to and north of the UPRR. The floodplain will be contained within the banks of the channel.

8. Project Participants: FCDMC, City of Avondale, City of Tolleson, MCDOT, Developers.

E. Durango Regional Outfall Basin #1
(Sheet 31 of 38)

1. Location: Adjacent to and north of the UPRR. Adjacent to and east of 111th Avenue. Within Avondale city limits.

2. Purpose: To attenuate peak discharges in the Durango Regional Outfall Channel and to serve as a neighborhood park.

3. Project elements: This off-line basin will allow up to 700 cfs to pass by. Flows above this amount will enter the basin via a side channel spillway. At an approximate depth of 6.2', the basin will impound 44 acre-feet. The basin will be drained by a 24-inch storm drain to the downstream channel.

4. Environmental Considerations:

   a. Environmental Resources: There are no prehistoric or historic sites found in the proposed basin area. One site considered to be a potential environmental concern, Site #311, was identified near the basin but not impacted by the proposed basin location; this site was listed as a Leaking Underground Storage Tank. This sub-project is located in the western section of the project area; this area consists of agricultural fields and does not contain adequate Sonoran desert habitat.

   b. 404 Permitting: There are no Section 404 permit requirements for this sub-project.

5. Right-of-Way: This basin and park will require 22.5 acres of additional right-of-way.

6. Utility Conflicts: No conflicts as of 08/15/2002.

7. Benefitted Area: Works in conjunction with the Durango Regional Outfall Channel, reducing channel flows in order to contain the 100-year floodplain within the banks of the channel. Also provides an opportunity for open space and possibly a city park.

8. Project Participants: FCDMC, City of Avondale.

F. Durango Regional Outfall Basin #2 & 99th Ave Lateral
(Sheets 8 & 32 of 38)

1. Location: The basin is adjacent to and east of 99th Avenue, 1/8 mile north of the UPRR. The lateral runs parallel to 99th Avenue and extends to the north side of Van Buren Street, within Tolleson city limits.

2. Purpose: The lateral will convey flows from north of Van Buren Street to the Durango Regional Outfall Channel. The basin is intended to attenuate peak discharges in the Durango Regional Outfall Channel and to serve as a neighborhood park.

3. Project elements: The channel will be lined with irrigated turf and will include a concrete box culvert at Van Buren Street and another at 1/8 mile south of Van Buren Street. The off-line basin will allow up to 500 cfs to pass through the 99th Avenue culvert. Flows above this amount will enter the basin via a side channel spillway located just upstream of the culvert. At an approximate depth of 7.1', the basin will impound approximately 75 acre-feet. The basin will be drained by a 24-inch storm drain to the downstream channel.

4. Environmental Considerations:

   a. Environmental Resources: There are no prehistoric or historic sites found in the surrounding area. This sub-project is located near one Potential Environmental Concern site, #221, that is listed as a Leaking Underground Storage Tank. Current project location is not designed to impact any sites considered to be a potential environmental concern. This project site is also located in the central and western section of the project area consisting of agricultural fields. These fields do not consist of Sonoran desert habitat.

   b. 404 Permitting: There are no Section 404 permit requirements for this basin and lateral sub-project.

5. Right-of-Way: This basin and park will require 28.3 acres of additional right-of-way.

6. Utility Conflicts: 12" water line at Van Buren Street. This line is in direct conflict with the proposed lateral alignment and requires relocation as of 08/15/2002.

7. Benefitted Area: Works in conjunction with the Durango Regional Outfall Channel, reducing channel flows in order to contain the 100-year floodplain within the banks of the channel. Also provides an opportunity for open space and possibly a city park.

8. Project Participants: FCDMC, City of Tolleson.

G. Durango Regional Outfall Basins #3a/3b & 91st Ave Lateral
(Sheets 9 & 33 of 38)

1. Location: Basin 3a is east of 91st Avenue, 1/4 mile south of Van Buren Street. The lateral runs from the intersection of 91st Avenue and Van Buren southeasterly to the basin within Tolleson city limits. Basin 3b is west of 91st Avenue, immediately north of the UPRR.

2. Purpose: The lateral will convey runoff from north of Van Buren Street to Basin 3a which will then drain into Basin 3b which is an offline storage basin for the Durango Regional Outfall Channel. Basin 3a is intended to detain peak discharges from the lateral. Basin 3b is intended to attenuate peak discharges from the Durango Regional Outfall Channel. These basins will also serve as neighborhood parks.

3. Project elements: The channel will be lined with irrigated turf and will include a concrete box culvert at Van Buren Street. Basin 3a will detain up to 574 cfs from the 91st Avenue lateral. The off-line basin, 3b, will receive flows via a box culvert diversion located just upstream of the basin. At an approximate depth of 5.1', Basin 3a will impound approximately 61 acre-feet. The basin will be drained to Basin 3b by a 24-inch storm drain. At an approximate depth of 5.0', Basin 3b will impound approximately 18 acre-feet. The basin will be drained back into the Durango Regional Outfall Channel by a 24-inch storm drain.

4. Environmental Considerations:

   a. Environmental Resources: There are no prehistoric sites or historic sites found in this segment. This basin and lateral are located within the central and western sections of the project area; this area consists of agricultural fields that do not contain Sonoran desert habitat. There are two sites that may have potential environmental concern (#116 (FINDS), #117 (AZ-SPILL)). These sites are near this sub-project but would not be impacted by the channel's currently proposed alignment.

   b. 404 Permitting: There are no Section 404 permit requirements for this outfall and lateral sub-project.

5. Right-of-Way: This basin and park will require 31 acres of right-of-way.

6. Utility Conflicts: The following utilities are in direct conflict with the proposed alignment and require relocation as of 08/15/2002.

   - 8" water line, 12" water line and (2) underground telephone lines at Van Buren Street.

7. Benefitted Area: Works in conjunction with the Durango Regional Outfall Channel, reducing channel flows in order to contain the 100-year floodplain within the banks of the channel. Also provides an opportunity for open space and possibly a city park.

8. Project Participants: FCDMC, City of Tolleson.

H. Durango Regional Conveyance Channel
(Sheets 10-24 of 38)

1. Location: Beginning at the UPRR, at approximately 63rd Avenue, extending west to 73rd Avenue, then south to ½ mile south of

Lower Buckeye Road and continuing west. Ending at the Agua Fria River, 1/4 mile south of Broadway Road.

2. Purpose: To convey flood water from the area north of the UPRR and thus reducing the FEMA Floodplain. This channel will also reduce the flooding potential along the BFC and provide an outfall for local development projects.

3. Project elements: Most of the channels within this reach will be grass lined. New concrete box culverts will be constructed at Dysart Road, El Mirage Road, Broadway Road, 115th, 107th, 99th, 91st and 83rd Avenues, Lower Buckeye Road, 75th Avenue, Buckeye Road, and at the UPRR/RID and at several intermediate locations. Concrete channels with vertical walls are required at the two most upstream reaches of the channel due to limited right-of-way.

4. Environmental Considerations:
   a. Environmental Resources: A section of the route would be located near the prehistoric Fowler Ruin where the channel connects with DRC Basin #4. The route also crosses historic St. John's Canal. Five areas of potential environmental concern appear to be near the proposed channel (Sites #345, #347, #389, #390, and #392). This sub-project area is located within the western and central portions of the project area. These areas consist of agricultural fields that would not contain a significant amount of Sonoran desert habitat. The outfall pipe would be designed to enter the Agua Fria River. The river's bank are relatively undisturbed areas located within riverine floodplains that do yield sonoran desert riparian habitat.
   b. 404 Permitting: Construction along this channel would require agency coordination with the UPRR, RID, and SRP in addition to obtaining all permits including a NPDES permit. A NWP 404 Permit is not anticipated based on a current jurisdictional delineation of the ordinary high water mark of the Agua Fria River. Detailed discussions of these environmental permit processes are included in Section VI *Environmental Permits and Approvals*.

5. Special Considerations: Based on the 10-year WSE in the Agua Fria River, a flap gate will be required on the end of the outfall pipe in order to prevent backwater in the river from entering the system and allow for positive drainage pipe.

6. Right-of-Way: The requirement shown on the plans is the ROW for the channel and access road.

7. Utility Conflicts: The following utilities are in direct conflict with the proposed alignment and require relocation as of 08/15/2002.

   - 20" gas line (El Paso Natural Gas) and (2) underground telephone line at 115th Avenue.
   - Underground telephone line at El Mirage Road.
   - Underground telephone line at 99th Avenue.
   - Underground telephone line at 91st Avenue.
   - Irrigation open lateral at 87th Avenue.
   - Irrigation open drain at 85th Avenue.
   - 36" sewer line and irrigation open lateral at 83rd Avenue.
   - MCI fiber optic line at Elwood Road, just east of 83rd Avenue.
   - Irrigation open lateral at 79th Avenue.
   - Sprint fiber optic at Lower Buckeye Road, just west of 75th Avenue.
   - 36" sewer line, 12" water line, and (3) underground telephone lines at 75th Avenue, approx. 1/4 mile north of Lower Buckeye Road.
   - Irrigation open lateral, underground electric line (SRP), (2) 12" water lines, 10" gas line (EPNG), and underground telephone line at Buckeye Road.
   - Tile approximately 9000 LF of existing BFC

7. Benefitted Area: North of the UPRR, between approximately 63rd Avenue and 73rd Avenue, the floodplain will be contained within the banks of the channel, removing over 100 homes from the potential floodplain. Benefits developers along the channel with a discharge point for flows. Helps to alleviate some of the flooding along the BFC.

8. Project Participants: City of Phoenix, City of Avondale, FCDMC, SRP Irrigation, Developers.

I. Durango Regional Conveyance Basin #1
(Sheet 34 of 38)

1. Location: Existing Sand and Gravel Pit between Dysart Road and the Agua Fria River, north of the BFC.

2. Purpose: To retain peak discharges from the Durango Regional Conveyance Channel.

3. Project elements: This off-line basin will allow up to 34 cfs to pass by in a 48-inch pipe. Flows above this amount will enter the basin via a side channel spillway. At a depth of up to 25', the basin will impound approximately 1584 acre-feet. The basin may be up to 44' deep in some locations from excavation operations, however groundwater is estimated to be approximately 25' below the surface, limiting the effective storage depth. The basin will be drained by a pump to the downstream channel or by natural infiltration.

4. Environmental Considerations:
   a. Environmental Resources: There are no prehistoric or historic sites found in the basin's surrounding area. Construction based on current basin design would not impact any sites considered to be a potential environmental concern. This sub-project is located within the western section of the project area; this area consists of agricultural fields that do not contain a significant amount of Sonoran desert habitat.
   b. 404 Permitting: There are no Section 404 permit requirements for this sub-projects.

5. Right-of-Way: This basin will require approximately 150 acres of right-of-way.

6. Utility Conflicts: No conflicts as of 08/15/2002.

7. Benefitted Area: Works in conjunction with the Durango Regional Conveyance Channel, reducing channel flows in order to allow for a gated outfall into the Agua Fria River, thus eliminating the need for channel berming due to backwater from the river. Also provides a possible opportunity for open space and a park in the future after sand and gravel operations are complete.

8. Project Participants: FCDMC, City of Avondale.

J. Durango Regional Conveyance Basin #2
(Sheet 35 of 38)

1. Location: Adjacent to and east of the 95th Avenue alignment, ½-mile north of Broadway Road, within Phoenix city limits.

2. Purpose: To attenuate peak discharges in the Buckeye Feeder Diversion Channel and to serve as a neighborhood park.

3. Project elements: This off-line basin will allow up to 1050 cfs to pass by. Flows above this amount will enter the basin via a side channel spillway. At an approximate depth of 4.6', the basin will impound approximately 61 acre-feet. The basin will be drained by a 24-inch outlet pipe into the channel.

4. Environmental Considerations:
   a. Environmental Resources: There are no prehistoric or historic sites found in the basin's surrounding area. Construction based on current basin design would not impact any sites considered to be a potential environmental concern. This sub-project is located within the western section of the project area; this area consists of agricultural fields that do not contain a significant amount of Sonoran desert habitat.
   b. 404 Permitting: There are no Section 404 permit requirements for this sub-project.

5. Right-of-Way: This basin and park will require 48 acres of additional right-of-way.

6. Utility Conflicts: No conflicts as of 08/15/2002.

7. Benefitted Area: Works in conjunction with the Durango Regional Conveyance Channel, reducing channel flows in order to allow for downstream capacity and to alleviate flooding along the BFC. Also provides an opportunity for open space and a possible city park.

8. Project Participants: FCDMC, City of Phoenix.

K. Durango Regional Conveyance Basin #3
(Sheet 36 of 38)

1. Location: Adjacent to and east of the 73rd Avenue alignment, 1/4 mile south of Buckeye Road. Within Phoenix city limits.

2. Purpose: To attenuate peak discharges in the Durango Regional Conveyance Channel and to serve as a community park.

3. Project elements: This off-line basin will allow up to 450 cfs to pass by. Flows above this amount will enter the basin via a side channel spillway. At an approximate depth of 4.5', the basin will impound approximately 16 acre-feet. The basin will be drained by a 24-inch outlet pipe into the channel.

4. Environmental Considerations:
   a. Environmental Resources: There are no prehistoric or historic sites found in the basin's surrounding area. Construction based on current basin design would not impact any sites considered to be a potential environmental concern. This sub-project is located within the central section of the project area; this area consists of agricultural fields that do not contain a significant amount of Sonoran desert habitat.
   b. 404 Permitting: There are no Section 404 permit requirements for this sub-project.

5. Right-of-Way: This basin and park will require 16.5 acres of additional right-of-way.

6. Utility Conflicts: No conflicts as of 08/15/2002.

7. Benefitted Area: Works in conjunction with the Durango Regional Conveyance Channel, reducing channel flows in order to allow for downstream capacity. Also provides an opportunity for open space and a possible city park.

8. Project Participants: FCDMC, City of Phoenix.

L. Durango Regional Conveyance Basin #4
(Sheet 37 of 38)

1. Location: Adjacent to and north of the UPRR, 1/4 mile west of 67th Avenue.

2. Purpose: To attenuate peak discharges in theDurango Regional Conveyance Channel and to serve as a neighborhood park.

3. Project elements: This off-line basin will allow up to 410 cfs to pass by. Flows above this amount will enter the basin via a side channel spillway. At an approximate depth of 8.0', the basin will impound approximately 58 acre-feet. The basin will be drained by a 24-inch storm drain to the downstream channel.

4. Environmental Considerations:
   a. Environmental Resources: The basin would be constructed near, and may impact a portion of the Fowler Ruin prehistoric site and two historic sites of the railroad (Fowler Station and Fowler Depot). Construction based on current basin design would not impact any sites considered to be a potential environmental concern. This sub-project is located within the central section of the project area; this area consists of agricultural fields that do not contain a significant amount of Sonoran desert habitat.
   b. 404 Permitting: There are no Section 404 permit requirements for this sub-projects.

5. Right-of-Way: This basin and park will require 29.3 acres of additional right-of-way.

6. Utility Conflicts: No conflicts as of 08/15/2002.

7. Benefitted Area: Works in conjunction with the Durango Regional Conveyance Channel, reducing channel flows in order to allow for downstream capacity. Also provides an opportunity for open space and a possible city park.

8. Project Participants: FCDMC, City of Phoenix.

M. Sunland Avenue Channel
(Sheets 25-27 of 38)

1. Location: Between 99th Avenue and 119th Avenue, approximately 1/4 mile north of Southern Avenue.

2. Purpose: To convey storm water to the Durango Regional Conveyance Channel and contain the local flooding potential.

3. Project elements: Water will be conveyed from the area along 99th Avenue, approximately 2.5 miles west to a junction with the Durango Regional Conveyance Channel. The majority of the project is designed as a grass channel, although a small portion from 113th Avenue to 115th Avenue is required to be a concrete box culvert in order to fit the channel under a local road in a small developed residential area.

4. Environmental Considerations:
   a. Environmental Resources: There are no prehistoric or historic sites found in the basin's surrounding area. Construction based on current basin design would not impact any sites considered to be a potential environmental concern. This sub-project is located within the western section of the project area; this area consists of a small residential development along with agricultural fields that do not contain a significant amount of Sonoran desert habitat.
   b. 404 Permitting: A Section 404 permit will not be required for this sub-project.

5. Right-of-Way: The requirement shown on the plans is the ROW for the channel and access road.

6. Utility Conflicts: No conflicts as of 08/15/2002.

7. Benefitted Area: Areas along the Sunland Avenue alignment which are subject to storm water runoff flows and have been identified as within a potential floodplain. Designed to contain flooding within the channel.

8. Project Participants: FCDMC, City of Phoenix, City of Avondale.

N. 47th Avenue Detention Basin and Channel
(Sheets 30 & 38 of 38)

1. Location: The northwest corner of the intersection of 47th Avenue and Buckeye Road alignment. Within Phoenix city limits.

2. Purpose: To attenuate peak discharges in the 47th Avenue Channel and to serve as a neighborhood park.

3. Project elements: Water will be conveyed from the area north of the UPRR by a box culvert and a landscaped earth channel to the detention basin. The detention basin is intended to be approximately 8' deep and impound approximately 75 acre-feet of water. The basin will drain via a box culvert to the downstream channel.

4. Environmental Considerations:
   a. Environmental Resources: There are no prehistoric or historic sites identified in the basin and inlet area. Four areas have been identified in the vicinity of the detention basin area as potential environmental concerns (Site #214, #240, #250, #252).
   b. 404 Permitting: A Section 404 permit will not be required for this sub-project.

5. Right-of-Way: This basin and park will require 44 acres of additional right-of-way.

6. Utility Conflicts: No conflicts as of 08/15/2002.

7. Benefitted Area: North of the UPRR near the 49th Avenue alignment and along Buckeye Road near 47th Avenue. Provides an opportunity for open space and possibly a city park.

8. Project Participants: FCDMC, City of Phoenix.

O. 47th Avenue Channel
(Sheets 28 & 29 of 38)

1. Location: Adjacent to and east of 47th Avenue, beginning at the 47th Ave Detention Basin and ending at the intersection with the Salt River. Within Phoenix city limits.

2. Purpose: To convey storm water to the Salt River and reduce the local flooding potential.

3. Project elements: Channels within this reach will be constructed with landscaped earth. New box culverts will be required at Lower Buckeye Road and the RID Canal and at intermediate channel crossings.

4. Environmental Considerations:
   a. Environmental Resources: Outfall structure to the Salt River required. There are no prehistoric archaeological sites but the channel does cross historic Highway 80 and Farmers Canal. The route also crosses the RID canal. There were no areas of potential environmental concern identified within the channel's route. Construction of this channel would require coordination with the RID in addition to obtaining all permits discussed in Section VI, Environmental Permits and Approvals.
   b. 404 Permitting: A Section 404 permit as well as a construction NPDES will likely be required for construction of this outfall structure. According to the current design drawings, a minimal area within jurisdictional waters will be disturbed during the construction of this sub-project.

5. Special Considerations: There may be a need for a flap-gate or pinch-valve to prevent Salt River flows from entering the channel system.

6. Right-of-Way: The requirement shown on the plans is the ROW for the channel and access road.

7. Utility Conflicts: The following utilities are in direct conflict with the proposed alignment and require relocation as of 08/15/2002.

   - 30" irrigation piped lateral at the Salt River.
   - Underground electric line (SRP) and MCI fiber optic line ½ mile south of Lower Buckeye Road.
   - Sprint fiber optic cable and 36" irrigation drain at Lower Buckeye Road.
   - Underground electric line (SRP) 1/4 mile south of the RID canal.
   - (4) fiber optic cable lines and (2) 10" petroleum pipelines at the UPRR.

8. Benefitted Area: Eastern portion of the study area. Allows regional runoff to be conveyed to the river. Alleviates some local flooding along 51st Avenue, Buckeye Road, and Lower Buckeye Road. Decreases the potential total runoff reaching the alignment of the proposed South Mountain Freeway.

9. Project Participants: FCDMC, City of Phoenix, Developers.

P. Tres Rios Retention Basins

Throughout the ADMP process, the need for a solution to accommodate the interior drainage in the southwest portion of the study area due to the proposed Tres Rios levee was discussed. The purpose of the discussions was ultimately to make the U.S. Army Corps of Engineers aware of the imapcts created by constructing the levee. An analysis to determine the benefit of 1 large retention basin versus several smaller retention basins was developed in September, 2000 and can be found in **Appendix E**. Based on the interior drainage analysis, the Draft Recommended Plan indicated a series of retention basins constructed behind the levee and were shown as part of the Recommended Plan.

In this final Recommended Plan, the Tres Rios Retention Basins are omitted, as it was determined that their benefit is solely to relieve interior drainage south of Southern Avenue, and would have no impact to the remaining ADMP elements. Thus the responsibility of accommodating interior drainage due to the proposed Tres Rios levee is that of the Corps of Engineers and is not included in this ADMP.

The ultimate solution for the accommodation of interior drainage is not required to be a series of retention basins as previously recommended in the Draft of this report, but rather could be a single basin, a linear basin behind the length of the levee, or some other solution as determined by the Corps of Engineers.

Q. Watershed Build-Out Conditions

Due to the Federal Emergency Management Agency (FEMA) regulatory floodplains within the study area, the Durango ADMP recommended plan elements were developed and sized based on existing watershed conditions hydrology. This was done so that when the master plan elements are constructed, the regulatory floodplains can be removed from the FEMA Flood Insurance Rate Maps (FIRM). FEMA regulates floodplains based on existing watershed conditions only. The watershed hydrology was updated for fully developed watershed conditions at build-out assuming on-site retention is in place. The master plan elements were then re-sized for build-out conditions flows to determine if any cost savings could be realized due to possible reductions in channel sizes.

Upon detailed analysis, it was determined that there is relatively little overall cost savings by designing for build-out conditions in the Durango ADMP Watershed. While certain channel segments and culverts could be reduced due to a reduction in peak flows, other channel segments were found to increase due to higher peak flows. There were no channels or basins that could be eliminated. The overall cost savings for the project was less than ½% of the original cost of the Recommended Plan. Cost savings of approximately $2.3 million and $0.9 million could be realized on the Durango Regional Conveyance Channel (DRCC) System and the 47th Avenue System respectively, while the cost of the Durango Regional Outfall Project (DROP) System and the Sunland Avenue System would increase by approximately $1.2 million and $1.5 million respectively.

A full summary of the build-out conditions analysis can be found in **Appendix B**.

Dysart Rd
El Mirage Rd
115th Ave
107th Ave
99th Ave
91st Ave
83rd Ave
75th Ave
67th Ave
59th Ave
51st Ave
43rd Ave
35th Ave
27th Ave
I-17 Freeway

Papago Diversion Channel
2-15'x10' CBC
I-10 Freeway
RID Canal
Durango Regional Outfall Lateral #1
DRC Basin #4
Van Buren St
Durango Regional Outfall Lateral #2
RID Canal
Durango Regional Outfall Channel
Durango Regional Outfall
Durango Regional Outfall Basin #1
Durango Regional Outfall Basin #2
Durango Regional Outfall Basin #3
UPRR
Buckeye Rd
TOLLESON WWTP
Conveyance Channel
DRC Basin #3
47th Ave Lateral
POWER STATION
47th Ave Basin
Buckeye Rd
RID Canal
47th Ave Channel
Lower Buckeye Rd
POWER SUB-STATION
Agua Fria River
Lower Buckeye Rd
Buckeye Feeder Canal
Durango Regional Conveyance Channel
DRC Basin #2
Broadway Rd
AVONDALE WWTP
Sand & Gravel Pit / DRC Basin #1
Durango Regional
Sunland Channel
91ST AVENUE WWTP
Buckeye Feeder Canal
Southern Ave
Salt River
Gila River

LEGEND
- Phoenix
- Maricopa County
- Tolleson
- Avondale
- Avondale Annexation Limits
- Phoenix Annexation Limits
- Tolleson Annexation Limits

N

0 600 1200 2400 3600 4800
SCALE IN FEET

FIGURE V-1

PROJECT TITLE: DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

EXHIBIT TITLE: RECOMMENDED PLAN
08/15/02

Dysart Rd
El Mirage Rd
115th Ave
107th Ave
99th Ave
91st Ave
83rd Ave
75th Ave
67th Ave
59th Ave
51st Ave
43rd Ave
35th Ave
27th Ave
I-17 Freeway
Papago Diversion Channel
2-15'x10' CBC
I-10 Freeway
RID Canal
Durango Regional Outfall Lateral #1
Van Buren St
Durango Regional Outfall Lateral #2
DRC Basin #4
RID Canal
Durango Regional Outfall Channel
Durango Regional Outfall Basin #1
Durango Regional Outfall Channel
Durango Regional Outfall Basin #2
Durango Regional Outfall Basin #3
UPRR
47th Ave Lateral
POWER STATION
UPRR
Buckeye Rd
47th Ave Basin
Buckeye Rd
TOLLESON WWTP
Conveyance Channel
DRC Basin #3
47th Ave Channel
RID Canal
Agua Fria River
Lower Buckeye Rd
Lower Buckeye Rd
POWER SUB-STATION
Buckeye Feeder Canal
Durango Regional Conveyance Channel
DRC Basin #2
Broadway Rd
Sand & Gravel Pit / DRC Basin #1
AVONDALE WWTP
Durango Regional
Sunland Channel
91ST AVENUE WWTP
Buckeye Feeder Canal
Southern Ave
Salt River
Gila River

LEGEND

- Proposed ADMP Channel
- Proposed ADMP Basin
- Existing Floodplain
- Residual Floodplain

N

0 600 1200 2400 3600 4800
SCALE IN FEET

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

EXHIBIT TITLE:
EXISTING AND RESIDUAL FLOODPLAINS
08/15/02

FIGURE V-2

VI. LANDSCAPE, AESTHETICS & MULTI-USE

A. Introduction

As part of the Durango ADMP process, a major objective has been to maximize opportunities to incorporate landscape aesthetics and multi-use into an effective flood control solution for this study area ("NAMU"- natural appearing multi-use). This effort has been driven by the belief that flood control solutions which successfully blend engineering, aesthetics, and multiple uses will provide the greatest benefit to the community. The study has included an extensive landscape aesthetic and multi-use analysis which documents the factors which have contributed to the development of recommended landscape themes deemed appropriate for the Durango area. Factors include existing and future desired landscape character, visual quality, visual resources, historic, prehistoric, and cultural influences and multi-use opportunities. Data was collected and concepts developed based upon field visits, project team meetings, stakeholder and agency meetings, municipal planning documents, and public open house meetings. This section describes the existing visual conditions, and the proposed landscape, aesthetics, and multi-use opportunities which are recommended to be incorporated into the design of the recommended plan for the Durango study area.

B. Recommended Plan

The recommended plan is divided into several different "projects" as depicted on the key map on **Figure VI-1**. The projects include the Durango Regional Outfall Channel, Basins and Laterals; the Durango Regional Conveyance Channel and Basins; the Sunland Channel; and the 47th Avenue Channel, Basin and Inlet. Each project will be described separately. The narrative for each project includes a description of the Visual Analysis, the Desired Landscape Character Theme, Multiple Use Opportunities, and the Recommended Landscape Design Guidelines.

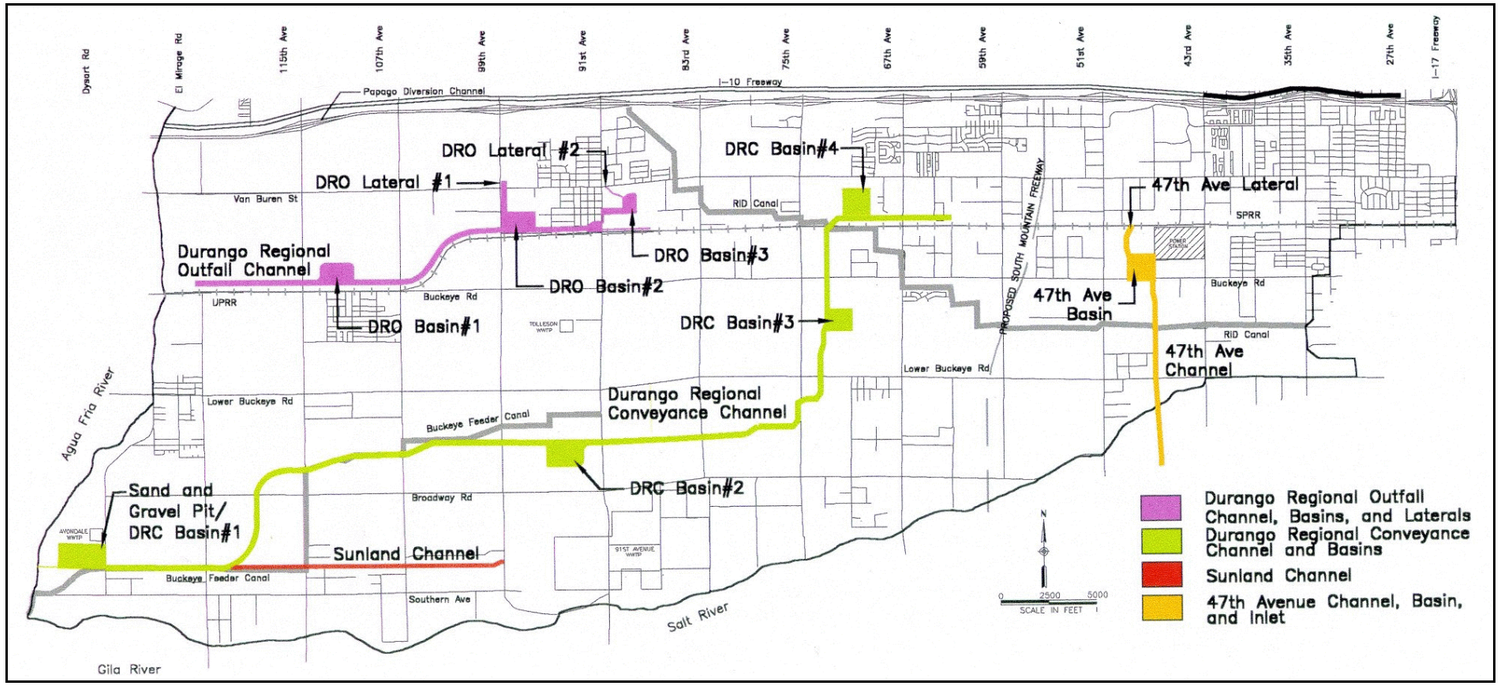


Figure VI-1. - Recommended Plan Key Map

1. Visual Analysis

The corridor visual analysis is intended to document existing visual conditions specific to the areas proposed as part of the recommended flood control plan alignment(s). Representative photographs are utilized to depict existing visual conditions. Refer to the **Figure VI-2, Visual Analysis Photo Key Map** for photograph locations.

2. Desired Landscape Character Themes

Because of the diversity within the Durango study area and the non existence of a single dominant appropriate theme applicable throughout, it is recommended that a mixed theme approach be taken to the landscape design of the recommended plan. The recommended landscape theme for each area or component should bear a relationship to either the proposed use, existing landscape character, future desired landscape character, and / or characteristics relating to the culture, history, or prehistory of the area. The desired landscape character themes are based on the information presented in the data collection phase of the project, supplemental corridor analysis, and the alternative evaluation process. **See Figures VI-3, VI-4, and VI-5**.

3. Multiple Use Opportunities

The recommended flood control plan for the Durango area features numerous opportunities to incorporate multiple uses including a variety of potential detention basin/park sites to serve existing and future development as well as multi-use trail/channel corridors providing local links to the regional trail systems along the Salt, Gila, and Agua Fria Rivers **(See Figure VI-3)**. The multi-use opportunities developed as part of this study and incorporated into the recommended plan are derived from recreational/park sites and trail alignments identified in various planning documents for the Cities of Phoenix, Tolleson, and Avondale. Grading and landscaping concepts for basins and channel corridors should consider park and recreational uses, buffers, safety, visual interest, maintenance, space requirements, and Americans with Disabilities Act (ADA) accessability. Maintenance roads should be designed in an aesthetically pleasing manner as meandering multi-use trails with a stabilized decomposed granite surface to allow for pedestrian, bicycle, and equestrian uses. Each corridor and basin should be examined individually to determine appropriate maintenance access needs. In order to maximize opportunities for landscape enhancement, buffering, and aesthetic grading it is recommended that the maintenance road be designed on only one side of channel corridors where possible.

4. Recommended Design Guidelines

Proposed landscape treatments should be consistent with adjacent developments and reinforce the landscape standards and guidelines proposed as part of the City of Phoenix's Estrella Village Plan, or landscape guidelines and objectives for the Cities of Tolleson and Avondale as applicable. The design guidelines included herein include a description of the recommended landscape palette, arrangement, scale of spaces, buffers, treatment of grading, low flow channels, and structures, and other amenities as applicable.

C. Durango Regional Outfall Channel, Basins and Laterals

The flood control solution proposed for the northwest portion of the Durango study area in the Cities of Tolleson and Avondale includes the Durango Regional Outfall (DRO) Channel (Via FÁrrea Channel), Durango Regional Outfall Basins 1 (Cashion Station Basin), 2 (Cowden Station Basin), and 3 (Jean Station Basin), and the Durango Regional Outfall Laterals 1 and 2. These facilities are intended to relieve the flooding which occurs along the north side of the UPRR and in the downtown Tolleson area. **See Figure VI-3**.

1. Corridor Visual Analysis

The alignment generally follows the north side of the railroad from approximately 85th Avenue west through the Coldwater Springs development to the outfall at the Agua Fria River, with some minor "jogs" to avoid existing development. The DRO Channel from 85th Avenue to 107th Avenue, Basins 2 and 3, and Laterals 1 and 2 are located within the City of Tolleson, and the DRO Channel west of 107th Avenue and Basin 1 are within the City of Avondale.

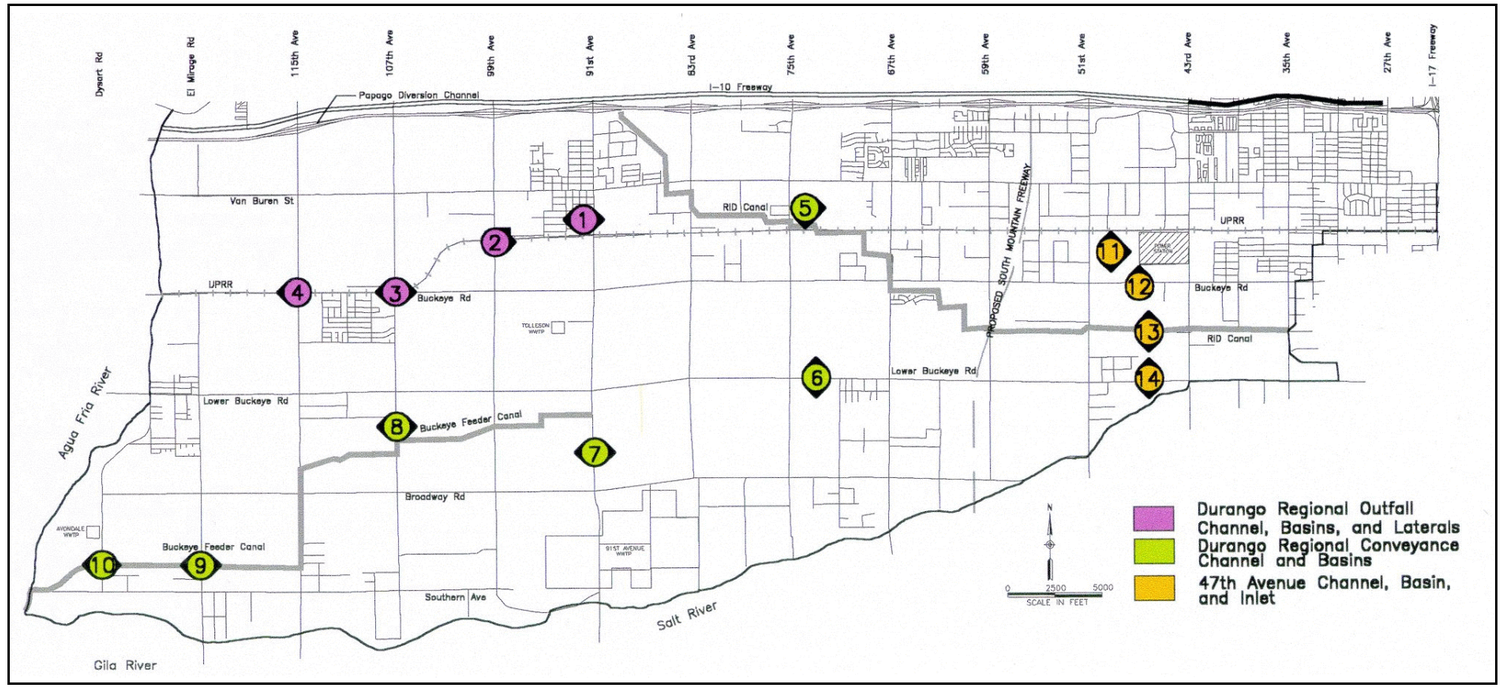


Figure VI-2. - Visual Analysis Photo Key Map

The area in the vicinity of 91st and 99th Avenues in Tolleson has a unique character with the existence of formal wind rows of pecan trees. Shaded irrigation canals, rows of large scale canopy trees, and turf characterize many areas in the vicinity of 91st Avenue within the City of Tolleson.

The majority of the railroad frontages consist of industrial type uses with relatively low visual quality. With the potential for the railroad corridor to become a future light rail corridor, opportunities to improve and enhance the visual quality of this corridor should be maximized. The western portion of the alignment has been incorporated into the Coldwater Springs development and golf course.

DRO Basin #3 Site - Northeast Corner of UPRR and 91st Avenue (Photo key location 1)

(Looking Northeast) (05/2000)

(Looking East) (05/2001)

UPRR at 91st Avenue(Photo key location 1)

(Looking West-existing pecan tree row along south side of UPRR) (05/2000)

(Looking East) (05/2000)

UPRR at 99th Avenue (Photo key location 2)

(Looking East) (05/2000)

(Looking Northeast) (05/2000)

UPRR at 107th Avenue (Photo key location 3)

(Looking East) (05/2000)

(Looking West) (05/2000)

UPRR at 115th Avenue (Photo key location 4)

(Looking East) (05/2000)

(Looking West) (05/2000)

2. Desired Landscape Character Theme

The "Railroad Theme" combined with a "Park-Like Theme" and / or modified "Formal Promenade Theme" would be applicable for the corridor and three associated basins which follow along the north side of the UPRR from 85th Avenue to the Coldwater Springs golf course. **See Figures VI-3 and VI-5**. The combination of themes allows for the design of an active recreation corridor and park sites which incorporates both turf and decomposed granite planting areas as well as shade trees in both formal and informal arrangements. Amenities and hardscape elements would reflect a railroad theme. This approach will result in a relatively lush appearing railroad corridor which provides opportunities for greater visual interest and variety, and which also relates to the existing landscape character (formal pecan tree rows) in the area and the landscape design approach for both the Cities of Tolleson and Avondale.

3. Multiple Use Opportunities

The three basins provide the opportunity to preserve community recreational open space in Tolleson and Avondale. A variety of active recreation uses can be accommodated in the three detention basins. These park facilities should be master planned in conjunction with the Cities of Tolleson and Avondale's Parks and Recreation Department once recreational needs for the area are identified and specific park uses programmed. Together with the basins, the channel corridor along the north side of the railroad will enhance this potential future light rail corridor, provide viewing opportunities for the railroad as well as a multi-use trail link to the regional trail system along the Agua Fria River. To further enhance the local trail system, a multi use trail connection is recommended north of DRO Basin #3 from the DRO Lateral #2 to the RID canal. With this connection, the RID Canal could become a potential trail corridor which would link a number of trail alignments thus greatly increasing the length of continuous trail in this area. The maintenance road both along the channel corridor and around the basins perimeter should be designed as a multi-use trail with a stabilized decomposed granite surface.

4. Recommended Design Guidelines

Currently a streetscape/drainage improvement project is under design for Van Buren Street in the City of Tolleson from approximately 91st Avenue to 96th Avenue. This project includes a streetscape landscape design with street trees, landscape plantings, traffic calmers and specialty paving for pedestrian nodal areas, site furniture, and amenities. As the main road through the City, a primary objective for this streetscape is to establish an identity for Tolleson. The landscape design will create an "oasis" with the site amenities featuring an "old town" theme**.** The street tree concept features canopy street trees with color accent trees at nodal areas. The street tree theme will be complimented by a variety of color shrubs, ground covers, and accent plants. Amenities which may be incorporated include a clock tower, bus shelters, trellis', and ornamental iron site furniture such as drinking fountains, lighting, benches, and trash receptacles. As another potential major corridor for Tolleson, the railroad corridor should also be designed to reinforce Tolleson's identity.

Landscape Treatment. The landscape palette would include extensive turf with canopy shade trees and color/accent trees as well as some side slope areas in both the basins and channels which would receive decomposed granite and mass shrub plantings. Primary canopy trees will consist of varieties such as Mesquite, Oak, Evergreen Elm, and Sissoo, with palms or color accent trees such as Acacia or Chinese Pistache also used in areas for special emphasis or significance. Strategic planting placement will serve to add visual interest, provide climate mitigation, and provide mitigation or visual buffering as appropriate for the adjacent railroad and other adjacent industrial uses. Shrub varieties may include: Cassia sp., Leucophyllum sp., Ruellia sp., Caesalpinia sp., Sophora, Simmondsia chinensis, Calliandra californica, Baccharis centennial, Hymenoxys acaulis, Lantana sp., Dalea sp, Hesperaloe, Convolvulus cneorum, Damianita, and Acacia redolens 'Desert Carpet'. Placement of materials in both formal and informal arrangements should be designed to maximize visual interest and should also consider the potential recreational uses of these areas.

Grading. Slopes and grading for both the channels and basins should vary and undulate (4:1 to 8:1 or more) to create a natural appearing landform. Both the top of slope (and trail) and toe of slope should meander slightly in a natural manner to create visual interest and variety. Grading should be natural, organic and freeform and should not follow site property lines. The basins should be designed with multiple levels including a low flow channel to maximize usability for various recreational activities. Low flow channels should be turf or natural rock depending on location. The basin grading should also include upper level flat areas for a potential parking lot and ramada locations. The trails and any access to the bottom of the basin should be graded to be ADA accessible.

Arrangement / Scale. The arrangement of materials along this alignment should vary and include both formal and informal groupings depending on location. Massings, scale of spaces, and degree of enclosure should vary along the corridor with some areas featuring a high degree of massing and sense of enclosure and other areas larger scale and open to allow views of the railroad and park areas.

Amenities / Structures. Amenities and structures should be designed to reinforce the railroad theme and or City of Tolleson identity.

Nodes. The primary nodes associated with the DRO Channel include the three detention basin sites, intersections with all major roadways including 91st Avenue, 99th Avenue, 107th Avenue, 115th Avenue and the connection to the regional trail system along the Agua Fria River. A grade separated crossing is desirable at all major roadways, however has not been accounted for in the preliminary channel designs or cost estimates. Nodes should receive accent / color plants. Site furniture, ramadas and other amenities may be incorporated within basins and at the intersection of the regional trail system at the Agua Fria River along with signage or an informational kiosk specific to that particular location. Public education opportunities, buildings, hardscape elements, design details, public art, and structures can be developed to establish relevant themes for special emphasis areas.

D. Durango Regional Conveyance Channel and Basins (DRC)

The proposed flood control facilities for the central portion of the study area consist of the Durango Regional Conveyance Channel, (DRCC, Estrella Channel) and Basins #1 (Sand and Gravel Pit), 2 (Pueblo Poniento Basin), 3 (Santa Maria Basin), and 4 (Fowler Station Basin). The north and eastern portion of this corridor to107th Avenue and Basins 2, 3, and 4 are within the City of Phoenix. The corridor west of 107th Avenue is within the City of Avondale annexation limits. **See Figure VI-3**.

1. Corridor Visual Analysis

The Durango Regional Conveyance Basin #4 is located at 71st Avenue north of the UPRR. The Durango Regional Conveyance Channel is a conveyance facility which originates at the DRC Basin #4, proceeds to the south past Lower Buckeye Road, then jogs to the west , south, and west again following the property lines of proposed developments in the area of 75th Avenue. West of 83rd Avenue the alignment angles to the southwest to follow a power line corridor to 107th Avenue. West of 107th Avenue the corridor angles to the southwest generally following the BFC alignment. At the intersection of 115th Avenue and the BFC the corridor proceeds due west then arcs to the south to follow an alignment approximately one half mile west of 115th Avenue. The corridor then arcs to the west again to follow the BFC / Sunland alignment to Dysart Road. Just west of Dysart Road, the channel terminates at DRC Basin #1 / Sand and Gravel Pit. A pipeline corridor then extends from DRC Basin #1 due west to the outfall at the Agua Fria River. The Durango Regional Conveyance Channel alignment incorporates the Sunland Channel which originates at 99th Avenue and follows the Sunland Avenue alignment to the DRCC. The DRCC also includes the two additional park/detention basin locations - one between Buckeye Road and Lower Buckeye Road east of 75th Avenue (DRC Basin #3) and one between 91st and 99th Avenue south of the BFC (DRC Basin #2).

The existing areas surrounding the Basin #4 site and northeastern portion of the channel corridor are a mixture of industrial and agricultural uses. Areas south of Buckeye Road are primarily existing

agricultural lands which are quickly being developed into residential uses. Other than the existing Swift Transportation facility which is located northwest of the corner of 75th Avenue and Lower Buckeye Road, the entire area is planned to become residential with associated support facilities such as schools, parks, and neighborhood commercial. There are currently two schools in close proximity to this alignment - the Santa Maria Middle School on Lower Buckeye Road east of 75th Avenue, and the Union Elementary School on 91st Avenue between Lower Buckeye Road and Broadway Road. The alignment utilizes the existing open agricultural and currently undeveloped land and follows a portion of an existing transmission line corridor. The agricultural lands in this area have a wide open character, with little vegetation other than the crop lands, and allow a panoramic vista of South Mountain and the Estrella Mountains to the south. Opportunities to provide parks, trails, and other recreational uses for the planned residential development in this area as well as linkages to the school sites should be maximized.

The Basin #1 site is an existing Sand and Gravel mining operation. This use is expected to continue for a number of years.

Durango Regional Conveyance Channel and Basin 4
(Photo key location 5)

(DRC Basin 4 Site) (05/2000)

(Looking South) (05/2001)

Durango Regional Conveyance Channel
(Photo key location 6)

(Looking North - Channel and Basin #3 Site) (05/2001)

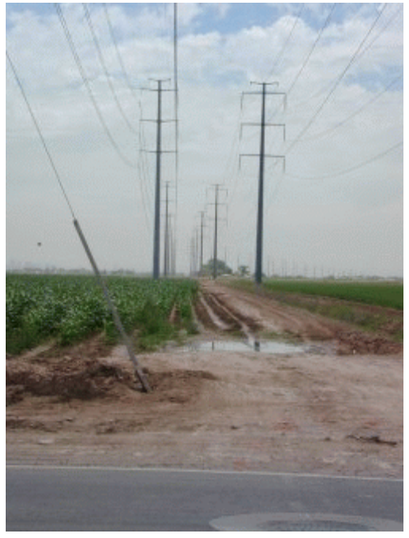
(Looking South) (05/2001)

Besides one mile roadways, the major existing corridors in this area consist of large transmission line corridors, the BFC and other numerous smaller irrigation canals. The Durango Regional Conveyance Channel utilizes the existing transmission line corridor south of Lower Buckeye Road from east of 83rd Avenue to 107th Avenue. This transmission line corridor contains of a double row of metal monopoles.

Design of the sections of the corridor following the transmission corridor should create pedestrian scale visual interest and include mitigation measures to buffer views of the power poles and power line and maintain the desirable views of the mountains to the south.

The recommended plan alignment also uses a small portion of the BFC alignment between 99th Avenue and 115th Avenue and then again from one half mile west of 115th Avenue to just west of Dysart Road. The existing BFC is an elevated, unimproved dirt lined ditch. It's route is adjacent to or within existing open agricultural lands and some rural residences. There are currently planned residential developments along the BFC from 91st Avenue to 115th Avenue. West of Dysart, the route is also adjacent to the existing Sand and Gravel Pit to the north.

Durango Regional Conveyance Channel (Photo key location 7)
Transmission Line Corridor



(Looking East) (05/2001)

Durango Regional Conveyance Channel (Photo key location 8)
Transmission corridor along the existing BFC.

(Looking East) (05/2001)

(Looking West - Channel and Basin #2 Site) (05/2001)

(Looking West) (05/2001)

Durango Regional Conveyance Channel (Photo key location 9)

(Looking East) (06/2002)

(Looking West) (06/2002)

Durango Regional Conveyance Channel (Photo key location 10)

(Looking East) (06/2002)

(Looking West) (06/2002)

(Looking Northwest towards Sand and Gravel Pit) (06/2002)

2. Desired Landscape Character Theme

The desired landscape theme for the DRC Channel and Basins represents a combination of themes based on the surrounding land uses and surrounding landscape character. **See Figures VI-3 and VI-4**. The Durango Regional Conveyance Basin #4 and Channel corridor north ofI Buckeye Road are in an area of existing agricultural land uses and industrial facilities in the vicinity of the railroad. South of Buckeye Road, the Durango Regional Conveyance Channel and Basins 2 & 3, traverses an area which is primarily open agricultural land uses currently being developed and planned for residential uses. The flood control facility theme in this area should reflect the opportunity to preserve open space and provide active recreation areas for a growing residential community. Special emphasis areas can reflect the agricultural heritage of the area or railroad theme depending on location. Public education opportunities, buildings, hardscape elements, design details, public art, and structures can be developed to establish relevant themes for special emphasis areas.

The "Modified Sonoran Theme" is recommended in the industrial areas north of Buckeye Road with the "Railroad Theme" incorporated for special emphasis areas and amenities along the railroad corridor. The "Modified Sonoran Desert Theme" can be described as a modified natural overall theme characterized by decomposed granite slopes and an informal arrangement of a modified Sonoran Desert plant palette including Mesquite, Palo Verde, and Acacia trees, with complimentary shrubs, ground covers, and accent plants. Turf would be incorporated in areas suitable for potential active recreation uses.

In the vicinity of Buckeye Road and extending to Dysart Road with surrounding agricultural and residential uses, the theme should transition to a "Park-Like theme" with the "Agricultural Heritage Theme" incorporated for special emphasis areas. The overall "Park-Like Theme" can be described as a turf greenbelt with similar characteristics as Scottsdale's Indian Bend Wash through this area. The emphasis is on active recreation, park facilities and amenities. The treatment is characterized by primarily open turf areas with an informal arrangement of medium to large canopy trees for climate mitigation, power line corridor mitigation, and framing of views to the mountains.

West of Dysart Road the treatment of the corridor should transition to a more natural treatment consistent with the landscape theme proposed along the Agua Fria River corridor. Durango Regional Conveyance Basin #1 is an existing Sand and Gravel Pit in this area. The sand and gravel mining operations are expected to continue for a number of years however as phases are completed, mitigation of this area should include landscape improvements and aesthetic grading

3. Multiple Use Opportunities

The overall flood control facility alignment in this area consisting of four total detention basins and connecting channel corridor provides an opportunity to create and preserve valuable community recreational open space for a growing residential population. All basins should ultimately be designed to accommodate some form of active recreation and the channel designed as a trail corridor with an ultimate connection to the proposed regional trail system along the Agua Fria River. Durango Regional Conveyance Basin #1 is an existing Sand and Gravel Pit. Mitigation of this area at the conclusion of each phase of sand and gravel mining operations should include landscape improvements and aesthetic grading to accommodate appropriate recreational activities as programed by the City of Avondale's Parks Department. The pipeline corridor west of Basin 1 can be used as a trail corridor connection to the Regional Trail system along the Agua Fria. Basin 2 (between 91st and 99th Avenues) is located in an area designated for a community park facility per the City of Phoenix's Estrella Village Plan. Basin 3 (at 71st Avenue south of Buckeye Road) is located in an area designated for a neighborhood park facility per the Estrella Village Plan. These park facilities should be master planned in conjunction with the City of Phoenix Parks, Recreation, and Library Department once recreational needs for this area are identified and specific park uses programmed. Durango Regional Conveyance Basin #4 (at 71st Avenue on the north side of the UPRR) is located in an area along the railroad corridor designated to develop as industrial. The channel corridor connecting the basins utilizes open agricultural lands in the north/south direction and follows a portion of a transmission corridor, the BFC, and open agricultural lands east/west. The channel alignment provides a multi use trail corridor linking to the proposed regional trail along the Agua Fria River. Where possible the trail should be located on the south side of the transmission corridor to provide opportunities for mitigation of the power line and allow unobstructed mountain views to the south. Maintenance access to the transmission line must be maintained.

4. Recommended Design Guidelines

Landscape Treatment. Proposed landscape treatments should be consistent with adjacent developments and reinforce the park and landscape standards and guidelines proposed for these areas by the Cities of Phoenix and Avondale.

All basins and channel corridors should be designed for active recreation with a heavy emphasis on turf and shade trees. The plant palette will be consistent with the Estrella Village Plan in the City of Phoenix, and with the TresRios Greenway Specific Plan in Avondale. North of Buckeye Road the primary tree palette will consist of Mesquite, Palo Verde or Palo Brea and Acacia with flowering trees or palms as accents. South of Buckeye Road the primary canopy trees will consist of Mesquite, Oak, Chinese Pistache, Evergreen Elm, Sissoo, and Acacia with palms or color accent trees such as Acacia, Palo Brea, or Chinese Pistache also used in areas for special emphasis or significance. Strategic tree placement will serve to add visual interest, provide climate mitigation, mitigation for the adjacent transmission corridors, and also allows for creation of view corridors of the mountains to the south. Placement and arrangement of materials should also consider the potential recreational uses of these areas.

In buffer areas, or areas where screening or special emphasis is required, decomposed granite planting areas may be incorporated. The shrub palette may include: Cassia sp., Leucophyllum sp., Ruellia sp., Caesalpinia sp., Sophora, Simmondsia chinensis, Calliandra californica, Baccharis centennial, Hymenoxys acaulis, Lantana sp., Dalea sp, Hesperaloe, Convolvulus cneorum, Damianita, and Acacia redolens 'Desert Carpet'. Placement and massings of materials should reflect an informal arrangement and should be designed to maximize visual interest, provide screening in areas as appropriate and should also consider the potential recreational uses of these areas.

In the areas in close proximity to the river, a more native palette should be utilized consisting primarily of Mesquite and Palo Verde trees in conjunction with a variety of native shrubs, groundcovers, and accents.

Grading. Slopes and grading for both the channels and basins should vary and undulate (4:1 to 8:1 or more) to create a natural appearing landform. Both the top of slope (and trail) and toe of slope should meander in a natural manner to create visual interest and variety. Grading should be natural, organic and freeform and should not follow site property lines. The basins should be designed with multiple levels including a low flow channel to maximize usability for various recreational activities. Low flow channels should be turf or natural rock depending on location. The park sites (especially the community park and neighborhood park sites (DRC Basins #2 and 3)) should also include upper level flat areas for a potential parking lot and ramada locations. The trails and any access to the bottom of the basins should be graded to be ADA accessible.

Channel sections adjacent to transmission line corridors should include a landscape buffer between the trail and power poles. The landscape buffer should include berming and tree and shrub massings to mitigate the views of the power line and create pedestrian scale visual interest.

Arrangement / Scale. The general scheme for the DRC Channel and Basins should reflect an informal arrangement which provides visual interest, shade for potential users, direct views of mountains, and adds screening where needed

Amenities / Structures. Minimize hard structures. Features should be designed to blend using natural materials or materials which are colored / stained / and or textured to be compatible. Amenities can be designed to reinforce the agricultural heritage of the area, railroad, or river areas as appropriate for each location.

Nodes. The primary nodes associated with the DRC Channel include the four detention basin sites, intersections with the UPRR, local trail intersections, intersection with the RID canal, and all major roadway intersections including 75th Avenue, 83rd Avenue, 91st Avenue, 99th Avenue, 107th Avenue, 115th Avenue, El Mirage Road, Broadway Road, and Dysart Road as well as the connection to the regional trail system along the Agua Fria River. A grade separated crossing should be provided at all major roadways, however has not been accounted for in the preliminary channel designs or cost estimates. Nodes should receive accent / color plantings. Site furniture, ramadas and other park amenities such as benches, lighting, drinking fountains, barbeque units, picnic tables, and play equipment may be incorporated within basins and at trail intersections along with signage or an informational kiosk specific to that particular location. Public education opportunities, buildings, hardscape elements, design details, public art, and structures can be developed to establish relevant themes such as the agricultural heritage of the area, railroad theme or river areas as applicable.

E. 47th Avenue Channel, Basin, and Inlet

The eastern portion of the study area within the City of Phoenix is served by a flood control facility which generally follows an alignment adjacent to 47th Avenue and an existing power line corridor.

1. Corridor Visual Analysis

This alignment originates at the 47th Avenue Detention Basin Inlet which conveys water from the UPRR to the 47th Avenue Detention Basin (Pueblo Del Rio Park) located at the northwest corner of 47th Avenue and Buckeye Road. From the 47th Avenue Detention Basin, the 47th Avenue Channel conveys water to the south along the power line corridor to the Salt River. **See Figure VI-3**.

The selected alignment utilizes open undeveloped or agricultural corridors within an area which contains primarily industrial development. The majority of the alignment south of Buckeye Road follows an existing canal and power line corridor. The 47th Avenue power line corridor contains three rows of tall metal monopoles north of Buckeye Road and two rows south of Buckeye Road. An existing irrigation ditch follows along the east side adjacent to the power line corridor for much of the distance south of Buckeye Road.

Panoramic views of South Mountain to the south are partially obstructed by buildings and power poles. Visual quality varies from one property to the next, however, many areas are characterized by industrial developments with outdoor operations or storage yards which are not sufficiently screened and have generally low visual quality. A flood control solution in this area provides a great opportunity to screen objectionable views, preserve desirable view corridors to the south, provide an open space recreational amenity and preserve a landscaped open space corridor and regional trail system link for industrial facility employees in an area relatively devoid of amenities.

47th Avenue Detention Basin Inlet Area (Photo key location12)
Southeast corner of 51st Avenue and the UPRR

(Looking North - adjacent industrial development)
(05/2000)

47th Avenue Detention Basin Inlet Area (Photo key location 12)

(Looking East - adjacent industrial development) (05/2000)

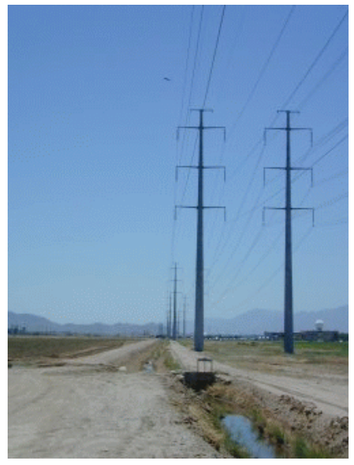
(Southwest of alignment - views of adjacent historic mills and background mountains) (05/2000)

47th Avenue Power Line Corridor and Buckeye Road
(Photo key location 13)

(Looking North- 47th Avenue Detention Basin Site) (05/2000)

47th Avenue Power Line Corridor and RID Canal
(Photo key location 14)

(Looking North) (05/2000)



(Looking South) (05/2000)

47th Avenue Power Line Corridor and Lower Buckeye
(Photo key location 15)

(Looking North) (05/2000)

(Looking South) (05/2000)

2. Desired Landscape Character Theme

The Proposed Landscape Theme for this area is a "Modified Sonoran Theme". **See Figures VI-3 and VI-4** . The "Modified Sonoran Desert Theme" can be described as a modified natural overall theme characterized by decomposed granite slopes and an informal arrangement of a modified Sonoran Desert plant palette including trees, shrubs, ground covers, and accent plantings. Turf would be incorporated in areas suitable for potential active recreation uses.

3. Multiple Use Opportunities

47th Avenue Basin, Inlet, and Channel landscape features a detention basin and multi use trail / channel which follows the alignment of a transmission line corridor . It is recommended that the basin and channel corridor feature a combination of active and passive recreational areas.

Turf should be limited to active recreation areas with planted and decomposed granite side slopes along the channel corridor and in more passive use areas of the basin. The detention basin should be designed with sufficient turf area, slope plantings, shade trees and park amenities (i.e. ramadas, benches, picnic tables, barbeques, lighting, and recreational/exercise/par course equipment) to facilitate site security and maintenance as well as provide a pleasant and functional environment for lunchtime and recreational uses for employees of adjacent industrial facilities.

The channel corridor alignment, adjacent to a north/south transmission line provides an off-road multi-use trail link to proposed regional trails along the banks of the Salt and Gila Rivers. In areas where alignments follow transmission line corridors, the combination multi-use trail and maintenance road must provide maintenance access to both the channel corridor as well as transmission line poles. The trail alignment should vary to maximize visual interest and variety while maintaining desirable views.

4. Recommended Design Guidelines

Landscape Treatment. Proposed landscape treatment for the 47th Avenue Channel and Basin should be consistent with desirable adjacent developments and reinforce the landscape standards and guidelines proposed as part of the City of Phoenix's Estrella Village Plan. The basin and channel corridor feature a combination of active and passive recreational areas. Turf should be limited to active recreation areas with planted and decomposed granite side slopes along the channel corridor and in more passive use areas of the basin. The plant palette will be consistent with the Estrella Village Plan Plant List, recommended street trees and adjacent existing industrial development. Primary canopy trees will consist of Mesquite, Palo Verde, and Acacia varieties, with palms and or color accent trees used in areas for special emphasis. Trees will also be complimented with mass plantings of compatible low water use arid region shrubs, ground covers, and accent plantings designed to maximize visual interest, variety, color, and texture. The shrub palette may include: Cassia sp., Leucophyllum sp., Ruellia sp., Caesalpinia sp., Sophora, Simmondsia chinensis, Calliandra californica, Baccharis centennial, Hymenoxys acaulis, Lantana sp., Dalea sp, Hesperaloe, Convolvulus cneorum, Damianita, and Acacia redolens 'Desert Carpet'. Strategic plant placement will serve to add visual interest, provide climate mitigation, mitigation for the adjacent transmission corridor, and also allows for creation of view corridors of the mountains to the south. Placement and arrangement of materials should also consider the potential recreational uses of these areas.

Grading. Slopes and grading for both the channels and basins should vary and undulate (4:1 to 8:1 or more) to create a natural appearing landform. Both the top of slope, trail, and toe of slope should meander in a natural manner to create visual interest and variety. Grading should be natural, organic and freeform and should not follow site property lines. The basin should be designed with multiple levels including a low flow channel to maximize usability for various recreational activities. Low flow channels should be turf or natural rock depending on location. The basin grading should incorporate a meandering perimeter trail with possible par course stations and also include upper level flat areas for potential ramada locations. The trails and any access to the bottom of the basin should be graded to be ADA accessible.

For channel sections adjacent to the transmission line corridor or adjacent to industrial facilities with poor visual quality, the design should include a landscape buffer between the trail and adjacent uses. The landscape buffer should include berming and tree and shrub massings to mitigate the views of the power line or other objectionable views and create pedestrian scale visual interest.

Arrangement / Scale. The general scheme for the 47th Avenue Channel and Basin should reflect an informal arrangement which provides visual interest, shade for potential users, directs views of mountains, and adds screening where needed. Plant massings shall vary creating a variety of scale of spaces, varying degrees of enclosure. The layout of plantings shall maintain and enhance desirable views of both adjacent historic mills and of the mountains to the south.

Amenities / Structures. Minimize hard structures. Features should be designed to blend using natural materials or materials which are colored / stained / and or textured to be compatible. Incorporate park amenities including ramadas, benches, lighting, signage, play equipment, etc. Design theme may reflect details evident in the design of the historic mills adjacent to the basin site.

Nodes. The primary nodes associated with the 47th Avenue Channel includethe detention basin site, the intersection with the UPRR, the intersection with the RID canal, and all major roadway intersections including Buckeye Road, and Lower Buckeye Road as well as the connection to the regional trail system along the Salt River. A grade separated crossing should be provided at all major roadways, however has not been accounted for in the preliminary channel designs or cost estimates. Nodes should receive accent / color plantings. Site furniture, ramadas and other park amenities such as benches, lighting, drinking fountains, barbeque units, picnic tables, and play equipment may be incorporated within basins and at trail intersections along with signage

or an informational kiosk specific to that particular location. Public education opportunities, buildings, hardscape elements, design details, public art, and structures can be developed to establish relevant themes.

F. Future Related Projects

A flood control solution will be developed for the Tres Rios area south of Southern Avenue and west of 99th Avenue to solve interior drainage problems in this area. The exact configuration and extent of the flood control facilities has not yet been determined. This project is not part of the Durango ADMP.

The Tres Rios area consists of existing agricultural lands adjacent to the Holly Acres Levee along the north side of the Salt/Gila River. With the availability of water in this area, the river areas adjacent to the levee represent dense areas of vegetation consisting of a mixture of Cottonwood, Willow, and a large amount of Tamarisk (Salt Cedar). Where vegetation opens, there are opportunities for relatively close up mountain views. These areas represent an opportunity to restore the natural character associated with the rivers, maintain and enhance mountain views, as well as restore and enhance bird and wildlife habitat. The river areas also have recreational significance as part of the regional trail system planned along those corridors.

The recommended theme for the flood control solution developed for this area would be a natural theme which incorporates native plant materials, enhanced bird and wildlife habitat, natural materials, possible water features, grading consistent with natural landforms, passive recreation uses, and a multi-use trail link to the regional trail system or nodes along the river corridors.

G. Public Sensing

As part of the Master Plan process, after the alternative evaluation process was completed and the preferred alternative selected, two public meetings were held on August 15 and August 17 in Tolleson and Phoenix respectively. The recommended plan was displayed and the community invited to review and comment. A questionnaire was distributed to all attendees. Sixteen people attended the August 15 public meeting at Littleton Elementary School in Tolleson and thirty four people attended the August 17 meeting at the City of Phoenix Fire Station #34. The results of Community Questionnaire 2 are summarized in **Appendix F**.

Conclusion: Generally, the reaction to the flood control facilities which incorporates the proposed multi use features and landscape amenities was well received by the public however many of the long time residents do not support any improvements which would encourage development of the area. There is a strong desire to retain the open spaces, natural features, and rural, agricultural heritage as much and as long as possible. Many suggested modifications to the alignment to be more compatible with existing land uses and proposed development plans.

Typical View to Gila River in Tres Rios Area

(05/2001)

H. Special Considerations

1. Landscape Costs

It should be noted that the themes, landscape treatments, and multi-use opportunities described herein represent a level of landscape treatment beyond the standard FCDMC funded landscape treatment as defined in the *Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects*. Implementation of the themes and multi-use features described herein will require a cost sharing arrangement with other partners or supplemental funding sources.

Per the current FCDMC Policy, the landscaping cost ceiling per acre for a suburban channel or basin is $40,000 per acre ($0.92 per s.f.). This represents the maximum total costs considered appropriate for landscaping including plantings, irrigation, seeding, general system costs, and labor. The FCDMC policy also includes a provision for some non landscaping aesthetic treatment such as for enhancing the structural components of District Projects. The maximum cost guideline for project aesthetic feature costs for a suburban facility is 8% for project costs of $1,000,000 and less,6% for project costs of $1,000,000 to $2,500,000, 5% for project costs of $2,500,000 to 10,000,000 , and 4% for projects over 10,000,000. Cost share percentage rates are determined between the District and project partners on a case by case basis and included in project Inter-governmental Agreements (IGA) for overall project costs.

For the purposes of this study, an estimated average per square foot landscape cost to completely implement the themes described herein is $1.80 per s.f., which is approximately double the landscape treatment cost of $0.92 per s.f. that the current FCDMC policy allows. Costs will vary depending on the exact types and sizes of materials, and the extent hardscape features, site furniture, buildings, structures, and other equipment is incorporated into the design. Addition of other elements such as lighting will also impact costs. These types of amenities could easily be phased in the future as funding becomes available.

2. Retention Basin Aesthetics & Multi-Use Evaluation

As a separate part of the project, an additional evaluation was performed to determine the additional land area required to enhance an "engineered" basin by incorporating aesthetic and multi-use features to create a "kinder and gentler" basin design that, with additional enhancements, can be utilized as a public park. The results of this evaluation determined that the additional area required is highly dependent on the individual site, but could range from approximately a 10 percent increase to approximately a 50 percent increase. The full evaluation of this analysis can be found in **Appendix G**.

PLAN KEY

- NODAL AREA
- PLANNED REGIONAL TRAIL ALIGNMENT
- PLANNED LOCAL TRAIL ALIGNMENT

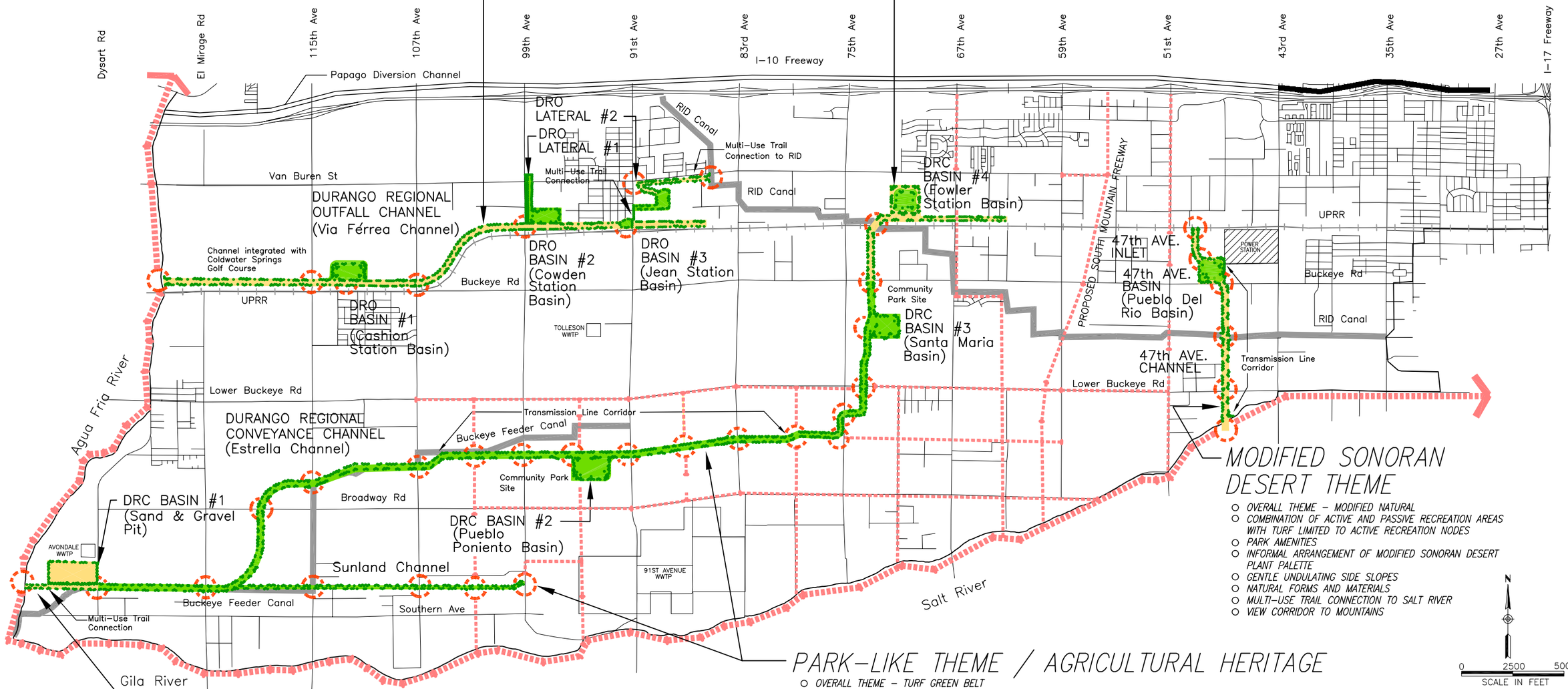
*NOTE: NAMES IN PARENTHESIS (Name) REPRESENT SUGGESTED POSSIBLE NAMES FOR THE PLANNED BASINS/PARKS AND CHANNELS

RAILROAD THEME COMBINED WITH PARK-LIKE THEME AND FORMAL PROMENADE

- COMBINATION OF FORMAL THEME AND PARK-LIKE THEME ADJACENT TO UPRR
- DESIGN CONSISTANT WITH TOLLESON AND AVONDALE LANDSCAPE OBJECTIVES
- FORMAL ROWS AND INFORMAL GROUPINGS OF LARGE SCALE CANOPY TREES
- UNDERSTORY TREATMENT IS A COMBINATION OF TURF , DECOMPOSED GRANITE AND SHRUB PLANTINGS
- FORMAL PLANTING AND HARDSCAPE ARRANGEMENT WITH BUILDINGS, HARDSCAPE ELEMENTS, DESIGN DETAILS, BRIDGES, PUBLIC ART, AND STRUCTURES FEATURING A RAILROAD THEME
- POSSIBLE FUTURE LIGHT RAIL CORRIDOR
- PUBLIC EDUCATION OPPORTUNITY – RAILROAD
- POTENTIAL BASIN/PARK SITES AND MULTI-USE TRAIL CORRIDOR LINK TO THE AGUA FRIA

MODIFIED SONORAN DESERT COMBINED WITH RAILROAD THEME

- CHANNEL AND BASIN NORTH OF BUCKEYE ROAD IN INDUSTRIAL AREA



MODIFIED SONORAN DESERT THEME

- OVERALL THEME – MODIFIED NATURAL
- COMBINATION OF ACTIVE AND PASSIVE RECREATION AREAS WITH TURF LIMITED TO ACTIVE RECREATION NODES
- PARK AMENITIES
- INFORMAL ARRANGEMENT OF MODIFIED SONORAN DESERT PLANT PALETTE
- GENTLE UNDULATING SIDE SLOPES
- NATURAL FORMS AND MATERIALS
- MULTI-USE TRAIL CONNECTION TO SALT RIVER
- VIEW CORRIDOR TO MOUNTAINS

PARK-LIKE THEME / AGRICULTURAL HERITAGE

- OVERALL THEME – TURF GREEN BELT
- EMPHASIS ON ACTIVE RECREATION, PARK FACILITIES, AND AMENITIES
- INCORPORATE "AGRARIAN THEME" AMENITIES
- LANDSCAPE TREATMENT CONSISTS PRIMARILY OF TURF WITH INFORMAL ARRANGEMENT OF MEDIUM TO LARGE CANOPY TREES FOR CLIMATE MITIGATION, POWER LINE CORRIDOR MITIGATION, AND FRAMING OF VIEWS TO THE MOUNTAINS
- GENTLE UNDULATING SIDE SLOPES
- MAINTAIN OPEN FEEL OF EXISTING AG LANDS
- MULTI-USE TRAIL CONNECTION TO AGUA FRIA AND GILA RIVERS

NATURAL THEME / NATIVE AMERICAN

- OVERALL NATURAL APPEARING THEME / TRANSITION TO RIVER AREA
- NATURAL FORMS, LAYOUT, AND MATERIALS
- LANDSCAPE TREATMENT CONSISTS PRIMARILY OF NATIVE PLANT PALETTE
- POSSIBLE WATER FEATURES
- BIRD AND WILDLIFE HABITAT IMPROVEMENT
- PASSIVE RECREATION / MULTI-USE TRAIL CONNECTION
- PUBLIC EDUCATION OPPORTUNITIES
- NATIVE AMERICAN THEME ELEMENTS CAN BE INCORPORATED

N

0 2500 5000

SCALE IN FEET

07/17/02

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
McCloskey ♦ Peltz, Inc.
LANDSCAPE ARCHITECTS

EXHIBIT TITLE:
RECOMMENDED PLAN
PROPOSED LANDSCAPE THEMES

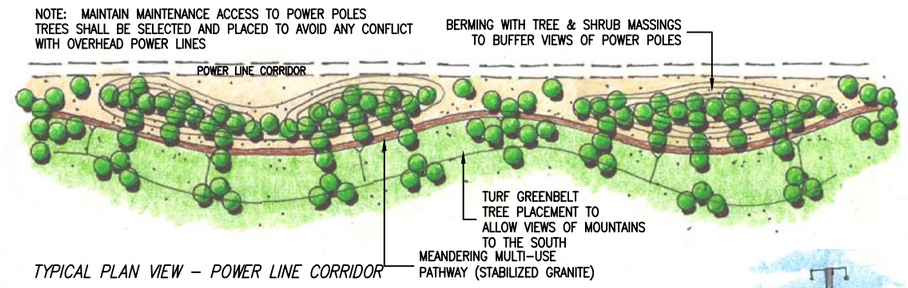
FIGURE VI-3

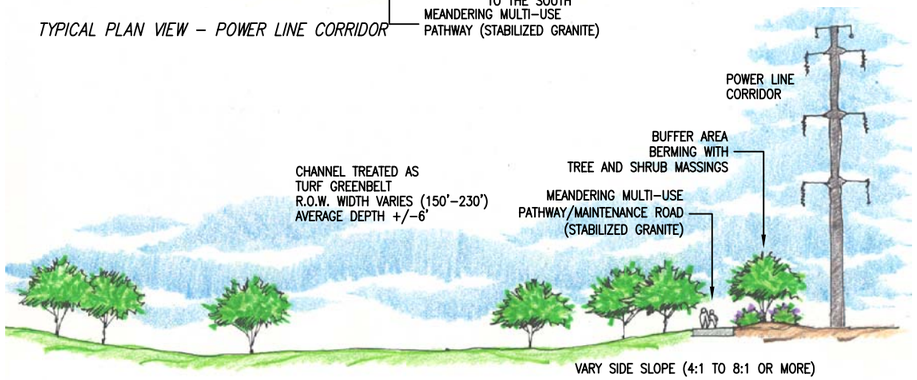
PARK-LIKE THEME
TURF GREENBELT
ACTIVE RECREATION EMPHASIS

NOTE:
COORDINATE RECREATIONAL FACILITY NEEDS
WITH MUNICIPAL PARK DEPARTMENT

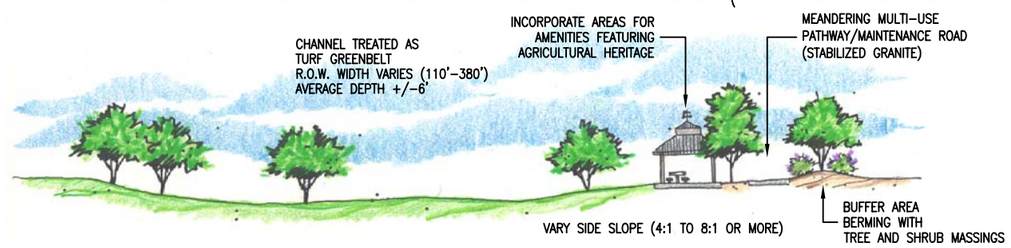
NOTE:
SLOPES AND GRADING FOR CHANNELS AND BASINS SHOULD BE ROUNDED AND SHOULD VARY AND UNDULATE TO CREATE A NATURAL APPEARING LANDFORM.
BASINS SHOULD BE DESIGNED WITH MULTIPLE LEVELS INCLUDING A LOW FLOW CHANNEL TO MAXIMIZE USABILITY FOR VARIOUS RECREATION ACTIVITIES.

TYPICAL BASIN PARK DURANGO REGIONAL CONVEYANCE CHANNEL





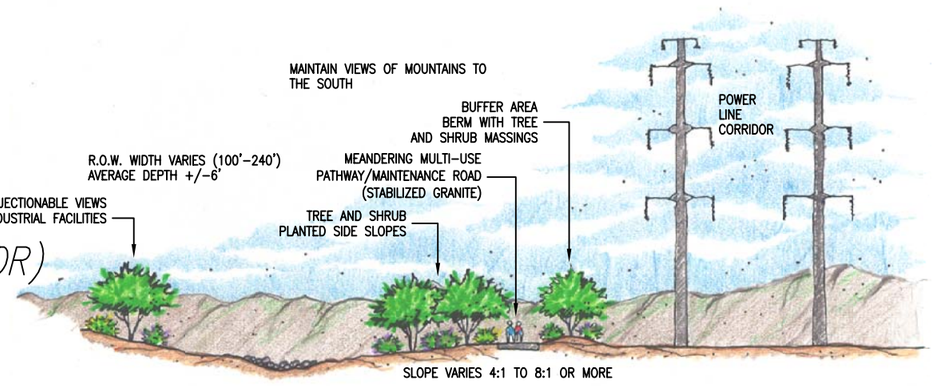
DURANGO REGIONAL CONVEYANCE CHANNEL (POWER LINE CORRIDOR)



DURANGO REGIONAL CONVEYANCE CHANNEL (NON POWER LINE CORRIDOR)

MODIFIED SONORAN DESERT THEME
MODIFIED NATURAL LANDSCAPE WITH
ACTIVE AND PASSIVE RECREATION AREAS

47TH AVENUE BASIN AND CHANNEL



47TH AVENUE CHANNEL (POWER LINE CORRIDOR)

07/01/02

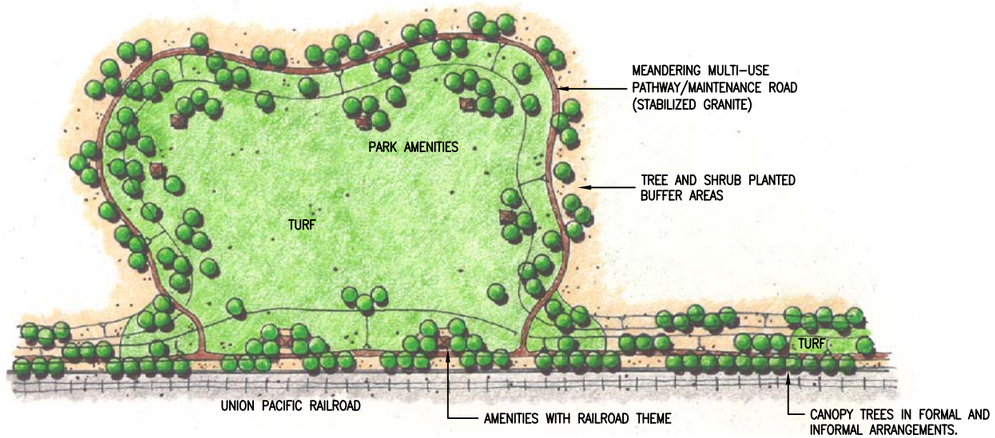
PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
McCloskey • Peltz, Inc.
LANDSCAPE ARCHITECTS

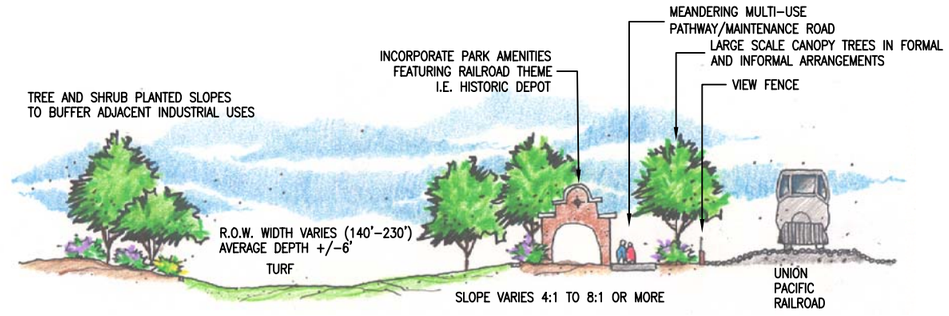
EXHIBIT TITLE:
RECOMMENDED PLAN LANDSCAPE CHARACTER

FIGURE VI-4

NOTE:
AMENITIES AND MATERIALS PALETTE FOR BASINS AND CHANNEL CORRIDOR IN TOLLESON TO BE COORDINATED WITH THE CITY OF TOLLESON VAN BUREN ROAD STREETSCAPE IMPROVEMENT PROJECT.



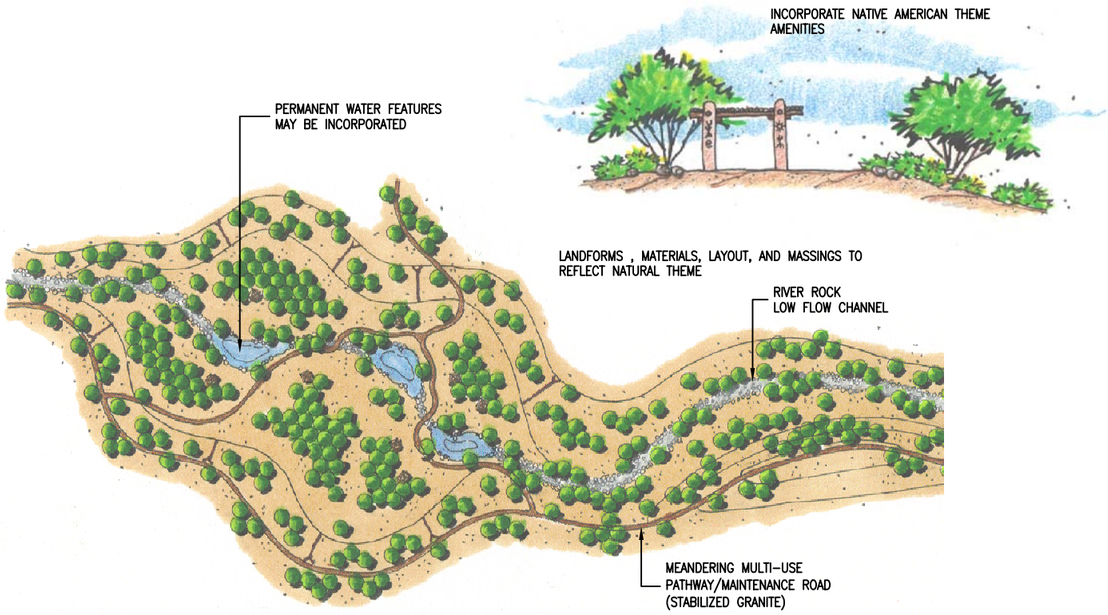
TYPICAL DURANGO REGIONAL OUTFALL BASIN AND CHANNEL



TYPICAL DURANGO REGIONAL OUTFALL CHANNEL

NOTE:
SLOPES AND GRADING FOR CHANNELS AND BASINS SHOULD BE ROUNDED AND SHOULD VARY AND UNDULATE TO CREATE A NATURAL APPEARING LANDFORM.
BASINS SHOULD BE DESIGNED WITH MULTIPLE LEVELS INCLUDING A LOW FLOW CHANNEL TO MAXIMIZE USABILITY FOR VARIOUS RECREATION ACTIVITIES.

NATURAL THEME



TRANSITIONS TO RIVER AREAS

07/01/02

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
McCloskey • Peltz, Inc.
LANDSCAPE ARCHITECTS

EXHIBIT TITLE:
RECOMMENDED PLAN
LANDSCAPE CHARACTER

FIGURE VI-5

VII. ENVIRONMENTAL & PERMIT ISSUES

A. Introduction

This section describes the environmental issues that may impact project implementation and identifies permits and approvals that may be required.

B. Ecological Assessment

At least 95% of the Durango project area has been disturbed by human activities and have allowed non-native plant and animal species to dominate the area. Little biological resource value is recognized in this area. The area, historically, has been used for agriculture. Currently, it is mostly comprised of urban, industrial and agricultural uses with very few areas still consisting of Sonoran Desert habitat. Undisturbed areas that still exist are chiefly in and adjacent to floodplains. The native vegetation in the Durango area is limited, but small areas of riparian zones still exist along the Gila, Salt, and Agua Fria Rivers. Portions of Agua Fria, Gila, and Salt River riparian forests as well as permanent and intermittent aquatic communities exist near these rivers. Vegetation communities typically consist of goodding willow, cottonwood, vine-mesquite grass, saltbush, red brome, bermuda grass, salt cedar, catclaw acacia, and ironwood. These areas provide potential habitat for several special interest species as well as several non-native terrestrial and aquatic species. Also, a constructed wetland associated with the City of Phoenix wastewater treatment plant exists along the Gila River beginning at 91st Avenue supported solely by the plant's discharge of treated effluent.

Four federally-listed species (lesser long-nosed bat, cactus ferruginous pygmy-owl, Yuma clapper rail, southwestern willow flycatcher) and five state-listed species (desert tortoise, western least bittern, western yellow-billed cuckoo, snowy egret, and great egret) may or are known to occur in the project area. All of these species are most likely to occur in aquatic communities or the adjacent riparian zones within the project area.

If possible, construction methods used during the Durango ADMP implementation (e.g. construction of diversion discharge points) within the banks of either of these river systems should strive to minimize impacts to the dense, mature riparian vegetation in these areas. Where impacts are unavoidable, plans should be in place to replace or mitigate for the removal of this type of vegetation. If construction activities would impact areas that contain suitable habitat for any of the four federally listed species, surveys should be conducted, using the proper protocol, to determine if federally listed species are present within the project areas. If federally listed species are found to be present, the District, or project sponsor, must consult with the U.S. Fish and Wildlife Service.

As currently planned, the only potential impacts to sensitive riparian habitats would occur with the construction of three of the four planned outfall structures. One of these three structures, the Buckeye Feeder Diversion channel, is planned to intersect the Agua Fria River. Two other outfall structures, the 47th Avenue and 91st Avenue channels, are designed to intersect the Salt/Gila River. In each case, a U.S. Army Corp of Engineers Section 404 Clean Water Act permit would likely be necessary if any dredging or filling is planned. The Corps' permit for these types of impacts would require mitigation for impacts to any mature riparian vegetation. Based on the current preliminary design plans there would be a small area of jurisdictional waters disturbed at each of the three proposed outfall sites, as noted in the project descriptions in Section V *Recommended Plan*, of this report. Therefore, replacement or compensatory mitigation for these impacts would be required, likely at a ratio of 1:1.

C. Cultural Resources

Prehistoric Hohokam culture has been documented in the Durango project area from 500-1,450 A.D. Development in the area has disturbed much of any surface evidence of the presence of prehistoric people but subsurface features in the area may still exist. The Hohokam people farmed the area and constructed an elaborate canal system through the Salt River Valley including the Durango project area. After the Hohokam presence, Spanish, Mexican, and Anglo factions began to occupy the area in the 18th century.

Within the project area, 30 prehistoric sites, including villages and artifact scatters, were identified during a literature search conducted for this project. Approximately five other sites were identified as historic, including two canal segments, a farmhouse, and two well sites. Specific site locations are identified in Section V of the *Data Collection Report* under separate cover for this study. During the alternative analysis process, the location of each of these cultural resource sites was considered when planning the drainage alignments. Where possible, alignments were chosen that would avoid these known cultural resource sites.

Because of the number and type of prehistoric sites present in the project area, it may not be possible to avoid impacting a small number of previously recorded prehistoric sites. Because of the nature of the data available, and the fact that the boundaries of many of the prehistoric sites have not been accurately defined, it is unclear if any of the proposed alignments will impact any prehistoric sites. According to the available data, it appears that the Buckeye Feeder Diversion Basin #3 proposed location is in the vicinity of what has been recorded as the Fowler Ruin, a pre-historic Hohokom village site originally documented in the 1920's. All prehistoric site locations, including the Fowler Ruin, are described and depicted in Section V of the *Data Collection Report*. An archeological inventory was conducted of the proposed basin location in April, 2001 by Scientific Archaeological Services. Results of that survey indicate that there is no surface expression of any archeological sites within that project's area and that no further work is recommended.

It is recommended that construction monitoring be implemented during any excavation activities to avoid impacts to any unknown buried prehistoric features.

Impacts to any of the historic train station, highway, or canal sites that may be within or adjacent to the proposed alignments should be avoided where possible. The currently proposed alignments and basin locations would not impact any of these known historic sites. If alignments shift, impacts would have to be re-evaluated based on information in the *Data Collection Report*. An extensive archaeological survey of the finalized project routes is recommended to accurately identify any historic sites that may be present.

D. Environmental Permits & Approvals

The recommended plan will require a Clean Water Act 404 Nationwide Permit (NWP), issued by the Army Corps of Engineers (CORPS), where projects impact jurisdictional waters of the U.S. Approval must be obtained in order to fill or impact jurisdictional waters. The recommended plan includes three outfall structures within riparian zones associated with jurisdictional waters. It is likely that the Corps will allow the construction of the proposed outfall structures under a Nationwide Permit for "Stormwater Management Facilities" (NWP #43) as long as impacts at each structure equal less than 0.5 acres. Mitigation for these impacts may also be required, probably at a ratio of 1:1. The Arizona Department of Environmental Quality (ADEQ) state water quality certification of jurisdictional waters is pre-certified for nationwide permit applications under Section 401 of the Clean Water Act. A National Pollutant Discharge Elimination System (NPDES) construction permit will also be required in order to construct this flood control facility. This project plans to discharge storm water to the Gila, Salt, and Agua Fria Rivers therefore a municipal NPDES permit will be required to utilize the outfalls. In this case, the FCDMC may be able to apply for a municipal application or if it already has one, may be able to include this in a system-wide or jurisdiction-wide municipal permit.

This project would impact rights-of-way and canals maintained by SRP and RID. As currently designed, the project plans to cross and modify SRP's BFC and cross an RID canal. SRP will require that the project coordinate with the existing systems of pipes, canals, and access roads to assure that no negative impacts occur to SRP or RID operations. The project would also require each organization's permission in order to impact canal or irrigation structures. The project would also be required to follow UPRR Drainage Modifications Procedures in order to obtain permission for drainage and waterway encroachment on railroad property/right-of-way.

Other interagency cooperation necessary for project completion will include: the City of Phoenix, City of Tolleson, City of Avondale, Maricopa County Department of Transportation (MCDOT), Maricopa County Recreation Services Department (MCRSD), Maricopa County Planning and Development Department, and the Arizona Department of Water Resources. Cooperation with each of these agencies/stakeholders will be required to obtain specific information/requirements regarding construction techniques, flooding issues, surface water rights, and existing and planned projects.

E. Potential Environmental Contamination

Environmental regulatory databases from federal, state, and local agencies were reviewed to document the type and location of any regulated sites within the project area. The database review documented 405 listed regulatory sites wtithin the project area. Listing of a site on the environmental regulatory records, however, does not mean the site is adversely affecting human health or the environment. The regulatory sites that are near the proposed flood control projects in this report are listed in the following table. Database site types are explained in detail in the *Data Collection Report* and are indicated in the table, and in the design drawings, by site code.

Site Code	Site Type (refer to Data Collection Report for more details)	Hazardous Waste Sites (according to Site #) identified by a number and a hexagon on design drawings
CERCLIS-NFRAP	Comprehensive Environmental Response, Compensation, and Liability Information System - No Further Remedial Action Planned	#225, #226, #240
ERNS	Emergency Response Notification System	#397
RCRIS-SQG	Resource Conservation and Recovery Information System	#306, #225, #347, #240, #250, #397
HWS	ZipAcids	#226, #250
FINDS	Facility Index System/Facility Identification Initiative Program Summary Report	#306, #305, #225, #116, #347, #389, #240, #250, #397
LUST	Leaking Tank Listing	#308, #310, #304, #311, #221, #217, #392, #397
AZ_SPILL	Hazardous Material Logbook	#117, #345, #250, #404
RCRIS-LQG	Resource Conservation and Recovery Information System	#305
UST	Underground Storage Tank Listing	#308, #310, #304, #307, #311, #221, #217, #390, #392, #405, #397
WWFAC	Waste Water Treatment Facilities	#397
DRY WELL	Drywell Registration	#214, #250

Prior to construction, these sites should be located and assessed regarding their proximity to proposed construction activities. The currently proposed alignments would not impact any potential environmental contamination sites. However, if alignment shifts occur

prior to construction and there are any contaminated sites that conflict with the proposed route such as contaminated soils sites due to leaking storage tanks, for example, these sites should be documented and avoided if possible.

F. Social and Economic Issues

Social and economic issues were considered in this project. As evidenced by the data presented in the *Data Collection Report*, there are no specific groups unfairly targeted by the project's location. The specific type of groups researched for this study include: income range, age, and ethnic background.

VIII. IMPLEMENTATION PLAN

A. Introduction

This Section contains recommendations for funding, cost sharing, budgetary and construction phasing for the recommended projects identified in Section V.

B. Construction Phasing

For budgeting purposes, capital improvements must be prioritized and constructed in phases as funding permits. To identify phasing of capital improvements, three priority categories are used. Priority 1 projects are current needs that should be constructed as soon as possible to correct existing system deficiencies. Priority 2 projects are projects that should be budgeted now for construction over the next five years and are needed to accommodate the anticipated development over the next five years. Priority 3 projects are improvements that are not needed within the next five years but will be needed as development occurs. Construction scheduling of priority 3 projects will be dictated by development timing and patterns.

Priorities were assigned for each project by the Review Committee at the Review Committee Meeting held on January 23, 2001. The assigned priorities will act as a guide to the relative urgency of the storm drainage improvements and will form the basis for developing project funding and Capital Improvement Program (CIP) budgets. It is recognized that the priorities will be subject to revision for various reasons during project implementation. For instance, in the next few years changes in development patterns may occur within the study area. The current financial obligations of government agencies or that of land developers may also vary. Further, as scheduling of roadway construction in the area becomes clearer, significant savings may be achieved by coordinating box culvert and channel construction with that of the roads or highways.

Figure VIII-1 illustrates Priority No. 1, 2, and 3 projects. **Table 2** summarizes each of the master plan projects and their construction costs.

1. Durango Regional Conveyance System

The Durango Regional Conveyance Channel and Basins were identified by the Review Committee as Priority 1 projects. Advanced land acquisition for all basins is also identified as Priority 1. If basin sites are not acquired quickly, the opportunity to implement the plan may be lost, or modifications to the plan may need to be made.

Due to the length of the Durango Regional Conveyance Channel and the need to construct the channel segments from downstream to upstream, it is important to quickly obtain cooperation between the multiple land owners, developers, and jurisdictions. Additionally construction phasing will be required based on available funding and other projects which are proceeding immediately. The first phase of the project is expected to be Reach 1, the portion between the outfall at the Agua Fria River and 107th Avenue, which is within the City of Avondale. The second phase of the project is expected to be Reach 2, the portion between 107th Avenue and 75th Avenue, which is within the City of Phoenix. The third and last phase of the system is expected to be Reach 3, the portion between 75th Avenue, and 63rd Avenue, which is within the City of Phoenix. A potential modification to this phasing is described below with the *75th Avenue Preliminary Storm Drain Study*.

A portion of Reach 1 may be constructed in conjunction with new developments within the Lakin Cattle Company property currently being master planned for residential and commercial development. A portion of Reach 2 may be constructed in conjunction with the Tuscano development at 75th Avenue and Lower Buckeye Road as well as improvements to the Country Place development at 99th Avenue and Lower Buckeye Road. A portion of Reach 3 may be constructed in conjunction with a City of Phoenix Storm Drain project along 75th Avenue as described below.

75th Avenue Preliminary Storm Drain Study

The concept of incorporating the 75th Avenue City of Phoenix Storm Drain project into a portion of the ADMP was developed to determine the feasibility of an interim drainage concept that beneficially utilizes the proposed City of Phoenix storm drain to allow implementation of certain features of the Durango ADMP prior to completion of the ultimate system outfall at the Agua Fria River. This analysis concludes that DRC basin #4 could be up sized and the flow-by channel along the basin could be redirected to a lateral storm drain that connects to the proposed City of Phoenix storm drain system, thus assisting in implementing a portion of the ADMP and still alleviating local flooding problems. A copy of the 75th Avenue Preliminary Storm Drain Study can be found in **Appendix H**.

2. Durango Regional Outfall System

The Durango Regional Outfall Channel, Basins and Laterals were identified by the Review Committee as Priority 1 projects. Advanced land acquisition for all basins is also identified as Priority 1. If basin sites are not acquired quickly, the opportunity to implement the plan may be lost, or modifications to the plan may need to be made.

3. Sunland Avenue System

The Sunland Avenue Channel was identified as a replacement to the previously identified "91st Avenue Channel" because it better accomplished the task of alleviating the floodplain. The 91st Avenue Channel was previously identified as a Priority 2 project by the Review Committee and as such the Sunland Avenue System is designated a Priority 2 project.

4. 47th Avenue System

The 47th Avenue Channel and Basin were identified by the Review Committee as Priority 3 projects. These projects are noted to be of low importance by the City of Phoenix due to the industrial nature of the area and the lack of prior flooding reported in this area.

5. Tres Rios System

The Tres Rios Basins were identified by the Review Committee as Priority 2 projects. The Tres Rios Basins should be constructed concurrently with the proposed Tres Rios levee. The Tres Rios Basins would not be needed without the proposed Tres Rios levee in place.

C. Project Funding

The projects identified in this master plan are recommended within the context of the existing development and environmental conditions of the study area as of this writing. The Durango ADMP area is developing at a rapid pace. Basin sites and channel alignments have been proposed based on perceived availability of those sites based on recent aerial photographs, field reconnaissance, and development planning information provided by the Cities and County staff. For this plan to become a reality, steps must be taken by each of the project participants to begin acquisition of needed right-of-way and to develop implementation plans. This section presents funding options to assist with the timely implementation of the adopted plan.

1. Estimated Costs

The total estimated cost of each of the projects identified in Section V is summarized in **Table 2**. The estimated costs are broken down according to the following:

- Land acquisition cost
- Landscape cost
- Construction cost
- Construction contingency at 15 percent of construction cost.
- Design and construction management cost at 15 percent of construction cost
- Total estimated cost, and
- Estimated annual maintenance cost.

Major cost items included in the channel cost estimates are excavation, concrete, utility relocations, maintenance roads, land acquisition, and landscape. The current FCMDC policy allows landscape cost of up to $0.92 per square foot for which they will share the expense up to 50%. This allowed cost is approximately half of the $1.80 per square foot cost estimated in this study, resulting in the FCDMC paying 1/4 of the total landscape cost as estimated. Utility relocation costs are computed separately and included in the table as a lump sum per project. Land acquisition costs are included only for new facilities and are based on required right-of-way widths.

Culvert costs are based on the length, number of barrels and size for each crossing and includes inlet and outlet headwalls.

Detention basin costs include basin excavation, outlet headwall and drain pipe with manholes, inflow spillway, land acquisition, and landscape.

A detailed breakdown of the estimated cost for each project is contained at the end of the report on the page facing the exhibits showing the project elements and I.D. descriptors.

2. Funding Sources

a. FCDMC CIP Process

The FCDMC participates in the planning, design, and construction of flood control projects throughout Maricopa County. The FCDMC follows an annual process of project prioritization to identify projects for their CIP program. The process of getting a project or projects funded by the FCDMC begins with a sponsoring agency, such as a City, submitting a project request to the FCDMC. The FCDMC includes projects requested by their constituent Cities in the prioritization process. Factors that are considered favorably in the prioritization are whether the project has been recommended in an adopted FCDMC Drainage Master Study, the level of cost participation offered by the City, and who will provide ongoing maintenance of the facility. Projects are seldom selected for the CIP budget with no cost sharing. The FCDMC typically seeks a 50 percent level of cost participation.

b. Project Participants

The development of this master plan has been a cooperative effort between many agencies and local interests within the study area. The agencies have been involved throughout the project with an eye towards developing a plan that will be consistent with the ongoing development plans within the area and will be accepted by the local interests. The following agencies have an interest in the area and will benefit from implementation of the plan:

- City of Phoenix
- Maricopa County Department of Transportation (MCDOT)
- City of Tolleson
- City of Avondale
- Salt River Project (SRP)
- U.S. Army Corps of Engineers (Tres Rios)
- Flood Control District of Maricopa County (FCDMC)
- Multiple Private Developers

Projects where shared benefits may accrue to the above agencies are identified in Section V, *Recommended Plan*. It is anticipated that as a result of the information contained in this *Recommended Design Report*, a concept for shared project participation can be agreed upon between the agencies.

City of Phoenix

The City of Phoenix is expected to share a significant portion of the cost of the Durango Regional Conveyance System. The City has planned improvements for a storm drain system in 75th Avenue which could be integrated into this overall ADMP. Additionally, the City would be responsible for partial construction costs based on an agreement to be developed with the FCDMC.

Maricopa County Department of Transportation (MCDOT)

MCDOT is currently planning improvements to 115th Avenue between Interstate 10 and Buckeye Road. A box culvert is expected to be constructed across 115th Avenue for the Durango Regional Outfall Channel and will be cost-shared with the FCDMC.

City of Tolleson

The City of Tolleson is expected to share a portion of the cost of the Durango Regional Outfall Project. The City has submitted the project to the FCDMC CIP budget. The City would be responsible for partial construction costs based on an agreement developed with the FCDMC.

City of Avondale

The City of Avondale is expected to share a portion of the cost of the Durango Regional Outfall Project and the Durango Regional Conveyance System. The City has submitted the projects to the FCDMC CIP budget. The City would be responsible for partial construction costs based on an agreement developed with the FCDMC.

Salt River Project (SRP)

SRP is expected to share a portion of the cost of the Durango Regional Conveyance System by donating existing right-of-way from the BFC.

Flood Control District of Maricopa County (FCDMC)

The FCDMC is expected to share 50% of the cost of each of the projects identified in the Recommended Plan, including land acquisition, design, construction, and landscaping. The District will only proceed with the recommended projects based on requests from the associated local municipalities. The District will pursue Letters of Intent (LOI), Memorandums of Understanding (MOU), and Inter-Governmental Agreements (IGA) with the local municipalities to form an agreement regarding construction of any of the projects.

c. Developer Participation

Land Developers that would be impacted by components of the ADMP would benefit by participating in partial cost-sharing of the recommended projects. By participating in the regional plan, developers will have a drainage solution which will help solve many of the local drainage problems for development in the area. One method of cost-sharing is by donating right-of-way in exchange for easing of the retention requirements that would normally be part of any development. For example, a developer would normally be required to retain the 100 yr, 2 hour storm runoff in retention. By donating right-of-way for the ADMP project, the developer may only be required to retain the "first flush" of runoff, and thereby discharge all other runoff directly into a regional channel or basin. As a result, more area is available to be developed. A developer may also receive impact fee credits if the value of donated land exceeds the amount that they would normally have to use for standard retention requirements. Developers should not receive credit for donated land that would already need to be utilized to meet on-site retention requirements.

Another method of developer participation is through partial construction of the regional drainage projects. For example, a developer could use the area that is proposed for a regional channel as a retention area until the channel is constructed. When the regional project is constructed, the retention areas would be graded into a continuous channel. Since a large portion of the excavation required for the channel will have been previously completed when the retention areas were constructed, a substantial cost savings could be realized.

d. Supplemental Funding Sources

A variety of supplemental funding sources may be available to implement portions of the environmental, landscape, aesthetic, and multi-use components of this project. The possible funding sources identified below have not been included in the preliminary allocation of funding.

Development Fees - Opportunity to develop parks recreational open space as development occurs.

Community Facility Districts - Opportunity for municipalities to plan, construct, operate and maintain infrastructure including recreational open spaces

Improvement Districts - Opportunity for the county or municipality to develop park and recreational areas.

General Obligation Bonds - Opportunity for the county or municipalities to develop their multi-use trails and associated amenities.

Conservation and Reinvestment Act (CARA) - Opportunity to develop multi-use and multi-modal trails and environmental education and multi-use facilities
Contacts: Maricopa Association of Governments (MAG)- trails
Arizona Game and Fish -Teaming with Wildlife Program

Arizona Heritage Fund / Trail Heritage Funds - Opportunity for the FCD and municipalities for wildlife habitat enhancement, public education and awareness, and for non motorized trails acquisition.
Contacts: Arizona State Parks - trails
Arizona Game and Fish - wildlife habitat enhancement

The Design Arts Program - Opportunity to receive funding for projects that promote excellence in design, planning, architecture, and landscape.
Contact: National Endowment for the Arts

American Greenways Eastman Kodak Grant Program - Opportunity for a small grant to promote the development of multi-use trails and associated amenities.
Contact: The Conservation Fund, Arlington VA.

Federal Highway Administration, Department of Transportation - Opportunity for the county and municipalities to receive federal funding for developing their multi-use trails.
Contact: DOT Office of Environment and Planning, Wash. D.C.

Marshall Fund of Arizona - Opportunity for municipalities and non-profit organizations to partner for creative approaches to improving the quality of life through the development of multi-use trails, open spaces, and riparian preservation and enhancement.
Contact: Marshall Fund of Arizona

National Fish and Wildlife Challenge Grants - Opportunity for municipalities for wildlife preservation and habitat enhancement and public education opportunities.
Contact: National Fish and Wildlife Foundation, Wash, D.C.

National Park Service, Department of the Interior - Opportunity for the county and municipalities to develop multi-use trails.
Contact: Recreation and Conservation, National Park Service

National Trails Endowment -Opportunity for municipalities to work with organizations for which foot trails are a primary focus to develop low impact trails.
Contact: American Hiking Society, Silver Spring MD.

PowerBar Direct Impact on Rivers and Trails (DIRT) - Opportunity for municipalities to partner to develop multi-use trails.
Contact: Dirt Program, Berkeley CA.

Recreation Improvement Fund (RIF)Grants and Recreation Trails Program Grants - Opportunity for municipalities for the development of multi-use trails and related facilities.
Contact: Forest Management Division, RIF

Transportation Equity Act TEA-21 Transportation Enhancement Funding - Opportunity for the county and municipalities to develop multi-use and multi-modal transportation systems.
Contact: Maricopa Association of Governments (MAG)

3. Projected Expenditures

A preliminary phased cost sharing program is presented in Tables 3, 4, and 5. **Table 3** shows projected project expenditures over the next 9 years broken down by project and type of cost. **Table 4** shows a cost sharing plan between the project participants for participants with shared interests in each project. **Table 5** shows the resulting projected cost per year for each agency through project completion. **Table 5** also shows projected revenues by year for each agency that have been identified to date. The fund balance shows the cumulative overage/shortfall on an annual basis throughout project implementation. **Table 5** shows that additional funding needs to be identified by every project participant to complete the project. Based on the cost sharing arrangement and the phased implementation costs, the participating agencies can incorporate project costs into their capital improvement programs.

D. Key Success Factors

The following issues were identified at Review Committee Meeting #4 as being key to the success of the project implementation:

- Pass a resolution for cities and county to adopt the plan (and add to general plan)
- Coordination with developers
- Advanced land acquisition
- Agreements with cities
- Identify funding sources

It is recommended that action plans be developed between the participating agencies to address the key success factors immediately upon completion of this report.

Table 2 - Recommended Plan Estimated Costs

Project	Land Acquisition	Landscaping (FCD Policy)	Construction	Construction Contingency (15%)	Design & CM (15%)	Base Total	Landscaping Enhancements	Total w/ Landscaping Enhancements
Durango Regional Conveyance Channel	$12,238,407	$11,125,824	$21,594,878	$3,239,232	$3,239,232	$51,437,572	$11,125,824	$62,563,396
Durango Regional Conveyance Basin #1	$6,468,660	$5,880,600	$1,305,459	$195,819	$195,819	$14,046,357	$5,880,600	$19,926,957
Durango Regional Conveyance Basin #2	$2,069,971	$1,881,792	$851,392	$127,709	$127,709	$5,058,572	$1,881,792	$6,940,364
Durango Regional Conveyance Basin #3	$712,846	$648,042	$356,826	$53,524	$53,524	$1,824,762	$648,042	$2,472,804
Durango Regional Conveyance Basin #4	$1,261,389	$1,146,717	$850,448	$127,567	$127,567	$3,513,688	$1,146,717	$4,660,405
DRCC System Total						**$75,880,951**		**$96,563,926**
Durango Regional Outfall Channel	$3,428,229	$3,059,030	$4,543,878	$681,582	$681,582	$12,394,301	$3,059,030	$15,453,331
Durango Regional Outfall Basin #1	$1,595,603	$1,450,548	$1,151,020	$172,653	$172,653	$4,542,476	$1,450,548	$5,993,024
Durango Regional Outfall Basin #2 and Lateral	$1,740,386	$1,582,169	$1,477,252	$221,588	$221,588	$5,242,983	$1,582,169	$6,825,152
Durango Regional Outfall Basins #3a/3b and Lateral	$1,522,929	$1,384,481	$1,542,010	$231,301	$231,301	$4,912,022	$1,384,481	$6,296,503
DROP System Total						**$27,091,782**		**$34,568,010**
Sunland Avenue Channel	$1,859,630	$1,690,573	$2,236,539	$335,481	$335,481	$6,457,703	$1,690,573	$8,148,276
Sunland Avenue System Total						**$6,457,703**		**$8,148,276**
47th Ave Channel	$1,689,932	$1,536,302	$3,393,831	$509,075	$509,075	$7,638,214	$1,536,302	$9,174,515
47th Ave Basin and Inlet	$2,089,886	$1,899,896	$3,088,042	$463,206	$463,206	$8,004,237	$1,899,896	$9,904,133
47th Avenue System Total						**$15,642,450**		**$19,078,648**
Base ADMP Total						**$125,072,887**		
Total Landscape Enhancements							**$33,285,974**	
ADMP Total w/ Landscape Enhancements								**$158,358,861**

Dysart Rd
El Mirage Rd
115th Ave
107th Ave
99th Ave
91st Ave
83rd Ave
75th Ave
67th Ave
59th Ave
51st Ave
43rd Ave
35th Ave
27th Ave
I-17 Freeway

Papago Diversion Channel
2-15'x10' CBC
I-10 Freeway
RID Canal
Durango Regional Outfall Basin #2 and Lateral
Durango Regional Outfall Basin #3a/3b and Lateral
DRC Basin #4
Reach 3, cont'd
Van Buren St
RID Canal
Durango Regional Outfall Basin #1
Durango Regional Outfall Channel
Buckeye Rd
UPRR
TOLLESON WWTP
Reach 3
Durango Regional Conveyance Channel
DRC Basin #3
UPRR
POWER STATION
47th Ave Basin and Inlet
47th Ave Channel
RID Canal
POWER SUB-STATION
Lower Buckeye Rd
Reach 2
Buckeye Feeder Canal
Durango Regional Conveyance Channel
Reach 1 (Cont'd)
Channel
DRC Basin #2
Broadway Rd
Reach 1
Conveyance
AVONDALE WWTP
Sand & Gravel Pit / DRC Basin #1
Durango Regional
Sunland Channel
91ST AVENUE WWTP
Buckeye Feeder Canal
Southern Ave
Salt River
Gila River
Agua
Fria
River

LEGEND
- Priority 1 Projects
- Priority 2 Projects
- Priority 3 Projects

N

0 600 1200 2400 3600 4800
SCALE IN FEET

FIGURE VIII-1

PROJECT TITLE: DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

EXHIBIT TITLE: PROJECT PRIORITIES
08/15/02

Capital Expenditures	Cost	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13
DRCC - Reach 1											
Land Acquisition	$6,119,315		$6,119,315								
Design	$852,677		$852,677								
Construction/Conting./C.M.	$13,927,065			$13,927,065							
FCD Policy Landscape	$5,563,013				$5,563,013						
Landscape Enhancements	$5,563,013				$5,563,013						
DRCC - Reach 2											
Land Acquisition	$4,074,396	$4,074,396									
Design	$487,036				$487,036						
Construction/Conting./C.M.	$7,954,924					$7,954,924					
FCD Policy Landscape	$3,703,997						$3,703,997				
Landscape Enhancements	$3,703,997						$3,703,997				
DRCC - Reach 3											
Land Acquisition	$2,044,696		$2,044,696								
Design	$279,902			$279,902							
Construction/Conting./C.M.	$4,571,736				$4,571,736						
FCD Policy Landscape	$1,858,814					$1,858,814					
Landscape Enhancements	$1,858,814					$1,858,814					
DRC Basin 1											
Land Acquisition	$6,468,660	$6,468,660									
Design	$97,909	$97,909									
Construction/Conting./C.M.	$1,599,188		$1,599,188								
FCD Policy Landscape	$5,880,600					$5,880,600					
Landscape Enhancements	$5,880,600					$5,880,600					
DRC Basin 2											
Land Acquisition	$2,069,971	$2,069,971									
Design	$63,854					$63,854					
Construction/Conting./C.M.	$1,042,955						$1,042,955				
FCD Policy Landscape	$1,881,792							$1,881,792			
Landscape Enhancements	$1,881,792							$1,881,792			
DRC Basin 3											
Land Acquisition	$712,846	$712,846									
Design	$26,762		$26,762								
Construction/Conting./C.M.	$437,112			$437,112							
FCD Policy Landscape	$648,042				$648,042						
Landscape Enhancements	$648,042				$648,042						
DRC Basin 4											
Land Acquisition	$1,261,389	$1,261,389									
Design	$63,784		$63,784								
Construction/Conting./C.M.	$1,041,798			$1,041,798							
FCD Policy Landscape	$1,146,717				$1,146,717						
Landscape Enhancements	$1,146,717				$1,146,717						
DRC System Base Total	**$75,880,951**	**$14,685,172**	**$10,706,421**	**$15,685,877**	**$12,416,545**	**$15,758,192**	**$4,746,952**	**$1,881,792**	**$0**	**$0**	**$0**
Landscape Enhancements	$20,682,975	$0	$0	$0	$7,357,773	$7,739,414	$3,703,997	$1,881,792	$0	$0	$0
DRC System Total w/ LS Enhancements	**$96,563,926**	**$14,685,172**	**$10,706,421**	**$15,685,877**	**$19,774,317**	**$23,497,606**	**$8,450,948**	**$3,763,584**	**$0**	**$0**	**$0**
DRO Channel - Reach 1											
Land Acquisition	$1,419,040	$1,419,040									
Design	$122,182	$122,182									
Construction/Conting./C.M.	$1,995,633		$1,995,633								
FCD Policy Landscape	$1,290,037			$1,290,037							
Landscape Enhancements	$1,290,037			$1,290,037							
DRO Channel - Reach 2											
Land Acquisition	$2,009,189		$1,004,595	$1,004,595							
Design	$218,609	$218,609									
Construction/Conting./C.M.	$3,570,618			$1,785,309	$1,785,309						
FCD Policy Landscape	$1,768,993				$884,497	$884,497					
Landscape Enhancements	$1,768,993				$884,497	$884,497					
DRO Basin 1											
Land Acquisition	$1,595,603	$1,595,603									
Design	$86,326	$86,326									
Construction/Conting./C.M.	$1,409,999		$1,409,999								
FCD Policy Landscape	$1,450,548		$1,450,548								
Landscape Enhancements	$1,450,548		$1,450,548								
DRO Basin 2 & Lateral											
Land Acquisition	$1,740,386	$1,740,386									
Design	$110,794	$110,794									
Construction/Conting./C.M.	$1,809,633			$1,809,633							
FCD Policy Landscape	$1,582,169			$1,582,169							
Landscape Enhancements	$1,582,169			$1,582,169							
DRO Basin 3 & Lateral											
Land Acquisition	$1,522,929	$1,522,929									
Design	$115,651	$115,651									
Construction/Conting./C.M.	$1,888,962				$1,888,962						
FCD Policy Landscape	$1,384,481				$1,384,481						
Landscape Enhancements	$1,384,481				$1,384,481						
DRO System Base Total	**$27,091,782**	**$6,931,520**	**$5,860,775**	**$7,471,743**	**$5,943,248**	**$884,497**	**$0**	**$0**	**$0**	**$0**	**$0**
Landscape Enhancements	$7,476,228	$0	$1,450,548	$2,872,206	$2,268,977	$884,497	$0	$0	$0	$0	$0
DRO System Total w/ LS Enhancements	**$34,568,010**	**$6,931,520**	**$7,311,323**	**$10,343,949**	**$8,212,226**	**$1,768,993**	**$0**	**$0**	**$0**	**$0**	**$0**
Sunland Avenue Channel											
Land Acquisition	$1,859,630						$1,859,630				
Design	$167,740						$167,740				
Construction/Conting./C.M.	$2,739,760							$2,739,760			
FCD Policy Landscape	$1,690,573							$1,690,573			
Landscape Enhancements	$1,690,573							$1,690,573			
Sunland Avenue System Base Total	**$6,457,703**	**$0**	**$0**	**$0**	**$0**	**$0**	**$2,027,370**	**$4,430,333**	**$0**	**$0**	**$0**
Landscape Enhancements	$1,690,573	$0	$0	$0	$0	$0	$0	$1,690,573	$0	$0	$0
Sunland System Total w/ LS Enhancements	**$8,148,276**	**$0**	**$0**	**$0**	**$0**	**$0**	**$2,027,370**	**$6,120,905**	**$0**	**$0**	**$0**
47th Ave Basin & Lateral											
Land Acquisition	$2,089,886		$2,089,886								
Design	$231,603							$231,603			
Construction/Conting./C.M.	$3,782,851								$3,782,851		
FCD Policy Landscape	$1,899,896									$1,899,896	
Landscape Enhancements	$1,899,896									$1,899,896	
47th Ave Channel											
Land Acquisition	$1,689,932							$1,689,932			
Design	$254,537								$254,537		
Construction/Conting./C.M.	$4,157,442									$4,157,442	
FCD Policy Landscape	$1,536,302										$1,536,302
Landscape Enhancements	$1,536,302										$1,536,302
47th Avenue System Base Total	**$15,642,450**	**$0**	**$2,089,886**	**$0**	**$0**	**$0**	**$0**	**$1,921,535**	**$4,037,388**	**$6,057,339**	**$1,536,302**
Landscape Enhancements	$3,436,198	$0	$0	$0	$0	$0	$0	$0	$0	$1,899,896	$1,536,302
47th Ave System Total w/ LS Enhancements	**$19,078,648**	**$0**	**$2,089,886**	**$0**	**$0**	**$0**	**$0**	**$1,921,535**	**$4,037,388**	**$7,957,235**	**$3,072,604**
TOTAL BASE EXPENDITURES	$125,072,887	$21,616,692	$18,657,082	$23,157,620	$18,359,793	$16,642,689	$6,774,322	$8,233,660	$4,037,388	$6,057,339	$1,536,302
TOTAL LANDSCAPE ENHANCEMENTS	$33,285,974	$0	$1,450,548	$2,872,206	$9,626,750	$8,623,911	$3,703,997	$3,572,365	$0	$1,899,896	$1,536,302
TOTAL ADMP w/ LANDSCAPE ENHANCEMENTS	**$158,358,861**	**$21,616,692**	**$20,107,630**	**$26,029,826**	**$27,986,543**	**$25,266,599**	**$10,478,319**	**$11,806,024**	**$4,037,388**	**$7,957,235**	**$3,072,604**

Capital Expenditures	Cost	City of Phoenix - Impact Fees		City of Phoenix - CIP Budget		City of Avondale		City of Tolleson		FCDMC		MCDOT		Tres Rios		SRP		Developers
DRCC - Reach 1			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$6,119,315		$0		$0		$0		$0		$0		$0		$0	33%	$2,019,374	67%	$4,099,941
Design	$852,677		$0		$0	50%	$426,339		$0	50%	$426,339		$0		$0		$0		$0
Construction/Conting./C.M.	$13,927,065		$0		$0	50%	$6,963,533		$0	50%	$6,963,533		$0		$0		$0		$0
FCD Policy Landscape	$5,563,013		$0		$0	50%	$2,781,507		$0	50%	$2,781,507		$0		$0		$0		$0
Landscape Enhancements	$5,563,013		$0		$0	100%	$5,563,013		$0	0%	$0		$0		$0		$0		$0
DRCC - Reach 2			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$4,074,396	50%	$2,037,198		$0		$0		$0	50%	$2,037,198		$0		$0		$0		$0
Design	$487,036	50%	$243,518		$0		$0		$0	50%	$243,518		$0		$0		$0		$0
Construction/Conting./C.M.	$7,954,924	50%	$3,977,462		$0		$0		$0	50%	$3,977,462		$0		$0		$0		$0
FCD Policy Landscape	$3,703,997	50%	$1,851,998		$0		$0		$0	50%	$1,851,998		$0		$0		$0		$0
Landscape Enhancements	$3,703,997	100%	$3,703,997		$0		$0		$0	0%	$0		$0		$0		$0		$0
DRCC - Reach 3			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$2,044,696		$0	50%	$1,022,348		$0		$0	50%	$1,022,348		$0		$0		$0		$0
Design	$279,902		$0	50%	$139,951		$0		$0	50%	$139,951		$0		$0		$0		$0
Construction/Conting./C.M.	$4,571,736		$0	50%	$2,285,868		$0		$0	50%	$2,285,868		$0		$0		$0		$0
FCD Policy Landscape	$1,858,814		$0	50%	$929,407		$0		$0	50%	$929,407		$0		$0		$0		$0
Landscape Enhancements	$1,858,814		$0	100%	$1,858,814		$0		$0	0%	$0		$0		$0		$0		$0
DRC Basin 1			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$6,468,660		$0		$0	50%	$3,234,330		$0	50%	$3,234,330		$0		$0		$0		$0
Design	$97,909		$0		$0	50%	$48,955		$0	50%	$48,955		$0		$0		$0		$0
Construction/Conting./C.M.	$1,599,188		$0		$0	50%	$799,594		$0	50%	$799,594		$0		$0		$0		$0
FCD Policy Landscape	$5,880,600		$0		$0	50%	$2,940,300		$0	50%	$2,940,300		$0		$0		$0		$0
Landscape Enhancements	$5,880,600		$0		$0	100%	$5,880,600		$0	0%	$0		$0		$0		$0		$0
DRC Basin 2			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$2,069,971	50%	$1,034,986		$0		$0		$0	50%	$1,034,986		$0		$0		$0		$0
Design	$63,854	50%	$31,927		$0		$0		$0	50%	$31,927		$0		$0		$0		$0
Construction/Conting./C.M.	$1,042,955	50%	$521,477		$0		$0		$0	50%	$521,477		$0		$0		$0		$0
FCD Policy Landscape	$1,881,792	50%	$940,896		$0		$0		$0	50%	$940,896		$0		$0		$0		$0
Landscape Enhancements	$1,881,792	100%	$1,881,792		$0		$0		$0	0%	$0		$0		$0		$0		$0
DRC Basin 3			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$712,846		$0	50%	$356,423		$0		$0	50%	$356,423		$0		$0		$0		$0
Design	$26,762		$0	50%	$13,381		$0		$0	50%	$13,381		$0		$0		$0		$0
Construction/Conting./C.M.	$437,112		$0	50%	$218,556		$0		$0	50%	$218,556		$0		$0		$0		$0
FCD Policy Landscape	$648,042		$0	50%	$324,021		$0		$0	50%	$324,021		$0		$0		$0		$0
Landscape Enhancements	$648,042		$0	100%	$648,042		$0		$0	0%	$0		$0		$0		$0		$0
DRC Basin 4			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$1,261,389		$0	50%	$630,694		$0		$0	50%	$630,694		$0		$0		$0		$0
Design	$63,784		$0	50%	$31,892		$0		$0	50%	$31,892		$0		$0		$0		$0
Construction/Conting./C.M.	$1,041,798		$0	50%	$520,899		$0		$0	50%	$520,899		$0		$0		$0		$0
FCD Policy Landscape	$1,146,717		$0	50%	$573,359		$0		$0	50%	$573,359		$0		$0		$0		$0
Landscape Enhancements	$1,146,717		$0	100%	$1,146,717		$0		$0	0%	$0		$0		$0		$0		$0
DRC System Base Total	**$75,880,951**		**$16,225,251**		**$10,700,372**		**$28,638,170**		**$0**		**$34,880,818**		**$0**		**$0**		**$2,019,374**		**$4,099,941**
Landscape Enhancements	$20,682,975																		
DRC System Total w/ LS Enhancements	**$96,563,926**																		
DRO Channel - Reach 1			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$1,419,040		$0		$0		$0		$0	40%	$567,616		$0		$0		$0	60%	$851,424
Design	$122,182		$0		$0	12%	$14,662		$0	50%	$61,091	10%	$12,218		$0		$0	28%	$34,211
Construction/Conting./C.M.	$1,995,633		$0		$0	12%	$239,476		$0	50%	$997,817	10%	$199,563		$0		$0	28%	$558,777
FCD Policy Landscape	$1,290,037		$0		$0	14%	$180,605		$0	50%	$645,018		$0		$0		$0	36%	$464,413
Landscape Enhancements	$1,290,037		$0		$0	64%	$825,623		$0	0%	$0		$0		$0		$0	36%	$464,413
DRO Channel - Reach 2			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$2,009,189		$0		$0		$0		$0	40%	$803,676		$0		$0		$0	60%	$1,205,513
Design	$218,609		$0		$0		$0	50%	$109,305	50%	$109,305		$0		$0		$0		$0
Construction/Conting./C.M.	$3,570,618		$0		$0		$0	50%	$1,785,309	50%	$1,785,309		$0		$0		$0		$0
FCD Policy Landscape	$1,768,993		$0		$0		$0	50%	$884,497	50%	$884,497		$0		$0		$0		$0
Landscape Enhancements	$1,768,993		$0		$0		$0	100%	$1,768,993	0%	$0		$0		$0		$0		$0
DRO Basin 1			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$1,595,603		$0		$0	50%	$797,801		$0	50%	$797,801		$0		$0		$0		$0
Design	$86,326		$0		$0	50%	$43,163		$0	50%	$43,163		$0		$0		$0		$0
Construction/Conting./C.M.	$1,409,999		$0		$0	50%	$705,000		$0	50%	$705,000		$0		$0		$0		$0
FCD Policy Landscape	$1,450,548		$0		$0	50%	$725,274		$0	50%	$725,274		$0		$0		$0		$0
Landscape Enhancements	$1,450,548		$0		$0	100%	$1,450,548		$0	0%	$0		$0		$0		$0		$0
DRO Basin 2 & Lateral			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$1,740,386		$0		$0		$0	50%	$870,193	50%	$870,193		$0		$0		$0		$0
Design	$110,794		$0		$0		$0	50%	$55,397	50%	$55,397		$0		$0		$0		$0
Construction/Conting./C.M.	$1,809,633		$0		$0		$0	50%	$904,817	50%	$904,817		$0		$0		$0		$0
FCD Policy Landscape	$1,582,169		$0		$0		$0	50%	$791,085	50%	$791,085		$0		$0		$0		$0
Landscape Enhancements	$1,582,169		$0		$0		$0	100%	$1,582,169	0%	$0		$0		$0		$0		$0
DRO Basin 3 & Lateral			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$1,522,929		$0		$0		$0	50%	$761,464	50%	$761,464		$0		$0		$0		$0
Design	$115,651		$0		$0		$0	50%	$57,825	50%	$57,825		$0		$0		$0		$0
Construction/Conting./C.M.	$1,888,962		$0		$0		$0	50%	$944,481	50%	$944,481		$0		$0		$0		$0
FCD Policy Landscape	$1,384,481		$0		$0		$0	50%	$692,240	50%	$692,240		$0		$0		$0		$0
Landscape Enhancements	$1,384,481		$0		$0		$0	100%	$1,384,481	0%	$0		$0		$0		$0		$0
DRO System Base Total	**$27,091,782**		**$0**		**$0**		**$4,982,152**		**$12,592,256**		**$13,203,068**		**$211,781**		**$0**		**$0**		**$3,578,752**
Landscape Enhancements	$7,476,228																		
DRO System Total w/ LS Enhancements	**$34,568,010**																		
Sunland Avenue Channel			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$1,859,630		$0		$0		$0		$0	40%	$743,852		$0		$0		$0	60%	$1,115,778
Design	$167,740		$0	50%	$83,870		$0		$0	50%	$83,870		$0		$0		$0		$0
Construction/Conting./C.M.	$2,739,760		$0	50%	$1,369,880		$0		$0	50%	$1,369,880		$0		$0		$0		$0
FCD Policy Landscape	$1,690,573		$0	50%	$845,286		$0		$0	50%	$845,286		$0		$0		$0		$0
Landscape Enhancements	$1,690,573		$0	100%	$1,690,573		$0		$0	0%	$0		$0		$0		$0		$0
Sunland Avenue System Base Total	**$6,457,703**		**$0**		**$3,989,609**		**$0**		**$0**		**$3,042,889**		**$0**		**$0**		**$0**		**$1,115,778**
Landscape Enhancements	$1,690,573																		
Sunland System Total w/ LS Enhancements	**$8,148,276**																		
47th Ave Basin & Lateral			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$2,089,886	25%	$522,472	25%	$522,472		$0		$0	50%	$1,044,943		$0		$0		$0		$0
Design	$231,603	25%	$57,901	25%	$57,901		$0		$0	50%	$115,802		$0		$0		$0		$0
Construction/Conting./C.M.	$3,782,851	25%	$945,713	25%	$945,713		$0		$0	50%	$1,891,426		$0		$0		$0		$0
FCD Policy Landscape	$1,899,896	25%	$474,974	25%	$474,974		$0		$0	50%	$949,948		$0		$0		$0		$0
Landscape Enhancements	$1,899,896	50%	$949,948	50%	$949,948		$0		$0	0%	$0		$0		$0		$0		$0
47th Ave Channel			$0		$0		$0		$0		$0		$0		$0		$0	
Land Acquisition	$1,689,932		$0		$0		$0		$0	40%	$675,973		$0		$0		$0	60%	$1,013,959
Design	$254,537	25%	$63,634	25%	$63,634		$0		$0	50%	$127,269		$0		$0		$0		$0
Construction/Conting./C.M.	$4,157,442	25%	$1,039,361	25%	$1,039,361		$0		$0	50%	$2,078,721		$0		$0		$0		$0
FCD Policy Landscape	$1,536,302	25%	$384,075	25%	$384,075		$0		$0	50%	$768,151		$0		$0		$0		$0
Landscape Enhancements	$1,536,302	50%	$768,151	50%	$768,151		$0		$0	0%	$0		$0		$0		$0		$0
47th Avenue System Base Total	**$15,642,450**		**$5,206,229**		**$5,206,229**		**$0**		**$0**		**$7,652,232**		**$0**		**$0**		**$0**		**$1,013,959**
Landscape Enhancements	$3,436,198																		
47th Ave System Total w/ LS Enhancements	**$19,078,648**																		
TOTAL BASE EXPENDITURES	$125,072,887		$21,431,480		$19,896,210		$33,620,323		$12,592,256		$58,779,007		$211,781		$0		$2,019,374		$9,808,430
TOTAL LANDSCAPE ENHANCEMENTS	$33,285,974																		
TOTAL ADMP w/ LANDSCAPE ENHANCEMENTS	**$158,358,861**																		

TABLE 5 - PROJECTED COST VS. REVENUE

COST VS. REVENUES		03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	Total
City of Phoenix - Impact Fees	Project Cost	$3,072,184	$522,472	$0	$243,518	$4,009,389	$6,077,473	$2,880,589	$1,009,347	$2,464,283	$1,152,226	$21,431,480
	Projected Revenues	$620,000	$682,000	$750,200	$825,220	$907,742	$998,516	$1,098,368	$1,208,205	$1,329,025	$1,461,928	$9,881,203
	Fund Balance	($2,452,184)	($2,292,655)	($1,542,455)	($960,753)	($4,062,400)	($9,141,357)	($10,923,578)	($10,724,720)	($11,859,978)	($11,550,277)	($11,550,277)
City of Phoenix - CIP Budget	Project Cost	$987,118	$1,590,092	$879,406	$4,978,007	$2,788,221	$83,870	$3,963,640	$1,009,347	$2,464,283	$1,152,226	$19,896,210
	Projected Revenues		$700,000	$11,000,000								$11,700,000
	Fund Balance	($987,118)	($1,877,210)	$8,243,384	$3,265,378	$477,157	$393,286	($3,570,353)	($4,579,701)	($7,043,983)	($8,196,210)	($8,196,210)
City of Avondale	Project Cost	$4,138,911	$4,346,230	$7,969,761	$8,344,520	$8,820,900	$0	$0	$0	$0	$0	$33,620,323
	Projected Revenues											$0
	Fund Balance	($4,138,911)	($8,485,141)	($16,454,902)	($24,799,423)	($33,620,323)	($33,620,323)	($33,620,323)	($33,620,323)	($33,620,323)	($33,620,323)	($33,620,323)
City of Tolleson	Project Cost	$1,854,185	$0	$4,170,725	$5,240,602	$1,326,745	$0	$0	$0	$0	$0	$12,592,256
	Projected Revenues											$0
	Fund Balance	($1,854,185)	($1,854,185)	($6,024,910)	($11,265,511)	($12,592,256)	($12,592,256)	($12,592,256)	($12,592,256)	($12,592,256)	($12,592,256)	($12,592,256)
FCDMC	Project Cost	$10,666,442	$6,168,424	$11,478,350	$9,179,897	$8,321,344	$3,201,198	$3,947,837	$2,018,694	$3,028,669	$768,151	$58,779,007
	Projected Revenues	$1,075,000	$2,350,000	$4,100,000	$3,450,000	$2,000,000						$12,975,000
	Fund Balance	($9,591,442)	($13,409,866)	($20,788,217)	($26,518,113)	($32,839,458)	($36,040,656)	($39,988,492)	($42,007,186)	($45,035,856)	($45,804,007)	($45,804,007)
MCDOT	Project Cost	$12,218	$199,563	$0	$0	$0	$0	$0	$0	$0	$0	$211,781
	Projected Revenues											$0
	Fund Balance	($12,218)	($211,781)	($211,781)	($211,781)	($211,781)	($211,781)	($211,781)	($211,781)	($211,781)	($211,781)	($211,781)
Tres Rios	Project Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Projected Revenues											$0
	Fund Balance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SRP	Project Cost	$0	$2,019,374	$0	$0	$0	$0	$0	$0	$0	$0	$2,019,374
	Projected Revenues											$0
	Fund Balance	$0	($2,019,374)	($2,019,374)	($2,019,374)	($2,019,374)	($2,019,374)	($2,019,374)	($2,019,374)	($2,019,374)	($2,019,374)	($2,019,374)
Developers	Project Cost	$885,635	$5,261,475	$1,531,583	$0	$0	$1,115,778	$1,013,959	$0	$0	$0	$9,808,430
	Projected Revenues											$0
	Fund Balance	($885,635)	($6,147,110)	($7,678,693)	($7,678,693)	($7,678,693)	($8,794,471)	($9,808,430)	($9,808,430)	($9,808,430)	($9,808,430)	($9,808,430)
TOTAL PROJECT COST		$21,616,692	$20,107,630	$26,029,826	$27,986,543	$25,266,599	$10,478,319	$11,806,024	$4,037,388	$7,957,235	$3,072,604	$158,358,861
TOTAL PROJECTED REVENUES		$1,695,000	$3,732,000	$15,850,200	$4,275,220	$2,907,742	$998,516	$1,098,368	$1,208,205	$1,329,025	$1,461,928	$34,556,203
NET FUND BALANCE		($19,921,692)	($36,297,322)	($46,476,948)	($70,188,271)	($92,547,128)	($102,026,931)	($112,734,588)	($115,563,771)	($122,191,982)	($123,802,658)	($123,802,658)

IX. MAINTENANCE PLAN

A. Introduction

This section contains requirements anticipated for ongoing operation and maintenance for the Recommended Plan features.

B. Operation & Maintenance Guidelines

Through partnerships with the agencies involved, it is recommended that local jurisdictions be responsible for maintenance of the proposed channels and detention basins. Maintenance should be such that grass, earth, and other channel and basin linings reflect the "n" value as shown on the preliminary design plans.

Specific maintenance tasks should include but not be limited to:

- Yearly inspection of structures
- Routine landscaping maintenance, and
- Inspection/cleaning of facilities after major storm events.

C. Maintenance Costs

Based on information provided by the FCDMC, an average maintenance cost was interpolated to be $0.025 per square foot of right-of-way per year. This cost was derived by comparing actual maintenance costs of existing channels and basins which are similar to the proposed ADMP channels in shape, size and landscaping. The annual maintenance costs for the recommended projects are shown in **Table 6**.

Table 6 - Recommended Plan Estimated Maintenance Costs

Project	Annual Maintenance
Durango Regional Conveyance Channel	$275,868
Durango Regional Conveyance Basin #1	$149,193
Durango Regional Conveyance Basin #2	$32,670
Durango Regional Conveyance Basin #3	$9,910
Durango Regional Conveyance Basin #4	$17,424
DRCC System Annual Maintenance Total	**$485,065**
Durango Regional Outfall Channel	$75,208
Durango Regional Outfall Basin #1	$19,602
Durango Regional Outfall Basin #2 and Lateral	$36,385
Durango Regional Outfall Basins #3a/3b and Lateral	$34,672
DROP System Annual Maintenance Total	**$165,867**
Sunland Avenue Channel	$41,568
Sunland Ave System Annual Maintenance Total	**$41,568**
47th Ave Channel	$37,860
47th Ave Basin and Inlet	$24,086
47th Avenue System Annual Maintenance Total	**$61,947**
ADMP Annual Maintenance Total	**$754,446**

X. REFERENCES

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EXHIBITS

Recommended Plan, Sheet 1

Channel Cost

ID	Excavated Volume (cy)	Unit Cost ($/cy)	Excavation Cost	Concrete Volume (cy)	Unit Cost ($/cy)	Concrete Cost	Utility Relocation Cost	Channel Length (ft)	Left Access Road Width (ft)	Right Access Road Width (ft)	6" ABC Access Road Unit Cost ($/sf)	Access Road Cost	Total Corridor Width-Channel+Access Rd (ft)	Existing Right-of-Way Width (ft.)	New Right-of-Way Width Required (ft.)	Landscape Unit Cost ($/sf)	Total Landscape Cost	Required Land Acquisition (Ac.)	Zoning	Land Acquisition Cost	Total Construction Cost	Channel Contingencies Cost	Total Construction, Land, Landscape, and Contingencies Costs
DROC01	58025	$6	$348,151	0	n/a	n/a	$0	2689.7	16	16	$0.65	$55,946	164.6	0	190	$1.80	$919,877	11.7	Res / Ag	$505,933	$404,096	121,229	**$1,951,135**
DROC02a	13170	$6	$79,017	0	n/a	n/a	$45,000	920.5	16	16	$0.65	$19,146	136.3	0	150	$1.80	$248,535	3.2	Res / Ag	$136,694	$143,164	42,949	**$571,342**
DROC02b	18794	$6	$112,762	0	n/a	n/a	$0	1559.8	16	16	$0.65	$32,444	131.2	0	150	$1.80	$421,146	5.4	Res / Ag	$231,630	$145,206	43,562	**$841,544**
DROC03	67699	$6	$406,195	0	n/a	n/a	$0	2501.3	16	16	$0.65	$52,027	195.0	0	220	$1.80	$990,515	12.6	Res / Ag	$544,783	$458,222	137,467	**$2,130,987**
DROC04	54819	$6	$328,913	0	n/a	n/a	$4,000	2176.8	16	16	$0.65	$45,277	182.7	0	210	$1.80	$822,830	10.5	Res / Ag	$452,557	$378,190	113,457	**$1,767,035**
DROC05a	15922	$6	$95,532	0	n/a	n/a	$26,000	1166	16	16	$0.65	$24,253	129.3	0	150	$1.80	$314,820	4.0	Res / Ag	$173,151	$145,785	43,735	**$677,491**
DROC05b	39016	$4	$156,063	0	n/a	n/a	$22,000	2857.2	16	16	$0.65	$59,430	129.3	0	150	$1.80	$771,444	9.8	Res / Ag	$424,294	$237,493	71,248	**$1,504,479**
DROC06a	44216	$6	$265,297	0	n/a	n/a	$51,000	2558	16	16	$0.65	$53,206	147.0	0	170	$1.80	$782,748	10.0	Res / Ag	$430,511	$369,504	110,851	**$1,693,614**
DROC06b	15243	$4	$60,973	2115	310	655692	$53,000	2664	16	16	$0.65	$55,411	56.0	0	70	$1.80	$220,579	4.3	Res / Ag	$184,615	$825,076	247,523	**$1,477,793**
DROC07	29980	$6	$179,879	0	n/a	n/a	$33,000	2482.4	16	16	$0.65	$51,634	122.7	0	140	$1.80	$625,565	8.0	Res / Ag	$344,061	$264,512	79,354	**$1,313,492**
99LTa	14863	$6	$89,177	0	n/a	n/a	$0	1572.9	16	16	$0.65	$32,716	110.7	0	130	$1.80	$368,059	4.7	Res / Ag	$202,432	$121,893	36,568	**$728,952**
99LTb	5266	$4	$21,064	0	n/a	n/a	$9,000	557.3	16	16	$0.65	$11,592	110.7	0	130	$1.80	$130,408	1.7	Res / Ag	$71,725	$41,656	12,497	**$256,286**
91LT	18114	$6	$108,686	0	n/a	n/a	$16,000	1105.6	16	16	$0.65	$22,996	151.2	0	170	$1.80	$338,314	4.3	Res / Ag	$186,072	$147,682	44,305	**$716,373**
47CH01a	40941	$4	$163,763	0	n/a	n/a	$0	1302.2	16	16	$0.65	$27,086	212.2	0	240	$1.80	$562,550	7.2	Res / Ag	$309,403	$190,849	57,255	**$1,120,056**
47CH01b	79473	$4	$317,893	0	n/a	n/a	$48,250	2527.8	16	16	$0.65	$52,578	212.2	0	240	$1.80	$1,092,010	13.9	Res / Ag	$600,605	$418,721	125,616	**$2,236,952**
47CH02	66919	$4	$267,677	0	n/a	n/a	$18,875	2476.2	16	16	$0.65	$51,505	189.3	0	210	$1.80	$936,004	11.9	Res / Ag	$514,802	$338,057	101,417	**$1,890,280**
47CH03	32163	$4	$128,651	3610	310	1119076	$0	2678	16	16	$0.65	$55,702	87.0	0	100	$1.80	$482,040	6.1	Res / Ag	$265,122	$1,303,429	391,029	**$2,441,620**
47CH04	21850	$4	$87,399	0	n/a	n/a	$130,000	1175.3	16	16	$0.65	$24,446	152.6	0	170	$1.80	$359,642	4.6	Res / Ag	$197,803	$241,845	72,553	**$871,843**

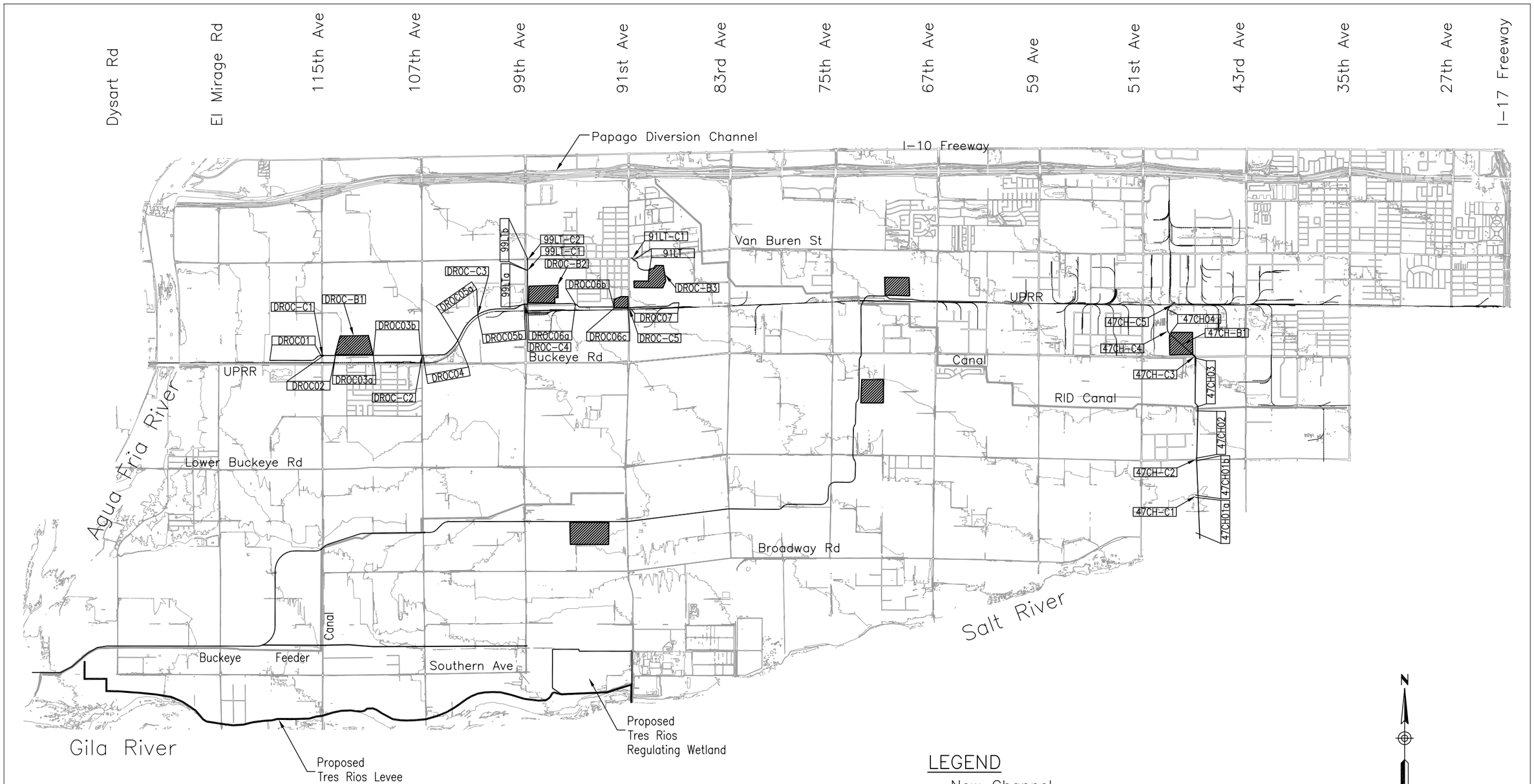
Culvert Cost

Location	ID	Length (ft.)	Number of Barrels	Culvert Dia./ Height	Unit	Width ft)	Length of Pipe/ Box Culvert (ft.)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	Inlet Headwall	Unit Cost ($/Ea.)	Inlet Headwall Cost	Outlet Headwall	Unit Cost ($/Ea.)	Outlet Headwall Cost	Required Land Acquisition (Ac.)	Zoning	Unit Cost ($/sf)	Culvert Land Acquisition Cost	Culvert Materials Cost	Culvert Contingencies Cost	Total Land, Construction, and Contingencies Costs
DROC / 115th Ave	DROC-C1	130	4	5	ft.	10	130	$2,100	$273,000	1	$5,700	$5,700	1	$9,900	$9,900	0.0	N/A	$0.00	$0	$288,600	$86,580	**$375,180**
DROC / 107th Ave	DROC-C2	110	3	5	ft.	10	110	$1,575	$173,250	1	$6,050	$6,050	1	$10,500	$10,500	0.0	N/A	$0.00	$0	$189,800	$56,940	**$246,740**
DROC / 103rd Ave RR Spur	DROC-C3	242.4	3	5	ft.	10	242.4	$1,575	$381,780	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$394,880	$118,464	**$513,344**
DROC / 99th Ave	DROC-C4	110	2	5	ft.	10	110	$1,050	$115,500	1	$4,950	$4,950	1	$8,600	$8,600	0.0	N/A	$0.00	$0	$129,050	$38,715	**$167,765**
DROC / 91st Ave	DROC-C5	150	2	5	ft.	10	150	$1,050	$157,500	1	$4,700	$4,700	1	$8,100	$8,100	0.0	N/A	$0.00	$0	$170,300	$51,090	**$221,390**
99th Ave Lateral / 1/8 mile S. of Van Buren	99LT-C1	100	2	5	ft.	10	100	$1,050	$105,000	1	$5,500	$5,500	1	$9,500	$9,500	0.0	N/A	$0.00	$0	$120,000	$36,000	**$156,000**
99th Ave Lateral / Van Buren St	99LT-C2	110	3	4	ft.	10	110	$1,575	$173,250	1	$6,200	$6,200	1	$10,700	$10,700	0.0	N/A	$0.00	$0	$190,150	$57,045	**$247,195**
91st Ave Lateral / Van Buren St	91LT-C1	185	3	4	ft.	10	185	$1,575	$291,375	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$304,475	$91,343	**$395,818**
47th Ave Channel / 1/2 mile S. of Lower Bu	47CH-C1	111	7	5	ft.	10	111	$3,675	$407,925	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$430,625	$129,188	**$559,813**
47th Ave Channel / Lower Buckeye Rd	47CH-C2	110	5	5	ft.	10	110	$2,625	$288,750	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$311,450	$93,435	**$404,885**
47th Ave Channel / Buckeye Rd	47CH-C3	323	3	5	ft.	8	323	$1,200	$387,600	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$400,700	$120,210	**$520,910**
47th Ave Channel / Det. Basin Entrance	47CH-C4	427	4	5	ft.	10	427	$2,100	$896,700	1	$6,500	$6,500	1	$11,200	$11,200	0.0	N/A	$0.00	$0	$914,400	$274,320	**$1,188,720**

Retention/Detention Basin Cost

I.D.	Basin Excavation Volume (cy)	Unit Cost ($/cy)	Detention Basin Excavation Cost	Length of Drain Pipe/ Box Culvert (ft.)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	# Of Manholes	Manhole Unit Cost ($)	Manhole Total Cost ($)	Headwall	Unit Cost ($/Ea.)	Headwall Cost	Inflow Spillway Area (ft^2)	Inflow Spillway Unit Cost ($/sf)	Inflow Spillway Cost	Basin Top Area (ac)	Required Land Acquisition (Ac.)	Unit Cost ($/sf)	Total Land Acquisition Cost	Landscape Restoration (sf)	Landscape Unit Cost ($/sf)	Total Construction Cost	Total Landscape Cost	Detention Basin Contingincies Cost	Total Construction, Land, Landscape and Contingencies Costs
DRO Basin #1 - 111th Ave	279,897	$4.00	$1,119,588	156	$55	$8,580	1	$4,500	$4,500	1	$1,100	$1,100	3450.319	$5	$17,252	18	37	$0.99	$1,595,603	1611720	$1.80	$1,151,020	$2,901,096	$345,306	**$5,993,024**
DRO Basin #2 - 99th Ave	231,400	$4.00	$925,600	155	$55	$8,525	1	$4,500	$4,500	1	$1,100	$1,100	8933.477	$5	$44,667	28	34	$0.99	$1,466,230	1481040	$1.80	$1,003,552	$2,665,872	$301,066	**$5,436,720**
DRO Basin #3a - 91st Ave	184,000	$4.00	$736,000	2280	$55	$125,400	6	$4,500	$27,000	1	$1,100	$1,100	0	$5	$0	21	24	$0.99	$1,034,986	1045440	$1.80	$889,500	$1,881,792	$266,850	**$4,073,128**
DRO Basin #3b - 91st Ave	39,800	$4.00	$159,200	91	$55	$5,005	1	$4,500	$4,500	2	$1,100	$2,200	5889.458	$5	$29,447	7	7	$0.99	$301,871	304920	$1.80	$200,352	$548,856	$60,106	**$1,111,185**
47th Ave Basin	260,633	$4.00	$1,042,532	0	$55	$0	0	$4,500	$0	0	$1,100	$0	19153	$5	$95,767	35.1	43.875	$0.99	$1,892,083	1911195	$1.80	$1,157,847	$3,440,151	$347,354	**$6,837,435**

* Contingencies are based on 30% of total construction cost and include design and construction administration costs



LEGEND

- New Channel
- XXX-# New Channel Reach Identifier
- New Culvert
- XXX-C# New Culvert Identifier
- New Detention Basin
- XXX-B# New Detention Basin Identifier

N

2500 0 2500 5000 7500

SCALE IN FEET

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
RECOMMENDED PLAN, SHEET 1
07/24/02

Recommended Plan, Sheet 2

Channel Cost

ID	Excavated Volume (cy)	Unit Cost ($/cy)	Excavation Cost	Concrete Volume (cy)	Unit Cost ($/cy)	Concrete Cost	Utility Relocation Cost	Channel Length (ft)	Left Access Road Width (ft)	Right Access Road Width (ft)	6" ABC Access Road Unit Cost ($/sf)	Access Road Cost	Total Corridor Width-Channel+Access Rd (ft)	Existing Right-of-Way Width (ft.)	New Right-of-Way Width Required (ft.)	Landscape Unit Cost ($/sf)	Total Landscape Cost	Required Land Acquisition (Ac.)	Zoning	Land Acquisition Cost	Total Construction Cost	Channel Contingencies Cost	Total Construction, Land, Landscape, and Contingencies Costs
DRCC01a	2591	$6	$15,546	1431	310	443611	$0	4229.6	16	16	$0.65	$87,976	36.0	0	40	$1.80	$304,531	3.9	Res / Ag	$167,492	$547,133	164,140	**$1,183,296**
DRCC01b	21989	$6	$131,934	0	n/a	n/a	$0	500	16	16	$0.65	$10,400	268.1	0	300	$1.80	$270,000	3.4	Res / Ag	$148,500	$142,334	42,700	**$603,534**
DRCC02a	110503	$6	$663,020	0	n/a	n/a	$0	2512.7	16	16	$0.65	$52,264	268.1	0	300	$1.80	$1,356,858	17.3	Res / Ag	$746,272	$715,284	214,585	**$3,032,999**
DRCC02b	110508	$4	$442,031	0	n/a	n/a	$0	2512.8	16	16	$0.65	$52,266	268.1	0	300	$1.80	$1,356,912	17.3	Res / Ag	$746,302	$494,297	148,289	**$2,745,800**
DRCC03a	138383	$6	$830,299	0	n/a	n/a	$0	3376.8	16	16	$0.65	$70,237	253.5	0	280	$1.80	$1,701,907	21.7	Res / Ag	$936,049	$900,536	270,161	**$3,808,653**
DRCC03b	103685	$4	$414,739	0	n/a	n/a	$0	2530.1	16	16	$0.65	$52,626	253.5	0	280	$1.80	$1,275,170	16.3	Res / Ag	$701,344	$467,366	140,210	**$2,584,089**
DRCC04	149479	$6	$896,871	0	n/a	n/a	$401,200	2645.9	16	16	$0.65	$55,035	323.6	0	360	$1.80	$1,714,543	21.9	Res / Ag	$942,999	$1,353,106	405,932	**$4,416,579**
DRCC05	140818	$6	$844,907	0	n/a	n/a	$405,150	2492.6	16	16	$0.65	$51,846	323.6	0	360	$1.80	$1,615,205	20.6	Res / Ag	$888,363	$1,301,904	390,571	**$4,196,042**
DRCC06a	53795	$6	$322,771	0	n/a	n/a	$280,950	2724.6	16	16	$0.65	$56,672	157.8	0	180	$1.80	$882,770	11.3	Res / Ag	$485,524	$660,392	198,118	**$2,226,804**
DRCC06b	47984	$4	$191,937	0	n/a	n/a	$280,800	2430.3	16	16	$0.65	$50,550	157.8	0	180	$1.80	$787,417	10.0	Res / Ag	$433,079	$523,288	156,986	**$1,900,771**
DRCC07	41224	$6	$247,341	0	n/a	n/a	$2,000	2778.2	16	16	$0.65	$57,787	136.1	0	150	$1.80	$750,114	9.6	Res / Ag	$412,563	$307,128	92,138	**$1,561,943**
DRCC08a	16589	$6	$99,537	0	n/a	n/a	$0	1079.1	16	16	$0.65	$22,445	146.0	0	170	$1.80	$330,205	4.2	Res / Ag	$181,613	$121,982	36,595	**$670,394**
DRCC08b	41229	$6	$247,376	0	n/a	n/a	$0	1250.2	16	16	$0.65	$26,004	218.0	0	240	$1.80	$540,086	6.9	Res / Ag	$297,048	$273,380	82,014	**$1,192,528**
DRCC09a	82977	$6	$497,860	0	n/a	n/a	$2,000	2484.3	16	16	$0.65	$51,673	218.7	0	250	$1.80	$1,117,935	14.3	Res / Ag	$614,864	$551,534	165,460	**$2,449,793**
DRCC09b	84617	$4	$338,467	0	n/a	n/a	$20,000	2533.4	16	16	$0.65	$52,695	218.7	0	250	$1.80	$1,140,030	14.5	Res / Ag	$627,017	$411,162	123,348	**$2,301,556**
DRCC10a	53924	$6	$323,545	0	n/a	n/a	$0	2564.6	16	16	$0.65	$53,344	163.2	0	180	$1.80	$830,930	10.6	Res / Ag	$457,012	$376,888	113,067	**$1,777,897**
DRCC10b	66746	$4	$266,984	0	n/a	n/a	$41,250	3174.4	16	16	$0.65	$66,028	163.2	0	180	$1.80	$1,028,506	13.1	Res / Ag	$565,678	$374,261	112,278	**$2,080,723**
DRCC11	39921	$6	$239,527	0	n/a	n/a	$15,000	2417.2	16	16	$0.65	$50,278	142.9	0	160	$1.80	$696,154	8.9	Res / Ag	$382,884	$304,805	91,441	**$1,475,284**
DRCC12	42113	$6	$252,678	0	n/a	n/a	$12,500	3037.1	16	16	$0.65	$63,172	131.4	0	150	$1.80	$820,017	10.5	Res / Ag	$451,009	$328,349	98,505	**$1,697,881**
DRCC13a	6581	$6	$39,488	0	n/a	n/a	$0	815.3	16	16	$0.65	$16,958	104.4	0	120	$1.80	$176,105	2.2	Res / Ag	$96,858	$56,447	16,934	**$346,343**
DRCC13b	12734	$6	$76,403	0	n/a	n/a	$0	1287.7	16	16	$0.65	$26,784	112.7	0	130	$1.80	$301,322	3.8	Res / Ag	$165,727	$103,187	30,956	**$601,192**
DRCC14	41250	$6	$247,501	0	n/a	n/a	$46,000	2421.5	16	16	$0.65	$50,367	144.4	0	160	$1.80	$697,392	8.9	Res / Ag	$383,566	$343,868	103,161	**$1,527,986**
DRCC15	18661	$6	$111,964	0	n/a	n/a	$30,000	2441	16	16	$0.65	$50,773	102.5	0	120	$1.80	$527,256	6.7	Res / Ag	$289,991	$192,737	57,821	**$1,067,805**
DRCC16	8488	$6	$50,931	1220	310	378105	$0	1287	16	16	$0.65	$26,770	67.0	0	80	$1.80	$185,328	2.4	Res / Ag	$101,930	$486,693	146,008	**$919,960**
DRCC17	14201	$6	$85,203	2135	310	661855	$10,000	2492.5	16	16	$0.65	$51,844	62.0	0	70	$1.80	$314,055	4.0	Res / Ag	$172,730	$868,722	260,617	**$1,616,124**
SUN01	63115	$6	$378,690	0	n/a	n/a	$0	3027.4	16	16	$0.65	$62,970	162.8	0	180	$1.80	$980,878	12.5	Res / Ag	$539,483	$441,660	132,498	**$2,094,518**
SUN02a	6493	$6	$38,956	993	310	307882	$0	1388.5	16	16	$0.65	$28,881	52.0	0	60	$1.80	$149,958	1.9	Res / Ag	$82,477	$375,719	112,716	**$720,869**
SUN02b	17203	$6	$103,218	0	n/a	n/a	$0	1203.2	16	16	$0.65	$25,027	132.8	0	150	$1.80	$324,864	4.1	Res / Ag	$178,675	$128,245	38,474	**$670,258**
SUN02c	35902	$6	$215,410	0	n/a	n/a	$0	2511	16	16	$0.65	$52,229	132.8	0	150	$1.80	$677,970	8.6	Res / Ag	$372,884	$267,639	80,292	**$1,398,784**
SUN03a	29398	$6	$176,391	0	n/a	n/a	$0	2469.7	16	16	$0.65	$51,370	122.1	0	140	$1.80	$622,364	7.9	Res / Ag	$342,300	$227,761	68,328	**$1,260,754**
SUN03b	29528	$6	$177,169	0	n/a	n/a	$0	2480.6	16	16	$0.65	$51,596	122.1	0	140	$1.80	$625,111	8.0	Res / Ag	$343,811	$228,766	68,630	**$1,266,318**

Culvert Cost

Location	ID	Length (ft.)	Number of Barrels	Culvert Dia./ Height	Unit	Width ft)	Length of Pipe/ Box Culvert (ft.)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	Inlet Headwall	Unit Cost ($/Ea.)	Inlet Headwall Cost	Outlet Headwall	Unit Cost ($/Ea.)	Outlet Headwall Cost	Required Land Acquisition (Ac.)	Zoning	Unit Cost ($/sf)	Culvert Land Acquisition Cost	Culvert Materials Cost	Culvert Contingencies Cost	Total Land, Construction, and Contingencies Costs
DRCC / Dysart Rd	DRCC-C1a	110	9	5	ft.	10	110	$4,725	$519,750	1	$8,900	$8,900	1	$15,400	$15,400	0.0	N/A	$0.00	$0	$544,050	$163,215	**$707,265**
DRCC / 1/2 mile W. of El Mirage Rd	DRCC-C1b	110	9	5	ft.	10	110	$4,725	$519,750	1	$9,300	$9,300	1	$16,100	$16,100	0.0	N/A	$0.00	$0	$545,150	$163,545	**$708,695**
DRCC / 1/2 mile S. of Broadway Rd	DRCC-C3	110	9	5	ft.	10	110	$4,725	$519,750	1	$8,900	$8,900	1	$15,400	$15,400	0.0	N/A	$0.00	$0	$544,050	$163,215	**$707,265**
DRCC / Broadway Rd	DRCC-C4	110	9	5	ft.	10	110	$4,725	$519,750	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$542,450	$162,735	**$705,185**
DRCC / 115th Ave	DRCC-C5	151	8	5	ft.	10	151	$4,200	$634,200	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$656,900	$197,070	**$853,970**
DRCC / 111th Ave	DRCC-C6	110	8	5	ft.	10	110	$4,200	$462,000	1	$6,400	$6,400	1	$11,100	$11,100	0.0	N/A	$0.00	$0	$479,500	$143,850	**$623,350**
DRCC / 107th Ave	DRCC-C7	110	6	5	ft.	10	110	$3,150	$346,500	1	$6,400	$6,400	1	$11,100	$11,100	0.0	N/A	$0.00	$0	$364,000	$109,200	**$473,200**
DRCC / 103rd Ave	DRCC-C8	110	6	5	ft.	10	110	$3,150	$346,500	1	$6,700	$6,700	1	$11,600	$11,600	0.0	N/A	$0.00	$0	$364,800	$109,440	**$474,240**
DRCC / 99th Ave	DRCC-C9	110	4	5	ft.	10	110	$2,100	$231,000	1	$6,050	$6,050	1	$10,500	$10,500	0.0	N/A	$0.00	$0	$247,550	$74,265	**$321,815**
DRCC / 95th Ave	DRCC-C10	140	8	4	ft.	10	140	$4,200	$588,000	1	$6,200	$6,200	1	$10,700	$10,700	0.0	N/A	$0.00	$0	$604,900	$181,470	**$786,370**
DRCC / 91st Ave	DRCC-C11	110	5	5	ft.	10	110	$2,625	$288,750	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$311,450	$93,435	**$404,885**
DRCC / 87th Ave	DRCC-C12	110.4	5	5	ft.	10	110.4	$2,625	$289,800	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$312,500	$93,750	**$406,250**
DRCC / 83rd Ave	DRCC-C13	110.5	4	5	ft.	10	110.5	$2,100	$232,050	1	$6,500	$6,500	1	$11,200	$11,200	0.0	N/A	$0.00	$0	$249,750	$74,925	**$324,675**
DRCC / 79th Ave	DRCC-C14	220	4	5	ft.	10	220	$2,100	$462,000	1	$6,500	$6,500	1	$11,200	$11,200	0.0	N/A	$0.00	$0	$479,700	$143,910	**$623,610**
DRCC / 75th Ave	DRCC-C15	146	4	5	ft.	10	146	$2,100	$306,600	1	$6,050	$6,050	1	$10,500	$10,500	0.0	N/A	$0.00	$0	$323,150	$96,945	**$420,095**
DRCC / Lower Buckeye Rd	DRCC-C16	110.2	4	5	ft.	8	110.2	$1,600	$176,320	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$189,420	$56,826	**$246,246**
DRCC / Buckeye Rd	DRCC-C17	110	3	5	ft.	8	110	$1,200	$132,000	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$145,100	$43,530	**$188,630**
DRCC / Railroad	DRCC-C18	380.5	3	4	ft.	8	380.5	$1,200	$456,600	1	$3,900	$3,900	1	$6,700	$6,700	0.0	N/A	$0.00	$0	$467,200	$140,160	**$607,360**
DRCC / 67th Ave	DRCC-C19	110	4	4	ft.	10	110	$2,100	$231,000	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$245,500	$73,650	**$319,150**
SAC / 111th Ave	SUN-C1	110	3	5	ft.	10	110	$1,575	$173,250	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$187,750	$56,325	**$244,075**
SAC / 107th Ave	SUN-C2	110	3	5	ft.	8	110	$1,200	$132,000	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$146,500	$43,950	**$190,450**
SAC / 103rd Ave	SUN-C3	110	2	5	ft.	10	110	$1,050	$115,500	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$130,000	$39,000	**$169,000**
SAC / 99th Ave	SUN-C4	110	2	5	ft.	8	110	$800	$88,000	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$102,500	$30,750	**$133,250**

Detention Basin Cost

I.D.	Basin Excavation Volume (cy)	Unit Cost ($/cy)	Detention Basin Excavation Cost	Length of Drain Pipe/ Box Culvert (ft.)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	# Of Manholes	Manhole Unit Cost ($)	Manhole Total Cost ($)	Headwall	Unit Cost ($/Ea.)	Headwall Cost	Inflow Spillway Area (ft^2)	Inflow Spillway Unit Cost ($/sf)	Inflow Spillway Cost	Basin Top Area (ac)	Required Land Acquisition (Ac.)	Unit Cost ($/sf)	Total Land Acquisition Cost	Landscape Restoration (sf)	Landscape Unit Cost ($/sf)	Total Construction Cost	Total Landscape Cost	Detention Basin Contingincies Cost	Total Construction, Land, Landscape and Contingencies Costs
DRC Basin #1 - Dysart Rd	0	$4.00	$0	500	$55	$27,500	2	$4,500	$9,000	1	$1,100	$1,100	253571.9	$5	$1,267,859	137	150	$0.99	$6,468,660	6534000	$1.80	$1,305,459	$11,761,200	$391,638	**$19,926,957**
DRC Basin #2 - 95th Ave	202,900	$4.00	$811,600	221	$55	$12,155	1	$4,500	$4,500	1	$1,100	$1,100	4407.338	$5	$22,037	30	48	$0.99	$2,069,971	2090880	$1.80	$851,392	$3,763,584	$255,418	**$6,940,364**
DRC Basin #3 - 73rd Ave	79,000	$4.00	$316,000	200	$55	$11,000	1	$4,500	$4,500	1	$1,100	$1,100	2129.961	$5	$10,650	9.1	16.53	$0.99	$712,846	720046.8	$1.80	$356,826	$1,296,084	$107,048	**$2,472,804**
DRC Basin #4 - 71st Ave	180,000	$4.00	$720,000	1161	$55	$63,855	3	$4,500	$13,500	1	$1,100	$1,100	6748.109	$5	$33,741	16	29.25	$0.99	$1,261,389	1274130	$1.80	$850,448	$2,293,434	$255,134	**$4,660,405**

* Contingencies are based on 30% of total construction cost and include design and construction administration costs

Dysart Rd
El Mirage Rd
115th Ave
107th Ave
99th Ave
91st Ave
83rd Ave
75th Ave
67th Ave
59 Ave
51st Ave
43rd Ave
35th Ave
27th Ave
I-17 Freeway

Papago Diversion Channel
I-10 Freeway
Van Buren St
UPRR
Buckeye Rd
RID Canal
Lower Buckeye Rd
Agua Fria River
Broadway Rd
Salt River
Gila River
Buckeye Feeder Canal
Southern Ave
Proposed Tres Rios Levee
Proposed Tres Rios Regulating Wetland

DRCC-C18
DRCC15
DRCC16
DRCC17
DRCC14
DRCC-B4
DRCC-C19
DRCC13b
DRCC-C17
DRCC13a
DRCC12
DRCC-B3
DRCC11
DRCC-C16
DRCC10b
DRCC10a
DRCC-C15
DRCC09b
DRCC-C13
DRCC-C14
DRCC08a
DRCC08b
DRCC09a
DRCC-C12
DRCC-C11
DRCC-B2
DRCC06a
DRCC06b
DRCC07
DRCC04
DRCC05
DRCC03c
DRCC-C8
DRCC-C10
DRCC-C6
DRCC-C7
DRCC-C9
DRCC-C5
DRCC03b
DRCC-C4
DRCC-C3
SUN-C2
SUN-C1
SUN-C3
SUN-C4
SUN02c
SUN03a
SUN03b
DRCC-C1c
DRCC-B1
DRCC-C1b
DRCC-C2
DRCC02a
DRCC02b
DRCC03a
DRCC01b
DRCC01a
SUN01
SUN02a
SUN02b

LEGEND

- New Channel
- XXX-# New Channel Reach Identifier
- New Culvert
- XXX-C# New Culvert Identifier
- New Detention Basin
- XXX-B# New Detention Basin Identifier

N

2500 0 2500 5000 7500
SCALE IN FEET

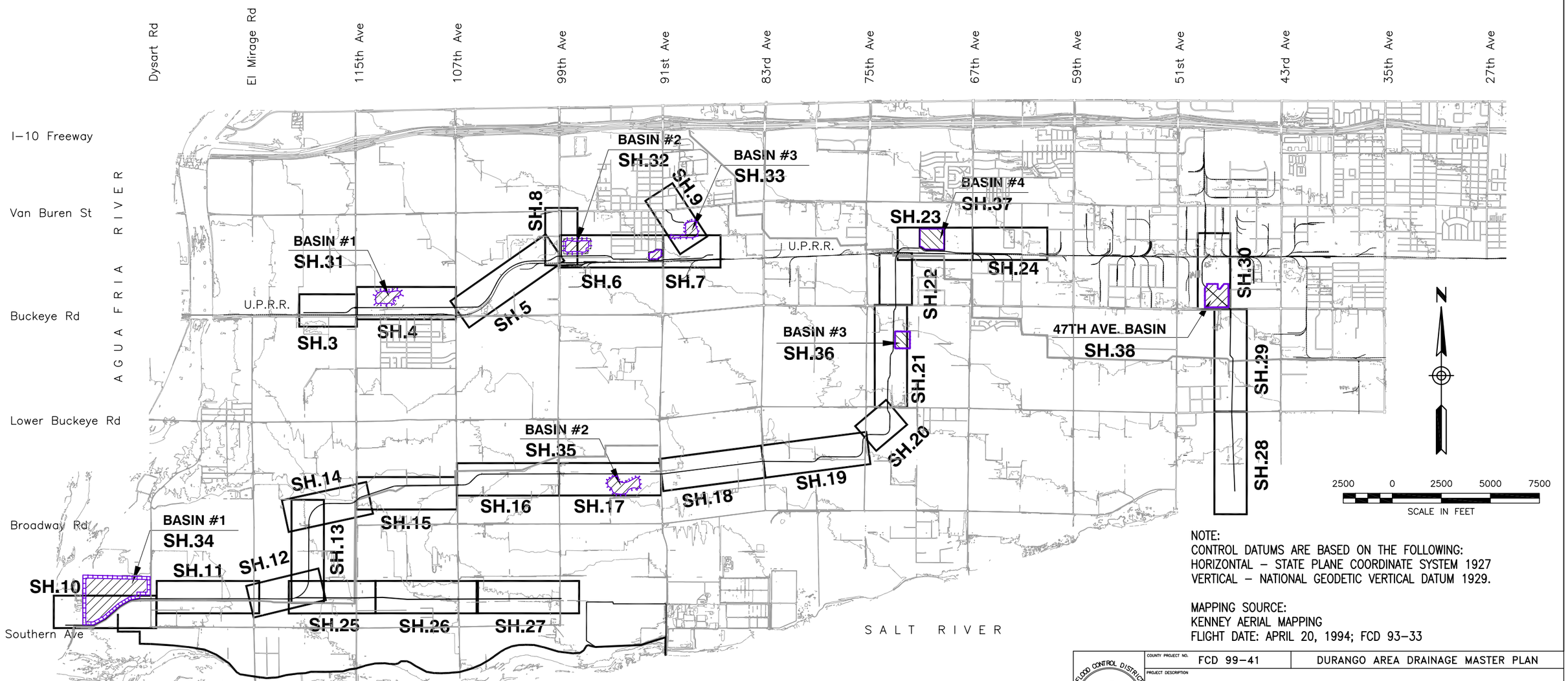
PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
RECOMMENDED PLAN, SHEET 2
10/08/02

Durango
Area Drainage Master Plan
FCD #99-41
Preliminary Design Plans

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



NOTE:
CONTROL DATUMS ARE BASED ON THE FOLLOWING:
HORIZONTAL – STATE PLANE COORDINATE SYSTEM 1927
VERTICAL – NATIONAL GEODETIC VERTICAL DATUM 1929.

MAPPING SOURCE:
KENNEY AERIAL MAPPING
FLIGHT DATE: APRIL 20, 1994; FCD 93-33

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: COVER SHEET	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: – / DES. JLM DATE: – / CKD. BJF DATE: –	SCALE: HORIZONTAL / VERTICAL
		SHEETS: NO. 1 OF 38

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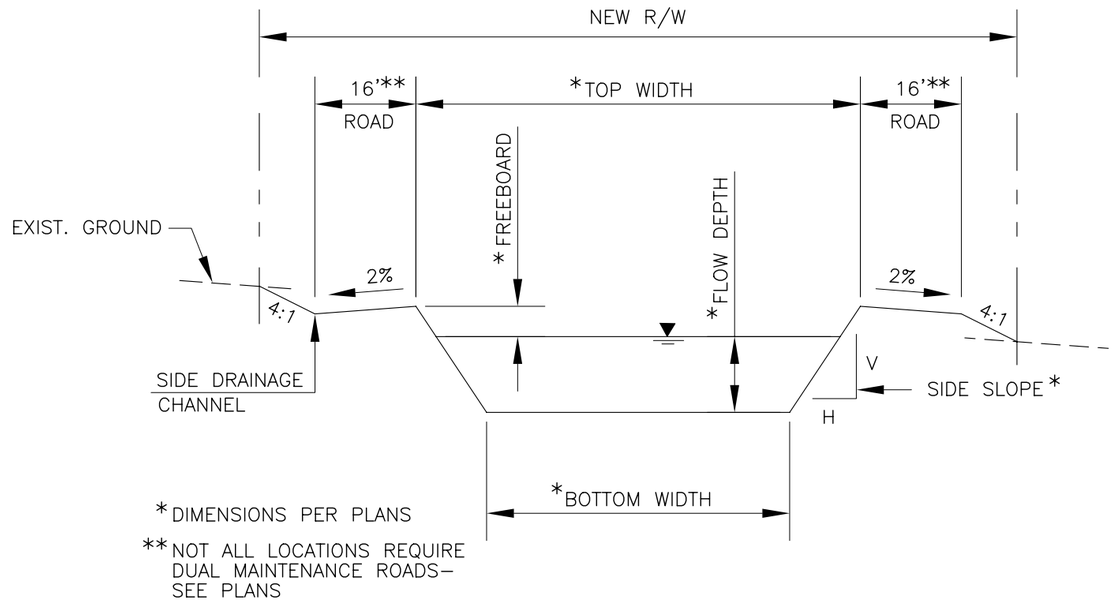


TYPICAL CHANNEL SECTION

N.T.S.

LEGEND

- XX-1 — CHANNEL REACH
- NEW CHANNEL
- NEW DETENTION BASIN SLOPE
- NEW DRAIN PIPE
- NEW CULVERT
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- 8 — PARCEL NUMBER
- EXISTING ROAD
- 1410 — EXIST. INDEX CONTOUR
- EXIST. INTERMEDIATE CONTOUR
- 15"S — EXISTING UTILITY
- EXISTING VEGETATION
- EXISTING POWER POLE
- EXISTING STREET LIGHT
- EXISTING STRUCTURE
- IMPACTED STRUCTURE
- 304 — ENVIRONMENTAL SITE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

TYPICAL SECTION/LEGEND

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
HORIZONTAL
VERTICAL

SHEETS
NO. 2 OF 38

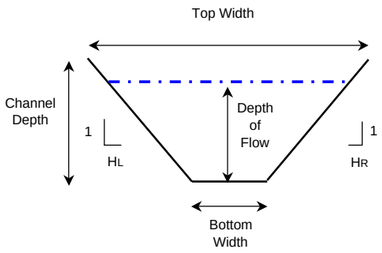
FILE:J:\9935\Acad\Prelim_Design\plan02-typs.dwg DATE:Oct, 10 2002 TIME: 01:55 pm

Durango Area Drainage Master Plan
Durango Regional Outfall Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DROC01	MCKDKA	920	920	975.5	977.2	2690	0.0006	0.0006	0.0	0	0.0	GR	0.0400	60.0	4.8	6	6	429.2	118.7	0.20	Sub	2.1	1.2	6.0	132.6	190

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Environmental Sites

No.	Name	Address	Database
304	Littleton Elementary School	1252 S 115th Ave	LUST, UST
310	Vacant Property Farm Equipment Y	S of SWC 115th Ave / Buckeye R	LUST, UST

Landscape Notes

Parklike theme combined with formal promenade and railroad theme along the UPRR
- Incorporate channel into Coldwater Springs Golf Course
- Multi-use trail link to the Agua Fria River
- River Enhancement

BOOK 500
MAP 29

DROC01

BEGINNING OF CHANNEL

05M

115TH AVE.

BUCKEYE RD.

U.P.R.R.

308

310

304

N 887000

N 886000

E 376000

E 377000

E 378000

E 379000

E 380000

E 381000

970

980

0 100 200 400 600 800
feet

CAUTION: Buried Petroleum Pipe Line. Contact Kinder–Morgan Co. 714–560–4940

CAUTION: Buried Fiber Optic Cable Contact MCI WORLDCOM 602–734–1273

CAUTION: Overhead High Voltage Electric Lines. Contact APS 602–371–6965

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915–496–5562

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.

DROC01
LENGTH = 2690'
S=0.0006'/ft
Q=920 cfs

BEGINNING OF CHANNEL

115TH AVE.

EXIST. COLDWATER SPRINGS GOLF COURSE CHANNEL

TOP OF CHANNEL

EXIST. GND. @ CHANNEL

CHANNEL FL

FL=975.54

FL=977.15

1000
980
960

DURANGO REGIONAL OUTFALL CHANNEL

COUNTY PROJECT NO. FCD 99–41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL OUTFALL CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE: 1"=400' HORIZONTAL; 1"=20' VERTICAL
	DES. JLM DATE: –	SHEETS: NO. 3 OF 38
	CKD. BJF DATE: –	

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

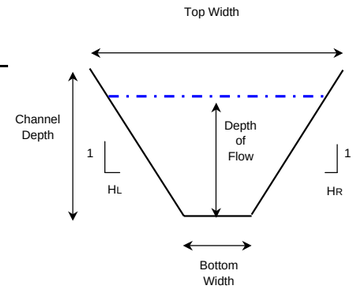
FILE:J:\9935\Acad\Prelim_Design\plpr03-droc.dwg DATE:Oct, 10 2002 TIME: 02:16 pm

Durango Area Drainage Master Plan
Durango Regional Outfall Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DROC02a	MCLEKD	920	920	977.5	979.1	921	0.0018	0.0018	0.0	0	0.0	GR	0.0400	40.0	4.3	6	6	278.4	91.7	0.33	Sub	3.3	1.1	5.4	104.3	150
DROC02b	MCDBY1	700	700	979.1	982.0	1560	0.0018	0.0018	0.0	0	0.0	GR	0.0400	45.0	3.5	6	6	232.2	87.7	0.33	Sub	3.0	1.0	4.5	99.2	150
DROC03	MCOBLE	1093	1093	982.0	983.2	2501	0.0005	0.0005	0.0	0	0.0	GR	0.0400	95.0	4.5	6	6	552.0	150.0	0.18	Sub	2.0	1.1	5.7	163.0	220

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DROC-C1	~CPKD	920	920	130	977.5	977.2	0.0026	RCBC	0.012	4	5	ft.	10	RCBC	Wingwall	4.82	5.04	1.01	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DROC-02a	DROC	Irrigation	42"	115th Avenue
DROC-02a	DROC	Irrigation	42"	115th Avenue
DROC-02a	DROC	Natural Ga:	20"	115th Avenue

Environmental Sites

No.	Name	Address	Database
305	IMC Western Operations Cashion	107th Ave & Buckeye Rd	FINDS, RCRIS-LQG
306	Englund Equipment Co	11498 W Buckeye Rd	RCRIS-SQG, FINDS
307	Austin	10508 W Buckeye Rd	UST
311	Savco #4	11123 W Buckeye Rd	LUST, UST

Landscape Notes

Parklike theme combined with formal promenade and railroad theme along the UPRR
- Active recreation uses in multi-level graded basins
- Meandering multi-use pathway
- Future Light Rail Corridor Potential
- Vary channel side slopes

BOOK 101

DROC02a

DROC02b

DROC03

DURANGO REGIONAL OUTFALL BASIN #1 SEE SHEET 31

1A

2A

2B

8

1B

115TH AVE.

107TH AVE.

U.P.R.R.

BUCKEYE RD.

972E

971B

972F

305

306

311

307

N 887000

N 886000

E 381000

E 382000

E 383000

E 384000

E 385000

E 386000

990

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

CAUTION: Buried Petroleum Pipe Line. Contact Kinder-Morgan Co. 714-560-4940

CAUTION: Buried Fiber Optic Cable Contact MCI WORLDCOM 602-734-1273

CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

0 100 200 400 600 800

feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.

DROC02a
LENGTH = 921'
S=0.0018'/ft
Q=920 cfs

DROC02b
LENGTH = 1560'
S=0.0018'/ft
Q=700 cfs

DROC03
LENGTH = 2501'
S=0.0005'/ft
Q=1093 cfs

1000

980

960

115TH AVE.

4-10'x5' CBC
DROC-C1

42"IRR

42"IRR

20'G
*El=978.08

FL=977.43

RELOCATE EXIST. UTILITIES (3)

IRR CHNL

TOP OF CHANNEL

EXIST. GND. @ CHANNEL

IRR CHNL

DURANGO REGIONAL OUTFALL BASIN #1

CHANNEL FL

FL=981.95

107TH AVE.

FL=983.20

DURANGO REGIONAL OUTFALL CHANNEL

* Indicates Potholed Elevation

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

DURANGO REGIONAL OUTFALL CHANNEL

PRIME CONSULTANT

DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962

DRN. JEV DATE: -

DES. JLM DATE: -

CKD. BJF DATE: -

SCALE

1"=400' HORIZONTAL

1"=20' VERTICAL

SHEETS

NO. 4 OF 38

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

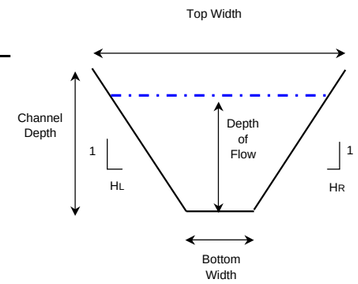
FILE:J:\9935\Acad\Prelim_Design\plpr04-droc.dwg DATE:Oct, 10 2002 TIME: 02:17 pm

Durango Area Drainage Master Plan
Durango Regional Outfall Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DROC04	MCOFOB	1013	1013	983.3	984.3	2177	0.0005	0.0005	0.0	0	0.0	GR	0.0400	80.0	4.7	6	6	508.9	137.2	0.18	Sub	2.0	1.2	5.9	150.7	210
DROC05a	MCOGOF	905	905	984.3	986.7	1166	0.0020	0.0020	0.0	0	0.0	GR	0.0400	25.0	4.8	6	6	256.9	83.2	0.35	Sub	3.5	1.2	6.0	97.3	150
DROC05b	MCOGOF	905	905	987.2	992.9	2857	0.0020	0.0020	0.0	0	0.0	GR	0.0400	25.0	4.8	6	6	256.9	83.2	0.35	Sub	3.5	1.2	6.0	97.3	150

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DROC-C2	~CPOB	1013	1013	110	983.3	983.2	0.0005	RCBC	0.012	3	5	ft.	10	RCBC	Wingwall	4.52	5.62	1.12	TW
DROC-C3	~CPOF	905	905	242.4	987.2	986.7	0.0020	RCBC	0.012	3	5	ft.	10	RCBC	Wingwall	4.78	5.38	1.08	TW

Utility Crossings

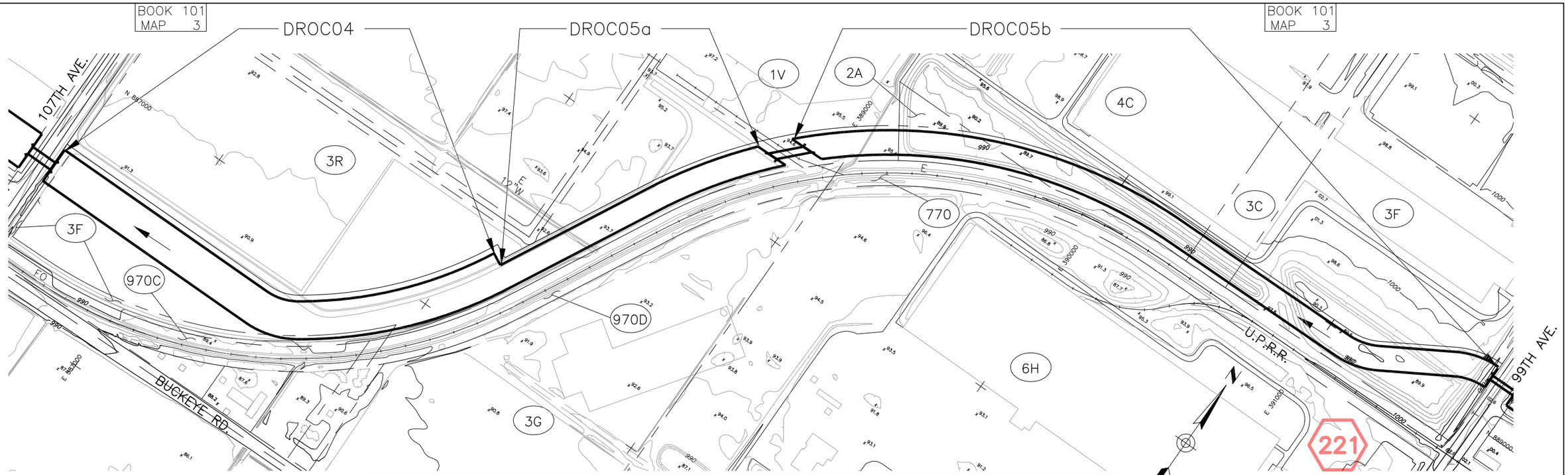
I.D.	Alignment	Type	Size	Location
DROC-04	DROC	Telephone	N/A	107th Avenue
DROC-04	DROC	Telephone	N/A	107th Avenue
DROC-05a	DROC	Water	12"	104th Avenue
DROC-05a	DROC	Water	12"	104th Avenue
DROC-05a	DROC	UG Electric	N/A	104th Avenue
DROC-05b	DROC	Irrigation	24"	103rd Avenue
DROC-05b	DROC	Irrigation	24"	103rd Avenue
DROC-05b	DROC	UG Electric	N/A	103rd Avenue

Environmental Sites

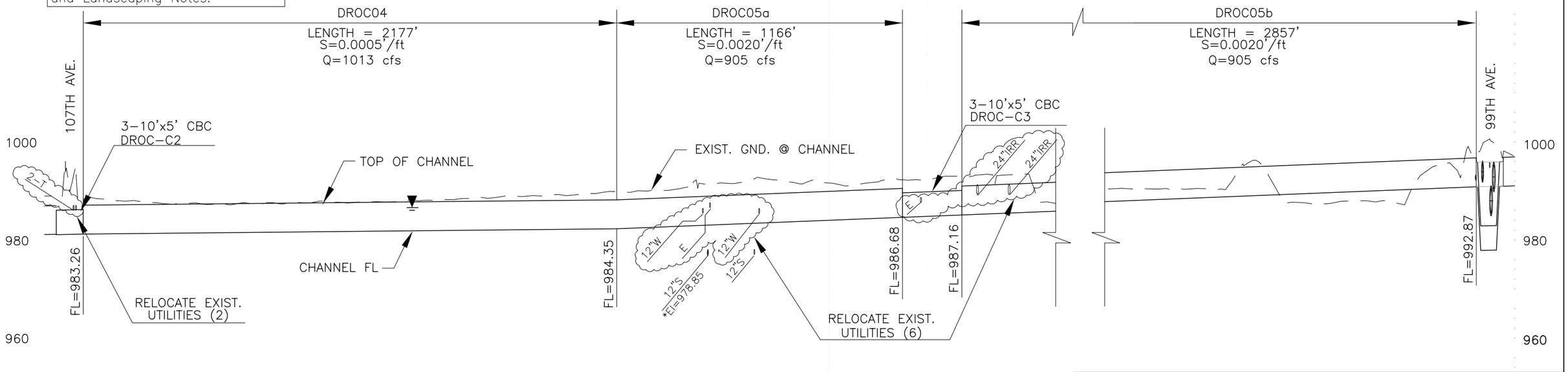
No.	Name	Address	Database
221	Puregro #174 Tolleson Facility	99th Ave / Harrison	LUST, UST

Landscape Notes

Parklike theme combined with formal promenade and railroad theme along the UPRR
- Active recreation uses in multi-level graded basins
- Meandering multi-use pathway
- Future Light Rail Corridor Potential
- Vary channel side slopes



See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



* Indicates Potholed Elevation

DURANGO REGIONAL OUTFALL CHANNEL

COUNTY PROJECT NO. FCD 99–41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL OUTFALL CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL
	DES. JLM DATE: –	SHEETS: NO. 5 OF 38
	CKD. BJF DATE: –	

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

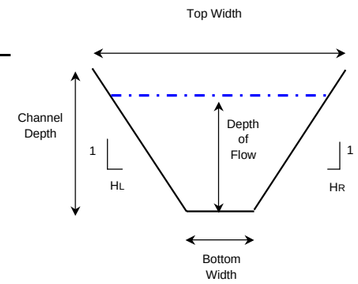
FILE:J:\9935\Acad\Prelim_Design\plpr05-droc.dwg DATE:Oct, 10 2002 TIME: 02:19 pm

Durango Area Drainage Master Plan
Durango Regional Outfall Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DROC06a	MCRHOG	1214	1214	993.0	997.9	2558	0.0019	0.0019	0.0	0	0.0	GR	0.0400	45.0	4.6	6	6	336.6	101.3	0.35	Sub	3.6	1.2	5.8	115.0	170
DROC06b	MCRHOG	1214	1214	997.9	1002.9	2664	0.0019	0.0019	0.0	0	0.0	C	0.0140	24.0	4.8	0	0	115.3	33.6	0.85	Sub	10.5	1.6	6.4	24.0	70

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DROC-C4	~CPOG	628	628	110	993.0	992.9	0.0011	RCBC	0.012	2	5	ft.	10	RCBC	Wingwall	4.78	5.67	1.13	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DROC-06a	DROC	Water	12"	99th Avenue
DROC-06a	DROC	Water	12"	97th Avenue
DROC-06a	DROC	Sewer	10"	97th Avenue
DROC-06a	DROC	Irrigation	Channel	99th Avenue
DROC-06b	DROC	Water	12"	95th Avenue
DROC-06b	DROC	Irrigation	Unk	95th Avenue
DROC-06c	DROC	Water	6"	91st Avenue

Environmental Sites

No.	Name	Address	Database
217	Everkrisp Vegetables	9202 W Harrison	LUST, UST
225	Puregro Co	99th Ave / Harrison St	RCRIS-SQG, FINDS, CERCLIS-NFRAP

Landscape Notes

Parklike theme combined with formal promenade and railroad theme along the UPRR
- Active recreation uses in multi-level graded basins
- Meandering multi-use pathway
- Future Light Rail Corridor Potential
- Vary channel side slopes
- Existing formal rows of pecan trees south of railroad

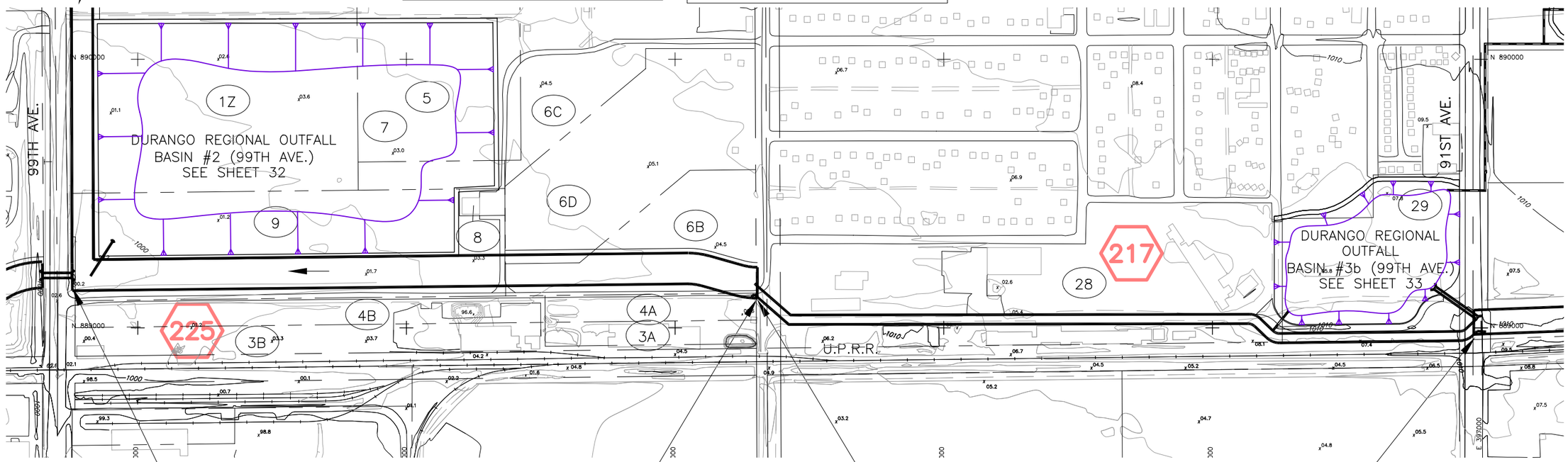
REACH 99-LT
SEE SHEET 08

BOOK 101
MAP 4

CAUTION: Buried Fiber Optic Cable
Contact MCI WORLDCOM
602-734-1273

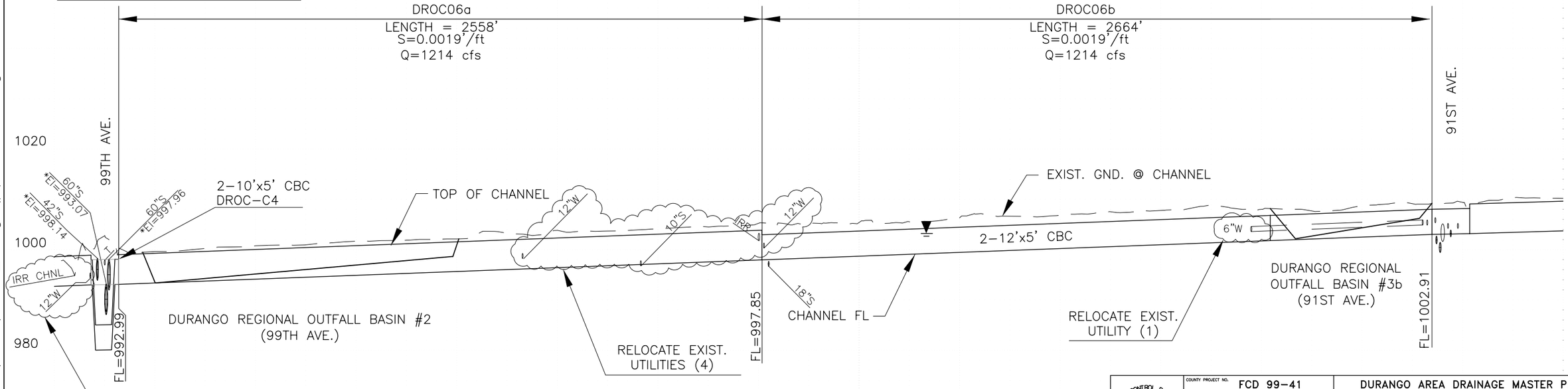
CAUTION: Buried Petroleum Pipe
Line. Contact Kinder-Morgan Co.
714-560-4940

BOOK 101
MAP 7



0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL OUTFALL CHANNEL

* Indicates Potholed Elevation

COUNTY PROJECT NO.	FCD 99-41
	DURANGO AREA DRAINAGE MASTER PLAN
PROJECT DESCRIPTION	DURANGO REGIONAL OUTFALL CHANNEL
PRIME CONSULTANT	DIBBLE & ASSOCIATES CONSULTING ENGINEERS
DRN. JEV DATE: –	SCALE 1"=400' HORIZONTAL
DES. JLM DATE: –	1"=20' VERTICAL
CKD. BJF DATE: –	SHEETS NO. 6 OF 38

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

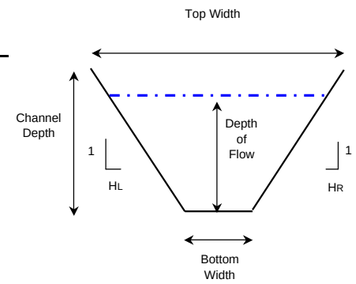
FILE:J:\9935\Acad\Prelim_Design\plpr06-droc.dwg DATE:Oct, 10 2002 TIME: 02:20 pm

Durango Area Drainage Master Plan
Durango Regional Outfall Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DROC07	MCRIRH	664	664	1003.1	1006.8	2482	0.0015	0.0015	0.0	0	0.0	GR	0.0400	20.0	4.7	6	6	225.5	77.0	0.30	Sub	2.9	1.2	5.9	90.7	140

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DROC-C5	~@CPRH	662	662	150	1003.1	1002.9	0.0010	RCBC	0.012	2	5	ft.	10	RCBC	Wingwall	4.81	5.83	1.17	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DROC-07	DROC	Water	12"	91st Avenue
DROC-07	DROC	Telephone	N/A	91st Avenue
DROC-07	DROC	Telephone	N/A	91st Avenue
DROC-07	DROC	Irrigation	42"	91st Avenue
DROC-07	DROC	Gas	3"	91st Avenue
DROC-07	DROC	Water	4"	91st Avenue

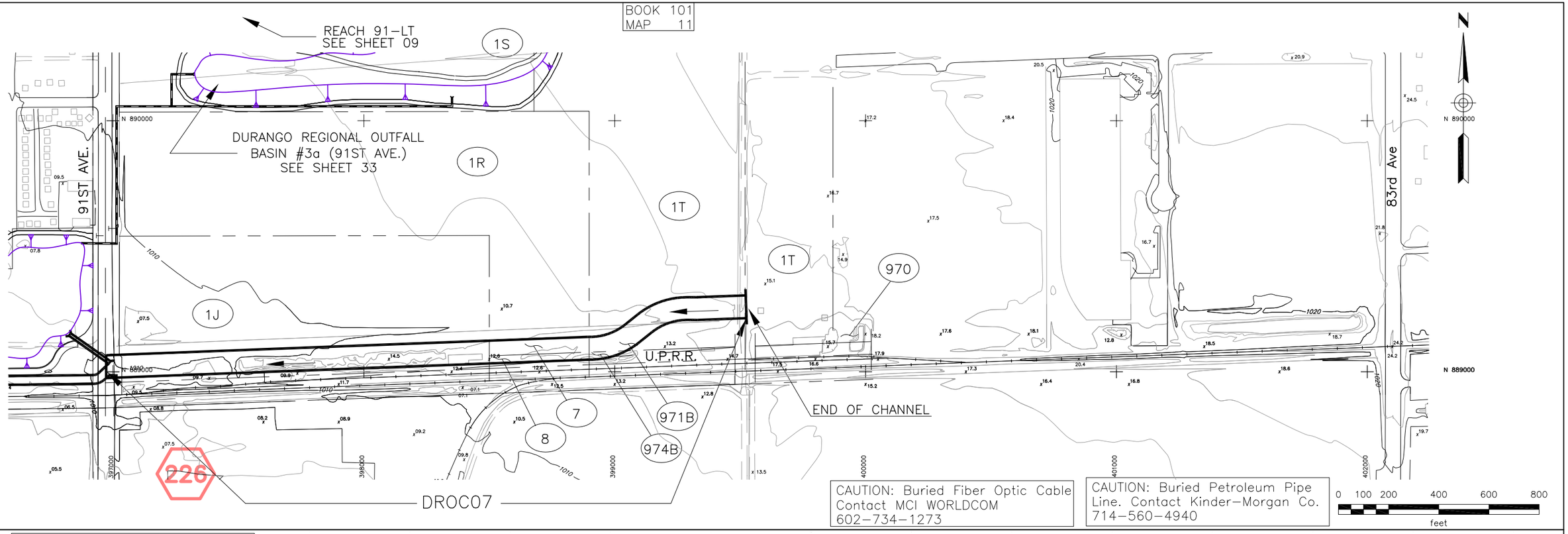
Environmental Sites

No.	Name	Address	Database
226	Swift Independent Packing Co	91st Ave	CERCLIS-NFRAP, HWS

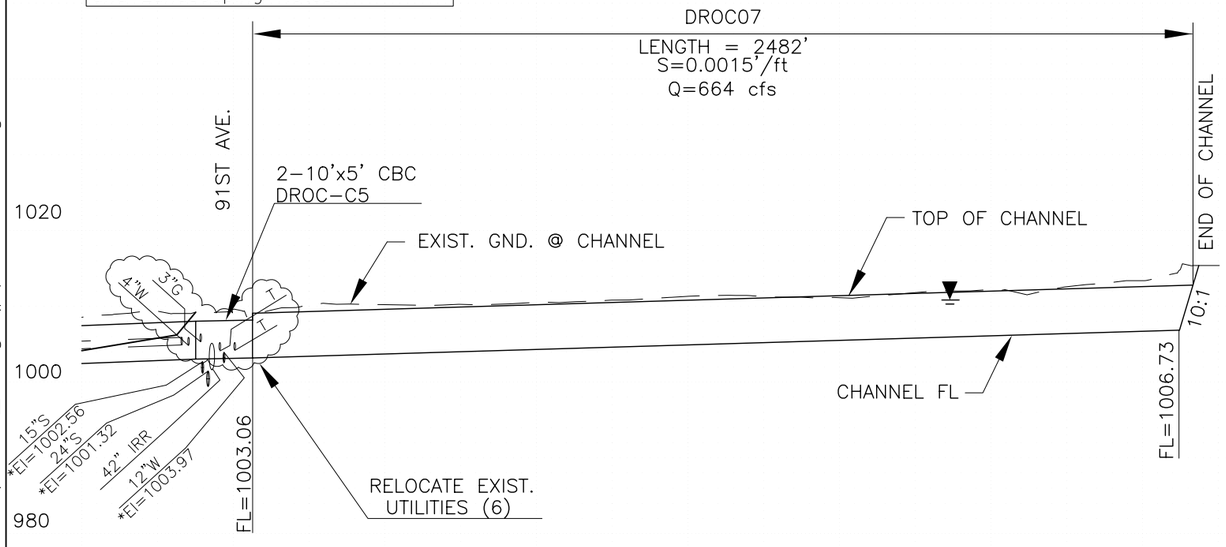
Landscape Notes

Parklike theme combined with formal promenade and railroad theme along the UPRR
- Active recreation uses in multi-level graded basins
- Meandering multi-use pathway
- Future Light Rail Corridor Potential
- Vary channel side slopes

BOOK 101
MAP 11



See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL OUTFALL CHANNEL

* Indicates Potholed Elevation

COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL OUTFALL CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: –	SCALE 1"=400' HORIZONTAL
	DES. JLM DATE: –	1"=20' VERTICAL
	CKD. BJF DATE: –	SHEETS NO. 7 OF 38

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

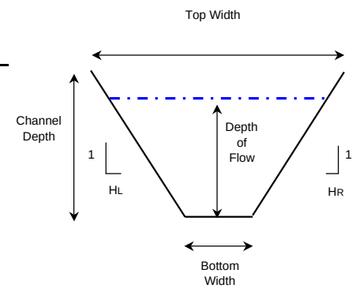
FILE:J:\9935\Acad\Prelim_Design\plpr07-droc.dwg DATE:Oct, 10 2002 TIME: 02:32 pm

Durango Area Drainage Master Plan
99th Ave Lateral

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
99LTa	MCRFOG	730	730	993.1	999.2	1573	0.0039	0.0039	0.0	0	0.0	GR	0.0400	8.0	4.7	6	6	167.0	64.6	0.48	Sub	4.4	1.2	5.9	78.7	130
99LTb	MCRFOG	730	730	999.6	1001.8	557	0.0039	0.0039	0.0	0	0.0	GR	0.0400	8.0	4.7	6	6	167.0	64.6	0.48	Sub	4.4	1.2	5.9	78.7	130

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
99LT-C1	~CPRF	730	730	100	999.6	999.2	0.0039	RCBC	0.012	2	5	ft.	10	RCBC	Wingwall	4.65	5.60	1.12	IC
99LT-C2	~CPRF	730	730	110	1001.9	1001.8	0.0011	RCBC	0.012	3	4	ft.	10	RCBC	Wingwall	4.65	5.50	1.38	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
99LTb	99th Lateral	Water	12"	Van Buren Street

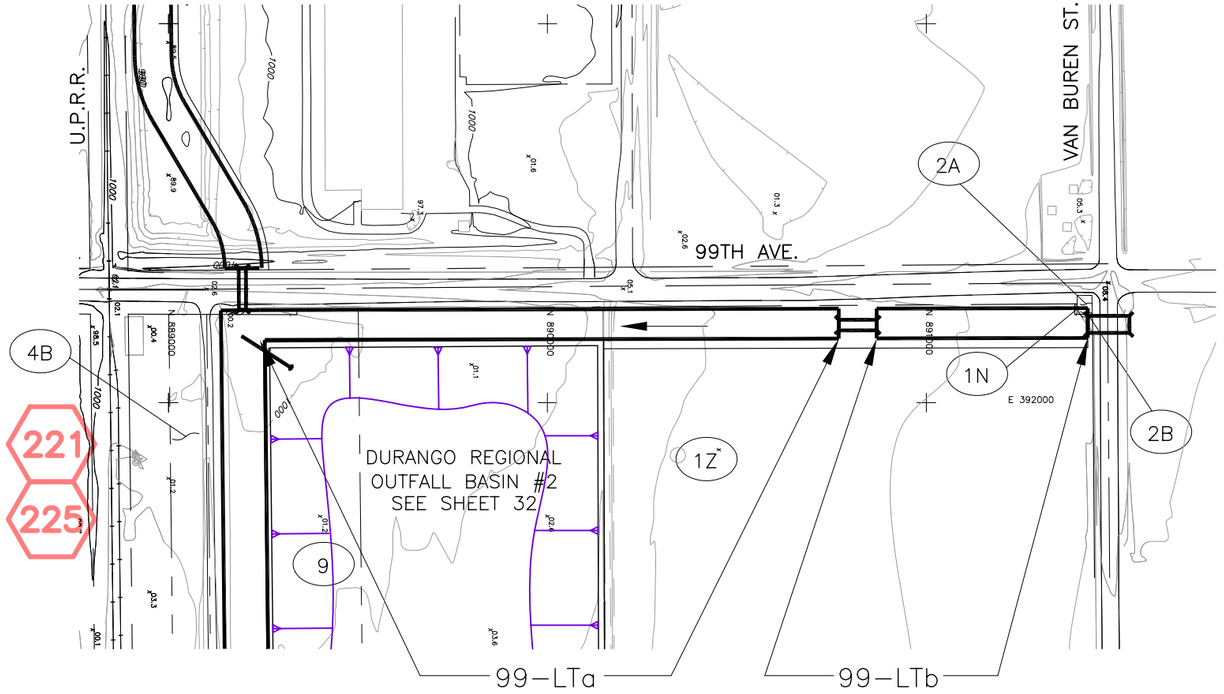
Environmental Sites

No.	Name	Address	Database
221	Puregro #174 Tolleson Facility	99th Ave / Harrison	LUST, UST
225	Puregro Co	99th Ave / Harrison St	RCRIS-SQG, FINDS, CERCLIS-NFRAP

Landscape Notes

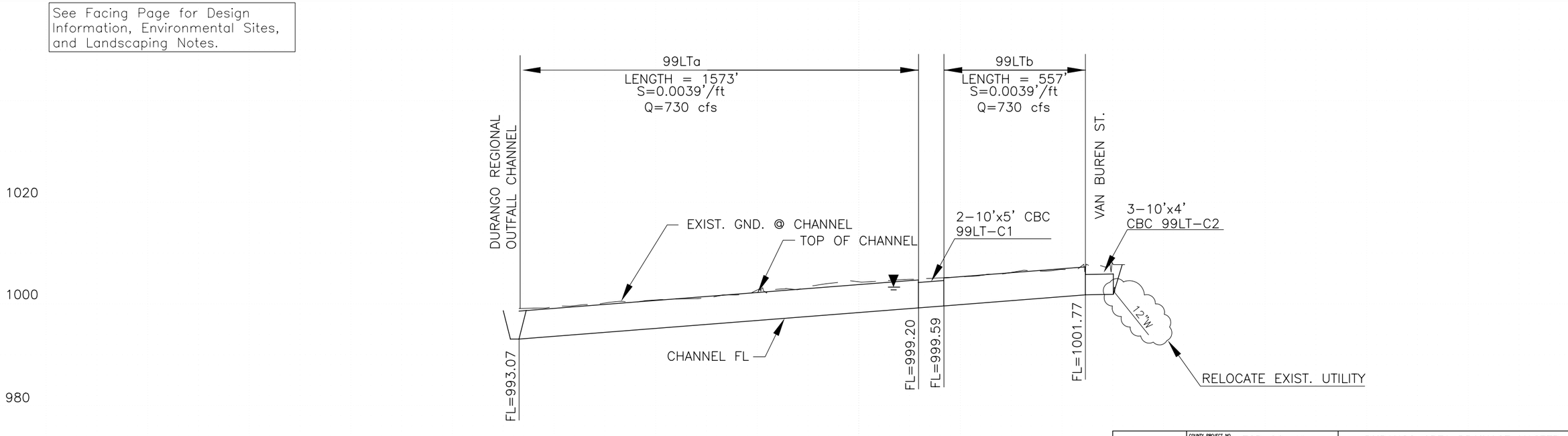
Parklike theme combined with formal promenade and railroad theme along the UPRR
- Active recreation uses in multi-level graded basins
- Meandering multi-use pathway
- Future Light Rail Corridor Potential
- Vary channel side slopes

BOOK 101
MAP 4



0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



99TH AVE. LATERAL

COUNTY PROJECT NO. FCD 99–41	DURANGO AREA DRAINAGE MASTER PLAN		
PROJECT DESCRIPTION: 99TH AVE. LATERAL			
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE 1"=400' HORIZONTAL	SHEETS NO. 8 OF 38
	DES. JLM DATE: –	1"=20' VERTICAL	
	CKD. BJF DATE: –		

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

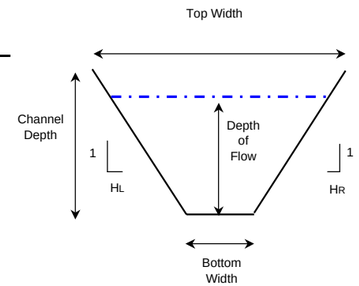
FILE:J:\9935\Acad\Prelim_Design\plpr08–99LT01.dwg DATE:Oct, 10 2002 TIME: 02:32 pm

Durango Area Drainage Master Plan
91st Ave Lateral

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
91LT	MCSARH	811	811	1008.5	1009.6	1106	0.0010	0.0010	0.0	0	0.0	GR	0.0400	60.0	3.9	6	6	328.5	107.8	0.25	Sub	2.5	1.0	4.9	119.2	170

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
91LT-C1	SUBSA	811	811	185	1009.8	1009.6	0.0010	RCBC	0.012	3	4	ft.	10	RCBC	Wingwall	3.93	5.08	1.27	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
91LTb	91st Lateral	Telephone	N/A	Van Buren Street
91LTb	91st Lateral	Telephone	N/A	Van Buren Street
91LTb	91st Lateral	Water	12"	Van Buren Street
91LTb	91st Lateral	Water	8"	Van Buren Street

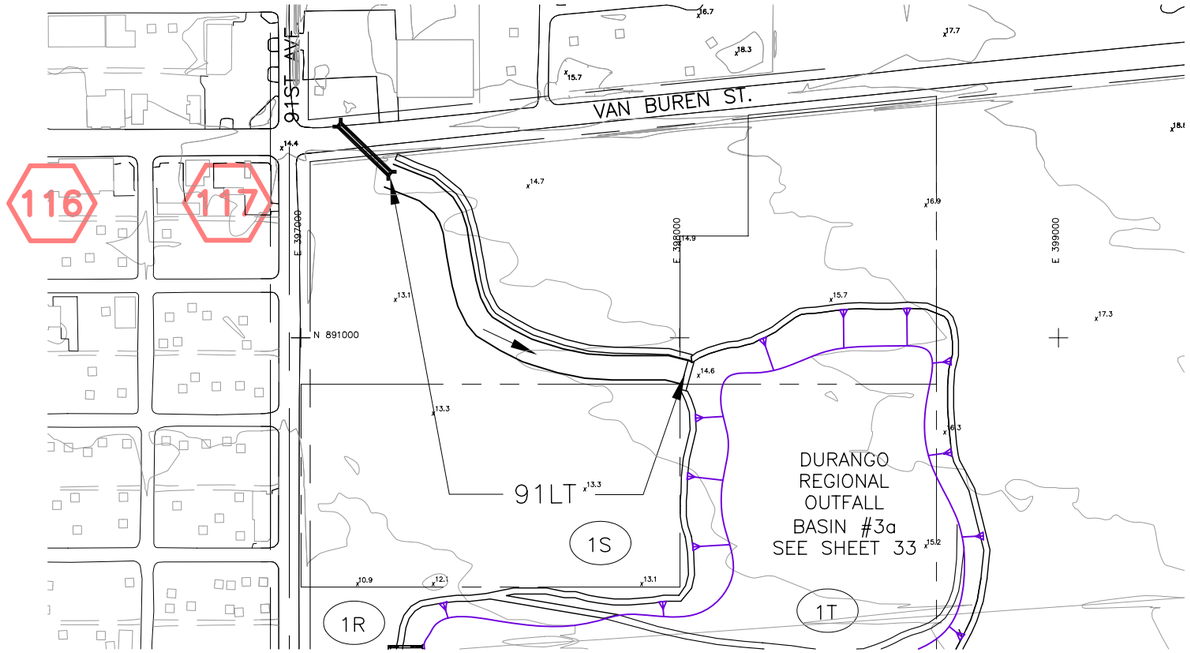
Environmental Sites

No.	Name	Address	Database
116	Tolleson Elementary SD#17	9261 W Van Buren St	FINDS
117	Circle K #8872	9110 W Van Buren St	UST
117	WR Grace Co	91st Ave / Van Buren	AZ_SPILL
117	Clark's Automotive Service	9123 W Van Buren St	UST

Landscape Notes

Parklike theme combined with formal promenade and railroad theme along the UPRR
- Active recreation uses in multi-level graded basins
- Meandering multi-use pathway
- Future Light Rail Corridor Potential
- Vary channel side slopes
- Existing formal rows of pecan trees north of Van Buren

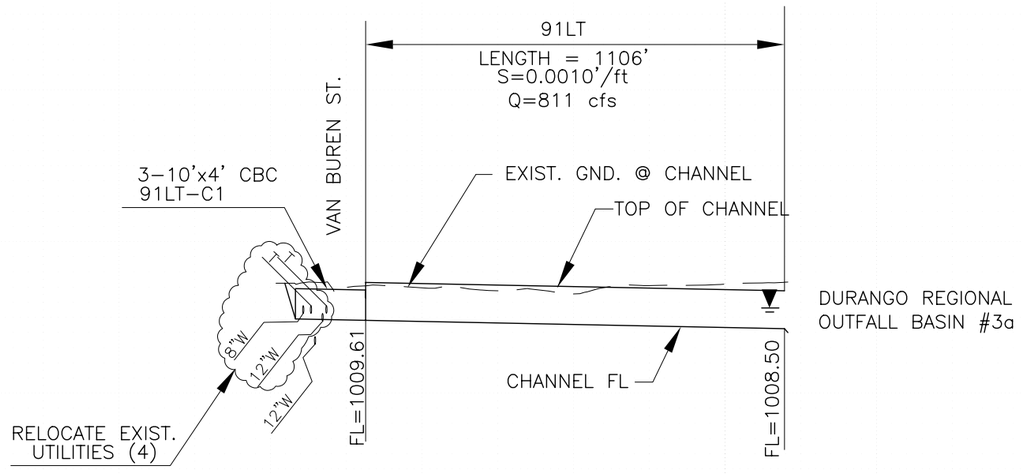
BOOK 101
MAP 11



N

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



91ST AVE. LATERAL

COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN
PROJECT DESCRIPTION: 91ST AVE. LATERAL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: – / DES. JLM DATE: – / CKD. BJF DATE: –
SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL	SHEETS: NO. 9 OF 38

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

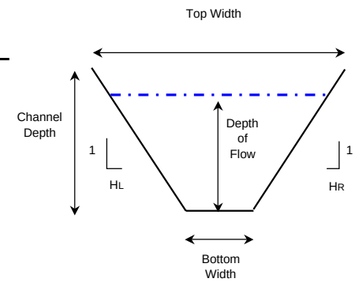
FILE:J:\9935\Acad\Prelim_Design\plpr09-91LT01.dwg DATE:Oct, 10 2002 TIME: 02:33 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC01a	- See Below																									40
DRCC01b	MCCABC	3224	3224	917.2	917.9	500	0.0014	0.0014	0.0	0	0.0	GR	0.0400	165.0	4.7	6	6	907.6	222.2	0.31	Sub	3.6	1.2	5.9	236.1	300

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Storm Drain Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Pipes	Pipe Diameter (in)
DRCC01a	MCCABC	34	915.0	917.2	4230	0.0005	C	0.0140	1	48

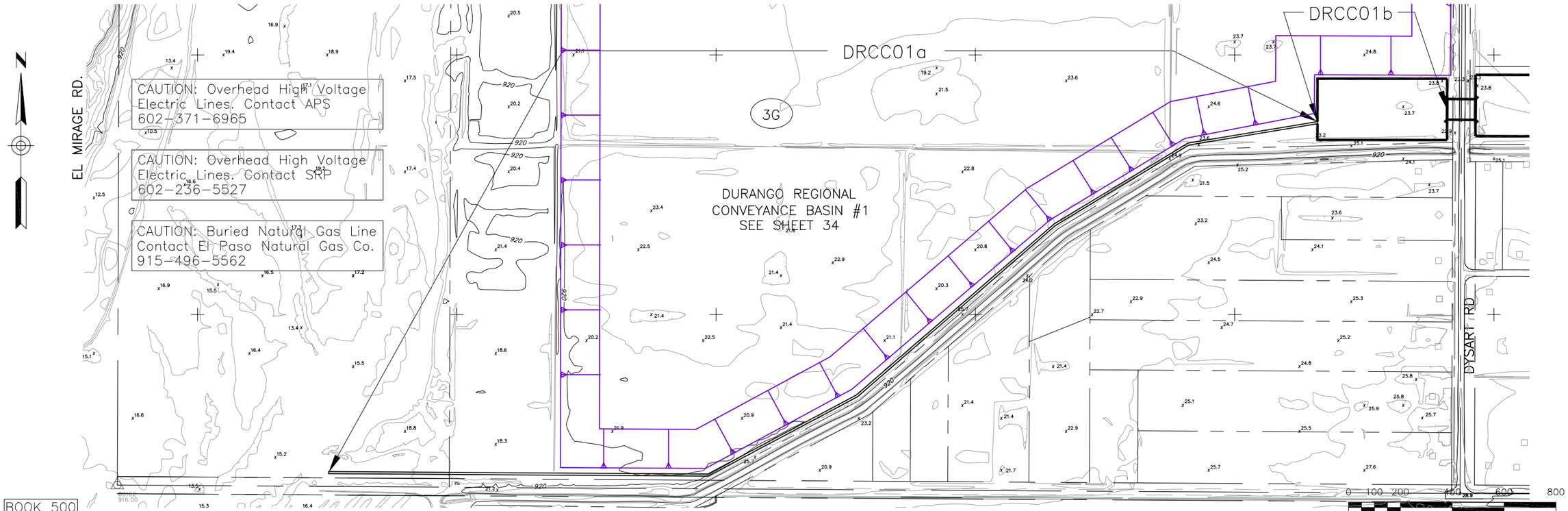
Environmental Sites

No.	Name	Address	Database

No known environmental sites

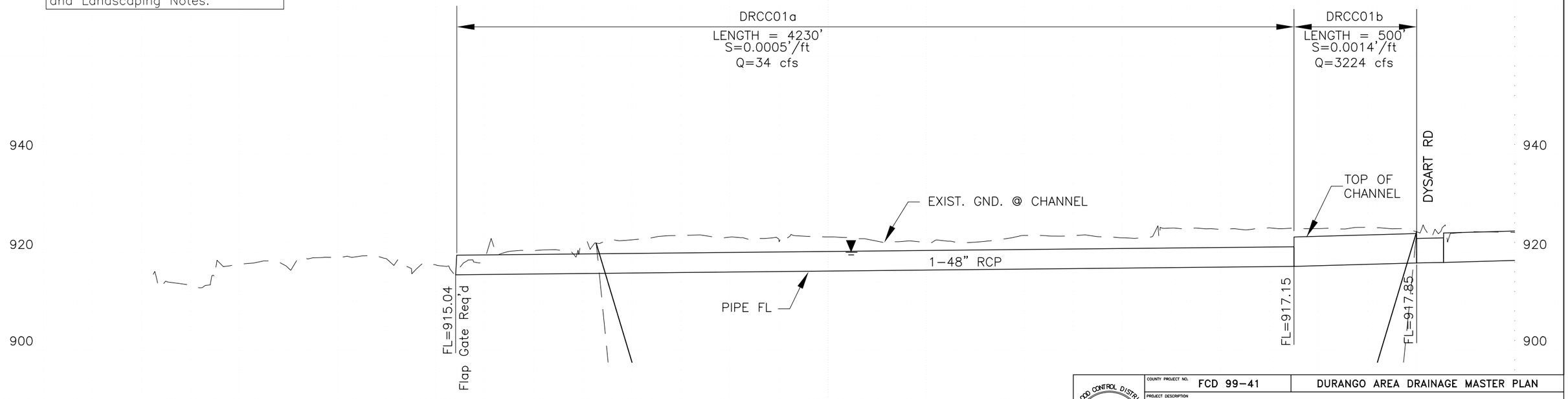
Landscape Notes

Natural landscape theme
Enhancement of river area



BOOK 500
MAP 77

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

COUNTY PROJECT NO.	FCD 99-41
PROJECT DESCRIPTION	DURANGO REGIONAL CONVEYANCE CHANNEL
DURANGO AREA DRAINAGE MASTER PLAN	
PRIME CONSULTANT	DIBBLE & ASSOCIATES CONSULTING ENGINEERS
DRN. JEV DATE: –	SCALE 1"=400' HORIZONTAL
DES. JLM DATE: –	1"=20' VERTICAL
CKD. BJF DATE: –	SHEETS NO. 10 OF 38

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

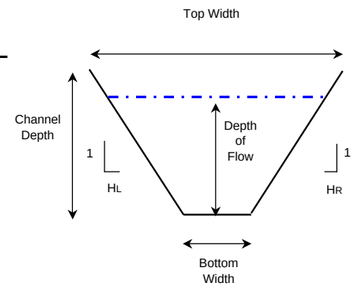
FILE:J:\9935\Acad\Prelim_Design\plpr10-drcc.dwg DATE:Oct, 10 2002 TIME: 02:34 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC02a	MCCBCA	3224	3224	918.0	921.5	2513	0.0014	0.0014	0.0	0	0.0	GR	0.0400	165.0	4.7	6	6	907.6	222.2	0.31	Sub	3.6	1.2	5.9	236.1	300
DRCC02b	MCCBCA	3224	3224	921.6	925.1	2513	0.0014	0.0014	0.0	0	0.0	GR	0.0400	165.0	4.7	6	6	907.6	222.2	0.31	Sub	3.6	1.2	5.9	236.1	300

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C1a	~CPCA2	3225	3225	110	918.0	917.9	0.0010	RCBC	0.012	9	5	ft.	10	RCBC	Wingwall	4.70	5.89	1.18	TW
DRCC-C1b	~CPCA2	3225	3225	110	921.6	921.5	0.0014	RCBC	0.012	9	5	ft.	10	RCBC	Wingwall	4.70	5.85	1.17	TW

Environmental Sites

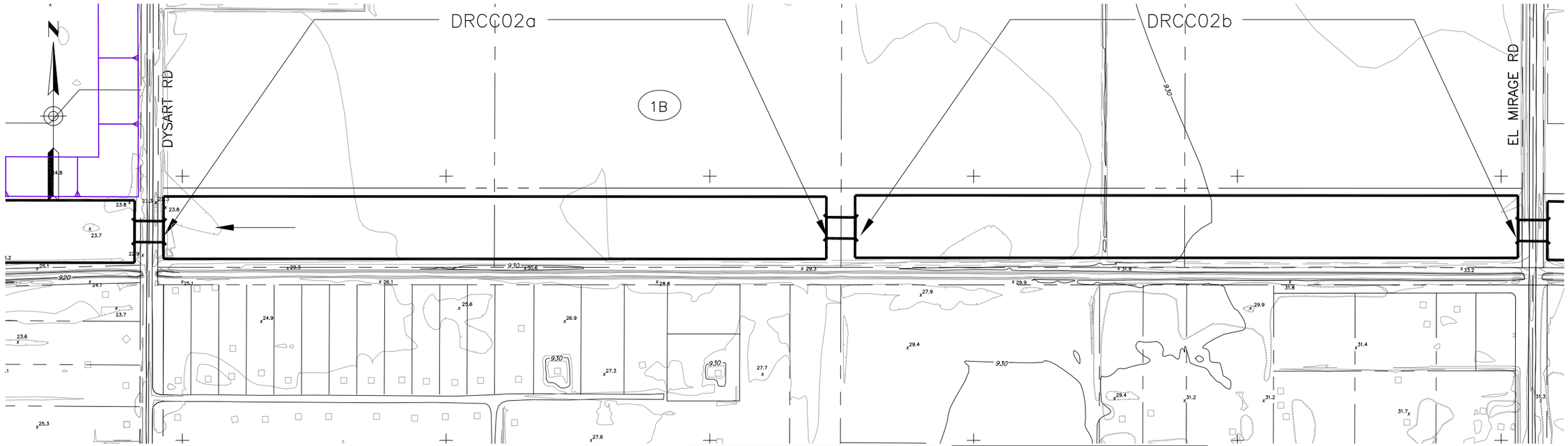
No.	Name	Address	Database

No known environmental sites

Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes

BOOK 500
MAP 72



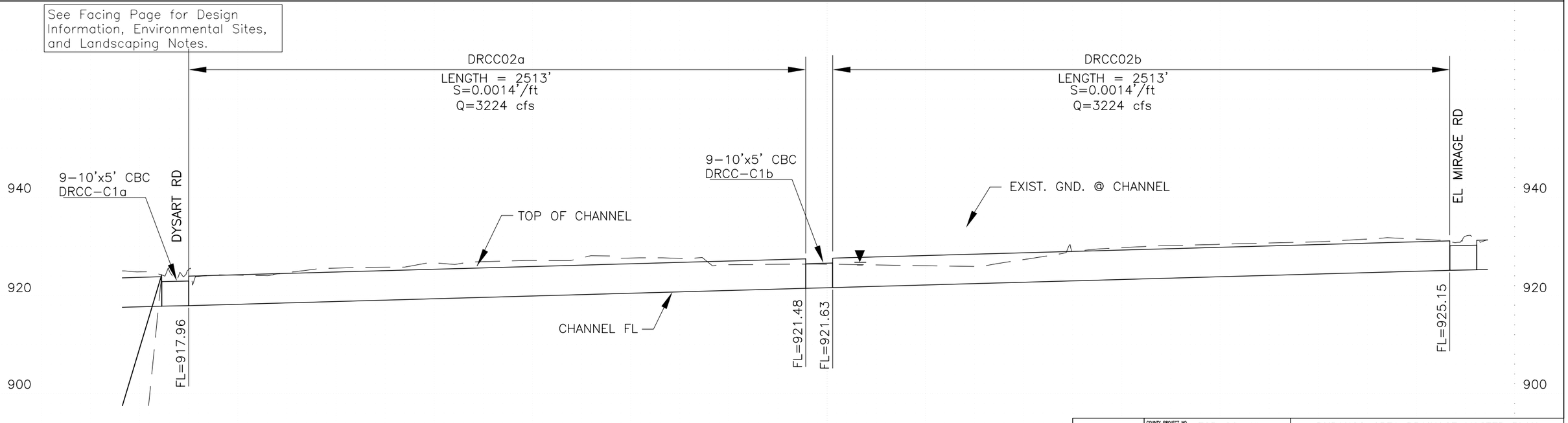
CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 11 OF 38

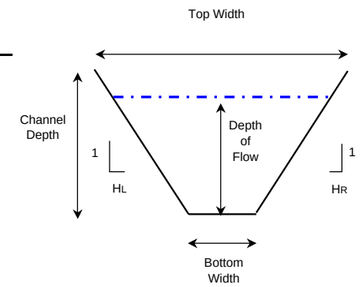
FILE:J:\9935\Acad\Prelim_Design\plpr11-drcc.dwg DATE:Oct, 10 2002 TIME: 02:35 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC03a	MCHACB	3278	3278	925.3	931.0	3377	0.0017	0.0017	0.0	0	0.0	GR	0.0400	150.0	4.7	6	6	841.4	207.4	0.34	Sub	3.9	1.2	6.0	221.5	280

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C2	~CPCB2	3522	3522	110	925.3	925.1	0.0010	RCBC	0.012	10	5	ft.	10	RCBC	Wingwall	4.70	5.84	1.17	TW

Environmental Sites

No.	Name	Address	Database

No known environmental sites

Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes

BOOK 500
MAP 67

DRCC03a

EL MIRAGE RD.

3C

3B

5

4B

SUNLAND AVENUE CHANNEL
SEE SHEET 25

CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

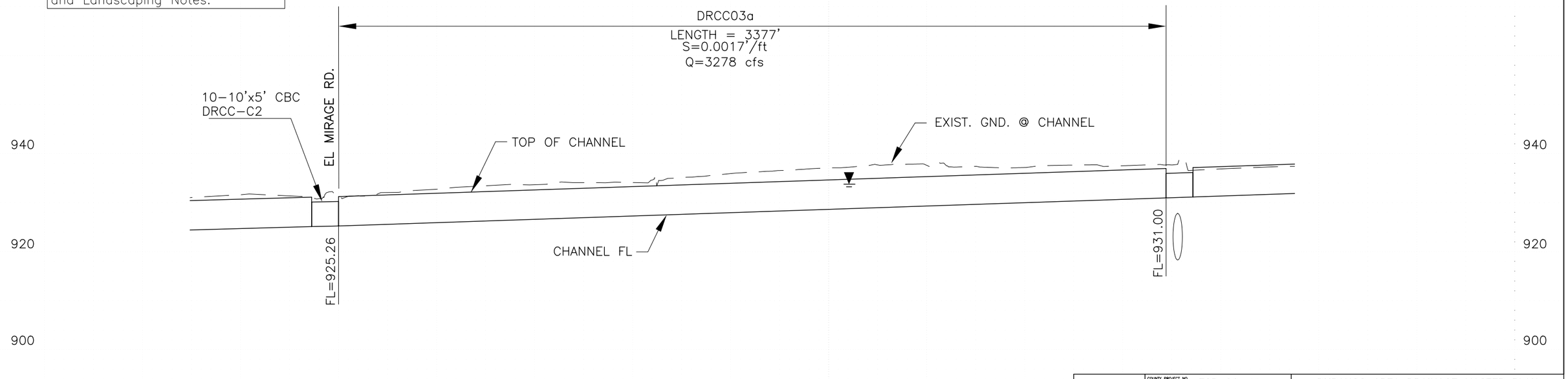
CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

BOOK 500
MAP 70

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 12 OF 38

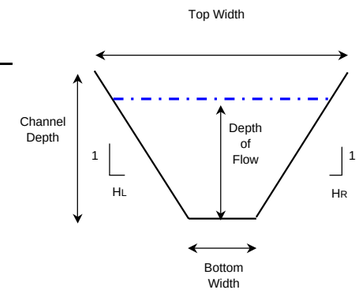
FILE:J:\9935\Acad\Prelim_Design\plpr12-drcc.dwg DATE:Oct, 10 2002 TIME: 02:36 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC03b	MCHAGD	3278	3278	931.2	935.5	2530	0.0017	0.0017	5.7	0	5.7	GR	0.0400	150.0	4.7	6	6	841.4	207.4	0.34	Sub	3.9	1.2	6.0	221.5	280

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C3	~CPCB1	3278	3278	110	931.2	931.0	0.0016	RCBC	0.012	9	5	ft.	10	RCBC	Wingwall	4.72	5.88	1.18	TW

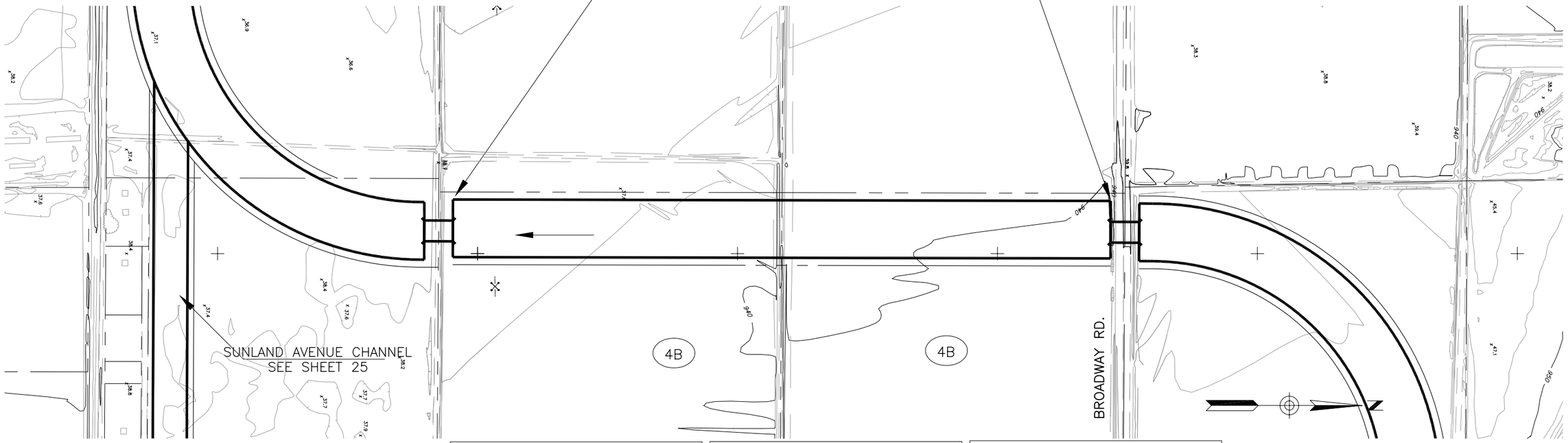
Environmental Sites

No.	Name	Address	Database

No known environmental sites

Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes



CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

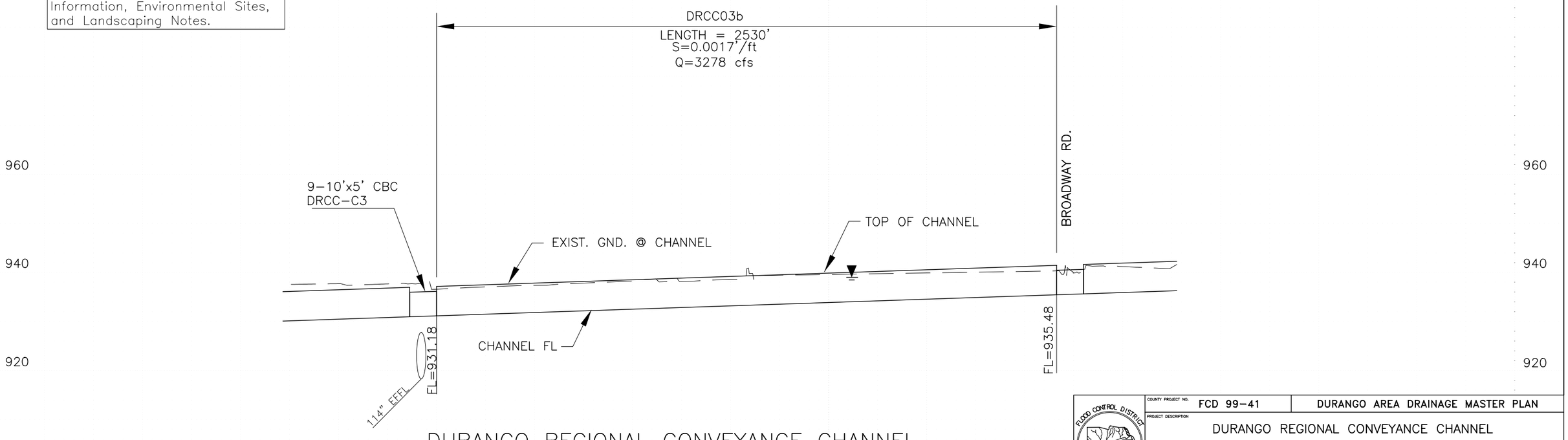
CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

0 100 200 400 600 800
feet

BOOK 500
MAP 67

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 13 OF 38

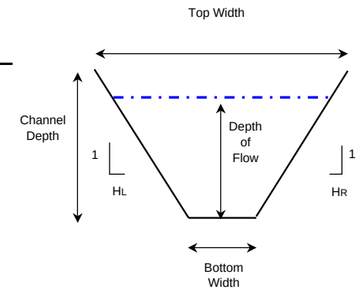
FILE:J:\9935\Acad\Prelim_Design\plpr13-drcc.dwg DATE:Oct, 10 2002 TIME: 02:37 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC03c	MCHAGD	3278	3278	935.7	940.8	3038	0.0017	0.0017	5.7	1	5.7	GR	0.0400	150.0	4.7	6	6	841.4	207.4	0.34	Sub	3.9	1.2	6.0	221.5	280

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C4	~CPCB1	3278	3278	110	935.7	935.5	0.0017	RCBC	0.012	9	5	ft.	10	RCBC	Wingwall	4.72	5.87	1.17	TW

Environmental Sites

No.	Name	Address	Database

No known environmental sites

Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes

BOOK 500
MAP 66

DRCC03c

CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

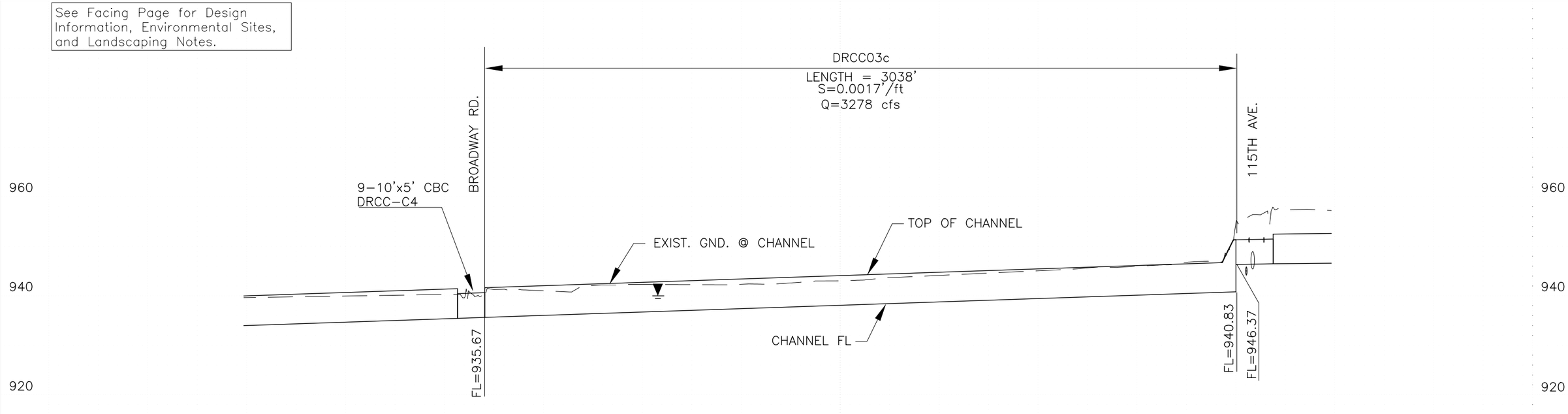
CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

0 100 200 400 600 800
feet

BOOK 500
MAP 67

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

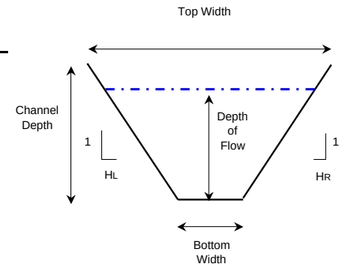
SHEETS
NO. 14 OF 38

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (HL)	Sideslope (H:1) Right (HR)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC04	MCIAHB	2578	2578	946.5	947.8	2646	0.0005	0.0005	0.0	0	0.0	GR	0.0400	220.0	4.8	6	6	1182.0	277.9	0.19	Sub	2.2	1.2	6.0	291.6	360
DRCC05	MCIBIA	2578	2578	947.8	949.1	2493	0.0005	0.0005	0.0	0	0.0	GR	0.0400	220.0	4.8	6	6	1182.0	277.9	0.19	Sub	2.2	1.2	6.0	291.6	360

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C5	~CPHB2	2628	2628	151	946.5	946.4	0.0010	RCBC	0.012	8	5	ft.	10	RCBC	Wingwall	4.72	5.72	1.14	TW
DRCC-C6	~CPIA	2578	2578	110	947.8	947.8	0.0000	RCBC	0.012	8	5	ft.	10	RCBC	Wingwall	4.76	5.81	1.16	TW

Utility Crossings

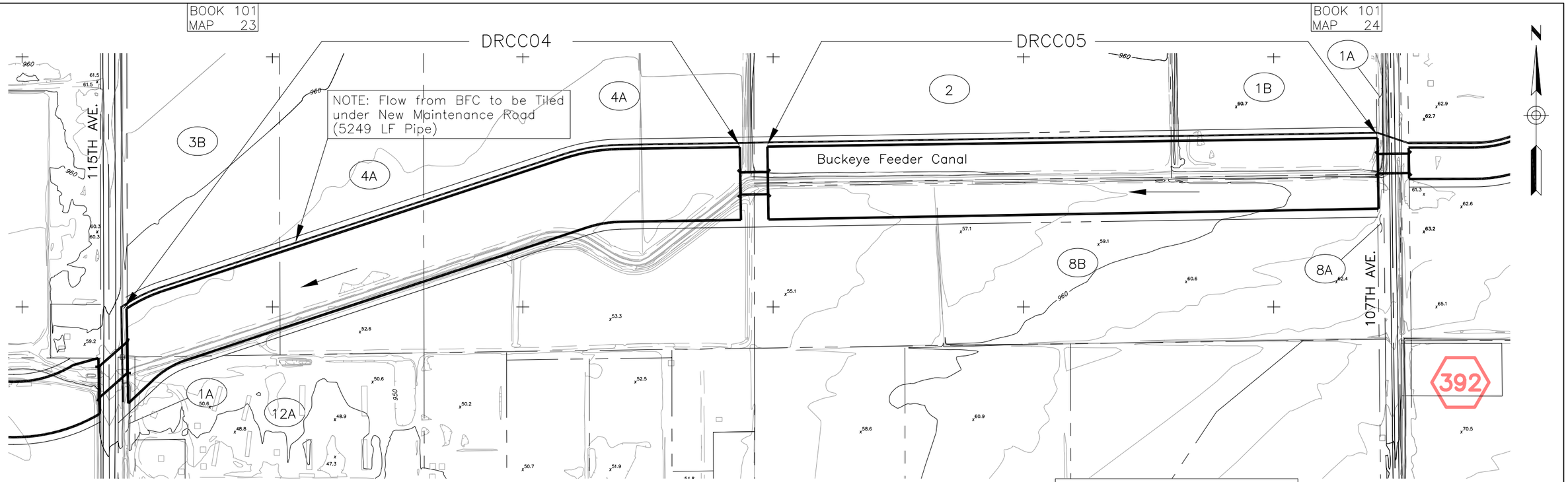
I.D.	Alignment	Type	Size	Location
DRCC-5	DRCC	Canal (BFC)	Assumed 48"	Parallel
DRCC-4	DRCC	Telephone	N/A	115th Avenue
DRCC-4	DRCC	Telephone	N/A	115th Avenue
DRCC-4	DRCC	Irrigation	42"	115th Avenue
DRCC-4	DRCC	Canal (BFC)	Assumed 48"	Parallel

Environmental Sites

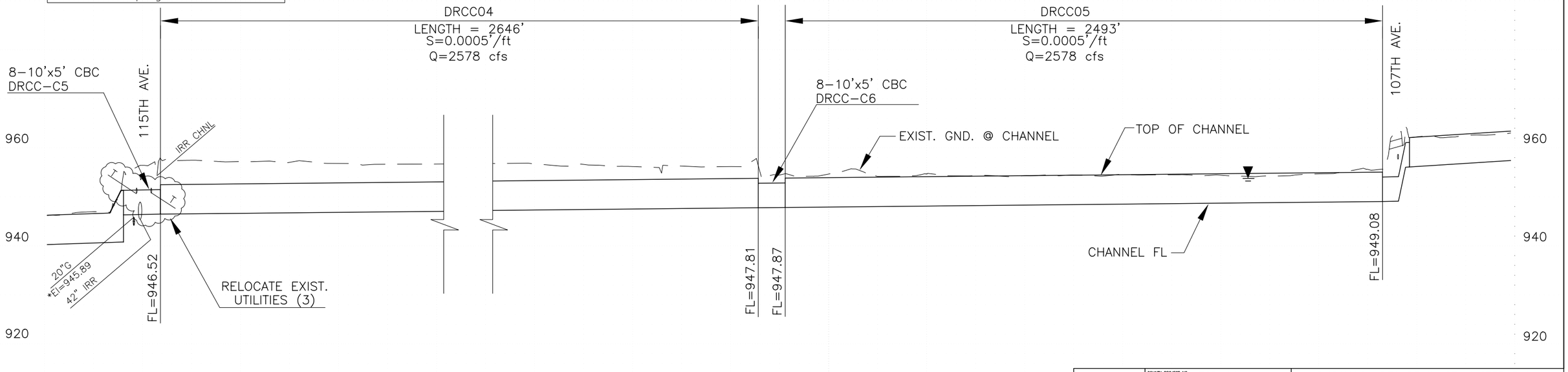
No.	Name	Address	Database
392	Cashion Gin	3436 S 107th Ave	LUST, UST

Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes



See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

* Indicates Potholed Elevation

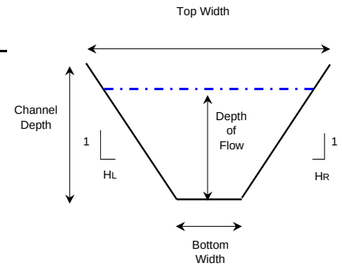
COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL CONVEYANCE CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: – / DES. JLM DATE: – / CKD. BJF DATE: –	SCALE 1"=400' HORIZONTAL, 1"=20' VERTICAL
		SHEETS NO. 15 OF 38

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC06a	MCIDIB	1849	1849	956.1	964.8	2725	0.0032	0.0032	0.0	0	0.0	GR	0.0400	55.0	4.6	6	6	385.1	111.5	0.45	Sub	4.8	1.3	5.9	125.8	180
DRCC06b	MCIDIB	1849	1849	965.2	973.0	2430	0.0032	0.0032	0.0	0	0.0	GR	0.0400	55.0	4.6	6	6	385.1	111.5	0.45	Sub	4.8	1.3	5.9	125.8	180

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C7	~CPIB1	1849	1849	110	956.1	949.1	0.0010	RCBC	0.012	6	5	ft.	10	RCBC	Wingwall	4.76	5.61	1.12	TW
DRCC-C8	~CPIB1	1849	1849	110	965.2	964.8	0.0024	RCBC	0.012	6	5	ft.	10	RCBC	Wingwall	4.65	5.35	1.07	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DRCC-6a	DRCC	Canal (BFC)	Assumed 48"	Parallel
DRCC-6b	DRCC	Canal (BFC)	Assumed 48"	Parallel

Environmental Sites

No.	Name	Address	Database

No known environmental sites

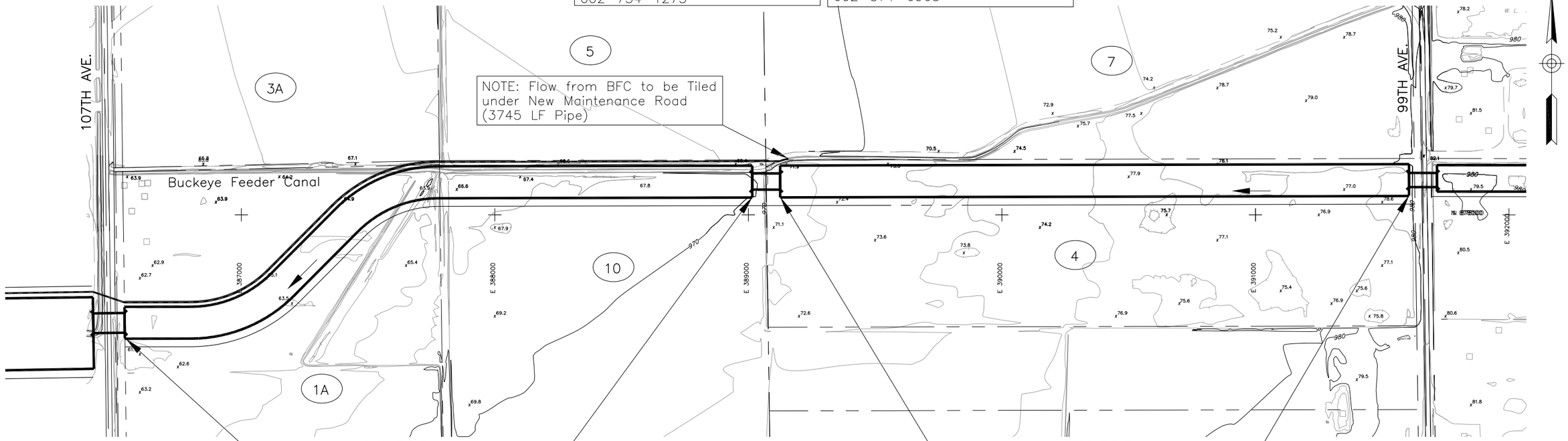
Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes
- Buffer views of transmission line corridor

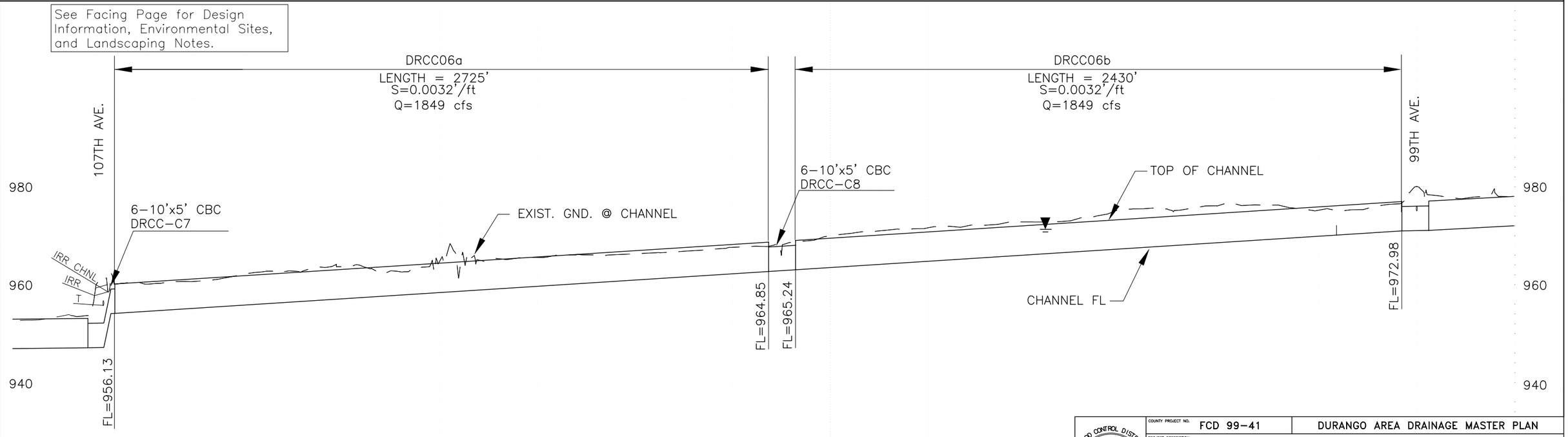
BOOK 101
MAP 25

CAUTION: Buried Fiber Optic Cable
Contact MCI WORLDCOM
602-734-1273

CAUTION: Overhead High Voltage
Electric Lines. Contact APS
602-371-6965



See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL CONVEYANCE CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE: 1"=400' HORIZONTAL; 1"=20' VERTICAL
	DES. JLM DATE: –	SHEETS: NO. 16 OF 38
	CKD. BJF DATE: –	

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

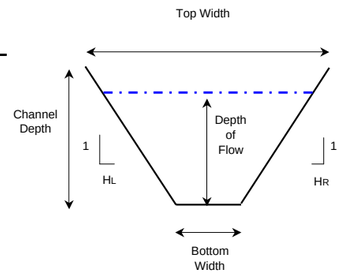
FILE:J:\9935\Acad\Prelim_Design\plpr16-drcc.dwg DATE:Oct, 10 2002 TIME: 02:39 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC07	MC95ID	1175	1175	973.1	980.6	2778	0.0027	0.0027	0.0	0	0.0	GR	0.0400	35.0	4.6	6	6	283.9	90.4	0.41	Sub	4.1	1.2	5.8	104.1	150
DRCC08a	MCBBY1	1050	1050	980.6	982.7	1079	0.0020	0.0020	0.0	0	0.0	GR	0.0400	55.0	3.9	6	6	305.1	102.4	0.35	Sub	3.4	1.0	4.9	114.0	170
DRCC08b	MCED95	1967	1967	982.8	984.0	1250	0.0010	0.0010	0.0	0	0.0	GR	0.0400	115.0	4.7	6	6	674.2	172.3	0.26	Sub	2.9	1.2	5.9	186.0	240

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C9	~CPID1	1175	1175	110	973.1	973.0	0.0010	RCBC	0.012	4	5	ft.	10	RCBC	Wingwall	4.65	5.41	1.08	TW
DRCC-C10	95PASS	1050	1050	140	980.6	980.6	0.0000	RCBC	0.012	8	4	ft.	10	RCBC	Wingwall	4.55	4.85	1.21	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DRCC-7	DRCC	Telephone	N/A	99th Avenue

Environmental Sites

No.	Name	Address	Database

No known environmental sites

Landscape Notes

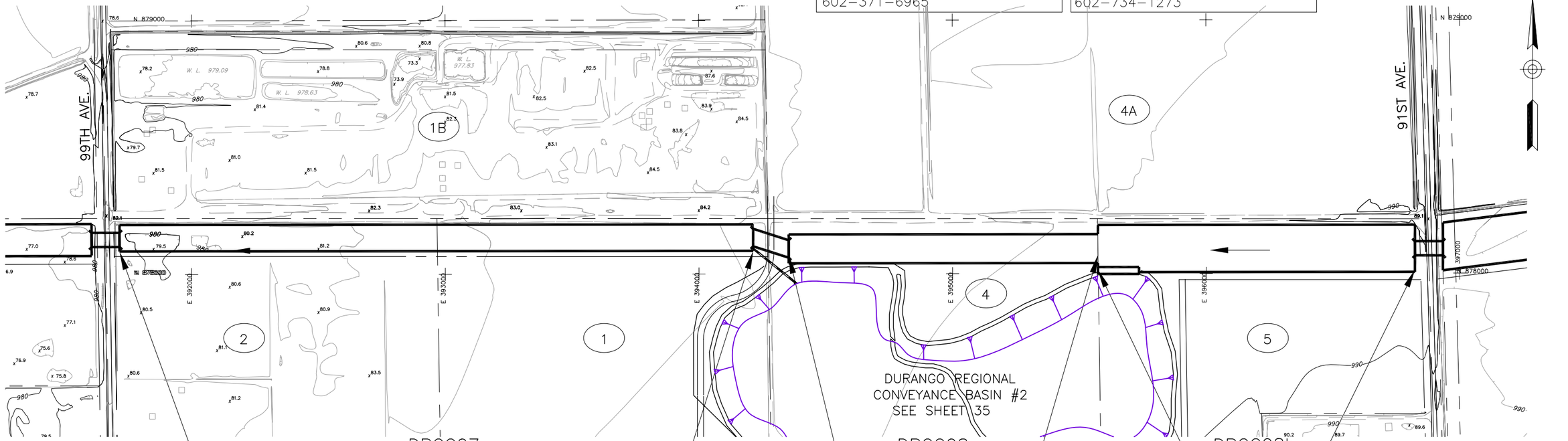
Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes
- Community Park site at basin
- Provide multi-use trail link to Union Elementary School
- Buffer views of transmission line corridor

BOOK 101
MAP 26

CAUTION: Overhead High Voltage
Electric Lines. Contact APS
602-371-6965

CAUTION: Buried Fiber Optic Cable
Contact MCI WORLDCOM
602-734-1273

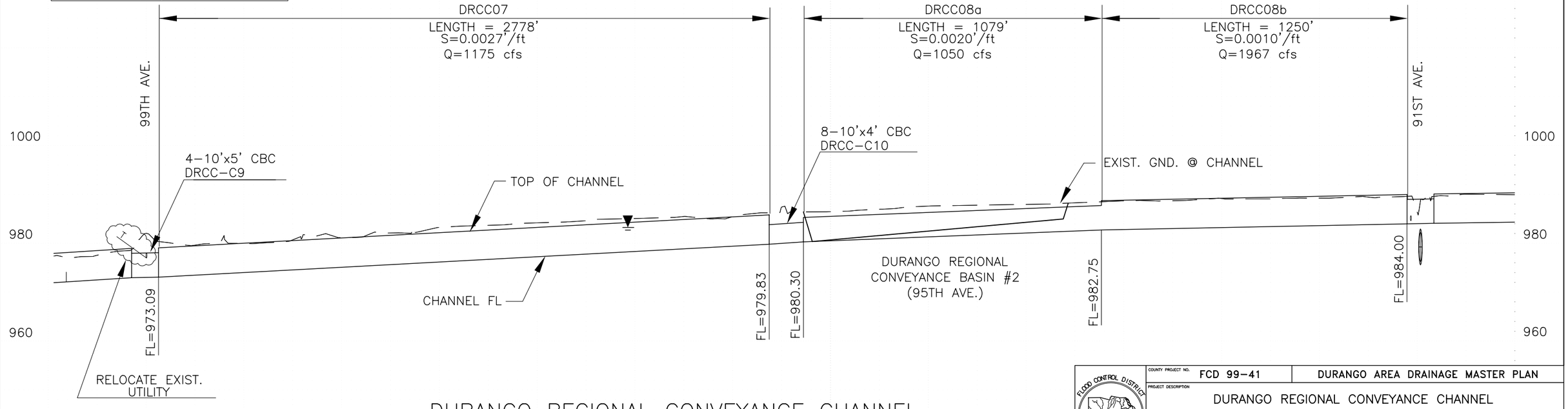
BOOK 101
MAP 27



BOOK 101
MAP 28

BOOK 101
MAP 29

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 17 OF 38

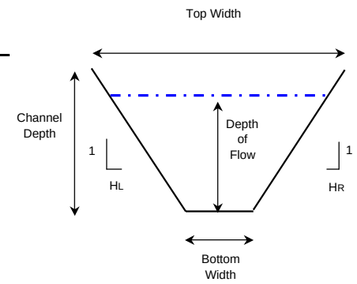
FILE:J:\9935\Acad\Prelim_Design\plpr17-drcc.dwg DATE:Oct, 10 2002 TIME: 02:41 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC09a	MCJBED	1681	1681	984.1	985.8	2484	0.0007	0.0007	0.0	0	0.0	GR	0.0400	115.0	4.8	6	6	683.9	172.9	0.22	Sub	2.5	1.2	6.0	186.7	250
DRCC09b	MCJBED	1681	1681	985.9	987.7	2533	0.0007	0.0007	0.0	0	0.0	GR	0.0400	115.0	4.8	6	6	683.9	172.9	0.22	Sub	2.5	1.2	6.0	186.7	250

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C11	~CPED1	1681	1681	110	984.1	984.0	0.0010	RCBC	0.012	5	5	ft.	10	RCBC	Wingwall	4.71	5.74	1.15	TW
DRCC-C12	~CPED1	1681	1681	110.4	985.9	985.8	0.0006	RCBC	0.012	5	5	ft.	10	RCBC	Wingwall	4.76	5.84	1.17	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DRCC09a	DRCC	Telephone	N/A	91st Avenue
DRCC09b	DRCC	Irrigatin	Channel	85th Avenue

Environmental Sites

No.	Name	Address	Database
389	Pendergast Elementary District	3802 S 91st Ave	FINDS
390	Union Elementary School	3834 S 91st Ave	FINDS, UST

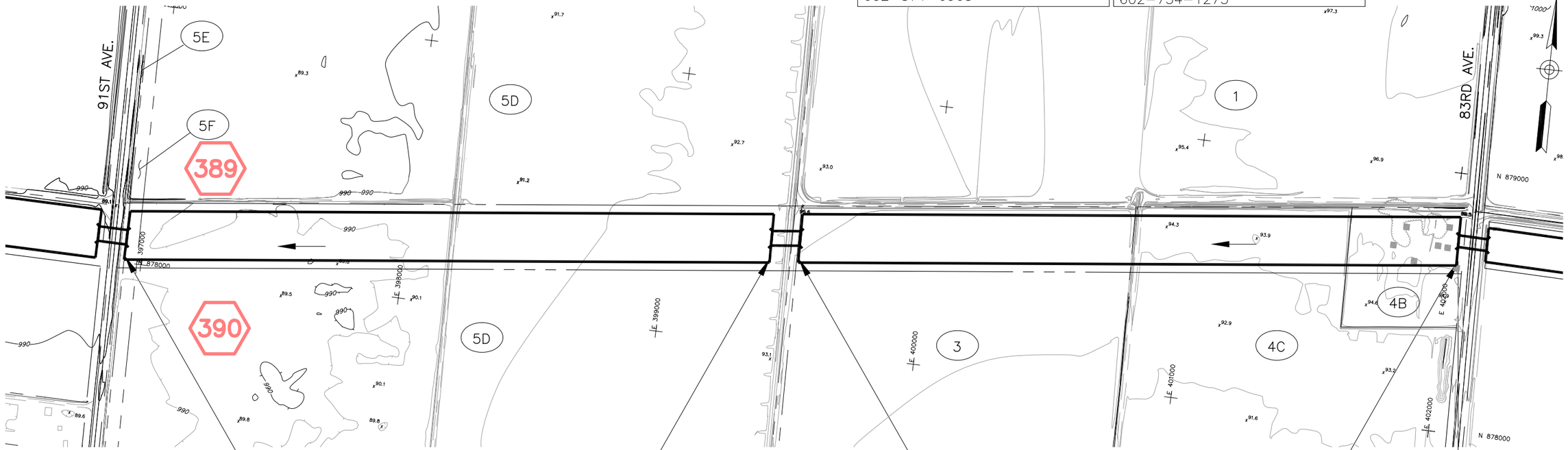
Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes
- Buffer views of transmission line corridor

BOOK 101
MAP 30

CAUTION: Overhead High Voltage
Electric Lines. Contact APS
602-371-6965

CAUTION: Buried Fiber Optic Cable
Contact MCI WORLDCOM
602-734-1273

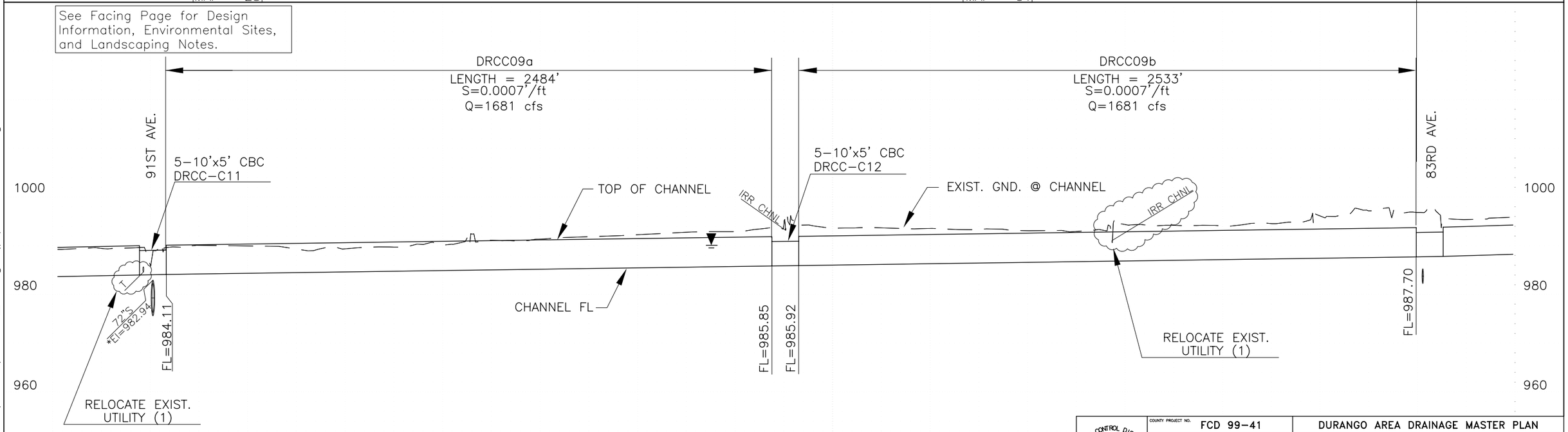


0 100 200 400 600 800
feet

BOOK 101
MAP 28

BOOK 101
MAP 31

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

* Indicates Potholed Elevation

COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL CONVEYANCE CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE 1"=400' HORIZONTAL
	DES. JLM DATE: –	1"=20' VERTICAL
	CKD. BJF DATE: –	SHEETS NO. 18 OF 38

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

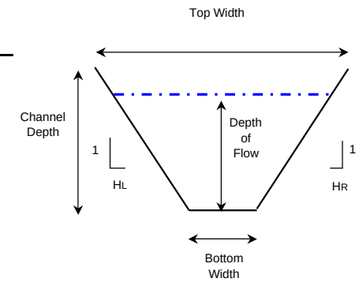
FILE:J:\9935\Acad\Prelim_Design\plpr18-drcc.dwg DATE:Oct, 10 2002 TIME: 02:42 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC10a	MCJCJB	1393	1393	987.8	991.7	2565	0.0015	0.0015	0.0	0	0.0	GR	0.0400	60.0	4.7	6	6	416.3	117.4	0.31	Sub	3.3	1.2	5.9	131.2	180
DRCC10b	MCJCJB	1393	1393	992.0	996.8	3174	0.0015	0.0015	0.0	0	0.0	GR	0.0400	60.0	4.7	6	6	416.3	117.4	0.31	Sub	3.3	1.2	5.9	131.2	180

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C13	~CPJB1	1393	1393	110.5	987.8	987.7	0.0011	RCBC	0.012	4	5	ft.	10	RCBC	Wingwall	4.76	5.88	1.18	TW
DRCC-C14	~CPJB1	1393	1393	220	992.0	991.7	0.0015	RCBC	0.012	4	5	ft.	10	RCBC	Wingwall	4.71	5.79	1.16	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DRCC10b	DRCC	Irrigation	Channel	79th Avenue
DRCC10b	DRCC	Fiber Optic	N/A	Elwood Road

Environmental Sites

No.	Name	Address	Database

No known environmental sites

Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes
- Buffer views of transmission line corridor

BOOK 104
MAP 53

DRCC10a

DRCC10b

83RD AVE.

75TH AVE.

1A

3A

6

7

4

N 879000

N 878000

N 880000

E 402000

E 403000

E 404000

E 405000

E 406000

CAUTION: Buried Fiber Optic Cable
Contact MCI WORLDCOM
602-734-1273

CAUTION: Buried Fiber Optic Cable
Contact Sprint
602-417-0970

CAUTION: Overhead High Voltage
Electric Lines. Contact APS
602-371-6965

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.

DRCC10a
LENGTH = 2565'
S=0.0015'/ft
Q=1393 cfs

DRCC10b
LENGTH = 3174'
S=0.0015'/ft
Q=1393 cfs

83RD AVE.

75TH AVE.

1020

1000

980

4-10'x5' CBC
DRCC-C13

4-10'x5' CBC
DRCC-C14

IRR CHNL

TOP OF CHANNEL

EXIST. GND. @ CHANNEL

CHANNEL FL

RELOCATE EXIST.
UTILITIES (2)

36"S
*EL=985.26

FL=987.81

FL=991.65

FL=991.99

FL=996.75

DURANGO REGIONAL CONVEYANCE CHANNEL

* Indicates Potholed Elevation

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 19 OF 38

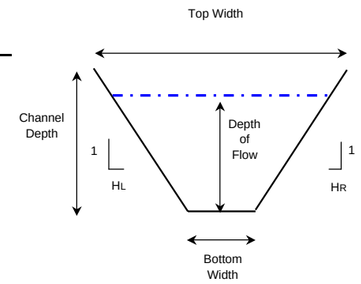
FILE:J:\9935\Acad\Prelim_Design\plpr19-drcc.dwg DATE:Oct, 10 2002 TIME: 02:43 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC11	MCNAJC	1173	1173	996.9	1001.7	2417	0.0020	0.0020	0.0	0	0.0	GR	0.0400	40.0	4.7	6	6	319.2	97.0	0.36	Sub	3.7	1.2	5.9	110.9	160

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C15	~CPJC1	1173	1173	146	996.9	996.8	0.0010	RCBC	0.012	4	5	ft.	10	RCBC	Wingwall	4.71	5.48	1.10	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DRCC-11	DRCC	Water	12"	75th Avenue
DRCC-11	DRCC	Telephone	N/A	75th Avenue
DRCC-11	DRCC	Telephone	N/A	75th Avenue
DRCC-11	DRCC	Telephone	N/A	75th Avenue

Environmental Sites

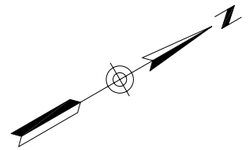
No.	Name	Address	Database

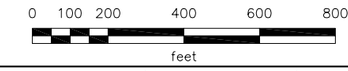
No known environmental sites

Landscape Notes

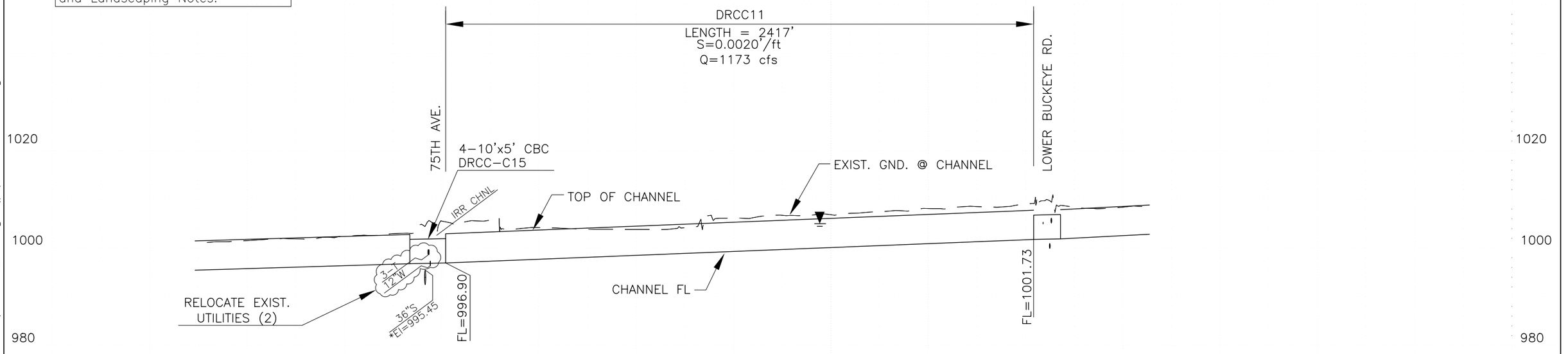
Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes

BOOK 104
MAP 52





See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

* Indicates Potholed Elevation

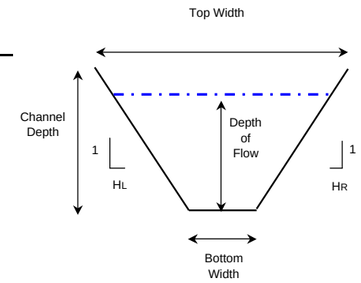
COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL CONVEYANCE CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE 1"=400' HORIZONTAL, 1"=20' VERTICAL
	DES. JLM DATE: –	
	CKD. BJF DATE: –	SHEETS NO. 20 OF 38

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC12	MC73NA	1053	1053	1001.8	1009.7	3037	0.0026	0.0026	0.0	0	0.0	GR	0.0400	30.0	4.6	6	6	263.1	85.7	0.40	Sub	4.0	1.2	5.8	99.4	150
DRCC13a	MCBBY2	450	450	1009.7	1011.6	815	0.0023	0.0023	0.0	0	0.0	GR	0.0400	4.0	4.5	6	6	141.3	59.1	0.36	Sub	3.2	1.2	5.7	72.4	120
DRCC13b	MCPB73	828	828	1011.6	1017.3	1288	0.0044	0.0044	0.0	0	0.0	GR	0.0400	10.0	4.6	6	6	175.7	66.5	0.51	Sub	4.7	1.2	5.9	80.7	130

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C16	~@CPNA	1053	1053	110.2	1001.8	1001.7	0.0010	RCBC	0.012	4	5	ft.	8	RCBC	Wingwall	4.69	5.69	1.14	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DRCC-12	DRCC	Fiber Optic	N/A	Lower Buckeye Road

Environmental Sites

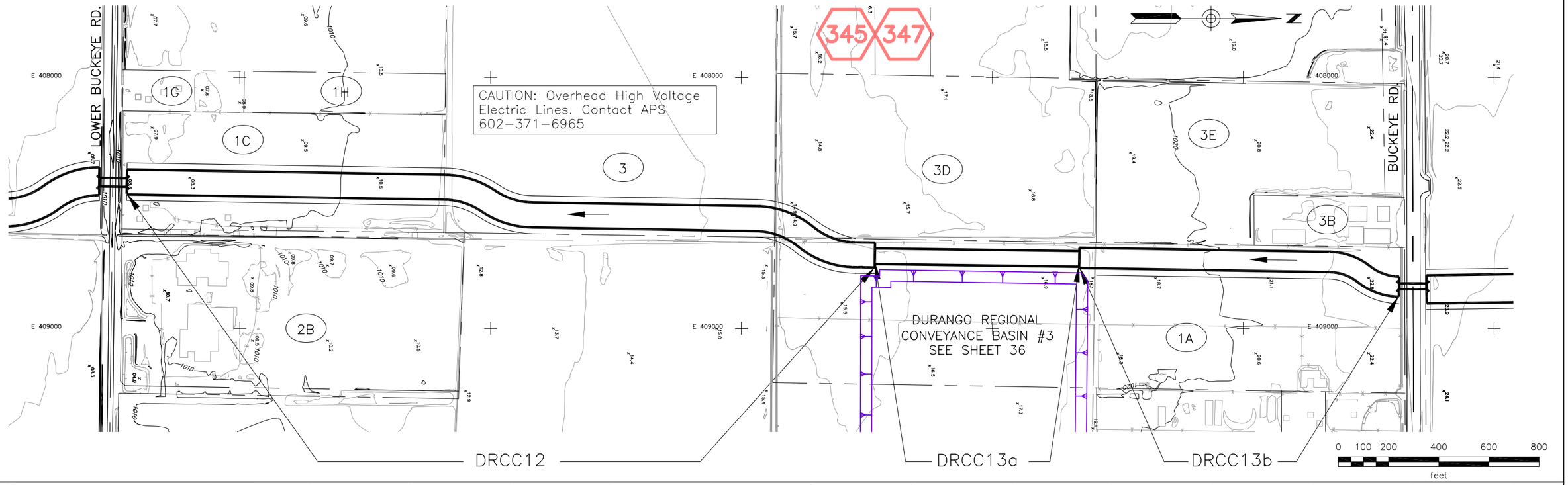
No.	Name	Address	Database
345	Swift Transportation Co	2200 S 75th Ave	AIRS
347	Swift Transportation	2200 S 75th Ave	RCRIS-SQG, FINDS

Landscape Notes

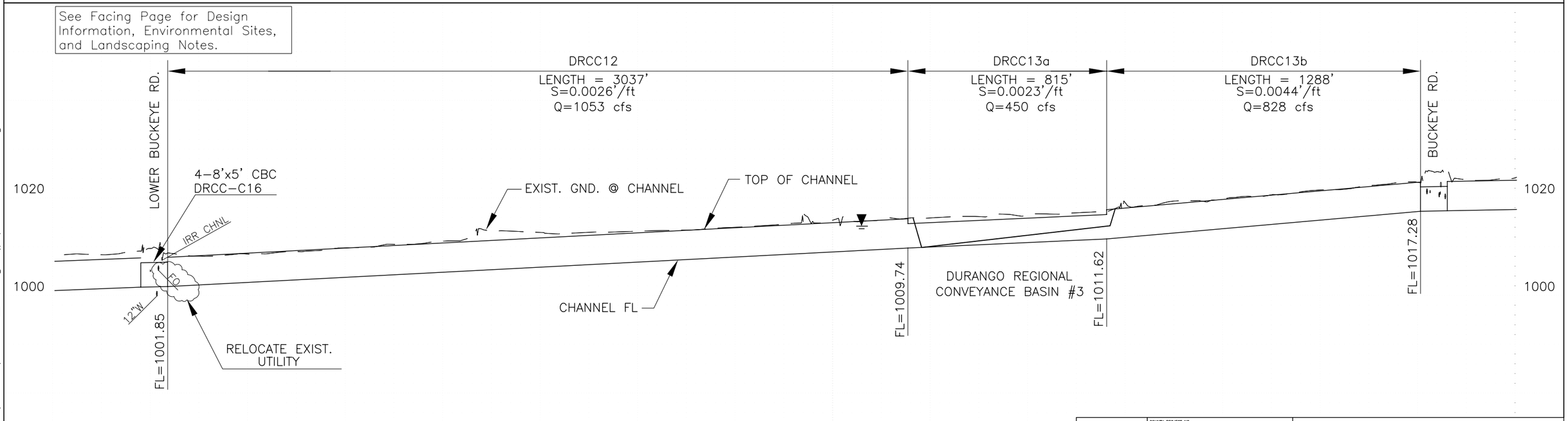
Park like landscape theme combined with agricultural heritage
- Active recreation uses in multi-level graded basins and channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes
- Community Park site at basin
- Provide multi-use trail link to Santa Maria Middle School

BOOK 104
MAP 35

BOOK 104
MAP 30



See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 21 OF 38

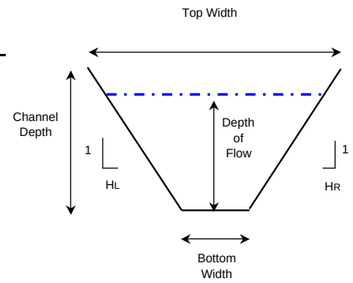
FILE:J:\9935\Acad\Prelim_Design\plpr21-drcc.dwg DATE:Oct, 10 2002 TIME: 02:44 pm

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC14	MC71PB	828	828	1017.4	1019.6	2422	0.0009	0.0009	0.0	0	0.0	GR	0.0400	40.0	4.8	6	6	331.1	98.5	0.24	Sub	2.5	1.2	6.0	112.4	160

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C17	~CPPB2	828	828	110	1017.4	1017.3	0.0009	RCBC	0.012	3	5	ft.	8	RCBC	Wingwall	4.64	5.76	1.15	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DRCC14	DRCC	Water	12"	Buckeye Road
DRCC14	DRCC	Water	12"	Buckeye Road
DRCC14	DRCC	Telephone	N/A	Buckeye Road
DRCC14	DRCC	Undrgrnd Electric	N/A	Buckeye Road
DRCC14	DRCC	Natural Gas	10"	Buckeye Road
DRCC14	DRCC	Irrigation	24"	Buckeye Road

Environmental Sites

No.	Name	Address	Database

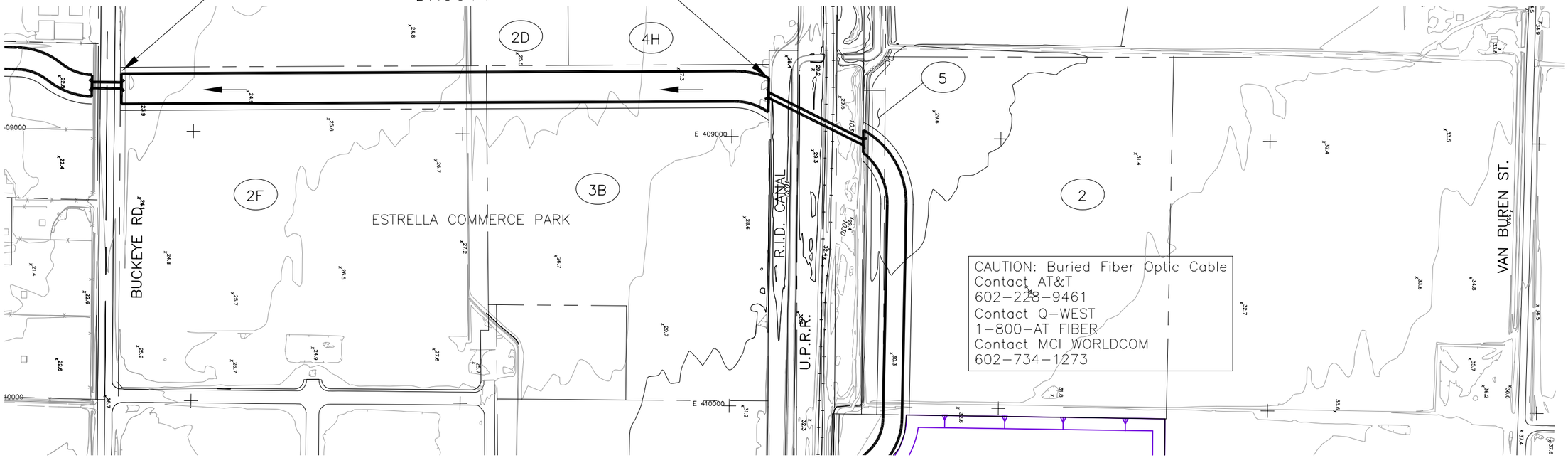
No known environmental sites

Landscape Notes

Modified Sonoran desert landscape theme for industrial areas
- Meandering multi-use pathway
- Vary channel side slopes
- Buffer views of adjacent industrial facilities

BOOK 104
MAP 15

BOOK 104
MAP 10



CAUTION: Buried Fiber Optic Cable
Contact AT&T
602-228-9461
Contact Q-WEST
1-800-AT FIBER
Contact MCI WORLDCOM
602-734-1273

CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

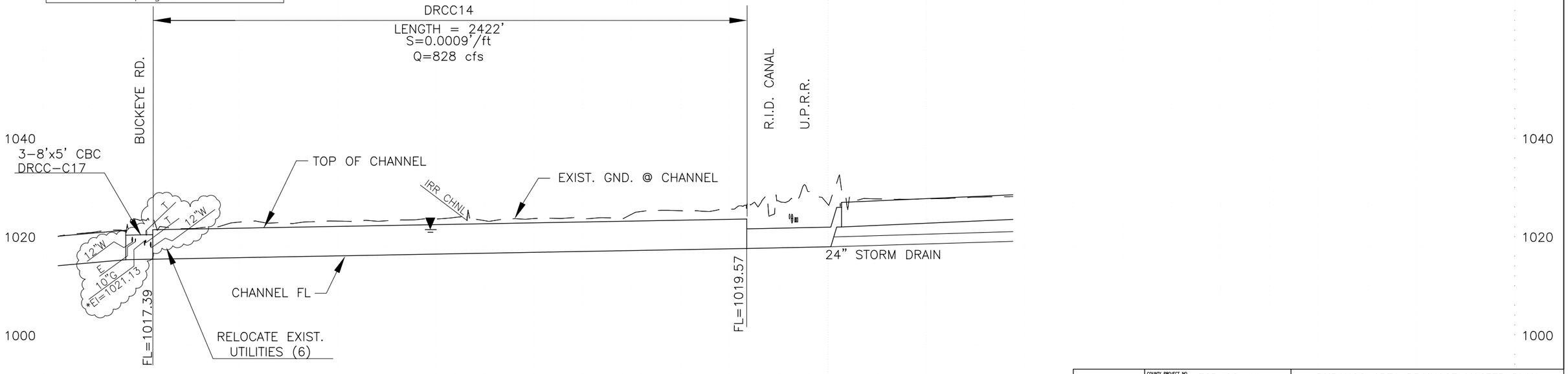
CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

CAUTION: Buried Petroleum Pipe Line. Contact Kinder-Morgan Co. 714-560-4940

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

* Indicates Potholed Elevation

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

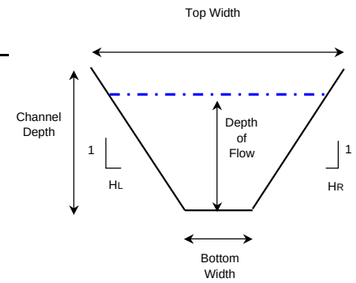
SHEETS
NO. 22 OF 38

Durango Area Drainage Master Plan
Durango Regional Conveyance Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC15	MC71RR	410	410	1024.0	1029.3	2441	0.0022	0.0022	0.0	0	0.0	GR	0.0400	4.0	4.4	6	6	134.0	57.6	0.35	Sub	3.1	1.1	5.5	70.5	120
DRCC16	MCUCUB	995	995	1029.3	1030.6	1287	0.0010	0.0010	0.0	0	0.0	C	0.0140	35.0	3.9	0	0	136.7	42.8	0.65	Sub	7.3	1.2	5.1	35.0	80

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C18	BSN71	410	410	380.5	1024.0	1019.6	0.0010	RCBC	0.012	3	4	ft.	8	RCBC	Wingwall	4.81	5.13	1.28	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
DRCC15	DRCC	Irrigation	Channel	U.P.R.R.
DRCC15	DRCC	Irrigation	Channel	69th Avenue

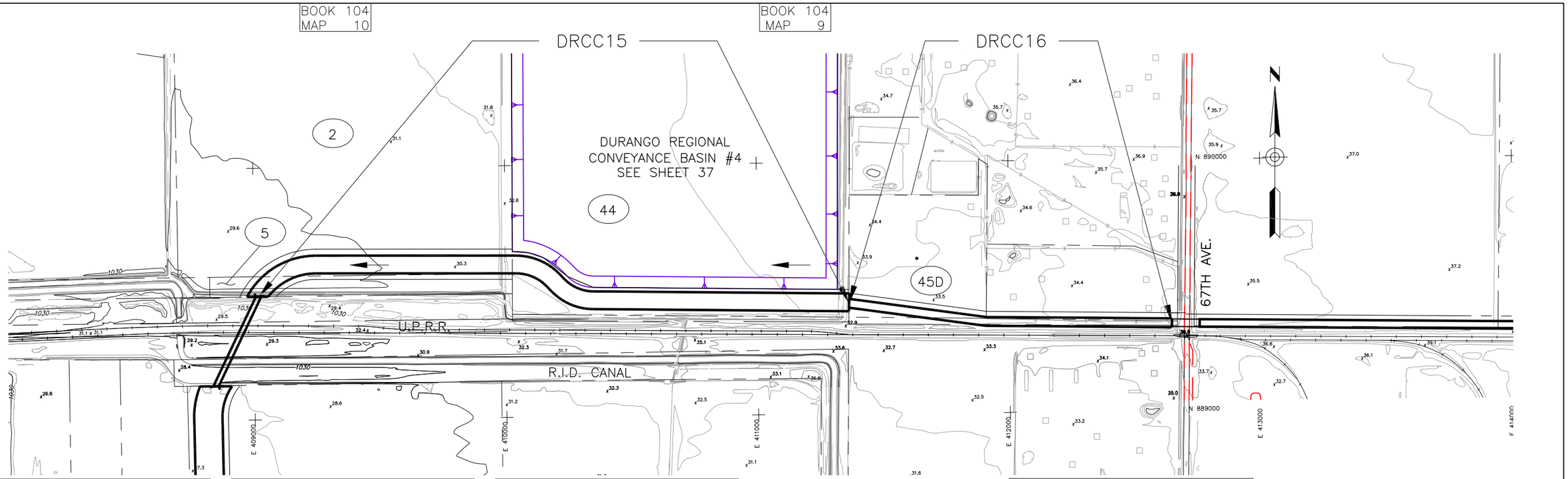
Environmental Sites

No.	Name	Address	Database

No known environmental sites

Landscape Notes

Modified Sonoran desert landscape theme for industrial areas
- Railroad theme along UPRR frontage
- Meandering multi-use pathway
- Active recreation opportunity in multi-level graded basins
- Vary channel side slopes
- Buffer views of adjacent industrial facilities



CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

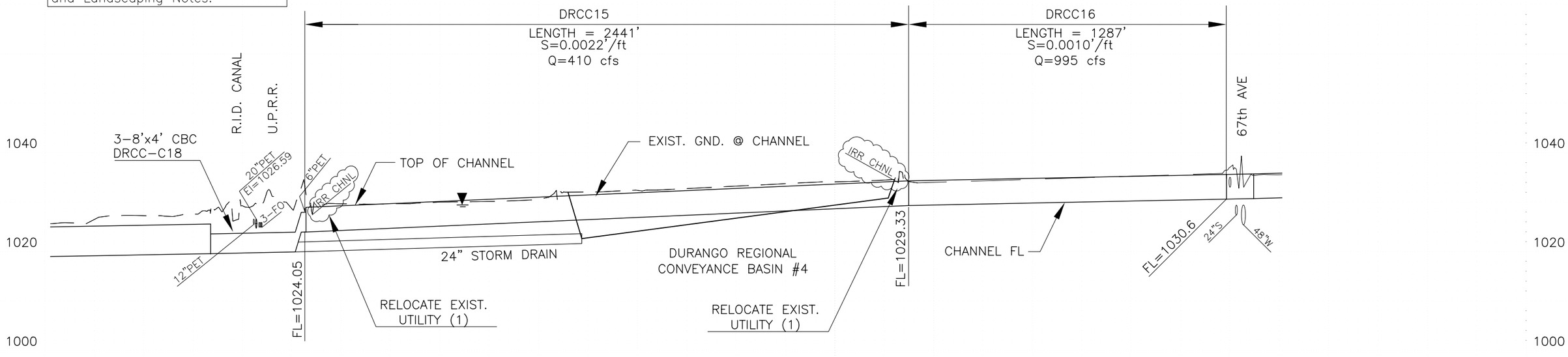
CAUTION: Buried Petroleum Pipe Line. Contact Kinder-Morgan Co. 714-560-4940

CAUTION: Buried Fiber Optic Cable Contact MCI WORLDCOM 602-734-1273

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

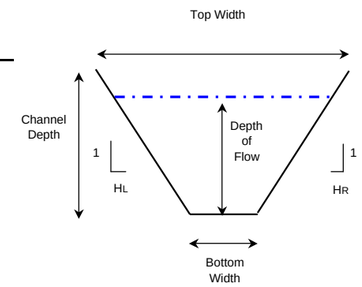
SHEETS
NO. 23 OF 38

FILE:J:\9935\Acad\Prelim_Design\plpr23-drcc.dwg DATE:Oct, 10 2002 TIME: 02:48 pm

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
DRCC17	MCUCUC	980	980	1030.7	1034.2	2493	0.0014	0.0014	0.0	0	0.0	C	0.0140	30.0	3.9	0	0	116.5	37.8	0.75	Sub	8.4	1.2	5.1	30.0	70

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
DRCC-C19	~CPUC2	980	980	110	1030.7	1030.6	0.0009	RCBC	0.012	4	4	ft.	10	RCBC	Wingwall	3.91	4.78	1.20	TW

Utility Crossings

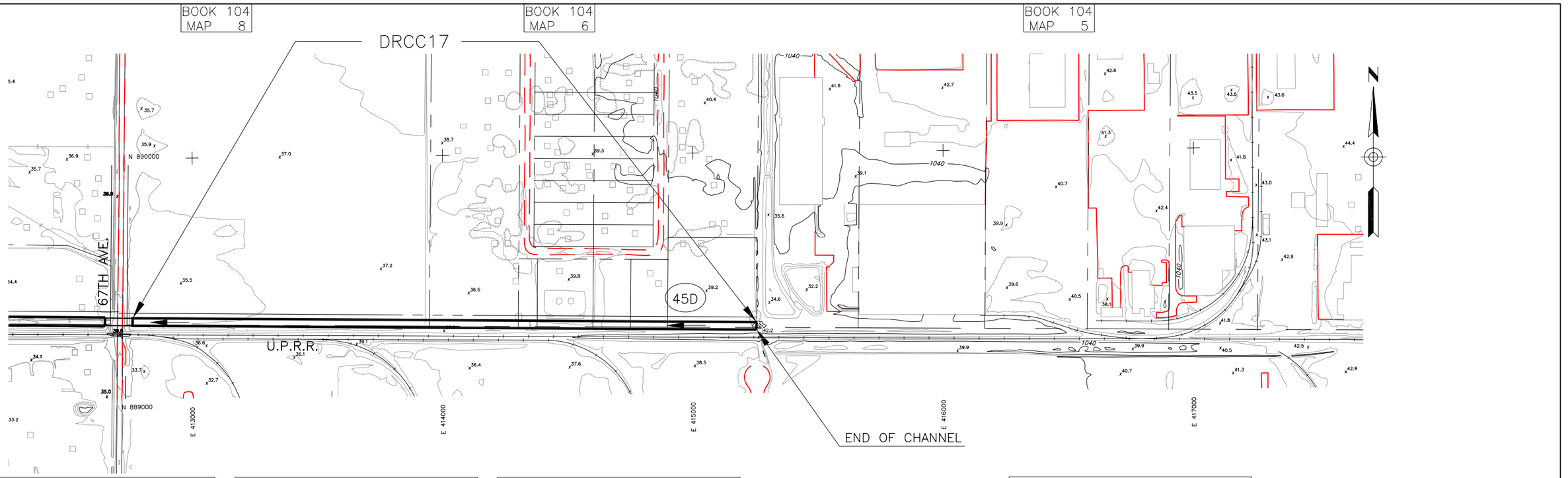
I.D.	Alignment	Type	Size	Location
DRCC-17	DRCC	Irrigation	Unk	67th Avenue

Environmental Sites

No.	Name	Address	Database

No known environmental sites

Landscape Notes



CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

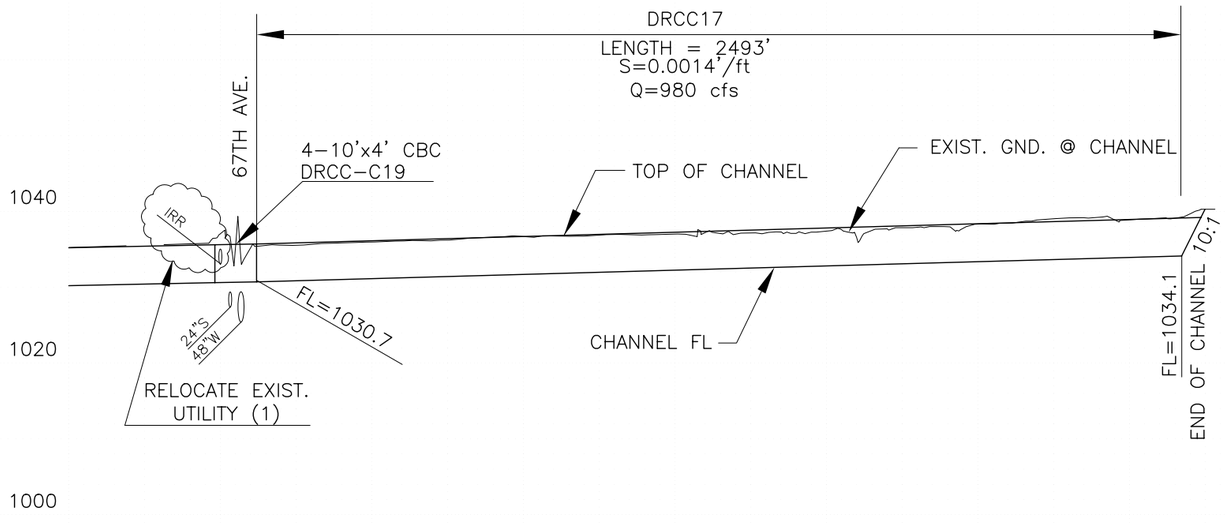
CAUTION: Buried Petroleum Pipe Line. Contact Kinder-Morgan Co. 714-560-4940

CAUTION: Buried Fiber Optic Cable Contact MCI WORLDCOM 602-734-1273

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



DURANGO REGIONAL CONVEYANCE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

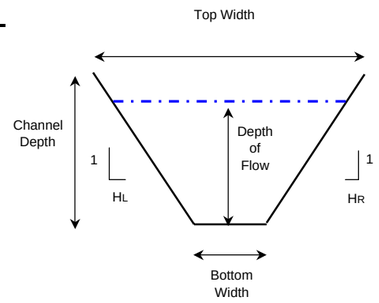
SHEETS
NO. 24 OF 38

Durango Area Drainage Master Plan
Sunland Avenue Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (HL)	Sideslope (H:1) Right (HR)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
SUN01	MCCCCB	1012	1012	930.8	933.2	3027	0.0008	0.0008	0.0	0	0.0	LE	0.0400	60.0	4.7	6	6	414.7	117.2	0.23	Sub	2.4	1.2	5.9	130.8	180

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Environmental Sites

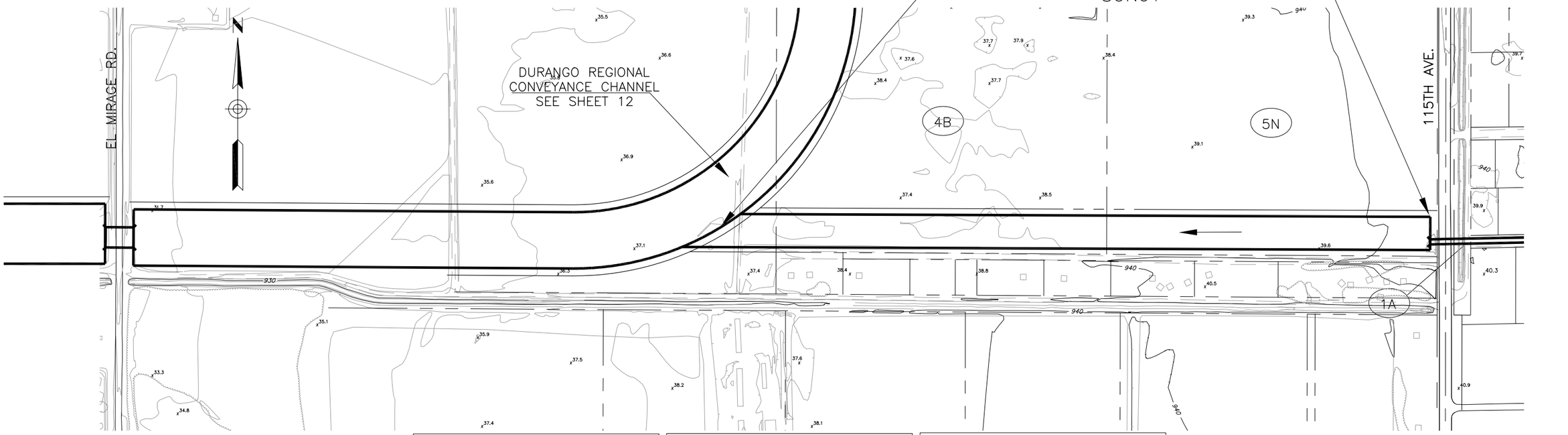
No.	Name	Address	Database

No known environmental sites

Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes

BOOK 500
MAP 68



BOOK 500
MAP 67

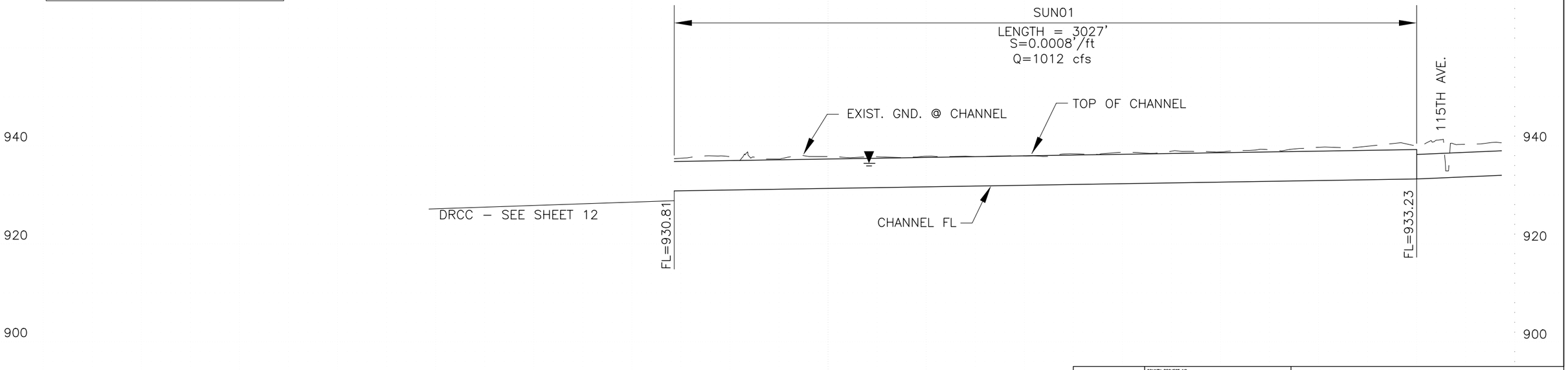
CAUTION: Overhead High Voltage
Electric Lines. Contact APS
602-371-6965

CAUTION: Overhead High Voltage
Electric Lines. Contact SRP
602-236-5527

CAUTION: Buried Natural Gas Line
Contact El Paso Natural Gas Co.
915-496-5562

0 100 200 400 600 800
feet

See Facing Page for Design
Information, Environmental Sites,
and Landscaping Notes.



SUNLAND AVENUE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41		DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: SUNLAND AVENUE CHANNEL			
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS (Since 1962)	DRN. JEV DATE: –	SCALE 1"=400' HORIZONTAL	SHEETS NO. 25 OF 38
	DES. JLM DATE: –	1"=20' VERTICAL	
	CKD. BJF DATE: –		

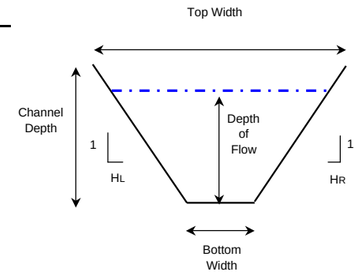
FILE:J:\9935\Acad\Prelim_Design\plpr25-sun.dwg DATE:Oct, 10 2002 TIME: 02:49 pm

Durango Area Drainage Master Plan
Sunland Avenue Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
SUN02a	MCDCCC	1012	1012	933.2	936.3	1389	0.0022	0.0022	0.0	0	0.0	C	0.0140	20.0	4.7	0	0	93.8	29.4	0.88	Trans	10.8	1.6	6.3	20.0	60
SUN02b	MCDCCC	1012	1012	936.3	938.9	1203	0.0022	0.0022	0.0	0	0.0	LE	0.0400	30.0	4.7	6	6	271.7	86.9	0.37	Sub	3.7	1.2	5.9	100.8	150
SUN02c	MCDCCC	1012	1012	939.2	944.7	2511	0.0022	0.0022	0.0	0	0.0	LE	0.0400	30.0	4.7	6	6	271.7	86.9	0.37	Sub	3.7	1.2	5.9	100.8	150

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
SUN-C1	~CPCC	1012	1012	110	939.2	938.9	0.0022	RCBC	0.012	3	5	ft.	10	RCBC	Wingwall	4.68	5.59	1.12	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
SUN02b	Sunland	Gas	20"	111th Avenue
SUN02b	Sunland	Irrigation	Channel	115th Avenue
SUN02b	Sunland	Irrigation	Channel	113th Avenue

Environmental Sites

No.	Name	Address	Database
400	DEA	11439 W. Hidalgo	ERNS, AZ_SPILL
398	Atlas Construction	NW Cor of 107th Ave / Pecan Rd	ERNS, AZ_SPILL

Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes

BOOK 101
MAP 41

SUN02a

SUN02b

SUN02b

115TH AVE

CHAMBERS ST.

SUNLAND AVE.

HIDALGO AVE.

107TH AVE

1

1G

400

398

88A 88B 89 90 91B 91C 92C 92D

87 86 85 84 83 82

CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

0 100 200 400 600 800
feet

BOOK 101
MAP 43

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.

SUN02a
LENGTH = 1389'
S=0.0022'/ft
Q=1012 cfs

SUN02b
LENGTH = 1203'
S=0.0022'/ft
Q=1012 cfs

SUN02c
LENGTH = 2511'
S=0.0022'/ft
Q=1012 cfs

960
940
920

115TH AVE.

107TH AVE.

3-10'x5' CBC
SUN-C1

Existing Irrigation Ditch to be Siphoned

TOP OF CHANNEL

EXIST. GND. @ CHANNEL

2-10'x5' CBC

CHANNEL FL

20'G

Existing Buckeye Feeder Canal to be Siphoned

FL=933.23

FL=936.29

FL=938.93

FL=939.18

FL=944.70

SUNLAND AVENUE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

SUNLAND AVENUE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 26 OF 38

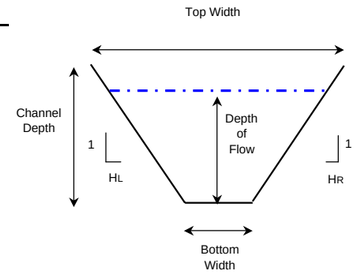
FILE:J:\9935\Acad\Prelim_Design\plpr26-sun.dwg DATE:Oct, 10 2002 TIME: 02:50 pm

Durango Area Drainage Master Plan
Sunland Avenue Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
SUN03a	MCEADC	712	712	944.8	949.3	2470	0.0018	0.0018	0.0	0	0.0	LE	0.0400	20.0	4.6	6	6	222.0	76.4	0.33	Sub	3.2	1.2	5.8	90.1	140
SUN03b	MCEADC	712	712	949.5	953.9	2481	0.0018	0.0018	0.0	0	0.0	LE	0.0400	20.0	4.6	6	6	222.0	76.4	0.33	Sub	3.2	1.2	5.8	90.1	140

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
SUN-C2	~CPDC	712	712	110	944.8	944.7	0.0010	RCBC	0.012	3	5	ft.	8	RCBC	Wingwall	4.68	5.48	1.10	TW
SUN-C3	~CPDC	712	712	110	949.5	949.3	0.0018	RCBC	0.012	2	5	ft.	10	RCBC	Wingwall	4.64	5.73	1.15	TW
SUN-C4	CPEA	499	499	110	954.0	953.9	0.0010	RCBC	0.012	2	5	ft.	8	RCBC	Wingwall	4.64	5.53	1.11	TW

Environmental Sites

No.	Name	Address	Database

No known environmental sites

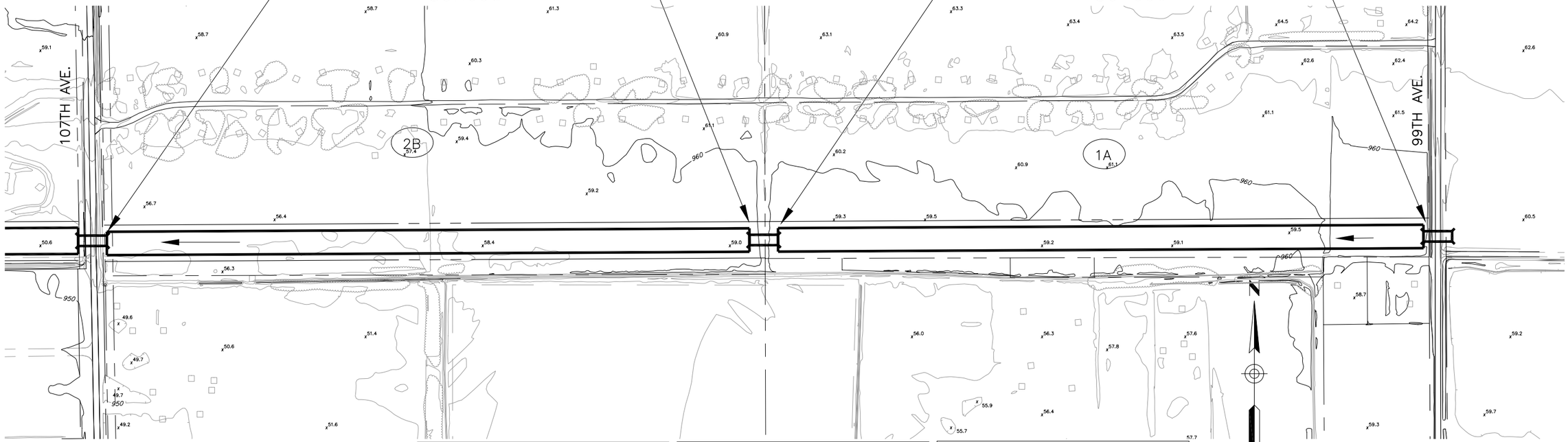
Landscape Notes

Park like landscape theme combined with agricultural heritage
- Active recreation uses in channel
- Emphasis on turf and canopy trees
- Maintain "open areas" and views of mountains to the south
- Meandering multi-use pathway
- Existing agricultural areas developing as residential uses
- Vary channel side slopes

BOOK 101
MAP 38

SUN03a

SUN03b



BOOK 101
MAP 40

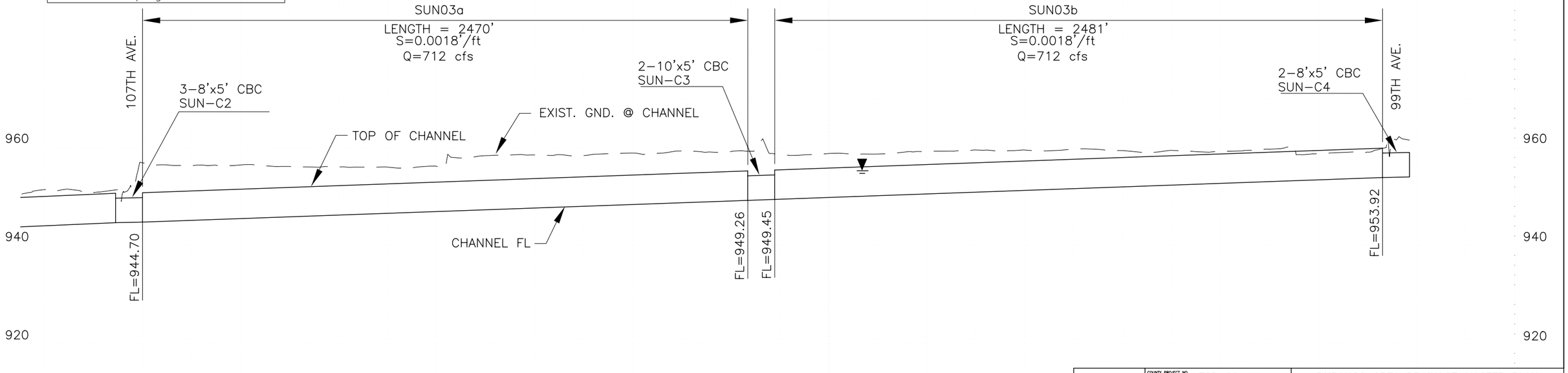
CAUTION: Overhead High Voltage Electric Lines. Contact APS 602-371-6965

CAUTION: Overhead High Voltage Electric Lines. Contact SRP 602-236-5527

CAUTION: Buried Natural Gas Line Contact El Paso Natural Gas Co. 915-496-5562

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



SUNLAND AVENUE CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
SUNLAND AVENUE CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 27 OF 38

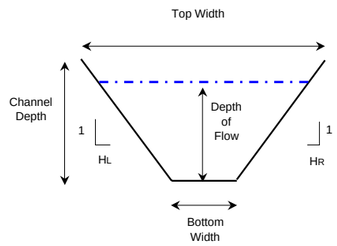
FILE:J:\9935\Acad\Prelim_Design\plpr27-sun.dwg DATE:Oct, 10 2002 TIME: 02:50 pm

Durango Area Drainage Master Plan
47th Ave Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
47CH01a	MCJKJL	2400	2400	1010.5	1012.7	1302	0.0017	0.0017	0.0	0	0.0	LE	0.0400	110.0	4.6	6	6	639.0	166.4	0.34	Sub	3.8	1.2	5.9	180.2	240
47CH01b	MCJKJL	2400	2400	1012.9	1017.2	2528	0.0017	0.0017	0.0	0	0.0	LE	0.0400	110.0	4.6	6	6	639.0	166.4	0.34	Sub	3.8	1.2	5.9	180.2	240

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
47CH-C1	~CPJL1	2400	2400	111	1012.9	1012.7	0.0017	RCBC	0.012	7	5	ft.	10	RCBC	Wingwall	4.64	5.64	1.13	TW

Utility Crossings

I.D.	Alignment	Type	Size	Location
47CH01b	47th Avenue	Fiber Optic	N/A	Elwood Road
47CH01b	47th Avenue	Undrgrnd Electric	N/A	Elwood Road
47CH01b	47th Avenue	Irrigation	Channel	Elwood Road

Environmental Sites

No.	Name	Address	Database

No known environmental sites

Landscape Notes

Modified Sonoran desert landscape theme
- Buffer views of adjacent power line corridor
- Screen / buffer views of outdoor storage areas of adjacent industrial facilities
- Maintain views of mountains to the south
- Meandering multi-use pathway
- Vary channel side slopes
- Enhancement of river area

BOOK 104
MAP 44

CAUTION: Buried Natural Gas Line
Contact El Paso Natural Gas Co.
915-496-5562

CAUTION: Overhead High Voltage
Electric Lines. Contact APS
602-371-6965

CAUTION: Buried Fiber Optic Cable
Contact Sprint
602-417-0970
Contact MCI WORLDCOM
602-734-1273

SALT RIVER

LOWER BUCKEYE RD.

47TH AVE. ALIGNMENT

E 426000

4A 3C 3B 2E 2A 3C

BEGINNING OF CHANNEL

47CH01a

47CH01b

BOOK 104
MAP 43

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.

47CH01a
LENGTH = 1302'
S=0.0017'/ft
Q=2400 cfs

47CH01b
LENGTH = 2528'
S=0.0017'/ft
Q=2400 cfs

SALT RIVER

BEGINNING OF CHANNEL

LOWER BUCKEYE RD.

1040
1020
1000

TOP OF CHANNEL

30"IRR

IRR CHNL

7-10'x5' CBC
47CH-C1

EXIST. GND. @ CHANNEL

10-yr HGL
1014.4

CHANNEL FL

FL=1010.50

FL=1012.70

FL=1012.89

FL=1017.18

RELOCATE EXIST.
UTILITIES (3)

47TH AVE. CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

47TH AVE. CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: -
DES. JLM DATE: -
CKD. BJF DATE: -

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

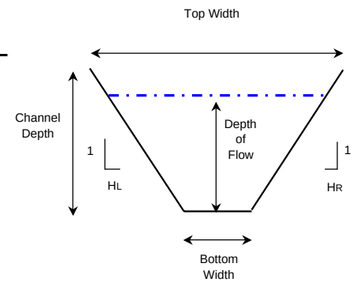
SHEETS
NO. 28 OF 38

Durango Area Drainage Master Plan
47th Avenue Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (HL)	Sideslope (H:1) Right (HR)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
47CH02	MCQBJK	2022	2022	1017.5	1021.7	2476	0.0017	0.0017	0.0	0	0.0	LE	0.0400	85.0	4.8	6	6	542.8	143.1	0.34	Sub	3.7	1.2	6.0	157.3	210
47CH03	MC47QB	1502	1502	1021.7	1023.0	2678	0.0005	0.0005	0.0	0	0.0	C	0.0140	55.0	4.6	0	0	253.4	64.2	0.49	Sub	5.9	1.3	5.9	55.0	100

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
47CH-C2	~CPJK	2022	2022	110	1017.5	1017.2	0.0027	RCBC	0.012	5	5	ft.	10	RCBC	Wingwall	4.64	6.02	1.20	IC
47CH-C3	BSN47	993	993	323	1026.0	1023.0	0.0092	RCBC	0.012	3	5	ft.	8	RCBC	Wingwall	4.61	6.10	1.22	IC

Utility Crossings

I.D.	Alignment	Type	Size	Location
47CH02	47th Avenue	Fiber Optic	N/A	Lower Buckeye Road
47CH02	47th Avenue	Irrigation	36"	Lower Buckeye Road
47CH02	47th Avenue	Undrgrnd Electric	N/A	1/4 S of RID Canal

Environmental Sites

No.	Name	Address	Database
280	AllWaste Transportation and Remediation	4705 W. Buckeye Rd	AZ_SPILL, RCRIS-SQG, FINDS, DRYCLEANERS, HMIRS
280	Great Western Leasing Co.	4705 W. Buckeye Rd	AZ_SPILL
280	Tri Peak Transprotation Co.	4705 W. Buckeye Rd	RCRIS-SQG, FINDS
280	Ruan Transport	4715 W. Buckeye Rd	UST

Landscape Notes

Modified Sonoran desert landscape theme
- Buffer views of adjacent power line corridor
- Screen / buffer views of outdoor storage areas of adjacent industrial facilities
- Maintain views of mountains to the south
- Meandering multi-use pathway
- Vary channel side slopes

BOOK 104
MAP 41

BOOK 104
MAP 24

CAUTION: Buried Natural Gas Line
Contact El Paso Natural Gas Co.
915-496-5562

CAUTION: Overhead High Voltage
Electric Lines. Contact APS
602-371-6965

CAUTION: Buried Fiber Optic Cable
Contact Sprint, 602-228-9461
Contact AT&T, 602-228-9461

LOWER BUCKEYE RD.

BUCKEYE RD.

47TH AVE. ALIGNMENT

R.I.D. CANAL

E 426000

426000

E 426000

1A

6B

1G

3D

4

3B

1

1A

1B

280

47CH02

47CH03

BOOK 104
MAP 42

BOOK 104
MAP 23

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.

47CH02
LENGTH = 2476'
S=0.0017'/ft
Q=2022 cfs

47CH03
LENGTH = 2678'
S=0.0005'/ft
Q=1502 cfs

LOWER BUCKEYE RD.

5-10'x5' CBC
47CH-C2

RELOCATE EXIST. UTILITY

TOP OF CHANNEL

CHANNEL FL

RELOCATE EXIST.
UTILITIES (2)

FO
87"S
*El=1016.23

36"IRR

FL=1017.48

R.I.D. CANAL

10"G

FO

FL=1021.69

66"S

5-11' x 5' CBC

EXIST. GND. @ CHANNEL

3-8'x5' CBC
47CH-C3

30"IRR

24"IRR

12"W

FO

30"SD
El=1024.47*

BUCKEYE RD.

FL=1023.03

1040

1020

1000

47TH AVE. CHANNEL

* Indicates Potholed Elevation

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: 47TH AVE. CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: –	SCALE: 1"=400' HORIZONTAL; 1"=20' VERTICAL
	DES. JLM DATE: –	SHEETS: NO. 29 OF 38
	CKD. BJF DATE: –	

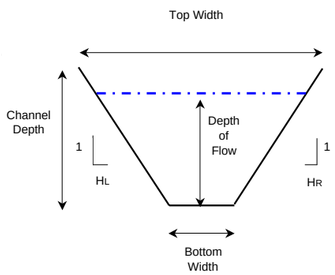
FILE:J:\9935\Acad\Prelim_Design\plpr29-47th.dwg DATE:Oct, 10 2002 TIME: 02:52 pm

Durango Area Drainage Master Plan
47th Avenue Channel

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, W (ft.)	Depth of Flow(ft.)	Sideslope (H:1) Left (H_L)	Sideslope (H:1) Right (H_R)	Area (sf.)	Wetted Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Channel Topwidth (ft)	Total ROW Width Required (ft)
47CH04	MCVC47	1368	1368	1038.1	1040.5	1175	0.0020	0.0020	0.0	0	0.0	LE	0.0400	50.0	4.7	6	6	363.7	106.7	0.36	Sub	3.8	1.2	5.9	120.6	170

Channel Material Type: C = Concrete, R = Riprap, GR = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section

Culvert Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
47CH-C4	~CPVC2	1368	1368	427	1038.1	1037.1	0.0024	RCBC	0.012	4	5	ft.	10	RCBC	Wingwall	4.95	5.58	1.12	TW
47CH-C5	~CPVC2	1368	1368	288.4	1042.8	1040.5	0.0079	RCBC	0.012	5	4	ft.	10	RCBC	Wingwall	4.66	4.62	1.16	IC

Utility Crossings

I.D.	Alignment	Type	Size	Location
47CH-04	47th Avenue	Fiber Optic	N/A	U.P.R.R.
47CH-04	47th Avenue	Fiber Optic	N/A	U.P.R.R.
47CH-04	47th Avenue	Fiber Optic	N/A	U.P.R.R.
47CH-04	47th Avenue	Fiber Optic	N/A	U.P.R.R.
47CH-04	47th Avenue	Petroleum	10"	U.P.R.R.
47CH-04	47th Avenue	Petroleum	10"	U.P.R.R.

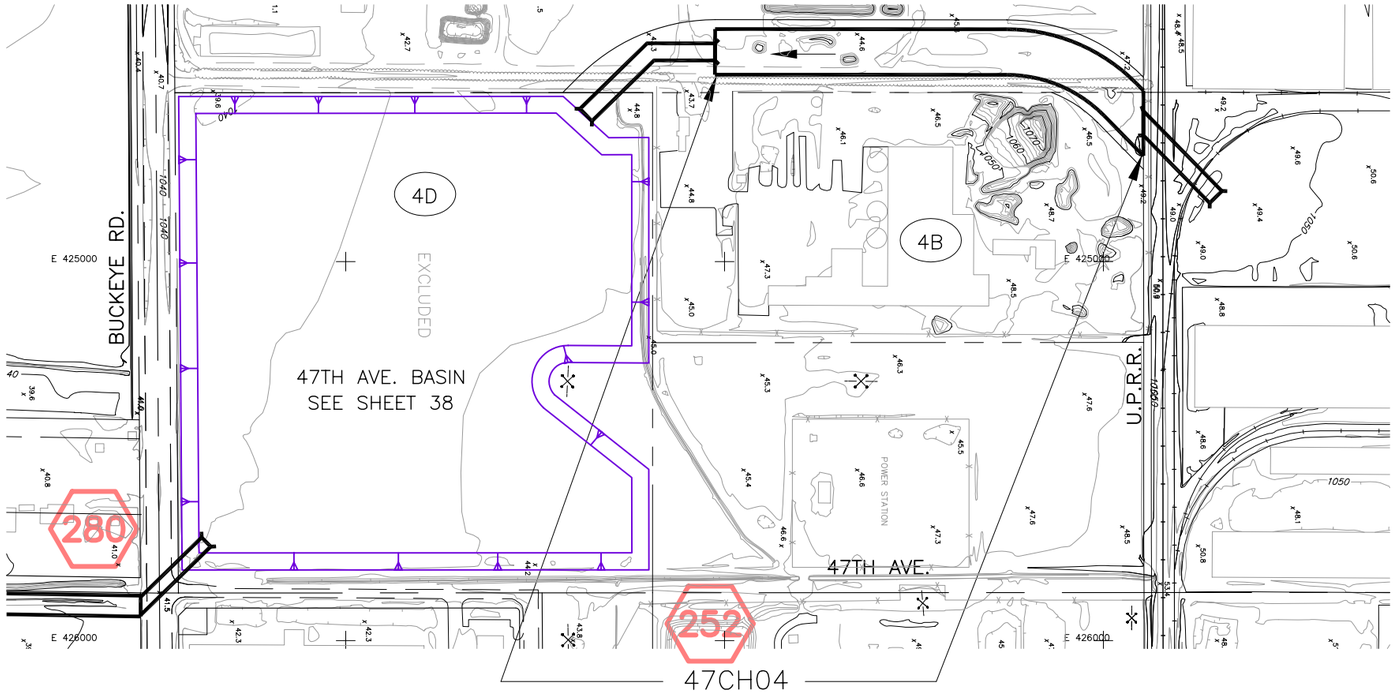
Environmental Sites

No.	Name	Address	Database
252	Arizona Public Service	4606 W Hadley St	AZ_SPILL, HWS

Landscape Notes

Modified Sonoran desert landscape theme
- Buffer views of adjacent power line corridor
- Screen / buffer views of outdoor storage areas of adjacent industrial facilities
- Maintain views of mountains to the south
- Meandering multi-use pathway
- Vary channel side slopes
- Architectural interest: Maintain view of historic mill / gin to the east

BOOK 104
MAP 21



CAUTION: Buried Natural Gas Line
Contact El Paso Natural Gas Co.
915-496-5562

CAUTION: Buried Fiber Optic Cable
Contact MCI WORLDCOM
602-734-1273

CAUTION: Overhead High Voltage
Electric Lines. Contact APS
602-371-6965

CAUTION: Buried Fiber Optic Cable
Contact Qwest Communication

CAUTION: Buried Petroleum Lines
Contact APS

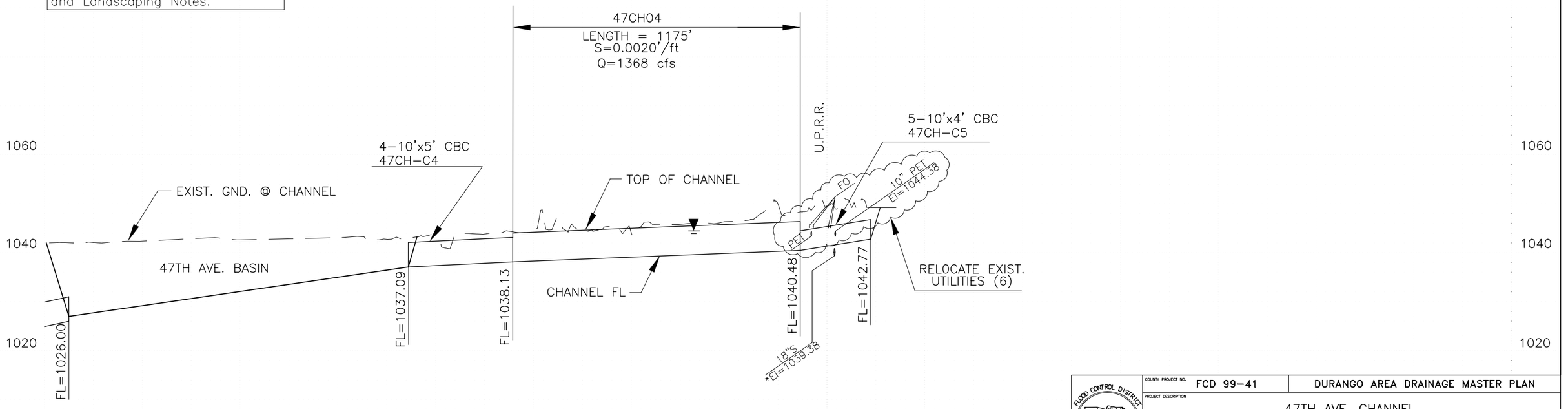
CAUTION: Buried Fiber Optic Cable
Contact Williams Communication

CAUTION: Buried Petroleum Lines
Contact Dyn-Air

CAUTION: Buried Fiber Optic Cable
Contact Level 3 Communication

0 100 200 400 600 800
feet

See Facing Page for Design Information, Environmental Sites, and Landscaping Notes.



47TH AVE. CHANNEL

* Indicates Potholed Elevation

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: 47TH AVE. CHANNEL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: – / DES. JLM DATE: – / CKD. BJF DATE: –	SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL
		SHEETS: NO. 30 OF 38

FILE:J:\9935\Acad\Prelim_Design\plpr30-47th.dwg DATE:Oct, 10 2002 TIME: 02:53 pm

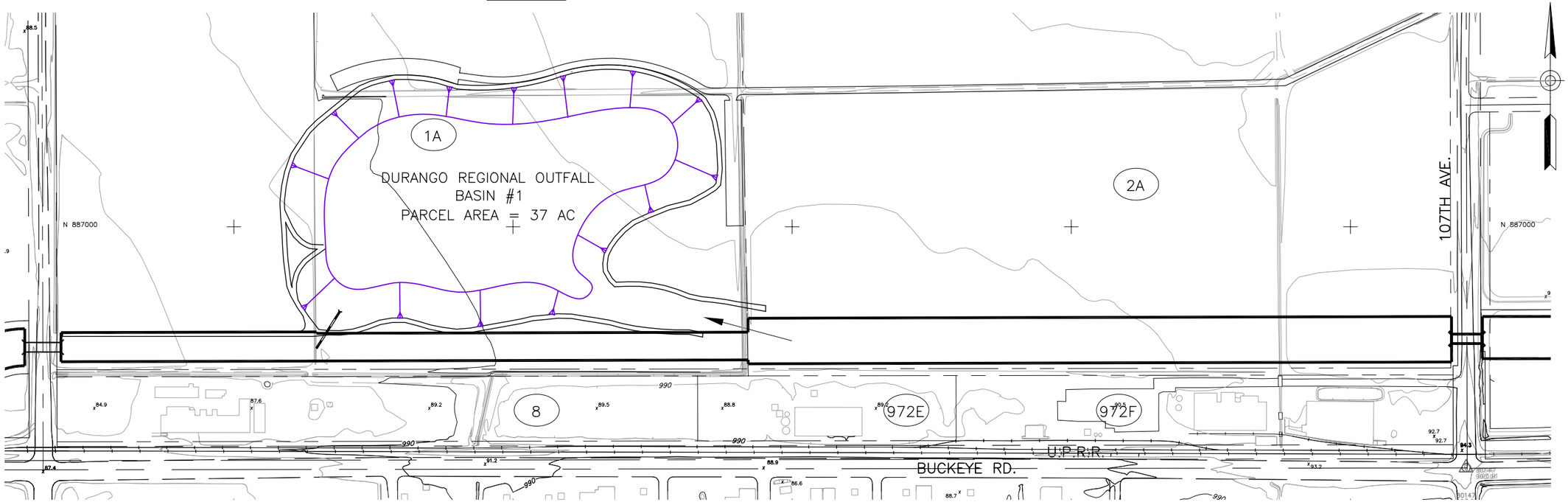
Detention Basin Properties

DRO Basin #1 - 111th Ave

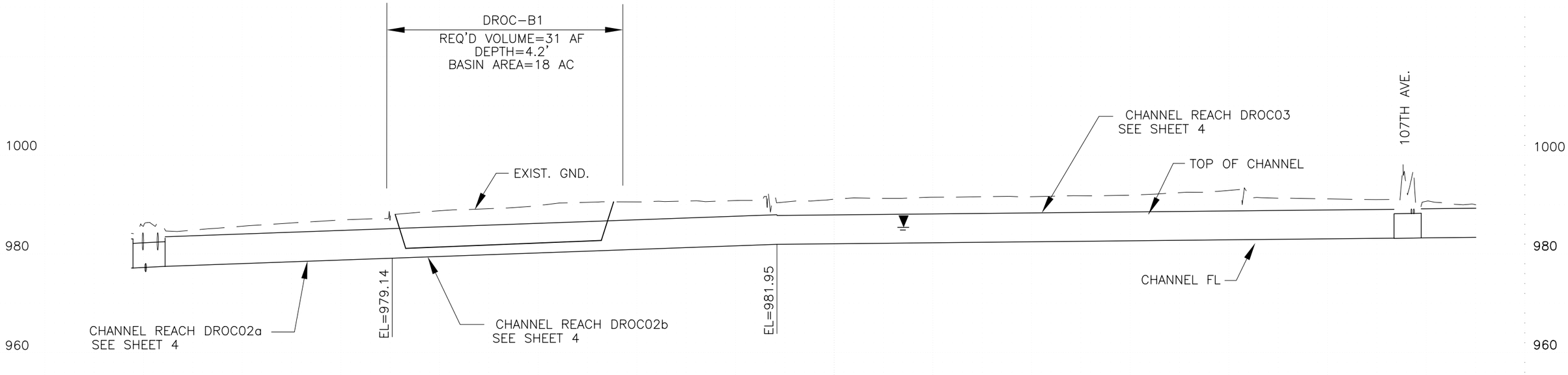
Basin Land Area	18	Acres	Length of Fencing =	0	ft
Basin Excavation Volume	279,897	C.Y.			
Q100 Inflow =	458	cfs	Outflow Pipe (no. & Dia.) =	1 24	in.
Q100 Outflow =	0	cfs	Pipe Invert at Inlet=	980.33	ft
Highwater Elev. (Q100) =	985.5	ft	Pipe Invert at Outlet=	980.17	ft
Maximum Ponding Depth	4.2	ft	Pipe Length =	156	ft
Total Basin Storage Volume	31	AF	Pipe Slope =	0.0010	ft/ft
			Inflow Spillway Width (2) =	136	ft
			Inflow Spillway Length (2) =	25	ft
			Spillway Elevation =	986.4	ft

Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.

BOOK 101
MAP 1



See Facing Page for Design Information



DURANGO REGIONAL OUTFALL BASIN #1

COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL OUTFALL BASIN #1		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE 1"=400' HORIZONTAL
	DES. JLM DATE: –	1"=20' VERTICAL
	CKD. BJF DATE: –	SHEETS NO. 31 OF 38

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE:J:\9935\Acad\Prelim_Design\plprbasn31-droc.dwg DATE:Oct, 10 2002 TIME: 02:54 pm

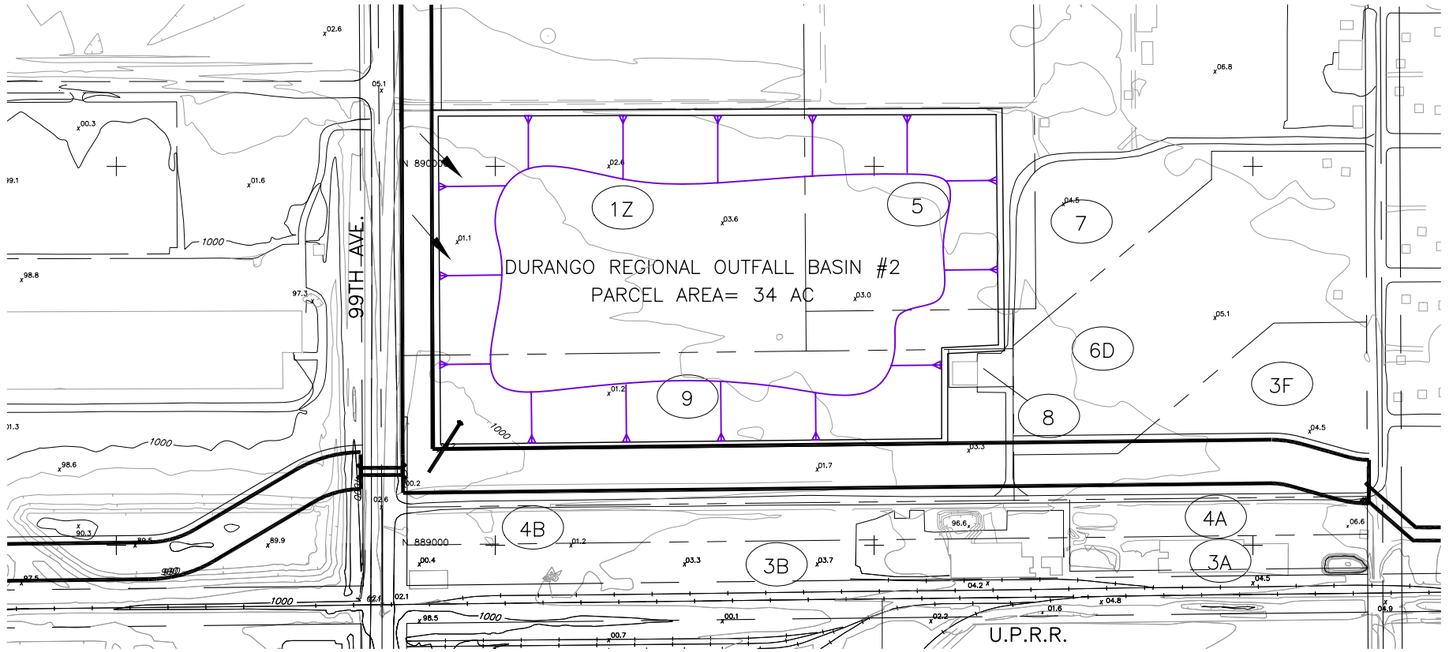
Detention Basin Properties

DRO Basin #2 - 99th Ave

Basin Land Area	28	Acres	Length of Fencing =		4,790	ft
Basin Excavation Volume	231,400	C.Y.				
Q100 Inflow =	808	cfs	Outflow Pipe (no. & Dia.) =	1	24	in.
Q100 Outflow =	0	cfs	Pipe Invert at Inlet=		992.88	ft
Highwater Elev. (Q100) =	1000	ft	Pipe Invert at Outlet=		992.73	ft
Maximum Ponding Depth	6.1	ft	Pipe Length =		155	ft
Total Basin Storage Volume	75	AF	Pipe Slope =		0.0010	ft/ft
			Inflow Spillway Width (2) =		240	ft
			Inflow Spillway Length (2) =		37	ft
			Spillway Elevation =		1000	ft

Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.

BOOK 101
MAP 4



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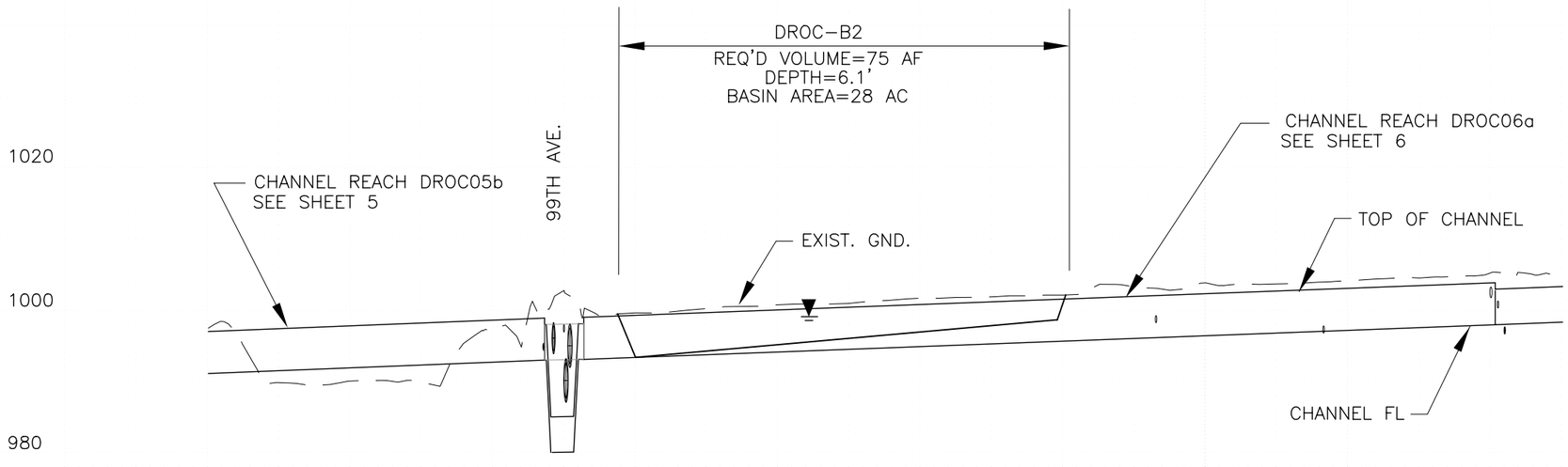
feet

See Facing Page for Design Information.



DURANGO REGIONAL OUTFALL BASIN #2

COUNTY PROJECT NO. FCD 99–41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL OUTFALL BASIN #2		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE: 1"=400' HORIZONTAL; 1"=20' VERTICAL
	DES. JLM DATE: –	SHEETS: NO. 32 OF 38
	CKD. BJF DATE: –	

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE:J:\9935\Acad\Prelim_Design\plprbasn32–droc.dwg DATE:Oct, 10 2002 TIME: 02:55 pm

Detention Basin Properties

DRO Basin #3a - 91st Avenue

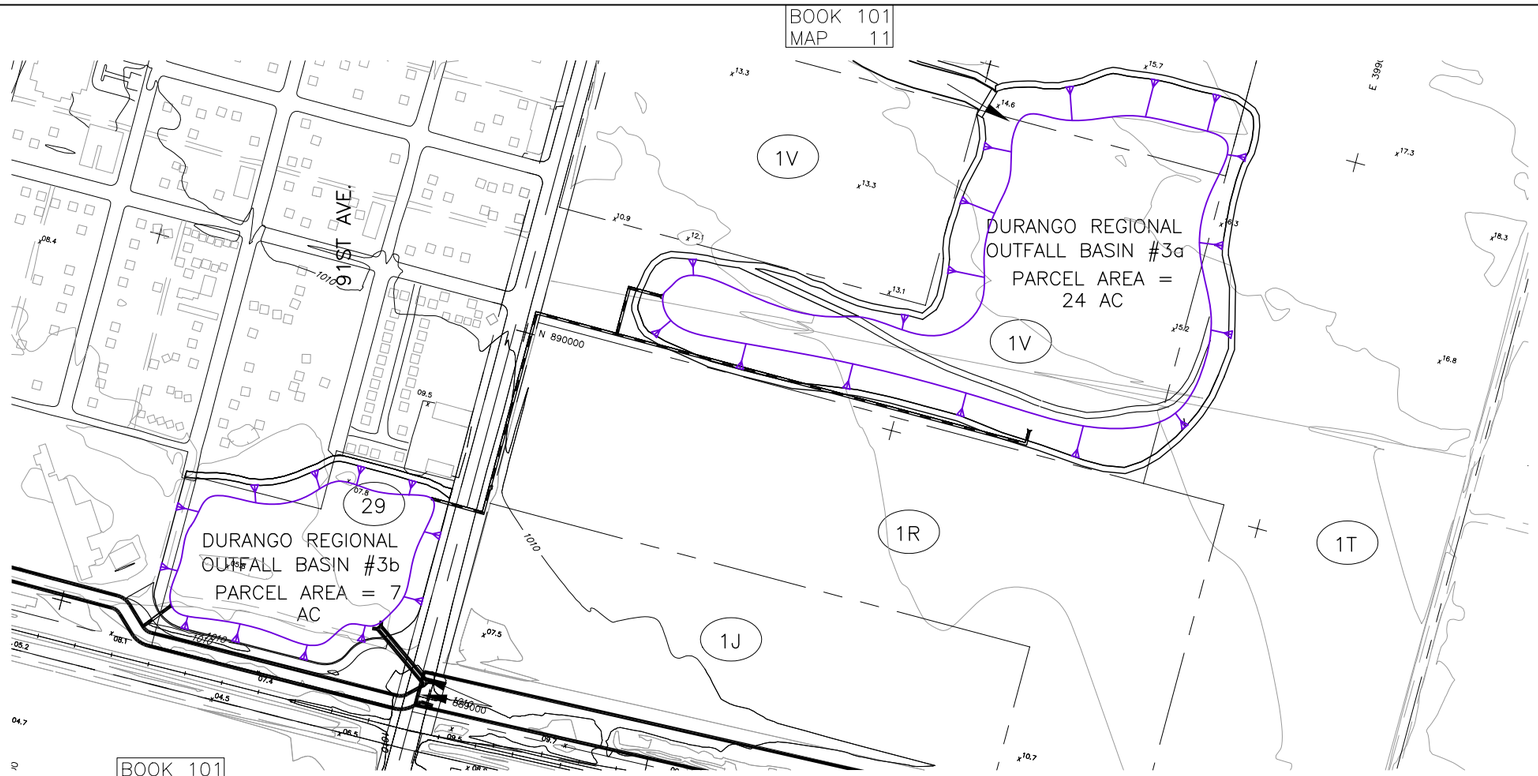
Basin Land Area	21	Acres	Length of Fencing =	0	ft
Basin Excavation Volume	184,000	C.Y.			
Q100 Inflow =	574	cfs	Outflow Pipe (no. & Dia.) =	1 24	in.
Q100 Outflow =	0	cfs			
Highwater Elev. (Q100) =	1011.6	ft	Pipe 1 Invert at Inlet=	1005.55	ft
Maximum Ponding Depth	5.1	ft	Pipe 1 Invert at Outlet=	1004.86	ft
Total Basin Storage Volume	61	AF	Pipe 1 Length =	215	ft
			Pipe 1 Slope =	0.0032	ft/ft
			Pipe 2 Invert at Inlet=	1006.02	ft
			Pipe 2 Invert at Outlet=	1003.96	ft
			Pipe 2 Length =	2065	ft
			Pipe 2 Slope =	0.0010	ft/ft
			Inflow Spillway Width (2) =	0	ft
			Inflow Spillway Length (2) =	0	ft
			Spillway Elevation =	N/A	ft

Detention Basin Properties

DRO Basin #3b - 91st Avenue

Basin Land Area	7	Acres	Length of Fencing =	0	ft
Basin Excavation Volume	39,800	C.Y.			
Q100 Inflow =	652	cfs	Outflow Pipe (no. & Dia.) =	1 24	in.
Q100 Outflow =	0	cfs	Pipe Invert at Inlet=	1001.00	ft
Highwater Elev. (Q100) =	1007	ft	Pipe Invert at Outlet=	1000.90	ft
Maximum Ponding Depth	5.0	ft	Pipe Length =	91	ft
Total Basin Storage Volume	18	AF	Pipe Slope =	0.0011	ft/ft
			Inflow Spillway Width (2) =	194	ft
			Inflow Spillway Length (2) =	30	ft
			Spillway Elevation =	1007	ft

Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.



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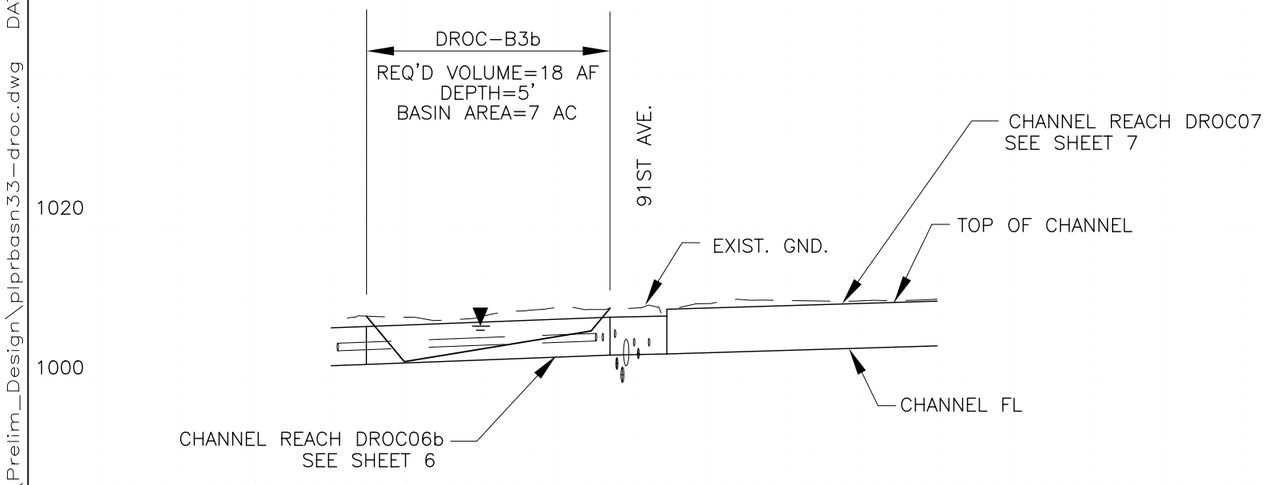
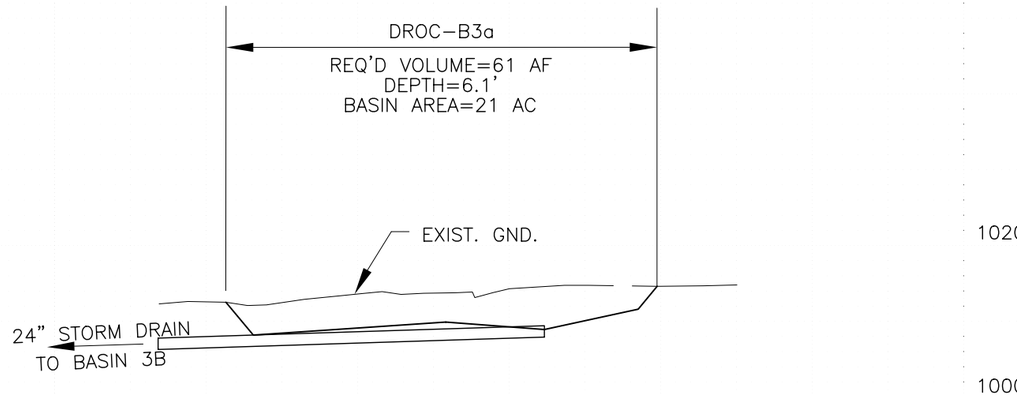
feet

See Facing Page for Design Information



DURANGO REGIONAL OUTFALL BASIN #3b



DURANGO REGIONAL OUTFALL BASIN #3a

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL OUTFALL BASIN #3a/3b

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 33 OF 38

FILE:J:\9935\Acad\Prelim_Design\plprbasn33-droc.dwg DATE:Oct, 10 2002 TIME: 02:55 pm

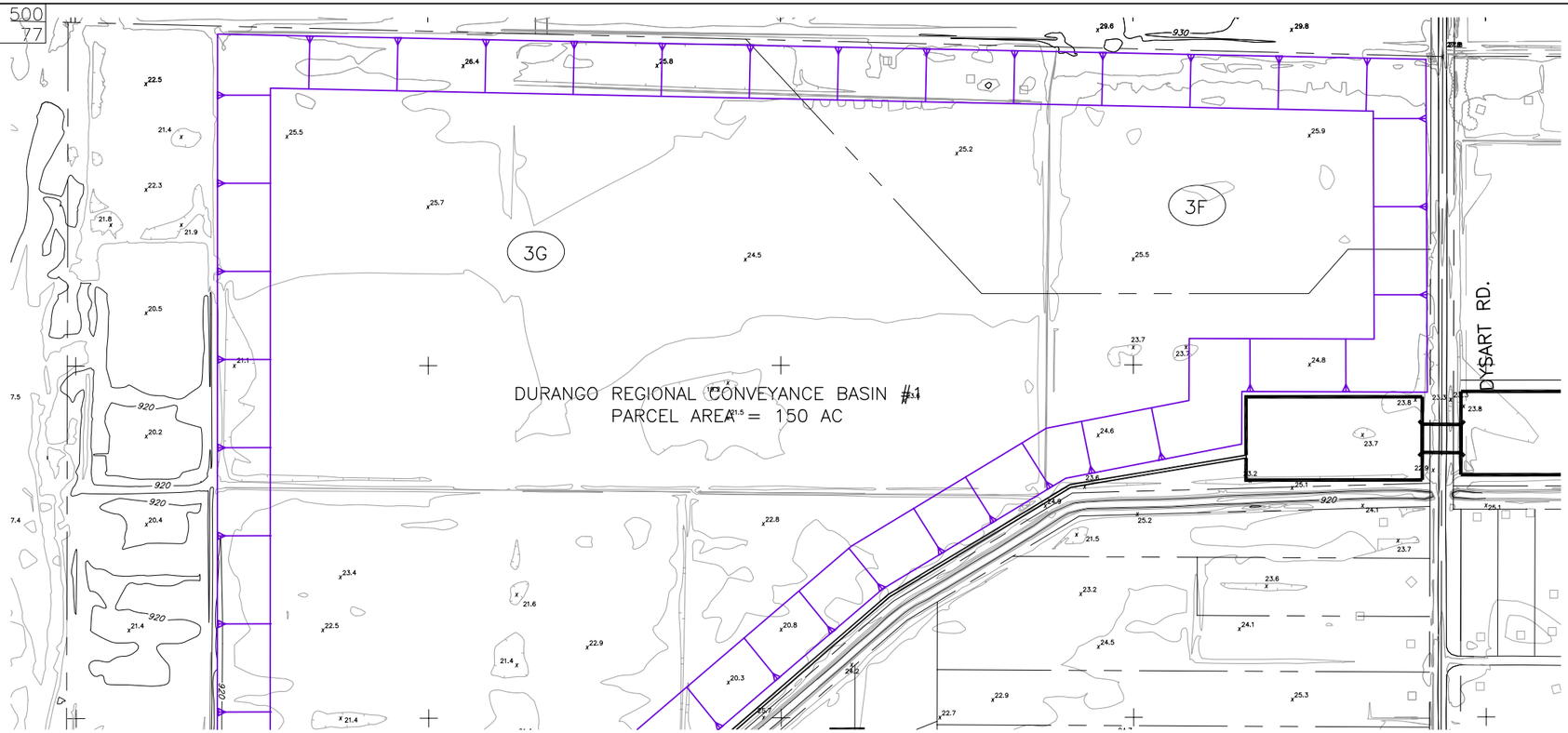
Detention Basin Properties

DRC Basin #1 - Dysart Rd

Basin Land Area	137	Acres	Length of Fencing =		0	ft
Basin Excavation Volume	0	C.Y.				
Q100 Inflow =	3,190	cfs	Outflow Pipe (no. & Dia.) =	1	24	in.
Q100 Outflow =	0	cfs	Pipe Invert at Inlet=		875.0	ft
Highwater Elev. (Q100) =	920	ft	Pipe Invert at Outlet=		874.5	ft
Maximum Ponding Depth	44.0	ft	Pipe Length =		500	ft
Total Basin Storage Volume	1584	AF	Pipe Slope =		0.0010	ft/ft
			Inflow Spillway Width (2) =		947	ft
			Inflow Spillway Length (2) =		268	ft
			Spillway Elevation =		923	ft

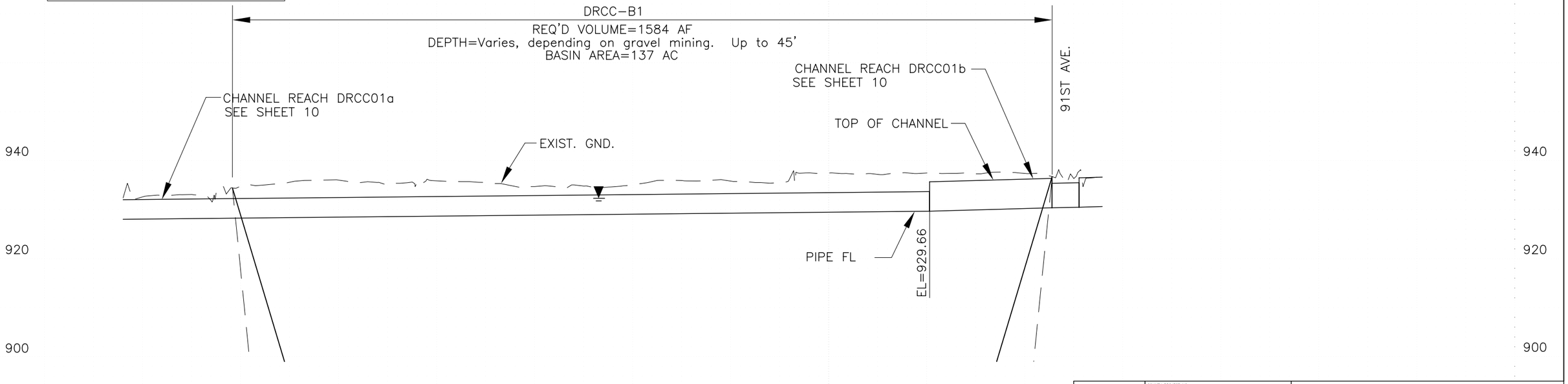
Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.

BOOK 500
MAP 77



0 100 200 400 600 800
feet

See Facing Page for Design Information.



DURANGO REGIONAL CONVEYANCE BASIN #1

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE BASIN #1

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 34 OF 38

FILE:J:\9935\Acad\Prelim_Design\plprbasn34-drcc.dwg DATE:Oct, 10 2002 TIME: 02:56 pm

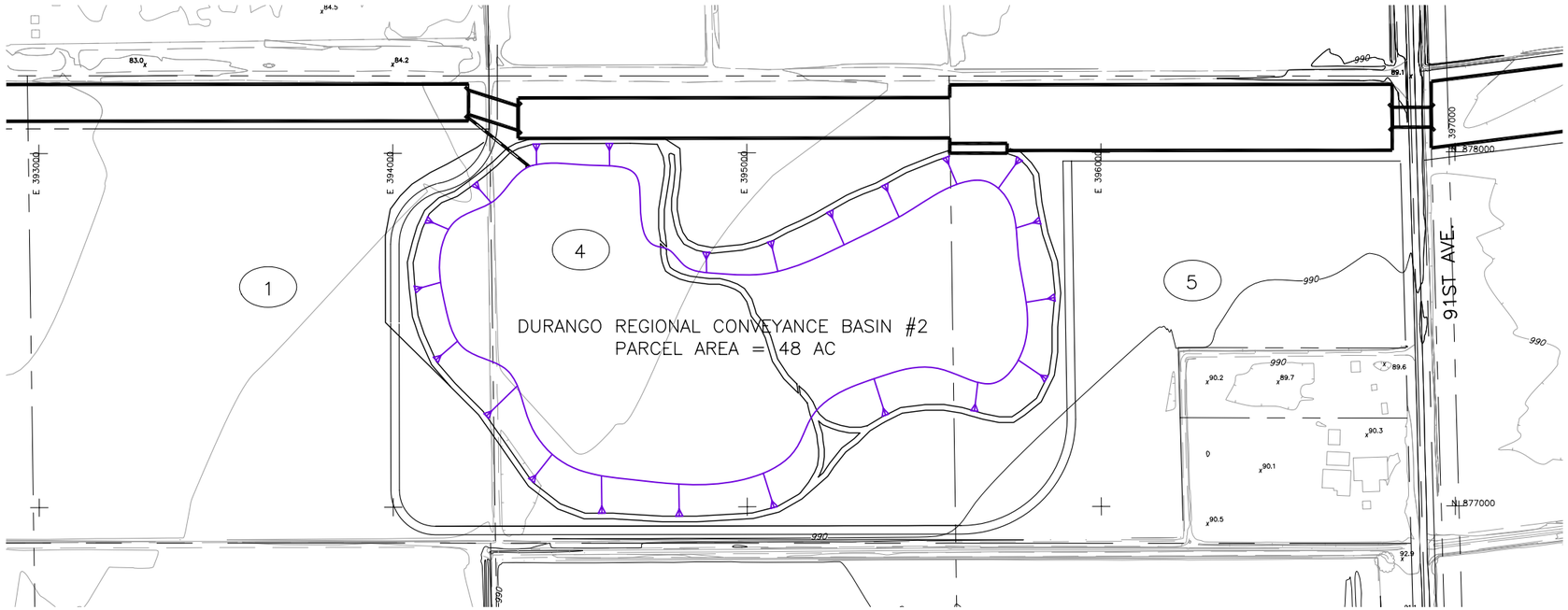
Detention Basin Properties

DRC Basin #2 - 95th Ave

Basin Land Area	30	Acres	Length of Fencing =		0	ft
Basin Excavation Volume	202,900	C.Y.				
Q100 Inflow =	535	cfs	Outflow Pipe (no. & Dia.) =	1	24	in.
Q100 Outflow =	0	cfs	Pipe Invert at Inlet=		980.04	ft
Highwater Elev. (Q100) =	985.6	ft	Pipe Invert at Outlet=		979.82	ft
Maximum Ponding Depth	4.6	ft	Pipe Length =		221	ft
Total Basin Storage Volume	61	AF	Pipe Slope =		0.0010	ft/ft
			Inflow Spillway Width (2) =		159	ft
			Inflow Spillway Length (2) =		28	ft
			Spillway Elevation =		985.6	ft

Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.

BOOK 101
MAP 26

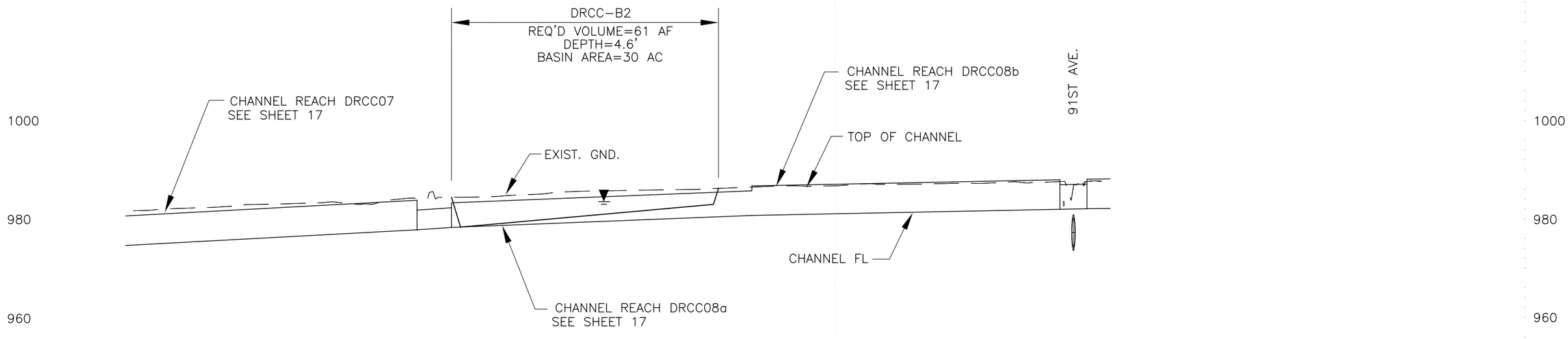


BOOK 101
MAP 28

BOOK 101
MAP 29

0 100 200 400 600 800
feet

See Facing Page for Design Information.



DURANGO REGIONAL CONVEYANCE BASIN #2

COUNTY PROJECT NO. FCD 99-41	DURANGO AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: DURANGO REGIONAL CONVEYANCE BASIN #2		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL
	DES. JLM DATE: –	
	CKD. BJF DATE: –	SHEETS: NO. 35 OF 38

Detention Basin Properties

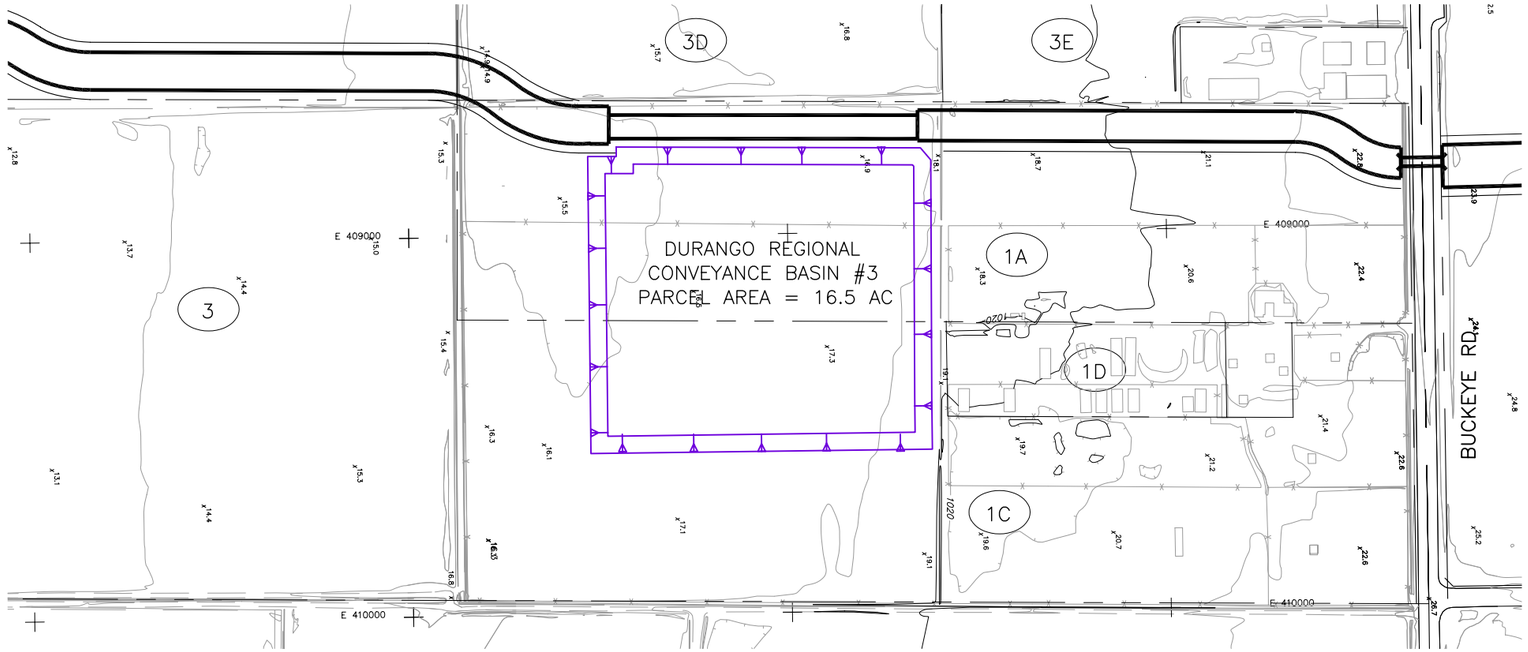
DRC Basin #3 - 73rd Ave

Basin Land Area	9	Acres	Length of Fencing =	3,394	ft
Basin Excavation Volume	79,000	C.Y.			
Q100 Inflow =	262	cfs	Outflow Pipe (no. & Dia.) = 1	24	in.
Q100 Outflow =	0	cfs	Pipe Invert at Inlet=	1008.0	ft
Highwater Elev. (Q100) =	1013.5	ft	Pipe Invert at Outlet=	1007.8	ft
Maximum Ponding Depth	4.5	ft	Pipe Length =	200	ft
Total Basin Storage Volume	16	AF	Pipe Slope =	0.0010	ft/ft
			Inflow Spillway Width (2) =	78	ft
			Inflow Spillway Length (2) =	27	ft
			Spillway Elevation =	1013.5	ft

Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.

BOOK 104
MAP 35

BOOK 104
MAP 30



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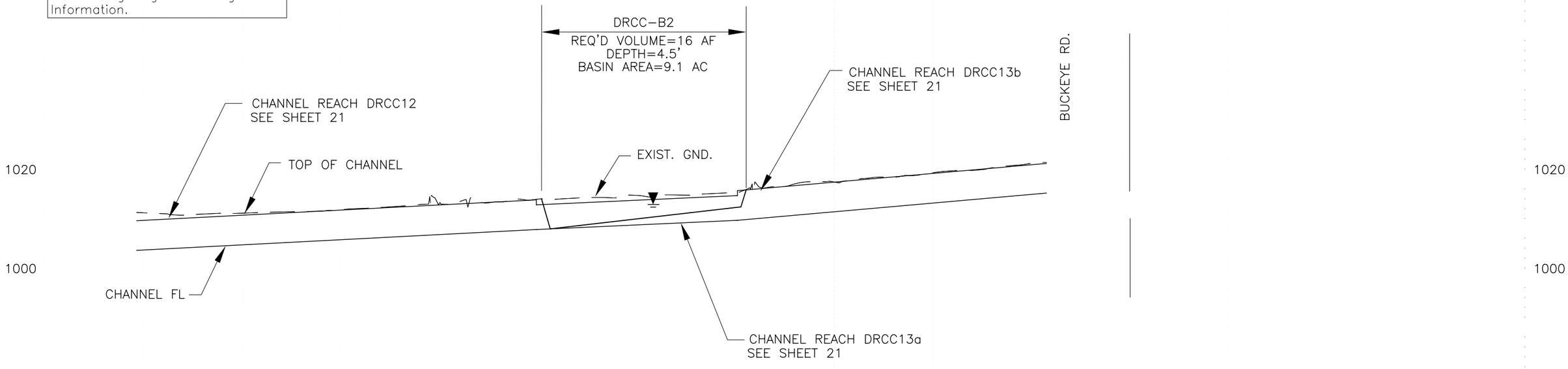
feet

See Facing Page for Design Information.



DURANGO REGIONAL CONVEYANCE BASIN #3

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99–41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE BASIN #3

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 36 OF 38

FILE:J:\9935\Acad\Prelim_Design\plprbasn36–drcc.dwg DATE:Oct, 10 2002 TIME: 02:57 pm

Detention Basin Properties

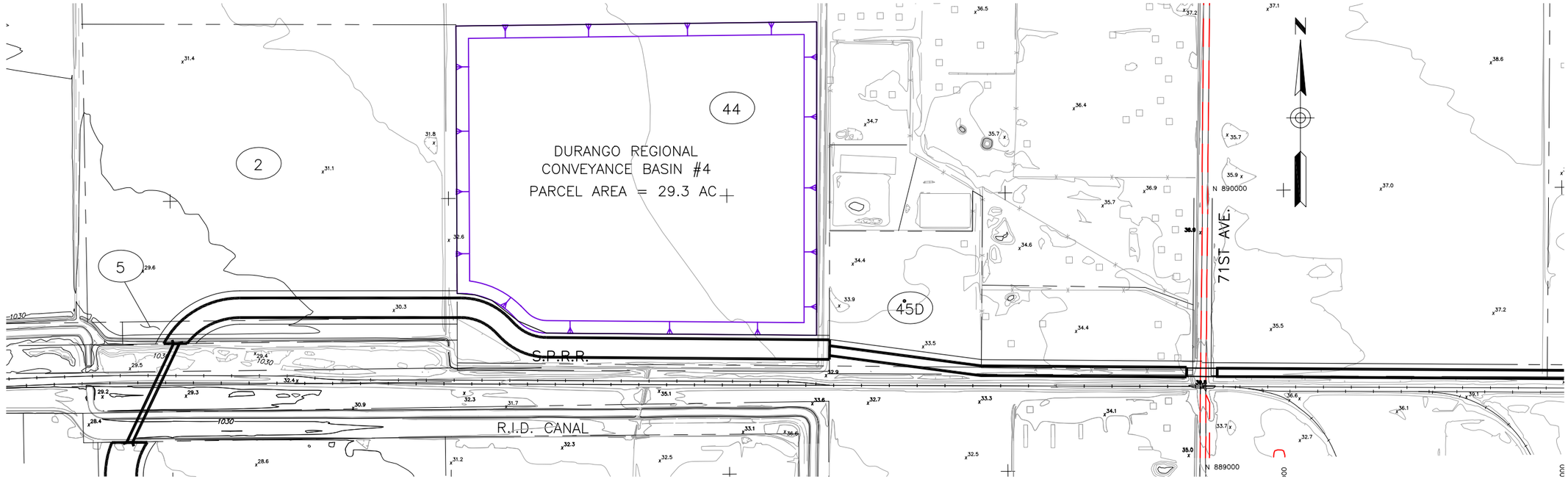
DRC Basin #4 - 71st Ave

Basin Land Area	16	Acres	Length of Fencing =	4,563	ft
Basin Excavation Volume	180,000	C.Y.			
Q100 Inflow =	487	cfs	Outflow Pipe (no. & Dia.) =	1 24	in.
Q100 Outflow =	0	cfs	Pipe Invert at Inlet=	1021.63	ft
Highwater Elev. (Q100) =	1030.3	ft	Pipe Invert at Outlet=	1019.91	ft
Maximum Ponding Depth	8	ft	Pipe Length =	1161	ft
Total Basin Storage Volume	58	AF	Pipe Slope =	0.0015	ft/ft
			Inflow Spillway Width (2) =	145	ft
			Inflow Spillway Length (2) =	47	ft
			Spillway Elevation =	1030.3	ft

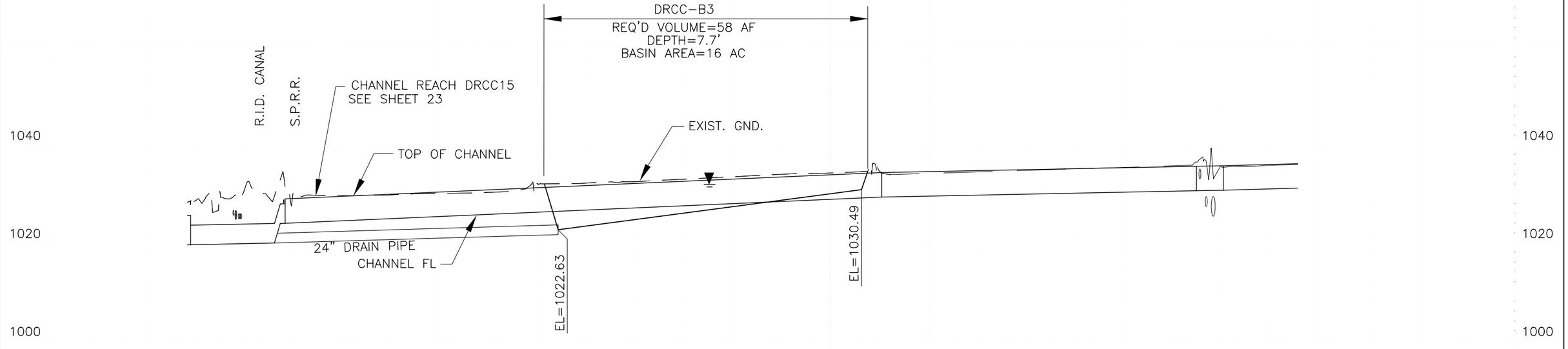
Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.

BOOK 104
MAP 10

BOOK 104
MAP 9



See Facing Page for Design Information.



DURANGO REGIONAL CONVEYANCE BASIN #4

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
DURANGO REGIONAL CONVEYANCE BASIN #4

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: –
DES. JLM DATE: –
CKD. BJF DATE: –

SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 37 OF 38

FILE:J:\9935\Acad\Prelim_Design\plprbasn37-drcc.dwg DATE:Oct, 10 2002 TIME: 02:59 pm

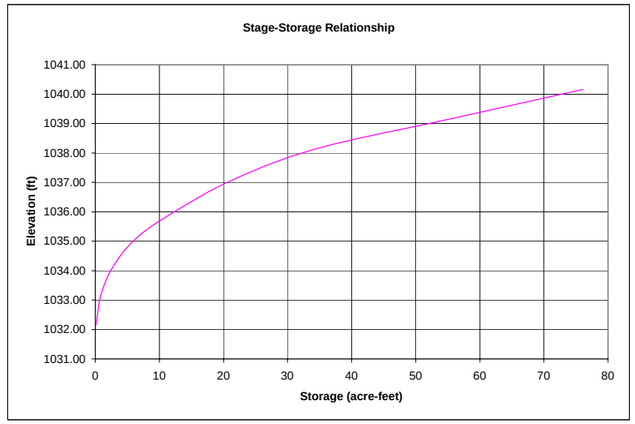
Detention Basin Properties

47th Ave Basin

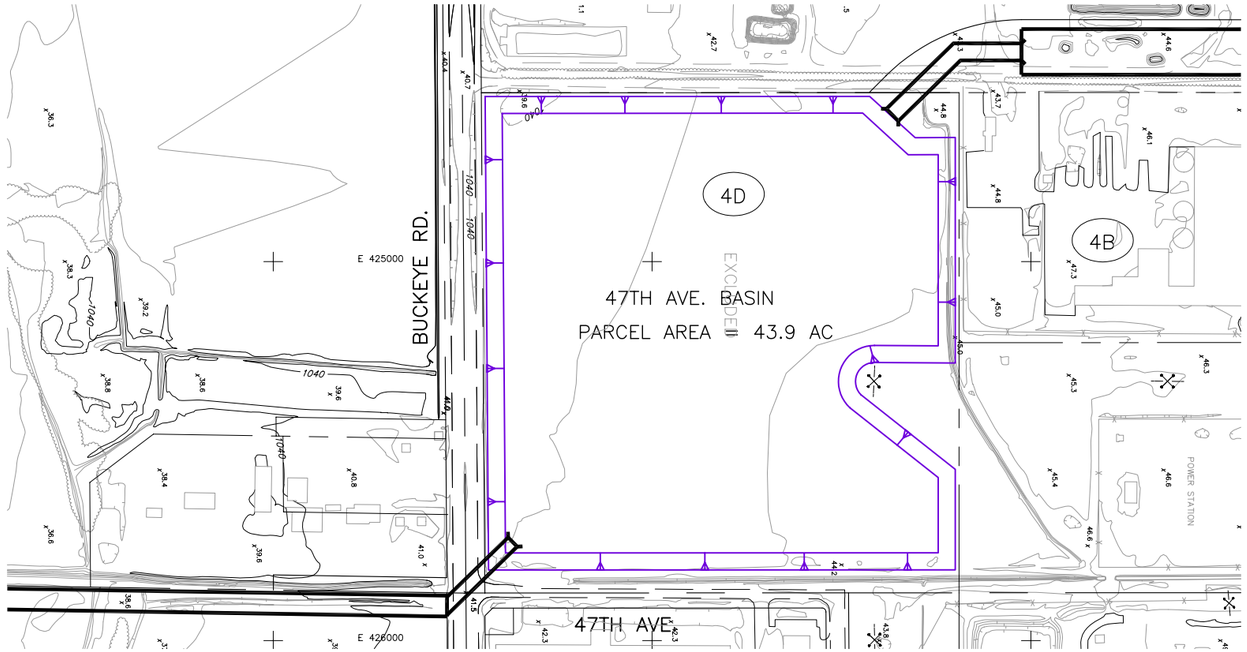
Basin Land Area	35	Acres	Length of Fencing =	4,887	ft
Basin Excavation Volume	260,633	C.Y.			
Q100 Inflow =	1,368	cfs	Outflow Pipe (no. & Dia.) =	1 24	in.
Q100 Outflow =	993	cfs	Pipe Invert at Inlet=	1026.0	ft
Highwater Elev. (Q100) =	1034.75	ft	Pipe Invert at Outlet=	1023.0	ft
Maximum Ponding Depth	7.8	ft	Pipe Length =	0	ft
Total Basin Storage Volume	22.3	AF	Pipe Slope =	0.0092	ft/ft
			Inflow Spillway Width (2) =	406	ft
			Inflow Spillway Length (2) =	47	ft
			Spillway Elevation =	1034.75	ft

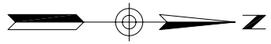
Elev.	Cum. Volume (acre-ft.)
1032.16	0.12
1033.16	0.86
1034.16	2.83
1035.16	6.69
1036.16	13.56
1037.16	22.24
1038.16	34.77
1039.16	55.53
1040.16	76.08

Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.



BOOK 104
MAP 21





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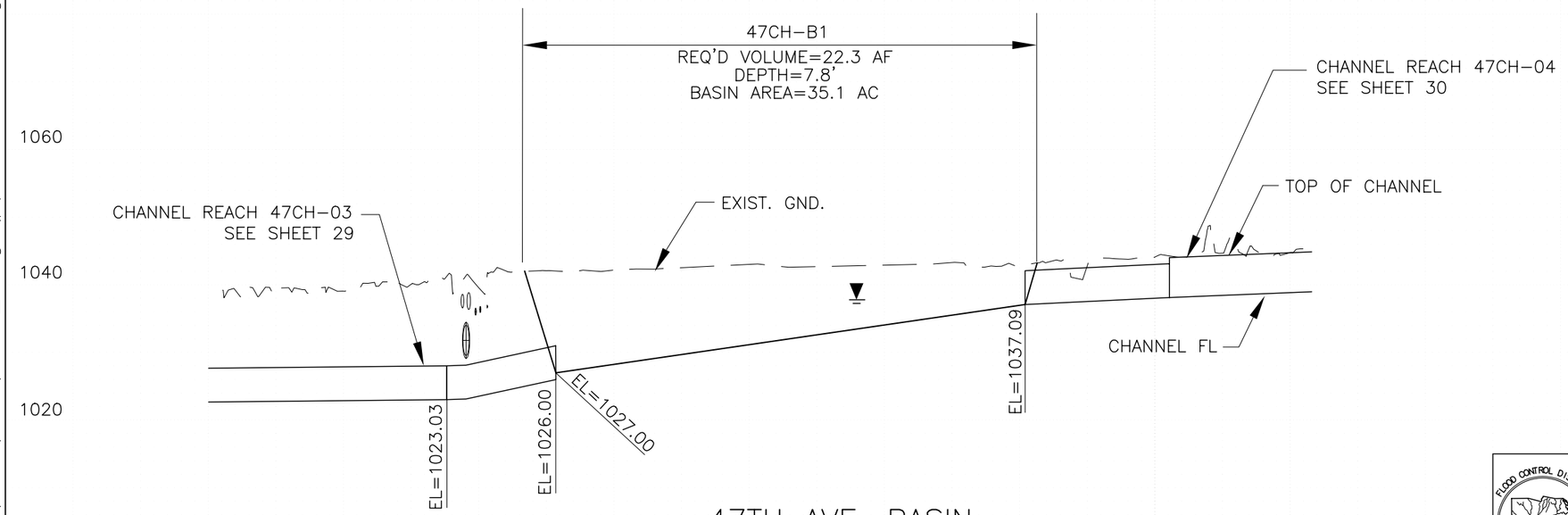
feet

See Facing Page for Design Information.



47TH AVE. BASIN

COUNTY PROJECT NO. FCD 99–41	DURANGO AREA DRAINAGE MASTER PLAN		
PROJECT DESCRIPTION 47TH AVE. BASIN			
PRIME CONSULTANT DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: –	SCALE	SHEETS
	DES. JLM DATE: –	1"=400' HORIZONTAL	NO. 38 OF 38
	CKD. BJF DATE: –	1"=20' VERTICAL	

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FILE:J:\9935\Acad\Prelim_Design\plprbasn38–47th.dwg DATE:Oct, 10 2002 TIME: 02:59 pm

APPENDIX A

HEC-1 Storm Comparison Flow Summary

		6-hour Storm						24-hr-storm							Design Control		
type	hec1id	q2	q5	q10	q25	q50	q100	q2	q5	q10	q25	q50	q100	sort	hec1id	Storm	Flow
Hydrograph	SUBWD	139	243	323	431	514	595	87	170	228	309	371	432	10	SUBWD	6	595
Routed	RTWDXA	114	212	291	396	476	551	67	143	198	280	339	399	20	RTWDXA	6	551
Hydrograph	SUBXA	194	292	357	445	513	580	135	210	258	324	375	425	30	SUBXA	6	580
Combined	CPXA1	192	298	386	513	622	740	138	222	283	374	448	525	40	CPXA1	6	740
Diversion	DIZZ1	0	0	0	0	0	0	0	0	0	0	0	0	50	DIZZ1	6	0
Hydrograph	DIXAO	192	298	386	513	622	740	138	222	283	374	448	525	60	DIXAO	6	740
Routed	RTXAWC	146	256	349	484	596	705	97	179	246	347	424	505	70	RTXAWC	6	705
Hydrograph	SUBWB	362	563	696	877	1017	1154	261	422	525	665	773	880	80	SUBWB	6	1154
Routed	RTWBWC	327	522	650	821	955	1092	228	385	485	618	722	823	90	RTWBWC	6	1092
Hydrograph	SUBWC	296	455	561	703	814	922	204	326	404	511	593	674	100	SUBWC	6	922
Combined	CPWC	472	794	1026	1357	1639	1937	372	651	829	1083	1299	1526	110	CPWC	6	1937
Diversion	DIQE	0	0	0	0	0	0	0	0	0	0	0	0	120	DIQE	6	0
Hydrograph	DIWCWA	472	794	1026	1357	1639	1937	372	651	829	1083	1299	1526	130	DIWCWA	6	1937
Routed	RTWCWA	163	293	381	585	747	946	133	222	308	406	562	708	140	RTWCWA	6	946
Hydrograph	SUBWA	406	606	740	919	1059	1196	279	434	532	666	769	872	150	SUBWA	6	1196
Combined	CPWA1	294	446	545	668	743	939	282	439	538	674	779	883	160	CPWA1	6	939
Hydrograph	SUBVD	372	581	719	907	1053	1195	271	438	546	693	806	917	170	SUBVD	6	1195
Routed	RTVDWA	234	409	527	687	817	941	154	289	378	504	600	695	180	RTVDWA	6	941
Combined	CPWA2	294	474	624	834	998	1159	308	490	608	782	924	1076	190	CPWA2	6	1159
Diversion	DIQD	19	103	225	401	553	707	23	116	212	355	484	627	200	DIQD	6	707
Hydrograph	DIWAVC	272	371	399	433	445	452	286	374	396	427	440	448	210	DIWAVC	6	452
Routed	RTWAVC	145	218	268	321	350	374	127	195	239	302	333	359	220	RTWAVC	6	374
Hydrograph	SUBVC	390	589	723	902	1041	1177	266	417	516	650	754	857	230	SUBVC	6	1177
Combined	CPVC1	239	376	467	589	684	776	271	424	525	662	767	872	240	CPVC1	24	872
Hydrograph	SUBVB	543	826	1014	1265	1460	1651	406	639	788	990	1145	1299	250	SUBVB	6	1651
Routed	RTVBVC	293	503	644	844	1001	1152	193	355	462	611	729	850	260	RTVBVC	6	1152
Combined	~CPVC2	313	571	751	992	1181	1368	310	518	678	913	1102	1292	270	~CPVC2	6	1368
Routed	MCVC47	308	564	742	986	1177	1363	290	499	657	889	1075	1261	280	MCVC47	6	1363
Hydrograph	SUBQA2	48	83	108	140	165	189	33	61	79	104	123	142	290	SUBQA2	6	189
Combined	CPQA2	334	617	813	1080	1290	1493	312	551	726	981	1184	1387	300	CPQA2	6	1493
Routed	BSN47	331	568	693	835	924	993	304	514	638	775	866	940	310	BSN47	6	993
Routed	MC47QB	327	562	690	833	922	992	294	511	635	773	863	938	320	MC47QB	6	992
Hydrograph	SUBQB	263	412	513	647	751	852	187	305	379	478	554	629	330	SUBQB	6	852
Combined	~CPQB	481	801	990	1209	1365	1502	475	786	962	1171	1323	1464	340	~CPQB	6	1502
Hydrograph	SUBQD	218	314	379	466	534	600	154	227	274	339	389	439	350	SUBQD	6	600
Hydrograph	DRQD	19	103	225	401	553	707	23	116	212	355	484	627	360	DRQD	6	707
Routed	RTDIQD	2	32	101	242	374	511	1	17	52	143	243	353	370	RTDIQD	6	511
Combined	@CPQD	218	314	379	537	572	604	154	227	274	339	389	439	380	@CPQD	6	604
Routed	RSQD	124	193	237	295	378	525	122	197	241	299	344	390	390	RSQD	6	525
Diversion	DIQC	105	161	196	242	309	394	104	164	199	246	282	318	400	DIQC	6	394
Hydrograph	DIQDQC	18	32	41	52	69	132	18	33	42	53	62	73	410	DIQDQC	6	132
Routed	RTQDQB	3	9	14	33	53	90	2	7	11	21	34	53	420	RTQDQB	6	90
Combined	@CPQB	500	826	1017	1242	1402	1542	477	789	965	1175	1328	1472	430	@CPQB	6	1542
Routed	MCQBJK	482	811	1003	1229	1386	1526	434	747	928	1143	1296	1436	440	MCQBJK	6	1526
Hydrograph	SUBJK	214	358	455	584	683	779	147	263	336	434	508	581	450	SUBJK	6	779
Combined	~CPJK	582	1000	1265	1580	1806	2022	539	943	1193	1504	1726	1935	460	~CPJK	6	2022
Routed	MCJKJL	539	959	1224	1540	1771	1982	478	877	1124	1428	1648	1851	470	MCJKJL	6	1982
Hydrograph	SUBJL	214	358	455	584	683	779	147	263	336	434	508	581	480	SUBJL	6	779
Combined	~CPJL1	588	1084	1414	1821	2122	2400	524	987	1293	1672	1961	2230	490	~CPJL1	6	2400
Hydrograph	SUBQE	573	845	1028	1275	1467	1654	441	669	815	1016	1170	1324	500	SUBQE	6	1654
Hydrograph	DRQE	0	0	0	0	0	0	0	0	0	0	0	0	510	DRQE	6	0
Routed	RTDIQE	0	0	0	0	0	0	0	0	0	0	0	0	520	RTDIQE	6	0
Combined	CPQE	573	845	1028	1275	1467	1654	441	669	815	1016	1170	1324	530	CPQE	6	1654
Routed	RSQE	409	701	897	1172	1377	1575	316	539	688	893	1041	1198	540	RSQE	6	1575
Routed	RTQEQC	367	639	836	1075	1283	1479	277	497	636	829	969	1107	550	RTQEQC	6	1479
Hydrograph	SUBQC	368	571	705	884	1024	1160	263	426	528	667	772	878	560	SUBQC	6	1160
Hydrograph	DRDIQC	105	161	196	242	309	394	104	164	199	246	282	318	570	DRDIQC	6	394
Routed	RTDIQC	45	83	112	181	276	358	37	73	99	133	191	271	580	RTDIQC	6	358
Combined	CPQC	461	887	1194	1590	1903	2220	355	719	957	1281	1525	1773	590	CPQC	6	2220
Diversion	DISR1	369	709	955	1272	1523	1776	284	575	766	1025	1220	1419	600	DISR1	6	1776
Hydrograph	DIQCR	92	177	239	318	381	444	71	144	191	256	305	355	610	DIQCR	6	444
Routed	RTQCJL	61	120	166	238	294	349	48	97	132	190	234	278	620	RTQCJL	6	349
Combined	CPJL2	589	1105	1456	1903	2243	2558	544	1038	1362	1793	2109	2422	630	CPJL2	6	2558
Hydrograph	SUBQA1	158	266	338	434	508	579	110	196	251	324	379	433	640	SUBQA1	6	579
Routed	RSQA	116	245	318	411	483	547	61	172	233	306	360	413	650	RSQA	6	547
Diversion	DIPF	58	109	138	175	204	230	35	80	104	134	155	176	660	DIPF	6	230
Hydrograph	DIQAPF	58	136	179	236	279	317	27	92	128	172	205	236	670	DIQAPF	6	317
Routed	RTQAJH	37	94	137	191	233	274	23	57	90	134	166	198	680	RTQAJH	6	274
Hydrograph	SUBJH	244	367	448	556	640	723	172	267	326	407	469	531	690	SUBJH	6	723
Combined	CPJH	230	347	424	527	607	686	171	266	325	406	468	530	700	CPJH	6	686
Routed	RTJHJI	113	201	262	345	409	472	76	144	190	254	298	349	710	RTJHJI	6	472
Hydrograph	SUBJI	190	299	370	463	535	604	134	218	271	340	394	447	720	SUBJI	6	604
Combined	CPJI	165	262	326	409	473	535	134	219	272	342	396	452	730	CPJI	6	535
Combined	CPJISR	617	1207	1606	2124	2509	2884	563	1108	1479	1980	2350	2717	740	CPJISR	6	2884
Hydrograph	SUBPF	420	642	791	992	1147	1297	285	454	565	716	832	947	750	SUBPF	6	1297
Diversion	RETPF	55	29	23	21	21	19	7	7	8	8	9	10	760	RETPF	6	19
Hydrograph	RETPF	420	642	791	992	1147	1297	285	454	565	716	832	947	770	RETPF	6	1297
Hydrograph	DRPF	58	109	138	175	204	230	35	80	104	134	155	176	780	DRPF	6	230
Routed	RTDIPF	46	86	114	150	180	207	32	62	83	111	133	153	790	RTDIPF	6	207
Combined	CPPF	422	643	793	995	1150	1300	286	456	567	719	836	952	800	CPPF	6	1300
Routed	RSPF	0	46	95	211	358	524	0	24	69	120	217	342	810	RSPF	6	524
Diversion	DIPE	0	0	0	0	0	0	0	0	0	0	0	0	820	DIPE	6	0
Hydrograph	DIPFPE	0	46	95	211	358	524	0	24	69	120	217	342	830	DIPFPE	6	524
Routed	RTPFJF	0	43	92	167	292	422	0	23	67	117	183	288	840	RTPFJF	6	422
Hydrograph	SUBUD	284	486	624	808	950	1087	210	375	483	629	741	851	850	SUBUD	6	1087
Diversion	DIUA	70	119	152	196	230	263	52	92	118	153	180	206	860	DIUA	6	263
Hydrograph	DIUDUA	214	367	472	612	720	824	158	283	365	476	561	645	870	DIUDUA	6	824
Routed	RTUDVA	120	244	333	453	547	637	81	175	243	336	409	483	880	RTUDVA	6	637
Hydrograph	SUBVA	408	607	740	919	1059	1195	280	430	528	663	766	869	890	SUBVA	6	1195
Combined	CPVA1	332	502	618	774	900	1024	283	436	538	678	786	898	900	CPVA1	6	1024
Diversion	DIUC	330	473	546	626	669	701	282	425	502	590	647	685	910	DIUC	6	701
Hydrograph	DIVAPE	3	29	72	148	231	323	1	11	37	88	139	213	920	DIVAPE	6	323
Routed	RTVAPE	0	3	10	32	65	109	0	1	3	11	25	47	930	RTVAPE	6	109
Hydrograph	SUBPE	406	630	781	987	1147	1303	266	439	551	705	824	944	940	SUBPE	6	1303
Hydrograph	DRPE	0	0	0	0	0	0	0	0	0	0	0	0	950	DRPE	6	0
Routed	RTDIPE	0	0	0	0	0	0	0	0	0	0	0	0	960	RTDIPE	6	0
Combined	CPPE	406	630	781	987	1147	1303	266	439	551	705	824	944	970	CPPE	6	1303
Routed	RSPE	9	145	309	520	664	820	8	126	289	491	631	835	980	RSPE	24	835
Diversion	DIPD	0	0	0	0	0	1	0	0	0	0	0	1	990	DIPD	6	1
Hydrograph	DIPEPD	9	145	309	520	663	819	8	126	289	491	631	835	1000	DIPEPD	24	835
Routed	RTPEJF	6	57	126	252	361	469	7	44	102	209	308	408	1010	RTPEJF	6	469
Hydrograph	SUBJF	515	765	934	1161	1337	1509	349	540	664	835	967	1097	1020	SUBJF	6	1509
Combined	CPJF	274	426	527	662	767	871	342	531	653	821	952	1082	1030	CPJF	24	1082
Routed	RTJFJG	88	164	236	360	513	693	68	126	183	289	420	580	1040	RTJFJG	6	693
Hydrograph	SUBJG	617	941	1159	1450	1676	1897	483	759	938	1183	1371	1558	1050	SUBJG	6	1897
Combined	CPJG	423	670	835	1060	1237	1412	483	761	943	1192	1384	1576	1060	CPJG	24	1576
Combined	CPJGSR	681	1350	1835	2496	3014	3517	714	1269	1708	2329	2813	3310	1070	CPJGSR	6	3517
Hydrograph	DRUC	330	473	546	626	669	701	282	425	502	590	647	685	1080	DRUC	6	701
Routed	RTVAUC	130	206	325	446	531	596	101	171	221	346	423	492	1090	RTVAUC	6	596
Routed	MCUCUC	129	205	321	444	529	594	101	170	219	344	421	490	1100	MCUCUC	6	594
Hydrograph	SUBUC	280	446	557	703	817	927	192	321	403	514	598	682	1110	SUBUC	6	927
Combined	@CPUC	218	359	451	574	671	763	199	332	416	531	618	704	1120	@CPUC	6	763
Hydrograph	SUBUA	253	414	522	666	777	886	177	304	386	498	583	666	1130	SUBUA	6	886
Hydrograph	DRUA	70	119	152	196	230	263	52	92	118	153	180	206	1140	DRUA	6	263
Routed	RTDIUA	19	37	52	74	91	114	14	28	39	55	70	83	1150	RTDIUA	6	114
Combined	@CPUA	253	414	522	666	777	886	177	304	386	498	583	666	1160	@CPUA	6	886

		6-hour Storm						24-hr-storm							Design Control		
type	hec1id	q2	q5	q10	q25	q50	q100	q2	q5	q10	q25	q50	q100	sort	hec1id	Storm	Flow
Diversion	DITB	42	71	91	117	137	156	35	60	77	99	116	133	1170	DITB	6	156
Hydrograph	DIUAUC	169	286	364	467	546	624	140	241	307	396	464	531	1180	DIUAUC	6	624
Routed	RTUAUC	91	188	255	348	418	489	68	143	196	271	332	389	1190	RTUAUC	6	489
Combined	~CPUC2	218	359	451	643	822	980	204	345	436	563	665	773	1200	~CPUC2	6	980
Diversion	DIUB	197	337	433	643	822	980	204	345	436	563	665	773	1210	DIUB	6	980
Hydrograph	DIUCPC	0	0	0	0	0	0	0	0	0	0	0	0	1220	DIUCPC	6	0
Routed	RTUCPC	0	0	0	0	0	0	0	0	0	0	0	0	1230	RTUCPC	6	0
Hydrograph	SUBPC	317	473	578	717	826	932	218	339	417	522	603	684	1240	SUBPC	6	932
Combined	CPPC	162	253	313	392	455	515	212	331	407	510	589	668	1250	CPPC	24	668
Routed	RSPC	5	5	5	5	21	60	5	5	5	5	5	17	1260	RSPC	6	60
Routed	RTPCNB	5	5	5	5	13	31	5	5	5	5	5	12	1270	RTPCNB	6	31
Hydrograph	SUBNB	289	447	554	697	808	917	195	314	392	499	582	664	1280	SUBNB	6	917
Combined	CPNB1	179	291	365	464	541	616	195	312	388	494	574	655	1290	CPNB1	24	655
Diversion	DINA	117	188	236	299	348	396	127	201	251	318	369	421	1300	DINA	24	421
Hydrograph	DINBNA	63	103	129	165	193	220	68	110	138	176	205	234	1310	DINBNA	24	234
Routed	RTNBJD	25	43	58	78	95	114	21	36	46	63	76	90	1320	RTNBJD	6	114
Hydrograph	SUBPD	362	568	707	892	1035	1174	240	398	502	643	750	856	1330	SUBPD	6	1174
Hydrograph	DRPD	0	0	0	0	0	1	0	0	0	0	0	1	1340	DRPD	6	1
Combined	CPPD2	362	568	707	892	1035	1175	240	398	502	643	750	856	1350	CPPD2	6	1175
Routed	RSPD	0	0	2	13	51	94	0	0	1	3	8	33	1360	RSPD	6	94
Routed	RTPDNC	0	0	2	12	43	82	0	0	1	3	8	30	1370	RTPDNC	6	82
Hydrograph	SUBNC	175	311	404	524	620	714	112	212	281	373	447	520	1380	SUBNC	6	714
Combined	CPNC	157	275	360	472	560	647	111	209	278	369	442	515	1390	CPNC	6	647
Routed	RTNCJE	93	172	240	328	400	470	58	117	168	236	293	351	1400	RTNCJE	6	470
Hydrograph	SUBJE1	225	354	440	554	644	732	144	244	308	395	461	528	1410	SUBJE1	6	732
Combined	CPJE1	179	290	363	461	538	612	147	249	313	401	469	538	1420	CPJE1	6	612
Routed	RTJEJD	141	236	305	394	473	548	105	192	247	330	392	459	1430	RTJEJD	6	548
Hydrograph	SUBJD	226	377	481	619	727	831	151	268	345	448	528	607	1440	SUBJD	6	831
Combined	CPJD	216	389	510	672	793	915	253	440	566	746	880	1014	1450	CPJD	24	1014
Diversion	DIJC2	80	142	186	244	288	331	93	160	206	271	319	367	1460	DIJC2	24	367
Hydrograph	DIJDJC	136	247	324	428	506	584	160	280	360	475	561	647	1470	DIJDJC	24	647
Routed	RTJDFC	84	165	234	332	413	495	81	153	213	297	366	435	1480	RTJDFC	6	495
Hydrograph	SUBJE2	259	381	462	573	658	742	181	275	335	417	481	544	1490	SUBJE2	6	742
Diversion	RETJE	151	145	133	128	139	123	109	84	58	23	20	15	1500	RETJE	6	123
Hydrograph	RETJE2	259	381	462	573	658	742	181	275	335	417	481	544	1510	RETJE2	6	742
Routed	RTJEFC	111	229	318	430	517	595	71	165	227	301	369	427	1520	RTJEFC	6	595
Hydrograph	SUBFC	297	452	557	697	805	910	202	322	399	505	586	666	1530	SUBFC	6	910
Combined	CPFC	179	379	528	729	891	1052	212	362	493	707	866	1030	1540	CPFC	6	1052
Combined	CPFCSR	760	1513	2073	2855	3465	4072	902	1495	1946	2668	3241	3817	1550	CPFCSR	6	4072
Hydrograph	SUBJC2	73	157	224	316	387	457	56	123	174	247	302	358	1560	SUBJC2	6	457
Diversion	RETJC2	68	105	115	136	141	133	53	85	94	92	87	81	1570	RETJC2	6	133
Hydrograph	RETJC2	64	157	224	316	387	457	56	123	174	247	302	358	1580	RETJC2	6	457
Hydrograph	DRJC2	80	142	186	244	288	331	93	160	206	271	319	367	1590	DRJC2	24	367
Routed	RTDIJC	39	72	101	150	192	236	35	65	89	124	161	196	1600	RTDIJC	6	236
Combined	@CPJC2	71	183	277	423	541	660	77	166	238	349	445	539	1610	@CPJC2	6	660
Diversion	DIJB2	33	84	127	195	249	303	36	76	109	160	205	248	1620	DIJB2	6	303
Hydrograph	DIJCJB	38	99	149	229	292	356	41	90	128	188	240	291	1630	DIJCJB	6	356
Routed	RTJCFB	25	76	121	195	254	314	28	70	105	160	207	255	1640	RTJCFB	6	314
Hydrograph	SUBFB	104	234	326	464	572	675	65	170	242	350	433	515	1650	SUBFB	6	675
Combined	CPFB	31	140	225	344	433	521	62	166	237	343	426	507	1660	CPFB	6	521
Combined	CPFBSR	760	1513	2115	2974	3656	4316	916	1556	2065	2870	3497	4143	1670	CPFBSR	6	4316
Hydrograph	SUBJB2	16	57	84	124	159	195	5	38	58	90	117	144	1680	SUBJB2	6	195
Hydrograph	DRJB2	33	84	127	195	249	303	36	76	109	160	205	248	1690	DRJB2	6	303
Routed	RTDIJB	19	58	91	150	199	248	21	54	80	125	162	202	1700	RTDIJB	6	248
Combined	@CPJB2	18	57	97	175	243	313	21	53	89	153	200	258	1710	@CPJB2	6	313
Diversion	DIEE	7	20	35	63	87	113	8	19	32	55	72	93	1720	DIEE	6	113
Hydrograph	DIJBEE	12	35	62	112	155	200	14	34	57	98	128	165	1730	DIJBEE	6	200
Routed	RTJBFA	7	25	45	80	119	159	9	27	43	70	101	132	1740	RTJBFA	6	159
Hydrograph	SUBFA	134	235	314	420	503	586	96	177	232	309	369	428	1750	SUBFA	6	586
Combined	CPFA	83	178	247	340	415	489	94	172	227	302	361	420	1760	CPFA	6	489
Combined	CPSRFA	762	1578	2219	3128	3848	4553	932	1656	2251	3120	3799	4491	1770	CPSRFA	6	4553
Hydrograph	DRUCUB	197	337	433	643	822	980	204	345	436	563	665	773	1780	DRUCUB	6	980
Routed	MCUCUB	194	334	431	643	821	982	197	337	428	553	655	765	1790	MCUCUB	6	982
Hydrograph	SUBUB	70	119	151	195	228	260	48	86	110	143	168	193	1800	SUBUB	6	260
Combined	~@CPUB	236	411	530	694	833	995	229	395	503	654	773	897	1810	~@CPUB	6	995
Diversion	DIUE	0	0	0	0	0	0	0	0	0	0	0	0	1820	DIUE	6	0
Hydrograph	DIUBSF	236	411	530	694	833	995	229	395	503	654	773	897	1830	DIUBSF	6	995
Diversion	D-B71	0	12	120	284	423	585	0	2	93	244	363	487	1840	D-B71	6	585
Hydrograph	71PASS	236	400	410	410	410	410	229	392	410	410	410	410	1850	71PASS	6	410
Diversion	BSN71	236	400	410	410	410	410	229	392	410	410	410	410	1860	BSN71	6	410
Hydrograph	DBSN71	0	0	0	0	0	0	0	0	0	0	0	0	1870	DBSN71	6	0
Combined	CLEAR	762	1578	2219	3128	3848	4553	932	1657	2251	3120	3799	4491	1880	CLEAR	6	4553
Hydrograph	SUBTB	269	460	591	767	904	1037	201	354	457	596	704	811	1890	SUBTB	6	1037
Hydrograph	DRTB	42	71	91	117	137	156	35	60	77	99	116	133	1900	DRTB	6	156
Routed	RTDITB	27	52	68	90	111	129	21	40	54	72	86	103	1910	RTDITB	6	129
Combined	CPTB	270	461	593	772	913	1051	202	356	459	600	710	822	1920	CPTB	6	1051
Diversion	DITA	67	113	144	187	221	254	50	87	112	146	172	199	1930	DITA	6	254
Hydrograph	DITBTA	203	349	449	585	692	797	151	269	347	454	538	623	1940	DITBTA	6	797
Routed	RTTBSF	133	261	350	475	575	671	93	189	258	355	433	512	1950	RTTBSF	6	671
Hydrograph	SUBSF	53	126	175	244	298	349	36	92	134	190	231	272	1960	SUBSF	6	349
Combined	CPSF	154	340	471	655	799	939	115	258	364	511	628	745	1970	CPSF	6	939
Diversion	DIRJ1	46	102	141	196	240	282	34	77	109	153	188	223	1980	DIRJ1	6	282
Hydrograph	DISFRJ	108	238	330	458	559	657	80	181	255	358	440	521	1990	DISFRJ	6	657
Routed	RTSFSH	102	231	322	447	549	646	77	175	247	349	429	511	2000	RTSFSH	6	646
Hydrograph	SUBSH	98	149	183	228	263	298	68	108	133	168	194	220	2010	SUBSH	6	298
Combined	CPSH	101	231	322	447	549	646	78	178	251	353	436	520	2020	CPSH	6	646
Routed	RSSH	10	84	146	311	448	580	7	61	108	213	323	439	2030	RSSH	6	580
Diversion	DIRJ2	6	54	96	235	352	467	4	39	69	152	246	344	2040	DIRJ2	6	467
Hydrograph	DISHRJ	4	30	50	76	96	113	2	22	39	61	77	95	2050	DISHRJ	6	113
Routed	RTSHSG	3	29	47	71	88	104	2	21	38	58	73	88	2060	RTSHSG	6	104
Hydrograph	SUBTA	26	72	103	149	186	222	14	51	75	112	140	168	2070	SUBTA	6	222
Hydrograph	DRTA	67	113	144	187	221	254	50	87	112	146	172	199	2080	DRTA	6	254
Routed	RTDITA	55	98	131	172	206	239	40	74	98	133	158	184	2090	RTDITA	6	239
Combined	@CPTA	60	132	192	270	333	396	44	100	143	208	255	306	2100	@CPTA	6	396
Routed	RTTASG	55	124	182	261	324	389	41	96	134	198	247	297	2110	RTTASG	6	389
Hydrograph	SUBSG	72	116	146	186	217	247	50	84	106	136	160	183	2120	SUBSG	6	247
Combined	CPSG	55	124	182	262	330	403	50	100	141	214	268	324	2130	CPSG	6	403
Routed	RSSG	1	88	169	261	328	403	4	76	134	212	267	323	2140	RSSG	6	403
Diversion	DIRJ4	0	53	114	188	242	302	0	45	86	149	193	238	2150	DIRJ4	6	302
Hydrograph	DISGRJ	1	35	55	73	86	101	4	31	48	63	74	85	2160	DISGRJ	6	101
Routed	RTSGSE	1	33	51	71	84	99	4	29	45	61	72	84	2170	RTSGSE	6	99
Hydrograph	SUBSC	27	91	136	192	240	294	10	55	89	132	172	212	2180	SUBSC	6	294
Diversion	DISD	15	49	73	104	130	159	6	30	48	72	93	115	2190	DISD	6	159
Hydrograph	DISCSD	12	42	62	88	111	135	5	25	41	61	79	98	2200	DISCSD	6	135
Routed	RTSCSE	8	31	49	71	91	113	3	18	31	48	63	80	2210	RTSCSE	6	113
Hydrograph	SUBSE	122	196	245	310	360	409	77	135	172	221	259	297	2220	SUBSE	6	409
Combined	CPSE	50	90	117	153	182	210	74	131	167	215	253	291	2230	CPSE	24	291
Routed	RSSE	3	7	36	102	147	186	3	10	36	91	136	169	2240	RSSE	6	186
Diversion	DIRJ5	3	7	36	102	147	186	3	10	36	91	136	169	2250	DIRJ5	6	186
Hydrograph	DISERJ	0	0	0	0	0	0	0	0	0	0	0	0	2260	DISERJ	6	0
Routed	RTSERI	0	0	0	0	0	0	0	0	0	0	0	0	2270	RTSERI	6	0
Hydrograph	SUBRJ	50	86	113	151	179	207	33	61	82	110	131	152	2280	SUBRJ	6	207
Hydrograph	CPRJ1	46	102	141	196	240	282	34	77	109	153	188	223	2290	CPRJ1	6	282
Routed	RTSFRJ	39	90	127	179	221	261	30	68	96	139	172	206	2300	RTSFRJ	6	261
Hydrograph	CPRJ2	6	54	96	235	352	467	4	39	69	152	246	344	2310	CPRJ2	6	467
Routed	RTSHRJ	6	53	92	222	337	452	4	38	68	142	235	334	2320	RTSHRJ	6	452

		6-hour Storm						24-hr-storm							Design Control		
type	hec1id	q2	q5	q10	q25	q50	q100	q2	q5	q10	q25	q50	q100	sort	hec1id	Storm	Flow
Combined	@CPRJ3	39	92	166	350	515	669	30	73	133	242	385	525	2330	@CPRJ3	6	669
Routed	RTRJ3	29	90	159	330	488	637	26	71	128	232	362	498	2340	RTRJ3	6	637
Hydrograph	CPRJ4A	0	53	114	188	242	302	0	45	86	149	193	238	2350	CPRJ4A	6	302
Combined	CPRJ4B	29	111	205	405	605	796	26	88	165	295	448	623	2360	CPRJ4B	6	796
Routed	RTSGRJ	28	111	203	400	596	788	26	88	164	292	441	613	2370	RTSGRJ	6	788
Hydrograph	CPRJ5	3	7	36	102	147	186	3	10	36	91	136	169	2380	CPRJ5	6	186
Routed	RTSERJ	3	7	34	91	138	181	3	10	33	79	124	165	2390	RTSERJ	6	181
Combined	@CPRJ6	61	111	217	443	653	871	35	91	184	356	526	723	2400	@CPRJ6	6	871
Routed	RSRJ	23	99	205	395	558	762	23	86	178	329	452	616	2410	RSRJ	6	762
Diversion	DIPA2	0	0	2	4	30	99	0	0	1	3	5	46	2420	DIPA2	6	99
Hydrograph	DIRJPA	23	99	203	391	529	663	23	86	177	325	447	570	2430	DIRJPA	6	663
Routed	RTRJRI	22	97	201	387	523	655	23	85	175	321	443	565	2440	RTRJRI	6	655
Routed	RTRIRI	22	96	200	385	521	653	23	85	174	319	442	563	2450	RTRIRI	6	653
Hydrograph	SUBRI	100	178	233	307	365	420	67	128	170	226	268	310	2460	SUBRI	6	420
Hydrograph	SUBSB	36	83	116	160	194	226	24	63	90	124	149	174	2470	SUBSB	6	226
Routed	RSSB	4	42	66	106	148	184	0	26	48	75	98	131	2480	RSSB	6	184
Hydrograph	SUBSD	29	86	121	172	213	253	12	58	85	125	158	190	2490	SUBSD	6	253
Hydrograph	DRSD	15	49	73	104	130	159	6	30	48	72	93	115	2500	DRSD	6	159
Combined	@CPSD	29	95	160	254	338	431	15	73	119	190	248	310	2510	@CPSD	6	431
Routed	RSSD	30	95	160	254	338	433	15	73	118	190	248	310	2520	RSSD	6	433
Routed	RTSDRI	21	91	153	244	329	418	10	63	113	180	238	305	2530	RTSDRI	6	418
Combined	~@CPRI	100	181	234	381	522	664	67	136	188	325	452	583	2540	~@CPRI	6	664
Routed	MCRIRH	42	106	195	378	518	658	51	122	177	323	450	579	2550	MCRIRH	6	658
Hydrograph	SUBUE	38	66	84	107	125	143	27	49	63	81	94	107	2560	SUBUE	6	143
Hydrograph	DRUE	0	0	0	0	0	0	0	0	0	0	0	0	2570	DRUE	6	0
Combined	CPUE	38	66	84	107	125	143	27	49	63	81	94	107	2580	CPUE	6	143
Routed	RSUE	0	0	0	0	0	1	0	0	0	0	0	1	2590	RSUE	6	1
Routed	RTUEPB	0	0	0	0	0	1	0	0	0	0	0	1	2600	RTUEPB	6	1
Hydrograph	DRB71	236	400	410	410	410	410	229	392	410	410	410	410	2610	DRB71	6	410
Routed	MC71PB	214	383	410	410	410	410	196	360	405	410	410	410	2620	MC71PB	6	410
Hydrograph	SUBPB2	107	185	239	312	368	422	73	135	176	230	272	313	2630	SUBPB2	6	422
Combined	~CPPB2	381	572	633	710	772	828	262	490	562	625	669	715	2640	~CPPB2	6	828
Routed	MCPB73	374	566	629	707	766	821	257	481	557	621	666	711	2650	MCPB73	6	821
Diversion	D-B73	0	116	179	257	316	371	0	31	107	171	216	261	2660	D-B73	6	371
Hydrograph	73PASS	374	450	450	450	450	450	257	450	450	450	450	450	2670	73PASS	6	450
Routed	MC73NA	354	450	450	450	450	450	240	442	450	450	450	450	2680	MC73NA	6	450
Hydrograph	SUBNA2	59	133	188	266	327	386	43	101	145	207	255	303	2690	SUBNA2	6	386
Hydrograph	DRNA	117	188	236	299	348	396	127	201	251	318	369	421	2700	DRNA	24	421
Routed	RTDINA	46	80	112	158	195	230	38	66	87	124	153	185	2710	RTDINA	6	230
Combined	~@CPNA	351	563	713	859	957	1053	277	524	605	766	852	934	2720	~@CPNA	6	1053
Routed	MCNAJC	297	557	706	855	953	1048	263	507	597	763	849	931	2730	MCNAJC	6	1048
Hydrograph	SUBPB1	56	94	121	157	185	212	38	69	89	116	137	158	2740	SUBPB1	6	212
Diversion	DIPA1	11	18	23	30	35	40	8	13	17	22	26	30	2750	DIPA1	6	40
Hydrograph	DIPBPA	45	76	98	127	150	172	31	56	73	94	111	127	2760	DIPBPA	6	172
Routed	RTPBNA	12	24	33	46	57	69	8	18	24	35	43	52	2770	RTPBNA	6	69
Hydrograph	SUBNA1	18	48	69	98	122	145	11	34	51	75	93	112	2780	SUBNA1	6	145
Combined	CPNA1	19	48	69	100	124	148	11	35	51	76	95	115	2790	CPNA1	6	148
Routed	RTNAJC	18	45	67	97	121	146	10	33	49	74	93	113	2800	RTNAJC	6	146
Hydrograph	SUBJC1	2	13	22	34	43	52	0	8	15	23	31	39	2810	SUBJC1	6	52
Combined	~CPJC1	296	581	750	929	1053	1173	271	539	646	832	938	1041	2820	~CPJC1	6	1173
Routed	MCJCJB	266	563	739	920	1043	1162	245	499	633	821	928	1030	2830	MCJCJB	6	1162
Hydrograph	SUBPA	139	242	322	430	512	593	91	173	231	313	374	435	2840	SUBPA	6	593
Hydrograph	DRPA	11	18	23	30	35	40	8	13	17	22	26	30	2850	DRPA	6	40
Routed	RTDIPA	2	4	5	8	9	11	1	3	4	6	7	9	2860	RTDIPA	6	11
Hydrograph	DRPA2	0	0	2	4	30	99	0	0	1	3	5	46	2870	DRPA2	6	99
Routed	RTRJPA	0	0	1	3	10	57	0	0	1	2	3	19	2880	RTRJPA	6	57
Combined	CPPA	139	242	322	430	512	593	91	173	231	313	375	435	2890	CPPA	6	593
Diversion	DIOE	25	44	58	77	92	107	17	31	42	56	67	78	2900	DIOE	6	107
Hydrograph	DIPAOE	114	199	264	352	420	487	74	142	190	257	307	357	2910	DIPAOE	6	487
Routed	RTPAMH	56	115	166	238	296	351	35	74	111	165	208	250	2920	RTPAMH	6	351
Hydrograph	SUBMH	49	117	163	228	277	325	32	86	124	175	211	248	2930	SUBMH	6	325
Combined	CPMH	56	117	178	266	337	412	35	88	128	187	243	301	2940	CPMH	6	412
Routed	RTMHMD	41	97	152	233	300	367	28	67	104	165	216	271	2950	RTMHMD	6	367
Hydrograph	SUBMD	115	181	225	285	331	376	79	129	161	205	240	274	2960	SUBMD	6	376
Diversion	RETMD	115	181	225	285	331	376	79	129	161	205	240	274	2970	RETMD	6	376
Hydrograph	RETMD	0	0	43	184	253	319	0	0	1	52	141	218	2980	RETMD	6	319
Combined	CPMD	41	97	156	245	320	396	28	67	104	180	241	305	2990	CPMD	6	396
Diversion	DIJB1	7	19	33	51	66	81	6	14	22	38	50	63	3000	DIJB1	6	81
Hydrograph	DIMDJB	30	72	123	194	254	315	22	52	82	142	191	242	3010	DIMDJB	6	315
Diversion	DIMFX	30	72	123	194	254	315	22	52	82	142	191	242	3020	DIMFX	6	315
Hydrograph	DIMDMF	0	0	0	0	0	0	0	0	0	0	0	0	3030	DIMDMF	6	0
Hydrograph	SUBMI	157	285	376	498	591	681	104	204	273	365	435	503	3040	SUBMI	6	681
Diversion	RETMI	157	285	368	440	474	483	104	204	273	334	394	362	3050	RETMI	6	483
Hydrograph	RETMI	0	197	357	498	591	681	0	50	215	343	435	503	3060	RETMI	6	681
Hydrograph	SUBMG	57	93	118	151	177	202	38	67	86	111	131	150	3070	SUBMG	6	202
Diversion	RETMG	57	93	118	151	177	183	38	67	86	111	131	150	3080	RETMG	6	183
Hydrograph	RETMG	0	0	27	86	142	200	0	0	1	37	89	118	3090	RETMG	6	200
Combined	CPMG	0	197	357	583	726	836	0	50	215	377	505	616	3100	CPMG	6	836
Routed	RTMGJB	0	62	156	331	461	590	0	18	75	189	294	398	3110	RTMGJB	6	590
Hydrograph	SUBJB1	6	40	68	102	129	160	0	22	43	69	92	117	3120	SUBJB1	6	160
Hydrograph	DRJB	7	19	33	51	66	81	6	14	22	38	50	63	3130	DRJB	6	81
Routed	RDIJB1	6	16	27	44	58	73	5	12	18	32	44	56	3140	RDIJB1	6	73
Combined	~CPJB1	266	562	795	1040	1217	1393	245	516	738	968	1113	1267	3150	~CPJB1	6	1393
Diversion	DIED	240	536	795	1040	1217	1393	242	516	738	968	1113	1267	3160	DIED	6	1393
Hydrograph	DIED	0	0	0	0	0	0	0	0	0	0	0	0	3170	DIED	6	0
Hydrograph	SUBSA	247	391	487	615	715	811	170	282	352	448	521	594	3180	SUBSA	6	811
Routed	MCSARH	229	373	466	594	693	781	154	263	334	428	502	566	3190	MCSARH	6	781
Diversion	D-B91A	229	373	466	594	693	781	154	263	334	428	502	566	3200	D-B91A	6	781
Hydrograph	BAS91A	0	0	0	0	0	0	0	0	0	0	0	0	3210	BAS91A	6	0
Hydrograph	SUBRH	43	102	142	198	243	285	28	74	108	153	186	218	3220	SUBRH	6	285
Combined	TEMP	15	63	97	143	178	211	25	69	102	147	179	211	3230	TEMP	6	211
Combined	~@CPRH	55	165	256	402	531	662	75	189	275	414	531	652	3240	~@CPRH	6	662
Diversion	D-B91B	0	0	0	0	86	212	0	0	0	1	81	202	3250	D-B91B	6	212
Hydrograph	91PASS	55	165	256	402	448	450	75	189	275	413	450	450	3260	91PASS	6	450
Routed	MCRHOG	42	143	234	384	446	450	55	161	245	385	445	450	3270	MCRHOG	6	450
Hydrograph	SUBRG	140	199	239	293	335	376	99	144	173	214	245	276	3280	SUBRG	6	376
Diversion	RETRG	140	159	191	143	119	134	99	116	87	63	36	23	3290	RETRG	6	134
Hydrograph	CPRG	44	184	236	293	335	376	10	133	173	214	245	276	3300	CPRG	6	376
Routed	RTRGRF	5	20	34	55	74	93	4	17	28	47	63	81	3310	RTRGRF	6	93
Hydrograph	SUBRF	162	282	366	479	566	652	116	212	277	365	433	500	3320	SUBRF	6	652
Combined	~CPRF	158	287	384	518	626	730	115	219	295	404	490	577	3330	~CPRF	6	730
Routed	MCRFOG	153	282	379	512	618	723	111	213	290	397	483	569	3340	MCRFOG	6	723
Hydrograph	SUBOG	198	325	409	523	612	699	136	234	296	382	448	513	3350	SUBOG	6	699
Combined	CPOG1	277	497	655	871	1043	1214	215	394	523	702	844	987	3360	CPOG1	6	1214
Diversion	D-B99A	98	318	476	692	864	1035	36	215	344	523	665	808	3370	D-B99A	6	1035
Hydrograph	BAS99A	179	179	179	179	179	179	179	179	179	179	179	179	3380	BAS99A	6	179
Combined	~CPOG	186	316	404	548	615	628	198	339	423	563	624	628	3390	~CPOG	6	628
Routed	MCOGOF	182	308	395	536	608	626	191	330	413	545	614	625	3400	MCOGOF	6	626
Hydrograph	SUBOF	207	308	377	468	539	608	144	221	271	340	393	445	3410	SUBOF	6	608
Hydrograph	SUBRE	79	141	183	241	286	329	60	111	140	180	211	242	3420	SUBRE	6	329
Routed	RTREOF	70	133	175	231	275	318	53	105	133	172	203	233	3430	RTREOF	6	318
Combined	~CPOF	204	417	541	730	846	905	219	439	550	721	826	875	3440	~CPOF	6	905
Routed	MCOFOB	202	407	533	719	839	902	215	425	540	709	814	871	3450	MCOFOB	6	902
Hydrograph	SUBOB	334	495	605	756	874	990	224	348	428	541	629	716	3460	SUBOB	6	990
Combined	~CPOB	270	433	555	750	877	966	280	466	589	765	907	1013	3470	~CPOB	24	1013
Hydrograph	SUBRD	80	148	194	257	305	351	58	108	137	178	211	245	3480	SUBRD	6	351

		6-hour Storm						24-hr-storm							Design Control		
type	hec1id	q2	q5	q10	q25	q50	q100	q2	q5	q10	q25	q50	q100	sort	hec1id	Storm	Flow
Diversion	DIOB	32	59	78	103	122	141	23	43	55	71	85	98	3490	DIOB	6	141
Hydrograph	DIRDOB	48	89	117	154	183	211	35	65	82	107	127	147	3500	DIRDOB	6	211
Routed	RTRDRC	19	40	56	82	101	121	12	27	37	51	64	79	3510	RTRDRC	6	121
Hydrograph	SUBRC	26	107	166	248	323	397	8	78	122	189	245	303	3520	SUBRC	6	397
Combined	CPRC	18	88	146	229	302	374	12	77	121	188	244	301	3530	CPRC	6	374
Routed	RTRCRB	12	49	90	154	223	291	9	41	70	119	162	217	3540	RTRCRB	6	291
Hydrograph	SUBRB	19	103	166	246	315	391	1	64	112	174	231	288	3550	SUBRB	6	391
Combined	CPRB	11	48	104	184	251	323	9	61	109	171	227	284	3560	CPRB	6	323
Diversion	DIKA3	5	24	52	92	126	162	5	31	55	85	113	142	3570	DIKA3	6	162
Hydrograph	DIRBKA	5	24	52	92	126	162	4	30	55	85	113	142	3580	DIRBKA	6	162
Routed	RTRBRA	3	15	34	70	105	145	3	18	32	58	83	112	3590	RTRBRA	6	145
Hydrograph	SUBRA	4	36	63	96	121	149	0	19	40	65	85	109	3600	SUBRA	6	149
Combined	CPRA	3	15	33	68	104	145	3	18	37	62	83	113	3610	CPRA	6	145
Diversion	DIKA4	0	4	13	44	80	119	0	3	16	38	61	90	3620	DIKA4	6	119
Hydrograph	DIRAKA	2	12	20	25	25	25	2	15	22	25	25	25	3630	DIRAKA	6	25
Diversion	DIAFX	2	12	20	25	25	25	2	15	22	25	25	25	3640	DIAFX	6	25
Hydrograph	DIKAAF	0	0	0	0	0	0	0	0	0	0	0	0	3650	DIKAAF	6	0
Hydrograph	CPOB2	32	59	78	103	122	141	23	43	55	71	85	98	3660	CPOB2	6	141
Routed	RTDIOB	8	18	26	37	47	56	5	12	16	24	29	36	3670	RTDIOB	6	56
Combined	@CPOB	270	431	553	750	876	961	280	466	589	765	907	1013	3680	@CPOB	24	1013
Routed	MCOBLE	260	421	547	742	871	937	255	439	562	739	866	940	3690	MCOBLE	24	940
Hydrograph	SUBLE	18	65	102	147	183	223	7	38	66	100	130	162	3700	SUBLE	6	223
Combined	~CPLE	266	432	563	766	923	1047	262	468	614	816	983	1093	3710	~CPLE	24	1093
Diversion	D-B111	0	0	0	73	223	347	0	0	0	116	283	393	3720	D-B111	24	393
Hydrograph	111PAS	266	432	563	698	700	700	262	468	614	700	700	700	3730	111PAS	6	700
Routed	MCLEKD	258	421	553	695	700	700	244	441	587	700	700	700	3740	MCLEKD	6	700
Hydrograph	SUBKD	14	74	127	196	254	316	4	48	91	144	190	241	3750	SUBKD	6	316
Combined	~CPKD	259	425	571	754	828	894	247	476	654	805	864	920	3760	~CPKD	24	920
Routed	MCKDKA	249	408	549	741	822	890	226	443	614	781	846	908	3770	MCKDKA	24	908
Hydrograph	SUBKA	51	92	119	161	195	229	30	62	82	114	139	164	3780	SUBKA	6	229
Diversion	RETKA	51	92	119	161	195	229	30	62	82	114	139	164	3790	RETKA	6	229
Hydrograph	RETKA	0	0	0	77	145	201	0	0	0	13	54	108	3800	RETKA	6	201
Hydrograph	CPKA3	5	24	52	92	126	162	5	31	55	85	113	142	3810	CPKA3	6	162
Routed	RTDIKA	5	19	37	72	112	153	4	20	34	60	87	118	3820	RTDIKA	6	153
Hydrograph	CPKA4	0	4	13	44	80	119	0	3	16	38	61	90	3830	CPKA4	6	119
Combined	~CPKA	249	406	548	752	843	982	226	445	624	809	887	1044	3840	~CPKA	24	1044
Combined	CPKAAF	885	1770	2470	3501	4305	5061	997	1982	2735	3803	4545	5283	3850	CPKAAF	24	5283
Hydrograph	SUBLC	85	145	184	238	279	319	51	98	128	168	200	231	3860	SUBLC	6	319
Diversion	RETLC	85	145	184	238	279	319	51	98	128	168	200	231	3870	RETLC	6	319
Hydrograph	RETLC	0	0	0	0	0	43	0	0	0	0	1	6	3880	RETLC	6	43
Routed	RTLCLA	0	0	0	0	0	5	0	0	0	0	1	2	3890	RTLCLA	6	5
Hydrograph	SUBLA	85	183	248	336	411	490	44	119	167	234	293	351	3900	SUBLA	6	490
Diversion	RETLA	85	183	248	336	411	490	44	119	167	234	293	351	3910	RETLA	6	490
Hydrograph	RETLA	0	0	0	163	309	441	0	0	0	25	125	255	3920	RETLA	6	441
Combined	CPLA	0	0	0	143	271	387	0	0	0	23	124	254	3930	CPLA	6	387
Routed	RTLAKB	0	0	0	41	94	160	0	0	0	8	43	87	3940	RTLAKB	6	160
Hydrograph	SUBKB	51	159	231	326	409	495	18	98	152	226	292	357	3950	SUBKB	6	495
Combined	CPKB	35	111	178	270	346	424	17	95	149	223	288	353	3960	CPKB	6	424
Combined	CPAFKB	885	1769	2471	3525	4351	5151	997	1996	2763	3860	4620	5397	3970	CPAFKB	24	5397
Hydrograph	SUBGA	55	136	188	255	306	356	21	86	125	177	216	255	3980	SUBGA	6	356
Combined	CPAFGA	884	1767	2471	3525	4352	5153	997	1996	2764	3860	4620	5397	3990	CPAFGA	24	5397
Hydrograph	SUBEC	1	6	10	15	19	24	0	3	7	11	14	18	4000	SUBEC	6	24
Combined	CPECSR	884	1767	2471	3526	4356	5160	997	1998	2768	3868	4631	5411	4010	CPECSR	24	5411
Hydrograph	SUBOE	132	233	300	400	481	560	81	160	210	286	345	405	4020	SUBOE	6	560
Diversion	RETOE	102	103	93	87	78	88	51	20	12	10	10	10	4030	RETOE	6	88
Hydrograph	RETOE	132	233	300	400	481	560	81	160	210	286	345	405	4040	RETOE	6	560
Hydrograph	CPOE1	25	44	58	77	92	107	17	31	42	56	67	78	4050	CPOE1	6	107
Routed	RTDIOE	6	11	16	23	29	35	4	8	12	17	21	26	4060	RTDIOE	6	35
Combined	@CPOE	132	233	300	400	481	560	81	160	211	287	346	406	4070	@CPOE	6	560
Diversion	DIOD	23	39	50	66	79	92	13	28	36	48	57	67	4080	DIOD	6	92
Hydrograph	DIOEOD	109	194	250	334	402	468	68	133	175	239	288	339	4090	DIOEOD	6	468
Routed	RTOEMF	28	68	97	154	204	256	19	50	74	111	149	186	4100	RTOEMF	6	256
Hydrograph	SUBMF	69	193	283	408	506	600	54	153	229	333	411	488	4110	SUBMF	6	600
Hydrograph	CPMF	30	72	123	194	254	315	22	52	82	142	191	242	4120	CPMF	6	315
Routed	RTMDMF	20	49	79	145	201	259	16	38	58	99	146	194	4130	RTMDMF	6	259
Combined	CPMF1	69	193	283	407	541	685	54	153	229	337	445	568	4140	CPMF1	6	685
Diversion	DIEB	27	85	125	187	251	317	24	72	107	157	207	263	4150	DIEB	6	317
Hydrograph	DIMFEB	31	95	143	215	290	368	29	80	121	180	238	304	4160	DIMFEB	6	368
Routed	RTMFMC	14	59	99	176	243	311	14	49	81	140	193	250	4170	RTMFMC	6	311
Hydrograph	SUBOD	186	309	394	507	596	681	128	225	288	373	439	504	4180	SUBOD	6	681
Diversion	RETOD	38	27	20	15	13	13	5	4	5	5	6	6	4190	RETOD	6	13
Hydrograph	RETOD	186	309	394	507	596	681	128	225	288	373	439	504	4200	RETOD	6	681
Hydrograph	DROD	23	39	50	66	79	92	13	28	36	48	57	67	4210	DROD	6	92
Routed	RTDIOD	7	17	23	34	43	53	5	13	18	26	33	40	4220	RTDIOD	6	53
Combined	CPOD	186	309	394	507	596	681	128	225	288	373	439	504	4230	CPOD	6	681
Diversion	DIOC	34	56	71	91	107	123	23	41	52	67	79	91	4240	DIOC	6	123
Hydrograph	DIODOC	153	253	323	416	488	558	105	185	236	306	360	414	4250	DIODOC	6	558
Routed	RTODMC	56	112	164	235	293	351	41	85	116	172	215	262	4260	RTODMC	6	351
Hydrograph	SUBMC	100	238	337	474	579	683	79	189	272	384	469	555	4270	SUBMC	6	683
Combined	CPMC1	67	199	314	508	666	819	77	190	278	419	549	682	4280	CPMC1	6	819
Diversion	DIMB	26	78	121	195	255	313	30	74	108	161	211	261	4290	DIMB	6	313
Hydrograph	DIMCMB	41	122	193	313	411	506	47	116	170	258	339	421	4300	DIMCMB	6	506
Routed	RTMCIE	34	113	186	298	389	479	37	102	159	246	320	398	4310	RTMCIE	6	479
Hydrograph	DREB	27	85	125	187	251	317	24	72	107	157	207	263	4320	DREB	6	317
Hydrograph	SUBEB	13	46	67	97	124	149	5	31	47	72	92	112	4330	SUBEB	6	149
Combined	CPEB	48	125	178	255	317	377	29	91	136	197	244	293	4340	CPEB	6	377
Hydrograph	RDIED	240	536	795	1040	1217	1393	242	516	738	968	1113	1267	4350	RDIED	6	1393
Routed	MCJBED	215	514	776	1030	1206	1381	217	483	708	960	1104	1253	4360	MCJBED	6	1381
Hydrograph	SUBED1	10	53	85	124	160	198	1	33	56	88	116	145	4370	SUBED1	6	198
Hydrograph	SUBED2	3	16	25	37	48	59	0	10	17	27	35	44	4380	SUBED2	6	59
Combined	~CPED1	338	736	997	1255	1465	1681	227	518	758	1022	1183	1350	4390	~CPED1	6	1681
Combined	~CPED2	336	772	1075	1418	1694	1967	237	561	831	1150	1368	1582	4400	~CPED2	6	1967
Routed	MCED95	325	757	1065	1405	1686	1962	232	551	820	1141	1359	1575	4410	MCED95	6	1962
Diversion	D-B95	0	0	39	355	636	912	0	0	0	91	309	525	4420	D-B95	6	912
Hydrograph	95PASS	325	757	1030	1050	1050	1050	232	551	820	1050	1050	1050	4430	95PASS	6	1050
Routed	MC95ID	318	747	1028	1050	1050	1050	228	544	811	1050	1050	1050	4440	MC95ID	6	1050
Hydrograph	SUBID1	23	58	82	116	143	169	15	42	62	90	110	131	4450	SUBID1	6	169
Hydrograph	SUBID2	11	60	98	144	183	226	1	34	63	99	131	164	4460	SUBID2	6	226
Combined	~CPID1	317	739	1027	1088	1130	1175	228	545	815	1075	1106	1143	4470	~CPID1	6	1175
Hydrograph	SUBIE	36	88	124	174	213	250	23	64	94	134	165	195	4480	SUBIE	6	250
Combined	CPID2	341	746	1021	1364	1536	1697	252	622	944	1326	1470	1614	4490	CPID2	6	1697
Routed	MCIDIB	239	627	1003	1354	1517	1676	247	609	930	1315	1450	1595	4500	MCIDIB	6	1676
Hydrograph	SUBIB	46	119	170	243	302	357	27	84	125	184	229	272	4510	SUBIB	6	357
Hydrograph	SUBIC	10	59	97	143	182	227	0	35	63	98	131	165	4520	SUBIC	6	227
Combined	~CPIB1	238	622	994	1396	1622	1849	247	616	952	1371	1558	1770	4530	~CPIB1	6	1849
Hydrograph	SUBOC	204	308	377	470	543	613	142	221	272	342	395	449	4540	SUBOC	6	613
Hydrograph	DROC	34	56	71	91	107	123	23	41	52	67	79	91	4550	DROC	6	123
Routed	RTDIOC	9	17	24	33	41	50	6	13	18	26	33	39	4560	RTDIOC	6	50
Combined	CPOC	204	308	377	470	543	613	142	221	272	342	396	449	4570	CPOC	6	613
Routed	RTOCMB	69	118	155	218	265	316	48	83	109	146	184	221	4580	RTOCMB	6	316
Hydrograph	SUBMB	86	227	329	469	578	684	68	181	266	382	469	556	4590	SUBMB	6	684
Hydrograph	DRMB	26	78	121	195	255	313	30	74	108	161	211	261	4600	DRMB	6	313
Routed	RTDIMB	19	60	97	161	213	269	20	53	83	130	174	220	4610	RTDIMB	6	269
Combined	@CPMB	85	240	363	546	691	830	93	226	329	484	608	740	4620	@CPMB	6	830
Routed	RTMBIB	65	204	317	484	618	749	72	193	287	427	541	659	4630	RTMBIB	6	749
Combined	@CPIB2	274	741	1212	1783	2170	2552	298	752	1165	1722	2053	2405	4640	@CPIB2	6	2552

		6-hour Storm						24-hr-storm							Design Control		
type	hec1id	q2	q5	q10	q25	q50	q100	q2	q5	q10	q25	q50	q100	sort	hec1id	Storm	Flow
Routed	MCIBIA	265	719	1180	1756	2138	2518	290	733	1138	1693	2018	2373	4650	MCIBIA	6	2518
Hydrograph	SUBME	20	79	122	176	220	268	6	46	79	119	155	193	4660	SUBME	6	268
Routed	RTMEIA	7	36	60	95	124	163	2	19	36	59	82	109	4670	RTMEIA	6	163
Hydrograph	SUBIA	46	117	163	231	290	347	20	77	112	167	210	254	4680	SUBIA	6	347
Combined	~CPIA	265	716	1175	1773	2175	2578	292	743	1158	1733	2081	2457	4690	~CPIA	6	2578
Routed	MCIAHB	256	696	1151	1754	2152	2554	286	731	1140	1715	2062	2435	4700	MCIAHB	6	2554
Hydrograph	SUBHB	34	113	166	235	295	358	11	68	109	162	210	258	4710	SUBHB	6	358
Hydrograph	SUBDA	53	113	156	220	270	318	32	79	112	161	198	235	4720	SUBDA	6	318
Combined	~CPHB1	255	693	1146	1747	2146	2555	286	732	1141	1720	2074	2456	4730	~CPHB1	6	2555
Hydrograph	SUBLD	106	191	247	329	395	460	60	127	168	232	281	329	4740	SUBLD	6	460
Routed	RTLDMA	87	163	215	297	361	423	47	104	142	202	247	296	4750	RTLDMA	6	423
Hydrograph	SUBMA	3	42	76	119	151	185	0	20	47	79	104	132	4760	SUBMA	6	185
Combined	CPMA	89	201	285	407	502	597	47	123	187	276	345	422	4770	CPMA	6	597
Routed	RTMAHB	36	91	140	215	285	354	19	54	87	139	181	234	4780	RTMAHB	6	354
Combined	~CPHB2	253	687	1141	1770	2194	2628	291	745	1164	1762	2139	2549	4790	~CPHB2	6	2628
Hydrograph	SUBLB	4	41	72	111	141	173	0	21	45	75	98	125	4800	SUBLB	6	173
Routed	RTLBHA	2	27	53	85	114	145	0	12	31	55	75	98	4810	RTLBHA	6	145
Hydrograph	SUBHA	10	42	65	95	119	145	3	25	43	65	85	106	4820	SUBHA	6	145
Combined	CPHA	253	686	1138	1780	2220	2670	291	750	1176	1789	2182	2615	4830	CPHA	6	2670
Routed	MCHACB	245	669	1119	1765	2200	2636	286	740	1163	1774	2168	2590	4840	MCHACB	6	2636
Hydrograph	SUBEE	19	88	152	238	314	395	5	74	123	189	250	311	4850	SUBEE	6	395
Hydrograph	CPEE1	7	20	35	63	87	113	8	19	32	55	72	93	4860	CPEE1	6	113
Routed	RTDIEE	6	19	31	58	81	105	7	18	29	50	68	87	4870	RTDIEE	6	105
Combined	CPEE	19	88	152	238	315	396	8	74	123	189	250	311	4880	CPEE	6	396
Routed	RTEEEA	8	38	65	91	120	191	5	32	53	81	97	130	4890	RTEEEA	6	191
Hydrograph	SUBEA	13	92	186	317	429	549	1	97	175	273	364	458	4900	SUBEA	6	549
Combined	CPEA	15	94	173	271	382	499	5	95	173	271	361	454	4910	CPEA	6	499
Routed	MCEADC	4	19	74	189	290	486	5	49	105	189	267	440	4920	MCEADC	6	486
Hydrograph	SUBDC	31	136	222	337	441	546	9	107	172	265	346	427	4930	SUBDC	6	546
Combined	~CPDC	5	52	129	245	343	712	8	102	168	258	339	650	4940	~CPDC	6	712
Routed	MCDCCC	3	18	58	151	254	698	4	41	86	165	246	636	4950	MCDCCC	6	698
Hydrograph	SUBDD	5	37	61	91	116	142	0	21	40	63	83	104	4960	SUBDD	6	142
Routed	RTDDCC	2	20	36	59	77	98	0	10	22	38	53	70	4970	RTDDCC	6	98
Hydrograph	SUBCC	87	240	348	515	651	780	60	195	278	411	516	621	4980	SUBCC	6	780
Combined	~CPCC	27	141	245	398	521	1012	56	190	271	403	508	940	4990	~CPCC	6	1012
Routed	MCCCCB	11	67	137	269	382	1008	22	92	153	260	351	930	5000	MCCCCB	6	1008
Hydrograph	SUBCB	42	107	153	217	267	315	31	82	121	175	217	260	5010	SUBCB	6	315
Combined	~CPCB1	244	662	1145	1935	2511	3153	288	800	1273	2023	2570	3278	5020	~CPCB1	24	3278
Hydrograph	SUBGD	668	976	1186	1469	1689	1903	516	775	944	1179	1359	1540	5030	SUBGD	6	1903
Hydrograph	SUBKC	4	47	83	129	163	199	0	23	51	86	113	143	5040	SUBKC	6	199
Routed	RTKCGD	1	17	34	59	78	102	0	7	19	36	50	69	5050	RTKCGD	6	102
Hydrograph	SUBGC	64	132	175	239	292	343	33	87	119	170	208	247	5060	SUBGC	6	343
Routed	RTGCGD	47	103	140	202	254	302	24	65	91	136	172	211	5070	RTGCGD	6	302
Combined	CPGD1	668	976	1186	1469	1689	1903	525	802	982	1245	1449	1654	5080	CPGD1	6	1903
Routed	RTGDCB	312	508	654	856	1022	1184	224	386	493	657	782	913	5090	RTGDCB	6	1184
Combined	~CPCB2	258	673	1186	2017	2650	3336	309	848	1339	2135	2741	3522	5100	~CPCB2	24	3522
Routed	MCCBCA	233	596	1009	1800	2428	3074	302	769	1200	1973	2540	3201	5110	MCCBCA	24	3201
Hydrograph	SUBCA	69	190	278	399	493	584	54	151	225	327	402	479	5120	SUBCA	6	584
Combined	~CPCA1	236	595	1005	1794	2429	3085	302	769	1197	1971	2552	3224	5130	~CPCA1	24	3224
Hydrograph	SUBGB	55	117	157	214	261	309	27	75	105	149	185	220	5140	SUBGB	6	309
Routed	RTGBCA	33	77	108	154	197	240	16	48	68	103	131	162	5150	RTGBCA	6	240
Combined	~CPCA2	240	594	1004	1793	2428	3084	301	769	1196	1969	2553	3225	5160	~CPCA2	24	3225
Routed	MCCABC	226	583	992	1776	2415	34	296	761	1187	1954	2541	34	5190	MCCABC	6	34
Hydrograph	SUBBC	97	188	256	345	418	496	62	132	184	252	311	371	5200	SUBBC	6	496
Combined	~CPBC	227	583	992	1779	2419	340	297	762	1188	1957	2545	381	5210	~CPBC	24	381
Combined	CPAFBC	883	1763	2464	3517	4352	5210	1016	2049	2869	4049	4899	5595	5220	CPAFBC	24	5595
Hydrograph	SUBAD	55	119	166	233	284	334	36	85	119	166	201	236	5230	SUBAD	6	334
Routed	BSNAD	7	8	9	9	9	10	7	8	8	9	9	9	5240	BSNAD	6	10
Hydrograph	SUBAC	56	117	164	231	282	332	35	82	116	163	199	235	5250	SUBAC	6	332
Combined	CPAC	50	110	156	221	270	319	41	88	123	169	206	241	5260	CPAC	6	319
Routed	BSNAC	4	4	7	40	100	179	4	4	5	8	23	56	5270	BSNAC	6	179
Hydrograph	SUBAB	59	124	168	240	295	349	33	83	119	170	210	250	5280	SUBAB	6	349
Combined	CPAB	44	94	139	206	259	314	32	82	117	167	207	248	5290	CPAB	6	314
Routed	BSNAB	1	2	4	8	42	135	1	1	4	4	8	11	5300	BSNAB	6	135
Hydrograph	SUBAA	27	65	90	131	165	198	13	43	62	93	115	139	5310	SUBAA	6	198
Combined	CPAA	10	43	69	108	140	266	13	43	62	92	114	137	5320	CPAA	6	266
Hydrograph	SUBBB	42	89	122	167	201	234	30	67	93	127	153	179	5330	SUBBB	6	234
Routed	RTBBBA	17	43	64	96	119	150	11	30	46	70	90	108	5340	RTBBBA	6	150
Hydrograph	SUBBA	38	79	108	154	190	224	21	53	76	109	135	161	5350	SUBBA	6	224
Combined	CPBA	35	76	105	150	186	220	21	53	76	108	134	160	5360	CPBA	6	220
Combined	HCTR1	17	80	132	207	266	436	31	87	124	182	226	271	5370	HCTR1	6	436
Routed	BSNAA	1	1	1	4	17	256	1	1	1	2	4	10	5380	BSNAA	6	256
Hydrograph	SUBWT1	394	630	789	1008	1180	1347	261	449	568	739	870	1000	5390	SUBWT1	6	1347
Hydrograph	SUBWT2	127	203	253	320	372	423	81	140	177	228	267	306	5400	SUBWT2	6	423
Combined	DUR	884	1763	2460	3534	4404	5230	1216	2160	2899	4091	4948	5666	5410	DUR	24	5666
Diversion	B-DRCC	0	0	0	0	0	3047	0	0	0	0	0	3191	5170	B-DRCC	24	3191
Hydrograph	P-DRCC	0	0	0	0	0	34	0	0	0	0	0	34	5180	P-DRCC	6	34

APPENDIX B

Build-Out Conditions Retention Calculations

	Existing			Future			Retention Calcs				
Sub-Basin	Landuse Code	Area (sm)	Developable Area (sm)	Landuse Code	Area (sm)	Developed Area (sm)	C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBAA	1	0.25	0.25								
			0.00	12	0.25	0.25	0.35	2.8	160.0	13.07	
			0.25			**0.25**				**13.07**	**10.45**
SUBAB	1	0.30	0.30								
			0.00	3	0.01	0.01	0.6	2.8	4.2	0.59	
			0.00	12	0.30	0.30	0.35	2.8	192.0	15.68	
			0.30			**0.31**				**16.27**	**13.02**
SUBAC	1	0.29	0.29								
			0.00	3	0.01	0.01	0.6	2.8	4.0	0.56	
			0.00	12	0.29	0.29	0.35	2.8	185.6	15.16	
			0.29			**0.30**				**15.72**	**12.58**
SUBAD	1	0.27	0.27								
			0.00	12	0.28	0.28	0.35	2.8	182.0	14.86	
	22	0.02	0.02			0.00				**14.86**	**11.89**
			0.28			**0.28**					
SUBBA	1	0.14	0.14								
	2	0.02	0.00								
	12	0.17	0.00	12	0.33	0.16	0.35	2.8	100.4	8.20	
			0.14			**0.16**				**8.20**	**6.56**
SUBBB	1	0.20	0.20								
				3	0.01	0.01	0.6	2.8	4.5	0.64	
	12	0.00	0.00	12	0.24	0.24	0.35	2.8	152.1	12.42	
	22	0.04	0.04							**13.05**	**10.44**
			0.24			**0.24**					
SUBBC1	1	0.01	0.01								
	9	0.07	0.00								
				11	0.05	0.05	0.35	2.8	32.0	2.61	
	12	0.02	0.00	12	0.02	0.00	0.35	2.8	0.0	0.00	
	22	0.04	0.04	22	0.04	0.00	0.35	2.8	0.0	0.00	
			0.05			**0.05**				**2.61**	**2.09**
SUBBC2	1	0.46	0.46								
	9	0.03	0.00	9	0.03	0.00	0.7	2.8	0.0	0.00	
			0.00	11	0.13	0.13	0.6	2.8	86.2	12.07	
			0.00	12	0.33	0.33	0.35	2.8	209.0	17.07	
			0.46			**0.46**				**29.14**	**23.31**
SUBCA1	1	0.14	0.14								
				11	0.03	0.03	0.6	2.8	19.5	2.73	
				12	0.00	0.00	0.35	2.8	2.9	0.24	
				13	0.11	0.11	0.5	2.8	68.9	8.03	
			0.14			**0.14**				**11.00**	**8.80**
SUBCA2	1	0.84	0.84								
				3	0.02	0.02	0.6	2.8	10.0	1.40	
				11	0.04	0.04	0.6	2.8	24.8	3.48	
				12	0.67	0.67	0.35	2.8	428.0	34.96	
				13	0.12	0.12	0.5	2.8	75.3	8.79	
			0.84			**0.84**				**48.62**	**38.89**
SUBCB	1	0.74	0.74								
				3	0.01	0.01	0.6	2.8	7.5	1.05	
				12	0.73	0.73	0.35	2.8	465.6	38.02	
			0.74			**0.74**				**39.07**	**31.26**
SUBCC	1	0.44	0.44								
			0.00	3	0.02	0.02	0.6	2.8	11.6	1.63	
	12	0.31	0.00	12	0.91	0.60	0.35	2.8	383.7	31.34	
	13	0.04	0.00	13	0.05	0.01	0.5	2.8	5.3	0.62	
	22	0.08	0.08							**33.59**	**26.87**
	25	0.11	0.11								
			0.63			**0.63**					
SUBDA	1	0.22	0.22								
			0.00	3	0.01	0.01	0.6	2.8	8.0	1.12	
	12	0.12	0.00	12	0.17	0.05	0.35	2.8	32.4	2.65	
			0.00	13	0.16	0.16	0.5	2.8	102.2	11.92	
	25	0.00	0.00							**15.69**	**12.56**
			0.22			**0.22**					
SUBDC	1	0.77	0.77								
	12	0.06	0.00	12	0.71	0.65	0.35	2.8	415.0	33.89	
			0.00	13	0.12	0.12	0.5	2.8	74.9	8.74	
			0.77			**0.77**				**42.63**	**34.11**

	Existing			Future			Retention Calcs				
Sub-Basin	Landuse Code	Area (sm)	Developable Area (sm)	Landuse Code	Area (sm)	Developed Area (sm)	C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBDD	1	0.10	0.10								
			0.00	12	0.02	0.02	0.35	2.8	13.1	1.07	
			0.00	13	0.11	0.11	0.5	2.8	72.0	8.40	
	25	0.03	0.03							**9.47**	**7.57**
			0.13			**0.13**					
SUBEA	1	1.23	1.23								
			0.00	12	1.18	1.18	0.35	2.8	756.9	61.81	
			0.00	13	0.13	0.13	0.5	2.8	82.0	9.57	
	25	0.08	0.08							**71.38**	**57.11**
			1.31			**1.31**					
SUBEB	1	0.14	0.14								
			0.00	13	0.14	0.14	0.5	2.8	88.8	10.36	
			0.14			**0.14**				**10.36**	**8.29**
SUBEC	1	0.04	0.04								
	9	0.00	0.00	9	0.04	0.04	0.7	2.8	26.6	4.35	
			0.04			**0.04**				**4.35**	**3.48**
SUBED1	1	0.38	0.38								
	12	0.00	0.00	12	0.01	0.01	0.35	2.8	3.2	0.26	
				13	0.37	0.37	0.5	2.8	239.6	27.95	
			0.38			**0.38**				**28.21**	**22.57**
SUBED2	1	0.11	0.11								
				12	0.11	0.11	0.35	2.8	72.7	5.94	
			0.11			**0.11**				**5.94**	**4.75**
SUBEE	1	0.56	0.56								
	9	0.01	0.00	9	0.01	0.00	0.7	2.8	0.0	0.00	
	12	0.04	0.00	12	0.95	0.90	0.35	2.8	576.6	47.09	
			0.00	13	0.00	0.00	0.5	2.8	0.7	0.08	
	22	0.02	0.02							**47.17**	**37.74**
	25	0.33	0.33								
			0.90			**0.90**					
SUBFA	1	0.50	0.50								
	9	0.26	0.00	9	0.26	0.00	0.7	2.8	0.0	0.00	
			0.00	12	0.50	0.50	0.35	2.8	321.4	26.25	
			0.50			**0.50**				**26.25**	**21.00**
SUBFB	1	0.24	0.24								
	12	0.26	0.00	12	0.40	0.14	0.35	2.8	89.0	7.27	
	22	0.06	0.06	22	0.31	0.25	0.35	2.8	160.4	13.10	
	25	0.09	0.09							**20.37**	**16.29**
			0.39			**0.39**					
SUBFC	1	0.33	0.33								
				13	0.33	0.33	0.5	2.8	211.8	24.71	
	22	0.03	0.03	22	0.05	0.02	0.35	2.8	15.4	1.26	
			0.36			**0.36**				**25.97**	**20.78**
SUBGA	12	0.08	0.00	12	0.14	0.06	0.35	2.8	39.8	3.25	
	22	0.06	0.06	22	0.06	0.00	0.35	2.8	0.0	0.00	
			0.06			**0.06**				**3.25**	**2.60**
SUBGB	1	0.03	0.03								
				11	0.01	0.01	0.6	2.8	4.3	0.60	
	12	0.13	0.00	12	0.13	0.00	0.35	2.8	0.0	0.00	
	13	0.06	0.00	13	0.08	0.03	0.5	2.8	17.7	2.06	
			0.03			**0.03**				**2.66**	**2.13**
SUBGC	1	0.01	0.01								
				3	0.04	0.04	0.6	2.8	25.9	3.63	
	12	0.12	0.00	12	0.13	0.01	0.35	2.8	7.7	0.63	
	13	0.05	0.00	13	0.05	0.00	0.5	2.8	0.0	0.00	
	22	0.02	0.02							**4.26**	**3.41**
	25	0.02	0.02								
			0.04			**0.05**					
SUBGD1	1	0.49	0.49								
			0.00	3	0.02	0.02	0.6	2.8	12.5	1.76	
			0.00	6	0.00	0.00	0.65	2.8	0.3	0.05	
			0.00	12	0.04	0.04	0.35	2.8	23.4	1.91	
			0.00	13	0.57	0.57	0.5	2.8	366.5	42.75	
	24	0.02	0.00							**46.47**	**37.17**
	25	0.12	0.12								
			0.61			**0.63**					

Sub-Basin	Existing Landuse Code	Existing Area (sm)	Existing Developable Area (sm)	Future Landuse Code	Future Area (sm)	Future Developed Area (sm)	Retention Calcs C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBGD2	1	0.21	0.21								
				3	0.01	0.01	0.6	2.8	9.1	1.27	
				12	0.00	0.00	0.35	2.8	0.8	0.06	
				13	0.19	0.19	0.5	2.8	123.9	14.46	
			0.21			**0.21**				**15.79**	**12.63**
SUBHA	1	0.13	0.13								
	6	0.02	0.00	6	0.02	0.00	0.65	2.8	0.5	0.08	
				13	0.13	0.13	0.5	2.8	82.9	9.68	
			0.13			**0.13**				**9.75**	**7.80**
SUBHB	1	0.21	0.21								
				3	0.01	0.01	0.6	2.8	3.6	0.51	
	12	0.12	0.00	12	0.12	0.00	0.35	2.8	0.0	0.00	
				13	0.21	0.21	0.5	2.8	134.4	15.68	
			0.21			**0.22**				**16.19**	**12.95**
SUBIA	1	0.18	0.18								
				3	0.00	0.00	0.6	2.8	3.0	0.42	
	12	0.13	0.00	12	0.13	0.00	0.35	2.8	2.8	0.22	
				13	0.17	0.17	0.5	2.8	108.8	12.69	
			0.18			**0.18**				**13.34**	**10.67**
SUBIB	1	0.53	0.53								
				3	0.00	0.00	0.6	2.8	0.1	0.01	
				13	0.53	0.53	0.5	2.8	340.7	39.75	
			0.53			**0.53**				**39.76**	**31.81**
SUBIC	1	0.41	0.41								
				12	0.00	0.00	0.35	2.8	0.1	0.01	
				13	0.46	0.46	0.5	2.8	294.9	34.41	
	25	0.05	0.05							**34.42**	**27.53**
			0.46			**0.46**					
SUBID1	1	0.13	0.13								
				13	0.21	0.21	0.5	2.8	135.0	15.75	
	25	0.08	0.08							**15.75**	**12.60**
			0.21			**0.21**					
SUBID2	1	0.28	0.28								
	6	0.01	0.00	6	0.01	0.00	0.65	2.8	0.0	0.00	
				13	0.34	0.34	0.5	2.8	217.5	25.38	
	25	0.06	0.06							**25.38**	**20.30**
			0.34			**0.34**					
SUBIE	1	0.30	0.30								
				13	0.30	0.30	0.5	2.8	193.2	22.54	
			0.30			**0.30**				**22.54**	**18.03**
SUBJB1	1	0.49	0.49								
				13	0.49	0.49	0.5	2.8	316.3	36.90	
			0.49			**0.49**				**36.90**	**29.52**
SUBJB2	1	0.49	0.49								
				12	0.45	0.45	0.35	2.8	286.3	23.38	
				13	0.05	0.05	0.5	2.8	29.3	3.42	
			0.49			**0.49**				**26.80**	**21.44**
SUBJC1	1	0.06	0.06								
				13	0.06	0.06	0.5	2.8	37.2	4.35	
			0.06			**0.06**				**4.35**	**3.48**
SUBJC2	1	0.63	0.63								
	12	0.10	0.00	12	0.10	0.00	0.35	2.8	0.0	0.00	
	13	0.19	0.00	13	0.83	0.63	0.5	2.8	406.3	47.41	
			0.63			**0.63**				**47.41**	**37.92**
SUBJD	1	0.12	0.12								
	12	0.13	0.00	12	0.13	0.00	0.35	2.8	0.0	0.00	
	13	0.19	0.00	13	0.37	0.18	0.5	2.8	117.2	13.67	
	22	0.07	0.07							**13.67**	**10.94**
			0.18			**0.18**					
SUBJE1	1	0.22	0.22								
				7	0.22	0.22	0.55	2.8	142.7	18.32	
	9	0.02	0.00	9	0.02	0.00	0.7	2.8	0.0	0.00	
	13	0.00	0.00	13	0.00	0.00	0.5	2.8	0.5	0.06	
	22	0.00	0.00							**18.38**	**14.70**
			0.22			**0.22**					

Sub-Basin	Existing Landuse Code	Existing Area (sm)	Existing Developable Area (sm)	Future Landuse Code	Future Area (sm)	Future Developed Area (sm)	Retention Calcs C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBJE2	1	0.15	0.15								
				7	0.00	0.00	0.55	2.8	0.8	0.11	
	12	0.01	0.00	12	0.01	0.00	0.35	2.8	0.0	0.00	
	13	0.09	0.00	13	0.24	0.15	0.5	2.8	94.7	11.05	
			0.15			**0.15**				**11.16**	**8.93**
SUBJF	1	0.41	0.41								
				7	0.00	0.00	0.55	2.8	0.3	0.03	
	9	0.10	0.00	9	0.19	0.10	0.7	2.8	61.6	10.07	
				14	0.31	0.31	0.6	2.8	197.4	27.64	
			0.41			**0.41**				**37.74**	**30.19**
SUBJG	1	0.75	0.75								
				7	0.39	0.39	0.55	2.8	252.7	32.43	
	9	0.07	0.00	9	0.10	0.03	0.7	2.8	16.3	2.66	
	12	0.01	0.00	12	0.01	0.00	0.35	2.8	0.0	0.00	
				13	0.36	0.36	0.5	2.8	230.9	26.94	
	22	0.03	0.03	22	0.04	0.01	0.35	2.8	9.2	0.75	
	22	0.03	0.03							**62.77**	**50.22**
			0.81			**0.80**					
SUBJH	1	0.08	0.08								
	3	0.00	0.00	3	0.00	0.00	0.6	2.8	0.0	0.00	
	9	0.11	0.00	9	0.26	0.15	0.7	2.8	94.7	15.47	
	22	0.05	0.05							**15.47**	**12.38**
	23	0.03	0.00								
			0.13			**0.15**					
SUBJI	1	0.05	0.05								
	3	0.05	0.00	3	0.05	0.00	0.6	2.8	0.0	0.00	
	9	0.02	0.00	9	0.17	0.16	0.7	2.8	100.6	16.43	
				13	0.00	0.00	0.5	2.8	0.3	0.03	
	22	0.02	0.02							**16.46**	**13.17**
	25	0.09	0.09								
			0.16			**0.16**					
SUBJK	1	0.24	0.24								
	9	0.00	0.00	9	0.25	0.25	0.7	2.8	157.9	25.79	
	22	0.01	0.01							**25.79**	**20.63**
			0.25			**0.25**					
SUBJL	1	0.08	0.08								
	3	0.00	0.00	3	0.00	0.00	0.6	2.8	0.0	0.00	
				9	0.08	0.08	0.7	2.8	49.9	8.14	
			0.08			**0.08**				**8.14**	**6.51**
SUBKA	6	0.02	0.00	6	0.02	0.00	0.65	2.8	0.0	0.00	
	13	1.04	0.00	13	1.04	0.00	0.5	2.8	0.0	0.00	
	17	0.29	0.00	17	0.29	0.00	0.45	2.8	0.0	0.00	
			0.00			**0.00**				**0.00**	**0.00**
SUBKB	1	0.18	0.18	1	0.18	0.00	0.25	2.8	0.0	0.00	
	9	0.02	0.00	9	0.02	0.00	0.7	2.8	0.0	0.00	
	12	0.04	0.00	12	0.04	0.00	0.35	2.8	0.3	0.02	
	13	0.03	0.00	13	0.36	0.33	0.5	2.8	209.8	24.48	
	17	0.00	0.00	17	0.00	0.00				0.00	
	22	0.07	0.07	22	0.07	0.00	0.35	2.8	0.0	0.00	
	25	0.07	0.07	25	0.07	0.00	0.35	2.8	0.0	0.00	
			0.32			**0.33**				**24.50**	**19.60**
SUBKC	1	0.26	0.26								
				3	0.03	0.03	0.6	2.8	16.2	2.27	
				12	0.06	0.06	0.35	2.8	38.8	3.17	
				13	0.18	0.18	0.5	2.8	113.5	13.25	
			0.26			**0.26**				**18.69**	**14.95**
SUBKD	1	0.67	0.67								
	9	0.03	0.00	3	0.03	0.00	0.6	2.8	1.9	0.26	
				7	0.00	0.00	0.55	2.8	0.1	0.01	
				13	0.43	0.43	0.5	2.8	275.4	32.13	
				23	0.24	0.24	0.75	2.8	151.9	26.59	
			0.67			**0.67**				**58.99**	**47.19**
SUBLA	1	0.21	0.21								
	3	0.02	0.00	3	0.02	0.00	0.6	2.8	0.0	0.00	
	6	0.04	0.00	6	0.04	0.00	0.65	2.8	0.0	0.00	
	12	0.00	0.00	12	0.21	0.21	0.35	2.8	135.6	11.08	
	13	0.24	0.00	13	0.25	0.00	0.5	2.8	1.5	0.17	
	17	0.00	0.00							**11.25**	**9.00**
			0.21			**0.21**					

	Existing			Future			Retention Calcs				
Sub-Basin	Landuse Code	Area (sm)	Developable Area (sm)	Landuse Code	Area (sm)	Developed Area (sm)	C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBLB	1	0.25	0.25								
				3	0.01	0.01	0.6	2.8	9.2	1.29	
			0.00	6	0.00	0.00	0.65	2.8	0.7	0.11	
			0.00	12	0.23	0.23	0.35	2.8	148.5	12.13	
			0.00	13	0.00	0.00	0.5	2.8	0.7	0.08	
			0.25			**0.25**				**13.61**	**10.88**
SUBLC	1	0.00	0.00								
	3	0.03	0.00	3	0.03	0.00	0.6	2.8	0.0	0.00	
										0.00	
	13	0.09	0.00	13	0.09	0.00	0.5	2.8	2.8	0.32	
			0.00			**0.00**				**0.32**	**0.26**
SUBLD	1	0.00	0.00								
	3	0.00	0.00	3	0.00	0.00	0.6	2.8	0.0	0.00	
				12	0.14	0.14	0.35	2.8	89.6	7.32	
	13	0.26	0.00	13	0.26	0.00	0.5	2.8	0.0	0.00	
	22	0.01	0.01							0.00	
				23	0.00	0.00	0.75	2.8	0.3	0.04	
			0.01			**0.00**				**7.36**	**5.89**
SUBLE	1	0.22	0.22								
	9	0.03	0.00								
				23	0.22	0.22	0.75	2.8	140.8	24.64	
			0.22			**0.22**				**24.64**	**19.71**
SUBMA	1	0.25	0.25								
				3	0.01	0.01	0.6	2.8	4.6	0.65	
	12	0.00	0.00	12	0.24	0.24	0.35	2.8	153.5	12.53	
			0.25			**0.25**				**13.18**	**10.54**
SUBMB	1	0.96	0.96								
			0.00	3	0.25	0.25	0.6	2.8	161.9	22.67	
			0.00	7	0.28	0.28	0.55	2.8	177.0	22.71	
	9	0.04	0.00	9	0.04	0.00	0.7	2.8	0.0	0.00	
			0.00	12	0.00	0.00	0.35	2.8	0.3	0.03	
			0.00	13	0.43	0.43	0.5	2.8	276.4	32.25	
	22	0.00	0.00								
			0.96			**0.96**				**77.65**	**62.12**
SUBMC	1	0.92	0.92								
				3	0.00	0.00	0.6	2.8	1.7	0.24	
				7	0.24	0.24	0.55	2.8	153.7	19.73	
	8	0.00	0.00	8	0.00	0.00	0.65	2.8	0.0	0.00	
	9	0.08	0.00	9	0.08	0.00	0.7	2.8	0.0	0.00	
				11	0.10	0.10	0.6	2.8	64.5	9.03	
				13	0.22	0.22	0.5	2.8	142.4	16.61	
				14	0.36	0.36	0.6	2.8	230.4	32.26	
				23	0.00	0.00	0.75	2.8	0.3	0.04	
			0.92			**0.93**				**77.92**	
SUBMD	1	0.00	0.00								
	13	0.25	0.00	13	0.25	0.00	0.5	2.8	0.3	0.04	
			0.00			**0.00**				**0.04**	**0.03**
SUBME	1	0.23	0.23								
				3	0.00	0.00	0.6	2.8	2.4	0.33	
	6	0.01	0.00	6	0.01	0.00	0.65	2.8	0.0	0.00	
				12	0.23	0.23	0.35	2.8	147.0	12.01	
	13	0.03	0.00	13	0.06	0.03	0.5	2.8	19.2	2.24	
	17	0.01	0.00	17	0.01	0.00	0.45	2.8	0.0	0.00	
	22	0.03	0.03							0.00	
				23	0.00	0.00	0.75	2.8	0.2	0.03	
			0.26			**0.26**				**14.61**	**11.69**
SUBMF	1	0.97	0.97								
				9	0.00	0.00	0.7	2.8	0.3	0.05	
				13	0.97	0.97	0.5	2.8	621.2	72.47	
			0.97			**0.97**				**72.52**	**58.02**
SUBMG	1	0.03	0.03								
	9	0.05	0.00	9	0.05	0.00	0.7	2.8	0.0	0.00	
				13	0.03	0.03	0.5	2.8	21.9	2.55	
			0.03			**0.03**				**2.55**	**2.04**
SUBMH	1	0.24	0.24								
				13	0.24	0.24	0.5	2.8	153.0	17.85	
			0.24			**0.24**				**17.85**	**14.28**
SUBMI	1	0.29	0.29								
	9	0.12	0.00	9	0.12	0.00	0.7	2.8	0.3	0.04	
				13	0.29	0.29	0.5	2.8	183.7	21.44	
			0.29			**0.29**				**21.48**	**17.18**

	Existing			Future			Retention Calcs				
Sub-Basin	Landuse Code	Area (sm)	Developable Area (sm)	Landuse Code	Area (sm)	Developed Area (sm)	C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBNA1	1	0.22	0.22								
				9	0.14	0.14	0.7	2.8	86.5	14.12	
				13	0.09	0.09	0.5	2.8	59.5	6.94	
	25	0.00	0.00							**21.06**	**16.85**
			0.23			**0.23**					
SUBNA2	1	0.61	0.61								
				9	0.41	0.41	0.7	2.8	260.2	42.50	
	12	0.00	0.00			0.00				0.00	
	13	0.12	0.00	13	0.34	0.22	0.5	2.8	139.9	16.32	
	25	0.01	0.01							**58.83**	**47.06**
			0.62			**0.63**					
SUBNB	1	0.21	0.21								
	7	0.13	0.00	7	0.13	0.00	0.55	2.8	0.0	0.00	
				9	0.00	0.00	0.7	2.8	1.3	0.22	
	12	0.01	0.00			0.00				0.00	
	13	0.09	0.00	13	0.31	0.22	0.5	2.8	139.3	16.25	
			0.21			**0.22**				**16.47**	**13.18**
SUBNC	1	0.28	0.28								
				7	0.00	0.00	0.55	2.8	0.2	0.02	
				13	0.15	0.15	0.5	2.8	97.2	11.34	
				14	0.15	0.15	0.6	2.8	98.5	13.79	
	25	0.02	0.02							**25.16**	**20.12**
			0.31			**0.31**					
SUBOB	1	0.06	0.06								
				3	0.04	0.04	0.6	3.1	23.5	3.64	
				9	0.02	0.02	0.7	3.1	12.8	2.31	
				13	0.00	0.00	0.5	3.1	0.4	0.05	
	23	0.38	0.00	23	0.38	0.00	0.75	3.1	0.0	0.00	
			0.06			**0.06**				**6.00**	**4.80**
SUBOC	1	0.10	0.10								
	9	0.01	0.00	9	0.12	0.11	0.7	3.1	68.5	12.38	
	23	0.19	0.00	23	0.19	0.00	0.75	3.1	0.0	0.00	
			0.10			**0.11**				**12.38**	**9.91**
SUBOD	1	0.28	0.28								
	9	0.11	0.00	9	0.39	0.28	0.7	3.1	179.3	32.42	
	23	0.11	0.00	23	0.11	0.00	0.75	3.1	0.0	0.00	
			0.28			**0.28**				**32.42**	**25.93**
SUBOE	1	0.25	0.25								
	9	0.09	0.00	9	0.35	0.26	0.7	3.1	166.9	30.18	
	23	0.12	0.00	23	0.12	0.00	0.75	3.1	0.0	0.00	
	25	0.01	0.01							**30.18**	**24.15**
			0.26			**0.26**					
SUBOF	1	0.08	0.08								
				3	0.02	0.02	0.6	3.1	9.9	1.53	
				9	0.06	0.06	0.7	3.1	38.4	6.94	
	23	0.17	0.00							**8.47**	**6.78**
			0.08			**0.08**					
SUBOG	1	0.12	0.12								
	6	0.03	0.00	6	0.03	0.00	0.65	3.1	0.0	0.00	
	9	0.11	0.00	9	0.21	0.10	0.7	3.1	65.6	11.86	
	11	0.02	0.00	11	0.02	0.00	0.6	3.1	0.0	0.00	
	13	0.16	0.00	13	0.16	0.00	0.5	3.1	0.0	0.00	
	14	0.02	0.00	14	0.02	0.00	0.6	3.1	0.0	0.00	
	17	0.04	0.00	17	0.06	0.01	0.45	3.1	8.7	1.01	
			0.12			**0.12**				**12.87**	**10.30**
SUBPA	1	0.24	0.24								
	9	0.18	0.00	9	0.48	0.30	0.7	3.1	190.6	34.47	
				13	0.00	0.00	0.5	3.1	0.6	0.07	
	22	0.06	0.06							**34.54**	**27.63**
			0.30			**0.30**					
SUBPB1	1	0.08	0.08								
	9	0.02	0.00	9	0.09	0.07	0.7	2.8	44.0	7.18	
	22	0.01	0.01							**7.18**	**5.75**
	23	0.03	0.00								
			0.09			**0.07**					
SUBPB2	1	0.14	0.14								
	9	0.11	0.00	9	0.29	0.18	0.7	2.8	113.9	18.61	
	22	0.04	0.04							**18.61**	**14.89**
			0.18			**0.18**					
SUBPC	1	0.07	0.07								
				7	0.00	0.00	0.55	2.8	0.4	0.06	

	Existing			Future			Retention Calcs				
Sub-Basin	Landuse Code	Area (sm)	Developable Area (sm)	Landuse Code	Area (sm)	Developed Area (sm)	C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBPC	9	0.06	0.00	9	0.07	0.01	0.7	2.8	3.4	0.55	
				13	0.17	0.17	0.5	2.8	107.8	12.57	
				14	0.00	0.00	0.6	2.8	0.2	0.03	
SUBPC	22	0.11	0.11			0.00				0.00	
	23	0.06	0.00	23	0.06	0.00	0.75	2.8	0.0	0.00	
			0.17			**0.17**				**13.21**	**10.57**
SUBPD	1	0.37	0.37								
				7	0.21	0.21	0.55	2.8	132.0	16.94	
	9	0.01	0.00	9	0.06	0.06	0.7	2.8	36.3	5.93	
				14	0.17	0.17	0.6	2.8	111.4	15.59	
	22	0.07	0.07							**38.46**	**30.77**
			0.44			**0.44**					
SUBPE	1	0.18	0.18								
				7	0.00	0.00	0.55	2.8	0.1	0.01	
	9	0.10	0.00	9	0.17	0.08	0.7	2.8	48.3	7.89	
				14	0.19	0.19	0.6	2.8	119.7	16.76	
	22	0.08	0.08			0.00				0.00	
	23	0.14	0.00	23	0.14	0.00	0.75	2.8	0.1	0.01	
			0.26			**0.26**				**24.68**	**19.74**
SUBPF	1	0.03	0.03								
	9	0.14	0.00	9	0.14	0.00	0.7	2.8	0.0	0.00	
				14	0.16	0.16	0.6	2.8	102.7	14.37	
	22	0.13	0.13			0.00				0.00	
	23	0.20	0.00	23	0.20	0.00	0.75	2.8	0.0	0.00	
			0.16			**0.16**				**14.37**	**11.50**
SUBQA1	1	0.18	0.18								
	9	0.13	0.00	9	0.36	0.23	0.7	2.8	150.2	24.53	
	22	0.05	0.05							**24.53**	**19.63**
			0.23			**0.23**					
SUBQA2	1	0.06	0.06								
	9	0.04	0.00	9	0.12	0.08	0.7	2.8	49.9	8.14	
	22	0.02	0.02							**8.14**	**6.51**
			0.08			**0.08**					
SUBQB	1	0.23	0.23								
	9	0.24	0.00	9	0.50	0.26	0.7	2.8	167.6	27.37	
	22	0.04	0.04							**27.37**	**21.89**
			0.26			**0.26**					
SUBQC	1	0.10	0.10								
	9	0.31	0.00	9	0.58	0.27	0.7	2.8	173.6	28.35	
	22	0.17	0.17							**28.35**	**22.68**
	23	0.03	0.00								
			0.27			**0.27**					
SUBQD	9	0.13	0.00	9	0.20	0.07	0.7	2.8	47.0	7.68	
	22	0.03	0.03							**7.68**	**6.15**
	23	0.06	0.00								
	25	0.03	0.03								
			0.06			**0.07**					
SUBQE	1	0.10	0.10								
	3	0.01	0.00	3	0.03	0.02	0.6	2.8	10.2	1.42	
	7	0.06	0.00	7	0.17	0.12	0.55	2.8	75.3	9.66	
	9	0.30	0.00	9	0.32	0.02	0.7	2.8	10.0	1.64	
	13	0.06	0.00			0.00				0.00	
	17	0.01	0.00	17	0.01	0.00	0.45	2.8	0.0	0.00	
	22	0.05	0.05							**12.72**	**10.18**
	23	0.32	0.00								
			0.15			**0.15**					
SUBRA	1	0.22	0.22								
				3	0.02	0.02	0.6	2.8	14.5	2.03	
				7	0.08	0.08	0.55	2.8	53.3	6.84	
				14	0.12	0.12	0.6	2.8	74.1	10.38	
			0.22			**0.22**				**19.25**	**15.40**
SUBRB	1	0.44	0.44								
				3	0.02	0.02	0.6	2.8	15.5	2.17	
				7	0.11	0.11	0.55	2.8	70.5	9.04	
				14	0.41	0.41	0.6	2.8	265.3	37.14	
SUBRB	22	0.11	0.11							**48.35**	**38.68**
			0.55			**0.55**					

	Existing			Future			Retention Calcs				
Sub-Basin	Landuse Code	Area (sm)	Developable Area (sm)	Landuse Code	Area (sm)	Developed Area (sm)	C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBRC	1	0.68	0.68								
				3	0.01	0.01	0.6	2.8	8.5	1.19	
				7	0.21	0.21	0.55	2.8	133.1	17.08	
				14	0.46	0.46	0.6	2.8	295.1	41.31	
			0.68			**0.68**				**59.58**	**47.67**
SUBRD	1	0.37	0.37								
				3	0.03	0.03	0.6	2.8	16.9	2.37	
				7	0.18	0.18	0.55	2.8	112.1	14.38	
				9	0.00	0.00	0.7	2.8	0.1	0.01	
				14	0.16	0.16	0.6	2.8	105.2	14.73	
			0.37			**0.37**				**31.49**	**25.19**
SUBRE	1	0.37	0.37								
				3	0.01	0.01	0.6	2.8	9.0	1.26	
				7	0.24	0.24	0.55	2.8	152.3	19.54	
				9	0.00	0.00	0.7	2.8	0.1	0.02	
				14	0.12	0.12	0.6	2.8	78.0	10.91	
			0.37			**0.37**				**31.74**	**25.39**
SUBRF	1	0.31	0.31								
				3	0.17	0.17	0.6	3.1	109.2	16.92	
	7	0.19	0.00	7	0.19	0.00	0.55	3.1	0.0	0.00	
	9	0.03	0.00	9	0.18	0.15	0.7	3.1	98.6	17.82	
	11	0.02	0.00	11	0.02	0.00	0.6	3.1	0.0	0.00	
	13	0.01	0.00	13	0.02	0.01	0.5	3.1	4.5	0.59	
	14	0.04	0.00	14	0.04	0.00	0.6	3.1	0.0	0.00	
	17	0.01	0.00	17	0.01	0.00	0.45	3.1	0.1	0.01	
	22	0.02	0.02							**35.34**	**28.27**
			0.33			**0.33**					
SUBRG	1	0.00	0.00								
				9	0.00	0.00	0.7	3.1	0.1	0.01	
	23	0.11	0.00	23	0.11	0.00	0.75	3.1	0.0	0.00	
			0.00			**0.00**				**0.01**	**0.01**
SUBRH	1	0.24	0.24								
				3	0.06	0.06	0.6	3.1	39.7	6.16	
				9	0.10	0.10	0.7	3.1	64.8	11.71	
				12	0.00	0.00	0.35	3.1	0.1	0.01	
				13	0.08	0.08	0.5	3.1	51.6	6.67	
				14	0.00	0.00	0.6	3.1	0.1	0.02	
			0.24			**0.24**				**24.58**	**19.66**
SUBRI	1	0.17	0.17								
				3	0.01	0.01	0.6	3.1	8.3	1.28	
				9	0.15	0.15	0.7	3.1	95.6	17.28	
				13	0.01	0.01	0.5	3.1	5.6	0.73	
	23	0.06	0.00	23	0.06	0.00	0.75	3.1	0.0	0.00	
			0.17			**0.17**				**19.29**	**15.43**
SUBRJ	1	0.09	0.09								
	9	0.07	0.00	9	0.16	0.09	0.7	3.1	56.5	10.22	
			0.09			**0.09**				**10.22**	**8.18**
SUBSA	12	0.15	0.00	12	0.15	0.01	0.35	3.1	3.2	0.29	
	13	0.27	0.00	13	0.27	0.00	0.5	3.1	0.0	0.00	
			0.00			**0.01**				**0.29**	**0.23**
SUBSB	1	0.17	0.17								
				3	0.05	0.05	0.6	3.1	34.8	5.40	
				9	0.11	0.11	0.7	3.1	72.4	13.10	
			0.17			**0.17**				**18.50**	**14.80**
SUBSC	1	0.35	0.35								
				3	0.05	0.05	0.6	2.8	31.5	4.41	
	9	0.06	0.00	9	0.40	0.35	0.7	2.8	223.0	36.42	
	22	0.05	0.05							**40.83**	**32.66**
			0.40			**0.40**					
SUBSD	1	0.09	0.09								
				3	0.02	0.02	0.6	3.1	14.5	2.25	
				9	0.15	0.15	0.7	3.1	92.9	16.80	
	22	0.08	0.08							**19.06**	**15.25**
			0.17			**0.17**					
				3	0.02	0.02	0.6	3.1	15.0	2.32	
SUBSE	9	0.13	0.00	9	0.13	0.00	0.7	3.1	0.0	0.00	
										2.32	**1.86**
			0.00			**0.02**					

Sub-Basin	Existing Landuse Code	Existing Area (sm)	Existing Developable Area (sm)	Future Landuse Code	Future Area (sm)	Future Developed Area (sm)	Retention Calcs C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBSF	1	0.35	0.35								
				9	0.37	0.37	0.7	2.8	239.8	39.17	
				13	0.00	0.00	0.5	2.8	0.4	0.04	
	22	0.02	0.02							39.21	31.37
			0.38			0.38					
SUBSG	1	0.05	0.05								
	9	0.09	0.00	9	0.14	0.05	0.7	3.1	31.6	5.72	
			0.05			0.05				5.72	4.57
SUBSH	1	0.01	0.01								
	9	0.08	0.00	9	0.10	0.03	0.7	3.1	18.0	3.25	
	22	0.01	0.01							3.25	2.60
			0.03			0.03					
SUBTA	1	0.24	0.24								
				9	0.24	0.24	0.7	2.8	154.4	25.21	
			0.24			0.24				25.21	20.17
SUBTB	1	0.16	0.16								
				3	0.01	0.01	0.6	2.8	8.1	1.13	
	6	0.01	0.00	6	0.01	0.00	0.65	2.8	0.0	0.00	
	7	0.25	0.00	7	0.25	0.00				0.00	
	9	0.12	0.00	9	0.35	0.23	0.7	2.8	147.6	24.11	
	13	0.02	0.00	13	0.17	0.15	0.5	2.8	98.1	11.45	
	17	0.01	0.00	17	0.01	0.00	0.45	2.8	0.0	0.00	
	22	0.24	0.24							0.00	
	23	0.08	0.00							0.00	
			0.40			0.40				36.68	29.34
SUBUA	1	0.09	0.09								
	4	0.06	0.00	4	0.06	0.00					
	7	0.07	0.00	7	0.07	0.00					
	12	0.08	0.00	12	0.14	0.06					
	13	0.17	0.00	13	0.26	0.09	0.5	2.8	60.2	7.03	
	17	0.03	0.00	17	0.03	0.00	0.45	2.8	0.0	0.00	
	22	0.06	0.06			0.00				7.03	5.62
			0.15			0.15					
SUBUB	12	0.10	0.00	12	0.10	0.00					
				13	0.03	0.03	0.5	2.8	19.2	2.24	
	22	0.03	0.03			0.00				2.24	1.79
			0.03			0.03					
SUBUC	1	0.09	0.09								
				7	0.09	0.09	0.55	2.8	57.6	7.39	
	9	0.21	0.00	9	0.21	0.00	0.7	2.8	0.0	0.00	
	12	0.12	0.00	12	0.12	0.00				0.00	
				13	0.06	0.06	0.5	2.8	38.4	4.48	
	22	0.05	0.05			0.00				11.87	9.50
			0.15			0.15					
SUBUD	1	0.35	0.35								
	9	0.30	0.00	9	0.70	0.40	0.7	2.8	258.7	42.25	
	13	0.03	0.00	13	0.03	0.00				0.00	
	14	0.03	0.00	14	0.03	0.00	0.6	2.8	0.0	0.00	
	22	0.06	0.06			0.00				42.25	33.80
			0.41			0.40					
SUBUE	1	0.05	0.05								
	9	0.02	0.00	9	0.02	0.00	0.7	2.8	0.8	0.14	
				13	0.05	0.05	0.5	2.8	29.1	3.39	
			0.05			0.05				3.53	2.82
SUBVA	9	0.44	0.00	9	0.44	0.00	0.7	2.8	0.0	0.00	
	23	0.05	0.00	23	0.05	0.00	0.75	2.8	0.0	0.00	
			0.00			0.00				0.00	0.00
SUBVB	9	0.59	0.00	9	0.72	0.13	0.7	2.8	85.1	13.89	
	22	0.13	0.13							13.89	11.11
			0.13			0.13					
SUBVC	9	0.45	0.00	9	0.49	0.04	0.7	2.8	27.4	4.47	
	22	0.04	0.04							4.47	3.58
			0.04			0.04					

Sub-Basin	Existing Landuse Code	Existing Area (sm)	Existing Developable Area (sm)	Future Landuse Code	Future Area (sm)	Future Developed Area (sm)	Retention Calcs C	D (in)	A (ac)	V (ac-ft)	Effective V (ac-ft)
SUBVD				3	0.04	0.04	0.6	2.8	24.8	3.47	
	4	0.14	0.00	4	0.14	0.00				0.00	
	6	0.02	0.00	6	0.02	0.00	0.65	2.8	0.0	0.00	
	7	0.01	0.00	7	0.01	0.00	0.55	2.8	0.1	0.01	
	12	0.01	0.00	12	0.02	0.01	0.35	2.8	5.8	0.47	
	13	0.40	0.00	13	0.40	0.00	0.5	2.8	0.0	0.00	
	14	0.06	0.00	14	0.06	0.00				0.00	
	17	0.01	0.00	17	0.01	0.00	0.45	2.8	0.0	0.00	
	22	0.05	0.05							3.95	3.16
			0.05			0.05					
SUBWA	9	0.39	0.00	9	0.49	0.11	0.7	2.8	67.7	11.06	
	22	0.11	0.11							11.06	8.85
			0.11			0.11					
SUBWB	3	0.01	0.00	3	0.01	0.00	0.6	2.8	0.0	0.00	
	6	0.05	0.00	6	0.06	0.00	0.65	2.8	2.7	0.41	
	7	0.02	0.00	7	0.02	0.00	0.55	2.8	0.0	0.00	
	11	0.01	0.00	11	0.01	0.00	0.6	2.8	0.0	0.00	
	13	0.44	0.00	13	0.44	0.00	0.5	2.8	0.0	0.00	
	14	0.07	0.00			0.00				0.00	
	17	0.06	0.00	17	0.06	0.00	0.45	2.8	0.1	0.01	
	22	0.00	0.00							0.42	0.34
			0.00			0.00					
SUBWC				3	0.04	0.04	0.6	2.8	25.6	3.58	
	4	0.01	0.00	4	0.01	0.00	0.6	2.8	0.0	0.00	
	6	0.01	0.00	6	0.01	0.00	0.65	2.8	0.0	0.00	
	9	0.08	0.00	9	0.08	0.00	0.7	2.8	0.0	0.00	
	13	0.22	0.00	13	0.22	0.00	0.5	2.8	0.0	0.00	
	14	0.08	0.00							3.58	2.87
	17	0.02	0.00								
	22	0.04	0.04								
			0.04			0.04					
SUBWD	3	0.02	0.00	3	0.04	0.03	0.6	2.8	17.7	2.47	
	13	0.05	0.00	13	0.05	0.00	0.5	2.8	0.0	0.00	
	14	0.01	0.00			0.00				0.00	
	17	0.26	0.00	17	0.30	0.04	0.45	2.8	27.1	2.84	
	22	0.05	0.05			0.00				0.00	
	23	0.01	0.00	23	0.01	0.00	0.75	2.8	0.1	0.01	
			0.05			0.07				5.33	4.26
SUBWT1	9	0.58	0.00	9	0.58	0.00	0.7	2.8	0.0	0.00	
			0.00			0.00				0.00	0.00
SUBWT2	9	0.14	0.00	9	0.14	0.00	0.7	2.8	0.0	0.00	
			0.00			0.00					
SUBXA				3	0.05	0.05	0.6	2.8	32.8	4.60	
	4	0.02	0.00							0.00	
	9	0.07	0.00	9	0.07	0.00	0.7	2.8	0.0	0.00	
	13	0.14	0.00	13	0.14	0.00	0.5	2.8	0.0	0.00	
	14	0.00	0.00							4.60	3.68
	23	0.02	0.00								
			0.00			0.00					

	Existing Conditions		Future Conditions Without Retention			Future Conditions With Retention	
	6-hr	24-hr	6-hr	24-hr		6-hr	24-hr
SUBWD	601	436	562	407	SUBWD	562	407
					FLOWWD	562	407
RTWDXA	557	404	524	378	RTWDXA	523	378
SUBXA	580	425	601	440	SUBXA	601	440
					FLOWXA	601	440
CPXA1	749	527	680	496	CPXA1	584	451
DIZZ1	0	0	0	0	DIZZ1	0	0
DIXAO	749	527	680	496	DIXAO	584	451
RTXAWC	713	509	639	444	RTXAWC	567	422
SUBWB	1154	880	1154	880	SUBWB	1155	880
					FLOWWB	1155	880
RTWBWC	1092	823	1092	823	RTWBWC	1093	824
SUBWC	922	674	947	692	SUBWC	959	700
					FLOWWC	959	700
CPWC	1944	1527	1953	1553	CPWC	1832	1497
DIQE	0	0	0	0	DIQE	0	0
DIWCWA	1944	1527	1953	1553	DIWCWA	1832	1497
RTWCWA	951	710	954	716	RTWCWA	875	691
SUBWA	1196	872	1191	867	SUBWA	1191	867
					FLOWWA	1191	867
CPWA1	944	883	950	881	CPWA1	869	872
SUBVD	1195	917	1147	880	SUBVD	1147	880
					FLOWVD	1147	880
RTVDWA	941	695	908	675	RTVDWA	906	675
CPWA2	1159	1076	1122	1041	CPWA2	1113	1033
DIQD	707	627	671	594	DIQD	663	586
DIWAVC	452	448	450	447	DIWAVC	450	446
RTWAVC	375	359	380	364	RTWAVC	371	359
SUBVC	1177	857	1168	850	SUBVC	1168	850
					FLOWVC	1168	850
CPVC1	776	872	776	869	CPVC1	769	844
SUBVB	1651	1299	1627	1271	SUBVB	1633	1276
					FLOWVB	1633	1276
RTVBVC	1152	850	1156	847	RTVBVC	1131	853
~CPVC2	1368	1292	1386	1302	~CPVC2	1345	1284
MCVC47	1363	1261	1382	1275	MCVC47	1332	1257
SUBQA2	189	142	298	220	SUBQA2	299	221
					FLWQA2	299	221
CPQA2	1493	1387	1504	1414	CPQA2	1451	1396
BSN47	993	940	1000	944	BSN47	979	932
MC47QB	992	938	999	941	MC47QB	978	930
SUBQB	852	629	1278	934	SUBQB	1278	934
					FLOWQB	1278	934
~CPQB	1502	1464	1460	1496	~CPQB	1381	1439
SUBQD	600	439	656	480	SUBQD	656	480
					FLOWQD	656	480
DRQD	707	627	671	594	DRQD	663	586
RTDIQD	511	353	496	342	RTDIQD	486	334
@CPQD	604	439	663	480	@CPQD	666	480
RSQD	525	390	507	432	RSQD	497	428
DIQC	394	318	383	342	DIQC	377	340
DIQDQC	132	73	124	90	DIQDQC	120	89
RTQDQB	90	53	84	50	RTQDQB	79	48
@CPQB	1542	1472	1496	1500	@CPQB	1415	1444
MCQBJK	1526	1436	1468	1414	MCQBJK	1386	1362
SUBJK	417	317	804	588	SUBJK	804	588
					FLOWJK	715	487
~CPJK	1759	1657	1692	1533	~CPJK	1582	1466
MCJKJL	1725	1602	1643	1469	MCJKJL	1489	1367
SUBJL	171	128	286	210	SUBJL	286	210
					FLOWJL	249	195
~CPJL1	1763	1628	1676	1489	~CPJL1	1511	1384
SUBQE	1646	1319	1734	1394	SUBQE	1734	1394
					FLOWQE	1734	1394
DRQE	0	0	0	0	DRQE	0	0
RTDIQE	0	0	0	0	RTDIQE	0	0
CPQE	1646	1319	1734	1394	CPQE	1734	1394
RSQE	1565	1192	1645	1247	RSQE	1622	1243
RTQEQC	1468	1100	1525	1156	RTQEQC	1477	1152
SUBQC	1150	871	1358	1023	SUBQC	1358	1023
					FLOWQC	1358	1023
DRDIQC	394	318	383	342	DRDIQC	377	340
RTDIQC	358	271	346	261	RTDIQC	339	255
CPQC	2200	1758	2201	1720	CPQC	2052	1659
DISR1	1760	1407	1761	1376	DISR1	1641	1327
DIQCR	440	352	440	344	DIQCR	410	332
RTQCJL	345	274	351	277	RTQCJL	303	253
CPJL2	1982	1852	1787	1609	CPJL2	1605	1480
SUBQA1	579	433	918	672	SUBQA1	918	672
					FLWQA1	918	672
RSQA	547	413	825	604	RSQA	752	567
DIPF	230	176	341	252	DIPF	312	238
DIQAPF	317	236	484	351	DIQAPF	441	330
RTQAJH	274	198	393	273	RTQAJH	281	203
SUBJH	723	531	888	649	SUBJH	888	649
					FLOWJH	888	649

	Existing Conditions		Future Conditions Without Retention			Future Conditions With Retention	
	6-hr	24-hr	6-hr	24-hr		6-hr	24-hr
CPJH	686	530	839	655	CPJH	833	644
RTJHJI	472	349	529	385	RTJHJI	395	314
SUBJI	572	424	810	592	SUBJI	810	592
					FLOWJI	810	592
CPJI	511	430	698	609	CPJI	687	585
CPJISR	2339	2207	2163	1933	CPJISR	1855	1747
SUBPF	1289	940	1482	1082	SUBPF	1482	1082
					FLOWPF	1482	1082
RETPF	19	10	29	12	RETPF	309	35
RETPF	1289	940	1482	1082	RETPF	1482	1082
DRPF	230	176	341	252	DRPF	312	238
RTDIPF	207	153	300	209	RTDIPF	216	161
CPPF	1293	945	1496	1104	CPPF	1482	1082
RSPF	498	332	803	622	RSPF	430	292
DIPE	0	0	0	0	DIPE	0	0
DIPFPE	498	332	803	622	DIPFPE	430	292
RTPFJF	409	278	641	507	RTPFJF	351	240
SUBUD	1087	851	1697	1341	SUBUD	1704	1346
					FLOWUD	1704	1346
DIUA	263	206	409	324	DIUA	411	325
DIUDUA	824	645	1288	1017	DIUDUA	1293	1021
RTUDVA	637	483	895	660	RTUDVA	697	549
SUBVA	1195	869	1195	869	SUBVA	1195	869
					FLOWVA	1195	869
CPVA1	1024	898	1437	1130	CPVA1	1011	898
DIUC	701	685	752	730	DIUC	703	685
DIVAPE	323	213	684	400	DIVAPE	312	213
RTVAPE	109	47	427	182	RTVAPE	175	83
SUBPE	829	600	1410	1028	SUBPE	1412	1030
					FLOWPE	1412	1030
DRPE	0	0	0	0	DRPE	0	0
RTDIPE	0	0	0	0	RTDIPE	0	0
CPPE	829	600	1410	1028	CPPE	1412	1030
RSPE	577	475	945	940	RSPE	643	616
DIPD	0	0	1	1	DIPD	0	0
DIPEPD	577	475	944	939	DIPEPD	643	616
RTPEJF	373	275	585	526	RTPEJF	344	272
SUBJF	754	558	1601	1167	SUBJF	1602	1169
					FLOWJF	1602	1169
CPJF	815	658	1174	1167	CPJF	921	1150
RTJFJG	646	511	980	848	RTJFJG	555	468
SUBJG	806	645	1458	1157	SUBJG	1468	1165
CPJG	837	694	1390	1271	CPJG	1163	1156
					FLOWJG	1145	1103
CPJGSR	2925	2853	3195	2908	CPJGSR	2401	2327
DRUC	701	685	752	730	DRUC	703	685
RTVAUC	596	492	688	620	RTVAUC	638	550
MCUCUC	594	490	683	615	MCUCUC	631	542
SUBUC	915	672	1014	740	SUBUC	1019	744
					FLOWUC	1019	744
@CPUC	752	694	821	771	@CPUC	821	757
SUBUA	882	663	944	703	SUBUA	944	703
					FLOWUA	944	678
DRUA	263	206	409	324	DRUA	411	325
RTDIUA	114	83	148	106	RTDIUA	88	73
@CPUA	882	663	944	704	@CPUA	944	672
DITB	155	132	166	141	DITB	165	134
DIUAUC	620	527	662	563	DIUAUC	661	538
RTUAUC	485	385	515	411	RTUAUC	321	224
~CPUC2	974	761	1109	946	~CPUC2	930	776
DIUB	974	761	1109	946	DIUB	930	776
DIUCPC	0	0	0	0	DIUCPC	0	0
RTUCPC	0	0	0	0	RTUCPC	0	0
SUBPC	704	518	743	545	SUBPC	743	545
					FLOWPC	475	533
CPPC	448	506	475	533			
RSPC	33	6	67	20	RSPC	67	20
RTPCNB	18	6	35	15	RTPCNB	35	15
SUBNB	551	402	760	550	SUBNB	764	554
					FLOWNB	764	554
CPNB1	415	397	542	543	CPNB1	546	547
DINA	268	256	349	350	DINA	351	352
DINBNA	147	141	193	194	DINBNA	194	195
RTNBJD	80	67	101	81	RTNBJD	77	64
SUBPD	535	403	1097	802	SUBPD	1100	804
DRPD	0	0	1	1	DRPD	0	0
CPPD2	535	403	1099	803	CPPD2	1100	804
RSPD	25	3	308	106	RSPD	315	110
RTPDNC	23	3	198	92	RTPDNC	204	95
SUBNC	265	194	755	549	SUBNC	755	549
					FLOWNC	746	538
CPNC	247	191	687	544	CPNC	672	534
RTNCJE	206	152	516	380	RTNCJE	276	204
SUBJE1	305	223	572	412	SUBJE1	579	418
					FLWJE1	571	348
CPJE1	263	218	551	431	CPJE1	423	342
RTJEJD	243	197	530	394	RTJEJD	289	217

	Existing Conditions		Future Conditions Without Retention			Future Conditions With Retention	
	6-hr	24-hr	6-hr	24-hr		6-hr	24-hr
SUBJD	669	491	784	571	SUBJD	784	571
					FLOWJD	784	571
CPJD	652	669	905	940	CPJD	1430	1325
DIJC2	237	243	328	341	DIJC2	517	479
DIJDJC	415	426	577	600	DIJDJC	913	846
RTJDFC	326	301	525	442	RTJDFC	736	607
SUBJE2	468	349	625	458	SUBJE2	625	458
					FLWJE2	625	458
RETJE	180	132	158	32	RETJE	477	359
RETJE2	468	349	625	458	RETJE2	625	458
RTJEFC	405	288	527	384	RTJEFC	404	265
SUBFC	350	265	692	505	SUBFC	692	505
					FLOWFC	659	419
CPFC	789	751	1040	1001	CPFC	1310	1102
CPFCSR	3438	3441	3922	3759	CPFCSR	1143	1088
SUBJC2	457	358	825	635	SUBJC2	825	635
					FLWJC2	825	635
RETJC2	133	81	72	12	RETJC2	434	433
RETJC2	457	358	825	635	RETJC2	824	634
DRJC2	237	243	328	341	DRJC2	517	479
RTDIJC	132	114	244	203	RTDIJC	300	231
@CPJC2	529	430	825	669	@CPJC2	903	731
DIJB2	243	198	367	308	DIJB2	415	336
DIJCJB	286	232	431	361	DIJCJB	488	395
RTJCFB	255	207	392	316	RTJCFB	351	270
SUBFB	675	515	1130	866	SUBFB	1120	858
					FLOWFB	1120	858
CPFB	521	504	767	863	CPFB	757	842
CPFBSR	3636	3741	4218	4300	CPFBSR	1520	1588
SUBJB2	195	144	461	334	SUBJB2	461	334
					FLWJB2	449	309
DRJB2	243	198	367	308	DRJB2	415	336
RTDIJB	203	163	312	251	RTDIJB	257	198
@CPJB2	260	210	462	334	@CPJB2	711	309
DIEE	93	76	131	120	DIEE	122	109
DIJBEE	166	134	233	214	DIJBEE	217	193
RTJBFA	134	111	195	162	RTJBFA	131	103
SUBFA	483	365	885	669	SUBFA	890	674
					FLOWFA	890	674
CPFA	378	357	668	656	CPFA	674	659
CPSRFA	3792	4034	4574	4869	CPSRFA	1978	2182
DRUCUB	974	761	1109	946	DRUCUB	930	776
MCUCUB	975	751	1108	942	MCUCUB	931	774
SUBUB	262	194	247	182	SUBUB	247	182
					FLOWUB	247	182
~@CPUB	989	886	1127	993	~@CPUB	951	917
DIUE	0	0	0	0	DIUE	0	0
DIUBSF	989	886	1127	993	DIUBSF	951	917
D-B71	579	476	717	583	D-B71	541	507
71PASS	410	410	410	410	71PASS	410	410
BSN71	410	410	410	410	BSN71	410	410
DBSN71	0	0	0	0	DBSN71	0	0
CLEAR	3792	4034	4574	4869	CLEAR	1988	2182
SUBTB	1037	811	1147	888	SUBTB	1155	895
					FLOWTB	1155	895
DRTB	155	132	166	141	DRTB	165	134
RTDITB	128	102	137	108	RTDITB	86	63
CPTB	1050	821	1159	900	CPTB	1155	895
DITA	254	199	280	218	DITA	279	217
DITBTA	796	622	879	682	DITBTA	876	678
RTTBSF	671	511	740	561	RTTBSF	717	544
SUBSF	349	272	908	662	SUBSF	911	665
					FLOWSF	831	484
CPSF	939	744	867	740	CPSF	816	651
DIRJ1	282	223	260	222	DIRJ1	245	195
DISFRJ	657	521	607	518	DISFRJ	571	456
RTSFSH	645	511	585	475	RTSFSH	562	435
SUBSH	298	220	315	232	SUBSH	316	233
					FLOWSH	316	233
CPSH	646	520	620	504	CPSH	573	447
RSSH	579	438	571	445	RSSH	459	350
DIRJ2	466	344	459	349	DIRJ2	362	269
DISHRJ	113	94	112	95	DISHRJ	97	81
RTSHSG	104	87	109	94	RTSHSG	89	76
SUBTA	222	168	614	450	SUBTA	616	451
					FLOWTA	495	316
DRTA	254	199	280	218	DRTA	279	217
RTDITA	238	184	262	202	RTDITA	259	199
@CPTA	396	306	614	455	@CPTA	493	313
RTTASG	389	297	484	414	RTTASG	289	229
SUBSG	247	183	353	260	SUBSG	354	261
					FLOWSG	354	261
CPSG	403	324	599	614	CPSG	360	269
RSSG	402	323	599	618	RSSG	348	246
DIRJ4	302	238	460	476	DIRJ4	258	176
DISGRJ	101	85	139	143	DISGRJ	90	70
RTSGSE	99	84	128	129	RTSGSE	84	69

	Existing Conditions		Future Conditions Without Retention			Future Conditions With Retention	
	6-hr	24-hr	6-hr	24-hr		6-hr	24-hr
SUBSC	294	212	907	650	SUBSC	912	653
					FLOWSC	811	577
DISD	159	115	490	351	DISD	438	312
DISCSD	135	98	417	299	DISCSD	373	265
RTSCSE	113	80	327	226	RTSCSE	169	107
SUBSE	407	294	424	308	SUBSE	426	309
					FLOWSE	426	309
CPSE	208	288	440	391	CPSE	213	299
RSSE	186	169	421	367	RSSE	179	147
DIRJ5	186	169	421	367	DIRJ5	179	147
DISERJ	0	0	0	0	DISERJ	0	0
RTSERI	0	0	0	0	RTSERI	0	0
SUBRJ	207	152	386	283	SUBRJ	387	283
					FLOWRJ	387	283
CPRJ1	282	223	260	222	CPRJ1	245	195
RTSFRJ	260	206	242	185	RTSFRJ	231	179
CPRJ2	466	344	459	349	CPRJ2	362	269
RTSHRJ	451	333	456	346	RTSHRJ	349	257
@CPRJ3	668	524	683	527	@CPRJ3	541	413
RTRJ3	636	497	671	521	RTRJ3	507	389
CPRJ4A	302	238	460	476	CPRJ4A	258	176
CPRJ4B	795	622	883	692	CPRJ4B	643	497
RTSGRJ	788	612	876	689	RTSGRJ	634	492
CPRJ5	186	169	421	367	CPRJ5	179	147
RTSERJ	181	165	405	356	RTSERJ	169	138
@CPRJ6	870	722	995	825	@CPRJ6	686	581
RSRJ	760	615	928	779	RSRJ	587	494
DIPA2	99	46	164	105	DIPA2	39	10
DIRJPA	662	570	764	673	DIRJPA	547	485
RTRJRI	655	564	759	670	RTRJRI	542	483
RTRIRI	652	563	757	668	RTRIRI	539	481
SUBRI	420	310	736	539	SUBRI	737	540
					FLOWRI	715	530
SUBSB	226	174	525	385	SUBSB	525	385
					FLOWSB	426	275
RSSB	184	131	414	297	RSSB	135	70
SUBSD	253	190	480	352	SUBSD	482	353
					FLOWSD	297	213
DRSD	159	115	490	351	DRSD	438	312
@CPSD	431	310	1193	939	@CPSD	681	505
RSSD	433	310	1123	913	RSSD	653	502
RTSDRI	418	305	1065	841	RTSDRI	514	348
~@CPRI	663	582	1006	967	~@CPRI	842	526
MCRIRH	657	578	991	951	MCRIRH	534	514
SUBUE	143	107	194	143	SUBUE	194	143
					FLOWUE	194	143
DRUE	0	0	0	0	DRUE	0	0
CPUE	143	107	194	143	CPUE	194	143
RSUE	1	1	1	1	RSUE	0	0
RTUEPB	1	1	1	1	RTUEPB	0	0
DRB71	410	410	410	410	DRB71	410	410
MC71PB	410	410	410	410	MC71PB	410	410
SUBPB2	422	313	711	520	SUBPB2	714	522
					FLWPB2	714	522
~CPPB2	827	713	1064	838	~CPPB2	890	806
MCPB73	820	710	1038	827	MCPB73	863	798
D-B73	370	260	588	377	D-B73	413	348
73PASS	450	450	450	450	73PASS	450	450
MC73NA	450	450	450	450	MC73NA	450	450
SUBNA2	386	303	952	721	SUBNA2	952	721
					FLWNA2	898	683
DRNA	268	256	349	350	DRNA	351	352
RTDINA	161	131	205	164	RTDINA	152	124
~@CPNA	957	849	1300	1175	~@CPNA	1259	1124
MCNAJC	953	846	1290	1159	MCNAJC	1169	1033
SUBPB1	212	158	367	270	SUBPB1	368	271
					FLWPB1	368	271
DIPA1	40	30	68	51	DIPA1	68	51
DIPBPA	172	127	299	219	DIPBPA	300	220
RTPBNA	69	52	88	64	RTPBNA	60	50
SUBNA1	145	112	395	288	SUBNA1	397	290
					FLWNA1	341	220
CPNA1	148	115	396	291	CPNA1	341	219
RTNAJC	146	113	369	269	RTNAJC	248	155
SUBJC1	52	39	116	85	SUBJC1	116	85
					FLWJC1	94	62
~CPJC1	1075	949	1572	1418	~CPJC1	1343	1167
MCJCJB	1066	943	1538	1370	MCJCJB	1215	1054
SUBPA	588	431	1099	799	SUBPA	1102	801
					FLOWPA	1102	801
DRPA	40	30	68	51	DRPA	68	51
RTDIPA	11	9	13	10	RTDIPA	9	8
DRPA2	99	46	164	105	DRPA2	39	10
RTRJPA	56	19	123	74	RTRJPA	15	5
CPPA	589	431	1099	800	CPPA	1102	801
DIOE	106	78	198	144	DIOE	198	144
DIPAOE	483	354	902	656	DIPAOE	904	657

	Existing Conditions		Future Conditions Without Retention			Future Conditions With Retention	
	6-hr	24-hr	6-hr	24-hr		6-hr	24-hr
RTPAMH	348	247	541	372	RTPAMH	324	227
SUBMH	325	248	569	418	SUBMH	569	418
					FLOWMH	558	379
CPMH	408	297	608	455	CPMH	493	375
RTMHMD	363	268	545	393	RTMHMD	285	213
SUBMD	367	267	367	267	SUBMD	367	267
RETMD	367	267	367	267	RETMD	367	267
RETMD	311	183	311	183	RETMD	311	183
CPMD	391	298	673	488	CPMD	327	246
DIJB1	80	62	137	100	DIJB1	67	51
DIMDJB	311	236	537	388	DIMDJB	259	195
DIMFX	311	236	537	388	DIMFX	259	195
DIMDMF	0	0	0	0	DIMDMF	0	0
SUBMI	681	503	1042	764	SUBMI	1042	764
					FLOWMI	1042	764
RETMI	483	362	402	195			
RETMI	681	503	1042	764			
SUBMG	202	150	249	183	SUBMG	249	183
					FLOWMG	249	183
RETMG	183	150	179	134	RETMG	242	181
RETMG	200	118	249	183	RETMG	178	110
CPMG	836	616	1290	943	CPMG	1206	841
RTMGJB	590	398	875	631	RTMGJB	755	506
SUBJB1	160	117	443	317	SUBJB1	443	317
					FLWJB1	393	245
DRJB	80	62	137	100	DRJB	67	51
RDIJB1	72	55	111	82	RDIJB1	58	43
~CPJB1	1262	1151	2321	2130	~CPJB1	1574	1399
DIED	1262	1151	2321	2130	DIED	1574	1399
DIED	0	0	0	0	DIED	0	0
SUBSA	811	594	894	654	SUBSA	894	654
					FLOWSA	894	654
MCSARH	789	574	867	633	MCSARH	862	631
D-B91A	789	574	867	633	D-B91A	862	631
BAS91A	0	0	0	0	BAS91A	0	0
SUBRH	285	218	666	489	SUBRH	666	489
					FLOWRH	630	362
TEMP	211	211	380	475	TEMP	296	349
~@CPRH	662	652	1255	1249	~@CPRH	558	645
D-B91B	212	202	805	799	D-B91B	108	195
91PASS	450	450	450	450	91PASS	450	450
MCRHOG	450	450	450	450	MCRHOG	450	450
SUBRG	376	276	376	276	SUBRG	376	276
					FLOWRG	376	276
RETRG	134	23	134	23	RETRG	134	23
CPRG	376	276	376	276	CPRG	376	276
RTRGRF	93	81	93	81	RTRGRF	93	81
SUBRF	652	500	1175	884	SUBRF	1181	888
					FLOWRF	1181	888
~CPRF	730	577	1163	905	~CPRF	1168	909
MCRFOG	723	569	1143	888	MCRFOG	1148	891
SUBOG	699	513	880	642	SUBOG	887	646
					FLOWOG	887	646
CPOG1	1214	987	1810	1514	CPOG1	1808	1521
D-B99A	1035	808	1631	1335	D-B99A	1629	1342
BAS99A	179	179	179	179	BAS99A	179	179
~CPOG	628	628	629	629	~CPOG	567	530
MCOGOF	626	625	629	629	MCOGOF	559	524
SUBOF	608	445	750	549	SUBOF	752	550
					FLOWOF	752	550
SUBRE	268	203	708	514	SUBRE	710	516
					FLOWRE	701	508
RTREOF	257	194	633	451	RTREOF	439	308
~CPOF	838	836	1127	1098	~CPOF	833	796
MCOFOB	834	831	1115	1074	MCOFOB	808	769
SUBOB	990	716	1260	916	SUBOB	977	916
					FLOWOB	977	916
~CPOB	965	1013	1258	1461	~CPOB	850	1097
SUBRD	233	170	778	565	SUBRD	782	568
					FLOWRD	767	554
DIOB	93	68	311	226	DIOB	307	221
DIRDOB	140	102	467	339	DIRDOB	460	332
RTRDRC	70	48	189	127	RTRDRC	78	60
SUBRC	392	299	1409	1081	SUBRC	1409	1081
					FLOWRC	1383	1055
CPRC	369	297	1295	1087	CPRC	1271	1050
RTRCRB	279	211	831	631	RTRCRB	417	342
SUBRB	391	288	1346	991	SUBRB	1347	993
					FLOWRB	1347	993
CPRB	323	284	1145	1073	CPRB	1038	983
DIKA3	162	142	573	536	DIKA3	519	491
DIRBKA	162	142	573	536	DIRBKA	519	491
RTRBRA	140	109	443	345	RTRBRA	198	175
SUBRA	150	110	540	391	SUBRA	541	392
					FLOWRA	541	392
CPRA	139	110	451	414	CPRA	355	384

	Existing Conditions		Future Conditions Without Retention			Future Conditions With Retention	
	6-hr	24-hr	6-hr	24-hr		6-hr	24-hr
DIKA4	114	87	420	383	DIKA4	325	354
DIRAKA	25	25	31	31	DIRAKA	29	30
DIAFX	25	25	31	31	DIAFX	29	30
DIKAAF	0	0	0	0	DIKAAF	0	0
CPOB2	93	68	311	226	CPOB2	307	221
RTDIOB	32	22	80	59	RTDIOB	33	27
@CPOB	965	1013	1257	1464	@CPOB	846	1097
MCOBLE	925	940	1245	1321	MCOBLE	807	981
SUBLE	223	162	800	584	SUBLE	800	584
					FLOWLE	776	584
~CPLE	1047	1093	1424	1448	~CPLE	937	1079
D-B111	347	393	724	748	D-B111	237	379
111PAS	700	700	700	700	111PAS	700	700
MCLEKD	700	700	700	700	MCLEKD	700	700
SUBKD	316	241	1052	792	SUBKD	1055	795
					FLOWKD	895	697
~CPKD	892	920	1390	1471	~CPKD	1257	1379
MCKDKA	885	908	1369	1424	MCKDKA	1141	1198
SUBKA	227	162	227	162	SUBKA	220	162
RETKA	227	162	227	162	RETKA	220	162
RETKA	198	107	198	107	RETKA	182	107
CPKA3	162	142	573	536	CPKA3	519	491
RTDIKA	148	115	497	387	RTDIKA	220	188
CPKA4	114	87	420	383	CPKA4	325	354
~CPKA	963	1042	1559	1597	~CPKA	1181	1221
CPKAAF	4350	4848	5683	6257	CPKAAF	2387	2740
SUBLC	324	235	324	235	SUBLC	316	236
					FLOWLC	316	236
RETLC	324	235	324	235	RETLC	316	236
RETLC	68	7	68	7	RETLC	5	5
RTLCLA	6	3	6	3	RTLCLA	1	2
SUBLA	490	351	704	503	SUBLA	704	503
					FLOWLA	704	503
RETLA	490	351	704	503	RETLA	704	503
RETLA	441	255	650	413	RETLA	490	232
CPLA	387	254	613	410	CPLA	429	231
RTLAKB	160	87	248	142	RTLAKB	149	64
SUBKB	503	364	672	482	SUBKB	672	482
					FLOWKB	647	368
CPKB	432	359	574	476	CPKB	481	354
CPAFKB	4410	4941	5863	6601	CPAFKB	2487	3030
SUBGA	356	255	356	255	SUBGA	355	253
					FLOWGA	355	253
CPAFGA	4411	4942	5878	6620	CPAFGA	2495	3040
SUBEC	24	18	93	68	SUBEC	94	68
					FLOWEC	67	42
CPECSR	4418	4955	5898	6650	CPECSR	2508	3063
SUBOE	560	405	1123	812	SUBOE	1126	814
					FLOWOE	1126	814
RETOE	88	10	28	12	RETOE	549	485
RETOE	560	405	1123	812	RETOE	1126	814
CPOE1	106	78	198	144	CPOE1	198	144
RTDIOE	35	26	49	36	RTDIOE	25	19
@CPOE	560	406	1123	815	@CPOE	1126	814
DIOD	92	67	182	132	DIOD	182	132
DIOEOD	468	339	942	683	DIOEOD	943	682
RTOEMF	256	186	402	288	RTOEMF	204	149
SUBMF	590	479	1264	995	SUBMF	1264	995
					FLOWMF	1175	903
CPMF	311	236	537	388	CPMF	259	195
RTMDMF	253	188	383	284	RTMDMF	194	138
CPMF1	676	557	1263	1036	CPMF1	1141	900
DIEB	313	258	561	479	DIEB	512	416
DIMFEB	363	299	654	558	DIMFEB	597	484
RTMFMC	305	243	499	403	RTMFMC	243	176
SUBOD	681	504	1229	898	SUBOD	1234	901
					FLOWOD	1234	901
RETOD	13	6	20	9	RETOD	165	290
RETOD	681	504	1229	898	RETOD	1234	901
DROD	92	67	182	132	DROD	182	132
RTDIOD	53	40	80	58	RTDIOD	43	34
CPOD	681	504	1229	902	CPOD	1234	901
DIOC	123	91	221	162	DIOC	222	162
DIODOC	558	414	1008	740	DIODOC	1012	739
RTODMC	351	262	487	347	RTODMC	286	212
SUBMC	683	555	1688	1362	SUBMC	1690	1364
					FLOWMC	1685	1356
CPMC1	819	682	1400	1384	CPMC1	1388	1342
DIMB	313	261	534	528	DIMB	529	512
DIMCMB	506	421	866	856	DIMCMB	859	830
RTMCIE	479	398	775	705	RTMCIE	551	486
DREB	313	258	561	479	DREB	512	416
SUBEB	149	112	304	223	SUBEB	304	223
					FLOWEB	287	169
CPEB	373	289	821	615	CPEB	689	472
RDIED	1262	1151	2321	2130	RDIED	1574	1399
MCJBED	1256	1146	2232	2019	MCJBED	1431	1270

	Existing Conditions		Future Conditions Without Retention			Future Conditions With Retention	
	6-hr	24-hr	6-hr	24-hr		6-hr	24-hr
SUBED1	198	145	498	359	SUBED1	498	359
					FLWED1	462	275
SUBED2	59	44	141	103	SUBED2	141	103
					FLWED2	139	89
~CPED1	1535	1262	2886	2211	~CPED1	1734	1370
~CPED2	1856	1505	3283	2541	~CPED2	1874	1510
MCED95	1833	1492	3224	2497	MCED95	1831	1471
D-B95	783	442	2174	1447	D-B95	781	421
95PASS	1050	1050	1050	1050	95PASS	1050	1050
MC95ID	1050	1050	1050	1050	MC95ID	1050	1050
SUBID1	169	131	344	252	SUBID1	344	252
					FLWID1	333	221
SUBID2	226	164	542	387	SUBID2	542	387
					FLWID2	463	281
~CPID1	1174	1138	1712	1564	~CPID1	1085	1082
SUBIE	250	195	518	379	SUBIE	518	379
					FLOWIE	501	337
CPID2	1691	1607	2602	2557	CPID2	1535	1321
MCIDIB	1669	1588	2564	2489	MCIDIB	1485	1310
SUBIB	357	272	753	548	SUBIB	753	548
					FLOWIB	713	420
SUBIC	227	165	575	412	SUBIC	575	412
					FLOWIC	503	322
~CPIB1	1839	1754	3324	3243	~CPIB1	1829	1531
SUBOC	613	449	785	574	SUBOC	788	576
					FLOWOC	788	576
DROC	123	91	221	162	DROC	222	162
RTDIOC	50	39	64	49	RTDIOC	36	30
CPOC	613	449	785	577	CPOC	788	576
RTOCMB	316	221	342	238	RTOCMB	260	202
SUBMB	674	546	1552	1244	SUBMB	1552	1244
					FLOWMB	1515	1205
DRMB	313	261	534	528	DRMB	529	512
RTDIMB	268	219	399	326	RTDIMB	208	174
@CPMB	819	729	1552	1293	@CPMB	1865	1205
RTMBIB	738	648	1151	1031	RTMBIB	727	633
@CPIB2	2526	2378	4311	4142	@CPIB2	2475	2098
MCIBIA	2496	2342	4225	4017	MCIBIA	2361	2023
SUBME	268	193	492	352	SUBME	489	349
					FLOWME	489	346
RTMEIA	163	109	279	179	RTMEIA	157	89
SUBIA	347	254	578	419	SUBIA	578	419
					FLOWIA	578	419
~CPIA	2554	2426	4450	4240	~CPIA	2427	2121
MCIAHB	2529	2407	4383	4155	MCIAHB	2322	2040
SUBHB	358	258	627	447	SUBHB	627	447
					FLOWHB	627	447
SUBDA	318	235	539	392	SUBDA	539	392
					FLOWDA	539	392
~CPHB1	2530	2427	4488	4266	~CPHB1	2326	2077
SUBLD	465	333	431	309	SUBLD	431	309
					FLOWLD	431	309
RTLDMA	428	300	403	279	RTLDMA	383	263
SUBMA	185	132	430	305	SUBMA	430	305
					FLOWMA	425	265
CPMA	601	426	703	475	CPMA	613	418
RTMAHB	358	236	437	284	RTMAHB	287	169
~CPHB2	2600	2516	4720	4521	~CPHB2	2432	2211
SUBLB	171	124	417	297	SUBLB	417	297
					FLOWLB	385	231
RTLBHA	144	97	314	211	RTLBHA	171	84
SUBHA	143	104	296	214	SUBHA	295	213
					FLOWHA	285	174
CPHA	2641	2583	4896	4733	CPHA	2469	2289
MCHACB	2608	2559	4775	4566	MCHACB	2278	2131
SUBEE	385	304	866	670	SUBEE	866	670
					FLOWEE	803	607
CPEE1	93	76	131	120	CPEE1	122	109
RTDIEE	87	71	120	99	RTDIEE	87	69
CPEE	386	304	868	672	CPEE	803	607
RTEEEA	179	117	341	217	RTEEEA	106	83
SUBEA	541	453	1322	1086	SUBEA	1322	1086
					FLOWEA	1213	961
CPEA	491	449	1200	1085	CPEA	1123	954
MCEADC	478	435	1134	1008	MCEADC	794	600
SUBDC	546	427	1135	890	SUBDC	1135	890
					FLOWDC	1107	789
~CPDC	703	645	1538	1318	~CPDC	874	762
MCDCCC	689	630	1505	1282	MCDCCC	797	590
SUBDD	142	104	293	210	SUBDD	293	210
					FLOWDD	244	153
RTDDCC	98	70	185	126	RTDDCC	80	41
SUBCC	780	621	1213	964	SUBCC	1213	964
					FLOWCC	1213	964
~CPCC	1007	939	2096	1830	~CPCC	1149	948
MCCCCB	1004	929	2054	1794	MCCCCB	1083	879
SUBCB	315	260	686	530	SUBCB	686	530

	Existing Conditions		Future Conditions Without Retention			Future Conditions With Retention	
	6-hr	24-hr	6-hr	24-hr		6-hr	24-hr
					FLOWCB	686	529
~CPCB1	3113	3242	6349	6229	~CPCB1	2764	2686
SUBGD	657	521	1340	1048	SUBGD	1340	1048
					FLOWGD	1340	1048
SUBKC	199	143	488	348	SUBKC	488	348
					FLOWKC	431	257
RTKCGD	102	69	229	146	RTKCGD	88	49
SUBGC	339	243	408	294	SUBGC	408	294
					FLOWGC	408	294
RTGCGD	298	207	359	249	RTGCGD	350	249
CPGD1	796	659	1573	1318	CPGD1	1522	1286
RTGDCB	627	496	1107	846	RTGDCB	727	542
~CPCB2	3402	3606	7078	6978	~CPCB2	3061	2961
MCCBCA	3065	3192	5266	5096	MCCBCA	2355	2309
SUBCA	584	479	1271	1006	SUBCA	1272	1007
					FLOWCA	1272	1007
~CPCA1	3068	3210	5265	5119	~CPCA1	2348	2306
SUBGB	309	220	364	259	SUBGB	365	261
					FLOWGB	365	261
RTGBCA	240	162	198	126	RTGBCA	208	142
~CPCA2	3067	3211	5277	5145	~CPCA2	2348	2315
B-DRCC	2965	3111	5177	5045	B-DRCC	2240	2216
P-DRCC	100	100	100	100	P-DRCC	100	99
MCCABC	100	100	100	100	MCCABC	99	99
SUBBC	327	244	829	610	SUBBC	851	626
					FLOWBC	851	626
~CPBC	285	326	576	675	~CPBC	562	671
CPAFBC	4413	5104	5995	7083	CPAFBC	2616	3487
SUBAD	176	129	388	281	SUBAD	388	281
					FLOWAD	384	248
BSNAD	9	8	9	9	BSNAD	8	8
SUBAC	290	209	567	408	SUBAC	567	408
					FLOWAC	567	400
CPAC	285	215	546	413	CPAC	544	400
BSNAC	58	8	213	59	BSNAC	14	6
SUBAB	346	250	621	448	SUBAB	621	448
					FLOWAB	621	448
CPAB	306	247	540	445	CPAB	538	443
BSNAB	12	4	173	16	BSNAB	5	4
SUBAA	198	139	198	139	SUBAA	198	139
					FLOWAA	198	139
CPAA	174	138	284	138	CPAA	174	138
SUBBB	209	159	375	276	SUBBB	375	276
					FLOWBB	375	261
RTBBBA	128	93	129	93	RTBBBA	73	48
SUBBA	221	159	353	251	SUBBA	353	251
					FLOWBA	353	251
CPBA	215	158	345	251	CPBA	345	250
HCTR1	305	257	369	309	HCTR1	280	246
BSNAA	26	4	173	40	BSNAA	4	2
SUBWT1	1347	1000	1347	1000	SUBWT1	1354	1005
SUBWT2	423	306	423	306	SUBWT2	425	308
DUR	4453	5165	6332	7658	DUR	2841	3768

Recommended Plan, Sheet 1 (Future Conditions)

Channel Cost

ID	Excavated Volume (cy)	Unit Cost ($/cy)	Excavation Cost	Concrete Volume (cy)	Unit Cost ($/cy)	Concrete Cost	Utility Relocation Cost	Channel Length (ft)	Left Access Road Width (ft)	Right Access Road Width (ft)	6" ABC Access Road Unit Cost ($/sf)	Access Road Cost	Total Corridor Width-Channel+Access Rd (ft)	Existing Right-of-Way Width (ft.)	New Right-of-Way Width Required (ft.)	Landscape Unit Cost ($/sf)	Total Landscape Cost	Required Land Acquisition (Ac.)	Zoning	Land Acquisition Cost	Total Construction Cost	Total Contingencies Cost	Total Construction, Land, Landscape, and Contingencies Costs
DROC01	80979	$6	$485,877	0	n/a	n/a	$0	2689.7	16	16	$0.65	$55,946	203.8	0	230	$1.80	$1,113,536	14.2	Res / Ag	$612,445	$541,822	162,547	**$2,430,350**
DROC02	17933	$6	$107,597	0	n/a	n/a	$45,000	920.5	16	16	$0.65	$19,146	157.1	0	180	$1.80	$298,242	3.8	Res / Ag	$164,033	$171,744	51,523	**$685,542**
DROC03a	18166	$6	$108,996	0	n/a	n/a	$0	1559.8	16	16	$0.65	$32,444	125.7	0	140	$1.80	$393,070	5.0	Res / Ag	$216,188	$141,440	42,432	**$793,129**
DROC03b	65748	$6	$394,487	0	n/a	n/a	$0	2501.3	16	16	$0.65	$52,027	187.7	0	210	$1.80	$945,491	12.1	Res / Ag	$520,020	$446,514	133,954	**$2,045,980**
DROC04	58096	$6	$348,576	0	n/a	n/a	$4,000	2176.8	16	16	$0.65	$45,277	188.6	0	210	$1.80	$822,830	10.5	Res / Ag	$452,557	$397,854	119,356	**$1,792,597**
DROC05a	14948	$6	$89,689	0	n/a	n/a	$26,000	1166	16	16	$0.65	$24,253	126.5	0	140	$1.80	$293,832	3.7	Res / Ag	$161,608	$139,942	41,982	**$637,364**
DROC05b	36629	$4	$146,517	0	n/a	n/a	$22,000	2857.2	16	16	$0.65	$59,430	126.5	0	140	$1.80	$720,014	9.2	Res / Ag	$396,008	$227,947	68,384	**$1,412,354**
DROC06a	60386	$6	$362,313	0	n/a	n/a	$51,000	2558	16	16	$0.65	$53,206	174.1	0	200	$1.80	$920,880	11.7	Res / Ag	$506,484	$466,520	139,956	**$2,033,840**
DROC06b	22657	$4	$90,627	2836	310	879082	$53,000	2664	16	16	$0.65	$55,411	72.0	0	80	$1.80	$191,808	4.9	Res / Ag	$210,989	$1,078,120	323,436	**$1,804,353**
#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	**#REF!**
DROC07	35538	$6	$213,227	0	n/a	n/a	$33,000	2482.4	16	16	$0.65	$51,634	132.9	0	150	$1.80	$670,248	8.5	Res / Ag	$368,636	$297,861	89,358	**$1,426,103**
99LTa	20470	$6	$122,822	0	n/a	n/a	$0	1572.9	16	16	$0.65	$32,716	127.2	0	140	$1.80	$396,371	5.1	Res / Ag	$218,004	$155,538	46,661	**$816,574**
99LTb	7253	$4	$29,012	0	n/a	n/a	$9,000	557.3	16	16	$0.65	$11,592	127.2	0	140	$1.80	$140,440	1.8	Res / Ag	$77,242	$49,603	14,881	**$282,166**
91LT	19211	$6	$115,266	0	n/a	n/a	$16,000	1105.6	16	16	$0.65	$22,996	147.3	0	170	$1.80	$338,314	4.3	Res / Ag	$186,072	$154,262	46,279	**$724,927**
47CH01a	28550	$4	$114,200	0	n/a	n/a	$0	1302.2	16	16	$0.65	$27,086	167.8	0	190	$1.80	$445,352	5.7	Res / Ag	$244,944	$141,286	42,386	**$873,968**
47CH01b	55421	$4	$221,682	0	n/a	n/a	$48,250	2527.8	16	16	$0.65	$52,578	167.8	0	190	$1.80	$864,508	11.0	Res / Ag	$475,479	$322,510	96,753	**$1,759,250**
47CH02	56167	$4	$224,668	0	n/a	n/a	$18,875	2476.2	16	16	$0.65	$51,505	180.1	0	200	$1.80	$891,432	11.4	Res / Ag	$490,288	$295,048	88,514	**$1,765,282**
47CH03	31295	$4	$125,180	3594	310	1114186	$0	2678	16	16	$0.65	$55,702	87.0	0	100	$1.80	$482,040	6.1	Res / Ag	$265,122	$1,295,068	388,521	**$2,430,751**
47CH04	21577	$4	$86,308	0	n/a	n/a	$130,000	1175.3	16	16	$0.65	$24,446	152.0	0	170	$1.80	$359,642	4.6	Res / Ag	$197,803	$240,754	72,226	**$870,425**

Culvert Cost

Location	ID	Length (ft.)	Number of Barrels	Culvert Dia./ Height	Unit	Width ft)	Length of Pipe/ Box Culvert (ft.)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	Inlet Headwall	Unit Cost ($/Ea.)	Inlet Headwall Cost	Outlet Headwall	Unit Cost ($/Ea.)	Outlet Headwall Cost	Required Land Acquisition (Ac.)	Zoning	Unit Cost ($/sf)	Culvert Land Acquisition Cost	Culvert Materials Cost	Culvert Contingencies Cost	Total Land, Construction, and Contingencies Costs
DROC / 115th Ave	DROC-C1	130	4	5	ft.	10	130	$2,100	$273,000	1	$5,700	$5,700	1	$9,900	$9,900	0.0	N/A	$0.00	$0	$288,600	$86,580	**$375,180**
DROC / 107th Ave	DROC-C2	110	4	5	ft.	8	110	$1,600	$176,000	1	$6,050	$6,050	1	$10,500	$10,500	0.0	N/A	$0.00	$0	$192,550	$57,765	**$250,315**
DROC / 103rd Ave RR Spur	DROC-C3	242.4	3	5	ft.	8	242.4	$1,200	$290,880	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$303,980	$91,194	**$395,174**
DROC / 99th Ave	DROC-C4	110	2	5	ft.	8	110	$800	$88,000	1	$4,950	$4,950	1	$8,600	$8,600	0.0	N/A	$0.00	$0	$101,550	$30,465	**$132,015**
DROC / 91st Ave	DROC-C5	150	2	5	ft.	10	150	$1,050	$157,500	1	$4,700	$4,700	1	$8,100	$8,100	0.0	N/A	$0.00	$0	$170,300	$51,090	**$221,390**
99th Ave Lateral / 1/8 mile S. of Van Buren	99LT-C1	100	3	5	ft.	10	100	$1,575	$157,500	1	$5,500	$5,500	1	$9,500	$9,500	0.0	N/A	$0.00	$0	$172,500	$51,750	**$224,250**
99th Ave Lateral / Van Buren St	99LT-C2	110	4	4	ft.	10	110	$2,100	$231,000	1	$6,200	$6,200	1	$10,700	$10,700	0.0	N/A	$0.00	$0	$247,900	$74,370	**$322,270**
91st Ave Lateral / Van Buren St	91LT-C1	185	3	4	ft.	10	185	$1,575	$291,375	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$304,475	$91,343	**$395,818**
47th Ave Channel / 1/2 mile S. of Lower Bu	47CH-C1	111	5	5	ft.	10	111	$2,625	$291,375	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$314,075	$94,223	**$408,298**
47th Ave Channel / Lower Buckeye Rd	47CH-C2	110	6	5	ft.	10	110	$3,150	$346,500	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$369,200	$110,760	**$479,960**
47th Ave Channel / Buckeye Rd	47CH-C3	323	3	5	ft.	8	323	$1,200	$387,600	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$400,700	$120,210	**$520,910**
47th Ave Channel / Det. Basin Entrance	47CH-C4	427	4	5	ft.	10	427	$2,100	$896,700	1	$6,500	$6,500	1	$11,200	$11,200	0.0	N/A	$0.00	$0	$914,400	$274,320	**$1,188,720**

Detention Basin Cost

I.D.	Basin Excavation Volume (cy)	Unit Cost ($/cy)	Detention Basin Excavation Cost	Length of Drain Pipe/ Box Culvert (ft.)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	# Of Manholes	Manhole Unit Cost ($)	Manhole Total Cost ($)	Headwall	Unit Cost ($/Ea.)	Headwall Cost	Inflow Spillway Area (ft^2)	Inflow Spillway Unit Cost ($/sf)	Inflow Spillway Cost	Basin Top Area (ac)	Required Land Acquisition (Ac.)	Unit Cost ($/sf)	Total Land Acquisition Cost	Landscape Restoration (sf)	Landscape Unit Cost ($/sf)	Total Landscape Cost	Total Construction Cost	Detention Basin Contingincies Cost	Total Construction, Land, and Landscape Costs
DRO Basin #1 - 111th Ave	279,897	$4.00	$1,119,588	156	$55	$8,580	1	$4,500	$4,500	1	$1,100	$1,100	3450.319	$5	$17,252	18	37	$0.99	$1,595,603	1611720	$1.80	$2,901,096	$1,151,020	$345,306	**$5,993,024**
DRO Basin #2 - 99th Ave	231,400	$4.00	$925,600	155	$55	$8,525	1	$4,500	$4,500	1	$1,100	$1,100	8933.477	$5	$44,667	28	34	$0.99	$1,466,230	1481040	$1.80	$2,665,872	$1,003,552	$301,066	**$5,436,720**
DRO Basin #3a - 91st Ave	184,000	$4.00	$736,000	2280	$55	$125,400	6	$4,500	$27,000	1	$1,100	$1,100	0	$5	$0	21	24	$0.99	$1,034,986	1045440	$1.80	$1,881,792	$889,500	$266,850	**$4,073,128**
DRO Basin #3b - 91st Ave	39,800	$4.00	$159,200	91	$55	$5,005	1	$4,500	$4,500	2	$1,100	$2,200	5889.458	$5	$29,447	7	7	$0.99	$301,871	304920	$1.80	$548,856	$200,352	$60,106	**$1,111,185**
47th Ave Basin	260,633	$4.00	$1,042,532	0	$55	$0	0	$4,500	$0	0	$1,100	$0	19153	$5	$95,767	35.1	43.875	$0.99	$1,892,083	1911195	$1.80	$3,440,151	$1,157,847	$347,354	**$6,837,435**

* Contingencies are based on 30% of total construction cost and include design and construction administration costs

Recommended Plan, Sheet 2 (Future Conditions)

Channel Cost

ID	Excavated Volume (cy)	Unit Cost ($/cy)	Excavation Cost	Concrete Volume (cy)	Unit Cost ($/cy)	Concrete Cost	Utility Relocation Cost	Channel Length (ft)	Left Access Road Width (ft)	Right Access Road Width (ft)	6" ABC Access Road Unit Cost ($/sf)	Access Road Cost	Total Corridor Width-Channel+Access Rd (ft)	Existing Right-of-Way Width (ft.)	New Right-of-Way Width Required (ft.)	Landscape Unit Cost ($/sf)	Total Landscape Cost	Required Land Acquisition (Ac.)	Zoning	Land Acquisition Cost	Total Construction Cost	Total Contingencies Cost	Total Construction, Land, Landscape, and Contingencies Costs
DRCC01a	2591	$6	$15,546	1431	310	443611	$0	4229.6	16	16	$0.65	$87,976	36.0	0	40	$1.80	$304,531	3.9	Res / Ag	$167,492	$547,133	164,140	**$1,183,296**
DRCC02a	83233	$6	$499,398	0	n/a	n/a	$0	2512.7	16	16	$0.65	$52,264	218.3	0	250	$1.80	$1,130,715	14.4	Res / Ag	$621,893	$551,662	165,499	**$2,469,769**
DRCC02b	83236	$4	$332,945	0	n/a	n/a	$0	2512.8	16	16	$0.65	$52,266	218.3	0	250	$1.80	$1,130,760	14.4	Res / Ag	$621,918	$385,211	115,563	**$2,253,453**
DRCC03a	118749	$6	$712,492	0	n/a	n/a	$0	3376.8	16	16	$0.65	$70,237	228.0	0	260	$1.80	$1,580,342	20.2	Res / Ag	$869,188	$782,729	234,819	**$3,467,079**
DRCC03b	88974	$4	$355,894	0	n/a	n/a	$0	2530.1	16	16	$0.65	$52,626	228.0	0	260	$1.80	$1,184,087	15.1	Res / Ag	$651,248	$408,520	122,556	**$2,366,411**
DRCC04	135542	$6	$813,254	0	n/a	n/a	$401,200	2645.9	16	16	$0.65	$55,035	298.9	0	330	$1.80	$1,571,665	20.0	Res / Ag	$864,416	$1,269,489	380,847	**$4,086,415**
DRCC05	133626	$6	$801,753	0	n/a	n/a	$405,150	2492.6	16	16	$0.65	$51,846	312.8	0	350	$1.80	$1,570,338	20.0	Res / Ag	$863,686	$1,258,749	377,625	**$4,070,398**
DRCC06a	53279	$6	$319,676	0	n/a	n/a	$280,950	2724.6	16	16	$0.65	$56,672	157.3	0	180	$1.80	$882,770	11.3	Res / Ag	$485,524	$657,297	197,189	**$2,222,780**
DRCC06b	47524	$4	$190,097	0	n/a	n/a	$280,800	2430.3	16	16	$0.65	$50,550	157.3	0	180	$1.80	$787,417	10.0	Res / Ag	$433,079	$521,447	156,434	**$1,898,378**
DRCC07	38872	$6	$233,233	0	n/a	n/a	$2,000	2778.2	16	16	$0.65	$57,787	131.8	0	150	$1.80	$750,114	9.6	Res / Ag	$412,563	$293,019	87,906	**$1,543,602**
DRCC08a	16589	$6	$99,537	0	n/a	n/a	$0	1079.1	16	16	$0.65	$22,445	146.0	0	170	$1.80	$330,205	4.2	Res / Ag	$181,613	$121,982	36,595	**$670,394**
DRCC08b	39611	$6	$237,667	0	n/a	n/a	$0	1250.2	16	16	$0.65	$26,004	212.6	0	240	$1.80	$540,086	6.9	Res / Ag	$297,048	$263,671	79,101	**$1,179,906**
DRCC09a	85313	$6	$511,879	0	n/a	n/a	$2,000	2484.3	16	16	$0.65	$51,673	223.4	0	250	$1.80	$1,117,935	14.3	Res / Ag	$614,864	$565,552	169,666	**$2,468,017**
DRCC09b	86999	$4	$347,997	0	n/a	n/a	$20,000	2533.4	16	16	$0.65	$52,695	223.4	0	250	$1.80	$1,140,030	14.5	Res / Ag	$627,017	$420,692	126,208	**$2,313,946**
DRCC10a	59491	$6	$356,944	0	n/a	n/a	$0	2564.6	16	16	$0.65	$53,344	173.2	0	200	$1.80	$923,256	11.8	Res / Ag	$507,791	$410,288	123,086	**$1,964,421**
DRCC10b	73636	$4	$294,545	0	n/a	n/a	$41,250	3174.4	16	16	$0.65	$66,028	173.2	0	200	$1.80	$1,142,784	14.6	Res / Ag	$628,531	$401,822	120,547	**$2,293,684**
DRCC11	44328	$6	$265,967	0	n/a	n/a	$15,000	2417.2	16	16	$0.65	$50,278	151.9	0	170	$1.80	$739,663	9.4	Res / Ag	$406,815	$331,244	99,373	**$1,577,096**
DRCC12	48123	$6	$288,740	0	n/a	n/a	$12,500	3037.1	16	16	$0.65	$63,172	139.2	0	160	$1.80	$874,685	11.2	Res / Ag	$481,077	$364,412	109,323	**$1,829,496**
DRCC13a	6581	$6	$39,488	0	n/a	n/a	$0	815.3	16	16	$0.65	$16,958	104.4	0	120	$1.80	$176,105	2.2	Res / Ag	$96,858	$56,447	16,934	**$346,343**
DRCC13b	13369	$6	$80,212	0	n/a	n/a	$0	1287.7	16	16	$0.65	$26,784	114.9	0	130	$1.80	$301,322	3.8	Res / Ag	$165,727	$106,997	32,099	**$606,144**
DRCC14	43585	$6	$261,507	0	n/a	n/a	$46,000	2421.5	16	16	$0.65	$50,367	149.0	0	170	$1.80	$740,979	9.5	Res / Ag	$407,538	$357,875	107,362	**$1,613,754**
DRCC15	18661	$6	$111,964	0	n/a	n/a	$30,000	2441	16	16	$0.65	$50,773	102.5	0	120	$1.80	$527,256	6.7	Res / Ag	$289,991	$192,737	57,821	**$1,067,805**
DRCC16	8243	$6	$49,457	1213	310	375930	$0	1287	16	16	$0.65	$26,770	67.0	0	80	$1.80	$185,328	2.4	Res / Ag	$101,930	$483,045	144,913	**$915,217**
DRCC17	13722	$6	$82,329	2119	310	656906	$10,000	2492.5	16	16	$0.65	$51,844	62.0	0	70	$1.80	$314,055	4.0	Res / Ag	$172,730	$860,900	258,270	**$1,605,955**
SUN01	69873	$6	$419,239	0	n/a	n/a	$0	3027.4	16	16	$0.65	$62,970	172.9	0	200	$1.80	$1,089,864	13.9	Res / Ag	$599,425	$482,209	144,663	**$2,316,161**
SUN02a	21814	$6	$130,882	0	n/a	n/a	$0	1388.5	16	16	$0.65	$28,881	138.8	0	160	$1.80	$399,888	5.1	Res / Ag	$219,938	$159,763	47,929	**$827,518**
SUN02b	18903	$6	$113,415	0	n/a	n/a	$0	1203.2	16	16	$0.65	$25,027	138.8	0	160	$1.80	$346,522	4.4	Res / Ag	$190,587	$138,442	41,533	**$717,083**
SUN02c	39448	$6	$236,690	0	n/a	n/a	$0	2511	16	16	$0.65	$52,229	138.8	0	160	$1.80	$723,168	9.2	Res / Ag	$397,742	$288,919	86,676	**$1,496,505**
SUN03a	48336	$6	$290,015	0	n/a	n/a	$0	2469.7	16	16	$0.65	$51,370	157.3	0	180	$1.80	$800,183	10.2	Res / Ag	$440,101	$341,384	102,415	**$1,684,083**
SUN03b	48549	$6	$291,295	0	n/a	n/a	$0	2480.6	16	16	$0.65	$51,596	157.3	0	180	$1.80	$803,714	10.3	Res / Ag	$442,043	$342,891	102,867	**$1,691,516**

Culvert Cost

Location	ID	Length (ft.)	Number of Barrels	Culvert Dia./ Height	Unit	Width ft)	Length of Pipe/ Box Culvert (ft.)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	Inlet Headwall	Unit Cost ($/Ea.)	Inlet Headwall Cost	Outlet Headwall	Unit Cost ($/Ea.)	Outlet Headwall Cost	Required Land Acquisition (Ac.)	Zoning	Unit Cost ($/sf)	Culvert Land Acquisition Cost	Culvert Materials Cost	Culvert Contingencies Cost	Total Land, Construction, and Contingencies Costs
DRCC / Dysart Rd	DRCC-C1a	110	7	5	ft.	10	110	$3,675	$404,250	1	$8,900	$8,900	1	$15,400	$15,400	0.0	N/A	$0.00	$0	$428,550	$128,565	**$557,115**
DRCC / 1/2 mile W. of El Mirage Rd	DRCC-C1b	110	7	5	ft.	10	110	$3,675	$404,250	1	$9,300	$9,300	1	$16,100	$16,100	0.0	N/A	$0.00	$0	$429,650	$128,895	**$558,545**
DRCC / 1/2 mile S. of Broadway Rd	DRCC-C3	110	8	5	ft.	10	110	$4,200	$462,000	1	$8,900	$8,900	1	$15,400	$15,400	0.0	N/A	$0.00	$0	$486,300	$145,890	**$632,190**
DRCC / Broadway Rd	DRCC-C4	110	8	5	ft.	10	110	$4,200	$462,000	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$484,700	$145,410	**$630,110**
DRCC / 115th Ave	DRCC-C5	151	7	5	ft.	10	151	$3,675	$554,925	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$577,625	$173,288	**$750,913**
DRCC / 111th Ave	DRCC-C6	110	8	5	ft.	10	110	$4,200	$462,000	1	$6,400	$6,400	1	$11,100	$11,100	0.0	N/A	$0.00	$0	$479,500	$143,850	**$623,350**
DRCC / 107th Ave	DRCC-C7	110	6	5	ft.	10	110	$3,150	$346,500	1	$6,400	$6,400	1	$11,100	$11,100	0.0	N/A	$0.00	$0	$364,000	$109,200	**$473,200**
DRCC / 103rd Ave	DRCC-C8	110	5	5	ft.	10	110	$2,625	$288,750	1	$6,700	$6,700	1	$11,600	$11,600	0.0	N/A	$0.00	$0	$307,050	$92,115	**$399,165**
DRCC / 99th Ave	DRCC-C9	110	4	5	ft.	8	110	$1,600	$176,000	1	$6,050	$6,050	1	$10,500	$10,500	0.0	N/A	$0.00	$0	$192,550	$57,765	**$250,315**
DRCC / 95th Ave	DRCC-C10	140	8	4	ft.	10	140	$4,200	$588,000	1	$6,200	$6,200	1	$10,700	$10,700	0.0	N/A	$0.00	$0	$604,900	$181,470	**$786,370**
DRCC / 91st Ave	DRCC-C11	110	5	5	ft.	10	110	$2,625	$288,750	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$311,450	$93,435	**$404,885**
DRCC / 87th Ave	DRCC-C12	110.4	5	5	ft.	10	110.4	$2,625	$289,800	1	$8,300	$8,300	1	$14,400	$14,400	0.0	N/A	$0.00	$0	$312,500	$93,750	**$406,250**
DRCC / 83rd Ave	DRCC-C13	110.5	5	5	ft.	10	110.5	$2,625	$290,063	1	$6,500	$6,500	1	$11,200	$11,200	0.0	N/A	$0.00	$0	$307,763	$92,329	**$400,091**
DRCC / 79th Ave	DRCC-C14	220	5	5	ft.	10	220	$2,625	$577,500	1	$6,500	$6,500	1	$11,200	$11,200	0.0	N/A	$0.00	$0	$595,200	$178,560	**$773,760**
DRCC / 75th Ave	DRCC-C15	146	4	5	ft.	10	146	$2,100	$306,600	1	$6,050	$6,050	1	$10,500	$10,500	0.0	N/A	$0.00	$0	$323,150	$96,945	**$420,095**
DRCC / Lower Buckeye Rd	DRCC-C16	110.2	4	5	ft.	10	110.2	$2,100	$231,420	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$244,520	$73,356	**$317,876**
DRCC / Buckeye Rd	DRCC-C17	110	3	5	ft.	8	110	$1,200	$132,000	1	$4,800	$4,800	1	$8,300	$8,300	0.0	N/A	$0.00	$0	$145,100	$43,530	**$188,630**
DRCC / Railroad	DRCC-C18	380.5	2	4	ft.	10	380.5	$1,050	$399,525	1	$3,900	$3,900	1	$6,700	$6,700	0.0	N/A	$0.00	$0	$410,125	$123,038	**$533,163**
DRCC / 67th Ave	DRCC-C19	110	4	4	ft.	10	110	$2,100	$231,000	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$245,500	$73,650	**$319,150**
SAC / 111th Ave	SUN-C1	110	3	5	ft.	10	110	$1,575	$173,250	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$187,750	$56,325	**$244,075**
SAC / 107th Ave	SUN-C2	110	3	5	ft.	10	110	$1,575	$173,250	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$187,750	$56,325	**$244,075**
SAC / 103rd Ave	SUN-C3	110	3	5	ft.	8	110	$1,200	$132,000	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$146,500	$43,950	**$190,450**
SAC / 99th Ave	SUN-C4	110	3	5	ft.	10	110	$1,575	$173,250	1	$5,300	$5,300	1	$9,200	$9,200	0.0	N/A	$0.00	$0	$187,750	$56,325	**$244,075**

Detention Basin Cost

I.D.	Basin Excavation Volume (cy)	Unit Cost ($/cy)	Detention Basin Excavation Cost	Length of Drain Pipe/ Box Culvert (ft.)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	# Of Manholes	Manhole Unit Cost ($)	Manhole Total Cost ($)	Headwall	Unit Cost ($/Ea.)	Headwall Cost	Inflow Spillway Area (ft^2)	Inflow Spillway Unit Cost ($/sf)	Inflow Spillway Cost	Basin Top Area (ac)	Required Land Acquisition (Ac.)	Unit Cost ($/sf)	Total Land Acquisition Cost	Landscape Restoration (sf)	Landscape Unit Cost ($/sf)	Total Landscape Cost	Total Construction Cost	Detention Basin Contingincies Cost	Total Construction, Land, and Landscape Costs
DRC Basin #1 - Dysart Rd	0	$4.00	$0	500	$55	$27,500	2	$4,500	$9,000	1	$1,100	$1,100	253571.9	$5	$1,267,859	137	150	$0.99	$6,468,660	6534000	$1.80	$11,761,200	$1,305,459	$391,638	**$19,926,957**
DRC Basin #2 - 95th Ave	202,900	$4.00	$811,600	221	$55	$12,155	1	$4,500	$4,500	1	$1,100	$1,100	4407.338	$5	$22,037	30	48	$0.99	$2,069,971	2090880	$1.80	$3,763,584	$851,392	$255,418	**$6,940,364**
DRC Basin #3 - 73rd Ave	79,000	$4.00	$316,000	200	$55	$11,000	1	$4,500	$4,500	1	$1,100	$1,100	2129.961	$5	$10,650	9.1	16.53	$0.99	$712,846	720046.8	$1.80	$1,296,084	$356,826	$107,048	**$2,472,804**
DRC Basin #4 - 71st Ave	180,000	$4.00	$720,000	1161	$55	$63,855	3	$4,500	$13,500	1	$1,100	$1,100	6748.109	$5	$33,741	16	29.25	$0.99	$1,261,389	1274130	$1.80	$2,293,434	$850,448	$255,134	**$4,660,405**

* Contingencies are based on 30% of total construction cost and include design and construction administration costs

APPENDIX C

Southwest Area Re-Study

DURANGO AREA DRAINAGE MASTER PLAN

Contract FCD# 99-41

SOUTHWEST AREA RE-STUDY

Prepared for:

Flood Control District of Maricopa County

Prepared by:

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

2633 East Indian School Road, Suite 401
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Durango ADMP Southwest Area Alternatives Analysis

A brainstorming meeting was held December 12, 2001 to identify new alternatives for the southwest area of the Durango Area Drainage Master Plan. This area of the Plan is being re-evaluated due to analysis of the residual floodplains that proved the Recommended Plan specified in a Draft of the Recommended Design Report was inadequate to alleviate the majority of flooding issues along the Buckeye Feeder Canal.

The southwest portion of the Master Plan consists of three main areas. The first area, denoted with the letter 'A', is between 91st Avenue and 99th Avenue, ½ mile south of Broadway Road. The second area, denoted with the letter 'B', is along 115th Avenue centered around the Buckeye Feeder Canal. The third area, denoted with the letter 'C', is the outfall to the Agua Fria River, either north or south of the Avondale Wastewater Treatment Plant. Each area has multiple alternatives of which one will be identified then combined with the chosen alternatives of the other areas to form an overall preferred alternative.

Several seed alternatives were presented at the meeting and are identified as alternatives A1, A2, A3, B1, B2a, B2b, C1, C2, and C3. An additional alternative and a couple variations were identified at the brainstorming meeting and are denoted with the letter 'D'. A common feature in all of the alternatives is a channel along the Sunland Avenue alignment to provide conveyance and flood relief between 91st Avenue and 115th Avenue. Therefore all of the alternatives shown here include a channel along this alignment, however one possible variation is a non-structural option along Sunland Avenue, instead regulating the floodplain in the area. This would effectively eliminate Alternative A2.

The alternatives are described herein including the advantages and disadvantages of each alternative, incorporating the effectiveness of reducing the residual floodplain, the feasibility of implementation, and the impact on the Durango ADMP. Based on this analysis, one alternative will be selected for further evaluation.

91st Avenue Alternatives

Alternative A1

Description:
Alternative A1 consists of a channel along the west side of 91st Avenue from ¼ mile south of Broadway Road to the Salt River. The intent of the channel is to capture runoff generated east of 91st Avenue and convey it south to the Salt River, thus reducing the runoff contributing to the Sunland Avenue floodplain and the Buckeye Feeder Canal. This alternative is consistent with the original Recommended Plan as specified in the Draft of the Recommended Design Report.

Advantages:
Reduces peak flows immediately west of 91st Avenue from between 500 and 550 cfs to between 0 and 550 cfs.
Protects the proposed Tres Rios Regulating Wetland from stormwater runoff originating east of 91st Avenue.

Disadvantages:
Peak flows return to existing values approximately ¾ mile west of 91st Avenue, only slightly reducing the residual floodplain along Sunland Avenue.
No benefit to the Buckeye Feeder Canal.

Effect on Residual Floodplain:
Alternative A1 would only slightly reduce the existing floodplain just west of 91st Avenue. There is very little benefit nearing 99th Avenue and further west. The local runoff within each drainage subarea is large enough to create a floodplain in low-lying areas such as the Sunland Avenue alignment without adequate conveyance along the main flow path. The greatest benefit is to the proposed Tres Rios Regulating Wetland, which would then have less offsite runoff to handle.

Feasibility of Implementation:
Alternative A1 is consistent with the original Recommended Plan and can be implemented fairly easily. The major challenges are the crossing of the 114" ANPP effluent water pipe and the coordination (logistic and financial) with the U.S. Army Corps of Engineers for issues regarding the proposed Tres Rios project.

Impact on the Durango ADMP:
Since Alternative A1 is consistent with the original intent and objectives of the ADMP as specified in the Draft of the Recommended Design Report, the impact on the overall Master Plan will be negligible.

Alternative A2

Description:
Alternative A2 consists of a channel along the Sunland Avenue alignment, approximately ¼ mile north of Southern Avenue, between 91st Avenue and 99th Avenue. The intent of the channel is to capture runoff generated east of 91st and north of the channel and convey it west to eventually outfall into the Agua Fria River.

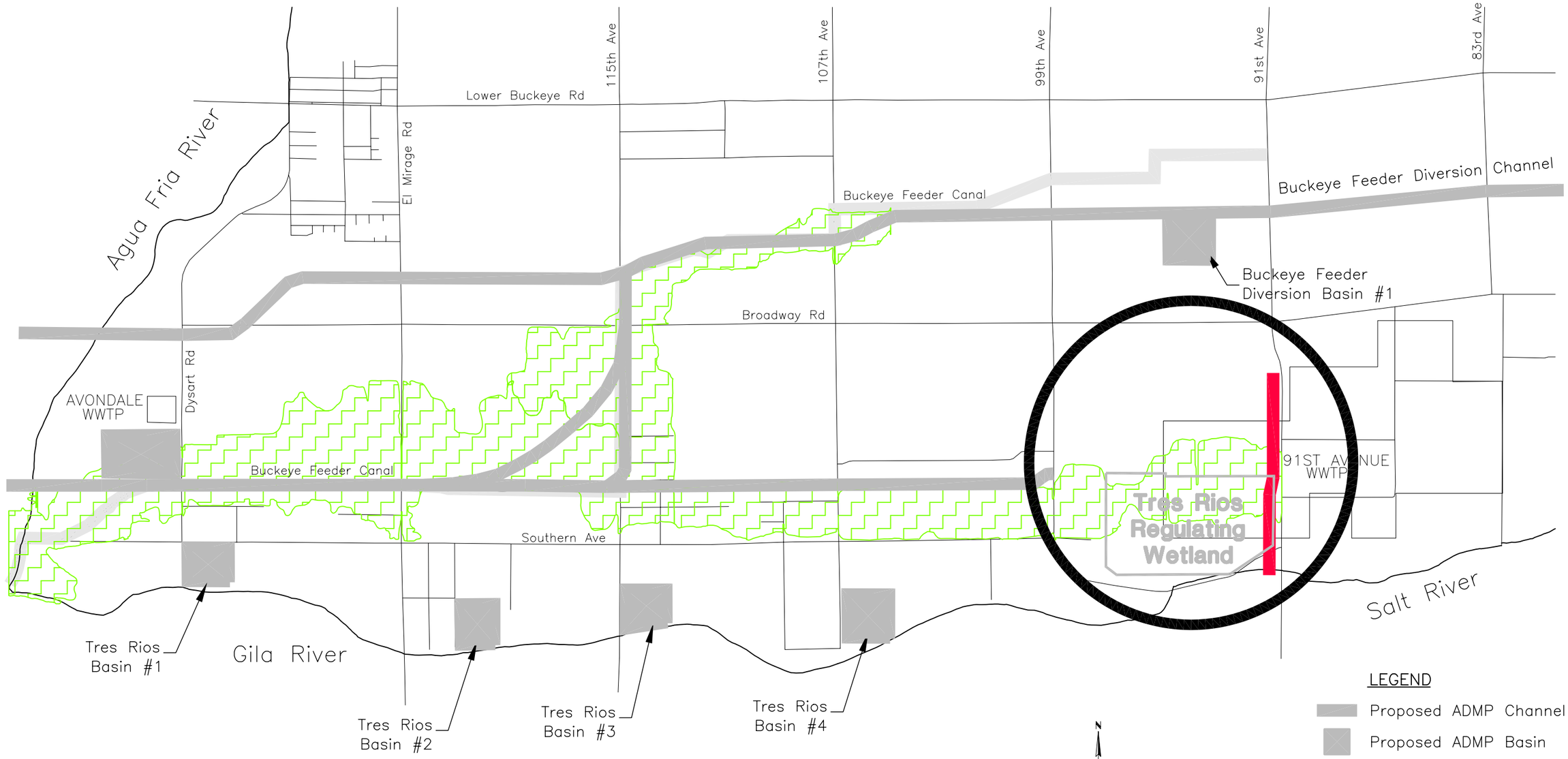
Advantages:
Efficiently conveys runoff to the west.
Fully protects the proposed Tres Rios Regulating Wetland from stormwater runoff.
Eliminates the Sunland Avenue floodplain between 91st Avenue and 99th Avenue.
Avoids potential conflict with 114" ANPP effluent line.

Disadvantages:
Higher cost than "Do-Nothing" Alternative

Effect on Residual Floodplain:
Alternative A2 eliminates the Sunland Avenue floodplain between 91st Avenue and 99th Avenue. In conjunction with a channel along the Sunland Avenue alignment to 115th Avenue, the Sunland Avenue tributary floodplain will be fully contained from 91st Avenue to 115th Avenue. This portion of the channel between 91st Avenue and 99th Avenue would remove approximately 9 homes from the floodplain.

Feasibility of Implementation:
Alternative A2 can be simply integrated into the Recommended Plan. This alternative ties into the upstream end of the Sunland Avenue channel. The major challenge of this alternative is the coordination (logistic and financial) with the U.S. Army Corps of Engineers for issues regarding the proposed Tres Rios project.

Impact on the Durango ADMP:
Alternative A2 is anticipated to be consistent with the original intent and objectives of the ADMP as specified in the Draft of the Recommended Design Report with respect to design criteria and multi-use considerations. The only deviation is the east-west alignment, which does not allow access to the Salt River versus a north-south alignment, which would allow access to the river.



Features
- Channel along 91st Avenue conveys runoff south to the Salt River.

Benefits
- Reduces peak flows west of 91st Avenue
- Slightly reduces floodplain between 91st Avenue and 99th Avenue
- Helps protect Tres Rios Regulating Wetland from stormwater runoff

OPTION SW–A1

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99–41

CONSULTANT:
DIBBLE & ASSOCIATES
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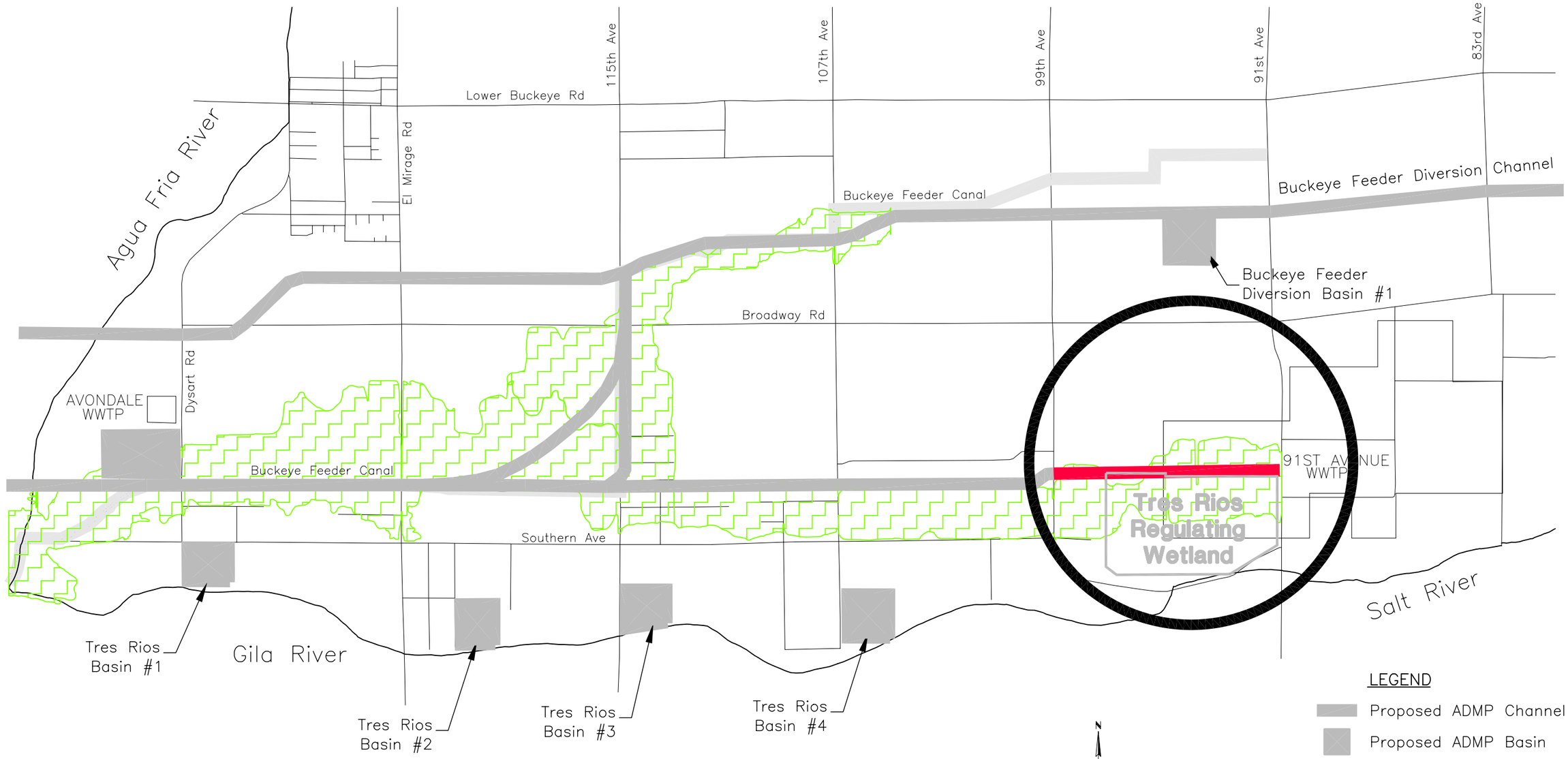
EXHIBIT TITLE:
SOUTHWEST AREA ALTERNATIVES
12/12/01



Features
- Channel north of Tres Rios Regulating Wetland conveys runoff west to the Agua Fria River.

Benefits
- Eliminates floodplain between 91st Avenue and 99th Avenue
- Protects Tres Rios Regulating Wetland from stormwater runoff

OPTION SW–A2

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99–41

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Alternative A3

Description:
Alternative A3 is a "Do-Nothing" alternative for this portion of the study area. The 91st Avenue Channel as specified in the Draft of the Recommended Design Report would be removed from the exhibits and the preliminary design plans.

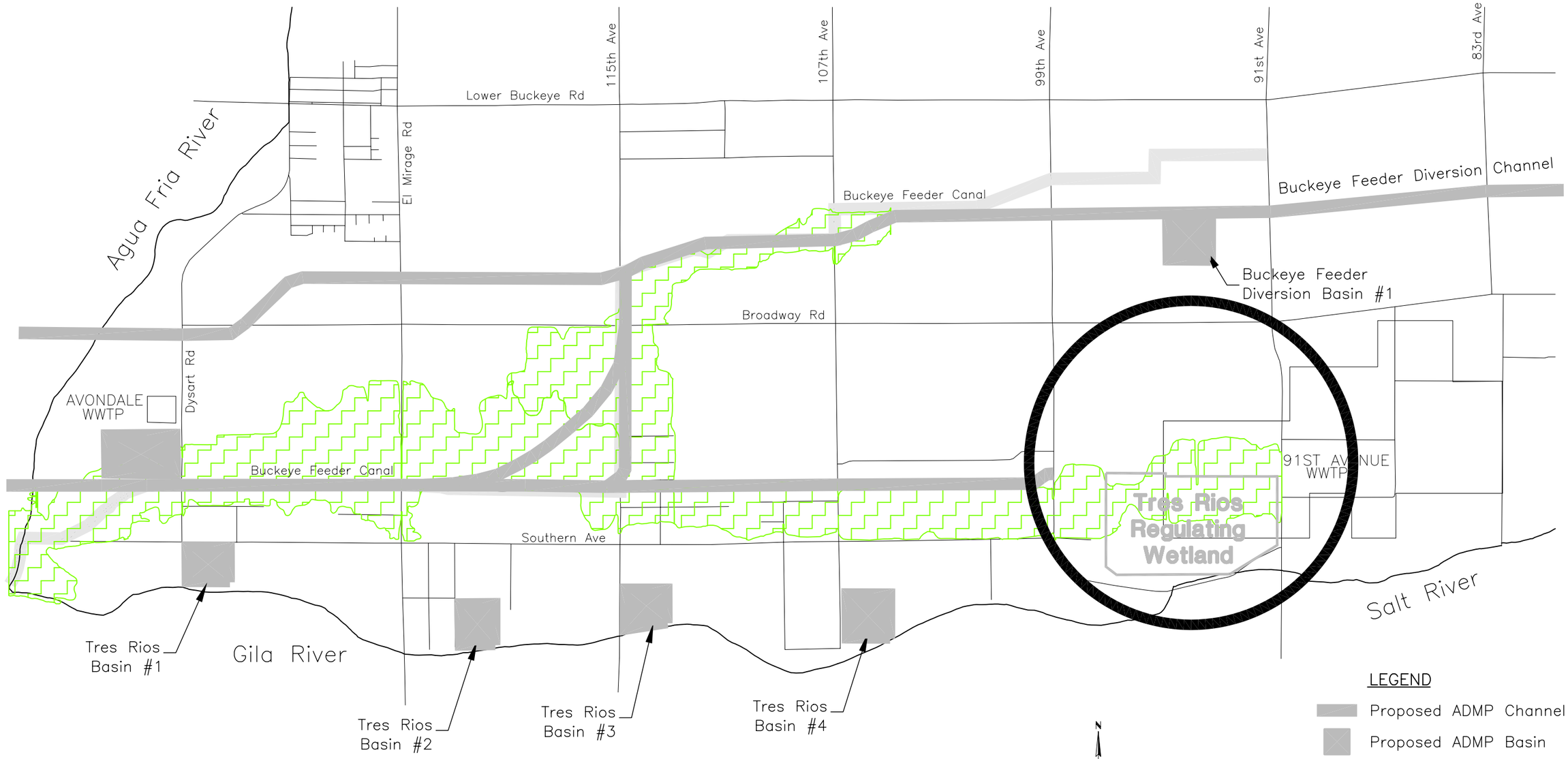
Advantages:
No cost to ADMP project.

Disadvantages:
USACE and Tres Rios Regulating Wetland have to consider local runoff.
Approximately 9 homes would still be prone to flooding.

Effect on Residual Floodplain:
Alternative A3 would have no effect on reducing the residual floodplain between 91st Avenue and 99th Avenue.

Feasibility of Implementation:
Alternative A3 is an easy alternative to implement, as there would be no construction project.
Approximately 9 homes may still be prone to flooding and would have to be handled on a regulatory basis.
The U.S. Army Corps of Engineers would have to consider the local runoff between 91st Avenue and 99th Avenue during the planning and design of the Tres Rios Regulating Wetland.

Impact on the Durango ADMP:
Impact on the ADMP would be minimal. The only change from the original intent and objectives of the ADMP is regarding providing access to the Salt River, which would no longer be available.



Features
- Tres Rios Regulating Wetland accepts local stormwater runoff
- No channel between 91st Avenue and 99th Avenue

Benefits
- Lower cost

OPTION SW–A3

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PROJECT NO. FCD 99–41

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115th Avenue Alternatives

Alternative B1

Description:
Alternative B1 consists of constructing a set of parallel channels from 115th Avenue to the outfall at the Agua Fria River. The north channel is consistent with the Recommended Plan as specified in the Draft of the Recommended Design Report. The south channel is required to convey flow west from the Sunland Avenue channel. The proposed alignment would replace the Buckeye Feeder Canal and put irrigation flows in a pipe.

Advantages:
Eliminates the floodplain along the Buckeye Feeder Canal.
Smaller channel size because of parallel system.
Provides multiple facilities for regional drainage for developers.

Disadvantages:
Multiple channels typically more costly because of land acquisition cost.
Berms would be required along channel banks, depending on outfall solution, which would create an interior drainage issue.
Multiple outfalls into Agua Fria River.

Effect on Residual Floodplain:
Alternative B1 would eliminate the floodplain along the Buckeye Feeder Canal from 115th Avenue to the Agua Fria River. The residual floodplain would be significantly reduced along 115th Avenue.

Feasibility of Implementation:
Alternative B1 may require berms along the channel banks to prevent flooding from the backwater effect of the Agua Fria River. The need for berms is discussed in detail in the outfall alternatives descriptions.

This alternative may not be the most efficient solution in terms of cost effectiveness due to the high expense of acquiring land.

Impact on the Durango ADMP:
Alternative B1 would be consistent with the original intent and objective of the ADMP as specified in the Draft of the Recommended Design Report with respect to design criteria and multi-use considerations.

Alternative B2a

Description:
Alternative B2a consists of modifying the original channel of the Recommended Plan as specified in the Draft of the Recommended Design Report to turn south along the east side of 115th Avenue, and then follow the Buckeye Feeder Canal alignment west to the Agua Fria River. Irrigation flows would be tiled. The proposed Sunland Avenue channel would connect to the proposed main channel at 115th Avenue, ¼ mile north of Southern Avenue. The intent of the channel is to provide a single conveyance facility to efficiently provide flood relief.

Advantages:
Efficient conveyance of stormwater from throughout the region.
Eliminates floodplain along 115th Avenue.
Eliminates floodplain along Buckeye Feeder Canal.
Lower overall cost compared to parallel system.

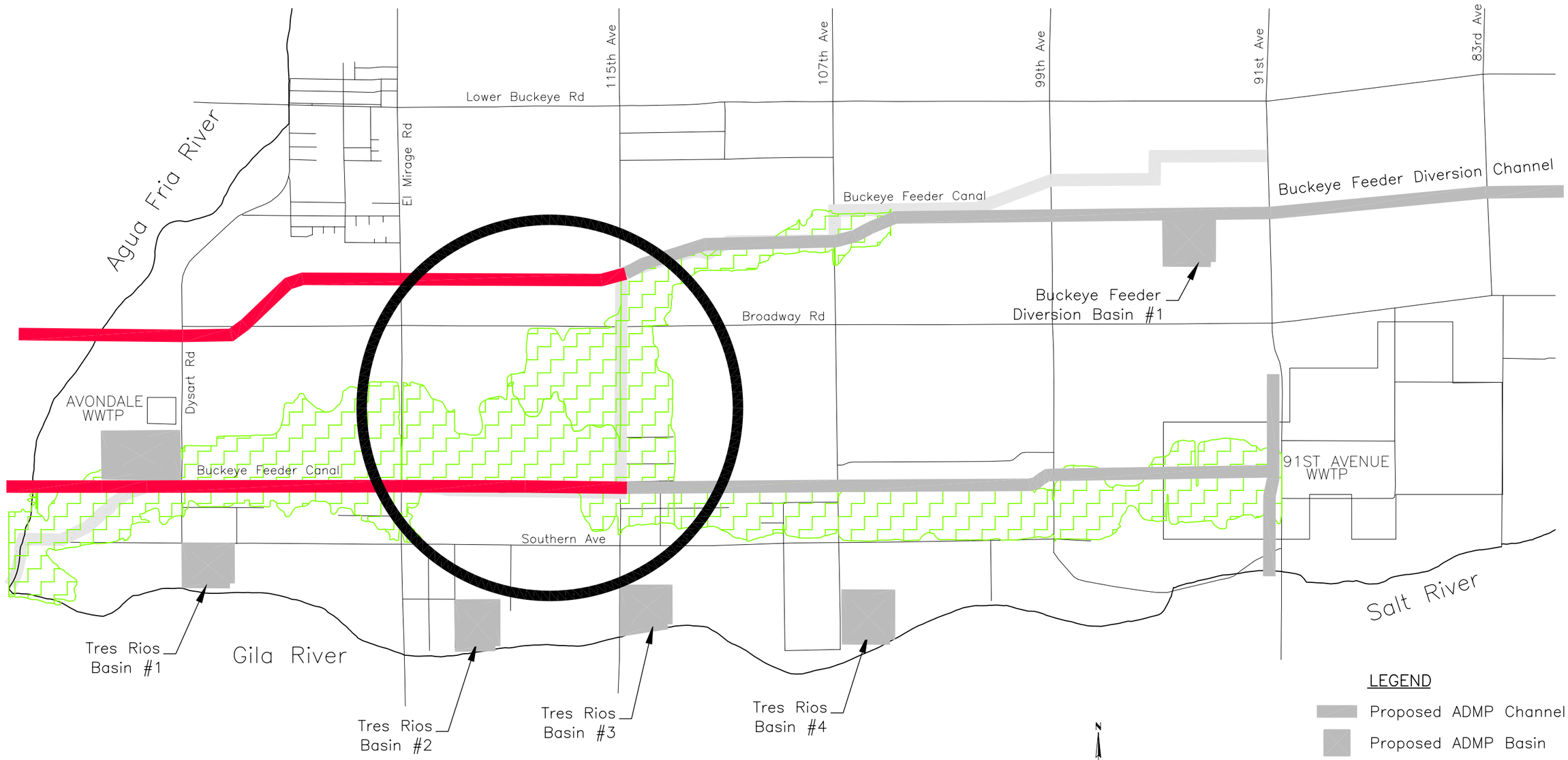
Disadvantages:
Berms may be required along channel banks, depending on outfall solution (Same as Alternative B1).
Steep slope along 115th Avenue may require hard channel lining.
May impact some homes and businesses along 115th Avenue depending on size of channel.

Effect on Residual Floodplain:
Alternative B2a would eliminate the floodplain along 115th Avenue and along the Buckeye Feeder Canal from 115th Avenue to the Agua Fria River.

Feasibility of Implementation:
Alternative B2a will require a more detailed investigation regarding constructing a channel along 115th Avenue. Topographically, the ideal alignment is along the east side of the road, however there are a number of homes as well as a dairy operation that may require modifications.

This alternative is efficient, considering the need for a channel along the Sunland Avenue alignment which could easily connect at the corner of the alignment.

Impact on the Durango ADMP:
Alternative B2a would be a significant modification to the original intent and objective of the ADMP as specified in the Draft of the Recommended Design Report with respect to design criteria and multi-use considerations. The likely need for a hard channel lining is inconsistent with providing a more kind and gentle facility for use in conjunction with other activities. However, a trail could still be built along the channel, though the aesthetic value of a hard-lined channel is low.



Features
- Parallel channels along Broadway Road and Buckeye Feeder Canal conveys runoff west to the Agua Fria River.

Benefits
- Eliminates floodplain along Buckeye Feeder Canal
- Smaller channel size because of parallel system

OPTION SW–B1

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PROJECT NO. FCD 99–41

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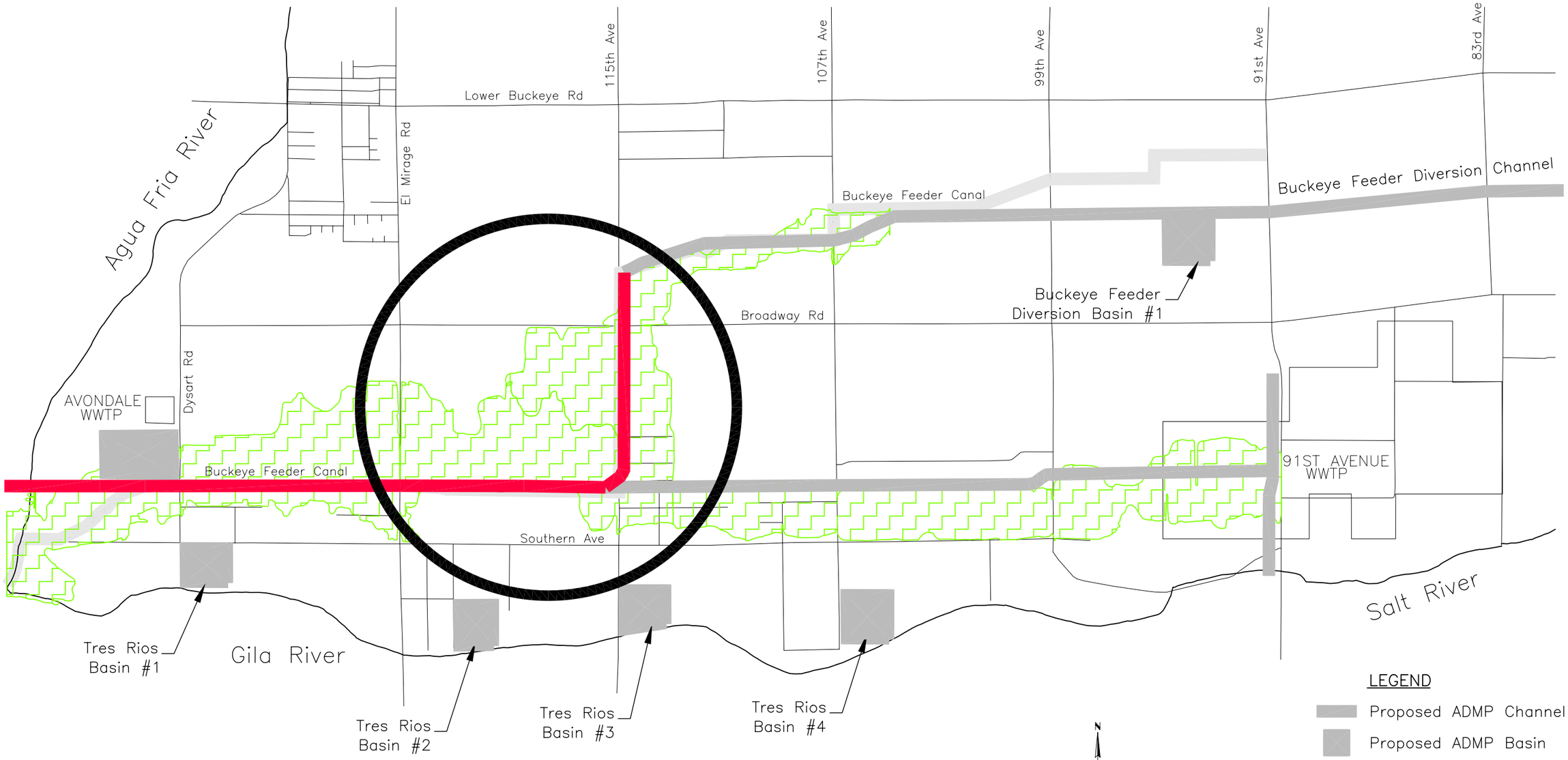

LEGEND

- Proposed ADMP Channel
- Proposed ADMP Basin
- Existing Floodplain

N

0 625 1250 2500 3750 5000

SCALE IN FEET

Features

– Single channel along 115th Avenue and Buckeye Feeder Canal conveys runoff west to the Agua Fria River.

Benefits

– Eliminates floodplain along 115th Avenue and along Buckeye Feeder Canal
– Lower overall cost compared to parallel system

OPTION SW–B2a

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Alternative B2b

Description:
Alternative B2b is identical to Alternative B2a with the exception that the channel would deviate from 115th Avenue in a curvilinear alignment and get back to the Buckeye Feeder Canal alignment just east of El Mirage Road. Irrigation flows would still need to be tiled. The proposed Sunland Avenue channel would connect to the proposed main channel approximately ¼ mile east of El Mirage Road, ¼ mile north of Southern Avenue. The intent of the channel is to provide a single conveyance facility to efficiently provide flood relief.

Advantages:
Kinder and gentler curvilinear alignment.
May not require hard channel lining.
Eliminates floodplain along 115th Avenue.
Eliminates floodplain along Buckeye Feeder Canal.
Lower overall cost compared to parallel system.

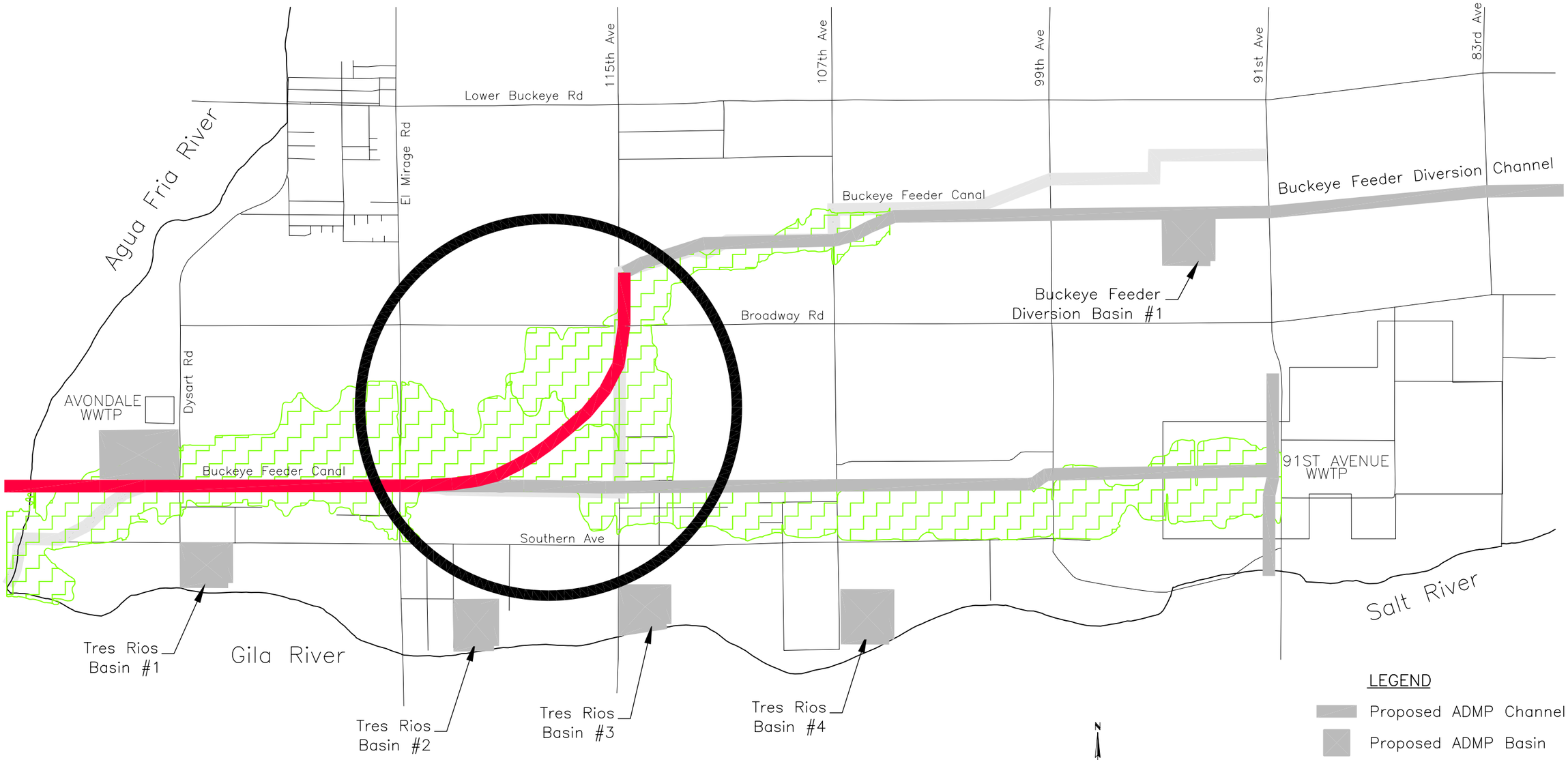
Disadvantages:
Berms may be required along channel banks, depending on outfall solution.

Effect on Residual Floodplain:
Alternative B2b would eliminate the floodplain along 115th Avenue and along the Buckeye Feeder Canal from 115th Avenue to the Agua Fria River.

Feasibility of Implementation:
Alternative B2b will require a more detailed investigation regarding constructing a channel along 115th Avenue and curvilinear through the existing farm field. There are a number of homes as well as a dairy operation that may require modifications.

This alternative is efficient in conveying runoff from the region to the outfall in the Agua Fria River.

Impact on the Durango ADMP:
Assuming a hard channel lining would not be required, Alternative B2b would be consistent with the original intent and objective of the ADMP as specified in the Draft of the Recommended Design Report with respect to design criteria and multi-use considerations.



LEGEND

- Proposed ADMP Channel
- Proposed ADMP Basin
- Existing Floodplain

N

0 625 1250 2500 3750 5000

SCALE IN FEET

Features

- Single channel along 115th Avenue and Buckeye Feeder Canal conveys runoff west to the Agua Fria River.

Benefits

- Eliminates floodplain along 115th Avenue and along Buckeye Feeder Canal
- Lower overall cost compared to parallel system
- Curvilinear alignment

OPTION SW–B2b

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PROJECT NO. FCD 99–41

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12/12/01

Outfall Alternatives

Alternative C1

Description:
Alternative C1 can be constructed in conjunction with any of the other alternatives and consists of an outfall(s) discharging directly into the Agua Fria River. The channel alignment(s) would be along Broadway Road and along the Buckeye Feeder Canal, or only along the Buckeye Feeder Canal. If Alternative B1 is selected, parallel outfalls to the Agua Fria River are required. If Alternative B2a or B2b is selected, only a single outfall is required. No retention near the outfall is intended as part of this alternative.

Advantages:
Lower land cost without retention.
Simple coordination

Disadvantages:
Berms required along channel banks.

Effect on Residual Floodplain:
This alternative, as well as Alternative C2 and Alternative C3 provide an outfall solution for Alternatives B1, B2a, and B2b. The residual floodplain is directly affected by the selection of Alternative B1, B2a, or B2b. As such, this alternative has no independent effect on the residual floodplain. However, because of the berms required on the channels, a small floodplain may still exist due to ponding along the channels and would need to be delineated and regulated.

Feasibility of Implementation:
Alternative C1 would require berms along the channel banks to prevent flooding from the backwater effect of the Agua Fria River. The berms would extend back to 115th Avenue on the south channel (Alt B1, B2a, or B2b) and back to El Mirage Road on the north channel (Alt B1). When berms are constructed, additional consideration needs to be given to handling local drainage behind the berms.

Impact on the Durango ADMP:
Alternative C1 would be consistent with the original intent and objective of the ADMP as specified in the Draft of the Recommended Design Report with respect to design criteria and multi-use considerations.

Alternative C2

Description:
Alternative C2 can be constructed in conjunction with either Alternative B2a or B2b and consists of an outfall which discharges directly into the Agua Fria River along with a retention basin to handle local drainage. The channel alignment would be along the Buckeye Feeder Canal while the retention basin would be west of Dysart Road in conjunction with a local sand and gravel pit. The purpose of the retention basin is to handle all of the local flow that would pond behind the berms of the proposed channel.

Advantages:
Provides a solution to handle local drainage behind berms.

Disadvantages:
Coordination / timing of the use of the retention basin with the sand and gravel operation.

Effect on Residual Floodplain:
This alternative, as well as Alternative C1 and Alternative C3 provide an outfall solution for Alternatives B1, B2a, and B2b. The residual floodplain is directly affected by the selection of Alternative B1, B2a, or B2b. As such, this alternative has no independent effect on the residual floodplain. However, because the retention basin handles local drainage and ponding caused by the berms no flooding due to ponding is anticipated.

Feasibility of Implementation:
Alternative C2 would still require berms along the channel banks to prevent flooding from the backwater effect of the Agua Fria River. The berms would extend back to 115th Avenue on the channel. When berms are constructed, additional consideration needs to be given to handling local drainage behind the berms. It is intended that a small swale or side channel north of the main proposed channel be constructed to convey local drainage to the retention basin.

Coordination with the owners of the sand and gravel operation will be required. Based on the excavation already completed in the sand and gravel pit, adequate storage volume currently exists.

Impact on the Durango ADMP:
Alternative C2 would be consistent with the original intent and objective of the ADMP as specified in the Draft of the Recommended Design Report with respect to design criteria and multi-use considerations.

Features
- Single or parallel channels convey runoff west to the Agua Fria River without use of retention for local runoff (to reduce ponding due to channel berming)

Benefits
- Eliminates floodplain
- No major coordination with sand and gravel pit

OPTION SW–C1

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99–41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

EXHIBIT TITLE:
SOUTHWEST AREA ALTERNATIVES
12/12/01

Features
- Single or parallel channels convey runoff west to the Agua Fria River with use of sand and gravel pit for retention of local runoff

Benefits
- Eliminates floodplain
- Eliminates local runoff ponding due to berming of outfall channel

OPTION SW–C2

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99–41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
SOUTHWEST AREA ALTERNATIVES
12/12/01

Alternative C3

Description:
Alternative C3 can be constructed in conjunction with either Alternative B2a or B2b and consists of a channel that would outfall directly into a retention basin while also handling local drainage. The channel alignment would be along the Buckeye Feeder Canal while the retention basin would be west of Dysart Road in conjunction with a local sand and gravel pit. The purpose of the retention basin is to handle all of the flow that would reach it from the conveyance channel and then slowly release the runoff over a period of time.

Advantages:
No berms required along channel banks.

Disadvantages:
Coordination / timing of the use of the retention basin with the sand and gravel operation.
Pumping may be required to fully drain the retention basin.

Effect on Residual Floodplain:
This alternative, as well as Alternative C1 and Alternative C2 provide an outfall solution for Alternatives B1, B2a, and B2b. The residual floodplain is directly affected by the selection of Alternative B1, B2a, or B2b. As such, this alternative has no independent effect on the residual floodplain. However, because no berms are required on the channels, no flooding due to ponding is anticipated.

Feasibility of Implementation:
Alternative C2 would not require berms along the channel banks and would be easily constructed. Only a small pipe outlet would be required to drain the retention basin, possibly with the help of a pump. Based on the excavation already completed in the sand and gravel pit, adequate storage volume may not currently exist. However the ultimate excavation volume planned for the sand and gravel pit is far greater than the volume anticipated to store the stormwater runoff from the drainage area. Therefore coordination with the owner and analysis to determine when the pit will have adequate storage volume, will be required.

Impact on the Durango ADMP:
Alternative C3 would be consistent with the original intent and objective of the ADMP as specified in the Draft of the Recommended Design Report with respect to design criteria and multi-use considerations. The only change is in regard to an access point to the Agua Fria River, which would be eliminated with this option, however a trail could still be built for access to the river.

Features
- Single channel conveys runoff west to the Agua Fria River with use of retention for entire runoff
- Low level outlet pipe drains retention after flow in river subsides

Benefits
- Eliminates floodplain
- No berming of outfall channel required. No backwater effect from river.

OPTION SW–C3

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99–41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
SOUTHWEST AREA ALTERNATIVES
12/12/01

Brainstorming Meeting Alternatives

The following alternative consists of a combination of some of the previous "seed" alternatives as well as some new concepts as discussed at the brainstorming meeting. This alternative is designated with a 'D' and is described more as a complete drainage system (solution), rather than an analysis on an area-by-area basis.

Alternative D1

Description:
Alternative D1 consists of a single main channel mostly following the Buckeye Feeder Canal alignment with a small deviation west of 115th Ave to allow for property frontage by developers along 115th Avenue. Near the outfall at the Agua Fria River, the channel bends north into a proposed retention basin immediately west of the Avondale Wastewater Treatment Plant.

This alternative also includes a channel or storm drain along the Sunland Avenue alignment from 91st Avenue to El Mirage Road but instead with the capacity for a 10-year runoff event rather than a 100-year event. There is a small 10-acre piece of property owned by MCDOT at the northwest corner of 99th Avenue and Southern Avenue, which could possibly be used to retain a portion of the runoff along the Sunland Avenue alignment.

This alternative is similar in nature to Alternatives A2, B2b, and C3.

Advantages:
Efficiently conveys runoff to the west.
Fully protects the proposed Tres Rios Regulating Wetland from stormwater runoff.
Eliminates the Sunland Avenue floodplain between 91st Avenue and 99th Avenue.
Kinder and gentler curvilinear alignment.
May not require hard channel lining.
Eliminates floodplain along 115th Avenue.
Eliminates floodplain along Buckeye Feeder Canal.
Lower overall cost compared to parallel system.
No berms required along channel banks.

Disadvantages:
Turning channel north near outfall may be against the grade of the land.
May not fully eliminate Sunland Avenue floodplain.

Effect on Residual Floodplain:
Alternative D1 would eliminate the floodplain along the Buckeye Feeder Canal from 115th Avenue to the Agua Fria River. It would reduce the floodplain along 115th Avenue. The floodplain along the Sunland Avenue alignment would be significantly reduced.

Feasibility of Implementation:
Alternative D1 will require a more detailed analysis regarding constructing a channel along 115th Avenue and curvilinear through the existing farm field. Alternative D1 would not require berms along the channel banks and would be easily constructed. Only a small pipe outlet would be required to drain the retention basin.

Impact on the Durango ADMP:
Impact on the ADMP would include the addition of plans for the retention basin, the Sunland Avenue system, and modifications to the existing plans due to the new channel location.

Additional Variations of Alternatives

1) Reconstruct 115th Avenue further to the west to allow room for a new channel on the east side of the roadway.

2) Variation of Alternative B2a consisting of a single main channel mostly following the Buckeye Feeder Canal alignment with a small deviation at the 111th Avenue alignment north of Broadway, to bring the channel approximately 1/3 mile south of Broadway Road and then west to cross 115th Avenue. This variation basically has the same advantages, disadvantages, residual floodplain issues, feasibility of implementation, and impact on the ADMP as Alternative B2a.

Lower Buckeye Rd

115th Ave

107th Ave

99th Ave

91st Ave

83rd Ave

Agua Fria River

El Mirage Rd

Buckeye Feeder Canal

Buckeye Feeder Diversion Channel

Buckeye Feeder
Diversion Basin #1

Broadway Rd

Dysart Rd

AVONDALE
WWTP

91ST AVENUE
WWTP

Buckeye Feeder Canal

Tres Rios
Regulating
Wetland

Southern Ave

Salt River

Tres Rios
Basin #1

Gila River

Tres Rios
Basin #2

Tres Rios
Basin #3

Tres Rios
Basin #4

LEGEND

Proposed ADMP Channel

Proposed ADMP Basin

Existing Floodplain

N

0 625 1250 2500 3750 5000

SCALE IN FEET

OPTION SW–D1

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99–41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
SOUTHWEST AREA ALTERNATIVES
02/05/02

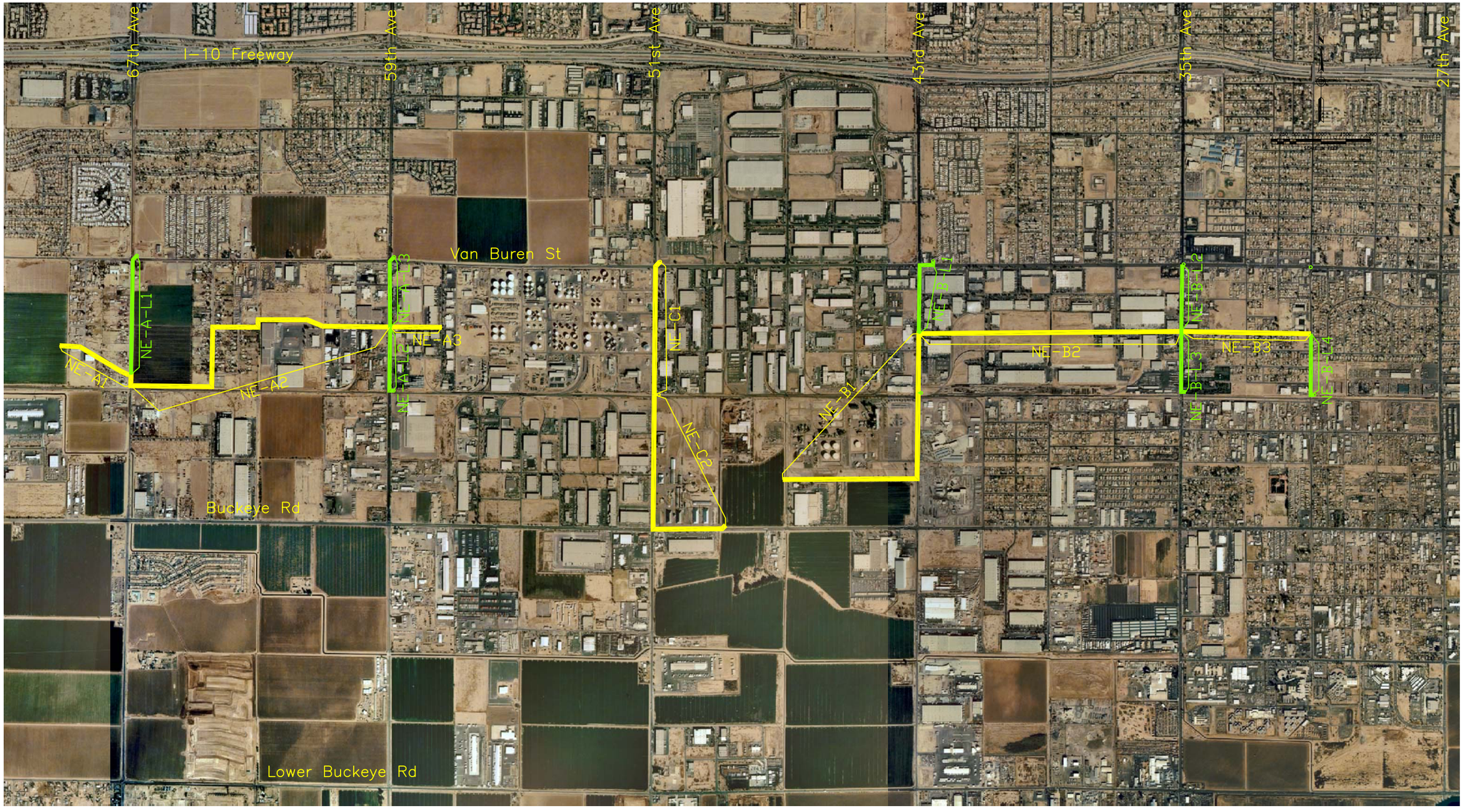
Results & Recommendations

The Review Committee chose a combination of the previously described alternatives for implementation into the overall Recommended Plan. The results can be seen on Figure V-1 of the Recommended Design Report. The following alternatives were selected and incorporated into the ADMP.

Area A	Alternative A3 – Do Nothing
Area B	Alternative B2b – With a slightly refined s-shape alignment
Area C	Alternative C3 – with a low level bypass

APPENDIX D

Northeast Area Alternatives Analysis



PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
NE AREA ALIGNMENTS
04/25/01

NorthEast Area Solution (10 Year Storm)

CHANNEL (BOX CULVERT STORM DRAIN) CAPACITIES AND COSTS

I.D.	Design Q (cfs)	Q (cfs)	Downstream Ground Elevation	Upstream Ground Elevation	Length (ft.)	Ground Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop Difference(ft.)	No. of Drop Structures	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width (ft.)	Depth of Flow (ft.)	Sideslope (H:1)	Area of Flow (sf.)	Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Top Width (ft)	Proposed R/W Width (ft)		Excavated Volume (cy)	Unit Cost ($/cy)	Excavation Cost	Length (ft.)	Unit Cost ($/ft)	Storm Drain Cost	Fence Length (ft.)	Unit Cost ($/lf)	Fence Cost	Riprap Volume (cy)	Unit Cost ($/cy)	Riprap Cost	Landscape Restoration (sf)	Unit Cost ($/sf)	Landscape Cost		Required Land Acquisition (Ac.)	Zoning	Unit Cost ($/sf)	Land Acquisition Cost	Total Construction Cost	Landscape Cost	Subtotal Const. Land Acq. Landscape Costs	30% Const. Contingency	**Total**
NE-A1	954	1005	1035.75	1039	1805	0.00180	0.00180	0.00	0	0.00	C	0.014	20	5.0	0	100.0	30.0	0.79	Sub	10.0	0.0	5.0	20	0		8925	$3	$26,774	1805	$1,050	$1,895,250	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,922,024	$0	$1,922,024	$576,607	$2,498,631
NE-A2	1029	1275	1039	1046	6540	0.00107	0.00110	-0.19	0	0.00	C	0.014	30	5.0	0	150.0	40.0	0.67	Sub	8.5	0.0	5.0	30	0		46870	$3	$140,610	6540	$1,500	$9,810,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$9,950,610	$0	$9,950,610	$2,985,183	$12,935,793
NE-A3	787	934	1046	1047	1040	0.00096	0.00100	-0.04	0	0.00	C	0.014	24	5.0	0	120.0	34.0	0.61	Sub	7.8	0.0	5.0	24	0		6067	$3	$18,200	1040	$1,400	$1,456,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,474,200	$0	$1,474,200	$442,260	$1,916,460
NE-A-L1	522	542	1037.5	1042	2415	0.00186	0.00190	-0.09	0	0.00	C	0.014	12	5.0	0	60.0	22.0	0.71	Sub	9.0	0.0	5.0	12	0		7648	$3	$22,943	2415	$650	$1,569,750	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,592,693	$0	$1,592,693	$477,808	$2,070,500
NE-A-L2	740	749	1046	1042	1360	-0.00294	0.00100	-5.36	0	0.00	C	0.014	20	5.0	0	100.0	30.0	0.59	Sub	7.5	0.0	5.0	20	0		6724	$3	$20,173	1360	$1,050	$1,428,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,448,173	$0	$1,448,173	$434,452	$1,882,625
NE-A-L3	476	672	1046	1048	1440	0.00139	0.00140	-0.02	0	0.00	C	0.014	16	5.0	0	80.0	26.0	0.66	Sub	8.4	0.0	5.0	16	0		5840	$3	$17,520	1440	$800	$1,152,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,169,520	$0	$1,169,520	$350,856	$1,520,376
NE-B1	1815	2206	1044	1053.5	5600	0.00170	0.00170	-0.02	0	0.00	C	0.014	40	5.0	0	200.0	50.0	0.87	Trans	11.0	0.0	5.0	40	0		52578	$3	$157,733	5600	$1,900	$10,640,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$10,797,733	$0	$10,797,733	$3,239,320	$14,037,053
NE-B2	1310	1310	1053.5	1058.8	5260	0.00101	0.00100	0.04	0	0.00	C	0.014	32	5.0	0	160.0	42.0	0.65	Sub	8.2	0.0	5.0	32	0		40034	$3	$120,103	5260	$1,600	$8,416,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$8,536,103	$0	$8,536,103	$2,560,831	$11,096,934
NE-B3	1065	1331	1058.8	1062	2580	0.00124	0.00120	0.10	0	0.00	C	0.014	30	5.0	0	150.0	40.0	0.70	Sub	8.9	0.0	5.0	30	0		18490	$3	$55,470	2580	$1,500	$3,870,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$3,925,470	$0	$3,925,470	$1,177,641	$5,103,111
NE-B-L1	717	862	1053.5	1057.5	1720	0.00233	0.00230	0.04	0	0.00	C	0.014	16	5.0	0	80.0	26.0	0.85	Trans	10.8	0.0	5.0	16	0		6976	$3	$20,927	1720	$800	$1,376,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,396,927	$0	$1,396,927	$419,078	$1,816,005
NE-B-L2	695	898	1058.8	1062.1	1345	0.00245	0.00250	-0.06	0	0.00	C	0.014	16	5.0	0	80.0	26.0	0.88	Trans	11.2	0.0	5.0	16	0		5455	$3	$16,364	1345	$800	$1,076,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,092,364	$0	$1,092,364	$327,709	$1,420,073
NE-B-L3	267	309	1058.8	1056	1305	-0.00215	0.00100	-4.10	0	0.00	C	0.014	10	5.0	0	50.0	20.0	0.49	Sub	6.2	0.0	5.0	10	0		3553	$3	$10,658	1305	$650	$848,250	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$858,908	$0	$858,908	$257,672	$1,116,580
NE-B-L4	1065	1215	1062	1060	1300	-0.00154	0.00100	-3.30	0	0.00	C	0.014	30	5.0	0	150.0	40.0	0.64	Sub	8.1	0.0	5.0	30	0		9317	$3	$27,950	1300	$1,500	$1,950,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,977,950	$0	$1,977,950	$593,385	$2,571,335
NE-C1	696	898	1053	1057	2705	0.00148	0.00250	-2.76	0	0.00	C	0.014	16	5.0	0	80.0	26.0	0.88	Trans	11.2	0.0	5.0	16	0		10970	$3	$32,911	2705	$800	$2,164,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,196,911	$0	$2,196,911	$659,073	$2,855,984
NE-C2	1108	1184	1040	1053	4180	0.00311	0.00250	2.55	0	0.00	C	0.014	20	5.0	0	100.0	30.0	0.93	Trans	11.8	0.0	5.0	20	0		20668	$3	$62,003	4180	$1,050	$4,389,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$4,451,003	$0	$4,451,003	$1,335,301	$5,786,304

TOTALS (Not Including Contingencies)	**0.0**		**$0**	**$52,790,589**	**$0**	**$52,790,589**	
TOTAL CONTINGENCIES							**$15,837,177**
GRAND TOTAL (NE Area - 10 yr)							**$68,627,766**

* NOTE: 30% Contingency is only applied to the Total Construction Cost

NorthEast Area Solution (50 Year Storm)

CHANNEL (BOX CULVERT STORM DRAIN) CAPACITIES AND COSTS

I.D.	Design Q (cfs)	Q (cfs)	Downstream Ground Elevation	Upstream Ground Elevation	Length (ft.)	Ground Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop Difference(ft.)	No. of Drop Structures	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width (ft.)	Depth of Flow (ft.)	Sideslope (H:1)	Area of Flow (sf.)	Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Top Width (ft)	Proposed R/W Width (ft)		Excavated Volume (cy)	Unit Cost ($/cy)	Excavation Cost	Length (ft.)	Unit Cost ($/ft)	Storm Drain Cost	Fence Length (ft.)	Unit Cost ($/lf)	Fence Cost	Riprap Volume (cy)	Unit Cost ($/cy)	Riprap Cost	Landscape Restoration (sf)	Unit Cost ($/sf)	Landscape Cost		Required Land Acquisition (Ac.)	Zoning	Unit Cost ($/sf)	Land Acquisition Cost	Total Construction Cost	Landscape Cost	Subtotal Const, Land Acq, Landscape Costs	30% Const. Contingency	Total
NE-A1	1079	1253	1035.75	1039	1805	0.00180	0.00180	0.00	0	0.00	C	0.014	24	5.0	0	120.0	34.0	0.82	Trans	10.4	0.0	5.0	24	0		10529	$3	$31,588	1805	$1,400	$2,527,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,558,588	$0	$2,558,588	$767,576	$3,326,164
NE-A2	1322	1374	1039	1046	6540	0.00107	0.00110	-0.19	0	0.00	C	0.014	32	5.0	0	160.0	42.0	0.68	Sub	8.6	0.0	5.0	32	0		49777	$3	$149,330	6540	$1,600	$10,464,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$10,613,330	$0	$10,613,330	$3,183,999	$13,797,329
NE-A3	1185	1215	1046	1047	1040	0.00096	0.00100	-0.04	0	0.00	C	0.014	30	5.0	0	150.0	40.0	0.64	Sub	8.1	0.0	5.0	30	0		7453	$3	$22,360	1040	$1,500	$1,560,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,582,360	$0	$1,582,360	$474,708	$2,057,068
NE-A-L1	777	783	1037.5	1042	2415	0.00186	0.00190	-0.09	0	0.00	C	0.014	16	5.0	0	80.0	26.0	0.77	Sub	9.8	0.0	5.0	16	0		9794	$3	$29,383	2415	$800	$1,932,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,961,383	$0	$1,961,383	$588,415	$2,549,797
NE-A-L2	1059	1215	1046	1042	1360	-0.00294	0.00100	-5.36	0	0.00	C	0.014	30	5.0	0	150.0	40.0	0.64	Sub	8.1	0.0	5.0	30	0		9747	$3	$29,240	1360	$1,500	$2,040,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,069,240	$0	$2,069,240	$620,772	$2,690,012
NE-A-L3	739	778	1046	1048	1440	0.00139	0.00140	-0.02	0	0.00	C	0.014	18	5.0	0	90.0	28.0	0.68	Sub	8.6	0.0	5.0	18	0		6480	$3	$19,440	1440	$950	$1,368,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,387,440	$0	$1,387,440	$416,232	$1,803,672
NE-B1	2730	2833	1044	1053.5	5600	0.00170	0.00170	-0.02	0	0.00	C	0.014	50	5.0	0	250.0	60.0	0.89	Trans	11.3	0.0	5.0	50	0		65022	$3	$195,067	5600	$2,400	$13,440,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$13,635,067	$0	$13,635,067	$4,090,520	$17,725,587
NE-B2	1978	2173	1053.5	1058.8	5260	0.00101	0.00100	0.04	0	0.00	C	0.014	50	5.0	0	250.0	60.0	0.68	Sub	8.7	0.0	5.0	50	0		61074	$3	$183,223	5260	$2,400	$12,624,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$12,807,223	$0	$12,807,223	$3,842,167	$16,649,390
NE-B3	1623	1853	1058.8	1062	2580	0.00124	0.00120	0.10	0	0.00	C	0.014	40	5.0	0	200.0	50.0	0.73	Sub	9.3	0.0	5.0	40	0		24223	$3	$72,670	2580	$1,900	$4,902,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$4,974,670	$0	$4,974,670	$1,492,401	$6,467,071
NE-B-L1	1047	1136	1053.5	1057.5	1720	0.00233	0.00230	0.04	0	0.00	C	0.014	20	5.0	0	100.0	30.0	0.90	Trans	11.4	0.0	5.0	20	0		8504	$3	$25,513	1720	$1,050	$1,806,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,831,513	$0	$1,831,513	$549,454	$2,380,967
NE-B-L2	1013	1040	1058.8	1062.1	1345	0.00245	0.00250	-0.06	0	0.00	C	0.014	18	5.0	0	90.0	28.0	0.91	Trans	11.6	0.0	5.0	18	0		6053	$3	$18,158	1345	$950	$1,277,750	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,295,908	$0	$1,295,908	$388,772	$1,684,680
NE-B-L3	406	568	1058.8	1056	1305	-0.00215	0.00100	-4.10	0	0.00	C	0.014	16	5.0	0	80.0	26.0	0.56	Sub	7.1	0.0	5.0	16	0		5293	$3	$15,878	1305	$800	$1,044,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,059,878	$0	$1,059,878	$317,963	$1,377,841
NE-B-L4	1623	1692	1062	1060	1300	-0.00154	0.00100	-3.30	0	0.00	C	0.014	40	5.0	0	200.0	50.0	0.67	Sub	8.5	0.0	5.0	40	0		12206	$3	$36,617	1300	$1,900	$2,470,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,506,617	$0	$2,506,617	$751,985	$3,258,602
NE-C1	1029	1040	1053	1057	2705	0.00148	0.00250	-2.76	0	0.00	C	0.014	18	5.0	0	90.0	28.0	0.91	Trans	11.6	0.0	5.0	18	0		12173	$3	$36,518	2705	$950	$2,569,750	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,606,268	$0	$2,606,268	$781,880	$3,388,148
NE-C2	1653	1921	1040	1053	4180	0.00311	0.00250	2.55	0	0.00	C	0.014	30	5.0	0	150.0	40.0	1.01	Trans	12.8	0.0	5.0	30	0		29957	$3	$89,870	4180	$1,500	$6,270,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$6,359,870	$0	$6,359,870	$1,907,961	$8,267,831

TOTALS (Not Including Contingencies)	**0.0**	**$0**	**$67,249,353**	**$0**	**$67,249,353**	
TOTAL CONTINGENCIES						**$20,174,806**
GRAND TOTAL (NE Area - 50 yr)						**$87,424,158**

* NOTE: 30% Contingency is only applied to the Total Construction Cost

NorthEast Area Solution (100 Year Storm)

CHANNEL (BOX CULVERT STORM DRAIN) CAPACITIES AND COSTS

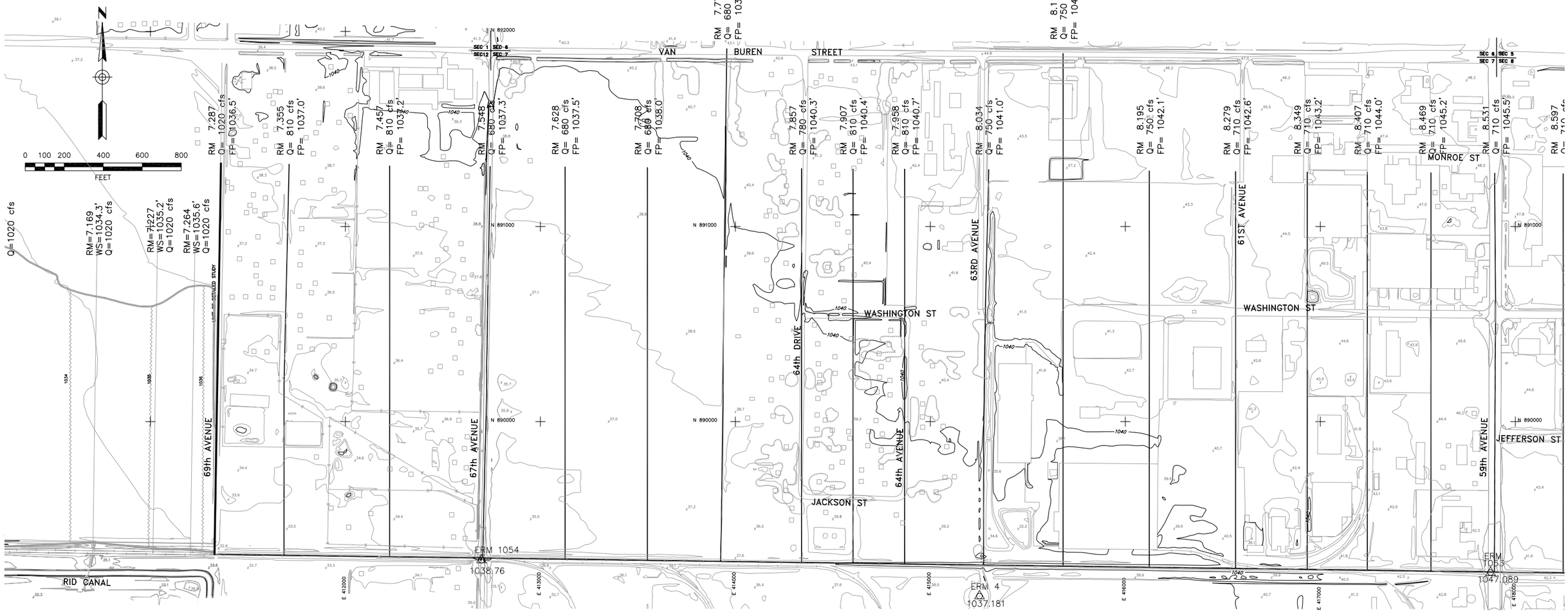
I.D.	Design Q (cfs)	Q (cfs)	Downstream Ground Elevation	Upstream Ground Elevation	Length (ft.)	Ground Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop Difference(ft.)	No. of Drop Structures	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width (ft.)	Depth of Flow (ft.)	Sideslope (H:1)	Area of Flow (sf.)	Perimeter (ft.)	Froude Number	Type of Flow	Velocity (fps)	Freeboard (ft.)	Design Depth (ft)	Top Width (ft)	Proposed R/W Width (ft)		Excavated Volume (cy)	Unit Cost ($/cy)	Excavation Cost	Length (ft.)	Unit Cost ($/ft)	Storm Drain Cost	Fence Length (ft.)	Unit Cost ($/lf)	Fence Cost	Riprap Volume (cy)	Unit Cost ($/cy)	Riprap Cost	Landscape Restoration (sf)	Unit Cost ($/sf)	Landscape Cost		Required Land Acquisition (Ac.)	Zoning	Unit Cost ($/sf)	Land Acquisition Cost	Total Construction Cost	Landscape Cost	Subtotal Const, Land Acq, Landscape Cost	30% Const. Contingency	**Total**
NE-A1	1129	1253	1035.75	1039	1805	0.00180	0.00180	0.00	0	0.00	C	0.014	24	5.0	0	120.0	34.0	0.82	Trans	10.4	0.0	5.0	24	0		10529	$3	$31,588	1805	$1,400	$2,527,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,558,588	$0	$2,558,588	$767,576	$3,326,164
NE-A2	1418	1774	1039	1046	6540	0.00107	0.00110	-0.19	0	0.00	C	0.014	40	5.0	0	200.0	50.0	0.70	Sub	8.9	0.0	5.0	40	0		61403	$3	$184,210	6540	$1,900	$12,426,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$12,610,210	$0	$12,610,210	$3,783,063	$16,393,273
NE-A3	1362	1692	1046	1047	1040	0.00096	0.00100	-0.04	0	0.00	C	0.014	40	5.0	0	200.0	50.0	0.67	Sub	8.5	0.0	5.0	40	0		9764	$3	$29,293	1040	$1,900	$1,976,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,005,293	$0	$2,005,293	$601,588	$2,606,881
NE-A-L1	886	907	1037.5	1042	2415	0.00186	0.00190	-0.09	0	0.00	C	0.014	18	5.0	0	90.0	28.0	0.79	Sub	10.1	0.0	5.0	18	0		10868	$3	$32,603	2415	$950	$2,294,250	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,326,853	$0	$2,326,853	$698,056	$3,024,908
NE-A-L2	1195	1215	1046	1042	1360	-0.00294	0.00100	-5.36	0	0.00	C	0.014	30	5.0	0	150.0	40.0	0.64	Sub	8.1	0.0	5.0	30	0		9747	$3	$29,240	1360	$1,500	$2,040,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,069,240	$0	$2,069,240	$620,772	$2,690,012
NE-A-L3	863	886	1046	1048	1440	0.00139	0.00140	-0.02	0	0.00	C	0.014	20	5.0	0	100.0	30.0	0.70	Sub	8.9	0.0	5.0	20	0		7120	$3	$21,360	1440	$1,050	$1,512,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,533,360	$0	$1,533,360	$460,008	$1,993,368
NE-B1	3127	3211	1044	1053.5	5600	0.00170	0.00170	-0.02	0	0.00	C	0.014	56	5.0	0	280.0	66.0	0.90	Trans	11.5	0.0	5.0	56	0		72489	$3	$217,467	5600	$2,700	$15,120,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$15,337,467	$0	$15,337,467	$4,601,240	$19,938,707
NE-B2	2273	2463	1053.5	1058.8	5260	0.00101	0.00100	0.04	0	0.00	C	0.014	56	5.0	0	280.0	66.0	0.69	Sub	8.8	0.0	5.0	56	0		68088	$3	$204,263	5260	$2,700	$14,202,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$14,406,263	$0	$14,406,263	$4,321,879	$18,728,142
NE-B3	1877	2380	1058.8	1062	2580	0.00124	0.00120	0.10	0	0.00	C	0.014	50	5.0	0	250.0	60.0	0.75	Sub	9.5	0.0	5.0	50	0		29957	$3	$89,870	2580	$2,400	$6,192,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$6,281,870	$0	$6,281,870	$1,884,561	$8,166,431
NE-B-L1	1189	1416	1053.5	1057.5	1720	0.00233	0.00230	0.04	0	0.00	C	0.014	24	5.0	0	120.0	34.0	0.93	Trans	11.8	0.0	5.0	24	0		10033	$3	$30,100	1720	$1,400	$2,408,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,438,100	$0	$2,438,100	$731,430	$3,169,530
NE-B-L2	1148	1184	1058.8	1062.1	1345	0.00245	0.00250	-0.06	0	0.00	C	0.014	20	5.0	0	100.0	30.0	0.93	Trans	11.8	0.0	5.0	20	0		6650	$3	$19,951	1345	$1,050	$1,412,250	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,432,201	$0	$1,432,201	$429,660	$1,861,861
NE-B-L3	470	568	1058.8	1056	1305	-0.00215	0.00100	-4.10	0	0.00	C	0.014	16	5.0	0	80.0	26.0	0.56	Sub	7.1	0.0	5.0	16	0		5293	$3	$15,878	1305	$800	$1,044,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$1,059,878	$0	$1,059,878	$317,963	$1,377,841
NE-B-L4	1877	2173	1062	1060	1300	-0.00154	0.00100	-3.30	0	0.00	C	0.014	50	5.0	0	250.0	60.0	0.68	Sub	8.7	0.0	5.0	50	0		15094	$3	$45,283	1300	$2,400	$3,120,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$3,165,283	$0	$3,165,283	$949,585	$4,114,868
NE-C1	1180	1184	1053	1057	2705	0.00148	0.00250	-2.76	0	0.00	C	0.014	20	5.0	0	100.0	30.0	0.93	Trans	11.8	0.0	5.0	20	0		13375	$3	$40,124	2705	$1,050	$2,840,250	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$2,880,374	$0	$2,880,374	$864,112	$3,744,486
NE-C2	1892	1921	1040	1053	4180	0.00311	0.00250	2.55	0	0.00	C	0.014	30	5.0	0	150.0	40.0	1.01	Trans	12.8	0.0	5.0	30	0		29957	$3	$89,870	4180	$1,500	$6,270,000	0	$0	$0	0	$0	$0	0	$0.00	$0		0.0	Public Street	$0.00	$0	$6,359,870	$0	$6,359,870	$1,907,961	$8,267,831

TOTALS (Not Including Contingencies)	**0.0**		**$0**	**$76,464,849**	**$0**	**$76,464,849**	
TOTAL CONTINGENCIES							**$22,939,455**
GRAND TOTAL (NE Area - 100 yr)							**$99,404,304**

* NOTE: 30% Contingency is only applied to the Total Construction Cost

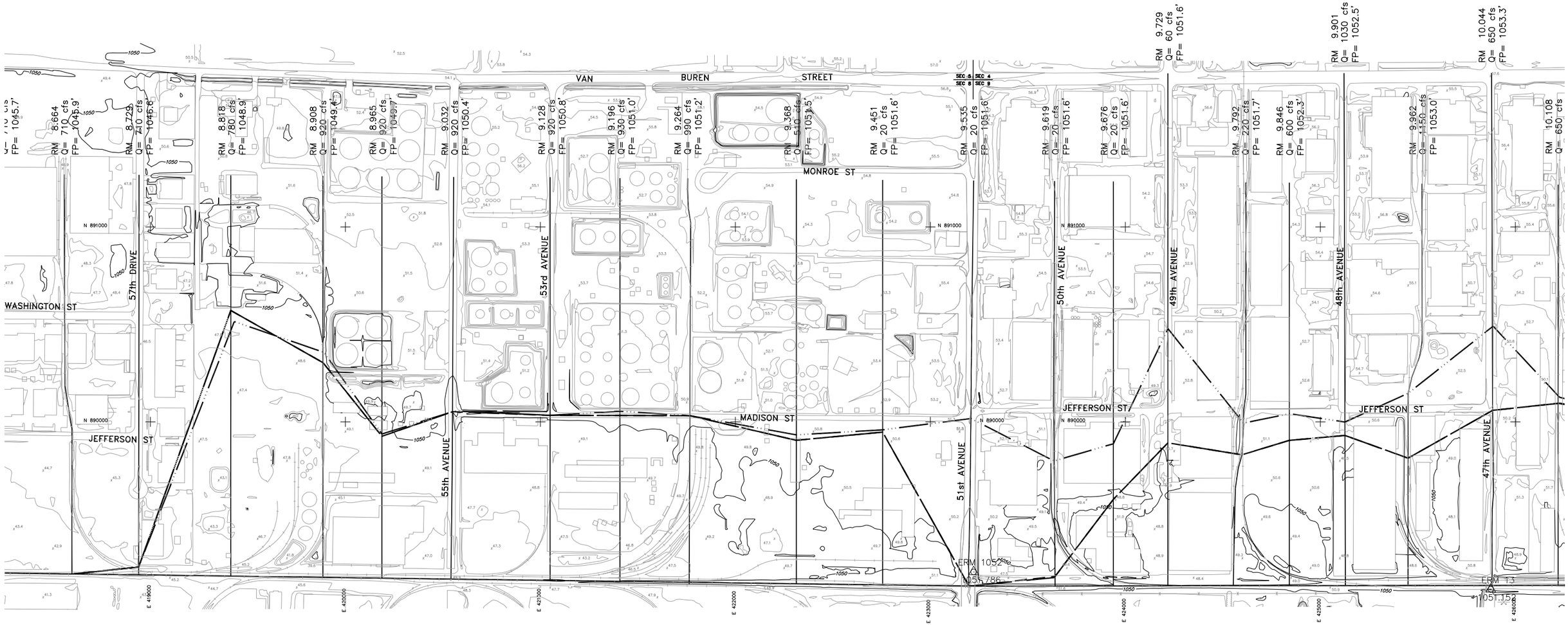
KEY

100 YR UNIMPROVED FLOODPLAIN
IMPROVED FLOODPLAIN – 100 YEAR DESIGN
IMPROVED FLOODPLAIN – 50 YEAR DESIGN
IMPROVED FLOODPLAIN – 10 YEAR DESIGN



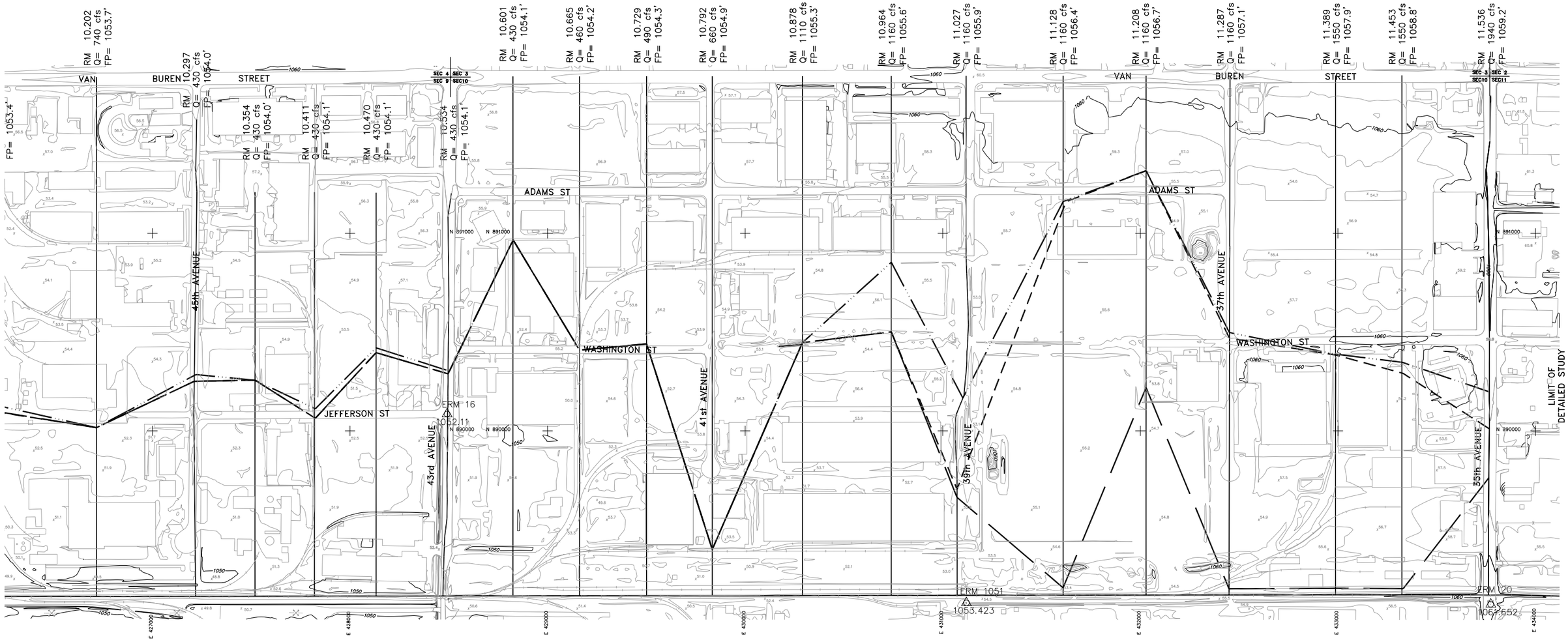
KEY

100 YR UNIMPROVED FLOODPLAIN
IMPROVED FLOODPLAIN – 100 YEAR DESIGN
IMPROVED FLOODPLAIN – 50 YEAR DESIGN
IMPROVED FLOODPLAIN – 10 YEAR DESIGN



KEY

100 YR UNIMPROVED FLOODPLAIN
IMPROVED FLOODPLAIN – 100 YEAR DESIGN
IMPROVED FLOODPLAIN – 50 YEAR DESIGN
IMPROVED FLOODPLAIN – 10 YEAR DESIGN



DURANGO ADMP
FCD NO. 99-41

FLOODPLAIN DELINEATION OF THE UNION PACIFIC RAILROAD

DIBBLE & ASSOCIATES
FEBRUARY 2001

APPENDIX E

Tres Rios Interior Drainage Study

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

2633 East Indian School Road, Suite 401
Phoenix, Arizona 85016-6763
Tel. (602) 957-1155
Fax (602) 957-2838

CIVIL ENGINEERING ■ Transportation ■ Airports ■ Drainage/Flood Control ■ Water Resources ■ Land Development ■ Surveying

MEMORANDUM

Date: October 2, 2000

To: Greg Jones, P.E., FCDMC

From: Brian Fry, P.E.

Subject: Durango ADMP
Tres Rios Interior Drainage

At the request of the Flood Control District of Maricopa County, Dibble & Associates has analyzed the interior drainage of the Durango ADMP study area as a result of the proposed Tres Rios levee by the US Army Corps of Engineers. The purpose of this mini-study is to determine the approximate size, location, and cost of retention basins to capture runoff from the 100 yr-24 hr design storm that would tend to pond and cause local flooding along the north side of the proposed levee, assuming that the recommended alternative of the Durango ADMP is not constructed. The results of this study will be incorporated into the recommended plan for the Durango ADMP.

Two options are evaluated for this study. The first option is a single retention basin at the west end of the proposed levee which will retain flow from all contributing drainage areas until it is safe to release them into the Gila River **(See Figure 1)**. This option also includes several concrete box culverts under the major roadways and are needed to convey runoff to the single retention basin. A single levee penetration will be required to drain the retention basin after the flood has passed. The second option is a series of four separate retention basins along the north side of the proposed levee which would retain flow from each of their individual contributing drainage areas **(See Figure 2)**. Culverts are not required for this option, however a levee penetration will be required at each location to drain the retention basin after the flood has passed. The drainage sub-basins for the Durango ADMP study area are shown on **Figure 3**.

Most of the natural runoff north of Southern Ave flows to the west via the Buckeye Feeder Canal alignment. As such, the only drainage areas that contribute to ponding behind the proposed levee, are AA, BA, BB, AB, AC, and AD. Therefore the recommended alternative from the Durango ADMP will have no effect in relieving any interior drainage issues associated with the proposed Tres Rios levee.

The approximate cost of the two options is summarized in the table below. The full cost analysis is included at the back of this memorandum.

	Land Acq. Cost	Construction Cost	Landscape Cost	Subtotal	30% Contingency	Total Cost
Option 1	$1,924,262	$2,041,640	$3,498,657	$7,464,559	$612,492	**$8,383,136**
Option 2	$1,599,780	$2,125,677	$2,908,690	$6,634,147	$637,703	**$7,271,850**

One issue that is associated with the proposed Tres Rios levee is the possibility of flood water from both the Agua Fria and Gila River flanking the end of the levee. Based on the FEMA floodplain for the Agua

Fria River it was determined that the end of the levee was outside of the existing floodplain. On the Gila River, the floodplain elevation near the end of levee is approximately equal to the existing ground elevation and no flanking would be expected. However, the flood water could potentially back up into the existing Buckeye Feeder Canal. If this scenario were to happen at the same time as a flood in the Durango ADMP study area, the natural runoff from the study area would not be able to outfall, and flooding would occur when the capacity of the existing Buckeye Feeder Canal was exceeded.

Dysart Rd
El Mirage Rd
115th Ave
107th Ave
99th Ave
91st Ave
83rd Ave
75th Ave
67th Ave
59 Ave
51st Ave
43rd Ave
35th Ave
27th Ave
I-17 Freeway

Papago Diversion Channel
I-10 Freeway
Van Buren St
RID Canal
UPRR/SPRR
UPRR/SPRR
Buckeye Rd
RID Canal
Agua Fria River
Lower Buckeye Rd
Canal
Feeder
Buckeye
Broadway Rd
Salt River
TR-B1
Buckeye Feeder Canal
Southern Ave
TR-C1
TR-C2
TR-C3
Gila River
Proposed
Tres Rios Levee

LEGEND

- New Detention Basin
- XXX-B# New Detention Basin Identifier
- New Concrete Box Culvert
- XXX-C# New Concrete Box Culvert Identifier

N

2500 0 2500 5000 7500
SCALE IN FEET

FIGURE 1

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
Tres Rios Interior Drainage
Option 1

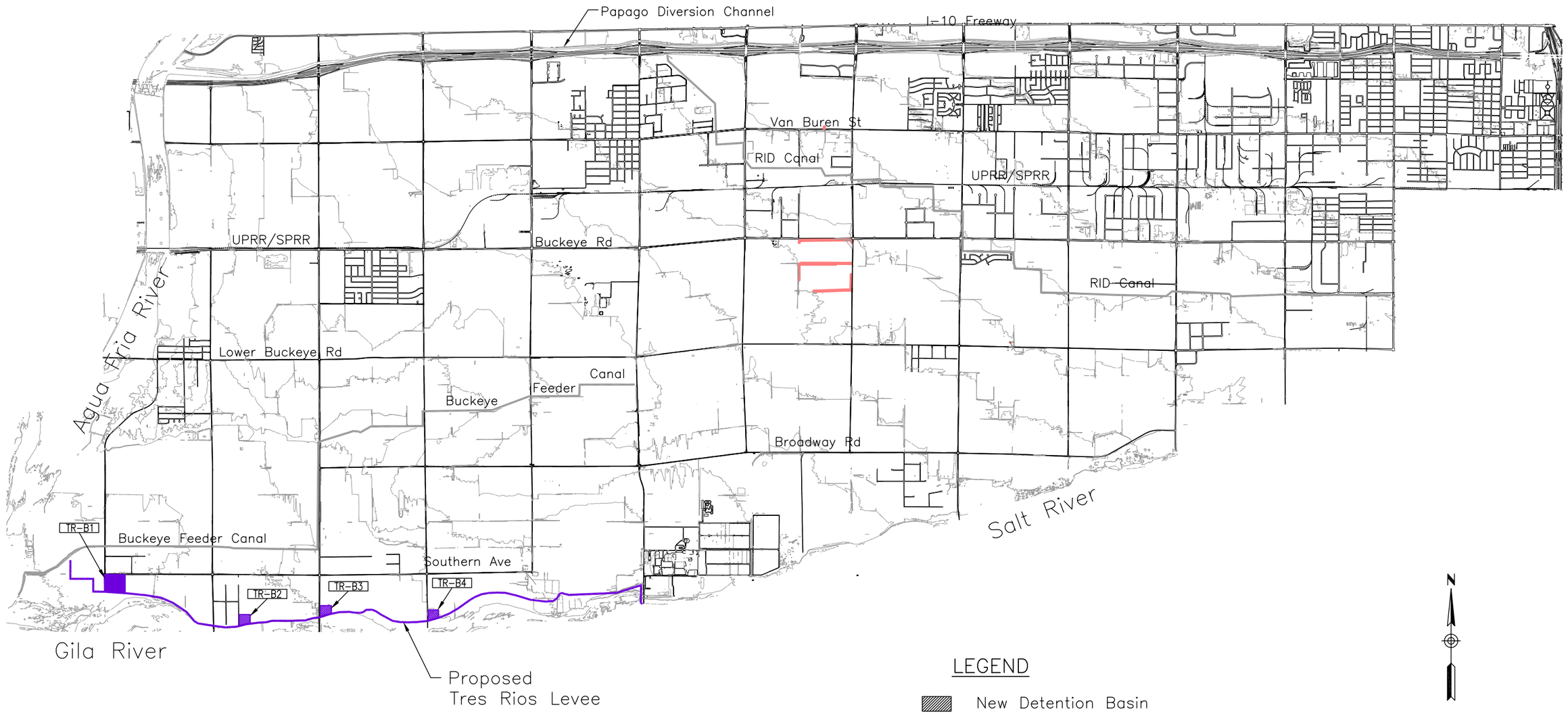
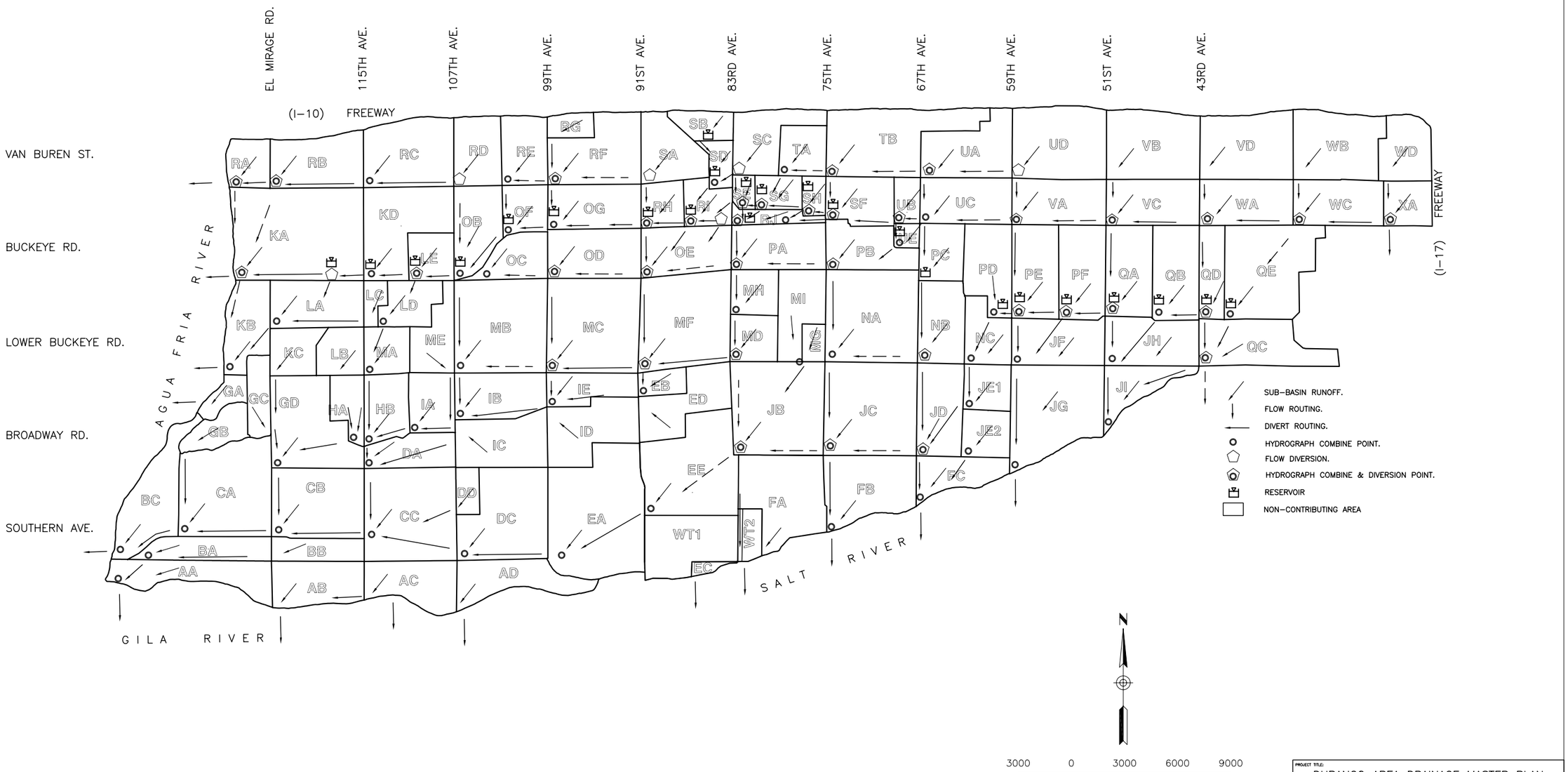


FIGURE 2

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
Tres Rios Interior Drainage Option 2



PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99–41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

EXHIBIT TITLE:
DRAINAGE SUB–BASINS

FIGURE 3

APPENDIX F

Public Involvement Documentation

The Location:

The Durango Area Drainage Master Plan will identify flood-prone areas in a 68-square mile area that includes the cities of Avondale, Tolleson and Phoenix, as well as unincorporated areas of Maricopa County. The study area is bounded by I-10 on the north, I-17 on the east, the Salt and Gila Rivers on the south, and the Agua Fria River on the west. The outcome of this study will be the development of cost-effective solutions for a storm water collection and disposal system.

What's Next?

After receiving your input, the proposed alternatives will be further developed. A future public meeting will be held to present the revised alternatives. Upon completion of the Durango Area Drainage Master Plan, the Flood Control District will work towards

FOR MORE INFORMATION
Please Contact:

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

Brian Fry, P.E.,
Consultant Project Manager
Dibble & Associates
Consulting Engineers
2633 East Indian School Road,
Suite 401
Phoenix, Arizona 85016
(602) 957-1155
email: bfry@dibblecorp.com

Important information about your community inside...

Flood Control District
Of Maricopa County
2801 W. Durango Street
Phoenix, Arizona 85009

DEAR NEIGHBOR:

The Flood Control District of Maricopa County invites you to help solve flooding issues in the Southwest Valley. Two public meetings, one on **Tuesday, April 11th** and the other on **Thursday, April 13th**, will provide you and your neighbors with information on the Durango Area Drainage Master Plan and allow you to contribute your opinion.

An Area Drainage Master Plan identifies where the regional (backbone) stormwater drainage facilities should be located in the study area. It also suggests the type(s) of stormwater facilities that should be used. Your comments will provide the Flood Control District and its consultant with important information about the kinds of flood protection that you would like to see in your neighborhood. Your contributions are vital to the success of this project.

OPEN HOUSE

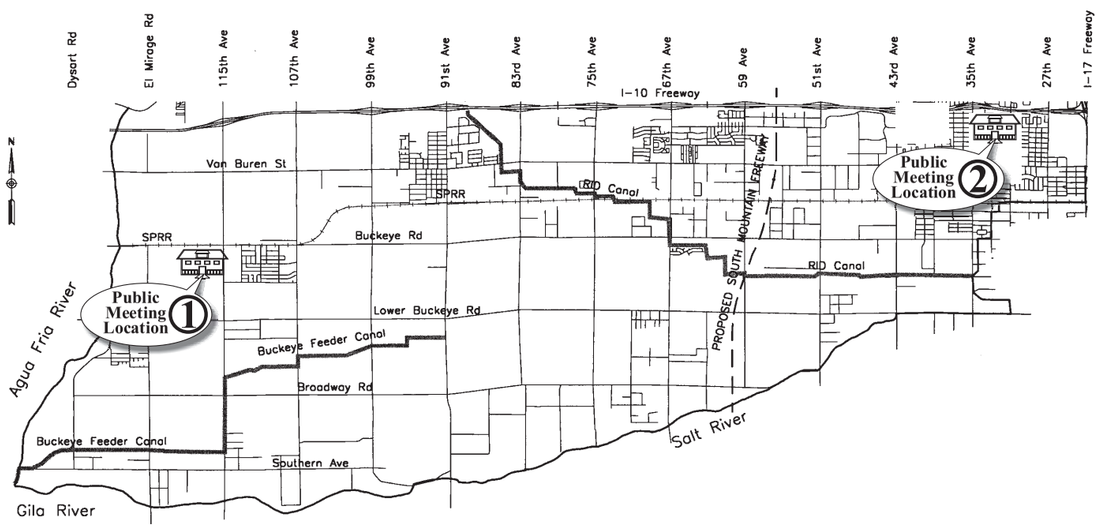
PUBLIC INFORMATION MEETING

PUBLIC MEETING #1
Tuesday
April 11, 2000
5:00 pm to 7:30 pm

Littleton Elementary School Cafetorium
1252 South 115th Avenue
Cashion, Arizona 85329
(SW corner of 115th Ave & Buckeye Rd.)

PUBLIC MEETING #2
Thursday
April 13, 2000
5:00 pm to 7:30 pm

Carl Hayden High School Cafeteria
3333 W. Roosevelt Street
Phoenix, Arizona 85009
(SE corner of Roosevelt & 35th Ave.)



DURANGO AREA DRAINAGE MASTER PLAN

A sign language interpreter will be made available upon request with 72 hours notice. Alternative format materials or FM or Infra Red Listening Devices are also available upon request with 72 hours notice. Additional reasonable accommodations will be made available to the extent possible within the time frame of the request. Please contact David Brozovsky, Flood Control District ADA Coordinator, at 602-506-1501, if any of these services are required. For specific questions related to the project, call Brian Fry, P.E., Dibble & Associates at 602-957-1155.

DURANGO AREA DRAINAGE MASTER PLAN

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FOR MORE INFORMATION
Please Contact:

Brian Fry, P.E.
Consultant Project Manager
Dibble & Associates
Consulting Engineers
2633 East Indian School Road, Suite 401
Phoenix, Arizona 85016
(602) 957-1155
email: bfry@dibblecorp.com

Flood Control District
Of Maricopa County
2801 W. Durango Street
Phoenix, Arizona 85009

Important information about your community inside...

DURANGO AREA DRAINAGE MASTER PLAN

OPEN HOUSE

PUBLIC MEETING

PUBLIC MEETING #1
Tuesday
August 15, 2000
6:00 pm to 8:00 pm

City of Phoenix
Fire Station #34
50 North 51st Avenue

PUBLIC MEETING #2
Thursday
August 17, 2000
6:00 pm to 8:00 pm

Littleton Elementary School
Cafetorium
1252 South 115th Avenue

DURANGO AREA DRAINAGE MASTER PLAN

The Flood Control District of Maricopa County invites you to share your ideas about the Durango Area Drainage Master Plan (ADMP). Your insight can:

- help solve flooding issues in the southwest Valley
- plan for future flood control projects to prevent flooding from new developments
- define concepts for community parks and trails

Two public open house meetings are planned to provide you and your neighbors with information on the Durango ADMP and allow you to give your opinion on the recommended plan.

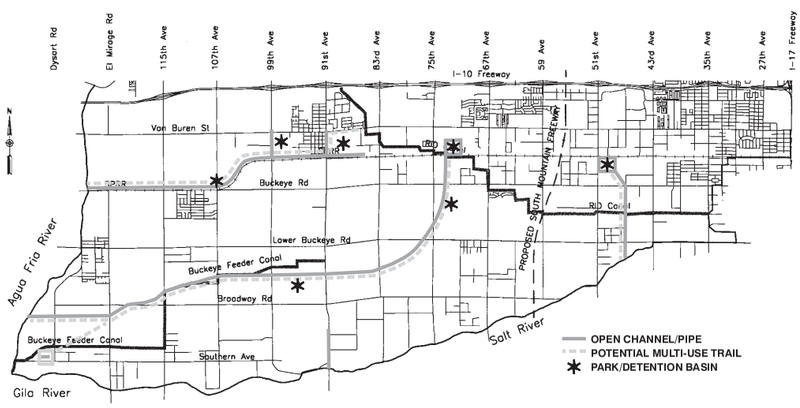
WHAT AREA IS BEING STUDIED?
The Durango Area Drainage Master Plan area covers a 53 square mile area that includes the cities of Avondale, Tolleson, and Phoenix as well as unincorporated areas of Maricopa County.

The study area is bounded by Interstate 10 on the north, Interstate 17 on the east, the Salt and Gila Rivers on the south and the Agua Fria River on the west.

WHY IS THE STUDY BEING DONE?
Existing Flooding Problems: One purpose of the study is to identify flood control alternatives and select a preferred plan to alleviate existing flooding problems within the study area. Flooding

problems have been identified along the Southern Pacific Railroad, the Buckeye Feeder Canal, and the Roosevelt Irrigation District (RID) canal.
New Developments: New development is taking place at a rapid pace. As land is converted from agriculture to subdivisions, the drainage patterns are changed. As there are no natural washes or streams, a coordinated plan is needed to allow new developments to handle runoff in a responsible manner.

Parks and Trails: The Flood Control District is committed to cooperating with local communities to encourage flood control facilities to have many uses that can benefit your neighborhood. Channels and basins can be developed as parks and trails. Natural areas can be preserved for native plant and wildlife habitat.



WHY SHOULD I COME TO THE OPEN HOUSE?
A recommended flood control plan will be presented at the open house. The plan will include locations for basins and channels as well as plans for parks and trails, complete with proposed landscape themes and planting treatments. Your input and that of your neighbors is needed to finalize the plan.

WHAT WILL HAPPEN NEXT?
Following the open house, the consultant team will proceed with preliminary design of the proposed flood control plan. Specific projects will be identified with estimated channel and basin sizes and costs. Project partners will be identified to share in the implementation. Construction of some portions may begin as early as fiscal year 2001-2002.

Durango Area Drainage Master Plan

We want your input.Please join us for our OPEN HOUSE.

Thursday
February 28, 2002
5:00 pm to 7:00 pm

Littleton Elementary School
1252 South 115th Ave.
Avondale, Arizona

The Flood Control District of Maricopa County invites you to share your ideas about the Durango Area Drainage Master Plan and its recommended solutions. A public meeting is being held to provide you and your neighbors with the opportunity to give your opinion.

The Durango Area Drainage Master Plan was started in order to:

- Provide a solution to identified flooding problems
- Identify a regional drainage system for fast growing private development
- Identify existing floodplains along the Union Pacific Railroad and the Buckeye Feeder Canal.

A sign language interpreter will be made available upon request with 72 hours notice. Alternative format materials or FM or Infra Red Listening Devices are also available upon request with 72 hours notice.

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David Brozovsky,
Flood Control District ADA Coordinator,
at 602-506-1501,
if any of these services are required.

For specific questions related to the project, call
Brian Fry, P.E.,
Dibble & Associates
at 602-957-1155.

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

Flood Control District
of Maricopa County
2801 W. Durango Street
Phoenix, Arizona 85009

Flood Control District of Maricopa County

Durango Area Drainage Master Plan

FINAL RECOMMENDED PLAN AND FLOODPLAIN DELINEATIONS

Public Meeting OPEN HOUSE

Thursday
February 28, 2002
5:00 pm to 7:00 pm

Littleton Elementary School
1252 South 115th Ave.
Avondale, Arizona

OPEN HOUSE

Public Information Meeting

The Flood Control District of Maricopa County, working in conjunction with the cities of Phoenix, Tolleson, and Avondale, is currently finalizing the Durango Area Drainage Master Plan (ADMP) for the southwest valley.

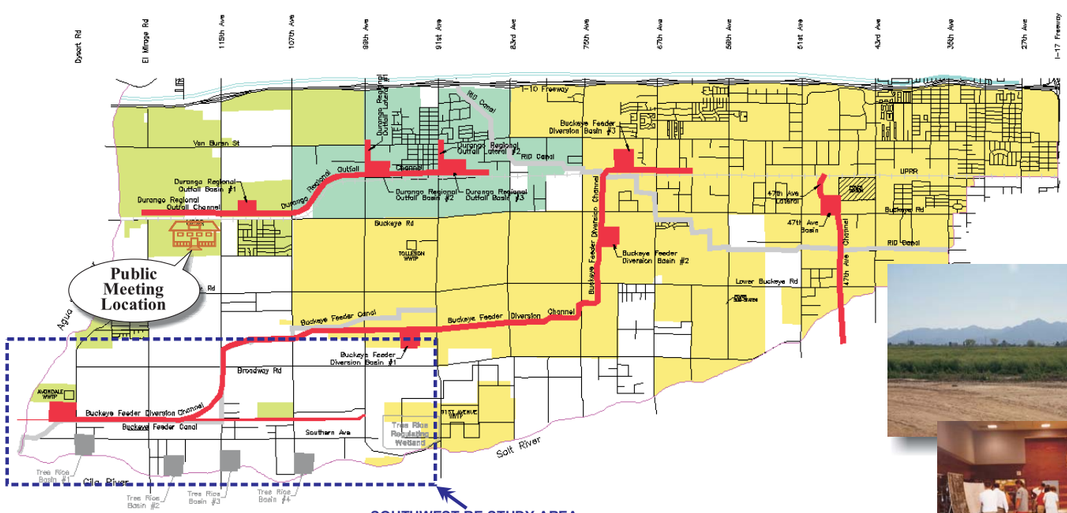
After months of study and identification of problems, the Durango ADMP planning team is now recommending a solution to the community. This is the final stage of public input. In addition, the planning team has also specifically re-adressed the southwest corner of the study area and is recommending a new solution. Also, the team will be presenting the final floodplain delineations.

Over the course of this planning process, the community has been given the opportunity to provide feedback on the existing flooding problems, the different solution alternatives, and the floodplain delineation. Now the planning team would like feedback on the final alternative and the final results of the floodplain analysis.

A team of engineers, hydrologists, and planning experts will be on hand at the Durango ADMP Open House to discuss the final recommendations and floodplain delineation and to answer any questions.

Should you have any immediate concerns, please call Joe Munoz at (602) 506-1501.

~



Durango Area Drainage Master Plan

Community Questionnaire 1

1. Do you live, work, or have financial interest in the study area? Check all answers that apply.

Live	4
Work	2
Have Financial Interest	10
None of these	2

Where?

Phoenix	3
Avondale	8
Tolleson	1
County	7

2. Have you experienced flooding problems? Check one.

Yes	2
No	8
Not applicable	3

Explain: An explanation for a not applicable answer was "We do engineering/development in this area".

3. Are there any particular valued landscape or natural features which you feel should be preserved or protected? Explain.

Railroad (1), Gila River (1), Agua Fria River (1), mature trees (2), wetland along river (1), bird nesting sites in the wetland (1), horse trails (1), agriculture (3), and the river bottom-area south of Southern (1).

4. Are there any particular negative features which you feel should be improved or enhanced? Explain.

"Utilize overhead power corridors to extent possible."
"Auto access to river to prevent dumping. Need recreational parking areas."
"River bottom should have horse trails or hiking with controlled vehicular access for emergencies."

5. Which of the following recreational activities do you participate in? (Check all that apply)

Walking	12
Soccer	2
Jogging/Running	5
Softball/Baseball	4
Bicycling	9
Basketball	4
Roller or In-line Skating	2
Equestrian	4
Other:	3 (Fishing-1, Dog Walks-1, ATV-1)

6. What do you feel would be the greatest benefit of a multi-use pathway? (Check all that apply)

Recreation	9
Exercise	9
Employment Commute	2
School Commute	5
Shopping Access	2
Regional Access	3
Other	0

7. Do you feel there are any drawbacks to combining a multi-use trail with an overhead power Line corridor?

Yes	1
No	9
No Opinion	1

Explain: For the yes answer the explanation was, "I've heard of health risks, but I'm not sure if they are real or not."
For one of the no answers the explanation was, "Both exist for the benefit of the community."

8. Which landscape theme(s) do you prefer? (Check all that apply)

Park-like theme	7
Natural theme	7
Modified Sonoran theme	3
Agricultural Heritage	7
Formal Promenade	3
Historic Canal	3
Railroad	6
Native American	3
Other	0

9. In the evaluation and selection of flood control facilities, which criteria do you feel should be given the greatest consideration in determining the ultimate location and design? Number in order of priority (1=highest priority, 6=lowest priority)

Environmental	(4-#2, 3-#3, 1-#4, 3-#5)	Avg. = 3.27	Overall ranking = 3
Recreational	(1-#2, 4-#3, 3-#4, 3-#5)	Avg. = 3.73	Overall ranking = 4
Cost	(2-#2, 1-#3, 4-#4, 4-#5)	Avg. = 3.91	Overall ranking = 5
Flood Control Effectiveness	(11-#1, 1-#2, 1-#3)	Avg. = 1.23	Overall ranking = 1
Visual Appearance	(2-#1, 2-#2, 2-#3, 3-#4, 1-#5)	Avg. = 2.75	Overall ranking = 2
Other	(1-#1, 11-#6)	Avg. = 6.08	Overall ranking = 6

For the category of other being ranked highest priority the explanation given was, "Most effective use of water."
Two reasons why the category of other was ranked lowest priority was, "Project property values," and, "$ should not be prohibitive but use what is needed for future generations. It must be effective, preserve the environment, and give open space to a populating arc."

10. Please rank the alternatives in order of preference (1=most preferred, 3=least preferred)

Alternative 1	(6-#1, 1-#2, 2-#3)	Avg. = 1.56	Overall ranking = 1
Alternative 2	(3-#1, 4-#2, 3-#3)	Avg. = 2.00	Overall ranking = 2
Alternative 3	(2-#1, 3-#2, 3-#3)	Avg. = 2.13	Overall ranking = 3

A vote of most preferred for Alternative 2 had the stipulation, "(except 117th Ave. drop to river feature)".

11. Other comments:
"#6 A transportation corridor for bikes, electric cars, pedestrians, etc."
"Tailwater discharge-both north and south side require return to Buckeye feeder ditch, along the entire feeder ditch."
"Major focus should be on impacts on existing and planned (zoned) development and effective flood control at post development condition (do not oversize facility)."
"Retain excess water to raise local aquifer. Divert and return water that was diverted from Pima use in the 1930's."
"The sooner this starts taking place the cost will be minimized; however, cost should not be the determining factor in initiation a park like theme which would improve land values and economy."
"Use of flood water for replenishing underground aquifers."
"Your alternatives look really good. I really like the softer design and think all of these themes will be better than traditional flood control channel."
"Modify 2 with north to south drainage ways."

Community Questionnaire 2

1. Do you live, work, or have financial interest in the study area? Check all answers that apply.

Live	8
Work	6
Have Financial Interest	7
None of these	0

Where?

Phoenix	4
Avondale	4
Tolleson	1
County	4

2. Have you experienced flooding problems? Check one.

Yes	2
No	7
Not applicable	1

Explain: The explanation for the not applicable answer was “Only been here one year.”
Explanations for the yes answers were, “Have been flooded 1987,” and “Flooded several times Buckeye Feeder.”
An explanation for a no answer was, “Previous owners have possibly.”
One comment made without an answer chosen was, “Before we moved there only.”

3. Are there any particular valued landscape or natural features related to the selected flood control alternative which you feel should be preserved or protected? Explain.

“No.”
“Sonoran landscape this is a desert.”
“River bottom; cottonwood, greenery, wildlife.”
“Cottonwood trees should be preserved-alfalfa fields.”
“Do not build.”
“Tall trees, greenery, wildlife-no more housing.”
“No more homes-enjoy current features.”
“The whole area is beautiful-I ride in the desert everyday-we moved in the area to enjoy the trees by the river.”

4. Are there any particular negative features related to the selected flood control alternative which you feel should be improved or enhanced? Explain.

“Beautiful just the way it is.”
“Underbrush needs to be cleared out-salt cedars need to be thinned-not cleared.”
“We enjoy the current features.”
“We don’t want our property taken.”
“If they take flood away more houses will be built.”

5. Which of the following recreational activities do you participate in? (Check all that apply)

Walking	6
Soccer	0
Jogging/Running	3
Softball/Baseball	1
Bicycling	2
Basketball	0
Roller or In-line Skating	0
Equestrian	7
Other:	Off-road vehicles

6. What landscape and/or recreational amenities would you like to see accommodated in the design for the selected alternative (please list).

“Parks in retention areas.”
“Equestrian; more trails access for off-road vehicle.”
“More open trails for riding horses.”
“Equestrian trails, and keep trees and shrubs so our horse trails can remain beautiful.”

7. Do you feel there are any drawbacks to combining a multi-use trail with an overhead power line corridor?

Yes	4
No	3
No Opinion	0

Explain: Comments for some of the yes answers were, “Any tract will interfere with the irrigation of the land.” “If it means putting more power line corridor there is enough already.” “Horses are afraid of ATV riders who have no regard for safety. They (the ATV drivers go too fast around blind corners).” “No flood plain means housing developments.”
For one of the no answers the explanation was “Good use of land.”
A comment without choosing an answer was, “Does it matter. Development doesn’t stop.”

8. Do you feel that the landscape themes proposed for the selected flood control alternative are appropriate for and will enhance the area in which the occur? Explain.

“Will nicely enhance our eastern property line.”
“No.”
“Park-like theme.”
“As long as horses are included. Riding trails are very important to us in this area.”

9. Other comments:

"Jon Humphreys with Building Products Co. located at 4850 W. Buckeye Rd. This project may interfere with our clay pipe manufacturing facility. Would like to have detailed plans showing property lines of existing plans. Would like to be contacted before proceeding into more definite plans. Mailing address, 4850 W. Buckeye, 85043."

"Long overdue, have been saying this since 1978 that this matter needs to be addressed."

"It does not matter what I write or my opinion you have already made up your minds and have made plans. You're not concerned about where I live or if I have to move or that you destroy the land I use. Thank you and I hope some day this happens to you. Brenda A. Jundquist, 13038 W. Hidalgo Ave."

"So why did I fill this out? You don't care what I have to say. NO! STOP!"

"I do not want this project to go through. I would rather be in a flood plain than have it all developed."

"My concern is the possible loss of the neighborhqood. I do not want the land value to go down. We moved into this area because of the low public volume. I do not want the fields developed or our trail areas destroyed."

"We like the openness and quietness of the area."

"This is the West, don't take the open range away from horse riders."

APPENDIX G

Retention Basin Aesthetics and Multi-Use Evaluation

DURANGO ADMP
RETENTION BASIN AESTHETICS & MULTI-USE EVALUATION
FCD 99-41

Prepared for:

Flood Control District of Maricopa County

Prepared by:

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

June, 2002

The purpose of this evaluation is to determine the additional land area required to enhance an "engineered" basin by incorporating aesthetic and multi-use features to create a "kinder and gentler" basin design that, with additional enhancements, can be utilized as a public park.

Approach

A baseline grading concept was developed for 3 retention basins proposed in the Durango ADMP to establish the land area requirements based on engineering requirements only. A second grading and landscape concept was developed incorporating aesthetic and multi-use design features using input from the District Landscape Architect. The two grading plans were compared to determine the additional land area required for aesthetics and multi-use. The basins evaluated are the Cashion Station Basin, Jean Station Basin, and the Buckeye Feeder Diversion (BFD) Basin #1.

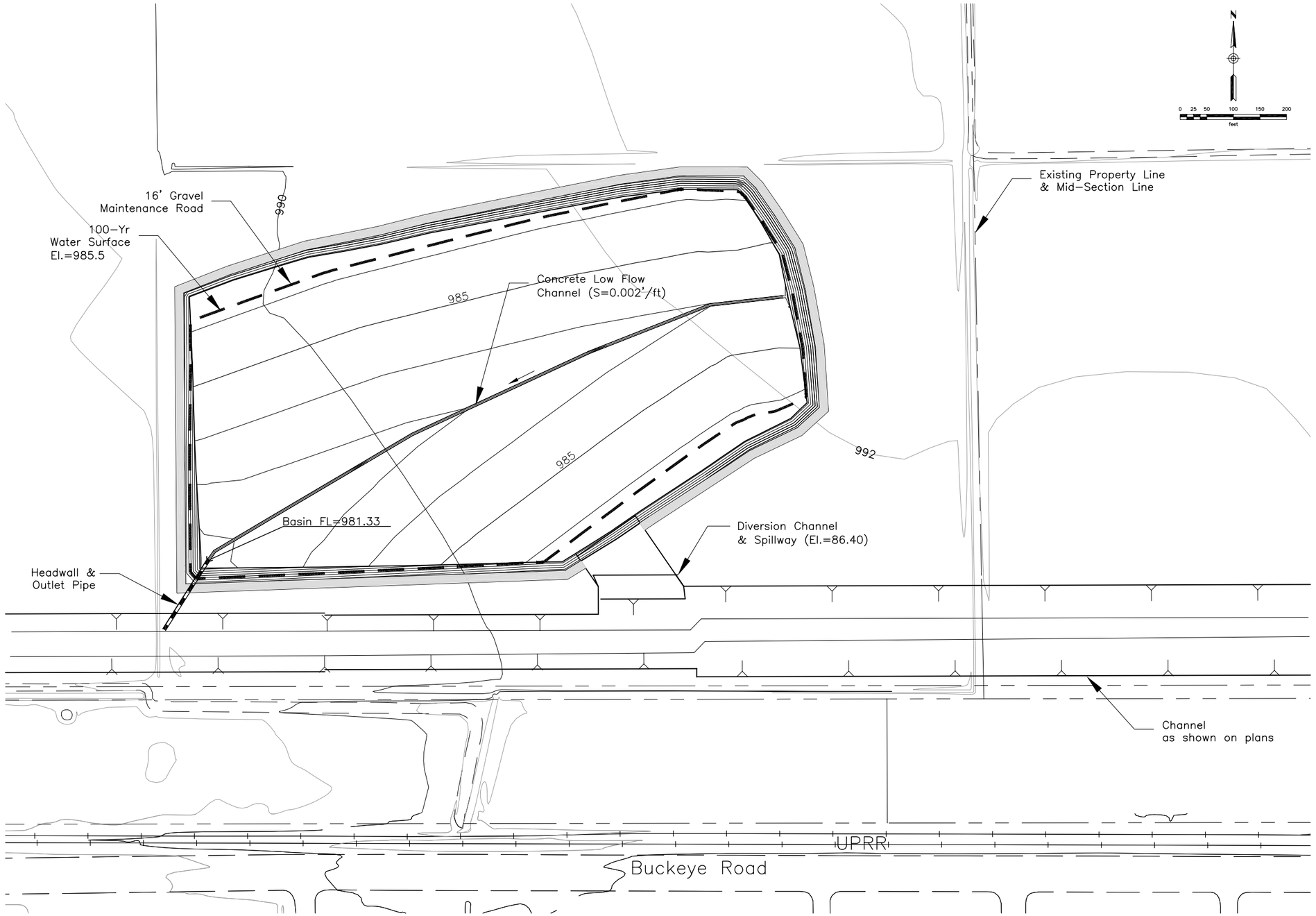
Design Charettes were conducted for each basin with the governing jurisdictional agency. The Cashion Station Basin is within the City of Avondale, the Jean Station Basin is within the City of Tolleson, and the Buckeye Feeder Diversion Basin #1 is within the City of Phoenix. At the Charettes, the site constraints and recreation objectives were reviewed and discussed with agency representatives. Several concepts were identified and marked on blueprints of the engineered basin plan. Following the Charettes, the consultant team evaluated the alternatives and developed an aesthetic and multi-use grading plan based on the input received at the Charette. The Landscape Architect then developed a landscape and multi-use plan for the enhanced grading plan.

Results

The baseline and enhanced grading plans and the landscape and multi-use plans are contained in the Appendix for the three basin sites. The pertinent basin design data are summarized in the following table:

		Required Land Area (acres)		Additional Area Req'd	
Basin	**Storage Volume (Ac-Ft)**	**Engineered Basin**	**Multi-Use Basin**	**(Acres)**	**(%)**
Cashion Sta.	25	18	37	19	51
Jean Sta.	79	28	31	3	10
BFD Basin #1	60	30	48	18	38

The Cashion Station Basin required the largest increase in land area, requiring an additional 19 acres (51%) to provide mounding, area out of the 100-year ponding limits, and terraced athletic fields. The Jean Station Basin required only 3 acres (10%) additional land area, the least increase in land area of all the basins. This is due to the limitation on available land due to other planned projects adjacent to the site. The average increase in land area for the three basins is 33 percent.



CASHION STATION BASIN
(111th Ave. Basin)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. 99–41

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	D. Frank	6/02
DRAWN	D. Frank	6/02
CHECKED	B. Fry	6/02

DIBBLE & ASSOCIATES CONSULTING ENGINEERS
Since 1962

DRAWING NO.		SHEET OF
C–1	ENGINEERED GRADING PLAN	2 10

LOCATION MAP

EAST BASIN DATA
Basin Area: 21 Ac
Water Depth: 6.0 Ft
Excavation Depth: 10.4 Ft
Storage Volume: 61 Ac–Ft
Total Inflow: 574 cfs
Flow By: 0 cfs
Diversion: 574 cfs

Van Buren

In–Flow Channel

CHILDHOOD CENTER

NOTE:
Contours are for preliminary design calculations only.

Final design should incorp varied side slopes and other aesthetic features.

91st Avenue

COPPER COVE APARTMENTS

MATCH LINE

Existing Property Line

16' Gravel Maintenance Road

16' Access Road

1008

1005

FL=03.96

1005

1010

1010

100–YR Water Surface EL=1012.00

Existing Property Line

Concrete Low Flow Channel (S=0.002'/ft)

FL=1006.02

24" Drain Pipe

100–yr Water Surface El.=1007.00

E=05.40

Basin FL=1002.00

Diversion Channel & Spillway

MATCH LINE

Channel & Culvert as shown on plans

Headwall & Outlet Pipe

Exist. Prop. Line

UPRR

West Basin

Existing Property Line

East Basin

Contour Intervals:
Existing – 2 ft
Proposed – 1 ft

WEST BASIN DATA
Basin Area: 6.7 Ac
Water Depth: 5.0 Ft
Excavation Depth: 7.0 Ft
Storage Volume: 18 Ac–Ft
Total Inflow: 652 cfs
Flow By: 450 cfs
Diversion: 202 cfs

JEAN STATION BASIN (91st Ave. Basin)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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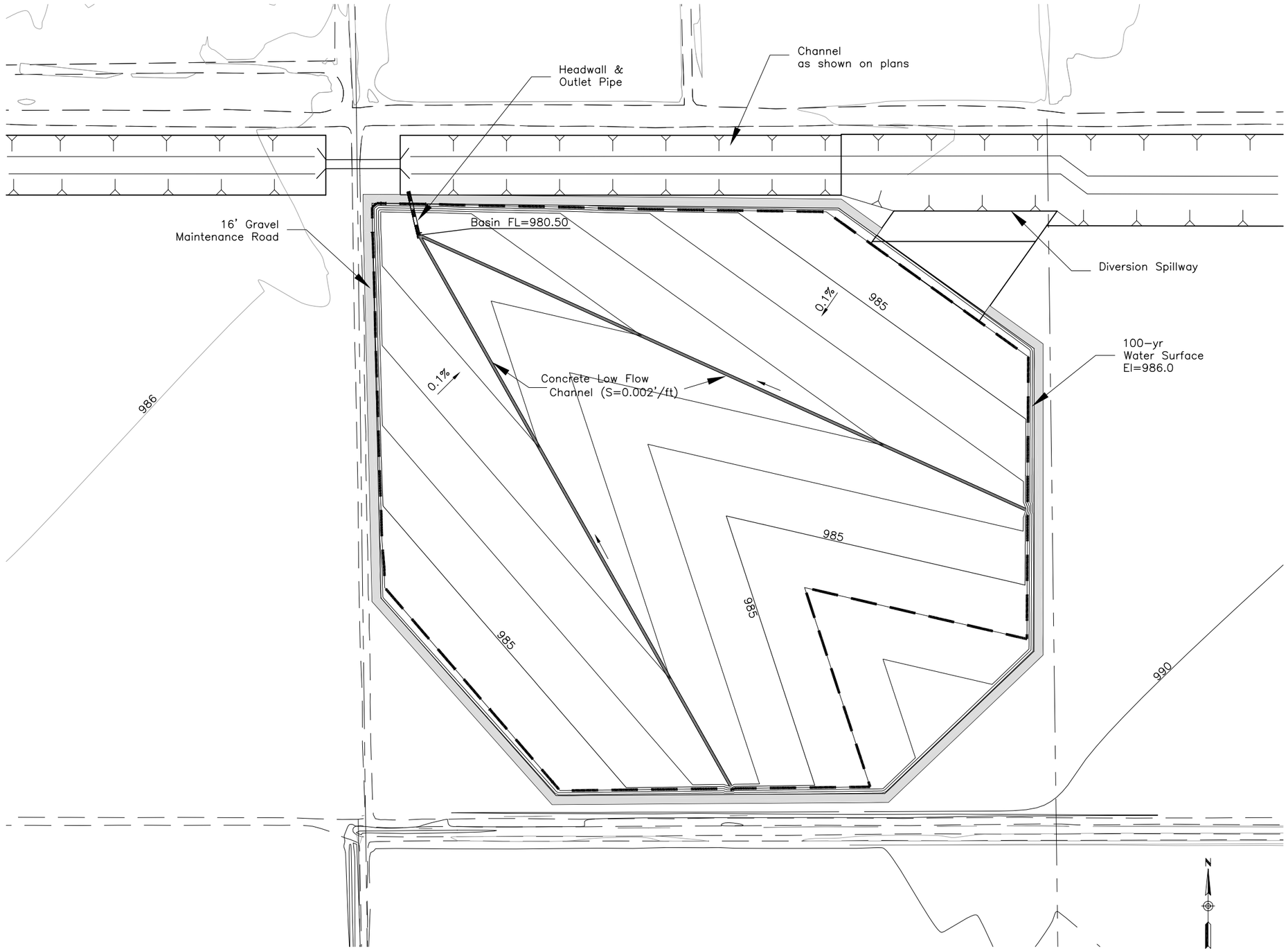
DRAWING NO. C–2

ENGINEERED GRADING PLAN

SHEET OF 3 10



NOTE:
Contours are for preliminary design calculations only.

Final design should incorp varied side slopes and other aesthetic features.

Contour Intervals:
Existing – 2 ft
Proposed – 1 ft

BASIN DATA
Basin Area: 30.0 Ac
Water Depth: 5.5 Ft
Excavation Depth: 8.8 Ft
Storage Volume: 60 Ac-Ft
Total Inflow: 1585 cfs
Flow By: 1050 cfs
Diversion: 535 cfs

BUCKEYE FEEDER DIVERSION BASIN #1
(95th Ave. Basin)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO AREA DRAINAGE MASTER PLAN
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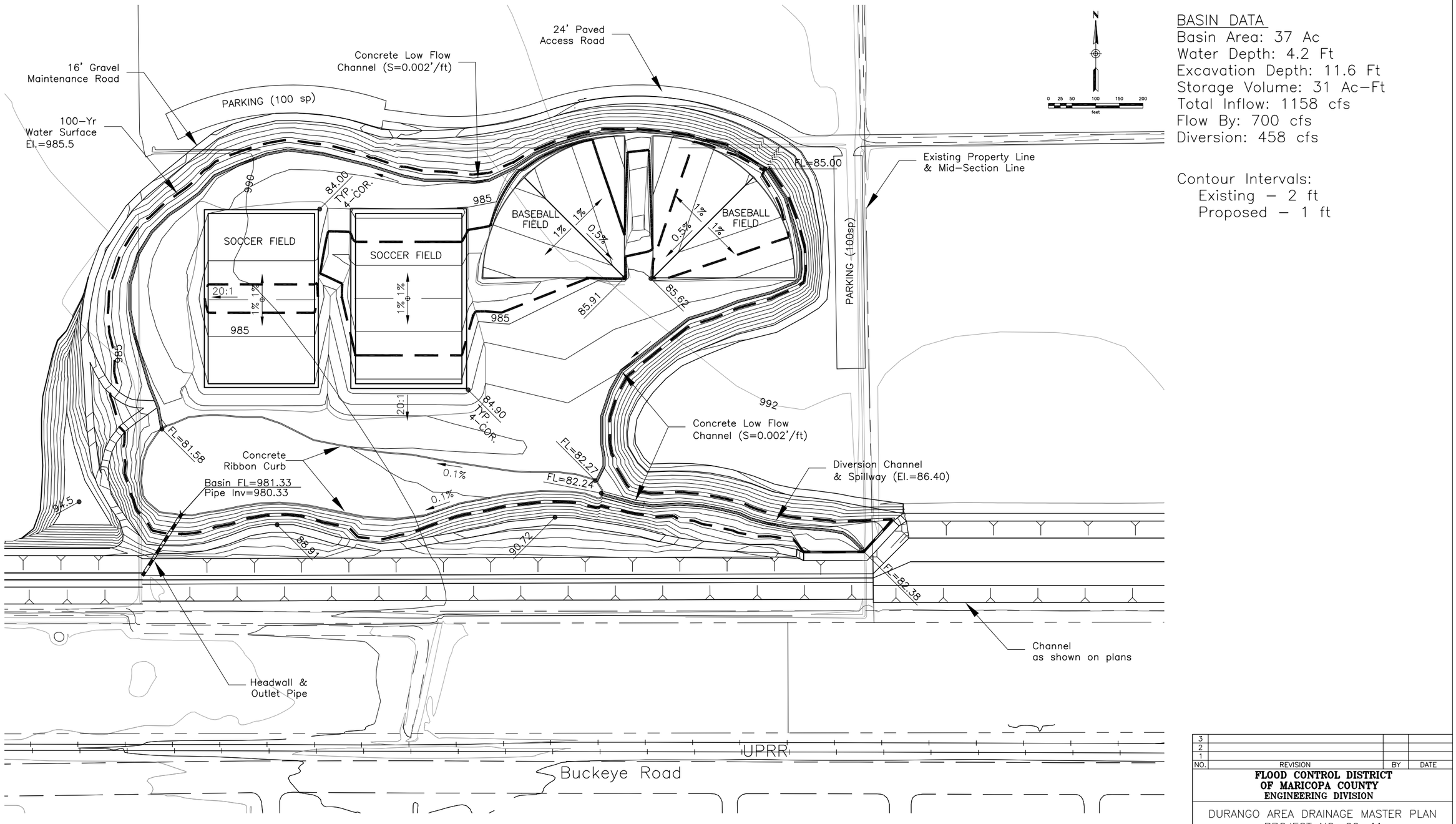
DRAWN	D. Frank	6/02
CHECKED	B. Fry	6/02

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRAWING NO.		SHEET OF
C-3	ENGINEERED GRADING PLAN	4 10



BASIN DATA
Basin Area: 37 Ac
Water Depth: 4.2 Ft
Excavation Depth: 11.6 Ft
Storage Volume: 31 Ac-Ft
Total Inflow: 1158 cfs
Flow By: 700 cfs
Diversion: 458 cfs

Contour Intervals:
Existing – 2 ft
Proposed – 1 ft

CASHION STATION BASIN
(111th Ave. Basin)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. 99-41

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DRAWN	D. Frank	6/02
CHECKED	B. Fry	6/02

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

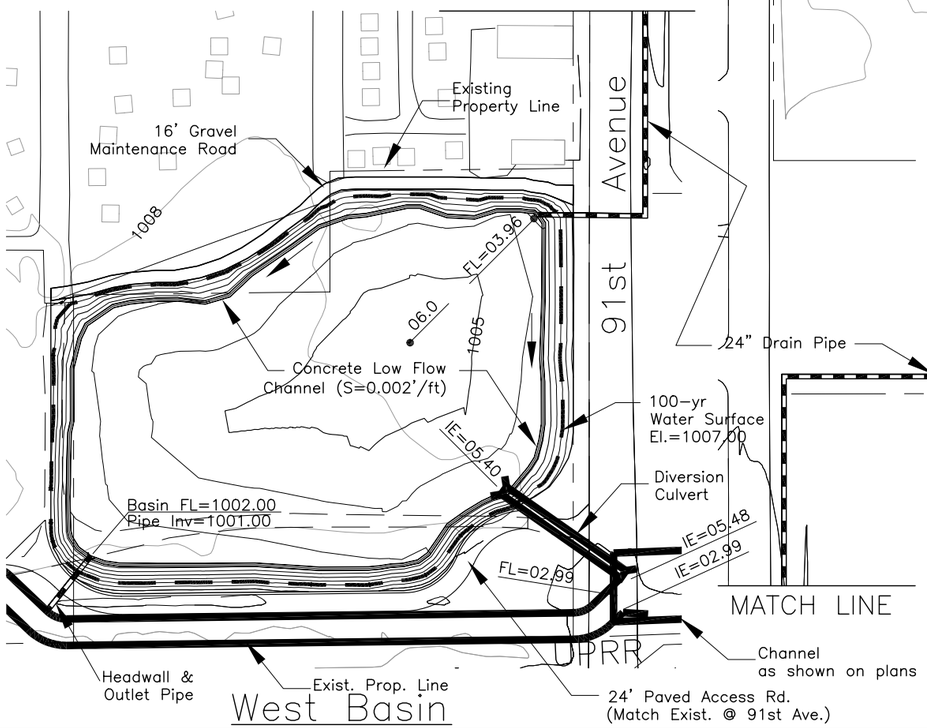
DRAWING NO.
C-4

AESTHETIC GRADING PLAN

SHEET OF
5 10

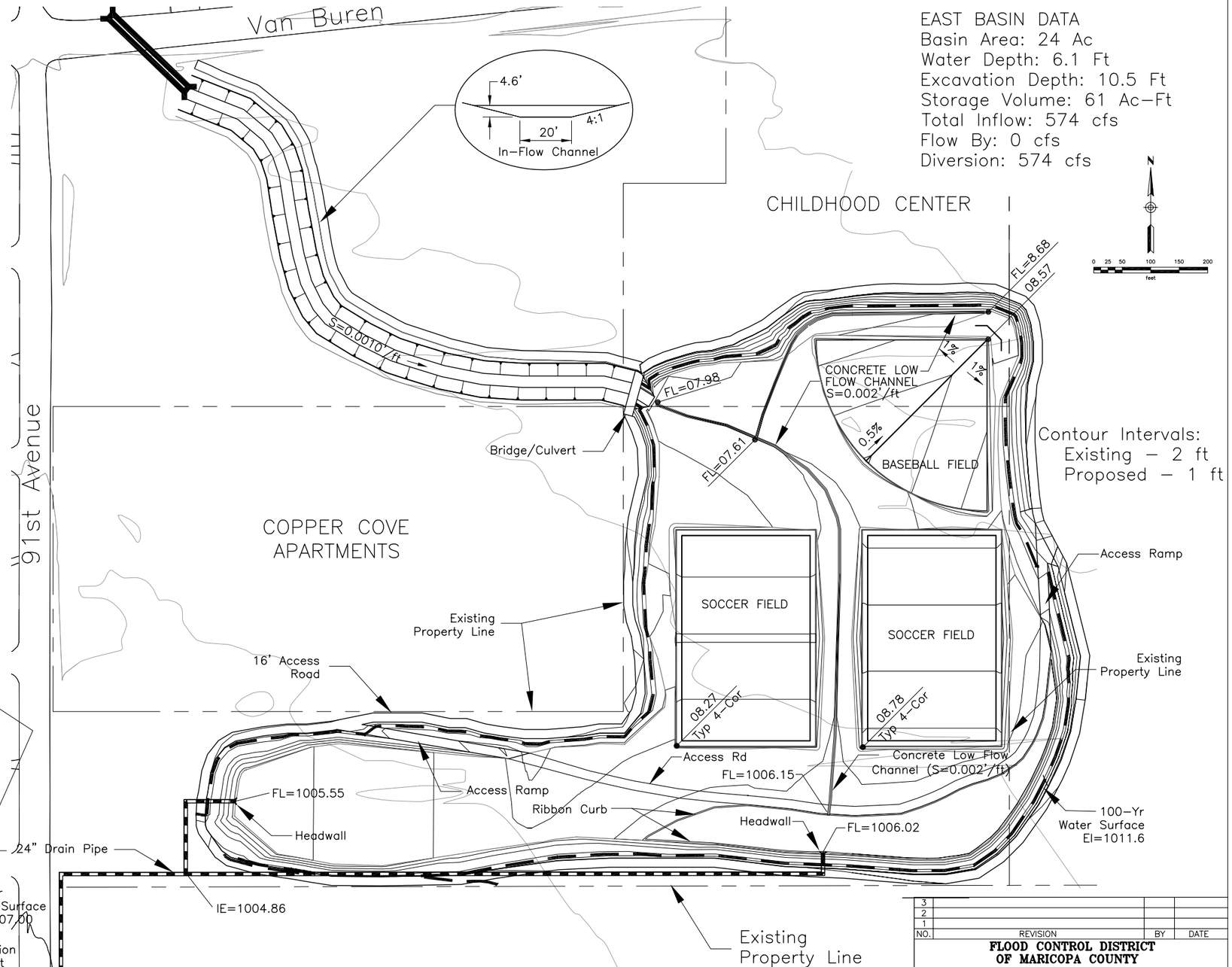
LOCATION MAP

MATCH LINE



West Basin

WEST BASIN DATA
Basin Area: 7.4 Ac
Water Depth: 5.0 Ft
Excavation Depth: 7.0 Ft
Storage Volume: 18 Ac-Ft
Total Inflow: 652 cfs
Flow By: 450 cfs
Diversion: 202 cfs



East Basin

JEAN STATION BASIN
(91st Ave. Basin)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO AREA DRAINAGE MASTER PLAN
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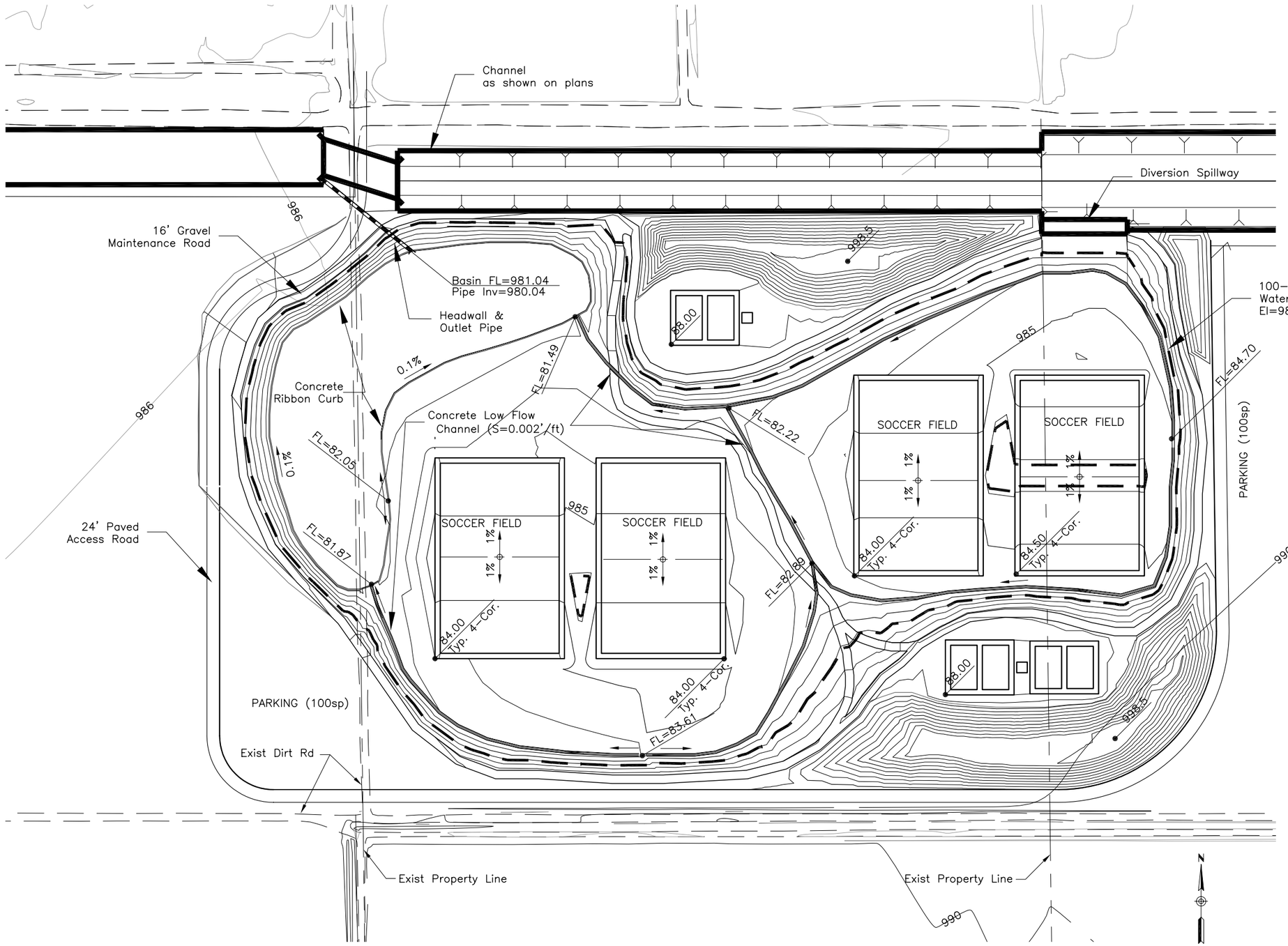
DRAWN	D. Frank	6/02
CHECKED	B. Fry	6/02

DIBBLE & ASSOCIATES CONSULTING ENGINEERS
Since 1962

DRAWING NO. C-5

AESTHETIC GRADING PLAN

SHEET OF 6 10



BASIN DATA
Basin Area: 48 Ac
Water Depth: 4.6 Ft
Excavation Depth: 9.0 Ft
Storage Volume: 61 Ac-Ft
Total Inflow: 1585 cfs
Flow By: 1050 cfs
Diversion: 535 cfs

Contour Intervals:
Existing – 2 ft
Proposed – 1 ft

BUCKEYE FEEDER DIVERSION BASIN #1
(95th Ave. Basin)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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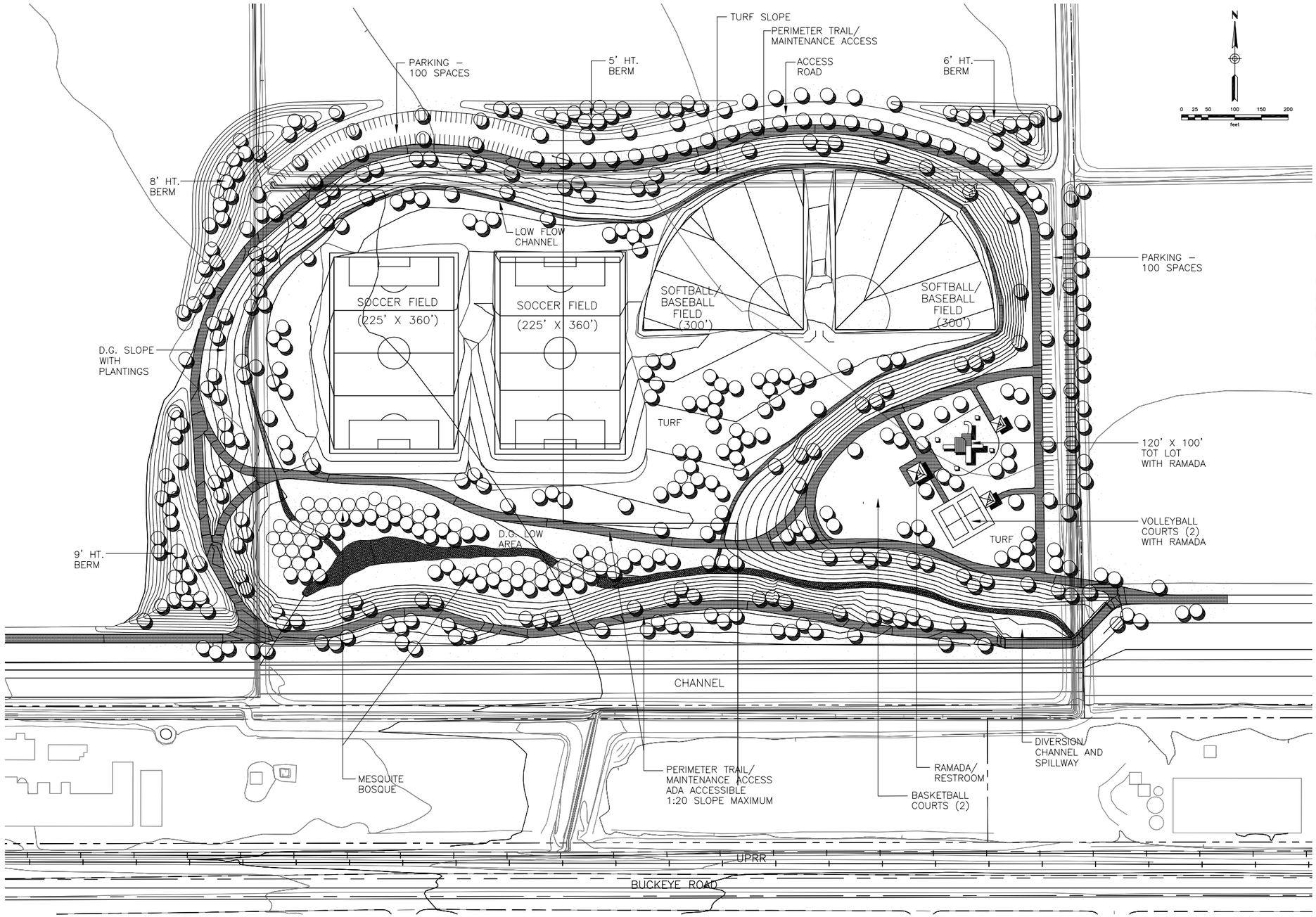
Since 1962

DRAWING NO. C-6

AESTHETIC GRADING PLAN

SHEET OF 7 10



CASHION STATION BASIN
(111th Ave. Basin)

PRELIMINARY PLANT LIST

BOTANICAL NAME	COMMON NAME
TREES	
ACACIA SP.	ACACIA
DALBERGIA SISSOO	SISSOO
FRAXINUS SP.	ASH
PISTACIA CHINENSIS	PISTACHE
PROSOPIS SP.	MESQUITE
QUERCUS VIRGINIANA "HERITAGE'	OAK
ULMUS PARVIFLORA	EVERGREEN ELM
SHRUBS, GROUND COVERS, AND ACCENTS	
ACACIA REDOLENS 'DESERT CARPET'	DESERT CARPET
BACCHARIS 'CENTENNIAL'	CENTENNIAL BACCHARIS
CAESALPINIA SP.	BIRD–OF–PARADISE
CALLIANDRA CALIFORNICA	BAJA RED FAIRY DUSTER
CHRYSACTINIA MEXICANA	DAMIANITA
CONVOLVULUS CNEORUM	BUSH MORNING GLORY
DALEA SP.	DALEA
DASYLIRION WHEELERI	DESERT SPOON
HESPERALOE PARVIFLORA	HESPERALOE
HYMENOXYS ACAULIS	ANGELITA DAISY
MUHLENBERGIA SP.	MUHLY
LANTANA SP.	LANTANA
LEUCOPHYLLUM SP.	SAGE
RUELLIA SP.	RUELLIA
SIMMONDSIA CHINENSIS	JOJOBA
SOPHORA SECUNDIFLORA	TEXAS MOUNTAIN LAUREL

TURF – SEED, BERMUDA TRIANGLE OR PRIMA VERA

DECOMPOSED GRANITE

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. 99–41

PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DESIGNED	DCM	12/01
DRAWN	HH	04/02
CHECKED	DCM	04/02

McCloskey ♦ Peltz, Inc.
LANDSCAPE ARCHITECTS

DRAWING NO. L – 1

PRELIMINARY
LANDSCAPE CONCEPT

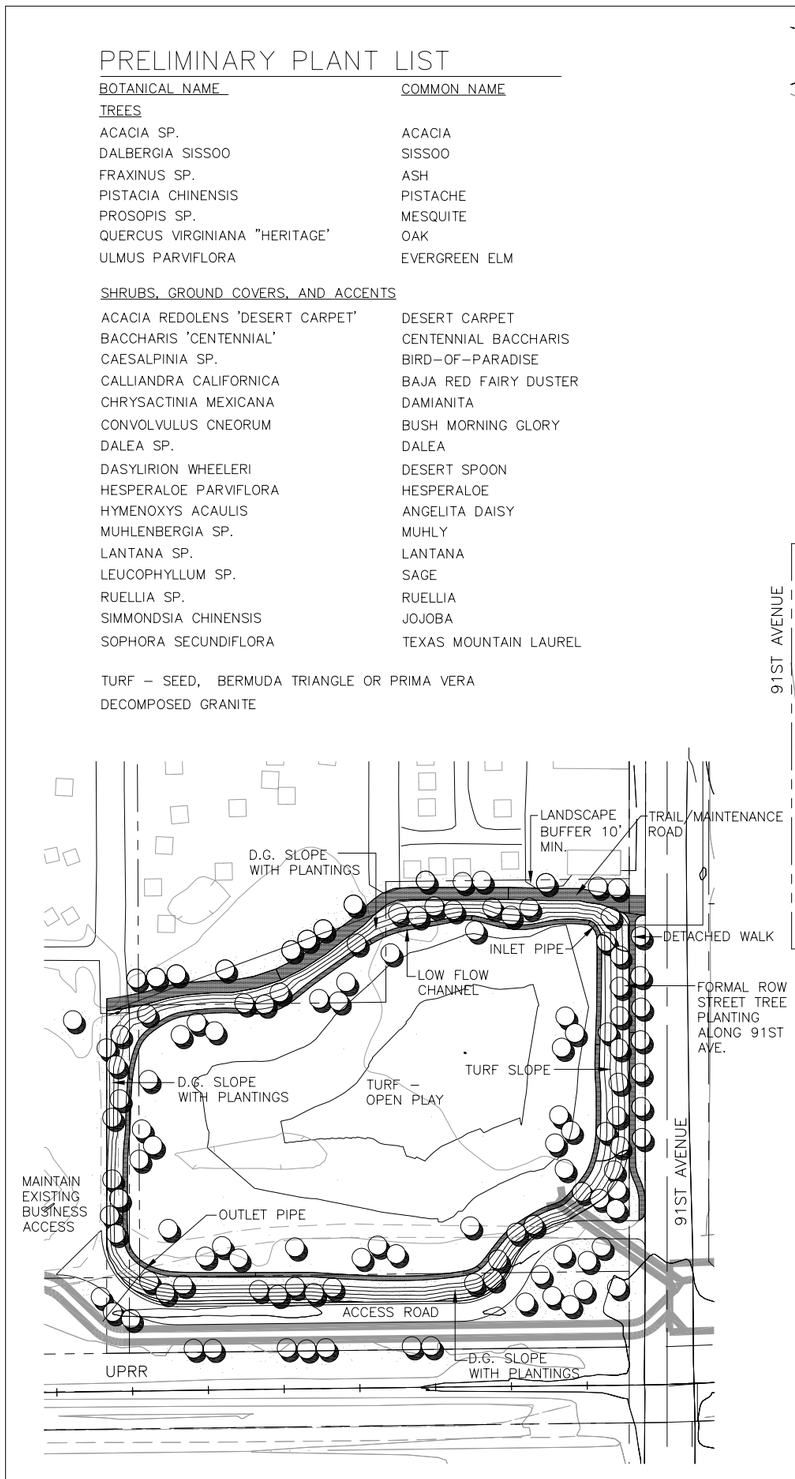
SHEET OF 8 10

PRELIMINARY PLANT LIST

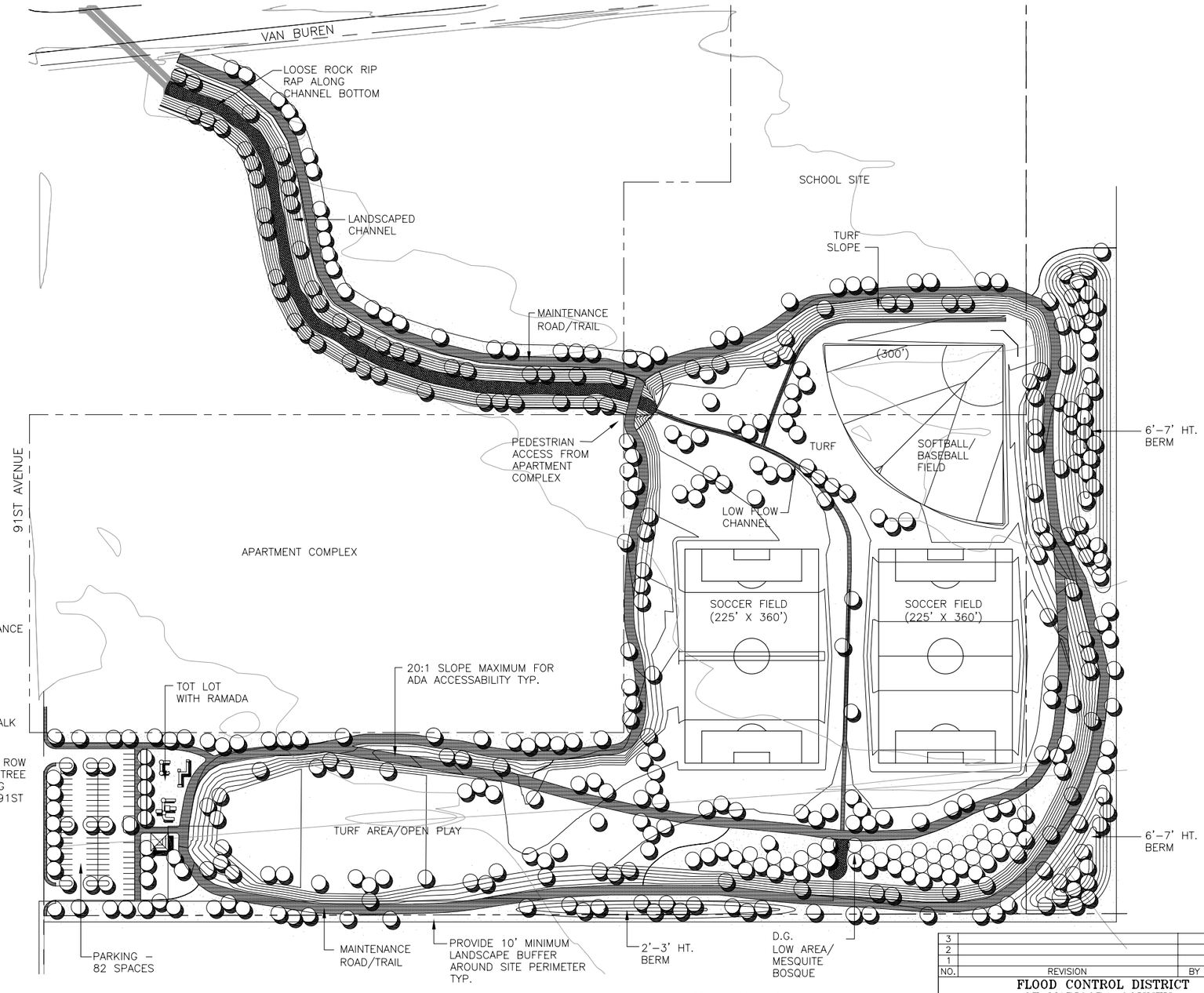
BOTANICAL NAME	COMMON NAME
TREES	
ACACIA SP.	ACACIA
DALBERGIA SISSOO	SISSOO
FRAXINUS SP.	ASH
PISTACIA CHINENSIS	PISTACHE
PROSOPIS SP.	MESQUITE
QUERCUS VIRGINIANA "HERITAGE"	OAK
ULMUS PARVIFLORA	EVERGREEN ELM
SHRUBS, GROUND COVERS, AND ACCENTS	
ACACIA REDOLENS 'DESERT CARPET'	DESERT CARPET
BACCHARIS 'CENTENNIAL'	CENTENNIAL BACCHARIS
CAESALPINIA SP.	BIRD-OF-PARADISE
CALLIANDRA CALIFORNICA	BAJA RED FAIRY DUSTER
CHRYSACTINIA MEXICANA	DAMIANITA
CONVOLVULUS CNEORUM	BUSH MORNING GLORY
DALEA SP.	DALEA
DASYLIRION WHEELERI	DESERT SPOON
HESPERALOE PARVIFLORA	HESPERALOE
HYMENOXYS ACAULIS	ANGELITA DAISY
MUHLENBERGIA SP.	MUHLY
LANTANA SP.	LANTANA
LEUCOPHYLLUM SP.	SAGE
RUELLIA SP.	RUELLIA
SIMMONDSIA CHINENSIS	JOJOBA
SOPHORA SECUNDIFLORA	TEXAS MOUNTAIN LAUREL

TURF – SEED, BERMUDA TRIANGLE OR PRIMA VERA

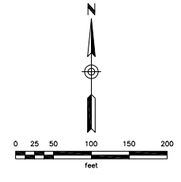
DECOMPOSED GRANITE



WEST BASIN



EAST BASIN



JEAN STATION
(91st Ave. Basin)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

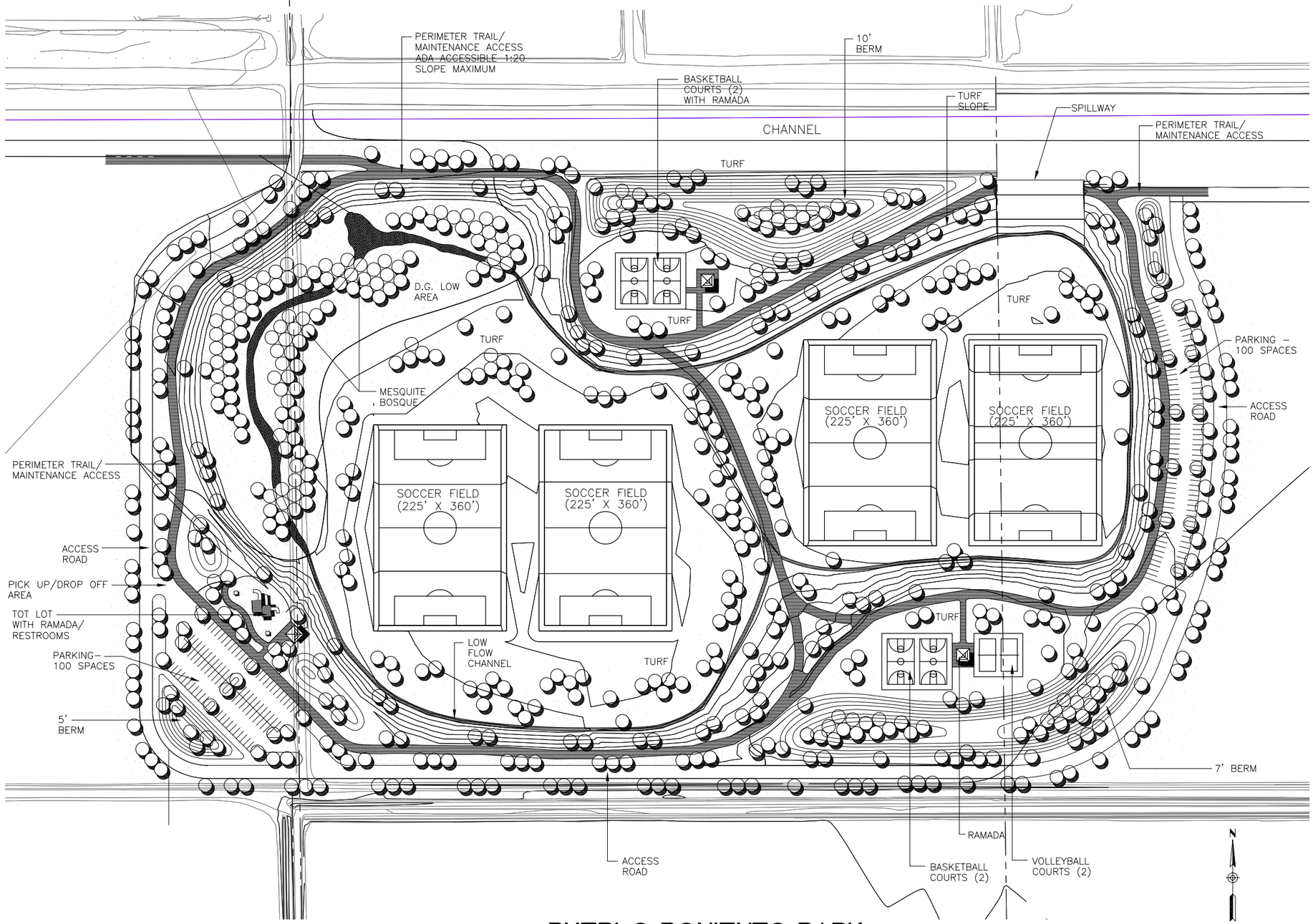
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. 99-41

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	DCM	12/01
DRAWN	HH	04/02
CHECKED	DCM	04/02

McCloskey • Peltz, Inc.
LANDSCAPE ARCHITECTS

DRAWING NO.		SHEET OF
L-2	PRELIMINARY LANDSCAPE CONCEPT	9 10



PUEBLO PONIENTO PARK
BUCKEYE FEEDER DIVERSION BASIN #1
(95th Ave. Basin)

PRELIMINARY PLANT LIST

BOTANICAL NAME	COMMON NAME
TREES	
ACACIA SP.	ACACIA
DALBERGIA SISSOO	SISSOO
FRAXINUS SP.	ASH
PISTACIA CHINENSIS	PISTACHE
PROSOPIS SP.	MESQUITE
QUERCUS VIRGINIANA "HERITAGE'	OAK
ULMUS PARVIFLORA	EVERGREEN ELM
SHRUBS, GROUND COVERS, AND ACCENTS	
ACACIA REDOLENS 'DESERT CARPET'	DESERT CARPET
BACCHARIS 'CENTENNIAL'	CENTENNIAL BACCHARIS
CAESALPINIA SP.	BIRD–OF–PARADISE
CALLIANDRA CALIFORNICA	BAJA RED FAIRY DUSTER
CHRYSACTINIA MEXICANA	DAMIANITA
CONVOLVULUS CNEORUM	BUSH MORNING GLORY
DALEA SP.	DALEA
DASYLIRION WHEELERI	DESERT SPOON
HESPERALOE PARVIFLORA	HESPERALOE
HYMENOXYS ACAULIS	ANGELITA DAISY
MUHLENBERGIA SP.	MUHLY
LANTANA SP.	LANTANA
LEUCOPHYLLUM SP.	SAGE
RUELLIA SP.	RUELLIA
SIMMONDSIA CHINENSIS	JOJOBA
SOPHORA SECUNDIFLORA	TEXAS MOUNTAIN LAUREL

TURF – SEED, BERMUDA TRIANGLE OR PRIMA VERA

DECOMPOSED GRANITE

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. 99–41

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	DCM	12/01
DRAWN	HH	04/02
CHECKED	DCM	04/02

McCloskey ♦ Peltz, Inc.
LANDSCAPE ARCHITECTS

DRAWING NO. L – 3

PRELIMINARY LANDSCAPE CONCEPT

SHEET OF 10 10

APPENDIX H

75th Avenue Preliminary Storm Drain Study

DURANGO ADMP
75TH AVENUE PRELIMINARY STORM DRAIN STUDY
FCD 99-41

Prepared for:

Flood Control District of Maricopa County

Prepared by:

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

June, 2002

Durango ADMP
75th Avenue Preliminary Storm Drain Study
FCD 99-41

The purpose of this study is to develop an interim drainage concept that beneficially utilizes the proposed City of Phoenix 75th Avenue storm drain to allow implementation of certain features of the Durango ADMP prior to completion of the ultimate system outfall at the Agua Fria River. The Durango ADMP Recommended Plan and the proposed City of Phoenix 75th Avenue storm drain alignment are shown on **Figure 1**.

Storm Drain Profile

The preliminary 75th Avenue storm drain profile extends from Roosevelt Street, just south of Interstate 10, to the Salt River, a distance of approximately 4.3 miles. Pipe sizes considered for this analysis are as presented by the City of Phoenix in their preliminary sizing analysis for a 2-year event.

The outfall of this network is the Salt River, which provides an ultimate outfall invert elevation of 970.0 feet. This outfall location also sets the hydraulic grade line (HGL) as the water surface in the Salt River. The 10-year water surface elevation was taken from the Maricopa County FIS study. This starting water surface elevation is 982.75'.

The minimum pipe cover for the design was set at 3 feet. Known utilities were avoided wherever possible. Utility information was obtained from as-builts, quarter section maps, pothole information, and information obtained directly from private utility companies. The exact locations of many of the utilities shown are not known, and elevations have been placed based on typical depths of cover.

Hydraulic computations were performed to determine the capacity of the preliminary profile, the results of which are shown in the **Appendix**.

Drainage Concept

The selected drainage concept consists of constructing a lateral to the proposed 72-inch storm drain from 75th Avenue, along the Harrison Street alignment approximately 4000-feet to the 71st Avenue Basin (Basin 3). This concept would reduce the cost of implementing the ADMP by approximately $1.8 million dollars due to the elimination of several ADMP elements. The proposed concept is shown on **Figure 2** and the estimated cost savings are summarized in **Table 1**.

Item	Quantity	Unit	Unit Cost	Total
Add'l Basin Excavation	108093	CY	$4	$432,373
72" Storm Drain	4053	LF	$180	$729,540
BUC-15 Chan credit	1	LS	-$891,117	-$891,117
BUC-14 Chan credit	1	LS	-$1,391,386	-$1,391,386
BUC-C18 Culv credit	1	LS	-$607,360	-$607,360
BUC-C17 Culv credit (50%)	1	LS	-$94,315	-$94,315
				-$1,822,265

Table-1 Estimated Cost Savings

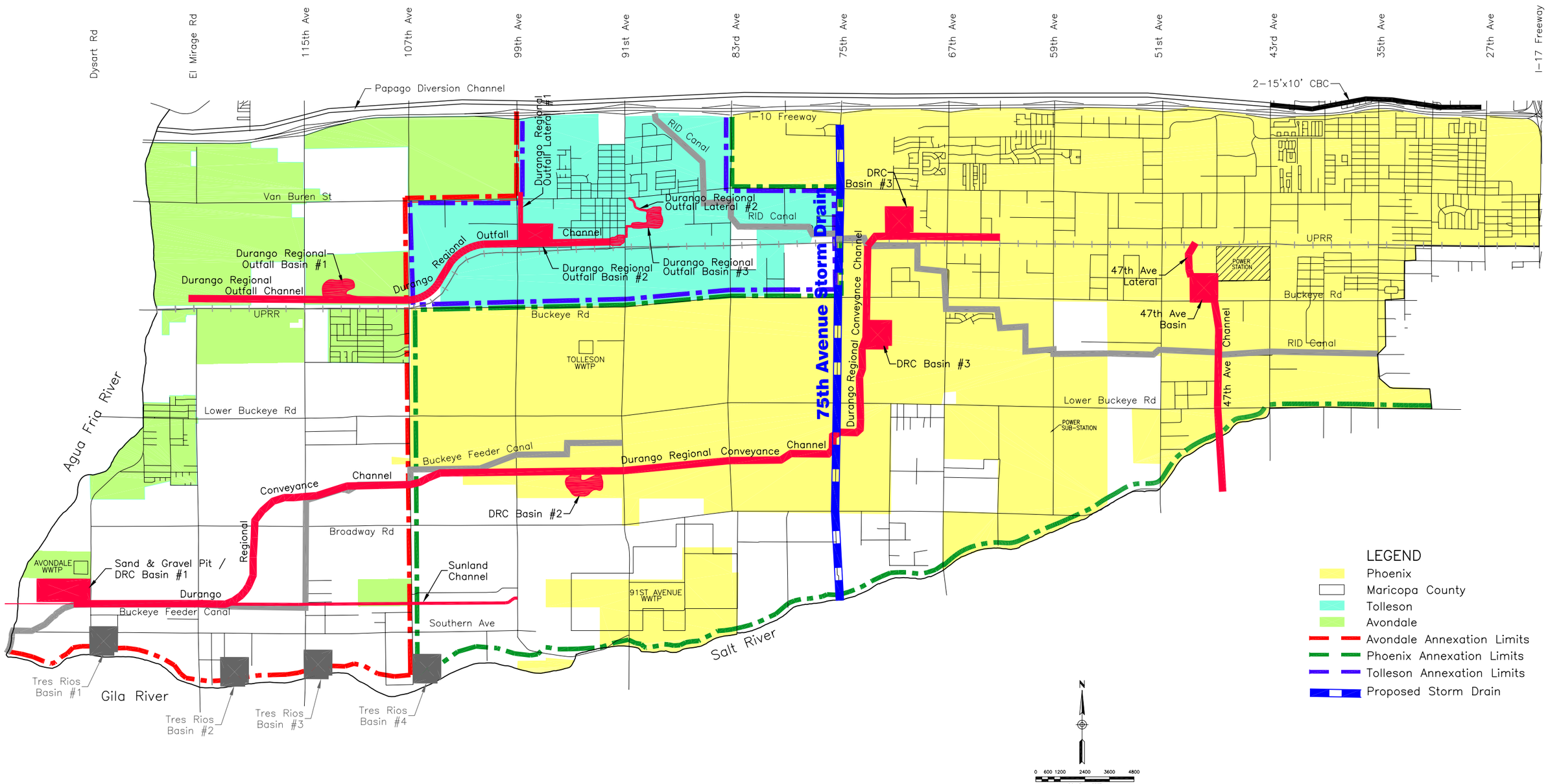


FIGURE – 1

PROJECT TITLE: DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

EXHIBIT TITLE: RECOMMENDED PLAN

06/19/02

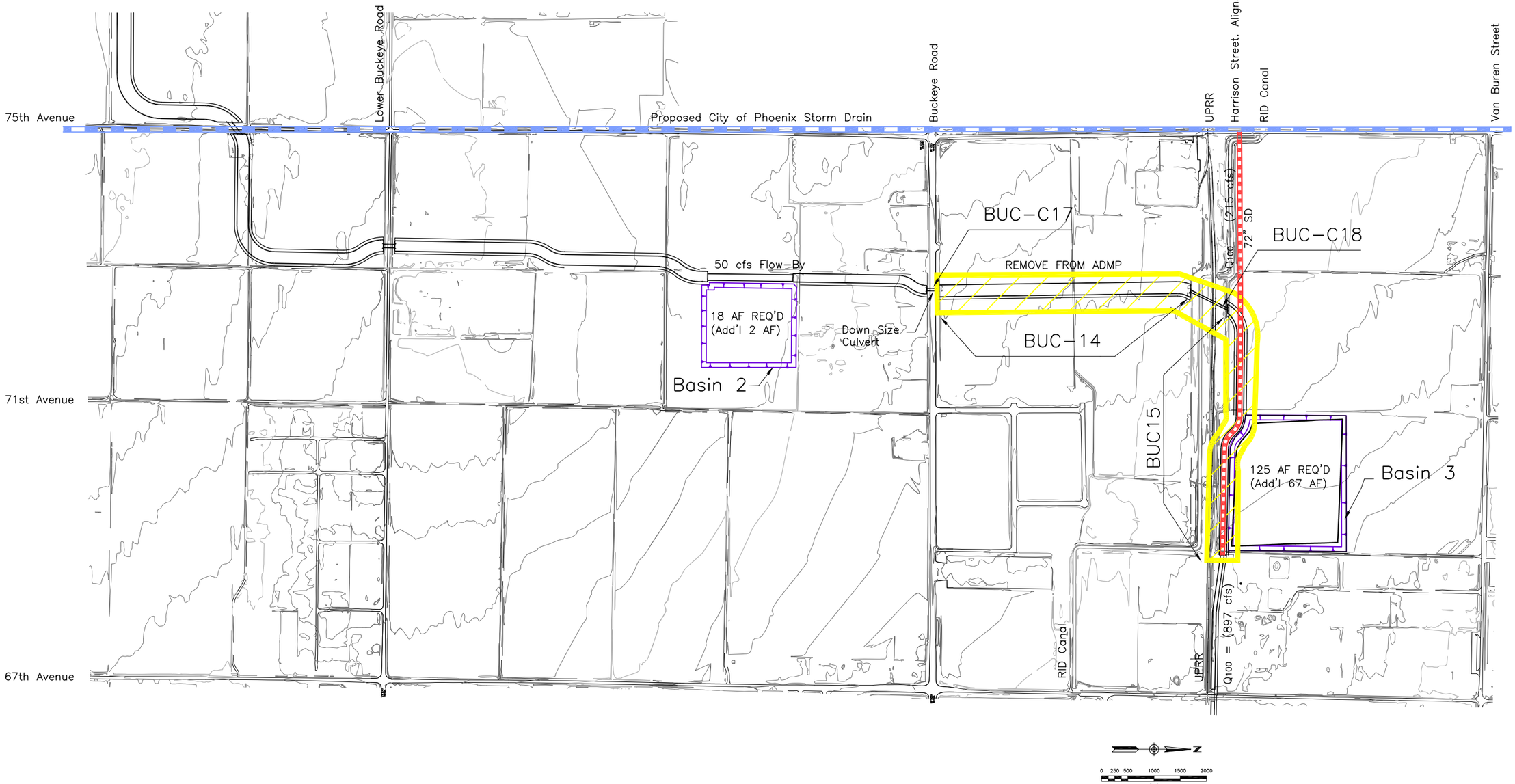


FIGURE – 2

PROJECT TITLE:
DURANGO AREA DRAINAGE MASTER PLAN
PROJECT NO. FCD 99-41

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

EXHIBIT TITLE:
RECOMMENDED CONCEPT

Results and Recommendations

The preliminary storm drain profile is shown on **Figure 3**. The natural ground slope along 75th Avenue is fairly gradual and consistent, lending itself to an efficient storm drain design. Storm drain slopes vary from 0.20% to 0.31%, providing a flowing velocity adequate to prevent sedimentation. At Broadway Road, there are two 90" sanitary sewer lines. It is likely that these lines cannot be avoided without the use of an inverted siphon. The proposed siphon is shown in the preliminary storm drain profile, and the appropriate losses are incorporated into the hydraulic computations.

The capacity of the storm drain system at each half-mile of the system is shown with the calculations in the **Appendix**. At the downstream end, the system has a capacity of 465 cfs. At the upstream end, the capacity is 110 cfs. At the Harrison Street alignment, the storm drain capacity is 215 cfs.

According to the Durango ADMP, the basin at 71st Avenue and the Harrison Street alignment (Basin 3) is programmed for a capacity of 58 acre-feet with a by-pass flow of 410 cfs. With the new concept, the bypass flow is set equal to the capacity of the storm drain system (215 cfs). This will require the basin to be up-sized to 125 acre-feet. This can be accomplished due to the extra depth available to drain the basin via the proposed storm drain.

Nearly $1.8 million in ADMP cost can be saved due to the elimination of several ADMP features. These features extend from Buckeye Road to Basin 3 and include BUC14, BUC-C18, BUC15 and a 50% reduction is size for culvert BUC-C17. Furthermore, the channel cost downstream from Buckeye Road will be reduced because of the reduced flows. The reduction in flows is summarized in **Table-2**.

HEC-1 ID	Location	ADMP	w/75th Ave.
~@CPNA	¼-mi. east of 75th Ave on Low. Buckeye Rd.	934	534
~CPJC1	¼-mi south of Low. Buckeye Rd. on 75th Ave.	1041	639
CPJB1	½-mi south of Low. Buckeye Rd. on 83rd Ave.	1268	847
CPED1	½-mi south of Low. Buckeye Rd. on 91st Ave.	1353	916
CPID1	½-mi south of Low. Buckeye Rd. on 99th Ave.	1147	1082
CPIB1	½-mi south of Low. Buckeye Rd. on 107th Ave.	1785	1593
CPIA	½-mi south of Low. Buckeye & ½-mi east of 115th Ave.	2479	2232

Table 2- HEC-1 Summary

Considering the cost savings for the various elements from Buckeye Road to Basin 3 ($1.8 million) as well as the potential to down-size all of the channel elements further downstream, it is recommended that the following combination of elements be constructed as part of the interim and ultimate drainage solution:

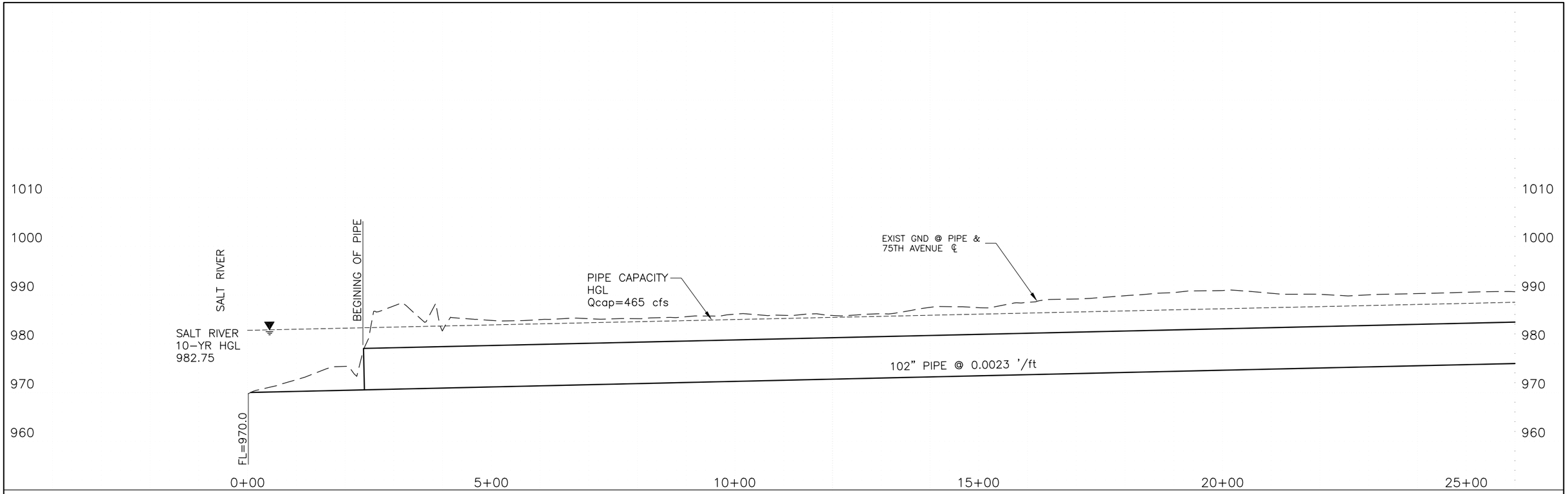
1) Obtain the entire required ROW for the channels and basins from the crossing at 75th Avenue south of Lower Buckeye Road up to Buckeye Road and the ROW for Basin 3 and the channel east of Basin 3 to 63rd Avenue. This way, the opportunity will not be lost to complete this part of the system due to land development ($3,270,556). This cost may be reduced due to the reduction in channel size realized by implementing this concept and should be evaluated further before ROW acquisition.

2) Design and construct Basin 3 to have 125 acre-feet capacity and construct the channel east to 63rd Avenue. This would relieve the identified flooding along the north side of the railroad ($2,875,400).

3) Provide a connection to the 75th Avenue storm drain from Basin 3 with capacity for the full capacity of the 75th Avenue storm drain (215 cfs). The basin connection would function as the flow-by system thus making the downstream ADMP features independent from the features north of the UPRR ($734,050).

4) Construct landscaping up to the remaining budget or the District policy landscape level ($1,236,447).

The total budget for the project is $15 million. It is assumed, based on information provided by the City of Phoenix, that the 75th Avenue storm drain project will cost $7,500,000. The items identified above total $8,116,540, which exceeds the remaining $7,500,000 budget by $616,540. The total project cost may be reduced due to the lesser ROW requirement resulting from the reduction in channel size realized by implementing this concept. Additional savings could also be realized during detailed design.



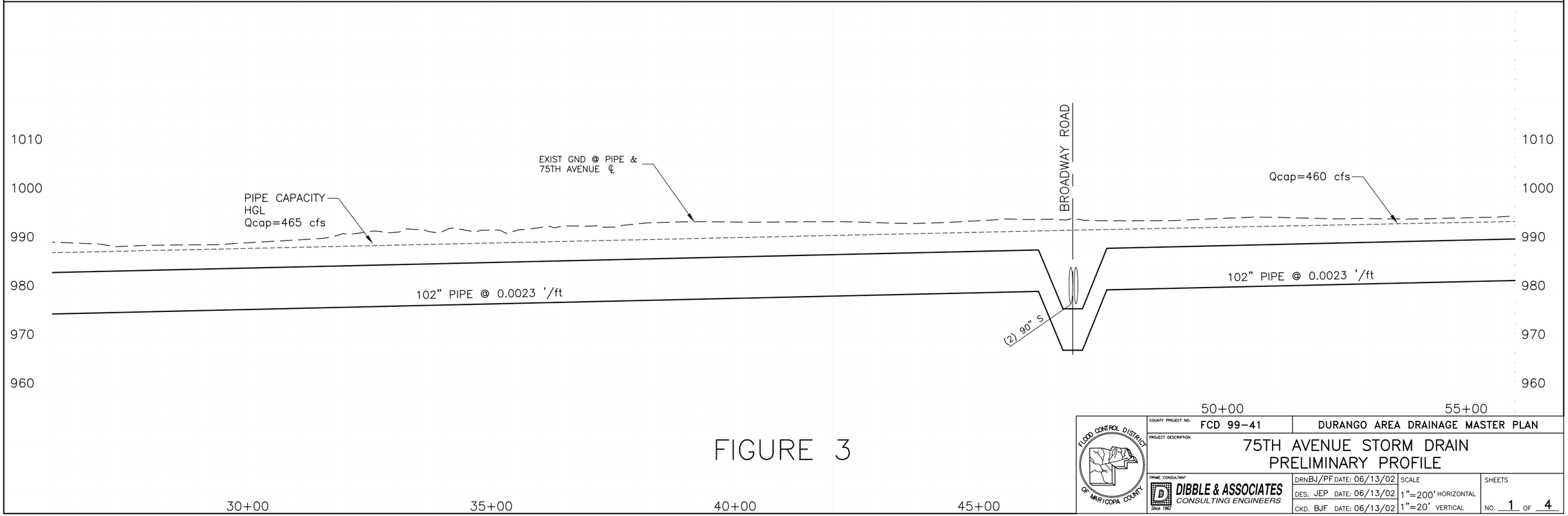


FIGURE 3

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

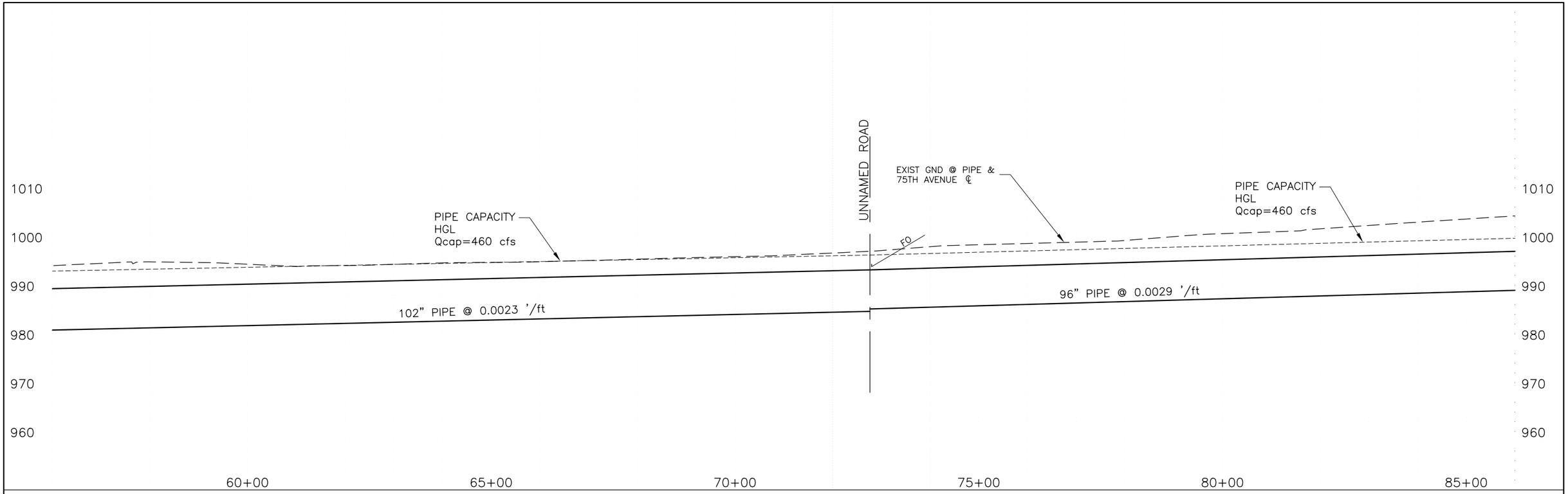
75TH AVENUE STORM DRAIN
PRELIMINARY PROFILE

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN BJ/PF DATE: 06/13/02
DES. JEP DATE: 06/13/02
CKD. BJF DATE: 06/13/02

SCALE
1"=200' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 1 OF 4



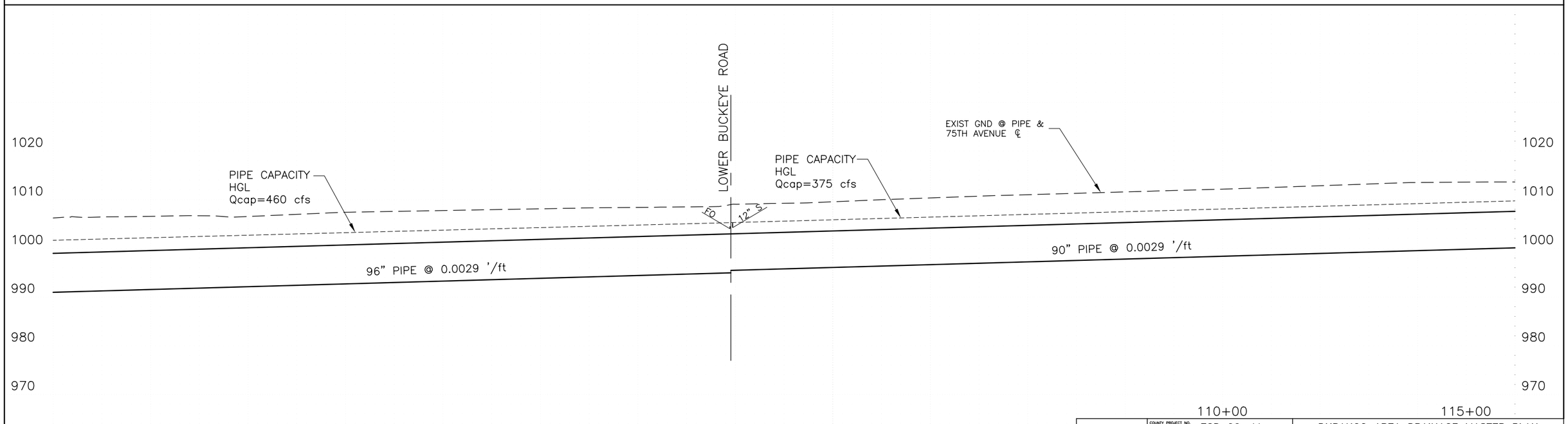


FIGURE 3

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41

DURANGO AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

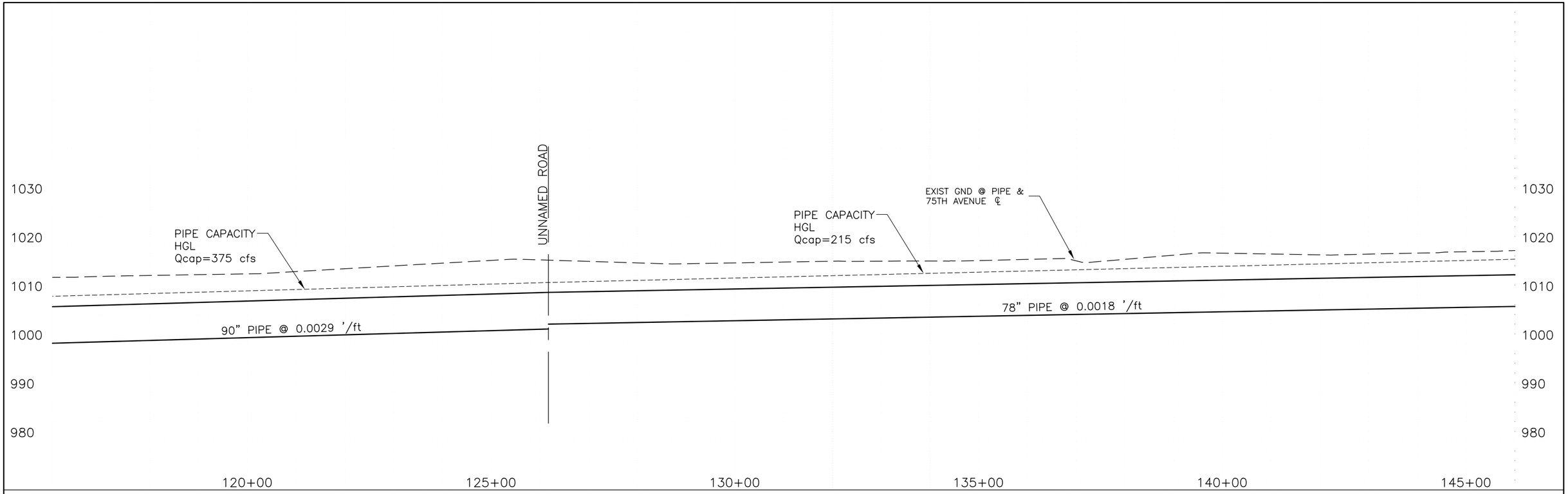
75TH AVENUE STORM DRAIN
PRELIMINARY PROFILE

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN BJ/PF DATE: 06/13/02
DES. JEP DATE: 06/13/02
CKD. BJF DATE: 06/13/02

SCALE
1"=200' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 2 OF 4



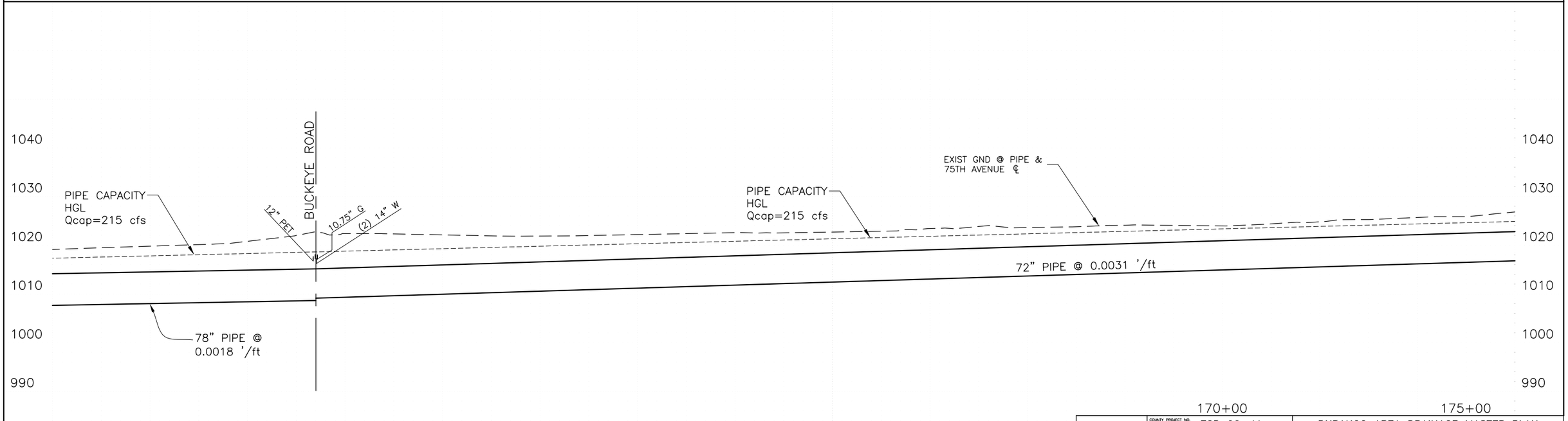
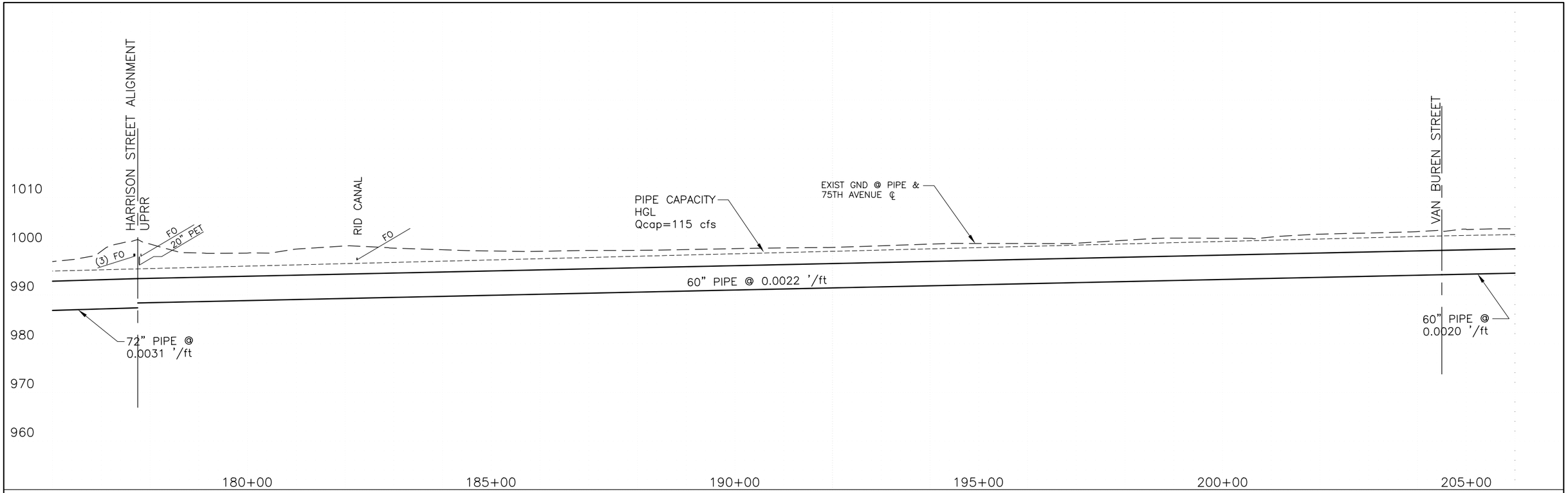


FIGURE 3

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41		DURANGO AREA DRAINAGE MASTER PLAN
PROJECT DESCRIPTION: 75TH AVENUE STORM DRAIN PRELIMINARY PROFILE		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN BJ/PF DATE: 06/13/02	SCALE
	DES. JEP DATE: 06/13/02	1"=200' HORIZONTAL
	CKD. BJF DATE: 06/13/02	1"=20' VERTICAL
		SHEETS NO. 3 OF 4



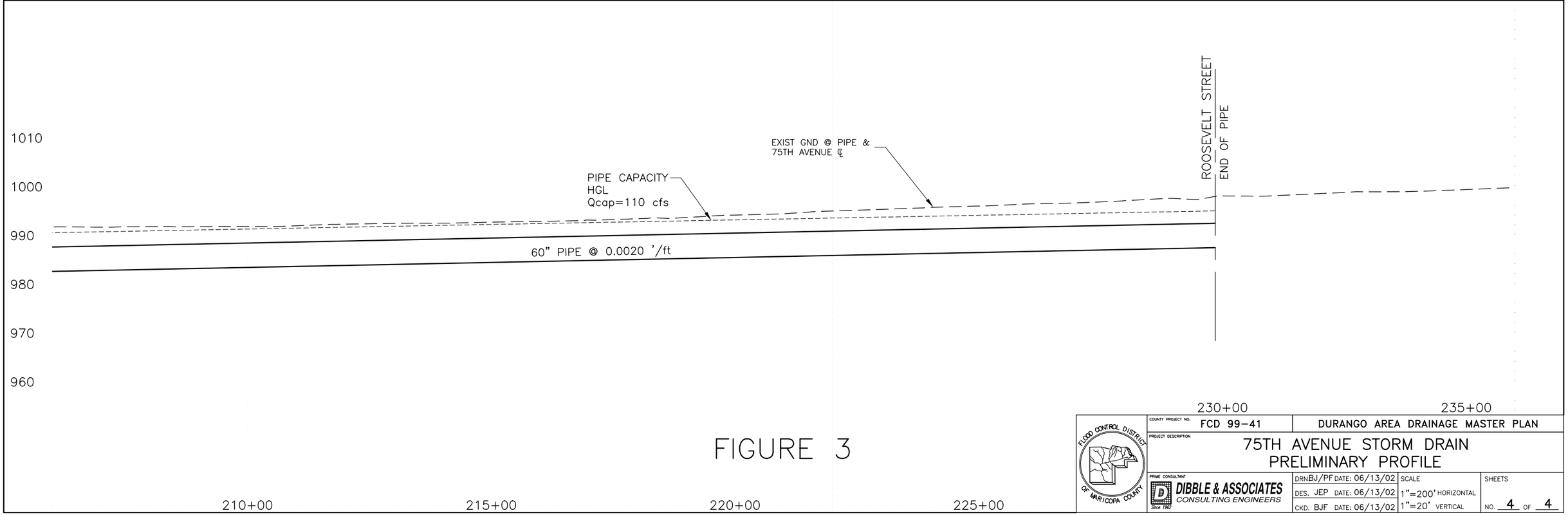


FIGURE 3

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. FCD 99-41		DURANGO AREA DRAINAGE MASTER PLAN
PROJECT DESCRIPTION: 75TH AVENUE STORM DRAIN PRELIMINARY PROFILE		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS (Since 1962)	DRN BJ/PF DATE: 06/13/02	SCALE
	DES. JEP DATE: 06/13/02	1"=200' HORIZONTAL
	CKD. BJF DATE: 06/13/02	1"=20' VERTICAL
		SHEETS NO. 4 OF 4

STORM DRAIN SIZING/HGL CALCULATIONS:

MANNING'S n = 0.013

	Station From -	To	CA	T_c (Min.)	I (in/hr)	Q (cfs)	Slope (ft/ft)	Size (in)	Velocity (fps)	Length (ft)	Delta T_c2 (min)	HGL S_f (ft/ft)	HGL H_f (ft)	*1 # of MH	*1 h_{mh} (ft)	*2 h_j (ft)	*2 angle (degrees)	*2 loss coeff k_b	*3 h_b (ft)	HGL Elev (ft)	(m)
PIPE	22984.6	20450.0		Main St. Drain		110.00	0.0020	60	5.9	2535	7	0.00178	4.52	5.000	0.14		0.000	0.00	0.00	1036.84	316.03
JCT.	20450.0															0.10				1032.19	314.61
PIPE	20450.0	17774.7				115.00	0.0022	60	6.2	2675	7	0.00195	5.22	5.000	0.15		0.000	0.00	0.00	1032.09	314.58
JCT.	17774.7															1.40				1026.72	312.94
PIPE	17774.7	15139.0				215.00	0.0031	72	8.3	2636	5	0.00258	6.79	5.000	0.27		0.000	0.00	0.00	1025.32	312.52
JCT.	15139.0															-0.36				1018.26	310.37
PIPE	15139.0	12618.1				215.00	0.0018	78	6.7	2521	6	0.00168	4.24	5.000	0.17		0.000	0.00	0.00	1018.62	310.47
JCT.	12618.1															1.66				1014.20	309.13
PIPE	12618.1	9987.3				375.00	0.0029	90	9.4	2631	5	0.00238	6.27	5.000	0.34		0.000	0.00	0.00	1012.54	308.62
JCT.	9987.3															0.66				1005.93	306.61
PIPE	9987.3	7274.3				460.00	0.0029	96	9.8	2713	5	0.00254	6.90	5.000	0.37		0.000	0.00	0.00	1005.26	306.40
JCT.	7274.3															-0.20				997.99	304.19
PIPE	7274.3	4691.4				460.00	0.0023	102	9.1	2583	5	0.00184	4.75	5.000	0.32		0.000	0.00	0.00	998.19	304.25
JCT.	4691.4															0.00				993.12	302.70
PIPE	4691.4	0.0				465.00	0.0023	102	9.1	4691	9	0.00188	8.83	9.000	0.57		60.000	0.76	0.97	993.12	302.70
JCT.	0	@ SALT RIVER																Starting HGL (Salt River 10 year depth)=		982.75	

NOTES:
1. Manhole losses computed as 0.05(V^2/2g)*no. of manholes.
*2. Junction losses per City of Los Angeles Thompson equation.
3. Bend losses computed as k_b(V^2/2g)

APPENDIX I

Summary of Utility Pothole Results

TESTHOLE SUMMARY REPORT

Legend

Pothole on Hold for RR Permit

Deleted Pothole

Azurix North America
2527 S. 16th Avenue
Phoenix, Arizona 85007
(602) 254-7344
Prepared by: CLYDE LUNSFORD

Date: 5/22/2001
PROJECT NAME: Durango ADMP
PROJECT NUMBER: 565-02-31
CONTRACT NUMBER:
AZURIX JOB # 02 260900

Data in Feet

UTILITY LOCATION REQUESTS					ACTUAL FIELD RECORDS						
TH#	Street	Northing/ Station (actual)	Easting/ Offset -Lt/+Rt (actual)	Anticipated Utility	Date	Ground Elevation	Top Elevation	Bottom Elevation	Material Type Outside Diameter	Depth of Cover	Calibration Region
1	103RD AVE	#N/A	#N/A	12" WATERLINE	01/00/00	#N/A	#N/A		0	0	II-A
2	99TH AVE	889193.81	391642.77	12" WATERLINE	2/9/2001	999.08	995.25		12" ACP WATERLINE	3.88	II-B
3	91ST AVE	889456.38	396989.7	16" WATERLINE	2/9/2001	1009.57	1003.79		12" ACP WATERLINE	5.78	II-C
4	L. BUCKEYE	881512.98	408423.38	12" WATERLINE	2/5/2001	1009.88	1006.12		12" ACP WATER LINE	3.75	III
5	BUCKEYE RD	886524.03	425777.61	12" WATERLINE	2/5/2001	1041.04	1036.55		12" ACP WATERLINE	4.49	IV
6	DYSART RD	874347.13	370854.92	36" SEWER	1/29/2001	931.63	918.51		48"RCP SEWER	13.12	V-A
7	DYSART RD	875237.83	370857.54	36" SEWER	1/29/2001	933.17	919.64		48" RCP SEWER	13.52	V-A
8	BROADWAY RD	875486.54	372431.18	36" SEWER	1/30/2001	933.24	922.29		48" RCP SEWERLINE	10.95	VA
9A	103RD AVE	886843.66	387967.6	15" SEWER	4/17/2001	995.7	0	979.1	NORTH MANHOLE 15" SEWER	0	II-A
9B	-	886843.66	387967.6	15" SEWER	4/17/2001	990.73	0	977.71	SOUTH MANHOLE 15" SEWER	0	II-A
10	99TH AVE	889194.41	391715.57	60" SEWER	2/12/2001	1001.71	997.96		60" RCP SEWERLINE	3.76	II-B
11A	99TH AVE	889194.06	391670.38	42" SEWER	2/12/2001	1001	998.14		42"RCP SEWER	2.86	II-B
11B	99TH AVE	889194.42	391705.34	SEWER	2/12/2001	1001.89	993.07		60" RCP SEWERLINE	8.8	II-B
12 MH	94TH AVE	889133.95	394339.01	60" SEWER	2/13/2001	1003.6	990.87	985.71	NO UTILITY FOUND (DIPPED MH)	12.73	II-B
13	94TH AVE	889286.6	394332.96	42" SEWER	2/12/2001	1003.88	997.55		12" VCP SEWERLINE	6.36	II-B
14A	91ST AVE	889458.07	396953.19	24" SEWER	2/8/2001	1009.37	1001.32		24" VCP SEWERLINE	8.06	II-C
14B	UPRR	889456.32	396932.92	24" SEWERLINE	2/8/2001	1009.45	1002.56		18" VCP SEWERLINE	6.89	II-C
15	91ST AVE	878114.27	396878.2	72" SEWER	2/8/2001	989.83	982.94		72" RCP SEWERLINE	6.88	VI-A
16	83RD AVE	878874.53	402048.72	30" SEWER	1/30/2001	999.03	985.26		36" ACP SEWER LINE	13.77	VI-B
17	75TH AVE	878824.98	407259.63	42" SEWER	1/31/2001	1000.09	992.77		36" ACP SEWERLINE	7.32	V-B
18	L. BUCKEYE	886648.05	408785.24	12" SEWER	2/5/2001	1026.49	1017.71		18" CLAY SEWERLINE	8.78	III
19A	UPRR	889192.86	424432.33	18" SEWER	4/17/2001	1049.36	0	1038.54	WEST MANHOLE 18" ACP SEWER	0	IV
19B	-	889193.23	424842.72	18" SEWER	4/17/2001	1049.79	0	1039.72	EAST MANHOLE 18" ACP SEWER	0	IV
20	L. BUCKEYE	881235.44	425852.06	87" SEWER	2/6/2001	1026.39	1016.23		87" ACP SEWERLINE	10.18	IV
21	47TH AVE	884041.42	425891.97	66" SEWER	2/13/2001	1032.2	1019.46		66" ACP SEWERLINE	12.72	IV
22	UPRR	0	0	FIBER OPTIC (MCI)	01/00/00	#N/A	#N/A		0	0	III
23	RID CANAL	0	0	FIBER OPTIC (ATT)	01/00/00	#N/A	#N/A		0	0	III
24	L. BUCKEYE	881479.24	408422.5	FIBER OPTIC (SPRINT)	1/30/2001	1009.78	1005.27		4" BLACK IRON PIPE	4.52	III
25	73RD AVE	0	0	FIBER OPTIC (MCI)	01/00/00	#N/A	#N/A		0	0	VI
26	RID CANAL	884082.18	425824.87	FIBER OPTIC (ATT)	2/1/2001	1034.22	1028.51		1 - 3/4" DIRECT BURIAL &	5.7	IV
27	L. BUCKEYE	881215.56	425800.44	FIBER OPTIC (SPRINT)	1/30/2001	1026	1021		4" BLACK IRON PIPE SPRINT FO	5	IV
28	91ST AVE	871529.91	397023.89	114" EFFLUENT	2/14/2001	967.82	962.8		36" RCP EFFLLUENT LINE	5.03	VI-A
29	UPRR	0	0	20" PETROLEUM	01/00/00	#N/A	#N/A		0	0	II-B
30	UPRR	0	0	20" PETROLEUM	01/00/00	#N/A	#N/A		0	0	II-C
31	UPRR	0	0	20" PETROLEUM	01/00/00	#N/A	#N/A		0	0	III
32	UPRR	889472.81	409114.67	6" PETRO	4/16/2001	1034.05	1028.75		7.5" MASTIC COATED STEEL	5.34	III
33	UPRR	889310.51	408881.6	20" PETROLEUM	4/16/2001	1029.7	1026.59		22" PLASTIC COATED STEEL	3.06	III
34	UPRR	0	0	12" PETROLEUM	01/00/00	#N/A	#N/A		0	0	III

TESTHOLE SUMMARY REPORT

Legend
Pothole on Hold for RR Permit
Deleted Pothole

Azurix North America
2527 S. 16th Avenue
Phoenix, Arizona 85007
(602) 254-7344
Prepared by: CLYDE LUNSFORD

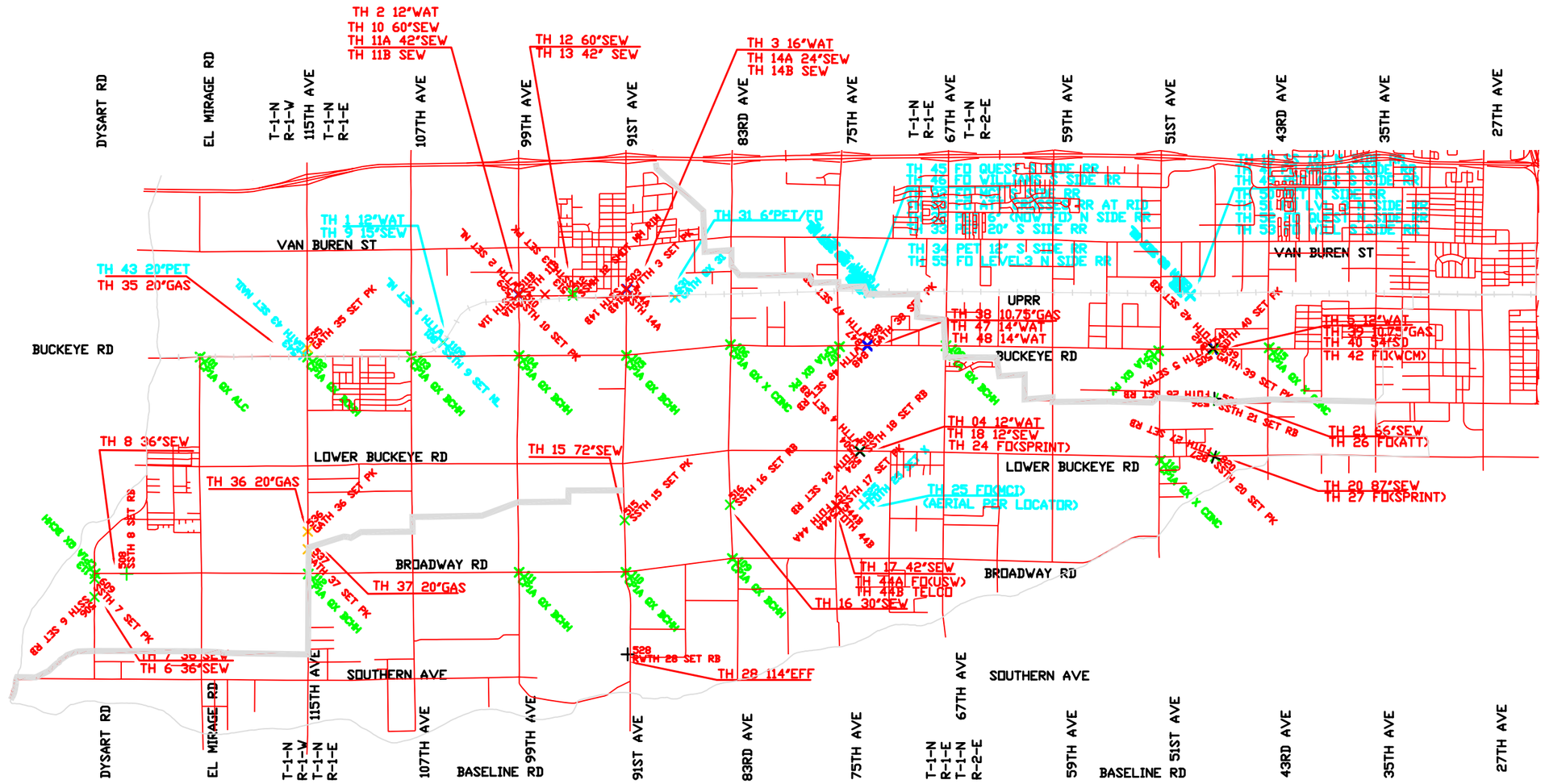
Date: 5/22/2001
PROJECT NAME: Durango ADMP
PROJECT NUMBER: 565-02-31
CONTRACT NUMBER:
AZURIX JOB # 02 260900

Data in Feet

UTILITY LOCATION REQUESTS					ACTUAL FIELD RECORDS						
TH#	Street	Northing/ Station (actual)	Easting/ Offset -Lt/+Rt (actual)	Anticipated Utility	Date	Ground Elevation	Top Elevation	Bottom Elevation	Material Type Outside Diameter	Depth of Cover	Calibration Region
35	115TH AVE	886565.13	381301.92	20" GAS	1/31/2001	983.31	978.08		20" MASTIC COATED STEEL	5.24	I
36	115TH AVE	877554.98	381323.14	20" GAS	1/31/2001	962.41	957.58		20" MASTIC COATED STEEL	4.86	V-B
37	115TH AVE	876689.64	381325.23	20" GAS	1/31/2001	955.63	945.89		20" MASTIC COATED STEEL	9.77	V-B
38	BUCKEYE RD	886698.32	408788.93	10.75" GAS	2/1/2001	1026.55	1021.13		10.75" MASTIC COATED	5.42	III
39	BUCKEYE RD	886533.74	425867.16	10.75" GAS	1/31/2001	1040.4	1036.82		10.75" MASTIC COATED STEEL	3.58	IV
40	BUCKEYE RD	886504.07	425791.47	54" STORM DRAIN	2/5/2001	1041.3	1034.47		54" RCP STORM DRAIN	6.84	IV
41	UPRR	#N/A	#N/A	FIBER OPTIC (MCI)	01/00/00	#N/A	#N/A		0	0	IV
42	BUCKEYE RD	886548.2	425744.43	FO (LDDS WORLDCOM)	2/9/2001	1041.06	1036.97		4" STEEL CONDUIT	4.14	IV
43	UPRR	0	0	20" PETROLEUM	01/00/00	#N/A	#N/A		0	0	I
44A	75TH AVE	878836.38	407317.4	FIBER OPTIC (US WEST)	2/8/2001	1000.33	996.9		2 - 4.5" PVC CONDUITS	3.42	VI-B
44B	POWER ESMT	878834.24	407249.89	US WEST TELCOM	2/7/2001	1000.98	997.79		1.5" DIRECT BURIAL TELCOM	3.2	VI-B
45	UPRR	0	0	FIBER OPTIC (QWEST)	01/00/00	#N/A	#N/A		0	0	III
46	UPRR	0	0	FIBER OPTIC (WILLIAMS)	01/00/00	#N/A	#N/A		0	0	III
47	BUCKEYE RD	886723.25	408786.37	12" WATERLINE	2/1/2001	1025.42	1020.85		14" ACP WATERLINE	4.58	III
48	BUCKEYE RD	886648.05	408785.24	12" WATERLINE	1/30/2001	1026.49	1021.87		14" ACP WATERLINE	4.64	III
49	UPRR	0	0	PETROLEUM APS	01/00/00	#N/A	#N/A		0	0	IV
50	UPRR	889193.93	424636.22	PETROLEUM	5/22/2001	1049.69	1044.38		11" COATED STEEL	5.33	IV
51	UPRR	0	0	FIBER OPTIC (LEVEL 3)	01/00/00	#N/A	#N/A		0	0	IV
52	UPRR	0	0	FIBER OPTIC (QWEST)	01/00/00	#N/A	#N/A		0	0	IV
53	UPRR	0	0	FIBER OPTIC (WILLIAMS)	01/00/00	#N/A	#N/A		0	0	IV
55	UPRR	0	0	0	01/00/00	#N/A	#N/A		0	0	III

DURANGO ADMP

POTHOLE LOCATIONS AS EXCAVATED



LEGEND

- CONTROL POINTS AT COORDINATES PROVIDED
- TEST HOLES COMPLETE, CALIBRATED BY REGION
- TEST HOLES NOT YET EXCAVATED, CALIBRATED BY REGION

N

1"=6000'

Azurix
UNDERGROUND INFRASTRUCTURE
2527 S. 16TH AVE.
PHOENIX, AZ 85007
PH 602-254-7344
FX 602-254-7412
azurixmap@aol.com

REV.	DESCRIPTION	BY	DATE

JOB NAME: DURANGO ADMP		DRAWN BY: CL	CHECKED BY: DP
LOCATION: 47TH AVE TO 115TH AVE MARICOPA CO., PHOENIX, TOLLESON, AZ		SCALE: 1"=2500'	
		DATE: 03-01-01	
		JOB NUMBER	SHEET
SHEET NAME: PHLOC		02 260900	__ OF __ △

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