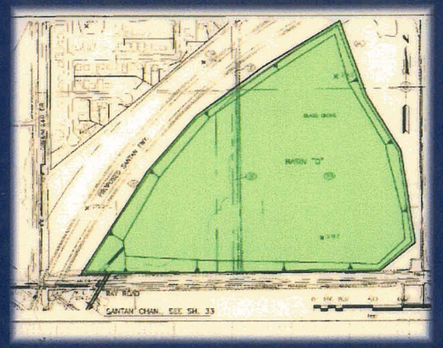
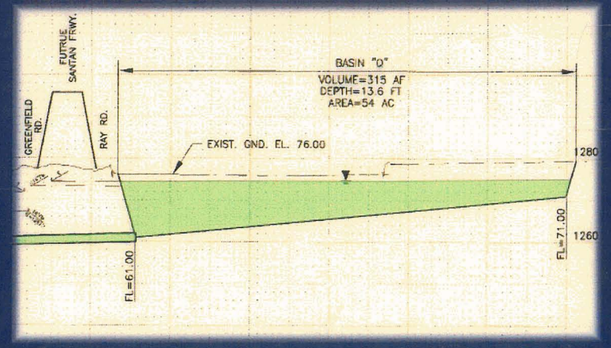
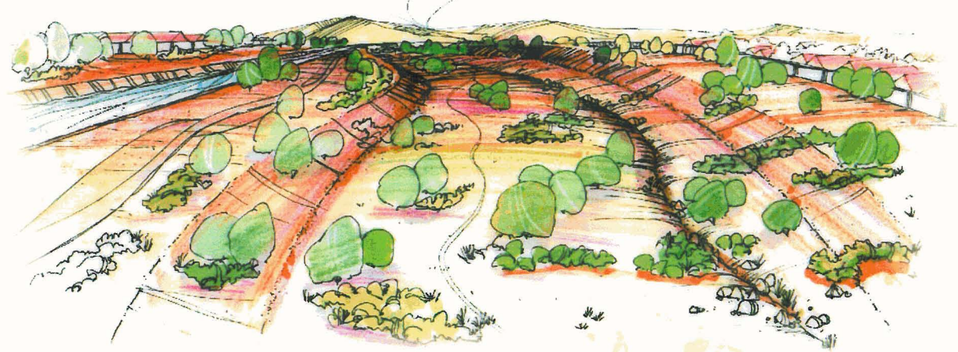
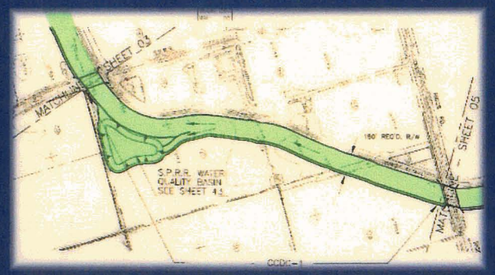
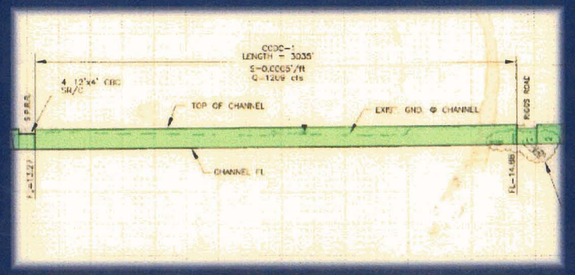




HIGLEY ADMP







Higley Area Drainage Master Plan

Recommended Design Report

FCD #98-13
October, 2000

prepared for:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD CONTROL DISTRICT of MARICOPA COUNTY 1959

prepared by:

DIBBLE & ASSOCIATES CONSULTING ENGINEERS
Since 1962

in association with:

LOGAN SIMPSON DESIGN INC

A491.601

HIGLEY AREA DRAINAGE MASTER PLAN
FCD #98-13

RECOMMENDED DESIGN REPORT

Prepared for:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Prepared by:

DIBBLE & ASSOCIATES, CONSULTING ENGINEERS
2633 East Indian School Road, Suite 401
Phoenix, Arizona 85016-6763
Phone: (602) 957-1155 FAX: (602) 957-2838
<www.dibblecorp.com>

In Association with:

LOGAN SIMPSON DESIGN, INC
51 West 3rd Street, Suite 450
Tempe, Arizona 85281
Phone: (480) 967-1343 FAX: (480) 966-9232

October 20, 2000

HIGLEY AREA DRAINAGE MASTER PLAN
RECOMMENDED DESIGN REPORT

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

HIGLEY AREA DRAINAGE MASTER PLAN
RECOMMENDED DESIGN REPORT

I. INTRODUCTION

A. Objective

This Recommended Design Report has been prepared for the Flood Control District of Maricopa County (FCDMC) as part of the Higley Area Drainage Master Plan (ADMP). The purpose of the project is to quantify the extent of flooding problems and develop alternative solutions to the flooding problems. The effort is limited to mitigation of flooding along the Eastern Canal, the Consolidated Canal, and the Southern Pacific Railroad adjacent to Arizona Avenue as well as flooding west of these features caused by possible overtopping of the canal or railroad from runoff generated within the study area. This plan presents preliminary costs, alignments, right-of-way requirements, utility conflicts, and landscape themes for the recommended alternative. The project location is shown on **Figure 1**. The study area covers eastern Maricopa County including portions of the City of Mesa, City of Chandler, the Town of Gilbert, and unincorporated Maricopa County. The jurisdictional boundaries are depicted on **Figure 2**.

B. Study Area

The study area encompasses approximately 73 square miles bounded by the Roosevelt Water Conservation District (RWCD) Main Canal and the FCDMC East Maricopa Floodway (EMF) on the east and the Salt River Project (SRP) Eastern Canal (from the Salt River to Pecos Road) and Arizona Ave (from Pecos Road to the County line) on the west, the Salt River Project South Canal on the north and the Maricopa/Pinal County boundary (Hunt Highway) to the south. Three distinct study areas have been identified within the project limits. The three study areas are also shown on **Figure 2**.

The ***North Study Area*** is the area north of the Superstition Freeway. This area of approximately 10 square miles is in the City of Mesa and is urbanized. The objective within the North Study Area is to evaluate opportunities for structural or non-structural solutions, which can mitigate the impacts of the floodplain. Because of limited availability of open land within the area, this area is considered the highest priority.

The ***Mid Study Area*** is between the Superstition Freeway and the Southern Pacific Railroad (SPRR). This area of approximately 16 square miles is predominately within the Town of Gilbert and is currently in a state of transition from an agricultural based rural environment to a newly developed urban environment. The floodplain in this area has been delineated and the Town of Gilbert has been able to limit development along the Eastern Canal. Flooding problems exist at major east-west crossroads particularly at Guadalupe Road. The RWCD submitted a CIP request to the FCDMC requesting evaluation and resolution of flooding and conveyance issues associated with the RWCD tail water ditch paralleling the Eastern Canal. The objective in this area is to evaluate alternative structural and/or non-structural solutions and to provide regional drainage and flooding relief within the area.

The ***South Study Area*** is south of the SPRR to Hunt Highway. This area of approximately 47 square miles is generally rural in nature and provides the greatest opportunity to provide a pro-active approach to providing drainage and flooding solutions, prior to the onset of development. The area is within the Town of Gilbert, the City of Chandler and unincorporated Maricopa County. Flooding problems exist at major east-west crossroads, particularly in the vicinity of Pecos Road. The RWCD also requested that the FCDMC evaluate flooding issues along the Eastern Canal Extension in the South Area The objective in this area is to evaluate alternative structural and/or non-structural solutions and to provide planning for development.

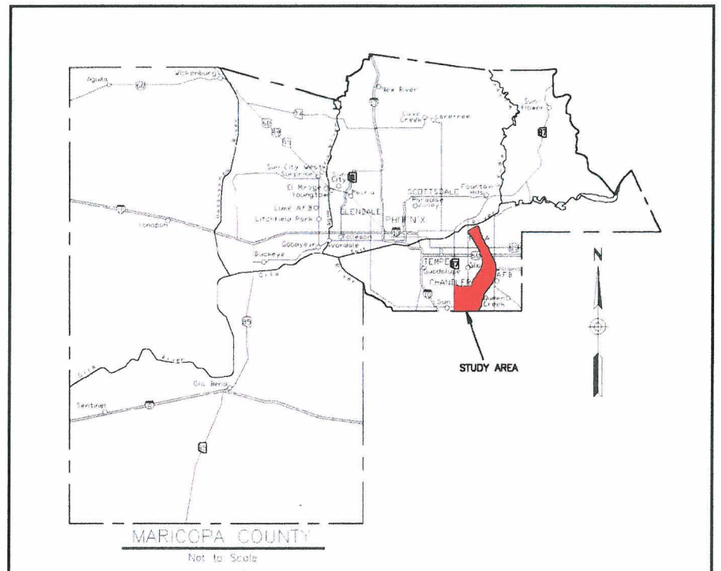
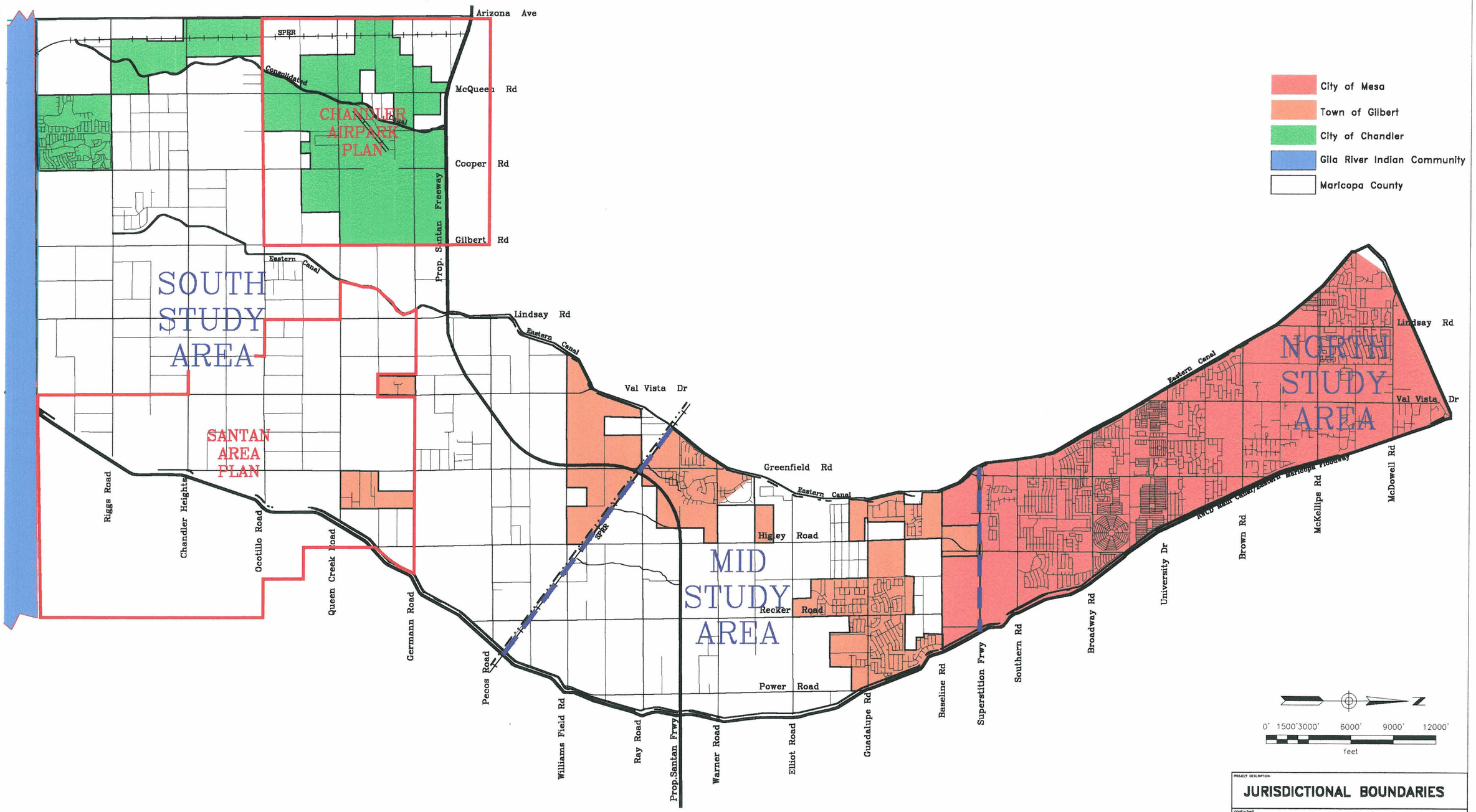


Figure 1 - Project Location

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"



PROJECT DESCRIPTION:
JURISDICTIONAL BOUNDARIES

CONSULTANT:
DIBBLE & ASSOCIATES CONSULTING ENGINEERS

FIGURE–2

II. HYDROLOGY

A. Introduction

The hydrology used for this study was derived from four source models. Hydrology for the North Area, north of the Superstition Freeway, is from the *Eastern Canal North, from Baseline Road north to McDowell Road, Floodplain Delineation Study*, completed in August 1999. Hydrology for the Mid Area is from the *Gilbert-Chandler Area Drainage Master Study*, completed in 1993. Hydrology for the South Area is from the *Gilbert-Chandler ADMS Addendum*, completed in 1998. The hydrology models just cited were modified by the FCDMC to reflect changes in land use that have occurred since the models were originally developed. The land use changes are due to development within the watershed changing from an agricultural condition to a more urbanized condition. In addition, changes were made to account for on-site retention due to development and sub-basin re-delineation to incorporate the proposed Santan Freeway alignment. Dibble and Associates then modified the FCDMC supplied hydrology to reflect changes in flow routing for the planned channels and detention basins.

Hydrology for the area south of Hunt Highway, within the Gila River Indian Community (GRIC), is based on hydrology from the *Santan Canal Reach ST-IC Hydrology Study*, completed in April 2000 as part of the design of the Pima-Maricopa Irrigation Project (PMIP) for the GRIC. Dibble & Associates expanded the limits of the GRIC model to develop hydrology for the area south of the Maricopa County line 2.5 miles to the EMF outfall as a means to identify runoff reaching the proposed Consolidated Canal Diversion Channel and Eastern Canal Diversion Channel outfalls within the GRIC.

B. Methodology

Hydrology for the Higley area is developed using the U.S. Army Corps of Engineers, *HEC-1 Flood Hydrograph Package* (HEC-1) computer program. 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 FCDMC, is used to aid in the application of the methods described in the Hydrology Manual.

In all models, runoff is evaluated under existing conditions for the 100-year storm event with a 24-hour duration using the SCS Type II time distribution of rainfall. Aerial reduction factors are utilized from the NOAA Atlas II. Rainfall losses are estimated using the Green-Ampt method. The S-graph method is used to represent runoff characteristics for the watershed in the Gilbert-Chandler ADMS, Addendum, and GRIC models. The Clark Unit hydrograph is used in the Eastern Canal FDS. The drainage subarea boundaries are shown on **Figure 3** for the Mid, South, and GRIC modeling areas. The North Area drainage subarea boundaries are contained in the **Appendix**.

C. Hydrologic Criteria

The preliminary design hydrology is based on providing 100-year flood protection for a 24 hour storm under existing watershed conditions.

D. Drainage Area Characteristics

Rainfall falling within the study area drains naturally from east to west in a shallow, sheet-flow fashion. Natural drainage ways have been obliterated with development of irrigated agricultural fields and residential development. The drainage area contributing runoff to the study area extends from the Eastern and Consolidated Canals east to the RWCD Canal. The East Maricopa Floodway (EMF) was constructed by the Soil Conservation Service (SCS) along the east (upstream) side of the RWCD Canal. The EMF is now owned and operated by the FCDMC. The EMF was originally sized for the 100-year storm and intercepts runoff generated east of the RWCD Canal. Although recent studies indicate that the EMF does not have capacity for the existing conditions 100-year flow, for purposes of this study, the EMF/ RWCD Canal is considered the eastern watershed boundary for runoff within the watershed. In addition to the RWCD Canal and the EMF, the Superstition Freeway and the Southern Pacific Railroad at Rittenhouse Road form major man-made drainage boundaries. The Superstition Freeway has a collector channel along its north right-of-way that collects and conveys runoff westerly to the Holmes Park retention basin situated between Greenfield Road and the Eastern Canal. Runoff stored in Holmes Park is pumped into the RWCD tailwater ditch, adjacent to the Eastern Canal, following a storm event. The elevated SPRR embankment directs surface runoff northwesterly to the Crossroads Park retention basin west of Greenfield Road. Runoff stored in Crossroads Park is also pumped into the RWCD tailwater ditch following a storm event.

The study area currently lacks a natural outfall. Runoff accumulates along the canals and creates ponding areas. As the water level rises, accumulated runoff flows southerly along the canal bank. In some locations, runoff flows into the irrigation canals and then overtops to the downstream side.

C. Existing Reports

The Higley area has been previously studied in other master plans and studies. These plans and studies are discussed in the *Alternatives Analysis Report*, March 2000. Improvements identified in this report are based on preliminary information contained in the *Alternatives Analysis Report*. 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 includes representatives from local government agencies and primary landholders with an interest in the project. The Review Committee met several times during the alternatives analysis to provide direction and feedback during the development and selection of the Recommended Alternative Plan.

The Review Committee consists of the following members:

REVIEW COMMITTEE

Agency	Representative
Arizona Department of Transportation	Mr. Bill Evans
Arizona Game & Fish Department	Mr. Timothy Wade
City of Chandler	Mr. Gary LaForge
Flood Control District of Maricopa County	Mr. Tim Phillips
	Ms. Kathryn Gross
Gila River Indian Community	Mr. Fred Ringlero
	Mr. Adrian Hendricks
Town of Gilbert	Mr. Lonnie Frost
Maricopa County Dept. of Transportation	Mr. David DeWeese
City of Mesa	Ms. Anna Leyva
Roosevelt Water Conservation District	Mr. Michael Leonard
Salt River Project	Mr. Paul Cherrington

In addition to the Review Committee, public input was solicited at a public open house held in the project study area. The open house was held early in the project to allow public input to be incorporated into the entire planning process. Other meetings were held to obtain input from the agencies represented on the Review Committee as described in the *Data Collection Report*.

E. Deliverables

The project consists 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	Recommended Design Report Preliminary Design Plans
5.	Implementation	Final Submittal Maintenance Plan

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.

F. Acknowledgments

The completion of this report was made possible by many individuals whose assistance and cooperation are gratefully acknowledged. We especially wish to thank Mr. Tim Phillips, P.E., Project Manager, Ms. Kathryn Gross, Hydrologist, Ms. Theresa Hoff, Environmental Services Planner, and Mr. Dennis Holcomb, Landscape Planner of the Flood Control District of Maricopa County, and all members of the Review Committee.

G. 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, and Mr. Frank Brown, P.E., Mr. Dan Frank, EIT, and Mr. Joshua Papworth, EIT, Project Engineers.

Dibble and Associates was assisted by Logan Simpson Design (LSD) for environmental studies and landscape design. Individuals from LSD who have contributed to the project include: Ms. Diane Simpson-Colebank, RLA, Principal, Mr. Steve Lohide, RLA, Project Landscape Architect, and Ms. Ashley Kowallis, Planner.

Additional sub-consultant firms and their representatives who have contributed to this project include: Mr. Larry Maldonado, P.E., Project Engineering Consultants, aerial mapping control, and Mr. Robert Parks, Aerial Mapping Company, aerial mapping.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"

N

0' 1250'2500' 5000' 7500' 10000'
feet

MODEL S3

MODEL S2

MODEL S1

MODEL M1

G.R.I.C. MODEL

EAST MARICOPA FLOODWAY

SPRR

Consolidated Canal

Eastern Canal

Prop. Santan Freeway

Arizona Ave

McQueen Rd

Cooper Rd

Gilbert Rd

Lindsay Rd

Val Vista Dr

Greenfield Rd

Higley Road

Recker Road

Power Road

Hunt Highway

Riggs Road

Chandler Heights

Ocotillo Road

Queen Creek Road

Germann Road

Pecos Road

Williams Field Rd

Ray Road

Prop.Santan Frwy.

Warner Road

Elliot Road

Guadalupe Rd

Baseline Rd

Superstition Frwy

ADOT Channel

* REFER TO APPENDIX FOR NORTH AREA DRAINAGE SUBAREA BOUNDARIES

PROJECT DESCRIPTION:
DRAINAGE SUBAREA BOUNDARIES
MID, SOUTH, GRIC MODELS

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

FIGURE-3

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.

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=0.015 for concrete, n=0.030 for earth, n=0.040 for landscaped earth, 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. Super-critical flow is allowed in special circumstances, such as where right-of-way is limited. Super-critical flow channels, when 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 criteria. Slopes are set as steeply as possible within the limitations of the channel material maximum allowable velocity and the limitation on Froude number.

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

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 4-inch thick gravel 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 will 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 include recommendations from a 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 to the same 100-year design discharge as used for the channel. The 50-year design flow criteria from the Hydraulics Manual will apply only to crossroad culverts with natural channels.

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 are 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 desired when site constraints permit.

Basin Longitudinal Slope - Minimum slopes of 0.5% are used for grass or earth low-flow channels or swales. A minimum slope of 0.2% and a maximum slope of 0.5% is used for concrete low-flow channels. Concrete low-flow channels are designed according to the rectangular concrete channel section found in Figure 8.3 of the Hydraulics Manual.

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. The maintenance road will include a 4-inch thick gravel 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 should be made during final design.

Emergency Spillway - Due to the basins being constructed in excavation conditions only, an emergency spillway is not required. However, a planned overflow location shall be designed to direct overtopping flows to a suitable outfall location.

Freeboard - A minimum freeboard of one foot is provided at the low-point on the basin perimeter.

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 during 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 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 right of way requirement for the channel, maintenance access road(s), and cut or fill slopes are added to determine the total right of way requirement for the reach.

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 and design invert slopes.
11	No. Of Drops	Number of drop structures in reach
12	Vertical Drop	height of each drop structure
13	Material Type	Channel lining material code
14	Manning's n	N-value for lining material
15	Bottom Width	channel design bottom width
16	Depth of Flow	design normal depth of flow
17	SS Left	channel side-slope left
18	SS Right	channel side-slope right
19	Area	Flow cross-sectional area
20	Perimeter	wetted perimeter of flow
21	Froude No.	Froude no based on hydraulic depth
22	Type of Flow	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.

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. 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 ponded. The low flow channel conveys low flows to the depressed outlet also without ponding.

Following development of the optimum grading plan for the site and determining flow-by 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 the off-line basins 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 4**. Utility conflicts affecting each planned project are identified 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 **City of Chandler** and the **Town of Gilbert** provide water and sewer service to the study area. The *water* distribution system within the **City of Chandler** consists of water-mains constructed on existing section line roads. The distribution system is planned to be expanded to include new section line roads as they are constructed. Existing primary water distribution corridors include Arizona Avenue, McQueen Road, Cooper Road, Riggs Road, Chandler Heights Road, Ocotillo Road, and Queen Creek Road which contain 16 to 24 inch waterlines. Within the **Town of Gilbert,** water-mains are installed much the same way as in the City of Chandler, with lines aligned along existing section line roads. Expansion is expected within Gilbert as well, providing service to a number of growing developments. Primary existing water distribution corridors include Guadalupe Road and Greenfield Road, both with 16 inch water mains. Additionally, a 36 inch water main exists at the midsection line between Guadalupe and Elliot Roads.

A number of existing and proposed *sanitary sewer* lines exist within the study area. Within the **City of Chandler**, existing primary sanitary sewer corridors include McQueen Road, Lindsay Road, and Riggs Road. Within the **Town of Gilbert,** Ray Road, Williams Field Road, and Greenfield Road comprise the existing primary sanitary sewer corridors. Notable proposed sanitary sewer lines include the following: a 27 inch line along Queen Creek Road; an additional 42 inch line along McQueen Road tying directly into a treatment facility just west of McQueen and South of Queen Creek; a 21 inch line along Riggs Road, a 36 inch line along Baseline Road; and a 72 inch line along Williams Field Road, turning south onto Greenfield Road and tying directly into a treatment facility south of Germann Road.

Existing primary *reclaimed water* corridors within the **City of Chandler** include Ocotillo Road, Riggs Road, McQueen Road, and Gilbert Road. Planned additional corridors include Queen Creek Road and Chandler Heights Road. These reclaimed water corridors tie into two treatment facilities. One of these facilities, currently in the planning stage, is located in the vicinity of Queen Creek Road and McQueen Road. The second treatment facility is existing and is located in the area of Ocotillo Road and Gilbert Road. Within the **Town of Gilbert**, primary reclaimed water lines are concentrated around a treatment facility in the vicinity of Elliot Road and Greenfield Road. Primary lines can be found along Warner Road, Greenfield Road, Elliot Road, and at the midsection line between Guadalupe and Elliot Roads.

2. Natural Gas

Natural gas service within the study area is provided by **Southwest Gas Corporation**. Natural Gas lines are primarily restricted to the **Town of Gilbert**. These lines are shown on the *Preliminary Design Plans*.

3. Electric Power

The study area is within the **Salt River Project** electric power service area. SRP has five overhead transmission corridors within the study area. An east-west oriented 230 KV overhead transmission corridor exists along the mid section line between Elliot and Guadalupe Roads. An additional 230 KV overhead transmission line is aligned along the SPRR, crossing the proposed alignment at Greenfield Road and at the Eastern Canal. A third overhead transmission corridor exists along Queen Creek Road, running east and west until it reaches the Eastern Canal; it then follows the canal south to Ocotillo Road where it turns west, then continues west until it reaches the SPRR running north and south. A fourth transmission corridor exists along the Superstition Freeway, turning north at the Eastern Canal, paralleling the canal until it leaves the study area at the northern boundary. A final east-west corridor is located north of University Drive. In addition to overhead electrical lines, underground electrical lines exist throughout the study area, with corridors following existing roadways along section lines. These underground and overhead electrical lines are shown on the *Preliminary Design Plans*.

4. Cable TV

Cable TV service is provided by **Cox Communications**. Cable TV lines are not shown on the *Preliminary Design Plans*. Cable TV is not considered a critical utility conflict.

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 **MCI** are known to be located within the study area. Major duct banks

and fiber optic lines are considered critical utility conflicts and are shown on the *Preliminary Design Plans*.

6. Irrigation

Irrigation water delivery is provided by the **Salt River Project** (SRP) and **Roosevelt Water Conservation District** (RWCD). SRP owns and operates the Eastern Canal from its source at the South Canal near McDowell Road to a point south of Pecos Road, and the Consolidated Canal for its entire length. The only SRP irrigation delivery area within the study area is the one half mile area between Germann Road and the proposed Santan Freeway between the Eastern and Consolidated Canals and the area west of the Consolidated canal to Arizona Avenue. The rest of the study area is served by the RWCD which has a major delivery canal aligned parallel to the EMF that provides irrigation delivery to the area between the RWCD canal and the Eastern Canal. An RWCD tailwater ditch runs parallel to the eastern side of the Eastern Canal. The RWCD tailwater ditch parallels the SRP Eastern Canal from near the Superstition Freeway to its terminus south of Pecos Road at which point flows in the tailwater ditch drain into the RWCD Eastern Canal Extension. The Eastern Canal Extension is used to deliver irrigation water to the area west of the canal to the Consolidated Canal. The RWCD Eastern Canal Extension ends at Riggs Road west of Gilbert Road. There is a large tailwater pond near the end of the ditch that collects and retains tailwater flows for future pumped reuse.

7. Petroleum

There is a **Kinder/Morgan** (formerly known as Southern Pacific Pipeline) petroleum line that provides jet fuel to Williams Gateway Airport and continues on to Davis-Monthan Air Force Base in Tucson. The petroleum line follows Pecos Road and crosses the proposed channel at the proposed Santan Freeway and the Eastern Canal. This is considered a critical utility and is shown on the *Preliminary Design Plans*.

Table 1 - Utility Company Contacts

Utility	Representative	Telephone No.
City of Chandler - Water, Sanitary Sewer, & Reclaimed Water	Robyn Lawson	480-782-3340
Town of Gilbert - Water, Sanitary Sewer, & Reclaimed Water	Mark Weiner	480-503-6848
Southwest Gas Corporation	Geraldo Lopez	602-484-5306
Salt River Project - Power	Alex Baxter	602-236-6356
Salt River Project - Irrigation	Bonnie Garcia	602-236-6179
Sprint	Collin Sword	602-419-0970
AT&T	Dale Polanski	602-228-0576
MCI	Rick Thomas	402-271-5000
SPRR (Union Pacific RR)	John Clarke	520-343-4563
Cox Communications	Scott Gusso	623-322-7210
Qwest - Telephone	Chris Lerdeque	480-831-4771
Roosevelt Water Conservation District	Michael Leonard	480-988-9586
Kinder / Morgan	Don R. Quinn	714-560-4940

C. Existing Drainage Features

Few drainage facilities exist within the study area. The drainage pattern is predominantly overland in an east to west direction accumulating along the Eastern and Consolidated Canals and the Southern Pacific Railroad adjacent to Rittenhouse Road and adjacent to Arizona Avenue.

1. ADOT Channel

The Superstition Freeway intercepts runoff reaching the freeway from the north and conveys it westerly in a concrete channel along the north right-of-way to Holmes Park.

2. Holmes Park

Holmes Park is a 17-acre retention basin situated along the east side of the Eastern Canal at Greenfield Road. The basin was constructed by the City of Mesa as part of the Superstition Freeway drainage system and incorporated into the City of Mesa Park system. A storm drain in Greenfield Road discharges into the basin. Holmes Park is drained with a pump system that can discharge into the RWCD Tailwater ditch adjacent to the Eastern Canal or west in the ADOT channel following a storm event.

3. Crossroads Park

Crossroads Park is a retention basin located along the north side of the SPRR at the Eastern Canal west of Greenfield Road. The park was constructed by the Town of Gilbert and FCDMC to reduce flooding of the downtown area. Crossroads Park is approximately 40 acres in size and stores 450 acre-feet of water which is pumped into the RWCD Tailwater ditch after a storm event. The park is an example of a tiered, multi-use facility composed of a lake, baseball and soccer fields and a playground.

4. East Maricopa Floodway

The East Maricopa Floodway was constructed by the Soil Conservation Service (SCS) along the east side of the RWCD Canal to serve as a regional storm water outfall for eastern Maricopa County. The EMF is now owned and operated by the FCDMC and intercepts storm runoff from east of the RWCD canal south of the South Canal near Thomas

Road and Val Vista Drive. The EMF starts at Brown and Greenfield Roads, parallels the RWCD canal, and extends over 27 miles crossing the Maricopa County southern boundary into Pinal County, across the GRIC to its outfall at the Gila River. The EMF discharges over 15,000 cfs in a 100-year storm event. The EMF and RWCD Canals form the eastern watershed boundary for the Higley ADMP study area.

5. RWCD Tailwater Ditch & Ponds

The primary purpose of the RWCD tailwater ditch is to collect agricultural return flows at the tail end of the fields and store it in ponds for potential reuse. However, during storm events surface runoff also drains into the ditch frequently resulting in flooding.

D. Planned Private Development

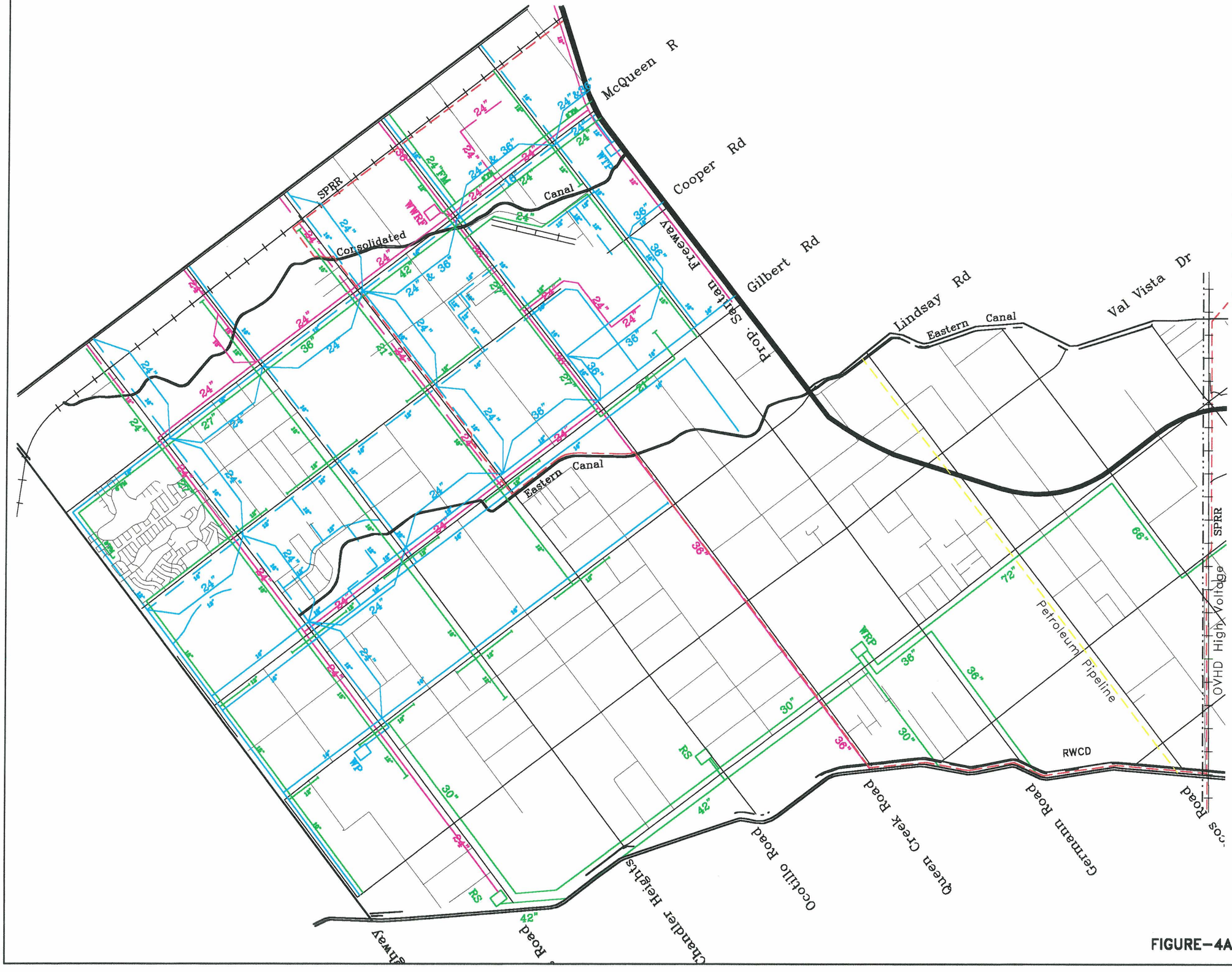
The study area, particularly the area south of the Superstition Freeway is developing at a rapid pace. Planned developments are identified on **Figure 5**. The planned developments shown were identified by the staff from the Cities of Mesa, Gilbert, and Chandler, and from Maricopa County. The Higley ADMP development and timing of implementation is constrained by the developments shown on **Figure 5**.

E. Planned Public Improvements

Santan Freeway - The proposed Santan Freeway will block westerly drainage within the study area from Lindsay Road to Higley Road. The preliminary design for the freeway included collector channels and basins to intercept the runoff, retain the flows, and drain westerly along the freeway to the Gila Floodway. Runoff accumulating along the SPRR, Consolidated Canal, and Eastern Canal was not planned to be intercepted by the freeway. Large equalizer culverts were proposed under the freeway to pass these flows through from north to south. ADOT has agreed to cooperate with the FCDMC in implementing the plan proposed herein which includes shared channels and retention basins to accommodate the regional runoff utilizing the planned ADOT outfall to the Gila Floodway.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"



- Planned Water
- Existing Water
- Planned Sewer
- Existing Sewer
- Planned Reclaimed Water
- Existing Reclaimed Water
- Existing Petoleum Pipeline
- Existing Overhead High Voltage
- Existing Fiber Optic

0' 1000' 2000' 4000' 6000' 8000'

1" = 2000'

PROJECT DESCRIPTION:

EXISTING & PLANNED MAJOR UTILITIES

CONSULTANT:

DIBBLE & ASSOCIATES CONSULTING ENGINEERS
Since 1962

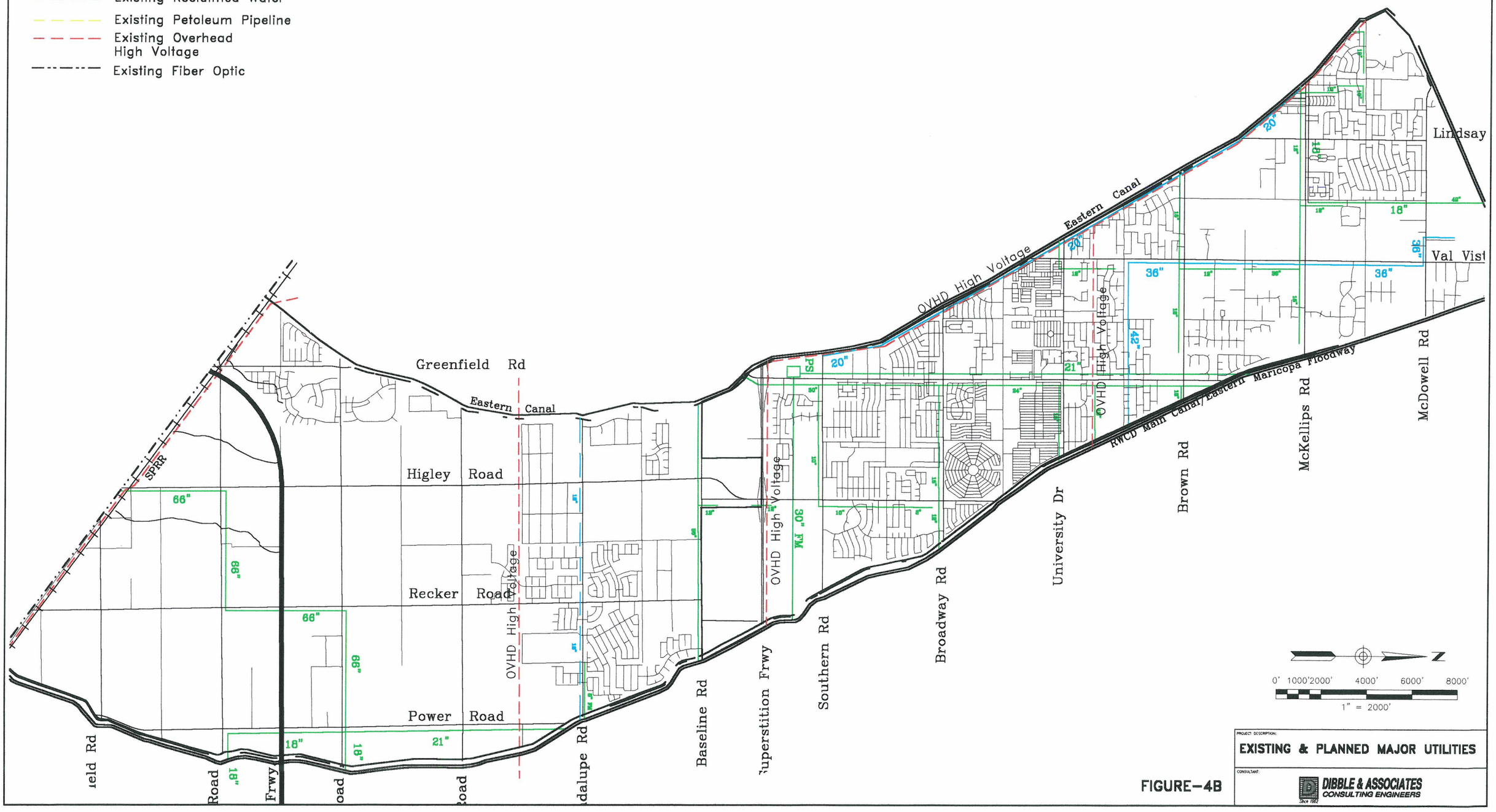
FIGURE-4A

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA AREA DRAINAGE MASTER PLAN

LEGEND

- Planned Water
- Existing Water
- Planned Sewer
- Existing Sewer
- Planned Reclaimed Water
- Existing Reclaimed Water
- Existing Petoleum Pipeline
- Existing Overhead High Voltage
- Existing Fiber Optic



PROJECT DESCRIPTION:
EXISTING & PLANNED MAJOR UTILITIES

CONSULTANT:
DIBBLE & ASSOCIATES CONSULTING ENGINEERS

FIGURE–4B

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA AREA DRAINAGE MASTER PLAN

"FCD CONTRACT # 98-13"

Chandler

1. Sun Groves
2. Springfield Lakes
3. Cooper Commons
4. Fieldstone Estates
5. Santan Vistas
6. RWCD
7. Riggs Ranch Meadows
8. Cooper Heights
9. Riggs & Cooper
10. Rockwood Estates
11. City Golf Course
12. Chandler Highlands
13. Adobe Land
14. Symphony II
15. The Pines
16. Queen Creek & Cooper
17. Ocotillo & Cooper
18. Tumbleweed Park
19. Springfield/Sunbird
20. Sun River
21. Whisper Ridge
22. Shadow Ridge
23. Brooks Ranch Phase 1
24. Riggs Ranch Unit 5
25. Circle G
26. Terra Linda
27. Monterey 110
28. Cooper Commons, West
29. Symphony III
30. Estates at McQueen & Country Lane
31. Heartland
32. Symphony I
33. Lantana Ranch
34. Cooper Greens
35. Markwood Farms
36. Whitening at Kruger

Gilbert

1. The Spectrum @ Val Vista
2. Mall Site
3.
4. Wastewater Recharge Site
5.
6.

Maricopa County (unincorporated)

1. Western Ranchettes Unit 4
2. Baars Estates
3. LM Estates
4. Estates at Chandler Heights

Mesa

1.
2. Valencia Court
3. Office Bldg
4. Stonegate Plaza
5.
6. Arizona Autumn
7. Osco Drug Store
8. Sunrise Springs
9.
10.
11. Mesa North Grove
12. Arboleda
13. Montery @ Val Vista
14. Vistas @ McDowell
15.
16.
17. Tuscany Groves
18. The Groves @ Broadway
19. Sienna Square
20. White Farms
21. Triana
22. Mahogany
23. Eastview Estates

- Future Developments
- Proposed Developments
- FEMA Floodplain
- Detention/Retention Basins
- Hazardous Materials Concerns
- 1928 Culvert – Potential Historic Feature
- Potential/Listed Historical Site(s)
- Area of High Archeological Site Density
- Preservation Area – Mesquite Bosque/Cottonwoods

GILA RIVER INDIAN COMMUNITY

EAST MARICOPA FLOODWAY

SPRR

SANTAN MOUNTAINS

CHANDLER AIRPARK PLAN

SANTAN AREA PLAN

SOUTH STUDY AREA

MID STUDY AREA

NORTH STUDY AREA

Arizona Ave

McQueen Rd

Cooper Rd

Gilbert Rd

Lindsay Rd

Val Vista Dr

Greenfield Rd

Higley Road

Recker Road

Power Road

Hunt Highway

Riggs Road

Chandler Heights

Ocotillo Road

Queen Creek Road

Germann Road

Pecos Road

Williams Field Rd

Rey Road

Prop.Santan Frwy

Warner Road

Elliot Road

Guadalupe Rd

Baseline Rd

Superstition Frwy

Southern Rd

Broadway Rd

University Dr

Power Rd

McKellips Rd

McDowell Rd

Eastern Canal

Consolidated Canal

Prop. Santan Freeway

Eastern Maricopa Floodway

FIGURE 5

PROJECT DESCRIPTION: STUDY CONSTRAINTS MAP

CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

V. LANDSCAPE, RECREATION, & AESTHETICS

A. Introduction

This section describes the proposed landscape treatments and multi-use opportunities for the proposed channel alignments and basins.

B. Desired Landscape Character

The North Study Area is developed and takes on an urban/residential feel. The far north end of the area reflects the citrus orchards. The remaining north end of the study area is urban in character. Mature native and exotic trees and shrubs characterize the landscape. The Middle and South Study areas are predominantly agricultural with pockets of urban/residential development. Large open agricultural fields with pockets of native vegetation characterize the landscape.

Based on information collected from developers and general plans the future desired landscape character leans towards a more urban / residential character as opposed to the current agricultural / suburban character. The landscape would be characterized by plantings of large native and exotic trees, shrub massings and turf at various locations.

C. Landscape Treatments

Landscape treatments are identified along the proposed flood control facilities as shown on **Figure 6**. These treatments range from incorporating existing development plans, to developing wildlife habitat, to responding to the surrounding landscape. The various landscape treatments are described as follows:

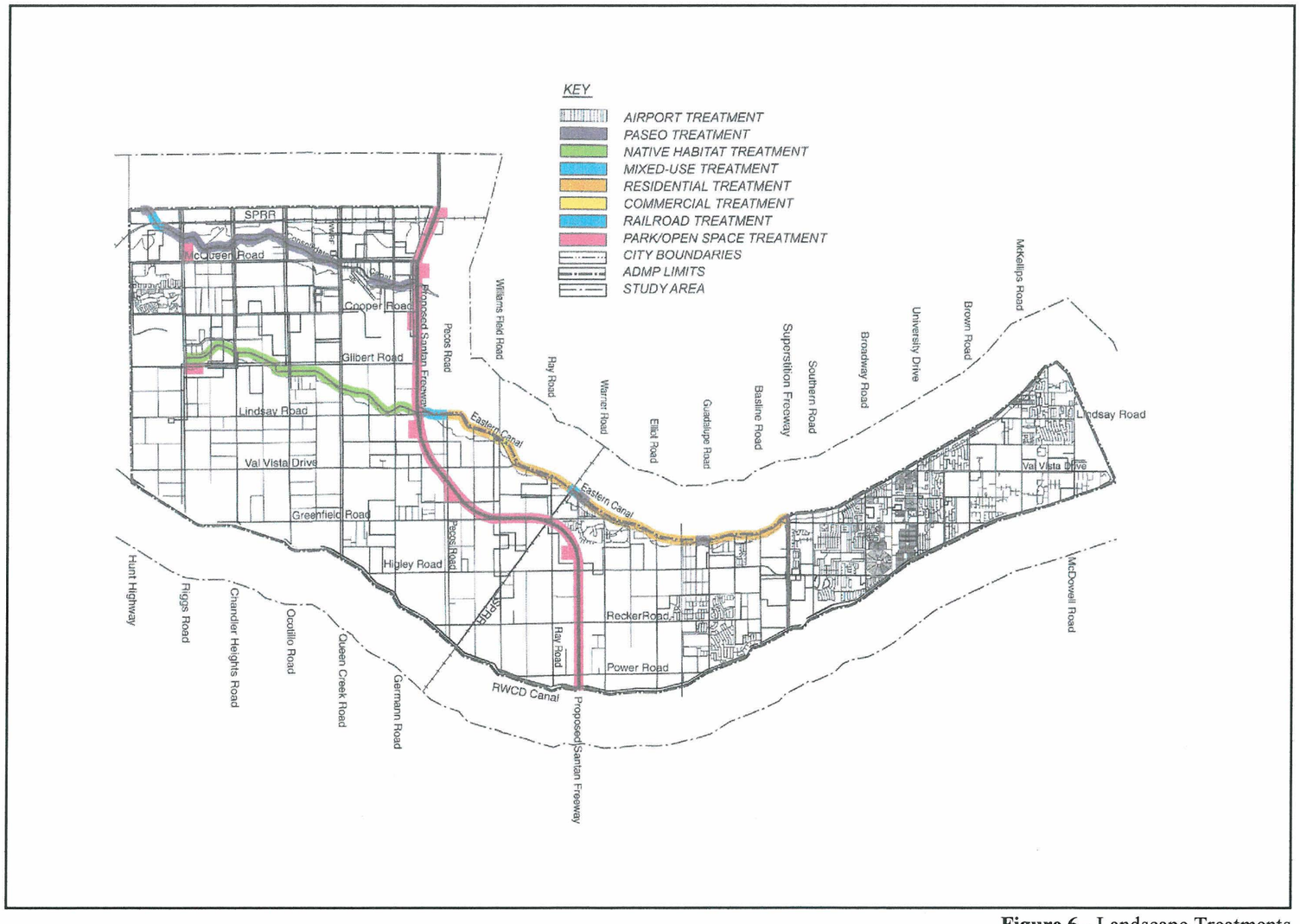


Figure 6 - Landscape Treatments

1. Paseo Treatment (Figure 7)

This treatment incorporates 'The Paseo' project as proposed by the City of Chandler. The overall landscape character of 'The Paseo' development, as identified in 'The Paseo' Master Plan, should be appropriate to the Sonoran Desert and reflect significant natural areas adjacent to the canal. Trees should be planted in an informal arrangement except at key locations where a homestead landscape pattern is characterized by tall trees planted in a row or grid and grouped around a space or along the edges of property or waterway. No landscaping, including tree canopies, should encroach within the fifteen (15)-foot clear zone along both banks of the canal.

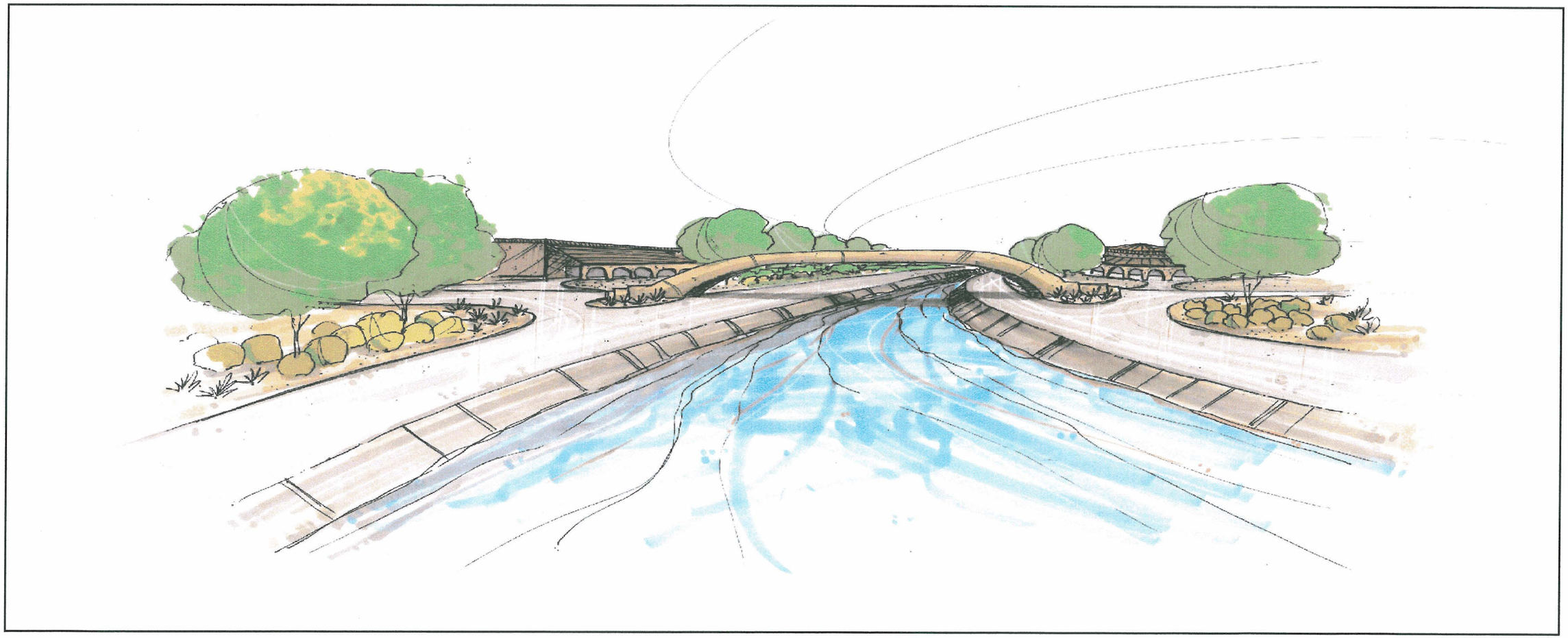


Figure 7 - Paseo Treatment

2. **Railroad Treatment (Figure 8)**

This treatment reinforces the Southern Pacific Railroad (SPRR) corridors that cross the project area. This would be accomplished by incorporating elements (railroad ties, steel rails, etc.) of the railroad corridors within the landscape. There are two locations where the SPRR cross the proposed flood control facilities. One location is adjacent to Crossroads Park and the Eastern Canal and the second location is just north of Hunt Highway on the Consolidated Canal.

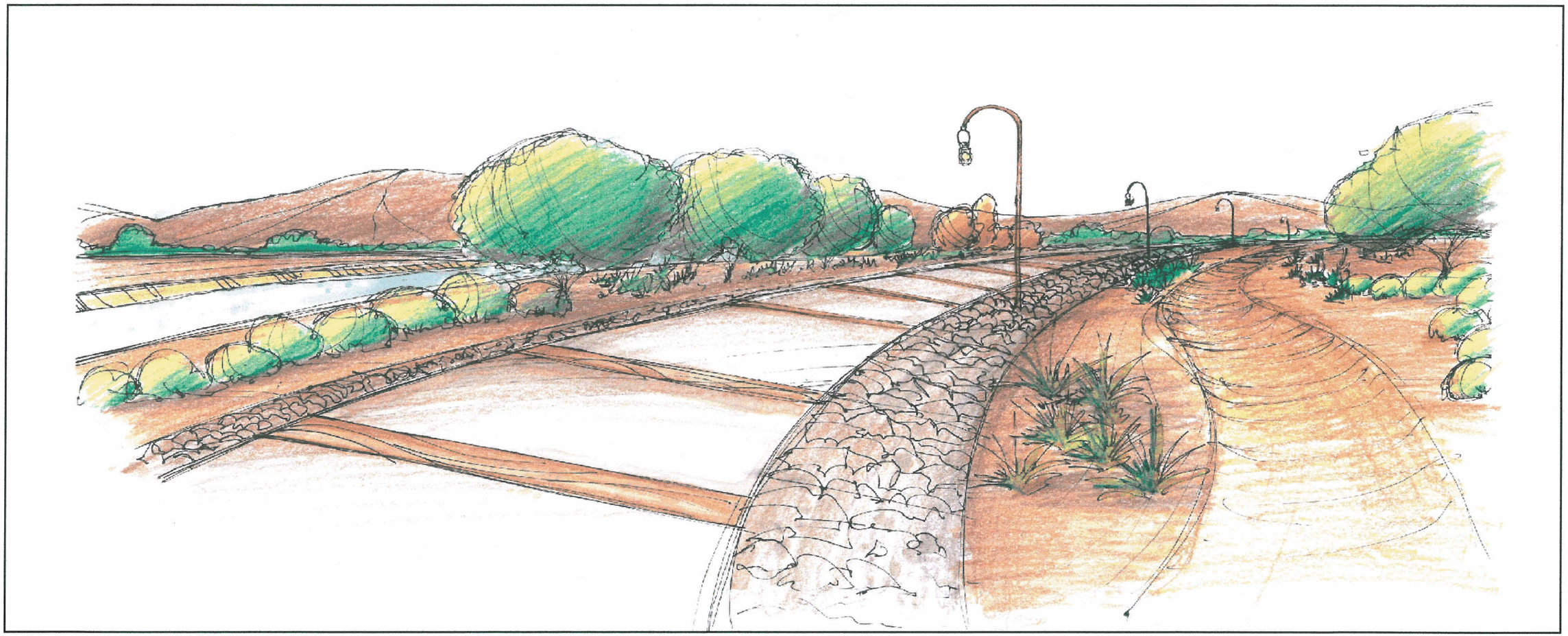


Figure 8 - Railroad Treatment

3. **Airport Treatment (Figure 9)**

This treatment reinforces the Chandler Municipal Airport located on the east side of the Consolidated Canal just north of Queen Creek Road. This would be accomplished by incorporating elements of an airport such as propellers, hanger facilities, jet engines, and metal and fabric within the landscape.

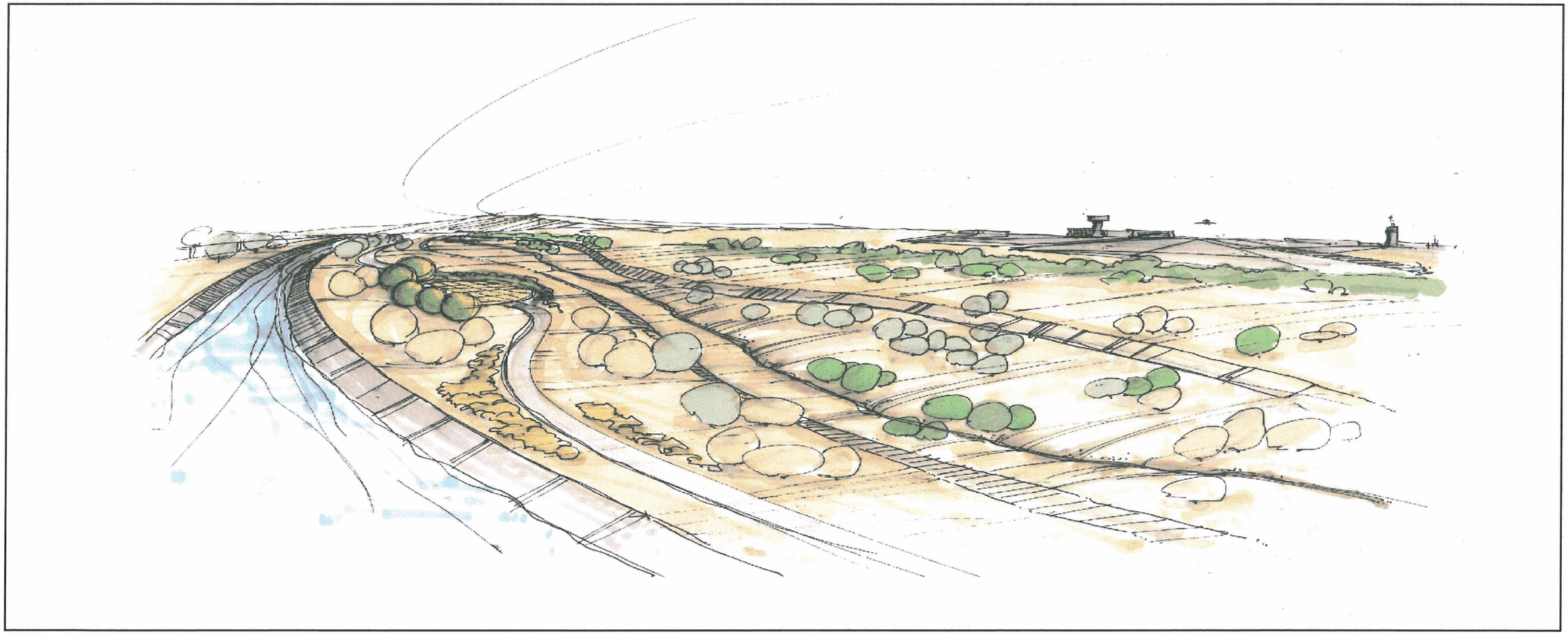


Figure 9 - Airport Treatment

4. **Native Habitat Treatment (Figure 10)**

This treatment reinforces the existing habitat located along the Eastern Canal from the Gila River Indian Community to the proposed Santan Freeway. Native trees, shrubs, and grasses would be planted throughout the diversion channel. Multi-use paths constructed of stabilized decomposed granite would meander the length of the diversion channel. The intent of the plantings and meandering multi-use paths is to create an irregular, organic pattern of elements.

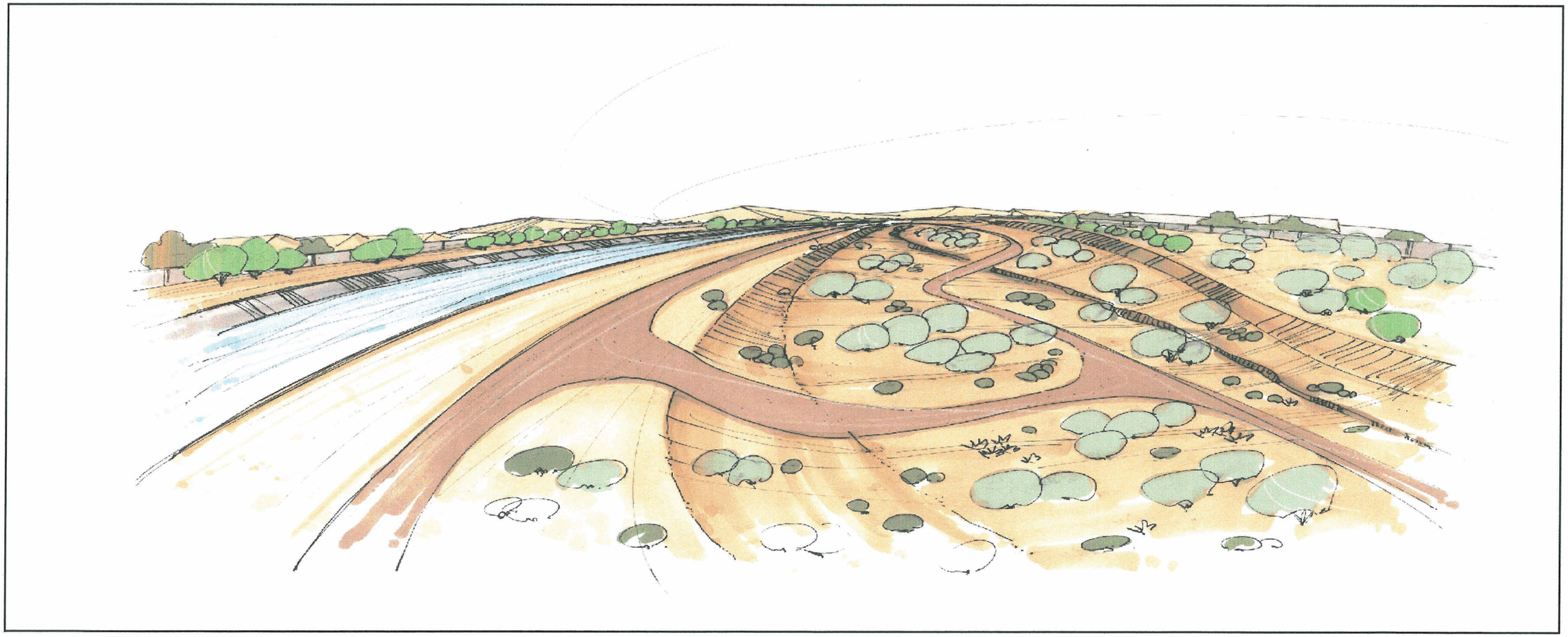


Figure 10 - Native Habitat Treatment

5. **Mixed-Use Treatment (Figure 11)**

This treatment occurs along the Eastern Canal from just south of Germann Road to Pecos Road. This treatment would visually mitigate the horizontal and vertical scale of the adjacent land uses by planting specimen and exotic/native trees and shrubs. No turf is envisioned for this treatment. Large bold masses of plant material would be planted. Distinct features in the area would be mimicked on a smaller scale by incorporating them into hardscape elements and use of materials and colors. The overall feel of the treatment should have a simple yet bold pattern of elements.

Figure 11 - Mixed-Use Treatment

6. **Residential Treatment (Figure 12)**

The residential treatment would be one of two types depending upon the type of development, Neighborhood or Urban. A Neighborhood treatment would be utilized in areas where the flood control facility would be a continuation of the residential 'yard'. This would be accomplished through the planting of large shade tree species with shrubs used as accent plantings and turf used in special use areas. Hardscape elements would consist of a variety of materials such as brick, wood, and masonry. Native material such as stabilized decomposed granite would be used for pathways and trails. Overall an informal pattern of elements would be created. This treatment would occur along the Eastern Canal just south of Warner Road.

An urban treatment to a proposed flood control facility would be an extension of the subdivision's streetscape. An urban treatment would be accomplished by planting specimen exotic and native trees, installation of shrubs, and the introduction of turf at various locations. Various hardscape materials would be incorporated to blend the flood control facility with the surrounding area. These materials would include stucco, tile, walls and concrete pathways. The overall feel for this treatment would be a well-organized, repetitive pattern of elements. This treatment would generally occur along the Eastern Canal from the Proposed Santan Freeway to Baseline Road.

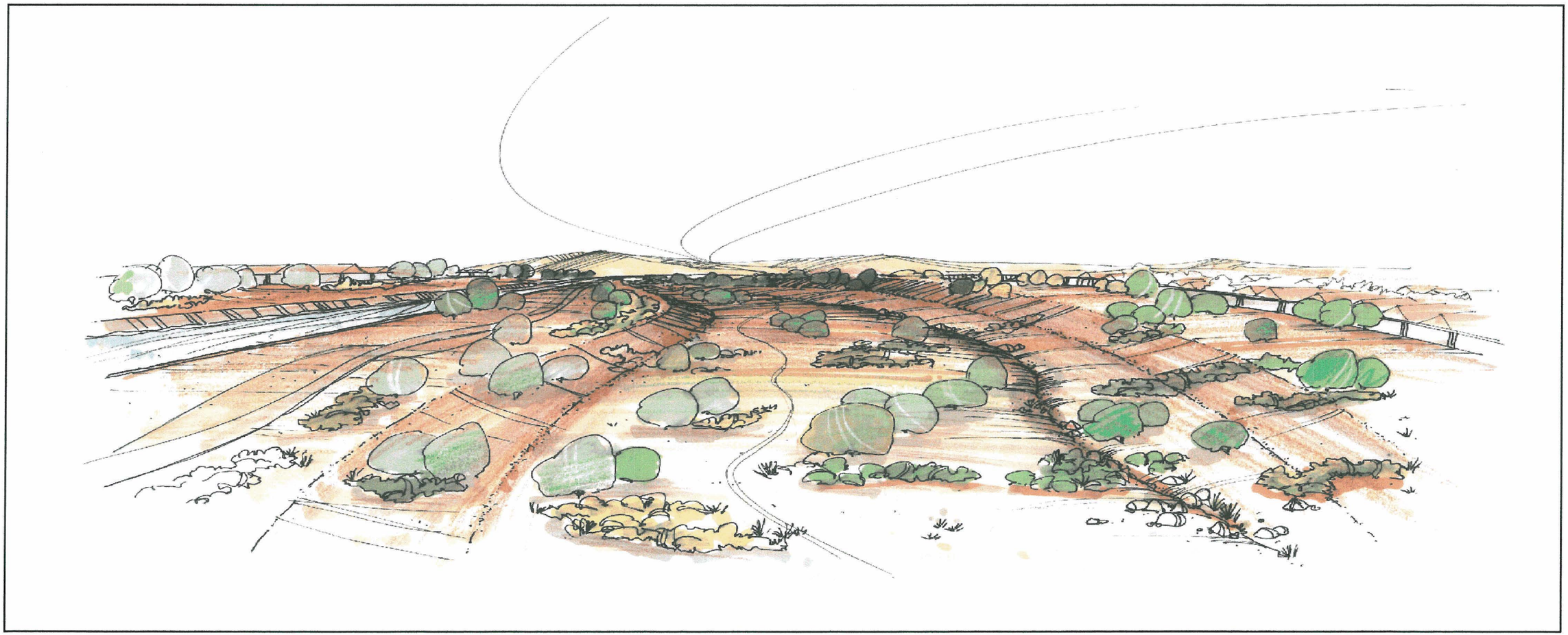


Figure 12 - Residential Treatment

7. **Commercial Treatment (Figure 13)**

This treatment occurs along the Eastern Canal at Williams Field Road. Typically in a commercial area plantings are a minor component to the landscape. A commercial treatment would be accomplished by planting a mixture of native and exotic tree and shrub species. Various hardscape materials would be incorporated to blend the flood control facility with the surrounding area. Concrete walkways, low walls, and various colors would be utilized.

Figure 13 - Commercial Treatment

8. **Park/Open Space Treatment (Figure 14)**

There are eight (8) new detention basins that are a part of this project. Six (6) of the new detention basins are located adjacent to the proposed Santan Freeway. The other two (2) detention basins are located at the south end of the Consolidated Canal and Eastern Canal. Elements of the six basins adjacent to the Santan Freeway would be ground contouring along the top of the basin, varying levels within the basin, and varying side slopes. The park areas would be comprised mainly of turf and large canopy trees. Concrete multi-use trails would be incorporated to link the detention basins with the diversion channel. The detention basin located at the south end of the Consolidated Canal would incorporate the theme of the Paseo while the detention basin located at the south end of the Eastern Canal would incorporate native habitat.

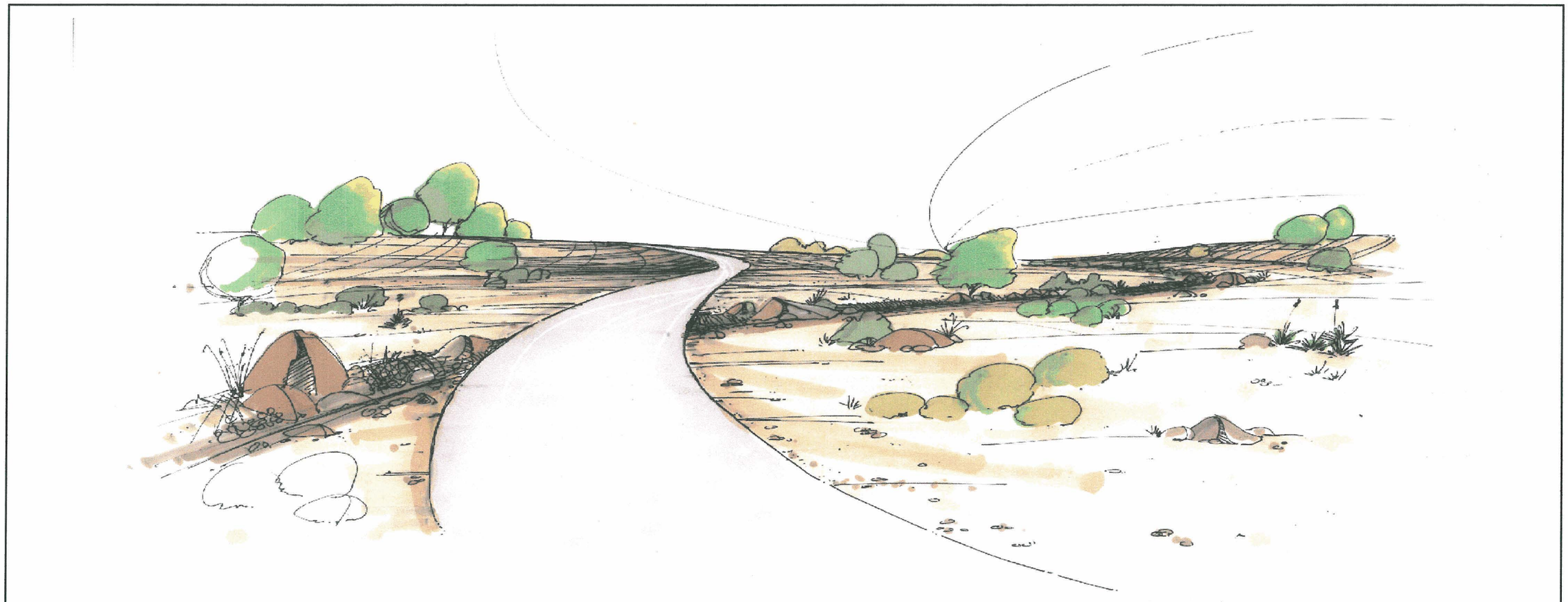


Figure 14 - Park/Open Space Treatment

D. Multi-Use Opportunities

Many types of multi-use opportunities can be incorporated into the proposed flood control facilities. The proposed detention basins can provide much needed open space. The basins can be developed with varying levels, similar to Crossroads Park, providing for continued use during a flood event. Ball fields and court sports can be incorporated into the basin bottoms. Depending upon the size and public interest, BMX courses, amphitheaters, golf courses, etc. could be constructed as part of the basins.

Along the proposed diversion channels several multi-use opportunities are available. Multi-use trails can be incorporated with the diversion channels. These trails would meander throughout the channel section. These trails would provide use for in-line skating, walking, biking, and equestrian. These trails would also link various sites within the project area. A major east-west multi-use trail could be located along the proposed Santan Freeway corridor. This trail would link the proposed detention basins as well as link the Consolidated and Eastern Canals.

Wildlife viewing areas can be incorporated into the wildlife habitat areas along the Eastern Canal. These viewing areas would be linked to the multi-use trails.

There are several items that can be associated with interpretive sites. These items include the native habitat areas, Chandler Municipal Airport, railroad crossings, agriculture, archaeological sites, 1928 culvert, historical sites and cultural sites in the area. Amenities at these sites would typically include shade, seating, and interpretive signage.

E. Special Considerations

Special environmental considerations are described in general below and are discussed in the project descriptions for each project. The locations of cultural, habitat, and hazmat sites are shown on **Figure 5**.

1. Cultural Sites

An area of high archaeological site density is located along the Eastern Canal between Pecos Road and Williams Field Road. These sites are associated with the prehistoric Hohokam culture. Potential/Listed Historical Sites are located on the far west side of the project area at Arizona Avenue and the proposed Santan Freeway alignment. A potential historic feature, a 1928 culvert, is located on the Eastern Canal at the Southern Pacific Railroad crossing. These sites could be incorporated as interpretive features in the project.

2. Habitat

A high habitat area is located along the Eastern Canal between Riggs Road and Ocotillo Road. This area contains mature mesquite bosques and ponds. The many existing fields throughout the area also enhance this habitat. This high value habitat could be incorporated into the habitat development along the Eastern Canal from Riggs Road to the proposed Santan Freeway alignment. Mesquite bosques are also located along the Consolidated Canal between Ocotillo Road and Queen Creek Road. These mesquite bosques could be incorporated into the Paseo Development.

3. Hazmat Sites

Hazmat sites are located throughout the project area. Three (3) hazmat sites have been identified along the Eastern Canal and three (3) hazmat sites also occur along the Consolidated Canal. Of the sites identified, one of the sites is listed on the State Superfund list. This site is located near the Consolidated Canal and Riggs Road. This site will need to be considered in any development that is considered in this area.

VI. RECOMMENDED PLAN

A. Introduction

The Recommended Plan is shown on **Figure 15**. 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 landscape and multi-use opportunities, 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.

1. North Area Plan

The recommended plan for the North Area is to purchase homes within the floodplain along the Eastern Canal. The residents occupying the floodprone homes would be relocated and the homes demolished. The vacant parcels created by removing the homes would be landscaped and used as open space. The open space could be made available for public use, if acceptable to the local residents. A total of 35 homes were identified within the floodplain. The total estimated cost for relocation, demolition, and landscaping is 6.8 million dollars.

2. Mid Area Plan

The recommended plan for the Mid Area is to utilize the Santan Freeway drainage system to convey runoff from the Mid Area westerly along the Santan Freeway to the Gila Floodway outfall. Due to capacity limitations within the downstream system, the maximum discharge that can be introduced into the ADOT system is 37 cfs at Arizona Avenue. As a result, the recommended plan consists of retaining all the runoff generated in the Mid Area and releasing it into the ADOT system after the storm. A system of six retention basins is proposed to store a total of 1,155 acre-feet of runoff. The basins will need to be drained in a systematic order as described in Section VIII. B. Operation & Maintenance Guidelines. Due to the flow rate restriction, it will take over 18 days to drain all the basins.

3. South Area Plan

The recommended plan for the South Area consists of diversion channels constructed along the upstream side of the Eastern and Consolidated Canals. The diversion channels will be extended southerly across the GRIC to an outfall at the EMF. Water quality basins are included near the GRIC boundary on both channels to improve the water quality before discharging onto the GRIC. Two existing RWCD ponds situated adjacent to the Eastern Canal are included in the plan to be used as detention basins. A new detention basin is planned along the Consolidated Canal.

4. GRIC Outfalls

The south area diversion channels extend through the GRIC, adjacent to State Route 587 and Gilbert Road, to the EMF. The natural ground slope in this area is from east to west. The north-south oriented channels therefore drain perpendicular to the natural ground slope. The existing EMF outfall channel flow-line limits the outfall elevation for the diversion channels, resulting in channels that are very flat that will require embankments to contain the flow. As a result of the embankments, surface runoff generated within the GRIC will not flow by gravity into the channels. Alternative approaches to address this issue are presented in Section V.

B. Plan Benefitted Area

The Higley ADMP study area comprises approximately 45,000 acres. According to the FCDMC GIS database, FEMA regulatory floodplains currently occupy 2,284 acres within the study area as noted in blue on **Figure 5**. FCDMC staff estimate that as of 1999 there are 827 buildings within the limits of floodplain areas. Land Use within the floodplain areas are characterized as follows:

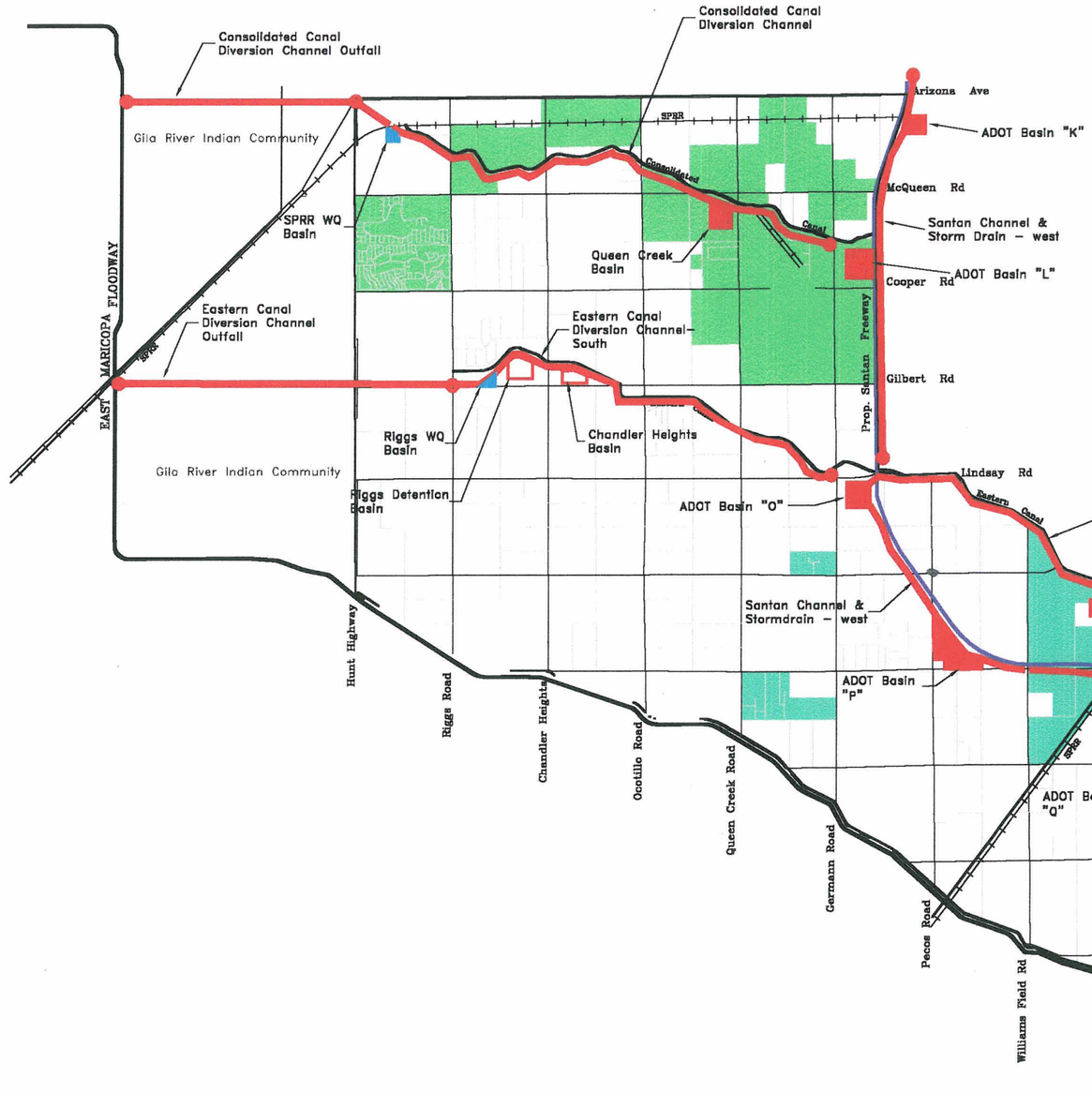
- Cultivated farmland 1,140 acres (50%)
- Other farmland 165 acres (7%)
- Residential 550 acres (24%)
- Vacant 280 acres (12%)
- Other 149 acres (7%)

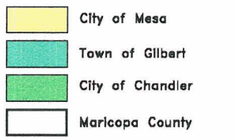
Residential areas within the floodplain would receive an immediate benefit from the recommended plan. Future benefits would accrue to farmland and vacant land as conversion of the farmland to residential development occurs.

A discussion is included in the following project descriptions describing the benefitted area for each recommended project.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"





PROJECT DESCRIPTION:

RECOMMENDED PLAN

CONSULTANT:

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

FIGURE 15

The individual structural projects identified in the Mid and South Areas are described in more detail as follows:

C. Eastern Canal Diversion Channel - North
(Sheets 21-25 of 44) **$18.2M**

1. Location: Adjacent to, and east of, the Eastern Canal extending from Baseline Road south to the Ray Basin south of Crossroads Park.

2. Purpose: To collect runoff accumulating along the upstream side of the Eastern Canal and convey it to the Ray Basin. The channel will contain and eliminate the FEMA designated floodplain. The low flow channel will convey the irrigation tailwater flows to replace the existing RWCD tailwater ditch.

3. Project elements: Channels within this reach will be constructed with earth, landscaped earth or concrete depending on right-of way limitations. Existing tailwater culverts will be removed and replaced with improved concrete box culverts at Baseline Road, Guadalupe Road, Elliot Road, Greenfield Road, Warner Road, Southern Pacific Rail Road Crossing and Ray Road The culvert at Ray road will also serve as a diversion structure to divert low flows around Ray Basin in a by-pass channel. A new inflow spillway and by-pass channel will be constructed at Crossroads Park.

4. Landscape & Multi-Use: The landscape treatment for this section would be comprised of three (3) treatments. The Railroad Treatment would occur at the intersection of the Eastern Canal and the Southern Pacific Railroad (SPRR). The Park/Open Space Treatment would occur south of Guadalupe Road adjacent to the Eastern Canal. The remaining portions of this section would have a Residential Treatment.

   Multi-Use trails would meander adjacent to the Eastern Canal. In addition to the materials used to incorporate the SPRR an interpretive area could be created to discuss the importance of the railroad to the area or to interpret the materials of the railroad. The 1928 culvert, which is a potential historic structure, could also be incorporated into this interpretive area.

5. Special Considerations: According to The EDR Corridor Study Report for the project area dated April 7, 1999 (Inquiry Number 355781.1s) an Underground Storage Tank (UST) is located in the vicinity of Guadalupe Road and the Eastern Canal. In addition, according to this same report a drywell is located in the vicinity of Elliot Road and the Eastern Canal.

   A 1928 culvert is located under the SPRR corridor. This structure is a potential historic site.

6. Right-of-Way: The requirement shown on the plans is the ROW for the channel and access road. Where possible, the access road will tie into existing parallel streets to minimize the ROW requirements. Existing ROW along the eastern canal is insufficient for this reach and there are 33 impacted structures which must be removed.

7. Utility Conflicts: A 16" waterline and a 54" storm drain at Guadalupe Road. A 24" irrigation pipe and a 36" proposed sewer line are in conflict at Baseline Road. A 21" sewer line and 12" irrigation pipe at the midsection line between Guadalupe and Elliot Roads. A 12" water line at Elliot Road. Underground electric at the intersection of Greenfield Road and the Eastern Canal. A 12" water line, 12" sewer line, 18" reclaimed water line and 6" gas line at Warner Road. A 8" reclaimed water line at a location just north of the midsection line between Warner and Ray Roads. Underground electric and a MCI Fiber Optic line in the vicinity of the intersection of the Eastern Canal with the SPRR right-of- way. A 12" water line at Ray Road. RWCD open laterals impose conflicts at each half section line, starting at Baseline Road. All of the above utilities are in direct conflict with the proposed alignment and require relocation. An 8" sewer line is beneath and parallels the proposed alignment for ½ mile just north of Warner Road. This sewer line is not in direct conflict, however, may require protection in place.

8. Benefitted Area: Within the current floodplain that parallels the Eastern Canal, 353 existing residential buildings and 4 existing commercial buildings will be removed. 0.49 square miles will be removed from the existing floodplain. 0.15 square miles of this new area is not yet developed. An additional unmeasurable area of land will be made available by eliminating flooding west of the Eastern Canal, caused by overtopping of the canal. Reduction of the land area inflicted by the current floodplain represents a reduction in insurance costs to property owners, reduced flood damage to existing property, secure ground for future development, and improved safety along roadways.

9. Project Participants: Town of Gilbert, SRP, and RWCD.

D. Eastern Canal Diversion Channel - Middle
(Sheets 17-21 of 44) **$14.5M**

1. Location: Adjacent to, and east of, the Eastern Canal extending from the Ray Basin south to ADOT Basin O, north of Germann Road.

2. Purpose: To collect runoff accumulating along the upstream side of the Eastern Canal and convey it to the ADOT Basin O. The channel will contain and eliminate the FEMA designated floodplain. The low flow channel will convey the irrigation tailwater flows to replace the existing RWCD tailwater ditch.

3. Project elements: Channels within this reach will be constructed with landscaped earth. Existing tailwater culverts will be removed and replaced with improved concrete box culverts at Val Vista Dr., Williams Field Road and Pecos Road A new culvert will also be required at the Future Santan Freeway overpass at Lindsay Road There is also a flow diversion structure north of the proposed Santan Freeway which will divert 100cfs to the Santan Channel & Storm Drain -West before the remaining flow continues to the ADOT Basin "O".

4. Landscape & Multi-Use: The landscape treatment for this section would be comprised of four (4) treatments. The Railroad Treatment would occur at the intersection of the Eastern Canal and the Southern Pacific Railroad (SPRR). The Mixed-Use Treatment would occur north of the proposed Santan Freeway to Pecos Road. The Commercial Treatment would take place at the intersection of Williams Field Road and the Eastern Canal. The remaining portions of this section would have a Residential Treatment.

   Multi-Use trails would meander adjacent to the Eastern Canal. In addition to the materials used to incorporate the SPRR an interpretive area could be created to discuss the importance of the railroad to the area or to interpret the materials of the railroad. The 1928 culvert which is a potential historic structure could also be incorporated into this interpretive area. Another interpretive site could be located between Williams Field Road and Pecos Road discussing the archaeological sites located within the area.

5. Special Considerations: The irrigation tailwater flows will need to be addressed at the downstream end of this project. The

tailwater flow could be collected and stored in Basin O and then pumped back into the system for downstream use. Volume has not been included in the basin sizing for this purpose. Alternatively, the tailwater flows could be diverted into the existing Eastern Canal upstream of Basin O.

An area of high archaeological site density occurs adjacent to the Eastern Canal from just north of Williams Field Road to Pecos Road.

A set of ponds are located at the intersection of the Eastern Canal and Pecos Road. These ponds provide habitat and a water source for the surrounding wildlife.

6. Right-of-Way: The requirement shown on the plans is the ROW for the channel and access road. For the channel north of Williams Field Road, the access road will tie into existing parallel streets to minimize the ROW requirements. While existing ROW along the eastern canal is insufficient for this reach, the City of Gilbert has set aside a suitable drainage corridor which is currently used for retention. There are 4 impacted structures just south of Williams Field Road From Pecos Road to the proposed Santan Freeway, the channel will fall east of 144th Street. This alignment will impact 18 structures.

7. Utility Conflicts: A 12" water line and underground electric line at Val Vista Road. A 12" water line at Williams Field Road. RWCD open laterals impose conflicts at each half section line, starting at Baseline Road. The above utilities are in direct conflict with the proposed alignment and require relocation. A 6" high pressure petroleum line is present along a Pecos Road. This utility is not in direct conflict, however, it may require protection in place.

8. Benefitted Area: The area within the current floodplain that parallels the Eastern Canal. 176 existing residential buildings and 11 existing commercial buildings are presently in the floodplain to be removed by the current recommended design. 0.36 square miles will be removed from the existing floodplain. 0.22 square miles of this new area is not yet developed. An additional unmeasurable area of land will be made available by eliminating the flooding west of the Eastern Canal caused by overtopping of the canal. Reduction of the land area inflicted by the current floodplain represents a reduction in insurance costs to property owners, reduced flood damage to existing property, secure ground for future development, and improved safety along roadways.

9. Project Participants: Town of Gilbert, ADOT, SRP, and RWCD.

E. Ray Retention Basin
(Sheet 38 of 44) **$9.2M**

1. Location: Adjacent to, and east of, the Eastern Canal immediately south of Ray Road.

2. Purpose: To retain runoff from the Eastern Canal Diversion Channel North, bleeding it off following the storm event. This basin will also attenuate peak flows to reduce the cost of downstream improvements and serve as a Town of Gilbert Park.

3. Project elements: This is an off-line basin with a by-pass channel along the western edge. The by-pass channel is sized to convey 75 cfs. The culvert system at Ray Road serves as the diversion structure with the 75 cfs continuing by the basin and the remaining peak flow entering the basin by an in-flow spillway. The basin is drained by approximately 16,500 feet of 24" culvert to ADOT Basin "O". This basin will impound 162 acre-feet at it's maximum depth of 11.8 feet.

4. Landscape & Multi-Use: The landscape treatment for this basin would be the Park/Open Space Treatment.

   Multi-Use trails would connect the basin with the Eastern Canal and the Rodeo Grounds. The basin is sized to accommodate up to 5 soccer fields to be incorporated into the Town of Gilbert park system.

5. Special Considerations: An existing retention area owned and operated by the local homeowners association will be incorporated into the basin.

6. Right-of-Way: 31 acres of additional ROW will be required for this Basin.

7. Utility Conflicts: A 12" water line and 15" sewer line are present in the vicinity of the Ray Retention Basin. These lines run North and south, beginning approximately 200 feet east of the Eastern Canal, and continuing South to supply the Gilbert Ranch subdivision. The 12" water line requires relocation. The 15" sewer is not in direct conflict, however, it may require protection in place.

8. Benefitted Area: In addition to the flood control benefits, this basin will provide a direct benefit to the community by providing more parks and open space for recreation within the Town of Gilbert.

9. Project Participants: Town of Gilbert, RWCD, and developers

F. Eastern Canal Diversion Channel - South
(Sheets 13-16 of 44) **$17.3M**

1. Location: Adjacent to, and east of, the RWCD Eastern Canal Extension from Germann Road south to Riggs Road and the Riggs Water Quality Basin.

2. Purpose: To collect runoff accumulating along the upstream side of the Eastern Canal Extension and convey it to the Riggs Water Quality Basin. The channel will contain and eliminate the FEMA designated floodplain.

3. Project elements: Channels within this reach will be constructed with landscaped earth. New concrete box culverts will be constructed at Germann Road, Queen Creek Road, Ocotillo Road, Gilbert Road and Chandler Heights Road This reach will also involve improvements to the existing Chandler Heights and Riggs Detention Basins as well as the construction of the Riggs Water Quality Basin. A by-pass channel will also be constructed to convey 100 cfs to the box culvert at Riggs Road.

4. Landscape & Multi-Use: The landscape treatment for this section would be the Native Habitat Treatment.

   Multi-Use trails would meander adjacent to the Eastern Canal. Interpretive sites and wildlife viewing areas would be located along the corridor.

5. Special Considerations: According to The EDR Corridor Study Report for the project area dated April 7, 1999 (Inquiry Number 355781.1s) an Underground Storage Tank (UST)/ Leaking Underground Storage Tank (LUST) is located in the vicinity of Germann Road and the Eastern Canal.

   Mesquite bosques and ponds are located at the southern end of the Eastern Canal just north of Riggs Road. These provide habitat and a water source for the surrounding wildlife.

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

the channel and access road. Existing ROW along the eastern canal is insufficient for this reach and additional ROW will need to be acquired.

7. Utility Conflicts: A 36" proposed reclaimed water line at Queen Creek Road. A 12" water line, 20" reclaimed water line, and underground electric line at Ocotillo Road. A 16" water line, a sewer line of unknown size, and 12" reclaimed water line at Chandler Heights Road. A 16" proposed water line, 24" proposed reclaimed water line, a 21" proposed sewer line, and a 30" irrigation line at Riggs Road. RWCD open laterals impose conflicts at each half section line along the eastern canal. High voltage overhead electric lines are present along the eastern canal, between Queen Creek Road and Ocotillo Road.

8. Benefitted Area: The area within the current floodplain, paralleling the Eastern Canal. 10 existing residential buildings will be removed by the current recommended design. 0.45 square miles of land will be removed from the existing floodplain. 0.42 square miles of this new area is not yet developed. An additional unmeasurable area of land will be made available by eliminating the floodplain west of the Eastern Canal caused by overtopping of the canal. Reduction of the land area inflicted by the current flooding represents a reduction in insurance costs to property owners, reduced flood damage to existing property, secure ground for future development, and improved safety along roadways.

9. Project Participants: RWCD and City of Chandler

G. Chandler Heights Detention Basin
(Sheet 36 of 44) **$0.9M**

1. Location: Gilbert Road north of Riggs Road adjacent to the Eastern Canal.

2. Purpose: To attenuate peak discharges in the Eastern Canal Diversion Channel.

3. Project elements: An existing RWCD tailwater pond is incorporated into the plan as a flow through detention basin.

4. Landscape & Multi-Use: The landscape treatment for this section would be the Native Habitat Treatment.

   Multi-Use trails would connect the basin with the Eastern Canal. Interpretive sites and wildlife viewing areas would be located adjacent to the mesquite bosques and ponds.

5. Special Considerations: A portion of the total basin volume would need to be preserved for tailwater storage by RWCD.

6. Right-of-Way: 9 acres of ROW is required.

7. Utility Conflicts: No conflicts.

8. Benefitted Area: In addition to the flood control benefits, this basin will provide a direct benefit to the community by providing more parks and open space for recreation within the City of Chandler. This basin's perennial water storage will provide habitat for plant and animal life within the community. Multi-Use trails could connect the basin with the Eastern Canal and interpretive sites and wildlife viewing areas could be located adjacent to the pond.

9. Project Participants: City of Chandler and RWCD.

H. Riggs Retention Basin
(Sheet 35 of 44) **$2.9M**

1. Location: Gilbert Road north of Riggs Road adjacent to the Eastern Canal.

2. Purpose: To attenuate peak discharges in the Eastern Canal Diversion Channel.

3. Project elements: An existing RWCD tailwater pond is incorporated into the plan as an off-line retention basin.

4. Landscape & Multi-Use: The landscape treatment for this section would be the Native Habitat Treatment.

   Multi-Use trails would connect the basin with the Eastern Canal. Interpretive sites and wildlife viewing areas would be located adjacent to the mesquite bosques and ponds.

5. Special Considerations: A portion of the total basin volume would need to be preserved for tailwater storage by RWCD.

6. Right-of-Way: 29 acres of ROW is required.

7. Utility Conflicts: No conflicts.

8. Benefitted Area: In addition to the flood control benefits, this basin will provide a direct benefit to the community by providing more parks and open space for recreation within the City of Chandler. This basin's perennial water storage will provide habitat for plant and animal life within the community. Multi-Use trails would connect the basin with the Eastern Canal. Interpretive sites and wildlife viewing areas could be located adjacent to the mesquite bosques and ponds.

9. Project Participants: City of Chandler and RWCD.

I. Riggs Water Quality Basin
(Sheet 35 of 44) **$0.8M**

1. Location: Gilbert Road north of Riggs Road adjacent to the RWCD tailwater pond.

2. Purpose: To capture and retain the first flush storm water runoff, controlling the quality of water flowing into the GRIC. The first flush storm runoff is the initial volume of runoff carrying non-point-source pollutants, generally accepted as the first ½ inch of storm water generated over the directly contributing impervious area of watershed.

3. Project elements: The basin is based upon a first flush runoff of 4.5 acre-feet. This runoff has been increased by 100% to account for volume reduction due to sedimentation, basin baffles, and a permanent wet pond volume. The basin requires a top surface area of approximately 2 acres, and represents a total excavation requirement of approximately 27 acre-feet. A pipe drains tailwater, regularly entering the water quality basin, exceeding 3 feet in depth into the Riggs Basin, allowing for adequate volume in the water quality basin to accept the first flush.

4. Landscape & Multi-Use: The landscape treatment for this section would be the Native Habitat Treatment.

   Multi-Use trails would connect the basin with the Eastern Canal. Interpretive sites and wildlife viewing areas would be located adjacent to the mesquite bosques and ponds.

5. Special Considerations: The basin is intended to be a permanent wet pond, with regular in flows due to tailwater. Baffles are recommended to aid in efficient sedimentation and to provide benches for shallow aquatic plants.

6. Right-of-Way: 2.8 acres of ROW is required.

7. Utility Conflicts: No conflicts.

8. Benefitted Area: The water quality basin directly benefits the GRIC by eliminating pollutants from storm water runoff before entering the Indian community. This requirement is a stipulation given by the GRIC in the agreement to allow outfall channels to pass through the Indian community. In addition to the water quality benefits, this basin will provide a direct benefit to the community by providing more open space and habitat for plant and animal life within the community.

9. Project Participants: City of Chandler, RWCD, and GRIC.

J. Eastern Canal Diversion Channel - Outfall
(Sheets 9-12 of 44) **$19.6M**

1. Location: Adjacent to, and east of, Gilbert Road extending from Riggs Road to the East Maricopa Floodway (EMF) on the GRIC.

2. Purpose: To provide an outfall for the Eastern Canal Diversion Channel system. The EMF drains to the Gila River.

3. Project elements: Channels within this reach will be constructed with earth. New concrete box culverts will be constructed at Riggs Road and Hunt Highway. Additionally, two box culverts will be constructed at 1-mile intervals south of Hunt Highway to allow for access. The termination of the channel at the EMF will also require special attention.

4. Landscape & Multi-Use: No treatment planned as part of this study.

5. Special Considerations: To maintain a positive slope and daylight into the EMF, portions of this channel are higher than existing ground. As a result, off-site runoff will be prevented from entering the channel. Potential alternatives to address this issue are presented in Section V.

6. Right-of-Way: Approximately 186 feet of new ROW will be required for the channel and access road.

7. Utility Conflicts: No conflict.

8. Benefitted Area: In addition to benefitting the area served by the Eastern Canal Diversion Channel, this channel would also benefit the Gila River Indian Community by providing a means of flood control for that area.

9. Project Participants: Town of Gilbert, City of Chandler, RWCD, and GRIC.

K. ADOT Basin Q
(Sheet 42 of 44) **$16.8M**

1. Location: Northeast corner of Greenfield and Ray Road, adjacent to the proposed Santan Freeway.

2. Purpose: To retain runoff from the area north of the SPRR and south of the proposed Santan Freeway, bleeding it off following the storm event. This basin will also serve as a Town of Gilbert Park.

3. Project elements: The basin receives runoff through the box culvert under Ray Road and will impound 315 acre-feet at a maximum depth of 13.6 feet. The basin is drained by approximately 5,700 feet of 24" pipe to Ray Basin.

4. Landscape & Multi-Use: The landscape treatment for this section would be the Park/Open Space Treatment.

   Multi-Use trails would connect the basin with the Crossroads Park, Eastern Canal, and the other basins located adjacent to the Santan Channel. Various recreational uses could be developed within this basin as described in Section V of this report.

5. Special Considerations: None.

6. Right-of-Way: 54 acres of additional ROW will be required.

7. Utility Conflicts: A 12" water line, 15" sewer line, Qwest underground telephone line, 24" irrigation pipe, and MCI fiber optic line are present in the vicinity of the basin Q outlet pipe. This section of the outlet pipe is aligned with Ray Road, west of Greenfield Road, ending at the Eastern Canal. The same basin Q outlet pipe, where it extends east of Greenfield Road, is in the vicinity of a 16" force main, 12" water line, and Qwest underground telephone. The above utilities are not presently in conflict with the proposed alignment; however, protection in place may be necessary. A high voltage overhead electric line is present along the SPRR right of way.

8. Benefitted Area: In addition to it's flood control benefits, this basin will provide a direct benefit to the community by providing more parks and open space for the Town of Gilbert.

9. Project Participants: Town of Gilbert, ADOT

L. ADOT Basin P
(Sheet 41 of 44) **$14.3M**

1. Location: Northwest corner of Greenfield Road and Pecos Road, adjacent to the proposed Santan Freeway.

2. Purpose: To attenuate peak flows to reduce the cost of downstream improvements. The basin will retain runoff from east of the proposed Santan Freeway, north of Pecos Road. The basin will also serve as a Town of Gilbert park.

3. Project elements: The basin will receive runoff from a segment of the Santan Channel through an inflow spillway. the basin will impound 80 acre-feet at a maximum depth of 8.4 feet. The basin is drained by approximately 7800 feet of 24" pipe to Basin "O".

4. Landscape & Multi-Use: The landscape treatment for this section would be the Park/Open Space Treatment.

   Multi-Use trails would connect the basin with the Eastern Canal, Santan Channel, and the other basins located adjacent to the Santan Channel. Various recreational uses could be developed within this basin as described in Section V of this report.

5. Special Considerations: None.

6. Right-of-Way: 24 acres of additional ROW will be required.

7. Utility Conflicts: A 6" high pressure petroleum pipeline is present along Pecos Road; this utility is not in direct conflict but may require protection in place.

8. Benefitted Area: In addition to it's flood control benefits, this basin will provide a direct benefit to the community by providing more parks and open space for the Town of Gilbert.

9. Project Participants: ADOT, Town of Gilbert

M. Santan Channel & Storm Drain - East
(Sheets 30-33 of43) **$8.4M**

1. Location: Parallel to the proposed Santan Freeway from Ray Road south to approximately Lindsay Road.

2. Purpose: To collect runoff accumulating along the proposed Santan Freeway and convey it to ADOT Basins "O","P" & "Q".

3. Project elements: Channels within this reach will be constructed with landscaped earth. New concrete box culverts will be constructed at Ray Road and Val Vista Dr.

4. Landscape & Multi-Use: The landscape treatment for this section would be a modified Park/Open Space Treatment. No turf would be utilized in this section.

   A multi-use trail would meander adjacent to the Santan Channel. This trail would connect the various basins located along the proposed Santan Freeway as well as the Eastern and Consolidated Canals.

5. Special Considerations: None.

6. Right-of-Way: It is intended that this channel fit into the ADOT ROW. However, due to the fill slopes on the freeway, additional ROW may be required for this reach. The required ROW for the channel and access road is shown on the plans.

7. Utility Conflicts: A Qwest underground telephone line at Val Vista Road. A 12" waterline, 16" force main, and 24" storm drain along Greenfield Road, just south of Ray Road. An MCI fiber optic line and a sewer line of unknown size at the SPRR right of way corridor. A 16" force main and underground electric line at Ray Road. The above utilities are in direct conflict with the proposed alignment and require relocation. A 6" high pressure petroleum pipeline is present along Pecos Road; this utility is not in direct conflict but may require protection in place.

8. Benefitted Area: The area that would be inundated by ponding resulting from construction of the proposed Santan Freeway.

9. Project Participants: ADOT, Town of Gilbert

N. ADOT Basin O
(Sheet 37 of 44) **$11.2M**

1. Location: Northeast corner of Lindsay Road and Germann Road, adjacent to the Santan Freeway.

2. Purpose: To attenuate peak flows to reduce the cost of downstream improvements. The basin will retain runoff from the area north of Germann Road and south of the proposed Santan Freeway, as well as flows from the Eastern Canal Diversion Channel - North. Following a storm event, the basin will drain by gravity to Basin "L". The basin will also serve as a City of Chandler Park.

3. Project elements: The basin will impound 249 acre-feet at a maximum depth of 20 feet. The basin is drained by approximately 14,350 feet of 24" pipe to Basin "L". The basin has two inflow spillways.

4. Landscape & Multi-Use: The landscape treatment for this section would be the Park/Open Space Treatment.

   Multi-Use trails would connect the basin with the Eastern Canal, Santan Channel, and the other basins located adjacent to the Santan Channel. Various recreational uses could be developed within this basin as described in Section V of this report.

5. Special Considerations: The basin is designed to attenuate peak flows from the Eastern Canal Diversion Channel - North by serving as an off-line basin. Flows from the Santan Channel & Stormdrain - East enter the basin in an in-line manner.

6. Right-of-Way: 24 acres of additional ROW will be required.

7. Utility Conflicts: No conflicts.

8. Benefitted Area: In addition to it's flood control benefits, this basin will provide a direct benefit to the community by providing more parks and open space.

9. Project Participants: ADOT, City of Chandler, SRP, and RWCD

O. Santan Channel & Stormdrain - West
(Sheets 26-29 of 44) **$11.7M**

1. Location: Parallel to the proposed Santan Freeway from Lindsay Road west to Arizona Avenue.

2. Purpose: To collect runoff accumulating along the proposed Santan Freeway and convey it to ADOT Basins "L" & "K".

3. Project elements: Channels within this reach will be constructed with landscaped earth. New concrete box culverts will be constructed at Lindsay Road/Eastern Canal, Gilbert Road, Cooper Road, McQueen Road, SPRR, Arizona Ave. and at the ADOT Basin "L" inlet under the proposed Santan Freeway.

4. Landscape & Multi-Use: The landscape treatment for this section would be a modified Park/Open Space Treatment. No turf would be utilized in this section.

   A multi-use trail would meander adjacent to the Santan Channel. This trail would connect the various basins located along the proposed Santan Freeway as well as the Eastern and Consolidated Canals.

5. Special Considerations: Per ADOT's direction, the maximum discharge of the system at Arizona Ave. is 37 cfs due to downstream capacity restrictions.

6. Right-of-Way: It is intended that this channel fit into the ADOT ROW. However, due to the fill slopes on the freeway, additional ROW may be required for this reach. The required ROW for the channel and access road is shown on the plans.

7. Utility Conflicts: A 12" water line, Qwest underground telephone line, and 2" gas line at the intersection of Willis Road and the proposed alignment. A 24" water line and Qwest underground telephone line at McQueen Road. A 6" water line and 4" gas line at Cooper Road. A 24" irrigation line and Qwest underground telephone line at Gilbert Road. An 18" sewer line at Lindsay Road.

8. Benefitted Area: The area that would be inundated with ponding from the proposed Santan Freeway. This channel is also an outfall route for the Eastern Canal Diversion Channel, North and Middle areas. See these sections for additional benefitted areas.

9. Project Participants: ADOT, City of Chandler, SRP.

P. ADOT Basin L
(Sheet 40 of 44) **$17.8M**

1. Location: Northeast corner of the Consolidated Canal and Germann Road, adjacent to the Santan Freeway

2. Purpose: To attenuate peak flows to reduce the cost of downstream improvements by retaining runoff generated from the area north of the proposed Santan Freeway, east of the Consolidated Canal. This basin will also serve as a City of Chandler Park.

3. Project elements: Runoff enters the basin from the Santan Channel & Stormdrain - West after crossing under the Santan Freeway and into the inflow spillway. The basin will impound 487 acre-feet at a maximum depth of 21.3'. The Consolidated Canal Diversion Channel Lateral will direct off-site flows away from the basin and into the Consolidated Canal Diversion Channel. The basin will drain through approximately 7000' of 24" pipe to ADOT Basin "K".

4. Landscape & Multi-Use: The landscape treatment for this section would be the Park/Open Space Treatment.

   Multi-Use trails would connect the basin with the Consolidated Canal, Santan Channel, and the other basins located adjacent to the Santan Channel. Recreational uses could be developed within this basin as described in Section V of this report.

5. Special Considerations: Since this basin is located near the City of Chandler Municipal Airport, bird habitat must be minimized. This necessitates the need for a quick drain time after the storm event as well as minimal vegetation.

6. Right-of-Way: 46 acres of additional ROW will be required.

7. Utility Conflicts: No conflicts.

8. Benefitted Area: In addition to flood control benefits, the basin will provide a direct benefit to the community by providing more parks and open space within the City of Chandler. This is a large basin which could serve as a large community park with multi-use ball fields.

9. Project Participants: ADOT, City of Chandler, SRP.

Q. ADOT Basin K
(Sheet 39 of 44) **$3.0M**

1. Location: Northeast corner of the SPRR and the Proposed Santan Freeway.

2. Purpose: To attenuate peak flows to the allowable maximum flow of 37 cfs leaving the study area at Arizona Ave. This basin will also serve as a City of Chandler Park.

3. Project elements: This is an off-line basin which will allow 37 cfs to by-pass the basin in a channel. Flow enters the basin from the Santan Channel & Stormdrain - West via a side channel spillway and a storm drain draining Basin L. At it's maximum depth of 17.6', the basin will impound 73 acre-feet. The basin can be drained to either the Santan freeway on-site collection system or to an off-site collection system 2 miles west.

4. Landscape & Multi-Use: The landscape treatment for this section would be the Park/Open Space Treatment.

   Multi-Use trails would connect the basin with the Consolidated Canal, Santan Channel, and the other basins located adjacent to the Santan Channel. Various recreational uses could be developed within this basin as described in Section V of this report.

5. Special Considerations: None

6. Right-of-Way: 10 acres of additional ROW will be required.

7. Utility Conflicts: No conflicts.

8. Benefitted Area: In addition to it's flood control benefits, this basin will provide a direct benefit to the community by providing more parks and open space within the City of Chandler.

9. Project Participants: ADOT, City of Chandler, SRP.

R. Consolidated Canal Diversion Channel
(Sheets 4-8 & 44 of 44) **$23.8M**

1. Location: Adjacent to, and east of, the Consolidated Canal extending from Germann Road south to the Southern Pacific Railroad (SPRR)

2. Purpose: To collect runoff accumulating along the upstream side of the Consolidated Canal and convey it to the SPRR Water Quality Basin. The channel will contain and eliminate the FEMA designated floodplain.

3. Project elements: Channels within this reach will be constructed with landscaped earth, earth and concrete depending on available ROW. New concrete box culverts will be constructed at Germann Road, Queen Creek Road, McQueen Road, Ocotillo Road, Chandler Heights Road, Riggs Road and the SPRR. Due to ROW limitations, the culvert at Germann Road will continue for approximately 2800' before opening into a wide existing retention area. A lateral is required at Germann Road to collect and divert runoff into the channel. Runoff from south of the proposed Santan Freeway should be directed into the channel, not into the ADOT Basin L.

4. Landscape & Multi-Use: The landscape treatment for this section would be comprised of two (2) treatments. The Railroad Treatment would occur at the intersection of the Consolidated Canal and the Southern Pacific Railroad (SPRR). The remaining portions of this section would have a Paseo Development Treatment.

5. Special Considerations: Due to ROW limitations along the City of Chandler Landfill, realignment of the existing Consolidated canal may be required. Additionally, special care should be taken near the landfill to avoid disturbing monitoring wells along the landfill toe of slope. The City of Chandler has indicated that they do not support a concrete channel in this reach and would like to see a landscaped earth channel instead. Alternative channel lining schemes should be considered adjacent to the landfill during the design phase of the project.

   A hazmat site has been identified in the vicinity of Santan Boulevard and the Consolidated Canal. This site has been identified for the Water Quality Assurance Revolving Fund.

6. Right-of-Way: The requirement shown on the plans is the ROW for the channel and access road. Existing ROW along the Consolidated Canal is insufficient for this reach especially in the vicinity of the airport and the landfill thus requiring concrete channel sections and a long segment of box culvert.

7. Utility Conflicts: A 12" water line and underground electric line at Germann Road. An underground electric line north of the

midsection line between Germann Road and Queen Creek Road. A 16" water line, underground electric line, and Qwest underground telephone at Queen Creek Road. A 16" water line, a 36" proposed reclaimed water line, a 27" proposed sewer line, and a Qwest underground telephone line at the intersection of McQueen Road and the Consolidated Canal. A 16" water line, 20" reclaimed water line, and Qwest underground telephone at Ocotillo Road. A 24"proposed reclaimed water line, a 16" water line, and a Qwest telephone line at Chandler Heights Road. A 16" water line, 8" force main, 12" reclaimed water line, Qwest underground telephone line, and a 48" irrigation line at Riggs Road. The above utilites are in direct conflict with the proposed alignment and require relocation. High voltage overhead electrical lines are present at Ocotillo road.

8. Benefitted Area: The area within the current floodplain that parallels the Consolidated Canal. Three existing residential buildings and 8 existing commercial buildings are presently in the floodplain to be removed by the current recommended design. 0.60 square miles will be removed from the existing floodplain. 0.55 square miles of this new area is not yet developed. An additional unmeasurable area of land will be made available by eliminating a portion of the flooding area west of the Consolidated Canal caused by overtopping of the canal. Reduction of the land area inflicted by the current floodplain represents a reduction in insurance costs to property owners, reduced flood damage to existing property, secure ground for future development, and improved safety along roadways.

9. Project Participants: SRP, City of Chandler

S. Queen Creek Basin
(Sheet 34 of 44) **$13.6M**

1. Location: Southeast corner of McQueen and Queen Creek Roads

2. Purpose: This basin will serve to attenuate peak flows to reduce the cost of downstream improvements by retaining runoff generated from the area north and east of the site.

3. Project elements: This is an off-line basin with a by-pass channel along it's western edge. The by-pass channel is sized to convey 350 cfs. The culvert system at Queen Creek Road serves as the diversion structure with the 350 cfs continuing by the basin and the remaining peak flow entering the basin by an in-flow spillway. A lateral channel is included along McQueen Road to collect and divert runoff from Ocotillo Road into the basin. After the storm event, the basin is drained by approximately 300 feet of 24" culvert to the Consolidated Canal Diversion Channel. This basin will impound 126 acre-feet at a maximum depth of 4.7 feet.

4. Landscape & Multi-Use: The landscape treatment for this section would be the Park/Open Space Treatment.

   Multi-Use trails would connect the basin with the Consolidated Canal and Paseo development. Recreational uses could be developed within this basin as described in Section V of this report. Interpretive sites would be located adjacent to the basin related to the Chandler Municipal Airport.

5. Special Considerations: Since this basin is located near the City of Chandler Municipal Airport, bird habitat must be minimized. This necessitates the need for a quick drain time after the storm event as well as minimal vegetation.

6. Right-of-Way: 63 acres of additional ROW will be required.

7. Utility Conflicts: No conflicts.

8. Benefitted Area: In addition to it's flood control benefits, this basin will provide a direct benefit to the community by providing more parks and open space for the City of Chandler.

9. Project Participants: City of Chandler, SRP

T. SPRR Water Quality Basin
(Sheet 43 of 44) **$0.9M**

1. Location: East of and adjacent to the Consolidated Canal, adjacent to the midsection line between Riggs Road and Hunt Highway.

2. Purpose: To capture and retain the first flush storm water runoff, controlling the quality of water flowing into the GRIC. The first flush storm runoff is the initial volume of runoff carrying non-point-source pollutants, generally accepted as the first ½ inch of storm water generated over the directly contributing impervious area of watershed.

3. Project elements: The basin is based upon a first flush runoff of 3.5 acre-feet. This runoff has been increased by 100% to account for volume reduction due to sedimentation, baffle volume consumption, and possible multiuse features. The basin requires a top surface area of approximately 2.2 acres, and represents a total excavation requirement of approximately 21 acre-feet.

4. Landscape & Multi-Use: The landscape treatment for this section would be the Park/Open Space Treatment modified to respond to the Paseo Development.

   Multi-Use trails would connect the basin with the Consolidated Canal and Paseo development. Recreational uses could be developed within this basin as described in Section V of this report.

5. Special Considerations: A hazmat site has been identified in the vicinity of Santan Boulevard and the Consolidated Canal. This site has been identified for the Water Quality Assurance Revolving Fund.

   The basin is intended to be a dry detention pond, with only shallow marshing present outside of periods of design storm rainfall. Multiuse features are recommended to reduce the permanently marshy surface area of the basin, allowing for a larger area of passive recreation.

6. Right-of-Way: 2.5 acres of ROW is required.

7. Utility Conflicts: No conflicts.

8. Benefitted Area: The water quality basin directly benefits the GRIC by eliminating pollutants from storm water runoff before entering the Indian community. This requirement is a stipulation given by the GRIC in the agreement to allow outfall channels to pass through the Indian community.

9. Project Participants: City of Chandler, SRP, GRIC.

U. Consolidated Canal Diversion Channel - Outfall
(Sheets 1-3 & 44 of 44) **$17.9M**

1. Location: Adjacent to, and east of, the Consolidated Canal extending from the SPRR to Hunt Highway and then approximately 100' east of the S.R. 587 centerline south to the EMF.

2. Purpose: To provide an outfall for the Consolidated Canal Diversion Channel system. The EMF drains to the Gila River.

3. Project elements: Channels within this reach will be constructed with earth. New concrete box culverts will be constructed at Hunt Highway with two additional box culverts constructed at 1-mile intervals south of Hunt Highway to allow for access. A lateral will be required along the north side of Hunt Higway to direct runoff accumulating along the upstream side of the SPRR to the channel. The termination of the channel at the EMF will also require special attention.

4. Landscape & Multi-Use: No treatment

5. Special Considerations: To maintain a positive slope and daylight into the EMF, portions of this channel are higher than existing ground. As a result, off-site runoff will be prevented from entering the channel. Potential alternatives to address this issue are presented in Section V.

   The proposed Pima-Maricopa Irrigation Project (PMIP) canal will cross this alignment. The configuration and hydraulics of the crossing channels will need to be addressed during final design.

6. Right-of-Way: Approximately 190 feet of ROW is required for the channel and access road.

7. Utility Conflicts: No conflicts.

8. Benefitted Area: In addition to benefitting the area served by the Consolidated Canal Diversion Channel, this channel would also benefit the Gila River Indian Community by providing a means of flood control for that area.

9. Project Participants: Town of Gilbert, City of Chandler, SRP, GRIC.

V. GRIC Outfall Alternatives

The following alternatives are identified to address the issue of GRIC runoff entering, or not entering, the outfall channel. The preliminary plans and calculations presented within this report are based on the total peak discharge within the channel assuming that local runoff, generated within the GRIC, is collected and conveyed within the channel:

1. Construct a **parallel channel** to convey off-site runoff to the EMF:

Description: A parallel channel could be constructed along the upstream side of the outfall channel to intercept local runoff and convey it to the EMF. For this alternative to work, the runoff would need to be retained until the flow within the EMF subsides. If there is a direct hydraulic connection to the EMF, flow would back up into the parallel channel, overtopping it's banks and flooding adjacent property. A retention basin, or series of retention basins located at the low points, could store the runoff and then drain either by gravity or by pumping into the EMF after the storm event.

Advantages: The channel and basins can be constructed with the outfall channel project and will alleviate potential flooding within the GRIC.

Disadvantages: The channel and basins will require a large amount of additional right-of-way and would be costly.

2. **Lower the EMF** flowline to allow the Eastern Canal Diversion Channel Outfall to be lowered:

Description: The flowline within the EMF could be lowered to allow the outfall channel to be lowered, increasing the channel slope and allowing local runoff to drain into the channel.

Advantages: Less right-of-way would be required than with parallel channel or retention alternatives. A steeper channel slope would make more efficient use of the channel cross-section by allowing higher velocities. Lowering the EMF flowline could be incorporated into another project if the EMF needs to be improved anyway due to findings of the FCDMC's EMF Capacity Study. If there is enough fall between the GRIC outfalls and the Gila River, this may be an attractive alternative.

Disadvantages: It is not known what downstream constraints may exist due to grades at the Gila River. Improvements would be required outside the limits of this project. As a result, implementation may be more difficult

3. Provide **retention** to store off-site runoff until it can be pumped or drained back into the system:

Description: Retention could be provided at low points along the alignment, perhaps at existing road crossing locations. The retention basins would collect and store the runoff, allowing it to drain into the channel by gravity or pumping, when the water level in the EMF and outfall channel subsides. Flap gates may be required as part of this alternative.

Advantages: This alternative would collect runoff at its point of concentration. As a result, no parallel channel would be required. The basins would drain directly into the channel. Since the runoff is released into the channel following the storm, the channel could be downsized.

Disadvantages: The land area required for retention would be quite large if the basins were to drain by gravity. The basins could occupy less land area if they were constructed deeper. However, pumping would then be required to drain the basins.

4. **Modify the channel alignment** to pick up grade by going southwesterly to the EMF:

Description: The channel alignment could be modified to pick up grade in a southwesterly direction to the EMF.

Advantages: The channel cross-section would be more efficient with more slope and higher velocities. Surface runoff within the GRIC could drain into the channel directly, eliminating the need for retention or parallel channels. The runoff would enter the EMF farther downstream which may have benefits if the EMF is determined to be undersized. An alignment away from section line roads may have advantages for future commercial development along the section line roads.

Disadvantages: Channel alignments that do not follow a north-south or east-west grid may present difficulties for agricultural land uses and irrigation delivery systems as well as potentially splitting existing land parcels. The channels would be longer than along the north-south roads as presented in the plan.

5. Pass off-site flows under the channel through **inverted siphons** along the historic flowpath:

Description: Runoff could be collected at existing points of concentration at the road crossings and passed under the channel and roadway in inverted siphons. The design would probably need to include de-silting basins to remove larger sediments before allowing runoff into the siphon. This would reduce the

likelihood and frequency of plugging due to water borne sediments settling out into the pipes.

Advantages: The Channel could be downsized to eliminate local runoff from the required channel capacity. Parallel channels and/or basins would not be required. Existing conditions would be maintained.

Disadvantages: Flooding from runoff generated within the GRIC would not be addressed. Maintenance of the siphons would be more costly than with other alternatives.

6. **"Do nothing"**

Description: Allow runoff accumulating along the channel embankment to pond into the GRIC and drain into the channel when the water level in the EMF and outfall channel subsides. Flap gates would be required as part of this alternative.

Advantages: Savings in right-of-way and construction costs. The channel could be downsized to eliminate local runoff from the required channel capacity.

Disadvantages: An advantage implicit in all the other alternatives presented is that flooding would be contained within project rights-of-way. In the Do Nothing alternative ponding would extend onto private and/or GRIC property. For this reason, the Do Nothing alternative is not considered to be a viable option.

Discussion: The problem exists for approximately the most downstream 1.5 miles of the Eastern Canal Diversion Channel Outfall (ECDCO) and for the full 2.5 miles of the Consolidated Canal Diversion Channel Outfall (CCDCO).

Based on the preceding discussion, lowering the EMF flowline and modifying the channel alignment to pick up grade by going southwesterly to the EMF appear to be the most promising alternatives. If it is feasible to lower the EMF flowline as part of a capacity enhancement project, the recommended plan alignment can be used and off-site flows can drain into the channel. If the EMF flowline will not be lowered, modifying the channel alignment will allow off-site runoff to enter the channel and provide adequate slope for an efficient channel design.

Determination of the preferred GRIC outfall alternative is left to the preliminary design phase of project development. It is anticipated that the decision will be based on more detailed design development and cost analysis and will include input from the GRIC on their desired alternative.

VII. IMPLEMENTATION PLAN

A. Introduction

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

B. Estimated Costs

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

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

Major cost items included in the channel cost estimates are excavation, concrete, utility relocations, maintenance roads, land acquisition, and landscape. Utility relocation costs are included as a lump sum, as a dollar amount per utility crossing. 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.

C. Project Prioritization

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 September 28, 2000. 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 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 16 illustrates Priority No. 1, 2, and 3 projects. **Table 2** summarizes each of the master plan projects and their construction costs grouped by priority.

1. North Area Priority

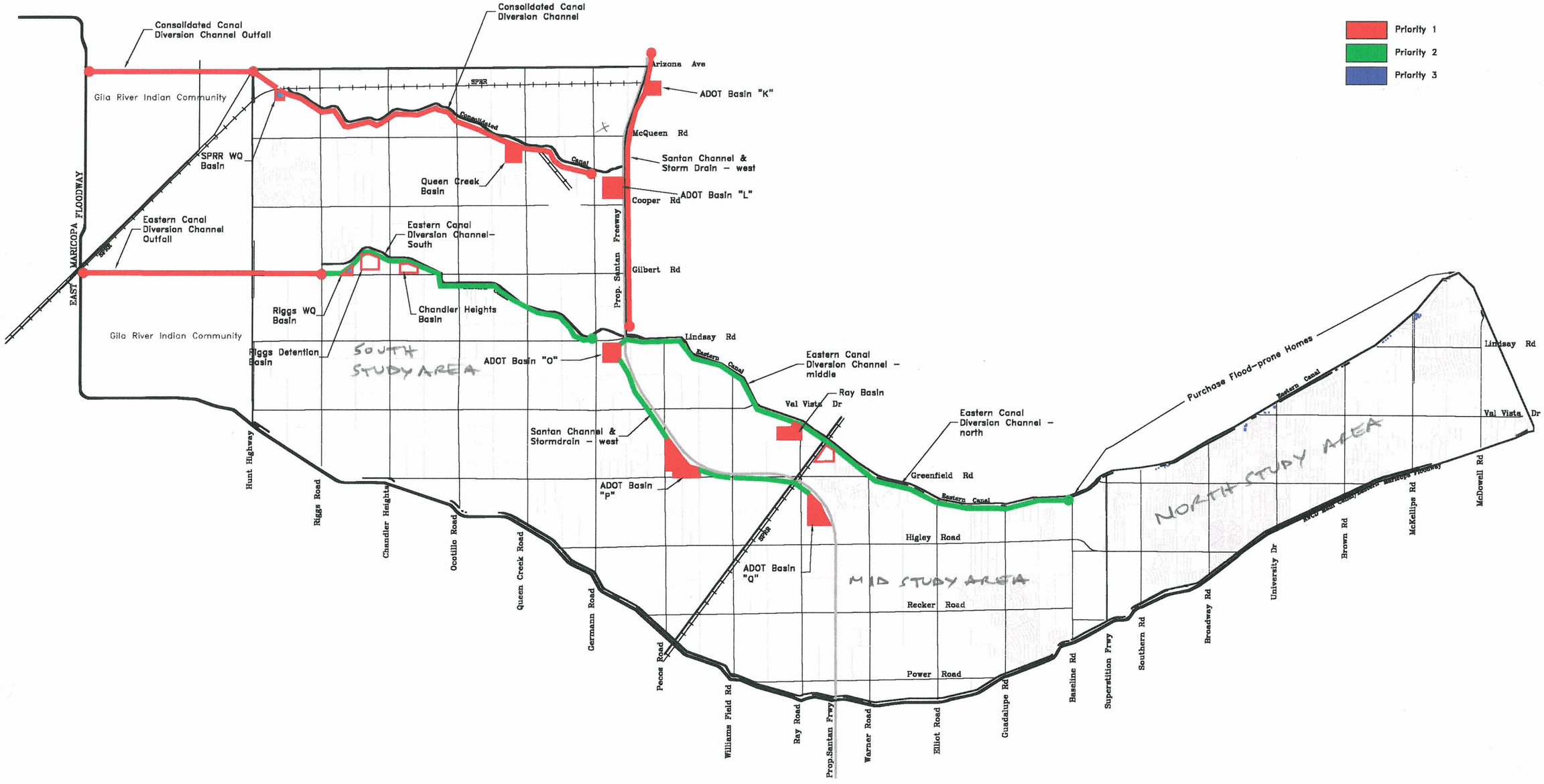
The purchase floodprone homes and land within the North Area is a priority 3 project. The North Area is contained entirely within the City of Mesa and the City of Mesa recommends a Do Nothing Alternative for the North Area. The City of Mesa position letter is contained in the **Appendix**.

2. Mid Area Priority

Advanced land acquisition for all basins is 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. The Santan freeway from Arizona Avenue to Gilbert Road is scheduled to be open to traffic in the year 2005. The Santan Channel and Storm Drain - West are identified as priority 1 to be implemented with construction of the freeway. The remaining elements of the Mid Area system - the Eastern Canal Diversion Channel Middle and North, and the Santan Channel and Storm Drain - East, are designated as priority 2. The Santan Channel and Storm Drain - East are to be constructed with construction of the Santan Freeway which is scheduled to be open to traffic from Gilbert Road to Williams Field Road in the year 2006 followed by the segment from Williams Field Road to Power Road to be open in 2007.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"



PROJECT DESCRIPTION:

PROJECT PHASING

CONSULTANT:

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

FIGURE 16

3. South Area Priority

As with the Mid Area, advanced land acquisition for basins is priority 1. The two outfall channels across the GRIC must be constructed first and are identified as priority 1. The portion of the Eastern Canal Diversion Channel Outfall from Hunt Highway to Riggs Road is identified as a critical reach due to development that is taking place as of this writing. The City of Chandler is moving forward with plans for the Paseo project along the Consolidated Canal. The entire Consolidated Canal Diversion Channel project is identified as priority 1. The Eastern Canal Diversion Channel - South is priority 2. The City of Chandler provided initial comments on the recommended plan and indicated that additional comments would be forthcoming. The City of Chandler position letter is contained in the **Appendix**.

D. 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 Higley 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.

4. 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.

5. 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 Mesa
- Arizona Department of Transportation (ADOT)
- Maricopa County Department of Transportation (MCDOT)
- Town of Gilbert
- City of Chandler
- Salt River Project
- Roosevelt Water Conservation District
- Gila River Indian Community
- Flood Control District of Maricopa County (FCDMC)

Projects where shared benefits may accrue to the above agencies are identified in Section VI. "Preliminary 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. Based on the cost sharing arrangement and the phased implementation costs, the participating agencies can incorporate project costs into their capital improvement programs.

E. Key Success Factors

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

- Gilbert, Chandler, and Maricopa County must formally **adopt the Higley ADMP**.
- Advanced **land acquisition**.
- The Critical Eastern Canal Diversion Channel reach from **Hunt Highway to Riggs Road**.
- **37 cfs** ADOT discharge limitation in the Mid Area Outfall plan.
- Project participants must make **funding** available.
- IGA with **ADOT**.
- IGA with the **GRIC**.

KEY SUCCESS FACTORS

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

ADOPT the plan!

AGREE to move forward!

ALLOCATE the funds!

ACQUIRE the land!

ADDRESS critical design issues!

Table 2 - Recommended Plan - Estimated Costs

Priority	Project	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Land Acquisition	Construction	Construction Contingency (15%)	Landscape	Design & CM (15%)	Total
1	Consolidated Canal Diversion Channel																$3,403,675	$9,837,528	$1,475,629	$7,563,722	$1,475,629	$23,756,183
1	Consolidated Canal Diversion Channel Outfall																$3,085,445	$6,152,618	$922,893	$6,856,545	$922,893	$17,940,395
1	Eastern Canal Diversion Channel Outfall																$3,619,504	$6,081,387	$912,208	$8,043,342	$912,208	$19,568,650
1	Santan Channel & Storm Drain - West																$2,308,392	$3,279,488	$491,923	$5,129,760	$491,923	$11,701,486
1	Queen Creek Basin & Lateral																$3,712,940	$1,237,250	$185,587	$8,250,979	$185,587	$13,572,344
1	Ray Basin																$1,671,071	$2,914,981	$437,247	$3,713,490	$437,247	$9,174,035
1	ADOT Basin "K"																$539,055	$944,656	$141,698	$1,197,900	$141,698	$2,965,008
1	ADOT Basin "L"																$2,425,748	$7,715,338	$1,157,301	$5,390,550	$1,157,301	$17,846,237
1	ADOT Basin "O"																$1,293,732	$5,415,023	$812,253	$2,874,960	$812,253	$11,208,222
1	ADOT Basin "P"																$2,264,031	$5,373,791	$806,069	$5,031,180	$806,069	$14,281,139
1	ADOT Basin "Q"																$2,910,897	$5,693,429	$854,014	$6,468,660	$854,014	$16,781,015
1	Riggs Water Quality Basin																$156,326	$236,589	$35,488	$347,391	$35,488	$811,283
1	SPRR Water Quality Basin																$172,498	$270,490	$40,574	$383,328	$40,574	$907,463
	Total Priority 1 Projects																					**$160,513,459**
2	Eastern Canal Diversion Channel - North																$2,668,318	$7,416,832	$1,112,525	$5,929,595	$1,112,525	$18,239,794
2	Eastern Canal Diversion Channel - Middle																$2,543,262	$4,873,714	$731,057	$5,651,693	$731,057	$14,530,783
2	Eastern Canal Diversion Channel - South																$3,083,242	$5,643,954	$846,593	$6,851,649	$846,593	$17,272,032
2	Riggs Detention Basin																$1,563,260	$8,342	$1,251	$1,318,511	$1,251	$2,892,615
2	Chandler Heights Detention Basin																$485,150	$8,000	$1,200	$397,276	$1,200	$892,826
2	Santan Channel & Storm Drain - East																$1,505,487	$2,734,550	$410,182	$3,345,527	$410,182	$8,405,929
	Total Priority 2 Projects																					**$62,233,978**
3	North Area - Purchase Flood-prone Homes																$3,625,657	$1,363,600	$787,989	$264,000	$787,989	$6,829,234
	Total Priority 3 Projects																					**$6,829,234**
	GRAND TOTAL																					**$229,576,672**

VIII. MAINTENANCE PLAN

A. Introduction

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

B. Operation & Maintenance Guidelines

1. Mid Area System O&M Requirements

Due to capacity limitations within the ADOT downstream system, the maximum discharge that can be introduced into the system is 37 cfs at Arizona Avenue. As a result, the Mid Area plan consists of retaining all the runoff and releasing it into the ADOT system after the storm. A system of six retention basins is planned to store a total of 1,155 acre-feet of runoff.

All six retention basins are drained to Basin K with a 24-inch pipe. Due to the difference in design water surface elevation within the basins, the system cannot be allowed to "float" by gravity. If the basins were allowed to float, the runoff stored in the upper basins would drain into the lower basins, causing them to overtop. To illustrate, the hydraulic profile of the six basin system is shown on **Figure 17**. Basin Q and Basin P are the highest basins in the system with 100-year design water surface elevations of 1273 and 1278, respectively. Basins Q and P drain to Ray Basin and Basin O, respectively, which have design water surface elevations of 1266 and 1258. The Ray Basin then drains to Basin O. Basin O then drains to Basins L and K which have design water surface elevations of 1222 and 1208, respectively.

It is recommended that all six retention basins be equipped with valves or gates at their drain pipes to prevent unplanned draining of the basins. Following a storm event, the basins should be drained according to the sequence shown in **Table 3**. The Basin P gate should be opened first. The Basin Q gate would be opened next, when the water surface elevation in Basin P has drained to 1273.19, which is the design water surface elevation for Basin Q. The Ray Basin gate should be opened third, when the water surface elevation in Basin Q has drained to 1265.60, which is the design water surface elevation for the Ray Basin. The Basin O gate should be opened 4th, when the water surface elevation in the Ray Basin has drained to 1258.41. The Basin L gate should be opened 5th, when Basin O and the other upstream basins are empty. The Basin K gate can then be opened, when the water surface elevation in Basin L has drained to 1207.8.

Table 3 - Mid Area Basin Draining Sequence

			Controlling Basin	
Basin	Design WSEL	Drain Sequence	Name	WSEL
P	1278.0	1	--	--
Q	1273.19	2	P	1273.19
Ray	1265.60	3	Q	1265.60
O	1258.41	4	Ray	1258.41
L	1221.66	5	O	empty
K	1207.8	6	L	1207.8

Due to this flow rate restriction, it will take over 18 days to drain all the basins. However, due to the draining sequence not all basins will hold water for the full 18 days.

Due to Basin L's proximity to the Chandler Airport, it may be drained first to preclude attracting any birds during the extended drain time which may pose a hazard to aircraft using the airport. If this is done, all the basin drain valves or gates would be closed during draining of Basin L. After Basin L is drained, the Basin L valve or gate will need to remain closed for the duration of the basin drain sequence to avoid being re-filled.

2. South Area System O&M Requirements

The south area operation will include the Riggs and SPRR water quality basins. Operation and maintenance requirements for the basins will depend on the adopted design approach. The operation and maintenance of the GRIC outfall channels will be dependent on the selected alternative approach as described in Section VI. Alternatives that require pumping or are prone to sediment accumulation will require more maintenance than passive systems that provide adequate sediment transport capacity.

C. Maintenance Costs

The FCDMC provided cost information for maintenance of the East Maricopa Floodway (EMF) Reach 6 for FY1999 from maintenance records. The total average cost as reported is $14,000 per mile.

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"

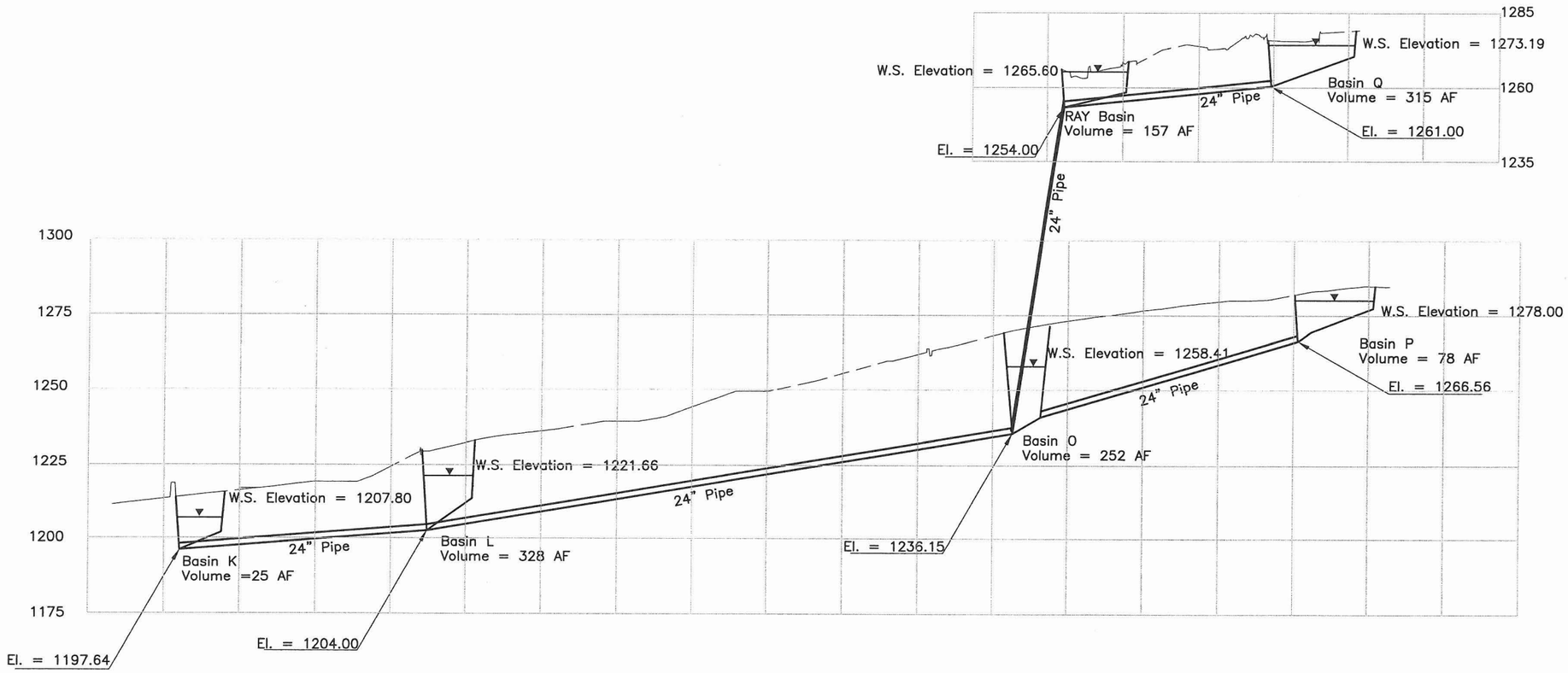


FIGURE 17

PROJECT DESCRIPTION:
HYDRAULIC PROFILE

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1982

IX. REFERENCES

BRW Engineering Inc., *Final Draft Design Concept Report for Queen Creek Rd– Arizona Ave. to McQueen Rd.,* February, 1999.

Carter-Burgess, *The Paseo Master Plan Consolidated Canal*, June, 1998.

Dibble & Associates, *Higley Area Drainage Master Plan, Data Collection Report*, May 1999.

Dibble & Associates, *Higley Area Drainage Master Plan, Alternatives Analysis Report*, March 2000.

Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Volume I, Hydrology*, January 1, 1995.

Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Volume II, Hydraulics*, January 28, 1996.

Flood Control District of Maricopa County, *Drainage Design Menu System, User's Guide*, January 1, 1995.

Flood Control District of Maricopa County, *Gilbert-Chandler Area Drainage Master Study Volume I, Current Conditions Hydrology*, July, 1993.

Flood Control District of Maricopa County, *Gilbert-Chandler Area Drainage Master Study Volume II, Future Conditions Hydrology*, January, 1994.

Flood Control District of Maricopa County, *Gilbert-Chandler ADMS Addendum*, May, 1999.

Flood Control District of Maricopa County, *Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects*, December 16, 1992.

Franzoy-Corey, *Flood Insurance Study, Gilbert-Chandler Area*, September, 1990.

HDR Engineering Inc., *Concept Drainage Report, Santan Freeway - Price Rd. to Gilbert Rd.,* June 1995.

Lee Engineering, *Riggs Rd. Access Control & Corridor Improvement Study,* Volume I, February, 1999.

Maricopa County Department of Transportation, *MCDOT Accomplishments & Five-year Capital Improvements Program for Fiscal Years 1998-2002.*

Parsons Engineering Science, Inc. *Santan Canal Reach ST-IC, Hydrology Study*, April, 2000.

Primatech Engineers and Consultants, *Draft Eastern Canal FDS*, May 1999.

Tetra Tech, Inc., *City of Mesa Master Drainage Study - Phase 1, Summary Report of Findings,* February, 1999.

Town of Gilbert, Brochure - *Wildlife Habitat Groundwater Recharge Ponds.*

U.S. Army Corps of Engineers, *HEC-1, Flood Hydrograph Package, Users Manual*, September, 1990.

U.S. Department of Transportation, Federal Highway Administration, Report No. FHWA-IP-85-15, *Hydraulic Design of Highway Culverts*, HDS-5, September 1985.

North Area, Recommended Plan

PROPERTY COSTS																					
PARCEL IDENTIFICATION NUMBER	NUMBER OF STRUCTURES PER PARCEL	STRUCTURAL FULL CASH VALUE PER PARCEL		DEMOLITION UNIT COST ($/house)	RELOCATION UNIT COST	HAZARDOUS MATERIALS UNIT COST	TITLE UNIT COST	LITIGATION UNIT COST	TOTAL REMOVAL & RELOCATION COST PER PARCEL		AVERAGE LOT SIZE (sf)	LANDSCAPE UNIT COST ($/sf)	LANDSCAPE COST PER PARCEL							Structural Value Per Parcel	Total Relocation and Removal Cost Per Parcel	Total Landscape Cost Per Parcel	Total Cost Per Parcel
136 04 003E	1	$0		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$0	$48,700	$9,000	$57,700
136 04 003F	1	$216,842		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$216,842	$48,700	$9,000	$274,542
136 04 003G	3	$74,924		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$74,924	$48,700	$9,000	$132,624
140 05 022	1	$137,293		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$137,293	$48,700	$9,000	$194,993
140 12 061	1	$161,022		$2,500	$30,000	$12,500	$700	$3,000	$48,700		8000	$1.50	$12,000							$161,022	$48,700	$12,000	$221,722
140 20 006	1	$638		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$638	$48,700	$9,000	$58,338
140 20 007F	2	$184,717		$2,500	$30,000	$12,500	$700	$3,000	$48,700		8000	$1.50	$12,000							$184,717	$48,700	$12,000	$245,417
140 21 009B	1	$54,616		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$54,616	$48,700	$9,000	$112,316
140 21 009D	1	$55,562		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$55,562	$48,700	$9,000	$113,262
140 21 009F	1	$117,361		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$117,361	$48,700	$9,000	$175,061
140 48 015	1	$62,572		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$62,572	$48,700	$9,000	$120,272
140 48 016	1	$83,873		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$83,873	$48,700	$9,000	$141,573
140 48 033	1	$144,078		$2,500	$30,000	$12,500	$700	$3,000	$48,700		8000	$1.50	$12,000							$144,078	$48,700	$12,000	$204,778
140 48 034	1	$92,806		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$92,806	$48,700	$9,000	$150,506
141 08 010N	1	$37,962		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$37,962	$48,700	$9,000	$95,662
141 08 010Q	1	$129,202		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$129,202	$48,700	$9,000	$186,902
141 08 010S	1	$120,216		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$120,216	$48,700	$9,000	$177,916
141 08 020	1	$77,859		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$77,859	$48,700	$9,000	$135,559
141 08 021	1	$89,207		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$89,207	$48,700	$9,000	$146,907
141 08 024	1	$75,541		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$75,541	$48,700	$9,000	$133,241
141 08 025	1	$80,544		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$80,544	$48,700	$9,000	$138,244
141 08 046	4	$1,346,691		$2,500	$30,000	$12,500	$700	$3,000	$48,700		8000	$1.50	$12,000							$1,346,691	$48,700	$12,000	$1,407,391
141 09 001N	1	$111,919		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$111,919	$48,700	$9,000	$169,619
141 09 001S	1	$37,856		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$37,856	$48,700	$9,000	$95,556
141 09 001T	1	$67,073		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$67,073	$48,700	$9,000	$124,773
141 09 003	1	$0		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$0	$48,700	$9,000	$57,700
141 09 004D	1	$0		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$0	$48,700	$9,000	$57,700
141 09 179A	1	$65,283		$2,500	$30,000	$12,500	$700	$3,000	$48,700		6000	$1.50	$9,000							$65,283	$48,700	$9,000	$122,983

TOTALS	**$3,625,657**	**$1,363,600**	**$264,000**	**$5,253,257**
CONTINGENCIES AT 30%				**$1,575,977**
GRAND TOTAL				**$6,829,234**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"

LEGEND

- Building
- Building in Floodplain
- Floodplain Boundry

19 Homes in Floodplain

5 Homes in Floodplain

1 Home in Floodplain

10 Homes in Floodplain

0' 600' 1200' 2400' 3600' 4800'

FEET

NORTH AREA
RECOMMENDED PLAN

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

Middle Area, Recommended Plan

Channel Cost

ID	Excavated Volume (cy)	Unit Cost ($/cy)	Excavation Cost	Concrete Volume (cy)	Unit Cost ($/cy)	Concrete Cost	No. of Utility Crossings	Unit Cost ($ per crossing)	Utilities 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
ECDC-10a	8,132	$11	$89,455	0	n/a	n/a	0	$3,000	$0	815	0	16	$0.65	$8,476	97.0	0	97.0	$2.20	$173,976	1.8	Res.	$78,289	$97,931	$29,379	**$379,575**
ECDC-10b	78,737	$11	$866,104	0	n/a	n/a	2	$3,000	$6,000	2055	0	16	$0.65	$21,372	192.7	0	192.7	$2.20	$871,261	9.1	Res.	$392,068	$893,476	$268,043	**$2,424,848**
ECDC-10c	8,612	$11	$94,728	806	$310	$249,978	0	$3,000	$0	447	0	16	$0.65	$4,649	104.1	0	104.1	$2.20	$102,370	1.1	Res.	$46,067	$349,355	$104,806	**$602,598**
ECDC-10d	28,889	$11	$317,782	0	n/a	n/a	0	$3,000	$0	754	0	16	$0.65	$7,842	192.7	0	192.7	$2.20	$319,674	3.3	Res.	$143,854	$325,624	$97,687	**$886,839**
ECDC-11a	18,403	$11	$202,431	0	n/a	n/a	4	$3,000	$12,000	438	0	16	$0.65	$4,555	178.0	0	178.0	$2.20	$171,541	1.8	Res.	$77,193	$218,987	$65,696	**$533,417**
ECDC-11b	47,520	$11	$522,717	0	n/a	n/a	1	$3,000	$3,000	1131	0	16	$0.65	$11,762	178.0	0	178.0	$2.20	$442,952	4.6	Res.	$199,328	$537,479	$161,244	**$1,341,003**
ECDC-11c	19,510	$11	$214,610	1,944	$310	$602,551	0	$3,000	$0	1040	0	0	$0.65	$0	92.6	0	92.6	$2.20	$211,910	2.2	Res.	$95,360	$817,161	$245,148	**$1,369,580**
ECDC-11d	86,754	$11	$954,291	0	n/a	n/a	0	$3,000	$0	2883	0	16	$0.65	$29,978	152.5	0	152.5	$2.20	$966,951	10.1	Res.	$435,128	$984,269	$295,281	**$2,681,629**
ECDC-12a	66,073	$11	$726,800	0	n/a	n/a	1	$3,000	$3,000	2640	0	16	$0.65	$27,456	169.8	0	169.8	$2.20	$986,092	10.3	Res.	$443,741	$757,256	$227,177	**$2,414,266**
ECDC-12b	45,258	$11	$497,833	0	n/a	n/a	2	$3,000	$6,000	2611	0	16	$0.65	$27,154	115.9	0	115.9	$2.20	$665,983	6.9	Res.	$299,692	$530,987	$159,296	**$1,655,959**
ECDC-13a	39,783	$11	$437,618	0	n/a	n/a	2	$3,000	$6,000	4035	0	16	$0.65	$41,964	87.8	0	87.8	$2.20	$779,654	8.1	Res.	$350,844	$485,582	$145,675	**$1,761,756**
ECDC-13b	12,105	$11	$133,156	0	n/a	n/a	1	$3,000	$3,000	1228	0	16	$0.65	$12,769	87.8	0	87.8	$2.20	$237,229	2.5	Res.	$106,753	$148,925	$44,677	**$537,585**
ECDC-5a	10,034	$11	$110,369	0	n/a	n/a	0	$3,000	$0	550	0	16	$0.65	$5,720	141.7	0	141.7	$2.20	$171,408	1.8	Res.	$77,134	$116,089	$34,827	**$399,458**
ECDC-5b	57,437	$11	$631,810	0	n/a	n/a	0	$3,000	$0	3037	0	16	$0.65	$31,585	143.4	0	143.4	$2.20	$957,943	10.0	Res.	$431,075	$663,395	$199,018	**$2,251,431**
ECDC-6	65,105	$11	$716,153	0	n/a	n/a	1	$3,000	$3,000	3396	0	16	$0.65	$35,318	147.6	0	147.6	$2.20	$1,102,870	11.5	Res.	$496,292	$754,472	$226,341	**$2,579,975**
ECDC-7	52,797	$11	$580,767	0	n/a	n/a	0	$3,000	$0	2754	0	16	$0.65	$28,642	147.6	0	147.6	$2.20	$894,377	9.3	Res.	$402,470	$609,409	$182,823	**$2,089,078**
ECDC-8a	50,145	$11	$551,595	0	n/a	n/a	1	$3,000	$3,000	2712	0	16	$0.65	$28,205	151.9	0	151.9	$2.20	$906,441	9.5	Res.	$407,898	$582,800	$174,840	**$2,071,978**
ECDC-8b	30,798	$11	$338,776	0	n/a	n/a	2	$3,000	$6,000	1780	0	16	$0.65	$18,512	133.1	0	133.1	$2.20	$521,209	5.4	Res.	$234,544	$363,288	$108,986	**$1,228,027**
ECDC-9a	19,567	$11	$215,234	0	n/a	n/a	0	$3,000	$0	1134	0	16	$0.65	$11,794	130.9	0	130.9	$2.20	$326,612	3.4	Res.	$146,976	$227,027	$68,108	**$768,723**
ECDC-9b	3,922	$11	$43,147	0	n/a	n/a	0	$3,000	$0	950	0	16	$0.65	$9,880	67.9	0	67.9	$2.20	$141,869	1.5	Res.	$63,841	$53,027	$15,908	**$274,646**
ECDC-9c	32,708	$11	$359,791	0	n/a	n/a	2	$3,000	$6,000	2367	0	16	$0.65	$24,617	120.8	0	120.8	$2.20	$628,962	6.6	Res.	$283,033	$390,408	$117,122	**$1,419,526**
ST-1a	5,754	$11	$63,299	0	n/a	n/a	1	$3,000	$3,000	2610	16	16	$0.65	$54,288	63.1	0	63.1	$2.20	$362,435	3.8	Res.	$163,096	$120,587	$36,176	**$682,293**
ST-1b	22,253	$11	$244,785	0	n/a	n/a	3	$3,000	$9,000	2950	16	16	$0.65	$61,360	106.3	0	106.3	$2.20	$689,567	7.2	Res.	$310,305	$315,145	$94,544	**$1,409,561**
ST-2	10,409	$11	$114,496	0	n/a	n/a	4	$3,000	$12,000	2135	16	16	$0.65	$44,408	78.1	0	78.1	$2.20	$366,678	3.8	Res.	$165,005	$170,904	$51,271	**$753,858**
ST-3a	9,410	$11	$103,505	0	n/a	n/a	0	$3,000	$0	1326	16	16	$0.65	$27,581	101.7	0	101.7	$2.20	$296,600	3.1	Res.	$133,470	$131,086	$39,326	**$600,482**
ST-3b	7,547	$11	$83,022	0	n/a	n/a	0	$3,000	$0	885	0	16	$0.65	$9,204	91.0	0	91.0	$2.20	$177,194	1.8	Res.	$79,737	$92,226	$27,668	**$376,825**
ST-4	33,525	$11	$368,779	0	n/a	n/a	1	$3,000	$3,000	5182	16	16	$0.65	$107,786	98.7	0	98.7	$2.20	$1,125,168	11.7	Res.	$506,326	$479,565	$143,869	**$2,254,929**
ST-5	34,504	$11	$379,544	0	n/a	n/a	3	$3,000	$9,000	4718	16	16	$0.65	$98,134	103.7	0	103.7	$2.20	$1,076,227	11.2	Res.	$484,302	$486,678	$146,003	**$2,193,212**
ST-6	42,801	$11	$470,813	0	n/a	n/a	0	$3,000	$0	4004	16	16	$0.65	$83,283	117.6	0	117.6	$2.20	$1,035,890	10.8	Res.	$466,150	$554,097	$166,229	**$2,222,366**
ST-7	35,500	$11	$390,502	0	n/a	n/a	2	$3,000	$6,000	3321	16	16	$0.65	$69,077	117.6	0	117.6	$2.20	$859,188	9.0	Res.	$386,635	$465,579	$139,674	**$1,851,076**
ST-8	60,286	$11	$663,143	0	n/a	n/a	0	$3,000	$0	3816	16	16	$0.65	$79,373	139.1	0	139.1	$2.20	$1,167,450	12.2	Res.	$525,353	$742,516	$222,755	**$2,658,074**
ST-9	57,629	$11	$633,917	0	n/a	n/a	8	$3,000	$24,000	4872	16	16	$0.65	$101,338	123.0	0	123.0	$2.20	$1,318,888	13.8	Res.	$593,500	$759,255	$227,776	**$2,899,419**

Culvert Cost

Location	ID	Length (ft.)	Number of Barrels	Culvert Dia./ Height	Unit	Width ft)	Barrel/ Material	Right-of-Way 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	Culvert Materials Cost	Culvert Contingencies Cost	Total Land, Construction, and Contingencies Costs
Santan/East	ST/E	300	3	4	ft.	10	RCBC		300	$1,400	$420,000	1.00	$4,300	$4,300	1.00	$4,300	$4,300	$428,600	$128,580	**$557,180**
Pecos	PS	100	3	4	ft.	10	RCBC		100	$1,400	$140,000	1.00	$4,300	$4,300	1.00	$4,300	$4,300	$148,600	$44,580	**$193,180**
Williams Field/East	WF/E	126	3	4	ft.	10	RCBC		126	$1,400	$176,400	1.00	$4,300	$4,300	1.00	$4,300	$4,300	$185,000	$55,500	**$240,500**
Val Vista/E	VV/E	245	3	4	ft.	10	RCBC		245	$1,400	$343,000	1.00	$4,300	$4,300	1.00	$4,300	$4,300	$351,600	$105,480	**$457,080**
Ray	RY/E	104	3	4	ft.	10	RCBC		104	$1,400	$145,600	1.00	$4,300	$4,300	1.00	$4,300	$4,300	$154,200	$46,260	**$200,460**
SPRR/East	SR/E	100	3	4	ft.	10	RCBC		100	$1,400	$140,000	1.00	$4,300	$4,300	1.00	$4,300	$4,300	$148,600	$44,580	**$193,180**
Warner	WR	132	5	6	ft.	10	RCBC		132	$1,900	$250,800	1.00	$5,800	$5,800	1.00	$5,800	$5,800	$262,400	$78,720	**$341,120**
Greenfield	GF	158	5	6	ft.	10	RCBC		158	$1,900	$300,200	1.00	$6,900	$6,900	1.00	$6,900	$6,900	$314,000	$94,200	**$408,200**
Elliot	ET	127	4	5	ft.	8	RCBC		127	$1,500	$190,500	1.00	$5,300	$5,300	1.00	$5,300	$5,300	$201,100	$60,330	**$261,430**
Guadalupe	GE	104	2	4	ft.	10	RCBC		104	$1,400	$145,600	1.00	$3,700	$3,700	1.00	$3,700	$3,700	$153,000	$45,900	**$198,900**
Baseline	BL	103	1	4	ft.	6	RCBC		103	$300	$30,900	1.00	$2,800	$2,800	1.00	$2,800	$2,800	$36,500	$10,950	**$47,450**
Arizona	AA	179	1	4	ft.	4	RCBC		179	$300	$53,700	1.00	$2,000	$2,000	1.00	$2,000	$2,000	$57,700	$17,310	**$75,010**
SPRR/Santan	SR/S	143	1	4	ft.	4	RCBC		143	$300	$42,900	1.00	$2,000	$2,000	1.00	$2,000	$2,000	$46,900	$14,070	**$60,970**
McQueen/Santan	MQ/S	100	2	4	ft.	8	RCBC		100	$1,050	$105,000	1.00	$3,200	$3,200	1.00	$3,200	$3,200	$111,400	$33,420	**$144,820**
Santan/Con	ST/C	300	2	4	ft.	8	RCBC		300	$1,050	$315,000	1.00	$4,700	$4,700	1.00	$4,700	$4,700	$324,400	$97,320	**$421,720**
Cooper	CR	120	2	4	ft.	8	RCBC		120	$1,050	$126,000	1.00	$4,700	$4,700	1.00	$4,700	$4,700	$135,400	$40,620	**$176,020**
Gilbert/Santan	GT/S	100	2	4	ft.	8	RCBC		100	$1,050	$105,000	1.00	$4,700	$4,700	1.00	$4,700	$4,700	$114,400	$34,320	**$148,720**
Eastern Canal/Santan	EC/S	450	1	4	ft.	6	RCBC		450	$300	$135,000	1.00	$2,000	$2,000	1.00	$2,000	$2,000	$139,000	$41,700	**$180,700**
Val Vista/Santan	VV/S	100	2	5	ft.	10	RCBC		100	$1,500	$150,000	1.00	$4,300	$4,300	1.00	$4,300	$4,300	$158,600	$47,580	**$206,180**
Ray/Santan	RY/S	400	2	5	ft.	8	RCBC		400	$1,500	$600,000	1.00	$4,300	$4,300	1.00	$4,300	$4,300	$608,600	$182,580	**$791,180**

Detention Basin Cost

I.D.	Basin Excavation Volume (cy)	Unit Cost ($/cy)	Detention Basin Excavation Cost	Length of Drain Pipe/ Box Culvert (ft.)	# Of Manholes	Manhole Unit Cost ($)	Manhole Total Cost ($)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	Headwall	Unit Cost (Ea.)	Headwall Cost	Inflow Spillway Area (ft^2)	Inflow Spillway Unit Cost ($/sf)	Inflow Spillway Cost ($/sf)	Basin Top Area (ac)	Required Land Acquisition (Ac.)	Landscape Restoration (sf)	Landscape Unit Cost ($/sf)	Landscape Cost	Total Land Acquisition Cost	Total Construction Cost	Total Landscape Cost	Total Construction, Land, and Landscape Costs
Ray Basin	**$303,617**	$6.00	$1,821,702	16476	41	$4,500	$185,355	$55	$906,180	1	$1,100	$1,100	129	$5	$644	31	39	1687950	$2.20	$3,713,490	$1,671,071	$2,914,981	$3,713,490	**$8,299,541**
Basin "K"	**$155,089**	$6.00	$930,534		0	$4,500	$0	$55	$0	1	$1,100	$1,100	2604	$5	$13,022	10	13	544500	$2.20	$1,197,900	$539,055	$944,656	$1,197,900	**$2,681,611**
Basin "L"	**$1,202,867**	$6.00	$7,217,202	7030	18	$4,500	$79,088	$55	$386,650	1	$1,100	$1,100	6260	$5	$31,299	45	56	2450250	$2.20	$5,390,550	$2,425,748	$7,715,338	$5,390,550	**$15,531,636**
Basin "O"	**$737,218**	$6.00	$4,423,308	14350	36	$4,500	$161,438	$55	$789,250	2	$1,100	$2,200	7766	$5	$38,828	24	30	1306800	$2.20	$2,874,960	$1,293,732	$5,415,023	$2,874,960	**$9,583,715**
Basin "P"	**$808,141**	$6.00	$4,848,846	7812	20	$4,500	$87,885	$55	$429,660	1	$1,100	$1,100	1260	$5	$6,300	42	53	2286900	$2.20	$5,031,180	$2,264,031	$5,373,791	$5,031,180	**$12,669,002**
Basin "Q"	**$898,540**	$6.00	$5,391,240	4170	10	$4,500	$46,913	$55	$229,350	1	$1,100	$1,100	4965	$5	$24,827	54	68	2940300	$2.20	$6,468,660	$2,910,897	$5,693,429	$6,468,660	**$15,072,986**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"

Arizona Ave.
S.P.R.R.
McQueen Road
BASIN "L"
Cooper Road
Gilbert Road
Lindsay Road
BASIN "O"
Val Vista Road
Greenfield Road
Higley Road
Germann Road
Pecos Road
Williams Field Road
Ray Road
Proposed Santan Freeway
Warner Road
Elliot Road
Baseline Road
US 60
Eastern Canal
RAY BASIN
BASIN "P"
BASIN "Q"
RIGGS
Guadalupe Road

AA
SR/S
ST-1a
BASIN "K"
ST-1b
MQ/S
ST-2
ST-3
CR
ST-4
GT/S
ST-5
EC/S
ECDC-5a
ECDC-5b
ST/E
PS
ECDC-6
ECDC-7
WF/E
ECDC-8a
ECDC-8b
VV/E
ECDC-9a
ECDC-9b
RY/E
SR/E
ECDC-9c
ECDC-10a
ECDC-10b
ECDC-10c
ECDC-10d
WR
GF
RY/S
ECDC-11a
ECDC-11b
ECDC-11c
ECDC-11d
ET
ECDC-12a
ECDC-12b
GE
ECDC-13a
ECDC-13b
BL
ST-6
VV/S
ST-7
ST-8
ST-9

LEGEND

ST-4	NEW CHANNEL REACH
	NEW CULVERT
GT/S	CULVERT DESIGNATION

N

0' 1000' 2000' 4000' 6000' 8000'
feet

PROJECT DESCRIPTION:
MIDDLE AREA RECOMMENDED PLAN

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

South Area, Recommended Plan

Channel Cost

ID	Excavated Volume (cy)	Unit Cost ($/cy)	Excavation Cost	Concrete Volume (cy)	Unit Cost ($/cy)	Concrete Cost	No. of Utility Crossings	Unit Cost ($ per crossing)	Utilities 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
CCDC-1	87755	$11	$965,302	0	n/a	n/a	4	$3,000	$12,000	3035	0	16	$0.65	$31,564	177.1	0	177	$2.20	1,182,667	12.3	Res.	$532,200	1,008,866	$302,660	**$3,026,393**
CCDC-2	171057	$11	$1,881,624	0	n/a	n/a	0	$3,000	$0	5916	0	16	$0.65	$61,526	177.1	0	177	$2.20	2,305,324	24.1	Res.	$1,037,396	1,943,150	$582,945	**$5,868,815**
CCDC-3	126002	$11	$1,386,024	0	n/a	n/a	1	$3,000	$3,000	5588	0	16	$0.65	$58,115	152.8	0	153	$2.20	1,878,162	19.6	Res.	$845,173	1,447,139	$434,142	**$4,604,616**
CCDC-4a	18774	$11	$206,515	3176	$310	$984,450	3	$3,000	$9,000	4118	0	16	$0.65	$42,827	48.9	0	49	$2.20	443,337	4.6	Res.	$199,501	1,242,792	$372,838	**$2,258,468**
CCDC-4b	12188	$11	$134,072	0	n/a	n/a	2	$3,000	$6,000	1319	0	0	$0.65	$0	78.0	0	78	$2.20	226,413	2.4	Res.	$101,886	140,072	$42,021	**$510,392**
CCDC-5a	12510	$11	$137,608	1570	$310	$486,815	2	$3,000	$6,000	1200	0	0	$0.65	$0	62.1	0	62	$2.20	163,845	1.7	Res.	$73,730	630,423	$189,127	**$1,057,125**
CCDC-5b	47486	$11	$522,341	0	n/a	n/a	0	$3,000	$0	1751	0	0	$0.65	$0	166.1	0	166	$2.20	639,664	6.7	Res.	$287,849	522,341	$156,702	**$1,606,556**
CCDC-5c	14683	$11	$161,514	2213	$310	$686,062	3	$3,000	$9,000	2832	0	0	$0.65	$0	25.0	0	25	$2.20	155,760	1.6	Res.	$70,092	856,576	$256,973	**$1,339,401**
CCDCL-1	24301	$11	$267,306	0	n/a	n/a	0	$3,000	$0	2833	0	16	$0.65	$29,463	91.2	0	91	$2.20	568,550	5.9	Res.	$255,847	296,769	$89,031	**$1,210,197**
CCDCL-2	18408	$11	$202,492	0	n/a	n/a	0	$3,000	$0	2350	0	16	$0.65	$24,440	90.0	0	90	$2.20	465,300	4.9	Res.	$209,385	226,932	$68,080	**$969,696**
CCDCO-1a	66406	$11	$730,468	0	n/a	n/a	0	$3,000	$0	2215	0	16	$0.65	$23,036	184.7	0	185	$2.20	899,934	9.4	Res.	$404,971	753,504	$226,051	**$2,284,460**
CCDCO-1b	83495	$11	$918,443	0	n/a	n/a	0	$3,000	$0	2785	0	16	$0.65	$28,964	184.7	0	185	$2.20	1,131,520	11.8	Res.	$509,184	947,407	$284,222	**$2,872,334**
CCDCO-2a	69286	$11	$762,148	0	n/a	n/a	0	$3,000	$0	2395	0	16	$0.65	$24,908	182.6	0	183	$2.20	962,369	10.0	Res.	$433,066	787,056	$236,117	**$2,418,607**
CCDCO-2b	95612	$11	$1,051,732	0	n/a	n/a	0	$3,000	$0	3305	0	16	$0.65	$34,372	182.6	0	183	$2.20	1,328,028	13.9	Res.	$597,613	1,086,104	$325,831	**$3,337,576**
CCDCO-3a	54214	$11	$596,353	0	n/a	n/a	0	$3,000	$0	1874	0	16	$0.65	$19,490	182.6	0	183	$2.20	753,018	7.9	Res.	$338,858	615,842	$184,753	**$1,892,471**
CCDCO-3b	94773	$11	$1,042,503	0	n/a	n/a	0	$3,000	$0	3276	0	16	$0.65	$34,070	182.6	0	183	$2.20	1,316,375	13.7	Res.	$592,369	1,076,574	$322,972	**$3,308,290**
ECDC-1a	13856	$11	$152,415	0	n/a	n/a	0	$3,000	$0	2845	0	16	$0.65	$29,588	72.3	0	72	$2.20	452,651	4.7	Res.	$203,693	182,003	$54,601	**$892,948**
ECDC-1b	54432	$11	$598,750	0	n/a	n/a	0	$3,000	$0	3050	0	16	$0.65	$31,720	130.7	0	131	$2.20	877,244	9.2	Res.	$394,760	630,470	$189,141	**$2,091,615**
ECDC-2a	28176	$11	$309,940	0	n/a	n/a	2	$3,000	$6,000	1705	0	16	$0.65	$17,732	130.9	0	131	$2.20	491,115	5.1	Res.	$221,002	333,672	$100,102	**$1,145,890**
ECDC-2b	7684	$11	$84,521	0	n/a	n/a	0	$3,000	$0	350	0	16	$0.65	$3,640	141.8	0	142	$2.20	109,187	1.1	Res.	$49,134	88,161	$26,448	**$272,930**
ECDC-2c	72451	$11	$796,958	0	n/a	n/a	0	$3,000	$0	3267	0	16	$0.65	$33,977	152.4	0	152	$2.20	1,095,108	11.4	Res.	$492,798	830,935	$249,280	**$2,668,121**
ECDC-3	148554	$11	$1,634,094	0	n/a	n/a	3	$3,000	$9,000	5780	0	16	$0.65	$60,112	173.3	0	173	$2.20	2,204,136	23.0	Res.	$991,861	1,703,206	$510,962	**$5,410,164**
ECDC-4a	54293	$11	$597,228	0	n/a	n/a	0	$3,000	$0	2741	0	16	$0.65	$28,506	144.2	0	144	$2.20	869,561	9.1	Res.	$391,303	625,734	$187,720	**$2,074,318**
ECDC-4b	39010	$11	$429,111	0	n/a	n/a	0	$3,000	$0	3131	0	16	$0.65	$32,562	109.3	0	109	$2.20	752,649	7.9	Res.	$338,692	461,673	$138,502	**$1,691,517**
ECDCO-1	70689	$11	$777,575	0	n/a	n/a	0	$3,000	$0	2668	0	16	$0.65	$27,747	200.6	0	201	$2.20	1,177,308	12.3	Res.	$529,789	805,322	$241,597	**$2,754,015**
ECDCO-2	137085	$11	$1,507,936	0	n/a	n/a	0	$3,000	$0	5174	0	16	$0.65	$53,810	200.6	0	201	$2.20	2,283,130	23.8	Res.	$1,027,409	1,561,745	$468,524	**$5,340,808**
ECDCO-3	136390	$11	$1,500,286	0	n/a	n/a	0	$3,000	$0	5200	0	16	$0.65	$54,080	200.1	0	200	$2.20	2,289,251	23.9	Res.	$1,030,163	1,554,366	$466,310	**$5,340,089**
ECDCO-4	136652	$11	$1,503,171	0	n/a	n/a	1	$3,000	$3,000	5210	0	16	$0.65	$54,184	200.1	0	200	$2.20	2,293,653	23.9	Res.	$1,032,144	1,560,355	$468,106	**$5,354,258**
QCLAT	37190	$11	$409,094	0	n/a	n/a	0	$3,000	$0	2833	0	16	$0.65	$29,463	113.0	0	113	$2.20	704,209	7.3	Res.	$316,894	438,558	$131,567	**$1,591,227**

Culvert Cost

Location	ID	Length (ft.)	Number of Barrels	Culvert Dia./ Height	Unit	Width ft)	Barrel/ Material	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	Culvert Materials Cost	Culvert Contingencies Cost	Total Land, Construction, and Contingencies Costs
Access 1/587	A1/587	100	4	4	ft.	12	RCBC	100	$1,500	$150,000	1	$7,800	$7,800	1	$7,800	$7,800	165600.0	$49,680	**$215,280**
Access 2/587	A2/587	100	4	4	ft.	12	RCBC	100	$1,500	$150,000	1	$7,800	$7,800	1	$7,800	$7,800	165600.0	$49,680	**$215,280**
Hunt/Con	HH/C	100	4	4	ft.	12	RCBC	100	$1,500	$150,000	1	$7,000	$7,000	1	$7,000	$7,000	164000.0	$49,200	**$213,200**
SPRR/Con	SR/C	100	4	4	ft.	12	RCBC	100	$1,500	$150,000	1	$7,000	$7,000	1	$7,000	$7,000	164000.0	$49,200	**$213,200**
Riggs/Con	RS/C	125	4	5	ft.	12	RCBC	125	$1,900	$237,500	1	$7,100	$7,100	1	$7,100	$7,100	251700.0	$75,510	**$327,210**
Chandler Heights/Con	CH/C	286	3	5	ft.	10	RCBC	286	$1,900	$543,400	1	$6,300	$6,300	1	$6,300	$6,300	556000.0	$166,800	**$722,800**
Ocotillo/Con	OO/C	100	2	4	ft.	8	RCBC	100	$1,050	$105,000	1	$3,900	$3,900	1	$3,900	$3,900	112800.0	$33,840	**$146,640**
McQueen/Con	MQ/C	363	2	5	ft.	8	RCBC	363	$1,500	$544,500	1	$4,300	$4,300	1	$4,300	$4,300	553100.0	$165,930	**$719,030**
Queen Creek/Con	QC/C	100	2	4	ft.	8	RCBC	100	$1,050	$105,000	1	$3,400	$3,400	1	$3,400	$3,400	111800.0	$33,540	**$145,340**
Queen Creek Basin Inlet	QC-I	100	3	4	ft.	12	RCBC	100	$1,500	$150,000	1	$7,000	$7,000	1	$7,000	$7,000	164000.0	$49,200	**$213,200**
Access 1/Gilbert	A1/G	100	5	4	ft.	12	RCBC	100	$1,500	$150,000	1	$7,800	$7,800	1	$7,800	$7,800	165600.0	$49,680	**$215,280**
Access 2/Gilbert	A2/G	100	5	4	ft.	12	RCBC	100	$1,500	$150,000	1	$7,000	$7,000	1	$7,000	$7,000	164000.0	$49,200	**$213,200**
Hunt/Gilbert	HH/G	100	5	4	ft.	12	RCBC	100	$1,500	$150,000	1	$7,000	$7,000	1	$7,000	$7,000	164000.0	$49,200	**$213,200**
Riggs/Gilbert	RS/G	340	1	4	ft.	4	RCBC	340	$300	$102,000	1	$2,000	$2,000	1	$2,000	$2,000	106000.0	$31,800	**$137,800**
Chandler Heights/East	CH/E	100	3	4	ft.	10	RCBC	100	$1,400	$140,000	1	$4,300	$4,300	1	$4,300	$4,300	148600.0	$44,580	**$193,180**
Gilbert/East	GT/E	100	3	5	ft.	12	RCBC	100	$1,900	$190,000	1	$6,800	$6,800	1	$6,800	$6,800	203600.0	$61,080	**$264,680**
Ocotillo/East	OO/E	100	4	4	ft.	12	RCBC	100	$1,500	$150,000	1	$7,000	$7,000	1	$7,000	$7,000	164000.0	$49,200	**$213,200**
Queen Creek/East	QC/E	100	3	4	ft.	10	RCBC	100	$1,400	$140,000	1	$4,300	$4,300	1	$4,300	$4,300	148600.0	$44,580	**$193,180**
Germann/East	GM/E	110	2	4	ft.	8	RCBC	110	$1,050	$115,500	1	$3,900	$3,900	1	$3,900	$3,900	123300.0	$36,990	**$160,290**

Detention Basin Cost

I.D.	Basin Excavation Volume (cy)	Unit Cost ($/cy)	Detention Basin Excavation Cost	Length of Drain Pipe/ Box Culvert (ft.)	# Of Manholes	Manhole Unit Cost ($)	Manhole Total Cost ($)	Unit Cost ($/ft.)	Pipe/Box Culvert Cost	Headwall	Unit Cost (Ea.)	Headwall Cost	Inflow Spillway Area (ft^2)	Inflow Spillway Unit Cost ($/sf)	Inflow Spillway Cost ($/sf)	Basin Top Area (ac)	Required Land Acquisition (Ac.)	Landscape Restoration (sf)	Landscape Unit Cost ($/sf)	Landscape Cost	Total Land Acquisition Cost	Total Construction Cost	Total Landscape Cost	Total Construction, Land, and Landscape Costs
Queen Creek Basin	128,812	$6	$772,872	300	0	$4,500	$0	$55	$16,500	1	$1,100	$1,100	1644.06	$5	$8,220	63	78.8	3430350	$2.20	$7,546,770	$3,396,046.50	$798,692	$7,546,770	**$11,741,509**
Riggs Basin	0	$6	$0	0	0	$4,500	$0	$55	$0	0	$1,100	$0	1668.42	$5	$8,342	29	36.3	599323	$2.20	$1,318,511	$1,563,259.50	$8,342	$1,318,511	**$2,890,112**
Chandler Heights Basin	0	$6	$0	0	0	$4,500	$0	$55	$0	0	$1,100	$0	0	$5	$8,000	9	11.3	180580	$2.20	$397,276	$485,149.50	$8,000	$397,276	**$890,426**
Riggs WQ Basin	33,719	$6	$202,314	140	0	$4,500	$0	$55	$7,700	0	$1,100	$0	5000	$5	$25,000	2.9	3.6	157905	$2.20	$347,391	$156,325.95	$236,589	$347,391	**$740,306**
SPRR WQ Basin	42,915	$6	$257,490	0	0	$4,500	$0	$55	$0	0	$1,100	$0	2600	$5	$13,000	3.2	4.0	174240	$2.20	$383,328	$172,497.60	$270,490	$383,328	**$826,316**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"

Arizona Ave.

S.P.R.R.

East Maricopa Floodway

A1/587 A2/587 HH/C SR/C RS/C CH/C OO/C MQ/C QC/C QC/I GM/C

CCDCO-1a CCDCO-1b CCDCO-2a CCDCO-2b CCDCO-3a CCDCO-3b

S.P.R.R. BASIN

CCDC-1 CCDC-2 CCDC-3 CCDC-4a CCDC-4b CCDC-5a CCDC-5b CCDC-5c

Consolidated Canal

QUEEN CREEK BASIN

CCDCL-1

McQueen Road

Cooper Road

A1/G A2/G HH/G RS/G CH/E GT/E OO/E QC/E GM/E

ECDCO-1 ECDCO-2 ECDCO-3 ECDCO-4

ECDC-1a ECDC-1b ECDC-2a ECDC-2b ECDC-2c ECDC-3 ECDC-4a ECDC-4b

CHANDLER HEIGHTS BASIN

RIGGS BASIN

Eastern Canal

Gilbert Road

Lindsay Road

Val Vista Road

Greenfield Road

Higley Road

Hunt Highway

Riggs Road

Chandler Heights

Ocotillo Road

Queen Creek Road

Germann Road

LEGEND

- ST-4 NEW CHANNEL REACH
- NEW CULVERT
- GT/S CULVERT DESIGNATION

N

0' 1000' 2000' 4000' 6000' 8000'

feet

PROJECT DESCRIPTION:

SOUTH AREA RECOMMENDED PLAN

CONSULTANT:

DIBBLE & ASSOCIATES CONSULTING ENGINEERS

Since 1962

APPENDIX

HEC-1 Schematic - North of Superstition Freeway
City of Chandler Letter
City of Mesa Letter

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

HIGLEY AREA
AREA DRAINAGE MASTER PLAN
"FCD CONTRACT # 98-13"

Superstition Freeway

Southern Ave.

Broadway Rd.

Eastern Canal

University Dr.

Brown Rd.

Lindsay Rd.

Val Vista Dr.

Mc. Dowell Rd.

Mc. Kellips Rd

RWCD Main Canal/Eastern Maricopa Floodway

ADOT Channel

N

0' 600' 1200' 2400' 3600' 4800'
feet

PROJECT DESCRIPTION:
NORTH AREA DRAINAGE SUBAREA BOUNDARIES

CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

Chandler • Arizona
Where Values Make The Difference

September 28, 2000

Mr. Tim Phillips
Maricopa County Flood Control District
2801 West Durango Street
Phoenix AZ 85009-6399

Re: Higley Area Drainage Plan

Dear Mr. Phillips:

We appreciate the opportunity to comment on the Higley Area Drainage Master Plans, FCD# 98-13, Recommended Design Report Initial Submittal. We are concerned that this plan will greatly affect our rapidly developing southeastern section of the City and we feel we need time to comment so that the selected plan can be implemented as smoothly as possible. The report characterizes southeast Chandler as agricultural with pockets of development. This is no longer true. Much of this area is platted and we have seen land costs in the area more than double in the last two years. In general, we would like to encourage MCFCD to consider "green solutions". Much of the proposed drainage plan includes landscaped, earthen channels and basins. This is commendable. However, some of the narrower channels appear to be concrete. The City would like to see these as usable green space for our community and we would like to have MCFCD work with us on the larger basins so that these might serve the City as parks, golf courses, or other similar amenities.

After initial review of the proposed drainage plan, it appears that many of the City of Chandler's utilities and facilities are either not shown or are shown incorrectly. Attached are copies of the following information so that this plan can be corrected:

- Copies of the City's water, wastewater, and reclaimed water master plan maps, from the plans approved by Council on December 16, 1999.

- A site plan for the City's existing, operational landfill. The City's landfill is shown on Plan Sheet No. 7 of 43 of the proposed drainage plan. It appears that the proposed drainage Plan calls for excavation of drainage channels along the Canal in this area. We are concerned that excavation adjacent to the landfill and/or the gas wells and monitoring system could create environmental issues. The landfill in this area extends as much as 50 feet vertically above the Canal. Additionally, there is another older landfill located between Ryan and Germann immediately adjacent to the east side of the Consolidated Canal, which is not shown in the Plan, but which can create similar environmental issues. This old landfill borders the north edge of the City's Airport Water Production Facility, which provides 2 million gallons of storage for the City's potable water system. As proposed in the drainage plan, a future channel would completely remove this facility. We are concerned that this will negatively impact the City's water system. The water production facility is shown on Plan Sheet No. 8 of 43 of the proposed drainage plan.

- At closure, the City's operational landfill is programmed to become a park. A proposed plan of this is attached.

- A site plan for the City's existing Airport Water Reclamation Facility and Solid Waste Transfer Facility.

- A site plan for the City's RO Injection Facilities and Brine Ponds which serve Intel. This facility is located immediately adjacent to the Eastern Canal north of Brooks Farm Road and is not shown in the proposed drainage plan. This site is home to large brine ponds for Intel's industrial flows and injection wells to inject the highly treated process water from Intel into the groundwater. Any excavation adjacent to these ponds or wells are of an environmental concern as well as any excavation in this area could impact Intel's manufacturing operations.

- A map showing the property the City has purchased for a recharge and wetlands site. This site is to be developed in the next two years.

- An aerial photo showing the planned Paseo Project location, along with a copy of an e-mail describing the current status of these projects. In addition to the Canal portion of the Paseo Project, MCFCD should be aware that area developers are dedicating and landscaping narrow (10 to 20 feet wide) tracts of land and 5 acre pocket parks between the Canal and their developments so that their residential neighborhoods are "part" of the Paseo system. If the currently proposed drainage plan is followed, much of the "green" concepts being implemented by developers would be replaced and widened with drainage channels. This could be controversial with these neighborhoods.

- A plan of the City's Airport showing the proposed future relocation of Germann Road and the City's proposed acquisition of additional land for a runway protection zone. This zone will also be home to the City Police Department's new driving track in the next three years. Additionally, it appears that some of the proposed plans' drainage basins, which are to be located within a two-mile radius of the Airport, may retain water for as long as 18 days. FAA has restrictions on standing water in Airport zones. What will be implemented to address FAA's bird mitigation requirements?

- A map showing the subdivisions which are currently in progress in southeast Chandler. We are most concerned with the proposed drainage plan because this section of Chandler is developing extremely rapidly. Our initial review of the proposed plan indicates that large tracts of land will be required basins and large strips of land will be required adjacent to the Consolidated and Eastern Canals. We are concerned that land for the proposed drainage improvements will either be unavailable or very costly, and that the proposed drainage plan would severely affect neighborhoods and projects such as the Paseo.

In addition to the information contained in this letter, the City's initial comments will be provided in today's review meeting. However, as we discussed in our meeting with you on June 29, 2000, City staff cannot commit the City to this Plan, only the City Council has the authority to commit the City to this type of Plan. During our previous meeting, you agreed that Maricopa County Flood Control District staff would join City staff in presenting this plan to Council. We are currently scheduling this presentation with the Public Works Subcommittee. The Plan then has to go to Council for approval. Given the short review time MCFCD has set, this cannot be completed in the current timeframe. Additionally, Bryan Patterson contacted Brian Fry of Dibble & Associates last week and indicated that, before we go to our Council, City staff have a number of concerns and comments which must be considered by MCFCD. The information I have enclosed today and which will be presented at today's meeting should assist MCFCD and Dibble in starting to modify the proposed drainage plan. However, given the short review time, City staff have not had an opportunity to complete their reviews. The City's final comments will not be forth coming until the proposed drainage plan has been presented to Council.

If you have further questions or would like to speak with me, I can be reached at 480-782-3300.

Sincerely,

Elizabeth M. Huning, DEE, PE
Assistant Public Works Director/City Engineer

xc: Donna Dreska
George Selvia
Doug Ballard
Rich Dlugas
Bryan Patterson
Patrice Kraus
Dan Cook
Karen Barfoot
Dave Siegel
Tom Little
Bob Darr
Greg Chenoweth
Gerry Backus

dress:
405
08
Arizona 85244-4008

Public Works Department
Development
Telephone (480) 782-3300
Fax (480) 782-3415

215 East Buff
Chandler, Arizo

CITY OF MESA
Great People, Quality Service!

Engineering

September 28, 2000

Mr. Tim Phillips, P.E.
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009-6399

Re: Higley Area Drainage Area Master Plan

Dear Mr. Phillips,

The City of Mesa has reviewed the report dated September 2000 and does not support the recommended plan for the North Study Area. The plan recommends purchasing 35 homes/businesses within the floodplain along the Eastern Canal. The Master Plan does not identify history of flood damage to the 35 buildings in the floodplain, and therefore the City cannot support displacing the citizens for no identified benefit.

The City of Mesa recommends a Do Nothing Alternative for the North Study Area and requests modifying the final report to incorporate the City's position.

We look forward to keeping the project moving. Please contact me if you have any questions or require additional information, (480) 644-2514.

Sincerely,

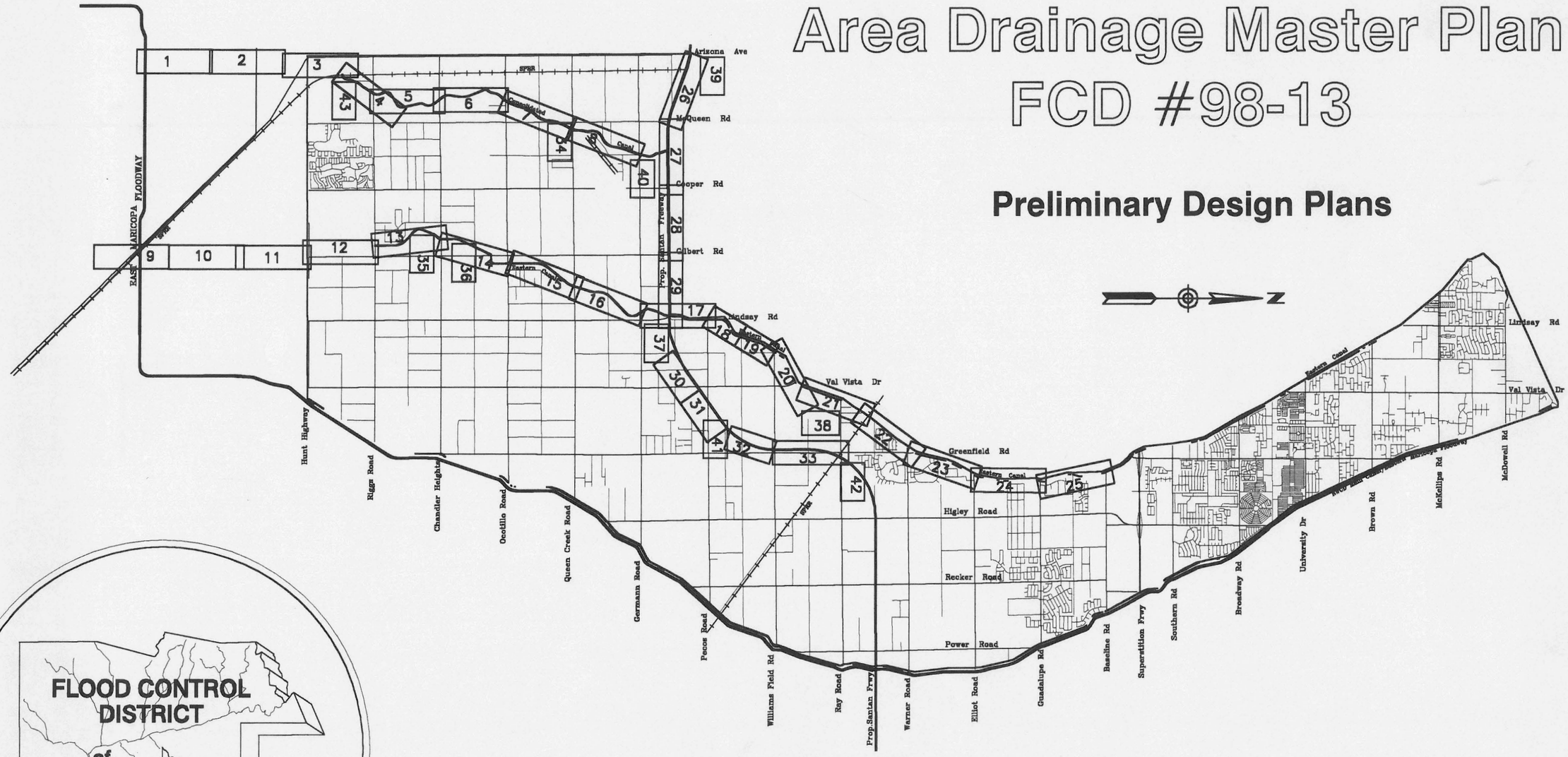
Peter Knudson, P.E.
Assistant City Engineer

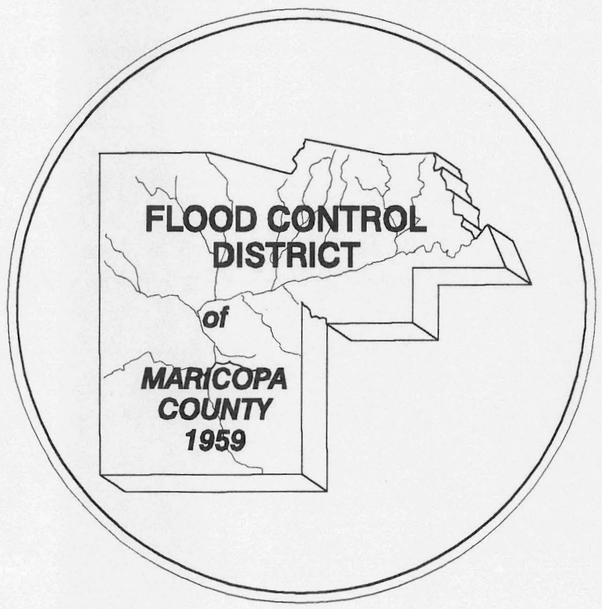
cc: Keith Nath
Anna Leyva-Easton
Brian Fry, Dibble and Associates

20 East Main Street Suite 500
P.O. Box 1466
Mesa Arizona 85211-1466
480.644.2251 Tel
480.644.3392 Fax

Higley
Area Drainage Master Plan
FCD #98-13

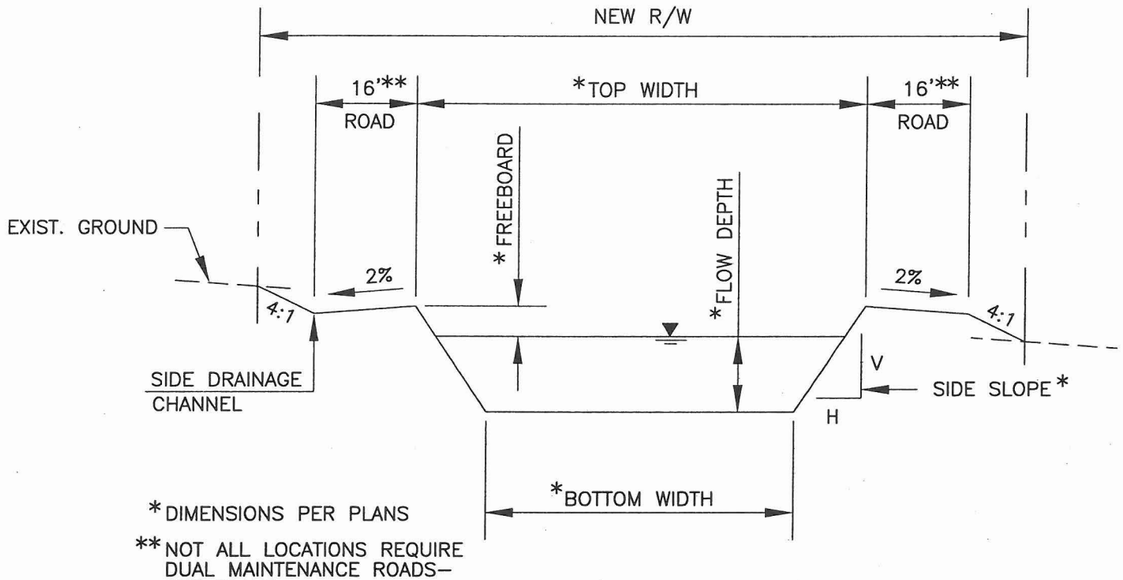
Preliminary Design Plans





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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98–13	HIGLEY AREA DRAINAGE MASTER PLAN	
	PROJECT DESCRIPTION: COVER SHEET		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS	DRN. JEV DATE: 08.16.00	SCALE: HORIZONTAL / VERTICAL	SHEETS: NO. ____ OF 44
	DES. DCF DATE: 08.04.00		
	CKD. BJF DATE: 08.20.00		



TYPICAL CHANNEL SECTION
N.T.S.

LEGEND

- XX–1 — CHANNEL REACH
- NEW CHANNEL FLOWLINE
- NEW CHANNEL
- NEW DETENTION BASIN SLOPE
- NEW DRAIN PIPE
- NEW CULVERT
- PROPERTY LINE
- RIGHT–OF–WAY LINE
- (8) — PARCAL 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

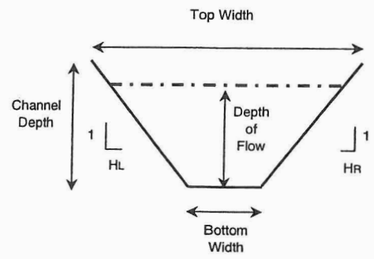
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98–13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION	TYPICAL SECTION/LEGEND
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00 DES. DCF DATE: 08.04.00 CKD. BJF DATE: 08.20.00	SCALE: HORIZONTAL / VERTICAL
		SHEETS: NO. 00 OF 44

Higley Area Drainage Master Plan
Consolidated Canal Diversion Channel Outfall

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)
CCDCO-1a	HCB1	1304	1304	1208.4	1209.1	2215	0.0003	0.0003	-0.7	0	0.0	m	0.0300	95.0	4.9	6	6	609.2	154.6	0.19	Sub	2.1	1.2	6.1	168.7
CCDCO-1b	HCB1	1304	1304	1209.1	1209.9	2785	0.0003	0.0003	-4.3	0	0.0	m	0.0300	95.0	4.9	6	6	609.2	154.6	0.19	Sub	2.1	1.2	6.1	168.7

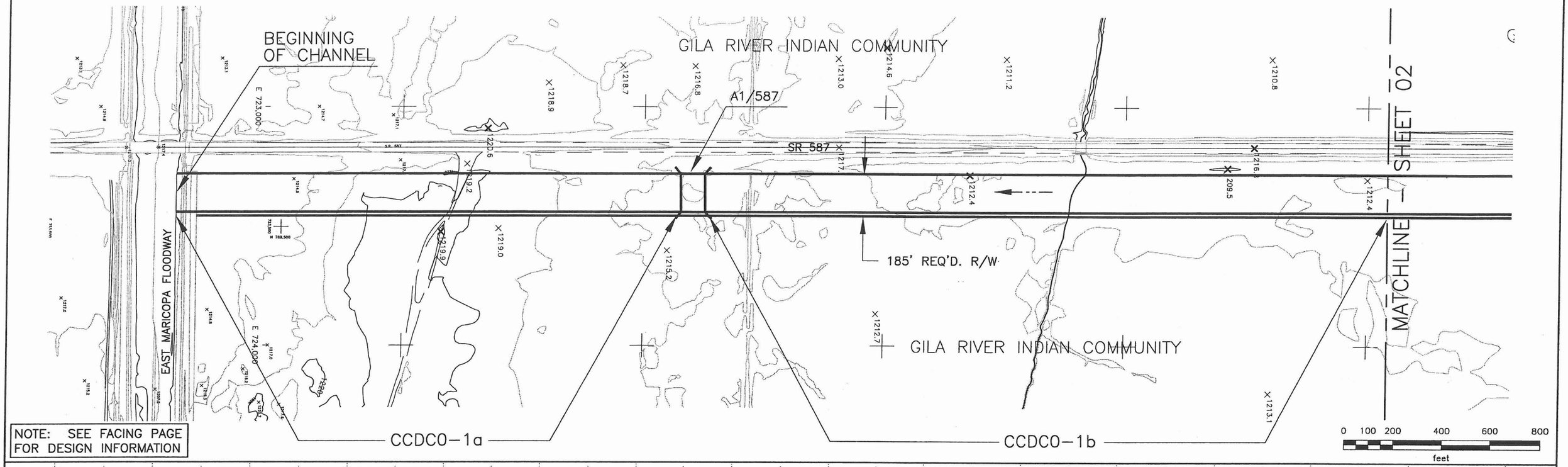
Channel Material Type: C = Concrete, R = Riprap, G = Grass, E = Natural or Earth, LE = Landscaped Earth

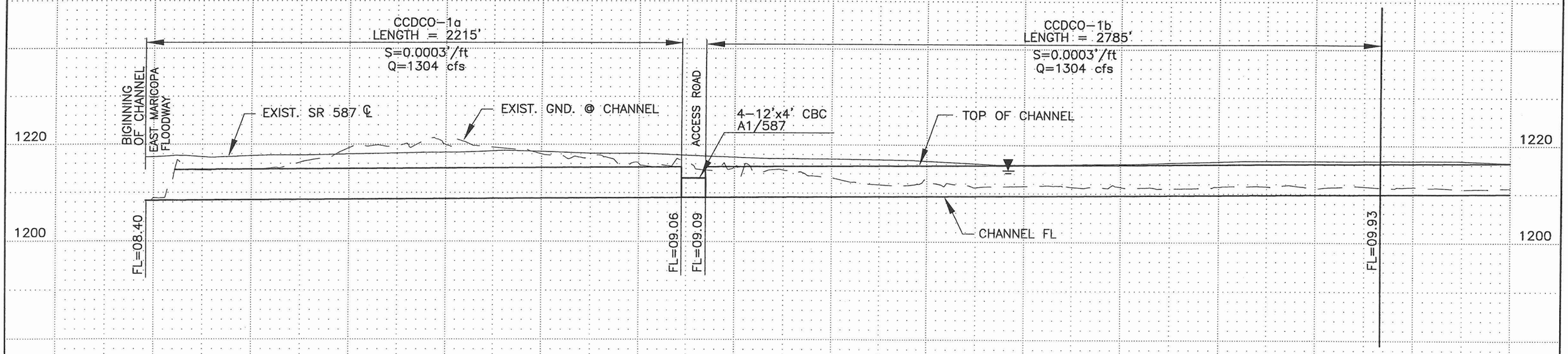


Typical Channel Section

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
A1/587	HCB1	1304	1304	100	1209.1	1209.1	0.0003	C	0.012	4	4	ft.	12	RCBC	Wingwall	4.76	5.91	1.48	TW





CONSOLIDATED CANAL DIVERSION CHANNEL OUTFALL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

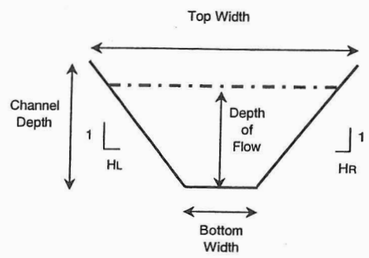
COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
PROJECT DESCRIPTION: CONSOLIDATED CANAL DIVERSION CHANNEL OUTFALL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS (Since 1962)	DRN. JEV DATE: 08.16.00
	DES. DCF DATE: 08.04.00
	CKD. BJF DATE: 08.20.00
SCALE	1"=400' HORIZONTAL / 1"=20' VERTICAL
SHEETS	NO. 01 OF 44

Higley Area Drainage Master Plan
Consolidated Canal Diversion Channel Outfall

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)
CCDCO-2a	CP17	1240	1240	1209.9	1210.6	2395	0.0003	0.0003	-1.1	0	0.0	m	0.0300	95.0	4.8	6	6	588.6	152.9	0.19	Sub	2.1	1.2	6.0	166.6
CCDCO-2b	CP17	1240	1240	1210.7	1211.7	3305	0.0003	0.0003	0.3	0	0.0	m	0.0300	95.0	4.8	6	6	588.6	152.9	0.19	Sub	2.1	1.2	6.0	166.6

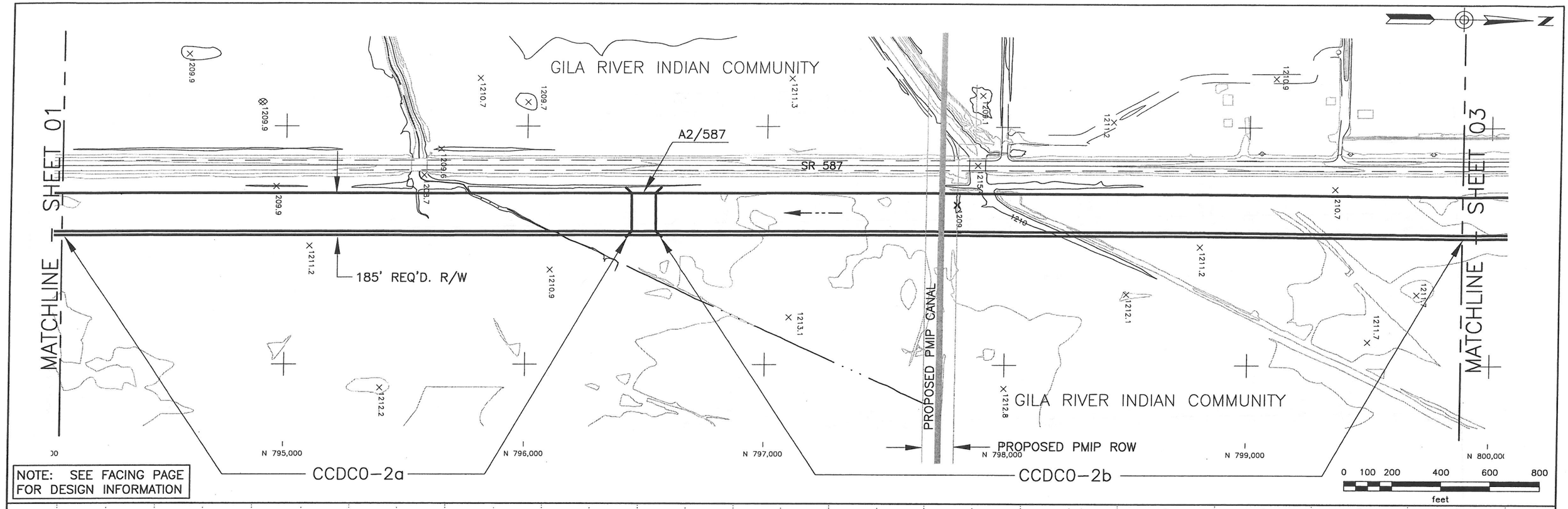
Channel Material Type: C = Concrete, R = Riprap, G = Grass, E = Natural or Earth, LE = Landscaped Earth



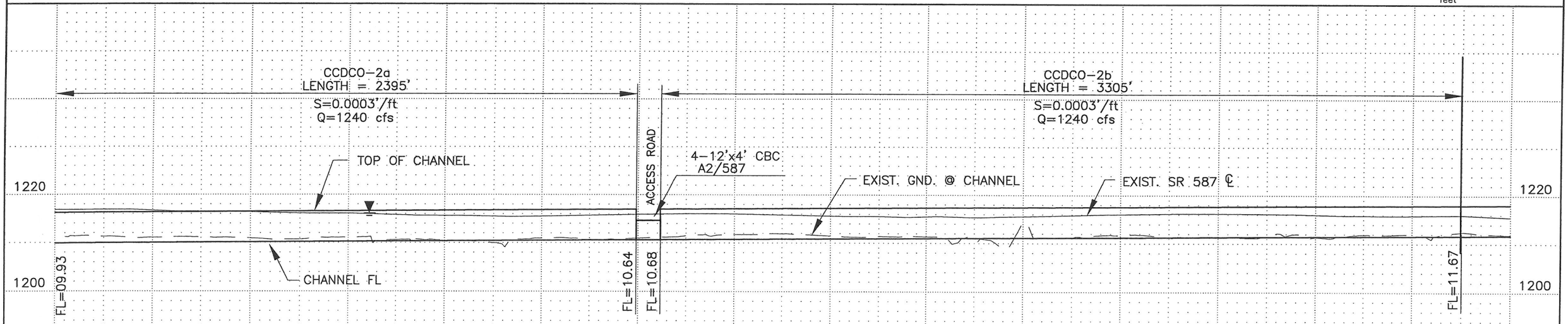
Typical Channel Section

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
A2/587	CP17	1240	1240	100	1210.7	1210.6	0.0004	C	0.012	4	4	ft.	12	RCBC	Wingwall	4.76	5.79	1.45	TW



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



CONSOLIDATED CANAL DIVERSION CHANNEL OUTFALL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION: CONSOLIDATED CANAL DIVERSION CHANNEL OUTFALL

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

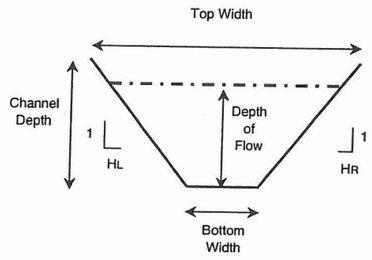
SHEETS NO. 02 OF 44

Higley Area Drainage Master Plan
Consolidated Canal Diversion Channel Outfall

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)
CCDCO-3a	CP17	1240	1240	1211.7	1212.2	1874	0.0003	0.0003	4.1	0	0.0	E	0.0300	95.0	4.8	6	6	588.6	152.9	0.19	Sub	2.1	1.2	6.0	166.6
CCDCO-3b	CP17	1240	1240	1212.3	1213.2	3276	0.0003	0.0003	0.7	0	0.0	E	0.0300	95.0	4.8	6	6	588.6	152.9	0.19	Sub	2.1	1.2	6.0	166.6

Channel Material Type: C = Concrete, R = Riprap, G = 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
HH/C	CP17	1240	1240	100	1212.3	1212.2	0.0003	C	0.012	4	4	ft.	12	RCBC	Wingwall	4.76	5.80	1.45	TW

BOOK 303
MAP 58

GILA RIVER INDIAN COMMUNITY

N 800,000

E 723,000

HH/C

ARIZONA AVE. (SR 87)

CONSOLIDATED

ABANDONED FEEDLOT

183' REQ'D. R/W

SHEET 02

SHEET 04

SR 587

SR 87

HUNT HIGHWAY

S.P.R.R.

MATCHLINE

MATCHLINE

GILA RIVER INDIAN COMMUNITY

SANTAN VISTA BK. 517, PG. 34 SHEET 2

RUINS

DEB.

DEB.

REACH CCDCL-2
SEE SHEET 44

CCDCO-3a

CCDCO-3b

0 100 200 400 600 800
feet

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

CCDCO-3a
LENGTH = 1874'
S=0.0003'/ft
Q=1240 cfs

CCDCO-3b
LENGTH = 3276'
S=0.0003'/ft
Q=1240 cfs

4-12'x4' CBC
HH/C

EXIST. SR 587 ℄

EXIST. GND. @ CHANNEL

HUNT HWY

TOP OF CHANNEL

S.P.R.R.

CHANNEL FL

1220

1200

FL=11.67

FL=12.23

FL=12.26

FL=13.24

CONSOLIDATED CANAL DIVERSION CHANNEL OUTFALL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

CONSOLIDATED CANAL
DIVERSION CHANNEL OUTFALL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

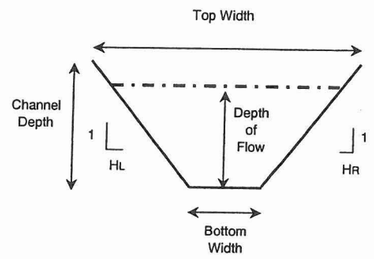
SHEETS
NO. 03 OF 44

Higley Area Drainage Master Plan
Consolidated Canal Diversion 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)
CCDC-1	CP7	1219	1219	1213.3	1214.8	3035	0.0005	0.0005	0.7	0	0.0	LE	0.0400	85.0	5.1	6	6	583.9	146.6	0.18	Sub	2.1	1.3	6.3	161.1

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

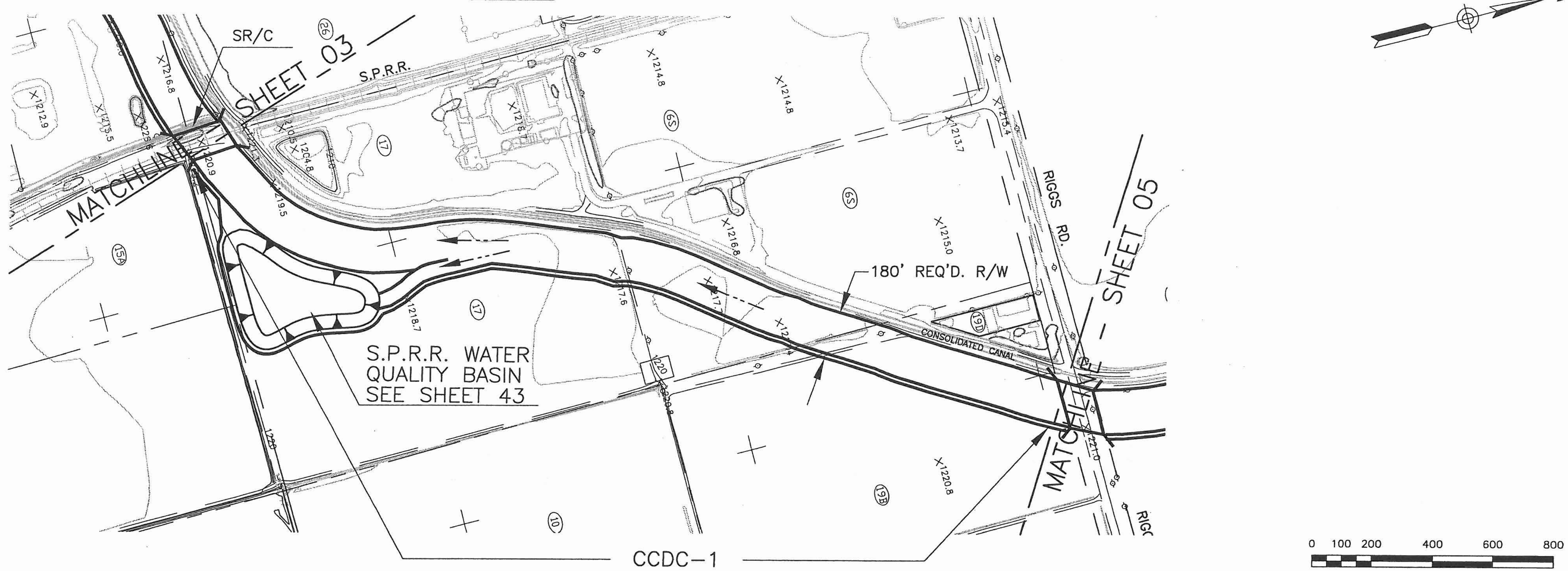


Typical Channel Section

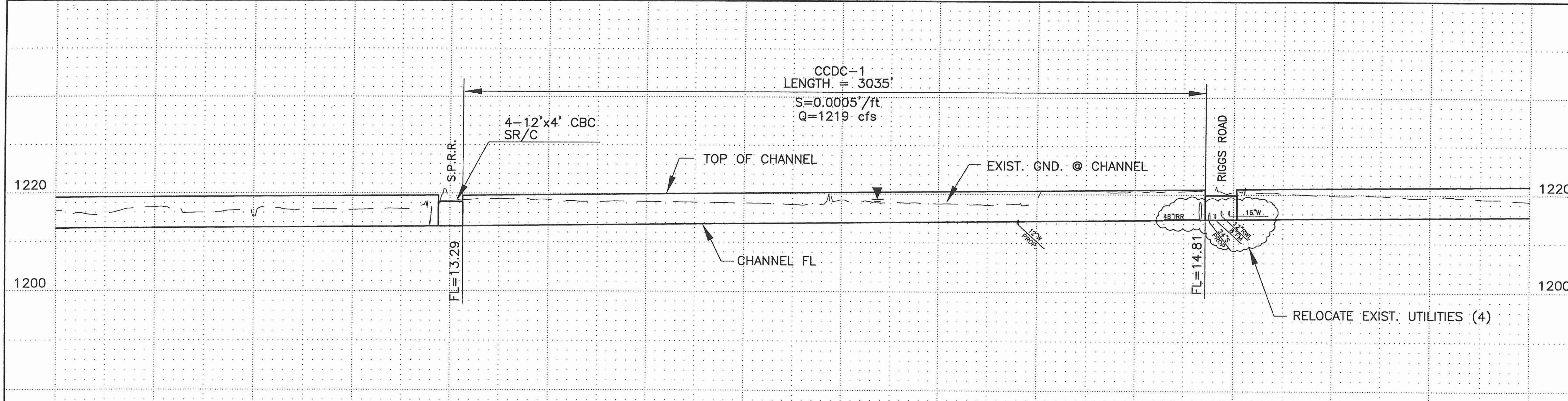
Culvert Properties

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
SR/C	CP17	1219	1219	100	1213.3	1213.2	0.0005	C	0.012	4	4	ft.	12	RCBC	Wingwall	4.76	5.74	1.44	TW

BOOK 303
MAP 58



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



CONSOLIDATED CANAL DIVERSION CHANNEL

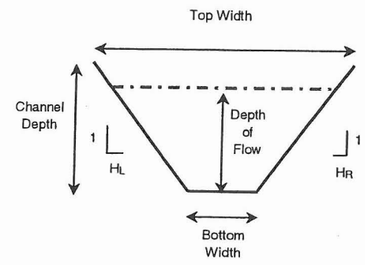
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION	CONSOLIDATED CANAL DIVERSION CHANNEL
	PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00 / DES. DCF DATE: 08.04.00 / CKD. BJF DATE: 08.20.00 — SCALE 1"=400' HORIZONTAL, 1"=20' VERTICAL — SHEETS NO. 04 OF 44

Higley Area Drainage Master Plan
Consolidated Canal Diversion 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)
CCDC-2	CP7	1219	1219	1214.9	1217.8	5916	0.0005	0.0005	-2.7	0	0.0	LE	0.0400	85.0	5.1	6	6	583.9	146.6	0.18	Sub	2.1	1.3	6.3	161.1

Channel Material Type: C = Concrete, R = Riprap, G = 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
RS/C	CP7	1219	1219	125	1214.9	1214.8	0.0004	C	0.012	4	5	ft.	12	RCBC	Wingwall	5.06	5.67	1.13	TW

BOOK 303
MAP 53

MATCHLINE SHEET_04

RS/C

GOLF COURSE

NEW DEVELOPMENT U/C

RIGGS RD.

CONSOLIDATED CANAL

MATCHLINE SHEET_06

GHTS RD.

CHANDLER HEIGHTS RD.

ROCKWOOD ESTATES
BK. 519, PG. 29
SHEETS 2-7

180' REQ'D. R/W

CCDC-2

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet

CCDC-2
LENGTH = 5916'
S=0.0005'/ft
Q=1219 cfs

4-12'x5' CBC
RS/C

TOP OF CHANNEL

EXIST. GND. @ CHANNEL

CHANNEL FL

12"W PROP

RIGGS RD.

CHANDLER HEIGHTS RD.

1220

1200

FL=14.86

FL=17.82

CONSOLIDATED CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
CONSOLIDATED CANAL
DIVERSION CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

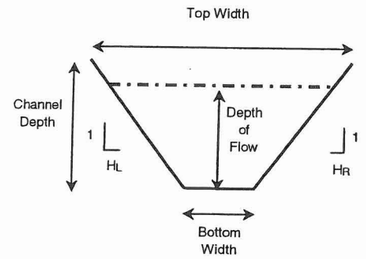
SHEETS
NO. 05 OF 44

Higley Area Drainage Master Plan
Consolidated Canal Diversion 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)
CCDC-3	CP6	889	889	1218.0	1220.8	5588	0.0005	0.0005	-0.7	0	0.0	LE	0.0400	64.0	4.8	6	6	450.3	122.9	0.18	Sub	2.0	1.2	6.1	136.8

Channel Material Type: C = Concrete, R = Riprap, G = 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
CH/C	CP6	889	889	286	1218.0	1217.8	0.0005	C	0.012	3	5	ft.	10	RCBC	Wingwall	5.06	6.01	1.20	TW

BOOK 303
MAP 46

CHANDLER HEIGHTS RD.

CONSOLIDATED CANAL

DENSE CROPS

CH/C

MATCHLINE SHEET 05

152' REQ'D. R/W

CAUTION: HIGH VOLTAGE OVERHEAD LINES. CONTACT SRP 602-236-5527

OCOTILLO RD.

MATCHLINE SHEET 07

CCDC-3

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet

CCDC-3
LENGTH = 5588'
S=0.0005'/ft
Q=889 cfs

CHANDLER HEIGHTS ROAD

3-10'x5' CBC
CH/C

TOP OF CHANNEL

EXIST. GND. @ CHANNEL

OCOTILLO RD.

1240

1220

FL=17.06

FL=20.75

CHANNEL FL

RELOCATE EXIST. UTILITIES (1)

CONSOLIDATED CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

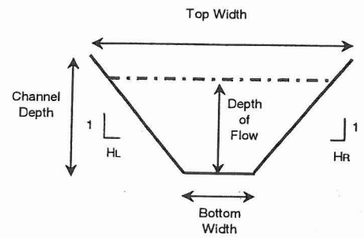
COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
PROJECT DESCRIPTION: CONSOLIDATED CANAL DIVERSION CHANNEL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS (Since 1962)	DRN. JEV DATE: 08.16.00
	DES. DCF DATE: 08.04.00
	CKD. BJF DATE: 08.20.00
SCALE	1"=400' HORIZONTAL; 1"=20' VERTICAL
SHEETS	NO. 06 OF 44

Higley Area Drainage Master Plan
Consolidated Canal Diversion 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)
CCDC-4a	CP42	384	384	1220.8	1222.9	4118	0.0005	0.0005	-3.2	0	0.0	C	0.0150	10.0	4.5	2	2	86.2	30.2	0.45	Sub	4.5	1.2	5.7	32.9
CCDC-4b	DIV42	350	350	1223.0	1223.7	1319	0.0005	0.0005	0.4	0	0.0	E	0.0300	10.0	4.5	6	6	167.9	65.0	0.23	Sub	2.1	1.1	5.7	78.0

Channel Material Type: C = Concrete, R = Riprap, G = 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
OO/C	DIV42	384	384	100	1220.8	1220.8	0.0005	C	0.012	2	4	ft.	8	RCBC	Wingwall	4.84	5.73	1.43	TW
MQ/C	HC41	350	350	363	1223.0	1222.9	0.0005	C	0.012	2	5	ft.	8	RCBC	Wingwall	4.53	5.02	1.00	TW

BOOK 303
MAP 41

MATCHLINE SHEET 06

MATCHLINE SHEET 08

00/C

MQ/C

48' REQ'D. R/W

72' REQ'D. R/W

APPLEBY RD.

CONSOLIDATED CANAL

CITY OF CHANDLER LANDFILL

CITY OF CHANDLER SOLID WASTE DISPOSAL

McQUEEN RD.

QUEEN CREEK BASIN
SEE SHEET 34

QUEEN CREEK RD.

OCOTILLO RD.

SYRD HY

QUEEN CREEK BASIN LATERAL SEE SH. 34

CAUTION: HIGH VOLTAGE OVERHEAD LINES. CONTACT SRP 602-236-5527

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

CCDC-4a

CCDC-4b

0 100 200 400 600 800
feet

CCDC-4a
LENGTH = 4118'
S=0.0005'/ft
Q=384 cfs

CCDC-4b
LENGTH = 1319'
S=0.0005'/ft
Q=350 cfs

2-8'x4' CBC
00/C

2-8'x5' CBC
MQ/C

EXIST. GND. @ CHANNEL

TOP OF CHANNEL

CHANNEL FL

RELOCATE EXIST. UTILITIES (3)

RELOCATE EXIST. UTILITIES (2)

FL=20.80

FL=22.85

FL=23.03

FL=23.69

1240

1220

CONSOLIDATED CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
CONSOLIDATED CANAL
DIVERSION CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1947

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

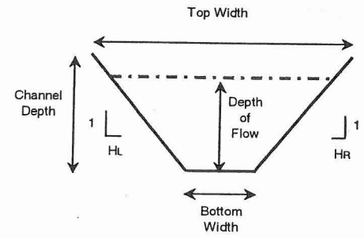
SHEETS
NO. 07 OF 44

Higley Area Drainage Master Plan
Consolidated Canal Diversion 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)
CCDC-5a	HC41	1086	1086	1223.8	1224.4	1200	0.0005	0.0005	-1.6	0	0.0	C	0.0150	40.0	4.3	2	2	210.7	59.4	0.47	Sub	5.2	1.2	5.5	62.1
CCDC-5b	HC41	1086	1086	1224.4	1225.2	1751	0.0005	0.0005	-1.9	0	0.0	LE	0.0400	100.0	4.4	6	6	554.9	153.4	0.18	Sub	2.0	1.1	5.5	166.1
CCDC-5c	HC39	536	536	1225.2	1226.6	2832	0.0005	0.0005	5.5	0	0.0	C	0.0150	25.0	4.4	0	0	110.2	33.8	0.41	Sub	4.9	1.2	5.6	25.0

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

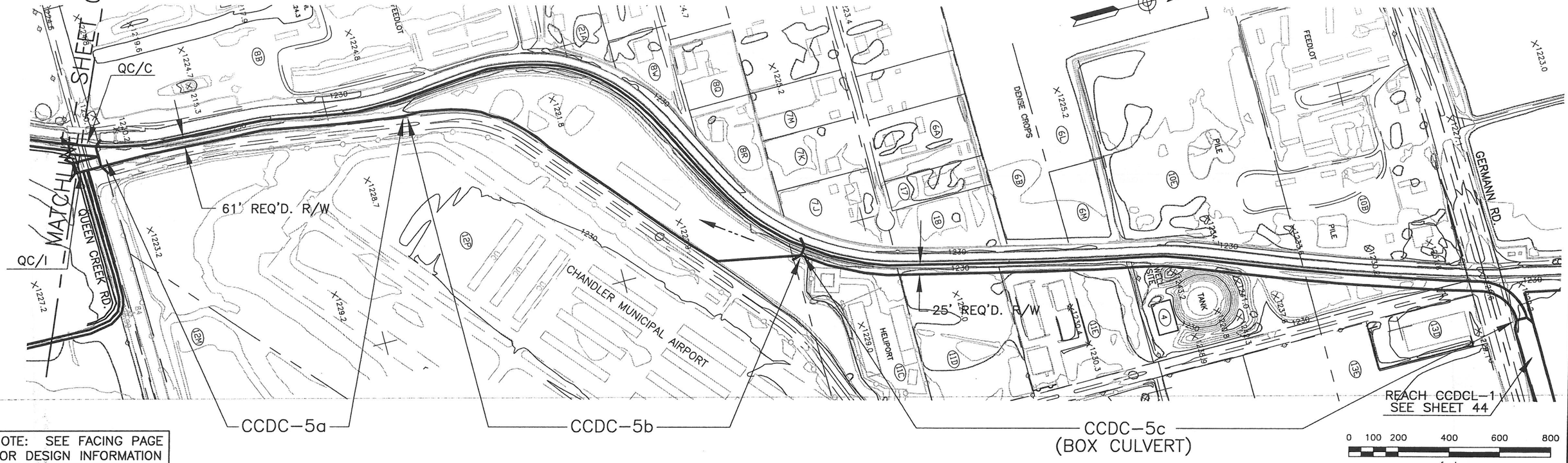


Typical Channel Section

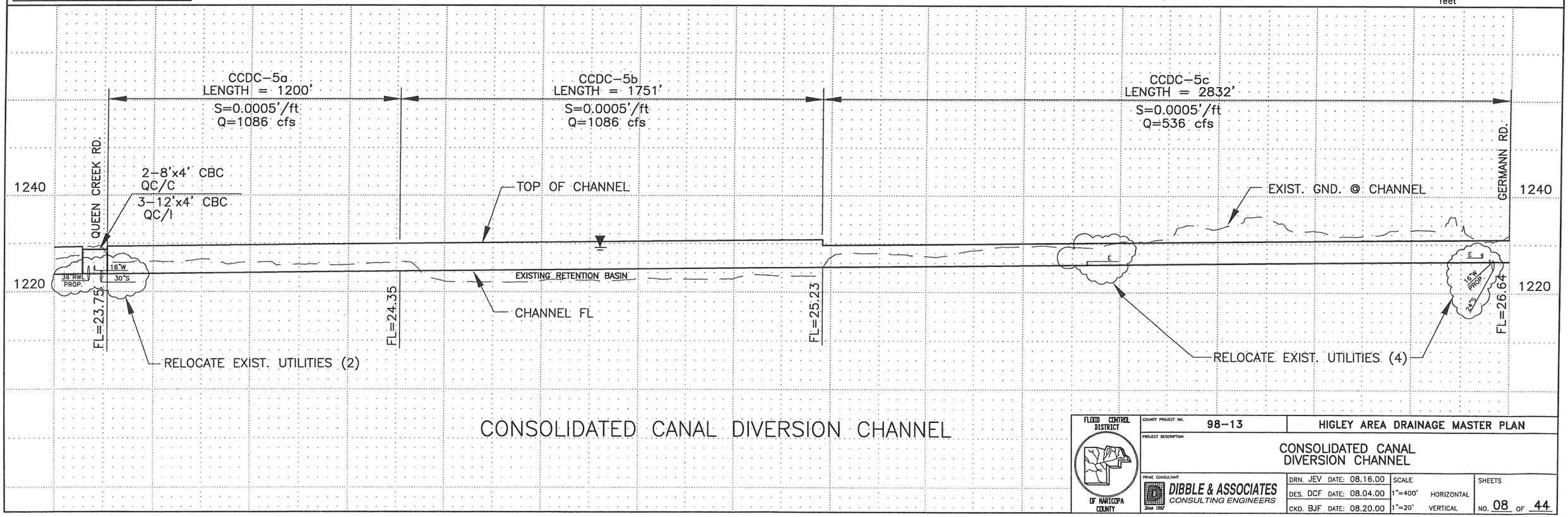
Culvert Properties

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
QC/C	DIV42	350	350	100	1223.8	1223.7	0.0005	C	0.012	2	4	ft.	8	RCBC	Wingwall	4.52	5.25	1.31	TW
QC/I	DBSNQC	763	763	100	1225.0	1224.1	0.0090	C	0.012	3	4	ft.	12	RCBC	Wingwall	3.30	3.87	0.97	IC

BOOK 303
MAP 32



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



CONSOLIDATED CANAL DIVERSION CHANNEL

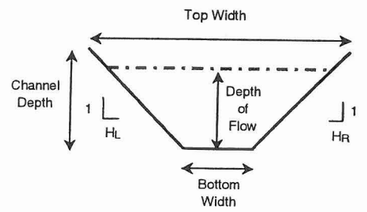
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: CONSOLIDATED CANAL DIVERSION CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS (Since 1962)	DRN. JEV DATE: 08.16.00	SCALE: 1"=400' HORIZONTAL; 1"=20' VERTICAL
	DES. DCF DATE: 08.04.00	
	CKD. BJF DATE: 08.20.00	SHEETS NO. 08 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion Channel Outfall

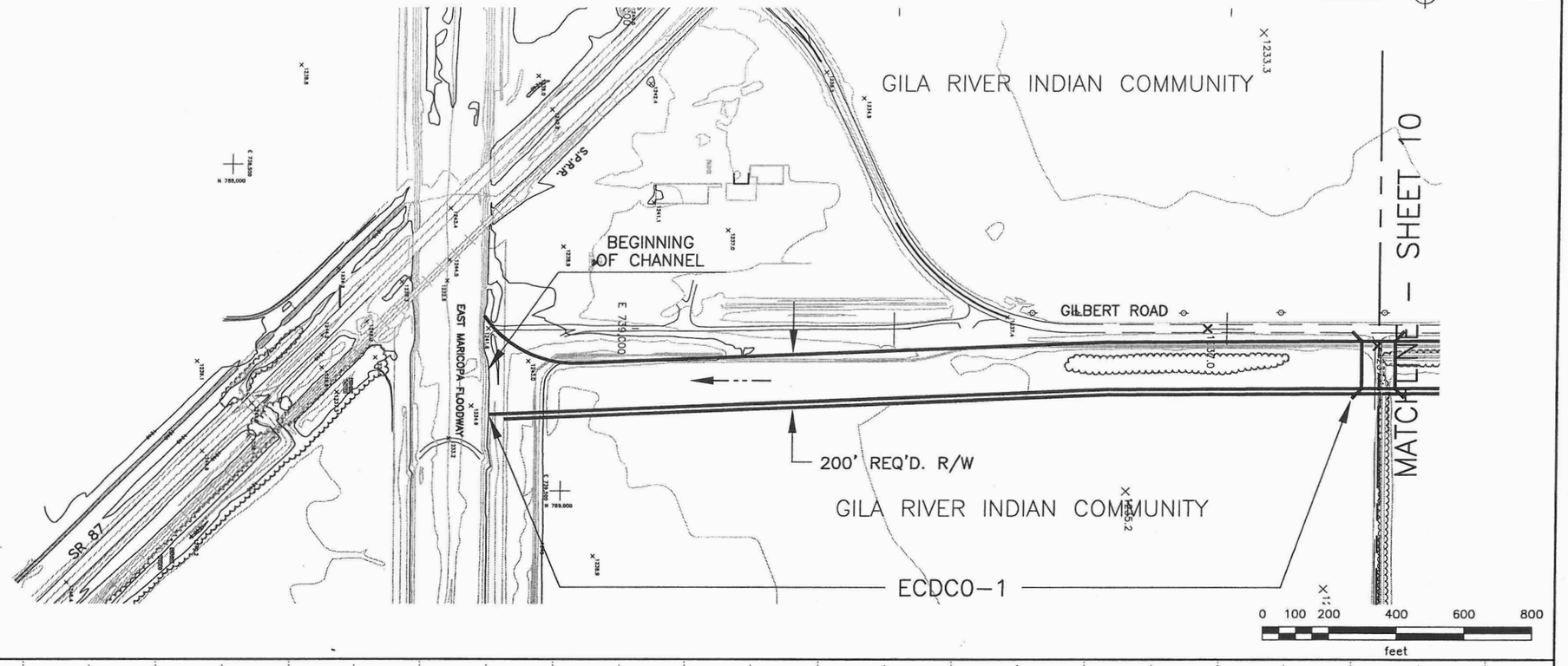
Channel Properties

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)
ECDCO-1	CP5P	1264	1264	1232.6	1234.1	2668	0.0006	0.0005	1.1	0	0.0	m	0.0300	130.0	3.5	6	6	536.8	173.2	0.24	Sub	2.4	1.0	4.5	184.6

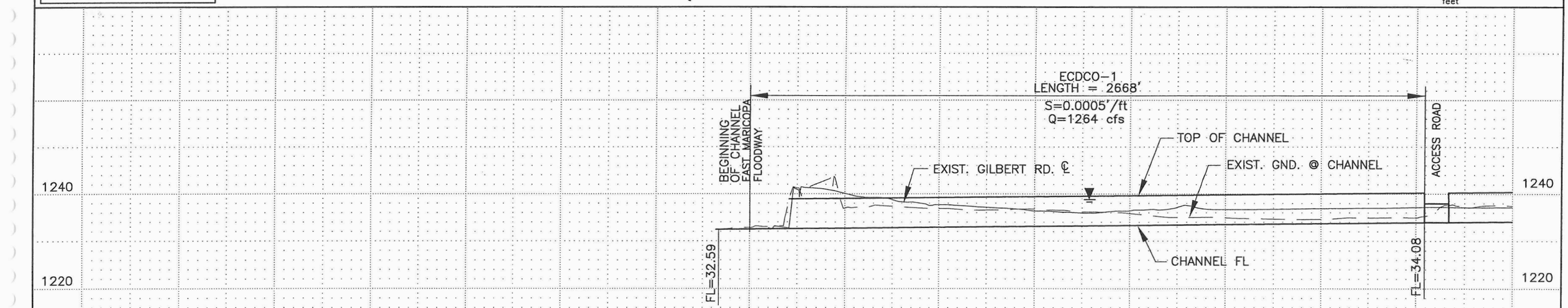


Typical Channel Section

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



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



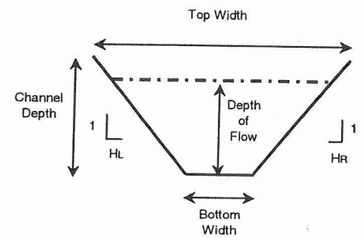
EASTERN CANAL DIVERSION CHANNEL OUTFALL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: EASTERN CANAL DIVERSION CHANNEL OUTFALL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00 / DES. DCF DATE: 08.04.00 / CKD. BJF DATE: 08.20.00	SCALE 1"=400' HORIZONTAL, 1"=20' VERTICAL
		SHEETS NO. 09 OF 44

East Mesa Area Drainage Master Plan
Eastern Canal Diversion Channel Outfall

Channel Properties

I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstrea m 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)
ECDCO-2	CP5P	1264	1264	1234.1	1236.7	5174	0.0005	0.0005	0.8	0	0.0	E	0.0300	130.0	3.5	6	6	536.8	173.2	0.24	Sub	2.4	1.0	4.5	184.6

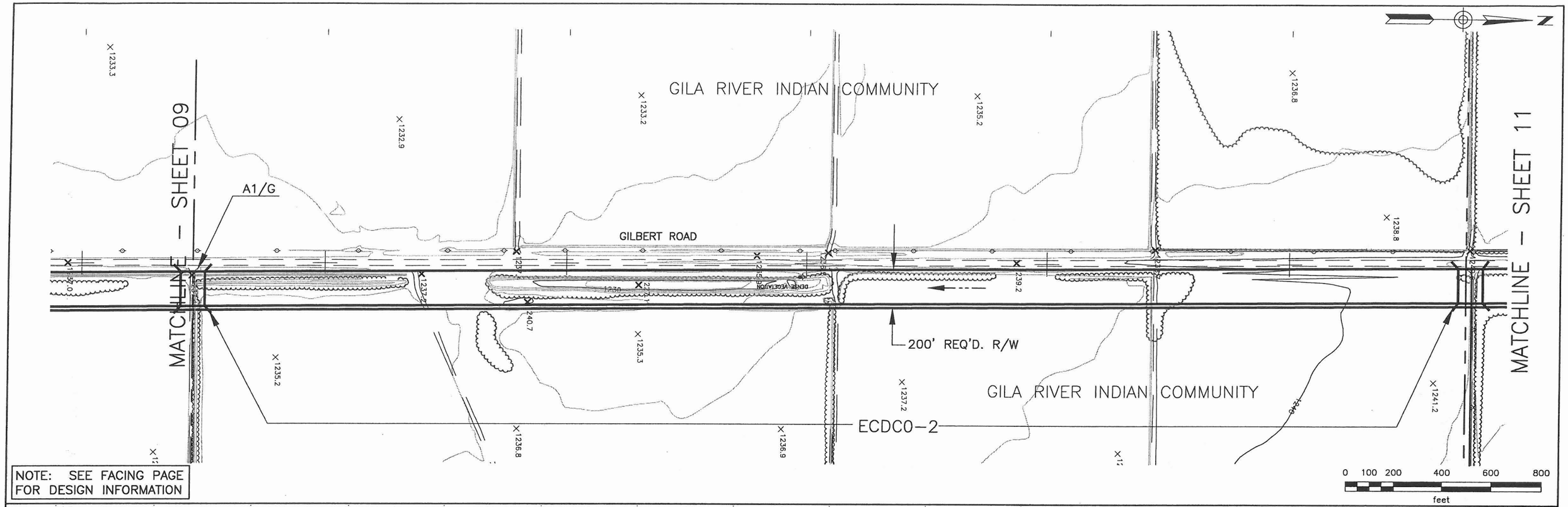


Typical Channel Section

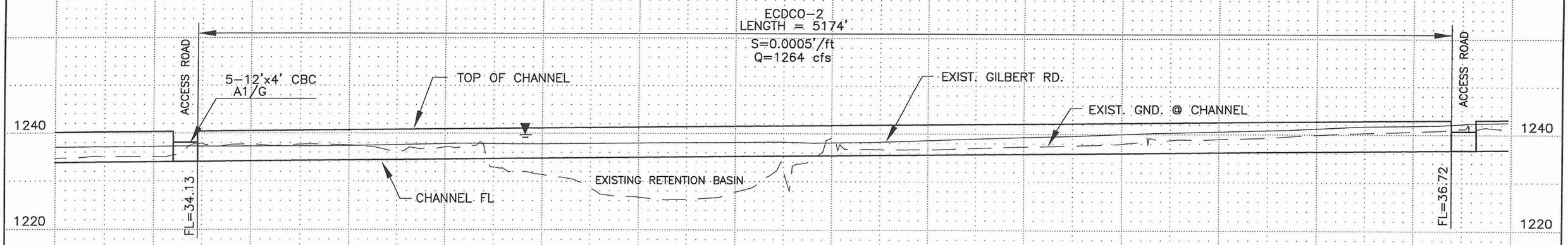
Channel Material Type: C = Concrete, R = Riprap, G = Grass, E = Natural or Earth, LE = Landscaped Earth

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
A1/G	CP5P	1264	1264	100	1234.1	1234.1	0.0005	C	0.012	5	4	ft.	12	RCBC	Wingwall	3.55	4.21	1.05	TW



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



EASTERN CANAL DIVERSION CHANNEL OUTFALL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98–13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION: EASTERN CANAL DIVERSION CHANNEL OUTFALL

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

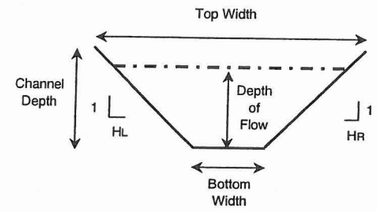
SHEETS NO. 10 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion Channel Outfall

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)
ECDCO-3	CP4P2	1240	1240	1236.7	1239.4	5200	0.0005	0.0005	8.8	0	0.0	E	0.0300	130.0	3.5	6	6	530.1	172.7	0.23	Sub	2.3	1.0	4.5	184.1

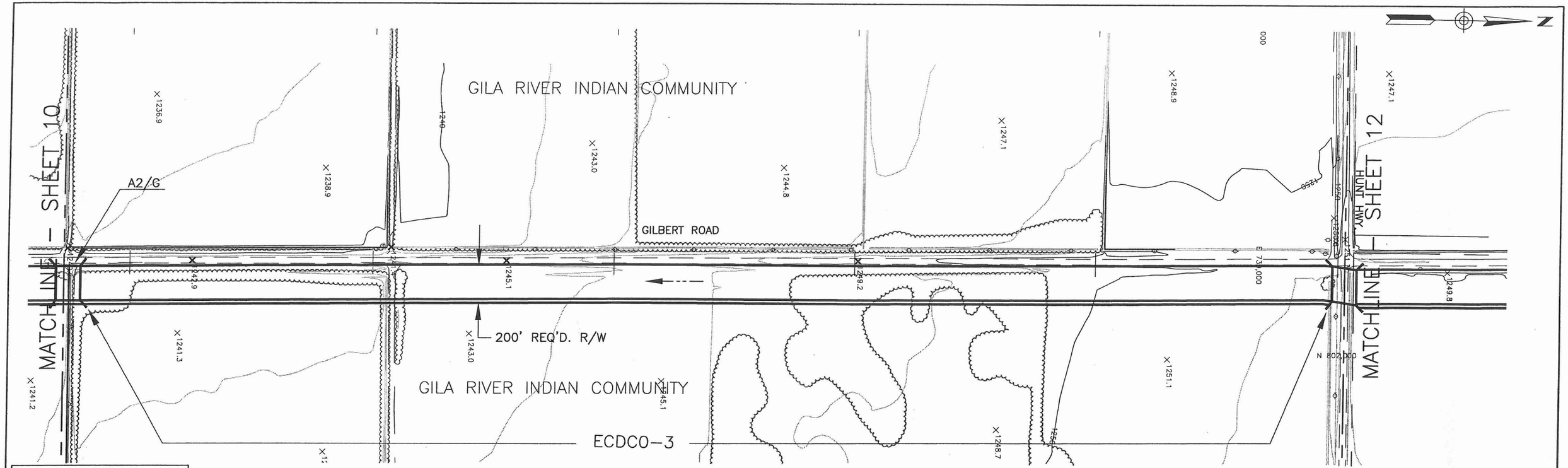
Channel Material Type: C = Concrete, R = Riprap, G = Grass, E = Natural or Earth, LE = Landscaped Earth



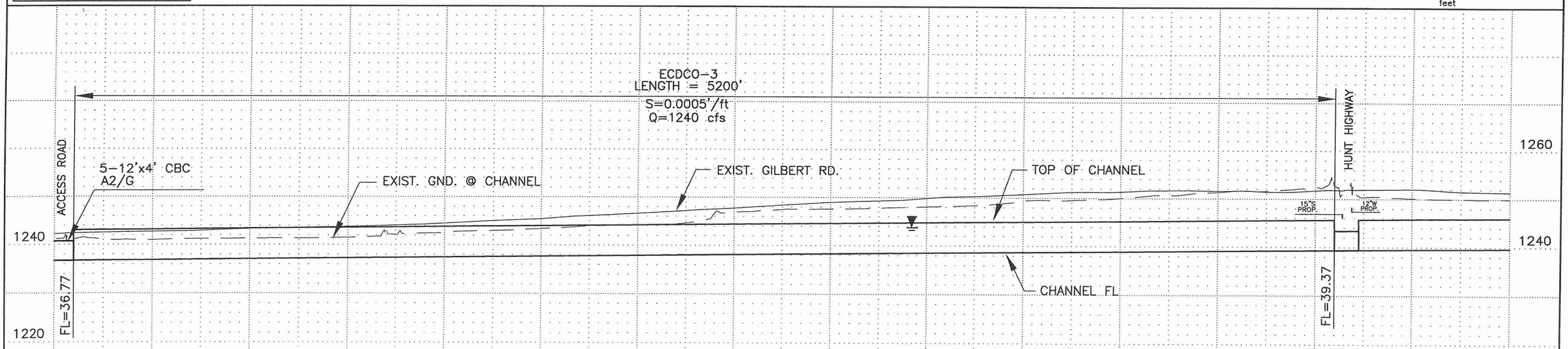
Typical Channel Section

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
A2/G	CP4P2	1240	1240	100	1236.8	1236.7	0.0005	C	0.012	5	4	ft.	12	RCBC	Wingwall	3.55	4.18	1.04	TW



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



EASTERN CANAL DIVERSION CHANNEL OUTFALL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

EASTERN CANAL
DIVERSION CHANNEL OUTFALL

PRIME CONSULTANT

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

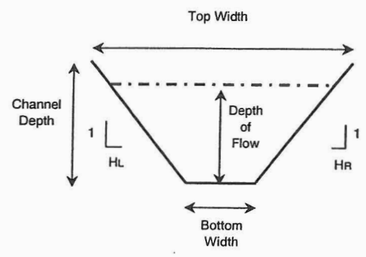
SHEETS
NO. 11 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion Channel Outfall

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)
ECDCO-4	CP4P2	1240	1240	1239.4	1242.0	5210	0.0005	0.0005	-1.8	0	0.0	E	0.0300	130.0	3.5	6	6	530.1	172.7	0.23	Sub	2.3	1.0	4.5	184.1

Channel Material Type: C = Concrete, R = Riprap, G = 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
HH/G	CP4P2	1240	1240	100	1239.4	1239.4	0.0005	C	0.012	5	4	ft.	12	RCBC	Wingwall	3.51	4.14	1.04	TW

BOOK 303
MAP 56

GILA RIVER INDIAN COMMUNITY

MATCHLINE SHEET 11

MATCHLINE SHEET 13

HUNT HWY.

HH/G

SUN RIVER

STOCKPILES

FEEDLOT

COOPER COMMONS 3, PARCEL 9

COOPER COMMONS 3, PARCEL 10

COOPER COMMONS 3, TRACT B

VG WATER TANK

WELL SITE

DENSE TREES

GILBERT ROAD

GILBERT RD

RIGGS ROAD

SPRINGFIELD LAKES

200' REQ'D. R/W

ECDCO-4

N 802,000
N 803,000
N 804,000
N 805,000
N 806,000
N 807,000
N 807,000

E 789,000

0 100 200 400 600 800
feet

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

ECDCO-4
LENGTH = 5210'
S=0.0005'/ft
Q=1240 cfs

HUNT HIGHWAY

5-12'x4' CBC
HH/G

EXIST. GILBERT RD.

EXIST. GND. @ CHANNEL

TOP OF CHANNEL

RIGGS ROAD

CHANNEL FL

RELOCATE EXIST. UTILITIES (1)

1260
1240
1220

FL=39.42

FL=42.02

12"W PROP.
16"W PROP.
30"IRR
24"IRR
24"W PROP.
24"RW PROP.
15"S PROP.
12"S PROP.

EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

EASTERN CANAL DIVERSION CHANNEL

PRIME CONSULTANT

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

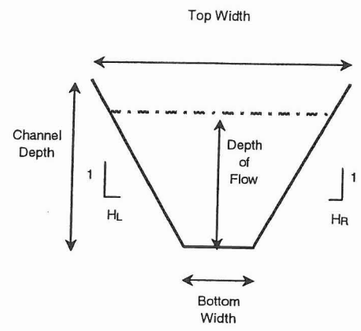
SHEETS
NO. 12 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion 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)
ECDC-1a	SRPLF	100	100	1243.4	1244.9	2845	0.0005	0.0005	-1.9	0	0.0	LE	0.0400	4.0	3.4	6	6	81.2	44.9	0.16	Sub	1.2	1.0	4.4	56.3
ECDC-1b	CH2	659	659	1244.9	1246.3	3050	0.0005	0.0005	-1.4			LE	0.0400	40.0	5.0	6	6	347.1	100.5	0.18	Sub	1.9	1.3	6.2	114.7

Channel Material Type: C = Concrete, R = Riprap, G = 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
RS/G	SRPLF	100	100	340	1243.4	1242.0	0.0041	C	0.012	1	4	ft.	4	RCBC	Wingwall	3.51	4.35	1.09	IC

BOOK 303
MAP 55

MATCHLINE - SHEET 12

MATCHLINE - SHEET 14

RIGGS RD.

GILBERT ROAD

CHANDLER HEIGHTS

EASTERN CANAL

CIRCLE G AT RIGGS HOMESTEAD RANCH UNIT 1

CIRCLE G AT RIGGS HOMESTEAD RANCH UNIT 2

RS/G

DENSE TREES

DENSE CROPS

72' REQ'D. R/W

133' REQ'D. R/W

ECDC-1a

ECDC-1b

EXIST. SRP IRRIG. TAILWATER POND WATER LEVEL 1238.5

RIGGS DETENTION & WATER QUALITY BASINS SEE SH. 35

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet

ECDC-1a
LENGTH = 2845'
S=0.0005'/ft
Q=100 cfs

ECDC-1b
LENGTH = 3050'
S=0.0005'/ft
Q=659 cfs

1-4'x4' CBC
RS/G

EXIST. GND. @ CHANNEL

EXIST. GND. @ EAST ACCESS ROAD

TOP OF CHANNEL

EXIST. TAILWATER POND

12'W PROP.

CHANNEL FL

FL=43.40

FL=44.90

FL=46.30

1260

1240

EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
EASTERN CANAL DIVERSION CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

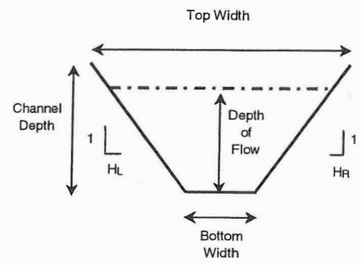
SHEETS
NO. 13 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion 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.)	Dasign Depth (ft)	Channel Topwidth (ft)
ECDC-2a	BASCH	591	591	1246.4	1247.2	1705	0.0005	0.0005	0.8	0	0.0	LE	0.0400	50.0	4.3	6	6	327.8	102.5	0.18	Sub	1.8	1.1	5.4	114.9
ECDC-2b	OC2	1025	1025	1247.3	1247.5	350	0.0007	0.0007	0.8	0	0.0	LE	0.0400	40.0	5.7	6	6	423.1	109.4	0.22	Sub	2.4	1.4	7.2	125.8
ECDC-2c	OC2	1025	1025	1247.6	1249.9	3267	0.0007	0.0007	-1.0	0	0.0	LE	0.0400	65.0	4.7	6	6	443.0	122.7	0.21	Sub	2.3	1.2	5.9	136.4

Channel Material Type: C = Concrete, R = Riprap, G = 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
CH/E	BASCH	591	591	100	1246.4	1246.3	0.0005	C	0.012	3	4	ft.	10	RCBC	Wingwall	4.97	5.55	1.39	TW
GT/E	OC2	1025	1025	100	1247.6	1247.5	0.0006	C	0.012	3	5	ft.	12	RCBC	Wingwall	5.70	6.45	1.29	TW

BOOK 303
MAP 44

133' REQ'D. R/W

CH/E

EASTERN CANAL

CHANDLER HEIGHTS BASIN SEE SH.36

WATER LEVEL 1247.2

WATER LEVEL 1253.0

WATER LEVEL 1251.4

DENSE VEGETATION

CHANDLER HEIGHTS ROAD

MATCHLINE — SHEET 13

MATCHLINE — SHEET 15

OCOTILLO ROAD

ECDC-2a

ECDC-2b

ECDC-2c

GILBERT ROAD

GT/E

152' REQ'D. R/W

CROPS

DENSE CROPS

CAUTION: HIGH VOLTAGE OVERHEAD LINES. CONTACT SRP 602-236-5527

12,000 E 739,000 N 813,000

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet

ECDC-2a
LENGTH = 1705'
S=0.0005'/ft
Q=591 cfs

ECDC-2b
LENGTH = 350'
S=0.0007'/ft
Q=1025 cfs

ECDC-2c
LENGTH = 3267'
S=0.0007'/ft
Q=1025 cfs

CHANDLER HEIGHTS RD.

GILBERT RD.

OCOTILLO RD.

3-10'x4' CBC
CH/E

3-12'x5' CBC
GT/E

EXIST. POND

EXIST. GND. @ EAST ACCESS ROAD

TOP OF CHANNEL

EXIST. GND. @ CHANNEL

CHANNEL FL

UNK. UT
12"RWL

16'W PROP.

18'S PROP.

24'RWL PROP.

16'W PROP.

24'W PROP.

12'W PROP.

12'S PROP.

1260

1240

FL=46.35

FL=47.20

FL=47.25

FL=47.50

FL=47.56

FL=49.85

RELOCATE EXIST. UTILITIES (2)

EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

EASTERN CANAL DIVERSION CHANNEL

PRIME CONSULTANT

DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962

DRN. JEV DATE: 08.16.00

DES. DCF DATE: 08.04.00

CKD. BJF DATE: 08.20.00

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

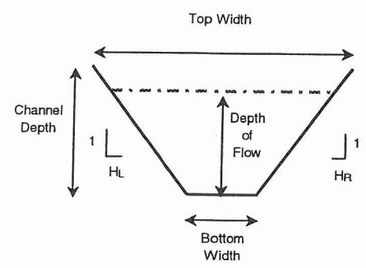
SHEETS NO. 14 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion 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)
ECDC-3	OC2	1025	1025	1249.9	1252.7	5780	0.0005	0.0005	0.9	0	0.0	LE	0.0400	90.0	4.5	6	6	523.2	144.5	0.18	Sub	2.0	1.1	5.6	157.3

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

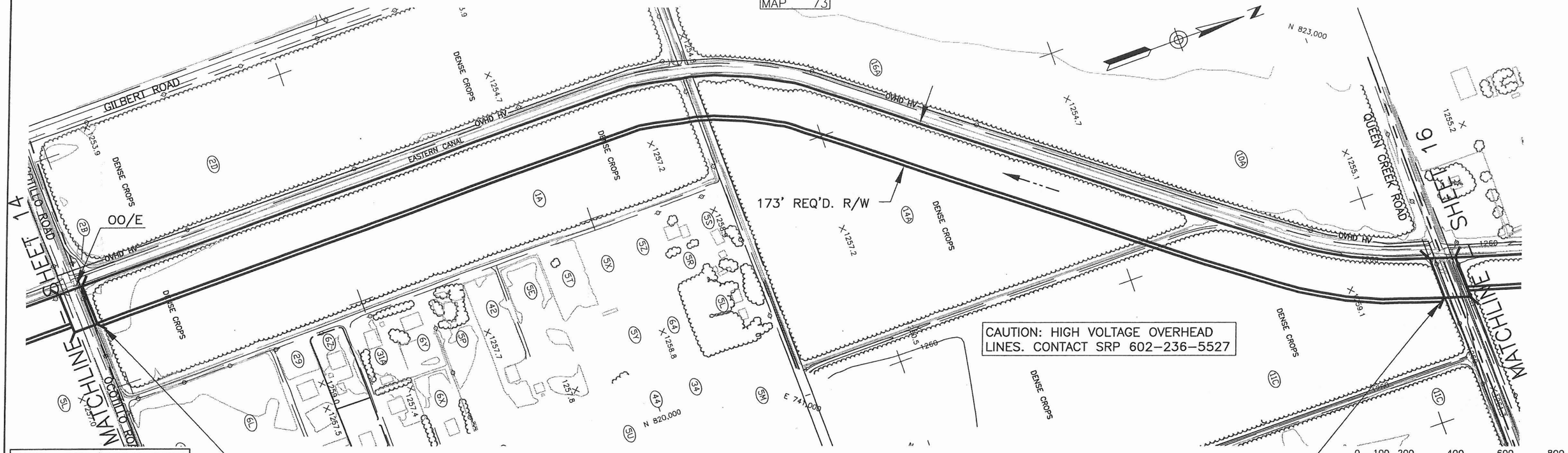


Typical Channel Section

Culvert Properties

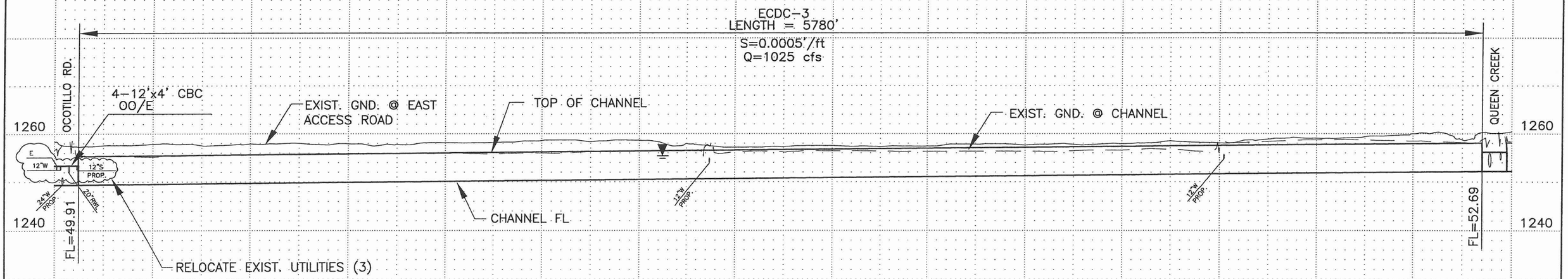
I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
OO/E	OC2	1025	1025	100	1249.9	1249.9	0.0006	C	0.012	4	4	ft.	12	RCBC	Wingwall	4.74	5.41	1.35	TW

BOOK 304
MAP 73



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

ECDC-3



EASTERN CANAL DIVERSION CHANNEL

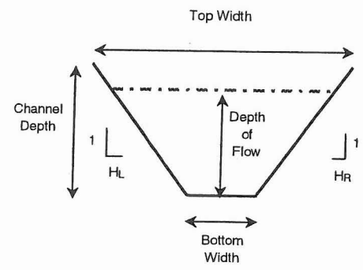
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: EASTERN CANAL DIVERSION CHANNEL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE: HORIZONTAL 1"=400' VERTICAL 1"=20'
	DES. DCF DATE: 08.04.00	
	CKD. BJF DATE: 08.20.00	SHEETS NO. 15 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion 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.)	Dasign 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)
ECDC-4a	HC35A	748	748	1252.7	1254.0	2741	0.0005	0.0005	-0.3	0	0.0	LE	0.0400	60.0	4.5	6	6	395.6	115.2	0.18	Sub	1.9	1.1	5.7	128.2
ECDC-4b	HC34	406	406	1254	1255.57	3131	0.0005	0.0005	-2.2	0	0.0	LE	0.0400	25.0	4.5	6	6	237.3	80.3	0.17	Sub	1.7	1.1	5.7	93.3

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

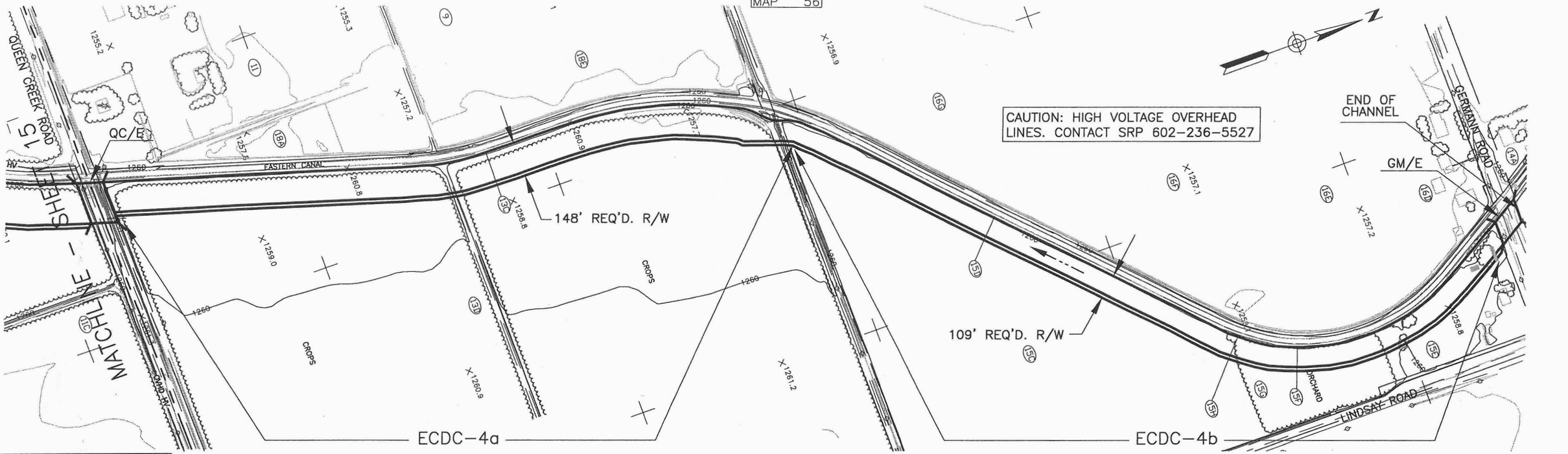


Typical Channel Section

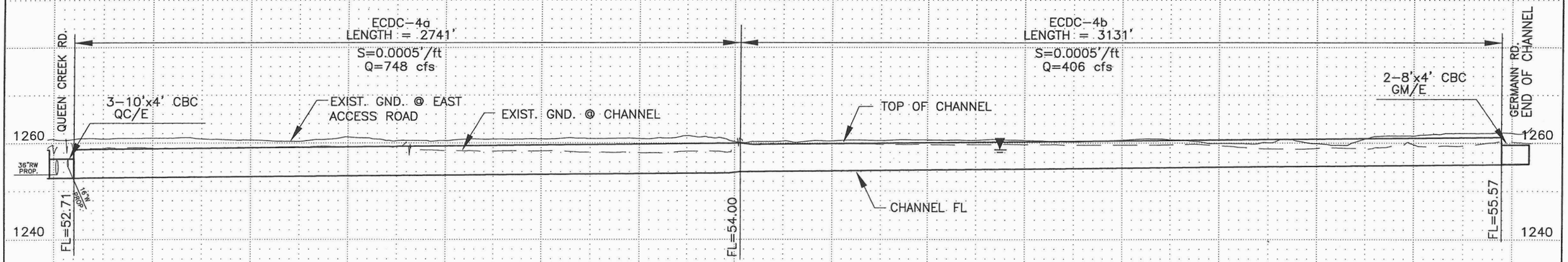
Culvert Properties

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
QC/E	HC35A	748	748	100	1252.7	1252.7	0.0002	C	0.012	3	4	ft.	10	RCBC	Wingwall	4.48	5.46	1.36	TW
GM/E	HC34	406	406	110	1255.6	1255.6	0.0004	C	0.012	2	4	ft.	8	RCBC	Wingwall	4.54	5.57	1.39	TW

BOOK 304
MAP 56



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
EASTERN CANAL
DIVERSION CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

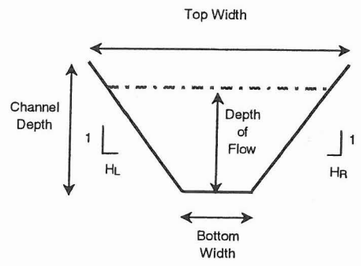
SHEETS
NO. 16 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion 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)
ECDC-5a	DIBASO	665	665	1252.9	1253.2	550	0.0005	0.0005	-2.6	0	0.0	LE	0.0400	63.0	4.2	6	6	366.7	113.7	0.18	Sub	1.8	1.1	5.2	125.7
ECDC-5b	HC32A	765	765	1253.4	1255.3	3037	0.0006	0.0006	0.2	0	0.0	LE	0.0400	63.0	4.3	6	6	379.4	115.1	0.20	Sub	2.0	1.1	5.4	127.4

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

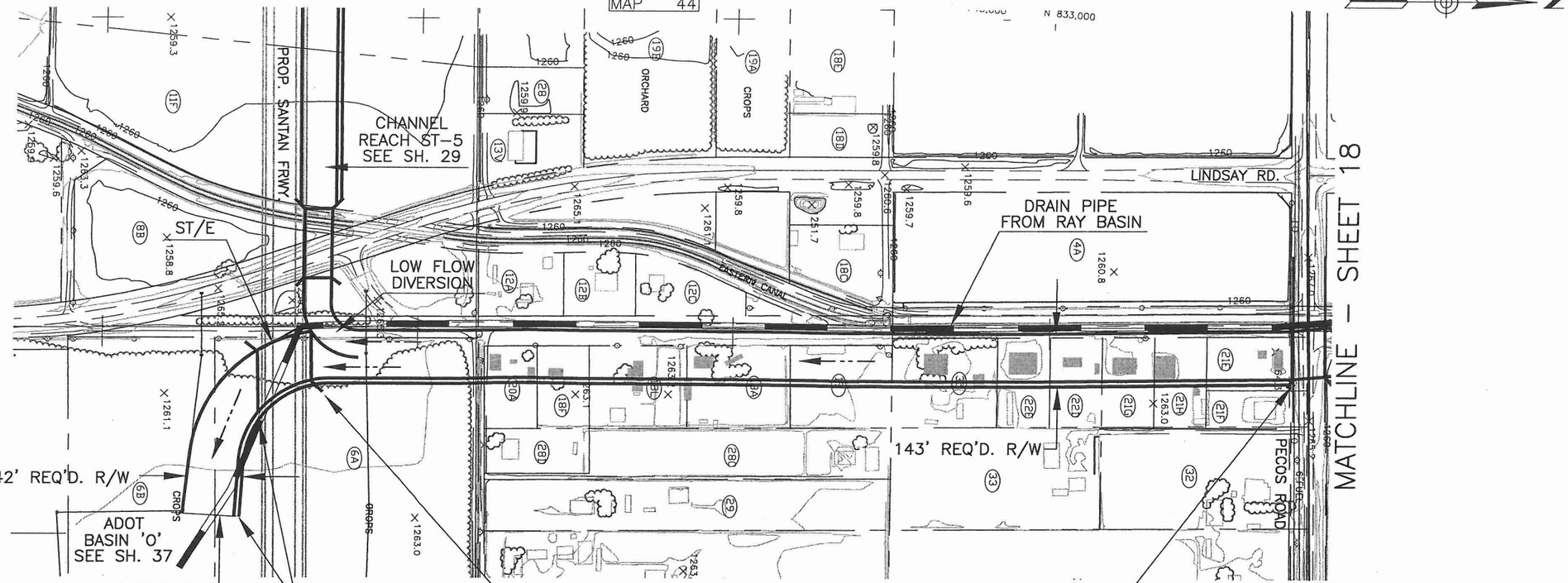


Typical Channel Section

Culvert Properties

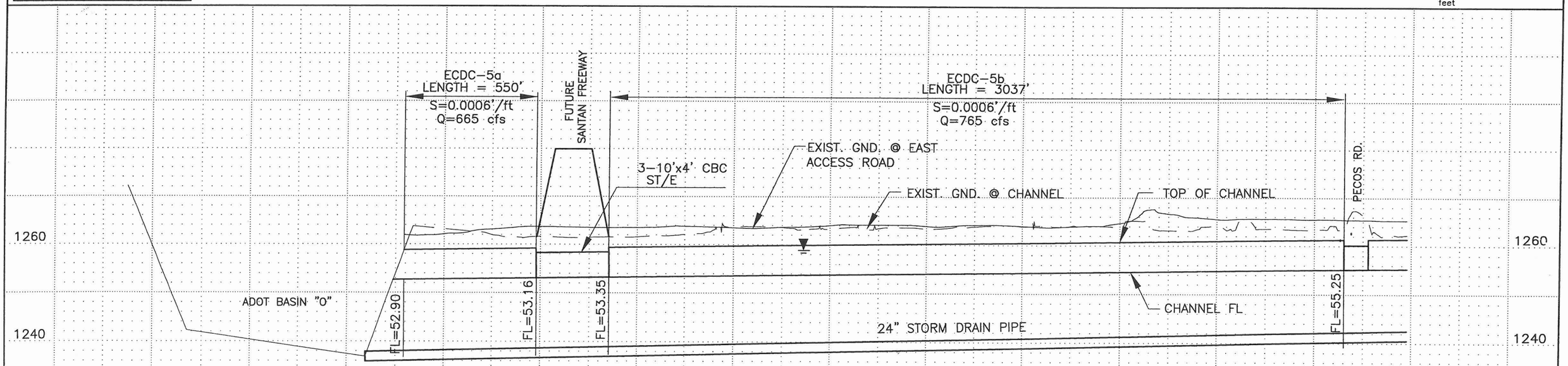
I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
ST/E	DIBASO	665	665	300	1253.4	1253.2	0.0006	C	0.0120	3	4	ft.	10	RCBC	Wingwall	4.2	5.02	1.25	TW

BOOK 304
MAP 44



CAUTION: BURIED HIGH PRESSURE PETROLEUM PIPELINE. CONTACT KINDER-MORGAN CO. 714-560-4940

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



EASTERN CANAL DIVERSION CHANNEL

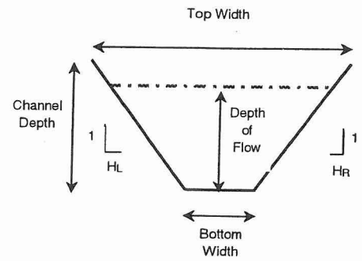
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: EASTERN CANAL DIVERSION CHANNEL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL
	DES. DCF DATE: 08.04.00	
	CKD. BJF DATE: 08.20.00	SHEETS NO. 17 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion 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)
ECDC-6	HC31A	704	704	1255.3	1256.9	3396	0.0005	0.0005	-3.5	0	0.0	LE	0.0400	70.0	4.1	6	6	387.6	119.8	0.18	Sub	1.8	1.0	5.1	131.6

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

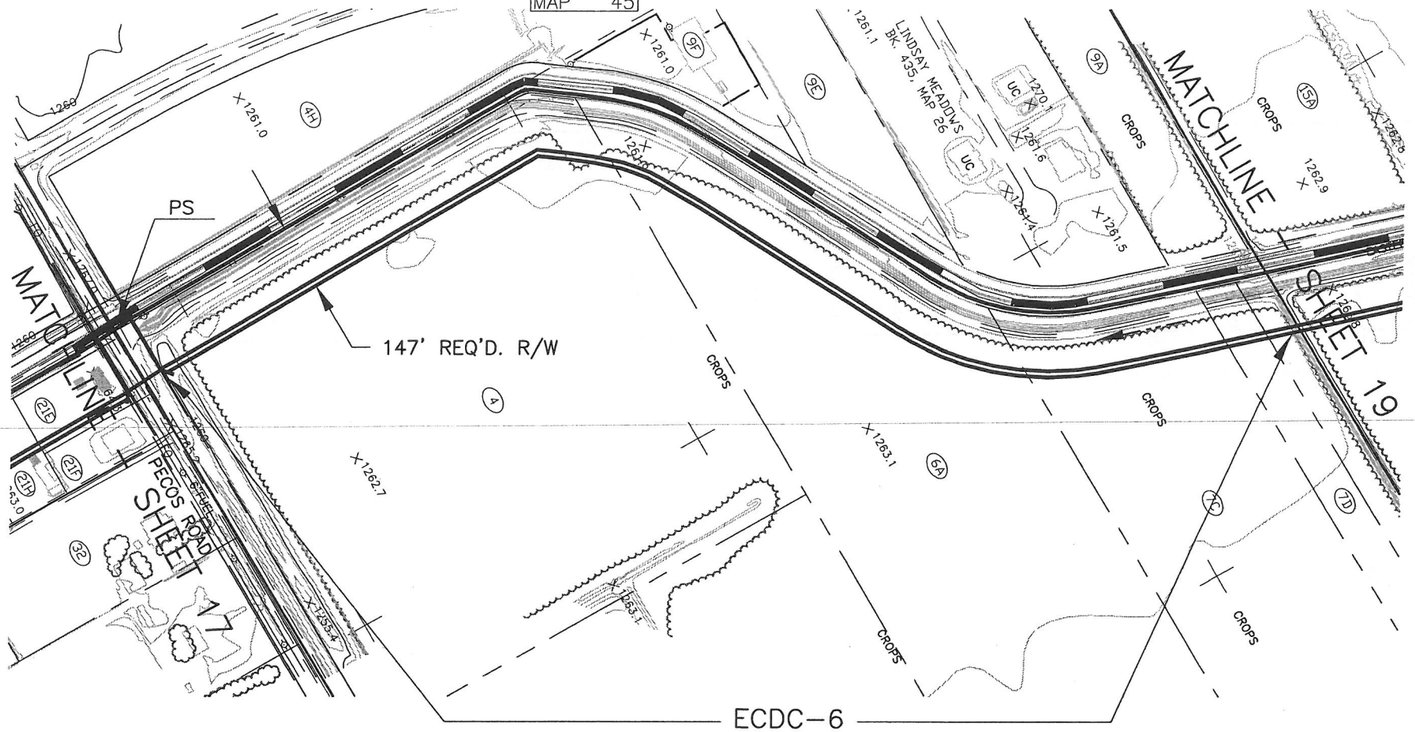


Typical Channel Section

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
PS	HC31A	704	704	100	1255.3	1255.3	0.0007	C	0.0120	3	4	ft.	10	RCBC	Wingwall	4.3	5.10	1.27	TW

BOOK 304
MAP 45

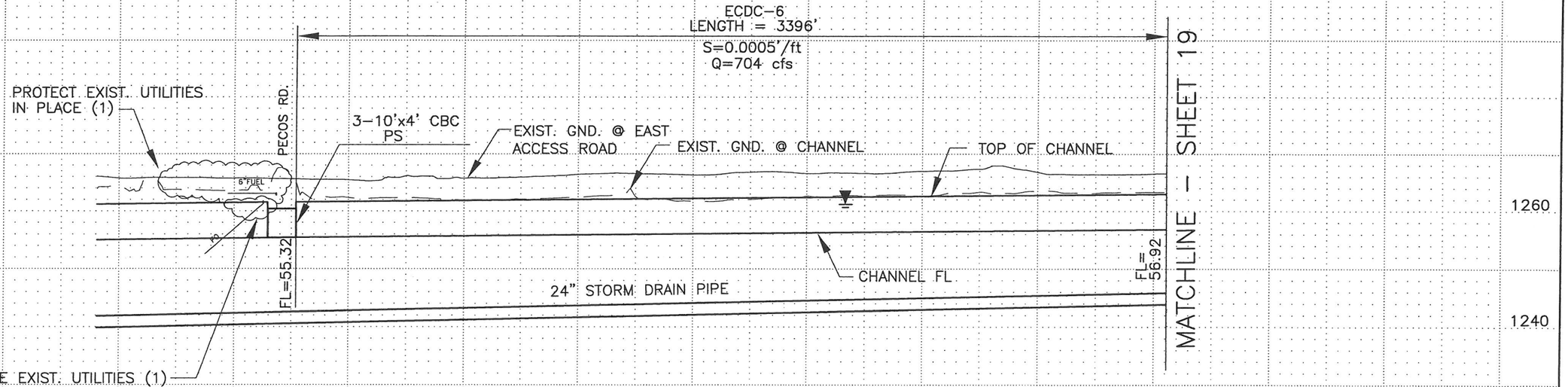


CAUTION: BURIED FIBER OPTIC LINE. CONTACT SPRINT. 602-417-0970

CAUTION: BURIED HIGH PRESSURE PETROLEUM PIPELINE. CONTACT KINDER-MORGAN CO. 714-560-4940

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet



EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

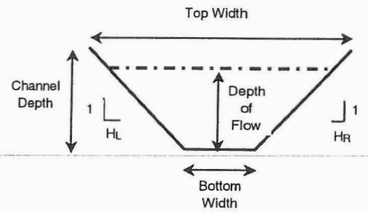
COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: EASTERN CANAL DIVERSION CHANNEL		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE
	DES. DCF DATE: 08.04.00	1"=400' HORIZONTAL
	CKD. BJF DATE: 08.20.00	1"=20' VERTICAL
		SHEETS NO. 18 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion Channel

Channel Properties

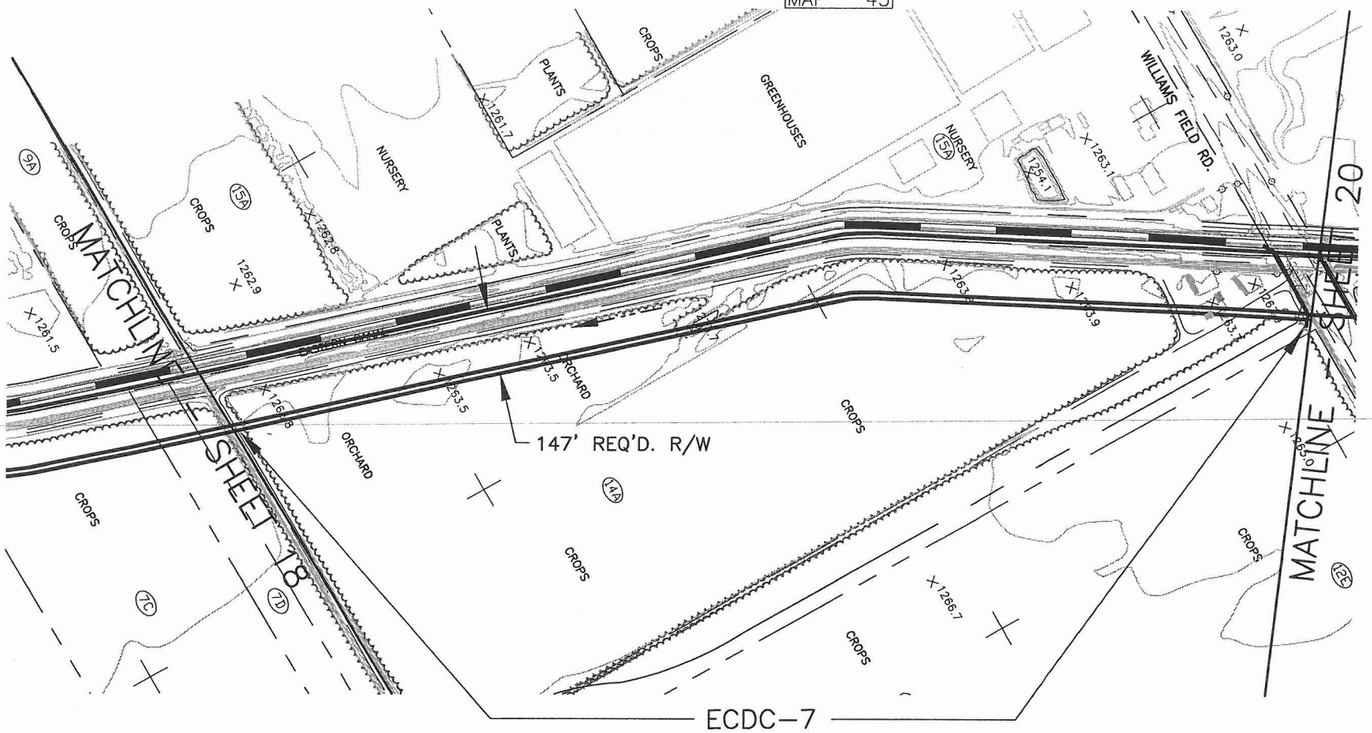
I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, 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)
ECDC-7	HC31A	704	704	1256.9	1258.2	2754	0.0005	0.0005	2.2	0	0.0	LE	0.0400	70.0	4.1	6	6	387.6	119.8	0.18	Sub	1.8	1.0	5.1	131.6

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



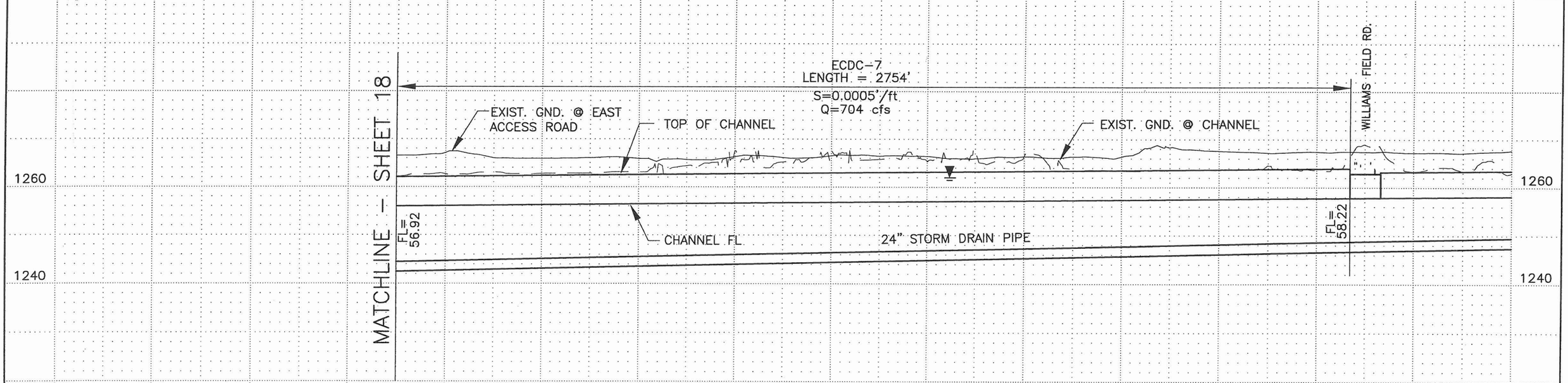
Typical Channel Section

BOOK 304
MAP 45



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet



EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98–13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
EASTERN CANAL DIVERSION CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962

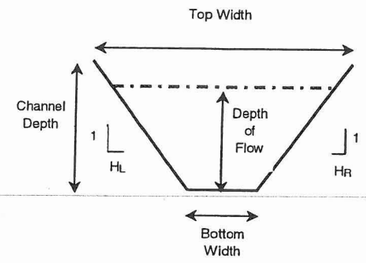
DRN. JEV	DATE: 08.16.00	SCALE	SHEETS
DES. DCF	DATE: 08.04.00	1"=400' HORIZONTAL	
CKD. BJF	DATE: 08.20.00	1"=20' VERTICAL	NO. 19 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion 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)
ECDC-8a	HC30	629	629	1258.3	1259.6	2712	0.0005	0.0005	-8.2	0	0.0	LE	0.0400	50.0	4.3	8	8	361.4	119.1	0.18	Sub	1.7	1.1	5.4	135.9
ECDC-8b	HC30	629	629	1259.9	1260.9	1780	0.0005	0.0005	1.5	0	0.0	LE	0.0400	50.0	4.5	6	6	342.6	104.3	0.18	Sub	1.8	1.1	5.6	117.1

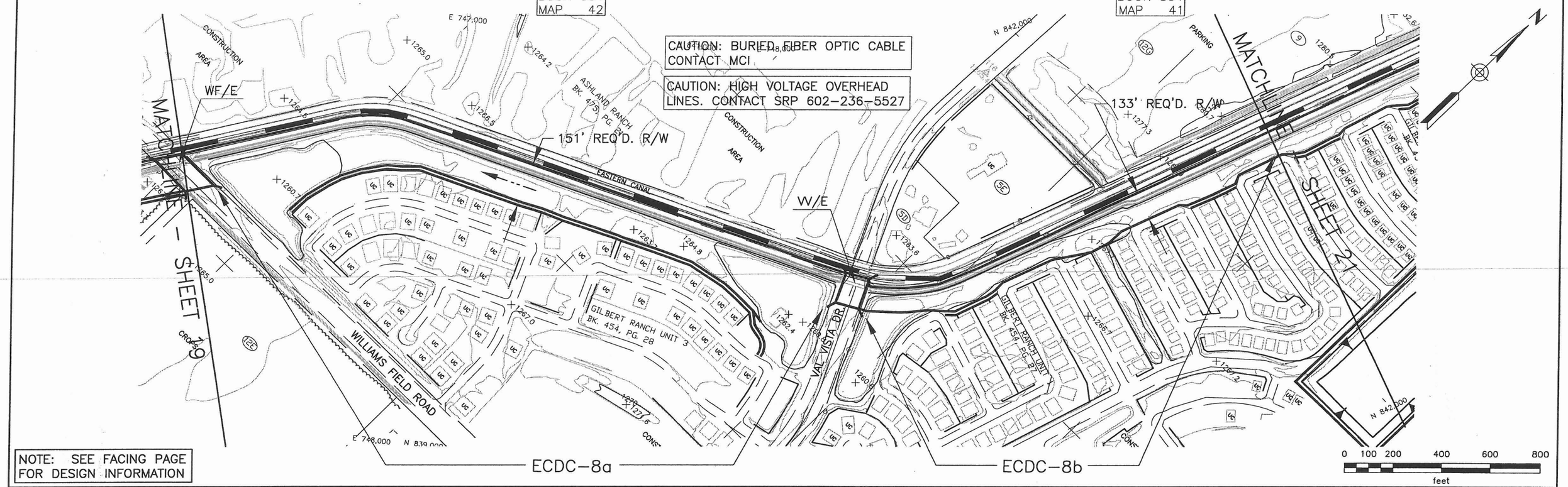
Channel Material Type: C = Concrete, R = Riprap, G = Grass, E = Natural or Earth, LE = Landscaped Earth



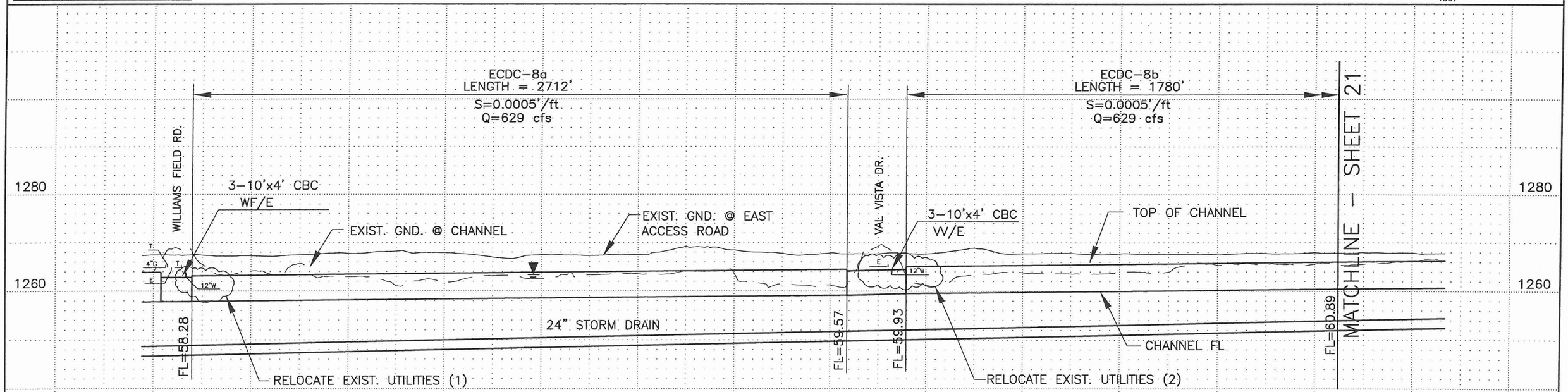
Typical Channel Section

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
WF/E	HC30	629	629	126	1258.3	1258.2	0.0005	C	0.0120	3	4	ft.	10	RCBC	Wingwall	4.1	4.77	1.19	TW
VV/E	HC30	629	629	245	1259.9	1259.6	0.0015	C	0.0120	3	4	ft.	10	RCBC	Wingwall	4.3	4.80	1.20	TW



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION: EASTERN CANAL DIVERSION CHANNEL

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

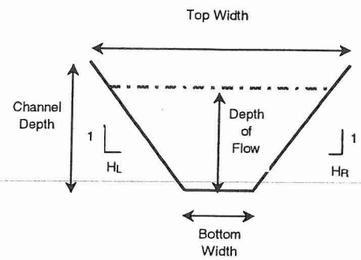
SHEETS NO. 20 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion 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)
ECDC-9a	HC30	629	629	1260.9	1261.5	1134	0.0005	0.0005	1.1	0	0.0	LE	0.0400	45.0	4.7	6	6	339.0	101.6	0.18	Sub	1.9	1.2	5.8	114.9
ECDC-9b	LFRAY	75	75	1261.5	1261.9	950	0.0005	0.0005	-1.5	0	0.0	LE	0.0400	4.0	3.0	6	6	65.6	40.4	0.16	Sub	1.1	1.0	4.0	51.9
ECDC-9c	HC29	466	466	1291.9	1263.1	2367	-0.0122	0.0005	-2.2	0	0.0	LE	0.0400	45.0	4.0	6	6	273.8	93.4	0.17	Sub	1.7	1.0	5.0	104.8

Channel Material Type: C = Concrete, R = Riprap, G = 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
RY/E	HC29	466	466	104	1261.9	1261.9	0.0001	C	0.012	3	4	ft.	10	RCBC	Wingwall	2.99	3.37	0.84	TW

BOOK 304
MAP 41

BOOK 304
MAP 26

E 749,000 N 843,000

MATCHLINE – SHEET 20

MATCHLINE – SHEET 22

PARKING

RODEO PARK

PARKING

RY/E

131' REQ'D. R/W

68' REQ'D. R/W

121' REQ'D. R/W

EASTERN CANAL

EASTERN CANAL

RAY BASIN
SEE SH. 38

RAY ROAD

S.P.R.R.

GILBERT RANCH UNIT 1
BK 454 PG 27

ECDC–9a

ECDC–9b

ECDC–9c

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet

CAUTION: BURIED FIBER OPTIC CABLE
CONTACT MCI

ECDC–9a
LENGTH = 1134'
S=0.0005'/ft
Q=629 cfs

ECDC–9b
LENGTH = 950'
S=0.0005'/ft
Q=75 cfs
BY–PASS CHANNEL

ECDC–9c
LENGTH = 2367'
S=0.0005'/ft
Q=466 cfs

MATCHLINE – SHEET 20

TOP OF CHANNEL

24" STORM DRAIN PIPE

CHANNEL FL

FL=60.89

FL=61.45

RAY BASIN

RAY ROAD

3–10'x4' CBC
RY/E

FL=61.91

FL=61.91

15"S
IE=48.1

EXIST. GND. @ EAST
ACCESS ROAD

EXIST. GND. @ CHANNEL

RELOCATE EXIST. UTILITIES (2)

S.P.R.R.

FL=63.09

1280

1260

1280

1260

EASTERN CANAL DIVERSION CHANNEL

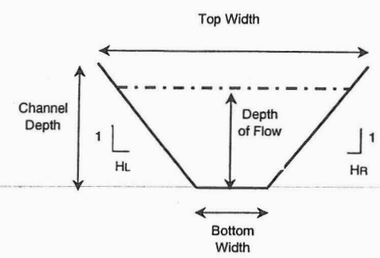
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98–13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: EASTERN CANAL DIVERSION CHANNEL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL
	DES. DCF DATE: 08.04.00	
	CKD. BJF DATE: 08.20.00	SHEETS NO. 21 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion 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)
ECDC-10a	LFCHAN	385	387	1263.1	1263.6	815	0.0005	0.0005	-0.4	0	0.0	E	0.0300	10.0	4.7	6	6	180.9	67.4	0.23	Sub	2.1	1.2	5.9	81.0
ECDC-10b	HC7A	2400	2400	1263.6	1264.6	2055	0.0005	0.0005	-3.7	0	0.0	E	0.0300	80.0	6.4	6	6	760.4	158.1	0.25	Sub	3.2	1.6	8.1	176.7
ECDC-10c	HC7A	2400	2400	1264.6	1264.8	447	0.0005	0.0005	-0.5	0	0.0	C	0.0150	60.0	5.5	2	2	390.7	84.6	0.50	Sub	6.1	1.5	7.0	88.1
ECDC-10d	HC7A	2400	2400	1264.8	1265.2	754	0.0005	0.0005	4.0	0	0.0	E	0.0300	80.0	6.4	6	6	760.4	158.1	0.25	Sub	3.2	1.6	8.1	176.7

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

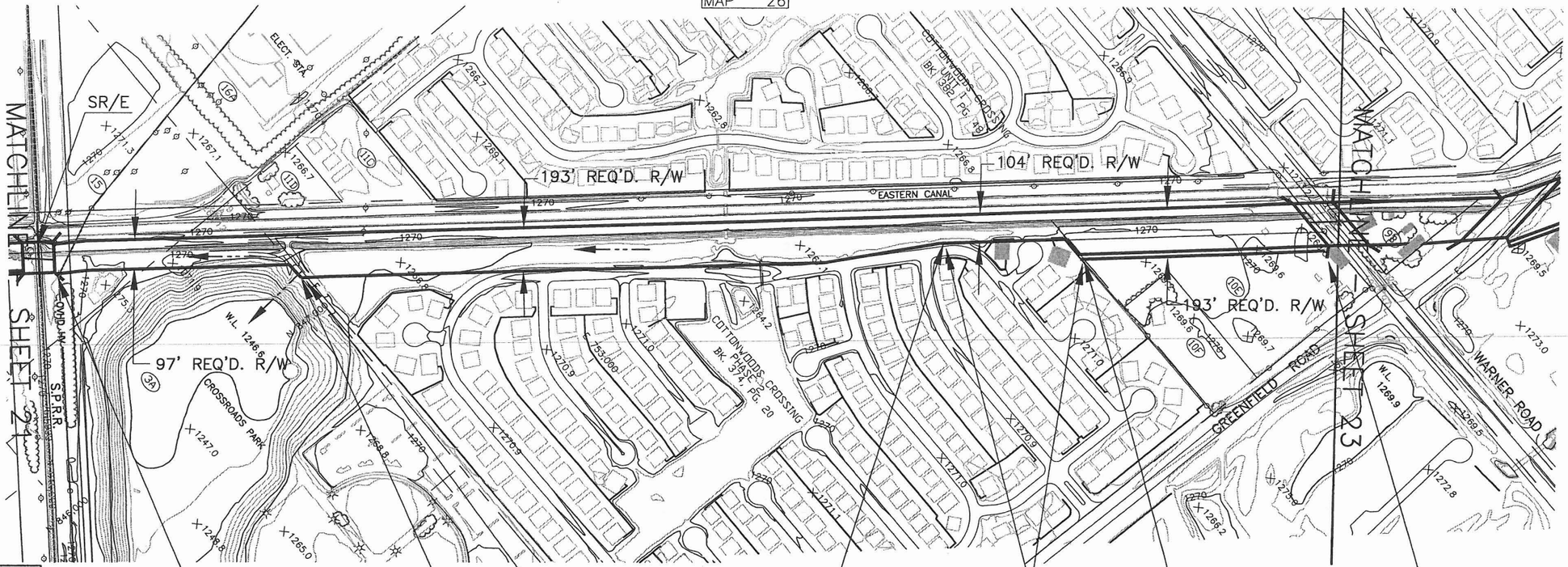


Typical Channel Section

Culvert Properties

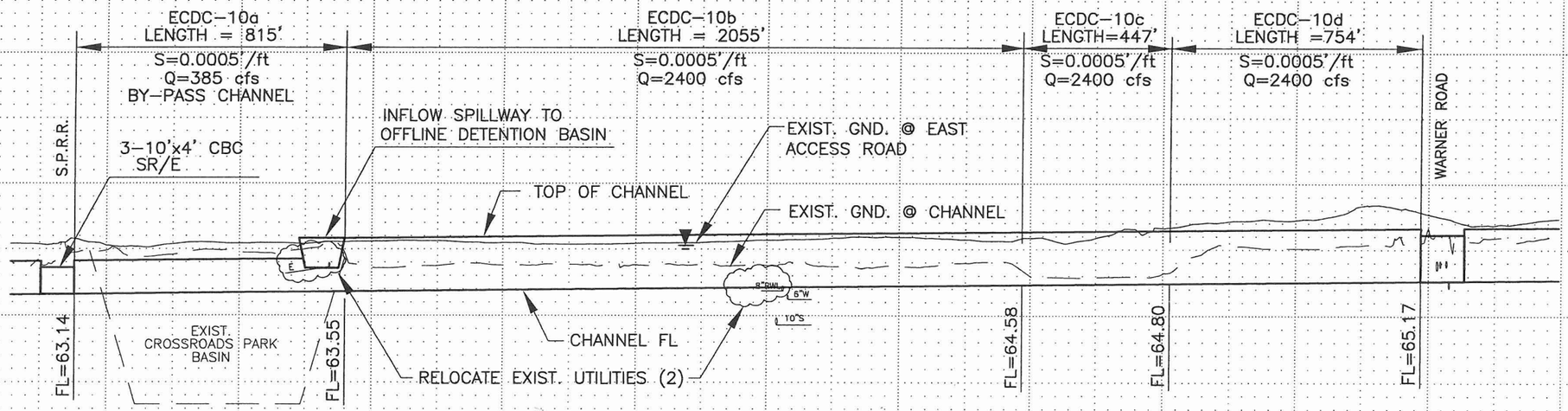
I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
SR/E	CBSNCR	385	385	100	1263.1	1263.1	0.0005	C	0.0120	3	4	ft.	10	RCBC	Wingwall	3.0	3.21	0.80	TW

BOOK 304
MAP 26



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet



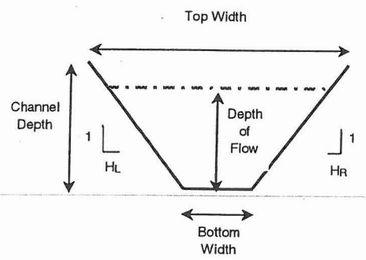
EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: EASTERN CANAL DIVERSION CHANNEL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE: 1"=400' HORIZONTAL; 1"=20' VERTICAL
	DES. DCF DATE: 08.04.00	SHEETS: NO. 22 OF 44
	CKD. BJF DATE: 08.20.00	

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)
ECDC-11a	HC6	2263	2263	1265.2	1265.4	438	0.0005	0.0005	3.8	0	0.0	LE	0.0400	90.0	7.2	4	4	852.4	149.2	0.19	Sub	2.7	1.8	9.0	162.0
ECDC-11b	HC6	2263	2263	1265.5	1266.1	1131	0.0005	0.0005	-10.4	0	0.0	LE	0.0400	90.0	7.2	4	4	852.4	149.2	0.19	Sub	2.7	1.8	9.0	162.0
ECDC-11c	HC6	2263	2263	1266.1	1266.6	1040	0.0005	0.0005	0.0	0	0.0	C	0.0150	50.0	5.6	2	4	387.7	90.6	0.49	Sub	5.8	1.5	7.1	92.6
ECDC-11d	HC5	1454	1454	1266.6	1268.0	2883	0.0005	0.0005	6.3	0	0.0	LE	0.0400	75.0	6.1	4	4	610.1	125.6	0.19	Sub	2.4	1.6	7.7	136.5

Channel Material Type: C = Concrete, R = Riprap, G = 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
WR	HC6	2263	2263	132	1265.2	1265.2	0.0004	C	0.012	5	6	ft.	10	RCBC	Wingwall	6.42	7.81	1.30	TW
GF	HC6	2263	2263	158	1265.5	1265.4	0.0004	C	0.012	5	6	ft.	10	RCBC	Wingwall	7.18	8.60	1.43	TW

BOOK 304
MAP 20

GREENFIELD ROAD

93' REQ'D. R/W

152' REQ'D. R/W

178' REQ'D. R/W

EASTERN CANAL

WARNER ROAD

GREENFIELD ROAD

ELLIOT RD.

MATCHLINE – SHEET 22

MATCHLINE – SHEET 24

GREENFIELD LAKES GOLF CLUB

GREENFIELD LAKES BK. 413, PG. 45

SAWYER ESTATES BK. 185, PG. 3

NFIELD JHS

TANK

ECDC–11a

ECDC–11b

ECDC–11c

ECDC–11d

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet

ECDC–11a
LENGTH=438'
S=0.0005'/ft
Q=2263 cfs

ECDC–11b
LENGTH = 1131'
S=0.0005'/ft
Q=2263 cfs

ECDC–11c
LENGTH = 1040'
S=0.0005'/ft
Q=2263 cfs

ECDC–11d
LENGTH = 2883'
S=0.0005'/ft
Q=1454 cfs

WARNER ROAD

GREENFIELD ROAD

ELLIOT ROAD

5–10'x6' CBC
WR

5–10'x6' CBC
GF

EXIST. GND. @ EAST ACCESS ROAD

EXIST. GND. @ CHANNEL

TOP OF CHANNEL

CHANNEL FL

1280

1260

18"RWL

6"G

12"W

12"S

EXIST. 8" SEWER

8"S IE=59.2

8"S IE=59.8

8"S IE=64.3

FL=65.22

FL=65.44

FL=65.49

FL=66.05

FL=66.57

FL=68.01

PROTECT EXIST. UTILITY IN–PLACE

RELOCATE EXIST. UTILITIES (5)

EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98–13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

EASTERN CANAL DIVERSION CHANNEL

PRIME CONSULTANT

DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962

DRN. JEV DATE: 08.16.00

DES. DCF DATE: 08.04.00

CKD. BJF DATE: 08.20.00

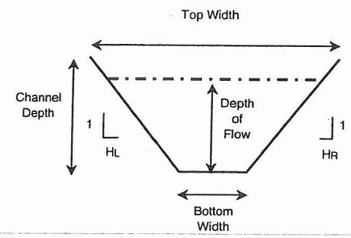
SCALE 1"=400' HORIZONTAL 1"=20' VERTICAL

SHEETS NO. 23 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion Channel

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)
ECDC-12a	HC4	940	940	1268.1	1269.4	2640	0.0005	0.0005	2.3	0	0.0	LE	0.0400	45.0	5.4	8	8	479.9	132.5	0.18	Sub	2.0	1.4	6.8	153.8
ECDC-12b	HC4	940	940	1269.4	1270.7	2611	0.0005	0.0005	3.5	0	0.0	E	0.0300	50.0	5.0	4	4	347.4	91.0	0.24	Sub	2.7	1.3	6.2	99.9

Channel Material Type: C = Concrete, R = Riprap, G = 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
ET	HC4	940	940	127	1268.1	1268.0	0.0004	C	0.012	4	5	ft.	8	RCBC	Wingwall	6.13	6.99	1.40	TW

BOOK 304
MAP 14

MATCHLINE – SHEET 23

MATCHLINE – SHEET 25

ELLIOT ROAD

GUADALUPE ROAD

EASTERN CANAL

QVHD HV

GILBERT COUNTRY ESTATES
BK. 214, PG. 7

179' REQ'D. R/W

116' REQ'D. R/W

WATER TREATMENT PLANT

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

ECDC–12a

ECDC–12b

0 100 200 400 600 800
feet

ECDC–12a
LENGTH = 2640'
S=0.0005'/ft
Q=940 cfs

ECDC–12b
LENGTH = 2611'
S=0.0005'/ft
Q=940 cfs

4–8'x5' CBC
ET

EXIST. GND. @ EAST
ACCESS ROAD

TOP OF CHANNEL

EXIST. GND. @ CHANNEL

CHANNEL FL

RELOCATE EXIST. UTILITY (1)

RELOCATE EXIST. UTILITY (2)

12"W

12" IRR.

21"S

12" RWL
IE=65.5

36" W
IE=65.5

FL=68.06

FL=69.39

FL=70.69

1280

1260

EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98–13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
EASTERN CANAL
DIVERSION CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

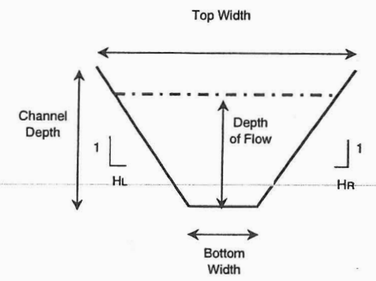
SHEETS
NO. 24 OF 44

Higley Area Drainage Master Plan
Eastern Canal Diversion Channel

Culvert 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)
ECDC-13a	HC3	450	450	1270.7	1272.8	4035	0.0005	0.0005	-0.9	0	0.0	E	0.0300	30.0	4.2	4	4	194.4	64.4	0.23	Sub	2.3	1.1	5.2	71.8
ECDC-13b	HC3	450	450	1272.8	1273.4	1228	0.0005	0.0005	0.7	0	0.0	E	0.0300	30.0	4.2	4	4	194.4	64.4	0.23	Sub	2.3	1.1	5.2	71.8

Channel Material Type: C = Concrete, R = Riprap, G = 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
GE	HC3	450	450	104	1270.7	1270.7	0.0005	C	0.012	2	4	ft.	10	RCBC	Wingwall	4.97	5.74	1.44	TW
BL	HC2	130	130	103	1273.4	1273.4	0.0005	C	0.012	1	4	ft.	6	RCBC	Wingwall	4.17	4.91	1.23	TW

BOOK 304
MAP 8

88' REQ'D. R/W

EASTERN CANAL

GREENFIELD PARK
K. 510, PG. 48

CARRIAGE PARC ESTATES 2
BK. 304, PG. 8

WHITE FENCE FARMS
UNIT FOUR
BK. 190, PG. 24

BASELINE/ZONE
BK. 480, PG. 28

GUADALUPE ROAD

BASELINE ROAD

BL

END OF CHANNEL

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

ECDC–13a

ECDC–13b

0 100 200 400 600 800
feet

ECDC–13a
LENGTH = 4035'
S=0.0005'/ft
Q=450 cfs

ECDC–13b
LENGTH = 1228'
S=0.0005'/ft
Q=450 cfs

GUADALUPE ROAD

BASELINE ROAD
END OF CHANNEL

TOP OF CHANNEL

EXIST. GND. @ EAST ACCESS ROAD

EXIST. GND. @ CHANNEL

1–6'x4' CBC
BL

1280

1260

54"SD
6"G

54" SD
16"W

24"IRR.

36"S
PROP.

FL=70.74

2–10'x4' CBC
GE

CHANNEL FL

FL=72.76

FL=73.37

FL=73.42

RELOCATE EXIST. UTILITIES (2)

RELOCATE EXIST. UTILITIES (1)

EASTERN CANAL DIVERSION CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98–13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
EASTERN CANAL
DIVERSION CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

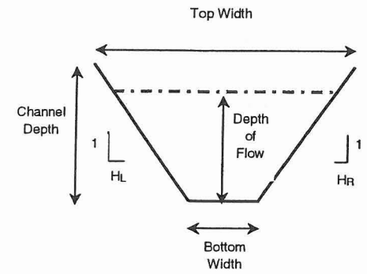
SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 25 OF 44

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) Laft (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)
ST-1a	CBASK	39	39	1209.3	1211.2	2610	0.0007	0.0007	2.0	0	0.0	LE	0.0400	4.0	2.4	4	4	32.4	23.7	0.18	Sub	1.2	1.0	3.4	31.1
ST-1b	HC48	291	291	1211.2	1214.7	2950	0.0012	0.0012	-0.1	0	0.0	LE	0.0400	25.0	3.1	6	6	135.4	62.8	0.26	Sub	2.1	1.0	4.1	74.3

Channel Material Type: C = Concrete, R = Riprap, G = 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
AA	CBASK	39	39	179	1209.3	1209.2	0.0007	C	0.0120	1	4	ft.	4	RCBC	Wingwall	2.4	2.79	0.70	OC
SR/S	CBASK	39	39	143	1210.3	1210.2	0.0009	C	0.0120	1	4	ft.	4	RCBC	Wingwall	2.4	2.77	0.69	OC

BOOK 303
MAP 28

BEGINNING OF CHANNEL

63' REQ'D. R/W

AA

SR/S

S.P.R.R.

BASIN K
SEE SH. 39

106' REQ'D. R/W

PROPOSED SANTAN FRWY.

ARIZONA AVE. (SR 87)

WILLIS RD.

McQUEEN RD.

RANCHOS DE CHANDLER UNIT ONE BK. 181, PG. 44

MADISON ESTATES BK. 326 PG. 14

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

ST-1a

ST-1b

0 100 200 400 600 800
feet

ST-1a
LENGTH = 2610'
S=0.0006'/ft
Q=39 cfs

ST-1b
LENGTH = 2950'
S=0.0012'/ft
Q=291 cfs

BEGINNING OF CHANNEL
ARIZONA AVE. (SR 87)

1-4'x4' CBC
A A

S.P.R.R.

1-4'x4' CBC
SR/S

EXIST. GND. @ CHANNEL

TOP OF CHANNEL

McQUEEN RD.

1220

1200

12'W

FL=09.17

FL=09.30

RELOCATE EXIST. UTILITY (1)

FL=10.17

FL=10.30

BASIN "K"

FL=11.20

12'W PROP.

T
12'W.0

2'C.

CHANNEL FL

FL=14.68

24" STORM DRAIN PIPE

RELOCATE EXIST. UTILITIES (3)

SANTAN CHANNEL & STORM DRAIN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
SANTAN
CHANNEL & STORM DRAIN

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

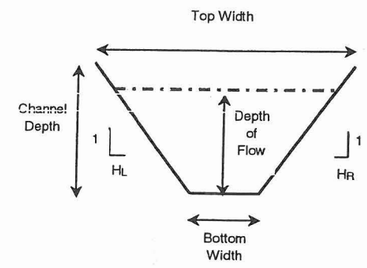
SHEETS
NO. 26 OF 44

Higley Area Drainage Master Plan
Santan 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)
ST-2	HC48	291	291	1214.8	1226.2	2135	0.0054	0.0028	10.6	0	0.0	LE	0.0400	4.0	4.2	4	4	86.3	38.4	0.39	Sub	3.4	1.1	5.3	46.1
ST-3a	HC39A	350	350	1228.8	1231.3	1326	0.0019	0.0019	0.1	0	0.0	LE	0.0400	16.0	3.5	6	6	127.9	58.2	0.32	Sub	2.7	1.0	4.5	69.7

Channel Material Type: C = Concrete, R = Riprap, G = 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
MQ/S	HC48	291	291	100	1214.8	1214.7	0.0011	C	0.0120	2	4	ft.	8	RCBC	Wingwall	3.1	3.54	0.88	TW
ST/C	HC39A	350	350	300	1228.8	1227.7	0.0035	C	0.0120	2	4	ft.	8	RCBC	Wingwall	0.0	3.97	0.99	IC

BOOK 303
MAP 29

SHEET 26

MATCHLINE

McQUEEN RD.

MQ/S

WILLIS RD.

78' REQ'D. R/W

91' REQ'D. R/W

102' REQ'D. R/W

CONSOLIDATED CANAL

CROPS

PROPOSED SANTAN FRWY.

ST-3a

ST-2

ST-3b

ST/C

BASIN "L"
SEE SHEET 40

COOPER RD.

SHEET 28

MATCHLINE

N 831,000

N 830,000

N

0 100 200 400 600 800
feet

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

ST-2
LENGTH = 2135'
S=0.0028'/ft
Q=291 cfs

ST-3b
LENGTH = 1326'
S=0.0015'/ft
Q=350 cfs

McQUEEN RD.

2-8'x4' CBC
MQ/S

TOP OF CHANNEL

CHANNEL FL

END OF CHANNEL

CONSOLIDATED CANAL

EXIST. GND. @ CHANNEL

2-8'x4' CBC
ST/C

FUTURE SANTAN FRWY.

BEGINNING OF CHAN.

COOPER ROAD

12"W
18"FM
24"S
36"W PROP.
24"RWL PROP.
12"RWL PROP.
12"W PROP.

FL=14.79

FL=26.22

FL=28.20

FL=28.75

FL=31.25

24" STORM DRAIN PIPE

BASIN "L"

RELOCATE EXIST. UTILITIES (4)

1220

1200

SANTAN CHANNEL & STORM DRAIN

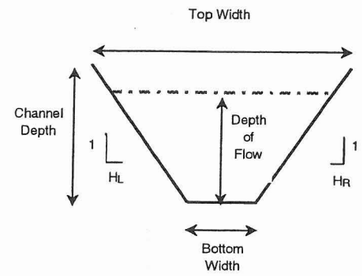
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: SANTAN CHANNEL & STORM DRAIN	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE
	DES. DCF DATE: 08.04.00	1"=400' HORIZONTAL
	CKD. BJF DATE: 08.20.00	1"=20' VERTICAL
		SHEETS NO. 27 OF 44

Higley Area Drainage Master Plan
Santan 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)
ST-4	HC39A	350	350	1231.4	1244.9	5182	0.0026	0.0026	12.6	0	0.0	LE	0.0400	16.0	3.2	6	6	114.0	55.2	0.37	Sub	3.1	1.0	4.2	66.7

Channel Material Type: C = Concrete, R = Riprap, G = 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
CR	HC39A	350	350	120	1231.4	1231.3	0.0014	C	0.0120	2	4	ft.	8	RCBC	Wingwall	3.5	4.11	1.03	TW

BOOK 303
MAP 30

ARIZONA ESTATES
BK. 491, PG. 24

PECOS ALDEA UNIT 7
BK. 395, PG. 45

ARIZONA IMPRESSIONS
BK. 504, PG. 14

25A

27

COOPER RD.

CR

N 831,000

9B

MATCHLINE SHEET 28

99' REQ'D. R/W

PROPOSED SANTAN FRWY.

10

4F

1

3

8D

N 830,000

GILBERT RD.

MATCHLINE SHEET 29

N

0 100 200 400 600 800
feet

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

ST-4

ST-4
LENGTH = 5182'
S=0.0026'/ft
Q=350 cfs

COOPER ROAD

GILBERT ROAD

2-8'x4' CBC
CR

TOP OF CHANNEL

EXIST. GND. @ CHANNEL

1260

1240

1220

4'G

36"W
PROP.

18"W
PROP.

FL=31.42

Q 12"W
PROP.

CHANNEL FL

FL=44.92

24" STORM DRAIN PIPE

RELOCATE EXIST. UTILTIES (1)

SANTAN CHANNEL & STORM DRAIN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
SANTAN
CHANNEL & STORM DRAIN

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

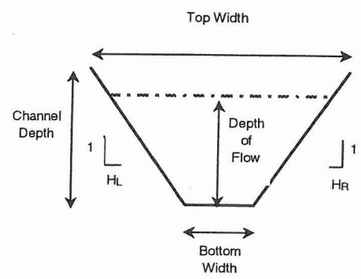
SHEETS
NO. 28 OF 44

Higley Area Drainage Master Plan
Santan 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)
ST-5	HC39A	350	350	1245.2	1253.6	4718	0.0018	0.0018	4.3	0	0.0	LE	0.0400	20.0	3.3	6	6	131.8	60.2	0.32	Sub	2.7	1.0	4.3	71.7

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

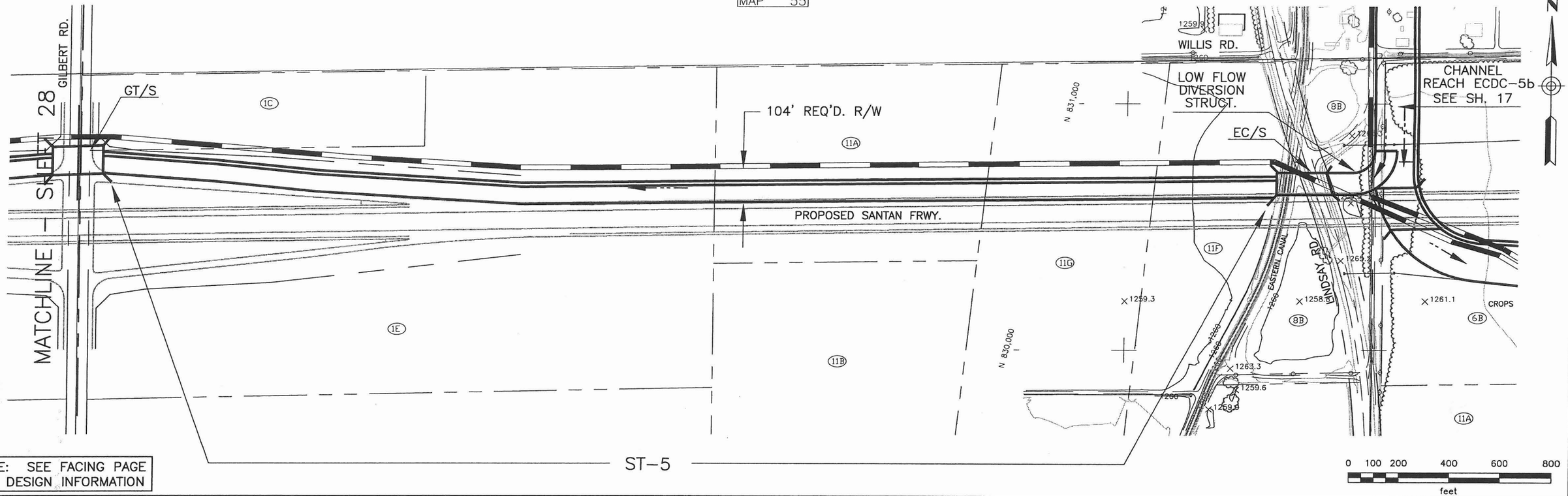


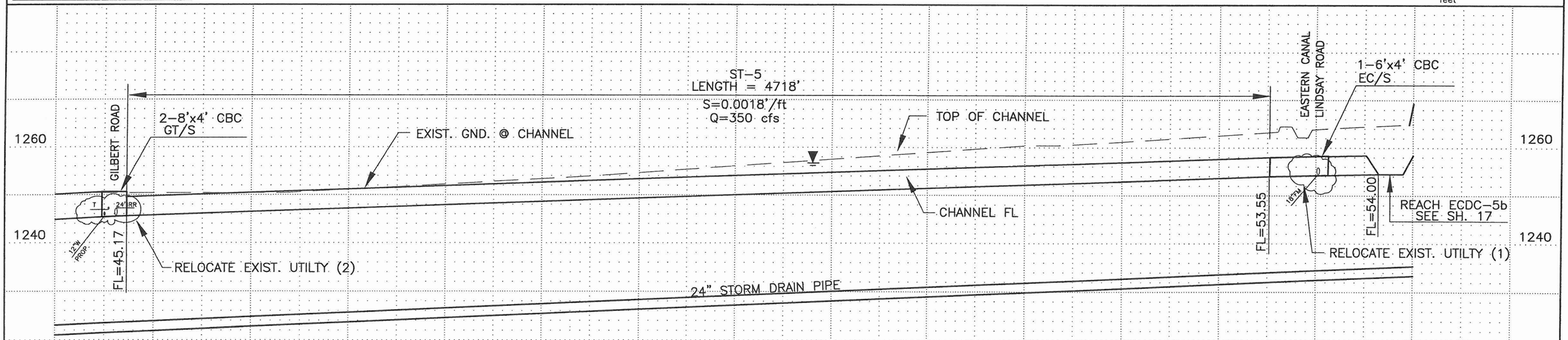
Typical Channel Section

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
GT/S	HC39A	350	350	100	1245.2	1244.9	0.0025	C	0.012	2	4	ft.	8	RCBC	Wingwall	3.22	3.97	0.99	IC
EC/S	DIOL	100	100	450	1254.0	1253.6	0.0010	C	0.012	1	4	ft.	6	RCBC	Wingwall	3.31	3.63	0.91	TW

BOOK 303
MAP 55





SANTAN CHANNEL & STORM DRAIN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

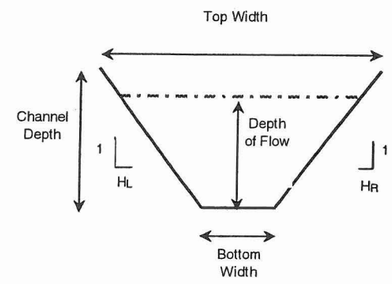
COUNTY PROJECT NO. 98–13	HIGLEY AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: SANTAN CHANNEL & STORM DRAIN		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE
	DES. DCF DATE: 08.04.00	1"=400' HORIZONTAL
	CKD. BJF DATE: 08.20.00	1"=20' VERTICAL
		SHEETS NO. 29 OF 44

Higley Area Drainage Master Plan
Santan Channel

Channel Properties

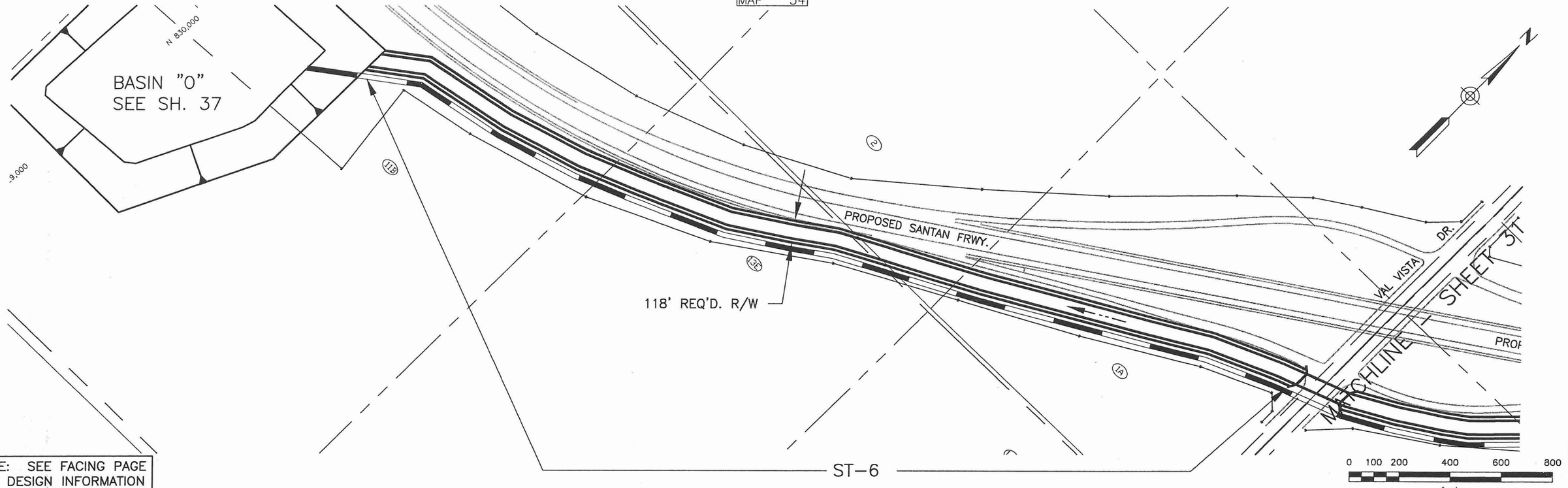
I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Downstream Invert Elevation (ft)	Upstream Invert Elevation (ft)	Length (ft.)	Computed Invert. Slope (ft./ft.)	Design Invert Slope (ft./ft.)	Total Vertical Drop (ft.)	No. of Drops	Vertical Drop (ft.)	Material Type	Manning's "n" Value	Bottom Width, 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)
ST-6	D32	584	584	1264.3	1270.7	4004	0.0016	0.0016	3.8	0	0.0	LE	0.0400	20.0	4.3	6	6	200.3	72.9	0.31	Sub	2.9	1.1	5.5	85.6

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

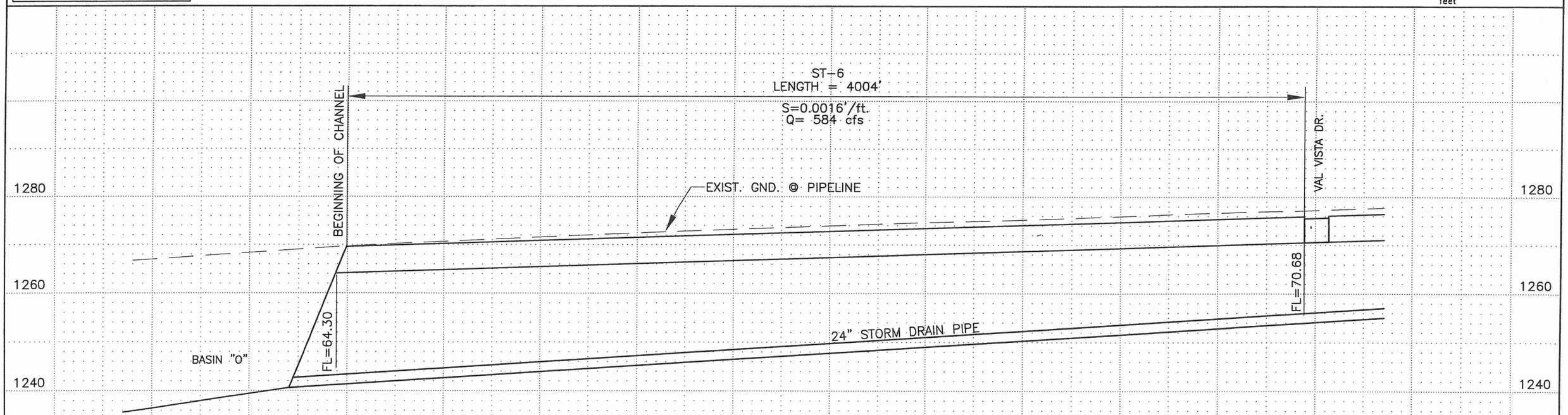


Typical Channel Section

BOOK 304
MAP 54



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



SANTAN CHANNEL & STORM DRAIN

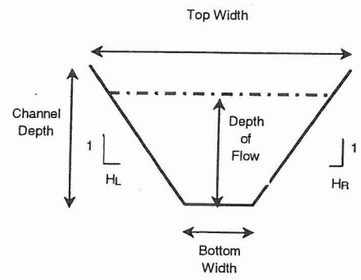
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: SANTAN CHANNEL & STORM DRAIN		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS (Since 1962)	DRN. JEV DATE: 08.16.00	SCALE: 1"=400' HORIZONTAL; 1"=20' VERTICAL
	DES. DCF DATE: 08.04.00	
	CKD. BJF DATE: 08.20.00	SHEETS NO. 30 OF 44

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)
ST-7	SUB32	584	584	1270.9	1276.2	3321	0.0016	0.0016	-0.9	0	0.0	LE	0.0400	20.0	4.3	6	6	200.3	72.9	0.31	Sub	2.9	1.1	5.5	85.6

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

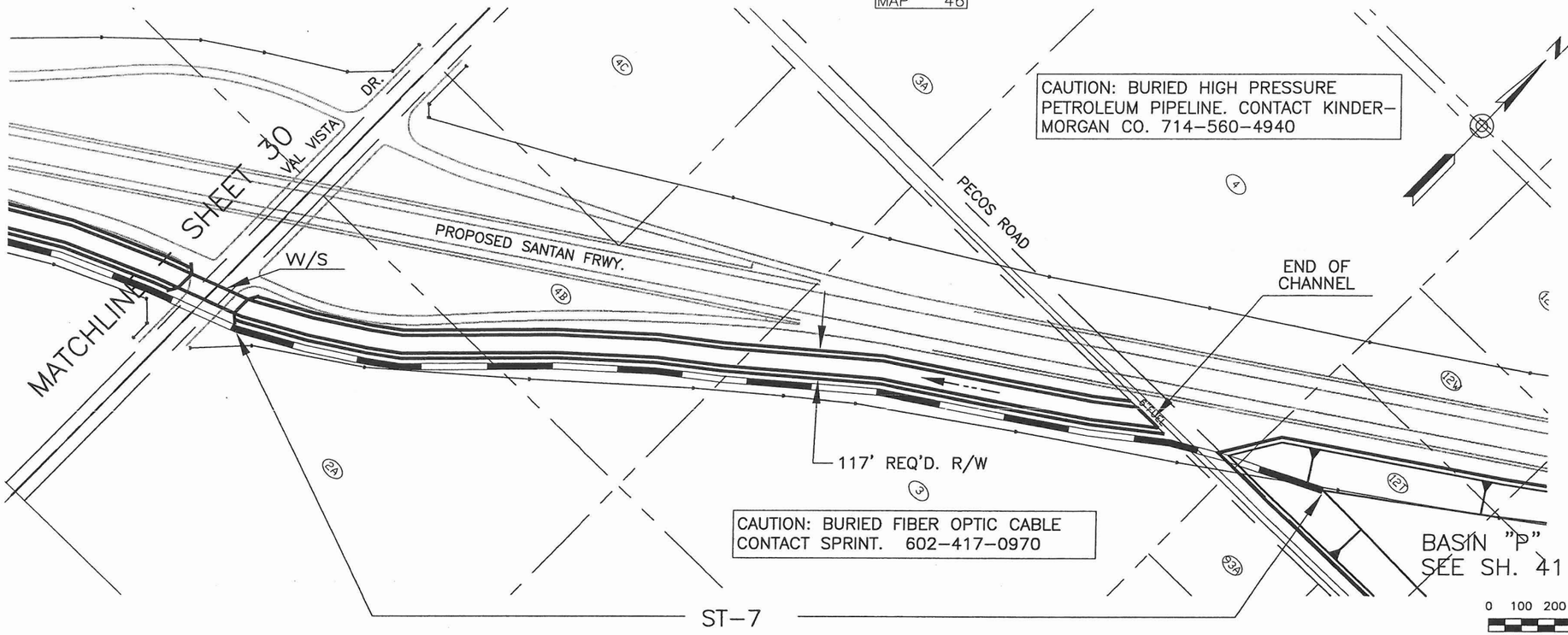


Typical Channel Section

Culvert Properties

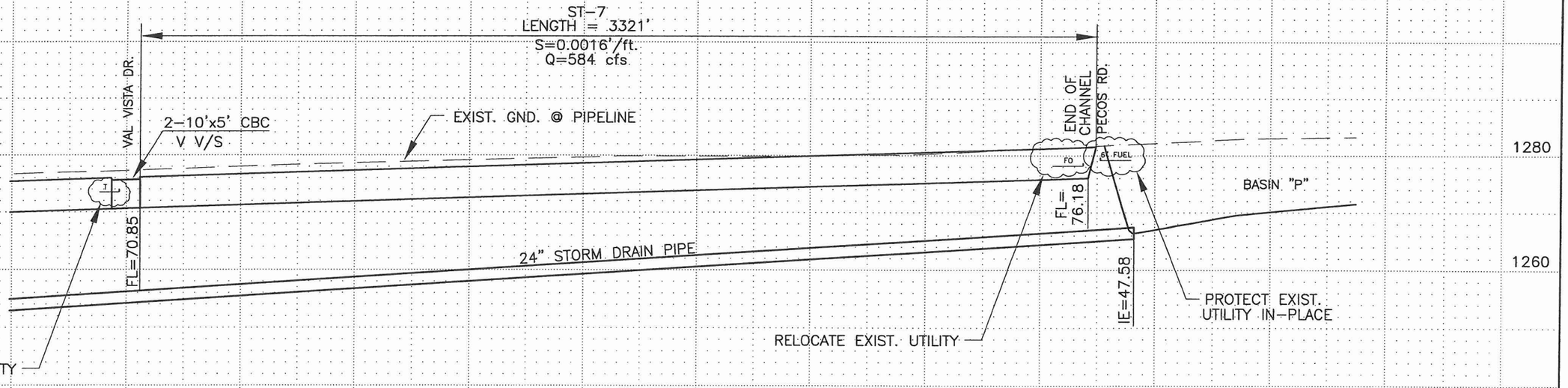
I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width (ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
VV/S	SUB32	584	584	100	1270.9	1270.7	0.0017	C	0.0120	2	5	ft.	10	RCBC	Wingwall	4.3	5.03	1.01	TW

BOOK 304
MAP 46



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

ST-7



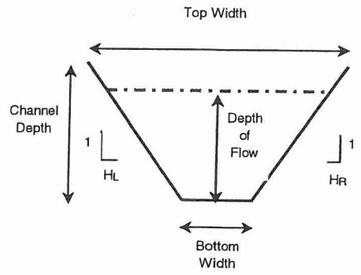
SANTAN CHANNEL & STORM DRAIN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: SANTAN CHANNEL & STORM DRAIN	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL
	DES. DCF DATE: 08.04.00	
	CKD. BJF DATE: 08.20.00	SHEETS NO. 31 OF 44

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)
ST-8	RT30P	560	560	1278.0	1279.9	3816	0.0005	0.0005	-1.3	0	0.0	LE	0.0400	35.0	4.8	6	6	305.7	93.3	0.18	Sub	1.8	1.2	6.0	107.1

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



Typical Channel Section

BOOK 304
MAP 46

BASIN "P"
SEE SH. 41

14C

14B

8A

END OF CHANNEL

PROPOSED SANTAN FRWY.

WILLIAMS FIELD RD.

MATCHLINE — SHEET 33

GREENFIELD RD.

140' REQ'D. R/W

8A

43X

34A

45

33

18D

18T

18R

8A

11G

22

7B

ST-8

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

BOOK 304
MAP 47

0 100 200 400 600 800
feet

ST-8
LENGTH = 3816'
S=0.0005'/ft
Q=560 cfs

BEGINNING OF CHANNEL

EXIST. GND. @ CHANNEL

TOP OF CHANNEL

END OF CHANNEL
WILLIAMS FIELD ROAD

PECOS RD.

1280

BASIN "P"

FL=78.00

CHANNEL FL

FL=79.90

1280

1260

1260

SANTAN CHANNEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

SANTAN CHANNEL

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

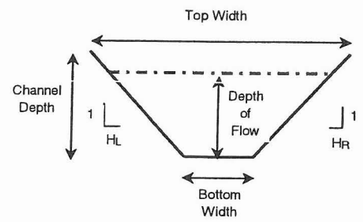
SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 32 OF 44

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)
ST-9	D30B	448	448	1276.4	1279.7	4872	0.0007	0.0007	0.7	0	0.0	LE	0.0400	25.0	4.4	6	6	225.5	78.4	0.21	Sub	2.0	1.1	5.5	91.0

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

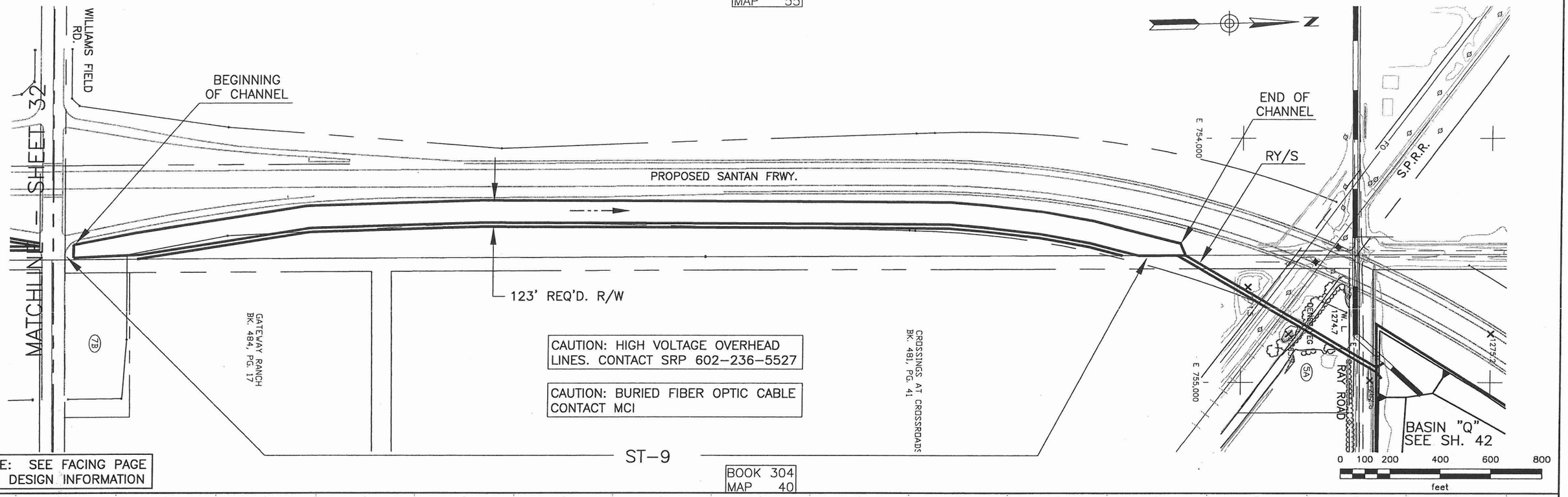


Typical Channel Section

Culvert Properties

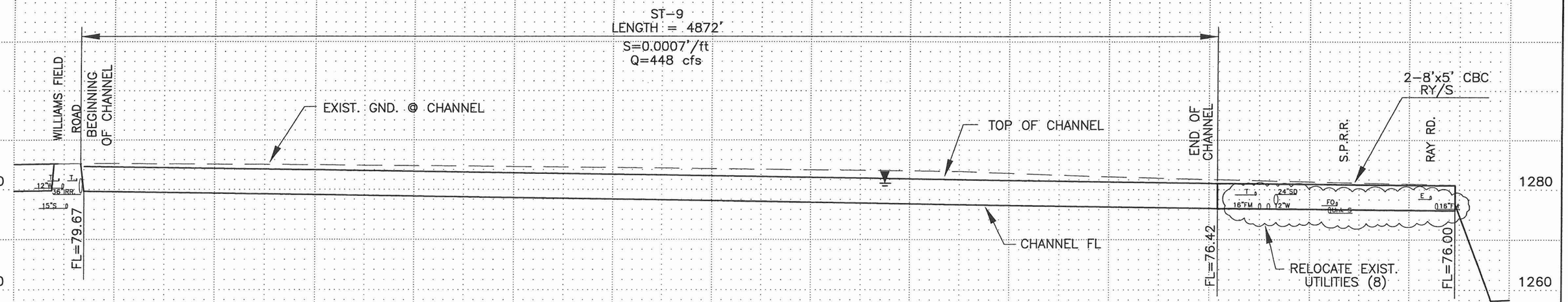
I.D.	HEC-1 I.D.	Design Q100 (cfs)	Comp. Capacity (cfs)	Length (ft.)	Inlet Inv. (ft.)	Outlet Inv. (ft.)	Slope (ft./ft.)	Material/ Barrel Type	Manning's "n" Value	Number of Barrels	Culvert Dia./ Height	Unit	Width ft)	Barrel/ Material	Entrance (Wingwall, Headwall or Project)	Tailwater Depth (ft.)	Computed Headwater	Computed HW/D	Control
RY/S	D30B	448	448	400	1276.4	1276.0	0.0011	C	0.0120	2	5	ft.	8	RCBC	Wingwall	4.8	5.51	1.10	TW

BOOK 303
MAP 55



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

BOOK 304
MAP 40



SANTAN CHANNEL

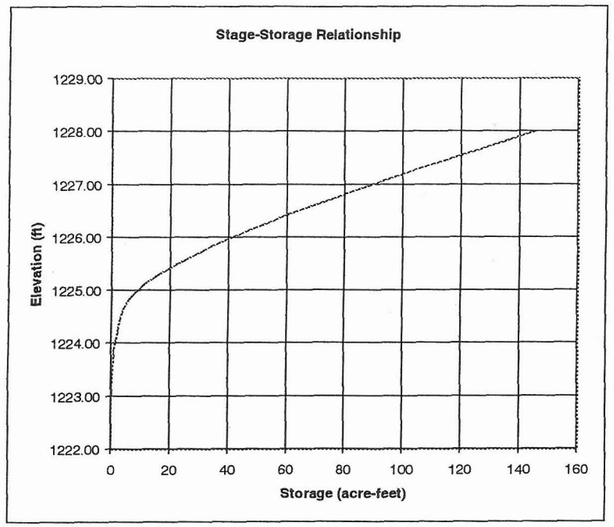
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: SANTAN CHANNEL	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00 / DES. DCF DATE: 08.04.00 / CKD. BJF DATE: 08.20.00	SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL
		SHEETS: NO. 33 OF 44

Detention Basin Properties

Queen Creek Basin

Basin Land Area	63.0 Acres	Length of Fencing =		0 ft
Basin Excavation Volume	128,812 C.Y.			
Q100 Inflow =	1,261 cfs	Outflow Pipe (no. & Dia.) =	1	24 in.
Q100 Outflow =	34 cfs	Pipe Invert at Inlet=		23.0 ft
Highwater Elev. (Q100) =	27.77 ft	Pipe Invert at Outlet=		24.1 ft
Maximum Ponding Depth	4.8 ft	Pipe Length =		300 ft
		Pipe Slope =		0.0037 ft/ft
		Inflow Spillway Width (2) =		58.3 ft
		Inflow Spillway Length (2) =		28.2 ft

Elev.	Cum. Volume (acre-ft.)
1223	0.13
1224	1.50
1225	8.80
1226	41.49
1227	89.49
1228	145.48



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 303
MAP 41

CHANNEL–REACH CCDC–4a
SEE SHEET 7

CHANNEL–REACH CCDC–4b
SEE SHEET 7

CHANNEL–REACH CCDC–5a
SEE SHEET 8

OCOTILLO RD.

McQUEEN ROAD

McQUEEN RD.

CITY OF CHANDLER
SOLID WASTE DISPOSAL

CONSOLIDATED CANAL

QUEEN CREEK BASIN

QUEEN CREEK RD.

INV=23.0

24" RCP DRAIN PIPE

113' REQ'D. R/W

BEGINNING OF CHANNEL

END OF CHANNEL

BASIN SERVICE RD.

NOTE: SEE FACING PAGE
FOR DESIGN INFORMATION

0 100 200 400 600 800
feet

QCLAT
LENGHT=2833'
S=0.0005'/ft
Q=581 cfs

QUEEN CREEK BASIN
VOLUME=132 AF
DEPTH=4.8 FT
AREA=63 AC

OCOTILLO RD.
BEGINNING OF CHANNEL

END OF CHANNEL

QUEEN CREEK RD.

QC/I
4–12'x4' CBC

1240

1220

EXIST. GND.

TOP OF CHANNEL

CHANNEL FL

EL=24.42

EL=23.0

EL=24.1

42"S
PROP.

16'W

QUEEN CREEK BASIN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

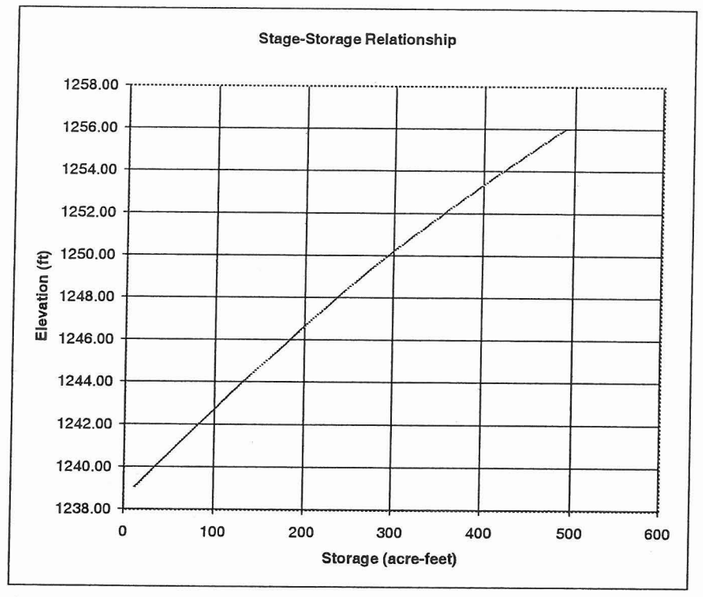
COUNTY PROJECT NO. 98–13	HIGLEY AREA DRAINAGE MASTER PLAN
PROJECT DESCRIPTION	QUEEN CREEK BASIN & LATERAL
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00
	DES. DCF DATE: 08.04.00
	CKD. BJF DATE: 08.20.00
SCALE	1"=400' HORIZONTAL; 1"=20' VERTICAL
SHEETS	NO. 34 OF 44

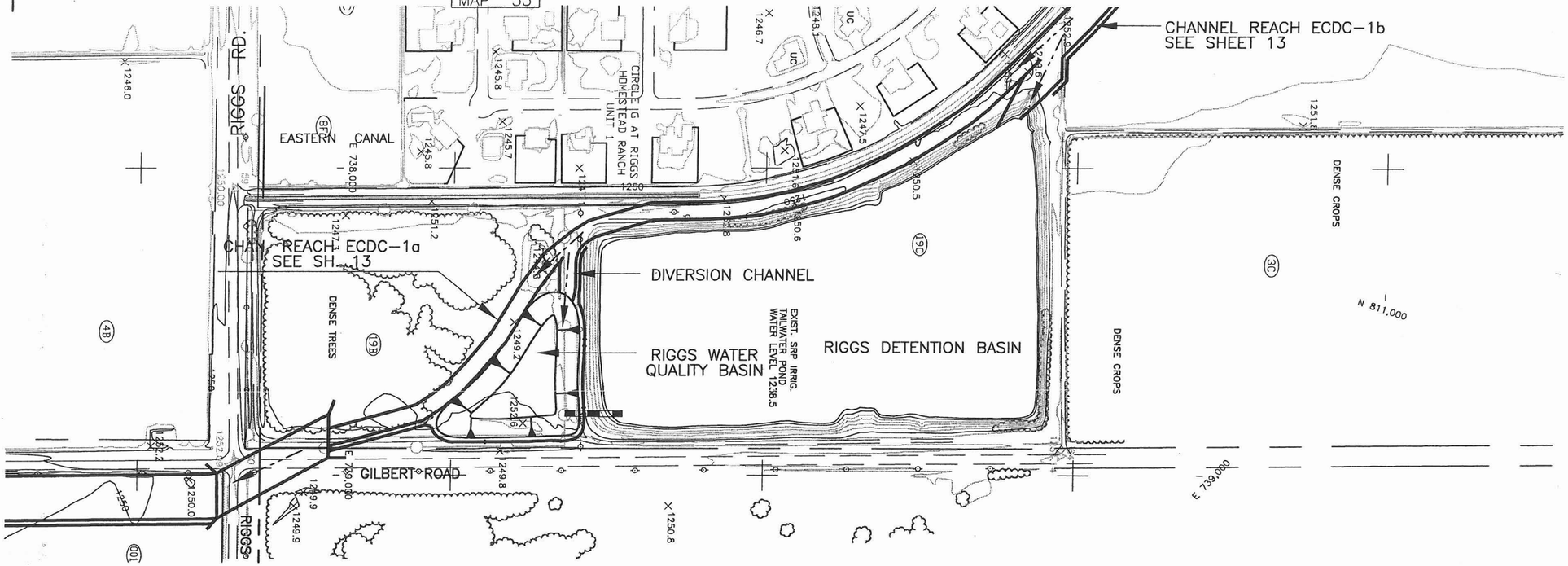
Detention Basin Properties
Riggs Basin

Basin Land Area	29.0 Acres	Length of Fencing =	0 ft
Basin Excavation Volume	0 C.Y.		
Q100 Inflow =	560 cfs	Outflow Pipe (no. & Dia.) =	- in.
Q100 Outflow =	0 cfs	Pipe Invert at Inlet=	- ft
Highwater Elev. (Q100) =	47.69 ft	Pipe Invert at Outlet=	- ft
Maximum Ponding Depth	* ft	Pipe Length =	0 ft
		Pipe Slope =	N/A ft/ft
* see design sheet		Inflow Spillway Width (2) =	29.9 ft
		Inflow Spillway Length (2) =	55.8 ft

Elev.	Cum. Volume (acre-ft.)
1239	11.55
1240	34.57
1241	58.01
1242	82.20
1243	106.93
1244	132.13
1245	157.79
1246	183.75
1247	209.99
1248	236.80
1249	264.38
1250	293.28
1251	323.96
1252	355.60
1253	388.27
1254	421.77
1255	455.48
1256	489.19

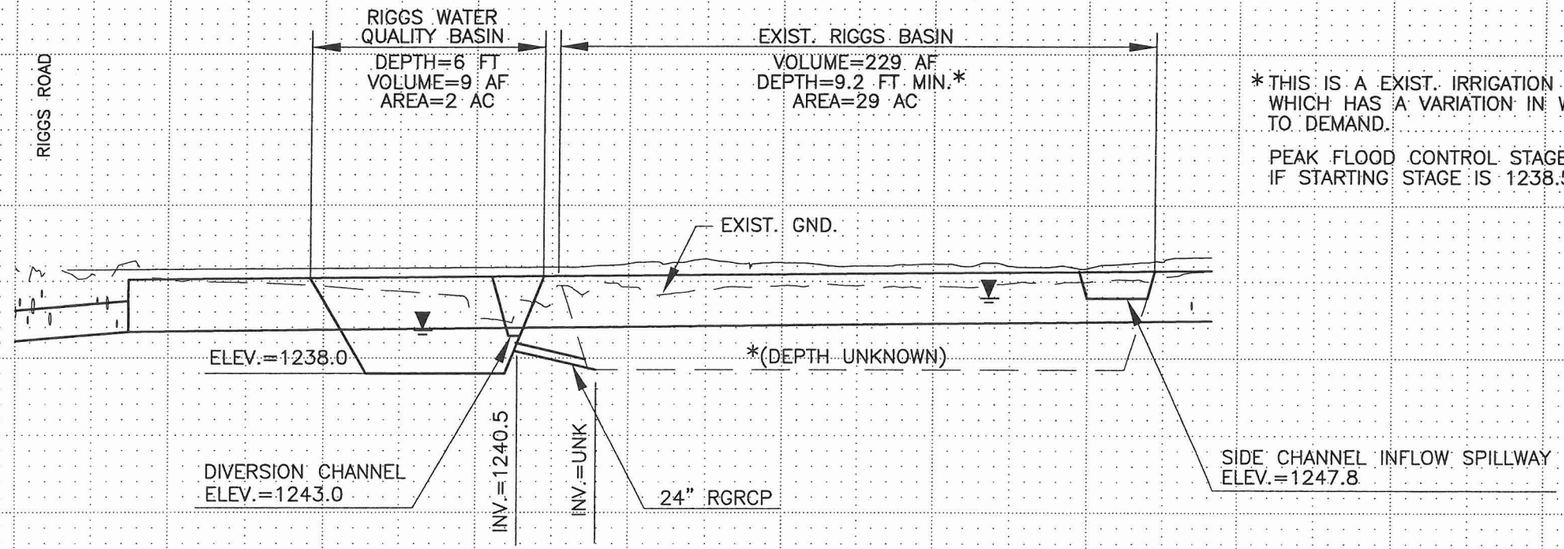
Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.





NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet



*THIS IS A EXIST. IRRIGATION TAILWATER BASIN WHICH HAS A VARIATION IN WATER DEPTH DUE TO DEMAND.

PEAK FLOOD CONTROL STAGE IS 1247.8' IF STARTING STAGE IS 1238.5'

WATER QUALITY BASIN

RIGGS BASIN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
RIGGS BASIN
WATER QUALITY BASIN

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

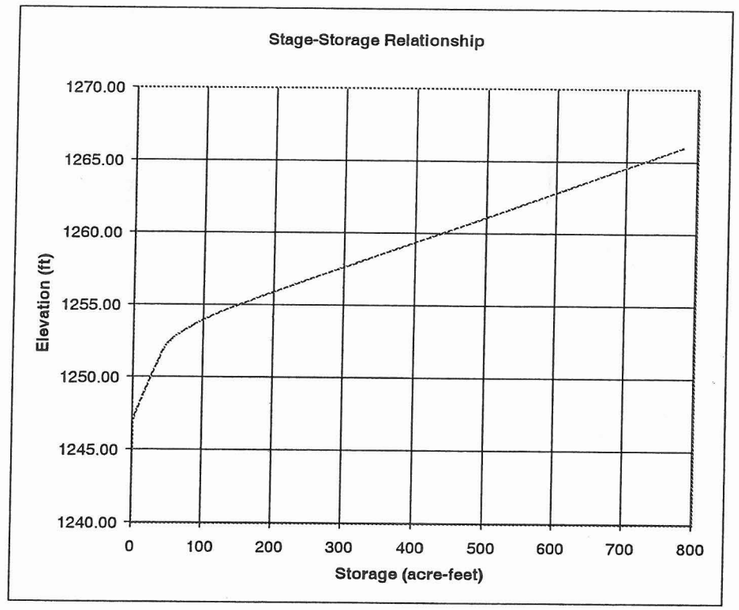
SHEETS
NO. 35 OF 44

Detention Basin Properties

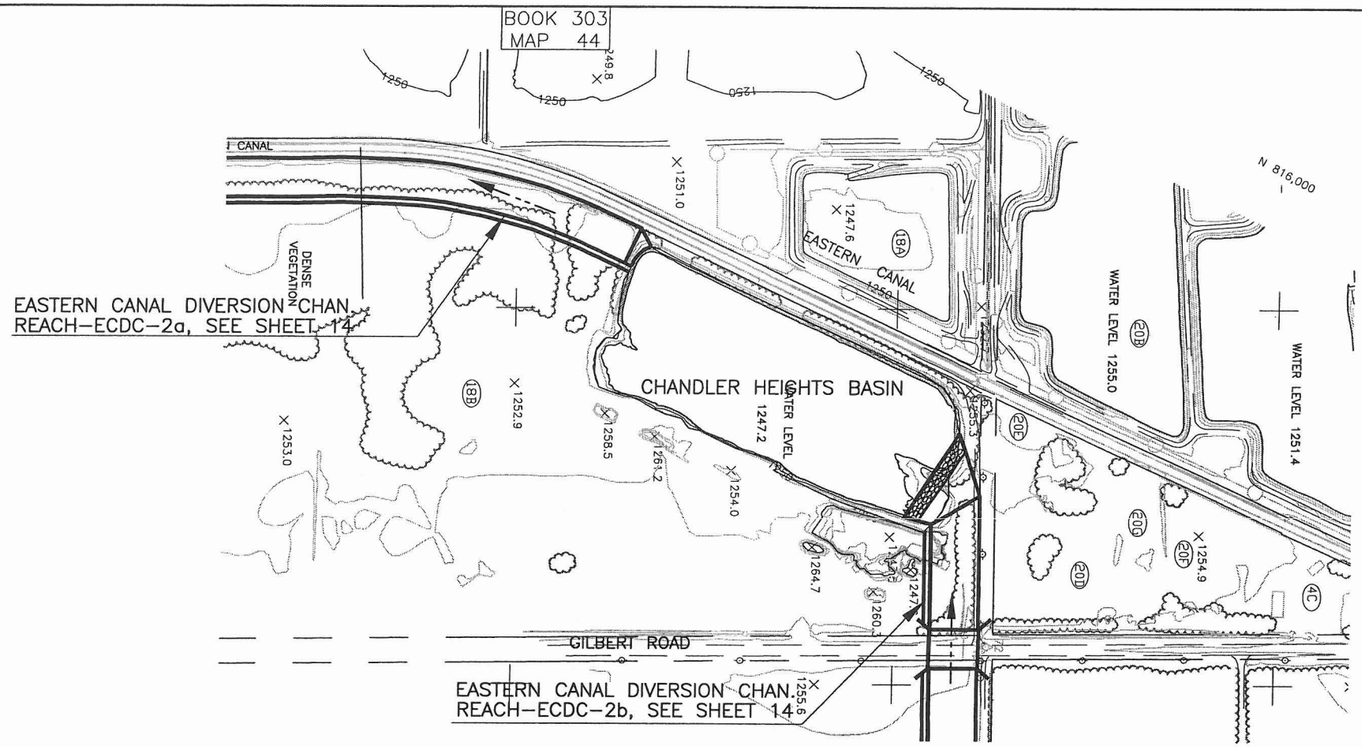
Chandler Heights Basin

Basin Land Area	9.0 Acres	Length of Fencing =	0 ft
Basin Excavation Volume	0 C.Y.		
Q100 Inflow =	1,014 cfs	Outflow Pipe (no. & Dia.) =	- - in.
Q100 Outflow =	595 cfs	Pipe Invert at Inlet=	- ft
Highwater Elev. (Q100) =	1253.63 ft	Pipe Invert at Outlet=	- ft
Maximum Ponding Depth	6.5 ft	Pipe Length =	0 ft
		Pipe Slope =	N/A ft/ft
		Inflow Spillway Width (2) =	N/A ft
		Inflow Spillway Length (2) =	N/A ft
		Spillway elevation =	1250 ft

Elev.	Cum. Volume (acre-ft.)
1243	0.00
1244	0.10
1245	0.54
1246	1.03
1247	1.59
1248	8.48
1249	16.95
1250	25.88
1251	35.21
1252	44.85
1253	65.05
1254	101.27
1255	150.66
1256	206.61
1257	263.95
1258	321.48
1259	379.09
1260	436.72
1261	494.36
1262	552.01
1263	609.66
1264	667.32
1265	724.97
1266	782.62

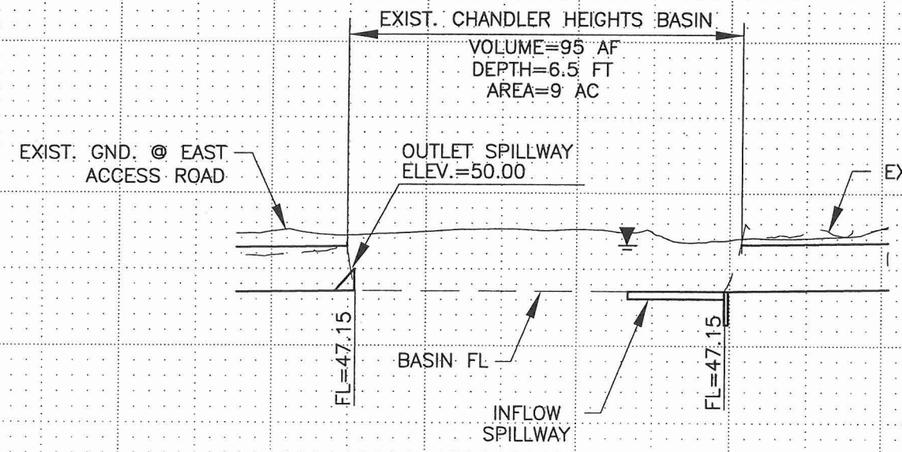


Note: (1) Volume computations based upon results obtained from surface modeling software.
(2) Width is perpendicular to flow. Length is measured down the slope.



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet



CHANDLER HEIGHTS BASIN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98–13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION: CHANDLER HEIGHTS BASIN

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1967

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

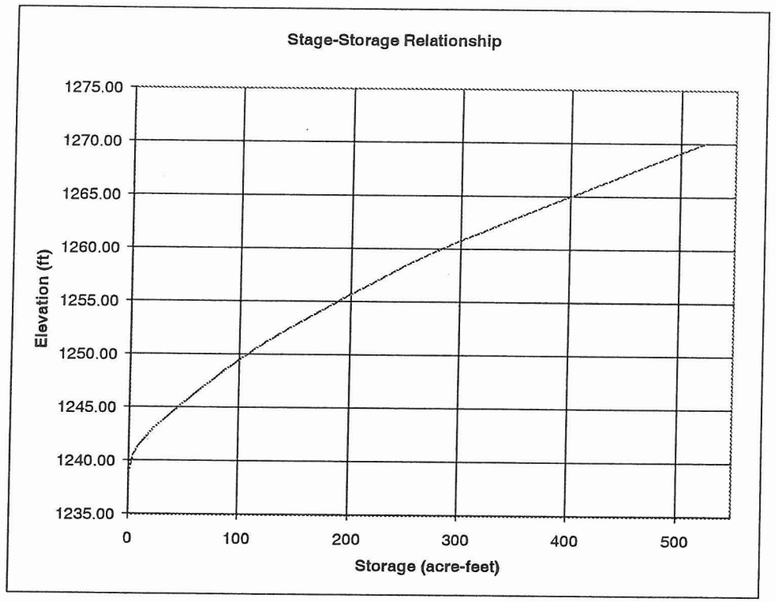
SCALE: 1"=400' HORIZONTAL; 1"=20' VERTICAL

SHEETS NO. 36 OF 44

Detention Basin Properties
ADOT Basin "O"

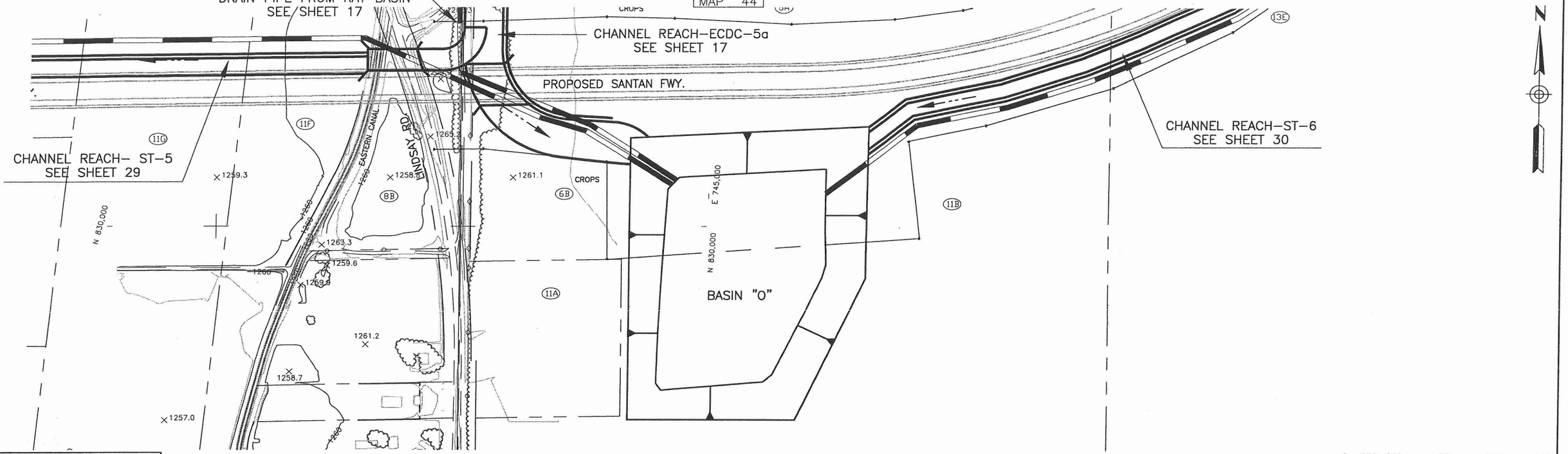
Basin Land Area	24.0 Acres	Length of Fencing =		0 ft
Basin Excavation Volume	737,218 C.Y.			
Q100 Inflow =	1,461 cfs	Outflow Pipe (no. & Dia.) =	1	24 in.
Q100 Outflow =	0 cfs	Pipe Invert at Inlet=		37.0 ft
Highwater Elev. (Q100) =	58.41 ft	Pipe Invert at Outlet=		3.5 ft
Maximum Ponding Depth	20.4 ft	Pipe Length =		14350 ft
		Pipe Slope =		0.0023 ft/ft
		Inflow Spillway Width (2) =		58 ft
		Inflow Spillway Length (2) =		265 ft

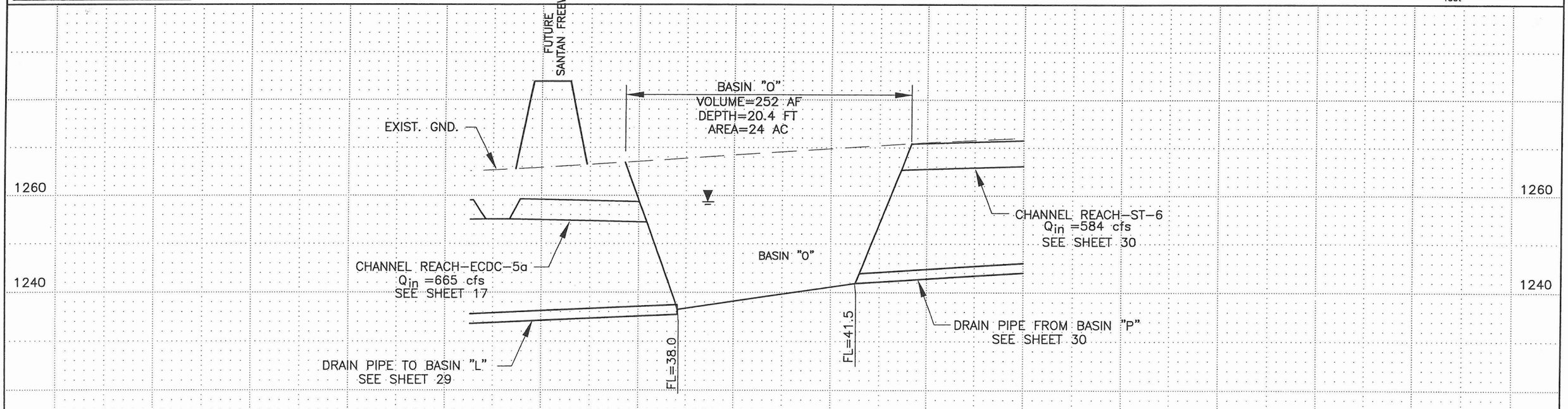
Elev.	Cum. Volume (acre-ft.)
1238	0.02
1239	0.36
1240	2.36
1241	6.09
1242	12.98
1243	22.17
1244	33.24
1245	44.77
1246	56.71
1247	68.78
1248	81.24
1249	94.29
1250	107.83
1251	121.86
1252	137.13
1253	154.00
1254	171.08
1255	188.17
1256	205.41
1257	223.52
1258	242.34
1259	261.82
1260	282.13
1261	304.67
1262	328.62
1263	352.58
1264	376.54
1265	400.50
1266	424.57
1267	448.72
1268	472.88
1269	497.03
1270	521.28



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 304
MAP 44





BASIN "O"

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98–13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

BASIN "O"

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

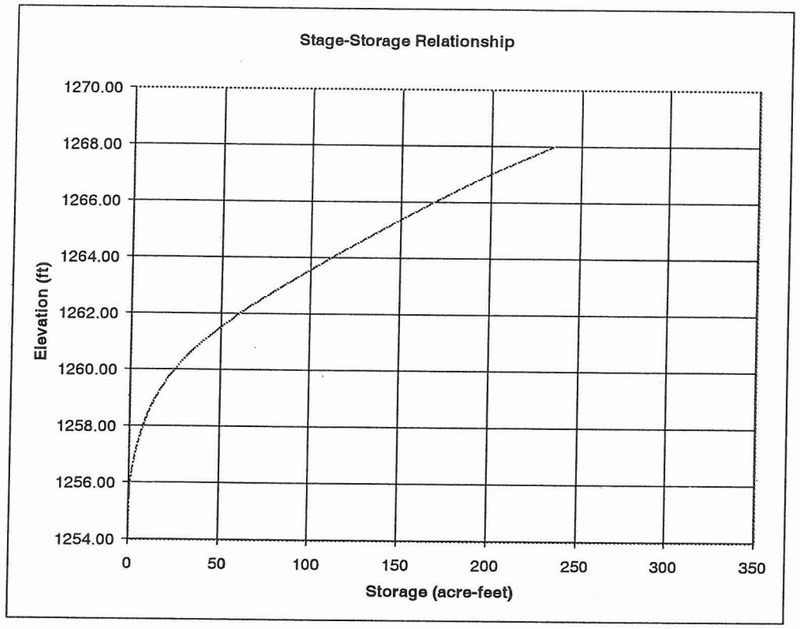
SHEETS
NO. 37 OF 44

Detention Basin Properties
Ray Basin

Basin Land Area	31.0 Acres	Length of Fencing =		0 ft
Basin Excavation Volume	303,617 C.Y.			
Q100 Inflow =	390 cfs	Outflow Pipe (no. & Dia.) =	1	24 in.
Q100 Outflow =	13 cfs	Pipe Invert at Inlet=		1254.0 ft
Highwater Elev. (Q100) =	1265.6 ft	Pipe Invert at Outlet=		1236.2 ft
Maximum Ponding Depth	10.9 ft	Pipe Length =		16476 ft
		Pipe Slope =		0.0011 ft/ft
		Inflow Spillway Width (2) =		19.5 ft
		Inflow Spillway Length (2) =		6.6 ft

Elev.	Cum. Volume (acre-ft.)
1255	0.00
1256	0.58
1257	3.01
1258	7.41
1259	14.07
1260	24.60
1261	39.99
1262	60.39
1263	84.91
1264	111.54
1265	139.44
1266	168.42
1267	199.36
1268	234.53

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 304
MAP 41

DRAIN PIPE TO BASIN "O"
INV=54.7

EASTERN CANAL DIVERSION CHAN.
REACH ECDC-9a, SEE SH. 21

EASTERN CANAL DIVERSION CHANNEL
REACH ECDC-9b
SEE SHEET 21

RAY BASIN

RAY ROAD

DRAIN PIPE FROM BASIN "Q"
SEE SHEET 42

N 841,000
N 842,000
N 843,000
N 844,000
E 751,000
E 750,000
N 846,000

0 100 200 400 600 800
feet

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

RAY BASIN
VOLUME=157 AF
DEPTH=10.9 FT
AREA=31 AC

1280
1260

EXIST. GND.
RELOCATE EXIST. UTILITIES (1)
RAY ROAD
S=0.003'/FT
12"ø
IE=64.9
INFLOW SPILLWAY
FL=61.7
FIELDS
S=0.0010'/FT
FL=59.0
15"S
IE=48.7
PROTECT EXIST. UTIL. IN PLACE(1)

RAY BASIN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

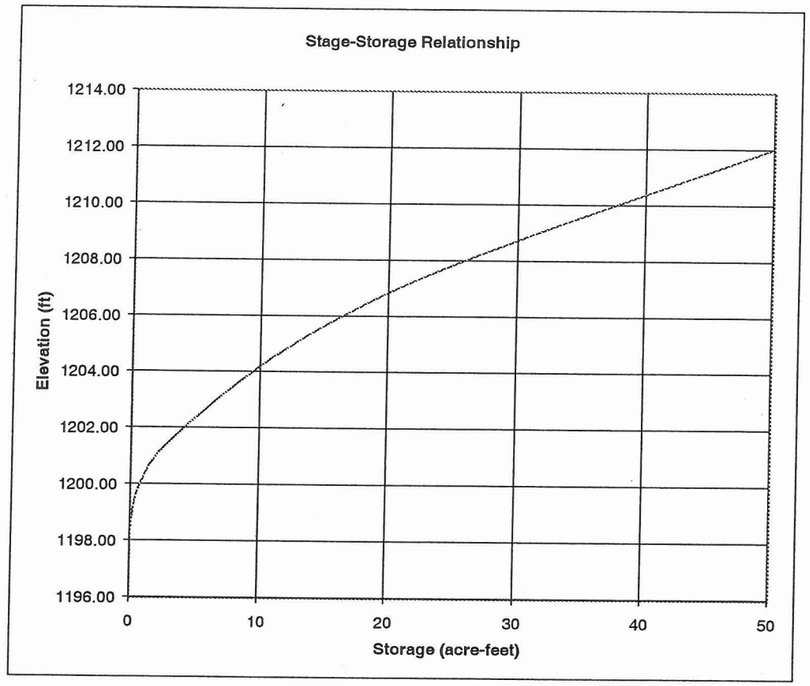
COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
PROJECT DESCRIPTION: RAY BASIN	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00
	DES. DCF DATE: 08.04.00
	CKD. BJF DATE: 08.20.00
SCALE	1"=400' HORIZONTAL, 1"=20' VERTICAL
SHEETS	NO. 38 OF 44

Detention Basin Properties
Basin K

Basin Land Area	10.0 Acres	Length of Fencing =	0 ft
Basin Excavation Volume	155,089 C.Y.		
Q100 Inflow =	254 cfs	Outflow Pipe (no. & Dia.) =	- in.
Q100 Outflow =	0 cfs	Pipe Invert at Inlet=	- ft
Highwater Elev. (Q100) =	1207.8 ft	Pipe Invert at Outlet=	- ft
Maximum Ponding Depth	9.8 ft	Pipe Length =	0 ft
		Pipe Slope =	N/A ft/ft
		Inflow Spillway Width (2) =	48.5 ft
		Inflow Spillway Length (2) =	214.8 ft

Elev.	Cum. Volume (acre-ft.)
1198	0.00
1199	0.16
1200	0.72
1201	1.98
1202	4.15
1203	6.71
1204	9.45
1205	12.67
1206	16.41
1207	20.76
1208	25.90
1209	31.61
1210	37.71
1211	43.83
1212	49.94

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 303
MAP 28

TO A.D.O.T. SYSTEM

SANTAN CHAN.–REACH ST–1a
SEE SHEET 26

S.P.R.R.

ARIZONA AVE. (SR 87)

N 832,000

PROJECT BOUNDARY

ADOT R/W

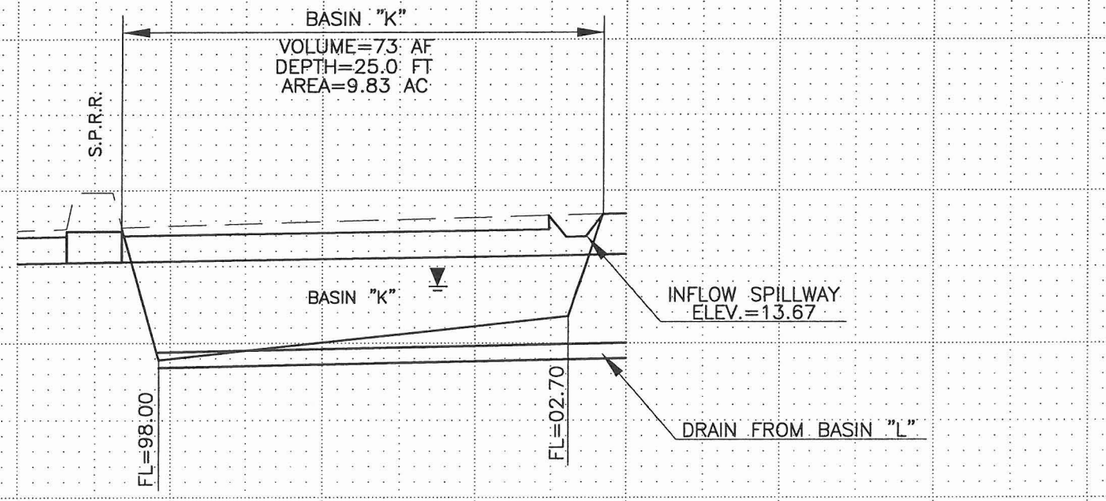
BASIN "K"

PROPOSED SANTAN FRWY.

SANTAN CHAN.–REACH ST–1a
SEE SHEET 26

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet



BASIN "K"

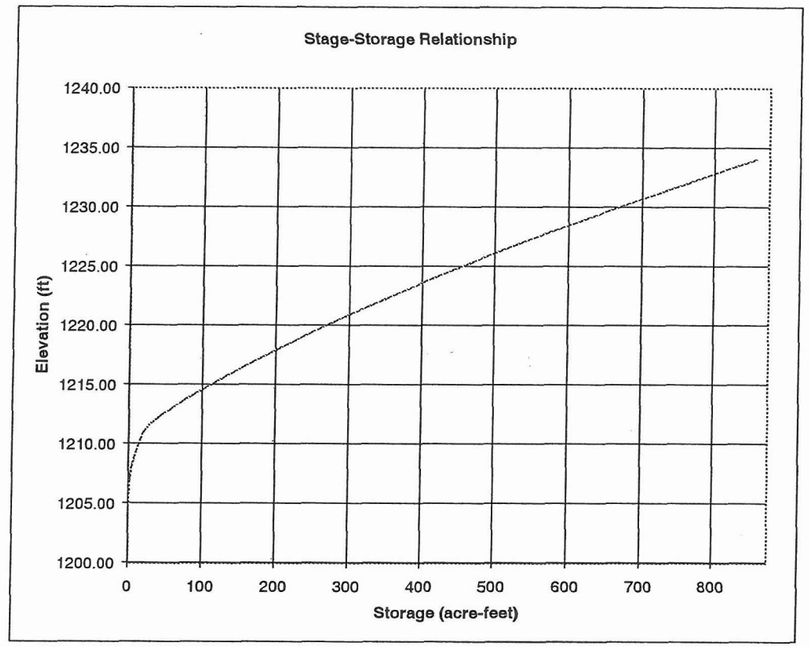
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98–13	HIGLEY AREA DRAINAGE MASTER PLAN
PROJECT DESCRIPTION	BASIN "K"
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS (Since 1963)	DRN. JEV DATE: 08.16.00
	DES. DCF DATE: 08.04.00
	CKD. BJF DATE: 08.20.00
SCALE	1"=400' HORIZONTAL; 1"=20' VERTICAL
SHEETS	NO. 39 OF 44

Detention Basin Properties
ADOT Basin "L"

Basin Land Area	45.0 Acres	Length of Fencing =		0 ft
Basin Excavation Volume	1,202,867 C.Y.			
Q100 Inflow =	349 cfs	Outflow Pipe (no. & Dia.) =	1	24 in.
Q100 Outflow =	0 cfs	Pipe Invert at Inlet=		1204.5 ft
Highwater Elev. (Q100) =	1221.66 ft	Pipe Invert at Outlet=		1197.6 ft
Maximum Ponding Depth	17.2 ft	Pipe Length =		7030 ft
		Pipe Slope =		0.0010 ft/ft
		Inflow Spillway Width (2) =		32.3 ft
		Inflow Spillway Length (2) =		193.8 ft

Elev.	Cum. Volume (acre-ft.)
1205	0.02
1206	0.35
1207	1.58
1208	4.45
1209	8.65
1210	14.03
1211	20.42
1212	35.09
1213	59.56
1214	84.95
1215	112.25
1216	141.51
1217	172.19
1218	203.93
1219	236.39
1220	269.27
1221	303.97
1222	340.61
1223	378.37
1224	416.78
1225	455.94
1226	495.62
1227	536.86
1228	580.79
1229	624.75
1230	668.96
1231	715.62
1232	762.63
1233	809.64
1234	856.74



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 303
MAP 29

PROPOSED SANTAN FRWY.

DRAIN PIPE TO BASIN "K"
SEE SHEET 27

SANTAN CHANNEL
REACH ST-3
SEE SHEET 27

CROPS

BASIN "L"

COOPER RD.

CROPS

CONSOLIDATION CANAL
DIVERSION CHANNEL
REACH CCDC-5c
SEE SHEET 8

CONSOLIDATED CANAL

CONSOLIDATION CANAL
DIVERSION CHANNEL LATERAL
SEE SHEET 44

GERMANN RD.

GERMANN ROAD

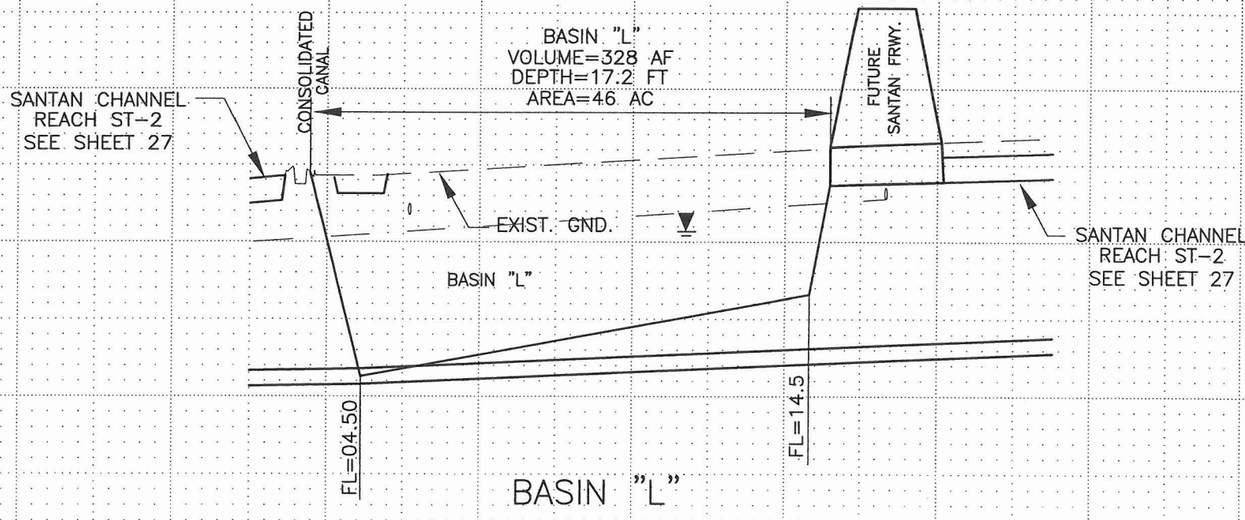
N 830,000

N 829,000

1229.1
1231.0
1229.9
1233.0
1227.7
1226

NOTE: SEE FACING PAGE
FOR DESIGN INFORMATION

0 100 200 400 600 800
feet



BASIN "L"

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION
BASIN "L"

PRIME CONSULTANT
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

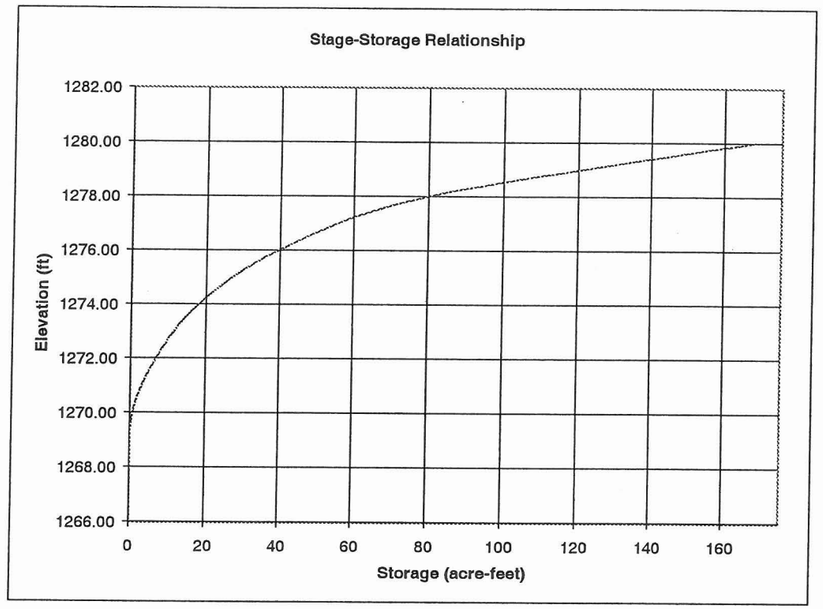
SCALE
1"=400' HORIZONTAL
1"=20' VERTICAL

SHEETS
NO. 40 OF 44

Detention Basin Properties
ADOT Basin "P"

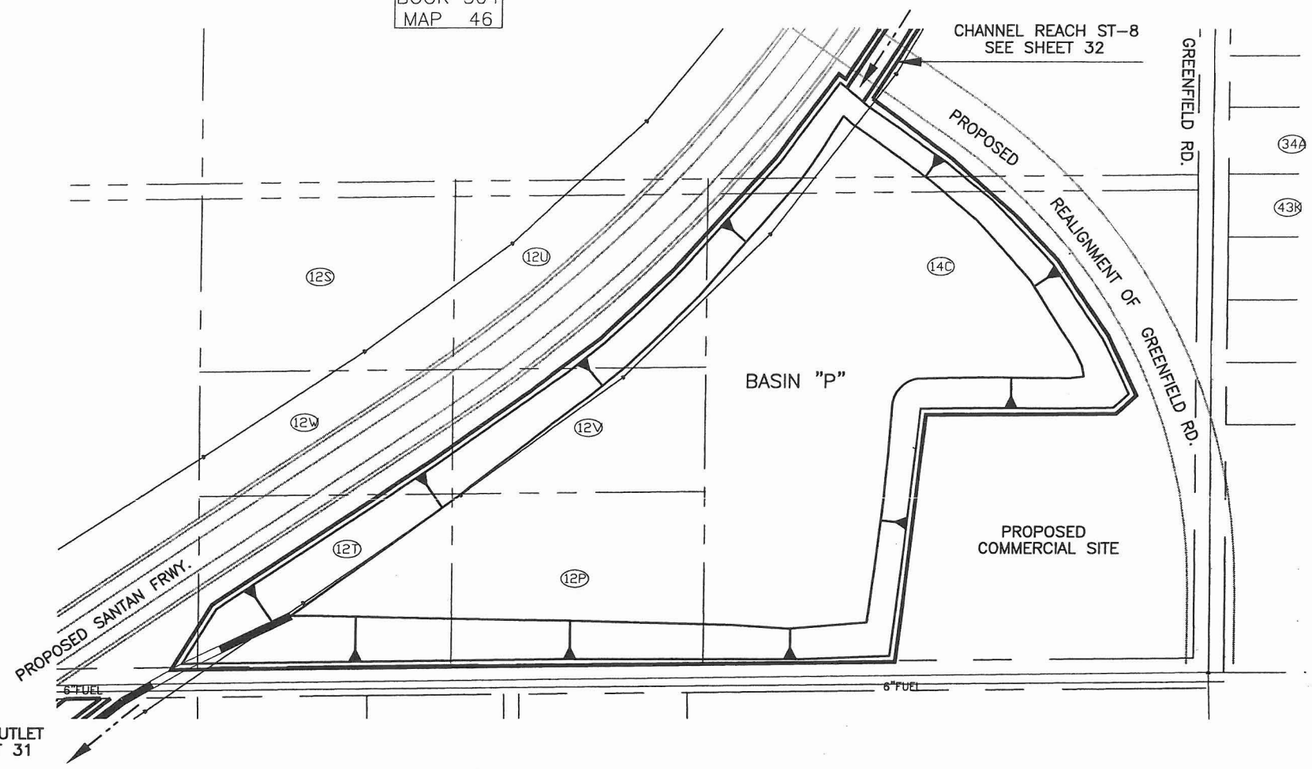
Basin Land Area	42.0 Acres	Length of Fencing =	0 ft
Basin Excavation Volume	808,141 C.Y.		
Q100 Inflow=	560 cfs	Outflow Pipe (no. & Dia.) =	1 24 in.
Q100 Outflow =	2 cfs	Pipe Invert at Inlet=	67.0 ft
Highwater Elev. (Q100) =	78 ft	Pipe Invert at Outlet=	41.5 ft
Maximum Ponding Depth	10.0 ft	Pipe Length =	7812 ft
		Pipe Slope =	0.0033 ft/ft
		Inflow Spillway Width (2) =	25 ft
		Inflow Spillway Length (2) =	50.4 ft

Elev.	Cum. Volume (acre-ft.)
1268	0.0
1270	0.7
1272	6.8
1274	18.1
1276	39.7
1278	80.1
1280	167.6



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 304
MAP 46

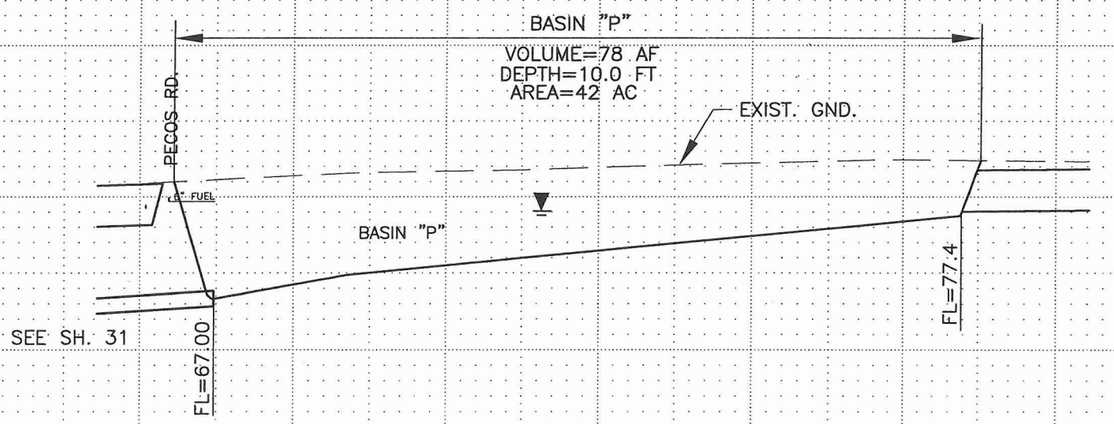


N

CAUTION: BURIED HIGH PRESSURE PETROLEUM PIPELINE. CONTACT KINDER-MORGAN CO. 714-560-4940

NOTE: SEE FACING PAGE FOR DESIGN INFORMATION

0 100 200 400 600 800
feet



BASIN "P"

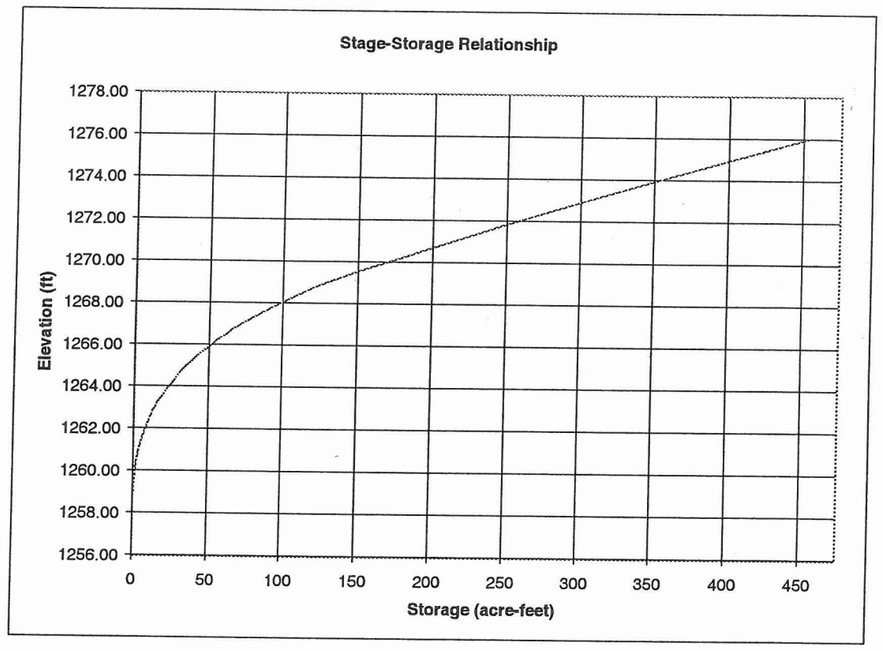
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN	
PROJECT DESCRIPTION: BASIN "P"		
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL
	DES. DCF DATE: 08.04.00	
	CKD. BJF DATE: 08.20.00	SHEETS NO. 41 OF 44

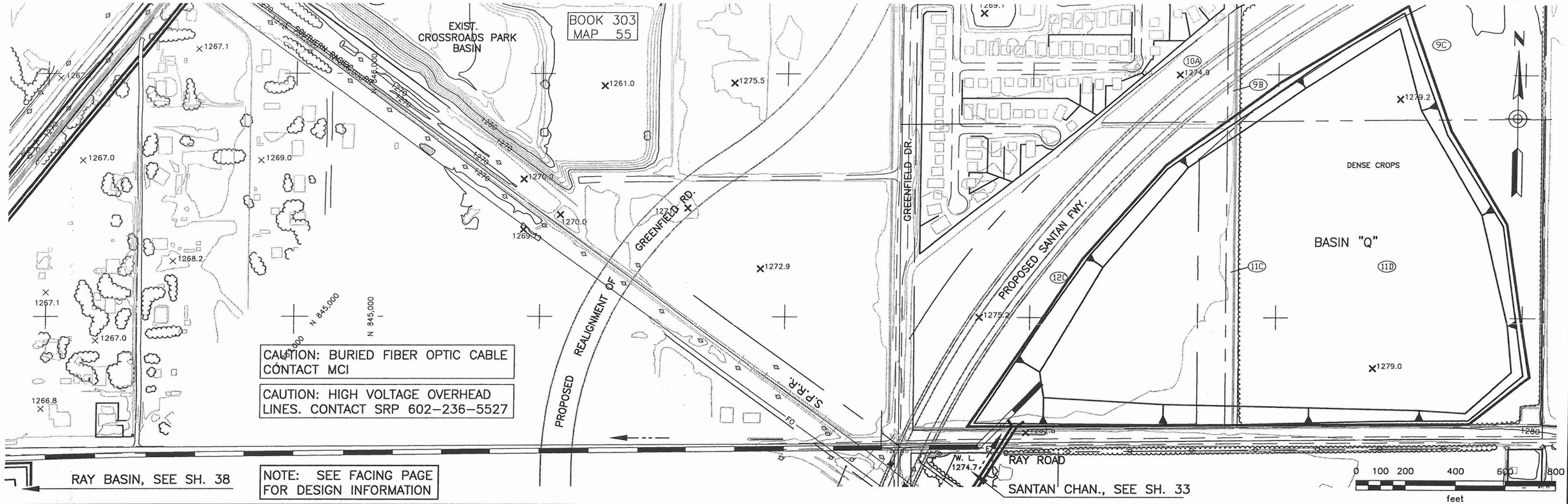
Detention Basin Properties
ADOT Basin "Q"

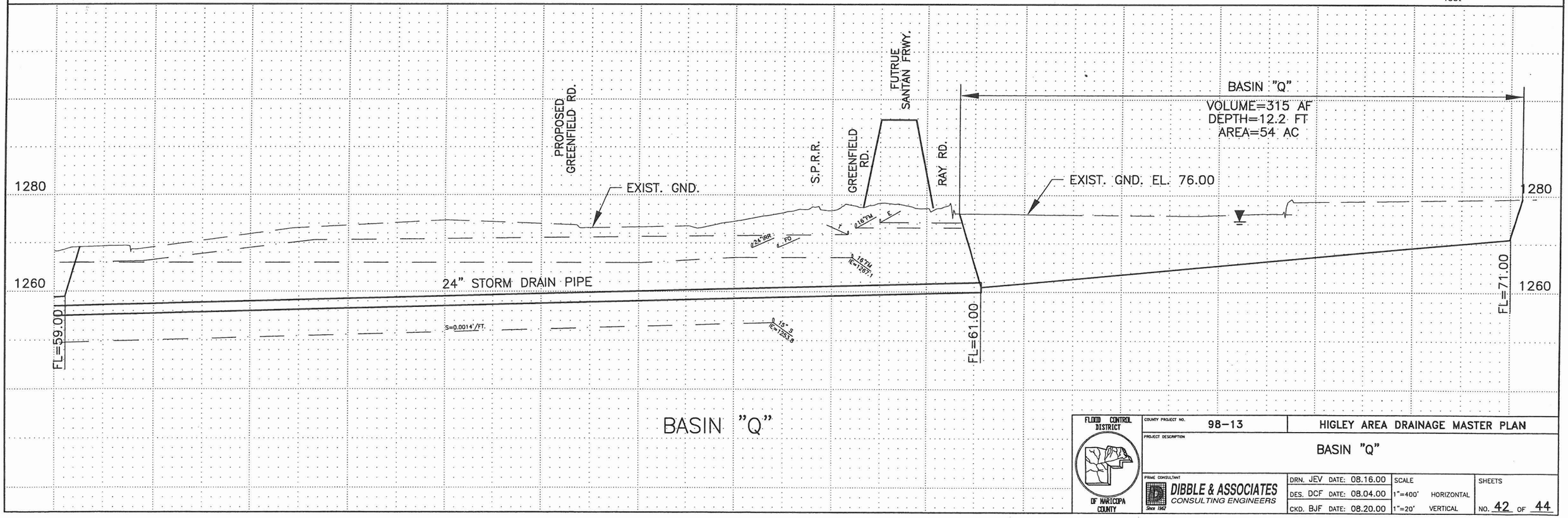
Basin Land Area	54.0 Acres	Length of Fencing =		0 ft
Basin Excavation Volume	898,540 C.Y.			
Q100 Inflow =	1,217 cfs	Outflow Pipe (no. & Dia.) =	1	24 in.
Q100 Outflow =	2 cfs	Pipe Invert at Inlet=		61.0 ft
Highwater Elev. (Q100) =	73.19 ft	Pipe Invert at Outlet=		54.0 ft
Maximum Ponding Depth	12.2 ft	Pipe Length =		4170 ft
		Pipe Slope =		0.0017 ft/ft
		Inflow Spillway Width (2) =		60.85 ft
		Inflow Spillway Length (2) =		81.6 ft

Elev.	Cum. Volume (acre-ft.)
1258	0.01
1259	0.31
1260	1.50
1261	3.58
1262	7.96
1263	13.70
1264	23.54
1265	35.17
1266	51.58
1267	72.51
1268	98.70
1269	129.69
1270	170.18
1271	213.49
1272	258.00
1273	304.84
1274	353.62
1275	403.52
1276	453.68



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





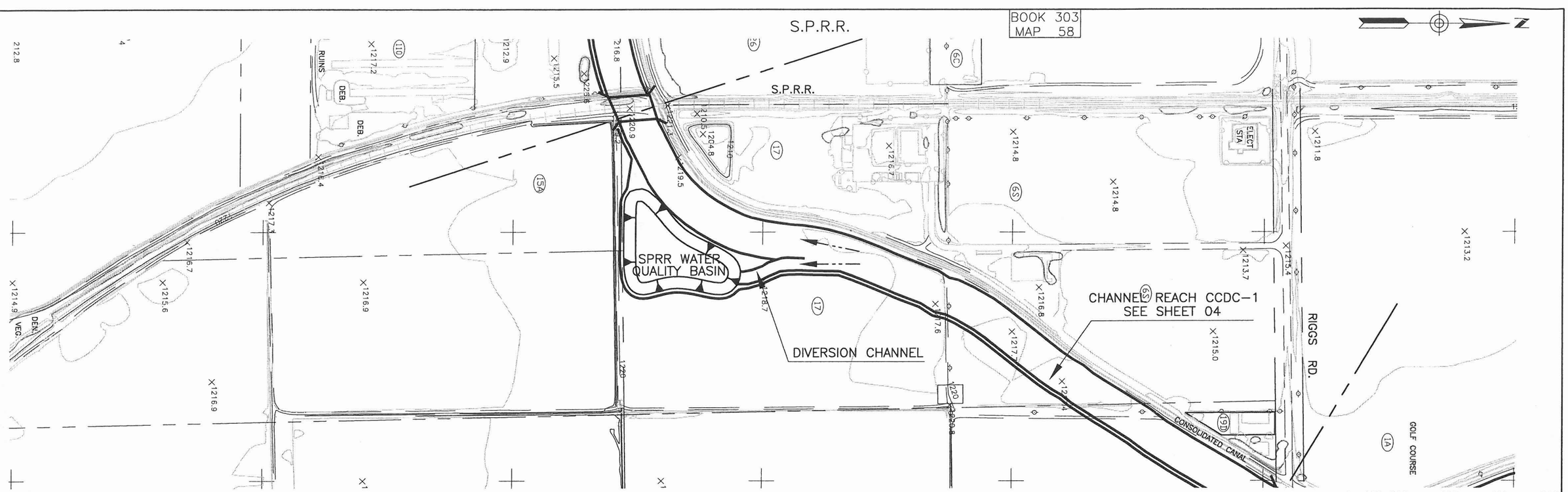
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	COUNTY PROJECT NO. 98-13	HIGLEY AREA DRAINAGE MASTER PLAN
	PROJECT DESCRIPTION: BASIN "Q"	
PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962	DRN. JEV DATE: 08.16.00	SCALE: 1"=400' HORIZONTAL, 1"=20' VERTICAL
	DES. DCF DATE: 08.04.00	
	CKD. BJF DATE: 08.20.00	SHEETS: NO. 42 OF 44

Detention Basin Properties

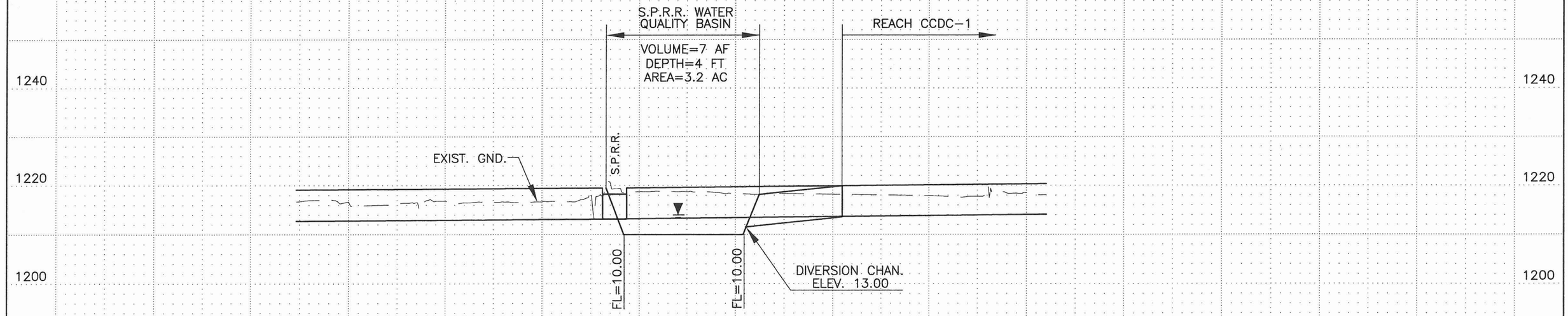
SPRR Water Quality

Basin Land Area		3.2	Acres	Length of Fencing =		0	ft
Basin Excavation Volume		42,915	C.Y.				
Q100 Inflow =	-		cfs	Outflow Pipe (no. & Dia.) =	1	24	in.
Q100 Outflow =	-		cfs	Pipe Invert at Inlet=	-		ft
Highwater Elev. (Q100) =	-		ft	Pipe Invert at Outlet=	-		ft
Maximum Ponding Depth	-		ft	Pipe Length =		0	ft
				Pipe Slope =	-		ft/ft
				Pipe Centerline at Inlet =	-		ft
				Orifice Coeff., C =	-		
				Inflow Spillway Width (2) =		N/A	ft
				Inflow Spillway Length (2) =		N/A	ft
				Spillway elevation =	-		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.



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



SPRR WATER QUALITY BASIN

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION: SPRR WATER QUALITY BASIN

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

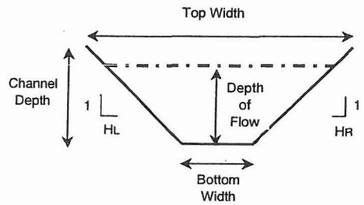
SHEETS NO. 43 OF 44

Higley Area Drainage Master Plan
Consolidated Canal Diversion Channel Lateral 1 & 2

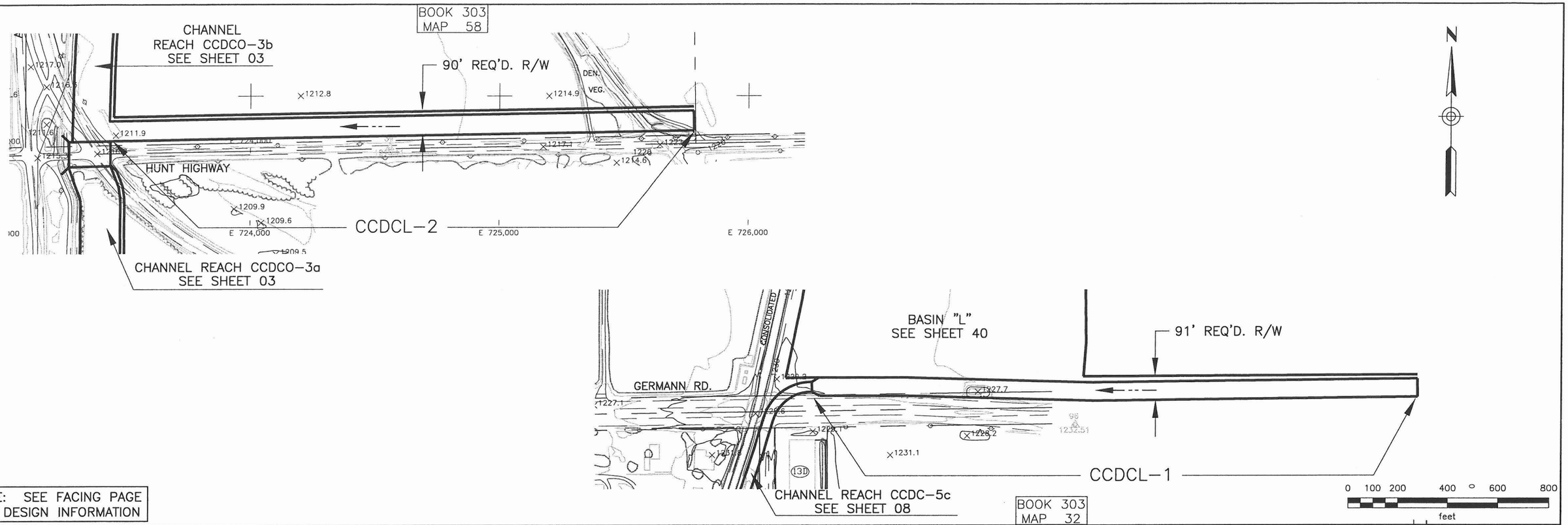
Channel Properties

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)
CCDCL-1	HC39	536	536	1226.6	1234.1	2833	0.0026	0.0026	0.6	0	0.0	LE	0.0400	10.0	4.3	6	6	154.6	62.4	0.39	Sub	3.5	1.1	5.4	75.2
CCDCL-2	CP9	327	327	1212.0	1213.6	2350	0.0007	0.0007	2.4	0	0.0	E	0.0300	20.0	3.5	6	6	143.5	62.6	0.26	Sub	2.3	1.0	4.5	74.0

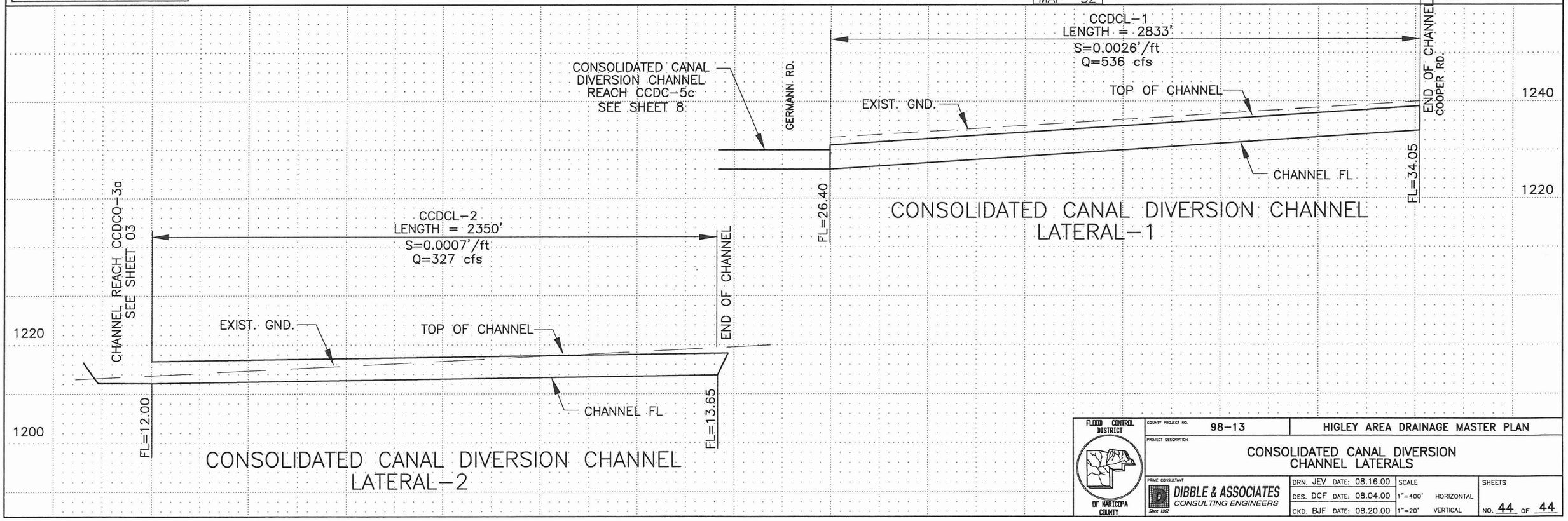
Channel Material Type: C = Concrete, R = Riprap, G = Grass, E = Natural or Earth, LE = Landscaped Earth



Typical Channel Section



NOTE: SEE FACING PAGE FOR DESIGN INFORMATION



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

COUNTY PROJECT NO. 98-13

HIGLEY AREA DRAINAGE MASTER PLAN

PROJECT DESCRIPTION

CONSOLIDATED CANAL DIVERSION CHANNEL LATERALS

PRIME CONSULTANT

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

DRN. JEV DATE: 08.16.00
DES. DCF DATE: 08.04.00
CKD. BJF DATE: 08.20.00

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

SHEETS
NO. 44 OF 44