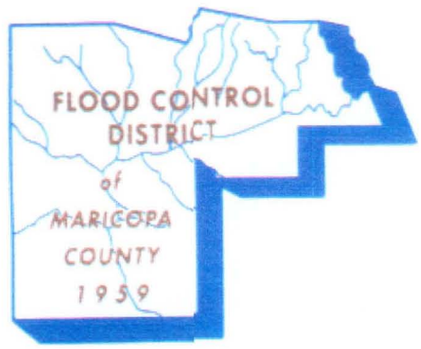
FINAL
DRAINAGE DESIGN REPORT

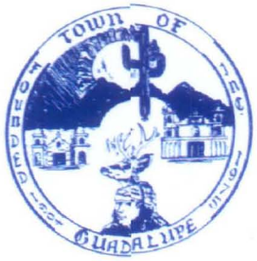
Guadalupe Drainage Improvement Project
Alternative Analysis
for Conveyance Facilities

Prepared for:



Flood Control District of Maricopa County
Contract FCD 98-45
Assignments #1 and #2
PCN 035-02-30

and the Town of Guadalupe



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Pentacore Job #5028.0001
August, 1999

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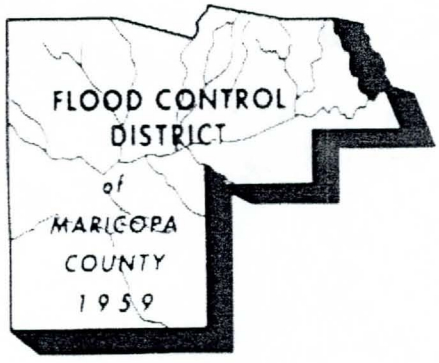

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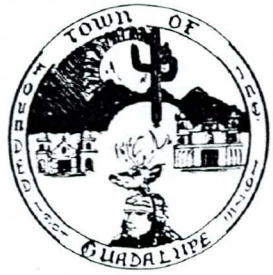

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SECTION 1: INTRODUCTION

1.1 Purpose

Pentacore Arizona has been contracted by the Flood Control District of Maricopa County to perform an alternative analysis for the identification and conceptual design of a conveyance/collector system along the North Branch of the Highline Canal within the Town of Guadalupe. The contract also requires the development of preliminary grading concepts for the each of the three retention basins, and updated watershed hydrology to reflect the proposed design concept and discrepancies noted in the original hydrology. The basis for this study is the report by PBS&J, Inc. entitled; *Guadalupe Pre-Design Study, Final Report*, May 1996 [PBS&J, 1996], herein referred to as the PBS&J Report.

1.2 Site Location

The project is situated within the Town of Guadalupe and lies along the Salt River Water User's Association's Highline Canal, from Interstate 10 at the north end to approximately the Mineral Road alignment (±2,600 feet south of Guadalupe Road) at the southern edge. The project watershed encompasses most of the Town and is generally bounded by Interstate 10 on the west, the Highline Canal on the north and east, Carmen Street west of Avenida Del Yaqui (Priest Drive) and Mineral Road east of Avenida Del Yaqui. The site is located in a portion of Sections 4, 5, 8, and 9, Township 1 South, Range 4 East, Gila and Salt River Base, Maricopa County, Arizona.

1.3 Background

The Town of Guadalupe historically has experienced much flood damage due to the lack of adequate drainage infrastructure such as curb and guttered streets, catch basins and storm drain, and open channel conveyance. The Highline Canal currently intercepts much of the Town's runoff and causes ponding of the intercepted runoff, flooding the upstream adjacent properties. Flows that exceed the canal banks will then spill to the downstream residences within the Town of Tempe.

The PBS&J Report documents several drainage studies that summarize the Town's drainage problems. That report also documents further analyses and recommends a solution for mitigation of the Town's flooding problems along the Highline Canal. In summary, the report recommends constructing

three strategically located retention basins (north, central, and south) to store the Town's runoff for a 100-year, 6-hour rainfall event, and a collection/conveyance system along the canal to direct the flows to the basins. The PBS&J Report also identifies potential outfall or post-storm drain alternatives for each basin.

As a result of the PBS&J Report findings, the Flood Control District of Maricopa County has purchased properties at each of the proposed basin locations. Figure 1.1 illustrates the general location of those properties. The north basin property (Basin A per the PBS&J Report) is approximately 11.5 acres in area and is generally bounded by Interstate 10 on the west, Avenida Del Yaqui on the east, Calle Cerritos on the south, and the Highline Canal alignment on the north. The central basin (Basin D per the PBS&J Report) is approximately 4.8 acres in area and is located at the northwest corner of the Highline Canal and Guadalupe Road. The south basin (Basin F per the PBS&J Report) is 8.8 acres in area and is located at the extreme southeastern boundary of the Town limits just west of the Highline Canal and north of the Mineral Road alignment.

1.4 Project Scope

The project scope is essentially separated into four general tasks. They are:

1. Update watershed hydrology to reflect the proposed design concept and correct discrepancies noted in the original modeling. This work is done under both Assignments #1 and #2 of this contract.
2. Perform an alternative evaluation of five channel/pipe configurations for collection of stormwater flows along the Highline Canal, and conveyance of those flows to each retention area.
3. Based on cost, aesthetics, and input from the project team, select an alternative for preliminary design and prepare preliminary conceptual plans (essentially 10 percent construction drawings).
4. Prepare conceptual grading plans for each basin.

1.4.1 Updated Watershed Hydrology

During the review of the hydrology model provided by the District, there were significant discrepancies noted in some of the subbasin delineations and the area reduction values and it was decided that the model should be revised. This work was performed as part of Assignment No. 2 and id additional to the simple refinements originally anticipated for defining the design peak discharges and collection points of the system.

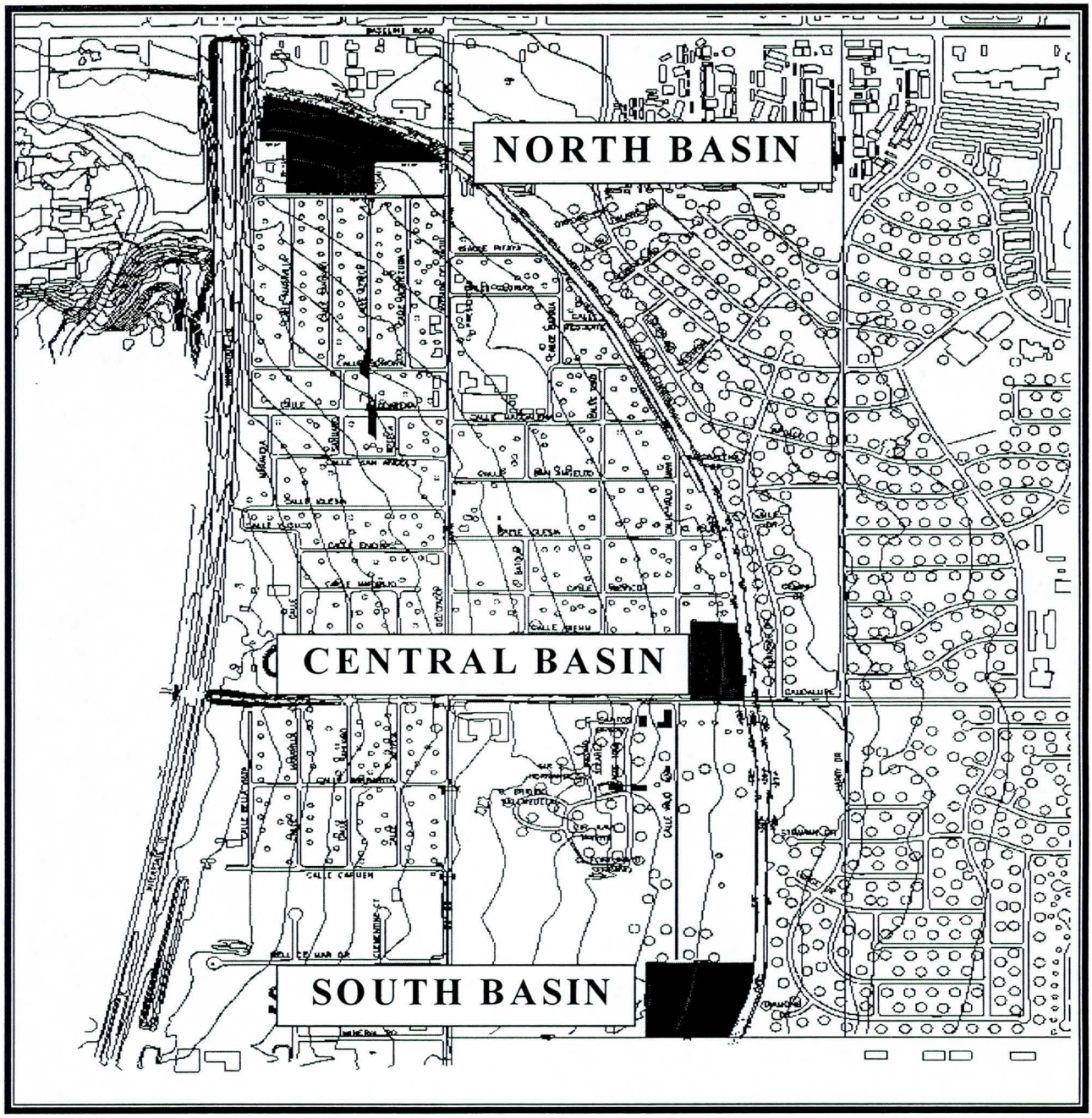


FIGURE 1.1

Retention basin property vicinity map

1.4.2 Conveyance System Alternative Analysis

This portion of the project entails a concept level alternative analysis for the following collection and conveyance system options:

Option 1 - Open channel designed to minimize cross-section (i.e. shotcrete or concrete lined with steep or vertical side walls) along the west maintenance road of the Highline Canal. Existing canal remains unchanged.

Option 2 - Natural open channel designed with flatter side slopes (i.e. 4H or 6H to 1V) along the west maintenance road of the Highline Canal. Existing canal remains unchanged.

Option 3 - Closed conduit and corresponding interception systems under the west maintenance road of the Highline Canal. Existing canal remains unchanged.

Option 4 - Closed conduit and corresponding interception systems under the west maintenance road of the Highline Canal. Highline Canal will be tiled.

Option 5 - Natural open channel designed with flatter side slopes (i.e. 4H or 6H to 1V) along the west maintenance road of the Highline Canal, assuming the Highline Canal is tiled.

Simplified HEC-RAS backwater and/or pressure flow hydraulic evaluations are performed for each alternative to establish sizes and geometry for each conveyance. Right-of-way requirements for each alternative are estimated and other major design issues regarding utilities and alignment are also quantified. Conceptual cost estimates are developed for each alternative, along with a summary of advantages and disadvantages, for the purpose of evaluating the best alternative.

The cost estimate and right-of-way requirement for each option is further subdivided by establishing reaches within the conveyance system. A reach is generally defined by the watershed that is tributary to each retention basin, with the exception of **Reach 1**, which is the length of conveyance from the North Basin to a location approximately 500-feet southeast of the Avenida Del Yaqui crossing (project station 80+00). Accordingly, **Reach 2** is that portion draining to the Reach 1 and the North Basin. **Reach 3** is the portion draining to the Central Basin and **Reach 4** is the portion draining to the South Basin. Figure 1.2 illustrates the approximate

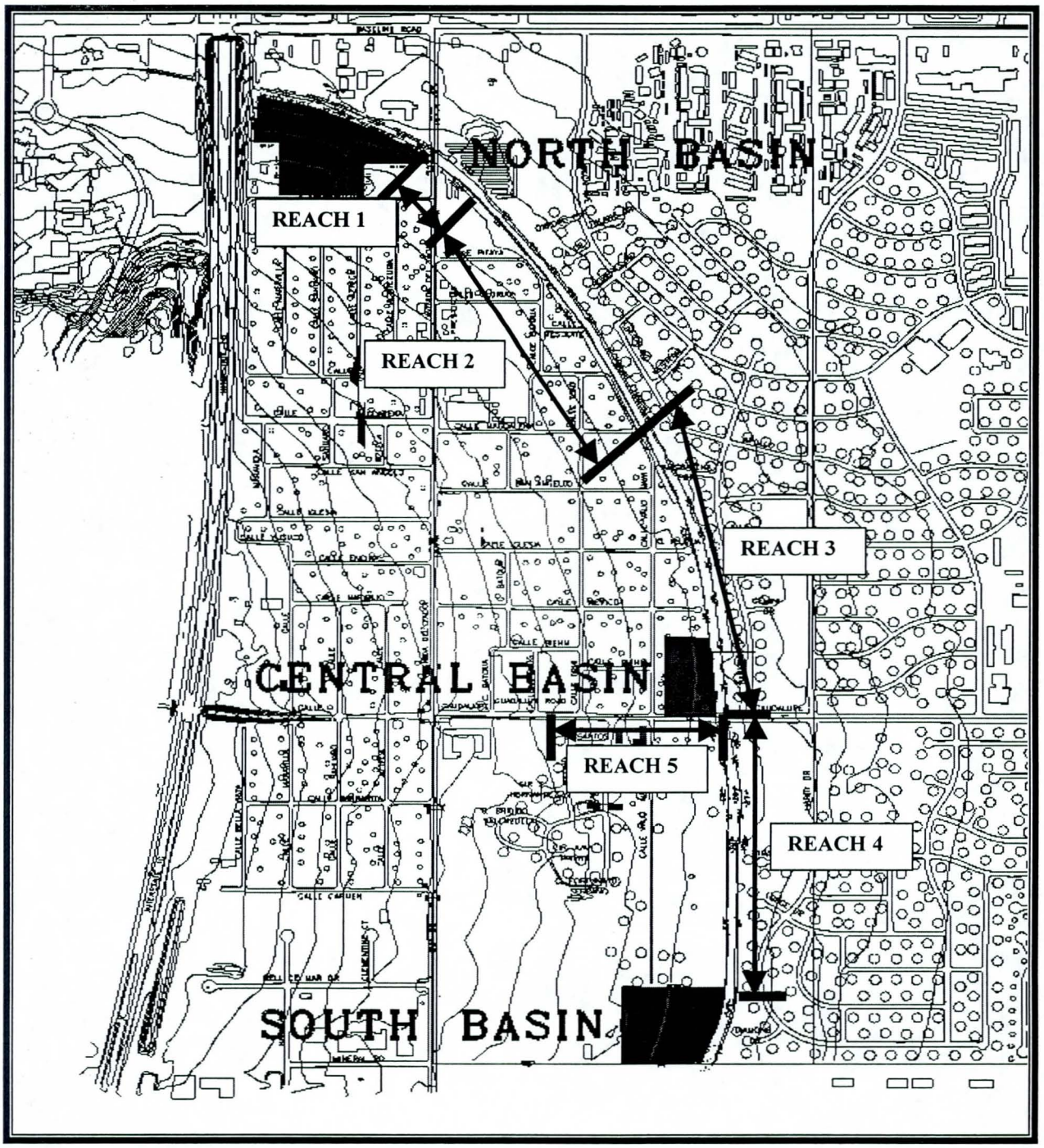


FIGURE 1.2

Conveyance system reach delineation map

reach limits. This approach provides the District and Town with a better working matrix for formulating the most efficient and cost effective overall conveyance system design.

There are also some "fixed" conceptual design elements that will contribute to the overall cost of the project. One example is the proposed catch basin and storm drain collection system for Guadalupe Road. Others include tiling the of the canal and certain utility relocations. These are summarized in more detail later in this report.

1.4.3 Preliminary Design Alternative

This phase of work finalizes the conveyance system design for this contract. The alternative options are evaluated with regard to construction cost, right-of-way requirements, and their overall advantage/disadvantage to the project goals. A recommended preliminary design concept is then formulated based on the conclusions of those evaluations, and with the input and guidance from the project partner agencies. Preliminary concept design plans for the recommended alternative(s) are then prepared for the project.

1.4.4 Retention Basin Conceptual Grading Plans

This task of the project is to prepare conceptual grading plans for each retention basin. The proposed concepts will incorporate the Town's multi-use facility planning for each basin, as appropriate.

SECTION 2: MAPPING

2.1 New Mapping

New one-foot contour interval mapping, compiled to a 1-inch equals 40-foot plotting scale, was developed for this project. The horizontal control is tied to NAD83 Arizona State Plane, Central Zone coordinates and the vertical control is based on NGVD 29 datum. The control network is also tied into existing survey data produced by Salt River Project in establishing the right-of-way along the Highline Canal. The new mapping generally covers an approximate 600-foot wide strip with 500-feet of it extending west(south) of the Highline Canal. The mapping also includes expanded coverage in the vicinity of the three retention basins.

Documentation of the project control surveying and other surveyed data are summarized in a separate report by Pentacore entitled; *Survey Report for Guadalupe Drainage Improvement Project, Alternative Analysis for Conveyance Facilities, FCD 98-45, Assignments #1 and #2, PCN 035-02-30,* July 1999.

2.2 Other Mapping

Other base mapping includes the 4-foot contour interval topographic mapping, land use mapping, and NRCS Soils Maps, all supplied in digital format by the District. These maps are primarily used in the hydrologic reanalysis and for any topographic needs outside of the new mapping area.

SECTION 3: HYDROLOGY

3.1 Addendum Hydrology

This section documents the revisions to the original PBS&J Report [PBS&J, 1996] hydrology and summarizes the revised modeling results.

3.1.1 Existing Model Overview

The methodology used in the PBS&J Report generally follows the Flood Control District of Maricopa County's *Drainage Design Manual for Maricopa County, Arizona, Vol. I, Hydrology,* January 1992 with January 1995 revisions. The watershed hydrology is modeled using the US Army Corps of Engineers' HEC-1 model. The 100-year, 6-hour storm is the selected design storm, with area reduction values and temporal distribution patterns estimated per the County manual. Rainfall losses are modeled using the Green & Ampt methodology and unit hydrographs are developed using the Clark Unit hydrograph. Channel routing is accomplished by the Muskingum-Cunge method and the PBS&J Report does not include any storage routing for the design event.

The PBS&J Report also presents 50- and 100-year, 6-hour models that represent a merging of the North Basin tributary area and the ADOT hydrology models developed for the I-10 improvements at the US Highway 60 (Superstition Freeway) interchange. The purpose of this modeling was to evaluate the potential for bleeding the North Basin into ADOT's system of detention basins. Slight changes to the precipitation depth, area reduction, temporal distribution, and the modeling time step were employed to match the ADOT modeling. Another change was to divert a portion of the flows approaching the Highline Canal crossing within Avenida Del Yaqui (Subbasin 2B) north over the canal to Baseline Road.

It should be noted that a printout of the 100-year, 6-hour design model is not provided in the PBS&J Report, however, copies of the 50- and 100-year, 6-hour blended ADOT models are. Digital and paper copies of the original design models were however, obtained from the District files.

3.1.2 Summary of Discrepancies in Original Modeling

The areas in which discrepancies of significance were noted during the review of the original HEC-1 models include:

- Area reduction value
- Rainfall distribution pattern numbers
- Subbasin boundary delineations
- XKSAT variables
- Modeling time step value

The point precipitation depth was areally reduced based on the basin area for the whole project watershed and not based on the tributary area to each retention basin. Because the flows were not expected to commingle, the area reduction value should reflect only the area draining to each basin. This affects both the peak discharges and the overall volume.

Similar to the area reduction factor, a single rainfall distribution pattern was used for all subbasins and is based on the overall project watershed area. Again, because the flows were not expected to commingle, the area basis for selection of the distribution pattern should be dictated by only the area draining to each retention basin. This will have more of an impact on the peak discharges than in the overall runoff volume, although both are expected to increase.

The delineation of a portion of the subbasin boundaries within the original model's major basins 6 through 9, required revision based on our field inspection of the project watershed. With concurrence of the District, it was also decided to direct the runoff that currently collects within the Guadalupe Road corridor, to the Central Basin as opposed to the original concept of conveying those flows south to the Southern Basin. It is understood that this will likely require an overflow routing from the Central Basin to the Southern Basin since the volume of runoff is expected to exceed the feasible capacity for the Central Basin. The peak discharges, however, should be substantially lowered. This concept will mitigate the need for a large capacity conveyance system to extend the entire length of Reach 4.

The XKSAT variables used in the original model do not coincide with values that are documented in the District's Hydrology manual for the soils present on the watershed. The adjustment of these values will impact both the peak discharges and the overall runoff volume.

The modeling time step of 3 minutes used in the original hydrology model was found to be too long. According to the District's Hydrology Manual, the time step should be between 0.15 and 0.25 times the shortest time of concentration, and in no case greater than 0.25Tc. According to the Tc estimates documented for the original modeling, this value should have been set to 2 minutes. This change will have the most impact on the peak discharges.

3.1.3 Revised Modeling Parameters

The revised subbasin boundaries are shown on Plate 1, which is included at the back of this report. Also shown are the Clark Tc flowpaths and the channel route flowpaths. The majority of the new subbasin boundaries were delineated through field reconnaissance of the area, with the aid of the new 1-foot contour interval mapping generated for this project and the original 4-foot contour interval mapping used in the PBS&J Report. Basin characteristics such as Tc flowpath length and slopes, and routing reach geometry, length, and slopes are also obtained from the two sources of mapping.

The 100-year, 6-hour point precipitation value of 3.30 inches, used in the PBS&J Report modeling, is also used for this model. The area reduction factors, however, were revised to adjust for the area tributary to each retention basin instead of the entire project watershed. Similarly, the rainfall distribution pattern 1.00 is also employed instead of the PBS&J Report's distribution pattern 1.22.

Digital soils and land use mapping was obtained from the District. The entire project is located within the Eastern Maricopa/Northern Pinal County NRCS mapping region. The watershed is comprised of two NRCS soil groups; Antho sandy loams and Valencia sandy loams, both of which have a weighted bare ground XKSAT value of 0.40 inches/hour. The digital land use polygons were updated to reflect the currently developed areas and also to reflect the projected land use for those areas currently undeveloped. The projected land use classifications are based on the proposed densities shown on the "Zoning Map" from page 7 of the PBS&J Report. That map is included in Appendix A of this report for reference. The IA, RTIMP, vegetative cover, and Kb classification for each land-use category are summarized in the DDMS output and were estimated from field inspections, examination of the stereo photographs from the

new mapping, guidance from the District's Hydrology Manual, and discussions with the District review staff.

The rainfall loss and Clark Unit Hydrograph parameters for each subbasin were redeveloped using the District's DDMS package. Table A-1, in Appendix A, summarizes the basin characteristics and HEC-1 modeling parameters for each subbasin as estimated by DDMS. The DDMS rainfall loss parameter worksheet listing for each subbasin is also supplied in Appendix A. It should be noted that the DDMS program produces erroneous results for the adjusted XKSAT values if the weighted vegetative cover percentage falls below 10 percent. The program apparently does not correctly limit the adjustment ratio to one, therefore, if the vegetative cover percentage is less than 10 percent, the program will adjust the bare ground XKSAT value *down* by direct application of the equation provided in Figure 4.4, page 4-14 of the District's Hydrology Manual. Accordingly, for those basins with weighted vegetative covers less than 10 percent, the adjusted XKSAT value produced by DDMS is hand-coded back to the bare ground value prior to entry into the MCHUP1 routine.

Channel routing is accomplished using the Muskingum-Cunge method. Some of the routing geometry parameters are coded to approximate the existing condition conveyance and some reflect the proposed improvement along the Highline Canal. This approach is similar to that used in the original study.

A diversion operation is coded at Concentration Point 302 (Subbasin 9B) to model a flow split that occurs at that location. Runoff from Subbasin 9B drains within the local streets to the two small retention basins located at the northeast corner of the subbasin. Once the capacity of those basins is exceeded, the excess runoff will begin to spill north over the local crest in the road, and east over the small berm at the perimeter of the basin. Field measurements were made with a spirit level, linker rod, and 100-foot tape to establish the diversion rating. A diagram of the measurements taken and supporting hydraulic analyses are supplied in Appendix B.

For the establishment of the base working model (addendum model), no-storage routing is performed. Instead, the hydrographs draining to retention basin are combined to reflect the ultimate inflow hydrograph.

3.1.4 Addendum Model Results

Table 3-1 summarizes the Addendum HEC-1 modeling results for each model operation. As expected the peak discharges are on average, slightly higher than those reported in the PBS&J Report, as are the cumulative runoff volumes draining to each basin. The summary values are provided using the nomenclature modeled in HEC-1 and are alphabetically sorted. It is also noted that the descriptors L, R, I, and O, are abbreviations for *L*eft branch, *R*ight branch, *I*nflow, and *O*utflow. Orientation for the left an right branch associations are looking downstream A printout of the HEC-1 model is provided in Appendix D and digital input and output files are included on a diskette inserted at the end of this report.

TABLE 3.1

Summary of Addendum HEC-1 model peak discharges

HEC-1 Operation (1)	Description (2)	Basin Area, sq. miles (3)	100-yr, 6-hr Peak Discharge cfs (4)
C102	Hydrograph Combine at CP 102	0.05	104
C103	Hydrograph Combine at CP 103	0.06	131
C105	Hydrograph Combine at CP 105	0.06	140
C106	Hydrograph Combine at CP 106	0.13	292
C107	Hydrograph Combine at CP 107	0.13	300
C108	Hydrograph Combine at CP 108	0.18	399
C202	Hydrograph Combine at CP 202	0.05	122
C203	Hydrograph Combine at CP 203	0.06	133
C205	Hydrograph Combine at CP 205	0.11	251
C207	Hydrograph Combine at CP 207	0.17	406
C208	Hydrograph Combine at CP 208	0.17	405
C303	Hydrograph Combine at CP 303	0.04	140
C306	Hydrograph Combine at CP 306	0.14	374
C306L	Hydrograph Combine for Left Branch of CP 306	0.12	373
C307	Hydrograph Combine at CP 307	0.15	386
C308	Hydrograph Combine at CP 308	0.16	401

TABLE 3.1

Summary of Addendum HEC-1 model peak discharges

HEC-1 Operation (1)	Description (2)	Basin Area, sq. miles (3)	100-yr, 6-hr Peak Discharge cfs (4)
C309	Hydrograph Combine at CP 309	0.18	472
C310	Hydrograph Combine at CP 310	0.21	521
C311	Hydrograph Combine at CP 311	0.23	549
D305L	Left Branch of Diversion at CP305	0.02	24
D305R	Right Branch of Diversion at CP305	0.00	37
S110I	Storage Route Inflow at CP 110	0.23	522
S210I	Storage Route Inflow at CP 216	0.19	454
S314I	Storage Route Inflow at CP 314	0.28	658
SUB2A	Subbasin Operation for 2A	0.027	73
SUB2B	Subbasin Operation for 2B	0.041	106
SUB2C	Subbasin Operation for 2C	0.025	54
SUB3A	Subbasin Operation for 3A	0.033	87
SUB3B	Subbasin Operation for 3B	0.029	87
SUB3C	Subbasin Operation for 3C	0.002	6
SUB3D	Subbasin Operation for 3D	0.007	24
SUB3E	Subbasin Operation for 3E	0.007	15
SUB4A	Subbasin Operation for 4A	0.022	53
SUB4B	Subbasin Operation for 4B	0.012	32
SUB4C	Subbasin Operation for 4C	0.023	57
SUB5A	Subbasin Operation for 5A	0.020	52
SUB5B	Subbasin Operation for 5B	0.030	72
SUB5C	Subbasin Operation for 5C	0.006	17
SUB6A	Subbasin Operation for 6A	0.028	72
SUB6B	Subbasin Operation for 6A	0.024	50
SUB7A	Subbasin Operation for 7A	0.048	136
SUB7B	Subbasin Operation for 7B	0.013	40
SUB7C	Subbasin Operation for 7C	0.012	35
SUB7D	Subbasin Operation for 7D	0.002	6

TABLE 3.1

Summary of Addendum HEC-1 model peak discharges

HEC-1 Operation (1)	Description (2)	Basin Area, sq. miles (3)	100-yr, 6-hr Peak Discharge cfs (4)
SUB7E	Subbasin Operation for 7E	0.007	17
SUB8A	Subbasin Operation for 8A	0.009	32
SUB8B	Subbasin Operation for 8B	0.012	35
SUB8C	Subbasin Operation for 8C	0.024	74
SUB8D	Subbasin Operation for 8D	0.042	131
SUB8E	Subbasin Operation for 8E	0.004	5
SUB8F	Subbasin Operation for 8F	0.035	111
SUB8G	Subbasin Operation for 8G	0.004	11
SUB9A	Subbasin Operation for 9A	0.011	29
SUB9B	Subbasin Operation for 9B	0.020	61
SUB9C	Subbasin Operation for 9C	0.019	49
SUB9D	Subbasin Operation for 9D	0.026	58
SUB9E	Subbasin Operation for 9E	0.020	38
SUB9F	Subbasin Operation for 9F	0.023	68
SUB9G	Subbasin Operation for 9G	0.012	37
SUB9H	Subbasin Operation for 9H	0.015	44

Table C-1 in Appendix C, summarizes the excess runoff volume calculated for each subbasin. The total volume directed to each retention basin is also calculated and summarized. Table C-2 in Appendix C, summarizes the data input and model results for each channel routing.

3.2 Alternative Analysis Hydrology

Several routing schemes were conceptually analyzed during the this study to evaluate maximizing the use of each basin and reduce to the extent possible, the magnitudes of discharge along each conveyance reach. For example, the flows at Concentration Point 307 were routed through the Central

Basin to see if a reduction in the peak discharge within Reach 4 might result. It was quickly discovered, however, that the reasonable storage capacity of Central Basin is insufficient to handle the additional flow and reduce peak discharges within Reach 4. Essentially, the basin is filled prior to the peak's arrival and there is no surplus storage for attenuation. Several stage-storage-discharge scenarios were modeled and in all cases, the Central Basin was surcharged beyond reasonable limits. If pursued, this option would ultimately result in a direct hydraulic connection between the Central and South Basins, with a very large structure required to cross Guadalupe Road. The economics of that structure plus the additional Reach 4 conveyance verses the Reach 4 system that directly conveys the CP307 flows to the South Basin, are such that there was no benefit gained by routing the flows at CP307 through the Central Basin. In fact the alternate routing scheme would probably be more expensive, due to all of the utility conflicts that would arise in the Guadalupe Road crossing.

Accordingly, the addendum hydrology modeling results are used as-is for the alternative analyses. No adjustments are made to the routing parameters for Reaches 1-4, since the resulting differences would be negligible.

SECTION 4: ALTERNATIVE ANALYSIS

4.1 General

As previously discussed, the alternative analysis for this project evaluates five different conveyance options and the project is divided into four separate conveyance reaches. Refer to Section 1.4.2 for a discussion of the alternative options and reaches.

For Reaches 2 and 3, most of the watershed runoff is concentrated within the east-west roadway corridors that drain east to the Highline Canal, and in two small landscaped depressions parallel to Calle Vaou Nawi and Calle Batoua where they parallel the canal. Over half of the runoff for Reach 4 is concentrated in the Guadalupe Road corridor, with the rest approaching the canal as sheet flow and concentrating at the scattered low areas along the western bank of the Highline Canal. Most of the major inlet requirements for each option and reach will be focused at these locations.

Within Reach 1, existing commercial structures (laundromat, car wash, and covered parking area), masonry walls, and other facilities currently located at the southeast corner of Avenida Del Yaqui and the Highline Canal are identified as significantly encroaching into the existing Salt River Project (SRP) right-of-way. The construction of Options 1, 2, or 5 will require either the purchase of the whole property and all structures, or a partial purchase with relocation of the buildings and fences. The costs associated with those measures, especially when compared to Options 3 and 4 that require no additional right-of-way, are prohibitive. Accordingly, no analyses, costs, or quantities, are presented for Options 1, 2, or 5 within Reach 1. Instead, a single culvert analysis, quantity and cost estimate is implemented for Reach 1 and included with Options 1, 2, and 5. The existing utilities within Avenida Del Yaqui, along with the SRP irrigation tile, constrain the possible horizontal and vertical alignment options for culverts at this location.

A catch basin and storm drain system currently exists within Avenida Del Yaqui, just upstream of the Highline Canal crossing. The curb opening requirements for interception of the 100-year flow approaching the system are estimated in a report prepared for ADOT by A-N West, Inc. entitled; *Supplemental Drainage Design Report for Avenida Del Yaqui from Calle Sonora to Highline Canal, Project No. STP-GUA-0(5)P, TRACS No. SS364-01C*, December 21, 1995. Inspection of the catch basin

and storm drain construction drawings prepared by Willdan & Associates, Inc. indicates however, that no provisions were made for clogging. The adequacy of this system is not addressed in this study, but may require further analysis during the preliminary design. The system is comprised of 5, very large curb opening catch basins that are currently plugged at the gutter, and a storm drain collection system that culminates in a single 54-inch concrete pipe. The intent of the system is to ultimately tie into the facilities for this project and drain to the North Retention Basin. Accordingly, all options include an allowance for a junction structure to introduce those discharges into the system within Reach 1.

According to the addendum hydrology model, a 100-year discharge of approximately 380 cfs is collected and conveyed within the Guadalupe Road corridor, where it accumulates at the sag location at the Highline Canal. Currently, a major portion of this runoff will spill the crest within Guadalupe Road and continue easterly into the City of Tempe. This discharge comprises nearly half of the peak runoff that will drain to the South Basin and will require a major collection system extending west of the canal to intercept and convey this water to Reach 4. Analysis of this system is beyond this project's scope of work, but an estimate of the facilities required to convey these flows is made to provide the District with a reasonable total project cost. This area is labeled and discussed as Reach 5 in the Section 4.4.6.

In all options, one of the design criteria is to maintain a 12-foot maintenance road along the south/west side of the canal. For the alternative analysis and conceptual design, a control line was established that is approximately parallel to the canal. A minimum offset from that control line was then established for each option such that a 12-foot corridor, *at the least*, is maintained.

4.2 Hydraulics

For Options 1, 2, and 5, the open channel hydraulics are analyzed using simple HEC-RAS models. Because the channel reaches are nearly flat and the discharge varies greatly along the reach, it is considered necessary to develop simple backwater models to insure that the sections proposed would work under the hydraulic conditions expected. The extremely flat natural ground also forces the use of flat channel slopes in order to keep the overall channel depths to a minimum. Accordingly, all channel slopes for Options 1, 2, and 5 are set at 0.25 percent for the alternative analysis.

The storm drains for Options 3 and 4 are analyzed using a simple model developed with Haestad Methods' StormCAD program. Again, this approach is used because of the nearly flat reaches and

varying discharges. Inflows to the system are approximated as single inlet locations at each concentration point identified in the addendum hydrology. Pipe slopes for Reaches 1, 2, and 3 are all set at 0.20 percent and Reach 4 is set at 0.25 percent. Loss coefficients of 0.5 and 1.0 are respectively used to conservatively simulate the energy losses at junction structures and inlets. For the purpose of estimating construction quantities and costs, the catch basin requirements for intercepting the flows are estimated by assuming that a combination of single-grate and triple-grate catch basin inlets will be used. Catch basin capacities are estimated based on the methodology published in the Federal Highway Department's HEC-22 and assume an effective ponding depth of 1-foot with 50 percent clogging factor for the grate. Grate dimensions are based on using single and triple versions of ADOT's Standard Detail C-15.80. It is also assumed that a small grader ditch will be constructed to direct sheet flow to the catch basin inlets when it is not already concentrated. Should this option be selected, finalization of the inlet locations and design will be required with the final design phase of this project.

For the channel Options 1, 2 and 5 in Reach 2, the culvert hydraulics for Reach 1 are analyzed using HY-8. With Options 3 and 4, the Reach 1 culvert is included in the StormCAD model.

For Options 1, 3, and 4, and all options for Reach 1, energy dissipation and scour protection at the locations where discharge enters the retention basins will most likely be some form of concrete headwall and apron with and end sill, and possibly a buried riprap or reno-mattress skirt. The exit velocities at the basin discharge locations are less than 9 fps for all options and can be easily handled using these materials.

In all options, the conveyance facilities are sized such that a minimum freeboard of 1.0-foot is maintained above either the water surface profile (open channels) or hydraulic grade line (closed conduit). This criteria meets District standards and provides a buffer for assuring flows can get into the system.

Pertinent printouts and summary results for each set of analyses are discussed or provided as appropriate, in the Appendices referenced with each section.

4.3 Utilities

In addition to the SRP Highline Canal irrigation facilities, there are several utilities within the project corridor that will impact the ultimate conveyance system design and add to the cost of the project. Utilities in the project area include the Town's sanitary sewer collection system (8- to 18-inch pipes), City

of Tempe water (8- to 30-inch mains), El Paso Natural Gas (4.5- and 6-inch high pressure transmission mains), Southwest Gas (2-inch service lines), SRP Power (transmission and service), Sprint (fiber optics), U.S. West, and Times Mirror Cable Television. The utilities identified at this concept level of design are indicated on the plan and profile sheets for each option.

One of the major utilities present within the canal corridor is Salt River Project's 230KV aerial transmission line. The steel towers are located along the north/east side of the canal and adjacent to the access road. Discussions with SRP personnel revealed that several criteria regarding encroachment limits, power line access, and design vehicular loadings for buried facilities will need to be met in order to obtain their approval for the project. They (SRP) don not however, have boiler plate standards, but instead evaluate requests on a case by case basis. Accordingly, the conceptual designs presented herein are an attempt to conservatively satisfy the perceived requirements. Further investigation and coordination with SRP will be required at the preliminary design stage. SRP also has additional shared service power poles within their right-of-way at various locations along the project reach. Removal and relocation of some of those poles may be required depending on the option selected.

4.3 Quantity and Cost Estimates

The cost estimates developed for these analyses are conceptual and based on approximate construction quantities and land acquisition costs with appropriate contingency factors applied. The land acquisition costs were supplied by the District. Demolition and relocation costs, where appropriate, are estimated, as well as an allowance for landscaping and aesthetics.

4.4 Alternative Evaluations

4.4.1 General

The following sections summarize the conceptual designs for Options 1 through 5. Each section discusses the general design results and lists the advantages and disadvantages for each option.

4.4.2 Option 1

Conceptual plan and profile maps for Option 1 are provided in Appendix E1. The rectangular sections typically vary from 8 to 14 feet wide and 5 to 11 feet deep. For Reach 2, the depths of flow are strongly influenced by the backwater effect of the box culvert in Reach 1.

Reaches 3 and 4 are more typically influenced by friction losses in the channel. This option will require substantial access barriers in the form of wrought iron or heavy gauge chain link fencing along both sides of the channel for safety. These barriers will benefit the system by discouraging dumping of unwanted materials into the channel. Property acquisition will be minimal, and for the most of the option length, the channels can be constructed within the existing right-of-way identified by SRP. The total construction and property acquisition cost for this option is approximately $4,832,000. Conceptual quantities and cost estimates for each reach are provided in Appendix E2. Supporting hydraulic calculations and computer program printouts are provided in Appendix E3. The following is a summary of the advantages and disadvantages of this option:

Advantages	Disadvantages
• Minimal footprint with little property acquisition. • Infrequent and simple maintenance requirements. • Easy accessibility by maintenance personnel from the basins or ramps. • Runoff is easily introduced into channel. • No erosion or scour concerns. • Efficient hydraulics. • Minor utility conflicts	• Engineered look with limited aesthetic appeal. • Limited opportunity for recreational path/trail within 12-foot access road. • Channel with access barrier fencing is more expensive than natural, unlined section.

4.4.3 Option 2

Conceptual plan and profile maps for Option 2 are provided in Appendix F1. The typical section for this option is a trapezoidal channel with a 6-foot bottom width and 4H to 1V side slopes. The side slopes in the upper 430 feet of Reach 2 are adjusted to 3H to 1V to keep the channel from encroaching into the existing pavement of Calle Vauo Nawi. The side slopes are then changed back to 4H to 1V for remaining channel. The channel lining will be comprised of natural materials such as decomposed granite and/or native grass cover with scattered landscape plantings in the upper portions of the channel banks. A Manning's coefficient of 0.035 is used to

approximate the mature channel roughness potential As with Option 1, the depths of flow for Reach 2 are strongly influenced by the backwater effect of the box culvert in Reach 1. Reaches 3 and 4 are more typically influenced by friction losses. Channel velocities range from 3 to 7 feet-per-second and marginally warrant investigation of channel stabilization measures. It is expected that a sufficient depth of coarse decomposed granite (3-inch minus gradation) over the native soils will most likely satisfy those requirements. This option will, however, require substantial channel armoring at the major inflow locations in order to prevent bank and toe erosion that would normally result from flows entering the channel perpendicularly. Identification of specific run-down locations will be required with the final design.

The resultant channel geometry for the Option 2 channel reaches will have significant storage capacity available for . This volume can be credited to each respective retention basin for a possible reduction in the total depth necessary to obtain the required storage volume.

A pathway or bike trail could be located along the 12-foot maintenance road or it might be possible to alter the side slopes of the channel, such that a benched pathway could be cut into the side slopes. Either way, the corridor required for this channel will provide for a sizable open space along the canal.

Substantial property acquisition will be required to accommodate the channel improvements of Option 2. In some locations, this includes the purchase of whole lots, with the added expense of relocation costs to move people to new homes. At the location where the channel parallels Calle Batoua, the entire roadway will require relocation to the west. That relocation will also require the purchase of additional lots to replace the existing road right-of-way. There are also several east-west roadway corridors that terminate in cul-de-sacs at the canal. Each of these will require removal and re-configuration to the west to accommodate the new channel.

The construction of this option will require the most extensive relocation and/or adjustment of existing utilities, especially when compared to the other options. This is particularly true for the water and sewer lines within Calle Vauo Nawi and Calle Batoua, where they parallel the canal.

The total construction and property acquisition cost for this option is approximately $4,597,000. Conceptual quantities and cost estimates for each reach are provided in Appendix F2. Supporting hydraulic calculations and computer program printouts are provided in Appendix F3. The following is a summary of the advantages and disadvantages of this option:

Advantages	Disadvantages
• More opportunity for recreational path/trail features on and off of the 12-foot access road. • Less engineered with more aesthetic value. • Easy accessibility by maintenance personnel. • Less channel safety considerations. • No headwalls or energy dissipation structure requirements at Central and South Basins. • Significant storage that can be credited for overall retention requirements.	• Major property acquisition requirements with some whole lot acquisitions that include additional relocation expenses. • Extensive roadway removal and relocation. • Extensive utility relocations. • Armoring requirements at major inflow locations. • Increased maintenance requirements for landscaping and channel linings. • Political implications of property purchase requirements.

4.4.4 Option 3

Conceptual plan and profile maps for Option 3 are provided in Appendix G1. Two types of storm drains, reinforced concrete circular pipe (RCP) and reinforced concrete box (RCB), were chosen for the alternative analysis and conceptual design. For Reaches 1 and 2, the invert profile is dictated by the Avenida Del Yaqui crossing. Reaches 3 and 4 invert profiles were set to allow for sufficient cover at the upstream ends, while minimizing the required trench depth as much as possible. The trunk line culvert sizes range from double barrel 48-inch RCP's to double barrel 8-foot by 5-foot RCB's. Schematic inlet locations are indicated on the plans for Option 3, but it should be noted that several inlets may be required between those shown to fully intercept the flows and drain them to the culvert. Due to the limited right-of-way, it is likely that the inlets will be constructed such that they drain directly into the storm drain at strategic locations along the

reach, with no laterals required. For the purposes of this design however, laterals with separate catch basin structures are assumed to be used.

Given the size of the storm drain systems, it is strongly recommended that access barriers be constructed at all inlet and outlet locations to inhibit public access. This can be accomplished through bolt down grates at inlet locations and hinged grates with shear pins at the outlets.

A pathway and/or bike trail could be located along the entire corridor west of the canal and landscape material could be strategically planted to enhance the visual aspects and even "hide" the inlet locations. The pathway/trail could be routed around the inlet locations to give a meandering feel to the pathway.

Property acquisition and utility conflicts for this option are minimal. Additional property is only required at a few strategic locations where sizable peak discharges may require larger interception facilities.

The total construction and property acquisition cost for this option is approximately $6,911,000. Conceptual quantities and cost estimates for each reach are provided in Appendix G2. Supporting hydraulic calculations and computer program printouts are provided in Appendix G3. The following is a summary of the advantages and disadvantages of this option:

Advantages	Disadvantages
• More opportunity for recreational path/trail features within the corridor west of the canal. • System is essentially invisible with the exception of structures at basins and inlet locations. • Closed system with less public safety issues. • Minor utility conflicts. • Trunk storm drain is low maintenance.	• High material costs due to SRP loading requirements. • Inlet locations are susceptible to clogging and will require frequent cleaning. • Energy dissipation measures required at locations where flows are discharged to retention basins. • Expensive

4.4.5 Option 4

Conceptual plan and profile maps for Option 4 are provided in Appendix H1. With the exception of a slight horizontal shift, the storm drain proposed for Option 4 is essentially identical to that of Option 3, with the hydraulics and storm drain sizes assumed to be the same. The only major difference is the assumption that the Highline Canal is to be tiled. The horizontal shift of the storm drain will better utilize the corridor and potentially avoid having to relocate some of the overhead utilities present within the corridor. No additional property acquisition is required for this option.

According to a communication from a SRP representative at one of the project meetings, the estimated cost for tiling the entire canal along the project reach is about one-million dollars. This cost is linearly prorated over each reach to in estimating this cost on a reach by reach basis.

This option presents the greatest opportunity for development of a path and trail system along the Highline Canal corridor that is essentially unhindered by drainage structures or surface facilities. It is also the most expensive of the five options.

The total construction cost for this option is approximately $8,743,000. Conceptual quantities and cost estimates for each reach are provided in Appendix H2. See Appendix G3 for supporting hydraulic calculations and computer program printouts. The following is a summary of the advantages and disadvantages of this option:

Advantages	Disadvantages
• Best opportunity for recreational path/trail features within the existing canal corridor. • System is essentially invisible with the exception of structures at basins and inlet locations. • Closed system with less public safety issues. • Minor utility conflicts. • Trunk storm drain is low maintenance.	• High material costs due to SRP loading requirements. • Additional cost of tiling SRP canal. • Inlet locations are susceptible to clogging and will require frequent cleaning. • Energy dissipation measures required at locations where flows are discharged to retention basins. • Tied to dry-up period of Highline Canal for construction activities.

4.4.5 Option 5

Conceptual plan and profile maps for Option 5 are provided in Appendix I1. The channel geometry, profile, and hydraulics for this option are assumed identical to Option 2, with the exception of a horizontal shift of the channel to the east. This option also assumes that the Highline Canal is tiled at a cost identical to that discussed in Option 4.

The property acquisition for this option is substantially reduced when compared to the acreage required for Option 2, however, the geometry of the channel is such that a significant amount of property acquisition is still required.

The total construction cost for this option is approximately $5,285,000. Conceptual quantities and cost estimates for each reach are provided in Appendix I2. See Appendix F3 for supporting hydraulic calculations and computer program printouts. The advantages and disadvantages for this option are essentially the same as those for Option 2 with the exception of the following:

Advantages	Disadvantages
• Less property acquisition required than for Option 2. • Less utility conflicts.	• Additional cost of tiling SRP canal. • Tied to dry-up period of Highline Canal for construction activities.

4.4.6 Reach 5

Reach 5 is comprised of the storm drain and inlets required to intercept the flows within the Guadalupe Road corridor and convey them to Reach 4. Based on the hydraulics for Option 3, Reach 4, it is assumed that a 10-foot by 5-foot box culvert (or equivalent) will be required to convey the flows intercepted in the Guadalupe Road corridor. It is also assumed that the entrance to this collection system will begin at a location approximately 1200 feet west of the Highline Canal, where most of the flows concentrate just north of Calle Tomi. An estimated quantity and cost for this system is provided in Appendix J. That cost is included as a line item in the Reach 4 summary costs for each of Options 1 through 5.

4.5 Conclusions and Recommendations

Table 4.1 summarizes the cost estimates for each option by reach and in total. As demonstrated by that summary, Options 2 and 5 provide the most economical solution to conveying the peak discharges into the three retention basins. Option 3 and 4 storm drain costs are higher than normally expected due to the extreme loading conditions expected to be mandated by SRP in the design of those structures.

TABLE 4.1

Summary of cost estimates for each option

	Construction and Land Acquisition Costs, in millions				
Option (1)	Reach 1 (2)	Reach 2 (3)	Reach 3 (4)	Reach 4 (&5) (5)	TOTAL (6)
1	$0.662	$1.015	$0.981	$2.174	$4.832
2	$0.662	$1.325	$0.739	$1.871	$4.597
3	$0.662	$1.561	$1.062	$3.626	$6.911
4	$0.862	$2.100	$1.556	$4.225	$8.743
5	$0.862	$1.134	$0.850	$2.439	$5.285

On a simply cost basis, either Option 2 or Option 5 are the best solutions. These options, however, have a non-tangible, political "cost" associated with the acquisition of property for their construction. Options 2 and 5 require the purchase of approximately 16 and 7 lots, respectively, with at least one residence per lot. The political implications of condemning and purchasing these lots is unknown and will require input from the Town of Guadalupe on assessing a "value" to assign these scenarios.

Based on an evaluation of each option's cost, multi-use functionality, and overall benefit to the Town and District, one of the following two scenarios is recommended for further investigation by this preliminary report.

4.5.1 Concept Design A

This concept essentially implements Option 5, with a proposal to steepen some of the side slopes from 4H:1V to 3H:1V in strategic locations to mitigate the land acquisition requirements as much as possible. It is anticipated that this can be done with only minor impact on the system hydraulics. As previously stated, this option requires tiling of the Highline Canal.

This concept provides the least cost solution with the minimum of property acquisition requirements. Tiling of the Highline Canal will be tied to their dry-up periods which may have an unknown impact regarding project scheduling. Depending on SRP's design of their facilities, this option may also limit the allowable discharge rate of the pumping facilities that are proposed to drain the Central and South Basins,.

4.5.2 Concept Design B

This concept proposes a blending of Options 1 and 2, with some minor modifications thereof. It is proposed that the Option 1 channel be constructed in Reach 2 and Option 2 channel be constructed in Reaches 3 and 4. This will help reduce the overall cost of a system that does not require tiling of the Highline Canal, and will significantly reduce the property acquisition requirements for Reach 2. Steepening of the side slopes from 4H:1V to 3H:1V in strategic locations might also mitigate the land acquisition requirements in Reaches 3 and 4, with again, only minor impact to the system's hydraulic performance.

SECTION 5: RECOMMENDED CONCEPTUAL DESIGN

5.1 Conveyance System

Comments and input were received from the various project stakeholders regarding the options presented in Section 4. The major focus of those comments was to have a conveyance system design that will limit the number of residential lots requiring purchase as much as possible. Based on that agreement, direction was received to implement a final concept design of the conveyance facilities that employs a mixture of Options 1 through 3. Due to the constraints of a very short dry-up period for the Highline Canal, direction was also given that tiling of the SRP canal (Options 4 and 5) was not to be considered further. Accordingly, the Final Concept Plans for this study blend Options 1, 2, and 3, to comprise a final design that optimally limits the acquisition of residential lots. The concept level plans are provided in Appendix K1, with the final concept quantity and cost estimate in Appendix K2 and the supporting hydraulic calculations in K3.

The total construction cost for the final concept design is approximately $4,599,000. By implementing the final concept plan, the number of residential lots targeted for acquisition is essentially eliminated. There are a few locations that are marginal and will require a closer analysis during the final design. The final concept design will also significantly reduce the number of utility impacts along the canal corridor, while still providing a cost-effective conveyance system.

5.2 Retention Basins

Preliminary grading concepts for the North, Central, and South Basins are presented in Appendix L, and are based on providing the required retention volume while accommodating the Town's desired multi-use facilities. Concept plans of those facilities, developed by the Town's Engineer, were provided to Pentacore and are included in Appendix M for reference.

It should be noted that the basin grading designs are conceptual and do not reflect any contouring or final aesthetic considerations. The intent of the plans is to show that the basins can be graded to accommodate both the Town's desired amenities and to supply the required storage volume. The concept plans assume a minimum of 4H to 1V side slopes, although most of the proposed grading concepts employ flatter slopes. The North Basin also includes an elevated storage cell along Calle Cerritos that

will essentially retain the runoff from Subbasin 2A prior to bleeding it into the northerly portion of the basin.

The North Basin will gravity drain to an existing ADOT storm drain located parallel to the western most property line and within ADOT right-of-way. Per comments from ADOT, the first hour of runoff from the area tributary to the North Basin is to be strictly retained before allowing flows to spill to the bleed-off system. The basin discharge is also to be limited to a maximum of 15 cfs. The first hour of accumulated runoff volume under the hydrograph at Concentration Point S110I approximately equals 0.3 acre-feet. It is proposed that this volume be stored in the low flow portion of the basin adjacent to the Highline Canal and then drained by either a manual or automated headgate, drywells, or an automated pump station for draining. Given the small storage volume, it is expected that drywells will most likely be the preferred method. Assuming an effective percolation rate of 0.1 cfs, only one drywell will be required to drain the initially stored 0.3 acre-feet.

The Central and South Basins will both primarily be drained by pumping stations, with the possibility of using drywells to drain nuisance flows. Peak discharges will for the pump station will be between 5 and 10 cfs. The Central Basin stored runoff will be pumped to the North Branch of the Highline Canal, where the flows will be conveyed north and west within the SRVWUA system and ultimately outfall to the Salt River. The South Basin stored runoff will be pumped to the South Branch of the Highline Canal, where the flows will be conveyed to the abandoned gravel pit located near Warner Road and Interstate 10, which is otherwise known as the ADOT "Pit." The pumped flows will then be removed from the canal and discharged to the ADOT "Pit."

An alternative outfall for the Central Basin may exist in a SRVWUA closed conduit lateral that extends from the North Branch Highline Canal easterly to the Western Canal. Currently, a portion of the runoff draining east within Guadalupe Road is intercepted upstream of the Highline Canal and discharged into the subject lateral. The lateral is a 24-inch RCP and according to the SRVWUA Zanjero maps, delivers approximately 500 miners-inches or 12.5 cfs. The actual capacity of the lateral is closer to 25 - 30 cfs, and in most storms, will be fully surcharged. The invert of the lateral is such that a majority of the runoff in the Central Basin could be gravity drained to it. It is recommended that this option be further investigated during the final design.

Table 5.1 summarizes the retention volume requirements and provision for each basin, as well as the assumed post-storm drain rate and corresponding drain time. Drain times are based on draining the required retention volume.

TABLE 5.1

Summary of retention basin volumes and drain times

Basin (1)	Required Volume ac-ft (2)	Volume Provided ac-ft (3)	Maximum Water Surface feet (4)	Proposed Drain Rate cfs (5)	Proposed Drain Time hours (6)
North (Upper Cell)	3.0	2.8	1228.0	5	7
North (Main Basin)	23.1	23.3	1223.5	15	22
Central	21.8	21.8	1224.1	8	36
South	32.8	37.1	1225.0	10	40

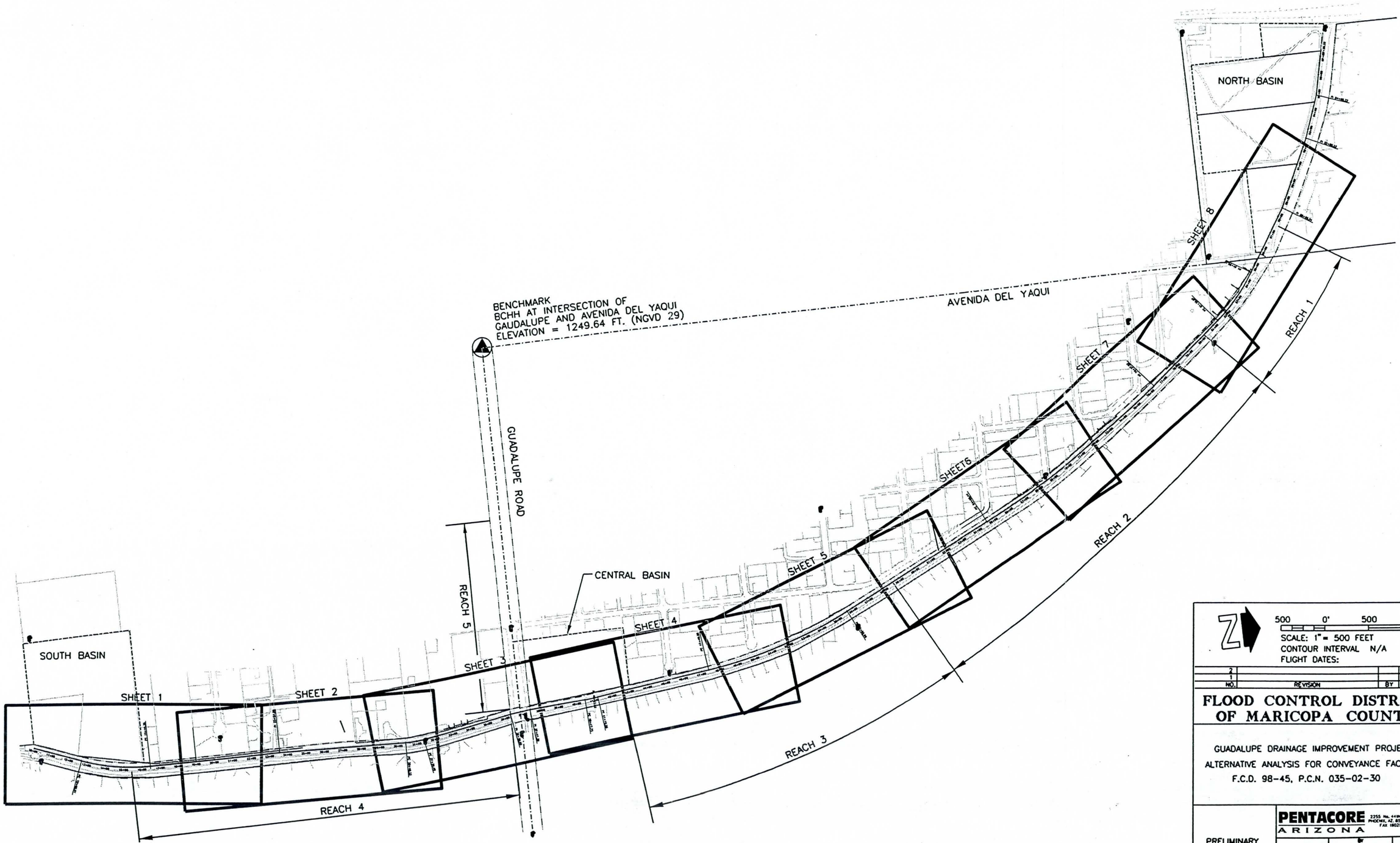
Construction quantity and cost estimates for each of the retention basins are included in Appendix N. Those estimates do not include provisions for constructing all of the recreational amenities indicated by the renderings in Appendix M, but only include those costs of the facilities to be constructed by the Flood Control District of Maricopa County. The estimates do include an allowance for pump stations at the Central and South Basins assuming the discharge is at the canal. In summary, the construction costs for the North, Central, and South Basins are $722,000, $410,000, and $810,000.

5.3 Summary

In summary, this report presents a comprehensive analysis of conveyance alternatives for collecting flows along the Highline Canal and conveying them to each of the respective retention basins, and a recommended final concept plan. The final concept plan incorporates a blending of the options proposed and it minimizes to the extent possible, the purchase of full residential lots.

This report also presents concept grading plans for each of the retention basins proposed for this project and incorporates the Town of Guadalupe's desired multi-use facilities wherever possible.

Quantities and costs are estimated for both the final concept conveyance system plans and the final concept retention basin plans. The total construction cost for this project, including both the conveyance system and retention basins, is approximated at $6,541,000.



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CONTOUR INTERVAL N/A
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

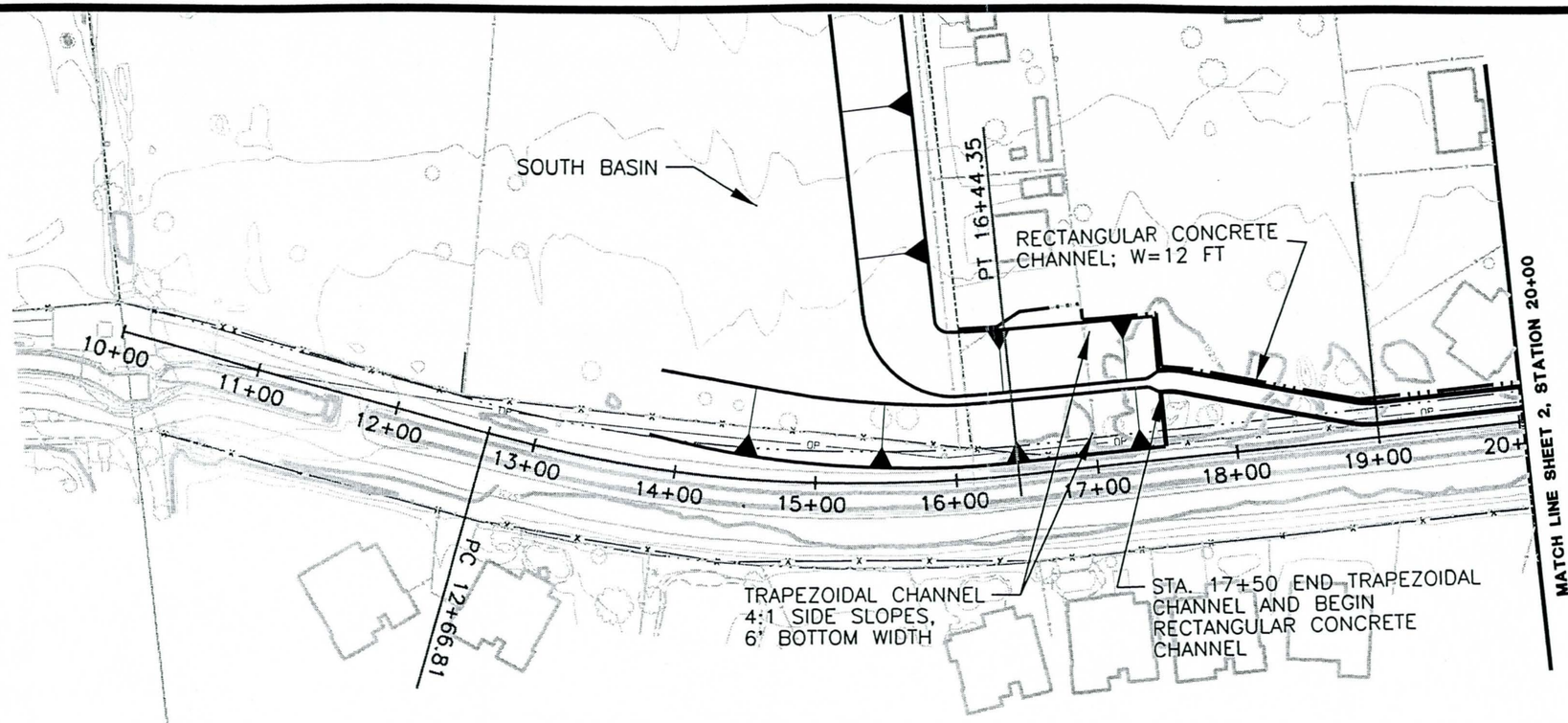
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

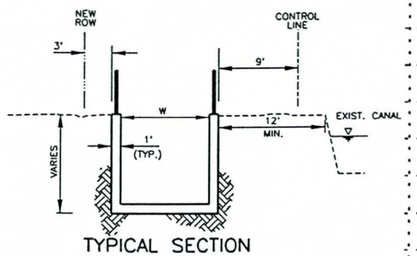
PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE
ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-8272
FAX (602) 681-8339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

LOCATION MAP SHEET 1 OF 1





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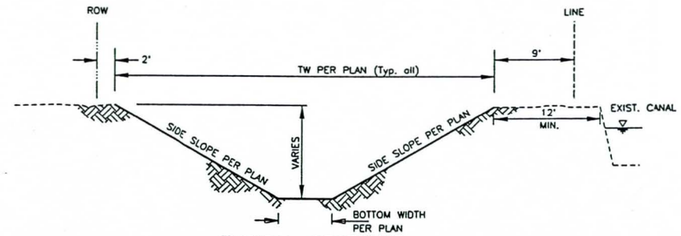
17+50–20+00



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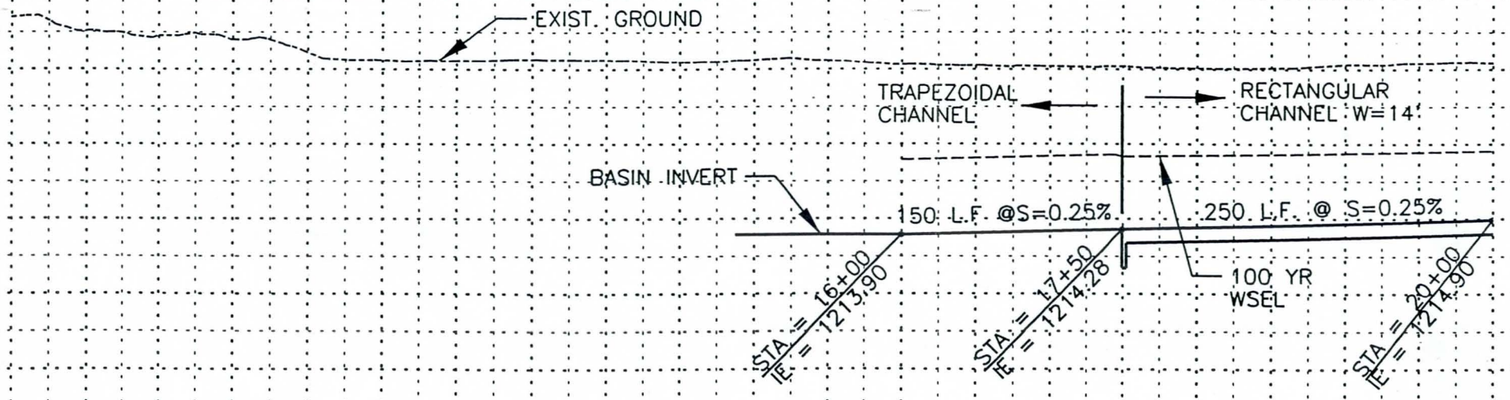
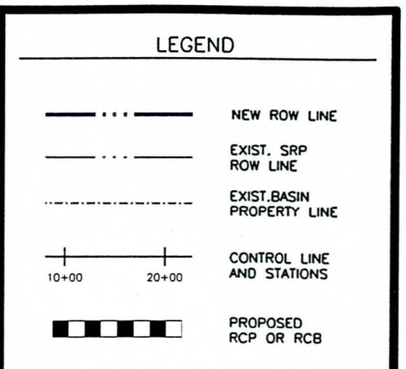


LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



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SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

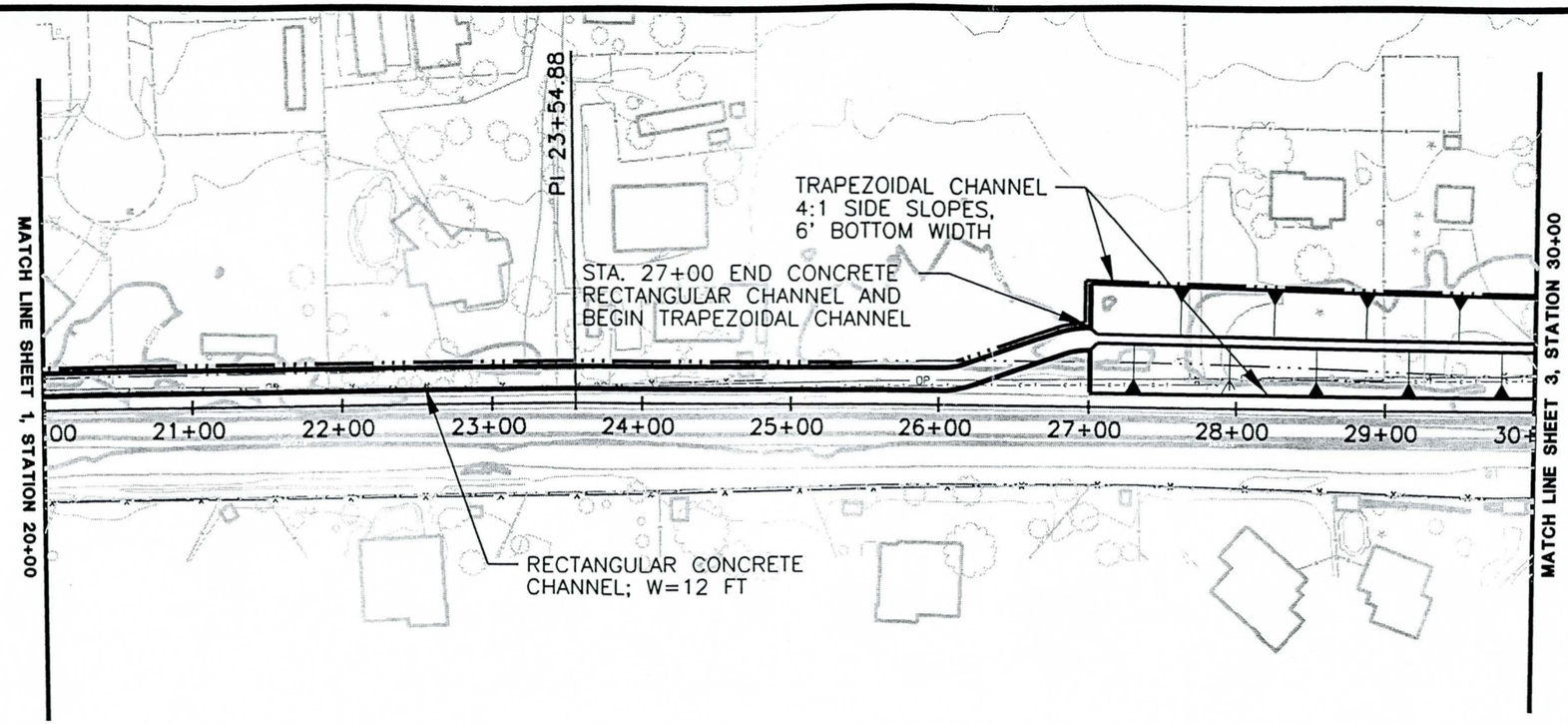
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

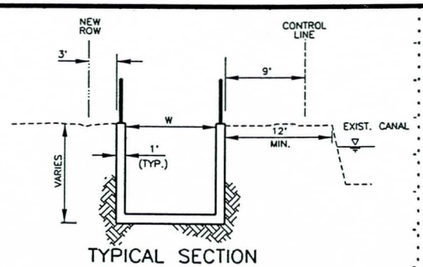
PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
3250 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 881-8272
FAX 18021 681-8338

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

FINAL CONCEPT SHEET 1 OF 8





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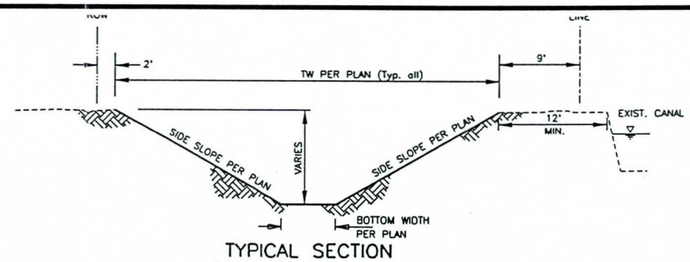
STA. 20+00–27+00



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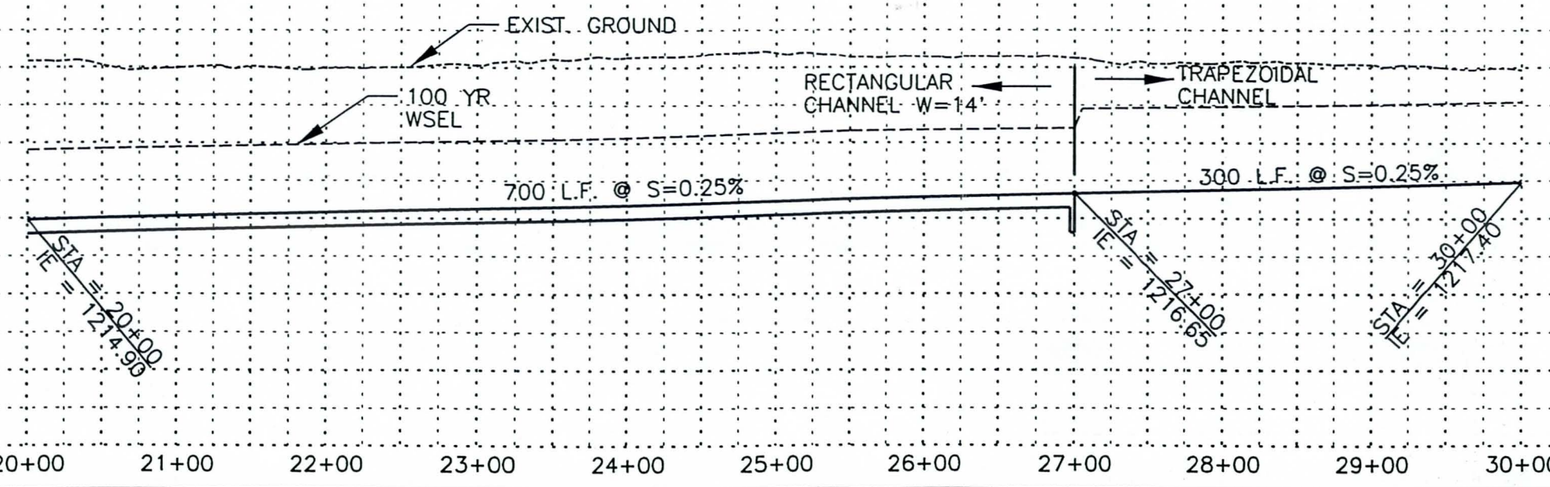
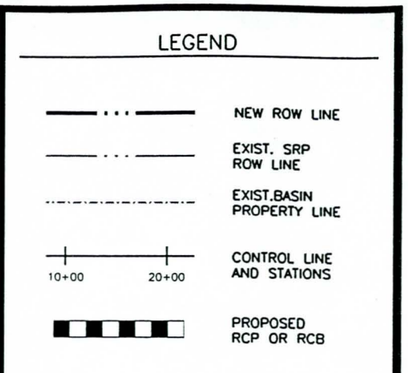


LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



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CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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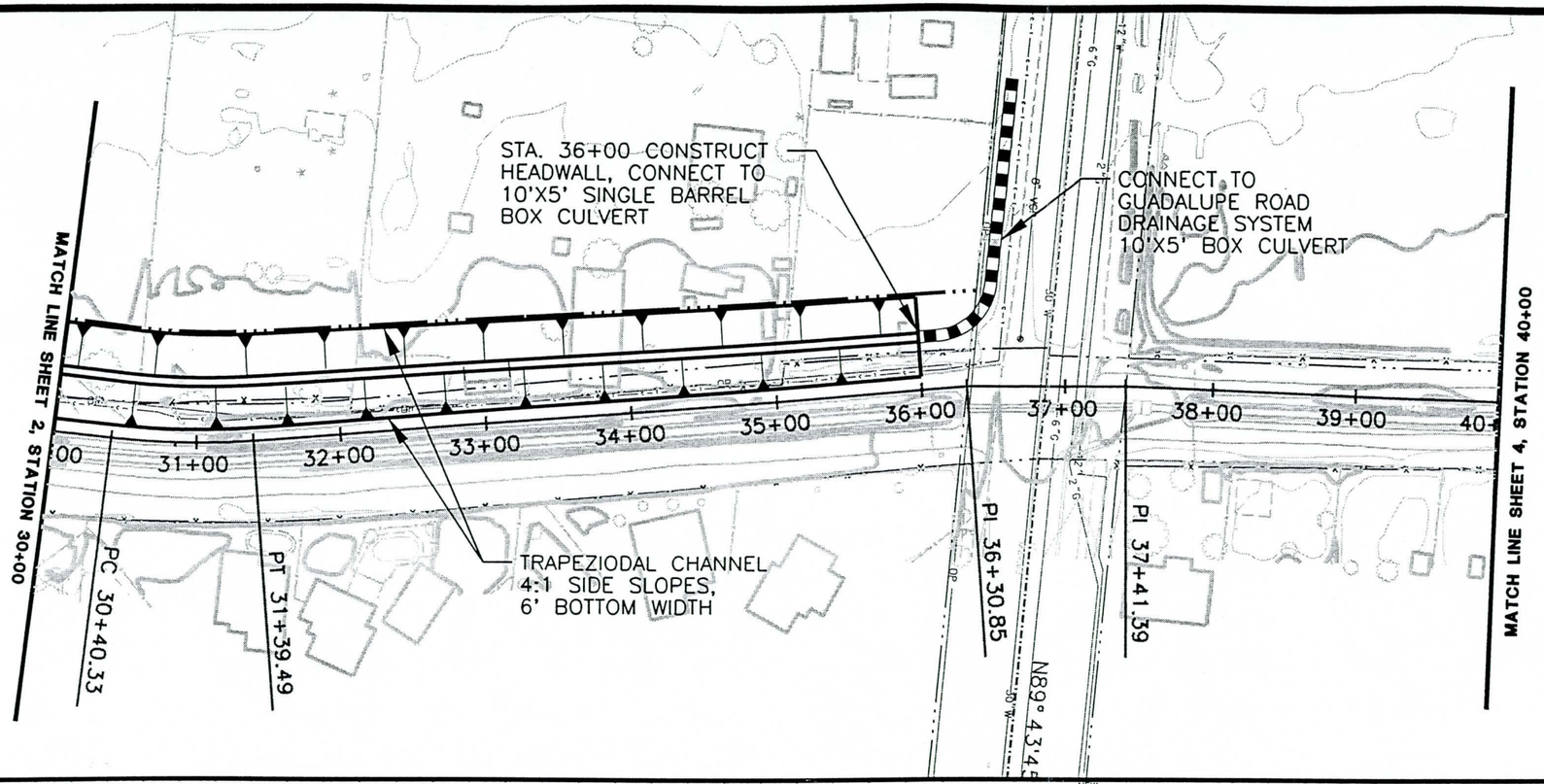
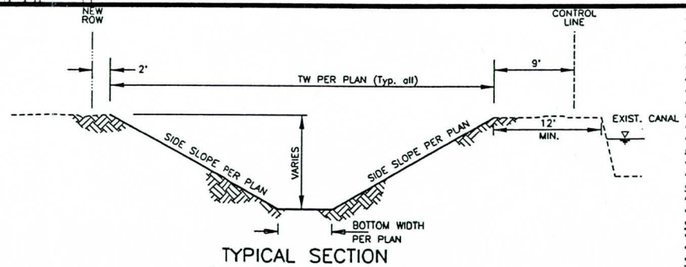
PENTACORE ARIZONA
2255 No. 44th St., Suite 255
PHOENIX, AZ. 85008 602-957-2
FAX (602) 681-9339

	BY	DATE
DESIGN	--	--
DESIGN CHK.	--	--
PLANS	--	--
PLANS CHK.	--	--

FINAL CONCEPT SHEET 2 OF 8





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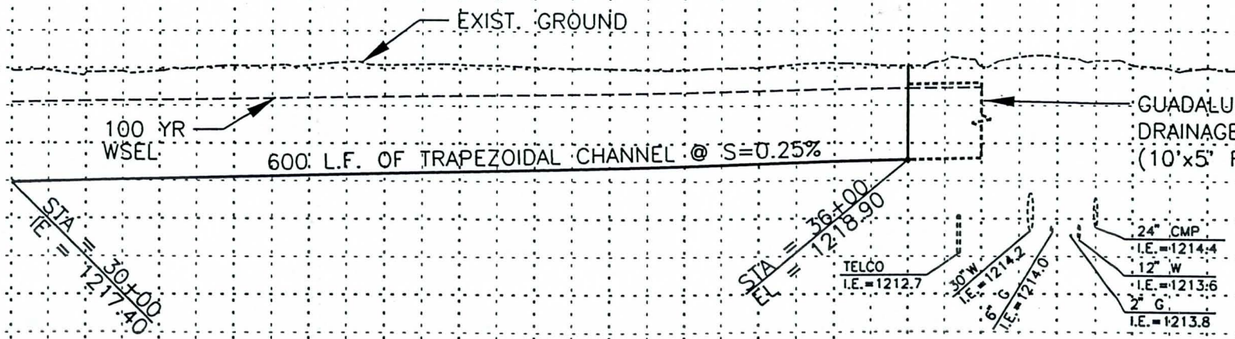

LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST. BASIN PROPERTY LINE
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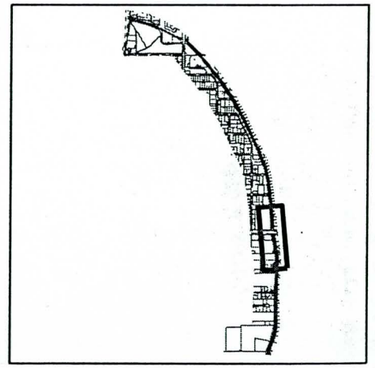
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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PENTACORE ARIZONA
2251 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-9277
FAX (602) 681-9330

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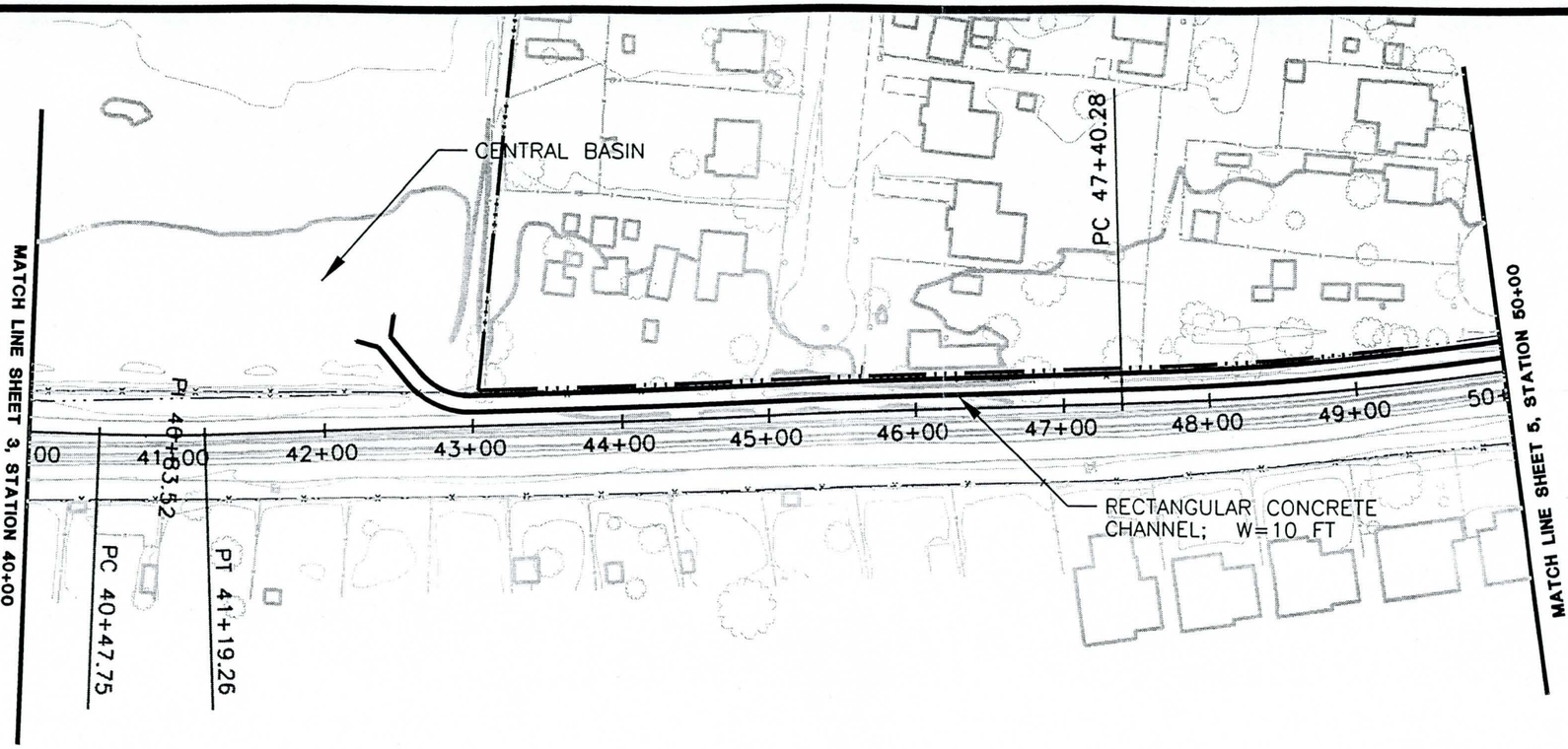
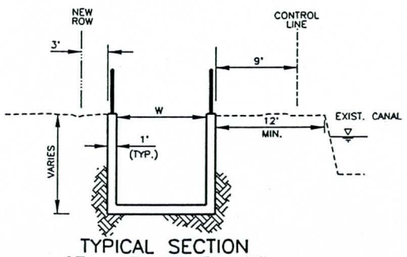
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

FINAL CONCEPT SHEET 3 OF 8





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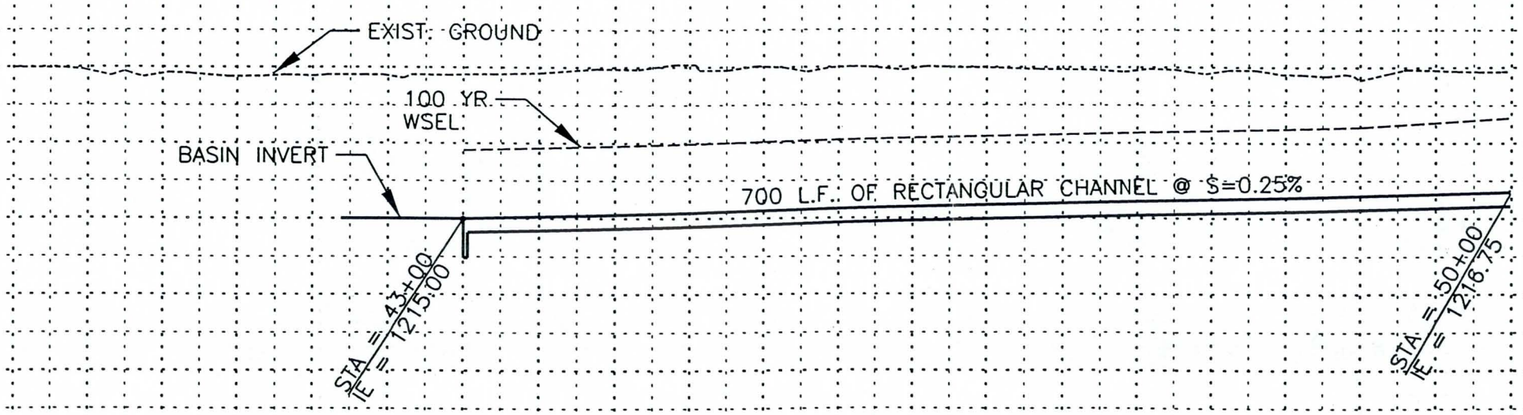
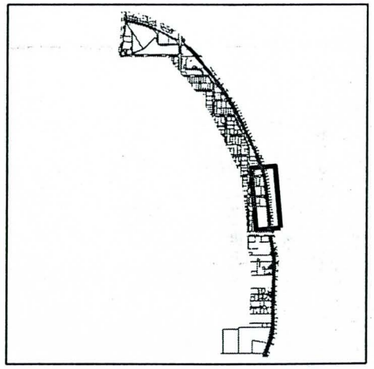
STA. 43+00–50+00



LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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2255 No. 44th St., SUITE 255
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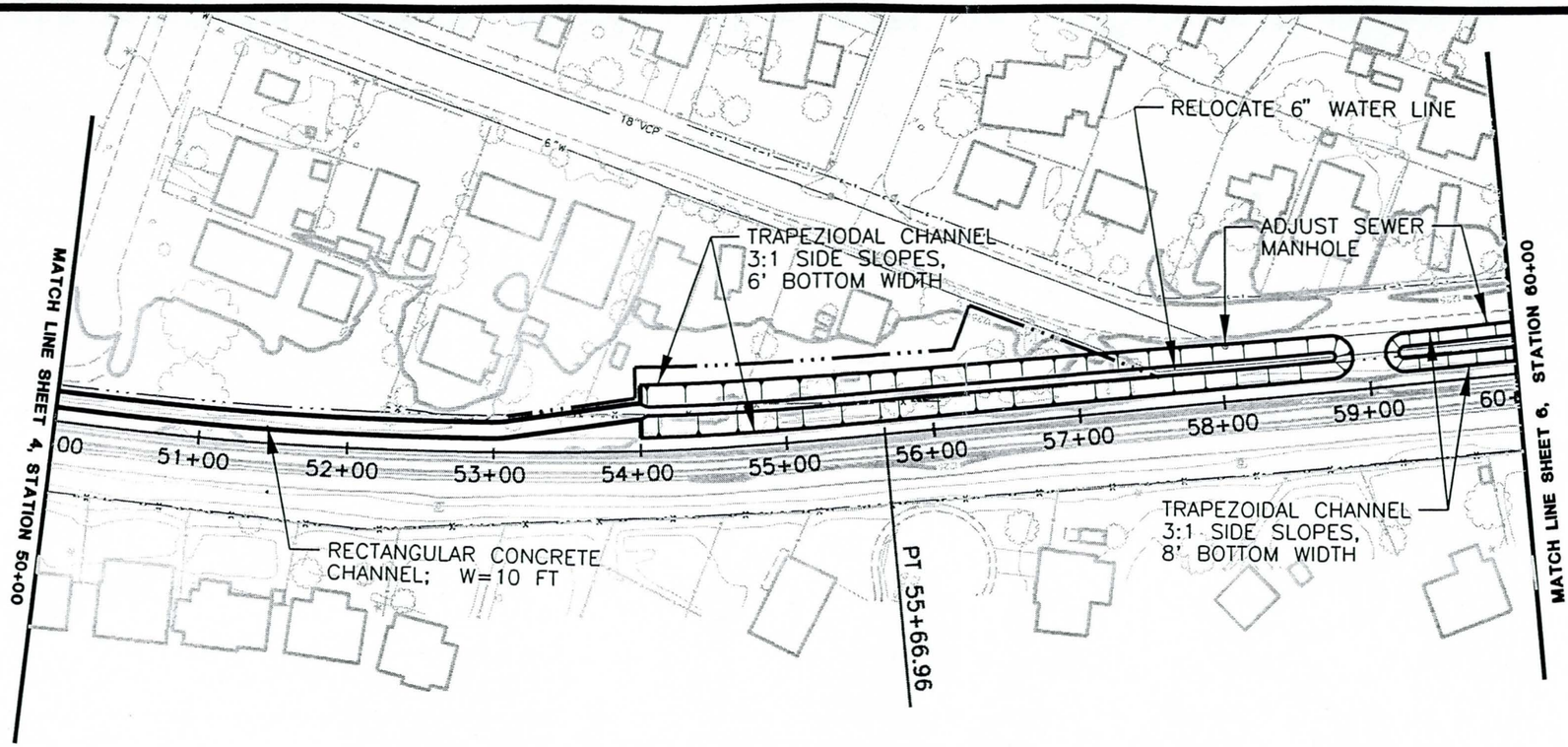
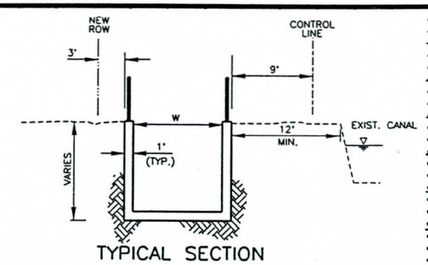
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

FINAL CONCEPT SHEET 4 OF 8





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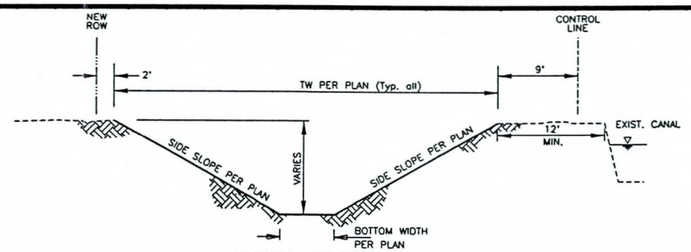

TYPICAL SECTION
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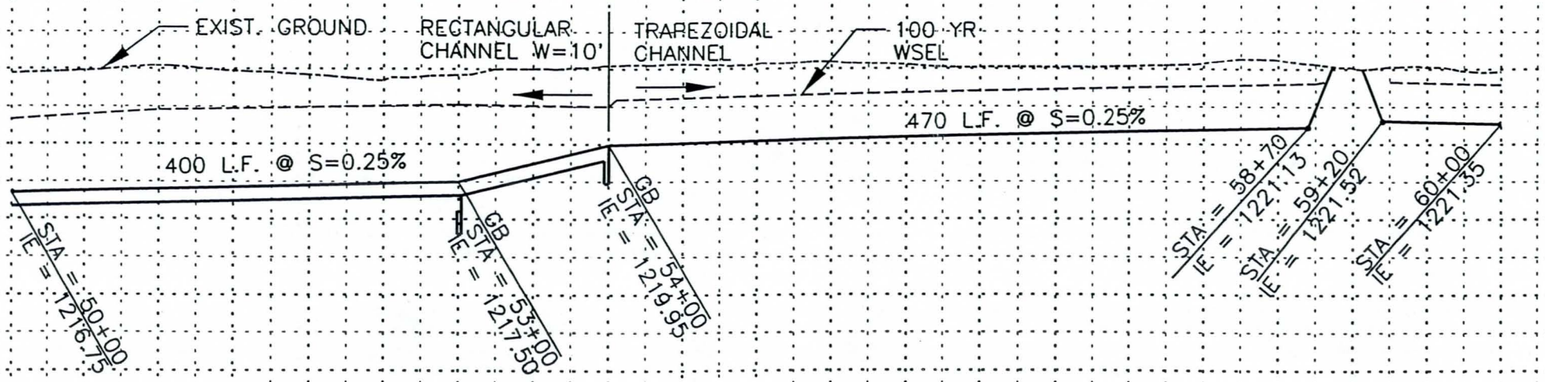
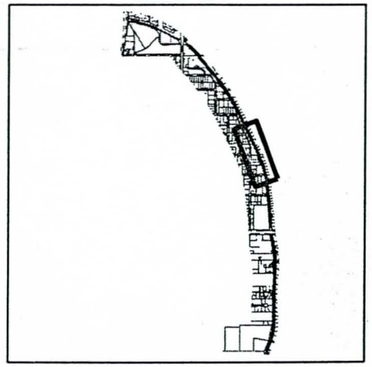


GROUND CONTROL SURVEY DATA

LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST. BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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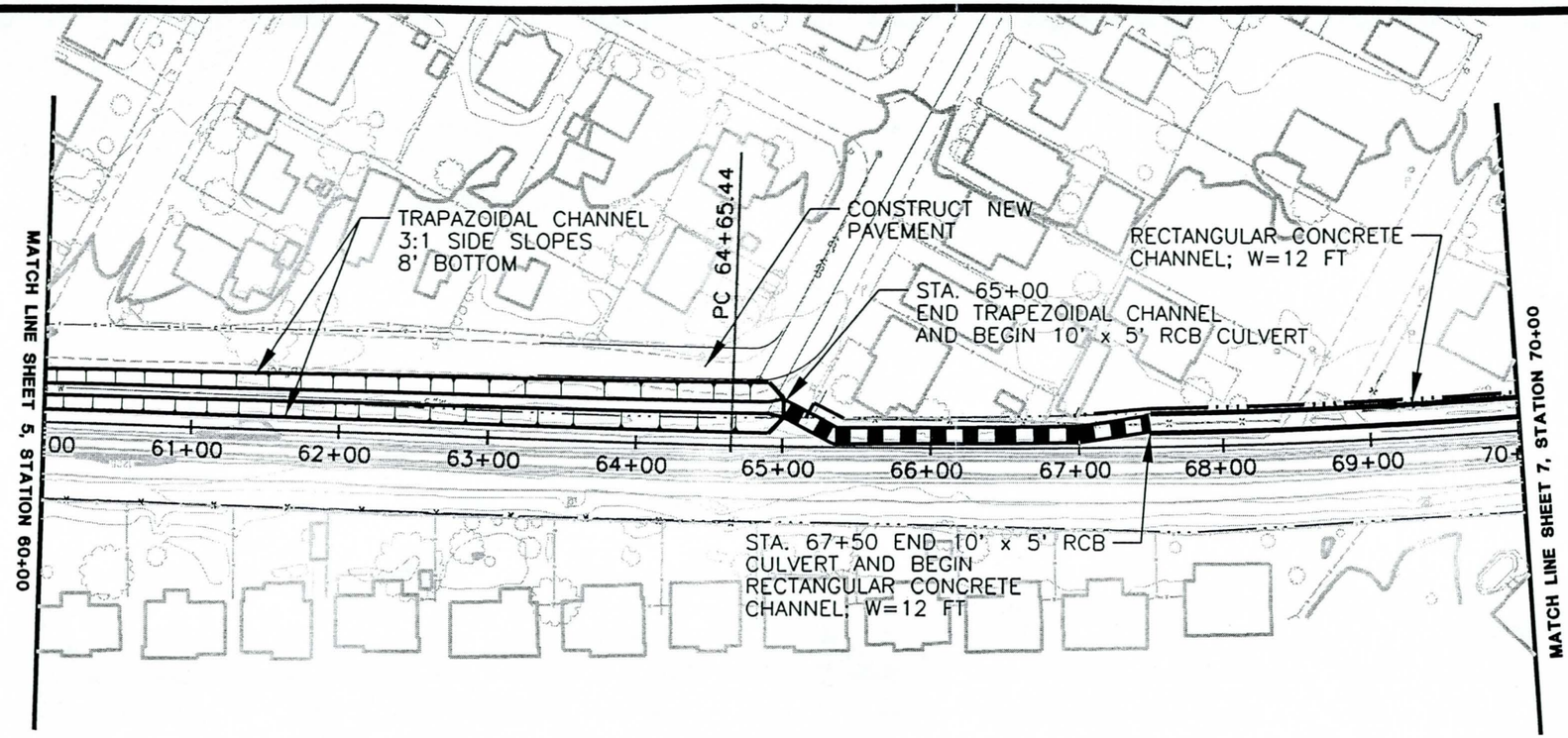
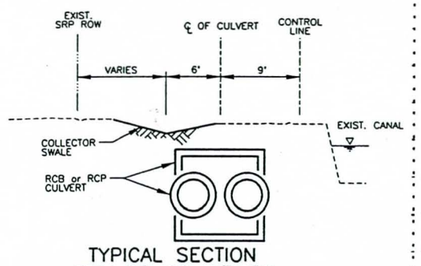
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-9272
FAX (602) 681-9339

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

FINAL CONCEPT SHEET 5 OF 8





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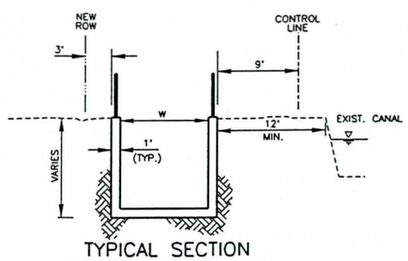

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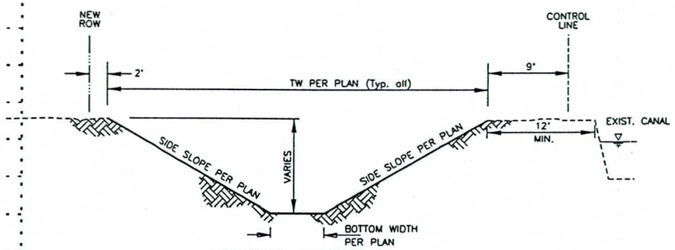

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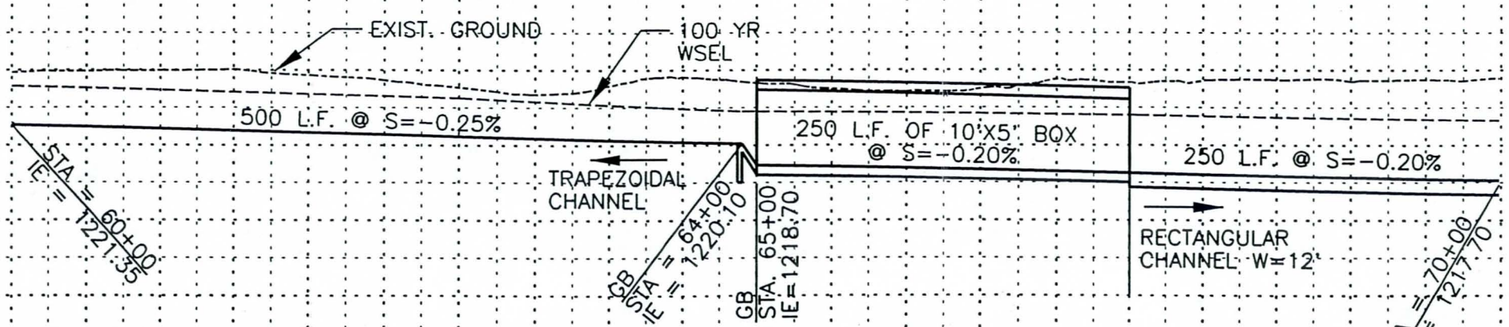

LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
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- PROPOSED TRAPEZOIDAL CHANNEL
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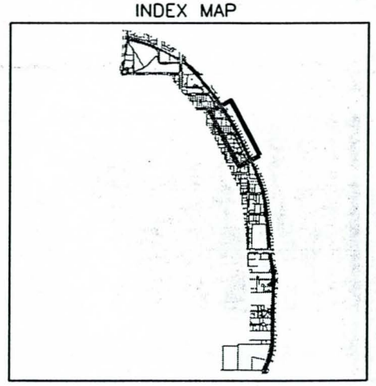
INDEX MAP



100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
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2255 No. 44th St. SUITE 255
PHOENIX, AZ. 85008 681-9272
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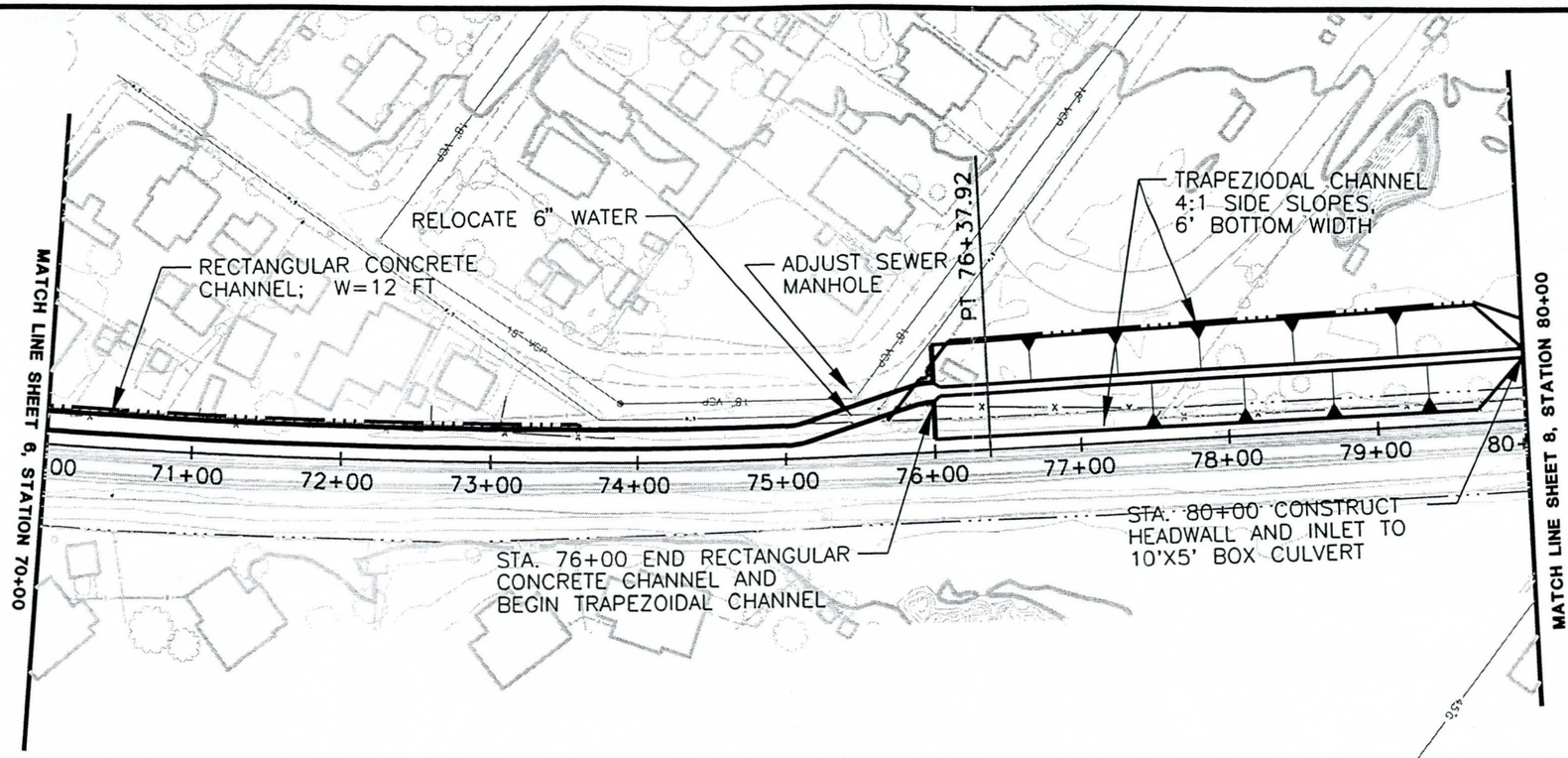
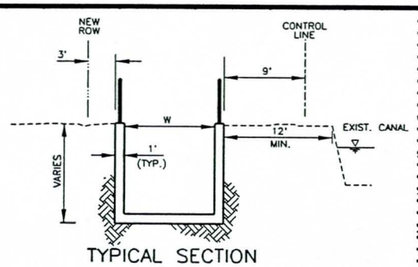
	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

FINAL CONCEPT SHEET 6 OF 8





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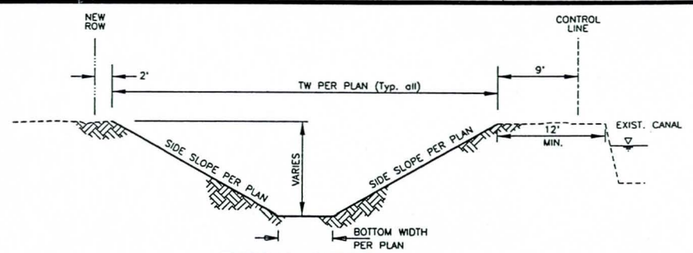
STA. 70+00–76+00



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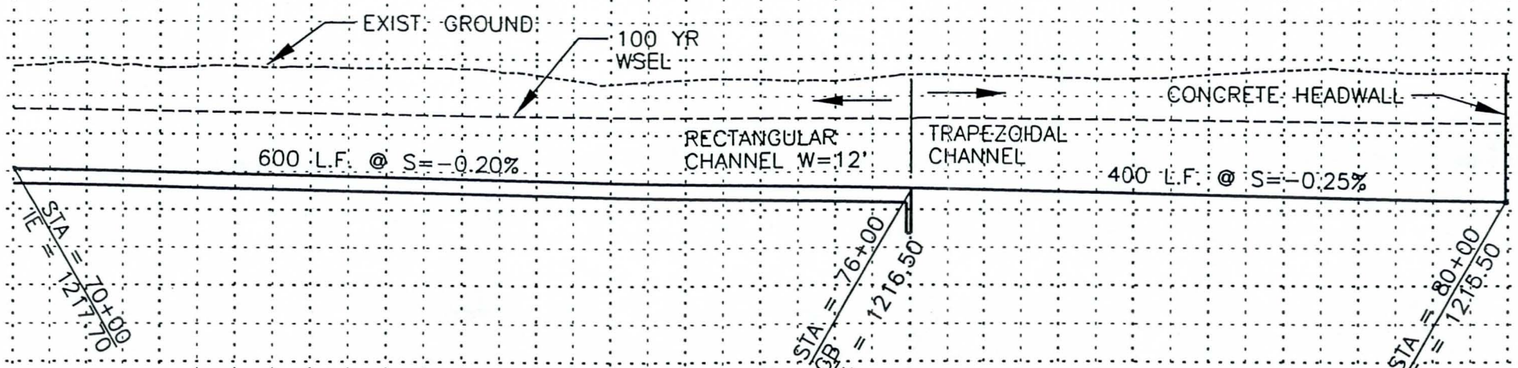
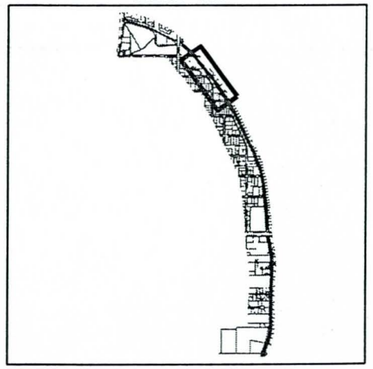


LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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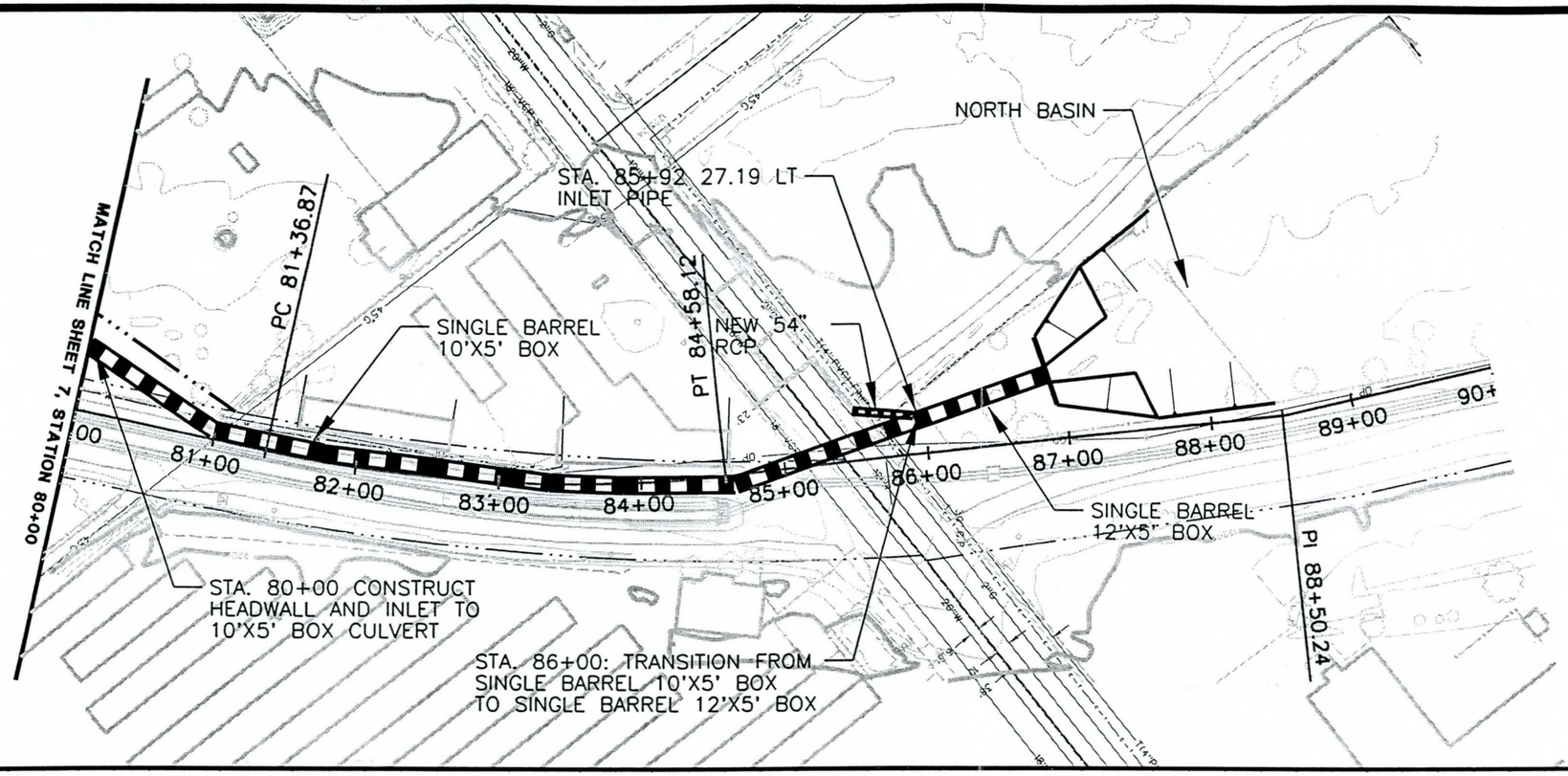
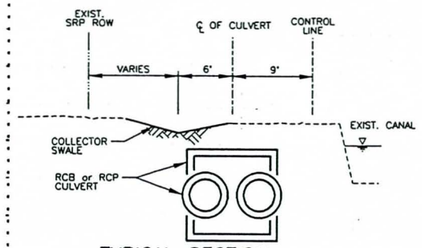
PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 (602) 957-9272
FAX (602) 684-6339

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

FINAL CONCEPT SHEET 7 OF 8





TYPICAL SECTION
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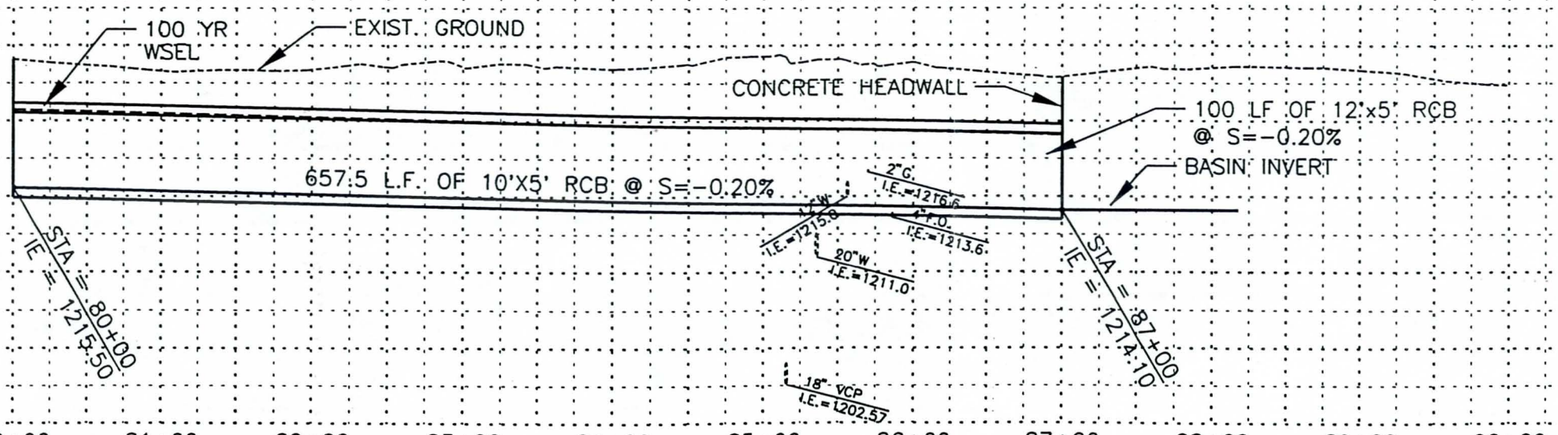

LEGEND

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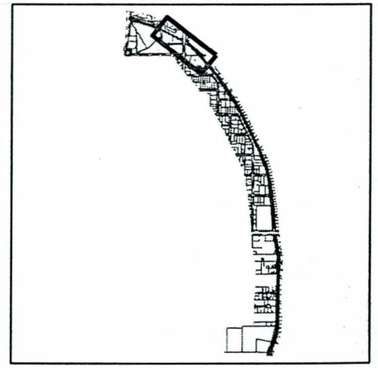
INDEX MAP



100 0' 100 200
SCALE: 1" = 100 FEET
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FLIGHT DATES:

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	BY	DATE
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DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

FINAL CONCEPT SHEET 8 OF 8

SECTION 6: REFERENCES

6.1 List of References

A-N West, Inc., December 1995, *Supplemental Drainage Design Report for Avenida Del Yaqui from Calle Sonora to Highline Canal, Project No. STP-GUA-0(5)P, TRACS No.SS364-01C.*

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Appendix A

Subbasin Characteristics and HEC-1 Input Parameters

LOSS PARAMETERS FOR SUBBASIN: 2B

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.041	100.	0.40	0
TOTAL =	0.041 Sq.Miles		XKSAT = 0.40	%Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.033	MDR 2	80.5	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.008	Comm\Ret	19.5	NORMAL	10	80	0.10	0.02	Min	0.04
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.041 = Total Area			Avg. =	15	40%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 40
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 40

LOSS PARAMETERS FOR SUBBASIN: 2C

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.025	100.	0.40	0
TOTAL =	0.025 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
0.022	Park 2	88.0	NORMAL	50	0	0.20	0.02	Min	0.03
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
	MDR 2		NORMAL	15	30	0.15	0.05	Min	
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.003	Comm\Ret	12.0	NORMAL	10	80	0.10	0.02	Min	0.04
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.025 = Total Area			Avg. =	49	10%	0.190			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.57

IMPERVIOUS AREA: URBAN @ 100 % effective = 10
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 10

LOSS PARAMETERS FOR SUBBASIN: 3A

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.033	100.	0.40	0
TOTAL =	0.033 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.031	MDR 2	93.9	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.002	Comm\Ret	6.1	NORMAL	10	80	0.10	0.02	Min	0.04
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.033 = Total Area			Avg. =	15	33%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 33
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 33

LOSS PARAMETERS FOR SUBBASIN: 3B

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.029	100.	0.40	0

TOTAL = 0.029 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
0.004	School	13.8	NORMAL	10	60	0.10	0.03	Min	0.04
0.008	Park 1	27.6	NORMAL	80	0	0.20	0.10	Min	0.04
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.010	MDR 2	34.5	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.006	Comm\Ret	20.7	NORMAL	10	80	0.10	0.02	Min	0.04
0.001	Canal	3.4	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.029 = Total Area			Avg. =	42	35%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.54

IMPERVIOUS AREA: URBAN @ 100 % effective = 35
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 35

LOSS PARAMETERS FOR SUBBASIN: 3C

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.002	100.	0.40	0

TOTAL = 0.002 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
	MDR 2		NORMAL	15	30	0.15	0.05	Min	
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.001	Comm\Ret	50.0	NORMAL	10	80	0.10	0.02	Min	0.04
0.001	Canal	50.0	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.002 = Total Area			Avg. =	10	40%	0.100			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.40

IMPERVIOUS AREA: URBAN @ 100 % effective = 40
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 40

LOSS PARAMETERS FOR SUBBASIN: 3D

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.007	100.	0.40	0
TOTAL =	0.007 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
	MDR 2		NORMAL	15	30	0.15	0.05	Min	
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.006	Comm\Ret	85.7	NORMAL	10	80	0.10	0.02	Min	0.04
0.001	Canal	14.3	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.007 = Total Area			Avg. =	10	69%	0.100			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.40

IMPERVIOUS AREA: URBAN @ 100 % effective = 69
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 69

LOSS PARAMETERS FOR SUBBASIN: 3E

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.007	100.	0.40	0

TOTAL = 0.007 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.006	MDR 2	85.7	NORMAL	15	30	0.15	0.05	Min	0.04
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
0.001	Canal	14.3	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.007 = Total Area			Avg. =	14	26%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 26
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 26

LOSS PARAMETERS FOR SUBBASIN: 4A

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.022	100.	0.40	0
TOTAL =	0.022 Sq.Miles		XKSAT = 0.40	%Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.019	MDR 2	86.4	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.003	Comm\Ret	13.6	NORMAL	10	80	0.10	0.02	Min	0.04
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.022 = Total Area			Avg. =	15	37%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 37
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 37

LOSS PARAMETERS FOR SUBBASIN: 4B

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.012	100.	0.40	0
TOTAL =	0.012 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
0.005	School	41.7	NORMAL	10	60	0.10	0.03	Min	0.04
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.007	MDR 2	58.3	NORMAL	15	30	0.15	0.05	Min	0.04
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.012 = Total Area			Avg. =	14	43%	0.130			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 43
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 43

LOSS PARAMETERS FOR SUBBASIN: 4C

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.023	100.	0.40	0

TOTAL = 0.023 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.019	MDR 2	82.6	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.003	Comm\Ret	13.0	NORMAL	10	80	0.10	0.02	Min	0.04
0.001	Canal	4.3	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.023 = Total Area			Avg. =	14	35%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 35
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 35

LOSS PARAMETERS FOR SUBBASIN: 5A

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.020	100.	0.40	0
TOTAL =	0.020 Sq.Miles	XKSAT = 0.40	%Rock = 0	

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.014	MDR 2	70.0	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
0.004	Ind	20.0	NORMAL	10	55	0.15	0.03	Min	0.04
0.002	Comm\Ret	10.0	NORMAL	10	80	0.10	0.02	Min	0.04
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.020 = Total Area			Avg. =	14	40%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 40
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 40

LOSS PARAMETERS FOR SUBBASIN: 5B

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.030	100.	0.40	0
TOTAL =	0.030 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
0.009	Park 1	30.0	NORMAL	80	0	0.20	0.10	Min	0.04
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.017	MDR 2	56.7	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.003	Comm\Ret	10.0	NORMAL	10	80	0.10	0.02	Min	0.04
0.001	Canal	3.3	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.030 = Total Area			Avg. =	41	25%	0.160			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.54

IMPERVIOUS AREA: URBAN @ 100 % effective = 25
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 25

LOSS PARAMETERS FOR SUBBASIN: 5C

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.006	100.	0.40	0

TOTAL = 0.006 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.005	MDR 2	83.3	NORMAL	15	30	0.15	0.05	Min	0.04
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
0.001	Canal	16.7	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.006 = Total Area			Avg. =	14	25%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 25
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 25

LOSS PARAMETERS FOR SUBBASIN: 6A

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.028	100.	0.40	0

TOTAL = 0.028 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.016	MDR 2	57.1	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
0.010	Ind	35.7	NORMAL	10	55	0.15	0.03	Min	0.03
0.002	Comm\Ret	7.1	NORMAL	10	80	0.10	0.02	Min	0.04
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.028 = Total Area			Avg. =	13	42%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.41

IMPERVIOUS AREA: URBAN @ 100 % effective = 42
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 42

LOSS PARAMETERS FOR SUBBASIN: 6B

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.024	100.	0.40	0

TOTAL = 0.024 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
0.001	School	4.2	NORMAL	10	60	0.10	0.03	Min	0.04
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.026	MDR 2	83.3	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.002	Comm\Ret	8.3	NORMAL	10	80	0.10	0.02	Min	0.04
0.001	Canal	4.2	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.024 = Total Area			Avg. =	14	34%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 34
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 34

LOSS PARAMETERS FOR SUBBASIN: 7A

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.048	100.	0.40	0

TOTAL = 0.048 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.040	MDR 2	83.3	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
0.001	Ind	2.1	NORMAL	10	55	0.15	0.03	Min	0.04
0.007	Comm\Ret	14.6	NORMAL	10	80	0.10	0.02	Min	0.04
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.048 = Total Area			Avg. =	15	38%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 38
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 38

LOSS PARAMETERS FOR SUBBASIN: 7B

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.013	100.	0.40	0
TOTAL =	0.013 Sq.Miles		XKSAT = 0.40	%Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.013	MDR 2	100.	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.006 = Total Area			Avg. =	15	30%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 30
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 30

LOSS PARAMETERS FOR SUBBASIN: 7C

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.012	100.	0.40	0

TOTAL = 0.012 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.012	MDR 2	100.	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.012 = Total Area			Avg. =	15	30%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 30
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 30

LOSS PARAMETERS FOR SUBBASIN: 7D

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.002	100.	0.40	0

TOTAL = 0.002 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.002	MDR 2	100.	NORMAL	15	30	0.15	0.05	Min	0.04
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.002 = Total Area			Avg. =	15	30%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 30
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 30

LOSS PARAMETERS FOR SUBBASIN: 7E

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.007	100.	0.40	0
TOTAL =	0.007 Sq.Miles		XKSAT = 0.40	%Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
0.006	Park 2	85.7	NORMAL	50	0	0.20	0.02	Min	0.04
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
	MDR 2		NORMAL	15	30	0.15	0.05	Min	
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
0.001	Canal	14.3	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.007 = Total Area			Avg. =	44	0%	0.190			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.55

IMPERVIOUS AREA: URBAN @ 100 % effective = 0
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 0

LOSS PARAMETERS FOR SUBBASIN: 8A

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.009	100.	0.40	0

TOTAL = 0.009 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.003	MDR 2	33.3	NORMAL	15	30	0.15	0.05	Min	0.04
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
0.006	Ind	66.7	NORMAL	10	55	0.15	0.03	Min	0.04
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.009 = Total Area			Avg. =	12	47%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.41

IMPERVIOUS AREA: URBAN @ 100 % effective = 47
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 47

LOSS PARAMETERS FOR SUBBASIN: 8B

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.012	100.	0.40	0

TOTAL = 0.012 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.012	MDR 2	100.	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.012 = Total Area			Avg. =	15	30%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 30
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 30

LOSS PARAMETERS FOR SUBBASIN: 8C

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.024	100.	0.40	0

TOTAL = 0.024 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.021	MDR 2	87.5	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.003	Comm\Ret	12.5	NORMAL	10	80	0.10	0.02	Min	0.04
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.024 = Total Area			Avg. =	15	36%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 36
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 36

LOSS PARAMETERS FOR SUBBASIN: 8D

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.042	100.	0.40	0
TOTAL =	0.042 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.032	MDR 2	76.2	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.010	Comm\Ret	23.8	NORMAL	10	80	0.10	0.02	Min	0.03
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.042 = Total Area			Avg. =	15	42%	0.140			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 42
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 42

LOSS PARAMETERS FOR SUBBASIN: 8E

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.004	100.	0.40	0
TOTAL =	0.004 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
0.001	Park 1	25.0	NORMAL	80	0	0.20	0.10	Min	0.04
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.003	MDR 2	75.0	NORMAL	15	30	0.15	0.05	Min	0.04
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.004 = Total Area			Avg. =	36	23%	0.160			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.52

IMPERVIOUS AREA: URBAN @ 100 % effective = 23
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 23

LOSS PARAMETERS FOR SUBBASIN: 8F

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.035	100.	0.40	0

TOTAL = 0.035 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
0.015	MDR 1	42.9	NORMAL	20	25	0.15	0.05	Min	0.03
	MDR 2		NORMAL	15	30	0.15	0.05	Min	
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.020	Comm\Ret	57.1	NORMAL	10	80	0.10	0.02	Min	0.03
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.035 = Total Area			Avg. =	17	56%	0.120			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.43

IMPERVIOUS AREA: URBAN @ 100 % effective = 56
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 56

LOSS PARAMETERS FOR SUBBASIN: 8G

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.004	100.	0.40	0
TOTAL =	0.004 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.004	MDR 2	100.	NORMAL	15	30	0.15	0.05	Min	0.04
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.004 = Total Area			Avg. =	15	30%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 30
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 30

LOSS PARAMETERS FOR SUBBASIN: 9A

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.011	100.	0.40	0
TOTAL =	0.011 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.011	MDR 2	100.	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.011 = Total Area			Avg. =	15	30%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 30
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 30

LOSS PARAMETERS FOR SUBBASIN: 9B

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.020	100.	0.40	0

TOTAL = 0.020 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
0.020	MDR 1	100.	NORMAL	20	25	0.15	0.05	Min	0.03
	MDR 2		NORMAL	15	30	0.15	0.05	Min	
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.020 = Total Area			Avg. =	20	25%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.44

IMPERVIOUS AREA: URBAN @ 100 % effective = 25
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 25

LOSS PARAMETERS FOR SUBBASIN: 9C

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.019	100.	0.40	0

TOTAL = 0.019 Sq.Miles XKSAT = 0.40 %Rock = 0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.018	MDR 2	94.7	NORMAL	15	30	0.15	0.05	Min	0.03
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
0.001	Canal	5.3	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.019 = Total Area			Avg. =	15	28%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.42

IMPERVIOUS AREA: URBAN @ 100 % effective = 28
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 28

LOSS PARAMETERS FOR SUBBASIN: 9D

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.026	100.	0.40	0
TOTAL =	0.026 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
0.003	MDR 1	11.5	NORMAL	20	25	0.15	0.05	Min	0.04
0.009	MDR 2	34.6	NORMAL	15	30	0.15	0.05	Min	0.04
0.013	M.F.R.	50.0	NORMAL	10	45	0.25	0.05	Min	0.03
	Ind		NORMAL	10	55	0.15	0.03	Min	
0.001	Comm\Ret	3.8	NORMAL	10	80	0.10	0.02	Min	0.04
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.026 = Total Area			Avg. =	13	39%	0.200			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.41

IMPERVIOUS AREA: URBAN @ 100 % effective = 39
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 39

LOSS PARAMETERS FOR SUBBASIN: 9E

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.020	100.	0.40	0
TOTAL =	0.020 Sq.Miles	XKSAT = 0.40	%Rock = 0	

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
0.012	MDR 2	60.0	NORMAL	15	30	0.15	0.05	Min	0.03
0.008	M.F.R.	40.0	NORMAL	10	45	0.25	0.05	Min	0.04
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.020 = Total Area			Avg. =	13	36%	0.190			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.41

IMPERVIOUS AREA: URBAN @ 100 % effective = 36
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 36

LOSS PARAMETERS FOR SUBBASIN: 9F

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.023	100.	0.40	0
TOTAL =	0.023 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
	MDR 2		NORMAL	15	30	0.15	0.05	Min	
0.015	M.F.R.	65.2	NORMAL	10	45	0.25	0.05	Min	0.03
0.008	Ind	34.8	NORMAL	10	55	0.15	0.03	Min	0.04
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.023 = Total Area			Avg. =	10	48%	0.220			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.40

IMPERVIOUS AREA: URBAN @ 100 % effective = 48
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 48

LOSS PARAMETERS FOR SUBBASIN: 9G

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.012	100.	0.40	0
TOTAL =	0.012 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
	Park 2		NORMAL	50	0	0.20	0.02	Min	
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
	MDR 2		NORMAL	15	30	0.15	0.05	Min	
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
0.012	Ind	100.	NORMAL	10	55	0.15	0.03	Min	0.03
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
	Canal		NORMAL	10	0	0.10	0.10	Min	
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.012 = Total Area			Avg. =	10	55%	0.150			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.40

IMPERVIOUS AREA: URBAN @ 100 % effective = 55
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 55

LOSS PARAMETERS FOR SUBBASIN: 9H

Soil Survey Used Maricopa

XKSAT

Map Unit	AREA Sq.Miles	% Area	XKSAT	% Rock Outcrop
1	0.015	100.	0.40	0
TOTAL =	0.015 Sq.Miles	XKSAT = 0.40	%Rock =	0

DTHETA

Dry = 0.35 PSIF = 3.95
Normal = 0.25
Wet = 0.00

LAND USE

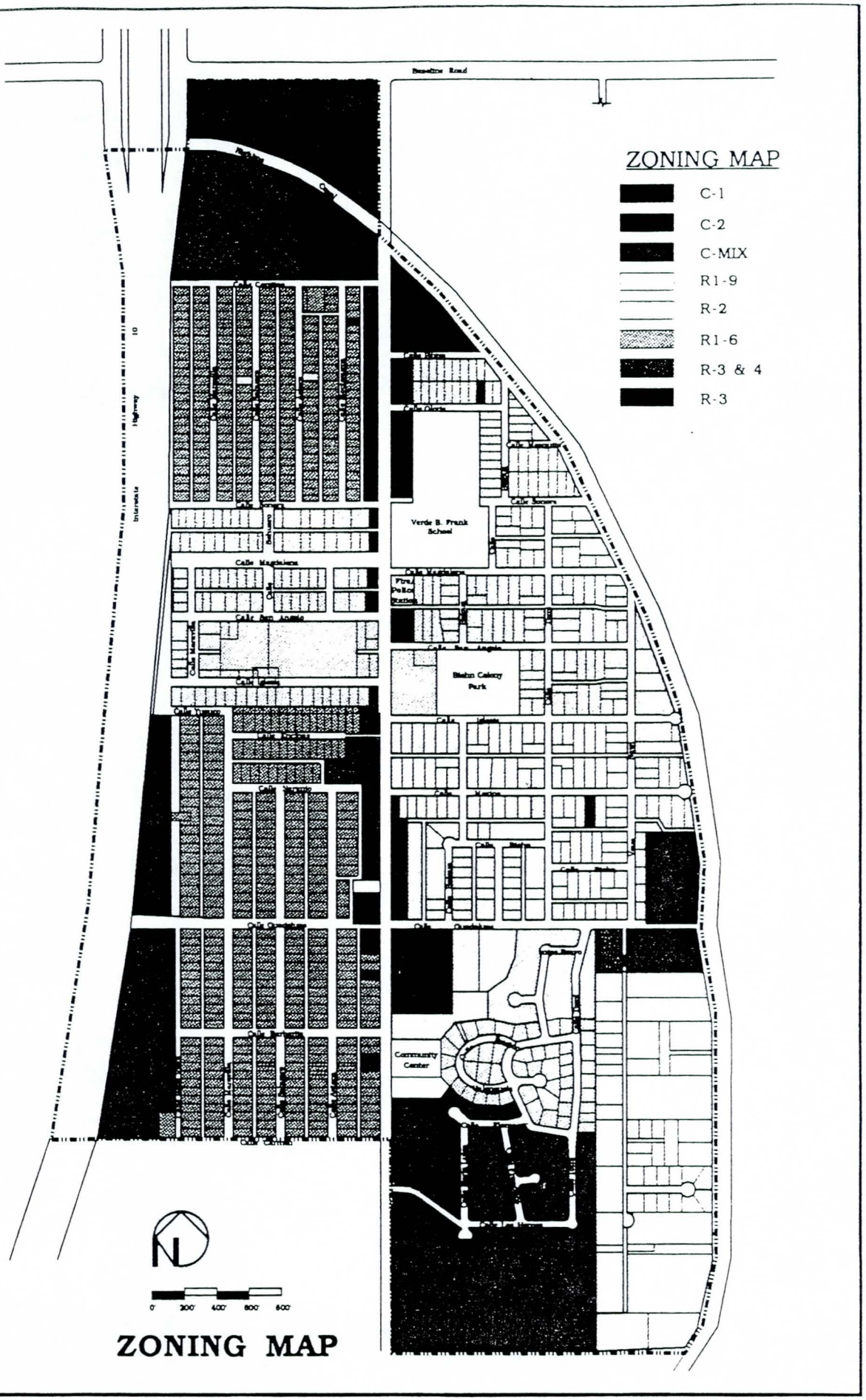
AREA Sq.Miles	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	School		NORMAL	10	60	0.10	0.03	Min	
	Park 1		NORMAL	80	0	0.20	0.10	Min	
0.014	Park 2	93.3	NORMAL	50	0	0.20	0.02	Min	0.03
	MDR 1		NORMAL	20	25	0.15	0.05	Min	
	MDR 2		NORMAL	15	30	0.15	0.05	Min	
	M.F.R.		NORMAL	10	45	0.25	0.05	Min	
	Ind		NORMAL	10	55	0.15	0.03	Min	
	Comm\Ret		NORMAL	10	80	0.10	0.02	Min	
0.001	Canal	6.7	NORMAL	10	0	0.10	0.10	Min	0.04
	V.L.D.R		NORMAL	30	5	0.30	0.05	Min	
0.015 = Total Area			Avg. =	47	0%	0.190			

PERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

SUBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

SUBBASIN XKSAT ADJUSTED FOR VEG. = 0.56

IMPERVIOUS AREA: URBAN @ 100 % effective = 0
ROCK OUTCROP @ 100 % effective = 0
% EFFECTIVE IMP. = 0


ZONING MAP
C-1
C-2
C-MIX
R1-9
R-2
R1-6
R-3 & 4
R-3
Interstate 10
Highway
Verde B. Frank School
Fire/ Police Station
Bloom Colony Park
Community Center
0' 200' 400' 800' 600'

ZONING MAP

B

Appendix B

Supporting Data for Diversion Operation at Concentration Point 302

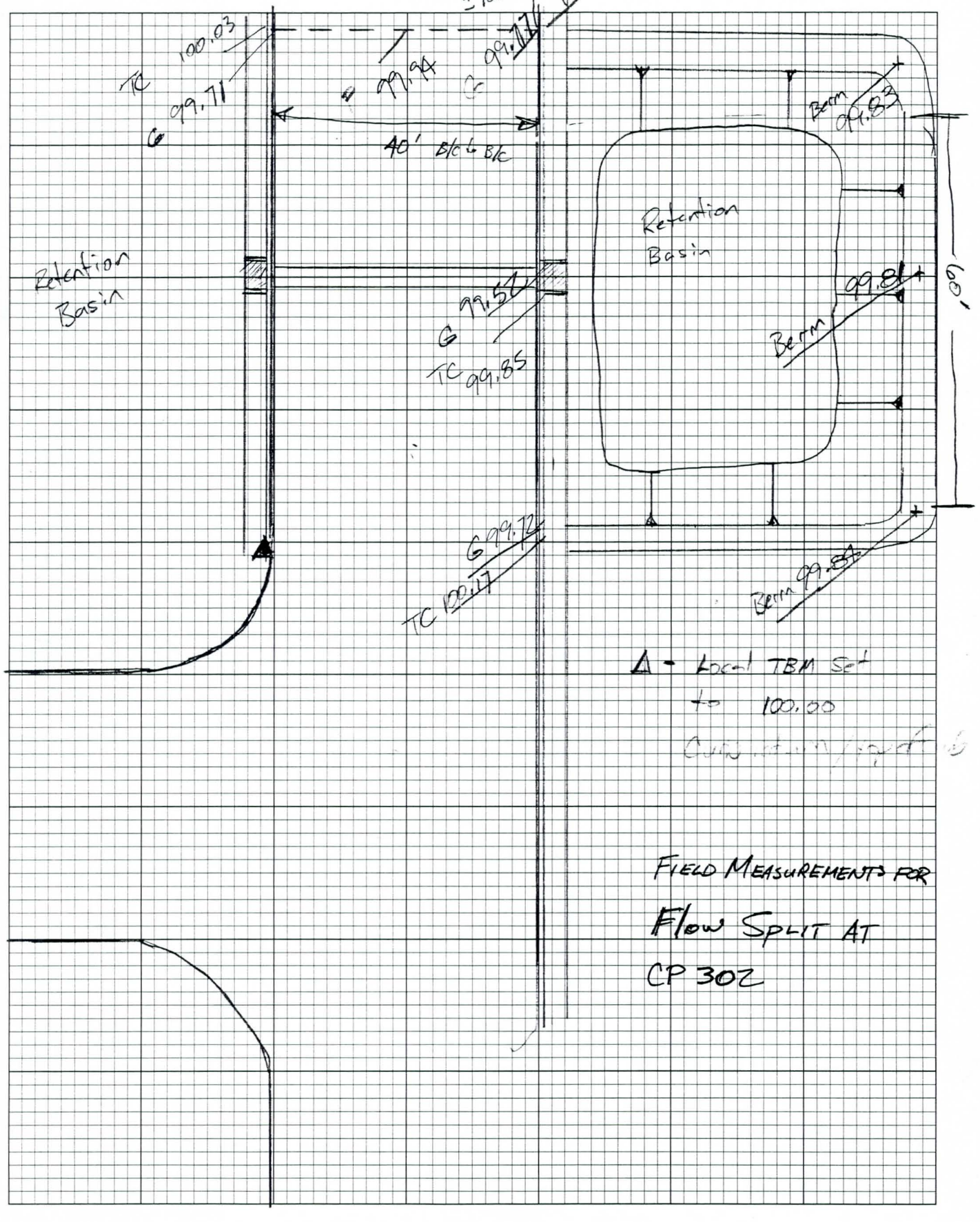
PENTACORE
ARIZONA
Civil Engineering • Construction Administration
Land Surveying • Planning • ADA Consulting

Job No. 5028.0001 Sheet 1 of 1

Project Guadalupe Crag Imprvmts - Alt Analysis

Subject

Designed By Date Checked By Date



FIELD MEASUREMENTS FOR FLOW SPLIT AT CP 302

Table B-1
Rating Table for Irregular Channel

Project Description	
Worksheet	Diversion at CP302 (CalleTomi)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Slope	0.001000 ft/ft

Options	
Current Roughness Method	mproved Lotter's Method
Open Channel Weighting Method	mproved Lotter's Method
Closed Channel Weighting Metho	Horton's Method

Attribute	Minimum	Maximum	Increment
Water Surface Elevation (ft	99.80	101.00	0.10

Water Surface Elevation (ft)	Discharge (cfs)	Velocity (ft/s)	Flow Area (ft^2)	Wetted Perimeter (ft)	Top Width (ft)
99.80	0.14	0.34	0.4	11.44	11.36
99.90	1.49	0.58	2.6	32.07	31.84
100.00	5.87	0.92	6.4	40.45	40.07
100.10	13.16	1.26	10.4	40.65	40.10
100.20	22.57	1.56	14.4	40.85	40.10
100.30	33.86	1.84	18.4	41.05	40.10
100.40	46.86	2.09	22.4	41.25	40.10
100.50	61.43	2.32	26.5	41.45	40.10
100.60	77.47	2.54	30.5	41.65	40.10
100.70	94.89	2.75	34.5	41.85	40.10
100.80	113.63	2.95	38.5	42.05	40.10
100.90	133.62	3.14	42.5	42.25	40.10
101.00	154.80	3.33	46.5	42.45	40.10

Table B-2
Rating Table for Broad Crested Weir

Project Description	
Worksheet	Diversion at CP302 (right branch weir)
Type	Broad Crested Weir
Solve For	Discharge

Input Data		
Crest Elevation	99.82	ft
Crest Surface Type	Gravel	
Crest Breadth	10.00	ft
Crest Length	60.00	ft

Attribute	Minimum	Maximum	Increment
Headwater Elevation (ft)	99.90	101.00	0.10
Tailwater Elevation (ft)	99.85	100.95	0.10

Headwater Elevation (ft)	Tailwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)	
99.90	99.85	3.44	0.72	←
100.00	99.85	11.81	1.09	
100.10	99.85	23.26	1.38	
100.20	99.85	37.29	1.64	
100.30	99.85	53.61	1.86	
100.40	99.85	72.04	2.07	
100.50	99.85	92.44	2.27	
100.60	99.85	114.69	2.45	
100.70	99.85	138.69	2.63	
100.80	99.85	164.35	2.80	
100.90	99.85	191.60	2.96	
101.00	99.85	220.36	3.11	
99.90	99.95	N/A	N/A	
100.00	99.95	11.81	1.09	←
100.10	99.95	23.26	1.38	
100.20	99.95	37.29	1.64	
100.30	99.95	53.61	1.86	
100.40	99.95	72.04	2.07	
100.50	99.95	92.44	2.27	
100.60	99.95	114.69	2.45	
100.70	99.95	138.69	2.63	
100.80	99.95	164.35	2.80	
100.90	99.95	191.60	2.96	
101.00	99.95	220.36	3.11	
99.90	100.05	N/A	N/A	
100.00	100.05	N/A	N/A	
100.10	100.05	22.59	1.34	←
100.20	100.05	37.29	1.64	
100.30	100.05	53.61	1.86	
100.40	100.05	72.04	2.07	
100.50	100.05	92.44	2.27	
100.60	100.05	114.69	2.45	
100.70	100.05	138.69	2.63	
100.80	100.05	164.35	2.80	
100.90	100.05	191.60	2.96	
101.00	100.05	220.36	3.11	

Table B-2
Rating Table for Broad Crested Weir

Headwater Elevation (ft)	Tailwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)	
99.90	100.15	N/A	N/A	
100.00	100.15	N/A	N/A	
100.10	100.15	N/A	N/A	
100.20	100.15	34.66	1.52	←
100.30	100.15	53.61	1.86	
100.40	100.15	72.04	2.07	
100.50	100.15	92.44	2.27	
100.60	100.15	114.69	2.45	
100.70	100.15	138.69	2.63	
100.80	100.15	164.35	2.80	
100.90	100.15	191.60	2.96	
101.00	100.15	220.36	3.11	
99.90	100.25	N/A	N/A	
100.00	100.25	N/A	N/A	
100.10	100.25	N/A	N/A	
100.20	100.25	N/A	N/A	
100.30	100.25	47.04	1.63	←
100.40	100.25	72.04	2.07	
100.50	100.25	92.44	2.27	
100.60	100.25	114.69	2.45	
100.70	100.25	138.69	2.63	
100.80	100.25	164.35	2.80	
100.90	100.25	191.60	2.96	
101.00	100.25	220.36	3.11	
99.90	100.35	N/A	N/A	
100.00	100.35	N/A	N/A	
100.10	100.35	N/A	N/A	
100.20	100.35	N/A	N/A	
100.30	100.35	N/A	N/A	
100.40	100.35	59.80	1.72	←
100.50	100.35	90.84	2.23	
100.60	100.35	114.69	2.45	
100.70	100.35	138.69	2.63	
100.80	100.35	164.35	2.80	
100.90	100.35	191.60	2.96	
101.00	100.35	220.36	3.11	
99.90	100.45	N/A	N/A	
100.00	100.45	N/A	N/A	
100.10	100.45	N/A	N/A	
100.20	100.45	N/A	N/A	
100.30	100.45	N/A	N/A	
100.40	100.45	N/A	N/A	
100.50	100.45	73.07	1.79	←
100.60	100.45	111.91	2.39	
100.70	100.45	138.69	2.63	
100.80	100.45	164.35	2.80	
100.90	100.45	191.60	2.96	
101.00	100.45	220.36	3.11	
99.90	100.55	N/A	N/A	
100.00	100.55	N/A	N/A	
100.10	100.55	N/A	N/A	
100.20	100.55	N/A	N/A	
100.30	100.55	N/A	N/A	

Table B-2

Rating Table for Broad Crested Weir

Headwater Elevation (ft)	Tailwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)
100.40	100.55	N/A	N/A
100.50	100.55	N/A	N/A
100.60	100.55	86.90	1.86
100.70	100.55	134.17	2.54
100.80	100.55	164.35	2.80
100.90	100.55	191.60	2.96
101.00	100.55	220.36	3.11
99.90	100.65	N/A	N/A
100.00	100.65	N/A	N/A
100.10	100.65	N/A	N/A
100.20	100.65	N/A	N/A
100.30	100.65	N/A	N/A
100.40	100.65	N/A	N/A
100.50	100.65	N/A	N/A
100.60	100.65	N/A	N/A
100.70	100.65	101.34	1.92
100.80	100.65	156.97	2.67
100.90	100.65	189.08	2.92
101.00	100.65	220.36	3.11
99.90	100.75	N/A	N/A
100.00	100.75	N/A	N/A
100.10	100.75	N/A	N/A
100.20	100.75	N/A	N/A
100.30	100.75	N/A	N/A
100.40	100.75	N/A	N/A
100.50	100.75	N/A	N/A
100.60	100.75	N/A	N/A
100.70	100.75	N/A	N/A
100.80	100.75	116.39	1.98
100.90	100.75	180.05	2.78
101.00	100.75	216.02	3.05
99.90	100.85	N/A	N/A
100.00	100.85	N/A	N/A
100.10	100.85	N/A	N/A
100.20	100.85	N/A	N/A
100.30	100.85	N/A	N/A
100.40	100.85	N/A	N/A
100.50	100.85	N/A	N/A
100.60	100.85	N/A	N/A
100.70	100.85	N/A	N/A
100.80	100.85	N/A	N/A
100.90	100.85	124.90	1.93
101.00	100.85	203.33	2.87
99.90	100.95	N/A	N/A
100.00	100.95	N/A	N/A
100.10	100.95	N/A	N/A
100.20	100.95	N/A	N/A
100.30	100.95	N/A	N/A
100.40	100.95	N/A	N/A
100.50	100.95	N/A	N/A
100.60	100.95	N/A	N/A
100.70	100.95	N/A	N/A
100.80	100.95	N/A	N/A

Table B-2

Rating Table for Broad Crested Weir

Headwater Elevation (ft)	Tailwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)
100.90	100.95	N/A	N/A
101.00	100.95	131.47	1.86

TABLE B-3

Summary of diversion rating curve at CP302

Total Inflow to Diversion DI Record cfs (1)	Right Branch - Weir Flow DQ Record cfs (2)	Left Branch - Street Flow Stack Hydrograph cfs (3)
0.1	0	0.1
4	3	1
18	12	6
34	23	11
57	35	22
81	47	34
107	50	57
134	73	61
164	87	77
196	101	95
230	116	114
259	125	134
286	131	155

Appendix C

Summary of Rainfall Excess Calculations and Muskingum-Cunge Routing Operations

TABLE C-1

Summary of rainfall excess and subbasin retention volume

Subbasin	Basin Area sq. miles	Total Rainfall inches	Total Loss inches	Total Excess inches	Excess Volume acre-feet	Retetion Basin Totals acre-feet
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2A	0.027	3.29	1.17	2.12	3.053	
2B	0.041	3.29	1.00	2.29	5.007	
2C	0.025	3.29	1.70	1.59	2.120	
3A	0.033	3.29	1.12	2.17	3.819	
3B	0.029	3.29	1.19	2.10	3.248	North Basin
3C	0.002	3.29	0.98	2.31	0.246	26.122
3D	0.007	3.29	0.51	2.78	1.038	
3E	0.007	3.29	1.24	2.05	0.765	
4A	0.022	3.29	1.05	2.24	2.628	
4B	0.012	3.29	0.95	2.34	1.498	
4C	0.023	3.29	1.09	2.20	2.699	
5A	0.020	3.29	1.00	2.29	2.443	
5B	0.030	3.29	1.38	1.91	3.056	
5C	0.006	3.29	1.26	2.04	0.653	
6A	0.028	3.29	0.97	2.33	3.479	
6B	0.024	3.29	1.11	2.18	2.790	Central Basin
7A	0.048	3.29	1.04	2.25	5.760	21.768
7B	0.013	3.29	1.17	2.12	1.470	
7C	0.012	3.29	1.17	2.12	1.357	
7D	0.002	3.29	1.17	2.12	0.226	
7E	0.007	3.29	1.86	1.43	0.534	
8A	0.009	3.29	0.88	2.41	1.157	
8B	0.012	3.29	1.17	2.11	1.350	
8C	0.024	3.29	1.07	2.22	2.842	
8D	0.042	3.29	0.97	2.32	5.197	
8E	0.004	3.29	1.39	1.89	0.403	
8F	0.035	3.29	0.74	2.55	4.760	
8G	0.004	3.29	1.17	2.11	0.450	
9A	0.011	3.29	1.17	2.11	1.238	South Basin
9B	0.020	3.29	1.28	2.01	2.144	32.807
9C	0.019	3.29	1.21	2.08	2.108	
9D	0.026	3.29	1.08	2.21	3.065	
9E	0.020	3.29	1.07	2.21	2.357	
9F	0.023	3.29	0.87	2.42	2.969	
9G	0.012	3.29	0.74	2.55	1.632	
9H	0.015	3.29	1.87	1.42	1.136	

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

Muskingum-Cunge Channel Routing for KK block : 101102

L	1400	Channel Length
S	0.0120	Slope
N	0.015	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	35.00	Bottom Width or Diameter
Z	4.00	Side Slope

Maximum Celerity : 5.93 fps Percent Error : -0.10
Peak Flow : 53.00 cfs
Volume : 3.00 (ac-ft)

Muskingum-Cunge Channel Routing for KK block : 101102

L	250	Channel Length
S	0.0025	Slope
N	0.035	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	8.00	Bottom Width or Diameter
Z	2.00	Side Slope

Maximum Celerity : 2.79 fps Percent Error : 0.10
Peak Flow : 51.00 cfs
Volume : 3.00 (ac-ft)

Muskingum-Cunge Channel Routing for KK block : 102103

L	300	Channel Length
S	0.0025	Slope
N	0.035	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	8.00	Bottom Width or Diameter
Z	2.00	Side Slope

Maximum Celerity : 3.42 fps Percent Error : 0.10
Peak Flow : 102.00 cfs
Volume : 5.00 (ac-ft)

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

Muskingum-Cunge Channel Routing for KK block : 103105

L	750	Channel Length
S	0.0025	Slope
N	0.035	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	8.00	Bottom Width or Diameter
Z	2.00	Side Slope

Maximum Celerity : 3.66 fps Percent Error : 0.20
Peak Flow : 127.00 cfs
Volume : 7.00 (ac-ft)

Muskingum-Cunge Channel Routing for KK block : 105106

L	200	Channel Length
S	0.0025	Slope
N	0.035	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	8.00	Bottom Width or Diameter
Z	2.00	Side Slope

Maximum Celerity : 3.74 fps Percent Error : 0.00
Peak Flow : 139.00 cfs
Volume : 8.00 (ac-ft)

Muskingum-Cunge Channel Routing for KK block : 104106

L	1400	Channel Length
S	0.0136	Slope
N	0.022	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	5.00	Bottom Width or Diameter
Z	4.00	Side Slope

Maximum Celerity : 7.62 fps Percent Error : 0.00
Peak Flow : 86.00 cfs
Volume : 4.00 (ac-ft)

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

```
Muskingum-Cunge Channel Routing for KK block :     106107
==========================================================

        L       450  Channel Length
        S    0.0025  Slope
        N     0.035  Channel Roughness Coefficient
       CA      0.00  Contributing Area
    SHAPE      TRAP  Channel Shape
       WD      8.00  Bottom Width or Diameter
        Z      2.00  Side Slope

Maximum Celerity :     4.65 fps    Percent Error :     0.10
      Peak Flow :   284.00 cfs
          Volume :    15.00 (ac-ft)


Muskingum-Cunge Channel Routing for KK block :     107108
==========================================================

        L       400  Channel Length
        S    0.0025  Slope
        N     0.035  Channel Roughness Coefficient
       CA      0.00  Contributing Area
    SHAPE      TRAP  Channel Shape
       WD      8.00  Bottom Width or Diameter
        Z      2.00  Side Slope

Maximum Celerity :     4.69 fps    Percent Error :     0.10
      Peak Flow :   296.00 cfs
          Volume :    16.00 (ac-ft)


Muskingum-Cunge Channel Routing for KK block :     201202
==========================================================

        L      1500  Channel Length
        S    0.0153  Slope
        N     0.022  Channel Roughness Coefficient
       CA      0.00  Contributing Area
    SHAPE      TRAP  Channel Shape
       WD      5.00  Bottom Width or Diameter
        Z      4.00  Side Slope

Maximum Celerity :     6.92 fps    Percent Error :     0.00
      Peak Flow :    52.00 cfs
          Volume :     2.00 (ac-ft)
```

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

Muskingum-Cunge Channel Routing for KK block : 202203

L	450	Channel Length
S	0.0025	Slope
N	0.035	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	8.00	Bottom Width or Diameter
Z	2.00	Side Slope

Maximum Celerity : 3.58 fps Percent Error : 0.10
Peak Flow : 118.00 cfs
Volume : 5.00 (ac-ft)

Muskingum-Cunge Channel Routing for KK block : 203205

L	107	Channel Length
S	0.0025	Slope
N	0.035	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	8.00	Bottom Width or Diameter
Z	2.00	Side Slope

Maximum Celerity : 3.68 fps Percent Error : 0.00
Peak Flow : 131.00 cfs
Volume : 6.00 (ac-ft)

Muskingum-Cunge Channel Routing for KK block : 204205

L	1850	Channel Length
S	0.0130	Slope
N	0.015	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	35.00	Bottom Width or Diameter
Z	4.00	Side Slope

Maximum Celerity : 6.77 fps Percent Error : -0.10
Peak Flow : 72.00 cfs
Volume : 3.00 (ac-ft)

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

```
   Muskingum-Cunge Channel Routing for KK block :     204205
   ============================================================

         L       100  Channel Length
         S    0.0025  Slope
         N     0.035  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD      8.00  Bottom Width or Diameter
         Z      2.00  Side Slope

Maximum Celerity :      3.06 fps    Percent Error :      0.00
      Peak Flow :     71.00 cfs
          Volume :      3.00 (ac-ft)


   Muskingum-Cunge Channel Routing for KK block :     205207
   ============================================================

         L       407  Channel Length
         S    0.0025  Slope
         N     0.035  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD      8.00  Bottom Width or Diameter
         Z      2.00  Side Slope

Maximum Celerity :      4.45 fps    Percent Error :      0.10
      Peak Flow :    245.00 cfs
          Volume :     12.00 (ac-ft)


   Muskingum-Cunge Channel Routing for KK block :     206207
   ============================================================

         L       850  Channel Length
         S    0.0130  Slope
         N     0.015  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD     35.00  Bottom Width or Diameter
         Z      4.00  Side Slope

Maximum Celerity :      8.37 fps    Percent Error :      0.00
      Peak Flow :    134.00 cfs
          Volume :      6.00 (ac-ft)
```

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

```
   Muskingum-Cunge Channel Routing for KK block :     207208
   ============================================================

         L       150  Channel Length
         S    0.0025  Slope
         N     0.035  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD      8.00  Bottom Width or Diameter
         Z      2.00  Side Slope

Maximum Celerity :     5.13 fps    Percent Error :     0.00
      Peak Flow :   400.00 cfs
          Volume :    20.00 (ac-ft)


   Muskingum-Cunge Channel Routing for KK block :     301303
   ============================================================

         L      1100  Channel Length
         S    0.0163  Slope
         N     0.022  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD      5.00  Bottom Width or Diameter
         Z      4.00  Side Slope

Maximum Celerity :     6.21 fps    Percent Error :     0.00
      Peak Flow :    31.00 cfs
          Volume :     1.00 (ac-ft)


   Muskingum-Cunge Channel Routing for KK block :     302303
   ============================================================

         L      1000  Channel Length
         S    0.0163  Slope
         N     0.022  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD      5.00  Bottom Width or Diameter
         Z      4.00  Side Slope

Maximum Celerity :     6.39 fps    Percent Error :     0.00
      Peak Flow :    35.00 cfs
          Volume :     1.00 (ac-ft)
```

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

```
   Muskingum-Cunge Channel Routing for KK block :     303306
   ============================================================

         L      1300  Channel Length
         S    0.0123  Slope
         N     0.015  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD     35.00  Bottom Width or Diameter
         Z      4.00  Side Slope

Maximum Celerity :     8.30 fps    Percent Error :     0.00
      Peak Flow :   139.00 cfs
          Volume :     5.00 (ac-ft)


   Muskingum-Cunge Channel Routing for KK block :     304306
   ============================================================

         L      1650  Channel Length
         S    0.0103  Slope
         N     0.022  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD      5.00  Bottom Width or Diameter
         Z      4.00  Side Slope

Maximum Celerity :     7.67 fps    Percent Error :     0.00
      Peak Flow :   130.00 cfs
          Volume :     5.00 (ac-ft)


   Muskingum-Cunge Channel Routing for KK block :     305306
   ============================================================

         L      1000  Channel Length
         S    0.0020  Slope
         N     0.015  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD     35.00  Bottom Width or Diameter
         Z   4000.00  Side Slope

Maximum Celerity :     0.68 fps    Percent Error :     0.00
      Peak Flow :    23.00 cfs
          Volume :     1.00 (ac-ft)
```

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

Muskingum-Cunge Channel Routing for KK block : 306307

L	1300	Channel Length
S	0.0123	Slope
N	0.015	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	35.00	Bottom Width or Diameter
Z	4.00	Side Slope

Maximum Celerity : 11.53 fps Percent Error : 0.00
Peak Flow : 371.00 cfs
Volume : 16.00 (ac-ft)

Muskingum-Cunge Channel Routing for KK block : 307308

L	450	Channel Length
S	0.0025	Slope
N	0.035	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	8.00	Bottom Width or Diameter
Z	2.00	Side Slope

Maximum Celerity : 5.06 fps Percent Error : 0.10
Peak Flow : 376.00 cfs
Volume : 17.00 (ac-ft)

Muskingum-Cunge Channel Routing for KK block : 308309

L	650	Channel Length
S	0.0025	Slope
N	0.035	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	8.00	Bottom Width or Diameter
Z	2.00	Side Slope

Maximum Celerity : 5.11 fps Percent Error : 0.10
Peak Flow : 391.00 cfs
Volume : 18.00 (ac-ft)

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

```
   Muskingum-Cunge Channel Routing for KK block :     305309
   ========================================================

         L       800  Channel Length
         S    0.0075  Slope
         N     0.022  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD      5.00  Bottom Width or Diameter
         Z      4.00  Side Slope

Maximum Celerity :     4.88 fps    Percent Error :
      Peak Flow :    37.00 cfs
          Volume :     1.00 (ac-ft)


   Muskingum-Cunge Channel Routing for KK block :     305309
   ========================================================

         L       500  Channel Length
         S    0.0025  Slope
         N     0.035  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD      8.00  Bottom Width or Diameter
         Z      2.00  Side Slope

Maximum Celerity :     2.51 fps    Percent Error :
      Peak Flow :    36.00 cfs
          Volume :     1.00 (ac-ft)


   Muskingum-Cunge Channel Routing for KK block :     309310
   ========================================================

         L       250  Channel Length
         S    0.0025  Slope
         N     0.035  Channel Roughness Coefficient
        CA      0.00  Contributing Area
     SHAPE      TRAP  Channel Shape
        WD      8.00  Bottom Width or Diameter
         Z      2.00  Side Slope

Maximum Celerity :     5.37 fps    Percent Error :     0.00
      Peak Flow :   465.00 cfs
          Volume :    21.00 (ac-ft)
```

TABLE C-2

Summary of Muskingum-Cunge Channel Routing Results

Muskingum-Cunge Channel Routing for KK block : 310311

L	250	Channel Length
S	0.0025	Slope
N	0.035	Channel Roughness Coefficient
CA	0.00	Contributing Area
SHAPE	TRAP	Channel Shape
WD	8.00	Bottom Width or Diameter
Z	2.00	Side Slope

Maximum Celerity : 5.53 fps Percent Error : 0.00
Peak Flow : 512.00 cfs
Volume : 25.00 (ac-ft)

Appendix D

HEC-1 Model Output for 100-Year, 6-Hour Storm

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              MAY  1991                *
*            VERSION 4.0.1E             *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  08/10/99  TIME  18:24:32   *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   1          ID   GUADALUPE DRAINAGE IMPROVEMENT PROJECT
   2          ID   ALTERNATIVES ANALYSIS FOR CONVEYANCE FACILITIES
   3          ID   FCD 98-45, ASSIGNMENTS #1 AND #2
   4          ID   PCN 035-02-30
   5          ID
   6          ID   By: Pentacore Arizona              File: Guadalup.ih1
   7          ID   Project No.: 50280001              Date Revised: 08-10-99 wso
   8          ID
   9          ID   100-year, 6-hour storm event
  10          ID
  11          ID   Future condition land-use is based on the Town of Guadalupe zoning.
  12          ID
  13          ID   EX or FU retention storage within the watershed in not modeled per FCDMC.
  14          ID
  15          ID   Routing paths along the canal assume post-project conditions.
  16          ID
  17          ID   Areal reductions are based on the tributary areas contributing to each
  18          ID     retention basin.
  19          ID
              *DIAGRAM
  20          IT       2                   540
  21          IO       5
              *   ****

  22          KK   SUB2A
  23          KM   SUB-BASIN 2A AT CONCENTRATION POINT 109 (CP109)
  24          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
  25          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
  26          KM     L =  .35  Kb = .032  Adj. Slope =   66.0
  27          BA    .027
  28          IN      15
  29          KM   RAINFALL DEPTH OF 3.30 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
  30          PB   3.290
  31          KM   THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN No. OF 1.00
  32          PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
  33          PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
  34          PC    .962    .972    .983    .991   1.000
  35          LG    .150    .250   3.950    .420  30.000
  36          UC    .162    .167
  37          UA       0       5      16      30      65      77      84      90      94      97
  38          UA     100
              *  *****

  39          KK   SUB4A
  40          KM   SUB-BASIN 4A AT CP101
  41          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
  42          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
  43          KM     L =  .40  Kb = .033  Adj. Slope =   65.0
  44          BA    .022
  45          LG    .140    .250   3.950    .420  37.000
  46          UC    .175    .226
  47          UA       0       5      16      30      65      77      84      90      94      97
  48          UA     100
              *  *****
```



```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
```

```
 49          KK  101102a
 50          KM   ROUTE HYDROGRAPH FROM CP101 TO CP102 THROUGH STREET SECTION
 51          RD    1400   0.012   0.015            TRAP      35       4
             *  *****

 52          KK  101102b
 53          KM   ROUTE HYDROGRAPH FROM CP101 TO CP102 THROUGH THE COLLECTOR CHANNEL
 54          RD     250  0.0025   0.035            TRAP       8       2
             *  *****

 55          KK   SUB4C
 56          KM   SUB-BASIN 4C AT CP102
 57          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 58          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 59          KM     L =  .37  Kb = .033  Adj. Slope =   57.0
 60          BA    .023
 61          LG    .140    .250   3.950    .420  35.000
 62          UC    .175    .207
 63          UA       0       5      16      30      65      77      84      90      94      97
 64          UA     100
             *  *****

 65          KK    C102
 66          KM   COMBINE THE HYDROGRAPH FROM CP101 AND SUBASIN 4C
 67          HC       2
             *  *****

 68          KK  102103
 69          KM   ROUTE HYDROGRAPH FROM CP101 TO CP102
 70          RD     300   .0025    .035            TRAP       8       2
             *  *****

 71          KK   SUB4B
 72          KM   SUB-BASIN 4B AT CP103
 73          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 74          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 75          KM     L =  .27  Kb = .034  Adj. Slope =   70.0
 76          BA    .012
 77          LG    .130    .250   3.950    .420  43.000
 78          UC    .142    .185
 79          UA       0       5      16      30      65      77      84      90      94      97
 80          UA     100
             *  *****

 81          KK    C103
 82          KM   COMBINE THE HYDROGRAPH FROM CP102 AND SUBASIN 4B
 83          HC       2
             *  *****
1                                        HEC-1 INPUT                                        PAGE  3
 LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 84          KK  103105
 85          KM   ROUTE HYDROGRAPH FROM CP103 TO CP105
 86          RD     750   .0025    .035            TRAP       8       2
             *  *****

 87          KK   SUB3E
 88          KM   SUB-BASIN 3E AT CP105
 89          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 90          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 91          KM     L =  .21  Kb = .036  Adj. Slope =   29.0
 92          BA    .007
 93          LG    .140    .250   3.950    .420  26.000
 94          UC    .171    .253
 95          UA       0       5      16      30      65      77      84      90      94      97
 96          UA     100
             *  *****

 97          KK    C105
 98          KM   COMBINE THE HYDROGRAPH FROM CP103 AND SUBASIN 3E
 99          HC       2
             *  *****

100          KK  105106
101          KM   ROUTE HYDROGRAPH FROM CP105 TO CP106
102          RD     200   .0025    .035            TRAP       8       2
             *  *****

103          KK   SUB3A
104          KM   SUB-BASIN 3A AT CP104
105          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
106          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
107          KM     L =  .40  Kb = .032  Adj. Slope =   70.0
108          BA    .033
109          LG    .150    .250   3.950   0.420  33.000
110          UC    .171    .175
111          UA       0       5      16      30      65      77      84      90      94      97
112          UA     100
             *  *****

113          KK  104106
```

```
114          KM   ROUTE HYDROGRAPH FROM CP104 TO CP106 (ASSUMED COMPOSITE SCTN FOR WHOLE REACH)
115          RD    1400   .0136    .022            TRAP       5       4
             *  *****

116          KK   SUB3B
117          KM   SUB-BASIN 3B AT CP106
118          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
119          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
120          KM     L =  .26  Kb = .032  Adj. Slope =   65.0
121          BA    .029
122          LG    .140    .250   3.950    .540  35.000
123          UC    .142    .108
124          UA       0       5      16      30      65      77      84      90      94      97
125          UA     100
             *  *****
1                                        HEC-1 INPUT                                                PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

126          KK    C106
127          KM   COMBINE THE HYDROGRAPH FROM CP104, CP105, AND SUBASIN 3B
128          HC       3
             *  *****

129          KK  106107
130          KM   ROUTE HYDROGRAPH FROM CP106 TO CP107
131          RD     450   .0025    .035            TRAP       8       2
             *  *****

132          KK   SUB3D
133          KM   SUB-BASIN 3D AT CP107
134          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
135          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
136          KM     L =  .12  Kb = .036  Adj. Slope =   58.0
137          BA    .007
138          LG    .100    .250   3.950    .400  69.000
139          UC    .104    .093
140          UA       0       5      16      30      65      77      84      90      94      97
141          UA     100
             *  *****

142          KK    C107
143          KM   COMBINE THE HYDROGRAPH FROM CP106 AND SUBASIN 3D
144          HC       2
             *  *****

145          KK  107108
146          KM   ROUTE HYDROGRAPH FROM CP107 TO CP108
147          RD     400   .0025    .035            TRAP       8       2
             *  *****

148          KK   SUB3C
149          KM   SUB-BASIN 3C AT CP108
150          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
151          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
152          KM     L =  .07  Kb = .039  Adj. Slope =   14.0
153          BA    .002
154          LG    .100    .250   3.950    .400  40.000
155          UC    .129    .157
156          UA       0       5      16      30      65      77      84      90      94      97
157          UA     100
             *  *****

158          KK   SUB2B
159          KM   SUB-BASIN 2B AT CP108
160          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
161          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
162          KM     L =  .45  Kb = .031  Adj. Slope =   56.0
163          BA    .041
164          LG    .140    .250   3.950    .420  40.000
165          UC    .188    .188
166          UA       0       5      16      30      65      77      84      90      94      97
167          UA     100
             *  *****
1                                        HEC-1 INPUT                                                PAGE  5

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

168          KK    C108
169          KM   COMBINE THE HYDROGRAPH FROM CP107, SUBASIN 2B, AND SUBASIN 3C
170          HC       3
             *  *****

171          KK   SUB2C
172          KM   SUB-BASIN 2C AT CP110
173          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
174          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
175          KM     L =  .25  Kb = .032  Adj. Slope =   12.0
176          BA    .025
177          LG    .190    .250   3.950    .570  10.000
178          UC    .237    .203
179          UA       0       5      16      30      65      77      84      90      94      97
180          UA     100
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                *  *****

      181       KK   S110I
      182       KO                          21
      183       KM   COMBINE THE HYDROGRAPH FROM CP108, CP109, AND CP110
      184       KM   STORAGE ROUTE INFLOW HYDROGRAPH FOR NORTH BASIN
      185       HC       3
                *  *****

      186       KK   SUB5A
      187       KM   SUB-BASIN 5A AT CP201
      188       KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
      189       KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
      190       KM     L =  .36  Kb = .033  Adj. Slope =   75.0
      191       BA    .020
      192       IN      15
      193       KM   RAINFALL DEPTH OF 3.30 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
      194       PB   3.292
      195       KM   THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN No. OF 1.00
      196       PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
      197       PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
      198       PC    .962    .972    .983    .991   1.000
      199       LG    .140    .250   3.950    .420  40.000
      200       UC    .158    .196
      201       UA       0       5      16      30      65      77      84      90      94      97
      202       UA     100
                *  *****

      203       KK  201202
      204       KM   ROUTE HYDROGRAPH FROM CP201 TO CP202
      205       RD    1500   .0153    .022            TRAP       5       4
                *  *****

      206       KK   SUB5B
      207       KM   SUB-BASIN 5B AT CP202
      208       KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
      209       KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
      210       KM     L =  .39  Kb = .032  Adj. Slope =   59.0
      211       BA    .030
1                                    HEC-1 INPUT                                          PAGE  6

     LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

      212       LG    .160    .250   3.950    .540  25.000
      213       UC    .179    .191
      214       UA       0       5      16      30      65      77      84      90      94      97
      215       UA     100
                *  *****

      216       KK    C202
      217       KM   COMBINE THE HYDROGRAPH FROM CP201 AND SUBASIN 5B
      218       HC       2
                *  *****

      219       KK  202203
      220       KM   ROUTE HYDROGRAPH FROM CP202 TO CP203
      221       RD     450   .0025    .035            TRAP       8       2
                *  *****

      222       KK   SUB5C
      223       KM   SUB-BASIN 5C AT CP203
      224       KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
      225       KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
      226       KM     L =  .16  Kb = .036  Adj. Slope =   62.0
      227       BA    .006
      228       LG    .140    .250   3.950    .420  25.000
      229       UC    .117    .145
      230       UA       0       5      16      30      65      77      84      90      94      97
      231       UA     100
                *  *****

      232       KK    C203
      233       KM   COMBINE THE HYDROGRAPH FROM CP202 AND SUBASIN 5C
      234       HC       2
                *  *****

      235       KK  203205
      236       KM   ROUTE HYDROGRAPH FROM CP203 TO CP205
      237       RD     107   .0025    .035            TRAP       8       2
                *  *****

      238       KK   SUB6A
      239       KM   SUB-BASIN 6A AT CP204
      240       KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
      241       KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
      242       KM     L =  .42  Kb = .032  Adj. Slope =   74.0
      243       BA    .028
      244       LG    .150    .250   3.950    .410  42.000
      245       UC    .171    .200
      246       UA       0       5      16      30      65      77      84      90      94      97
      247       UA     100
                *  *****
1                                    HEC-1 INPUT                                          PAGE  7

     LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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248          KK  204205a
249          KM   ROUTE HYDROGRAPH FROM CP204 TO CP205 THROUGH THE STREET
250          RD    1850    .013    .015            TRAP      35       4
             *  *****

251          KK  204205b
252          KM   ROUTE HYDROGRAPH FROM CP204 TO CP205 THROUGH THE COLLECTOR CHANNEL
253          RD     100   .0025    .035            TRAP       8       2
             *  *****

254          KK   SUB6B
255          KM   SUB-BASIN 6B AT CP205
256          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
257          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
258          KM     L =  .47  Kb = .033  Adj. Slope =   51.0
259          BA    .024
260          LG    .140    .250   3.950    .420  34.000
261          UC    .204    .291
262          UA       0       5      16      30      65      77      84      90      94      97
263          UA     100
             *  *****

264          KK    C205
265          KM   COMBINE THE HYDROGRAPH FROM CP203, CP204, AND SUBASIN 6B
266          HC       3
             *  *****

267          KK  205207
268          KM   ROUTE HYDROGRAPH FROM CP205 TO CP207
269          RD     407   .0025    .035            TRAP       8       2
             *  *****

270          KK   SUB7A
271          KM   SUB-BASIN 7A AT CP206
272          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
273          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
274          KM     L =  .45  Kb = .031  Adj. Slope =   82.0
275          BA    .048
276          LG    .140    .250   3.950    .420  38.000
277          UC    .167    .151
278          UA       0       5      16      30      65      77      84      90      94      97
279          UA     100
             *  *****

280          KK  206207
281          KM   ROUTE HYDROGRAPH FROM CP206 TO CP207
282          RD     850    .013    .015            TRAP      35       4
             *  *****
1                                        HEC-1 INPUT                                          PAGE  8

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

283          KK   SUB7B
284          KM   SUB-BASIN 7B AT CP207
285          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
286          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
287          KM     L =  .18  Kb = .034  Adj. Slope =   61.0
288          BA    .013
289          LG    .150    .250   3.950    .420  30.000
290          UC    .121    .107
291          UA       0       5      16      30      65      77      84      90      94      97
292          UA     100
             *  *****

293          KK    C207
294          KM   COMBINE THE HYDROGRAPH FROM CP205, CP206, AND SUBASIN 7B
295          HC       3
             *  *****

296          KK  207208
297          KM   ROUTE HYDROGRAPH FROM CP207 TO CP208
298          RD     150   .0025    .035            TRAP       8       2
             *  *****

299          KK   SUB7D
300          KM   SUB-BASIN 7D AT CP208
301          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
302          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
303          KM     L =  .08  Kb = .039  Adj. Slope =   25.0
304          BA    .002
305          LG    .150    .250   3.950    .420  30.000
306          UC    .117    .156
307          UA       0       5      16      30      65      77      84      90      94      97
308          UA     100
             *  *****

309          KK    C208
310          KM   COMBINE THE HYDROGRAPH FROM CP207 AND SUBASIN 7D
311          HC       2
             *  *****

312          KK   SUB7C
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313          KM   SUB-BASIN 7C AT CP209
314          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
315          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
316          KM     L =  .19  Kb = .034  Adj. Slope =   47.0
317          BA    .012
318          LG    .150    .250   3.950    .420  30.000
319          UC    .138    .135
320          UA       0       5      16      30      65      77      84      90      94      97
321          UA     100
             *  *****
1                                      HEC-1 INPUT                                          PAGE  9

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


322          KK   SUB7E
323          KM   SUB-BASIN 7E AT CP216
324          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
325          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
326          KM     L =  .12  Kb = .036  Adj. Slope =   17.0
327          BA    .007
328          LG    .190    .250   3.950    .550    .000
329          UC    .158    .148
330          UA       0       5      16      30      65      77      84      90      94      97
331          UA     100
             *  *****

332          KK   S210I
333          KO                                    21
334          KM   COMBINE THE HYDROGRAPH FROM CP208, CP209, AND SUBASIN 7E
335          KM   STORAGE ROUTE INPUT HYDROGRAPH FOR CENTRAL BASIN
336          HC       3
             *  *****

337          KK   SUB8A
338          KM   SUB-BASIN 8A  AT CP301
339          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
340          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
341          KM     L =  .12  Kb = .035  Adj. Slope =  117.0
342          BA    .009
343          IN      15
344          KM   RAINFALL DEPTH OF 3.30 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
345          PB   3.288
346          KM   THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN No. OF 1.00
347          PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
348          PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
349          PC    .962    .972    .983    .991   1.000
350          LG    .150    .250   3.950    .410  47.000
351          UC    .083    .063
352          UA       0       5      16      30      65      77      84      90      94      97
353          UA     100
             *  *****

354          KK  301303
355          KM   ROUTE HYDROGRAPH FROM CP301 TO CP303
356          RD    1100   .0163    .022            TRAP       5       4
             *  *****

357          KK   SUB8B
358          KM   SUB-BASIN 8B AT CP302
359          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
360          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
361          KM     L =  .20  Kb = .034  Adj. Slope =   60.0
362          BA    .012
363          LG    .150    .250   3.950    .420  30.000
364          UC    .129    .131
365          UA       0       5      16      30      65      77      84      90      94      97
366          UA     100
             *  *****
1                                      HEC-1 INPUT                                          PAGE 10

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


367          KK  302303
368          KM   ROUTE HYDROGRAPH FROM CP302 TO CP303
369          RD    1000   .0163    .022            TRAP       5       4
             *  *****

370          KK   SUB8C
371          KM   SUB-BASIN 8C AT CP303
372          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
373          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
374          KM     L =  .26  Kb = .033  Adj. Slope =   92.0
375          BA    .024
376          LG    .140    .250   3.950    .420  36.000
377          UC    .129    .109
378          UA       0       5      16      30      65      77      84      90      94      97
379          UA     100
             *  *****

380          KK    C303
381          KM   COMBINE THE HYDROGRAPH FROM CP210, CP211, AND SUBASIN 8C
382          HC       3
             *  ******
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383          KK  303306
384          KM   ROUTE HYDROGRAPH FROM CP303 TO CP306
385          RD    1300   .0123    .015            TRAP      35       4
             *  *****

386          KK   SUB8D
387          KM   SUB-BASIN 8D AT CP304
388          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
389          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
390          KM     L =  .34  Kb = .031  Adj. Slope =   91.0
391          BA    .042
392          LG    .140    .250   3.950    .420  42.000
393          UC    .142    .109
394          UA       0       5      16      30      65      77      84      90      94      97
395          UA     100
             *  *****

396          KK  304306
397          KM   ROUTE HYDROGRAPH FROM CP304 TO CP306
398          RD    1650   .0103    .022            TRAP       5       4
             *  *****

399          KK   SUB8F
400          KM   SUB-BASIN 8F AT CP306
401          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
402          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
403          KM     L =  .29  Kb = .032  Adj. Slope =   59.0
404          BA    .035
405          LG    .120    .250   3.950    .430  56.000
406          UC    .150    .113
407          UA       0       5      16      30      65      77      84      90      94      97
408          UA     100
             *  *****
1                                        HEC-1 INPUT                                        PAGE 11

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

409          KK   C306L
410          KM   COMBINE THE HYDROGRAPH FROM CP303, CP304, AND SUBASIN 8F
411          HC       3
             *  *****

412          KK   SUB9B
413          KM   SUB-BASIN 9B AT CP305
414          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
415          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
416          KM     L =  .20  Kb = .033  Adj. Slope =   55.0
417          BA    .020
418          LG    .150    .250   3.950    .440  25.000
419          UC    .133    .101
420          UA       0       5      16      30      65      77      84      90      94      97
421          UA     100

422          KK  D305L
423          KM   40% OF THE FLOW FROM SUBASIN 9B IS DIRECTED NORTH, AND 60% OF THE FLOW IS
424          KM   DIRECTED EAST
425          DT   D305R
426          DI      .1       4      18      34      57      81     107     134     164     196
427          DI     230     259     286
428          DQ       0       3      12      23      35      47      60      73      87     101
429          DQ     116     125     131
             *  *****

430          KK  305306
431          KM   ROUTE DIVERTED HYDROGRAPH 305L FROM CP305 TO CP306
432          RD    1000    .002    .015          TRAP          35    4
             *  *****

433          KK    C306
434          KM   COMBINE THE HYDROGRAPH FROM CP306L AND D305L
435          HC       2
             *  *****

436          KK  306307
437          KM   ROUTE HYDROGRAPH FROM CP306 TO CP307
438          RD    1300   .0123    .015            TRAP      35       4
             *  *****

439          KK   SUB8E
440          KM   SUB-BASIN 8E AT CP216
441          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
442          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
443          KM     L =  .37  Kb = .037  Adj. Slope =   62.0
444          BA    .004
445          LG    .160    .250   3.950    .520  23.000
446          UC    .183    .591
447          UA       0       5      16      30      65      77      84      90      94      97
448          UA     100
             *  *****
1                                        HEC-1 INPUT                                        PAGE 12

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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449          KK   SUB8G
450          KM   SUB-BASIN 8G  AT CP307
451          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
452          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
453          KM     L =  .14  Kb = .037  Adj. Slope =   57.0
454          BA    .004
455          LG    .150    .250   3.950    .420  30.000
456          UC    .117    .165
457          UA       0       5      16      30      65      77      84      90      94      97
458          UA     100
             *  *****

459          KK    C307
460          KM   COMBINE THE HYDROGRAPH FROM CP306, SUBASIN 8E, AND SUBASIN 8G
461          HC       3
             *  *****

462          KK  307308
463          KM   ROUTE HYDROGRAPH FROM CP307 TO CP308
464          RD     450   .0025    .035            TRAP       8       2
             *  *****

465          KK   SUB9A
466          KM   SUB-BASIN 9A AT CP308
467          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
468          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
469          KM     L =  .20  Kb = .035  Adj. Slope =   30.0
470          BA    .011
471          LG    .150    .250   3.950    .420  30.000
472          UC    .162    .178
473          UA       0       5      16      30      65      77      84      90      94      97
474          UA     100
             *  *****

475          KK    C308
476          KM   COMBINE THE HYDROGRAPH FROM CP307 AND SUBASIN 9A
477          HC       2
             *  *****

478          KK  308309
479          KM   ROUTE HYDROGRAPH FROM CP308 TO CP309
480          RD     650   .0025    .035            TRAP       8       2
             *  *****

481          KK   D305R
482          KM   RETRIEVE DIVERTED FLOW FROM RIGHT BRANCH OF FLOW SPLIT LOCATED AT CP35
483          DR   D305R
             *  *****
1                                        HEC-1 INPUT                                        PAGE 13

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

484          KK  305309a
485          KM   ROUTE DIVERTED HYDROGRAPH FROM CP305 TO CP309 THROUGH OVERLAND AREA
486          RD     800   .0075    .022            TRAP       5       4
             *  *****

487          KK  305309b
488          KM   ROUTE DIVERTED HYDROGRAPH FROM CP305 TO CP309 ALONG CHANNEL REACH
489          RD     500   .0025    .035            TRAP       8       2
             *  *****

490          KK   SUB9C
491          KM   SUB-BASIN 9C AT CP309
492          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
493          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
494          KM     L =  .23  Kb = .033  Adj. Slope =   22.0
495          BA    .019
496          LG    .150    .250   3.950    .420  28.000
497          UC    .188    .171
498          UA       0       5      16      30      65      77      84      90      94      97
499          UA     100
             *  *****

500          KK    C309
501          KM   COMBINE THE HYDROGRAPH FROM CP301, D302R, AND SUBASIN 9C
502          HC       3
             *  *****

503          KK  309310
504          KM   ROUTE DIVERTED HYDROGRAPH FROM CP309 TO CP310
505          RD     250   .0025    .035            TRAP       8       2
             *  *****

506          KK   SUB9D
507          KM   SUB-BASIN 9D  AT  CP310
508          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
509          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
510          KM     L =  .45  Kb = .032  Adj. Slope =   53.0
511          BA    .026
512          LG    .200    .250   3.950    .410  36.000
513          UC    .196    .256
514          UA       0       5      16      30      65      77      84      90      94      97
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```
 515 '      UA     100
            *  *****

 516        KK    C310
 517        KM   COMBINE THE HYDROGRAPH FROM CP309, AND SUBASIN 9D
 518        HC       2
            *  *****
1                                        HEC-1 INPUT                                                    PAGE 14

LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10


 519        KK  310311
 520        KM   ROUTE DIVERTED HYDROGRAPH FROM CP310 TO CP311
 521        RD     250   .0025    .035            TRAP       8       2
            *  *****

 522        KK   SUB9E
 523        KM   SUB-BASIN 9E AT CP311
 524        KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 525        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 526        KM     L =  .48  Kb = .033  Adj. Slope =   48.0
 527        BA    .020
 528        LG    .190    .250   3.950    .410  36.000
 529        UC    .213    .343
 530        UA       0       5      16      30      65      77      84      90      94      97
 531        UA     100
            *  *****

 532        KK    C311
 533        KM   COMBINE THE HYDROGRAPH FROM CP310, AND SUBASIN 9E
 534        HC       2
            *  *****

 535        KK   SUB9F
 536        KM   SUB-BASIN 9F AT  CP312
 537        KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 538        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 539        KM     L =  .28  Kb = .033  Adj. Slope =   57.0
 540        BA    .023
 541        LG    .220    .250   3.950    .400  48.000
 542        UC    .150    .140
 543        UA       0       5      16      30      65      77      84      90      94      97
 544        UA     100
            *  *****

 545        KK   SUB9G
 546        KM   SUB-BASIN 9G AT  CP313
 547        KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 548        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 549        KM     L =  .20  Kb = .034  Adj. Slope =   55.0
 550        BA    .012
 551        LG    .150    .250   3.950    .400  55.000
 552        UC    .129    .131
 553        UA       0       5      16      30      65      77      84      90      94      97
 554        UA     100
            *  *****

 555        KK   SUB9H
 556        KM   SUB-BASIN 9H AT CP314
 557        KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 558        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 559        KM     L =  .15  Kb = .034  Adj. Slope =   67.0
 560        BA    .015
 561        LG    .190    .250   3.950    .560    .000
 562        UC    .112    .079
1                                        HEC-1 INPUT                                                    PAGE 15

LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

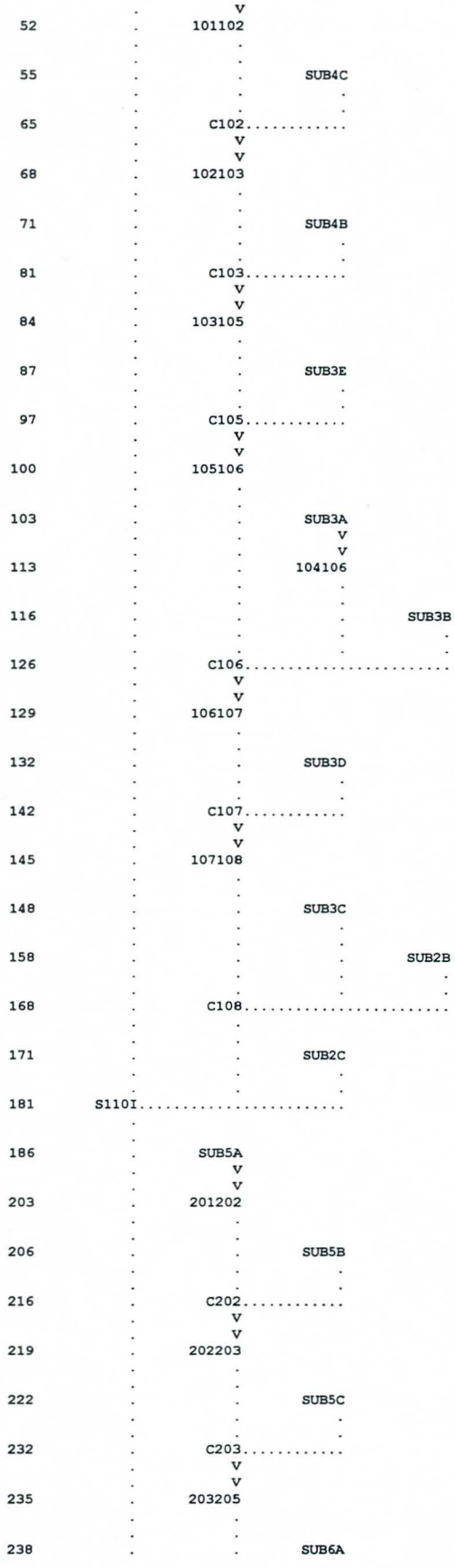
 563        UA       0       5      16      30      65      77      84      90      94      97
 564        UA     100
            *  *****

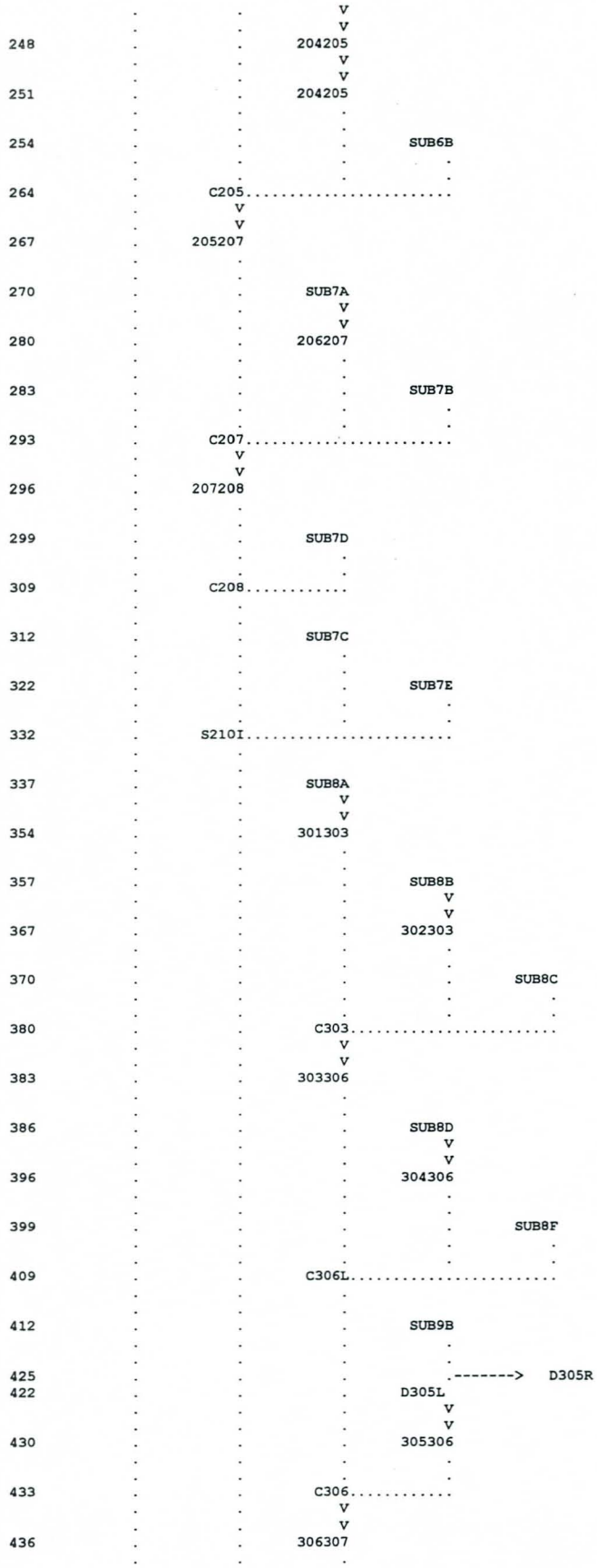
 565        KK   S314I
 566        KO                                    21
 567        KM   COMBINE THE HYDROGRAPHS FROM 311, 312, 312, SUBASIN 9E, AND SUBASIN 9H
 568        KM   STORAGE ROUTE INFLOW HYDROGRAPH FOR SOUTH BASIN
 569        HC       4
 570        ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK

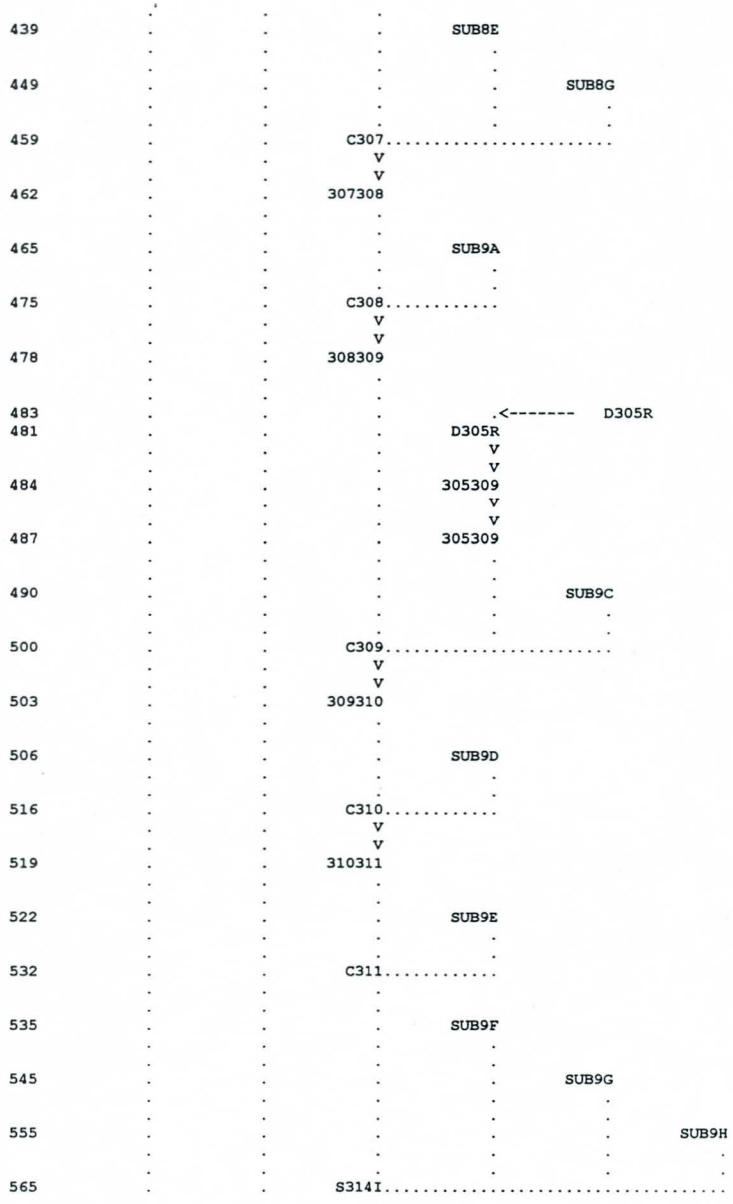
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    22       SUB2A
               .
               .
    39         .       SUB4A
               .         V
               .         V
    49         .      101102
               .         V
```


52
101102
55
SUB4C
65
C102
68
102103
71
SUB4B
81
C103
84
103105
87
SUB3E
97
C105
100
105106
103
SUB3A
113
104106
116
SUB3B
126
C106
129
106107
132
SUB3D
142
C107
145
107108
148
SUB3C
158
SUB2B
168
C108
171
SUB2C
181
S110I
186
SUB5A
203
201202
206
SUB5B
216
C202
219
202203
222
SUB5C
232
C203
235
203205
238
SUB6A


248
204205
251
204205
254
SUB6B
264
C205
267
205207
270
SUB7A
280
206207
283
SUB7B
293
C207
296
207208
299
SUB7D
309
C208
312
SUB7C
322
SUB7E
332
S210I
337
SUB8A
354
301303
357
SUB8B
367
302303
370
SUB8C
380
C303
383
303306
386
SUB8D
396
304306
399
SUB8F
409
C306L
412
SUB9B
425
D305R
422
D305L
430
305306
433
C306
436
306307



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               MAY   1991              *
*           VERSION 4.0.1E              *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  08/10/99  TIME  18:24:32   *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVES ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, ASSIGNMENTS #1 AND #2
PCN 035-02-30

By: Pentacore Arizona File: Guadalup.ih1
Project No.: 50280001 Date Revised: 08-10-99 wso

100-year, 6-hour storm event

Future condition land-use is based on the Town of Guadalupe zoning.

EX or FU retention storage within the watershed in not modeled per FCDMC.

```
                    Routing paths along the canal assume post-project conditions.

                    Areal reductions are based on the tributary areas contributing to each
                      retention basin.

 21 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           2  MINUTES IN COMPUTATION INTERVAL
                      IDATE       1    0  STARTING DATE
                      ITIME         0000  STARTING TIME
                         NQ         540  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE       1    0  ENDING DATE
                     NDTIME        1758  ENDING TIME
                     ICENT           19  CENTURY MARK

                   COMPUTATION INTERVAL    0.03 HOURS
                       TOTAL TIME BASE   17.97 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 181 KK     *     S110I  *
            *            *
            **************

 182 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH          21  PUNCH COMPUTED HYDROGRAPH
                       IOUT           0  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         540  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       0.033  TIME INTERVAL IN HOURS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 332 KK     *     S210I  *
            *            *
            **************

 333 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         540  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       0.033  TIME INTERVAL IN HOURS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 565 KK     *     S314I  *
            *            *
            **************

 566 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
```

ISAV2 540 LAST ORDINATE PUNCHED OR SAVED
TIMINT 0.033 TIME INTERVAL IN HOURS

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUB2A	73.	4.03	6.	2.	2.	0.03		
+	HYDROGRAPH AT	SUB4A	53.	4.03	5.	2.	2.	0.02		
+	ROUTED TO	101102	53.	4.10	5.	2.	2.	0.02		
+	ROUTED TO	101102	51.	4.13	5.	2.	2.	0.02		
+	HYDROGRAPH AT	SUB4C	57.	4.03	5.	2.	2.	0.02		
+	2 COMBINED AT	C102	104.	4.07	11.	4.	4.	0.05		
+	ROUTED TO	102103	102.	4.10	11.	4.	4.	0.05		
+	HYDROGRAPH AT	SUB4B	32.	4.03	3.	1.	1.	0.01		
+	2 COMBINED AT	C103	131.	4.07	14.	5.	5.	0.06		
+	ROUTED TO	103105	127.	4.13	14.	5.	5.	0.06		
+	HYDROGRAPH AT	SUB3E	15.	4.07	2.	1.	1.	0.01		
+	2 COMBINED AT	C105	140.	4.13	15.	5.	5.	0.06		
+	ROUTED TO	105106	139.	4.13	15.	5.	5.	0.06		
+	HYDROGRAPH AT	SUB3A	87.	4.03	8.	3.	3.	0.03		
+	ROUTED TO	104106	86.	4.10	8.	3.	3.	0.03		
+	HYDROGRAPH AT	SUB3B	87.	4.03	7.	2.	2.	0.03		
+	3 COMBINED AT	C106	292.	4.07	29.	10.	10.	0.13		
+	ROUTED TO	106107	284.	4.10	29.	10.	10.	0.13		
+	HYDROGRAPH AT	SUB3D	24.	4.00	2.	1.	1.	0.01		
+	2 COMBINED AT	C107	300.	4.07	31.	10.	10.	0.13		
+	ROUTED TO	107108	296.	4.10	31.	10.	10.	0.13		
+	HYDROGRAPH AT	SUB3C	6.	4.03	0.	0.	0.	0.00		
+	HYDROGRAPH AT	SUB2B	106.	4.03	10.	3.	3.	0.04		
+	3 COMBINED AT	C108	399.	4.10	42.	14.	14.	0.18		
+	HYDROGRAPH AT	SUB2C	54.	4.07	4.	1.	1.	0.03		
+	3 COMBINED AT	S110I	522.	4.07	52.	17.	17.	0.23		
+	HYDROGRAPH AT	SUB5A	52.	4.03	5.	2.	2.	0.02		
+	ROUTED TO	201202	52.	4.10	5.	2.	2.	0.02		

+	HYDROGRAPH AT SUB5B	72.	4.03	6.	2.	2.	0.03
+	2 COMBINED AT C202	122.	4.07	11.	4.	4.	0.05
+	ROUTED TO 202203	118.	4.10	11.	4.	4.	0.05
+	HYDROGRAPH AT SUB5C	17.	4.03	1.	0.	0.	0.01
+	2 COMBINED AT C203	133.	4.07	12.	4.	4.	0.06
+	ROUTED TO 203205	131.	4.10	12.	4.	4.	0.06
+	HYDROGRAPH AT SUB6A	72.	4.03	7.	2.	2.	0.03
+	ROUTED TO 204205	72.	4.10	7.	2.	2.	0.03
+	ROUTED TO 204205	71.	4.10	7.	2.	2.	0.03
+	HYDROGRAPH AT SUB6B	50.	4.07	6.	2.	2.	0.02
+	3 COMBINED AT C205	251.	4.10	25.	8.	8.	0.11
+	ROUTED TO 205207	245.	4.10	25.	8.	8.	0.11
+	HYDROGRAPH AT SUB7A	136.	4.03	12.	4.	4.	0.05
+	ROUTED TO 206207	134.	4.07	12.	4.	4.	0.05
+	HYDROGRAPH AT SUB7B	40.	4.03	3.	1.	1.	0.01
+	3 COMBINED AT C207	406.	4.07	39.	13.	13.	0.17
+	ROUTED TO 207208	400.	4.07	39.	13.	13.	0.17
+	HYDROGRAPH AT SUB7D	6.	4.03	0.	0.	0.	0.00
+	2 COMBINED AT C208	405.	4.07	40.	13.	13.	0.17
+	HYDROGRAPH AT SUB7C	35.	4.03	3.	1.	1.	0.01
+	HYDROGRAPH AT SUB7E	17.	4.03	1.	0.	0.	0.01
+	3 COMBINED AT S210I	454.	4.07	44.	15.	15.	0.19
+	HYDROGRAPH AT SUB8A	32.	4.00	2.	1.	1.	0.01
+	ROUTED TO 301303	31.	4.03	2.	1.	1.	0.01
+	HYDROGRAPH AT SUB8B	35.	4.03	3.	1.	1.	0.01
+	ROUTED TO 302303	35.	4.07	3.	1.	1.	0.01
+	HYDROGRAPH AT SUB8C	74.	4.03	6.	2.	2.	0.02
+	3 COMBINED AT C303	140.	4.03	11.	4.	4.	0.04
+	ROUTED TO 303306	139.	4.07	11.	4.	4.	0.04
+	HYDROGRAPH AT SUB8D	131.	4.03	10.	3.	3.	0.04
+	ROUTED TO 304306	130.	4.07	10.	3.	3.	0.04
	HYDROGRAPH AT						

+		SUB8F	111.	4.03	10.	3.	3.	0.04
	3 COMBINED AT							
+		C306L	373.	4.03	31.	10.	10.	0.12
	HYDROGRAPH AT							
+		SUB9B	61.	4.03	4.	1.	1.	0.02
	DIVERSION TO							
+		D305R	37.	4.03	3.	1.	1.	0.02
	HYDROGRAPH AT							
+		D305L	24.	4.03	2.	1.	1.	0.02
	ROUTED TO							
+		305306	23.	4.37	2.	1.	1.	0.02
	2 COMBINED AT							
+		C306	374.	4.03	32.	11.	11.	0.14
	ROUTED TO							
+		306307	371.	4.07	32.	11.	11.	0.14
	HYDROGRAPH AT							
+		SUB8E	5.	4.07	1.	0.	0.	0.00
	HYDROGRAPH AT							
+		SUB8G	11.	4.03	1.	0.	0.	0.00
	3 COMBINED AT							
+		C307	386.	4.07	34.	11.	11.	0.15
	ROUTED TO							
+		307308	376.	4.10	34.	11.	11.	0.15
	HYDROGRAPH AT							
+		SUB9A	29.	4.03	2.	1.	1.	0.01
	2 COMBINED AT							
+		C308	401.	4.10	36.	12.	12.	0.16
	ROUTED TO							
+		308309	391.	4.10	36.	12.	12.	0.16
	HYDROGRAPH AT							
+		D305R	37.	4.03	3.	1.	1.	0.00
	ROUTED TO							
+		305309	37.	4.07	3.	1.	1.	0.00
	ROUTED TO							
+		305309	36.	4.10	3.	1.	1.	0.00
	HYDROGRAPH AT							
+		SUB9C	49.	4.03	4.	1.	1.	0.02
	3 COMBINED AT							
+		C309	472.	4.10	43.	14.	14.	0.18
	ROUTED TO							
+		309310	465.	4.10	43.	14.	14.	0.18
	HYDROGRAPH AT							
+		SUB9D	58.	4.07	6.	2.	2.	0.03
	2 COMBINED AT							
+		C310	521.	4.10	49.	17.	17.	0.21
	ROUTED TO							
+		310311	512.	4.13	49.	17.	17.	0.21
	HYDROGRAPH AT							
+		SUB9E	38.	4.07	5.	2.	2.	0.02
	2 COMBINED AT							
+		C311	549.	4.10	54.	18.	18.	0.23
	HYDROGRAPH AT							
+		SUB9F	68.	4.03	6.	2.	2.	0.02
	HYDROGRAPH AT							
+		SUB9G	37.	4.03	3.	1.	1.	0.01
	HYDROGRAPH AT							
+		SUB9H	44.	4.00	2.	1.	1.	0.01
	4 COMBINED AT							
+		S314I	658.	4.10	65.	22.	22.	0.28

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME

```
                              (MIN)      (CFS)       (MIN)      (IN)      (MIN)      (CFS)      (MIN)       (IN)
          101102  MANE         2.00      52.79     246.00      2.23      2.00      52.79     246.00       2.23

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2611E+01 EXCESS=0.0000E+00 OUTFLOW=0.2612E+01 BASIN STORAGE=0.1321E-02 PERCENT ERROR=  -0.1

          101102  MANE         1.49      51.71     247.66      2.22      2.00      51.45     248.00       2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2612E+01 EXCESS=0.0000E+00 OUTFLOW=0.2609E+01 BASIN STORAGE=0.3180E-03 PERCENT ERROR=   0.1

          102103  MANE         1.46     102.40     245.70      2.20      2.00     102.23     246.00       2.20

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5296E+01 EXCESS=0.0000E+00 OUTFLOW=0.5291E+01 BASIN STORAGE=0.4130E-03 PERCENT ERROR=   0.1

          103105  MANE         2.00     126.69     248.00      2.23      2.00     126.69     248.00       2.23

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6781E+01 EXCESS=0.0000E+00 OUTFLOW=0.6768E+01 BASIN STORAGE=0.9843E-03 PERCENT ERROR=   0.2

          105106  MANE         0.89     139.03     248.08      2.20      2.00     138.97     248.00       2.21

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7530E+01 EXCESS=0.0000E+00 OUTFLOW=0.7526E+01 BASIN STORAGE=0.2643E-03 PERCENT ERROR=   0.0

          104106  MANE         2.00      86.43     246.00      2.16      2.00      86.43     246.00       2.16

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3793E+01 EXCESS=0.0000E+00 OUTFLOW=0.3793E+01 BASIN STORAGE=0.6054E-03 PERCENT ERROR=   0.0

          106107  MANE         1.61     284.71     245.03      2.16      2.00     284.00     246.00       2.16

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1455E+02 EXCESS=0.0000E+00 OUTFLOW=0.1454E+02 BASIN STORAGE=0.6566E-03 PERCENT ERROR=   0.1

          107108  MANE         1.42     295.94     246.06      2.19      2.00     295.76     246.00       2.19

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1558E+02 EXCESS=0.0000E+00 OUTFLOW=0.1557E+02 BASIN STORAGE=0.4983E-03 PERCENT ERROR=   0.1

          201202  MANE         2.00      51.56     246.00      2.28      2.00      51.56     246.00       2.28

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2429E+01 EXCESS=0.0000E+00 OUTFLOW=0.2429E+01 BASIN STORAGE=0.6411E-03 PERCENT ERROR=   0.0

          202203  MANE         2.00     118.39     246.00      2.05      2.00     118.39     246.00       2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5478E+01 EXCESS=0.0000E+00 OUTFLOW=0.5470E+01 BASIN STORAGE=0.6577E-03 PERCENT ERROR=   0.1

          203205  MANE         0.48     131.64     244.92      2.05      2.00     131.23     246.00       2.05

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6118E+01 EXCESS=0.0000E+00 OUTFLOW=0.6116E+01 BASIN STORAGE=0.1343E-03 PERCENT ERROR=   0.0

          204205  MANE         2.00      71.67     246.00      2.32      2.00      71.67     246.00       2.32

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3457E+01 EXCESS=0.0000E+00 OUTFLOW=0.3458E+01 BASIN STORAGE=0.1674E-02 PERCENT ERROR=  -0.1

          204205  MANE         0.54      70.88     246.78      2.31      2.00      70.63     246.00       2.31

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3458E+01 EXCESS=0.0000E+00 OUTFLOW=0.3457E+01 BASIN STORAGE=0.1280E-03 PERCENT ERROR=   0.0

          205207  MANE         1.53     245.90     247.18      2.14      2.00     245.32     246.00       2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1236E+02 EXCESS=0.0000E+00 OUTFLOW=0.1235E+02 BASIN STORAGE=0.5646E-03 PERCENT ERROR=   0.1

          206207  MANE         1.69     135.21     243.62      2.24      2.00     134.09     244.00       2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5741E+01 EXCESS=0.0000E+00 OUTFLOW=0.5742E+01 BASIN STORAGE=0.7859E-03 PERCENT ERROR=   0.0

          207208  MANE         0.49     401.02     244.20      2.17      2.00     399.82     244.00       2.17
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1955E+02 EXCESS=0.0000E+00 OUTFLOW=0.1955E+02 BASIN STORAGE=0.1927E-03 PERCENT ERROR=   0.0

            301303  MANE         2.00     31.14    242.00      2.39      2.00     31.14    242.00        2.39

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1150E+01 EXCESS=0.0000E+00 OUTFLOW=0.1149E+01 BASIN STORAGE=0.5002E-03 PERCENT ERROR=   0.0

            302303  MANE         2.00     34.99    244.00      2.10      2.00     34.99    244.00        2.10

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1347E+01 EXCESS=0.0000E+00 OUTFLOW=0.1347E+01 BASIN STORAGE=0.3623E-03 PERCENT ERROR=   0.0

            303306  MANE         2.00    139.04    244.00      2.22      2.00    139.04    244.00        2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5320E+01 EXCESS=0.0000E+00 OUTFLOW=0.5321E+01 BASIN STORAGE=0.1047E-02 PERCENT ERROR=   0.0

            304306  MANE         2.00    130.41    244.00      2.31      2.00    130.41    244.00        2.31

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5171E+01 EXCESS=0.0000E+00 OUTFLOW=0.5171E+01 BASIN STORAGE=0.9541E-03 PERCENT ERROR=   0.0

            305306  MANE         2.00     22.51    262.00      0.71      2.00     22.51    262.00        0.71

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7617E+00 EXCESS=0.0000E+00 OUTFLOW=0.7590E+00 BASIN STORAGE=0.2893E-02 PERCENT ERROR=   0.0

            306307  MANE         1.88    372.98    244.38      2.11      2.00    371.18    244.00        2.11

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1598E+02 EXCESS=0.0000E+00 OUTFLOW=0.1598E+02 BASIN STORAGE=0.1197E-02 PERCENT ERROR=   0.0

            307308  MANE         1.48    376.56    244.78      2.10      2.00    375.69    246.00        2.10

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1684E+02 EXCESS=0.0000E+00 OUTFLOW=0.1682E+02 BASIN STORAGE=0.5831E-03 PERCENT ERROR=   0.1

            308309  MANE         2.00    391.28    246.00      2.10      2.00    391.28    246.00        2.10

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1805E+02 EXCESS=0.0000E+00 OUTFLOW=0.1803E+02 BASIN STORAGE=0.8250E-03 PERCENT ERROR=   0.1

            305309  MANE         2.00     36.88    244.00     -1.00      2.00     36.88    244.00       -1.00

            305309  MANE         2.00     35.83    246.00     -1.00      2.00     35.83    246.00       -1.00

            309310  MANE         0.78    465.36    246.11      2.24      2.00    464.51    246.00        2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2150E+02 EXCESS=0.0000E+00 OUTFLOW=0.2149E+02 BASIN STORAGE=0.3260E-03 PERCENT ERROR=   0.0

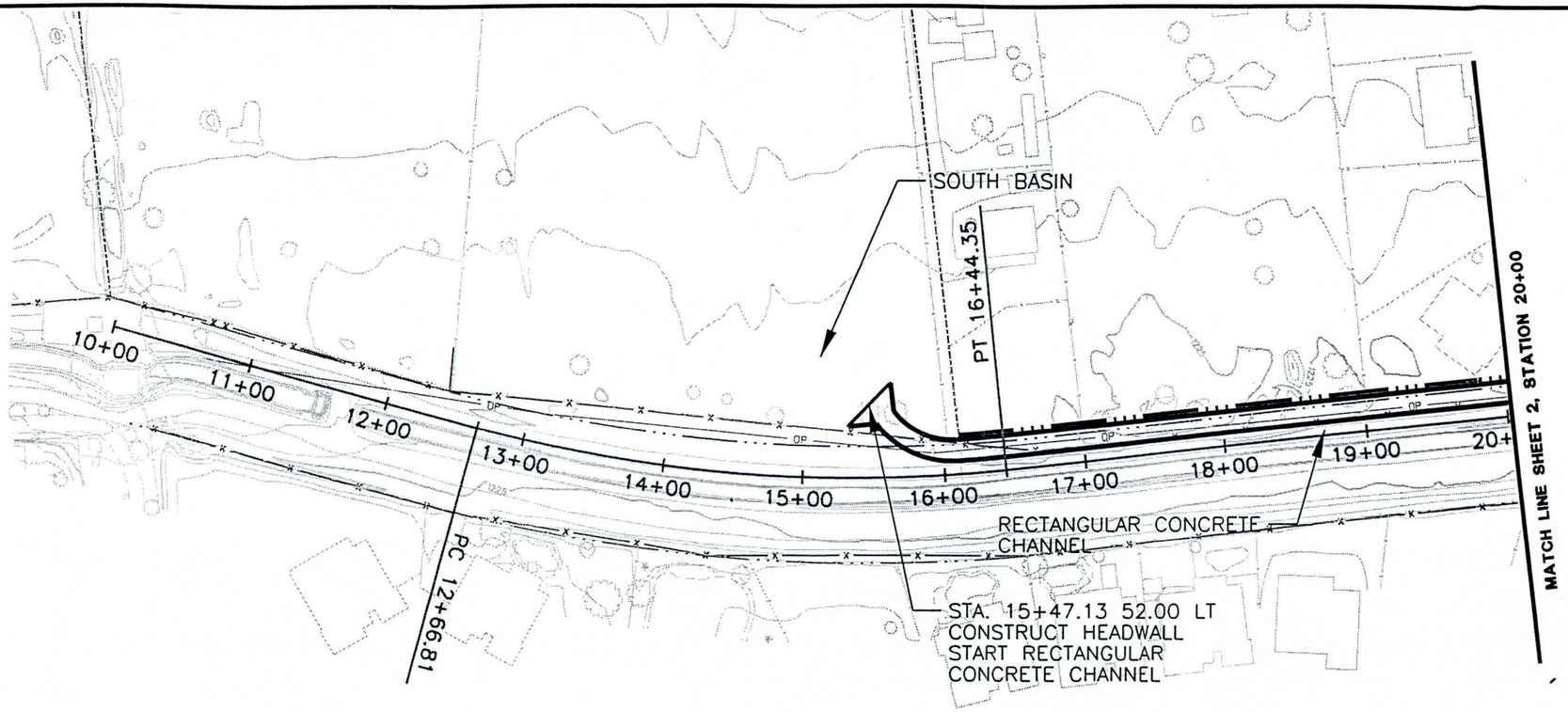
            310311  MANE         0.75    513.58    247.34      2.23      2.00    512.16    248.00        2.23

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2454E+02 EXCESS=0.0000E+00 OUTFLOW=0.2453E+02 BASIN STORAGE=0.3344E-03 PERCENT ERROR=   0.0


*** NORMAL END OF HEC-1 ***
```

Appendix E1

OPTION 1: Plan and Profile Sheets



LEGEND

- NEW ROW LINE
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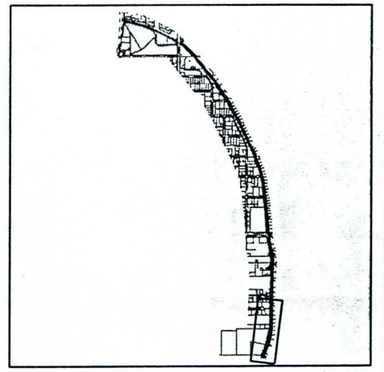
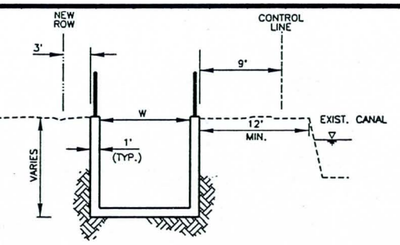
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP





OPTION 1
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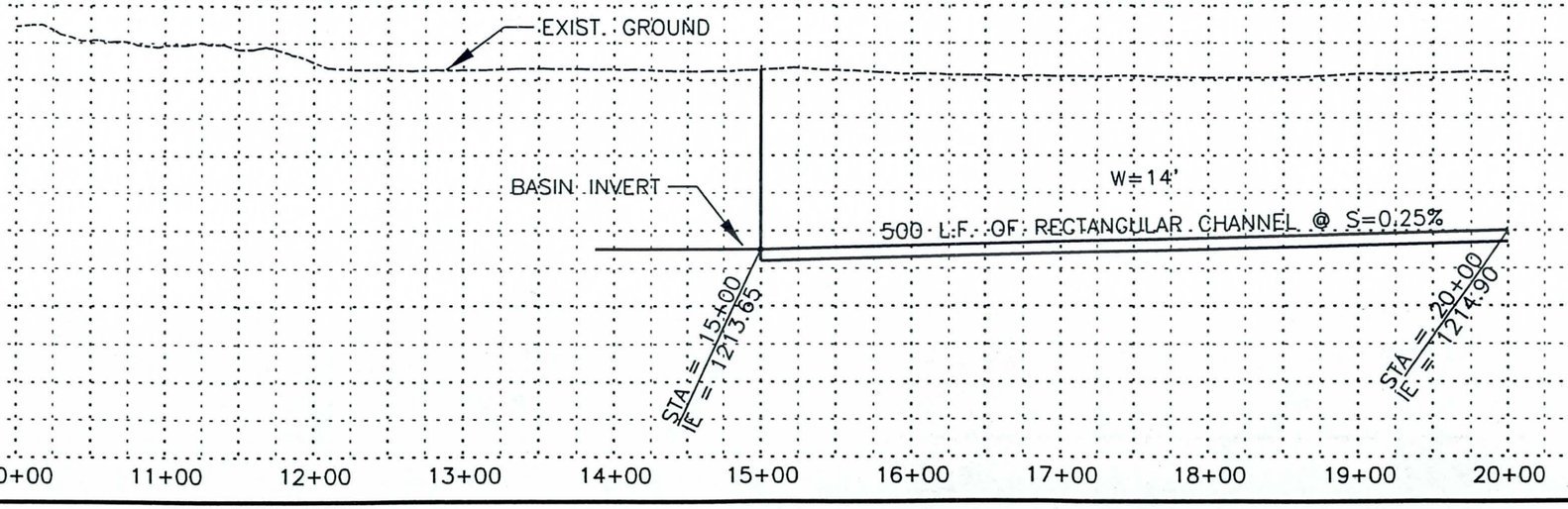

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CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

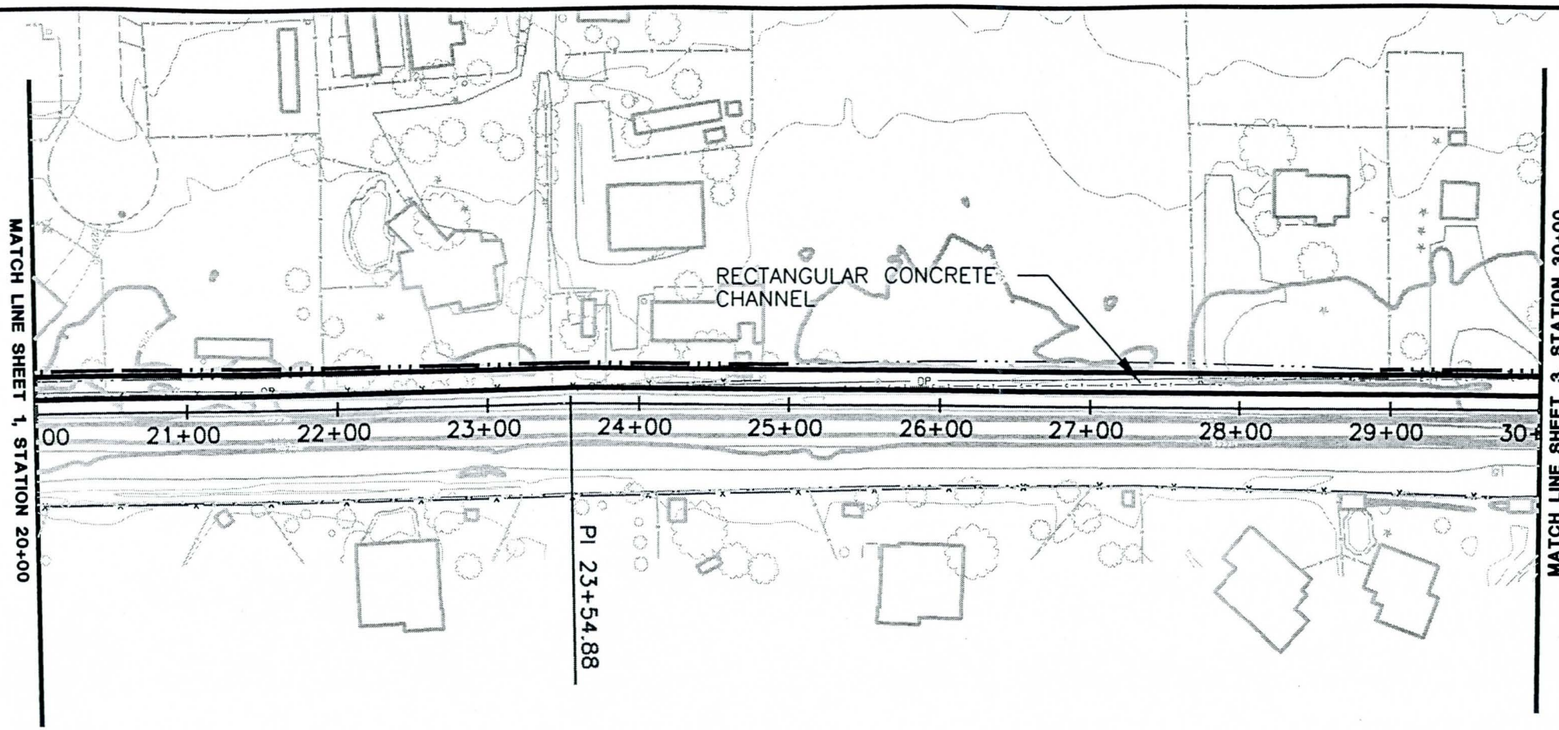
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

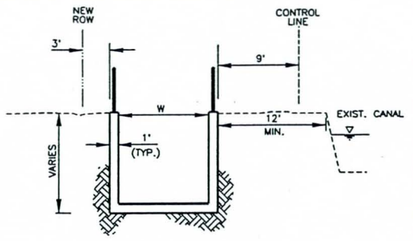
PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., Suite 255
PHOENIX, AZ. 85008 681-8720
FAX (602) 681-8339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 1 SHEET OF





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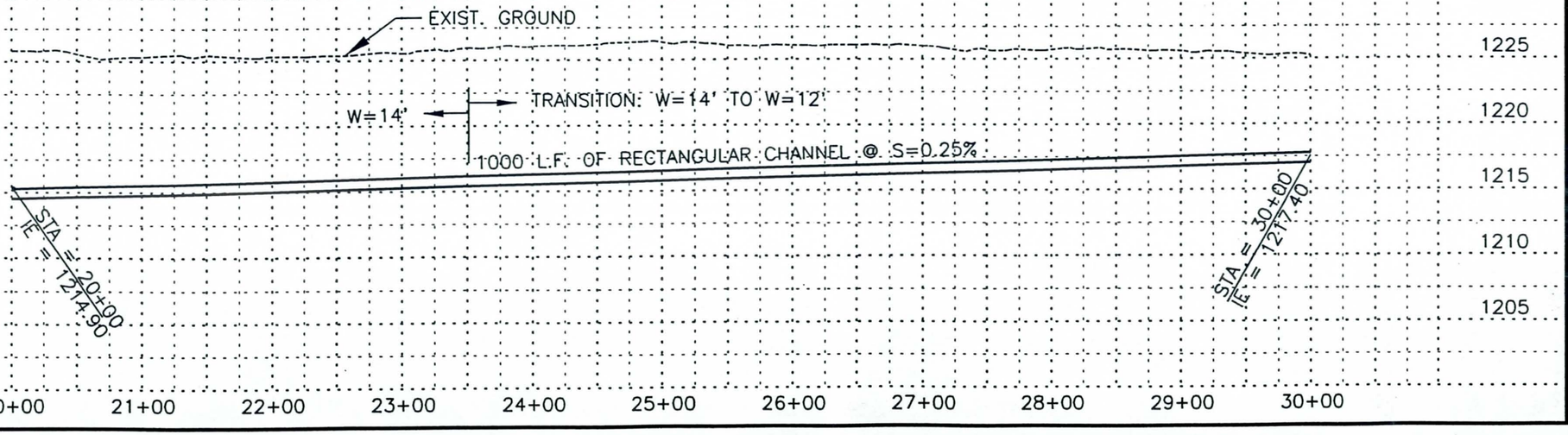

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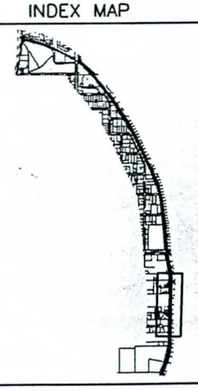
INDEX MAP



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

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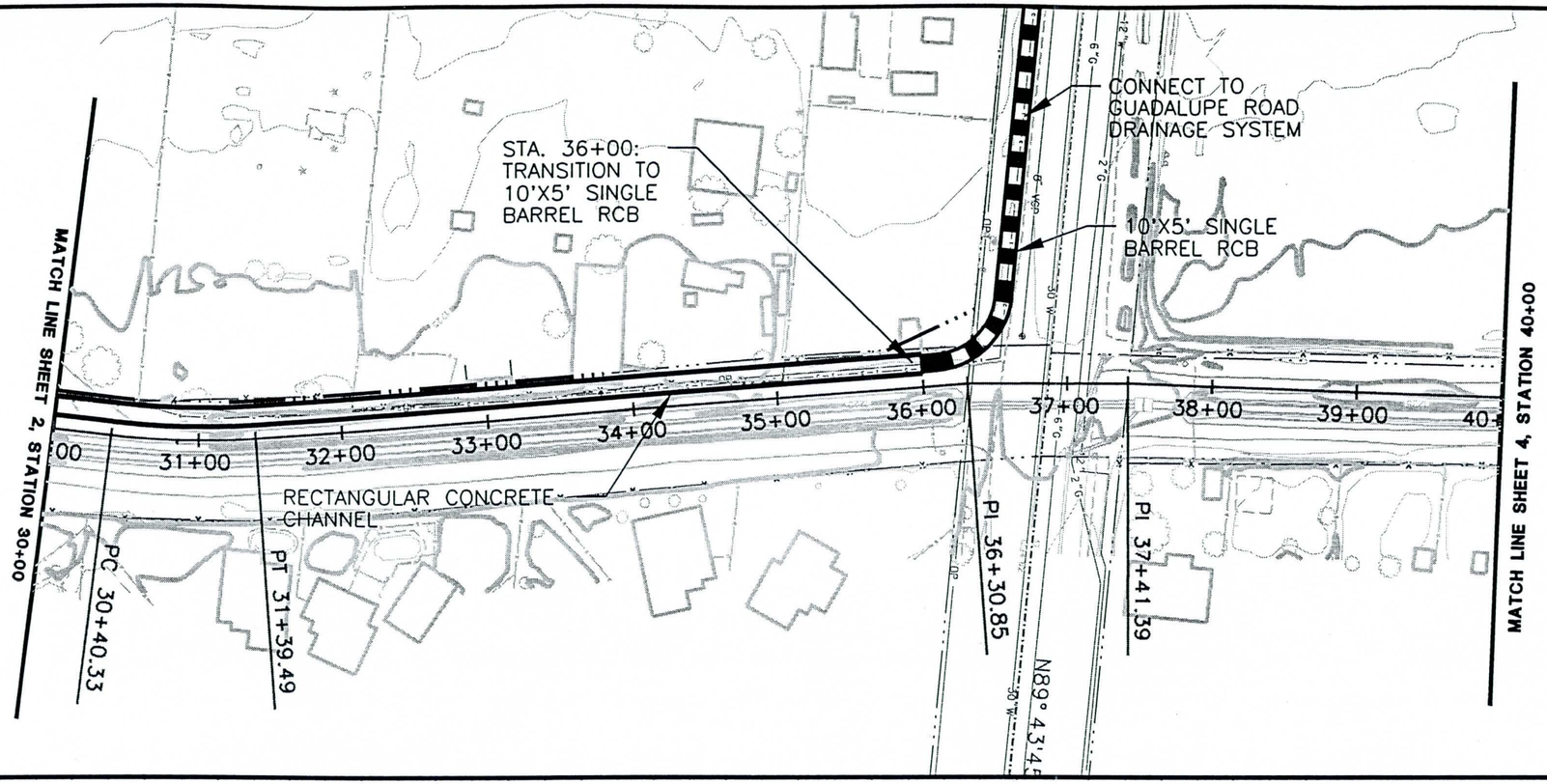

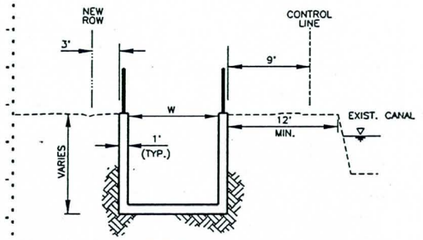

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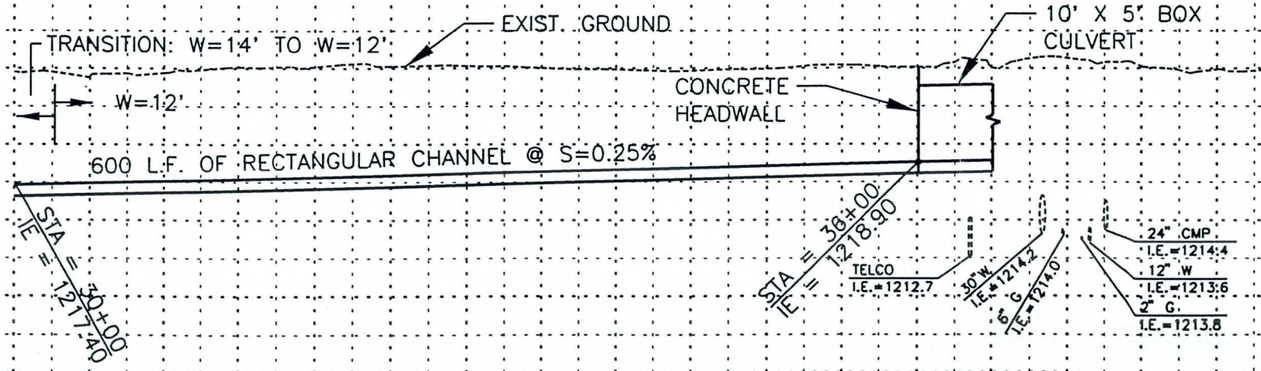
TYPICAL SECTION



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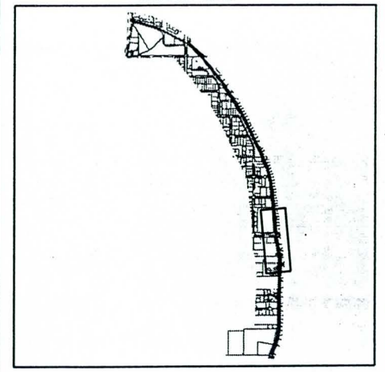

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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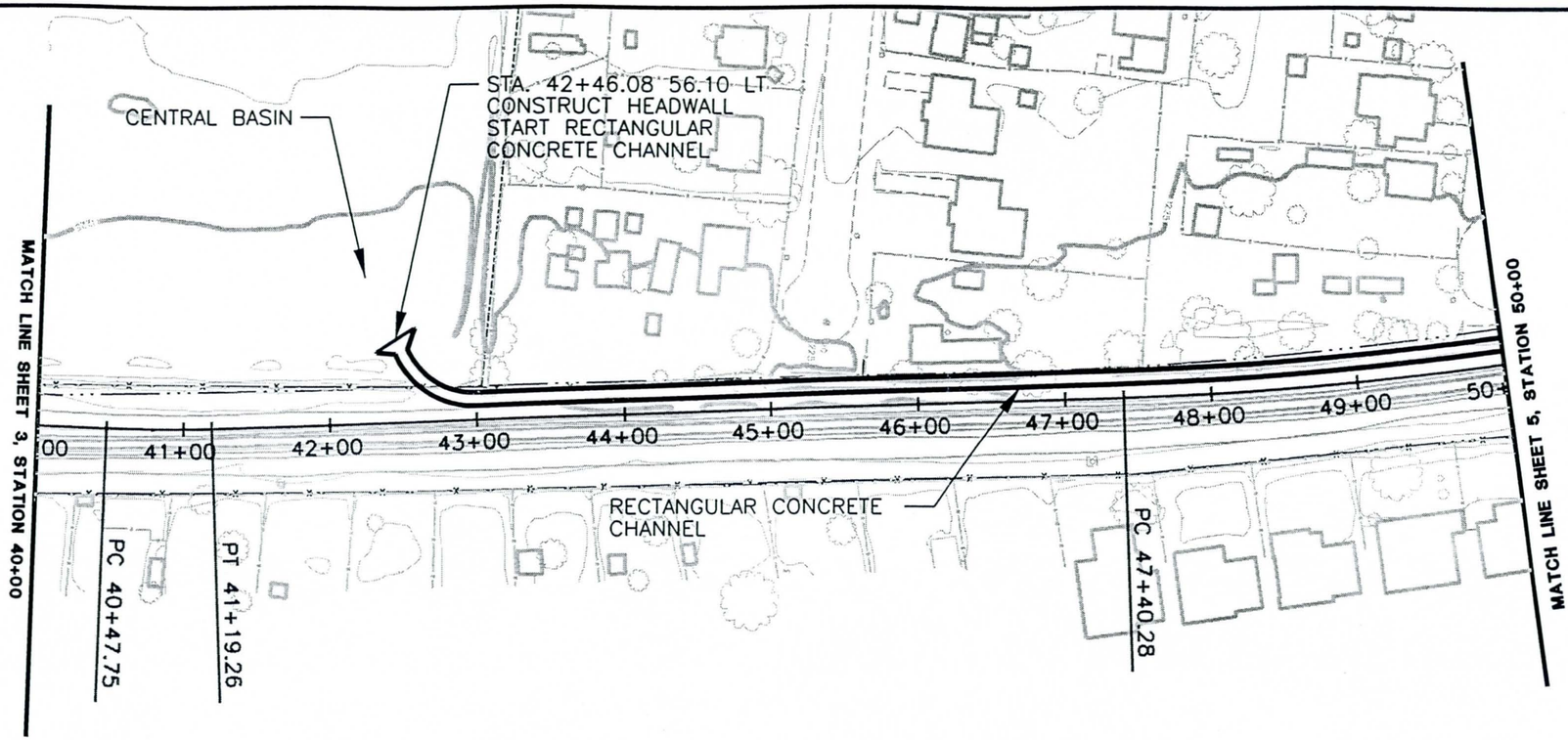
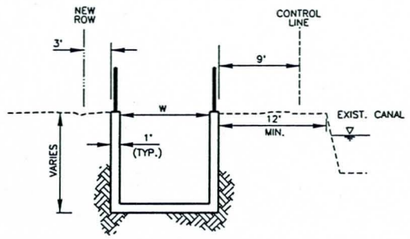
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 1 SHEET OF





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TYPICAL SECTION

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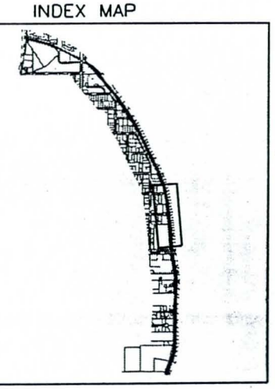

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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F.C.D. 98-45, P.C.N. 035-02-30

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PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 602-627-2
FAX (602) 681-9339

	BY	DATE
DESIGN	-	-
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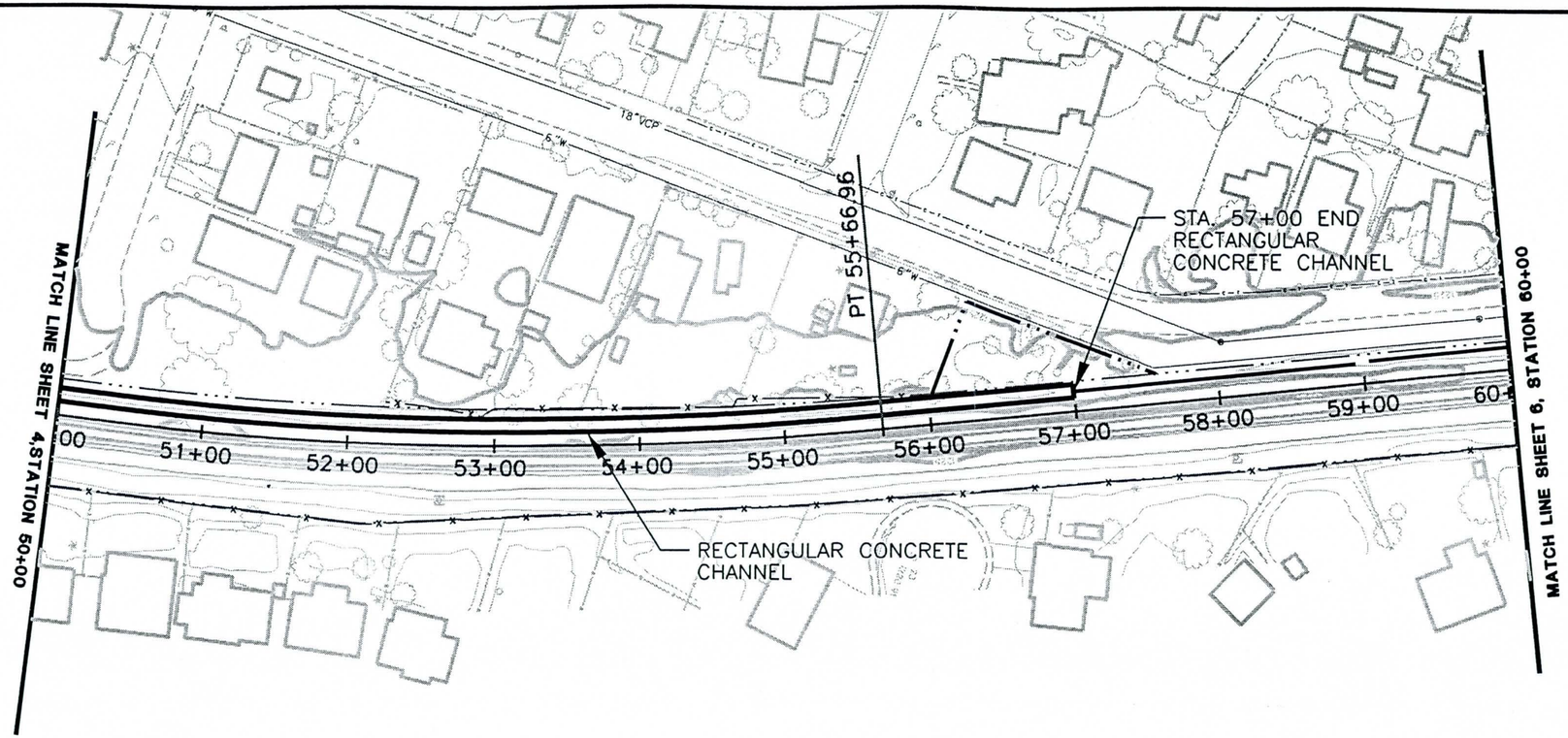
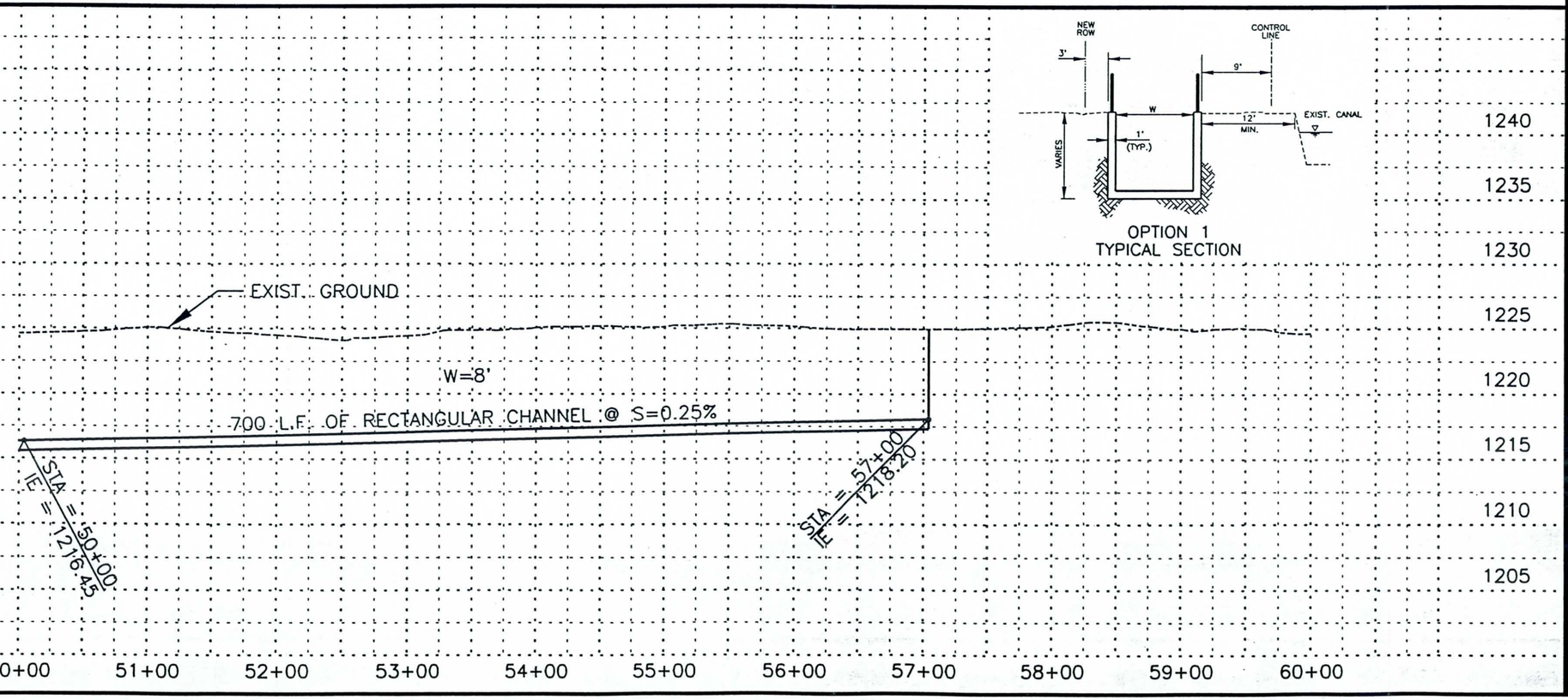
PLANS	-	-
PLANS CHK.	-	-

OPTION 1 SHEET OF





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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

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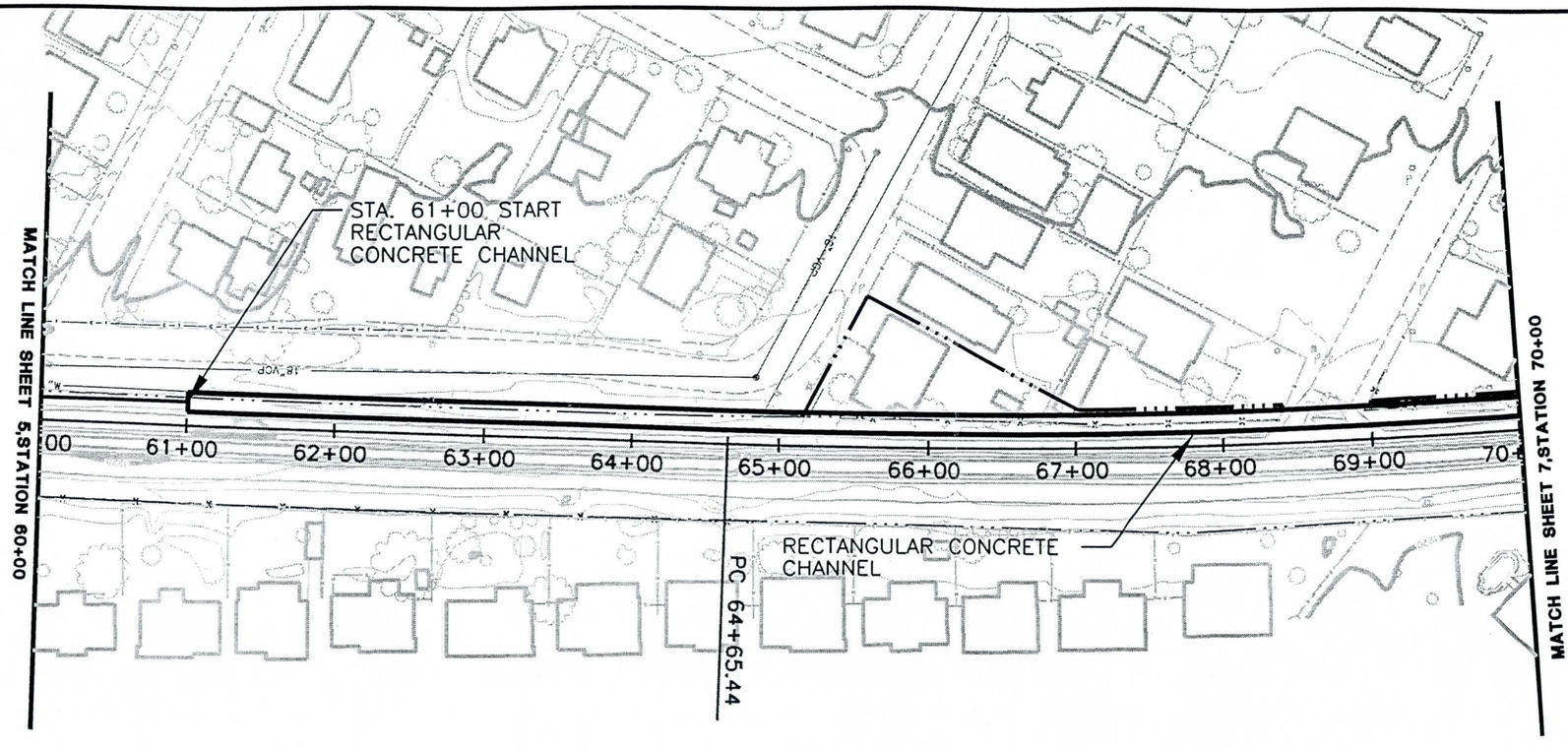
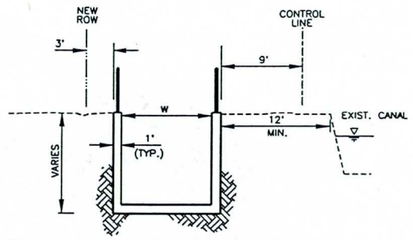
PLANS	-	-
PLANS CHK.	-	-

OPTION 1 SHEET OF





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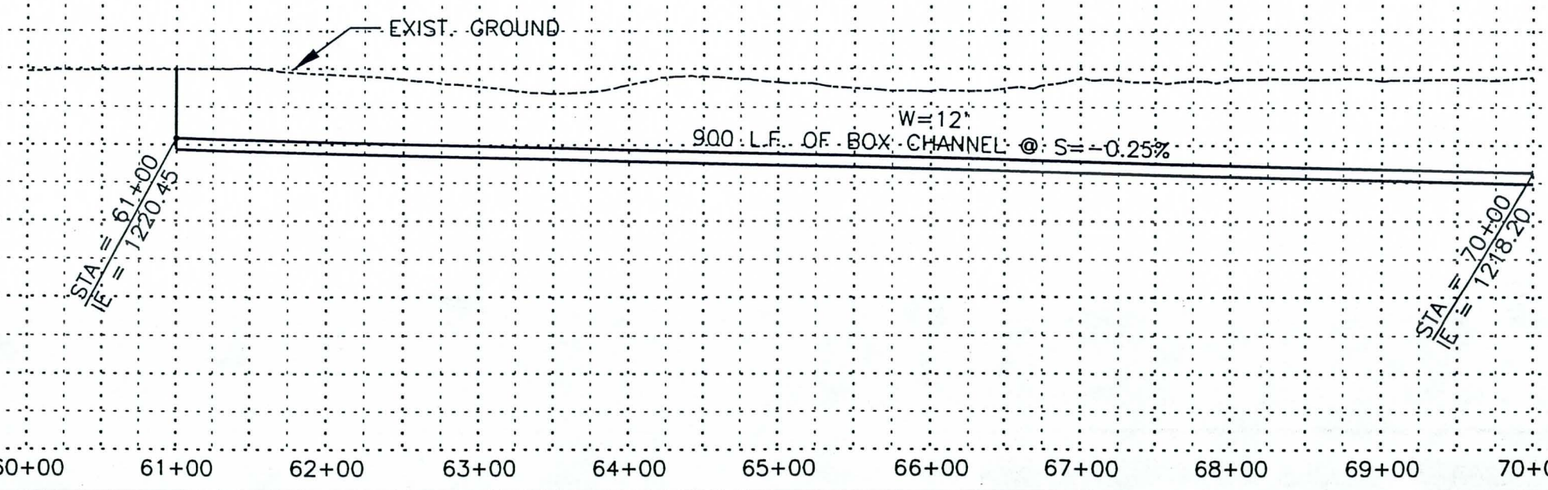

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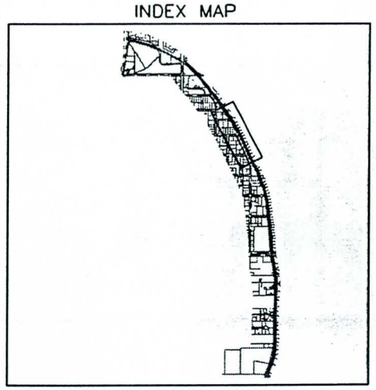

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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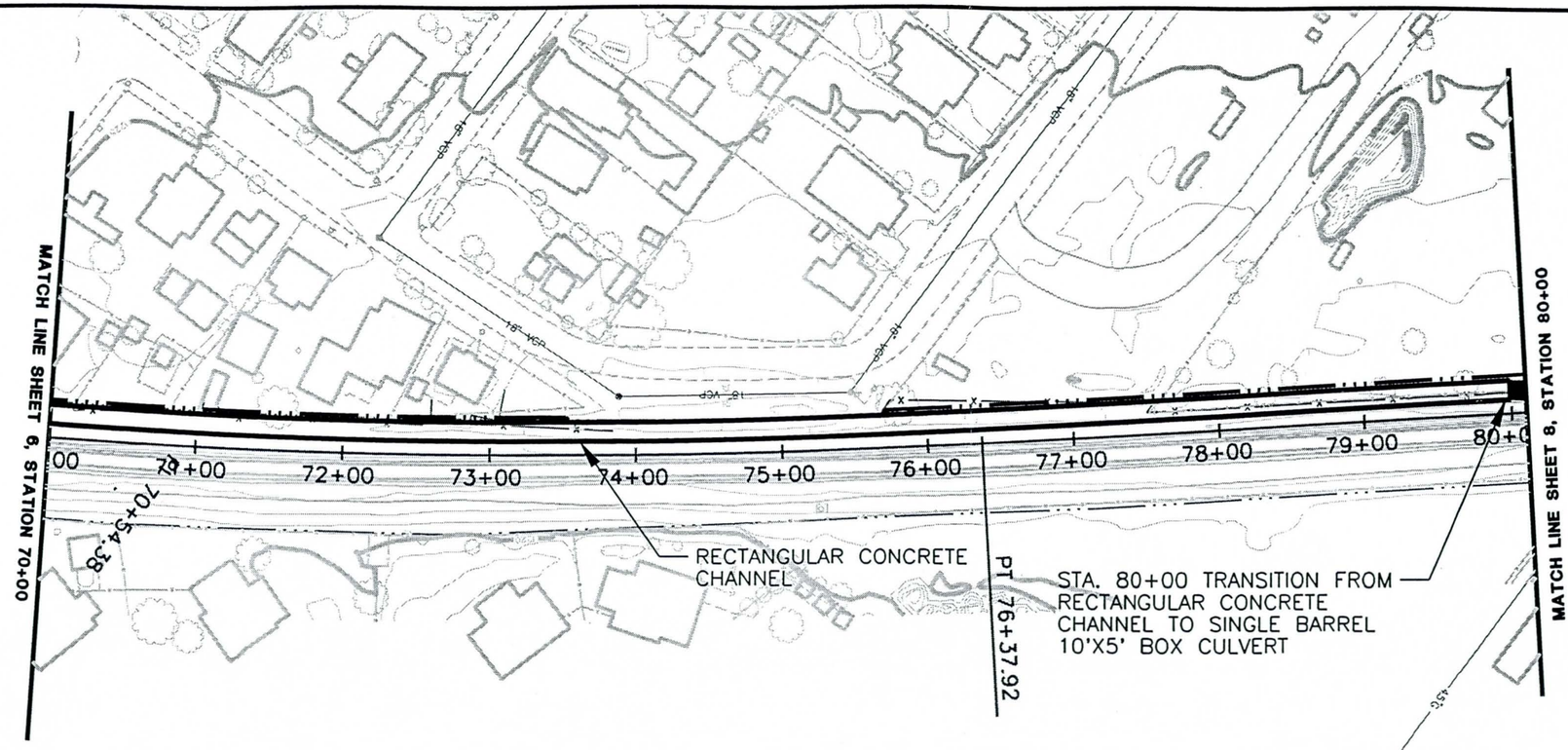
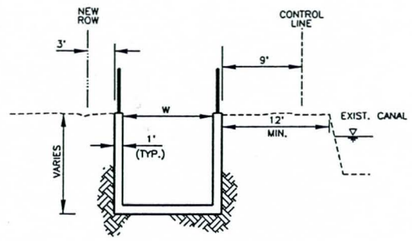
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 1 SHEET OF





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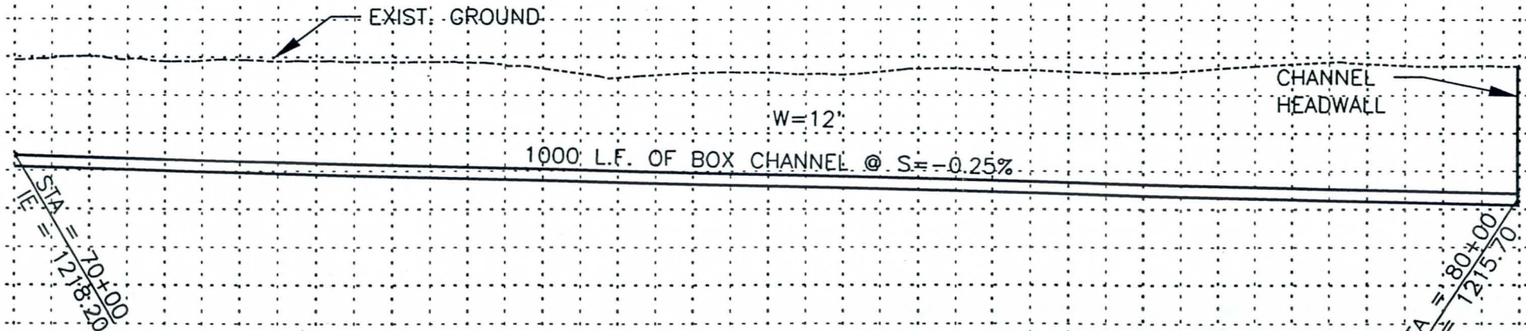

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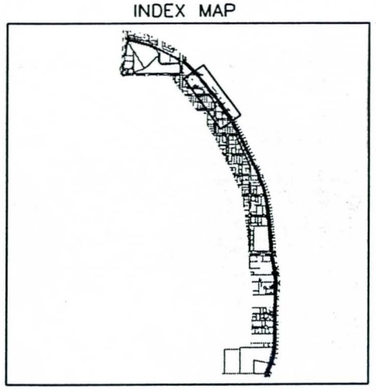

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SCALE: 1" = 100 FEET
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

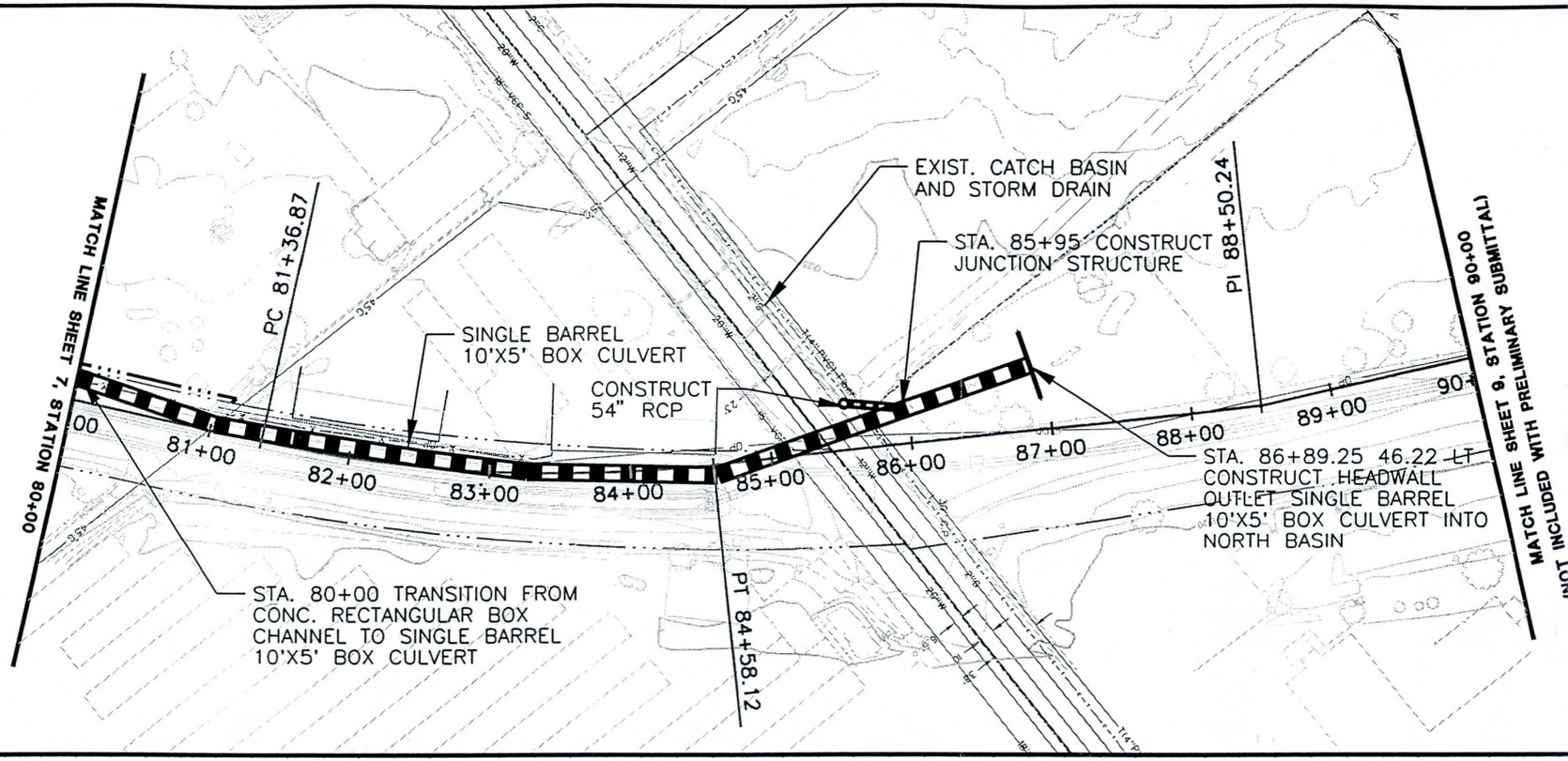
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 481-8272
FAX (602) 481-9339

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

OPTION 1 SHEET OF



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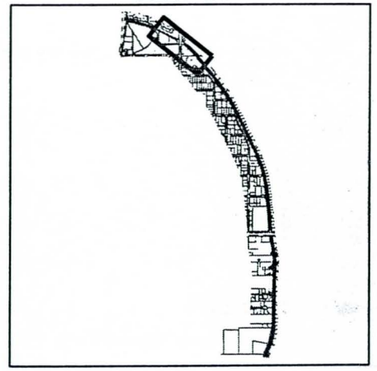

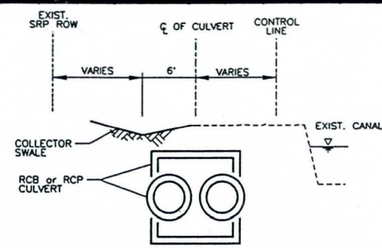

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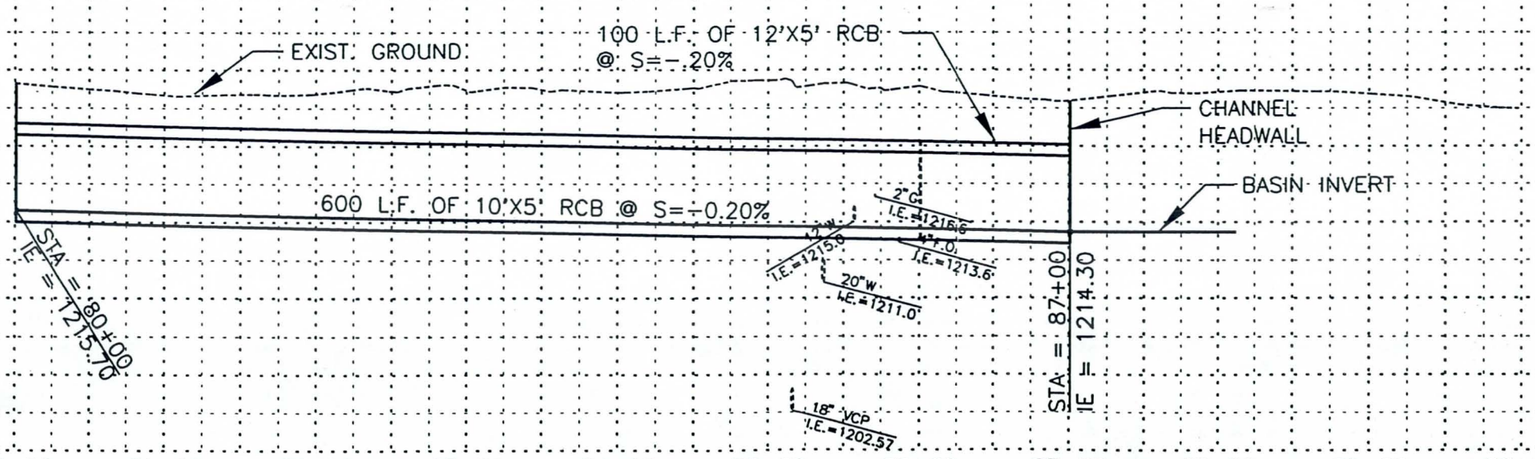

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 (602) 957-8272
FAX (602) 681-8539

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 1 SHEET OF

Appendix E2

OPTION 1: Quantity and Cost Estimates

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY Revised 8-13-99 - wso
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 1 - OPTIONS 1, 2, AND 3						
	201-1	CLEARING AND GRUBBING	SY	1160	$0.30	$348.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$26,000.00	$26,000.00
	220-1	DUMPED RIPRAP	CY	30	$35.00	$1,050.00
	336-1	REMOVE AND REPLACE ASPHALT PAVEMENT	SY	110	$35.00	$3,850.00
	340-1	REMOVE AND REPLACE CURB, GUTTER, & SIDEWALK	SF	360	$5.00	$1,800.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMN	LS	1	$5,000.00	$5,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	500	$20.00	$10,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	2000	$1.00	$2,000.00
	430-2	PATH AND TRAIL	LF	800	$5.00	$4,000.00
	505-1	HEADWALLS w/ SAFETY RAILING	EA	2	$5,000.00	$10,000.00
	505-2	CONCRETE SPLASH PAD W/ END SILL	CY	20	$300.00	$6,000.00
	505-3	JUNCTION STRUCTURES	LS	1	$10,000.00	$10,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	0	$2,500.00	$0.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE)	EA	0	$5,000.00	$0.00
	610-1	VERTICAL REALIGNMENT OF 12" WATER (DIP W/ RSTN JNT	LF	60	$150.00	$9,000.00
	618-1	54" STORM DRAIN	LF	50	$150.00	$7,500.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	600	$600.00	$360,000.00
	618-3	CONCRETE BOX CULVERT 12'X5'	LF	100	$800.00	$80,000.00
	625-1	STORM DRAIN MANHOLE	EA	1	$5,000.00	$5,000.00
		CONSTRUCTION COST SUBTOTAL				$551,548.00
		CONSTRUCTION CONTIGENCY AT 20%				$110,309.60
		TOTAL CONSTRUCTION COST				$661,857.60
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0.00		$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$662,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 2 - OPTION 1						
	201-1	CLEARING AND GRUBBING	SY	4410	$0.30	$1,323.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$37,000.00	$37,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	9610	$4.00	$38,440.00
	220-1	DUMPED RIPRAP	CY	30	$35.00	$1,050.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$25,000.00	$25,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	4200	$20.00	$84,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	21000	$1.00	$21,000.00
	430-2	PATH AND TRAIL	LF	2100	$5.00	$10,500.00
	505-1	HEADWALLS w/ SAFETY RAILING	EA	0	$5,000.00	$0.00
	505-6	CONCRETE CHANNEL LINING	CY	1830	$300.00	$549,000.00
		CONSTRUCTION COST SUBTOTAL				$777,313.00
		CONSTRUCTION CONTIGENCY AT 20%				$155,462.60
		TOTAL CONSTRUCTION COST				$932,775.60
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0.23	$30,000.00	$6,900.00
		RELOCATION EXPENSES	LOT	1	$75,000.00	$75,000.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$1,015,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 3 - OPTION 1						
	201-1	CLEARING AND GRUBBING	SY	5620	$0.30	$1,686.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$36,000.00	$36,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	10053	$4.00	$40,212.00
	220-1	DUMPED RIPRAP	CY	30	$35.00	$1,050.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$10,000.00	$10,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	3200	$20.00	$64,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	18500	$1.00	$18,500.00
	430-2	PATH AND TRAIL	LF	1850	$5.00	$9,250.00
	505-1	HEADWALLS w/ SAFETY RAILING	EA	1	$5,000.00	$5,000.00
	505-2	ENERGY DISSIPATION STRUCTURE	LS	1	$10,000.00	$10,000.00
	505-6	CONCRETE CHANNEL LINING	CY	1823	$300.00	$546,900.00
		CONSTRUCTION COST SUBTOTAL				$752,598.00
		CONSTRUCTION CONTIGENCY AT 20%				$150,519.60
		TOTAL CONSTRUCTION COST				$903,117.60
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0.10	$30,000.00	$3,000.00
		RELOCATION EXPENSES	LOT	1	$75,000.00	$75,000.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$981,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 4 - OPTION 1						
	201-1	CLEARING AND GRUBBING	SY	6300	$0.30	$1,890.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$86,000.00	$86,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	16350	$4.00	$65,400.00
	220-1	DUMPED RIPRAP	CY	30	$35.00	$1,050.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$25,000.00	$25,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	3800	$20.00	$76,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	21000	$1.00	$21,000.00
	430-2	PATH AND TRAIL	LF	1900	$5.00	$9,500.00
	505-1	HEADWALLS w/ SAFETY RAILING	EA	1	$5,000.00	$5,000.00
	505-2	ENERGY DISSIPATION STRUCTURE	LS	1	$10,000.00	$10,000.00
	505-6	CONCRETE CHANNEL LINING	CY	2520	$300.00	$756,000.00
	9999	REACH 5 STORM DRAIN	LS	1	$740,910.00	$740,910.00
		CONSTRUCTION COST SUBTOTAL				$1,807,750.00
		CONSTRUCTION CONTIGENCY AT 20%				$361,550.00
		TOTAL CONSTRUCTION COST				$2,169,300.00
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0.15	$30,000.00	$4,500.00
		RELOCATION EXPENSES	LOT	0	$75,000.00	$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$2,174,000.00**

Appendix E3

OPTION 1: Supporting Hydraulic Calculations

HECRAS OUTPUT - OPTION 1

Reaches 2,3, & 4

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 2	6	106	1220.57	1222.96		1223.17	0.000665	3.67	28.89	12.14	0.42
Reach 2	5	133	1220.12	1222.77		1223.04	0.000781	4.16	31.94	12.14	0.45
Reach 2	4	142	1219.50	1222.64		1222.86	0.000539	3.74	37.93	12.14	0.37
Reach 2	3	295	1217.40	1221.64		1222.16	0.001001	5.76	51.18	12.13	0.49
Reach 2	2	303	1216.94	1221.51		1221.98	0.000858	5.50	55.13	12.13	0.45
Reach 2	1	303	1215.70	1221.30	1218.39	1221.61	0.000493	4.48	67.58	12.13	0.33
Reach 3	5700	122	1218.20	1223.24		1223.38	0.000309	2.99	40.77	8.17	0.24
Reach 3	5040	248	1216.55	1222.58		1222.99	0.000808	5.09	48.77	8.16	0.37
Reach 3	4560	399	1215.35	1221.00		1222.19	0.002497	8.76	45.53	8.13	0.65
Reach 3	4300	399	1214.70	1220.34	1218.94	1221.54	0.002498	8.77	45.50	8.12	0.65
Reach 4	3640	401	1219.00	1223.46		1224.32	0.001598	7.44	53.91	12.15	0.62
Reach 4	3100	401	1217.65	1222.97		1223.58	0.000988	6.24	64.27	12.14	0.48
Reach 4	3090	472	1217.63	1222.54		1223.53	0.001708	7.97	59.24	12.13	0.64
Reach 4	2360	521	1215.80	1219.75	1219.67	1221.61	0.003821	10.94	47.61	12.09	0.97
Reach 4	2050	549	1214.95	1219.31		1220.56	0.002174	8.96	61.26	14.09	0.76
Reach 4	2000	549	1214.90	1219.06		1220.43	0.002503	9.41	58.36	14.08	0.81
Reach 4	1500	549	1213.65	1217.80	1217.26	1219.18	0.0025	9.42	58.29	14.07	0.82

Reach 2 Note: River Sta 6 = Plan STA 61+00
River Sta 5 = Plan STA 62+80
River Sta 4 = Plan STA 65+30
River Sta 3 = Plan STA 73+70
River Sta 2 = Plan STA 75+50
River Sta 1 = Plan STA 80+50

CURRENT DATE: 06-23-1999 FILE DATE: 06-23-1999
CURRENT TIME: 16:19:51 FILE NAME: AVDLYAQ1

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 6.0 **********
****

CU LV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1215.77	1214.37	700.00	1 RCB	10.00	5.00	.015	CONVENTIONAL
2								
3								
4								
5								
6								

****

SUMMARY OF CULVERT FLOWS (cfs) FILE: AVDLYAQ1 DATE: 06-23-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1215.77	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1216.92	31.0	31.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1217.59	62.0	62.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1218.15	93.0	93.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1218.65	124.0	124.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1219.11	155.0	155.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1219.55	186.0	186.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1219.74	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1220.36	248.0	248.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1220.74	279.0	279.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1221.12	310.0	310.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1223.40	525.5	525.5	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

****

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: AVDLYAQ1 DATE: 06-23-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1215.77	0.000	0.00	0.00	0.00
1216.92	0.000	31.00	0.00	0.00
1217.59	0.000	62.00	0.00	0.00
1218.15	0.000	93.00	0.00	0.00
1218.65	0.000	124.00	0.00	0.00
1219.11	0.000	155.00	0.00	0.00
1219.55	0.000	186.00	0.00	0.00
1219.74	0.000	200.00	0.00	0.00
1220.36	0.000	248.00	0.00	0.00
1220.74	0.000	279.00	0.00	0.00
1221.12	0.000	310.00	0.00	0.00

****

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

****

CURRENT DATE: 06-23-1999 FILE DATE: 06-23-1999
CURRENT TIME: 16:19:51 FILE NAME: AVDLYAQ1

****

PERFORMANCE CURVE FOR CULVERT 1 - 1(10.00 (ft) BY 5.00 (ft)) RCB

****

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1215.77	0.00	-1.37	0-NF	0.00	0.00	0.00	0.03	0.00	0.00
31.00	1216.92	1.03	1.15	3-M1t	0.84	0.67	0.89	0.89	3.48	3.60
62.00	1217.59	1.63	1.82	3-M1t	1.33	1.06	1.38	1.38	4.51	4.61
93.00	1218.15	2.13	2.38	3-M1t	1.75	1.39	1.79	1.79	5.20	5.28
124.00	1218.65	2.59	2.88	3-M1t	2.13	1.69	2.17	2.17	5.72	5.80
155.00	1219.11	3.01	3.34	3-M1t	2.49	1.96	2.52	2.52	6.15	6.22
186.00	1219.55	3.41	3.78	3-M1t	2.82	2.21	2.86	2.86	6.51	6.57
200.00	1219.74	3.58	3.97	3-M1t	2.97	2.32	3.01	3.01	6.65	6.72
248.00	1220.36	4.13	4.59	3-M1t	3.46	2.68	3.50	3.50	7.09	7.15
279.00	1220.74	4.48	4.97	3-M1t	3.77	2.90	3.81	3.81	7.33	7.39
310.00	1221.12	4.83	5.35	3-M1t	4.07	3.11	4.11	4.11	7.54	7.60

****

El. inlet face invert 1215.77 ft El. outlet invert 1214.37 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

****

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	8000.00 ft
INLET ELEVATION	1215.77 ft
OUTLET STATION	8700.00 ft
OUTLET ELEVATION	1214.37 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0020
CULVERT LENGTH ALONG SLOPE	700.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.015
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (30-75 DEG. FLARE)
INLET DEPRESSION	NONE

****

CURRENT DATE: 06-23-1999 FILE DATE: 06-23-1999
CURRENT TIME: 16:19:51 FILE NAME: AVDLYAQ1

****
********** TAILWATER **********
****

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	10.00 ft
SIDE SLOPE H/V (X:1)	0.0
CHANNEL SLOPE V/H (ft/ft)	0.002
MANNING'S n (.01-0.1)	0.015
CHANNEL INVERT ELEVATION	1214.40 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1214.37 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1214.40	0.000	0.00	0.00	0.00
31.00	1215.26	0.685	0.86	3.60	0.11
62.00	1215.75	0.700	1.35	4.61	0.17
93.00	1216.16	0.702	1.76	5.28	0.22
124.00	1216.54	0.699	2.14	5.80	0.27
155.00	1216.89	0.694	2.49	6.22	0.31
186.00	1217.23	0.689	2.83	6.57	0.35
200.00	1217.38	0.686	2.98	6.72	0.37
248.00	1217.87	0.676	3.47	7.15	0.43
279.00	1218.18	0.670	3.78	7.39	0.47
310.00	1218.48	0.663	4.08	7.60	0.51

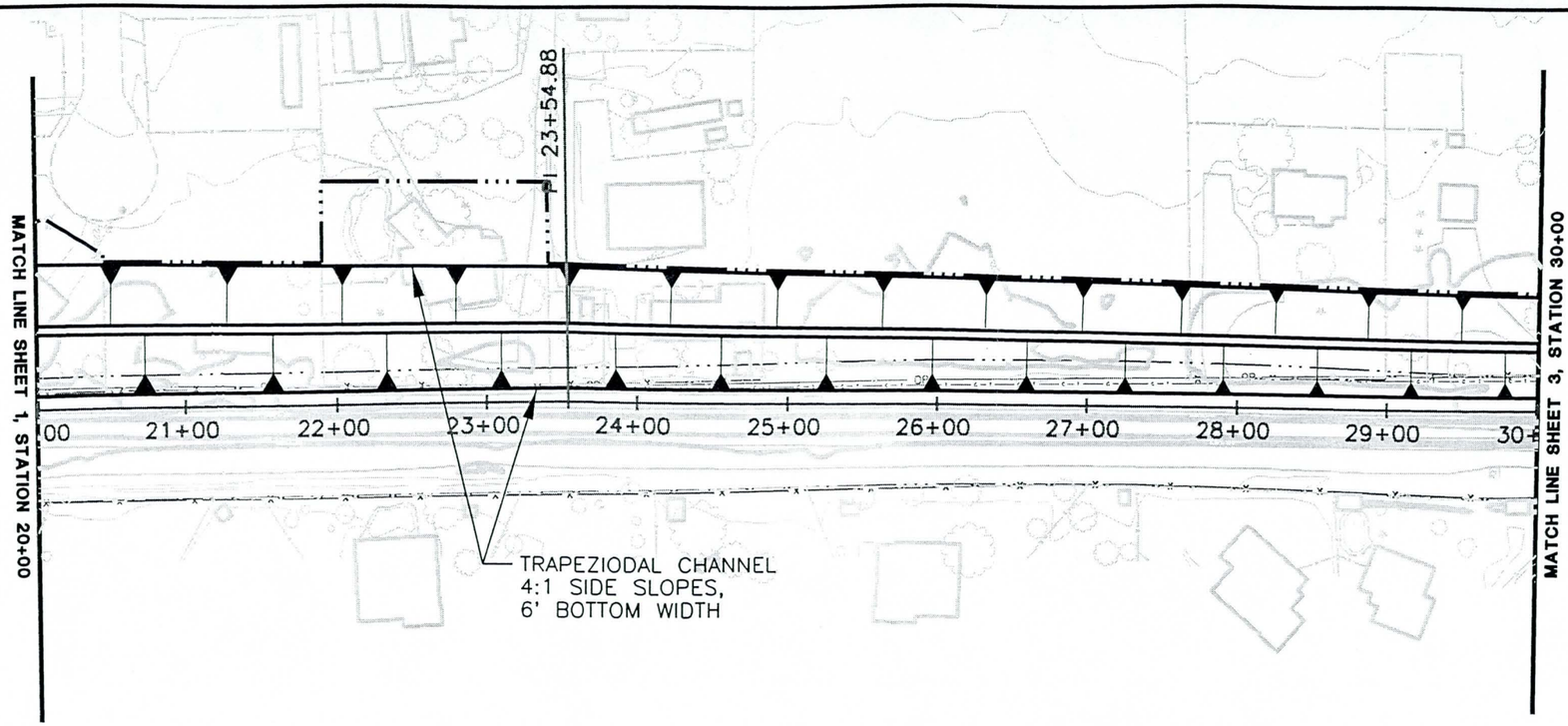
****
********** ROADWAY OVERTOPPING DATA **********
****

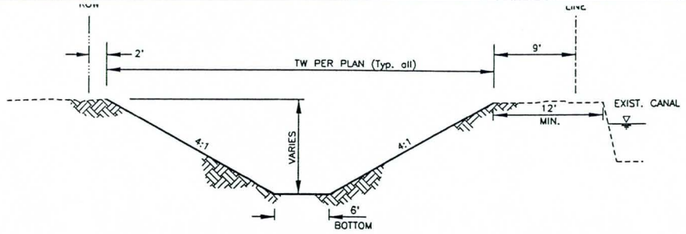
ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	50.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	1223.40 ft

****

Appendix F1

OPTION 2: Plan and Profile Sheets



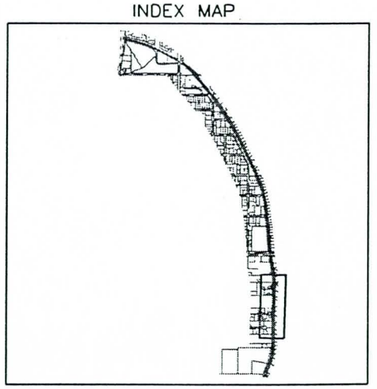


OPTION 2
TYPICAL SECTION

LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



N

100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

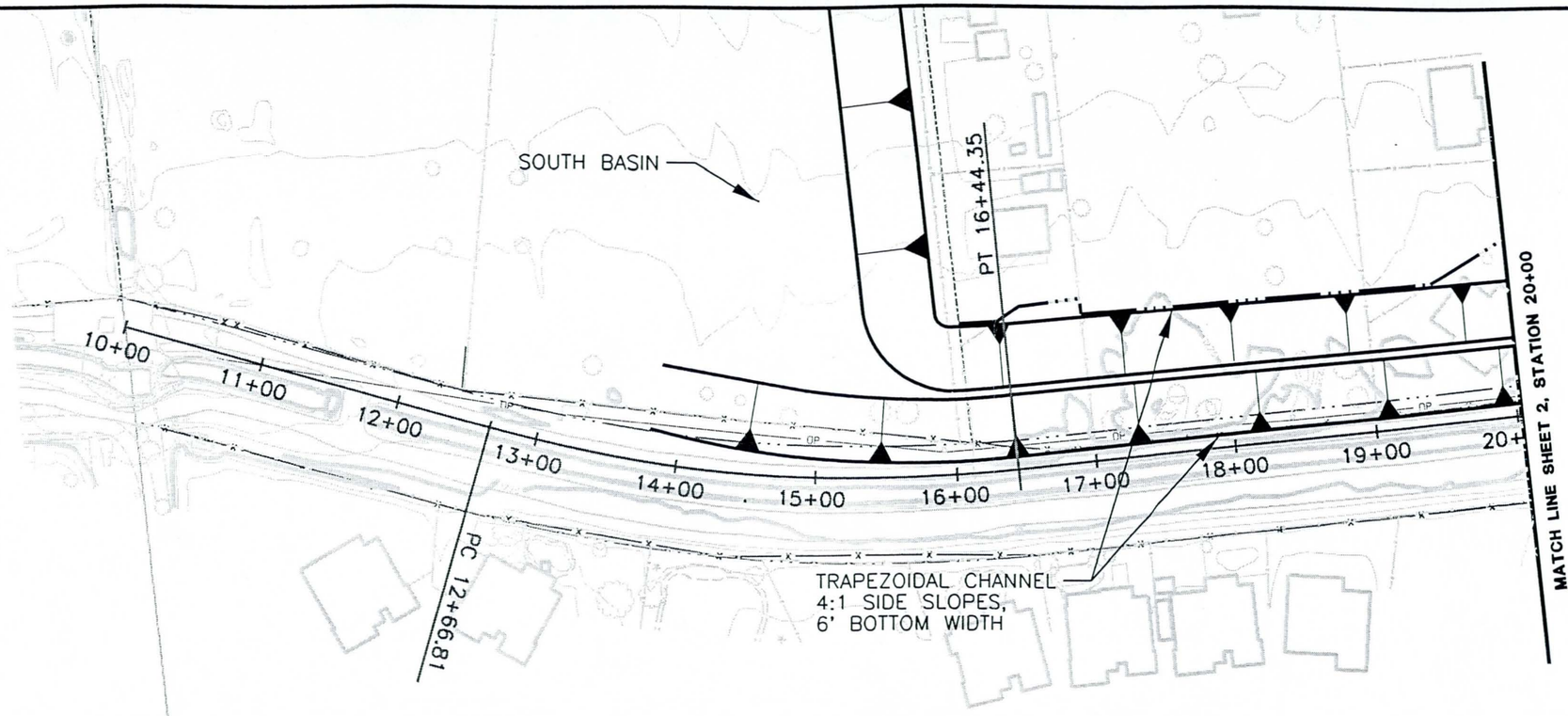
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 881-8272
FAX (602) 681-9539

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

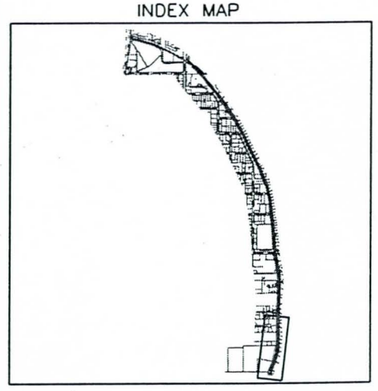
OPTION 2 SHEET OF

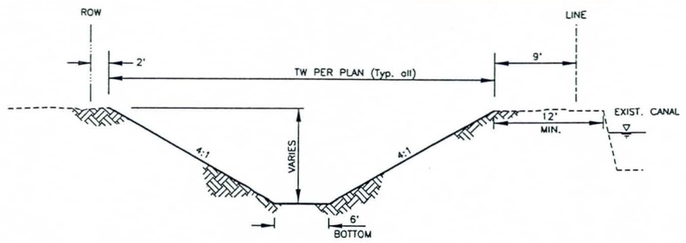


LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP





OPTION 2
TYPICAL SECTION

100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

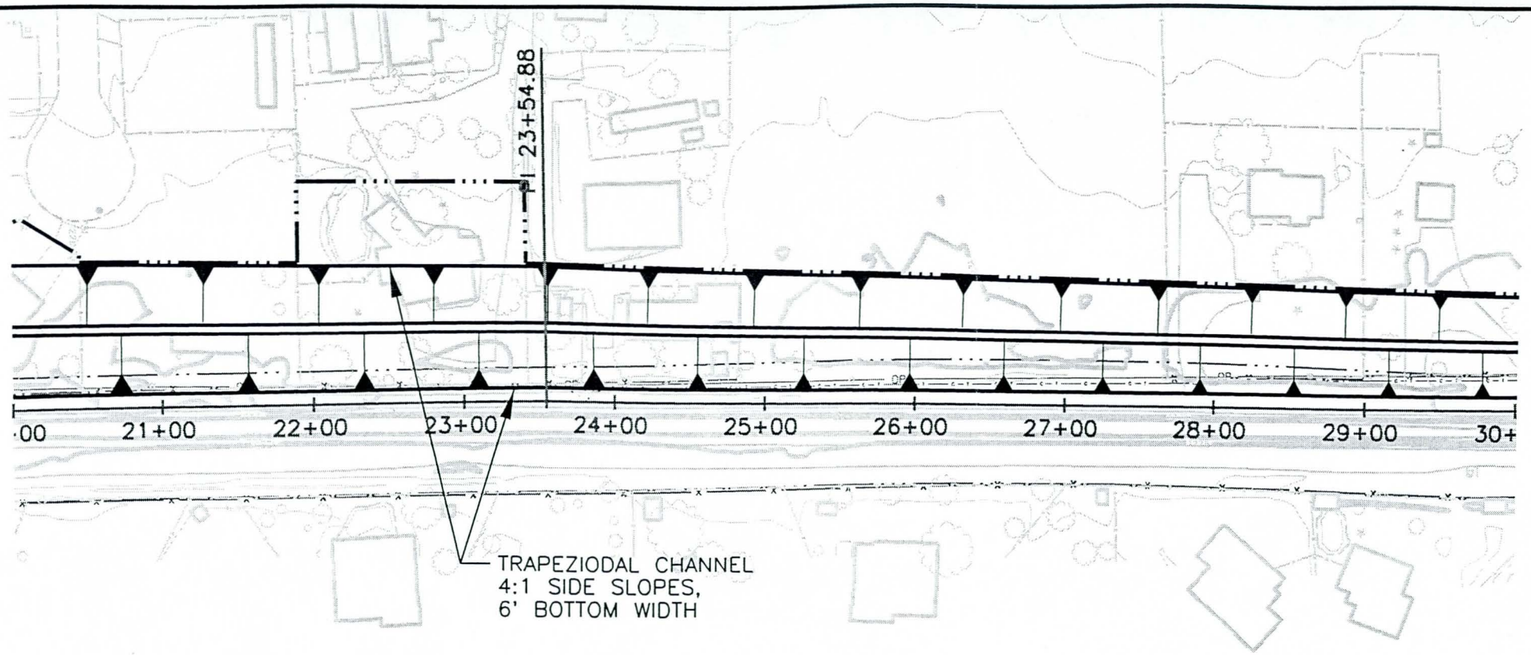
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

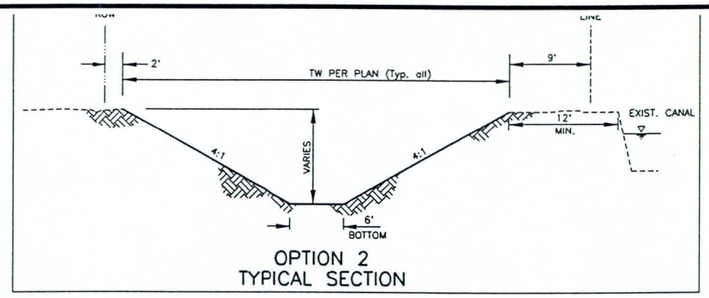
PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-9272
FAX (602) 681-9339

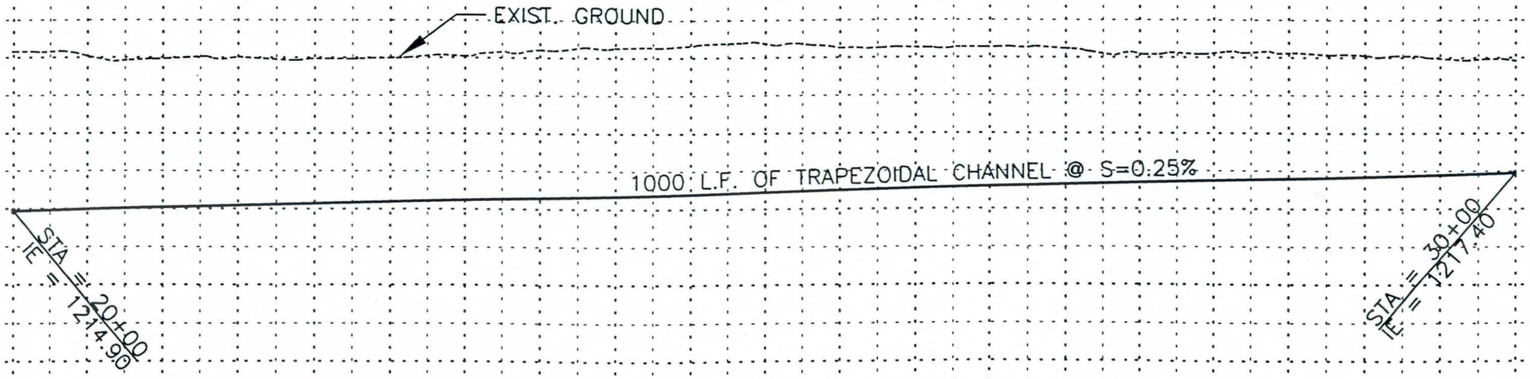
	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 2 SHEET OF





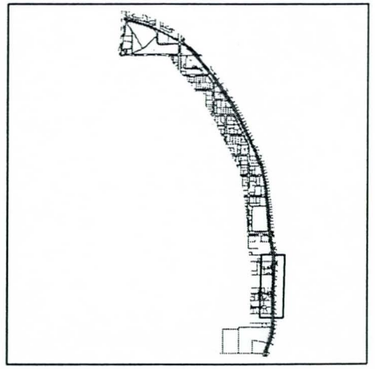
OPTION 2
TYPICAL SECTION



LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

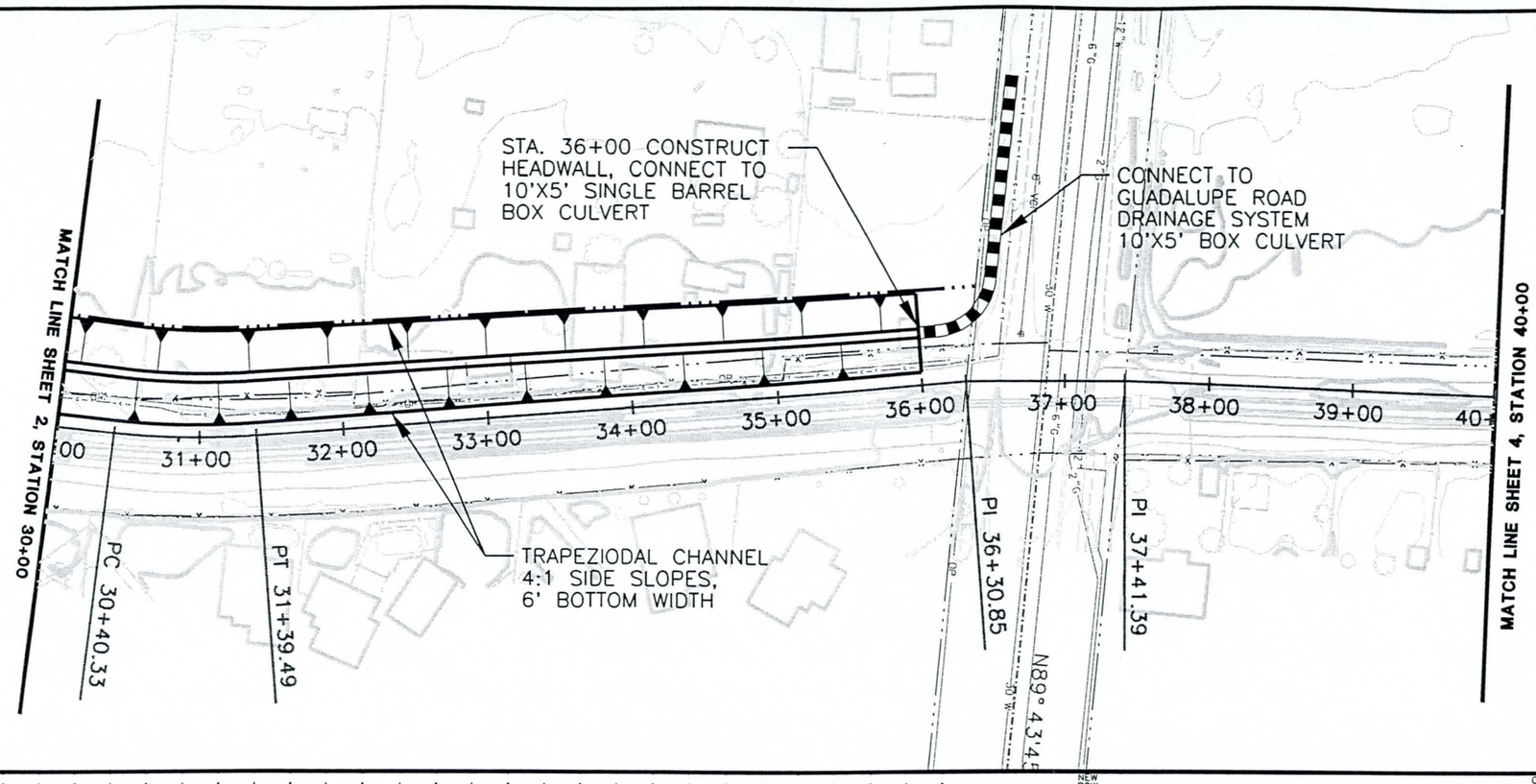
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

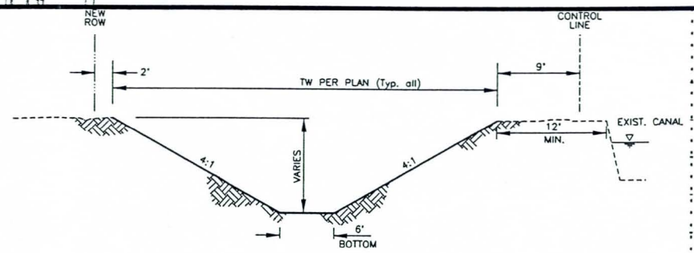
PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St. SUITE 255
PHOENIX, AZ. 85008 681-8272
FAX (602) 681-8339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 2 SHEET OF





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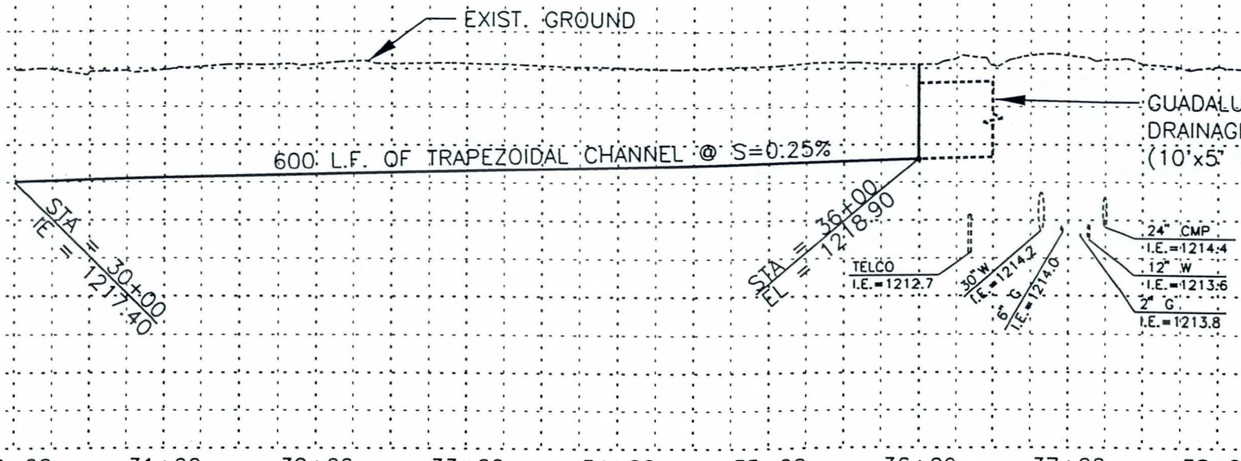
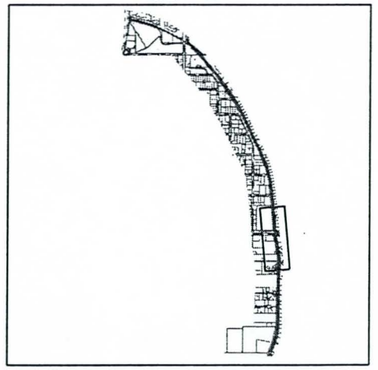


LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST. BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

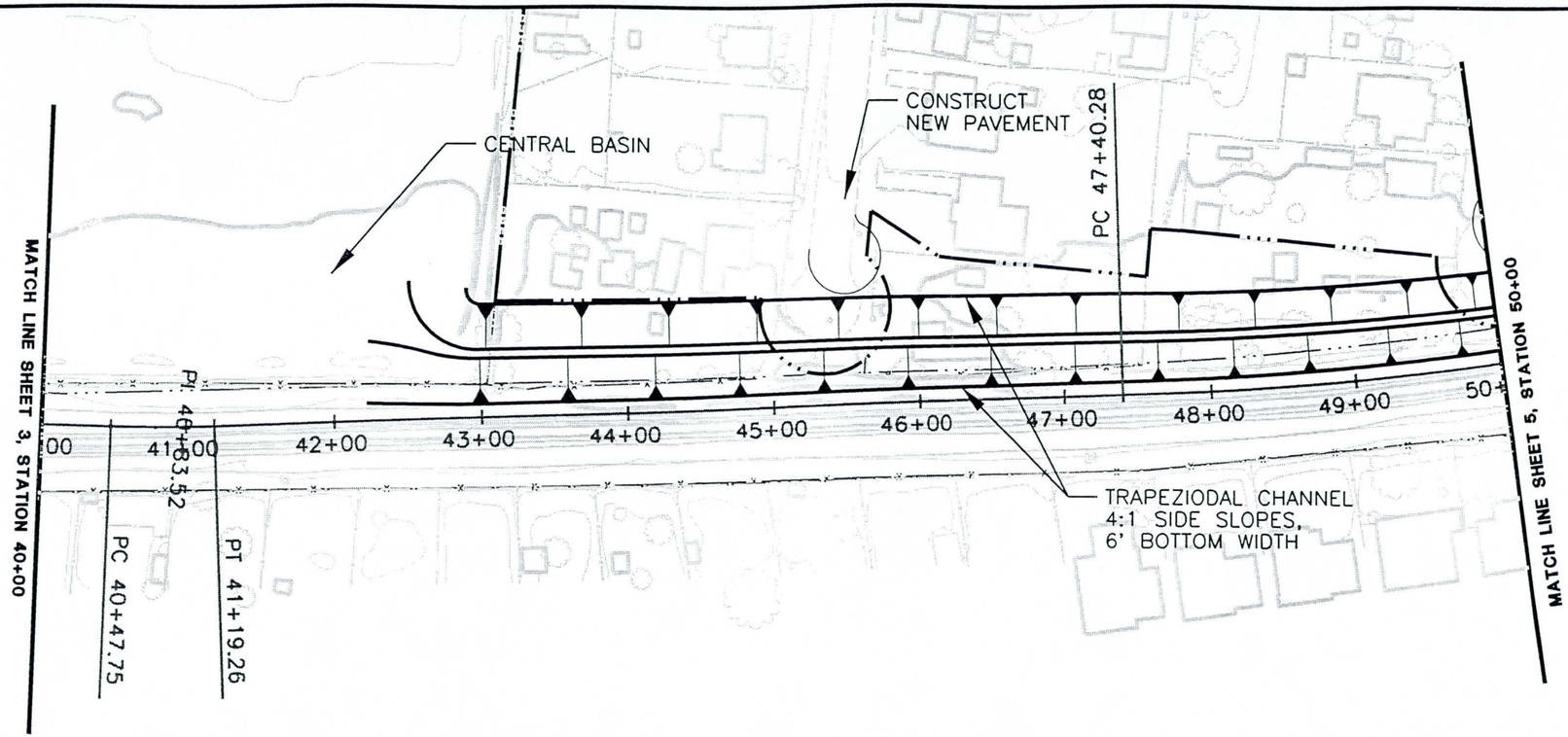
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

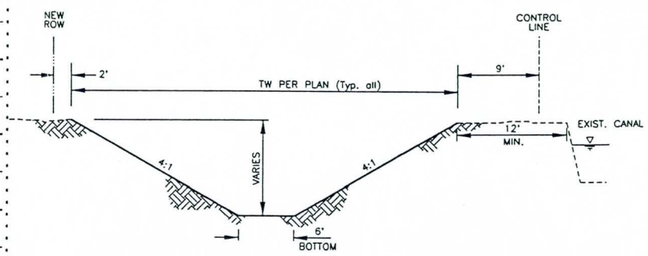
PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-8370
FAX (602) 681-8339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 2 SHEET OF





OPTION 2
TYPICAL SECTION

LEGEND

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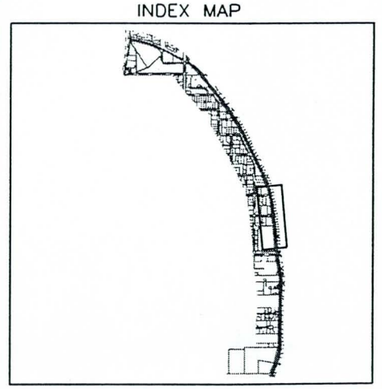

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

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PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ 85008 881-9272
FAX (602) 681-8338

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
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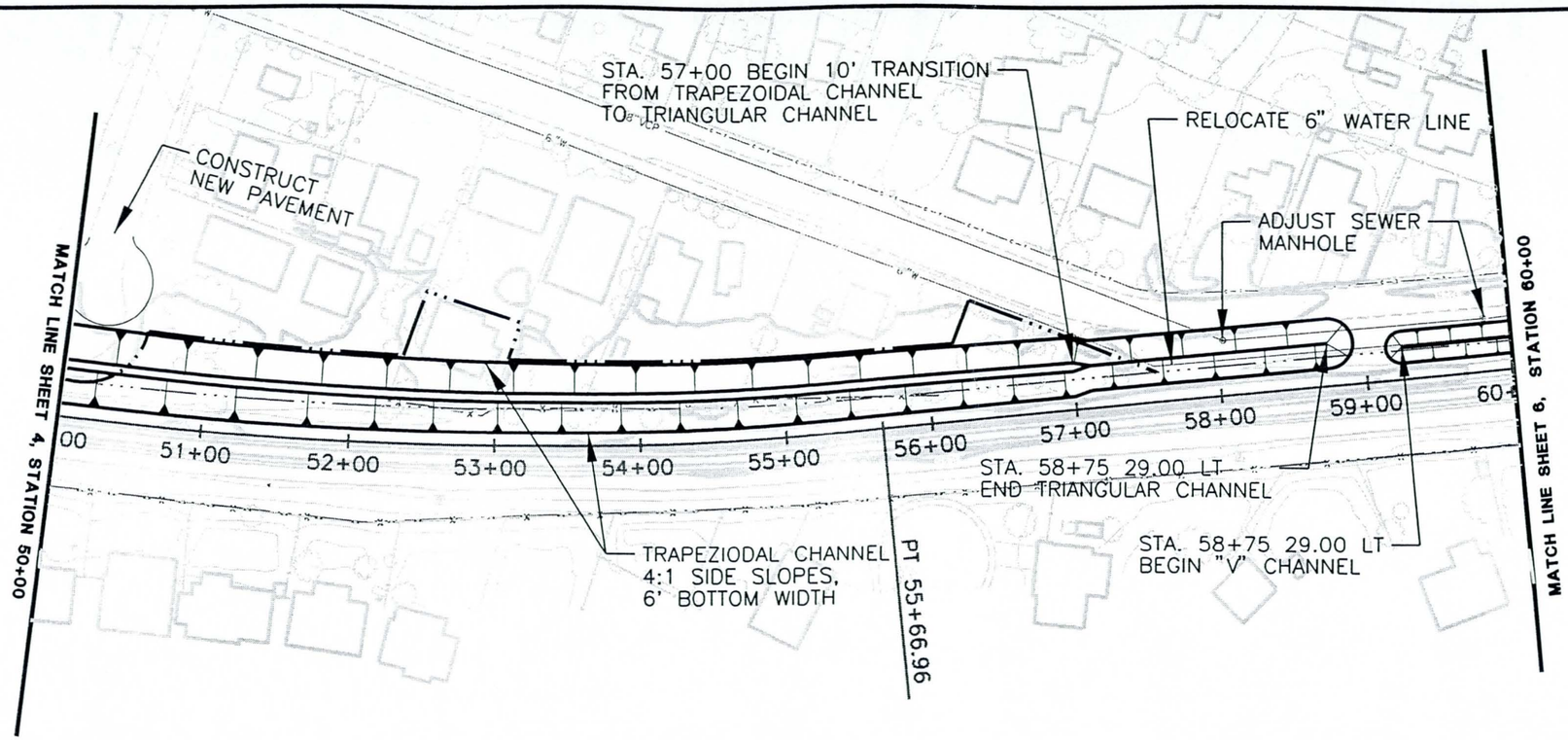

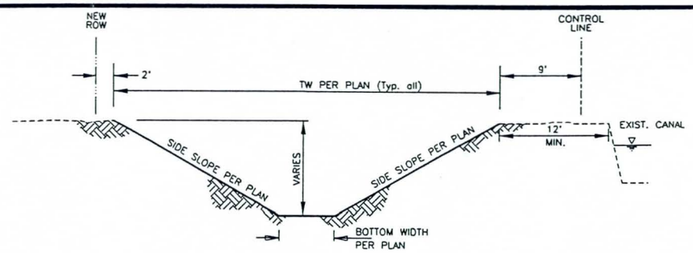

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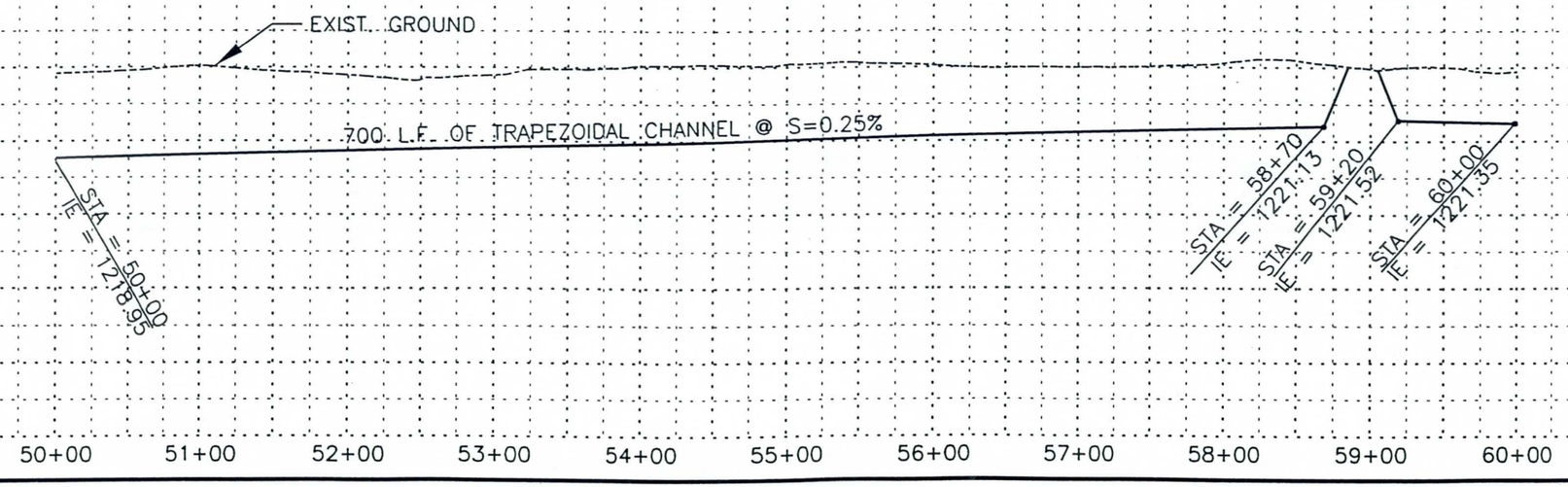

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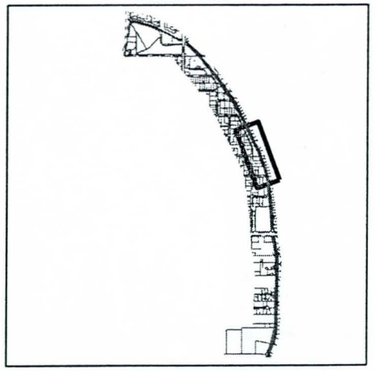

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SCALE: 1" = 100 FEET
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

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2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-8272
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PLANS CHK.	-	-

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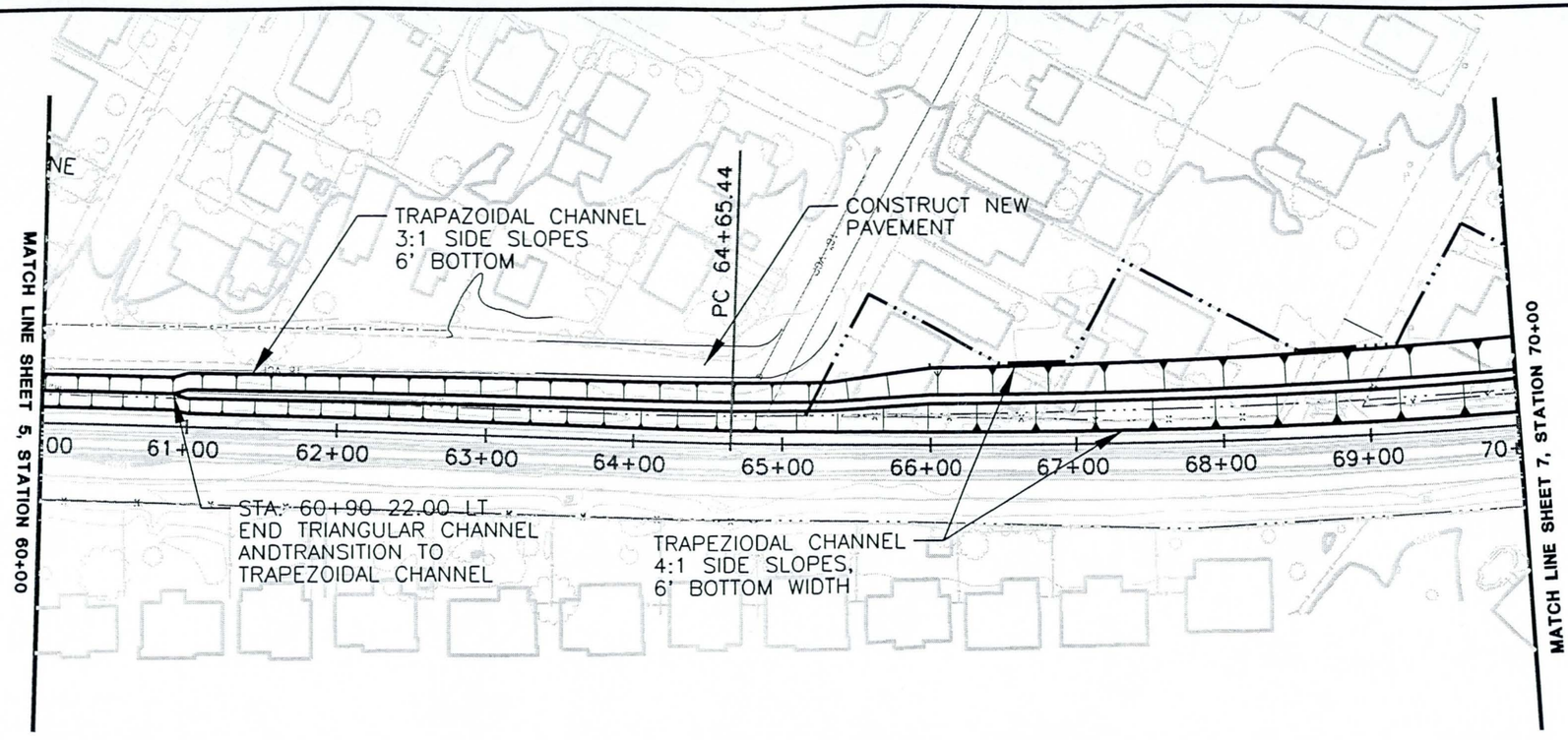

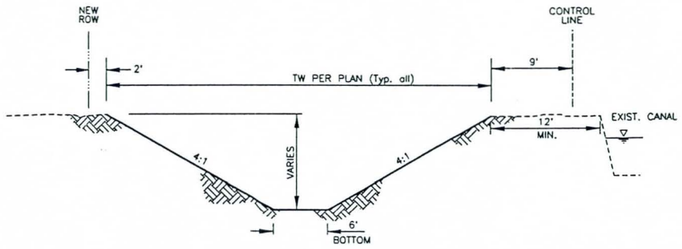

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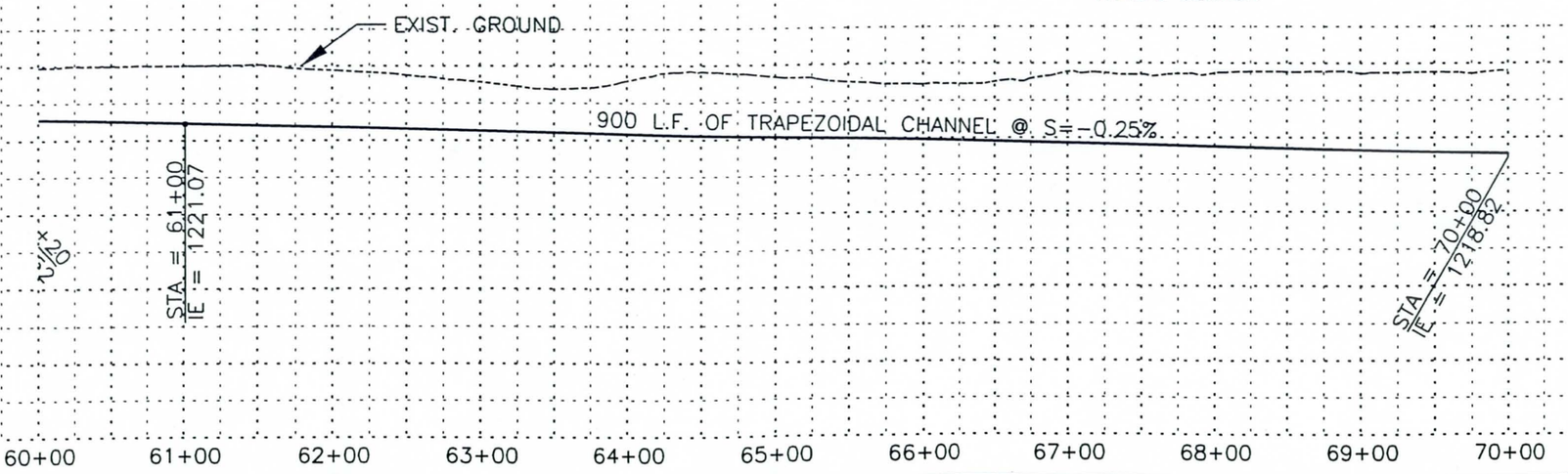

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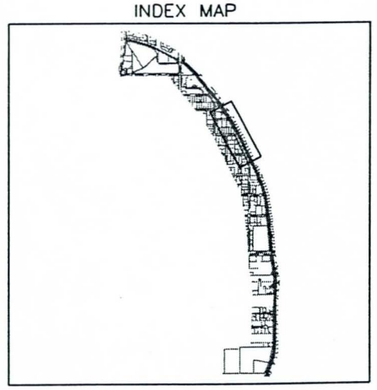

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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F.C.D. 98-45, P.C.N. 035-02-30

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2255 No. 44th St., Suite 255
PHOENIX, AZ. 85008 681-8272
FAX (602) 681-8339

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DESIGN	-	-
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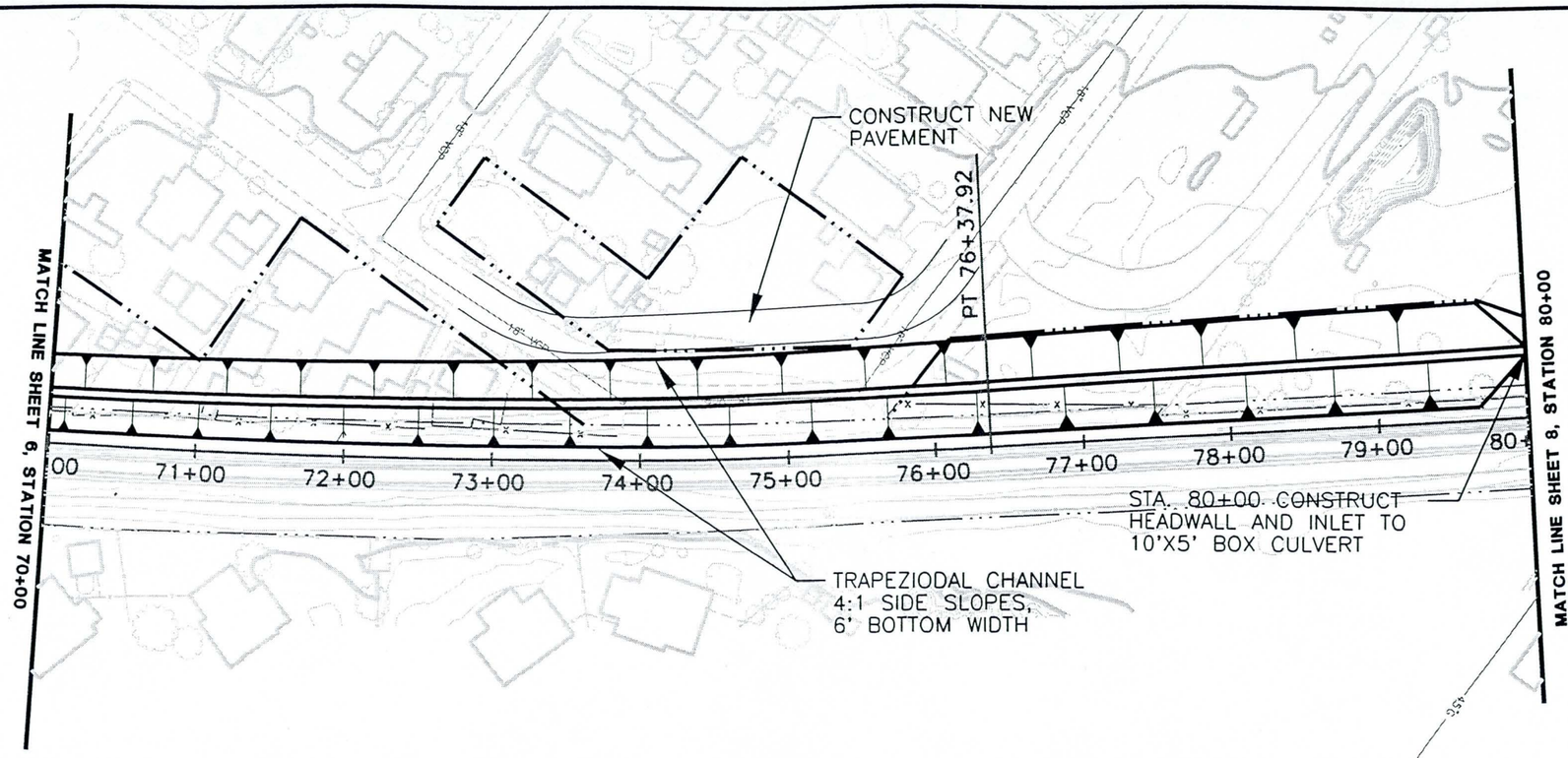

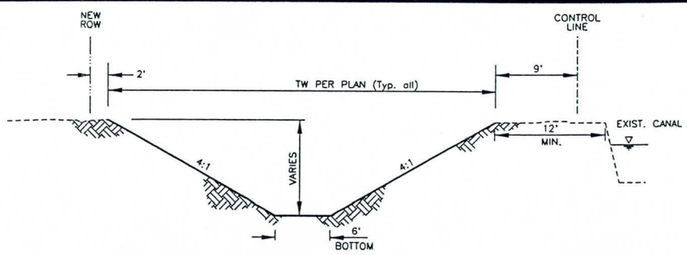

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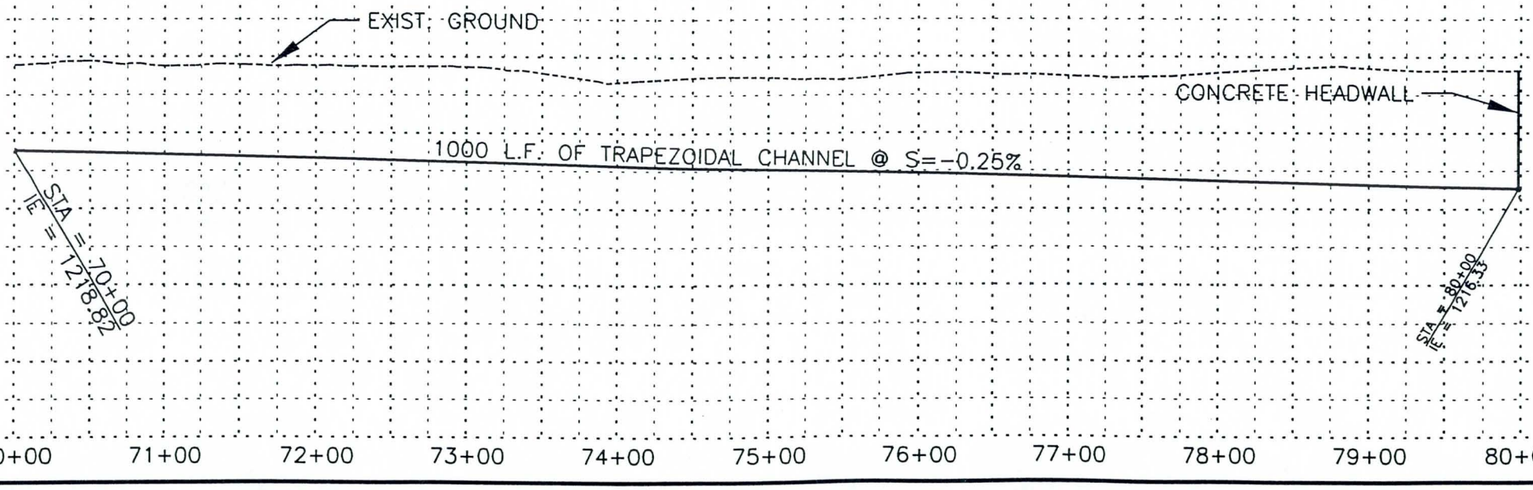

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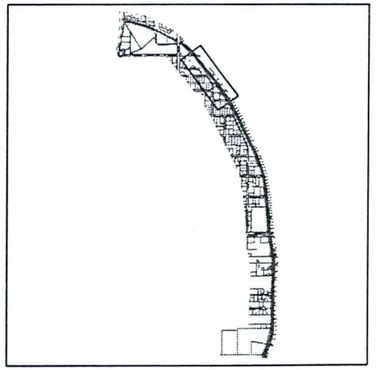

100 0' 100 200
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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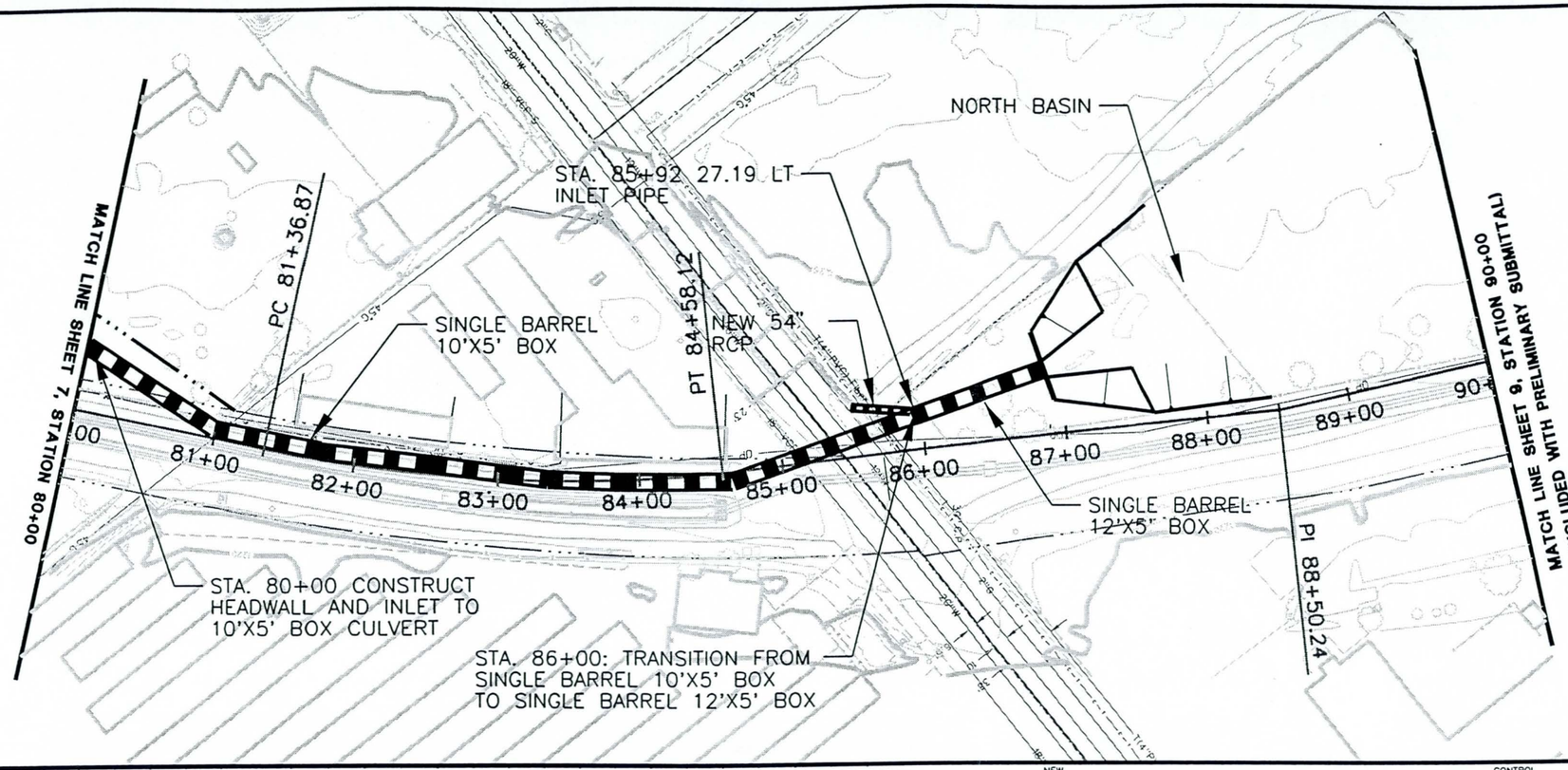
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2355 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-6272
FAX (602) 681-9339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 2 SHEET OF



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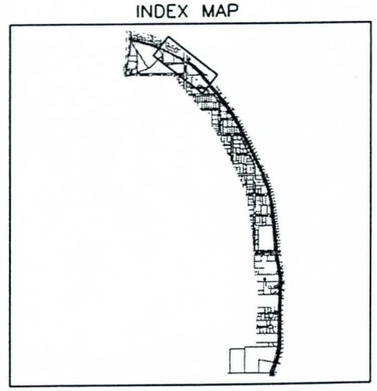

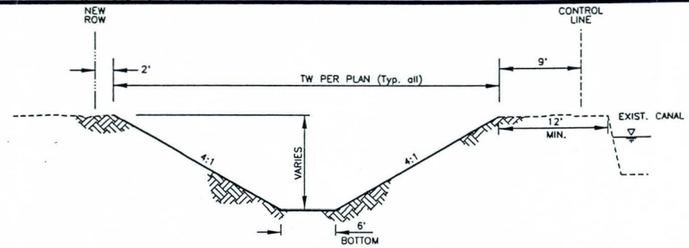

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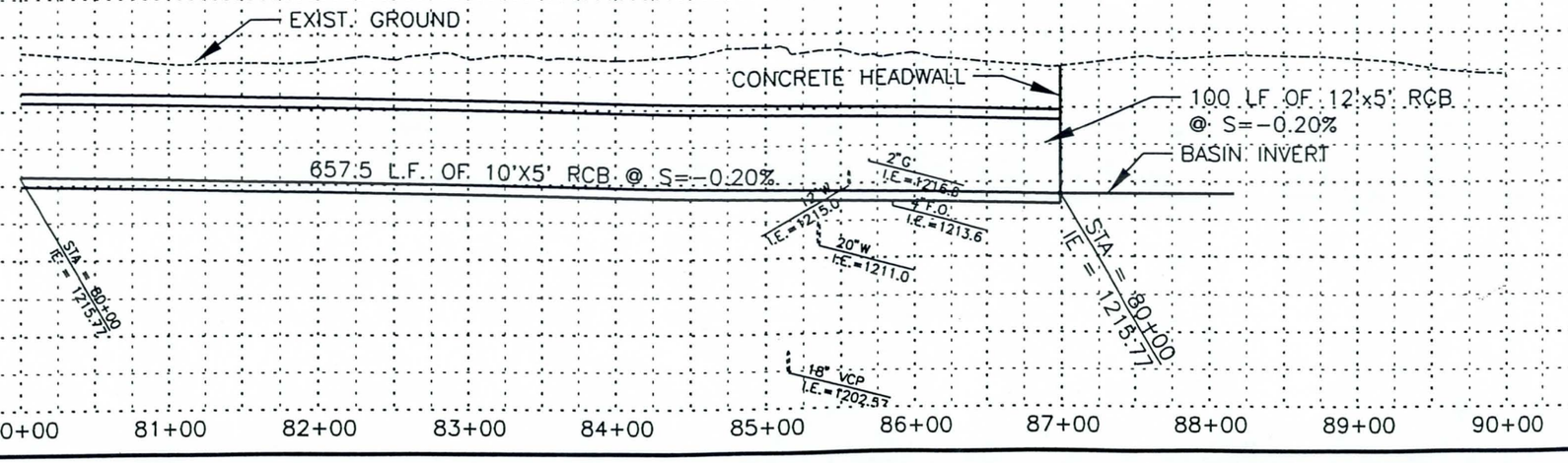

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE ARIZONA
2255 N. 44th St., SUITE 255
PHOENIX, AZ. 85008 602-957-2
FAX (602) 681-9339

	BY	DATE
DESIGN	--	--
DESIGN CHK.	--	--
PLANS	--	--
PLANS CHK.	--	--

OPTION 2 SHEET OF

Appendix F2

OPTION 2: Quantity and Cost Estimates

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY Revised 8-13-99 - wso
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 1 - OPTIONS 1, 2, AND 3						
	201-1	CLEARING AND GRUBBING	SY	1160	$0.30	$348.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$26,000.00	$26,000.00
	220-1	DUMPED RIPRAP	CY	30	$35.00	$1,050.00
	336-1	REMOVE AND REPLACE ASPHALT PAVEMENT	SY	110	$35.00	$3,850.00
	340-1	REMOVE AND REPLACE CURB, GUTTER, & SIDEWALK	SF	360	$5.00	$1,800.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMN	LS	1	$5,000.00	$5,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	500	$20.00	$10,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	2000	$1.00	$2,000.00
	430-2	PATH AND TRAIL	LF	800	$5.00	$4,000.00
	505-1	HEADWALLS w/ SAFETY RAILING	EA	2	$5,000.00	$10,000.00
	505-2	CONCRETE SPLASH PAD W/ END SILL	CY	20	$300.00	$6,000.00
	505-3	JUNCTION STRUCTURES	LS	1	$10,000.00	$10,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	0	$2,500.00	$0.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE)	EA	0	$5,000.00	$0.00
	610-1	VERTICAL REALIGNMENT OF 12" WATER (DIP W/ RSTN JNT	LF	60	$150.00	$9,000.00
	618-1	54" STORM DRAIN	LF	50	$150.00	$7,500.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	600	$600.00	$360,000.00
	618-3	CONCRETE BOX CULVERT 12'X5'	LF	100	$800.00	$80,000.00
	625-1	STORM DRAIN MANHOLE	EA	1	$5,000.00	$5,000.00
		CONSTRUCTION COST SUBTOTAL				$551,548.00
		CONSTRUCTION CONTIGENCY AT 20%				$110,309.60
		TOTAL CONSTRUCTION COST				$661,857.60
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0.00		$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$662,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 2 - OPTION 2						
	201-1	CLEARING AND GRUBBING	SY	15730	$0.30	$4,719.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$26,000.00	$26,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	11980	$4.00	$47,920.00
	220-1	DUMPED RIPRAP	CY	340	$35.00	$11,900.00
	336-1	REMOVE AND REPLACE ASPHALT PAVEMENT	SY	1770	$35.00	$61,950.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$30,000.00	$30,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	2100	$20.00	$42,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	141570	$1.00	$141,570.00
	430-2	PATH AND TRAIL	LF	2100	$5.00	$10,500.00
	610-1	WATERLINE RELOCATION (6")	LF	1000	$100.00	$100,000.00
	615-1	18" SANITARY SEWER RELOCATION	LF	330	$150.00	$49,500.00
	625-1	SEWER MANHOLE ADJUSTMENT	EA	2	$1,500.00	$3,000.00
	625-2	SEWER MANHOLE REMOVAL AND REPLACEMENT	EA	2	$4,000.00	$8,000.00
		CONSTRUCTION COST SUBTOTAL				$547,059.00
		CONSTRUCTION CONTIGENCY AT 20%				$109,411.80
		TOTAL CONSTRUCTION COST				$656,470.80
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	2.30	$30,000.00	$69,000.00
		RELOCATION EXPENSE	LOT	8	$75,000.00	$600,000.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$1,325,000.00**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY Revised 8-13-99 - wso
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 3 - OPTION 2						
	201-1	CLEARING AND GRUBBING	SY	14620	$0.30	$4,386.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$16,000.00	$16,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	7710	$4.00	$30,840.00
	220-1	DUMPED RIPRAP	CY	270	$35.00	$9,450.00
	336-1	REMOVE AND REPLACE ASPHALT PAVEMENT	SY	610	$35.00	$21,350.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$30,000.00	$30,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	1600	$20.00	$32,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	131550	$1.00	$131,550.00
	430-2	PATH AND TRAIL	LF	1600	$5.00	$8,000.00
	610-1	WATERLINE RELOCATION (6")	LF	300	$100.00	$30,000.00
	625-1	SEWER MANHOLE ADJUSTMENT	EA	3	$1,500.00	$4,500.00
		CONSTRUCTION COST SUBTOTAL				$328,076.00
		CONSTRUCTION CONTIGENCY AT 20%				$65,615.20
		TOTAL CONSTRUCTION COST				$393,691.20
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	1.51	$30,000.00	$45,300.00
		RELOCATION EXPENSE	LOT	4	$75,000.00	$300,000.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$739,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 4 - OPTION 2						
	201-1	CLEARING AND GRUBBING	SY	20480	$0.30	$6,144.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$59,000.00	$59,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	29400	$4.00	$117,600.00
	220-1	DUMPED RIPRAP	CY	340	$35.00	$11,900.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$30,000.00	$30,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	1900	$20.00	$38,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	184320	$1.00	$184,320.00
	430-2	PATH AND TRAIL	LF	2100	$5.00	$10,500.00
	505-1	HEADWALLS w/ SAFETY RAILING (REACH 5 OUTLET)	EA	1	$5,000.00	$5,000.00
	505-2	ENERGY DISSIPATION STRUCTURE (REACH 5 OUTLET)	LS	1	$20,000.00	$20,000.00
	9999	REACH 5 STORM DRAIN	LS	1	$740,910.00	$740,910.00
		CONSTRUCTION COST SUBTOTAL				$1,233,374.00
		CONSTRUCTION CONTIGENCY AT 20%				$246,674.80
		TOTAL CONSTRUCTION COST				$1,480,048.80
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	3.02	$30,000.00	$90,600.00
		RELOCATION EXPENSE	LOT	4	$75,000.00	$300,000.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$1,871,000.00**

Appendix F3

OPTION 2: Supporting Hydraulic Calculations

HECRAS OUTPUT - OPTION 2

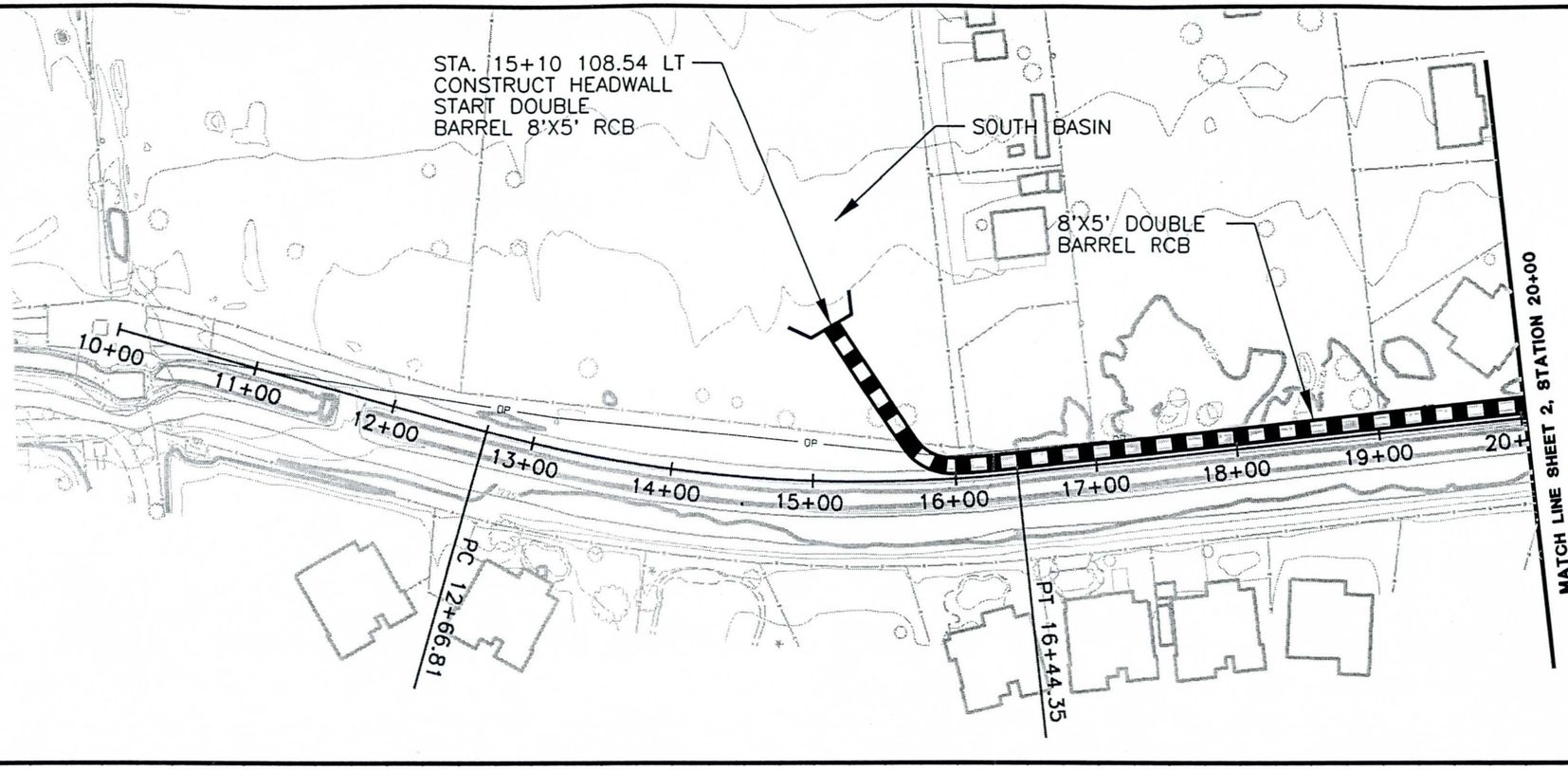
Reaches 2,3, & 4

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 2	6	106	1221.07	1223.15		1223.42	0.001220	4.18	25.38	18.45	0.63
Reach 2	5	133	1220.62	1222.65		1223.11	0.002104	5.42	24.54	18.18	0.82
Reach 2	4	142	1220.00	1222.06		1222.56	0.002247	5.65	25.13	18.38	0.85
Reach 2	3	295	1217.90	1221.37		1221.66	0.000740	4.27	69.09	33.79	0.53
Reach 2	2	303	1217.44	1221.32		1221.53	0.000467	3.62	83.66	37.07	0.42
Reach 2	1	303	1216.20	1221.30	1218.78	1221.38	0.000131	2.25	134.64	46.80	0.23
Reach 3	5700	122	1220.70	1222.88		1223.04	0.000757	3.25	37.55	28.43	0.50
Reach 3	5580	133	1220.40	1222.72		1222.94	0.000904	3.75	35.49	24.57	0.55
Reach 3	5040	248	1219.05	1222.20		1222.48	0.000815	4.23	58.56	31.19	0.54
Reach 3	4560	399	1217.85	1220.88	1220.80	1221.70	0.002500	7.26	54.99	30.26	0.95
Reach 3	4300	399	1217.20	1220.23	1220.14	1221.05	0.002503	7.26	54.96	30.26	0.95
Reach 4	3640	401	1219.00	1223.28		1223.46	0.001891	3.46	116.00	44.23	0.38
Reach 4	3100	401	1217.65	1222.61		1222.73	0.000978	2.71	148.19	49.71	0.28
Reach 4	3090	472	1217.63	1222.47		1222.70	0.002207	3.84	122.84	44.74	0.41
Reach 4	2360	521	1215.80	1220.79		1221.04	0.002328	4.02	129.62	45.93	0.42
Reach 4	2050	549	1214.95	1220.07		1220.33	0.002285	4.04	135.74	46.99	0.42
Reach 4	2000	549	1214.90	1219.94		1220.21	0.002477	4.17	131.71	46.30	0.44
Reach 4	1500	549	1213.65	1218.69	1217.09	1218.96	0.002502	4.19	130.97	45.97	0.44

Reach 2 Note: River Sta 6 = Plan STA 61+00
River Sta 5 = Plan STA 62+80
River Sta 4 = Plan STA 65+30
River Sta 3 = Plan STA 73+70
River Sta 2 = Plan STA 75+50
River Sta 1 = Plan STA 80+50

Appendix G1

OPTION 3: Plan and Profile Sheets

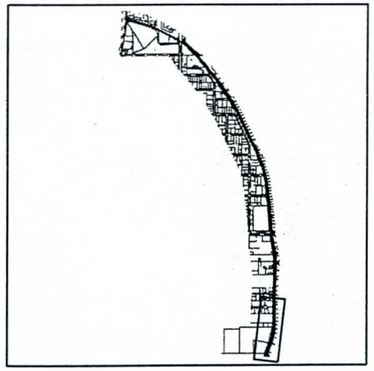


OPTION 3
TYPICAL SECTION

LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



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SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

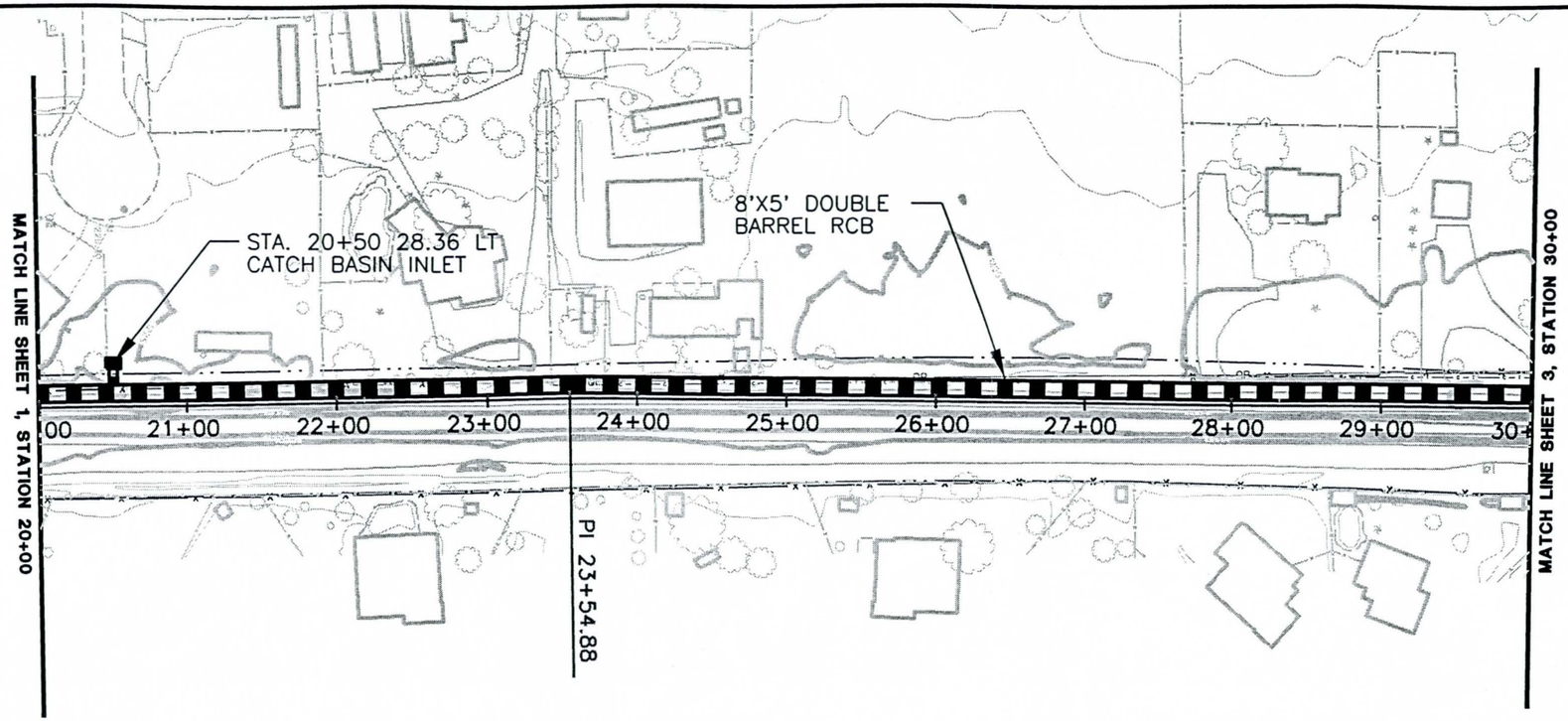
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

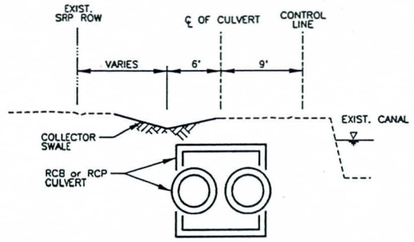
PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 (602) 437-2
FAX (602) 667-9329

	BY	DATE
DESIGN	--	--
DESIGN CHK.	--	--
PLANS	--	--
PLANS CHK.	--	--

OPTION 3 SHEET OF





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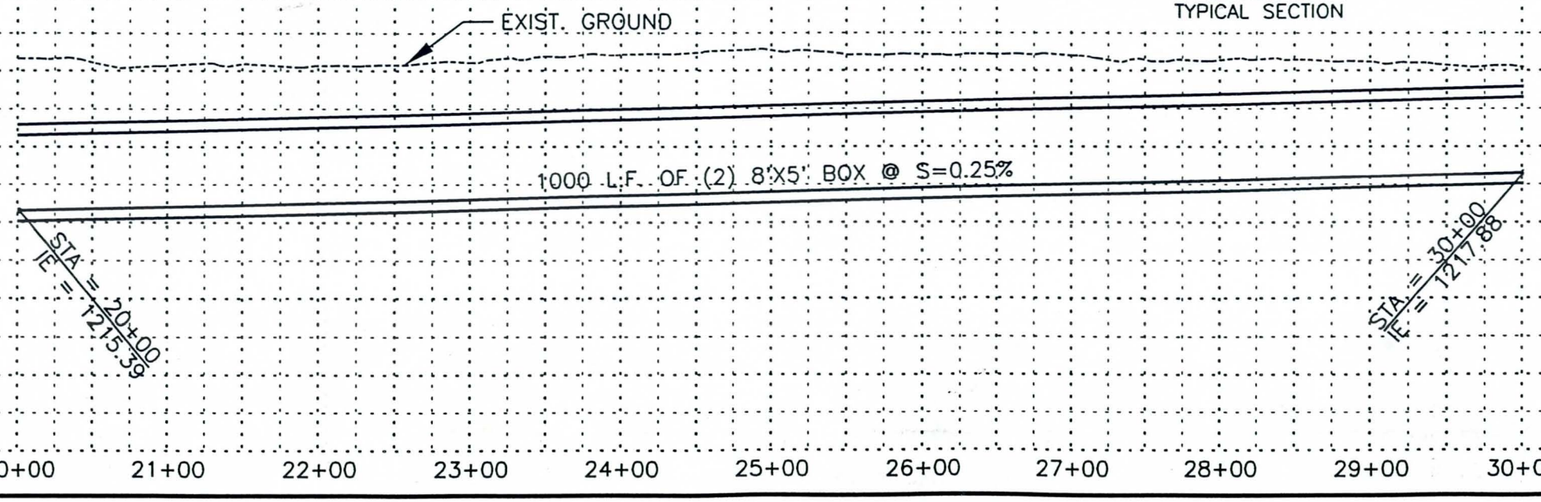

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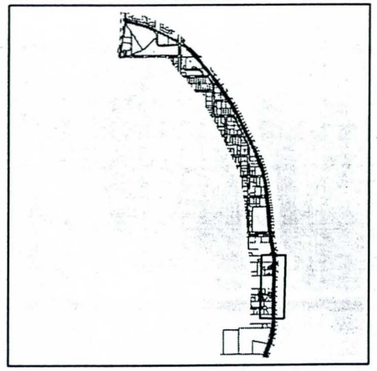

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2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 881-8272
FAX (602) 681-9336

	BY	DATE
DESIGN	--	--
DESIGN CHK.	--	--
PLANS	--	--
PLANS CHK.	--	--

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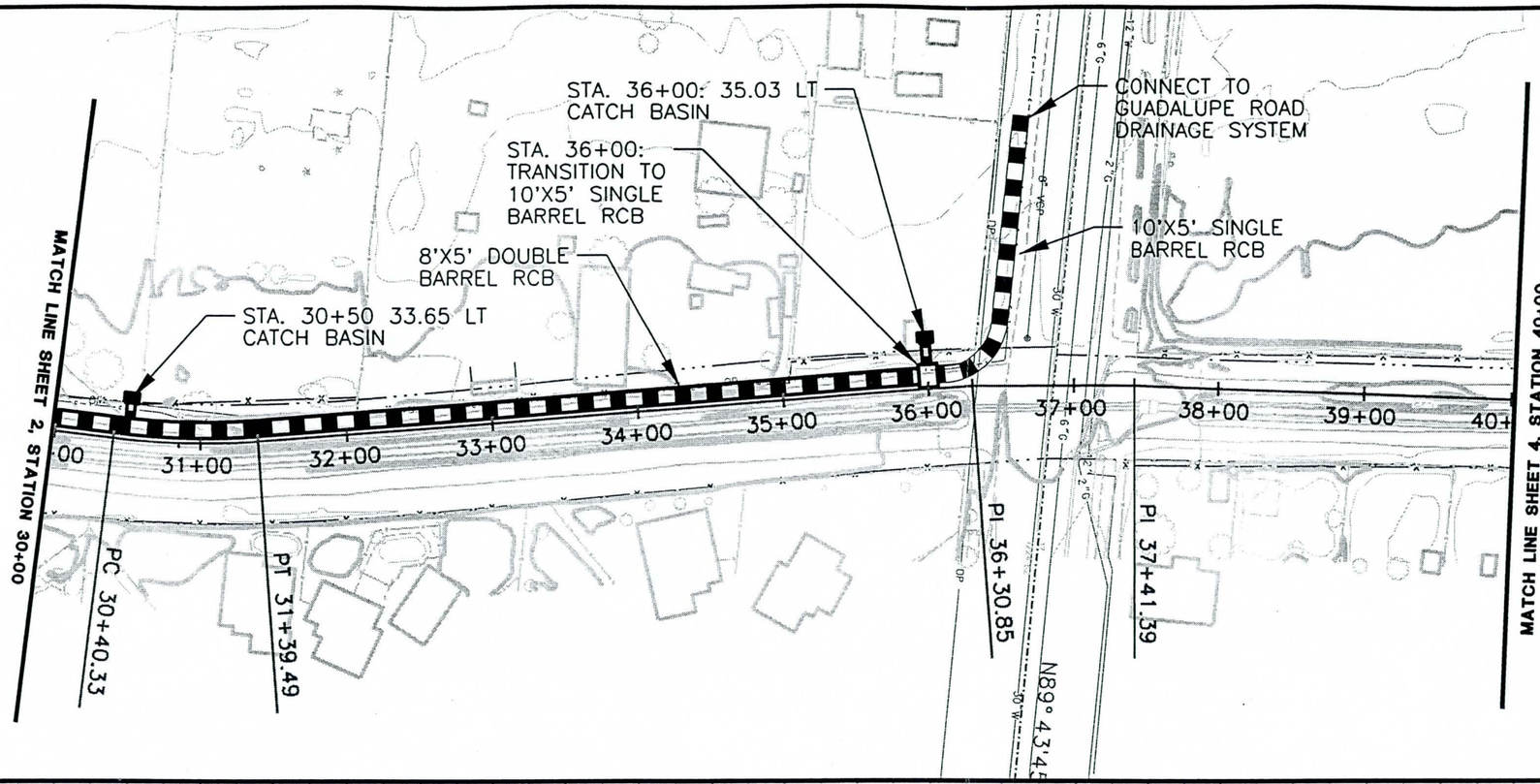

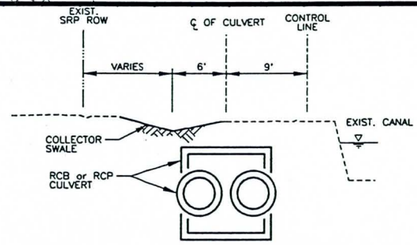

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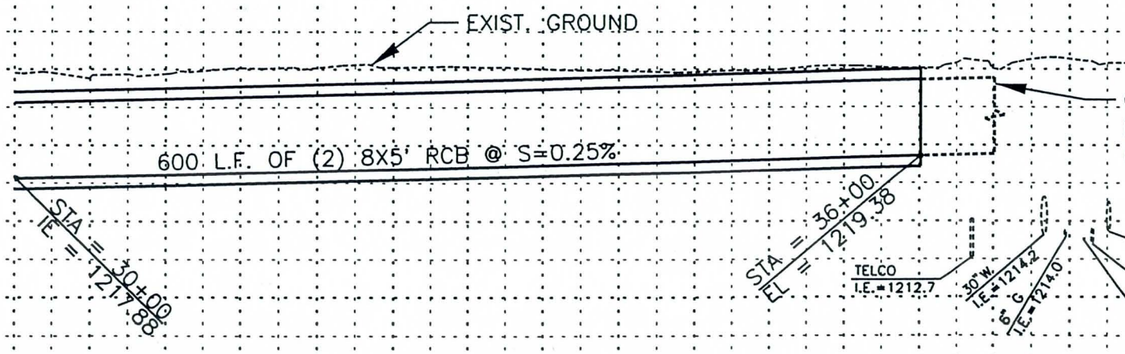

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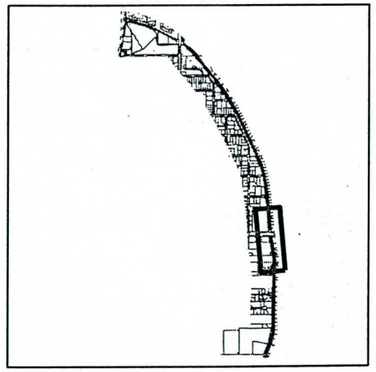

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2250 No. 44th St., SUITE 255
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FAX (602) 681-9339

	BY	DATE
DESIGN	-	-
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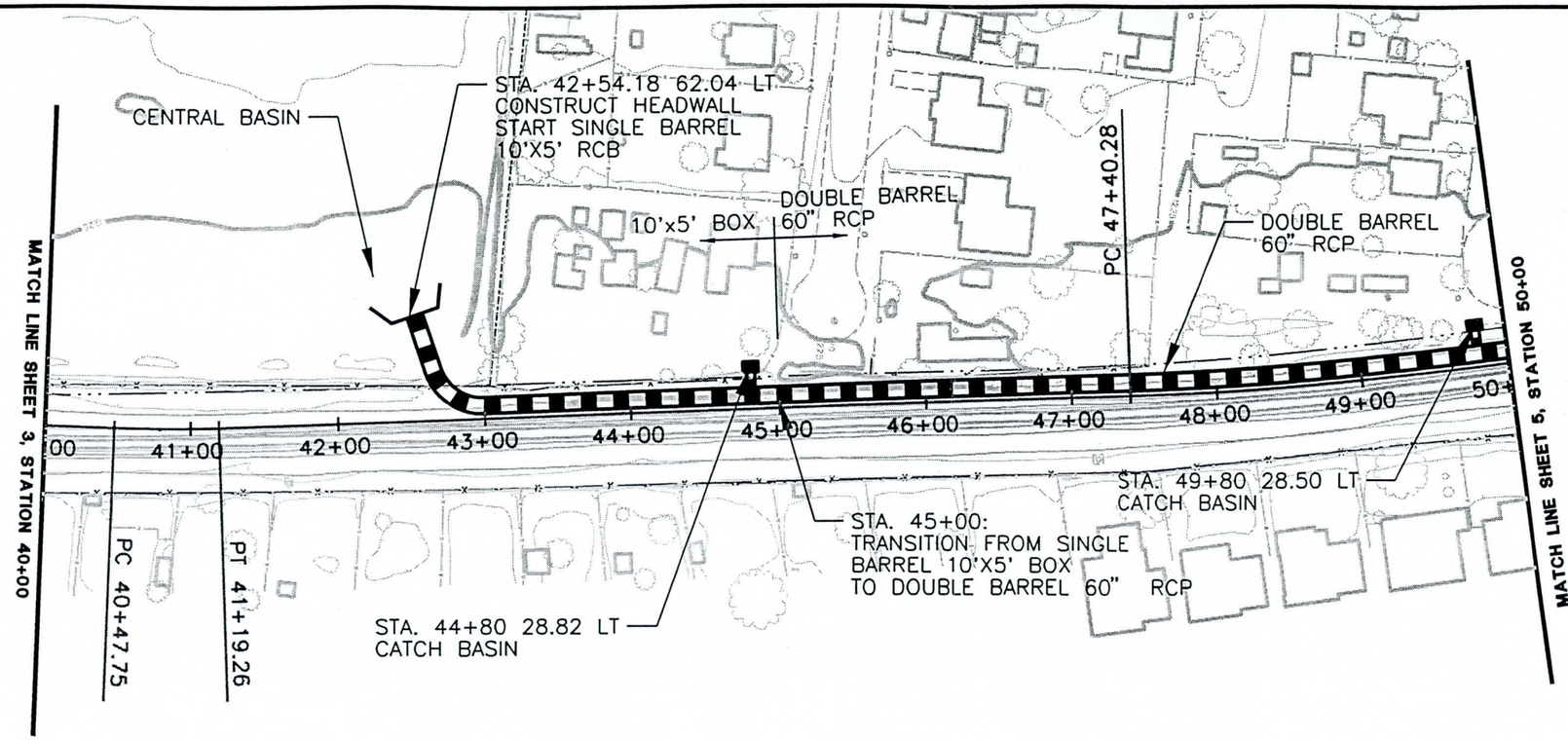
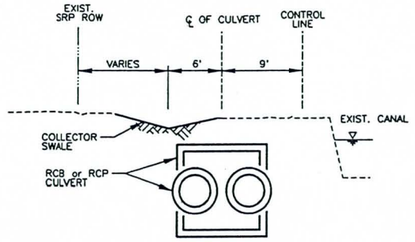
PLANS	-	-
PLANS CHK.	-	-

OPTION 3 SHEET OF





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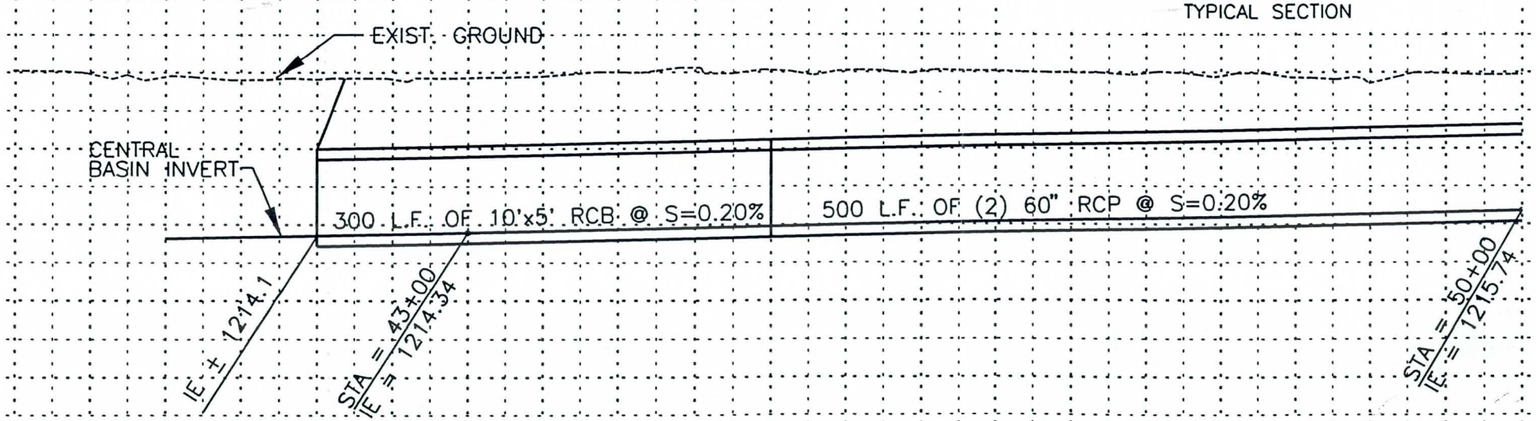

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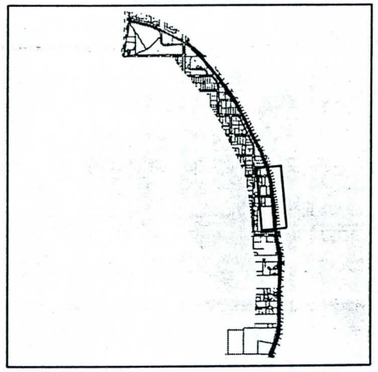

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PHOENIX, AZ. 85008 681-4272
FAX (602) 681-5330

	BY	DATE
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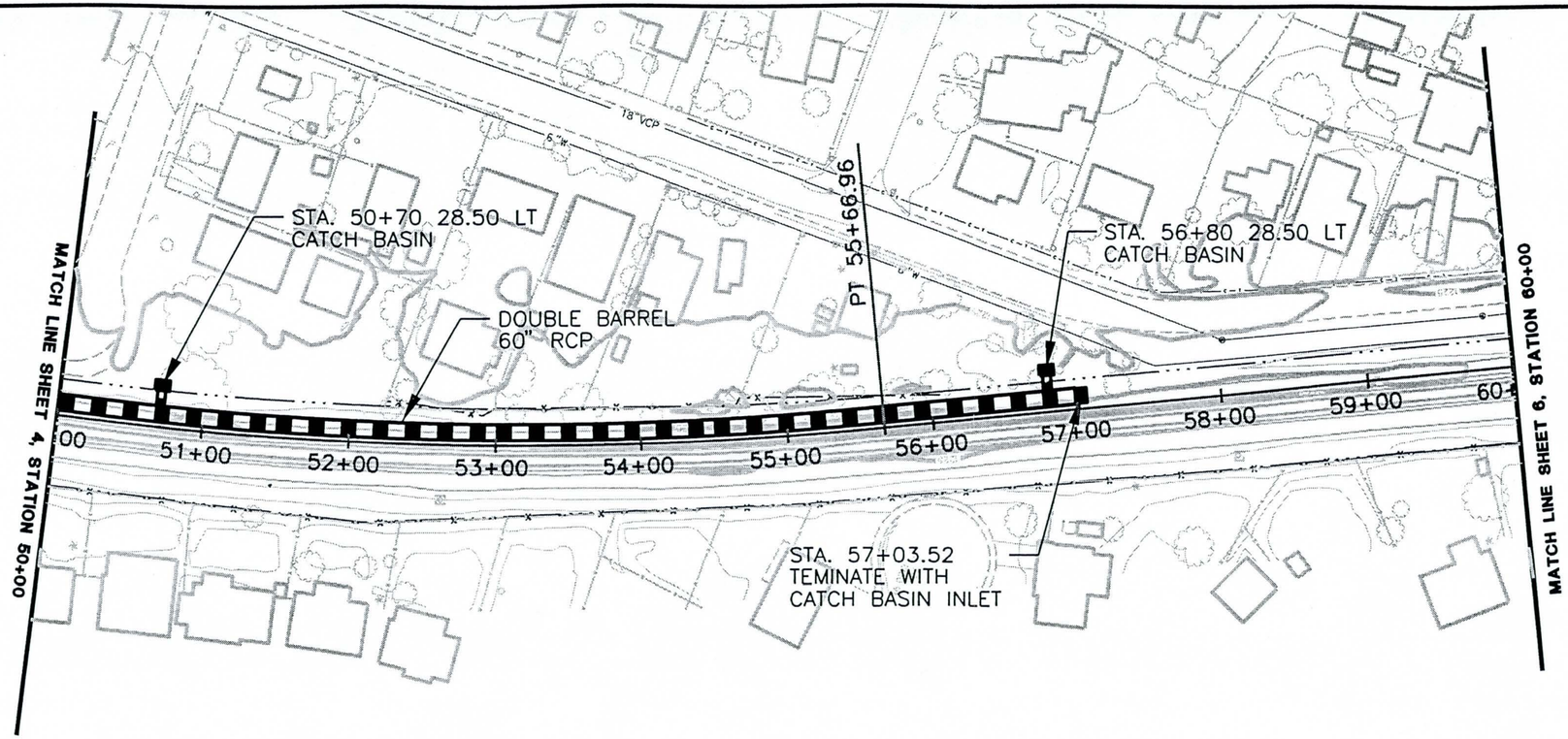

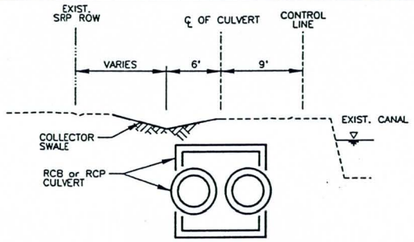

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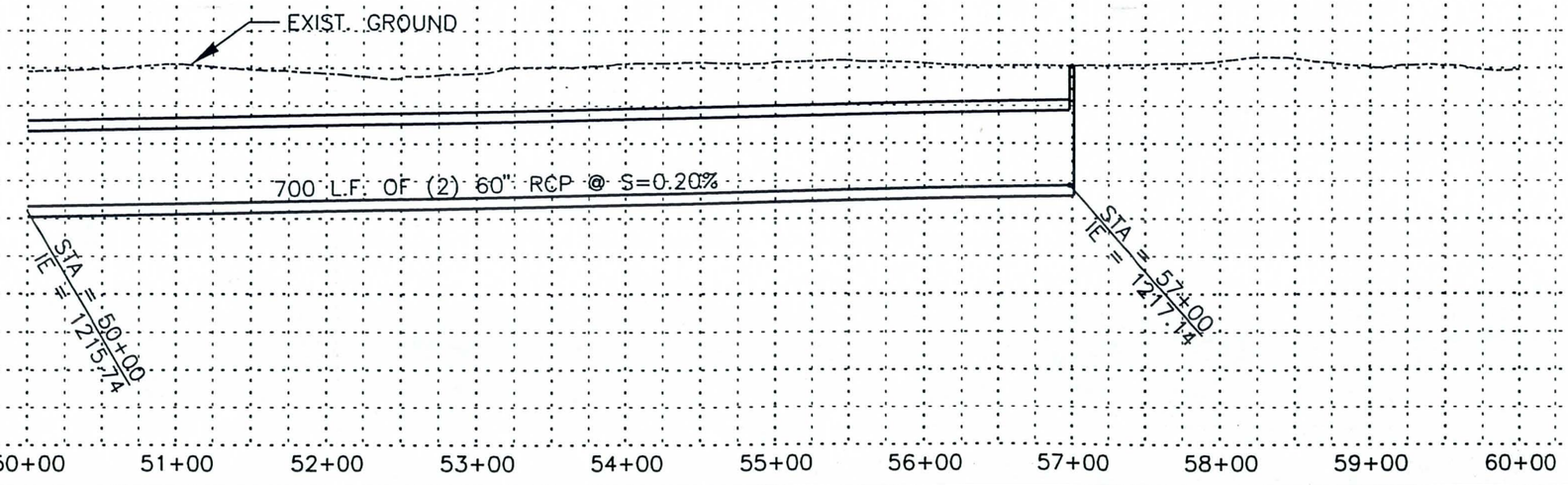

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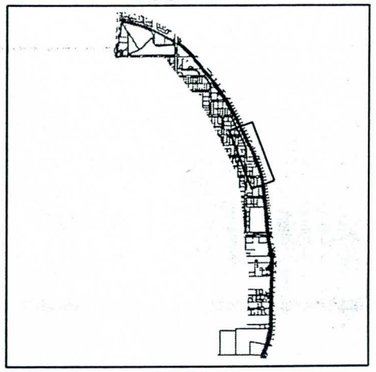

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PLANS CHK.	–	–

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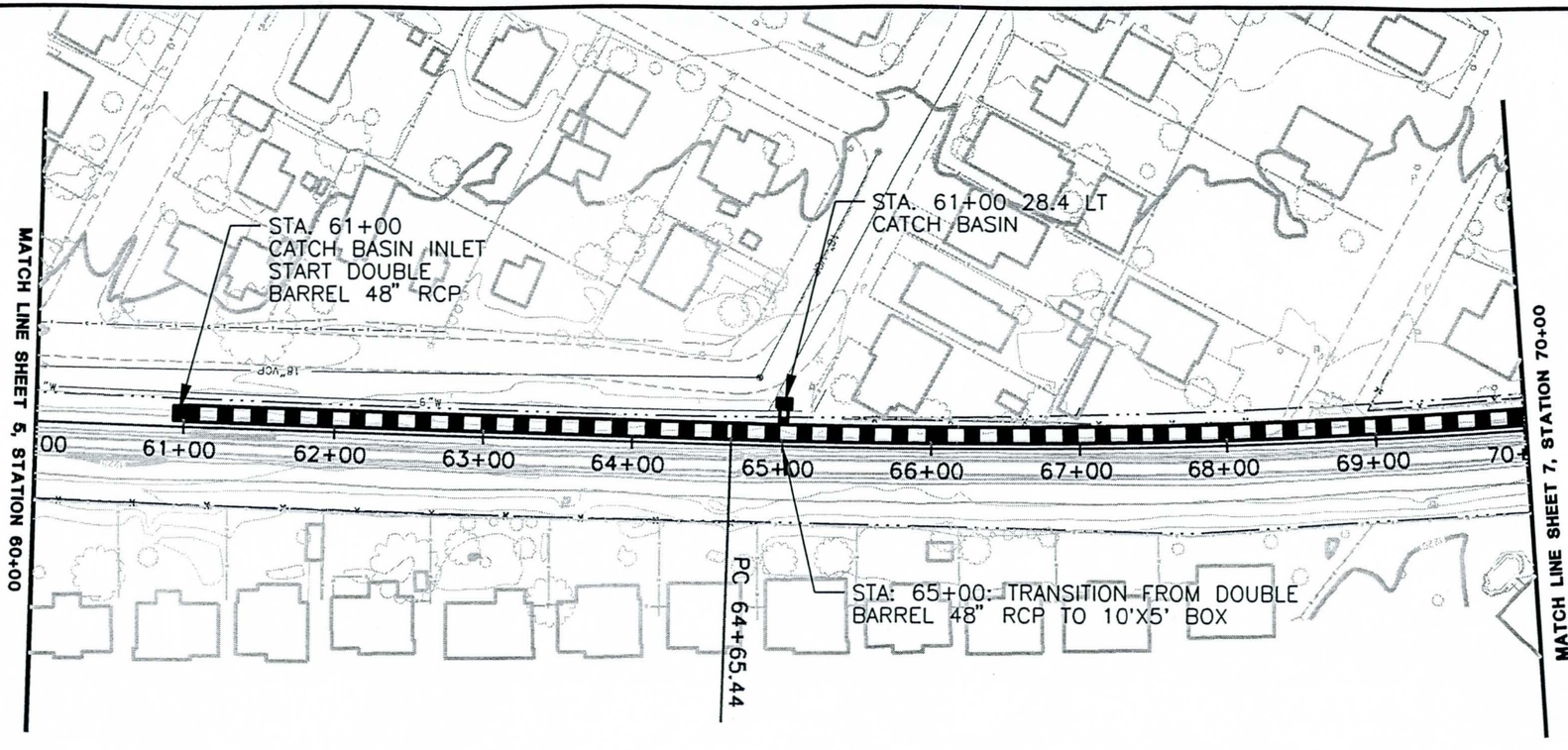

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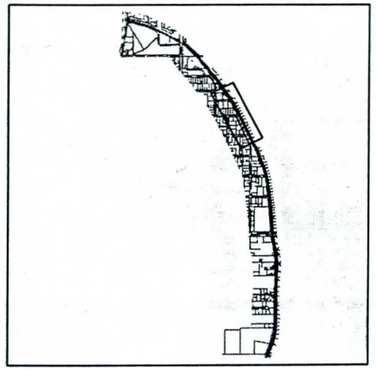

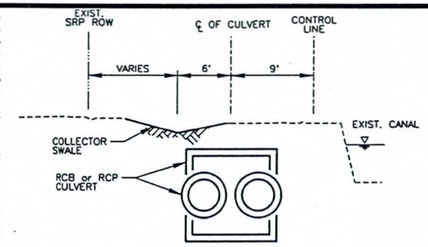

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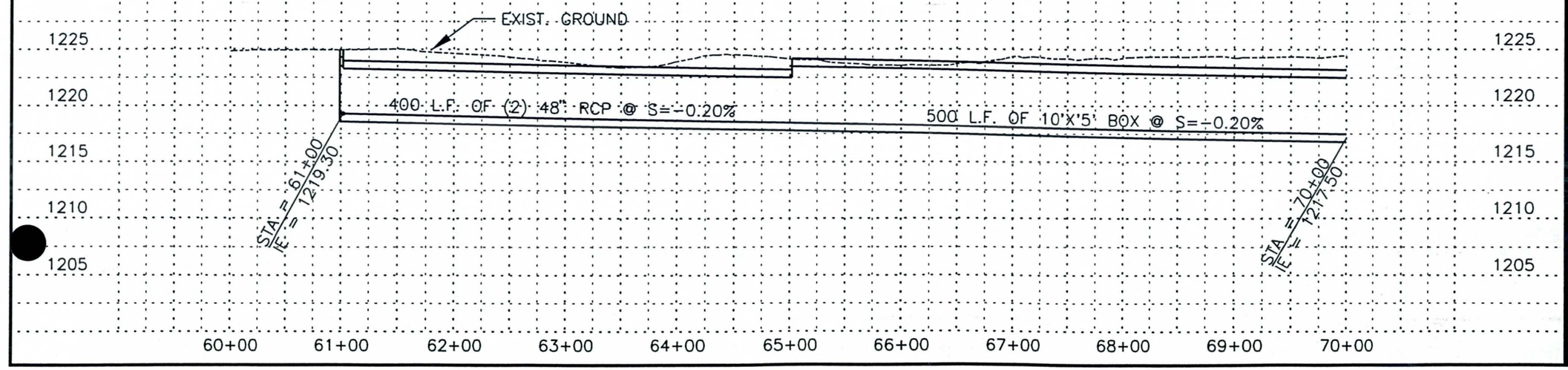

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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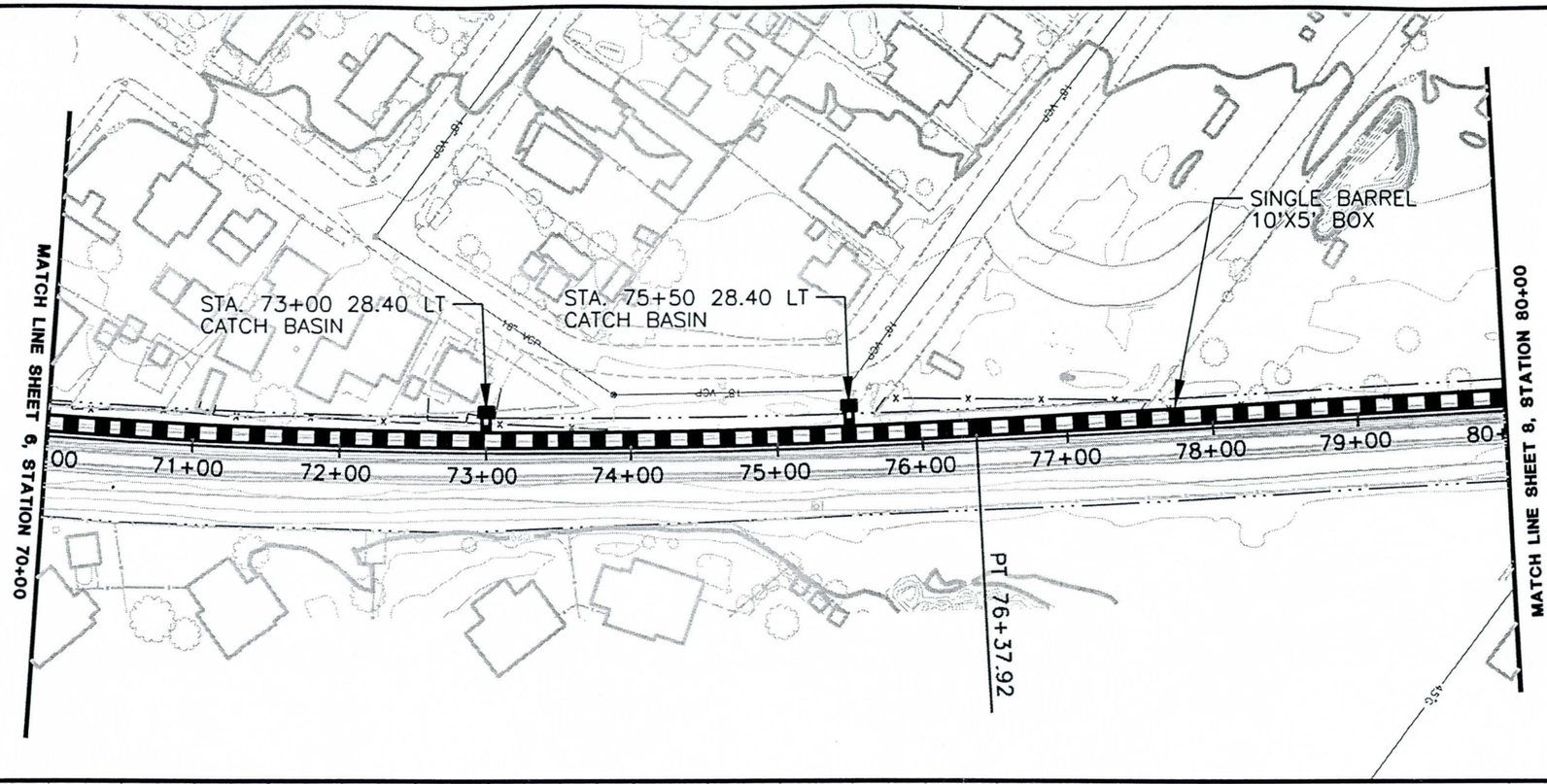
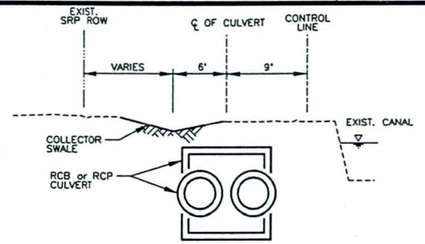
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 881-8272
FAX (602) 681-8338

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 3 SHEET OF





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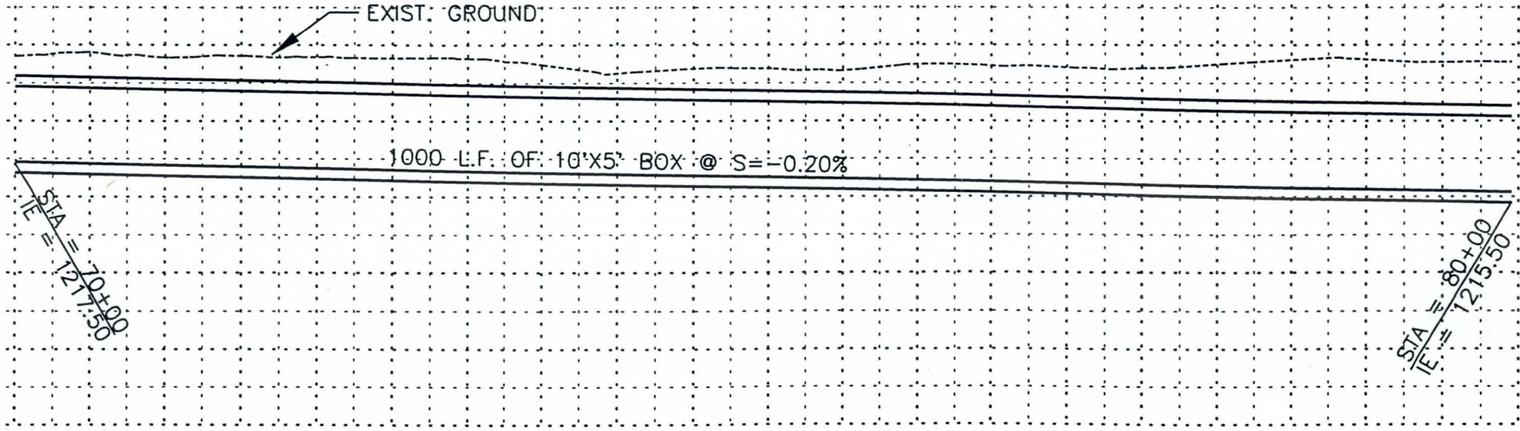

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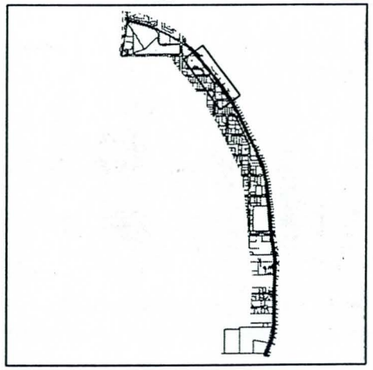

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PLANS	-	-
PLANS CHK.	-	-

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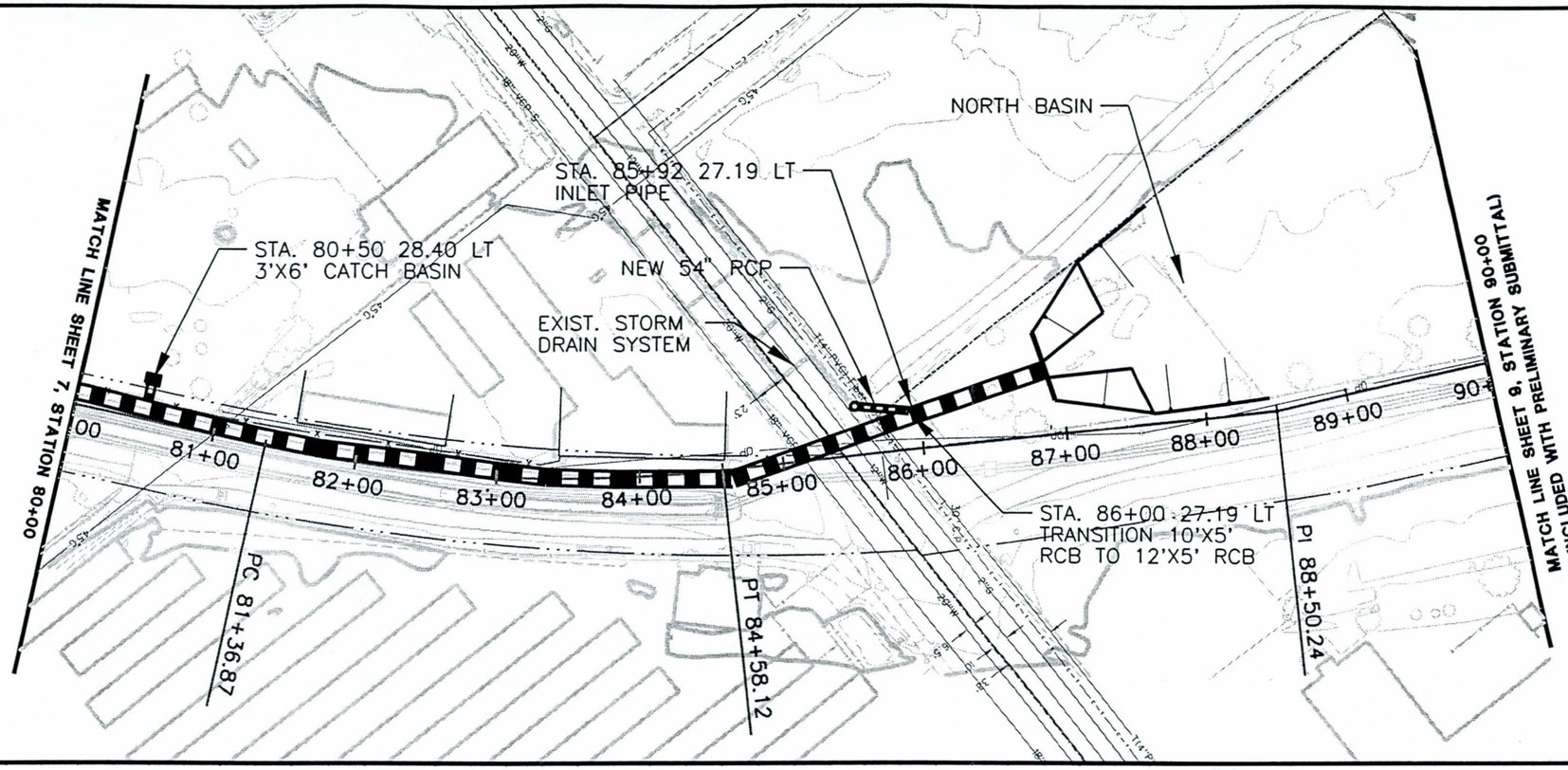

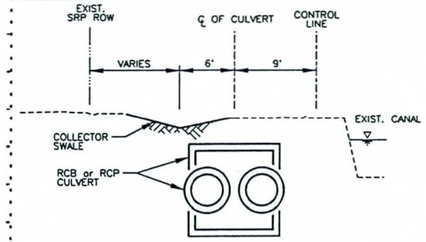

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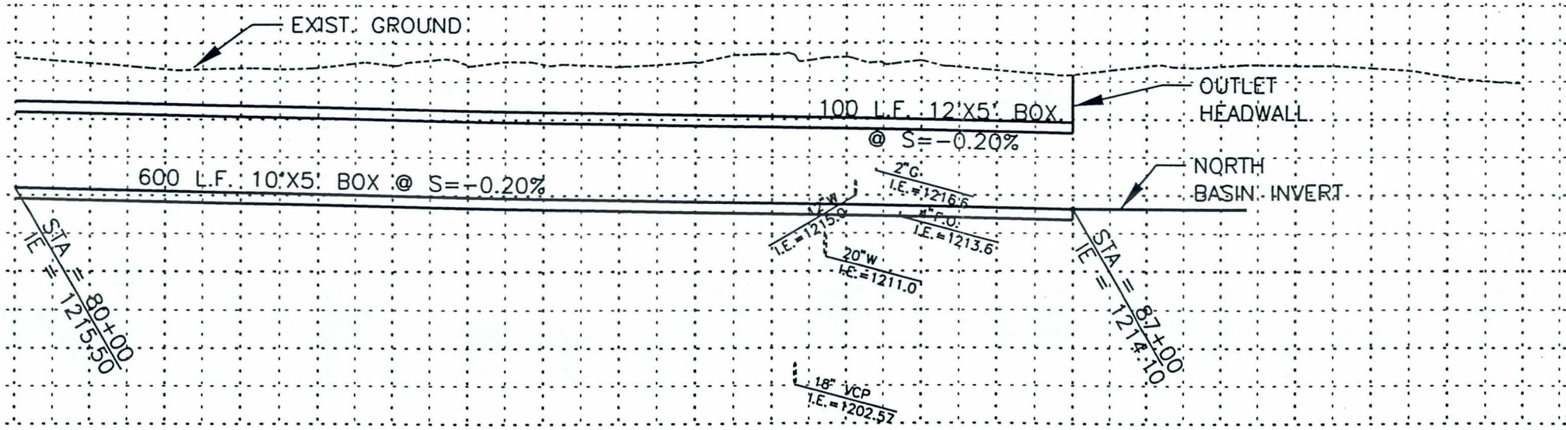

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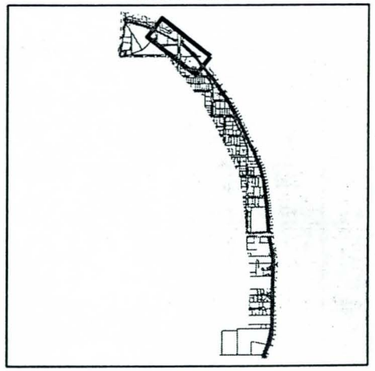

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FAX (602) 681-9339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 3 SHEET OF

Appendix G2

OPTION 3: Quantity and Cost Estimates

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 1 - OPTIONS 1, 2, AND 3						
	201-1	CLEARING AND GRUBBING	SY	1160	$0.30	$348.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$26,000.00	$26,000.00
	220-1	DUMPED RIPRAP	CY	30	$35.00	$1,050.00
	336-1	REMOVE AND REPLACE ASPHALT PAVEMENT	SY	110	$35.00	$3,850.00
	340-1	REMOVE AND REPLACE CURB, GUTTER, & SIDEWALK	SF	360	$5.00	$1,800.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMN	LS	1	$5,000.00	$5,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	500	$20.00	$10,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	2000	$1.00	$2,000.00
	430-2	PATH AND TRAIL	LF	800	$5.00	$4,000.00
	505-1	HEADWALLS w/ SAFETY RAILING	EA	2	$5,000.00	$10,000.00
	505-2	CONCRETE SPLASH PAD W/ END SILL	CY	20	$300.00	$6,000.00
	505-3	JUNCTION STRUCTURES	LS	1	$10,000.00	$10,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	0	$2,500.00	$0.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE)	EA	0	$5,000.00	$0.00
	610-1	VERTICAL REALIGNMENT OF 12" WATER (DIP W/ RSTN JNT	LF	60	$150.00	$9,000.00
	618-1	54" STORM DRAIN	LF	50	$150.00	$7,500.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	600	$600.00	$360,000.00
	618-3	CONCRETE BOX CULVERT 12'X5'	LF	100	$800.00	$80,000.00
	625-1	STORM DRAIN MANHOLE	EA	1	$5,000.00	$5,000.00
		CONSTRUCTION COST SUBTOTAL				$551,548.00
		CONSTRUCTION CONTIGENCY AT 20%				$110,309.60
		TOTAL CONSTRUCTION COST				$661,857.60
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0.00		$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$662,000.00**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY Revised 8-13-99 - wso
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 2 - OPTION 3						
	201-1	CLEARING AND GRUBBING	SY	3340	$0.30	$1,002.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$62,000.00	$62,000.00
	215-2	GRADER DITCH	LF	1500	$4.00	$6,000.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$2,000.00	$2,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	2100	$20.00	$42,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	42000	$1.00	$42,000.00
	430-2	PATH AND TRAIL	LF	2100	$5.00	$10,500.00
	505-3	JUNCTION STRUCTURES	EA	2	$15,000.00	$30,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	3	$2,500.00	$7,500.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE0	EA	6	$5,000.00	$30,000.00
	618-1	48" STORM DRAIN	LF	800	$180.00	$144,000.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	1500	$600.00	$900,000.00
	618-3	MISC CONNECTOR PIPES (18" TO 42")	LF	40	$100.00	$4,000.00
	625-1	STORMDRAIN MANHOLE	EA	4	$2,500.00	$10,000.00
		CONSTRUCTION COST SUBTOTAL				$1,301,002.00
		CONSTRUCTION CONTIGENCY AT 20%				$260,200.40
		TOTAL CONSTRUCTION COST				$1,561,202.40
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0		$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$1,561,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 3 - OPTION 3						
	201-1	CLEARING AND GRUBBING	SY	5130	$0.30	$1,539.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$42,000.00	$42,000.00
	215-2	GRADER DITCH	LF	1500	$4.00	$6,000.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$2,000.00	$2,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	1600	$20.00	$32,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	34000	$1.00	$34,000.00
	430-2	PATH AND TRAIL	LF	1700	$5.00	$8,500.00
	505-3	JUNCTION STRUCTURES	EA	1	$15,000.00	$15,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	3	$2,500.00	$7,500.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE0	EA	11	$5,000.00	$55,000.00
	618-1	60" STORM DRAIN	LF	2400	$200.00	$480,000.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	300	$600.00	$180,000.00
	618-3	MISC CONNECTOR PIPES (18" TO 54")	LF	40	$100.00	$4,000.00
	625-1	STORMDRAIN MANHOLE	EA	3	$2,500.00	$7,500.00
		CONSTRUCTION COST SUBTOTAL				$885,039.00
		CONSTRUCTION CONTIGENCY AT 20%				$177,007.80
		TOTAL CONSTRUCTION COST				$1,062,046.80
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0		$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$1,062,000.00**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY Revised 8-13-99 - wso
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

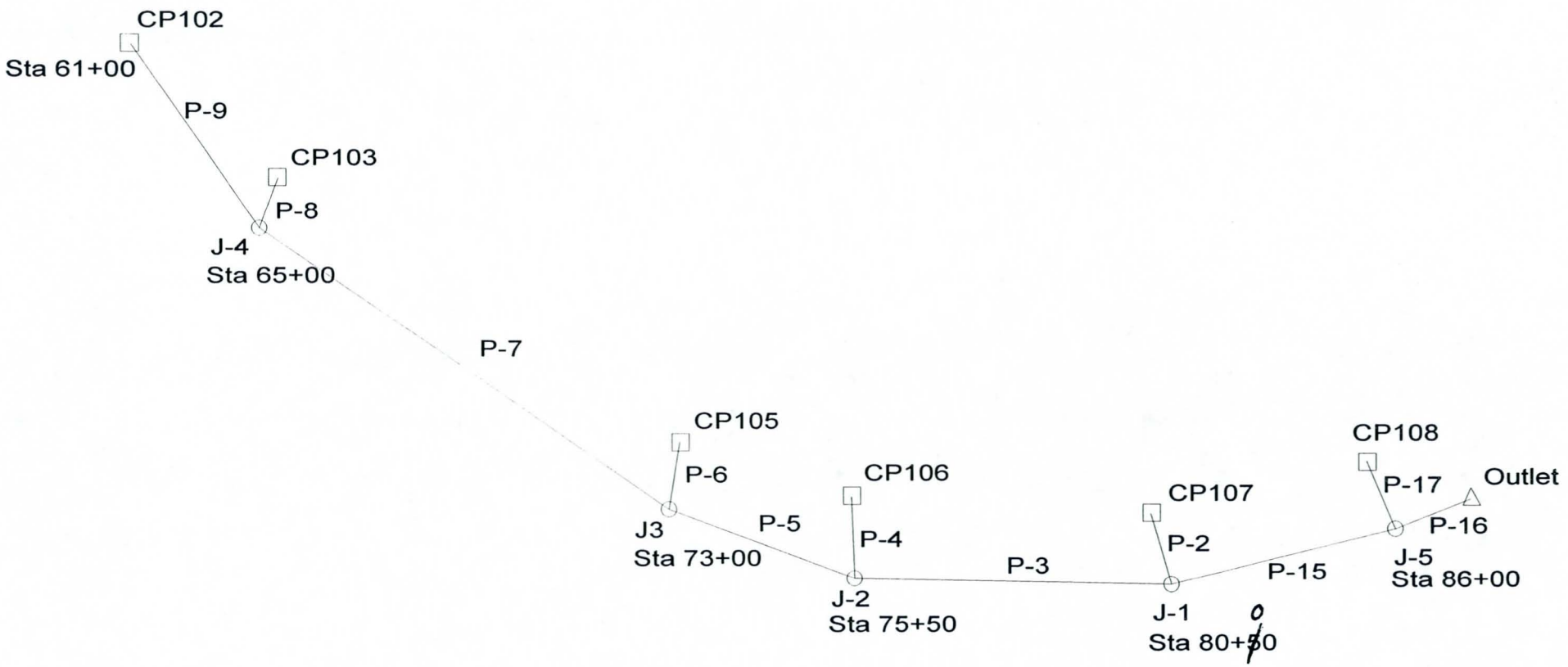
NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 4 - OPTION 3						
	201-1	CLEARING AND GRUBBING	SY	5570	$0.30	$1,671.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$144,000.00	$144,000.00
	215-2	GRADER DITCH	LF	2100	$4.00	$8,400.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$2,000.00	$2,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	1900	$20.00	$38,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	42000	$1.00	$42,000.00
	430-2	PATH AND TRAIL	LF	2100	$5.00	$10,500.00
	505-3	JUNCTION STRUCTURES	EA	1	$15,000.00	$15,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	3	$2,500.00	$7,500.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE0	EA	11	$5,000.00	$55,000.00
	618-2	CONCRETE BOX CULVERT, DBL BARREL 8'X5'	LF	2150	$900.00	$1,935,000.00
	618-3	MISC CONNECTOR PIPES (24" TO 36")	LF	40	$100.00	$4,000.00
	625-1	STORMDRAIN MANHOLE	EA	3	$2,500.00	$7,500.00
	9999	REACH 5 STORM DRAIN	LS	1	$740,910.00	$740,910.00
		CONSTRUCTION COST SUBTOTAL				$3,021,481.00
		CONSTRUCTION CONTIGENCY AT 20%				$604,296.20
		TOTAL CONSTRUCTION COST				$3,625,777.20
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0		$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$3,626,000.00**

Appendix G3

OPTION 3: Supporting Hydraulic Calculations

OPTIONS 3 & 4

Reaches 1 & 2

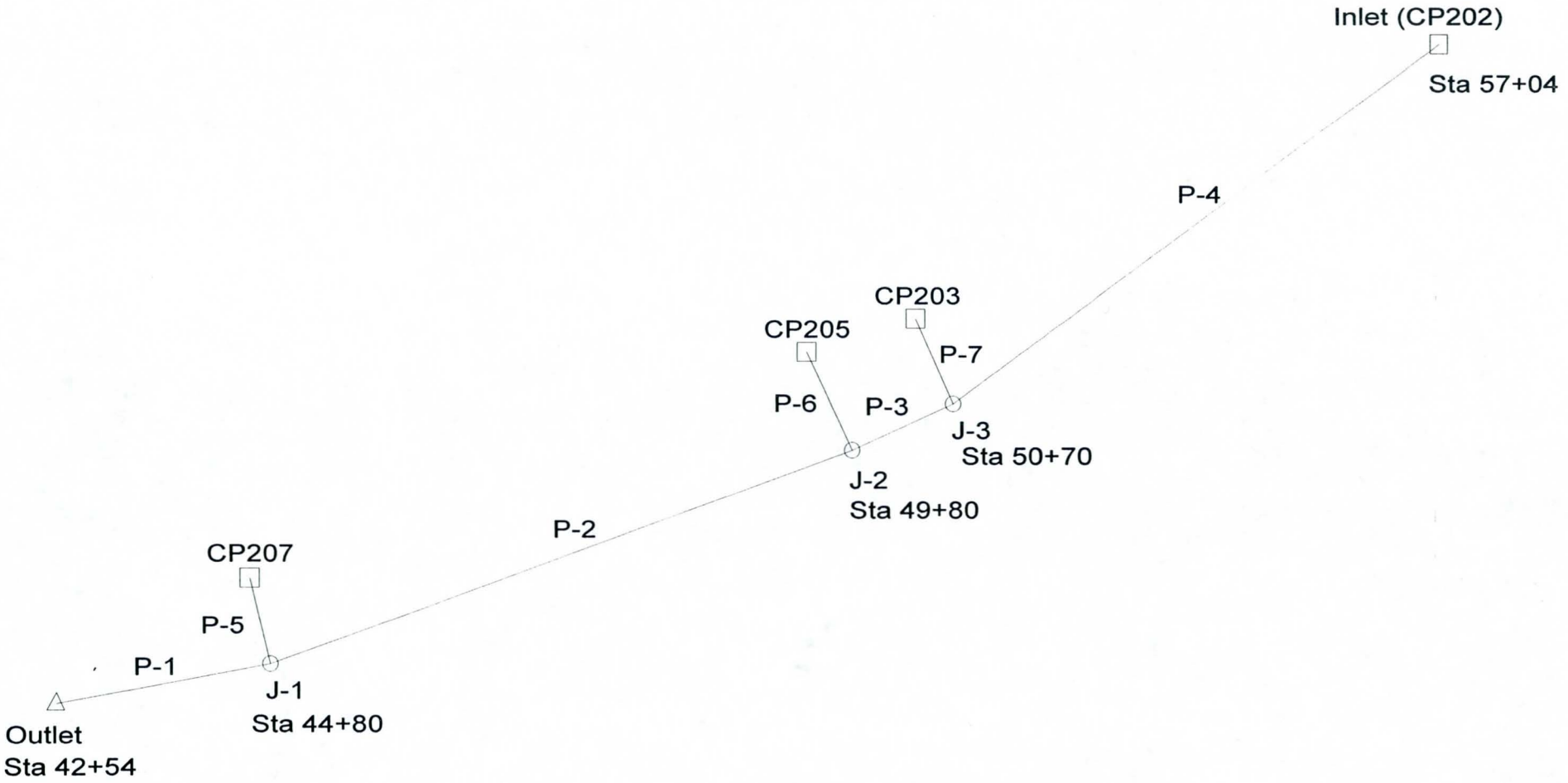


OPTIONS 3 & 4
Reaches 1 & 2

Pipe	Node Upstream Downstream	Section Shape Size	Number Sections	Section Discharge Capacity (cfs)	Roughness	Average Velocity (ft/s)	Length (ft)	Invert Upstream Downstream (ft)	Ground Upstream Downstream (ft)	Cover Upstream Downstream (ft)	HGL Upstream Downstream (ft)	Slope Energy Constructed (ft/ft)
P-17	CP108	Circular	1	98	0.015	6.16	50	1214.8	1,223.00	3.7	1,219.82	0.003307
	J-5	54 inch		170.42				1214.3	1,223.00	4.2	1,219.65	0.01
P-2	CP107	Circular	1	8	0.015	4.53	10	1215.9	1,223.40	6	1,221.12	0.007723
	J-1	18 inch		20.36				1215.4	1,223.40	6.5	1,221.05	0.05
P-4	CP106	Circular	1	152	0.015	12.1	10	1216.9	1,222.00	1.1	1,222.25	0.014909
	J-2	48 inch		278.35				1216.4	1,223.70	3.3	1,222.10	0.05
P-6	CP105	Circular	1	9	0.015	5.09	10	1217.4	1,223.00	4.1	1,222.36	0.009774
	J3	18 inch		20.36				1216.9	1,224.00	5.6	1,222.26	0.05
P-8	CP103	Circular	1	27	0.015	3.82	10	1219.0	1,222.90	0.9	1,222.36	0.002182
	J-4	36 inch		129.25				1218.5	1,224.00	2.5	1,222.34	0.05
P-9	CP102	Circular	2	104	0.015	4.27	400	1219.3	1,223.50	0.2	1,222.93	0.001518
	J-4	48 inch		111.34				1218.5	1,224.00	1.5	1,222.34	0.002
P-7	J-4	Box	2	131	0.015	1.51	800	1218.5	1,224.00	0.5	1,222.32	0.000087
	J3	10 x 5 ft		622.76				1216.9	1,224.00	2.1	1,222.26	0.002
P-5	J3	Box	1	140	0.015	2.8	250	1216.9	1,224.00	2.1	1,222.20	0.000404
	J-2	10 x 5 ft		311.38				1216.4	1,223.70	2.3	1,222.10	0.002
P-3	J-2	Box	1	292	0.015	5.84	450	1216.4	1,223.70	2.3	1,221.84	0.001759
	J-1	10 x 5 ft		311.38				1215.5	1,223.40	2.9	1,221.05	0.002
P-15	J-1	Box	1	300	0.015	6	600	1215.5	1,223.40	2.9	1,220.77	0.001857
	J-5	10 x 5 ft		311.38				1214.3	1,223.00	3.7	1,219.65	0.002
P-16	J-5	Box	1	398	0.015	6.63	100	1214.3	1,223.00	3.7	1,219.31	0.002103
	Outlet	12 x 5 ft		388.17				1214.1	1,223.00	3.9	1,219.10	0.002

OPTION 3 & 4

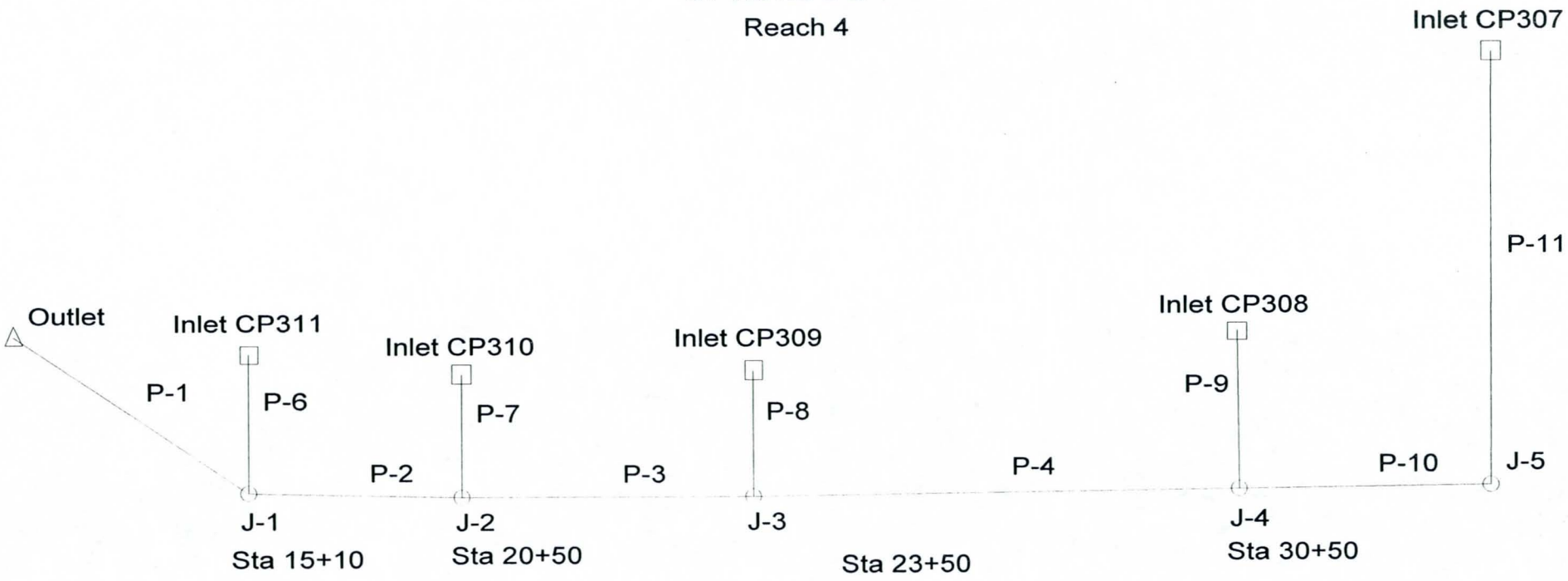
Reach 3



OPTIONS 3 & 4
Reach 3

Pipe	Node Upstream Downstream	Section Shape Size	Number Sections	Section Discharge Capacity (cfs)	Roughness	Average Velocity (ft/s)	Length (ft)	Invert Upstream Downstream (ft)	Ground Upstream Downstream (ft)	Cover Upstream Downstream (ft)	HGL Upstream Downstream (ft)	Slope Energy Constructed (ft/ft)
P-5	CP207	Circular	1	151	0.015	9.49	28	1215.00	1,224.50	5	1,220.73	0.007851
	J-1	54 inch		187.79				1214.66	1,225.00	5.84	1,220.51	0.012143
P-6	CP205	Circular	2	115	0.015	3.62	28	1216.00	1,224.50	4	1,221.99	0.001138
	J-2	54 inch		352.8				1215.70	1,225.00	4.8	1,221.96	0.010714
P-7	CP203	Circular	1	11	0.015	3.5	33	1216.00	1,223.80	5.8	1,222.21	0.003148
	J-3	24 inch		11.82				1215.88	1,225.00	7.12	1,222.11	0.003636
P-4	Inlet (CP202)	Circular	2	122	0.013	3.11	630	1217.14	1,224.50	2.36	1,222.45	0.000549
	J-3	60 inch		232.93				1215.88	1,225.00	4.12	1,222.11	0.002
P-3	J-3	Circular	2	133	0.013	3.39	90	1215.88	1,225.00	4.12	1,222.02	0.000652
	J-2	60 inch		232.93				1215.70	1,225.00	4.3	1,221.96	0.002
P-2	J-2	Circular	2	248	0.013	6.32	500	1215.70	1,225.00	4.3	1,221.65	0.002267
	J-1	60 inch		237.55				1214.66	1,225.00	5.34	1,220.51	0.00208
P-1	J-1	Box	1	399	0.015	7.98	280	1214.66	1,225.00	5.34	1,220.02	0.003284
	Outlet	10 x 5 ft		311.38				1214.10	1,225.00	5.9	1,219.10	0.002

OPTIONS 3 & 4
Reach 4

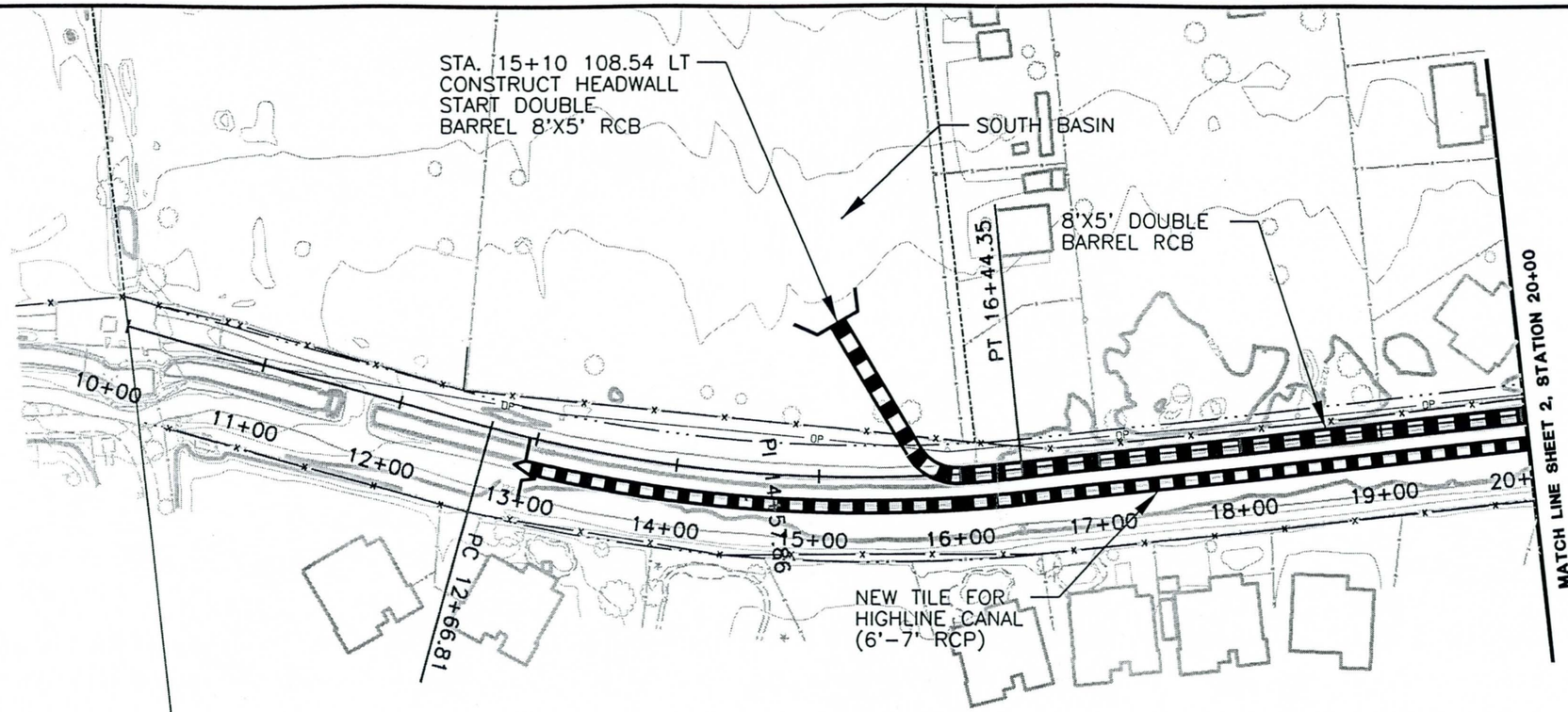


OPTIONS 3 & 4
Reach 4

Pipe	Node Upstream Downstream	Section Shape Size	Number Sections	Section Discharge Capacity (cfs)	Roughness	Average Velocity (ft/s)	Length (ft)	Invert Upstream Downstream (ft)	Ground Upstream Downstream (ft)	Cover Upstream Downstream (ft)	HGL Upstream Downstream (ft)	Slope Energy Constructed (ft/ft)
P-6	Inlet CP311	Circular	1	28	0.015	5.7	30	1215.50	1,225.00	7	1,220.48	0.006205
	J-1	30 inch		51.51				1214.87	1,225.00	7.63	1,220.30	0.021
P-7	Inlet CP310	Circular	1	49	0.015	9.98	28	1216.25	1,225.00	6.25	1,221.77	0.019002
	J-2	30 inch		58.18				1215.50	1,225.00	7	1,221.24	0.026786
P-11	Inlet CP307	Box	1	386	0.013	9.44	210	1219.91	1,226.00	1.09	1,223.94	0.002328
	J-5	10 x 5 ft		403.6				1219.38	1,225.00	0.62	1,223.53	0.002524
P-10	J-5	Box	2	386	0.013	5.55	550	1219.38	1,225.00	0.62	1,223.23	0.000886
	J-4	8 x 5 ft		610.41				1218.00	1,225.00	2	1,222.99	0.002509
P-9	Inlet CP308	Circular	1	15	0.015	4.77	30	1219.18	1,225.00	3.82	1,223.16	0.005854
	J-4	24 inch		38.88				1218.00	1,225.00	5	1,222.99	0.039333
P-4	J-4	Box	2	401	0.015	5.13	700	1218.00	1,225.00	2	1,222.77	0.001395
	J-3	8 x 5 ft		528.07				1216.25	1,225.00	3.75	1,221.84	0.0025
P-8	Inlet CP309	Circular	1	71	0.015	10.04	30	1217.00	1,225.00	5	1,222.29	0.015088
	J-3	36 inch		91.39				1216.25	1,225.00	5.75	1,221.84	0.025
P-3	J-3	Box	2	472	0.015	5.9	300	1216.25	1,225.00	3.75	1,221.84	0.001997
	J-2	8 x 5 ft		528.07				1215.50	1,225.00	4.5	1,221.24	0.0025
P-2	J-2	Box	2	521	0.015	6.51	250	1215.50	1,225.00	4.5	1,220.91	0.002434
	J-1	8 x 5 ft		530.17				1214.87	1,225.00	5.13	1,220.30	0.00252
P-1	J-1	Box	2	549	0.015	6.86	345	1214.87	1,225.00	5.13	1,219.93	0.002702
	Outlet	8 x 5 ft		530.36				1214.00	1,225.00	6	1,219.00	0.002522

Appendix H1

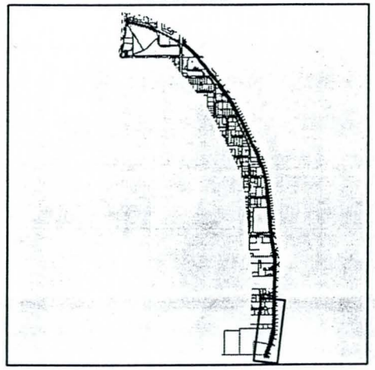
OPTION 4: Plan and Profile Sheets



LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



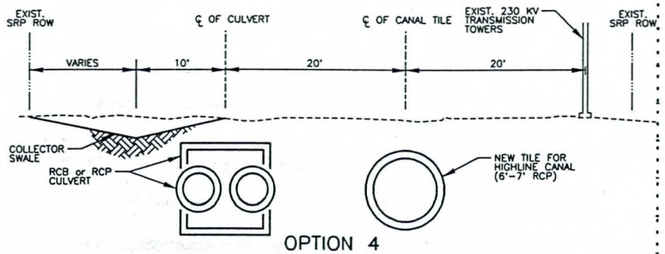
N

100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

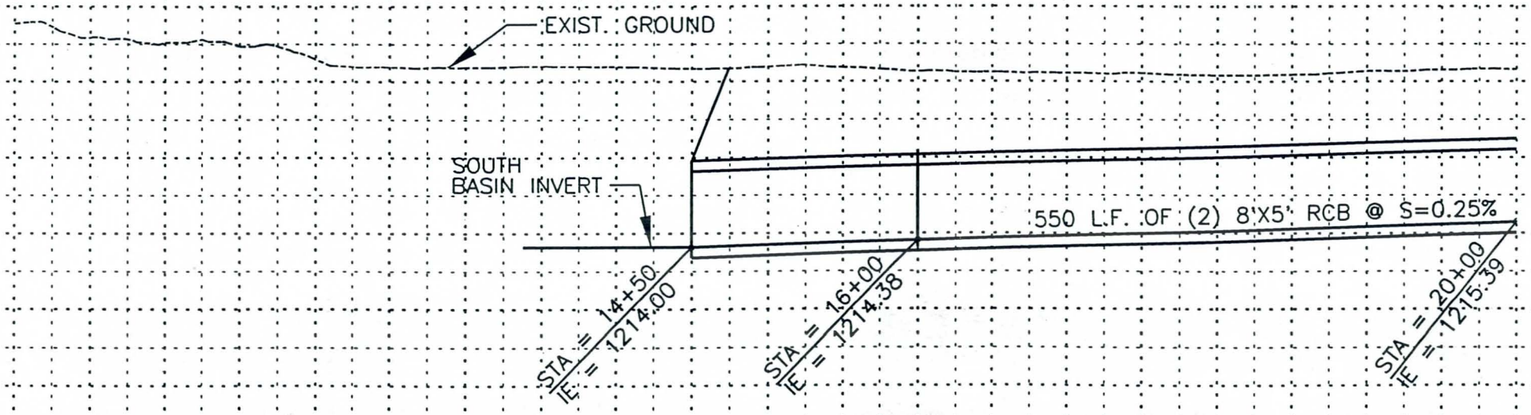
NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30



OPTION 4
TYPICAL SECTION

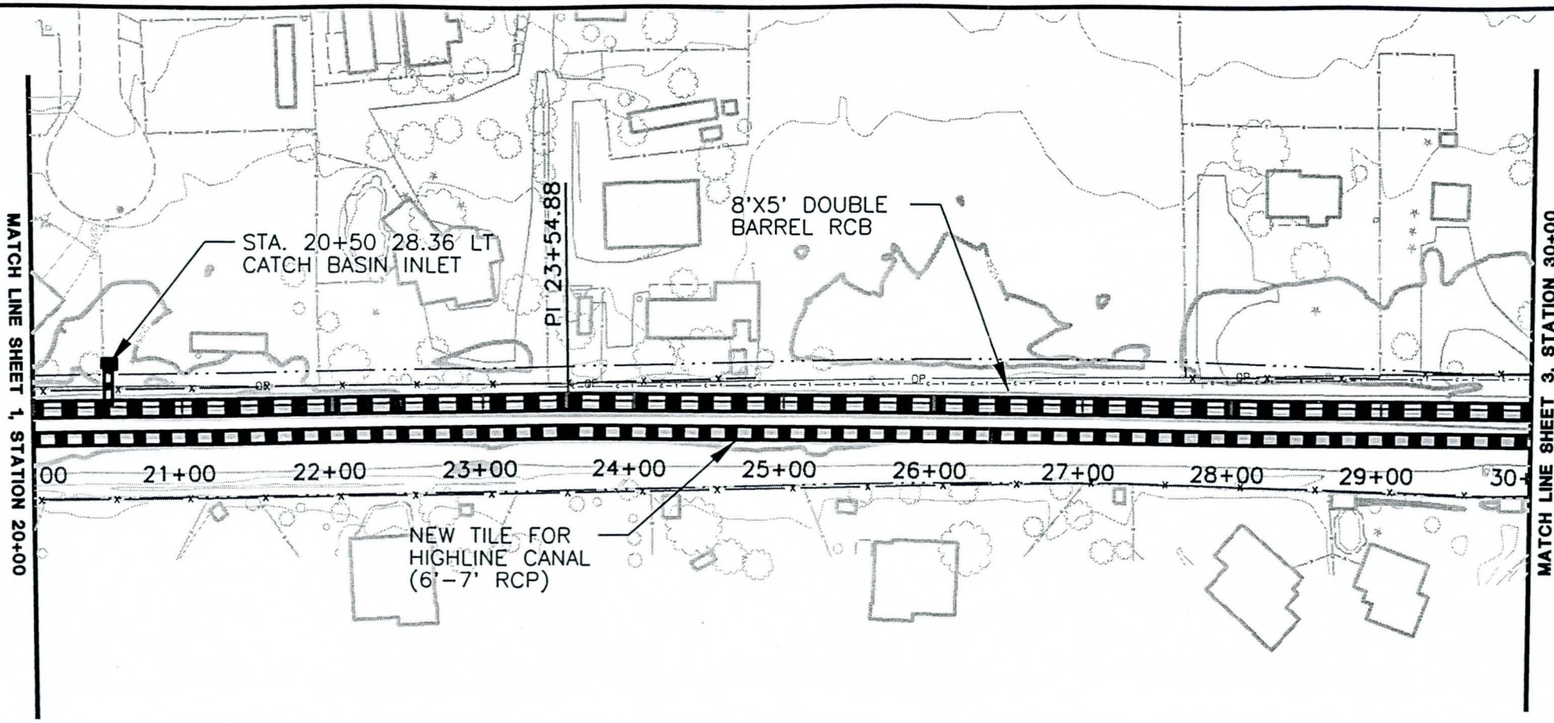


PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255, PHOENIX, AZ. 85008 602-687-2121 FAX (602) 681-9339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

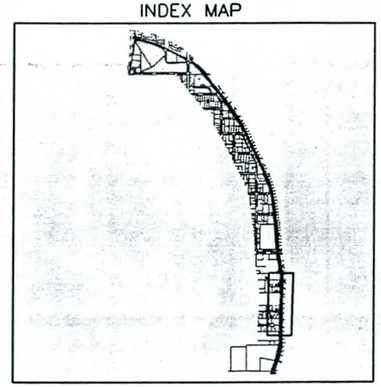
OPTION 4 SHEET OF

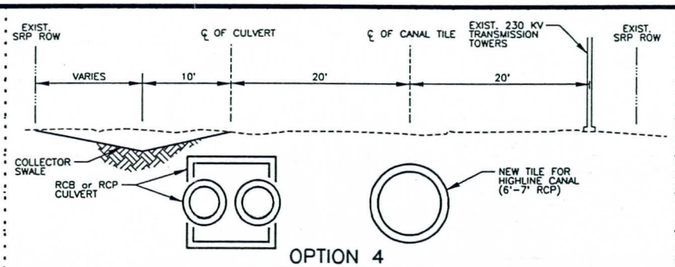


LEGEND

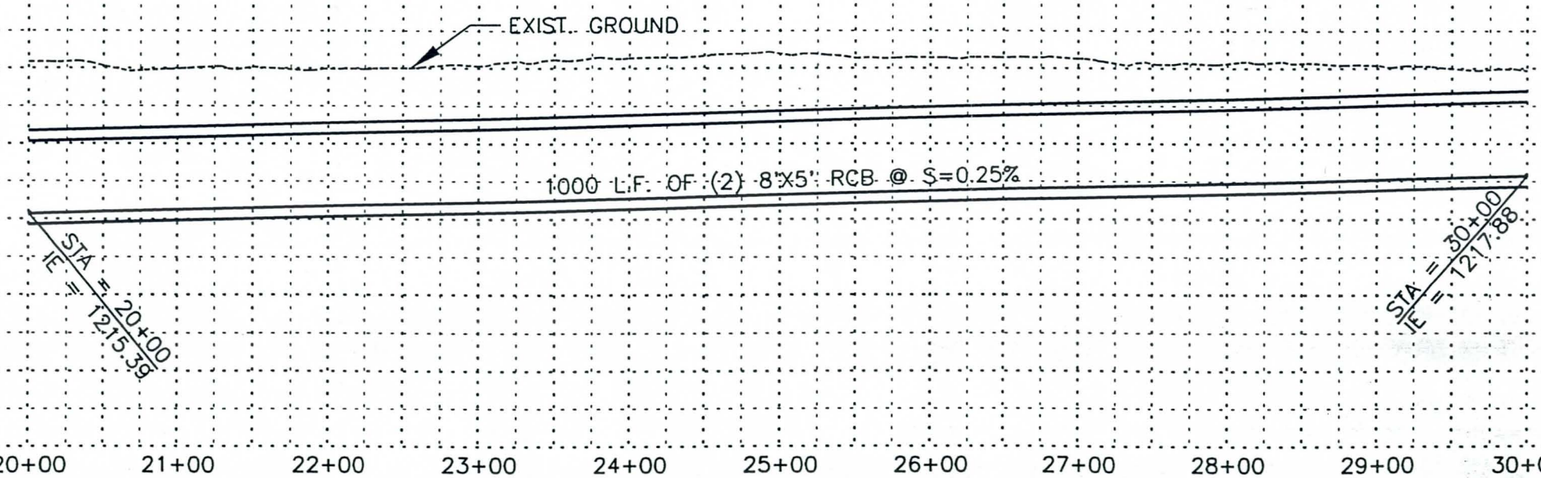
- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP





OPTION 4
TYPICAL SECTION



100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

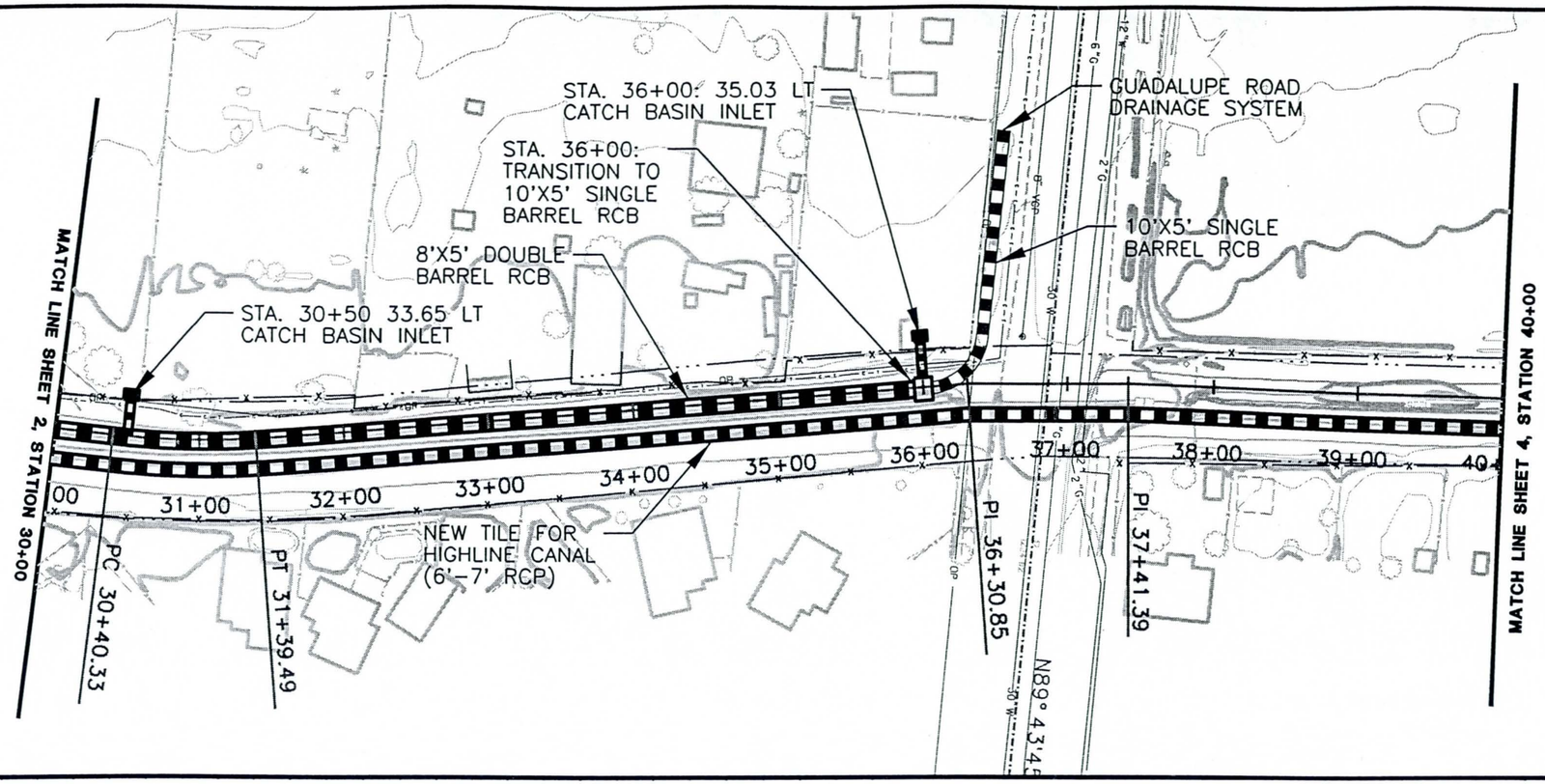
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

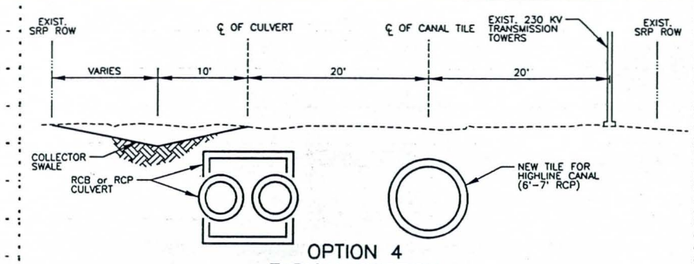
PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ 85008 602-957-2727
FAX (602) 581-9339

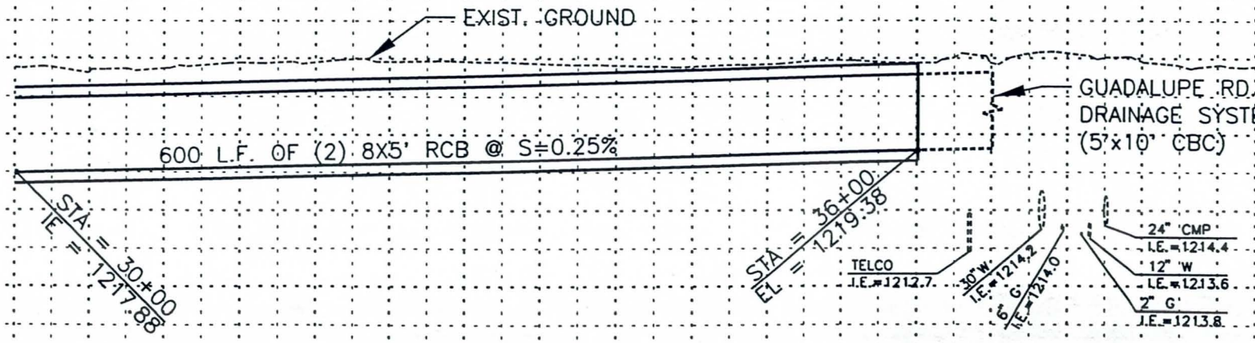
	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 4 SHEET OF





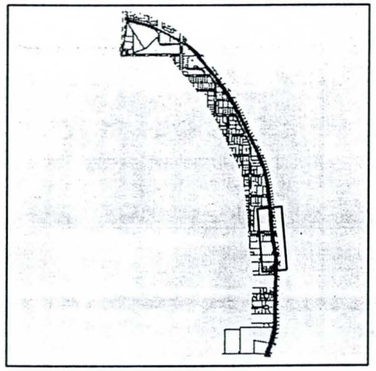
OPTION 4
TYPICAL SECTION



LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST. BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



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CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

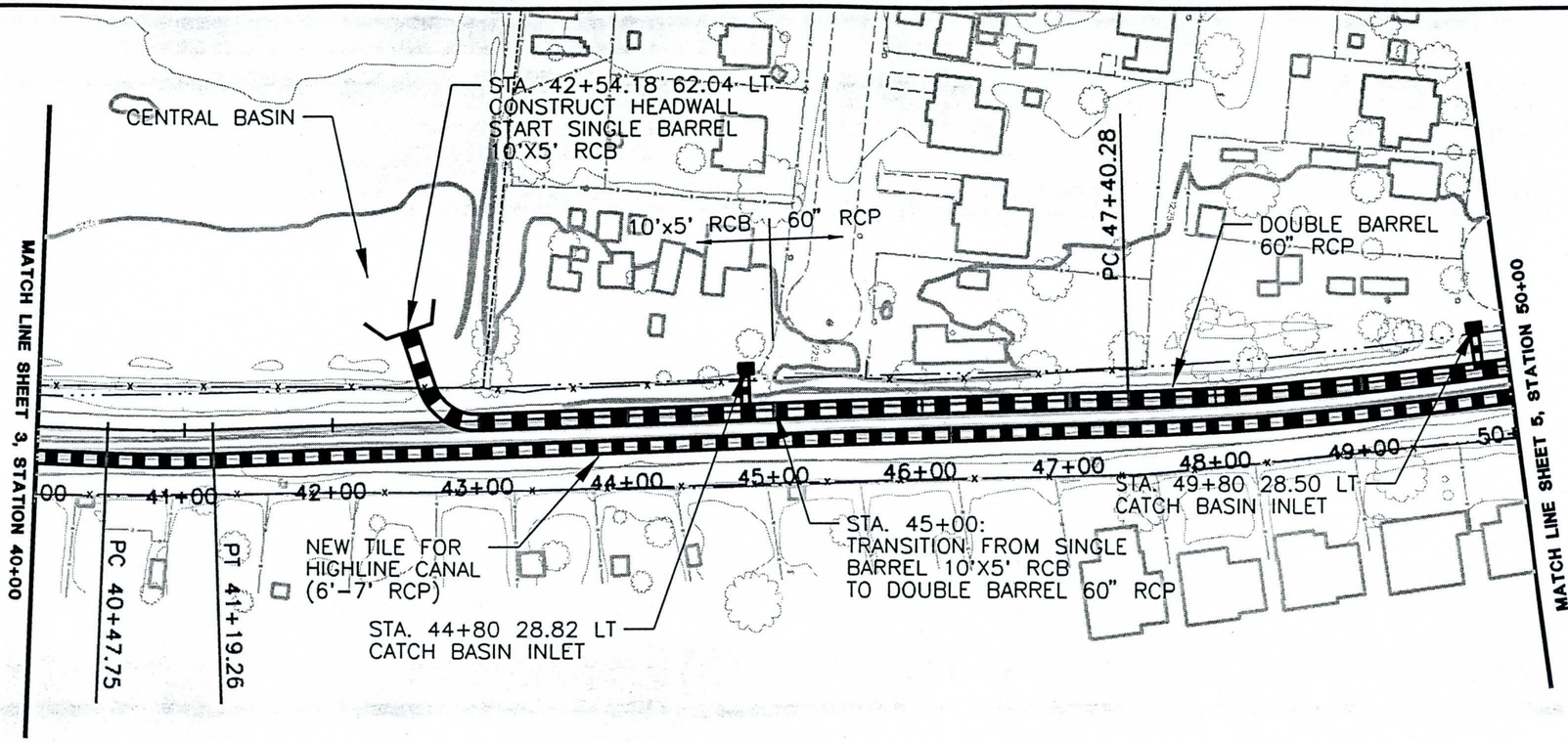
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

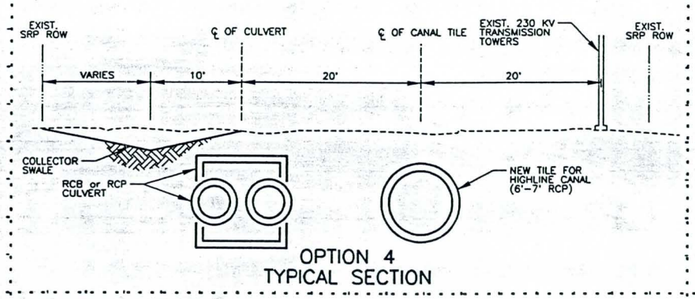
PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 881-8272
FAX (602) 881-8339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 4 SHEET OF





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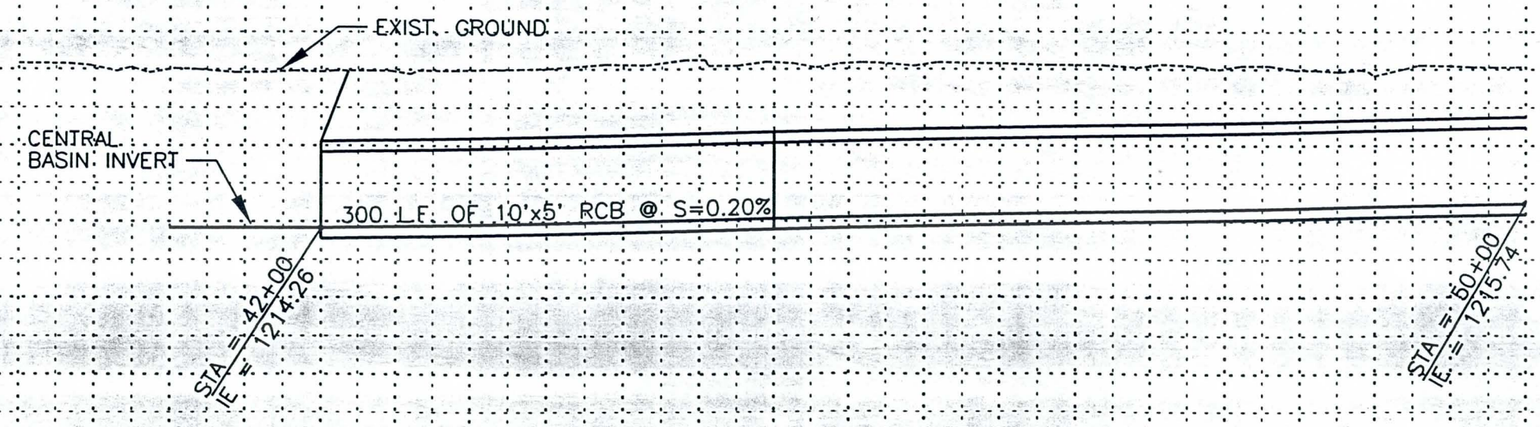
TYPICAL SECTION



LEGEND

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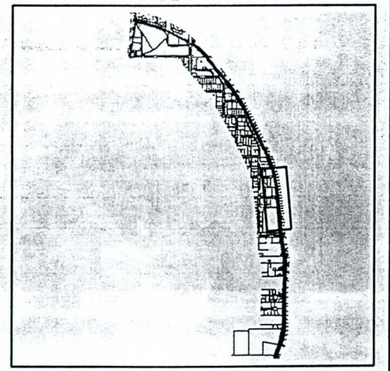


100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

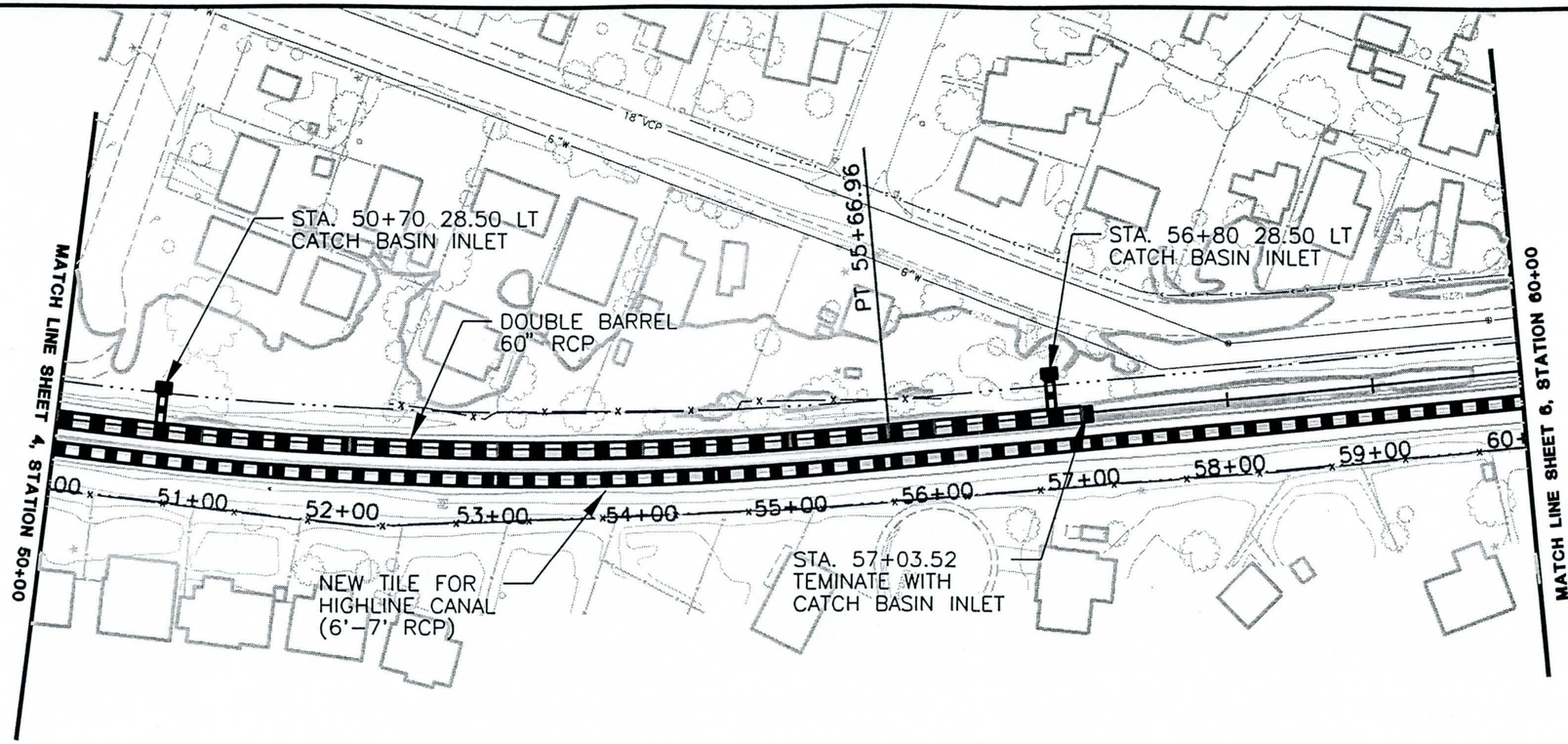
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

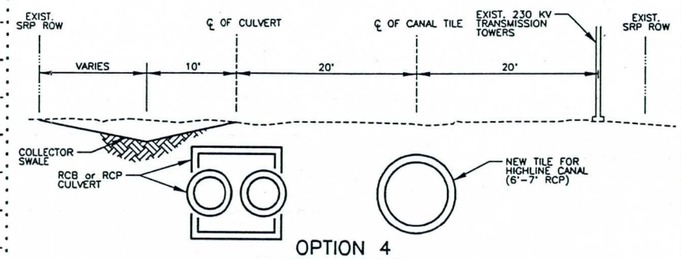
PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 250
PHOENIX, AZ. 85008 (602) 957-9272
FAX (602) 681-9339

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

OPTION 4 SHEET OF





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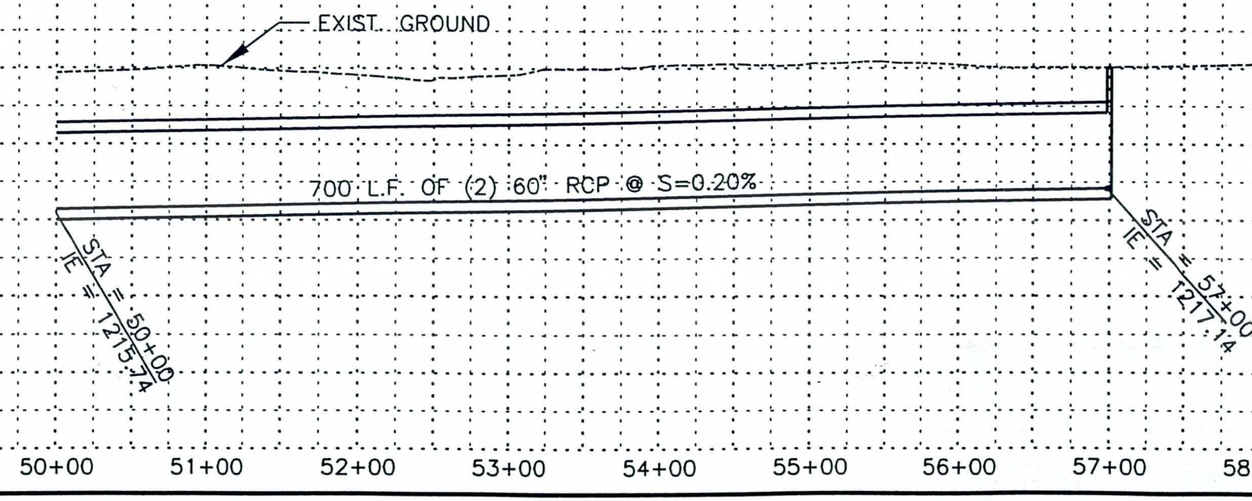
TYPICAL SECTION



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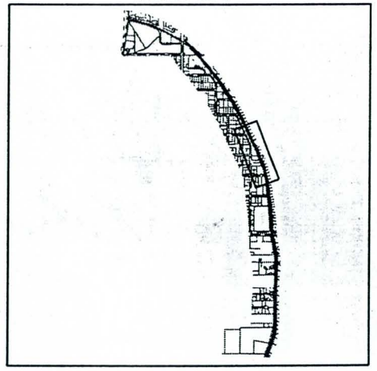

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SCALE: 1" = 100 FEET
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FLIGHT DATES:

NO.	REVISION	BY	DATE
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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY
NOT FOR
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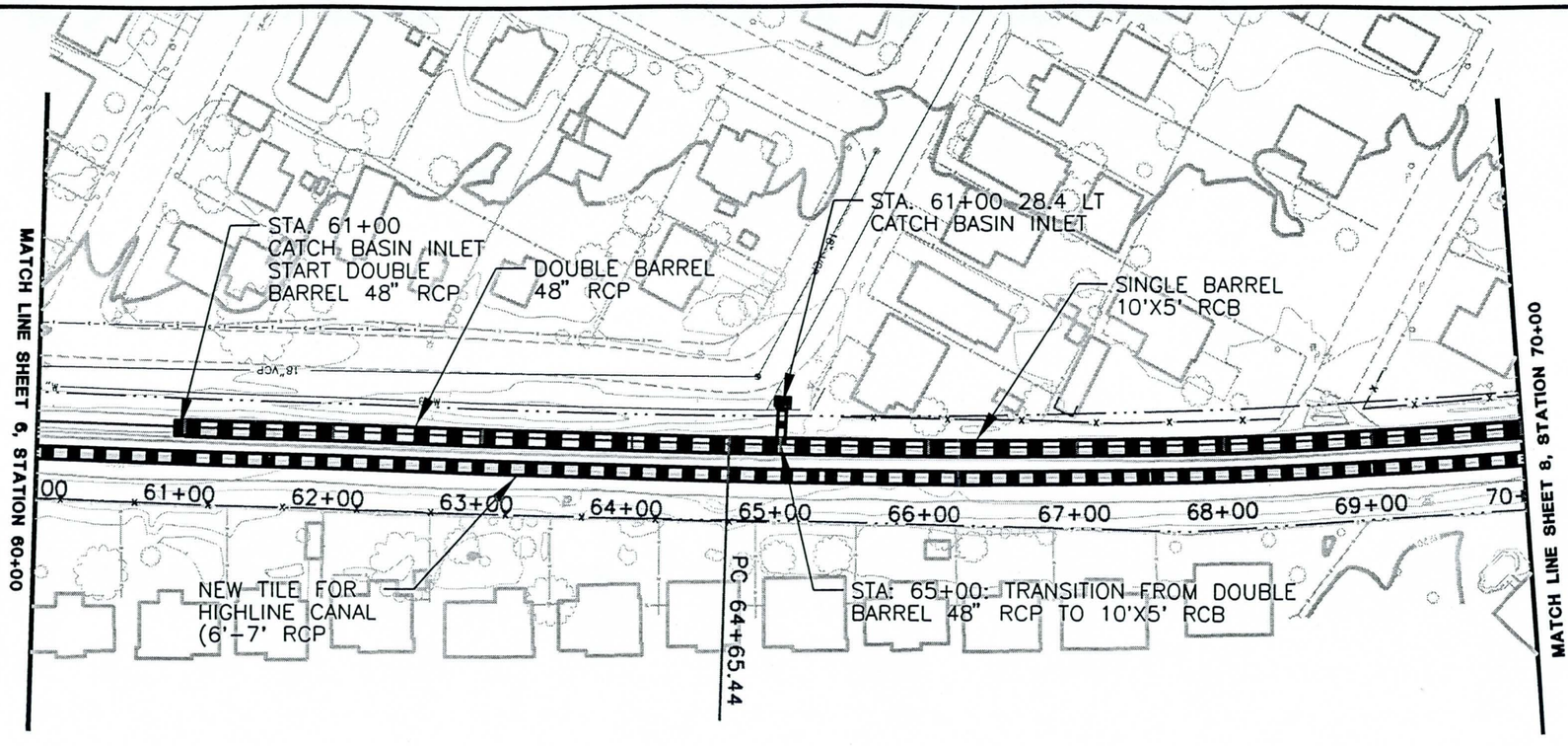
PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 602-687-8772
FAX (602) 681-6339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 4 SHEET OF



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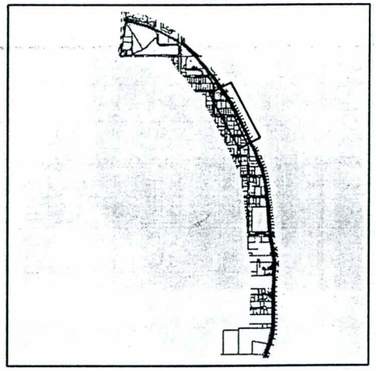
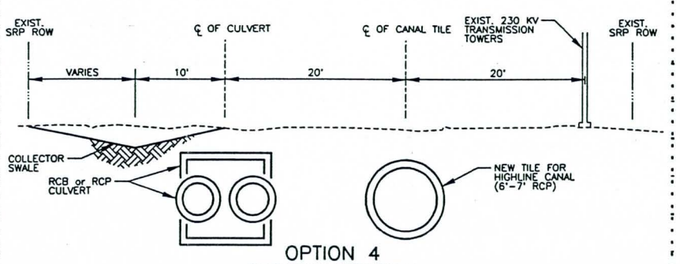
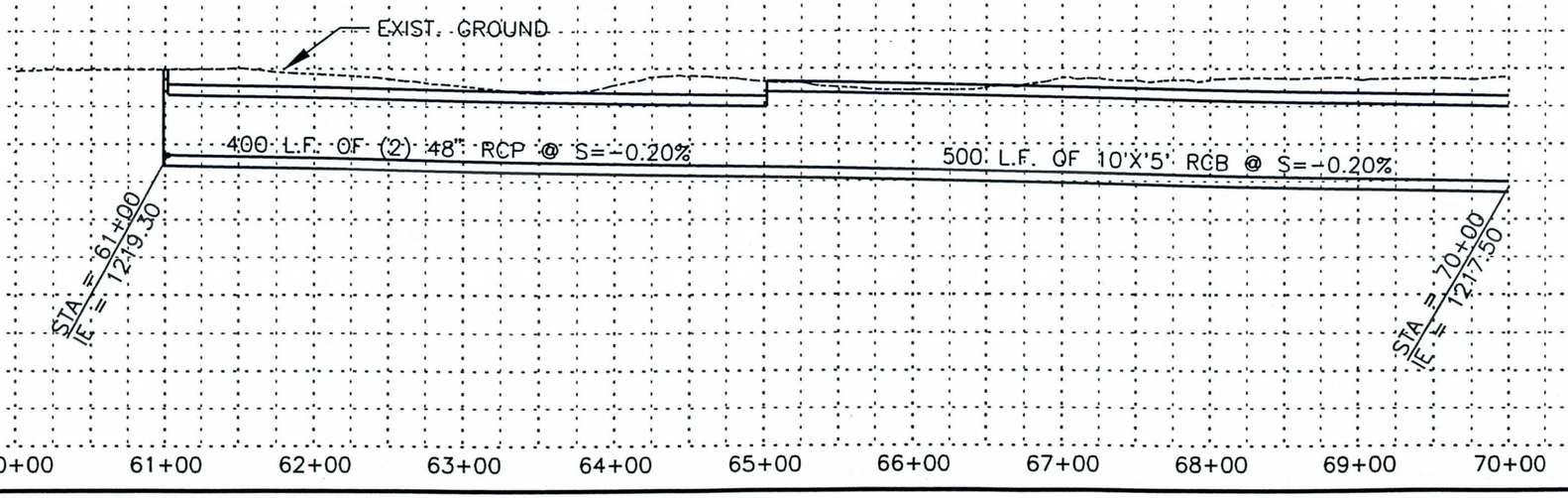




OPTION 4
TYPICAL SECTION



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

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PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 881-8272
FAX (602) 881-8339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

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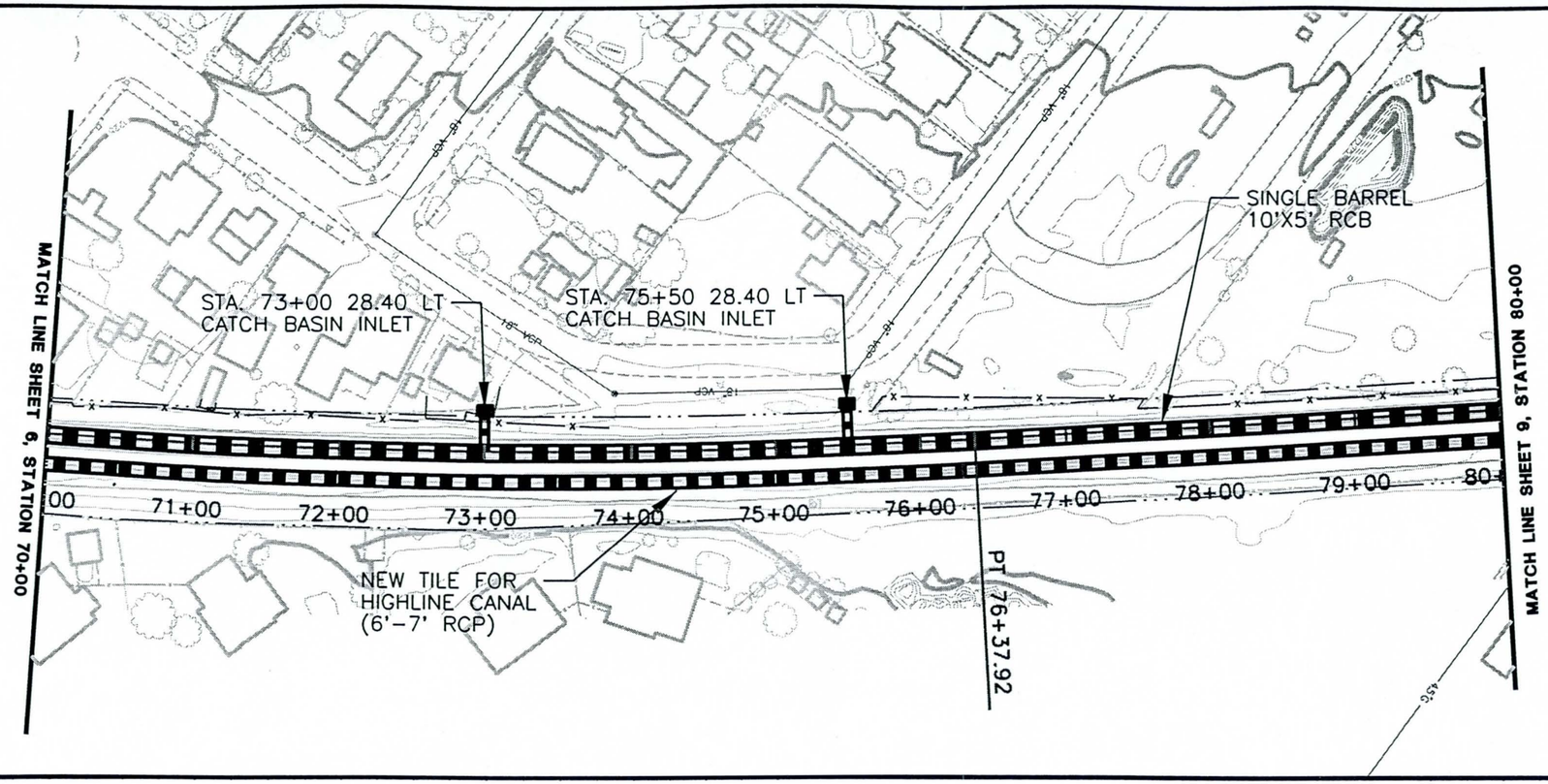

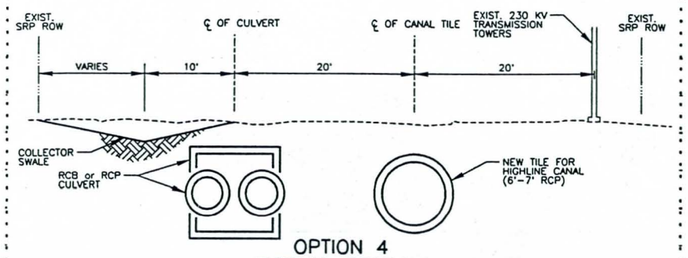

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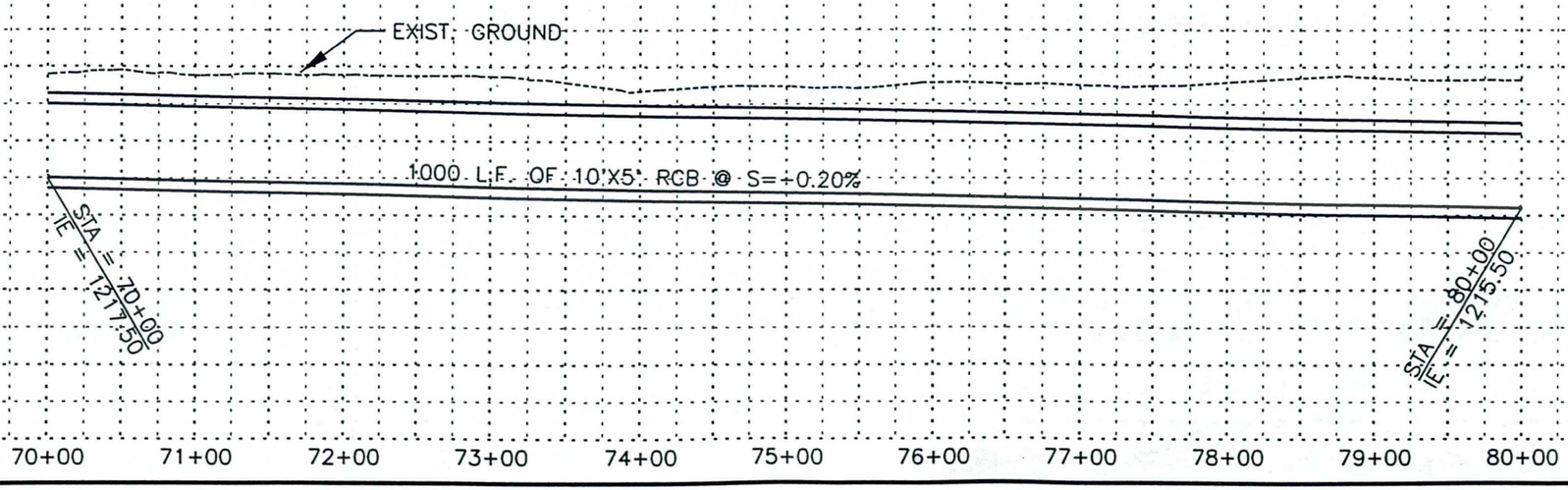

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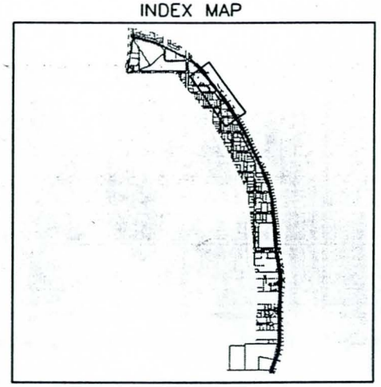

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

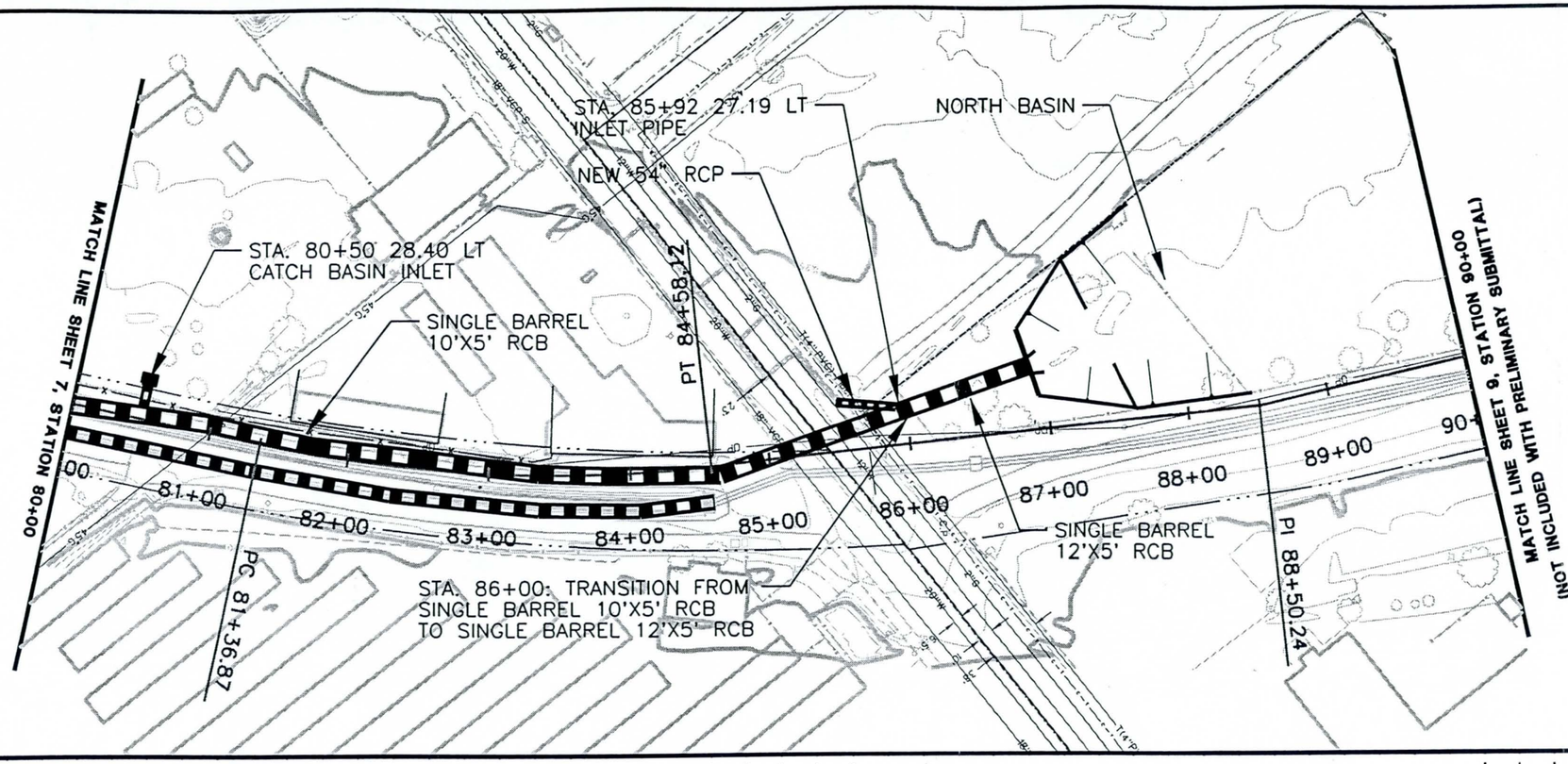
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 (602) 681-8372
FAX (602) 681-8329

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 4 SHEET OF



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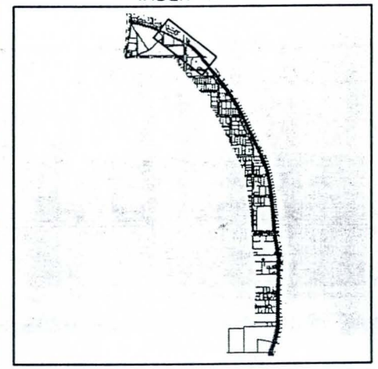
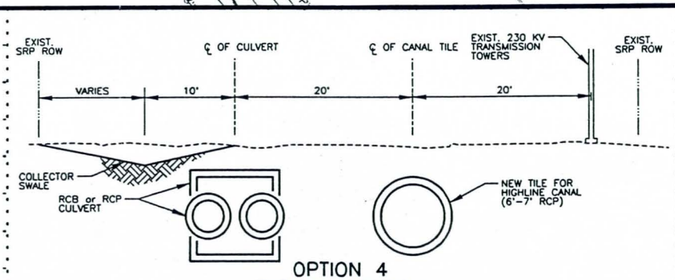
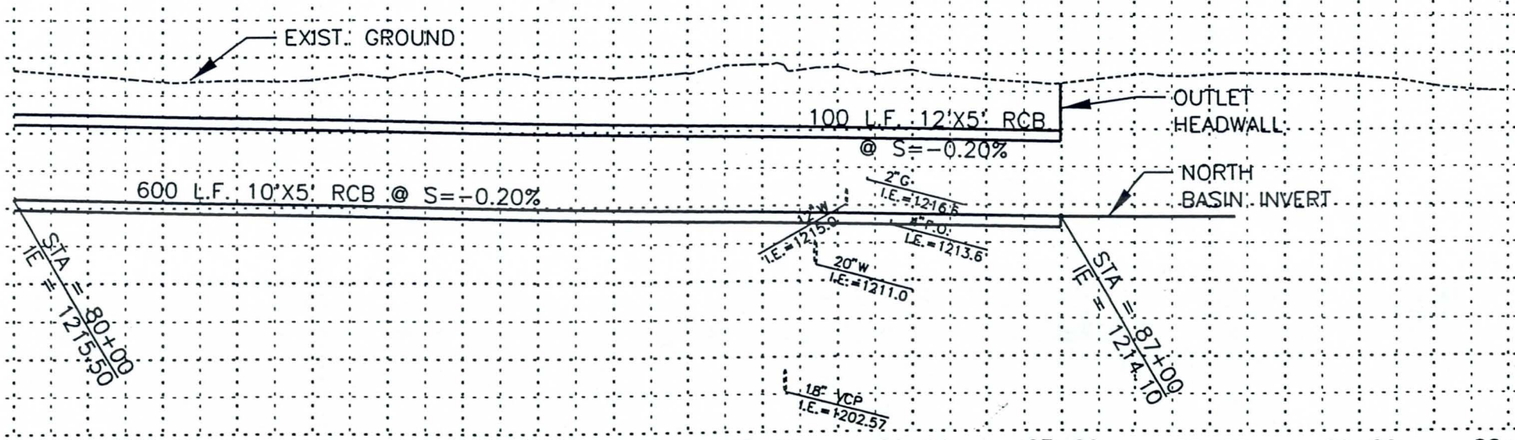




OPTION 4
TYPICAL SECTION



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FLIGHT DATES:

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 481-9272
FAX (602) 681-9339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 4 SHEET OF

Appendix H2

OPTION 4: Quantity and Cost Estimates

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

Revised 8-13-99 - wso

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 1 - OPTIONS 4 AND 5						
	201-1	CLEARING AND GRUBBING	SY	1160	$0.30	$348.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$34,000.00	$34,000.00
	220-1	DUMPED RIPRAP	CY	30	$35.00	$1,050.00
	336-1	REMOVE AND REPLACE ASPHALT PAVEMENT	SY	110	$35.00	$3,850.00
	340-1	REMOVE AND REPLACE CURB, GUTTER, & SIDEWALK	SF	360	$5.00	$1,800.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMN	LS	1	$5,000.00	$5,000.00
	350-2	DEMO, RMVL, AND DSPSL OF EX CANAL LINING & STRCTS	LS	1	$5,000.00	$5,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	500	$20.00	$10,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	2000	$1.00	$2,000.00
	430-2	PATH AND TRAIL	LF	800	$5.00	$4,000.00
	505-1	HEADWALLS w/ SAFETY RAILING	EA	2	$5,000.00	$10,000.00
	505-2	ENERGY DISSIPATION STRUCTURE	LS	1	$10,000.00	$10,000.00
	505-3	JUNCTION STRUCTURES	LS	1	$10,000.00	$10,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	0	$2,500.00	$0.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE)	EA	0	$5,000.00	$0.00
	610-1	WATER VERTICAL RELOCATION (12")	EA	1	$15,000.00	$15,000.00
	618-1	54" STORM DRAIN	LF	50	$150.00	$7,500.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	600	$600.00	$360,000.00
	618-3	CONCRETE BOX CULVERT 12'X5'	LF	100	$800.00	$80,000.00
	625-1	STORM DRAIN MANHOLE	EA	1	$5,000.00	$5,000.00
	999-1	TILING OF HIGHLINE CANAL	LF	800	$180.00	$144,000.00
		CONSTRUCTION COST SUBTOTAL				$718,548.00
		CONSTRUCTION CONTIGENCY AT 20%				$143,709.60
		TOTAL CONSTRUCTION COST				$862,257.60
		ROW/PROPERTY ACQUISITION	AC	0.00	$30,000.00	$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$862,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 2 - OPTION 4						
	201-1	CLEARING AND GRUBBING	SY	3340	$0.30	$1,002.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$83,000.00	$83,000.00
	215-2	GRADER DITCH	LF	1500	$4.00	$6,000.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$5,000.00	$5,000.00
	350-2	DEMO, RMVL, AND DSPSL OF EX CANAL LINING & STRCTS	LS	1	$5,000.00	$5,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	2100	$20.00	$42,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	84000	$1.00	$84,000.00
	430-2	PATH AND TRAIL	LF	2100	$5.00	$10,500.00
	505-3	JUNCTION STRUCTURES	EA	2	$15,000.00	$30,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	3	$2,500.00	$7,500.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE0	EA	6	$5,000.00	$30,000.00
	618-1	48" STORM DRAIN	LF	800	$180.00	$144,000.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	1500	$600.00	$900,000.00
	618-3	MISC CONNECTOR PIPES (18" TO 42")	LF	40	$100.00	$4,000.00
	625-1	STORMDRAIN MANHOLE	EA	4	$2,500.00	$10,000.00
	999-1	TILING OF HIGHLINE CANAL	LF	2100	$180.00	$378,000.00
		CONSTRUCTION COST SUBTOTAL				$1,750,002.00
		CONSTRUCTION CONTIGENCY AT 20%				$350,000.40
		TOTAL CONSTRUCTION COST				$2,100,002.40
		ROW/PROPERTY ACQUISITION	AC	0	$30,000.00	$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$2,100,000.00**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY Revised 8-13-99 - wso
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

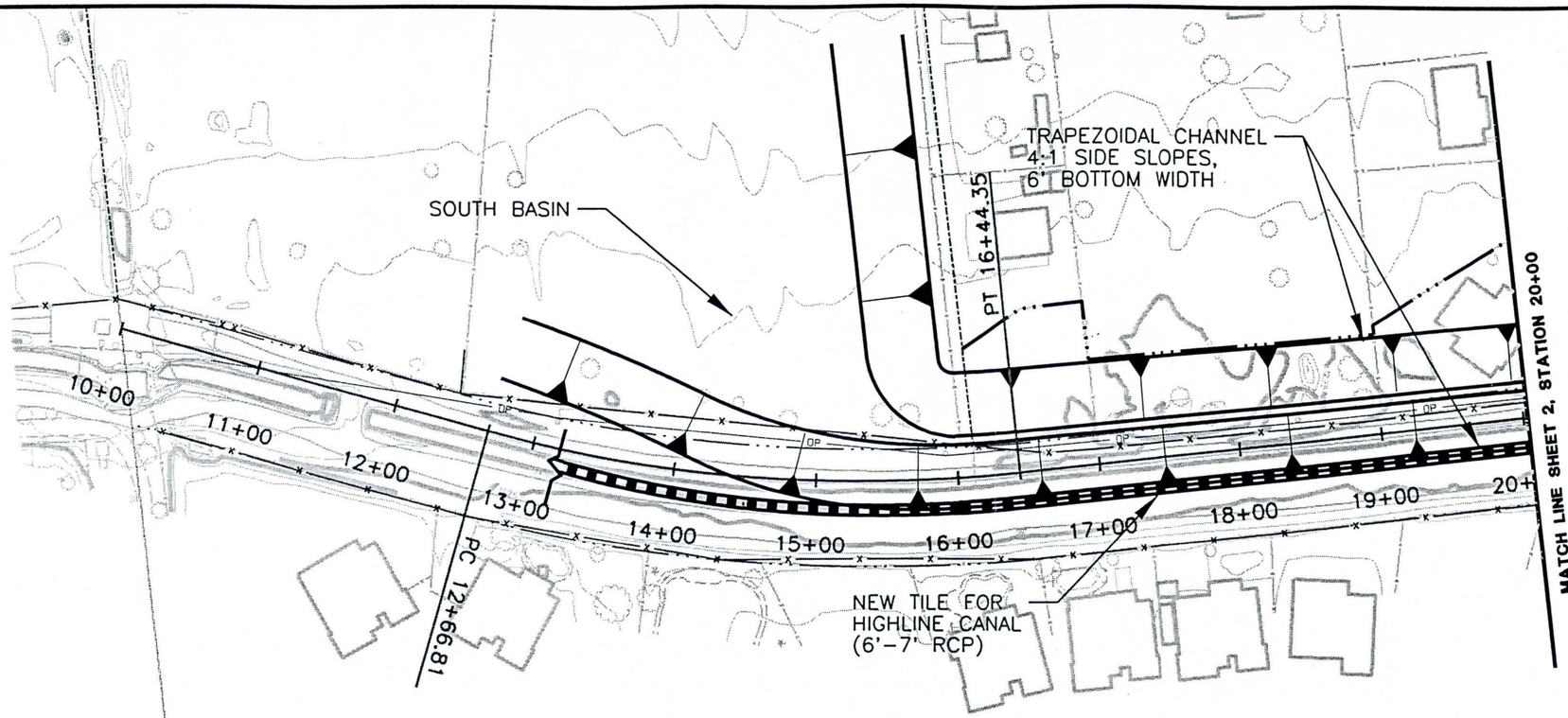
NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 3 - OPTION 4						
	201-1	CLEARING AND GRUBBING	SY	5130	$0.30	$1,539.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$62,000.00	$62,000.00
	215-2	GRADER DITCH	LF	1500	$4.00	$6,000.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$2,000.00	$2,000.00
	350-2	DEMO, RMVL, AND DSPSL OF EX CANAL LINING & STRCTS	LS	1	$5,000.00	$5,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	1600	$20.00	$32,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	34000	$1.00	$34,000.00
	430-2	PATH AND TRAIL	LF	1700	$5.00	$8,500.00
	505-3	JUNCTION STRUCTURES	EA	1	$15,000.00	$15,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	3	$2,500.00	$7,500.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE0	EA	11	$5,000.00	$55,000.00
	618-1	60" STORM DRAIN	LF	2400	$200.00	$480,000.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	300	$600.00	$180,000.00
	618-3	MISC CONNECTOR PIPES (18" TO 54")	LF	40	$100.00	$4,000.00
	625-1	STORMDRAIN MANHOLE	EA	3	$2,500.00	$7,500.00
	999-1	TILING OF HIGHLINE CANAL	LF	2150	$180.00	$387,000.00
		CONSTRUCTION COST SUBTOTAL				$1,297,039.00
		CONSTRUCTION CONTIGENCY AT 20%				$259,407.80
		TOTAL CONSTRUCTION COST				$1,556,446.80
		ROW/PROPERTY ACQUISITION	AC	0		$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$1,556,000.00**

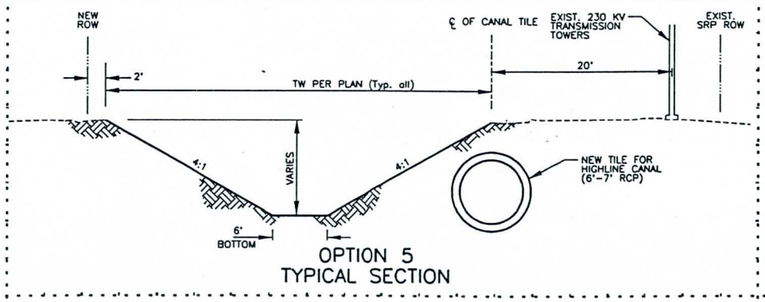
CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 4 - OPTION 4						
	201-1	CLEARING AND GRUBBING	SY	5570	$0.30	$1,671.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$168,000.00	$168,000.00
	215-2	GRADER DITCH	LF	2100	$4.00	$8,400.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$2,000.00	$2,000.00
	350-2	DEMO, RMVL, AND DSPSL OF EX CANAL LINING & STRCTS	LS	1	$7,500.00	$7,500.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	1900	$20.00	$38,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	42000	$1.00	$42,000.00
	430-2	PATH AND TRAIL	LF	2100	$5.00	$10,500.00
	505-3	JUNCTION STRUCTURES	EA	1	$15,000.00	$15,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	3	$2,500.00	$7,500.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE0	EA	11	$5,000.00	$55,000.00
	618-2	CONCRETE BOX CULVERT, DBL BARREL 8'X5'	LF	2150	$900.00	$1,935,000.00
	618-3	MISC CONNECTOR PIPES (24" TO 36")	LF	40	$100.00	$4,000.00
	625-1	STORMDRAIN MANHOLE	EA	3	$2,500.00	$7,500.00
	999-1	TILING OF HIGHLINE CANAL	LF	2600	$180.00	$468,000.00
	9999	REACH 5 STORM DRAIN	LS	1	$740,910.00	$740,910.00
		CONSTRUCTION COST SUBTOTAL				$3,520,981.00
		CONSTRUCTION CONTIGENCY AT 20%				$704,196.20
		TOTAL CONSTRUCTION COST				$4,225,177.20
		ROW/PROPERTY ACQUISITION	AC	0		$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$4,225,000.00**

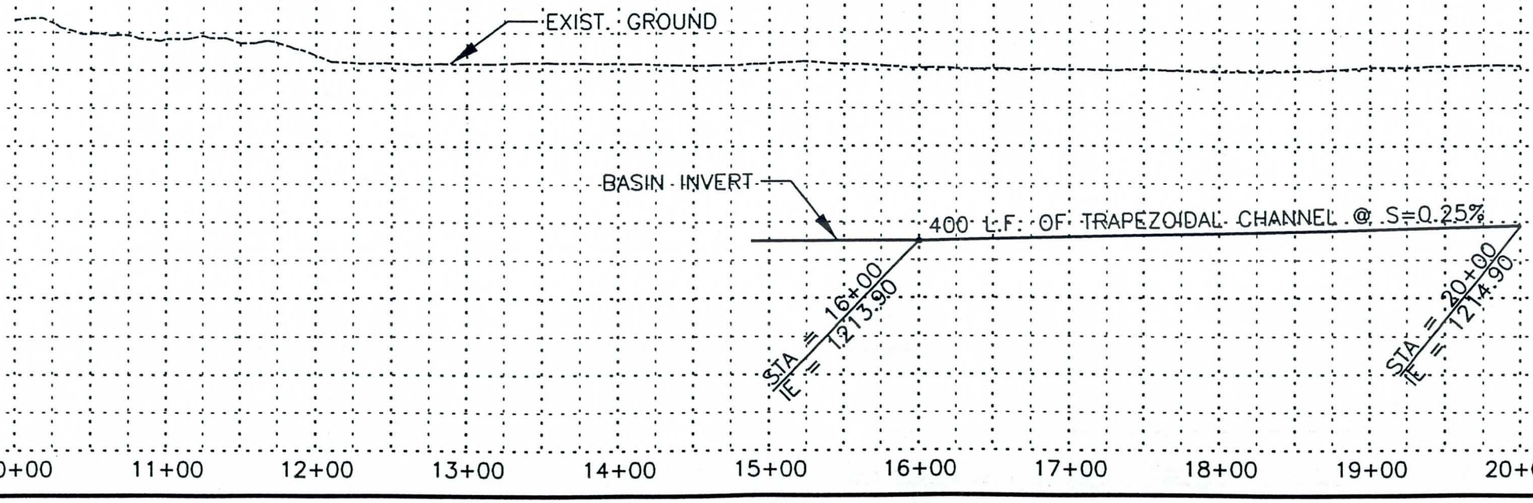
Appendix I1

OPTION 5: Plan and Profile Sheets





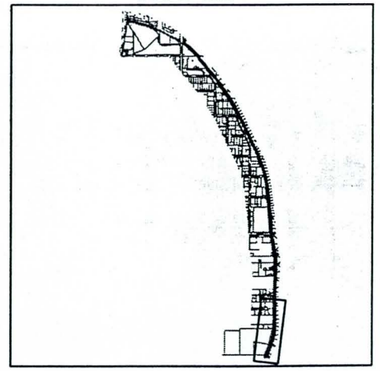
OPTION 5
TYPICAL SECTION



LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST. BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

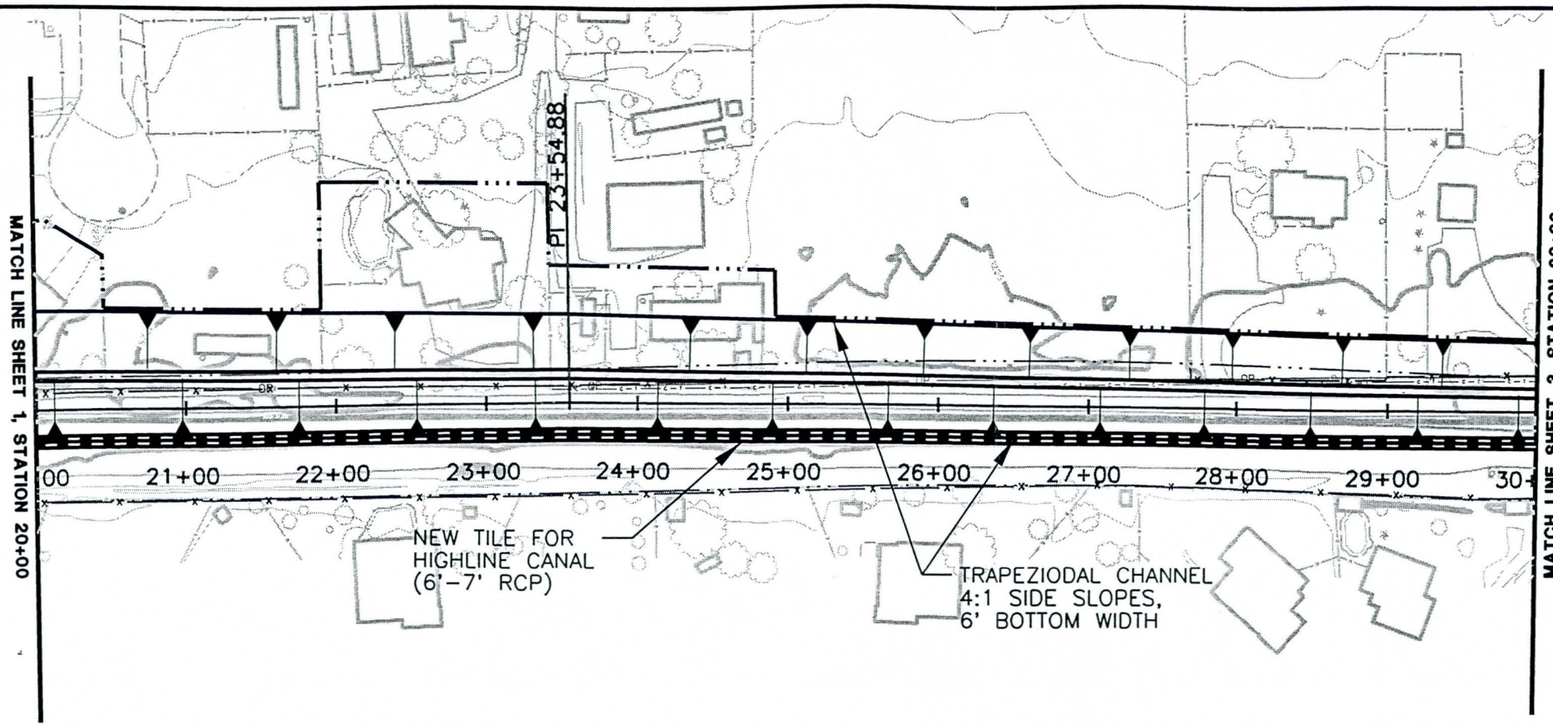
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

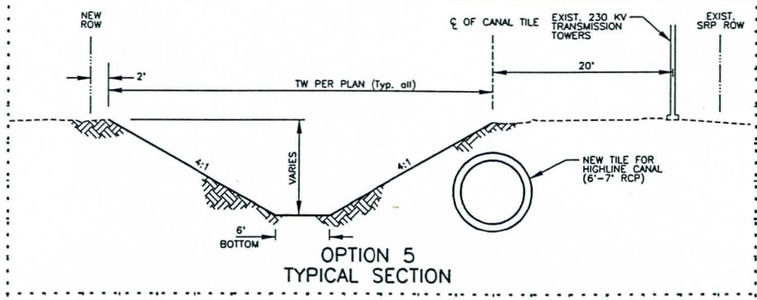
PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE ARIZONA
2755 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 581-8272
FAX (602) 581-8539

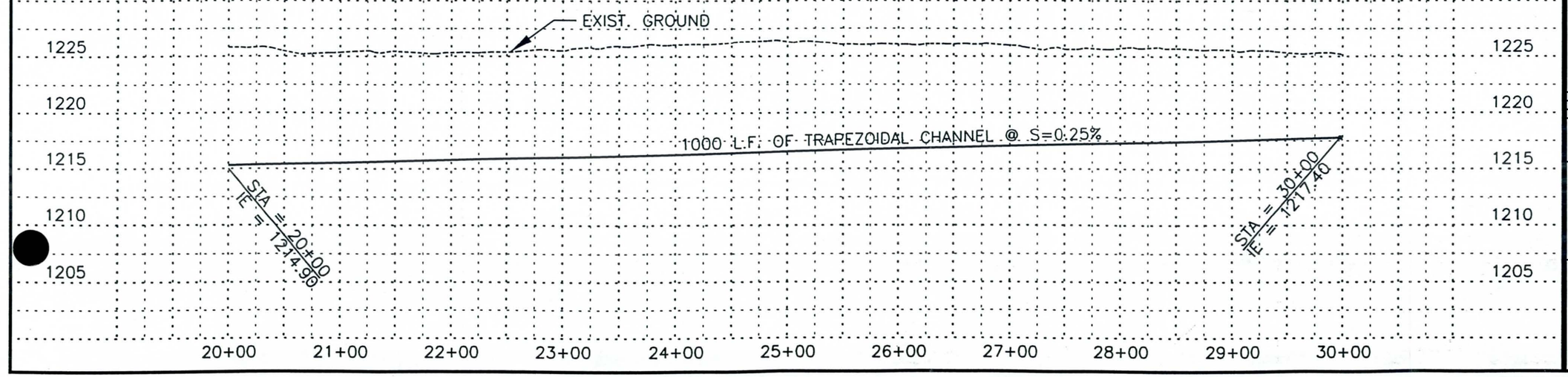
	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	–	–
PLANS CHK.	–	–

OPTION 5 SHEET OF





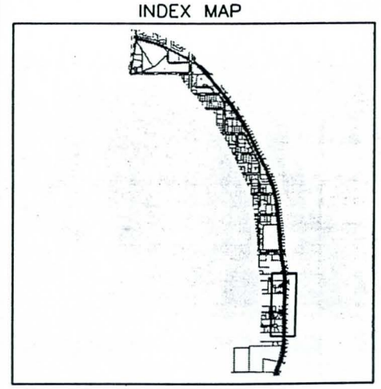
OPTION 5
TYPICAL SECTION



LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
- EXIST.BASIN PROPERTY LINE
- CONTROL LINE AND STATIONS (10+00 — 20+00)
- PROPOSED RCP OR RCB
- PROPOSED TRAPEZOIDAL CHANNEL
- PROPOSED RECTANGULAR CHANNEL

INDEX MAP



N

100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-8720
FAX (602) 681-8339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 5 SHEET OF

STA. 36+00 CONSTRUCT HEADWALL, CONNECT TO 10'X5' SINGLE BARREL RCB

GUADALUPE ROAD DRAINAGE SYSTEM 10'X5' RCB

MATCH LINE SHEET 2, STATION 30+00

MATCH LINE SHEET 4, STATION 40+00

PI 37+41.39

PI 36+30.85

PC 30+40.33

PT 31+39.49

TRAPEZIODAL CHANNEL 4:1 SIDE SLOPES, 6' BOTTOM WIDTH

NEW TILE FOR HIGHLINE CANAL (6'-7' RCP)

N89° 43'43"E

30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00 39+00 40+00

LEGEND

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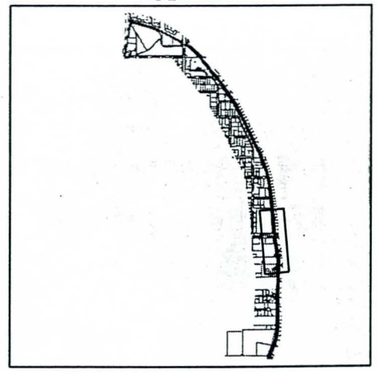
INDEX MAP



SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 602-957-2727
FAX (602) 681-9339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 5 SHEET OF

NEW ROW — 2' — TW PER PLAN (Typ. all) — ℄ OF CANAL TILE — EXIST. 230 KV TRANSMISSION TOWERS — 20' — EXIST. SRP ROW

4:1 — VARIES — 4:1 — 6' BOTTOM — NEW TILE FOR HIGHLINE CANAL (6'-7' RCP)

OPTION 5
TYPICAL SECTION

1240 1235 1230 1225 1220 1215 1210 1205

EXIST. GROUND

600 L.F. OF TRAPEZOIDAL CHANNEL @ S=0.25%

STA = 30+00
I.E. = 1217.40

STA = 36+00
I.E. = 1218.90

GUADALUPE RD. STORM DRAIN (5'x10' CBC)

TELGO
I.E.=1212.7

30" W
I.E.=1214.2

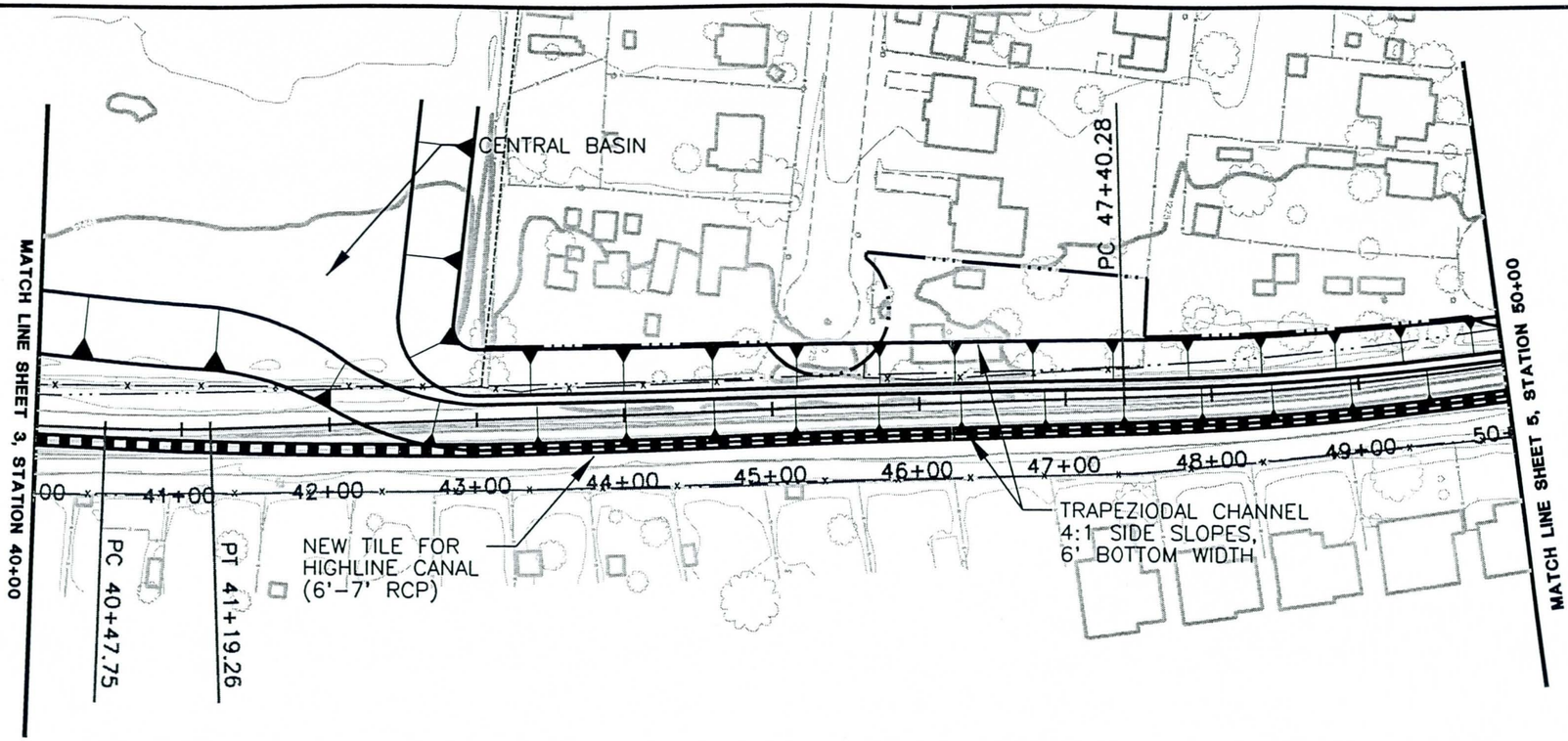
6" G
I.E.=1214.0

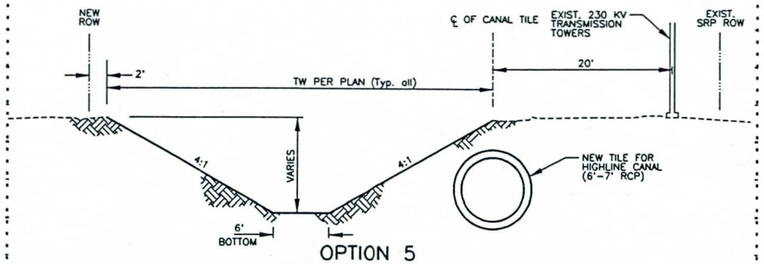
24" CMP
I.E.=1214.4

12" W
I.E.=1213.6

2" G
I.E.=1213.8

30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00 39+00 40+00





OPTION 5
TYPICAL SECTION

LEGEND

- NEW ROW LINE
- EXIST. SRP ROW LINE
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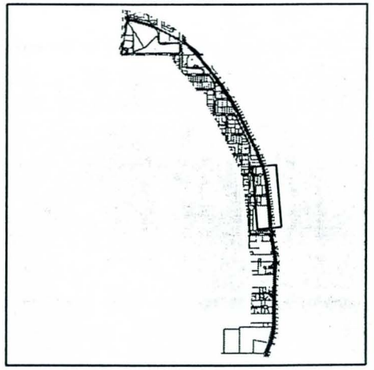
INDEX MAP



100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

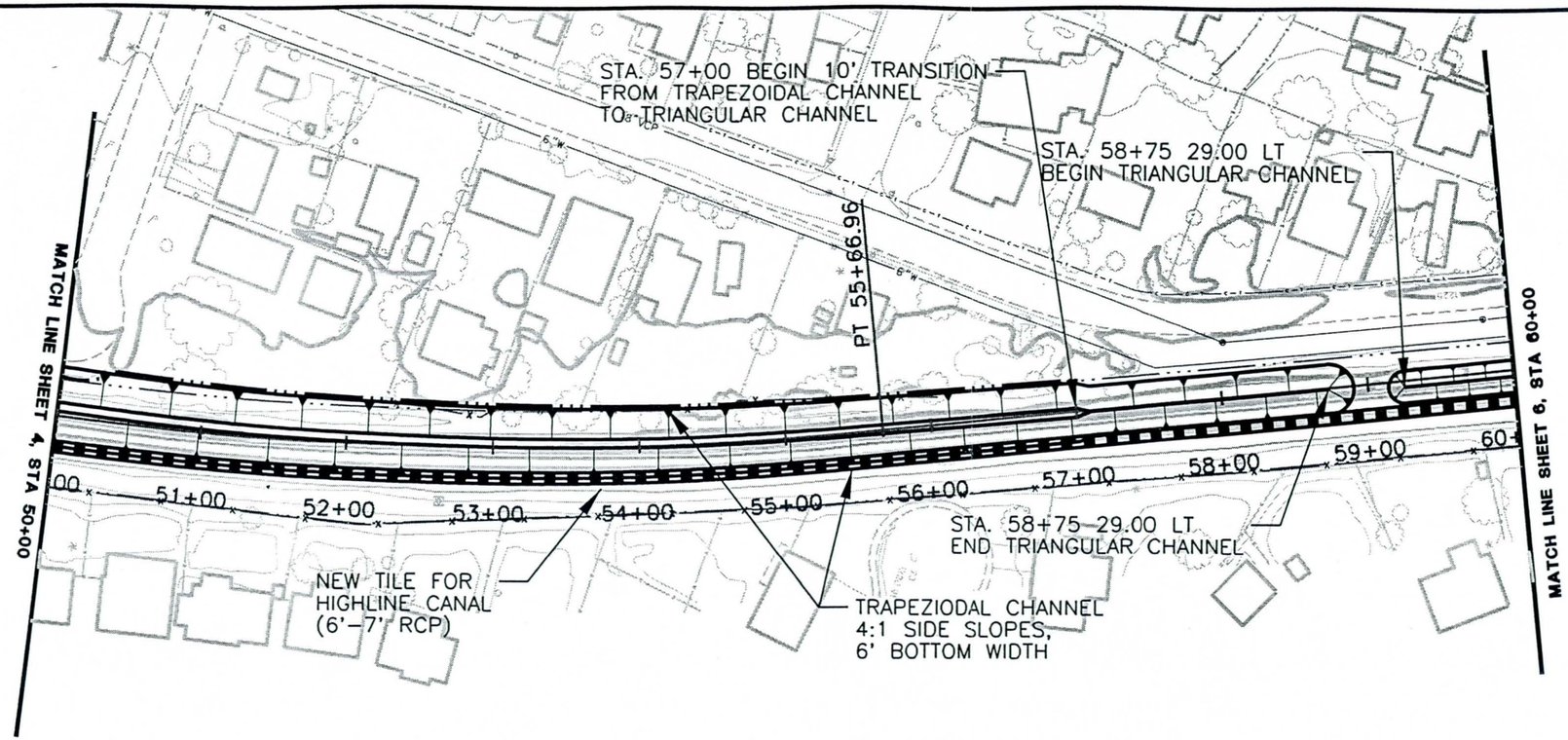
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

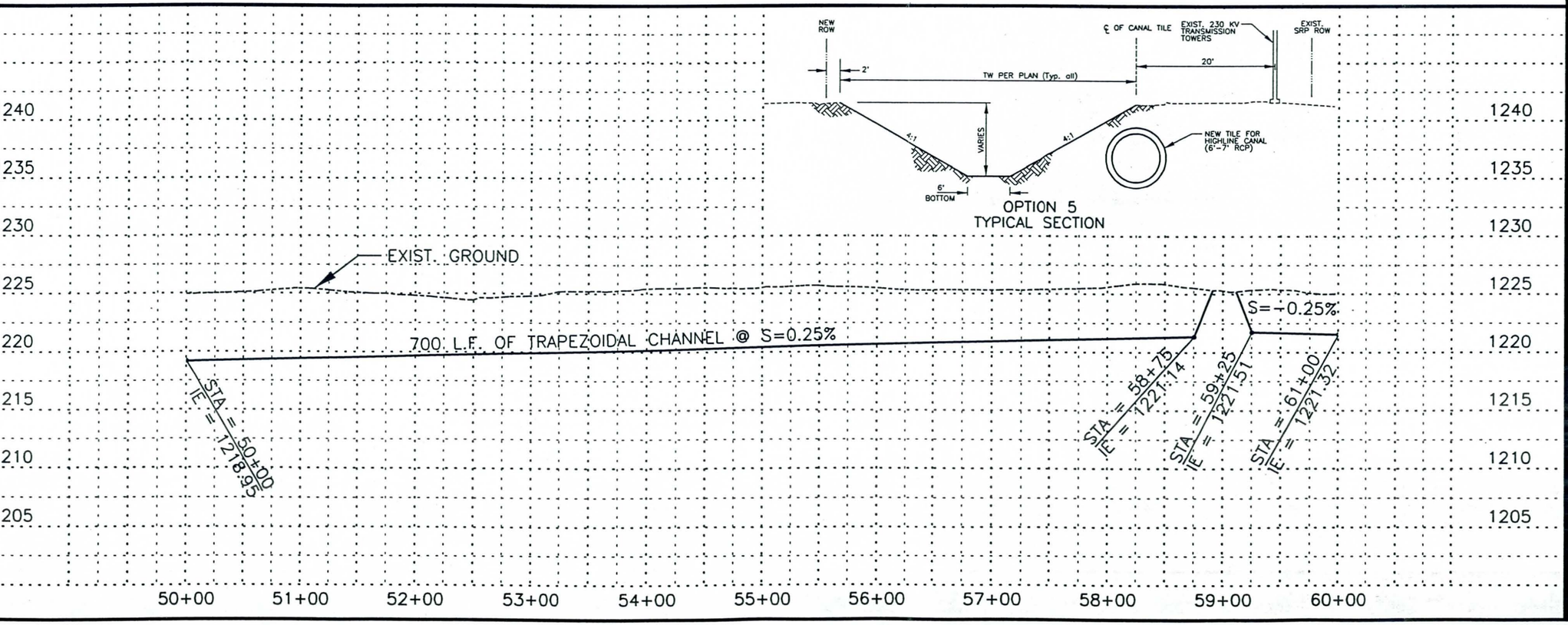
PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-8772
FAX: (602) 681-9339

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 5 SHEET OF





LEGEND

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INDEX MAP

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CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

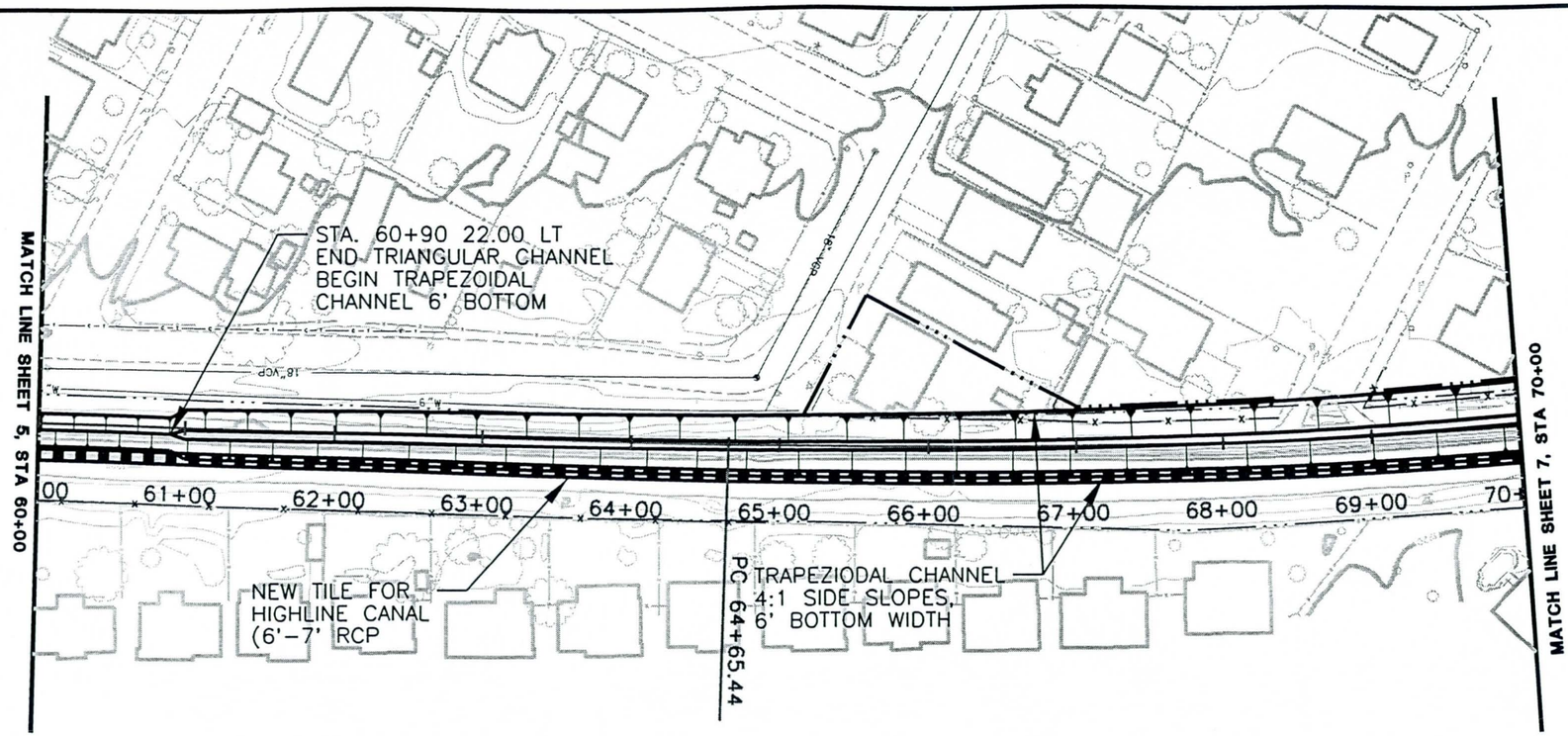
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

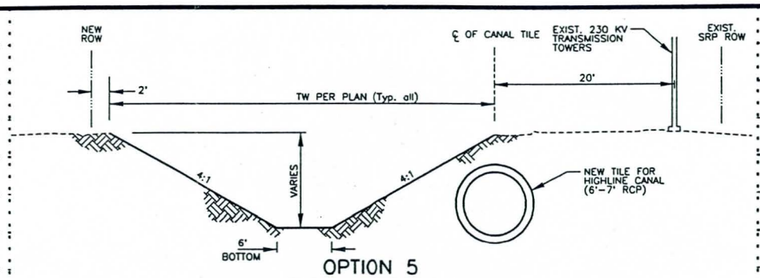
PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., Suite 255, Phoenix, AZ. 85008 602-687-8772
FAX (602) 687-9339

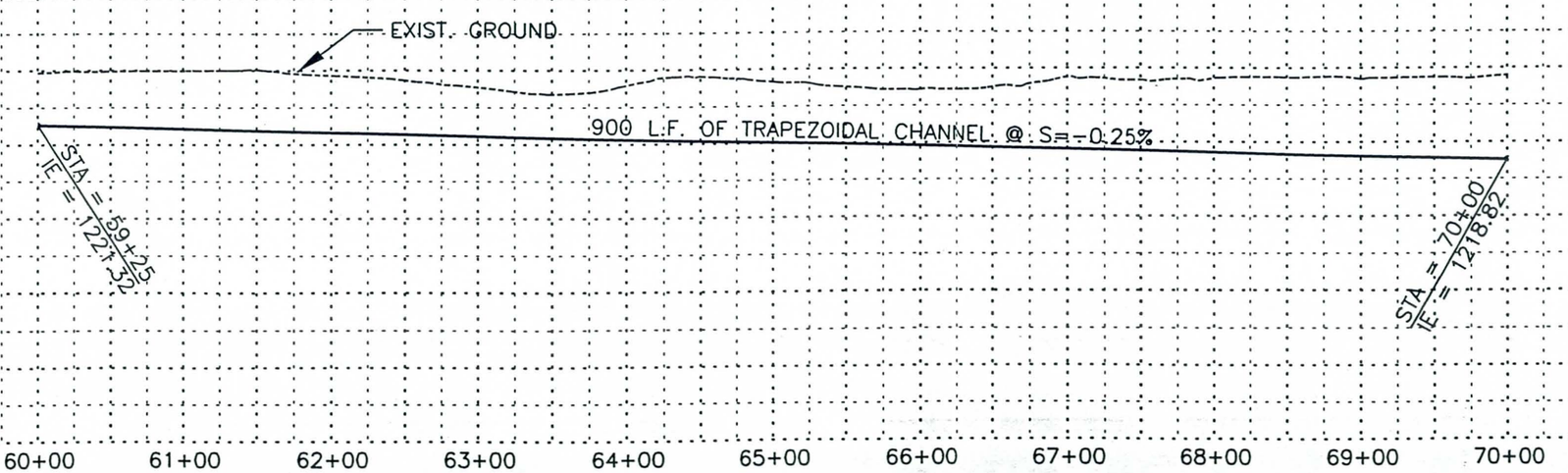
	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 5 SHEET OF





OPTION 5
TYPICAL SECTION



LEGEND

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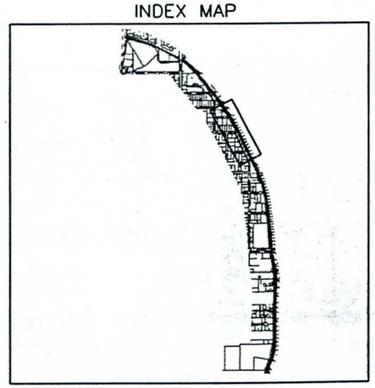


100 0' 100 200
SCALE: 1"= 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
1			
2			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

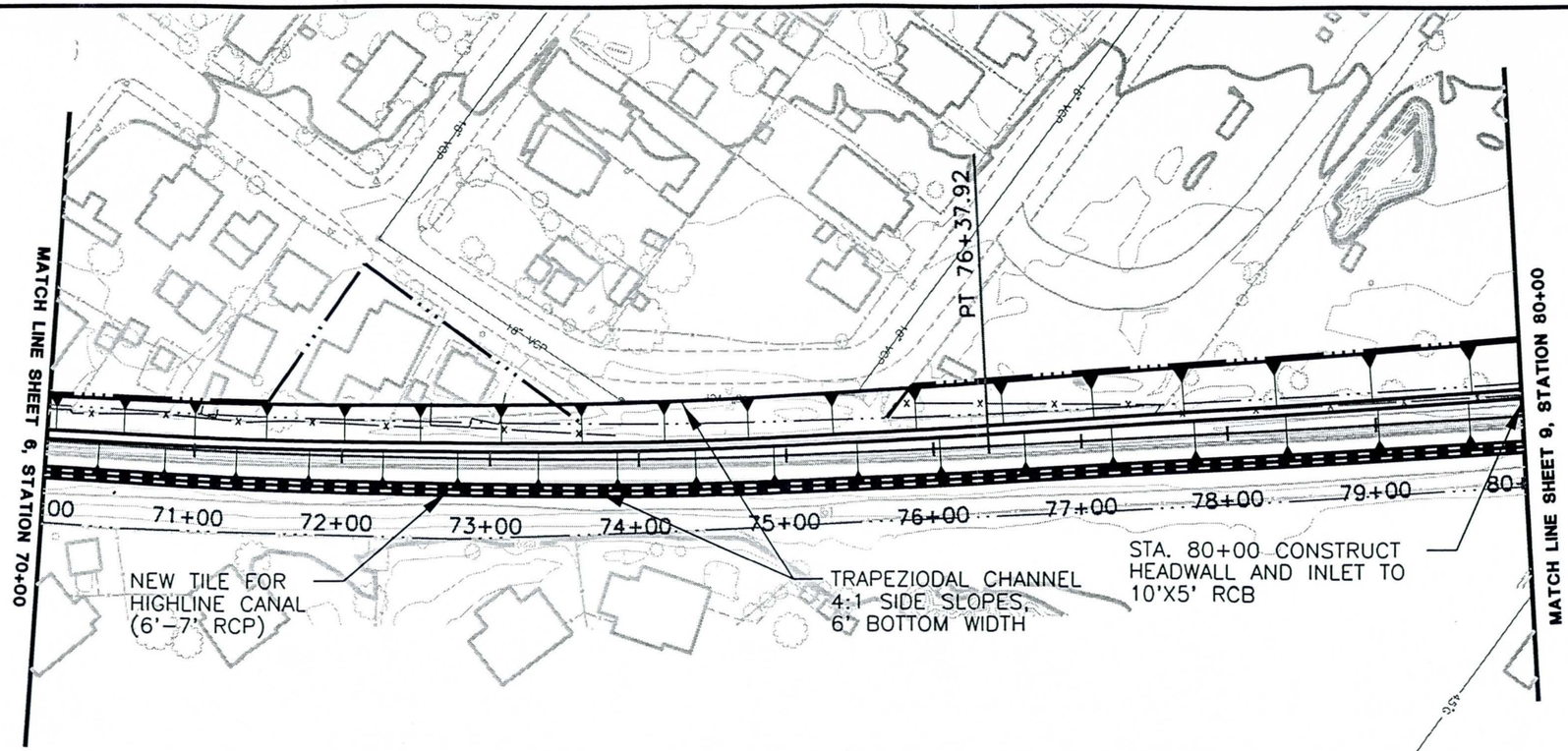
GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

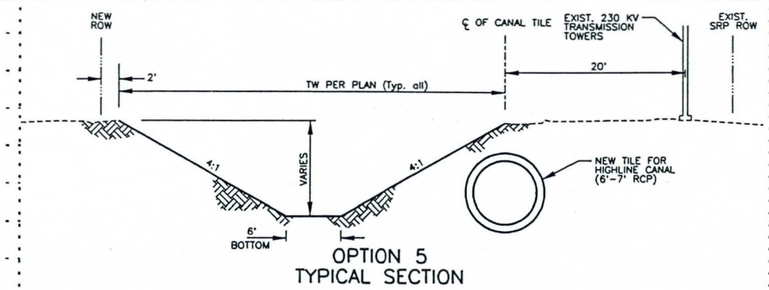
PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St. SUITE 255
PHOENIX, AZ. 85008 881-8772
FAX (602) 881-8339

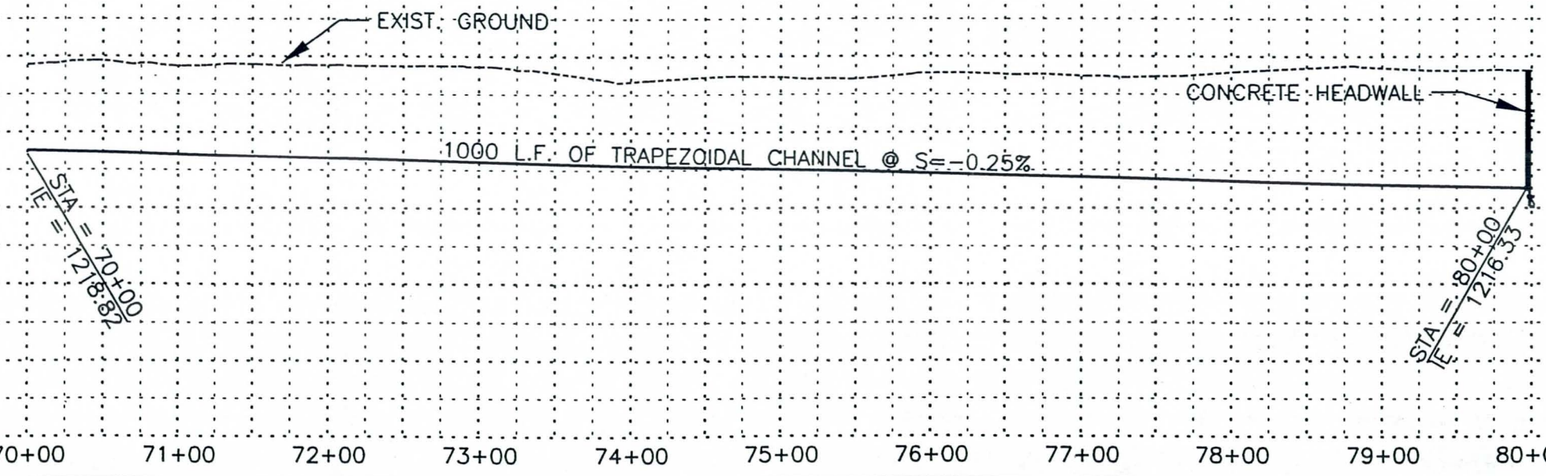
	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	-	-
PLANS CHK.	-	-

OPTION 5 SHEET OF





OPTION 5
TYPICAL SECTION



LEGEND

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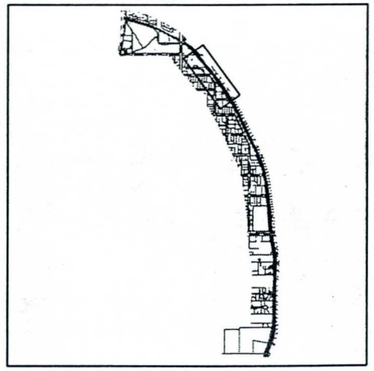


100 0' 100 200
SCALE: 1" = 100 FEET
CONTOUR INTERVAL = 1 FOOT
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D. 98-45, P.C.N. 035-02-30

PRELIMINARY NOT FOR CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St. SUITE 255
PHOENIX, AZ. 85008 (602) 667-3779
FAX (602) 667-3339

	BY	DATE
DESIGN	--	--
DESIGN CHK.	--	--
PLANS	--	--
PLANS CHK.	--	--

OPTION 5 SHEET OF

Appendix I2

OPTION 5: Quantity and Cost Estimates

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY Revised 8-13-99 - wso
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 1 - OPTIONS 4 AND 5						
	201-1	CLEARING AND GRUBBING	SY	1160	$0.30	$348.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$34,000.00	$34,000.00
	220-1	DUMPED RIPRAP	CY	30	$35.00	$1,050.00
	336-1	REMOVE AND REPLACE ASPHALT PAVEMENT	SY	110	$35.00	$3,850.00
	340-1	REMOVE AND REPLACE CURB, GUTTER, & SIDEWALK	SF	360	$5.00	$1,800.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMN	LS	1	$5,000.00	$5,000.00
	350-2	DEMO, RMVL, AND DSPSL OF EX CANAL LINING & STRCTS	LS	1	$5,000.00	$5,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	500	$20.00	$10,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	2000	$1.00	$2,000.00
	430-2	PATH AND TRAIL	LF	800	$5.00	$4,000.00
	505-1	HEADWALLS w/ SAFETY RAILING	EA	2	$5,000.00	$10,000.00
	505-2	ENERGY DISSIPATION STRUCTURE	LS	1	$10,000.00	$10,000.00
	505-3	JUNCTION STRUCTURES	LS	1	$10,000.00	$10,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	0	$2,500.00	$0.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE)	EA	0	$5,000.00	$0.00
	610-1	WATER VERTICAL RELOCATION (12")	EA	1	$15,000.00	$15,000.00
	618-1	54" STORM DRAIN	LF	50	$150.00	$7,500.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	600	$600.00	$360,000.00
	618-3	CONCRETE BOX CULVERT 12'X5'	LF	100	$800.00	$80,000.00
	625-1	STORM DRAIN MANHOLE	EA	1	$5,000.00	$5,000.00
	999-1	TILING OF HIGHLINE CANAL	LF	800	$180.00	$144,000.00
		CONSTRUCTION COST SUBTOTAL				$718,548.00
		CONSTRUCTION CONTIGENCY AT 20%				$143,709.60
		TOTAL CONSTRUCTION COST				$862,257.60
		ROW/PROPERTY ACQUISITION	AC	0.00	$30,000.00	$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$862,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 2 - OPTION 5						
	201-1	CLEARING AND GRUBBING	SY	13100	$0.30	$3,930.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$38,000.00	$38,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	11980	$4.00	$47,920.00
	220-1	DUMPED RIPRAP	CY	340	$35.00	$11,900.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$30,000.00	$30,000.00
	350-2	DEMO, RMVL, AND DSPSL OF EX CANAL LINING & STRCTS	LS	1	$5,000.00	$5,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	2100	$20.00	$42,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	117900	$1.00	$117,900.00
	430-2	PATH AND TRAIL	LF	2100	$5.00	$10,500.00
	610-1	WATERLINE RELOCATION (6")	LF	1000	$100.00	$100,000.00
	625-1	SEWER MANHOLE ADJUSTMENT	EA	4	$1,500.00	$6,000.00
	999-1	TILING OF HIGHLINE CANAL	LF	2100	$180.00	$378,000.00
		CONSTRUCTION COST SUBTOTAL				$801,150.00
		CONSTRUCTION CONTIGENCY AT 20%				$160,230.00
		TOTAL CONSTRUCTION COST				$961,380.00
		ROW/PROPERTY ACQUISITION	AC	0.77	$30,000.00	$23,100.00
		RELOCATION EXPENSE	LOT	2	$75,000.00	$150,000.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$1,134,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 3 - OPTION 5						
	201-1	CLEARING AND GRUBBING	SY	11202	$0.30	$3,360.60
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$30,000.00	$30,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	7710	$4.00	$30,840.00
	220-1	DUMPED RIPRAP	CY	270	$35.00	$9,450.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$15,000.00	$15,000.00
	350-2	DEMO, RMVL, AND DSPSL OF EX CANAL LINING & STRCTS	LS	1	$5,000.00	$5,000.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	1600	$20.00	$32,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	100820	$1.00	$100,820.00
	430-2	PATH AND TRAIL	LF	1600	$5.00	$8,000.00
	999-1	TILING OF HIGHLINE CANAL	LF	2150	$180.00	$387,000.00
		CONSTRUCTION COST SUBTOTAL				$631,470.60
		CONSTRUCTION CONTIGENCY AT 20%				$126,294.12
		TOTAL CONSTRUCTION COST				$757,764.72
		ROW/PROPERTY ACQUISITION	AC	0.56	$30,000.00	$16,800.00
		RELOCATION EXPENSE	LOT	1	$75,000.00	$75,000.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$850,000.00**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 4 - OPTION 5						
	201-1	CLEARING AND GRUBBING	SY	20480	$0.30	$6,144.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$82,000.00	$82,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	29400	$4.00	$117,600.00
	220-1	DUMPED RIPRAP	CY	340	$35.00	$11,900.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$30,000.00	$30,000.00
	350-2	DEMO, RMVL, AND DSPSL OF EX CANAL LINING & STRCTS	LS	1	$7,500.00	$7,500.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	1900	$20.00	$38,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	184320	$1.00	$184,320.00
	430-2	PATH AND TRAIL	LF	2100	$5.00	$10,500.00
	505-1	HEADWALLS w/ SAFETY RAILING (REACH 5 OUTLET)	EA	1	$5,000.00	$5,000.00
	505-2	ENERGY DISSIPATION STRUCTURE (REACH 5 OUTLET)	LS	1	$20,000.00	$20,000.00
	999-1	TILING OF HIGHLINE CANAL	LF	2600	$180.00	$468,000.00
	9999	REACH 5 STORM DRAIN	LS	1	$740,910.00	$740,910.00
		CONSTRUCTION COST SUBTOTAL				$1,731,874.00
		CONSTRUCTION CONTIGENCY AT 20%				$346,374.80
		TOTAL CONSTRUCTION COST				$2,078,248.80
		ROW/PROPERTY ACQUISITION	AC	2.01	$30,000.00	$60,300.00
		RELOCATION EXPENSE	LOT	4	$75,000.00	$300,000.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$2,439,000.00**

Appendix J

Reach 5: Quantity and Cost Estimates

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
REACH 5 - OPTIONS 1 THROUGH 5						
	201-1	CLEARING AND GRUBBING	SY	2700	$0.30	$810.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$35,000.00	$35,000.00
	336-1	REMOVE AND REPLACE ASPHALT PAVEMENT	SY	300	$35.00	$10,500.00
	340-1	REMOVE AND REPLACE CURB, GUTTER, & SIDEWALK	SF	720	$5.00	$3,600.00
	401-1	TRAFFIC CONTROL	LS	1	$10,000.00	$10,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	6000	$1.00	$6,000.00
	505-1	HEADWALLS w/ SAFETY RAILING	EA	1	$5,000.00	$5,000.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE)	EA	10	$5,000.00	$50,000.00
	610-1	WATER VERTICAL RELOCATION	EA	2	$10,000.00	$20,000.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	1200	$500.00	$600,000.00
		CONSTRUCTION COST SUBTOTAL				$740,910.00
		CONSTRUCTION CONTIGENCY AT 20%				$148,182.00
		TOTAL CONSTRUCTION COST				$889,092.00
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	0.00		$0.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$889,000.00**

Appendix K1

Final Concept Design
Plan and Profile Drawings

Appendix K2

Final Concept Design
Quantity and Cost Estimates

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY Revised 8-13-99 - wso
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
FINAL CONCEPT DESIGN (REACHES 1-5)						
	105-1	UTILITY RELOCATIONS	LS	1	$100,000.00	$100,000.00
	201-1	CLEARING AND GRUBBING	SY	35031	$0.30	$10,509.30
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$169,000.00	$169,000.00
	215-1	OPEN CHANNEL EARTHWORK	CY	9610	$4.00	$38,440.00
	220-1	DUMPED RIPRAP	CY	500	$35.00	$17,500.00
	336-1	REMOVE AND REPLACE ASPHALT PAVEMENT	SY	943	$35.00	$33,005.00
	340-1	REMOVE AND REPLACE CURB, GUTTER, & SIDEWALK	SF	1080	$5.00	$5,400.00
	350-1	DEMOLITION, REMOVAL, AND DISPOSAL OF EX IMPRVMNT	LS	1	$95,000.00	$95,000.00
	401-1	TRAFFIC CONTROL	LS	1	$50,000.00	$50,000.00
	420-1	FENCE (NEW AND REPLACEMENT)	LF	9190	$20.00	$183,800.00
	430-1	LANDSCAPING & IRRIGATION	SF	288500	$1.00	$288,500.00
	430-2	PATH AND TRAIL	LF	6700	$5.00	$33,500.00
	505-1	HEADWALLS w/ SAFETY RAILING (EACH WING)	EA	20	$5,000.00	$100,000.00
	505-2	CONCRETE SPLASH PAD W/ END SILL	EA	3	$6,000.00	$18,000.00
	505-3	JUNCTION STRUCTURES	LS	1	$10,000.00	$10,000.00
	505-4	CATCH BASIN - ADOT STD DWG C-15.80	EA	2	$2,500.00	$5,000.00
	505-5	CATCH BASIN INLETS - SPECIAL DESIGN (TRIPLE GRATE)	EA	10	$5,000.00	$50,000.00
	505-6	CONCRETE CHANNEL LINING	CY	3370	$300.00	$1,011,000.00
	610-1	WATERLINE RELOCATION (6")	LF	950	$100.00	$95,000.00
	610-2	VERTICAL REALIGNMENT OF 12" W (DIP W/ RSTN JNTS)	LF	60	$150.00	$9,000.00
	618-1	54" STORM DRAIN	LF	50	$150.00	$7,500.00
	618-2	CONCRETE BOX CULVERT 10'X5'	LF	2050	$600.00	$1,230,000.00
	618-3	CONCRETE BOX CULVERT 12'X5'	LF	100	$800.00	$80,000.00
	625-1	SEWER MANHOLE ADJUSTMENT	EA	2	$1,500.00	$3,000.00
	625-2	STORM DRAIN MANHOLE	EA	1	$5,000.00	$5,000.00
		CONSTRUCTION COST SUBTOTAL				$3,648,154.30
		CONSTRUCTION CONTIGENCY AT 20%				$729,630.86
		TOTAL CONSTRUCTION COST				$4,377,785.16
		TILING OF HIGHLINE CANAL	LF	N/A		$0.00
		ROW/PROPERTY ACQUISITION	AC	2.36	$30,000.00	$70,800.00
		RELOCATION EXPENSES	EA	2	$75,000.00	$150,000.00
	CONSTRUCTION AND PROPERTY ACQUISITION TOTAL					**$4,599,000.00**

Appendix K3

Final Concept Design
Supporting Hydraulic Calculations

HECRAS OUTPUT - FINAL CONCEPT DESIGN

Reaches 2,3, & 4

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 2	11	104	1221.52	1224.15	1222.99	1224.26	0.001859	2.67	38.91	20.8	0.34
Reach 2	10	131	1220.58	1223.16		1223.34	0.003137	3.37	38.83	22.05	0.45
Reach 2	9	131	1220.1	1222.26		1222.53	0.006002	4.2	31.2	20.94	0.61
Reach 2	8	140	1218.7	1222.26	1220.52	1222.5	0.000581	3.9	35.86	10.13	0.37
Reach 2	7.5	Culvert									
Reach 2	7	140	1218.2	1222.01		1222.16	0.000303	3.04	46.02	12.13	0.28
Reach 2	6	140	1218.19	1222.01		1222.16	0.000301	3.04	46.13	12.13	0.27
Reach 2	5	292	1217.1	1221.24		1221.77	0.001049	5.85	49.89	12.12	0.51
Reach 2	4	292	1216.7	1221.08		1221.56	0.000892	5.52	52.88	12.12	0.47
Reach 2	3	300	1216.5	1220.99		1221.47	0.000882	5.54	54.17	12.12	0.46
Reach 2	2	300	1216.49	1221.06		1221.17	0.001173	2.71	110.84	42.51	0.3
Reach 2	1	300	1215.5	1220.77	1218.07	1220.84	0.000597	2.1	142.71	48.16	0.22
Reach 3	5875	122	1221.1	1224.05	1222.84	1224.17	0.002002	2.79	43.79	23.7	0.36
Reach 3	5700	133	1220.7	1223.63		1223.78	0.002432	3.06	43.43	23.61	0.4
Reach 3	5405	133	1219.96	1222.96		1223.1	0.002184	2.94	45.25	24.12	0.38
Reach 3	5400	133	1219.95	1222.5		1222.92	0.001352	5.18	25.67	10.1	0.57
Reach 3	5300	133	1217.5	1222.62		1222.72	0.000196	2.58	51.54	10.14	0.2
Reach 3	5100	251	1217	1222.27		1222.62	0.000642	4.73	53.07	10.13	0.36
Reach 3	4900	405	1216.5	1221.05		1222.27	0.002499	8.85	45.74	10.11	0.73
Reach 3	4500	405	1215.5	1220.05		1221.27	0.002508	8.87	45.67	10.1	0.73
Reach 3	4300	405	1215	1219.54	1218.7	1220.77	0.002497	8.87	45.64	10.09	0.74

HECRAS OUTPUT - FINAL CONCEPT DESIGN

Reaches 2,3, & 4

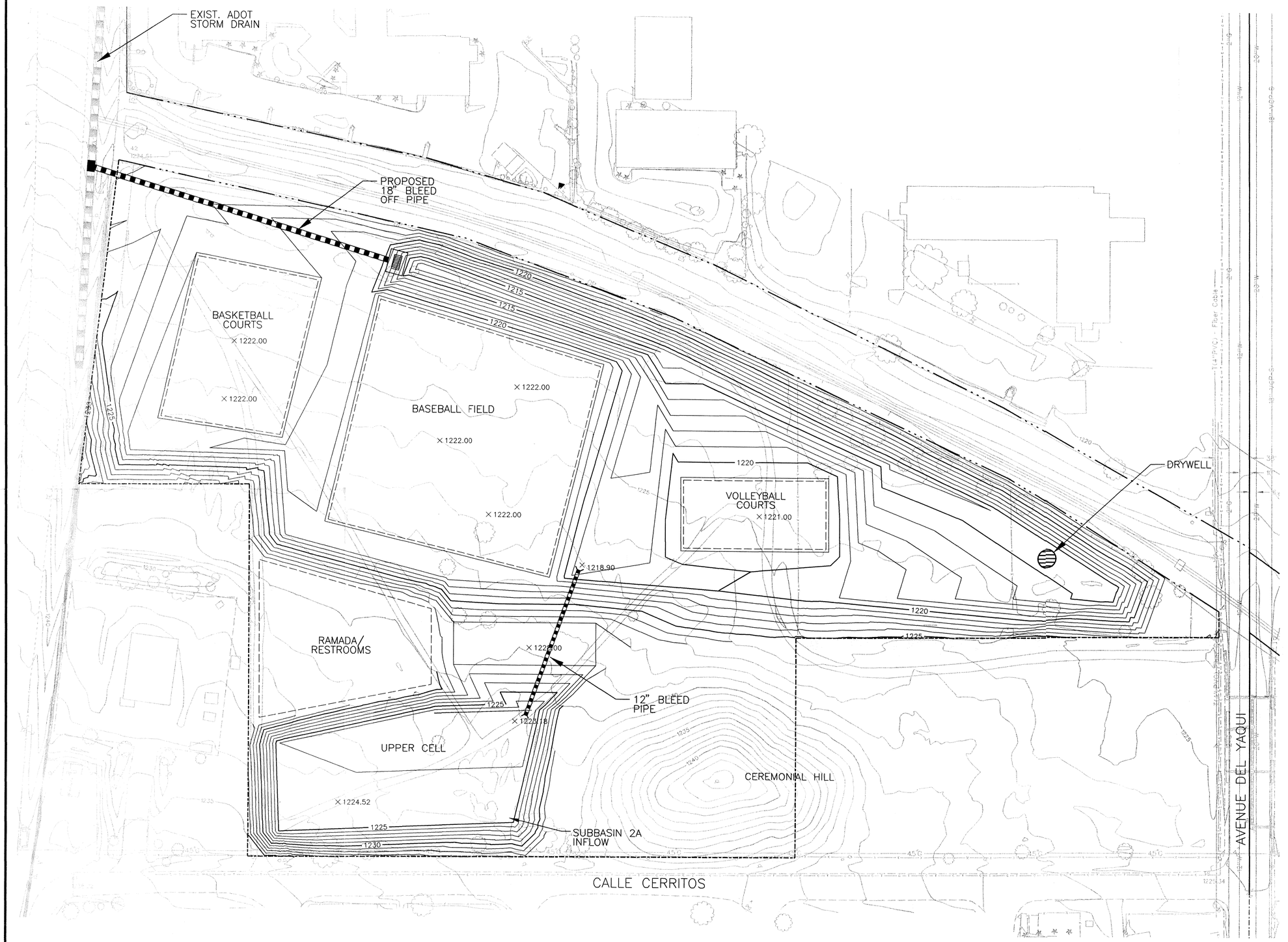
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 4	3600	401	1218.9	1223.64	1221.85	1223.82	0.001762	3.39	118.29	43.92	0.36
Reach 4	3100	472	1217.65	1222.76		1222.95	0.001703	3.49	135.36	46.95	0.36
Reach 4	2705	472	1216.66	1222.27		1222.4	0.001098	2.96	159.51	50.9	0.29
Reach 4	2700	472	1216.65	1220.99		1221.92	0.001634	7.74	60.97	14.1	0.66
Reach 4	2550	472	1216.28	1220.79		1221.65	0.001465	7.44	63.4	14.1	0.62
Reach 4	2350	521	1215.77	1220.23		1221.3	0.001841	8.32	62.62	14.1	0.7
Reach 4	2050	549	1215.02	1219.61		1220.74	0.001885	8.51	64.53	14.09	0.7
Reach 4	1900	549	1214.65	1219.37		1220.44	0.00175	8.28	66.32	14.09	0.67
Reach 4	1750	549	1214.28	1219.15		1220.15	0.00159	8.02	68.46	14.09	0.64
Reach 4	1745	549	1214.27	1219.29		1219.56	0.00252	4.2	130.85	46.14	0.44
Reach 4	1600	549	1213.9	1218.93	1217.34	1219.2	0.0025	4.18	131.25	46.22	0.44

Reach 2 Note:

River Sta 11 = Plan STA 59+25
River Sta 10 = Plan STA 63+00
River Sta 9 = Plan STA 64+90
River Sta 8 = Plan STA 65+00
River Sta 7.5 = Culvert
River Sta 7 = Plan STA 67+50
River Sta 6 = Plan STA 67+55
River Sta 5 = Plan STA 73+00
River Sta 4 = Plan STA 75+00
River Sta 3 = Plan STA 76+00
River Sta 2 = Plan STA 76+05
River Sta 1 = Plan STA 80+00

Appendix L

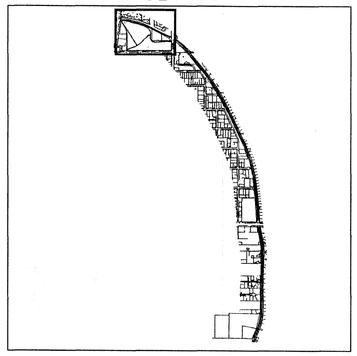
North, Central, and South Retention Basin Conceptual Grading Plans



LEGEND

1250	PROPOSED INDEX CONTOUR
	PROPOSED INTERMEDIATE CONTOUR
	EXISTING BASIN PROPERTY LINE
	EXIST SRP ROW

INDEX MAP



N

50' 0' 50' 100'

SCALE: 1" = 50' FEET
CONTOUR INTERVAL = 1' FEET
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D.98-45, P.C.N. 035-02-30

PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-9272
FAX (602) 681-9339

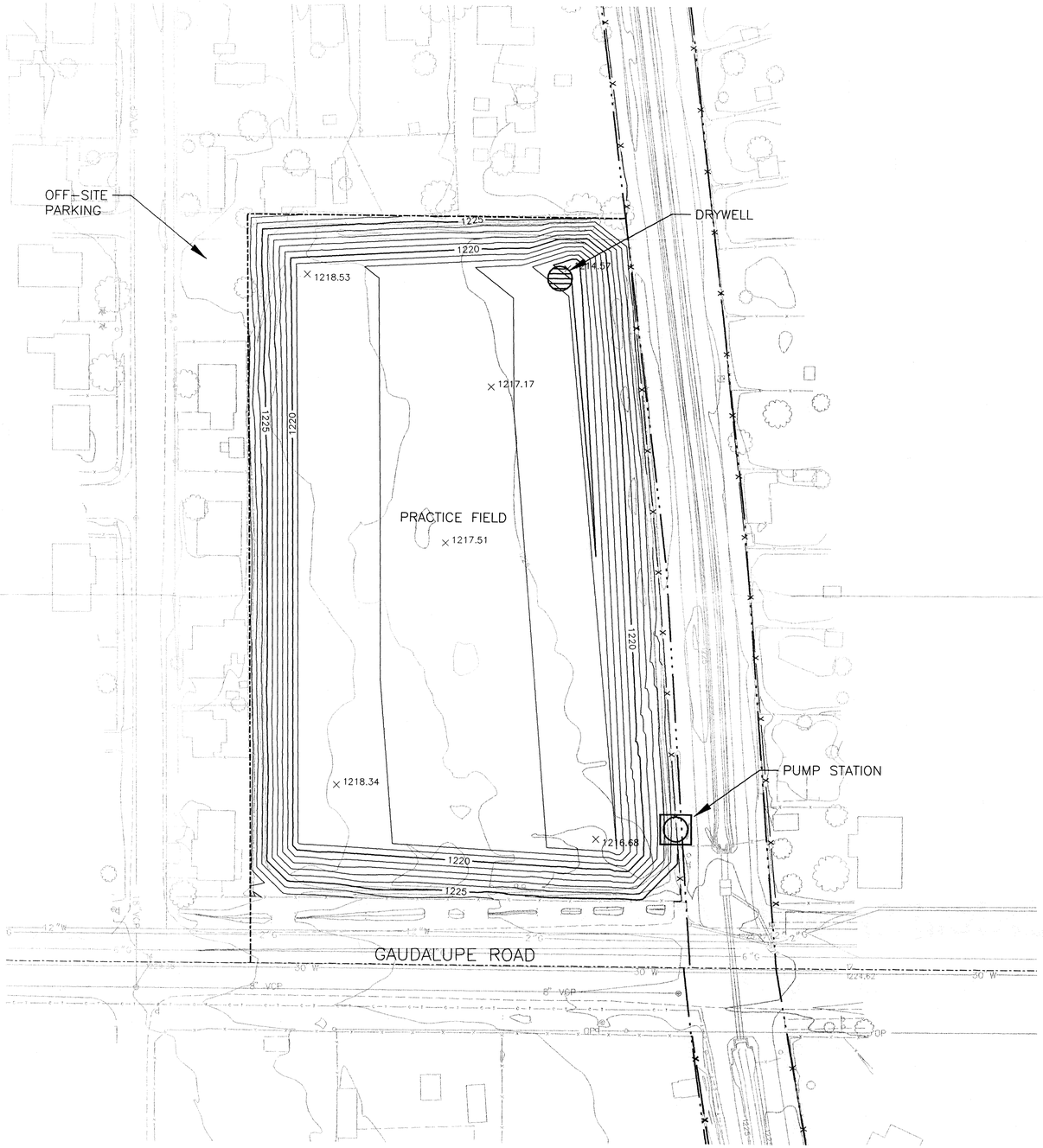
	BY	DATE
DESIGN	WSO	07-14
DESIGN CHK.	–	–
PLANS	MTC	07-14
PLANS CHK.	–	–

NORTH BASIN SHEET XX OF XX

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= ____' HORIZONTAL SCALE AND ____ 'CONTOUR INTERVALS.

AERIAL MAPPING COMPANY NAME GOES HERE.

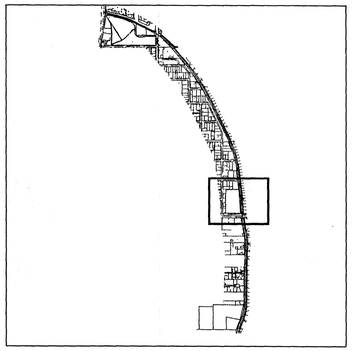
GROUND CONTROL SURVEY DATA PROVIDED BY NAME OF COMPANY



LEGEND

1250	PROPOSED INDEX CONTOUR
	PROPOSED INTERMEDIATE CONTOUR
	EXISTING BASIN PROPERTY LINE
	EXIST SRP ROW

INDEX MAP



50' 0' 50' 100'

SCALE: 1" = 50' FEET
CONTOUR INTERVAL = 1' FEET
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D.98-45, P.C.N. 035-02-30

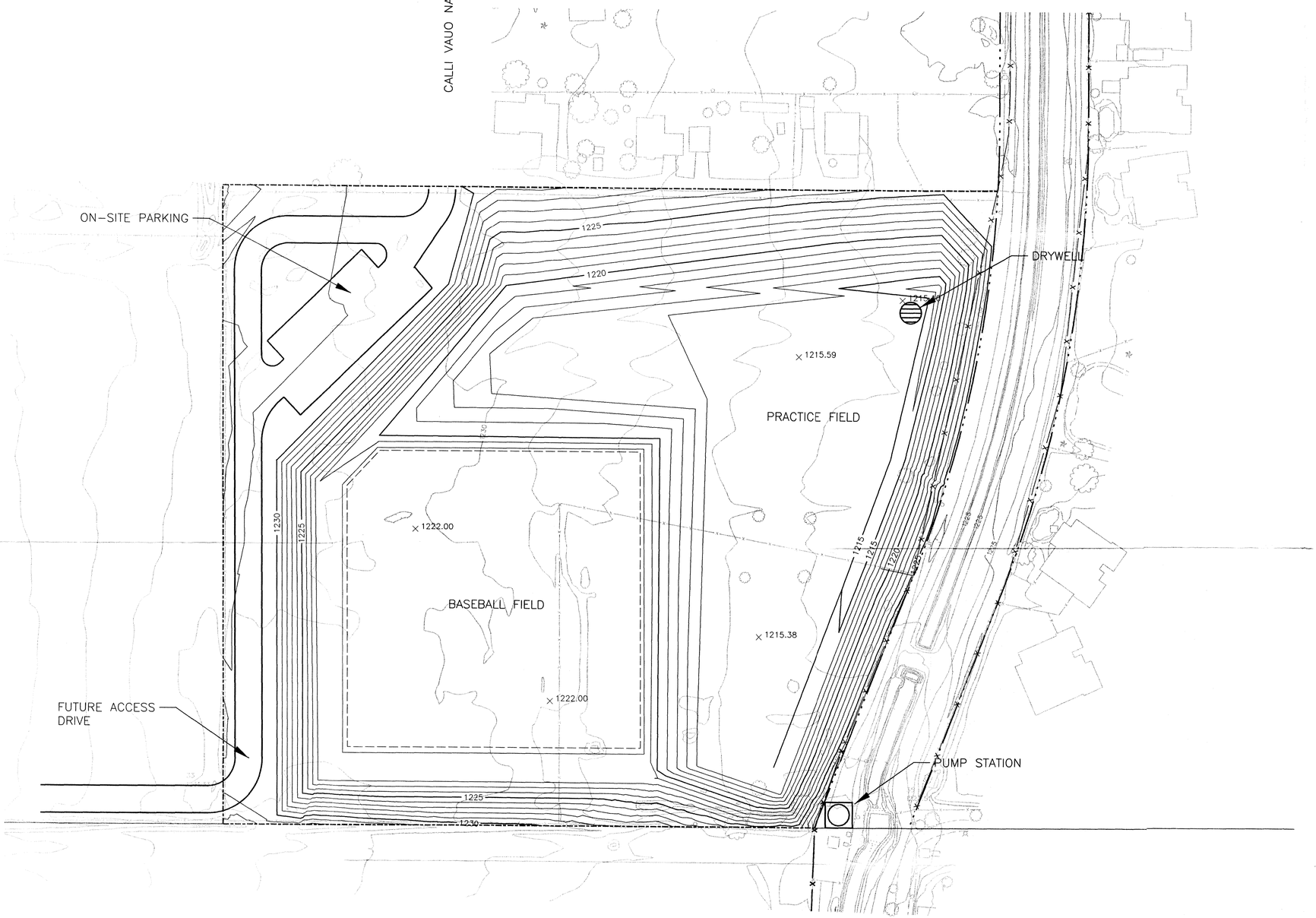
PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE
ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-9272
FAX (602) 681-9339

	BY	DATE
DESIGN	WSO	07-14
DESIGN CHK.	–	–
PLANS	MTC	07-14
PLANS CHK.	–	–

CENTRAL BASIN SHEET XX OF XX

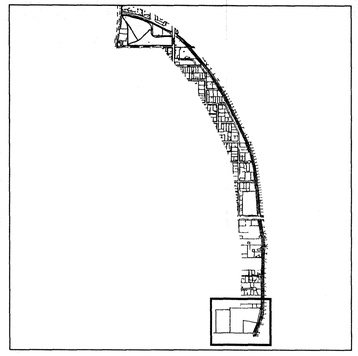
THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR ... AERIAL MAPPING COMPANY, JUNE 2005. HERE ... GROUND CONTROL SURVEY DATA



LEGEND

1250	PROPOSED INDEX CONTOUR
	PROPOSED INTERMEDIATE CONTOUR
	EXISTING BASIN PROPERTY LINE
	EXIST SRP ROW

INDEX MAP



50' 0' 50' 100'

SCALE: 1" = 50' FEET
CONTOUR INTERVAL = 1' FEET
FLIGHT DATES:

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
F.C.D.98-45, P.C.N. 035-02-30

PRELIMINARY
NOT FOR
CONSTRUCTION

PENTACORE ARIZONA
2255 No. 44th St., SUITE 255
PHOENIX, AZ. 85008 681-9272
FAX (602) 681-9339

	BY	DATE
DESIGN	WSO	07-14
DESIGN CHK.	–	–
PLANS	MTC	07-14
PLANS CHK.	–	–

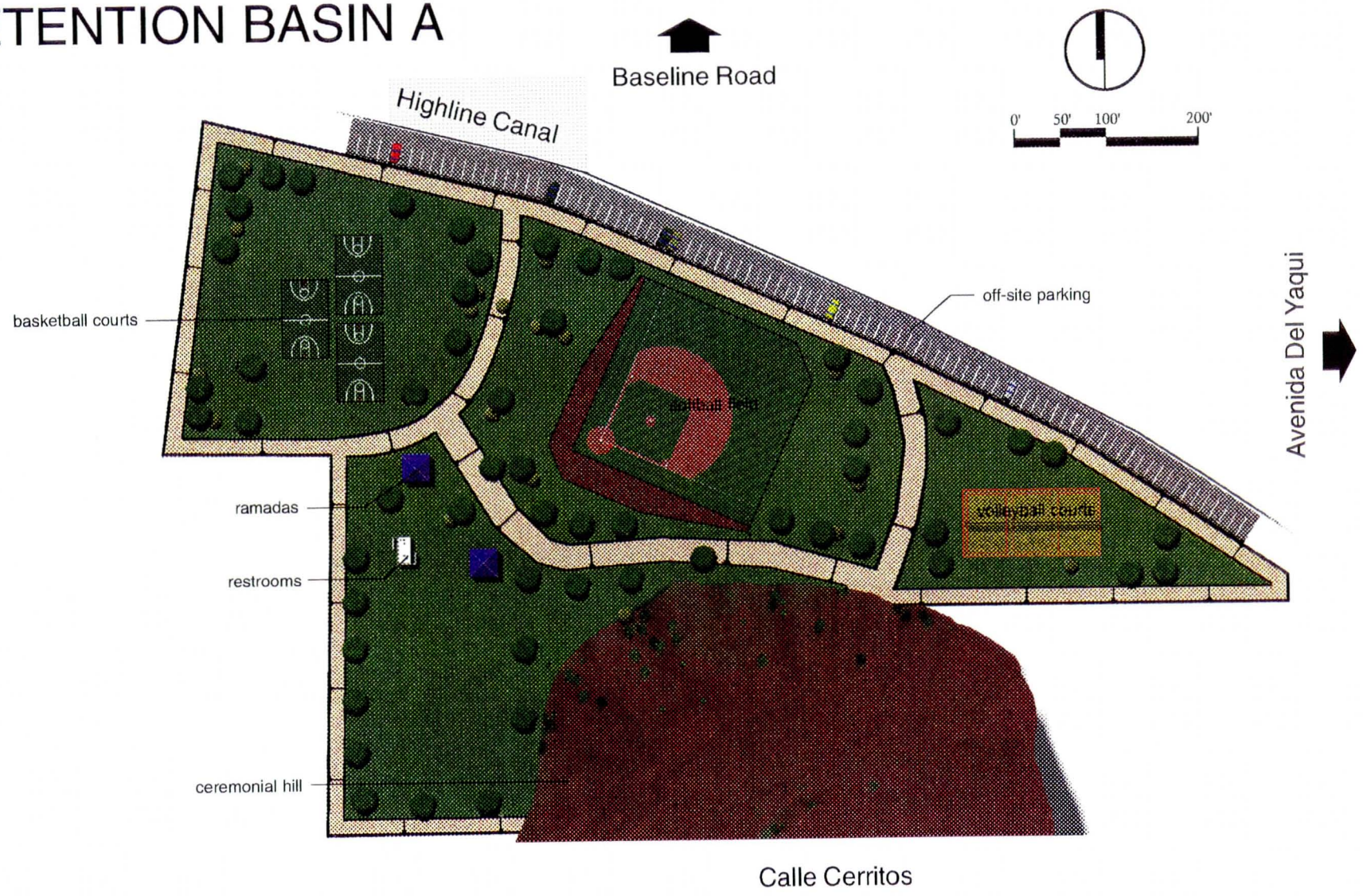
SOUTH BASIN SHEET XX OF XX

GROUND CONTROL SURVEY DATA

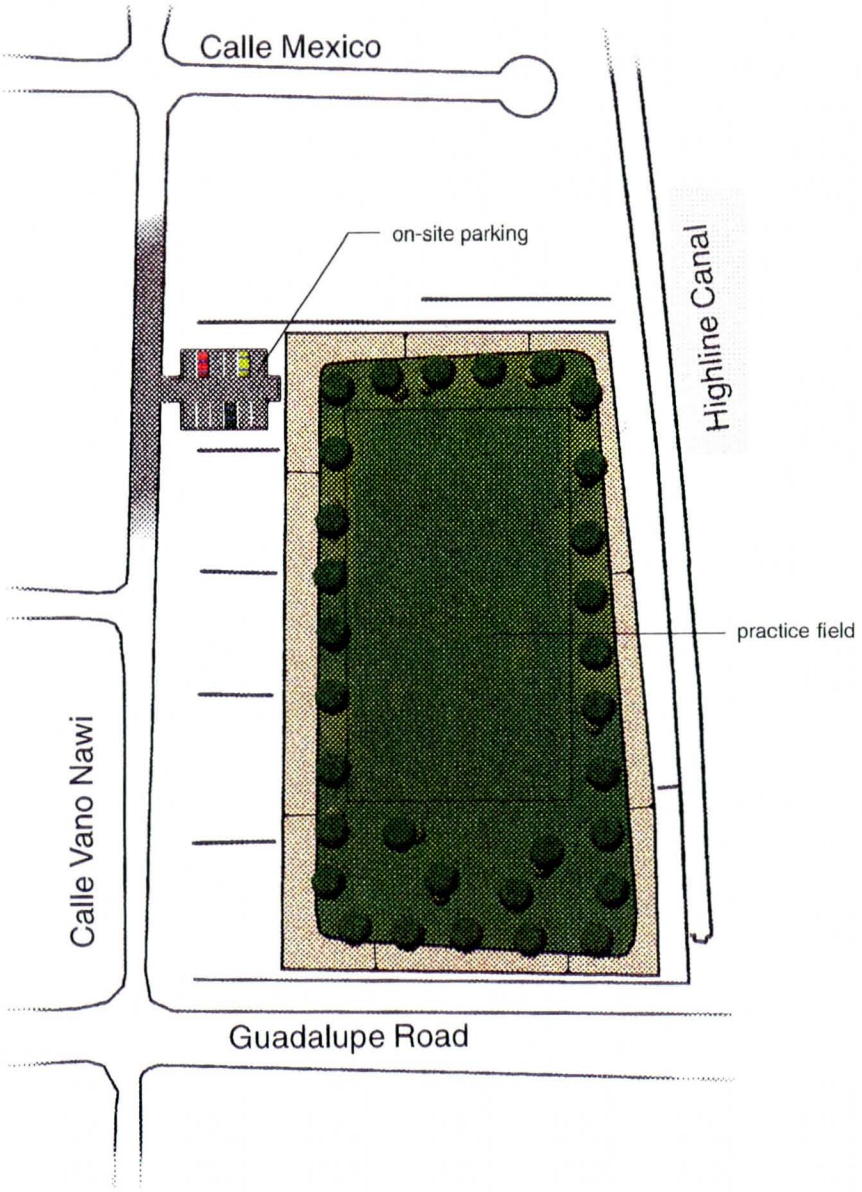
Appendix M

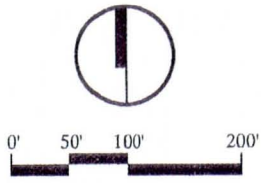
North, Central, and South Retention Basin Multi-Use Facility Concept Plans

DETENTION BASIN A



DETENTION BASIN D





DETENTION BASIN F

Appendix N

North, Central, and South Retention Basin Quantity and Cost Estimates

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

Revised 8-13-99 - wso

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
NORTH BASIN						
	201-1	CLEARING AND GRUBBING	SY	46820	$0.30	$14,046.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$29,000.00	$29,000.00
	215-1	BASIN EXCAVATION	CY	73400	$4.00	$293,600.00
	401-1	TRAFFIC CONTROL	LS	1	$5,000.00	$5,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	421380	$0.50	$210,690.00
	505-1	CATCH BASIN	EA	1	$5,000.00	$5,000.00
	618-1	18" STORM DRAIN	LF	380	$70.00	$26,600.00
	618-2	12" STORM DRAIN AND END SECTIONS	LF	160	$50.00	$8,000.00
	625-1	STORM DRAIN MANHOLE	EA	1	$5,000.00	$5,000.00
	900-2	DRYWELL	EA	1	$5,000.00	$5,000.00
		CONSTRUCTION COST SUBTOTAL				$601,936.00
		CONSTRUCTION CONTIGENCY AT 20%				$120,387.20
		TOTAL CONSTRUCTION COST				**$722,323.20**

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
CENTRAL BASIN						
	201-1	CLEARING AND GRUBBING	SY	20450	$0.30	$6,135.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$16,000.00	$16,000.00
	215-1	BASIN EXCAVATION	CY	48050	$4.00	$192,200.00
	401-1	TRAFFIC CONTROL	LS	1	$5,000.00	$5,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	184050	$0.50	$92,025.00
	900-1	AUTOMATED PUMP STATION (SIMPLEX)	EA	1	$25,000.00	$25,000.00
	900-2	DRYWELL	EA	1	$5,000.00	$5,000.00
		CONSTRUCTION COST SUBTOTAL				$341,360.00
		CONSTRUCTION CONTIGENCY AT 20%				$68,272.00
		TOTAL CONSTRUCTION COST				**$409,632.00**

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY Revised 8-13-99 - wso
GUADALUPE DRAINAGE IMPROVEMENT PROJECT - ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, Assignments #1 & #2
FCDMC PCN 035-02-30

CONCEPTUAL DESIGN ENGINEERS ESTIMATE

NO.	ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
SOUTH BASIN						
	201-1	CLEARING AND GRUBBING	SY	42360	$0.30	$12,708.00
	202-1	MOBILIZATION (5% OF CONSTRUCTION COST)	LS	1	$32,000.00	$32,000.00
	215-1	BASIN EXCAVATION	CY	101150	$4.00	$404,600.00
	401-1	TRAFFIC CONTROL	LS	1	$5,000.00	$5,000.00
	430-1	LANDSCAPING & IRRIGATION	SF	381240	$0.50	$190,620.00
	900-1	AUTOMATED PUMP STATION (SIMPLEX)	EA	1	$25,000.00	$25,000.00
	900-2	DRYWELL	EA	1	$5,000.00	$5,000.00
		CONSTRUCTION COST SUBTOTAL				$674,928.00
		CONSTRUCTION CONTIGENCY AT 20%				$134,985.60
		TOTAL CONSTRUCTION COST				**$809,913.60**

Appendix O

Review Comments and Responses for Preliminary Report Submittal

PENTACORE
ARIZONA

Civil Engineering
Construction Administration
Land Surveying
GPS Surveys
Planning
ADA Consulting

DESIGN MEMORANDUM

Date: August 13, 1999 **Project No.:** 5028.0001

To: Flood Control District of Maricopa County
2801 West Durango
Phoenix, Arizona 85009

Attn: Raju Shah, P.E.

From: W. Scott Ogden, P.E.

Subject: **Guadalupe Drainage Improvement Project**
Alternative Analysis for Conveyance Facilities
FCD 98-45, Assignments #1 and #2
Response to Preliminary Report Review Comments

On behalf of Pentacore Arizona, I wish to thank all of the reviewers of the preliminary report and plans for their thoughtful and thorough review comments. In response, the following are offered as responses to the written and or verbal comments received. Copies of those comments are included as attachments hereto.

Comments by Afshin Ahouraiyan, FCDMC dated 22 July 1999

1. Several factors were considered in assigning the RTIMP values. In areas where existing improvements exist, a few representative areas were evaluated to assess the effective (i.e. hydraulically connected) impervious cover and values were assigned. Future development areas were assigned RTIMP values based on the projected land-use and the County's suggested value. An attempt was also made to generally match the PBS&J report's average values, since they generally seemed reasonable. With regard to the school versus the industrial area, the industrial values were set at the suggested value by the County Manual. The school value was determined specific to the "School" land-use polygon and the measured impervious area within it, or in other words, it is project specific.

2. Reach 101102 will be subdivided. Reach 104106 is actually comprised of four separate reaches, each with a different geometry. The routing parameters coded for 104106 are considered a composite of those reaches and are assumed hydrologically equivalent to the overall reach characteristics. We played with the parameters some and found that in general, the peak discharges along the canal were hydrologically insensitive to the routing (less than 2% changes).

3. Routing length for 203205 will be adjusted.

4. The routings suggested will in reality not occur because the flows enter the retention basins at the upstream end of each. The intent is to schematically indicate that all the hydrographs are combined at each basin with Areas 2C, 7E, and 9H comprising the basins.

5. The intent of the HEC-RAS modeling was only to give a conceptual indication of the functionality of the channels for the alternative analysis. By the scope, only normal depth calculations were required, but it became very obvious to me that some attempt at estimating the backwater influence should be made. The HEC-RAS models are somewhat generic in that they do not exactly model the conceptual channels and they were never intended to. They were conceptual only. With regard to the low point between stations 63+00 and 64+00, that is not a good indicator of the actual minimum bank section. The profile just happens to pass through a localized low point. The actual average ground elevation for the area is still around 1225 feet.

Comments by Richard Harris of FCDMC dated 23 July 1999

Hydrualics/Report:

1. The file name will be changed.

2. This will be done in the final submittal.

3. This item will be changed.

4. Report is checked and revised

5. For the conceptual design, the freeboard requirement was assumed to be the minimum of 1 foot. Because these calculations and designs are conceptual only, full freeboard calculations are not warranted, although it is recognized that calculating the freeboard requirement based on 25% of the EGL elevation will exceed the 1-foot minimum simply by the depth of the channels alone. It is highly recommended, however, that the District consider a variance to this requirement for this project in order to mitigate the size of the facilities.

6. These were provided by the District's PM and may or may not require adjustment during the final design phase of this project.

7. Suggestion is noted and should be pursued during the final design.

8. Based on ADOT's previous communications, they cannot handle ANY additional flows during the first hour of the design storm. The pumping station that drains the retention areas

near the I-10 and Superstition interchange is strictly limited to 15 cfs. The suggested option will allow some flows to immediately begin entering the ADOT storm drain, which may not be desirable to ADOT. Additional Hydrologic modeling may be required to substantiate this approach.

9. The intent of the hydraulic modeling was only to give a conceptual indication of the functionality of the options for the alternative analysis and it is recognized that they are not adequate for a final hydraulic analysis. The scope and budget for this contract does not provide for detailed hydraulic analysis. In fact, only normal depth calculations were required for evaluation of the alternatives. It became very obvious however, that due to the flat terrain, some attempt at modeling the backwater influence had to be made since the normal depth analyses were giving questionably small sizes for the conveyance options. The HEC-RAS and StormCAD models are somewhat generic in that they are not exact or finished product models, only conceptual. They provide a tool to evaluate the options without spending the time and money required for a full and unnecessary hydraulic analysis. The refinement and detailing of the hydraulic models should be performed during the final design once the options are settled on.

10. This can be adjusted/refined with the final design plans, should this option be pursued further.

11. See return comment for #9.

12. See return comment for #9.

13. District PM to address.

14. Again, these are preliminary concept designs and for the purposes of the analyses, the soffit assumption is adequate. It is recommended, however, that during the course of the final design the stage elevation at the discharge time to peak be checked in each retention area to check for the controlling starting water surface elevation. The maximum elevations indicated in Table 5.1 are the elevation at which the total volume of runoff is stored within each basin. Essentially at that time, the whole system along the canal (basins and conveyance) will be one large pond.

Plans (General):

1. These are concept only and are not intended for construction, and therefore do not require geometric control. The construction line was created solely to provide some basis by which a consistent line could be referenced. A full reference sheet will be created to indicate the project reaches, sheet breaks, and bench marks.

2. See comment #1.

3. These analyses shall be performed during the final design phase.

4. Per agreement with the District's PM, we will provide this on the Final Concept plans only.

5. Per agreement with the District's PM, this shall be done for the Final Concept plans only.

6. Same comment as #5.

7. See comment #9 under the hydraulics/report section.

8. The intent of the typical cross section was to show that either double barrel RCP's or a concrete box will be used. See the plan callouts for specific culvert size and type.

Plans (Specific; Option 1):

1. Corrected for final report.

2. This was an attempt to account for some form of protection at the discharge location to the North Basin. The item is changed to a concrete splash pad with small end sill.

3. a) The value entered for the 12" water were in error. Based on Bid tabs received from the District, it is assumed that approximately 60 LF of DIP with restrained joints will be required at this crossing. b) The pipe costs are based on the additional structural section required to carry what was communicated as 100-ton loading requirement (this far exceeds standard HS-20 or HS-44 loads).

4. Removed per comment #2.

5. These items should be value engineered with the final design. The estimates provided are purposefully conservative for this level of cost estimating.

6. Per direction of the District's PM, the value is to remain at 20%.

Plans (Specific; Option 2):

1. a) Per agreement with the District's PM, the section shall be provided on the Final Concept Plans if employed. b) The text will be adjusted and the sheet reproduced.

2. a) A 50-foot roadway ROW extends to the canal ROW through this area. b) This can be accomplished with the final design.

3. a) Because of the channel width, the entire reach of roadway adjacent to the canal in this area will require relocation to the west. That relocation will require the purchase of the additional blocks of property. b) The final report will include a cost estimate for this relocation work.

Plans (Specific; Option 3):

1. The Reach 4 StormCAD model will be revised.

2. This sheet will be corrected and replotted in the final report.

3. The typical for this reach is generic for either a RCB or 2-barrel RCP's. (See return comment #8 under the Plans (General) section.

4. Corrected and replotted with the final report.

5. We will add these to the cost estimate.

6. a) See comment #9 in the hydraulics/report section. b) See return comment #5 to Afshin Ahouraiyan.

7. See return comment #9 in the hydraulics/report section.

8. The StormCAD models will be redone.

Plans (Specific; Option 3):

1. Per direction from the District's PM, we will add a line item 350-2 for canal demolition.

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399
(602) 506-1501
FAX: (602) 506-4601
TT: (602) 506-5897

07-22-99

MEMO TO: Raj Shah

FROM: Afshin Ahouraiyan

SUBJECT: Preliminary Drainage Report, Guadalupe Drainage Improvement Project Alternative Analysis

The following are comments on the subject study:

1- **Request an explanation on assigning of the percent impervious (RTIMP) values for the hydrological analysis. Example is why the RTIMP values for schools are at 60% versus 55% for Industrial area.**
2- **The routing reach 204205 is divided into two segments. Explain the reason for not dividing reach 100102 and 104106 into two segments. These reaches have flows routed next to the canal, same as routing reach 204205.**
3- **Concentration point 203 is further away than concentration 204, however, length for reach 203205 is shorter than the second part of routing reach 204205, (107 feet versus 450 feet). An explanation is needed to address this.**
4- **According to the drainage map the following routings are taking place under existing conditions. However they are not included in the model. The drainage map should be adjusted if the same map is being used for the alternative conditions or an HEC-1 model for the existing condition should also be submitted. The routings are 109110, 108110, 208216, 7E216, 311314, 9F314, 9G314, and 9H314.**
5- **In order to better anlayze the water surface elevations within each reach, for all the options that a HEC-RAS model was utilized, add cross sections for the lowest ground elevation locations. An example is to add a cross section between stations 63+00 and 64+00.**

There are no concerns on the schematic of the HEC-1 model and the main concerns are as mentioned above.

If you have any questions on this matter, please contact me at ext. 64519.

FLOOD CONTROL DISTRICT
of
Maricopa County

Interoffice Memorandum

DATE: July 23, 1999

TO: RCS RDS

VIA: MAL

FROM: RPH

SUBJECT: Guadalupe Drainage Improvement Project Alternative Analysis Preliminary Drainage Design Report

---

I have reviewed the subject materials, and offer the following comments:

Hydraulics/Report

1) The Stormcad model title Reach1.stm is confusing since the model represents both reach numbers 1 and 2. Please clarify with something like Reach1&2.stm for the title.

2) The drainage report should be stamped by an Arizona Registered Professional Engineer.

3) Under the column titled ▒ Description▒ in table 3.1, the item entitled ▒ Storage Route Inflow at CP 216▒ could not be located on Plate 1. Should this be relabeled as ▒ ..CP 210▒ ?

4) The text in the report has several grammatical errors. Please check.

5) The freeboard requirement in the design should be checked using equation 6.10 and related criteria from the Drainage Design Manual. From this, the actual design depths and station extents of open channel sections should be listed in the report and/or shown on the plans in order to substantiate and compare unit costs between the options.

6) Please explain why the ROW/Property Acquisition cost of $30,000.00 and the Relocation Expense of $75,000.00 are so low.

7) In order to minimize the need for additional ROW and mitigate the potential erosion problems that lateral inflows might cause to the earthen open channel embankments (options 2 and 5), I suggest that a design that includes a shotcrete low-flow trapezoid within the earthen section be explored.

8) FYI, storing the volume of flow that ADOT will require be ▒ strictly retained▒ may not require a manually operated head gate, drywell, or pump station if the outlet design includes a low flow pipe positioned at the base of an elevated, drop outlet box. This design requires less maintenance than the others, and therefore functions as intended, more often.

9) The standard head loss coefficient value used in the Stormcad modeling for locations where there are significant changes in discharge quantities, such as at node J-1 (near station 45+00, Option 3), should be either increased to 0.7, or, it should be replaced with an absolute head loss value derived by using equation 4.9a or 4.9b from the drainage design manual. The greater of the two values should be applied to the models.

10) To minimize head losses at junctions and transitions, the design should show that soffits are matched (Option 3, station 65+00).

11) At or near critical flow/depth is shown for several locations in the HEC-RAS output. Please adjust the models in order to avoid this condition. Also, both the contraction and expansion coefficients used in the modeling should be increased.

12) The V-type channel shown on the plans upstream of station 61+00 for reach 2 should be included in the related the HEC-RAS model.

13) Field check of the Central Basin site revealed that much of it is or once was used as a junk yard. Could constructing a basin at this site exacerbate an existing environmental hazard? What is the status/findings of the Environmental Report for this project?

14) Please substantiate using the soffit elevations for the beginning tailwater conditions in the hydraulic analyses. Please address the relevance of the maximum water surfaces shown in table 5.1.

Plans

General

1) The plans should list the project benchmark as well as any other benchmarks within close proximity to the drainage features. Also, the bearings of the construction centerline should be shown.

2) The index map inset shown along the left edge of the plan sheets should be enlarged to a regular sized sheet so that it is legible.

3) With due consideration to the hydraulic performance of open-channel drainage features, their design should address the most hydraulically efficient/cost effective dimensions. Please check.

4) The HGL and water surfaces should be shown in the profile views for all options.

5) The North arrow shown near the map scale on the P/P sheets should be moved to the plan view.

6) Please label the reach ID's on the plans.

7) Drainage feature lengths shown on the plans should reflect the lengths used in the Stormcad models. Please check.

8) Please clarify why the plan sheets for Option 4 include a cross-section that shows what seems to be a drainage alternate between double pipes vs. box culvert. If this is a design alternate, please provide an additional cost estimate and hydraulic analysis for the double pipe design, or, revise the cross-section to reflect features shown in the profile view of each sheet.

Plans

Specific

Option 1

1) The Option 1 Typical Section shown on the sheet representing stations 80+00 to 90+00 does not reflect features shown in the plan view. Please rectify.

2) The need for a $10,000.00 energy dissipater near the outlet of reach 1 is not substantiated by the results of the hydraulic analysis, which shows outlet velocities under 8 fps. Please clarify.

3) The cost of $15,000.00 for the 12▒ vertical water line relocation should be substantiated. Also, the unit costs for the box culverts are between $100.00 and $200.00 too high (Options 1-4). Please check.

4) Please explain why there is an energy dissipater listed in the cost estimate for reach 2.

5) Velocities listed in the hydraulic analysis for this option do not suggest that structural concrete be required for most locations. Cheaper alternatives should be explored, including gabions and interlocking block.

6) In order to address additional unexpected construction difficulties for reach 1, I suggest increasing the construction contingency to 25% (all options).

Option 2

1) A Typical Section for the V-shaped channel should be added to the sheet representing stations 50+00 to 60+00. Also on this sheet, some of the text in the profile view near the left edge got cut off. Please restore it.

2) Please explain why no new ROW is shown to be needed between stations 57+00 and 65+20 (plan view). Also, it might be useful to show the 16▒ VCP that parallels the channel upstream of station 65+00 in the Typical Section.

3) It is not clear why the entire block of land west of the channel between station 72+50 and 75+50 would need to be acquired. Please explain. Also, it appears that a section of the 18▒ VCP between stations 73+75 and 75+50 will need to be relocated. Please address in the cost estimate for this reach.

Option 3

1) The invert elevations shown on the plans and in the Stormcad model do not agree with one-another for the outlet of reach 4. Please rectify.

2) Features shown in the plan view and the profile view do not line up on the sheet representing stations 30+00 to 40+00. Please check.

3) The typical section shown on the sheet representing stations 70+00 to 80+00 does not relate to any features in the plan or profile views. Please replace it with a more appropriate section.

4) There is misprint for the station shown at the outlet to the North basin, on the plans please address.

5) Four additional storm drain manholes should be added to the cost estimate for reach 2; 3 additional each for both reaches 3 and 4.

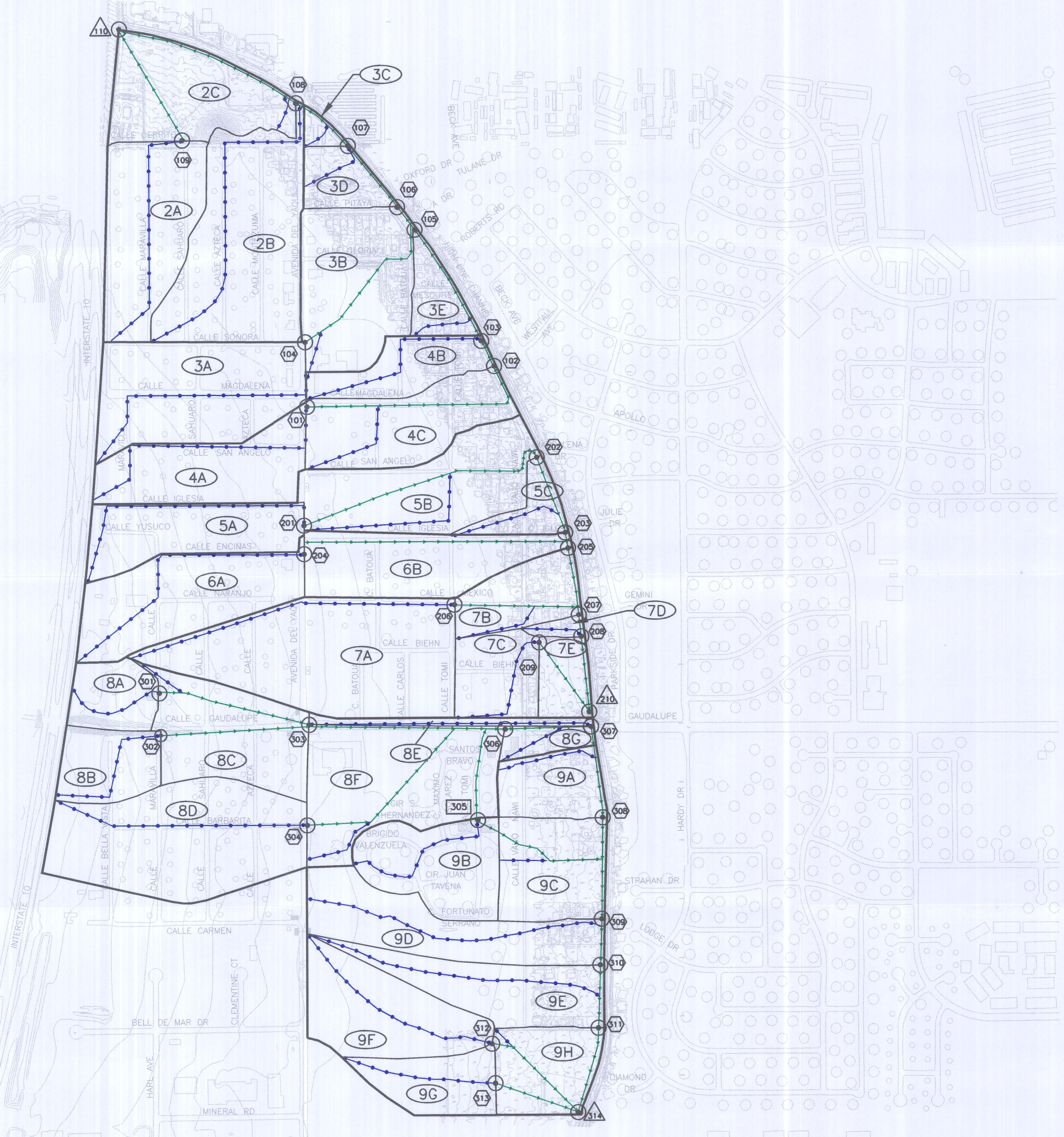
6) The head loss coefficient for the Stormcad node CP102 should be increased to equal 1.0. Also, the HGL elevation shown for pipe P-4 is above the ground. Please address.

7) The difference between the ground elevation and the HGL elevation for pipes P-6, P-8, and P-9 is less than 1' and therefore their design does not meet the criteria already set. Please address.

8) Please check the pipe lengths shown on the plans against those used in the Stormcad model for reaches 3 and 4. Several of them currently differ.

Option 4

1) Should item 350-1 in the Cost Estimate for reach 3 be increased to account for the tiling of the Highline Canal?



LEGEND

EXISTING RETENTION AREA

EXISTING SCUPPER

EXISTING CATCH BASIN & STORM DRAIN

HYDROGRAPH STORAGE ROUTE

CONCENTRATION POINT

302 HYDROGRAPH DIVERSION

2C SUBBASIN IDENTIFIER

109 HYDROGRAPH COMBINE

TIME OF CONCENTRATION FLOW PATH

ROUTING FLOW PATH

MAJOR BASIN BOUNDARY

MINOR BASIN BOUNDARY

200 0 200 400

SCALE: 1"=400'

NO.	REVISION	BY	DATE
3			
2			
1			

PENTACORE ARIZONA

Civil Engineering · Construction Administration · Land Surveying · Planning · ADA Consulting

2255 No. 44th St., SUITE 255 Phoenix, AZ 85008

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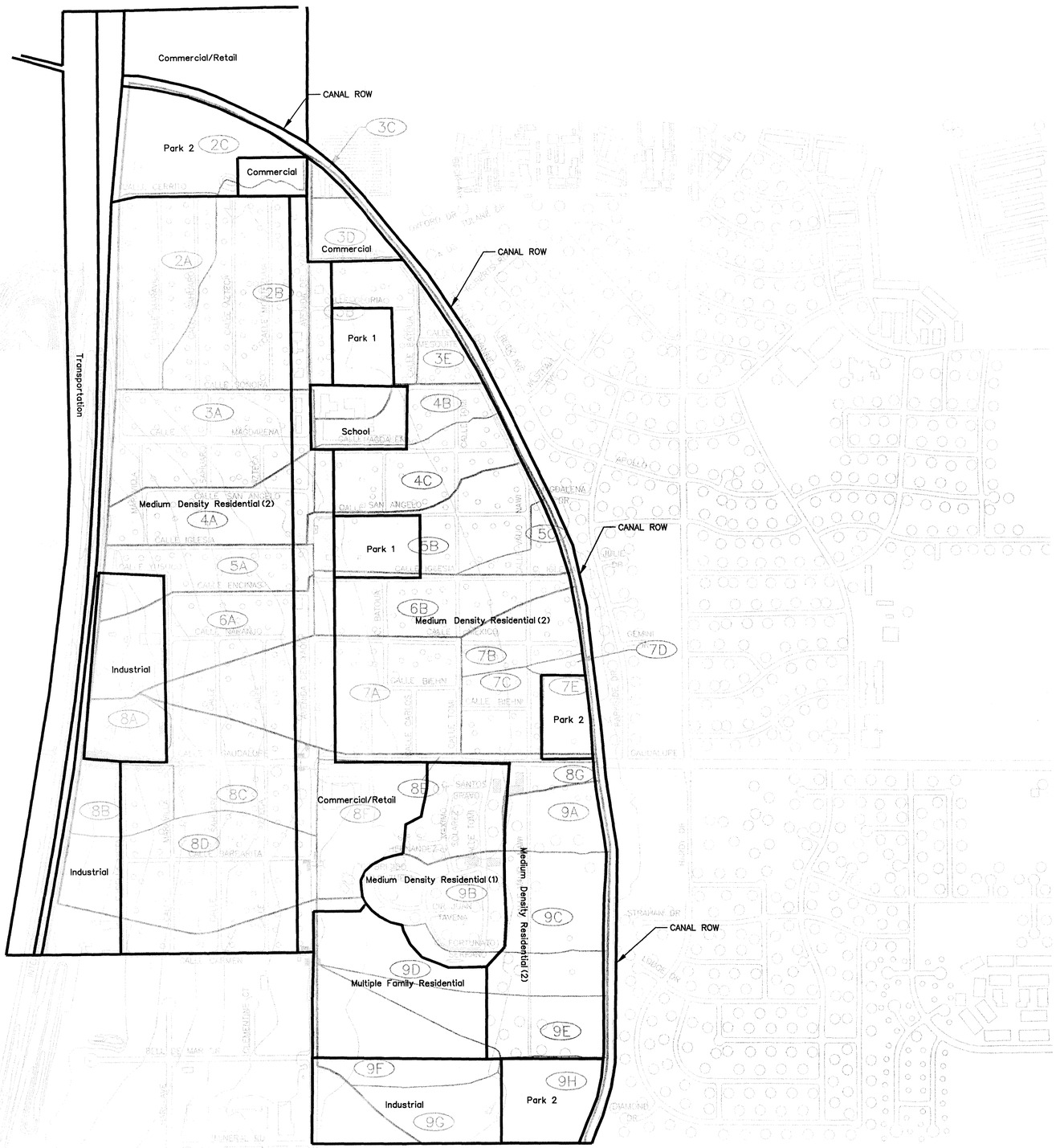
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

GUADALUPE DRAINAGE IMPROVEMENT PROJECT
ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, PCN 035-02-30

	BY	DATE
DESIGNED	WSO	08/99
DRAWN	KK	08/99
CHECKED	WSO	08/99

DRAWING NO.

PLATE 1
WATERSHED MAP



LEGEND

2C — SUBBASIN IDENTIFIER

——— MAJOR BASIN BOUNDARY

——— MINOR BASIN BOUNDARY

——— LAND USE BOUNDARY

200 0 200 400

NO.	REVISION	BY	DATE
3			
2			
1			

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ALTERNATIVE ANALYSIS FOR CONVEYANCE FACILITIES
FCD 98-45, PCN 035-02-30

	BY	DATE
DESIGNED	WSO	08/99
DRAWN	KK	08/99
CHECKED	WSO	08/99

DRAWING NO.

PLATE 2
LAND USE MAP