Book 1 of 13

Glendale Peoria

Area Drainage Master Plan Update

DATA COLLECTION REPORT

VOLUME DC

Entellus

Flood Control District of Maricopa County

GLENDALE

CITY OF PEORIA

Glendale Peoria
Area Drainage Master Plan Update

DATA COLLECTION REPORT

Property of
Flood Control District of MC Library
Return to
1801 W. Durango
Phoenix, AZ 85009

VOLUME DC

Contract FCD 99-44

May 30, 2001

Prepared by:

Intelligent Engineering
Environmental *Solutions*

Registered Professional Engineer (Civil)
CERTIFICATE NO.
29737
HERNAN A.
ARISTIZABAL
Date Signed 9-5-01
ARIZONA, U.S.A.

Entellus™

2255 N. 44th Street
Suite 125
Phoenix, AZ 58008
Phone (602) 244 2566
Fax (602) 244 8947
Web: www.entellus.com

In association with:

PENTACORE ARIZONA

LOGAN SIMPSON DESIGN INC.

LTM Engineering, Inc.
3923 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032

January 29, 2001

VOLUME DESIGNATION

VOLUME ID	Volume Name	Number
DC	Data Collection	1
HY	Hydrology	2
PA	Potential Alternatives	3
AA	Alternative Analysis (Level II)	4
RA	Recommended Alternatives (Level III)	5
ZA	Zone A Floodplain Delineation	6
DS	Detailed (Section 15)	7
AL	Arrowhead Lakes Hydrology	8
AR	Administrative Report (Correspondence)	9

Note: Volume ID will be used for Section, Plate, Figure, and Table identifiers.

Glendale/Peoria Area Drainage Master Plan Update

FCD 99-44

TABLE OF CONTENTS

DATA COLLECTION REPORT (VOLUME DC)

SECTION DC-1: EXECUTIVE SUMMARY 1:1

SECTION DC-2: PROJECT DESCRIPTION 2:1

2.1 Project Objective 2:1
2.2 Project Location 2:1
2.3 Sub-Areas 2:2
2.4 Flooding Problem Areas 2:2
2.4.1 North Side of ACDC Canal 2:4
2.4.2 91st Avenue and Greenway Channels to the New River 2:4
2.4.3 91st Avenue to the Agua Fria River along Beardsley Road, 115th Avenue and Bell Road 2:5
2.4.4 83rd Avenue to the New River north of Beardsley Road 2:5
2.4.5 Rock Springs Creek 2:6
2.4.6 Channel along North Side of Grand Avenue 2:6
2.4.7 Drainage along 99th Avenue and Bell Road to the Agua Fria River 2:6
2.4.8 Beardsley Channel from Lake Pleasant Road to 107th Avenue and the Ventana Lakes system. 2:7
2.4.9 Pinnacle Peak Road between 67th Avenue and the New River 2:7
2.4.10 Wier Wash 2:8
2.4.11 87th Avenue and Williams Road 2:8

SECTION DC-3: SCOPE OF PROJECT 3:1

SECTION DC-4: DATA COLLECTION RESULTS 4:1

4.1 ACDC Sub-Area 4:1
4.1.1 Current Conditions 4:1
4.1.2 Existing and Future Development Plans 4:2
4.1.3 Areas and Locations of Potential Flooding 4:2
4.1.4 Existing and Future Drainage Facilities 4:4
4.2 New River Sub-Area 4:4
4.2.1 Current Conditions 4:5
4.2.2 Existing and Future Development Plans 4:5

4.2.3 Areas and Locations of Potential Flooding 4:6
4.2.4 Existing and Future Drainage Facilities 4:9
4.3 Sun City Sub-Area 4:9
4.3.1 Current Conditions 4:9
4.3.2 Existing and Future Development Plans 4:10
4.3.3 Areas and Locations of Potential Flooding 4:10
4.3.4 Existing and Future Drainage Facilities 4:11
4.4 Agua Fria Sub-Area 4:11
4.4.1 Current Conditions 4:12
4.4.2 Existing and Future Development Plans 4:12
4.4.3 Areas and Locations of Potential Flooding 4:12
4.4.4 Existing and Future Drainage Facilities 4:13

SECTION DC-5: ENVIROMENTAL OVERVIEW 5:1

SECTION DC-6: ECOLOGICAL ASSESSMENT 6:1

SECTION DC-7: CULTURAL RESOURCE SURVEY 7:1

SECTION DC-8: LAND 8:1

8.1 Parcel Ownership 8:1
8.2 Rights-of-Entry Requirements 8:1

SECTION DC-9: HYDROLOGY/HYDRAULICS MODELS 9:1

9.1 ACDC Sub-Area 9:1
9.1.1 Summary of Models/Conditions 9:1
9.1.2 Concerns 9:3
9.2 New River Sub-Area 9:5
9.2.1 Summary of Models/Conditions 9:5
9.2.2 Concerns 9:5
9.3 Sun City Sub-Area 9:6
9.3.1 Summary of Models/Conditions 9:6
9.3.2 Concerns 9:7
9.4 Agua Fria Sub-Area 9:7
9.4.1 Summary of Models/Conditions 9:7
9.4.2 Concerns 9:8

SECTION DC-10: MAJOR UTILITIES 10:1

SECTION DC-11: DATA COLLECTION SOURCES **11:1**

SECTION DC-12: REFERENCES AND TABLES **12:1**

12.1 Data Collection Summary 12:1

12.2 Reference Documents 12:1

APPENDIX A. PLATES **A:1**

APPENDIX B. FIELD RECONAISSANCE DATA **B:1**

APPENDIX C. SCOPE OF WORK **C:1**

APPENDIX D. SURVEY FIELD NOTES **D:1**

LIST OF TABLES

Table DC-1 Existing/Proposed Structure Log
Table DC-2 Utilities in Study Area
Table DC-3 Data Collection Log

LIST OF FIGURES

Figure DC-1 Study Area
Figure DC-2 Major Sub-watersheds
Figure DC-3 Eleven Problem Areas
Figure DC-4 Original ADMS Subbasins

LIST OF PLATES

Plate DC-1 Developments
Plate DC-2 Existing/Planned Facilities - North
Plate DC-3 Existing/Planned Facilities - South
Plate DC-4 ACDC Sub-Area Problem Areas
Plate DC-5 New River Sub-Area Problem Areas
Plate DC-6 Sun City Sub-Area Problem Areas
Plate DC-7 Agua Fria Sub-Area Problem Areas

Glendale/Peoria Area Drainage Master Plan Update
FCD No. 99-44

DATA COLLECTION REPORT

SECTION DC-1: EXECUTIVE SUMMARY

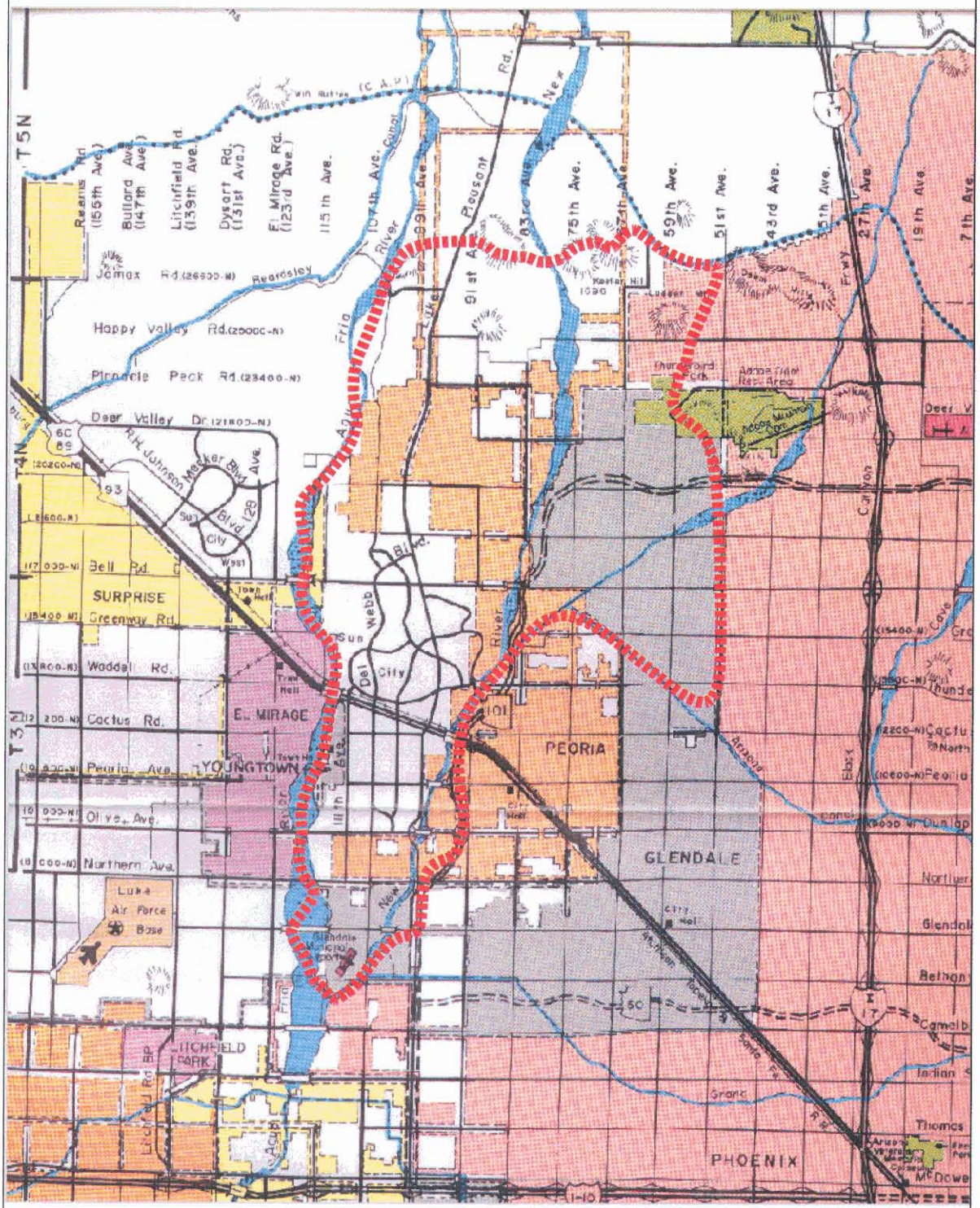
This report presents a summary of data collected as of the date of preparation for the Glendale/Peoria ADMP Update. The purpose of the update is to develop a Master Drainage Plan for portions of the previous ADMP completed for the Flood Control District of Maricopa County (District) in 1987 **(Reference 1)**. The project includes areas within the cities of Glendale, Peoria, Youngtown, and unincorporated areas of Maricopa County as shown in **Figure DC-1**. To facilitate discussion, the study area was divided into the following four sub-areas as shown in **Figure DC-2**:

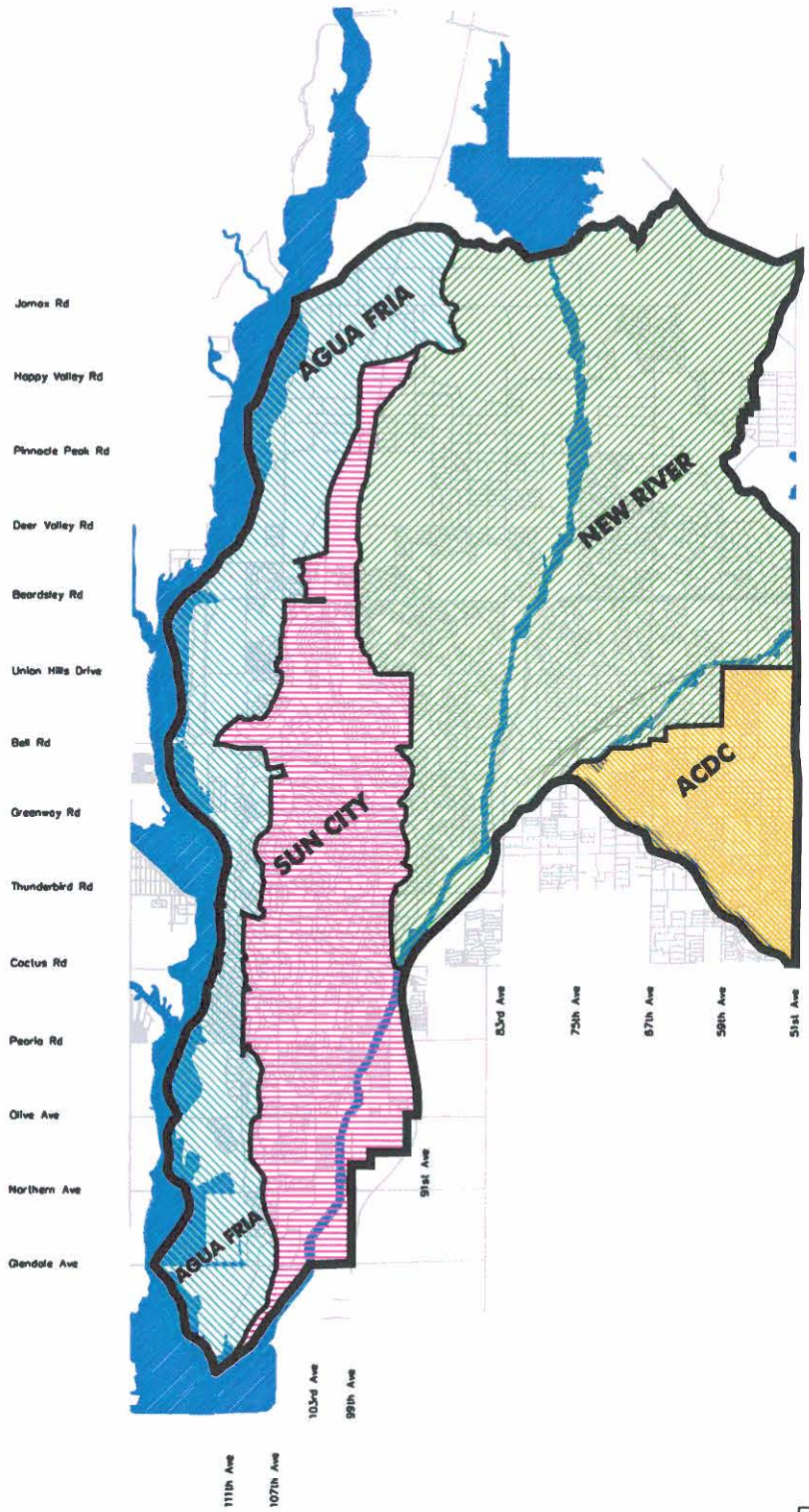
- ACDC Sub-area
- New River Sub-area
- Sun City Sub-area
- Agua Fria Sub-area

The scope of this project is focused in the eleven areas depicted in **Figure DC-3** and further described on **Plates DC-4** through **DC-7**.

Existing and future major structures identified during the data collection effort are shown on **Plates DC-2** and **DC-3** and described in **Table DC-1** contained in **Appendix B**.

The ACDC sub-area is fully developed with only small pockets of vacant land. The flooding problem investigation was focused on a 1500-foot strip adjacent to the northern bank of the Arizona Canal Diversion Channel (ACDC). The identified flooding problem locations are shown on **Plate DC-4** and described in Subsection 4.1.3. Existing major facilities in this sub-area primarily consist of the ACDC and the trunk line storm drain located in 51st, 59th, and 67th Avenues, as well as Thunderbird and Bell Roads.


T5N
T4N
T3N
Reems Rd (155th Ave.)
Bullard Ave. (147th Ave.)
Litchfield Rd. (139th Ave.)
Dysart Rd. (131st Ave.)
El Mirage Rd. (123rd Ave.)
115th Ave.
107th Ave.
99th Ave.
91st Ave.
83rd Ave.
75th Ave.
67th Ave.
59th Ave.
51st Ave.
43rd Ave.
35th Ave.
27th Ave.
19th Ave.
7th Ave.
Jomax Rd.
Happy Valley Rd.
Pinnacle Peak Rd.
Deer Valley Dr.
Bell Rd.
SURPRISE
Greenway Rd.
Waddell Rd.
Cactus Rd.
E. MIRAGE
YOUNGTOWN
Peoria Ave.
Olive Ave.
Northern Ave.
Luke Air Force Base
LITCHFIELD PARK
PEORIA
GLENDALE
PHOENIX
Sun City West
Sun City
Pleasant Ridge
Arizona Canal
Grand Canal
Thunderbird Park
Adobe Field Rec. Area
Deer V
Cactu
Peoria
Dunlap
Norther
Glendal
Bethan
Camelb
Indian
Thomas
McDowe
Cave
Thunde
Canyon
Elbow
Arizona
Santa Fe
Rd.
Freeway
Rd.
Pleasant
Ridge
Canal
Arizona
Canal
Grand
Canal
Sun
City
Del
Webb
Blvd.
Sun
City
West
Blvd.
Blvd.
Ave.
Blvd.
Ave.
Blvd.
Ave

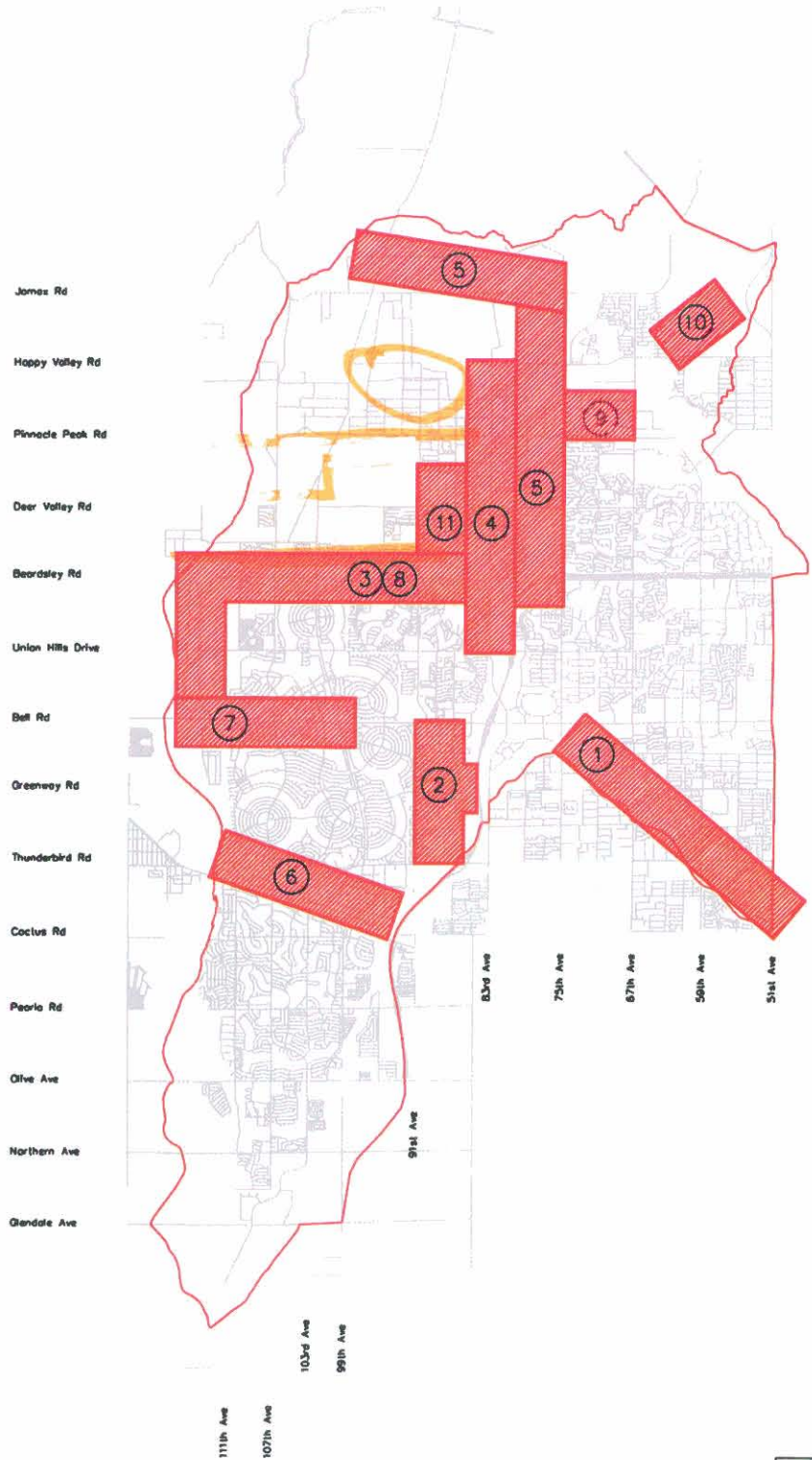


Entellus

GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

IN ASSOCIATION WITH:
PENTAGON ARIZONA
LTM Engineering, Inc.

GLENDALE/PEORIA ADMP
SUB-AREA BOUNDARIES
FIGURE DC-2



Entellus

GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

IN ASSOCIATION WITH:
PENTAGON ARIZONA
LTM Engineering, Inc.

GLENDALE/PEORIA ADMP
SUB-AREA BOUNDARIES
FIGURE DC-3

The New River sub-area consists of urban areas in different stages of development, ranging from fully developed to natural desert. The flooding problem investigation was focused on the flooding problem locations (as discussed in Section 2.4) within this sub-area. The identified flooding problem locations are shown on **Plate DC-5** and described in Subsection 4.2.3. Most of the existing structures in this sub-area were constructed as part of a subdivision development. Major drainage facilities are located mostly along arterial streets. Typical drainage channels are along 83rd Avenue, 91st Avenue, Beardsley Road and Greenway Road.

The Sun City sub-area includes most of the master planned community of Sun City and the City of Youngtown. This area is fully developed except for the northern and southern tips. Data collection efforts were concentrated on the two flooding problem locations within this sub-area. The identified flooding problem locations are shown on **Plate DC-6** and described in Subsection 4.3.3. Major drainage structures within this sub-area are the channels along Grand Avenue, 99th Avenue, Del Webb Boulevard, and Bell Road.

The Agua Fria Sub-area consists of mostly undeveloped land with pockets of industrial and residential developments. Investigation in this sub-area was focused on the two flooding problem locations within the sub-area. The identified flooding problem locations are shown on **Plate DC-7** and described in Subsection 4.4.3. A few number of drainage structures are within this sub-area, mainly in the form of channels along Grand Avenue, Bell Road and Beardsley Road.

For the ACDC and New River sub-areas, the ACDC Area Drainage Master Study models done by Kaminski-Hubbard **(Reference 5)** are the most current. For the Sun City sub-area, the most current and relevant model is the Sun City Hydrology Study model prepared by the District in 1998 **(Reference 4)**. Modifications to these previous hydrology models will be limited to the study area boundaries (that means that no changes will be made for existing hydrology for areas east of 51st Avenue).

SECTION DC-2: PROJECT DESCRIPTION

2.1 Project Objective

The purpose of the Glendale/Peoria ADMP Update is to update a portion of the existing Glendale/Peoria ADMP study, completed for the District in May 1987 **(Reference 1)**, by quantifying the extent of flooding problems and developing alternative solutions to these problems.

There are three major objectives of the study. The first objective is to quantify the reported drainage problems within the study area. The second objective is to assess the adequacy of existing infrastructures in terms of drainage and flood protection. The third objective is to develop a plan to prevent the study area from potential flood damage caused by a 100-year storm. Since the natural watersheds of the study area have been developed rapidly in the past decade, the previous hydrology models need to be modified to accurately reflect the present and future conditions of the study area. In addition, it is necessary to update the hydrology models to meet the current District standards. Area floodplain managers, municipalities, and developers may use the results of this study as a basis for drainage regulation, improvements and design.

2.2 Project Location

The area of study for the Glendale/Peoria ADMP Update falls within Glendale, Peoria, and Youngtown, as well as some unincorporated areas of Maricopa County. It includes the area covered by the original study north of

the Arizona Canal Diversion Channel (ACDC), and portions of the New River, Agua Fria River, and Skunk Creek, as shown in **Figure DC-1**.

The southern boundary of the study area is formed by the ACDC and the New River. The New River Dam, 51st Avenue, Hedgpeth Hills, and the East Wing and Ludden Mountains form the northern and eastern boundaries for the study area. The Agua Fria River forms the western boundary of the study area. The ACDC contributes to Skunk Creek at approximately 75th Avenue, while Skunk Creek contributes to the New River in the vicinity of 87th Avenue. The New River joins the Agua Fria River near Bethany Home and Camelback Roads, forming the southerly extent of the study area. The total study area is approximately 80 square miles.

2.3 Sub-Areas

The study area was broken down into the following four sub-areas based upon drainage patterns and corporate limits or development boundaries:

- ACDC Sub-area
- New River Sub-area
- Sun City Sub-area
- Agua Fria Sub-area

The boundaries of each sub-area are shown on **Figure DC-2** of this report.

2.4 Flooding Problem Areas

The scope of this project is focused on eleven areas (as indicated in **Figure DC-3**) that were identified by the District with known flooding problems. Photographs from field visits are included in **Appendix B**. The eleven problem areas are summarized on the next page.

NO.	FLOODING PROBLEM AREAS	SUB-AREA
1	North side of ACDC	ACDC
2	91st Avenue and Greenway channels to the New River	New River
3	91st Avenue to the Agua Fria River along Beardsley Road, 115th Avenue and Bell Road.	New River
4	83rd Avenue to the New River north of Beardsley Road	New River
5	Rock Springs Creek	New River
6	Channel along north side of Grand Avenue	Sun City
7	Drainage along 99th Avenue and Bell Road to the Agua Fria River	Sun City
8	Beardsley Drainage Channel between Lake Pleasant Road and 107th Avenue	New River
9	Pinnacle Peak Road between 67th Avenue and the New River	New River
10	Wier Wash	New River
11	87th Avenue and Williams Road	New River

The flooding problems within each problem area are briefly discussed in the following paragraphs.

2.4.1 North Side of ACDC

No provisions were made to convey storm water from the nearby subdivisions to the ACDC. Kaminski-Hubbard did a preliminary study for a 500-foot wide swath along the north side of the ACDC **(Reference 7)**.

Flooding in this area typically stems from surcharging of existing facilities that were originally sized to convey the 10-year peak flows. Flows exceeding this design event would flow to the ACDC in the form of overland flow, causing erosion and inundation in the streets. Flooding is especially prevalent at the locations where major mile and half-mile roadways intersect the ACDC.

2.4.2 91st Avenue and Greenway Channels to the New River

Significant periodic flooding has been reported in the vicinity of 91st Avenue and Union Hills Drive. Runoff collected at this location and the surrounding locations is ultimately conveyed to the 91st Avenue channel. A storm drain collection, detention, and conveyance system is currently under construction to reduce the peak flows in this area. However, the capacity of the Greenway channel may be insufficient to handle the flows resulting from a 100-year, 6-hour storm event. Existing development downstream of 91st Avenue and the Greenway Road alignment may also be susceptible to flooding during major storms.

If the capacity of the Greenway channel is adequate, the analysis will be complete. If the channel is under capacity, the effect of

overtopping down 91st Avenue and into Desert Harbor development will be analyzed during the Level II alternative development.

2.4.3 91st Avenue to the Agua Fria River along Beardsley Road, 115th Avenue and Bell Road

Runoff from the area north of Ventana Lakes discharges to a channel along Beardsley Road and then flows towards the Agua Fria River. Upon reaching 115th Avenue the capacity of the channel is severely restricted at the inlet into the Coyote Lakes golf course, and hence causes the channel to overtop. The infiltration ponds at the adjacent treatment plant restrict the path for storm water flowing to the Agua Fria River. Berms were subsequently constructed to divert water to the south. Without anticipation of any diversion from the north, local development to the south did not provide additional capacity to handle this flow in their drainage system. A diversion berm constructed around an adjacent sand and gravel operation exacerbates the problem. As a result, storm runoff cannot adequately reach the Agua Fria River, causing flooding problems in the vicinity of 115th Avenue and Bell Road.

2.4.4 83rd Avenue to the New River north of Beardsley Road

Flooding along the northern reaches of 83rd Avenue is due to piecemeal development coupled with the lack of a joint drainage plan between Maricopa County and the City of Peoria. There are two types of drainage problems in this area: 1) concentrated flows around existing developments without ultimate discharge points; and 2) substantial offsite flows from the upstream-undeveloped areas.

2.4.5 Rock Springs Creek

Historically, Rock Springs Creek flowed southerly from its origin near the Whitewing Mountains and joins the New River just north of Beardsley Road. The historic flow path crossed an area south of Pinnacle Peak Road where a sand and gravel mining operation was later established. After this mining operation was in place, it completely cutoff Rock Springs Creek from the New River. Currently the creek ends at Patrick Road. At this location, the flow spreads over a wide area and is stored in several excavated areas within the mining operation site. However, the mining operation was closed and the area will likely be developed in the near future. Consequently, the excavated areas will be filled eventually and flow in Rock Spring Creek would have to find a new way to the New River. In addition, the area upstream from Pinnacle Peak Road is currently under development and some of these developments are encroaching the floodplain of the creek.

2.4.6 Channel along North Side of Grand Avenue

Flooding has been reported along Grand Avenue at various points between the Agua Fria and New Rivers. The community of Sun City was designed prior to most of the current storm flow retention policies or any hydrologic master planning. Therefore, the channel along the north side of Grand Avenue needs to be re-examined to comply with the current regional requirements.

2.4.7 Drainage along 99th Avenue and Bell Road to the Agua Fria River

99th Avenue is a major drainage way for the northern portion of Sun City. Flows are diverted to the west to the Bell Road channel at Del

Webb Boulevard. Stormwater runoff in excess of the 99th Avenue channel capacity may spill into the streets and other areas of Sun City near 99th Avenue and Del Webb Boulevard. This drainage system contains numerous transitions and sharp turns, which could significantly decrease the conveyance capacity.

2.4.8 Beardsley Channel from Lake Pleasant Road to 107th Avenue and the Ventana Lakes system.

The lakes within the Ventana Lakes development on the north side of Beardsley Road were originally designed to provide storage for storm runoff. However, these lakes are typically kept too full and left hardly any room for storage of storm water. Even relatively minor storms would overtop the lakes. Excess flow from the lakes normally spills into the Beardsley Road channel and flows west to the Agua Fria River. However, the Beardsley Road channel was not designed to handle this additional flow.

2.4.9 Pinnacle Peak Road between 67th Avenue and the New River

There have been repeated flooding problems in the subdivisions located south of Pinnacle Peak Road, east of the New River. These flooding problems are caused by runoff from the upper-basin area that is intercepted and concentrated along the northern perimeter of the subdivisions. These concentrated flows are directed into the subdivisions via overland drainage tracts and surface streets. The lots along the northern perimeter of the subdivision are backed to Pinnacle Peak Road and are elevated. The stormwater flows follow a circuitous route down steeply sloping local streets, including several right angle turns, which contributed to the flooding problem. The runoff is removed from the roadway via grated and curb opening

inlet catch basins located both on-grade, and in sumps, that discharge to a storm drain. The collected runoff is ultimately conveyed and discharged to the New River at various locations along the 75th Avenue alignment.

2.4.10 Wier Wash

Many development activities are currently underway in the Wier Wash area and potential drainage problems may occur. The wash has been completely replaced by a man-made channel from the Jomax Road crossing to its confluence with the New River. This channel was constructed as part of the Terramar subdivision and its performance under a 100-year storm is unclear.

2.4.11 87th Avenue and Williams Road

An old irrigation ditch is located on the south side of Williams Road. The ditch has been filled in and its banks are higher than the roadway or the ground in each side. Flow from the contributing area north of Williams Road ponds behind the ditch and floods the roadway. A low spot has been created along 87th Avenue on the abandoned ditch bank. Once the water level is high enough, runoff would flow down 87th Avenue.

SECTION DC-3: SCOPE OF PROJECT

The scope of the project is included in **Appendix C** of this report.

SECTION DC-4: DATA COLLECTION RESULTS

4.1 ACDC Sub-Area

The New River Sub-area on the north, 51st Avenue on the east, the ACDC on the south, and the confluence of Skunk Creek and the ACDC on the west bound the ACDC Sub-area. The majority of this sub-area is situated within the City of Glendale, with a very small western-most portion within the City of Peoria. The area is characterized by traditional urban development with a mix of land uses ranging from low density single-family residential to high-density commercial and retail areas. All runoff generated by this sub-area drains to the ACDC, and is conveyed either overland by streets and drainage tracts, or underground by storm drains. The general drainage pattern is to the southwest.

4.1.1 Current Conditions

The majority of the ACDC Sub-area is fully developed with only small, scattered pockets of vacant land. Most of the older single-family subdivisions were developed prior to the implementation of more stringent retention policies and, therefore, provide little to no retention for storm runoff. Most of the newer subdivisions (post 1990) provide retention in centralized basins and most, if not all, of the high density residential, commercial/industrial, and retail developments provide onsite retention either in landscaped basins or within parking areas.

4.1.2 Existing and Future Development Plans

The largest tract of vacant land remaining within the sub-area is approximately 100 acres in size and is located upstream of the junction of Skunk Creek and the ACDC, between the two watercourses. That parcel is in the preliminary stages of development planning and will likely be fully developed within the next two years. The remaining parcels are also likely to develop in the near future.

4.1.3 Areas and Locations of Potential Flooding

According to the scope of work for this project, investigations into areas and locations of current and potential flooding for this sub-area are primarily limited to the 1,500-foot strip adjacent to the northern bank of the ACDC, between 51st Avenue and the ACDC confluence with Skunk Creek. This area is indicated on **Plate DC-4**. Because the area is primarily developed and the watershed hydrology is generally not expected to change significantly in the future, the current and potential flooding locations are considered to be the same. The following are summaries of the areas identified to exhibit flooding potential during the data collection effort. The numerical identifiers indicated on **Plate DC-4** show the general location of the flooding area.

Area 1-1 – This flooding problem was identified in the Kaminski-Hubbard ACDC ADMS Phase I, Volume 2.2 report **(Reference 5)**. A sag with catch basins is located in 59th Avenue approximately 500-feet north of the ACDC. The catch basins and storm drain to which they discharge were sized for a 10-year flow. Runoff exceeding this

capacity ponds within 59th Avenue and then spills westerly through an existing nursery to the ACDC.

Area 1-2 – A sump is located in 61st Avenue just south of Hearn Road, and is drained by one small catch basin and a small diameter storm drain. According to the City of Glendale, there have been several reports of flooding at this location.

Area 1-3 – Country Gables Drive and 63rd Avenue both collect and convey a significant volume of storm water, concentrating the flows at the intersection of the two streets. At this point, much of the flows pass southerly through the schoolyard and some will continue easterly within 63rd Avenue. The flows continuing easterly in 63rd Avenue will eventually flow down Banff Lane and into the sag in the cul-de-sac at 64th Avenue. It should be noted that this area is already targeted by the City of Glendale for a proposed storm drain (see **Plate DC-3**). However, no studies have been performed to date.

Area 1-4 – The sag located at the cul-de-sac of 66th Lane is experiencing significant erosion of the landscaped areas adjacent to the existing scupper spillway. It is obvious from field visits that runoff intended to be removed by the scupper exceeds the capacity of the spillway.

Area 1-5 – Sumps are located at the intersections of 70th Avenue and Greenway Road, and 71st Avenue and Greenway Road. The catch basins currently in place to drain these sags have very small openings

and cause significant flows to pond and spill overland into the ACDC.

4.1.4 Existing and Future Drainage Facilities

The major drainage facilities within this sub-area primarily consist of the ACDC and the trunk line storm drains located within 51st, 59th, and 67th Avenues, and Thunderbird and Bell Roads. The remaining existing drainage facilities are those that were constructed with the subdivisions and commercial areas to satisfy site-specific storage and conveyance requirements.

The only future drainage facilities proposed for this sub-area are lateral extensions of the trunk storm drains and a few, site specific, development-oriented improvements. Future and existing facilities are indicated on **Plate DC-3** and details are provided in **Table DC-1** located in **Appendix B** of this report.

4.2 New River Sub-Area

The New River Sub-area includes the portion of the project area draining to the New River from the New River Dam to its confluence with the Agua Fria River, excluding portions of Sun City, Youngtown and the ACDC drainage area. This Sub-area also includes the area tributary to Skunk Creek from 51st Avenue to its confluence with the New River. This sub-area is approximately 35 square miles and is located mostly within the City of Peoria with small portions within the Cities of Glendale and Phoenix, and the unincorporated area of Maricopa County.

4.2.1 Current Conditions

This sub-area consists of urban areas in different stages of development, ranging from fully developed area (mostly residential) to natural desert.

4.2.2 Existing and Future Development Plans

This area has experienced quite rapid development and the comprehensive drainage development plan is outdated. The original Glendale/Peoria ADMP completed in 1987 **(Reference 1)** was formally adopted by the City of Peoria, but has not been strictly enforced. The developers have been building drainage infrastructures in a piecemeal manner. It is expected that the entire sub-area will be fully developed within the next ten years.

In addition to the City's above-mentioned plan, the City of Peoria has the following planning documents:

- Trails Master Plan
- Peoria Desert Lands Conservation Master Plan
- Rivers Master Plan
- City of Peoria Parks Master Plan

The City also has a Hill Side Ordinance Amendment to their zoning ordinance.

The City of Glendale also has similar plans and ordinances. However, the portion of this sub-area within the City of Glendale corporate boundaries has been mostly developed. New development

probably would not have as much impact on the overall drainage in this area.

The District is conducting a Watercourse Master Plan for the New River and the Agua Fria River. The District is also conducting a Zone A Floodplain delineation for Rock Springs Creek. In addition, the District completed a conceptual plan for recreational corridors along the Agua Fria River in 1999.

4.2.3 Areas and Locations of Potential Flooding

According to the scope of work for this project, the investigation into the locations of potential flooding within this sub-area focused on six areas. These areas are: the Greenway channel, the 83rd Avenue channel, Rock Springs Creek, Pinnacle Peak Road and 67th Avenue, 87th Avenue and Williams Road, and the master planned community of Arrowhead Lakes. These locations are identified on **Plate DC-5** and described below.

Area 2-1 - The 91st Avenue channel drains into a multiple-barrel culvert that makes a ninety-degree turn into the Greenway alignment channel. During a large rainfall event, the culvert's capacity may be exceeded, causing the 91st Avenue channel to be overtopped.

Area 2-2 - The Greenway channel was constructed against the surrounding ground slope for a portion of the channel. There is not enough channel gradient between 91st Avenue and the New River. This condition makes the channel very susceptible to back water

effects from the New River and may not be very effective under New River's 100-year water surface conditions.

Area 2-3 - When the culvert capacity and Greenway channel are exceeded, the flow will be directed to the south along 91st Avenue and into the Desert Harbor development. This may cause local flooding or operational problems to the lakes within the Desert Harbor development.

Area 4-1 - The lack of an overall drainage plan has caused a piecemeal drainage system with frequent transitions and turns which decrease the overall efficiency of the system. The performance of this drainage system will be difficult to ascertain and will require careful modeling.

Area 5-1 - The historical flow path of the Rock Springs Creek has been significantly altered. The creek historical outlet to the New River has been cut off. Currently, flows are stored in the excavated areas for a sand and gravel mining operation. However, the mining operation is close and the excavated area will be filled by new developments and flows will have to find a new way to the New River.

Area 5-2 - Several single-family developments have been constructed that encroach the floodplain.

Area 9-1 - The overland runoff is not directed to any concentration points where it can be conveyed in the existing drainageways through

the subdivision to the south. Localized flooding has been reported because local flows cannot reach the drainageways' inlets.

Area 9-2 – Due to the lack of an area drainage plan, storm runoff was redirected by housing developments and consolidated at drainage corridors, sending impacts to downstream areas.

Area 11-1 - The abandoned irrigation canal along the south side of Williams Road causes ponding of runoff at the road. There is no specific drainage path to drain the area. However, 87th Avenue and 89th Avenue are lower than the adjacent ground and has become the drainage path for these flows once the ponded water is deep enough.

Area 12-1 - The lakes in the Arrowhead Lakes developments were designed to meet the runoff storage requirements. However, the lakes are operated in such a way that little storage is available. During relatively small rainfall events, the lakes capacity may be exceeded and it is unclear what effects will have on the Arrowhead Lakes development or downstream subdivisions.

Area 12-2 - There is an unnamed wash, which originates at the CAP Canal on the northern boundary of this project. It flows southwesterly through a saddle in the mountains and ends at the lake system of Arrowhead Lakes development. North of Pinnacle Peak Road, the wash is not well defined. This area is currently under development.

4.2.4 Existing and Future Drainage Facilities

There are several existing drainage facilities within this sub-area. Most of these facilities were constructed as part of the subdivisions to take care of their own runoff and meet on-site storage and conveyance requirements. Several man-made lake systems are within this sub-area. Most of these lakes were built as amenities as well as to meet storage requirements. However, the operation of these lakes may limit the runoff storage potential of these facilities. The main existing drainage facilities are encountered mostly along the arterial roads. **Plates DC-2** and **DC-3** show the location of existing and future facilities and details are provided on **Table DC-1** located in **Appendix B** of this report.

4.3 Sun City Sub-Area

The Sun City Sub-area includes most of the master planned communities of Sun City and Youngtown, the area north of Sun City contributing to the 99th Avenue storm drain, and the south portion of the study area near the confluence of the New River and the Agua Fria River. This sub-area is approximately 20 square miles. The north 0.7 square mile portion of this sub-area is within the City of Peoria but most of the area is in the unincorporated Sun City development. The south portion (approximately 4 square miles) is in the Town of Youngtown. This sub-area drains both to the New River and the Agua Fria River.

4.3.1 Current Conditions

With the exception of the northern and southern ends, the Sun City Sub-area consists mainly of high-density single-family type development. The north end is an undeveloped area within the City

of Peoria, and the southern end includes residential and industrial areas within the cities of Peoria and Glendale.

4.3.2 Existing and Future Development Plans

Both Sun City and Youngtown are fully developed and the only tracks of vacant land are located in the northern and southern ends of the sub-area. Both of these areas will most likely be fully developed in the near future.

4.3.3 Areas and Locations of Potential Flooding

According to the scope of work for this project, the investigation into the location of potential flooding within this sub-area was primarily focused on the Grand Avenue Channel and the 99th Avenue drainage system. These locations are identified in **Plate DC-6** and described below.

Area 6-1 - The capacity of the Grand Avenue channel is exceeded during medium rainfall events. The channel was not designed to handle additional flows generated in the upstream development.

Area 6-2 - The capacity of the canal is exceeded during medium rainfall events. The channel was not designed to handle additional flows generated in the upstream development.

Area 7-1 - The flow is routed ninety-degrees within the multiple-barrel culvert. During a large rainfall event, the culvert capacity may be exceeded, causing flow to overtop the channels and flood downstream areas.

Area 7-2 - The flow is routed through several sharp turns within the channel. A large rainfall event may cause the channel to overtop.

Area 8-1 - The Beardsley Road channel begins at the intersection of 99th Avenue and Beardsley Road. A culvert drains the area from the north into this channel. However, flows in excess of the capacity of the culvert may overtop the road and enter the 99th Avenue channel.

Area 8-2 - The lakes in the Ventana Lakes development are kept full and during minor rainfall events the lakes capacities may be exceeded. If this is the case, flow will overtop the road enter into the Beardsley channel.

4.3.4 Existing and Future Drainage Facilities

The main drainage facilities in this sub-area are the Grand Avenue channel and the 99th Avenue/Bell Road channel. These facilities, along with other drainage facilities, are indicated in **Plates DC-2 and DC-3** and details are provided in **Table DC-1** located in **Appendix B** of this report.

4.4 Agua Fria Sub-Area

This sub-area includes the east watershed of the Agua Fria River from the Whitewing mountains to the confluence with the New River. The sub-area does not include the portions of Sun City or Youngtown tributary to the Agua Fria River. The size of this sub-area is approximately 17 square miles and is located mostly within the unincorporated area of Maricopa County with small portions within the Cities of Peoria and Surprise.

4.4.1 Current Conditions

This sub-area consists of mostly undeveloped areas with pockets of residential and industrial developments. The main development includes two treatment plants and a sand and gravel operation as well as the Coyote Lakes and Ventana Lakes subdivisions.

4.4.2 Existing and Future Development Plans

The northern portion of this sub-area will most likely be developed within the next 10 years. The sand and gravel operation is likely to be replaced by other types of industrial development. The District developed a conceptual plan for a recreational corridor along the Agua Fria which may have an effect on future development in this sub-area.

4.4.3 Areas and Locations of Potential Flooding

The potential flooding data collection for this sub-area was focused on the scope items as described in Section 2.4. Potential flooding areas are presented in **Plate DC-7** and described below.

Area 3-1 - Runoff along Beardsley Road has overtopped the Beardsley Road channel and flowed southerly along 115th Avenue. The culvert at the wall of the Coyote Lakes Golf course has significantly less capacity than the upstream channel. Improving this culvert and the channel downstream may solve most of the flooding problems.

Area 3-2 - The aeration ponds for the treatment plant do not allow an adequate drainage corridor to the Agua Fria River, and the Beardsley channel may be undersized.

Area 3-3 - When the Beardsley channel at 115th Avenue overtops, the flow is then routed to the south where it causes flooding problems along 115th Avenue as well as to the Coyote Lakes development.

Area 6-1 - The Grand Avenue channel does not have enough capacity to convey runoff from medium to large rainfall events. Flooding and ponding often occur along this location.

Area 7-1 - The flow is routed through a sharp turn within a culvert. During a large rainfall event, the culvert capacity may be exceeded causing flow to overtop the channels.

Area 8-3 - The lakes in the Ventana Lakes development are kept full to accommodate storm events. During minor rainfall events, the Lakes capacity is exceeded and excess runoff flows into the Beardsley Road channel. This channel does not have enough capacity to handle additional flow.

4.4.4 Existing and Future Drainage Facilities

The main facilities in this sub-area consist of open channels discharging directly into the Agua Fria River. Of particular interest are the Grand Avenue channel and the Beardsley Road channel. These facilities, along with other facilities found in the data

collection effort, are presented in **Plates DC-2 and DC-3** and details are provided in **Table DC-1** located in **Appendix B** of this report.

SECTION DC-5: ENVIROMENTAL OVERVIEW

The environmental overview report was prepared by Logan Simpson Design and is included as part of this data collection report as an attached volume, *Glendale/Peoria Area Drainage Master Plan – Data Collection Report – Volume DC-A.*

SECTION DC-6: ECOLOGICAL ASSESSMENT

The ecological assessment report was prepared by Logan Simpson Design and is included as part of this data collection report as an attached volume, *Glendale/Peoria Area Drainage Master Plan – Data Collection Report – Volume DC-B.*

SECTION DC-7: CULTURAL RESOURCE SURVEY

The cultural resource survey report was prepared by Logan Simpson Design and is included as part of this data collection report as an attached volume, *Glendale/Peoria Area Drainage Master Plan – Data Collection Report – Volume DC-C.*

SECTION DC-8: LAND

8.1 Parcel Ownership

Entellus has received the Maricopa County Assessor's right-of-way map index and parcel numbers. As alternatives are developed, these right-of-way maps will be used to determine available rights-of-way and parcel ownership as needed to assess and quantify the right-of-way impacts and costs for each alternative considered.

8.2 Rights-of-Entry Requirements

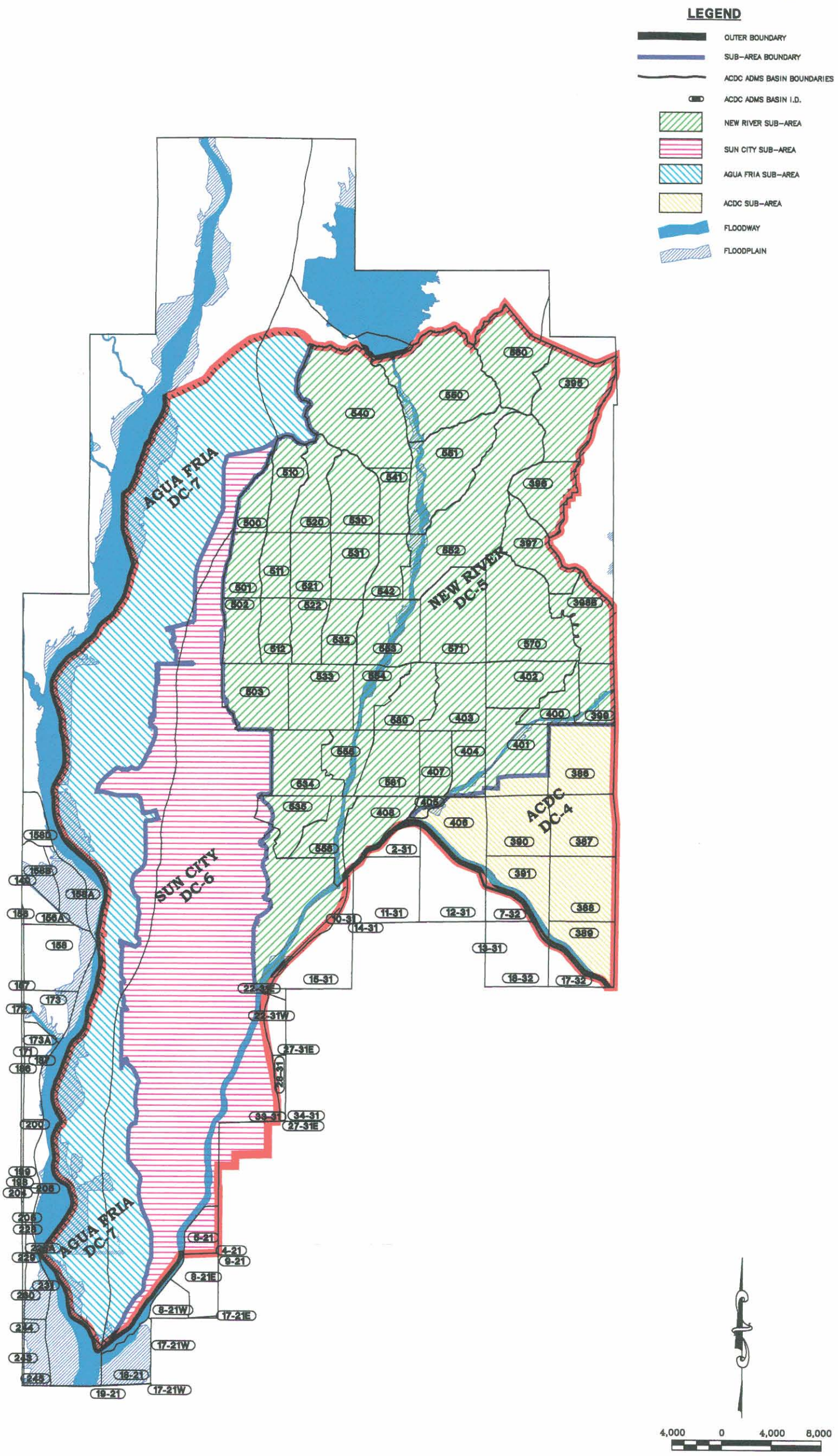
At the present time, there is no need for obtaining the rights-of-entry. However, it will be obtained on an as-needed basis.

SECTION DC-9: HYDROLOGY/HYDRAULICS MODELS

9.1 ACDC Sub-Area

9.1.1 Summary of Existing Models/Conditions

The most current hydrologic modeling of the ACDC Sub-area is accomplished using HEC-1 **(Reference 2)** and FCDMC Hydrology Manual **(Reference 3)** methodologies, and was developed as a part of the ACDC Area Drainage Master Study (ACDC ADMS) **(Reference 5)**. The modeling for the portion of sub-area situated north of Bell Road is documented in Volume 1.3 of the ACDC ADMS Phase I report. The modeling for the portion of sub-area situated south of Bell Road is documented in Volume 1.5 of the ACDC ADMS Phase I report. Models were developed for the existing and future condition, 2-, 10-, and 100-year, 6- and 24-hour storms. The existing condition ACDC ADMS modeling subbasins, indicated on **Figure DC-4,** generally follows the major arterial roadways. Diversion records are used to model flow splits at the major intersections and also to account for directing flows intercepted by the storm drains. Existing condition models assumed that 10-year, 32-hour retention volume was provided for all developments. Future developments were assumed to provide 100-year, 2-hour retention. The retention is modeled by diverting runoff from the hydrograph until the assumed volume is satisfied, and then routing the remaining hydrograph downstream.



Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 310.017

GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

IN ASSOCIATION WITH:
PENTACORE ARIZONA
2255 No. 44th St., SUITE 255 Phoenix, AZ 85008
TELEPHONE (602) 681-0272 FAX (602) 681-9338
LTM Engineering, Inc.
3973 East Thunderbird Road Suite 25-171
Phoenix, Arizona 85032

ACDC ADMS BASIN BOUNDARIES
FIGURE DC-4

No hydraulic models were collected, but it is assumed that the ACDC was modeled using HEC-2.

9.1.2 Concerns

With regard to the hydrology models for the ACDC Sub-area, the following concerns were noted:

1. According to the scope of work, this study will assume no changes in the hydrology east of 51st Avenue. Hydrographs generated at 51st Avenue as in the ACDC ADMS Phase I study will be directly incorporated into this study. This somewhat limits the validity of a "complete" update of the hydrology, since changes to the watershed east of 51st Avenue are not accounted for.

2. The current subbasin delineations are insufficient in detail to analyze the flooding areas identified in Subsection 4.1.3. In order to better define peak discharges at these locations, the subbasins defined by the ACDC ADMS will require further subdividing.

3. The peak discharges (especially from a 100-year storm event) reported at some of the intersections far exceed the conveyance capacity of the streets. It is probable that flows will split from the arterial streets into collector and local streets prior to entering the intersection. This will require additional diversion modeling.

4. Modification of the diversions at some of the arterial intersections will be required to account for storm drain that has been constructed since the 1995 ACDC ADMS study.

5. When comparing the future condition modeling to the existing condition modeling, it is noted that many of the subbasin boundaries were re-delineated and the numbering sequence was completely changed. In some areas, identical subbasins have different identification numbers. This makes comparing the existing and future condition results very tedious and even confusing. It is suggested that naming styles and basin boundaries be standardized between the two modeling conditions to provide comparable results for the ACDC Sub-area and to clearly separate the existing and future condition basins.

6. Some of the storm drain capacities assumed in the ACDC ADMS Phase I modeling appear excessive given the size of pipe available. These capacities should be checked for validity or at least documented.

7. In identifying the overall proposed limit of the ACDC Sub-area, it was discovered that a significant portion of the ACDC ADMS Subbasin 401 (Future conditions Subbasin 373) drains directly to Skunk Creek and not to the intersection of 67th Avenue and Bell Road. The new proposed Sub-area boundary is indicated on **Plate DC-4** and **Figure DC-4.**

9.2 New River Sub-Area

9.2.1 Summary of Existing Models/Conditions

The original Glendale/Peoria ADMP **(Reference 1)** used the Environmental Protection Agency's Storm Water Management Model (SWMM) **(Reference 6)** for runoff simulation. This area was also modeled using HEC-1, as a part of the ACDC ADMS **(Reference 5)**. Several other models were developed as part of the subdivision analysis and local projects that provide more detailed information for particular areas. The methodology used in these models may not be consistent with the District's current criteria but they will provide additional information useful for model updating.

9.2.2 Concerns

In addition to the concerns discussed under Subsection 9.1.2, other particular concerns to this sub-area includes the following:

1. The northern portion of this sub-area is currently being developed with man-made channels and other structures replacing the natural drainage patterns. Considering the flat terrain in this area, even small man-made structures can significantly affect downstream runoff. The existing ACDC ADMS model was developed before many of the new subdivisions were constructed. Many of the original flow patterns have been significantly altered by new construction. Similarly, if a well-defined plan is not implemented, any updated model will soon become obsolete as well.

2. Most of the new subdivisions have implemented some kind of drainage system to take care of the on-site as well as off-site flows. However, these facilities may or may not be consistent with other existing or future subdivisions and will require careful modeling to make sure that the model accurately represents the interaction between these systems.

3. Another main concern is the Rock Springs Creek watercourse. This creek drains a significant area, from approximately the alignment of Jomax Road to Pinnacle Peak. Historically, this creek joined the New River near Beardsley Road. However, it no longer joins the New River but ends at a sand and gravel operation south of Pinnacle Peak Road where runoff is mostly stored in the excavated areas. The sand and gravel operation has been shut down and there are plans to develop the area, which will undoubtedly fill the excavated area.

9.3 Sun City Sub-Area

9.3.1 Summary of Models/Conditions

The most current and relevant hydrologic modeling developed in this area was prepared as part of the Sun City Hydrology Study prepared by the District in 1998 **(Reference 4)**. That modeling was based on the HEC-1 **(Reference 2)** and FCDMC Hydrology Manual **(Reference 3).** The models were developed for a 100-year, 6-hour storm and a 100-year, 24-hour storm.

9.3.2 Concerns

1. The topographic information used in developing the hydrologic model was mostly based on the USGS 7.5 Minute Quadrangle Topographic Maps. Since this sub-area is relatively large and flat, the USGS maps do not give sufficient details in many areas. Therefore, the hydrology modeling will be completely re-done based on more detailed mapping information.

2. Capacities of the 99th Avenue and Del Webb Boulevard channels need to be verified. These channels make several sharp turns and abrupt transitions, which may significantly affect their capacity. The capacity of the channel is critical to the routing logic of the HEC-1 model.

3. The Sun-City sub-area hydrologic characteristics are not independent from the New River sub-area. The existing model made some assumptions that may not be valid, depending on the development and facilities within the New River sub-area.

9.4 Agua Fria Sub-Area

9.4.1 Summary of Models/Conditions

The Agua Fria sub-area has been modeled as part of the Agua Fria floodplain delineation and watercourse master plan. However, this model's scale is much larger and does not provide the level of detail required for this study. The existing model will be used only as a reference to develop a new model.

9.4.2 Concerns

As stated in the previous section, the existing model for this sub-area is not detailed enough for this study and new models will be developed. Considering the topography of the area, flow splits from both the New River and Sun City sub-areas are very similar.

SECTION DC-10: MAJOR UTILITIES

Entellus called the Blue Stake Center and asked them to perform a search based on every section in the Study Area. There were 58 "utilities" identified in the project area. They are shown in **Table DC-2**. Of the listed utilities, many of them are small utilities or are not even utilities (for example, Arizona Game and Fish), and hence would not have an impact on this project. Where major known utilities were identified, the name, address, and phone number are included in **Table DC-2**. Most of the utilities lie within roadway right-of-way or adjacent easements. As alternative solutions are developed, these utility companies will be contacted to obtain quarter section or as-built information about the pertinent utilities. In addition, above-ground utility information will be obtained with field survey for specific corridors.

Table DC-2

Utilities Contact List

UTILITY NAME	PHONE #	ADDRESS	CONTACT NAME
Adman Water District	623-935-2837		David Schlofield
APS	602-932-6758	P.O. Box 53933 Phoenix, AZ 85072	John Herrera
City of Glendale	602-930-3630		Russell Fletcher
City of Phoenix	602-262-4935	200 W. Washington Phoenix, AZ 85003	Central Records
City of Phoenix Sewer		200 W. Washington Phoenix, AZ 85003	
City of Phoenix Traffic Signal		200 W. Washington Phoenix, AZ 85003	
City of Phoenix Water	602-495-5601	200 W. Washington Phoenix, AZ 85003	
City of Tolleson	602-936-3381	9555 W. Van Buren Tolleson, AZ 85353	David Tylor
COX Cable	602-352-5860 x-179	115 N 1st Avenue Phoenix, AZ 85043	Angie Hardesty
New River Utility Co.	(603) 561-1848	7839 West Deer Valley Rd. Peoria, AZ 85382	Bob Fletcher
SRP	602-236-8476	P.O. Box 52025 Phoenix, AZ 85072	Jim Frescholts
SW Gas	602-484-5256	9 S. 43rd Avenue Phoenix, AZ 85009	Jason Wolf
US West	602-395-2419	2233 W. Dunlap#232 Phonix, AZ 85021	Nathon Vasey
Paseo Place Homeowners Assoc.	623-572-7579		
Flood Control District of Maricopa County	(602) 506-1501	2801 West Durango Phoenix, AZ 85009	
A.D.O.T.			
American Public Services			
Amerigas			
Arizona Game & Fish			
Arrowhead Ranch Amenities			
ASU West			
A,T & T			
Black Mountain Gas			
Blue Cross & Blue Shield			
Carsten Manufacturing			
Central Arizona Water			
Citizen Utilities			

Table DC-2

Utilities Contact List

UTILITY NAME	PHONE #	ADDRESS	CONTACT NAME
Citizen Water Resources			
Citrus Garden Estates Irrigation District			
City of Avondale			
City of El Mirage			
City of Goodyear			
City of Peoria			
City of Surprise			
Electric Light ways			
El Paso Natural Gas			
Fairway Ridge Homeowners Assoc.			
Honneywell Inc.			
Insight Cable Vision			
Kinder Morgan Energy			
Litchfield Park Services			
Maricopa County Highway Department			
Maricopa County Parks & Recreation Department			
MCI Worldcom			
Optel Inc.			
Outdoor Systems			
Rec. Center of Sun City			
Roosevelt Irrigation District			
Rose Valley Water			
Satellite Management Services			
Sunburst Farms Irrigation District			
Sun Health Corporation			
Sunrise Water Co.			
Western Meadows Irrigation District			
Wilholt Water			
1st National Management			

SECTION DC-11: DATA COLLECTION SOURCES

Table DC-3 summarizes the sources and documents obtained and reviewed as part of the data collection effort.

TABLE DC-3
DATA COLLECTION SUMMARY

Data Number	Data Description	Prepared by	Date
1	Hydrology Update on Glendale-Peoria Area Drainage Master Study	Maximo R. De Vera (FCDMC)	Jan. 1993
2	Master Grading and Drainage Plan	Carter Associates ,INC.	May 1989
3	Glendale-Peoria Area Drainage Master Plan	CDM INC. and JM Montgomery Inc.	May 1987
4	Concept/Routing study	Wood, Patel and Assoc. Inc.	March 1996
5	Orangewood Storm Drain Location Study	Wood, Patel and Assoc. Inc.	March 1996
6	Preliminary Drainage Report	Coe and Van Loo Consultants Inc.	April 1994
7	Glendale-Peoria-Sun City Drainage Area no.1	Hydrology Branch Engineering Div.	Jan. 1995
8	Drainage Report on Union Hills Dr.	Erikson and Salmon, Inc.	August 1987
9	Flood Damage Report on storm and flood of Aug. 16-17 1963	U.S. Army Corps of Engineers	June 1964
10	Cactus Road Storm Drain	Stanley Franzoy Corey	Nov. 1992
11	Westbrook Village East Drainage Study	Goldman, Toy and Assoc. Inc.	Oct. 1998
12	91st Ave. Drain Hydrology Update	Maximo R. De Vera (FCDMC)	Oct. 1994
13	Desert Amethyst Drainage Project - 60% Plans	Wood, Patel and Assoc. Inc.	May 1999
14	Glendale-Peoria-Sun City Drainage Area no. 2	Hydrology Branch Engineering Div.	Jan. 1995
15	Arrowhead Ranch - Specific Area Plan and Storm Drainage Plan	Dibble and Associates	April 1992
16	Storm Water Master Plan - City of Peoria	JM Montgomery Inc.	April 1985
17	Desert Amethyst Drainage Master Plan	Montgomery Watson	July 1997
18	Preliminary Drainage Report for Intersection Improvements	Hendrich, Eberhart and Assoc., Inc	August 1995
19	500' Swath/Intersection Drainage Plan	Kaminski Hubbard Engineering Co.	July 1993
20	Storm Water Management Plan	Camp Dresser and McKee Inc.	Jan. 1986
21	Glendale General Plan	City of Glendale	Sept. 1987
22	City of Peoria Master Plan of Storm Drainage - Executive Summary	J.M. Montgomery Inc.	April 1988
23	Storm Water Management Plan Capitol Improvement Sum.	Camp Dresser and McKee Inc.	Jan. 1986
24	Storm Drain along Cactus Road - Proposal	Steve Corrales Engineering Co.	Sept. 1990
25	Concept/Routing study (43rd to 99th Ave and Glendale to Olive Ave)	Wood, Patel and Assoc. Inc.	March 1996
26	Final Drainage Report for Eagle Canyon	American Engineering Co.	Jan. 1998
27	Lake Pleasant Road Corridor Study	Kirkham Michael Engineers	May 1999
28	Glendale-Peoria area Drainage Master Plan	CDM INC. and JM Montgomery Inc.	May 1987
29	Revisions to Final Drainage Report Deer Village Unit 1	Coe and Van Loo Consultants Inc.	March 1997
30	Silverton Beazer Homes HEC-RAS and HEC-FDA summary	Sage Engineering Corporation	August 1997
31	Fletcher Heights - Final Drainage Plan	CMX Group Inc.	June 1996
32	Deer Village Units 5&6 - Final Drainage Report	CVL Consultants, Inc	Dec. 1996
33	Dove Valley Ranch - Final Drainage Report Parcels 2,3,5	Neil/McGill Consultants,Inc.	Oct. 1998
34	Deer Village Final Drainage Report Units 1,2,3,4	CVL Consultants, Inc	Dec. 1996
35	Alta Vista Estates - Drainage Report, Units 3 and 4	CMX Group Inc.	Jan. 1998
36	Orangewood Alignment Concept/Routing Study	Wood, Patel and Assoc. Inc.	Nov. 1995
37	Addendum to Glendale-Peoria area Drainage Master Plan	CDM INC. and JM Montgomery Inc.	May 1987
38	Marinette heading canal Floodplain Removal	Coe and Van Loo Consultants Inc.	Sept. 1995
39	Gila River Basin New River and Phoenix City Streams	U.S. Army Corps of Engineers	1982
40	Final Drainage Report for Parkridge at 95th Ave and Beardsley	Coe and Van Loo Consultants Inc.	Jan. 1994
41	Marinette Heading Canal floodplain removal Request for revision	Coe and Van Loo Consultants Inc.	March 1995
42	Drainage Report For Alta Vista Estates, Units 1 and 2	CMX Group Inc.	June 1995
43	Ironwood Final Drainage Plan	CMX Group Inc.	Oct. 1998
44	Peoria Desert Lands Conservation Master Plan	Dames & Moore	Aug 1999
45	City of Peoria Parks Master Plan	Planners Ink	Feb 1996
46	Rivers Master Plan - Executive Summary	Cella Barr Associates Inc.	March 1999
47	Rivers Master Plan	Cella Barr Associates Inc.	Jan 1999
48	Trails Master Plan - Executive Summary	Cella Barr Associates Inc.	March 1999
49	Trails Master Plan	Cella Barr Associates Inc.	Jan 1999
50	Sun City Hydrologic Study	FCDMC	Nov. 1997
51	Silverton Drainage Report	Sage Engineering Corporation	Aug. 1997
52	Fletcher Heights - Preliminary Drainage Plan, Phase III	CMX Group Inc.	June 1996
53	Deer Valley Estates Drainage Plan	CMX Group Inc.	Aug. 1996
54	Fletcher Heights - Preliminary Drainage Plan, Phase II	CMX Group Inc.	July 1996
55	Fletcher Heights - Preliminary Drainage Plan Concept Overview	CMX Group Inc.	June 1993
56	Drainage Report for Calbrisa	CVL Consultants, Inc	July 1993
57	Drainage Report for Calle Lejos Estates	CMX Group Inc.	Nov. 1994
58	Drainage Report for Parcel XI at Arizona Traditions	CVL Consultants, Inc	Oct. 1998
59	Drainage Report for Parcel VIII, IX, and X at Arizona Traditions	CVL Consultants, Inc	June 1998

TABLE DC-3
DATA COLLECTION SUMMARY

Data Number	Data Description	Prepared by	Date
60	Fletcher Heights - Preliminary Drainage Plan, Phase I Volume I of 2	CMX Group Inc.	June 1996
61	Fletcher Heights - Phase III - Evaluation of Offsite Drainage	CMX Group Inc.	Sept. 1996
62	Drainage Report for La Caille	CMX Group Inc.	Dec 1994
63	Boardwalk/Peoria Units 1&2 Preliminary Drainage Report	Erie and Associates	April 1994
64	Deer Village Final Drainage Report Units 1,2,3,4 PLATE	CVL Consultants, Inc	Dec. 1996
65	Deer Village Final Drainage Report Units 1 Revisions to Final Drainage Report	CVL Consultants, Inc	Dec. 1996
66	Final Drainage Report for Pinnacle Ranch	American Engineering Co.	Oct. 1994
68	Arrowhead Cove & Arrowhead Business Park Preliminary Drainage Report	Erie and Associates	July 1993
69	Ventana Lakes Final Drainage Report	Collar, Williams & White Engineering	
70	Bell Road Project Drainage Study Volume IV	Greiner Engineering Sciences	Oct 1987
73	New River Watercourse Master Plan-Report & Tech. Notebook	Stantech (draft)	June, 1999
74	Patrick Ranch - Final Drainage Report	Sage Engineering Corporation	March, 1994
75	Hillcrest Ranch - Master Drainage Report	Wood Patel & Associates, Inc.	August, 1991
76	Hillcrest Ranch - Phase 2 Drainage Improvements	Wood Patel & Associates, Inc.	August, 1992
77	Final Drainage for Fletcher Hts Phase 2a	CMX Group Inc.	Dec. 1997
78	Drainage Report for Arrowhead Horizons	DEA	May 1995
79	Drainage Report for Boardwalk	DEA	June, 1995
80	91st Channel plans	Dibble and Associates	Dec. 1998
81	Union Hills paving plans	Carter Associates ,INC.	1990
82	Walgreen Plans	Pasterneck	
83	Bell Rd Plans		
84	Desert Amethyst Drainage Project - 95% Plans	Wood, Patel and Assoc. Inc.	May 1999
85	Westbrook Village East Drainage Study	IMC Consultants	May 1993
86	Smith's Drainage Report	CBA	March 1998
87	Drainage Report for Hunter Ridge	DEA	Aug 1995
90	Hydrologic Analysis of Beardsley Channel extension project	FCDMC	Dec. 1990
91	Master Drainage Report for Terramar	CVL Consultants, Inc	Oct, 1996
93	West Valley Recreation Corridor Pasajes Del Rio Design Concept Report	Carter -Burgess	June, 1999
94	City of Glendale - Existing Structures Map	Unknown	**Current**
95	City of Glendale - General Plan	Glendale Planning Department	**Current**
96	87th Avenue Design Concept Report	Kimley-Horn and Assoc.	Oct 1999
97	Preliminary Drainage Report for Intersection Improvements		
98	Skunk Creek Channel Improvements - FEMA forms	FCDMC	Aug 1993
99	Final Design Report for Skunk Creek Channel Improvements	Simons, Li & Associates	June, 1998
100	ACDC / ADMS PHASE I - VOLUME 1.2	Kaminski Hubbard Engineering Co.	May 1995
101	ACDC / ADMS PHASE I - VOLUME 1.3	Kaminski Hubbard Engineering Co.	Feb. 1995
102	ACDC / ADMS PHASE I - VOLUME 1.5	Kaminski Hubbard Engineering Co.	March 1995
103	Hydrology Worksheets for Area between Skunk Creek and the ACDC	Kaminski Hubbard Engineering Co.	March 1995
104	Skunk Creek Hydrology Report	Coe and Van Loo Consultants Inc.	Nov. 1990
105	Drainage Infrastructure Report for Terramar	Coe and Van Loo Consultants Inc.	Nov. 1996
106	Area Drainage Master Study Little Deer Valley	Collar, Williams & White Engineering	July 1990
107	Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects	FCDMC	Dec. 1992
108	Final Drainage Report for Hunter Field Estates	Tobar	Feb 2000
109	Preliminary Drainage Report for Summit at Sunrise Mountain	American Engineering Co.	5-2000
110	Durango ADMP -Potential Alternatives Submittal	Dibble and Associates	3-31-2000
111	Lake Pleasant Parkway Detention Basin	Goldman, Toy and Assoc. Inc.	1-2000
112	Lake Pleasant Parkway Detention Basin - Plans and bid Documents	Goldman, Toy and Assoc. Inc.	1-2000
113	Lake Pleasant Parkway Detention Basin - Addendum #5	Goldman, Toy and Assoc. Inc.	1-2000
114	Floodplain and Floodway Delineation for Rock Springs Creek	Stantec Consulting	March 2000
115	Camino A Lago Specific Plan	Urban Lands Development	Feb 1997
116	87th Avenue Final Canidate Assesment Report	DMJM	Feb 1998
117	Pinnacle Peak Road Final Canidate Assesment Report	Entranco	Oct 1999
150	101 As-Built Information	Franzoy-Corey	1991
200	Kaminski Hubbard Drainage Basins	Kaminski Hubbard Engineering Co.	
201	MAG Landuse	FCDMC	
202	SOILS	FCDMC	
203	USGS Mapping	USGS	
204	1999 Aerials	FCDMC	

TABLE DC-3
DATA COLLECTION SUMMARY

Data Number	Data Description	Prepared by	Date
300	Peoria Zoning Map	City of Peoria	12-06-99
400	Proposed Hydraulic modifications to Lake 7 - Arrowhead Lakes	Pace	May-00
401	Hydrology & Hydraulics Report for Camelot Views at Arrowhead Ranch	Clouse Emgineering Inc.	January-93
402	Drainage Report for Tierra Verde Infrastructure	Clouse Emgineering Inc.	April-95
403	Hydrology & Hydraulics Report for Arrowhead Lakes Unit 8	Clouse Emgineering Inc.	May-93
404	Drainage Report for Sierra Verde Phase II South Half	Clouse Emgineering Inc.	June-96
405	Hydrology & Hydraulics Report for Top of the Ranch One	Clouse Emgineering Inc.	September-90
406	Arrowhead Ranch Parcel I - Drainage Supplement 1	CMX	May-96
407	Drainage Report for Fulton Homes at Arrowhead Ranch Phase 1	American Engineering Company	June-92
408	Hydrology & Hydraulics Report for Arrowhead Ranch Parcel 6	Clouse Emgineering Inc.	June-93
409	Hydrology & Hydraulics Report for Arrowhead Ranch Parcels 3 & 4	Clouse Emgineering Inc.	September-93
410	Hydrology & Hydraulics Report for Tanoan & Top of the Ranch Three	Clouse Emgineering Inc.	September-93
411	Hydrology & Hydraulics Report for Arrowhead Lakes Units 5A & 5B	Clouse Emgineering Inc.	March-93
412	Drainage Report for Tierra Verde Parcel E	CVL	January-96
413	Drainage Report for Tierra Verde Parcel G	CVL	January-96
414	Drainage Report for Tierra Verde Parcel D	CVL	January-96
415	Arrowhead Enclave - Final Drainage Report	CMX	March-97
416	Final Drainage Report for Arrowhead Lakes Unit 6	Sage Engineering	May-93
417	Drainage Report for Country Club Estates at Arrowhead Ranch	CVL	February-92
418	Master Drainage Study for Continental at Arrowhead Ranch	Clouse Emgineering Inc.	December-93
419	Hydrology & Hydraulics Report for Arrowhead Ranch Parcel 2	Clouse Emgineering Inc.	February-93
420	Hydrology & Hydraulics Report for Tuscany Point	Clouse Emgineering Inc.	February-93
421	Drainage Report for Fulton Homes at Arrowhead Ranch Phase 2	American Engineering Company	October-92
422	Final Drainage Report for Arrowhead Heights	Wood/Patel	January-94
423	Addendum to Final Drainage Report for Estates at Arrowhead - Phase 1	Harrison Group	January-95
424	Hydrology & Hydraulics Report for Hillcrest Ranch Infrastructure	Clouse Emgineering Inc.	December-91
425	Drainage Report for Tierra Verde Parcel B	CVL	January-96
426	Drainage Report for Arrowhead Ranch Parcel 10	Clouse Emgineering Inc.	September-95
427	Hydrology & Hydraulics Report for Arrowhead Ranch Parcel 5	Clouse Emgineering Inc.	February-94
428	Master Drainage Study for Tierra Verde	Clouse Emgineering Inc.	November-95
429	Drainage Report for Tierra Verde Parcel N	CVL	March-96
430	Drainage Report for Tierra Verde Parcel R	CVL	March-96
431	Supplemental Drainage Report for 67th Avenue Drainage	Pivotal Companies	August-92
432	Final Drainage Report for Arrowhead Lakes Unit 7	Sage Engineering	May-93

SECTION DC-12: REFERENCES AND TABLES

12.1 Data Collection Summary

References used to obtain the information in this report are identified in the Data Collection Log, **Table DC-3**. Additional Tables are provided for convenience and quick reference. **Table DC-1** includes a summary of the existing and proposed facilities identified as part of the data collection process. **Table DC-2** provides a summary of utility companies identified in the overall project area.

12.2 Reference Documents

1 CDM INC. and JM Montgomery Inc., *Glendale - Peoria Area Drainage Master Plan*, May 1987

2 U.S Department of Army, Corps of Engineers, Hydrologic Engineering Center, *Generalized Computer Program 723-X6-L2010, HEC-1 Flood Hydrograph Package*, Davis California, February 1981, Revised May 1991.

3 Flood Control District of Maricopa County, *Hydrology Design Manual for Maricopa County, Arizona, Volume 1- Hydrology*, January 1995.

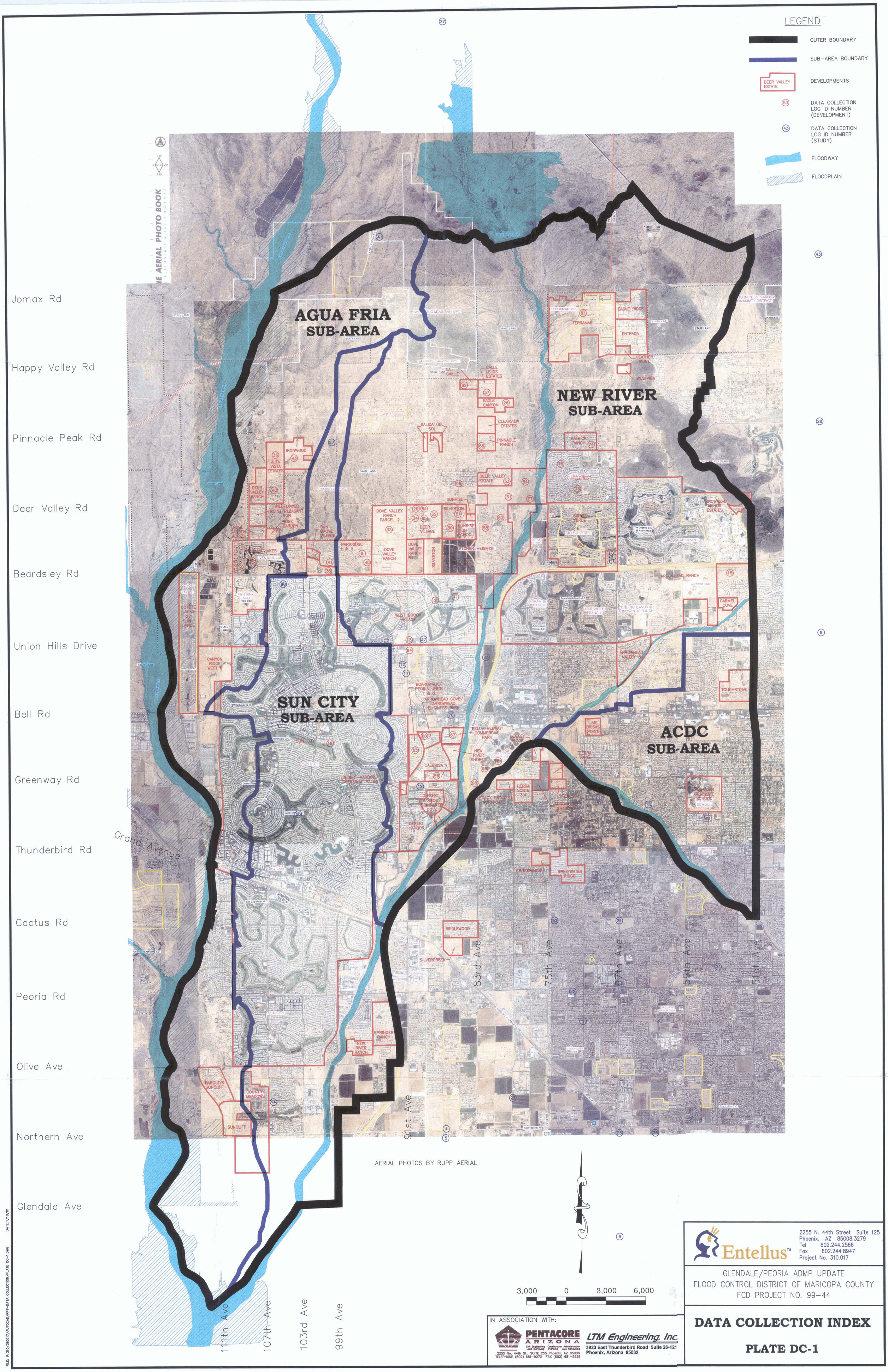
4 Flood Control District of Maricopa County, *Sun City Area Hydrologic Study*, November 1997.

5 Kaminski-Hubbard Engineering, Inc. *Arizona Canal Diversion Channel Area Drainage Master Study*, Volumes 1.2, 1.3, & 1.5, May 1995

6 Environmental Protection Agency, *Stormwater Management Model,* Version 4.3, 1994.

7 Kaminski-Hubbard Engineering, Inc. *500 Foot Swath/Intersection Drainage Plan*, July 1993

APPENDIX A. PLATES



AERIAL PHOTOS BY RUPP AERIAL

IN ASSOCIATION WITH:

PENTACORE ARIZONA
Civil Engineering Construction Administration
Land Surveying Planning ADA Consulting
2255 No. 44th St., SUITE 255 Phoenix, AZ 85008
TELEPHONE (602) 681-9272 FAX (602) 681-9339

LTM Engineering, Inc.
3923 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032

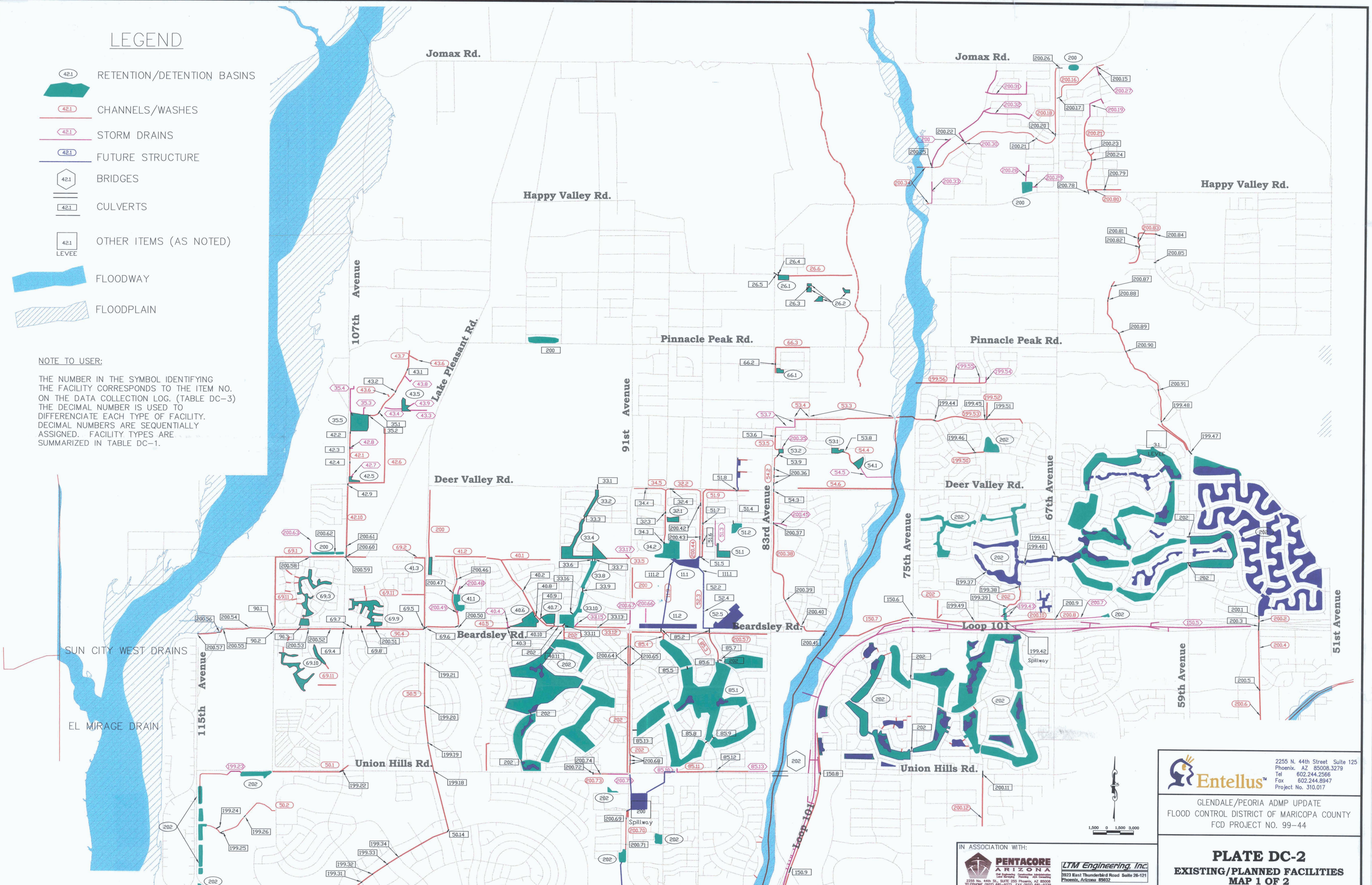
Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008.3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 310.017

GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

DATA COLLECTION INDEX

PLATE DC-1

FILE: R:\310\310017\AUTOCAD\RPT-DATA COLLECTION\PLATE DC-1.DWG DATE:1/18/01


LEGEND
RETENTION/DETENTION BASINS
CHANNELS/WASHES
STORM DRAINS
FUTURE STRUCTURE
BRIDGES
CULVERTS
OTHER ITEMS (AS NOTED)
LEVEE
FLOODWAY
FLOODPLAIN
NOTE TO USER:
THE NUMBER IN THE SYMBOL IDENTIFYING THE FACILITY CORRESPONDS TO THE ITEM NO. ON THE DATA COLLECTION LOG. (TABLE DC-3) THE DECIMAL NUMBER IS USED TO DIFFERENCIATE EACH TYPE OF FACILITY. DECIMAL NUMBERS ARE SEQUENTIALLY ASSIGNED. FACILITY TYPES ARE SUMMARIZED IN TABLE DC-1.
Jomax Rd.
Happy Valley Rd.
Pinnacle Peak Rd.
Deer Valley Rd.
Beardsley Rd.
Union Hills Rd.
Loop 101
107th Avenue
Lake Pleasant Rd.
91st Avenue
83rd Avenue
75th Avenue
67th Avenue
59th Avenue
51st Avenue
115th Avenue
SUN CITY WEST DRAINS
EL MIRAGE DRAIN
Spillway
LEVEE
1,500 0 1,500 3,000
Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008.3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 310.017
GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44
IN ASSOCIATION WITH:
PENTACORE ARIZONA
Civil Engineering Construction Administration Planning ADA Consulting
2255 No. 44th St., SUITE 255 Phoenix, AZ 85008
TELEPHONE (602) 681-9272 FAX (602) 681-9339
LTM Engineering, Inc.
3923 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032
PLATE DC-2
EXISTING/PLANNED FACILITIES
MAP 1 OF 2

SUN CITY WEST DRAINS

SUN CITY DRAINS

SUN CITY DRAINS

SUN CITY DRAINS

NEW RIVER CHANNELIZATION

SKUNK CREEK CHAN.

Bell Rd.

Greenway Rd.

Thunderbird Rd.

Grand Avenue

Cactus Rd.

Peoria Avenue

Olive Rd.

115th Avenue

107th Avenue

99th Avenue

83rd Avenue

75th Avenue

67th Avenue

59th Avenue

Loop 101

Inlet

LEGEND

- 42.1 RETENTION/DETENTION BASINS
- 42.1 CHANNELS/WASHES
- 42.1 STORM DRAINS
- 42.1 FUTURE STRUCTURE
- 42.1 BRIDGES
- 42.1 CULVERTS
- 42.1 LEVEE — OTHER ITEMS (AS NOTED)
- FLOODWAY
- FLOODPLAIN

NOTE TO USER:

THE NUMBER IN THE SYMBOL IDENTIFYING THE FACILITY CORRESPONDS TO THE ITEM NO. ON THE DATA COLLECTION LOG. (TABLE DC-3) THE DECIMAL NUMBER IS USED TO DIFFERENCIATE EACH TYPE OF FACILITY. DECIMAL NUMBERS ARE SEQUENTIALLY ASSIGNED. FACILITY TYPES ARE SUMMARIZED IN TABLE DC-1.

1,500 0 1,500 3,000

Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008.3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 310.017

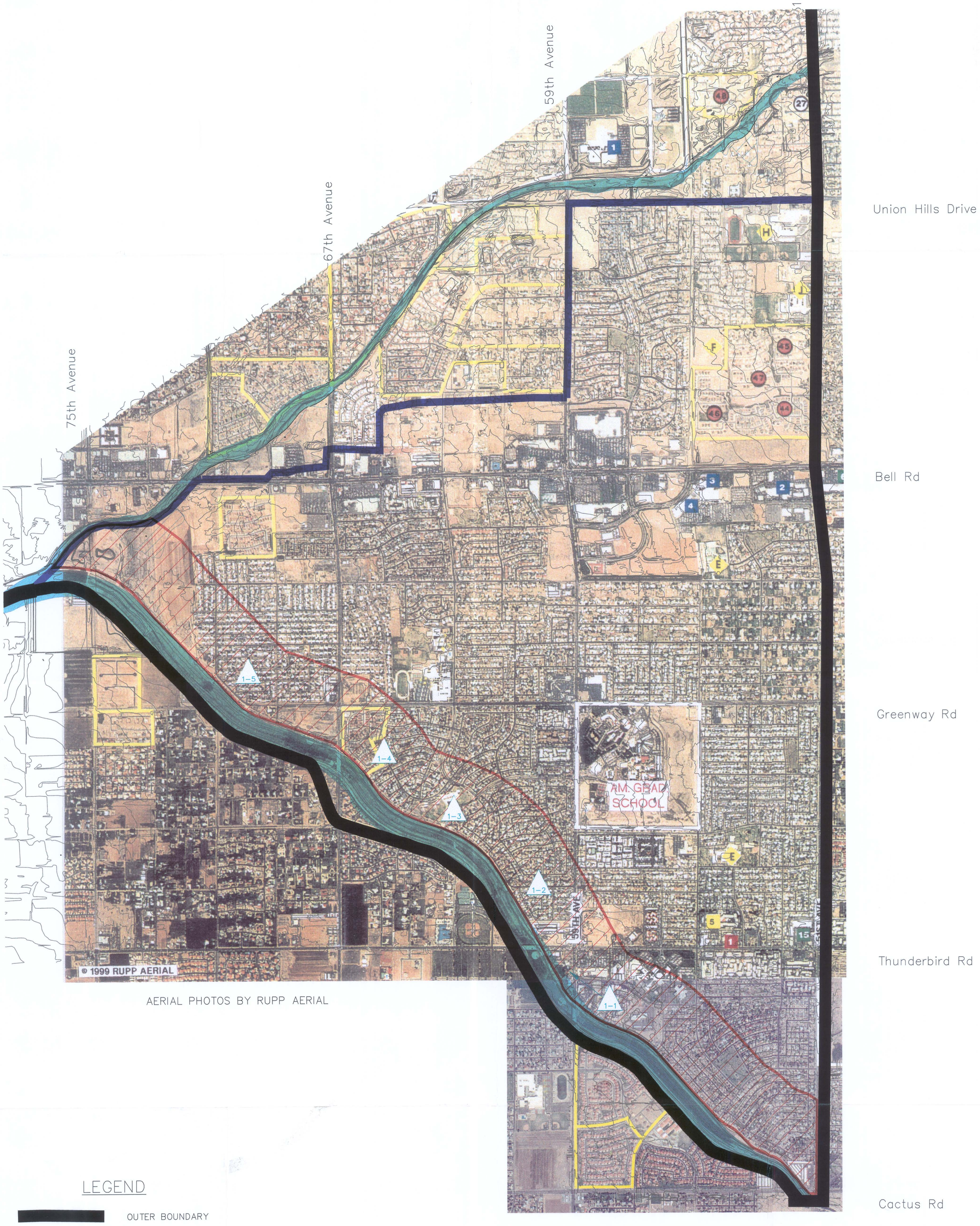
GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

IN ASSOCIATION WITH:
PENTACORE ARIZONA
Civil Engineering Construction Administration
Land Surveying Planning ADA Consulting
2255 No. 44th St., SUITE 255 Phoenix, AZ 85008
TELEPHONE (602) 681-9272 FAX (602) 681-9339
LTM Engineering, Inc.
3923 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032

PLATE DC-3

EXISTING/PLANNED FACILITIES MAP 2 OF 2

FILE: R:\310\310017/AUTOCAD/RPT-DATA COLLECTION/PLATE DC-3.DWG DATE: 1/6/20



AERIAL PHOTOS BY RUPP AERIAL

LEGEND

- OUTER BOUNDARY
- SUB-AREA BOUNDARY
- 1.2 FLOOD AREA IDENTIFICATION NUMBER
- PRIMARY INVESTIGATION AREA
- FLOODWAY
- FLOODPLAIN

1,000 0 1,000 2,000

IN ASSOCIATION WITH:

PENTACORE ARIZONA
Civil Engineering Land Surveying Construction Planning Administration ADA Consulting
2255 No. 44th St., SUITE 255 Phoenix, AZ 85008
TELEPHONE (602) 681-9272 FAX (602) 681-9339

LTM Engineering, Inc.
3923 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032

Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008.3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 310.017

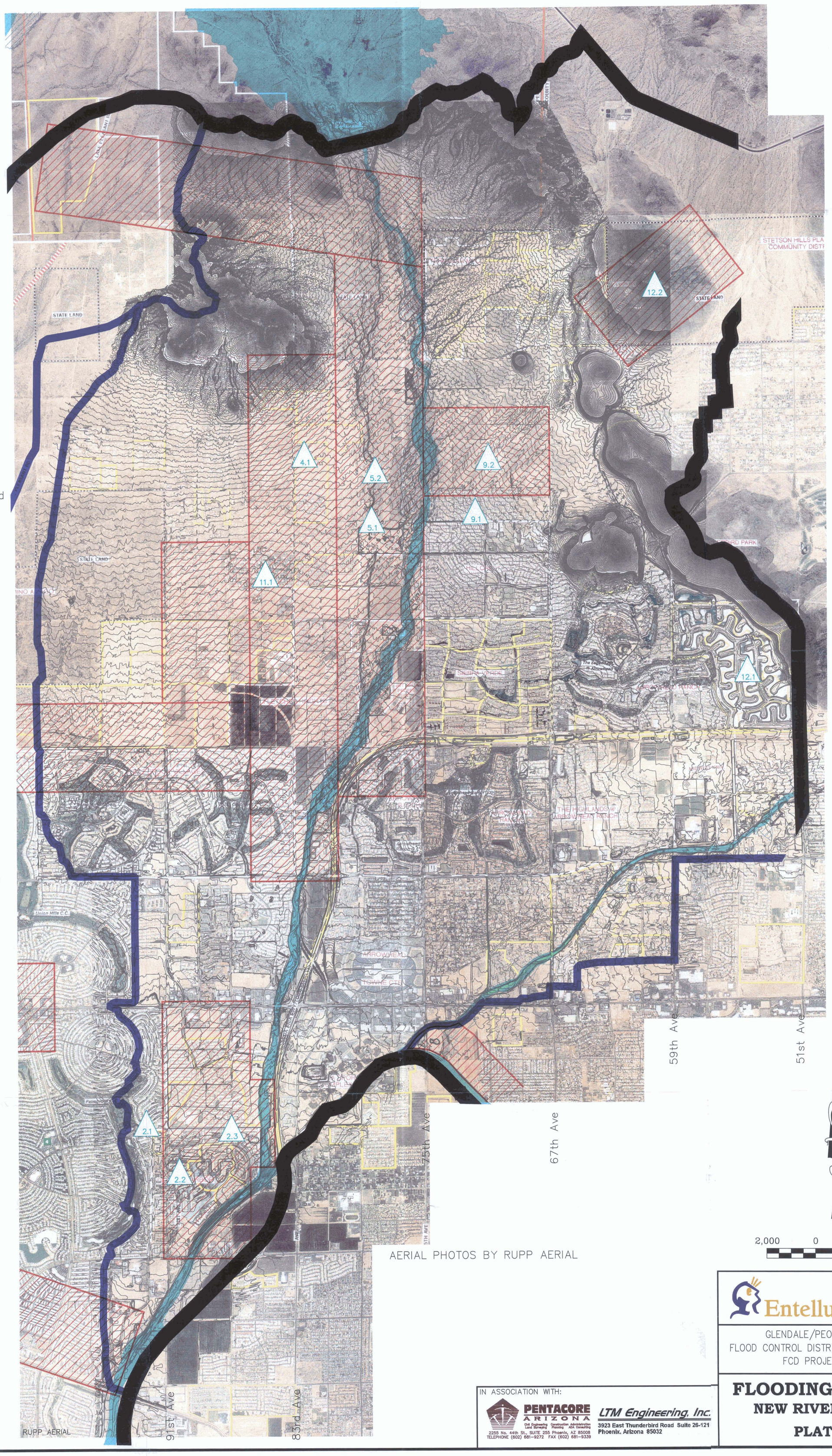
GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

FLOODING PROBLEMS
NEW RIVER SUB-AREA
PLATE DC-4

FILE: R:310/310017/AUTOCAD/RPT-DATA COLLECTION/PLATE DC-4.DWG DATE:1/18/01

LEGEND

- OUTER BOUNDARY
- SUB-AREA BOUNDARY
- 1.2 — FLOOD AREA IDENTIFICATION NUMBER
- PRIMARY INVESTIGATION AREA
- FLOODWAY
- FLOODPLAIN



AERIAL PHOTOS BY RUPP AERIAL

2,000 0 2,000 4,000

Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008.3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 310.017

GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

FLOODING PROBLEMS
NEW RIVER SUB-AREA
PLATE DC-5

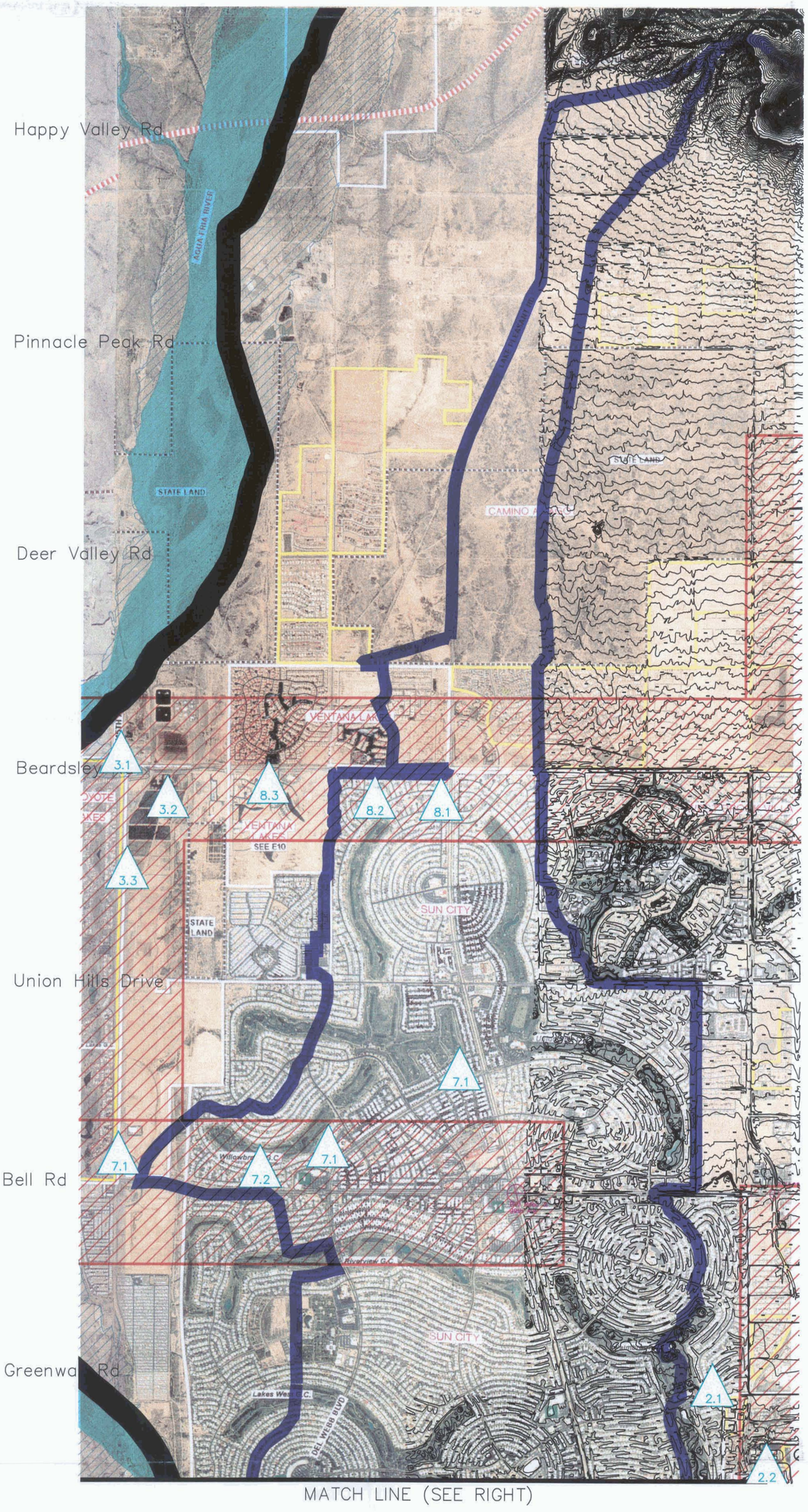
IN ASSOCIATION WITH:
PENTACORE ARIZONA
Civil Engineering Construction Administration Land Surveying Planning ADA Consulting
2255 No. 44th St., SUITE 255 Phoenix, AZ 85008
TELEPHONE (602) 681-9272 FAX (602) 681-9339
LTM Engineering, Inc.
3923 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032

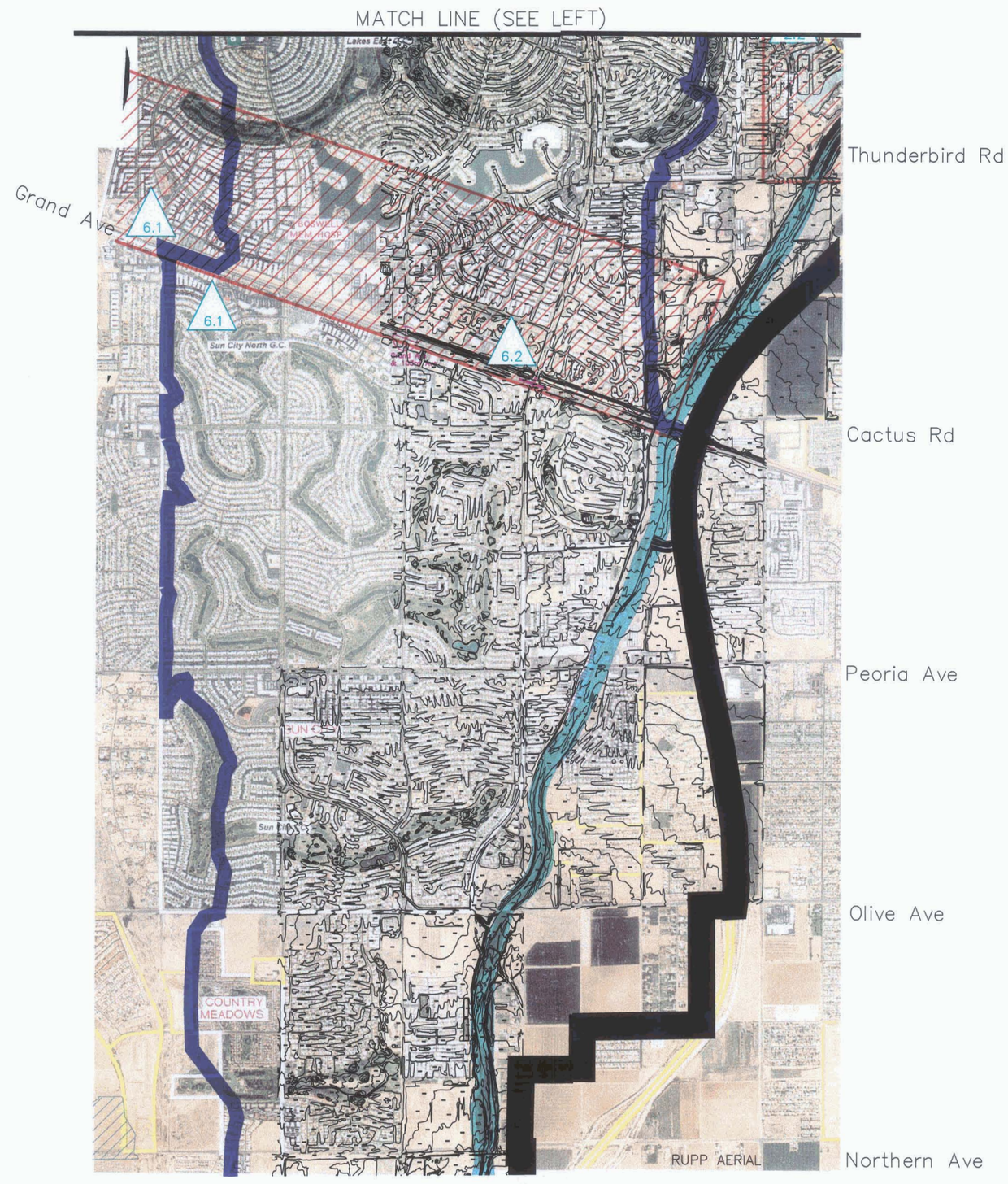
FILE: R:310/310017/AUTOCAD/RPT-DATA COLLECTION/PLATE DC-5.DWG DATE: 1/18/01

LEGEND

- OUTER BOUNDARY
- SUB-AREA BOUNDARY
- 1.2 — FLOOD AREA IDENTIFICATION NUMBER
- PRIMARY INVESTIGATION AREA
- FLOODWAY
- FLOODPLAIN

AERIAL PHOTOS BY RUPP AERIAL





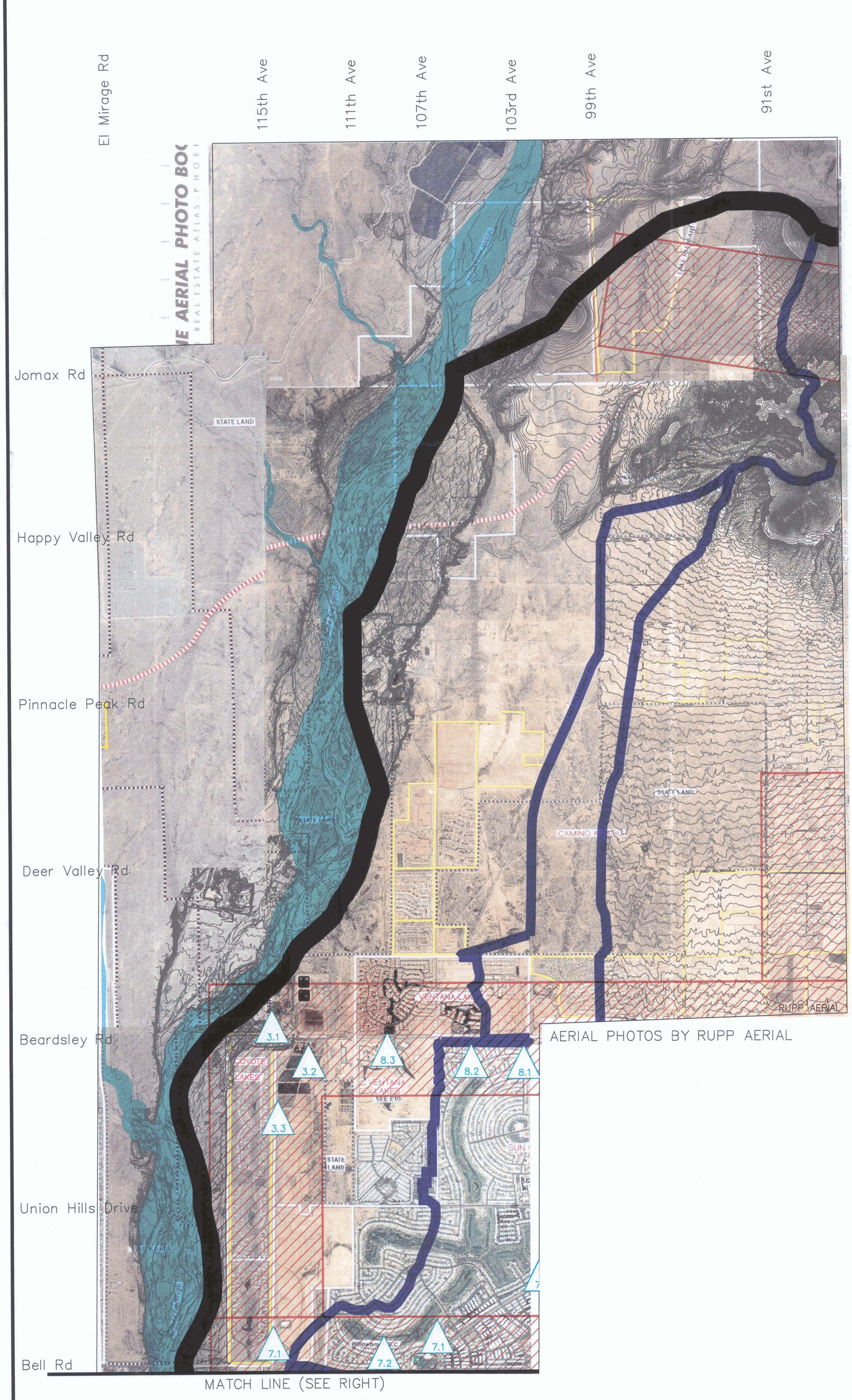
2,000 0 2,000 4,000

Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008.3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 310.017

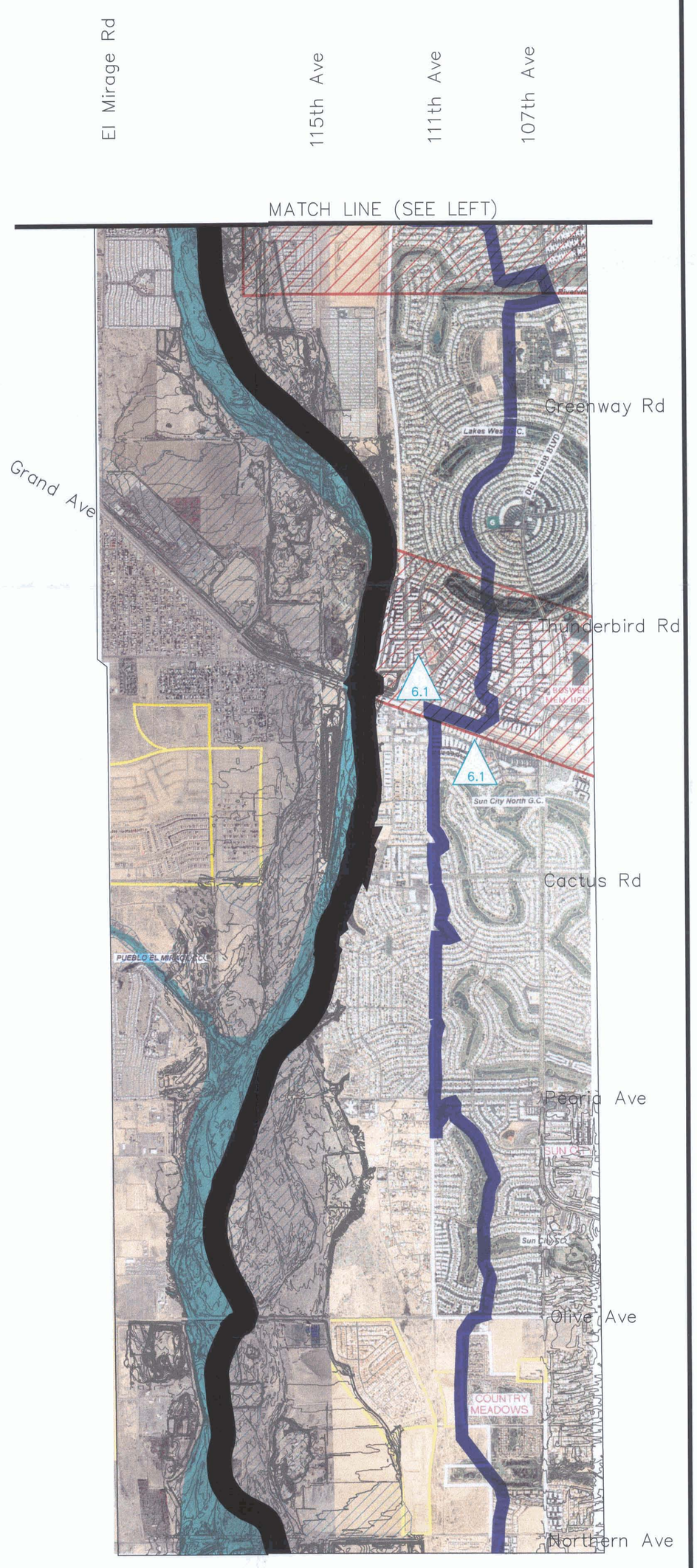
GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

FLOODING PROBLEMS
SUN CITY SUB-AREA
PLATE DC-6

IN ASSOCIATION WITH:
PENTACORE ARIZONA
Civil Engineering Land Surveying Construction Planning Administration ADA Consulting
2255 No. 44th St., SUITE 255 Phoenix, AZ 85008
TELEPHONE (602) 681-9272 FAX (602) 681-9339
LTM Engineering, Inc.
3923 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032



AERIAL PHOTOS BY RUPP AERIAL



AERIAL PHOTOS BY RUPP AERIAL

LEGEND

- OUTER BOUNDARY
- SUB-AREA BOUNDARY
- 1.2 FLOOD AREA IDENTIFICATION NUMBER
- PRIMARY INVESTIGATION AREA
- FLOODWAY
- FLOODPLAIN

2,000 0 2,000 4,000

Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008.3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 310.017

GLENDALE/PEORIA ADMP UPDATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FCD PROJECT NO. 99-44

FLOODING PROBLEMS
AGUA FRIA SUB-AREA
PLATE DC-7

IN ASSOCIATION WITH:
PENTACORE ARIZONA
Civil Engineering Construction Administration Land Surveying Planning ADA Consulting
2255 No. 44th St., SUITE 255 Phoenix, AZ 85008
TELEPHONE (602) 681-9272 FAX (602) 681-9339
LTM Engineering, Inc.
3923 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032

FILE: R:310/310017/AUTOCAD/RPT-DATA COLLECTION/PLATE DC-7.DWG DATE:1/18/01

APPENDIX B. FIELD RECONAISSANCE DATA

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
3	Glendale-Peoria Drainage Master Plan
	1 Levee
17	Desert Amethyst Drainage Master Plan
	1 2- 6ft x 6ft Concrete Box Culverts
26	Final Drainage Report for Eagle Canyon
	1 Off-site retention basin 2 On-site storage 3 18" RGRCP culvert 4 3-24" RGRCP culvert 5 3-24" RGRCP culvert 6 Channel
32	Deer Village Units 5 & 6 Final Drainage Report
	1 On-site Storage 2 20' wide channel 3 4 - 10' X ?' RBC 4 ?" RGRCP
33	Final Drainage Report for Dove Valley Ranch
	1 3- 4ft x 6ft Box Culvert 2 On-site/Off-site storage 3 5- 3ft x 6ft Box Culvert 4 On-site/Off-site storage 5 2ft Drainage Channel 6 5- 3ft x 6ft Box Culvert 7 3- 18" Drains for the Detention Basin 8 On-site/Off-site storage 9 6- 3ft x 6ft Box Culvert

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
33	Final Drainage Report for Dove Valley Ranch
	10 On-site/Off-site storage
	11 4-12" Drains for the Detention Basin
	12 30ft Channel
	13 Culvert
	14
	15 2- 24" Storm Drain
	16 24" Storm Drain
	17 Storm Sewer
34	Deer Valley Village Units 1,2,3 & 4
	1 80' wide channel
	2 On-site Storage
	3 5 - 10' X ? RBC
	4 ?" RGRCP
	5 20' wide channel
35	Drainage Report for Alta Vista Estates Units 3 & 4
	1 2- 3ft x 8ft Box Culvert
	2 2- 3ft x 8ft Box Culvert
	3 24" Storm Drain
	4 30" to 42" Storm Drain
	5 On-site/Off-site storage
37	Addendum to Glendale-Peoria ADMP
	1 Channel
40	Final Drainage Report for Parkridge at 95th Ave & Beardsley Rd
	1 10ft t0 27ft Channel
	2 4- 3ft x 10ft Box Culvert
	3 18" Culvert

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
40	Final Drainage Report for Parkridge at 95th Ave & Beardsley Rd
	4 18" to 30" Storm Drain
	5 Drainage Channel
	6 On-site/Off-site storage
	7 On-site/Off-site storage
	8 18" Drain for the Detention Basin
	9 24" Culvert
	10 18" Drain for the Detention Basin
	11 3- 3ft x 8ft Culvert
41	Marinette Heading Canal Floodplain Removal Request
	1 On-site/Off-site storage
	2 8ft - 10ft Channel
	3 On-site/Off-site storage
42	Drainage Report for Alta Vista Estates Units 1 & 2
	1 30-ft channel
	2 12" Drain for the Detention Basin
	3 1- 3ft x 8ft Box Culvert
	4 1- 3ft x 8ft Box Culvert
	5 On-site/Off-site storage
	6 Channel
	7 1-27" and 1-36" Storm Drain
	8 1-24" and 1-30" Storm Drain
	9 2- 6ft x 10ft Box Culverts
	10 4ft channel (Undersized)
43	Ironwood Final Drainage Plan
	1 2- 3ft x 10ft Box Culverts
	2 4ft x 10ft Box Culvert
	3 18" to 30" Storm Drain

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
43	Ironwood Final Drainage Plan
	4 24" Storm Drain
	5 On-site/Off-site storage
	6 Spillway Channels
	7 Natural Drainage Path
	8 Catch Basin and Storm pipe
	9 Catch Basin and 24" Storm Drain
50	Sun City Area Hydrologic Study
	1 15ft Channel
	2 Channel
	3 20ft Channel (6' deep)
	4 16ft Channel
	5 16ft Channel
	6 15ft Channel
	7 26ft Channel
	8 6ft Channel
	9 9ft Channel
	10 18ft Channel (7' deep)
	11 10ft Channel (4' to 5' deep)
	12 10ft Channel (8' deep)
	13 10ft Channel
	14 5-48" Culverts
	15 8ft x 10ft Box Culvert
	16 10ft Channel (4' -5 ' deep)
51	Silverton Drainage Report
	1 On-site storage
	2 On-site/off-site Storage
	3 36" to 42" Storm Drain
	4 18" Storm Drain

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
51	Silverton Drainage Report
	5 2 - 10' X 3' RBC 6 2 - 10' X 2' RBC 7 2 - 8' X 2' RBC 8 2 - 8' X 2' RBC 9 20' wide channel
52	Fletcher Heights, Phase 3- Preliminary Drainage Report
	1 4 -4' x 10' RBC 2 4 -4' x 10' RBC 3 60' wide channel 4 4 -4' x 10' RBC 5 On-site/off-site Storage 6 4 -3' x 10' RBC
53	Deer Valley States Drainage Plan
	1 On-site storage 2 On-site/Off-site storage 3 24-ft wide channel 4 24-ft wide channel 5 30ft Channel
54	Fletcher Heights, Phase 2- Preliminary Drainage Report
	1 On-site Storage 2 50-ft wide channel lined 3 3- 3' X 8' RCB 4 30' wide channel 5 36" Storm Drain 6 40' wide channel

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
56	Drainage Report for Calbrisa
	1 42" Srorm Drain 2 Greenway Alignment Channel
63	Boardwalk/Peoria Units 1 & 2
	1 91st Avenue Channel
66	Final Drainage Report for Pinnacle Ranch
	1 On-site Storage 2 2-12" RGRCP Culvert 3 24-ft wide Channel
68	Arrowhead Cove / Arrowhead Business Park Preliminary Report
	1 On-site/Off-site storage 2 Culvert 3 Box Culvert
69	Drainage Report for Ventana Lakes
	1 Channel from 22-ft wide to 20-ft wide (10yr flow is diverted into 69.3) 2 Channel from 14-ft wide to 26-ft wide. 3 On-site/Off-site storage 4 Double Box Culvert 5 Double 36" Culvert 6 Triple 36" Culvert 7 36" Culvert 8 36" Culvert 9 On-site Storage

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
69	Drainage Report for Ventana Lakes
	10 On-site Storage
	11 6ft channels to the lakes
85	Westbrook Village Section 27
	1 On-site/off-site Storage (golf course)
	2 8' X 3' RBC
	3 60ft wide channel
	4 60ft wide channel
	5 8' X 3' RBC
	6 8' X 3' RBC
	7 2 - 36" Storm Drains
	8 8' X 3' RBC
	9 10' X 3' REBC
	10 30ft wide channel
	11 2 - 24" Culverts
	12 42" Storm Drain
90	Hydrologic Analysis of Beardsley Channel Project
	1 3- 4ft x 8ft Concrete Box Culverts
	2 2- 4ft x 8ft Concrete Box Culverts
	3 4-24" CMP Culverts
	4 Beardsley Channel from 6ft to 14ft
94	City of Glendale Existing Structures Map
	Proposed Storm Drain
103	Hydrology Worksheets for Area between Skunk Creek and the ACDC
	1 144" Storm Drain
	2 36" - 72" Storm Drain
	3 54" - 66" Storm Drain

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
103	Hydrology Worksheets for Area between Skunk Creek and the ACDC
	4 36" - 84" Storm Drain
	5 36" - 96" Storm Drain
150	As-Built Information for the 101
	1 10' Channel
	2 8ft x 10 ft Concrete Box Culvert
	3 1- 36" & 1- 60" RCP Culvert
	4 6ft x 10ft Concrete Box Culvert
	5 24" to 54" Storm Drain
	6 2- 8ft x 12ft Concrete Box Culverts
	7 12ft Channel
	8 4ft x 6ft Concrete Box Culvert
	9 4ft x 6ft Concrete Box Culvert
	10 2- 6ft x 8ft Concrete Box Culvert
	11 48" Culvert
	12 7ft x 10ft Concrete Box Culvert
	13 Storm Sewer
	14 Storm Sewer
	15 Storm Sewer
	16 Culverts
	17 2- 42" Storm Drains
	18 Culverts
	19 Storm Sewer
	20 2- 7ft x 8ft Concrete Box Culvert
	21 5ft Channel
	22 2ft Channel
	23 10ft Channel
	24 Storm Sewer
	25 Culverts
	26 2- 7ft x 8ft Concrete Box Culverts

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
150	As-Built Information for the 101
	27 15ft Channel
	28 3- 7ft x 8ft Concrete Box Culverts
	29 Storm Sewer
	30 72" Storm Drain w/ pump station
	31 36" Storm Drain
	32 3- 7ft x 8ft Concrete Box Culvert
199	Field Investigated - Sun City
	1 2- 4ft x 10ft CBC & 1- 5ft x 10ft CBC
	2 1- 4ft x 10ft CBC
	3 20ft Channel 6' deep
	4 6- 48" RCP (8" below grade due to soil cement)
	5 2- 3' x 12' Concrete Box Culvert
	6 6- 48" RCP (6" below grade due to soil cement)
	7 2- 5' x 9' Concrete Box Culvert
	8 2- 5' x 9' Concrete Box Culvert
	9 2- 4' x 10' Concrete Box Culvert
	10 2- 4' x 10' Concrete Box Culvert
	11 2ft channel 4:1 side slopes 3'-4' deep
	12 2- 4' x 10' Concrete Box Culvert
	13 2- 4' x 10' Concrete Box Culvert
	14 2- 4' x 10' Concrete Box Culvert
	15 2- 4' x 10' Concrete Box Culvert
	16 2- 4' x 10' Concrete Box Culvert
	17 2- 3' x 10' Concrete Box Culvert
	18 2- 3' x 8' Concrete Box Culvert
	19 1- 3' x 10' Concrete Box Culvert
	20 3- 36" RCP Culverts
	21 1- 24" RCP Culvert
	22 2- 24" CMP's Storm Drains

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
199	Field Investigated - Sun City
23	2-4' x 11' Arch Storm Drain
24	1- 48" & 1-36" RCP Storm Drains
25	1- 4' x 11' Arch Culvert & 36" RCP storm drain
26	1- 4' x 11' Arch Culvert
27	3- 5' x 9' Concrete Box Culvert
28	1- 24" RCP Culvert
29	2- 4' x 10' Concrete Box Culvert
30	5- 48" RCP Culverts
31	2- 4' x 10' Concrete Box Culverts
32	2- 4' x 10' Concrete Box Culverts
33	2- 4' x 10' Concrete Box Culverts
34	2- 4' x 10' Concrete Box Culverts
35	2- 48" RCP Storm Drains
36	3- 48" RCP Storm Drains
37	1- 36" RCP Culvert
38	2- 4ft x 8ft Concrete Box Culverts
39	2- 3ft x 10ft Concrete Box Culvert
40	1- 5ft x 12ft Concrete Box Culvert (with a weir)
41	2- 4ft x 8ft Concrete Box Culvert
42	5- 18" x 12' Spillway openings and 1- 24" RCP low-flow pipe
43	24" RCP Stormdrains
44	3- 3ft x 8ft Concrete Box Culverts
45	2- 3ft x 6ft Concrete Box Culverts
46	2- 36" RCP Culverts
47	4- 8ft x 10ft Concrete Box Culverts
48	2- 54" RCP Culverts
49	3- 8ft x 10ft Concrete Box Culverts
50	5ft Channel
51	2- 24" RCP Culverts
52	2ft Channel (3ft deep)

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
199	Field Investigated - Sun City
	53 2ft Channel (3-4 ft deep)
	54 2- 36" x 60" Arch Concrete Stormdrain
	55 1- 36" x 60" Arch Concrete Stormdrain
	56 8ft Channel (4-5 ft deep)
	57 10ft Channel (5ft deep 3:1 sides)
200	Field Investigated
	1 6- 4ft x 10ft Concrete Box Culverts
	2 60ft Concrete Channel
	3 6- 4ft x 10ft Concrete Box Culverts
	4 60ft Channel
	5 5- 4ft x 10ft Concrete Box Culverts
	6 60ft Channel
	7 2- 42" RCP Storm Drains
	8 10ft Concrete Channel
	9 2- 5ft x 8ft Concrete Box Culverts
	10 15ft Conrete Channel
	11 2- 3ft x 10ft Concrete Box Culverts
	12 30ft Channel
	13 2- 3ft x 10ft Concrete Box Culverts
	14 30ft Channel
	15 4- 3ft x 10ft Concrete Box Culverts
	16 30ft Channel
	17 4- 4ft x 10ft Concrete Box Culverts
	18 30ft Channel (Wier Wash)
	19 48" RCP Storm Drain
	20 4- 4ft x 10ft Concrete Box Culvets
	21 4- 4ft x 10ft Concrete Box Culvets
	22 4- 4ft x 10ft Concrete Box Culvets

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
200	Field Investigated
	23 3- 42" RCP Culverts
	24 3- 42" RCP Culverts
	25 4- 4ft x 10ft Concrete Box Culvets
	26 4- 3ft x 8ft Concrete Box Culvert
	27 24" RCP Storm Drain
	28 36" RCP Storm Drain
	29 2-24" RCP Storm Drain
	30 2-24" RCP Storm Drain
	31 24" to 42" RCP Storm Drain
	32 24" to 2- 42" RCP Storm Drains
	33 4ft x 10ft Concrete Storm Drain
	34 Outlet Channels to New River
	35 36" RCP Storm Drain
	36 3- 3ft x 5ft Concrete Box Culverts
	37 3- 3ft x 6ft Concrete Box Culverts
	38 20ft to 40ft Channel
	39 3- 3ft x 5ft Concrete Box Culvert
	40 4- 3ft x 9ft Concrete Box Culvert
	41 4- 4ft x 8ft Concrete Box Culvert
	42 2- 3ft x 10ft Concrete Box Culvert
	43 2- 4ft x 6ft Concrete Box Culvert
	44 10ft Channel
	45 36" RCP Storm Drain
	46 2- 3ft x 10ft Concrete Box Culverts
	47 2- 3ft x 10ft Concrete Box Culverts
	48 24" RCP Storm Drain
	49 18" Drain for detention basin
	50 3- 3ft x 8ft Concrete Box Culvert
	51 2-48" CMP Culverts
	52 2- 4ft x 10ft Concrete Box Culverts

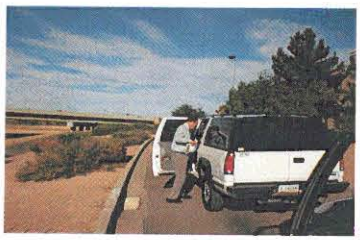
Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
200	Field Investigated
	53 2- 4ft x 10ft Concrete Box Culverts
	54 3- 48" HDP Culverts
	55 6- 24" CMP Culverts
	56 3- 48" CMP Culverts
	57 36" RCP Culvert
	58 2- 4ft x 8ft Concrete Box Culverts
	59 4- 18" RCP Culverts
	60 3- 30" RCP Culverts
	61 4- 12" RCP Culverts
	62 24" RCP Culvert
	63 36" RCP Storm Drain
	64 2- 24" RCP Storm Drain
	65 2- 24" RCP Storm Drain
	66 42" Storm Drain
	67 24" Storm Drain
	68 3-18" RCP Storm Drain
	69 3- 5ft x 8ft Concrete Box Culverts
	70 10ft Channel
	71 3- 5ft x 8ft Concrete Box Culverts
	72 18" RCP Culvert
	73 5ft Channel
	74 24" RCP Culvert
	75 18" Storm Drain
	76 18" to 24" Storm Drain
	77 54" Storm Drain
	78 3- 4ft x 8ft Concrete Box Culverts
	79 4- 42" RCP Culverts
	80 20ft Channel
	81 2- 4ft x 10ft Concrete Box Culverts
	82 2- 4ft x 10ft Concrete Box Culverts

Table DC-1
Existing/Proposed Structure Log

Data Log No.	Title of Report
200	Field Investigated
	83 15ft Channel (5ft deep, 2:1 Right, Vertical Left)
	84 4- 48" RCP Culverts
	85 **3- 48" RCP Culverts**
	86 3 – 48" RCP Culverts
	87 **8 foot Steel Pipe**
	88 8 foot Steel Pipe
	89 **Unk.**
	90 **Unk.**
	91 72" RCP
201	FCDMC GIS database data
	1 New River floodplain/floodway
	2 Agua Fria floodplain/floodway
	3 Skunk Creek floodway/floodplain
	4 Rock Springs Creek
202	FCDMC Aerial Identification (sizes not known)

Photographs 1-33



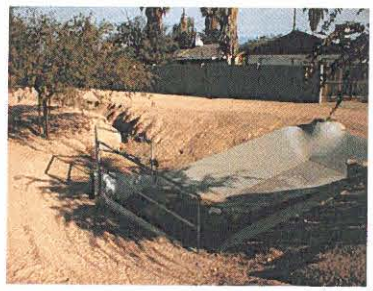
1- Problem Area 1 - North side Access Road for the ACDC canal. The 6" curb collects drainage from the access road to the canal.

2- Problem Area 1 - The parking lot at 6003 W. Thunderbird Rd. This area was identified in the Kamiski-Hubbard (K-H) 500' swath report as a problem area. This parking lot is lower than Thunderbird Road. Since that report, an inlet was constructed to drain the parking lot into the canal.

3- Problem Area 1 - Looking east down Thunderbird Road. The parking lot at 6003 W. Thunderbird Rd. is on the east side of the picture.

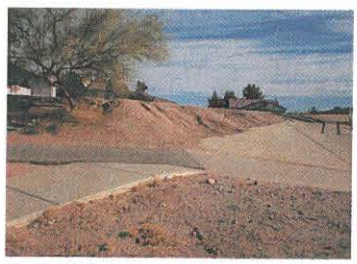
4- Problem Area 1 - Acoma Drive looking north. This road appears to drain away from the ACDC canal for 200-300 feet.

5- Problem Area 1 - An outlet and spillway from a subdivision north of the ACDC canal.

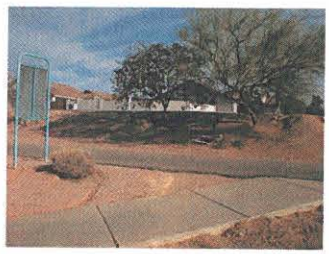


6- Problem Area 1 - Another view of the spillway. The contributing natural channel is very eroded.

7- Problem Area 1 - The flow is forced to turn the corner. There is no inlet or scupper to carry the flow into the canal at this point. Iron fence likely constructed to replace brick wall during 1990 flood events.

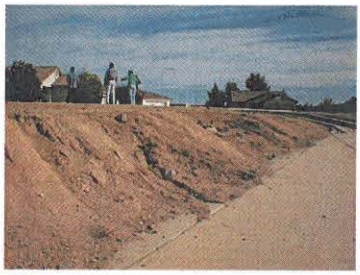


8- Problem Area 1 - Area near the Maui Lane cul-de-sac. The hillside is too steep and has erosion. The 6" curb on the south side of the road is being overtopped and causing the erosion.



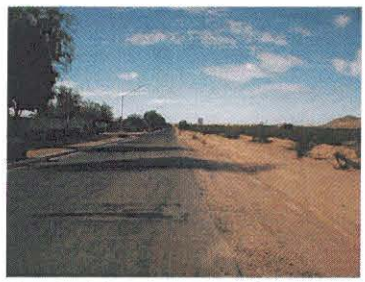
9- Problem Area 1 - Maui Lane cul-de-sac. Evidence of the 6" curb being overtopped and flowing down the hillside causing erosion.

Photographs 1-33



10- Problem Area 1 - Further evidence of the 6" curb being overtopped at the cul-de-sac at Maui Lane.

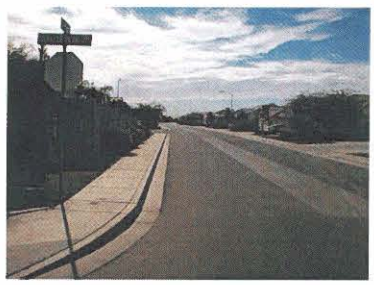
11- Problem Area 1 - The scupper at the downstream side of the Maui Lane cul-de-sac. The scupper is under- sized and there is evidence of scour around the structure.



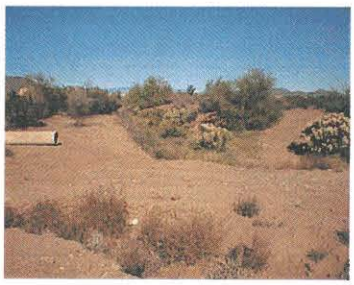
12- Problem Area 9 - Pinnacle Peak Road looking west. The overland flow from the north crosses this road and enters the subdivision to the south.

13- Problem Area 9 - A storm drain channel into the subdivision south of Pinnacle Peak Road west of 67th Avenue. This drains the areas from the north that flow across Pinnacle Peak Road

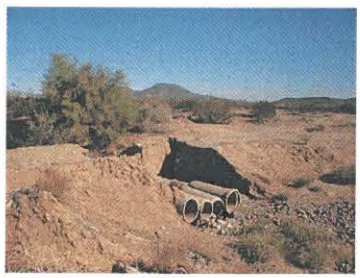
14- Problem Area 9 - Pinnacle Peak Road looking east. The flow overtops the road and enters the subdivision on the right side.



15-Problem Area 9 - An entrance to the subdivision on the south side of Pinnacle Peak Road. The road is an inverted crown to aid in the capacity of the road to handle the extra flow.



16- Problem Area 5 - Rock Springs Creek as it enters the gravel pit.

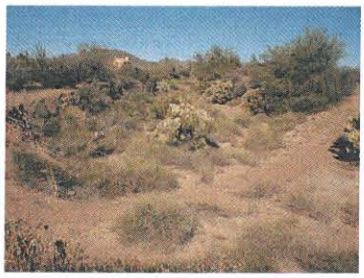


17- Problem Area 5 - Rock Springs Creek as it enters the gravel pit. The culvert was placed to carry the flows. The erosion around the culverts appears recent.

18- Problem Area 5 - Overhead view of the culvert that carry flow from Rock Springs Creek into the gravel pit.

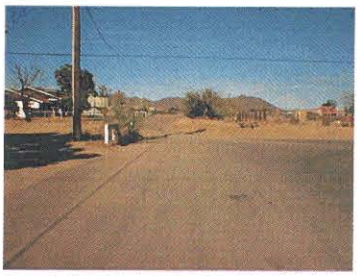
Photographs 1-33

19- Problem Area 5 - Rock Springs Creek looking south as it enters the gravel pit. The creek completely disappears at this location.

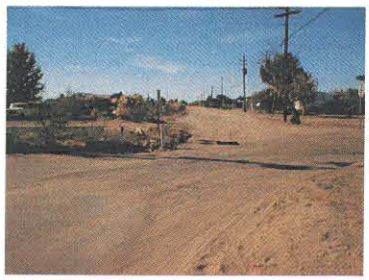


20- Problem Area 5 - Rock Springs Creek looking north from the entrance to the gravel pit.

21- Additional Problem Area per City of Peoria. The abandoned irrigation canal at 89th Avenue and Williams Road looking east.

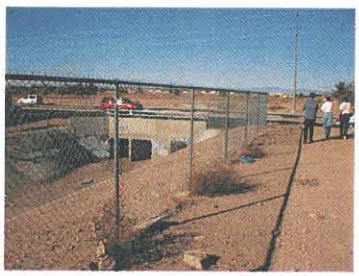


22- Additional Problem Area per City of Peoria. 87th and Williams Road. 87th Avenue drains to the south and leaves sediment on the paved road.

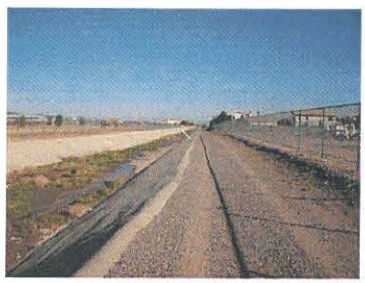


23- Additional Problem Area per City of Peoria. Sediment deposits on Williams Road at 87th Avenue.

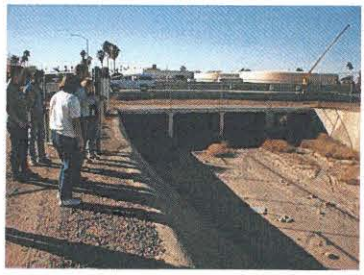
24- Problem Area 3 - 115th Avenue looking south from Beardsley Road. The excess flow from the canal to the north overtops and flows down this road.



25- Problem Area 2 - Looking north at the upper end of the 91st Avenue drainage channel at Bell Road.

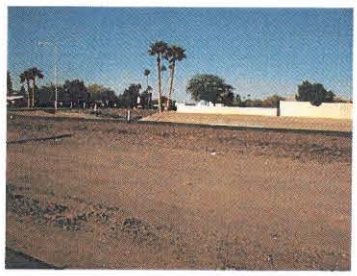


26- Problem Area 2 - Looking East down the Greenway channel towards the New River. A portion of the channel slope is against grade.

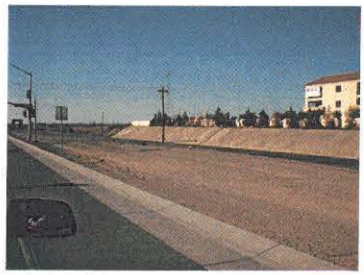


27- Problem Area 2 - Looking west at the Greenway channel and 91st Avenue bridge.

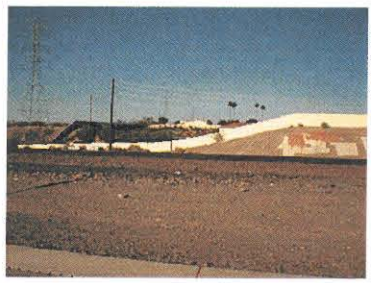
Photographs 1-33



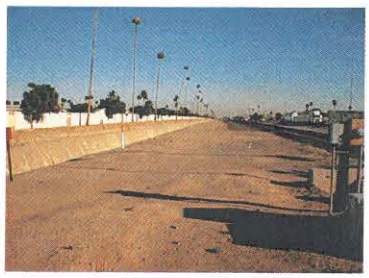
28- Problem Area 6 - Sun City along Grand Avenue looking northwest



29- Problem Area 6 - Sun City along Grand Avenue looking west.



30-Problem Area 7 - The old baseball stadium looking north. This area is now an apartment complex. There seems to be a low point at the west end.

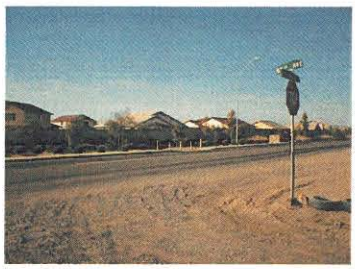


31- Problem Area 6 - Sun City along Grand Avenue looking east.

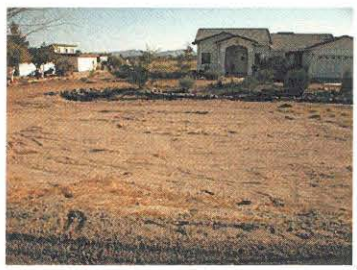
32- Problem Area 6 - Sun City along Grand Avenue looking east.

33- Problem Area 7 - A drainage channel in Sun City that takes the flow to the Agua Fria River looking west. Approximately ½ mile north of Thunderbird Road on Agua Fria Drive.

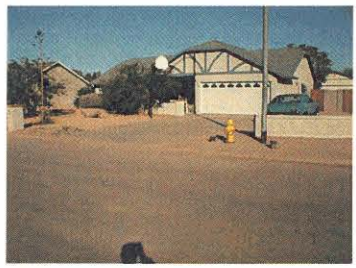
Field Trip Photos (1–10-2000)



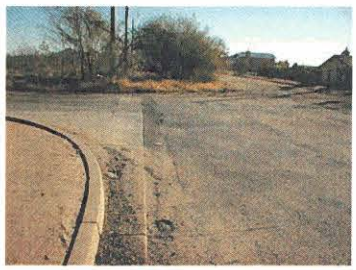
Picture 1



Picture 2

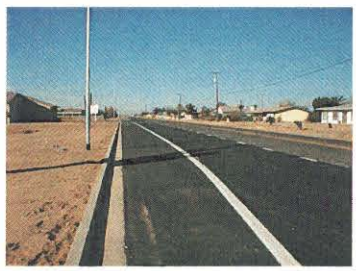


Picture 3

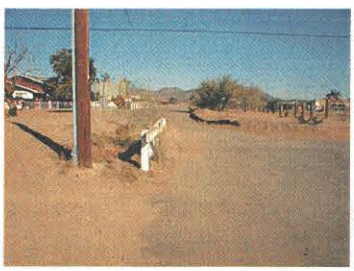


Picture 4

Picture 5



Picture 6



Picture 7

Picture 8

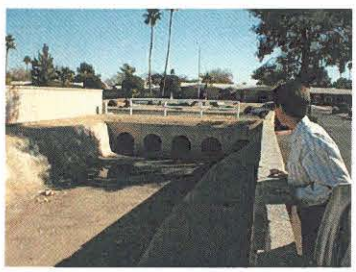
Picture 9

Picture 10

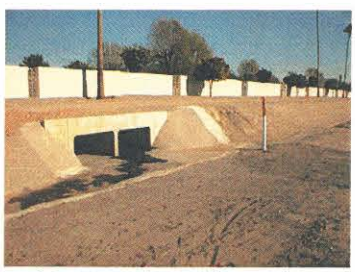
Picture 11

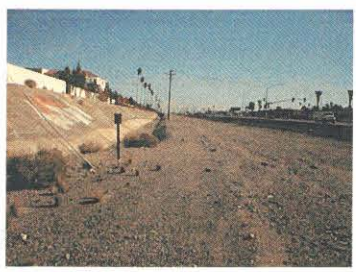
Picture 12

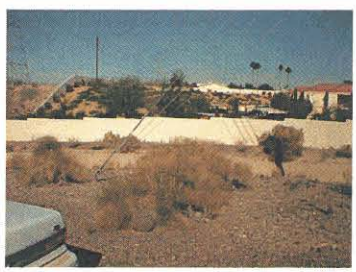
Picture 13


Picture 14

Picture 15


Picture 16


Picture 17

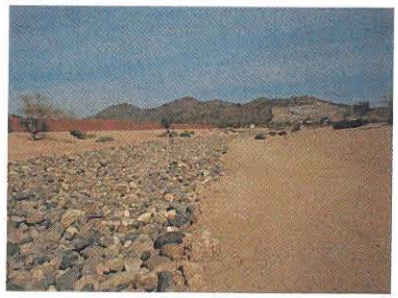

Picture 18

Picture 19

Photographs 1-55

Picture 1
Weir Wash as it turns south at the northeast corner of 67th avenue and Jomax Road.

Picture 2
Looking downstream at Weir Wash as it enters the 4- 4ft x 10ft Box Culverts that flow under 67th Avenue and into Terramar.



Picture 3
Looking North towards Jomax Rd from the east channel along 67th avenue.

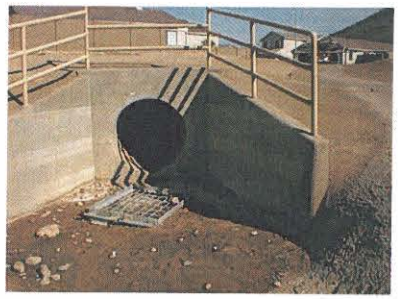
Picture 4
Looking south along the channel on the east side of 67th avenue south of Jomax Rd.

Picture 5
Looking upstream at Weir Wash as it enters the Box culvert under 64th avenue.

Picture 6
The 4- 3ft x 10ft Box culverts under 64th avenue, just south of Jomax Rd.

Picture 7
Weir Wash downstream of 64th avenue, south of Jomax Rd.

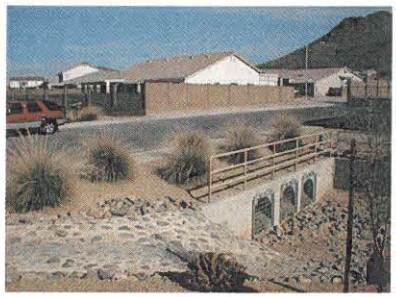
Picture 8
The 24" RCP that enters the box culvert at 64th avenue, just south of Jomax.



Picture 9
The 48" RCP that empties into the channel at 65th avenue and Prickly Pear Trail.

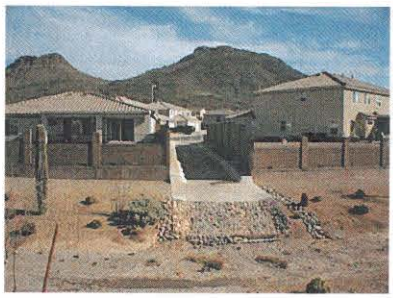
Photographs 1-55

Picture 10
Looking downstream of the channel that begins at 65th avenue and Prickly Pear Trail.

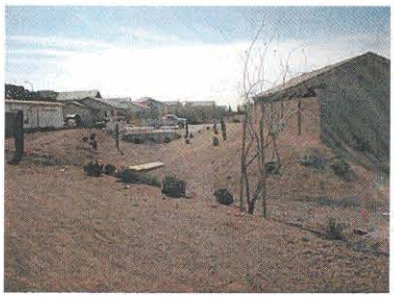


Picture 11
3-42" RCP culverts for the channel as it crosses Avenida Del Ray.

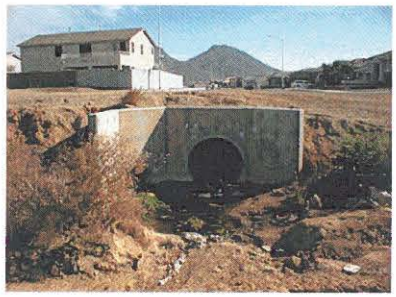
Picture 12
Looking south down the channel at Avenida Del Ray.



Picture 13
Spillway that enters the channel at the turn in 65th avenue.

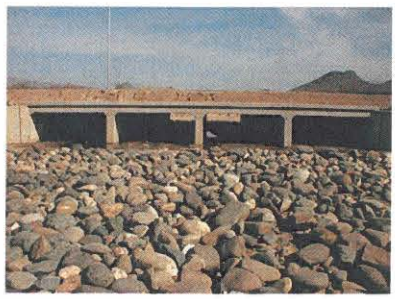


Picture 14
Looking at the 3- 42" RCP culverts that cross at the channel and Saddlehorn Rd.



Picture 15
42" RCP that drains the north that drains Tether Trail to Briles Road.

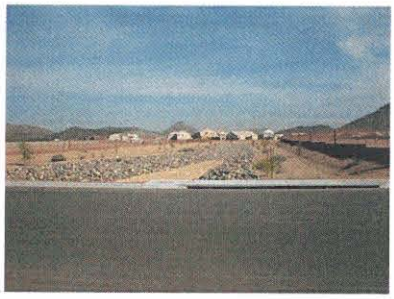
Picture 16
Looking at the northern most wash that drains Terramar.



Picture 17
4- 4ft x 10ft Box culverts at Terramar Continental development.

Picture 18
4- 4ft x 10ft Box culverts at Terramar Continental development.

Photographs 1-55



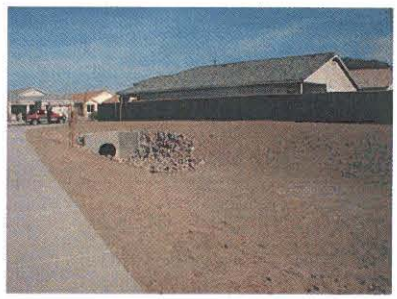
Picture 19
Looking upstream at Weir Wash as it crosses the box culvert at the Continental development.

Picture 20
The 4- 4ft x 10ft box culverts at 67th avenue and Desert Moon Way.

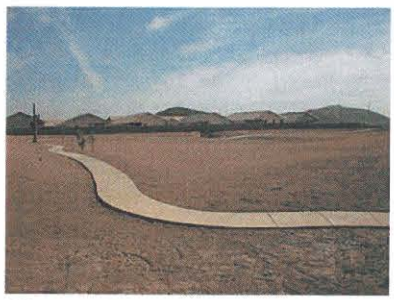
Picture 21
Looking upstream of Weir Wash at 67th, south of Cortez Place.

Picture 22
The 4- 4ft x 10ft box culverts at 67th, south of Cortez Place.

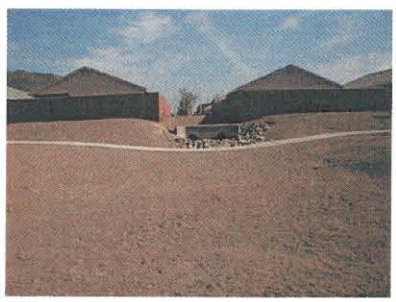
Picture 23
Looking downstream at Weir Wash after it crosses 67th south of Cortez Place.



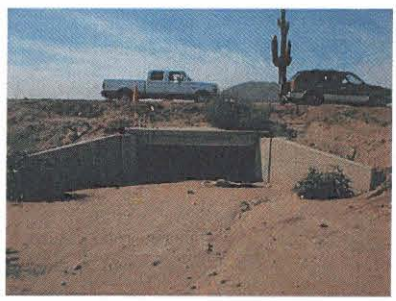
Picture 24
36" RCP that empties into the detention basin south of Desert Road and north of Happy Valley.



Picture 25
Detention basin between Desert Rd and Happy Valley Rd.

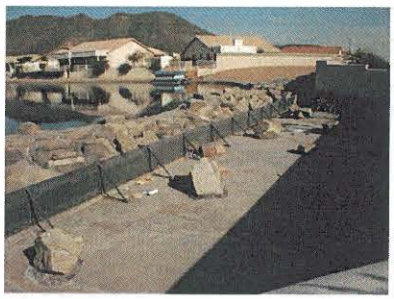


Picture 26
2- 24" RCP that empties into the detention basin at Buckskin Trail.

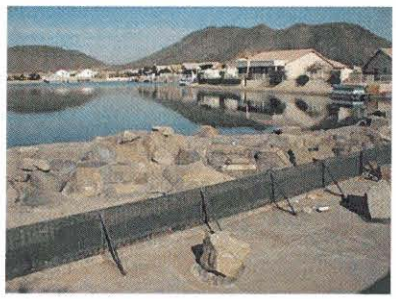


Picture 27
RCB outlet for the storm drain that collects the local wash just north of the intersection of Terramar and Happy Valley Road.

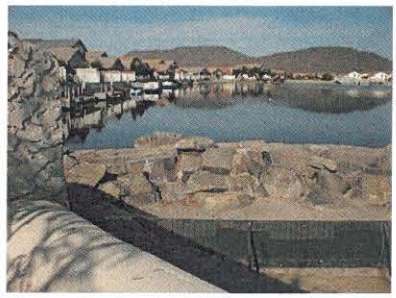
Photographs 1-55



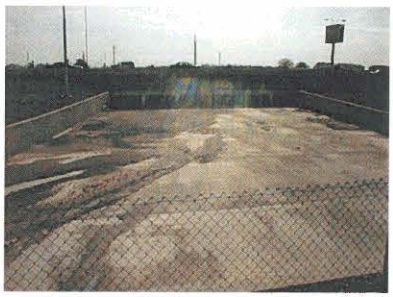
Picture 28
The spillway/outfall for the Arrowhead Lakes subdivision.



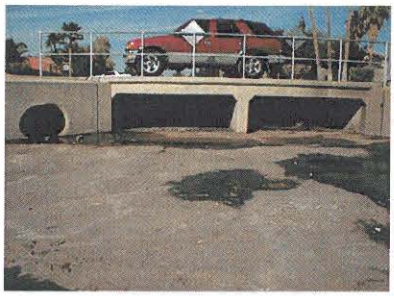
Picture 29
The spillway/outfall for the Arrowhead Lakes subdivision.



Picture 30
Arrowhead Lakes at the spillway.



Picture 31
The concrete channel between the frontage road and the 101. There is 6- 4ft x 10ft box culverts at both the north and south end.

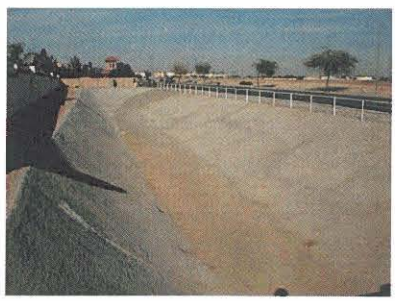


Picture 32
The box culverts that drain the south Arrowhead Ranch development just north of Union Hills and west 0f 70th avenue.

Picture 33
Looking downstream of the channel that drains Arrowhead Ranch at Union Hills and 70th avenue.

Picture 34
The 3- 5ft x 8ft Box culverts at Athens St and 91st avenue.

Picture 35
Looking downstream along the channel on the west side of 91st avenue that begins to the south of Desert Amethyst.

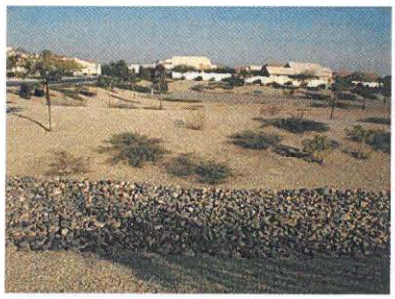


Picture 36
Looking upstream of the channel to the spillway that empties 91st avenue into the channel.

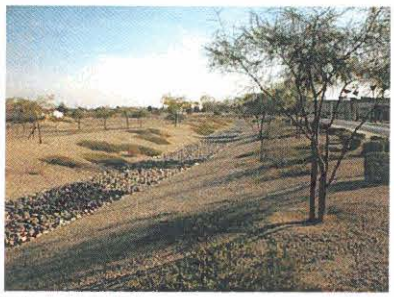
Photographs 1-55

Picture 37
Beardsley and 91st avenue looking west down Beardsley Rd.

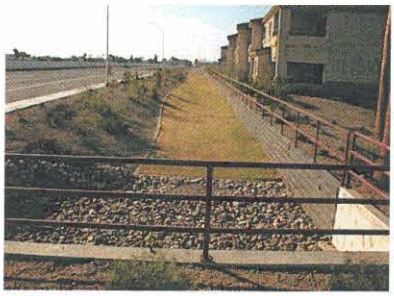
Picture 38
2- 3ft x 10ft Box culverts for the channel on the east side of 101st avenue northt of Beardsley Rd.



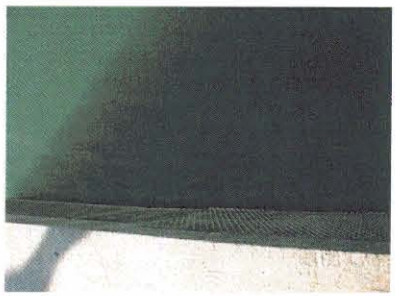
Picture 39
The detention basin south of the intersection of 101st avenue and Mohawk Lane. The channel to the west side does not flow into the basin. The basin drains into the channel.



Picture 40
Looking downstream of the channel along 101st avenue just south of Mohawk Lane.



Picture 41
Looking west down Beardsley at 101st avenue.



Picture 42
The Ventana Lakes overflow structure. (east lakes)

Picture 43
3- 3ft x 6ft box culverts at the entrance of Fletcher Heights south of Deer Valley Road.

Picture 44
Looking downstream of the channel that flows along 83rd avenue and through Fletcher Heights.

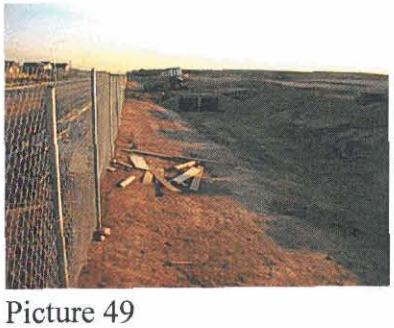
Picture 45
83rd Avenue and Fletcher Heights.

Photographs 1-55

Picture 46
Pedestrian walkway for the channel that flows through Fletcher Heights just before it empties into the New River.

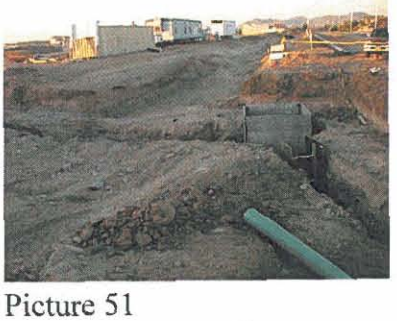
Picture 47
4- 4ft x 8ft box culverts for the pedestrian walkway.

Picture 48
2- 3ft x 10ft box culverts being constructed on 87th avenue south of Deer Valley Rd.



Picture 49
Looking south along the channel on the west side of 87th avenue south of Deer Valley Rd

Picture 50
Looking south at the 2- 2ft x 10ft box culverts on the east side of 87th avenue south of Deer Valley Rd.



Picture 51
Trouble area at 87th avenue where the channels will empty into a detention basin that is not constructed. The water is going to pond at this location.

Picture 52
Looking upstream from the west channel along 87th avenue, just north of the problem area.

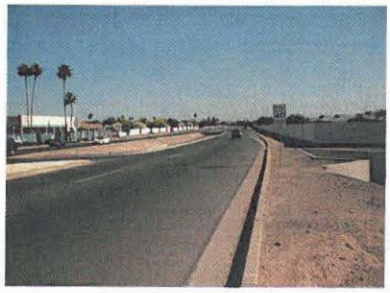
Picture 53
looking south from the problem area. The future detention pons is on the right side. (There is an orchard there now)

Picture 54
Where the 87th channel enters the problem area. The future detention pond is in the orchard.

Picture 55
Looking west from the problem area where they are constructing a sewer.

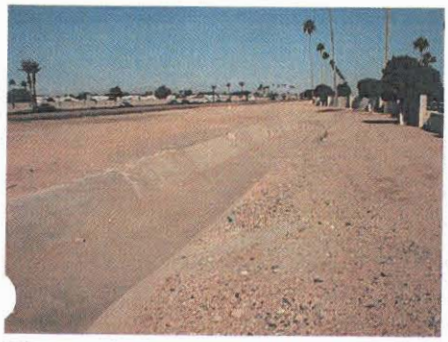
Field Trip Photos
May 4, 2000

Picture 1
99th Ave & Grand Ave
The two culvert structures that drain into the main Grand Ave channel.

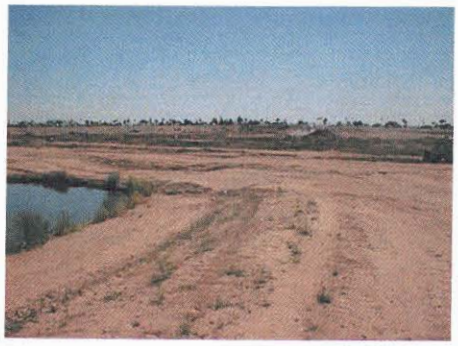


Picture 2
Looking north on 99th Ave.
The inverted crown road with drainage in the middle.

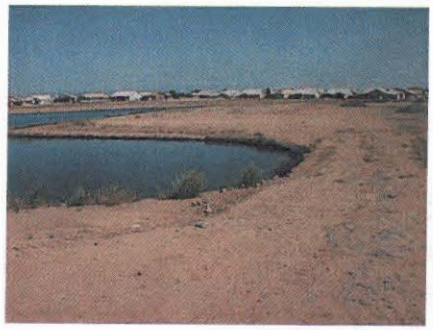
Picture 3
Looking north on 99th Ave.



Picture 4
Grand Avenue looking northwest from 99th Ave. The channel has an-S transition as it nears the culvert under 99th Ave.

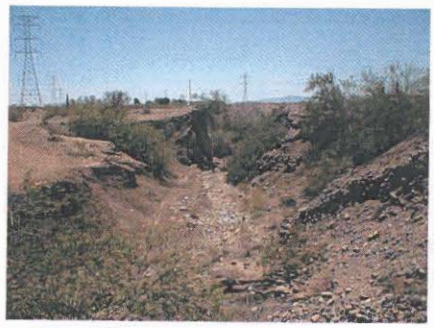


Picture 5
The south lake in the Ventana Lakes development. This lake has no outlet.

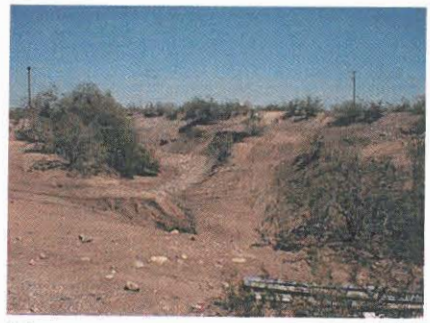


Picture 6
The same lake from another view.

Picture 7
The northwest wash that will have a Zone A delineation.



Picture 8
Same was from a different view. Slopes are very steep with much degradation.



Picture 9
Same wash from a different view.

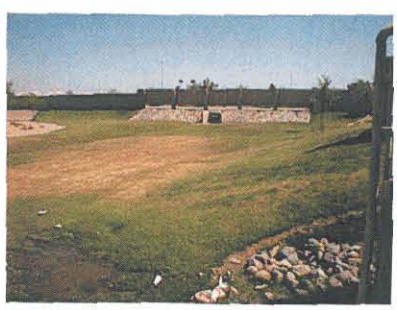
Picture 10
The wash as it crosses 107th Ave. The culvert is undersized and filled with sediment. The excess runoff overtops the road and is eroding the road near the culvert.

Picture 11
The same wash.

Picture 13
The east side of the overflow structure at 67th Ave between the two lakes. The grate accepts the smaller overflows, and the larger spillway takes the remaining overflow.

Picture 14
The spillway which is under construction at 67th Ave between the two lakes in the Arrowhead Lakes development.

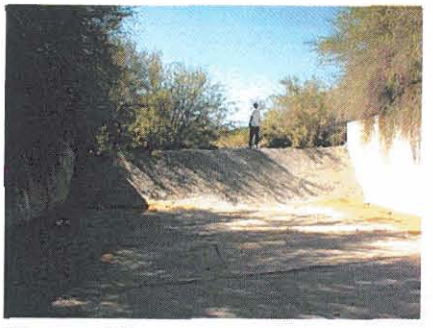
Picture 15
Another view of the spillway that is being constructed.



Picture 16
The detention basin with overflow structure that spills into the channel along I-101.

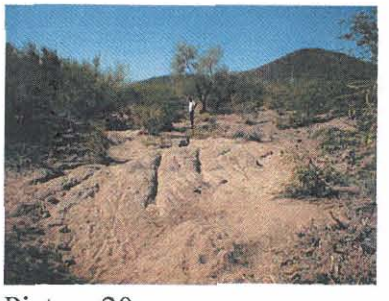
Picture 17
The spillway structure at the south end of Picture 16. The large channel is on the other side.

Picture 12



Picture 18
The drop structure from the natural wash just upstream of the 59th Avenue box culvert.

Picture 19
Looking at the berm to the north of the Arrowhead Lakes development.

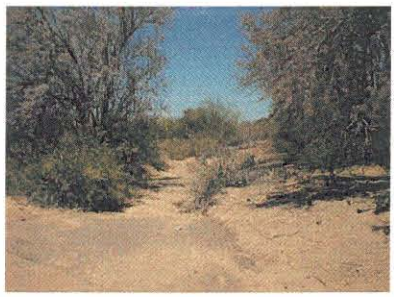


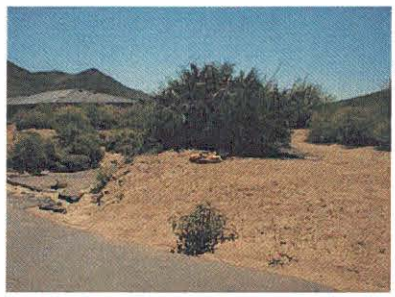
Picture 20
The natural wash on the east side of the project area that will have a Zone A delineation.

Picture 21
Looking downstream on the drop structure. The 59th Avenue culverts take the flow into a wetlands area.

Field Trip May 9, 2000

Picture 1


Picture 2

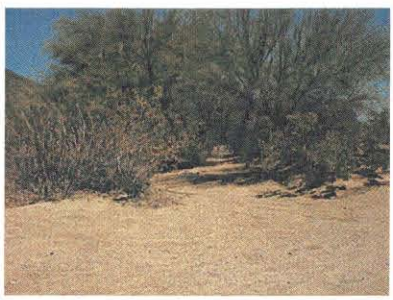

Picture 3

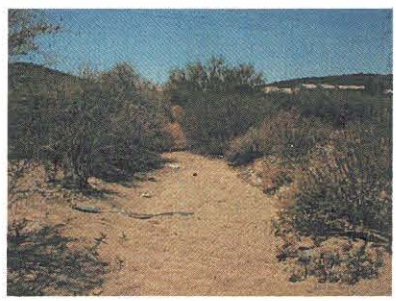
Picture 4

Picture 5

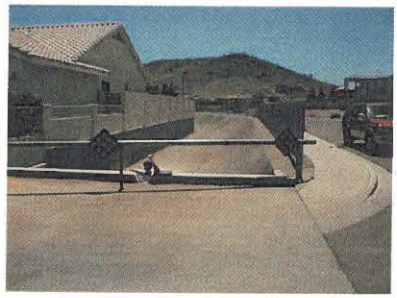
Picture 6

Picture 7


Picture 8

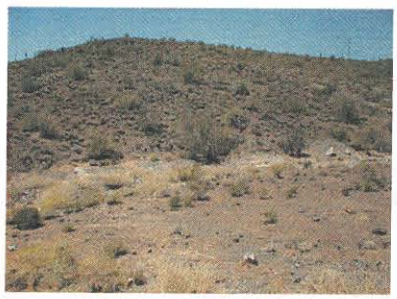

Picture 9

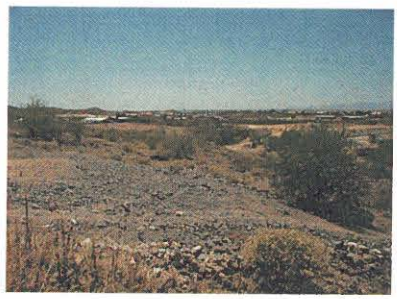
Picture 10

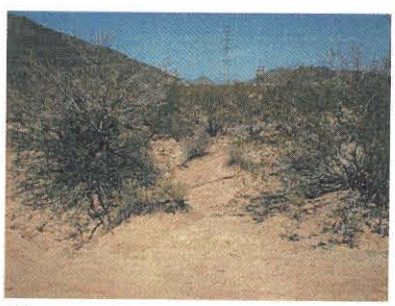

Picture 11

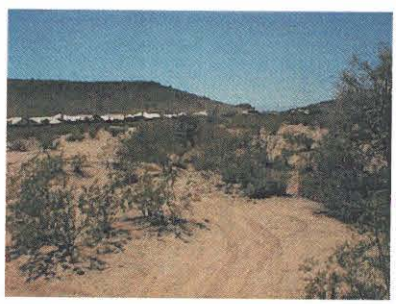
Picture 12

Picture 13

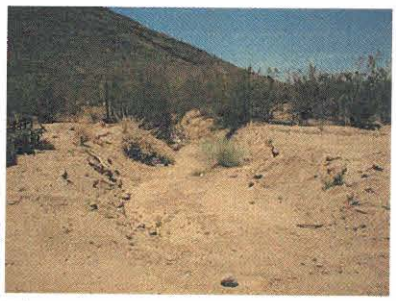

Picture 14

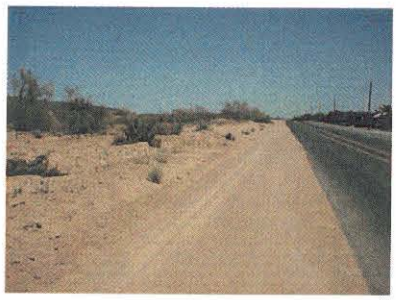

Picture 15

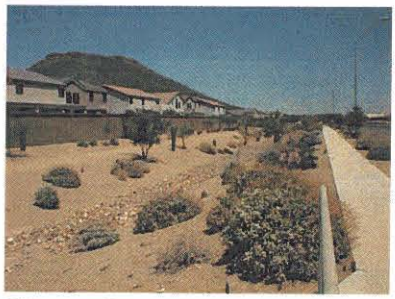

Picture 16


Picture 17

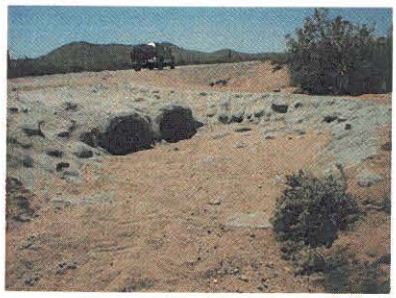
Picture 18

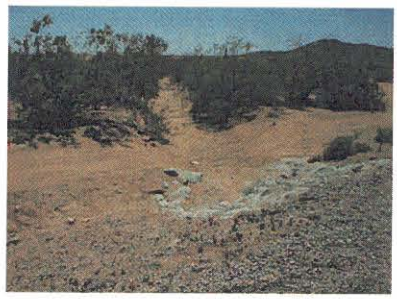

Picture 19

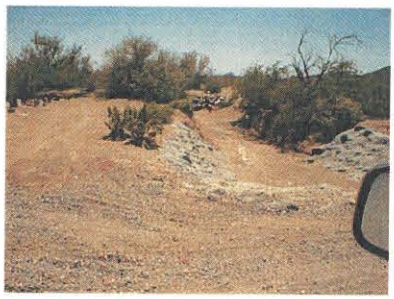

Picture 20


Picture 21

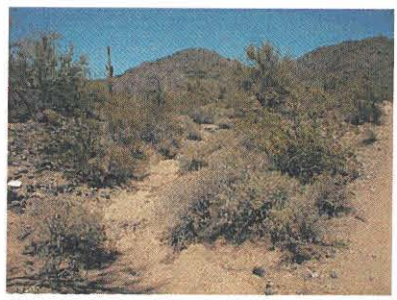
Picture 22

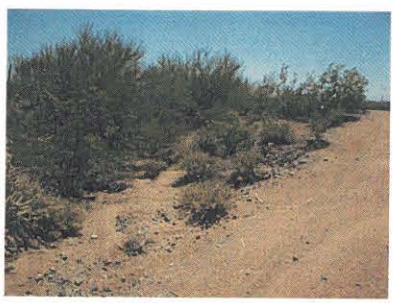

Picture 23

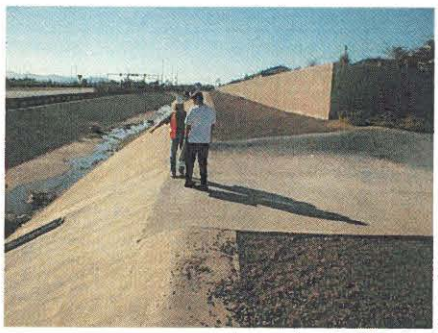

Picture 24


Picture 25

Picture 26

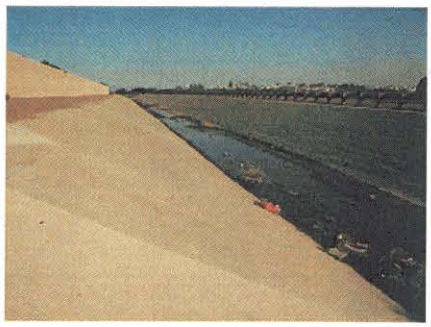

Picture 27


Picture 28

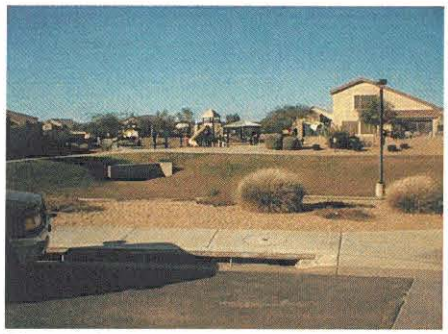


Picture 1
Overflow Weir at Arrowhead Lakes into the I-101 channel.

Picture 2
Looking upstream into combination overflow weir at Arrowhead Lakes.



Picture 3
The I-101 channel looking upstream.



Picture 4
Detention Basin in Arrowhead Lakes.

Picture 5
Overflow weir for the downstream lake in Section 24 of Arrowhead Lakes.

Picture 6
Upstream view of the same overflow weir.

APPENDIX C. SCOPE OF WORK

SCOPE OF WORK

Glendale/Peoria Area Drainage Master Plan Update
FCD No. 99-44

FLOOD CONTROL DISTRICT of Maricopa County

TABLE OF CONTENTS

1.0 GENERAL DESCRIPTION 3
1.1 PROJECT DESCRIPTION 3
1.2 PURPOSE AND NEED 3
1.3 LOCATION 3
1.4 PARTICIPANTS 4
1.5 CONTRACT TIMEFRAME AND SCHEDULE 4
1.6 PROJECT REFERENCES 4

2.0 TASKS 7
2.1 DATA COLLECTION AND EXISTING CONDITIONS ANALYSIS 7
2.2 FEMA FLOODPLAIN AND FLOODWAY DELINEATION 10
2.3 LEVEL I ANALYSIS – ALTERNATIVES FORMULATION/PRELIMINARY ANALYSIS 11
2.4 LEVEL II ANALYSIS – ALTERNATIVE ANALYSIS 11
2.5 LEVEL III ANALYSIS – PREFERRED ALTERNATIVE ANALYSIS 12
2.6 MAINTENANCE PLAN 12
2.7 IMPLEMENTATION PLAN 12
2.8 FIELD SURVEY AND MAPPING 12
2.9 HYDRAULIC ANALYSIS 13
2.10 HYDROLOGIC ANALYSIS 13
2.11 LAND OWNERSHIP, RIGHT-OF-WAY AND EASEMENTS 16
2.12 ENVIRONMENTAL OVERVIEW 17
2.13 VISUAL RESOURCES AND MULTIPLE USE OPPORTUNITIES ASSESSMENT 18
2.14 PUBLIC INVOLVEMENT 20
2.15 UTILITIES 21
2.16 SITE VISITS 21
2.17 MEETINGS 21

3.0 PROJECT ADMINISTRATION 22
3.1 SCHEDULE 22
3.2 INVOICES 23
3.3 PROJECT MANAGEMENT 23
3.4 REPORTS 23
3.5 DELIVERABLES 26

1.0 GENERAL DESCRIPTION

1.1 PROJECT DESCRIPTION

1.1.1 This scope-of-work (SOW) is to contract for professional engineering services necessary to update the existing Glendale/Peoria Area Drainage Master Plan (ADMP). Current drainage facilities, provided mainly through private development, often do not meet the requirements as developed in the original ADMP study. Private developers have pursued detailed individual and independent hydrology studies used to make drainage improvements for protection of their specific developments only. In many rural areas drainage has been altered by individual property owners to suit their particular needs. These changes alter overall drainage in the region, resulting in increased downstream liabilities.

The Glendale/Peoria ADMP Update will identify current drainage problems and develop cost-effective solutions to alleviate known and potential flooding problems. Flooding solutions may include storm water collection and disposal systems, drainage design policies, standards and guidelines, or some combination of these.

The SOW will include public coordination, survey and mapping, hydraulics, hydrology, identification of drainage problems, environmental overview, visual resource assessment, development of alternative solutions, and preparation of preliminary design plans based on a preferred alternative(s).

1.2 PURPOSE AND NEED

1.2.1 The purpose of the Glendale/Peoria ADMP Update is to update a portion of the existing Glendale/Peoria ADMP study completed in May 1987, by quantifying the extent of flooding problems and developing alternative solutions to flooding problems. Arizona Revised Statutes Title 48, Chapter 21 requires the Board of Directors to identify flooding problems and plan for the construction of facilities which will eliminate or minimize flooding problems.

1.2.2 There are two major objectives of the study. The first is to quantify selected drainage problems within the study area. The second is to develop a plan to control runoff to prevent flood damage to developments within the study area.

1.2.3 Since current models do not accurately reflect the conditions of the study area, this work is necessary to update the hydrology to meet current DISTRICT standards. Area floodplain managers, municipalities, and developers will use this study as a basis for drainage regulation, improvements and design. This study will impact the floodplain administration for the Agua Fria River at the conceptual level.

1.2.4 The expectation of this study is to identify flooding solutions for the study area that may be implemented together, individually or not at all, based on scheduling, funding and cost sharing.

1.3 LOCATION

1.3.1 The area of study for the Glendale/Peoria ADMP Update is comprised of all the area of the original study north of the Arizona Canal Diversion Channel (ACDC) and Skunk Creek, and west of the New River. The area approximately includes the Skunk Creek drainage area downstream of Adobe Dam and west of 51st Avenue, the New River drainage area downstream of the New River Dam to its confluence with Skunk Creek, the drainage area to the west of New River from its confluence with Skunk Creek to its confluence with the Agua Fria River, the drainage area to the east of the Agua Fria River downstream of the Dynamite Boulevard alignment to its confluence with New River, and a small portion of the ACDC watershed west of 51st Avenue and south of Skunk Creek.

The southern boundary of the study area is formed by the ACDC structure and the New River; the north and easterly boundaries are formed by 51st Avenue, the dams on Skunk Creek and New

River, and the Hedgpeth Hills and East Wing and Ludden Mountains (trending NW-SE between the two structures); the western boundary is formed by the Agua Fria River. The ACDC is tributary to Skunk Creek at approximately 75th Avenue, which is tributary to the New River at approximately 87th Avenue, which is tributary to the Agua Fria River between Bethany Home Road and Camelback Road, forming the southerly extent of the study area. The total study area is approximately 85 square miles.

1.4 PARTICIPANTS

1.4.1 The following project Participants will be receiving copies of project submittals and will act as the agency point-of-contact:

Marilyn DeRosa, R.G.
Planning Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

Burton R. Charron, P.E.
Civil Engineer, Public Works Department
City of Peoria
8401 West Monroe Street
Peoria, AZ 85345

Daniel A. Sherwood, P.E.
Senior Civil Engineer, Engineering Department
City of Glendale
5850 West Glendale Avenue
Glendale, AZ 85301

1.4.2 The CONSULTANT may be coordinating with the following organizations for information and input in the study:

Flood Control District of Maricopa County
Arizona Department of Transportation
Maricopa County Parks and Recreation Department
Maricopa County Department of Transportation
City of Glendale
City of Peoria
City of Phoenix
Central Arizona Project
Arizona State Land Department

1.5 CONTRACT TIMEFRAME AND SCHEDULE

1.5.1 The DISTRICT shall issue the Notice to Proceed on/or about November 3, 1999, with completion of the project expected by approximately February 25, 2001.

1.5.2 The CONSULTANT shall complete the ADMP Update within the contract period of 480 calendar days.

1.6 PROJECT REFERENCES

1.6.1 All work under this SOW will be in accordance with the DISTRICT Consultant Guidelines dated October 1998, unless otherwise noted.

1.6.2 General references and standards available are as outlined in Section 20, Consultant Guidelines, October 1, 1998. This section provides general requirements, methodologies, and

procedures to be followed in completing work for the DISTRICT. Any specific work tasks described in this SOW should be completed consistent with this SOW. Any variations from this SOW or the Consultant Guidelines document shall not be undertaken without written concurrence from the DISTRICT.

1.6.3 The DISTRICT will make available to the CONSULTANT, the following project related references and information:

Addendum to Glendale/Peoria ADMP, prepared for the Flood Control District of Maricopa County (FCDMC) by Camp Dresser and McKee, Inc., and James M. Montgomery, Consulting Engineers, Inc., May 1987.

Orangewood Alignment Concept/Routing Study, prepared for FCDMC by Wood, Patel and Associates, November 1995.

ACDC Area Drainage Master Study: 500-foot Swath Drainage Plan, prepare for FCDMC by Kaminski-Hubbard Engineering, Inc., July 1997.

Drainage Report on Union Hills Drive: 27th Avenue to 57th Avenue, Phoenix and Glendale, Arizona, prepared for FCDMC by Erikson and Salmon, Inc., August 1987.

Cactus Road Storm Drain (67th Avenue to the Agua Fria Freeway), prepared for FCDMC by Stanley Franzoy Corey, Engineering Company, dated November 1992.

Storm Drain along Cactus Road: 67th Avenue to Agua Fria Outer Loop Freeway, prepared for FCDMC by Steve Corrales Engineering Corp., September 1990.

Northern/Orangewood Storm Drain Project: Concept/Routing Study prepared for FCDMC by Wood, Patel and Associates, Inc., March 1996.

Northern/Orangewood Storm Drain Project: Location Study, prepared for FCDMC by Wood, Patel and Associates, Inc., March 1996.

Arrowhead Ranch Development, Glendale, Arizona: Specific Area Plan, Storm Drainage Plan, prepared for the City of Glendale, Arizona, April 1992.

City of Glendale, Arizona: Storm Water Management Plan, Capital Improvement Program Summary, prepared for the City of Glendale, Arizona, and FCDMC by Camp Dresser and McKee, Inc., January 1986.

Glendale General Plan Development Guide, DRAFT, prepared by the City of Glendale, Arizona, September 1987.

Hydrology Update on Glendale/Peoria ADMP, DRAFT, prepared by FCDMC, January 1993.

Glendale/Peoria/Sun City Drainage Area No. 1, prepared by FCDMC, January 1995.

Glendale/Peoria/Sun City Drainage Area No. 2, prepared by FCDMC, January 1995.

City of Peoria: Master Plan of Storm Drainage, prepared for the City of Peoria, Arizona, and the FCDMC by James M. Montgomery, Consulting Engineers, Inc., April 1988.

Master Grading and Drainage Plan: Westbrook Village, Section 27, Peoria, Arizona, prepared for UDC Homes by Carter Associates, Inc., revised June 1989.

Westbrook Village East Drainage Study, prepared for the City of Peoria, Arizona, by Goldman, Toy and Associates, Inc., October 1998.

Gila River and Tributaries in Arizona and New Mexico, Flood Damage Report, Storm and Flood of August 16-17, 1963, Glendale/Maryvale Area, prepared for FCDMC by U.S. Army Corps of Engineers, Los Angeles District, June 1964.

City of Glendale, Arizona: Storm Water Management Plan, prepared for the City of Glendale and FCDMC by Camp Dresser and McKee, Inc., January 1986.

City of Peoria, Arizona: Storm Water Master Plan Hydrology Report, prepared for the City of Peoria by James M. Montgomery, Consulting Engineers, Inc., April 1985.

91st Avenue Drain Hydrology Update, DRAFT, prepared by FCDMC, October 1994.

Preliminary Drainage Report for 95th Avenue and Beardsley Road, prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., April 1994.

Preliminary Drainage Report For Intersection Improvements: 99th Avenue, Bell Road to Thunderbird Road, prepared for the Maricopa County Department of Transportation by Hendrich, Eberhart and Associates, Inc., August 1995.

Desert Amethyst Drainage Master Plan: Summary Report prepared for the City of Peoria, Arizona, by Montgomery Watson, July 1997.

Desert Amethyst Drainage Report: Design Documentation Summary for 60 percent Plan Submittal, prepared for the City of Peoria, Arizona, by Wood, Patel and Associates, Inc., May 1999.

Final Drainage Report for Parkridge: 95th Avenue and Beardsley Road, prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., January 1994.

Final Drainage Report for Parkridge II, prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., January 1995.

Marinette Heading Canal Floodplain Removal Request for Conditional Letter of Map Revision for "Parkridge and Parkridge II" (Subdivision Development), prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., September 1995.

Supplement to Marinette Heading Canal Floodplain Removal Request for Conditional Letter of Map Revision for "Parkridge and Parkridge II" (Subdivision Development), prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., March 1995.

Deer Village Units 1, 2, 3 and 4, Final Drainage Report, prepared for Woodside Homes by Coe and Van Loo, Consultants, Inc., revised December 1996.

Deer Village Units 5 and 6, Final Drainage Report prepared for Woodside Homes by Coe and Van Loo, Consultants, Inc., December 1996.

Deer Village Unit 1, Revisions to Final Drainage Report, prepared for the City of Peoria, Arizona, by Coe and Van Loo, Consultants, Inc., March 1997.

Drainage Report for Alta Vista Estates, Units 1 and 2: Peoria, Arizona, prepared for Capital-Deer Valley, L.L.C., by the CMX Group, Inc., revised January 1997.

Drainage Report for Alta Vista Estates, Units 3 and 4: Peoria, Arizona, prepared for Capital-Deer Valley, L.L.C., by the CMX Group, Inc., revised January 1998.

Ironwood-Lake Pleasant Road and Williams Road, Peoria, Arizona, Final Drainage Plan, prepared for Fidelity Properties, L.L.C., by the CMX Group, Inc., revised September 1998.

Final Drainage Report for Eagle Canyon, prepared for A and B Investments, Inc., by American Engineering Company, revised May 1998.

Silverton Drainage Report, prepared for Beazer Homes Holdings Corp. by Sage Engineering Corp., August 1997.

Silverton HEC-RAS, HEC-FDA Summary, prepared for Beazer Homes Holdings Corp. by Sage Engineering Corp., August 1997.

Fletcher Heights, Phase 1: Final Drainage Plan Volume 2 of 2, Appendix F, prepared for Fulton Homes at Fletcher Heights by the CMX Group, Inc., revised March 1997.

Lake Pleasant Road and New River Road Corridor Study, DRAFT, prepared for Maricopa County Department of Transportation by Kirkham Michael Consulting Engineers, May 1999.

Final Drainage Report for Dove Valley Ranch Planned Area Development: Parcels 2, 3 and 5, prepared by Neil/McGill Consultants, Inc., revised October 1998.

Gila River Basin: Phoenix, Arizona, and Vicinity (including New River), Hydrology Part 2: Design Memorandum No. 2, prepared for FCDMC by U.S. Army Corps of Engineers, Los Angeles District, 1982.

Sun City Area Hydrologic Study, DRAFT, prepared by FCDMC, revised September 1998.

ACDC ADMS, Volumes I and II (New River and Skunk Creek areas), prepared for FCDMC by Kaminsky-Hubbard Engineering, Inc., July 1997.

2.0 TASKS

2.1 DATA COLLECTION AND EXISTING CONDITIONS ANALYSIS

2.1.1 The CONSULTANT shall conduct this portion of the study in accordance with Section 14.2, Data Collection and Existing Conditions Analysis, Consultant Guidelines, October 1, 1998.

2.1.2 The CONSULTANT shall review pertinent data from the DISTRICT and other outside sources. Data to be reviewed will include materials relevant to the project such as existing topographic mapping, as-built plans for existing structures, FEMA Flood Hazard Boundary Maps and any Letters of Map Amendment and/or Revisions, drainage reports, site plans and future drainage improvement plans and other pertinent information. Interviews should be arranged with the DISTRICT's On-Call Consultant for Planning and the appropriate agencies for information on

drainage problems in the area.

2.1.3 The CONSULTANT shall review the provided list of known flooding problems as well as identify any additional potential flooding areas. This data collection and existing conditions analysis will result in a preliminary list of problem areas suitable for evaluation during the Level I – Alternatives Formulation/Preliminary Analysis stage of this study. A preliminary list of flooding problem areas is provided in this section.

2.1.3.1 North side of ACDC Canal.
No provisions were made to convey water from subdivisions adjacent to the ACDC to the canal itself. Kaminsky-Hubbard (K-H) did a preliminary study for a 500-foot wide swath along the north side of the ACDC. The CONSULTANT shall review the K-H "500-foot swath" report on the local drainage problems adjacent to the ACDC. The CONSULTANT should verify the K-H sites in the field and investigate whether the problem sites are the same as during the time of the report. Anticipating concept design requirements, while in the field the CONSULTANT should identify locations where spot elevations are needed to support basic design concepts as well as measuring potential corridor locations between houses or buildings.

Given the age of the K-H report and the rapid pace of development in the Valley, the CONSULTANT should note changes in the flooding areas adjacent to the ACDC that may influence the problem sites, as well as changes in the contributing sub-basins west of 51st Avenue that may increase or decrease the volume of water that finds its way to the problem locations.

Results of the CONSULTANT's findings to this point should be conveyed to the Project Manager at the DISTRICT in a memorandum. At that time, there will be an informal prioritization of the problem sites (some may be eliminated). Those sites given high priority will be evaluated further during the Level I – Alternatives Formulation/Preliminary Analysis.

2.1.3.2 Ninety-first Avenue to the New River along Union Hills Drive.
As a partial "ultimate" discharge point, the Union Hills Storm drain (95 percent design plans) will accept the Q100 minus Q10, but the remainder of the 100-year flow will remain in the street. The CONSULTANT shall review the reports which provide background for the site and shall evaluate the hydrology for those contributing sub-basins reflecting any new development.

When the updated hydrology model has been developed the flow into the Union Hills Storm drain should be diverted within the HEC-1 model. The remainder of the flow should be split and routed, as appropriate, either down Union Hills Drive to the New River, or down 91st Avenue to Bell Road, and then east over to the New River or continue south through the existing subdivision to the New River at approximately the alignment of Thunderbird Road. The CONSULTANT shall check the outlet capacity of the channel leading to New River. The proportioning on the flow splits should be according to the street capacity, street slopes and topography at the arterial intersections.

If the arterial streets have sufficient capacity to carry the flows while observing the one drivable lane in each direction requirement, the analysis will be complete. A written summary of the findings should be prepared for the DISTRICT, along with the updated HEC-1 model and supporting documentation. If the streets do not have sufficient capacity, the site will be evaluated further during the Level I – Alternatives Formulation/Preliminary Analysis.

2.1.3.3 Ninety-first Avenue to the Agua Fria River along Beardsley and Bell Roads.
The south part of sub-basin 502 discharges to a channel along Beardsley Road which then flows towards the Agua Fria River. There is significant overflow from the adjacent sub-division lakes. Upon reaching the 115th Avenue channel, these additional and unanticipated flows cause the 115th Avenue channel to overtop. Design of aeration ponds for the adjacent treatment plant did not preserve an adequate corridor to the Agua Fria River for storm water

flows. Berms were subsequently constructed to divert water to the south. Local development to the south did not anticipate these diversions and did not design sufficient capacity into the system. A diversion constructed around an adjacent sand and gravel operation exacerbates the problem. As a result, flows cannot adequately reach the Agua Fria River resulting in flooding problems at and near 115th Avenue and Bell Road. The CONSULTANT shall take into account and assess current plans to design a channel down the Beardsley Road alignment.

2.1.3.4 Eighty-third Avenue to the New River north of Beardsley Road.
Flooding along the northerly reaches of 83rd Avenue is due to piecemeal development coupled with the lack of an overall drainage plan coordinated between Maricopa County and the City of Peoria. There are two types of problems: 1) Concentrated flow around developments that lack an ultimate discharge point. 2) Developments down-gradient of undeveloped areas result in substantial offsite flows impacting the development. Even when a developer "follows all of the rules" and accommodates offsite drainage around or through his development, there will be a discontinuity up and downstream.

2.1.3.5 Rock Springs Creek.
The DISTRICT is currently undertaking a Floodplain Delineation study for Rock Springs Creek (FCD No. 98-47, Stantec Consulting). Historically, the creek flowed south through sub-basins 540, 541, 542 and 553 to join the New River north of Beardsley Road. A field investigation reveals that the Creek has been diverted at a 90-degree angle at one point, diverted into an extended (> ¼ mile) box culvert and forced to travel along various man-made conveyance corridors. The most striking observation from an informal field investigation is the inconsistent sizing along the channel of the stabilization measures.

2.1.3.6 Channel along north side of Grand Avenue.
Flooding occurs along Grand Avenue at various points between the Agua Fria and New Rivers. Sun City was designed prior to most of the current retention policies or hydrologic master planning, resulting in a somewhat inconsistent drainage system. The capacity of the channel and the hydraulic structures along Grand Avenue should be verified.

2.1.3.7 Drainage on west side of Sun City.
Minor drainage channels along the west side of Sun City are undersized. On the uphill side, there is head cutting into the perimeter wall of Sun City. On the downstream side, water flows into the SRP easement north of Grand Avenue.

2.1.3.8 Beardsley Drainage Channel between Lake Pleasant Road and 107th Avenue.
Lakes designed for storm water runoff are kept too full to accommodate storm events. During relatively minor rainstorms the capacity of the lakes is exceeded resulting in overtopping.

2.1.3.9 Pinnacle Peak Road and 67th Avenue.
There have been repeated flooding problems in the subdivision south of Pinnacle Peak Road, east of the New River. Water from the upbasin undeveloped area impacts the subdivision along the northern perimeter. The first row (northern edge) of homes are elevated. However, off-site flows move west along the northern perimeter and are then directed into the subdivision, follow a circuitous route down steeply sloping local streets, including several right angle turns, and finally into a large storm drain in a cul-de-sac along the westerly edge of the sub-division. The storm drain flows west and discharges into a channel at the 75th Avenue alignment. The channel then discharges into New River.

2.1.3.10 Wier Wash.
Much development is currently underway in the Weir Wash area. The CONSULTANT shall identify all current and planned projects and evaluate drainage plans to anticipate potential drainage problems. The CONSULTANT should identify candidate segments of Weir Wash for floodplain delineation under Section 2.2 of this SOW.

2.1.4 The CONSULTANT shall prepare an inventory of drainage facilities that are being

planned by other public jurisdictions, irrigation districts or private development.

2.1.5 The CONSULTANT shall develop a comprehensive list of proposed development planned within the study area.

2.1.6 The CONSULTANT shall prepare an Existing Facilities Exhibit illustrating the location of man-made drainage facilities in the watershed. The condition, type and ownership of man-made facilities will be noted. These facilities will become part of the base map for alternatives. The CONSULTANT shall make maximum use of these facilities, where feasible, as part of the stormwater management plan alternatives. Base mapping will include land ownership, land use types, and soil types available from the DISTRICT. The land ownership maps will indicate whether property is publicly or privately held and the owning agency.

2.1.7 The CONSULTANT shall become familiar and give consideration to existing hydrologic studies and models, and assumptions made to assist with the new hydrologic analysis.

2.1.8 The CONSULTANT shall collect and compile a list of historic flooding information and drainage problem areas in the study area.

2.2 FEMA FLOODPLAIN AND FLOODWAY DELINEATION

2.2.1 This ADMP Update study will include A-Zone floodplain delineation studies and/or Letters of Map Revision (LOMRs), whichever is appropriate, at the following locations for submittal to the Federal Emergency Management Agency (FEMA).

2.2.1.1 Unnamed tributary wash to the Agua Fria River (approximately 4 miles in length) adjacent to Lake Pleasant Road (reference in Loop 303 drainage plan completed by HDR).

2.2.1.2 Unnamed wash flowing south through sub-basins 501 and 502 (approximately 2 miles in length).

2.2.1.3 Unnamed tributary wash to the New River (approximately 2 miles in length) flowing south-southwest through sub-basin 550.

2.2.1.4 Any washes or tributaries identified during the Weir Wash evaluation conducted in Section 2.1.3.10 of the SOW.

2.2.1.5 Unnamed wash flowing south through sub-basins 395, 396 and 397 (approximately 6 miles in length). The wash discharges to Arrowhead Ranch Lakes creating a possible overflow/sediment problem.

2.2.1.6 Small localized floodplains west of 91st Avenue, between Beardsley and Deer Valley Roads. CONSULTANT shall evaluate drainage and submit LOMRs where appropriate.

2.2.2 The CONSULTANT shall prepare Letter of Map Revision (LOMR) submittals in accordance with 44 CRF §65.8 Review of Proposed Projects and 44 CFR §65.6 Revision of Base Flood Elevation Determinations.

2.2.3 The CONSULTANT shall prepare floodplain delineations and FEMA submittals in accordance with Sections 11 and 12, Floodplain Delineation Studies, and FEMA Submittals, Consultant Guidelines, October 1, 1998. The CONSULTANT shall submit the delineations to the DISTRICT for review and approval prior to submittal to FEMA so that the DISTRICT can coordinate with the effected jurisdictions.

2.3 LEVEL I ANALYSIS – ALTERNATIVES FORMULATION/PRELIMINARY ANALYSIS

2.3.1 The CONSULTANT shall prepare the Level I Analysis in accordance with Section 14.3, Level I Analysis – Alternatives Formulation/Preliminary Analysis, Consultant Guidelines, October

1, 1998.

2.3.2 The CONSULTANT shall prepare an existing constraints map based on information derived from the existing data for presentation at a Brainstorming Meeting of the participants to initiate the Level I Analysis. The presentation shall identify existing flooding problem areas and the results from existing studies in the area. The CONSULTANT will provide several seed ideas for potential solutions and consideration. During the Brainstorming Meeting, the participants shall include any information provided by the Cultural, Environmental, Ecological, Visual and/or other analyses that have been conducted. The CONSULTANT shall document all the possible alternatives identified during the Brainstorming Meeting.

2.3.3 Based on the concepts identified in the Brainstorming Meeting, the CONSULTANT shall identify those alternatives which can be discarded with no or minimal analysis, and eliminated from further consideration.

2.3.4 The CONSULTANT shall identify possible project alternatives for mitigation of flooding and conveyance of storm flows.

2.3.5 The CONSULTANT shall recommend those alternatives to be studied further. The DISTRICT, with input from the study participants, will make the final selection of alternatives.

2.3.6 The CONSULTANT shall submit schematic drawings and a narrative description of the potential alternatives for review (Potential Alternatives Submittal). The purpose is to review and approve the alternatives prior to proceeding with the analysis. The drawings shall be sufficient to describe and compare the project requirements and alignment of the alternative. The narrative shall describe the alternatives and identify the advantages and disadvantages.

2.3.7 The CONSULTANT shall develop evaluation criteria with input from the participating agencies for evaluation of the alternatives and prepare a matrix by which alternatives can be evaluated by assigning scores to each of the evaluation criteria. Socioeconomic, physical and natural environmental, flood safety, and cultural and visual resource impacts are to be included, as applicable, in the evaluation criteria.

2.3.8 The CONSULTANT shall include a No-Action Alternative during development of the alternatives.

2.4 LEVEL II ANALYSIS – ALTERNATIVE ANALYSIS

2.4.1 The CONSULTANT shall prepare the Level II Analysis in accordance with Section 14.4, Level II Analysis – Alternative Analysis, Consultant Guidelines, October 1, 1998.

2.4.2 The CONSULTANT shall evaluate the approved alternatives with respect to potential flood safety issues by evaluating proposed future recreational facilities and develop a summary of potential flood safety needs/constraints for these facilities and identifying potential mitigation techniques such as augmenting the existing DISTRICT Alert System, the use of passive safety devices such as posting evacuation routes, and the role of public education.

2.4.3 The CONSULTANT shall evaluate the approved alternatives to determine the engineering feasibility and approximate costs. Conceptual design of the project features shall be limited to typical sizes and dimensions and shall be sufficient to determine the costs of major project components. Conceptual design will be based on the 100-year/6-hour, existing conditions runoff. Capital cost estimates shall include design, major construction items, rights-of-way, and major utility relocations.

2.4.4 The CONSULTANT shall prepare an Alternatives Summary presenting the alternatives and evaluation criteria to be reviewed by the Participants and used to evaluate the selected alternatives at a comparative level of detail. The CONSULTANT shall prepare a minimum of two (2) alternative solutions per identified problem site. An Alternative Evaluation meeting of the

Participants will be held to evaluate the alternatives. The CONSULTANT shall assemble the evaluations and identify the preferred alternative receiving the highest composite score based on the scores assigned by the reviewers. The preferred alternative may be comprised of multiple features, providing a collective solution.

2.4.5 (OPTIONAL) The CONSULTANT shall prepare up to an additional 12 alternative solutions for consideration by the public and project Participants during the Alternatives Analysis. These additional 12 alternative analyses would be distributed among all problem areas as needed.

2.5 LEVEL III ANALYSIS – PREFERRED ALTERNATIVE ANALYSIS

2.5.1 The CONSULTANT shall prepare the Level III Analysis in accordance with Section 14.5, Level III Analysis – Preferred Alternative Analysis, Consultant Guidelines, October 1, 1998.

2.5.2 The CONSULTANT shall refine the design and cost estimate for the preferred alternative identified in the Alternatives Analysis Report.

2.5.3 The CONSULTANT shall prepare Conceptual Design Plans (15 percent) which will identify the approximate sizes, slopes, profiles, alignments, cross-sections and plan and profile for proposed channels, culverts, basins and/or other features. These plans shall be presented on a 100-scale base drawing, containing available contour, utility, and right-of-way information.

Recreation, cultural, environmental, and/or ecological sites and aesthetic features shall be shown in project drawings where they are contained within the plan view of the drawings.

The landscape conceptual design plans (15 percent) will identify the geographic boundaries of proposed landscape treatment areas. The landscape treatment areas will correspond with the integrated drainage solution selected for each specific problem area. Schematic landscape treatments and cross-sections will be prepared for each problem area as appropriate.

2.5.4 The CONSULTANT shall present the Preferred Alternative to the participant. The Participants shall prioritize the features of the preferred alternative and the CONSULTANT shall include the prioritization in the final report.

2.6 MAINTENANCE PLAN

2.6.1 The CONSULTANT shall estimate maintenance requirements and costs for the preferred alternative on an annual basis. The life cycle to be used in calculations shall be 50 years.

2.6.2 The CONSULTANT shall prepare general maintenance and operation guidelines for operation and maintenance for features of the preferred alternative.

2.7 IMPLEMENTATION PLAN

2.7.1 The CONSULTANT shall prepare an implementation plan for the preferred alternative that shall document the available tools or procedures, including funding mechanisms, for implementing the results of the Project. The CONSULTANT shall prepare the necessary submittals for inclusion of the recommended projects in the DISTRICT's CIP Prioitization Process. Submittals will include addressing the Prioritization Procedure currently accepted by the DISTRICT. The CONSULTANT shall identify tools, such as existing ordinances and regulations, for each jurisdiction within the study area that may be modified or created to encourage development standards that are compatible with the Project.

2.8 FIELD SURVEY AND MAPPING

2.8.1 The CONSULTANT shall evaluate and verify the usefulness of existing aerial and topographic mapping and survey work within the ADMP Update area.

2.8.2 The CONSULTANT shall obtain supplemental field surveys as needed of bridges, culverts, and drainage structures when record drawings or previous survey data is not available. Benchmark control data shall be provided by the DISTRICT from the control survey established for the aerial mapping to be provided under Task 2.8.4 following herein. At least two recoverable control points, located within one mile of each study area to be surveyed, shall be provided by the DISTRICT for the CONSULTANT'S use in the supplemental survey.

2.8.3 The aerial mapping control survey for Task 2.8.4 herein (and hence all supplemental surveys), shall tie to the Maricopa County Department of Transportation's control system where available. If not available, the control survey shall be referenced to the DISTRICT's Glendale/Peoria structural control for New River and Adobe Dams.

2.8.4 The CONSULTANT shall coordinate with the DISTRICT'S on-call aerial mapping and survey consultants who will prepare aerial photography at a scale of 1:7200 (1 inch = 600 feet) and digital topographic mapping at a scale of 1 inch = 200 feet with a 2-foot contour interval for a half-mile wide band along the points of detailed study (approximately 20 linear miles). The CONSULTANT will work with the DISTRICT to identify the specific limits of mapping. The contour map will be derived from a digital terrain model using break lines and a 50-foot spacing grid of mass points. Planimetric data will be compiled in separate layers to facilitate translation to the DISTRICT's HIS database. Only major landmark buildings will be compiled. Spot elevations shall be placed along roadways, and in road intersections, saddles, depressions, and on significant tops.

2.8.5 The CONSULTANT shall establish five (5) Elevation Reference Markers (ERMs) for the Zone A floodplain delineations of Task 2.2 herein. The final location of the ERMs shall be proposed by the CONSULTANT and approved by the DISTRICT prior to surveying (and possibly setting) the final monumentation. Any new monumentation shall be set in accordance with Section 11.3.4.2, of the Consultant Guidelines, October 1, 1998.

2.9 HYDRAULIC ANALYSIS

2.9.1 The CONSULTANT shall prepare preliminary hydraulic analysis in accordance with Chapter 10, Hydraulics, Consultant Guidelines, October 1, 1998.

2.9.2 The CONSULTANT shall prepare hydraulic analysis for bridge crossings and culverts as applicable.

2.9.3 The CONSULTANT shall prepare digital deliverables in accordance with the DISTRICT's Data Delivery Specifications, Revision 3.1, June 1998. The CONSULTANT will submit the following coverages:

PRJ	Project Boundaries	CP-60
DQ	Data Quality	CP-410
NDXPRJ	Map Sheet Boundaries	CP-40
FPCTLFCD	Elevation Reference Marks	CP-523
FPZNFCD	Floodplain Zones	CP-550

2.10 HYDROLOGIC ANALYSIS

2.10.1 The CONSULTANT shall prepare preliminary hydrologic analysis in accordance with Chapter 9, Hydrology, Consultant Guidelines, October 1, 1998.

2.10.2 The CONSULTANT shall prepare or update the following hydrologic models:

2.10.2.1 South of Skunk Creek, north of the ACDC, west of 51st Avenue, and east of 71st Avenue. Using the Kaminski-Hubbard ACDC ADMS study hydrology as a basis, the

CONSULTANT shall develop a more detailed hydrologic analysis by splitting the previously identified sub-basins where needed. The analysis will include an identification of the aerial extent of flooding (i.e., the number of homes potentially flooded).

2.10.2.1.1 The CONSULTANT shall update and refine the current Existing Condition 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour hydrology with sub-basins and points-of-concentration defined as applicable for the model frequency. Updated DDMS files shall be included.

2.10.2.1.2 The CONSULTANT shall update the current Future Condition 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT should assume that 80 percent of retention requirements (100-year/2-hour volume) are met for Future Conditions modeling. A DDMS update shall be included.

2.10.2.1.3 The CONSULTANT shall develop runoff hydrographs for input to the updated models for all areas east of 51st Avenue. These input hydrographs shall be generated using the existing HEC-1 modeling documented in the Kaminski-Hubbard ACDC ADMS. No modifications or updating of data east of 51st Avenue will be performed as part of this project.

2.10.2.2 South of New River Dam, north of Skunk Creek and the Sun Cities, west of the 51st Avenue alignment, and east of the Agua Fria River (the numbered sub-basins as identified in the ACDC hydrologic models prepared by Kaminski-Hubbard).

2.10.2.2.1 The CONSULTANT shall update the Existing Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT shall update the sub-basin boundaries as needed. A DDMS update shall be included.

2.10.2.2.2 The CONSULTANT shall prepare Future Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT should assume that 80 percent of retention requirements (100-year/2-hour volume) are met for Future Conditions modeling.

2.10.2.2.3 The CONSULTANT shall modify the northeastern drainage area boundary from approximately Pinnacle Peak Road to the CAP.

2.10.2.3 Sun City north of Grand Avenue (as defined in the Sun City Area Hydrologic Study, DRAFT, prepared by the DISTRICT).

2.10.2.3.1 The CONSULTANT shall verify the input assumptions made for the Sun City Area Hydrologic Study, DRAFT, north of Grand Avenue. The DISTRICT study includes only the Existing Conditions 100-year/6-hour model.

2.10.2.3.2 The CONSULTANT shall incorporate the DISTRICT's Existing Conditions 100-year/6-hour model into the overall model for the ADMP. The CONSULTANT shall prepare the Existing Conditions 100-year/24-hour and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency.

2.10.2.3.3 The CONSULTANT shall prepare Future Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT should assume that 80 percent of retention requirements are met (100-year/2-hour volume) for Future Conditions modeling.

2.10.2.4 North of Grand Avenue to the northern ADMP Update study area boundary, west

of the Sun City Area Hydrologic Study, and east of the Agua Fria River 100-year floodplain (portions of sub-basins BBB and CCC).

2.10.2.4.1 The CONSULTANT shall prepare Existing Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency.

2.10.2.4.2 The CONSULTANT shall prepare Future Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT should assume that 80 percent of retention requirements (100-year/2-hour volume) are met for Future Conditions modeling.

2.10.3 The CONSULTANT shall provide the same hydrology models incorporating the hydrologic effects of the preferred alternative(s) and features once identified through this ADMP Update.

2.10.4 The CONSULTANT shall prepare a package for use by the DISTRICT, Peoria, Glendale, and other designated users that contains the final Hydrology model, the CAD watershed map, and a brief information packet. The information packet will describe the model and main assumptions, the restrictions on use, and will reference people to contact when using or modifying the model. The information packet will be developed and reviewed by the users listed above. The three items listed, above will be placed on CD ROM and submitted with an additional hard copy of the information packet at the end of the project.

2.10.5 The CONSULTANT shall prepare digital deliverables in accordance with the DISTRICT's Data Delivery Specifications Rev. 3.1 June 1, 1998. The CONSULTANT will submit the following coverages:

PRJ.REL	Contract Name/ID	CP-430
PRJ	Project Boundaries	CP-60
DQ	Data Quality	CP-410
DRNBSN	Drainage Basin	CP-920
DRNPATH	Drainage Paths	CP-930
LAKE	---------	CP-950
CULVERTS	---------	CP-620

2.10.6 (OPTIONAL) Arrowhead Ranch Lakes Analysis for the Lakes and Legends Communities north of ADOT Loop 101 (Beardsley Road alignment) (Subbasins 397, 398B, and 570).

At the option of the DISTRICT, a detailed hydrologic study will be performed for this area. Currently, most of the runoff from offsite areas and the developed residential communities within this study area drain directly to a series of lakes that are situated internally within the Arrowhead Ranch Lakes and Legends communities. The lakes were primarily designed to provide a source of irrigation water for the adjacent golf courses by storing effluent and/or pumped well water and as an aesthetic feature. Surcharge storage of approximately 3-feet was also designed into the overbank areas of the lake for the attenuation of onsite and offsite area runoff. For its design, the lake system hydrology was modeled for a 100-year/24-hour storm using the NRCS (formerly SCS) TR20 model. Each lake employs a series of weirs that control the operational water surface and the flood flow water surface. Storm flows cascade through the system and ultimately outfall to one of two locations along the perimeter of the study area. The main outfall is located just north of Loop 101 at approximately the 55th Avenue alignment. The second outfall is located at 67th Avenue approximately 0.5 miles south of Deer Valley Road. The system on a whole, has reportedly never been completely as-built and hydrologically analyzed for the as-built conditions. Glendale has received complaints from the community homeowner's associations regarding flooding problems with the lakes. It is requested by the City of Glendale, that the entire lake system be hydrologically updated in detail for the as-built, existing lake conditions to assess the potential operation of the lakes during the design 100-year/24-hour event.

The CONSULTANT shall obtain all available design data for the lakes including design and construction drawings and as-builts, the design report and TR20 models, and any drainage reports of subdivisions developed within area. The CONSULTANT shall also meet with representatives of the homeowners associations and appropriate maintenance personnel to identify and document their concerns regarding flooding problems, and to identify the current lake operational procedures. The CONSULTANT shall model in detail the lake systems for the 100-year, 24-hour existing and future condition storms. The entire watershed for this study area shall be updated to current County methodology. The CONSULTANT shall perform adequate field surveys of the lake system weirs to establish the as-built conditions and develop stage/discharge rating relations for each lake. The CONSULTANT shall also develop stage/storage and other routing parameters using the 1990 topographic mapping developed for the ACDC ADMP (to be supplied by the DISTRICT).

The CONSULTANT shall summarize the results of the as-built surveys and hydrologic analyses in a report. If problem areas are identified, the CONSULTANT shall also summarize those areas in the report and present the overall findings to the DISTRICT and Glendale for discussion.

Mitigative measures may be formulated to address problem areas identified in the analysis. At the option and direction of the DISTRICT, the CONSULTANT shall conduct Level I, II, and III Alternative Analyses. For viable alternatives, the CONSULTANT shall prepare 15 percent conceptual level design plans of the proposed solution(s). These will be presented in the Alternatives Analysis Report and Recommended Design Report.

2.11 LAND OWNERSHIP, RIGHT-OF-WAY AND EASEMENTS

2.11.1 The CONSULTANT shall review assessor parcel ownership maps and identify which properties will be affected by the preferred alternatives.

2.11.2 The CONSULTANT shall identify permanent and temporary right-of-way and easement requirements necessary for the preferred alternatives. The CONSULTANT will identify the right-of-way in the specific areas of alternatives that are to be given a level II evaluation. The DISTRICT will provide all GIS right-of-way information available to the CONSULTANT. The remaining right-of-way will be researched and drawn on the alternative study area base sheets by the CONSULTANT. Only right-of-way information needed to obtain approximate areas of additional right-of-way or easements necessary to construct the alternatives will be identified.

2.11.3 The CONSULTANT will identify any necessary rights-of-entry within the study area. The DISTRICT will obtain any necessary rights-of-entry for the study area and furnish the CONSULTANT with Right-of-Entry letters.

2.12 ENVIRONMENTAL OVERVIEW

2.12.1 The CONSULTANT shall prepare an Environmental Overview analysis in accordance with Chapter 7, Environmental Requirements, Consultant Guidelines, October 1, 1998. The Environmental Overview shall include a comparative analysis for each of the alternatives identified to include socioeconomic, physical and natural environmental impacts, and cultural aspects of the study area. This comprehensive analysis shall address all of the major environmental disciplines and identify any potential problem areas (fatal flaws) that might exist.

2.12.2 Environmental Permits and Approvals. For the Preferred Alternative, the CONSULTANT shall be responsible for identifying project-specific plan approvals, permits, or licenses from other agencies that will be required. Other agencies may include, but may not be limited to: municipalities, tribal governments, the U.S. Environmental Protection Agency (EPA), the Maricopa County Department of Environmental Services (MCDES), the Arizona Department of Environmental Quality (ADEQ), the Arizona Department of Water Resources (ADWR), the Army Corps of Engineers (ACOE), railroads, utilities, and water districts. The primary emphasis of this

task is to identify the Section 404 permit requirements. Requirements for permits shall be documented in the Implementation Plan.

2.12.3 Cultural Resources Assessment.

2.12.3.1 The CONSULTANT shall complete a Class I Survey and an Archeological Assessment to identify any prehistoric and historic resources for the entire study area. The purpose of the archeological inventory is to determine the effects of each proposed alternative on the identified cultural resources.

2.12.3.2 The CONSULTANT shall prepare a report documenting the results of the archeological assessment. The report shall describe the size, features and significance of any identified or known cultural resources (up to and including one mile outside the study boundaries on the north and east sides) and the potential impact of the preliminary project alternatives on the sites based on existing information. The report shall include recommendations for further study and associated costs, including testing or mitigation, if required. In addition, the CONSULTANT shall map (hand draw) the sites on USGS 7.5 minute quad maps and on aerial photos. Aerials to be provided by the DISTRICT. Digital mapping will not be required. The DISTRICT will provide the results of cultural investigations being completed for current projects on the Agua Fria and New Rivers.

2.12.4 Environmental Regulatory Records Review.

2.12.4.1 The CONSULTANT shall conduct a search of the federal, state, and local environmental lists and databases located in the project area and their respective search radius (ASTM 1527 - 97) for each proposed alternative.

2.12.4.2 The CONSULTANT shall document the locations of the regulatory sites on the area map. The CONSULTANT shall include a brief description of the regulatory sites which should include, the descriptive location of the site, the type of regulated substance or waste at the site, the extent of the contamination, the status of the site (i.e. closed or open status), remediation plans of the site, and the named potentially responsible party(s). The CONSULTANT is not expected to conduct extensive file review on the identified regulatory sites to obtain this information.

2.12.4.3 The CONSULTANT shall recommend alternative locations and/or solutions to avoid costly remediation if any of the proposed alternatives appears to require land that is listed as a regulatory site or may be affected by a regulatory site.

2.12.4.4 The CONSULTANT shall make a qualitative estimate of the general cost to investigate and remediate the potential problem resulting from the regulatory sites in terms of relative magnitude, i.e. high, moderate or low. The information will be used in the analysis of the alternatives.

2.12.5 Ecological Assessment.

2.12.5.1 . The CONSULTANT shall conduct a non-intensive field survey and use current aerial photographs to identify and map the existing ecological resources within the project area including the riparian vegetation communities (xeric, meso and hydrophytic), wildlife, sensitive species and critical habitat, water resources, and potential wetlands. Upland vegetation communities will not be mapped. The CONSULTANT shall contact the U.S. Fish and Wildlife Service (USFWS) and the Arizona Game and Fish Department (AGFD) to obtain information regarding the presence of listed Threatened and Endangered Species, Wildlife Species of Special Concern, and designated critical habitat in the project area.

2.12.5.2 The CONSULTANT shall determine the effects of each of the proposed alternatives on the identified ecological resources and any identified sensitive species or habitat.

2.12.5.3 The CONSULTANT shall prepare a report summarizing the results of the ecological assessment. The report shall include a description and maps or aerial photographs (scale: 1 inch = 400 feet) depicting the locations of the identified ecological resources. In addition, the report shall describe the identified effects of each alternative on the ecological resources. The CONSULTANT shall recommend methods to avoid or minimize any negative effects the proposed alternatives may have on the ecological resources. If any of the negative effects can not be avoided or minimized, then the CONSULTANT shall make a qualitative estimate of the general mitigation costs for the negative effects in terms of the relative magnitude, i.e. high, moderate or low. This information will be used in the analysis of the alternatives.

2.12.6 Title VI Environmental Justice Assessment. The CONSULTANT shall document and map the social and economic attributes of the citizens affected by this study using current census data (1995 preferred). The factors prohibited from serving as a basis for action or inaction which discriminates include, race, color, national origin, sex, age, and handicap/disability. Therefore, the efforts to prevent discrimination must address, but not be limited to a program's impacts, access, benefits, participation, treatment, services, contracting opportunities, training opportunities, investigations of complaints, allocations of funds, prioritization of projects and the functions of right-of-way, research, planning and design.

2.13 VISUAL RESOURCES AND MULTIPLE USE OPPORTUNITIES ASSESSMENT

2.13.1 Visual Resources Assessment. The purpose of this assessment is to identify aesthetic features and geographic units of the study area that may be preserved, enhanced, or improved. The units will serve as the basis for establishing landscape design themes and the future desired character for each alternative.

2.13.1.1 The CONSULTANT shall delineate the existing landscape character units within the study area. The units should be delineated based on land use, landforms, spatial enclosure, land marks, and/or vegetation conditions within the study area which give each unit an identifiable character and sense of place. The landscape character units will be mapped and documented with photographs of each unit cross referenced to their location on the map. A brief narrative will be prepared describing each unit.

2.13.1.2 The CONSULTANT shall prepare a visual analysis map and brief narrative that identifies distinct features (cultural or natural), areas of low feature/visual diversity, major viewpoints within and adjacent to the study area, opportunities for aesthetic improvements/restoration, and areas to be preserved because of their inherent aesthetic value (visual diversity).

2.13.1.3 The CONSULTANT shall prepare a map and brief narrative of the existing visual conditions to identify relative levels of intactness of natural and cultural features. This information may be included on the visual analysis map.

2.13.1.4 The CONSULTANT shall assess the extent to which existing flood control facilities and their related features incorporate the aesthetic treatment guidelines contained in the DISTRICT's Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects. In cases where existing flood control facilities are found to be in non-conformance with the DISTRICT's aesthetic treatment policy, the CONSULTANT shall identify possible measures for retrofitting existing facilities to achieve consistency with the policy.

2.13.1.5 The CONSULTANT shall utilize the visual resource assessment to develop the desired landscape character themes (visions) for each alternative that will protect and enhance local community character and create aesthetic value. The CONSULTANT shall prepare graphic exhibits which may include rendered conceptual plans, cross sections, sketches, simulations and/or other media appropriate for public communication that illustrates the desired landscape character and aesthetic features for the recommended alternative for

use in future design phases. The CONSULTANT shall identify ways to enhance public landscape viewing opportunities through the location, orientation and design of the recommended alternative.

2.13.2 Multiple-Use Opportunities Assessment. The purpose of this assessment is to serve as a basis for the formulation of alternatives that will provide flood control functions while maximizing opportunities to meet local community needs for recreation, open space, protection and enhancement of natural landscape and local community character, alternative forms of transportation, and/or ground water recharge.

2.13.2.1 The CONSULTANT shall inventory and map existing and future planned land uses, including recreation sites, open spaces, transportation systems and nodes, residential, commercial, educational, and industrial centers within the study area and including the area within one-mile of the study area. The CONSULTANT shall also review the inventory of existing conditions including the natural and/or cultural landscape features. The DISTRICT will provide data and resource mapping prepared by Carter-Burgess for the West Valley Recreation Corridor Study. This information will be illustrated on the site inventory map(s), and a brief narrative explaining the site inventory map will be prepared.

2.13.2.2 The CONSULTANT shall prepare a planning influences map that identifies the opportunities and limitations based on the analysis of the site inventory and visual analysis information. A brief narrative will be prepared to describe the planning influences map.

2.13.2.3 The CONSULTANT will utilize the inventory and analysis information and the planning and design requirements for flood control to identify and describe the types of multi-uses that might be appropriately incorporated into the alternatives developed for flood control management. The CONSULTANT shall briefly describe the benefits associated with integrating the identified multiple-use opportunities into the various alternatives. The multiple-use opportunities will be delineated on a map and briefly described.

2.13.2.4 The CONSULTANT shall identify and briefly describe, in general, potential partners and funding sources for implementation of multiple-use opportunities for each alternative.

2.13.2.5 The CONSULTANT shall identify design guidelines for integration of multi-use opportunities with flood control management facilities to guide subsequent design phases for the recommended alternative.

2.14 PUBLIC INVOLVEMENT

2.14.1 The CONSULTANT will plan and conduct a total of six open houses/public meetings throughout the Update study area in conjunction with this study. Meetings may serve any of the following functions:

2.14.1.1 Open House/Public Meeting to inform the public of the purpose and scope of the study, including the floodplain delineation components of the study, and to receive comments and concerns.

2.14.1.2 Open House/Public Meeting to present project alternatives to be studied and/or to present the results of the floodplain delineation study, and to receive public comments. The purpose of the meeting shall be to request public input regarding the alternatives, their preferences, and any recommendations they may have for other alternatives that need to be evaluated. In addition, the meeting will be to obtain public comment on the floodplain delineation study results. Any public meetings in conjunction with the floodplain delineation component of this study must take place prior to the submittal of floodplain delineation studies to FEMA.

2.14.1.3 Open House/Public Meeting to inform the public and obtain public comment on the study results. The purpose of the meeting is to present the results of the alternative analysis and the recommended alternative.

2.14.2 The CONSULTANT shall be responsible for the preparation of handouts and display boards for open houses and/or public meetings (assume 500 handouts/comments sheets per open house meeting). The CONSULTANT will be responsible for the preparation of all the graphic displays for neighborhood meetings and public agency board meetings. The CONSULTANT will provide, in digital and printed format, an exhibit showing the general project features or project impact area suitable for reproduction or publication.

2.14.3 The CONSULTANT shall chair the meetings as necessary. The CONSULTANT shall participate in the presentation, and respond to questions as required by making formal presentations or by written document addressing the issue.

2.14.4 The CONSULTANT shall provide required refreshments.

2.14.5 The CONSULTANT shall prepare a summary of the open houses and neighborhood meetings, including concerns raised by the public.

2.14.6 (OPTIONAL) The CONSULTANT shall participate with the DISTRICT in up to 20 miscellaneous meetings as requested by the DISTRICT, including any City or Town Council Meetings or Work-Study Sessions to present the study effort purpose, scope and progress to date. It is anticipated that illustration boards and graphics prepared for the open houses will be used to partially fulfill the needs for this task.

2.14.7 The CONSULTANT will provide all public notification and/or placement of the required legal advertising.

2.14.8 At the start of the project the CONSULTANT shall prepare a one-page front and back, tri-color, tri-fold project brochure for distribution to the public (assume 5,000 total), providing the project purpose, background, history, schedule, and points-of-contact. The DISTRICT will provide final review and approval of any document to be sent to the public. The CONSULTANT will mail any documents using a mailing list approved by the DISTRICT.

2.14.9 (OPTIONAL) Up to 7,000 additional brochures will be prepared and distributed as directed by the DISTRICT.

2.14.10 The CONSULTANT shall prepare two project milestone (as defined by the DISTRICT) newsletters/project status updates for distribution to the public (assume 5,000 x 2 distributions), the project participants, and other interested parties. The newsletter/update will provide at a minimum a project update of work conducted during the previous time-period, work to be conducted during the next time-period, upcoming events, questions and answers to questions identified during the study effort, and the project schedule. The DISTRICT will provide final review and approval of any document to be sent to the public. The CONSULTANT will mail any documents.

2.14.11 (OPTIONAL) Up to 7,000 additional newsletters will be prepared and distributed as directed by the DISTRICT.

2.14.12 Early in the project the CONSULTANT shall develop internet webpages for the project to communicate project information and status. Webpages shall be updated at project completion to include project results. Content, format and design of the webpages shall be approved by the DISTRICT. The webpages shall be linked to the DISTRICT website.

2.14.13 (OPTIONAL) The CONSULTANT shall be responsible for the establishment and maintenance of a voice-mail hotline. The hotline will allow the public to leave a voice-mail message which will provide another medium for the public to comment on the project. The

hotline will be checked at appropriate intervals, but in no case more than every second day, and the messages will be summarized in a weekly report. If a message requires a verbal or written response, the appropriate DISTRICT or CONSULTANT personnel will be contacted. The message summary will contain information on who and what response was provided to the caller.

2.15 UTILITIES

2.15.1 The CONSULTANT shall identify major existing utilities for the alternatives. Utilities shall be identified within the project construction limits that may impact the project. The alignment of the utilities shall be shown on the alternative sketches and in the Conceptual Design Plans. Estimates of the cost to relocate or realign the utilities shall be included in the project cost estimates as a separate line item. The CONSULTANT shall contact each utility company that has facilities, known or suspected, within the project area, to request the alignment and size of the utility facilities. Record drawings shall be obtained to ascertain all underground utility locations. Where record drawings are not available, blue stake services shall be utilized to locate the horizontal alignment of the underground facilities.

2.15.2 The CONSULTANT shall provide the vertical location of sanitary and storm sewers which will be determined from field surveys as appropriate.

2.16 SITE VISITS

2.16.1 The CONSULTANT shall make site visits as necessary to become familiar with existing conditions.

2.16.2 The DISTRICT will conduct three site visits, generally as follows:

2.16.2.1 Site visit to orient the CONSULTANT and the DISTRICT with the project area, and to determine any initial conflicts or opportunities.

2.16.2.2 Site visit near the end of the Alternatives Analysis. This site visit shall incorporate any environmental, ecological or cultural field review as appropriate.

2.16.2.3 Site visit during the Preferred Alternative Analysis and to verify that the conditions have not significantly changed during the final stages of the project.

2.17 MEETINGS

2.17.1 The CONSULTANT shall meet with the jurisdictions, other affected agencies and utilities as required, generally being held at their offices. The DISTRICT shall be kept informed of all such meetings, and shall attend the meetings whenever possible and as required. The DISTRICT shall be copied on all meeting minutes.

2.17.2 The CONSULTANT is responsible for the minutes of any meetings and shall include copies of minutes of meetings, telephone conversations, and correspondence to the DISTRICT in the Project Administrative Report.

2.17.3 The CONSULTANT shall participate in the following specific meetings, monthly progress meetings and other meetings as dictated by the project. Meetings, when possible, will be generally held at municipality offices or at the CONSULTANT office.

2.17.3.1 Kick Off Meeting. The CONSULTANT shall meet with the DISTRICT to submit the project schedule (completed in Microsoft Project 98 or compatible software) that shall include dates of all proposed submittals and review meetings, and to discuss the schedule and the tasks necessary to accomplish it. The CONSULTANT shall bring the key project team members, including the project checkers, to the meeting to introduce them to the DISTRICT staff who will be working on the project. The DISTRICT will give available aerial topographic mapping to the CONSULTANT at this time.

2.17.3.2 Data Collection Report Review Meeting. The CONSULTANT shall meet with the DISTRICT Project Manager to review the overall project status and to discuss the Data Collection Report review comments which will be provided to the CONSULTANT at the meeting. The CONSULTANT should be prepared to explain all information and any assumptions made up to this point. Any problems will be identified and discussed.

2.17.3.3 Alternatives Brainstorming Meeting. A brainstorming session with the participants to discuss existing flooding problems, existing studies and to identify potential solutions.

2.17.3.4 Alternative Evaluation Meeting. A meeting with Review Committee members to evaluate the alternatives.

2.17.3.5 Landscaping and Aesthetics Committee Meeting No. 1. A meeting with the DISTRICT's Landscaping and Aesthetics Committee to review landscaping issues.

2.17.3.6 Alternatives Analysis Report Review Meeting. Three weeks after submittal of the Alternatives Analysis Report, the CONSULTANT shall meet with the DISTRICT Project Manager to review the overall project status and to discuss the Alternatives Analysis Report review comments. The CONSULTANT should be prepared to discuss alternative flood mitigation solutions and the preliminary cost estimates.

2.17.3.7 Feature Prioritization Meeting. A meeting with the participants to discuss implementation of the Recommended Plan and develop project priorities and phasing.

2.17.3.8 Landscaping and Aesthetics Committee Meeting No. 2. A meeting with the DISTRICT Landscaping and Aesthetics Committee to review final landscaping issues.

2.17.3.9 Recommended Design Report and Preliminary Plans Submittal Meeting. Three weeks after submittal of the Recommended Design Report and Preliminary Plans, the CONSULTANT shall meet with the DISTRICT Project Manager to review the overall project status and to discuss the Recommended Design Report. The CONSULTANT will be prepared to explain all assumptions and calculations completed up to this point. Any problems will be identified and corrective actions agreed upon at this meeting. The CONSULTANT will make any necessary corrections and provide written responses to all comments and will resubmit the Recommended Design Report Preferred Alternative and Preliminary plans as required to the satisfaction of the DISTRICT.

2.17.3.10 Final (100 percent) Submittal Meeting. The CONSULTANT shall meet with the DISTRICT Project Manager to make the final submittal of the hydrology and hydraulic analyses, the alternative flood mitigation solutions, the cost estimates, and the final recommended solution as revised per the Recommended Design Report review comments. The CONSULTANT shall supply the hydraulic data and plans on 3.5-inch diskettes or CDs. The plans should be in AutoCAD version 13 format. A Final Performance Evaluation will be completed at this time.

3.0 PROJECT ADMINISTRATION

The CONSULTANT shall prepare project schedules and projected billings in accordance with Section 2.0 of the Consultant Guidelines with the following inclusions or exceptions:

3.1 SCHEDULE

3.1.1 The project schedule outline will be consistent with the numbering and tasks defined in this SOW and the fee proposal.

3.1.2 The CONSULTANT shall prepare a significant event calendar in Microsoft Project 98 or

compatible software that shows, at a minimum, general timeframes for participant, agency and public meetings, and submittal milestones. The CONSULTANT shall update the calendar as necessary and provide it to the DISTRICT Project Manager, to keep it current.

3.2 INVOICES

3.2.1 The CONSULTANT will submit a projection of monthly project billings within 14 days of Notice to Proceed (NTP). The projected billing will be consistent with the tasking of the SOW, the project schedule and the fee proposal.

3.2.2 The DISTRICT will provide a general format for invoices. The invoices will be consistent with the tasking of the SOW, project schedule, fee proposal and projected billing.

3.2.3 The CONSULTANT shall submit invoices to Accounts Payable, Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009. A copy of the invoice will be forwarded to the DISTRICT Project Manager.

3.2.4 The CONSULTANT shall submit progress reports with each invoice reflecting the work completed during the previous pay period. The DISTRICT will provide the CONSULTANT with the desired format.

3.3 PROJECT MANAGEMENT

3.3.1 The CONSULTANT shall appoint a Project Manager who shall be knowledgeable of the progress of each phase of the project. The Project Manager shall be the same person listed in the CONSULTANT Technical Proposal unless otherwise approved by the DISTRICT. The Project Manager shall be the point of contact for the DISTRICT. The CONSULTANT Project Manager shall attend all meetings as required by the DISTRICT. The CONSULTANT Project Manager shall keep the DISTRICT informed of all coordination with outside agencies and other affected parties. The DISTRICT may terminate this agreement if the Project Manager is not available or if the CONSULTANT is unable to provide a replacement Project Manager acceptable to the DISTRICT. The DISTRICT may request replacement of the Project Manager if the DISTRICT determines that this would be in the best interest of the project.

3.4 REPORTS

3.4.1 All reports shall be submitted to the DISTRICT for review in draft form. Upon receipt of review comments, the CONSULTANT shall incorporate appropriate revisions and complete the report.

3.4.2 The CONSULTANT shall provide the DISTRICT, in the project schedule, a three-week review period for each submittal.

3.4.3 Data Collection Report. The Data Collection Report will contain a description of information collected for this project. Other data collected pertinent to the project should also be contained in the Data Collection Report. Existing major natural washes and existing and planned man-made drainage facilities in the watershed should be shown on the Existing Facilities Exhibit to be submitted with the Data Collection Report. The Existing Facilities Exhibit will be prepared in AutoCAD format.

3.4.3.1 The Data Collection Report should include the following as applicable:

Executive Summary
Project Description
Scope of Project
Data Collection Results
- Current Conditions
- Areas of Flooding

Existing and Future Development Plans
Areas and Locations of Potential Flooding
Existing and Future Drainage Facilities
Environmental Overview
Environmental Permits and Approvals
Biological Survey Analysis
Cultural Resources Analysis
Environmental Regulatory Records Review
Visual Resources and Multi-Use Opportunities Assessment
Land
Parcel Ownership
Rights-of-Entry Requirements
Hydrology/Hydraulics Models
Summary of Models/Conditions
Concerns
Major Utilities
Existing Facilities Exhibit
References/Figures

3.4.4 Alternative Analysis Report. The Alternative Analysis Report shall be prepared containing narrative descriptions of the alternatives considered and discarded, the alternatives selected for analysis, the results of the analysis of alternatives, and comparative cost estimates. The advantages and disadvantages and general impacts of each alternative shall be identified. The recommended alternative shall be identified in the report.

3.4.4.1 The Alternatives Analysis Report Format should include the following as applicable:

Summary
Description of Study Area
Scope of Project
Environmental Overview
Socioeconomic Environment
Physical and Natural Environment
Cultural Resources
Visual Resources and Multi-Use Opportunities Overview
Alternatives Descriptions/ Sketches
Alternatives Eliminated
Cost Estimates
Evaluation Criteria/Matrix
Evaluation of Alternatives
References/Figures

3.4.5 Recommended Design Report. The CONSULTANT shall prepare a Recommended Design Report which will include engineering design guidelines to maintain 100-year conveyance, landscaping, habitat and recreation considerations, cost estimates and Conceptual Design plans.

3.4.5.1 The Recommended Design Report should include the following as applicable:

Summary
Description of Study Area
Scope of Project
Evaluation Criteria
Selection of Preferred Alternative
Recommendations to Regulators
Environmental Overview Summary
Visual and Multi-Use Overview Summary
Costs
Priority of Features

Maintenance Plan
Implementation Plan
References/Figures
Disk or CD ROM Copies of applicable hydrologic, hydraulic models

3.4.5.2 Conceptual Design Plans:

Indicate existing topography.
Indicate cultural, biological, environmental impact areas.
Indicate conveyance criteria – approximate size and configuration, invert, typical cross-section.
Indicate conflicting utilities.

3.4.6 Project Final Submittal. Upon approval of the Recommended Design Report, the CONSULTANT shall incorporate review comments and make any required corrections and changes to the hydrology and/or hydraulic models.

3.4.6.1 The CONSULTANT shall submit a Final Design Submittal with final versions of all reports applicable to the Project including:

Data Collection Report
Alternatives Analysis Report
Recommended Design Report
Project Survey Report Appendix
Technical Report Appendix
Administrative Report Appendix

3.4.6.2 The CONSULTANT shall prepare a separate, reproducible Executive Summary of the Final Design Submittal.

3.4.7 Project Survey Report Appendix. Survey data will be documented in a Project Survey Appendix to the Project Final Submittal. Copies of all survey note books or printout of digital files developed with data collectors will be provided. The horizontal and vertical benchmarks used for the survey shall be documented along with documentation of the datum upon which the benchmark was originally established. Conversion to other datum as required herein shall be documented in the report. A summary table of the ERMs and benchmarks shall be included.

3.4.8 Project Technical Report Appendix. The CONSULTANT shall maintain a technical report throughout the project, which contains documentation of the designs, analysis, and calculations. The report shall be organized to include, but not limited to, the following sections as appropriate to the project:

Lateral design, configuration, alignment, and feature locations.
Right-of-way and easement information.
Special project features, including unusual construction techniques, special materials, and/or conditions.
Maps, sketches, calculations, and other supporting documentation as required.
Hydrology and hydraulics.
Cost estimates.
Conflicting utilities that are to be relocated and/or protected.
Preliminary hydrology and hydraulics analysis and calculations.
Environmental and Permit requirements.

3.4.9 Project Administration Appendix. The Project Administration Appendix shall include copies of all correspondence, minutes of meetings and conversations with the DISTRICT, affected agencies and others as appropriate.

3.5 DELIVERABLES

3.5.1 The CONSULTANT shall submit all items 'sealed' by a registered civil engineer in the State of Arizona. Upon receipt of the final submittal, the DISTRICT shall review the report and preliminary plans for the accurate incorporation of all final comments. If incomplete and/or incorrect incorporation of those comments is found, the original documents shall be returned to the CONSULTANT for correction and resubmittal.

3.5.2 The CONSULTANT shall submit computer files of the information to the DISTRICT delivered on 3.5-inch diskettes or CDs.

3.5.3 Reports and tables should be in Word 6.0 and/or Excel 97 or DISTRICT acceptable software.

3.5.4 Plans should be in AutoCAD version 13 format (dwg) or MicroStation (dgn) format in accordance with Section 19, CADD Drafting Standards, Consultant Guidelines dated October 1, 1998.

3.5.5 The CONSULTANT shall submit three (3) copies for each DRAFT report, estimates, schedules or drawings to the DISTRICT and one (1) copy for each DRAFT report, estimates, schedules or drawings to each participating agency.

3.5.6 The CONSULTANT shall submit five (5) copies for each FINAL report, estimates, schedules or drawings to the DISTRICT and two (2) copies for each FINAL report, estimates, schedules or drawings to each participating agency.

APPENDIX D. SURVEY FIELD NOTES

SOKKIA™

MADE IN U.S.A.

HOLMAN'S INC.
8152-05
603056 NOV2398
SOKKIA ECONOMY STUDENT FIELD BOOK
$ 2.75 PHO

SOKKIA™

FAD 99-44

ECONOMY FIELD BOOK

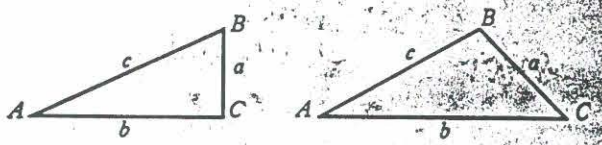
ADMP UPDATE

SAB 88

BOOK 1 OF

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES



$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

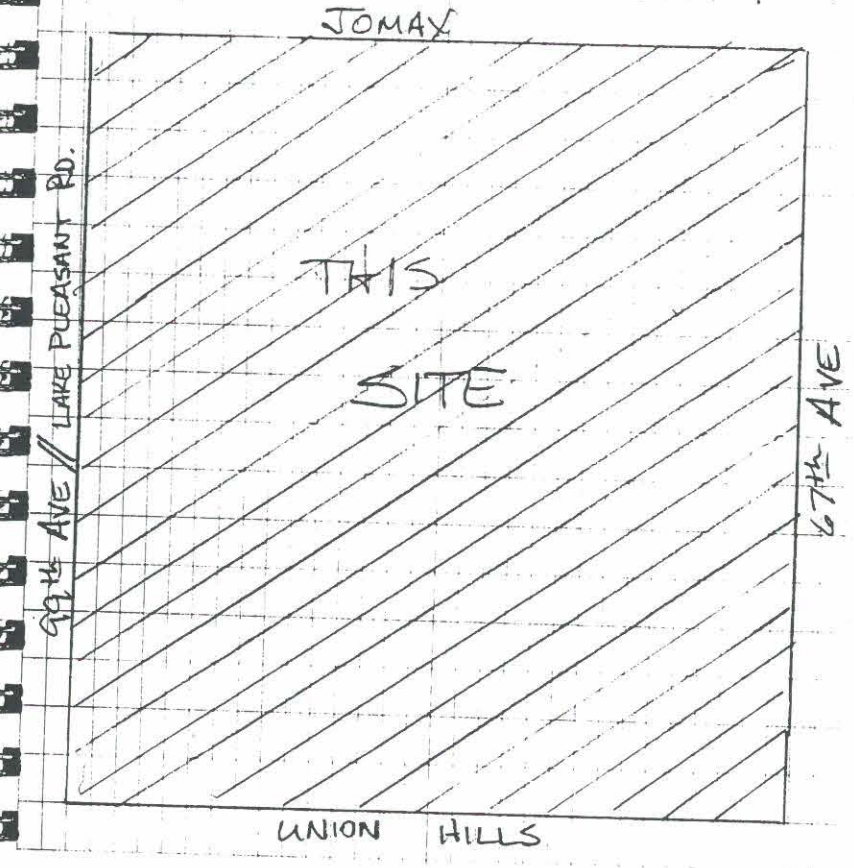
FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN U.S.A.

ADMP UPDATE

5043.0001
FCD 99-44



Pg #	Contents	Crew	Date
1-18	Bench Loops For Flood Cont. B.C's	R. Roman, M. Brown, K. Kesti	6-8 → 6-12-2000
19-22	Maps For Flood Cont. B.C's	R. Roman	6-12-2000
23-27	Flood Control B.C. Locations (ERM's)	R. Roman, J. Farnsworth	11-21-2000

FLOOD CONTROL BENCH LOOP #1

R. ROMAN 6-8-2006
M. BROWN SUNNY & HOT 95°

1

STA	+	HI	−	ELEV.	DESCRIPTION
				1327.14	BCF @ PINNACLE PEAK & 69th AVE #88048
	6.23	1333.37			
TP #1			3.13	1330.24	P.K. NAIL APPROX. 600'+/- E OF TBM @ EDGE OF PAVEMENT (N. SIDE)
	7.47	1337.71			
TP #2			2.92	1334.79	P.K. NAIL APPROX 1200'+/- E OF TBM @ N. EDGE OF PAVEMENT (300'+/- EW. OF 67th AVE)
	6.33	1341.12			
TP #3			3.13	1337.99	P.K. NAIL APPROX 300'+/- E OF 67th AVE @ N. EDGE OF PAVEMENT (CLOSE TO 2ND PP)
	9.01	1347.00			
TP #4			2.44	1344.56	P.K. NAIL 100'+/- E OF 65th PL // BY W.M. @ S. EDGE OF PAVEMENT
	4.00	1348.56			
TP #5			5.25	1343.31	P.K. NAIL IN FRONT OF 6323 PARKCREST @ N. EDGE OF PAVEMENT

CONT'

STA	+	HI	-	ELEV.	DESCRIPTION
	4.47	1347.78			
TP #6			5.72	1342.06	FLOOD CONTROL B.C. @ E SIDE OF WASH APPROX. 15'+/- N. OF EDGE OF PAVEMENT & 60'+/- W. OF NO OUTLET SIGN & BR RANCH SIGN
	5.49	1347.55			
TP #5			4.24	1343.31	
	5.38	1348.69			
TP #4			4.13	1344.56	
	1.78	1346.34			
TP #3			8.34	1338.00	
	3.30	1341.30			
TP # 2			6.50	1334.80	
	2.41	1337.21			
TP # 1			6.97	1330.24	
	3.22	1333.46			
T.B.M			6.32	1327.14 ✓	B.C.F. @ PINNACLE PEAK & 69TH AVE (#88048) EL = 1327.14

#2

STA	+	HI	−	ELEV.	DESCRIPTION
TBM				1280.12	ADOT BC STAMPED "PT4475" EPOXIED TO WELL CASING @ THE S.W. COR. OF 83RD AVE & DEER VALLEY RD.
	5.53	1285.65			
TP#1			5.74	1279.91	F/C - T/C 600'+/- W. OF 83RD AVE @ END CURB ON S. SIDE OF RD.
	6.11	1286.02			
TP#2			5.74	1280.28	B/C - T/C 300'+/- W. OF 85th AVE. "+" ON CONC.
	5.07	1285.35			
TP#3			5.13	1280.22	B/C - T/C 200'+/- W. OF 86th AVE. "+" ON CONC. // @ W. EDGE C.B.
	5.63	1285.85			
TP#4			5.78	1280.07	B/C - T/C 400'+/- W. OF 87th AVE. "+" ON CONC. // @ CURB OPENING
	5.45	1285.52			
TP#5			5.00	1280.52	B/C - T/C 30'+/- W. OF 89th AVE "+" ON CONC. // @ N.W. RET. (S. SIDE RD.)

CONT'

STA	+	HI	−	ELEV.	DESCRIPTION
	5.47	1285.99			
TP #6			5.29	1280.70	B/C - T/C 100'+/- E. OF 90th AVE "+" ON CONC.
	5.44	1286.14			
TP #7			3.80	1282.34	B/C - T/C 200'+/- W. OF 91ST AVE. "+" ON CONC.
	4.98	1287.32			
TP #8			5.57	1281.75	B/C - T/C 800'+/- W. OF 91ST AVE. "+" ON CONC.
	6.08	1287.83			
TP #9			10.50	1277.33	FLOOD CONTROL B.C. @ N.W. COR. HEADWALL @ S.W. COR. 93RD AVE & DEER VALLEY RD.
	10.67	1288.00			
TP #8			6.25	1281.75	
	5.05	1286.80			
TP #7			4.47	1282.33	
	3.90	1286.23			
TP #6			5.53	1280.70	

CONT'

STA	+	HI	−	ELEV.	DESCRIPTION
	5.13	1286.83			
TP#5			5.30	1280.53	
	4.89	1285.42			
TP#4			5.34	1280.08	
	5.67	1285.75			
TP#3			5.52	1280.23	
	5.34	1285.57			
TP#2			5.27	1280.30	
	5.73	1286.03			
TP#1			6.10	1279.93	
	5.65	1285.58			
TBM			5.45	1280.13	ADOT B.C. STAMPED "PT4475" EPOXIED TO WELL CASING @ THE S.W. COR. OF 83RD AVE & DEER VALLEY RD. EL = 1280.12

CLOSURE ERROR +0.01
ADJ PER TURN = 0.0011

R. ROMAN 6-9-2000
M. BROWN SUNNY & HOT 95°

#3

STA	+	HI	-	ELEV.	DESCRIPTION
				1387.10	B/CHH @ 67th AVE & SADDLEHORN W. (ELEV. PER DTM INFO) #99097
	3.53	1390.63			SHOT ON RING OF H.H.
TP #1			5.88	1384.75	P.K. NAIL APPROX. 200'+/- N OF HAPPY VALLEY @ E EDGE OF PAVEMENT ON 67th AVE.
	1.04	1385.79			
TP #2			3.92	1381.87	P.K. NAIL APPROX. 300'+/- E. OF 67th AVE @ S. EDGE OF PAVEMENT ON HAPPY VALLEY
	6.60	1388.47			
TP #3			5.89	1382.58	B/C T/C APPROX. 200'+/- FROM W. END CURB @ S. SIDE OF HAPPY VALLEY RD. "+" ON CURB
	4.04	1386.62			
TP #4			4.33	1382.29	B/C - T/C APPROX. 300'+/- FROM HEATHER RIDGE ENTRANCE. "+" ON CURB, S. SIDE RD.
	6.95	1389.24			
TP #5			1.47	1387.77	B/C - T/C APPROX 50'+/- E. OF 62ND AVE "+" ON CURB, S. SIDE RD.

CONT'

STA	+	HI	−	ELEV.	DESCRIPTION
	9.48	1397.25			
TP #6			2.61	1394.64	B/W - T/W APPROX. 300' +/- W. OF 61ST AVE. "+" ON CONC.
	11.94	1406.58			
TP #7			0.78	1405.80	B/C - T/C @ S.W. RETURN OF 61ST AVE & HAPPY VALLEY "+" ON CONC.
	0.15	1405.95			
TP #8			10.43	1395.52	B/C - T/C @ SE RETURN OF 61ST AVE & W. VILLA LINDA "+" ON CURB
	0.60	1396.12			
TP #9			11.04	1385.08	B/C - T/C BETWEEN WESTWIND & WHISPERING WIND "+" ON CURB, BY TRANS. PADS.
	3.34	1388.42			
TP #10			4.56	1383.86	B/C - T/C. APPROX 40' +/- N OF SAGUARO PARK "+" ON CURB.
	0.93	1384.79			
TP #11			7.92	1376.87	B/C - T/C APPROX 300' +/- W. OF 61ST AVE "+" ON CURB, S. SIDE QUESTA DR.

CONT'

STA	+	HI	−	ELEV.	DESCRIPTION
	4.38	1381.25			
TP#12			5.58	1375.67	FLOOD CONTROL B.C. ON HEADWALL @ THE S.W. COR. OF QUESTA DR. & 61ST PL. ON S.W. COR OF HEADWALL
	5.62	1381.29			
TP#11			4.41	1376.88	
	8.18	1385.06			
TP#10			1.19	1383.87	
	4.48	1388.35			
TP#9			3.25	1385.10	
	11.05	1396.15			
TP#8			0.61	1395.54	
	10.62	1406.16			
TP#7			0.34	1405.82	
	1.29	1407.11			
TP#6			12.45	1394.66	
	3.13	1397.79			
TP#5			10.01	1387.78	
	1.26	1389.04			
TP#4			6.73	1382.31	
	4.57	1386.88			
TP#3			4.27	1382.61	NOT SAME AS ORIG. T.P. / ORIG. GOT REMOVED (SAME GEN. LOCATION THOUGH)
	5.46	1388.07			
TP#2			6.19	1381.88	

CONT'

STA	+	HI	−	ELEV	DESCRIPTION
	4.68	1386.56			
TP #1			1.83	1384.73	
	6.02	1390.75			
TBM			3.66	1387.07	BCHH @ 67th AVE & SADDLEHORN W. #99097
					SHOT ON RING OF H.H. (INFO PER DTM)
					ELEV. = 1387.10
					CLOSURE ERROR = -0.03
					ADJUSTMENT PER TURN = 0.0025

#4

STA	+	HI	—	ELEV.	DESCRIPTION
				1405.18	SET 60d NAIL w/ SHINER 1' E. OF 4 STRAND BARBWIRE FENCE. (BETWEEN FENCE & TRACK RD) 1/4 MILE S. OF THE E. 1/4 COR. SEC. 33
	2.95	1408.13			
TP#1			8.39	1399.74	SET RANDOM HUB
	3.55	1403.29			
TP#2			5.17	1398.12	SET RANDOM HUB
	7.53	1405.65			
TP#3			5.25	1400.40	SET RANDOM HUB
	2.65	1403.05			
TP#4			6.25	1396.80	FLOOD CONTROL B.C. 0.2 MILES E. OF LAKE PLEASANT RD. 4' N. OF 4 STRAND BARBWIRE FENCE. SET IN RING OF STONE STAMPED FCD 99-44
	6.42	1403.22			
TP#3			2.83	1400.39	
	5.25	1405.64			
TP#2			7.53	1398.11	1396.80
	5.13	1403.24			
TP#1			3.49	1399.75	

CONT'

STA	+	HI	-	ELEV	DESCRIPTION
	8.55	1408.30			
TBM			3.11	1405.19	SET 60d NAIL W/SHINER 1' E. OF 4 STRAND BARBWIRE FENCE (BETWEEN FENCE & TRACK RD) 1/4 MILE S. OF THE E 1/4 COR. SEC. 33 ELEV = 1405.18
					CLOSURE ERROR = +0.01
					ADJUSTMENT PER TURN = 0.0025

R. ROMAN 6-12-2000
K. KESTI SUNNY & HOT 100°

#5

STA	+	HI	−	ELEV.	DESCRIPTION
TBM				1311.13	BCHH C.O.P. @ PINNACLE PEAK & 99th AVE
	1.36	1312.49			SHOT ON RIM OF H.H.
TP #1			8.37	1304.12	60d NAIL @ N.E. COR. OF LAKE
	8.44	1312.56			PLEASANT & PINNACLE PEAK (2' SOUTH OF STOP SIGN)
TP #2			1.87	1310.69	60d NAIL 10'+/- E. OF EDGE OF PAVEMEN
	9.19	1319.88			600'+/- N. OF PINNACLE PEAK (4' N OF ST. SIGN)
TP #3			3.33	1316.55	60d NAIL 10'+/- E. OF E.P. 300'+/- N. OF
	9.04	1325.59			HACIENDA DEL SOL
TP #4			3.57	1322.02	60d NAIL 10'+/- E OF E.P. 400'+/- N OF
	8.40	1330.42			MARIPOSA GRANDE
TP #5			3.66	1326.76	60d NAIL 10'+/- E. OF E.P. 300'+/- N. OF
	7.88	1334.64			CALLE DE JOS

CONT'

STA	+	HI	-	ELEV.	DESCRIPTION
	7.88	1334.64			
TP #6			3.91	1330.73	60d NAIL 10'+/- W. OF E.P. 300'+/- N. OF HATFIELD.
	6.85	1337.58			
TP #7			3.64	1333.94	60d NAIL. RANDOM IN DESERT
	5.42	1339.36			
TP #8			6.87	1332.49	FLOOD CONTROL B.C. // 0.20 MILES W. ON HAPPY VALLEY RD. (DIRT). THEN 300'+/- SOUTH BC IN RING OF STONE. @ E SIDE OF WASH
	7.03	1339.52			
TP #7			5.57	1333.95	
	5.86	1339.81			
TP #6			9.07	1330.74	
	2.19	1332.93			
TP #5			6.16	1326.77	
	2.37	1329.14			
TP #4			7.10	1322.04	
	3.03	1325.07			
TP #3			8.50	1316.57	

CONT'

STA	+	HI	−	ELEV.	DESCRIPTION
	2.38	1318.95			
TP#2			8.23	1310.72	
	0.73	1311.45			
TP#1			7.30	1304.15	
	7.81	1311.96			
TBM			0.83	1311.13	C.O.P. BCHH @ PINNACLE PEAK & 99th AVE. SHOT ON RIM OF H.H.

#6

STA	+	HI	−	ELEV.	DESCRIPTION
				1405.80	TP #7, BENCH LOOP #3, Pg. 7
	11.26	1417.06			B/C-T/C S.W. RETURN OF 61ST AVE & HAPPY VALLEY "+" ON CONC.
TP #1			1.53	1415.53	60d NAIL 10'+/- S. OF E.P. @ 600'+/- E. OF 61ST AVE.
	2.93	1418.46			
TP #2			9.57	1408.89	60d NAIL 10'+/- S. OF E.P. @ 1200'+/- E. OF 61ST AVE.
	2.21	1411.10			
TP #3			5.36	1405.74	60d NAIL 10'+/- S. OF E.P. @ 300'+/- E. OF ENTRANCE TO IND. PARK
	10.42	1416.16			
TP #4			6.13	1410.03	B/C-T/C S. SIDE HAPPY VALLEY 200'+/- E. OF END OF CURB "+" ON CONC.
	7.63	1417.66			
TP #5			0.68	1416.98	B/C-T/C S. SIDE HAPPY VALLEY 800'+/- E. OF END OF CURB. "+" ON CONC.

CONT'

STA	+	HI	-	ELEV	DESCRIPTION
	8.17	1425.15			
TP #6			4.41	1420.74	B/C-T/C S. SIDE HAPPY VALLEY 300'+/- E. OF 55th AVE. "+" ON CONC.
	5.49	1426.23			
TP #7			4.46	1421.77	B/C-T/C S. SIDE HAPPY VALLEY 100'+/- W. OF 53RD AVE "+" ON CONC.
	4.38	1426.15			
TP #8			5.40	1420.75	60d NAIL 10'+/- S OF E.P 500'+/- E. OF 53RD AVE.
	4.53	1425.28			
TP #9			1.47	1423.81	B/C-T/C 300'+/- N OF HAPPY VALLEY ON E. SIDE OF 51ST AVE. "+" ON CONC.
	9.43	1433.24			
TP #10			2.46	1430.78	60d NAIL 300'+/- N. OF BARRICADES @ END OF 51ST AVE. @ ℄ DIRT RD.
	9.29	1340.07			
TP #11			0.59	1439.48	60d NAIL 900'+/- N. OF BARRICADES @ ℄ DIRT RD.

STA	+	HI	−	ELEV.	DESCRIPTION
	8.90	1448.38			
TP #12			0.97	1447.41	60d NAIL @ ℄ DIRT RD.
	9.27	1456.68			
TP #13			0.93	1455.75	60d NAIL @ ℄ DIRT RD.
	11.17	1466.92			
TP #14			1.40	1465.52	60d NAIL @ ℄ DIRT RD.
	13.16	1478.68			
TP #15			5.92	1472.76	2" ALUM. CAP // COLLAR, WILLIAMS & WHITE RLS 18214 @ 1 MILE N. OF HAPPY VALLEY & 300 ±E. OF 51ST AVE., AND 50' ± North
	5.90	1478.66			
TP #14			13.14	1465.52	
	1.62	1467.14			
TP #13			11.39	1455.75	↳ Description for ERM # 3
	1.17	1456.92			
TP #12			9.53	1447.39	

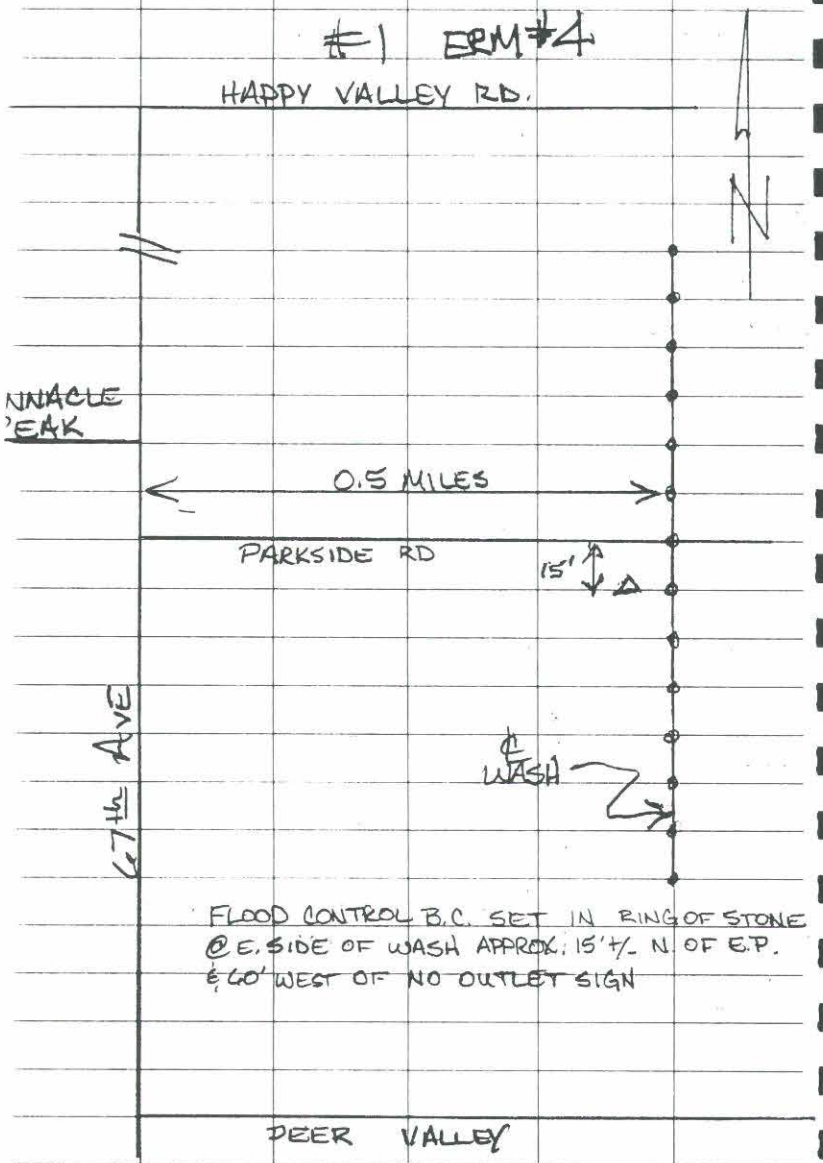
CONT'

STA	+	HI	−	ELEV.	DESCRIPTION
	1.73	1449.12			
TP #11			9.66	1439.46	
	1.25	1440.71			
TP #10			9.95	1430.76	
	2.37	1433.13			
TP #9			9.33	1423.80	
	1.43	1425.23			
TP #8			4.47	1420.76	
	5.68	1426.44			
TP #7			4.69	1421.75	
	4.27	1426.02			
TP #6			5.29	1420.73	
	4.33	1425.06			
TP #5			8.08	1416.98	
	0.67	1417.65			
TP #4			7.62	1410.03	
	6.47	1416.50			
TP #3			10.75	1405.75	
	7.65	1413.40			
TP #2			4.51	1408.89	
	10.36	1419.25			
TP #1			3.71	1415.54	
	3.29	1418.83			
TBM			13.04	1405.79	T.P. #7, BENCH. LOOP #3, pg. 7

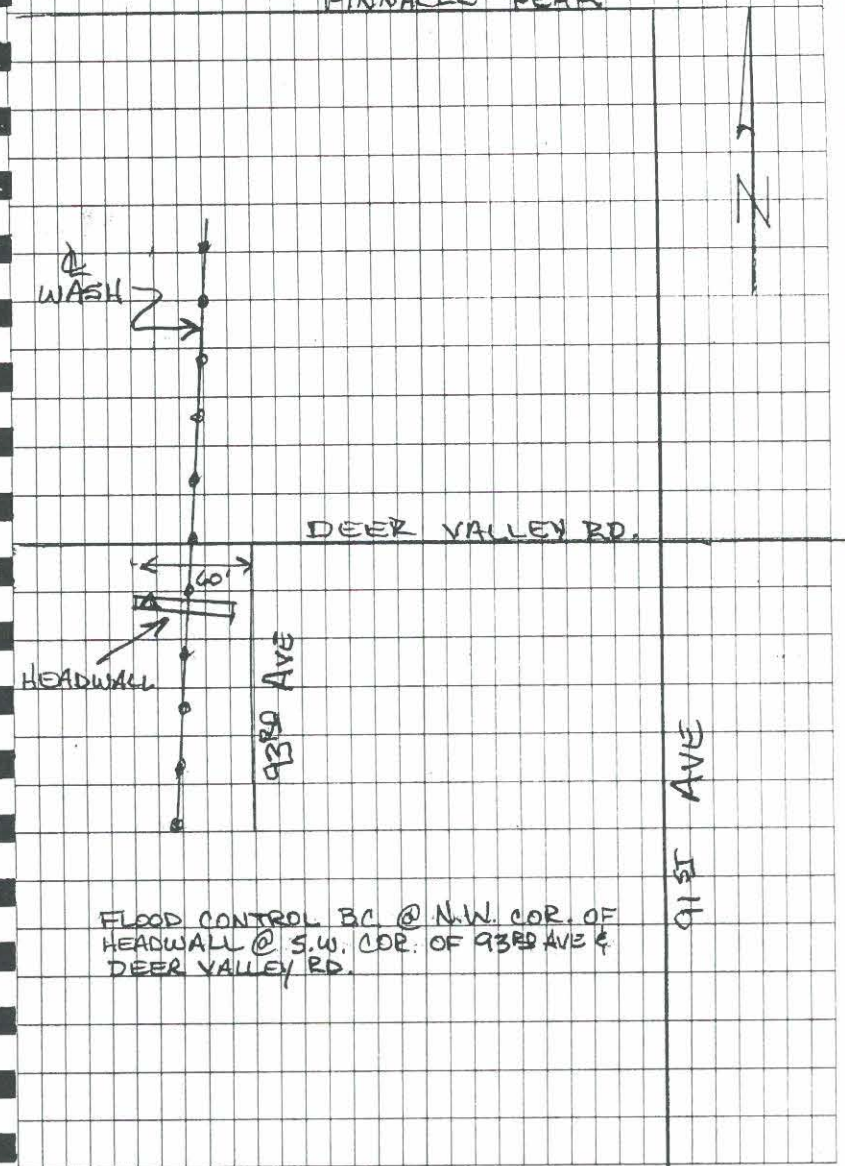
EL = 1405.80 CLOSURE ERROR = -0.01
ADJ PER TURN = 0.0007

MAPS FOR BENCH LOOPS

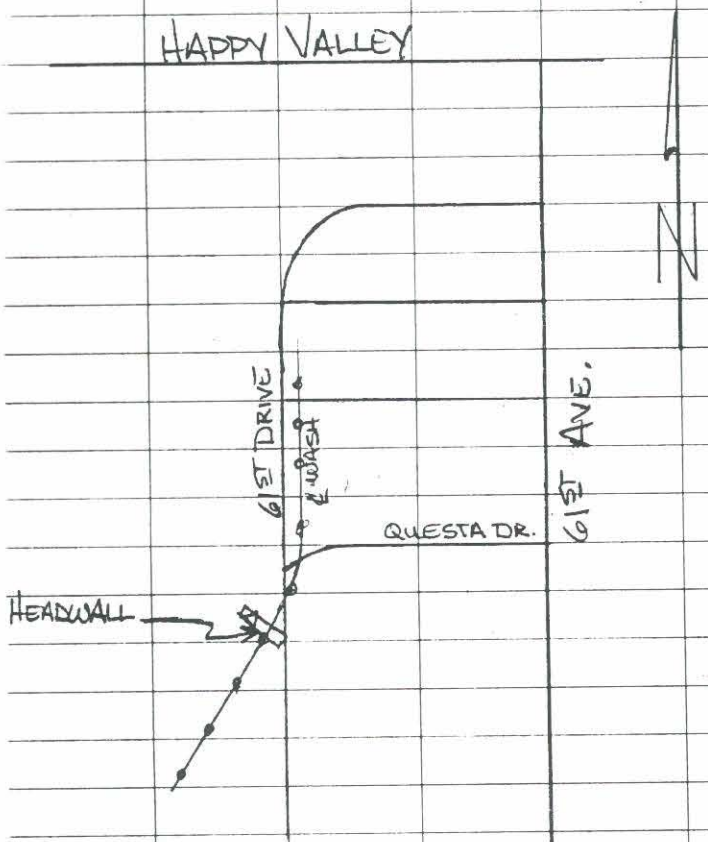
#1 ERM#4



#2

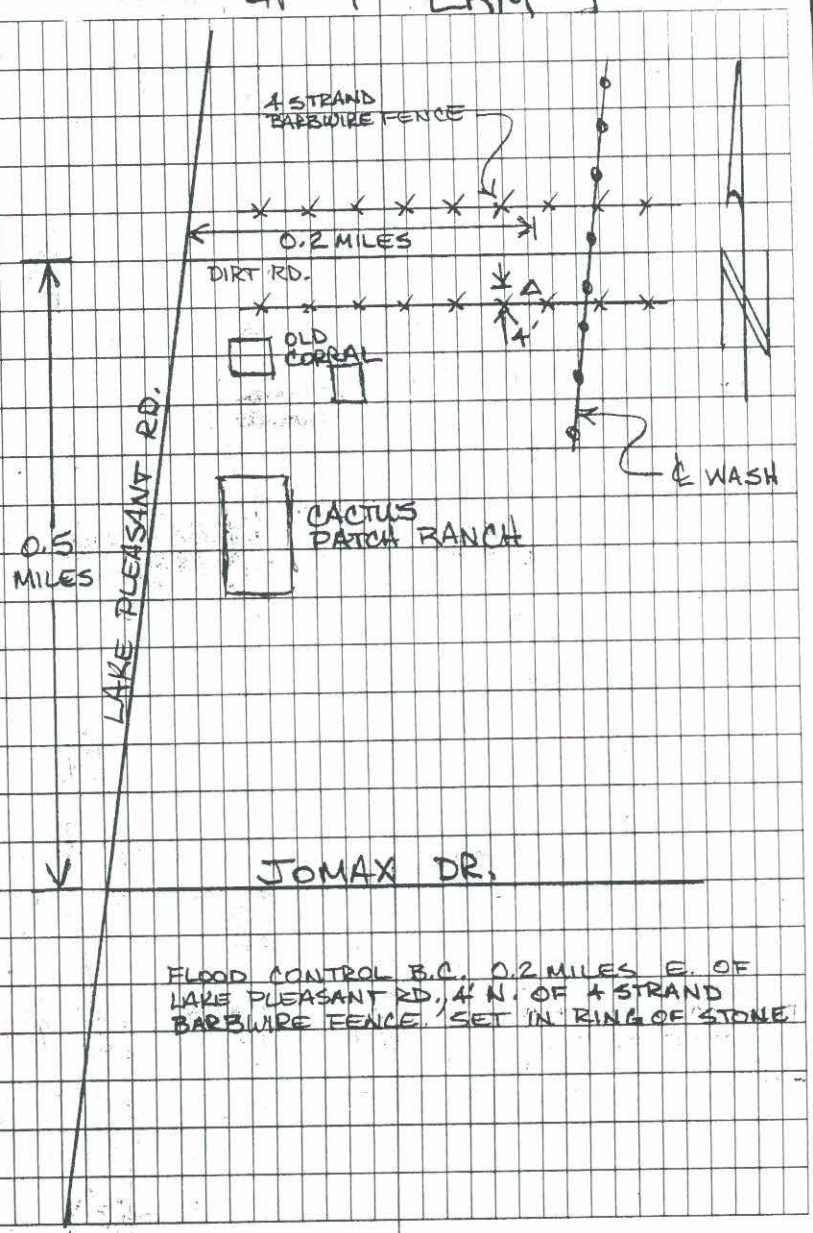


#3 ERM#5



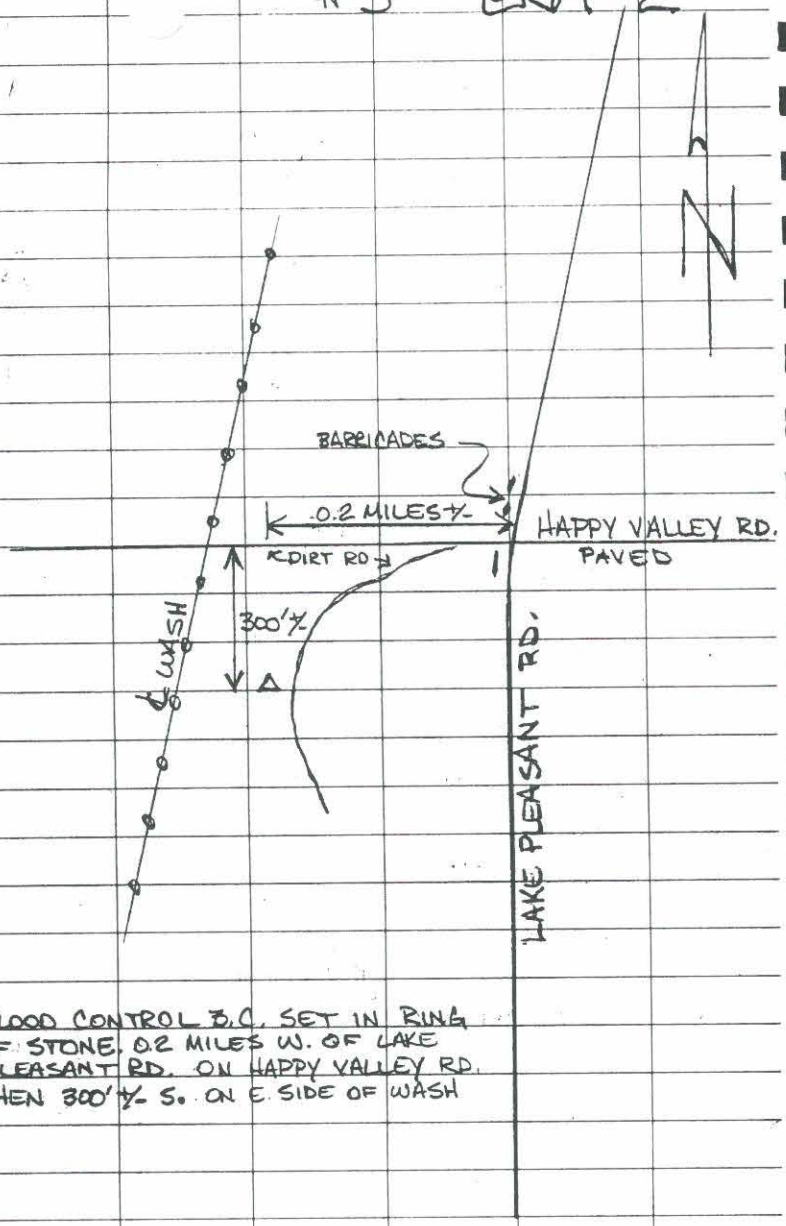
FLOOD CONTROL B.C. @ S.W. CORNER OF HEADWALL @ THE S.W. COR. OF QUESTA DR. & 61ST PLACE

#4 ERM#1



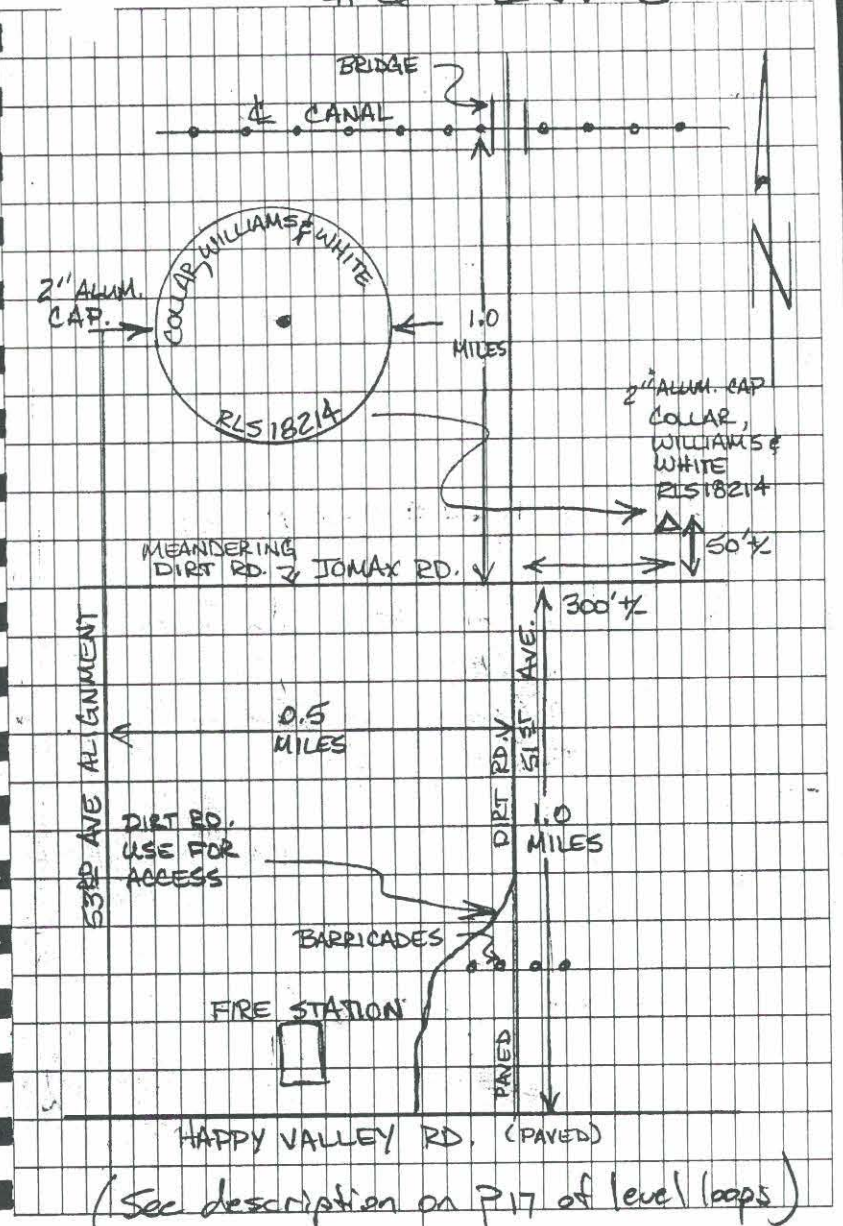
FLOOD CONTROL B.C. 0.2 MILES E. OF LAKE PLEASANT RD., 4' N. OF 4 STRAND BARBWIRE FENCE. SET IN RING OF STONE

#5 ERM #2



FLOOD CONTROL B.C. SET IN RING OF STONE. 0.2 MILES W. OF LAKE PLEASANT RD. ON HAPPY VALLEY RD. THEN 300' +/- S. ON E. SIDE OF WASH

#6 ERM #3



(See description on P17 of level loops)

ERM	Bench Loop #	Elevation
#1	4	1396.80
#2	5	1332.49
#3	6	1472.76
#4	1	1342.06
#5	3	1375.67
#6	**	1371.02

** DTM control Pt # 99917

Desc: Top of AZDOT aluminum cap (BM 517-6), at NW corner of Section 2, T4N, R1E

R ROMAN 11-21-2000
J ARNSWORTH P. CLOUDY & COOL 70° 23

ERM LOCATIONS

BASE @ #1 #4RB (1/2") 40' S. OF TOP OF SLOPE CUT, IN APPROX. ℄ OF LOT 15, OF THUNDERBIRD VISTAS SUB-DIVISION @ END OF CUL-DE-SAC W. ALAMEDA RD.

GRND TO ANT. = (HOOK TAPE)

PT #	DESCRIPTION
300	FIRST SHOT
300	FD. #4RB W/ 2" ALUM. CAP RLS18214, ERM #3
11	FD. AZDOT ALUM. CAP (BM517-6) N.W. COR. SEC. 2, T4N, R1E ERM #6, ADMP #99917
12	FD. #4RB (1/2") W/ RED CAP STAMPED "TRAV. PT." 15'+/- E. OF TRACK RD., 0.33 MILES N. OF E 1/4 COR. SEC. 33., ADMP #99076

CONTINUED

(SEE BOOK 4, PG. 1)

PT #	DESCRIPTION
301	FD. FLOOD CONTROL B.C., ERM #1
302	FD. FLOOD CONTROL B.C., ERM #2
13	FD. BCHH @ INT OF 91ST AVE & PINNACLE PEAK RD. (ADMD # 99058)
302	LAST SHOT

C -IBRATION PT'S

GPS	#4		ERM #4 (SEE BOOK 4, PG 1-3)
GRID	#4A	VERT. ONLY	N=980864.975 E=615439.551 EL=1342.06
GPS	#5		ERM #5 (SEE BOOK 4, PG 1-3)
GRID	#5A	VERT. ONLY	N=984725.052 E=615874.254 EL=1375.67
GPS	#6		ADMP #99104
GRID	#6A	VERT. ONLY	
GPS	#7		ADMP #99097
GRID	#7A	HORIZ & VERT.	
GPS	#8		ADMP #99096
GRID	#8A	HORIZ & VERT.	
GPS	#9		ADMP #7203
GRID	#9A	HORIZ & VERT.	
GPS	#10		ADMP #99100
GRID	#10A	HORIZ & VERT.	

CONTINUED

GPS #11
GRID #11A HORIZ & VERT.

~~GPS #12~~
~~GRID #12A HORIZ & VERT.~~

GPS #13
GRID #13A HORIZ & VERT.

ADMP PT #99076
SOMETHING AINT RIGHT.
THROWS CALIBRATION OUT
1000' +/-
BAD NORTH & EAST. ?

MY COORDS
N = 994136.025
E = 595621.492
EL = 1399.91 (PER GPS)

OR JUST SHOT WRONG PT.

ADMP #99917
(ERM #6)

~~ADMP #99076~~
~~N = 995714.909 E = 597199.029 EL = 1428.11~~

ADMP #99058
N = 981032.219 E = 597062.434 EL = 1313.475

** ALL CALIBRATION & CONTROL **
* POINTS LOCATED IN *
** 5 MIN. SESSIONS **

ERM'S X, Y, & Z

ERM # 1
N = 994110.023
E = 595257.746 EL = 1396.80

ERM # 2
N = 986071.111
E = 590400.420 EL = 1332.39

ERM # 3
N = 991478.004
E = 623381.453 EL = 1472.76

ERM # 4
N = 980864.975
E = 615439.551 EL = 1342.06

ERM # 5
N = 984725.052
E = 615874.254 EL = 1375.67

ERM # 6 (ADMP # 99917)
N = 991467.776
E = 607592.682 EL = 1371.017

SOKKIA™

MADE IN U.S.A.

[redacted]

SOKKIA™ BOOK 2

ECONOMY
FIELD BOOK

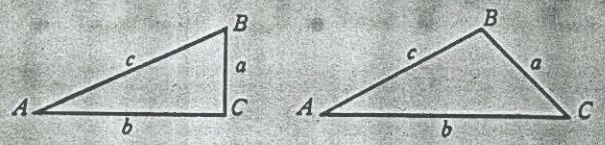
ADMP
UPDATE
ARROW HEAD
LAKES
CONTROL
BOOK 2

SEC. CORE MON. LOCATIONS

504-3.0001

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES



$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN USA

ADMP – ARROWHEAD LAKES
5043.0001

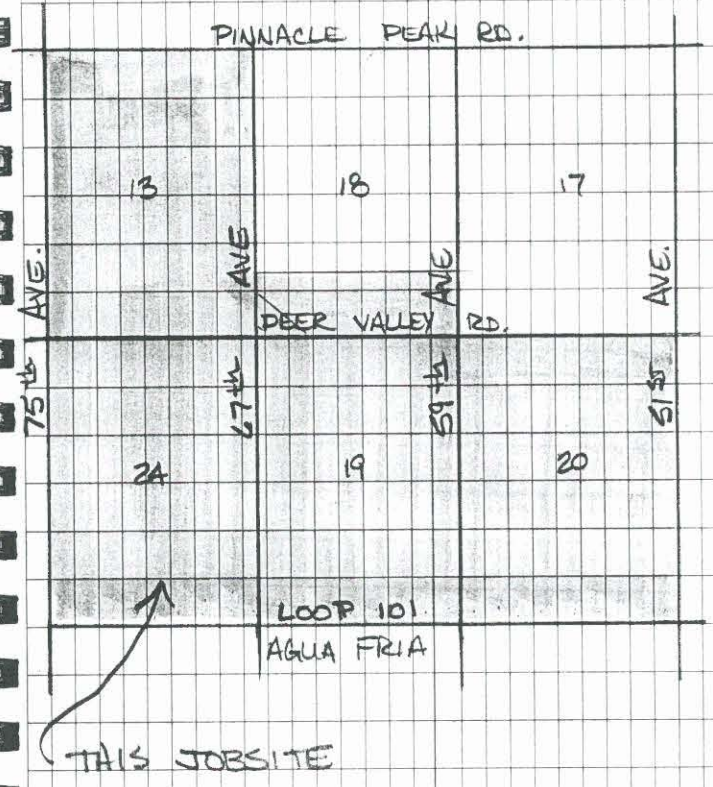


TABLE OF CONTENTS

DESCRIPTION	PG. #			
BENCH LOOP FROM #7203 TO #99112 & #99111	1-7			
CONTROL PT. LOCATIONS & CALIBRATION PT.'S	8-9			
SEC. COR. & MON. LOCATIONS	10-15	GPS	R. ROMAN, J. KRAFT	12-13-2000
	16-17	GPS	R. ROMAN, J. KRAFT	12-14-2000

K. KONAN 6-21-2000
M. OWN CLOUDY & HUMID 95°

1

BE 4 LOOP TO #99112

STA	+	HI	-	ELEV.
				1293.60
	-5.83	1299.43		
TP # 1			5.30	1294.13
	6.48	1300.61		
TP # 2			3.75	1296.86
	6.31	1303.17		
TP # 3			6.11	1297.06
	4.44	1301.50		
TP # 4			2.05	1299.45
	8.91	1308.36		
TP # 5			1.06	1307.30
	2.08	1309.38		

CONT.'

DESCRIPTION

P.K. W/ SHINER @ COR. OF V.G. & APRON @ NE CORNER OF 64th AVE & LOUISE DR.

"⊠" @ B/C-T/C @ 200'+/- N. OF 64th AVE ON E. SIDE OF DEER VALLEY RD.

"⊠ @ B/C-T/C @ 6313 DEER VALLEY RD. ON E. SIDE OF DEER VALLEY RD.

"⊠" @ B/C-T/C 300'+/- N. OF 63RD AVE. ON E. SIDE OF DEER VALLEY RD.

"⊠" @ B/C-T/C @ N BCR OF DEER VALLEY RD & 61ST DR.

"⊠" @ B/C-T/C 300'+/- N. OF 61ST AVE ON (W) SIDE OF DEER VALLEY RD.

STA	+	HI	-	ELEV.	DESCRIPTION
	2.08	1309.38			
TP#6			6.57	1302.81	"⊠" @ B/C-T/C @ 100'+/- N. OF 59th AVE ON MELINDA LANE (DEER VALLEY TO N) ON W. SIDE RD.
	4.76	1307.57			
TP#7			4.47	1303.10	"⊠" @ B/C-T/C- 700'+/- N. OF 59th AVE ON MELINDA ON W. SIDE OF RD.
	4.89	1307.99			
TP#8			3.11	1304.88	"⊠" @ B/C-T/C 600'+/- N. OF T.P. #7, W. SIDE OF RD. @ S. END OF BRIDGE.
	3.15	1308.03			
TP#9			4.44	1303.59	"⊠" @ B/C-T/C 400'+/- N. OF 56th AVE ON W. SIDE OF RD.
	1.00	1304.59			
TP#10			3.98	1300.61	"⊠" @ B/C-T/C @ S. SIDE OF ISLAND @ MELINDA & 53RD DR.
	4.25	1304.86			
		CONT'			

STA	+	HI	−	ELEV.	DESCRIPTION
	4.25	1304.86			
TP#11			5.47	1299.39	"⊠" B/C-T/C @ 50'± E. OF MELINDA LN. ON ARROWHEAD LAKES DR.
	11.00	1310.39			
TP#12			0.77	1309.62	"⊠" B/C-T/C @ 60'± E. OF TP #11
	16.40	1326.02			
TP#13			1.15	1324.87	C.O.G. BCFD ON ℄ OF ARROWHEAD LAKES DR, EAST OF MELINDA LN.. POINT IS @ WEST END OF BULLNOSE @ GATED ENTRANCE TO PRIVATE SUBDIVISION.
	0.81	1325.68			
TP#12			16.07	1309.61	
	0.89	1310.50			
TP#11			11.11	1299.39	
	5.22	1304.61			
TP#10			3.98	1300.63	
	3.89	1304.52			
TP#9			0.91	1303.61	
	3.89	1307.50			
TP#8			2.62	1304.88	
	2.27	1307.15			
		CONT'			

STA	+	HI	−	ELEV.	DESCRIPTION
	2.27	1307.15			
TP #7			4.05	1303.10	
	4.31	1307.41			
TP #6			4.61	1302.80	
	6.97	1309.77			
TP #5			2.48	1307.29	
	1.29	1308.58			
TP #4			9.13	1299.45	
	2.08	1301.53			
TP #3			4.47	1297.06	
	6.25	1303.31			
TP #2			6.45	1296.86	
	3.59	1300.45			
TP #1			6.33	1294.12	
	4.96	1299.08			
TBM			5.49	1293.59	

BEN. LOOP TO #99111

STA	+	HI	−	ELEV.	DESCRIPTION
				1299.39	TP#11 FROM BENCH LOOP TO #99112 (SEE PG. 3, THIS BOOK)
	5.14	1304.53			
TP#1			4.99	1299.54	"⊠" @ B/C-T/C 400'+/- N. OF ARROWHEADS LAKES DR. ON W. SIDE OF RD. (50'+/- S. OF ABRAHAM) (MELINDA CHANGES TO 52ND AVE. @ ABRAHAM)
	7.09	1306.68			
TP#2			8.21	1298.42	"⊠" @ B/C-T/C 300'+/- N. OF LONE CACTUS ON THE E. SIDE OF 52ND AVE. @ ℄ OF CATCH BASIN
	6.38	1304.80			
TP#3			4.59	1300.21	"⊠" @ B/C-T/C 300'+/- N. OF ROSE GARDEN ON W. SIDE OF RD.
	9.37	1309.58			
TP#4			8.51	1301.07	"⊠" @ B/C-T/C 150'+/- N. OF POTTER DR. ON E SIDE OF RD. (@ ℄ OF CATCH BASIN)
	15.73	1316.80			
TP#5			4.70	1312.10	"⊠" @ B/W-T/W 100'+/- E OF POTTER ON 51ST AVE S. SIDE OF RD.

STA	+	HI	—	ELEV.	DESCRIPTION
	0.25	1312.35			
TP#6			9.45	1302.90	"⊠" @ B/W-T/W 40' E OF IRMA DR/S. SIDE RD.
	3.37	1306.27			
TP#7			5.19	1301.08	"⊠" @ B/W-T/W 300'± E. OF TONOPAH DR. S. SIDE OF RD.
	5.69	1306.77			
TP#8			4.13	1302.64	P.K IN SHINER @ SOUTH END OF ℄ DIVIDER BULLNOSE @ 51st AVE & BEARDSLEY RD. (NORTH FRONTAGE RD. OF LOOP 101)
	3.83	1306.47			
TP#7			5.39	1301.08	
	5.14	1306.22			
TP#6			3.32	1302.90	
	9.82	1312.72			
TP#5			0.61	1312.11	
	4.58	1316.69			
TP#4			15.61	1301.08	
	8.69	1309.77			
TP#3			9.55	1300.22	
	4.57	1304.79			
		CONT'			

STA	+	HI	—	ELEV.	DESCRIPTION
	4.57	1304.79			
TP#2			6.36	1298.43	
	8.12	1306.55			
TP#1			6.99	1299.56	
	4.98	1304.54			
TBM			5.15	1299.39	TP#11 FROM BENCH LOOP TO #99112 (SEE pg. 3, THIS BOOK)

CONTROL & CALIBRATION PT. LOCATIONS

BASE @ # 1000 #4 RB
HI = 5.28

PT #	DESCRIPTION
1001	C.O.G. BCFD @ ARROWHEADS LAKES RD & ARROWHEAD MANOR ESTATES. N.E. OF MELINDA LN. 400'+/- @ S.W. END OF BULLNOSE (#99112) FIRST SHOT
1002	P.K. IN SHINER @ S. END OF ℄ DIVIDER BULLNOSE @ 51ST AVE & BEARDSLEY RD. (N FRONTAGE RD OF LOOP 101) (#99111)
1003	ADOT BCHH @ 75th AVE & LOOP 101. S. SIDE LOOP 101 @ ℄ 75th AVE IN ISLAND N. OF CROSSWALK. (AERIAL TARGET) (#99084)
1004	C.O.G. BCFD @ ℄ OF CUL-DE-SAC 7431 W. MONTE LINDO (#99913)

CONT'

#4RB @ S.W. COR. OF 59th AVE & DEER VALLEY RD 26'+/- S OF DEER VALLEY & 40'+/- W. OF 59th AVE. (ALL MEASUREMENTS FROM ℄)

** ALL CONTROL POINTS **
* LOCATED IN 10 MIN. *
** SESSIONS. **
* GPS 4800 *

PT. #	DESCRIPTION
1005	C.O.G BCFD @ MONONA & 67th DRIVE (1 BLOCK W. OF 67th AVE) (#99095)
1006	P.K. IN SHINER @ COR. OF V.G & APRON @ N.E. COR OF 64th AVE & LOUISE DR. (#7203)
1007	C.O.G BCFD @ 61ST DR & DEER VALLEY (#99102)

LAST SHOT

SITE CALIBRATION PT'S

GRID = #99913
GPS = #1004 HORIZ. & VERT.

GRID = #99084
GPS = #1003 HORIZ & VERT.

GRID = #99095
GPS = #1005 HORIZ. ONLY

GRID = #7203
GPS = #1006 HORIZ & VERT.

GRID = #99112
GPS = #1001 VERT. ONLY

GRID = #99111
GPS = #1002 VERT. ONLY

SEC. COR. & MON. LOCATIONS

BASE @ #1 #4RB (1/2") @ TOP OF SLOPE
OUT @ ℄ OF LOT 15
(SEE BOOK 4, PG. 1)
GRND TO ANT = 4.93 (HOOK TAPE)

PT #	DESCRIPTION
710	FIRST SHOT
710	FD #4RB (1/2") @ INT OF DEER VALLEY RD & 95th AVE. PROPOSED SEC 1/4 COR FOR S. SIDE OF SEC. 16.
711	FD. #5RB (3/4") @ PROPOSED S.W. COR. OF SEC. 16 (DEER VALLEY RD & 99th AVE ALIGNMENT)
712	FD. #4RB (1/2") @ PROPOSED S. 1/4 COR FOR SEC. 17.
713	FD. C.O. PEORIA BCHH @ INT. OF DEER VALLEY RD & 107th AVE PROPOSE SW. COR. SEC. 17

CONT.

** ALL SEC. COR.'S & MON. **
* LOCATED IN 1 MIN. *
** SESSIONS **

PT #	DESCRIPTION
714	FD. C.O. PEORIA BC FLUSH @ INT. OF 109th AVE & ROSE GARDEN LN.
715	FD. C.O. PEORIA BCHH @ INT. OF 107th AVE & ROSE GARDEN LN. PROPOSED 1/4 COR. FOR W. SIDE OF SEC. 20.
716	FD. C.O. PEORIA BC FLUSH ON N. SIDE OF ROSE GARDEN LN. BETWEEN 102ND LN & LAKE PLEASANT PKWY. (RD) PROPOSED CENTER OF SEC. 20.
717	FD C.O. PEORIA BC FLUSH @ INT. OF ROSE GARDEN LN & LAKE PLEASANT RD.
718	FD. P.K. NAIL @ INT. OF 111th AVE & BEARDSLEY RD. (1 OF 4)
719	FD. P.K. NAIL (2 OF 4)
720	FD. P.K. NAIL (3 OF 4)

CONT.

PT #	DESCRIPTION
721	FD. P.K NAIL @ INT. OF 111th AVE & BEARDSLEY RD. (4 OF 4)
722	FD. BCHH @ INT. OF 107th AVE & BEARDSLEY RD. PROPOSED S.W. COR. OF SEC. 20
723	FD. C.O. PEORIA BC FLUSH ON S. SIDE OF BEARDSLEY RD. @ PROPOSED 1/4 COR ON S. SIDE OF SEC. 20
724	FD. P.K. NAIL IN POTHOLE @ INT. OF BEARDSLEY RD. & LAKE PLEASANT RD.
725	FD. C.O. PEORIA BCHH @ INT. OF 99th AVE & BEARDSLEY RD, PROPOSED SE COR SEC. 20
726	FD C.O. PEORIA BCHH @ INT. OF DEER VALLEY RD & 83RD AVE. PROPOSED SE. COR. SEC 15

CONT.'

PT #	DESCRIPTION
727	FD. MARICOPA COUNTY HWY. DIV. BCHH @ INT. OF 83RD AVE & WILLIAMS RD. PROPOSED 1/4 COR. FOR E. SIDE OF SEC. 15
728	FD. MCHD BCHH @ INT. OF 83RD AVE & PINNACLE PEAK RD. PROPOSED N.E. COR. SEC. 15
729	FD. M.C.H.D. BCHH @ INT. OF 83RD AVE & CALLE LEJOS PROPOSED 1/4 COR. FOR E. SIDE OF SEC. 10
730	FD C.O. PEORIA BC FLUSH @ INT. OF PINNACLE PEAK RD. & 87th AVE PROPOSED 1/4 COR. FOR N. SIDE OF SEC. 15
731	FD. STONE IN POTHOLE @ INT. OF PINNACLE PEAK RD & 95th AVE PROPOSED 1/4 COR. FOR N. SIDE OF SEC. 16

CONT.

PT #	DESCRIPTION
732	FD. MCHD. BCHH @ INT. OF PINNACLE PEAK RD & 99th AVE. PROPOSED N.W. COR. SEC. 16
733	FD. #4 RB (1/2") ON E SIDE OF LAKE PLEASANT RD & PINNACLE PEAK RD. @ ℄ OF PINNACLE PEAK
734	FD #4 RB w/CAP R.A. DELP ES #17178 ON W. SIDE OF LAKE PLEASANT RD. @ ℄ OF PINNACLE PEAK RD., 30'+- W. OF EDGE OF PAV.
735	FD. STONE w/ CHISLED "+" @ PROPOSED 1/4 COR. FOR N. SIDE OF SEC. 17
736	FD. #4 RB (1/2") IN VICINITY OF PROPOSE 1/4 COR. FOR N. SIDE OF SEC. 17.
737	FD. #4 RB (1/2") w/CAP RLS #16887 IN VICINITY OF 1/4 FOR N. SIDE OF SEC. 17.

PT #	DESCRIPTION
738	FD. STONE W/ CHISLED "+" @ PROPOSED N.W. COR. OF SEC. 17
738	LAST SHOT

R. ROMAN 12-14-2000
J. KR T P.CLOUDY & WARM 65° 16

SEC. COR. & MON LOCATIONS CONT.

BASE @ #1 #4RB (1/2") @ TOP OF SLOPE
CUT @ APPROX ℄ OF LOT 15
(SEE BOOK 4, PG. 1)
GRND TO ANT. = 4.93 (HOOK TAPE)

PT #	DESCRIPTION
739	FIRST SHOT
739	FD. M.C.H.D. BCHH @ INT. OF HAPPY VALLEY RD & 67th AVE. PROPOSED N.W. COR. OF SEC. 7
740	FD MCHD BCHA @ ℄ OF 67th AVE @ PROPOSE NE COR OF SEC. 12 (0.10 MILES SOUTH OF HAPPY VALLEY RD.)
741	FD. MCHD BCHH @ ℄ OF 67th AVE. APPROX 100'+/- SOUTH OF VILLA LINDO @ PROPOSED 1/4 COR. FOR W. SIDE OF SEC. 7

CONT.

T #	DESCRIPTION
742	FD. MCHD BCHH @ INT. OF 67th AVE & PINNACLE PEAK (E. BOUND) PROPOSED SW. COR. OF SEC. 7
743	FD MCHD BCHH @ INT. OF 67th AVE. & PINNACLE PEAK (W. BOUND) PROPOSED SE COR OF SEC. 12
744	FD. C.O. GLENDALE B.C. FLUSH @ INT. OF PINNACLE PEAK (W.) & 74th AVE. (ADMP #88049)
745	FD. C.O. GLENDALE BC FLUSH @ INT. OF PINNACLE PEAK (W) & 71ST AVE. (S)
746	FD. BC. SPINDLE @ INT OF PINNACLE PEAK (W) & 71ST AVE (N)
746	LAST SHOT

Points

Project name	50430629		
Coordinate Units	International feet		
Distance Units	International feet		
Height Units	International feet		
Date printed	5/24/01 9:53:33 AM		
Coordinate System	US State Plane 1983	**Zone**	Arizona Central 0202
Datum	NAD 1983 (Conus)	**Geoid model**	GEOID99 (Conus)

Coordinate units: International feet
Elevation units: International feet

Point listing

Name	Northing	Easting	Elevation	Feature Code
7203	975913.570	614378.727	1293.603	136
99095	973347.006	612666.916	1271.453	136
99913	980807.225	607962.630	1308.213	136
99084	970408.912	607590.196	1258.433	136
1000	976069.839	617774.608	1299.871	136
1001	975272.787	621703.083	1321.038	136
1002	971050.253	623137.975	1298.828	136
1003	970408.536	607589.969	1254.761	136
1004	980807.742	607962.360	1304.562	136
1005	973346.839	612667.073	1267.760	136
1006	975913.596	614379.068	1289.751	136
99111	971050.253	623137.975	0.000	136
99112	975272.787	621703.083	1324.873	136
1007	975921.138	616650.826	1295.255	136

Back to top

Points

Project name	50431214		
Coordinate Units	International feet		
Distance Units	International feet		
Height Units	International feet		
Date printed	5/24/01 10:11:02 AM		
Coordinate System	Projection from data collector	**Zone**	Zone from data collector
Datum	(WGS 84)	**Geoid model**	Not selected

Coordinate units: International feet
Elevation units: International feet

Point listing

Name	Northing	Easting	Elevation	Feature Code
1	983699.973	615500.490	1435.716	RB
5	984727.021	615875.485	1375.585	FCBC
6	986814.238	616544.479	1407.078	BCF
7	987854.657	612887.887	1386.726	BCHH
8	983641.640	612847.348	1350.348	BCHH
4	980866.937	615440.782	1342.136	FCBC
9	975911.074	614384.167	1293.568	PK IN SHINER
10	979455.558	614512.403	1391.522	PK IN SHINER
7A	987854.166	612887.656	1387.103	BCHH
8A	983641.557	612847.066	1350.073	PK SHINER
9A	975911.722	614383.809	1293.603	PK SHINER
10A	979455.869	614512.039	1391.543	PK SHINER
4A	980867.039	615440.476	1342.063	FCBC
5A	984727.124	615875.168	1375.673	FCBC
6A	986814.344	616544.155	1407.013	BCFD
100	985264.125	616557.299	1380.458	COR WGWL
101	985257.135	616549.110	1383.208	COR WGWL
102	985231.985	616549.951	1383.280	COR WGWL
103	985225.202	616558.187	1380.520	COR WGWL
104	985253.274	616549.613	1377.367	FL
105	985247.379	616549.852	1377.311	FL
106	985241.799	616550.025	1377.319	FL
107	985235.972	616550.121	1377.443	FL
108	985254.515	616543.308	1382.996	BARRICADE
109	985233.960	616543.797	1382.868	BARRICADE
110	985193.628	616544.501	1381.096	NG
111	985194.155	616535.440	1383.062	EP
112	985195.318	616517.070	1383.325	P
113	985196.407	616496.278	1383.626	BC
114	985195.951	616492.232	1383.706	BW
115	985196.594	616486.853	1383.233	NG
116	985229.347	616479.933	1380.285	CORWGWL
117	985231.982	616489.419	1382.935	CORWGWL
118	985257.068	616488.448	1383.002	CORWGWL
119	985258.992	616479.124	1380.357	CORWGWL
120	985236.016	616488.458	1377.292	FL
121	985241.701	616488.344	1377.308	FL
122	985247.197	616488.250	1377.306	FL
123	985252.831	616488.169	1377.352	FL
124	985235.955	616496.841	1382.793	BC
125	985253.038	616497.143	1382.716	BC

126	985244.443	616499.139	1382.804	CLVG
127	985244.697	616536.000	1382.870	CLVG
128	985244.898	616517.492	1382.862	CLVG
129	985232.003	616535.618	1382.911	EP
130	985257.755	616536.329	1382.904	EP
131	985283.773	616543.339	1382.358	NG
132	985284.780	616536.515	1382.903	EP
133	985285.375	616520.838	1383.035	P
134	985286.024	616497.724	1383.138	BC
135	985286.206	616493.723	1383.197	BW
136	985285.855	616484.666	1385.977	NG
137	985217.025	616241.979	1380.310	TOP
138	985228.384	616242.687	1376.677	TOE
139	985243.635	616240.886	1376.879	TOE
140	985253.235	616239.573	1379.773	TOP
141	985297.261	616237.073	1379.724	NG
142	985384.606	616234.738	1380.791	NG
143	985047.425	615855.835	1376.400	WGWL
144	985053.142	615855.685	1376.409	WGWL
145	985053.994	615876.820	1377.072	WGWL
146	985048.139	615876.829	1376.486	WGWL
147	985061.526	615879.651	1376.554	BARRICADE
148	985052.424	615853.141	1376.919	BARRICADE
149	985047.787	615852.823	1377.495	BW
150	985047.764	615848.847	1377.423	BC
151	985047.447	615831.665	1377.225	P
152	985056.051	615854.689	1376.411	BW
153	985058.890	615851.810	1376.566	BC
154	985063.013	615877.740	1376.494	BW
155	985066.761	615877.730	1376.498	BC
156	985053.248	615861.528	1371.547	FL
157	985053.341	615871.882	1371.590	FL
158	985063.429	615930.627	1377.500	BW
159	985067.365	615930.854	1377.378	BC
160	985084.638	615931.167	1377.362	P
161	985100.580	615931.390	1377.419	BC
162	985104.491	615931.516	1377.472	BW
163	985104.108	615877.117	1376.588	BW
164	985100.163	615877.222	1376.632	BC
165	985084.060	615877.266	1376.581	CONC
166	985083.517	615866.018	1376.443	CONC
167	985083.410	615854.606	1376.546	CONC
168	985082.865	615830.894	1377.264	P
169	985099.814	615832.940	1377.479	BC
170	985103.853	615832.668	1377.575	BW
171	985103.987	615854.073	1376.665	BW
172	985100.148	615854.118	1376.688	BC
173	985108.481	615852.296	1376.992	BARRICADE
174	985108.369	615878.958	1377.952	BARRICADE
175	985113.650	615879.910	1376.633	WGWL
176	985108.970	615876.242	1377.242	WGWL
177	985108.993	615855.188	1377.317	WGWL
178	985114.620	615855.461	1376.849	WGWL
179	985109.239	615859.471	1371.808	FL
180	985109.268	615870.874	1372.095	FL
181	985148.836	615879.542	1380.389	TOP
182	985149.347	615870.167	1372.735	TOE
183	985122.456	615861.650	1371.859	TOE
184	985124.449	615854.915	1379.790	TOP
185	984929.076	615874.590	1371.128	TOE
186	984927.595	615869.179	1371.376	TOE
187	984925.652	615859.985	1377.132	TOP
188	984924.170	615856.611	1377.100	WIFENCE
189	984923.979	615855.477	1377.080	BW

190	984922.699	615851.850	1377.035	BC
191	984918.210	615835.977	1376.964	P
192	984913.995	615819.760	1377.148	BC
193	984907.772	615794.259	1379.484	NG
194	984807.654	615928.618	1376.012	CORHDWL
195	984813.493	615906.853	1376.120	CORHDWL
196	984818.331	615904.246	1375.598	CORWGWL
197	984817.181	615901.471	1376.232	BW
198	984815.530	615897.917	1376.195	BC
199	984809.180	615882.567	1375.988	P
200	984802.430	615867.168	1376.336	BC
201	984796.590	615849.548	1377.713	NG
202	984812.919	615904.849	1375.581	BARRICADE
203	984809.260	615905.093	1375.621	BW
204	984803.740	615903.028	1375.516	BC
205	984806.002	615930.184	1375.682	BARRICADE
206	984799.258	615925.912	1375.434	BW
207	984794.195	615924.157	1375.365	BC
208	984809.834	615922.403	1370.587	FL
209	984812.385	615912.441	1370.631	FL
210	984843.288	615909.830	1370.546	TOE
211	984839.878	615901.396	1370.746	TOE
212	984812.718	615960.243	1375.934	BC
213	984808.953	615961.157	1375.829	BC
214	984782.124	615938.361	1375.624	P
215	984765.797	615942.814	1375.645	BC
216	984762.324	615944.411	1375.671	BW
217	984741.409	615934.751	1375.533	BW
218	984740.012	615931.138	1375.504	BC
219	984715.546	615946.066	1374.791	BW
220	984713.848	615942.632	1374.587	BC
221	984707.666	615927.852	1374.653	P
222	984700.853	615912.167	1374.674	BC
223	984689.136	615907.723	1372.941	TOP
224	984685.359	615899.941	1369.824	TOE
225	984683.539	615888.986	1369.832	TOE
226	984679.862	615878.456	1374.150	TOP
227	984674.167	615869.534	1376.960	NG
228	984720.506	615890.729	1369.952	FL
229	984724.132	615880.513	1370.037	FL
230	984723.048	615870.105	1375.561	CORWGWL
231	984726.118	615875.870	1375.495	CORHDWL
232	984719.100	615895.621	1375.568	CORHDWL
233	984713.477	615898.787	1375.474	CORWGWL
234	984718.989	615898.151	1374.530	BARRICADE
235	984727.691	615873.427	1374.999	BARRICADE
236	984737.443	615878.703	1375.111	BC
237	984728.202	615899.888	1375.044	BC
238	984752.037	615908.415	1375.139	CONC
239	984767.363	615902.946	1375.139	CONC
240	984781.612	615895.132	1375.334	CONC
241	984429.759	615906.647	1372.845	TB
242	984433.878	615889.023	1367.196	TS
243	984436.442	615879.146	1367.146	TS
244	984447.302	615857.642	1372.022	NG
245	984461.133	615826.676	1379.118	TB
246	984466.868	615812.711	1379.814	BC
247	983095.936	614875.964	1362.112	NG
248	983108.017	614840.566	1360.716	TOP
249	983112.097	614824.961	1352.587	TOE
250	983114.601	614815.626	1352.813	TOE
251	983118.276	614799.177	1359.403	TOP
252	983131.404	614753.407	1360.655	NG
253	982158.643	614886.038	1351.291	NG

254	982143.491	614859.534	1350.534	TOP
255	982138.914	614850.581	1346.461	TOE
256	982133.837	614843.605	1346.919	TOE
257	982125.176	614830.508	1350.905	TOP
258	982115.905	614817.709	1352.373	NG
300	991479.987	623382.700	1472.802	BCFD
11A	991469.759	607593.897	1371.020	BCFD
11	991470.294	607593.720	1371.173	BCFD
13	981034.031	597062.571	1313.430	BCHH
302	986073.083	590401.601	1333.814	BC
301	994112.011	595258.936	1396.984	BC
12	994138.013	595622.683	1399.919	RB
12A	995716.900	597200.223	1428.113	RB
13A	981034.181	597063.628	1313.478	RB
402	983326.192	614889.339	1361.886	NG
403	983321.585	614892.413	1363.141	HDWL
404	983308.579	614899.695	1363.239	HDWL
405	983305.877	614906.291	1363.206	HDWL
406	983309.614	614924.566	1363.211	HDWL
407	983311.246	614904.458	1353.720	FL
408	983310.478	614931.272	1363.378	NG
409	983265.392	614984.767	1365.856	NG
410	983280.692	614928.435	1362.897	NG
411	983312.800	614848.031	1362.632	NG
412	983329.281	614784.455	1363.614	NG
413	983284.402	614857.143	1361.875	NG
414	983263.255	614905.990	1362.380	NG
415	983266.268	614902.359	1363.349	HDWL
416	983277.163	614892.732	1363.237	HDWL
417	983279.680	614887.558	1363.373	HDWL
418	983283.620	614861.825	1363.301	HDWL
419	983273.876	614888.376	1353.182	FL
420	982846.026	614706.218	1357.947	NG
421	982844.773	614771.072	1358.227	NG
422	982845.871	614849.240	1358.437	NG
423	982863.369	614795.104	1357.399	NG
424	982871.116	614749.963	1357.749	NG
425	982832.943	614735.453	1357.349	NG
426	982833.322	614802.995	1358.217	NG
427	982832.128	614780.155	1358.412	HDWL
428	982832.814	614751.553	1358.418	HDWL
429	982868.597	614758.789	1358.347	HDWL
430	982859.448	614767.918	1358.326	HDWL
431	982857.868	614775.371	1358.390	HDWL
432	982861.739	614789.588	1358.401	HDWL
433	982861.964	614772.416	1350.926	FL
434	982808.801	614762.338	1350.716	FL
435	988974.175	612731.473	1400.980	HDWL
436	988966.860	612738.191	1403.017	HDWL
437	988966.091	612758.625	1403.014	HDWL
438	988965.238	612781.448	1402.930	HDWL
439	988971.868	612788.446	1400.938	HDWL
440	988966.726	612759.835	1397.563	FL
441	989019.371	612760.663	1398.190	FL
442	988954.334	612690.555	1404.538	BC
443	988948.560	612763.255	1404.357	BC
444	988948.115	612818.559	1404.997	BC
445	988931.546	612687.297	1404.886	BC
446	988925.816	612754.999	1404.575	BC
447	988925.100	612810.614	1404.839	BC
448	988917.708	612818.198	1404.959	BC
449	988910.047	612810.784	1404.789	BC
450	988910.535	612758.702	1404.614	BC
451	988914.739	612700.871	1404.763	BC

452	988891.971	612698.313	1404.354	BC
453	988887.657	612756.596	1404.295	BC
454	988886.873	612819.060	1404.904	BC
455	988861.868	612784.572	1400.353	HDWL
456	988868.994	612778.115	1402.258	HDWL
457	988870.006	612756.472	1402.258	HDWL
458	988870.629	612734.910	1402.283	HDWL
459	988863.932	612727.539	1400.283	HDWL
460	988869.029	612756.417	1396.898	FL
461	988824.434	612755.862	1396.698	FL
462	988889.681	612729.409	1403.642	CB
463	988889.535	612732.777	1403.699	CB
464	988949.277	612736.204	1403.779	CB
465	988950.889	612716.125	1403.814	CB
466	988713.048	612094.279	1394.188	HDWL
467	988722.601	612092.004	1396.151	HDWL
468	988740.931	612103.552	1396.087	HDWL
469	988759.242	612114.932	1396.033	HDWL
470	988761.577	612124.639	1394.033	HDWL
471	988740.741	612104.123	1390.717	FL
472	988711.955	612147.545	1390.945	FL
473	988797.565	612124.579	1399.328	BC
474	988769.133	612103.480	1398.879	BC
475	988749.778	612089.368	1398.398	BC
476	988697.095	612057.619	1397.320	BC
477	988713.283	612022.287	1397.376	BC
478	988770.836	612054.485	1398.348	BC
479	988821.679	612091.386	1399.240	BC
480	988812.473	612110.695	1399.134	P
481	988757.743	612070.715	1398.346	P
482	988691.519	612033.836	1397.065	P
483	988758.755	612017.768	1393.781	HDWL
484	988761.709	612030.118	1395.634	HDWL
485	988780.067	612041.569	1395.604	HDWL
486	988798.430	612053.004	1395.587	HDWL
487	988811.013	612050.401	1393.697	HDWL
488	988780.381	612041.015	1390.156	FL
489	988808.801	611996.734	1389.775	FL
490	989047.349	611174.724	1391.433	NG
491	989029.073	611172.575	1386.669	NG
492	989022.843	611171.766	1385.763	NG
493	989015.382	611171.672	1384.954	TOP
494	989003.468	611172.550	1382.093	TOE
495	988986.222	611171.887	1381.634	TOE
496	988976.313	611172.085	1384.921	TOP
497	988950.368	611170.743	1385.814	NG
498	988920.034	611170.082	1389.618	NG
499	988551.653	609475.718	1365.934	HDWL
500	988563.938	609477.887	1367.834	HDWL
501	988581.668	609465.461	1367.882	HDWL
502	988599.466	609453.005	1367.928	HDWL
503	988601.789	609441.192	1366.197	HDWL
504	988581.216	609464.638	1362.432	FL
505	988557.721	609431.036	1361.070	FL
506	988644.536	609438.444	1370.302	BC
507	988589.753	609477.076	1369.882	BC
508	988535.222	609515.445	1369.744	BC
509	988561.018	609547.861	1369.778	BC
510	988611.033	609512.556	1369.848	BC
511	988666.678	609473.195	1370.425	BC
512	988654.704	609455.670	1370.100	P
513	988599.879	609494.986	1369.685	P
514	988549.857	609530.567	1369.631	P
515	988545.632	609508.974	1369.000	CB

516	988565.822	609494.644	1369.018	CB
517	988588.343	609527.788	1369.010	CB
518	988568.279	609541.859	1369.072	CB
519	988602.957	609544.955	1366.231	HDWL
520	988604.459	609535.473	1368.267	HDWL
521	988622.165	609522.981	1368.300	HDWL
522	988639.972	609510.565	1368.359	HDWL
523	988649.336	609512.047	1366.367	HDWL
524	988622.514	609523.297	1362.870	FL
525	988652.236	609565.817	1363.320	FL
526	987693.690	608226.499	1348.731	HDWL
527	987686.820	608233.268	1350.614	HDWL
528	987665.265	608233.381	1350.542	HDWL
529	987643.768	608233.324	1350.593	HDWL
530	987637.170	608226.527	1348.636	HDWL
531	987665.264	608232.501	1345.664	FL
532	987666.221	608181.416	1341.777	FL
533	987715.076	608248.190	1352.047	BC
534	987664.797	608244.634	1351.653	BC
535	987590.471	608243.346	1351.738	BC
536	987594.336	608266.266	1352.071	BC
537	987663.040	608267.658	1352.094	BC
538	987715.188	608271.374	1352.500	BC
539	987713.652	608286.271	1352.473	BC
540	987667.905	608282.965	1352.127	BC
541	987598.967	608281.186	1352.127	BC
542	987599.871	608304.147	1351.688	BC
543	987666.580	608306.010	1351.709	BC
544	987712.210	608309.298	1352.029	BC
545	987612.832	608303.703	1351.049	CB
546	987633.476	608304.087	1350.972	CB
547	987614.509	608244.199	1351.001	CB
548	987635.063	608244.257	1350.933	CB
549	987636.662	608324.341	1348.894	HDWL
550	987643.454	608317.522	1350.782	HDWL
551	987665.204	608317.521	1350.846	HDWL
552	987686.739	608317.526	1350.879	HDWL
553	987693.429	608324.416	1348.864	HDWL
554	987665.113	608318.058	1345.882	FL
555	987668.744	608372.279	1346.650	FL
556	987936.537	608671.418	1360.460	NG
557	987928.438	608694.130	1356.637	NG
558	987925.225	608702.131	1356.478	NG
559	987922.871	608708.016	1356.350	NG
560	987921.146	608714.197	1356.283	TOP
561	987915.421	608728.276	1352.782	TOE
562	987911.321	608739.521	1353.492	TOE
563	987906.546	608750.993	1356.424	TOP
564	987896.304	608775.569	1357.530	NG
565	987889.802	608790.043	1361.197	NG
566	991448.779	614281.690	1431.156	HD
567	991441.874	614277.767	1433.811	HD
568	991421.115	614283.640	1433.813	HD
569	991400.423	614289.561	1433.781	HD
570	991396.269	614296.473	1431.160	HD
571	991421.164	614284.357	1429.595	FL
572	991435.892	614333.748	1430.025	FL
573	991470.637	614257.678	1436.812	BC
574	991416.573	614270.010	1435.231	BC
575	991333.665	614288.652	1433.524	BC
576	991329.302	614266.108	1433.511	P
577	991414.258	614249.257	1435.227	P
578	991466.726	614236.812	1436.825	P
579	991456.056	614218.661	1436.790	BC

580	991405.176	614230.228	1435.258	BC
581	991323.949	614248.774	1433.571	BC
582	991375.414	614214.342	1430.721	HDWL
583	991381.416	614221.935	1433.300	HDWL
584	991401.908	614216.072	1433.268	HDWL
585	991422.566	614210.119	1433.275	HDWL
586	991423.561	614200.476	1430.664	HDWL
587	991401.816	614215.101	1428.970	FL
588	991383.985	614170.495	1428.484	FL
589	991281.145	612807.192	1414.280	HDWL
590	991287.811	612814.053	1416.323	HDWL
591	991309.393	612814.012	1416.222	HDWL
592	991330.915	612813.835	1416.224	HDWL
593	991337.753	612806.834	1414.393	HDWL
594	991309.531	612813.255	1410.752	FL
595	991308.352	612774.154	1409.228	FL
596	991397.199	612851.389	1417.375	BC
597	991308.627	612851.422	1416.981	BC
598	991238.340	612851.438	1416.973	BC
599	991259.933	612852.138	1416.405	CB
600	991270.309	612852.054	1416.293	CB
601	991219.427	612886.220	1416.973	EP
602	991304.140	612885.897	1416.961	EP
603	991395.607	612891.273	1417.460	EP
604	991390.207	612901.211	1417.332	NG
605	991307.782	612897.878	1416.960	NG
606	991245.803	612900.062	1416.717	NG
607	991255.214	612931.714	1417.534	NG
608	991357.794	612927.360	1417.325	NG
609	991332.553	612906.303	1416.486	HDWL
610	991332.673	612909.593	1416.554	HDWL
611	991310.774	612909.788	1416.473	HDWL
612	991288.225	612910.023	1416.463	HDWL
613	991288.128	612906.649	1416.425	HDWL
614	991310.330	612910.473	1410.980	FL
615	991315.524	612958.922	1412.760	FL
616	991286.320	612923.834	1414.796	HDWL
617	991284.634	612922.933	1414.755	HDWL
618	991284.219	612918.952	1414.704	HDWL
619	991285.890	612917.797	1414.672	HDWL
620	991286.024	612921.054	1410.739	FL
621	991017.209	612933.792	1417.686	SDMH
622	991002.922	612950.210	1417.772	NG
623	991015.282	612885.448	1417.914	EP
624	991019.173	612851.677	1417.749	BC
625	991024.540	612821.169	1417.354	NG
626	991028.748	612804.014	1411.957	NG
627	991030.234	612795.591	1411.520	TOP
628	991037.313	612784.337	1407.823	TOE
629	991038.010	612771.356	1407.853	TOE
630	991038.307	612757.777	1411.378	TOP
631	991044.498	612720.283	1412.612	NG
632	991045.554	612713.022	1413.504	NG
633	991050.761	612691.371	1416.516	NG
634	990215.855	612808.580	1412.638	HDWL
635	990222.682	612815.226	1414.872	HDWL
636	990244.307	612815.362	1414.840	HDWL
637	990266.005	612815.402	1414.845	HDWL
638	990272.841	612808.506	1412.810	HDWL
639	990244.344	612814.570	1409.440	FL
640	990242.921	612761.706	1406.334	FL
641	990175.321	612831.024	1416.388	NG
642	990245.096	612839.858	1416.951	NG
643	990308.096	612835.999	1417.664	NG

644	990308.530	612852.045	1417.570	BC
645	990246.200	612852.037	1416.944	BC
646	990172.597	612852.048	1416.205	BC
647	990177.319	612885.777	1416.349	P
648	990247.405	612884.884	1416.949	P
649	990301.641	612884.721	1417.550	P
650	990302.106	612921.163	1417.300	BC
651	990243.766	612921.081	1416.704	BC
652	990195.883	612921.052	1416.217	BC
653	990216.805	612958.061	1418.669	NG
654	990213.121	613015.303	1418.603	NG
655	990274.419	613012.641	1418.629	NG
656	990279.094	612947.849	1418.707	NG
657	990334.432	612946.859	1419.624	NG
658	990305.284	612955.660	1415.065	HDWL
659	990291.523	612956.197	1417.513	HDWL
660	990291.079	612978.191	1417.556	HDWL
661	990290.792	613000.454	1417.528	HDWL
662	990302.555	613003.797	1415.178	HDWL
663	990292.099	612978.249	1412.144	FL
664	990339.682	612986.348	1412.515	FL
665	989890.840	612971.144	1416.226	NG
666	989890.574	612954.903	1415.713	NG
667	989890.432	612941.490	1414.530	NG
668	989889.738	612929.063	1414.392	NG
669	989889.448	612921.544	1413.446	BC
670	989888.361	612885.871	1413.769	P
671	989888.674	612852.308	1413.650	BC
672	989888.402	612826.981	1413.845	NG
673	989887.540	612798.154	1408.273	NG
674	989889.086	612789.328	1407.575	TOP
675	989891.143	612773.426	1403.542	TOE
676	989893.821	612764.819	1403.601	TOE
677	989894.325	612752.698	1407.344	TOP
678	989896.427	612739.025	1408.087	NG
679	989893.190	612699.699	1411.575	NG
680	989893.021	612706.061	1411.257	NG
681	979460.990	616621.777	1331.425	EP
682	979471.662	616658.872	1332.492	EP
683	979474.514	616670.954	1332.793	EP
684	979491.235	616719.113	1333.460	EP
685	979512.232	616709.659	1332.931	EP
686	979496.743	616668.582	1332.753	EP
687	979494.107	616658.528	1332.638	EP
688	979488.069	616631.935	1332.025	EP
689	979503.552	616660.015	1331.765	RCP
690	979506.332	616670.551	1331.815	RCP
691	979461.506	616658.815	1331.226	RCP
692	979464.358	616669.370	1331.136	RCP
693	979421.161	616664.435	1325.091	FL
694	979530.332	616666.571	1325.465	FL
695	978311.796	616849.907	1322.325	EP
696	978324.501	616807.864	1324.351	EP
697	978327.310	616796.230	1324.778	EP
698	978333.872	616767.222	1324.986	EP
699	978356.928	616772.614	1324.314	EP
700	978351.636	616790.530	1324.875	EP
701	978349.454	616800.934	1324.661	EP
702	978338.715	616847.796	1322.483	EP
703	978355.818	616799.661	1324.003	RCP
704	978359.017	616789.088	1323.764	RCP
705	978319.670	616798.203	1323.283	RCP
706	978316.547	616809.144	1322.508	RCP
707	978279.226	616817.363	1318.851	FL

708	978374.983	616791.972	1318.645	FL
710	975757.932	594435.362	1280.808	RB
711	975756.602	591799.931	1278.275	RB
712	975773.310	589148.054	1268.301	RB
713	975788.585	586497.111	1245.005	BCHH
714	973117.860	585128.649	1234.166	BCFD
715	973132.718	586453.671	1237.979	BCHH
716	973121.077	589107.664	1251.425	BCFD
717	973119.634	589492.984	1255.861	BCFD
718	970453.657	583781.323	1221.145	PK
719	970453.809	583789.539	1221.198	PK
720	970453.810	583795.591	1221.097	PK
721	970508.674	583781.698	1221.312	PK
722	970477.510	586409.318	1238.237	BCHH
723	970469.299	589066.296	1241.309	BCFD
724	970468.170	589463.940	1241.896	PK
725	970461.633	591723.863	1246.288	BCHH
726	975664.109	602300.463	1279.405	BCHH
727	978338.472	602361.197	1294.298	BCHH
728	980998.804	602363.094	1310.331	BCHH
729	983647.095	602387.349	1331.894	BCHH
730	981016.015	599711.885	1311.306	BCFD
731	981027.458	594421.613	1314.018	STONE
732	981021.601	591787.337	1311.030	BCHH
733	981034.665	590943.655	1304.450	RB
734	981035.799	590872.593	1304.618	RB
735	981061.653	589200.334	1299.266	STONE
736	981059.177	589365.010	1301.046	RB
737	981114.114	589364.618	1301.671	RB
738	981102.973	586542.426	1257.183	STONE
739	986789.725	612887.021	1379.916	BCHH
740	986277.643	612888.106	1373.880	BCHH
741	984151.802	612887.315	1355.694	BCHH
742	981511.760	612887.245	1339.979	BCHH
743	980997.937	612887.089	1337.131	BCHH
744	981005.066	608353.238	1310.048	BCFD
745	981002.212	609972.919	1320.146	BCFD
746	981001.659	610253.178	1322.555	BCFD

Back to top

SOKKIA™

MADE IN U.S.A.

[redacted]

SOKKIA™ BOOK 3

ECONOMY
FIELD BOOK

ADMP
UPDATE –
ARROWHEAD
LAKES
S20. WEIRS

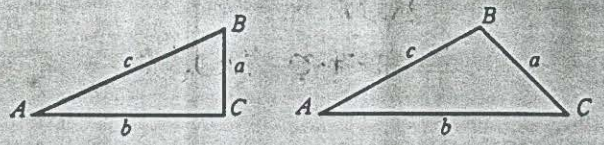
[redacted]

BOOK 3

No. 8152-05

SOAF.0001

FORMULAE FOR SOLVING RIGHT TRIANGLES



$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN USA

ADMP UPDATE - ARROWHEAD LAKES
WEIR SURVEY IN SEC. 20
5043.0001

THIS SURVEY IS A PORTION OF
SEC. 20, T4N, R2E.

TABLE OF CONTENTS

DESCRIPTION	PG. #	CONV./GPS	CREW/DATE
CONTROL PT. LOCATIONS & CALIBRATION PT.'S	1-3		
SEC. 20 WEIR TOPO'S			
WEIR S20-1	4-5	GPS	RVR, JMF, KS. / 8-2-2000
WEIR S20-2	6-7		
WEIR S20-3	8-9		
WEIR S20-4	10-11		
WEIR S20-5	12-13		
WEIR S20-6	14-15		
~~SEC. 19 WEIR TOPO'S~~			
~~WEIR S19-1~~	~~16~~		

CONTROL CALIBRATION PT. LOCATIONS

PT #	DESCRIPTION
1000	#4RB @ S.W. COR OF 59th AVE & DEER VALLEY RD. 26'+/- S. OF DEER VALLEY RD & 40'+/- W. OF 59th AVE. (ALL MEASUREMENTS FROM ℄) — BASE PT. —
1001	C.O.G. BCFD @ ARROWHEAD LAKES RD. & ARROWHEAD MANOR ESTATES. N.E. OF MELINDA LN. 400'+/- @ S.W. END OF BULLNOSE (#99112)
1002	P.K. IN SHINER @ S. END OF ℄ DIVIDER BULLNOSE @ 51st AVE & BEARDSLEY RD. (N. FRONTAGE RD. OF LOOP 101) (#99111)
1003	ADOT. BCHH @ 75th AVE & LOOP 101. S. SIDE OF LOOP 101 @ ℄ 75th AVE IN ISLAND N. OF CROSSWALK (AERIAL TARGET) (#99084)
1004	C.O.G. BCFD @ ℄ OF CUL-DE-SAC 7431 W. MONTE LINDO (#99913)

CONT.'

SEE BOOK 2, pg 8-9 FOR ADDITIONAL INFORMATION.

Pt #	DESCRIPTION
1005	C.O.G BCFD @ MONONA & 67th DRIVE. (1 BLOCK W. OF 67th AVE) (#99095)
1006	P.K. IN SHINER @ COR. OF V.G. & APRON @ N.E. COR. OF 64th AVE & LOUISE DR. (#7203)
1007	C.O.G BCFD @ 61st DRIVE & DEER VALLEY (#99102)

SITE CALIBRATION PT.'S

GRID #99913
GPS #1004 HORIZ. & VERT.

GRID #99084
GPS #1003 HORIZ. & VERT.

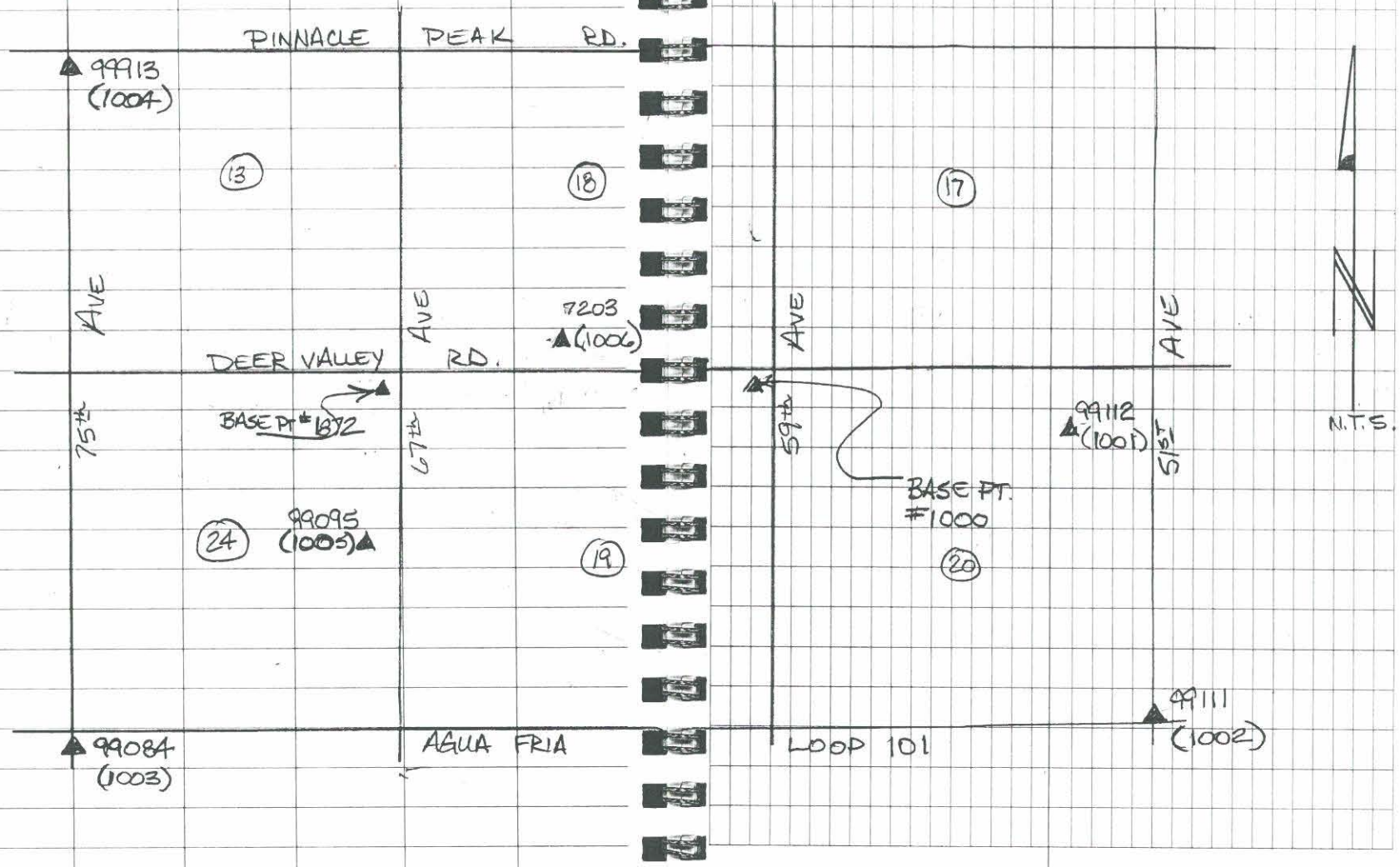
GRID #99095
GPS #1005 HORIZ. ONLY

GRID #99112
GPS #1001 VERT. ONLY

GRID = #7203
GPS = #1006 HORIZ. & VERT.

GRID = #99111
GPS = #1002 VERT. ONLY

CONTROL PT & CALIBRATION PT. MAP



R. ROMAN 8-2-2000
J FAR SWORTH
K SC SIDER

SEC 20 WEIR TOPO'S
WEIR S20-1

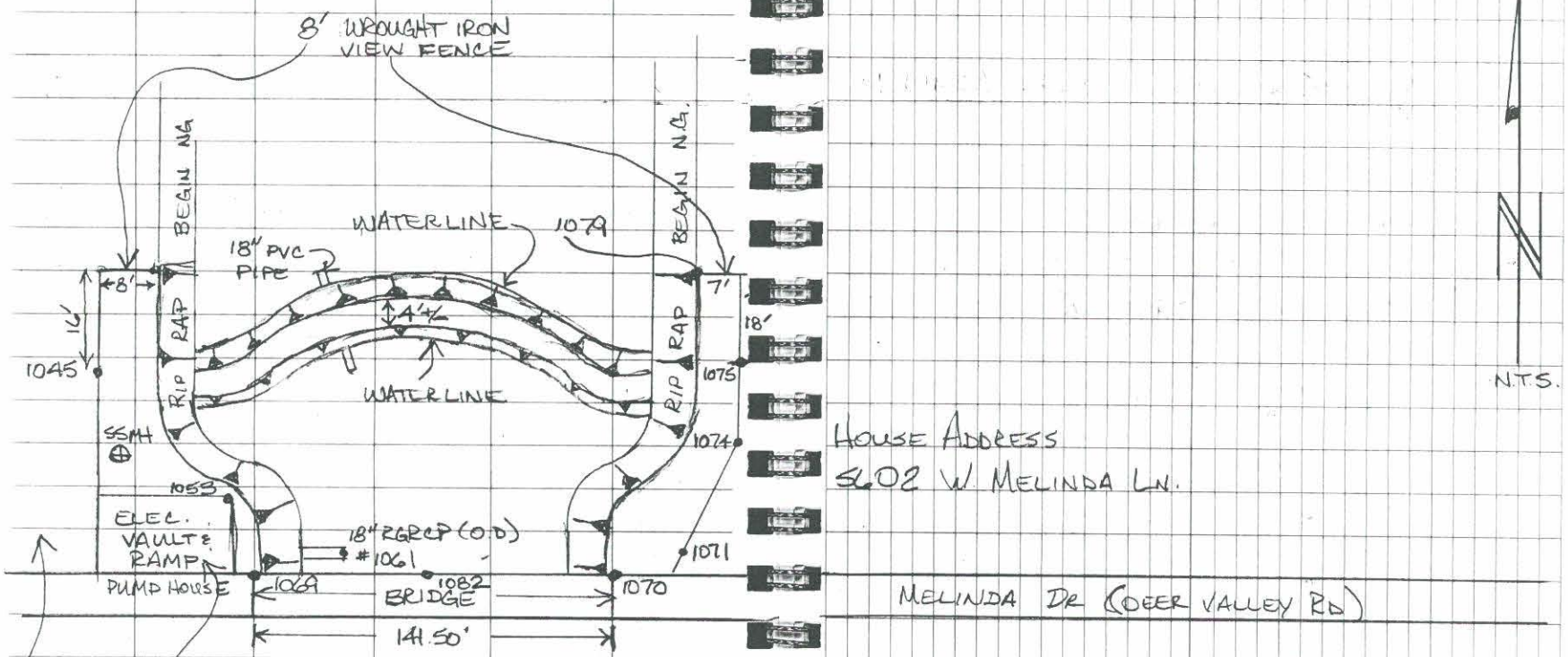
BASE @ #1000 #4RB
HI = 5.40

PT #	DESCRIPTION
1010	TWEIR = TOP OF WEIR (TYP.)
1027 & 1028	TOP OF 18" PVC PIPE
1029	WL = WATERLINE (TYP.)
1082	LAST SHOT / FACE OF BRIDGE

S.W. COR. OF 59th AVE & DEER VALLEY RD.
26'+- S. OF DEER VALLEY & 40'+- W. OF 59th AVE.
(ALL MEASUREMENTS FROM B/C)

FIRST SHOT

WEIR 520-1



HOUSE ADDRESS
5602 W. MELINDA LN.

MELINDA DR (DEER VALLEY RD)

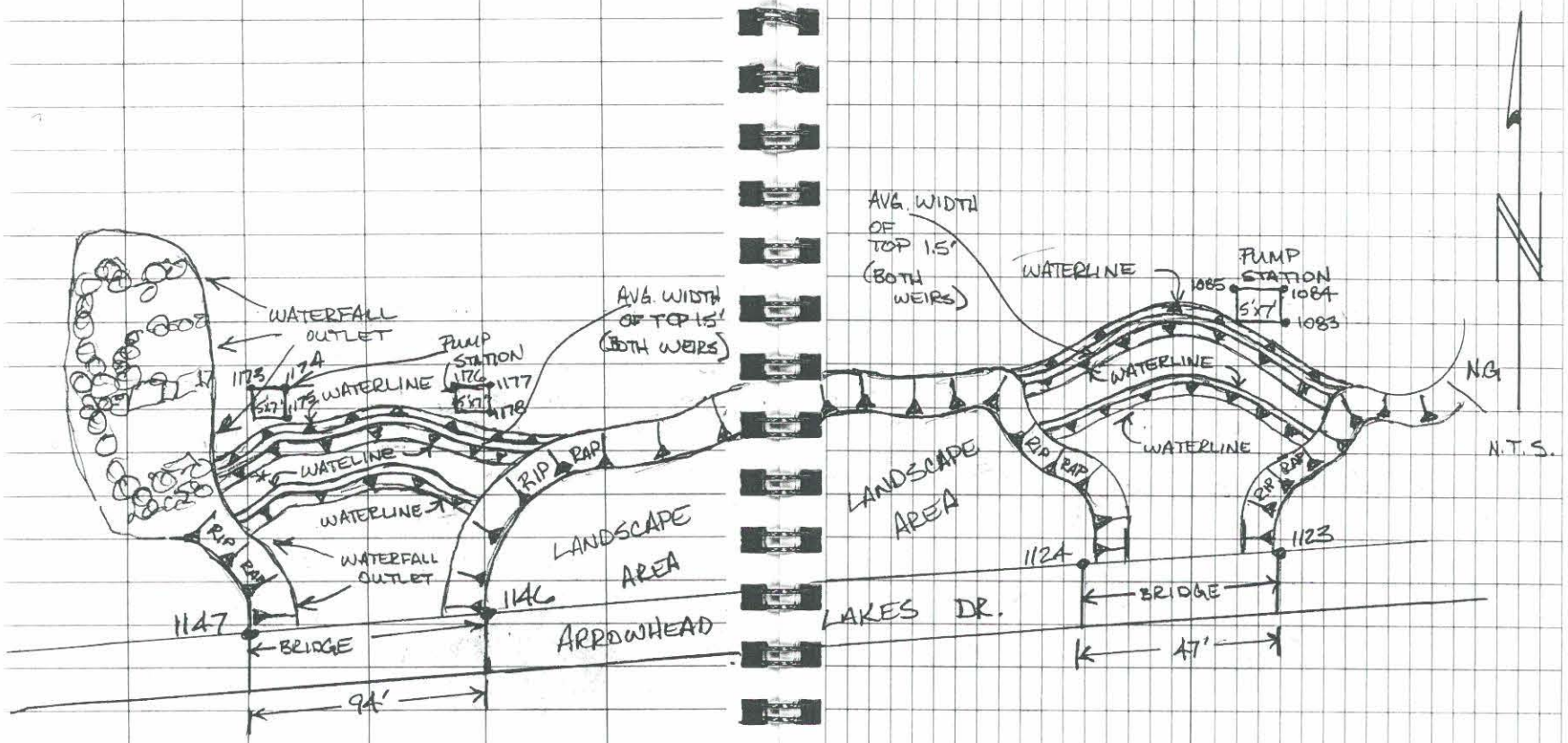
5614 W MELINDA LANE
(STAMPED ON ELEC. METER)

HOUSE ADDRESS
5612 W. MELINDA LN.

WEIR 520-2

PT. #	DESCRIPTION
1083	FIRST SHOT // COR. PUMP STATION
1107	BEE'S
1121 & 1122 1125 & 1126, 1144 & 1145, 1148 & 1149	COR. WINGWAL
***	WATERFALL SHOTS @ TOP & BOTT.
1202	LAST SHOT

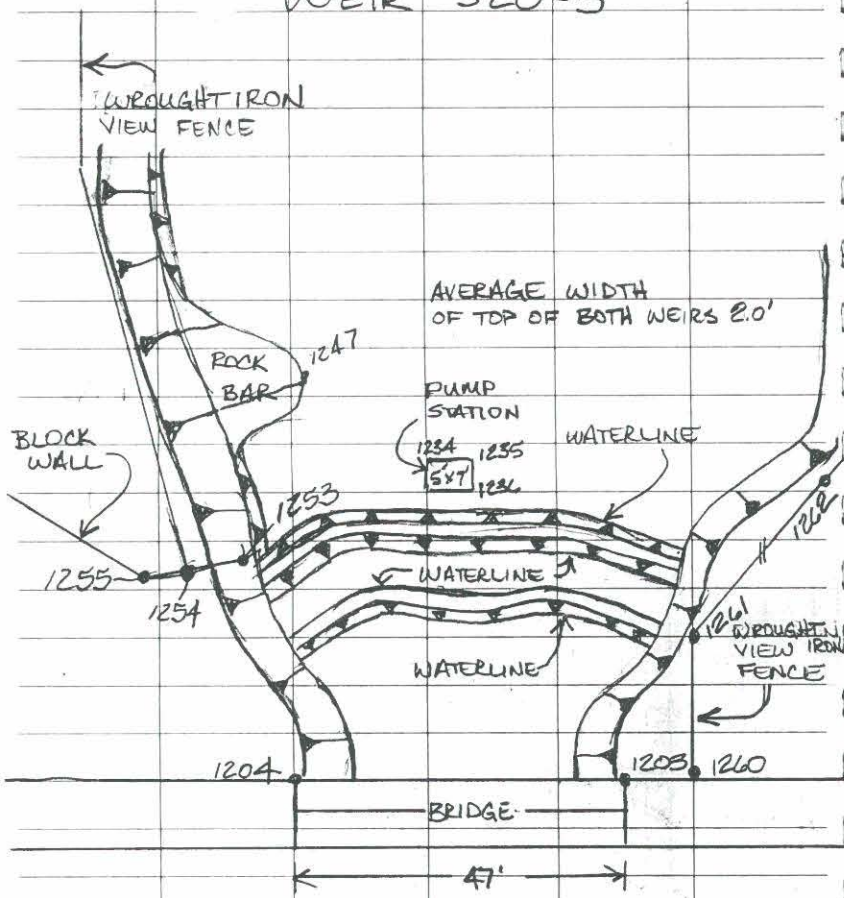
WEIR S20-2

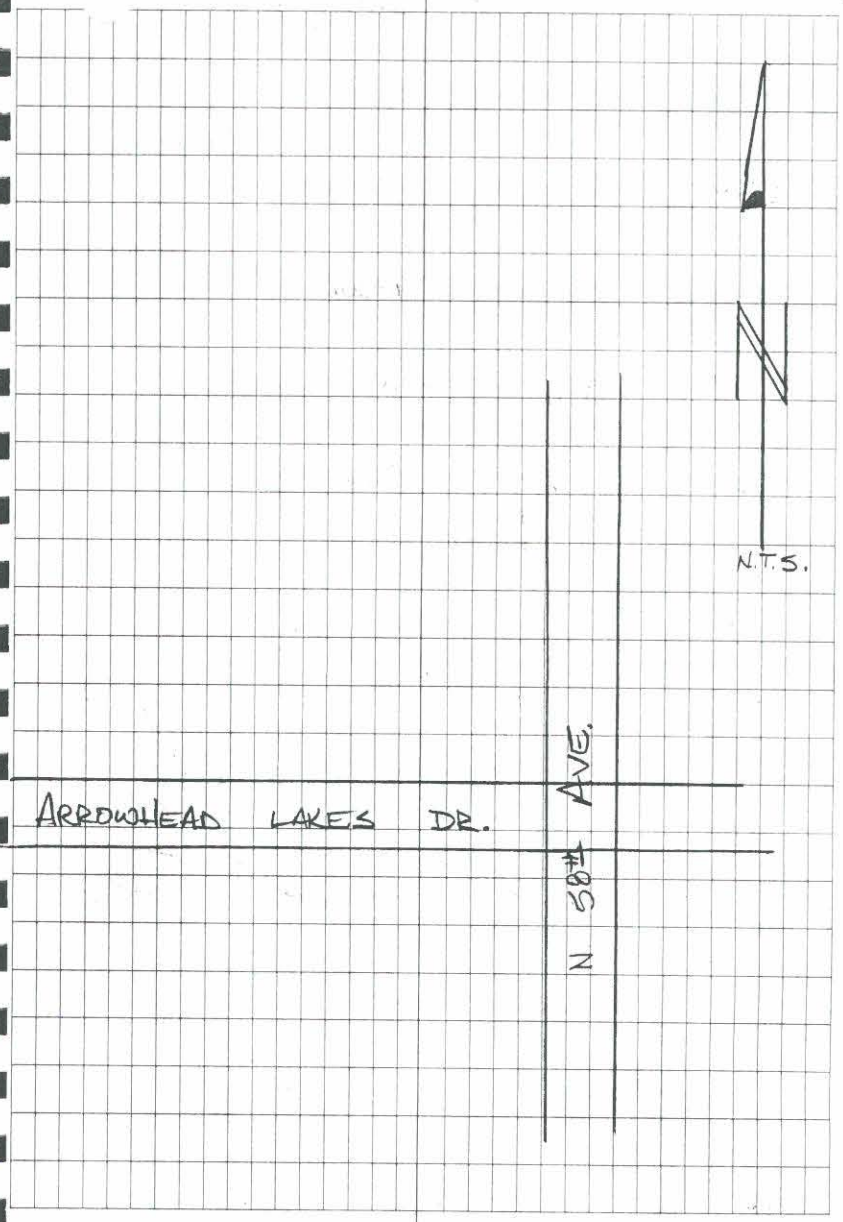

WATERFALL OUTLET
PUMP STATION
1175
1174
5'x7'
1173
WATERLINE
1176
1177
5'x7'
1178
AVG. WIDTH OF TOP 1.5' (BOTH WEIRS)
WATELINE
WATERLINE
RIP RAP
WATERFALL OUTLET
LANDSCAPE AREA
1147
1146
BRIDGE
ARROWHEAD
94'
AVG. WIDTH OF TOP 1.5' (BOTH WEIRS)
WATERLINE
PUMP STATION
1085
1084
5'x7'
1083
WATERLINE
WATERLINE
N.G.
N.T.S.
LANDSCAPE AREA
RIP RAP
RIP RAP
1124
1123
BRIDGE
LAKES DR.
47'

WEIR S20-3

PT. #	DESCRIPTION
1203	FIRST SHOT
1205-1208	COR. WINGWALL
1262	LAST SHOT

WEIR S20-3

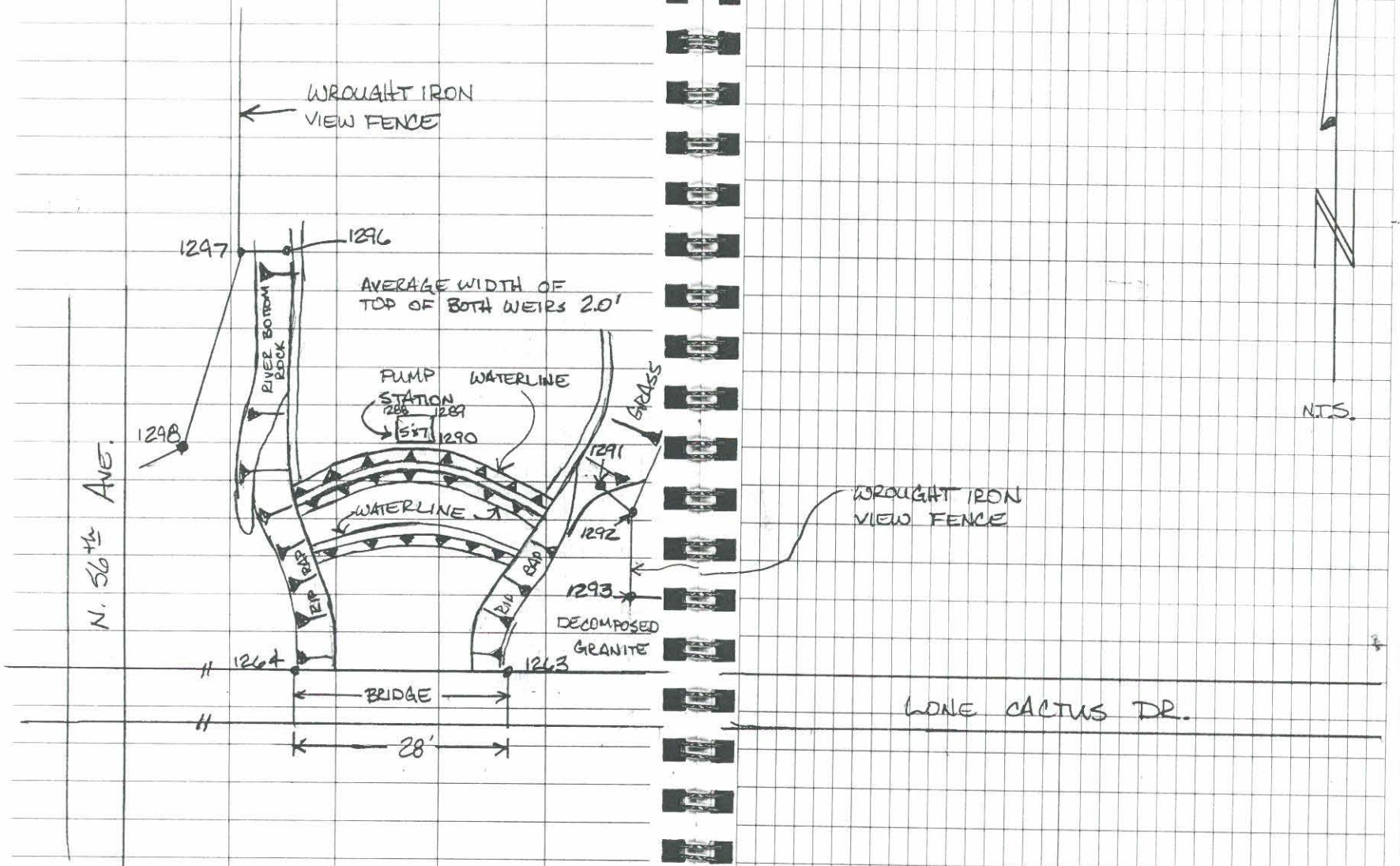

WROUGHT IRON VIEW FENCE
AVERAGE WIDTH OF TOP OF BOTH WEIRS 2.0'
ROCK BAR
1247
PUMP STATION
1234
1235
5x7
1236
WATERLINE
BLOCK WALL
1253
1255
1254
WATERLINE
WATERLINE
1262
1261
WROUGHT IRON VIEW FENCE
1204
1203
1260
BRIDGE
47'


N.T.S.
ARROWHEAD LAKES DR.
N 58th AVE.

WEIR S20-4

PT #	DESCRIPTION
1263	FIRST SHOT
1265-1268	COR. OF WINGWALL
1288-1290	COR. OF PUMP STATION
1312	LAST SHOT

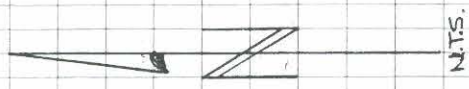
WEIR S20-4


WROUGHT IRON VIEW FENCE
1297
1296
AVERAGE WIDTH OF TOP OF BOTH WEIRS 2.0'
RIVER BOTTOM ROCK
PUMP STATION
WATERLINE
1288
1289
S&T
1290
GRASS
1298
1291
WATERLINE
1292
RIP
RIP
RIP
RIP
1293
DECOMPOSED GRANITE
N. 56th AVE.
1264
1263
BRIDGE
28'
WROUGHT IRON VIEW FENCE
LONE CACTUS DR.
N.T.S.

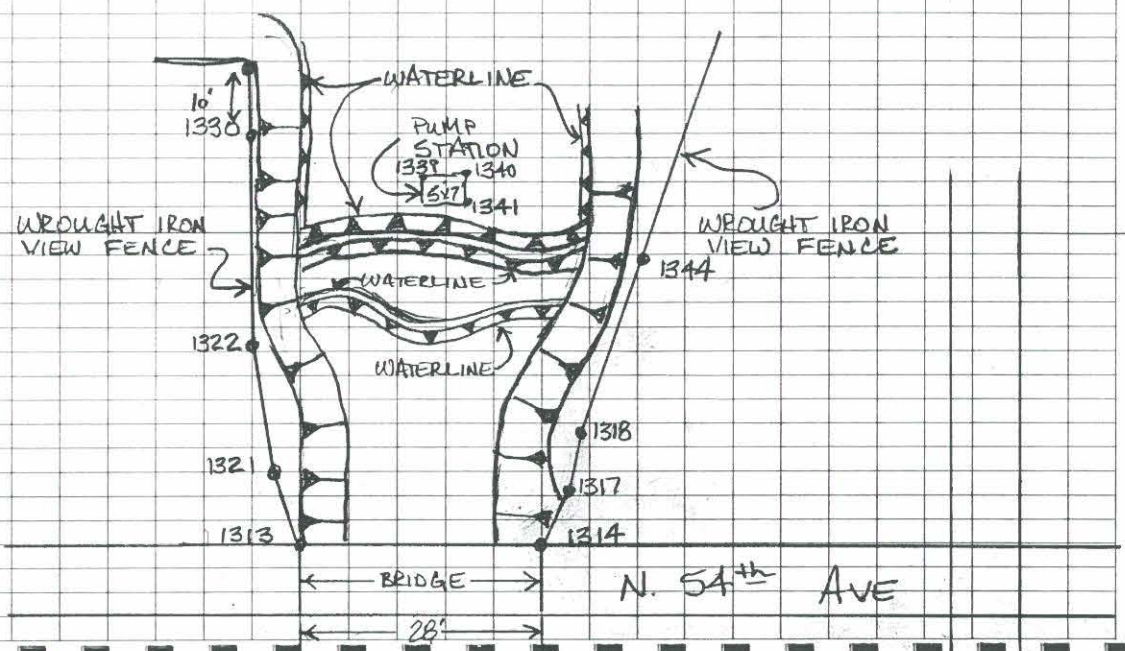
WEIR 520-5

PT #	DESCRIPTION
1313	FIRST SHOT
1315 & 1316 1319 & 1320	COR. WINGWALL
1359	LAST SHOT

13



AVERAGE WIDTH OF TOP OF BOTH WEIRS 1.5'



PONTIAC DR.

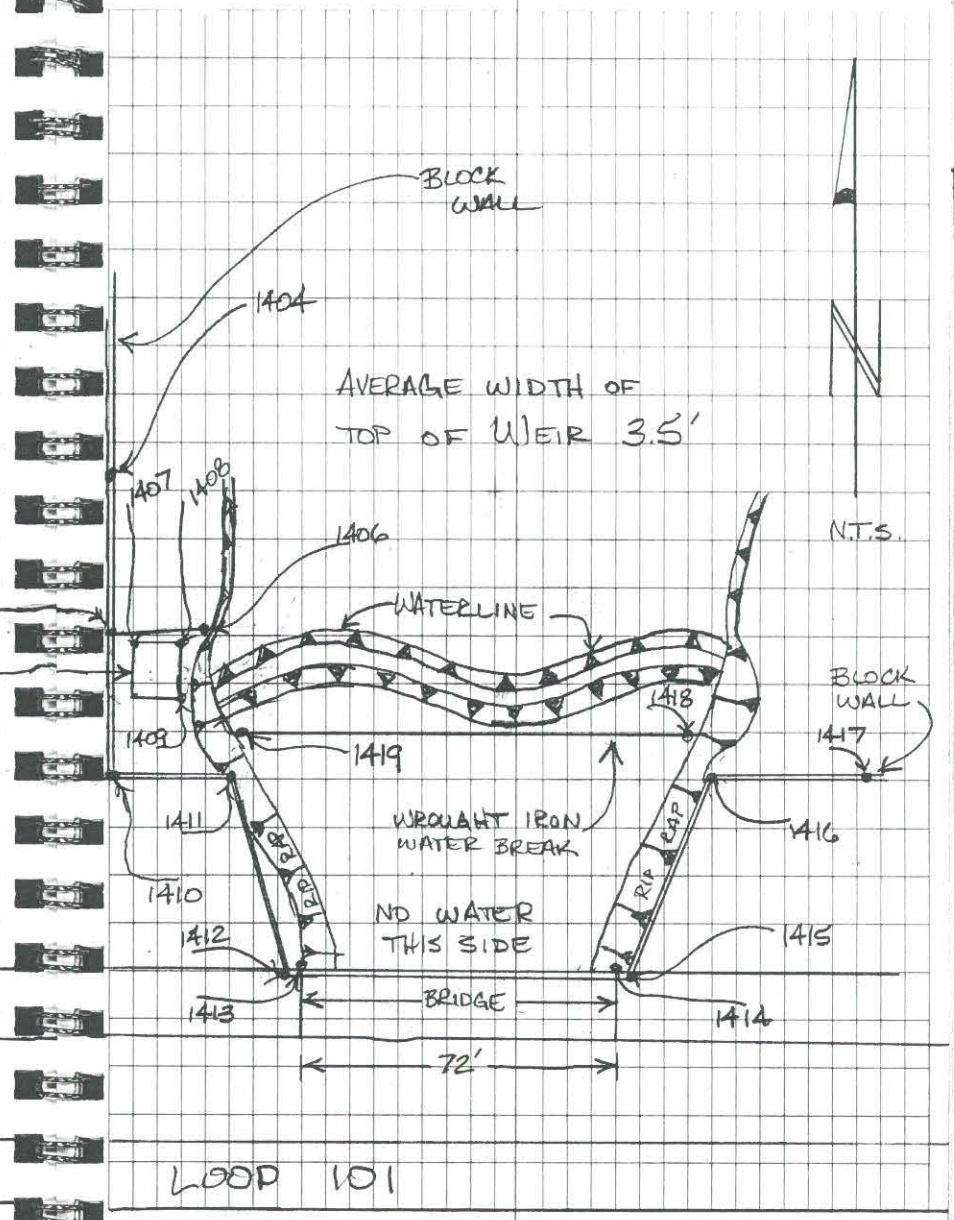
WEIR 520-5

WEIR 520-6

PT #	DESCRIPTION
1360	FIRST SHOT
1420-1423	COR. OF WINGWALL
1418 & 1419	W. BREAK = WROUGHT IRON WATER BREAK
1434	LAST TOPO SHOT
1435	CHECK TO #99112 (#1001) C.O.G. BCFD @ ARROWHEAD LAKES DR & ARROWHEAD MANOR ESTATES. N.E. OF MELINDA LN. 400'+/- @ S.W. END OF BULLNOSE HORIZ = ±0.08 VERT. = ±0.31

LAST SHOT

WEIR 520-6


BLOCK WALL
1404
AVERAGE WIDTH OF TOP OF WEIR 3.5'
N.T.S.
1407
1408
1406
1405
WATERLINE
ELEC. ENCL.
6' CLF
1418
BLOCK WALL
1417
1409
1419
1411
WROUGHT IRON WATER BREAK
1416
RIP RAP
RIP RAP
1410
NO WATER THIS SIDE
1412
1415
BEARDSLEY RD.
1413
BRIDGE
1414
72'
AGUA FRIA
LOOP 101

Points

Project name	50431128
Coordinate Units	International feet
Distance Units	International feet
Height Units	International feet
Date printed	5/24/01 10:34:38 AM
Coordinate System	Projection from data collector
Datum	(WGS 84)

X, Y, & Z
For Books 3, 6, &

Zone	Zone from data collector
Geoid model	Not selected

Coordinate units: International feet
Elevation units: International feet

Point listing

Name	Northing	Easting	Elevation	Feature Code
7203	975911.722	614383.809	1293.603	136
99095	973344.927	612671.835	1271.453	136
99913	980805.832	607967.136	1308.213	136
99084	970406.581	607594.645	1258.433	136
1000	976067.997	617780.002	1303.671	136
1001	975270.864	621708.840	1324.873	136
1002	971047.931	623143.855	1302.681	136
1003	970406.205	607594.419	1258.439	136
1004	980806.349	607966.865	1308.258	136
1005	973344.760	612671.992	1271.501	136
1006	975911.748	614384.150	1293.513	136
99112	975270.864	621708.840	1324.873	136
1007	975919.285	616656.116	1299.043	136
99111	971047.931	623143.855	1302.643	136
1010	976253.406	619718.371	1295.864	TWEIR
1011	976253.418	619718.366	1295.965	TWEIR
1012	976247.972	619717.379	1295.789	TWEIR
1013	976253.752	619697.624	1295.787	TWEIR
1014	976256.047	619698.617	1295.809	TWEIR
1015	976264.555	619677.620	1295.889	TWEIR
1016	976262.582	619677.106	1295.884	TWEIR
1017	976270.887	619656.663	1295.924	TWEIR
1018	976272.289	619656.973	1295.893	TWEIR
1019	976273.803	619633.756	1295.973	TWEIR
1020	976272.098	619633.674	1295.983	TWEIR
1021	976268.347	619611.226	1295.910	TWEIR
1022	976271.099	619610.240	1296.052	TWEIR
1023	976262.494	619588.241	1295.914	TWEIR
1024	976259.817	619589.555	1295.660	TWEIR
1025	976247.521	619565.430	1295.915	TWEIR
1026	976252.604	619564.912	1295.924	TWEIR
1027	976278.842	619608.390	1293.703	PIPE
1028	976263.298	619611.640	1293.779	PIPE
1029	976255.392	619565.994	1294.068	WL
1030	976243.853	619566.373	1292.480	WL
1031	976258.838	619591.892	1293.494	WL
1032	976265.920	619588.082	1294.001	WL
1033	976274.628	619612.309	1294.031	WL
1034	976264.848	619613.842	1293.492	WL
1035	976269.506	619634.404	1293.557	WL
1036	976277.809	619634.235	1293.946	WL

1037	976275.957	619654.465	1293.967	WL
1038	976267.103	619651.780	1293.510	WL
1039	976261.233	619674.625	1293.471	WL
1040	976269.104	619676.666	1293.971	WL
1041	976261.007	619696.446	1294.078	WL
1042	976251.838	619694.165	1293.554	WL
1043	976245.384	619714.879	1293.485	WL
1044	976258.513	619714.926	1294.108	WL
1045	976281.757	619554.506	1300.518	FM
1046	976281.197	619561.734	1298.086	TB
1047	976280.054	619564.344	1294.315	TS
1048	976280.427	619566.150	1294.061	WL
1049	976254.582	619561.745	1298.024	TB
1050	976225.024	619557.210	1303.142	SSMH
1051	976220.968	619557.974	1302.174	TB
1052	976226.430	619572.057	1293.662	TS
1053	976215.541	619567.041	1303.456	CONC
1054	976215.298	619555.723	1303.389	CONC
1055	976203.298	619555.529	1303.389	CONC
1056	976203.726	619567.340	1303.489	CONC
1057	976213.478	619567.904	1299.288	CONC
1058	976213.543	619571.142	1299.193	CONC
1059	976203.972	619571.377	1299.348	CONC
1060	976203.899	619568.481	1299.524	CONC
1061	976194.461	619591.590	1293.620	PIPE
1062	976194.261	619584.631	1294.450	PIPE
1063	976192.047	619585.582	1293.521	WL
1064	976189.885	619568.518	1302.051	TB
1065	976190.414	619565.459	1304.842	CONC
1066	976187.298	619568.580	1305.247	CONC
1067	976185.329	619555.036	1304.946	FM
1068	976185.332	619555.420	1304.990	CONC
1069	976187.072	619571.213	1305.281	COR BRIDGE
1070	976188.003	619712.414	1305.263	COR BRIDGE
1071	976193.475	619718.272	1302.658	FM
1072	976197.826	619717.052	1301.871	TB
1073	976199.490	619700.000	1293.501	WL
1074	976247.769	619727.964	1301.081	FM
1075	976280.818	619727.411	1299.359	FM
1076	976280.257	619721.034	1297.909	TB
1077	976280.186	619716.991	1294.014	WL
1078	976298.192	619717.278	1293.888	WL
1079	976299.145	619718.564	1297.517	FNC
1080	976299.202	619721.875	1297.927	TB
1081	976250.500	619720.663	1298.601	TB
1082	976187.481	619630.056	1305.496	BRIDGE
1083	975019.823	621178.248	1293.971	PUMP
1084	975024.203	621177.008	1294.130	PUMP
1085	975022.541	621170.450	1294.153	PUMP
1086	975015.437	621211.835	1293.520	WL
1087	975014.712	621211.714	1294.007	TWEIR
1088	975014.923	621194.246	1293.987	TWEIR
1089	975015.994	621194.275	1293.437	WL
1090	975016.264	621177.854	1293.528	WL
1091	975015.844	621177.699	1293.942	TWEIR
1092	975010.741	621159.404	1294.009	TWIER
1093	975011.492	621159.464	1293.517	WL
1094	974997.152	621143.801	1293.496	WL
1095	974996.562	621144.479	1293.891	TWIER
1096	974981.585	621139.660	1293.965	TWIER
1097	974981.611	621139.084	1293.532	WL
1098	974980.555	621150.961	1291.972	TWIER
1099	974978.675	621152.883	1291.252	WL
1100	974992.356	621160.151	1291.110	WL

1101	974993.967	621158.457	1291.983	TWIER
1102	975000.561	621167.884	1292.006	TWIER
1103	974998.415	621168.210	1291.158	WL
1104	975002.399	621184.044	1291.151	WL
1105	975004.483	621184.266	1291.956	TWIER
1106	975006.489	621201.233	1292.043	TWIER
1107	975006.311	621194.883	1292.177	BEES
1108	975005.291	621203.674	1291.176	WL
1109	975006.574	621209.022	1291.148	WL
1110	975008.293	621209.785	1292.028	TWIER
1111	975021.499	621247.114	1297.695	TB
1112	975027.385	621243.818	1295.185	TS
1113	975027.907	621243.686	1293.493	WL
1114	975018.964	621224.633	1293.552	WL
1115	975017.489	621224.126	1295.162	TS
1116	975011.738	621228.232	1298.227	TB
1117	974994.280	621222.872	1298.327	TB
1118	974998.258	621208.224	1291.202	WL
1119	974978.168	621204.915	1291.295	WL
1120	974978.977	621221.612	1298.445	TB
1121	974975.888	621220.665	1299.096	WGWL
1122	974968.603	621218.857	1300.271	WGWL
1123	974967.303	621217.082	1300.547	BRIDGE
1124	974943.361	621176.585	1300.655	BRIDGE
1125	974942.951	621175.305	1300.493	WGWL
1126	974944.433	621167.282	1299.326	WGWL
1127	974949.748	621160.322	1298.771	TB
1128	974960.738	621175.757	1291.285	WL
1129	974973.538	621157.841	1291.321	WL
1130	974961.200	621151.236	1297.803	TB
1131	974964.150	621134.605	1297.794	TB
1132	974970.515	621131.842	1294.658	TS
1133	974971.424	621131.398	1293.568	WL
1134	974961.321	621112.331	1293.604	WL
1135	974960.153	621111.744	1294.760	TS
1136	974953.885	621114.955	1297.820	TB
1137	974942.196	621091.116	1297.190	TB
1138	974945.644	621086.146	1294.874	TS
1139	974946.304	621085.541	1293.588	WL
1140	974920.616	621084.836	1296.829	TB
1141	974920.758	621068.636	1289.388	WL
1142	974899.052	621069.466	1289.416	WL
1143	974906.469	621088.391	1297.497	TB
1144	974901.312	621093.343	1299.279	WGWL
1145	974893.290	621090.744	1300.718	WGWL
1146	974892.751	621089.947	1300.768	BRIDGE
1147	974845.468	621008.680	1300.450	BRIDGE
1148	974844.836	621007.772	1300.411	WGWL
1149	974846.894	620999.666	1299.075	WGWL
1150	974851.663	620999.230	1299.342	TB
1151	974860.649	621011.482	1289.291	WL
1152	974865.191	621002.590	1289.343	WATERFALL
1153	974865.076	621002.517	1289.330	WATERFALL
1154	974869.846	620998.354	1289.317	WATERFALL
1155	974859.460	620984.847	1299.900	WATERFALL
1156	974859.451	620984.827	1299.894	WATERFALL
1157	974854.330	620989.633	1299.859	WATERFALL
1158	974879.739	620967.586	1299.867	WATERFALL
1159	974882.987	620983.297	1296.851	WATERFALL
1160	974886.581	620983.617	1296.830	WATERFALL
1161	974883.488	620995.621	1290.319	WATERFALL
1162	974887.963	620996.170	1289.717	WATERFALL
1163	974893.875	620980.114	1296.929	WATERFALL
1164	974903.185	620973.729	1296.909	WATERFALL

1165	974909.867	620971.616	1295.894	WATERFALL
1166	974923.884	620967.004	1295.932	WATERFALL
1167	974917.783	620955.734	1298.881	WATERFALL
1168	974909.574	620960.341	1298.834	WATERFALL
1169	974906.095	620953.068	1299.880	WATERFALL
1170	974894.786	620958.416	1299.805	WATERFALL
1171	974887.526	620962.867	1299.829	WATERFALL
1172	974895.247	620986.420	1293.946	TWIER
1173	974922.763	620988.829	1293.872	PUMP
1174	974926.154	620994.707	1293.880	PUMP
1175	974922.249	620996.960	1293.899	PUMP
1176	974953.715	621031.465	1293.923	PUMP
1177	974955.879	621037.910	1293.861	PUMP
1178	974951.622	621039.466	1293.854	PUMP
1179	974895.563	620985.864	1293.656	WL
1180	974911.138	620986.208	1293.573	WL
1181	974912.292	620988.239	1293.980	TWIER
1182	974921.975	621003.402	1293.919	TWIER
1183	974922.025	621002.526	1293.542	WL
1184	974935.339	621014.461	1293.547	WL
1185	974934.946	621015.173	1293.844	TWIER
1186	974945.652	621034.315	1293.995	TWIER
1187	974946.173	621034.206	1293.548	WL
1188	974947.093	621052.657	1293.536	WL
1189	974946.251	621052.462	1293.982	TWIER
1190	974943.545	621065.006	1293.991	TWIER
1191	974944.492	621065.081	1293.573	WL
1192	974941.810	621073.973	1293.558	WL
1193	974941.226	621072.996	1294.008	TWIER
1194	974933.041	621072.105	1292.034	TWIER
1195	974933.906	621057.638	1292.025	TWIER
1196	974935.069	621044.949	1291.999	TWIER
1197	974930.110	621030.329	1291.996	TWIER
1198	974921.442	621021.868	1291.987	TWIER
1199	974908.677	621006.030	1292.018	TWIER
1200	974899.924	620995.120	1291.982	TWIER
1201	974890.696	620992.111	1292.005	TWIER
1202	974888.649	620996.238	1289.247	WL
1203	975066.269	618435.896	1300.417	BRIDGE
1204	975051.316	618391.437	1300.473	BRIDGE
1205	975050.999	618390.066	1300.433	WGWL
1206	975054.491	618382.479	1298.901	WGWL
1207	975068.606	618438.448	1299.836	WGWL
1208	975073.822	618441.299	1298.836	WGWL
1209	975077.107	618446.518	1299.963	TB
1210	975077.776	618430.053	1291.424	WL
1211	975066.719	618427.959	1291.458	WL
1212	975114.335	618430.083	1291.437	WL
1213	975119.719	618440.813	1298.248	TB
1214	975133.225	618444.393	1297.313	TB
1215	975133.777	618439.971	1293.530	WL
1216	975126.309	618433.003	1293.893	TWIER
1217	975127.778	618433.086	1294.005	TWIER
1218	975128.113	618433.212	1293.522	WL
1219	975130.994	618413.596	1293.505	WL
1220	975130.644	618413.851	1293.985	TWIER
1221	975128.919	618414.140	1293.968	TWIER
1222	975121.539	618397.402	1294.020	TWIER
1223	975122.395	618396.816	1294.011	TWIER
1224	975123.080	618396.591	1293.574	WL
1225	975115.908	618381.040	1293.525	WL
1226	975115.515	618380.702	1293.965	TWIER
1227	975114.828	618381.146	1293.958	TWIER
1228	975105.624	618370.790	1293.880	TWIER

1229	975106.632	618369.429	1293.974	TWIER
1230	975107.074	618369.029	1293.527	WL
1231	975102.401	618364.573	1293.535	WL
1232	975101.687	618364.931	1293.949	TWIER
1233	975100.046	618365.968	1293.886	TWIER
1234	975126.332	618385.380	1294.206	PUMP
1235	975128.435	618391.879	1294.159	PUMP
1236	975124.100	618393.295	1294.136	PUMP
1237	975120.037	618430.604	1292.055	TWIER
1238	975118.225	618429.117	1291.322	WL
1239	975119.257	618420.260	1291.891	TWIER
1240	975118.390	618410.770	1291.989	TWIER
1241	975109.529	618399.752	1291.975	TWIER
1242	975102.009	618381.684	1292.019	TWIER
1243	975093.927	618368.412	1292.052	TWIER
1244	975092.510	618369.030	1291.411	WL
1245	975130.346	618330.262	1293.444	WL
1246	975134.884	618343.762	1293.376	WL
1247	975131.003	618352.023	1293.537	WL
1248	975121.345	618352.095	1293.544	WL
1249	975115.908	618350.870	1293.505	WL
1250	975105.166	618346.269	1298.059	TB
1251	975111.128	618353.448	1295.159	TS
1252	975111.969	618354.129	1293.500	WL
1253	975103.160	618360.255	1296.454	FNC
1254	975098.670	618353.256	1298.711	FNC
1255	975077.735	618320.911	1298.783	FNC
1256	975069.892	618369.277	1299.277	TB
1257	975079.303	618380.169	1291.422	WL
1258	975057.277	618397.296	1291.425	WL
1259	975053.019	618387.001	1297.938	TB
1260	975079.354	618463.155	1299.925	FNC
1261	975122.372	618443.724	1298.129	FNC
1262	975141.679	618453.315	1297.592	FNC
1263	974056.939	619830.109	1297.900	BRIDGE
1264	974048.401	619803.613	1297.864	BRIDGE
1265	974048.304	619802.440	1297.819	WGWL
1266	974051.847	619794.858	1296.291	WGWL
1267	974057.374	619831.444	1297.943	WGWL
1268	974064.457	619835.415	1296.044	WGWL
1269	974062.060	619833.874	1295.064	TB
1270	974059.612	619825.832	1289.340	WL
1271	974077.138	619826.389	1289.399	WL
1272	974077.893	619835.673	1295.410	TB
1273	974097.341	619844.083	1296.573	TB
1274	974117.346	619836.142	1291.503	WL
1275	974098.989	619832.221	1292.011	TWIER
1276	974101.315	619832.395	1291.964	TWIER
1277	974101.873	619832.655	1291.422	WL
1278	974102.406	619817.235	1291.421	WL
1279	974101.287	619816.386	1292.003	TWIER
1280	974099.413	619816.782	1291.923	TWIER
1281	974096.020	619801.892	1291.950	TWIER
1282	974098.245	619801.251	1291.976	TWIER
1283	974098.745	619801.187	1291.453	WL
1284	974091.408	619790.307	1291.368	WL
1285	974091.031	619791.414	1291.818	TWIER
1286	974089.907	619792.396	1291.800	TWIER
1287	974087.398	619783.499	1292.218	TWIER
1288	974105.220	619799.290	1292.041	PUMP
1289	974107.141	619805.931	1292.068	PUMP
1290	974102.877	619807.248	1292.010	PUMP
1291	974118.555	619837.269	1293.419	FNC
1292	974117.560	619844.420	1295.854	FNC

1293	974093.302	619850.257	1297.122	FNC
1294	974088.921	619782.310	1292.010	TWIER
1295	974089.253	619782.002	1291.521	WL
1296	974119.816	619765.755	1292.862	FNC
1297	974117.009	619760.510	1296.669	FNC
1298	974066.483	619772.210	1297.306	FNC
1299	974117.770	619766.933	1291.485	WL
1300	974084.762	619772.871	1296.614	TB
1301	974064.396	619780.572	1296.764	TB
1302	974050.572	619791.324	1297.232	TB
1303	974048.969	619801.363	1294.111	WL
1304	974052.419	619806.105	1289.384	WL
1305	974065.484	619797.463	1289.392	WL
1306	974079.210	619789.044	1289.347	WL
1307	974081.203	619787.578	1290.259	TWIER
1308	974084.817	619797.587	1290.277	TWIER
1309	974088.808	619814.048	1290.221	TWIER
1310	974090.988	619825.199	1290.185	TWIER
1311	974091.424	619830.391	1290.377	TWIER
1312	974089.202	619826.985	1289.263	WL
1313	971427.015	620939.695	1298.094	BRIDGE
1314	971399.181	620939.634	1298.098	BRIDGE
1315	971397.126	620939.395	1297.952	WGWL
1316	971392.705	620944.050	1297.079	WGWL
1317	971392.675	620944.731	1297.004	FNC
1318	971389.631	620952.745	1296.024	FNC
1319	971428.950	620939.217	1297.960	WGWL
1320	971433.429	620944.098	1297.087	WGWL
1321	971433.328	620944.582	1297.101	WGWL
1322	971437.862	620965.044	1296.318	WGWL
1323	971431.047	620943.407	1295.737	TB
1324	971422.807	620947.301	1289.342	WL
1325	971424.171	620961.917	1289.378	WL
1326	971435.436	620958.545	1296.122	TB
1327	971436.683	620972.945	1294.729	TB
1328	971428.424	620976.455	1289.451	WL
1329	971434.098	620997.954	1294.058	TB
1330	971433.859	621034.642	1295.985	FNC
1331	971430.853	621032.112	1293.832	TB
1332	971426.809	621031.723	1291.283	WL
1333	971424.604	621001.955	1291.252	WL
1334	971427.052	620999.247	1292.143	TWIER
1335	971409.976	620996.860	1292.099	TWIER
1336	971409.885	620997.871	1291.267	WL
1337	971392.346	620991.504	1291.252	WL
1338	971392.566	620990.161	1292.179	TWIER
1339	971405.949	620999.928	1291.982	PUMP
1340	971404.645	621004.293	1291.950	PUMP
1341	971398.052	621002.195	1291.949	PUMP
1342	971377.805	620985.189	1292.160	TWIER
1343	971377.239	620986.863	1291.218	WL
1344	971358.271	620987.913	1294.995	FNC
1345	971361.679	620990.746	1294.570	TB
1346	971364.271	620993.478	1291.277	WL
1347	971389.134	620970.423	1289.381	WL
1348	971383.556	620961.613	1295.644	TB
1349	971390.637	620952.495	1295.301	TB
1350	971402.157	620956.844	1289.309	WL
1351	971403.434	620943.287	1289.279	WL
1352	971394.974	620943.235	1296.289	TB
1353	971385.392	620977.891	1290.227	TWIER
1354	971398.491	620979.780	1290.180	TWIER
1355	971409.334	620981.904	1290.172	TWIER
1356	971414.897	620986.689	1290.168	TWIER

1357	971421.093	620990.510	1290.174	TWIER
1358	971426.860	620990.896	1290.141	TWIER
1359	971427.191	620986.799	1289.378	WL
1360	971110.716	620464.069	1290.259	TWIER
1361	971108.913	620465.220	1290.268	TWIER
1362	971111.549	620463.631	1289.378	WL
1363	971118.829	620484.326	1289.398	WL
1364	971116.672	620484.964	1290.142	TWIER
1365	971113.768	620484.923	1290.050	TWIER
1366	971107.130	620506.366	1290.165	TWIER
1367	971110.518	620506.994	1290.247	TWIER
1368	971112.475	620507.377	1289.347	WL
1369	971104.944	620526.392	1289.370	WL
1370	971103.297	620525.306	1290.162	TWIER
1371	971101.145	620524.739	1290.199	TWIER
1372	971104.387	620547.720	1290.329	TWIER
1373	971106.074	620547.694	1290.250	TWIER
1374	971107.852	620547.332	1289.395	WL
1375	971114.706	620569.972	1289.391	WL
1376	971113.687	620571.702	1290.233	TWIER
1377	971110.387	620571.896	1290.263	TWIER
1378	971104.077	620590.974	1290.221	TWIER
1379	971107.639	620593.209	1290.227	TWIER
1380	971108.466	620593.865	1289.357	WL
1381	971116.692	620617.064	1291.771	TB
1382	971119.828	620615.285	1290.864	TS
1383	971120.225	620614.894	1289.325	WL
1384	971109.808	620601.421	1289.384	WL
1385	971107.857	620602.582	1291.534	TS
1386	971104.034	620607.113	1293.092	TB
1387	971093.345	620599.413	1293.224	TB
1388	971090.268	620588.165	1290.506	TB
1389	971091.831	620582.523	1286.543	TS
1390	971078.678	620570.750	1286.212	TS
1391	971075.915	620572.446	1289.844	TB
1392	971078.860	620490.014	1285.978	TS
1393	971075.344	620482.733	1290.959	TB
1394	971091.915	620463.688	1292.062	TB
1395	971094.906	620455.543	1293.194	TB
1396	971109.909	620447.872	1292.876	TB
1397	971111.877	620451.694	1292.011	TS
1398	971112.800	620452.797	1289.347	WL
1399	971120.801	620445.690	1289.380	WL
1400	971120.664	620444.778	1290.678	TS
1401	971118.729	620440.407	1292.592	TB
1402	971152.626	620440.826	1289.311	WL
1403	971152.738	620440.231	1291.001	TS
1404	971148.872	620434.936	1291.715	FNC
1405	971108.525	620438.150	1294.185	FNC
1406	971111.250	620451.966	1292.224	FNC
1407	971107.664	620440.237	1293.591	FNC
1408	971108.332	620446.205	1293.612	FNC
1409	971098.214	620447.542	1293.521	FNC
1410	971089.792	620440.223	1294.184	FNC
1411	971089.870	620462.889	1292.882	FNC
1412	971066.139	620486.841	1291.095	FNC
1413	971067.005	620490.267	1290.924	BRIDGE
1414	971066.949	620561.964	1291.077	BRIDGE
1415	971065.962	620565.536	1290.971	FNC
1416	971089.590	620589.832	1292.862	FNC
1417	971089.526	620621.852	1293.953	FNC
1418	971094.009	620588.266	1289.489	WBREAK
1419	971094.490	620472.685	1289.447	WBREAK
1420	971076.036	620489.523	1288.482	WGWL

1421	971067.243	620490.679	1290.452	WGWL
1422	971075.451	620569.896	1289.009	WGWL
1423	971067.178	620561.651	1290.565	WGWL
1424	971100.287	620585.610	1286.435	TS
1425	971099.385	620558.080	1286.490	TS
1426	971095.818	620537.234	1286.413	TS
1427	971097.223	620510.382	1286.434	TS
1428	971107.195	620485.198	1286.414	TS
1429	971103.375	620471.909	1286.533	TS
1430	971096.103	620474.540	1286.486	TS
1431	971079.116	620490.622	1285.935	CONC
1432	971078.695	620513.957	1285.819	CONC
1433	971077.412	620538.046	1285.778	CONC
1434	971076.299	620562.743	1285.698	CONC
1435	975270.852	621708.761	1325.187	BCFD
1450	976200.828	617241.420	1306.951	TOP
1451	976205.502	617236.206	1307.276	TOP
1452	976209.153	617229.690	1304.093	TOP
1453	976209.146	617211.186	1303.504	TOP
1454	976204.310	617202.950	1307.072	TOP
1455	976199.641	617197.640	1307.231	TOP
1456	976194.395	617194.507	1307.090	TOP
1457	976181.955	617189.247	1307.099	TOP
1458	976167.671	617187.340	1307.422	TOP
1459	976163.875	617189.197	1307.729	TOP
1460	976162.509	617193.143	1307.847	TOP
1461	976169.892	617242.764	1307.928	TOP
1462	976175.287	617247.431	1307.384	TOP
1463	976182.462	617249.134	1307.020	TOP
1464	976189.484	617247.302	1304.363	TOE
1465	976179.505	617226.817	1299.917	TOE
1466	976175.037	617223.166	1298.674	TOE
1467	976169.983	617222.556	1297.547	TOE
1468	976170.922	617242.132	1305.907	TOE
1469	976195.807	617245.559	1304.743	TOE
1470	976184.748	617221.112	1299.594	TOE
1471	976178.253	617214.156	1298.643	TOE
1472	976168.372	617212.893	1297.423	TOE
1473	976163.673	617193.097	1305.525	TOE
1474	976163.376	617193.220	1306.933	HDWL
1475	976167.029	617217.463	1306.867	HDWL
1476	976170.700	617242.268	1306.962	HDWL
1477	976149.187	617185.821	1307.274	BC
1478	976154.319	617218.697	1307.353	BC
1479	976157.779	617246.152	1307.394	BC
1480	976133.898	617248.215	1307.946	BC
1481	976130.396	617221.324	1307.826	BC
1482	976125.193	617188.214	1307.778	BC
1483	976115.349	617190.039	1307.788	BC
1484	976120.563	617222.508	1307.785	BC
1485	976124.417	617254.643	1307.803	BC
1486	976100.522	617257.163	1307.462	BC
1487	976096.647	617225.006	1307.488	BC
1488	976092.761	617199.787	1307.395	BC
1489	976084.637	617204.632	1306.385	HDWL
1490	976088.417	617230.693	1306.394	HDWL
1491	976091.860	617253.949	1306.383	HDWL
1492	976092.661	617254.100	1307.044	TOP
1493	976092.486	617257.723	1307.535	TOP
1494	976089.039	617260.749	1307.231	TOP
1495	976078.472	617265.029	1306.804	TOP
1496	976060.413	617267.825	1306.290	TOP
1497	976031.416	617245.536	1306.042	TOP
1498	976044.040	617229.435	1303.054	TOP

1499	976046.847	617226.754	1300.856	TOP
1500	976054.601	617225.765	1300.697	TOP
1501	976058.882	617219.214	1300.427	TOP
1502	976058.154	617211.813	1300.649	TOP
1503	976054.013	617205.050	1300.573	TOP
1504	976055.467	617203.941	1302.326	TOP
1505	976072.551	617208.897	1304.926	TOP
1506	976084.930	617203.249	1306.871	TOP
1507	976084.330	617204.882	1305.556	TOE
1508	976084.449	617224.874	1297.143	TOE
1509	976073.264	617232.575	1299.026	TOE
1510	976059.561	617250.026	1302.855	TOE
1511	976052.292	617255.880	1304.508	TOE
1512	976058.088	617266.790	1304.908	TOE
1513	976066.325	617252.200	1302.325	TOE
1514	976076.178	617240.917	1299.375	TOE
1515	976086.590	617235.092	1296.963	TOE
1516	976091.682	617254.223	1305.889	TOE
1517	976083.728	617223.439	1296.703	DRY
1518	976057.439	617222.022	1299.959	WL
1519	976209.780	617220.080	1302.581	WL
1520	976473.808	616757.690	1305.212	BC
1521	976452.955	616779.383	1305.297	BC
1522	976424.843	616808.019	1305.201	BC
1523	976412.746	616793.241	1305.097	P
1524	976432.078	616774.793	1305.165	P
1525	976461.095	616744.185	1305.233	P
1526	976448.257	616732.379	1305.424	BC
1527	976426.836	616755.090	1305.374	BC
1528	976399.167	616782.736	1305.087	BC
1529	976401.296	616740.842	1299.662	WL
1530	976437.608	616847.925	1302.507	WL
1531	976434.095	616773.503	1305.122	BCFD
1532	975906.564	616379.813	1302.199	NG
1533	975899.692	616369.350	1303.549	TOP
1534	975892.472	616362.735	1301.567	TOP
1535	975881.769	616354.190	1301.228	TOP
1536	975879.921	616344.094	1301.572	TOP
1537	975874.869	616336.605	1301.356	TOP
1538	975872.462	616333.141	1302.797	TOP
1539	975873.059	616328.557	1302.295	NG
1540	975868.092	616308.332	1302.306	NG
1541	975870.771	616297.999	1302.304	TOP
1542	975871.654	616296.342	1301.388	TOP
1543	975876.111	616287.821	1301.444	TOP
1544	975881.619	616279.127	1301.147	TOP
1545	975885.646	616271.384	1302.912	TOP
1546	975892.543	616265.069	1303.426	NG
1547	975815.355	616217.041	1299.345	NG
1548	975777.031	616251.040	1298.419	NG
1549	975722.105	616294.985	1297.922	NG
1550	975739.642	616350.759	1297.477	NG
1551	975797.270	616413.510	1297.668	NG
1552	975854.161	616428.031	1299.429	NG
1553	975910.994	616361.459	1299.616	WL
1554	975851.930	616402.969	1293.820	WL
1555	975637.318	616307.933	1296.172	BCFD
1556	976396.228	615670.136	1302.968	NG
1557	976379.328	615672.492	1303.438	TOP
1558	976371.488	615673.585	1301.734	TOP
1559	976361.529	615672.854	1301.507	TOP
1560	976350.324	615673.197	1301.566	TOP
1561	976343.699	615671.265	1303.093	TOP
1562	976324.744	615671.929	1302.699	NG

1563	976337.684	615679.547	1299.630	WL
1564	976359.201	615629.605	1296.785	WL
1565	976338.114	615538.981	1296.682	WL
1566	976365.647	615567.350	1302.175	BC
1567	976345.451	615570.783	1302.242	BC
1568	976317.402	615577.549	1302.382	BC
1569	976323.722	615613.453	1302.424	BC
1570	976353.809	615605.683	1302.210	BC
1571	976382.050	615601.068	1302.271	BC
1572	976378.095	615583.139	1302.158	P
1573	976349.291	615588.317	1302.213	P
1574	976318.958	615596.317	1302.399	P
1575	976368.377	615584.836	1302.128	BCFD
1576	976280.903	614459.509	1296.868	NG
1577	976246.913	614455.907	1296.595	TOP
1578	976240.147	614456.606	1295.102	TOP
1579	976229.648	614458.668	1294.983	TOP
1580	976219.465	614455.401	1294.929	TOP
1581	976213.258	614451.081	1296.225	TOP
1582	976198.922	614446.537	1296.370	NG
1583	976223.478	614395.530	1291.796	HDWL
1584	976234.369	614395.584	1291.860	HDWL
1585	976242.791	614396.984	1292.570	HDWL
1586	976260.775	614366.398	1297.532	BC
1587	976235.077	614361.506	1296.394	BC
1588	976208.127	614358.303	1296.278	BC
1589	976209.856	614322.038	1296.310	BC
1590	976231.212	614324.658	1296.312	BC
1591	976254.355	614327.636	1296.557	BC
1592	976250.987	614344.873	1296.411	P
1593	976226.962	614342.062	1296.184	P
1594	976202.069	614338.666	1296.178	P
1595	976223.638	614303.979	1291.765	HDWL
1596	976235.476	614303.917	1291.735	HDWL
1598	976218.145	614297.936	1289.563	WL
1599	976215.425	614398.780	1289.565	WL
1600	976210.128	614455.591	1293.521	WL
1601	976275.234	614348.337	1296.679	BCFD
1602	975911.795	614384.188	1293.494	CHECK
1603	975812.100	614087.545	1293.721	NG
1604	975813.914	614098.982	1293.045	TOP
1605	975813.409	614105.006	1291.184	TOP
1606	975813.186	614106.229	1289.438	TOP
1607	975806.848	614132.444	1289.433	TOP
1608	975806.367	614134.367	1290.991	TOP
1609	975806.030	614141.778	1292.461	TOP
1610	975807.069	614146.044	1292.696	NG
1611	975714.263	614159.484	1292.385	TOP
1612	975735.393	614160.813	1293.671	TOP
1613	975747.862	614148.818	1291.760	TOP
1614	975740.799	614145.014	1290.041	TOP
1615	975735.685	614132.986	1286.625	TOP
1616	975736.426	614115.977	1286.927	TOP
1617	975739.855	614104.894	1289.569	TOP
1618	975752.007	614097.310	1291.467	TOP
1619	975739.394	614086.590	1293.054	TOP
1620	975731.478	614088.331	1292.891	TOP
1621	975719.953	614093.431	1292.595	TOP
1622	975706.969	614100.246	1292.880	TOP
1623	975707.622	614109.144	1292.777	TOP
1624	975722.543	614093.167	1291.272	TOE
1625	975725.188	614111.684	1286.402	TOE
1626	975714.586	614127.697	1282.447	TOE
1627	975708.050	614100.863	1292.411	TOE

1628	975729.036	614090.060	1291.717	TOE
1629	975730.939	614121.014	1284.793	TOE
1630	975715.613	614137.798	1282.195	TOE
1631	975714.384	614158.489	1291.630	TOE
1632	975713.395	614157.528	1291.503	HDWL
1633	975711.064	614133.220	1291.505	HDWL
1634	975708.452	614109.345	1291.547	HDWL
1635	975703.401	614170.507	1291.762	BC
1636	975699.039	614133.607	1290.519	BC
1637	975695.127	614093.777	1290.249	BC
1638	975681.008	614187.232	1291.037	BC
1639	975671.982	614158.903	1290.831	BC
1640	975669.716	614156.739	1291.507	BC
1641	975668.001	614159.533	1291.007	BC
1642	975672.107	614189.413	1291.110	BC
1643	975650.813	614209.842	1290.678	BC
1644	975645.114	614169.879	1290.604	BC
1645	975641.352	614140.079	1291.471	BC
1646	975665.416	614094.286	1291.206	P
1647	975669.556	614147.342	1291.268	P
1648	975632.184	614146.351	1290.937	HDWL
1649	975634.381	614167.621	1290.950	HDWL
1650	975636.973	614191.680	1290.974	HDWL
1651	975637.132	614191.950	1292.386	TOP
1652	975638.832	614208.912	1293.248	TOP
1653	975631.502	614211.967	1293.312	TOP
1654	975619.513	614208.560	1289.777	TOP
1655	975607.934	614205.106	1290.241	TOP
1656	975605.572	614198.543	1289.036	TOP
1657	975607.713	614183.834	1286.537	TOP
1658	975608.428	614172.423	1286.530	TOP
1659	975606.872	614156.431	1290.489	TOP
1660	975632.025	614151.359	1290.279	TOP
1661	975633.329	614161.684	1287.584	TOP
1662	975609.658	614166.379	1288.271	TOP
1663	975629.570	614163.635	1281.827	TOE
1664	975619.809	614172.717	1282.446	TOE
1665	975614.118	614187.997	1284.655	TOE
1666	975610.803	614206.049	1288.550	TOE
1667	975617.292	614208.014	1288.529	TOE
1668	975621.239	614188.886	1284.235	TOE
1669	975628.129	614176.419	1281.456	TOE
1670	973257.278	612944.357	1270.425	TOP
1671	973253.309	612956.042	1270.330	TOP
1672	973248.032	612968.622	1268.263	TOP
1673	973244.369	612977.762	1267.476	TOP
1674	973239.429	612997.971	1267.481	TOP
1675	973241.306	613000.803	1268.414	TOP
1676	973239.303	613007.679	1270.914	TOP
1677	973255.467	613008.424	1270.174	TOP
1678	973270.228	613001.653	1270.780	TOP
1679	973289.643	612978.407	1271.405	TOP
1680	973298.318	612957.449	1271.734	TOP
1681	973294.397	612952.678	1272.151	HDWL
1682	973285.221	612943.148	1272.166	HDWL
1683	973258.461	612943.393	1272.144	HDWL
1684	973240.755	612954.676	1271.576	HDWL
1685	973200.223	612956.421	1271.299	HDWL
1686	973159.906	612957.984	1270.942	HDWL
1687	973137.387	612946.222	1271.515	HDWL
1688	973150.360	612968.279	1265.426	TOE
1689	973185.316	612968.058	1265.352	TOE
1690	973225.934	612966.826	1265.046	TOE
1691	973226.268	612959.647	1264.759	TOE

1692	973240.530	612960.572	1264.850	TOE
1693	973239.781	612972.705	1264.785	TOE
1694	973240.188	612976.331	1265.433	TOE
1695	973232.516	613009.851	1265.402	TOE
1696	973241.226	612997.236	1267.715	TOE
1697	973267.802	612984.595	1267.097	TOE
1698	973283.293	612952.511	1265.318	TOE
1699	973269.014	612952.603	1265.207	TOE
1700	973261.935	612966.274	1266.481	TOE
1701	973246.780	612975.252	1267.551	TOE
1702	973238.292	612964.796	1264.786	GRATE
1703	973238.457	612962.308	1264.761	GRATE
1704	973228.039	612961.559	1264.745	GRATE
1705	973282.762	612950.707	1265.117	GRATE
1706	973269.497	612947.409	1265.060	GRATE
1707	973282.667	612947.414	1265.082	GRATE
1708	973301.107	612946.648	1272.817	NG
1709	973291.180	612988.111	1273.148	NG
1710	973242.309	613010.997	1270.976	NG
1711	973325.520	612925.561	1272.981	BC
1712	973269.358	612920.286	1272.584	BC
1713	973135.373	612921.802	1271.258	BC
1714	973136.117	612894.812	1271.953	BC
1715	973167.749	612894.682	1272.281	BC
1716	973316.858	612892.228	1273.412	BC
1717	973239.333	612976.994	1264.273	WL
1718	973691.130	613989.885	1276.344	NG
1719	973686.913	614008.794	1275.451	TOP
1720	973686.152	614014.295	1272.702	TOP
1721	973677.552	614058.391	1272.691	TOP
1722	973674.099	614064.631	1275.326	TOP
1723	973666.403	614078.104	1275.627	NG
1724	973650.424	614046.188	1268.023	HDWL
1725	973653.859	614027.452	1267.900	HDWL
1726	973657.455	614007.897	1267.913	HDWL
1727	973611.338	614060.358	1273.712	NG
1728	973618.617	614030.239	1273.305	NG
1729	973631.104	613994.691	1273.247	NG
1730	973643.824	613973.712	1275.697	NG
1731	973591.698	614035.145	1267.896	HDWL
1732	973595.508	614014.797	1267.886	HDWL
1733	973598.777	613996.016	1267.942	HDWL
1734	973596.404	614000.781	1264.255	WL
1735	973664.552	614014.747	1264.282	WL
1736	973698.155	614009.456	1272.574	WL
1737	973378.053	613907.803	1267.860	HDWL
1738	973394.395	613898.278	1267.849	HDWL
1739	973408.224	613890.282	1267.766	HDWL
1740	973504.556	613848.822	1274.352	CONC
1741	973457.067	613845.322	1272.756	CONC
1742	973404.136	613852.892	1272.095	CONC
1743	973314.175	613868.737	1271.902	CONC
1744	973268.109	613862.677	1272.577	CONC
1745	973372.096	613819.155	1267.773	HDWL
1746	973355.037	613829.007	1267.802	HDWL
1747	973336.658	613839.790	1267.811	HDWL
1748	973340.396	613833.892	1264.249	WL
1749	973385.356	613909.228	1264.214	WL
1750	974016.840	613966.129	1280.397	NG
1751	974016.387	613973.413	1280.208	TOP
1752	974015.951	613978.111	1279.131	TOP
1753	974013.801	613993.955	1279.129	TOP
1754	974013.581	613994.183	1277.174	TOP
1755	974009.812	614002.234	1277.119	TOP

1756	974009.778	614002.314	1276.866	TOP
1757	974009.161	614008.401	1276.854	TOP
1758	974009.126	614008.474	1277.131	TOP
1759	974010.496	614017.341	1277.134	TOP
1760	974010.516	614017.619	1279.133	TOP
1761	974008.956	614033.720	1279.148	TOP
1762	974008.485	614038.267	1280.121	TOP
1763	974007.832	614043.964	1280.528	NG
1764	974014.871	614058.686	1280.661	CONC
1765	974017.390	614041.775	1280.596	CONC
1766	974021.795	614008.241	1282.267	CONC
1767	974026.770	613972.221	1280.540	CONC
1768	974034.003	613947.728	1280.941	CONC
1769	974057.648	613911.751	1280.263	CONC
1770	974039.078	613978.453	1276.817	WL
1771	973994.223	613962.333	1272.617	WL
1772	974550.938	616583.122	1286.644	WL
1773	974551.384	616574.782	1288.882	HDWL
1774	974542.158	616571.468	1288.848	HDWL
1775	974527.739	616566.285	1288.758	HDWL
1776	974493.959	616530.164	1289.284	BC
1777	974547.933	616551.744	1289.802	BC
1778	974634.292	616578.964	1290.574	BC
1779	974724.527	616598.460	1291.424	BC
1780	974810.827	616608.921	1292.218	BC
1781	974878.479	616611.808	1292.802	BC
1782	974898.714	616611.901	1292.927	BC
1783	974886.023	616632.828	1290.894	HDWL
1784	974877.937	616632.862	1290.862	HDWL
1785	974870.186	616632.883	1290.904	HDWL
1786	974871.300	616640.240	1288.394	WL
1787	974903.606	616576.807	1293.463	BC
1788	974890.628	616577.125	1293.375	BC
1789	974878.355	616578.144	1293.248	BC
1790	974816.383	616575.476	1292.750	BC
1791	974796.588	616573.704	1292.574	BC
1792	974756.251	616568.817	1292.169	BC
1793	974667.267	616552.211	1291.281	BC
1794	974608.929	616536.553	1290.845	BC
1795	974580.904	616532.503	1290.682	BC
1796	974551.016	616526.958	1290.257	BC
1797	974537.824	616523.046	1290.171	BC
1798	974528.543	616519.601	1290.081	BC
1799	974550.903	616527.185	1290.316	BC
1800	974582.312	616538.524	1290.377	BC
1801	974637.943	616555.179	1291.015	BC
1802	974725.789	616574.494	1291.713	BC
1803	974813.116	616585.305	1292.651	BC
1804	974853.439	616585.746	1293.106	BC
1805	974865.752	616583.227	1293.089	BC
1806	974878.386	616578.144	1293.238	BC
1807	974899.875	616554.015	1293.173	BC
1808	974820.148	616551.720	1292.386	BC
1809	974740.877	616542.418	1291.446	BC
1810	974681.932	616531.064	1290.864	BC
1811	974645.918	616522.050	1290.522	BC
1812	974641.380	616520.612	1290.531	BC
1813	974630.493	616512.101	1290.273	BC
1814	974628.943	616495.798	1291.089	BC
1815	974596.868	616483.213	1291.132	BC
1816	974586.816	616497.494	1290.194	BC
1817	974572.350	616498.907	1289.933	BC
1818	974516.585	616476.737	1289.257	BC
1819	974680.365	616876.676	1291.496	NG

1820	974674.464	616883.661	1291.525	TOP
1821	974673.056	616903.994	1289.363	TOP
1822	974677.188	616923.713	1289.527	TOP
1823	974680.089	616940.676	1291.354	TOP
1824	974682.836	616950.618	1291.219	NG
1825	974545.178	616976.776	1289.216	NG
1826	974613.423	616960.122	1290.723	NG
1827	974666.795	616937.431	1291.312	NG
1828	974661.449	616895.582	1290.848	NG
1829	974613.820	616914.532	1290.365	NG
1830	974552.266	616930.477	1289.984	NG
1831	974552.534	616943.381	1287.669	TOE
1832	974611.838	616926.427	1288.244	TOE
1833	974663.936	616907.584	1288.822	TOE
1834	974666.074	616922.717	1288.841	TOE
1835	974623.311	616941.798	1288.146	TOE
1836	974550.975	616962.689	1287.613	TOE
1837	974545.240	616962.120	1286.643	WL
1838	974679.371	616914.536	1288.396	WL
1839	972598.696	616508.985	1274.422	NG
1840	972596.035	616518.162	1273.981	TOP
1841	972594.492	616522.730	1272.985	TOP
1842	972589.339	616552.735	1273.024	TOP
1843	972588.937	616557.775	1273.887	TOP
1844	972586.985	616567.189	1274.298	NG
1845	972577.955	616582.097	1274.337	CONC
1846	972583.568	616557.281	1275.017	CONC
1847	972587.407	616535.770	1276.102	CONC
1848	972590.716	616514.616	1275.006	CONC
1849	972594.148	616482.503	1274.573	CONC
1850	972605.470	616522.298	1271.819	WL
1851	972564.343	616490.161	1267.974	WL
1852	973323.540	617042.042	1278.084	NG
1853	973315.402	617056.206	1279.658	TOP
1854	973312.259	617061.293	1277.763	TOP
1855	973302.345	617070.035	1277.864	TOP
1856	973293.691	617081.339	1277.739	TOP
1857	973288.912	617089.041	1278.985	TOP
1858	973282.558	617097.122	1278.778	NG
1859	973273.815	617110.887	1278.653	CONC
1860	973285.237	617082.336	1279.311	CONC
1861	973296.720	617067.448	1280.224	CONC
1862	973307.657	617052.595	1279.325	CONC
1863	973322.925	617032.179	1278.501	CONC
1864	973326.645	617067.804	1276.306	WL
1865	973290.180	617042.771	1274.735	WL
1866	972981.696	616717.045	1277.710	TOP
1867	972985.960	616711.514	1276.146	TOP
1868	972993.911	616700.384	1276.246	TOP
1869	973001.651	616691.868	1276.460	TOP
1870	972988.351	616711.344	1274.675	WL
1871	972975.512	616699.578	1271.750	WL
1872	975667.363	612796.355	1293.480	RB
2000	975225.932	611654.183	1288.767	BC
2001	975226.348	611718.902	1288.813	BC
2002	975226.560	611776.908	1288.804	BC
2003	975220.942	611791.733	1287.943	BC
2004	975203.826	611797.931	1287.873	BC
2005	975135.520	611798.511	1287.654	BC
2006	975040.242	611799.236	1287.173	BC
2007	975046.274	611817.070	1287.221	P
2008	975137.175	611816.314	1287.494	P
2009	975244.685	611815.565	1288.057	P
2010	975244.327	611800.178	1287.750	P

2011	975244.244	611795.889	1287.850	P
2012	975244.493	611773.999	1288.717	P
2013	975244.619	611716.079	1288.689	P
2014	975243.681	611654.286	1288.466	P
2015	975089.346	611662.907	1286.403	NG
2016	975099.741	611683.971	1286.017	NG
2017	975120.046	611694.438	1285.876	NG
2018	975165.127	611693.312	1286.868	NG
2019	975190.658	611702.370	1287.801	NG
2020	975205.258	611728.251	1288.366	NG
2021	975204.499	611756.764	1287.868	NG
2022	975194.564	611773.528	1287.453	NG
2023	975172.700	611775.524	1287.245	NG
2024	975127.080	611775.610	1286.412	NG
2025	975073.611	611772.599	1285.636	NG
2026	975039.123	611781.361	1286.917	NG
2027	975090.936	611737.622	1281.496	NG
2028	975140.164	611737.677	1281.903	NG
2029	975243.647	611640.779	1288.442	BCFL
2030	974893.274	611155.433	1285.513	BC
2031	974899.782	611189.279	1285.392	BC
2032	974914.937	611214.397	1285.418	BC
2033	974953.026	611224.948	1285.295	BC
2034	974962.688	611222.038	1285.516	BC
2035	974971.318	611219.998	1285.669	BC
2036	975016.839	611210.980	1286.030	BC
2037	975054.092	611203.695	1286.497	BC
2038	975051.496	611166.223	1286.400	BC
2039	974995.926	611176.315	1285.814	BC
2040	974956.086	611183.502	1285.436	BC
2041	974940.211	611180.615	1285.047	BC
2042	974931.772	611166.714	1285.450	BC
2043	974937.245	611189.058	1284.872	VG
2044	974939.739	611203.817	1284.844	VG
2045	974943.237	611223.427	1284.746	VG
2046	974951.637	611224.604	1284.581	SCUP
2047	974939.127	611224.554	1284.536	SCUP
2048	974924.511	611219.773	1284.550	SCUP
2049	974940.992	611289.551	1280.560	NG
2050	975000.181	611278.547	1280.566	NG
2051	975052.026	611185.188	1286.256	P
2052	974929.107	611198.201	1285.064	P
2053	974910.607	611150.130	1285.477	P
2054	974864.543	610130.300	1287.660	P
2055	974793.366	610287.084	1285.847	VG
2056	974808.467	610292.088	1285.873	VG
2057	974823.258	610296.966	1285.877	VG
2058	974823.744	610300.862	1285.874	VG
2059	974818.752	610316.129	1285.994	VG
2060	974814.166	610330.527	1286.053	VG
2061	974787.257	610300.342	1285.900	SCUP
2062	974791.942	610286.684	1285.760	SCUP
2063	974795.975	610274.544	1285.944	SCUP
2064	974765.703	610279.166	1285.391	NG
2065	974774.927	610188.376	1288.332	NG
2066	974738.845	610180.246	1287.927	NG
2067	974691.636	610167.653	1287.639	NG
2068	974802.244	610309.852	1286.065	BCFL
2069	974666.712	611455.374	1284.347	NG
2070	974655.954	611418.022	1283.000	NG
2071	974643.917	611375.988	1283.206	NG
2072	974626.637	611303.351	1283.399	NG
2073	974628.702	611253.046	1285.897	NG
2074	974655.458	611315.004	1280.484	NG

2075	974663.351	611370.181	1279.988	NG
2076	974675.293	611423.555	1280.736	NG
2077	974652.975	611373.097	1279.990	FL
2078	974587.019	611387.003	1278.268	FL
2079	974572.691	611405.109	1278.272	NG
2080	974565.109	611354.876	1278.517	NG
2081	974298.850	611408.010	1277.620	NG
2082	974294.069	611455.245	1277.294	NG
2083	974282.424	611487.834	1281.213	NG
2084	974252.327	611462.149	1280.744	NG
2085	974261.396	611412.750	1281.100	NG
2086	974282.199	611367.925	1280.782	NG
2087	974274.736	611438.186	1277.362	FL
2088	974215.264	611434.645	1273.808	FL
2089	974204.891	611413.889	1274.318	NG
2090	974201.793	611472.195	1274.318	NG
2091	974080.473	611433.269	1273.883	NG
2092	974073.499	611470.859	1273.576	NG
2093	974044.881	611485.409	1277.447	NG
2094	974050.750	611446.703	1277.038	NG
2095	974055.686	611404.462	1277.220	NG
2096	974062.069	611456.847	1274.039	FL
2097	974024.268	611443.084	1274.546	FL
2098	974008.627	611446.109	1274.296	NG
2099	974004.769	611434.484	1274.445	NG
2100	973937.581	611421.469	1273.947	DRY
2101	973846.231	611381.450	1278.007	NG
2102	973864.947	611409.901	1277.919	NG
2103	973869.846	611439.874	1276.884	NG
2104	973869.661	611443.405	1276.078	NG
2105	973868.303	611456.089	1275.906	NG
2106	973867.745	611460.202	1276.793	NG
2107	973855.978	611491.323	1277.411	NG
2108	973821.541	611539.283	1278.427	NG
2109	973799.944	611556.633	1278.736	NG
2110	973808.346	611518.906	1275.166	TOE
2111	973839.488	611496.041	1275.187	TOE
2112	973852.541	611455.935	1275.163	TOE
2113	973855.156	611440.908	1275.156	TOE
2114	973849.234	611415.407	1275.170	TOE
2115	973827.889	611384.288	1275.311	TOE
2116	973853.952	611447.710	1274.948	WL
2117	974782.524	611408.778	1280.994	NG
2118	974793.315	611350.337	1280.794	NG
2119	974786.129	611306.228	1281.082	NG
2120	974809.536	611350.124	1280.152	FL
2121	974843.748	611345.898	1279.610	FL
2122	974828.111	611402.166	1283.810	NG
2123	974832.672	611365.368	1283.190	NG
2124	974834.388	611304.254	1283.885	NG
2125	974814.605	611234.511	1285.930	NG
2126	974859.796	611345.752	1280.071	NG
2127	974983.001	611342.787	1280.429	NG
2128	973610.889	611493.601	1276.988	CONC
2129	973590.697	611469.829	1276.751	CONC
2130	973582.279	611438.470	1277.106	CONC
2131	973580.736	611426.114	1276.280	CONC
2132	973578.848	611412.975	1276.275	CONC
2133	973576.527	611398.925	1277.335	CONC
2134	973565.404	611362.436	1276.786	CONC
2135	973547.025	611337.899	1276.382	CONC
2136	973585.313	611422.764	1274.892	PIPE
2137	973584.606	611418.953	1274.886	PIPE
2138	973584.228	611414.500	1274.904	PIPE

2139	973573.923	611416.307	1274.851	PIPE
2140	973574.649	611420.290	1274.926	PIPE
2141	973575.293	611424.210	1274.954	PIPE
2142	973597.253	611446.369	1274.938	WL
2143	973560.083	611445.001	1270.954	WL
2144	973164.911	611538.996	1273.013	NG
2145	973173.369	611502.967	1272.334	CONC
2146	973177.931	611473.432	1272.432	CONC
2147	973178.798	611461.600	1271.702	CONC
2148	973178.800	611448.916	1271.697	CONC
2149	973178.967	611436.426	1272.353	CONC
2150	973178.427	611422.314	1272.038	CONC
2151	973193.613	611396.253	1272.250	NG
2152	973183.644	611458.596	1270.973	PIPE
2153	973183.696	611454.431	1270.992	PIPE
2154	973183.642	611450.721	1270.878	PIPE
2155	973173.735	611450.413	1270.972	PIPE
2156	973173.812	611454.618	1270.902	PIPE
2157	973173.946	611458.633	1270.988	PIPE
2158	973165.563	611470.275	1270.864	TOP
2159	973168.462	611441.463	1270.691	TOP
2160	973158.384	611418.804	1265.094	WL
2161	973191.019	611422.086	1270.884	WL
2162	973568.628	611434.056	1274.596	TOP
2163	973567.590	611409.440	1274.696	TOP
2164	972913.943	611804.773	1270.013	BC
2165	972927.147	611769.381	1269.931	BC
2166	972941.926	611737.703	1269.811	BC
2167	972944.121	611733.334	1269.889	BC
2168	972955.845	611721.490	1269.603	BC
2169	972973.501	611725.643	1270.119	BC
2170	973015.412	611750.020	1271.238	BC
2171	973085.681	611778.616	1272.117	BC
2172	973125.500	611788.221	1272.375	BC
2173	973131.084	611752.974	1272.431	BC
2174	973070.110	611735.293	1272.006	BC
2175	973003.933	611702.762	1270.559	BC
2176	972957.788	611674.353	1269.268	BC
2177	972896.729	611799.566	1269.985	P
2178	972928.630	611724.928	1269.401	P
2179	972948.975	611689.994	1269.251	P
2180	973001.459	611722.188	1270.358	P
2181	973129.066	611770.568	1272.273	P
2182	973028.168	611776.082	1267.582	TOP
2183	973022.417	611779.416	1267.567	TOP
2184	973008.426	611777.461	1267.490	TOP
2185	972996.734	611772.662	1267.490	TOP
2186	972990.331	611767.158	1267.618	TOP
2187	972991.043	611759.632	1267.614	TOP
2188	972993.754	611754.185	1267.677	TOP
2189	973021.167	611698.073	1270.319	TOP
2190	972980.641	611746.420	1270.362	HDWL
2191	972994.972	611754.425	1270.300	HDWL
2192	973009.376	611762.137	1270.348	HDWL
2193	973010.637	611692.295	1270.297	HDWL
2194	973024.981	611700.137	1270.415	HDWL
2195	973039.240	611708.068	1270.525	HDWL
2196	973031.831	611702.485	1266.212	CONC
2197	973038.588	611697.128	1266.192	CONC
2198	973048.881	611697.786	1266.096	CONC
2199	973062.420	611701.083	1266.211	CONC
2200	973071.864	611695.762	1266.244	CONC
2201	973019.604	611695.549	1266.071	CONC
2202	973021.505	611686.693	1266.151	CONC

2203	973020.422	611682.321	1266.187	CONC
2204	973017.203	611678.658	1266.193	CONC
2205	973010.455	611673.645	1266.152	CONC
2206	973004.995	611668.403	1266.131	CONC
2207	973001.976	611758.743	1268.857	CONC
2208	973007.780	611767.291	1268.327	CONC
2209	973032.345	611777.516	1268.236	CONC
2210	972986.379	611751.035	1268.006	CONC
2211	972978.244	611752.866	1268.209	CONC
2212	972967.801	611752.073	1268.249	CONC
2213	972964.163	611754.377	1267.632	WL
2214	973056.979	611699.888	1264.874	WL
2215	972948.284	611689.477	1269.294	BCFL
2216	972359.141	611606.396	1267.667	BC
2217	972313.744	611606.755	1267.443	BC
2218	972292.817	611609.638	1267.395	BC
2219	972232.512	611622.800	1267.862	BC
2220	972205.346	611627.111	1267.903	BC
2221	972184.291	611628.731	1267.585	BC
2222	972170.092	611622.632	1266.785	BC
2223	972164.291	611608.297	1266.896	BC
2224	972164.391	611551.876	1266.813	BC
2225	972164.268	611502.356	1266.738	BC
2226	972163.784	611456.762	1266.780	BC
2227	972111.634	611454.116	1266.806	BC
2228	972106.428	611517.437	1266.660	BC
2229	972106.298	611608.539	1266.876	BC
2230	972137.999	611457.053	1266.924	P
2231	972135.049	611645.875	1267.038	P
2232	972162.127	611646.579	1266.575	P
2233	972186.352	611646.537	1267.301	P
2234	972361.815	611624.855	1267.543	P
2235	972305.687	611578.408	1266.258	CONC
2236	972265.379	611589.548	1266.191	CONC
2237	972235.346	611587.609	1266.206	CONC
2238	972201.613	611577.960	1266.219	CONC
2239	972189.392	611567.779	1266.311	CONC
2240	972191.092	611512.168	1266.138	CONC
2241	972200.611	611493.441	1266.127	CONC
2242	972215.551	611473.495	1266.174	CONC
2243	972194.031	611514.058	1265.685	TOP
2244	972216.912	611530.108	1265.655	TOP
2245	972224.925	611541.336	1265.687	TOP
2246	972217.317	611549.049	1265.712	TOP
2247	972191.577	611566.445	1265.661	TOP
2248	972190.025	611557.906	1266.578	HDWL
2249	972180.802	611548.426	1266.547	HDWL
2250	972180.660	611548.242	1267.065	HDWL
2251	972180.567	611531.479	1267.071	HDWL
2252	972180.748	611531.281	1266.546	HDWL
2253	972189.857	611521.405	1266.588	HDWL
2254	972081.337	611521.642	1266.405	HDWL
2255	972090.307	611530.855	1266.377	HDWL
2256	972090.442	611531.150	1266.859	HDWL
2257	972090.434	611548.213	1266.891	HDWL
2258	972090.238	611548.530	1266.436	HDWL
2259	972080.726	611558.443	1266.387	HDWL
2260	972085.848	611539.740	1259.165	FL
2261	972186.004	611539.667	1259.909	FL
2262	972067.034	611539.343	1259.092	NG
2263	971979.097	611554.557	1257.477	NG
2264	972225.314	611541.525	1264.861	WL
2265	972135.390	611646.681	1266.989	BCFL
2266	971328.323	611130.756	1257.973	BC

2267	971368.035	611088.862	1258.732	BC
2268	971401.489	611040.260	1258.853	BC
2269	971370.546	611021.401	1259.148	BC
2270	971340.575	611065.260	1258.806	BC
2271	971301.470	611106.300	1257.857	BC
2272	971313.152	611120.243	1257.802	P
2273	971360.490	611070.389	1258.639	P
2274	971389.706	611025.480	1258.878	P
2275	971377.456	611095.743	1258.302	HDWL
2276	971384.216	611086.693	1258.124	HDWL
2277	971390.655	611078.139	1258.127	HDWL
2278	971344.873	611043.100	1257.952	HDWL
2279	971337.985	611052.117	1257.902	HDWL
2280	971331.274	611060.712	1257.857	HDWL
2281	971330.676	611045.641	1253.261	FL
2282	971388.302	611090.843	1253.813	FL
2283	971447.401	611107.387	1258.865	NG
2284	971431.537	611127.842	1254.283	NG
2285	971415.683	611150.243	1258.370	NG
2286	971320.266	611037.547	1252.967	NG
2287	971291.856	610985.832	1253.558	NG
2288	971271.482	611151.464	1257.245	BCFL
2289	971014.488	610979.719	1253.579	NG
2290	971014.500	611028.468	1252.376	NG
2291	971016.156	611044.775	1254.101	NG
2292	970935.958	611045.063	1253.134	NG
2293	970933.848	611014.266	1252.267	NG
2294	970934.170	610976.880	1253.745	NG
2295	970902.202	610977.596	1253.479	TOE
2296	970902.876	611010.500	1252.453	TOE
2297	970903.163	611042.468	1253.149	TOE
2298	970888.935	611042.789	1257.052	TOP
2299	970888.128	611010.219	1257.039	TOP
2300	970888.062	610978.181	1257.299	TOP
2301	970899.544	611009.920	1252.284	FL
2302	970861.573	611009.604	1250.136	FL
2303	970871.390	611042.875	1256.239	TOP
2304	970870.992	611009.274	1256.172	TOP
2305	970870.782	610977.515	1256.165	TOP
2306	970857.206	610977.309	1249.639	TOE
2307	970857.589	611009.462	1249.631	TOE
2308	970857.468	611042.743	1249.643	TOE
2309	972584.817	610304.775	1269.929	CONC
2310	972609.957	610315.370	1269.644	CONC
2311	972638.308	610312.113	1268.950	CONC
2312	972673.259	610310.558	1268.496	CONC
2313	972709.918	610327.290	1268.632	CONC
2314	972760.869	610367.055	1269.411	CONC
2315	972801.631	610394.195	1270.087	CONC
2316	972682.209	610338.635	1266.062	TOP
2317	972708.564	610348.221	1266.128	TOP
2318	972731.959	610371.066	1266.152	TOP
2319	972741.476	610399.393	1266.179	TOP
2320	972740.573	610421.091	1266.198	TOP
2321	972757.732	610322.826	1266.289	TOP
2322	972730.279	610322.212	1266.220	TOP
2323	972714.214	610311.345	1266.174	TOP
2324	972704.555	610289.096	1266.140	TOP
2325	972727.154	610316.653	1266.080	PIPE
2326	972705.845	610348.570	1266.042	PIPE
2327	972741.225	610401.568	1266.772	PIPE
2328	972739.597	610396.247	1264.817	WL
2329	972734.242	610322.647	1264.851	WL
2330	972566.736	610267.381	1269.977	BCFL

2331	973312.900	608454.306	1270.056	BC
2332	973291.733	608473.599	1270.205	BC
2333	973265.730	608478.118	1270.226	BC
2334	973256.899	608477.913	1270.303	BC
2335	973247.606	608478.946	1270.353	BC
2336	973162.310	608495.585	1270.177	BC
2337	973151.429	608503.000	1269.461	BC
2338	973149.385	608518.969	1269.587	BC
2339	973154.895	608546.319	1269.594	BC
2340	973160.985	608581.357	1269.650	BC
2341	973165.863	608616.604	1269.815	BC
2342	973092.509	608530.089	1269.569	BC
2343	973084.386	608516.864	1269.298	BC
2344	973069.152	608513.837	1269.950	BC
2345	973019.830	608523.246	1270.303	BC
2346	973014.659	608487.906	1270.305	BC
2347	973062.179	608478.601	1269.740	BC
2348	973074.758	608470.246	1269.406	BC
2349	973077.867	608455.114	1269.330	BC
2350	973072.419	608426.375	1269.324	BC
2351	973129.633	608417.968	1269.263	BC
2352	973135.922	608448.757	1269.408	BC
2353	973143.043	608457.321	1269.389	BC
2354	973158.132	608459.882	1270.103	BC
2355	973208.155	608449.998	1270.468	BC
2356	973259.993	608439.752	1270.214	BC
2357	973272.800	608431.372	1269.913	BC
2358	973275.335	608416.182	1270.300	BC
2359	973295.201	608436.761	1269.895	P
2360	973287.111	608450.684	1269.647	P
2361	973208.254	608468.205	1270.286	P
2362	973162.571	608477.090	1269.863	P
2363	973141.373	608481.272	1268.994	P
2364	973114.191	608488.484	1269.617	P
2365	973138.943	608633.594	1269.968	P
2366	973085.718	608492.386	1269.037	P
2367	973017.277	608505.517	1270.095	P
2368	972983.231	608512.717	1269.728	P
2369	973102.932	608419.097	1269.955	BC
2370	973108.681	608448.664	1269.996	BC
2371	973111.071	608450.336	1269.889	BC
2372	973112.677	608447.905	1269.997	BC
2373	973106.975	608418.187	1269.886	BC
2374	973111.158	608451.051	1269.482	PK
2375	973242.454	608552.392	1268.077	NG
2376	973287.589	608531.937	1267.731	NG
2377	973227.947	608574.765	1267.657	NG
2378	973051.848	608437.887	1263.394	FL
2379	972987.870	608454.078	1263.086	FL
2380	972706.385	608511.050	1261.633	FL
2381	972745.145	608555.318	1267.194	BCFL
2382	971848.423	608362.953	1256.018	NG
2383	971885.125	608411.571	1256.036	NG
2384	971820.896	608420.603	1255.647	FL
2385	971817.914	608418.100	1255.628	FL
2386	971814.699	608415.651	1255.697	FL
2387	971765.244	608473.706	1255.324	FL
2388	971768.104	608476.160	1255.336	FL
2389	971771.051	608478.647	1255.325	FL
2390	971847.926	608464.933	1261.448	NG
2391	971791.233	608461.653	1261.320	NG
2392	971749.218	608458.487	1260.932	NG
2393	971787.136	608541.984	1260.330	NG
2394	971770.803	608542.693	1255.019	FL

2395	971804.859	608640.415	1255.414	FL
2396	971725.747	608524.558	1255.113	FL
2397	971725.750	608520.840	1255.100	FL
2398	971725.720	608517.317	1255.103	FL
2399	971506.614	608516.557	1254.921	FL
2400	971506.506	608520.417	1254.753	FL
2401	971506.414	608523.826	1254.583	FL
2402	971662.173	608578.730	1260.339	BC
2403	971672.212	608566.097	1260.286	BC
2404	971679.304	608560.450	1260.170	BC
2405	971697.498	608531.087	1259.622	BC
2406	971674.792	608484.918	1259.984	BC
2407	971660.709	608466.211	1260.465	BC
2408	971622.801	608472.391	1260.151	BC
2409	971622.057	608489.761	1260.383	BC
2410	971616.986	608503.299	1260.287	BC
2411	971612.092	608522.546	1260.193	BC
2412	971618.327	608548.796	1260.366	BC
2413	971622.188	608562.720	1260.055	BC
2414	971621.855	608580.215	1260.302	BC
2415	971639.474	608531.182	1260.395	BC
2416	971652.933	608541.331	1260.319	BC
2417	971670.233	608531.883	1260.347	BC
2418	971655.530	608531.508	1260.351	BC
2419	971656.175	608522.623	1260.353	BC
2420	971671.769	608523.053	1260.264	BC
2421	971655.146	608508.085	1260.310	BC
2422	971638.289	608522.162	1260.329	BC
2423	971573.531	608543.500	1261.652	NG
2424	971570.292	608510.889	1261.488	NG
2425	971108.577	608493.253	1259.676	NG
2426	971108.305	608512.490	1254.404	NG
2427	971108.146	608531.046	1258.015	NG
2428	971107.989	608542.449	1258.353	NG
2429	971108.010	608542.899	1260.221	WALL
2430	971017.911	608542.428	1260.186	WALL
2431	971005.370	608551.277	1258.020	NG
2432	971003.813	608526.018	1258.054	NG
2433	971003.551	608488.648	1258.864	NG
2434	971019.776	608512.523	1254.787	FL
2435	970962.884	608522.079	1253.131	FL
2436	970908.664	608531.318	1256.040	TOP
2437	970926.557	608538.311	1257.734	TOP
2438	970970.719	608543.240	1257.280	TOP
2439	970980.349	608538.679	1257.588	TOP
2440	970987.215	608530.762	1257.591	TOP
2441	970987.622	608493.195	1258.852	TOP
2442	970929.781	608502.615	1258.236	TOP
2443	970911.026	608505.053	1256.346	TOP
2444	970910.846	608506.244	1255.599	TOE
2445	970929.061	608507.690	1255.728	TOE
2446	970954.338	608521.405	1252.579	TOE
2447	970953.899	608523.992	1252.570	TOE
2448	970925.864	608532.567	1255.803	TOE
2449	970908.396	608530.162	1255.277	TOE
2450	970903.923	608574.664	1255.794	TOP
2451	970913.072	608486.435	1256.387	TOP
2452	970895.120	608485.243	1247.479	TOE
2453	970892.410	608516.003	1247.465	TOE
2454	970888.022	608573.757	1247.433	TOE
2455	970895.065	608516.317	1248.317	FL
2456	970954.497	608522.665	1248.373	FL
2457	973344.767	612671.983	1271.430	CHECK
2458	973319.677	612727.306	1271.634	BC

2459	973320.072	612818.106	1273.165	BC
2460	973314.266	612834.124	1272.435	BC
2461	973299.089	612840.485	1272.519	BC
2462	973232.432	612841.873	1271.979	BC
2463	973232.113	612879.660	1272.904	BC
2464	973281.613	612878.684	1273.321	BC
2465	973328.732	612877.926	1273.600	BC
2466	973256.216	612841.941	1271.551	CB
2467	973248.073	612841.996	1271.492	CB
2468	973256.862	612812.513	1270.726	HDWL
2469	973277.630	612812.259	1270.727	HDWL
2470	973297.439	612812.543	1270.716	HDWL
2471	973296.573	612810.958	1268.254	TOP
2472	973290.483	612778.953	1268.162	TOP
2473	973288.641	612774.377	1268.213	TOP
2474	973276.604	612769.362	1268.265	TOP
2475	973262.137	612764.990	1268.276	TOP
2476	973235.309	612762.415	1268.187	TOP
2477	973222.287	612751.290	1268.291	TOP
2478	973258.215	612811.672	1268.301	TOP
2479	973255.621	612803.668	1268.249	TOP
2480	973248.500	612799.969	1268.275	TOP
2481	973241.468	612800.623	1268.358	TOP
2482	973265.594	612811.342	1267.875	TOP
2483	973264.147	612803.258	1267.875	TOP
2484	973256.863	612796.167	1267.919	TOP
2485	973249.450	612784.791	1267.831	TOP
2486	973255.014	612776.206	1267.876	TOP
2487	973265.107	612775.274	1267.884	TOP
2488	973278.476	612782.205	1267.859	TOP
2489	973284.983	612791.787	1267.839	TOP
2490	973288.445	612811.701	1267.897	TOP
2491	973277.152	612810.034	1265.752	FL
2492	973250.147	612780.083	1267.426	WL
2500	971618.961	612477.259	1261.659	SW
2501	971615.574	612462.155	1261.387	SW
2502	971617.360	612449.559	1260.935	SW
2503	971620.811	612436.422	1260.939	SW
2504	971625.549	612423.400	1260.813	SW
2505	971628.904	612403.693	1261.109	SW
2506	971644.353	612376.381	1261.558	SW
2507	971651.356	612364.088	1261.961	SW
2508	971653.206	612357.734	1262.065	SW
2509	971638.997	612386.064	1261.155	SW
2510	971627.843	612379.129	1263.597	SW
2511	971620.912	612378.955	1263.710	SW
2512	971621.568	612371.203	1263.673	NG
2513	971635.985	612367.340	1263.447	NG
2514	971627.175	612395.537	1261.354	NG
2515	971633.667	612415.160	1260.661	NG
2516	971628.838	612477.010	1260.418	TOP
2517	971626.547	612460.391	1260.413	TOP
2518	971626.825	612451.223	1260.421	TOP
2519	971631.734	612438.717	1260.384	TOP
2520	971654.619	612406.229	1260.419	TOP
2521	971664.560	612383.512	1260.397	TOP
2522	971662.102	612355.438	1260.359	TOP
2523	971637.585	612430.133	1259.694	WL
2524	971600.492	612391.690	1260.311	TOP
2525	971613.123	612408.719	1260.241	TOP
2526	971614.102	612429.649	1260.291	TOP
2527	971604.613	612456.640	1260.304	TOP
2528	971587.348	612468.114	1260.732	TOP
2529	971611.390	612438.997	1259.710	WL

2530	971214.551	612348.795	1260.355	TOP
2531	971194.676	612340.127	1260.392	TOP
2532	971183.783	612324.638	1260.358	TOP
2533	971183.528	612320.287	1260.329	TOP
2534	971194.435	612303.685	1260.407	TOP
2535	971223.324	612299.354	1260.386	TOP
2536	971183.833	612320.745	1260.825	TOP
2537	971184.211	612324.101	1260.761	TOP
2538	971181.681	612324.377	1260.793	TOP
2539	971181.319	612321.022	1260.815	TOP
2540	971171.378	612284.759	1261.431	NG
2541	971171.740	612310.407	1261.227	NG
2542	971169.910	612333.942	1261.121	NG
2543	971170.905	612355.547	1261.454	NG
2544	971172.192	612373.131	1261.403	NG
2545	971170.996	612372.651	1261.752	BC
2546	971170.585	612353.300	1261.557	BC
2547	971155.085	612353.806	1261.151	BC
2548	971153.264	612353.117	1261.142	BC
2549	971152.501	612351.193	1261.149	BC
2550	971152.732	612309.403	1261.150	BC
2551	971153.889	612306.327	1261.196	BC
2552	971156.823	612305.037	1261.239	BC
2553	971171.003	612304.650	1261.519	BC
2554	971170.433	612286.137	1261.651	BC
2555	971142.104	612322.907	1260.202	SD
2556	971142.209	612326.431	1260.192	SD
2557	971139.658	612326.481	1260.192	SD
2558	971139.493	612323.217	1260.234	SD
2559	971108.994	612287.310	1261.661	BC
2560	971108.603	612322.891	1261.775	BC
2561	971108.592	612327.703	1261.729	BC
2562	971109.549	612388.132	1261.701	BC
2563	971141.298	612383.615	1260.531	P
2564	971140.830	612330.905	1260.282	P
2565	971141.172	612316.977	1260.322	P
2566	971140.034	612284.384	1260.620	P
2567	971093.440	612283.334	1260.347	NG
2568	971093.954	612313.758	1259.656	NG
2569	971094.086	612339.893	1260.288	NG
2570	971094.318	612384.381	1260.562	NG
2571	971108.460	612328.169	1261.189	CONC
2572	971093.916	612328.319	1258.820	CONC
2573	971093.894	612322.440	1258.877	CONC
2574	971108.301	612322.295	1261.034	CONC
2575	971101.588	612325.281	1259.711	SDMH
2576	971100.331	612244.066	1260.790	SDMH
2577	971093.821	612325.203	1258.344	FL
2578	971092.215	612364.289	1258.746	NG
2579	971091.654	612322.594	1258.741	NG
2580	971091.398	612276.238	1258.481	NG
2581	971030.045	612285.363	1259.477	NG
2582	971029.178	612327.965	1259.396	NG
2583	971034.523	612439.512	1258.621	NG
2584	970999.925	612497.473	1257.868	NG
2585	970993.430	612430.237	1257.605	NG
2586	970984.641	612340.643	1257.831	NG
2587	970979.724	612295.986	1257.825	NG
2588	970976.175	612238.993	1258.825	NG
2589	970957.074	612239.626	1256.497	TOP
2590	970966.438	612338.515	1256.535	TOP
2591	970975.406	612431.773	1256.556	TOP
2592	970963.085	612430.295	1250.896	TOE
2593	970951.611	612312.548	1250.712	TOE

2594	970944.684	612238.949	1250.606	TOE
2595	970949.432	612246.621	1252.490	FL
2600	971183.100	608135.999	1260.055	TOP
2601	971165.925	608123.353	1260.168	TOP
2602	971162.488	608109.468	1260.114	TOP
2603	971162.435	608104.187	1260.037	TOP
2604	971181.068	608073.557	1260.080	TOP
2605	971203.952	608066.977	1260.102	TOP
2606	971162.843	608104.806	1260.546	CONC
2607	971162.801	608108.722	1260.583	CONC
2608	971159.804	608108.701	1260.602	CONC
2609	971159.933	608104.699	1260.587	CONC
2610	971171.598	608066.374	1261.636	SW
2611	971160.011	608084.450	1261.174	SW
2612	971156.621	608096.111	1261.180	SW
2613	971153.875	608107.969	1261.097	SW
2614	971150.386	608126.970	1261.708	SW
2615	971150.377	608103.601	1260.766	P
2616	971088.781	608087.696	1260.985	P
2617	971013.518	608118.199	1261.170	P
2618	971019.228	608070.791	1261.418	P
2619	971020.776	608056.981	1261.414	P
2620	971021.857	608046.078	1261.507	P
2621	971083.235	608074.667	1261.008	P
2622	971086.489	608065.041	1261.137	P
2623	971155.136	608082.558	1260.408	P
2624	971152.425	608093.072	1260.494	P
2625	971023.093	608017.224	1258.948	P
2626	970991.115	608046.045	1261.407	BC
2627	970990.147	608054.421	1261.419	BC
2628	970985.660	608095.513	1260.875	BC
2629	970985.434	608098.634	1261.123	BC
2630	970984.105	608113.478	1260.792	BC
2631	970968.506	608125.780	1257.600	NG
2632	970970.444	608106.192	1257.651	NG
2633	970970.859	608102.360	1257.644	NG
2634	970971.303	608097.739	1257.601	NG
2635	970971.806	608092.463	1257.597	NG
2636	970972.195	608088.411	1257.609	NG
2637	970975.022	608060.224	1257.620	NG
2638	970975.995	608095.113	1258.408	SD
2639	970975.328	608098.356	1258.329	SD
2640	970973.101	608098.307	1258.270	SD
2641	970973.203	608095.097	1258.407	SD
2642	970954.211	608067.383	1257.792	TOP
2643	970949.392	608113.306	1257.972	TOP
2644	970944.539	608161.473	1257.523	TOP
2645	970923.493	608161.739	1247.298	TOE
2646	970926.885	608117.096	1247.053	TOE
2647	970929.591	608075.076	1246.832	TOE
2648	970940.727	608094.203	1252.190	FL
2650	971255.818	608046.524	1260.013	TOP
2651	971248.250	608032.217	1260.088	TOP
2652	971238.717	608024.948	1260.006	TOP
2653	971229.359	608032.461	1260.112	TOP
2654	971228.690	608042.339	1260.014	TOP
2655	971221.760	608055.506	1259.995	TOP
2656	971221.700	608056.215	1259.283	WL
2657	971213.143	608051.061	1261.590	SW
2658	971221.586	608031.693	1261.878	SW
2659	971220.559	608003.456	1261.856	SW
2660	971214.369	607985.760	1261.979	SW
2661	971223.322	608013.899	1261.780	SW
2662	971240.325	608015.811	1261.582	SW

2663	971259.103	608009.381	1261.877	SW
2664	971269.001	607991.581	1261.956	SW
2665	971251.770	608014.727	1261.894	SW
2666	971254.478	608026.846	1261.636	SW
2667	971264.999	608041.835	1261.408	SW
2668	971257.787	607979.033	1260.108	TOP
2669	971251.462	607991.461	1260.088	TOP
2670	971240.531	607997.441	1260.074	TOP
2671	971230.849	607990.106	1260.235	TOP
2672	971229.376	607982.643	1260.107	TOP
2673	971229.817	607982.436	1259.394	WL

Back to top

SOKKIA™

MADE IN U.S.A.

BOOK 4 OF [redacted]

SOKKIA™ FCD99-44

ADMP UPDATE

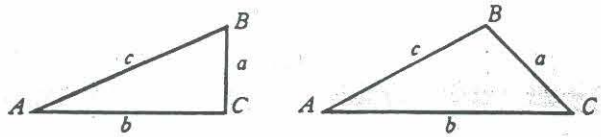
ECONOMY FIELD BOOK

HAPPY VALLEY & 61ST AVE.
WASH & X-SEC.

5043.0001

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES



$\text{Sin } A = \frac{a}{c} = \text{Cos } B$ $\quad$ $\text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B$ $\quad$ $\text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B$ $\quad$ $\text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A,\ a = c \sin A,\ b = c \cos A.$
A, b	B, a, c	$B = 90° - A,\ a = b \tan A,\ c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A,\ b = a \cot A,\ c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B,\ b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B,\ c = \sqrt{a^2 + b^2}$

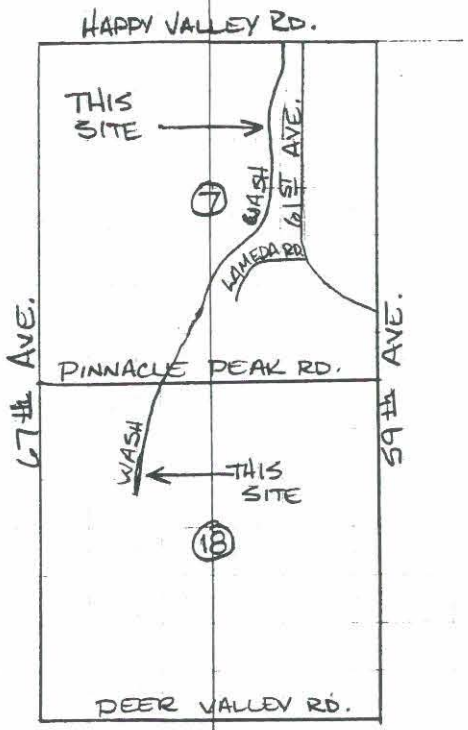
FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a},\ c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C,\ c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN USA

ADMP - UPDATE
FCD 99-44
JOB #5043.0001
HAPPY VALLEY & 61ST AVE, WASH & X-SEC.

THIS SURVEY IS A PORTION OF SEC. 7, T , R , & SEC 18, T , R .



SCALE
1:3000

TABLE OF CONTENTS

DESCRIPTION	PG. #	GPS/CONV.	CREW	DATE
CONTROL & CALIBRATION PT.'S	1-3	GPS	RVR, K.S., MB	8-4-2000
BOX CULVERT TOPO'S & X-SEC'S	4-10	GPS	RVR, K.S., MB	8-4-2000
ADDITIONAL TOPO & X-SEC.	11-15	GPS	RVR, TV	12-4-2000
ADDITIONAL TOPO & X-SEC	16-27	GPS	RVR, TV.	12-5-2000

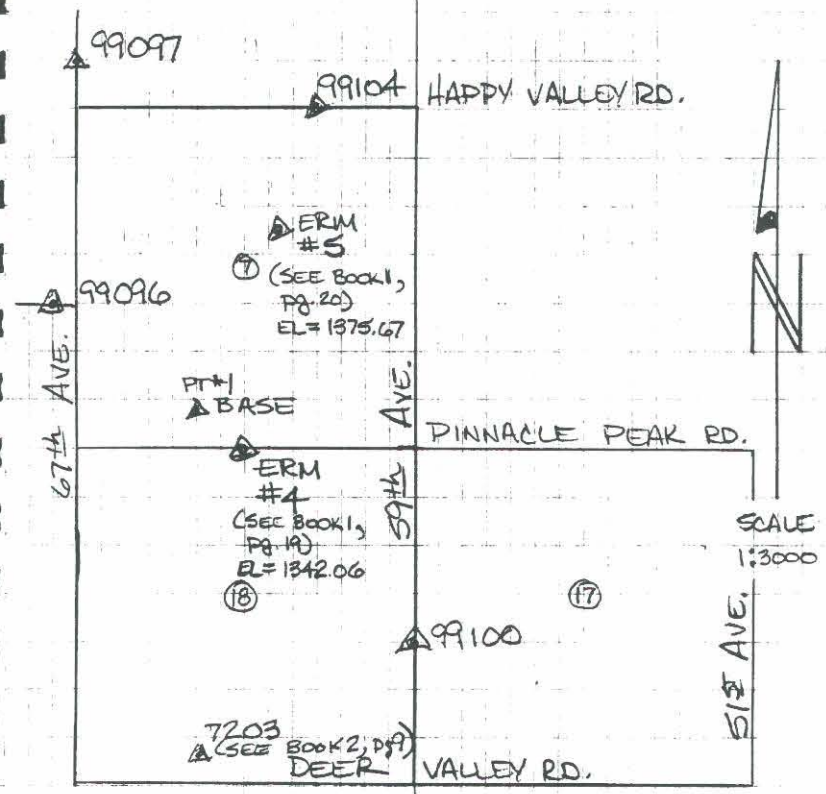
NTROL & CALIBRATION PT.'S

BASE @ #1 #4 RB.
HT. FROM GRND. TO π = 5.23

PT #	DESCRIPTION
5	FLOOD CONTROL B.C. ON N.W. COR. OF HEADWALL @ THE S.W. COR. OF QUESTA DR & 61ST DR. (ERM #5, SEE BOOK 1, pg. 8)
6	FD. C.O.P. BCFD @ 61ST AVE & HAPPY VALLEY RD. (#99104) (EL. OBTAINED FROM BOOK 1, pg. 7 T.P. #7)
7	FD. C.O.P. ~~BCHH~~ @ 67th AVE & SADDLEHORN RD (#99097)
8	FD. PK. NAIL W/SHINER ON ℄ OF CALLE LEJOS, @ 50'+/- W. OF ℄ OF 67th AVE. (#99096) ** CODE IS BCHH SHOULD BE PK. NAIL **

CONT'

SET #4 RB (½") @ 40'+/- S. OF TOP OF SLOPE CUT, IN APPROX. CENTER OF LOT 15, OF THUNDERBIRD VISTAS HOUSING SUB-DIVISION. END OF CUL-DE-SAC W. ALAMEDA RD.



PT #	DESCRIPTION
4	FLOOD CONTROL B.C. @ E. SIDE OF WASH APPROX 15'+/- N OF EDGE OF PAVEMENT & 60'+/- W. OF NO OUTLET SIGN & Pm RANCH SIGN (ERM #4)(SEE BOOK 1, pg 19)
10	FD. PK NAIL W/SHINER 10'+/- N. OF GATE TO RAMADA'S 9, 10, & 11 IN THUNDERBIRD PARK. ACCESS FROM PINNACLE PEAK RD & 59th AVE. PARK ENTRANCE. E. LINE SEC 18, T4N, R2E (#99100)
9	P.K. IN SHINER @ COR. OF V.G. & APRON. @ N.E. COR. OF 64th AVE & LOUISE DR. (#7203)(SEE BOOK 2, pg. 8)

** ALL CONTROL PT.'S **
** LOCATED IN S. MIN. **
** SESSIONS **

CALIBRATION PT.'S

GPS	#4				
GRID	#4A		VERT.	ONLY	✓
GPS	#5				
GRID	#5A		VERT.	ONLY	✓
GPS	#6				
GRID	#6A		VERT.	ONLY	✓
GPS	#7				
GRID	#7A		HORIZ. &	VERT.	✓
GPS	#8				
GRID	#8A		HORIZ. &	VERT.	✓
GPS	#9				
GRID	#9A		HORIZ. &	VERT	✓
GPS	#10				
GRID	#10A		HORIZ. &	VERT.	✓

ERM #4
EL = 1342.06

ERM #5
EL = 1375.67

ADMP #99104
EL = 1407.01

ADMP #99097
EL = 1387.10

ADMP #99096
EL = 1350.07

ADMP # 7203
EL = 1293.60

ADMP # 99100
EL = 1391.54

SEE Pg. 1, THIS BOOK FOR MAP.

BOX CULVERT TOPO'S & X-SEC'S

BASE @ #1 #4RB

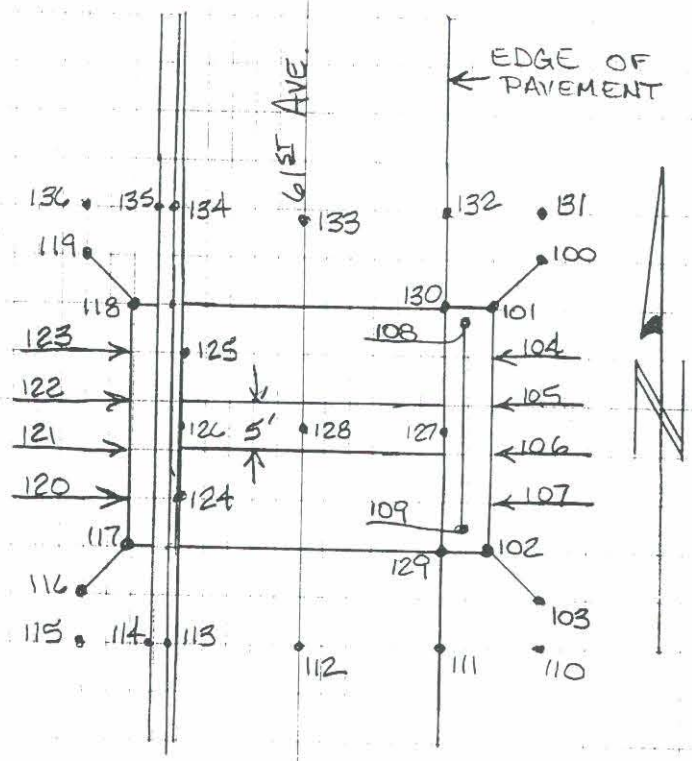
HT. FROM GRND. TO ⊼ = 5.23

BOX CULVERT #1 (61ST AVE)

PT #	DESCRIPTION
100	COR. OF WINGWALL
101 & 102	COR. OF HEADWALL
103	COR. OF WINGWALL
104 - 107	⊼ OF 48" OUTLETS
108 - 109	END OF BARRICADE
111	EDGE OF PAVEMENT
115	N.G @ FACE OF WALL
116 & 119	COR. OF WINGWALL
117 & 118	COR. OF HEADWALL
120 - 123	⊼ OF 48" OUTLETS

SET #4RB (1/2") @ 40'+/- S. OF SLOPE CUT, IN APPROX. CENTER OF LOT 15, OF THUNDERBIRD VISTAS HOUSING SUB-DIVISION. END OF CUL-DE-SAC / W. ALAMEDA RD.

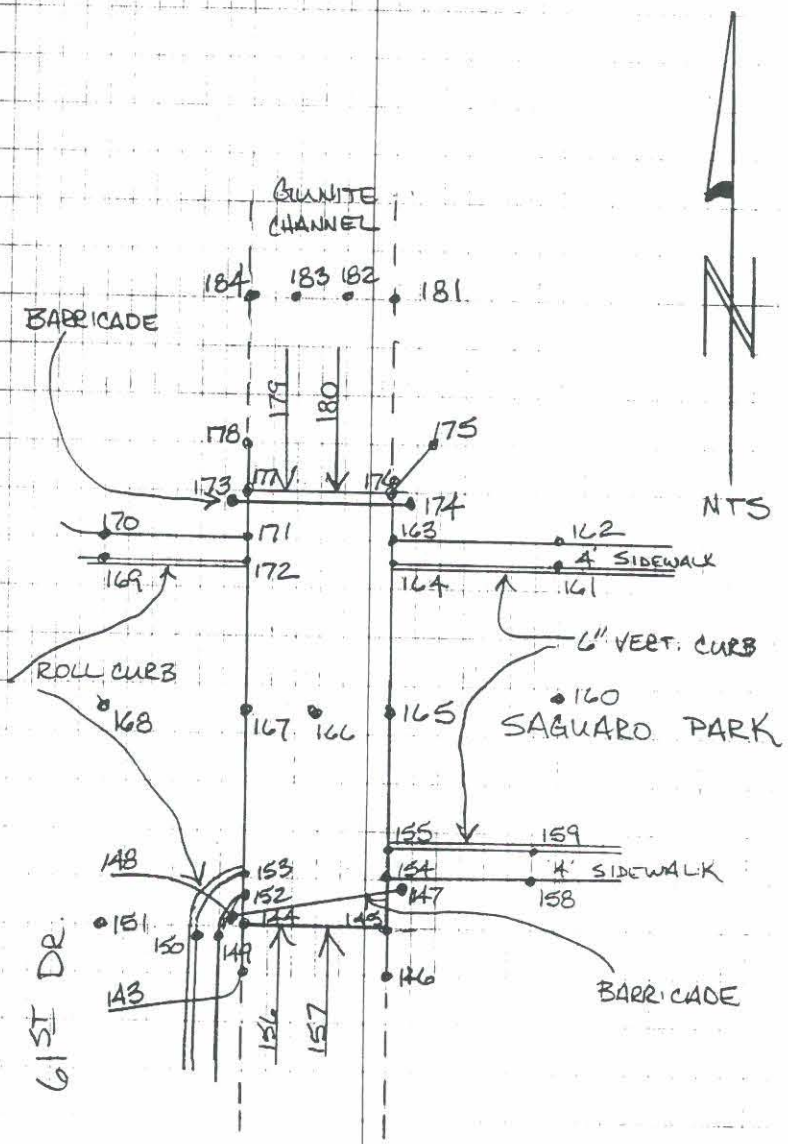
N. of Sangaro Pk Cn



PT #	DESCRIPTION
124 & 125	B/C – CURB OPENING
126 & 127 & 128	℄ OF 5' V.G.
136	NG, LAST SHOT BOX CULVERT #1
	X-SEC. W OF CULVERT #1
137	TOP OF CONC. CHANNEL
138 & 139	TOE OF CONC. CHANNEL
140	TOP OF CONC CHANNEL
141 & 142	N. GROUND / LAST SHOT

BOX CULVERT #2 (61ST DR & SAG. PARK)

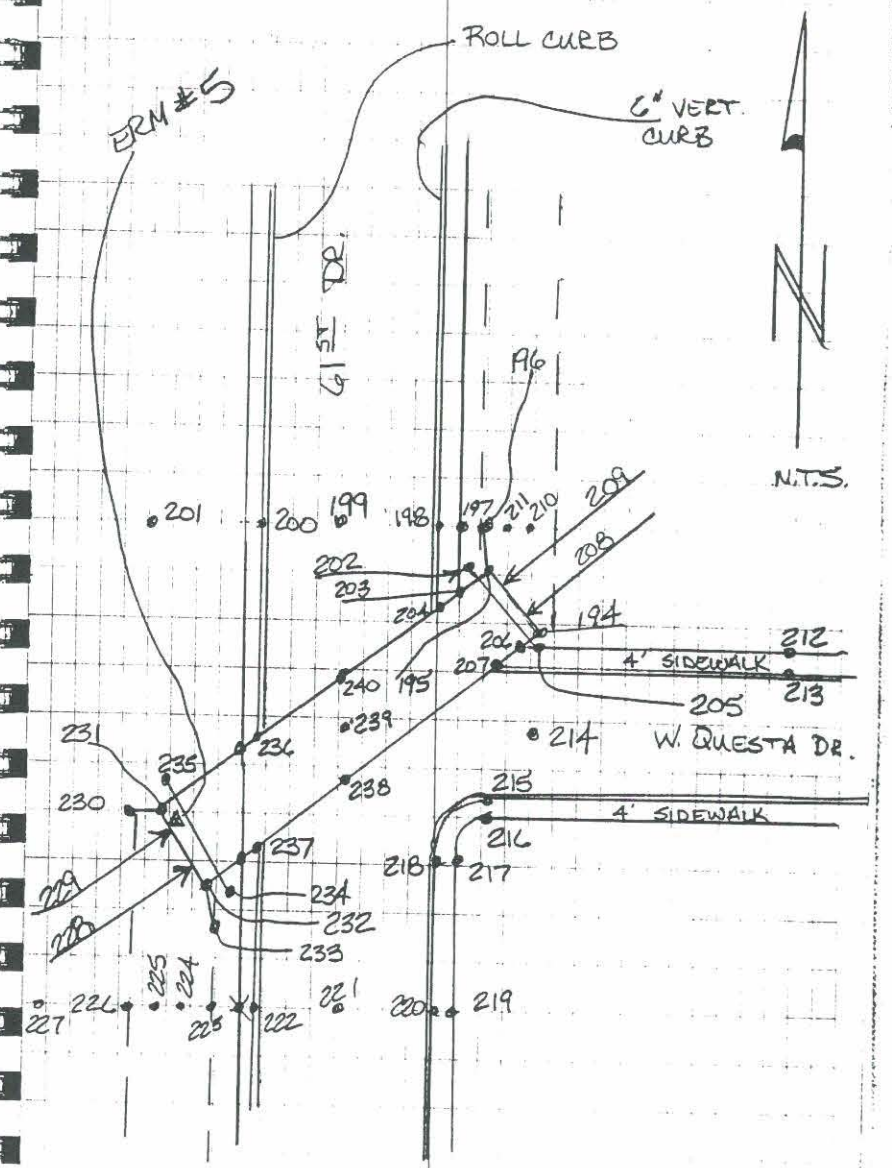
PT #	DESCRIPTION
143	COR. WINGWALL
144 & 145	COR. HEADWALL
146	COR. WINGWALL
156 & 157	℄ & ⊥ OF 10'X5' OPENING
175	COR. WINGWALL
176 & 177	COR. HEADWALL
178	COR. WINGWALL
179 & 180	℄ & ⊥ OF 10'X5' OPENING
181 & 184	TOP OF GUNITE CHANNEL
182 & 183	TOE OF GUNITE CHANNEL
184	LAST SHOT BOX CULVERT #2



PT #	DESCRIPTION (X-SEC. /S. OF CULVERT 2)	
185	TOE ℄ GUNITE CHANNEL @ FACE OF BLOCK WALL. TOP OF BLOCK WALL IS +12'± FROM ℄.	** OFFSET PT. 5' E. FOR ** ** ACTUAL TOE LOCATION **
186	TOE OF GUNITE CHANNEL	
187	TOP OF GUNITE CHANNEL	
188	△ PT. 5' WROUGHT IRON FENCE	
189	BACK OF 4' WALK	
190	BACK OF CURB / TOP OF CURB	
191	PAVEMENT @ ℄	
192	BACK OF CURB / TOP OF CURB	
193	NATURAL GROUND.	

Box Culvert #3 (61st Dr & Questa Dr)

Pt #	Description
194 & 195	COR. HEADWALL
196	COR WINGWALL
208 & 209	℄ & ⊥ OF 5'X10' OPENINGS
210	(5) TO E. TO ACTUAL TOE
223	TOP GUNITE CHANNEL
224 & 225	TOE GUNITE CHANNEL
226	TOP GUNITE CHANNEL
228 & 229	⊥ & ℄ OF 5'X10' OPENING
230	COR WINGWALL
231 & 232	COR HEADWALL
233	COR WINGWALL
240	LAST SHOT



X-SEC. 3 (S. OF CULVERT 3)

PT #	DESCRIPTION
241	TOP OF DIRT CHANNEL @ COR. OF WALL
242 & 243	TOE OF DIRT CHANNEL
244	N G ON SLOPE
245	TOP OF DIRT CHANNEL
246	B/C - T/C - 4" ROLL LAST SHOT
247	NAT GROUND
248	TOP DIRT DITCH
249 & 250	TOE OF DIRT DITCH
251	TOP DIRT DITCH
252	NAT GROUND

X-SEC 4

X-SEC 5

PT #	DESCRIPTION
253	NAT. GROUND
254	TOP DIRT DITCH
255 & 256	TOE DIRT DITCH
257	TOP DIRT DITCH
258	NAT. GROUND LAST SHOT

R. ROMAN 12-4-2000
T. VAN VLEET SUNNY & WARM 75°

11

ADDITIONAL TOPO & X-SEC

BASE @ #1 #4RB(½) @ TOP OF SLOPE
@ END OF CUL-DE-SAC
(SEE PG 1 THIS BOOK)

N=983697.917 E=615498.813 EL=1435.826

GRND TO ANT.=5 (HOOK TAPE)

** ALL CONTROL PT'S LOCATED **
* IN 5 MIN. SESSIONS *
* SEE PG. 3 THIS BOOK *
** FOR CALIBRATION PT'S **

PT #	DESCRIPTION
5	FIRST SHOT
5	FLOOD CONTROL B.C, ERM #5 (SEE BOOK 1, PG. 8)
6	C.O.P. BCFLUSH @ INT. OF 61ST AVE & HAPPY VALLEY RD. (#99104)
7	C.O.P. BCHH @ INT OF 67th AVE & SADDLEHORN RD. (#99097)
8	FD. P.K. NAIL @ CALLE LEJOS & 67th AVE (#99096)
4	FLOOD CONTROL B.C, ERM #4 (SEE BOOK 1, PG. 9)

984724.896
615873.774

BOOK #4

CONT.

PT #	DESCRIPTION	
10	FD. PK. NAIL @ GATE TO RAMADAS 9, 10 & 11 IN T. BIRD PARK. (#99100)	
9	FD. PK NAIL IN SHINER @ COR. OF 64th AVE. & LOUISE DR (#7203)	
300	FIRST TOPO SHOT	
300-305	B/C - T/C, 6" ROLL, 24" (BC) (303-305 RETURN)	w/ ATTACHED 4' S/W
306-308	℄ & ⊕ 3' V.G. (VG)	
309-313 314-320	B/C - T/C, 6" ROLL 24" (BC) (309-311 RETURN)	w/ ATTACHE 4' S/W
321-326	MISC. PAV. @ ℄ (P)	
327-333	MISC. NAT. GRND (NG) (328-332 @ FACE OF BLOCK WALL)	

CONT'

PT #	DESCRIPTION
334-337	MISC. NAT. GRND (NG) (X-SEC)
338 & 339	B/C-T/C, 6" ROLL, 24" (BC)
340	MISC. PAV. @ ~~B~~ (P)
341-343	MISC. NAT. GRND (NG)
344 & 347	TOP @ NAT. GRND. (TOP)
345 & 346	TOE @ NAT. GRND (TOE)
348 & 349	MISC. NAT. GRND (NG)
350 & 351	MISC. NAT. GRND (NG)
352 & 355	TOP @ N.G (TOP)
353 & 354	TOE @ NG (TOE)
356-358	MISC. NAT. GRND (NG)

CONT.'

PT. #	DESCRIPTION
359 - 363	MISC NAT. GRND (NG)
364 & 367	TOP @ N.G. (TOP)
365 & 366	TOE @ N.G. (TOE)
368 & 369	MISC. NAT. GRND (NG)
370 - 372	MISC NAT. GRND (NG)
373 & 376	TOP @ NG (TOP)
374 & 375	TOE @ NG (TOE)
377 - 379	MISC. NAT. GRND (NG)
380 - 383	MISC. NAT. GRND (NG)
384 & 387	TOP @ N.G. (TOP)
385 & 386	TOE @ NG (TOE)

CONT.'

PT #	DESCRIPTION
388 & 389	MISC. NAT. GRND (NG)
390-395	MISC. NAT. GRND (NG)
396 & 399	TOP @ NG (TOP)
397 & 398	TOE @ NG (TOE)
400 & 401	MISC. NAT GRND. (NG)

R. ROMAN 12-5-2000

T. VAN VLEET P. CLOUDY & WARM 75° 16

ADDITIONAL TOPO & X-SEC. CONTINUED

BASE @ #1 #4RB (1/2") @ TOP OF SLOPE @ END OF CUL-DE-SAC (SEE PG. 1 THIS BOOK)

GRND TO ANT. = 4.93 (HOOK TAPE)

PT #	DESCRIPTION	
402	FIRST SHOT	
402	NAT. GRND (NG)	
403-406	COR OF HEADWALL @ FACE (HDWL)	(0.80' WIDE)
407	FL @ 5' FROM FACE OF HEADWALL (FL)	(8' STEEL PIPE)
408-414	MISC NAT GRND (NG)	
415-418	COR. OF HEADWALL @ FACE (HDWL)	(0.80' WIDE)
419	FL @ 5' FROM FACE OF HEADWALL (FL)	
420-426	MISC. NAT. GRND (NG)	

CONT.'

Pt #	DESCRIPTION	
427-428	COR OF HEADWALL @ FACE (HDWL)	(0.80' WIDE)
429-432	(COR IS 5' FARTHER W FROM #428)	
433	Th @ 5' FROM FACE (FL)	(8' STEEL PIPE W/ 1.5'+/- OF SILT)
434	Th @ 25' FROM FACE (FL)	(8' STEEL PIPE W/ 1.5'+/- OF SILT)
435-439	COR. OF HEADWALL @ FACE (HDWL) (0.80' WIDE)	(FOUR OPENINGS @ 4' HIGH BY 10' WIDE)
440	Th @ ℄ OF 4 OPENINGS (FL)	
441	Th @ ℄ OF WASH (FL)	
442-444	B/c - T/c, 6" V.C., 24" (BC)	(445- 6" V.C., 6")
445-451	(ISLAND), 452-454	
455-459	COR. OF HEADWALL @ FACE (HDWL) (TYP. OF 1ST HEADWALL)	
[illegible]	Th @ ℄ OF [illegible] (FL)	

CONT.'

PT #	DESCRIPTION
461	FL @ ℄ OF WASH (FL)
462-463 464-465	COR. OF CATCH BASIN @ GUTTERLINE (CB) (DN.'S UNOBTAINABLE)
466-470	COR. OF HEADWALL @ FACE (HDWL) (0.80' WIDE X 4 OPENINGS @ 4' HIGH BY 10' WIDE)
471	FL @ ℄ OF HEADWALL (FL)
472	FL @ ℄ OF WASH (FL)
473-476 477-479	B/C - T/C, 6" ROLL, 24" (BC)
480-482	MISC. PAV. @ ℄ (P)
483-487	COR OF HEADWALL @ FACE (HDWL)
488	FL @ ℄ OF HEADWALL (FL)

(473-474 6" V.C., 24", CATCH BASIN)

CONT.'

PT #	DESCRIPTION
489	FL @ ℄ OF WASH (FL)
490-492	MISC. NAT. GRND. (NG) (491 & 492 @ EDGE OF FOOTPATH)
493 & 496	TOP @ NAT. GRND (TOP)
494 & 495	TOE @ NAT. GRND (TOE)
497 & 498	MISC NAT. GRND. (NG)
499-503	COR. OF HEADWALL @ FACE (HDWL) (FOUR OPENINGS 4' HIGH BY 10' WIDE) (0.80' WIDE)
504	FL @ ℄ OF HEADWALL (FL)
505	FL @ ℄ OF WASH (FL)
506-508 509-511	B/C-T/C, 6" V.C., 24" (BC)

CONT.'

PT #	DESCRIPTION
512-514	MISC. PAV @ ℄ (P)
515-516 517-518	COR. OF CATCH BASIN @ GUTTERLINE (CB) (DN'S UNOBTAINABLE)
519-523	COR OF HEADWALL @ FACE (HDWL)
524	FL @ ℄ OF HEADWALL (FL)
525	FL @ ℄ OF WASH (FL)
526-530	COR. OF HEADWALL @ FACE (HDWL) (4 OPENINGS 4' HIGH BY 10' WIDE)
531	FL @ ℄ OF HEADWALL (FL)
532	FL @ ℄ OF WASH (FL)
533-535	B/C-T/C, 6" V.C., 24" (BC)
536-538 539-541	B/C-T/C, 6" V.C., 6" (BC)
542-544	B/C-T/C, 6" V.C., 24" (BC)

CONT.'

PT #	DESCRIPTION
545 - 546	COR. OF CATCH BASIN @ GUTTERLINE (G)
547 - 548	(DN'S UNOBTAINABLE)
549 - 553	COR. OF HEADWALL @ FACE (HDWL)
554	FL @ ℄ OF HEADWALL (FL)
555	FL @ ℄ OF WASH (FL)
556 - 559	MISC. NAT. GRND. (NG)
	(556 @ FACE OF BLOCK WALL)
	(558 & 559 @ EDGE OF FOOTPATH)
560 & 563	TOP @ NAT. GRND. (TOP)
561 & 562	TOE @ NAT. GRND. (TOE)
564 & 565	MISC. NAT. GRND. (NG)
	(564 @ FACE OF BLOCK WALL)

CONT.

PT #	DESCRIPTION
566-570	COR. OF HEADWALL @ FACE (HDWL) (4 OPENINGS 4' HIGH BY 10' WIDE)
571	FL @ ℄ OF HEADWALL (FL)
572	FL @ ℄ OF WASH (FL)
573-575	B/C-T/C, 6" V.C, 24" (BC)
~~579-581~~	
576-578	MISC. PAV. @ ℄ (P)
582-586	COR. OF HEADWALL @ FACE (HDWL)
587	FL @ ℄ OF HEADWALL (FL)
588	FL @ ℄ OF WASH (FL)
589-593	COR. OF HEADWALL @ FACE (HDWL) (4 OPENINGS 4' HIGH BY 10' WIDE)
594	FL @ ℄ OF HEADWALL (FL)

(0.80' WIDE)

JOMAK RD & 64th AVE

CONT.'

PT #	DESCRIPTION
595	FL @ ℄ OF WASH (FL)
596 - 598	B/C - T/C, 6" V.C., 24" (BC)
599 - 600	COR OF CATCH BASIN @ GUTTERLINE (CB)
601 - 603	EDGE OF PAV. (EP)
604 - 608	MISC. NAT. GRND. (NG)
609 - 613	COR. OF HEADWALL @ FACE (HDWL)
614	FL @ ℄ OF HEADWALL (FL)
615	FL @ ℄ WASH/RET. BOTTOM (FL)
616 - 619	COR. OF HEADWALL @ FACE (HDWL)
620	FL @ ℄ 18" RCP (FL)
621	STORM DRAIN MH (SDMH) (NO OUTLET PIPE INTO NEW WASH)

RIM =
FL =

DN = 475 N-E, 490 W
FLOW = N → W, E → W

CONT.

PT #	DESCRIPTION
622	NAT. GRND. (NG)
623	EDGE OF PAV. (EP)
624	B/C-T/C, 6" V.C, 24" (BC)
625-626	MISC. NAT. GRND (NG)
627 & 630	TOP @ NAT. GRND (TOP)
628 & 629	TOE @ NAT. GRND (TOE)
631-633	MISC. NAT. GRND (NG) (631 & 632 @ EDGE OF FOOTPATH) (633 @ FACE OF BLOCK WALL)
634-638	COR. OF HEADWALL @ FACE (HDWL) (4 OPENINGS 4' HIGH BY 10' WIDE)
639	FL @ ℄ OF HEADWALL (FL)

CONT'

PT #	DESCRIPTION
640	FL @ ℄ OF WASH (FL)
641-643	MISC. NAT. GRND (NG)
644-646	B/C-T/C, 6" V.C., 24" (BC)
647-649	MISC PAV. @ ℄ (P)
650-652	B/C-T/C, 6" V.C, 24" (BC)
653-657	MISC NAT. GRND. (NG)
658-662	COR OF HEADWALL @ FACE (HDWL)
663	FL @ ℄ OF HEADWALL (FL)
664	FL @ ℄ OF WASH (FL)
665-668	MISC. NAT. GRND (NG)
669-	B/C-T/C, 6" V.C, 24" (BC)

CONT.

PT #	DESCRIPTION
670	PAV. @ ℄ (P)
671	B/C - T/C, 6" V.C., 24" (BC)
672 - 673	MISC NAT. GRND
674 & 677	TOP @ NAT. GRND. (TOP)
675 & 676	TOE @ NAT. GRND. (TOE)
678 - 680	MISC NAT GRND (NG) (679 & 680 EDGE OF FOOTPATH) (678 3' FROM BLOCK WALL)
681 - 684	EDGE OF PAV. (EP)
685 - 688	
689 - 692	TOP OF 72" RCP @ ℄ (RCP)
693 & 694	FL @ ℄ OF WASH (FL)

CONT'

PT #	DESCRIPTION
695-698	EDGE OF PAV. (EP)
699-702	
703-706	TOP OF 72" RCP @ ℄ (RCP)
707 & 708	℄ @ ℄ OF WASH (FL)
708	LAST SHOT

707 is higher than 708, and 707 is downstream!
JS

Points

Project name	50431214		
Coordinate Units	International feet		
Distance Units	International feet		
Height Units	International feet		
Date printed	5/24/01 1:45:07 PM		
Coordinate System	Projection from data collector	**Zone**	Zone from data collector
Datum	(WGS 84)	**Geoid model**	Not selected

Coordinate units: International feet
Elevation units: International feet

Point listing

Name	Northing	Easting	Elevation	Feature Code
1	983699.973	615500.490	1435.716	RB
5	984727.021	615875.485	1375.585	FCBC
6	986814.238	616544.479	1407.078	BCF
7	987854.657	612887.887	1386.726	BCHH
8	983641.640	612847.348	1350.348	BCHH
4	980866.937	615440.782	1342.136	FCBC
9	975911.074	614384.167	1293.568	PK IN SHINER
10	979455.558	614512.403	1391.522	PK IN SHINER
7A	987854.166	612887.656	1387.103	BCHH
8A	983641.557	612847.066	1350.073	PK SHINER
9A	975911.722	614383.809	1293.603	PK SHINER
10A	979455.869	614512.039	1391.543	PK SHINER
4A	980867.039	615440.476	1342.063	FCBC
5A	984727.124	615875.168	1375.673	FCBC
6A	986814.344	616544.155	1407.013	BCFD
100	985264.125	616557.299	1380.458	COR WGWL
101	985257.135	616549.110	1383.208	COR WGWL
102	985231.985	616549.951	1383.280	COR WGWL
103	985225.202	616558.187	1380.520	COR WGWL
104	985253.274	616549.613	1377.367	FL
105	985247.379	616549.852	1377.311	FL
106	985241.799	616550.025	1377.319	FL
107	985235.972	616550.121	1377.443	FL
108	985254.515	616543.308	1382.996	BARRICADE
109	985233.960	616543.797	1382.868	BARRICADE
110	985193.628	616544.501	1381.096	NG
111	985194.155	616535.440	1383.062	EP
112	985195.318	616517.070	1383.325	P
113	985196.407	616496.278	1383.626	BC
114	985195.951	616492.232	1383.706	BW
115	985196.594	616486.853	1383.233	NG
116	985229.347	616479.933	1380.285	CORWGWL
117	985231.982	616489.419	1382.935	CORWGWL
118	985257.068	616488.448	1383.002	CORWGWL
119	985258.992	616479.124	1380.357	CORWGWL
120	985236.016	616488.458	1377.292	FL
121	985241.701	616488.344	1377.308	FL
122	985247.197	616488.250	1377.306	FL
123	985252.831	616488.169	1377.352	FL
124	985235.955	616496.841	1382.793	BC
125	985253.038	616497.143	1382.716	BC

126	985244.443	616499.139	1382.804	CLVG
127	985244.697	616536.000	1382.870	CLVG
128	985244.898	616517.492	1382.862	CLVG
129	985232.003	616535.618	1382.911	EP
130	985257.755	616536.329	1382.904	EP
131	985283.773	616543.339	1382.358	NG
132	985284.780	616536.515	1382.903	EP
133	985285.375	616520.838	1383.035	P
134	985286.024	616497.724	1383.138	BC
135	985286.206	616493.723	1383.197	BW
136	985285.855	616484.666	1385.977	NG
137	985217.025	616241.979	1380.310	TOP
138	985228.384	616242.687	1376.677	TOE
139	985243.635	616240.886	1376.879	TOE
140	985253.235	616239.573	1379.773	TOP
141	985297.261	616237.073	1379.724	NG
142	985384.606	616234.738	1380.791	NG
143	985047.425	615855.835	1376.400	WGWL
144	985053.142	615855.685	1376.409	WGWL
145	985053.994	615876.820	1377.072	WGWL
146	985048.139	615876.829	1376.486	WGWL
147	985061.526	615879.651	1376.554	BARRICADE
148	985052.424	615853.141	1376.919	BARRICADE
149	985047.787	615852.823	1377.495	BW
150	985047.764	615848.847	1377.423	BC
151	985047.447	615831.665	1377.225	P
152	985056.051	615854.689	1376.411	BW
153	985058.890	615851.810	1376.566	BC
154	985063.013	615877.740	1376.494	BW
155	985066.761	615877.730	1376.498	BC
156	985053.248	615861.528	1371.547	FL
157	985053.341	615871.882	1371.590	FL
158	985063.429	615930.627	1377.500	BW
159	985067.365	615930.854	1377.378	BC
160	985084.638	615931.167	1377.362	P
161	985100.580	615931.390	1377.419	BC
162	985104.491	615931.516	1377.472	BW
163	985104.108	615877.117	1376.588	BW
164	985100.163	615877.222	1376.632	BC
165	985084.060	615877.266	1376.581	CONC
166	985083.517	615866.018	1376.443	CONC
167	985083.410	615854.606	1376.546	CONC
168	985082.865	615830.894	1377.264	P
169	985099.814	615832.940	1377.479	BC
170	985103.853	615832.668	1377.575	BW
171	985103.987	615854.073	1376.665	BW
172	985100.148	615854.118	1376.688	BC
173	985108.481	615852.296	1376.992	BARRICADE
174	985108.369	615878.958	1377.952	BARRICADE
175	985113.650	615879.910	1376.633	WGWL
176	985108.970	615876.242	1377.242	WGWL
177	985108.993	615855.188	1377.317	WGWL
178	985114.620	615855.461	1376.849	WGWL
179	985109.239	615859.471	1371.808	FL
180	985109.268	615870.874	1372.095	FL
181	985148.836	615879.542	1380.389	TOP
182	985149.347	615870.167	1372.735	TOE
183	985122.456	615861.650	1371.859	TOE
184	985124.449	615854.915	1379.790	TOP
185	984929.076	615874.590	1371.128	TOE
186	984927.595	615869.179	1371.376	TOE
187	984925.652	615859.985	1377.132	TOP
188	984924.170	615856.611	1377.100	WIFENCE
189	984923.979	615855.477	1377.080	BW

190	984922.699	615851.850	1377.035	BC
191	984918.210	615835.977	1376.964	P
192	984913.995	615819.760	1377.148	BC
193	984907.772	615794.259	1379.484	NG
194	984807.654	615928.618	1376.012	CORHDWL
195	984813.493	615906.853	1376.120	CORHDWL
196	984818.331	615904.246	1375.598	CORWGWL
197	984817.181	615901.471	1376.232	BW
198	984815.530	615897.917	1376.195	BC
199	984809.180	615882.567	1375.988	P
200	984802.430	615867.168	1376.336	BC
201	984796.590	615849.548	1377.713	NG
202	984812.919	615904.849	1375.581	BARRICADE
203	984809.260	615905.093	1375.621	BW
204	984803.740	615903.028	1375.516	BC
205	984806.002	615930.184	1375.682	BARRICADE
206	984799.258	615925.912	1375.434	BW
207	984794.195	615924.157	1375.365	BC
208	984809.834	615922.403	1370.587	FL
209	984812.385	615912.441	1370.631	FL
210	984843.288	615909.830	1370.546	TOE
211	984839.878	615901.396	1370.746	TOE
212	984812.718	615960.243	1375.934	BC
213	984808.953	615961.157	1375.829	BC
214	984782.124	615938.361	1375.624	P
215	984765.797	615942.814	1375.645	BC
216	984762.324	615944.411	1375.671	BW
217	984741.409	615934.751	1375.533	BW
218	984740.012	615931.138	1375.504	BC
219	984715.546	615946.066	1374.791	BW
220	984713.848	615942.632	1374.587	BC
221	984707.666	615927.852	1374.653	P
222	984700.853	615912.167	1374.674	BC
223	984689.136	615907.723	1372.941	TOP
224	984685.359	615899.941	1369.824	TOE
225	984683.539	615888.986	1369.832	TOE
226	984679.862	615878.456	1374.150	TOP
227	984674.167	615869.534	1376.960	NG
228	984720.506	615890.729	1369.952	FL
229	984724.132	615880.513	1370.037	FL
230	984723.048	615870.105	1375.561	CORWGWL
231	984726.118	615875.870	1375.495	CORHDWL
232	984719.100	615895.621	1375.568	CORHDWL
233	984713.477	615898.787	1375.474	CORWGWL
234	984718.989	615898.151	1374.530	BARRICADE
235	984727.691	615873.427	1374.999	BARRICADE
236	984737.443	615878.703	1375.111	BC
237	984728.202	615899.888	1375.044	BC
238	984752.037	615908.415	1375.139	CONC
239	984767.363	615902.946	1375.139	CONC
240	984781.612	615895.132	1375.334	CONC
241	984429.759	615906.647	1372.845	TB
242	984433.878	615889.023	1367.196	TS
243	984436.442	615879.146	1367.146	TS
244	984447.302	615857.642	1372.022	NG
245	984461.133	615826.676	1379.118	TB
246	984466.868	615812.711	1379.814	BC
247	983095.936	614875.964	1362.112	NG
248	983108.017	614840.566	1360.716	TOP
249	983112.097	614824.961	1352.587	TOE
250	983114.601	614815.626	1352.813	TOE
251	983118.276	614799.177	1359.403	TOP
252	983131.404	614753.407	1360.655	NG
253	982158.643	614886.038	1351.291	NG

254	982143.491	614859.534	1350.534	TOP
255	982138.914	614850.581	1346.461	TOE
256	982133.837	614843.605	1346.919	TOE
257	982125.176	614830.508	1350.905	TOP
258	982115.905	614817.709	1352.373	NG
300	991479.987	623382.700	1472.802	BCFD
11A	991469.759	607593.897	1371.020	BCFD
11	991470.294	607593.720	1371.173	BCFD
13	981034.031	597062.571	1313.430	BCHH
302	986073.083	590401.601	1333.814	BC
301	994112.011	595258.936	1396.984	BC
12	994138.013	595622.683	1399.919	RB
12A	995716.900	597200.223	1428.113	RB
13A	981034.181	597063.628	1313.478	RB
402	983326.192	614889.339	1361.886	NG
403	983321.585	614892.413	1363.141	HDWL
404	983308.579	614899.695	1363.239	HDWL
405	983305.877	614906.291	1363.206	HDWL
406	983309.614	614924.566	1363.211	HDWL
407	983311.246	614904.458	1353.720	FL
408	983310.478	614931.272	1363.378	NG
409	983265.392	614984.767	1365.856	NG
410	983280.692	614928.435	1362.897	NG
411	983312.800	614848.031	1362.632	NG
412	983329.281	614784.455	1363.614	NG
413	983284.402	614857.143	1361.875	NG
414	983263.255	614905.990	1362.380	NG
415	983266.268	614902.359	1363.349	HDWL
416	983277.163	614892.732	1363.237	HDWL
417	983279.680	614887.558	1363.373	HDWL
418	983283.620	614861.825	1363.301	HDWL
419	983273.876	614888.376	1353.182	FL
420	982846.026	614706.218	1357.947	NG
421	982844.773	614771.072	1358.227	NG
422	982845.871	614849.240	1358.437	NG
423	982863.369	614795.104	1357.399	NG
424	982871.116	614749.963	1357.749	NG
425	982832.943	614735.453	1357.349	NG
426	982833.322	614802.995	1358.217	NG
427	982832.128	614780.155	1358.412	HDWL
428	982832.814	614751.553	1358.418	HDWL
429	982868.597	614758.789	1358.347	HDWL
430	982859.448	614767.918	1358.326	HDWL
431	982857.868	614775.371	1358.390	HDWL
432	982861.739	614789.588	1358.401	HDWL
433	982861.964	614772.416	1350.926	FL
434	982808.801	614762.338	1350.716	FL
435	988974.175	612731.473	1400.980	HDWL
436	988966.860	612738.191	1403.017	HDWL
437	988966.091	612758.625	1403.014	HDWL
438	988965.238	612781.448	1402.930	HDWL
439	988971.868	612788.446	1400.938	HDWL
440	988966.726	612759.835	1397.563	FL
441	989019.371	612760.663	1398.190	FL
442	988954.334	612690.555	1404.538	BC
443	988948.560	612763.255	1404.357	BC
444	988948.115	612818.559	1404.997	BC
445	988931.546	612687.297	1404.886	BC
446	988925.816	612754.999	1404.575	BC
447	988925.100	612810.614	1404.839	BC
448	988917.708	612818.198	1404.959	BC
449	988910.047	612810.784	1404.789	BC
450	988910.535	612758.702	1404.614	BC
451	988914.739	612700.871	1404.763	BC

452	988891.971	612698.313	1404.354	BC
453	988887.657	612756.596	1404.295	BC
454	988886.873	612819.060	1404.904	BC
455	988861.868	612784.572	1400.353	HDWL
456	988868.994	612778.115	1402.258	HDWL
457	988870.006	612756.472	1402.258	HDWL
458	988870.629	612734.910	1402.283	HDWL
459	988863.932	612727.539	1400.283	HDWL
460	988869.029	612756.417	1396.898	FL
461	988824.434	612755.862	1396.698	FL
462	988889.681	612729.409	1403.642	CB
463	988889.535	612732.777	1403.699	CB
464	988949.277	612736.204	1403.779	CB
465	988950.889	612716.125	1403.814	CB
466	988713.048	612094.279	1394.188	HDWL
467	988722.601	612092.004	1396.151	HDWL
468	988740.931	612103.552	1396.087	HDWL
469	988759.242	612114.932	1396.033	HDWL
470	988761.577	612124.639	1394.033	HDWL
471	988740.741	612104.123	1390.717	FL
472	988711.955	612147.545	1390.945	FL
473	988797.565	612124.579	1399.328	BC
474	988769.133	612103.480	1398.879	BC
475	988749.778	612089.368	1398.398	BC
476	988697.095	612057.619	1397.320	BC
477	988713.283	612022.287	1397.376	BC
478	988770.836	612054.485	1398.348	BC
479	988821.679	612091.386	1399.240	BC
480	988812.473	612110.695	1399.134	P
481	988757.743	612070.715	1398.346	P
482	988691.519	612033.836	1397.065	P
483	988758.755	612017.768	1393.781	HDWL
484	988761.709	612030.118	1395.634	HDWL
485	988780.067	612041.569	1395.604	HDWL
486	988798.430	612053.004	1395.587	HDWL
487	988811.013	612050.401	1393.697	HDWL
488	988780.381	612041.015	1390.156	FL
489	988808.801	611996.734	1389.775	FL
490	989047.349	611174.724	1391.433	NG
491	989029.073	611172.575	1386.669	NG
492	989022.843	611171.766	1385.763	NG
493	989015.382	611171.672	1384.954	TOP
494	989003.468	611172.550	1382.093	TOE
495	988986.222	611171.887	1381.634	TOE
496	988976.313	611172.085	1384.921	TOP
497	988950.368	611170.743	1385.814	NG
498	988920.034	611170.082	1389.618	NG
499	988551.653	609475.718	1365.934	HDWL
500	988563.938	609477.887	1367.834	HDWL
501	988581.668	609465.461	1367.882	HDWL
502	988599.466	609453.005	1367.928	HDWL
503	988601.789	609441.192	1366.197	HDWL
504	988581.216	609464.638	1362.432	FL
505	988557.721	609431.036	1361.070	FL
506	988644.536	609438.444	1370.302	BC
507	988589.753	609477.076	1369.882	BC
508	988535.222	609515.445	1369.744	BC
509	988561.018	609547.861	1369.778	BC
510	988611.033	609512.556	1369.848	BC
511	988666.678	609473.195	1370.425	BC
512	988654.704	609455.670	1370.100	P
513	988599.879	609494.986	1369.685	P
514	988549.857	609530.567	1369.631	P
515	988545.632	609508.974	1369.000	CB

516	988565.822	609494.644	1369.018	CB
517	988588.343	609527.788	1369.010	CB
518	988568.279	609541.859	1369.072	CB
519	988602.957	609544.955	1366.231	HDWL
520	988604.459	609535.473	1368.267	HDWL
521	988622.165	609522.981	1368.300	HDWL
522	988639.972	609510.565	1368.359	HDWL
523	988649.336	609512.047	1366.367	HDWL
524	988622.514	609523.297	1362.870	FL
525	988652.236	609565.817	1363.320	FL
526	987693.690	608226.499	1348.731	HDWL
527	987686.820	608233.268	1350.614	HDWL
528	987665.265	608233.381	1350.542	HDWL
529	987643.768	608233.324	1350.593	HDWL
530	987637.170	608226.527	1348.636	HDWL
531	987665.264	608232.501	1345.664	FL
532	987666.221	608181.416	1341.777	FL
533	987715.076	608248.190	1352.047	BC
534	987664.797	608244.634	1351.653	BC
535	987590.471	608243.346	1351.738	BC
536	987594.336	608266.266	1352.071	BC
537	987663.040	608267.658	1352.094	BC
538	987715.188	608271.374	1352.500	BC
539	987713.652	608286.271	1352.473	BC
540	987667.905	608282.965	1352.127	BC
541	987598.967	608281.186	1352.127	BC
542	987599.871	608304.147	1351.688	BC
543	987666.580	608306.010	1351.709	BC
544	987712.210	608309.298	1352.029	BC
545	987612.832	608303.703	1351.049	CB
546	987633.476	608304.087	1350.972	CB
547	987614.509	608244.199	1351.001	CB
548	987635.063	608244.257	1350.933	CB
549	987636.662	608324.341	1348.894	HDWL
550	987643.454	608317.522	1350.782	HDWL
551	987665.204	608317.521	1350.846	HDWL
552	987686.739	608317.526	1350.879	HDWL
553	987693.429	608324.416	1348.864	HDWL
554	987665.113	608318.058	1345.882	FL
555	987668.744	608372.279	1346.650	FL
556	987936.537	608671.418	1360.460	NG
557	987928.438	608694.130	1356.637	NG
558	987925.225	608702.131	1356.478	NG
559	987922.871	608708.016	1356.350	NG
560	987921.146	608714.197	1356.283	TOP
561	987915.421	608728.276	1352.782	TOE
562	987911.321	608739.521	1353.492	TOE
563	987906.546	608750.993	1356.424	TOP
564	987896.304	608775.569	1357.530	NG
565	987889.802	608790.043	1361.197	NG
566	991448.779	614281.690	1431.156	HD
567	991441.874	614277.767	1433.811	HD
568	991421.115	614283.640	1433.813	HD
569	991400.423	614289.561	1433.781	HD
570	991396.269	614296.473	1431.160	HD
571	991421.164	614284.357	1429.595	FL
572	991435.892	614333.748	1430.025	FL
573	991470.637	614257.678	1436.812	BC
574	991416.573	614270.010	1435.231	BC
575	991333.665	614288.652	1433.524	BC
576	991329.302	614266.108	1433.511	P
577	991414.258	614249.257	1435.227	P
578	991466.726	614236.812	1436.825	P
579	991456.056	614218.661	1436.790	BC

580	991405.176	614230.228	1435.258	BC
581	991323.949	614248.774	1433.571	BC
582	991375.414	614214.342	1430.721	HDWL
583	991381.416	614221.935	1433.300	HDWL
584	991401.908	614216.072	1433.268	HDWL
585	991422.566	614210.119	1433.275	HDWL
586	991423.561	614200.476	1430.664	HDWL
587	991401.816	614215.101	1428.970	FL
588	991383.985	614170.495	1428.484	FL
589	991281.145	612807.192	1414.280	HDWL
590	991287.811	612814.053	1416.323	HDWL
591	991309.393	612814.012	1416.222	HDWL
592	991330.915	612813.835	1416.224	HDWL
593	991337.753	612806.834	1414.393	HDWL
594	991309.531	612813.255	1410.752	FL
595	991308.352	612774.154	1409.228	FL
596	991397.199	612851.389	1417.375	BC
597	991308.627	612851.422	1416.981	BC
598	991238.340	612851.438	1416.973	BC
599	991259.933	612852.138	1416.405	CB
600	991270.309	612852.054	1416.293	CB
601	991219.427	612886.220	1416.973	EP
602	991304.140	612885.897	1416.961	EP
603	991395.607	612891.273	1417.460	EP
604	991390.207	612901.211	1417.332	NG
605	991307.782	612897.878	1416.960	NG
606	991245.803	612900.062	1416.717	NG
607	991255.214	612931.714	1417.534	NG
608	991357.794	612927.360	1417.325	NG
609	991332.553	612906.303	1416.486	HDWL
610	991332.673	612909.593	1416.554	HDWL
611	991310.774	612909.788	1416.473	HDWL
612	991288.225	612910.023	1416.463	HDWL
613	991288.128	612906.649	1416.425	HDWL
614	991310.330	612910.473	1410.980	FL
615	991315.524	612958.922	1412.760	FL
616	991286.320	612923.834	1414.796	HDWL
617	991284.634	612922.933	1414.755	HDWL
618	991284.219	612918.952	1414.704	HDWL
619	991285.890	612917.797	1414.672	HDWL
620	991286.024	612921.054	1410.739	FL
621	991017.209	612933.792	1417.686	SDMH
622	991002.922	612950.210	1417.772	NG
623	991015.282	612885.448	1417.914	EP
624	991019.173	612851.677	1417.749	BC
625	991024.540	612821.169	1417.354	NG
626	991028.748	612804.014	1411.957	NG
627	991030.234	612795.591	1411.520	TOP
628	991037.313	612784.337	1407.823	TOE
629	991038.010	612771.356	1407.853	TOE
630	991038.307	612757.777	1411.378	TOP
631	991044.498	612720.283	1412.612	NG
632	991045.554	612713.022	1413.504	NG
633	991050.761	612691.371	1416.516	NG
634	990215.855	612808.580	1412.638	HDWL
635	990222.682	612815.226	1414.872	HDWL
636	990244.307	612815.362	1414.840	HDWL
637	990266.005	612815.402	1414.845	HDWL
638	990272.841	612808.506	1412.810	HDWL
639	990244.344	612814.570	1409.440	FL
640	990242.921	612761.706	1406.334	FL
641	990175.321	612831.024	1416.388	NG
642	990245.096	612839.858	1416.951	NG
643	990308.096	612835.999	1417.664	NG

644	990308.530	612852.045	1417.570	BC
645	990246.200	612852.037	1416.944	BC
646	990172.597	612852.048	1416.205	BC
647	990177.319	612885.777	1416.349	P
648	990247.405	612884.884	1416.949	P
649	990301.641	612884.721	1417.550	P
650	990302.106	612921.163	1417.300	BC
651	990243.766	612921.081	1416.704	BC
652	990195.883	612921.052	1416.217	BC
653	990216.805	612958.061	1418.669	NG
654	990213.121	613015.303	1418.603	NG
655	990274.419	613012.641	1418.629	NG
656	990279.094	612947.849	1418.707	NG
657	990334.432	612946.859	1419.624	NG
658	990305.284	612955.660	1415.065	HDWL
659	990291.523	612956.197	1417.513	HDWL
660	990291.079	612978.191	1417.556	HDWL
661	990290.792	613000.454	1417.528	HDWL
662	990302.555	613003.797	1415.178	HDWL
663	990292.099	612978.249	1412.144	FL
664	990339.682	612986.348	1412.515	FL
665	989890.840	612971.144	1416.226	NG
666	989890.574	612954.903	1415.713	NG
667	989890.432	612941.490	1414.530	NG
668	989889.738	612929.063	1414.392	NG
669	989889.448	612921.544	1413.446	BC
670	989888.361	612885.871	1413.769	P
671	989888.674	612852.308	1413.650	BC
672	989888.402	612826.981	1413.845	NG
673	989887.540	612798.154	1408.273	NG
674	989889.086	612789.328	1407.575	TOP
675	989891.143	612773.426	1403.542	TOE
676	989893.821	612764.819	1403.601	TOE
677	989894.325	612752.698	1407.344	TOP
678	989896.427	612739.025	1408.087	NG
679	989893.190	612699.699	1411.575	NG
680	989893.021	612706.061	1411.257	NG
681	979460.990	616621.777	1331.425	EP
682	979471.662	616658.872	1332.492	EP
683	979474.514	616670.954	1332.793	EP
684	979491.235	616719.113	1333.460	EP
685	979512.232	616709.659	1332.931	EP
686	979496.743	616668.582	1332.753	EP
687	979494.107	616658.528	1332.638	EP
688	979488.069	616631.935	1332.025	EP
689	979503.552	616660.015	1331.765	RCP
690	979506.332	616670.551	1331.815	RCP
691	979461.506	616658.815	1331.226	RCP
692	979464.358	616669.370	1331.136	RCP
693	979421.161	616664.435	1325.091	FL
694	979530.332	616666.571	1325.465	FL
695	978311.796	616849.907	1322.325	EP
696	978324.501	616807.864	1324.351	EP
697	978327.310	616796.230	1324.778	EP
698	978333.872	616767.222	1324.986	EP
699	978356.928	616772.614	1324.314	EP
700	978351.636	616790.530	1324.875	EP
701	978349.454	616800.934	1324.661	EP
702	978338.715	616847.796	1322.483	EP
703	978355.818	616799.661	1324.003	RCP
704	978359.017	616789.088	1323.764	RCP
705	978319.670	616798.203	1323.283	RCP
706	978316.547	616809.144	1322.508	RCP
707	978279.226	616817.363	1318.851	FL

708	978374.983	616791.972	1318.645	FL
710	975757.932	594435.362	1280.808	RB
711	975756.602	591799.931	1278.275	RB
712	975773.310	589148.054	1268.301	RB
713	975788.585	586497.111	1245.005	BCHH
714	973117.860	585128.649	1234.166	BCFD
715	973132.718	586453.671	1237.979	BCHH
716	973121.077	589107.664	1251.425	BCFD
717	973119.634	589492.984	1255.861	BCFD
718	970453.657	583781.323	1221.145	PK
719	970453.809	583789.539	1221.198	PK
720	970453.810	583795.591	1221.097	PK
721	970508.674	583781.698	1221.312	PK
722	970477.510	586409.318	1238.237	BCHH
723	970469.299	589066.296	1241.309	BCFD
724	970468.170	589463.940	1241.896	PK
725	970461.633	591723.863	1246.288	BCHH
726	975664.109	602300.463	1279.405	BCHH
727	978338.472	602361.197	1294.298	BCHH
728	980998.804	602363.094	1310.331	BCHH
729	983647.095	602387.349	1331.894	BCHH
730	981016.015	599711.885	1311.306	BCFD
731	981027.458	594421.613	1314.018	STONE
732	981021.601	591787.337	1311.030	BCHH
733	981034.665	590943.655	1304.450	RB
734	981035.799	590872.593	1304.618	RB
735	981061.653	589200.334	1299.266	STONE
736	981059.177	589365.010	1301.046	RB
737	981114.114	589364.618	1301.671	RB
738	981102.973	586542.426	1257.183	STONE
739	986789.725	612887.021	1379.916	BCHH
740	986277.643	612888.106	1373.880	BCHH
741	984151.802	612887.315	1355.694	BCHH
742	981511.760	612887.245	1339.979	BCHH
743	980997.937	612887.089	1337.131	BCHH
744	981005.066	608353.238	1310.048	BCFD
745	981002.212	609972.919	1320.146	BCFD
746	981001.659	610253.178	1322.555	BCFD

Back to top

SOKKIA™

MADE IN U.S.A.

BOOK 5 OF

[redacted]

SOKKIA™

ECONOMY
FIELD BOOK

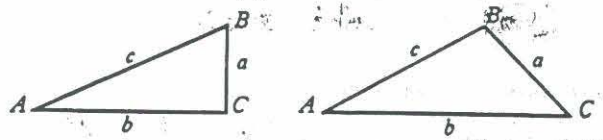
GLENDALE/PEORIA
ADMP UPDATE
FCD 99-44
99th AVE./Grand
CROSS-SECTIONS

BOOK 5 OF

5043.0001

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES



$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN USA

99th AVE, X-SEC.
GLENDALE/PEORIA ADMP UPDATE
FCD 99-44
JOB # 5043.0001
THIS SURVEY IS A PORTION OF SEC. 29 & 32, T4N, R1E, SEC. 5, 4, 9, & 16, T3N, R1E.

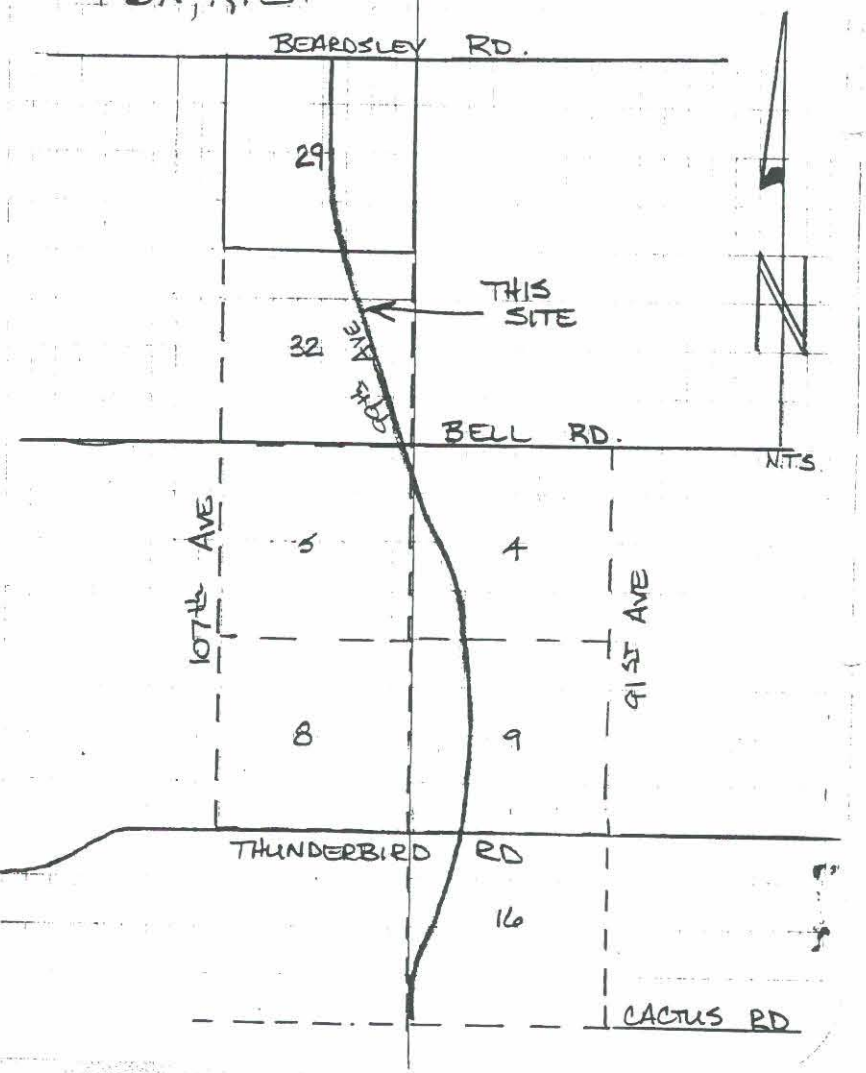


TABLE OF CONTENTS

DESCRIPTION	PG. #	CONV/GPS	CREW	DATE
CONTROL PT & SITE MAP	1 & 2	—		
CONTROL PT TIES & CALIBRATION PT'S	3-6	GPS	R ROMAN, J. FARNSWORTH	8-15-2000
99th AVE. CROSS-SECTIONS				
X-SEC #1	7-8	GPS	R. ROMAN, J FARNSWORTH	8-16-2000
X-SEC. #2	9			
X-SEC. #3	10-11			
X-SEC. #4	11-12			
X-SEC #5	13-14			
X-SEC. #6	14-15			
X-SEC. #7	15-16			
X-SEC. #8	16-17			
X-SEC. #9	17-18			
ADDITIONAL TOPO ON GRANDE AVE.	19-21	GPS	R. ROMAN, T. VAN VLEET	12-5-2000
ADDITIONAL TOPO ON GRANDE AVE.	22-25	GPS	R. ROMAN, T. VAN VLEET	12-6-2000

CONTROL PT & SITE MAP

PT # DESCRIPTION

7006 = P.K. & SHINER @ N. END OF ℄ STRIPE N. OF BELL RD., BETWEEN BELL RD & GRANADA DR. ON 105th AVE.

7009 = 98th & CAMPANA, GO EAST ON CAMPANA TO 1ST CUL-DE-SAC TO SOUTH (RT), P.K. & SHINER @ S.W COR. OF APRON.

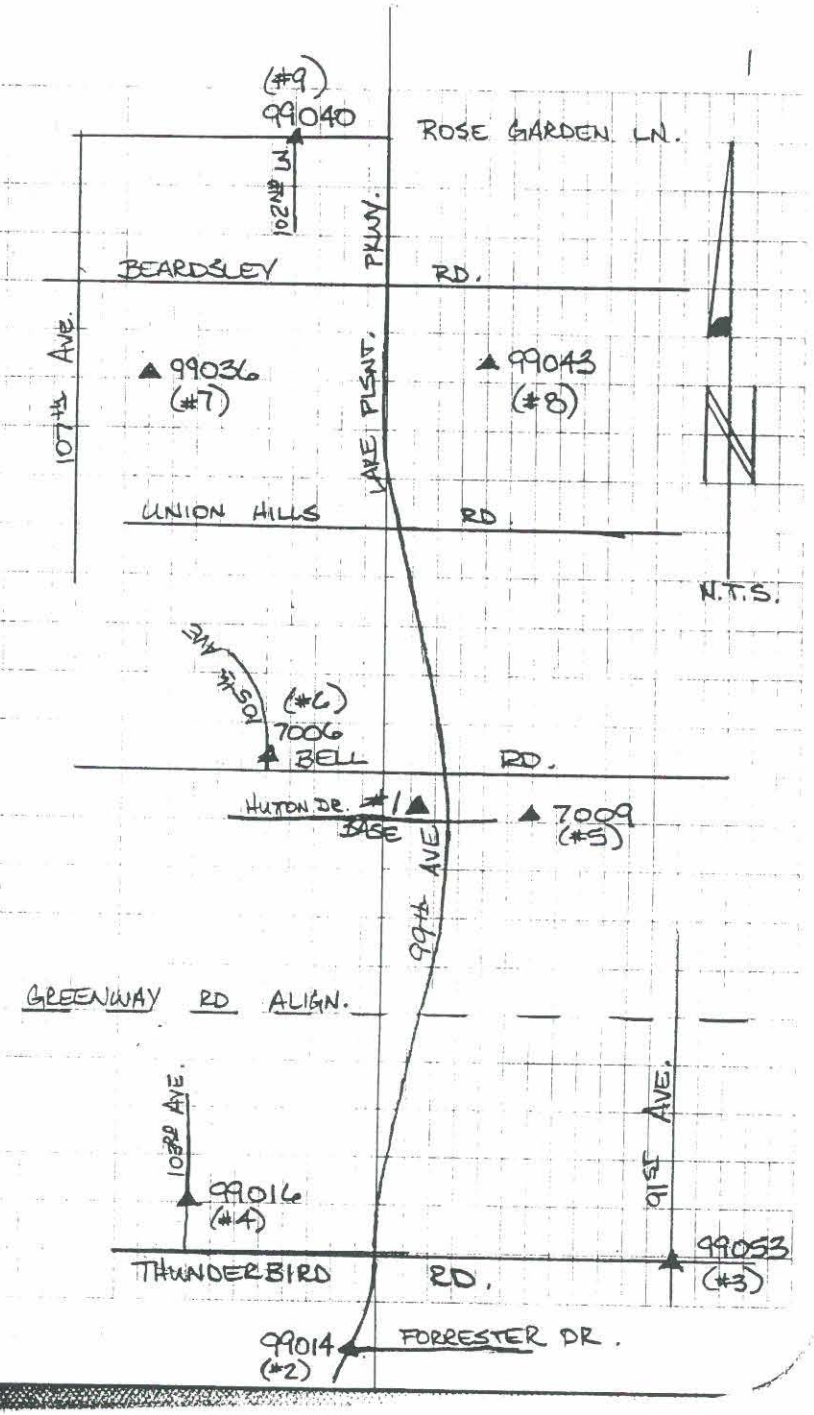
99014 = P.K @ SHINER IN EXPANSION JOINT OF SIDEWALK ON N. SIDE OF BRIDGE, OVER DRAINAGE CHANNEL ON ℄ OF 99th AVE @ 99th AVE & FORRESTER DR. (CP#2)

99016 = BCF @ ℄ OF 103RD AVE & BOUVER DR. (CP#4)

99036 = MARICOPA COUNTY BCF @ INT. OF WELK DR. & TURQUOISE HILL DR.

99040 = BCF @ 102ND LN & ROSE GARDEN LN. B.C. IS @ N EDGE OF PAVEMENT.

CONT'



PT. #	DESCRIPTION
99043 =	MARICOPA COUNTY BCF @ INT. OF PINE SPRINGS & HASSAYAMPA
99053 =	PK & SHINER @ S. END OF BULLNOSE @ 91ST AVE & THUNDERBIRD RD. (CP #3)
1	BASE PT., SET #4RB (1/2") @ N.W. COR. OF 99th AVE & HUTTON DR. (S.E. COR. OF BELL REC. CTR. PARKING LOT) 53 '+/- W. OF B/C-T/C ON 99th AVE. 104 '+/- N. OF B/C-T/C ON HUTTON DR.

R. ROMAN
J. FARNSWORTH

8-15-2000
P. CLOUDY & HOT 100°

3

CONTROL PT. TIES & CALIBRATION PTS

BASE @ #1 #4RB(1/2") @ N.W. COR. OF
99th AVE & HUTTON DR.
53'± W. OF ℄-T/C ON 99th AVE.
104'± N. OF ℄-T/C ON HUTTON DR.
(S.E. COR. OF BELL REC. CENTER PARKING LOT)
GRND. TO T = 5.11

[redacted]

PT #	DESCRIPTION
2	P.K. & SHINER IN EXPANSION JOINT OF SIDEWALK ON N. SIDE OF BRIDGE, OVER DRAINAGE CHANNEL ON ℄ OF 99th AVE @ 99th AVE & FORRESTER DR. (#99014)
3	P.K. & SHINER @ THE SOUTH END OF BULLNOSE @ 91ST AVE & THUNDERBIRD RD. (#99053)
4	PLAN BCF @ ℄ OF 103RD AVE & BOLIVER DR. (#99016) (HAS PUNCHED 1" "+")

CONT'

PT #	DESCRIPTION
5	P.K. & SHINER - 98th AVE & CAMPANA DR. GO EAST ON CAMPANA TO 1ST CUL-DE-SAC TO SOUTH (RT.) P.K. & SHINER @ N.E. COR OF APRON OF THE N.W. RETURN. (#7009)
6	P.K. & SHINER 200'+/- N. OF BELL RD @ N. END OF ℄ STRIPE ON 105th AVE., BETWEEN BELL RD & GRANADA DR. (#7006)
7	MARICOPA COUNTY BCF @ INT. OF WELK DR & TURQUOISE HILL DR. (#99036)
8	MARICOPA COUNTY BCF @ INT. OF PINE SPRINGS DR & HASSAYAMPA DR. (#99043)

CONT'

PT #	DESCRIPTION
9	MARICOPA COUNTY BCF @ 102ND LN & ROSE GARDEN BC. is @ N. EDGE OF PAVEMENT. (#99040)

CALIBRATION PT'S

GRID	2A		N = 947094.23	
GPS	2	(#99014)	E = 592497.72	EL = 1142.83
GRID	3A		N = 949609.95	
GPS	3	(#99053)	E = 597022.83	EL = 1149.64
GRID	4A		N = 949417.73	
GPS	4	(#99016)	E = 589269.01	EL = 1155.10
GRID	5A		N = 958652.57	
GPS	5	(#7009)	E = 593090.30	EL = 1195.59
GRID	6A		N = 960075.96	
GPS	6	(#7006)	E = 589298.66	EL = 1199.32
GRID	7A		N = 969144.46	
GPS	7	(#99036)	E = 587209.29	EL = 1235.21
GRID	8A		N = 969456.77	
GPS	8	(#99043)	E = 591086.22	EL = 1240.18
GRID	9A		N = 973120.714	
GPS	9	(#99040)	E = 588961.294	EL = 1251.88

R. ROMAN
J. FARNSWORTH

8-16-2000
P. CLOUDY & HUMID

98 7

99th AVE CROSS-SECTIONS

BASE @ #1 #4RB(½") @ THE N.W. COR. OF 99th AVE & HUTTON DR.
53'+/- W. OF ℄-℄ ON 99th AVE.
104'+/- N. OF ℄-℄ ON HUTTON DR.
(S.E. COR. OF BELL REC. CTR. PARKING LOT)

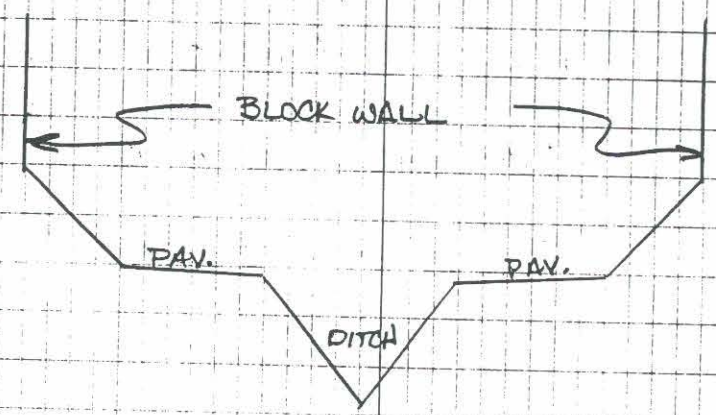
GRND TO ⊼ = 5.10

PT #	DESCRIPTION
	[redacted]
100	FIRST SHOT
100	FACE OF 6' BLOCK WALL E. SIDE 99th AVE. (FM)
101	NAT. GRND. / 1' E. OF E/P
102 & 103	EDGE OF PAVEMENT (EP) N. BOUND LANES
104	NAT GRND. / 1' W. OF EP
105	TOP OF DIRT DRAINAGE DITCH

CONT'

THIS X-SEC IS 200'+/- NORTH OF THE INTERSECTION OF 99th AVE & SOMBRERO CIR.

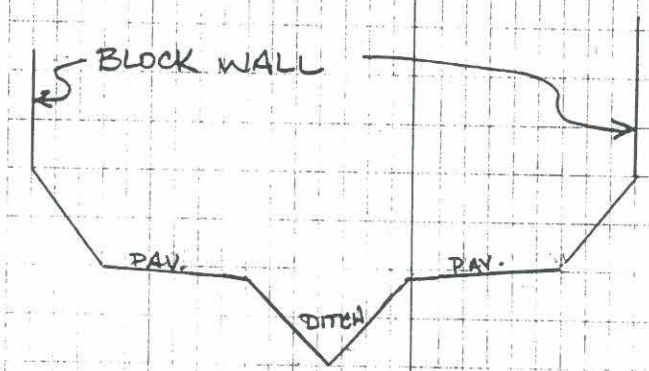
PT #	DESCRIPTION
106	TOE & ℄ OF DIRT DITCH
107	TOP OF DIRT DITCH
108	NAT. GRND / 1' E. OF EP
109 & 110	E.P. / SOUTH BOUND LNS.
111	NAT. GRND. / 1' W. OF EP
112	FACE OF 6' BLOCK WALL TOP
113	FD. #4 RB (1/2") @ INT. OF 99th AVE & SOMBRERO CIR. APPROX. 200' +/- SOUTH OF X-SEC #1 LAST SHOT



[redacted]

Pt #	Description
120	First Shot
120	Face of 6' Block wall/Top
121	Nat. Grnd. / 1' W. of E.P.
122 & 123	Edge of Pav. (EP), South Bound
124	Nat. Grnd. / 1' E. of E.P.
125	Top of Dirt Channel
126	Toe/Hl of Dirt Channel
127	Top of Dirt Channel
128	Nat. Grnd. / 1' W. of E.P.
129 & 130	E.P., North Bound
131	Nat. Grnd. / 1' E. of E.P.
132	Face of 6' Block wall/Top Last Shot

THIS X-SEC IS 1100'+/-
SOUTH OF UNION HILLS DR.
GOING WEST TO EAST

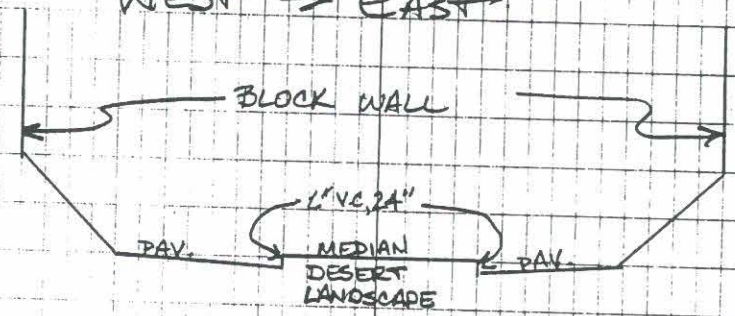


[redacted]

PT #	DESCRIPTION
140	FACE OF 6' BLOCK WALL / TOP
141	NAT. GRND. / 1' W. OF E.P.
142	E.P., SOUTH BOUND
143	LIP OF GUTTER / E.P.
144	GUTTER
145	B/C-T/C 6" V.C., 24"
146	NAT GRND @ ℄ OF MEDIAN
147	B/C-T/C 6" V.C., 24"
148	GUTTER
149	LIP OF GUTTER / E.P.
150	E.P., NORTH BOUND

CONT'

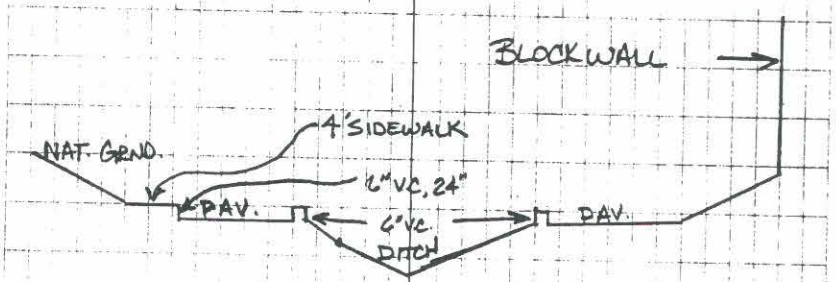
THIS X-SEC IS LOCATED 300' +/- N. OF THE INTERSECTION OF 99th AVE & PALMERAS DR.
WEST → EAST



PT #	DESCRIPTION
151	NAT. GRND. / 1' E. OF E.P.
152	FACE OF 6' BLOCKWALL / TOP LAST SHOT [redacted]
160	NAT. GRND / 10'+/- W. OF B/W FIRST SHOT
161	BACK OF WALK (B/W)
162	B/C-T/C 6" V.C, 24"
163	GUTTER
164	LIP OF GUTTER / E.P. / SOUTH BOUND
165	1/4 CROWN PAV.
166	LIP OF GUTTER / E.P. / SOUTH BOUND
167	GUTTER / FACE OF GUARDRAIL

CONT'

THIS X-SEC. IS LOCATED
50'+/- NORTH OF BASE PT #1
150'+/- NORTH OF HUTTON DR.
WEST → EAST



PT #	DESCRIPTION
168	B/C-T/C 6" V.C., 24"
169	TOP OF CONC CHANNEL @ B/C
170	MID. PT. ON SLOPE OF CONC. CHANNEL (CONC.)
171	℄ ≡ ℄ OF CONC. CHANNEL
172	TOP OF CONC. CHANNEL @ B/C
173	B/C-T/C 6" V.C., 6"
174	E.P. @ FACE OF CURB
175	E.P., NORTH BOUND
176	NAT. GRND. / 1' E. OF EP.
177	FACE OF 6' BLOCK WALL / TOP LAST SHOT

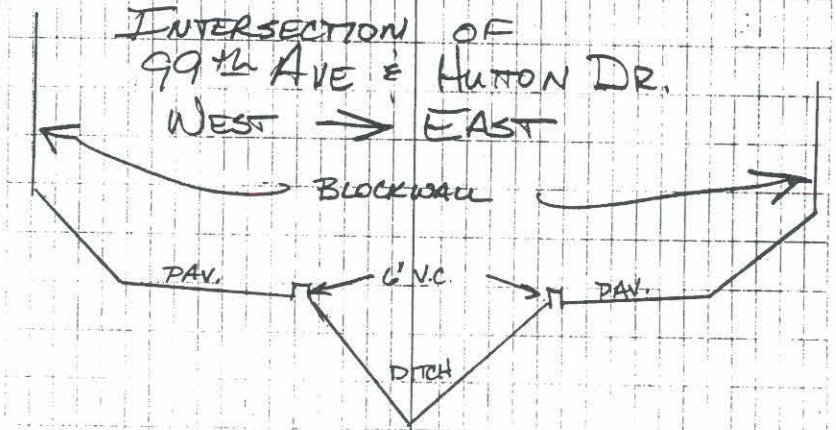
[redacted]

PT #	DESCRIPTION
180	FIRST SHOT FACE OF 6' BLOCKWALL / TOP
181	NAT. GRND. / 1' W OF E.P.
182	E.P., SOUTH BOUND
183	E.P., @ FACE OF 6" V.C., 6"
184	B/C-T/C, 6" V.C., 6"
185 & 36	TOP OF CONC. CHANNEL (286 @ B/C)
187	℄ & ℄ OF CONC. CHANNEL
188 & 189	TOP OF CONC. CHANNEL (289 @ B/C)
190	B/C-T/C, 6" V.C., 6"
191 & 192	E.P., NORTH BOUND (291 @ F/C)
193	NAT GRND. / 1' E. OF E.P.

CONT'

THIS X-SEC IS LOCATED 1100'+/- SOUTH OF THE INTERSECTION OF 99th AVE & HUTTON DR.

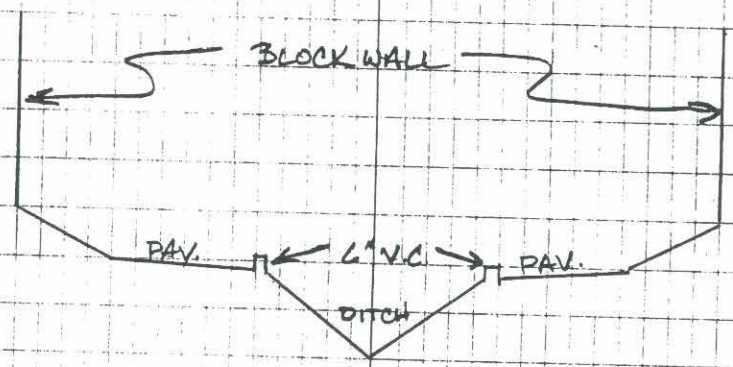
WEST → EAST



Pt #	DESCRIPTION
194	FACE OF 6' BLOCKWALL / TOP LAST SHOT
	[redacted]
200	FIRST SHOT FACE OF 6' BLOCKWALL / TOP
201	NAT. GRND / 1' W. OF E.P.
202 & 203	E.P., SOUTH BOUND (203 @ F/C)
204	B/C-T/C, 6" V.C., 6"
205 & 206	TOP CONC. CHANNEL (205 @ B/C)
207	℄ & ⊥ CONC CHANNEL
208 & 209	TOP CONC. CHANNEL (209 @ B/C)
210	B/C-T/C, 6" V.C., 6"

CONT'

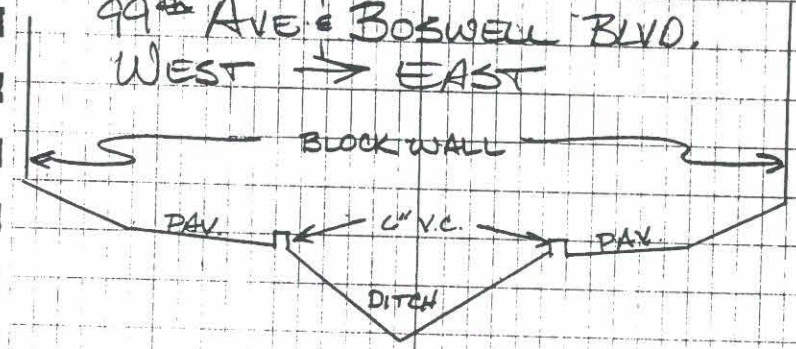
THIS X-SEC IS LOCATED 200'+/- NORTH OF 99th AVE & PLEASANT VALLEY RD.
WEST → EAST



PT #	DESCRIPTION
211 & 212	E.P, NORTH BOUND (211 @ F/C)
213	NAT. GRND / 1' E. OF E.P.
214	FACE 6' BLOCKWALL / TOP LAST SHOT
[redacted]	
220	FIRST SHOT FACE 6' BLOCKWALL / TOP
221	NAT. GRND. / 1' W. OF E.P.
222 & 223	E.P., SOUTH BOUND (223 @ F/C)
224	B/C-T/C, 6" V.C., 6"
225 & 226	TOP CONC. CHANNEL (225 @ B/C)
227	℄ & ℄ OF CONC. CHANNEL

CONT'

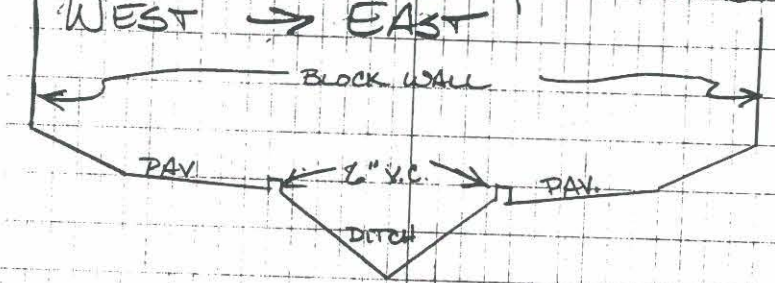
THIS X-SEC. IS LOCATED 700'+/- NORTH OF 99th AVE & BOSWELL BLVD.
WEST → EAST



PT #	DESCRIPTION
228 & 229	TOP CONC CHANNEL (229 @ B/C)
230	B/C - T/C, 6" V.C, 6"
231 & 232	E.P., NORTH BOUND (231 @ F/C)
233	NAT. GRND. / 1' E. OF EP
234	FACE OF 6' BLOCK WALL / TOP LAST SHOT
[redacted]	
240	FIRST SHOT FACE 6' BLOCK WALL / TOP
241	NAT. GRND. / 1' W. OF E.P.
242 & 243	E.P., SOUTH BOUND (243 @ F/C)
244	B/C - T/C, 6" V.C, 6"
245 & 246	TOP CONC CHANNEL (244 @ B/C)

CONT'

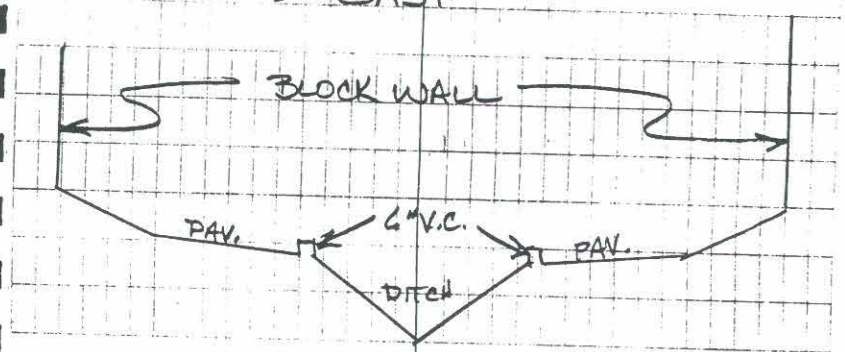
THIS X SEC. LOCATED 300'+/- NORTH OF 99th AVE & CAMEO DR.
WEST → EAST



PT #	DESCRIPTION
247	℄ & ⅊ CONC. CHANNEL
248 & 249	TOP CONC. CHANNEL (248 @ B/C)
250	B/C - T/C, 6" V.C., 6"
251 & 252	E.P., NORTH BOUND (250 @ F/C)
253	NAT. GRND. / 1' E OF E.P.
254	FACE 6' BLOCK WALL / TOP LAST SHOT
[redacted]	
260	FIRST SHOT FACE 6' BLOCK WALL / TOP
261	NAT. GRND. / 1' W OF E.P.
262 & 263	E.P., SOUTH BOUND (263 @ F/C)

CONT'

THIS X-SEC. LOCATED 100'+/-
SOUTH OF 99th AVE & LANCASTER DR.
WEST → EAST



PT. #	DESCRIPTION
264	B/C - T/C, 6" VC, 6"
265 & 266	TOP CONC CHANNEL (265 @ B/C)
267 & 268	TOE & FL CONC CHANNEL
269 & 270	TOP CONC CHANNEL (269 @ B/C)
271	B/C - T/C, 6" V.C., 2"
272 & 273	E.P., NORTH BOUND (271 @ F/C)
274	NAT. GRND. / 1' E. OF E.P.
275	FACE 6' BLOCK WALL / TOP LAST SHOT
280	CHECK SHOT TO CP #2 (#99014) ~~BAD LAS SHOT~~

HORIZ = +0.016
VERT = +0.020

ADDITIONAL TOPO & X-SEC'S/

BASE @ #1 #4 RB @ N.W. COR OF
99th AVE & HUTTON DR.
(SEE PG. 2, THIS BOOK)
GRND TO ANT. = 5.27' (HOOK TAPE)

PT. #	DESCRIPTION
300	FIRST SHOT
300-303	COR. OF HEADWALL @ FACE (HDWL)
304	FL @ ℄ OF HEADWALL (FL)
305 & 306	FL @ ℄ OF WASH (FL)
307-311	COR. OF HEADWALL @ FACE
~~[illegible]~~	~~CONT. PT. # [illegible] @ OUTSIDE (CP) [illegible] OF HEADWALL (VERT ONLY)~~
313-317	B/C-T/C, 6" V.C., 30" (BC)
318-328	B/C-T/C, 6" V.C., 24" (BC) (ISLAND)

CONT.

T. 1 /LEET P. CLOUDY & WARM 75° 19

N = 945374.010 EL = 1141.345
E = 591962.727

PT #	DESCRIPTION	
329 - 333	B/C - T/C, 6" V.C., 30" (BC)	
334 - 336	COR. OF HEADWALL @ FACE (HDWL)	(OTHER SIDE OF HEADWALL MIRRORS OTHERSIDE)
337	FL @ ℄ OF HEADWALL (FL)	
338	FL @ ℄ OF WASH (FL)	
339 - 346	B/C - T/C, 6" VC, 24" (BC)	
347 - 350	COR. OF HEADWALL @ FACE (HDWL)	
351	FL @ ℄ OF WASH (FL)	
352	FL @ ℄ OF WASH (FL)	
353 - 354	MISC NAT. GRND. (NG)	
355 - 358	TOP OF WASH @ NG (TOP)	(CHANNEL LINED W/ SHOTCRETE)
356 - 357	TOE OF WASH (TOE)	

CONT'

PT #	DESCRIPTION
359 - 362	MISC. NAT. GRND (NG) (362 @ ¢ OF R/R TRACKS)
362	LAST SHOT

GLENDE AVE X-SEC & TOPO CONT.

BASE @ #1 #4 RB (1/2") @ N.W. COR OF
99th AVE & HUTTON DR.
(SEE PG. 2 THIS BOOK)
GRND TO ANT = 5.43 (HOOK TAPE)

PT. #	DESCRIPTION
363	FIRST SHOT
363-366	MISC NAT. GRND (NG) (363 @ ℄ R/R TRACKS)
367 & 370	TOP @ EDGE CONC WASH (TOP)
368 & 369	TOE @ EDGE CONC WASH (TOE)
371 & 372	MISC NAT. GRND (NG) (372 @ FACE OF 6' BLOCK WALL)
373-375	COR OF HEADWALL @ FACE (HDWL)
376-384	COR. OF CONC. @ HEADWALL (CONC) (PIPE LAYOUT UNDERNEATH)

CONT.

T.V LEET P.CLOUDY & WARM 75°

(3 - 48" RCP X PIPE LENGTH 42')

PT #	DESCRIPTION	
385 & 386	FL @ ℄ OF WASH (FL)	
387-390	MISC. NAT. GRND. (NG)	(#390 @ ℄ OF P/R TRACKS)
391-394	COR. OF HEADWALL @ FACE (HDWL)	(NO CONC. PAD VISIBLE THIS SIDE)
395 & 396	FL @ ℄ OF WASH (FL)	
397-404	B/C-T/C, 6" V.C., 24" (BC)	(398-399 D/W, 402-403 CURB OPENING)
405-408	COR. OF HEADWALL @ FACE (HDWL)	(408 @ B/W) (3-48" RCP)
409-411	TOP OF WASH @ CURB OPENING (CONC)	(#410) (CP #91015) (CONC. PAD)
412-414	MISC. PAV. @ ℄ (P)	
415-426	B/C-T/C, 6" V.C., 24" (BC)	(417-418 D/W, 420-422 & 423-425 CURB OPENING)
427-430	COR. OF HEADWALL @ FACE (HDWL)	
431 & 432	FL @ ℄ OF WASH (FL)	(433 & 434 FL @ ℄ OF CURB OPENING)
435 & 436		

CONT.

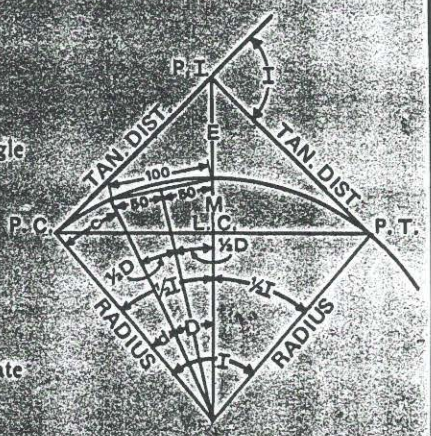
PT #	DESCRIPTION	
437-440	MISC NAT. GRND (NG)	(437 @ ℄ OF R/R TRACKS
441 & 444	TOP OF WASH (TOP)	
442 & 443	TOE OF WASH (TOE)	
445-447	MISC. NAT. GRND. (NG)	(447 @ FACE OF BLOCKWALL)
448 & 449	EDGE OF PAV. (EP)	
450-452	B/C-T/C, 6" V.C., 24" (BC)	
453-455	COR. OF HEADWALL @ FACE (HDWL)	(2-60" RCP)
456-458	MISC. PAV. @ ℄ (P)	
459-461	B/C-T/C, 6" V.C., 24" (BC)	
462-464	EDGE OF PAV. (EP)	
465-467	COR. OF HEADWALL @ FACE (HDWL)	

CONT.

PT #	DESCRIPTION
468 - 471	Fh @ ℄ of WASH (FL)
~~472~~	~~FD. AZDOT 50~~ (CP #88016)
473 - 476	MISC. NAT. GRND (NG) (473 @ ℄ R/R TRACKS)
477 & 480	TOP OF WASH (TOP)
478 & 479	TOE OF WASH (TOE)
481 & 482	MISC. NAT GRND (NG)

CURVE FORMULAE

D = Degree of Curve
1° = 1 Degree of Curve
2° = 2 Degree of Curve
P.C. = Point of Curve
P.T. = Point of Tangent
P.I. = Point of Intersection
I = Intersection of Angle, Angle Between Two Tangents
L = Length of Curve (from P.C. to P.T.)
T = Tangent Distance
E = External Distance
R = Radius
L.C. = Length of Chord
M = Length of Middle Ordinate
c = Length of Sub-Chord
d = Angle of Sub-Chord



$$R = \frac{L.C.}{2\sin\frac{1}{2}I} \quad T = R\tan\tfrac{1}{2}I = \frac{L.C.}{2\cos\frac{1}{2}I}$$

$$\frac{L.C.}{2} = R\sin\frac{I}{2}, \quad D\,1^\circ = R = 5730, \quad D\,2^\circ = \frac{5730}{2}, \quad D = \frac{5730}{R}$$

$$M = R(1 - \cos\tfrac{1}{2}I), = R - R\cos\frac{I}{2}$$

$$\frac{E + R}{R} = \sec\frac{I}{2}, \quad \frac{R - M}{R} = \cos\frac{I}{2}$$

$$c = 2R\sin\tfrac{1}{2}d, \quad d = \frac{c}{2R}$$

$$L.C. = 2R\sin\tfrac{1}{2}I, \quad E = R(\sec\tfrac{1}{2}I - 1), = R\sec\frac{I}{2} - R$$

Minutes in Decimals of a Degree

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2'	.0333	12'	.2000	22'	.3667	32'	.5333	42'	.7000	52'	.8667
3'	.0500	13'	.2167	23'	.3833	33'	.5500	43'	.7167	53'	.8833
4'	.0667	14'	.2333	24'	.4000	34'	.5667	44'	.7333	54'	.9000
5'	.0833	15'	.2500	25'	.4167	35'	.5833	45'	.7500	55'	.9167
6'	.1000	16'	.2667	26'	.4333	36'	.6000	46'	.7667	56'	.9333
7'	.1167	17'	.2833	27'	.4500	37'	.6167	47'	.7833	57'	.9500
8'	.1333	18'	.3000	28'	.4667	38'	.6333	48'	.8000	58'	.9667
9'	.1500	19'	.3167	29'	.4833	39'	.6500	49'	.8167	59'	.9833
10'	.1667	20'	.3333	30'	.5000	40'	.6667	50'	.8333	60'	1.0000

Inches in Decimals of a Foot

1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729	

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Points

Project name	50430319
Coordinate Units	International feet
Distance Units	International feet
Height Units	International feet
Date printed	3/19/01 4:23:36 PM
Coordinate System	Projection from data collector
Datum	(WGS 84)

X, Y, & Z
Books 5 & 8

Zone	Zone from data collector
Geoid model	Not selected

Coordinate units: International feet
Elevation units: International feet

Point listing

Name	Northing	Easting	Elevation	Feature Code
1	958490.850	591435.549	1193.511	RB
2	947095.256	592499.081	1142.821	PKFD
3	949611.281	597024.531	1149.649	PKFD
4	949419.015	589270.104	1155.131	BCFD
5	959654.653	593091.689	1195.544	PKFD
6	960078.092	589299.768	1199.262	PKFD
7	969147.435	587210.232	1235.274	BCFD
8	969459.798	591087.455	1240.176	BCFD
9	973123.989	588962.312	1251.891	BCFD
2A	947096.124	592498.905	1142.832	GRID
3A	949611.849	597024.024	1149.642	GRID
4A	949419.629	589270.189	1155.102	GRID
5A	959654.489	593091.486	1195.592	GRID
6A	960077.880	589299.839	1199.322	GRID
7A	969146.398	587210.464	1235.212	GRID
8A	969458.709	591087.402	1240.182	GRID
9A	973122.660	588962.472	1251.883	GRID
100	968212.720	589511.881	1231.877	FM
101	968212.312	589495.926	1229.454	NG
102	968212.114	589494.723	1229.594	EP
103	968212.093	589466.499	1228.963	EP
104	968212.081	589465.529	1228.698	NG
105	968212.851	589459.553	1228.053	TOP
106	968213.854	589441.528	1224.204	TOE
107	968212.857	589423.813	1228.185	TOP
108	968213.089	589417.718	1228.911	NG
109	968213.180	589416.698	1229.252	EP
110	968213.625	589388.748	1229.731	EP
111	968213.573	589387.895	1229.546	NG
112	968212.988	589371.623	1232.889	FM
113	968061.350	589415.469	1228.388	RBFD
120	964191.013	589987.421	1215.857	FM
121	964195.565	590003.932	1213.628	NG
122	964195.855	590004.722	1213.748	EP
123	964201.990	590031.142	1213.256	EP
124	964202.220	590031.920	1213.024	NG
125	964203.613	590036.823	1212.206	TOP
126	964208.195	590055.351	1207.740	TOE
127	964211.871	590073.707	1212.346	TOP
128	964213.107	590078.237	1212.811	NG
129	964213.274	590079.239	1213.098	EP

130	964221.143	590106.148	1213.681	EP
131	964221.463	590106.908	1213.686	NG
132	964225.499	590123.025	1216.271	FM
140	962232.581	590499.837	1207.365	FM
141	962236.573	590516.078	1204.801	NG
142	962236.726	590517.144	1204.912	EP
143	962244.548	590544.227	1204.351	LG
144	962244.906	590545.283	1204.281	G
145	962245.021	590545.983	1204.819	BC
146	962251.347	590566.916	1204.644	NG
147	962255.445	590589.667	1204.730	BC
148	962255.635	590590.399	1204.192	G
149	962255.825	590591.471	1204.220	LG
150	962262.538	590618.562	1204.883	EP
151	962262.615	590619.765	1204.857	NG
152	962266.612	590636.022	1207.176	FM
160	958564.590	591453.652	1190.948	NG
161	958567.708	591465.825	1189.725	BW
162	958568.653	591469.808	1189.635	BC
163	958568.870	591470.422	1189.031	G
164	958569.239	591471.426	1188.934	LG
165	958572.612	591488.662	1188.928	P
166	958577.976	591512.042	1188.648	LG
167	958578.302	591513.118	1188.553	G
168	958577.953	591513.987	1189.012	BC
169	958578.056	591514.085	1188.189	TOP
170	958578.685	591517.677	1186.566	CONC
171	958580.932	591529.162	1184.344	TOE
172	958587.881	591550.477	1188.015	TOP
173	958587.980	591550.678	1188.571	BC
174	958588.160	591551.231	1188.203	P
175	958596.095	591581.185	1188.730	EP
176	958596.444	591582.086	1188.688	NG
177	958600.183	591596.538	1190.973	FM
180	957218.041	591813.721	1184.389	FM
181	957221.956	591829.472	1182.239	NG
182	957222.189	591830.477	1182.240	EP
183	957228.979	591856.056	1181.928	EP
184	957228.996	591856.339	1182.423	BC
185	957229.131	591856.529	1181.835	TOP
186	957230.193	591862.403	1181.405	TOP
187	957234.448	591881.596	1177.620	TOE
188	957238.826	591902.222	1181.249	TOP
189	957240.512	591908.056	1181.676	TOP
190	957240.572	591908.293	1182.183	BC
191	957240.563	591908.794	1181.724	EP
192	957246.198	591934.563	1182.206	EP
193	957246.391	591935.538	1182.092	NG
194	957250.046	591949.891	1184.234	FM
200	955159.282	592352.836	1176.382	FM
201	955162.573	592368.562	1174.323	NG
202	955162.783	592369.462	1174.361	EP
203	955169.446	592395.146	1173.931	EP
204	955169.427	592395.690	1174.449	BC
205	955169.710	592395.859	1173.896	TOP
206	955171.382	592400.348	1173.392	TOP
207	955176.831	592420.037	1168.576	TOE
208	955181.424	592441.534	1173.164	TOP
209	955182.438	592446.465	1173.517	TOP
210	955182.557	592446.770	1174.066	BC
211	955182.408	592447.127	1173.554	EP
212	955188.715	592473.264	1174.078	EP
213	955189.011	592474.192	1174.180	NG
214	955192.276	592489.502	1176.536	FM

220	952856.396	592913.834	1167.079	FM
221	952859.084	592930.196	1163.768	NG
222	952859.156	592930.954	1163.687	EP
223	952862.354	592957.095	1163.298	EP
224	952862.397	592957.572	1163.722	BC
225	952862.738	592957.772	1163.234	TOP
226	952863.739	592962.521	1162.662	TOP
227	952866.108	592982.406	1157.916	TOE
228	952869.720	593003.016	1162.456	TOP
229	952870.164	593008.677	1162.874	TOP
230	952870.213	593009.036	1163.347	BC
231	952870.372	593009.453	1162.942	EP
232	952873.004	593035.985	1163.475	EP
233	952873.240	593037.088	1163.537	NG
234	952875.876	593052.678	1165.997	FM
240	950943.115	593081.114	1158.492	FM
241	950942.064	593097.386	1155.628	NG
242	950941.971	593098.703	1155.722	EP
243	950942.243	593125.734	1155.234	EP
244	950942.244	593126.083	1155.636	BC
245	950942.196	593126.581	1155.100	TOP
246	950941.865	593131.184	1154.545	TOP
247	950940.775	593151.649	1150.233	TOE
248	950939.566	593171.570	1154.420	TOP
249	950939.498	593176.905	1154.900	TOP
250	950939.544	593177.158	1155.445	BC
251	950939.539	593177.708	1154.828	EP
252	950939.714	593204.355	1155.449	EP
253	950939.850	593205.248	1155.363	NG
254	950940.493	593221.245	1158.237	FM
260	948103.090	592730.448	1148.346	FM
261	948101.245	592746.094	1146.134	NG
262	948100.703	592747.572	1146.138	EP
263	948093.694	592773.295	1145.730	EP
264	948093.618	592773.827	1146.123	BC
265	948093.629	592773.830	1145.663	TOP
266	948092.050	592779.356	1144.958	TOP
267	948087.190	592795.922	1140.200	TOE
268	948085.390	592800.959	1140.342	TOE
269	948079.798	592817.857	1145.077	TOP
270	948077.771	592823.559	1145.400	TOP
271	948077.703	592823.771	1145.868	BC
272	948077.568	592824.314	1145.383	EP
273	948070.565	592850.037	1145.829	EP
274	948070.438	592851.228	1145.876	NG
275	948066.534	592865.477	1148.002	FM
280	947095.271	592499.088	1142.801	CHECK
300	945290.964	591931.155	1137.014	HDWL
301	945287.892	591925.504	1140.777	HDWL
302	945278.584	591922.453	1140.812	HDWL
303	945272.704	591925.210	1137.202	HDWL
304	945282.763	591924.637	1134.924	FL
305	945258.909	592005.345	1133.415	FL
306	945327.383	591966.687	1133.238	FL
307	945332.623	591947.847	1141.243	HDWL
308	945337.819	591959.034	1141.312	HDWL
309	945347.249	591954.335	1141.291	HDWL
310	945375.026	591964.432	1141.268	HDWL
311	945292.194	592004.428	1141.206	HDWL
312	945376.123	591963.960	1141.344	CP
313	945427.439	591976.779	1141.140	BC
314	945393.486	591963.732	1141.417	BC
315	945327.547	591936.346	1141.931	BC
316	945283.903	591917.903	1142.171	BC

317	945244.688	591902.364	1142.460	BC
318	945258.679	591863.924	1142.446	BC
319	945294.673	591878.980	1141.985	BC
320	945329.836	591894.331	1141.658	BC
321	945365.729	591911.135	1141.409	BC
322	945367.727	591910.849	1141.278	BC
323	945368.613	591908.657	1141.334	BC
324	945360.901	591885.640	1141.510	BC
325	945358.946	591883.213	1141.509	BC
326	945356.484	591882.097	1141.425	BC
327	945311.116	591870.788	1142.004	BC
328	945266.378	591858.249	1142.393	BC
329	945284.947	591811.324	1142.776	BC
330	945315.309	591820.723	1142.474	BC
331	945349.430	591830.151	1142.159	BC
332	945370.652	591828.101	1141.774	BC
333	945385.308	591810.705	1141.295	BC
334	945313.347	591808.854	1137.429	HDWL
335	945316.220	591814.618	1141.159	HDWL
336	945321.368	591816.345	1141.176	HDWL
337	945321.684	591815.432	1135.216	FL
338	945336.256	591771.193	1135.645	FL
339	945445.225	591896.500	1140.696	BC
340	945396.204	591885.217	1141.188	BC
341	945393.826	591885.559	1141.173	BC
342	945390.718	591890.750	1141.225	BC
343	945390.714	591903.587	1141.316	BC
344	945394.182	591920.217	1141.040	BC
345	945405.959	591928.468	1140.800	BC
346	945446.898	591944.403	1140.608	BC
347	945432.737	591936.263	1141.492	HDWL
348	945415.367	591930.358	1141.338	HDWL
349	945404.568	591926.457	1141.277	HDWL
350	945399.293	591915.850	1141.216	HDWL
351	945438.790	591915.654	1133.452	FL
352	945470.917	591928.416	1133.483	FL
353	945278.009	592083.568	1141.339	NG
354	945260.721	592076.983	1140.268	NG
355	945254.077	592074.937	1139.830	TOP
356	945247.916	592070.253	1133.379	TOE
357	945229.551	592063.464	1133.053	TOE
358	945223.079	592061.346	1138.983	TOP
359	945191.940	592050.184	1138.778	NG
360	945146.205	592033.920	1140.839	NG
361	945136.265	592029.821	1140.809	NG
362	945129.307	592027.087	1141.925	NG
363	945394.842	591268.240	1144.195	NG
364	945402.753	591271.503	1142.967	NG
365	945412.608	591275.077	1142.632	NG
366	945424.318	591279.027	1141.197	NG
367	945443.105	591284.888	1140.993	TOP
368	945447.685	591285.101	1136.929	TOE
369	945457.891	591288.822	1136.810	TOE
370	945462.972	591289.391	1141.118	TOP
371	945471.773	591291.438	1143.038	NG
372	945484.189	591295.223	1143.382	NG
373	945725.342	590565.185	1144.172	HDWL
374	945723.803	590561.967	1144.328	HDWL
375	945696.780	590581.238	1144.383	HDWL
376	945697.190	590580.144	1143.970	CONC
377	945700.159	590571.617	1143.905	CONC
378	945703.606	590572.555	1143.928	CONC
379	945707.157	590569.953	1143.986	CONC
380	945708.675	590564.877	1144.019	CONC

381	945712.368	590565.916	1144.001	CONC
382	945716.042	590563.264	1143.976	CONC
383	945717.563	590558.166	1143.992	CONC
384	945724.164	590560.061	1143.962	CONC
385	945707.437	590580.286	1138.486	FL
386	945685.752	590629.835	1138.459	FL
387	945750.869	590522.604	1143.728	NG
388	945715.841	590548.456	1144.004	NG
389	945663.290	590582.179	1145.183	NG
390	945629.675	590596.983	1146.283	NG
391	945712.505	590525.547	1144.039	HDWL
392	945713.265	590530.899	1144.125	HDWL
393	945723.801	590523.639	1144.182	HDWL
394	945739.894	590511.947	1144.159	HDWL
395	945728.073	590515.504	1138.901	FL
396	945740.500	590465.943	1138.862	FL
397	946197.430	589013.514	1147.636	BC
398	946211.834	589013.528	1147.272	BC
399	946233.695	589013.686	1146.470	BC
400	946262.628	589013.738	1145.861	BC
401	946273.419	589015.428	1145.501	BC
402	946281.319	589022.179	1145.229	BC
403	946282.083	589054.521	1145.034	BC
404	946280.350	589080.883	1145.059	BC
405	946266.282	589026.627	1146.234	HDWL
406	946247.842	589021.331	1146.100	HDWL
407	946239.490	589018.359	1146.056	HDWL
408	946266.540	589026.831	1144.263	CONC
409	946258.101	589041.399	1143.609	CONC
410	946247.178	589064.223	1144.471	CONC
411	946310.735	588985.017	1145.679	P
412	946245.578	588983.803	1146.330	P
413	946199.347	588982.994	1148.048	P
414	946218.658	588954.208	1147.862	BC
415	946224.065	588956.486	1147.816	BC
416	946253.047	588956.493	1146.384	BC
417	946275.098	588956.804	1145.904	BC
418	946295.186	588956.797	1145.638	BC
419	946307.184	588954.380	1145.511	BC
420	946314.015	588947.610	1145.342	BC
421	946311.576	588944.036	1145.222	BC
422	946289.034	588935.789	1144.581	BC
423	946289.022	588926.377	1144.684	BC
424	946314.439	588935.637	1145.220	BC
425	946318.584	588934.591	1145.260	BC
426	946330.882	588901.750	1145.411	BC
427	946293.084	588942.634	1146.103	HDWL
428	946286.594	588948.841	1146.272	HDWL
429	946266.569	588942.968	1146.212	HDWL
430	946264.056	588934.215	1146.199	HDWL
431	946276.815	588944.559	1140.455	FL
432	946282.650	588906.844	1140.701	FL
433	946289.122	588931.789	1143.837	FL
434	946316.330	588940.782	1144.843	FL
435	946250.328	589026.710	1140.164	FL
436	946232.675	589064.489	1140.280	FL
437	947805.431	584381.058	1150.472	NG
438	947810.552	584382.239	1150.359	NG
439	947813.727	584384.146	1149.134	NG
440	947832.051	584393.670	1146.861	NG
441	947851.378	584401.820	1146.564	TOP
442	947855.922	584401.743	1139.883	TOE
443	947867.321	584405.141	1139.954	TOE
444	947870.888	584405.756	1146.436	TOP

445	947872.739	584405.779	1147.885	NG
446	947878.235	584408.918	1149.577	NG
447	947894.003	584414.743	1150.791	NG
448	948051.076	583719.632	1148.603	EP
449	948086.457	583719.787	1148.016	EP
450	948089.790	583720.093	1148.247	BC
451	948137.264	583720.412	1147.928	BC
452	948200.838	583720.274	1147.463	BC
453	948109.791	583737.126	1148.632	HDWL
454	948098.703	583732.782	1148.633	HDWL
455	948087.551	583728.375	1148.678	HDWL
456	948055.804	583688.834	1148.628	P
457	948097.074	583689.403	1148.182	P
458	948170.686	583689.462	1147.661	P
459	948175.358	583660.772	1147.428	BC
460	948136.807	583660.273	1147.838	BC
461	948112.761	583659.994	1148.031	BC
462	948108.632	583660.506	1147.436	EP
463	948088.766	583658.305	1147.801	EP
464	948074.082	583652.257	1148.100	EP
465	948118.397	583646.613	1148.551	HDWL
466	948129.451	583650.938	1148.602	HDWL
467	948140.736	583655.152	1148.635	HDWL
468	948135.076	583637.660	1138.788	FL
469	948150.675	583597.002	1138.741	FL
470	948093.996	583743.419	1138.906	FL
471	948077.352	583789.159	1138.932	FL
472	948088.034	583728.272	1148.601	CP
473	948318.472	582915.347	1143.420	NG
474	948322.800	582917.391	1143.358	NG
475	948329.846	582920.901	1140.959	NG
476	948347.051	582927.406	1139.490	NG
477	948366.267	582933.073	1138.975	TOP
478	948374.397	582934.892	1134.391	TOE
479	948383.351	582938.886	1134.280	TOE
480	948401.765	582944.242	1148.283	TOP
481	948403.969	582944.226	1148.347	NG
482	948414.057	582949.283	1148.532	NG
312A	945377.191	591963.854	1141.292	GRID
472A	948088.746	583728.767	1148.632	GRID
500	959827.433	596994.260	1194.618	LIP
501	959826.223	596994.247	1194.483	G
502	959825.530	596994.202	1195.084	BC
503	959821.969	596994.122	1195.237	NG
504	959813.073	596993.782	1197.177	FM
505	959812.542	597002.056	1197.103	FM
506	959816.063	597002.707	1196.559	TOP
507	959816.614	597005.422	1195.148	TOE
508	959825.988	597002.030	1194.606	DW
509	959820.248	597006.079	1195.172	DW
510	959820.016	597019.725	1195.147	DW
511	959825.563	597024.080	1194.584	DW
512	959825.144	597013.487	1194.742	BC
513	959819.952	597024.053	1195.164	BW
514	959819.081	597031.365	1195.222	BW
515	959818.823	597062.371	1195.187	BW
516	959819.147	597070.190	1195.155	BW
517	959818.705	597093.743	1195.279	BW
518	959823.651	597094.042	1195.131	BC
519	959824.297	597094.061	1194.628	G
520	959825.517	597094.050	1194.647	LIP
521	959825.224	597044.131	1194.435	CB
522	959825.450	597037.639	1194.479	CB
523	959774.103	597002.840	1197.049	CLF

524	959774.227	597006.820	1194.721	CLF
525	959774.095	597018.453	1193.437	CLF
526	959799.632	597017.432	1193.802	CLF
527	959814.622	597022.812	1194.829	CLF
528	959819.264	597030.523	1195.185	CLF
529	959811.337	597023.720	1196.735	HDWL
530	959810.835	597024.175	1196.724	HDWL
531	959818.153	597031.622	1196.728	HDWL
532	959819.030	597031.423	1196.679	HDWL
533	959818.908	597058.895	1196.787	HDWL
534	959818.084	597058.923	1196.777	HDWL
535	959818.929	597059.143	1195.180	CLF
536	959818.727	597069.376	1195.242	CLF
537	959791.299	597076.659	1198.089	CLF
538	959811.178	597023.346	1194.227	TOP
539	959808.556	597021.403	1194.172	TOP
540	959786.802	597020.088	1193.533	TOP
541	959787.396	597037.154	1185.508	TOE
542	959810.290	597030.186	1185.680	TOE
543	959813.350	597051.629	1185.345	TOE
544	959787.190	597045.273	1185.331	TOE
545	959787.878	597061.899	1193.467	TOP
546	959809.718	597061.385	1193.508	TOP
547	959817.165	597062.471	1194.724	TOP
548	959815.946	597052.192	1185.433	RCP
549	959814.313	597027.711	1185.239	RCP
550	959818.183	597035.109	1185.213	CUL
551	959818.135	597041.933	1185.287	CUL
552	959742.856	597002.731	1185.715	FM
553	959740.629	597002.876	1185.664	TOP
554	959740.754	597007.660	1182.821	TOE
555	959741.158	597013.929	1182.492	NG
556	959741.451	597021.135	1182.143	TOP
557	959742.275	597037.670	1173.894	TOE
558	959742.848	597045.695	1173.904	TOE
559	959743.129	597061.778	1181.929	TOP
560	959743.207	597063.676	1182.166	TOE
561	959742.840	597076.194	1186.146	TOP
562	959741.196	597076.446	1186.544	CLF
563	959101.843	597007.265	1183.055	TOP
564	959101.420	597009.455	1181.478	TOP
565	959099.215	597012.982	1181.458	TOP
566	959098.990	597013.211	1182.428	HDWL
567	959098.732	597013.055	1182.410	HDWL
568	959097.671	597014.760	1182.438	HDWL
569	959097.837	597015.123	1182.421	HDWL
570	959095.024	597015.045	1193.740	HDWL
571	959095.241	597014.692	1193.752	HDWL
572	959094.299	597012.819	1193.748	HDWL
573	959094.133	597012.478	1192.783	TOP
574	959093.613	597013.021	1193.782	HDWL
575	959094.775	597010.129	1192.608	TOP
576	959096.496	597007.522	1194.347	TOP
577	959099.522	597007.120	1194.103	FM
578	959098.827	597008.456	1191.757	FL
579	959097.445	597010.924	1191.504	FL
580	959095.945	597010.945	1191.756	TOE
581	959098.848	597011.530	1191.690	TOE
582	959096.421	597014.443	1189.392	RCP
583	959095.609	597035.103	1188.388	RCP
584	959099.161	597007.172	1191.906	FL
585	958797.756	597009.355	1193.245	TOP
586	958797.797	597010.058	1192.804	TOP
587	958797.097	597014.384	1192.720	TOP

588	958796.640	597014.571	1193.549	HDWL
589	958796.925	597014.783	1193.508	HDWL
590	958795.842	597016.448	1193.466	HDWL
591	958795.656	597016.120	1193.417	HDWL
592	958793.055	597016.098	1193.424	HDWL
593	958792.857	597016.394	1193.400	HDWL
594	958791.928	597014.555	1193.398	HDWL
595	958792.211	597014.391	1193.394	HDWL
596	958792.018	597014.091	1192.417	TOP
597	958792.477	597011.106	1192.498	TOP
598	958793.609	597009.423	1193.167	TOP
599	958796.799	597009.960	1190.286	TOE
600	958796.363	597013.386	1190.260	TOE
601	958794.980	597010.508	1190.483	TOE
602	958796.028	597009.880	1190.660	FL
603	958794.442	597015.822	1189.150	RCP
604	958794.350	597036.335	1188.355	RCP
605	958785.312	597009.458	1193.080	FM
606	958783.626	597009.531	1193.154	TOP
607	958783.751	597010.819	1192.523	TOE
608	958783.654	597015.867	1192.463	NG
609	958784.427	597028.471	1192.321	TOP
610	958784.440	597044.514	1184.066	TOE
611	958785.567	597052.690	1184.131	TOE
612	958784.662	597069.152	1192.093	TOP
613	958784.797	597076.190	1192.526	NG
614	958784.987	597083.072	1191.150	CLF
615	958978.867	597069.402	1192.676	NG
616	958979.769	597081.926	1193.538	CLF
617	958391.154	597071.798	1191.735	TOP
618	958391.846	597075.868	1191.884	TOP
619	958367.580	597060.189	1185.815	TOP
620	958367.373	597076.068	1185.965	TOP
621	958340.668	597076.533	1185.933	TOP
622	958338.506	597059.925	1185.779	TOP
623	958315.016	597071.954	1191.685	TOP
624	958314.366	597076.233	1191.745	TOP
625	958386.899	597085.626	1190.815	CLF
626	958385.293	597085.501	1190.360	FEM
627	958369.329	597085.908	1188.417	FEM
628	958337.840	597086.048	1186.708	FEM
629	958321.327	597086.664	1190.188	FEM
630	958313.464	597086.752	1190.276	FEM
631	958312.780	597086.538	1190.433	FM
632	958314.926	597079.042	1191.553	TOP
633	958391.054	597079.835	1191.699	TOP
634	958367.655	597077.622	1186.059	TOE
635	958339.237	597078.057	1186.036	TOE
636	958335.251	597296.070	1190.418	NG
637	958337.537	597296.298	1190.263	TOP
638	958347.160	597296.530	1186.337	TOE
639	958360.515	597296.664	1186.186	NG
640	958372.773	597299.430	1186.296	TOE
641	958384.675	597302.133	1190.753	TOP
642	958448.851	597011.781	1191.822	TOP
643	958448.554	597013.571	1191.058	TOP
644	958448.008	597016.532	1190.928	TOP
645	958447.796	597016.738	1192.490	HDWL
646	958448.067	597016.877	1192.495	HDWL
647	958447.049	597018.740	1192.470	HDWL
648	958446.857	597018.429	1192.475	HDWL
649	958444.427	597018.387	1192.521	HDWL
650	958444.215	597018.711	1192.495	HDWL
651	958443.454	597016.658	1192.486	HDWL

652	958443.212	597016.801	1192.461	HDWL
653	958443.188	597016.107	1191.330	TOP
654	958445.416	597013.803	1191.210	TOP
655	958446.037	597011.806	1191.960	TOP
656	958446.433	597012.676	1189.120	TOE
657	958445.329	597015.616	1189.254	TOE
658	958444.247	597016.971	1189.299	TOE
659	958447.526	597016.366	1189.380	TOE
660	958447.438	597014.774	1189.282	TOE
661	958448.199	597012.279	1189.289	TOE
662	958447.558	597011.738	1189.190	FL
663	958445.767	597018.169	1188.612	RCP
664	958445.509	597039.173	1187.641	RCP
665	958391.056	597031.226	1191.755	TOP
666	958314.649	597031.436	1191.709	TOP
667	958134.880	597013.717	1191.513	FM
668	958136.053	597013.702	1191.489	TOP
669	958135.598	597015.054	1190.871	NG
670	958134.172	597020.864	1191.537	NG
671	958132.633	597033.045	1191.289	TOP
672	958133.611	597047.897	1183.420	TOE
673	958132.049	597044.823	1183.417	TOE
674	958131.848	597048.065	1180.614	TOE
675	958131.817	597057.686	1180.686	TOE
676	958132.246	597060.893	1183.523	TOE
677	958133.916	597058.067	1183.442	TOE
678	958132.058	597058.118	1183.538	TOP
679	958132.001	597053.085	1183.521	TOP
680	958132.057	597045.903	1183.434	TOP
681	958132.278	597073.648	1191.615	TOP
682	958131.291	597083.086	1191.318	NG
683	958131.825	597086.899	1190.522	NG
684	958131.883	597087.941	1190.486	FM
685	958115.155	597018.334	1190.777	VG
686	958109.894	597014.703	1191.004	VG
687	958101.174	597031.646	1190.531	VG
688	958108.073	597031.500	1190.637	VG
689	958105.037	597031.218	1190.310	FL
690	958112.911	597017.108	1190.593	FL
691	958032.999	597032.787	1188.706	TOP
692	958033.063	597050.030	1180.437	TOE
693	958033.623	597057.737	1180.408	TOE
694	958034.188	597074.217	1188.384	TOE
695	957582.652	597083.639	1187.947	TOP
696	957581.827	597078.111	1187.915	TOP
697	957571.704	597073.423	1185.829	TOP
698	957571.709	597083.922	1185.819	TOP
699	957550.820	597073.674	1185.670	TOP
700	957551.682	597083.775	1185.822	TOP
701	957539.780	597078.592	1187.890	TOP
702	957540.092	597083.847	1187.985	TOP
703	957581.562	597091.765	1186.716	FM
704	957539.671	597091.916	1187.041	FM
705	957530.781	597092.206	1186.605	FM
706	957531.179	597101.913	1186.597	FM
707	957232.116	597083.695	1187.109	TOP
708	957232.299	597072.023	1179.262	TOP
709	957232.546	597056.378	1179.433	TOP
710	957232.157	597060.905	1176.663	TOE
711	957232.230	597063.847	1176.590	TOE
712	957232.487	597043.355	1187.230	TOP
713	957220.599	597027.840	1186.689	VG
714	957214.191	597026.999	1186.937	VG
715	957206.076	597041.943	1186.279	VG

716	957212.314	597042.163	1186.346	VG
717	957216.201	597028.881	1186.620	FL
718	957208.736	597043.506	1185.961	FL
719	957131.699	597045.455	1182.710	TOP
720	957132.034	597058.840	1176.313	TOE
721	957131.984	597070.800	1176.374	TOE
722	957132.110	597083.962	1182.541	TOP
723	957063.198	597085.253	1182.499	CONC
724	957062.807	597091.280	1182.438	CONC
725	957042.135	597085.230	1182.539	CONC
726	957042.724	597091.268	1182.424	CONC
727	957063.853	597104.779	1183.265	FM
728	957039.329	597104.911	1183.184	FM
729	956985.330	597105.431	1183.692	FM
730	956984.072	597105.031	1183.660	CLF
731	957085.596	597031.736	1183.927	HDWL
732	957085.937	597031.630	1183.918	HDWL
733	957086.761	597033.205	1183.922	HDWL
734	957086.591	597033.575	1183.942	HDWL
735	957089.491	597033.616	1183.968	HDWL
736	957089.219	597033.204	1183.950	HDWL
737	957090.237	597031.647	1183.950	HDWL
738	957090.554	597031.853	1183.937	HDWL
739	957087.896	597031.408	1182.433	FL
740	957087.962	597033.149	1180.220	RCP
741	957087.510	597052.332	1179.681	RCP
742	956864.156	597033.043	1183.099	HDWL
743	956863.814	597032.897	1183.120	HDWL
744	956862.725	597034.738	1183.063	HDWL
745	956862.903	597035.023	1183.130	HDWL
746	956860.153	597035.033	1183.117	HDWL
747	956860.312	597034.722	1183.122	HDWL
748	956859.302	597032.989	1183.271	HDWL
749	956858.944	597033.021	1183.254	HDWL
750	956861.330	597032.346	1180.775	FL
751	956861.727	597034.803	1179.155	RCP
752	956861.413	597054.628	1178.386	RCP
753	956729.963	597047.224	1182.048	TOP
754	956729.683	597058.950	1175.730	TOE
755	956729.736	597066.875	1175.803	TOP
756	956729.865	597067.588	1175.828	TOP
757	956729.580	597075.080	1175.802	TOP
758	956728.876	597074.329	1173.022	TOE
759	956729.329	597061.587	1173.063	TOE
760	956729.296	597087.855	1182.073	TOP
761	956638.891	597107.432	1180.564	CLF
762	956637.308	597087.710	1179.321	TOP
763	956637.195	597074.915	1172.707	TOE
764	956637.059	597062.014	1172.736	TOE
765	956637.173	597048.923	1179.282	TOP
766	956636.972	597038.404	1179.772	NG
767	956636.067	597035.745	1179.994	TOE
768	956636.000	597034.320	1181.742	TOP
769	956636.803	597033.930	1181.822	FM
770	956607.544	597035.276	1180.488	HDWL
771	956607.777	597035.414	1180.509	HDWL
772	956606.673	597037.451	1180.598	HDWL
773	956606.476	597037.225	1180.643	HDWL
774	956603.433	597037.425	1180.509	HDWL
775	956603.243	597037.770	1180.490	HDWL
776	956602.295	597035.786	1180.508	HDWL
777	956602.006	597035.802	1180.437	HDWL
778	956604.423	597055.778	1175.694	RCP
779	955231.037	597055.488	1176.665	TOP

780	955231.092	597044.350	1176.864	TOP
781	955254.942	597057.047	1172.826	TOE
782	955263.986	597046.784	1173.402	TOE
783	955291.974	597044.830	1174.203	TOE
784	955284.316	597056.780	1173.215	TOE
785	955314.047	597054.795	1176.178	TOP
786	955313.163	597044.849	1176.634	TOP
787	955333.922	597042.722	1177.674	FM
788	955332.422	597043.144	1177.580	TOP
789	955332.426	597044.464	1176.958	TOE
790	955332.714	597051.211	1176.752	NG
791	955332.978	597056.910	1176.482	TOP
792	955335.136	597069.331	1170.302	TOE
793	955334.672	597083.451	1170.290	TOE
794	955335.050	597096.584	1176.418	TOP
795	955335.550	597106.064	1176.376	NG
796	955335.744	597116.058	1174.911	CLF
797	955266.203	597041.565	1176.372	TOP
798	955276.016	597034.412	1176.675	TOP
799	955277.231	597034.440	1176.623	FM
800	955355.490	596980.298	1175.776	FM
801	955343.174	596968.003	1175.718	FM
802	955420.395	596913.281	1174.734	TOE
803	955414.550	596908.632	1174.629	FL
804	955409.511	596901.711	1174.795	TOE
805	955293.716	597043.270	1177.279	FM
806	955276.316	597037.611	1173.786	TOE
807	955268.705	597044.157	1173.391	TOE
808	955292.490	597043.210	1174.107	TOE
809	955280.503	597056.858	1172.980	TOP
810	955268.766	597056.910	1172.860	TOP
811	955255.332	597056.867	1172.854	TOP
812	955284.194	597070.000	1170.133	TOE
813	955269.118	597069.962	1170.093	TOE
814	955253.290	597070.167	1170.140	TOE
815	955144.003	597070.474	1170.377	TOE
816	955143.389	597057.225	1177.000	TOP
817	955143.047	597043.419	1176.609	NG
818	955142.364	597033.999	1177.053	FM
819	955143.845	597085.490	1170.279	TOE
820	955143.963	597098.546	1176.829	TOP
821	955111.538	597113.448	1174.608	NG
822	955110.391	597117.626	1174.539	CLF
823	955060.522	597101.807	1176.964	CLF
824	955084.561	597096.652	1177.003	TOP
825	955084.564	597088.403	1170.057	TOE
826	955084.250	597067.460	1170.060	TOE
827	955084.588	597058.973	1176.831	TOP
828	955064.571	597034.933	1177.217	CLF
829	955064.968	597058.764	1176.979	CLF
830	955023.468	597060.988	1176.726	CLF
831	955023.837	597108.039	1177.562	CLF
832	955025.432	597101.350	1169.779	CUL
833	955025.098	597089.287	1169.787	CUL
834	955024.806	597078.969	1169.896	CUL
835	955024.720	597067.828	1169.898	CUL
836	955024.721	597063.274	1169.849	TOE
837	955024.597	597105.764	1170.073	TOE
838	955024.731	597106.694	1176.760	TOP
839	955024.333	597062.750	1176.737	TOP
840	954934.748	597118.794	1178.078	P
841	954922.486	597118.227	1178.078	P
842	954912.843	597116.379	1178.064	P
843	954896.534	597115.306	1178.081	P

844	954829.983	597232.823	1178.180	CLF
845	954829.664	597208.907	1177.759	CLF
846	954847.945	597207.633	1176.659	CLF
847	954852.996	597166.343	1176.640	CLF
848	954901.532	597165.696	1176.675	CLF
849	954916.281	597208.869	1177.290	CLF
850	954915.944	597225.234	1177.341	CLF
851	954859.460	597167.290	1169.574	CUL
852	954870.031	597167.433	1169.567	CUL
853	954881.031	597167.180	1169.520	CUL
854	954892.561	597175.713	1169.528	CUL
855	954897.323	597180.096	1169.822	TOE
856	954895.012	597224.990	1169.841	TOE
857	954892.200	597286.156	1169.703	TOE
858	954887.880	597386.233	1169.537	TOE
859	954899.835	597389.044	1176.510	TOP
860	954901.062	597347.344	1176.526	TOP
861	954902.217	597304.082	1176.581	TOP
862	954903.403	597256.118	1176.523	TOP
863	954904.186	597209.725	1176.731	TOP
864	954898.855	597166.986	1176.512	TOP
865	954854.695	597166.863	1176.639	TOP
866	954850.193	597211.900	1176.620	TOP
867	954847.838	597254.968	1176.614	TOP
868	954848.275	597315.353	1176.713	TOP
869	954862.479	597316.227	1169.554	TOE
870	954861.727	597273.162	1169.496	TOE
871	954859.629	597226.580	1169.695	TOE
872	954856.230	597180.793	1169.668	TOE
873	954830.539	597287.682	1178.439	CLF
874	954831.169	597345.527	1178.892	CLF
875	955982.485	597833.997	1179.301	P
876	957040.043	598214.541	1183.972	P
877	958054.446	597981.849	1187.299	P
878	958358.269	597823.800	1188.446	P
879	958334.623	597750.798	1190.848	TOP
880	958334.848	597773.019	1191.039	TOP
881	958330.603	597782.615	1190.486	TOP
882	958336.380	597786.477	1188.659	TOE
883	958341.310	597774.228	1188.280	TOE
884	958344.717	597753.288	1188.083	TOE
885	958382.477	597700.822	1190.057	TOP
886	958412.851	597740.630	1191.070	TOP
887	958386.752	597743.633	1191.117	TOP
888	958392.904	597762.100	1188.870	TOE
889	958415.126	597751.605	1189.067	TOE
890	958372.070	597698.413	1187.287	TOE
891	958371.722	597747.072	1188.159	TOE
892	958386.954	597764.409	1188.436	TOE
893	959090.012	597686.140	1191.841	P
894	959661.120	597687.701	1195.161	P

Back to top

10-8 2000
11-3

SOKKIA™

MADE IN U.S.A.

5043.0001

BOOK 6 OF [redacted]

SOKKIA™

ECONOMY FIELD BOOK

ADMP UPDATE

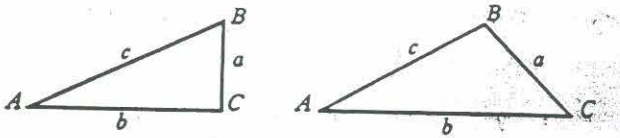
ARROWHEAD LAKES

SEC. 19 WEIRS

BOOK 6

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES



$\text{Sin } A = \frac{a}{c} = \text{Cos } B$ $\quad$ $\text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B$ $\quad$ $\text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B$ $\quad$ $\text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN USA

5043.0001
ADMP UPDATE - ARROWHEAD LAKES
WEIR SURVEY FOR SEC 19

THIS SURVEY IS A PORTION OF
SEC 19, T4N, R2E

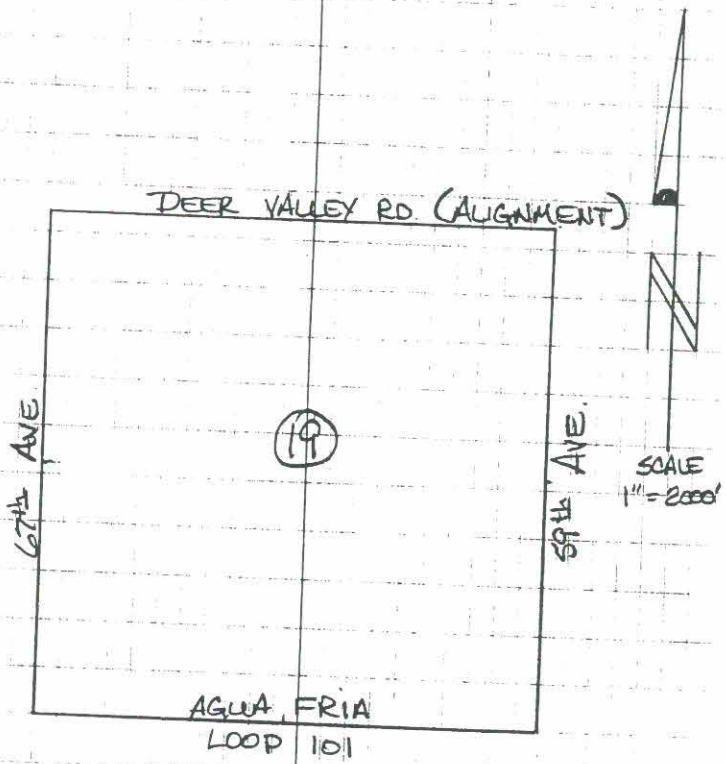


TABLE OF CONTENTS

DESCRIPTION	PG #	GPS/CONV.	C. W	DATE
CALIBRATION PT'S	1	GPS	R. ROMAN, J. FARNSWORTH	10-27-2000
SEC. 19, WEIR TOPO'S	—	GPS	R. ROMAN, J FARNSWORTH	10-27-2000
WEIR S19-1	2-3			
WEIR S19-2	4			
WEIR S19-3	5			
WEIR S19-4	6			
WEIR S19-5	7			
WEIR S19-6	8-9		R. ROMAN, J. FARNSWORTH	10-27-2000, 11-3-2000
WEIR S19-7	10			
WEIR S19-9	11			
WEIR S19-8	12			
WEIR S19-10	13			
WEIR S19-11	14			
WEIR S19-12	15			
WEIR S19-13	16			
WEIR S19-14	17			
WEIR S19-15	18			
BASE PT # 1872	19			

CALIBRATION PT - J. FARNSWORTH CLOUDY & RAINING

GRID #99913		
GPS #1004	HORIZ & VERT.	
GRID #99084		
GPS #1003	HORIZ & VERT.	
GRID #99095		
GPS #1005	HORIZ ONLY	
GRID #99112		
GPS #1001	VERT. ONLY	
GRID #7203		
GPS #1006	HORIZ & VERT.	
GRID #99111		
GPS #1002	VERT. ONLY	

** SEE BOOK 3, PG. 1-3 FOR **
* CALIBRATION PT. LOCATIONS *

DEC 14, WEIR TOPOS

J.F. SWORTH

70°

2

BASE @ # 1000 #4RB (1/2") @ S.W COR OF 59th AVE & DEER VALLEY RD. @ 25'± S. OF B/C ON DEER VALLEY & 40'± W. OF B/C ON 59th AVE

GRND TO ANT = 5.10 (HOOK TAPE)
(WEIR S19-1)

PT #	DESCRIPTION
1450	FIRST SHOT
1450-1460	TOP OF WEIR (TOP)
1461-1463	(RIP-RAP AREA)
1464-1468	TOE OF WEIR (TOE)
1469-1473	(RIP-RAP AREA) (EDGE OF GOLF CART PATH)
1474-1476	TOP OF HEADWALL (HDWL) ℄ FACE (1' WIDE)
1477-1479	B/C-T/C, 6" ROLL, 24" (BC)
1480-1482, 1483-1485, 1486-1488	

CONT.

PT #	DESCRIPTION
1488-1491	TOP OF HEADWALL @ FACE (HDWL) (1' THICK)
1492-1496	TOP OF WEIR (TOP)
1497-1506	(RIP-RAP AREA)
1507-1511	TOE OF WEIR (TOE)
1512-1516	(RIP-RAP AREA) (EDGE OF GOLF CART PATH)
1517	DRYWELL (DRY)
1518-1519	WATERLINE ELEV (WL)
1519	LAST SHOT

(WEIR S19-2)

PT #	DESCRIPTION
1520	FIRST SHOT
1520-1522	B/C-T/C, 6" ROLL, 24" (BC)
1523-1525	PAN @ ℄ (P)
1526-1528	B/C-T/C, 6" ROLL, 24" (BC)
1529 & 1530	WATERLINE ELEV (WL)
1531	FD. BC SPINDLE @ P.T. ON 61ST AVE, 200'+/- S. OF INT. OF 61ST AVE & DONALD DR.
1531	LAST SHOT

(WEIR S19-3)

PT #	DESCRIPTION
1532	FIRST SHOT
1532	NAT. GRND @ FENCE (NG)
1533 - 1538	TOP OF WEIR (TOP) (1533 & 1538 @ EDGE NG & RIP-RAP)
1539 & 1540	NAT. GRND @ EDGE OF WATERFALL
1541 - 1545	TOP OF WEIR (TOP) (1541 & 1545 @ EDGE NG & RIP-RAP)
1546	NAT GRND @ FENCE (NG)
1547 - 1552	NAT. GRND @ TOP OF SWALE AROUND POND (NG)
1553 & 1554	WATERLINE ELEV (WL)
1555	FD. C.O.G. BC FLUSH @ INT. OF DEER VALLEY RD & ARROWHEAD LOOP
1555	LAST SHOT

(WEIR 514-4)

PT. #	DESCRIPTION
1556	FIRST SHOT
1556-	NAT GRND @ FENCE (NG)
1557-1561	TOP OF WEIR (TOP) (1557 & 1561 @ EDGE NG & RIP-RAP)
1562	NAT. GRND @ FENCE (NG)
1563-1565	WATERLINE ELEV. (WL)
1566-1568	B/C-T/C, 6" ROLL, 24" (BC)
1569-1571	
1572-1574	PAV. @ ℄ (P)
1575	FD. C.O.G. BC FLUSH @ P.T ON 63RD AVE, 200'+/- S OF INT OF 63RD AVE & DONALD DR.
1575	LAST SHOT

(WEIR S19-5)

PT #	DESCRIPTION
1576	FIRST SHOT
1576	NAT. GRND. @ FENCE (NG)
1577-1581	TOP OF WEIR (TOP) (1577 & 1581 @ EDGE NG & RIP-RAP)
1582	NAT GRND @ FENCE (NG)
1583-1585	TOP OF HEADWALL (HDWL)
1586-1588 1589-1591	B/C-P/C, 6" V.C, 24" (BC)
1592-1594	PAV. @ ℄ (P)
1595-1597	TOP OF HEADWALL (HDWL)
1598-1600	WATERLINE ELEV. (WL)
1601	FD. C.O.G BC. FLUSH @ P.C. ON 64th AVE. 400'+/- N OF 64th AVE & LOUISE DR.
1601	LAST SHOT.

*PT #1597 IS 12' FROM #1596 ON SAME LINE AS [illegible]

(WEIR S19-6)

PT #	DESCRIPTION	
1602	CHECK SHOT (#10006)(7203)	HORIZ = +0.061 VERT = +0.019
1603	NAT. GRND. (NG)	
1604-1609	TOP OF WEIR (TOP) (1604 & 1609 @ EDGE NG & RIP-RAP)	** ALL SHOTS THIS PG. ** ** ON N. SIDE OF ST. **
1610	NAT. GRND. (TOP)	
1611-1620	TOP @ EDGE OF RIP-RAP (TOP)	
1621-1623		
1624-1627	TOE @ EDGE OF RIP-RAP & GOLF	
1628-1631	CART PATH (TOE)	
1632-1634	TOP OF HEADWALL @ FACE (HDWL)	
1634	LAST SHOT	* LIGHTNING & RAIN STARTED *

S-? M, WEIR TOPO'S

J.F SWORTH P.CLOUDY & COOL 65° 9

BASE @ #1000 #4RB(½") @ S.W. COR. OF 59th AVE & DEER VALLEY RD.

GRND TO ANT = 5.13' (HOOK TAPE)

(WEIR S19-16)

(SEE PG #2)

PT #	DESCRIPTION
1635	FIRST SHOT
1635-1637	B/C-P/C, 6" ROLL, 24" (BC)
1638-1642, 1643-1645	(1638-1642 ISLAND)
1646 & 1647	PAV. @ ℄ (P)
1648-1650	TOP OF HEADWALL @ FACE (HDWL)
1651-1654	TOP @ EDGE OF RIP-RAP (TOP)
1655-1662	
1663-1666	TOE @ EDGE OF RIP-RAP/GOLF CART
1667-1669	PATH (TOE)
1669	LAST SHOT

(WEIR S19-7)

PT #	DESCRIPTION
1670	FIRST SHOT
1670 - 1680	TOP OF WEIR (TOP)
1681 - 1687	TOP OF HEADWALL @ FACE (HDWL)
1688 - 1695 1696 - 1698, 1699 - 1701	TOE OF WEIR (TOE)
1702 - 1704 1705 - 1707	COR. STORM DRAIN GRATE (GRATE) (1704 & 1707 CLOSE)
1708 - 1710	MISC NAT GRND (NG)
1711 - 1713 1714 - 1716	B/C - T/C, 6" V.C, 24" (BC)
1717	WATERLINE ELEV. (WL)
1717	LAST SHOT

** THIS WEIR WILL ALSO **
* BE PART OF WEIR *
* TOPO FOR SEC. 24 *
** FOR HANNAN w/ENTELLUS **
* (WEIR S24-) *

(WEIR S19-9)

PT #	DESCRIPTION
1718	FIRST SHOT
1718	NAT GRND @ EDGE OF GOLF CART PATH (NG)
1719-1722	TOP OF WEIR (TOP) (1719 & 1722 @ EDGE OF RIP-RAP)
1723	NAT. GRND @ FENCE (NG)
1724-1726	TOP OF HEADWALL @ FACE (HDWL)
1727-1730	℄ 15' WIDE DIRT RD (?) (NG)
1731-1733	TOP OF HEADWALL @ FACE (HDWL)
1734-1736	WATERLINE ELEV. (WL)
1736	LAST SHOT

(WEIR S19-8)

PT #	DESCRIPTION
1737	FIRST SHOT
1737-1739	TOP OF HEADWALL @ FACE (HDWL)
1740-1744	℄ 10' WIDE GOLF CART PATH (CONC)
1745-1747	TOP OF HEADWALL @ FACE (HDWL)
1748 & 1749	WATERLINE ELEV. (WL)
1749	LAST SHOT

(WEIR S19-10)

PT #	DESCRIPTION
1750	FIRST SHOT
1750	NAT. GRND. (NG)
1751-1762	TOP OF WEIR (TOP) (1751 & 1762 @ EDGE OF NG & RIP-RAP)
1763	NAT. GRND. (NG)
1764-1769	℄ GOLF CART PATH & BRIDGE (CONC) (1765-1767 WOODEN BRIDGE)
1770 & 1771	WATERLINE ELEV (WL)
1771	LAST SHOT

(WEIR S19-11)

PT #	DESCRIPTION
1772	FIRST SHOT
1772	WATERLINE ELEV. (WL)
1773 - 1775	TOP OF HEADWALL @ FACE (HDWL)
1776 - 1782	B/C - T/C, 6" ROLL, 24" (BC)
1783 - 1785	COR OF HEADWALL @ FACE (HDWL)
1786	WATERLINE ELEV. (WL)
1787 & 1788	℄ 2' WIDE CURB, 6" HIGH V.C. (BC)
1789 - 1796	B/C - T/C, 6" ROLL, 24" (BC)
1797 & 1798	℄ 2' WIDE CURB, 6" V.C (BC)
1799 - 1806	B/C - T/C, 6" ROLL, 24" (BC)
1807 - 1814, 1815 - 1818	
	(1812-1814 RETURN, 6" VC, 24")
	(1815-1817 RETURN, 6" VC, 24")
1818	LAST SHOT

(WEIR S19-12)

PT #	DESCRIPTION
1819	FIRST SHOT
1819	NAT. GRND. (NG)
1820-1823	TOP OF WEIR (TOP)
1824	NAT GRND (NG)
1825-1827	MISC NAT GRND/TOP (NG)
1828-1830	
1831-1833	TOE @ NAT GRND (TOE)
1834-1836	
1837 & 1838	WATERLINE ELEV. (WL)

(WEIR S19-13)

PT #	DESCRIPTION
1839	FIRST SHOT
1839	NAT GRND (NG)
1840-1843	TOP OF WEIR (TOP)
1844	NAT GRND. (NG)
1845-1849	℄ 10' WIDE CONC FOOT PATH/BRIDGE (CONC) (1846-1848 BRIDGE)
1850 & 1851	WATERLINE ELEV. (WL)
1851	LAST SHOT

(WEIR S14-K4)

PT #	DESCRIPTION
1852	FIRST SHOT
1852 -	NAT GRND. (NG)
1853-1857	TOP OF WEIR (TOP)
1858	NAT GRND (NG)
1859-1863	℄ 10' WIDE CONC FOOTPATH/BRIDGE (CONC) (1860-1862 BRIDGE)
1864 & 1865	WATERLINE ELEV. (WL)
1865	LAST SHOT

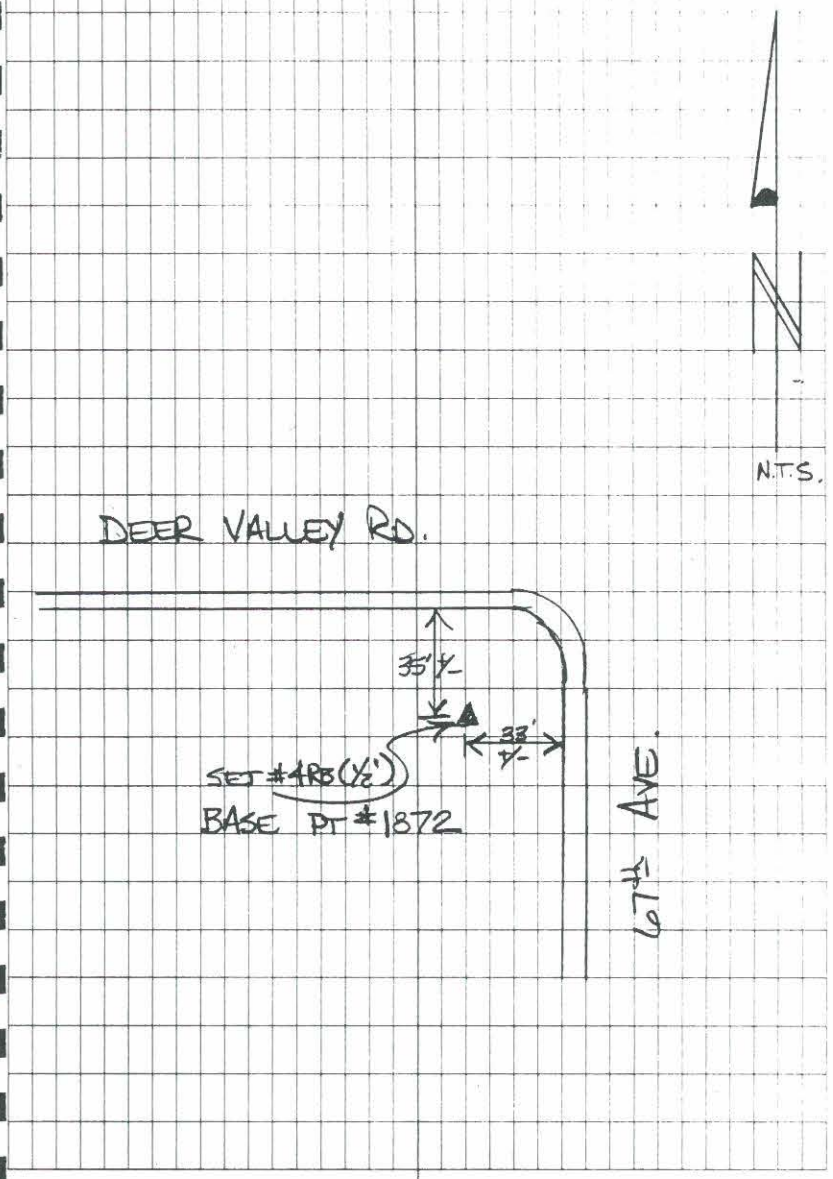
(WEIR S19-15)

PT #	DESCRIPTION
1866	FIRST SHOT
1866-1869	TOP OF WEIR (TOP)
1870 & 1871	WATERLINE ELEV. (WL)
1871	LAST SHOT

(TOP OF RIP-RAP ON W SIDE OF WEIR IS 5' WEST & UP 3' IN ELEV., UNABLE TO SHOOT PRIVATE PROPERTY (DOGS))

PT #	DESCRIPTION
1872	SET #4 RB (1/2") @ S.W. COR OF 67th AVE & DEER VALLEY RD. 35'+/- S. OF B/C ON DEER VALLEY RD. 33'+/- W. OF B/C ON 67th AVE

** LOCATED IN 10 MIN **
* SESSION *



11-8 2000

SOKKIA™

MADE IN U.S.A.

BOOK 1 OF

[redacted]

SOKKIA™

ECONOMY FIELD BOOK

ADMP UPDATE

ARROWHEAD LAKES

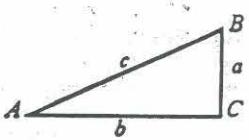
SEC. 24 WEIRS

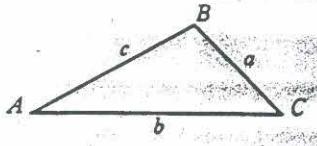
5043 0001

BOOK 7 OF

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES





$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN USA

5040.0001

A MP UPDATE - ARROWHEAD LAKES
WEIR SURVEY FOR SEC 24

THIS SURVEY IS A PORTION OF
SEC 24, T4N, R2E

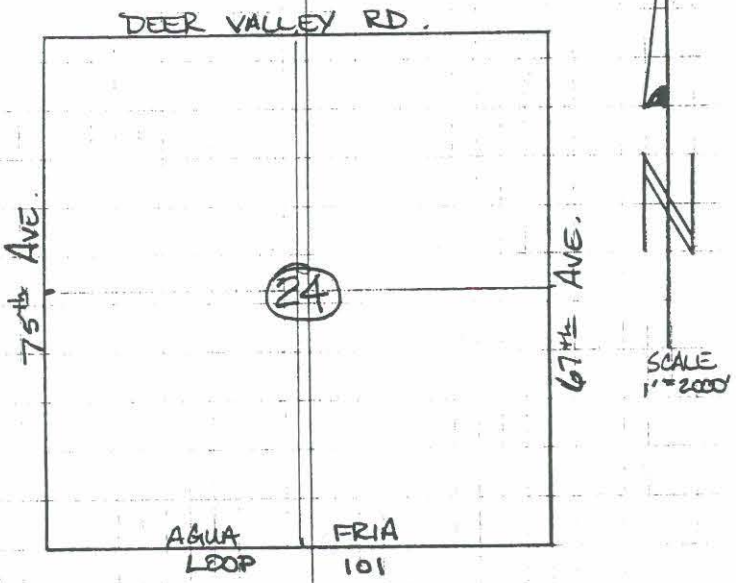


TABLE OF CONTENTS

DESCRIPTION	PG. #	GPS/CONV.	CREW	DATE
CALIBRATION PT'S	1	GPS	R ROMAN, J FARNSWORTH	11-6-2000
SEC. 24, WEIR TOPO'S	—	GPS	R. ROMAN, J. FARNSWORTH	11-6-2000
WEIR S24-1	2			
WEIR S24-2	3			
WEIR S24-3	4-5			
WEIR S24-4	6			
WEIR S24-5	7			
WEIR S24-6	8-9	GPS	R. ROMAN, J. FARNSWORTH	11-8-2000
WEIR S24-7	10			
WEIR S24-8	11			
WEIR S24-9	12			
WEIR S24-10	13			
WEIR S24-11	14			
WEIR S24-12	15			
WEIR S24-13	16			
WEIR S24-14	17			
WEIR S24-15	18		R. ROMAN, J. FARNSWORTH	11-22-2000
WEIR S24-16	19-20			
WEIR S24-17	21-22			
WEIR S24-18	23			

CALIBRATION PT'S

GRID	#99913	
GPS	#1004	HORIZ & VERT.
GRID	#99084	
GPS	#1003	HORIZ & VERT
GRID	#99095	
GPS	#1005	HORIZ ONLY
GRID	#99112	
GPS	#1001	VERT. ONLY
GRID	#7203	
GPS	#1006	HORIZ & VERT.
GRID	#99111	
GPS	#1002	VERT. ONLY

** SEE BOOK 3, PG 1-3 FOR **
* CALIBRATION PT LOCATIONS *

S24, WEIR TOPOS

J.FA' WORTH CLOUDY & COOL 65°

BASE @ #1872 #ARB(1/2") @ S.W. COR. OF 67th AVE & DEER VALLEY RD. (SEE BOOK 6, PG. 19)

GRND TO ANT = 5.14 (HOOK TAPE)

(S24-1)

PT #	DESCRIPTION
2000	FIRST SHOT
2000 - 2007	B/C. T/C, 6" V.C, 24" (BC) (2002-2004 RETURN)
2008 - 2014	MISC. PAV. @ ℄ (P)
2015 - 2026	MISC NAT. GRND @ TOP (NG)
2022 & 2023	MISC NAT. GRND / LOW SPOT (NG)
2029	FD. C.O.G BC FLUSH @ INT. OF MORNING DOVE DR & 69th DR.
2029	LAST SHOT

(S24-2)

PT #	DESCRIPTION
2030	FIRST SHOT
2030 - 2037 2038 - 2042	B/C - T/C, 6" V.C, 24" (BC)
2043 - 2045	℄ & ⊕ 7' V.G (V.G)
2046 - 2048	⊕ SCUPPER @ GUTTERLINE (SCUP)
2049 & 2050	MISC. NAT. GRND / LOW SPOT (NG)
2051 - 2054	MISC PAV. @ ℄ (P)
2055 - 2057	℄ & ⊕ 7' V.G. (VG)
2058 - 2060	℄ & ⊕ 3' V.G. (V.G)
2061 - 2063	⊕ SCUPPER @ GUTTERLINE (SCUP)
2064 - 2067	MISC. NAT. GRND (NG)
2068	FD. C.O.G BC FLUSH @ INT. OF LONE CACTUS DR & 70th DR.
2068	LAST SHOT

(524-3)

PT #	DESCRIPTION
2069	FIRST SHOT
2069 - 2073	MISC NAT. GRND. TOP (NG)
2074 - 2076	MISC NAT. GRND. / LOW SPOT (NG)
2077 & 2078	℄ & ⊕ 2, 8" PVC PIPES (FL)
2079 & 2080	MISC. NAT. GRND / LOW SPOT (NG)
2081 & 2082	
2083 - 2086	MISC. NAT. GRND / TOP (NG)
2087 & 2088	℄ & ⊕ 2, 8" PVC PIPES (FL)
2089 & 2090	MISC. NAT. GRND. / LOW SPOT (NG)
2091 & 2092	
2093 - 2095	MISC. NAT GRND. / TOP (NG)
2096 & 2097	℄ & ⊕ 2, 8" PVC PIPES (FL)

CONT.

(S24-3)

PT #	DESCRIPTION
2098-2099	MISC NAT. GRND / LOW SPOT (NG)
2100	℄ GRATE OF DRYWELL (DRY)
2101-2109	MISC. NAT. GRND. / TOP (NG)
2110-2115	EDGE OF LAKE / TOE (TOE)
2116	WATERLINE ELEV. (WL)
2117-2119	MISC NAT. GRND / LOW SPOT (NG)
2120 & 2121	℄ & ⊥ 1,8" PVC PIPE (FL)
2122-2125	MISC NAT. GRND / TOP (NG)
2126 & 2127	MISC NAT. GRND. / LOW SPOT (NG)
2127	LAST SHOT

(S24-4)

PT #	DESCRIPTION
2128	FIRST SHOT
2128 - 2135	℄ 10' WIDE SIDEWALK (CONC)
2136 - 2141	℄ @ TOP OF 8" PVC PIPE (PIPE)
2142 & 2143	WATERLINE ELEV. (WL)
~~2143~~	~~LAST SHOT~~
2162 & 2163	TOP OF WEIR (TOP)
2163	LAST SHOT

(S24-5)

PT #	DESCRIPTION
2144	FIRST SHOT
2144-	MISC NAT. GRND (NG)
2145-2150	℄ 10' SIDEWALK (CONC)
2152-2157	℄ @ TOP OF 8" PVC PIPE (PIPE)
2151	MISC NAT GRND (NG)
2158 & 2159	TOP OF WEIR (TOP)
2160 & 2161	WATERLINE ELEV. (WL)
2161	LAST SHOT

SEC 24, WEIR TOPO'S

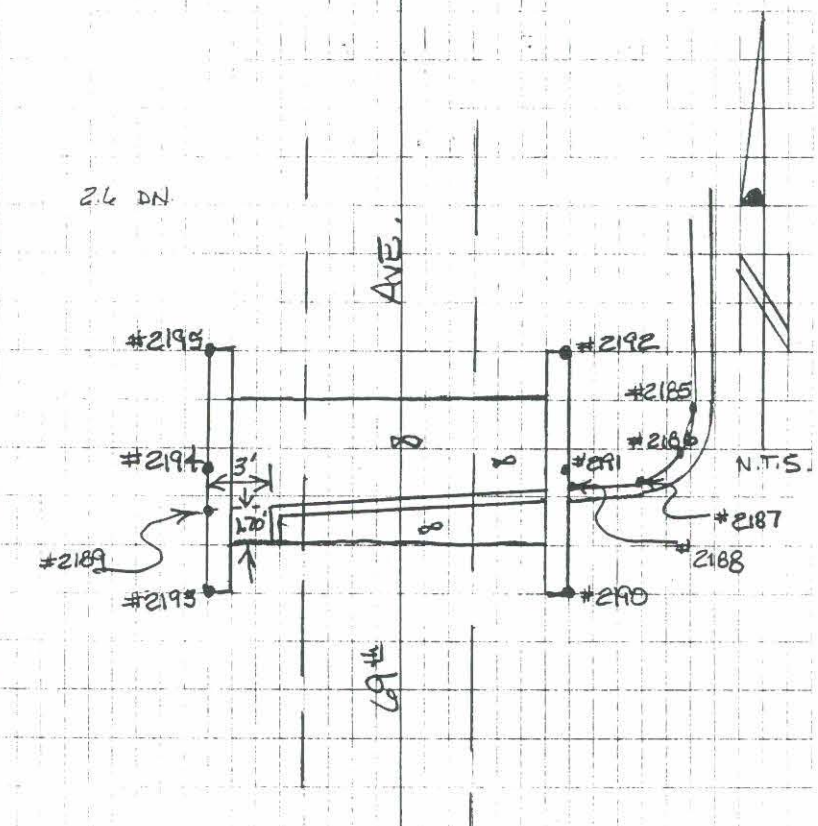
J.F ISWORTH SUNNY & COOL 65° 0

BASE @ #1872 #4 RB (1/2") @ S.W. COR OF 67th AVE & DEER VALLEY RD. (SEE BOOK 6, PG 19)

GRND TO ANT = 5.30 (HOOK TAPE) (S24-6)

PT #	DESCRIPTION
2164	FIRST SHOT
2164-2166	B/C-T/C, 6" ROLL, 24" (BC)
2167-2172	B/C-T/C, 6" V.C, 24" (BC)
2173-2176	(2167-2169 RETURN)
2177-2181	MISC PAV. @ ℄ (P)
2182-2189	TOP OF WEIR (TOP) (NOTE @ BT. N.W. COR OF WEIR IS 3' ⊄ & 2.60' DOWN FROM PT #2189, IT IS ALSO ON SAME LINE @S #2187-2188)
2190-2192	TOP OF HEADWALL @ FACE (HDWL)
2193-2195	

CONT.



(S24-6)

PT #	DESCRIPTION
2196-2200	EDGE OF LAKE (CONC)
2201-2206, 2207-2209, 2210-2212	
2213 & 2214	WATERLINE ELEV. (WL)
2215	FD. C.O.G. BC FLUSH @ INT. OF 69th AVE & SKYLARK
2215	LAST SHOT

(S24-7)

PT #	DESCRIPTION
2216	FIRST SHOT
2216-2226	B/C-T/C, 6" V.C, 24" (BC)
2227-2229	(2221-2223 RETURN)
2230-2234	MISC. PAV @ ℄ (P)
2235-2239	EDGE OF LAKE/TOP (CONC)
2240-2242	
2243-2247	TOP OF WEIR (TOP)
2248-2253	TOP OF HEADWALL @ FACE (HDWL)
2254-2259	
2260-2261	FLOWLINE @ FACE OF BOX CULV. (FL) (5' FROM FACE OF BOX CULV.)
2262-2263	MISC. NAT. GRND @ BOTTOM OF RET. (NG)
2264	WATERLINE ELEV. (WL)
2265	FD. COG BC FLUSH @ INT. OF 69th AVE & ARROWHEAD LOOP
2265	LAST SHOT

PT #	DESCRIPTION
2266	FIRST SHOT
2266-2268	B/C-T/C, 6" V.C., 24" (BC)
2269-2271	
2272-2274	MISC PAV. @ ℄ (P)
2275-2277	TOP OF HEADWALL @ FACE (HDWL)
2278-2280	
2281-2282	FL @ 5' FROM FACE OF HEADWALL (FL)
2283-2287	MISC NAT. GRND. (NG)
2288	FD. COG BC FLUSH @ INT. OF 68th LANE & BLACKHAWK DR.
2288	LAST SHOT

(S24-9)

PT #	DESCRIPTION
2289	FIRST SHOT
2289-2294	MISC NAT. GRND/BOTT OF RET. (NG)
2295-2297	TOE OF WEIR/EDGE RIP-RAP (TOE)
2298-2300	TOP OF WEIR/# 2' HIGH WEEP HOLES (TOP)
2301-2302	# 24" RCP (#)
2303-2305	TOP OF CONC. CHANNEL (TOP)
2306-2308	TOE OF CONC. CHANNEL (TOE)
2308	LAST SHOT

(S24-10)

Pt #	Description
2309	FIRST SHOT
2309-2315	℄ 20' WIDE CONC. SIDEWALK (CONC)
2316-2320	TOP EDGE OF LAKE (TOP)
2321-2324	
2325-2327	TOP OF 36" RCP ℄ (PIPE)
2328 & 2329	WATERLINE ELEV.
2330	FD. COG BC FLUSH @ INT OF ARROWHEAD LOOP & 71ST AVE
2330	LAST SHOT

- COULDN'T GET TO ℄, UNDERWATER

(S24-11)

PT #	DESCRIPTION
2331	FIRST SHOT
2331-2341 2342-2345, 2346-2350, 2351-2358	B/C-T/C, 6" V.C., 24" (BC)
2359-2368	MISC PAV. @ ℄ (P)
2369-2373	B/C-T/C, 6" V.C., 6" (BC)
2374	FD. P.K. W/SHINER @ BULLNOSE OF ISLAND @ INT OF 74th AVE & ROSE GARDEN LN. #88409
2375-2377	MISC NAT. GRND. (NG)
2378-2380	℄ & ℄ 36" RCP @ FACE OF HEADWALL (FL)
2381	FD. C.O.G. BC FLUSH @ INT OF 74th AVE & MONONA DR.
2381	LAST SHOT

2378 FROM CATCH BASIN IN ST
2379-2380 CONNECTED

88409

(S24-12)

PT #	DESCRIPTION
2382	FIRST SHOT
2382 & 2383	MISC. NAT GRND/LOW SPOT (NG)
2384-2389	℄ & ⊥ 24" RCP @ FACE OF HEADWALL (FL)
2390-2393	MISC NAT. GRND./TOP (NG)
2394 & 2395	℄ & ⊥ 10" PVC @ HEADWALL (FL)
2396-2401	℄ & ⊥ 24" RCP @ HEADWALL (FL)
2402-2407	B/C-T/C, 6" V.C, 24" (BC)
2408-2414, 2415-2418, 2419-2422	(2415-2418 ISLAND)(2419-2422 ISLAND)
2423 & 2424	MISC NAT GRND./TOP (NG)
2424	LAST SHOT

(2384-2389)(2385-2388)(2386-2387)

(2396-2401)(2397-2400)(2398-2399)

(S24-13)

PT #	DESCRIPTION
2425	FIRST SHOT
2425 - 2428	MISC. NAT. GROND (NG)
2429 - 2430	TOP OF LOW WALL (WALL)
2431 - 2433	MISC NAT GRND/TOP (NG)
2434 & 2435	℄ & ⊕ 8" PVC PIPE (FL)
2436 - 2443	TOP OF CONC APRON (TOP)
2444 - 2449	TOE OF CONC. APRON (TOE) (2446 & 2447 COR OF STORM DRAIN GRATE)
2450 & 2451	TOP OF CONC. CHANNEL (TOP)
2452 - 2454	TOE OF CONC. CHANNEL (TOE)
2455 & 2456	℄ & ⊕ 24" RCP (FL)
2456	LAST SHOT

TOP, TOE (⊕), TOP, TOP

(024-14)

PT #	DESCRIPTION
2457	FIRST SHOT
2457	CHECK SHOT #1005 (#99095)
2458 - 2462	B/C - T/C, 6" V.C, 24" (BC) (2459 - 2461 RETURN)
2463 - 2465	B/C - T/C, 6" V.C, 6" (BC)
2466 - 2467	COR. CATCH BASIN @ GUTTERLINE (CB)
2468 - 2470	TOP OF HEADWALL @ FACE (HDWL)
2471 - 2477	TOP EDGE OF LAKE (TOP)
2478 - 2481	
2482 - 2490	TOP OF WEIR (TOP)
2491	FL OF BOX CULV @ FACE OF HEADWALL (FL)
2492	WATERLINE ELEV. (WL)
2492	LAST SHOT

HORIZ = +0.011 VERT = +0.071

[redacted]

J. ENSWORTH SUNNY & COOL 70°

C. 24 WEIR TOPO'S

BASE @ #1872 #4 REB (1/2") @ S.W. COR. OF 67th AVE & DEER VALLEY RD. (SEE BOOK 6, PG. 19)

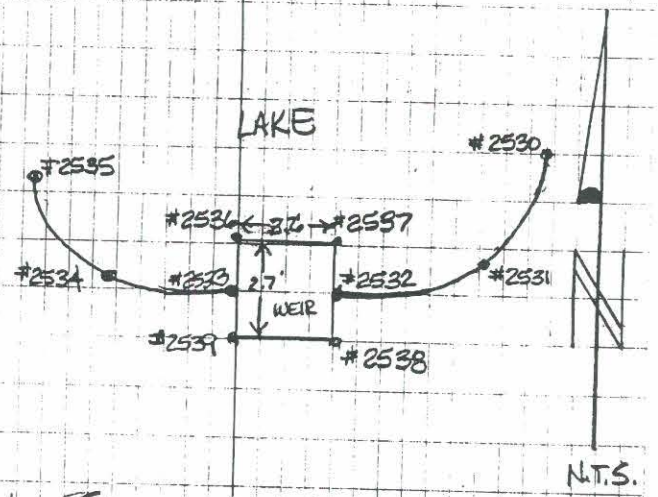
GRND TO ANT = (HOOK TAPE) (524-15)

PT #	DESCRIPTION
2500	FIRST SHOT
2500-2508	℄ 5' MEANDERING SIDEWALK (SW)
2509-2511	
2512-2515	MISC. NAT. GRND (NG)
2516-2522	EDGE OF LAKE @ TOP OF CONC. (TOP)
2523	WATERLINE ELEV. (WL)
2524-2528	EDGE OF LAKE @ TOP OF CONC. (TOP)
2529	WATERLINE ELEV. (WL)
2529	LAST SHOT

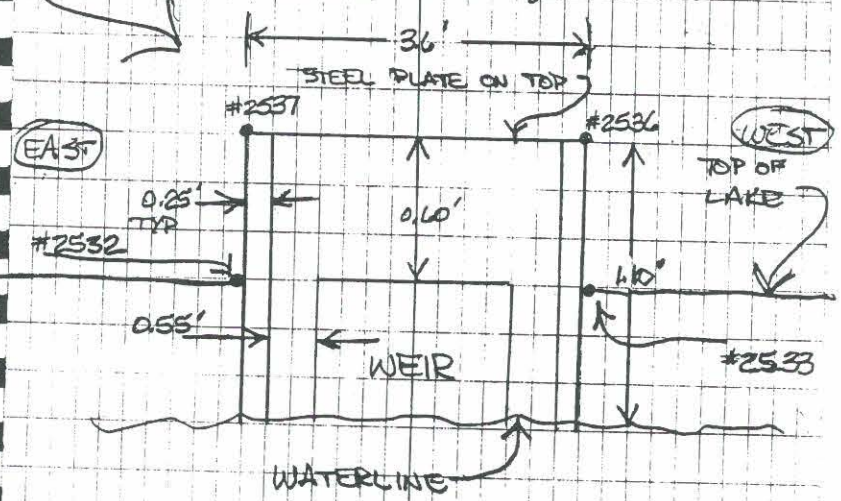
(524-16)

PT #	DESCRIPTION
2530	FIRST SHOT
2530-2532 2533-2535	EDGE OF LAKE @ TOP OF CONC. (TOP)
2536-2539	COR. OF BOX WEIR (CONC)
2540-2544	MISC. NAT. GRND (NG)
2545-2554	B/C-T/C, 6" V.C., 6" (BC)
2555-2558	COR. OF S/D GRATE (SD) (DN TO ℞ = 5.30)
2559-2560	B/C-T/C, 6" V.C., 6" (BC)
2561-2562	(CURB OPENING BETWEEN 2560 & 2561)
2563-2566	MISC. PAV. @ ℄ (P)
2567-2568 2569-2570	NAT. GRND @ FACE OF RET WALL (NG)
2571-2574	COR. CONC PAD (CONC)

CONT'



LOOKING SOUTH @ WEIR FROM LAKE (NORTH FACE OF WEIR)

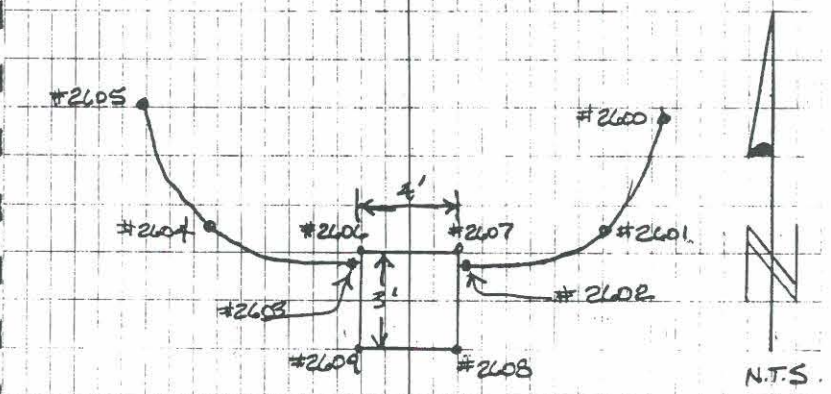


PT #	DESCRIPTION		
2575	℄ STORM DRAIN MH (SDMH)	RIM =	IN =
		⊕ =	FLOW =
2576	℄ STORM DRAIN MH (SDMH)	RIM =	IN =
		⊕ =	FLOW =
2577	⊕ WEEP HOLE @ FACE OF RET. WALL (FL)		
2578-2580	MISC. NAT. GRND, 1' FROM FACE OF RET. WALL (NG)		
2581-2588	MISC. NAT. GRND (NG)		
2589-2591	TOP OF CONC. CHANNEL (TOP)		
2592-2594	TOE OF CONC. CHANNEL (TOE)		
2595	⊕ 12" CMP (FL)		
2595	LAST SHOT		

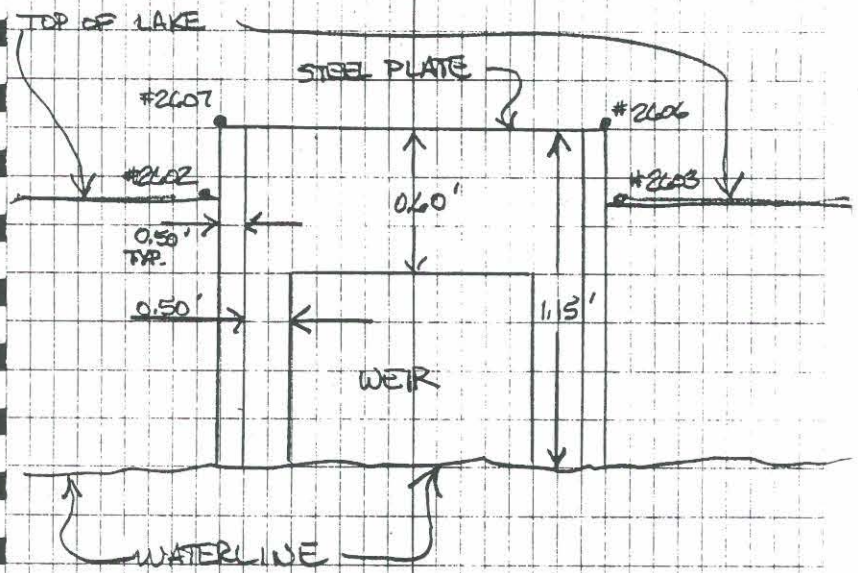
(S24-17)

PT #	DESCRIPTION
2600	FIRST SHOT
2600-2602	EDGE OF LAKE @ TOP OF CONC (TOP)
2603-2605	
2606-2609	COR OF BOX WEIR (CONC)
2610-2614	℄ 4' SIDEWALK (SW)
2615-2625	MISC. PAV. (P)
2626-2628	B/C-T/C, 6" V.C., 6" (BC)
2629-2630	(CURB OPENING 2628-2629)
2631-2637	MISC NAT. GRND @ FACE OF RET. WALL (NG)
	(2632 WEEP HOLE UP 2.5')
	(2633 WEEP HOLE UP 2.5')
	(2634 " " " 2.5')
	(2635 " " " 2.5')
	(2636 " " " 2.5')

CONT.'



LOOKING SOUTH @ NORTH FACE OF WEIR



PT #	DESCRIPTION
2638-2641	COR. OF STORM DRAIN GRATE (SD) (DN TO FL = 6.00')
2642-2644	TOP OF CONC. CHANNEL (TOP)
2645-2647	TOE OF CONC. CHANNEL (TOE)
2648	℄ & FL 12" PVC PIPE (FL)
2648	LAST SHOT

(524-18)

PT #	DESCRIPTION
2650	FIRST SHOT
2650-2655	EDGE OF LAKE @ TOP OF CONC (TOP)
2656	WATERLINE ELEV. (WL)
2657-2660	℄ 5' SIDEWALK (SW)
2661-2664, 2665-2667	
2668-2672	EDGE OF LAKE @ TOP OF CONC (TOP)
2673	WATERLINE ELEV. (WL)
2673	LAST SHOT

SOKKIA™

MADE IN U.S.A.

Book 8 of [redacted]

SOKKIA™

ECONOMY FIELD BOOK

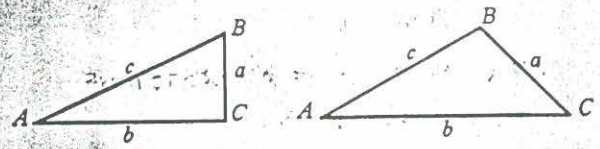
ENTELLUS
91ST AVE.
X-SEC.

5043.0001

Book 8 of

No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES



$\text{Sin } A = \frac{a}{c} = \text{Cos } B \qquad \text{Cot } A = \frac{b}{a} = \text{Tan } B$

$\text{Cos } A = \frac{b}{c} = \text{Sin } B \qquad \text{Sec } A = \frac{c}{b} = \text{Cosec } B$

$\text{Tan } A = \frac{a}{b} = \text{Cot } B \qquad \text{Cosec } A = \frac{c}{a} = \text{Sec } B$

Given	Required	Solution
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}$

FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180° - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

MADE IN USA

ENTELLIS/91ST AVE X-SEC.
91ST AVE - GREENWAY CHANNEL
5043.0001
THIS SURVEY IS A PORTION OF
SEC 3, T-3-N, R-1-E.

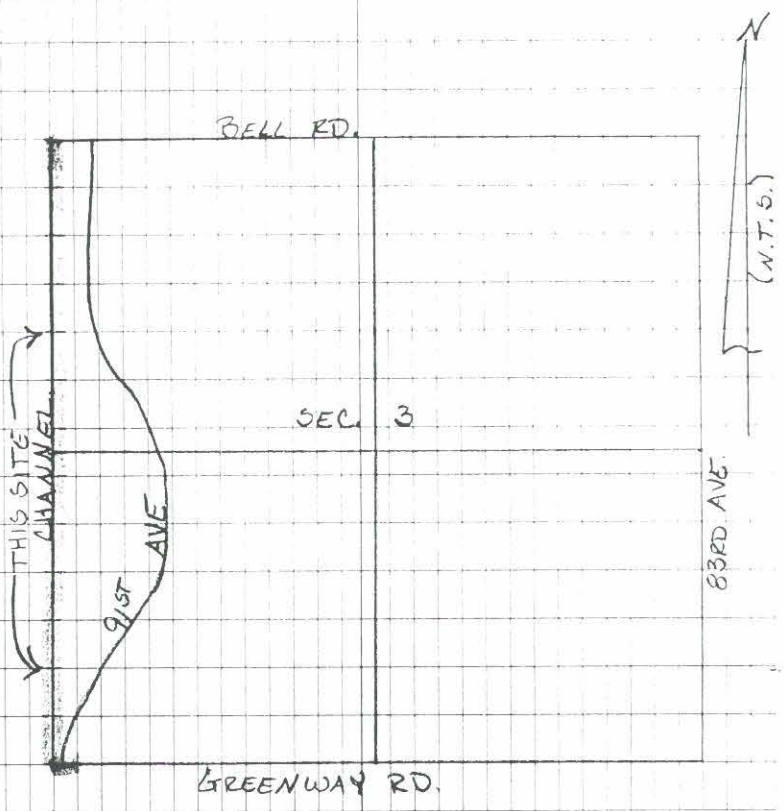


TABLE OF CONTENTS

DESCRIPTION	PG#	CONV/GPS	CREW	DATE
CALIBRATION PNTS.	1-2	GPS	J. FARNSWORTH/A. CREEL.	3-19-01
CHANNEL X-SEC'S	3-10	GPS	J. FARNSWORTH/A. CREEL	3-19-01

J. F. ISWORTH, III, PC.
A. CREEL ∅.

1

3-19-01
SUNNY, CLEAR
62° AM
GPS 4800

BASE @ #1, #4 RB (1/2") @ N.W. COR OF
99TH AVE & HUTTON DR.
53'+/- W OF B/C - T/C ON 99TH AVE
104'+/- N OF B/C - T/C ON HUTTON DR.
(S.E. COR OF BELL REC. CENTER
PARKING LOT.)
GRND TO π = 5.38

* * ALL CONTROL PNTS * *
* * LOCATED IN 5 MIN * *
* * SESSIONS * *

PNT #	DESCRIPTION.
2	P.K. & SHINER IN EXPANSION JOINT OF SIDEWALK ON N. SIDE OF BRIDGE, OVER DRAINAGE CHANNEL ON ℄ OF 99TH AVE @ 99TH AVE & FORRESTER DR.
3	P.K. & SHINER @ THE SOUTH END OF BULLNOSE @ 91ST AVE & THUNDER BIRD RD.
4	PLAINBCF @ ℄ OF 103RD. AVE & BOLIVER DR. (HAS PUNCHED "+")

* ALL PNTS, REFER BOOK 5, PG 3 & SKETCH PG 1.

PNT #	DESCRIPTION
5	P.K. & SHINER. 98TH AVE & CAMPANA DR. GO EAST ON CAMPANA TO 1ST CUL-DE-SAC TO SOUTH (RT.) PK & SHINER @ N.E. COR OF APRON OF THE N.W. RETURN.
6	PK & SHINER 200'+/- N OF BELL RD. @ N END OF ℄ STRIPE ON 105TH AVE, BETWEEN BELL RD. & GRANADA DR.
7	MARICOPA COUNTY BCF @ INT. OF WERK DR. & TURQUOISE HILL DR.
8	MARICOPA COUNTY BCFC INT. OF PINE SPRINGS DR. & HASSAYAMPA DR.
9	MARICOPA COUNTY BCF. @ 102ND LN & ROSE GARDEN. BC IS @ N. EDGE OF PAVEMENT.

CHANNEL X-SEC'S

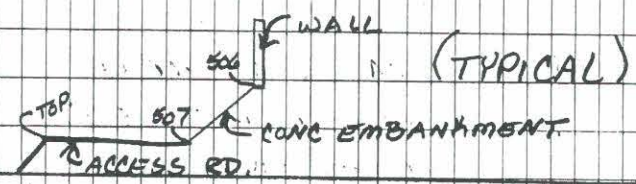
J.F. WSWORTH III, PC.
A. CREEL Ø

3-19-01
SUNNY, CLEAR
65° AM
GPS 4800

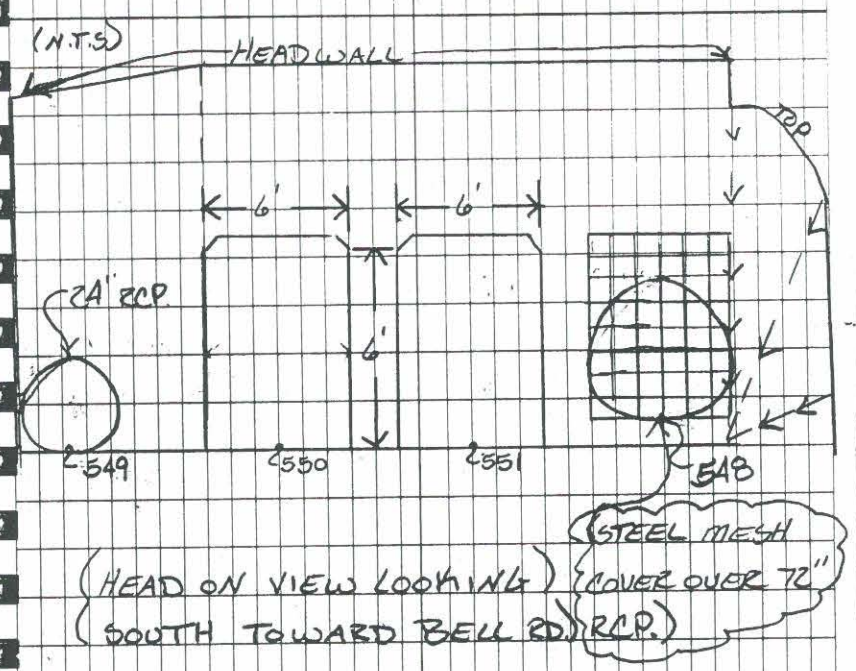
BASE @ 1 "SEE PG 1"

GRND TO T = 5.38

PNT	CODE	DESCRIPTION.
500	—	FIRST SHOT.
502	BC	6" VC'G CONC 24" WIDE.
504	FM	BEGIN 6' SLUMP BLOCK WALL.
506-507	TOP/TOE	CONC. EMBANKMENT FROM WALL TO EDGE OF ACCESS RD.
512	BC	22' D/W INCLUDING 4' WINGS.
513	B W	X PNT, 5' CONC WALK TO 6' CONC WALK.
521-22	CB	OPEN FACE CATCH BASIN.

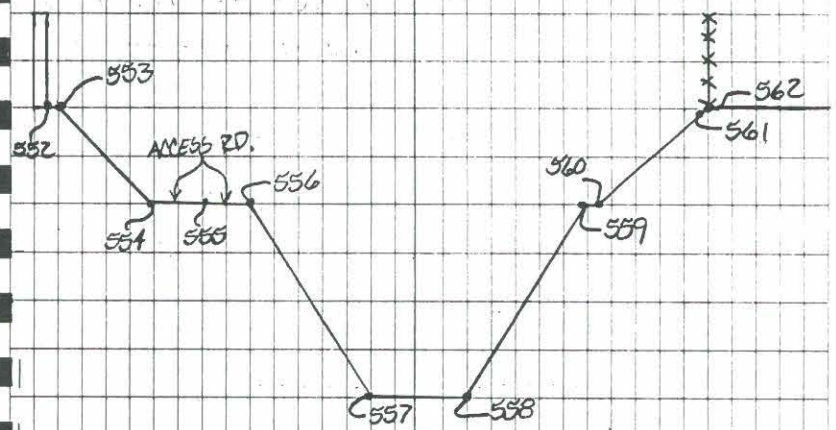


PNT	CODE	DESCRIPTION.
523-28	CLF	6' CHAIN LINK FENCE
529-34	HDWL	CORNERS OF CONC. HEADWALL.
535-537	CLF	BEGIN 6' CHAIN LINK FENCE.
538-540	TOP	TOP CONC DITCH.
541-543	TOE	TOE CONC DITCH
549	RCP	~~A~~ 24" RCP @ FACE OF HEADWALL, HEADS S.E. (SEE SKETCH)
548	RCP	~~A~~ ~~A~~ 72" RCP w/ STEEL MESH COVER.
550/551	CUL	~~A~~ ~~A~~ 6' WIDE 6' HIGH CULVERT TYPE OPENING. (SEE SKETCH)



PNT	CODE	DESCRIPTION.
552-562	——	(FM, TOP, TOE, NG, TOP, TOE, TOE, TOP, TOE, TOP, CLF.) SEE SKETCH.) →

* TYPICAL X-SEC OF CHANNEL.



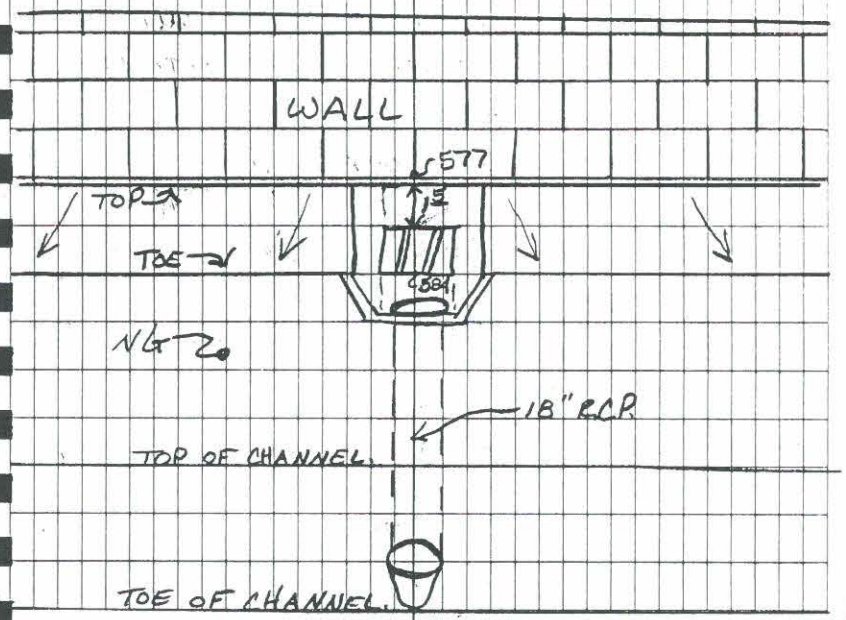
552 = FM (6')
553 = TOP
554 = TOE
555 = NG
556 = TOP
557 = TOE
558 = TOE
559 = TOP
560 = TOE (NG)
561 = TOP (NG)
562 = CLF (6')

* ALL SHOTS TYPICAL EXCEPT PNT NUMBERS.

PNT	CODE	DESC
563	TOP	TOP OF CONCLINED OPENING FOR DRAIN OF INTO DITCH VIA 18" RCP.
582-583	RCP	& FL 18" (I.D.) RCP @ INLET & OUTLET.
552-569	—	ROD = 5.09 NOT 17.25
577	FM	6' SLUMP BLOCK WALL, OUTLET OF STRUCTURE GOES BENEATH WALL (SEE SKETCH.)

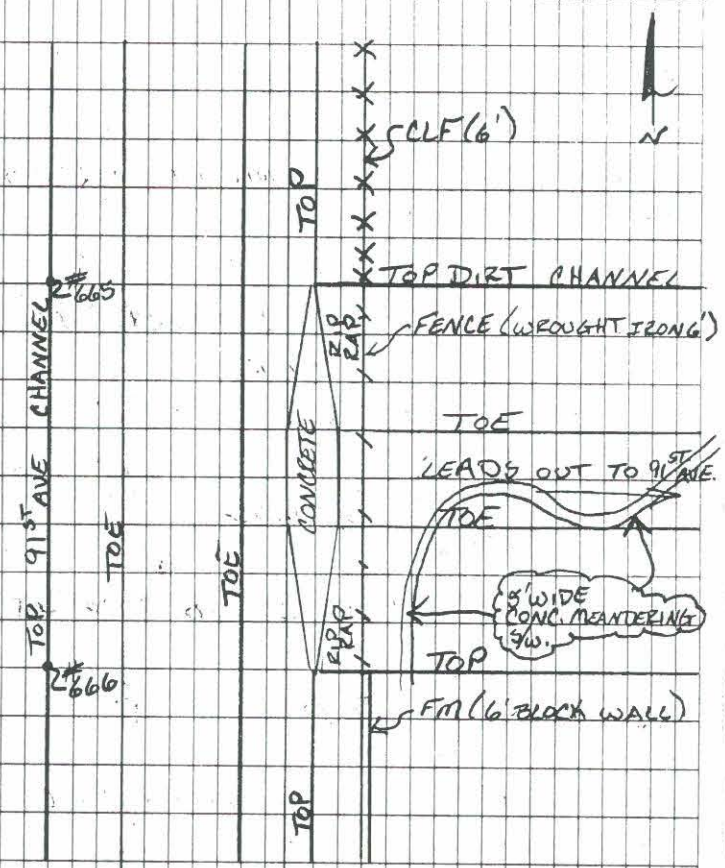
← NOTE.....***

TYPICAL WALL TYPE OUTLET



PNT	CODE	DESCRIPTION
603-04	RCP	ch ft 18" RCP (I.D)
663-64	RCP	ch ft 18" RCP (I.D.)
685-688	VG	5' WIDE VALLEY GUTTER (BUILT FOR ACCESS RD. RUN-OFF)
689-690	FL	VALLEY GUTTER FLOW-LINE
695-702	TOP	CUT OUT E. SIDE OF 91ST AVE CHANNEL, LEADS INTO RETENTION BASIN (PROBABLY OVERFLOW FOR RETENTION)
703-704	FM	6' BLOCK WALL BREAKS, WALL HAS BEEN REPLACED BY WROUGHT IRON FENCE.
713-716	VG	5' VALLEY GUTT. (BUILT FOR ACCESS RD. RUN-OFF)
717-718	FL	ch ft VALLEY GUTT.

(I.D. = INSIDE DIAMETER)



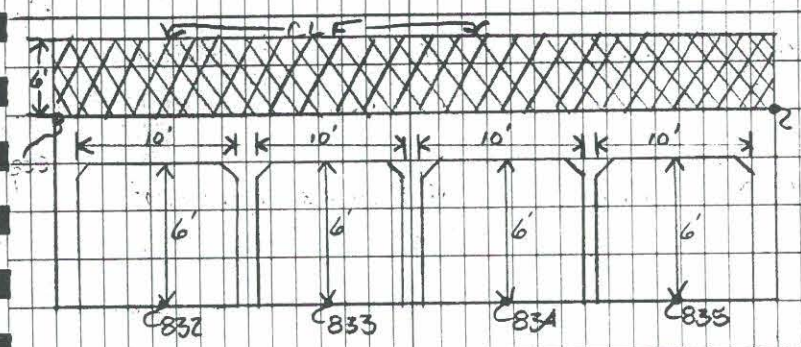
PNT	CODE	DESCRIPTION.
719-722	——	TOP, TOE, TOE, TOP. / GRADE BREAK IN DITCH.
723-726	CONC	INLET FROM SUBDIVISION TO THE EAST
727-728	FM	OPENING IN BLOCK WALL (WROUGHT IRON FENCE)
729	FM	END 6' BLOCK WALL, BEGIN 6' C.L.F.
739	FL	Centerline / Flowline 3' sq opening
740-741	RCP	℄/FE 18" RCP (I.D.)
751-752	RCP	℄ FE 18" RCP (I.D.)
778	RCP	℄ FE 24" RCP (I.D.)

(COULD ONLY SHOOT OUTLET INTO DITCH, DUE TO OBSTRUCTIONS OVERHEAD.)
FE @ HDWL DN = 4.28 FROM TOP OF HDWL TO FE 24" RCP.)

PNT	CODE	DESCRIPTION
779-786	TOP	CONCRETE OUTLET INTO CHANNEL.
800	FM	END 6' BLOCK WALL.
801	FM.	BEGIN 6' BLOCK WALL.
832-35	CUL	℄ FR. 10' × 6' CULVERT OPENINGS.
8	TOP.	TOP CORNERS OF CULVERT.

HORIZ. LOCATION ONLY, NO VERT.

" " " "



(N.T.S)

841-43	P	℄ 91ST AVE. OVER CHANNEL CROSSING.
844-847	CLF	BEGIN 6' CHAIN LINK FENCE.
847-848	CLF	CHAIN LINK FENCE TRANSITIONS FROM 6' TO 10'.
848-50	CLF	TRANSITIONS BACK DOWN TO A 6' CLF.
851-853	CUL	℄ ⊥ 10' × 6' CULVERT OPENINGS (SEE SKETCH PG 9.)
854	CUL	10' OFFSET WEST
875,876,877 878,893,894.	P	℄ PAVEMENT SHOTS ON 91ST AVE.
894	—	LAST SHOT.