MASTER DRAINAGE REPORT
FOR
DEVELOPMENT UNIT 7
AT
MESA PROVING GROUNDS

December 20, 2011

WP# 113697.02

REVIEWED BY
CITY STAFF
1/18/12 BY
DATE

WOOD/PATEL
MISSION: CLIENT SERVICE™

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FOR
DEVELOPMENT UNIT 7
AT
MESA PROVING GROUNDS

December 20, 2011
WP# 113697.02

Submitted to:

City of Mesa
55 North Center Street
P.O. Box 1466
Mesa, Arizona 85211-1466
Phone: (480) 644-3258

Prepared for:

DMB Mesa Proving Grounds, LLC
7600 East Doubletree Ranch Road
Suite 300
Scottsdale, Arizona 85258
Phone: (480) 367-7000

EXPIRES 6-30-13

Prepared by:

Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500
Fax: (602) 335-8580

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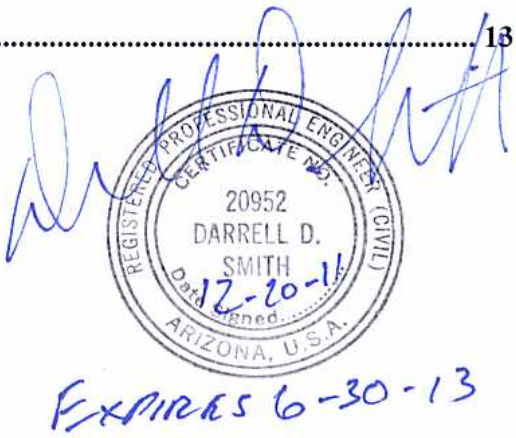

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EXPIRES 6-30-13

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1.0 INTRODUCTION

1.1 General Background and Project Location

The proposed Development Unit 7 (Site) is anticipated to be an approximate 582-acre Development Unit (DU) within the 3,155-acre Mesa Proving Grounds master planned community in Mesa, Arizona. It is a Planned Community District (PCD) which is a mixed-use development that will include single-family residential, multi-family residential, commercial uses, various community uses, and open spaces.

This Master Drainage Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel's) understanding of the City of Mesa (City) and the Flood Control District of Maricopa County (FCDMC) drainage requirements.

The Site is located within portions of Sections 22 and 23 of Township 1 South, Range 7 East of the Gila and Salt River Meridian. The Site is bounded by the Warner Road (South) alignment to the north, Ray Road and the Powerline Floodway on the south, Signal Butte Road to the east, and Spine Road West on the west. Please refer to Plate 1 – *Vicinity Map*.

The Site consists of multiple automotive test tracks and undisturbed desert. The Site was previously used by General Motors as a desert automobile testing facility. The majority of the Site is surrounded by automotive test tracks and undisturbed desert along the northern, western, and southern boundaries. Along the eastern boundary, the Site is bordered by two residential developments, Nova Vista and Mountain Horizons, which are mostly constructed.

In addition, the Powerline Floodway Channel traverses the southern boundary of the Site along the Ray Road alignment. This is a major FCDMC facility that provides conveyance of discharge from the Powerline Flood Retarding Structures, approximately three miles east of the Site, and drainage conveyance for stormwater runoff for areas adjacent to the channel. Ultimately, the flow is conveyed to the East Maricopa Floodway (EMF) west of the Site.

1.2 Scope of the DU 7 Master Drainage Report

The DU 7 Master Drainage Report was prepared to support the development of approximately 15,000 square feet of non-residential space and 2,129 multi- and single-family residential dwelling units. The drainage analysis is consistent with procedures and standards of the City of Mesa and the Flood Control District of Maricopa County. The proposed drainage plan provides an outline for the required major drainage facilities for storage and conveyance of stormwater runoff for the development of DU 7 at Mesa Proving Grounds. Updates to the Master Drainage Report may be required if significant changes are made to the land uses and assumptions utilized to prepare this report.

1.3 Construction Phasing

It is anticipated that DU 7 construction and drainage infrastructure will be phased. Phase 1 is anticipated to include approximately the southern half of DU 7 along the Ray Road Corridor and is proposed to consist of single family residential, commercial, church, and various community uses. Phase 2 is anticipated to include the northern half of DU7 and is proposed to consist of single-family residential, multi-family residential, educational, church, and commercial uses.

2.0 DESCRIPTION OF STUDY AREA

2.1 Existing Soil Conditions

According to the Natural Resources Conservation Service's Soil Survey, Mesa Proving Grounds is located within the Aguila-Carefree soil survey area. The majority of the surface soils onsite are classified as sandy loam, clay loam, or loam. Refer to Plate 2 – *Soils Map*, and Appendices A and B for information pertaining to existing soil conditions.

2.2 Rainfall Seasons

There are two distinct rainfall seasons associated with the desert southwest corresponding to the project area. The first season occurs during the winter months from November to March when the area is subjected to occasional storms from the Pacific Ocean. While classified as a rainfall season, there can be long periods where there can be little or no precipitation. Generally, storms occurring during the winter rainfall season are classified as being long-duration, low-intensity storms.

The second rainfall period occurs during the summer months of June through August, and is commonly referred to as Monsoon Season. During this season, Arizona is subjected to widespread thunderstorm activity whose moisture supply originates both in the Gulf of Mexico and along Mexico's west coast. These thunderstorms are typically classified as being short duration, high intensity storms with extreme variability per location.

2.3 FEMA Flood Insurance Rate Map (FIRM)

The Maricopa County, Arizona and Incorporated Areas Flood Insurance Rate Map (FIRM) Panel Number 04013CIND0A dated September 30, 2005, references Panel Number 04013C2705F, which indicates the Site is within Zone "D". Panel Number 04013C2705F has a note that states "Panel Not Printed – Area in Zone D".

Zone "D" is defined by FEMA as follows:

> *"Areas in which flood hazards are undetermined."*

Please refer to Plate 3 – *Flood Insurance Rate Map* for illustration.

2.4 Section 404 Jurisdictional Areas

A Jurisdictional Delineation has been completed by the U.S. Army Corps of Engineers (Corps) for Mesa Proving Grounds. A portion of the Powerline Floodway channel and a small wash have been designated as Jurisdictional, and fall within the DU 7 boundary. Please refer to Plate 4 – *Section 404 Jurisdictional Delineation Map* for location of Jurisdictional Areas.

Proposed disturbances to the Jurisdictional areas are required to be permitted with the Corps. A Section 404 Individual Permit will be required for disturbance during development with conditions that must be adhered.

2.5 Master Drainage Report for Mesa Proving Grounds

The *Master Drainage Report for Mesa Proving Grounds*, dated September 15, 2011, by Wood, Patel and Associates, Inc., has set the drainage criteria for the site. The report includes a pre-developed condition HEC-1 model (MGPEX.DAT) as well as a full build-out model (MPGDU7.DAT) which were modified versions of the current flood control district area drainage master plan models. The East Mesa Area Drainage Master Plan (ADMP), prepared in 1998 by Dibble & Associates, Inc. and Hoskin Ryan Consultants, Inc., is a regional drainage study prepared for the FCDMC.

Anticipated future studies may be conducted under the auspices of FCDMC. Results of future studies may reflect a reduction of offsite peak flows impacting existing and future drainage infrastructure within Mesa Proving Grounds. Peak flow evaluation for design of future facilities should consider the most current published East Mesa ADMP. It is anticipated the City of Mesa will accept relevant changes and allow for future drainage infrastructure to utilize the most current peak flow information.

Mesa Proving Grounds is located in the eastern portion of the study, which is bound by the FRS in Pinal County to the east and the EMF to the west. In general, the area drains northeast to southwest and discharges into the EMF. The ADMP sets the regional drainage constraints for facilities within the study area of the Mesa Proving Grounds. The full build-out model was utilized to verify that the development of the Mesa Proving Grounds does not adversely impact any drainage infrastructure downstream.

3.0 EXISTING DRAINAGE CONDITION

3.1 Existing Drainage Plan

The Site generally slopes in a southwesterly direction at approximately 0.5 to 1 percent. The peak elevation within the Site is approximately 1,450 feet above mean sea level (MSL), located near the intersection of Signal Butte Road and Warner Road. The lowest elevation within the Site is approximately 1,412 feet above MSL, located near the future intersection of Warner Road South and Spine Road West. The Site is covered with typical Sonoran Desert vegetation including mesquite trees, saguaro cactus, creosote, etc. is approximately 1,450 feet above mean sea level.

Existing berms surrounding the Mesa Proving Grounds, north of the Powerline Floodway, currently retain an estimated 75 percent of the stormwater runoff produced onsite, and have been modeled accordingly within the current 100-year, 24-hour FCDMC model and the Master Drainage Report model. The remaining onsite stormwater, approximately 261 cfs, discharges in a location near the existing buildings and into the Powerline Floodway at the northeast corner of Ellsworth Road and the Ray Road alignment. DU 7 combined with the Phase 1 of the First Solar site comprises approximately one-quarter of the Mesa Proving Grounds north of the Powerline Floodway. The retention provided within the Phase 1 of the First Solar site exceeds the runoff volume of the 100-year, 24-hour storm event modeled therefore no runoff is leaving that site for the modeled storm event. Proposed 100-year, 2-hour retention will decrease the runoff volume and peak flow produced on Site.

3.1.1 Northern Boundary

Generally the site topography slopes east to west; however, along the northern boundary of DU 7 the site slopes slightly south as well. The northern boundary bisects several existing swales which are directed to the south towards the Site and several elevated tracks that impede drainage paths. Proposed Phase 1 development will consist of the south end of DU 7 and the site is anticipated to develop from south to north. Due to the proposed phasing plan and the direction of the existing topography, each phase of development must analyze the offsite drainage impact along the northern boundary in the design process.

3.1.2 Eastern Boundary

Offsite flows impacting the eastern boundary between the Elliot Road and Ray Road are diverted south by existing channels, washes, and berms along the west side of Signal Butte Road. In the existing condition, approximately 419 cfs impacts the Site near Warner Road from an existing double-barrel 10-foot by 3-foot box culvert from Mountain Horizons. This flow is conveyed south along an existing swale which collects any additional flow leaving Mountain Horizons, and discharges into the Powerline Floodway. The southern portion of the swale was delineated as a Section 404 wash and will require a permit for any planned disturbance.

3.1.3 Western Boundary

The western boundary is not impacted by offsite flows entering the Site.

3.1.4 Southern Boundary

The southern boundary of DU 7 is bound by the Powerline Floodway. The floodway provides a low-flow outlet to FRS dams upstream of the Site, and also storm water conveyance for areas adjacent to the channel. The channel prevents any storm water produced to the south from entering Site.

4.0 PROPOSED DRAINAGE CONDITION

4.1 Proposed Drainage Plan

The drainage concept for DU 7 is to route offsite flows around the site and direct onsite stormwater runoff to retention basins for storage. Offsite runoff impacting the northern boundary will be unique to each development as the site develops from south to north. Interim condition impacts will have to be addressed for each development. Along the eastern Site boundary, a proposed channel will convey tributary offsite runoff originating east of the Site south to the Powerline Floodway. A conceptual channel section has been provided within Appendix B; design may vary due to field conditions at the time of design and construction.

Onsite runoff will be collected with roadways for overland flow conveyance to localized retention basins. Where street capacities are exceeded for vertical curb, underground storm drain systems or roadside channels may be utilized to convey the runoff in excess of top of curb. Please refer to Plate 5 – *Interim Condition HEC-1 Schematic* for watershed delineations and locations.

Retention basins will be sized to retain the runoff volume from a 100-year, 2-hour storm event in accordance with City of Mesa requirements. Emergency overflow routes must be provided in the event that retention basin capacities are exceeded due to a storm larger than the design event or back-to-back storms. Retention basins will be designed to drain retained runoff within 36 hours after a storm event. Land uses depicted in the hydrologic models are conceptual and subject to change, based on the allowable criteria for a PCD.

The Great Park is planned as a multi-functional area including passive and active recreation, and will provide stormwater storage for the park. The Great Park Master Plan will include provisions for lake design, retention, landscaping, improvements, and other amenities.

In all locations, lowest floor elevations shall be set a minimum of 1 foot above the emergency overflow elevation, or any 100-year water surface elevation adjacent the Site, whichever is greater.

4.2 Interim Condition Hydrology

An interim condition HEC-1 model (DU7INT.DAT) was created to assess the impact of developing DU 7 to the downstream drainage infrastructure. The model was created based upon the most current post-developed condition model. Watersheds within the Mesa Proving Grounds were modeled with a low-density employment land use to represent an automotive proving ground per the FCDMC's DDMSW program, with exception to the northeast corner of the site and DU 7. The northeast corner of the site was modeled as industrial to account for the Phase 1 First Solar Site. The provided retention volume from the site was modeled per plan.

DU 7 was modeled with multiple conceptual land uses including residential, commercial, and open space. Retention for DU 7 was calculated based on these conceptual land uses and applied to the interim condition HEC-1 model. Based on point precipitation frequency estimates from NOAA Atlas 14, the 100-year, 2-hour precipitation is 2.19 inches. Flows in excess of the 100-year, 2-hour basin capacities within DU 7 were routed downstream to historic outfall locations.

Offsite routing parameters along Signal Butte Road were updated to reflect the conceptual future channel planned to convey offsite flow along the eastern boundary. The existing channel section for the Powerline Floodway was also used in the model. The following table provides a summary of 100-year, 24-hour discharges for the existing, interim, and proposed conditions, which indicate a negligible increase of peak discharge in the interim condition, and a decreased peak discharge in the full build-out condition to the Powerline Floodway. The Powerline Floodway is anticipated to convey approximately 1,100 cfs with additional freeboard.

EXISTING CONDITION		INTERIM CONDITION		FULL BUILD-OUT CONDITION	
LOCATION ID	DISCHARGE	LOCATION ID	DISCHARGE	LOCATION ID	DISCHARGE
CP 75	661cfs	CP75	666 cfs	CP75	613 cfs

4.3 Proposed Hydraulics

4.3.1 Street Hydraulics

Arterials and major collectors shall be designed to convey the peak flows generated by a 10-year peak storm within the roadway infrastructure with a spread limited to 1 traffic lane in each direction. All other public roadways shall be designed to convey the peak flows generated by a 10-year peak storm between the curbs. All roadways shall be designed to convey the 100-year storm within the right-of-way and adjacent parkway. Where the peak flows exceed the capacity of the public street and drainage permitted areas to convey the peak flows, storm drains or various other drainage facilities shall be installed and sized to carry the excess flows (i.e., when the 10-year peak exceeds the spread criteria or exceeds the curb capacity of the public street, or when the right-of-way cannot convey the 100-year peak). Storm drain and/or channel systems will convey stormwater runoff to drainage facilities and retention basins located throughout the development.

The Community Plan provides flexibility in roadway paths and cross-sections to be utilized within Development Unit 7 and future developments. Detailed analysis provided in the drainage reports, prepared in conjunction with preliminary and final plats, will provide cross-section conveyance capacities for various slopes and geometrics. Easements and tracts adjacent to public rights-of-way will be utilized to provide conveyance of 100-year flow. Storm drains, channels, bio-swales, scuppers and inlets, as necessary, will be designed to accommodate peak flow conveyance consistent with City of Mesa drainage requirements.

4.4 Retention

4.4.1 Retention Storage

Currently, the portion of the Site north of the Powerline Floodway is retained by a series of berms along Ellsworth, Elliot, and Signal Butte Roads. Due to this existing condition, the FCDMC originally required Mesa Proving Grounds to retain the majority of runoff from the 100-year, 24-hour storm event in the proposed condition. Twenty-five percent of the onsite flow from this sub-basin (approximately 261 cfs) discharged into the Powerline Floodway.

The Phase 1 First Solar Site provided approximately 15.5 acre-feet of stormwater runoff storage volume within onsite retention basins. 100-year, 2-hour required retention volume for DU 7 was estimated to be 73.7 acre-feet based on conceptual land use. If actual land uses and required retention volumes vary from this report updates to this report may be required to analyze impacts to downstream drainage infrastructure.

See *Table 5 – Interim Condition Onsite Retention Volume Summary* in Appendix A for a detailed summary of required retention volumes per applicable watershed. Proposed DU 7 volumes are based on a 100-year, 2-hour precipitation depth of 2.19 inches obtained from NOAA Atlas 14 Precipitation Frequency Data. Retention basins will be required to dissipate stormwater within 36 hours by utilizing storm drain, drywells, pumps, or bleed lines to a positive outfall such as the Powerline Floodway.

The proposed channel adjacent to Signal Butte Road shall convey offsite stormwater runoff from the east of the Site to the Powerline Floodway. Retention along Signal Butte Road for the half-street widening will be provided onsite. Retention basins will be designed to drain after the storm event within 36 hours. Refer to *Table 5 – Interim Condition Onsite Retention Volume Summary* in Appendix B for detailed calculations of the retention volumes.

4.4.2 Stormwater Quality

The required retention storage volume for the Site exceeds the first flush requirement of storing the first one-half inch of runoff. All runoff will have settlement time within retention basins prior to draining by percolation, drywells, release into natural watercourses, and/or release into existing storm drain systems.

4.5 Maintenance

Ongoing maintenance of the designed or recommended drainage systems will be required to preserve the design integrity and purpose of the drainage system. Failure to provide maintenance can prevent the drainage system from performing to its intended design purpose, and can result in reduced performance. Maintenance is the responsibility of private developers and owners associations for facilities on private property within all easements and private streets, except for drainage structures within public rights-of-way accepted by the City of Mesa for maintenance. Ownership and maintenance responsibilities will be associated with developments discharging to retention facilities and will be managed by the owners associations established for the Site. A regular maintenance program is required to have drainage systems perform to the level of protection or service as presented in this report.

5.0 CONCLUSIONS

Based on the analysis of the *Master Drainage Report for Development Unit 7 at Mesa Proving Grounds*, the following conclusions can be made:

1. This *Master Drainage Report for Development Unit 7 at Mesa Proving Grounds* is prepared in accordance with Wood, Patel & Associates, Inc.'s understanding of the drainage parameters set by the Flood Control District of Maricopa County, the City of Mesa, and the *Master Drainage Report for Mesa Proving Grounds.*

2. Offsite flows shall be conveyed around the Site adequately per jurisdictional requirements. FCDMC may require a review of this *DU7 Master Drainage Report.*

3. Peak flows for the interim condition 100-year, 24-hour storm appear not to adversely impact downstream drainage infrastructure.

4. Onsite retention shall be provided to retain runoff generated by the 100-year, 2-hour storm event for developed areas.

6. Flow in excess of onsite storage capacity shall outfall to emergency overflow routes. Elevations and locations to be determined with final design.

7. Lowest floor elevations shall be set a minimum of 1 foot above the adjacent 100-year water surface elevation or emergency outfall water surface elevation, whichever is greater.

8. Drainage infrastructure shall be designed in accordance with the appropriate criteria per the City of Mesa and/or Flood Control District of Maricopa County.

9. Ongoing maintenance is required for all drainage systems in order to assure design performance.

6.0 REFERENCES

1. *Master Drainage Report for Mesa Proving Grounds*, Wood, Patel and Associates, Inc., September 15, 2011.

2. *Drainage Design Manual for Maricopa, County, Arizona, Volumes 1 and 2,* Flood Control District of Maricopa County, 2011.

3. *Drainage Policies and Standards for Maricopa County*, Arizona, Flood Control District of Maricopa County, July, 2010.

4. *2009 Engineering & Design Standards,* City of Mesa, 2009.

5. *Flood Insurance Rate Map,* Federal Emergency Management Agency (FEMA), September 30, 2005.

6. *HEC-1 Flood Hydrograph Package,* US Army Corps of Engineers, June 1998.

7. *FlowMaster 2005*, Haestad Methods, Inc., 2004.

8. *Final Drainage Report for First Solar MSA-01, Mesa, Arizona*, Beck Consulting Engineers, Inc., April 18, 2011.

APPENDIX A

Interim Condition Data and Hydrology

Hydrology Interim Condition

100-Year, 24-Hour HEC-1 Output

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*           VERSION 4.1                 *
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*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*        DAVIS, CALIFORNIA 95616        *
*          (916) 756-1104               *
*                                       *
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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   13         ID        IT REFLECTS A POINT IN TIME WHERE PHASE 1 OF THE FIRST SOLAR
   14         ID        MANUFACTURING FACILITY IS CONSTRUCTED ALONG WITH THE PROPOSED DU 7.
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   18         ID        ENSURE THE INTERIM DEVELOPMENT CONDITION WITHIN THE MESA PROVING GROUNDS
   19         ID        PROJECT IS NOT NEGATIVELY IMPACTING DOWNSTREAM FLOOD CONTROL
   20         ID        INFRASTRUCTURE.
   21         ID
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   32         ID        DANIEL W. MATTHEWS, E.I.T.
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   60         ID        MODEL REVISED BY:
   61         ID        WOOD, PATEL & ASSOCIATES, INC.
   62         ID        DANIEL W. MATTHEWS, E.I.T.
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 183          ID       BY SWABACK PARTNERS ON 12/12/07.
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 187          ID       DISTRICT OF MARICOPA COUNTY (WS4-SEM.DAT).  WATERSHEDS 68A, 68B,
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 216          ID    This model covers the Southeast Mesa Area and should reference as a DSS
 217          ID    the watershed model for the Northeast Mesa Area (Filename WS2-NEM.DAT).
 218          ID
 219          ID    This model is necessary to determine the input hydrographs for the
 220          ID    Rittenhouse Basin Design HEC-RAS Unsteady State analysis.  To develop
1                                    HEC-1 INPUT                                    PAGE  5

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

 221          ID    the necessary input hydrographs the following models should be run in order.
 222          ID    Because the files utilize a TAPE21 file to export import hydrographs
 223          ID    between models, prior to running the FIRST model (WS1-NWM.DAT) any existing
 224          ID    TAPE21 file in the directory should be deleted.  The run procedure order is:
 225          ID
 226          ID         1)  WS1-NWM.DAT
 227          ID         2)  WS2-NEM.DAT
 228          ID         3)  WS3-QCSW.DAT
 229          ID         4)  WS4-SEM.DAT (referencing WS2-NEM.DSS for the DSS file)
 230          ID         5)  RT1-BASE.DAT
 231          ID
 232          ID    The necessary input hydrographs for the Rittenhouse Basin analysis
 233          ID    are determined in RT1-BASE.  In that output file, the hydrograph at
 234          ID    RWFLD1 should be exported and used as the input hydrograph at the
 235          ID    EMF Reach 4 Cross Section 17.082.  And the hydrograph at RITTEN should
 236          ID    be exported and used as the input hydrograph for the Rittenhouse Main
 237          ID    Channel at Cross Section 820.00
 238          ID
 239          ID
 240          ID    ************************************************************************
 241          ID    **** NOTE BY PRIMATECH ENGINEERS:                                  ****
 242          ID    **** DATE: 06/12/2001                                              ****
 243          ID    **** THE NEW FILE NAME IS: SEBTALT2.DAT                            ****
 244          ID    **** THE FILE WAS RENAMED AS <<RTBTALT2.DAT>> FOR THE EAST MARICOPA ****
 245          ID    **** FLOODWAY CAPACITY MITIGATION PROJECT, BY FLOOD CONTROL DISTRICT OF ****
 246          ID    **** MARICOPA COUNTY.                                              ****
 247          ID    **** THE FILE WAS RENAMED <<RTBTALT3.DAT>> AND UPDATED USING GREEN AND  ****
 248          ID    **** AMPT FUTURE CONDITIONS FOR BASINS 258 TO 268.                 ****
 249          ID    ************************************************************************
 250          ID
 251          ID
 252          ID
 253          ID     THIS MODEL WAS ORIGINALLY MIDDOUT.DAT
 254          ID     IT HAS BEEN MODIFIED BY CPE (7/2000)
 255          ID     FOR ALTERNATIVE 2 FOR THE EAST MARICOPA FLOODWAY
 256          ID     CAPACITY MITIGATION AND MULTI-USE CORRIDOR STUDY
 257          ID     TO ROUTE BOTH THE POWERLINE FLOODWAY
 258          ID     AND THE SANTAN FREEWAY CHANNEL INTO THE RAY BASIN PRIOR THEIR OUTFALL
```

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355          ID   CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL
356          ID
357          ID   VELOCITIES FOR ADMP IMPROVEMENT CHANNELS FROM DIBBLE AND ASSOCIATES
358          ID   SUGGESTED ALTERNATIVES (JULY 1, 1997)
359          ID
360          ID   ********************************************************************************
361          ID   **** THE FOLLOWING NOTE WAS ADDED BY PRIMATECH ENGINEERS ON 06-12-2001 ****
362          ID   ********************************************************************************
363          ID   NOTE: MUST USE NEBUILD.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
364          ID         SUPERSTITION FREEWAY.
365          ID   ********************************************************************************
366          ID
367          ID
368          ID   NOTE: MUST USE NDIBF.DSS AS THE DSS FILE TO IMPORT FLOWS ACROSS THE
369          ID         SUPERSTITION FREEWAY.
370          ID
371          ID   DDM MCUHP2 SE MESA ADMP - SOUTH OF SUPERSTITION FWY, FUTURE CONDITIONS
             *DIAGRAM
372          IT       5  1APR97    0000     600
373          IO       5
374          IN      15
375          JD    3.60    0.01
376          PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
377          PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
378          PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
379          PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
380          PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
381          PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
382          PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
383          PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
384          PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
1                                          HEC-1 INPUT                                    PAGE  8
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
385          PC    .983    .986    .989    .992    .995    .998   1.000
386          JD    3.58     1.0
387          JD    3.49     5.0
388          JD    3.38    10.0
389          JD    3.24    30.0
390          JD    3.10    60.0
391          JD    3.05    90.0
392          JD    3.00   120.0
393          JD    2.97   150.0
             * ********************************************************************************
             *

394          KK     73A
395          KM    BASIN 73A
396          KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
397          KM     L=       2.3  Lca=       1.0   S=   34.9  Kn= .093  LAG=   94.5
398          KM     PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
399          BA      .95
400          LG      .35     .36    5.00     .27     .00
401          UI     34.     34.     34.     34.     84.    117.    134.    158.    171.    185.
402          UI    197.    214.    232.    254.    274.    317.    381.    429.    424.    369.
403          UI    332.    303.    282.    263.    240.    220.    202.    185.    169.    157.
404          UI    134.    107.     90.     60.     60.     57.     55.     54.     34.     34.
405          UI     34.     34.     16.     10.     10.     10.     10.     10.     10.     10.
406          UI     10.     10.     10.     10.     10.     10.      0.      0.      0.      0.
407          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             *

408          KK   73ATB   ROUTE
409          KM   ROUTE FLOW FROM BASIN 73A THROUGH THE MOUNTAIN HEIGHTS DEVELOPEMENT FROM
410          KM   MERIDIAN ROAD TO MOUNTAIN ROAD.
411          RS       2    FLOW      -1
412          RC   0.045   0.040   0.045    2930  0.0050    0.00
413          RX    0.00    5.00   10.00   20.00  120.00  130.00  135.00  140.00
414          RY    4.00    3.00    2.50    0.00    0.00    2.50    3.00    4.00
             *
             *

415          KK     73B   BASIN
416          KM    BASIN 73B
417          KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
418          KM     L=0.56  Lca=0.28  S=30.4  Kn=0.040  LAG=14.9
419          KM     PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
420          BA   0.425
421          LG    0.25    0.25    5.40    0.27      30
422          UI     169     530     973     829     481     180      73      30       0       0
423          UI       0       0       0       0       0       0       0       0       0       0
             *
             *
1                                          HEC-1 INPUT                                    PAGE  9
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

424          KK  RET73B  DIVERT
425          KM   RETAIN 80% OF THE 100 YR 2 HR RUNOFF VOLUME
426          DT  73BRET    39.5      0.0
427          DI       0   10000
428          DQ       0   10000
             *
             *

429          KK   CF73B COMBINE
430          KM   COMBINE HYDROGRAPHS 73ATB AND BASIN 73B
431          HC       2
             *
             *
```

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499          DI       0   10000
500          DQ       0   10000
             *
             *

501          KK   CP74B COMBINE
502          KM   COMBINE HYDROGRAPHS 74ATB AND BASIN 74B
503          HC       2
             *
             *

504          KK   74BTC   ROUTE
505          KM   ROUTE FLOW VIA THE POWERLINE FLOODWAY FROM MOUNTAIN ROAD TO SIGNAL BUTTE
506          KM   ROAD.
507          RS       1    FLOW      -1
508          RC   0.013   0.013   0.013    3100  0.0055    0.00
509          RX    0.00    7.00   21.50   30.00   36.00   44.50   59.00   66.00
510          RY    6.00    5.50    5.50    0.00    0.00    5.50    5.50    6.00
             *
             *

511          KK     74C   BASIN
512          KM   BASIN 74C
513          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
514          KM    L=1.22  Lca=0.40  S=25.4  Kn=0.040  LAG=23.7
515          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
516          BA   0.345
517          LG    0.25    0.17    6.80    0.15      30
518          UI      48     180     276     386     588     428     310     211      97      65
519          UI      35      15      15      16       0       0       0       0       0       0
520          UI       0       0       0       0       0       0       0       0       0       0
             *
             *

521          KK  RET74C  DIVERT
522          KM   RETAIN 80% OF THE 100 YR 2 HR RUNOFF VOLUME
523          DT  74CRET    22.6     0.0
524          DI       0   10000
525          DQ       0   10000
             *

526          KK   CP74C COMBINE
527          KM   COMBINE HYDROGRAPHS 73T74C, 74BTC, AND BASIN 74C
             * KO     2
528          HC       3
             *
             *  ********************************DU ? MASTER REPORT************************
             *  ********************************DWH 09/28/2011****************************
             *

1                                        HEC-1 INPUT                                    PAGE 12

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

529          KK  74CT10
530          KM  ROUTE FLOW FROM IN THE POWERLINE FLOODWAY FROM CP74C TO CP10
531          RS       2    FLOW      -1
532          RC   0.030   0.013   0.030    5050   .0036
533          RX       0      15    16.5      25      33    41.5      43      58
534          RY     6.6     6.6     5.6       0       0     5.6     6.6     6.6
             *
             *

535          KK      10   BASIN
536          KM    BASIN 10
537          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
538          KM    L=1.16  Lca=0.85  S=21.6  Kn=0.045  LAG=36.0
539          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
540          BA   0.186
541          LG    0.22    0.21    6.40    0.20      31
542          UI       0      17      31      71      93     113     143     208     188     148
543          UI     119      95      73      40      30      22      17       7       5       5
544          UI       5       5       0       0       0       0       0       0       0       0
545          UI       0       0       0       0       0       0       0       0       0       0
546          UI       0       0       0       0       0       0       0       0       0       0
             *
             *

547          KK   RET10  DIVERT
548          KM   RETAIN 100 YR 2 HR RUNOFF VOLUME
             * KO     2
549          DT   10RET    14.5     0.0
550          DI       0   10000
551          DQ       0   10000
             *
             *

552          KK    CP10
553          KM    COMBINE HYDROGRAPHS 74CT10 AND RET10
554          HC       2
             *
             *

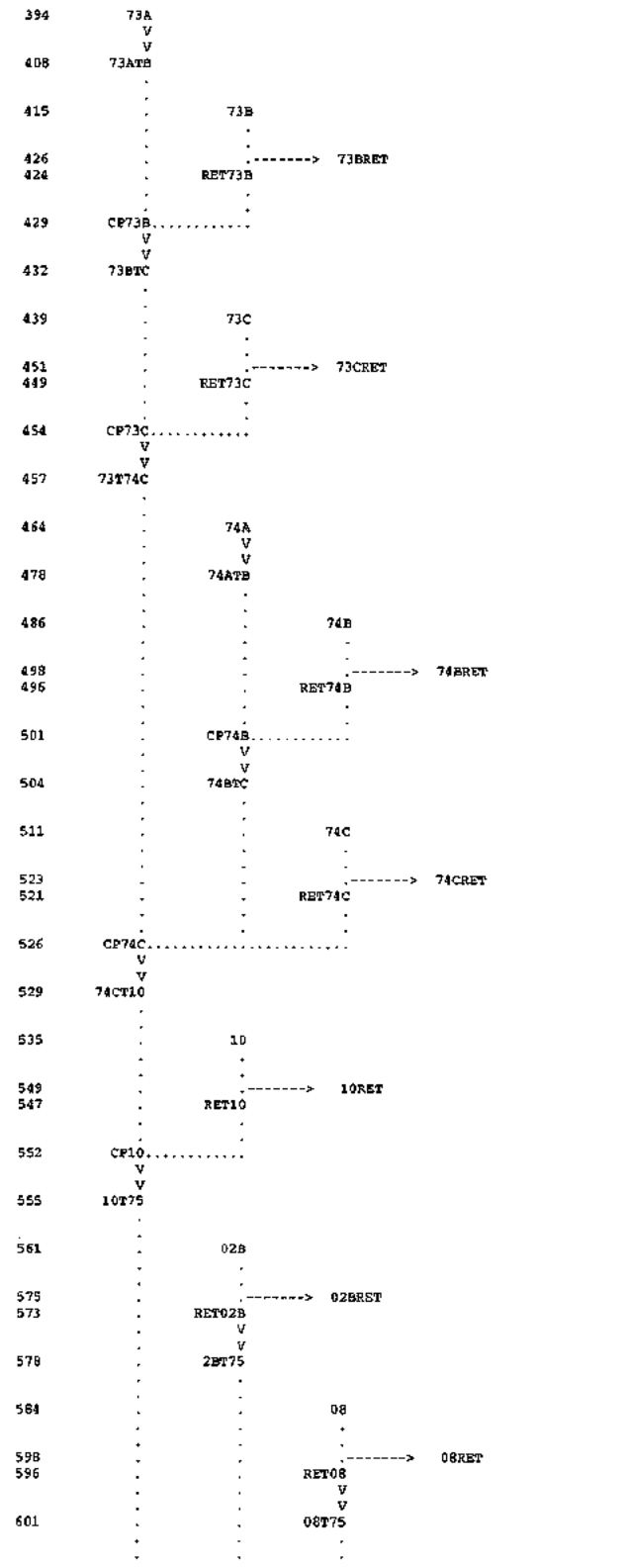
555          KK   10T75   ROUTE
556          KM   ROUTE FLOW FROM CP10 TO CP75 WITHIN THE POWERLINE FLOODWAY
557          RS       1    FLOW      -1
558          RC   0.030   0.013   0.030    5590   .0056
559          RX       0      15    16.5      26      34    43.5      45      60
560          RY     7.3     7.3     6.3       0       0     6.3     7.3     7.3
             *
             *

561          KK     02B   BASIN
562          KM    BASIN 02B
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING
(.) CONNECTOR
(---->) DIVERSION OR PUMP FLOW
(<----) RETURN OF DIVERTED OR PUMPED FLOW



```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998              *
*           VERSION 4.1              *
*                                    *
*  RUN DATE   28SEP11  TIME  13:00:09  *
*                                    *
**************************************
```

```
**************************************
*                                    *
*   U.S. ARMY CORPS OF ENGINEERS     *
*   HYDROLOGIC ENGINEERING CENTER    *
*        609 SECOND STREET           *
*      DAVIS, CALIFORNIA 95616       *
*        (916) 756-1104              *
*                                    *
**************************************
```

FILE: DU7INT.DAT

MODEL REVISED: 09-28-2011

PROJECT: DEVELOPMENT UNIT 7 AT MESA PROVING GROUNDS (MPG)

THIS MODEL IS AN EXERPT OF THE FULL BUILD OUT MODEL. NO REFERENCE TO OTHER MODELS IS REQUIRED TO RUN THIS MODEL.

THIS IS AN INTERIM CONDITION MODEL WHICH REFLECTS THE FLOOD CONTROL DISTRICT'S FULL BUILD OUT MODEL FOR AREA OUTSIDE OF MESA PROVING GROUNDS IT REFLECTS A POINT IN TIME WHERE PHASE 1 OF THE FIRST SOLAR MANUFACTURING FACILITY IS CONSTRUCTED ALONG WITH THE PROPOSED DU 7. ALTHOUGH ALL WATERSHEDS WITHIN THE MODEL ARE CURRENTLY NOT FULLY BUILT OUT, IT WAS CHOSEN AS THE INTERIM CONDITION BASE MODEL DUE TO UNCERTAINTY OF DEVELOPMENT PHASING OUTSIDE THE PROJECT AND ALSO TO ENSURE THE INTERIM DEVELOPMENT CONDITION WITHIN THE MESA PROVING GROUNDS PROJECT IS NOT NEGATIVELY IMPACTING DOWNSTREAM FLOOD CONTROL INFRASTRUCTURE.

MODEL REVISION DESCRIPTION:

THE MOST CURRENT POST-DEVELOPED MPG MODEL(MPGDU7.DAT) WAS USED AS THE START TO THIS MODEL. THE MODEL UTILIZES POST DEVELOPED WATERSHEDS FOR FIRST SOLAR PHASE 1 AS WELL AS DU 7. A REDUCTION FACTOR OF 0.75 WAS MULTIPLIED TO THE WATERSHED 75 RUNOFF RATIO TO ACCOUNT FOR 25% OF THE WATERSHED BEING DEVELOPED AND PROVIDING RETENTION.

MODEL REVISED BY:
WOOD, PATEL & ASSOCIATES, INC.
DANIEL W. MATTHEWS, E.I.T.

FILE PATH:
R:\MESA PROVING GROUNDS\2011\113697\PROJECT SUPPORT\REPORTS\
DRAINAGE\DU 7 DRAINAGE\HYDROLOGY\INTERIM\DU7INT.DAT

****

FILE: MPGDU7.DAT

MODEL REVISED: 09-07-2011

PROJECT: MESA PROVING GROUNDS

THIS MODEL SHOULD REPLACE WS4-SEM.DAT IN THE HEC-1 RUN SEQUENCE SPECIFIE BELOW. REFERENCING WS2-NEM.DSS IS STILL REQUIRED.

MODEL REVISION DESCRIPTION:

THIS MODEL IS AN EXERPT OF THE MODEL PROVIDED BY THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (WS4-SEM.DAT). ONSITE WATERSHEDS WERE UPDATED TO REFLECT A GRADING PLAN.
MODELING OF THE POWERLINE FLOODWAY HAS BEEN UPDATED TO REFLECT THE EXISTING SECTIONS AND SLOPE PER AS-BUILT DRAWINGS ACROSS THE MPG SITE.

MODEL REVISED BY:
WOOD, PATEL & ASSOCIATES, INC.
DANIEL W. MATTHEWS, E.I.T.

FILE PATH:
R:\MESA PROVING GROUNDS\2011\113697\PROJECT SUPPORT\REPORTS\
DRAINAGE\HYDROLOGY\MPGDU7.DAT

****

FILE: MPG20RT2.DAT

MODEL REVISED: 04-25-2011

PROJECT: MESA PROVING GROUNDS

THIS MODEL SHOULD REPLACE WS4-SEM.DAT IN THE HEC-1 RUN SEQUENCE SPECIFIE BELOW. REFERENCING WS2-NEM.DSS IS STILL REQUIRED.

THIS IS A 100-YEAR, 2-HOUR RETENTION SCENARIO MODEL USING THE 20MSF COMMERCIAL SPACE AND 15K DU LAND PLAN PROVIDED BY SWABACK PARTNERS ON 12/12/07.

MODEL REVISION DESCRIPTION:

THIS MODEL IS AN EXERPT OF THE MODEL PROVIDED BY THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (WS4-SEM.DAT). ONSITE WATERSHEDS 01 AND 20 WERE UPDATED TO REFLECT THE INCORPORATION OF THE FIRST SOLAR SITE IN THE NORTHEAST CORNER OF DU-6. WATERSHED 02 WAS SPLIT INTO 02A AND 02B. LAND USE WAS CHANGED TO INDUSTRIAL FOR 02B AND ENTIRELEY

WOOD, PATEL & ASSOCIATES, INC.
DANIEL W. MATTHEWS, E.I.T.

FILE PATH:
R:\MESA PROVING GROUNDS\2005\062753\PROJECT SUPPORT\HYDRO\MDR-20-15 LAND PLAN\HYDROLOGY\POST-DEVELOPED 100YR2HR RETENTION MODEL (MPG20RT2)\MPG20RT2.DAT

****

ID Kirkham Michael:
Last Revised Date: 1/22/03
Filename: WS4-SEM.DAT

Comments Dated 1/22/03 (CJ)

This model should be used ONLY for the Rittenhouse and Chandler Heights Basin Design Project - Final Design Analyses.

This model is one of several models that represent the EMF watershed. This model covers the Southeast Mesa Area and should reference as a DSS the watershed model for the Northeast Mesa Area (Filename WS2-NEM.DAT).

This model is necessary to determine the input hydrographs for the Rittenhouse Basin Design HEC-RAS Unsteady State analysis. To develop the necessary input hydrographs the following models should be run in order. Because the files utilize a TAPE21 file to export import hydrographs between models, prior to running the FIRST model (WS1-NWM.DAT) any existing TAPE21 file in the directory should be deleted. The run procedure order is:

1) WS1-NWM.DAT
2) WS2-NEM.DAT
3) WS3-QCSW.DAT
4) WS4-SEM.DAT (referencing WS2-NEM.DSS for the DSS file)
5) RT1-BASE.DAT

The necessary input hydrographs for the Rittenhouse Basin analysis are determined in RT1-BASE. In that output file, the hydrograph at RWFLD1 should be exported and used as the input hydrograph at the EMF Reach 4 Cross Section 17.082. And the hydrograph at RITTEN should be exported and used as the input hydrograph for the Rittenhouse Main Channel at Cross Section 820.00

****
**** NOTE BY PRIMATECH ENGINEERS: ****
**** DATE: 06/12/2001 ****
**** THE NEW FILE NAME IS: SEBTALT2.DAT ****
**** THE FILE WAS RENAMED AS <<RTSBTALT2.DAT>> FOR THE EAST MARICOPA ****
**** FLOODWAY CAPACITY MITIGATION PROJECT, BY FLOOD CONTROL DISTRICT OF ****
**** MARICOPA COUNTY. ****
**** THE FILE WAS RENAMED <<RTBTALT3.DAT>> AND UPDATED USING GREEN AND ****
**** AMPT FUTURE CONDITIONS FOR BASINS 258 TO 268. ****
****

THIS MODEL WAS ORIGINALLY MIDDOUT.DAT
IT HAS BEEN MODIFIED BY CPE (7/2000)
FOR ALTERNATIVE 2 FOR THE EAST MARICOPA FLOODWAY
CAPACITY MITIGATION AND MULTI-USE CORRIDOR STUDY
TO ROUTE BOTH THE POWERLINE FLOODWAY
AND THE SANTAN FREEWAY CHANNEL INTO THE RAY BASIN PRIOR THEIR OUTFALL
INTO THE EMF

****

Model files changed by Collins/Pina Engineering
to reflect multi-use design concepts (recreation
and environment) proposed throughout the entire
EMF Corridor. July 2000

VERSION 8.06 CPE 7/31/00

****

****
FILENAME: MIDDOUT.DAT

ALL CIP INFRASTRUCTURE IS IN PLACE, FUTURE CONDITIONS LANDUSE IS IN PLACE
FLOW IS ROUTED UP ELLSWORTH ROAD IN A EARTH LINED CHANNEL

****
PRODUCED BY DIBBLE AND ASSOCIATES AND HOSKIN ENGINEERING CONSULTANTS.
File Name: Final8.Dat
Revised - Jan. 2000 by SZ (Wood/Patel) From Final7.dat - new Z-V & Sideweir
Revised - Jan. 2000 by SZ (Wood/Patel) from Final6.dat - 60% review comments
Revised - Dec. 1999 by SZ (Wood/Patel) from Final5.dat
Revised - Dec. 1999 by SZ (Wood/Patel) from Final4.dat
Revised - Nov. 1999 by SZ (Wood/Patel) from Final3.dat
Revised - June 1999 by SZ (Wood/Patel) for Final Model from Opt1.dat.
Revised - May 1999 by SZ (Wood/Patel) for Option 1, Based on Model SDIB.DAT
REVISED - MAY, 1999 BY VAS TO INCORPORATE INCREASE OF SUBBASIN RETENTION AND REVISIONS TO THE REGIONAL DETENTION BASIN STORAGE
REVISED - FEB, 1999 BY VALERIE SWICK, FCD OF MARICOPA COUNTY
REVISED - MAY, 1998 BY D&A

REVISED BY VALERIE SWICK, FEB. 26, 1998

FLOWS FROM DETENTION BASIN LOCATED AT NE CORNER OF ELLIOT AND ELLSWORTH ROADS IS ROUTED TO THE SOUTHWEST BY SIPHON DRAW TO SUBBASIN 70A. FROM THERE THEY

376 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

386 JD INDEX STORM NO. 2

STRM 3.58 PRECIPITATION DEPTH
TRDA 1.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

387 JD INDEX STORM NO. 3

STRM 3.49 PRECIPITATION DEPTH
TRDA 5.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

388 JD INDEX STORM NO. 4

STRM 3.38 PRECIPITATION DEPTH
TRDA 10.00 TRANSPOSITION DRAINAGE AREA

TRDA 90.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

392 JD INDEX STORM NO. 8

STRM 3.00 PRECIPITATION DEPTH

TRDA 120.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

393 JD INDEX STORM NO. 9

STRM 2.97 PRECIPITATION DEPTH

TRDA 150.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

HYDROGRAPH MULTIPLIED BY .19

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	73A	378.	13.33	96.	24.	12.	.95		
ROUTED TO	73ATB	355.	13.50	96.	24.	12.	.95		
HYDROGRAPH AT	73B	748.	12.08	68.	20.	10.	.43		
DIVERSION TO	73BRET	748.	12.08	68.	20.	10.	.43		
HYDROGRAPH AT	RET73B	4.	20.75	2.	1.	0.	.43		
2 COMBINED AT	CP73B	355.	13.50	96.	25.	12.	1.38		
ROUTED TO	73BTC	332.	13.83	95.	24.	12.	1.38		
HYDROGRAPH AT	73C	822.	12.25	94.	28.	14.	.58		
DIVERSION TO	73CRET	822.	12.25	70.	19.	9.	.58		
HYDROGRAPH AT	RET73C	501.	12.42	33.	10.	5.	.58		
2 COMBINED AT	CP73C	441.	12.42	124.	33.	16.	1.96		
ROUTED TO	73T74C	348.	12.83	122.	33.	16.	1.96		
HYDROGRAPH AT	74A	306.	13.33	77.	19.	9.	.75		
ROUTED TO	74ATB	300.	13.42	77.	19.	9.	.75		
HYDROGRAPH AT	74B	455.	12.25	55.	16.	8.	.33		
DIVERSION TO	74BRET	455.	12.25	33.	9.	4.	.33		
HYDROGRAPH AT	RET74B	382.	12.33	27.	8.	4.	.33		
2 COMBINED AT	CP74B	445.	12.33	103.	27.	13.	1.08		
ROUTED TO	74BTC	410.	12.42	103.	27.	13.	1.08		
HYDROGRAPH AT	74C	516.	12.25	62.	18.	9.	.34		
DIVERSION TO	74CRET	516.	12.25	42.	11.	5.	.34		
HYDROGRAPH AT	RET74C	360.	12.42	25.	7.	3.	.34		
3 COMBINED AT	CP74C	713.	12.42	240.	64.	31.	3.39		
ROUTED TO	74CT10	615.	12.58	239.	64.	31.	3.39		
HYDROGRAPH AT	10	207.	12.50	32.	10.	5.	.19		
DIVERSION TO	10RET	207.	12.50	27.	7.	4.	.19		
HYDROGRAPH AT	RET10	66.	13.00	7.	2.	1.	.19		
2 COMBINED AT	CP10	615.	12.58	245.	66.	32.	3.57		
ROUTED TO	10T75	533.	14.08	244.	66.	32.	3.57		
HYDROGRAPH AT	02B	220.	12.17	23.	8.	4.	.12		
DIVERSION TO	02BRET	220.	12.17	23.	8.	4.	.12		
HYDROGRAPH AT	RET02B	0.	.00	0.	0.	0.	.12		

NOAA Atlas Precipitation Data

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Arizona 33.3325 N 111.62 W 1420 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Mon Oct 22 2007

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | D

Precipitation Frequency Estimates (inches)

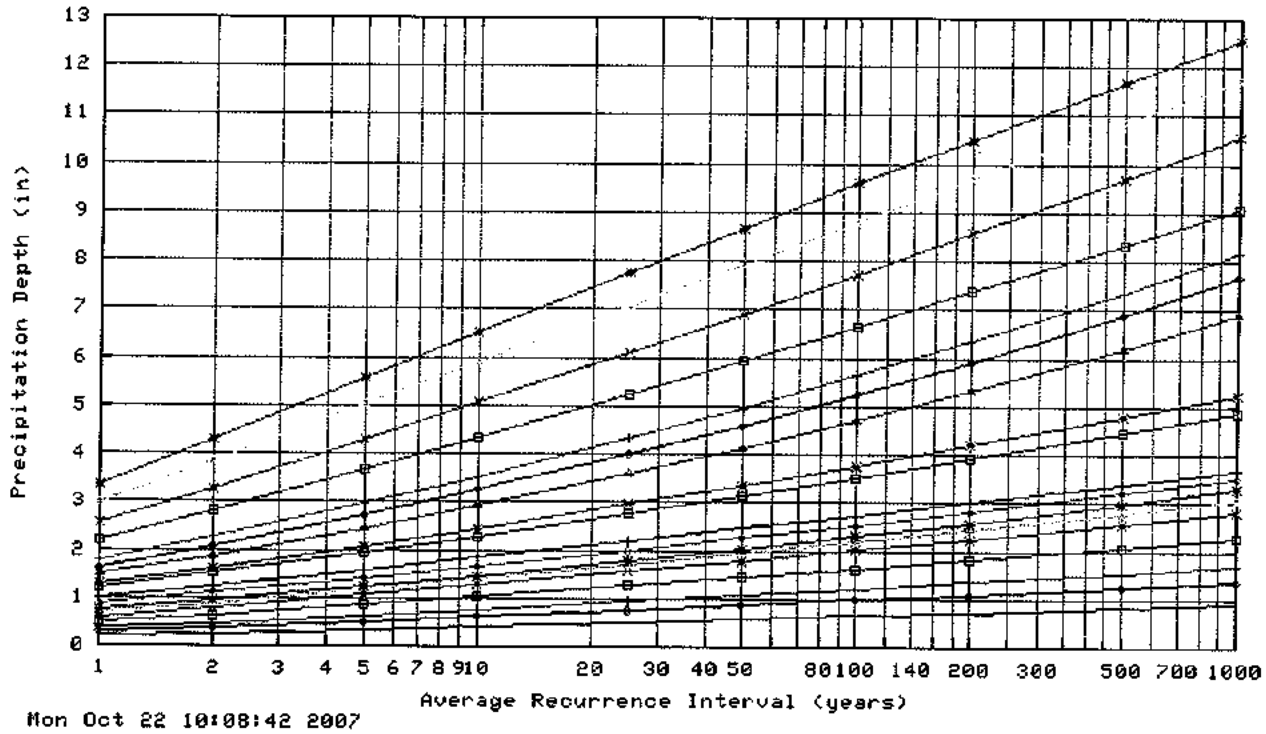
ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.19	0.29	0.36	0.48	0.60	0.68	0.73	0.88	0.99	1.21	1.27	1.47	1.62	1.77	2.19	2.56	2.99	3.33
2	0.25	0.38	0.47	0.63	0.78	0.89	0.93	1.11	1.26	1.52	1.61	1.87	2.07	2.25	2.81	3.28	3.84	4.28
5	0.34	0.51	0.64	0.85	1.06	1.18	1.22	1.42	1.58	1.95	2.08	2.45	2.71	2.96	3.68	4.29	5.02	5.58
10	0.40	0.61	0.76	1.03	1.27	1.40	1.45	1.66	1.84	2.29	2.44	2.92	3.24	3.52	4.35	5.06	5.90	6.53
25	0.50	0.76	0.94	1.26	1.56	1.71	1.77	2.00	2.19	2.75	2.95	3.59	3.98	4.32	5.25	6.10	7.05	7.76
50	0.57	0.86	1.07	1.44	1.78	1.95	2.03	2.26	2.46	3.12	3.35	4.13	4.59	4.96	5.94	6.91	7.93	8.68
100	0.64	0.97	1.21	1.63	2.01	2.19	2.30	2.54	2.74	3.51	3.77	4.70	5.24	5.64	6.65	7.73	8.81	9.60
200	0.71	1.09	1.35	1.81	2.24	2.44	2.58	2.82	3.02	3.90	4.20	5.31	5.92	6.36	7.37	8.57	9.69	10.49
500	0.81	1.24	1.53	2.06	2.56	2.78	2.97	3.21	3.40	4.45	4.79	6.17	6.89	7.36	8.35	9.70	10.84	11.66
1000	0.89	1.35	1.68	2.26	2.79	3.04	3.28	3.52	3.69	4.88	5.25	6.87	7.68	8.17	9.10	10.57	11.71	12.53

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

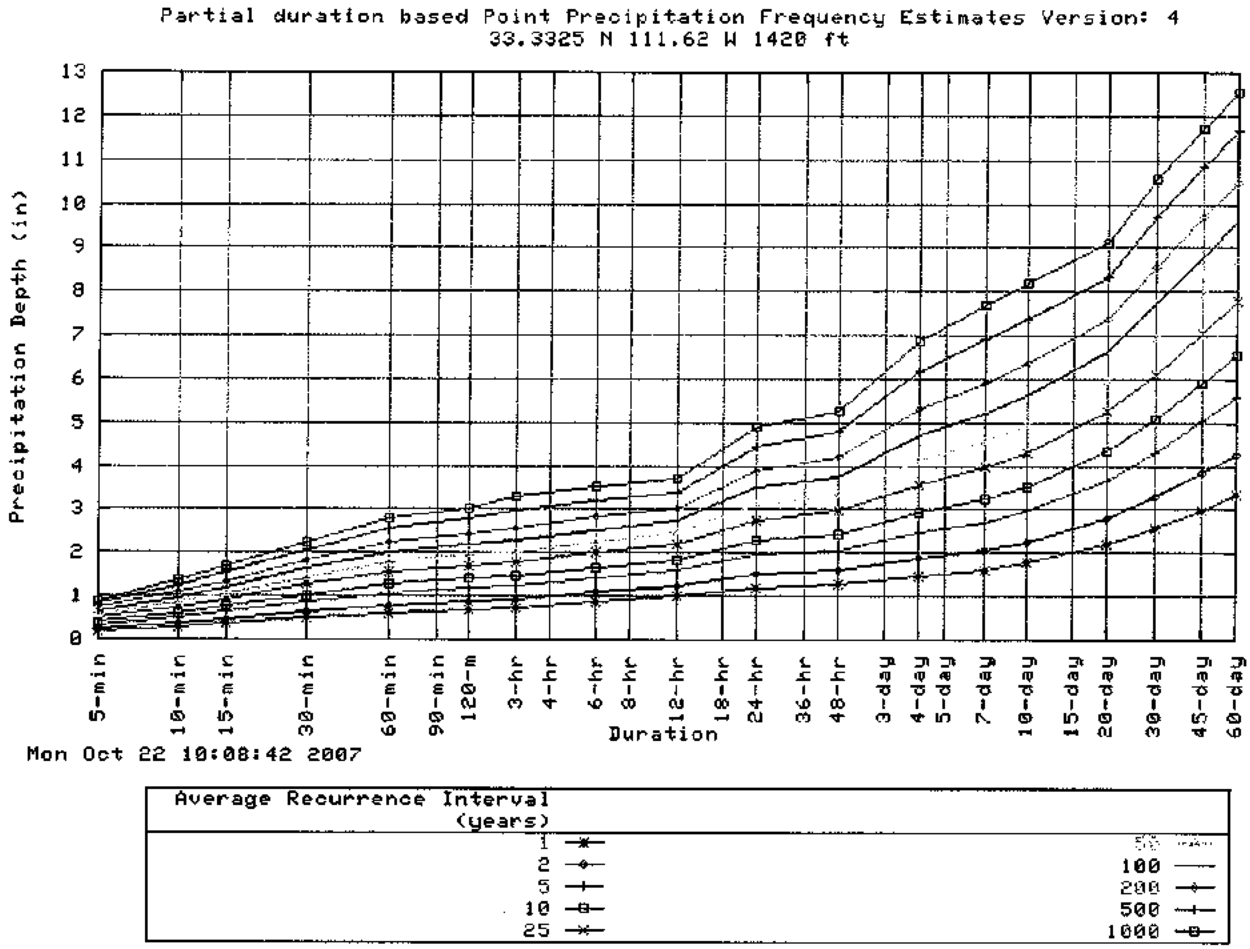
MESA PROVING GROUNDS ONSITE PRECEPITATION DEPTHS

Partial duration based Point Precipitation Frequency Estimates Version: 4
33.3325 N 111.62 W 1420 ft



Mon Oct 22 10:08:42 2007

Duration			
5-min	120-hr	48-hr	30-day
10-min	3-hr	4-day	45-day
15-min	6-hr	7-day	60-day
30-min	12-hr	10-day	
60-min	24-hr	20-day	



Confidence Limits -

*** Upper bound of the 90% confidence interval**
Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.23	0.35	0.44	0.59	0.73	0.82	0.89	1.03	1.14	1.36	1.42	1.62	1.79	1.95	2.42	2.81	3.29	3.65
2	0.30	0.46	0.57	0.77	0.96	1.06	1.14	1.31	1.44	1.72	1.81	2.07	2.28	2.48	3.10	3.60	4.22	4.70
5	0.41	0.62	0.77	1.04	1.29	1.41	1.49	1.67	1.81	2.19	2.33	2.70	2.99	3.25	4.05	4.70	5.51	6.12
10	0.49	0.75	0.93	1.25	1.54	1.68	1.76	1.95	2.10	2.57	2.74	3.22	3.57	3.86	4.79	5.54	6.48	7.16
25	0.60	0.91	1.13	1.52	1.88	2.04	2.14	2.33	2.49	3.09	3.30	3.94	4.38	4.73	5.77	6.68	7.75	8.52
50	0.68	1.04	1.29	1.74	2.15	2.32	2.44	2.63	2.79	3.50	3.75	4.54	5.05	5.43	6.54	7.56	8.71	9.53
100	0.77	1.17	1.45	1.95	2.42	2.61	2.76	2.95	3.11	3.93	4.22	5.18	5.76	6.18	7.33	8.48	9.69	10.55
200	0.86	1.30	1.61	2.17	2.69	2.90	3.09	3.28	3.43	4.38	4.71	5.86	6.53	6.97	8.13	9.41	10.67	11.55
500	0.98	1.49	1.84	2.48	3.07	3.30	3.56	3.74	3.88	5.01	5.40	6.83	7.62	8.11	9.24	10.69	11.98	12.88
1000	1.07	1.63	2.02	2.72	3.36	3.63	3.94	4.11	4.24	5.53	5.95	7.63	8.53	9.02	10.11	11.71	12.99	13.88

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

*** Lower bound of the 90% confidence interval**

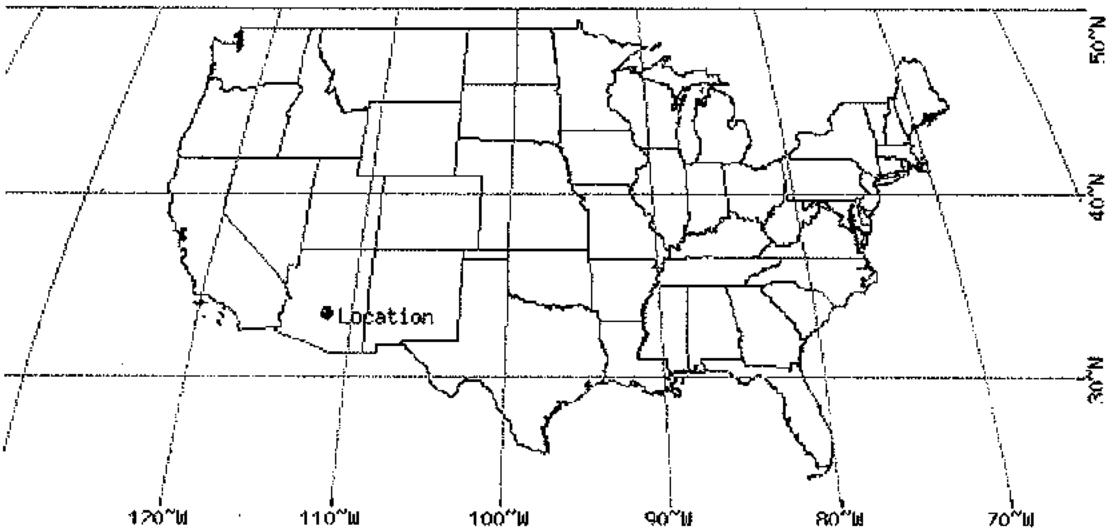
Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.16	0.24	0.30	0.41	0.50	0.58	0.61	0.76	0.87	1.08	1.14	1.34	1.48	1.61	1.99	2.33	2.72	3.04
2	0.21	0.32	0.40	0.53	0.66	0.75	0.79	0.96	1.10	1.37	1.44	1.70	1.88	2.06	2.55	2.98	3.49	3.90
5	0.28	0.43	0.53	0.71	0.88	0.99	1.03	1.22	1.39	1.74	1.86	2.22	2.46	2.69	3.34	3.90	4.56	5.08
10	0.34	0.51	0.63	0.85	1.05	1.17	1.21	1.42	1.60	2.04	2.18	2.64	2.93	3.19	3.93	4.60	5.35	5.93
25	0.41	0.62	0.76	1.03	1.27	1.41	1.46	1.69	1.88	2.43	2.61	3.23	3.58	3.90	4.73	5.52	6.38	7.03
50	0.46	0.70	0.86	1.16	1.44	1.58	1.64	1.88	2.09	2.73	2.94	3.69	4.10	4.44	5.33	6.22	7.14	7.83
100	0.51	0.77	0.96	1.29	1.59	1.75	1.82	2.07	2.29	3.04	3.27	4.17	4.64	5.01	5.94	6.93	7.90	8.62
200	0.56	0.84	1.05	1.41	1.75	1.91	2.01	2.26	2.49	3.34	3.60	4.66	5.20	5.60	6.54	7.63	8.63	9.38
500	0.62	0.94	1.16	1.57	1.94	2.12	2.25	2.51	2.73	3.74	4.03	5.34	5.96	6.40	7.33	8.55	9.58	10.35
1000	0.66	1.00	1.25	1.68	2.08	2.27	2.42	2.68	2.92	4.04	4.35	5.88	6.57	7.03	7.92	9.23	10.28	11.05

* The lower bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are less than.
** These precipitation frequency estimates are based on a partial duration maxima series. ARI is the Average Recurrence Interval.

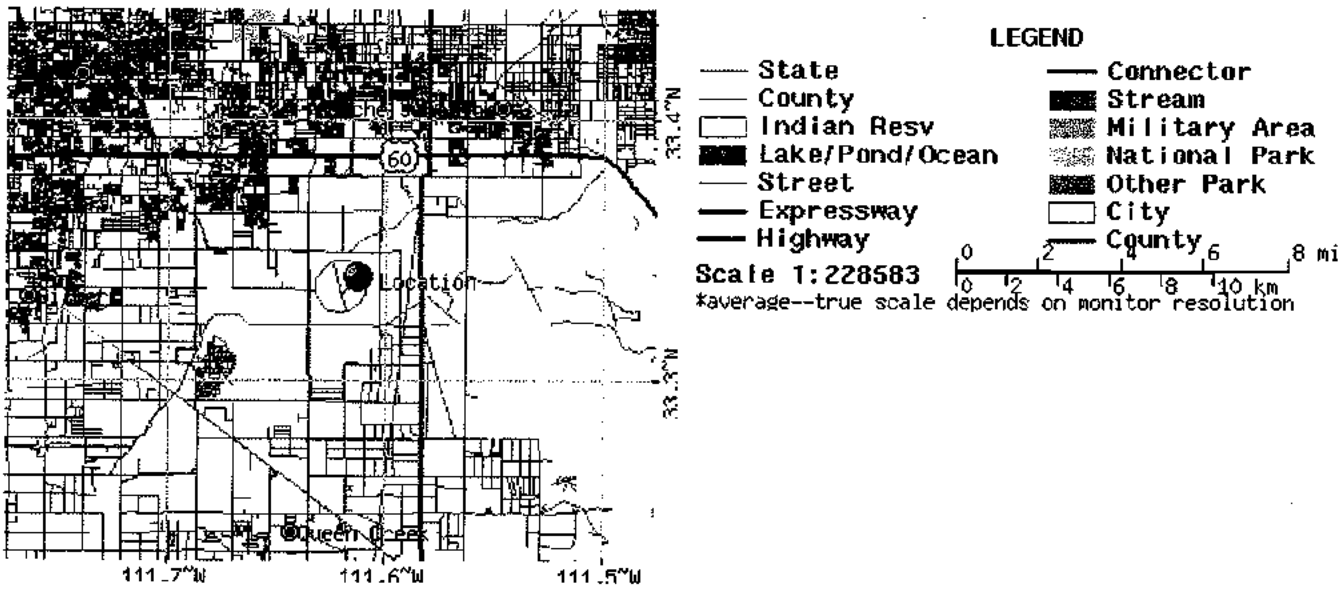
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

Maps -



These maps were produced using a direct map request from the U.S. Census Bureau Mapping and Cartographic Resources Tiger Map Server.

Please read disclaimer for more information.



Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available
from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information
about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study,
please refer to our documentation.

Using the **National Climatic Data Center's (NCDC)** station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (33.3325/-111.62). Digital ASCII data can be obtained directly from **NCDC**.

Find Natural Resources Conservation Service (NRCS) SNOTEL (SNOwpack TELemetry) stations by visiting the **Western Regional Climate Center's state-specific SNOTEL station maps**.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910

(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Interim Condition HEC-1 Sub-Basin Data

Table 1 - Interim Condtion HEC-1 Sub-Basin Data

Description: Sub-basin data

Location Development Unit 7 - Mesa Proving Grounds - East Mesa, Arizona

Date: 09/29/11

Reference: DDMSW Version 4.6.0

ONSITE BASINS									
Sub-Basin ID	Basin Area (sq. ft.)	Basin Area (acres)	Basin Area (sq. mi)	Length (ft)	Length (mi)	USGE (ft)	DSGE (ft)	Lca (ft)	Lca (mi)
2b	3,258,219	74.80	0.117	2800	0.53	1462.0	1450.0	1190	0.23
8	20,171,991	463.09	0.724	8100	1.53	1445.0	1415.0	5760	1.09
10	5,197,164	119.31	0.186	6140	1.16	1445.0	1420.0	4480	0.85
75	83,064,711	1,906.90	2.980	19282	3.65	1450.0	1390.0	3430	0.65

Interim Condition HEC-1 Soil Data

Table 2 - Interim Condition HEC-1 Soils Data

Description: Post Developed Soil Data

Location Development Unit 7 - Mesa Proving Grounds - East Mesa, Arizona

Date: 09/29/11

Reference: NRCS Web Soil Survey
Aguila-Carefree Area Soil Survey

Sub-Basin ID	Soil ID	Soil Type	Area (acres)	Area (sq. mi.)
2B	75	Mohall Loam	74.72	0.117
	77	Mohall Clay Loam	0.08	0.000
		TOTAL	**74.80**	**0.117**
8	1	Antho Sandy Loams	11.91	0.019
	50	Estrella Loams	46.32	0.072
	75	Mohall Loam	206.07	0.322
	77	Mohall Clay Loam	116.29	0.182
	78	Mohall Clay Loam, Calcareous Solum	16.97	0.027
	112	Tremant Gravelly Sandy Loams	65.53	0.102
		TOTAL	**463.09**	**0.724**
10	1	Antho Sandy Loams	6.40	0.010
	2	Antho Gravelly Sandy Loams	10.73	0.017
	50	Estrella Loams	26.78	0.042
	77	Mohall Clay Loam	59.83	0.093
	112	Tremant Gravelly Sandy Loams	15.39	0.024
	115	Tremant Gravelly Sandy Loams	0.18	0.000
		TOTAL	**119.31**	**0.186**
75	50	Estrella Loams	143.39	0.224
	55	Gilman Loams	1.63	0.003
	75	Mohall Loam	573.96	0.897
	77	Mohall Clay Loam	802.33	1.254
	78	Mohall Clay Loam, Calcareous Solum	71.49	0.112
	79	Mohall Clay	176.00	0.275
	112	Tremant Gravelly Sandy Loams	138.10	0.216
		TOTAL	**1906.90**	**2.981**

Interim Condition HEC-1 Land Use Data

Table 3 - Interim Condition HEC-1 Land Use Data

Description: Land use data based on proposed development

Location Development Unit 7 - Mesa Proving Grounds - East Mesa, Arizona

Date: 09/29/11

Reference: DDMSW Version 4.6.0

Sub-Basin ID	Basin Area (sq. ft.)	Basin Area (acres)	Basin Area (sq. mi)	DU	DU Area (ac)	Land Use	Land Use Area (sq. ft.)	Land Use Area (acres)	Land Use Area (sq. mi.)	Kn
02b	3258219	74.8	0.1169	DU6	74.8	Industrial	3108341	71.4	0.1116	0.040
						General Transportation	149878	3.4	0.0053	0.030
08	20171991	463.1	0.7236	DU7	463.1	Educational	871200	20.0	0.0313	0.055
						Institutional	588060	13.5	0.0211	0.040
						Active Open Space	871200	20.0	0.0313	0.050
						High Density Residential (10-15 DU/Acre)	1624788	37.3	0.0583	0.030
						Small Lot Residential (4-10 DU/Acre)	6464304	148.4	0.2319	0.040
						Medium Lot Residential (2-4 DU/Acre)	9753084	223.9	0.3498	0.045
10	5197164	119.3	0.1864	DU7	118.4	General Commercial	239580	5.5	0.0086	0.035
						Institutional	108900	2.5	0.0039	0.040
						Active Open Space	666468	15.3	0.0239	0.050
						Medium Lot Residential (2-4 DU/Acre)	4142556	95.1	0.1486	0.045
				---	0.9	General Transportation	39204	0.9	0.0014	0.030
75	83064711	1906.9	2.9795	---	1906.9	Other Employment - Low (Proving Grounds)	83064711	1906.9	2.9795	0.060

Interim Condition HEC-1 Routing Data

Table 4 - Post Developed HEC-1 Routing Data

Description: Routing parameters based on proposed channels and drainage corridors

Location: Mesa Proving Grounds - East Mesa, Arizona

Date: 9/27/2011

Reference: DDMSW Version 4.6.0

Routing ID	Routing Method	LOB N	CHAN N	ROB N	Length (ft)	Slope (ft/ft)	RX1	RX2	LB	RX4	RX5	RB	RX7	RX8	RY1	RY2	LB	RY4	RY5	RB	RY7	RY8
73T74C	Normal Depth	0.032	0.032	0.032	4370	0.0024	0.0	5.0	10.0	31.0	69.0	79.5	84.5	89.5	3.50	3.50	3.50	0.00	0.00	3.50	3.50	3.50
74CT10	Normal Depth	0.030	0.013	0.030	5050	0.0036	0.0	15.0	16.5	25.0	33.0	41.5	43.0	58.0	6.60	6.60	5.60	0.00	0.00	5.60	6.60	6.60
10T75	Normal Depth	0.030	0.013	0.030	5590	0.0056	0.0	15.0	16.5	25.0	34.0	43.5	45.0	60.0	7.30	7.30	6.30	0.00	0.00	6.30	7.30	7.30
2bT75	Normal Depth	0.035	0.035	0.035	16485	0.0036	0.0	5.0	10.0	15.0	1015.0	1020.0	1025.0	1030.0	2.00	1.50	1.00	0.00	0.00	1.00	1.50	2.00
8T75	Normal Depth	0.035	0.035	0.035	5770	0.0043	0.0	5.0	10.0	15.0	1015.0	1020.0	1025.0	1030.0	2.00	1.50	1.00	0.00	0.00	1.00	1.50	2.00

Interim Condition Onsite Retention Volume Summary

Table 5 - Interim Condition Onsite Retention Volume Summary

Description: Calculation of Required Retention Volume Using the Rational Method

Location Mesa Proving Grounds

Date: 09/27/11

Reference: Drainage Design Manual for Maricopa County, Vol. I, Hydrology

Known Values: Design storm: 100-yr, 2-hr
Rainfall, D: 2.19 inches

Calc. Values: V = DAC
Where: V = Retention Volume Required
D = Depth of Rainfall (ft)
A = Area of Watershed Contributing
C = Runoff Coefficient

Retention - 100YR, 2HR Volumes (North of the Powerline Floodway)

Retention Basin	Retention Location	Sub-basin		Development Unit		Weighted "C_{100}"	100YR - 2HR Volume Required (acre-feet)	Total 100YR - 2HR Volume Required (acre-feet)
		Contributing Sub-basin	Contributing Sub-basin Area (acres)	Contributing DUs	DU Area Within Sub-basin (acres)			
RET02B[1]	First Solar	02b	74.80	DU-6	74.80	-	15.5	15.5
RET08	DU-7	08	463.09	DU-7	463.09	0.70	59.2	59.2
RET10	DU-10	10	119.30	DU-7	118.40	0.67	14.5	14.5
							Total	**89.2** ac-ft

1.Retention required/provided for RET2B were acquired from the *Final Drainage Report for First Solar MSA-01, Mesa AZ, April 18, 2011,* by Beck Consulting Engineers, Inc.

Mesa Proving Grounds Interim Condition Requred Retention Total = 89.2 ac-ft

APPENDIX B

Existing and Preliminary Channel Calculations

SIGNAL BUTTE CHANNEL - WARNER TO RAY

Worksheet for 73T74C

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.032	
Channel Slope	0.00240	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	38.00	ft
Discharge	441.00	ft³/s

Results

Normal Depth	2.48	ft
Flow Area	122.04	ft²
Wetted Perimeter	60.95	ft
Hydraulic Radius	2.00	ft
Top Width	60.34	ft
Critical Depth	1.51	ft
Critical Slope	0.01375	ft/ft
Velocity	3.61	ft/s
Velocity Head	0.20	ft
Specific Energy	2.69	ft
Froude Number	0.45	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.48	ft
Critical Depth	1.51	ft
Channel Slope	0.00240	ft/ft

Worksheet for 73T74C

CVI Output Data

Critical Slope	0.01375	ft/ft

Messages

Notes

From existing box culvert beneath Signal Butte Road near Warner Road to the Powerline Floodway

Cross Section for 73T74C

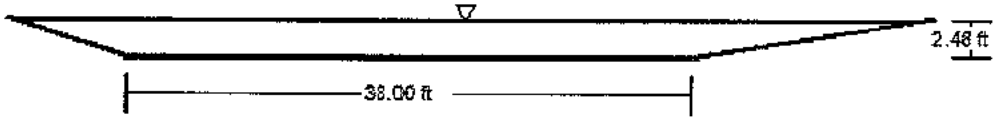
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.032	
Channel Slope	0.00240	ft/ft
Normal Depth	2.48	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	6.00	ft/ft (H:V)
Bottom Width	38.00	ft
Discharge	441.00	ft³/s

Cross Section Image



V: 1
H: 1

POWERLINE FLOODWAY EXISTING CHANNEL
SIGNAL BUTTE TO SPINE EAST

Worksheet for 74CT10

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00355	ft/ft
Left Side Slope	1.50	ft/ft (H:V)
Right Side Slope	1.50	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	1100.00	ft³/s

Results

Normal Depth	5.02	ft
Flow Area	77.90	ft²
Wetted Perimeter	26.09	ft
Hydraulic Radius	2.99	ft
Top Width	23.05	ft
Critical Depth	5.88	ft
Critical Slope	0.00187	ft/ft
Velocity	14.12	ft/s
Velocity Head	3.10	ft
Specific Energy	8.12	ft
Froude Number	1.35	
Flow Type	Supercritical	

CHANNEL DEPTH = 5.75 ft
FREEBOARD = 0.73 ft

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.02	ft
Critical Depth	5.88	ft
Channel Slope	0.00355	ft/ft

Worksheet for 74CT10

GVF Output Data

Critical Slope	0.00187	ft/ft

Cross Section for 74CT10

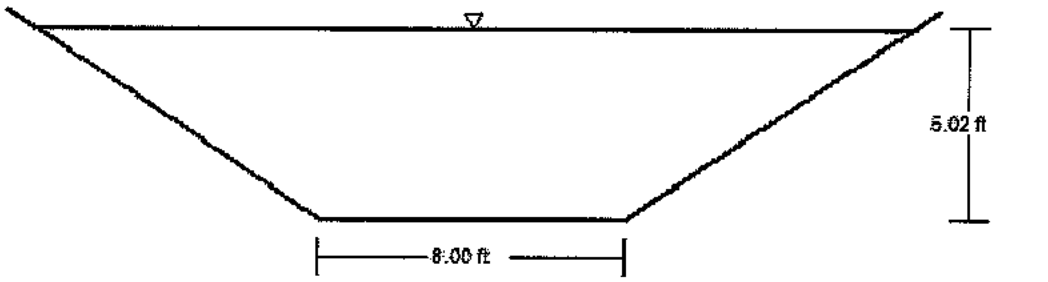
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00355	ft/ft
Normal Depth	5.02	ft
Left Side Slope	1.50	ft/ft (H:V)
Right Side Slope	1.50	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	1100.00	ft³/s

Cross Section Image



POWERLINE FLOODWAY EXISTING CHANNEL SPINE EAST TO ELLSWORTH ROAD

Worksheet for 10T75

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00376	ft/ft
Left Side Slope	1.50	ft/ft (H:V)
Right Side Slope	1.50	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	1100.00	ft³/s

Results

Normal Depth	4.95	ft
Flow Area	76.30	ft²
Wetted Perimeter	25.84	ft
Hydraulic Radius	2.95	ft
Top Width	22.84	ft
Critical Depth	5.88	ft
Critical Slope	0.00187	ft/ft
Velocity	14.42	ft/s
Velocity Head	3.23	ft
Specific Energy	8.18	ft
Froude Number	1.39	
Flow Type	Supercritical	

CHANNEL DEPTH = 6.25 ft
FREEBOARD = 1.3 ft

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.95	ft
Critical Depth	5.88	ft
Channel Slope	0.00376	ft/ft

Worksheet for 10T75

SVF Output Data

Critical Slope	0.00187	ft/ft

Cross Section for 10T75

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00376	ft/ft
Normal Depth	4.95	ft
Left Side Slope	1.50	ft/ft (H:V)
Right Side Slope	1.50	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	1100.00	ft³/s

Cross Section Image

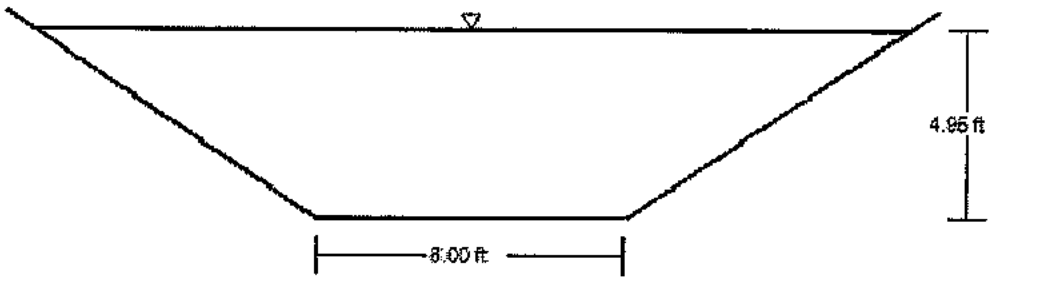


PLATE 1

Vicinity Map

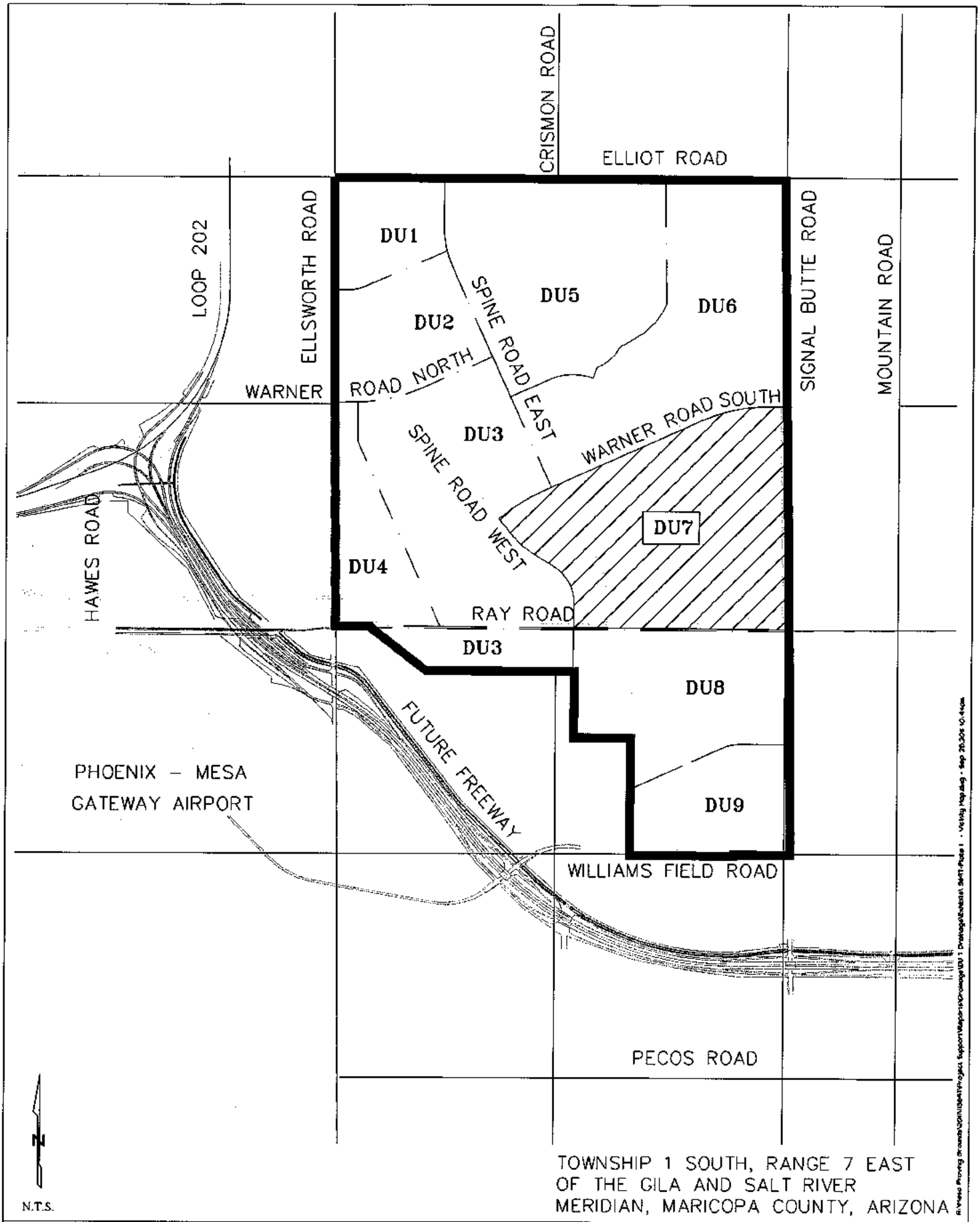


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PLATE 1: VICINITY MAP

MESA PROVING GROUNDS
MESA, ARIZONA
SEPTEMBER 29, 2011

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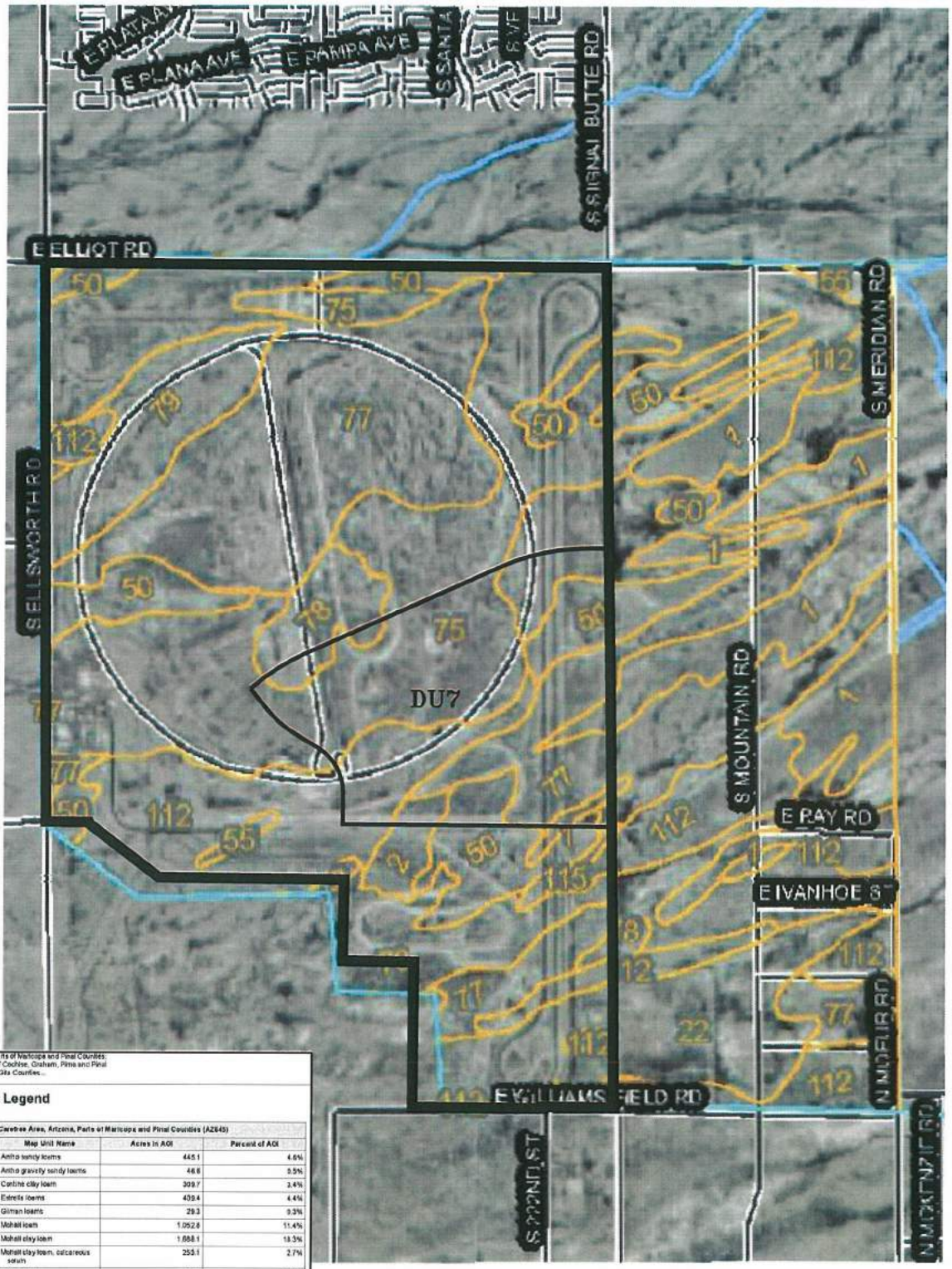
PLATE 2

Soils Map



Soil Map--Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties; Coronado National Forest, Arizona, Parts of Cochise, Graham, Pima and Pinal Counties; and Eastern Pinal and Southern Gila Counties...

Map Unit Legend

Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties (AZ645)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Antho sandy loams	445.1	4.8%
2	Antho gravelly sandy loams	46.8	0.5%
22	Contine clay loam	309.7	3.4%
50	Estrella loams	409.4	4.4%
55	Gilman loams	29.3	0.3%
75	Mohall loam	1,052.8	11.4%
77	Mohall clay loam	1,688.1	18.3%
78	Mohall clay loam, calcareous subsh	253.1	2.7%
79	Mohall clay	179.4	1.9%
112	Tremant gravelly sandy loams	771.5	8.4%
115	Tremant-Antho complex, 1 to 5 percent slopes	13.2	0.1%
Coronado National Forest, Arizona, Parts of Cochise, Graham, Pima and Pinal Counties (AZ723)			
No soil data available for this soil survey area.			
Eastern Pinal and Southern Gila Counties, Arizona (AZ661)			
No map units selected for this soil survey area.			
Totals for Area of Interest (AOI)		9,214.8	100.0%

3000 0 1500 3000

1 inch = 3000 ft.

N

R:\Mesa Proving Grounds\CIVIL\Drainage\Project Support\Reports\Drainage\DU7 Drainage\Exhibits\ 8x11-Plate 2-Soils Map - HPB.dwg - Sep 29,2011 10:45am

PLATE 2: SOILS MAP

MESA PROVING GROUNDS
MESA, ARIZONA
SEPTEMBER 29, 2011

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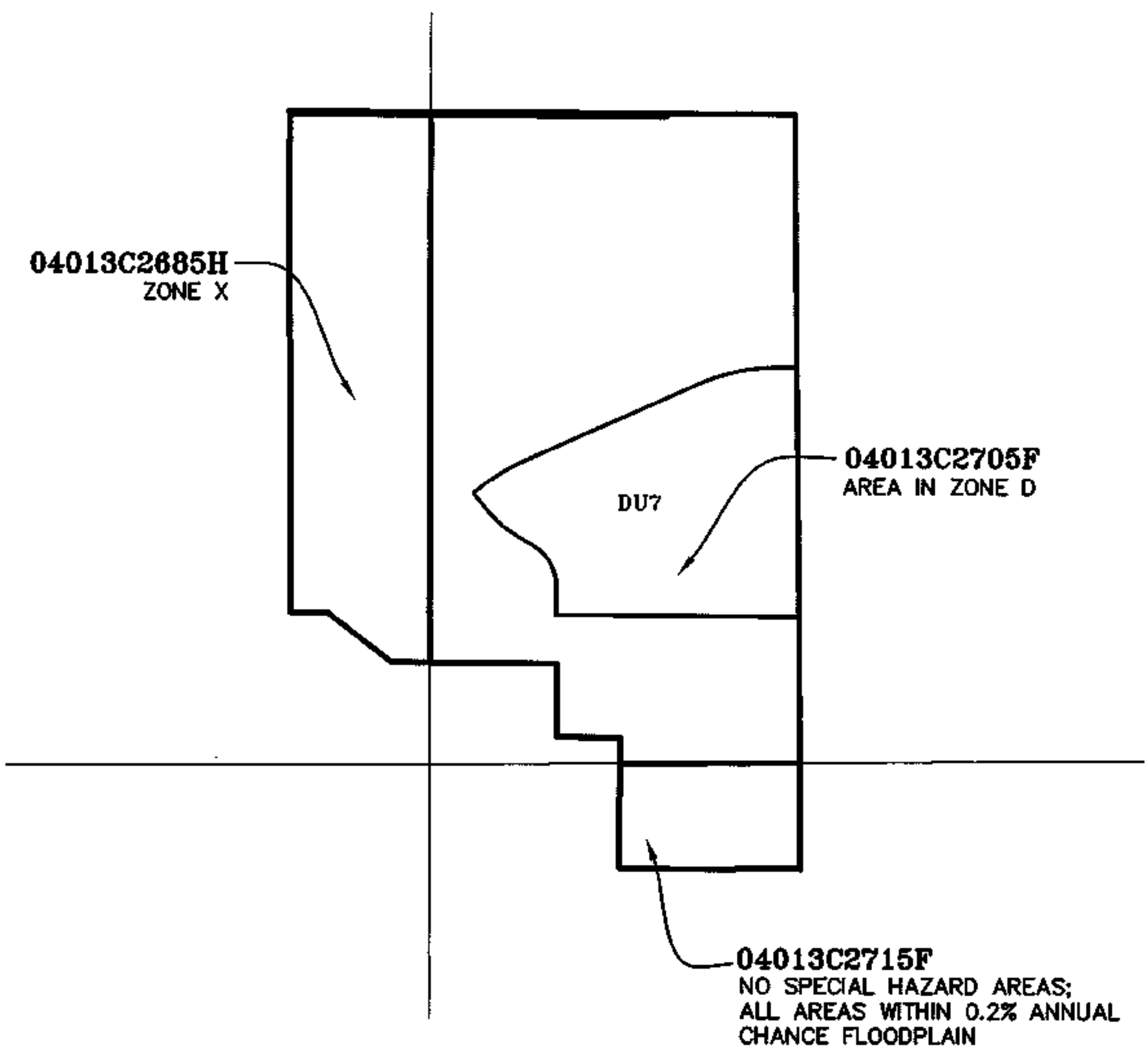
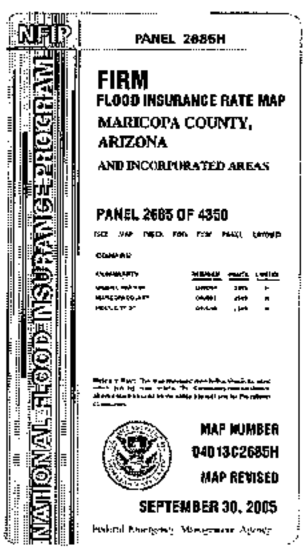
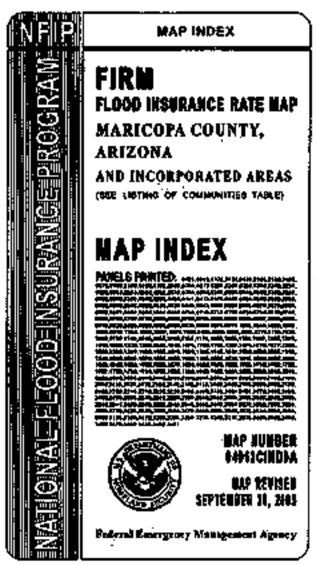
PLATE 3

Flood Insurance Rate Map

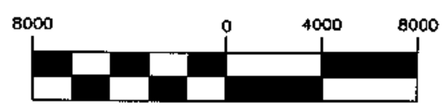






Zone "X" is defined by FEMA as follows:
Areas of 0.2% annual chance flood: areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

Zone "D" is defined by FEMA as follows:
Areas in which flood hazards are undetermined.



1 inch = 8000ft.

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PLATE 3: FEMA FIRM MAP

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SEPTEMBER 29, 2011

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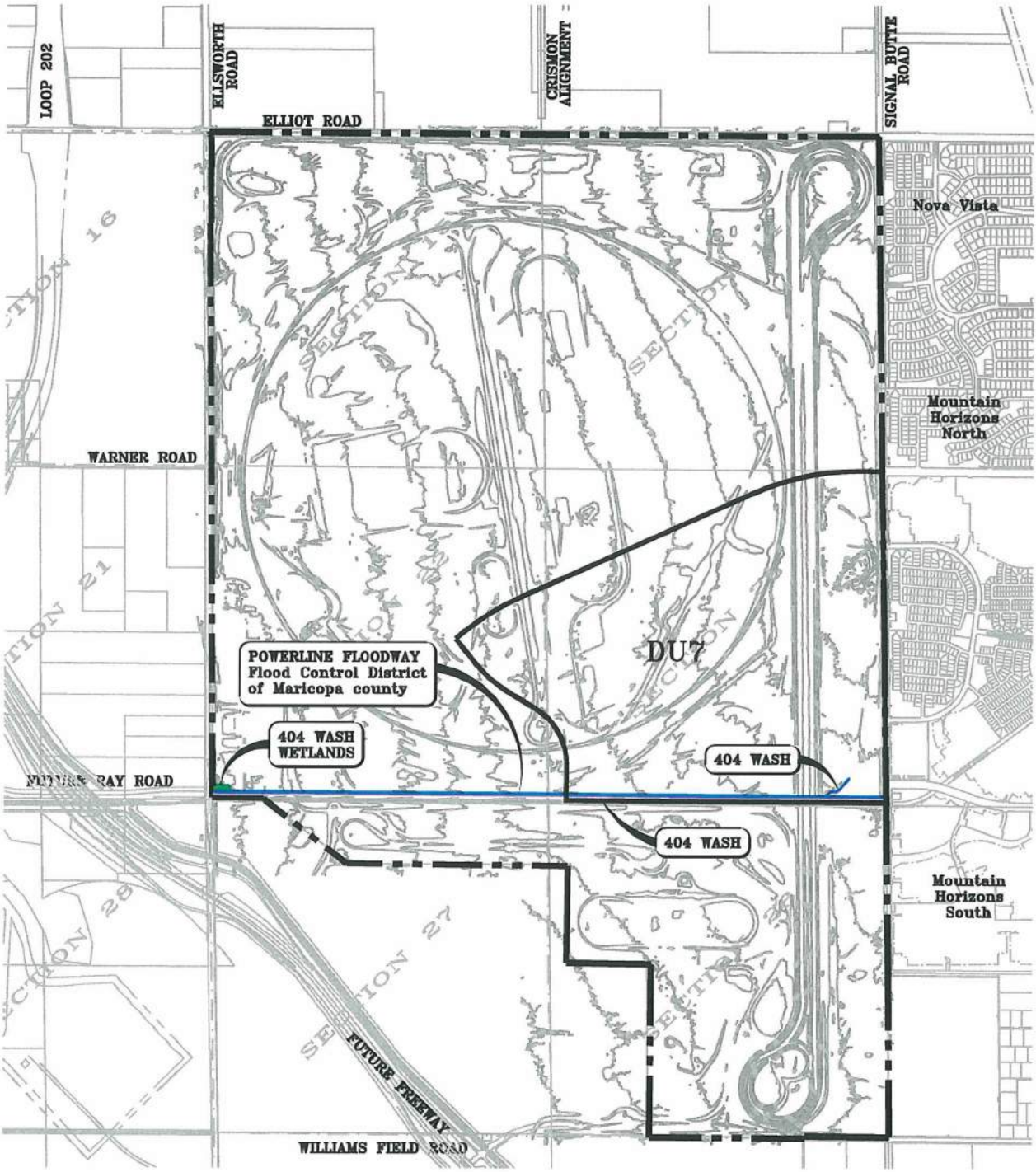
PLATE 4

Section 404 Jurisdictional Delineation Map



LEGEND

- 404 WASH
- 404 WASH WETLANDS
- PROPERTY BOUNDARY
- 5 FT. CONTOUR 1430

N

N.T.S.

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PLATE 4: 404 JURISDICTIONAL DELINEATION MAP

MESA PROVING GROUNDS
MESA, ARIZONA
SEPTEMBER 29, 2011

NOT FOR CONSTRUCTION OR RECORDING

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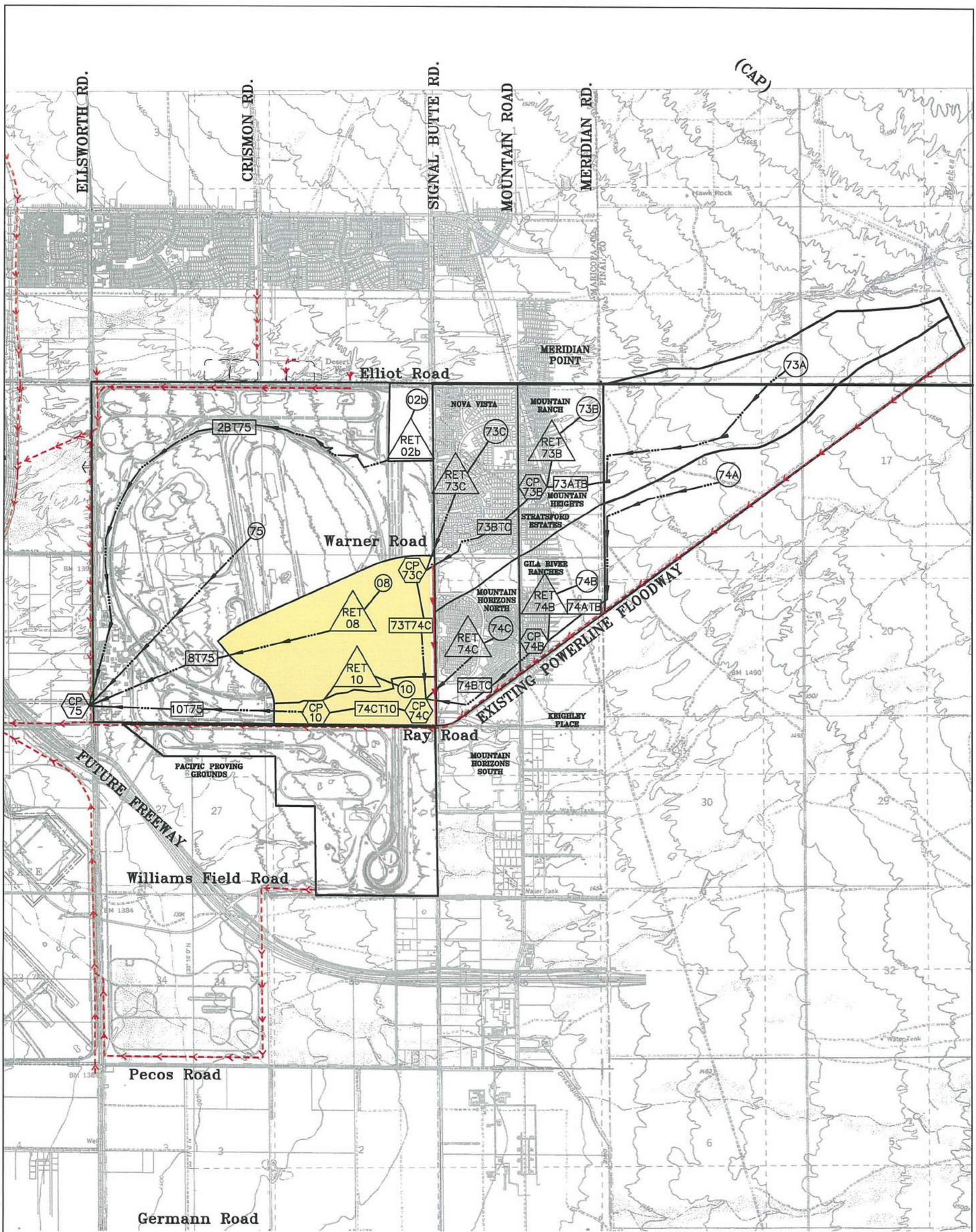
PLATE 5

Interim Condition HEC-1 Schematic



LOCATION ID	DISCHARGE (CFS)
CP73C	441
CP74C	713
CP75	666

LEGEND

- SUB-BASIN BOUNDARY
- EXISTING STORM DRAIN
- PROPOSED CHANNEL AND/OR STORM DRAIN SYSTEM
- EXISTING CHANNEL OR STORM DRAIN
- ROUTING
- 5 FT. CONTOUR
- FLOW DIRECTION ARROW
- DU-7
- 77C — WATERSHED ID
- 77BTC — ROUTING ID
- C 77C — CONCENTRATION POINT ID
- RET 73B — RETENTION ID

3000 0 1500 3000

Horz. 1 in. = 3000 ft.

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PLATE 5: INTERIM CONDITION HEC-1 SCHEMATIC

MESA PROVING GROUNDS
MARICOPA COUNTY, ARIZONA
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