

## MASTER DRAINAGE REPORT

### I. EXECUTIVE SUMMARY AND INTRODUCTION

THE PROPOSED APS NORTHWEST EDUCATION CORRIDOR SITE IS LOCATED IN A RAPIDLY DEVELOPING AREA OF ALBUQUERQUE'S NORTHWEST MESA. THE SITE LIES WITHIN THE BOCA NEGRA WATERSHED SOUTH OF THE ALAMEDA GRANT LINE. THE PROPERTY CONSISTS OF APPROXIMATELY 63.3 ACRES TO BE DEVELOPED INTO AN ELEMENTARY SCHOOL, A MIDDLE SCHOOL AND SOCCER FIELD COMPLEX. THE DEVELOPED STORM RUNOFF FROM THE SITE WILL DISCHARGE TO AND WITHIN PRIVATE DRAINAGE EASEMENTS TO BE GRANTED TO APS BY THE COMMISSIONER OF PUBLIC LANDS ACROSS THE PROPOSED TRACT C-2 ADJACENT TO THE SOUTH, WHICH IS STATE TRUST LAND, AND THENCE INTO THE BOCA NEGRA ARROYO. MINOR OFFSITE FLOWS WILL CONTINUE TO BE ACCEPTED AND CONVEYED THROUGH THE PROPERTY TO THE HISTORIC DISCHARGE POINT OF THE ARROYO.

THE PURPOSE OF THIS SUBMITTAL IS TO SUPPORT:

1. PRELIMINARY PLAT APPROVAL
2. ESTABLISH THE DRAINAGE REQUIREMENTS FOR THE PROPERTY FOR FUTURE GRADING AND DRAINAGE PLANS
3. WORK ORDER PLAN APPROVAL FOR PUBLIC AND PRIVATE INFRASTRUCTURE
4. MASS GRADING FOR SOCCER COMPLEX AND PRIVATE ROADWAY SYSTEM
5. DEFINE LIMITS OF PRIVATE DRAINAGE EASEMENTS ACROSS PROPOSED TRACT C-2 TO SERVE PROPOSED TRACT C-1.

THIS REPORT ADDRESSES TRACTS C-1 AND C-2, ANCIENT MESA AND THE FRONTING PORTION OF RAINBOW BOULEVARD NW.

### II. PROJECT DESCRIPTION

AS SHOWN BY THE VICINITY MAP, THE SITE IS LOCATED ON ALBUQUERQUE'S NORTHWEST MESA ALONG THE WEST ROW OF RAINBOW BOULEVARD NW (A.K.A. ATRISCO DRIVE), SOUTH OF WOODMONT AVENUE NW. THE EASTERLY HALF OF RAINBOW BOULEVARD NW IS DEVELOPED WITH TEMPORARY AND PERMANENT CURB AND ASPHALT PAVEMENT, CONSTRUCTED UNDER CITY PROJECT NO. 766981 TO SUPPORT THE NEW APS NORTHWEST HIGH SCHOOL (A.K.A. VOLCANO VISTA HIGH SCHOOL). THE TRAILS SUBDIVISION CURRENTLY UNDER DEVELOPMENT BY LONGFORD HOMES IS ADJACENT TO THE NORTH BOUNDARY OF THE PROPERTY. THIS DEVELOPMENT IS REQUIRED TO CONVEY DEVELOPED RUNOFF TO A PUBLIC STORM DRAIN IN UNIVERSE BOULEVARD NW TO BE CONSTRUCTED. THE WESTERLY BOUNDARY OF THE PROPOSED TRACTS ARE UNDEVELOPED TRACTS 4 AND 5, BOND RANCHES WHICH ARE PART OF THE PETROGLYPH NATIONAL MONUMENT. THE PROPERTIES ALONG THE SOUTH BOUNDARY ARE UNDEVELOPED BUT ARE PLATTED AS PART OF THE VOLCANO CLIFFS. THE PROPOSED LEGAL DESCRIPTIONS OF THE PROPERTY ARE TRACTS C-1 AND C-2, ANCIENT MESA. TRACT C-1 IS APPROXIMATELY 63.3 ACRES AND WILL BE DEVELOPED AS AN ELEMENTARY SCHOOL, SOCCER FIELD COMPLEX AND A MIDDLE SCHOOL. TRACT C-2 IS APPROXIMATELY 77.5 ACRES AND IS PRESENTLY UNDEVELOPED. THIS PLAN DOES NOT ADDRESS FUTURE DEVELOPMENT OF THE STATE TRUST LAND THAT COMPRISES PROPOSED TRACT C-2. AS SHOWN BY PANEL 111 OF 825 OF THE NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAPS, BERNALILLO COUNTY, NEW MEXICO, AND INCORPORATED AREAS, DATED NOVEMBER 19, 2003, TRACT C-1 DOES NOT LIE WITHIN A DESIGNATED FLOOD HAZARD ZONE; TRACT C-2 INCLUDES A FEMA DESIGNATED FLOOD HAZARD ZONE "A" PASSING THROUGH THE SITE IN A SOUTHEASTERLY DIRECTION FROM THE WEST BOUNDARY AND EXITING THE SOUTH BOUNDARY.

### III. BACKGROUND DOCUMENTS

THE FOLLOWING IS A LIST OF DOCUMENTS RELATED TO THE SITE AND SURROUNDING AREA. THIS LIST MAY NOT BE ALL INCLUSIVE, HOWEVER, REPRESENTS A SUMMARY OF RELEVANT PLANS AND DOCUMENTS WHICH ARE KNOWN TO THE ENGINEER AT THE TIME OF PLAN PREPARATION.

1. PRELIMINARY PLAT OF TRACTS C-1 AND C-2, ANCIENT MESA PREPARED BY HIGH MESA CONSULTING GROUP (HMC) DATED SEPTEMBER, 2007. THE PRELIMINARY PLAT DEMONSTRATES THE CREATION OF TWO TRACTS FROM TRACT C, ANCIENT MESA AND THE PROPOSED GRANTS OF PUBLIC WATERLINE, AND THE PROPOSED DEDICATION OF PUBLIC STREET RIGHT-OF-WAY. THE PRELIMINARY PLAT WAS APPROVED AT THE OCTOBER 10, 2007 HEARING OF THE DEVELOPMENT REVIEW BOARD (DRB). THIS REPORT UPDATES THE PREVIOUSLY APPROVED MASTER DRAINAGE PLAN FOR THE PROPOSED TRACTS C-1 AND C-2.
2. AMENDMENT TO THE TRAILS SUBDIVISION MASTER DRAINAGE STUDY PREPARED FOR LONGFORD HOMES BY WILSON & COMPANY, INC., DATED JULY 29, 2004. THE ORIGINAL PLAN FOR THE TRAILS WAS PREPARED BY BOHANNON-HUSTON, INC. (BHI). THE AMENDMENT BY WILSON & COMPANY REVISED THE DRAINAGE CONCEPT FOR THE TRAILS TO ONE WHEREBY STORM WATER WOULD BE DETAINED IN PONDS DISCHARGING TO THE PROPOSED UNIVERSE STORM DRAIN.
3. PRE-DESIGN MEETING WITH THE CITY HYDROLOGIST DATED 03/08/2007 (COPY OF MEETING RECAP IS SUBMITTED HEREWITH). THE RECAP SUMMARIZES THE DRAINAGE CRITERIA FOR DEVELOPMENT OF THE PROPERTY WHICH ALLOWS DEVELOPED RUNOFF TO BE COLLECTED AND FREELY DISCHARGED BY SHEET FLOW TO THE BOCA NEGRA ARROYO.
4. VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN (VHSDP) AND ORDINANCE PASSED AND ADOPTED BY THE CITY OF ALBUQUERQUE CITY COUNCIL ON SEPTEMBER 6, 2006 AND APPROVED OCTOBER 2, 2006. THE VHSDP IDENTIFIES DRAINAGE MANAGEMENT CRITERIA FOR PRESERVING THE NATURAL CHARACTER AND FUNCTION OF THE BOCA NEGRA ARROYO

THE PROPOSED DRAINAGE CONCEPT OF MITIGATING STORM RUNOFF VIA STILLING BASINS AND DEVELOPING SHEET FLOW AS DESCRIBED HEREIN IS IN ACCORDANCE WITH THE POLICIES AND REQUIREMENTS OF THE ABOVE LISTED DOCUMENTS.

### IV. EXISTING CONDITIONS

TRACTS C-1 AND C-2, ANCIENT MESA ARE UNDEVELOPED WITH SPARSE GROUND COVER OF NATIVE VEGETATION. THE SITE GENERALLY SLOPES FROM THE WEST TO EAST. THE EXISTING SITE RUNOFF DRAINS TO THE SOUTHEAST CORNER AND ULTIMATELY TO THE UNDEVELOPED BOCA NEGRA ARROYO. THE PROPERTY IS BOUNDED BY THE TRAILS SUBDIVISION ON THE NORTH, WHICH IS CURRENTLY UNDER DEVELOPMENT. DEVELOPED FLOWS FROM THE TRAILS WILL DRAIN TO AN INTERNAL DETENTION POND AND STORM DRAIN SYSTEM AND WILL NOT CONTRIBUTE OFFSITE FLOWS TO THE SITE. THE SITE IS NOT IMPACTED BY UNDEVELOPED FLOWS FROM THE TRAILS DUE TO THE TEMPORARY RETENTION POND AND ACCESS ROAD THAT INTERCEPT THESE FLOWS AT THE NORTHWEST QUADRANT OF THE PROPERTY, AND THE EASTERLY DEVELOPED PORTION IS GRADED TO CONVEY DEVELOPED RUNOFF TO THE TRAILS DEVELOPMENT DRAINAGE SYSTEM. THE PETROGLYPHS NATIONAL MONUMENT BOUNDS THE PROPERTY TO THE WEST OF PROPOSED TRACT C-2. TRACT C-2 IS PRESENTLY UNDEVELOPED AS DESCRIBED ABOVE IN SECTION II. TRACT C-2 WILL CONTINUE TO ACCEPT HISTORIC OFFSITE FLOWS GENERATED UPSTREAM, INCLUDING THOSE FLOWS CONTAINED WITHIN THE EXISTING FLOOD ZONE A OF THE BOCA NEGRA ARROYO. TRACT C-1 IS NOT IMPACTED BY THESE OFFSITE FLOWS BECAUSE THE NORTHWEST CORNER OF THE TRACT IS A TOPOGRAPHIC HIGH POINT. THE SOUTHERN BOUNDARY ADJUTS PLATTED UNDEVELOPED LANDS OF THE VOLCANO CLIFFS SUBDIVISION (UNITS 12 AND 13) WHICH ARE TOPOGRAPHICALLY LOWER THAN THESE TRACTS AND ARE INCAPABLE OF GENERATING OFFSITE FLOWS. RAINBOW BOULEVARD NW LIES ALONG THE EAST OF TRACT C-1, WHERE THE EAST HALF OF THE ROADWAY WAS CONSTRUCTED BY CITY PROJECT NO. 766981. DEVELOPED CONDITIONS

### V. DEVELOPED CONDITIONS

#### A. ULTIMATE DEVELOPMENT SCENARIO

TRACT C-1 IS INTENDED TO BE DEVELOPED BY APS FOR AN ELEMENTARY SCHOOL, SOCCER FIELD COMPLEX, AND MIDDLE SCHOOL. AS PART OF THE DEVELOPMENT OF THIS TRACT, APS WILL CONSTRUCT THE HALF-WIDTH FRONTAGE OF RAINBOW BOULEVARD NW. DEVELOPED FLOWS FROM THIS TRACT WILL BE CONVEYED SOUTH TO TRACT C-2 (STATE TRUST LANDS) WHICH IS PRESENTLY UNDEVELOPED. THIS PLAN DOES NOT ADDRESS FUTURE DEVELOPMENT OF THE STATE TRUST LANDS WHICH COMPREHENDS PROPOSED TRACT C-2. THE DISCHARGE OF RUNOFF FROM PROPOSED TRACT C-1 ONTO PROPOSED TRACT C-2 WILL BE SUBJECT TO APPROVAL BY THE NMSLO. IN ADVANCE OF SUCH APPROVAL, TRACT C-2 MAY BE SUBJECT TO DRAINAGE EASEMENTS THAT, IF REQUIRED, WILL BE GRANTED BY THE FORTHCOMING PLATTING ACTION. THE EASEMENTS WILL PROVIDE FOR THE CONTINUED CONVEYANCE OF RUNOFF FROM PROPOSED TRACT C-1 ACROSS PROPOSED TRACT C-2 (STATE TRUST LANDS) TO THE BOCA NEGRA ARROYO, CONSISTENT WITH THE VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN. ALL DEVELOPMENT PROPOSED BY THIS PLAN WILL BE CONTAINED IN A SINGLE TRACT (C-1); CROSS-LOT DRAINAGE EASEMENTS ARE THEREFORE NOT REQUIRED BETWEEN THE INDIVIDUAL APS SITES AND THE PROPOSED USES.

IT IS THE INTENT OF THIS PLAN TO CONVEY DEVELOPED RUNOFF FROM TRACT C-1 FROM THE NORTH TO THE SOUTH PORTION OF THE SITE. THE PROPOSED PRIVATE ACCESS ROADS AND PARKING AREAS WILL AID IN CONVEYANCE TO PRIVATE STORM INLETS AND PIPE, TRANSFERRING THE FLOWS TO RIP-RAP LINED ENERGY DISSIPATION (STILLING) BASINS. THE BASINS WILL LIE WITHIN PROPOSED TRACT C-1 AND WILL BE CONTAINED BY CONCRETE WEIR WALLS WHICH WILL ALLOW RUNOFF TO SPILL OVER AS SHEET FLOW INTO PROPOSED TRACT C-2, STATE TRUST LANDS, AND ULTIMATELY TO THE BOCA NEGRA ARROYO.

#### B. INTERIM DEVELOPMENT SCENARIO

AT THE TIME OF PREPARATION OF THIS PLAN, AMAFCA IS DESIGNING THE BOCA NEGRA DAM TO BE LOCATED DOWNSTREAM OF THIS SITE. TO ASSIST IN THE CONSTRUCTION OF THE DAM, AMAFCA HAS REQUESTED THAT DEVELOPED RUNOFF UPSTREAM OF THE DAM BE TEMPORARILY MITIGATED BY THE USE OF RETENTION PONDS. PROPOSED AREAS FOR THE PONDS ARE SHOWN ON THIS MASTER DRAINAGE PLAN IMMEDIATELY UPSTREAM OF THE ENERGY DISSIPATION BASINS. ONCE THE BOCA NEGRA DAM IS CONSTRUCTED, THESE TEMPORARY RETENTION PONDS CAN BE RECLAIMED FOR USE BY THE INDIVIDUAL SITES. THESE TEMPORARY RETENTION PONDS ARE SIZED TO ACCOMMODATE THE VOLUME FROM THE 100-YEAR STORM EVENT IN THE DEVELOPED CONDITION TO INTERCEPT AND TO MITIGATE THE MORE FREQUENT RUNOFF FROM THE SITE TO THE BOCA NEGRA DAM. GRADING AND DRAINAGE PLANS FOR EACH SITE COMPONENT WILL BE REQUIRED TO INCLUDE THE TEMPORARY RETENTION PONDS. THESE SITE SPECIFIC PLANS SHOULD DESIGN THE INTERIM RETENTION PONDS TO ALLOW LATER CONVERSION TO DETENTION PONDS THAT DISCHARGE DEVELOPED RUNOFF IN SMALLER, MORE MANAGEABLE RATES.

#### C. RAINBOW BLVD NW

AS PART OF THE TRACT C-1 DEVELOPMENT, APS PLANS TO CONSTRUCT A PERMANENT 31 FOOT FACE-TO-FACE STREET SECTION IN THE RAINBOW BOULEVARD NW FRONTAGE. THE SECTION WILL REPRESENT THE WEST HALF OF THE COMPLETED RAINBOW BOULEVARD NW PRINCIPAL ARTERIAL SECTION. THE TRAILS PROJECT TO THE NORTH HAS COMPLETED THE CONSTRUCTION OF RAINBOW BOULEVARD TO THE NORTHEAST PROPERTY CORNER WHICH INCLUDES INLETS TO INTERCEPT UPSTREAM FLOWS GENERATED BY THE PUBLIC RIGHT-OF-WAY IMPROVEMENTS. THEREFORE, THE ONLY FLOWS IN THE WEST HALF OF RAINBOW BOULEVARD WILL BE THOSE GENERATED BY THE RIGHT-OF-WAY ITSELF. AS SHOWN BY THE HYDRAULIC ANALYSIS FOR SECTION B-B ON SHEET 3, THE ULTIMATE 10-YEAR PEAK FLOW RATE WILL PRESERVE 10 FEET OF FREE DRIVING LANE AND THEREBY SATISFYING THE ARTERIAL STREET REQUIREMENTS.

NO PUBLIC STORM DRAIN IMPROVEMENTS ARE PROPOSED FOR THE REACH OF RAINBOW BOULEVARD NW FRONTING TRACT C-1, ANCIENT MESA. AS DEMONSTRATED BY THE HYDRAULIC CALCULATIONS SHOWN HEREIN, THE GROSS INCREASE IN PEAK 100-YEAR FLOW RATE FOR THE RAINBOW RIGHT-OF-WAY ATTRIBUTABLE TO THE DEVELOPMENT WILL BE 9.7 - 7.1 = 2.6 CFS. QUALITATIVELY, THE DOWNSTREAM IMPACT OF THIS INCREASE TO THE UNIMPROVED DOWNSTREAM RAINBOW BOULEVARD NW RIGHT-OF-WAY AND UNDEVELOPED BOCA NEGRA ARROYO WILL BE MORE THAN OFFSET BY THE ELIMINATION OF UPSTREAM FLOWS FROM THE TRAILS SUBDIVISION WHICH CUTS OFF FLOWS AT THE ALAMEDA GRANT LINE. DEVELOPMENT OF THE SCHOOLS AND SOCCER COMPLEX IN TRACT C-1 WILL ALSO ELIMINATE PORTIONS OF THE UNDEVELOPED SITE THAT DRAIN TO THE RIGHT-OF-WAY. THE RUNOFF GENERATED WILL BE ACCEPTED BY THAT PORTION OF THE SITE SOUTH OF THE SOUTHERNMOST ENTRANCE AND CONVEYED TO THE SOUTHEASTERN ENERGY DISSIPATION BASIN THEREBY PERPETUATING THE EXISTING DRAINAGE PATTERNS PRESENT WHILE ATTENUATING PEAK RATE AND MITIGATING EROSION.

### VI. DRAINAGE SITE PLAN

THE DRAINAGE SITE PLAN ON SHEET 2 SHOWS: 1) EXISTING GRADES INDICATED BY CONTOURS AT 1 FOOT INTERVALS FROM A TOPOGRAPHIC SURVEY CONDUCTED IN MARCH, 2007 PREPARED BY THIS OFFICE, 2) PROPOSED BOUNDARY AND EASEMENT DATA FROM THE SKETCH PLAT OF TRACTS C-1 AND C-2, ANCIENT MESA PREPARED BY THIS OFFICE (SHEET 4), 3) THE LIMIT AND CHARACTER OF THE EXISTING IMPROVEMENTS AS SHOWN BY THE FOREMENTIONED SURVEY, 4) THE LIMIT AND CHARACTER OF THE PROPOSED PUBLIC IMPROVEMENTS IN RAINBOW BOULEVARD NW, 5) THE LIMIT AND CHARACTER OF THE PRELIMINARY DESIGN OF THE SOCCER FIELD COMPLEX, AND 56) THE LIMIT AND CHARACTER OF THE PROPOSED PRIVATE ACCESS ROAD AND OTHER DRAINAGE FEATURES FOR TRACT C-1.

### VII. CALCULATIONS

THE CALCULATIONS APPEARING HEREON ANALYZE BOTH THE EXISTING AND PROPOSED CONDITIONS FOR THE 100-YEAR, 6-HOUR RAINFALL EVENT. THE PROCEDURE FOR 40-ACRE AND SMALLER BASIN, AS SET FORTH IN THE REVISION OF SECTION 22.2, HYDROLOGY OF THE DEVELOPMENT PROCESS MANUAL, VOLUME 2, DESIGN CRITERIA, DATED JANUARY, 1993, HAS BEEN USED TO QUANTIFY THE PEAK RATE OF DISCHARGE AND VOLUME OF RUNOFF GENERATED. FOR THE PURPOSES OF THIS PLAN, TABLE A-5 WAS USED TO ESTABLISH THE PERCENTAGE OF LAND TREATMENT D (IMPERVIOUS) FOR EACH BASIN, AND THE REMAINING PORTION WAS EQUALLY DIVIDED BETWEEN LAND TREATMENTS B AND C. WEIR CALCULATIONS FOR THE ENERGY DISSIPATION BASINS AND PIPE FLOW CAPACITY FOR BASIN A SUMMARIZED ON THIS SHEET HAVE BEEN PERFORMED USING FLOWMASTER PE 6.0 BY HAESTAD METHODS.

### VIII. CONCLUSIONS

1. THE PROPOSED SITE IMPROVEMENTS AND DRAINAGE CONCEPT ARE CONSISTENT WITH THE DEVELOPMENT CRITERIA ESTABLISHED BY PREVIOUSLY APPROVED PLANS FOR THE SITE (THE TRAILS MDP, VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN (VHSDP)).
2. THE PROPOSED DRAINAGE CONCEPT IS CONSISTENT WITH PREDESIGN CONFERENCE WITH THE CITY HYDROLOGIST ON MARCH 8, 2007.
3. DEVELOPED RUNOFF GENERATED BY THE DEVELOPMENT OF PROPOSED TRACT C-1 WILL BE TEMPORARILY MITIGATED BY THE USE OF RETENTION PONDS TO ALLEVIATE ITS IMPACT ON THE DOWNSTREAM BOCA NEGRA DAM CONSTRUCTION.
4. TEMPORARY RETENTION PONDS DESCRIBED HEREIN MAY BE REMOVED UPON CONSTRUCTION OF THE BOCA NEGRA DAM.
5. TRACT C-1 WILL ULTIMATELY DRAIN DIRECTLY TO PROPOSED TRACT C-2 VIA TWO ENERGY DISSIPATION BASINS WHICH WILL DISSIPATE DEVELOPED RUNOFF BY CONTROLLED DISCHARGE OVER CONCRETE WEIR WALLS. THE DISCHARGE ENTERING PROPOSED TRACT C-2 WILL BE NON-EROSIVE AND WILL BE CONVEYED WITHIN PRIVATE DRAINAGE EASEMENTS GRANTED TO APS BY THE COMMISSIONER OF PUBLIC LANDS ACROSS PROPOSED TRACT C-2.
6. TRACT C-2 WILL BE SUBJECT TO TWO DESIGNATED SURFACE A BLANKET DRAINAGE EASEMENTS TO BE GRANTED BY PLAT TO APS BY THE COMMISSIONER OF PUBLIC LANDS TO ACCEPT CONTROLLED DISCHARGE FROM TRACT C-1.
7. TRACT C-2, WHICH CONTAINS A REACH OF THE BOCA NEGRA ARROYO, IS UNDEVELOPED AT THIS TIME; THIS PLAN DOES NOT ADDRESS THE FUTURE DEVELOPMENT OF TRACT C-2.
8. RAINBOW BOULEVARD NW IS NOT INTENDED TO ACCEPT RUNOFF FROM THE DEVELOPED TRACT C-1.
9. RAINBOW BOULEVARD NW DOES NOT RECEIVE UPSTREAM CONTRIBUTION OF RUNOFF FROM THE TRAILS DEVELOPMENT AND ONLY RECEIVES THAT RUNOFF GENERATED FROM WITHIN THE ROAD'S RIGHT OF WAY.
10. RUNOFF GENERATED BY THE DEVELOPED RAINBOW BOULEVARD NW FRONTAGE WILL DISCHARGE FREELY TO THE UNDEVELOPED DOWNSTREAM RIGHT OF WAY. THIS IS QUALITATIVELY JUSTIFIED DUE TO THE SIGNIFICANT DECREASE IN DOWNSTREAM RUNOFF RESULTING FROM UPSTREAM TRAILS DEVELOPMENT ELIMINATING OFFSITE FLOWS FROM THE AREA NORTH OF THE ALAMEDA GRANT LINE.
11. AS DEMONSTRATED ON SHEET 3, THE 10-YEAR FREE DRIVING LANE CRITERIA FOR ARTERIAL STREETS WILL BE MET FOR RAINBOW BOULEVARD NW WITHOUT ADDITIONAL STORM DRAINAGE IMPROVEMENTS.
12. THERE ARE NO DPM DESIGN VARIANCES OR PUBLIC DRAINAGE EASEMENTS REQUIRED BY THIS PROJECT.
13. SEPARATE SUBMITTALS FOR THE ELEMENTARY SCHOOL, SOCCER FIELD COMPLEX AND MIDDLE SCHOOL CONSTRUCTION WILL BE REQUIRED FOR PERMITTING.
14. THIS SUBMITTAL SUPPORTS THE FORTHCOMING WORK ORDER PLANS TO CONSTRUCT THE ULTIMATE BUILD-OUT CONDITION OF RAINBOW BOULEVARD NW ALONG THE FRONTAGE OF TRACT C-1, ANCIENT MESA.

IX. REVISION - OCTOBER, 2007

THIS MASTER DRAINAGE PLAN IS REVISED TO OBTAIN FINAL PLAT APPROVAL AND REFLECT THE ULTIMATE DEVELOPMENT OF THE SITE. THE PLAN REVISION RESTRICTS THE ULTIMATE DISCHARGE FROM THE SITE THEREBY REDUCING THE DOWNSTREAM IMPACT OF DEVELOPED FLOWS VIA DETENTION PONDS. SHEET 4 SHOWS THE PROPOSED IMPROVEMENTS ON TRACT C-2 TO MITIGATE THE IMPACT OF DISCHARGE FROM PROPOSED TRACT C-1 FLOWS.

UPON CONSTRUCTION OF THE BOCA NEGRA DAM BY AMAFCA, THE RETENTION POND IN SUB-BASIN A-1 WILL BE RECLAIMED FOR USE BY THE ELEMENTARY SCHOOL. THE TEMPORARY RETENTION PONDS IN SUB-BASINS A-2 AND B-1 WILL BE CONVERTED FROM INTERIM RETENTION TO PERMANENT DETENTION BASINS.

### SITE CHARACTERISTICS

1. PRECIPITATION ZONE = 1
2. P<sub>600</sub>, 1 HR = P<sub>360</sub> = 2.20
3. TOTAL PROJECT AREA (A<sub>T</sub>) = 2,757,949 SF / 63.31 AC
4. EXISTING LAND TREATMENT
 

A. BASIN A	TOTAL=	682,938 SF = 15.68 AC
TREATMENT	AREA (SF/AC)	%
B	682,938 / 15.68	100
5. BASIN B
 

TOTAL=	914,995 SF = 21.01 AC	
TREATMENT	AREA (SF/AC)	%
B	914,995 / 21.01	100
6. BASIN C
 

TOTAL=	1,160,016 SF = 26.63 AC	
TREATMENT	AREA (SF/AC)	%
B	1,160,016 / 26.63	100
7. RAINBOW
 

TOTAL=	107,593 SF = 2.47 AC	
TREATMENT	AREA (SF/AC)	%
C	107,593 / 2.47	100

### 5. DEVELOPED LAND TREATMENT

1. BASIN A
 

TOTAL=	682,938 SF = 15.68 AC	
TREATMENT	AREA (SF/AC)	%
B	86,250 / 1.98	25
C	86,250 / 1.98	25
D	172,500 / 3.96	50
2. SUB-BASIN A-2
 

TOTAL=	202,938 SF = 4.66 AC	
TREATMENT	AREA (SF/AC)	%
B	50,735 / 1.16	25
C	50,735 / 1.16	25
D	101,470 / 2.33	50
3. SUB-BASIN A-3
 

TOTAL=	110,000 SF = 2.53 AC	
TREATMENT	AREA (SF/AC)	%
C	62,575 / 1.44	57
D	47,425 / 1.09	43
4. BASIN B
 

TOTAL=	914,995 SF = 21.01 AC	
TREATMENT	AREA (SF/AC)	%
B	169,755 / 3.90	54
C	38,195 / 0.88	12
D	104,250 / 2.39	33
5. SUB-BASIN B-2
 

TOTAL=	602,795 SF = 13.84 AC	
TREATMENT	AREA (SF/AC)	%
B	683,626 / 6.51	47
C	145,111 / 3.33	24
D	174,100 / 4.00	29
6. BASIN C
 

TOTAL=	1,160,016 SF = 26.63 AC	
TREATMENT	AREA (SF/AC)	%
B	290,004 / 6.66	25
C	290,004 / 6.66	25
D	580,008 / 13.32	50
7. RAINBOW
 

TOTAL=	107,593 SF = 2.47 AC	
TREATMENT	AREA (SF/AC)	%
C	32,278 / 0.74	30
D	75,315 / 1.73	70

### HYDROLOGY

#### I. EXISTING CONDITION

1. BASIN A
 

1. VOLUME	E <sub>w</sub> = (E <sub>A</sub> A <sub>A</sub> + E <sub>B</sub> A <sub>B</sub> + E <sub>C</sub> A <sub>C</sub> + E <sub>D</sub> A <sub>D</sub> )/A <sub>T</sub>	E <sub>w</sub> = ((0.00+0.44)+(15.68+0.67)+(0.00+0.99)+(0.00+1.97))/15.68 = 0.67 IN	V <sub>100</sub> = (E <sub>w</sub> /12)A <sub>T</sub> = (0.67/12)15.68 = 0.8754 AC-FT = 38,131 CF
2. PEAK DISCHARGE	Q <sub>p</sub> = Q <sub>pA</sub> A <sub>A</sub> + Q <sub>pB</sub> A <sub>B</sub> + Q <sub>pC</sub> A <sub>C</sub> + Q <sub>pD</sub> A <sub>D</sub>	Q <sub>p</sub> = Q <sub>100</sub> = ((0.00+1.29)+(15.68+2.03)+(0.00+2.87)+(0.00+4.37)) = 31.8 CFS	
2. BASIN B
 

1. VOLUME	E <sub>w</sub> = (E <sub>A</sub> A <sub>A</sub> + E <sub>B</sub> A <sub>B</sub> + E <sub>C</sub> A <sub>C</sub> + E <sub>D</sub> A <sub>D</sub> )/A <sub>T</sub>	E <sub>w</sub> = ((0.00+0.44)+(21.01+0.67)+(0.00+0.99)+(0.00+1.97))/21.01 = 0.67 IN	V <sub>100</sub> = (E <sub>w</sub> /12)A <sub>T</sub> = (0.67/12)21.01 = 1.1728 AC-FT = 51,087 CF
2. PEAK DISCHARGE	Q <sub>p</sub> = Q <sub>pA</sub> A <sub>A</sub> + Q <sub>pB</sub> A <sub>B</sub> + Q <sub>pC</sub> A <sub>C</sub> + Q <sub>pD</sub> A <sub>D</sub>	Q <sub>p</sub> = Q <sub>100</sub> = ((0.00+1.29)+(21.01+2.03)+(0.00+2.87)+(0.00+4.37)) = 42.6 CFS	
3. BASIN C
 

1. VOLUME	E <sub>w</sub> = (E <sub>A</sub> A <sub>A</sub> + E <sub>B</sub> A <sub>B</sub> + E <sub>C</sub> A <sub>C</sub> + E <sub>D</sub> A <sub>D</sub> )/A <sub>T</sub>	E <sub>w</sub> = ((0.00+0.44)+(26.63+0.67)+(0.00+0.99)+(0.00+1.97))/26.63 = 0.67 IN	V <sub>100</sub> = (E <sub>w</sub> /12)A <sub>T</sub> = (0.67/12)26.63 = 1.4869 AC-FT = 64,768 CF
2. PEAK DISCHARGE	Q <sub>p</sub> = Q <sub>pA</sub> A <sub>A</sub> + Q <sub>pB</sub> A <sub>B</sub> + Q <sub>pC</sub> A <sub>C</sub> + Q <sub>pD</sub> A <sub>D</sub>	Q <sub>p</sub> = Q <sub>100</sub> = ((0.00+1.29)+(26.63+2.03)+(0.00+2.87)+(0.00+4.37)) = 54.1 CFS	
4. RAINBOW BOULEVARD NW
 

1. VOLUME	E <sub>w</sub> = (E <sub>A</sub> A <sub>A</sub> + E <sub>B</sub> A <sub>B</sub> + E <sub>C</sub> A <sub>C</sub> + E <sub>D</sub> A <sub>D</sub> )/A <sub>T</sub>	E <sub>w</sub> = ((0.00+0.44)+(0.00+0.67)+(2.47+0.99)+(0.00+1.97))/2.47 = 0.99 IN	V <sub>100</sub> = (E <sub>w</sub> /12)A <sub>T</sub> = (0.99/12)2.47 = 0.2038 AC-FT = 8,876 CF
2. PEAK DISCHARGE	Q <sub>p</sub> = Q <sub>pA</sub> A <sub>A</sub> + Q <sub>pB</sub> A <sub>B</sub> + Q <sub>pC</sub> A <sub>C</sub> + Q <sub>pD</sub> A <sub>D</sub>	Q <sub>p</sub> = Q <sub>100</sub> = ((0.00+1.29)+(0.00+2.03)+(2.47+2.87)+(0.00+4.37)) = 7.1 CFS	

#### II. DEVELOPED CONDITION

1. BASIN A
 

1. VOLUME	E <sub>w</sub> = (E <sub>A</sub> A <sub>A</sub> + E <sub>B</sub> A <sub>B</sub> + E <sub>C</sub> A <sub>C</sub> + E <sub>D</sub> A <sub>D</sub> )/A <sub>T</sub>	E <sub>w</sub> = ((0.00+0.44)+(0.00+0.67)+(1.98+0.99)+(3.96+1.97))/15.68 = 0.67 IN	V <sub>100</sub> = (E <sub>w</sub> /12)A <sub>T</sub> = (0.67/12)15.68 = 0.8754 AC-FT = 38,131 CF
2. PEAK DISCHARGE	Q <sub>p</sub> = Q <sub>pA</sub> A <sub>A</sub> + Q <sub>pB</sub> A <sub>B</sub> + Q <sub>pC</sub> A <sub>C</sub> + Q <sub>pD</sub> A <sub>D</sub>	Q <sub>p</sub> = Q <sub>100</sub> = ((0.00+1.29)+(0.00+2.03)+(1.98+2.87)+(3.96+4.37)) = 15.9 CFS	
2. SUB-BASIN A-1
 

1. VOLUME	E <sub>w</sub> = (E <sub>A</sub> A <sub>A</sub> + E <sub>B</sub> A <sub>B</sub> + E <sub>C</sub> A <sub>C</sub> + E <sub>D</sub> A <sub>D</sub> )/A <sub>T</sub>	E <sub>w</sub> = ((0.00+0.44)+(0.00+0.67)+(1.16+0.99)+(2.33+1.97))/4.66 = 0.82 IN	V <sub>100</sub> = (E <sub>w</sub> /12)A <sub>T</sub> = (0.82/12)4.66 = 0.54 AC-FT = 13,927 CF
2. PEAK DISCHARGE	Q <sub>p</sub> = Q <sub>pA</sub> A <sub>A</sub> + Q <sub>pB</sub> A <sub>B</sub> + Q <sub>pC</sub> A <sub>C</sub> + Q <sub>pD</sub> A <sub>D</sub>	Q <sub>p</sub> = Q <sub>100</sub> = ((0.00+1.29)+(1.16+2.03)+(1.16+2.87)+(2.33+4.37)) = 15.9 CFS	
3. SUB-BASIN A-3
 

1. VOLUME	E <sub>w</sub> = (E <sub>A</sub> A <sub>A</sub> + E <sub>B</sub> A <sub>B</sub> + E <sub>C</sub> A <sub>C</sub> + E <sub>D</sub> A <sub>D</sub> )/A <sub>T</sub>	E <sub>w</sub> = ((0.00+0.44)+(0.00+0.67)+(1.44+0.99)+(1.09+1.97))/2.53 = 1.41 IN	V <sub>100</sub> = (E <sub>w</sub> /12)A <sub>T</sub> = (1.41/12)2.53 = 0.29 AC-FT = 12,948 CF
2. PEAK DISCHARGE	Q <sub>p</sub> = Q <sub>pA</sub> A <sub>A</sub> + Q <sub>pB</sub> A <sub>B</sub> + Q <sub>pC</sub> A <sub>C</sub> + Q <sub>pD</sub> A <sub>D</sub>	Q <sub>p</sub> = Q <sub>100</sub> = ((0.00+1.29)+(3.90+2.03)+(0.88+2.87)+(2.39+4.37)) = 20.9 CFS	
4. BASIN B
 

1. VOLUME	E <sub>w</sub> = (E <sub>A</sub> A <sub>A</sub> + E <sub>B</sub> A <sub>B</sub> + E <sub>C</sub> A <sub>C</sub> + E <sub>D</sub> A <sub>D</sub> )/A <sub>T</sub>	E <sub>w</sub> = ((0.00+0.44)+(6.66+0.67)+(6.66+0.99)+(13.32+1.97))/26.63 = 1.40 IN	V <sub>100</sub> = (E <sub>w</sub> /12)A <sub>T</sub> = (1.40/12)26.63 = 3.1069 AC-FT = 135,335 CF
2. PEAK DISCHARGE	Q <sub>p</sub> = Q <sub>pA</sub> A <sub>A</sub> + Q <sub>pB</sub> A <sub>B</sub> + Q <sub>pC</sub> A <sub>C</sub> + Q <sub>pD</sub> A <sub>D</sub>	Q <sub>p</sub> = Q <sub>100</sub> = ((0.00+1.29)+(6.66+2.03)+(6.66+2.87)+(13.32+4.37)) = 90.8 CFS	
5. RAINBOW BOULEVARD NW
 

1. VOLUME	E <sub>w</sub> = (E <sub>A</sub> A <sub>A</sub> + E <sub>B</sub> A <sub>B</sub> + E <sub>C</sub> A <sub>C</sub> + E <sub>D</sub> A <sub>D</sub>
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