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CABEZON COMMUNITIES PHASE 1
DRAINAGE MANAGEMENT PLAN
UNIT 16

April 2004

PREPARED FOR:

Curb North LLC
5160 San Francisco NE
Albuquerque, New Mexico 87107

SUBMITTED TO:

City Of Rio Rancho & Southern Sandoval County
Arroyo Flood Control Authority

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WCEA File No. X3-218-032

WILSON &COMPANY

DR-4

CABEZON COMMUNITIES PHASE 1

DRAINAGE MANAGEMENT PLAN

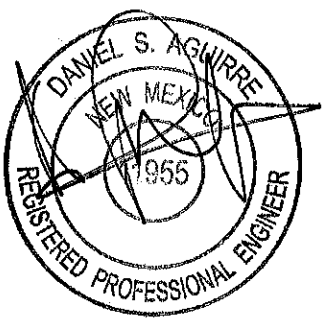
UNIT 16

April 2004

I, Daniel S. Aguirre, do hereby certify that this report was prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the State of New Mexico.

Daniel S. Aguirre, P.E.
NM No. 11955

4/27/04
Date



CABEZON COMMUNITIES PHASE 1

DRAINAGE MANAGEMENT PLAN

UNIT 16

By: _____ Date: 4/8/4

Bo Johnson, P.E.
Curb North LLC.

By: _____ Date: 5/18/04

Kenneth W. Curtis III, P.E.
City of Rio Rancho City Engineer

By: _____ Date: May 14, 2004

David Stoliker, P.E.
SSCAFCA Executive Director

By: _____ for Date: May 25, 2004

William C. Yarbrough
SSCAFCA Chairman

By: _____ Date: 5-11-04

John Kelly, P.E.
AMAFCA Executive Engineer

Supporting / Corresponding Documents

Black Arroyo Watershed Management Plan, August 2002
Cabezon Communities Master Plan, April 9, 2003
Cabezon Communities Drainage Implementation Plan, April 8, 2004

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DRAINAGE MANAGEMENT PLAN – CABEZON PHASE 1 DEVELOPMENT

Introduction

This report is based on the drainage section of the approved Cabezon Communities Master Plan (Master Plan), 2003, and specifically outlines the drainage plan for Phase 1 of development. It addresses requirements of the Master Plan and is consistent with the Black Arroyo Drainage Management Plan (BLWMP) (ASCG, 2002). The Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) Board of Directors approved the Master Plan, but left two items for discussion. The two items were improvements proposed for the East Branch of the Black Arroyo and conveyance of the flows under Unser Boulevard. Neither of these items directly affects or is affected by Phase 1. An Implementation Plan, detailing the major infrastructure being proposed with the development and identifying the phasing of the proposed infrastructure, is being submitted concurrent with this document.

Phase 1 encompasses approximately 275 acres of the northwest corner of the Cabezon Development. *Figure 1* shows the entire Cabezon Community Development area, and *figure 2* details the area slated for Phase 1 of development. The alternate area, as shown in orange in *figure 1*, is currently Unser Boulevard Right-of-Way, but could possibly be brought into the project in the future. Although three phases of development were discussed in the Master Plan, development within the 914-acre community will now occur in two phases: Phase 1 and Phase 2.

Drainage Constraints

As the BLWMP has been approved by SSCAFCA, Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), and the City of Rio Rancho (CORR), any changes to it must be approved by all three entities. Chief among the drainage constraints that this places on the Cabezon Communities Development is that the Black Dam is not in the present, nor under assumed ultimate build-out conditions, permitted to overtop the emergency spillway in a 100-year 24-hour storm event. This criterion must be met at the conclusion of total build-out of the Cabezon Community. The other primary requirement

of the BLWMP is that the first flush of runoff from the development, or the initial 0.25 inches, be treated to the maximum extent practicable to remove floatables, oil, grease and biological waste. Although the required volume treatment for Cabezon is 22 AF, the developer has agreed to treat 44 AF of runoff at the completion of both phases. This is in accordance with the BLWMP, which suggests that a larger portion of the Black watershed be treated to improve water quality.

Hydrology Methodology

Hydrologic Analysis for Phase 1 conforms to Section 22.2, Hydrology, of the Development Process Manual, Volume 2, Design Criteria for the City of Albuquerque, New Mexico, January 1993 (COA DPM), and to the BLWMP. Hydrologic modeling was performed using the Arid-lands Hydrologic Model (AHYMO_97), distributed by Anderson Hydro. The 100-year 24-hour return frequency storm was used as the basis of this analysis. Assumptions regarding land treatments, storm duration and intensity, routing, and water quality requirements established in the BLWMP were followed in this analysis. Major off-site flows are taken directly from the Modified BLWMP Ultimate Conditions Model (dated January 20, 2004).

Existing Conditions Hydrology

Existing conditions are taken primarily from the BLWMP, which relied heavily on the FEMA floodplain mapping study (RTI, 1994). The original AHYMO files created for that study were obtained and used as a foundation for further detailed analysis. A summary of the FEMA floodplains and key flowrates from that model for the area are shown in *figure 3*.

Figure 6 is the Black Dam's current topography. The corresponding table in this figure shows the stage-storage relationship of the facility. Of note is that the existing storage in the Dam, 294 AF, is only slightly less than the State Engineer's permitted storage volume of 304 AF, which was used in the Modified BLWMP Ultimate Conditions Model.

Proposed Conditions

The Modified BLWMP Ultimate Conditions Model, dated January 20, 2004, provides the basis for the Cabezon Model (file name: Cab_0204.DAT). Several changes were made to the Modified BLWMP Model to reflect the development within Cabezon Phase 1.

First, BLWMP sub-basin 211 was deleted and then divided into three parts in the Cabezon Model (*Appendix A*). Sub-basin 211A is the residential portion, with land treatment (LT) type percentages taken directly from the BLWMP (A=0, B=12, C=15, D=73). Sub-basin 211B is the Southern Plaza Shopping Center, which field investigation determined had extensive detention and retention facilities on-site (*figure 10*). Therefore, flows from 211B were limited to pre-development levels. Finally, 211C is the portion of Southern Boulevard within BLWMP sub-basin 211. *Appendix A* contains both the Modified BLWMP Ultimate Conditions AHYMO model (40120_BL.DAT) and the Cabezon Model (Cab_0204.DAT) on diskette, as well as a hardcopy of the Cabezon summary output file.

Second, in an effort to tie Phase 1 development into the BLWMP and assess the cumulative effect on Black Dam, the Phase 1 portion of the Cabezon Model—with the above changes—was pasted into the Modified BLWMP Ultimate Conditions Model. That is, the portion of the original Cabezon Model above the arrows labeled *Phase 1* in *figure 5* was added to the Modified BLWMP Model. To account for this insertion, four BLWMP sub-basins within Phase 1 were deleted from this model. These sub-basins were 250, 251, 252, and 254 (*figure 9*).

There is only one major off-site flow coming onto Phase 1. This flow, originating from sub-basin 211 of the BLWMP discussed above, outfalls via 48-inch RCP and an asphalt rundown, 330 feet south of the intersection of Western Hills Road and Southern Boulevard. The New Mexico Department of Transportation completed construction of these two conveyances in 1992 to alleviate flooding problems at the intersection. The 48-inch pipe was designed to carry 176 cfs, but the total discharge from both conveyances for the 100-year event is 320 cfs. The Modified BLWMP yields a flowrate of 335 cfs for

this sub-basin. When the existing on-site detention facilities at Southern Plaza (211B) are taken into account in the Cabezon Model, flow from the entire sub-basin 211 is reduced to 320 cfs (page 11 of summary output in *Appendix A*).

Figure 2 illustrates the proposed drainage network. *Figures 7* and *8* show additional detail of the storm drain line. A storm drain system connects to the existing 48-inch storm drain discussed above and conveys the off-site 320 cfs to the multi-use detention/WQ facility in Tract 17, shown in *figure 4*. This storm drain line increases in size from 54 to 78 inches and collects on-site flows as it extends south to the facility (*figure 4*).

The multi-use facility will allow for detention of 25 AF of stormwater. It also includes a 7.5 AF slow-release water quality pool, designed to remove oil, grease, floating waste, and sediment, as well as treat biological concerns to the maximum extent practicable. This is accomplished by an extended detention period caused by a low outflow rate, achieved by using a hooded riser system. The hooded riser system limits outflow from the 100 year, 24 hour storm to 497 cfs. If the water surface elevation rises above the 100 year, 24 hour elevation, full outflow is allowed. Most of the pond's storm detention volume is above the WQ pond, in an area that will also be used as soccer fields.

Per the Implementation Plan, a Phase 2 storm drain line will carry the pond outfall to the East Branch arroyo, collecting more on-site flows on the way. As shown in *figure 2*, this portion of the downstream storm drain will be constructed during Phase 1 and will serve as outflow from the pond. This 72 to 60 inch storm drain will carry the outflow past Phase 1 development, releasing it into the natural drainage path. Should a storm event large enough to cause discharge from the facility occur before this is completed, the developer will repair any erosion caused by this discharge, and—if requested by AMAFCA, the owner of Black Dam—remove an equivalent amount of sediment from the Black Dam sediment pool. The Implementation Plan has more information regarding the transition between phases.

The only Phase 1 sub-basin flow that is not collected in the backbone drainage infrastructure is sub-basin 7C. Originally, this sub-basin was to drain to a 3 AF on-site retention facility. However, the Implementation Plan now calls for it to drain into the section of main storm drain along Trail Side Road discussed above (labeled *Phase 2 Storm Drain* in *figure 4*). Flows will then be conveyed directly to the East Branch of the Black Arroyo. If necessary, on-site retention facilities will be constructed prior to the construction of downstream Phase 2 facilities, subject to approval by the appropriate entity. The AHYMO summary file can be found in *Appendix A* along with electronic files containing input and output files.

Water Quality is also a priority in Phase 1. The two-stage detention facility in Tract 17 described above acts to improve the quality of the storm water it releases. In addition, flows from Cabezon Boulevard will be directed to a median bioswale as an additional treatment (*Appendix A*).

Hydrology for Phase 1 has been modified from the Cabezon Communities Master Plan in several ways. The largest change is the removal of a proposed detention/water quality facility on the north end of the project on Western Hills Road, just south of Southern Boulevard (*figure 2*). As an alternative, flows are routed directly to the Tract 17 detention facility via the storm drain.

Another change from the Cabezon Master Plan is the routing of off-site sub-basins north of the project and south of Southern Boulevard (*figure 4*). Improved mapping showed that the direction of runoff from these sub-basins differs from the direction used in the FIS for effective conditions. Current flow directions are shown on *figure 4*, and a corresponding routing schematic is shown on *figure 5*. The Cabezon Master Plan routed those off-site basins to the proposed water quality facility on Western Hills Road. They are now routed locally to flow along proposed streets in the Cabezon development. They are then collected in the backbone storm drain system, in Western Hills Road, scheduled for the first phase of construction.

The CORR stipulates that commercially zoned properties may not exceed historic discharge. This requirement is typically met by using on-site detention facilities. For this reason, Tract 11, the only commercially zoned property within Cabezon Phase 1, is modeled with hypothetical detention facilities that limit the flowrate to pre-development levels. *Table 1* lists the land treatments assigned to all sub-basins in the Cabezon model, including off-site basins. Flowrates and total runoff volumes are also listed.

Table 1. Cabezon Drainage Basins-Phase 1

				Land Treatments				Q_{peak}	Volume	
Sub-basin	Acres	DUs/Acre	T_p	A	B	C	D	(cfs)	(ac-ft)	Methodology/Notes
Off_1A	3.47	Commercial	0.13	0	0	15	85	5.0	0.662	Modeled as existing based on CORR ponding requirements
Off_1B	3.60	Commercial	0.13	0	0	15	85	5.1	0.687	"
Off_1C	3.48	1/3 acre lots	0.13	0	34	31.7	34.3	11.0	0.414	D per DPM (3 DUs assumed); B & C per SSCAFCA
Off_1D	3.00	1/2 acre lots	0.13	10	33	30	27	8.8	0.316	SSCAFCA
Off_2A	3.61	Commercial	0.13	0	0	15	85	15.1	0.708	SSCAFCA
Off_2B	3.01	Commercial	0.13	0	0	15	85	4.7	0.577	Modeled as existing based on CORR ponding requirements
Off_2C	3.01	1/2 acre lots	0.13	10	33	30	27	8.8	0.316	SSCAFCA
Off_3A	5.63	Commercial	0.13	0	0	15	85	23.7	1.112	"
Off_3B	7.61	Commercial/Church	0.13	0	0	15	85	32.0	1.505	"
Off_3C	4.00	1/2 acre lots	0.13	10	33	30	27	11.7	0.423	SSCAFCA
Off_3D	2.00	Commercial	0.13	10	33	30	27	5.8	0.208	SSCAFCA
R_1	4.22	Roadway	0.13	0	3	17	80	17.4	0.802	
R_2	4.29	Roadway	0.13	0	5	29	66	16.7	0.732	
R_3	3.33	Roadway	0.13	0	5	29	66	13.0	0.568	
21ST	0.62	Roadway	0.13	0	0	10	90	2.8	0.131	
22ND	0.61	Roadway	0.13	0	0	10	90	2.8	0.131	
23RD	0.90	Roadway	0.13	0	0	10	90	3.9	0.183	
24TH	0.90	Roadway	0.13	0	0	10	90	3.9	0.183	
25TH	0.90	Roadway	0.13	0	0	10	90	3.9	0.183	
211A	89.09	Residential	0.19	0	12	15	73	282.6	15.8	Per BLWMP
211B	23.49	Commercial	0.133	0	0	15	85	32.6	4.64	Modeled as existing based on CORR ponding requirements
211C	3.33	Roadway	0.133	0	0	10	90	14.2	0.68	
3A	34.81	5.8	0.13	0	29	15.6	55.4	122.8	5.21	D per DPM; B & C per SSCAFCA
3B	39.77	5.9	0.13	0	28.6	15.3	56.1	104.7	5.99	"
4A	37.90	5.6	0.13	0	30	16.1	53.9	132.5	5.58	"
4B	30.80	5.7	0.13	0	29.5	15.8	54.7	108.2	4.57	"
11	10.24	Commercial	0.13	0	0	15	85	14.1	1.96	Modeled as existing based on CORR ponding requirements
7A	29.70	5.7	0.13	0	29.5	15.8	54.7	104.3	4.41	D per DPM; B & C per SSCAFCA
7B	17.10	5.5	0.13	0	30.5	16.3	53.2	59.5	2.50	D per DPM; B & C per SSCAFCA
7C	21.40	5.1	0.13	0	32.4	17.4	50.2	73.2	3.03	D per DPM; B & C per SSCAFCA
17	15.00	Park/Pond	0.13	0	85	0	15.0	36.9	1.21	SSCAFCA

Commercial, off-site sub-basins were only modeled with detention ponds if field inspection confirmed their presence. The only off-site sub-basins within the model to contain such facilities are OFF_1A, OFF_1B, and OFF_2B. *Figure 4* shows the location of these sub-basins.

Due to their large size, the residential sub-basins within Phase 1 are broken into smaller units than in either the Master Plan or Implementation Plan (*figure 4*). Land treatment types were also adjusted to reflect the expected development density, which is just below the allocated six dwelling units per acre (6 DUs/Acre) discussed in the Master Plan. The routing for Phase 1, as well as the rest of the Master Plan routing, is presented in the schematic in *figure 5*.

Hydraulics

Phase 1 involves the transport of off-site flows from Western Hills Road, and the collection and transport of on-site runoff. As seen in *figure 7*, the main branch of the storm drain system runs south down Western Hills Road, across Cabezon Boulevard and into the detention facility on the south side of the Tract 17 Community Center/Park site. This portion of the storm drain connects to an existing 48-inch RCP and flow is conveyed in the R-O-W of Western Hills Road.

Flow onto the development from north of Southern Boulevard is 320 cfs, including street flow. Phase 1 development includes the appropriate infrastructure to collect and convey these flows downstream. The slope of the storm drain line ranges between 1.67% and 2.77% from the upstream end to the detention pond invert, and ranges in size from 54 inches to 84 inches. A hydraulic grade line (HGL) analysis was performed using Haested Methods' StormCAD and calculating minor losses according to Albuquerque's Development Process Manual to size the storm drain lines. The HGL and the storm drain are shown on the plan and profile drawings in *figure 7*.

An additional, smaller storm drain conveys the flow from sub-basin 4B to the intersection of Cabezon Boulevard and Trailside Drive, and was modeled with Intelisolve's HydraFlow Storm Sewers. Here flows from sub-basin 5A are added, and the total flow is conveyed to the Tract 17 detention facility through a 48-inch pipe in the Trailside Drive R-O-W (*figure 8*). Flows for all facilities are shown on *figure 4*.

Conclusion

One of the most important objectives of the Cabezon Development's Drainage Management Plan is minimizing impact on the Black Dam, both currently and in the BLWMP ultimate build-out scenario. As mentioned above, 25 AF of detention is to be provided upstream in Tract 17. Although the Black Dam is near its permitted volume when fully developed conditions are modeled, it is currently not at risk, as the majority of the watershed is not yet developed.

Table 2 compares the water surface elevation at Black Dam as predicted by the Modified BLWMP Ultimate Conditions Model and the Cabezon Model. The Modified BLWMP Ultimate Conditions Model places it at 5164.22 feet, 1.53 feet below the emergency spillway. The Cabezon Model, which adds Cabezon Phase 1 development into the previous model, shows a water surface elevation of 5165.01 feet, an increase of 0.79 feet, and leaving 0.74 feet of freeboard.

Table 2 - Comparison of Water Surface Elevation at Black Dam

Emergency Spillway Elevation	**5165.75**	
		Remaining Storage Depth Prior to Overflow
MAX. WATER SURFACE ELEVATION for:	**Elevation**	
	(ft)	**(ft)**
Modified BLWMP Ultimate Condition Model	5164.22	1.53
Cabezon Model (Mod. BLWMP w/Ph. 1 Cab.)	5165.01	0.74

Per CORR drainage ordinance, new developments must not adversely affect downstream drainage facilities. The Cabezon Master Plan originally included a 12 AF pond just north of the site (*figure 2*) to store some flow upstream of Black Dam, minimizing Cabezon's impact on the Dam. This pond has been removed, however, and Cabezon is now using more than its designated share of storage in the Black Dam, as seen in the increased water surface elevation.

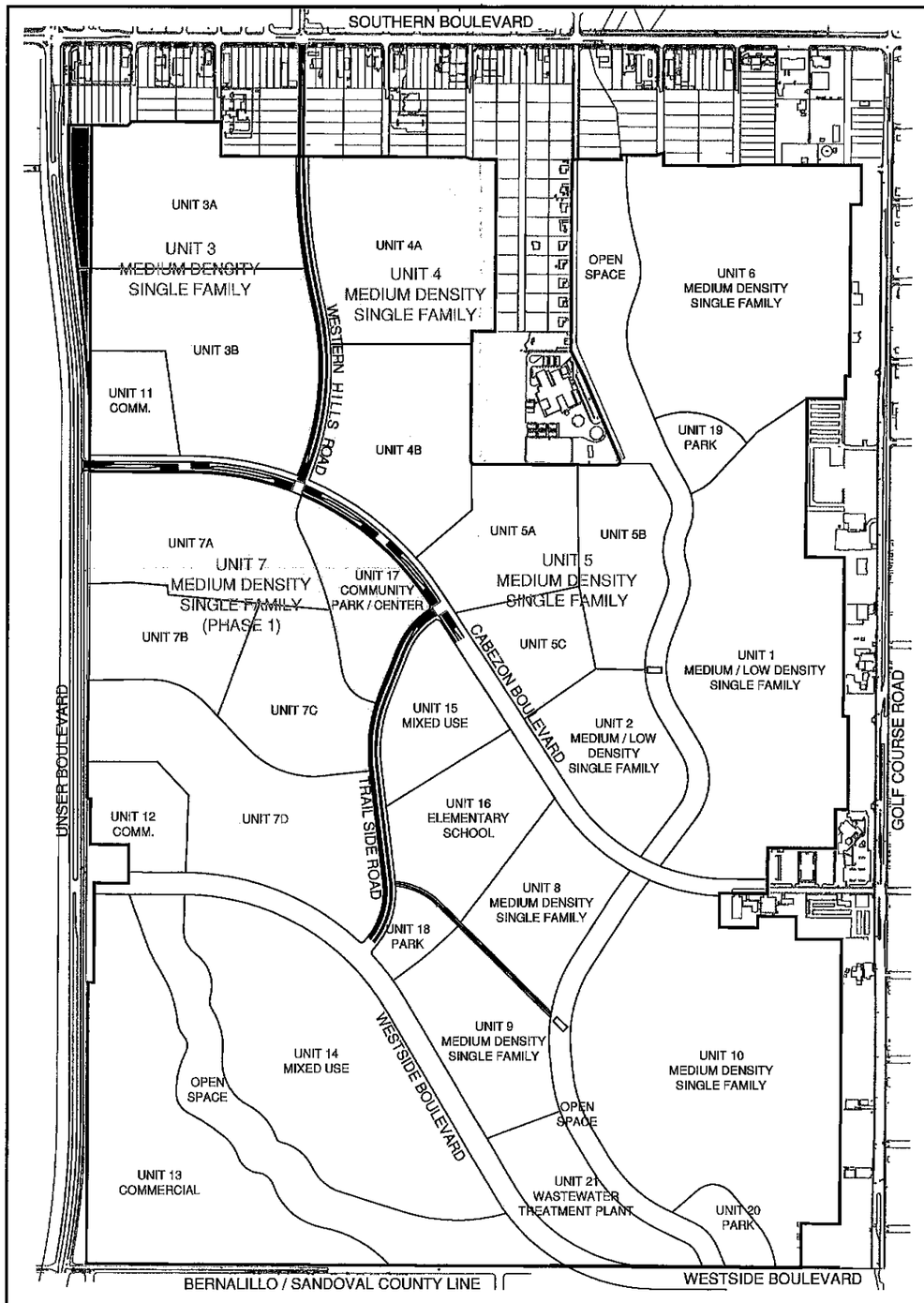
Three alternatives are proposed to alleviate the problem:

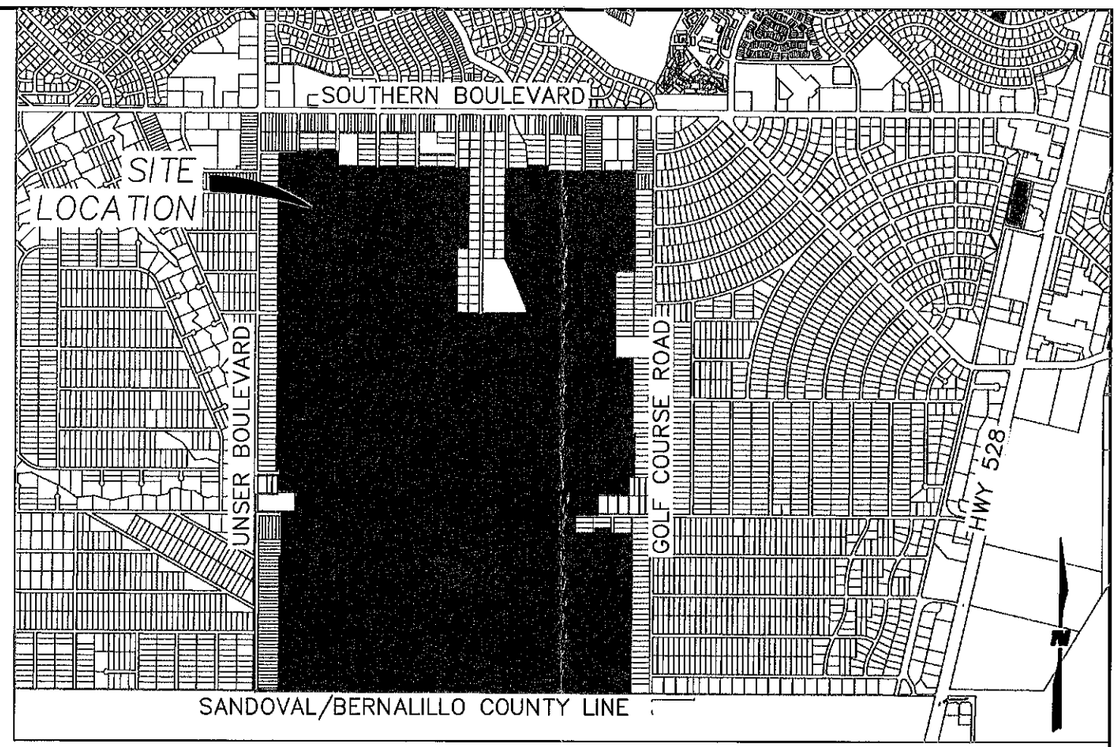
1. A sediment basin of 12 AF or larger, as discussed in the Master Plan, to be constructed on the East Branch with SSCAFCA;

2. A detention facility sized to lower the water surface elevation at the Black Dam to the BLWMP level (at least 12 AF of storage), to be constructed in Phase 2,
3. Storage of 12 AF added to the Black Dam so that its functionality is retained.

One of these alternatives, or a combination of several, will be chosen and constructed prior to full development of the Cabezon Communities.

For subdivision design, permissible peak flowrates and their entrance locations to the backbone network are shown in *figure 4*. Each subdivision is permitted free discharge to the major drainage network. If a subdivision drainage plan calls for a higher discharge rate than identified in this plan, the subdivision plan must receive approval from CORR, SSCAFCA, and AMAFCA. For approval, the subdivision drainage plan must show that downstream systems can safely conduct this additional flow, and also that the water surface elevation at Black Dam will not be increased.





VICINITY MAP

LEGEND

PHASE 1

ALTERNATE

1000 0 500 1000 2000

GRAPHIC SCALE (IN FEET) 1" = 1000 ft.

N

CITY OF RIO RANCHO

WILSON &COMPANY
2600 THE AMERICAN ROAD S.E.
SUITE 100
RIO RANCHO, NEW MEXICO
87124
(505) 898-8021

FIGURE 1
CABEZON - PHASE 1
DRAINAGE MANAGEMENT PLAN

CABEZON
VICINITY MAP

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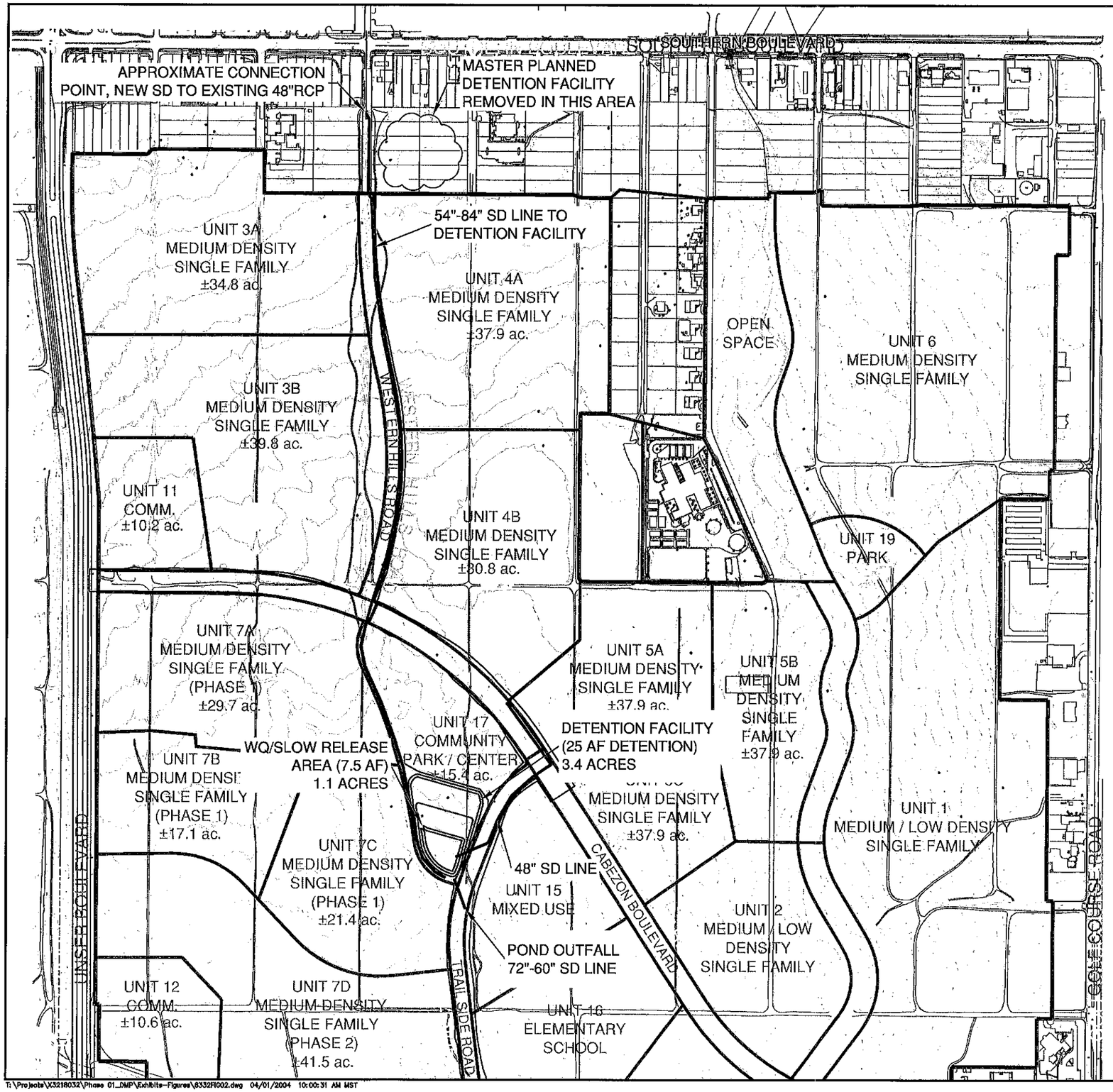

LEGEND

PHASE 1

- SD LINE
- WQ/DETENTION FACILITY BOUNDARY
- SITE/SUB-BASIN BOUNDARY
- EXISTING SD LINE

N

600 0 300 600 1200

GRAPHIC SCALE (IN FEET) 1" = 600 ft.

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FIGURE 2
CABEZON - PHASE 1
DRAINAGE MANAGEMENT PLAN

PHASE 1 ENLARGEMENT WITH IMPROVEMENTS

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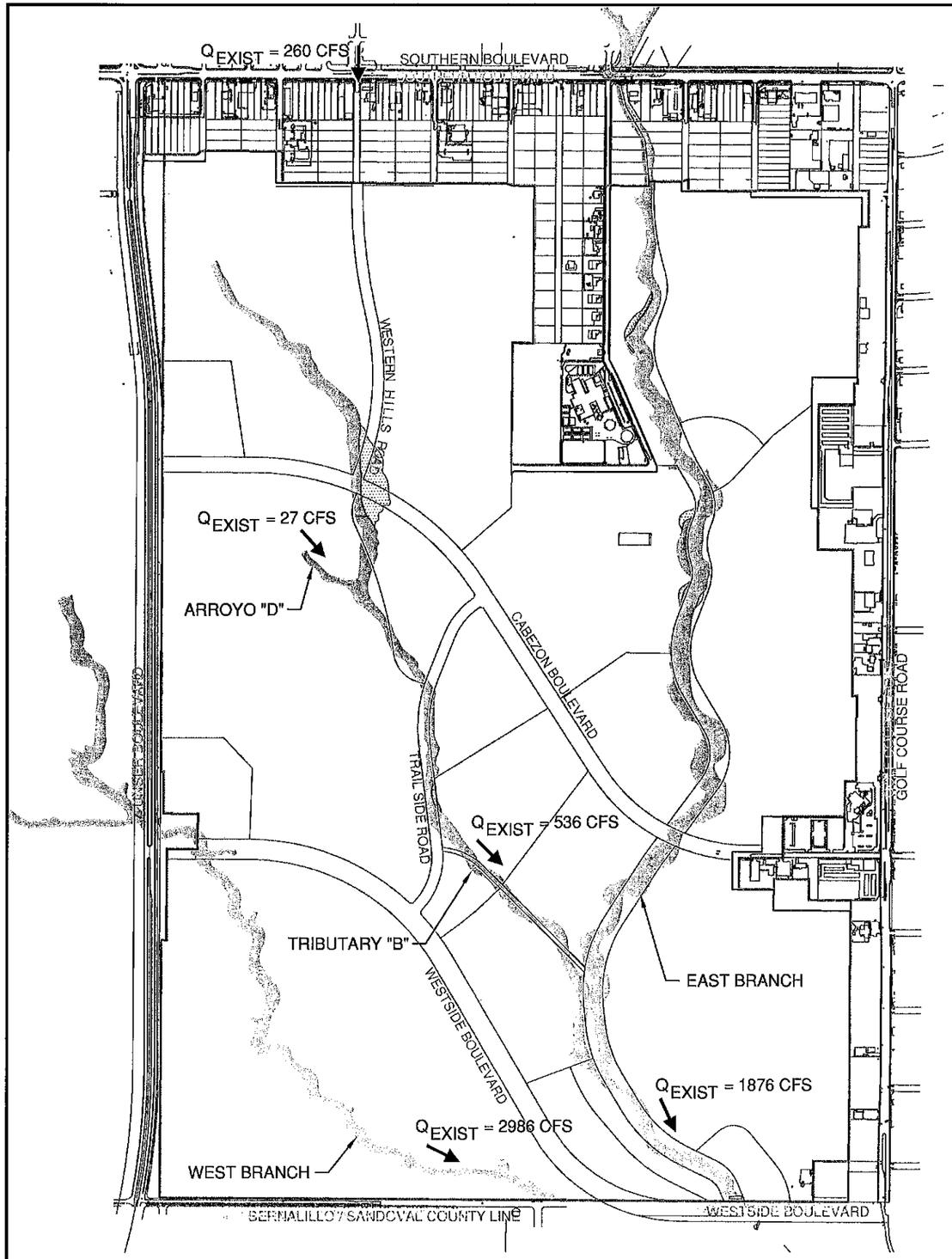

LEGEND

SPECIAL FLOOD HAZARD AREAS
INUNDATED BY 100-YEAR FLOOD (ZONE AE)
AS DEFINED BY FEMA

OTHER FLOOD AREAS
(AREAS OF 500 YEAR FLOOD)

NOTE: TAKEN FROM FLOOD INSURANCE RATE MAP (FIRM)
MAP NUMBER: 35043C0894 C
EFFECTIVE DATE: JULY 16, 1996

NOTE

EXISTING FLOWS BASED ON FEMA STUDY

N

1000 0 500 1000 2000
GRAPHIC SCALE (IN FEET) 1" = 1000 ft.

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FIGURE 3
CABEZON - PHASE 1
DRAINAGE MANAGEMENT PLAN

EXISTING FLOWS &
FEMA FLOOD PLAINS

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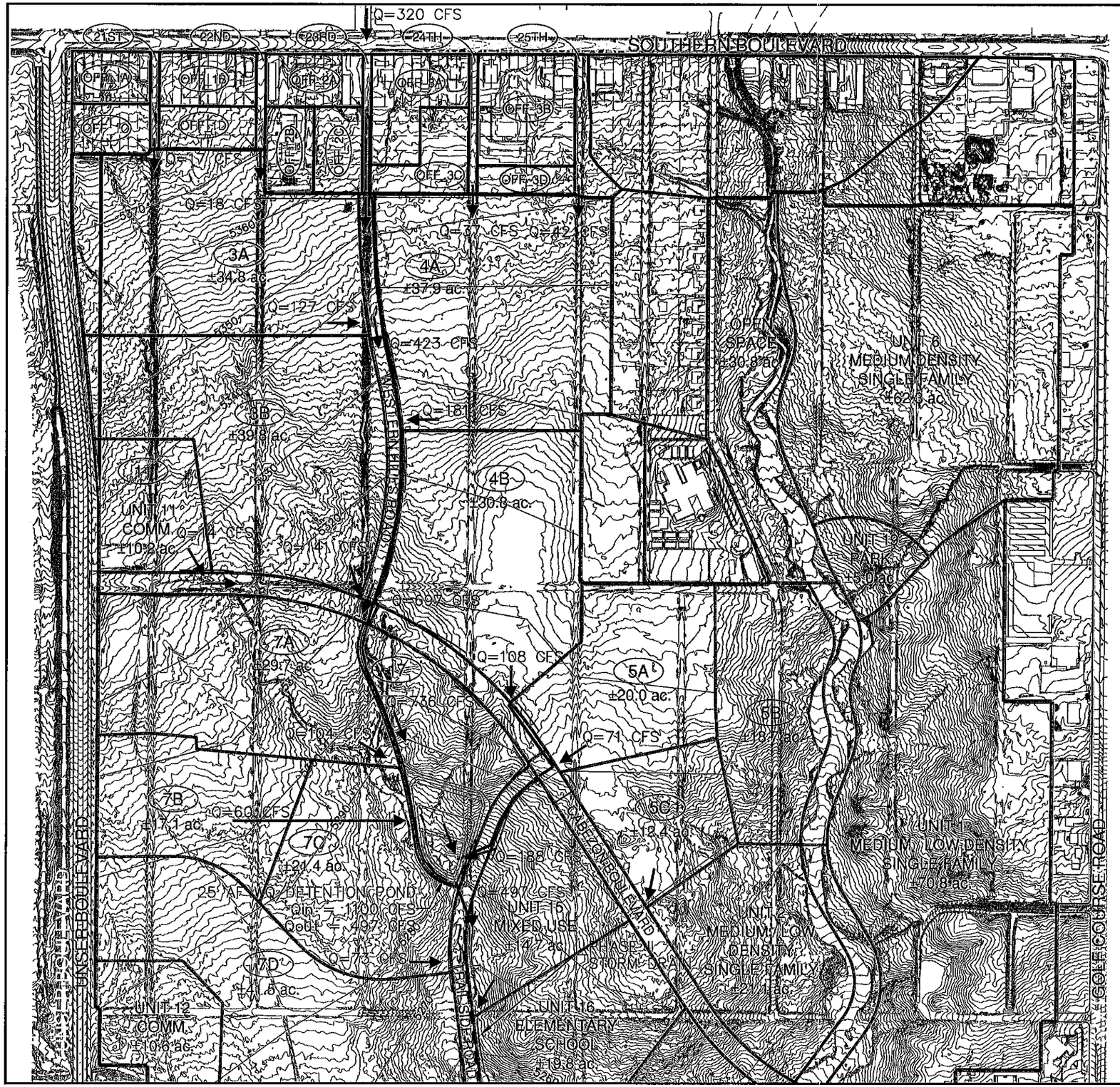

LEGEND

- PHASE 1
- 7A — PROPOSED BASIN BOUNDARY LABEL
- PROPOSED BASIN BOUNDARY
- FLOW ARROW
- FLOW ARROW
- STORM DRAIN LINE
- 5300 — MAJOR ROUGH GRADING CONTOUR (10' INTERVAL)
- PHASE 2 STORM DRAIN

N

600 0 300 600 1200

GRAPHIC SCALE (IN FEET) 1" = 600 ft.

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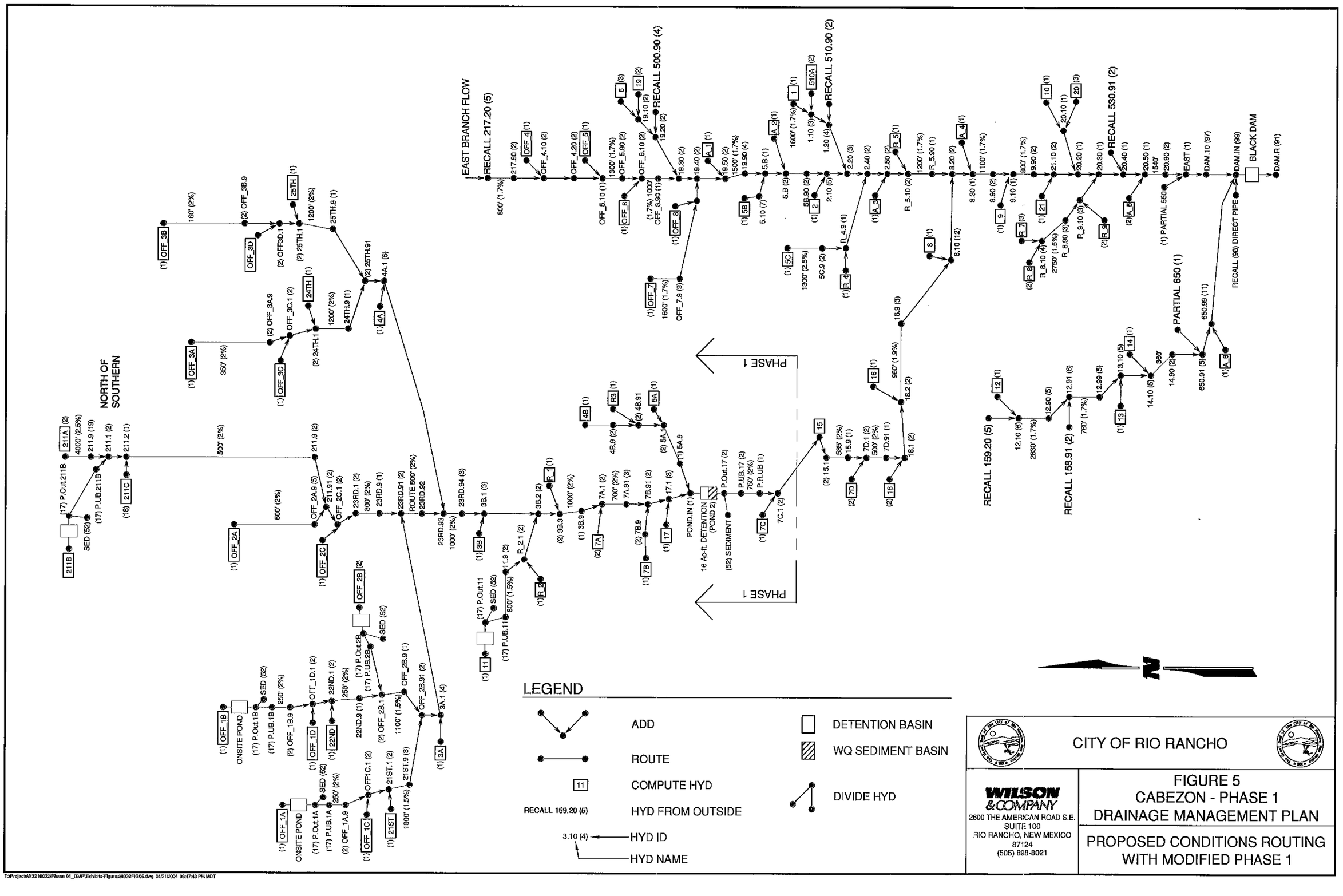
FIGURE 4
CABEZON - PHASE 1
DRAINAGE MANAGEMENT PLAN

PHASE 1
BASIN & FLOW LOCATIONS



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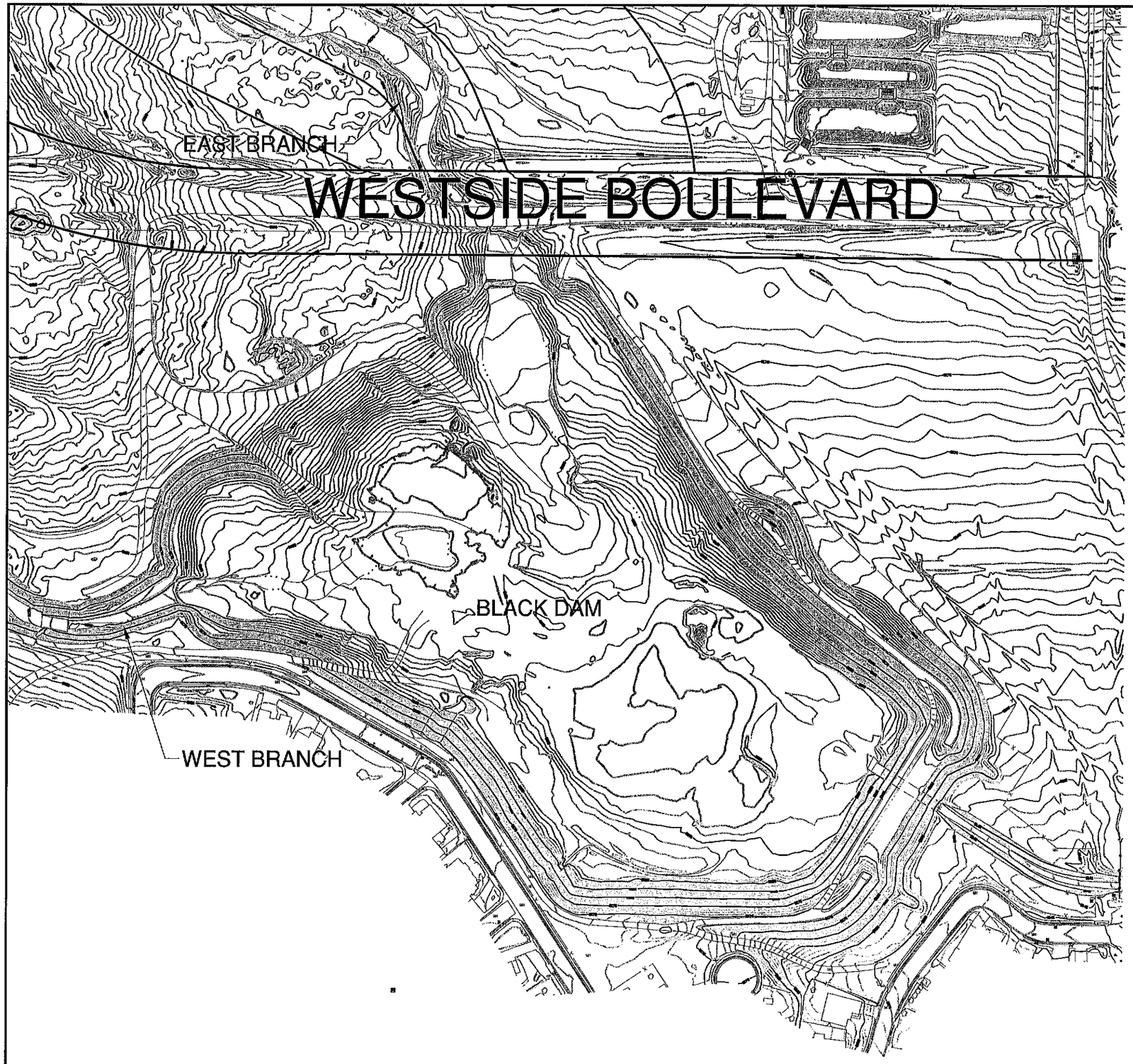

STORAGE RATING CURVE TABLE

Elevation (feet)	Incremental Volume (cubic feet)	Cumulative Volume (cubic feet)	Acre-Feet (feet)	SurfaceArea (square feet)
5148.00	2902.10	2902.10	0.10	8935.60
5149.00	207701.40	210603.50	4.80	205637.90
5150.00	220139.60	430743.10	9.90	319357.00
5151.00	393872.70	824615.70	18.90	451569.50
5152.00	406166.30	1230782.00	28.30	494995.40
5153.00	451813.90	1682595.80	38.60	530895.70
5154.00	500511.30	2183107.10	50.10	572649.40
5155.00	543290.50	2726397.60	62.60	603091.20
5156.00	581581.60	3307979.20	75.90	633021.10
5157.00	617944.30	3925923.60	90.10	670280.10
5158.00	655630.60	4581554.10	105.20	712476.40
5159.00	693088.10	5274642.20	121.10	752977.90
5160.00	723941.80	5998584.00	137.70	771818.90
5161.00	747001.30	6745585.30	154.90	788731.90
5162.00	767851.00	7513436.30	172.50	808768.80
5163.00	788759.50	8302195.80	190.60	828446.70
5164.00	811694.80	9113890.60	209.20	857403.10
5165.00	832995.70	9946886.30	228.30	889818.60
5166.00	853634.40	10800520.80	247.90	914272.00
5167.00	876263.40	11676784.10	268.10	936044.60
5168.00	896379.80	12573163.90	288.60	952232.30
5168.25	226971.30	12800135.30	293.90	956111.60

*ELEVATIONS IN NAVD 83

SPILLWAY

N

200 0 100 200 400

GRAPHIC SCALE (IN FEET) 1" = 200 ft.

CITY OF RIO RANCHO

WILSON &COMPANY
2600 THE AMERICAN ROAD S.E.
SUITE 100
RIO RANCHO, NEW MEXICO
87124
(505) 898-8021

FIGURE 6
CABEZON - PHASE 1
DRAINAGE MANAGEMENT PLAN

BLACK DAM
CURRENT TOPOGRAPHY

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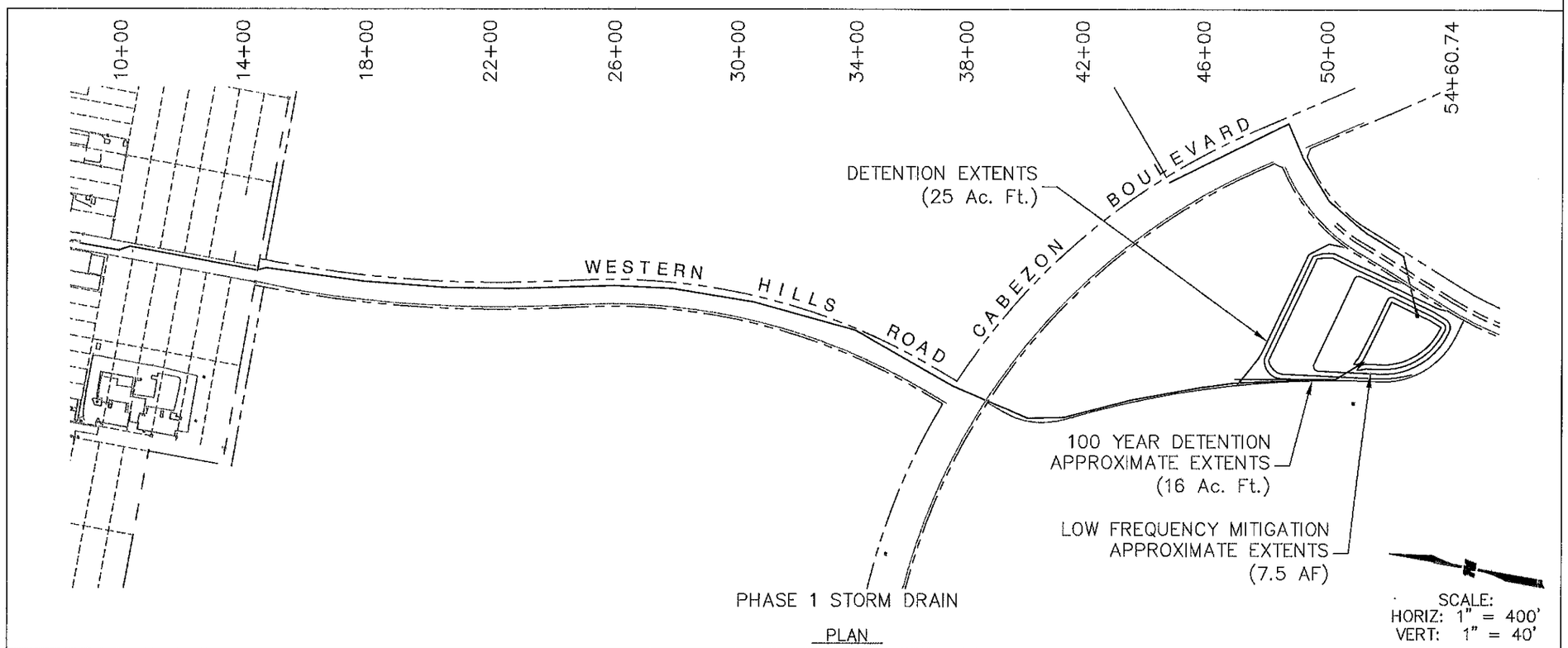

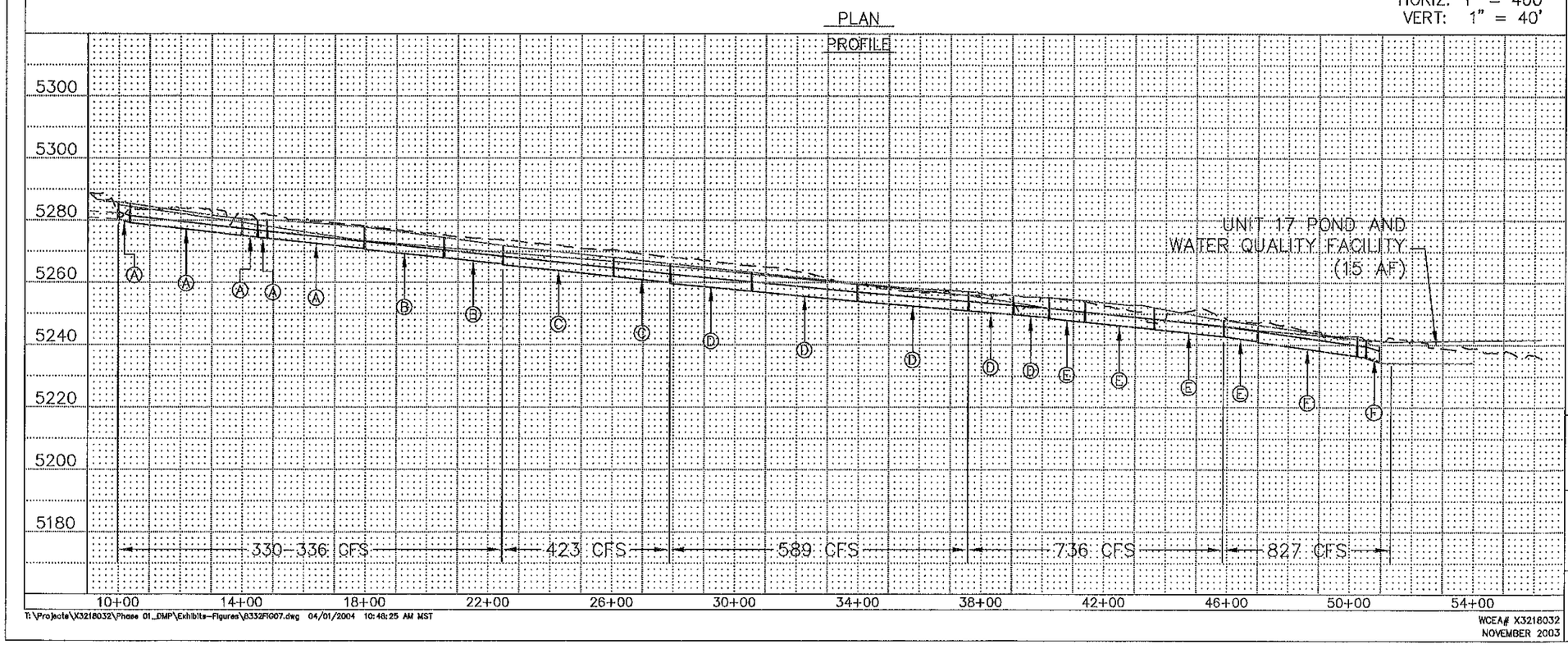

T:\Projects\X3218032\Phase 01_DMP\Exhibits-Figures\8332FIG07.dwg 04/01/2004 10:48:25 AM MST

WCEA# X3218032
NOVEMBER 2003

LEGEND (PLAN)

- STORM DRAIN
- POND EXTENTS

KEYED NOTES:

- Ⓐ 54" STORM DRAIN @ 2.10-6.28%
- Ⓑ 60" STORM DRAIN @ 2.10%
- Ⓒ 66" STORM DRAIN @ 2.10%
- Ⓓ 72" STORM DRAIN @ 1.67-1.90%
- Ⓔ 78" STORM DRAIN @ 2.01%
- Ⓕ 84" STORM DRAIN @ 2.77%

NOTE:

T-TYPE MANHOLES ASSUMED AT EACH STORM DRAIN BEND AND AT LEAST EVERY 450 FEET

LEGEND (PROFILE)

- STORM DRAIN
- EXISTING GRADE
- HYDRAULIC GRADE LINE
- FINISH GRADE (APPROXIMATE)

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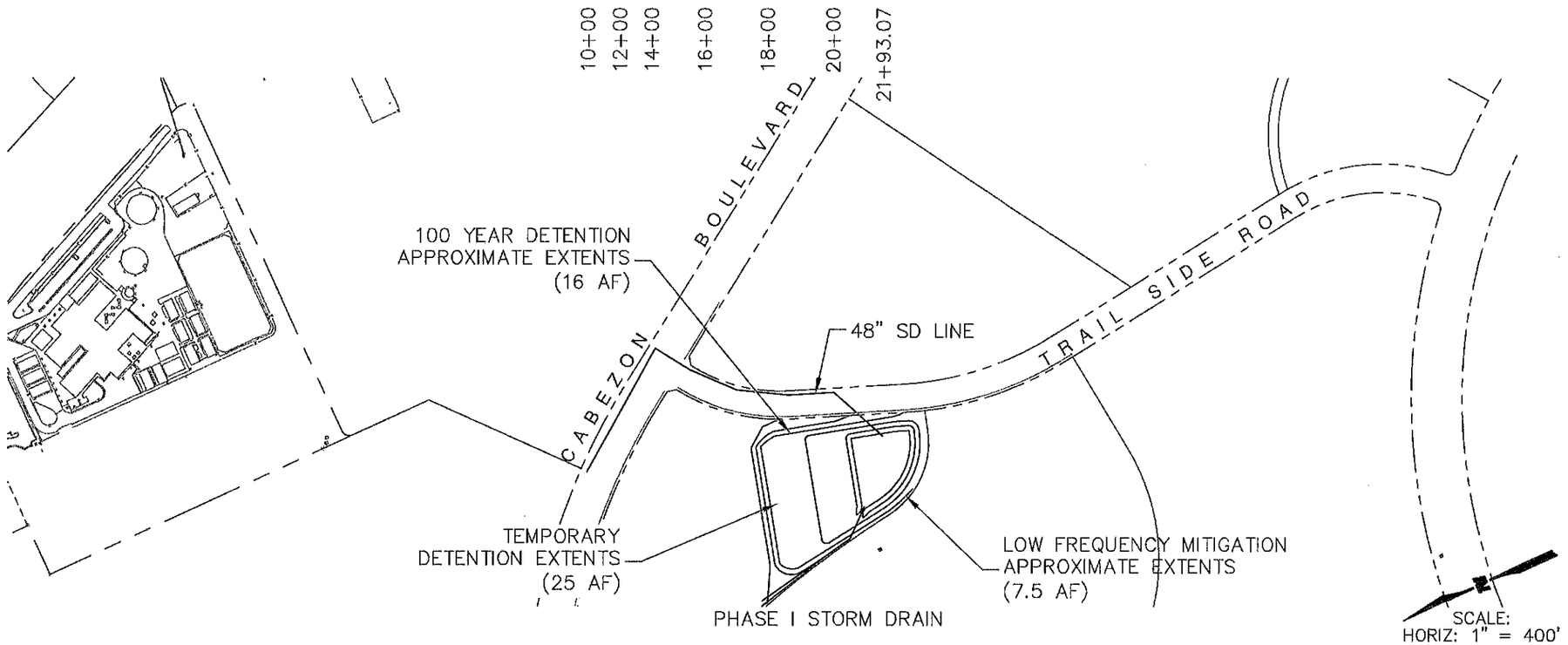
CITY OF RIO RANCHO

FIGURE 7
CABEZON-PHASE 1
DRAINAGE MANAGEMENT PLAN

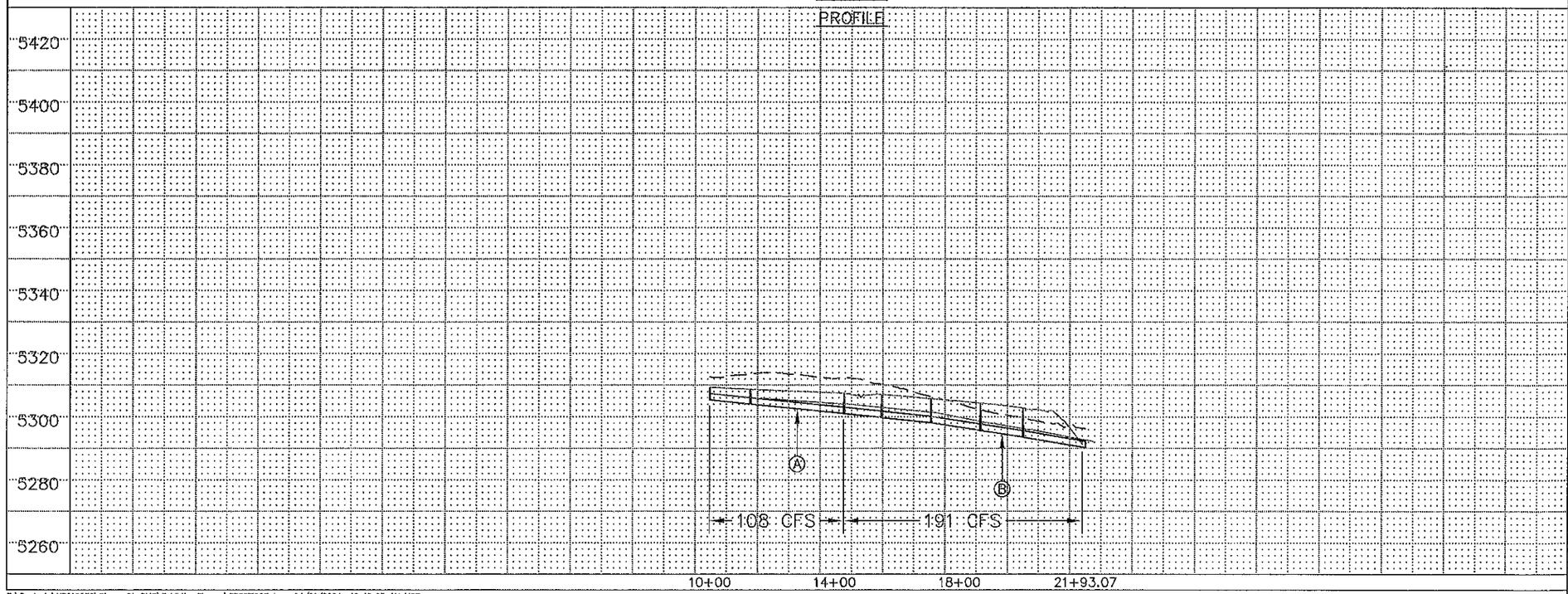
PHASE 1 STORM DRAIN
STA 10+00 TO STA 51+32.25



PLAN

SCALE:
HORIZ: 1" = 400'
VERT: 1" = 40'

PROFILE



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WCEA# X3218032
NOVEMBER 2003

LEGEND (PLAN)

- STORM DRAIN
- POND EXTENTS

LEGEND (PROFILE)

- STORM DRAIN
- EXISTING GRADE
- HYDRAULIC GRADE LINE
- FINISH GRADE (APPROXIMATE)

KEYED NOTES:

Ⓐ 48" STORM DRAIN @ 2.00%
Ⓑ 48" STORM DRAIN @ 3.00%

NOTE:

T-TYPE MANHOLES ASSUMED AT EACH STORM DRAIN BEND AND AT LEAST EVERY 450 FEET

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CITY OF RIO RANCHO

FIGURE 8
CABEZON-PHASE 1
DRAINAGE MANAGEMENT PLAN

PHASE 1 STORM DRAIN
STA 0+00 TO STA 21+93.07

APPENDIX A

Hydrology

ANALYSIS OF SUB_BASIN 211

Sub-basin 211 split into three sub-basins; 211A, 211B, and 211C. (See attached)

Sub-basin 211A is the residential area on the northern half of the basin. Percent land treatment types were taken directly from the BLWMP and are: A=0, B=12, C=15, D=73.

Sub-basin 211B is the commercial area just to the north of Southern Boulevard. It is primarily comprised of Southern Plaza but includes The Garden Center, McDonalds, and the Giant Gas Station. The later three have approved drainage plans that call out for limiting the flow rates to the 100 year. A visual inspection confirmed that the specified drainage features are in place and that the Southern Plaza area has extensive retention and detention that is in good condition. The sub-basin was modeled as both undeveloped and developed (%D = 85), and then a stage-discharge curve was developed for a detention pond that limits flow to historic levels. The AHYMO input file on diskette has more information.

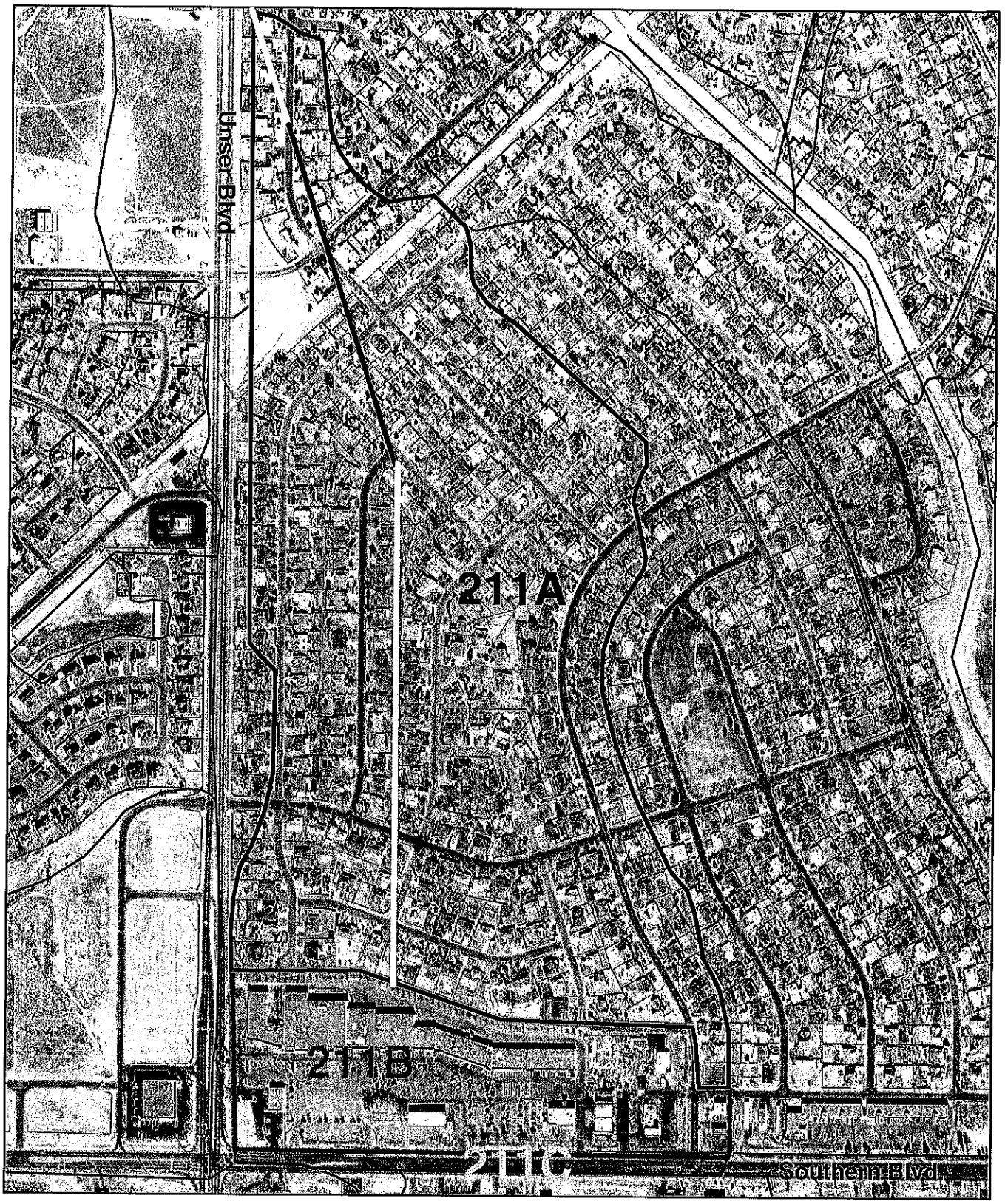
Sub-basin 211C is the portion of Southern Blvd. contained in the original BLWMP sub-basin 211. It is given land treatment type percentages as follows: A=0, B=0, C=10, and D=90.

Time to peak (TP) values were adjusted for the new sub-basins. For both 211B and 211C, the DPM's minimum value of 0.13 hours was used. The TP of sub-basin 211A was calculated to be 0.19 hrs based on the following calculations. Also see attached.

BASIN 211A

FLOW TYPE - DESCRIPTION	REACH LENGTH	SLOPE	K	v	TC	TP
SHEET	400	0.02	1.00	1.41	0.08	0.05
Concentrated	1280	0.0294	3.00	5.14	0.07	0.05
Concentrated	2320	0.0257	3.00	4.81	0.13	0.09
	4000			TOTAL		**0.19**

Offsite Sub-basin 211

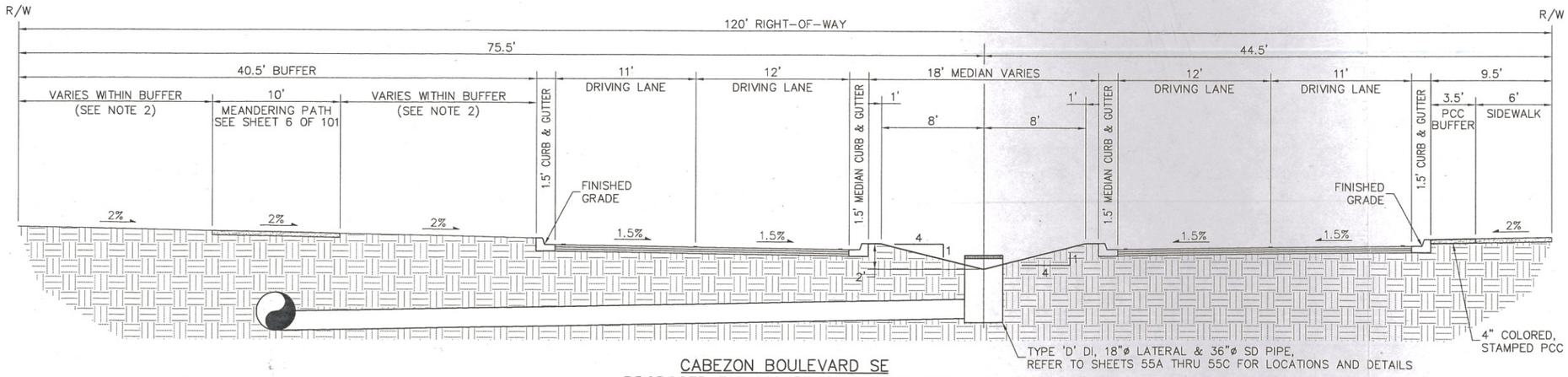


Lines used to calculate time to peak for sub-basin 211A shown in yellow and red: first yellow line is 400 feet long and represents length of sheet flow. Red line is 1280 feet long and represents concentrated flow. Final yellow line is 2320 feet long and also represents concentrated flow.

500 Feet

N

MEDIAN BIOSWALE



CABEZON BOULEVARD SE
PROPOSED TYPICAL ROADWAY SECTION

STATION 11+82.48 TO 15+97.00, STATION 19+41.74 TO 24+23.77, STATION 27+66.93 TO 31+25.61
STATION 34+71.64 TO 37+66.19, STATION 41+17.63 TO 42+00.00
SCALE: 1"=6'

D(s16.66H
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =02/25/2004
INPUT FILE = T:\Projects\X3218032\CLOMR\AHYMO\one_24\Cab_0204.DAT USER NO.= AHYMO-I-9702a01000C05-AH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= .00
*S 01/20/2004 ADJUSTMENTS TO THIS MODEL FROM THE BLWMP										
*S "DOUBLE" COUNTING OF STREETS IN LAND TREATMENT REMOVED										
*S SUB-BASIN 211 ROUTED ADJUSTED TO EXISTING FIELD CONDITIONS (XING SOUTHERN)										
*S NOTHING ELSE HAS BEEN ADJUSTED - USER ACCEPTS THIS MODEL AS IS AND TAKES THE										
*S RESPONSIBILITY FOR CHECKING IT FOR ACCURACY PRIOR TO USE...										
*S * * * FUTURE CONDITIONS MODEL - ALTERNATE B * * * * * * * * * * * * * * *										
*S * * * 3 DAMS ON THE WEST BRANCH * * * * * * * * * *										
*S * * * UNSER GATEWAY DAM, AND WATER QUALITY DIVERSIONS * * * * * * * * * *										
*S * * * ROUTING WITH MCUNGE METHOD AFTER WATER QUALITY DIVERSIONS ARE * * * *										
*S * * * UTILIZED TO ADJUST FOR THE UNSTABLE HYDROGRAPHS WITH A STEEP SLOPE * *										
*S * * * AFTER MODIFICATION TO REDIRECT THE FIRST FLUSH OF 0.25" RUNOFF FOR SWQ										
*S 2/25/04										
*S CABEZON DEVELOPMENT DRAINAGE MASTER PLAN, PHASE 1 OF DEVELOPMENT										
*S THIS MODEL TAKES CABEZON PHASE 1 INTO THE MODIFIED BLWMP MODEL										
*S DEVELOPED BY ASCG (1/20/04) TO ASSESS CABEZON'S IMPACT ON BLACK DAM										
*S DELETED SECTIONS FROM THE BLWMP MODEL ARE COMMENTED OUT IN THIS MODEL										
*S										
RAINFALL TYPE= 2										
*S**********										RAIN24= 2.703
*S BEGINNING OF THE BLACK ARROYO WEST BRANCH										
*S**********										
*S LISBON CHANNEL NORTH OF TULIP										
*S *										
SEDIMENT BULK										
COMPUTE NM HYD	101.00	-	1	.33970	593.56	32.325	1.78418	1.600	2.730	PK BF = 1.18
ROUTE	101.90	1	2	.33970	600.17	32.325	1.78418	1.600	2.761	PER IMP= 48.00
COMPUTE NM HYD	102.00	-	1	.25390	380.86	17.629	1.30186	1.550	2.344	
ADD HYD	102.10	1& 2	3	.59360	971.95	49.953	1.57788	1.600	2.558	PER IMP= 26.00
ROUTE	102.90	3	4	.59360	986.45	49.954	1.57788	1.600	2.597	
COMPUTE NM HYD	103A	-	1	.18030	304.30	13.521	1.40612	1.550	2.637	PER IMP= 28.00
*S *										
*S START OF LISBON CHANNEL AT TULIP AND INFLOW TO DAM										
*S *										
ADD HYD	103A.90	1& 4	3	.77390	1272.22	63.475	1.53786	1.600	2.569	
*S ROUTE 103A.90 THRU LISBON @ TULIP DAM/POND										
ROUTE RESERVOIR	TULIS.DAM	3	4	.77390	4.59	10.507	.25457	20.700	.009	AC-FT= 55.125
*S **********DIVIDE HYD TO UNBULK BY 3% **********										
DIVIDE HYD	UNBULK	4	4	.75068	4.46	10.192	.25457	20.700	.009	
	SEDIMENT	and	51	.02322	.14	.315	.25457	20.700	.009	
*S ROUTE IN PIPE TO LISBON CHANNEL										
*S * * * * * AP=TULIS.90 *										
ROUTE	TULIS.90	4	3	.75068	4.46	10.175	.25415	20.750	.009	
*S *										
*S START OF LISBON CHANNEL AT TULIP										
*S *										
SEDIMENT BULK										
COMPUTE NM HYD	103B	-	1	.08950	162.97	6.029	1.26312	1.500	2.845	PK BF = 1.06
*S ADD 103B TO PREVIOUS HYDROGRAPHS FOR TOTAL Q IN LISBON CHANNEL AT										PER IMP= 28.00
*S DOWNSTREAM END OF BASIN 103B										
ADD HYD	103B.10	1& 3	3	.84018	163.21	16.205	.36163	1.500	.304	
*S ROUTE 103B.10 THRU 104B TO 104B.90										
ROUTE	104B.90	3	4	.84018	163.14	16.199	.36151	1.500	.303	

```
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S START OF SUNSET CHANNEL
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

                                FROM   TO                    PEAK        RUNOFF                  TIME TO    CFS       PAGE =   2
                  HYDROGRAPH    ID     ID        AREA        DISCHARGE   VOLUME      RUNOFF      PEAK       PER
COMMAND           IDENTIFICATION NO.   NO.       (SQ MI)     (CFS)       (AC-FT)     (INCHES)    (HOURS)    ACRE      NOTATION

SEDIMENT BULK
                                                                                                                      PK BF =      1.18
COMPUTE NM HYD         106A1     -      1        .11660      192.09       9.032      1.45241     1.550      2.574   PER IMP=    33.00
ROUTE                 106A.90    1      3        .11660      187.83       9.032      1.45242     1.600      2.517
COMPUTE NM HYD          104A     -      1        .18340      419.56      17.201      1.75857     1.500      3.575   PER IMP=    45.00
ADD HYD               104.10    3& 1    1        .30000      560.17      26.233      1.63958     1.500      2.918
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S ROUTE 104.10 THROUGH PROPOSED SUNSET @ TULIP POND/DAM
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ROUTE RESERVOIR      TUSUN.DAM   1      2        .30000        4.75      10.176       .63597     3.600       .025   AC-FT=      20.921
*S *************DIVIDE HYD TO UNBULK BY 3% **********************
DIVIDE HYD            UNBULK     2      2        .29100        4.61       9.870       .63597     3.600       .025
                    SEDIMENT    and    52        .00900         .14        .305       .63597     3.600       .025
*S ROUTE IN PIPE TO LISBON CHANNEL
ROUTE                TUSUN.90    2      3        .29100        4.61       9.838       .63391     3.700       .025
SEDIMENT BULK
                                                                                                                      PK BF =      1.06
COMPUTE NM HYD          104B     -      1        .03550       72.78       2.991      1.57974     1.500      3.203   PER IMP=    45.00
ADD HYD               104.20    1& 3    5        .32650       73.14      12.829       .73674     1.500       .350
*S LISBON CHANNEL AFTER SUNSET CHANNEL CONFLUENCE (HYD=104B.1)
ADD HYD               104.30    5& 4    3       1.16668      236.28      29.028       .46652     1.500       .316
ROUTE                 104.90     3      4       1.16668      221.37      28.944       .46516     1.550       .296
SEDIMENT BULK
                                                                                                                      PK BF =      1.06
COMPUTE NM HYD        105.00     -      1        .15090      233.80      12.980      1.61284     1.600      2.421   PER IMP=    44.00
*S LISBON CHANNEL AFTER SUB-BASIN 105
ADD HYD               105.10    1& 4    5       1.31758      439.44      41.924
ROUTE                 105.90     5      4       1.31758      445.57      41.897       .59660     1.550       .521
                                                                                      .59622     1.600       .528
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S START OF SUGAR CHANNEL AT TULIP
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
COMPUTE NM HYD         106A2     -      1        .13590      224.60       9.457      1.30471     1.500      2.582   PER IMP=    33.00
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S BALI CHANNEL
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
COMPUTE NM HYD          106B     -      3        .15220      265.08      12.921      1.59175     1.550      2.721   PER IMP=    45.00
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S SUGAR CHANNEL INCLUDING CONFLUENCE WITH BALI CHANNEL
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ADD HYD              106B.10    1& 3    5        .28810      484.54      22.377      1.45634     1.550      2.628
*S   ROUTE 106B.10 TO 106C.90 (TO CONFLUENCE OF LISBON & SUGAR CHLS) (106C)
ROUTE                106B.90     5      1        .28810      489.71      22.377      1.45635     1.550      2.656
COMPUTE NM HYD          106C     -      3        .04840       63.20       2.672      1.03493     1.550      2.040   PER IMP=    22.00
ADD HYD              106C.10    1& 3    5        .33650      552.91      25.049      1.39573     1.550      2.567
*S * * * * AP 106.90 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S    LISBON CHANNEL AFTER CONFLUENCE WITH SUGAR CHANNEL
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ADD HYD               106.20    5& 4    5       1.65408      986.40      66.946       .75887     1.550       .932
ROUTE                 106.91     5      2       1.65408      975.89      66.908       .75844     1.600       .922
COMPUTE NM HYD        107.00     -      1        .03580       77.45       3.234      1.69355     1.500      3.380   PER IMP=    49.00
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S    LISBON CHANNEL AFTER ADDING SUB-BASIN 107
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ADD HYD               107.10    1& 2    5       1.68988     1044.14      70.141       .77825     1.550       .965
COMPUTE NM HYD        109.00     -      1        .08640      143.67       7.775      1.68735     1.600      2.598   PER IMP=    49.00
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

```
*S   BALTIC CHANNEL
*S   FLOW AT CASCADE RD @ 600 FT. W. OF COMANCHE RD.  (HYD. 109)
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
COMPUTE NM HYD          110.00    -     3        .05090      94.74       4.431      1.63237     1.550     2.908 PER IMP=   46.00
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S   ARKANSAS CHANNEL INCLUDING FLOW FROM BALTIC CHANNEL
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

                                  FROM   TO                     PEAK        RUNOFF                  TIME TO    CFS       PAGE =    3
                   HYDROGRAPH      ID    ID         AREA      DISCHARGE     VOLUME      RUNOFF       PEAK      PER
COMMAND          IDENTIFICATION    NO.   NO.      (SQ MI)       (CFS)      (AC-FT)     (INCHES)    (HOURS)    ACRE      NOTATION

ADD HYD                 110.10   1& 3   6        .13730      236.46      12.207     1.66696     1.550     2.691
ROUTE                   110.90    6     2        .13730      235.00      12.207     1.66697     1.550     2.674
COMPUTE NM HYD          108.00    -     1        .06720      128.69       6.686     1.86551     1.550     2.992 PER IMP=   59.00
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S     ARKANSAS CHANNEL INCLUDING FLOW FROM BALTIC CHANNEL BEFORE CONFLUENCE
*S     WITH LISBON CHANNEL
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S     LISBON AVE. @ 250 FT.  N. OF HOOD RD.
*S
ADD HYD                 108.10   1& 2   6        .20450      363.70      18.893     1.73221     1.550     2.779
*S * * * * AP 108.91 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S     LISBON CHANNEL AFTER ADDING ARKANSAS CHANNEL FLOWS
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ADD HYD                 108.20   5& 6   5       1.89438     1407.84      89.034      .88123     1.550     1.161
ROUTE                   108.90    5     2       1.89438     1416.47      88.958      .88048     1.600     1.168
COMPUTE NM HYD          111.00    -     1        .11590      212.18      10.915     1.76575     1.550     2.861 PER IMP=   54.00
*S * * * * * * * * * * * *  AP 111.10 * * * * * * * * * * * * * * * * * * * * *
*S     LISBON CHANNEL DISCHARGE @ SOUTHERN BLVD
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ADD HYD                 111.10   1& 2   5       2.01028     1617.59      99.873      .93152     1.600     1.257
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S START OF LISBON ARROYO
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ROUTE                   111.90    5     2       2.01028     1625.57      99.825      .93107     1.600     1.263
SEDIMENT BULK                                                                                                       PK BF =      1.18
COMPUTE NM HYD          116.00    -     1        .03190       82.45       3.612     2.12321     1.500     4.038 PER IMP=   61.00
ADD HYD                 116.10   1& 2   5       2.04218     1682.52     103.438      .94970     1.600     1.287
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * *   END LISBON CHANNEL AND LISBON ARROYO WATERSHED * * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * *   START IVORY WATERSHED                          * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
SEDIMENT BULK
*S * * * PECOS/RODEO CHANNEL                                       * * * * * * * * * *          PK BF =      1.06
COMPUTE NM HYD          114.00    -     1        .06980      124.84       5.739     1.54175     1.550     2.795 PER IMP=   41.00
ROUTE                   114.90    1     2        .06980      125.41       5.739     1.54176     1.550     2.807
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * SPUR CHANNEL                                       * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
COMPUTE NM HYD          115.00    -     1        .12520      212.43      11.634     1.74233     1.600     2.651 PER IMP=   52.00
ADD HYD                 115.10   1& 2   6        .19500      335.09      17.374     1.67053     1.550     2.685
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * IVORY CHANNEL                                      * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
COMPUTE NM HYD          113.00    -     1        .04770      105.53       4.647     1.82682     1.500     3.457 PER IMP=   57.00
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * CONFLUENCE OF IVORY AND SPUR                              * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
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ADD HYD               113.10  1& 6   6        .24270     431.33     22.021     1.70125   1.550   2.777
*S ******  AP 113.90 * * * *********************
ROUTE                 113.90   6     2        .24270     430.41     22.021     1.70125   1.550   2.771
COMPUTE NM HYD        112.00   -     1        .07360     143.11      6.851     1.74541   1.550   3.038 PER IMP=  52.00
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S    SOUTHERN BLVD. @ 1900 FT. E. OF PECOS LP.
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S    IVORY CHANNEL @ SOUTHERN BLVD
*S ****************** AP 112.10 *********************************************
0
                                FROM   TO                  PEAK       RUNOFF                TIME TO   CFS      PAGE =  4
                  HYDROGRAPH     ID    ID       AREA      DISCHARGE   VOLUME      RUNOFF      PEAK    PER
COMMAND         IDENTIFICATION   NO.   NO.    (SQ MI)      (CFS)     (AC-FT)    (INCHES)   (HOURS)   ACRE     NOTATION

ADD HYD               112.10  1& 2   6        .31630     573.52     28.872     1.71152   1.550   2.833
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * IVORY ARROYO                                     * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ROUTE                 112.90   6     2        .31630     562.86     28.872     1.71153   1.600   2.780
SEDIMENT BULK                                                                                        PK BF =     1.18
COMPUTE NM HYD        117.00   -     1        .12590     291.45     11.998     1.78677   1.500   3.617 PER IMP=  46.00
ADD HYD               117.10  1& 2   6        .44220     820.69     40.870     1.73295   1.550   2.900
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * CONFLUENCE OF IVORY AND LISBON ARROYOS IN PARK   * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ADD HYD               117.20  5& 6   5       2.48438    2450.20    144.307     1.08911   1.600   1.541
COMPUTE NM HYD         118A    -     1        .17330     382.30     15.016     1.62466   1.500   3.447 PER IMP=  38.00
ROUTE                118A.90   1     2        .17330     374.52     15.016     1.62466   1.500   3.377
*S ***************** AP 118A.10 ********************************************
ADD HYD              118A.10  5& 2   5       2.65768    2744.84    159.324     1.12403   1.600   1.614
*S PUNCH AND ADJUST HYDROGRAPH TO DELETE "FIRST FLUSH" RUNOFF AND SEND TO
*S WATER QUALITY PONDS WHICH IS ESSENTIALLY OUT OF THE SYSTEM THROUGH TIMING.
RECALL HYD           118A.10   -     5       2.65770    2744.84    137.138      .96750   1.600   1.614
ROUTE MCUNGE          118.91   5     2       2.65770    2719.68    136.858      .96553   1.650   1.599 CCODE =      .1
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * START OF WEST BRANCH ARROYO                      * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
COMPUTE NM HYD        119.00   -     1        .08640     158.02      6.464     1.40284   1.500   2.858 PER IMP=  28.00
ADD HYD               119.10  1& 2   5       2.74410    2825.93    143.322      .97930   1.650   1.609
COMPUTE NM HYD         120B    -     1        .08640     195.53      7.710     1.67321   1.500   3.536 PER IMP=  39.00
ROUTE                 119.90   5     4       2.74410    2954.15    143.260      .97887   1.650   1.682
ADD HYD              120B.10  1& 4   4       2.83050    3061.66    150.970     1.00007   1.650   1.690
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * START OF TRIBUTARY "C"                           * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
COMPUTE NM HYD          118B    -     1        .06200     136.27      5.372     1.62466   1.500   3.434 PER IMP=  38.00
ROUTE                118B.90   1     2        .06200     128.36      5.372     1.62467   1.550   3.235
COMPUTE NM HYD         120A    -     1        .12780     289.39     11.405     1.67321   1.500   3.538 PER IMP=  39:00
ADD HYD              120A.10  2& 1   5        .18980     406.67     16.777     1.65735   1.500   3.348
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * CONFLUENCE OF TRIBUTARY "C" WITH WEST BRANCH ARROYO * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ADD HYD              120A.20  4& 5   5       3.02030    3312.45    167.747     1.04137   1.650   1.714
COMPUTE NM HYD        155.00   -     1        .12450     277.52     13.645     2.05492   1.550   3.483 PER IMP=  57.00
ADD HYD               155.10  1& 5   9       3.14480    3515.40    181.392     1.08150   1.650   1.747
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * URBAN AREA WEST OF UNSER, EAST OF LISBON CHANNEL, NORTH OF * * * *
*S * * * SOUTHERN AND SOUTH OF TULIP                                * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
SEDIMENT BULK                                                                                        PK BF =     1.06
*S ALL 300 AND 400 SERIES BASINS ARE COMPUTED WITH ORIGINAL TP's FROM      * * *
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*S THE FEMA RESTUDY MODEL * * *

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	300.00	-	2	.14830	224.36	15.649	1.97855	1.650	2.364	PER IMP= 65.00
ROUTE	300.90	2	3	.14830	224.46	15.649	1.97855	1.700	2.365	
ROUTE	300.91	3	2	.14830	224.07	15.649	1.97855	1.700	2.361	
COMPUTE NM HYD	310.00	-	3	.08000	188.80	8.372	1.96228	1.500	3.688	PER IMP= 64.00
ADD HYD	310.10	2& 3	4	.22830	314.49	24.021	1.97285	1.650	2.152	
COMPUTE NM HYD	320.00	-	2	.07690	134.73	7.455	1.81771	1.550	2.737	PER IMP= 57.00
DIVIDE HYD	320.80	2	10	.07087	104.89	6.871	1.81770	1.550	2.312	
	320.81	and	11	.00603	29.84	.584	1.81770	1.550	7.736	
ROUTE	320.90	10	3	.07087	101.36	6.871	1.81771	1.600	2.235	
ADD HYD	320.10	4& 3	4	.29917	415.46	30.892	1.93609	1.650	2.170	
COMPUTE NM HYD	400.00	-	2	.00410	6.55	.181	.82952	1.500	2.495	PER IMP= .00

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	400.10	4& 2	4	.30327	420.27	31.074	1.92113	1.600	2.165	
*S ******** AP 400.30 **********INFLOW INTO WEXFORD POND**********										
*S**										
ROUTE RESERVOIR	400.90	4	5	.30327	142.37	31.074	1.92113	2.150	.733	AC-FT= 11.403
*S ********** AP 400.OUT (BEFORE DIVIDE) **********										
*S **********DIVIDE HYD TO UNBULK TO 3% **********										
DIVIDE HYD	UNBULK	5	1	.29418	138.10	30.141	1.92113	2.150	.733	
	SEDIMENT	and	53	.00910	4.27	.932	1.92113	2.150	.733	
*S DIVIDE INTO PIPE AND SPILLWAY FLOWS AP 400.OUT PIPE AND SPILL **********										
DIVIDE HYD	400.81	1	1	.29333	135.00	30.055	1.92113	1.950	.719	
	400.82	and	3	.00084	3.10	.086	1.92115	2.150	5.739	
ROUTE	400.90	1	6	.29333	135.05	30.055	1.92113	2.000	.719	
ROUTE	400.91	3	2	.00084	2.82	.087	1.93034	2.250	5.224	
ADD HYD	400.20	2& 6	6	.29418	137.82	30.142	1.92116	2.250	.732	
COMPUTE NM HYD	410.00	-	3	.03630	75.54	3.793	1.95920	1.550	3.251	PER IMP= 64.00
ADD HYD	410.10	6& 3	4	.33048	175.98	33.935	1.92533	1.550	.832	
ROUTE	410.90	4	2	.33048	174.66	33.935	1.92533	1.600	.826	
COMPUTE NM HYD	420.00	-	3	.05160	137.89	6.523	2.37033	1.500	4.176	PER IMP= 85.00
ADD HYD	420.10	2& 3	14	.38208	291.42	40.458	1.98543	1.550	1.192	
COMPUTE NM HYD	330.00	-	2	.06330	135.65	6.810	2.01732	1.550	3.348	PER IMP= 67.00
ROUTE	330.90	2	3	.06330	126.42	6.810	2.01733	1.600	3.121	
COMPUTE NM HYD	340.00	-	1	.04580	99.84	4.786	1.95920	1.500	3.406	PER IMP= 64.00
ADD HYD	340.10	1& 3	4	.10910	221.80	11.596	1.99292	1.550	3.177	
COMPUTE NM HYD	430.00	-	2	.00440	9.97	.429	1.82988	1.500	3.542	PER IMP= 57.00
ADD HYD	430.10	2& 4	4	.11350	230.64	12.026	1.98659	1.550	3.175	
ROUTE	430.90	4	3	.11350	228.96	12.026	1.98660	1.550	3.152	
ROUTE	430.91	3	2	.11350	225.54	12.026	1.98660	1.600	3.105	
ADD HYD	430.20	2&14	10	.49558	514.74	52.483	1.98570	1.550	1.623	
COMPUTE NM HYD	440.00	-	2	.01060	24.16	1.045	1.84923	1.500	3.562	PER IMP= 58.00
ROUTE	440.90	11	3	.00603	31.51	.585	1.81899	1.600	8.170	
ROUTE	440.91	3	5	.00603	29.31	.585	1.81899	1.650	7.599	
ADD HYD	440.10	5& 2	4	.01663	45.69	1.630	1.83821	1.600	4.294	
ROUTE	440.92	4	2	.01663	44.17	1.630	1.83825	1.650	4.151	
ROUTE	440.93	2	3	.01663	44.93	1.630	1.83826	1.650	4.222	
ADD HYD	440.20	3&10	14	.51220	546.89	54.113	1.98091	1.550	1.668	
COMPUTE NM HYD	350.00	-	2	.04750	100.75	6.005	2.37033	1.550	3.314	PER IMP= 85.00
ROUTE	350.90	2	3	.04750	102.01	6.005	2.37034	1.600	3.356	
ROUTE	350.91	3	2	.04750	100.48	6.005	2.37034	1.600	3.305	
COMPUTE NM HYD	360.00	-	3	.01450	32.16	1.398	1.80748	1.500	3.466	PER IMP= 56.00
ADD HYD	360.10	2& 3	4	.06200	123.39	7.403	2.23869	1.600	3.110	

*S ADD THE TOTAL FLOW IN 20TH STREET AT THE NORTH SIDE OF SOUTHERN TO THE
*S TOTAL FLOW ROUTED TO THE INTERSECTION FROM THE NORTH AND THE WEST
*S THIS FLOW IS ROUTED UNDER SOUTHERN TO THE UNSER CHANNEL
*S ********** AP 360.20 **********

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ADD HYD              360.20  4&14   5       .57420     664.51      61.516     2.00874   1.550    1.808
ROUTE                360.90    5    2       .57420     664.46      61.516     2.00874   1.550    1.808
*S CONCRETE LINED PORTION OF UNSER CHANNEL
ROUTE                360.91    2    5       .57420     668.99      61.516     2.00875   1.600    1.820
*S EARTH LINED PORTION OF UNSER CHANNEL
ROUTE                360.92    5    2       .57420     580.99      61.516     2.00874   1.700    1.581
SEDIMENT BULK                                                                                          PK BF =      1.18
COMPUTE NM HYD       121.00    -    1       .25810     596.47      32.014     2.32567   1.550    3.611 PER IMP=  70.00
ADD HYD              121.10  1& 2   5       .83230    1077.76      93.530     2.10702   1.600    2.023
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * CONFLUENCE OF UNSER CHANNEL WITH WEST BRANCH ARROYO  * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ADD HYD              121.20  5& 9   5      3.97710    4567.12     274.921     1.29611   1.650    1.794
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S * * * START OF TRIBUTARY "A"                               * * * * * * * * * *
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

                                   FROM  TO                  PEAK      RUNOFF               TIME TO   CFS      PAGE =   6
                     HYDROGRAPH     ID   ID      AREA      DISCHARGE   VOLUME     RUNOFF     PEAK     PER
COMMAND            IDENTIFICATION   NO.  NO.   (SQ MI)      (CFS)     (AC-FT)    (INCHES)  (HOURS)   ACRE       NOTATION

COMPUTE NM HYD       153.00    -    1       .14660     212.32      12.808     1.63810   1.650    2.263 PER IMP=  38.00
ROUTE                153.90    1    4       .14660     212.79      12.808     1.63810   1.650    2.268
COMPUTE NM HYD       150.00    -    1       .08730     177.71       6.811     1.46278   1.500    3.181 PER IMP=  32.00
ROUTE                150.90    1    2       .08730     171.83       6.811     1.46279   1.550    3.075
COMPUTE NM HYD       152.00    -    1       .19840     326.60      15.616     1.47578   1.550    2.572 PER IMP=  32.00
ADD HYD              152.10  1& 2   6       .28570     498.43      22.426     1.47181   1.550    2.726
ROUTE                152.90    6    2       .28570     499.03      22.426     1.47181   1.550    2.729
COMPUTE NM HYD       151.00    -    1       .15130     313.48      12.442     1.54193   1.500    3.237 PER IMP=  34.00
ROUTE                151.90    1    3       .15130     313.13      12.442     1.54194   1.500    3.234
ADD HYD              152.10  2& 3   6       .43700     796.96      34.869     1.49609   1.550    2.850
ROUTE                152.91    6    2       .43700     801.91      34.869     1.49609   1.550    2.867
*S  ************************** AP 153.10 ************************************
ADD HYD              153.10  4& 2   6       .58360     972.40      47.676     1.53176   1.550    2.603
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*S   ROUTE HYD.  THROUGH TRIBUTARY "A" DAM
*S * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
ROUTE RESERVOIR    TRIBA.DAM   6    2       .58360       4.07       9.341      .30012  14.750     .011 AC-FT=    40.658
*S *************DIVIDE HYD TO UNBULK BY 3% **********************
DIVIDE HYD           UNBULK    2    2       .56609       3.94       9.061      .30012  14.750     .011
                   SEDIMENT   and  54       .01751        .12        .280      .30012  14.750     .011
ROUTE                153.91    2    6       .56609       3.94       9.037      .29932  14.800     .011
COMPUTE NM HYD       154.00    -    1       .21910     391.17      16.606     1.42107   1.550    2.790 PER IMP=  29.00
ADD HYD              154.10  1& 6   6       .78519     391.58      25.643      .61233   1.550     .779
ROUTE                154.90    6    2       .78519     379.10      25.598      .61126   1.550     .754
COMPUTE NM HYD       159.00    -    1       .06000     159.77       7.186     2.24569   1.500    4.161 PER IMP=  67.00
ADD HYD              159.10  1& 2   6       .84519     520.63      32.784      .72729   1.550     .962
*S * * * CONFLUENCE OF TRIB. "A" WITH WEST BRANCH ARROYO        * * * * * *
*S   BLACK ARROYO @ UNSER BLVD. (WEST BRANCH)
*S   ***************************** AP 159.20 *********************************
ADD HYD              159.20  5& 6   5      4.82229    4978.11     307.706     1.19642   1.650    1.613
*S PUNCH AND ADJUST HYDROGRAPH TO DELETE "FIRST FLUSH" RUNOFF AND SEND TO
*S WATER QUALITY PONDS WHICH IS ESSENTIALLY OUT OF THE SYSTEM THROUGH TIMING.
RECALL HYD           159.20    -    5      4.82230    4978.11     287.475     1.11776   1.650    1.613
ROUTE MCUNGE         159.90    5    2      4.82230    4953.98     287.230     1.11680   1.700    1.605 CCODE =        .1
COMPUTE NM HYD       253.00    -    1       .07000     163.60       6.541     1.75208   1.500    3.652 PER IMP=  42.00
ADD HYD              253.10  1& 2   5      4.89230    5025.74     293.771     1.12589   1.700    1.605
ROUTE                253.90    5    4      4.89230    4971.41     293.651     1.12543   1.750    1.588
COMPUTE NM HYD       160.00    -    1       .12580     250.88      10.579     1.57677   1.500    3.116 PER IMP=  37.00
ADD HYD              160.10  1& 4   5      5.01810    5073.99     304.231     1.13675   1.750    1.580
*S * * * WEST BRANCH                                   * * * * * * * *
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COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
*S * * * START OF TRIBUTARY "E"						* * * * * * *				
COMPUTE NM HYD	156.00	-	1	.22940	510.82	19.722	1.61200	1.500	3.479	PER IMP= 36.00
ROUTE	156.90	1	2	.22940	483.52	19.722	1.61200	1.550	3.293	
COMPUTE NM HYD	157.00	-	1	.18890	431.87	17.953	1.78204	1.500	3.572	PER IMP= 45.00
ADD HYD	157.10	1& 2	6	.41830	885.55	37.676	1.68879	1.500	3.308	
COMPUTE NM HYD	158.00	-	1	.08160	229.14	10.652	2.44757	1.500	4.388	PER IMP= 77.00
ROUTE	158.90	1	3	.08160	226.56	10.652	2.44758	1.500	4.338	
ADD HYD	158.10	3& 6	6	.49990	1112.11	48.328	1.81264	1.500	3.476	
*S UNSER GATEWAY DAM										
ROUTE RESERVOIR	GATE.POND	6	3	.49990	678.28	48.328	1.81264	1.650	2.120	AC-FT= 11.566
*S **********DIVIDE HYD TO UNBULK BY 3% **********										
DIVIDE HYD	UNBULK	3	3	.48490	657.93	46.878	1.81264	1.650	2.120	
	SEDIMENT	and	55	.01500	20.35	1.450	1.81264	1.650	2.120	
ROUTE	158.91	3	2	.48490	656.27	46.878	1.81265	1.700	2.115	
COMPUTE NM HYD	620.00	-	1	.05640	71.34	4.048	1.34560	1.650	1.976	PER IMP= 27.00
ADD HYD	620.10	1& 2	6	.54130	726.40	50.925	1.76398	1.650	2.097	
ADD HYD	620.20	5& 6	5	5.55940	5765.66	355.156	1.19782	1.750	1.620	
ROUTE	620.90	5	2	5.55940	5762.12	355.124	1.19771	1.750	1.619	
COMPUTE NM HYD	161.00	-	1	.07380	130.03	6.697	1.70159	1.600	2.753	PER IMP= 40.00
*S * * * * AP 620.20 *										
ADD HYD	161.10	1& 2	5	5.63320	5845.18	361.821	1.20431	1.750	1.621	
*S PUNCH AND ADJUST HYDROGRAPH TO DELETE "FIRST FLUSH" RUNOFF AND SEND TO										
*S WATER QUALITY PONDS WHICH IS ESSENTIALLY OUT OF THE SYSTEM THROUGH TIMING.										
RECALL HYD	161.10	-	5	5.63320	5845.18	353.721	1.17735	1.750	1.621	
ROUTE MCUNGE	161.90	5	2	5.63320	5845.18	353.721	1.17735	1.750	1.621	CCODE = .0
COMPUTE NM HYD	650.00	-	1	.05450	102.89	3.186	1.09623	1.500	2.950	PER IMP= 9.00
*S BLACK'S ARROYO (WEST BRANCH) @ DAM										
*S * * * * *AP 650.99 *										
ADD HYD	650.99	1& 2	11	5.68770	5878.81	356.907	1.17657	1.750	1.615	
*S END OF THE BLACK'S ARROYO WEST BRANCH										
*S *										
*S BEGINING OF THE BLACK'S ARROYO EAST BRANCH										
*S * * * START OF LEMA CHANNEL						* * * * * * *				
SEDIMENT BULK										
COMPUTE NM HYD	201.00	-	1	.24840	482.06	23.473	1.77184	1.550	3.032	PK BF = 1.06
ROUTE	201.90	1	2	.24840	489.73	23.473	1.77184	1.550	3.081	PER IMP= 54.00
COMPUTE NM HYD	204.00	-	1	.01500	35.61	1.583	1.97855	1.500	3.710	PER IMP= 65.00
ADD HYD	204.10	1& 2	5	.26340	521.10	25.056	1.78361	1.550	3.091	
*S * * * START OF SNEAD CHANNEL						* * * * * * *				
COMPUTE NM HYD	205.00	-	1	.09140	159.75	8.890	1.82377	1.600	2.731	PER IMP= 57.00
*S * * * CONFLUENCE OF LEMA AND SNEAD						* * * * * * *				
ADD HYD	205.10	5& 1	5	.35480	680.00	33.946	1.79396	1.550	2.995	
ROUTE	205.90	5	2	.35480	673.43	33.946	1.79396	1.550	2.966	
COMPUTE NM HYD	202.00	-	1	.12390	233.94	13.588	2.05625	1.600	2.950	PER IMP= 69.00
ROUTE	202.90	1	4	.12390	192.64	13.588	2.05625	1.650	2.429	
COMPUTE NM HYD	203.00	-	1	.05390	87.87	5.521	1.92050	1.600	2.547	PER IMP= 62.00
*S WESTERN HILLS DR. @ BLACK'S ARROYO (EAST BRANCH)										
*S * * * AP 203.10 *										
ADD HYD	203.10	4& 1	5	.17780	280.28	19.108	2.01509	1.650	2.463	
ADD HYD	203.20	5& 2	5	.53260	918.17	53.055	1.86778	1.600	2.694	
ROUTE	203.91	5	2	.53260	891.54	53.055	1.86778	1.600	2.616	
COMPUTE NM HYD	212.00	-	1	.09950	179.17	10.175	1.91744	1.600	2.814	PER IMP= 62.00
ADD HYD	212.10	1& 2	5	.63210	1070.71	63.230	1.87560	1.600	2.647	
COMPUTE NM HYD	213.00	-	1	.10800	196.80	11.379	1.97548	1.600	2.847	PER IMP= 65.00
ROUTE	213.90	1	4	.10800	198.27	11.379	1.97548	1.600	2.869	
ADD HYD	213.20	5& 4	4	.74010	1268.98	74.609	1.89017	1.600	2.679	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 8 NOTATION
*S * * * START OF NICKLAUS CHANNEL					* * * * * * *					
COMPUTE NM HYD	214.00	-	1	.19090	315.82	18.962	1.86246	1.600	2.585	PER IMP= 59.00
ROUTE	214.90	1	2	.19090	312.74	18.962	1.86246	1.650	2.560	
COMPUTE NM HYD	216.00	-	1	.09660	177.20	9.412	1.82682	1.550	2.866	PER IMP= 57.00
*S COMBINE HYD.'S 214.9 AND 216 AT 216.1										
*S										
*S CASPER DR. @ 150 FT. W. OF NICKLAUS DR.										
*S * * * * * AP 216.10 *										
ADD HYD	216.10	1& 2	6	.28750	477.59	28.374	1.85048	1.600	2.596	
COMPUTE NM HYD	215.00	-	1	.11020	169.42	11.060	1.88180	1.650	2.402	PER IMP= 60.00
ROUTE	215.90	1	3	.11020	156.37	11.060	1.88181	1.700	2.217	
ADD HYD	216.20	6& 3	6	.39770	604.33	39.434	1.85916	1.650	2.374	
*S * * * AFTER SNEAD AND NICKLAUS CONFLUENCE						* * * * * * *				
*S ********** AP 216.30 **********										
ADD HYD	216.30	6& 4	5	1.13780	1857.88	114.043	1.87933	1.600	2.551	
COMPUTE NM HYD	217B	-	2	.06660	73.38	4.246	1.19525	1.650	1.722	PER IMP= 26.00
*S ROUTE 217B DOWN SOUTHERN TO THE PLAYERS CHANNEL										
ROUTE	217B.90	2	3	.06660	72.24	4.246	1.19525	1.700	1.695	
COMPUTE NM HYD	217A	-	1	.19020	240.60	14.113	1.39127	1.650	1.977	PER IMP= 36.00
*S COMBINE HYD.'S 217A AND 217B AT PLAYERS CHANNEL										
ADD HYD	217A.10	1& 3	1	.25680	312.49	18.359	1.34043	1.650	1.901	
*S * * * EAST BRANCH CROSSING SOUTHERN BLVD.						* * * * * * *				
*S SOUTHERN BLVD. @ 2100 FT. W. OF GOLF COURSE RD.										
*S ********** AP 217.20 **********										
ADD HYD	217.20	5& 1	5	1.39460	2159.62	132.401	1.78010	1.600	2.420	
ROUTE	217.90	5	2	1.39460	2167.47	132.401	1.78010	1.650	2.428	
SEDIMENT BULK										PK BF = 1.18
COMPUTE NM HYD	218A	-	1	.16550	312.06	16.960	1.92146	1.600	2.946	PER IMP= 51.00
*S COMBINE HYDS 218A AND 217.90 AT 218.10										
ADD HYD	218.10	1& 2	2	1.56010	2448.55	149.362	1.79510	1.650	2.452	
*S * * * START OF GOLF COURSE CHANNEL						* * * * * * *				
SEDIMENT BULK										PK BF = 1.06
*S GOLF COURSE ROAD STORM DRAIN SYSTEM WITH TWO OUTFALLS UPSTREAM OF										
*S 23RD AVENUE PONDS										
COMPUTE NM HYD	500.00	-	3	.02610	52.98	2.651	1.90437	1.550	3.172	PER IMP= 60.00
*S ROUTE 500 IN STORM DRAIN TO EAST BRANCH										
ROUTE	500.90	3	4	.02610	50.41	2.651	1.90439	1.600	3.018	
*S COMBINE 218A.10 AND 500.90 AT 500.10										
ADD HYD	500.10	4& 2	3	1.58620	2493.46	152.012	1.79689	1.650	2.456	
*S ROUTE 500.10 THROUGH 218B (EAST BRANCH)TO 500.91										
ROUTE	500.91	3	4	1.58620	2485.25	152.012	1.79689	1.650	2.448	
*S COMPUTE 219 ON EAST BRANCH										
SEDIMENT BULK										PK BF = 1.18
COMPUTE NM HYD	219.00	-	1	.16200	314.51	14.919	1.72672	1.550	3.033	PER IMP= 41.00
COMPUTE NM HYD	218B	-	2	.13580	281.64	13.916	1.92146	1.550	3.241	PER IMP= 51.00
*S COMBINE 219 AND 218B AT 219.10										
ADD HYD	219.10	2& 1	2	.29780	596.15	28.835	1.81552	1.550	3.128	
*S COMBINE 500.90 AND 219.10 AT 500.20										
ADD HYD	500.20	2& 4	3	1.88400	2954.42	180.848	1.79984	1.650	2.450	
*S NEXT SECTION OF GOLF COURSE ROAD STORM DRAIN										
SEDIMENT BULK										PK BF = 1.06
COMPUTE NM HYD	510.00	-	1	.04080	75.92	3.729	1.71381	1.550	2.907	PER IMP= 51.00
*S ROUTE 510 TO 510.90 (EAST BRANCH)										
ROUTE	510.90	1	2	.04080	75.06	3.729	1.71382	1.550	2.874	
*S COMBINE 510.90 AND 500.20 AT 510.10										
ADD HYD	510.10	2& 3	2	1.92480	3017.16	184.577	1.79801	1.650	2.449	

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ROUTE                  510.91    2    5       1.92480      3016.09      184.577      1.79801    1.650    2.448
SEDIMENT BULK
COMPUTE NM HYD         220.00    -    1        .08780       189.44        7.267      1.55200    1.500    3.371 PK BF =    1.18
ADD HYD                220.10  1& 5   7       2.01260      3120.75      191.844      1.78728    1.650    2.423 PER IMP=  34.00
*S * * * START OF TRIBUTARY "B"                                    * * * * * * *
*S*****************************************************************************
*S      REVISIONS BEGIN HERE*************************************************
*S      FROM FILE CAB05******************************************************
*S   End of West Branch-  Beginning of East Branch
*S   Starting with the area that will drain to East Branch
*S   through the major storm drain line that runs between
*S   Subbasins 8 and 9
*S*****************************************************************************
SEDIMENT BULK
*S************************************************************
*S Following is the Northwest corner of offsites and Subbasin 3A
*S It will be held on ID=4
*S************************************************************
COMPUTE NM HYD         Off_1A    -    1        .00540        14.55         .683      2.37034    1.500    4.211 PER IMP=  85.00
*S  ROUTE OFF_1A through existing pond
*S  Pond Exists in field; Volume and outflow assumed to
*S  limit flowrate to predevelopment level
*S
ROUTE RESERVOIR      P.Out.1A    1   17        .00540         5.18         .682      2.36893    1.800    1.499 AC-FT=     .200
*S *************DIVIDE HYD TO UNBULK BY 3% ***********************
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COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 9 NOTATION
DIVIDE HYD	P.UB.1A	17	17	.00524	5.03	.662	2.36891	1.800	1.499	
	SEDIMENT	and	52	.00016	.16	.020	2.36892	1.800	1.499	
ROUTE MCUNGE	Off_1A.9	17	2	.00524	5.02	.662	2.36826	1.900	1.499	CCODE = .1
COMPUTE NM HYD	Off_1C	-	1	.00540	10.98	.414	1.43633	1.500	3.178	PER IMP= 34.30
ADD HYD	Off1C.1	1& 2	2	.01064	14.08	1.075	1.89503	1.500	2.069	
COMPUTE NM HYD	21ST	-	1	.00100	2.75	.131	2.45016	1.500	4.303	PER IMP= 90.00
ADD HYD	21ST.1	1& 2	2	.01164	16.84	1.206	1.94270	1.500	2.261	
ROUTE MCUNGE	21ST.9	2	3	.01164	16.40	1.204	1.93931	1.800	2.202	CCODE = .1

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*S************************************************************
COMPUTE NM HYD         Off_1B    -    1        .00560        15.09         .708      2.37034    1.500    4.211 PER IMP=  85.00
*S  ROUTE OFF_1B through existing pond
*S  Pond Exists in field; Total volume = 0.22 ac-ft
*S  limited flowrate to predevelopment level
*S
ROUTE RESERVOIR      P.Out.1B    1   17        .00560         5.26         .709      2.37246    1.800    1.467 AC-FT=     .211
*S *************DIVIDE HYD TO UNBULK BY 3% ***********************
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DIVIDE HYD	P.UB.1B	17	17	.00543	5.10	.687	2.37245	1.800	1.467	
	SEDIMENT	and	52	.00017	.16	.021	2.37245	1.800	1.467	
ROUTE MCUNGE	Off_1B.9	17	2	.00543	5.10	.687	2.37182	1.900	1.467	CCODE = .1
COMPUTE NM HYD	Off_1D	-	1	.00470	8.76	.316	1.25884	1.500	2.911	PER IMP= 27.00
ADD HYD	Off1D.1	1& 2	2	.01013	11.92	1.003	1.85535	1.500	1.838	
COMPUTE NM HYD	22ND	-	1	.00100	2.75	.131	2.45016	1.500	4.303	PER IMP= 90.00
ADD HYD	22ND.1	1& 2	2	.01113	14.67	1.133	1.90875	1.500	2.059	
ROUTE MCUNGE	22ND.9	2	1	.01113	14.42	1.133	1.90904	1.550	2.025	CCODE = .2
COMPUTE NM HYD	Off_2B	-	2	.00470	12.67	.594	2.37033	1.500	4.212	PER IMP= 85.00

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*S  ROUTE OFF_2B through existing pond
*S  Pond Exists in field; Total volume = 0.18 ac-ft
*S  limited flowrate to predevelopment level
*S
ROUTE RESERVOIR      P.Out.2B    2   17        .00470         4.88         .595      2.37213    1.800    1.623 AC-FT=     .160
*S *************DIVIDE HYD TO UNBULK BY 3% ***********************
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COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
DIVIDE HYD	P.UB.2B	17	17	.00456	4.73	.577	2.37212	1.800	1.623	
	SEDIMENT	and	52	.00014	.15	.018	2.37212	1.800	1.623	
ADD HYD	Off2B.1	1&17	2	.01569	18.74	1.710	2.04352	1.550	1.866	
ROUTE MCUNGE	OFF2B.9	2	1	.01569	18.45	1.708	2.04142	1.700	1.837	CCODE = .1
*S ADD 21ST and 22ND STs offsite routed flows										
ADD HYD	Off2B.91	1& 3	2	.02733	33.41	2.912	1.99788	1.750	1.910	
COMPUTE NM HYD	3A	-	1	.05440	122.81	5.207	1.79465	1.500	3.528	PER IMP= 55.40
ADD HYD	3A.1	1& 2	4	.08173	126.90	8.119	1.86261	1.500	2.426	
*S**********										
*S Area coming down 24th to project										
COMPUTE NM HYD	Off_3A	-	1	.00880	23.71	1.112	2.37034	1.500	4.210	PER IMP= 85.00
*S Use roadway cross-section to route Off_3A thru Off_3C although there is										
*S not one presently there										
ROUTE MCUNGE	OFF3A.9	1	2	.00880	23.55	1.112	2.36943	1.550	4.182	CCODE = .1
COMPUTE NM HYD	Off_3C	-	1	.00630	11.73	.423	1.25884	1.500	2.909	PER IMP= 27.00
ADD HYD	Off3C.1	1& 2	2	.01510	33.98	1.535	1.90601	1.550	3.517	
COMPUTE NM HYD	24th	-	1	.00140	3.85	.183	2.45015	1.500	4.297	PER IMP= 90.00
ADD HYD	24TH.1	1& 2	2	.01650	37.29	1.718	1.95216	1.550	3.531	
ROUTE MCUNGE	24TH.9	2	5	.01650	36.94	1.715	1.94857	1.650	3.498	CCODE = .1
*S**********										
COMPUTE NM HYD	Off_3B	-	1	.01190	32.06	1.504	2.37034	1.500	4.209	PER IMP= 85.00
ROUTE MCUNGE	Off_3B.9	1	2	.01190	31.99	1.505	2.37056	1.500	4.201	CCODE = .2
COMPUTE NM HYD	Off_3D	-	1	.00310	5.78	.208	1.25884	1.500	2.913	PER IMP= 27.00
ADD HYD	OFF3D.1	1& 2	2	.01500	37.77	1.713	2.14074	1.500	3.935	
COMPUTE NM HYD	25th	-	1	.00140	3.85	.183	2.45015	1.500	4.297	PER IMP= 90.00
ADD HYD	25TH.1	1& 2	2	.01640	41.62	1.896	2.16713	1.500	3.966	
ROUTE MCUNGE	25TH.9	2	1	.01640	41.28	1.896	2.16814	1.550	3.933	CCODE = .2

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	25TH.91	1& 5	2	.03290	66.41	3.611	2.05798	1.600	3.154	
COMPUTE NM HYD	4A	-	1	.05920	132.50	5.580	1.76716	1.500	3.497	PER IMP= 53.90
ADD HYD	4A.1	1& 2	6	.09210	181.37	9.191	1.87104	1.500	3.077	
*S **********										
*S STORM DRAIN MAIN LINE										
*S **********										
*S 211 from BLWMP (Modified 9/03)										
*s 211A IS RESIDENTIAL AREA, BLWMP LT PERCENTS ARE USED										
COMPUTE NM HYD	211A	-	2	.13920	291.02	15.844	2.13414	1.550	3.267	PER IMP= 73.00
ROUTE MCUNGE	211.90	2	19	.13920	282.57	15.810	2.12959	1.650	3.172	CCODE = .2
*S Predevelopment for 211B, this should have been the										
*S determining flowrate for the Southern Plaza design										
*S Field investigation shows extensive detention/retention										
*S on this site.										
*S Current condition of 211B										
COMPUTE NM HYD	211B	-	1	.03670	98.08	4.640	2.37034	1.500	4.176	PER IMP= 85.00
*S ROUTE 211B through pond										
*S Southern Plaza has ponds, as do the other										
*S individual businesses										
*S Limited flowrate to predevelopment level										
*S										
ROUTE RESERVOIR	P.Out.211B	1	17	.03670	32.57	4.636	2.36875	1.800	1.387	AC-FT= 1.535
*S **********DIVIDE HYD TO UNBULK BY 3% **********										
DIVIDE HYD	P.UB.211B	17	17	.03560	31.59	4.497	2.36874	1.800	1.387	
	SEDIMENT	and	52	.00110	.98	.139	2.36875	1.800	1.387	
*S 211C IS ROW										
COMPUTE NM HYD	211C	-	18	.00520	14.15	.680	2.45015	1.500	4.253	PER IMP= 90.00
ADD HYD	211.10	17&19	2	.17480	312.86	20.307	2.17829	1.650	2.797	
ADD HYD	211.20	2&18	1	.18000	320.41	20.987	2.18615	1.650	2.781	

ROUTE MCUNGE	211.92	1	2	.18000	320.41	20.987	2.18615	1.650	2.781	CCODE =	.0
*S**** ORIGINAL CODE FOR BASIN 211 FOLLOWS AND IS COMMENTED OUT ********											
*S											
*S BEGIN SECOND REVISIONS, PASTED IN FROM CAB05**********											
*S OFFSITE COMMERCIAL BASINS ARE ADDED, AS ARE**********											
*S BASINS FROM CABEZON PHASE 1. BLWMP BASINS 250,**********											
*S 251, 252, AND 254 HAVE BEEN OMITTED AND ARE**********											
*S COMMENTED OUT ABOVE**********											
*S**********											
COMPUTE NM HYD	Off_2A	-	1	.00560	15.09	.708	2.37034	1.500	4.211	PER IMP=	85.00
ROUTE MCUNGE	OFF2A.9	1	5	.00560	14.79	.708	2.37079	1.550	4.126	CCODE =	.2
ADD HYD	211.91	5& 2	2	.18560	329.57	21.695	2.19171	1.650	2.775		
COMPUTE NM HYD	Off_2C	-	1	.00470	8.76	.316	1.25884	1.500	2.911	PER IMP=	27.00
ADD HYD	OFF2C.1	1& 2	2	.19030	334.29	22.010	2.16867	1.650	2.745		
COMPUTE NM HYD	23RD	-	1	.00140	3.85	.183	2.45015	1.500	4.297	PER IMP=	90.00
ADD HYD	23RD.1	1& 2	2	.19170	336.29	22.193	2.17073	1.650	2.741		
ROUTE MCUNGE	23RD.9	2	1	.19170	336.29	22.193	2.17073	1.650	2.741	CCODE =	.0
ADD HYD	23RD.91	1& 4	2	.27343	422.98	30.312	2.07863	1.650	2.417		
ROUTE MCUNGE	23RD.92	2	3	.27343	422.98	30.312	2.07863	1.650	2.417	CCODE =	.0
*S Bring in the Flow from Subbasin 4A											
ADD HYD	23RD.93	3& 6	2	.36553	588.85	39.503	2.02632	1.550	2.517		
ROUTE MCUNGE	23RD.94	2	3	.36553	580.69	39.438	2.02300	1.600	2.482	CCODE =	.1
COMPUTE NM HYD	3B	-	1	.06210	140.74	5.986	1.80728	1.500	3.541	PER IMP=	56.10
ADD HYD	3B.1	1& 3	3	.42763	697.15	45.424	1.99167	1.550	2.547		
*S Run a predevelopment for commercial lot (11) to determine											
*S the maximum permissible pond outflow											
COMPUTE NM HYD	11.00	-	1	.01560	14.02	.388	.46598	1.500	1.405	PER IMP=	.00
*S Real Unit 11											
COMPUTE NM HYD	11.00	-	1	.01560	42.02	1.972	2.37033	1.500	4.209	PER IMP=	85.00
*S ROUTE Unit 11 through pond that will be required											
*S limit flowrate to predevelopment level											

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 11 NOTATION	
*S											
ROUTE RESERVOIR	P.Out.11	1	17	.01560	14.14	1.961	2.35714	1.800	1.416	AC-FT=	.614
*S **********DIVIDE HYD TO UNBULK BY 3% **********											
DIVIDE HYD	P.UB.11	17	17	.01513	13.72	1.902	2.35714	1.800	1.416		
	SEDIMENT	and	52	.00047	.42	.059	2.35714	1.800	1.416		
ROUTE MCUNGE	11.90	17	2	.01513	13.71	1.900	2.35483	1.900	1.415	CCODE =	.1
COMPUTE NM HYD	R_2	-	1	.00670	16.68	.732	2.04713	1.500	3.890	PER IMP=	66.00
ADD HYD	R_2.1	1& 2	2	.02183	23.95	2.632	2.26033	1.500	1.714		
ADD HYD	3B.2	2& 3	2	.44946	720.80	48.056	2.00472	1.550	2.506		
COMPUTE NM HYD	R_1	-	1	.00660	17.36	.802	2.27858	1.500	4.111	PER IMP=	80.00
ADD HYD	3B.3	1& 2	2	.45606	735.75	48.858	2.00868	1.550	2.521		
ROUTE MCUNGE	3B.9	2	1	.45606	735.75	48.858	2.00868	1.550	2.521	CCODE =	.0
COMPUTE NM HYD	7A	-	2	.04640	104.33	4.409	1.78172	1.500	3.513	PER IMP=	54.70
ADD HYD	7A.1	1& 2	2	.50246	826.74	53.267	1.98772	1.550	2.571		
ROUTE MCUNGE	7A.91	2	3	.50246	826.74	53.267	1.98772	1.550	2.571	CCODE =	.0
COMPUTE NM HYD	7B	-	1	.02670	59.52	2.498	1.75423	1.500	3.483	PER IMP=	53.20
ROUTE MCUNGE	7B.9	1	2	.02670	57.98	2.500	1.75545	1.550	3.393	CCODE =	.2
ADD HYD	7B.91	2& 3	2	.52916	884.72	55.766	1.97600	1.550	2.612		
COMPUTE NM HYD	17.00	-	1	.02340	36.85	1.209	.96836	1.500	2.460	PER IMP=	15.00
ADD HYD	17.10	1& 2	3	.55256	918.01	56.975	1.93333	1.550	2.596		
COMPUTE NM HYD	4B	-	1	.04810	108.15	4.571	1.78172	1.500	3.513	PER IMP=	54.70
*S Route 4B to the Intersection of Cabezon and Trailside											
ROUTE MCUNGE	4B.9	1	2	.04810	107.17	4.571	1.78180	1.500	3.481	CCODE =	.2
COMPUTE NM HYD	R_3	-	1	.00520	12.95	.568	2.04713	1.500	3.891	PER IMP=	66.00
*S Add 4B and Road Section 3											

```
ADD HYD              4B.91  1& 2   2        .05330      120.12      5.139     1.80767   1.500    3.521
COMPUTE NM HYD         5A    -     1        .03130       70.94      3.017     1.80728   1.500    3.541 PER IMP=   56.10
*S  Add 4B.91 and 5A at Intersection of Cabezon and Trailside
ADD HYD              5A.1  1& 2   2        .08460      191.06      8.156     1.80752   1.500    3.529
ROUTE MCUNGE         5A.9    2    1        .08460      187.66      8.156     1.80756   1.500    3.466 CCODE =     .2
ADD HYD            POND.IN 1& 3   1        .63716     1099.66     65.131     1.91663   1.550    2.697
*S  ROUTE FLOWS THROUGH Pond/Park in Unit 17
*S  Pond Based on Very Rough Grading of Pond assuming 7 ac-ft of
*S  low storage/WQ and then filling a full sized soccer field
*S  graded at 2%
ROUTE RESERVOIR     P.Out.17    1    2        .63716      512.42     62.227     1.83118   1.900    1.257 AC-FT=   18.725
*S *************DIVIDE HYD TO UNBULK BY 3% ************************
DIVIDE HYD          P.UB.17     2    2        .61805      497.04     60.360     1.83118   1.900    1.257
                   SEDIMENT  and   52        .01911       15.37      1.867     1.83118   1.900    1.257
*S  Route unbulked pond outflow at 17 to southern end of 15
*S  through a 66" pipe
ROUTE MCUNGE        P.Rout.17    2    1        .61805      497.04     60.360     1.83118   1.900    1.257 CCODE =     .0
COMPUTE NM HYD         7C    -     2        .03340       73.17      3.027     1.69956   1.500    3.423 PER IMP=   50.20
ADD HYD              7C.1  1& 2   2        .65145      518.83     60.692      1.74685   1.800    1.244
*S     END REVISIONS FROM CAB05*****************************************
*S     RESUME ORIGINAL BLWMP********************************************
*S*****************************************************************
COMPUTE NM HYD       255.00    -    1        .10720      241.43     10.608     1.85543   1.500    3.519 PER IMP=   58.00
ADD HYD              255.10  1& 2   6        .75865      719.64     71.300     1.76220   1.500    1.482
ROUTE                255.90    6    2        .75865      761.61     71.294     1.76205   1.550    1.569
COMPUTE NM HYD       256.00    -    1        .04940       80.83      2.900     1.10065   1.500    2.557 PER IMP=   22.00
ADD HYD              256.10  1& 2   6        .80805      835.41     74.194     1.72162   1.550    1.615
*S * * * CONFLUENCE OF EAST BRANCH AND TRIBUTARY "B"                * * * * * * *
*S ******************************  AP 256.20 *********************************
ADD HYD              256.20  6& 7   5       2.82065     3825.42    266.039     1.76847   1.650    2.119
*S PUNCH AND ADJUST HYDROGRAPH TO DELETE "FIRST FLUSH" RUNOFF AND SEND TO
*S WATER QUALITY PONDS WHICH IS ESSENTIALLY OUT OF THE SYSTEM THROUGH TIMING.
RECALL HYD           256.20    -    5       2.82060     3825.42    266.039     1.76850   1.650    2.119
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE MCUNGE	256.90	5	2	2.82060	3815.95	266.064	1.76867	1.650	2.114	CCODE = .2
SEDIMENT BULK										PK BF = 1.06
COMPUTE NM HYD	540.00	-	1	.04590	84.89	3.555	1.45218	1.500	2.890	PER IMP= 37.00
ADD HYD	540.10	1& 2	6	2.86650	3869.74	269.619	1.76360	1.650	2.109	
SEDIMENT BULK										PK BF = 1.18
COMPUTE NM HYD	530B	-	1	.07280	163.21	6.695	1.72422	1.500	3.503	PER IMP= 42.00
ADD HYD	540.20	1& 6	4	2.93930	3963.50	276.314	1.76262	1.650	2.107	
*S REMAINDER OF GOLF COURSE ROAD STORM DRAIN SYSTEM										
SEDIMENT BULK										PK BF = 1.06
COMPUTE NM HYD	520.00	-	1	.04090	82.95	3.427	1.57126	1.500	3.169	PER IMP= 43.00
*S ROUTE 520 TO 530C AT 520.90										
ROUTE	520.90	1	3	.04090	76.92	3.427	1.57127	1.550	2.939	
COMPUTE NM HYD	530A	-	2	.14730	291.77	12.212	1.55444	1.500	3.095	PER IMP= 41.00
*S ************************** AP 530A.90 (20PP.IN) **********************										
*S ROUTE 530A THROUGH 20TH AVENUE PARK POND SIZE AND VOLUME ARE ASSUMED										
*S BASED ON FIELD INVESTIGATION BUT NOT ON A COMPREHENSIVE SURVEY.										
*S THIS POND HAS AN OVERFLOW ON THE TWO LOTS ON THE SOUTH EDGE AND										
*S IS MODELED WITH THE PROPOSED EXPANSION.										
ROUTE RESERVOIR	530A.90	2	7	.14730	61.58	12.212	1.55444	1.950	.653	AC-FT= 5.377
*S**************DIVIDE HYD TO UNBULK TO 3% **********************										
DIVIDE HYD	UNBULK	7	7	.14288	59.73	11.845	1.55444	1.950	.653	
	SEDIMENT and		57	.00442	1.85	.366	1.55444	1.950	.653	
*S ************************** AP 20PP.OUT ******************************										

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*S ROUTE 530A.90 "UNBULKED" THROUGH STORM DRAIN TO GOLF COURSE ROAD SYSTEM.
*S OUTFALL PIPE IS 48" CMP.
ROUTE              530A.91   7   99        .14288       59.72       11.845      1.55444    2.000     .653
*S PUNCH HYDROGRAPH FOR FOR GOLF COURSE ROAD STORM DRAIN DESIGN MODEL
*S COMBINE 530A.91 AND 520.90 AT STORM DRAIN OUTFALL TO GCR SYSTEM
ADD HYD            530A.10 99& 3   3        .18378      132.66       15.273      1.55818    1.550    1.128
*S ROUTE COMBINED HYDROGRAPHS IN PIPE TO 23RD AVENUE
ROUTE              530A.92   3   2        .18378      130.52       15.273      1.55819    1.600    1.110
*S COMPUTE 530C
COMPUTE NM HYD       530C    -   1        .02530       50.49        1.940      1.43793    1.500    3.118 PER IMP=  35.00
*S COMPUTE 530D 23RD AVE. POND BASIN
COMPUTE NM HYD       530D    -   3        .01000       15.95         .442       .82952    1.500    2.493 PER IMP=    .00
*S   ADD 530D TO 530C
ADD HYD            530D.10  1& 3   3        .03530       66.44        2.383      1.26557    1.500    2.941
*S ADD ROUTED 520 AND 530A TO 530C
ADD HYD            530D.20  2& 3   2        .21908      185.30       17.655      1.51104    1.550    1.322
*S  ****************************  AP 530.90' (GC.OUT)  ************************
*S ROUTE COMBINED FLOW THROUGH 23RD AVENUE PONDS
*S THE PONDS ARE COMBINED AND TREATED AS ONE TEN ACRE FOOT POND FOR
*S FOR THIS MODEL.
ROUTE RESERVOIR    530.90    2   3        .21908       47.71       17.629      1.50877    3.350     .340 AC-FT=    9.378
*S THIS RESERVOIR NOT UNBULKED
ROUTE              530.91    3   2        .21908       47.66       17.628      1.50870    3.350     .340
*S COMBINE ROUTED FLOW WITH ALL EAST BRANCH FLOW 530B, ETC.
*S  ****************************  AP 530.92  ***********************************
ADD HYD            530.92  2& 4   1       3.15838     3976.40      293.942      1.74501    1.650    1.967
*S ROUTE IN EAST BRANCH TO BLACK DAM
ROUTE              530.93    1   2       3.15838     3957.73      293.935      1.74497    1.650    1.958
SEDIMENT BULK                                                                                  PK BF =    1.18
COMPUTE NM HYD       550.00  -   1        .04970      100.14        3.690      1.39212    1.500    3.148 PER IMP=  25.00
*S ADD 550 TO EAST BRANCH FLOWS
ADD HYD            550.10  1& 2   1       3.20808     4016.38      297.625      1.73950    1.650    1.956
*S ADD WEST BRANCH AND EAST BRANCH FLOWS
*S THIS IS TOTAL FLOW INTO THE BLACK DAM/EXCLUDING SOME PORTIONS
*S OF BERNALILLO COUNTY
ADD HYD            DAM.10 11& 1  97       8.89578     9557.94      654.533      1.37958    1.750    1.679
*S  RECALL HYDROGRAPHS FROM BERNALILLO COUNTY SUBIDIVISIONS
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COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION


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*S  THESE ARE PUNCH HYDROGRAPHS AND FLOWS DRAIN DIRECTLY TO THE DAM POOL
*S  VIA PIPES.
*S                TEXT TAKEN FROM MODEL RECEIVED 1/9/02 * * * * * * * * *
*S  Ridgeview Village(DB4), Los Suenos(DB3), and the Park Hill(DB2)
*S Subdivisions have free developed discharge based on R-1, 5 du/acre density.
*S Flow from some commercial sites east of Unser between Mcmahon and
*S Black Arroyo Blvd. is restricted to historic as per Ridgeview Unit 1 Plan.
*S Developed flow is accommodated from the residential tracts and
*S other commercial tracts. * * * * ** *
RECALL HYD              AP5   -   18        .38090      850.60       31.937      1.57209    1.550    3.489
*S  STONEBRIDGE SUBDIVISON FROM MODEL RECEIVED 1/15/02
RECALL HYD              AP15  -   19        .23850      359.51       17.620      1.38518    1.500    2.355
*S  ADD RECALL HYDROGRAPHS
ADD HYD          DIRECT.PIPE 18&19  98       .61940     1191.72       49.556      1.50012    1.550    3.006
*S  ADD RECALL HYDS TO EAST AND WEST BRANCH FLOWS FOR TOTAL INTO BLACK DAM
ADD HYD            DAM.IN 98&97  99       9.51518    10122.83      704.088      1.38743    1.750    1.662
*S  ROUTE FLOWS THROUGH BLACK DAM RATING CURVE TAKEN FROM BLACK DAM
*S  FILING SHEET RECORD DRAWINGS - BLARD-51  Stamp dated 9/14/91
*S   Record Dwg Stamp 11/9/92 AMAFCA Ref # NW-04-114 Calabacillas
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   *S  THIS IS THE FUTURE CONDITIONS RATING CURVE
   ROUTE RESERVOIR         DAM.R   99   91        9.51518      2713.81      704.052      1.38736    2.300     .446 AC-FT=  288.768
   *S EMERGENCY SPILLWAY CREST IS AT ELEV 5165.75 FT
   FINISH
0(s10H
```
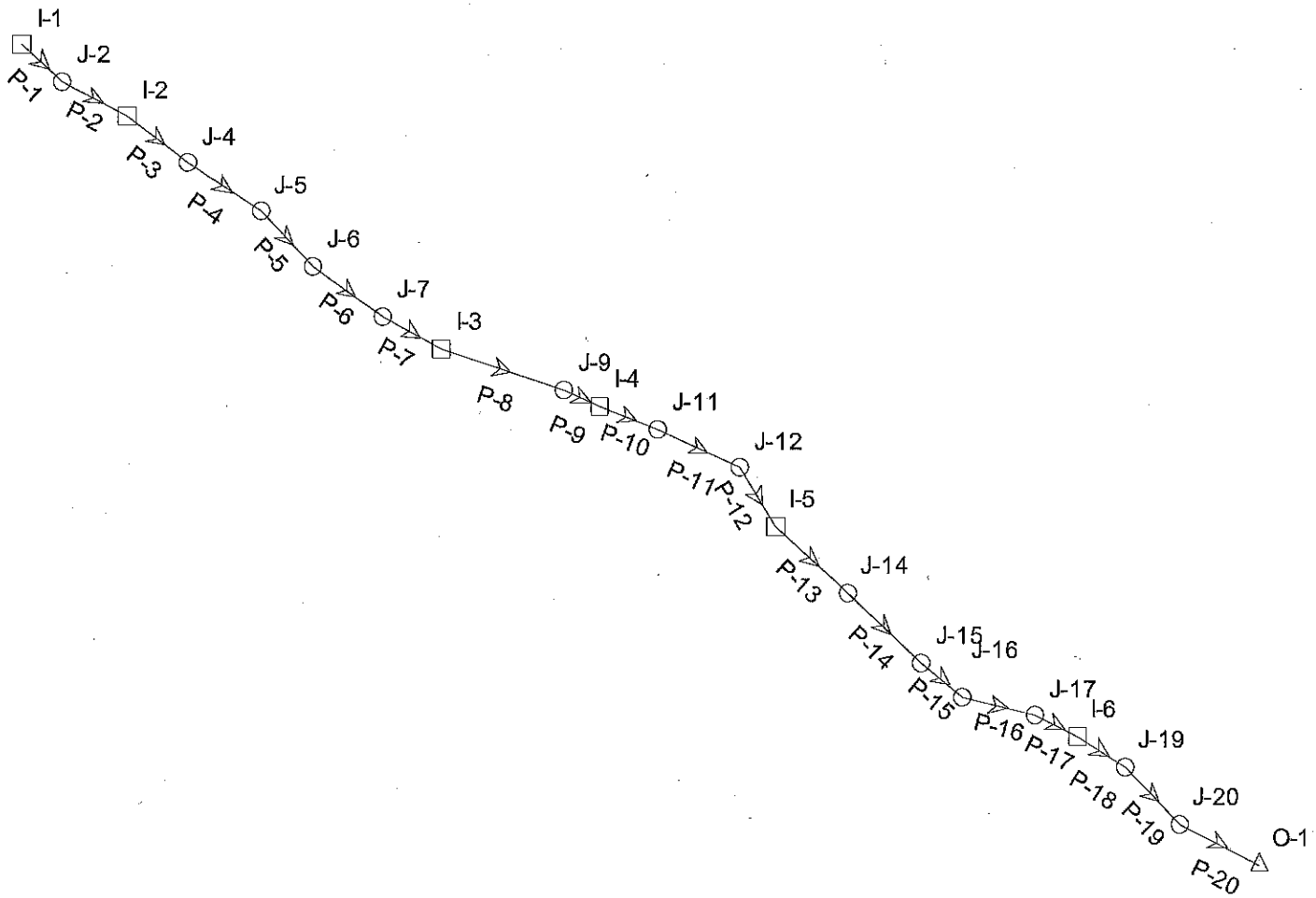

APPENDIX B

Hydraulics

Scenario: pipe sizes

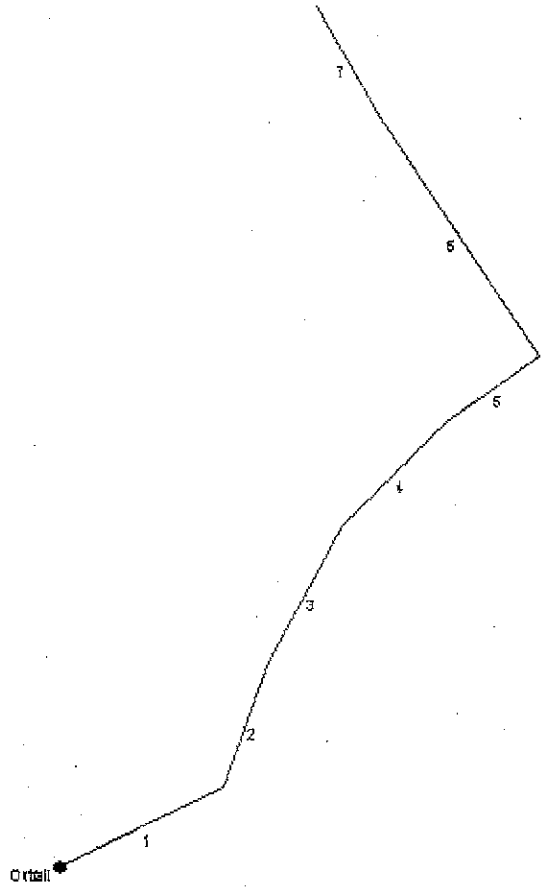


Scenario: pipe sizes

Pipe Report

Label	Downstream Pipe Label	Total System Flow (cfs)	Length (ft)	Section Size	Constructed Slope (ft/ft)	Mannings n	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Downstream Ground Elevation (ft)	Upstream Ground Elevation (ft)	Gravity Element Headloss (ft)
P-1	P-2	330.00	37.59	54 inch	0.060122	0.013	5,355.36	5,353.10	5,364.61	5,363.55	5,365.31	5,366.34	1.06
P-2	P-3	330.00	362.41	54 inch	0.022516	0.013	5,353.10	5,344.94	5,363.48	5,353.27	5,355.70	5,365.31	10.21
P-3	P-4	336.00	51.60	54 inch	0.022481	0.013	5,344.94	5,343.78	5,353.20	5,351.70	5,354.81	5,355.70	1.51
P-4	P-5	336.00	30.61	54 inch	0.022215	0.013	5,343.78	5,343.10	5,351.63	5,350.73	5,354.80	5,354.81	0.89
P-5	P-6	336.00	316.04	54 inch	0.021010	0.013	5,343.10	5,336.46	5,350.67	5,341.44	5,349.99	5,354.80	9.23
P-6	P-7	336.00	258.29	60 inch	0.019048	0.013	5,335.96	5,331.04	5,341.39	5,337.09	5,343.51	5,349.99	4.30
P-7	P-8	336.00	225.75	60 inch	0.020022	0.013	5,331.04	5,326.52	5,337.05	5,333.29	5,336.13	5,343.51	3.76
P-8	P-9	423.00	323.34	66 inch	0.021680	0.013	5,326.02	5,319.01	5,333.29	5,328.16	5,330.61	5,336.13	5.13
P-9	P-10	423.00	185.09	66 inch	0.024367	0.013	5,319.01	5,314.50	5,328.11	5,325.17	5,326.90	5,330.61	2.94
P-10	P-11	589.00	265.95	72 inch	0.016732	0.013	5,314.00	5,309.55	5,325.17	5,320.03	5,321.17	5,326.90	5.14
P-11	P-12	589.00	341.69	72 inch	0.019023	0.013	5,309.55	5,303.05	5,319.96	5,313.35	5,314.33	5,321.17	6.61
P-12	P-13	589.00	361.10	72 inch	0.018084	0.013	5,303.05	5,296.52	5,313.28	5,306.30	5,308.68	5,314.33	6.99
P-13	P-14	736.00	145.70	72 inch	0.016609	0.013	5,296.52	5,294.10	5,306.30	5,301.90	5,306.36	5,308.68	4.40
P-14	P-15	736.00	117.69	72 inch	0.020987	0.013	5,294.10	5,291.63	5,301.79	5,298.24	5,304.94	5,306.36	3.55
P-15	P-16	736.00	116.30	78 inch	0.015735	0.013	5,291.13	5,289.30	5,298.16	5,295.87	5,303.10	5,304.94	2.29
P-16	P-17	736.00	224.20	78 inch	0.020384	0.013	5,289.30	5,284.73	5,295.79	5,291.38	5,298.60	5,303.10	4.42
P-17	P-18	736.00	226.83	78 inch	0.020324	0.013	5,284.73	5,280.12	5,291.30	5,286.83	5,290.18	5,298.60	4.47
P-18	P-19	827.00	109.67	78 inch	0.027720	0.013	5,280.12	5,277.08	5,286.83	5,284.10	5,285.64	5,290.18	2.73
P-19	P-20	827.00	326.84	84 inch	0.026129	0.013	5,276.58	5,268.04	5,284.03	5,278.55	5,280.22	5,285.64	5.48
P-20	None	827.00	106.10	84 inch	0.028652	0.013	5,268.04	5,265.00	5,278.48	5,276.70	5,272.50	5,280.22	1.78

Hydraflow Plan View



Project file: Triside_2_25_04.stm	No. Lines: 7	04-26-2004

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		191.0	48 c	199.3	5264.05	5270.03	3.000	5267.87	5273.85	0.00	End
2		191.0	48 c	137.3	5269.74	5273.86	3.000	5273.85	5277.68	0.00	1
3		191.0	48 c	158.7	5273.96	5278.72	2.999	5277.68	5282.54	0.00	2
4		191.0	48 c	158.7	5278.82	5282.00	2.003	5282.54	5285.82	0.00	3
5		191.0	48 c	121.1	5282.11	5284.53	1.998	5285.82	5288.35	0.00	4
6		108.0	48 c	298.4	5284.64	5290.61	2.001	5288.35	5293.68	0.00	5
7		108.0	48 c	130.4	5290.70	5293.31	2.002	5293.68	5296.38	0.00	6

Project File: Trlside_2_25_04.stm | Number of lines: 7 | Run Date: 04-26-2004

NOTES: c = circular; e = elliptical; b = box; Return period = 100 Yrs.; * Indicates surcharge condition.

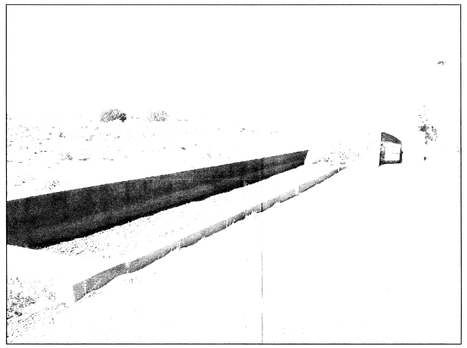
Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	199.3	-23.3	None	191.00	0.00	0.00	0.0	5264.05	3.00	5270.03	48	Cir	0.013	0.00	0.00	
2	1	137.3	-45.0	None	191.00	0.00	0.00	0.0	5269.74	3.00	5273.86	48	Cir	0.013	0.00	0.00	
3	2	158.7	8.8	None	191.00	0.00	0.00	0.0	5273.96	3.00	5278.72	48	Cir	0.013	0.00	0.00	
4	3	158.7	17.6	None	191.00	0.00	0.00	0.0	5278.82	2.00	5282.00	48	Cir	0.013	0.00	0.00	
5	4	121.1	8.8	None	191.00	0.00	0.00	0.0	5282.11	2.00	5284.53	48	Cir	0.013	0.00	0.00	
6	5	298.4	-92.9	None	108.00	0.00	0.00	0.0	5284.64	2.00	5290.61	48	Cir	0.013	0.00	0.00	
7	6	130.4	4.3	None	108.00	0.00	0.00	0.0	5290.70	2.00	5293.31	48	Cir	0.013	0.00	0.00	

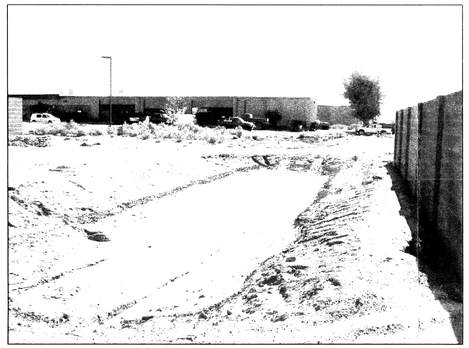
Project File: Trlside_2_25_04.stm | Number of lines: 7 | Date: 04-26-2004

E: ACCEPTS FLOW FROM OFFICE BLDG. ON SW CORNER SOUTHERN AND 21ST. POND APPEARS TO BE PERMANENT, FUNCTIONING PROPERLY, AND OF ADEQUATE SIZE.

G: ACCEPTS FLOW FROM BARBER SHOP AND OFFICES, SE CORNER SOUTHERN AND 21ST. POND APPEARS TO BE PERMANENT, FUNCTIONING PROPERLY, AND OF ADEQUATE SIZE.

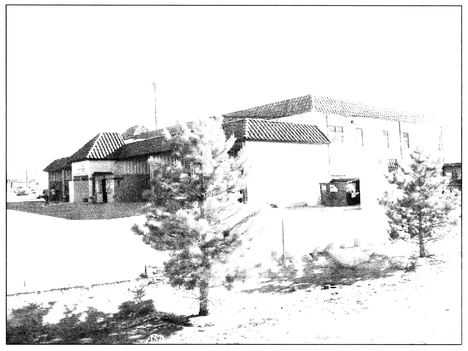


H: ACCEPTS FLOW FROM TRUE VALUE HARDWARE SOUTH OF SOUTHERN. POND APPEARS TO BE PERMANENT, FUNCTIONING PROPERLY, AND OF ADEQUATE SIZE.



I: POND WILL ACCEPT FLOW FROM SITE CURRENTLY UNDER CONSTRUCTION. POND DOES NOT APPEAR TO BE COMPLETED, BUT LOOKS LIKE IT WILL BE PERMANENT, FUNCTION PROPERLY, AND OF ADEQUATE SIZE.

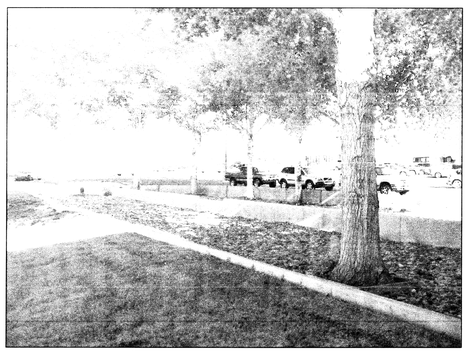
J: BEHIND DAIRY QUEEN SW CORNER SOUTHERN AND 22ND. POND DOES NOT APPEAR TO MEET CORR DRAINAGE ORDINANCE GUIDELINES.



D: ACCEPTS FLOW FROM CAR WASH ON SE CORNER SOUTHERN AND UNSER. POND APPEARS TO BE PERMANENT, FUNCTIONING PROPERLY, AND OF ADEQUATE SIZE.

F: ACCEPTS FLOW FROM ANIMAL CLINIC ON SW CORNER SOUTHERN AND 21ST. POND APPEARS TO BE PERMANENT, FUNCTIONING PROPERLY, AND OF ADEQUATE SIZE.

C: ACCEPTS FLOW FROM EASTERN PART OF SOUTHERN PLAZA PARKING LOT, DISCHARGES TO SOUTHERN CHANNEL. POND APPEARS TO BE



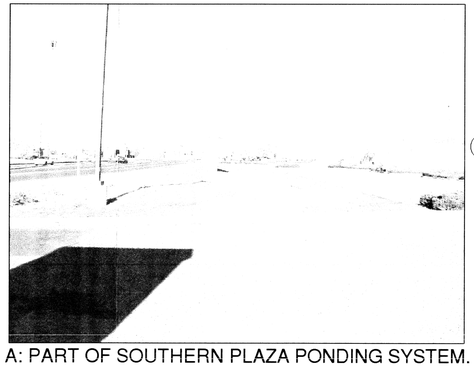
B: TWO-STAGE POND ACCEPTING FLOW FROM SOUTHERN PLAZA PARKING LOT AND DISCHARGING TO SOUTHERN CHANNEL.

SITE PLAN
N.T.S.

LEGEND

A — VIEW DIRECTION

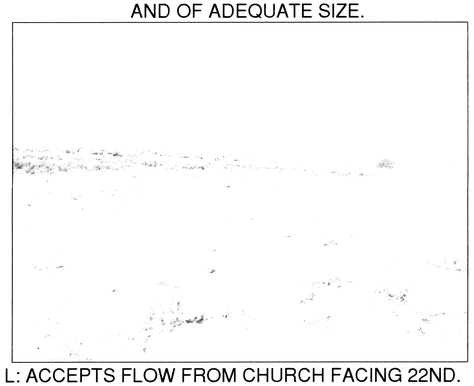
OFF_1D — SUB-BASIN I.D.



A: PART OF SOUTHERN PLAZA PONDING SYSTEM.

NOTE: All photographs taken 4/16/2004.

K: ACCEPTS FLOW FROM TIRE SHOP ON SE CORNER SOUTHERN AND 22ND. POND APPEARS TO BE PERMANENT, FUNCTIONING PROPERLY, AND OF ADEQUATE SIZE.



L: ACCEPTS FLOW FROM CHURCH FACING 22ND. POND APPEARS TO BE PERMANENT, FUNCTIONING PROPERLY, AND OF ADEQUATE SIZE.

CITY OF RIO RANCHO

CABEZON-PHASE 1
DRAINAGE MANAGEMENT PLAN

2600 THE AMERICAN ROAD S.E.
SUITE 100
RIO RANCHO, NEW MEXICO

FIGURE 10 - PHASE 1