PIEDRAS MARCADAS WATERSHED AND LYON BOULEVARD

Storm Drain Drainage Management Plan

May 9, 2003

I, Daniel J. Grochowski, hereby certify that I am a Registered Professional Engineer, registered in the state of New Mexico, and that the following report was prepared under my direction and is true and correct to the best of my knowledge and belief.

Daniel J. Grochowski, P.E.

NMPE No. 8766

EXECUTIVE SUMMARY

This analysis update report covers the area roughly bounded by Unser/Lyon Boulevard on the east, Paradise Boulevard on the north and Paseo del Norte (PDN) extension on the south, comprising almost 600 acres of the Piedras Marcadas Dam watershed. The primary focus of the study was to determine what portion of the watershed could discharge to the Albuquerque Metropolitan Arroyo Flood Control Authority's (AMAFCA) future Lyon Boulevard storm drain extension. In the past year, the study was expanded to include analysis of the Piedras Marcardas Dam capacity, specifically to assess how much of the Piedras Marcardas developed watershed must be diverted north to the Calabacillas Arroyo to maintain one foot of freeboard in the dam.

History

There has been development interest in this area; however, due to lack of existing drainage outfalls, development has been limited. Following is a summary of some of the issues:

- The National Park Service has stated objections to allowing storm water runoff above the "historic" (not necessarily undeveloped) flow rate to pass through the Petroglyph National Monument.
- Flow to the south and east is limited. The Draft Piedras Marcadas Drainage Management Plan Revision, prepared by Molzen-Corbin & Associates in May 1993, found that the Piedras Marcadas Dam capacity would be exceeded under fully developed watershed conditions. The feasible solution was to divert storm water to the Calabacillas Arroyo at two locations. One diversion was in the vicinity of Ventana Ranch Subdivision, which has already been built, and the other was at Lyon Boulevard, which is the subject of AMAFCA's current study.
- The diversion of the upper part of the watershed was completed with the Las Ventanas Dam and outfall pipe to the Calabacillas Arroyo.
- The existing 72-inch storm drain outfall to the Calabacillas Arroyo in Lyon Boulevard has limited capacity.
- Property owners in the area, including Albuquerque Public Schools (APS), have been interested in developing their property but have been constrained by lack of drainage outfalls.

- Bernalillo County and the City of Albuquerque have an interest in a storm drain outfall for the future Unser Boulevard extension that will ultimately connect to Lyon Boulevard from the south.

Since AMAFCA has the Lyon Diversion Storm Drain on its project schedule, AMAFCA sponsored the drainage study for the area. AMAFCA entered into an Agreement with the City, County and developers in March 2001 to prepare a "Mini" Drainage Management Plan. The primary purpose was to determine how existing and proposed development will impact AMAFCA facilities. AMAFCA contracted Bohannan Huston, Inc. (BHI) to perform the work.

Results of Study

BHI took the original hydrologic model from the 1993 Molzen-Corbin study and updated drainage basins and facility capacities to reflect construction since that time. Among these projects are:

- Las Ventanas Dam and 60-inch storm drain outfall to the Calabacillas Arroyo.
- The Lyon Boulevard 72-inch storm drain outfall to the Calabacillas Arroyo.
- The Paradise Boulevard storm drain from Lyon Boulevard to an existing storm drain stub-out west of Golf Course Road. The ultimate outfall is the Piedras Marcadas Dam.
- Expansion of Piedras Marcadas Dam.

BHI used the 100-year flow rates from this analysis to determine storm drain options in the Lyon/Unser Boulevard corridor. The study was limited in scope to evaluate the following options:

- Option 1 – Free discharge from the study area into a larger, proposed Lyon Boulevard outfall pipe. This option was used as a benchmark to compare the other options.
- Option 2 – Utilize a single "regional" detention pond to reduce flow to minimize pipe sizes and to match the capacity of the existing outfall pipe.
- Option 3 – Utilize a series of smaller detention ponds to reduce flow to minimize pipe sizes and to match the capacity of the outfall pipe.
- Option 4 – Utilize detention ponding to reduce flow to minimize pipe sizes (Option 2 or 3). Maximize the existing outfall pipe capacity with pressure flow.

The results of the analysis also indicated that the capacity of the Piedras Marcadas Dam must also be taken into account. Although approximately 2.7 square miles have been diverted from the dam watershed to the Calabacillas Arroyo with the Las Ventanas Dam and Lyon Boulevard storm drain outfalls, it was necessary to evaluate the dam capacity with ultimate development. The current capacity, with one foot of freeboard, is 280 acre-feet. The study evaluated the additional drainage basin area that will need to be diverted to the Lyon Boulevard storm drain to maintain this capacity. An area of approximately 115 acres will be required to discharge to the Lyon Boulevard storm drain. Since the total discharge from this area is 400 cfs, and the additional capacity available in the outfall in Option 4 is 210 cfs, detention ponding will be required.

Construction Cost Estimates

Several construction cost scenarios were evaluated. The first was total project cost, from the future PDN to the existing 72-inch outfall to the Calabacillas Arroyo. The second was just the AMAFCA portion from the Paradise/Lyon intersection to the existing outfall. The third was the AMAFCA portion, excluding basalt excavation. This scenario was included as a comparison since construction within the basalt layer will significantly drive up the cost.

The County and APS have been interested in extending the Paradise Boulevard storm drain to the west. Therefore, this fourth scenario was included as an addition to the AMAFCA Lyon Boulevard storm drain portion.

Following is a summary of the construction cost estimates:

Storm Drain Option	Total Project Cost	Lyon Project Cost (AMAFCA)	Lyon Project Cost (excl. basalt) (AMAFCA)	Paradise/Lyon Project Cost	Flow from South (cfs)
1	$24,831,000	$7,800,000	$3,477,000	$9,153,000	1460
2	$26,429,000	$4,687,000	$1,343,000	$6,040,000	170
3	$17,359,000	$3,082,000	$1,129,000	$4,435,000	130
4	n/a	$3,337,000	$1,292,000	$4,690,000	210

The recommended option is Option 4. The total project cost was not calculated since the storm drain option south of Paradise Boulevard could follow Option 2 or 3. The AMAFCA Lyon

storm drain project is $255,000 more than Option 3 because it has a 90-inch storm drain connection to the existing outfall, while Option 3 has a 78-inch and 84-inch storm drain. Option 4 optimizes the use of the existing outfall and, with an increase of one pipe diameter, almost doubles the allowable flow from south of Paradise Boulevard.

I. INTRODUCTION

The Piedras Marcadas Watershed and Lyon Boulevard Storm Drain Analysis Update deals with an area of northwest Albuquerque that, up to this time, has had a very limited potential for development due to the lack of an outfall for developed flows. This area is approximately bounded by Unser/Lyon Boulevard on the east, Paradise Boulevard on the north, and on the south and west sides by the limits of the Piedras Marcadas Watershed. An attempt was made to include whole properties into the primary study area, and some area east of Unser Boulevard is included because it is possible to use the same system. There is an existing 72" storm drain line in the Unser/Lyon Boulevard Alignment from Irving Boulevard to the Calabacillas Arroyo. Past studies have proposed a southern extension of this storm drain to Paradise Boulevard. The intent of the primary analysis is to determine the feasibility of using the proposed Lyon Boulevard storm drain as the outfall point for the primary study area. The effects of recent developments in the entire watershed on the Piedras Marcadas Dam have also been included in this report. The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), the chief sponsor of this study, the City, and area landowners have funded and provided needed information for this study.

Two past reports are foundational to the work done in this study. The first is the "Piedras Marcadas Drainage Management Plan" by Molzen-Corbin done in May 1993. It deals with drainage issues for the entire Piedras Marcadas Watershed. A number of developments have occurred in the watershed in the ten years since the report was completed, changing the area's hydrology. The other report is the "Conceptual Design Analysis for Lyon (Unser) Boulevard/Paradise Boulevard Storm Drain" by Bohannan Huston done in June 2000. The report evaluates a proposed storm drain down Paradise to Lyon and then continuing in Lyon connecting to the existing Lyon Boulevard Storm Drain.

As a starting point for this study, the existing section of storm drain, from Irving to the Calabacillas Arroyo, was analyzed to determine the existing capacity, which was determined to be 734 cfs based on Manning's Equation. In addition, the maximum area that could be routed to the storm drain was determined. The preliminary layout for the Paradise Boulevard Storm Drain west of Lyon Boulevard was also examined to determine whether or not it could be reduced due to addition

of storm drain line south of Paradise Boulevard. Three options were investigated for diverting the maximum drainage basin to the Lyon Boulevard Storm Drain System, and a fourth option was investigated for the storm drains in Paradise and Lyon Boulevards. The first option assumes an upsizing of the existing storm drain and an Unser Storm Drain that extends into the study area without detention ponds. The second option utilizes one detention pond to reduce flows to preserve the existing storm drain. The third option also looks to use the existing system, but makes use of several detention ponds rather than one. The fourth option looks at a pressure storm drain system in Paradise and Lyon Boulevards. The four options are discussed in further detail in Section III, below.

Since the watershed has undergone some development and improvements to the drainage system, the effects of that development have changed its hydrology. After revising the hydrology, other possible scenarios became apparent and are discussed in Section IV, below.

II. HYDROLOGY

Hydrologic modeling for this project was performed using the 1997 version of The Arid-Lands Hydrologic Model (AHYMO) in accordance with the City of Albuquerque Development Process Manual, Section 22.2, January 1993. Pipes were sized using Manning's Equation. Hydraulic grade lines were not calculated except for Option 4. Concrete box culverts were modeled as equivalent pipes in the AHYMO model. The 100-year storm event is used.

A. Drainage Basins

As mentioned above, the primary focus of the study area is bounded on the east, with some exceptions, by the proposed alignment for Unser Boulevard. This is because the Unser Corridor is a natural extension for the Lyon/Unser Storm Drain and is very nearly the outer limit of area that can physically be drained to the Calabacillas. There is some area east of Unser that is included because it could drain to the system and does not have another currently available outlet due to the presence of the Petroglyph National Monument downstream. The National Park Service has been very restrictive about allowing developed storm water flows to pass through the Monument.

In order to get as much area as possible to drain into the system, it was assumed that the storm drain trench at the intersection of Lyon and Paradise Boulevards should not be deeper than 30'. A hypothetical pipe line was taken from the intersection south at a 0.2% slope. The placement of the hypothetical pipe line was determined by maintaining at least two feet of cover above the soffitt in relation to the existing contours. The hypothetical pipe line was then used as the basis for the basin boundary. It is also the approximate location for the pipe lines in the three options. Other properties on the east that border the Unser alignment could be brought into the system if they are filled on the eastern portion of the property and the added flow does not overload the system. This may require the use of detention ponds on these sites. Due to the complexity of analyzing the feasibility of this option, these areas were not included in this study.

The sub-basins used in these options were developed from the basins in the Molzen-Corbin report "Piedras Marcadas Drainage Management Plan Revision" (1993) for the area south of Paradise Boulevard and the Bohannan-Huston report "Conceptual Design Analysis for Lyon (Unser) Boulevard/ Paradise Boulevard Storm Drain" (2000) for the area north of Paradise Boulevard. Plate 1 is a copy of the drainage basin map from the conceptual Lyon report. Plate 2 includes the basin maps from the Piedras Marcadas Report. Sub-basin 315 from the Piedras Marcadas report was the primary basin in the Lyon/Unser study area and was divided into Sub-basins 1 through 7. Sub-basins 3 and 6A are extended past the outer boundary of the Piedras Marcadas to include whole properties. This was the practice everywhere possible so that an owner would not have two separate drainage systems on the same property. Sub-basin 313 is a combination of sections from Molzen-Corbin's Sub-basins 313N and 313S. Sub-basins 311N, 311S, and 310 are located similarly to Molzen-Corbin's, except that there are changes due to the new mapping used (Bernalillo County, 1999), and the sub-basins end at the Unser alignment. Sub-basin 312 is only the very southern portion of Molzen-Corbin's original. Sub-basin 8 is within a portion of the proposed Unser Boulevard Corridor. The sub-basins can be seen in Exhibit 1.

B. Land Treatments

The land treatment percentages were determined based on zoning and the intended land uses as provided by the primary land owners in the area. The intended uses and zoning are also shown in Exhibit 1, and the land treatment percentages assigned to each basin are shown in Appendix A along with the AHYMO input and summary printouts. The land treatment percentages for the sub-basins, along with the 100-yr flow rates, volumes, and CFS/acre, are shown in Table 1. The land treatment percentages for the entire watershed analysis were not revised from the Molzen-Corbin report.

Table 1 – Sub-Basin Summary (Lyon Blvd. Storm Drain Options)

SUB-BASIN	AREA (acres)	% LAND TREATMENT *				Q (100-YR) (CFS)	VOLUME (acre-ft)	CFS/Acre
		A	B	C	D			
1	22.7	0.0	12.9	18.1	69.0	88.5	3.8	3.91
2	16.0	0.0	9.3	11.6	79.1	65.2	2.9	4.09
3	64.4	0.0	9.7	12.3	78.0	185.1	11.6	2.87
4	103.7	0.0	9.0	12.2	78.9	361.6	18.8	3.49
5	27.7	0.0	14.7	19.6	65.7	106.5	4.5	3.84
6A	176.8	0.0	13.4	17.4	69.1	451.8	29.8	2.56
6B	48.3	0.0	15.0	20.0	65.0	184.9	7.9	3.83
7	21.4	0.0	9.6	10.9	79.5	66.5	3.9	3.10
313	38.0	0.0	12.7	16.6	70.7	122.5	6.5	3.22
310	7.3	0.0	15.0	20.0	65.0	27.9	1.2	3.83
311S	18.7	0.0	14.0	19.3	66.7	72.2	3.1	3.84
311N	32.4	0.0	8.2	10.9	80.9	109.8	6.0	3.39
312	8.2	0.0	8.6	12.1	79.3	33.1	1.5	4.07
8	11.2	0.0	0.0	10.0	90.0	29.8	2.2	2.65

*Obtained from Section 22.2, Hydrology of the Development Process Manual, Volume 2.

For comparison purposes, Table 2 shows Molzen-Corbin's sub-basins within this area and the CFS/Acre for each. The areas of each sub-basin are not shown since the sub-basins' areas have changed, due to being cut off at the Unser Alignment, inclusion of whole properties, and changes due to new mapping. (Refer to Section II.A.)

Table 2 – Molzen-Corbin's Sub-Basins Within Study Area

SUB-BASIN	CFS/Acre
315W	3.50
315S	3.50
315N	3.50
313S	3.15
311S	3.50
310	3.50
311N	2.78
312	2.26

C. Paradise Boulevard Storm Drain Analysis

Part of the scope of the study was to examine the preliminary layout of the Paradise Boulevard Storm Drain, from Chamisa Ridge to Lyon/Unser Boulevard, to determine if the size of the system could be reduced based on a reduced drainage area. There was a reduction in area since the original study in an area east of the James Monroe Middle School. This area, which is included in the new Sub-basin 313, was originally in a sub-basin contributing to the Paradise Boulevard Storm Drain according to the 2000 Lyon Report. In addition, some of the other areas south of Paradise Boulevard have been developed at a lower density than was predicted by the 2000 Lyon Report. However, even with the area reduction and less impervious contributing areas, the flow rates were not reduced enough to require a smaller storm drain system. The majority of flow into the system is from the north side of Paradise Boulevard. Please refer to the 2000 "Conceptual Design Analysis for Lyon Boulevard/Paradise Boulevard Storm Drain" by Bohannan Huston for information, calculations and layout of the Paradise Boulevard storm drain.

III. LYON BLVD. STORM DRAIN OPTIONS

A. Option 1: Free Discharge, All New Storm Drain, Full Conveyance

Option 1 is a storm drain only option without detention and, consequently, includes expansion of the existing storm drain. This option requires concrete box culverts (CBC) as large as 12' X 12'. The entire network including flow rates can be seen on Exhibit 3. The flow

rate in the pipe network coming into the intersection of Paradise and Lyon is 1,453 cfs, and the box culvert size is 12' X 12' with a slope of 0.2%. Under this option, the storm drain on the north side of the intersection must be an 11' X 10' CBC, and the replacement of the existing storm drain must be 96" pipe. The total flow at the outfall to the Calabacillas is 1,983 cfs.

B. Option 2: Existing Storm Drain, 1 Large Detention Basin South of Paradise Blvd.

Option 2 maintains the existing storm drain as is and has one large detention pond to attenuate flows to its capacity. Option 2 is shown in Exhibit 4. A possible location for the pond was found to be near the intersection of Paradise and Lyon. This site is chosen because it can collect runoff from all of the basins in the study area. This is important since even the smaller sub-basins adjacent to the chosen pond site (311N&S, 312, 310, and 8) could overwhelm the existing storm drain if their flows are not attenuated. The pond would need to have storage of 65.4 ac-ft and would cover an area of approximately 8-9 acres. This option would also require very large concrete box culverts (12' X 12') upstream of the pond. The peak flow rate entering the pond is 1509 cfs, and the peak outflow is 174 cfs. The pipes north of the intersection to the existing storm drain would need to be 84" and 90".

C. Option 3: Existing Storm Drain, 4 Smaller Detention Basins South of Paradise Blvd.

There is more flexibility in Option 3, which is shown in Exhibit 5. Four detention ponds are used to attenuate flows in this option. The largest pipe in the system south of the intersection of Lyon and Paradise is 66", and the largest pipe north of the intersection is 84". The total amount of storage provided by the ponds is 113.6 ac-ft, and the approximate area needed for all four ponds is 15 acres. The peak outflow from the final pond, which enters the Lyon Boulevard storm drain, is 131 cfs.

D. Option 4: Existing Storm Drain, Full Conveyance under Pressure Flow Conditions Assuming 212 cfs from Area South of Paradise Blvd.

As mentioned in the introduction, Option 4 is exclusively for the Paradise and Lyon Boulevard Storm Drains. It includes a hydraulic grade line (HGL) analysis to determine the maximum flow rate that can be allowed from the south at the intersection of Paradise and Lyon, while tying to the existing storm drain. The maximum allowable flow rate is 212 cfs. The largest pipe size required is 90". Larger sizes were tried just north of the intersection, but the ultimate control of the system is the existing storm drain. Therefore, the 90" gave as much capacity as a larger diameter pipe. Exhibit 6 contains a plan and profile sheet showing Option 4, as well as a profile of the basalt along the Lyon Boulevard alignment.

IV. REVISED PIEDRAS MARCADAS DAM WATERSHED HYDROLOGY AND SCENARIOS

Subsequent to the development of the four options for the Lyon Blvd. storm drain, an outfall to the Piedras Marcadas Dam from developing areas upstream of the Petroglyph National Monument again became a possibility with the designation of the future Paseo del Norte alignment. In order to take advantage of this outfall in the Paseo del Norte corridor, the effects on the dam of all current and future development in the Piedras Marcadas watershed were investigated.

The total drainage area to the dam is nearly 4.0 square miles. The drainage area is slightly less than that reported in the Molzen-Corbin study primarily because Basin 311N is now shown as being diverted to the Calabacillas Arroyo via the future Lyon Boulevard storm drain. Figure 1 shows the overall area draining to the dam (Molzen-Corbin - Alternative 9) as well as the areas being diverted to the Calabacillas Arroyo.

The drainage area to the dam includes the area west of Lyon Boulevard and south of the drainage divide to the Calabacillas Arroyo. The four Options previously discussed assumed a diversion of a large portion of this area to the Calabacillas Arroyo via the future Lyon Boulevard storm drain. This diversion is not incorporated into the revised hydrology because it was not required to meet the capacity of the dam.

Albuquerque Metropolitan Arroyo Flood Control Authority

N

ANALYSIS POINT

	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AF)
H(istoric)	84	9.24
E(xisting)	304	20
F(uture)	590	60

2.27 SQ. MI. TO CALABACILLAS

H 50 2.76
E 50 2.79
F 128 5.7

0.47 SQ. MI. TO CALABACILLAS

H 84 9.24
E 304 20
F 395 114

ADDED AREA FROM PARADISE BLVD. STORM DRAIN REPORT

H 37 3.65
E 30 23.7
F 232 11

H 394 37.5
E 741 66.8
F 459 33

H 308 23.6
E 581 28.6
F 814 44

H 1142 113.5
E 2060 179
F 4552 304

H 392 45.3
E 674 75
F 1523 105

H 301 24.3
E 365 33
F 205 9.7

H 45 2.2
E 50 2.46
F 108 4.3

500 SERIES BASINS FROM VENTANA RANCH MASTER PLAN

600 SERIES BASINS FROM VENTANA RANCH MASTER PLAN

72" PIPE

84" PIPE

60" PIPE

48" PIPE

42" PIPE

PARADISE BLVD.

POND

POND REMOVED

CHANNEL

PDN CHANNEL

3.92 SQ. MI. TO PIEDRAS MARCADAS PDAM

320 312 314 314.1 318 316 317 319 315 311N 311S 313N 313S 310 307 306 305 308 309 304E 304W 302E 302W 303 204.1 204.3 204.4 204.2 204.5 205 203 202 201 101 301 103 102 404 402 401 404.1 403.3 403 403.2 403.1

NOTES:
MANY MOLZEN-CORBIN DRAINAGE BASINS HAVE BEEN DIVIDED INTO SMALLER BASINS, OR REDEFINED. THESE BASINS ARE NOT REFLECTED ON THIS MAP.

LEGEND

- BASIN BOUNDARY
- SUBBASIN BOUNDARY
- (315) SUBBASIN DESIGNATION
- PETROGLYPH NATIONAL MONUMENT
- CORRIDOR ALIGNMENT
- HISTORIC FLOWLINES
- I SYSTEM TRANSITION

PROPOSED IMPROVEMENTS

- POND
- CHANNEL
- PIPE

FIGURE 4.1.9:
PIEDRAS MARCADAS DRAINAGE MANAGEMENT PLAN ALTERNATIVE 9

MOLZEN-CORBIN & Associates

Johannan & Huston Inc.
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▲ SPATIAL DATA ▲ ADVANCED TECHNOLOGIES

BASINS FOR MOLZEN-CORBIN ALTERNATIVE 9 FIGURE 1

The Molzen-Corbin AHYMO model (Option 9) served as the base model for this analysis. It has been appended with the Ventana Ranch, Shenandoah and Rancho Sereno subdivisions. The Ventana Ranch Detention Dam, shown in Basin 316, has been constructed and is responsible for diverting over two square miles of the upper watershed to the Calabacillas Arroyo. The second diversion area to the Calabacillas Arroyo is the Lyon Boulevard storm drain. This diversion is planned for the future and was presented in the original Molzen-Corbin model, but with a different drainage area to the outlet.

In addition to these changes, the AHYMO model has been modified in a number of other ways. Most notably, the proposed pond in Basin 302/304 has been removed; the Shenandoah and Rancho Sereno Subdivision models, located within Basins 301 and 102 respectively, have been edited so that all the hydrographs are being added into the dam. A new basin has been created out of Basin 205 for the Paradise Ridge Subdivision. Routes have been added to reflect the new Paradise Boulevard storm drain.

When all the revisions were included, the model indicated a smaller drainage area to the dam than in the Molzen-Corbin report. Comparisons were made between the original AHYMO model and subsequent changes over the last ten years. It was discovered that when the subbasins were redefined, and the Shenandoah and Rancho Sereno Subdivisions were incorporated, the new drainage basin boundaries did not match the original basin boundaries in Basins 102 and 301. A new basin in 102 was added to account for this and area added to offsite Basin SHENO1E in 301.

The information used to calculate the required sediment storage in the dam was based on Dr. Richard Heggen's Sediment Study of the Piedras Marcadas Watershed as included in the Piedras Marcadas DMP. His results did not include any diversions to the Calabacillas Arroyo, so the total drainage area to the dam was larger than it is today. No reduction in sediment to the dam for the reduced area has been included in this analysis. From observations made during a site visit, it was noted that vegetation has grown in the dam basin. No account for any loss of capacity due to the vegetation has been made.

The results of the analysis of the capacity of the Piedras Marcadas Dam at the emergency spillway are as follows:

	Source	Volume (ac-ft)
Piedras Marcadas Dam Design Capacity (to the crest of the emergency spillway)	1995 Revised Grading Plan by BHI	307 ac-ft
Sediment Volume (5 x annual + 100-year) (5 x 0.31 ac-ft + 2.07 ac-ft)	Piedras Marcadas DMP, 1993	3.6 ac-ft
Available storage in Piedras Marcadas Dam		303 ac-ft
100-Yr Runoff Volume	2002 Revised AHYMO model by BHI	292 ac-ft
Excess Capacity in the Piedras Marcadas Dam		**11 ac-ft**
Freeboard in the Piedras Marcadas Dam		**0.55 ft**

In order to meet an AMAFCA requirement for one foot of freeboard below the emergency spillway, a maximum of 280 ac-ft of runoff volume can be allowed into the dam. The runoff volume into the Piedras Marcadas Dam cannot be reduced to the recommended 280 ac-ft while not exceeding the 212 cfs capacity of the Option 4 Lyon Boulevard storm drain if free discharge from all basins to Lyon Boulevard is assumed. Below are presented results for two scenarios that would satisfy the dam volume constraint (280 ac-ft) and the Lyon Blvd. storm drain capacity constraint (212 cfs). Refer to Figure 2.

A. Scenario 1: Do not Exceed Lyon Boulevard Storm Drain Capacity

To not exceed the Lyon Boulevard storm drain capacity, only Basins 311N and 311S can free discharge to Lyon Boulevard. The total 100-year flow from these basins is approximately 205 cfs. The runoff volume into the dam is reduced to 287 ac-ft. Recall that in the original model Basin 311N was already diverted north.

B. Scenario 2: Disregard Lyon Boulevard Storm Drain Capacity and Meet the Required Runoff Volume

To reduce the total runoff volume into the dam to 280 ac-ft, Basins 311N, 311S, 310, 313SA and 315NE need to be diverted to the Lyon Boulevard storm drain. The total 100-year runoff from these basins is 400 cfs. The calculated runoff volume to the dam is 278 ac-ft.

The most obvious way to meet both limitations is to construct a detention pond(s) that would attenuate the flows in the second scenario to the 212 cfs capacity. Another option to meet both criteria is to convert the Piedras Marcadas Dam from retention to detention. The Piedras Marcadas Dam is currently operated as a retention dam; however, modifications to create a detention facility are possible and could prove very beneficial. Only after downstream facilities are capable of accepting flows impounded in the dam can the principle spillway (a 36" pipe) be opened. If the principle spillway were to be extended to the Rio Grande (approximately 4500'), the hydraulic capacity of the dam and its ability to accept more runoff would be enhanced. Even with none of the area shown in being diverted to the Lyon Blvd. storm drain, there is still approximately 45 ac-ft of capacity in the dam with the 36" pipe open to the river. Figure 2 illustrates the drainage areas corresponding to each scenario above. Note that the basin labeled "312" is actually only a very small portion of Basin 312 in the AHYMO model. The majority of the basin lies north of Paradise Boulevard. Therefore, runoff from the sliver shown does not contribute to the total flow in the storm drain south of Paradise Boulevard.

In general, the basin divides shown are based on topography and are similar to those of the Molzen-Corbin study. The exception is Basin 315NE, which was based on lot lines. It seemed prudent to create the basin in this manner so that the entirety of Lot 6 will be diverted to the storm drain, rather than having only, a portion of it diverted. Basins 313SA and 315NE were originally part of larger basins, 313S and 315N respectively, but were subdivided to suit this analysis.

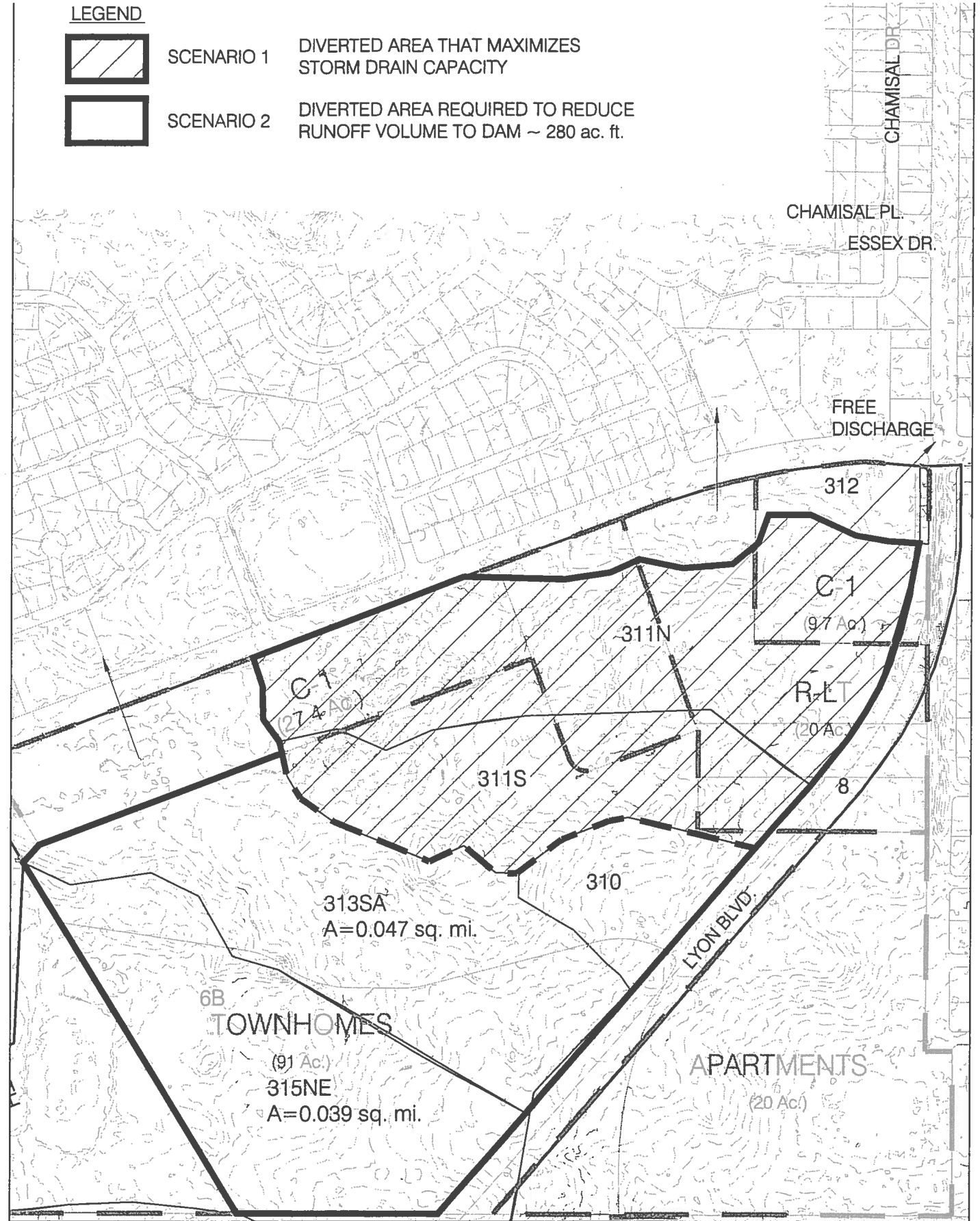
V. COST ESTIMATE FOR THE FOUR LYON BLVD. OPTIONS

There are four design parameters that strongly impact the cost of the options; storm drain size, trench depth, detention pond size, and land costs. The first three are especially important because they affect the amount of basalt rock removal that will be necessary. In the areas where basalt rock removal was determined to be necessary there are no trenching costs, but there is a backfill cost since the basalt rock cannot be used as backfill. Where trenching is specified, the unit cost was based on the 1998 Unit Cost used by the City of Albuquerque with a 30% increase to

LEGEND

SCENARIO 1 — DIVERTED AREA THAT MAXIMIZES STORM DRAIN CAPACITY

SCENARIO 2 — DIVERTED AREA REQUIRED TO REDUCE RUNOFF VOLUME TO DAM ~ 280 ac. ft.



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PIEDRAS MARCADAS WATERSHED AND LYON BOULEVARD STORM DRAIN

BASINS FOR SCENARIOS 1 AND 2

FIGURE 2

DRAWN BY: S.F.G	DATE: 01.07.03
CHECKED BY: D.J.G.	PROJECT NO: 00289.09C

P:\00289\Hydro\Lyons-moved from 0289-don't use\Cad\ne\Cad\00289basesheet01.dwg
May 08, 2003 - 2:47pm

make it comparable to recent contractors' estimates for storm drain construction. The pond costs were determined based on the costs of recent AMAFCA dams and recently constructed ponds designed by Bohannan-Huston. The dams and ponds were placed in an Excel spreadsheet based on size and cost per acre-foot. An equation was derived for a fitted curve, and that equation was used to determine the cost per acre-foot for the ponds used in the estimate. A chart showing the points and fitted curve is shown in Appendix B. The reinforced concrete pipe / concrete box culverts costs were determined by using the 1998 Unit Cost, recent contractor bids, and information provided by a local supplier and local contractor. The 20% contingency used for the cost estimates in the preliminary report has been reduced to 10% for the cost estimates presented here because unit costs that are more accurate were used. The cost of the land was roughly estimated at $50,000 per acre.

The most important aspect of the cost of any of the options is the presence of basalt rock. One area that is proven to have basalt is the area from the intersection of Paradise and Lyon Boulevards to the outfall. Basalt removal calculations were performed in this area based on information in the Conceptual Lyon Report (2000), which is based on borehole data. Refer to Appendix E. However, it is assumed that all the trenches south of Paradise Boulevard will also require basalt removal. This assumption is based on visual appraisal of the surface and borehole data provided in the "Unser Middle Transportation Corridor Study" done by Leedshill-Herkenhoff in 1992. Two boreholes that fall within the study area near the proposed Paseo Del Norte alignment show basalt rock from 2-5 feet below the surface through 31-38 feet below the surface. The basalt removal greatly increases the costs of all options. The basalt rock removal volumes were calculated based on a typical trench prism in rock. This assumes vertical sides. It was also assumed that basalt rock removal will be necessary for the ponds unless they are located in a valley where a berm could be placed above ground to gain storage. The pond in Option 2, therefore, requires basalt rock removal, as do Ponds 1 and 3 in Option 3. The cost of basalt rock removal was based on current projects near the study area.

The estimated costs of the four options are shown below in Table 3. The estimated construction cost for the Paradise Boulevard portion of the storm drain system is $1,353,000, assuming that there is no basalt rock removal. For detailed estimates, see Appendix C.

Table 3 – Estimated Construction Cost

OPTION	Primary Study Area	Lyon Boulevard Storm Drain	Paradise Boulevard Storm Drain	Total without Paradise Blvd. Storm Drain	Total with Paradise Blvd. Storm Drain
OPTION 1	17,031,000	7,800,000	1,353,000	24,831,000	26,184,000
OPTION 2	21,742,000	4,687,000	1,353,000	26,429,000	27,782,000
OPTION 3	14,277,000	3,082,000	1,353,000	17,359,000	18,712,000
OPTION 4	NA	3,337,000	1,353,000	NA	NA

VI. CONCLUSION

A. Four original Lyon Blvd. storm drain options

Though Option 3 is the lowest cost option for the Paradise/Lyon Blvd. storm drain, Option 4 is the recommended option. Though slightly more expensive than Option 3, Option 4 will maximize use of the existing storm drain and allow a maximum area south of Paradise Blvd. to flow to the storm drain. There are also other advantages to Option 4, including constructability. All of the items in Option 4 are commonly constructed in the Albuquerque area, whereas the large box culverts required in the first two options are not. This could lead to more problems in design and construction. Having such large box culverts also increases the possibility for conflicts with existing utilities and will make the design and construction of future utilities in the area much more difficult. Although the Option 4 configuration is more costly than Option 3 by $255,000, it allows approximately 80 cfs more than Option 3 into the Lyon Boulevard storm drain. This increased flow rate means that less ponding would be required south of Paradise Boulevard, which would reduce the pond costs. It is also recommended that more information be acquired concerning the basalt in the area, as this is the most expensive element of any plan.

B. Additional Scenarios

After completion of the four options investigation, an outfall for developed runoff upstream of the Petroglyph National Monument to the Piedras Marcadas Dam through the Paseo del Norte corridor became a possibility. Additional hydrologic scenarios were studied to make use of this outfall.

The Piedras Marcadas Dam can accept a volume of 280 ac-ft. The watershed area that can flow with free discharge to the dam, based on Molzen-Corbin's development assumptions, can be maximized to make full use of this capacity. This allows for a reduction in the area flowing to the Lyon Blvd. storm drain compared to the four original options. Used in conjunction with the Option 4 storm drain, the area immediately south and west of the Lyon Blvd. /Paradise Blvd. intersection can flow to the storm drain at a maximum flow rate of 212 cfs. In order to accomplish this flow rate some detention ponding is necessary.

If the Piedras Marcadas Dam can be converted to a detention dam additional areas would be able to flow with free discharge to the dam. This assumes the conveyance facilities to the dam already in place can accept the added flow.

ZONE/USE	LAND TREATMENT PERCENTAGES			
	A	B	C	D
O-1	0	20	20	60
C-1	0	5	5	90
R-T	0	15	20	65
Roadway	0	0	10	90
Apartments	0	15	15	70
Town Homes	0	15	20	65
R-D	0	13.5	13.5	73
R-LT	0	15	25	60
Chamisa	48	10	25	17
School	0	15	25	60

BASIN 102

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	PROJECT NAME: LYONS BLVD STORM DRAIN									
S	MINI DRAINAGE MANAGEMENT PLAN									
S	JOB NO. 00280C4.01									
S	DATE: June 25, 2001									
S										
S	INPUT FILE NAME: Opt3_03.HYM									
S	OUTUPUT FILE NAME: Opt3_03.out									
S	FILES LOCATION: BHI-MAIN\00280\HYDRO\DESIGN\AHYMO									
S	COMMENTS:									
S	7-2-01: Divided Sub-basin 6 into 6A and 6B and added a pond									
S										
S	6-25-01: Added Three Ponds									
S										
S	5-16-01: Revised Basins 1&2 and added Basin 7									
S										
S	5-9-01: Basin 315 has been broken into several smaller basins									
S										
S										
S	4-2-01: Basins are based on those used in previous reports									
S	in this area, originally from Molzen-Corbin's Piedras									
S	Marcadas Arroyo Analysis (1991); however, basins									
S	have been modified to reflect new mapping and the									
S	maximum drainable area (based on slope).									
S										
S	//									
RAINFALL	TYPE= 2									RAIN24= 2.700
SEDIMENT	BULK									PK BF = 1.02
S										
*S	SUB-BASIN 1									
COMPUTE	NM HYD	1.00	-	1	.03540	88.50	3.818	2.02214	1.500	3.906 PER IMP= 69.00
S										
*S	Route Basin 1 through 4.5' pipe for 1350'									
ROUTE	MCUNGE	RT1	1	12	.03540	77.57	3.759	1.99087	1.550	3.424 CCODE = .2
*S	SUB-BASIN 2									
COMPUTE	NM HYD	2.00	-	2	.02490	65.15	2.902	2.18492	1.500	4.088 PER IMP= 79.10
*S	Add Sub-basin 2 and the Routed Sub-basin 1									
ADD	HYD	RT1&2	12& 2	13	.06030	136.94	6.660	2.07098	1.500	3.548
*S	Route Sub-basin 2 and the upstream flow through 920' of 66" pipe									
ROUTE	MCUNGE	RT2UP	13	14	.06030	130.44	6.611	2.05566	1.550	3.380 CCODE = .2
*S	SUB-BASIN 3									
COMPUTE	NM HYD	3.00	-	3	.10070	185.06	11.639	2.16716	1.650	2.871 PER IMP= 78.00
*S	Add Sub-basin 3 to upstream flow (will go to Pond 1)									
ADD	HYD	RT2UP&3	14& 3	15	.16100	308.27	18.250	2.12539	1.600	2.992
*S	SUB-BASIN 4									
COMPUTE	NM HYD	4.00	-	4	.16200	361.61	18.848	2.18149	1.550	3.488 PER IMP= 78.80
*S	Add Sub-basin 4 to upstream flow to go to Pond 1									
ADD	HYD	RT3UP&4	15& 4	17	.32300	653.99	37.098	2.15353	1.550	3.164
*S	SUB-BASIN 5									
COMPUTE	NM HYD	5.00	-	5	.04330	106.46	4.542	1.96678	1.500	3.842 PER IMP= 65.70
*S	Route Sub-basin 5 through 54" pipe for 400'									

HYDROGRAPH	FROM ID	TO ID	AREA	PEAK DISCHARGE	RUNOFF VOLUME	RUNOFF	TIME TO PEAK	CFS PER

COMMAND	IDENTIFICATION	NO.	NO.	(SQ MI)	(CFS)	(AC-FT)	(INCHES)	(HOURS)	ACRE	NOTATION
ROUTE MCUNGE	RT5	5	18	.04330	96.17	4.442	1.92359	1.500	3.470	CCODE = .2
*S Add Sub-basin 5 to Pond 1 Inflow										
ADD HYD	RT4UP&5	18&17	19	.36630	739.66	41.540	2.12635	1.550	3.155	
*S SUB-BASIN 7										
COMPUTE NM HYD	7.00	-	30	.03350	66.49	3.913	2.18983	1.600	3.101	PER IMP= 79.50
*S Add Sub-basin 7 to Pond1 Iflow										
ADD HYD	RT5UP&6&7	19&30	20	.39980	801.79	45.453	2.13167	1.550	3.134	
*S ROUTE FLOW THROUGH POND 1										
ROUTE RESERVOIR	Pond1out	20	43	.39980	108.30	45.065	2.11347	2.300	.423	AC-FT= 27.690
*S Route Pond 1 Outflow through 60" pipe for 1645'										
ROUTE MCUNGE	RT5UP	43	21	.39980	107.92	45.030	2.11186	2.350	.422	CCODE = .2
*S SUB-BASIN 6A										
COMPUTE NM HYD	6A	-	51	.27620	451.78	29.806	2.02337	1.650	2.556	PER IMP= 69.20
*S Route Sub-basin 6A through Pond 4										
*S ROUTE FLOW THROUGH POND WITH 42" OUTFLOW PIPE										
ROUTE RESERVOIR	Pond4out	51	52	.27620	64.33	29.393	1.99533	2.450	.364	AC-FT= 17.982
*S Route Pond 4 outflow through 2000' of 42" pipe										
ROUTE MCUNGE	RT6A	52	53	.27620	64.32	29.384	1.99478	2.500	.364	CCODE = .2
*S SUB-BASIN 6B										
COMPUTE NM HYD	6B	-	6	.07550	184.93	7.873	1.95532	1.500	3.827	PER IMP= 65.00
*S Add Pond 4 outflow to 6B										
ADD HYD	P4RT&6B	53& 6	54	.35170	186.00	37.258	1.98631	1.500	.826	
*S SUB-BASIN 313										
COMPUTE NM HYD	313.00	-	7	.05940	122.50	6.488	2.04812	1.550	3.222	PER IMP= 70.70
*S Add Sub-basin 313 to Basin 6										
ADD HYD	Pond2inflow	54& 7	22	.41110	292.98	43.746	1.99524	1.500	1.114	
*S ROUTE FLOW THROUGH POND 2										
*S ROUTE FLOW THROUGH POND WITH 42" OUTFLOW PIPE										
ROUTE RESERVOIR	Pond2out	22	41	.41110	49.22	42.435	1.93545	3.950	.187	AC-FT= 14.199
*S Add outflow from Pond 2 to the Routed outflow from Pond 1										
ADD HYD	P1RT&P2	21&41	23	.81090	148.49	87.466	2.02243	2.500	.286	
*S Route Combined flow through 66" pipe for 700'										
ROUTE MCUNGE	RT313UP	23	24	.81090	148.30	87.431	2.02162	2.550	.286	CCODE = .2
*S SUB-BASIN 310										
COMPUTE NM HYD	310.00	-	8	.01140	27.94	1.189	1.95532	1.500	3.830	PER IMP= 65.00
*S Add Sub-basin 310 to upstream flow in pipe										
ADD HYD	RT313UP&310	24& 8	25	.82230	149.03	88.620	2.02070	2.550	.283	
*S Route Sub-basin 310 and upstream flow through 66" pipe for 1000'										
ROUTE MCUNGE	RT310UP	25	26	.82230	148.77	88.578	2.01974	2.600	.283	CCODE = .2
*S SUB-BASIN 311S										
COMPUTE NM HYD	311.01	-	9	.02920	72.19	3.090	1.98409	1.500	3.863	PER IMP= 66.70
*S Add Sub-basin 311S to upstream flow in pipe										
ADD HYD	RT310UP&311S	26& 9	27	.85150	150.59	91.668	2.01852	2.550	.276	
*S Route Sub-basin 311S and upstream flow through 66" pipe for 150'										
ROUTE MCUNGE	RT311SUP	27	28	.85150	150.59	91.668	2.01852	2.550	.276	CCODE = .0
*S SUB-BASIN 311N										
COMPUTE NM HYD	311.02	-	10	.05060	109.82	5.979	2.21552	1.550	3.391	PER IMP= 80.90
*S Add Sub-basin 311N to upstream flow in pipe										
ADD HYD	RT311SUP&311	28&10	29	.90210	210.02	97.647	2.02957	1.550	.364	
*S SUB-BASIN 312S										
COMPUTE NM HYD	312.00	-	11	.01270	33.05	1.484	2.19032	1.500	4.066	PER IMP= 79.30
*S Add Sub-basin 312S to upstream flow into the pond										

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	RT311NUP&312	29&11	30	.91480	239.43	99.130	2.03180	1.550	.409	

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*S              SUB-BASIN 8
COMPUTE NM HYD          8.00    -     31        .01760        29.84       2.235      2.38065    1.700    2.649 PER IMP=  90.00
*S Add Sub-basin 8 to upstream flow into the pond
ADD HYD            RT312SUP&8 30&31  32        .93240       257.78     101.365      2.03838    1.550     .432
*S  ROUTE FLOW THROUGH POND WITH 60" OUTFLOW PIPE
ROUTE RESERVOIR       Pondout   32   41        .93240       131.04     100.281      2.01660    3.700     .220 AC-FT=   16.017
*S  Route POND OUTFLOW through 60" pipe for 1350'
ROUTE MCUNGE         RT311NUP   41   33        .93240       128.51     100.019      2.01133    3.800     .215 CCODE =      .2
*S******************FROM FORMER BHI REPORT ON LYONS SD_ MODIFIED FOR INCREASED
*S*** FLOWS
*S*************************************************************************
*S* THE DOWNSTREAM FACE OF LAS VENTANAS DRAINAGE FACILITY DRAINS EAST TO *****
*S* BUENA VISTA AVE, TO LA PAZ RD, THRU BASIN 314, AND FINALLY TO POND AT*****
*S* NORTH SIDE OF PARADISE BLVD***************************************************
*S*
*S*****************PIEDRAS MARCADAS WATERSHED**********************************
*S*************** CALC BASIN 316 FLOW ***************
COMPUTE NM HYD         316.00    -     1         .03000        60.16       2.421      1.51308    1.500    3.133 PER IMP=  45.00
*S********* ROUTE 316 THRU 313N PARADISE*******
ROUTE MCUNGE            RT316    1     2         .03000        53.34       2.386      1.49151    1.750    2.778 CCODE =      .1
*S*************** CALC BASIN 313N FLOW ***************
COMPUTE NM HYD          313N     -     3         .07800       135.26       8.065      1.93878    1.600    2.709 PER IMP=  65.00
*S*** ADD RT316 TO 313N********
ADD HYD                313NUP  2& 3    4         .10800       171.30      10.452      1.81453    1.700    2.478
*S*************** CALC BASIN 314 FLOW ***************
COMPUTE NM HYD         314.00    -     5         .08900       185.78       7.273      1.53229    1.500    3.262 PER IMP=  43.00
*S*** ADD 313NUP TO 314********
ADD HYD              AP1-314UP  4& 5    6         .19700       296.39      17.725      1.68702    1.550    2.351
*S*************** CALC BASIN 314.1 FLOW ***************
COMPUTE NM HYD       AP2-314.1    -     7         .03600        74.63       2.867      1.49321    1.500    3.239 PER IMP=  40.00
*S*** ADD 314UP TO 314.1 FOR DISCHARGE INTO POND********
ADD HYD              AP314.1UP  6& 7    8         .23300       363.30      20.592      1.65707    1.550    2.436
*S****ROUTE AP314.1UP FLOW THROUGH PARK POND W/ ASSUMED DISCHARGE.  ASSUME 48" D
ROUTE RESERVOIR AP3-RT314.1P     8     9         .23300       108.05      20.592      1.65707    2.050     .725 AC-FT=    9.449
*S********* ROUTE DISCHARGE THRU PIPE TO UNSER LYONS *******
ROUTE MCUNGE           113.40    9    10         .23300       108.02      20.584      1.65640    2.150     .724 CCODE =      .1
*S*************** CALC BASIN 312 FLOW ***************
COMPUTE NM HYD         312.00    -    11         .20200       349.49      19.641      1.82308    1.600    2.703 PER IMP=  59.10
*S*** ADD 113.4 TO 312********
ADD HYD              AP4-312UP 10&11  12         .43500       403.28      40.224      1.73380    1.600    1.449
*S*****ADD NEW FLOW FROM SOUTH UNSER SD  (6/01)
ADD HYD                NewAP4 33&12   35        1.36740       423.97     140.243      1.92304    1.650     .484
*S********* ROUTE DISCHARGE THRU PIPE TO ESSEX 84"*******
ROUTE MCUNGE           RT312UP   35   13        1.36740       422.38     140.183      1.92221    1.650     .483 CCODE =      .1
*S*************** CALC BASIN 312.1 FLOW ***************
COMPUTE NM HYD       AP5-312.1    -    14         .01400        32.56       1.361      1.82319    1.500    3.634 PER IMP=  59.00
*S*** ADD RT312UP TO 312.1********
ADD HYD              AP312.1 13&14  15        1.38140       440.17     141.544      1.92120    1.650     .498
*S********* ROUTE THROUGH PIPE TO MH9 84"*******
ROUTE MCUNGE           RT312.1   15   42        1.38140       438.48     141.520      1.92088    1.650     .496 CCODE =      .2
*S********* ROUTE DISCHARGE THRU PIPE TO ALDER 78"******
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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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ROUTE MCUNGE           RT312.12  42   16        1.38140       438.48     141.520      1.92088    1.650     .496 CCODE =      .0
*S*CALABACILLAS WATERSHED***
*S*************** CALC BASIN 101 FLOW ***************
COMPUTE NM HYD         101.00    -    17         .05100       103.51       4.959      1.82319    1.550    3.171 PER IMP=  59.00
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*S*************** CALC BASIN 105 FLOW ***************
COMPUTE NM HYD        105.00    -     18         .02100        48.83       2.042      1.82319    1.500    3.633 PER IMP=  59.00
*S*** ADD 101 TO 105********
ADD HYD                105UP 17&18   19         .07200       146.78       7.001      1.82318    1.550    3.185
*S********** ROUTE 105UP TO LYONS*******
ROUTE MCUNGE         RT105UP   19    20         .07200       146.47       6.985      1.81910    1.600    3.179 CCODE =       .1
*S*************** CALC BASIN 105.1 FLOW ***************
COMPUTE NM HYD        105.10    -     21         .00900        20.94        .875      1.82319    1.500    3.635 PER IMP=  59.00
*S*** ADD 105UP TO 105.1********
ADD HYD              105.1UP 20&21   22         .08100       161.00       7.860      1.81954    1.600    3.106
*S*************** CALC BASIN 107 FLOW ***************
COMPUTE NM HYD        107.00    -     23         .06700       119.80       6.515      1.82319    1.600    2.794 PER IMP=  59.00
*S*************** CALC BASIN 108 FLOW ***************
COMPUTE NM HYD        108.00    -     24         .01000        23.26        .972      1.82319    1.500    3.635 PER IMP=  59.00
*S*** ADD 107 TO 108********
ADD HYD                108UP 23&24   25         .07700       137.35       7.487      1.82318    1.550    2.787
*S*** ADD RT312.1 TO AP108********
ADD HYD           AP6-AP108UP 16&25   26        1.45840       560.91     149.007      1.91572    1.650     .601
*S*************** CALC BASIN 108.1 FLOW ***************
COMPUTE NM HYD        108.10    -     27         .01100        25.59       1.070      1.82319    1.500    3.634 PER IMP=  59.00
*S*** ADD 108.1 TO 105.1UP********
ADD HYD          AP7-AP108.1U 27&22   28         .09200       178.76       8.930      1.81997    1.600    3.036
*S********** ROUTE DISCHARGE THRU PIPE TO IRVING 78" *******
ROUTE MCUNGE           RT312.1   26    29        1.45840       560.91     149.007      1.91572    1.650     .601 CCODE =       .0
*S*** ADD RT312.1 TO 108.1UP********
ADD HYD             AP108.1UP 29&28   30        1.55040       728.51     157.937      1.91004    1.650     .734
FINISH
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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
*SUMMARY	1 MID. B. PIEDRAS- DEV CONDS WITH BULK - MODIFIED 7/95									
START										TIME= .00
RAINFALL TYPE= 2										RAIN24= 2.660
SEDIMENT BULK										PK BF = 1.00
S										
*S**********										
*S***** ANALYSIS FOR LAS VENTANAS SUBDIVISION DRAINAGE MASTER PLAN **********										
S										
S TWO MAIN SYSTEMS CONVEY FLOWS TO THE LARGE POND IN BASIN 316. THIS										
S POND IS CALLED "LAS VENTANAS DRAINAGE FACILITY NO. 1" (LVDF NO. 1).										
S THE TWO MAIN SYSTEMS CONSIST OF ONE IN THE NORTH AND ONE IN THE SOUTH										
S PART OF THE SUBDIVISION. NORTH IS THE "WEST BRANCH CALABACILLAS										
S DIVERSION SYSTEM", AND SOUTH IS THE "NORTH BRANCH PIEDRAS MARCADAS										
S SYSTEM".										
*S**********										
*S******* W BRANCH CALABACILLAS DIVERSION SYSTEM FOR LAS VENTANAS **********										
S MAIN CHANNEL IS "WEST BRANCH CALABACILLAS DIVERSION CHANNEL" **********										
S										
*S********** CALC BASIN 502 FLOW **********										
COMPUTE NM HYD	502.00	-	1	.03400	74.39	3.148	1.73601	1.500	3.419	PER IMP= 59.00
*S********* ROUTE DISCHARGE THRU BASIN 503W 36" PIPE (REACH 1)*******										
ROUTE	503W.1	1	2	.03400	70.85	3.148	1.73603	1.550	3.256	
*S****ROUTE 502 FLOW THROUGH POND IN NEIGHBORHOOD PARK AT W SIDE OF 503W ****										
ROUTE RESERVOIR	503W.2	2	3	.03400	13.24	3.148	1.73595	2.100	.608	AC-FT= 1.647
*S********* ROUTE DISCHARGE THRU 36" PIPE IN BASIN 503W (REACH 2) *******										
ROUTE	503W.3	3	2	.03400	13.24	3.148	1.73594	2.100	.608	
*S********** CALC BASIN 503W FLOW **********										
COMPUTE NM HYD	503W	-	1	.14100	218.31	11.614	1.54445	1.600	2.419	PER IMP= 46.00
*S** DIVIDE 503W FLOWS INTO OVERLAND & PIPE FLOWS **********										
S 100 CFS TO 42" PIPE IN RAINBOW (REACH 4) **********										
DIVIDE HYD	503M.1	1	6	.11168	100.00	9.199	1.54445	1.450	1.399	
	503M.2	and	4	.02932	118.31	2.415	1.54445	1.600	6.304	
*S***** ROUTE RAINBOW PIPE FLOWS SOUTH TO RAINBOW & LOOP RD INTERSECTION*******										
ROUTE	503M.11	6	7	.11168	103.68	9.199	1.54445	1.500	1.451	
*S***ROUTE OVERLAND FLOWS SOUTH ON RAINBOW BLVD ****										
ROUTE	503M.21	4	8	.02932	117.74	2.416	1.54471	1.600	6.274	
*S*** ADD 503W OVERLAND AND PIPE FLOWS AT RAINBOW & LOOP RD*********										
ADD HYD	503W.5	7& 8	9	.14100	218.17	11.615	1.54450	1.600	2.418	
*S*** ADD 503W FLOWS TO ROUTED FLOWS FROM 503W POND										
ADD HYD	503W.6	2& 9	3	.17500	228.34	14.762	1.58169	1.600	2.039	
*S********** CALC BASIN 504E FLOW **********										
COMPUTE NM HYD	504E	-	1	.07400	102.64	6.095	1.54445	1.650	2.167	PER IMP= 46.00
*S** DIVIDE 504E FLOWS; (LOWER PART OF 504E IS ADDED LATER AT PARK) ******										
DIVIDE HYD	504E.1	1	2	.03700	51.32	3.048	1.54444	1.650	2.167	
	504E.2	and	5	.03700	51.32	3.048	1.54444	1.650	2.167	
*S** ADD UPPER PART OF BASIN 504E TO ROUTED FLOWS FROM 503W POND **********										
ADD HYD	503W.7	3& 5	4	.21200	278.35	17.810	1.57519	1.600	2.051	
*S** DIVIDE COMBINED FLOWS INTO OVERLAND AND PIPE FLOWS ******										
DIVIDE HYD	503W.71	4	7	.19523	185.00	16.401	1.57519	1.550	1.481	
	503W.72	and	8	.01677	93.35	1.409	1.57519	1.600	8.697	
S ROUTE PIPE FLOWS IN 54" PIPE (REACH 3) TO W BRANCH CALABACILLAS DIV CHAN ***										

BASIN 103

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 = 1 NOTATION
S	PROJECT NAME: LYONS BLVD STORM DRAIN									
S	MINI DRAINAGE MANAGEMENT PLAN									
S	JOB NO. 00280C4.01									
S	DATE: JUNE, 2001									
S										
S	INPUT FILE NAME: Opt2_04.HYM									
S	OUTUPUT FILE NAME: Opt2_04.out									
S	FILES LOCATION: BHI-MAIN\00280\HYDRO\DESIGN\AHYMO									
S	COMMENTS:									
S	7-2-01: Divided Sub-basin 6 into 6A and 6B and adjusted pipes									
S	6-01: Added one large pond near intersection of Paradise									
S	and Lyons									
S										
S	6-19-01: Added the BHI study of the LYONS SD done in 99									
S	and modified for the additional flows									
S										
S										
S	6-01: Added Basin 8									
S										
S	5-16-01: Revised Basins 1&2 and added Basin 7									
S										
S	5-9-01: Basin 315 has been broken into several smaller basins									
S										
S										
S	4-2-01: Basins are based on those used in previous reports									
S	in this area, originally from Molzen-Corbin's Piedras									
S	Marcadas Arroyo Analysis (1991); however, basins									
S	have been modified to reflect new mapping and the									
S	maximum drainable area (based on slope).									
S										
S	//									
RAINFALL TYPE= 2										RAIN24= 2.700
SEDIMENT BULK										PK BF = 1.02
*S										
*S	SUB-BASIN 1									
COMPUTE NM HYD	1.00	-	1	.03540	88.50	3.818	2.02214	1.500	3.906	PER IMP= 69.00
*S										
*S Route Basin 1 through 4.5' pipe for 1350'										
ROUTE MCUNGE	RT1	1	12	.03540	77.57	3.759	1.99087	1.550	3.424	CCODE = .2
*S	SUB-BASIN 2									
COMPUTE NM HYD	2.00	-	2	.02490	65.15	2.902	2.18492	1.500	4.088	PER IMP= 79.10
*S Add Sub-basin 2 and the Routed Sub-basin 1										
ADD HYD	RT1&2	12& 2	13	.06030	136.94	6.660	2.07098	1.500	3.548	
*S Route Sub-basin 2 and the upstream flow through 920' of 66" pipe										
ROUTE MCUNGE	RT2UP	13	14	.06030	130.44	6.611	2.05566	1.550	3.380	CCODE = .2
*S	SUB-BASIN 3									
COMPUTE NM HYD	3.00	-	3	.10070	185.06	11.639	2.16716	1.650	2.871	PER IMP= 78.00
*S Add Sub-basin 3 to upstream flow in pipe										
ADD HYD	RT2UP&3	14& 3	15	.16100	308.27	18.250	2.12539	1.600	2.992	
*S Route Sub-basin 3 and the upstream flow through 530' of 90" pipe										

HYDROGRAPH	FROM ID	TO ID	AREA	PEAK DISCHARGE	RUNOFF VOLUME	RUNOFF	TIME TO PEAK	CFS PER	PAGE = 2

COMMAND	IDENTIFICATION	NO.	NO.	(SQ MI)	(CFS)	(AC-FT)	(INCHES)	(HOURS)	ACRE	NOTATION
ROUTE MCUNGE	RT3UP	15	16	.16100	300.99	18.201	2.11970	1.600	2.921	CCODE = .2
*S SUB-BASIN 4										
COMPUTE NM HYD	4.00	-	4	.16200	361.61	18.848	2.18149	1.550	3.488	PER IMP= 78.80
*S Add Sub-basin 4 to upstream flow in pipe										
ADD HYD	RT3UP&4	16& 4	17	.32300	638.94	37.049	2.15069	1.550	3.091	
*S Route Sub-basin 4 and upstream flow through 465' of 114" pipe										
ROUTE MCUNGE	RT4UP	17	18	.32300	624.22	36.899	2.14196	1.600	3.020	CCODE = .2
*S SUB-BASIN 5										
COMPUTE NM HYD	5.00	-	5	.04330	106.46	4.542	1.96678	1.500	3.842	PER IMP= 65.70
*S Add Sub-basin 5 to upstream flow in pipe										
ADD HYD	RT4UP&5	18& 5	19	.36630	707.27	41.441	2.12126	1.550	3.017	
*S Route Sub-basin 5 and upstream flow through 120" pipe for 885'										
ROUTE MCUNGE	RT5UP	19	20	.36630	681.43	41.204	2.10915	1.600	2.907	CCODE = .2
*S SUB-BASIN 7										
COMPUTE NM HYD	7.00	-	30	.03350	66.49	3.913	2.18983	1.600	3.101	PER IMP= 79.50
*S Add Sub-basin 7 to upstream flow in pipe										
ADD HYD	RT5UP&6&7	20&30	31	.39980	747.93	45.117	2.11591	1.600	2.923	
*S Route Sub-basin 7 and upstream flow through 126" pipe for 760'										
ROUTE MCUNGE	RT7UP	31	21	.39980	729.73	44.963	2.10870	1.600	2.852	CCODE = .2
*S SUB-BASIN 6A										
COMPUTE NM HYD	6A	-	51	.27620	451.78	29.806	2.02337	1.650	2.556	PER IMP= 69.20
*S Route Sub-basin 6A through 2500' of 66" pipe										
ROUTE MCUNGE	RT6A	51	52	.27620	451.17	29.806	2.02338	1.700	2.552	CCODE = .2
*S SUB-BASIN 6B										
COMPUTE NM HYD	6B	-	6	.07550	184.93	7.873	1.95532	1.500	3.827	PER IMP= 65.00
*S Add Sub-Basin 6B to the Routed 6A										
ADD HYD	RT6A&6B	52& 6	53	.35170	534.75	37.679	2.00877	1.650	2.376	
*S Add Sub-basin 6A and 6B to upstream flow in pipe										
ADD HYD	RT5UP&6	21&53	22	.75150	1253.30	82.642	2.06193	1.650	2.606	
*S SUB-BASIN 313										
COMPUTE NM HYD	313.00	-	7	.05940	122.50	6.488	2.04812	1.550	3.222	PER IMP= 70.70
*S Add Sub-basin 313 to upstream flow in pipe										
ADD HYD	RT6UP&313	22& 7	23	.81090	1361.68	89.131	2.06092	1.600	2.624	
*S Route Sub-basin 313 and upstream flow through 156" pipe for 700'										
ROUTE MCUNGE	RT313UP	23	24	.81090	1343.45	88.864	2.05476	1.650	2.589	CCODE = .2
*S SUB-BASIN 310										
COMPUTE NM HYD	310.00	-	8	.01140	27.94	1.189	1.95532	1.500	3.830	PER IMP= 65.00
*S Add Sub-basin 310 to upstream flow in pipe										
ADD HYD	RT313UP&310	24& 8	25	.82230	1358.65	90.053	2.05338	1.650	2.582	
*S Route Sub-basin 310 and upstream flow through 156" pipe for 1000'										
ROUTE MCUNGE	RT310UP	25	26	.82230	1331.34	89.687	2.04504	1.650	2.530	CCODE = .2
*S SUB-BASIN 311S										
COMPUTE NM HYD	311.01	-	9	.02920	72.19	3.090	1.98409	1.500	3.863	PER IMP= 66.70
*S Add Sub-basin 311S to upstream flow in pipe										
ADD HYD	RT310UP&311S	26& 9	27	.85150	1370.55	92.777	2.04295	1.650	2.515	
*S Route Sub-basin 311S and upstream flow through 156" pipe for 150'										
ROUTE MCUNGE	RT311SUP	27	28	.85150	1370.55	92.777	2.04295	1.650	2.515	CCODE = .0
*S SUB-BASIN 311N										
COMPUTE NM HYD	311.02	-	10	.05060	109.82	5.979	2.21552	1.550	3.391	PER IMP= 80.90
*S Add Sub-basin 311N to upstream flow in pipe										
ADD HYD	RT311SUP&311	28&10	29	.90210	1463.34	98.756	2.05262	1.650	2.535	
*S SUB-BASIN 312S										

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	312.00	-	11	.01270	33.05	1.484	2.19032	1.500	4.066	PER IMP= 79.30

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*S Add Sub-basin 312S to upstream flow into the pond
ADD HYD         RT311NUP&312 29&11  30        .91480      1481.53     100.239      2.05453    1.650    2.530
*S             SUB-BASIN 8
COMPUTE NM HYD          8.00    -     31        .01760        29.84       2.235      2.38065    1.700    2.649 PER IMP=  90.00
*S Add Sub-basin 8 to upstream flow into the pond
ADD HYD           RT312SUP&8 30&31  32        .93240      1509.49     102.474      2.06069    1.650    2.530
*S  ROUTE FLOW THROUGH POND WITH 60" OUTFLOW PIPE
ROUTE RESERVOIR      Pondout   32    41        .93240       173.98      99.187      1.99459    2.500     .292 AC-FT=   65.410
*S  Route POND OUTFLOW through 72" pipe for 300'
ROUTE MCUNGE        RT311NUP   41    33        .93240       173.93      99.166      1.99416    2.500     .291 CCODE =      .2
*S******************FROM FORMER BHI REPORT ON LYONS SD_ MODIFIED FOR INCREASED
*S*** FLOWS
*S*************************************************************************
*S* THE DOWNSTREAM FACE OF LAS VENTANAS DRAINAGE FACILITY DRAINS EAST TO *****
*S* BUENA VISTA AVE, TO LA PAZ RD, THRU BASIN 314, AND FINALLY TO POND AT*****
*S* NORTH SIDE OF PARADISE BLVD************************************************
*S*
*S****************PIEDRAS MARCADAS WATERSHED**********************************
*S************** CALC BASIN 316 FLOW ***************
COMPUTE NM HYD        316.00    -     1        .03000        60.16       2.421      1.51308    1.500    3.133 PER IMP=  45.00
*S********* ROUTE 316 THRU 313N PARADISE*******
ROUTE MCUNGE           RT316    1     2        .03000        53.34       2.386      1.49151    1.750    2.778 CCODE =      .1
*S************** CALC BASIN 313N FLOW ***************
COMPUTE NM HYD          313N    -     3        .07800       135.26       8.065      1.93878    1.600    2.709 PER IMP=  65.00
*S*** ADD RT316 TO 313N********
ADD HYD               313NUP  2& 3    4        .10800       171.30      10.452      1.81453    1.700    2.478
*S************** CALC BASIN 314 FLOW ***************
COMPUTE NM HYD        314.00    -     5        .08900       185.78       7.273      1.53229    1.500    3.262 PER IMP=  43.00
*S*** ADD 313NUP TO 314********
ADD HYD            AP1-314UP  4& 5    6        .19700       296.39      17.725      1.68702    1.550    2.351
*S************** CALC BASIN 314.1 FLOW ***************
COMPUTE NM HYD     AP2-314.1    -     7        .03600        74.63       2.867      1.49321    1.500    3.239 PER IMP=  40.00
*S*** ADD 314UP TO 314.1 FOR DISCHARGE INTO POND********
ADD HYD            AP314.1UP  6& 7    8        .23300       363.30      20.592      1.65707    1.550    2.436
*S****ROUTE AP314.1UP FLOW THROUGH PARK POND W/ ASSUMED DISCHARGE.  ASSUME 48" D
ROUTE RESERVOIR AP3-RT314.1P     8     9        .23300       108.05      20.592      1.65707    2.050     .725 AC-FT=    9.449
*S********* ROUTE DISCHARGE THRU PIPE TO UNSER LYONS *******
ROUTE MCUNGE          113.40    9     10       .23300       108.02      20.584      1.65640    2.150     .724 CCODE =      .1
*S************** CALC BASIN 312 FLOW ***************
COMPUTE NM HYD        312.00    -     11       .20200       349.49      19.641      1.82308    1.600    2.703 PER IMP=  59.10
*S*** ADD 113.4 TO 312********
ADD HYD            AP4-312UP 10&11   12       .43500       403.28      40.224      1.73380    1.600    1.449
*S*****ADD NEW FLOW FROM SOUTH UNSER SD  (6/01)
ADD HYD                NewAP4 33&12   35      1.36740       437.98     139.390      1.91134    1.650     .500
*S********* ROUTE DISCHARGE THRU PIPE TO ESSEX 84"*******
ROUTE MCUNGE          RT312UP   35    13      1.36740       435.37     139.330      1.91051    1.650     .497 CCODE =      .1
*S************** CALC BASIN 312.1 FLOW ***************
COMPUTE NM HYD     AP5-312.1    -     14       .01400        32.56       1.361      1.82319    1.500    3.634 PER IMP=  59.00
*S*** ADD RT312UP TO 312.1********
ADD HYD            AP312.1 13&14   15      1.38140       453.16     140.691      1.90962    1.650     .513
*S********* ROUTE THROUGH PIPE TO MH9 84"*******
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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
ROUTE MCUNGE	RT312.1	15	42	1.38140	449.64	140.663	1.90925	1.650	.509	CCODE = .2
*S********* ROUTE DISCHARGE THRU PIPE TO ALDER 84"******										
ROUTE MCUNGE	RT312.12	42	16	1.38140	449.64	140.663	1.90925	1.650	.509	CCODE = .0

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*S*CALABACILLAS WATERSHED***
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*S*************** CALC BASIN 101 FLOW ***************
COMPUTE NM HYD        101.00    -    17        .05100       103.51       4.959      1.82319    1.550    3.171 PER IMP=  59.00
*S*************** CALC BASIN 105 FLOW ***************
COMPUTE NM HYD        105.00    -    18        .02100        48.83       2.042      1.82319    1.500    3.633 PER IMP=  59.00
*S*** ADD 101 TO 105********
ADD HYD                105UP 17&18  19        .07200       146.78       7.001      1.82318    1.550    3.185
*S********* ROUTE 105UP TO LYONS*******
ROUTE MCUNGE         RT105UP   19   20        .07200       146.47       6.985      1.81910    1.600    3.179 CCODE =       .1
*S*************** CALC BASIN 105.1 FLOW ***************
COMPUTE NM HYD        105.10    -    21        .00900        20.94        .875      1.82319    1.500    3.635 PER IMP=  59.00
*S*** ADD 105UP TO 105.1********
ADD HYD              105.1UP 20&21  22        .08100       161.00       7.860      1.81954    1.600    3.106
*S*************** CALC BASIN 107 FLOW ***************
COMPUTE NM HYD        107.00    -    23        .06700       119.80       6.515      1.82319    1.600    2.794 PER IMP=  59.00
*S*************** CALC BASIN 108 FLOW ***************
COMPUTE NM HYD        108.00    -    24        .01000        23.26        .972      1.82319    1.500    3.635 PER IMP=  59.00
*S*** ADD 107 TO 108********
ADD HYD                108UP 23&24  25        .07700       137.35       7.487      1.82318    1.550    2.787
*S*** ADD RT312.1 TO AP108********
ADD HYD           AP6-AP108UP 16&25  26       1.45840       572.08     148.151      1.90471    1.650     .613
*S*************** CALC BASIN 108.1 FLOW ***************
COMPUTE NM HYD        108.10    -    27        .01100        25.59       1.070      1.82319    1.500    3.634 PER IMP=  59.00
*S*** ADD 108.1 TO 105.1UP********
ADD HYD          AP7-AP108.1U 27&22  28        .09200       178.76       8.930      1.81997    1.600    3.036
*S********* ROUTE DISCHARGE THRU PIPE TO IRVING 90" *******
ROUTE MCUNGE          RT312.1   26   29       1.45840       572.08     148.151      1.90471    1.650     .613 CCODE =       .0
*S*** ADD RT312.1 TO 108.1UP********
ADD HYD             AP108.1UP 29&28  30       1.55040       739.68     157.081      1.89968    1.650     .745
FINISH
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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	PROJECT NAME: LYONS BLVD STORM DRAIN									
S	MINI DRAINAGE MANAGEMENT PLAN									
S	JOB NO. 00280C4.01									
S	DATE: JUNE, 2001									
S										
S	INPUT FILE NAME: Opt1_06.HYM									
S	OUTUPUT FILE NAME: Opt1_06.out									
S	FILES LOCATION: BHI-MAIN\00280\HYDRO\DESIGN\AHYMO									
S	COMMENTS:									
S	6-29-01: Divided Sub-basin 6 into 6A and 6B									
S	6-19-01: Added the BHI study of the LYONS SD done in 99									
S	and modified for the additional flows									
S										
S										
S	6-01: Added Basin 8									
S										
S	5-16-01: Revised Basins 1&2 and added Basin 7									
S										
S	5-9-01: Basin 315 has been broken into several smaller basins									
S										
S										
S	4-2-01: Basins are based on those used in previous reports									
S	in this area, originally from Molzen-Corbin's Piedras									
S	Marcadas Arroyo Analysis (1991); however, basins									
S	have been modified to reflect new mapping and the									
S	maximum drainable area (based on slope).									
S										
S	//									
RAINFALL	TYPE= 2									RAIN24= 2.700
SEDIMENT	BULK									PK BF = 1.02
S										
S	SUB-BASIN 1									
COMPUTE NM HYD	1.00	-	1	.03540	88.50	3.818	2.02214	1.500	3.906	PER IMP= 69.00
S										
*S	Route Basin 1 through 4.5' pipe for 1350'									
ROUTE MCUNGE	RT1	1	12	.03540	77.57	3.759	1.99087	1.550	3.424	CCODE = .2
*S	SUB-BASIN 2									
COMPUTE NM HYD	2.00	-	2	.02490	65.15	2.902	2.18492	1.500	4.088	PER IMP= 79.10
*S	Add Sub-basin 2 and the Routed Sub-basin 1									
ADD HYD	RT1&2	12&	2	13	.06030	136.94	6.660	2.07098	1.500	3.548
*S	Route Sub-basin 2 and the upstream flow through 920' of 66" pipe									
ROUTE MCUNGE	RT2UP	13	14	.06030	130.44	6.611	2.05566	1.550	3.380	CCODE = .2
*S	SUB-BASIN 3									
COMPUTE NM HYD	3.00	-	3	.10070	185.06	11.639	2.16716	1.650	2.871	PER IMP= 78.00
*S	Add Sub-basin 3 to upstream flow in pipe									
ADD HYD	RT2UP&3	14&	3	15	.16100	308.27	18.250	2.12539	1.600	2.992
*S	Route Sub-basin 3 and the upstream flow through 530' of 90" pipe									
ROUTE MCUNGE	RT3UP	15	16	.16100	300.99	18.201	2.11970	1.600	2.921	CCODE = .2
*S	SUB-BASIN 4									

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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COMPUTE NM HYD          4.00   -     4        .16200       361.61      18.848      2.18149    1.550    3.488 PER IMP=  78.80
*S  Add Sub-basin 4 to upstream flow in pipe
ADD HYD              RT3UP&4 16& 4  17        .32300       638.94      37.049      2.15069    1.550    3.091
*S   Route Sub-basin 4 and upstream flow through 465' of 114" pipe
ROUTE MCUNGE           RT4UP   17   18        .32300       624.22      36.899      2.14196    1.600    3.020 CCODE =       .2
*S      SUB-BASIN 5
COMPUTE NM HYD          5.00   -     5        .04330       106.46       4.542      1.96678    1.500    3.842 PER IMP=  65.70
*S  Add Sub-basin 5 to upstream flow in pipe
ADD HYD              RT4UP&5 18& 5  19        .36630       707.27      41.441      2.12126    1.550    3.017
*S  Route Sub-basin 5 and upstream flow through 120" pipe for 885'
ROUTE MCUNGE           RT5UP   19   20        .36630       681.43      41.204      2.10915    1.600    2.907 CCODE =       .2
*S      SUB-BASIN 7
COMPUTE NM HYD          7.00   -    30        .03350        66.49       3.913      2.18983    1.600    3.101 PER IMP=  79.50
*S  Add Sub-basin 7 to upstream flow in pipe
ADD HYD           RT5UP&6&7 20&30  31        .39980       747.93      45.117      2.11591    1.600    2.923
*S  Route Sub-basin 7 and upstream flow through 126" pipe for 760'
ROUTE MCUNGE           RT7UP   31   21        .39980       729.73      44.963      2.10870    1.600    2.852 CCODE =       .2
*S      SUB-BASIN 6A
COMPUTE NM HYD            6A   -    51        .27620       451.78      29.806      2.02337    1.650    2.556 PER IMP=  69.20
*S  Route Sub-basin 6A through 2500' of 66" pipe
ROUTE MCUNGE           RT6A   51   52        .27620       451.17      29.806      2.02338    1.700    2.552 CCODE =       .2
*S      SUB-BASIN 6B
COMPUTE NM HYD            6B   -     6        .07550       184.93       7.873      1.95532    1.500    3.827 PER IMP=  65.00
*S Add Sub-Basin 6B to the Routed 6A
ADD HYD              RT6A&6B 52& 6  53        .35170       534.75      37.679      2.00877    1.650    2.376
*S  Add Sub-basin 6A and 6B to upstream flow in pipe
ADD HYD              RT5UP&6 21&53  22        .75150      1253.30      82.642      2.06193    1.650    2.606
*S       SUB-BASIN 313
COMPUTE NM HYD        313.00   -     7        .05940       122.50       6.488      2.04812    1.550    3.222 PER IMP=  70.70
*S Add Sub-basin 313 to upstream flow in pipe
ADD HYD           RT6UP&313 22& 7  23        .81090      1361.68      89.131      2.06092    1.600    2.624
*S  Route Sub-basin 313 and upstream flow through 156" pipe for 700'
ROUTE MCUNGE         RT313UP   23   24        .81090      1343.45      88.864      2.05476    1.650    2.589 CCODE =       .2
*S        SUB-BASIN 310
COMPUTE NM HYD        310.00   -     8        .01140        27.94       1.189      1.95532    1.500    3.830 PER IMP=  65.00
*S Add Sub-basin 310 to upstream flow in pipe
ADD HYD          RT313UP&310 24& 8  25        .82230      1358.65      90.053      2.05338    1.650    2.582
*S  Route Sub-basin 310 and upstream flow through 156" pipe for 1000'
ROUTE MCUNGE         RT310UP   25   26        .82230      1331.34      89.687      2.04504    1.650    2.530 CCODE =       .2
*S          SUB-BASIN 311S
COMPUTE NM HYD        311.01   -     9        .02920        72.19       3.090      1.98409    1.500    3.863 PER IMP=  66.70
*S Add Sub-basin 311S to upstream flow in pipe
ADD HYD          RT310UP&311S 26& 9  27        .85150      1370.55      92.777      2.04295    1.650    2.515
*S  Route Sub-basin 311S and upstream flow through 156" pipe for 150'
ROUTE MCUNGE         RT311SUP   27   28        .85150      1370.55      92.777      2.04295    1.650    2.515 CCODE =       .0
*S          SUB-BASIN 311N
COMPUTE NM HYD        311.02   -    10        .05060       109.82       5.979      2.21552    1.550    3.391 PER IMP=  80.90
*S Add Sub-basin 311N to upstream flow in pipe
ADD HYD          RT311SUP&311 28&10  29        .90210      1463.34      98.756      2.05262    1.650    2.535
*S  Route Sub-basin 311N and upstream flow through 156" pipe for 1250'
ROUTE MCUNGE         RT311NUP   29   30        .90210      1407.20      98.074      2.03846    1.650    2.437 CCODE =       .2
*S             SUB-BASIN 312S

                                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

COMPUTE NM HYD        312.00   -    11        .01270        33.05       1.484      2.19032    1.500    4.066 PER IMP=  79.30
*S Add Sub-basin 312S to upstream flow in pipe
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ADD HYD         RT311NUP&312 30&11  31        .91480      1425.39      99.558      2.04057    1.650    2.435
*S  Route Sub-basin 312S and upstream flow through 156" pipe for 100'
ROUTE MCUNGE        RT312SUP   31   32        .91480      1425.39      99.558      2.04057    1.650    2.435 CCODE =       .0
*S              SUB-BASIN 8
COMPUTE NM HYD          8.00   -    33        .01760        29.84       2.235      2.38065    1.700    2.649 PER IMP=   90.00
*S Add Sub-basin 8 to upstream flow in pipe
ADD HYD           RT312SUP&8 32&33  34        .93240      1453.35     101.793      2.04699    1.650    2.435
*S******************FROM FORMER BHI REPORT ON LYONS SD_ MODIFIED FOR INCREASED
*S*** FLOWS
*S*************************************************************************
*S* THE DOWNSTREAM FACE OF LAS VENTANAS DRAINAGE FACILITY DRAINS EAST TO *****
*S* BUENA VISTA AVE, TO LA PAZ RD, THRU BASIN 314, AND FINALLY TO POND AT*****
*S* NORTH SIDE OF PARADISE BLVD***********************************************
*S*
*S****************PIEDRAS MARCADAS WATERSHED**********************************
*S*************** CALC BASIN 316 FLOW ***************
COMPUTE NM HYD        316.00   -     1        .03000        60.16       2.421      1.51308    1.500    3.133 PER IMP=   45.00
*S********** ROUTE 316 THRU 313N PARADISE*******
ROUTE MCUNGE           RT316    1    2        .03000        53.34       2.386      1.49151    1.750    2.778 CCODE =       .1
*S*************** CALC BASIN 313N FLOW ***************
COMPUTE NM HYD          313N   -     3        .07800       135.26       8.065      1.93878    1.600    2.709 PER IMP=   65.00
*S*** ADD RT316 TO 313N********
ADD HYD             313NUP  2& 3   4        .10800       171.30      10.452      1.81453    1.700    2.478
*S*************** CALC BASIN 314 FLOW ***************
COMPUTE NM HYD        314.00   -     5        .08900       185.78       7.273      1.53229    1.500    3.262 PER IMP=   43.00
*S*** ADD 313NUP TO 314********
ADD HYD            AP1-314UP  4& 5   6        .19700       296.39      17.725      1.68702    1.550    2.351
*S*************** CALC BASIN 314.1 FLOW ***************
COMPUTE NM HYD     AP2-314.1    -     7        .03600        74.63       2.867      1.49321    1.500    3.239 PER IMP=   40.00
*S*** ADD 314UP TO 314.1 FOR DISCHARGE INTO POND********
ADD HYD            AP314.1UP  6& 7   8        .23300       363.30      20.592      1.65707    1.550    2.436
*S****ROUTE AP314.1UP FLOW THROUGH PARK POND W/ ASSUMED DISCHARGE.  ASSUME 48" D
ROUTE RESERVOIR AP3-RT314.1P    8    9        .23300       108.05      20.592      1.65707    2.050     .725 AC-FT=     9.449
*S********** ROUTE DISCHARGE THRU PIPE TO UNSER LYONS *******
ROUTE MCUNGE          113.40    9   10        .23300       108.02      20.584      1.65640    2.150     .724 CCODE =       .1
*S*************** CALC BASIN 312 FLOW ***************
COMPUTE NM HYD        312.00   -    11        .20200       349.49      19.641      1.82308    1.600    2.703 PER IMP=   59.10
*S*** ADD 113.4 TO 312********
ADD HYD            AP4-312UP 10&11  12        .43500       403.28      40.224      1.73380    1.600    1.449
*S*****ADD NEW FLOW FROM SOUTH UNSER SD  (6/01)
ADD HYD               NewAP4 34&12  35       1.36740      1853.85     142.017      1.94735    1.650    2.118
*S********** ROUTE DISCHARGE THRU PIPE TO ESSEX 144" for 738'*******
ROUTE MCUNGE        RT312UP   35   13       1.36740      1853.85     142.017      1.94735    1.650    2.118 CCODE =       .0
*S*************** CALC BASIN 312.1 FLOW ***************
COMPUTE NM HYD     AP5-312.1    -    14        .01400        32.56       1.361      1.82319    1.500    3.634 PER IMP=   59.00
*S*** ADD RT312UP TO 312.1********
ADD HYD            AP312.1 13&14  15       1.38140      1871.64     143.378      1.94609    1.650    2.117
*S********** ROUTE DISCHARGE THRU PIPE TO ALDER 144" for 1120******
ROUTE MCUNGE        RT312.1   15   16       1.38140      1857.49     143.306      1.94512    1.650    2.101 CCODE =       .2
*S*CALABACILLAS WATERSHED***
*S*************** CALC BASIN 101 FLOW ***************

                                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

COMPUTE NM HYD        101.00   -    17        .05100       103.51       4.959      1.82319    1.550    3.171 PER IMP=   59.00
*S*************** CALC BASIN 105 FLOW ***************
COMPUTE NM HYD        105.00   -    18        .02100        48.83       2.042      1.82319    1.500    3.633 PER IMP=   59.00
*S*** ADD 101 TO 105********
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ADD HYD                105UP 17&18  19        .07200       146.78       7.001      1.82318    1.550    3.185
*S********* ROUTE 105UP TO LYONS*******
ROUTE MCUNGE          RT105UP   19   20        .07200       146.47       6.985      1.81910    1.600    3.179 CCODE =       .1
*S*************** CALC BASIN 105.1 FLOW ***************
COMPUTE NM HYD        105.10    -    21        .00900        20.94        .875      1.82319    1.500    3.635 PER IMP=  59.00
*S*** ADD 105UP TO 105.1********
ADD HYD              105.1UP 20&21  22        .08100       161.00       7.860      1.81954    1.600    3.106
*S*************** CALC BASIN 107 FLOW ***************
COMPUTE NM HYD        107.00    -    23        .06700       119.80       6.515      1.82319    1.600    2.794 PER IMP=  59.00
*S*************** CALC BASIN 108 FLOW ***************
COMPUTE NM HYD        108.00    -    24        .01000        23.26        .972      1.82319    1.500    3.635 PER IMP=  59.00
*S*** ADD 107 TO 108********
ADD HYD                108UP 23&24  25        .07700       137.35       7.487      1.82318    1.550    2.787
*S*** ADD RT312.1 TO AP108********
ADD HYD           AP6-AP108UP 16&25  26       1.45840      1979.92     150.793      1.93868    1.650    2.121
*S*************** CALC BASIN 108.1 FLOW ***************
COMPUTE NM HYD        108.10    -    27        .01100        25.59       1.070      1.82319    1.500    3.634 PER IMP=  59.00
*S*** ADD 108.1 TO 105.1UP********
ADD HYD          AP7-AP108.1U 27&22  28        .09200       178.76       8.930      1.81997    1.600    3.036
*S********** ROUTE DISCHARGE THRU PIPE TO IRVING 144" for 500'********
ROUTE MCUNGE         RT312.1   26   29       1.45840      1834.36     148.629      1.91085    1.700    1.965 CCODE =       .2
*S*** ADD RT312.1 TO 108.1UP********
ADD HYD             AP108.1UP 29&28  30       1.55040      1983.23     157.559      1.90546    1.650    1.999
FINISH
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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
ROUTE	318BW.1	1	4	.04300	91.05	3.981	1.73602	1.500	3.309	
*S********** ADD 318A TO "TRIB A" **********										
ADD HYD	318BW.2	4& 6	3	.36100	547.85	32.964	1.71213	1.600	2.371	
*S********* ROUTE THRU "TRIB A" CHAN IN 318BW *******										
ROUTE	318BW.3	3	2	.36100	543.61	32.964	1.71213	1.650	2.353	
*S********** CALC BASIN 318BW FLOW **********										
COMPUTE NM HYD	318BW	-	1	.12200	248.67	11.296	1.73601	1.500	3.185	PER IMP= 59.00
*S********** ADD 318BW TO ROUTED 501/504W/318A IN "TRIB A" **********										
ADD HYD	318BW.4	2& 1	3	.48300	739.23	44.260	1.71816	1.600	2.391	
*S********** CALC BASIN 319A FLOW **********										
COMPUTE NM HYD	319A	-	1	.57200	935.79	52.960	1.73601	1.600	2.556	PER IMP= 59.00
*S********* ROUTE 319A DISCHARGE EAST THRU "TRIB B" CHAN IN 319B *******										
ROUTE	319B.1	1	2	.57200	936.29	52.960	1.73601	1.600	2.558	
*S********** CALC BASIN 319B FLOW **********										
COMPUTE NM HYD	319B	-	1	.02300	48.22	1.959	1.59702	1.500	3.276	PER IMP= 50.00
*S********** ADD 319A TO 319B "TRIB B" CHAN FLOWS **********										
ADD HYD	319B.2	1& 2	4	.59500	969.97	54.919	1.73064	1.600	2.547	
*S********* ROUTE COMBINED 319A+B DISCHARGE IN "TRIB B" IN 318BW ********										
ROUTE	318BW.5	4	5	.59500	970.10	54.919	1.73064	1.600	2.548	
*S********** ADD "TRIB A" TO "TRIB B" FLOWS AT WELL SITE PARK **********										
ADD HYD	WELLSITE	3& 5	4	1.07800	1709.33	99.179	1.72505	1.600	2.478	
*S** ROUTE THRU 318BE; "N BRANCH PIEDRAS MARCADAS CHANNEL" **********										
ROUTE	318BE.1	4	3	1.07800	1693.32	99.179	1.72505	1.600	2.454	
*S********** CALC BASIN 318BE FLOW **********										
COMPUTE NM HYD	318BE	-	1	.14800	218.05	12.771	1.61791	1.600	2.302	PER IMP= 51.00
*S********** ADD 318BE TO N BRANCH PIEDRAS MARC CHAN **********										
ADD HYD	318BE.2	3& 1	4	1.22600	1911.37	111.950	1.71212	1.600	2.436	
*S**********CALC BASIN 317B **********										
COMPUTE NM HYD	317B	-	1	.13400	215.23	11.878	1.66202	1.600	2.510	PER IMP= 54.00
*S********** ADD 317B TO CHAN FLOWS (NOW INCLUDES 501/504W/318A+B/319A+B)										
ADD HYD	318BE.3	4& 1	2	1.36000	2126.60	123.827	1.70718	1.600	2.443	
*S********* ROUTE COMBINED FLOWS EAST IN N BRANCH PIEDRAS MARC CHAN ******										
ROUTE	318BE.4	2	13	1.36000	2129.57	123.827	1.70718	1.650	2.447	
*S**********CALC BASIN 601 **********										
COMPUTE NM HYD	601.00	-	1	.02000	43.77	1.852	1.73601	1.500	3.419	PER IMP= 59.00
*S**********ROUTE 601 FLOWS THRU 602, OVERLAND DOWN PASEOdelNORTE										
ROUTE	602.10	1	2	.02000	34.46	1.852	1.73604	1.550	2.692	
*S**********CALC BASIN 602 **********										
COMPUTE NM HYD	602.00	-	1	.06400	100.72	5.825	1.70653	1.600	2.459	PER IMP= 57.00
*S********** ADD 602 FLOW TO 601 FLOWS **********										
ADD HYD	602.20	2& 1	4	.08400	134.94	7.677	1.71354	1.600	2.510	
*S**********ROUTE 601/602 FLOWS OVERLAND DOWN PdN										
ROUTE	602.30	4	5	.08400	109.23	7.677	1.71355	1.700	2.032	
*S**********CALC BASIN 317A **********										
COMPUTE NM HYD	317A	-	20	.01700	37.20	1.574	1.73601	1.500	3.419	PER IMP= 59.00
S FLOWS FROM BASIN 317A GO EAST, AND DO NOT ENTER LAS VENTANAS. PER ADDENDUM										
S DATED 7/20/95.										
*S***ROUTE 601/602/317A OVERLAND NORTH ON UNIVERSE BLVD ****										
ROUTE	316SW.1	5	12	.08400	90.82	7.677	1.71355	1.850	1.689	
*S*** ADD OVERLAND FLOW TO N BRANCH PIEDRAS MARCADAS CHAN FLOWS *********										
ADD HYD	316SW.2	13&12	4	1.44400	2179.07	131.504	1.70755	1.650	2.358	
*S**********CALC BASIN 316SW **********										

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	316SW	-	1	.07600	130.48	7.144	1.76261	1.600	2.683	PER IMP= 60.00
*S********** ADD 316SW TO CHAN FLOWS **********										
ADD HYD	316SW.3	1& 4	5	1.52000	2297.59	138.648	1.71030	1.650	2.362	
*S***** ROUTE COMBINED FLOWS THRU N BRANCH PM CHAN IN BASIN 316SW *******										
ROUTE	316SW.4	5	3	1.52000	2312.53	138.648	1.71030	1.650	2.377	
*S** SUM N BRANCH PIED MARC CHAN AND W BRANCH CALABACILLAS DIVERSION CHAN ***										
ADD HYD	316SW.5	23& 3	2	1.93600	2747.52	173.290	1.67830	1.650	2.217	
*S********** CALC BASIN 316SE **********										
COMPUTE NM HYD	316SE	-	1	.06500	118.83	6.335	1.82754	1.550	2.856	PER IMP= 65.00
S										
*S********** ADD 316SE TO SUMMED CHANNEL FLOWS **********										
ADD HYD	316SE.1	1& 2	3	2.00100	2848.25	179.626	1.68315	1.650	2.224	
*S****** CALC BASIN 314BM **********										
*S** NOTE: 314BM IS THE PART OF BASIN 314B THAT IS IN LVDF NO. 1****										
COMPUTE NM HYD	314BM	-	1	.02740	38.70	1.214	.83098	1.500	2.207	PER IMP= 10.00
*S** ADD 314BM TO THE FLOWS GOING INTO LVDF NO. 1 ********										
S SUM IS TOTAL INTO LAS VENTANAS DRAINAGE FACILITY NO. 1 IN BASIN 316										
ADD HYD	316SE.2	1& 3	2	2.02840	2870.51	180.841	1.67164	1.650	2.211	
S										
S										
*S** ROUTE SUMMED FLOWS THRU LAS VENTANAS DETENTION DAM										
*S** (FORMERLY KNOWN AS LVDF NO. 1)										
*S** USE 32" ORIFICE PLATE TO LIMIT PRINCIPAL SPILLWYA DISCHARGE										
*S** TO 80 CFS FOR WATER MATCHING THE CREST OF THE EMERGENCY SPILLWAY										
*S** AT ELEVATION 5405										
S (EXISTING 100 YR FLOW INTO POND AREA=250CFS)										
*S** 5/31/00 Interpolated between 5404 and 5405 for outflow										
*S** 5/31/00 Changed storage to match "Reserved" Volumes										
ROUTE RESERVOIR	POND_ONE	2	4	2.02840	75.74	155.396	1.43644	3.450	.058	AC-FT= 133.111
S ROUTE LVDF NO. 1 DISCHARGE THRU 42" PIPE (REACH 6) NORTH TO 314BN										
ROUTE	314BN.1	4	3	2.02840	75.73	155.075	1.43347	3.550	.058	
*S********** CALC BASIN 315B **********										
*S*** NOTE: 315B DOES NOT GET INTO LVDF NO. 1 IN BASIN 316 **********										
COMPUTE NM HYD	315B	-	21	.04700	104.82	4.434	1.76881	1.500	3.485	PER IMP= 60.00
S FLOWS FROM 315B ARE NOT ALLOWED TO DISCHARGE OFF SITE AS IN EXIST CONDITIONS										
*S** ASSUME FLOWS CAN DISCHARGE OFFSITE, CHANGE ID FROM 1 TO 21 - DJG - 9/27/02										
*S****** CALC BASIN 314BS **********										
*S***** NOTE: FLOW FROM 314BS GOES EASTWARD OUT OF LAS VENTANAS (NO POND)										
COMPUTE NM HYD	314BS	-	22	.02330	32.91	1.033	.83098	1.500	2.207	PER IMP= 10.00
*S****** CALC BASIN 314BN **********										
COMPUTE NM HYD	314BN	-	1	.02740	37.36	1.214	.83098	1.500	2.131	PER IMP= 10.00
*S*** ADD 314BN TO PIPE DISCHARGE FROM LVDF NO. 1 ****										
ADD HYD	320.10	3& 1	2	2.05580	75.90	156.289	1.42544	3.200	.058	
*S**********CALCULATE BASIN 320 **********										
COMPUTE NM HYD	320.00	-	1	.19000	286.27	15.853	1.56445	1.600	2.354	PER IMP= 49.00
S FLOWS FROM 320 ARE NOT ALLOWED TO DISCHARGE OFF SITE AS IN EXIST CONDITIONS										
S ROUTE 320 THRU "LVDF NO. 2" AT E. END OF 320, ORIFICE=30" ***										
ROUTE RESERVOIR	POND_TWO	1	4	.19000	31.76	15.853	1.56444	2.350	.261	AC-FT= 9.713
S ROUTE LVDF NO. 2 DISCHARGE THROUGH 36" PIPE (REACH 7) EAST										
ROUTE	320.11	4	5	.19000	31.76	15.853	1.56444	2.400	.261	
*S** ADD REACH 7 FLOWS TO REACH 6. BECOMES A 54" PIPE (REACH 8) *******										

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	320.20	2& 5	3	2.24580	107.29	172.142	1.43720	2.550	.075	
*S***** ROUTE THRU 54" PIPE (REACH 8) NORTH TO IRVING BLVD ***										
ROUTE	505.10	3	2	2.24580	107.28	171.995	1.43597	2.600	.075	
*S******************CALCULATE BASIN 505 **********************										
COMPUTE NM HYD	505.00	-	1	.02200	35.77	1.225	1.04368	1.500	2.540	PER IMP= 20.00
*S*************** ADD 505 FLOW TO FLOWS ***********										
*S**** FLOW TOWARDS CALABACILLAS AT NE COR LAS VENTANAS DRAINAGE										
ADD HYD	505.20	1& 2	15	2.26780	108.80	173.219	1.43216	2.050	.075	
*S****END OF LAS VENTANAS DRAINAGE ANALYSIS										
COMPUTE NM HYD	314A	-	3	.08600	143.70	7.962	1.73598	1.600	2.611	PER IMP= 59.10
*S****GET NORTH PIECE (PANHANDLE) OF 313 INTO SYSTEM TO CALABACILLAS******										
*S******************CALCULATE BASIN 313N **********************										
COMPUTE NM HYD	313.10	-	6	.06500	114.35	6.018	1.73598	1.550	2.749	PER IMP= 59.10
*S****** ADD 314A/316R/313N FLOWS INTO LAST SECTION OF PIPE INTO PARK POND***										
ADD HYD	113.30	3&22	4	.10930	169.50	8.995	1.54305	1.550	2.423	
ADD HYD	113.20	4& 6	5	.17430	283.85	15.013	1.61500	1.550	2.545	
*S***** ROUTE 316R/314A/313N TOTAL INTO LAST SECTION OF PIPE INTO PARK POND***										
ROUTE	113.40	5	2	.17430	283.63	15.013	1.61500	1.600	2.543	
*S******************CALCULATE BASIN 314.1 **********************										
COMPUTE NM HYD	314.10	-	3	.03500	68.88	2.639	1.41366	1.500	3.075	PER IMP= 40.00
*S****** ADD 314.1 AND 314A/316R/313N FOR DISCH. INTO POND*****										
ADD HYD	113.30	3& 2	4	.20930	341.67	17.652	1.58133	1.550	2.551	
*S********* ROUTE THRU PARK POND WITH ASSUMED DISCHARGE **********************										
*S*** ASSUME 48" DISCHARGE PIPE *****************************										
ROUTE RESERVOIR	507.20	4	5	.20930	101.94	17.652	1.58133	2.000	.761	AC-FT= 7.683
*S***** ROUTE POND DISCH. THRU PIPE TO UNSER LYONS******										
ROUTE	113.40	5	2	.20930	101.94	17.652	1.58133	2.000	.761	
*S*********** CALCULATE BASIN 312 **********************										
COMPUTE NM HYD	312.00	-	1	.21100	304.64	19.536	1.73598	1.650	2.256	PER IMP= 59.10
*S****** ADD POND DISCH. AND 312 ***********										
ADD HYD	113.30	1& 2	4	.42030	382.97	37.187	1.65896	1.650	1.424	
*S***** CALCULATE BASIN 311N ************										
COMPUTE NM HYD	311N	-	1	.04800	105.97	4.444	1.73598	1.500	3.450	PER IMP= 59.10
*S************** CALCULATE BASIN 311S ****************										
COMPUTE NM HYD	311S	-	3	.04800	105.97	4.444	1.73598	1.500	3.450	PER IMP= 59.10
S	ROUTE THRU STORM DRAIN TO BASIN 311N									
ROUTE	311SR	3	6	.04800	99.31	4.444	1.73599	1.500	3.233	
*S****** ADD ROUTED 311S TO 311N ***********										
S	TOTAL FLOW IN LYON BLVD SD SOUTH OF PARADISE									
S	SIN 312 THAT IS SOUTH OF PARADISE IS ADDED IN ON NORTH SIDE)									
S	COMBINED 100 YR FLOW LIMITED TO 212 CFS									
ADD HYD	311T	6& 1	7	.09600	205.28	8.888	1.73598	1.500	3.341	
ADD HYD	113.40	7& 4	8	.51630	510.02	46.076	1.67329	1.600	1.543	
*S** NOW RT. 312/314/316R THRU PIPE TO CALABACILLLAS****										
ROUTE	112.20	8	14	.51630	503.34	46.076	1.67329	1.650	1.523	
*S************** ID14 IS DISCHARGE FROM 312 TO CAB.******										
*S**** DOWN TO PDN CHANNEL BASINS******										
*S*********** NOW CALCULATE BASIN 315W **************										
*S*** NOTE: (BHI ANALYSIS BY NM) FROM 315W										
COMPUTE NM HYD	315.10	-	3	.13300	293.36	12.314	1.73598	1.500	3.446	PER IMP= 59.10
*S**************** ADD 315B TO 315W										
ADD HYD	115.20	21& 3	1	.18000	398.18	16.748	1.74455	1.500	3.456	
S										

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*************** ADD 317A TO 315B AND 315W										
ADD HYD	315.20 20& 1		19	.19700	435.38	18.322	1.74381	1.500	3.453	
*S***** ROUTE THIS FLOW TO WEST EDGE OF 309 THRU PDN CHANNEL****										
ROUTE	116.00	19	2	.19700	395.88	18.322	1.74381	1.550	3.140	
*S************ NOW CALCULATE BASIN 315S **************										
COMPUTE NM HYD	315.20	-	3	.18000	396.83	16.665	1.73598	1.500	3.445	PER IMP= 59.10
*S*************** ADD 315S FLOW TO PDN CHANNEL FLOW @ W. EDGE 309***										
ADD HYD	116.20 2& 3		1	.37700	756.55	34.987	1.74007	1.500	3.136	
*S***** ROUTE THIS FLOW TO EAST EDGE OF 309 THRU PDN CHANNEL****										
ROUTE	116.00	1	2	.37700	763.83	34.987	1.74007	1.550	3.166	
*S************ CALCULATE BASIN 309S **********************										
COMPUTE NM HYD	309S	-	3	.04800	105.97	4.444	1.73598	1.500	3.450	PER IMP= 59.10
*S*************** ADD 309S FLOW TO PDN CHANNEL FLOW @ E. EDGE 309***										
ADD HYD	116.20 2& 3		1	.42500	856.22	39.431	1.73961	1.550	3.148	
*S***** ROUTE THIS FLOW THRU 302W IN PDN CHANNEL*****										
ROUTE	116.00	1	2	.42500	869.26	39.431	1.73961	1.550	3.196	
*S************ NOW CALCULATE BASIN 315N**************										
COMPUTE NM HYD	315.00	-	1	.18000	396.83	16.665	1.73598	1.500	3.445	PER IMP= 59.10
*S********** ROUTE 315N THRU INTERCEPTOR CHANNEL TO THE TOP OF B302W BOUNDRY***										
ROUTE	115.01	1	3	.18000	359.84	16.665	1.73598	1.550	3.124	
*S************ CALCULATE BASIN 309N **********************										
COMPUTE NM HYD	309.00	-	4	.04800	105.97	4.444	1.73598	1.500	3.450	PER IMP= 59.10
*S************ ROUTE 309 THRU PROPOSED CULVERT 3 ***********										
ROUTE	109.00	4	5	.04800	106.38	4.444	1.73599	1.500	3.463	
*S**ROUTE CULVERT DISCHARGE THROUGH SMALL CHANNEL TO THE TOP OF B302W****										
ROUTE	115.01	5	6	.04800	101.38	4.444	1.73599	1.550	3.300	
*S**INTERCEPTOR CHANNEL ALSO PICKS UP PART OF 304, WE'LL CALL IT 304S**										
*S************ CALCULATE BASIN 304S **********************										
COMPUTE NM HYD	304.00	-	4	.03500	77.28	3.241	1.73598	1.500	3.450	PER IMP= 59.10
*S ADD TO GET THE TOTAL AT THE NORTH BOUNDRY OF B302W**										
ADD HYD	304.10 3& 6		7	.22800	461.22	21.110	1.73598	1.550	3.161	
ADD HYD	304.20 4& 7		8	.26300	528.60	24.350	1.73598	1.550	3.140	
*S *ROUTE 315N/309N/304S FLOWS THRU INTERCEPTOR CHANNEL TO END OF B302W @ PDN**										
ROUTE	115.01	8	9	.26300	534.96	24.350	1.73598	1.550	3.178	
*S*************** CALCULATE BASIN 302W **********************										
COMPUTE NM HYD	302.00	-	1	.04500	99.35	4.166	1.73598	1.500	3.450	PER IMP= 59.10
*S**** ADD INTERCEPTOR FLOW TO 302W FLOW @ POND IN 302W***										
ADD HYD	116.20 9& 1		4	.30800	621.59	28.516	1.73598	1.550	3.153	
*S****ROUTE COMBINED FLOW THROUGH POND**										
S REMOVE POND PER AMAFCA INSTRUCTION										
*S>>>ADD INTERCEPTOR/302 FLOW TO THE PDN CHANNEL FLOW**										
ADD HYD	116.30 2& 4		5	.73300	1490.85	67.948	1.73809	1.550	3.178	
COMPUTE NM HYD	SHENO1W	-	20	.10350	121.70	7.919	1.43452	1.700	1.837	PER IMP= 40.00
ADD HYD	116.31 5&20		5	.83650	1576.10	75.866	1.70052	1.550	2.944	
*S***ADD OUTFLOW FROM SHENO1W TO FLOW FROM 302W										
*S***** ROUTE THIS FLOW THRU 302E IN PDN CHANNEL*****										
ROUTE	116.00	5	2	.83650	1556.35	75.866	1.70052	1.550	2.907	
*S*************** CALCULATE BASIN 302E **********************										
COMPUTE NM HYD	302.00	-	1	.08900	76.85	2.679	.56450	1.550	1.349	PER IMP= 6.20
*S*************** ADD 302E FLOW TO PDN CHANNEL FLOW @ EAST END OF 302***										
ADD HYD	116.20 2& 1		19	.92550	1633.20	78.546	1.59128	1.550	2.757	
*S****** ID=19 IS FLOW AT CULVERT AT PDN IN B302*****										

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*S************ CALCULATE BASIN 313S **************************										
COMPUTE NM HYD	313.00	-	3	.08900	173.55	8.240	1.73598	1.550	3.047	PER IMP= 59.10
*S********** ROUTE B313S FLOW (ID3) THRU PROPOSED CULVERT 2 *****										
ROUTE	113.40	3	12	.08900	175.14	8.240	1.73599	1.550	3.075	
*S** ID12 IS DISCHARGE THRU PROPOSED CULVERT TWO AND HEAD OF P.N. PARK CAYNON**										
*S********** CALCULATE BASIN 310 ************										
COMPUTE NM HYD	310.00	-	1	.01500	33.13	1.389	1.73598	1.500	3.451	PER IMP= 59.10
*S********** ROUTE COMBINED (11/20/02:NOW ONLY BASIN 310) FLOWS THRU CULVERT ONE										
ROUTE	110.00	1	6	.01500	33.27	1.389	1.73602	1.500	3.466	
*S****** TAKE DISCHARGE FROM CULVERT 2 AND ROUTE THRU 308,2 SECT. *******										
ROUTE	108.00	12	3	.08900	161.64	8.240	1.73599	1.600	2.838	
*S************ CALCULATE BASIN 308 **********************										
COMPUTE NM HYD	308.00	-	4	.03600	47.78	1.746	.90934	1.500	2.074	PER IMP= 22.10
*S*********** ADD ROUTE FROM 313 AND 308 ******************										
ADD HYD	108.10	3& 4	1	.12500	201.80	9.986	1.49791	1.550	2.523	
*S********** ROUTE THIS FLOW PART WAY DOWN MAIN BRANCH ******										
ROUTE	104.10	1	3	.12500	150.67	9.986	1.49791	1.650	1.883	
*S************ CALCULATE BASIN 307 **********************										
COMPUTE NM HYD	307.00	-	4	.06500	131.80	5.447	1.57132	1.500	3.168	PER IMP= 52.00
*S************ ROUTE CULVERT 1 DISCHARGE THRU 307 ********										
ROUTE	107.00	6	10	.01500	27.62	1.389	1.73601	1.550	2.877	
*S**** ADD 307/310/311R INTO PLAYA IN 307 **********										
ADD HYD	307.40	4&10	9	.08000	155.17	6.836	1.60219	1.500	3.031	
*S********* ROUTE THRU PLAYA IN 307 **********************										
ROUTE RESERVOIR	507.20	9	4	.08000	104.75	6.176	1.44758	1.650	2.046	AC-FT= 2.222
*S**** ROUTE OUTFLOW TO PM MAIN BRANCH ******										
ROUTE	104.40	4	5	.08000	72.68	6.175	1.44733	1.750	1.420	
*S********** ADD (307+308) AT PM POINT ********										
ADD HYD	104.20	3& 5	4	.20500	218.85	16.161	1.47817	1.700	1.668	
*S************ CALCULATE BASIN 306 **********************										
COMPUTE NM HYD	306.00	-	3	.03100	68.49	2.873	1.73776	1.500	3.452	PER IMP= 59.20
*S*********** ROUTE THRU PLAYA IN BASIN 306 ********										
ROUTE RESERVOIR	506.00	3	1	.03100	16.96	2.216	1.34028	1.900	.855	AC-FT= 1.477
*S******* ROUTE POND DISCHARGE THRU 305 **************										
ROUTE	105.00	1	5	.03100	16.48	2.212	1.33808	2.050	.831	
*S********** CALCULATE BASIN 305 **********************										
COMPUTE NM HYD	305.00	-	3	.02700	47.32	1.891	1.31316	1.500	2.739	PER IMP= 40.50
ADD HYD	105.10	5& 3	1	.05800	47.39	4.103	1.32648	1.500	1.277	
*S********* ROUTE 305T TO PM PART WAY DOWN 304******************										
ROUTE	104.60	1	5	.05800	45.24	4.103	1.32628	1.550	1.219	
*S****** ADD 305T TO 307-308 ROUTES AT MAIN BRANCH PART WAY DOWN 304*****										
ADD HYD	104.70	4& 5	3	.26300	250.19	20.264	1.44468	1.700	1.486	
*S***** ROUTE REMAINING 700' TO END OF BASIN 304 *************										
ROUTE	104.80	3	2	.26300	248.77	20.263	1.44461	1.700	1.478	
*S************ CALCULATE BASIN 304 **********************										
COMPUTE NM HYD	304.00	-	3	.18500	236.35	9.600	.97296	1.500	1.996	PER IMP= 25.00
*S***** ADD 304 TO ALL FLOWS @ END OF 304 TO GET TOTAL FLOW THERE ****										
ADD HYD	104.11	2& 3	1	.44800	389.85	29.863	1.24984	1.600	1.360	
ROUTE	103.00	1	2	.44800	299.27	29.856	1.24957	1.800	1.044	
*S*************** CALCULATE BASIN 303 **********************										
COMPUTE NM HYD	303.00	-	3	.16500	97.30	4.968	.56450	1.650	.921	PER IMP= 6.20
*S************** ADD 304T ROUTE AND 303 *****************										

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ADD HYD	103.10	2& 3	1	.61300	373.20	34.824	1.06517	1.750	.951	
*S************** ROUTE FLOW THRU PROPOSED CULVERT 4 ***********										
ROUTE	103.20	1	2	.61300	373.07	34.824	1.06517	1.750	.951	
*S*** !!!!!!!!										
*S************** ADD PDN CHANNEL FLOW FROM WEST TO MIDDLE BRANCH FLOW*****										
ADD HYD	103.10	2&19	5	1.53850	1868.78	113.369	1.38165	1.600	1.898	
ROUTE	101.00	5	13	1.53850	1900.73	113.368	1.38164	1.600	1.930	
S>>> REPLACE BASIN 301 WITH HYMO RUN FROM SHENANDOAH ESTATES SUBDIVISION										
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENO1E										
COMPUTE NM HYD	SHENO1E	-	10	.09600	40.09	2.395	.46784	1.700	.652	PER IMP= .00
ROUTE RESERVOIR	POND-1	10	11	.09600	38.41	2.395	.46786	1.750	.625	AC-FT= .324
ROUTE	PIPE	11	30	.09600	38.37	2.399	.46859	1.767	.625	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENO2										
COMPUTE NM HYD	SHENO2	-	11	.02860	25.26	.714	.46784	1.500	1.380	PER IMP= .00
ROUTE RESERVOIR	POND-2	11	12	.02860	20.28	.714	.46790	1.600	1.108	AC-FT= .216
ROUTE	PIPE	12	31	.02860	20.54	.712	.46693	1.633	1.122	
ADD HYD	TOTPIPE	30&31	32	.12460	53.47	3.111	.46820	1.667	.671	
ROUTE	TOTPIPE	32	33	.12460	53.41	3.111	.46820	1.667	.670	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENO3										
COMPUTE NM HYD	SHENO3	-	12	.04501	90.18	3.481	1.45009	1.500	3.130	PER IMP= 40.00
DIVIDE HYD	O3SD	12	30	.04052	57.00	3.134	1.45008	1.450	2.198	
	O3ST	and	20	.00449	33.18	.347	1.45008	1.500	11.557	
ROUTE	TOTPIPE	30	31	.04052	57.51	3.059	1.41550	1.500	2.217	
ADD HYD	TOTPIPE	31&33	30	.16512	103.99	6.171	.70068	1.633	.984	
ROUTE	CRSMT2	20	21	.00449	31.19	.339	1.41735	1.533	10.865	
DIVIDE HYD	O3SD	21	31	.00328	16.80	.248	1.41726	1.500	8.006	
	O3ST	and	22	.00121	14.39	.091	1.41726	1.533	18.632	
ADD HYD	TOTPIPE	31&30	33	.16840	108.34	6.418	.71457	1.600	1.005	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENA										
COMPUTE NM HYD	SHENA	-	1	.01820	35.23	1.392	1.43452	1.500	3.024	PER IMP= 40.00
DIVIDE HYD	ASD	1	10	.01461	16.00	1.118	1.43450	1.400	1.711	
	AST	and	11	.00359	19.23	.274	1.43450	1.500	8.376	
ADD HYD	TOTPIPE	10&33	30	.18302	124.34	7.505	.76892	1.600	1.062	
ROUTE	PIPE	30	31	.18302	124.64	7.506	.76897	1.633	1.064	
ADD HYD	A&O3	11&22	21	.00479	32.06	.364	1.42505	1.500	10.448	
DIVIDE HYD	CRESSSD	21	30	.00479	32.06	.364	1.42505	1.500	10.448	
	CRESSST	and	22	.00000	.00	.000	.00000	-.033	.000	
ADD HYD	TOTPIPE	31&30	32	.18781	133.04	7.870	.78572	1.600	1.107	
ROUTE	PIPE	32	30	.18781	133.83	7.870	.78568	1.533	1.113	
ROUTE	BURMART	22	21	.00000	.00	.000	.00000	-.033	.000	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENB3										
COMPUTE NM HYD	SHENB3	-	1	.00420	8.43	.325	1.45009	1.500	3.135	PER IMP= 40.00
DIVIDE HYD	MARTSD	1	39	.00258	2.00	.199	1.45001	1.350	1.211	
	MARTST	and	29	.00162	6.43	.125	1.45001	1.500	6.198	
ADD HYD	TOTPIPE	30&39	1	.19039	135.83	8.061	.79389	1.533	1.115	
ROUTE	PIPE	1	30	.19039	136.18	8.061	.79385	1.533	1.118	
ADD HYD	BUS1	21&29	20	.00162	6.43	.125	1.44721	1.500	6.198	
ROUTE	CUMBURS1	20	21	.00162	5.28	.125	1.45039	1.567	5.092	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENB2										
COMPUTE NM HYD	SHENB2	-	3	.00670	12.90	.518	1.45009	1.500	3.009	PER IMP= 40.00
ADD HYD	B2ST	21& 3	20	.00832	17.61	.632	1.42436	1.533	3.307	

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DIVIDE HYD	NBURSD	20	32	.00832	17.61	.632	1.42436	1.533	3.307	
	NBURST	and	22	.00000	.00	.000	.00000	-.033	.000	
ADD HYD	TOTPIPE	30&32	31	.19871	153.79	8.693	.82025	1.533	1.209	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENB1										
COMPUTE NM HYD	SHENB1	-	2	.01060	19.03	.719	1.27203	1.500	2.806	PER IMP= 30.00
DIVIDE HYD	B1SD	2	30	.00685	5.40	.465	1.27200	1.400	1.232	
	B1ST	and	20	.00375	13.63	.255	1.27200	1.500	5.677	
ADD HYD	B1ST	20&22	21	.00375	13.63	.254	1.27039	1.500	5.676	
ADD HYD	TOTPIPES	31&30	32	.20556	159.19	9.143	.83397	1.533	1.210	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENC1										
COMPUTE NM HYD	SHENC1	-	4	.00570	11.16	.421	1.38510	1.500	3.060	PER IMP= 36.00
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENO4										
COMPUTE NM HYD	SHENO4	-	49	.00280	5.62	.217	1.45009	1.500	3.138	PER IMP= 40.00
ADD HYD	ID	4&49	48	.00850	16.79	.638	1.40644	1.500	3.086	
ROUTE	CUMBURS4	48	22	.00850	13.96	.623	1.37463	1.567	2.566	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENC2										
COMPUTE NM HYD	SHENC2	-	5	.00350	6.10	.271	1.45009	1.550	2.724	PER IMP= 40.00
ADD HYD	INLET	22& 5	29	.01200	19.85	.888	1.38704	1.567	2.585	
DIVIDE HYD	SBURSD	29	35	.00940	9.00	.695	1.38704	1.433	1.496	
	SBURST	and	25	.00260	10.85	.192	1.38704	1.567	6.518	
ADD HYD	TOTPIPES	32&35	30	.21496	168.19	9.838	.85815	1.533	1.223	
ADD HYD	INLET	21&25	20	.00635	23.37	.447	1.31815	1.533	5.747	
DIVIDE HYD	BURSUMP	20	31	.00419	10.65	.294	1.31815	1.467	3.973	
	BURESID	and	29	.00217	12.72	.152	1.31815	1.533	9.177	
ADD HYD	TOTPIPES	30&31	32	.21914	178.84	10.133	.86695	1.533	1.275	
ROUTE	PIPE	32	31	.21914	179.14	10.133	.86695	1.533	1.277	
ROUTE	BASINABCT	29	22	.00217	13.11	.153	1.32054	1.533	9.457	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHEND2										
COMPUTE NM HYD	SHEND2	-	9	.00270	5.42	.209	1.45009	1.500	3.138	PER IMP= 40.00
DIVIDE HYD	SFRYLSD	9	33	.00160	1.20	.124	1.44997	1.350	1.168	
	SFRYLST	and	25	.00110	4.22	.085	1.44997	1.500	6.025	
ADD HYD	TOTPIPES	31&33	30	.22075	180.34	10.252	.87075	1.533	1.276	
ADD HYD	INLET	25&22	21	.00326	16.96	.237	1.36398	1.533	8.124	
ROUTE	PIPE	30	31	.22075	180.28	10.252	.87076	1.533	1.276	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHEND3										
COMPUTE NM HYD	SHEND3	-	7	.00180	3.62	.139	1.45009	1.500	3.143	PER IMP= 40.00
ADD HYD	INLET	21& 7	23	.00506	20.33	.373	1.38329	1.533	6.275	
DIVIDE HYD	WCUMCCSD	23	35	.00364	8.80	.268	1.38329	1.467	3.778	
	WCUMCCST	and	25	.00142	11.53	.105	1.38329	1.533	12.667	
ADD HYD	TOTPIPES	31&35	30	.22439	189.08	10.520	.87907	1.533	1.317	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHEND1										
COMPUTE NM HYD	SHEND1	-	6	.01820	36.47	1.408	1.45009	1.500	3.131	PER IMP= 40.00
DIVIDE HYD	NCCSD	6	36	.01547	19.20	1.197	1.45007	1.400	1.939	
	NCCST	and	26	.00273	17.27	.211	1.45007	1.500	9.894	
ADD HYD	TOTPIPES	30&36	31	.23986	208.28	11.686	.91351	1.533	1.357	
ADD HYD	INLET	25&26	6	.00415	27.14	.313	1.41581	1.500	10.221	
ADD HYD	TOTPIPES	6&31	7	.24401	234.55	11.999	.92205	1.533	1.502	
ROUTE	PIPE	7	30	.24401	235.06	12.000	.92206	1.533	1.505	
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENE1										
COMPUTE NM HYD	SHENE1	-	1	.01230	24.65	.951	1.45009	1.500	3.132	PER IMP= 40.00
*S>>>>>>>>>>>>>>>CALCULATE BASIN SHENE2										
COMPUTE NM HYD	SHENE2	-	3	.00760	15.24	.588	1.45009	1.500	3.133	PER IMP= 40.00

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ADD HYD	INLET	1& 3	10	.01990	39.89	1.539	1.45006	1.500	3.132	
ROUTE	PIPE	10	14	.01990	39.60	1.505	1.41812	1.500	3.109	
*S********* ADD FLOW FROM SHENANDOAH TO FLOW IN MIDDLE BRANCH AT GOLF COURSE **										
ADD HYD	101.40	30&13	4	1.78251	2114.76	122.119	1.28455	1.600	1.854	
*S>>>>>>>>>>>>>>CALCULATE - BASIN BETWEEN CHANNEL AND GOLF COURSE										
COMPUTE NM HYD	301.10	-	3	.02580	49.54	2.191	1.59219	1.500	3.000	PER IMP= 58.00
*S********* ADD FLOW FROM 301.1 TO MIDDLE BRANCH AT GOLF COURSE **										
ADD HYD	301.11	3& 4	15	1.80831	2149.16	124.221	1.28803	1.600	1.857	
*S**>>> TOTAL UPSTREAM OF GOLF COURSE IN MIDDLE BRANCH **										
*S*** ID 15 IS DISCHARGE UPSTREAM OF GOLF COURSE IN MIDDLE BRANCH ***********										
*S************** NORTH BRANCH **										
*S***************** CALCULATE BASIN 204.1 **********************										
COMPUTE NM HYD	204.00	-	1	.10200	218.10	8.755	1.60944	1.500	3.341	PER IMP= 50.00
S	ASSUME ALL OF BASIN 204.1 ENTERS PARADISE BLVD. SD									
S	UTE 204.1 FLOW THRU 72" PARADISE BLVD. SD TO GOLF COURSE RD.									
ROUTE	201.20	1	64	.10200	194.68	8.755	1.60945	1.550	2.982	
*S***************** CALCULATE BASIN 204.3 **********************										
COMPUTE NM HYD	204.30	-	3	.08500	118.37	5.604	1.23610	1.550	2.176	PER IMP= 30.00
*S************* ROUTE THRU POND IN GOLF COURSE ********										
ROUTE RESERVOIR	204.31	3	2	.08500	.43	.744	.16407	13.650	.008	AC-FT= 5.000
*S********* ROUTE DISCHARGE FROM POND TO FAIRFAX (MID-POINT)******										
ROUTE	204.32	2	6	.08500	.41	.733	.16166	14.600	.008	
*S***************** CALCULATE BASIN 204.4 **********************										
COMPUTE NM HYD	204.40	-	3	.09500	151.56	6.263	1.23610	1.550	2.493	PER IMP= 30.00
*S********* ROUTE 204.4 THROUGH GOLF COURSE TO FAIRFAX MIDPOINT*****										
ROUTE	204.32	3	5	.09500	150.87	6.263	1.23610	1.550	2.481	
*S**** ADD 204.4R AND 204.3R ROUTES***										
ADD HYD	204.42	5& 6	7	.18000	150.91	6.996	.72872	1.550	1.310	
*S**** ROUTE THIS TOTAL AT FAIRFAX MIDPOINT TO DISCHARGE AT PARADISE****										
ROUTE	204.39	7	2	.18000	145.23	6.989	.72806	1.600	1.261	
*S***************** CALCULATE BASIN 204.2 **********************										
COMPUTE NM HYD	204.20	-	3	.04900	85.82	3.787	1.44917	1.550	2.736	PER IMP= 42.00
*S**** ADD 204.2 TO TOTAL ROUTES DOWN FAIRFAX *****										
ADD HYD	204.21	2& 3	1	.22900	219.23	10.777	.88236	1.600	1.496	
*S***************** CALCULATE BASIN 204.5 **********************										
COMPUTE NM HYD	204.50	-	3	.09000	72.56	4.440	.92497	1.700	1.260	PER IMP= 15.00
*S**** ADD 204.5 TO 204.2-204.4 SUBBASINS **********										
ADD HYD	204.99	1& 3	4	.31900	281.61	15.216	.89438	1.600	1.379	
*S**************** ROUTE THRU CULVERT UNDER P.H. BLVD. **********										
*S************** CULVERT CAN'T HANDLE THIS FLOW ******************										
*S************ ROUTE THRU POND AREA TO SIMULATE FLOW OVER ROAD ********										
ROUTE RESERVOIR	506.00	4	3	.31900	305.71	15.214	.89426	1.600	1.497	AC-FT= .350
*S***************** CALCULATE BASIN 205.1 - PARADISE RIDGE SUB'D *****										
COMPUTE NM HYD	205.10	-	1	.03500	79.85	3.396	1.81930	1.500	3.565	PER IMP= 62.13
*S**** ROUTE 205.1 FLOW IN 72" STORM DRAIN DOWN PARADISE BLVD. TO GOLF COURSE RD										
S APPROXIMATELY AT BASIN 204.5 **************										
ROUTE	201.20	1	66	.03500	66.81	3.396	1.81932	1.550	2.982	
*S***************** CALCULATE BASIN 205.2 **********************										
COMPUTE NM HYD	205.20	-	2	.17500	296.52	16.202	1.73598	1.600	2.648	PER IMP= 59.10
*S********** ADD 205.2 AND 205.1R **************************										
ADD HYD	205TOTA	2&66	67	.21000	361.29	19.598	1.74987	1.550	2.688	
*S********** ADD 205TOTA AND 204.1R **************************										
*S*** ASSUME THIS IS TOTAL IN PARADISE BLVD. SD JUST WEST OF GOLF COURSE										

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	205TOT	67&64	68	.31200	555.96	28.354	1.70396	1.550	2.784	
*S********** ADD 204.2-204.5 AND 205TOT **************************										
ADD HYD	204.00	3&68	1	.63100	844.23	43.568	1.29462	1.600	2.091	
*S**** ROUTE FLOW IN 96" PIPE TO TOP OF BASIN 202.2 **************										
ROUTE	201.20	1	2	.63100	832.44	43.566	1.29454	1.600	2.061	
*S*************** COMPUTE BASIN 203 **********************										
COMPUTE NM HYD	203.00	-	3	.12980	104.83	6.328	.91407	1.650	1.262	PER IMP= 24.00
*S***************** CALCULATE BASIN 202.1 **********************										
COMPUTE NM HYD	202.10	-	4	.04220	91.74	3.868	1.71856	1.500	3.397	PER IMP= 58.00
*S******* ROUTE 202.1 FLOW THROUGH BASIN 202.2 *****************										
*S**** ROUTE FLOW IN 96" PIPE TO TOP OF BASIN 202.2 **************										
ROUTE	201.20	4	5	.04220	86.29	3.868	1.71857	1.550	3.195	
*S******* ADD ROUTED BASIN 202.1 AND BASIN **********************										
ADD HYD	203.00	5& 3	6	.17200	177.64	10.196	1.11144	1.600	1.614	
*S********** ADD THE UPPER BASINS (204-205) TO 201.1/203										
ADD HYD	201.10	6& 2	4	.80300	1010.08	53.761	1.25532	1.600	1.965	
*S***************** COMPUTE BASIN 202.2 **************************										
COMPUTE NM HYD	202.20	-	5	.04330	94.13	3.969	1.71856	1.500	3.397	PER IMP= 58.00
*S***** ADD 202.2 AND UPPER BASINS,(COMPARE AT THIS NODE)******										
ADD HYD	202.30	4& 5	1	.84630	1075.37	57.730	1.27902	1.600	1.985	
*S**** ROUTE NEW HYDRAGRAPH THROUGH THE END OF BASIN 202.3*****										
*S**** ROUTE FLOW IN 96" PIPE TO TOP OF BASIN 202.2 **************										
ROUTE	201.20	1	4	.84630	1080.88	57.729	1.27900	1.600	1.996	
*S***************** COMPUTE BASIN 202.3 **********************										
COMPUTE NM HYD	202.30	-	3	.02050	43.78	1.879	1.71856	1.500	3.337	PER IMP= 58.00
*S*************** CALCULATE BASIN 202.4 **********************										
COMPUTE NM HYD	202.40	-	5	.04010	87.18	3.675	1.71855	1.500	3.397	PER IMP= 58.00
*S******************* ADD 202.3 TO 202.4 ************************										
ADD HYD	202.40	5& 3	2	.06060	130.96	5.554	1.71855	1.500	3.377	
*S******** ADD THE UPPER BASINS TO 202.3/202.4 TO END ***********										
ADD HYD	202.00	2& 4	5	.90690	1172.95	63.283	1.30837	1.600	2.021	
*S*************** CALCULATE BASIN 202.5 ********************** CHECK AREA										
COMPUTE NM HYD	202.50	-	3	.02050	44.57	1.879	1.71856	1.500	3.397	PER IMP= 58.00
*S********* ADD ALL UPPER N. B. BASINS TO 202.35 ***********										
ADD HYD	202.00	3& 5	6	.92740	1203.87	65.162	1.31744	1.600	2.028	
*S******* ID 6 IS TOTAL DISCHARGE AT PASEO DEL NORTE FROM NORTH BRANCH ***										
*S**** ROUTE NORTH BRANCH FLOW AT PASEO/GOLF COURSE TO MIDDLE BRANCH *****										
*S**** ROUTE FLOW IN 90" PIPE **********										
ROUTE	202.51	6	16	.92740	1215.06	65.161	1.31741	1.600	2.047	
*S******* ID 16 IS TOTAL DISCHARGE IN NORTH BRANCH PIPE AT MIDDLE BRANCH ***										
*S*************** MAIN BRANCH INTO DAM ********************************										
*S*************** CALCULATE BASIN 103 **********************										
COMPUTE NM HYD	103.00	-	2	.05810	128.35	5.385	1.73776	1.500	3.452	PER IMP= 59.20
*S********** ROUTE THRU STORM DRAIN UNDER NORTENA AND GOLF C. RD.********										
ROUTE	103.10	2	3	.05810	128.35	5.385	1.73777	1.500	3.452	
*S***>>> ADD SHEHANDOAH BASIN E FLOWS TO BASIN 103 *****										
ADD HYD	103.10	3&14	4	.07800	167.94	6.742	1.62072	1.500	3.364	
*S**>>> FLOW DOWNSTREAM OF GOLF COURSE IN MIDDLE BEFORE ADDING N. BRANCH										
ADD HYD	103.20	15& 4	15	1.88631	2269.10	130.964	1.30178	1.600	1.880	
*S**>>> TOTAL FLOW DOWNSTRAM OF GOLF COURSE MIDDLE AND NORTH BRANCHES										
ADD HYD	103.20	15&16	17	2.81371	3484.14	194.179	1.29397	1.600	1.935	

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ROUTE	102.10	17	13	2.81371	3446.32	194.180	1.29397	1.600	1.914	
*S**>>> TOTAL FLOW IN MIDDLE BRANCH UPSTREAM OF RANCHO SERENA										
*S>>>>********** CALCULATE BASIN 102 **********										
COMPUTE NM HYD	RANCHO_O1	-	1	.00566	7.49	.257	.85203	1.500	2.069	PER IMP= 16.00
ROUTE	NORT&SER	1	4	.00566	6.39	.253	.83843	1.567	1.764	
COMPUTE NM HYD	RANCHO_O2	-	2	.00786	8.57	.279	.66441	1.500	1.705	PER IMP= 9.00
ADD HYD	RANCHO12	2& 4	1	.01352	14.35	.529	.73308	1.533	1.659	
DIVIDE HYD	SERENO	1	2	.00676	7.18	.264	.73308	1.533	1.659	
	BUTTER	and	3	.00676	7.18	.264	.73308	1.533	1.659	
ROUTE	SER&LARG	2	23	.00676	6.66	.264	.73264	1.600	1.539	
ROUTE	BUTTER&DAM	3	24	.00676	4.99	.264	.73170	1.633	1.154	
COMPUTE NM HYD	BASIN_102R	-	1	.01107	23.75	.971	1.64507	1.500	3.352	PER IMP= 52.00
ADD HYD	BUTTERTOT	1&24	55	.01783	26.31	1.211	1.27304	1.500	2.306	
COMPUTE NM HYD	BASIN_E1	-	1	.00215	4.62	.189	1.64506	1.500	3.361	PER IMP= 52.00
ADD HYD	SER&LARG	1&23	4	.00891	10.47	.448	.94276	1.567	1.837	
COMPUTE NM HYD	BASIN_F1	-	1	.00807	16.84	.673	1.56383	1.500	3.261	PER IMP= 47.00
ROUTE	TO_BSN_H	1	3	.00807	16.51	.657	1.52590	1.500	3.197	
COMPUTE NM HYD	BASIN_H	-	2	.00192	3.84	.147	1.43384	1.500	3.123	PER IMP= 39.00
ADD HYD	LARG&DOR	2& 3	1	.00999	20.35	.800	1.50199	1.500	3.183	
ROUTE	TO_BSN_G	1	3	.00999	20.41	.800	1.50159	1.533	3.193	
COMPUTE NM HYD	BASIN_G	-	2	.00279	6.03	.247	1.66131	1.500	3.377	PER IMP= 53.00
ADD HYD	LARG&QUI	2& 3	1	.01278	26.00	1.041	1.52706	1.533	3.179	
ROUTE	TOSERENO	1	3	.01278	26.36	1.041	1.52685	1.533	3.223	
COMPUTE NM HYD	BASIN_F2	-	2	.00415	9.11	.378	1.71006	1.500	3.429	PER IMP= 56.00
ADD HYD	LARG&SER	2& 3	1	.01693	34.78	1.409	1.56067	1.533	3.210	
DIVIDE HYD	PIPE	1	2	.01550	23.00	1.290	1.56067	1.467	2.318	
	STRT	and	3	.00143	11.78	.119	1.56067	1.533	12.895	
ROUTE	STORMDRN	2	5	.01550	23.75	1.290	1.56053	1.467	2.394	
ADD HYD	SER&LARG	4& 3	1	.01034	22.17	.567	1.02810	1.533	3.351	
ROUTE	TOCHANNL	1	4	.01034	22.39	.567	1.02775	1.533	3.384	
ADD HYD	CHNNLTOT	4& 5	9	.02584	45.55	1.857	1.34738	1.533	2.754	
COMPUTE NM HYD	BASIN_B1	-	1	.00340	7.62	.322	1.77505	1.500	3.504	PER IMP= 60.00
ROUTE	LARG&ENC	1	3	.00340	6.94	.313	1.72502	1.533	3.189	
COMPUTE NM HYD	BASIN_B2	-	1	.00408	9.00	.376	1.72631	1.500	3.448	PER IMP= 57.00
ADD HYD	LARG&ENC	1& 3	5	.00748	15.43	.678	1.70078	1.500	3.223	
COMPUTE NM HYD	BASIN_A1	-	1	.00567	12.50	.522	1.72630	1.500	3.446	PER IMP= 57.00
ROUTE	ALGR&ENC	1	3	.00567	11.48	.508	1.67856	1.533	3.163	
COMPUTE NM HYD	BASIN_A2	-	2	.00426	9.15	.374	1.64507	1.500	3.356	PER IMP= 52.00
ADD HYD	ENC&LARG	2& 3	4	.00993	19.95	.872	1.64621	1.533	3.140	
ADD HYD	A1A2B1B2	4& 5	7	.01741	35.22	1.550	1.66965	1.533	3.161	
ROUTE	A1A2B1B2	7	4	.01741	35.63	1.549	1.66875	1.533	3.198	
COMPUTE NM HYD	BASINA3	-	3	.00209	4.37	.174	1.56383	1.500	3.269	PER IMP= 47.00
ADD HYD	TOTA&B	3& 4	7	.01950	39.69	1.719	1.65320	1.533	3.180	
ROUTE	STORMDRN	7	10	.01950	39.75	1.719	1.65322	1.533	3.185	
COMPUTE NM HYD	BASIN_C	-	3	.00046	.82	.027	1.10888	1.500	2.797	PER IMP= 19.00
COMPUTE NM HYD	BASIN_D	-	4	.00024	.38	.010	.80017	1.500	2.445	PER IMP= .00
COMPUTE NM HYD	BASIN_I1	-	11	.00045	.98	.036	1.51209	1.500	3.388	PER IMP= 37.00
COMPUTE NM HYD	BASIN_I2	-	12	.00168	3.45	.122	1.36719	1.500	3.209	PER IMP= 27.00
*S********** ADD RANCHO2 BASINS (F-H) INTO CHANNEL AT RANCHO SERENO ****										
ADD HYD	102.20	13& 9	14	2.83955	3485.60	195.999	1.29422	1.600	1.918	
*S********** ADD RANCHO2 BASIN I-2 INTO CHANNEL AT RANCHO SERENO********										
ADD HYD	102.20	14&12	13	2.84123	3488.03	196.088	1.29403	1.600	1.918	
*S********** ADD RANCHO2 BASIN I-1 INTO CHANNEL AT RANCHO SERENO********										

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	102.30	13&11	97	2.84168	3488.71	196.123	1.29406	1.600	1.918	
*S************** ADD RANCHO BASINS C, D, DIVIDED FLOW FROM RANCHO12 AND										
*S************** STORM DRAIN FLOW FROM BASINS A AND B										
S ASSUME ALL THIS RUNOFF GOES DIRECTLY INTO DAM. ADD IN LATER										
ADD HYD	102.40	3& 4	88	.00070	1.20	.037	1.00255	1.500	2.677	
ADD HYD	102.50	88&10	98	.02020	40.88	1.756	1.63021	1.533	3.162	
ADD HYD	102.60	98&55	99	.03803	66.40	2.967	1.46275	1.533	2.728	
*S**>>>********** CALCULATE MC BASIN 101.1 **********										
COMPUTE NM HYD	101.10	-	95	.17600	388.27	16.312	1.73776	1.500	3.447	PER IMP= 59.20
COMPUTE NM HYD	101.20	-	2	.07025	123.73	5.688	1.51815	1.550	2.752	PER IMP= 44.19
ROUTE	402.10	2	1	.07025	124.15	5.688	1.51816	1.550	2.761	
COMPUTE NM HYD	101.30	-	2	.02675	54.99	2.166	1.51815	1.500	3.212	PER IMP= 44.19
*S************ ADD 101.3 to routed flow from 101.2 **********										
ADD HYD	101.11	2& 1	1	.09700	173.20	7.854	1.51815	1.550	2.790	
ROUTE	402.10	1	2	.09700	174.19	7.854	1.51815	1.550	2.806	
*S************ TOTAL FLOW IN MIDDLE BRAHCH DOWNSTREAM OF RANCHO SERENA **********										
ADD HYD	101.11	2&97	18	2.93868	3643.25	203.792	1.30028	1.600	1.937	
ROUTE	102.10	18	19	2.93868	3594.25	203.792	1.30028	1.600	1.911	
*S**>>> TOTAL FLOW IN MIDDLE BRANCH UPSTREAM OF RANCHO SERENA										
*S********** ID 19 IS TOTAL FLOW INTO DAM from Middle Branch **********										
*S****************** SOUTH BRANCH ******************										
*S****************** CALCULATE BASIN 404 **********										
COMPUTE NM HYD	404.00	-	2	.19500	361.19	14.473	1.39167	1.500	2.894	PER IMP= 44.00
*S****************** ROUTE THIS FLOW THRU 404.1 **********										
ROUTE	404.01	2	1	.19500	318.67	14.473	1.39167	1.550	2.553	
*S***************** CALCULATE BASIN 404.1 **********										
COMPUTE NM HYD	404.10	-	2	.11500	253.87	10.658	1.73776	1.500	3.449	PER IMP= 59.20
*S************* ADD 404.1 AND 404 ROUTE **********										
ADD HYD	404.02	1& 2	3	.31000	540.23	25.132	1.52005	1.550	2.723	
*S************ ROUTE THIS FLOW THRU 403.3 LARGE CHANNEL**********										
ROUTE	403.01	3	1	.31000	542.29	25.132	1.52005	1.550	2.733	
*S***************** CALCULATE BASIN 403.3 **********										
COMPUTE NM HYD	403.30	-	2	.03700	81.77	3.426	1.73601	1.500	3.453	PER IMP= 59.00
*S************ ROUTE THIS FLOW THRU 10' CONCRETE CHANNEL **********										
ROUTE	403.02	2	3	.03700	82.18	3.426	1.73602	1.500	3.470	
*S************* ADD 403.3R AND TOTAL ROUTE **********										
ADD HYD	403.03	3& 1	4	.34700	614.68	28.557	1.54308	1.550	2.768	
COMPUTE NM HYD	403.20	-	2	.01400	30.95	1.296	1.73601	1.500	3.454	PER IMP= 59.00
*S************ ROUTE THIS FLOW THRU 10' CONCRETE CHANNEL (S.)**********										
ROUTE	403.21	2	3	.01400	31.24	1.296	1.73605	1.500	3.487	
*S******* ADD 403.2R AND TOTAL ROUTE IN LARGE CHANNEL (ID=4)**********										
ADD HYD	403.22	3& 4	1	.36100	642.56	29.853	1.55056	1.550	2.781	
*S*** DIVIDE TOTAL INFLOW;PIPE CAP. W/8-9' HEAD IS 265 CFS, REST IS OVERFLOW***										
*S******* DIVIDE HYD BETWEEN PIPE CAPACITY AND STREET FLOW****										
DIVIDE HYD	403.11	1	3	.28227	265.00	23.343	1.55056	1.450	1.467	
	403.12	and	7	.07873	377.56	6.511	1.55056	1.550	7.493	
*S************** ROUTE PIPE FLOW THRU 403 STORM DRAIN TO GOLF C. RD.**********										
ROUTE	403.19	3	5	.28227	267.05	23.343	1.55056	1.500	1.478	
*S********** ROUTE OVERFLOW DOWN FIREWHEEL AND ACROSS BASIN 403*****										
ROUTE	403.21	7	6	.07873	354.13	6.511	1.55066	1.600	7.028	
*S******** ADD OVERLAND AND PIPE FLOW FROM MAIN CHANNEL THRU 403*****										

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ADD HYD	403.40	5& 6	4	.36100	619.17	29.854	1.55058	1.600	2.680	
*S****************** CALCULATE BASIN 403 **********************										
COMPUTE NM HYD	403.00	-	2	.06800	127.74	6.296	1.73601	1.550	2.935	PER IMP= 59.00
*S*************** ADD 403 AND THE ROUTES THRU 403 **************************										
ADD HYD	403.40	4& 2	3	.42900	736.09	36.150	1.57997	1.600	2.681	
*S****************** CALCULATE BASIN 402 **********************										
COMPUTE NM HYD	402.00	-	2	.09300	205.42	8.611	1.73601	1.500	3.451	PER IMP= 59.00
*S************ ROUTE 402 THRU PIPE TO G.C. ROAD ********************										
ROUTE	402.10	2	1	.09300	205.87	8.611	1.73602	1.500	3.459	
*S************** ADD 402R AND TOTAL ROUTES FROM 403 ID=3 ************************										
ADD HYD	402.20	1& 3	6	.52200	890.48	44.760	1.60777	1.550	2.665	
*S******************* CALCULATE BASIN 403.1 **********************										
COMPUTE NM HYD	403.10	-	2	.03000	66.30	2.778	1.73601	1.500	3.453	PER IMP= 59.00
*S******* DIVIDE HYD BETWEEN PIPE CAPACITY AND STREET FLOW****										
DIVIDE HYD	403.11	2	22	.02811	46.70	2.602	1.73600	1.450	2.596	
	403.12	and	3	.00189	19.60	.175	1.73600	1.500	16.173	
*S*********** ROUTE 403.1 PIPE FLOW THRU PIPE TO SOUTH BRANCH******************										
ROUTE	403.11	22	1	.02811	46.36	2.602	1.73603	1.550	2.577	
*S*********** ROUTE LEFTOVER STREET FLOW DOWN GOLF COURSE********										
ROUTE	403.21	3	4	.00189	9.08	.176	1.74010	1.550	7.492	
*S*************** ADD OVERLAND AND PIPE FLOW FROM 403.1******										
ADD HYD	403.19	1& 4	1	.03000	55.44	2.778	1.73624	1.550	2.888	
*S*** ADD 403.1ROUTES AND TOTAL ROUTE ID=6 FOR TOT. @ BUTTERFIELD AND G.C.****										
ADD HYD	403.12	1& 6	7	.55200	945.92	47.538	1.61476	1.550	2.678	
*S*** DIVIDE HYD BETWEEN PIPE CAPACITY AND OVERLAND LEFTOVER THRU 401***										
DIVIDE HYD	401.10	7	77	.50218	618.00	43.248	1.61476	1.500	1.923	
	401.20	and	3	.04982	327.92	4.291	1.61476	1.550	10.284	
*S************ ROUTE NEW PIPE TOTAL THRU 401 PIPE TO DAM *********************										
ROUTE	401.10	77	1	.50218	617.52	43.248	1.61475	1.700	1.921	
*S*********** ROUTE LEFTOVER STREET FLOW OVERLAND THRU 401********										
ROUTE	401.21	3	4	.04982	217.26	4.291	1.61491	1.650	6.813	
*S*************** ADD OVERLAND AND PIPE ROUTES THRU 401******										
ADD HYD	401.99	1& 4	5	.55200	834.31	47.539	1.61477	1.650	2.362	
*S****************** CALCULATE BASIN 401 **********************										
COMPUTE NM HYD	401.00	-	2	.20600	309.50	19.073	1.73601	1.650	2.348	PER IMP= 59.00
*S************ ADD BASIN 401 TO ROUTES**********************										
*S************** TOTAL SOUTH BRANCH FLOW ******************										
*S*************** ID=3 IS SOUTH BRANCH FLOW **************************										
ADD HYD	403.12	2& 5	3	.75800	1143.81	66.612	1.64772	1.650	2.358	
*S**** NOW ADD SOUTH BRANCH FLOW (ID3) TO NORTH/MAIN FLOW (ID=18)********										
*S*********** TOTAL INTO PIEDRAS MARCADAS DAM *******************										
ADD HYD	100.00	19& 3	1	3.69668	4709.58	270.404	1.37152	1.600	1.991	
S	ADD FLOW FROM BASIN 101.10 DIRECTLY INTO DAM									
ADD HYD	TOT1	1&95	2	3.87268	4973.27	286.716	1.38816	1.600	2.007	
S	FROM MISC RANCHO SERENO BASINS (BASIN 102) DIRECTLY INTO DAM									
ADD HYD	TOT2	2&99	1	3.91071	5029.28	287.316	1.37754	1.600	2.009	
*S*********** ROUTE THRU PIEDRAS MARCADAS DAM ********										
*S	MOVE - THIS RATING CURVE DOES NOT REFLECT WHAT EXISTS TODAY.									
*S	IS A GATED OUTLET SO FLOW OUT ONLY THRU EMERGENCY SPILLWAY.									
FINISH										

APPENDIX E

Geotechnical Investigation and Pavement Section Design

Vinyard & Associates, Inc.

4415-D Hawkins, NE
Albuquerque, New Mexico 87109
(505) 345-1937

Geotechnical Engineering • Materials Testing • Environmental Engineering

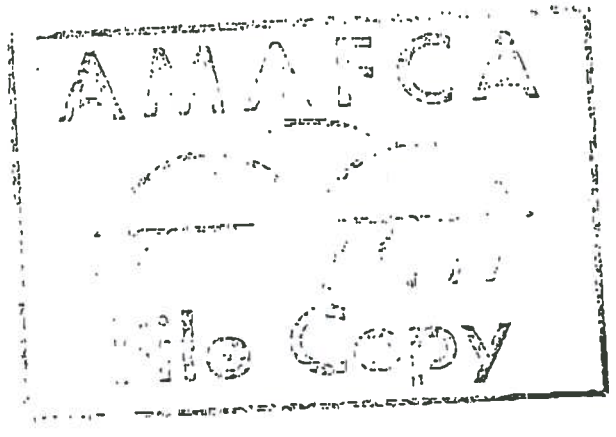
REVISED GEOTECHNICAL INVESTIGATION AND PAVEMENT SECTION DESIGN UNSER BLVD. FROM PARADISE BLVD. TO THE BERNALILLO COUNTY LINE

Prepared for:

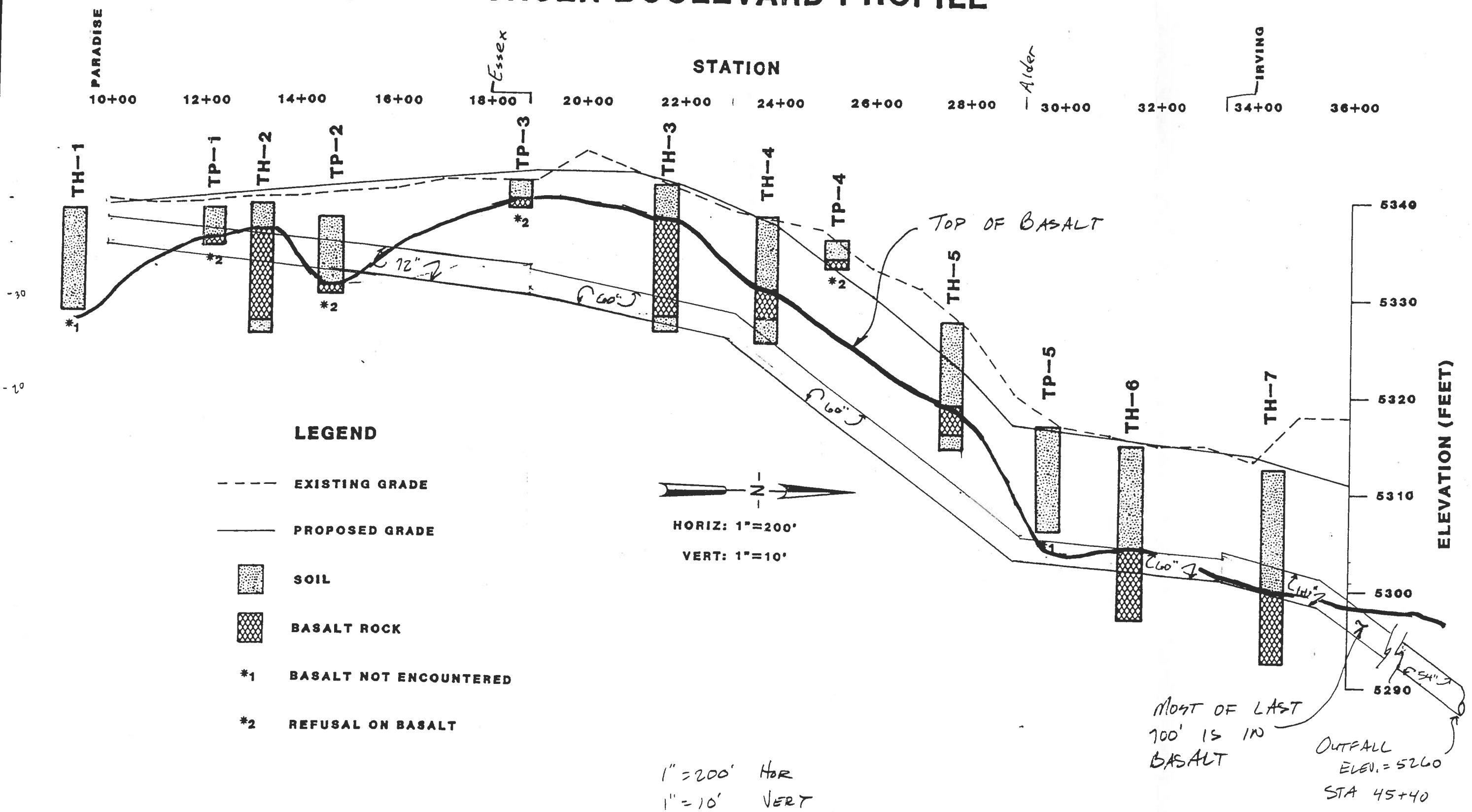
Leedshill-Herkenhoff, Inc.

Project No.: 90-1-10

April 9, 1990



UNSER BOULEVARD PROFILE



LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- SOIL
- BASALT ROCK
- *1 BASALT NOT ENCOUNTERED
- *2 REFUSAL ON BASALT

N

HORIZ: 1"=200'

VERT: 1"=10'

1" = 200' HOR
1" = 10' VERT

PROJECT NO.: 90-1-10

FIGURE NO.: 23