CITY OF
Albuquerque

October 8, 1997

Martin J. Chávez, Mayor

Gregory Krenik, P.E.
Mark Goodwin & Assoc.
P.O. Box 90606
Albuquerque, NM 87199

RE: LAS MARCADAS SHOPPING CENTER - BLOCKBUSTER (C12-D2D1). ENGINEER'S CERTIFICATION FOR CERTIFICATE OF OCCUPANCY. ENGINEER'S CERTIFICATION DATED SEPTEMBER 18, 1997.

Dear Mr. Krenik:

Based on the information provided on your September 18, 1997 submittal, the above referenced project is approved for Certificate of Occupancy.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

CITY OF
Albuquerque
Public Works Department

Martin J. Chávez, Mayor
February 6,1997

Robert E. Gurulé, Director

Greg Krenik
Mark Goodwin & Associates
P.O. Box 90606
Albuquerque, New Mexico 87199

RE: ENGINEER CERTIFICATION FOR LOOP ROAD PAVING AND PARTIAL STORM SEWER FACILITIES @ LAS MARCADAS SHOPPING CENTER (C12-D2D)
CERTIFICATION STATEMENT AND STAMP DATED 1/29/97

Dear Mr. Krenik:

Based on the information provided on your January 29, 1997 submittal, partial Engineer Certification for the above referenced site is acceptable.

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia

Sincerely

Bernie J. Montoya CE
Engineering Associate

CITY OF
Albuquerque
Public Works Department

Martin J. Chávez, Mayor

Robert E. Gurulé, Director

March 28, 1997

Greg Krenik, PE
Mark Goodwin & Associates
PO Box 90606
Albuquerque, new Mexico 87199

RE: REVISED DRAINAGE PLAN FOR BLOCKBUSTERS @ LAS MARCADAS
SHOPPING CENTER (C12-D2D1) REVISION DATED 3/26/97

Dear Mr. Krenik:

Based on the information provided on your March 27, 1997 resubmittal, the above referenced site is approved for Building Permit.

Please attach a copy of this approved plan to the construction sets prior to sign off by Hydrology.

Also, prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist will be required.

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia
File

Sincerely

Bernie J. Montoya CE
Engineering Associate

CITY OF
Albuquerque
Public Works Department

Martin J. Chávez, Mayor

Robert E. Gurulé, Director

March 17, 1997

Greg Krenik, PE
Mark Goodwin & Associates
PO Box 90606
Albuquerque, new Mexico 87199

RE: REVISED DRAINAGE PLAN FOR BLOCKBUSTERS @ LAS MARCADAS
SHOPPING CENTER (C12-D2D1) REVISION DATED 3/13/97

Dear Mr. Krenik:

Based on the information provided on your March 13, 1997 resubmittal, the above referenced site is approved for Building Permit.

Please attach a copy of this approved plan to the construction sets prior to sign off by Hydrology.

Also, prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist will be required.

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia
File

Sincerely

Bernie J. Montoya CE
Engineering Associate

CITY OF
Albuquerque
Public Works Department

Martin J. Chávez, Mayor

Robert E. Gurulé, Director

March 12,1997

Gregory J. Krenik, PE
Mark Goodwin & Associates
PO Box 90606
Albuquerque, New Mexico 87199

RE: REVISED DRAINAGE PLAN FOR BLOCKBUSTERS @ LAS MARCADAS SHOPPING CENTER (C12-D2D1) ENGINEER'S STAMP DATED 3/4/97

Dear Mr. Krenik:

Based on the information provided on your March 5, 1997 resubmittal, the above referenced site is approved for Building Permit.

Please attach a copy of this approved plan to the construction sets prior to sign off by Hydrology.

Also, Engineer Certification per the DPM checklist will be required prior to Certificate Of Occupancy release.

If I can be of further assistance, please feel free to contact me 924-3986.

C: Andrew Garcia
File

Sincerely

Bernie J. Montoya

Bernie J. Montoya CE
Engineering Associate

CITY OF
Albuquerque

P.O. Box 1293 Albuquerque, NM 87103

July 19, 1996

Martin J. Chávez, Mayor

Gregory J Krenik, PE
Mark Goodwin & Assoc
PO Box 90606
Albuquerque, NM 87199

RE: GRADING & DRAINAGE PLAN FOR BLOCKBUSTER @ GC & PDN
RECEIVED JULY 1, 1996 FOR BUILDING PERMIT
ENGINEER'S STAMP DATED 6-21-96 (C-12/D2D1)

Dear Mr. Krenik:

Based on the information included in the submittal referenced above, City Hydrology accepts the revised Grading & Drainage Plan for Building Permit.

Include a copy of the Grading & Drainage Plan, dated 6-21-96, in the set of construction documents that will be submitted to Code Administration for the Building Permit.

Engineer's Certification of grading & drainage per DPM checklist must be accepted by City Hydrology before any Certificate of Occupancy will be released. Include as-built INV & TG and a copy of the "Green Tag" for the Final Inspection of the retaining walls.

If Tract H6 Riverview is divided into lots then private drainage easements will be required for cross lot drainage. Maintenance responsibility for the private storm drain must also be declared.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia
Fred Aguirre
George Rainhart, 2325 San Pedro NE, Suite 2B, 87110

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 30, 1995

Gregory J Krenik, PE
Mark Goodwin & Assoc
PO Box 90606
Albuquerque, NM 87199

RE: GRADING & DRAINAGE PLAN FOR BLOCKBUSTER @ GC & PDN
RECEIVED NOVEMBER 22, 1995 FOR BUILDING PERMIT
ENGINEER'S STAMP DATED 11-20-95 (C-12/D2D1)

Dear Mr. Krenik:

Based on the information included in the submittal referenced above, City Hydrology accepts the revised Grading & drainage Plan for Building Permit.

Include a copy of the Grading & Drainage Plan, dated 11-20-95, in the set of construction documents that will be submitted to Code Administration for the Building Permit.

Engineer's Certification of grading & drainage per DPM checklist must be accepted by City Hydrology before any Certificate of Occupancy will be released. Include a copy of the "Green Tag" for the Final Inspection of the retaining walls.

If Tract H6 Riverview is divided into lots then private drainage easements will be required for cross lot drainage. Maintenance responsibility for the private storm drain must also be declared.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 6, 1995

Gregory J Krenik, PE
Mark Goodwin & Assoc
PO Box 90606
Albuquerque, NM 87199

RE: DRAINAGE REPORT FOR BLOCKBUSTER @ GC & PDN (C-12/D2D1)
RECEIVED OCTOBER 19, 1995 FOR BUILDING PERMIT
ENGINEER'S STAMP DATED 10-13-95

Dear Mr. Krenik:

Based on the information included in the submittal referenced above, City Hydrology accepts the Drainage Report for Building Permit.

Include a copy of the Grading & Drainage Plan, dated 10-13-95, in the set of construction documents that will be submitted to Code Administration for the Building Permit.

Engineer's Certification of grading & drainage per DPM checklist must be accepted by City Hydrology before any Certificate of Occupancy will be released. Include a copy of the "Green Tag" for the Final Inspection of the retaining walls.

If Tract H6 Riverview is divided into lots then private drainage easements will be required for cross lot drainage. Maintenance responsibility for the private storm drain must also be declared.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia

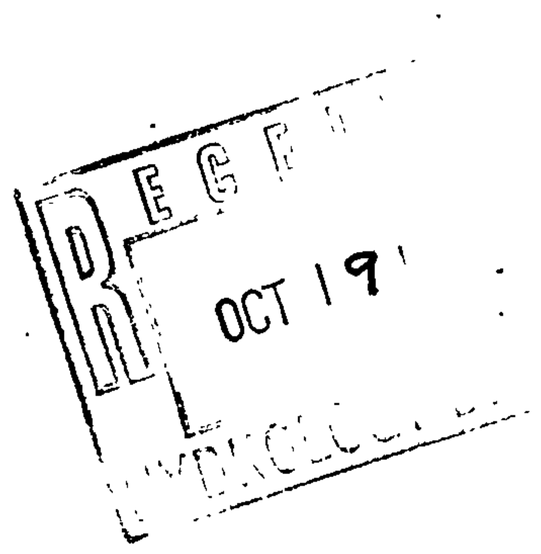
DRB 95-361

DRAINAGE REPORT

for

BLOCKBUSTER VIDEO

LAS MARCADAS SHOPPING CENTER



October 1995

PURPOSE

The purpose of this report is to present the drainage management plan for Blockbuster Video at the Las Marcadas Shopping Center to obtain Building Permit approval. All applicable ordinances, the DPM, and HYMO were utilized to prepare this plan.

EXISTING CONDITIONS

The project comprises an area of 0.6679 AC. This area comprises a portion of basins III and V of the Furr's Drainage Report. See attached Vicinity Map.

HYDROLOGIC ANALYSIS

HYMO was utilized for this analysis. All of the pertinent hydrologic parameters and calculations are located in the appendix of this report.

PROPOSED MANAGEMENT PLAN

As a developed site, this plan proposes to discharge stormwater runoff at two locations, the Golf Course Storm Drain and Golf Course Road right-of-way.

Drainage basin III will discharge 2.49 cfs to the Golf Course Stormdrain via a transverse inlete and a single "D" inlet.

Drainage basin V will discharge 0.19 cfs to the Golf Course Road right-of-way.

INTERIM EROSION CONTROL

Due to the sensitive nature of the sandy soils associated with the site, an Erosion Control Plan is part of this report and project.

This centers on the fact that storm waters will not be allowed free discharge during the construction process until all paving is accomplished. Erosion control berms will be required along the east and south sides of the project.

CONCLUSIONS

The proposed Blockbuster Video at the Las Marcadas Shopping Center can be readily accommodated through the implementation of this plan. It has been adequately shown in this report that the internal conveyance of stormwater can be accomplished while meeting all current City requirements.

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT BLOCKBUSTER - LAS MARCADAS
SUBJECT DRAINAGE CALCS
BY GJK DATE 10-11-95
CHECKED _____ DATE _____
SHEET 1 OF ____

- THIS SITE IS PART OF DRAINAGE BASINS III AND IV
- THIS SITE WILL DISCHARGE WATER DIRECTLY INTO THE GOLF COURSE ROAD STORM DRAIN VIA A TRANSVERSE INLET AND A SINGLE "D" INLET ON SITE.
- THE AREA OF BASIN IV WILL DRAIN TO THE ROADWAY OF GOLF COURSE ROAD DIRECTLY AND ENTER THE STORM DRAIN THROUGH THE EXISTING ROADWAY INLETS.
- REFER TO CONCEPTUAL DRAINAGE REPORT FOR LAS MARCADAS SHOPPING CENTER DATED 3-1-95. APPENDIX "A"
- REVISIONS TO THE CONCEPTUAL PLAN REQUIRED THE FINE TUNING OF THE SITE AND FURTHER DRAINAGE BASIN DESIGN, REFER TO THE FURRS - LAS MARCADAS DRAINAGE REPORT. (C-12/020)

TOTAL SITE = 0.6679 AC
AREA OF BASIN III = 0.5957 AC = 0.000931 SM
AREA OF BASIN IV = 0.0722 AC = 0.000113

BASIN	III	IV
TYPE B	11.92 %	86.15 %
TYPE D	88.08 %	13.85 %

$P_1 = 1.90$ in
$P_6 = 2.20$ in
$P_{24} = 2.65$ in
DT = 0.03333 HR
TP = 0.1333 HR

FROM HYMO OUTPUT 2-4 BASIN III
Q = 2.49 CFS
V = 0.0909 AC-FT
THIS IS ROUTED THROUGH THE ONSITE INLETS

FROM HYMO OUTPUT 5-7 BASIN IV
Q = 0.19 CFS
V = 0.0052 AC-FT
THIS FLOW GOES INTO GOLF COURSE ROAD

THE 2.99 CFS IS CAUGHT IN THE TRANSVERSE INLET AND THE SINGLE "D" INLET AND TRANSFERED THROUGH 30" RCP TO THE GOLF COURSE STORM DRAIN.

CONCEPTUAL DRAINAGE REPORT

for

LAS MARCADAS SHOPPING CENTER

PREPARED FOR

De la Torre-Rainhart
7801 Academy Road
Albuquerque, NM 87109

December 1994

PURPOSE

The purpose of this report is to present the drainage management plan for the Las Marcadas Shopping Center to obtain Final Plat and Work Order approval. All applicable ordinances, the DPM and HYMO were utilized to prepare this plan.

EXISTING CONDITIONS

The project comprises an area of 13.1334 ac at the northwest corner of Golf Course Road and Paseo del Norte. This site is bounded by Golf Course Road to the east, Paseo del Norte to the south, Heights First Church of the Nazarene to the north and Paradise Valley and the Las Marcadas Arroyo to the west (see attached Vicinity Map).

The tract is fairly steep sloping from northwest to southeast at approximately 6-7 percent. Vegetation cover is typical of westside property, and the soils are sandy. The site drains to the intersection of Golf Course Road and Paseo del Norte.

HYDROLOGIC ANALYSIS

HYMO was utilized for this analysis. All of the pertinent hydrologic parameters and calculations are located in the appendix of this report.

PROPOSED MANAGEMENT PLAN

As a developed site, this plan proposes to discharge stormwater runoff at two locations, the Golf Course Storm Drain and the Las Marcadas Arroyo.

There are four drainage basins, three of which discharge to the Golf Course Storm Drain and one discharges to the Las Marcadas Arroyo.

Drainage Basin I will discharge 10.19 cfs to the Las Marcadas Arroyo at the rip-rap rundown that was proposed as part of the Las Marcadas II Subdivision. A HEC-2 run was completed for the section of the arroyo along the property. Our analysis matched the study prepared by Smith Engineering (Appendix A). The Prudent Line is shown on the grading plan and a slight conflict with the proposed paving exists. Per meetings with Kurt Browning of AMAFCA, it is proposed that scour protection be provided to scour depth along the perimeter wall for the duration of the conflict. This will eliminate any appurtances within AMAFCA's jurisdiction and eliminate the need for any agreements with AMAFCA. Drainage Basins II, III and IV will discharge 18.7 cfs, 16.71 cfs and 5.76 cfs, respectively to the Golf Course Storm Drain. These discharge points are preceded by a series of catch basins that transmit the stormwater runoff. The open areas that are undeveloped are graded such that there is a one foot depression for retention so as to avoid any silt transfer around the site. The outfall to the middle connection is raised 6" above the surrounding grade so any silt will settle out before it discharges to the Golf Course storm drain.

INTERIM EROSION CONTROL

Due to the sensitive nature of the sandy soils associated with the site, an Erosion Control Plan is part of this report and project.

This centers on the fact that storm waters will not be allowed free discharge during the construction process until all paving is accomplished. Erosion control berms will be required along the east and south sides of the project.

CONCLUSIONS

The proposed Las Marcadas Shopping Center can be readily accommodated through the implementation of this plan. It has been adequately shown in this report that the internal conveyance of stormwater can be accomplished while meeting all current City requirements.

EROSION SETBACK STUDY

PIEDRAS MARCADAS ARROYO
ABOVE PASEO DEL NORTE

Report Prepared for

Community Sciences Corporation
Corrales, New Mexico

Project:

Las Marcadas II
for the Strosnider Company

Prepared by:

Smith Engineering Company
6400 Uptown Blvd. NE, Suite 500E
Albuquerque, New Mexico 87110
Tel: 505/884-0700

SEC #94-77-01

This report was prepared by me, Clifford E. Anderson, NM PE & PS No. 6472. On Friday, July 29, 1994, I conducted an on-site review of this study area, and had in my possession the topographic map that is included in this report. It appears that no grading or filling has occurred on the site since the preparation of the topographic map, and by visual observation, the topographic map appears to reflect the conditions I observed.

8/9/94

Clifford E. Anderson
NM PE & PS No. 6472

Date

CLIFFORD E. ANDERSON
NEW MEXICO
6472
LAND SURVEYOR
REGISTERED PROFESSIONAL ENGINEER

EROSION SETBACK STUDY
PIEDRAS MARCADAS ARROYO
ABOVE PASEO DEL NORTE

INTRODUCTION

Community Sciences Corporation (CSS) has authorized Smith Engineering Company (SEC) to prepare an erosion setback study for the Piedras Marcadas Arroyo above the future alignment of Paseo del Norte. A future subdivision, Las Marcadas II, is proposed to be platted and constructed on the easterly side of the arroyo. The purpose of this study is to determine the extent to the area to be set aside for drainage, if the arroyo is allowed to remain in a natural condition and the new residential lots will be placed outside of the anticipated erosion setback area. The study reach of the arroyo is approximately 2,400 feet long. A vicinity map is included as Figure 1 of this report.

It is anticipated that drainage from the new development can discharge at the downstream end of the subdivision in a manner that does not cause upstream instability due to head cutting. Additional stabilization of the arroyo bank adjacent to the subdivision could be constructed with the subdivision to reduce the land area required for erosion protection. While this report may be of assistance for engineers designing such bank stabilization, this report does not include specifics required to design such stabilization. No bank stabilization construction is currently known to be under consideration.

The westerly side of the Piedras Marcadas Arroyo is currently owned by the City of Albuquerque as Open Space/Piedras Marcadas National Monument. No development of this property is currently anticipated. This erosion setback study included both sides of the arroyo in order to determine if some feature on the westerly bank would impact the erosion of the easterly bank. The primary purpose of this study is to establish the erosion setback at the easterly bank.

Hydrology

Flow rates for the middle branch of the Piedras Marcadas Arroyo have been established by Molzen-Corbin and Associates with the "Piedras Marcadas Drainage Management Plan Revision" (draft, May, 1993). This report is not yet completed and has not been distributed for agency or public review. The report includes hydrology for existing conditions and 9 alternatives. No alternative has been selected, but it appears that alternatives number 1 through 4 will not be further considered because of downstream flow constraints. Of the remaining alternatives, number 9 (Model No. WCUPDN2.DAT) represents the most critical proposed flow condition in this reach of the Piedras Marcadas Arroyo. The flow near, within, and immediately downstream of sub-basin 303 represents the study area. A basin boundary map showing the Piedras Marcadas watershed is included as Figure 2 of this

report. These are represented in the AHYMO computer output files from the Molzen-Corbin draft study by Hydrographs 104.11 (@ 4,400' upstream of Paseo del Norte) and 103.10 (@ Paseo del Norte). The Molzen-Corbin study also contains an existing conditions model of the watershed (Model No. EX100.DAT). Because the proposed alternatives 5 through 9 include the diversion of existing flows out of the watershed, the existing condition represents the critical flow condition for this watershed. If future upstream diversions were funded and constructed, the erosion setback distances would be subject to reevaluation.

The Molzen Corbin study might receive further hydrologic modifications to incorporate a 3-minute incremental time with a 24-hour rainfall distribution, as currently recommended in the City Development Process Manual (DPM). Also, recent studies in the Rio Rancho area have indicated that the channel routing function in the AHYMO program, as used by Molzen-Corbin, may not accurately represent the actual routing conditions of the steep sand bottom arroyos common to the Albuquerque area. A new routing function, the Muskingum-Cunge procedure, has recently been added to the AHYMO program to correct this problem. Updated input files using Muskingum-Cunge routings were obtained from AMAFCA. The results of the revised AHYMO analysis in the Piedras Marcadas Arroyo adjacent to Las Marcadas II are summarized as follows:

	Q_{100}@ Paseo del Norte Alignment (HYD No. = 103.10)	Q_{100}@ 4,400' Upstream Paseo del Norte (HYD No. = 104.11)
Existing Condition (PMEX100M)	740.27	728.87
Alternative No. 9 (WCUPD2PM)	650.85	657.51

Summary printouts from the AHYMO program modeling are included with this report.

The upper end of Las Marcadas II is approximately 2,400 feet upstream of Paseo del Norte, so the critical flow at the upper end of the project is 735 cfs. The flow rate at the Paseo del Norte alignment, with Q_{100}=740 cfs, is the recommended value for further erosion setback analysis. If the future option 9 is constructed, the revised flow rates would result in a 5 percent reduction in the erosion setbacks obtained using existing condition flow rates.

Computation of Erosion Setback

The procedures in Section 3.4.5 of AMAFCA's Sediment and Erosion Design Guide (March 1994) were used to obtain the maximum erosion distance. Specifically, the procedures to obtain the "Approximate Maximum Erosion Distance based on Optimal Bend Shape" were

used. The procedures for estimating migration rate using the sediment transport and bend shear procedures and the CURVECALL program are not required for this site. As described in page 3-80 of the Sediment and Erosion Design Guide, if the total migration rate computations are used and "the maximum distance is reached, the computations can be stopped and the erosion buffer estimated based on the maximum erosion envelope." For this report, the "maximum erosion envelope" procedures will be used.

The computation of the maximum erosion envelope proceeded as follows:

Compute dominant discharge from Q_{100}:

$Q_d = 0.2Q_{100} = 0.2*740 \text{ cfs} = 148 \text{ cfs}$

(ref: equation 3.77)

Determine if arroyo section is supercritical or subcritical:

$S_c = 0.037Q_d^{-0.133} = 0.019^{ft/ft}$

(ref: equation 3.80)

Actual ground slope = (5169'-5117')/2,360' $= 0.022^{ft/ft}$

Since $0.022 > S_c$ then slope is critical or supercritical

Compute channel width for dominant discharge:

$W_D = 4.6Q_D^{0.4} = 4.6(148)^{0.4} = 33.95$ feet

use $W_D = 34$ feet

(ref: equation 3.78)

Compute the meander wavelength:

$\lambda/W_D = 10$ for $Q_D \leq 200$ cfs

(ref: equation 3.74a)

$\lambda = 10*W_D = 10*34 = 340$ feet

The half meander wavelength ($\lambda/2$) represents the approximate location where the meandered channel crosses the average down-valley direction.

Determination of the average down-valley direction requires the following steps:

- determine the centerline of flow from the existing topography
- determine the location where the $\lambda/2$ distances intersect the centerline of flow. Distances are adjusted so that existing meanders are centered on the $\lambda/2$ distances.

- plot a smooth line between the points of intersection to obtain the average down-valley direction.

The maximum channel offset (Δmax) is computed by:

$$\Delta max \doteq 2.5 W_d = 2.5 * 34 = 85^{feet}$$

for $Q_D \leq 200$ cfs
(ref: equation 3.75a)

The centerline setback (CSB) is computed as:

$$CSB = \Delta max + W_D/2 = 85 + 34/2 = 102 \text{ feet}$$

(ref: page 3-74)

The centerline setback is then plotted parallel with and 102 feet from the average down-valley direction.

The existing topographic mapping did not clearly indicate a location for the channel bank, and further location of this feature was based on field observation. In many cases, a definite bank could not be observed. Where it was observed that the bank of a wide arroyo section could impact the erosion setback, this feature was noted on the topographic map.

The bankline setback was then established at Δmax from the bank. For this study reach, the bankline setback was critical only at 2 locations (Station 5+00 to 7+00) with both locations on the west bank and not impacting Las Marcadas II on the east side.

Field investigation and topographic mapping also indicated a large sharp meander near Station 7+00 to 9+00 that impacted the east bank of the arroyo. It appears that this meander was created by a large low sand dune on the west bank of the arroyo. Based on the vegetation on the dune, this feature does not appear to be currently active. Nevertheless, this feature appears to be of sufficient significance that the erosion envelope could be impacted. The low flow channel of the arroyo is immediately adjacent to the west bank in this area, and the erosion setback was adjusted so that the centerline setback was established from the existing low flow channel. None of the other local meanders appear to result in a need for similar adjustment.

The erosion envelope, or estimated maximum erosion distance, was based on the critical condition for the centerline setback and bankline setbacks.

The 100-year flood zone from the existing FEMA Flood Insurance Rate Map (Community Panel No. 350002-00080) was overlaid onto the existing topographic mapping to determine if the flood zone would represent a critical condition. Figure 3 of this report contains an enlarged copy of a portion of this map. Within Las Marcadas II, the computed erosion envelope is always outside of the mapped flood zone. Erosion setback distances from the

100-year flood zone are between 40 and 80 feet. At one location immediately south of Las Marcadas II, the flood zone is outside of the centerline setback. This condition appears to have been created by filling that occurred after the creation of the FEMA maps.

The erosion envelope obtained using the procedures outlined herein, is shown on the enclosed Drawing No. 1.

Conclusions

The Piedras Marcadas Arroyo in this study reach appears to be very stable and well vegetated. There is no evidence of headcutting or rapid bed degradation, but there is also no evidence of aggradation. There is only limited evidence of recent bank instability. However, the soils in this area consist of very fine sands and are highly erosive. A major flow event could cause rapid changes to the arroyo with little chance to take corrective action. If this arroyo is to remain unlined or Las Marcadas II will not be constructing arroyo bank stabilization, the erosion envelope established in this report should provide equivalent protection to adjacent property for storms up to a 100-year flood event.