

# THE PROMENADE PHASE II

## PRELIMINARY DRAINAGE REPORT ADDENDUM

Prepared By:  
**CMX GROUP, INC.**  
1515 East Missouri, Suite 115  
Phoenix, Arizona 85014  
(602) 279-8436

Prepared For:  
**THE PEDERSON GROUP**  
2800 North Central Avenue, Suite 1525  
Phoenix, Arizona 85004  
(602) 265-2888



November 19, 2001  
CMX Project No. 6380

## TABLE OF CONTENTS

<u>Title</u>	<u>Page No.</u>
I. Introduction.....	1
II. Flood Plain Designation.....	1
III. Offsite Drainage.....	1
IV. Onsite Drainage.....	1

Figure 1 Vicinity Map

Appendix A Portion of Original Promenade Drainage Report

Appendix B Phase II Preliminary Grading & Drainage Map



## **I. INTRODUCTION**

The Promenade is an 84-acre retail center located on the southeast corner of Scottsdale Road and Frank Lloyd Wright Boulevard in Scottsdale, Arizona. Currently, 65 acres are developed, including retail stores and restaurants. The adjacent streets on all four (4) sides of the Promenade are fully improved.

This addendum addresses the undeveloped 19-acres in the northwest portion of the Promenade site (see Figure 1.).

## **II. FLOOD PLAIN DESIGNATION**

The site is designated as Zone "X" by the Federal Emergency management Agency (FEMA) in accordance with the Flood Insurance Rate Map Panel Number 04013C1245G, dated July 19, 2001. Zone "X" is defined by FEMA as areas of the 500-year flood; areas of the 100-year flood with average depths of less than one foot or with drainage areas less than one square mile; and area protected by levees from the 100-year flood.

## **III. OFFSITE DRAINAGE**

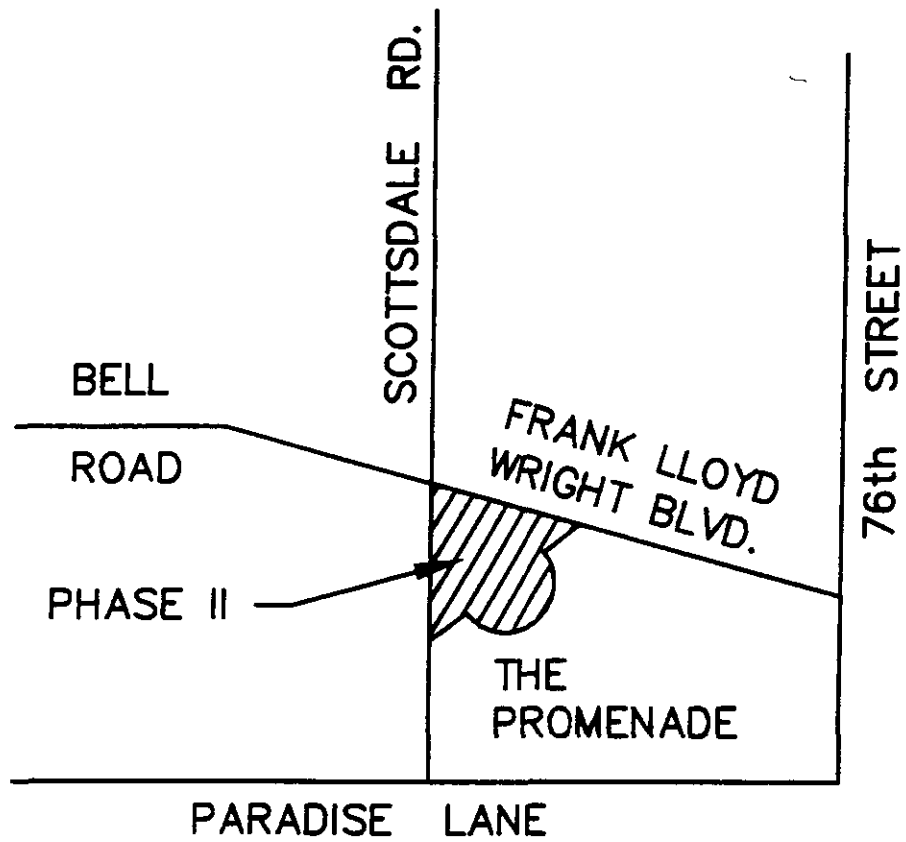
Offsite drainage for the Promenade was addressed in the original drainage report (see Appendix A). Offsite conditions remain the same for this phase.

## **IV. ONSITE DRAINAGE**

Onsite detention for the 100-year, 2-hour storm was provided for the entire Promenade project with Phase I construction in a large detention basin located at the southeast corner of the Promenade (see Appendix A). An existing storm drain system carries all stormwater falling on the Promenade to this basin.

While the Phase II layout has been slightly modified, the drainage concept will remain the same. The existing storm drain system constructed with Phase I will be utilized as originally intended. See the Preliminary Grading and Drainage Plan in Appendix B for details.

All Phase II finish floor elevations will be adequately established to protect them from a 100-year storm event. The proposed lowest floor elevation for each building or pad has been set at an elevation which is a minimum of 6 inches above the highest adjacent curb or 12 inches above the adjacent pavement grade. This will protect it from flooding in the 100-year storm event. The 100-year stormwater elevation in the detention basin is 1499.00. The lowest floor elevation within Phase II is 1505.50 providing a minimum of 6.5 feet of protection.



# VICINITY MAP

N.T.S.

FIGURE 1

**APPENDIX A**  
**PORTION OF ORIGINAL PROMENADE**  
**DRAINAGE REPORT**

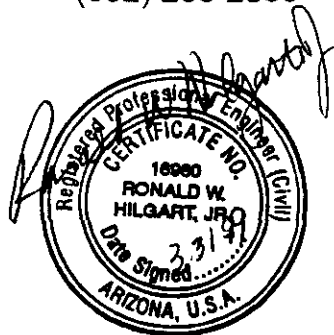
---

# THE PROMENADE

## DRAINAGE REPORT

Prepared By :  
**CMX GROUP INC.**  
1515 East Missouri, Suite 115  
Phoenix, Arizona 85014  
(602) 279-8436

Prepared For:  
**THE PEDERSON GROUP**  
2800 North Central Avenue, Suite 1525  
Phoenix, Arizona 85004  
(602) 265-2888



Revised March 31, 1999  
January 25, 1999  
CMX Project No. 5739

# TABLE OF CONTENTS

TITLE	PAGE NO.
I. Introduction .....	1
II. Flood Plain Designation .....	1
III. Offsite Drainage .....	1
IV. Onsite Drainage .....	1
V. Detention Provisions .....	2
VI. Phasing Plan and Finish Floor Selection .....	2
VII. Conclusions .....	3

## List of Figures

Figure 1 - Site Location Map

## List of Tables

Table 1 - Storm Drain Pipe Size Calculations

## List of Exhibits

Exhibit A - Drainage Map  
Exhibit B - Basin "A" Detention Calculations  
Exhibit C - Flood Insurance Rate Map

APPENDIX A - Storm Drain Pipe Size Support Calculations

APPENDIX B - Stormwater Discharge System Calculations

APPENDIX C - Rip-Rap Calculations



## **I. INTRODUCTION**

The Promenade is located on the southeast corner of Scottsdale Road and Frank Lloyd Wright Boulevard in Scottsdale, Arizona. Paradise Lane parallels the south property line and 76<sup>th</sup> Street is adjacent to the east property line. The 84-acre project will be comprised of mainly commercial development such as restaurants, specialty shops and retail stores. Figure 1 shows the Site Location Map.

The site slopes approximately 16 feet from north to south. The slope is approximately one (1) percent.

This report discusses the existing drainage pattern and defines the proposed drainage improvements and storm water retention provisions. A Master Drainage Map is included as Exhibit A.

## **II. FLOOD PLAIN DESIGNATION**

The site is designated as Zone "X" by the Federal Emergency Management Agency (FEMA) in accordance with the Flood Insurance Rate Map Panel Number 04013C1245F, dated September 30, 1995. Zone "X" is defined by FEMA as areas of the 500-year flood; areas of the 100-year flood with average depths of less than one foot or with drainage areas less than one square mile; and area protected by levees from the 100-year flood. See Exhibit B for the Flood Insurance Rate Map.

## **III. OFFSITE DRAINAGE**

Stormwater will not enter the project site from Scottsdale Road due to the existing terrain pattern. On the north, offsite runoff will be intercepted by the CAP canal. Pavement drainage from a portion of the southern half-street of Frank Lloyd Wright Boulevard will be conveyed to a catch basin along the northern property line. Currently, this stormwater runoff flows west and south through a manmade swale to an existing catch basin located on the east side of Scottsdale Road. As part of the development of this site, a storm drain pipe will be designed to convey these flows to the Scottsdale Road catch basin. On the east, runoff will drain to the south along 76<sup>th</sup> Street. A catch basin, once located near the southwest corner of the site, will be relocated to the northern curb along Paradise Lane, near Scottsdale Road. This catch basin will accommodate some stormwater runoff from the northern half-street of Paradise Lane.

## **IV. ONSITE DRAINAGE**

The site drainage map is included as Exhibit A. It shows the project site plan and the proposed drainage patterns. Onsite drainage will be conveyed from the parking areas to the detention basin via catchbasins and storm drains. The storm drain system will be designed with a 10-year storm capacity. The stormdrain pipe size calculations are provided in Table 1. Calculations for the rip-rap at outlet structures in the detention basin are provided in Appendix C.



Detention volume will be provided in Basin A, which is located near the southeast corner of the site. Basin A will be 20 feet deep with 2.5 horizontal to 1 vertical side slopes. An 8-foot high combination block wall and wrought iron fence will be constructed along the perimeter of Basin D. Site outfall will be along the south property line into Paradise Lane. All of the stormwater runoff will be conveyed into Basin A either by the storm drain pipe system or by the shallow drainage swales located along the southern property line. No stormwater detention is being provided in parking areas.

## V. DETENTION PROVISIONS

Onsite detention will be provided for storm runoff generated by a 100-year 2-hour storm (2.82 inches per hour according to the City of Scottsdale Design Standards and Policies Manual). The formula for calculating the detention volume is:

$$V = (D/12) A C$$

Where V = detention volume in cubic feet per second

C = runoff coefficient

D = rainfall depth for a 100-year 2-hour storm (2.82 in.)

A = size of drainage area in square feet

Calculations are included in this report to verify the adequacy of detention storage for the required stormwater. The "C" runoff coefficient used is 0.90 for commercial site.

The required detention volume is 771,000 cubic feet (or 17.70 acre-feet) and the total provided volume in the Basin A will be 796,034 cubic feet (or 18.27 acre-feet). The detention system will be emptied within a 36-hour period with the installation of a sump pump connection to the City of Scottsdale storm drain located at the northeast corner of Scottsdale Road and Paradise Lane. The sump pump will be operated by manual switch and the system will be emptied after a storm event has passed (City Staff has stated that downstream system is at capacity). The maximum discharge rate for this system will be 6 cubic feet per second. This will drain Detention Basin A in 36 hours.

Calculations of the Basin A detention volume are provided in Exhibit B.

The storm drain system and detention basin for this project are private and will be maintained by the owners. The side slopes of the basin will be lined with a cellular confinement system to protect against erosion. The bottom of the basin will need to be cleaned of trash and debris and the discharge pump system inspected after each major storm.

## VI. PHASING PLAN AND FINISH FLOOR SELECTION

The entire project site will be mass graded with Phase 1 construction. The detention basin, drainage swales, storm drain pipes, catch basins and headwalls will be installed with Phase 1. A geotextile poly-fabric will be installed under each catch basin grate to

prevent silt buildup in storm drain system until surrounding pavement is in place. The storm water discharge pump and the connection to the offsite storm drain will also be part of Phase 1 construction.

All finish floor elevations will be adequately established to protect them from a 100-year storm event. The proposed lowest floor elevation for each building or pad has been set at an elevation which is a minimum of 6 inches above the highest adjacent curb or 12 inches above the adjacent pavement grade. This will protect it from flooding in the 100-year storm event (see Section II). The 100-year stormwater elevation in the detention basin is 1499.00. The lowest floor elevation within this project is 1502.00, providing a minimum of 3 feet of protection.

## **VII. CONCLUSIONS**

The proposed development will be in compliance with all drainage laws and the City of Scottsdale drainage criteria and stipulations. No adverse impacts are expected to the existing drainage system in the adjacent areas. The study has determined that:

1. The site is not within a flood prone area.
2. Existing and proposed improvements will prevent offsite flows from entering the site.
3. Onsite detention will have adequate capacity to hold the 100-year 2-hour storm runoff. The detention system will be emptied within a 36-hour period with the installation of sump pump.
4. Finish floors will be adequately elevated to protect them from a 100-year storm event.
5. No stormwater is being detained in parking areas.

**FIGURE 1**  
**SITE LOCATION MAP**

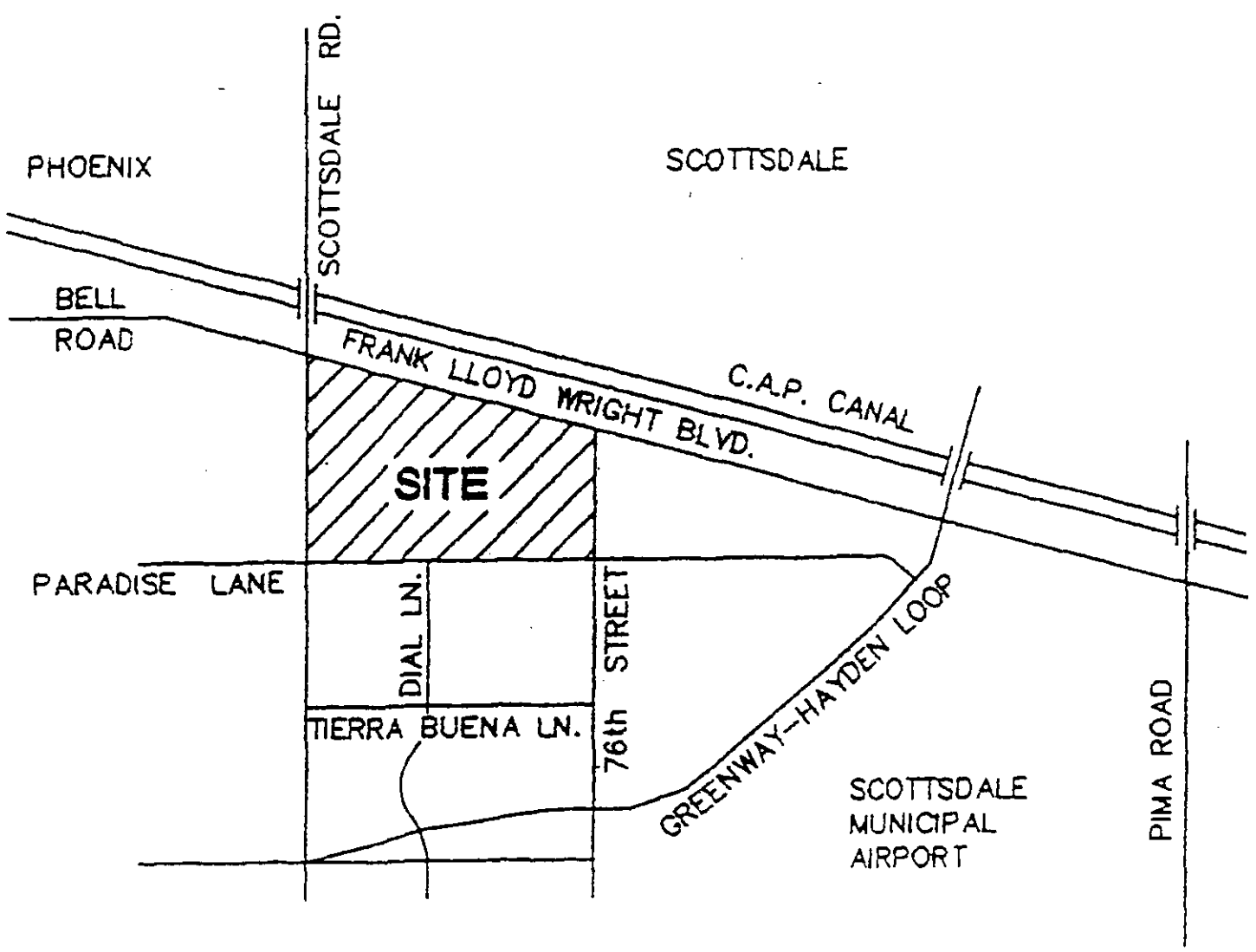


TABLE 1  
STORM DRAIN PIPE SIZES

Subarea	LOCATION	Q(cfs)	DIA (in)	AREA (sf)	Sf	VEL (fps)	LENGTH (ft)	DOWNSTREAM HGL (ft)	SUM OF KL	MINOR LOSSES (ft)	PIPE HEADLOSS (ft)	UPSTREAM HGL (ft)
1	BASIN A TO CP-O	114	48	12.57	0.006302	9.07	696	83.5	2.2	2.81	4.39	90.70
1	CP-O TO CP-P	11	15	1.227	0.028639	8.96	374	90.70	1.2	1.50	10.71	102.90
1	CP-O TO CP-Q	23	24	3.14	0.010357	7.32	124	90.70	1.2	1.00	1.28	92.98
1	CP-Q TO CP-R	18	18	1.77	0.029388	10.17	80	92.98	1.2	1.93	2.35	97.26
1	CP-R TO CP-S	13	15	1.227	0.040000	10.59	124	97.26	0.2	0.35	4.96	102.57
1	CP-O TO CP-N	60	36	7.07	0.008116	8.49	130	90.70	1.2	1.34	1.06	93.09
1	CP-N TO CP-M	54	36	7.07	0.006574	7.64	84	93.09	1.2	1.09	0.55	94.73
1	CP-M TO CP-L	40	30	4.91	0.009518	8.15	126	94.73	1.2	1.24	1.20	97.17
1	CP-L TO CP-J	34	30	4.91	0.006877	6.92	126	97.17	1.2	0.89	0.87	98.93
1	CP-J TO CP-I	26	24	3.14	0.013235	8.28	84	98.93	1.2	1.28	1.11	101.32
1	CP-I TO CP-H	19	24	3.14	0.007068	6.05	130	101.32	1.2	0.68	0.92	102.92
1	CP-H TO CP-G	6	15	1.227	0.008521	4.89	414	102.92	0.2	0.07	3.53	106.52
1	CP-M TO CP-K	8	15	1.227	0.015148	6.52	380	94.73	1.2	0.79	5.76	101.28
5	BASIN A TO CP-EE	25	24	3.14	0.012237	7.96	20	97.6	1.2	1.18	0.24	99.03
4	BASIN A TO CP-CC	21	24	3.14	0.008634	6.69	442	89	0.7	0.49	3.82	93.30
6	SWALE TO CP-GG	32	30	4.91	0.006092	6.52	290	92.9	1.7	1.12	1.77	95.79
6	CP-GG TO CP-FF	12	18	1.77	0.013061	6.78	310	95.79	0.2	0.14	4.05	99.98
3	BASIN A TO CP-II	198	60	19.63	0.001917	10.09	640	86.5	2.2	3.48	1.23	91.20
3	CP-II TO CP-AA	178	60	19.63	0.004673	9.07	664	91.20	1.2	1.53	3.10	95.84
3	CP-AA TO CP-F	55	42	9.62	0.002989	5.72	360	95.84	1.2	0.61	1.08	97.52
3	CP-F TO CP-E	49	36	7.07	0.005413	6.93	140	97.52	1.2	0.90	0.76	99.17
3	CP-E TO CP-D	36	36	7.07	0.002922	5.09	168	99.17	1.2	0.48	0.49	100.15
3	CP-D TO CP-C	19	24	3.14	0.007068	6.05	258	100.15	0.2	0.11	1.82	102.09

TABLE 1  
STORM DRAIN PIPE SIZES

PIPE #	LOCATION	Q(cfs)	DIA (in)	AREA (sf)	Sf	VEL (fps)	LENGTH (ft)	DOWNSTREAM HGL (ft)	SUM OF KL	MINOR LOSSES (ft)	PIPE HEADLOSS (ft)	UPSTREAM HGL (ft)
3	CP-C TO CP-B	12	18	1.77	0.013061	6.78	100	102.09	1.2	0.86	1.31	104.25
3	CP-B TO CP-A	11	18	1.77	0.010975	6.21	90	104.25	1.2	0.72	0.99	105.96
3	CP-AA TO CP-Z	107	54	15.9	0.002965	6.73	190	95.84	1.2	0.84	0.56	97.24
3	CP-Z TO CP-Y	99	54	15.9	0.002538	6.23	126	97.24	1.2	0.72	0.32	98.29
3	CP-Y TO CP-X	87	48	12.57	0.003671	6.92	210	98.29	1.2	0.89	0.77	99.95
3	CP-X TO CP-W	72	48	12.57	0.002514	5.73	362	99.95	1.2	0.61	0.91	101.47
3	CP-W TO CP-V	47	36	7.07	0.004980	6.65	254	101.47	0.2	0.14	1.26	102.87
3	CP-V TO CP-U	30	30	4.91	0.005354	6.11	100	102.87	1.2	0.70	0.54	104.10
3	CP-U TO CP-T	29	30	4.91	0.005003	5.91	100	104.10	1.2	0.65	0.50	105.25
3	CP-II TO CP-BB	1	15	1.227	0.000237	0.81	228	91.20	1.2	0.01	0.05	91.27
2	Scottsdale CB to CP-KK	11	24	3.14	0.002369	3.50	1200	102.55	2	0.38	2.84	105.77

The following equations were used:

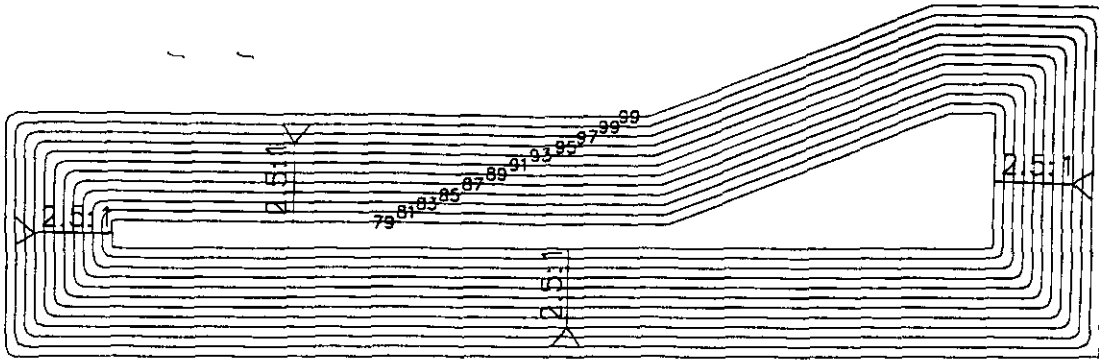
Minor Losses (Headloss at Structures), FT =  $KL(v^2)/2g$   
 where the assumed values for KL:  
 0.2 FOR INLET LOSSES  
 0.5 FOR 45 DEGREE CATCHBASIN BEND  
 1.0 FOR 90 DEGREE CATCHBASIN BEND  
 1.0 FOR FLOWS ENTERING A SURCHARGED PIPE

Pipe Headloss, FT =  $Sf \times L$   
 where:  $Sf = [Q/(1.486(A \cdot R^{2/3})/n)]^2$   
 $n = 0.013$   
 $L = \text{LENGTH OF PIPE, FT.}$

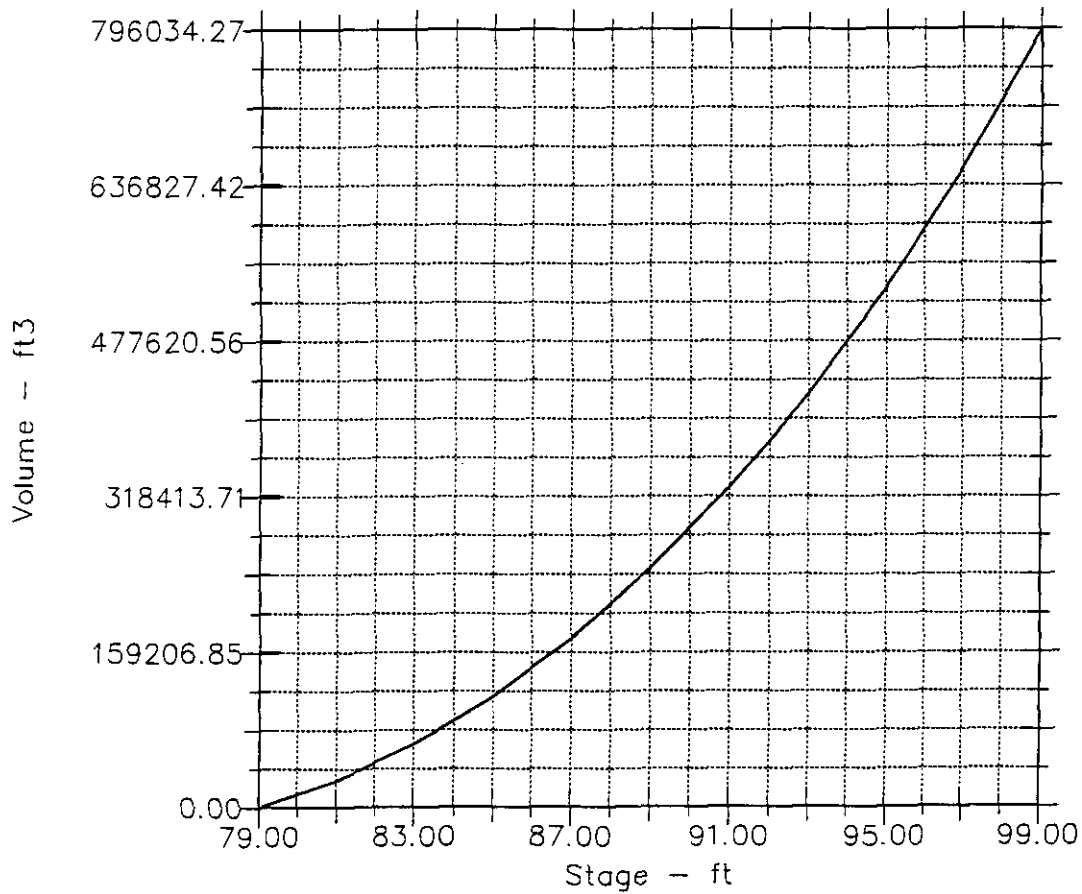
**EXHIBIT A**  
**DRAINAGE MAP**

**EXHIBIT B**

**BASIN "A" DETENTION  
CALCULATIONS**



Stage-Storage Curve



VOLUME REQUIRED: 771,000 FT.<sup>3</sup>

RETENTION BASIN "A"  
 VOLUME PROVIDED: 796,034.27 FT.<sup>3</sup>  
 Top Elevation : 99.00 ft  
 Bottom Elevation: 79.00 ft

**EXHIBIT "B"**

BASIN "A" DETENTION CALCULATIONS



CMX GROUP INC.  
 1515 E. MISSOURI, #115  
 PHOENIX, AZ 85014  
 PH (602)279-8436

SCALE: 1"=100'

PROJECT NO.

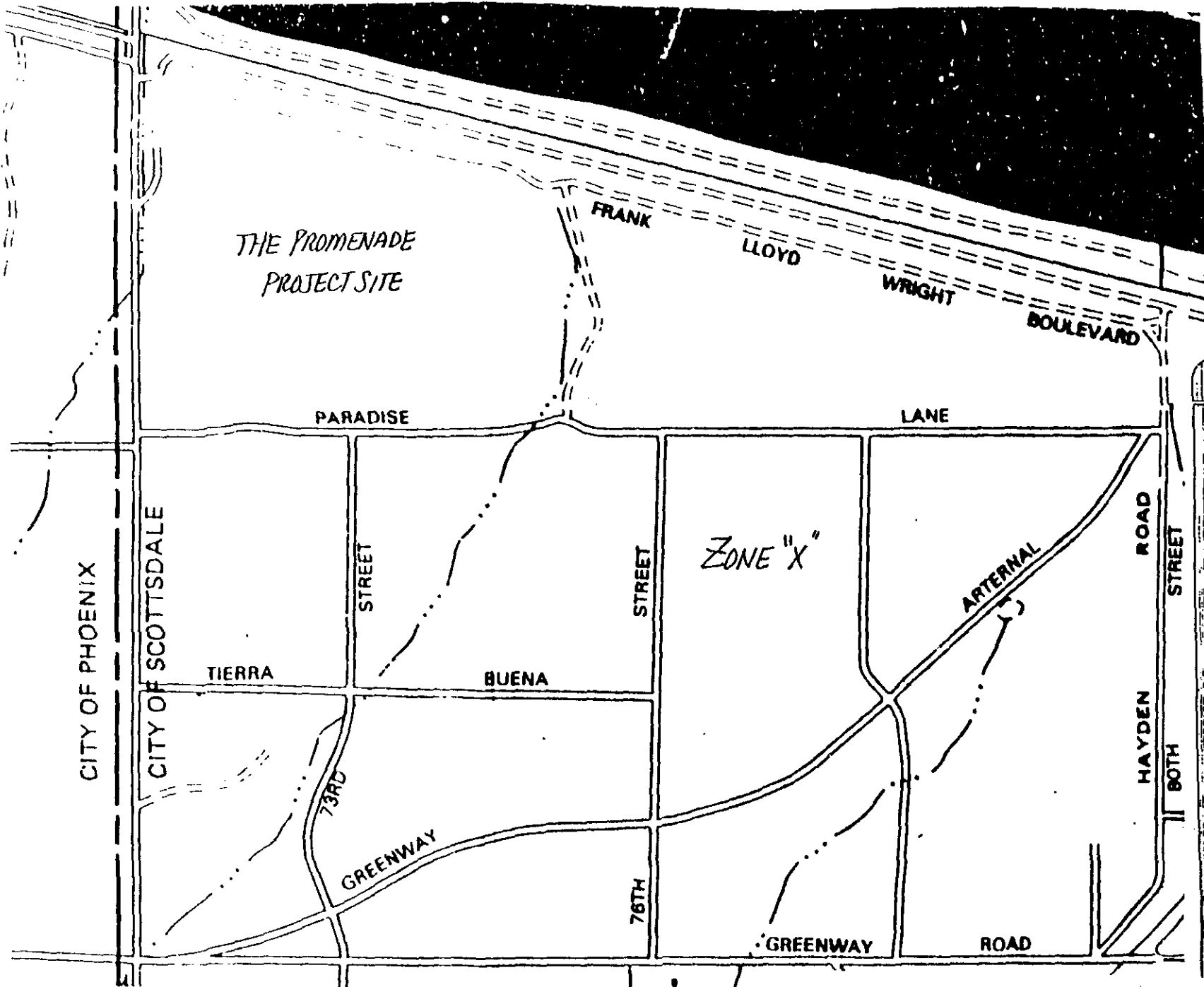
DATE: 01-22-99

5739



**EXHIBIT C**

**FLOOD INSURANCE RATE MAP**



**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM**  
**FLOOD INSURANCE RATE MAP**


**MARICOPA COUNTY,  
 ARIZONA AND  
 INCORPORATED AREAS**

**PANEL 1245 OF 4350**

EDITION	COMPLETION	NUMBER	PANEL	SUFFIX
UNDEVELOPED MAP		0401	1245	A
UNDEVELOPED MAPS		0401	1245	A
PHOENIX CITY OF		0401	1245	A
SCOTTSDALE CITY OF		0401	1245	A

**MAP NUMBER**  
 04013C1245 F

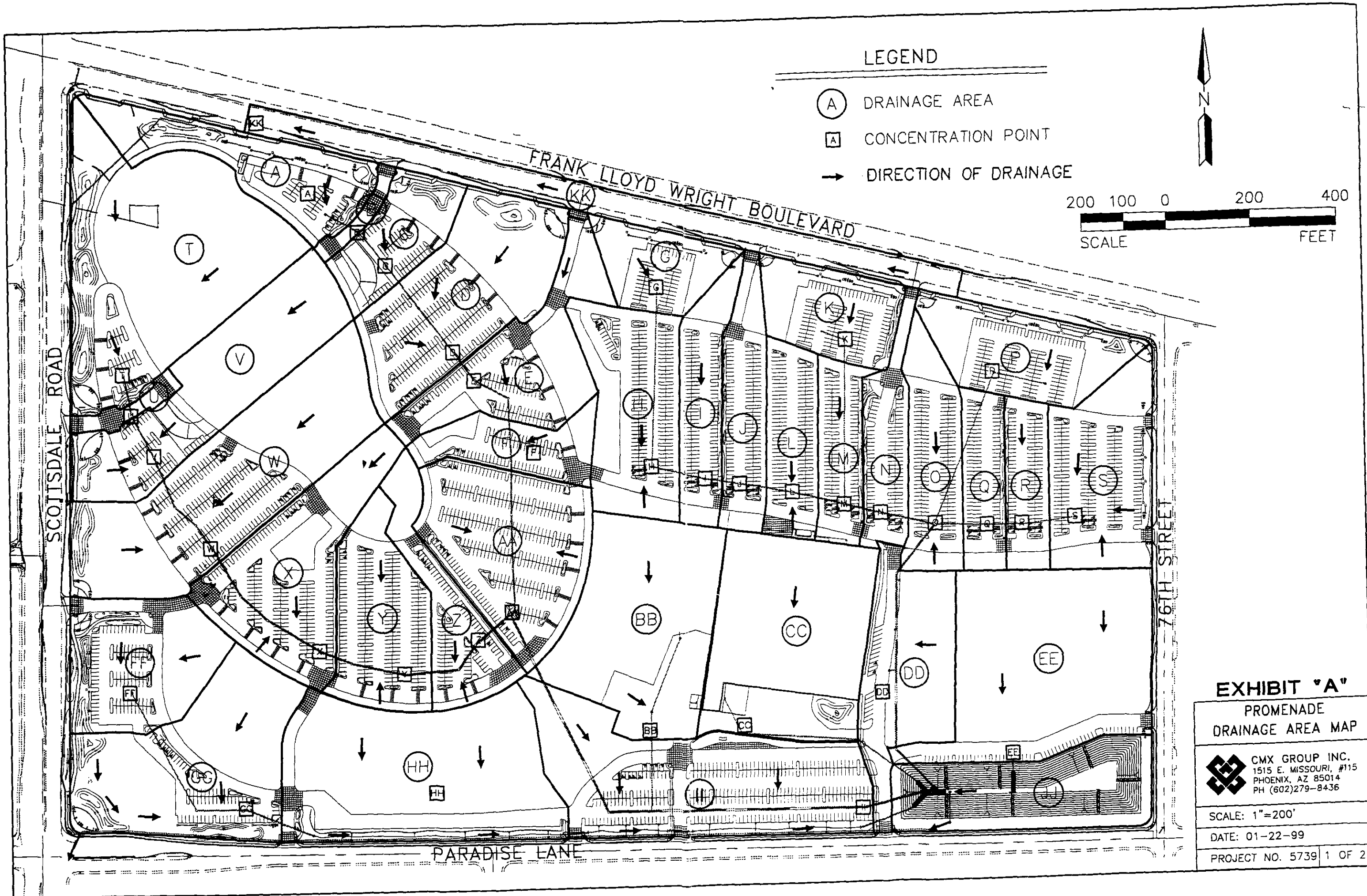
**MAP REVISED:**  
 SEPTEMBER 30, 1995



Federal Emergency Management Agency

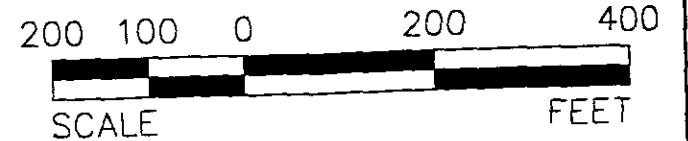
**APPENDIX B**  
**PHASE II PRELIMINARY GRADING AND**  
**DRAINAGE REPORT**

---




LEGEND

- (A) DRAINAGE AREA
- [A] CONCENTRATION POINT
- DIRECTION OF DRAINAGE



**EXHIBIT "A"**  
**PROMENADE**  
**DRAINAGE AREA MAP**

 **CMX GROUP INC.**  
 1515 E. MISSOURI, #115  
 PHOENIX, AZ 85014  
 PH (602)279-8436


SCALE: 1"=200'  
 DATE: 01-22-99  
 PROJECT NO. 5739 | 1 OF 2

DRAINAGE AREA	AREA (SQ. FT.)	AREA (ACRES)
A	86,684	1.99
B	9,583	0.22
C	54,450	1.25
D	139,392	3.20
E	101,495	2.33
F	49,658	1.14
G	50,530	1.16
H	104,108	2.39
I	57,935	1.33
J	58,370	1.34
K	63,598	1.46
L	54,886	1.26
M	44,867	1.03
N	48,787	1.12
O	67,518	1.55
P	84,942	1.95
Q	42,699	0.98
R	40,185	0.92
S	103,683	2.38

DRAINAGE AREA	AREA (SQ. FT.)	AREA (ACRES)
T	234,263	5.38
U	11,671	0.27
V	136,353	3.13
W	196,901	4.52
X	125,898	2.89
Y	90,615	2.08
Z	64,479	1.48
AA	135,917	3.12
BB	160,311	3.68
CC	168,587	3.87
DD	98,456	2.26
EE	200,820	4.61
FF	99,752	2.29
GG	161,172	3.70
HH	201,247	4.62
II	189,050	4.34
JJ	106,722	2.45
KK	111,949	2.57
TOTAL	3,645,685	83.69

**EXHIBIT "A"**

**DRAINAGE MAP**

 **CMX GROUP INC.**  
 1515 E. MISSOURI, #115  
 PHOENIX, AZ 85014  
 PH (602)279-8436

SCALE: 1"=200'

DATE: 01-22-99

PROJECT NO. 5739 | 2 OF 2