HYDROLOGY E20/D15 THREE PLANS

E20/D15

3 Plans

T. T. Burnett Engineering, Inc.
Consulting Engineers
4055 MONTGOMERY BLVD. N.E., SUITE A
ALBUQUERQUE, NEW MEXICO 87109

TELEPHONE
(505) 883-3093

October 31, 1980

E20-D15

Mr. Richard Heller, City Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico

Dear Sir:

As per our discussion regarding the Drainage Report for Yorba Linda Subdivision, we submit the following comments:

1. The topography map included in the Drainage Report does not indicate the removal and breach of the old Pino Dam. The breach was constructed as per a survey performed by this firm. The breach is slightly south of the Yorba Linda south boundary.

2. Knuckles within basin "A" and basin "D" shall be super-elevated to prevent storm water entering front yards.

3. Outlet structures from basin"A" and basin "C" shall be constructed as drop inlets and outlet pipes extending to the flow line of the Pino Arroyo rather than as open channels as indicated in the original Drainage Report.

4. Basin "E" shall be regraded to flow to the Pino Arroyo, instead of to Harper Road.

5. A portion of the flows within Harper Road (not to exceed one-half of the 100 year storm within the east bound lanes) shall be diverted to the Pino Arroyo at the west boundary of Yorba Linda via a storm sewer.

6. The platted street between Tracts "B" and "D" shall not be constructed with this development Standard curb shall extend across this platted right-of-way.

7. The street abutting Tracts "B" and "D" shall be super-elevated to drain to the Pino Arroyo. Curb openings no more than one foot in width and skewed to the roadway shall be spaced along the roadway and will drain over a continuous concrete blanket to the arroyo. In addition, a valley gutter shall cross this street at the most westerly north-south street in basin "D".

8. A continuous concrete blanket shall be constructed along the south boundary of the proposed subdivision from Layton Avenue to the west boundary of the proposed subdivision. The blanket shall have a toe wall near the design flood plain limit as shown on Plate I. Slope of the blanket shall be 2 to 1 and there shall be a 15 foot super-elevated area between the blanket and the south boundary of the lots abutting the Pino Arroyo. The 15 foot strip will not be surfaced.

9. Metal beam guard rail shall be installed on the south side of the street abutting Tracts "B" and "D". There shall be no sidewalk within this area.

If you have any questions or comments, please contact me.

Very truly yours,

Jean J. Bordenave

Jean J. Bordenave
President

ms

FEDERAL EMERGENCY MANAGEMENT AGENCY
Washington, D.C. 20472

IN REPLY REFER TO:
IFE (218)
FLO-1

20 JUN 1980

E20-D15

Mr. Kleston H. Laws
Presley Company of New Mexico
1909 Carlisle Boulevard, N.E.
Albuquerque, NM 87110

Dear Mr. Laws:

This is in response to your letter of February 8, 1980, requesting that the Federal Insurance Administrator determine whether Tracts A and B, Yorba Linda Subdivision, City of Albuquerque and Bernalillo County, New Mexico, recorded as Document Number 78-30021 in Volume D-8, Folio 112, and Document Number 80-1971 in Volume C-16, Folio 45, respectively, in the Office of the Recorder, Bernalillo County, New Mexico, are located within the Special Flood Hazard Area.

We have reviewed the Flood Hazard Boundary Map in light of the additional flood data you furnished and have determined that the above mentioned property would be partially inundated by a flood having a one-percent chance of occurrence in any given year (base flood). While your letter of March 14, 1980, indicates that all lot pad elevations will be graded to be a minimum of one foot vertically above the 100-year base flood elevations as delineated on the Topographic Map, Yorba Linda, by Thomas R. Mann and Associates, dated December, 1977, a final determination as to whether the proposed structures for this property would be located in the Special Flood Hazard Area cannot be made at this time. However, a final determination will be made upon receiving (1) an actual copy of the recorded plat map for Yorba Linda bearing the seal of the Recorder, indicating the official recordation and proper citation; (2) certified "as-built" information on the proposed dam breach; and (3) certified "as-built" information showing the locations of the structures, the elevations of the lowest finished grades adjacent to the structures and the elevations of the lowest floor, including basement. If it is determined that the structures are not located within the Special Flood Hazard Area, then flood insurance will not be required.

The above stated results of your request for exemption from the Federal requirement for the purchase of flood insurance are based on minimum criteria established by FIA for flood plain management regulations and are intended only to reflect your status in relation to the Federal requirement for the purchase of insurance. Community officials, based on knowledge of local conditions and in the interest of human safety, may set higher standards for construction in the flood plain than the minimum criteria established by FIA. If the State of New

Mexico or the City of Albuquerque has adopted more restrictive and comprehensive flood plain management criteria, these criteria are encouraged and take precedence over the minimum federal criteria for the purpose of regulating development in the flood plain. This policy is set forth in Section 60.1(d) (presently appearing at its former Section 1910.1) of the National Flood Insurance Program regulations.

If you have any questions or if we can be of further assistance, please contact the Program Implementation & Engineering Office at (202) 755-6570 or toll free at (800) 424-8872.

Sincerely,

Gloria M. Jimenez
Federal Insurance Administrator

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 12, 1980

E20-015

Ms. Debra Cassis
Program Implementation and
Engineering Office
National Flood Insurance Program
451 7th St., S.W.
Washington, D.C. 20410

Reference: Yorba Linda Subdivision

Dear Ms. Cassis:

Mr. Kleston Laws, representative of the developer Presley Homes, has submitted to the City a preliminary plat for the subdivision to be known as 'Yorba Linda'.

Concurrently, he has also requested that a revision to the Flood Hazard Boundary Map for Bernalillo County be made and that the property, which is annexed into the City, be shown on the Flood Hazard Boundary Map for the City of Albuquerque. He has also requested that a revision be made to the Flood Hazard Boundary Map; to this purpose he has submitted backwater analysis and hydrologic determination made by Mr. Kent Whitman, P.E., with Community Science Corporation. These studies represent the westward extension of the investigations made by Mr. Kent Whitman in conjunction with the development known as 'Tanoan', submitted to your office last year. Therefore, I am forwarding to your office the following:

1. A vicinity map for the Yorba Linda Subdivision;
2. A preliminary plat for the Yorba Linda Subdivision;
3. A letter from Mr. Richard Leonard, Executive Engineer, for Albuquerque Metropolitan Arroyo Flood Control Authority, dated February 5, 1980;
4. A letter from Mr. Richard Leonard, Executive Engineer, for AMAFCA, dated February 25, 1980;

5. A recent orthotopographic map of the area in question;

6. A copy of a portion of Page 4 of 15 of the Flood Hazard Boundary Map, Bernalillo County, New Mexico dated July 10, 1979;

7. A copy of the pertinent sheet of the Northeast Heights Drainage Management Plan, which was used in the original definition of the extent of the flood-plain;

8. A copy of the map prepared by Mr. Kent Whitman with an indication of the extent of the flood-plain, following the removal of the old Pino Dam and its replacement by AMAFCA to the east of the 'Tanoan Development'.

9. The computer print-outs for the HEC-1 runs and the HEC-2 prepared by Mr. Kent Whitman.

If you need additional information, please feel free to contact my office.

Very truly yours,

Bruno Conegliano
Assistant City Engineer/Hydrology

BC/lc
encls.
xc: Richard Leonard, AMAFCA
Kleston Laws, Presley Homes
Richard S. Heller, City Engineer

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
David Rusk

E20-015

March 12, 1980

RECEIVED MAR 14 1980 CITY ENGINEER

Presley Company of New Mexico
1909 Carlisle NE
Albuquerque, NM 87110

What is this? Yorba Linda Subdivision

REF: S-78-48-1

Francis
File with Planning and attach to S-78-48-1 Planning file

Gentlemen:

At their meeting of March 11, 1980, the Subdivision Review Board approved your request for subdivision approval subject to the following conditions:

1. The perimeter streets be widened to 60' as discussed during the meeting.
2. The Moon Street intersection should be shown on the revised development plan.
3. That the lots be widened to 32'.
4. The exterior connector street be relocated further north.
5. A drainage report which meets city standards must be submitted.
6. One on-street parking space be provided for every two units.
7. Parking spaces may not be further than 200' from the unit each serves.

If you have any questions concerning this matter, please do not hesitate to contact me at 766-7422.

Sincerely,

Bob Casias
Planner

RSH	ADM
HRO	SUR
CDS	COUN
LES	SEC
INSP	FILE
HYDRO	RETURN

BC/lmg

cc: T. T. Burnett Engineering, Inc., 120 Morningside Dr. NE, 87108

RICHARD E. LEONARD
EXECUTIVE ENGINEER

B. H. SWINBURNE, CHAIRMAN
WILLIAM V. HEREFORD, VICE-CHAIRMAN
FRANCES MCCOY, SECRETARY-TREASURER
VERNON DUAK, DIRECTOR
ELESTON LAWS, DIRECTOR

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 PROSPECT AVE. N.E.
P. O. BOX 25851 - ALBUQUERQUE, N. M. 87125
TELEPHONE 344-3516

February 25, 1980

Mr. Larry Frishman
Planning Department
City of Albuquerque

Re: S-78-48-1 Layout for Yorba Linda Subdivision

Dear Larry:

Subsequent to our February 5, 1980, comments, I have had the opportunity to review a backwater analysis of the Pino Arroyo along the south boundary of Yorba Linda. Based on this, I am satisfied that subdivision layout is outside the 100-year floodplain. Accordingly, recommend you permit the developer to proceed with detailed planning based on this layout.

Forthcoming drainage report must address stability of the natural channel. Some bank armoring may be needed to protect adjacent homesites.

Sincerely,

Richard E. Leonard

Richard E. Leonard
Executive Engineer

cy: Gene Mares
Richard Heller
Bruno Conegliano

RICHARD E. LEONARD
EXECUTIVE ENGINEER

B. H. SWINBURNE, CHAIRMAN
WILLIAM V. HEREFORD, VICE-CHAIRMAN
FRANCES MCCOY, SECRETARY-TREASURER
VERNON DOAK, DIRECTOR
KLESTON LAWS, DIRECTOR

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 PROSPECT AVE. N.E.
P. O. BOX 25851 - ALBUQUERQUE, N. M. 87125
TELEPHONE 344-3516

RECEIVED
PLANNING DEPARTMENT

February 5, 1980

To: Albuquerque/Bernalillo County Planning Division

From: AMAFCA DS

Subject: Comments: Vacations, Subdivisions, Annexations

AX-80-7 Z-80-18	No objection to annexation or zone change. Prior to development plan approval, a drainage report must be submitted and approved. It should be noted that a drainage channel is planned along the eastern boundary of this tract.
AX-80-8 Z-80-23 S-80-6	No objection to annexation or zone change. Subdivision approval should not be approved until submission and approval of the drainage report. It should be noted that portions of the tract fall in the 100-year flood plain. Additionally, ROW for a flood control channel should be dedicated as a condition of subdivision approval.
S-78-48-1	Subdivision should not be approved until submission and approval of drainage report. Drainage considerations may impact significantly on subdivision layout. Specifically, the plat appears to encroach on the existing 200 ft. easement for Pino Arroyo.
S-80-2	Subdivision plan should not be approved until submission and approval of drainage report.
V-80-2	AMAFCA not affected.
V-80-3	AMAFCA not affected.
V-80-4	AMAFCA not affected.
V-80-6	AMAFCA not affected.
V-80-7	AMAFCA not affected.

cc: Bruno Conegliano

Presley Company Of New Mexico

RECEIVED
DEC 24 1979
CITY ENGINEER

December 18, 1979

Mr. Richard S. Heller, City Engineer
Municipal Development Dept.
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Yorba Linda Subdivision

Dear Mr. Heller:

On June 4, 1979, a request was made to modify the flood plain in the vicinity of the Old Pino Dam as required by Ordinance 55-1976. To my knowledge nothing locally has been done, although I have been told the information was sent to the appropriate federal agency.

Since it has been six months, I would like to determine what progress is being made. Would you provide the information necessary for me to check with the federal government? Do you feel it is necessary to have the federal concurrance before the flood plain is changed locally as provided in the flood plain ordinance?

Very truly yours,

PRESLEY COMPANY OF NEW MEXICO

Kleston H Laws

Kleston H. Laws
Vice President

KHL/pad

1909 Carlisle Blvd., N.E. • Albuquerque, New Mexico 87110 • (505) 265-5811

DRAINAGE REPORT

FOR

YORBA LINDA

OCTOBER 1980

RECEIVED

OCT 27 1980

CITY ENGINEER

Prepared By:
T. T. Burnett Engineering, Inc
4055 Montgomery Blvd. NE
Albuquerque, New Mexico 87109

Prepared For:
The Presley Company of New Mexico
2109 Carlisle Blvd. NE
Albuquerque, New Mexico 87106

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR NO. 5110 NEW MEXICO JEAN J. BORDENAVE

Jean J. Bordenave N. M. P. E. & L. S. #5110

TABLE OF CONTENTS

	Page
PURPOSE	1
SITE LOCATION AND TOPOGRAPHY	1
DESIGN CRITERIA	1
PROPOSED DEVELOPMENT	2
OFF SITE DRAINAGE	2
INTERNAL DRAINAGE	2
CONCLUSIONS	2

APPENDIX A - Correspondence

APPENDIX B - Design Charts

APPENDIX C - Computations

APPENDIX D - Soils

Plate I - Proposed Subdivision and Location Map (See Pocket)

Plate II - Natural Conditions Map (See Pocket)

Plate III - Flood Hazard Boundary Map

DRAINAGE REPORT

FOR

YORBA LINDA

PURPOSE

The Presley Company is currently planning development of Yorba Linda Subdivision. The purpose of this report is to present a drainage management plan to be used in design of the proposed subdivision.

SITE LOCATION AND TOPOGRAPHY

Yorba Linda is located in the northeast quadrant of Albuquerque and is bounded on the north by Harper Road, on the east by the future Layton Avenue, on the south by the Pino Arroyo and on the west by Lands of the Albuquerque Boys Academy. (See Plate I for exact location.) The site is split by an east-west ridge line, with present flows flowing north to Harper Road and south to the Pino Arroyo. Slopes in the east-west direction average 2.5 percent. Soils consist of alluvial sands and silts, and decomposed granite is the major soil constituent. A light growth of native grasses, cacti and small brush dominates the area.

DESIGN CRITERIA

In accordance with AMAFCA and City of Albuquerque requirements, the hydrological analysis is based on the 100 year frequency rainfall. Enclosed in Appendix B is a curve representing the 100 year storm.

PROPOSED DEVELOPMENT

Yorba Linda, though zoned R-T, will be developed as single family residences with a density of approximately 4.3 dwelling units per acre. Lots will vary from 50 to 55 feet in width and 110 to 130 feet in depth. Streets will be 32 feet wide from face-to-face of curb. Lots shall be graded to direct all roof flows to the street. Ponding of rear yard runoff will be designed on all lots possible. (See Plate I.)

OFF SITE DRAINAGE

External flows will be intercepted by Layton Avenue on the east and be directed either north to Harper Road or south to the Pino Arroyo. Existing flows in Harper Road will not be allowed to enter the proposed subdivision.

INTERNAL DRAINAGE

Internal flows will be directed to five outlets, two of which are on Harper Road, and the other three are on the Pino Arroyo. Roll type mountable curb will be used wherever possible. Computations enclosed indicate where roll type mountable and standard curb will be used. Standard curbs are used whenever the energy line exceeds the top of the mountable curb plus 2/10 of a foot.

CONCLUSIONS

As per the letter (see Appendix A) from Mr. Richard Leonard of AMAFCA, no ponding is required on this site. Due to the terrain this subdivision will not be ponded. Computations within this report indicate that without ponding we can reduce the flows in Harper Road by 37 cfs from the natural condition.

The peak flow will be increased in the Pino Arroyo by 37 cfs from the natural condition. These two conditions exist due to the time lag of the peak in the Pino Arroyo.

Due to the above noted conditions it is requested that this report by approved without ponding requirements.

APPENDIX A

RICHARD E. LEONARD
EXECUTIVE ENGINEER

B. H. SWINBURNE, CHAIRMAN
WILLIAM V. HEREFORD, VICE-CHAIRMAN
FRANCES MCCOY, SECRETARY-TREASURER
VERNON OOAK, DIRECTOR
KLESTON LAWS, DIRECTOR

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 PROSPECT AVE. N.E.
P. O. BOX 25851 - ALBUQUERQUE, N. M. 87125
TELEPHONE 344-3516

May 21, 1979

Mr. Bruno Conegliano
Assistant City Engineer/Hydrology
Albuquerque, N.M. 87103

Dear Bruno:

Reference our telephone discussion today concerning the Tanoan Development.

This will confirm AMAFCA's position that volume control of stormwater runoff in the Pino Arroyo is no longer a requirement. This is based on removal of Old Pino Dam. Also considered was construction of several detention dams which should more than compensate for incrementally heavier flows in the North Diversion Channel.

Sincerely,

Richard E. Leonard

Richard E. Leonard
Executive Engineer

REL:ic
cc: K. Whitman
S. Sweenhart (AMDEC)
K. Laws
J. Bordenave ✓

RESOLUTION NO. 1978-10
RELATING TO REMOVAL OF OLD PINO DAM

WHEREAS the Northeast Heights Drainage Management Plan provides for acquiring and upgrading the Old Pino Dam located on the Arroyo Del Pino approximately two-thirds of a mile east of the Albuquerque Academy; and

WHEREAS the Presley Company has purchased the land upon which the Old Pino Dam is situated and has notified the Authority of its intent to breach or remove the dam; and

WHEREAS it is necessary for the Authority to either purchase the dam site and then cause the dam to be extensively repaired and upgraded, or to amend the Norhteast Heights Drainage Management Plan so that the dam may be breached or removed; and

WHEREAS the Board of Directors of the Authority has caused a public hearing to consider the relative merits of acquiring and upgrading the Old Pino Dam, or permitting its removal, and

WHEREAS the need for the Old Pino Dam has been somewhat reduced by the construction of the North Tramway Dam on the Arroyo del Pino; and

WHEREAS it appears that the cost of acquiring the Old Pino Dam site with its related ponding area and repairing and upgrading the dam to meet applicable safety standards would exceed $1,700,000; and

WHEREAS it appears that, if the Old Pino Dam were removed, the cost of improving the Arroyo del Pino channel to meet increased stream flows would be considerably less than $1,700,000.

NOW, THEREFORE BE IT RESOLVED by the Board of Directors of the Albuquerque Metropolitan Arroyo Flood Control Authority,

(1) That it is not in the public interest for the Authority to purchase the land upon which the Old Pino Dam and its related ponding area are situated and to repair and upgrade the Old Pino Dam to meet applicable safety standards.

(2) That it is in the public interest for the Authority to amend the Northeast Heights Drainage Management Plan by providing for the deletion of Old Pino Dam.

(3) That the Authority has no objection to the breaching or removal of the Old Pino Dam by the owner of the land upon which the dam is situated, provided that such work is accomplished at private expense and is so performed as to provide for the Arroyo del Pino to flow in its historic water course.

(4) That the Northeast Heights Drainage Management Plan is amended by deleting therefrom all requirements for the acquisition, construction, repair, and upgrading of the Old Pino Dam.

(5) That the designated stream flow below the Old Pino Dam is amended to provide for the consequences of the removal of the Old Pino Dam.

PASSED, ADOPTED AND SIGNED this 26th day of October, 1978.

ALBUQUERQUE METROPOLITAN ARROYO
FLOOD CONTROL AUTHORITY

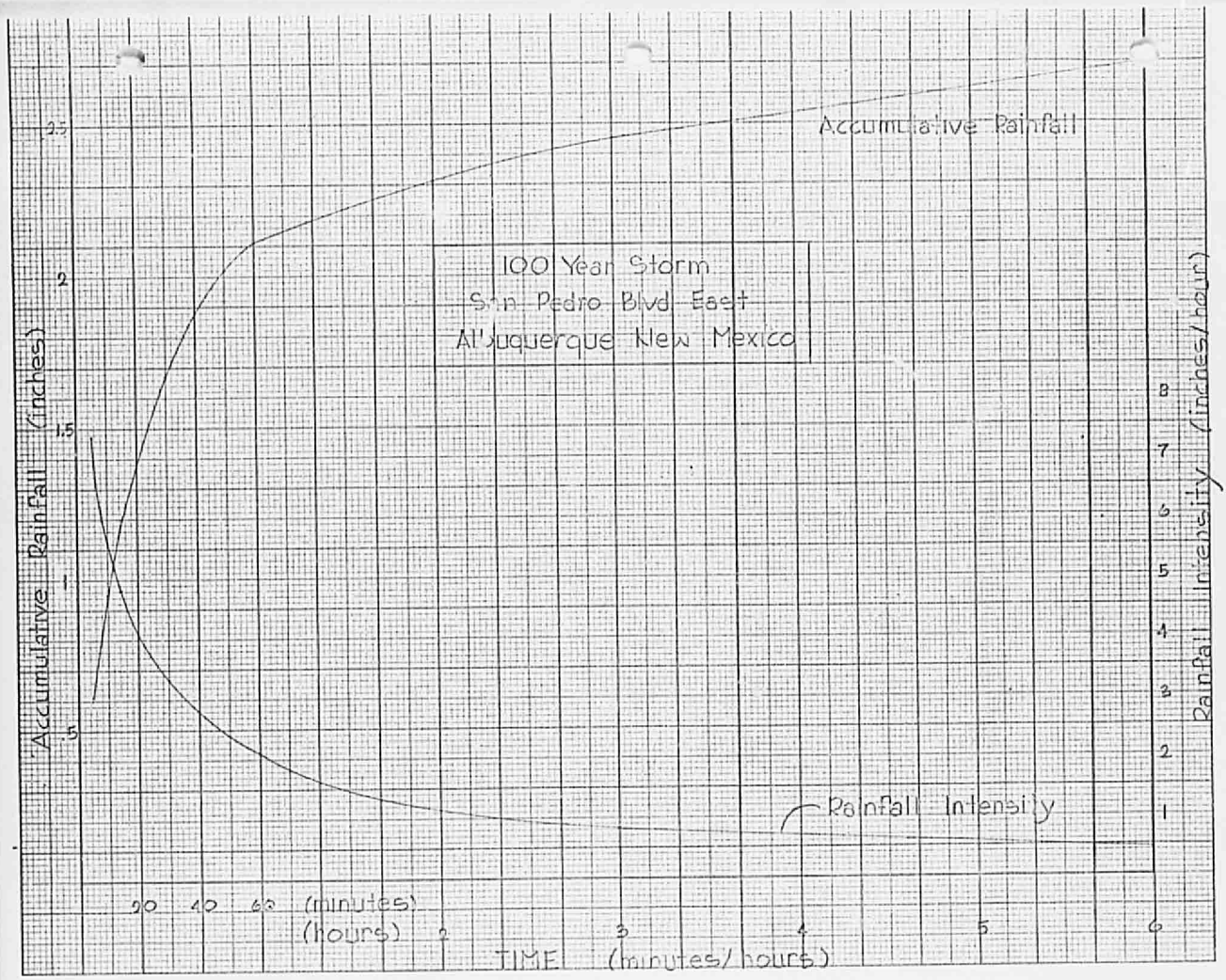
Chairman, Board of Directors

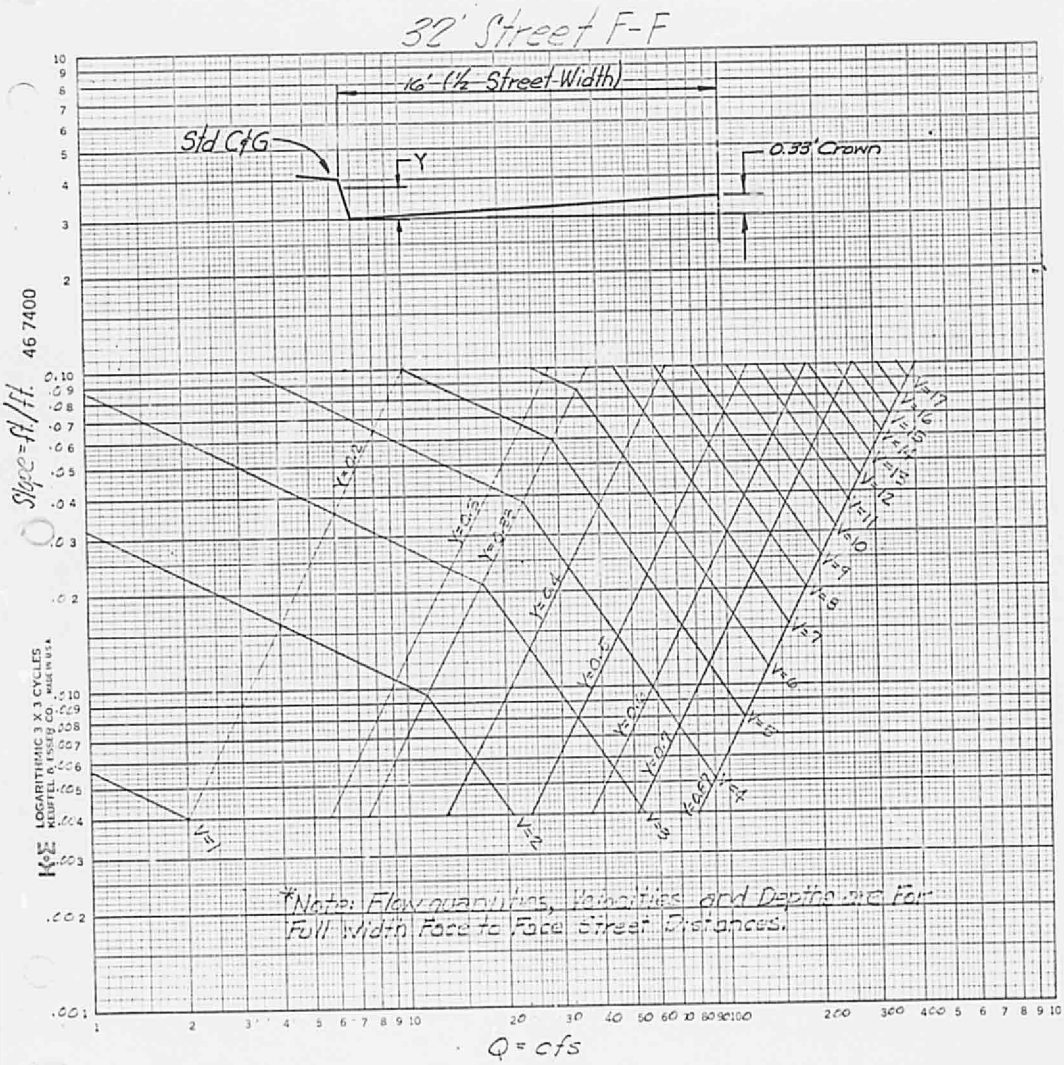
(SEAL)

ATTEST:

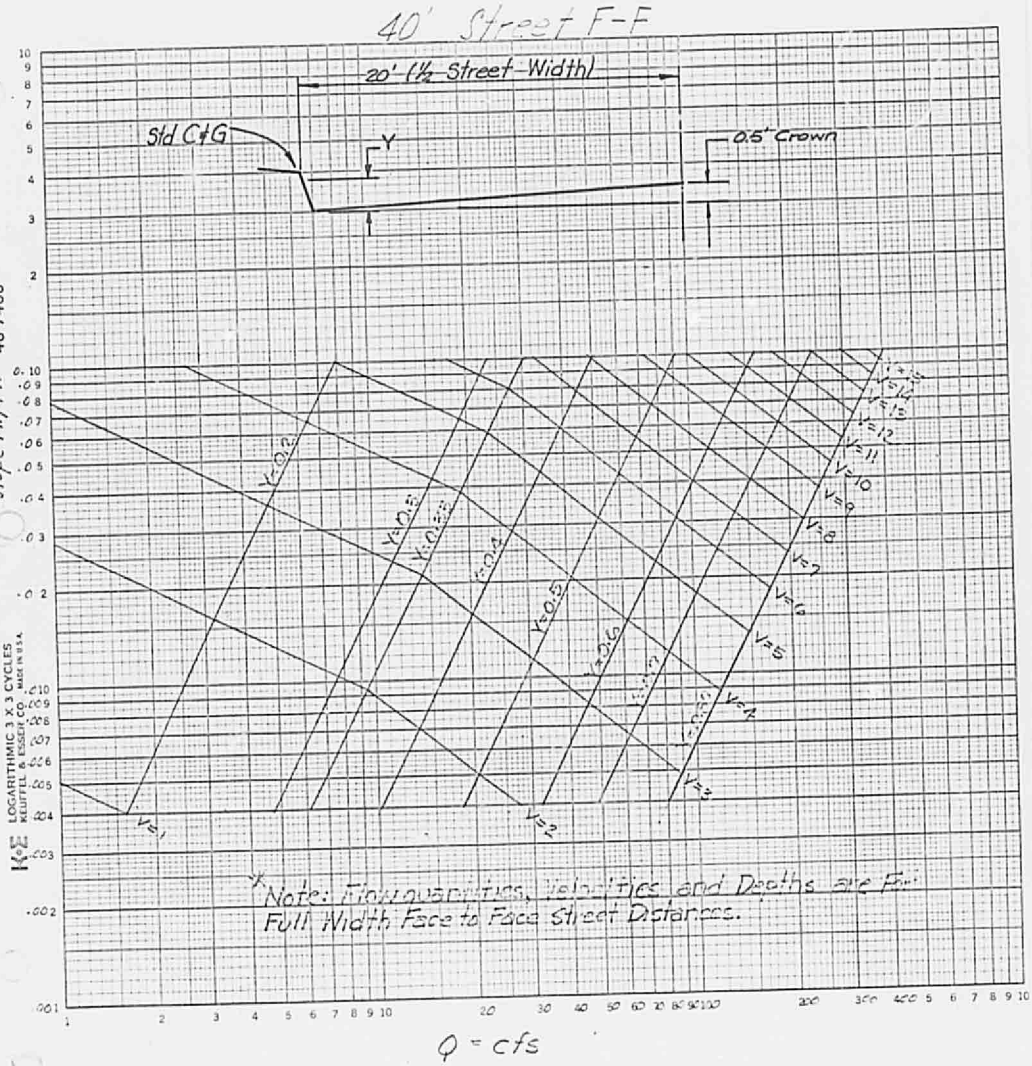
Secretary (Assistant)

APPENDIX B


Accumulative Rainfall
100 Year Storm
San Pedro Blvd East
Albuquerque New Mexico
Rainfall Intensity
Accumulative Rainfall (inches)
Rainfall Intensity (inches/hour)
(minutes)
(hours)
TIME (minutes/hours)

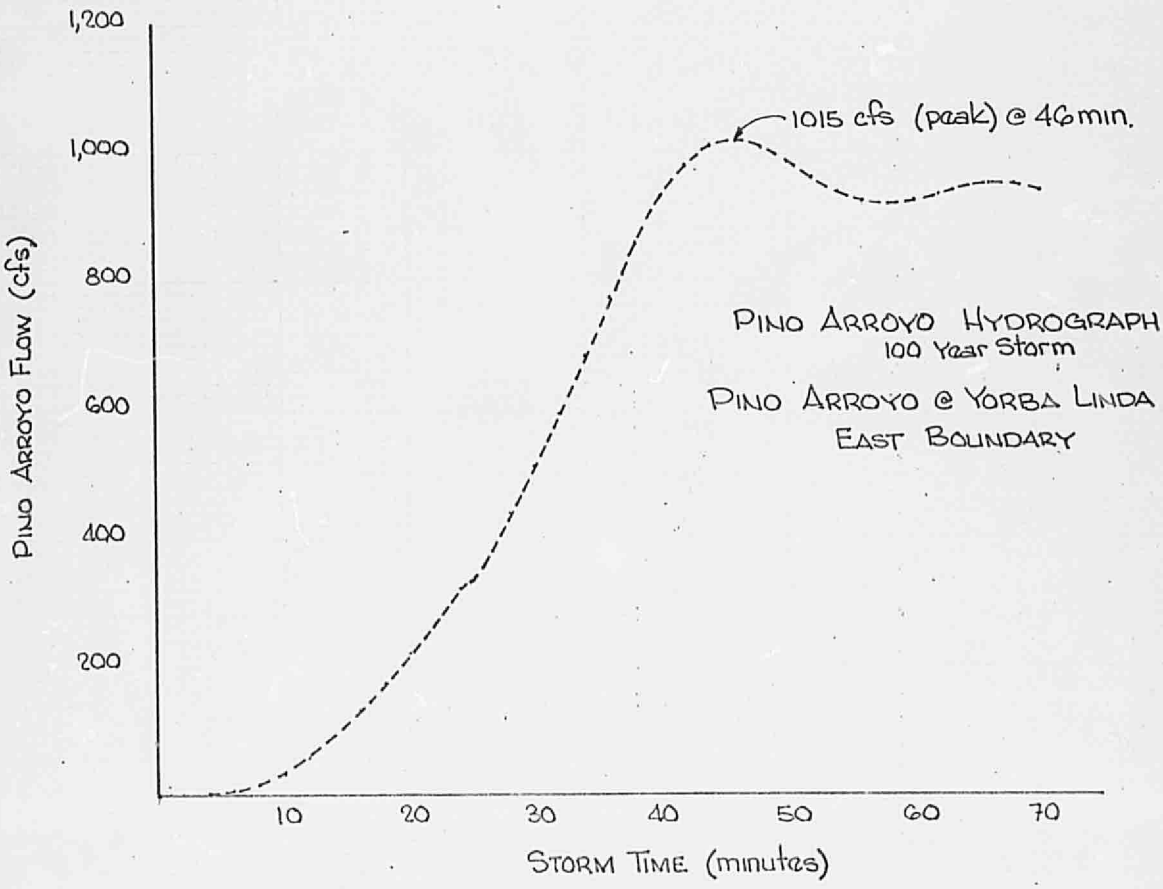


Cross Slope = 0.0205 $V = \frac{1.486}{.02} r^{2/3} s^{1/2}$ $Q = VA$



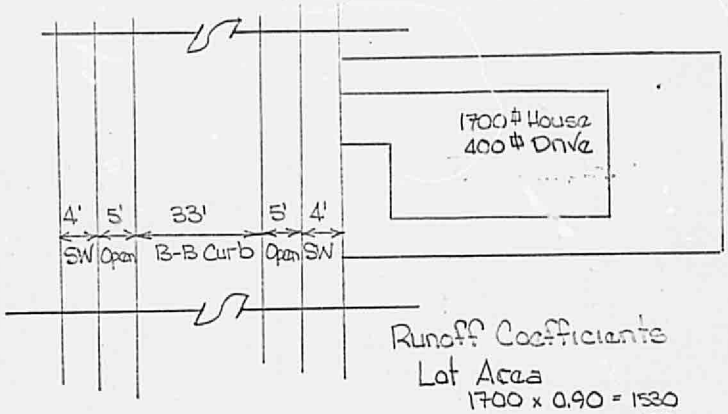
*Note: Flow quantities, Velocities and Depths are For Full Width Face to Face Street Distances.

Cross Slope = 0.0250 $V = \frac{1.486}{.02} r^{2/3} s^{1/2}$ $Q = VA$


1,200
1,000
800
600
400
200
Pino Arroyo Flow (cfs)
1015 cfs (peak) @ 46 min.
Pino Arroyo Hydrograph
100 Year Storm
Pino Arroyo @ Yorba Linda
East Boundary
10
20
30
40
50
60
70
Storm Time (minutes)

APPENDIX C

TYPICAL IMPERVIOUS AREA



Runoff Coefficients

Lot Area

1700 x 0.90 = 1530
400 x 1.00 = 400 = 1930

1930/2100 = 0.92 = C

Street Area

33 x 0.90 = 29.7
2 x 4 x 1.00 = 8.0
2 x 5 x 0.53 = 5.3
43.0

43.0/50 = 0.86 = C

assuming an average of 52.5' of street per 2 houses

(0.86)(52.5)(50) + (2)(1930) = 6118

6118/(52.5)(50 + 3860 = 0.94

Use C_{imp} = 0.95

TYPICAL PERVIOUS AREA

ASSUMES NO SW LANDSCAPING
NO LOT COMPACTION

Assume 52.5' wide lot
97.5' deep including 20' front yard

(52.5)(20) - 400 = 650 ♯

(3)(0.3)(650) + (1)(0.7)(650)/2600 = 0.4

(52.5)(77.5) - 1700 = 2369 ♯

[(650)(0.4) + (2369)(0.3)] / (650 + 2369) = 0.32

Use Cperv. = 0.32

YORBA LINDA

JJB
4

RUNOFF SOURCE

Basin/ Sub basin		Basin Area	Contributing to Runoff				Non-Contrib
			Total Area	Impervious	Pervious	Comp. C	Perv.
		ft²	ft²	ft²	ft²	-	ft²
A	A1	106,000	100,000	47,500	52,500	0.62	6,000
	A2	117,000	107,000	55,000	52,000	0.64	10,000
	A3	125,000	108,500	46,500	62,000	0.59	16,500
		348,000	315,500	149,000	166,500	0.62	32,500
B	B1	152,500	132,000	73,000	59,000	0.67	20,500
	B2	98,000	83,000	41,500	41,500	0.64	15,000
	B3	86,000	71,000	39,500	31,500	0.67	15,000
	B4	69,000	56,000	31,500	24,500	0.67	13,000
	B5	107,000	91,000	48,500	42,500	0.66	16,000
		512,500	433,000	234,000	199,000	0.66	79,500
C	C1	120,500	108,000	54,000	54,000	0.64	12,500
	C2	90,500	75,000	40,000	35,000	0.66	15,500
	C3	51,500	50,000	25,000	25,000	0.64	1,500
	C4	105,500	91,000	47,500	43,500	0.65	14,500
		368,000	324,000	166,500	157,500	0.64	44,000
D	D1	139,000	123,500	59,500	64,000	0.62	15,500
	D2	23,500	20,000	15,500	4,500	0.81	3,500
	D3	259,000	222,000	115,500	106,500	0.65	37,000
	D4	195,500	157,000	84,000	73,000	0.66	38,500
	D5	117,500	97,500	48,000	49,500	0.63	20,000
	D6	84,500	84,500	40,000	44,500	0.62	-
	D7	100,500	88,000	43,500	44,500	0.63	12,500
	D8	53,500	53,500	31,000	22,500	0.69	-
		973,000	846,000	437,000	409,000	0.65	127,000
E	E1	88,000	88,000	52,000	36,000	0.69	-
	E2	85,000	74,500	35,000	39,500	0.62	10,500
		173,000	162,500	87,000	75,500	0.66	10,500
		2,374,500	2,081,000	1,073,500	1,007,500	0.64	293,500

DRAINAGE TO PINO ARROYO AFTER DEVELOPMENT

TIME OF CONCENTRATION

BASIN A

(450' @ 2.7% w/Q < 10 cfs + 300' @ 1.4% w/Q < 20 cfs) 32' st.

$t_c = 450/(3)(60) + 300/(2.8)(60) + 5$

$= 9$ min.

BASIN C

(400' @ 0.5% w/Q < 10 cfs + 150' @ 2.0% w/Q < 15 cfs
+ 350' @ 1.6% wQ < 30 cfs) on 32' street

$t_c = 400/(1.6)(60) + 150/(2.9)(60) + 350/(3.5)(60) + 5$

$= 11$ min

BASIN D

(450' @ 3.3% w/Q < 10 cfs + 300' @ 3.0% w/Q < 15 cfs
+ 270' @ 2.2% w/Q < 30 cfs + 400' @ 1.1% w/Q < 40 cfs) 32' St.
(+ 150' @ 1.0% w/Q < 50 cfs) 40' street

$t_c = 450/(3.2)(60) + 300/(3.3)(60) + 270/(3.7)(60)$
$400/(3.5)(60) + 150/(3.7)(60) + 5$

$= 13$ min

PINO LAG TIME (assuming 15 fps & 12 fps in Pino)

BASIN A

$500/(15)(60) = 0.5$ min

BASIN B

$500/(15)(60) + 600/(12)(60) = 1.4$ min

BASIN D

$(500)/(15)(60) + 1800/(12)(60) = 3$ min

Note: this is a conservative assumption for the beginning of the storm but has little affect on the peak flow @ 46 minutes.

YORBA LINDA

PINO ARROYO FLOWS AFTER DEVELOPMENT

BASIN A
use t=0 on Pino t=0 Basin A

BASIN C
use t=0 on Pino t=2 Basin C

BASIN D
use t=0 on Pino t=4 Basin D

YORBA LINDA CONTRIBUTION TO PINO ARROYO

TRACT D 11.3 Acres, C=0.45, sheet flow,

Time	Pino-In	Basin A		Basin C		Basin D		Tract D		Pino-Out
min.	cfs	cfs		cfs		cfs		cfs		cfs
-4	0		0		0		0		0	0
-2	0		0		0	7.4	0	7.4	10	10
0	0		0	7.4	8	7.4	5	7.4	20	25
2	2	7.4	8	7.4	21	6.8	6	6.8	35	72
4	4	7.4	26	6.8	27	6.1	50	6.1	31	138
6	9	6.8	31	6.1	29	5.65	71	5.65	29	169
8	19	6.1	27	5.65	27	5.25	66	5.25	27	166
10	36	5.65	25	5.25	25	4.9	62	4.9	25	173
12	61	5.25	23	4.9	23	4.6	58	4.6	24	189
14	94	4.9	22	4.6	22	4.3	54	4.3	22	214
16	133	4.6	21	4.3	20	4.1	52	4.1	21	247
18	176	4.3	19	4.1	20	3.9	49	3.9	20	284
20	222	4.1	18	3.9	19	3.7	47	3.75	19	325
24	322	3.75	17	3.6	17	3.5	44	3.5	18	418
28	442	3.5	16	3.4	16	3.3	42	3.3	17	533
32	597	3.3	15	3.2	15	3.1	39	3.1	16	682
36	776	3.1	14	3.0	14	2.9	37	2.9	15	856
40	931	2.9	13	2.8	13	2.7	34	2.7	14	1005
44	1009	2.7	12	2.6	12	2.5	32	2.5	13	1078
48	1006	2.5	11	2.4	11	2.3	29	2.3	12	1069
52	962	2.3	10	2.25	11	2.2	28	2.2	11	1022
56	924	2.2	10	2.15	10	2.1	27	2.1	11	982
60	925	2.1	9	2.05	10	2.0	25	2.0	10	979
64	944	2.0	9	1.95	9	1.9	24	1.9	10	996
68	953	1.9	9	1.85	9	1.8	23	1.8	9	1003
72	939	1.8	8	1.75	8	1.7	21	1.7	9	985
46	1015	2.6	12	2.5	12	2.4	30	2.4	12	1081

DRAINAGE TO PINO ARROYO BEFORE DEVELOPMENT

Due to lack of many well defined channels use sheet flow for the area. Use L = 600 ft., 3.5% slope

Overland flow time = 600/(1.8)(.30) = 5.6 min
(from SCS Chap 2 Peak Rates for Small Watersheds) Use 6 min.

Use 4 min lag time (from sht 3)

PINO ARROYO FLOWS BEFORE DEVELOPMENT

26.8 Acres, C = 0.45, Sheet Flow

Time	Pino-In	Basin			Pino-Out
min.	cfs	cfs			cfs
-4	0		0	4.5	0
-2	0	7.4	15	17.8	15
0	0	7.4	59	26.8	59
2	2	6.8	82		84
4	4	6.1	74		78
6	9	5.65	68		77
8	19	5.25	63		82
10	36	4.9	59		95
12	61	4.6	55		116
14	94	4.3	52		146
16	133	4.1	49		182
18	176	3.9	47		223
20	222	3.7	45		267
24	322	3.5	42		364
28	442	3.3	40		482
32	597	3.1	37		634
36	776	2.9	35		811
40	931	2.7	33		964
44	1009	2.5	30		1039
46	1015	2.4	29		1044
48	1006	2.3	28		1034
52	962	2.2	27		989
56	924	2.1	25		949
60	925	2.0	24		949
64	944	1.9	23		967
68	953	1.8	22		975
72	939	1.7	21		960

YORBA LINDA

JSB
4

PINO ARROYO FLOW COMPARISON

Time	Dev.	Natural	Difference
min	cfs	cfs	cfs
-4	0	0	
-2	10	15	-5
0	25	59	-34
2	72	84	-12
4	138	78	+60
6	169	77	92
8	166	82	84
10	173	95	78
12	189	116	73
14	214	146	68
16	247	182	65
18	284	223	61
20	325	267	58
24	418	364	54
28	533	482	51
32	682	634	48
36	856	811	45
40	1,005	964	41
44	1,078	1,039	39
46	1,081	1,044	37
48	1,069	1,034	35
52	1,022	989	33
56	982	949	33
60	979	949	30
64	996	967	29
68	1,003	975	28
72	985	960	25

INTERNAL FLOWS

BASIN A

Point A-A

Sub basin A-1

$t_c = 450/(3)(60) + 5 = 7.5$ min

$Q_p = (0.62)(6.2)(100{,}000)/43560$

$= 9$ cfs

$V = 2.9$ fps

$d = 0.25'$

$E = 0.38' < 0.53'$ use mountable curb

Point AB

Subbasins A-1&3+2

$t_c = 9$ min. (sht 3)

$Q_{p1,3} = (0.60)(5.8)(208{,}500)/43560)$

$= 17$ cfs

$Q_{p2} = (0.64)(5.8)(107/43.56)$

$= 9$ cfs @ $S = 1.6\%$

$V = 2.4$ fps

$d = 0.28$ ft

$E = 0.37' < 0.53'$

superelev $= 0.01'$

Outlet

entrance

$Q = (2.6)(16)H^{3/2}$

@ $Q = 26$ cfs, $H = 0.73'$

use std. curb until grade change $= +0.4'$

channel

$S = 0.02\%$

$n = 0.015$

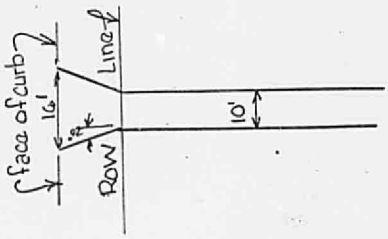
$b = 10'$

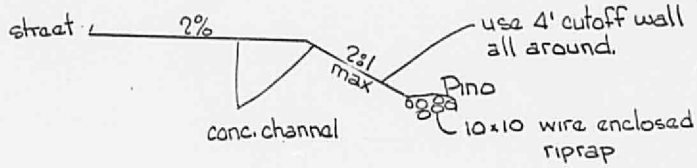
ss = vertical

$Q = 26$ cfs

$d =$

$V =$





INTERNAL FLOWS (cont.)

BASIN B

Point B-A

Subbasin B-1

600' @ 0.8% < 10 cfs V = 1.8 fps

t_c = 600/(1.8)(60) + 5 = 11 min

Q_p = (0.67)(5.4)(132,000/43560)

= 11 cfs

V = 1.8 fps

d = 0.33 ft

E = 0.38' < 0.53' use mountable curb

Point B-B

subbasins B-1 & 2 + 3

300' @ 2% < 15 cfs, V = 2.9 fps

t_c = (300)/(2.9)(60) + 11 = 13 min

$Q_{p1\&2}$ = (0.66)(5.05)(215,000/43560)

= 16 cfs

V = 2.9 fps

d = 0.32 ft

E = 0.45' < 0.53'

Q_{p3} = (0.67)(5.05)(71,000/43560)

= 6 cfs @ S = 0.8%

V = 1.7 fps

d = 0.28 ft

E = 0.32' < 0.53'

Q_{123} = 22 cfs @ 2.75%

V = 3.5 fps

d = 0.34 ft

E = 0.53' = 0.53' use mountable curb.

Point B-C

subbasins 1,2,3 & 5 + 4

t_c = 400/(3.5)(60) + 13 = 15 min

$Q_{p123\&5}$ = (0.66)(4.8)(377,000/43560)

= 27 cfs @ 2.8%

V = 3.9 fps

d = 0.36 ft std. curb

E = 0.6' > 0.53'
< 0.87'

Q_{p4} = (0.67)(4.8)(56,000/43560)

= 4 cfs @ 2.0%

V = 2.2 fps

d = 0.19 ft mountable

E = 0.27' < 0.53'

INTERNAL FLOWS (cont.)

BASIN C

Point C-A

Sub basin C-1 + 2

t_c = 10 min (sht 3)

Q_{p1} = (0.64)(5.6)(108/43.56)
= 9 cfs @ 2.0%
V = 2.6 fps
d = 0.27 ft
E = 0.38' < 0.53'

Q_{p2} = (0.66)(5.6)(75/43.56)
= 6 cfs @ 1.8%
V = 2.3 fps
d = 0.23 ft
E = 0.31' < 0.53'

$Q_{p\,1+2}$ = 15 cfs @ 1.3%
V = 2.4 fps
d = 0.34 ft
E = 0.43' < 0.53'

Point C-B

Sub basins 1,2,3,4

t_c = 11 min (sht 3)

Q_p = (0.64)(5.4)(324/43.56)
= 26 cfs

Outlet

see sht 7 for comps, details & notes.

BASIN D

Point D-A

Subbasin D-1,2 portion 3 (55,000 #)

t_c = 9 min (sht 3)

Q_p = (0.65)(5.8)(198/43.56)
= 17 cfs @ 3.0%
V = 3.4 fps
d = 0.31 ft
E = 0.49 < 0.53 Use waterblock min. 0.5'

INTERNAL FLOWS (cont.)

BASIN D (cont.)

Point D-B
Subbasin D-1,2 portion 3 (125,000 ☐')

t_c = 10 min (sht 3)

Q_p = (0.65)(5.6)(268.5/43.56)
= 22 cfs @ 2.2%

V = 3.3 fps
d = 0.36 ft
E = 0.53' = 05'

superelevate knuckle beyond valley gutter
use std curb from south return south

Point D-C
Subbasin D-1,2 portion 3 (220,500)

t_c = 12 min. (sht 3)

Q_p = (0.65)(5.3)(364/43.56)
= 29 cfs @ 1.1%

V = 3.1 fps
d = 0.45 ft.
E = 0.60' < 0.87'

use s

Point D-D
Subbasin D-4

520' @ 1.9% < 15 cfs

t_c = 520/(2.8)(60) + 5
= 8 min

Q_p = (0.66)(6.1) 157/43.56)
= 15 cfs @ 1.9%

V = 2.8 fps
d = 0.32 ft

E = 0.44' < 0.53' use 0.5' min. waterblock mountable curb

INTERNAL FLOWS (cont.)

BASIN D (cont.)

Point D-E

Sub basin D4 + 5

250' @ 1.2% < 20 cfs

$t_c = 250/(2.7)(60) + 8 = 10$ min

$Q_{P4} = (0.66)(5.6)(157/43.56)$
$= 13$ cfs @ 1.2%

$V = 2.3$ fps
$d = 0.33$ ft
$E = 0.41' < 0.53'$

$Q_{P5} = (0.63)(5.6)(97.5/43.56)$
$= 8$ cfs @ 2.6%

$V = 2.8$ fps
$d = 0.24$ ft
$E = 0.36' < 0.53'$

superelevate street such that there is a 0.02% x slope @ street intersection provide 1 valley gutter to cross @ south curb return. Use std curb to Pt. D-G

Point D-F

sub basin D4,5,6 + 7

370' @ 4.6% Q < 25

$t_c = 370/(4.3)(60) + 10 = 11$ min.

$Q_{P4,5,6} = (0.64)(5.4)(339/43.56)$
$= 27$ cfs
$V = 4.5$ fps
$d = 0.44$ ft
$E = 0.75' < 0.87'$
std. curb

$Q_7 = (0.63)(5.4)(88/43.56)$
$= 7$ cfs @ 1.4%
$V = 2.1$ fps
$d = 0.26$ ft
$E = 0.33' < 0.53'$
mountable curb

Point D-G

sub basin D4 thru 8

$t_c = 13$ min. (sht 3)

$Q_P = 0.65(5.05)(846/43.56)$
$= 64$ cfs

INTERNAL FLOWS (cont.)

BASIN D (cont.)

Outlet

Entrance

$Q = (2.6)(40)(H^{3/2})$

$= 64$ cfs

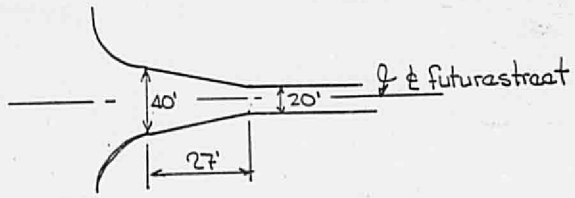
$H = 0.72' < 0.87'$

Construct 40' street to end of return

20' conc. rundown to pino

use concrete cutoff wall (min. 4' deep) allaround project 1' above asphalt.

10' x 30' wire enclosed riprap @ base



BASIN E

Point E-A

Subbasin E-1,2 (40' street)

400' @ 2.1%, Q<10; 300' @ 1.0%, Q<15

$t_c = 400/(2.8)(60) + 300/(2.3)(60) + 5 = 10$ min.

$Q_{P1,2} = (0.66)(5.6)(162.5/43.56)$

$= 14$ cfs @ 1%

$V = 2.3$ fps

$d = 0.38$ ft

$E = 0.46' < 0.53'$

mountable curb

FLOW TO HARPER ROAD

NATURAL CONDITIONS

Time of Concentration (SCS

400' Overland @ 4.5%

1120' Channel w/ Elev. diff. = 36ft

$t_c = 400/(0.2)(60) + (0.12)(60) + 5 = 15$ min

$Q = (0.45)(4.8)(38)$

$= 82$ cfs

DEVELOPED CONDITIONS

$Q = Q_B + Q_E$ (Shts 8 & 12)

$= 31 + 14$

$= 45$ cfs

APPENDIX D

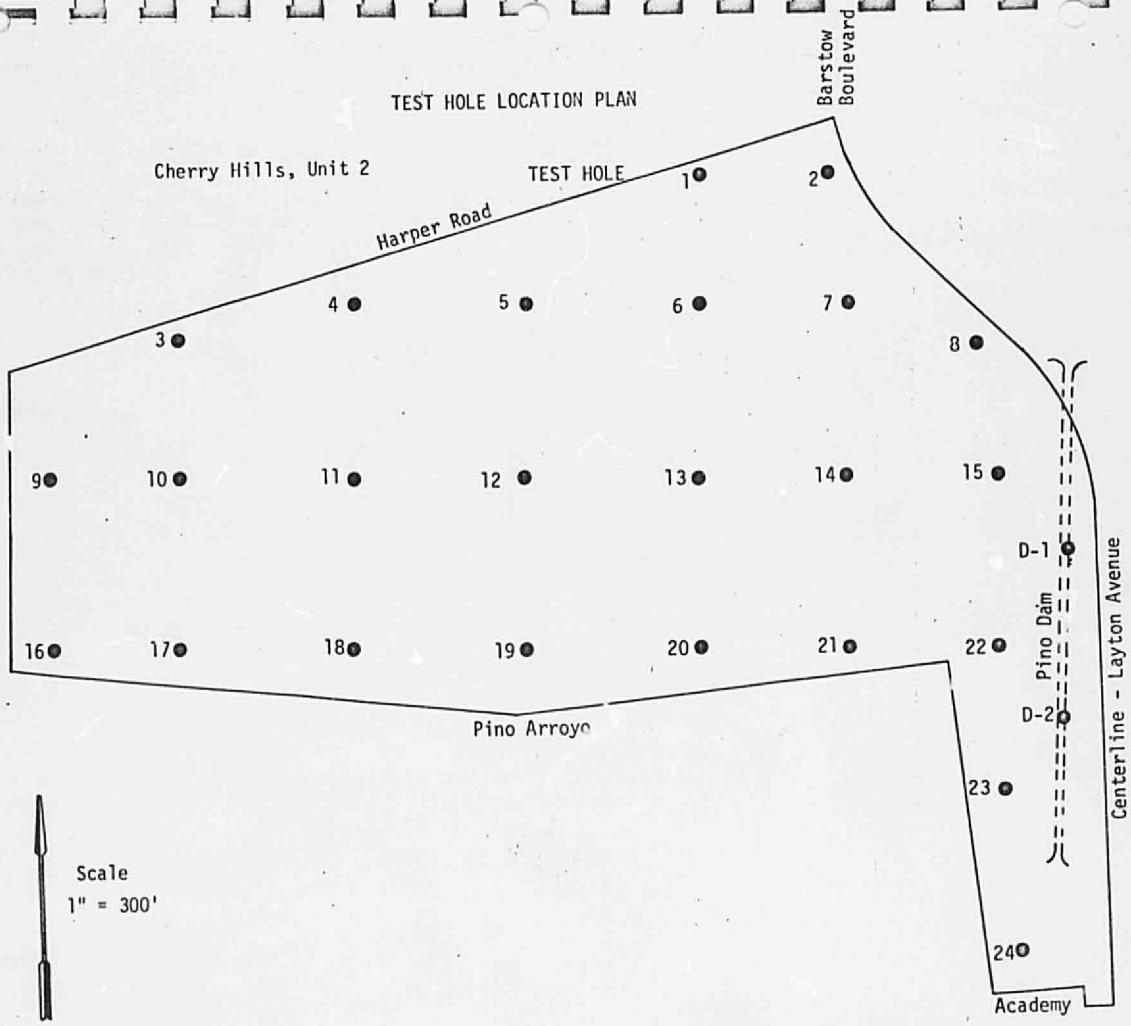
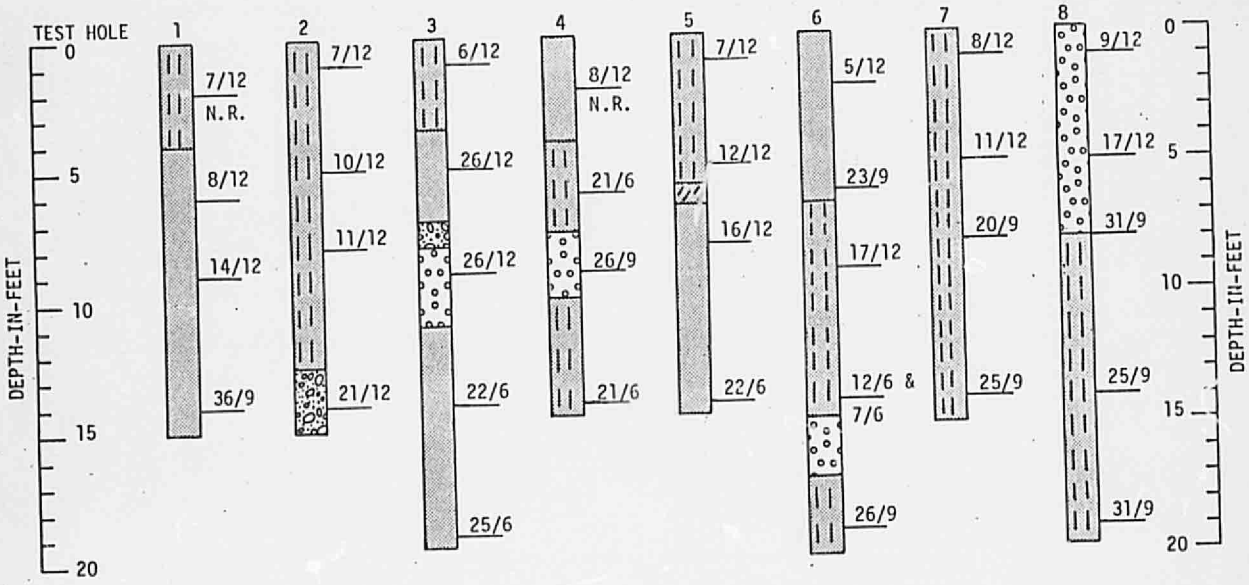
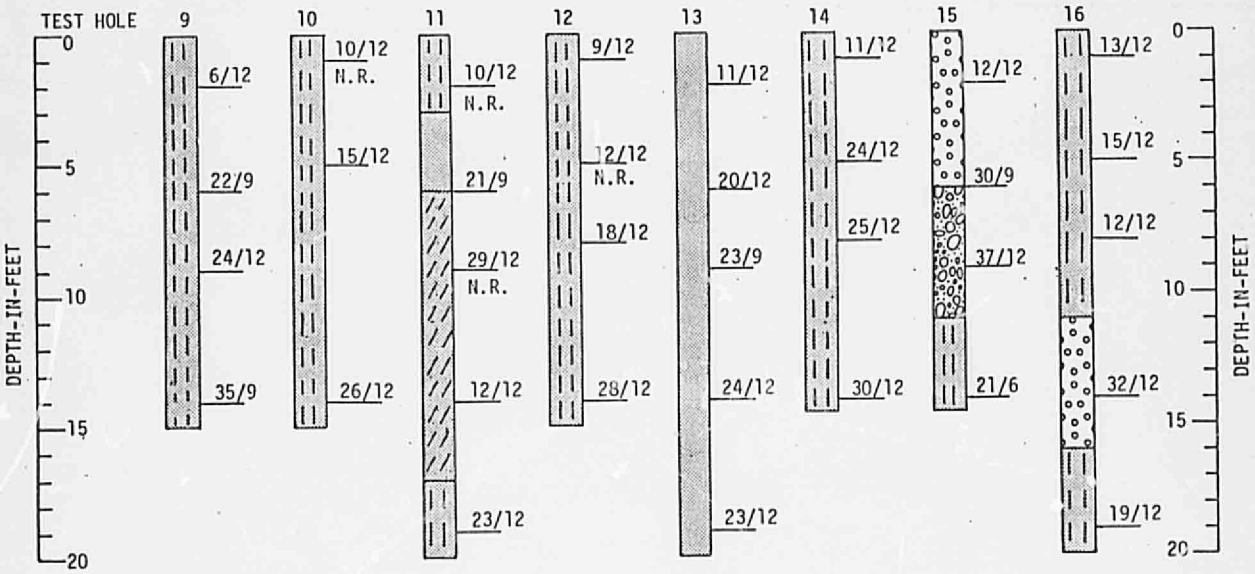

TEST HOLE LOCATION PLAN
Cherry Hills, Unit 2
TEST HOLE
Barstow Boulevard
Harper Road
Pino Arroyo
Pino Dam
Centerline - Layton Avenue
Academy
D-1
D-2
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Scale
1" = 300'

Figure 1



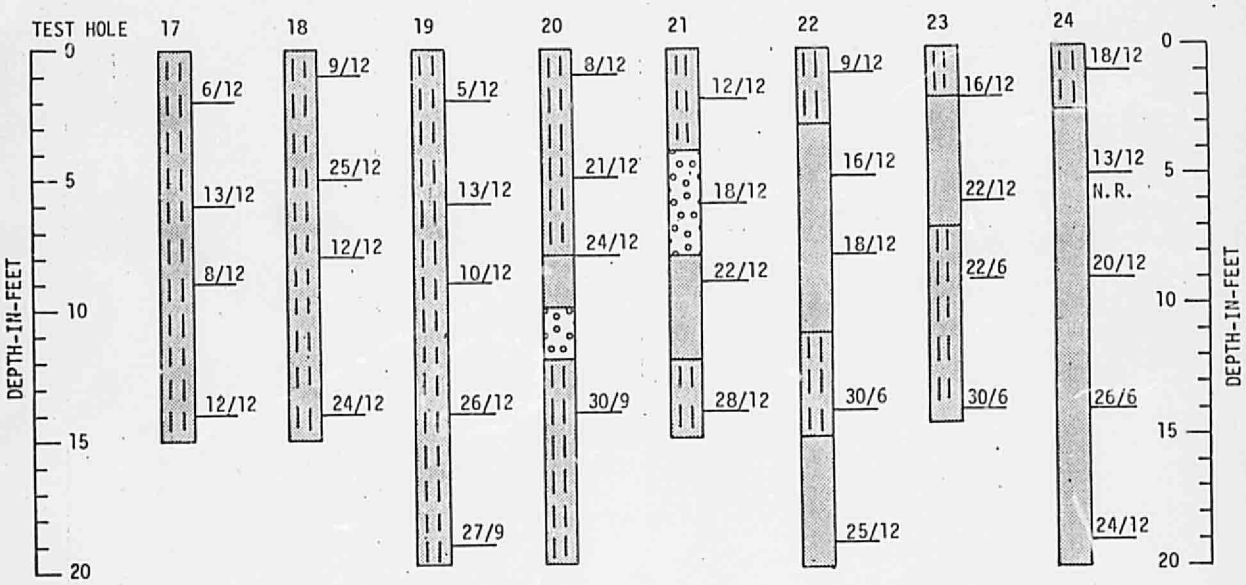
LOGS OF TEST HOLES

Figure 2



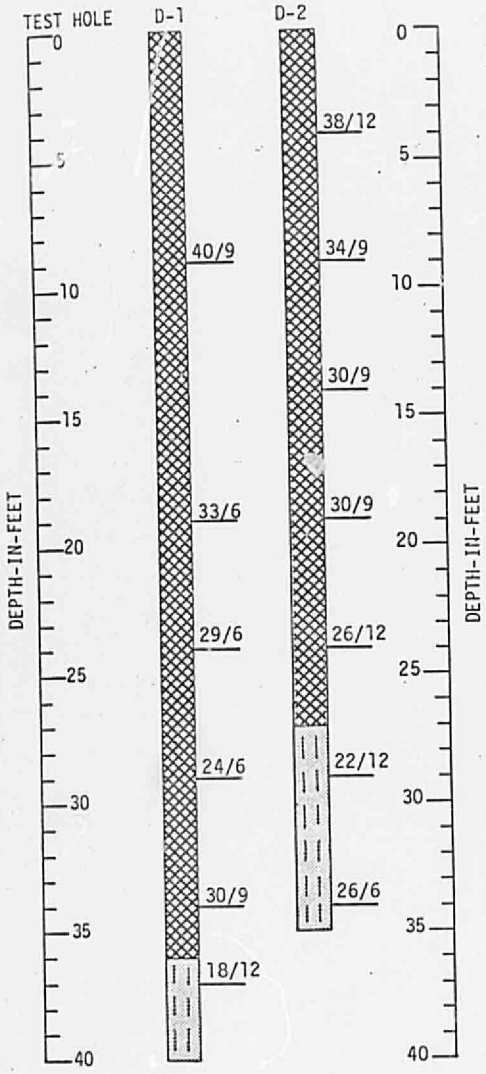
LOGS OF TEST HOLES

Figure 3



LOGS OF TEST HOLES

Figure 4



LEGEND

MAN-MADE FILL, sand, coarse to fine-grained, silty, dense, moist, dark brown (SM)

SAND, coarse to fine-grained, slightly silty to silty, loose to dense, slightly moist to medium moist, some slightly calcareous, dark brown to gray-brown (SM)

SAND, coarse to fine-grained, slightly silty, loose to dense, slightly moist to medium moist, brown (SP-SM)

SAND AND GRAVEL, coarse to fine-grained, slightly silty to silty, medium dense to dense, slightly moist, brown, gray-brown (SM-GM)

SAND, coarse to fine-grained, clean, poorly to well-graded, medium dense to dense, slightly moist, brown (SP, SW)

SAND, fine-grained, silty, medium dense slightly moist to medium moist, brown (SM)

N.R. indicates no sample recovery

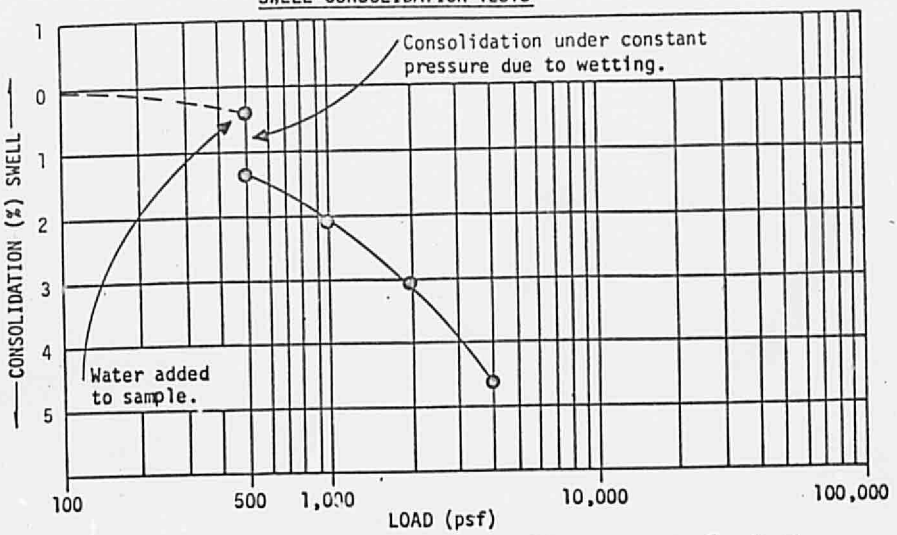
NOTES

1. Test holes were drilled on May 8 and 9, 1978, with a 4-inch diameter continuous flight power auger.
2. (7/12) location of Standard Penetration Test; indicates that 7 blows with a 140-pound hammer, falling 30 inches, were required to drive a 2-inch diameter sampler 12 inches.
3. Ground water was not encountered in any of the test holes at the time of drilling.

LOGS OF TEST HOLES

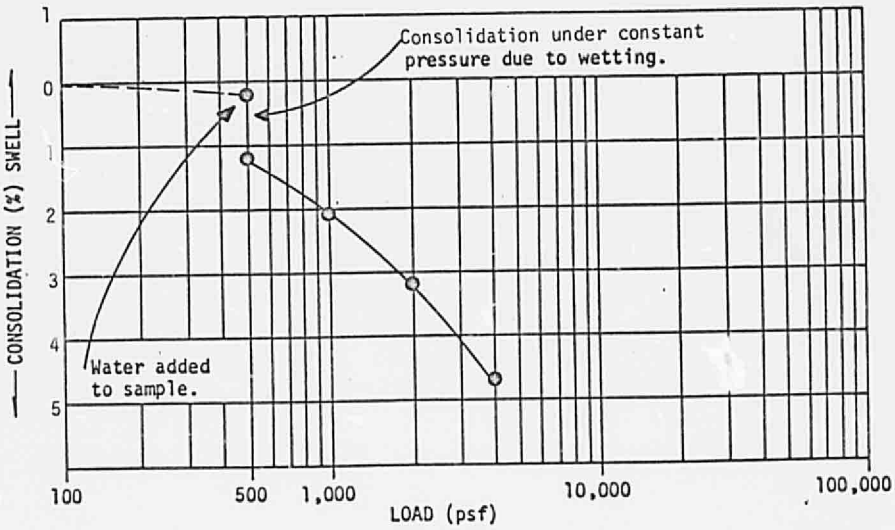
Figure 5

SWELL-CONSOLIDATION TESTS



Sample of silty SAND from test hole 14 from depth 8 feet.

Natural Moisture Content 3.2% Natural Dry Density 113 pcf



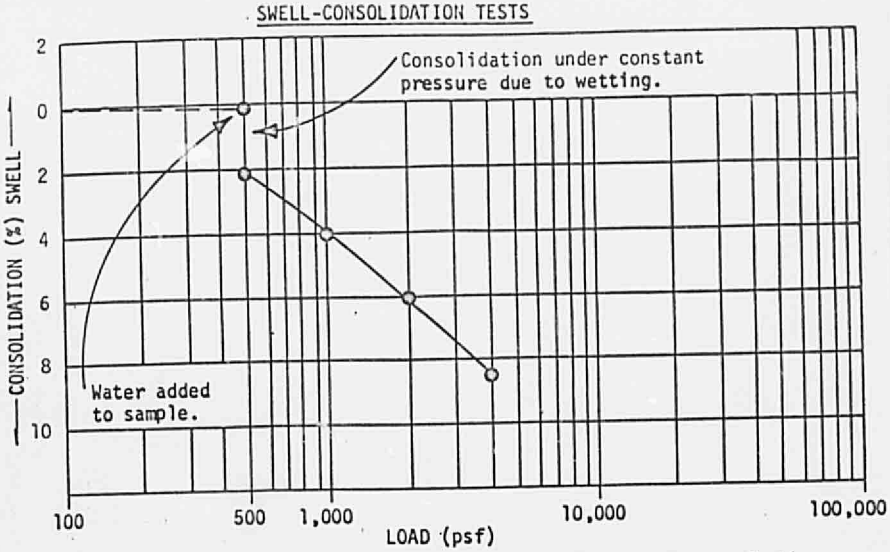
Sample of silty SAND from test hole 16 from depth 1 feet.

Natural Moisture Content 4.2% Natural Dry Density 109 pcf

Form 1-109

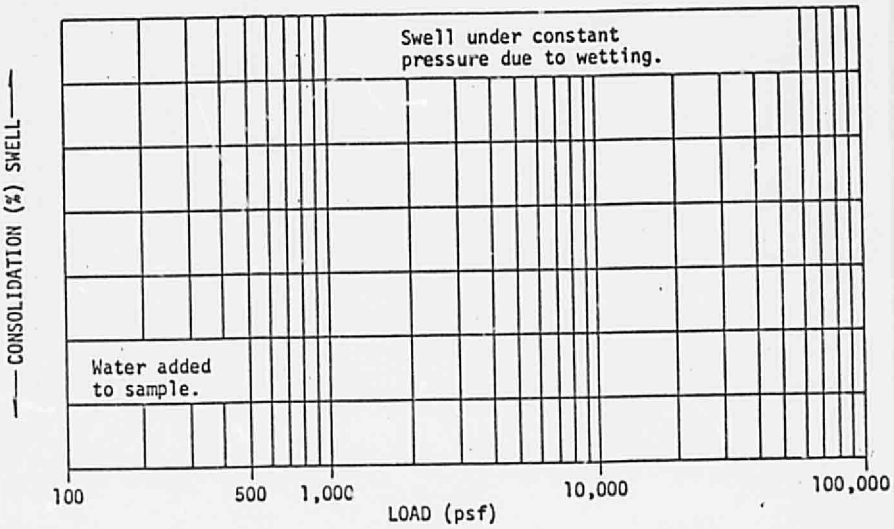
FIGURE 6

SWELL-CONSOLIDATION TESTS



Sample of silty SAND from test hole 20 from depth 1 feet.

Natural Moisture Content 3.0% Natural Dry Density 108 pcf



Sample of _____ from test hole ____ from depth ____ feet.

Natural Moisture Content _____ Natural Dry Density _____

Form 1-109

FIGURE 7

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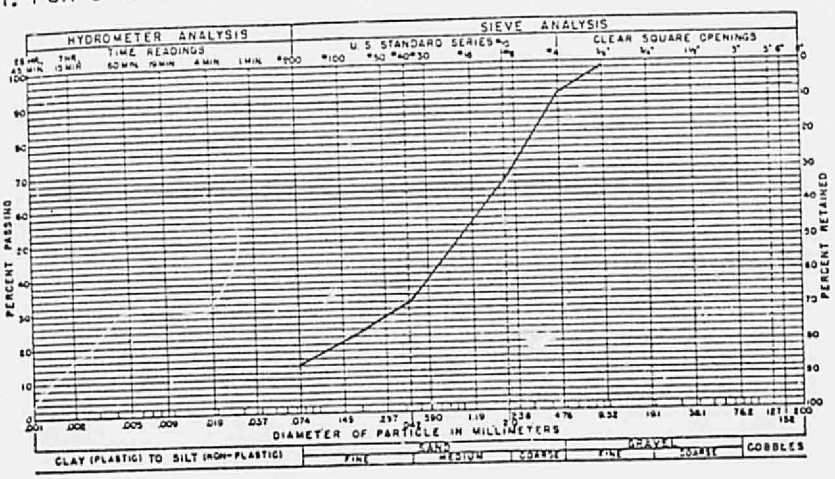
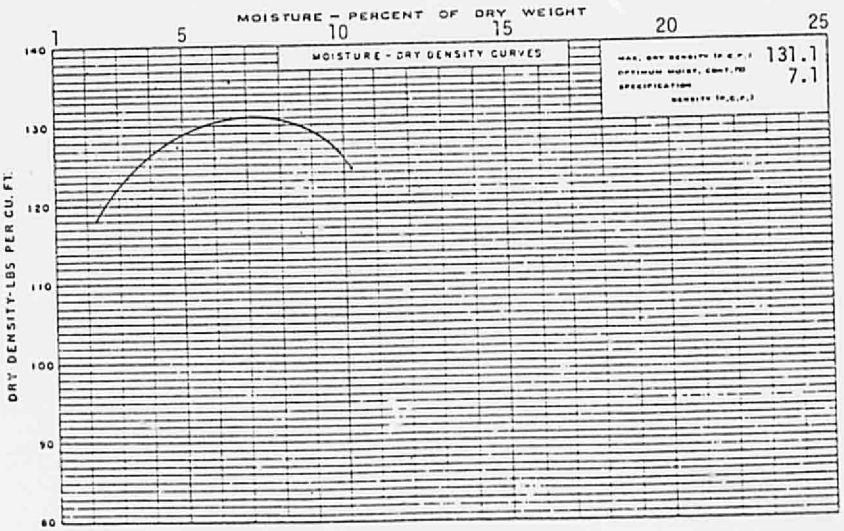
SOIL, FOUNDATION & GEOLOGICAL INVESTIGATIONS



GRADATION TEST RESULTS

GRAVEL 8.8 % SAND 76.9 % SILT AND CLAY 14.3 %

LIQUID LIMIT NV % PLASTICITY INDEX NP %



COMPACTION TEST RESULTS

COMPACTION TEST PROCEDURE ASTM D-1557

SAMPLE OF SAND, coarse to fine-grained, trace gravel, silty, brown (SM)

FROM Composite DEPTH . FIG. 8

SUMMARY OF LABORATORY TEST DATA

Hole No.	Depth of Sample (ft)	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits LL	Atterberg Limits PI	Sieve Analysis % Passing No. 4	Sieve Analysis % Passing No. 10	Sieve Analysis % Passing No. 40	Sieve Analysis % Passing No. 200	Soil Description	Remarks
1	9	114	1.9	NV	NP	92	62	18	7	slightly silty SAND	
2	5	114	1.4	NV	NP	88	63	36	19	silty SAND	
4	6	125	1.4	NV	NP	95	82	41	14	silty SAND	
7	1	103	5.9	28.5	5.6	94	78	56	41	very silty SAND	
8	5	122	3.2	NV	NP	95	74	32	11	slightly silty SAND	
10	5		1.2	NV	NP	92	66	24	7	slightly silty SAND	
13	6	109	1.3	NV	NP	92	67	24	4	SAND	
14	8	113	3.2	NV	NP	98	83	55	29	silty SAND	Figure 6

NV indicates No Value

NP indicates Non-Plastic

Table 1

SUMMARY OF LABORATORY TEST DATA

Hole No.	Depth of Sample (ft)	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits LL	Atterberg Limits PI	Sieve Analysis % Passing No. 4	No. 10	No. 40	No. 200	Soil Description	Remarks
16	1	109	4.2	NV	NP	90	81	65	38	silty SAND	Figure 6
17	9	116	3.1	18.8	NP	97	77	41	22	silty SAND	
19	2	112	2.7	NV	NP	95	75	40	18	silty SAND	
20	1	108	3.0	NV	NP	99	84	45	24	silty SAND	Figure 7
22	5	111	2.1	NV	NP	98	74	19	5	slightly silty SAND	
24	9	115	2.2	NV	NP	92	64	22	5	slightly silty SAND	
D-1	34	123	4.7	20.2	NP	91	70	41	21	MAN-MADE FILL	
D-2	24	123	5.5	20.6	NP	93	70	41	23	MAN-MADE FILL	

NV indicates No Value

NP indicates Non-Plastic

Table 1 (con't.)

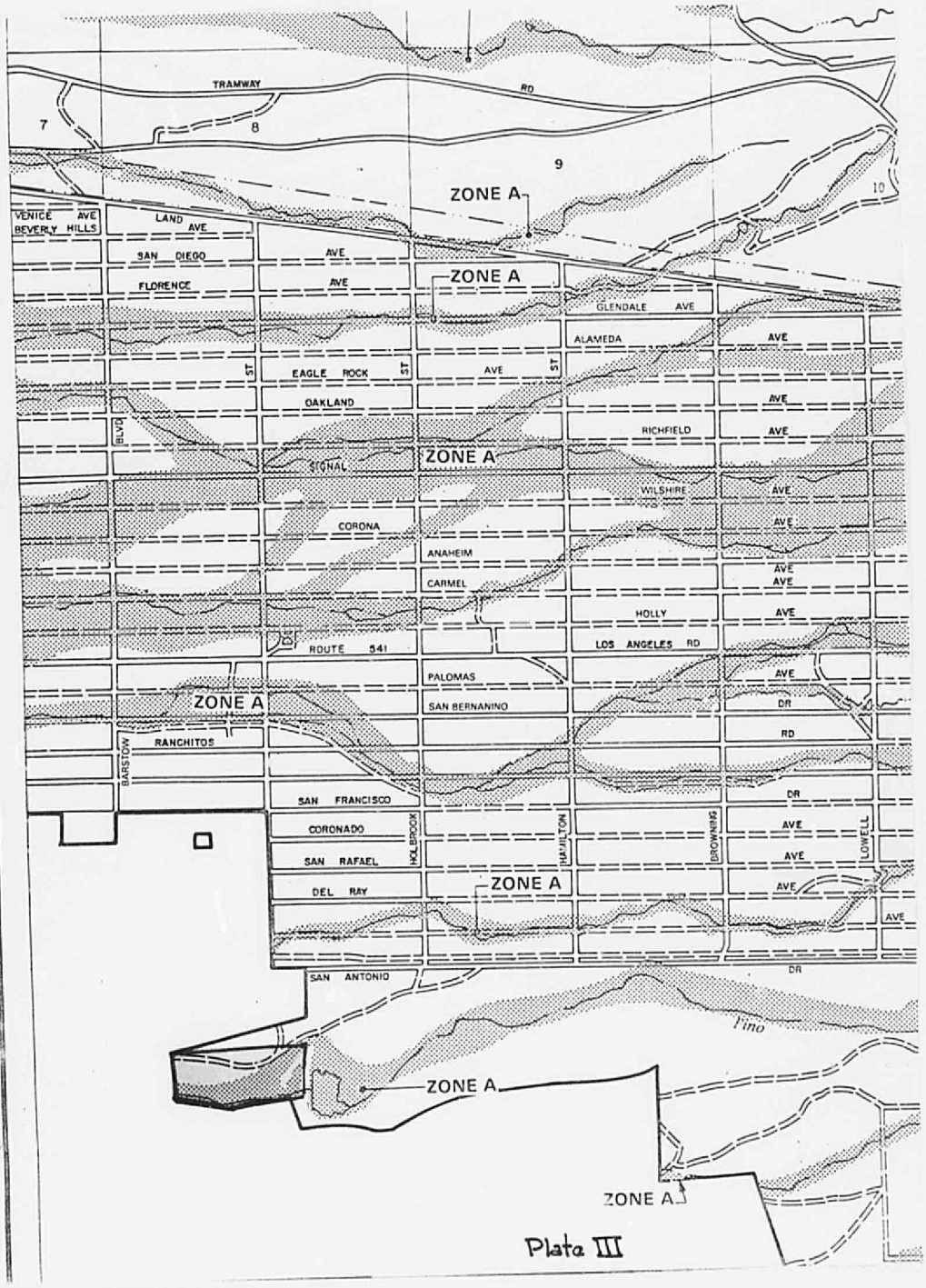

TRAMWAY
RD
7
8
9
10
ZONE A
VENICE AVE
BEVERLY HILLS
LAND AVE
SAN DIEGO
AVE
FLORENCE
AVE
GLENDALE AVE
ALAMEDA
AVE
EAGLE ROCK
ST
AVE
OAKLAND
AVE
RICHFIELD
AVE
BLVD
SIGNAL
WILSHIRE
AVE
CORONA
AVE
ANAHEIM
AVE
CARMEL
AVE
HOLLY
AVE
DR
ROUTE 541
LOS ANGELES RD
PALOMAS
AVE
SAN BERNANINO
DR
RD
RANCHITOS
BARSTOW
SAN FRANCISCO
DR
CORONADO
AVE
SAN RAFAEL
AVE
DEL RAY
AVE
AVE
HOLBROOK
HAMILTON
BROWNING
LOWELL
SAN ANTONIO
DR
Tino

Plate III