DRAINAGE REPORT

FOR

PUBLIC STORM DRAIN SYSTEM
IRVING BLVD. &
GOLF COURSE ROAD

ARROYO VILLAS APARTMENT DEVELOPMENT

ALBUQUERQUE NEW MEXICO
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CONSTRUCTION DRAWINGS

RECORD DRAWINGS

I. INTRODUCTION

This report gives the design analysis for public drainage improvements for portions of Irving Blvd. and Golf Course Road required under the Site Plan approval process for the development of the Arroyo Villas Apartments, Tract T-1A, Town of Alameda Grant, which is located at the northwest corner of the above streets. See the Vicinity Map, Appendix Page A-1, for location of the project.

A separate drainage study was prepared for the drainage analysis of the on-site improvements for the proposed Arroyo Villas Apartments. This report (B-12/D2) was approved by City Hydrology on July 20, 1994. In general, runoff from the apartment complex will be collected in a private storm drain system which will outfall into the public storm drain system which this report addresses.

II. STORM DRAIN SYSTEM ANALYSIS

GENERAL. A new pubic storm drain system will be constructed to intercept storm runoff in the area. The general location and layout of the system is shown on Sheet 5, which is taken from the work order plan set and found in the rear pocket of this report.

Sheets 9, 10, and 11, found in the rear pocket, show the proposed construction details for the storm drain main and inlets. The storm drain main has been sized to convey the total developed runoff which will ultimately flow into Irving Blvd. and Golf Course Road in the project area. However, the drainage inlets proposed in this project are located and sized primarily to capture flows which will occur in the north half of Irving Blvd. and the west half of Golf Course Road. Inlets on the other sides of these streets will be constructed as the adjacent properties develop.

RUNOFF ANALYSIS. Appendix Page A-2, Drainage Map, shows the tributary drainage areas and associated analysis points within the project area. In general, analysis point locations coincide with drainage inlet locations.

The following notes are made to assist the reader in studying the map:

1. The westerly boundary of the drainage area for Analysis Point ⟨1⟩ in the Irving Blvd. right-of-way is located at the location of a new storm drain installed for Paradise Greens, Phase 1. This storm drain will intercept flows in Irving Blvd. coming from the west.

2. Tract T-2, the Tract immediately west of the Arroyo Villas Apartments, will drain north to the Calabacillas Arroyo and will not contribute to this storm drain system.

3. Runoff from Paradise Greens, Phase 2 will be collected in a 36-inch on-site storm drain and flow into the Irving Blvd. storm drain at location ⟨3A⟩ .

4. The majority of runoff from Arroyo Villas Apartments will be collected in a private storm drain and flow into the Golf Course Road storm drain at location ⟨5A⟩ .

Flow calculations for the analysis points shown on the Drainage Map (A-2) are found on Page A-3, 10-year frequency; and Page A-4, 100-year frequency. All calculations are based on developed conditions.

INLET DESIGN. Storm drain inlets for this project are proposed at the locations shown on the construction drawings, Sheets 9-11. No inlets are being provided for the south lanes of Irving Blvd. - these inlets will be the responsibility of the developer of Paradise Greens, Phase II. However, connector pipes and lateral lines for future inlets and storm drain mains are included in the project to avoid future pavement cuts in the new pavement areas.

No inlets are provided for the southwest corner, southeast corner, and northeast corner of the Irving-Golf Course intersection. These inlets will be provided as development occurs in these areas (all these areas are presently undeveloped).

Calculations to determine the flow interception rates of inlets are given on Pages A-4 through A-8.

LANE FLOODING ANALYSIS. Calculations for 10-year frequency rainfall given on Pages A-5, 6, 8, and 9 show that inside lanes will not flood.

STORM DRAIN MAIN DESIGN. Design flow rates for the storm drain main are tabulated on Page A-10. Hydraulic grade line calculations for the storm drain are presented on Page A-11.

CALABACILLAS OUTFALL. The storm drain will outfall into an existing soil-cement grade control structure located on the downstream (east) side of the Golf Course Road bridge over the Calabacillas Arroyo. Sheet 12 presents details of this connection. A print of the record drawing of the soil-cement grade control structure is included in the rear pocket for informational purposes.

AMAFCA approval of this connection is required and AMAFCA must grant a license to the City for operation of this facility.

III. INTERIM MEASURES

Since this facility does not intercept the total existing 100-year design flow rate, interim measures are necessary to take care of potential excess surface flows. Presently flows entering the Irving-Golf Course intersection are carried by a soil-cement channel running along the west side of Golf Course Road and an arroyo located at the northeast quadrant of the intersection. The soil-cement channel will taken out of operation by this construction. The arroyo will still function to carry overflows. The entrance to the arroyo is protected from erosion by a soil-cement apron. A soil-cement faced berm along the north side of the apron directs the flows to the arroyo. The arroyo, which is within a dedicated drainage easement, will provide interim drainage protection until completion of the total storm drain system.

RUNOFF CALCULATIONS FOR Q_{10}

Zone 1

Precip Zone	Q_{10} Runoff Rates (cfs/ac)			
	A	B	C	D
1	0.24	0.76	1.49	2.89
2	0.38	0.95	1.71	3.14
3	0.58	1.19	2.00	3.39
4	0.87	1.45	2.26	3.57

Analysis Point	Area (ac)					Q_{10} (cfs)	Remarks
	A_T	A_A	A_B	A_C	A_D		
1	2.57			0.62	1.95	6.6	
2	1.48		0.06	0.56	0.86	3.4	
3	0.89			0.22	0.67	2.3	
4	1.96			0.75	1.21	4.6	
5	1.45			1.08	0.37	2.7	
6	4.06			0.40	3.66	11.2	
7	5.10			0.51	4.59	14.0	
8	0.53			0.21	0.32	1.2	
3A	26.16		8.50	8.50	9.16	45.6	
5A	13.84	0.76	2.01	3.09	7.98	29.4	

RUNOFF CALCULATIONS FOR Q_{100}

Zone 1 →

Precip. Zone	Q_{100} Runoff Rates (cfs/ac) A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.70
3	1.87	2.60	3.45	5.02
4	2.20	2.92	3.73	5.25

Analysis Point ⬡	Areas (ac.) A_T	A_A	A_B	A_C	A_D	Q_{100} (cfs)	Remarks
1	2.57			0.62	1.95	10.3	
2	1.48		0.06	0.56	0.86	5.5	
3	0.89			0.22	0.67	3.6	
4	1.96			0.75	1.21	7.4	
5	1.45			1.08	0.37	4.7	
6	4.06			0.40	3.66	17.1	
7	5.10			0.51	4.59	21.5	
8	0.53			0.21	0.32	2.0	
3A	26.16		8.50	8.50	9.16	81.7	
5A	13.84	0.76	2.01	3.09	7.98	48.8	

STORM DRAIN INLET ANALYSIS

Location ⟨1⟩

Q_{10} Analysis

Q_{10} = 6.6 (full street) ÷ 2 = 3.3 cfs

1st INLET ⟨1⟩ Inlet Type A

Street Slope = 2.80 % longitudinal, = 2.0 % transverse

Flow Depth in Gutter = 0.28 ft

Inlet Capacity = 2.7 cfs

Flow Past Inlet = 0.6 cfs

2nd Inlet ◇ Inlet Type ____

Flow Depth in Gutter = ______ ft

Inlet Capacity ______ cfs

Flow Past Gutter = ______ cfs

Dry Lane Check: (125' west, S = 2.3%)

Flow depth in gutter = .29', use 0.13' gutter depth

0.29' − .13' = 0.16' ÷ .02 = 8' OK, One lane is dry

Q_{100} Analysis

Q_{100} = 10.3 (full street) ÷ 2 = 5.15 cfs

1st Inlet ⟨1⟩ Inlet Type A

Flow Depth in Gutter = 0.32 ft

Inlet Capacity = 3.7 cfs

Flow Past Inlet = 1.5 cfs

2nd Inlet ◇ Inlet Type ____

Flow Depth in Gutter = ____ ft.

Inlet Capacity = _____ cfs

Flow Past Inlet = _____ cfs

STORM DRAIN INLET ANALYSIS
Location ⟨2⟩

Q_{10} Analysis

Q_{10} = 3.4 (from ⟨2⟩) + 0.6 (past ⟨1⟩) = 4.0 cfs

1st INLET ⟨2⟩ Inlet Type A

Street Slope = 2.1 % longitudinal, = 2.00 % transverse

Flow Depth in Gutter = 0.31 ft

Inlet Capacity = 3.2 cfs

Flow Past Inlet = 0.8 cfs

Dry Lane Check:

Q = 4.0 cfs

Depth = 0.31 - 0.13 = .18'

Lane Encroachment = 0.18 ÷ .02 = 9.0'

OK, one lane dry

2nd Inlet ◇ Inlet Type ____

Flow Depth in Gutter = ____ ft

Inlet Capacity ____ cfs

Flow Past Gutter = ____ cfs

Q_{100} Analysis

Q_{100} = 5.5 (from ⟨2⟩) + 1.5 (past ⟨1⟩) = 7.0 cfs

1st Inlet ⟨2⟩ Inlet Type A

Flow Depth in Gutter = 0.36 ft

Inlet Capacity = 4.5 cfs

Flow Past Inlet = 2.5 cfs

2nd Inlet ◇ Inlet Type ____

Flow Depth in Gutter = ____ ft

Inlet Capacity = ____ cfs

Flow Past Inlet = ____ cfs

STORM DRAIN INLET ANALYSIS
Location ⟨3⟩

Q_{10} Analysis

Q_{10} = 2.3 (from ⟨3⟩) + 0.6 (past ⟨1⟩) = 2.9 cfs
1st INLET ⟨*⟩ Inlet Type A
Street Slope = 4.0 % longitudinal, = 2.0 % transverse
Flow Depth in Gutter = 0.26 ft
Inlet Capacity = 2.7 cfs
Flow Past Inlet = 0.2 cfs

2nd Inlet ◇ Inlet Type ____
Flow Depth in Gutter = ______ ft
Inlet Capacity ______ cfs
Flow Past Gutter = _____ cfs

Q_{100} Analysis

Q_{100} = 3.6 (from ⟨3⟩) + 1.5 (past ⟨1⟩) = 5.1 cfs
1st Inlet ⟨*⟩ Inlet Type A
Flow Depth in Gutter = 0.30 ft
Inlet Capacity = 3.8 cfs
Flow Past Inlet = 1.3 cfs

2nd Inlet ◇ Inlet Type ____
Flow Depth in Gutter = ____ ft
Inlet Capacity = _____ cfs
Flow Past Inlet = _____ cfs

* Future Inlet on south side of Irving, not included in this project

STORM DRAIN INLET ANALYSIS
Location ⟨4⟩

Q_{10} Analysis

Q_{10} = 4.6 (from ⟨4⟩) + 0.8 (past ⟨2⟩) + 0.2 past ⟨3⟩) = 5.6 cfs

1st INLET ⟨3⟩ Inlet Type ____

Street Slope = 5.5 % longitudinal, = 2.0 % transverse

Flow Depth in Gutter = 0.29 ft

Inlet Capacity = 4.5 cfs

Flow Past Inlet = 1.1 cfs

Dry LANE CHECK

0.29 − 0.13 = 0.16'

Lane encroachment = 0.16 ÷ .02 = 8'

OK, one lane dry

2nd Inlet ◇ Inlet Type ____

Flow Depth in Gutter = ____ ft

Inlet Capacity ____ cfs

Flow Past Gutter = ____ cfs

Q_{100} Analysis

Q_{100} = 7.4 (from ⟨4⟩) + 2.5 (past ⟨2⟩) + 1.3 (past ⟨3⟩) = 11.2 cfs

1st Inlet ⟨3⟩ Inlet Type A

Flow Depth in Gutter = 0.36 ft

Inlet Capacity = 6.7 cfs

Flow Past Inlet = 4.5 cfs

2nd Inlet ◇ Inlet Type ____

Flow Depth in Gutter = ____ ft.

Inlet Capacity = ____ cfs

Flow Past Inlet = ____ cfs

STORM DRAIN INLET ANALYSIS
Location ⟨5⟩

Q_{10} Analysis

Q_{10} = 2.7 (from ⟨5⟩) + 1.1 (past ⟨4⟩) = 3.8 cfs

1st INLET ⟨4⟩ Inlet Type A

Street Slope = 3.8 % longitudinal, = 2.0 % transverse

Flow Depth in Gutter = 0.28 ft

Inlet Capacity = 3.6 cfs

Flow Past Inlet = 0.2 cfs

DRY LANE CHECK

0.28 − .13' = 0.15'

Lane Encroachment = 0.15 ÷ .02 = 7.5'

OK, one lane dry.

2nd Inlet ⟨5⟩ Inlet Type 2C

Flow Depth in Gutter = 0.11 ft

Inlet Capacity 1.0 cfs

Flow Past Gutter = 0 cfs

Q_{100} Analysis

Q_{100} = 4.7 (from ⟨5⟩) + 4.5 (past ⟨4⟩) = 9.2 cfs

1st Inlet ⟨4⟩ Inlet Type 1A

Flow Depth in Gutter = 0.36 ft

Inlet Capacity = 5.6 cfs

Flow Past Inlet = 3.6 cfs

2nd Inlet ⟨5⟩ Inlet Type 2C

Flow Depth in Gutter = 0.27 ft

Inlet Capacity = 3.3 cfs

Flow Past Inlet = 0.3 cfs

STORM DRAIN FLOW RATES

MH No	Q100 FLOWS (cfs)			
	Incoming Line	Inlets	Lateral Line	Total
8		7.4		7.4
7	7.4			7.4
6	7.4	3.8	81.7 (1)	92.9
5	92.9	4.5		97.4
4	97.4		38.6 (2)	136.0
3	136.0	6.7		142.7
2	142.7	5.6 + 3.3	48.7 (3)	200.3
1	200.3	2.0 (4)		202.3

NOTES:

(1) Paradise Greens Unit II

(2) Future Lateral Line Collecting

⟨6⟩ 17.1 cfs
⟨7⟩ 21.5
38.6

(3) Flows from Arroyo Villa Apts
Phase I = 37.0 cfs
Phase II = 11.7 "
48.7 "

(4) Future Inlet on East Curb of Golf Course Road

HYDRAULIC GRADE LINE CALCULATIONS

From	To	Q	Dia	Line Losses			Bend Losses				Manhole Losses			
				L	h_f	HG	Δ	K_b	h_b	HG	Δ	K_b	h_{mb}	HG
Outlet	MH-1	202	42	67	*	41.7	41	.13	2.2	43.9			.8	44.7
MH-1	MH-2	200	42	126.5	*	50.6	60	.16	1.1	51.7			0.4	52.1
MH-2	MH-3	143	36	335.2	*	68.3	8	.06	0.4	68.7			0.4	69.1
MH-3	MH-4	136	36	196	*	77.3	45	.14	0.8	78.1			0.3	78.4
MH-4	MH-5	97	36	34.2	0.5	78.9	48	.15	0.7	79.6			0.2	79.8
MH-5	MH-6	93	36	90.2	1.3	81.1	45	.14	0.6	81.7			0.2	81.9
MH-6	MH-7	7	24	310.3	*	97.8	—						0.1	97.9
MH-7	MH-8	7	24	420	*	21.7	—							
MH-6	Stub SW	82	36	86	1.0	82.9								

* Gravity Flow