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Drainage Report

For

Verano Plaza

In

Albuquerque, New Mexico

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2/18/04

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Appendices

Attachments (in Back Pocket)

Purpose

This drainage report provides the hydrologic rationale for the development of Verano Plaza, and will accompany the DRC drawings for review and approval.

Project Location

The project is comprised of lots 31 and 32, block 5 of Albuquerque Acres Tract B, Unit A, which is a developing commercial/industrial area within the City of Albuquerque. The site is on the northeast corner of San Mateo and San Diego, west of Sumitomo Silmax. It is bordered by the public rights-of-way of these two streets on the west and south, respectively. There is an undeveloped lot east of the site, with a newly-constructed commercial lot just east of that (drainage file B18010, dated 3/4/2003), and an older developed lot just east of that (Praxair drainage file B18005, dated 9/30/1996). Just north of the site is a new site that is under construction (Gateway Park Office/Warehouse Complex drainage file B18011, dated 7/3/2003), including adjacent public infrastructure in the San Mateo right-of-way.

Related Reports

In a pre-design conference with City Hydrology on Dec. 10, 2003, it was stated that the City wished to use the Praxair drainage report referenced above as the framework for the development of this site. However, when doing the drainage research for this site, it was found that another drainage report may provide a more comprehensive framework for the development of this site (Citicorp drainage file B17003, dated 5/1/1996). So comparison is made to both of these reports in the hydrologic summary below.

Comparison of Developed Discharge from Lots 29-32

Description	Flow (cfs)
Basin 5A from Citicorp Report, with 10% B, 5% C, and 85% D (page A-14)	16.52
Basin C from Praxair Report (computed by rational method) (page A-15)	18.91
All the basins from this report, added manually (not routed)	16.81
All the basins from this report (routed)—page A-6	16.47

Floodplain

35001C0129F

Per FEMA FIRM Map ~~35001C0328~~ dated Sept., 1996, this site not located ~~is located within an AO Flood Zone. Zone AO indicates "flood depths of 1 to 3 feet for 100-year flood (usually sheet flow on steep terrain).~~ within a flood zone

Existing Conditions

The site is in a developing area, and there is some evidence of grading in, around, and on the site within the last few years. The source of the grading is not known, but the grading activities did not affect the existing drainage pattern. Vegetation is spares, and consists of some desert brush.

The current drainage pattern is sheet flow from the east to the west. Some off-site flow from the west has been intercepted by the Praxair site, thus leaving only flows from off-site lots 29 and 30 to contend with.

Developed Conditions
The site is going to be developed as commercial office and warehouse buildings, with paved parking and some new landscaping.

The capacities of the proposed storm drain pipe, streets, and inlets were computed in the appendix, and are included in the summary below.

Hydrologic and Hydraulic Summary

Description	Flow (cfs)	Capacity (cfs)	Page Reference
Basin 101, discharging to the new northeast storm inlet	3.31	3.73	A-11
Basin 102, discharging to the exist. Beehive inlet	3.40	4.22	A-12
Pipe from on-site inlet (12" pipe at 1.0%)	3.31	3.83	A-2
Flow upstream of inlets in San Diego (half-street flow)	9.91	11.33	A-4/5
First inlet in San Diego (dble A)	7.10	7.10	A-10
Second inlet in San Diego (dble C)	2.81	7.10	A-10
Pipe from San Diego inlets (24" pipe at 0.50%)	9.91	17.21	A-5/6
Existing 42" pipe to channel	16.47	76.53	A-6/7

Conclusion
As the attached plan sheets indicate, there are two sets of plans that will construct the drainage infrastructure required for this site. Sheet C102, the Grading Plan, is part of the building permit set. This sheet also includes the details of some on-site private inlets. Sheet 2 of 5 covers the public infrastructure that will be built under a DRC-approved plan set. This includes the storm inlets, pipe, and paving in the San Diego right-of-way. It is anticipated that both of these construction projects will proceed forward now, and there will be no phasing.

1. Check the width of the 2' wide trough in the parking lot, to make sure the entrance is wide enough to accept the flow.

Q actual = 1.10 cfs (approx. 1/3 of Basin 101)

Use the weir equation for unsubmerged flows:

$Q = C*L*(H)^{3/2} * Cf$

Use the weir equation, with:

C = weir coefficient = 3.00 for a broad-crested weir
L = length of weir = 2 feet (which is the width of the opening)
Clogging factor, Cf = 0.90 (10% clogging)

Use the weir equation to compute the values in the table:

Water Depth (H) (ft)	Weir Flow (cfs)	
0.00	0.00	
0.50	1.91	>1.10, okay.

2. Flow into the new on-site storm inlet in a sump--use a 24" x 24" inlet.

Q actual = 3.31 cfs (Basin 101)

Because the curb height is short, the flow into the inlet will be weir flow around the edges.

Use the weir equation, with:

C = weir coefficient = 3.30 for a sharp-crested weir
L = length of weir = 4.00 feet (for flow on two sides)
Clogging factor, Cf = 0.80 (20% clogging)

Use the weir equation to compute the values in the table:

Water Depth (H) (ft)	Weir Flow (cfs)	
0.00	0.00	
0.50	3.73	>3.31, okay

3. Check the depth of the new on-site storm inlet to make sure it will be deep enough to get all the flow into the exit pipe (Albuquerque's "V" depth).

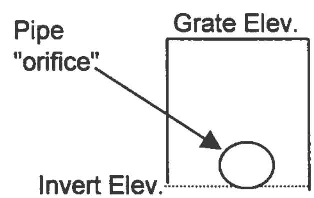
Q actual = 3.31 cfs (Basins 101)

Use the orifice equation for submerged flows:

$Q = C*A*(2*g*H)^{1/2}$

Where:

C = orifice coefficient = 0.60
A = orifice size = 0.79 sq. ft. (for a 12 " dia. pipe)
g = gravitational force = 32.217 ft/sec^2



H = water depth above centroid of orifice in feet (varies per table below).
Q = flow in cfs (varies per table below).

Centroid Depth (ft)	Inlet Depth (ft)	Pipe Flow (cfs)	
NA	0.00	0.00	
1.00	1.50	3.78	
1.50	2.00	4.63	
2.00	2.50	5.35	
2.50	3.00	5.98	>3.31, okay

4. Flow into the existing 12" dia. beehive inlet grate.

Q actual = 3.40 cfs (Basin 102)

Install a curb around the inlet to give it enough depth to accept the flow.

Use the orifice equation, with:

C = orifice coefficient = 0.60 for a sharp-crested weir
A = orifice size = 0.79 sq. ft. (for a 12 " dia. pipe)
g = gravitational force = 32.217 ft/sec^2
Clogging factor, Cf = 0.70 (30% clogging, and grate impedance)

H = water depth above centroid of orifice in feet (varies per table below).
Q = flow in cfs (varies per table below).

Centroid Depth (ft)	Pipe Flow (cfs)	
0.00	0.00	
1.00	2.65	
1.50	3.24	
2.00	3.74	
2.54	4.22	>3.40, okay

5. Check the depth of the new street storm inlet to make sure it will be deep enough to get all the flow into the exit pipe (Albuquerque's "V" depth).

Q actual = 10.1 cfs (Basins 103 and 201 combined)

Use the orifice equation, with:

C = orifice coefficient = 0.60
A = orifice size = 3.14 sq. ft. (for a 24 " dia. pipe)
g = gravitational force = 32.217 ft/sec^2

H = water depth above centroid of orifice in feet (varies per table below).
Q = flow in cfs (varies per table below).

Centroid Depth (ft)	Inlet Depth (ft)	Pipe Flow (cfs)	
NA	0.00	0.00	
1.00	2.00	15.12	
2.00	3.00	21.38	
3.00	4.00	26.19	>10.1, okay