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

November 19, 2001

Kim Kemper, PE
Kemper – Vaughan Construction Engineers
5610 San Francisco NE
Albuquerque, NM 87199

Re: Lorraine Ct. Warehouse Grading and Drainage Plan
Engineer's Stamp dated 2-22-01, (D17/D67) D17/D67F
Engineering Certification dated 11-06-01

Dear Mr. Kemper,

Based upon the information provided in your submittal dated 11-13-01 and 11-19-01, Engineering Certification for Certificate of Occupancy for the above referenced site is approved.

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

Sincerely,

Bradley L. Bingham, PE
Senior Engineer,
Building and Development Services

C: Vickie Chavez, CoA
file

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

768-2804

February 22, 2001

Kim R. Kemper, P.E.
Kemper-Vaughan Consulting Engineers
5610 San Francisco NE
Albuquerque, NM 87109

Re: Drainage Plan & Grading Plan Submittal for Building Permit Approval and SO-19, Lorraine Court Warehouse, Engineer's stamp dated 01-22-01 (D17/D067F)

Dear Mr. Kemper:

Based on the information provided in your submittal dated Feb. 22, 2001, the above referenced project is approved for Building Permit. Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

In addition, the submittal is approved for an SO 19 permit, which is required for construction of the drainage improvements within the city right-of-way.

Prior to release of the Certificate of Occupancy, an Engineer Certification per the DPM checklist will be required. If you have any questions or if I may be of further assistance to you, please call me at 924-3988.

Sincerely,

Nancy Musinski, P.E.
Hydrology/Utility Development
City of Albuquerque Public Works

cc: Pamela Lujan, PWD - Permits
file

LORRAINE COURT WAREHOUSE

GRADING PLAN & DRAINAGE PLAN

January 17, 2001

Prepared for:

JLS Architecture

1600 Rio Grande Blvd. NW

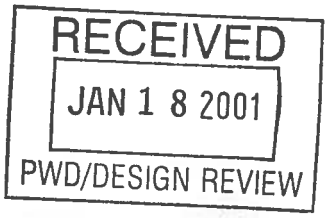
Albuquerque, New Mexico 87104

Prepared by:

KEMPER-VAUGHAN CONSULTING ENGINEERS

3700 Coors Road NW

Albuquerque, New Mexico 87120



PROJECT OVERVIEW

The site is located in the newly developed Paseo Del Norte Industrial Park Subdivision just west of Jefferson and south of Paseo Del Norte. As shown on panel 136 of the 1996 FIRM (attached), this site does not lie within a designated flood hazard area. The site is 1.94 acres in total and is currently vacant. There exists a 50-foot railroad spur easement along the eastern property line. Due to the topography within this easement approximately 0.13 acres of this site drains to the north and does not impact the subject site. As such all the data presented herein includes a total site area of 1.81 acres. The proposed project includes the construction of a new office/warehouse and related parking and landscaping.

DRAINAGE PLAN

As stated above, this site is within the Paseo Del Norte Industrial Park Subdivision that has just recently been completed. The drainage plan for this subdivision can be found it City file D17/D67. In that subdivision plan limited downstream capacities were identified. As such, each parcel in the subdivision was assigned a maximum allowable peak rate of discharge. The subject site, parcel H, has an allowable discharge of 3.2 cfs. This limitation requires onsite detention of developed storm water runoff.

The site is configured and graded into two separate sub-basins. There is a grade break in the southeast corner of the site. The east and north drive isles and parking represent one sub-basin identified in the calculations as the north drainage area. The new building, storage yards and south drive isle represent the sub-basin identified as the south drainage area. Two detention areas, two controlled outlets and two new sidewalk culverts were required to complete this plan. Each detention area is drained with a small diameter pipe. In a storm larger than the design event each detention area will breach through the proposed driveways into public right-of-way. The water blocks in the new drive isles were set at an elevation to provide the required detention volume and to provide a maximum head water (h) on the proposed pipe outlets. Using this maximum (h) a maximum peak rate of discharge for the controlled release can be calculated. Calculations for these culverts (controlled release) are attached.

Calculations are provided for the total site as well as the north area and the south area individually. To determine the required detention volumes it was identified that these ponds will drain in less than 6-hours; therefore, the 6-hour volumes were used. Hydrographs were calculated for the total site and each sub-basin. The volume of storm water released during the design event was determined and the required storage could then be calculated. The results of this exercise is as follows:

Total Site:

V_{100} = 11,375 cf Q_{100} = 7.28 cfs

$T_b = (2.107)(1.73)(1.81/7.28)-(0.25)(1.23/1.81) = 0.736$ hrs

$T_p = (0.7)(0.2)+((1.6-1.23/1.81)/12) = 0.217$ hrs

Duration of Peak = (0.25)(1.23/1.81) = 0.170 hrs

North Area:

V_{100} = 4,479 cf Q_{100} = 2.87 cfs

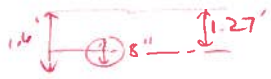
T_b = (2.107)(1.67)(0.74/2.87)-(0.25)(0.49/0.74) = 0.742 hrs

T_p = (0.7)(0.2)+((1.6-0.49/0.74)/12) = 0.218 hrs

Duration of Peak = (0.25)(0.49/0.74) = 0.166 hrs

8" culvert discharge pipe @ h = 1.27' max. Q_{max} = 1.4 cfs

Volume of water released during the storm event = 3,031 cf



Required storage = 4,479 – 3,031 = 1,448 cf

Storage provided per the proposed grading plan at water surface elevation equal to 5092.0 is approximately 2,400 cf

South Area:

V_{100} = 6,896 cf Q_{100} = 4.41 cfs

T_b = (2.107)(1.67)(1.07/4.41)-(0.25)(0.74/1.07) = 0.737 hrs

T_p = (0.7)(0.2)+((1.6-0.74/1.07)/12) = 0.216 hrs

Duration of Peak = (0.25)(0.74/1.07) = 0.173 hrs

10" culvert discharge pipe @ h = 1.00' max. Q_{max} = 1.7 cfs h = 1.1

Volume of water released during the storm event = 3,846 cf

8186 4340

Required storage = ~~6,896~~ – 3,846 = 3,050 cf

Storage provided per the proposed grading plan at water surface elevation equal to 5092.5 is approximately 3,300 cf need 1040 more cu ft. Raise waterblock to 92,60 from 92,50

The maximum peak rate of discharge from this site as proposed is 1.4 + 1.7 = 3.1 cfs.

PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

January 17, 2001
LORRAINE CT. WAREHOUSE
CONTROL OUTLET
8" CMP

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PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Culvert Diameter (feet)	0.67
FHWA Chart Number (1,2 or 3)	1
Scale Number on Chart (Type of Culvert Entrance)	3
Manning`s Roughness Coefficient (n-value)	0.0240
Entrance Loss Coefficient of Culvert Opening	0.50
Culvert Length (feet)	10.0
Culvert Slope (feet per foot)	0.0100

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PROGRAM RESULTS:

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
1.0	0.00	0.73	0.89	0.67	0.48	0.48	3.74
1.1	0.00	0.79	0.98	0.67	0.50	0.50	3.92
1.2	0.00	0.83	1.09	0.67	0.52	0.52	4.08
1.3	0.00	0.89	1.20	0.67	0.54	0.54	4.28
1.4	0.00	0.96	1.32	0.67	0.56	0.56	4.47
1.5	0.00	1.04	1.45	0.67	0.57	0.57	4.68

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PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

January 17, 2001
LORRAINE CT. WAREHOUSE
CONTROL OUTLET
10" CMP

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PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Culvert Diameter (feet)	0.83
FHWA Chart Number (1,2 or 3)	1
Scale Number on Chart (Type of Culvert Entrance)	3
Manning`s Roughness Coefficient (n-value)	0.0240
Entrance Loss Coefficient of Culvert Opening	0.50
Culvert Length (feet)	10.0
Culvert Slope (feet per foot)	0.0100

==========

PROGRAM RESULTS:

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Velocity (fps)
1.5	0.00	0.83	0.93	0.83	0.55	0.55	3.95
1.6	0.00	0.86	0.99	0.83	0.57	0.57	4.06
1.7	0.00	0.90	1.05	0.83	0.59	0.59	4.17
1.8	0.00	0.95	1.11	0.83	0.60	0.60	4.28

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AREA = 1.81 ac.

LORRAINE COURT OFFICE-WAREHOUSE
TOTAL SITE

DRAINAGE ZONE 2
PRECIPITATION: 360 = 2.35 in.
1140 = 2.75 in.
10day = 3.95 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:
TREATMENT A	0.53 in.	1.56 cfs/ac.
TREATMENT B	0.78 in.	2.28 cfs/ac.
TREATMENT C	1.13 in.	3.14 cfs/ac.
TREATMENT D	2.12 in.	4.70 cfs/ac.

EXISTING CONDITIONS:	AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	1.81 ac.	0.00 ac.
TREATMENT B	0 ac.	0.37 ac.
TREATMENT C	0 ac.	0.21 ac.
TREATMENT D	0 ac.	1.23 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.53)x(1.81)+(0.78)x(0.00)+(1.13)x(0.00)+(2.12)x(0.00)/ 1.81 ac.
= 0.53 in.

V100-360 = (0.53)x(1.81)/ 12 = 0.079942 ac-ft = 3482 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.56)x(1.81)+(2.28)x(0.00)+(3.14)x(0.00)+(4.70)x(0.00)= 2.82 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.53)x(0.00)+(0.78)x(0.37)+(1.13)x(0.21)+(2.12)x(1.23)/ 1.81 ac.
= 1.73 in.

V100-360 = (1.73)x(1.81)/ 12.0 = 0.261125 ac-ft = 11375 cf

V100-1440 = (0.26)+(1.23)x(2.75 - 2.35)/ 12 = 0.302125 ac-ft = 13161 cf

V100-10day = (0.26)+(1.23)x(3.95 - 2.35)/ 12 = 0.425125 ac-ft = 18518 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.56)x(0.00)+(2.28)x(0.37)+(3.14)x(0.21)+(4.70)x(1.23)= 7.28 cfs

RESULTS

7.28 - 2.82 = 4.46 cfs Increase in peak discharge
11375 - 3482 = 7892 cf Increase in runoff volume

AREA = 0.74 ac.

LORRAINE COURT OFFICE-WAREHOUSE
NORTH DRAINAGE AREA

DRAINAGE ZONE 2
PRECIPITATION:

360 =	2.35 in.
1140 =	2.75 in.
10day =	3.95 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:	
TREATMENT A	0.53 in.	1.56	cfs/ac.
TREATMENT B	0.78 in.	2.28	cfs/ac.
TREATMENT C	1.13 in.	3.14	cfs/ac.
TREATMENT D	2.12 in.	4.70	cfs/ac.

EXISTING CONDITIONS:	AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	0.74 ac.	0.00 ac.
TREATMENT B	0 ac.	0.25 ac.
TREATMENT C	0 ac.	0.00 ac.
TREATMENT D	0 ac.	0.49 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.53)x(0.74)+(0.78)x(0.00)+(1.13)x(0.00)+(2.12)x(0.00)/ 0.74 ac.
= 0.53 in.

V100-360 = (0.53)x(0.74)/ 12 = 0.032683 ac-ft = 1424 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.56)x(0.74)+(2.28)x(0.00)+(3.14)x(0.00)+(4.70)x(0.00)= 1.15 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.53)x(0.00)+(0.78)x(0.25)+(1.13)x(0.00)+(2.12)x(0.49)/ 0.74 ac.
= 1.67 in.

V100-360 = (1.67)x(0.74)/ 12.0 = 0.102817 ac-ft = 4479 cf

V100-1440 = (0.10)+(0.49)x(2.75 - 2.35)/ 12 = 0.119150 ac-ft = 5190 cf

V100-10day = (0.10)+(0.49)x(3.95 - 2.35)/ 12 = 0.168150 ac-ft = 7325 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.56)x(0.00)+(2.28)x(0.25)+(3.14)x(0.00)+(4.70)x(0.49)= 2.87 cfs

RESULTS

2.87 - 1.15 =	1.72 cfs	Increase in peak discharge
4479 - 1424 =	3055 cf	Increase in runoff volume

AREA = 1.07 ac.

LORRAINE COURT OFFICE-WAREHOUSE
SOUTH DRAINAGE AREA

DRAINAGE ZONE 2
PRECIPITATION:

360 =	2.35 in.
1140 =	2.75 in.
10day =	3.95 in.

	EXCESS PRECIPITATION:	PEAK DISCHARGE:
TREATMENT A	0.53 in.	1.56 cfs/ac.
TREATMENT B	0.78 in.	2.28 cfs/ac.
TREATMENT C	1.13 in.	3.14 cfs/ac.
TREATMENT D	2.12 in.	4.70 cfs/ac.

	EXISTING CONDITIONS: AREA	PROPOSED CONDITIONS: AREA
TREATMENT A	1.07 ac.	0.00 ac.
TREATMENT B	0 ac.	0.12 ac.
TREATMENT C	0 ac.	0.21 ac.
TREATMENT D	0 ac.	0.74 ac.

EXISTING EXCESS PRECIPITATION:

Weighted E = (0.53)x(1.07)+(0.78)x(0.00)+(1.13)x(0.00)+(2.12)x(0.00)/ 1.07 ac.
= 0.53 in.

V100-360 = (0.53)x(1.07)/ 12 = 0.047258 ac-ft = 2059 cf

EXISTING PEAK DISCHARGE:

Q100 = (1.56)x(1.07)+(2.28)x(0.00)+(3.14)x(0.00)+(4.70)x(0.00)= 1.67 cfs

PROPOSED EXCESS PRECIPITATION:

Weighted E = (0.53)x(0.00)+(0.78)x(0.12)+(1.13)x(~~0.21~~ 0)+(2.12)x(~~0.74~~ .95)/ 1.07 ac.
= ~~1.78~~ 2.11 in.

V100-360 = (1.78)x(1.07)/ 12.0 = 0.158308 .1879 ac-ft = 6896 8186 cf

V100-1440 = (0.16)+(0.74)x(2.75 - 2.35)/ 12 = 0.182975 ac-ft = 7970 cf

V100-10day = (0.16)+(0.74)x(3.95 - 2.35)/ 12 = 0.256975 ac-ft = 11194 cf

PROPOSED PEAK DISCHARGE:

Q100 = (1.56)x(0.00)+(2.28)x(0.12)+(3.14)x(~~0.21~~ 0)+(4.70)x(~~0.74~~ .95)= ~~4.41~~ 4.74 cfs

RESULTS

~~4.41~~ 4.74	-	1.67	=	~~2.74~~ 3.07	cfs Increase in peak discharge
~~6896~~ 8186	-	2059	=	~~4837~~ 6127	cf Increase in runoff volume