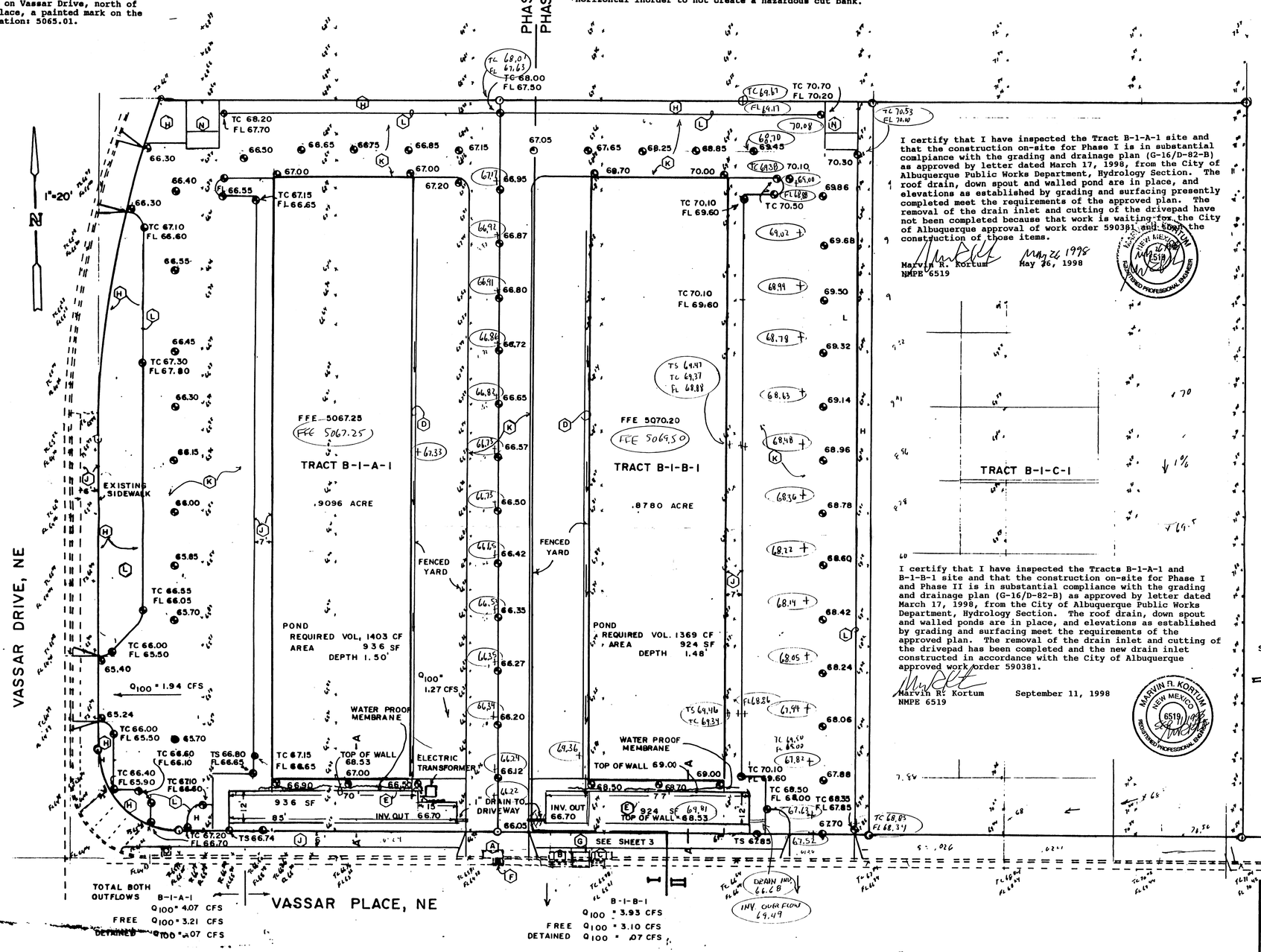
BENCHMARK: The Comanche Business Park project benchmark is station M-6, located on Montgomery Boulevard, on the east abutment of the bridge crossing over the North Diversion Channel. The station is a brass marker located between the west bound and east bound bridges. Elevation 5110.492. There is a temporary bench mark located on the top of the curb on Vassar Drive, north of the intersection with Vassar Place, a painted mark on the east side of the street. Elevation: 5065.01.

Phase I includes the grading and drainage improvements shown for lot B-1-A-1 and that portion of the common access driveway and drivepad along the common property line between lots B-1-A-1 and B-1-B-1. The unimproved portion of lot B-1-B-1 that is adjacent to the surfaced driveway will be sloped back from the edge of the pavement surface at a slope not to exceed 1 vertical to 3 horizontal inorder to not create a hazardous cut bank.

LEGAL DESCRIPTION: Tracts B-1-A-1 and B-1-B-1, COMANCHE BUSINESS PARK, Albuquerque, Bernalillo County, New Mexico.



I certify that I have personally inspected the Tracts B-1-A-1 and B-1-B-1 site and the surrounding terrain. The representation of the land and the contours are as presented on these drawings and the accompanying text as of December 1997.

Marvin R Kortum — Dec 10, 1997
Marvin R Kortum — Date

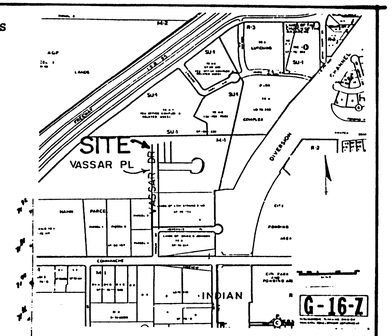
Topographic survey by Marvin R Kortum

I certify that I have inspected the Tract B-1-A-1 site and that the construction on-site for Phase I is in substantial complianc with the grading and drainage plan (G-16/D-82-B) as approved by letter dated March 17, 1998, from the City of Albuquerque Public Works Department, Hydrology Section. The roof drain, down spout and walled pond are in place, and elevations as established by grading and surfacing presently completed meet the requirements of the approved plan. The removal of the drain inlet and cutting of the drivepad have not been completed because that work is waiting for the City of Albuquerque approval of work order 590381 and for the construction of those items.

Marvin R. Kortum — May 26, 1998
NMPE 6519 — May 26, 1998

I certify that I have inspected the Tracts B-1-A-1 and B-1-B-1 site and that the construction on-site for Phase I and Phase II is in substantial compliance with the grading and drainage plan (G-16/D-82-B) as approved by letter dated March 17, 1998, from the City of Albuquerque Public Works Department, Hydrology Section. The roof drain, down spout and walled ponds are in place, and elevations as established by grading and surfacing meet the requirements of the approved plan. The removal of the drain inlet and cutting of the drivepad has been completed and the new drain inlet constructed in accordance with the City of Albuquerque approved work order 590381.

Marvin R. Kortum — September 11, 1998
NMPE 6519



LEGEND

	Existing	Proposed
Spot Elevation	× 65.23	⊗ 64.25
Top of Curb	TC 65.23	TC
Flow Line Invert	FL 65.23	FL
Finished Floor Elevation	FFE	FFE
Contour Line	----- 4962 -----	—64—
Property Line		○——○
Lot Number		(5)
Structure	- - - - - -	
Curb and Gutter		
Driveway		

AS-BUILT ELEVATIONS & NOTES

SECTION A-A POND DETAILS 1"=4'

NOTES

A. EXISTING SINGLE "A" INLET
B. EXISTING DOUBLE "C" INLET
C. EXISTING SINGLE "A" INLET
D. INSTALL ROOF GUTTER TO COLLECT AND DIREDT ROOF RUNOFF TO THE EAST POND. GUTTER SHALL BE 6 INCHES BY 6 INCHES OR LARGER, AND SHALL BE SET AT A 0.5% SLOPE (1/8 INCH PER FOOT) OR LARGER. THE GUTTER SHALL DIRECT THE FLOW TO A DOWNSPOUT, THEN INTO THE DETENTION POND.
E. CONSTRUCT DETENTION POND.
F. REMOVE EXISTING INLET A.
G. CONSTRUCT NEW INLET, TYPE SINGLE "A"
H. LANDSCAPING. IF A MEMBRANE IS USED, THE MEMBRANE WILL BE PERVIOUS.
J. PCC SIDEWALK.
K. Asphalt or PCC pavement.
L. 6" WIDE BY REQUIRED DEPTH HEADER CURB. A PCC CURB AND GUTTER MAY BE USED.
M. OFF-SITE FLOWS FROM ADJACENT UNDEVELOPED PROPERTY CAN BE ACCEPTEQ, PASSED THROUGH THE PROPERTY, AND DISPOSED OF IN ACCORDANCE WITH THE COMANCHE BUSINESS PARK MASTER DRAINAGE PLAN.
N. TRASH COLLECTION BIN.
P. ALL BERMS AND EARTHWORK SUPPORTING STRUCTURES MUST BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY (MODIFIED PROCTOR TEST).
Q. ELEVATIONS OF BUILDING PADS ARE BASED ON SLAB ON GRADE.
R. QUANTITATIVE EARTHWORK ESTIMATES SHOULD BE BASED ON MORE DETAILED TOPOGRAPHIC CROSS SECTIONS OF THE WORK AREA.

APPROVALS, REVISIONS	BY	DATE
AS-BUILT FINAL	MRK	SEP 11, 1998
AS-BUILT PHASE I	MRK	MAY 26, 1998
INCREASE POND AREA	MRK	MAR 16, 1998
RELOCATE INLET	MRK	FEB 20, 1998
ADD PHASE I, II LINE	MRK	JAN 13, 1998
Preliminary	Marvin R Kortum	December 10, 1997

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Civil Engineering
NM PE 6519
1605 Speakman Drive, S.E.
Albuquerque, New Mexico 87123
(505) 299-0774

Jan 13 1998 — Feb 20 1998

GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B
COMANCHE BUSINESS PARK
SITE GRADING

RECEIVED
SEP 11 1998
HYDROLOGY SECTION

G-16/D82B — G-16 — 1/3

BENCHMARK: The Comanche Business Park project benchmark is station M-6, located on Montgomery Boulevard, on the east abutment of the bridge crossing over the North Diversion Channel. The station is a brass marker located between the west bound and east bound bridges. Elevation 5110.492. There is a temporary bench mark located on the top of the curb on Vassar Drive, north of the intersection with Vassar Place, a painted mark on the east side of the street. Elevation: 5065.01.

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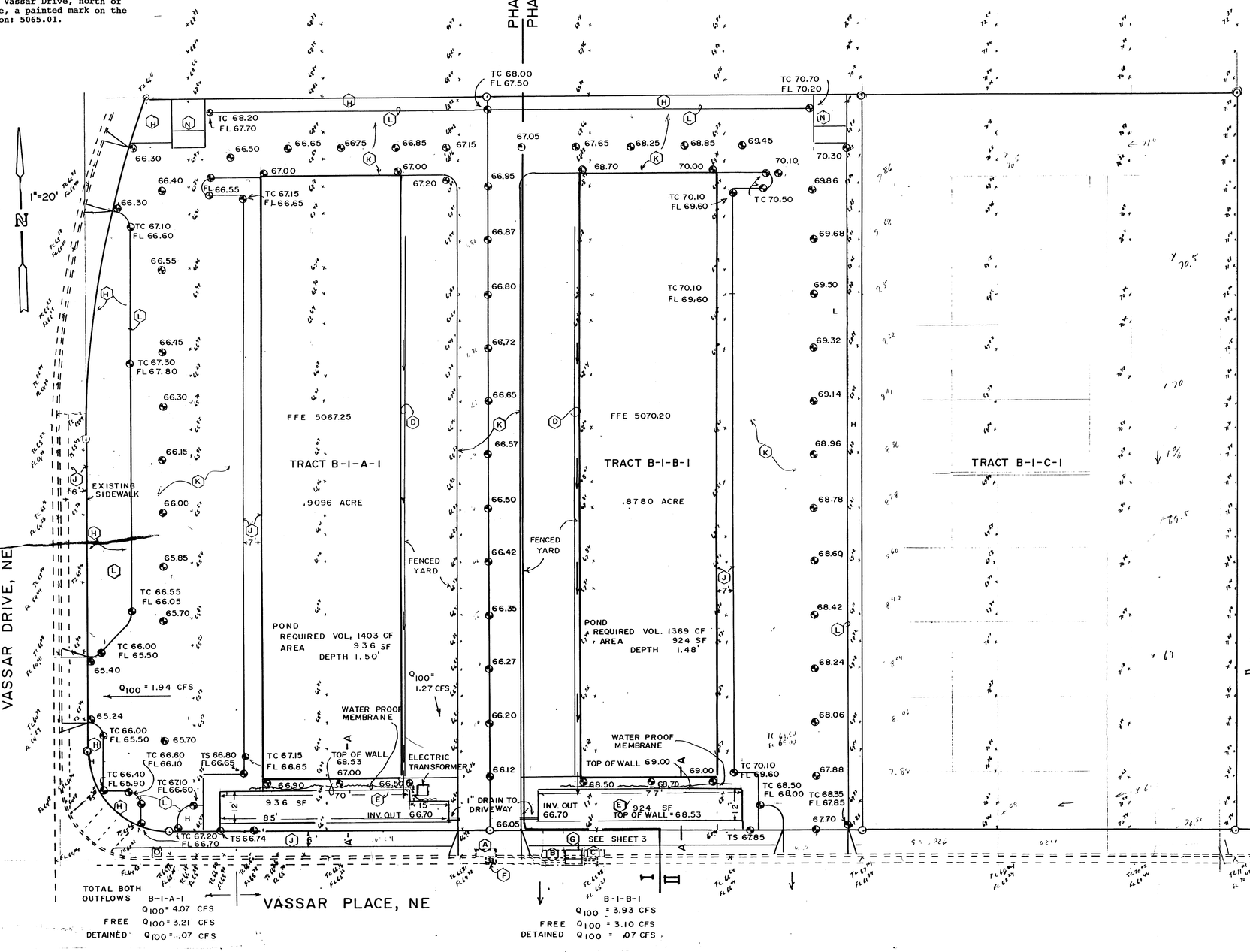
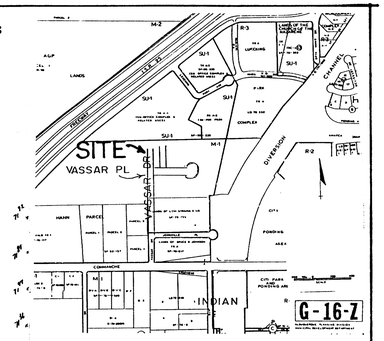
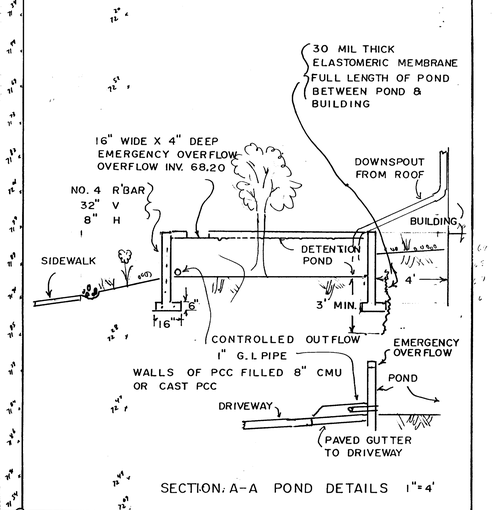




LEGEND

	Existing	Proposed
Spot Elevation	× 63.7	64.25
Top of Curb	TC 63.72	TC
Flow Line Invert	FL 63.12	FL
Finished Floor Elevation	F.F.E.	FFE
Contour Line	4962	64
Property Line		
Lot Number		S
Structure		
Curb and Gutter		
Driveway		



SECTION: A-A POND DETAILS 1"=4'

I certify that I have personally inspected the Tracts B-1-A-1 and B-1-B-1 site and the surrounding terrain. The representation of land and the contours are as presented on these drawings and the accompanying text as of December 1997.

Marvin R Kortum — Date: Dec 10, 1997

Topographic survey by Marvin R Kortum

NOTES

A. EXISTING SINGLE "A" INLET
B. EXISTING DOUBLE "C" INLET
C. EXISTING SINGLE "A" INLET
D. INSTALL ROOF GUTTER TO COLLECT AND DIREDT ROOF RUNOFF TO THE EAST POND. GUTTER SHALL BE 6 INCHES BY 6 INCHES OR LARGER, AND SHALL BE SET AT A 0.5% SLOPE (1/8 INCH PER FOOT) OR LARGER. THE GUTTER SHALL DIRECT THE FLOW TO A DOWNSPOUT, THEN INTO THE DETENTION POND.
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Preliminary APPROVALS, REVISIONS	BY	DATE
INCREASE POND AREA	MRK	MAR 16, 1998
RELOCATE INLET	MRK	FEB 20, 1998
ADD PHASE I, II LINE	MRK	JAN 13, 1998
	Marvin R Kortum	December 10, 1997

MARVIN R. KORTUM, NEW MEXICO 6519 PROFESSIONAL ENGINEER

Jan 13 1998 MRK
FEB 20 1998 MRK

MARVIN R. KORTUM, P.E.
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NM PE 6519

1605 Speakman Drive, S.E.
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GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
SITE GRADING

RECEIVED MAR 16 1998 HYDROLOGY SECTION

G-16/D82B G-16 1/3

I. PURPOSE

The purpose of this Grading and Drainage Plan is to obtain approval for the construction of commercial buildings on Tracts B-1-A-1 and B-1-B-1, COMANCHE BUSINESS PARK.

II. SITE DESCRIPTION

A. A master drainage plan for the Comanche Business Park has been prepared and approved (G16/D82). The Comanche Business Park is in an area with the off-site runoff being limited to an amount specified by SAD 216. The essence of the master plan is that the site will operate in an initial condition with a centrally located pond which will detain runoff and have a controlled discharge into the existing drainage channel. After SAD is completed, the central pond will be removed from operation, and all discharge from the site will be by means of a sub-surface storm drain system internal to the park which will discharge to the SAD downstream system.

B. A condition of the Comanche Business Park master drainage plan is that the disharge from each of the developed lots will be limited to 3.61 CFS inorder for the overall site not to exceed the capacity of the SAD 216 system downstream.

C. The improvements on Tract B-1-A-1 will provide a runoff of 4.07 CFS (see Table A-1). The allowable runoff for Tract B-1-A-1 is 3.28 CFS, (.9096 acres x 3.61 CFS/acre), which results in an excess of .79 CFS (4.07-3.28). It is proposed that a portion of the site be designed for free discharge of about 3.21 CFS, and that runoff from the remainder of the site be captured in a pond, and that discharge from the pond be limited to less than .07 CFS, so the total of free discharge, 3.21 CFS, plus the controlled discharge, .07 CFS will not exceed the allowable discharge of 3.28 CFS. Table A-2 shows that a total of 31680 SF of Tract B-1-A-1 will have free discharge, and that the runoff from 7942 SF of impervious area will have to be detained, which results in a volume of 1403.1 CF for the design 100 year-6 hour storm. Similar calculations for Tract B-1-B-1 are shown in Tables B-1 and B-2, with a volume of 1368.5 CF required to be detained and discharged at a controlled rate not to exceed .07 CFS (3.17-3.10).

D. Inasmuch as the required detention volumes and rates of discharge for Tracts B-1-A-1 and B-1-B-1 are similar, the following discussions on method of detention will apply to both lots, and the larger area of 7942 SF, the larger volume of 1405.1 CF and the controlled discharge rate of .07 CFS will be used.

E. The total roof area for each building is about 11,648 SF (52 x 224), which means that the roof runoff from a portion of the roof, 7942 SF, or 153 feet length, will be a sufficient amount to detain. It is proposed that the runoff be channel by a roof gutter to a pond of adequate capacity, and that the discharge from the pond be directed through a properly sized orifice, discharging through a pipe onto the parking area, and out the driveway. Tables C, D and E show various sizes of ponds, orifices and roof gutters. The ponds will be rectangular in size, with impervious block walls, with the interior of the pond being available for planting of suitable shrubs and trees which will aethetic relief to the commercial buildings. The ponds will have the appearance of planters, with a secondary terrace along the street side for the planting of low level vegetation.

F. The common driveway along the property line of Tracts B-1-A-1 and B-1-B-1 is in a location which will cross over an existing catch basin. It will be required to remove the this basin. A similar basin will be required and constructed within the sump area of the street gutter.

III. OFF SITE DRAINAGE

A. Off-site flows will be as designated by the approved master drainage plan for Comanche Business Park and the SAD 216.

IV. SOILS

The soils within the Tract B area are identified by reference C as Embudo gravelly fine sandy loam, 0 to 5 percent slopes (EmB). The Embudo series consists of deep, well drained soils that formed in alluvium derived from decomposed, coarse grained, granite rocks on old alluvial fans. Runoff is medium, and the hazard of water erosion is moderate. The soils on the site have been disturbed, particularly on the surface which appears to have been recently cleared of surface trash. Sub-surface borings, and the adjacent excavation of the pond on Tract B-1-J do not show evidence of sub-surface trash or past use as a landfill. The site is within an historic arroyo which has been intercepted by the AMAFCA North Diversion Ditch, located adjacent to and east of the Comanche Business Park. The soils appear satisfactory for the planned purpose of low commercial buildings, with sufficient tests and compaction as recommended by a soils engineer.

V. CONCLUSIONS

A. The development proposed will not produce runoff which will be a hazard to the site or to downstream properties.

B. The site is partially within a 100 year flood plain, but the floodplain does not create a hazard interior to the buildings.

REFERENCES:

A. Bernalillo County Ordinance No. 88-42.
B. Section 22.2, Hydrology, of the Development Process Manual, Volume 2, Design Criteria, for the City of Albuquerque...Bernalillo County...AMAFCA, January 1993.
C. Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico, USDA-SCS.

The numbers shown on the tables are recorded to the significant number shown primarily to aid in tracking computations. Results are reasonably valid only to the first number, ie. 5643.7 represents a result between about 5000 and 6000.

RUNOFF FOR TRACTS B-1-A-1 AND B-1-B-1, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

Runoff considerations after SAD 216 is constructed. Estimates shown below do not consider any allowance for runoff from the paved street surfaces.

TABLE A-1
Runoff Estimate: For On-site Basin of .9096 acres, Tract B-1-A-1

Land use		Runoff Factors Zone 2 Peak	Total	CURRENT USE Area	Percent	Peak Runoff	Total Runoff	PROPOSED USE Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	39622.00	100.0	1.4	1750.0	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3680.00	9.3	0.19	239.2
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	35942.00	90.7	3.88	6349.8
TOTALS				39622.00	100.000	1.4	1750.0	39622.00	100.000	4.07	6589.0
				0.9096 acre				0.9096 acre			

ALLOWABLE PEAK FLOW 3.61 CFS/ACRE
ALLOWABLE PEAK FLOW FOR TRACT B-1-A-1 3.28

TABLE A-2
Runoff Estimate: Lot B-1-A-1, for on-site Basin of .7273 acres, area permited to have free discharge of 3.21 CFS

Land use		Runoff Factors Zone 2 Peak	Total	CURRENT USE Area	Percent	Peak Runoff	Total Runoff	PROPOSED USE Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	31680.00	100.0	1.1	1399.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3680.00	11.6	0.19	239.2
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	28000.00	88.4	3.02	4946.7
TOTALS				31680.00	100.000	1.1	1399.2	31680.00	100.000	3.21	5185.9
				0.7273 acre				0.7273 acre			

ALLOWABLE PEAK FLOW 3.28 CFS/LOT B-1-A-1
ACTUAL FREE DISCHARGE PEAK FLOW 3.21 CFS/LOT B-1-A-1

TOTAL LOT AREA	39622	SF	
AREA WITH FREE DISCHARGE	31680	SF	
AREA REQUIRING CONTROLED DISCHARGE	7942	SF	
VOLUME FROM CONTROLLED AREA, ALL IMPERVIOUS, (AREA X 2.12'')			1403.1 CF
TOTAL VOLUME, FREE DISCHARGE PLUS CONTROLLED DISCHARGE			6589.0

TABLE B-1
Runoff Estimate: For On-site Basin of .8780 acres, Tract B-1-B-1

Land use		Runoff Factors Zone 2 Peak	Total	CURRENT USE Area	Percent	Peak Runoff	Total Runoff	PROPOSED USE Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	38246.00	100.0	1.4	1689.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3500.00	9.2	0.18	227.5
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	34746.00	90.8	3.75	6138.5
TOTALS				38246.00	100.000	1.4	1689.2	38246.00	100.000	3.93	6366.0
				0.8780 acre				0.8780 acre			

ALLOWABLE PEAK FLOW 3.61 CFS/ACRE
ALLOWABLE PEAK FLOW FOR TRACT B-1-A-1 3.17 CFS

TABLE B-2
Runoff Estimate: Lot B-1-B-1, for on-site Basin of .7002 acres, area permited to have free discharge of 3.10 CFS

Land use		Runoff Factors Zone 2 Peak	Total	CURRENT USE Area	Percent	Peak Runoff	Total Runoff	PROPOSED USE Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	31680.00	100.0	1.1	1399.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3500.00	11.5	0.18	227.5
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	27000.00	88.5	2.91	4770.0
TOTALS				31680.00	100.000	1.1	1399.2	30500.00	100.000	3.10	4997.5
				0.7273 acre				0.7002 acre			

ALLOWABLE PEAK FLOW 3.17 CFS/LOT B-1-B-1
ACTUAL FREE DISCHARGE PEAK FLOW 3.10 CFS/LOT B-1-B-1

TOTAL LOT AREA	38246	SF	
AREA WITH FREE DISCHARGE	30500	SF	
AREA REQUIRING CONTROLED DISCHARGE	7746	SF	
VOLUME FROM CONTROLLED AREA, ALL IMPERVIOUS, (AREA X 2.12'')			1368.5 CF
TOTAL VOLUME, FREE DISCHARGE PLUS CONTROLLED DISCHARGE			6366.0 CF

NOTES:
a. Runoff factors from Section 22.2, DPM, January, 1993
b. Land use descriptions: A. Uncompacted soil
B. Lawn, shrubs
C. Compacted soil
D. Impervious areas
c. Peak runoff = Area (acres) x factor (CFS/acre) = CFS
d. Total runoff = Area (SF) x factor (inches) / 12 (inches /foot) = CF
e. Peak and total runoff is based on 6 hour, 100 year frequency storm

TABLE D
SIZE OF DISCHARGE PIPE
DECEMBER 10, 1997

Use equation Q=Ca(2gh)^.5, where C=.82 for a short pipe orifice.

PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS	PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS	PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS
0.5	6	0.022	0.5	4	0.018	0.5	2	0.013
0.625	6	0.034	0.625	4	0.028	0.625	2	0.020
0.75	6	0.049	0.75	4	0.040	0.75	2	0.029
1	6	0.088	1	4	0.072	1	2	0.051
1.25	6	0.137	1.25	4	0.112	1.25	2	0.079
1.5	6	0.198	1.5	4	0.162	1.5	2	0.114
2	6	0.352	2	4	0.287	2	2	0.203
2.5	6	0.549	2.5	4	0.449	2.5	2	0.317
3	6	0.791	3	4	0.646	3	2	0.457

REQUIRED DISCHARGE, 1400 CF IN 24 HOURS = 1400/24/60/60= 0.016 CFS

TABLE E
ROOF GUTTER CAPACITIES
LOT B-1-A-1, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

Ditch capacities of rectangular metal channel
Q=Area x Velocity; Velocity=1.486/n x (Rh)^.6667 x (s)^.5

	Mannings n	Ditch Side Slope (A)	Side slope (B)	Bottom width Ft	Depth Ft	Top Width Ft	Area SF	Wetted Perimeter Ft	Hydraulic Radius Ft	Velocity FPS	Capacity CFS	Froude # V/(gL)^.5 (C)	Sequent depth Rectangular (D) Ft	Sloped (E) F	Trapezoid (F) Ft
FOR ROOF GUTTERS ALONG EAVES OF BUILDINGS															
1	0.011	5.000	0	0.330	0.30	0.3	0.1	0.930	0.106	2.145	0.212	0.69	0.18	0.22	0.16
2	0.011	10.000	0	0.330	0.30	0.3	0.1	0.930	0.106	3.034	0.300	0.98	0.29	0.34	0.25
3	0.011	5.000	0	0.417	0.33	0.4	0.1	1.077	0.128	2.423	0.333	0.74	0.22	0.26	0.19
4	0.011	10.000	0	0.417	0.25	0.4	0.1	0.917	0.114	3.170	0.330	1.12	0.29	0.34	0.25
5	0.011	5.000	0	0.500	0.27	0.5	0.1	1.040	0.130	2.449	0.331	0.83	0.21	0.25	0.18
6	0.011	10.000	0	0.500	0.21	0.5	0.1	0.920	0.114	3.178	0.334	1.22	0.27	0.32	0.23

REQUIRED Q100 = 0.33 CFS

(A) Ft(vertical)/1000 Ft(horizontal)
(B) Ft(horizontal)/1 Ft(vertical)
(C) Froude No. (Fn)=velocity/(g x area/top width)^.5
(D) Sequent depth for rectangular level channel, y2=(y1/2)x(((1+8 x Fn^2)^.5) -1)
(E) Sequent depth for sloping rectangular channel
y2=((y1/2)/cos slope angle) x (((1+8(((10^(.027 x slope angle))^2) x Fn^2)^.5-1)
(F) Correction factor for trapezoidal channel, figure 3.4
(G) Reference: Richard H French, Open Channel Hydraulics, 1985

TABLE A-3
Runoff Estimate: West side of Lot B-1-A-1, for on-site Basin of .4477 acres, which will drain to Vassar Drive as historic flow.

Land use		Runoff Factors Zone 2 Peak	Total	CURRENT USE Area	Percent	Peak Runoff	Total Runoff	PROPOSED USE Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	19500.00	100.0	0.7	861.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3000.00	15.4	0.16	195.0
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	16500.00	84.6	1.78	2915.0
5			1.6								2200.0
TOTALS				19500.00	100.000	0.7	861.2	19500.00	100.000	1.94	3110.0
								with 10 day volume			5310.0
				0.4477 acre				0.4477 acre			

ADD TABLE A-3	MRK	MAR 16, 1998
RELOCATED INLET	MRK	FEB 20, 1998
ADD PHASE I, II LINE	MRK	JAN 13, 1998
Preliminary APPROVALS, REVISIONS	Marvin R Kortum BY	December 10, 1997 DATE

MARVIN R. KORTUM NEW MEXICO 6519 REGISTERED PROFESSIONAL ENGINEER
Jan 13 1998 MRK Feb 20 1998 MRK

MARVIN R. KORTUM, P.E.
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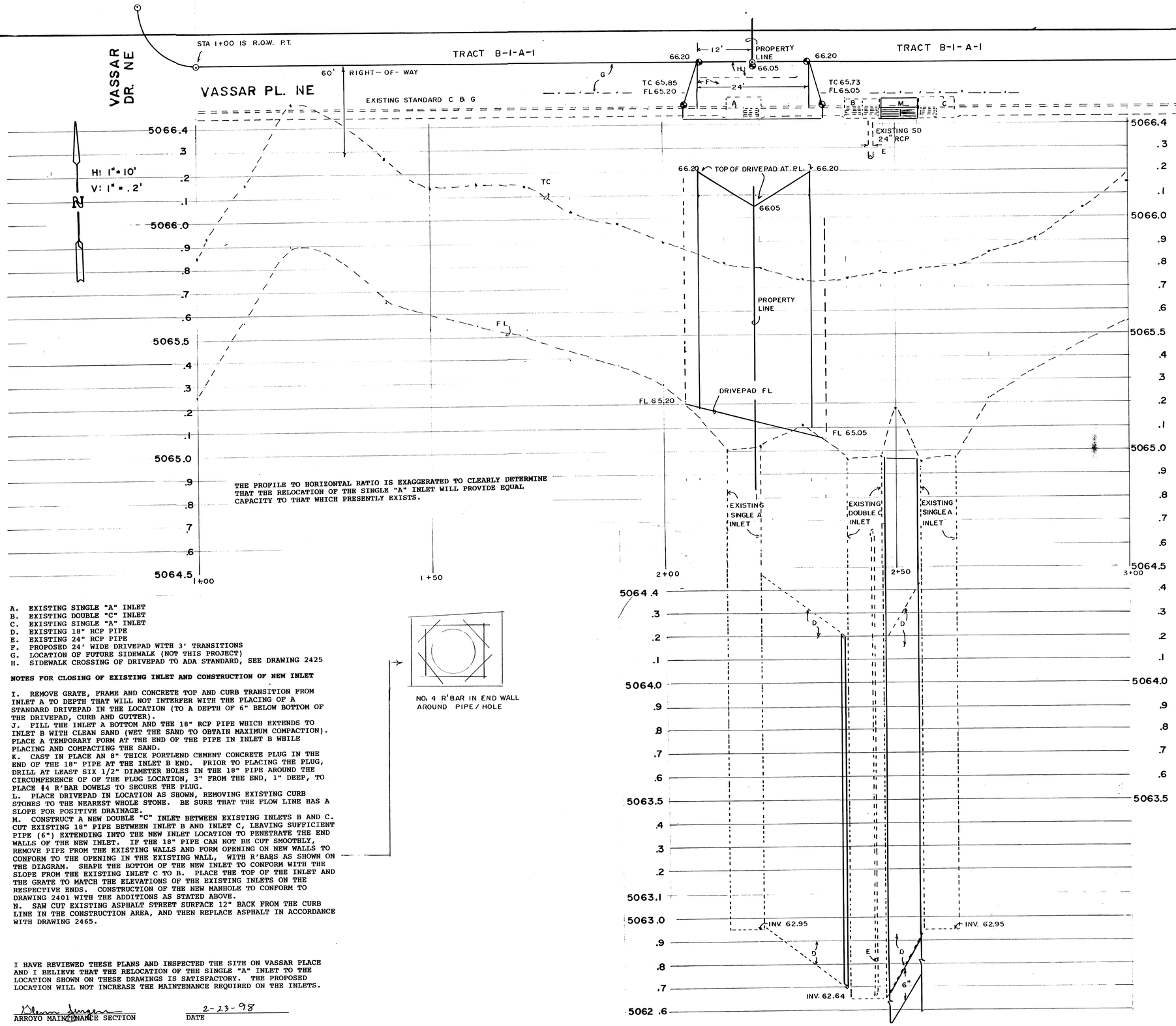
GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
DISCUSSION

RECEIVED MAR 16 1998 HYDROLOGY SECTION

G-16/D82B



A. EXISTING SINGLE "A" INLET
B. EXISTING DOUBLE "C" INLET
C. EXISTING SINGLE "A" INLET
D. EXISTING 18" RCP PIPE
E. EXISTING 24" RCP PIPE
F. PROPOSED 24' WIDE DRIVEPAD WITH 3' TRANSITIONS
G. LOCATION OF FUTURE SIDEWALK (NOT THIS PROJECT)
H. SIDEWALK CROSSING OF DRIVEPAD TO ADA STANDARD, SEE DRAWING 2425

NOTES FOR CLOSING OF EXISTING INLET AND CONSTRUCTION OF NEW INLET

I. REMOVE GRATE, FRAME AND CONCRETE TOP AND CURB TRANSITION FROM INLET A TO DEPTH THAT WILL NOT INTERFER WITH THE PLACING OF A STANDARD DRIVEPAD IN THE LOCATION (TO A DEPTH OF 6" BELOW BOTTOM OF THE DRIVEPAD, CURB AND GUTTER).
J. FILL THE INLET A BOTTOM AND THE 18" RCP PIPE WHICH EXTENDS TO INLET B WITH CLEAN SAND (WET THE SAND TO OBTAIN MAXIMUM COMPACTION). PLACE A TEMPORARY FORM AT THE END OF THE PIPE IN INLET B WHILE PLACING AND COMPACTING THE SAND.
K. CAST IN PLACE AN 8" THICK PORTLEND CEMENT CONCRETE PLUG IN THE END OF THE 18" PIPE AT THE INLET B END. PRIOR TO PLACING THE PLUG, DRILL AT LEAST SIX 1/2" DIAMETER HOLES IN THE 18" PIPE AROUND THE CIRCUMFERENCE OF OF THE PLUG LOCATION, 3" FROM THE END, 1" DEEP, TO PLACE #4 R'BAR DOWELS TO SECURE THE PLUG.
L. PLACE DRIVEPAD IN LOCATION AS SHOWN, REMOVING EXISTING CURB STONES TO THE NEAREST WHOLE STONE. BE SURE THAT THE FLOW LINE HAS A SLOPE FOR POSITIVE DRAINAGE.
M. CONSTRUCT A NEW DOUBLE "C" INLET BETWEEN EXISTING INLETS B AND C. CUT EXISTING 18" PIPE BETWEEN INLET B AND INLET C, LEAVING SUFFICIENT PIPE (6") EXTENDING INTO THE NEW INLET LOCATION TO PENETRATE THE END WALLS OF THE NEW INLET. IF THE 18" PIPE CAN NOT BE CUT SMOOTHLY, REMOVE PIPE FROM THE EXISTING WALLS AND FORM OPENING ON NEW WALLS TO CONFORM TO THE OPENING IN THE EXISTING WALL, WITH R'BARS AS SHOWN ON THE DIAGRAM. SHAPE THE BOTTOM OF THE NEW INLET TO CONFORM WITH THE SLOPE FROM THE EXISTING INLET C TO B. PLACE THE TOP OF THE INLET AND THE GRATE TO MATCH THE ELEVATIONS OF THE EXISTING INLETS ON THE RESPECTIVE ENDS. CONSTRUCTION OF THE NEW MANHOLE TO CONFORM TO DRAWING 2401 WITH THE ADDITIONS AS STATED ABOVE.
N. SAW CUT EXISTING ASPHALT STREET SURFACE 12" BACK FROM THE CURB LINE IN THE CONSTRUCTION AREA, AND THEN REPLACE ASPHALT IN ACCORDANCE WITH DRAWING 2465.

NO. 4 R'BAR IN END WALL AROUND PIPE / HOLE

I HAVE REVIEWED THESE PLANS AND INSPECTED THE SITE ON VASSAR PLACE AND I BELIEVE THAT THE RELOCATION OF THE SINGLE "A" INLET TO THE LOCATION SHOWN ON THESE DRAWINGS IS SATISFACTORY. THE PROPOSED LOCATION WILL NOT INCREASE THE MAINTENANCE REQUIRED ON THE INLETS.

Vernon Singer
ARROYO MAINTENANCE SECTION

2-23-98
DATE

NO CHANGE	MRK	MAR. 16, 1998
RELOCATE INLET	MRK	FEB. 20, 1998

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GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
DRIVE PAD AND INLET

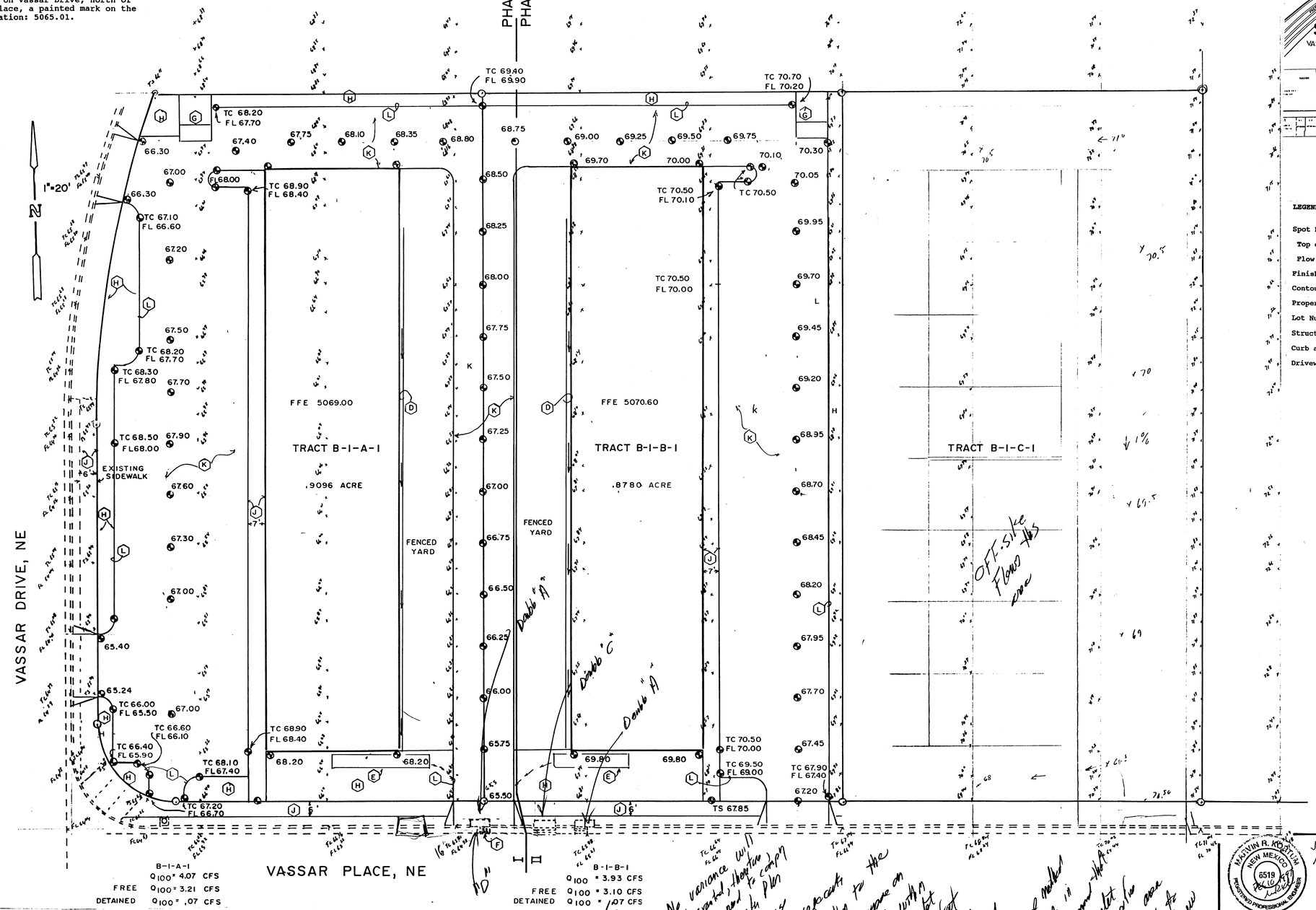
RECEIVED
MAR 16 1998
HYDROLOGY SECTION

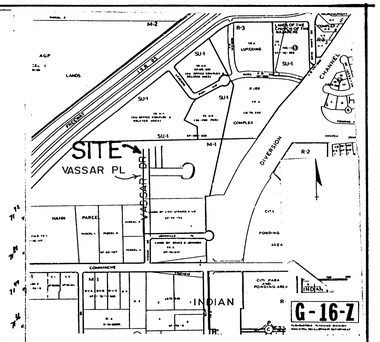
G-16/D82B G-16 3/3

BENCHMARK: The Comanche Business Park project benchmark is station M-6, located on Montgomery Boulevard, on the east abutment of the bridge crossing over the North Diversion Channel. The station is a brass marker located between the west bound and east bound bridges. Elevation 5110.492. There is a temporary bench mark located on the top of the curb on Vassar Drive, north of the intersection with Vassar Place, a painted mark on the east side of the street. Elevation: 5065.01.

Phase I includes the grading and drainage improvements shown for lot B-1-A-1 and that portion of the common access driveway and drivepad along the common property line between lots B-1-A-1 and B-1-B-1. The unimproved portion of lot B-1-B-1 that is adjacent to the surfaced driveway will be sloped back from the edge of the pavement surface at a slope not to exceed 1 vertical to 3 horizontal inorder to not create a hazardous cut bank.

LEGAL DESCRIPTION: Tracts B-1-A-1 and B-1-B-1, COMANCHE BUSINESS PARK, Albuquerque, Bernalillo County, New Mexico.





LEGEND

	Existing	Proposed
Spot Elevation	64.25	64.25
Top of Curb	TC 63.99	TC
Flow Line Invert	FL 63.49	FL
Finished Floor Elevation	FFE.	FFE
Contour Line	4962	64
Property Line		
Lot Number		5
Structure		
Curb and Gutter		
Driveway		

I certify that I have personally inspected the Tracts B-1-A-1 and B-1-B-1 site and the surrounding terrain. The representation of the land and the contours are as presented on these drawings and the accompanying text as of December 1997.

Marvin R Kortum — Dec 10 1997 — Date

Topographic survey by Marvin R Kortum

NOTES

A All berms and earthwork supporting structures must be compacted to 95% of maximum dry density (Modified Proctor Test).

B Elevations of building pads are based on slab on grade.

C Quantitative earthwork estimates should be based on more detailed topographic cross sections of the work area.

D. Install roof gutter to collect and direct roof runoff to the east pond. Gutter shall be 6 inches by 6 inches or larger, and shall be set at a 0.5% slope (1/8 inch per foot) or larger. The gutter shall direct the flow to a hopper into the top of the detention tank.

E. Place detention tanks.

F. Reconstruct existing drainage catch basin to a "cattle guard" catch basin. work order

G. Trash collection bin.

H. Landscaping. If a membrane is used the membrane will be pervious.

J. PCC sidewalk.

K. Asphalt or PCC pavement.

L. 6" wide by required depth header curb. A PCC curb and gutter may be used.

M. Off-site flows from adjacent undeveloped property can be accepted, passed through the property, and disposed of in accordance with the Comanche Business Park master drainage plan.

Phase I

1. No variance will be granted, therefore you will need to comply with the Master plan
2. cross-lot drainage
3. You will need to relocate the Double "A" further to the west, if you still propose on locating the double "A" inlet
4. ADD PHASE I, II LINE

Double "A"
Double "C"
Double "A"
Double "A"
16" RCP
RD

Off-site flows this pond

5. The new based method is not acceptable in this situation. Recommend you provide an inlet box in the centerline of the parking area with a curb opening of the proposed new double "A" inlet

Preliminary APPROVALS, REVISIONS — Marvin R Kortum BY — December 10, 1997 DATE — MRK — JAN 13, 1998

RECEIVED JAN 13 1998 HYDROLOGY SECTION

MARVIN R. KORTUM NEW MEXICO 6519 REGISTERED PROFESSIONAL ENGINEER — Jan 13 1998 MRK

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GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
SITE GRADING

G-16/D — G-16 — 1/2

I. PURPOSE

The purpose of this Grading and Drainage Plan is to obtain approval for the construction of commercial buildings on Tracts B-1-A-1 and B-1-B-1, COMANCHE BUSINESS PARK.

II. SITE DESCRIPTION

A. A master drainage plan for the Comanche Business Park has been prepared and approved (G16/D). The Comanche Business Park is in an area with the off-site runoff being limited to an amount specified by SAD 216. The essence of the master plan is that the site will operate in an initial condition with a centrally located pond which will detain runoff and have a controlled discharge into the existing drainage channel. After SAD is completed, the central pond will be removed from operation, and all discharge from the site will be by means of a sub-surface storm drain system internal to the park which will discharge to the SAD downstream system.

B. A condition of the Comanche Business Park master drainage plan is that the disharge from each of the developed lots will be limited to 3.61 CFS inorder for the overall site not to exceed the capacity of the SAD 216 system downstream.

C. The improvements on Tract B-1-A-1 will provide a runoff of 4.07 CFS (see Table A-1). The allowable runoff for Tract B-1-A-1 is 3.28 CFS, (.9096 acres x 3.61 CFS/acre), which results in an excess of .79 CFS (4.07-3.28). It is proposed that a portion of the site be designed for free discharge of about 3.21 CFS, and that runoff from the remainder of the site be captured in a pond or tank, and that discharge from the pond or tank be limited to less than .07 CFS, so the total of free discharge, 3.21 CFS, plus the controlled discharge, .07 CFS will not exceed the allowable discharge of 3.28 CFS. Table A-2 shows that a total of 31680 SF of Tract B-1-A-1 will have free discharge, and that the runoff from 7942 SF of impervious area will have to be detained, which results in a volume of 1403.1 CF for the design 100 year-6 hour storm. Similar calculations for Tract B-1-B-1 are shown in Tables B-1 and B-2, with a volume of 1368.5 CF required to be detained and discharged at a controlled rate not to exceed .07 CFS (3.17-3.10).

D. Inasmuch as the required detention volumes and rates of discharge for Tracts B-1-A-1 and B-1-B-1 are similar, the following discussions on method of detention will apply to both lots, and the larger area of 7942 SF, the larger volume of 1405.1 CF and the controlled discharge rate of .07 CFS will be used.

E. The total roof area for each building is about 11,648 SF (52 x 224), which means that the roof runoff from a portion of the roof, 7942 SF, or 153 feet length, will be a sufficient amount to detain. It is proposed that the runoff be channel by a roof gutter to a tank of adequate capacity, and that the discharge from the tank be directed through a properly sized orifice, discharging through a pipe onto the parking area, and out the driveway. Tables C, D and E show various sizes of tanks, orifices and roof gutters. The tank may be a large diameter tank placed vertically, with the limitation that the top of the tank must be sufficiently low to permit the roof gutter to feed into the top of the tank by gravity, or a smaller diameter tank place horizontally, with an appropriate entry hopper. The orifice must then be sized based on the water elevation. Multiple tanks may be used if more economical. Tanks are proposed to be placed along the south side of the building, and painted a dark color to absorb the winter sun to reduce the possibility of the tank becoming full, freezing, and unable to detain the required runoff in the event of a 100 year-6 hour design storm during a cold spell.

F. The common driveway along the property line of Tracts B-1-A-1 and B-1-B-1 will cross over an existing catch basin. It will be required to remove the top curb side of this basin, and reconstruct the basin to be a "cattle guard" type basin. This reconstruction is not a serious problem, and the end result will be a convenient discharge location for both the controlled discharge and some of the free discharge.

III. OFF SITE DRAINAGE

A. Off-site flows will be as designated by the approved master drainage plan for Comanche Business Park and the SAD 216.

IV. SOILS

The soils within the Tract B area are identified by reference C as Embudo gravelly fine sandy loam, 0 to 5 percent slopes (EmB). The Embudo series consists of deep, well drained soils that formed in alluvium derived from decomposed, coarse grained, granite rocks on old alluvial fans. Runoff is medium, and the hazard of water erosion is moderate. The soils on the site have been disturbed, particularly on the surface which appears to have been recently cleared of surface trash. Sub-surface borings, and the adjacent excavation of the pond on Tract B-1-J do not show evidence of sub-surface trash or past use as a landfill. The site is within an historic arroyo which has been intercepted by the AMAFCA North Diversion Ditch, located adjacent to and east of the Comanche Business Park. The soils appear satisfactory for the planned purpose of low commercial buildings, with sufficient tests and compaction as recommended by a soils engineer.

V. CONCLUSIONS

A. The development proposed will not produce runoff which will be a hazard to the site or to downstream properties.

B. The site is partially within a 100 year flood plain, but the floodplain does not create a hazard interior to the buildings.

REFERENCES:

A. Bernalillo County Ordinance No. 88-42.
B. Section 22.2, Hydrology, of the Development Process Manual, Volume 2, Design Criteria, for the City of Albuquerque...Bernalllio County...AMAFCA, January 1993.
C. Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico, USDA-SCS.

The numbers shown on the tables are recorded to the significant number shown primarily to aid in tracking computations. Results are reasonably valid only to the first number, ie. 5643.7 represents a result between about 5000 and 6000.

RUNOFF FOR TRACTS B-1-A-1 AND B-1-B-1, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

Runoff considerations after SAD 216 is constructed. Estimates shown below do not consider any allowance for runoff from the paved street surfaces.

TABLE A-1
Runoff Estimate: For On-site Basin of .9096 acres, Tract B-1-A-1

	Runoff Factors Zone 2			CURRENT USE				PROPOSED USE			
	Land use	Peak	Total	Area	Percent	Peak Runoff	Total Runoff	Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	39622.00	100.0	1.4	1750.0	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3680.00	9.3	0.19	239.2
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	35942.00	90.7	3.88	6349.8
TOTALS				39622.00	100.000	1.4	1750.0	39622.00	100.000	4.07	6589.0
				0.9096 acre				0.9096 acre			

ALLOWABLE PEAK FLOW 3.61 CFS/ACRE
ALLOWABLE PEAK FLOW FOR TRACT B-1-A-1 3.28

TABLE A-2
Runoff Estimate: Lot B-1-A-1, for on-site Basin of .7273 acres, area permited to have free discharge of 3.21 CFS

	Runoff Factors Zone 2			CURRENT USE				PROPOSED USE			
	Land use	Peak	Total	Area	Percent	Peak Runoff	Total Runoff	Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	31680.00	100.0	1.1	1399.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3680.00	11.6	0.19	239.2
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	28000.00	88.4	3.02	4946.7
TOTALS				31680.00	100.000	1.1	1399.2	31680.00	100.000	3.21	5185.9
				0.7273 acre				0.7273 acre			

ALLOWABLE PEAK FLOW 3.28 CFS/LOT B-1-A-1
ACTUAL FREE DISCHARGE PEAK FLOW 3.21 CFS/LOT B-1-A-1

TOTAL LOT AREA	39622 SF	
AREA WITH FREE DISCHARGE	31680 SF	
AREA REQUIRING CONTROLED DISCHARGE	7942 SF	
VOLUME FROM CONTROLLED AREA, ALL IMPERVIOUS, (AREA X 2.12'')		1403.1 CF
TOTAL VOLUME, FREE DISCHARGE PLUS CONTROLLED DISCHARGE		6589.0

TABLE B-1
Runoff Estimate: For On-site Basin of .8780 acres, Tract B-1-B-1

	Runoff Factors Zone 2			CURRENT USE				PROPOSED USE			
	Land use	Peak	Total	Area	Percent	Peak Runoff	Total Runoff	Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	38246.00	100.0	1.4	1689.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3500.00	9.2	0.18	227.5
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	34746.00	90.8	3.75	6138.5
TOTALS				38246.00	100.000	1.4	1689.2	38246.00	100.000	3.93	6366.0
				0.8780 acre				0.8780 acre			

ALLOWABLE PEAK FLOW 3.61 CFS/ACRE
ALLOWABLE PEAK FLOW FOR TRACT B-1-A-1 3.17 CFS

TABLE B-2
Runoff Estimate: Lot B-1-B-1, for on-site Basin of .7002 acres, area permited to have free discharge of 3.10 CFS

	Runoff Factors zone 2			CURRENT USE				PROPOSED USE			
	Land use	Peak	Total	Area	Percent	Peak Runoff	Total Runoff	Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	31680.00	100.0	1.1	1399.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3500.00	11.5	0.18	227.5
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	27000.00	88.5	2.91	4770.0
TOTALS				31680.00	100.000	1.1	1399.2	30500.00	100.000	3.10	4997.5
				0.7273 acre				0.7002 acre			

ALLOWABLE PEAK FLOW 3.17 CFS/LOT B-1-B-1
ACTUAL FREE DISCHARGE PEAK FLOW 3.10 CFS/LOT B-1-B-1

TOTAL LOT AREA	38246 SF	
AREA WITH FREE DISCHARGE	30500 SF	
AREA REQUIRING CONTROLED DISCHARGE	7746 SF	
VOLUME FROM CONTROLLED AREA, ALL IMPERVIOUS, (AREA X 2.12'')		1368.5 CF
TOTAL VOLUME, FREE DISCHARGE PLUS CONTROLLED DISCHARGE		6366.0 CF

NOTES:
a. Runoff factors from Section 22.2, DPM, January, 1993
b. Land use descriptions:
   A. Uncompacted soil
   B. Lawn, shrubs
   C. Compacted soil
   D. Impervious areas
c. Peak runoff = Area (acres) x factor (CFS/acre) = CFS
d. Total runoff = Area (SF) x factor (inches) / 12 (inches /foot) = CF
e. Peak and total runoff is based on 6 hour, 100 year frequency storm

TABLE C
STORAGE TANK SIZES FOR ROOF RUNOFF, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

TANK DIAMETER FT	TANK HEIGHT FT	TANK VOLUME CF
6	50.00	1413.7
7	37.00	1423.9
8	28.00	1407.4
9	22.30	1418.7
10	18.00	1413.7
11	15.00	1425.5
12	12.50	1413.7
13	10.60	1407.0
14	9.20	1416.2

REQUIRED VOLUME 1403.1 CF

TABLE D
SIZE OF DISCHARGE PIPE
DECEMBER 10, 1997

Use equation Q=Ca(2gh)^.5, where C=.82 for a short pipe orifice.

PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS	PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS	PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS
0.5	6	0.022	0.5	4	0.018	0.5	2	0.013
0.625	6	0.034	0.625	4	0.028	0.625	2	0.020
0.75	6	0.049	0.75	4	0.040	0.75	2	0.029
1	6	0.088	1	4	0.072	1	2	0.051
1.25	6	0.137	1.25	4	0.112	1.25	2	0.079
1.5	6	0.198	1.5	4	0.162	1.5	2	0.114
2	6	0.352	2	4	0.287	2	2	0.203
2.5	6	0.549	2.5	4	0.449	2.5	2	0.317
3	6	0.791	3	4	0.646	3	2	0.457

REQUIRED DISCHARGE, 1400 CF IN 24 HOURS = 1400/24/60/60= 0.016 CFS

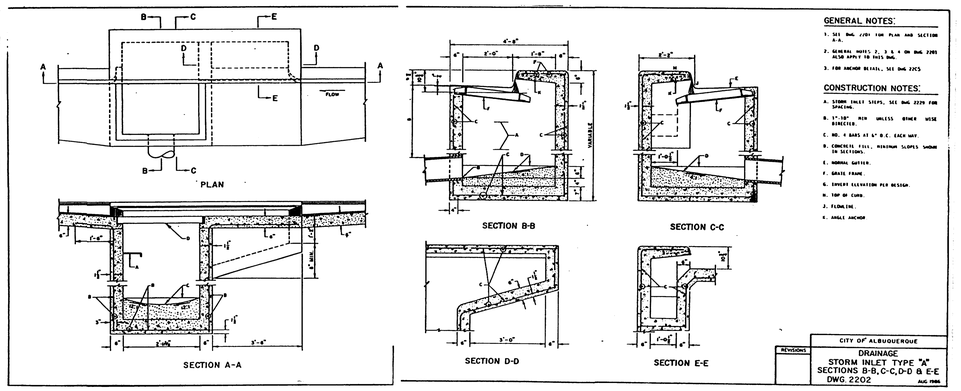
TABLE E
ROOF GUTTER CAPACITIES
LOT B-1-A-1, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

Ditch capacities of rectangular metal channel
Q=Area x Velocity; Velocity=1.486/n x (Rh)^.6667 x (s)^.5

	Mannings n	Ditch Slope (A)	Side slope (B)	Bottom width Ft	Depth Ft	Top Width FT	Area SF	Wetted Perimeter Ft	Hydraulic Radius Ft	Velocity FPS	Capacity CFS	Froude # V/(gL)^.5 (C)	Sequent depth Rectangular (D) Ft	Sloped (E) F	Trapezoid (F) Ft
FOR ROOF GUTTERS ALONG EAVES OF BUILDINGS															
1	0.011	5.000	0	0.330	0.30	0.3	0.1	0.930	0.106	2.145	0.212	0.69	0.18	0.22	0.16
2	0.011	10.000	0	0.330	0.30	0.3	0.1	0.930	0.106	3.034	0.300	0.98	0.29	0.34	0.25
3	0.011	5.000	0	0.417	0.33	0.4	0.1	1.077	0.128	2.423	0.333	0.74	0.22	0.26	0.19
4	0.011	10.000	0	0.417	0.25	0.4	0.1	0.917	0.114	3.170	0.330	1.12	0.29	0.34	0.25
5	0.011	5.000	0	0.500	0.27	0.5	0.1	1.040	0.130	2.449	0.331	0.83	0.21	0.25	0.18
6	0.011	10.000	0	0.500	0.21	0.5	0.1	0.920	0.114	3.178	0.334	1.22	0.27	0.32	0.23

REQUIRED Q100 = 0.33 CFS

(A) Ft(vertical)/1000 Ft(horizontal)
(B) Ft(horizontal)/1 Ft(vertical)
(C) Froude No. (Fn)=velocity/(g x area/top width)^.5
(D) Sequent depth for rectangular level channel, y2=(y1/2)x(((1+8 x Fn^2)^.5) -1)
(E) Sequent depth for sloping rectangular channel
y2=((y1/2)/cos slope angle) x (((1+8(((10^(.027 x slope angle))^2) x Fn^2)^.5-1)
(F) Correction factor for trapezoidal channel, figure 3.4
(G) Reference: Richard H French, Open Channel Hydraulics, 1985



NOTES FOR CONVERSION OF DRAINAGE CATCH BASIN TO CATTLE GUARD CATCH BASIN

1. Remove top concrete by breaking or chipping of the concrete to 6" below the new top level of the catch basin.

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4. Fabricate a grate of the same strength, weight and thickness as the existing grate to fit inside the new grate frame. See drawings 2220.

5. Fabricate and add filler to the existing center support assembly to provide center support to the two new grates. See drawing 2215 for materials to use.

ADD PHASE I,II LINE	MRK	JAN 13, 1998
Preliminary APPROVALS, REVISIONS	Marvin R Kortum BY	December 10, 1997 DATE

MARVIN R. KORTUM NEW MEXICO 6519 REGISTERED PROFESSIONAL ENGINEER
JAN 13 1998

MARVIN R. KORTUM, P.E.
Civil Engineering
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1605 Speakman Drive, S.E.
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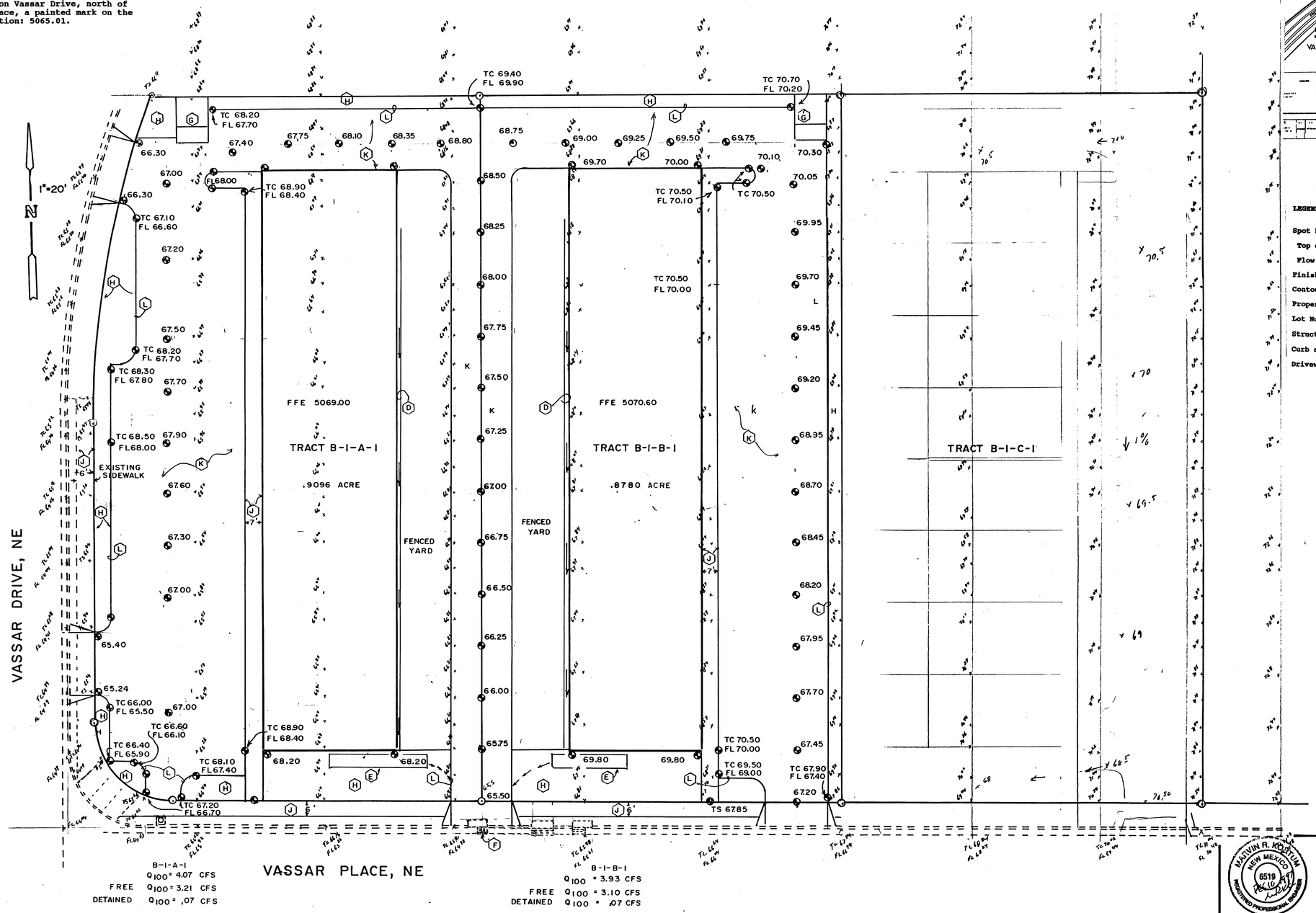
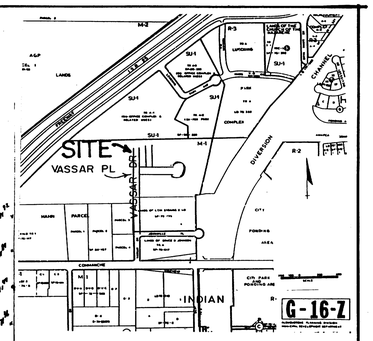
GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
DISCUSSION

G-16/D G 16 2/2

BENCHMARK: The Comanche Business Park project benchmark is station M-6, located on Montgomery Boulevard, on the east abutment of the bridge crossing over the North Diversion Channel. The station is a brass marker located between the west bound and east bound bridges. Elevation 5110.492. There is a temporary bench mark located on the top of the curb on Vassar Drive, north of the intersection with Vassar Place, a painted mark on the east side of the street. Elevation: 5065.01.

LEGAL DESCRIPTION: Tracts B-1-A-1 and B-1-B-1, COMANCHE BUSINESS PARK, Albuquerque, Bernalillo County, New Mexico.





LEGEND

	Existing	Proposed
Spot Elevation	× 65.7	● 64.25
Top of Curb	TC 65.7	TC
Flow Line Invert	FL 65.7	FL
Finished Floor Elevation	F.F.E.	FFE
Contour Line	---- 4962 ----	—64—
Property Line		⊙——⊙
Lot Number		(5)
Structure	- - - - - -	
Curb and Gutter		
Driveway		

I certify that I have personally inspected the Tracts B-1-A-1 and B-1-B-1 site and the surrounding terrain. The representation of the land and the contours are as presented on these drawings and the accompanying text as of December 1997.

Marvin R Kortum — Date: Dec 10, 1997

Topographic survey by Marvin R Kortum

NOTES

A All berms and earthwork supporting structures must be compacted to 95% of maximum dry density (Modified Proctor Test).

B Elevations of building pads are based on slab on grade.

C Quantitative earthwork estimates should be based on more detailed topographic cross sections of the work area.

D. Install roof gutter to collect and direct roof runoff to the east pond. Gutter shall be 6 inches by 6 inches or larger, and shall be set at a 0.5% slope (1/8 inch per foot) or larger. The gutter shall direct the flow to a hopper into the top of the detention tank.

E. Place detention tanks.

F. Reconstruct existing drainage catch basin to a "cattle guard" catch basin.

G. Trash collection bin.

H. Landscaping. If a membrane is used the membrane will be pervious.

J. PCC sidewalk.

K. Asphalt or PCC pavement.

L. 6" wide by required depth header curb. A PCC curb and gutter may be used.

M. Off-site flows from adjacent undeveloped property can be accepted, passed through the property, and disposed of in accordance with the Comanche Business Park master drainage plan.

Preliminary APPROVALS, REVISIONS — Marvin R Kortum BY — December 10, 1997 DATE

MARVIN R. KORTUM NEW MEXICO 6519 REGISTERED PROFESSIONAL ENGINEER

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GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
SITE GRADING

RECEIVED DEC 10 1997 HYDROLOGY SECTION

G-16/D — G-16 — 1/2

I. PURPOSE

The purpose of this Grading and Drainage Plan is to obtain approval for the construction of commercial buildings on Tracts B-1-A-1 and B-1-B-1, COMANCHE BUSINESS PARK.

II. SITE DESCRIPTION

A. A master drainage plan for the Comanche Business Park has been prepared and approved (G16/D). The Comanche Business Park is in an area with the off-site runoff being limited to an amount specified by SAD 216. The essence of the master plan is that the site will operate in an initial condition with a centrally located pond which will detain runoff and have a controlled discharge into the existing drainage channel. After SAD is completed, the central pond will be removed from operation, and all discharge from the site will be by means of a sub-surface storm drain system internal to the park which will discharge to the SAD downstream system.

B. A condition of the Comanche Business Park master drainage plan is that the disharge from each of the developed lots will be limited to 3.61 CFS inorder for the overall site not to exceed the capacity of the SAD 216 system downstream.

C. The improvements on Tract B-1-A-1 will provide a runoff of 4.07 CFS (see Table A-1). The allowable runoff for Tract B-1-A-1 is 3.28 CFS, (.9096 acres x 3.61 CFS/acre), which results in an excess of .79 CFS (4.07-3.28). It is proposed that a portion of the site be designed for free discharge of about 3.21 CFS, and that runoff from the remainder of the site be captured in a pond or tank, and that discharge from the pond or tank be limited to less than .07 CFS, so the total of free discharge, 3.21 CFS, plus the controlled discharge, .07 CFS will not exceed the allowable discharge of 3.28 CFS. Table A-2 shows that a total of 31680 SF of Tract B-1-A-1 will have free discharge, and that the runoff from 7942 SF of impervious area will have to be detained, which results in a volume of 1403.1 CF for the design 100 year-6 hour storm. Similar calculations for Tract B-1-B-1 are shown in Tables B-1 and B-2, with a volume of 1368.5 CF required to be detained and discharged at a controlled rate not to exceed .07 CFS (3.17-3.10).

D. Inasmuch as the required detention volumes and rates of discharge for Tracts B-1-A-1 and B-1-B-1 are similar, the following discussions on method of detention will apply to both lots, and the larger area of 7942 SF, the larger volume of 1405.1 CF and the controlled discharge rate of .07 CFS will be used.

E. The total roof area for each building is about 11,648 SF (52 x 224), which means that the roof runoff from a portion of the roof, 7942 SF, or 153 feet length, will be a sufficient amount to detain. It is proposed that the runoff be channel by a roof gutter to a tank of adequate capacity, and that the discharge from the tank be directed through a properly sized orifice, discharging through a pipe onto the parking area, and out the driveway. Tables C, D and E show various sizes of tanks, orifices and roof gutters. The tank may be a large diameter tank placed vertically, with the limitation that the top of the tank must be sufficiently low to permit the roof gutter to feed into the top of the tank by gravity, or a smaller diameter tank place horizontally, with an appropriate entry hopper. The orifice must then be sized based on the water elevation. Multiple tanks may be used if more economical. Tanks are proposed to be placed along the south side of the building, and painted a dark color to absorb the winter sun to reduce the possibility of the tank becoming full, freezing, and unable to detain the required runoff in the event of a 100 year-6 hour design storm during a cold spell.

F. The common driveway along the property line of Tracts B-1-A-1 and B-1-B-1 will cross over an existing catch basin. It will be required to remove the top curb side of this basin, and reconstruct the basin to be a "cattle guard" type basin. This reconstruction is not a serious problem, and the end result will be a convenient discharge location for both the controlled discharge and some of the free discharge.

III. OFF SITE DRAINAGE

A. Off-site flows will be as designated by the approved master drainage plan for Comanche Business Park and the SAD 216.

IV. SOILS

The soils within the Tract B area are identified by reference C as Embudo gravelly fine sandy loam, 0 to 5 percent slopes (EmB). The Embudo series consists of deep, well drained soils that formed in alluvium derived from decomposed, coarse grained, granite rocks on old alluvial fans. Runoff is medium, and the hazard of water erosion is moderate. The soils on the site have been disturbed, particularly on the surface which appears to have been recently cleared of surface trash. Sub-surface borings, and the adjacent excavation of the pond on Tract B-1-J do not show evidence of sub-surface trash or past use as a landfill. The site is within an historic arroyo which has been intercepted by the AMAFCA North Diversion Ditch, located adjacent to and east of the Comanche Business Park. The soils appear satisfactory for the planned purpose of low commercial buildings, with sufficient tests and compaction as recommended by a soils engineer.

V. CONCLUSIONS

A. The development proposed will not produce runoff which will be a hazard to the site or to downstream properties.

B. The site is partially within a 100 year flood plain, but the floodplain does not create a hazard interior to the buildings.

REFERENCES:

A. Bernalillo County Ordinance No. 88-42.
B. Section 22.2, Hydrology, of the Development Process Manual, Volume 2, Design Criteria, for the City of Albuquerque...Bernalillo County...AMAFCA, January 1993.
C. Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico, USDA-SCS.

The numbers shown on the tables are recorded to the significant number shown primarily to aid in tracking computations. Results are reasonably valid only to the first number, ie. 5643.7 represents a result between about 5000 and 6000.

RUNOFF FOR TRACTS B-1-A-1 AND B-1-B-1, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

Runoff considerations after SAD 216 is constructed. Estimates shown below do not consider any allowance for runoff from the paved street surfaces.

TABLE A-1
Runoff Estimate: For On-site Basin of .9096 acres, Tract B-1-A-1

	Land use	Runoff Factors Zone 2 Peak	Total	CURRENT USE Area	Percent	Peak Runoff	Total Runoff	PROPOSED USE Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	39622.00	100.0	1.4	1750.0	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3680.00	9.3	0.19	239.2
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	35942.00	90.7	3.88	6349.8
TOTALS				39622.00	100.000	1.4	1750.0	39622.00	100.000	4.07	6589.0
				0.9096 acre				0.9096 acre			

ALLOWABLE PEAK FLOW 3.61 CFS/ACRE
ALLOWABLE PEAK FLOW FOR TRACT B-1-A-1 3.28

TABLE A-2
Runoff Estimate: Lot B-1-A-1, for on-site Basin of .7273 acres, area permited to have free discharge of 3.21 CFS

	Land use	Runoff Factors Zone 2 Peak	Total	CURRENT USE Area	Percent	Peak Runoff	Total Runoff	PROPOSED USE Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	31680.00	100.0	1.1	1399.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3680.00	11.6	0.19	239.2
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	28000.00	88.4	3.02	4946.7
TOTALS				31680.00	100.000	1.1	1399.2	31680.00	100.000	3.21	5185.9
				0.7273 acre				0.7273 acre			

ALLOWABLE PEAK FLOW 3.28 CFS/LOT B-1-A-1
ACTUAL FREE DISCHARGE PEAK FLOW 3.21 CFS/LOT B-1-A-1

TOTAL LOT AREA	39622 SF	
AREA WITH FREE DISCHARGE	31680 SF	
AREA REQUIRING CONTROLED DISCHARGE	7942 SF	
VOLUME FROM CONTROLLED AREA, ALL IMPERVIOUS, (AREA X 2.12'')	1403.1	CF
TOTAL VOLUME, FREE DISCHARGE PLUS CONTROLLED DISCHARGE	6589.0	

TABLE B-1
Runoff Estimate: For On-site Basin of .8780 acres, Tract B-1-B-1

	Land use	Runoff Factors Zone 2 Peak	Total	CURRENT USE Area	Percent	Peak Runoff	Total Runoff	PROPOSED USE Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	38246.00	100.0	1.4	1689.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3500.00	9.2	0.18	227.5
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	34746.00	90.8	3.75	6138.5
TOTALS				38246.00	100.000	1.4	1689.2	38246.00	100.000	3.93	6366.0
				0.8780 acre				0.8780 acre			

ALLOWABLE PEAK FLOW 3.61 CFS/ACRE
ALLOWABLE PEAK FLOW FOR TRACT B-1-A-1 3.17 CFS

TABLE B-2
Runoff Estimate: Lot B-1-B-1, for on-site Basin of .7002 acres, area permited to have free discharge of 3.10 CFS

	Land use	Runoff Factors Zone 2 Peak	Total	CURRENT USE Area	Percent	Peak Runoff	Total Runoff	PROPOSED USE Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	31680.00	100.0	1.1	1399.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3500.00	11.5	0.18	227.5
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	27000.00	88.5	2.91	4770.0
TOTALS				31680.00	100.000	1.1	1399.2	30500.00	100.000	3.10	4997.5
				0.7273 acre				0.7002 acre			

ALLOWABLE PEAK FLOW 3.17 CFS/LOT B-1-B-1
ACTUAL FREE DISCHARGE PEAK FLOW 3.10 CFS/LOT B-1-B-1

TOTAL LOT AREA	38246 SF	
AREA WITH FREE DISCHARGE	30500 SF	
AREA REQUIRING CONTROLED DISCHARGE	7746 SF	
VOLUME FROM CONTROLLED AREA, ALL IMPERVIOUS, (AREA X 2.12'')	1368.5	CF
TOTAL VOLUME, FREE DISCHARGE PLUS CONTROLLED DISCHARGE	6366.0	CF

NOTES:
a. Runoff factors from Section 22.2, DPM, January, 1993
b. Land use descriptions: A. Uncompacted soil
B. Lawn, shrubs
C. Compacted soil
D. Impervious areas
c. Peak runoff = Area (acres) x factor (CFS/acre) = CFS
d. Total runoff = Area (SF) x factor (inches) / 12 (inches /foot) = CF
e. Peak and total runoff is based on 6 hour, 100 year frequency storm

TABLE C
STORAGE TANK SIZES FOR ROOF RUNOFF, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

TANK DIAMETER FT	TANK HEIGHT FT	TANK VOLUME CF
6	50.00	1413.7
7	37.00	1423.9
8	28.00	1407.4
9	22.30	1418.7
10	18.00	1413.7
11	15.00	1425.5
12	12.50	1413.7
13	10.60	1407.0
14	9.20	1416.2

REQUIRED VOLUME 1403.1 CF

TABLE D
SIZE OF DISCHARGE PIPE
DECEMBER 10, 1997

Use equation Q=Ca(2gh)^.5, where C=.82 for a short pipe orifice.

PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS	PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS	PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS
0.5	6	0.022	0.5	4	0.018	0.5	2	0.013
0.625	6	0.034	0.625	4	0.028	0.625	2	0.020
0.75	6	0.049	0.75	4	0.040	0.75	2	0.029
1	6	0.088	1	4	0.072	1	2	0.051
1.25	6	0.137	1.25	4	0.112	1.25	2	0.079
1.5	6	0.198	1.5	4	0.162	1.5	2	0.114
2	6	0.352	2	4	0.287	2	2	0.203
2.5	6	0.549	2.5	4	0.449	2.5	2	0.317
3	6	0.791	3	4	0.646	3	2	0.457

REQUIRED DISCHARGE, 1400 CF IN 24 HOURS = 1400/24/60/60= 0.016 CFS

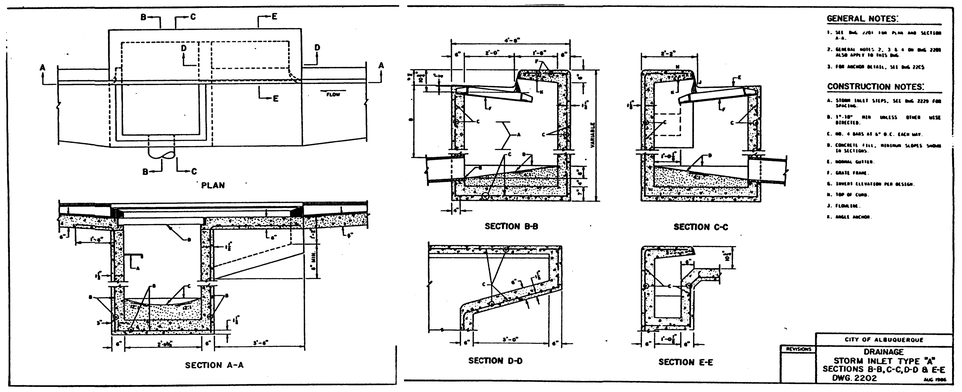
TABLE E
ROOF GUTTER CAPACITIES
LOT B-1-A-1, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

Ditch capacities of rectangular metal channel
Q=Area x Velocity; Velocity=1.486/n x (Rh)^.6667 x (s)^.5

	Mannings n	Ditch Side Slope (A)	Ditch Side Slope (B)	Bottom width Ft	Depth Ft	Top Width FT	Area SF	Wetted Perimeter Ft	Hydraulic Radius Ft	Velocity FPS	Capacity CFS	Froude # V/(gL)^.5 (C)	Sequent depth Rectangular (D) Ft	Sloped (E) F	Trapezoid (F) Ft
FOR ROOF GUTTERS ALONG EAVES OF BUILDINGS															
1	0.011	5.000	0	0.330	0.30	0.3	0.1	0.930	0.106	2.145	0.212	0.69	0.18	0.22	0.16
2	0.011	10.000	0	0.330	0.30	0.3	0.1	0.930	0.106	3.034	0.300	0.98	0.29	0.34	0.25
3	0.011	5.000	0	0.417	0.33	0.4	0.1	1.077	0.128	2.423	0.333	0.74	0.22	0.26	0.19
4	0.011	10.000	0	0.417	0.25	0.4	0.1	0.917	0.114	3.170	0.330	1.12	0.29	0.34	0.25
5	0.011	5.000	0	0.500	0.27	0.5	0.1	1.040	0.130	2.449	0.331	0.83	0.21	0.25	0.18
6	0.011	10.000	0	0.500	0.21	0.5	0.1	0.920	0.114	3.178	0.334	1.22	0.27	0.32	0.23

REQUIRED Q100 = 0.33 CFS

(A) Ft(vertical)/1000 Ft(horizontal)
(B) Ft(horizontal)/1 Ft(vertical)
(C) Froude No. (Fn)=velocity/(g x area/top width)^.5
(D) Sequent depth for rectangular level channel, y2=(y1/2)x(((1+8 x Fn^2)^.5) -1)
(E) Sequent depth for sloping rectangular channel
y2=((y1/2)/cos slope angle) x (((1+8((10^(.027 x slope angle))^2) x Fn^2)^.5-1)
(F) Correction factor for trapezoidal channel, figure 3.4
(G) Reference: Richard H French, Open Channel Hydraulics, 1985



NOTES FOR CONVERSION OF DRAINAGE CATCH BASIN TO CATTLE GUARD CATCH BASIN

1. Remove top concrete by breaking or chipping of the concrete to 6" below the new top level of the catch basin.

2. Cut the existing rebar back to a level below new top of the catch basin. Add horizontal rebar.

3. Fabricate a grate frame to match the existing opening in the concrete. Frame to be of size, strength, and means of anchoring as shown in drawings 2216.

4. Fabricate a grate of the same strength, weight and thickness as the existing grate to fit inside the new grate frame. See drawings 2220.

5. Fabricate and add filler to the existing center support assembly to provide center support to the two new grates. See drawing 2215 for materials to use.

APPROVALS, REVISIONS	BY	DATE
Preliminary	Marvin R Kortum	December 10, 1997

MARVIN R. KORTUM, P.E.
Civil Engineering
NM PE 6519

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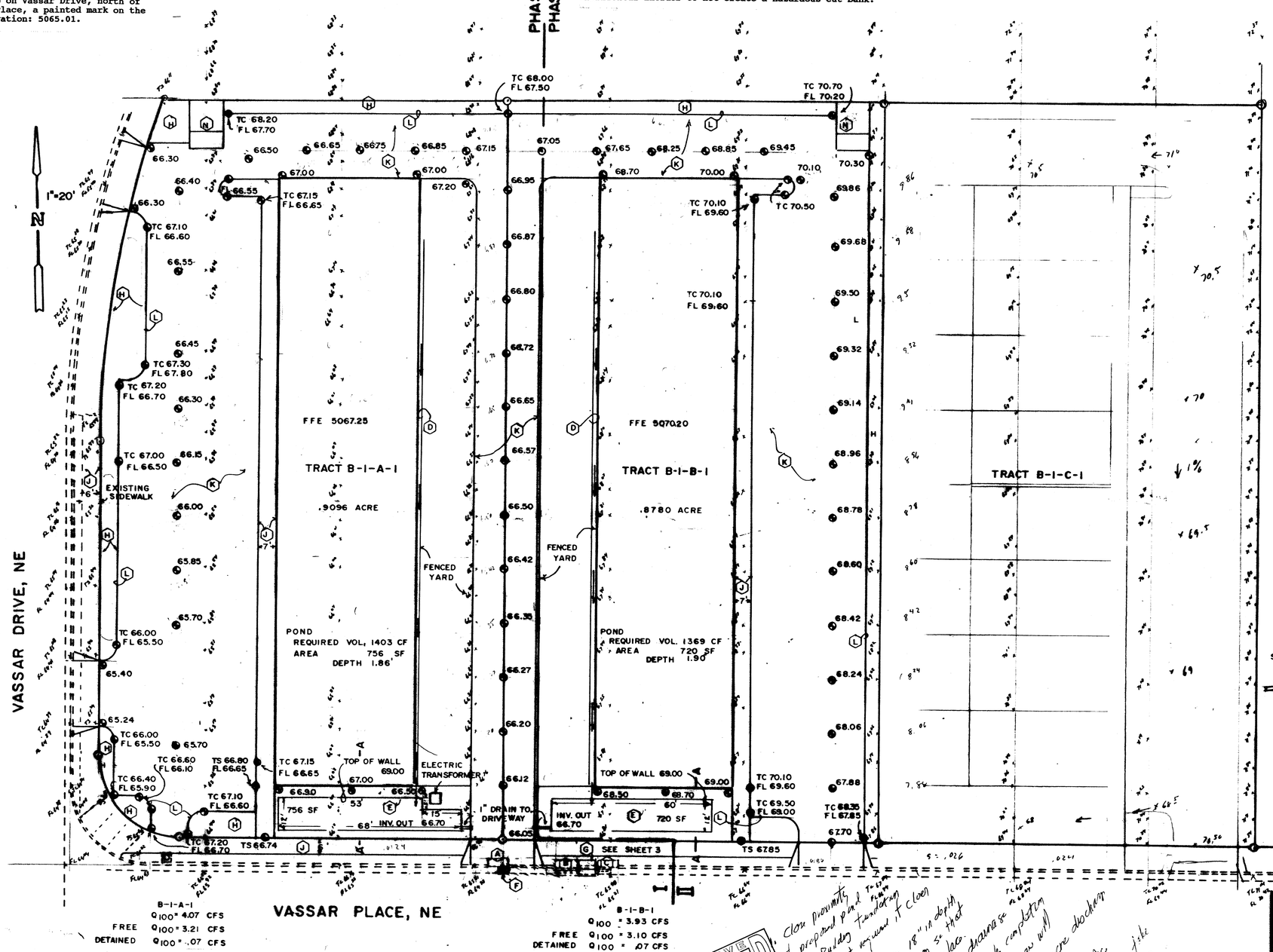
GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
DISCUSSION

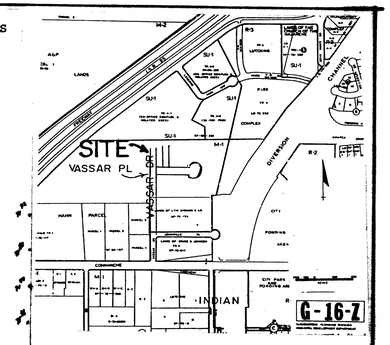
G-16/D G 16 2/2

BENCHMARK: The Comanche Business Park project benchmark is station M-6, located on Montgomery Boulevard, on the east abutment of the bridge crossing over the North Diversion Channel. The station is a brass marker located between the west bound and east bound bridges. Elevation 5110.492. There is a temporary bench mark located on the top of the curb on Vassar Drive, north of the intersection with Vassar Place, a painted mark on the east side of the street. Elevation: 5065.01.

Phase I includes the grading and drainage improvements shown for lot B-1-A-1 and that portion of the common access driveway and drivepad along the common property line between lots B-1-A-1 and B-1-B-1. The unimproved portion of lot B-1-B-1 that is adjacent to the surfaced driveway will be sloped back from the edge of the pavement surface at a slope not to exceed 1 vertical to 3 horizontal inorder to not create a hazardous cut bank.

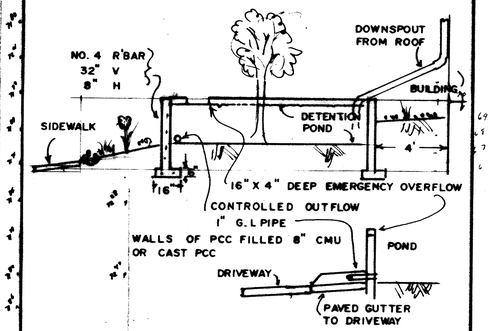
LEGAL DESCRIPTION: Tracts B-1-A-1 and B-1-B-1, COMANCHE BUSINESS PARK, Albuquerque, Bernalillo County, New Mexico.





LEGEND

	Existing	Proposed
Spot Elevation	x 63.5	64.25
Top of Curb	TC 63.5	TC
Flow Line Invert	FL 63.12	FL
Finished Floor Elevation	F.F.E.	F.F.E.
Contour Line	4962	64
Property Line		
Lot Number		5
Structure		
Curb and Gutter		
Driveway		



SECTION A-A POND DETAILS 1"=4'

I certify that I have personally inspected the Tracts B-1-A-1 and B-1-B-1 site and the surrounding terrain. The representation of the land and the contours are as presented on these drawings and the accompanying text as of December 1997.

Marvin R Kortum — Dec 10, 1997
Marvin R Kortum — Date

Topographic survey by Marvin R Kortum

NOTES

A. EXISTING SINGLE "A" INLET
B. EXISTING DOUBLE "C" INLET
C. EXISTING SINGLE "A" INLET
D. INSTALL ROOF GUTTER TO COLLECT AND DIREDT ROOF RUNOFF TO THE EAST POND. GUTTER SHALL BE 6 INCHES BY 6 INCHES OR LARGER, AND SHALL BE SET AT A 0.5% SLOPE (1/8 INCH PER FOOT) OR LARGER. THE GUTTER SHALL DIRECT THE FLOW TO A DOWNSPOUT, THEN INTO THE DETENTION POND.
E. CONSTRUCT DETENTION POND.
F. REMOVE EXISTING INLET A.
G. CONSTRUCT NEW INLET, TYPE SINGLE "A"
H. LANDSCAPING. IF A MEMBRANE IS USED, THE MEMBRANE WILL BE PERVIOUS.
J. PCC SIDEWALK.
K. Asphalt or PCC pavement.
L. 6" WIDE BY REQUIRED DEPTH HEADER CURB. A PCC CURB AND GUTTER MAY BE USED.
M. OFF-SITE FLOWS FROM ADJACENT UNDEVELOPED PROPERTY CAN BE ACCEPTED, PASSED THROUGH THE PROPERTY, AND DISPOSED OF IN ACCORDANCE WITH THE COMANCHE BUSINESS PARK MASTER DRAINAGE PLAN.
N. TRASH COLLECTION BIN.
P. ALL BERMS AND EARTHWORK SUPPORTING STRUCTURES MUST BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY (MODIFIED PROCTOR TEST).
Q. ELEVATIONS OF BUILDING PADS ARE BASED ON SLAB ON GRADE.
R. QUANTITATIVE EARTHWORK ESTIMATES SHOULD BE BASED ON MORE DETAILED TOPOGRAPHIC CROSS SECTIONS OF THE WORK AREA.

RECEIVED FEB 23 1998 HYDROLOGY SECTION

1. Close proximity of proposed pad to the Building Sails repout foundation than 1.5' pads state than 18" in depth
2. pads state 5" that will require some tonsoil 5" that no infiltration can take place.
3. According to the Master drainage plan concepts, only after the completion of SP 216 is completed the 361 ctg/gore dockets will be issued that time all the comments must be resolved to the
4. You design should be in accordance with the Master drainage plan.

RELOCATE INLET
ADD PHASE I. II LINE

Preliminary — FEB 20 1998
APPROVALS, REVISIONS — JAN 13, 1998
Marvin R Kortum — BY
December 10, 1997 — DATE

MARVIN R. KORTUM NEW MEXICO 6519 REGISTERED PROFESSIONAL ENGINEER
Jan 13 1998 MRK
Feb 20 1998 MRK

MARVIN R. KORTUM, P.E.
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GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
SITE GRADING

RECEIVED FEB 23 1998 HYDROLOGY SECTION

G-16/D82B — G-16 — 1/3

I. PURPOSE

The purpose of this Grading and Drainage Plan is to obtain approval for the construction of commercial buildings on Tracts B-1-A-1 and B-1-B-1, COMANCHE BUSINESS PARK.

II. SITE DESCRIPTION

A. A master drainage plan for the Comanche Business Park has been prepared and approved (G16/D82). The Comanche Business Park is in an area with the off-site runoff being limited to an amount specified by SAD 216. The essence of the master plan is that the site will operate in an initial condition with a centrally located pond which will detain runoff and have a controlled discharge into the existing drainage channel. After SAD is completed, the central pond will be removed from operation, and all discharge from the site will be by means of a sub-surface storm drain system internal to the park which will discharge to the SAD downstream system.

B. A condition of the Comanche Business Park master drainage plan is that the disharge from each of the developed lots will be limited to 3.61 CFS inorder for the overall site not to exceed the capacity of the SAD 216 system downstream.

C. The improvements on Tract B-1-A-1 will provide a runoff of 4.07 CFS (see Table A-1). The allowable runoff for Tract B-1-A-1 is 3.28 CFS, (.9096 acres x 3.61 CFS/acre), which results in an excess of .79 CFS (4.07-3.28). It is proposed that a portion of the site be designed for free discharge of about 3.21 CFS, and that runoff from the remainder of the site be captured in a pond, and that discharge from the pond be limited to less than .07 CFS, so the total of free discharge, 3.21 CFS, plus the controlled discharge, .07 CFS will not exceed the allowable discharge of 3.28 CFS. Table A-2 shows that a total of 31680 SF of Tract B-1-A-1 will have free discharge, and that the runoff from 7942 SF of impervious area will have to be detained, which results in a volume of 1403.1 CF for the design 100 year-6 hour storm. Similar calculations for Tract B-1-B-1 are shown in Tables B-1 and B-2, with a volume of 1368.5 CF required to be detained and discharged at a controlled rate not to exceed .07 CFS (3.17-3.10).

D. Inasmuch as the required detention volumes and rates of discharge for Tracts B-1-A-1 and B-1-B-1 are similar, the following discussions on method of detention will apply to both lots, and the larger area of 7942 SF, the larger volume of 1405.1 CF and the controlled discharge rate of .07 CFS will be used.

E. The total roof area for each building is about 11,648 SF (52 x 224), which means that the roof runoff from a portion of the roof, 7942 SF, or 153 feet length, will be a sufficient amount to detain. It is proposed that the runoff be channel by a roof gutter to a pond of adequate capacity, and that the discharge from the pond be directed through a properly sized orifice, discharging through a pipe onto the parking area, and out the driveway. Tables C, D and E show various sizes of ponds, orifices and roof gutters. The ponds will be rectangular in size, with impervious block walls, with the interior of the pond being available for planting of suitable shrubs and trees which will aethetic relief to the commercial buildings. The ponds will have the appearance of planters, with a secondary terrace along the street side for the planting of low level vegetation.

F. The common driveway along the property line of Tracts B-1-A-1 and B-1-B-1 is in a location which will cross over an existing catch basin. It will be required to remove the this basin. A similar basin will be required and constructed within the sump area of the street gutter.

III. OFF SITE DRAINAGE

A. Off-site flows will be as designated by the approved master drainage plan for Comanche Business Park and the SAD 216.

IV. SOILS

The soils within the Tract B area are identified by reference C as Embudo gravelly fine sandy loam, 0 to 5 percent slopes (EmB). The Embudo series consists of deep, well drained soils that formed in alluvium derived from decomposed, coarse grained, granite rocks on old alluvial fans. Runoff is medium, and the hazard of water erosion is moderate. The soils on the site have been disturbed, particularly on the surface which appears to have been recently cleared of surface trash. Sub-surface borings, and the adjacent excavation of the pond on Tract B-1-J do not show evidence of sub-surface trash or past use as a landfill. The site is within an historic arroyo which has been intercepted by the AMAFCA North Diversion Ditch, located adjacent to and east of the Comanche Business Park. The soils appear satisfactory for the planned purpose of low commercial buildings, with sufficient tests and compaction as recommended by a soils engineer.

V. CONCLUSIONS

A. The development proposed will not produce runoff which will be a hazard to the site or to downstream properties.

B. The site is partially within a 100 year flood plain, but the floodplain does not create a hazard interior to the buildings.

REFERENCES:

A. Bernalillo County Ordinance No. 88-42.
B. Section 22.2, Hydrology, of the Development Process Manual, Volume 2, Design Criteria, for the City of Albuquerque...Bernalillo County...AMAFCA, January 1993.
C. Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico, USDA-SCS.

The numbers shown on the tables are recorded to the significant number shown primarily to aid in tracking computations. Results are reasonably valid only to the first number, ie. 5643.7 represents a result between about 5000 and 6000.

RUNOFF FOR TRACTS B-1-A-1 AND B-1-B-1, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

Runoff considerations after SAD 216 is constructed. Estimates shown below do not consider any allowance for runoff from the paved street surfaces.

TABLE A-1
Runoff Estimate: For On-site Basin of .9096 acres, Tract B-1-A-1

		Runoff Factors Zone 2		CURRENT USE				PROPOSED USE			
Land use		Peak	Total	Area	Percent	Peak Runoff	Total Runoff	Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	39622.00	100.0	1.4	1750.0	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3680.00	9.3	0.19	239.2
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	35942.00	90.7	3.88	6349.8
TOTALS				39622.00	100.000	1.4	1750.0	39622.00	100.000	4.07	6589.0
				0.9096 acre				0.9096 acre			
						ALLOWABLE PEAK FLOW				3.61	CFS/ACRE
						ALLOWABLE PEAK FLOW FOR TRACT B-1-A-1				3.28	

TABLE A-2
Runoff Estimate: Lot B-1-A-1, for on-site Basin of .7273 acres, area permited to have free discharge of 3.21 CFS

		Runoff Factors Zone 2		CURRENT USE				PROPOSED USE			
Land use		Peak	Total	Area	Percent	Peak Runoff	Total Runoff	Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	31680.00	100.0	1.1	1399.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3680.00	11.6	0.19	239.2
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	28000.00	88.4	3.02	4946.7
TOTALS				31680.00	100.000	1.1	1399.2	31680.00	100.000	3.21	5185.9
				0.7273 acre				0.7273 acre			
						ALLOWABLE PEAK FLOW				3.28	CFS/LOT B-1-A-1
						ACTUAL FREE DISCHARGE PEAK FLOW				3.21	CFS/LOT B-1-A-1

TOTAL LOT AREA	39622 SF	
AREA WITH FREE DISCHARGE	31680 SF	
AREA REQUIRING CONTROLED DISCHARGE	7942 SF	
VOLUME FROM CONTROLLED AREA, ALL IMPERVIOUS, (AREA X 2.12'')		1403.1 CF
TOTAL VOLUME, FREE DISCHARGE PLUS CONTROLLED DISCHARGE		6589.0

TABLE B-1
Runoff Estimate: For On-site Basin of .8780 acres, Tract B-1-B-1

		Runoff Factors Zone 2		CURRENT USE				PROPOSED USE			
Land use		Peak	Total	Area	Percent	Peak Runoff	Total Runoff	Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	38246.00	100.0	1.4	1689.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3500.00	9.2	0.18	227.5
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	34746.00	90.8	3.75	6138.5
TOTALS				38246.00	100.000	1.4	1689.2	38246.00	100.000	3.93	6366.0
				0.8780 acre				0.8780 acre			
						ALLOWABLE PEAK FLOW				3.61	CFS/ACRE
						ALLOWABLE PEAK FLOW FOR TRACT B-1-A-1				3.17	CFS

TABLE B-2
Runoff Estimate: Lot B-1-B-1, for on-site Basin of .7002 acres, area permited to have free discharge of 3.10 CFS

		Runoff Factors Zone 2		CURRENT USE				PROPOSED USE			
Land use		Peak	Total	Area	Percent	Peak Runoff	Total Runoff	Area	Percent	Peak Runoff	Total Runoff
		CFS/acre	inches	SF		CFS	CF	SF		CFS	CF
1	A	1.56	0.53	31680.00	100.0	1.1	1399.2	0.00	0.0	0.00	0.0
2	B	2.28	0.78	0.00	0.0	0.0	0.0	3500.00	11.5	0.18	227.5
3	C	3.14	1.13	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0
4	D	4.70	2.12	0.00	0.0	0.0	0.0	27000.00	88.5	2.91	4770.0
TOTALS				31680.00	100.000	1.1	1399.2	30500.00	100.000	3.10	4997.5
				0.7273 acre				0.7002 acre			
						ALLOWABLE PEAK FLOW				3.17	CFS/LOT B-1-B-1
						ACTUAL FREE DISCHARGE PEAK FLOW				3.10	CFS/LOT B-1-B-1

TOTAL LOT AREA	38246 SF	
AREA WITH FREE DISCHARGE	30500 SF	
AREA REQUIRING CONTROLED DISCHARGE	7746 SF	
VOLUME FROM CONTROLLED AREA, ALL IMPERVIOUS, (AREA X 2.12'')		1368.5 CF
TOTAL VOLUME, FREE DISCHARGE PLUS CONTROLLED DISCHARGE		6366.0 CF

NOTES:
a. Runoff factors from Section 22.2, DPM, January, 1993
b. Land use descriptions: A. Uncompacted soil
B. Lawn, shrubs
C. Compacted soil
D. Impervious areas
c. Peak runoff = Area (acres) x factor (CFS/acre) = CFS
d. Total runoff = Area (SF) x factor (inches) / 12 (inches /foot) = CF
e. Peak and total runoff is based on 6 hour, 100 year frequency storm

4.07
361
.46

TABLE D
SIZE OF DISCHARGE PIPE
DECEMBER 10, 1997

Use equation Q=Ca(2gh)^.5, where C=.82 for a short pipe orifice.

PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS	PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS	PIPE DIA INCH	WATER DEPTH FEET	DISCHARGE CFS
0.5	6	0.022	0.5	4	0.018	0.5	2	0.013
0.625	6	0.034	0.625	4	0.028	0.625	2	0.020
0.75	6	0.049	0.75	4	0.040	0.75	2	0.029
1	6	0.088	1	4	0.072	1	2	0.051
1.25	6	0.137	1.25	4	0.112	1.25	2	0.079
1.5	6	0.198	1.5	4	0.162	1.5	2	0.114
2	6	0.352	2	4	0.287	2	2	0.203
2.5	6	0.549	2.5	4	0.449	2.5	2	0.317
3	6	0.791	3	4	0.646	3	2	0.457

REQUIRED DISCHARGE, 1400 CF IN 24 HOURS = 1400/24/60/60= 0.016 CFS

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TABLE E
ROOF GUTTER CAPACITIES
LOT B-1-A-1, COMANCHE BUSINESS PARK
DECEMBER 10, 1997

Ditch capacities of rectangular metal channel
Q=Area x Velocity; Velocity=1.486/n x (Rh)^.6667 x (s)^.5

	Mannings n	Ditch Slope (A)	Side slope (B)	Bottom width Ft	Depth Ft	Top Width FT	Area SF	Wetted Perimeter Ft	Hydraulic Radius Ft	Velocity FPS	Capacity CFS	Froude # V/(gL)^.5 (C)	Sequent depth Rectangular (D) Ft	Sloped (E) F	Trapezoid (F) Ft
FOR ROOF GUTTERS ALONG EAVES OF BUILDINGS															
1	0.011	5.000	0	0.330	0.30	0.3	0.1	0.930	0.106	2.145	0.212	0.69	0.18	0.22	0.16
2	0.011	10.000	0	0.330	0.30	0.3	0.1	0.930	0.106	3.034	0.300	0.98	0.29	0.34	0.25
3	0.011	5.000	0	0.417	0.33	0.4	0.1	1.077	0.128	2.423	0.333	0.74	0.22	0.26	0.19
4	0.011	10.000	0	0.417	0.25	0.4	0.1	0.917	0.114	3.170	0.330	1.12	0.29	0.34	0.25
5	0.011	5.000	0	0.500	0.27	0.5	0.1	1.040	0.130	2.449	0.331	0.83	0.21	0.25	0.18
6	0.011	10.000	0	0.500	0.21	0.5	0.1	0.920	0.114	3.178	0.334	1.22	0.27	0.32	0.23

REQUIRED Q100 = 0.33 CFS

(A) Ft(vertical)/1000 Ft(horizontal)
(B) Ft(horizontal)/1 Ft(vertical)
(C) Froude No. (Fn)=velocity/(g x area/top width)^.5
(D) Sequent depth for rectangular level channel, y2=(y1/2)x(((1+8 x Fn^2)^.5) -1)
(E) Sequent depth for sloping rectangular channel
y2=((y1/2)/cos slope angle) x (((1+8(((10^(.027 x slope angle))^2) x Fn^2)^.5-1)
(F) Correction factor for trapezoidal channel, figure 3.4
(G) Reference: Richard H French, Open Channel Hydraulics, 1985

RELOCATED INLET	MRK	FEB 20, 1998
ADD PHASE I,II LINE	MRK	JAN 13, 1998
Preliminary APPROVALS, REVISIONS	Marvin R Kortum BY	December 10, 1997 DATE

MARVIN R. KORTUM NEW MEXICO 6519 PROFESSIONAL ENGINEER
Jan 13 1998 MRK
Feb 20 1998 MRK

MARVIN R. KORTUM, P.E.
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1605 Speakman Drive, S.E.
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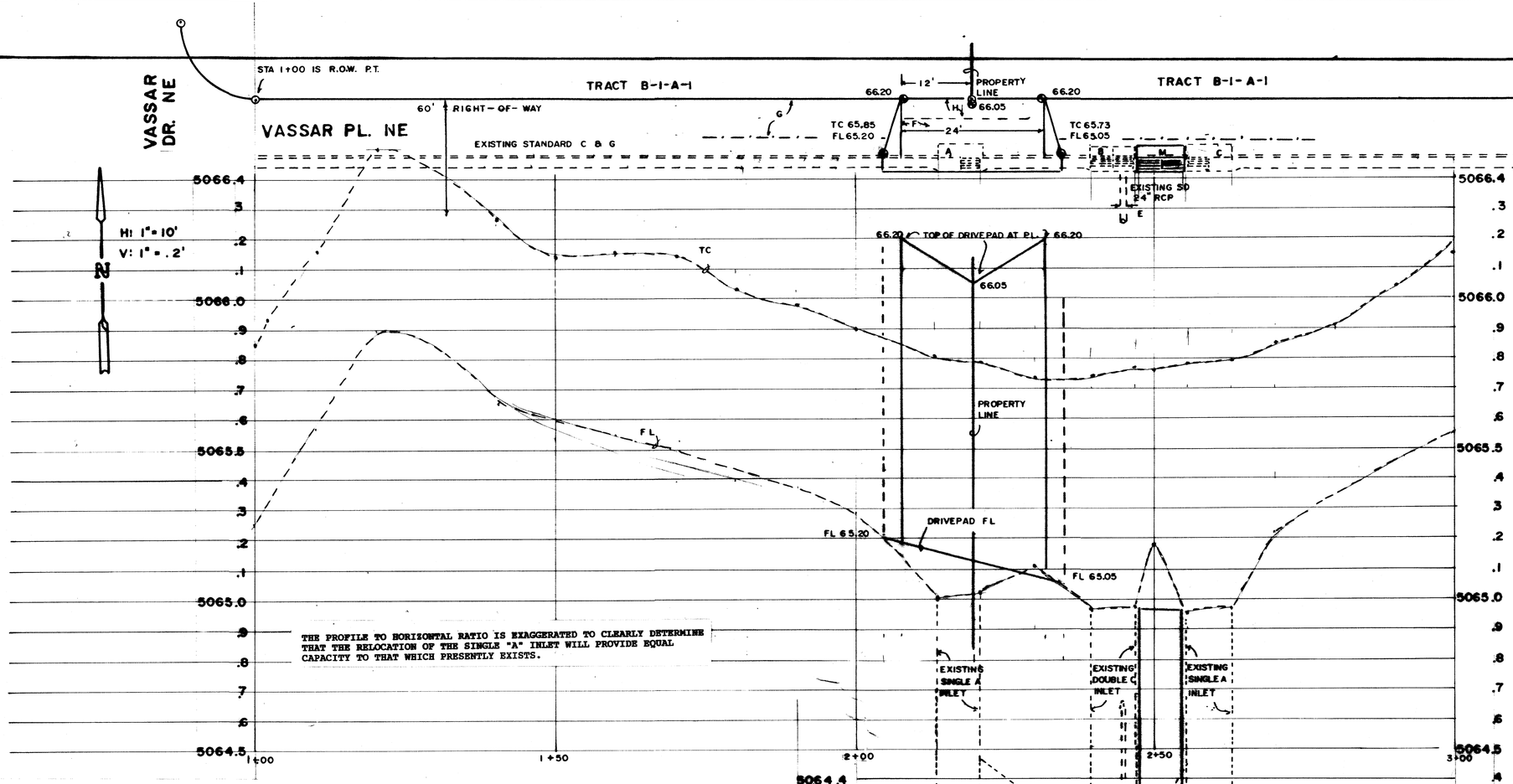
GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
DISCUSSION

G-16/D82B

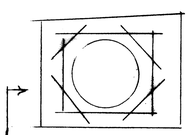


THE PROFILE TO HORIZONTAL RATIO IS EXAGGERATED TO CLEARLY DETERMINE THAT THE RELOCATION OF THE SINGLE "A" INLET WILL PROVIDE EQUAL CAPACITY TO THAT WHICH PRESENTLY EXISTS.

A. EXISTING SINGLE "A" INLET
B. EXISTING DOUBLE "C" INLET
C. EXISTING SINGLE "A" INLET
D. EXISTING 18" RCP PIPE
E. EXISTING 24" RCP PIPE
F. PROPOSED 24' WIDE DRIVEPAD WITH 3' TRANSITIONS
G. LOCATION OF FUTURE SIDEWALK (NOT THIS PROJECT)
H. SIDEWALK CROSSING OF DRIVEPAD TO ADA STANDARD, SEE DRAWING 2425

NOTES FOR CLOSING OF EXISTING INLET AND CONSTRUCTION OF NEW INLET

I. REMOVE GRATE, FRAME AND CONCRETE TOP AND CURB TRANSITION FROM INLET A TO DEPTH THAT WILL NOT INTERFER WITH THE PLACING OF A STANDARD DRIVEPAD IN THE LOCATION (TO A DEPTH OF 6" BELOW BOTTOM OF THE DRIVEPAD, CURB AND GUTTER).
J. FILL THE INLET A BOTTOM AND THE 18" RCP PIPE WHICH EXTENDS TO INLET B WITH CLEAN SAND (WET THE SAND TO OBTAIN MAXIMUM COMPACTION). PLACE A TEMPORARY FORM AT THE END OF THE PIPE IN INLET B WHILE PLACING AND COMPACTING THE SAND.
K. CAST IN PLACE AN 8" THICK PORTLEND CEMENT CONCRETE PLUG IN THE END OF THE 18" PIPE AT THE INLET B END. PRIOR TO PLACING THE PLUG, DRILL AT LEAST SIX 1/2" DIAMETER HOLES IN THE 18" PIPE AROUND THE CIRCUMFERENCE OF OF THE PLUG LOCATION, 3" FROM THE END, 1" DEEP, TO PLACE #4 R'BAR DOWELS TO SECURE THE PLUG.
L. PLACE DRIVEPAD IN LOCATION AS SHOWN, REMOVING EXISTING CURB STONES TO THE NEAREST WHOLE STONE. BE SURE THAT THE FLOW LINE HAS A SLOPE FOR POSITIVE DRAINAGE.
M. CONSTRUCT A NEW DOUBLE "C" INLET BETWEEN EXISTING INLETS B AND C. CUT EXISTING 18" PIPE BETWEEN INLET B AND INLET C, LEAVING SUFFICIENT PIPE (6") EXTENDING INTO THE NEW INLET LOCATION TO PENETRATE THE END WALLS OF THE NEW INLET. IF THE 18" PIPE CAN NOT BE CUT SMOOTHLY, REMOVE PIPE FROM THE EXISTING WALLS AND FORM OPENING ON NEW WALLS TO CONFORM TO THE OPENING IN THE EXISTING WALL, WITH R'BARS AS SHOWN ON THE DIAGRAM. SHAPE THE BOTTOM OF THE NEW INLET TO CONFORM WITH THE SLOPE FROM THE EXISTING INLET C TO B. PLACE THE TOP OF THE INLET AND THE GRATE TO MATCH THE ELEVATIONS OF THE EXISTING INLETS ON THE RESPECTIVE ENDS. CONSTRUCTION OF THE NEW MANHOLE TO CONFORM TO DRAWING 2401 WITH THE ADDITIONS AS STATED ABOVE.
N. SAW CUT EXISTING ASPHALT STREET SURFACE 12" BACK FROM THE CURB LINE IN THE CONSTRUCTION AREA, AND THEN REPLACE ASPHALT IN ACCORDANCE WITH DRAWING 2465.



NO. 4 R'BAR IN END WALL AROUND PIPE / HOLE

I HAVE REVIEWED THESE PLANS AND INSPECTED THE SITE ON VASSAR PLACE AND I BELIEVE THAT THE RELOCATION OF THE SINGLE "A" INLET TO THE LOCATION SHOWN ON THESE DRAWINGS IS SATISFACTORY. THE PROPOSED LOCATION WILL NOT INCREASE THE MAINTENANCE REQUIRED ON THE INLETS.

Glenn Jensen
ARROYO MAINTENANCE SECTION

2-23-98
DATE

RECEIVED FEB 23 1998 HYDROLOGY SECTION

RELOCATE INLET	MRK	FEB. 20, 1998

MARVIN R. KORTUM, P.E.
Civil Engineering
NM PE 6519

1605 Speakman Drive, S.E.
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(505) 299-0774

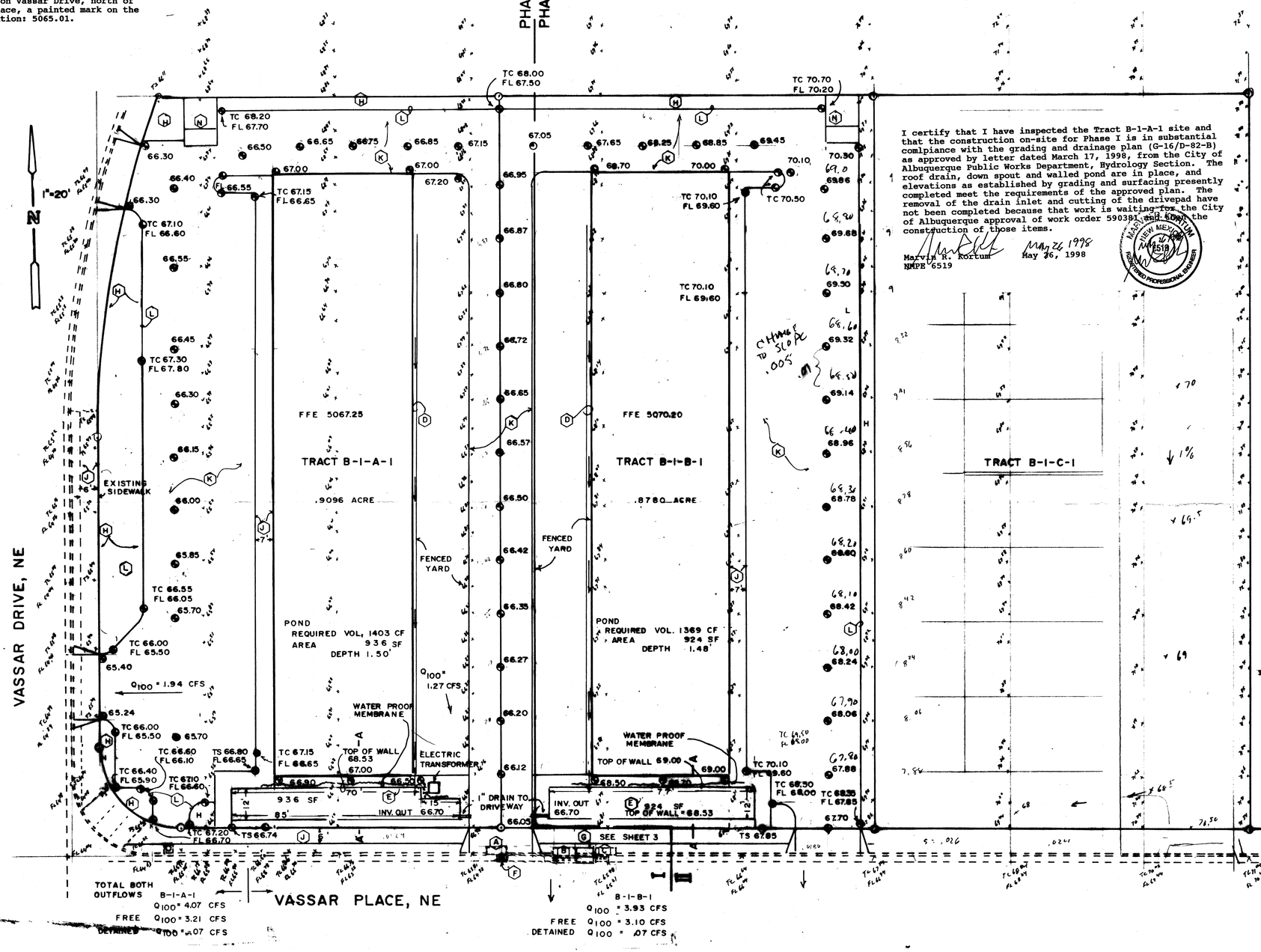
GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
DRIVE PAD AND INLET

G-16/D82B G-16 3/3

BENCHMARK: The Comanche Business Park project benchmark is station M-6, located on Montgomery Boulevard, on the east abutment of the bridge crossing over the North Diversion Channel. The station is a brass marker located between the west bound and east bound bridges. Elevation 5110.492. There is a temporary bench mark located on the top of the curb on Vassar Drive, north of the intersection with Vassar Place, a painted mark on the east side of the street. Elevation: 5065.01.

Phase I includes the grading and drainage improvements shown for lot B-1-A-1 and that portion of the common access driveway and drivepad along the common property line between lots B-1-A-1 and B-1-B-1. The unimproved portion of lot B-1-B-1 that is adjacent to the surfaced driveway will be sloped back from the edge of the pavement surface at a slope not to exceed 1 vertical to 3 horizontal inorder to not create a hazardous cut bank.

LEGAL DESCRIPTION: Tracts B-1-A-1 and B-1-B-1, COMANCHE BUSINESS PARK, Albuquerque, Bernalillo County, New Mexico.

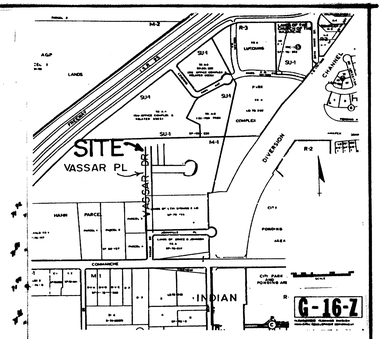


I certify that I have inspected the Tract B-1-A-1 site and that the construction on-site for Phase I is in substantial complpiance with the grading and drainage plan (G-16/D-82-B) as approved by letter dated March 17, 1998, from the City of Albuquerque Public Works Department, Hydrology Section. The roof drain, down spout and walled pond are in place, and elevations as established by grading and surfacing presently completed meet the requirements of the approved plan. The removal of the drain inlet and cutting of the drivepad have not been completed because that work is waiting for the City of Albuquerque approval of work order 590381 and completion the construction of those items.

Marvin R. Kortum
NMPE 6519

May 26, 1998
May 26, 1998

MARVIN R. KORTUM NEW MEXICO 6519 REGISTERED PROFESSIONAL ENGINEER



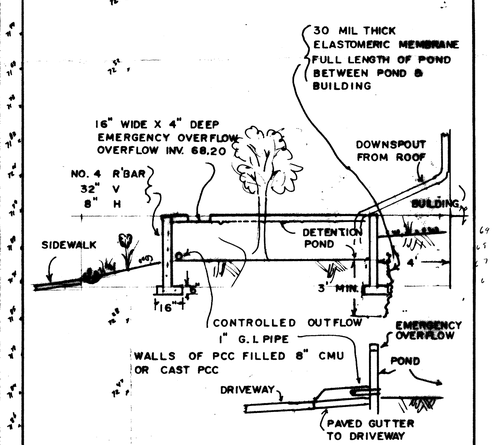
LEGEND

	Existing	Proposed
Spot Elevation	× 63.7	× 64.25
Top of Curb	TC 63.7	TC
Flow Line Invert	FL 63.2	FL
Finished Floor Elevation	F.F.E.	F.F.E.
Contour Line	4962	64
Property Line		
Lot Number		S
Structure		
Curb and Gutter		
Driveway		

I I certify that I have personally inspected the Tracts B-1-A-1 and B-1-B-1 site and the area as presented on these drawings and the accompanying text as of December 1997.

Marvin R Kortum — Dec 10, 1997
Marvin R Kortum — Date

Topographic survey by Marvin R Kortum



SECTION A-A POND DETAILS 1"=4'

NOTES

A. EXISTING SINGLE "A" INLET
B. EXISTING DOUBLE "C" INLET
C. EXISTING SINGLE "A" INLET
D. INSTALL ROOF GUTTER TO COLLECT AND DIREDT ROOF RUNOFF TO THE EAST POND. GUTTER SHALL BE 6 INCHES BY 6 INCHES OR LARGER, AND SHALL BE SET AT A 0.5% SLOPE (1/8 INCH PER FOOT) OR LARGER. THE GUTTER SHALL DIRECT THE FLOW TO A DOWNSPOUT, THEN INTO THE DETENTION POND.
E. CONSTRUCT DETENTION POND.
F. REMOVE EXISTING INLET A.
G. CONSTRUCT NEW INLET, TYPE SINGLE "A"
H. LANDSCAPING. IF A MEMBRANE IS USED, THE MEMBRANE WILL BE PERVIOUS.
J. PCC SIDEWALK.
K. Asphalt or PCC pavement.
L. 6" WIDE BY REQUIRED DEPTH HEADER CURB. A PCC CURB AND GUTTER MAY BE USED.
M. OFF-SITE FLOWS FROM ADJACENT UNDEVELOPED PROPERTY CAN BE ACCEPTED, PASSED THROUGH THE PROPERTY, AND DISPOSED OF IN ACCORDANCE WITH THE COMANCHE BUSINESS PARK MASTER DRAINAGE PLAN.
N. TRASH COLLECTION BIN.
P. ALL BERMS AND EARTHWORK SUPPORTING STRUCTURES MUST BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY (MODIFIED PROCTOR TEST).
Q. ELEVATIONS OF BUILDING PADS ARE BASED ON SLAB ON GRADE.
R. QUANTITATIVE EARTHWORK ESTIMATES SHOULD BE BASED ON MORE DETAILED TOPOGRAPHIC CROSS SECTIONS OF THE WORK AREA.

Preliminary APPROVALS, REVISIONS	BY	DATE
INCREASE POND AREA	MRK	MAR 16, 1998
RELOCATE INLET	MRK	FEB 20, 1998
ADD PHASE I, II LINE	MRK	JAN 13, 1998
Marvin R Kortum		December 10, 1997

MARVIN R. KORTUM NEW MEXICO 6519 PROFESSIONAL ENGINEER

Jan 13 1998 MRK
Feb 20 1998 MRK

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GRADING AND DRAINAGE PLAN
TRACTS B-1-A-1 & B-1-B-1
COMANCHE BUSINESS PARK
SITE GRADING

RECEIVED MAY 27 1998 HYDROLOGY SECTION

Jan 6 EL 1/3

G-16/D 82 B — G-16 — 2/5