DRAINAGE PLAN UPDATE

EXECUTIVE SUMMARY AND INTRODUCTION

THIS PLAN REPRESENTS AN UPDATE TO A PREVIOUSLY APPROVED GRADING AND DRAINAGE PLAN FOR SHUBE'S MANUFACTURING, INC. THE SCOPE OF WORK IS LIMITED TO A 24' X 24' BUILDING ADDITION WITHIN SUB-BASIN A-3. THIS IS AN ALREADY PAVED AREA. NO OTHER CONSTRUCTION ON THE SITE IS PROPOSED BY THIS PLAN.

BACKGROUND

A GRADING AND DRAINAGE PLAN WAS PREPARED FOR A BUILDING ADDITION AND PARKING LOT IMPROVEMENTS JULY 1994. THAT PLAN WAS SUBSEQUENTLY APPROVED (L20/D1) AUGUST 3, 1994. UPON THE COMPLETION OF CONSTRUCTION, THE GRADING AND DRAINAGE ASPECTS OF THE PROJECT WERE AS-BUILT AND CERTIFIED ON JANUARY 24, 1996. THE PROPOSED BUILDING ADDITION HAS BEEN SUPERIMPOSED ONTO THE GRADING AND DRAINAGE PLAN WHICH WAS APPROVED AND SUBSEQUENTLY CERTIFIED.

EXISTING CONDITIONS

THE DRAINAGE CERTIFICATION DISCUSSED ABOVE REPRESENTS THE EXISTING CONDITIONS FOR THIS SITE. A RECENT FIELD VISIT CONFIRMS, BASED UPON VISUAL OBSERVATION, THAT NO OTHER IMPROVEMENTS AND/OR ALTERNATIONS HAVE BEEN CONSTRUCTED ON THE SITE SINCE THE 1996 CERTIFICATION.

PROPOSED CONDITIONS

AS DESCRIBED IN THE EXECUTIVE SUMMARY AND INTRODUCTION, THIS PROJECT CONSISTS OF THE CONSTRUCTION OF A 24' X 24' BUILDING ADDITION WITHIN SUB-BASIN A-3. SUB-BASIN A-3 IS AN ENCLOSED STORAGE AREA WHICH DRAINS FROM WEST TO EAST THROUGH WEEPHOLES IN AN EXISTING BLOCK WALL TO AN EXISTING DEPRESSED AREA WITHIN SUB-BASIN A-4. THIS DRAINAGE PATTERN WILL NOT BE ALTERED BY THE PROPOSED CONSTRUCTION. FURTHERMORE, THE PROPOSED ADDITION WILL LIE WITHIN AN ALREADY PAVED AREA. THEREFORE, NOT ALTERING THE HYDROLOGY OF THE SITE.

GRADING PLAN

SHEET 2 OF THIS SUBMITTAL ILLUSTRATES THE LOCATION OF THE PROPOSED BUILDING ADDITION. THE ADDITION WILL BE CONSTRUCTED WITHIN AN ALREADY PAVED AREA. WITH THE EXCEPTION OF THE BUILDING FOOTPRINT, NO OTHER PAVING WILL BE REMOVED AND/OR REPLACED. INASMUCH, THERE IS NO PROPOSED GRADING ASSOCIATED WITH THIS PROJECT.

CALCULATIONS

DUE TO THE FACT THAT THE PROPOSED BUILDING ADDITION WILL BE CONSTRUCTED WITHIN AN ALREADY PAVED AREA, NO SUPPLEMENTAL CALCULATIONS HAVE BEEN PERFORMED. THE CALCULATIONS WHICH APPEAR ON SHEET 3 OF THIS SUBMITTAL REPRESENT THE HYDROLOGIC CALCULATIONS FOR THE PROJECT. THESE CALCULATIONS WERE REVISED IN JANUARY, 1996 AS PART OF THE ABOVE REFERENCED DRAINAGE CERTIFICATION. THE CALCULATIONS REVISED AS OF THAT DATE ARE STILL REPRESENTATIVE OF CURRENT SITE CONDITIONS.

CONCLUSION

THIS DRAINAGE PLAN UPDATE IS CONSISTENT WITH THE PREVIOUSLY APPROVED PLAN AND WILL NOT ALTER THE HYDROLOGY AND/OR DRAINAGE PATTERNS OF THE SITE. NO FURTHER DRAINAGE MITIGATION IS WARRANTED AS PART OF THIS PROJECT.

JEFFREY G. MORTENSEN NEW MEXICO 8547 REGISTERED PROFESSIONAL ENGINEER

03-11-99

File Path: F:\DATA\CAD\1A\
File Name: 930358DR.DWG

Plot Date: 03-10-1999
Plot Time: 12:24 pm

JEFF MORTENSEN & ASSOCIATES, INC.
6010-B MIDWAY PARK BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87109
ENGINEERS SURVEYORS (505) 345-4250

DRAINAGE PLAN UPDATE

SHUBE'S MANUFACTURING, INC.

DESIGNED BY	J.G.M.
DRAWN BY	J.M.C.
APPROVED BY	J.G.M.

NO.	DATE	BY	REVISIONS

JOB NO.	930358
DATE	03/99
SHEET	1 OF 3

LEGAL DESCRIPTION

BLOCK 56A, SKYLINE HEIGHTS

ADDRESS

600 MOON ST. S.E., ALBUQUERQUE N.M.

PROJECT BENCHMARK

CITY OF ALBUQUERQUE USC&GS BRASS TABLET STAMPED "SUSAN 1969", SET IN TOP OF A CONCRETE POST FLUSH WITH THE GROUND LOCATED NORTH OF THE INTERSECTION OF SOUTHERN AVE. S.E. & GARCIA STREET S.E.
ELEVATION = 5444.49'(M.S.L.D.)

T.B.M.

TOP OF CURB LOCATED BY THE NORTHWEST CORNER OF SAID SITE AS SHOWN BELOW.
ELEVATION = 5429.57'(M.S.L.D.)

LEGEND

TC	TOP CURB
FL	FLOW LINE
TA	TOP ASPHALT
TCO	TOP CONCRETE
TW	TOP WALL
PP	POWER POLE
FH	FIRE HYDRANT
NG	NATURAL GRADE
TA@W	TOP ASPHALT AT WALL
EA	EDGE ASPHALT
	CONIFEROUS TREE
	SHRUB
*33.90	PROPOSED SPOT ELEVATION
39	PROPOSED CONTOUR
40.00	PROPOSED SPOT ELEVATION
	DIRECTION OF FLOW
	BASIN BOUNDARY LINE
	ROOF DRAINAGE
	BASIN BOUNDARY
	LIMIT OF NEW ASPHALT

△1 AS-BUILT LEGEND

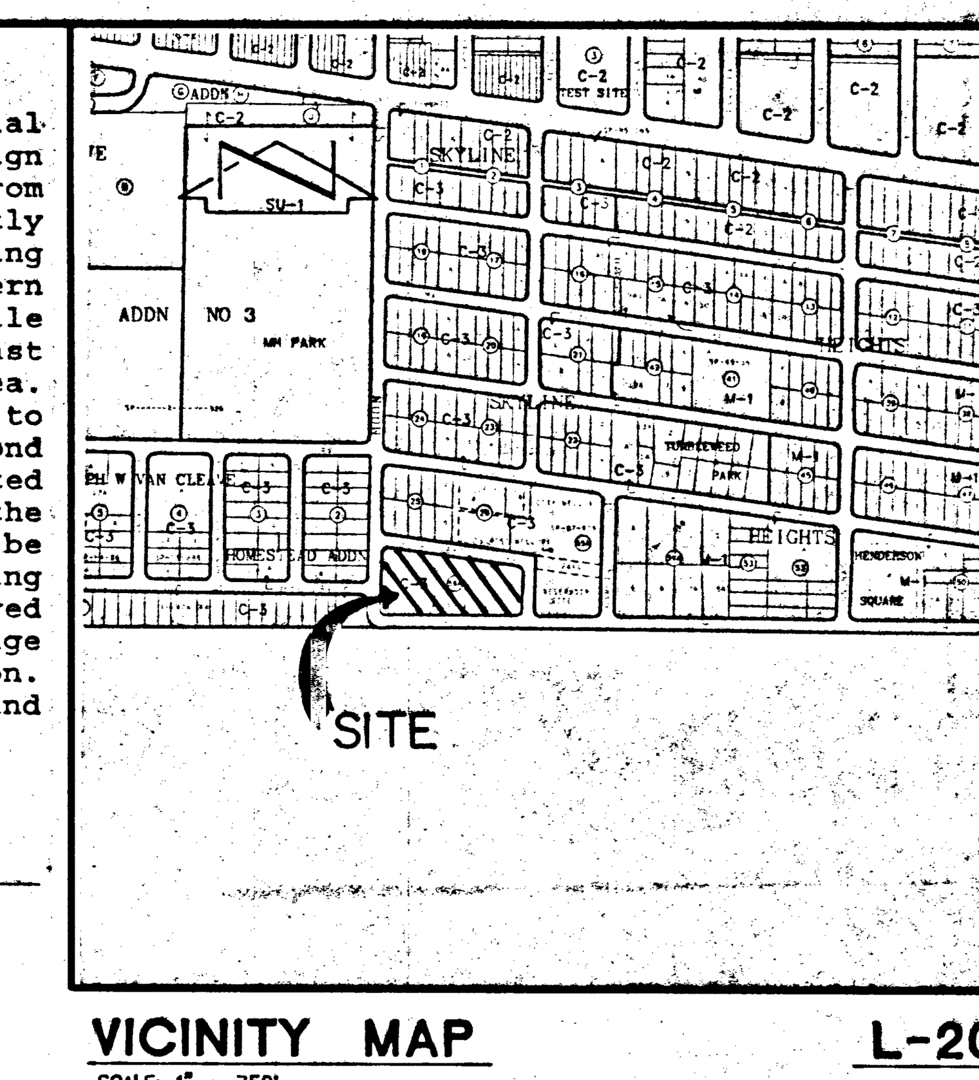
33.61 / 2.42	AS-BUILT ELEVATION
✓	AS-BUILT = AS-DESIGNED
— —	AS-BUILT CONTOUR

DRAINAGE CERTIFICATION

As indicated by the as-built information shown hereon, this has been completed in substantial compliance with the approved Plan with four modifications: (1) Sub-Basin A1 has less than design volume, however, has sufficient capacity to hold the difference between the calculated runoff from the design storm minus that runoff discharged via the 4" pipe. (2) Sub-Basin A2 pond has slightly greater than design capacity which exceeds the approved plan. (3) The runoff from the new building addition and the new landscaped areas south of the building addition do not exit onto Southern Avenue. The runoff from the building addition drain south into the adjacent landscaped area, while the landscaped area southwest of the building addition drains via a 4" PVC pipe into the east landscaped area. An 8" diameter drain was installed at the low spot to drain this landscaped area. This drain is connected to the newly installed 8" storm drain line that connects Sub-Basin A2 to the existing public storm drain inlet at the southwest corner of the site. The calculated pond volume of this east landscaped area is sufficient to hold the difference between the calculated runoff from the design storm minus that runoff discharged via the drain for the duration of the storm. The runoff generated by the building addition and the adjacent landscaped areas will be discharged from the site at a rate less than approved. (4) The newly paved Handicapped parking spaces at the southwest corner of the existing building exceed ADA requirements. The new paved area does drain in a manner consistant with the approved plan and thus does not present a drainage problem, however, it may represent an accessibility problem beyond the scope of this certification. The As-Built information has been obtained by me or under my direct supervision and is true and correct to the best of my knowledge and belief.

Jeffrey G. Mortensen, NMPE 8547 — 01-24-96
Date

JEFFREY G. MORTENSEN — NEW MEXICO — 8547 — REGISTERED PROFESSIONAL ENGINEER



JEFFREY G. MORTENSEN — NEW MEXICO — 8547 — REGISTERED PROFESSIONAL ENGINEER — 03-11-99

NO.	DATE	BY	REVISIONS
△1	01/96	M.D.S.	AS-BUILT AND CERTIFY
△2	3/99	J.G.M.	BLDG. ADDITION.

DESIGNED BY M.F.D.
DRAWN BY S.G.H.
APPROVED BY J.G.M.

JOB NO. 930358
DATE 01-1994
SHEET 2 OF 3

JEFF MORTENSEN & ASSOCIATES, INC.
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ALBUQUERQUE NEW MEXICO 87109
ENGINEERS SURVEYORS (505) 345-4250

GRADING AND DRAINAGE PLAN
SHUBE'S MANUFACTURING, INC.

DRAINAGE PLAN

The following items concerning the Shube's Manufacturing are contained hereon:

1. Vicinity Map
2. F.I.R.M.
3. Grading Plan
4. Calculations

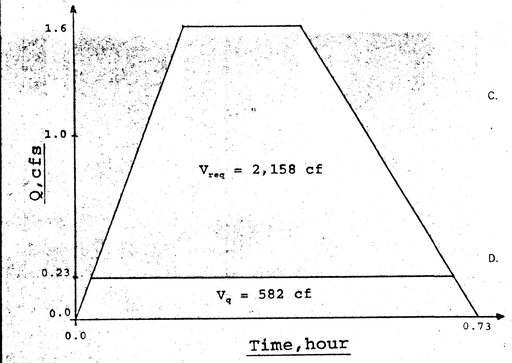
As shown by the Vicinity Map, the site is located on the northeast corner of the intersection of Moon Street S.E. and Southern Avenue S.E. At present, the site consists of an existing building, which will be expanded, along with associated paved and unpaved parking, which will also be expanded.

As shown by Panel 36 of 50 of the National Flood Insurance Program, Flood Insurance Rate Maps for the City of Albuquerque, Bernalillo County, New Mexico, dated October 14, 1983, this site does not lie within a designated AO (depth 1) lies approximately 600' north of and downstream from the site. The site currently drains east to west to Moon Street S.E. The site is bordered on all sides by improved roadways, so no offsite flows enter the site.

The Grading and Drainage Plan shows: 1) existing and proposed grades indicated by spot elevations and contours at 1'0" intervals, 2) the limit and character of the existing improvements, 3) the limit and character of the proposed improvements per the revised site plan, 4) limited future drainage improvements, and 5) continuity between existing and proposed grades. The site is characterized a single basin, with sub-basins created by the new and future parking area at the east edge of the site. This new parking area will also act a s a detention pond, which will discharge its runoff through a 4" PVC pipe. This area is called Sub-Basin A1. The 4" pipe connects to another inlet which will drain finally through an 8" pipe to an inlet located on the southwest corner of the site. The area of the second inlet will be called Sub-Basin A2. Finally a third Sub-Basin called A3, which is a future project, will also be in a sump condition and will also drain to the inlet in Sub-Basin A2. This was done so as to decrease the amount of runoff draining to the existing retention pond. From Basin A2, the pipe will connect to an existing storm inlet located at the southwest corner of the site. The flow through the pipe was calculated assuming a sump condition. The calculations for the Orifice equation is located under the subtitle pond release in the attached calculations. A small building addition to the southeast of the existing building will require the removal and repaving of some of the pavement to allow for the construction of the new building and to enhance positive drainage. The increased runoff created by the new parking lot paving will be detained and then released offsite via an 8" PVC C-900 pipe which connects to the existing storm inlet located on the southwest of the site. The existing onsite ponds will not be altered other than an overall decrease in contributing area. At present, the existing pond retains a portion of the runoff generated upstream with the excess overflowing to Moon Street S.E. per the original Grading and Drainage Plan (L20/01). Sub-Basin A4 is for reference only. It is the remaining area that is draining into the onsite retention pond. The original area draining into the onsite retention pond consisted of Sub-Basins A1, A2, and A4. Since the amount of area going to this pond has decreased, and also the soil treatment in that area will not be changed, logically a decrease in runoff in this area is expected. No additional impervious area will be developed in conjunction with the building addition which will be replacing existing asphalt paving.

The Calculations which appear hereon analyze both the existing and developed conditions for the 100-year, 6-hour rainfall event. The Procedure for 40-acre and Smaller Basins, as set forth in the Revision of Section 22.2, Hydrology of the Development Process Manual, Volume 2, Design Criteria, dated January, 1993, has been used to quantify the peak rate of discharge and volume of runoff generated. As shown by these calculations, a slight increase in runoff volume with a decrease in peak discharge is anticipated by the proposed improvements.

⚠ HYDROGRAPH FOR SUB-BASIN A1



⚠
DISCHARGE FROM SUB-BASIN A1
Using Feild's Hydraulics Calculator for Gravity Flow in Pipes
Where: s = 0.032%, n = 0.013, d = 4 inches
q = 0.35 cfs

HYDROGRAPH CALCULATIONS FOR SUB-BASIN A1

1. $t_b = (2.017*E_w*A_T/Q_p) - (0.25*A_p/A_T)$
   $t_b = (2.017*2.15*0.35/1.6) - (0.25*0.30/0.35)$
   $t_b = 0.73$ hr

2. $t_p = (0.7*t_c) + ((1.6-(A_p/A_T))/12)$
   $t_p = (0.7*0.2) + ((1.6-(0.30/0.35))/12)$
   $t_p = 0.2$ hr

3. $p_{dur} = 0.25*A_p/A_T$
   $p_{dur} = 0.25*0.30/0.35$
   $p_{dur} = 0.21$ hr

CALCULATIONS

Site Characteristics

1. Precipitation Zone = 3
2. $P_{6,100} = P_{360} =$ 2.60 in.
3. Total Area (A_T) = 2.88 acres
4. Existing Land Treatment

	Treatment	Area (sf/ac)	%
A.	Entire Site		
	B	1,760/0.04	1.4
	C	56,250/1.29	44.8
	D	67,530/1.55	53.8
B.	Sub-Basin A-1	15,120/0.35	100
	C	15,120/0.35	100
C.	Sub-Basin A-2	7,250/0.17	100
	C	720/0.02	10
	D	6,530/0.15	90
D.	Sub-Basin A-3	14,130/0.32	100
	D	14,130/0.32	100

5. Developed Land Treatment

	Treatment	Area (sf/ac)	%
A.	Rest of Site	89,040/2.04	100
	B	4,120/0.09	4.6
	C	40,410/0.93	45.4
	D	44,510/1.02	50.0
B.	Sub-Basin A-1	15,120/0.35	100
	B	2,230/0.05	14.7
	D	12,890/0.30	85.3
C.	Sub-Basin A-2	7,250/0.17	100
	D	7,250/0.17	100
D.	Sub-Basin A-3	14,130/0.32	100
	D	14,130/0.32	100

Existing Condition

A. Entire Site
   1. Volume
   $E_W = (E_AA_A+E_BA_B+E_CA_C+E_DA_D)/A_T$
   $E_W = [(0.92)(0.04)+(1.29)+(2.36)(1.55)]/(2.88) = 1.86$ in.
   $V_{100} = (E_W/12)A_T$
   $V_{100} = (1.86/12)2.88 = 0.4466$ ac.ft.; 19,450 cf
   2. Peak Discharge
   $Q_p = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$
   $Q_p = Q_{100} = (2.60)(0.04)+(3.45)(1.29)+(5.02)(1.55) = 12.3$ cfs

B. Sub-Basin A-1
   1. Volume
   $E_W = (E_AA_A+E_BA_B+E_CA_C+E_DA_D)/A_T$
   $E_W = [(1.29)(0.35)]/(0.35) = 1.29$ in.
   $V_{100} = (E_W/12)A_T$
   $V_{100} = (1.29/12)(0.35) = 0.0376$ ac.ft.; 1,640 cf
   2. Peak Discharge
   $Q_p = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$
   $Q_p = Q_{100} = (3.45)(0.35) = 1.2$ cfs

C. Sub-Basin A-2
   1. Volume
   $E_W = (E_AA_A+E_BA_B+E_CA_C+E_DA_D)/A_T$
   $E_W = [(1.29)(0.02)+(2.36)(0.15)]/(0.17) = 2.23$ in.
   $V_{100} = (E_W/12)A_T$
   $V_{100} = (2.23/12)(0.17) = 0.0316$ ac.ft.; 1,380 cf
   2. Peak Discharge
   $Q_p = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$
   $Q_p = Q_{100} = (3.45)(0.02) + (5.02)(0.15) = 0.8$ cfs

D. Sub-Basin A-3
   1. Volume
   $E_W = (E_AA_A+E_BA_B+E_CA_C+E_DA_D)/A_T$
   $E_W = (2.36)(0.32)/(0.32) = 2.36$ in.
   $V_{100} = (E_W/12)A_T$
   $V_{100} = (2.36/12)(0.32) = 0.0629$ ac.ft.; 2,740 cf
   2. Peak Discharge
   $Q_p = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$
   $Q_p = Q_{100} = (5.02)(0.32) = 1.6$ cfs

⚠
4. Volume Calculations
   a. Volume of Discharge (Trapezoid Method)
      $V_q = 2/3*q*((b1+b2)/2)$
      $V_q = 2/3*0.35*((39.3+43.8)/2)$
      $V_q = 582$ cf
   b. Pond Volume Required (V_{req})
      $V_{req} = V_{100} - V_q$
      $V_{req} = 2,740 - 582 = 2,158$ cf
   c. Pond Volume Provided (Average End Area Method)

Elev(ft)	Area(sf)	Vol(cf)	ΣVol(cf)
37.58	3.0		
		196.0	196.0
38.00	932.0		
		2,011.0	2,207.0
38.67	5,072.0		

   $V_{pond} = 2,207$cf
   d. Comparison
   $V_{pond} > V_{req}$

Developed Condition

A. Rest of Site
   1. Volume
   $E_W = (E_AA_A+E_BA_B+E_CA_C+E_DA_D)/A_T$
   $E_W = [(0.92)(0.09)+(1.29)(0.93)+(2.36)(1.02)]/(2.04) = 1.81$ in.
   $V_{100} = (E_W/12)A_T$
   $V_{100} = (1.81/12)(2.04) = 0.3075$ ac.ft.; 13,390 cf
   2. Peak Discharge
   $Q_p = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$
   $Q_p = Q_{100} = (2.60)(0.09)+(3.45)(0.93)+(5.02)(1.02) = 8.6$ cfs

B. Sub-Basin A-1
   1. Volume
   $E_W = (E_AA_A+E_BA_B+E_CA_C+E_DA_D)/A_T$
   $E_W = [(0.92)(0.05)+(2.36)(0.30)]/(0.35) = 2.15$ in.
   $V_{100} = (E_W/12)A_T$
   $V_{100} = (2.15/12)(0.35) = 0.0628$ ac.ft.; 2,740 cf
   2. Peak Discharge
   $Q_p = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$
   $Q_p = Q_{100} = (2.60)(0.05)+(5.02)(0.30) = 1.6$ cfs

⚠ Sub-Basin A-1
Pond Volume (Calculated by the Average End Area Method)

Elev (ft)	Area (sf)	Vol (cf)	ΣVol (cf)
~~36.66~~	0		
		~~322~~ 196	~~322~~ 196
~~37.0~~ 38.0	7.58 8.0	~~1610~~ 932	
		~~4668.5~~ 2,011	~~4990.5~~ 2,207
~~38.0~~	.67	~~7727~~ 5,072	

(Orifice Equation) (4" PVC C-900)
$Q = CA(2gh)^{1/2}$ 2.92
$Q = 0.6(0.0873)[(2)(32.2)(~~2.89~~)]^{1/2}$
⚠ $Q = 0.~~72~~$ cfs
.72

C. Sub-Basin A-2
   1. Volume
   $E_W = (E_AA_A+E_BA_B+E_CA_C+E_DA_D)/A_T$
   $E_W = [(2.36)(0.17)/(0.17) = 2.36$ in.
   $V_{100} = (E_W/12)A_T$
   $V_{100} = (2.36/12)(0.17) = 0.0334$ ac.ft.; 1,460 cf
   2. Peak Discharge
   $Q_p = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$
   $Q_p = Q_{100} = (5.02)(0.17) = 0.9$ cfs

⚠ Sub-Basin A-2
Pond Volume (Calculated by the Average End Area Method)

Elev (ft)	Area (sf)	Vol (cf)	ΣVol (cf)
~~33.0~~	32.93 0		
		~~357.5~~ 493	~~357.5~~ 493
33.5	.62	1430	

(Orifice Equation) (8" PVC C-900)
$Q = CA(2gh)^{1/2}$ 3.10
$Q = 0.6(0.3491)[(2)(32.2)(~~2.86~~)]^{1/2}$
⚠ $Q = ~~2.8~~$ cfs 3.0
$Q_{inlet} = ~~2.8~~ 3.0 - 0.7 - 0.7 = ~~1.4~~ 1.6$ cfs > $Q_{subbasin} = 0.9$ cfs

Sub-Basin A-3

1. Volume
   No Change
2. Peak Discharge
   No Change

Sub-Basin A-3
Pond Volume (Calculated by the Average End Area Method)

Elev (ft)	Area (sf)	Vol (cf)	Σ Vol (cf)
32.75	0		
		112.5	112.5
33.0	900		
		3757.5	3870.0
34.0	6615		

(Orifice Equation) (4" PVC C-900)
$Q = CA(2gh)^{1/2}$
$Q = 0.6(0.0873)[(2)(32.2)(2.65)]^{1/2}$
$Q = 0.7$ cfs

Comparison

A. Entire Site
   1. $\Delta V_{100} = 13,390+2,740+1.380+2,740-19,450 = 800$ cf (increase)
   2. $\Delta Q_{100} = 12.3 - 8.6 - 0.7 - 0.7 - 0.9 = 1.4$ cfs (decrease)

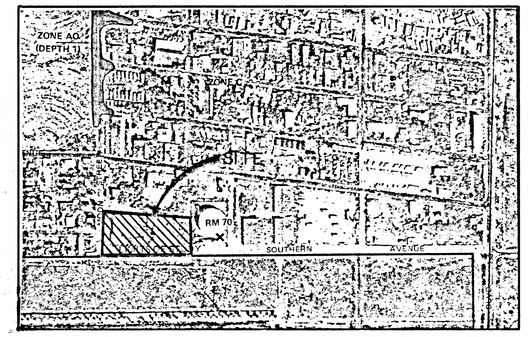
B. Sub-Basin A-1
   1. $\Delta V_{100} = 2,740 - 1,640 = 1,100$ cf (increase)
   2. $\Delta Q_{100} = 1.2 - 0.7 = 0.5$ cfs (decrease)

C. Sub-Basin A-2
   1. $\Delta V_{100} = 1,460 - 1,380 = 80$ cf (increase)
   2. $\Delta Q_{100} = 0.9 - 0.8 = 0.1$ cfs (increase)

D. Sub-Basin A-3
   1. $\Delta V_{100} = 2,740 - 2,740 = 0$ cf (no change)
   2. $\Delta Q_{100} = 1.6 - 0.7 = 0.9$ cfs (decrease)

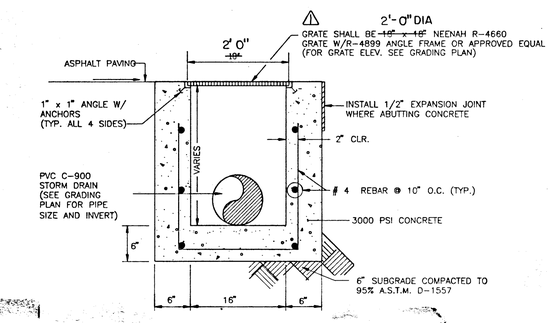
JEFFREY G. MORTENSEN NEW MEXICO 3547 REGISTERED PROFESSIONAL ENGINEER

03-11-99 01-24-96



F.I.R.M. MAP PANEL 36 OF 50

SCALE: 1" = 500'(APPROX)



TYPICAL STORM INLET SECTION

SCALE: 1" = 1' - 0"

Erosion Control Measures

1. The contractor shall ensure that no soil erodes from the site into public right-of-way or onto private property. This can be achieved by constructing temporary berms at the property lines and wetting the soil to keep it from blowing.

2. The contractor shall promptly clean up any material excavated within the public right-of-way so that the excavated material is not susceptible to being washed down the street.

3. The contractor shall secure "Topsoil Disturbance Permit" prior to beginning construction.

APPROVALS NAME	DATE	
A.C.E./DESIGN		
INSPECTOR		
A.C.E./FIELD		

Construction Notes:

1. Two (2) working days prior to any excavation, contractor must contact New Mexico One Call System 260-1990, for location of existing utilities.

2. Prior to construction, the contractor shall excavate and verify the horizontal and vertical location of all potential obstructions. Should a conflict exist, the contractor shall notify the engineer in writing so that the conflict can be resolved with a minimum amount of delay.

3. All work on this project shall be performed in accordance with applicable federal, state and local laws, rules and regulations concerning construction safety and health.

4. All construction within public right-of-way shall be performed in accordance with applicable City of Albuquerque Standards and Procedures.

5. If any utility lines, pipelines, or underground utility lines are shown on these drawings, they are shown in an approximate manner only, and such lines may exist where none are shown. If any such existing lines are shown, the location is based upon information provided by the owner of said utility, and the information may be incomplete, or may be obsolete by the time construction commences. The engineer has conducted only preliminary investigation of the location, depth, size, or type of existing utility lines, pipelines, or underground utility lines. This investigation is not conclusive, and may not be complete, therefore, makes no representation pertaining thereto, and assumes no responsibility or liability therefor. The contractor shall inform itself of the location of any utility line, pipeline, or underground utility line in or near the area of the work in advance of and during excavation work. The contractor is fully responsible for any and all damage caused by its failure to locate, identify and preserve any and all existing utilities, pipelines, and underground utility lines. In planning and conducting excavation, the contractor shall comply with state statutes, municipal and local ordinances, rules and regulations, if any, pertaining to the location of these lines and facilities.

6. An Excavation/Construction Permit will be required before beginning any work within City right-of-way. An approved copy of these plans must be submitted at the time of application for this permit.

7. Backfill compaction shall be according to Arterial street use.

8. Maintenance of these facilities shall be the responsibility of the owner of the property served.

9. The design of planters and landscaped areas is not part of this plan. All planters and landscaped areas adjacent to the building(s) shall be provided with positive drainage to avoid any ponding adjacent to the structure. For construction details, refer to landscaping plan.

JEFF MORTENSEN & ASSOCIATES, INC.
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ENGINEERS SURVEYORS (505) 345-4250

SECTIONS, NOTES, AND CALCULATIONS
SHUBE'S MANUFACTURING, INC.

DESIGNED BY M.F.D.
DRAWN BY C.J.H.
APPROVED BY J.G.M.

NO.	DATE	BY	REVISIONS
⚠1	01/96	MDS	AS-BUILT AND REVISE CALCULATIONS
⚠2	3/99	JGM	UPDATE - SEE SHEET 1.

JOB NO. 930358
DATE 07-1994
SHEET 3 OF 3

LEGAL DESCRIPTION

BLOCK 56A, SKYLINE HEIGHTS

ADDRESS

600 MOON ST. S.E., ALBUQUERQUE N.M.

PROJECT BENCHMARK

CITY OF ALBUQUERQUE USC&GS BRASS TABLET STAMPED "SUSAN 1969", SET IN TOP OF A CONCRETE POST FLUSH WITH THE GROUND LOCATED NORTH OF THE INTERSECTION OF SOUTHERN AVE. S.E. & GARCIA STREET S.E.
ELEVATION = 5444.49'(M.S.L.D.)

T.B.M.

TOP OF CURB LOCATED BY THE NORTHWEST CORNER OF SAID SITE AS SHOWN BELOW.
ELEVATION = 5429.57'(M.S.L.D.)

SCALE: 1" = 20'

LEGEND

TC	TOP CURB
FL	FLOW LINE
TA	TOP ASPHALT
TCO	TOP CONCRETE
TW	TOP WALL
PP	POWER POLE
FH	FIRE HYDRANT
NG	NATURAL GRADE
TA@W	TOP ASPHALT AT WALL
EA	EDGE ASPHALT
	CONIFEROUS TREE
	SHRUB
*33.90	PROPOSED SPOT ELEVATION
—39—	PROPOSED CONTOUR
40.00	PROPOSED SPOT ELEVATION
	DIRECTION OF FLOW
	BASIN BOUNDARY LINE
	ROOF DRAINAGE
	BASIN BOUNDARY
	LIMIT OF NEW ASPHALT

AS-BUILT LEGEND

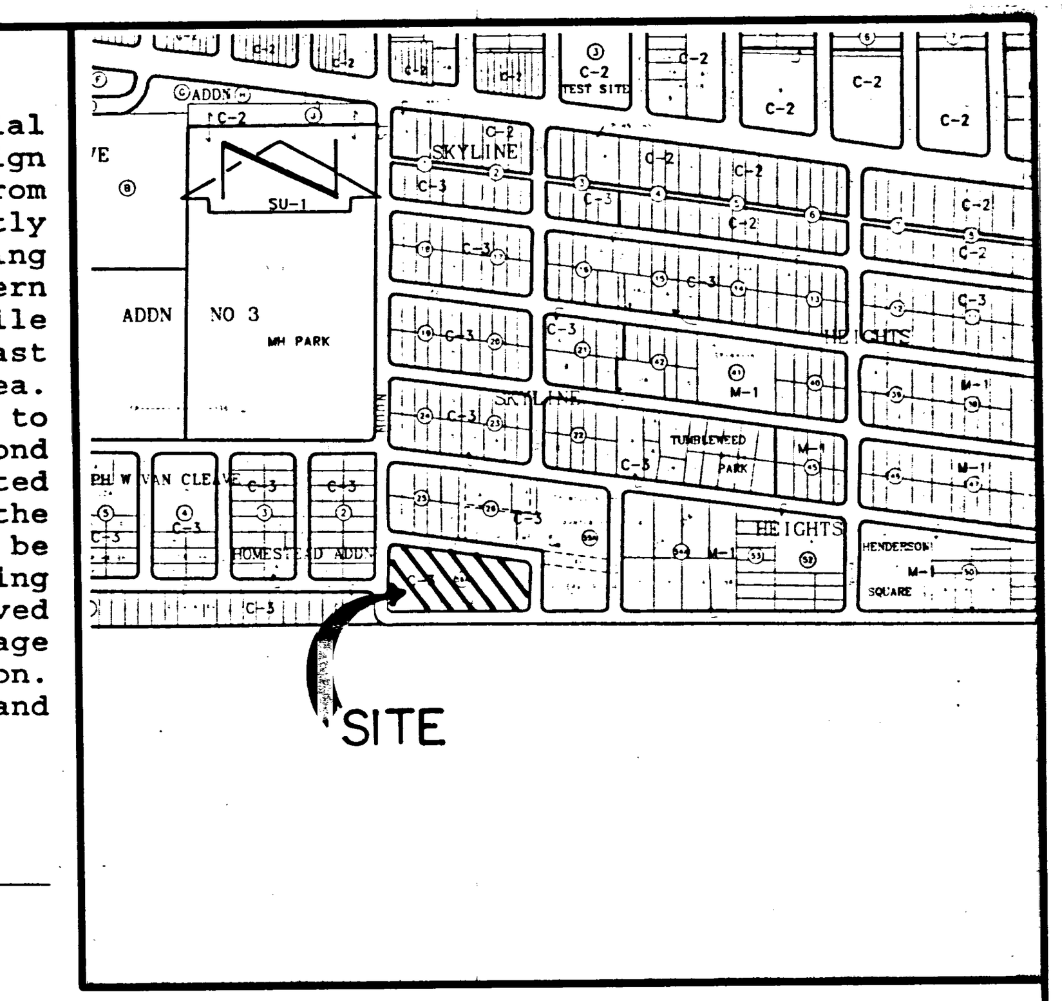
33.61 / 2.42	AS-BUILT ELEVATION
✓	AS-BUILT = AS-DESIGNED
	AS-BUILT CONTOUR

DRAINAGE CERTIFICATION

As indicated by the as-built information shown hereon, this has been completed in substantial compliance with the approved Plan with four modifications: (1) Sub-Basin A1 has less than design volume, however, has sufficient capacity to hold the difference between the calculated runoff from the design storm minus that runoff discharged via the 4" pipe. (2) Sub-Basin A2 pond has slightly greater than design capacity which exceeds the approved plan. (3) The runoff from the new building addition and the new landscaped areas south of the building addition do not exit onto Southern Avenue. The runoff from the building addition drain south into the adjacent landscaped area, while the landscaped area southwest of the building addition drains via a 4" PVC pipe into the east landscaped area. An 8" diameter drain was installed at the low spot to drain this landscaped area. This drain is connected to the newly installed 8" storm drain line that connects Sub-Basin A2 to the existing public storm drain inlet at the southwest corner of the site. The calculated pond volume of this east landscaped area is sufficient to hold the difference between the calculated runoff from the design storm minus that runoff discharged via the drain for the duration of the storm. The runoff generated by the building addition and the adjacent landscaped areas will be discharged from the site at a rate less than approved. (4) The newly paved Handicapped parking spaces at the southwest corner of the existing building exceed ADA requirements. The new paved area does drain in a manner consistant with the approved plan and thus does not present a drainage problem, however, it may represent an accessibility problem beyond the scope of this certification. The As-Built information has been obtained by me or under my direct supervision and is true and correct to the best of my knowledge and belief.

Jeffrey G. Mortensen, NMPE 8547 — 01-24-96 Date

JEFFREY G. MORTENSEN — NEW MEXICO — 8547 — REGISTERED PROFESSIONAL ENGINEER



VICINITY MAP — SCALE: 1" = 750'

L-20

RECEIVED JAN 24 1996 HYDROLOGY DIVISION

JEFF MORTENSEN & ASSOCIATES, INC.
6010-B MIDWAY PARK BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87109
ENGINEERS SURVEYORS (505) 345-4250

GRADING AND DRAINAGE PLAN

SHUBE'S MANUFACTURING, INC.

		NO.	DATE	BY	REVISIONS
DESIGNED BY	M.F.D.	1	01/96	M.D.S.	AS-BUILT AND CERTIFY
DRAWN BY	S.G.H.				
APPROVED BY	J.G.M.				

JOB NO. 930354
DATE 01-1994
SHEET 1 OF 2

DRAINAGE PLAN

The following items concerning the Shube's Manufacturing are contained hereon:

1. Vicinity Map
2. F.I.R.M.
3. Grading Plan
4. Calculations

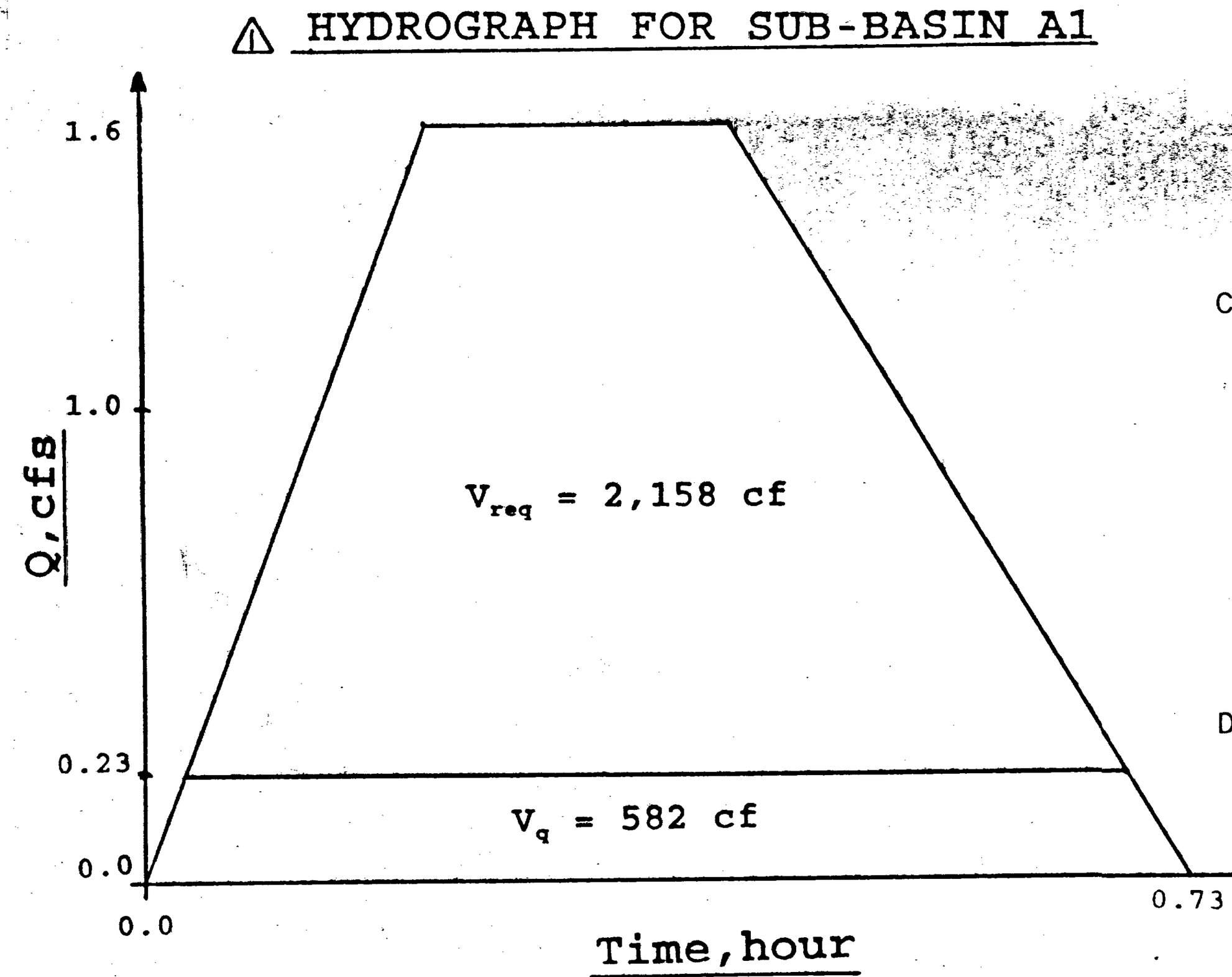
As shown by the Vicinity Map, the site is located on the northeast corner of the intersection of Moon Street S.E. and Southern Avenue S.E. At present, the site consists of an existing building, which will be expanded, along with associated paved and unpaved parking, which will also be expanded.

As shown by Panel 36 of 50 of the National Flood Insurance Program, Flood Insurance Rate Maps for the City of Albuquerque, Bernalillo County, New Mexico, dated October 14, 1983, this site does not lie within a designated AO (depth 1) lies approximately 600' north of and downstream from the site. The site currently drains east to west to Moon Street S.E. The site is bordered on all sides by improved roadways, so no offsite flows enter the site.

The Grading and Drainage Plan shows: 1) existing and proposed grades indicated by spot elevations and contours at 1'0" intervals, 2) the limit and character of the existing improvements, 3) the limit and character of the proposed improvements per the revised site plan, 4) limited future drainage improvements, and 5) continuity between existing and proposed grades. The site is characterized a single basin, with sub-basins created by the new and future parking area at the east edge of the site. This new parking area will also act a s a detention pond, which will discharge its runoff through a 4" PVC pipe. This area is called Sub-Basin A1. The 4" pipe connects to another inlet which will drain finally through an 8" pipe to an inlet located on the southwest corner of the site. The area of the second inlet will be called Sub-Basin A2. Finally a third Sub-Basin called A3, which is a future project, will also be in a sump condition and will also drain to the inlet in Sub-Basin A2. This was done so as to decrease the amount of runoff draining to the existing retention pond. From Basin A2, the pipe will connect to an existing storm inlet located at the southwest corner of the site. The flow through the pipe was calculated assuming a sump condition. The calculations for the Orifice equation is located under the subtitle pond release in the attached calculations. A small building addition to the southeast of the existing building will require the removal and repaving of some of the pavement to allow for the construction of the new building and to enhance positive drainage. The increased runoff created by the new parking lot paving will be detained and then released offsite via an 8" PVC C-900 pipe which connects to the existing storm inlet located on the southwest of the site. The existing onsite ponds will not be altered other than an overall decrease in contributing area. At present, the existing pond retains a portion of the runoff generated upstream with the excess overflowing to Moon Street S.E. per the original Grading and Drainage Plan (L20/D1). Sub-Basin A4 is for reference only. It is the remaining area that is draining into the onsite retention pond. The original area draining into the onsite retention pond consisted of Sub-Basins A1, A2, and A4. Since the amount of area going to this pond has decreased, and also the soil treatment in that area will not be changed, logically a decrease in runoff in this area is expected. No additional impervious area will be developed in conjunction with the building addition which will be replacing existing asphalt paving.

The Calculations which appear hereon analyze both the existing and developed conditions for the 100-year, 6-hour rainfall event. The Procedure for 40-acre and Smaller Basins, as set forth in the Revision of Section 22.2, Hydrology of the Development Process Manual, Volume 2, Design Criteria, dated January, 1993, has been used to quantify the peak rate of discharge and volume of runoff generated. As shown by these calculations, a slight increase in runoff volume with a decrease in peak discharge is anticipated by the proposed improvements.

⚠ HYDROGRAPH FOR SUB-BASIN A1



⚠

DISCHARGE FROM SUB-BASIN A1
Using Feild's Hydraulics Calculator for Gravity Flow in Pipes
Where: s = 0.0328, n = 0.013, d = 4 inches
q = 0.35 cfs

HYDROGRAPH CALCULATIONS FOR SUB-BASIN A1

1. $t_b = (2.017*E_W*A_T/Q_P) - (0.25*A_D/A_T)$
   $t_b = (2.017*2.15*0.35/1.6) - (0.25*0.30/0.35)$
   $t_b = 0.73$ hr

2. $t_p = (0.7*t_c) + ((1.6-(A_D/A_T))/12)$
   $t_p = (0.7*0.2) + ((1.6-(0.30/0.35))/12)$
   $t_p = 0.2$ hr

3. $P_{dur} = 0.25*A_D/A_T$
   $P_{dur} = 0.25*0.30/0.35$
   $P_{dur} = 0.21$ hr

CALCULATIONS

Site Characteristics

1. Precipitation Zone = 3
2. $P_{6,100} = P_{360} =$ 2.60 in.
3. Total Area (A_T) = 2.88 acres
4. Existing Land Treatment

	Treatment	Area (sf/ac)	%
A.	Entire Site		
	B	1,760/0.04	1.4
	C	56,250/1.29	44.8
	D	67,530/1.55	53.8
B.	Sub-Basin A-1	15,120/0.35	100
	C	15,120/0.35	100
C.	Sub-Basin A-2	7,250/0.17	100
	C	720/0.02	10
	D	6,530/0.15	90
D.	Sub-Basin A-3	14,130/0.32	100
	D	14,130/0.32	100

5. Developed Land Treatment

	Treatment	Area (sf/ac)	%
A.	Rest of Site	89,040/2.04	100
	B	4,120/0.09	4.6
	C	40,410/0.93	45.4
	D	44,510/1.02	50.0
B.	Sub-Basin A-1	15,120/0.35	100
	B	2,230/0.05	14.7
	D	12,890/0.30	85.3
C.	Sub-Basin A-2	7,250/0.17	100
	D	7,250/0.17	100
D.	Sub-Basin A-3	14,130/0.32	100
	D	14,130/0.32	100

Existing Condition

A. Entire Site
1. Volume

$E_W = (E_A A_A + E_B + E_C A_C + E_D A_D)/A_T$
$E_W = [(0.92)(0.04)+(1.29)+(2.36)(1.55)]/(2.88) = 1.86$ in.
$V_{100} = (E_W/12)A_T$
$V_{100} = (1.86/12)2.88 = 0.4466$ ac.ft.; 19,450 cf

2. Peak Discharge

$Q_p = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$
$Q_p = Q_{100} = (2.60)(0.04)+(3.45)(1.29)+(5.02)(1.55) = 12.3$ cfs

B. Sub-Basin A-1
1. Volume

$E_W = (E_A A_A + E_B + E_C A_C + E_D A_D)/A_T$
$E_W = [(1.29)(0.35)]/(0.35) = 1.29$ in.
$V_{100} = (E_W/12)A_T$
$V_{100} = (1.29/12)(0.35) = 0.0376$ ac.ft.; 1,640 cf

2. Peak Discharge

$Q_p = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$
$Q_p = Q_{100} = (3.45)(0.35) = 1.2$ cfs

C. Sub-Basin A-2
1. Volume

$E_W = (E_A A_A + E_B + E_C A_C + E_D A_D)/A_T$
$E_W = [(1.29)(0.02)+(2.36)(0.15)]/(0.17) = 2.23$ in.
$V_{100} = (E_W/12)A_T$
$V_{100} = (2.23/12)(0.17) = 0.0316$ ac.ft.; 1,380 cf

2. Peak Discharge

$Q_p = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$
$Q_p = Q_{100} = (3.45)(0.02) + (5.02)(0.15) = 0.8$ cfs

D. Sub-Basin A-3
1. Volume

$E_W = (E_A A_A + E_B + E_C A_C + E_D A_D)/A_T$
$E_W = (2.36)(0.32)/(0.32) = 2.36$ in.
$V_{100} = (E_W/12)A_T$
$V_{100} = (2.36/12)(0.32) = 0.0629$ ac.ft.; 2,740 cf

2. Peak Discharge

$Q_p = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$
$Q_p = Q_{100} = (5.02)(0.32) = 1.6$ cfs

⚠

4. Volume Calculations

a. Volume of Discharge (Trapezoid Method)
$V_q = 2/3*q*((b1+b2)/2)$
$V_q = 2/3*0.35*((39.3+43.8)/2)$
$V_q = 582$ cf

b. Pond Volume Required (V_{req})
$V_{req} = V_{100} - V_q$
$V_{req} = 2{,}740 - 582 = 2{,}158$ cf

c. Pond Volume Provided (Average End Area Method)

Elev(ft)	Area(sf)	Vol(cf)	ΣVol(cf)
37.58	3.0		
		196.0	196.0
38.00	932.0		
		2,011.0	2,207.0
38.67	5,072.0		

$V_{pond} = 2{,}207$ cf

d. Comparison
$V_{pond} > V_{req}$

Developed Condition

A. Rest of Site
1. Volume

$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D)/A_T$
$E_W = [(0.92)(0.09)+(1.29)(0.93)+(2.36)(1.02)]/(2.04) = 1.81$ in.
$V_{100} = (E_W/12)A_T$
$V_{100} = (1.81/12)(2.04) = 0.3075$ ac.ft.; 13,390 cf

2. Peak Discharge

$Q_p = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$
$Q_p = Q_{100} = (2.60)(0.09)+(3.45)(0.93)+(5.02)(1.02) = 8.6$ cfs

B. Sub-Basin A-1
1. Volume

$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D)/A_T$
$E_W = [(0.92)(0.05)+(2.36)(0.30)]/(0.35) = 2.15$ in.
$V_{100} = (E_W/12)A_T$
$V_{100} = (2.15/12)(0.35) = 0.0628$ ac.ft.; 2,740 cf

2. Peak Discharge

$Q_p = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$
$Q_p = Q_{100} = (2.60)(0.05)+(5.02)(0.30) = 1.6$ cfs

⚠ Sub-Basin A-1
Pond Volume (Calculated by the Average End Area Method)

Elev (ft)	Area (sf)	Vol (cf)	Σ Vol (cf)
~~36.60~~ 7.58	0		
		~~322~~ 196	~~322~~ 196
~~37.0~~ 8.0	~~1610~~ 932		
		~~4668.5~~ 2,011	~~4990.5~~ 2,207
38.~~0~~ .67	~~7727~~ 5,072		

(Orifice Equation) (4" PVC C-900)

$Q = CA(2gh)^{1/2}$
⚠ $Q = 0.6(0.0873)[(2)(32.2)(\sout{2.89}\ 2.92)]^{1/2}$
$Q = 0.\sout{78}\ .72$ cfs

C. Sub-Basin A-2
1. Volume

$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D)/A_T$
$E_W = [(2.36)(0.17)/(0.17) = 2.36$ in.
$V_{100} = (E_W/12)A_T$
$V_{100} = (2.36/12)(0.17) = 0.0334$ ac.ft.; 1,460 cf

2. Peak Discharge

$Q_p = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$
$Q_p = Q_{100} = (5.02)(0.17) = 0.9$ cfs

⚠ Sub-Basin A-2
Pond Volume (Calculated by the Average End Area Method)

Elev (ft)	Area (sf)	Vol (cf)	Σ Vol (cf)
~~33.0~~ 32.93	0	~~357.5~~ 493	~~357.5~~ 493
33.~~5~~ .62	1430		

(Orifice Equation) (8" PVC C-900)

$Q = CA(2gh)^{1/2}$
⚠ $Q = 0.6(0.3491)[(2)(32.2)(\sout{2.86}\ 3.10)]^{1/2}$
$Q = \sout{2.8}$ cfs 3.0
$Q_{inlet} = \sout{2.8}\ 3.0 - 0.7 - 0.7 = \sout{1.4}\ 1.6$ cfs $> Q_{subbasin} = 0.9$ cfs

Sub-Basin A-3

1. Volume
   No Change
2. Peak Discharge
   No Change

Sub-Basin A-3
Pond Volume (Calculated by the Average End Area Method)

Elev (ft)	Area (sf)	Vol (cf)	Σ Vol (cf)
32.75	0		
		112.5	112.5
33.0	900		
		3757.5	3870.0
34.0	6615		

(Orifice Equation) (4" PVC C-900)

$Q = CA(2gh)^{1/2}$
$Q = 0.6(0.0873)[(2)(32.2)(2.65)]^{1/2}$
$Q = 0.7$ cfs

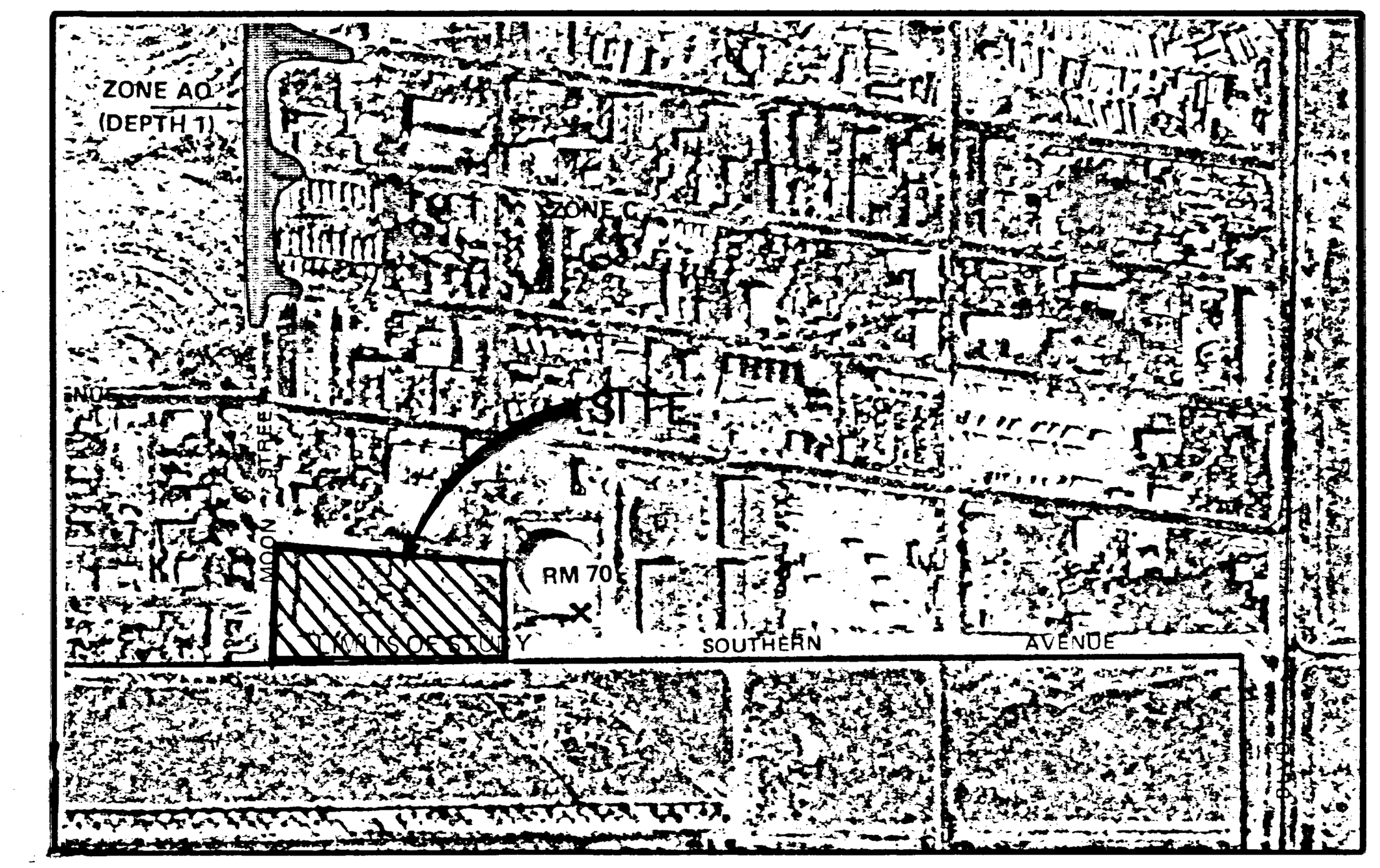
Comparison

A. Entire Site
1. Δ V_{100} = 13,390+2,740+1,380+2,740−19,450 = 800 cf (increase)
2. Δ Q_{100} = 12.3 − 8.6 − 0.7 − 0.7 − 0.9 = 1.4 cfs (decrease)

B. Sub-Basin A-1
1. Δ V_{100} = 2,740 − 1,640 = 1,100 cf (increase)
2. Δ Q_{100} = 1.2 − 0.7 = 0.5 cfs (decrease)

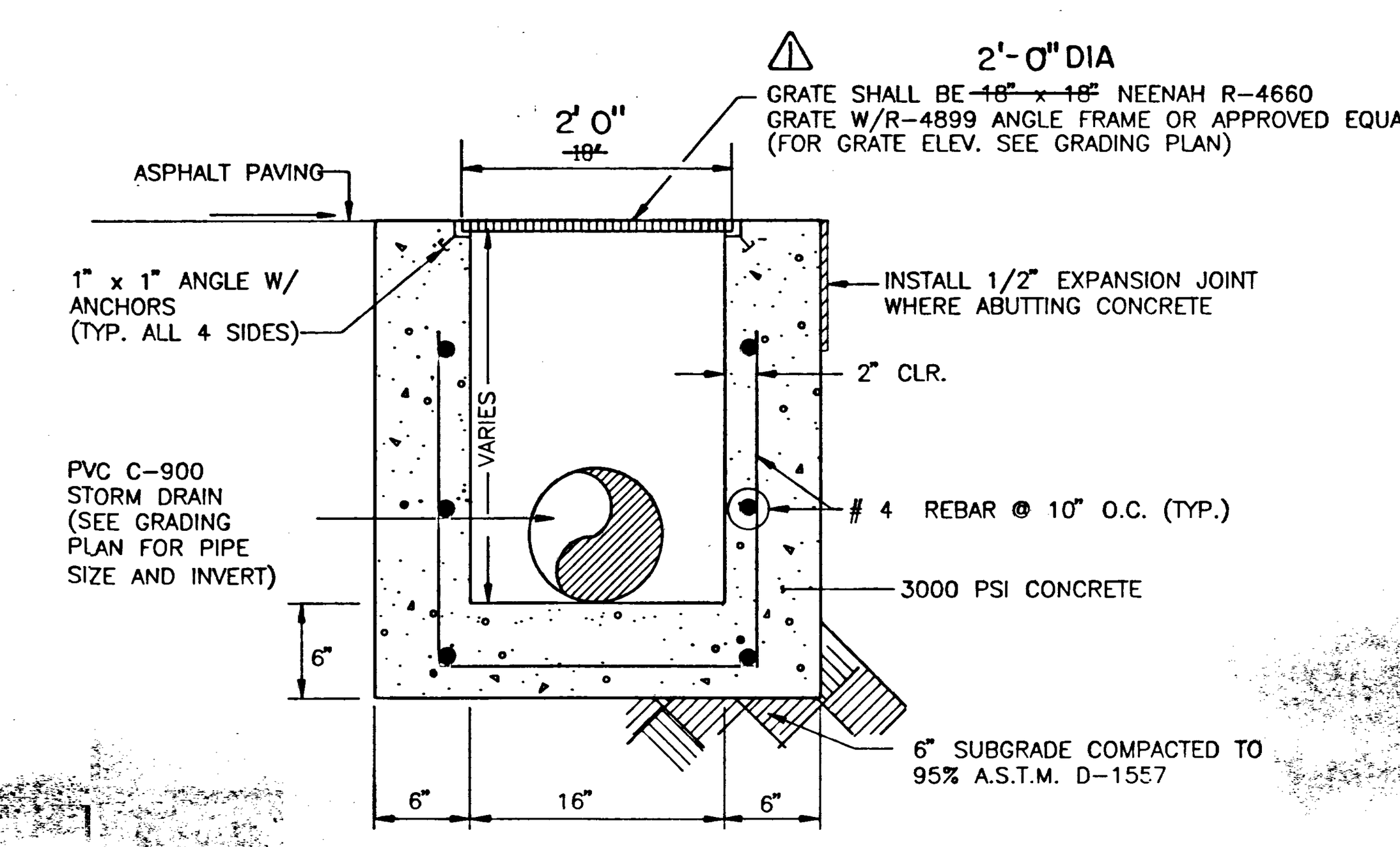
C. Sub-Basin A-2
1. Δ V_{100} = 1,460 − 1,380 = 80 cf (increase)
2. Δ Q_{100} = 0.9 − 0.8 = 0.1 cfs (increase)

D. Sub-Basin A-3
1. Δ V_{100} = 2,740 − 2,740 = 0 cf (no change)
2. Δ Q_{100} = 1.6 − 0.7 = 0.9 cfs (decrease)



F.I.R.M. MAP　　PANEL 36 OF 50

SCALE: 1" = 500'(APPROX)



TYPICAL STORM INLET SECTION

SCALE: 1" = 1' - 0"

Construction Notes:

1. Two (2) working days prior to any excavation, contractor must contact New Mexico One Call System 260-1990, for location of existing utilities.

2. Prior to construction, the contractor shall excavate and verify the horizontal and vertical location of all potential obstructions. Should a conflict exist, the contractor shall notify the engineer in writing so that the conflict can be resolved with a minimum amount of delay.

3. All work on this project shall be performed in accordance with applicable federal, state and local laws, rules and regulations concerning construction safety and health.

4. All construction within public right-of-way shall be performed in accordance with applicable City of Albuquerque Standards and Procedures.

5. If any utility lines, pipelines, or underground utility lines are shown on these drawings, they are shown in an approximate manner only, and such lines may exist where none are shown. If any such existing lines are shown, the location is based upon information provided by the owner of said utility, and the information may be incomplete, or may be obsolete by the time construction commences. The engineer has conducted only preliminary investigation of the location, depth, size, or type of existing utility lines, pipelines, or underground utility lines. This investigation is not conclusive, and may not be complete, therefore, makes no representation pertaining thereto, and assumes no responsibility or liability therefor. The contractor shall inform itself of the location of any utility line, pipeline, or underground utility line in or near the area of the work in advance of and during excavation work. The contractor is fully responsible for any and all damage caused by its failure to locate, identify and preserve any and all existing utilities, pipelines, and underground utility lines. In planning and conducting excavation, the contractor shall comply with state statutes, municipal and local ordinances, rules and regulations, if any, pertaining to the location of these lines and facilities.

6. An Excavation/Construction Permit will be required before beginning any work within City right-of-way. An approved copy of these plans must be submitted at the time of application for this permit.

7. Backfill compaction shall be according to Arterial street use.

8. Maintenance of these facilities shall be the responsibility of the owner of the property served.

9. The design of planters and landscaped areas is not part of this plan. All planters and landscaped areas adjacent to the building(s) shall be provided with positive drainage to avoid any ponding adjacent to the structure. For construction details, refer to landscaping plan.

Erosion Control Measures

1. The contractor shall ensure that no soil erodes from the site into public right-of-way or onto private property. This can be achieved by constructing temporary berms at the property lines and wetting the soil to keep it from blowing.

2. The contractor shall promptly clean up any material excavated within the public right-of-way so that the excavated material is not susceptible to being washed down the street.

3. The contractor shall secure "Topsoil Disturbance Permit" prior to beginning construction.

JAN 2 4 1996
HYDROLOGY DIVISION

APPROVALS	NAME	DATE	
A.C.E./DESIGN			
INSPECTOR			
A.C.E./FIELD			

JEFFREY G. MORTENSEN
NEW MEXICO
8547
REGISTERED PROFESSIONAL ENGINEER
01-24-96

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