

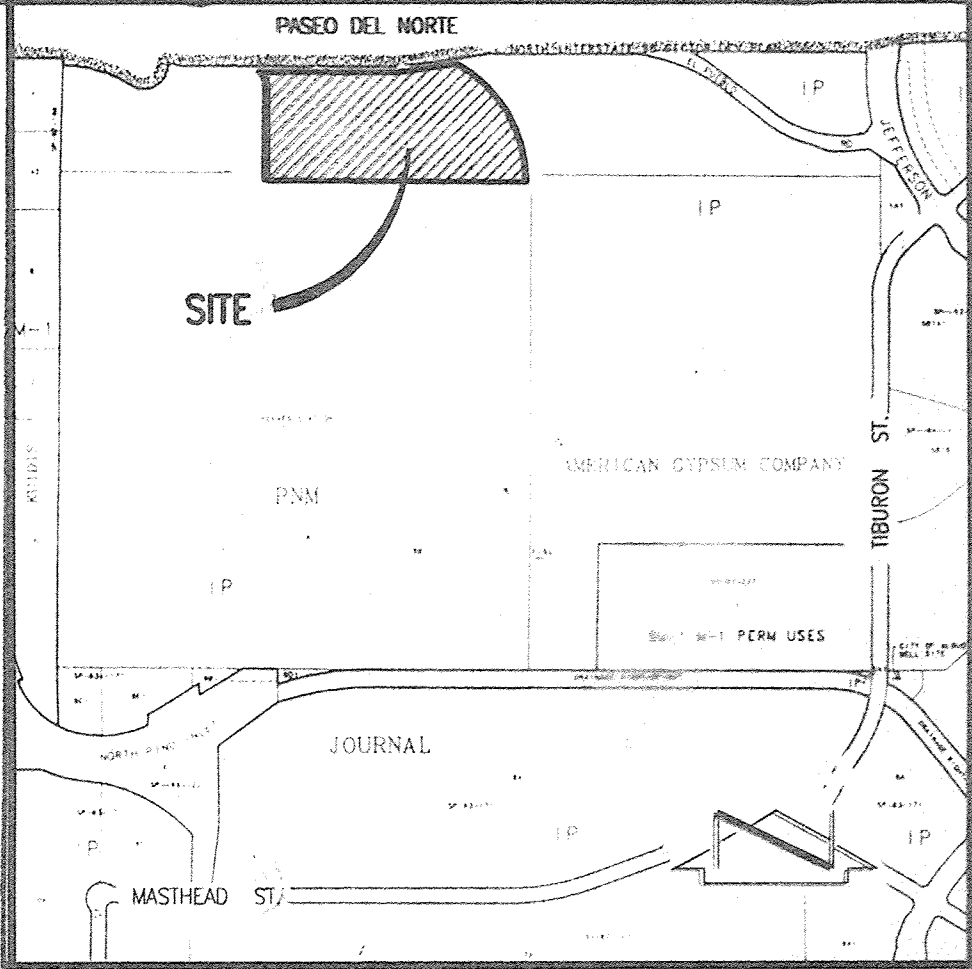
CURVE TABLE					
CURVE	RADIUS	LENGTH	CHORD	BEARING	DELTA
C1	60.00'	56.76'	54.66'	N 26°39'28" W	54°12'03"
C2	523.22'	523.22'	527.03'	S 30°08'05" E	60°28'56"

PROJECT BENCHMARK
STATION IS A STANDARD BRASS TABLE (AMAFCA RIGHT-OF-WAY MARKER) STAMPED, "NAA-9", SET IN CONCRETE PROJECTING 0.3 FEET. THE STATION IS LOCATED AT THE INTERSECTION OF LOS ANGELES BLVD. N.E. AND THE NORTH DIVISION CHANNEL IN THE SOUTHEAST QUADRANT OF THE CROSSING.
ELEVATION = 5069.27 FEET (M.S.L.D.)

T.B.M.
T.B.M. #1
A 12" CHISELED ON TOP OF THE CURB NEAR THE NORTHWEST CORNER OF THE PROPERTY AS SHOWN ON THE DRAWING.
ELEVATION = 5081.01 FEET (M.S.L.D.)

T.B.M. #2
A 12" CHISELED ON TOP OF THE CURB NEAR THE NORTHEAST CORNER OF THE PROPERTY AS SHOWN ON THE DRAWING.
ELEVATION = 5090.12 FEET (M.S.L.D.)

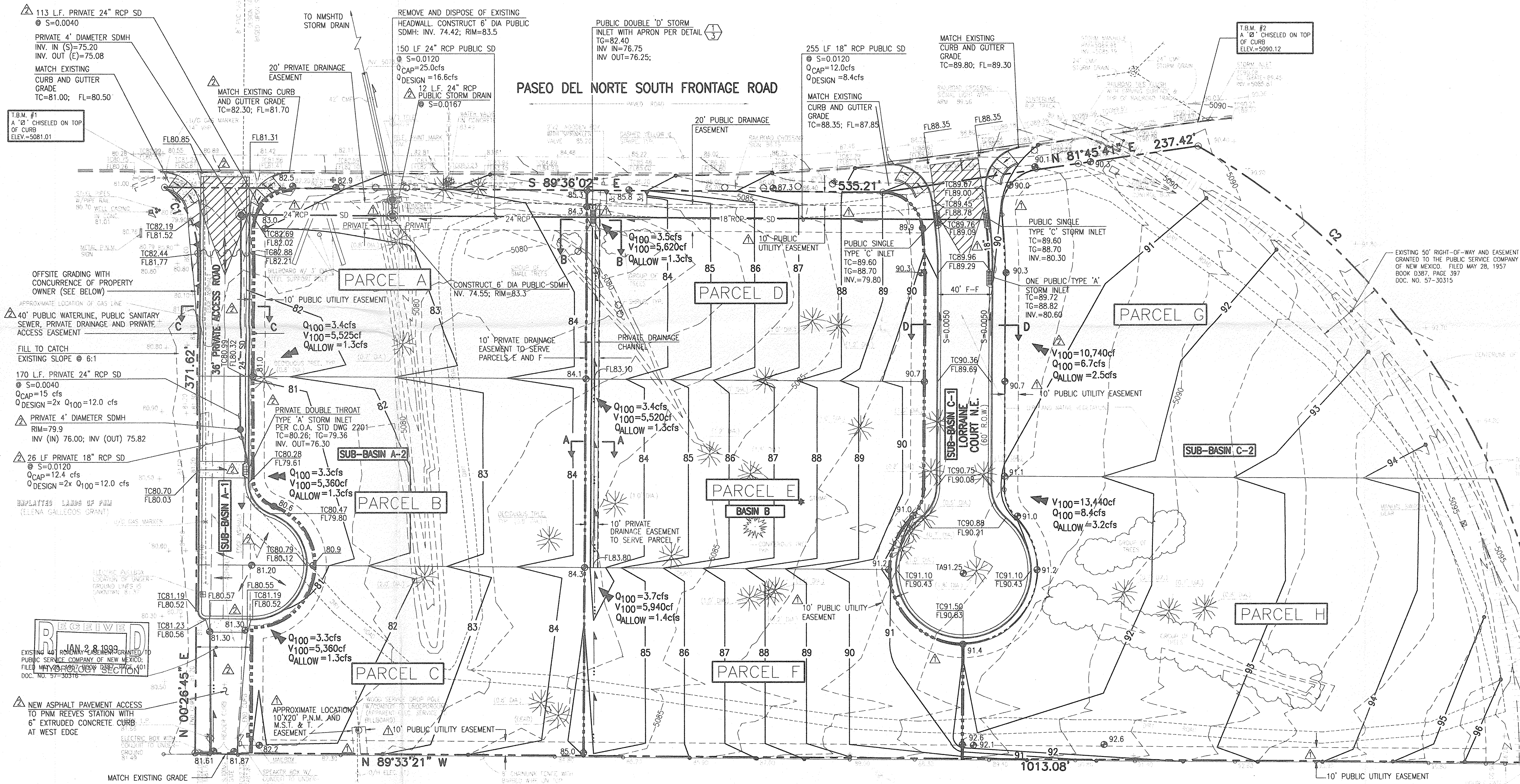
LEGAL DESCRIPTION
EXISTING: EXISTING UNPLATTED LANDS OF THE ALBUQUERQUE ACADEMY
PROPOSED: PARCELS A-H, PASEO DEL NORTE INDUSTRIAL PARK (ORB 98 - 208)



VICINITY MAP
SCALE: 1" = 750'±

D-17

- LEGEND**
- TC: TOP OF CURB
 - FL: FLOWLINE
 - TA: TOP OF ASPHALT
 - EA: EDGE OF ASPHALT
 - TCO: TOP OF CONCRETE
 - S.V.: SPRINKLER VALVE
 - U/G: UNDERGROUND
 - ELEC.: ELECTRIC
 - TELE: TELEPHONE
 - Q/H: OVERHEAD ELECTRIC LINE (NO. OF LINES)
 - U/G T: UNDERGROUND TELEPHONE LINE(S)
 - U/G T: EXISTING SPOT ELEVATION
 - U/G T: EXISTING CONTOUR
 - U/G T: EXISTING CONFIRMED TREE
 - U/G T: EXISTING DECIDUOUS TREE (WITH CALIPER SIZE)
 - U/G T: EXISTING SHRUB
 - U/G T: EXISTING TREE LINE
 - U/G T: EXISTING RAILROAD SPUR
 - U/G T: PROPOSED FLOWLINE
 - U/G T: PROPOSED CONTOUR
 - U/G T: PROPOSED SPOT ELEVATION
 - U/G T: PROPOSED TOP OF CURB
 - U/G T: PROPOSED FLOWLINE ELEVATION
 - U/G T: PROPOSED STORM DRAIN
 - U/G T: PROPOSED BASIN BOUNDARY
 - U/G T: PROPOSED SUB-BASIN BOUNDARY
 - U/G T: HIGH POINT (WATERBLOCK)



NOTE:
THIS IS NOT A BOUNDARY SURVEY. APPARENT PROPERTY CORNERS ARE SHOWN FOR ORIENTATION ONLY. BOUNDARY DATA SHOWN HEREON IS FROM THE BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY JEFF MORTENSEN AND ASSOC., INC. DATED SEPTEMBER, 1998.

APPROVED FOR OFFSITE GRADING:



MASTER DRAINAGE PLAN

PASEO DEL NORTE INDUSTRIAL PARK

APPROVED FOR ROUGH GRADING:

DESIGNED BY: G.R.B.

DRAWN BY: S.G.H./J.Y.R.

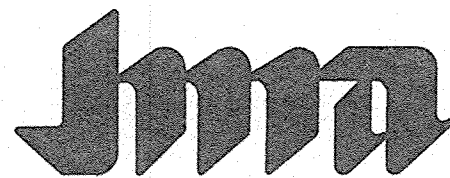
APPROVED BY: J.G.M.

NO.	DATE	BY	REVISIONS
1	1/99	G.M.	SHOW EASEMENTS, REVISED STORM DRAIN LOCATION, CHANGE TITLE
2	1/99	G.M.	REVISE PRIVATE ROADWAY LOCATION

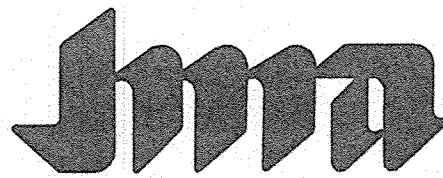
JOB NO. 990031

DATE 01-1999

SHEET 1 OF 3



JEFF MORTENSEN & ASSOCIATES, INC.
6810-B MIDWAY PARK BLVD. NE
ALBUQUERQUE, NEW MEXICO 87109
ENGINEERS SURVEYORS (505) 345-4250



JEFF MORTENSEN & ASSOCIATES, INC.
600-B MIDWAY PARK BLVD. NE.
ALBUQUERQUE, NEW MEXICO 87109
ENGINEERS SURVEYORS (505) 245-4250

DRAINAGE PLAN AND CALCULATIONS PASEO DEL NORTE INDUSTRIAL PARK

EXECUTIVE SUMMARY

THIS PLAN OUTLINES THE DEVELOPMENT SCENARIO THAT WILL GOVERN DEVELOPMENT AT PASEO DEL NORTE INDUSTRIAL PARK AND IDENTIFIES THE STORM RUNOFF DRAINAGE PATTERNS AND THE NECESSARY IMPROVEMENTS TO MITIGATE THE DEVELOPED DRAINAGE PATTERNS. THIS PLAN IS INTENDED TO SUPPORT THE MINOR SUBDIVISION PLATTING ACTION AND ALLOW FOR ROUGH/MASS GRADING OF THE SITE. THE SKETCH PLAT HAS BEEN REVIEWED AND APPROVED BY THE DRB AS CASE NO. DRB-98-208. THE SCOPE OF THE ANTICIPATED DEVELOPMENT CONSISTS OF AN EIGHT LOT INDUSTRIAL PARK SUBDIVISION INCLUDING ASSOCIATED INFRASTRUCTURE. APPROVAL FOR PRELIMINARY PLAT, FINAL PLAT, ROUGH GRADING AND WORK ORDER IS BEING SOUGHT IN CONJUNCTION WITH THIS SUBMITTAL.

INTRODUCTION

A DRAINAGE INFORMATION SHEET, AN INFRASTRUCTURE LIST AND A COPY OF THE PRELIMINARY PLAT ARE INCLUDED WITH THIS SUBMITTAL. A SEPARATE SUBMITTAL WILL BE REQUIRED FOR DEVELOPMENT OF EACH INDIVIDUAL LOT AND WILL BE REQUIRED TO CONFORM WITH THE DRAINAGE PATTERNS AND MITIGATIVE MEASURES OUTLINED HEREIN.

REFERENCES

THE FOLLOWING IS A LIST OF PREVIOUSLY APPROVED GRADING AND DRAINAGE PLANS FOR THIS SITE. THIS LIST MAY NOT BE INCLUSIVE, HOWEVER, REPRESENTS A SUMMARY OF THOSE PLANS WHICH ARE KNOWN TO THIS PREPARER.

1. PLANT WORLD CONCEPTUAL GRADING AND DRAINAGE PLAN FOR SITE DEVELOPMENT PLAN APPROVAL PREPARED BY JEFF MORTENSEN & ASSOCIATES DATED 4/27/90 (D17/D67).

THIS MASTER DRAINAGE PLAN IS CONSISTENT WITH THE DRAINAGE CONCEPTS PREVIOUSLY ESTABLISHED AND APPROVED FOR THIS SITE.

PROJECT DESCRIPTION

AS SHOWN BY THE VICINITY MAP, THIS SITE IS LOCATED ON THE SOUTH SIDE OF THE PASEO DEL NORTE FRONTAGE ROAD, APPROXIMATELY 800 FEET WEST OF JEFFERSON STREET NE. THE SITE IS CURRENTLY ZONED IP. THE CURRENT LEGAL DESCRIPTION IS THE UNPLATTED LANDS OF THE ACADEMY BOYS TRUST, AS SHOWN BY PANEL 136 OF 825 OF THE NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP FOR BERNALILLO COUNTY, NEW MEXICO, AND INCORPORATED AREAS, DATED SEPTEMBER 20, 1996 THIS SITE DOES NOT LIE WITHIN NOR UPSTREAM OF A DESIGNATED FLOOD HAZARD ZONE. THIS SITE ALSO LIES WITHIN AN INFILL AREA. THE PREVIOUS SUBMITTAL REFERENCED ABOVE IDENTIFIES THAT DOWNSTREAM CONDITIONS ALLOW FOR THE CONTINUED FREE DISCHARGE OF RUNOFF FROM THIS SITE DUE TO THE PRESENCE OF AN EXISTING PUBLIC STORM DRAIN SYSTEM WITHIN PASEO DEL NORTE AND THE CLOSE PROXIMITY OF THE SITE TO THE NORTH DIVERSION CHANNEL.

EXISTING CONDITIONS

AS SHOWN BY THE GRADING PLAN, THIS SITE GENERALLY SHEET FLOWS WESTERLY. APPROXIMATELY THREE-QUARTERS OF THE SITE DRAIN TO AN EXISTING 42" CMP CULVERT CONSTRUCTED AS PART OF THE PASEO DEL NORTE IMPROVEMENTS BY THE NEW MEXICO STATE HIGHWAY AND TRANSPORTATION DEPARTMENT (NMSHTD). THE CULVERT DRAINS DIRECTLY INTO THE PUBLIC STORM DRAIN SYSTEM OWNED, OPERATED AND MAINTAINED BY THE NMSHTD. THE REMAINING PORTION OF THE SITE SHEETFLOWS WESTERLY ONTO UNPLATTED PROPERTY OWNED BY THE PUBLIC SERVICE COMPANY OF NEW MEXICO. NO OFFSITE FLOWS IMPACT THE SITE. RUNOFF GENERATED BY THE VACANT PROPERTY TO THE EAST CANNOT ENTER THE SITE BECAUSE THE RAILROAD SPUR SEPARATING THE SITES IS TOPOGRAPHICALLY HIGHER THAN THE EXISTING GRADE AND HENCE BLOCKS POTENTIAL FLOWS. ALTHOUGH TOPOGRAPHICALLY HIGHER, THE CURB & GUTTER IN THE IMPROVED PASEO DEL NORTE FRONTAGE ROAD (A.K.A. EL PUEBLO ROAD NE) CONTAINS THE RUNOFF GENERATED BY THAT ROADWAY, AND CARRIES THE FLOWS WEST AWAY FROM THE SITE. THE PNM REEVES SUBSTATION SOUTH OF THE PROPERTY TOPOGRAPHICALLY PARALLELS THE GRADES OF THIS PROPERTY. PNM HAS ALSO CONSTRUCTED SMALL RETENTION PONDS ALONG THE PROPERTY LINE AND HAS GRADED A BERM ALONG THE FENCELINE AS VISUALLY OBSERVED BY VISITING THE SITE. THE TOPOGRAPHIC SURVEY DOES NOT SHOW THESE BERMS DUE TO THE FACT THAT THE PNM SITE IS FENCED AND ACCESS IS PROHIBITED. SHOULD THE PONDS OVERFLOW, RUNOFF WILL CONTINUE WESTERLY BY SHEETFLOW WITHIN PNM PROPERTY. THE PNM UNPLATTED PROPERTY IS TOPOGRAPHICALLY LOWER; THEREFORE NO OFFSITE FLOWS CAN ENTER THE SITE FROM THE WEST. THE EXISTING GRADES AS INDICATED BY SPOT ELEVATIONS AND CONTOURS AT 1-FOOT INTERVALS SUPPORT THESE OBSERVATIONS.

DEVELOPED CONDITIONS

AS INDICATED ABOVE, THE PROPOSED DEVELOPMENT CONSISTS OF SUBDIVIDING THE PROPERTY INTO EIGHT PARCELS, INCLUDING THE CONSTRUCTION OF ASSOCIATED INFRASTRUCTURE IMPROVEMENTS. THE DEVELOPED CONDITION OF THIS SITE IS CHARACTERIZED BY THREE DRAINAGE BASINS IDENTIFIED AS A, B, & C.

DRAINAGE BASIN A INCLUDES PARCELS A, B, C, AND THE PRIVATE ACCESS ROAD. THE PRIVATE ROAD WILL PROVIDE ACCESS TO THOSE PARCELS, INCLUDING THE PNM REEVES SUBSTATION. THE ROAD WILL CONVEY RUNOFF GENERATED BY THE PROPOSED PAVING AND PARCELS A, B, & C, IMMEDIATELY UPSTREAM. RUNOFF GENERATED BY THE PNM REEVES SUBSTATION WILL NOT ENTER THE ROAD. A SUMP CONDITION IN THE ROAD WILL CONVEY THE RUNOFF INTO TWO TYPE A INLETS FOR INTRODUCTION INTO A PRIVATE STORM DRAIN DISCHARGING NORTHEASTERLY INTO THE NMSHTD 42" CMP CULVERT. THE PRIVATE STORM DRAIN IS SIZED TO CONVEY TWICE THE PEAK DISCHARGE OF RUNOFF GENERATED BY THE 100-YEAR STORM EVENT TO ACT AS THE PRIMARY DRAINAGE SYSTEM, AND TO ALSO SERVE AS AN EMERGENCY OVERFLOW.

BASIN B CONSISTS OF PARCELS D, E, AND F. THESE PARCELS WILL SHEETFLOW WESTERLY TO A PRIVATE DRAINAGE EASEMENT AND 3" PRIVATE DRAINAGE CHANNEL. THE CHANNEL WILL CONVEY THE RUNOFF NORTH TO A DOUBLE TYPE D STORM INLET FOR INTRODUCTION INTO THE EXISTING 42" CMP CULVERT.

BASIN C INCLUDES PARCELS G, H AND THE PUBLIC RIGHT-OF-WAY DESCRIBED AS LORRAINE COURT NE. PARCELS G AND H WILL SHEETFLOW TO LORRAINE COURT NE, WHICH WILL CONVEY THE RUNOFF NORTH TO MULTIPLE TYPE A AND C PUBLIC STORM INLETS. THE INLETS WILL ACCEPT AND CONVEY THE RUNOFF WITHIN A PROPOSED PUBLIC STORM DRAIN SYSTEM DRAINING TO THE EXISTING NMSHTD 42" CMP CULVERT. IF THE SYSTEM BECOMES PLUGGED, THE RUNOFF WILL CONTINUE TO FLOW NORTHERLY INTO THE PASEO DEL NORTE FRONTAGE ROAD, PUBLIC RIGHT-OF-WAY.

THE DOWNSTREAM CAPACITY OF THE NMSHTD STORM DRAIN SYSTEM IS LIMITED. THEREFORE ALL FUTURE DEVELOPMENT FOR THE PARCELS WILL BE RESTRICTED TO 1.66 CFS PER ACRE; DETENTION PONDING WILL BE REQUIRED ON EACH PARCEL AT THE TIME OF DEVELOPMENT. LORRAINE COURT NE AND THE PRIVATE ACCESS ROAD WILL FREELY DISCHARGE INTO THEIR RESPECTIVE STORM DRAIN SYSTEMS, HOWEVER THE DEVELOPED PARCELS WILL BE RESTRICTED. THE TOTAL ALLOWABLE DISCHARGE FROM THIS SITE IS 18.3 CFS, AS IDENTIFIED AS THE EXISTING CONDITION. THE PROPOSED DRAINAGE PATTERNS ARE CONSISTENT WITH THE CURRENT DRAINAGE PATTERNS EXISTING AT THE SITE. THE GRADING PLAN SHOWS SPOT ELEVATIONS AND CONTOURS AT 1 FOOT INTERVALS. THE PLAN ALSO SUPPORTS CONTINUITY BETWEEN THE EXISTING AND PROPOSED GRADES. NO OFFSITE IMPROVEMENTS OR DRAINAGE EASEMENTS ARE REQUIRED. HOWEVER, PRIVATE AND PUBLIC EASEMENTS WILL BE GRANTED AS PART OF THE PLATTING ACTION FOR THE SITE. PUBLIC DRAINAGE IMPROVEMENTS CONTAINED WITHIN THE PUBLIC DRAINAGE EASEMENT WILL BE OWNED, OPERATED AND MAINTAINED BY THE CITY OF ALBUQUERQUE. PRIVATE STORM DRAIN IMPROVEMENTS WILL BE OWNED, OPERATED AND MAINTAINED BY THE OWNERS OF PARCELS A, B, AND C.

CONCLUSION

THE CALCULATIONS WHICH APPEAR HEREON ANALYZE BOTH THE EXISTING AND DEVELOPED CONDITIONS FOR THE 100-YEAR, 6-HOUR STORM EVENT. THE PROCEDURE FOR 40-ACRE AND SMALLER BASINS, AS SET FORTH IN 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 THE CALCULATIONS, AN INCREASE OF PEAK RATE OF DISCHARGE AND VOLUME OF RUNOFF IS ANTICIPATED. THE FIELD'S HYDRAULIC CALCULATOR FOR GRAVITY FLOW IN PIPES WAS USED TO CALCULATE PIPE FLOW CAPACITY. PLATES D-5 AND D-6 IN DPM SECTION 22.3 WERE USED TO CALCULATE FLOW ACCEPTANCE FOR INLETS IN NON-SUMP CONDITIONS. THE PRESSURE EQUATION WAS USED TO CALCULATE INLET CAPACITY AT SUMP CONDITIONS.

SITE CHARACTERISTICS

I. PRECIPITATION ZONE = 2

II. $P_{6,100} = P_{360} = 2.35$ IN.

III. TOTAL AREA (A_T) = 9.3 AC.

IV. EXISTING CONDITIONS

A. LAND TREATMENT

TREATMENT	AREA (SF/AC)	%
A	310,600/7.13	76.7
C	84,400/1.94	20.9
D	10,100/0.23	2.4

B. VOLUME

$$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D) / A_T$$
$$E_W = (0.53(7.13) + 1.13(1.94) + 2.12(0.23)) / 9.3 = 0.69 \text{ IN.}$$
$$V_{100} = (E_W / 12) A_T$$
$$V_{100} = (0.69 / 12) 9.3 = 0.5348 \text{ AC.FT.} = 23,290 \text{ CF}$$

C. PEAK DISCHARGE

$$Q_P = Q_{PA} A_A + Q_{PB} A_B + Q_{PC} A_C + Q_{PD} A_D$$
$$Q_P = Q_{100} = 1.56(7.13) + 3.14(1.94) + 4.70(0.23) = 18.3 \text{ CFS}$$

V. DEVELOPED CONDITIONS

A. BASIN A ($A_T = 2.81$ AC)

1. SUB-BASIN A-1 ($A_T = 0.48$ AC)

a. LAND TREATMENT

TREATMENT	AREA (SF/AC)	%
D	17,310/0.40	83
C	3,500/0.08	17

b. VOLUME

$$E_W = (1.13)(0.08) + (2.12)(0.40) / 0.48 = 1.96 \text{ IN.}$$
$$V_{100} = (1.96 / 12) 0.48 = 0.0784 \text{ AC.FT.} = 3,415 \text{ CF}$$

c. PEAK DISCHARGE

$$Q_P = Q_{100} = (3.14)(0.08) + (0.40)(4.70) = 2.1 \text{ CFS}$$

2. SUB-BASIN A-2 ($A_T = 2.33$ AC)

a. NET AREA PER PARCEL-SUBTRACT 0.13 AC PER PARCEL FOR ACCESS ROAD				
	NET AREA	% OF TOTAL		
PARCEL A = 0.94	AC-0.16 AC = 0.078	AC 34		
PARCEL B = 0.93	AC-0.16 AC = 0.077	AC 33		
PARCEL C = 0.93	AC-0.16 AC = 0.077	AC 33		
	TOTAL = 2.32	AC 100 %		

b. LAND TREATMENT

TREATMENT	AREA (SF/AC)	%
B	15,250/0.35	15.0
D	86,250/1.98	85.0

c. VOLUME

$$E_W = 0.78(0.35) + 2.12(1.98) / 2.33 = 1.92 \text{ IN.}$$
$$V_{100} = (1.92 / 12) 2.33 = 0.373 \text{ AC.FT.} = 16,250 \text{ CF}$$

d. PEAK DISCHARGE

$$Q_P = Q_{100} = 2.28(0.35) + 4.70(1.98) = 10.1 \text{ CFS}$$

e. ALLOWABLE DISCHARGE PER PARCEL

$$Q_{\text{ALLOW}} = 1.65 \text{ CFS } (A_{\text{NET}} = 1.65 (2.33) = 3.8 \text{ CFS})$$
$$\text{PARCEL A (34\%)} Q_{\text{ALLOW}} = 1.3 \text{ CFS}$$
$$\text{PARCEL B (33\%)} Q_{\text{ALLOW}} = 1.3 \text{ CFS}$$
$$\text{PARCEL C (33\%)} Q_{\text{ALLOW}} = 1.3 \text{ CFS}$$

f. RUNOFF PER PARCEL

$$\text{PARCEL A (34\%)} V_{100} = 5525 \text{ CF}$$
$$Q_{100} = 3.4 \text{ CFS}$$
$$\text{PARCEL B (33\%)} V_{100} = 5360 \text{ CF}$$
$$Q_{100} = 3.3 \text{ CFS}$$
$$\text{PARCEL C (33\%)} V_{100} = 5360 \text{ CF}$$
$$Q_{100} = 3.3 \text{ CFS}$$

3. ACCESS ROAD DRAINAGE IMPROVEMENTS

a. ROAD CAPACITY (40' FACE TO FACE) USING DPM PLATE 22.3 D-2
LET: SLOPE = 0.0050
D = 0.67 FT

$$\text{THEREFORE: } Q/2 = 23 \text{ CFS}$$
$$Q = 46 \text{ CFS} >> 6.0 \text{ CFS} = Q_{\text{ALLOW}} \text{ BASIN A}$$

b. RUNOFF DEPTH USING DPM PLATE 22.3 D-2

$$\text{LET: SLOPE} = 0.0050$$
$$\text{THEREFORE: } D = 0.40 \text{ FT FOR } Q_{\text{ALLOW}} = 6.0 \text{ CFS}$$

CALCULATIONS

c. INLET GRATE CAPACITY
SUMP CONDITION
GRATE CAPACITY: (HALF CLOGGED)

$$Q = CA(2gh)^{0.5}$$
$$\text{LET: } C = 0.6$$
$$A = 6.9 \text{ SF} / 2 = 3.5 \text{ SF}$$
$$g = 32.2 \text{ FT/S}^2$$
$$h = 0.90 \text{ FT}$$

$$\text{THEREFORE: } Q = 16.0 \text{ CFS} > 12.0 \text{ CFS} = Q_{100} (/2)$$

USE DOUBLE THROAT TYPE 'A' INLET AT SUMP

d. PIPE CAPACITY
USING FIELD'S WHEEL FOR GRAVITY FLOW IN PIPES (MANNING'S EQUATION)
LET: $s = 0.0040$
 $d = 24 \text{ IN.}$
 $n = 0.013$

$$\text{THEREFORE: } Q_{\text{CAP}} = 15.0 \text{ CFS} > 12.0 \text{ CFS} = Q_{100} = Q_{\text{DESIGN}}$$

PIPE CAPACITY IS GREATER THAN THE Q_{DESIGN} TO SERVE AS BASIN 'A' EMERGENCY "SPILLWAY"

B. BASIN B ($A_T = 2.45$ AC)

1. RUNOFF CALCULATIONS

a. NET AREA PER PARCEL			
	NET AREA	% OF TOTAL	
PARCEL D = 0.8084	AC 32.9		
PARCEL E = 0.7923	AC 32.3		
PARCEL F = 0.8537	AC 34.8		
	TOTAL = 2.4500	AC 100.0	

b. LAND TREATMENT

TREATMENT	AREA (SF/AC)	%
B	15,680/0.36	15.0
D	91,040/2.09	85.0

c. VOLUME

$$E_W = (0.78(0.36) + 2.12(2.09)) / 2.45 = 1.92 \text{ IN.}$$
$$V_{100} = (1.92 / 12) 2.45 = 0.3920 \text{ AC.FT.} = 17,080 \text{ CF}$$

d. PEAK DISCHARGE

$$Q_P = Q_{100} = 2.28(0.36) + 4.70(2.06) = 10.6 \text{ CFS}$$

e. ALLOWABLE DISCHARGE PER PARCEL
 $Q_{\text{ALLOW}} = 1.65 \text{ CFS } (A_{\text{NET}} = 1.65 (2.45) = 4.0 \text{ CFS})$

$$\text{PARCEL D (32.9\%)} Q_{\text{ALLOW}} = 1.3 \text{ CFS}$$
$$\text{PARCEL E (32.3\%)} Q_{\text{ALLOW}} = 1.3 \text{ CFS}$$
$$\text{PARCEL F (34.8\%)} Q_{\text{ALLOW}} = 1.4 \text{ CFS}$$

f. RUNOFF CALCULATIONS PER PARCEL

$$\text{PARCEL D (32.9\%)} V_{100} = 5620 \text{ CF}$$
$$Q_{100} = 3.5 \text{ CFS}$$
$$\text{PARCEL E (32.3\%)} V_{100} = 5520 \text{ CF}$$
$$Q_{100} = 3.4 \text{ CFS}$$
$$\text{PARCEL F (34.8\%)} V_{100} = 5940 \text{ CF}$$
$$Q_{100} = 3.7 \text{ CFS}$$

2. PRIVATE DRAINAGE IMPROVEMENTS

a. TRICKLE CHANNEL
USING MANNING'S EQUATION
LET: $n = 0.013$
 $s = 0.0050$
 $d = 0.5 \text{ FT}$
WIDTH = 3.0 FT.

$$\text{THEREFORE: } Q_{\text{CAPACITY}} = 5.3 \text{ CFS} > 4.1 \text{ CFS} = Q_{\text{ALLOW}}$$

b. INLET GRATE CAPACITY (HALF CLOGGED)
DOUBLE 'D' INLET
 $Q = CA(2gh)^{0.5}$
LET: $C = 0.6$
 $A_{\text{EFF}} = 13.6 \text{ SF} / 2 = 6.8 \text{ SF}$
 $g = 32.2 \text{ FT/S}^2$
 $h = 0.5 \text{ FT}$

$$\text{THEREFORE: } Q_{\text{CAPACITY}} = 23.2 \text{ CFS} > 10.6 \text{ CFS} = Q_{100}$$

c. PIPE CAPACITY
USING FIELD'S WHEEL FOR GRAVITY FLOW IN PIPES
LET: $d = 24 \text{ IN.}$
 $s = 0.0120$
 $n = 0.013$

$$\text{THEREFORE: } Q_{\text{CAP}} = 25.0 \text{ CFS} >> 16.6 \text{ CFS} = Q_{\text{DESIGN}}$$

d. PIPE CAPACITY DESIGN FLOW

$$Q_{\text{DESIGN}} = 20_{100} (\text{BASIN 'B'}) + Q_{100} (\text{BASIN 'C'})$$
$$= 2(4.1) + 8.4 = 16.6 \text{ CFS}$$

C. BASIN C ($A_T = 4.03$ AC)

1. SUB-BASIN C-1 ($A_T = 0.56$ AC)

LORRAINE COURT N.E.
a. LAND TREATMENT

TREATMENT	AREA (SF/AC)	%
C	1760/0.04	7.1
D	22415/0.52	92.9

b. VOLUME

$$E_W = (1.13(0.04) + 2.12(0.52)) / 0.56 = 2.05 \text{ IN.}$$
$$V_{100} = (2.05 / 12) 0.56 = 0.0957 \text{ AC.FT.} = 4170 \text{ CF}$$

$$\text{c. PEAK DISCHARGE}$$
$$Q_P = Q_{100} = 3.14(0.04) + 4.70(0.52) = 2.6 \text{ CFS}$$

2. SUB-BASIN C-2 ($A_T = 3.47$ AC)

a. NET AREA PER PARCEL

NET AREA	%
PARCEL G = 1.54 AC	44.4
PARCEL H = 1.93 AC	55.6

b. LAND TREATMENT

TREATMENT	AREA (SF/AC)	%
B	22,650/0.52	15.0
D	128,500/2.95	85.0

c. VOLUME

$$E_W = (0.78(0.52) + 2.12(2.95)) / 3.47 = 1.92 \text{ IN.}$$
$$V_{100} = (1.92 / 12) 3.47 = 0.5552 \text{ AC.FT.} = 24,180 \text{ CF}$$

d. PEAK DISCHARGE

$$Q_P = Q_{100} = 2.28(0.52) + 4.70(2.95) = 15.1 \text{ CFS}$$

e. ALLOWABLE DISCHARGE PER PARCEL
 $Q_{\text{ALLOW}} = 1.65 \text{ CFS } (A_{\text{NET}} = 1.65 (3.47) = 5.7 \text{ CFS})$

$$\text{PARCEL G (44.4\%)} Q_{\text{ALLOW}} = 2.5 \text{ CFS}$$
$$\text{PARCEL H (56.6\%)} Q_{\text{ALLOW}} = 3.2 \text{ CFS}$$

f. RUNOFF CALCULATIONS PER PARCEL

$$\text{PARCEL G (44.4\%)} V_{100} = 10,740 \text{ CF}$$
$$Q_{100} = 6.7 \text{ CFS}$$
$$\text{PARCEL H (56.6\%)} V_{100} = 13,440 \text{ CF}$$
$$Q_{100} = 8.4 \text{ CFS}$$

3. PUBLIC DRAINAGE IMPROVEMENTS (LORRAINE COURT N.E.)

a. ONE-HALF ROADWAY FLOW DEPTH
USING MANNING'S EQUATION
LET: $s = 0.0050$
 $n = 0.017$
 $d = 48 \text{ FT (CROWN HEIGHT)}$
20' FACE TO CROWN ROADWAY

$$\text{THEREFORE: } Q = 8.6 \text{ CFS}$$

FLOWS EXCEEDING 8.6 WILL CREST ROAD CROWN

b. ROAD DEPTH

USING MANNING'S EQUATION
LET: $Q = 8.6 \text{ CFS}$
 $s = 0.0050$
 $n = 0.017$
40' FACE TO FACE ROADWAY

$$\text{THEREFORE: } d = 0.40 \text{ FT}$$
$$V = 2.1 \text{ FPS}$$
$$Fr = 0.83$$

c. OPTIMUM INLET SPACING

PER FIGURE 6 OF PROPOSED DPM REVISION
LET: $Fr = 0.83$

$$\text{THEREFORE: DISTANCE} = 17.5 \text{ FT } +/-$$

USE 25' MINIMUM SPACING FOR INLETS IN LORRAINE COURT

d. TYPE 'A' INLET CAPACITY

USING DPM PLATE 22.3 D-5
LET: $d = 0.48 \text{ FT}$
 $s = 0.0050$

$$\text{THEREFORE: } Q_{\text{ACCEPTED}} = 5.4 \text{ CFS PER INLET}$$

INSTALL TYPE 'C' INLETS TO ACCEPT RESIDUAL RUNOFF

e. DOWNSTREAM PIPE CAPACITY

USING FIELD'S WHEEL FOR GRAVITY FLOW IN PIPES

LET: $d = 18 \text{ IN.}$
 $s = 0.0120$
 $n = 0.0130$

$$\text{THEREFORE: } Q_{\text{CAP}} = 18.0 \text{ CFS} > 17.8 \text{ CFS} = Q_{100}$$

D. DOWNSTREAM SYSTEM CAPACITY

1. 42 IN. CMP CULVERT
USING FIELD'S WHEEL FOR GRAVITY FLOW IN PIPES

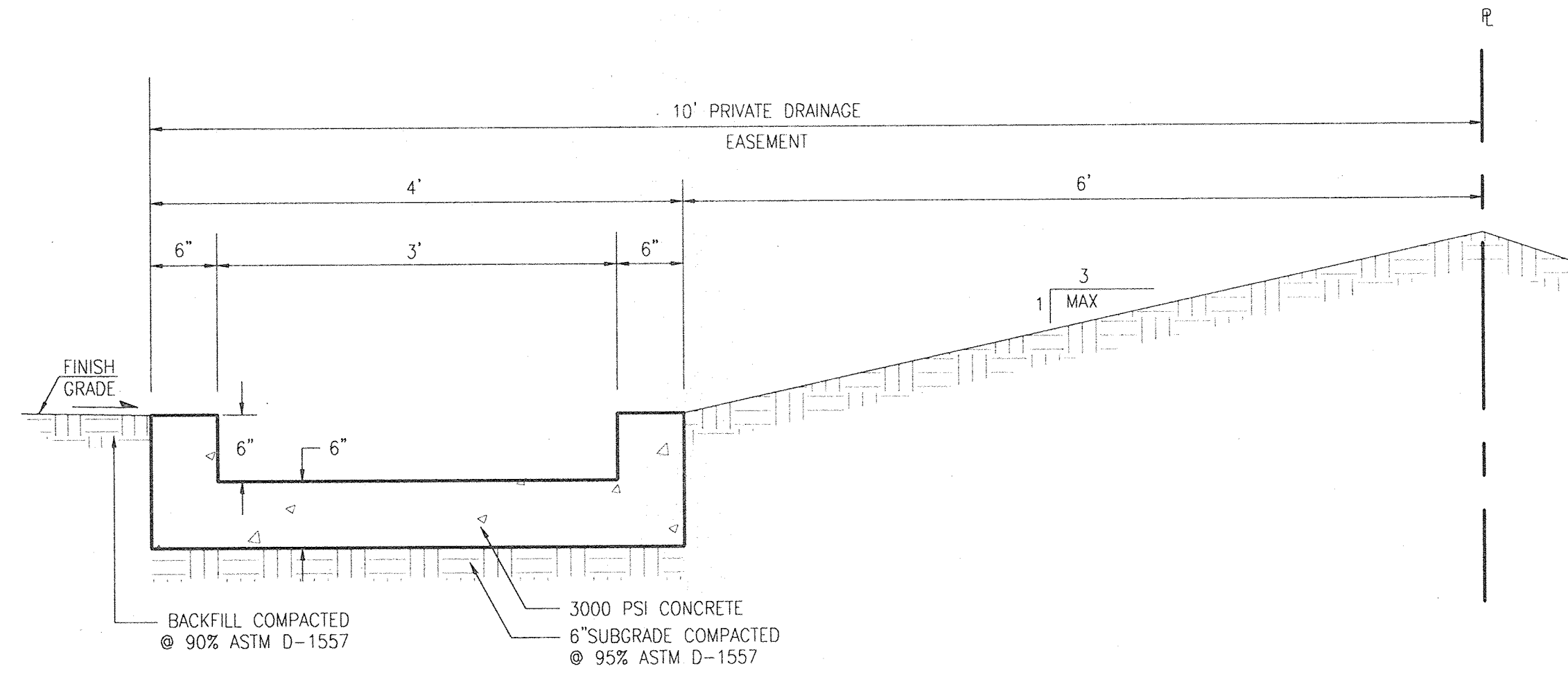
LET: $s = 0.0052$ PER NMSHTD AS-BUILTS
 $n = 0.024$ (CMP)
 $d = 42 \text{ IN. EQUIVALENT FOR 49S X 33R ARCH PIPE}$

$$\text{THEREFORE: } Q_{\text{CAP}} = 44.0 \text{ CFS}$$

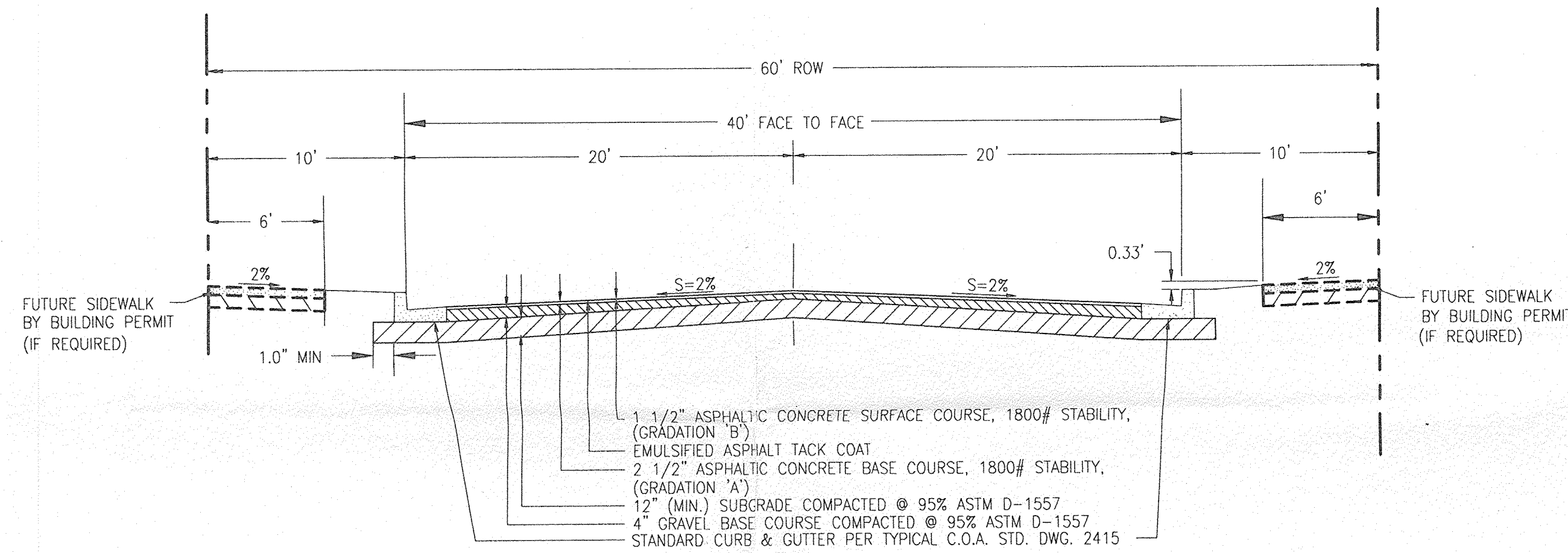
THE 42 IN. CULVERT DOES NOT HAVE ENOUGH CAPACITY TO CARRY ANTICIPATED FLOWS FOR THE FULLY DEVELOPED SITE WITHOUT DETENTION.

$$\text{X. MAXIMUM ALLOWABLE DISCHARGE}$$
$$Q_{\text{ALLOW}} = (Q_{100} (\text{EXISTING}) - Q_{\text{ROADWAYS}}) / (A_{\text{TOTAL}} - A_{\text{ROADWAYS}})$$
$$= (18.3 - 2.1 - 2.6) / (9.3 - 0.48 - 0.56) = 1.65 \text{ CFS PER ACRE}$$

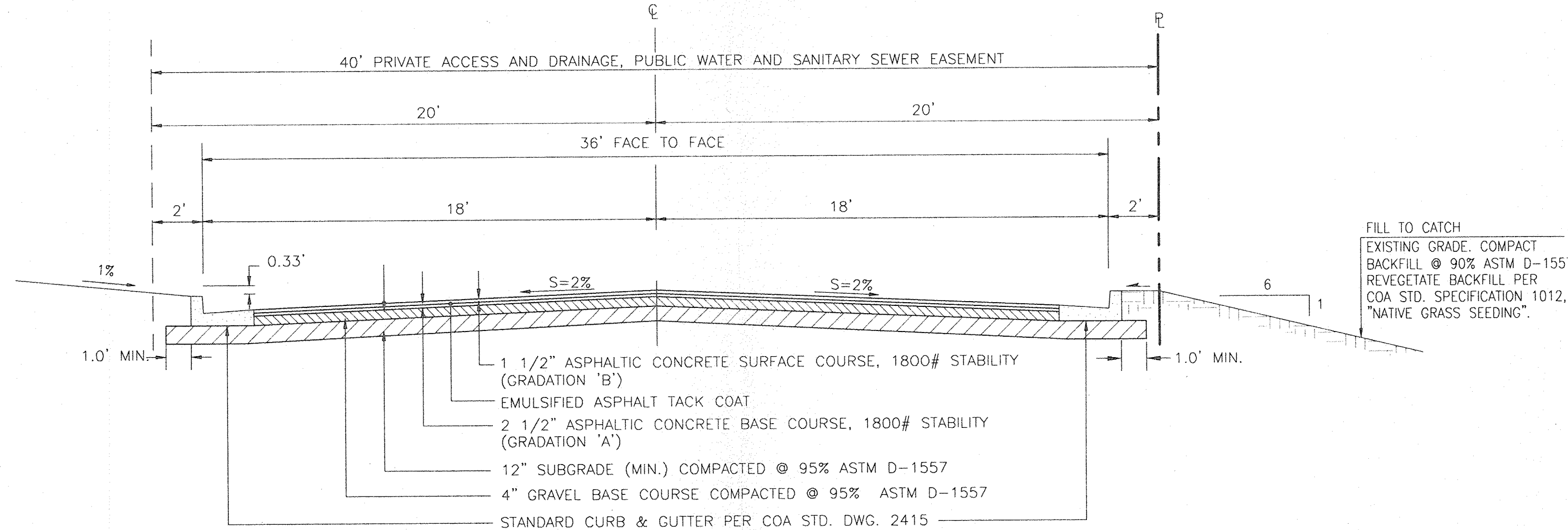
XI. COMPARISON (ENTIRE SITE)



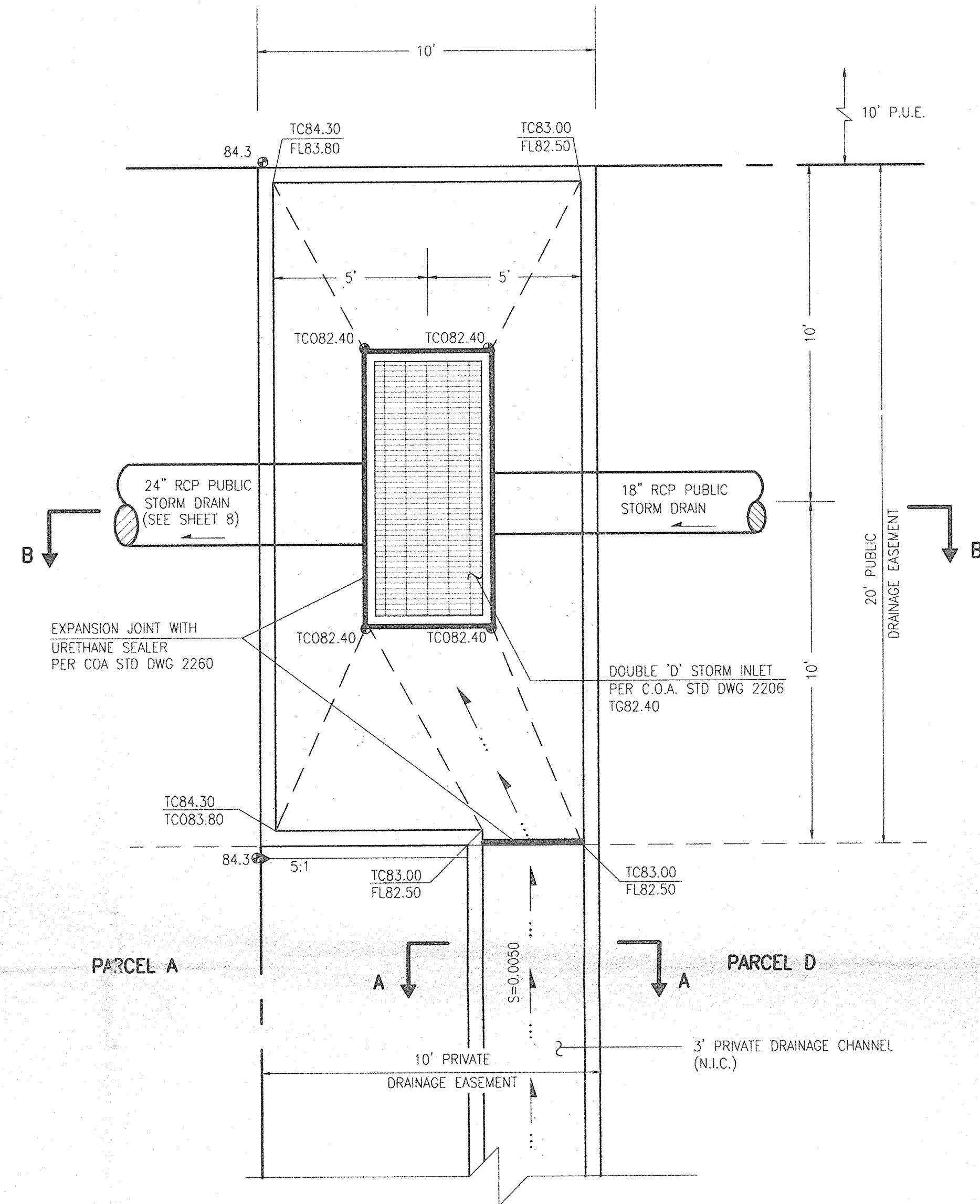
SECTION A-A
SCALE: 1" = 1'



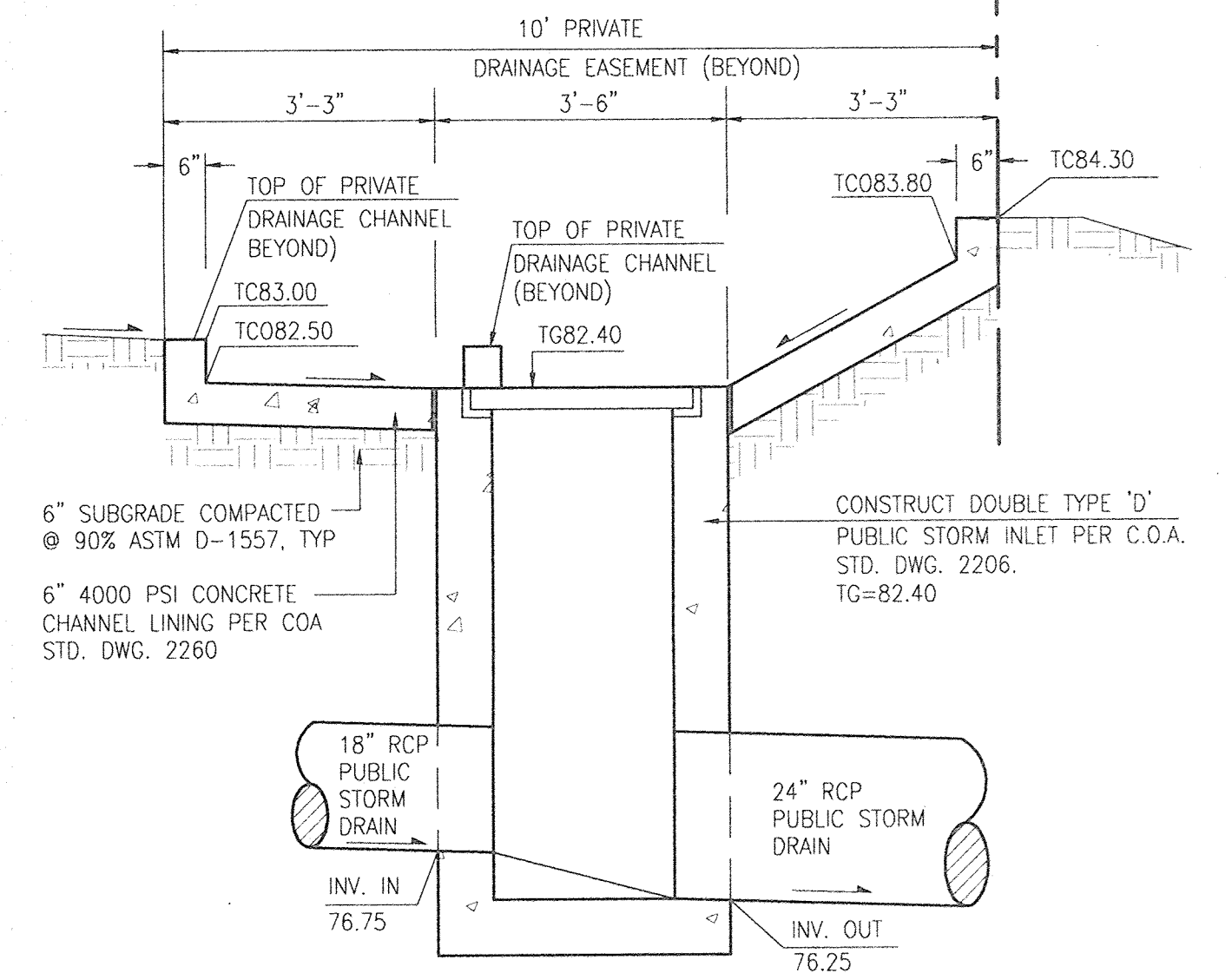
SECTION D-D
SCALE: 1" = 6'



SECTION C-C
SCALE: 1" = 4'-0"



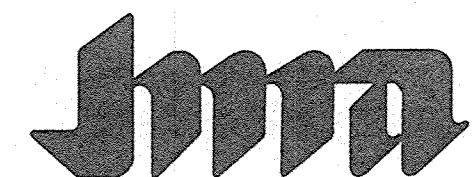
DETAIL 1
SCALE: 1" = 3'



SECTION B-B
SCALE: 1" = 2'



01-28-99
01-07-99 11-18-98



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

SECTIONS AND DETAILS PASEO DEL NORTE INDUSTRIAL PARK

DESIGNED BY	DATE	BY	REVISIONS	JOB NO.
G.R.B.	1/99	G.M.	REVISE SECTIONS AND DETAILS	990031
J.Y.R.	1/99	G.M.	REVISE PRIVATE ROADWAY LOCATION	DATE 01-1999
J.G.M.				SHEET 3 OF 3