facsimile
TRANSMITTAL

to: **Brad Bingham**
fax #: **924-3864**
re: **Meadows Unit 3A**
date: **March 24, 2005**
pages: **, Including this cover sheet.**

File P9/D2

Brad,

Call me.

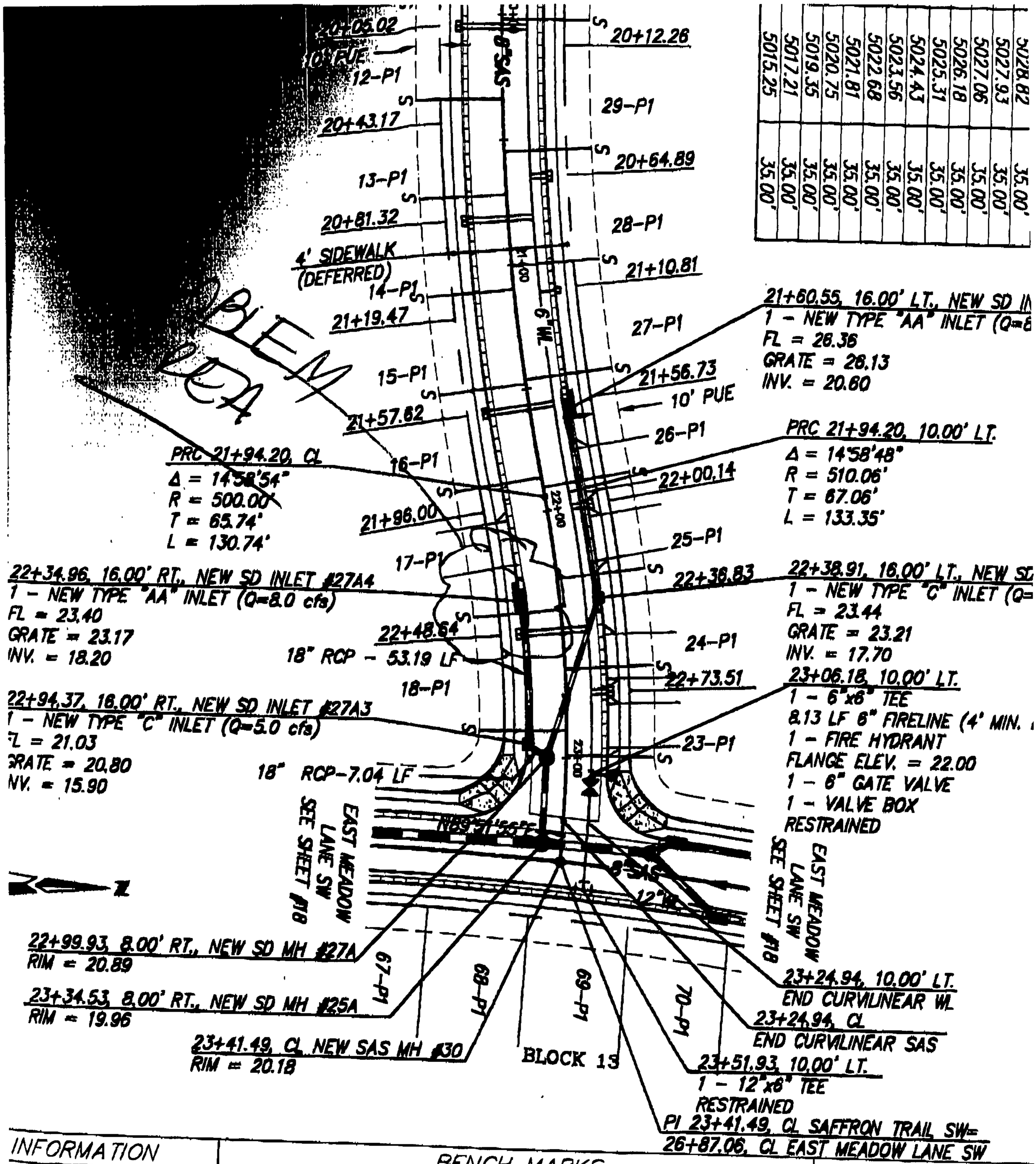
Thanks,

Diane Hoelzer

From the desk of...

Diane Hoelzer. P.E.
Civil Engineer
D.Mark Goodwin & Associates, PA
P.O.BOX 90606
Albuquerque, NM 87199

(505) 828-2200
Fax: 797-9539



5028.82	35.00'
5027.93	35.00'
5027.06	35.00'
5026.18	35.00'
5025.31	35.00'
5024.43	35.00'
5023.56	35.00'
5022.68	35.00'
5021.81	35.00'
5020.75	35.00'
5019.35	35.00'
5017.21	35.00'
5015.25	35.00'

BEM
EA

INFORMATION

NOTES

BY	DATE

BENCH MARKS

STATION "2-P10" IS LOCATED 4.9 MI. SW OF DOWNTOWN ALBUQUERQUE TO REACH STATION FROM INT. OF COORS AND DENNIS CHAVEZ BLVD. (FORMERLY RIO BRAVO), GO N. ON COORS 0.1 MI. TO FLORA VISTA AND GO WEST ON FLORA VISTA 0.5 MI. TO CONDERSHIRE, THEN GO S. ON CONDERSHIRE 0.4

AS BUILT INFO

CONTRACTOR

WORK STAKED BY

INSPECTOR'S ACCEPTANCE BY

FIELD VERIFICATION BY

NO.	DATE	REMARKS	BY

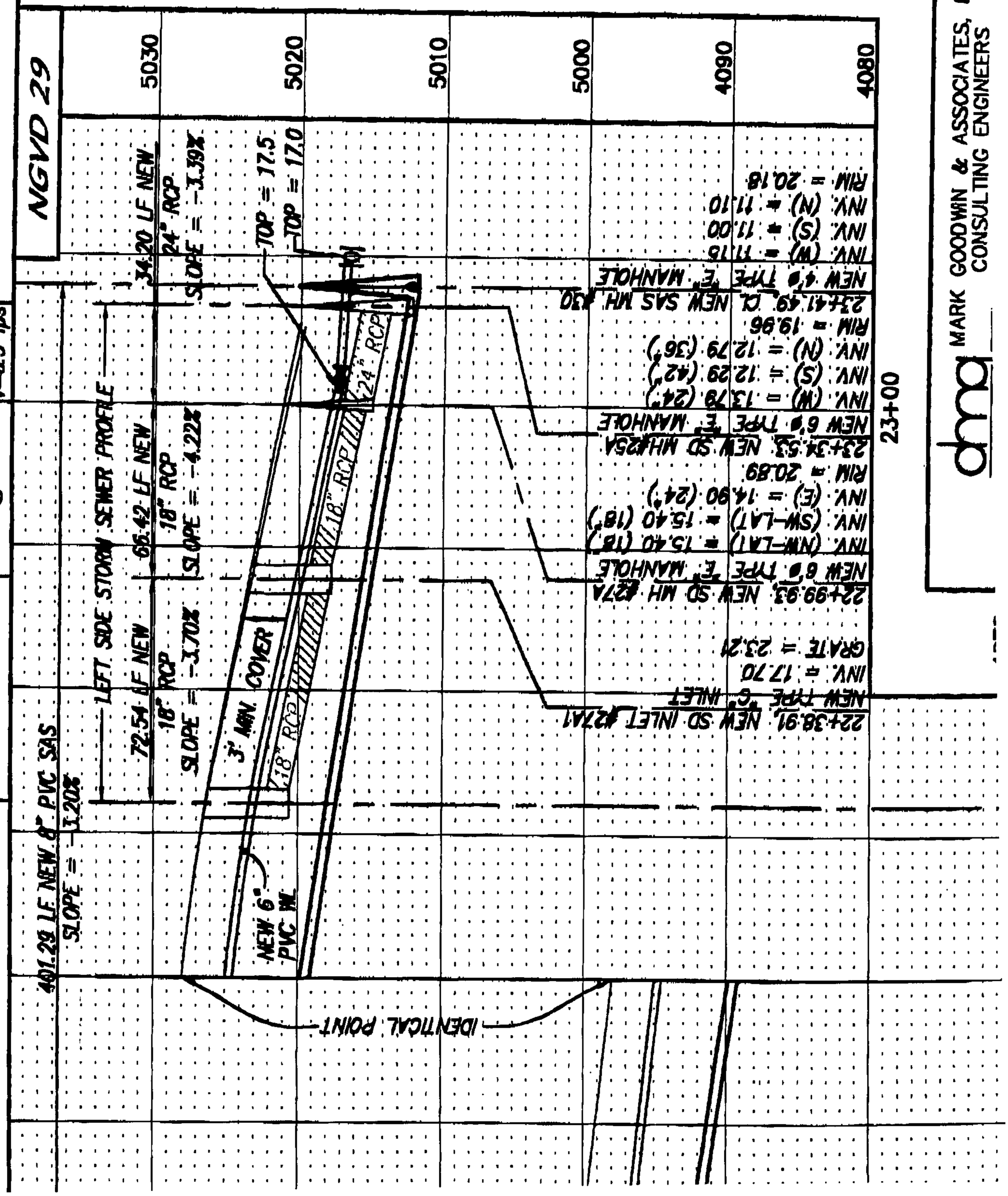
REVISIONS

DESIGN

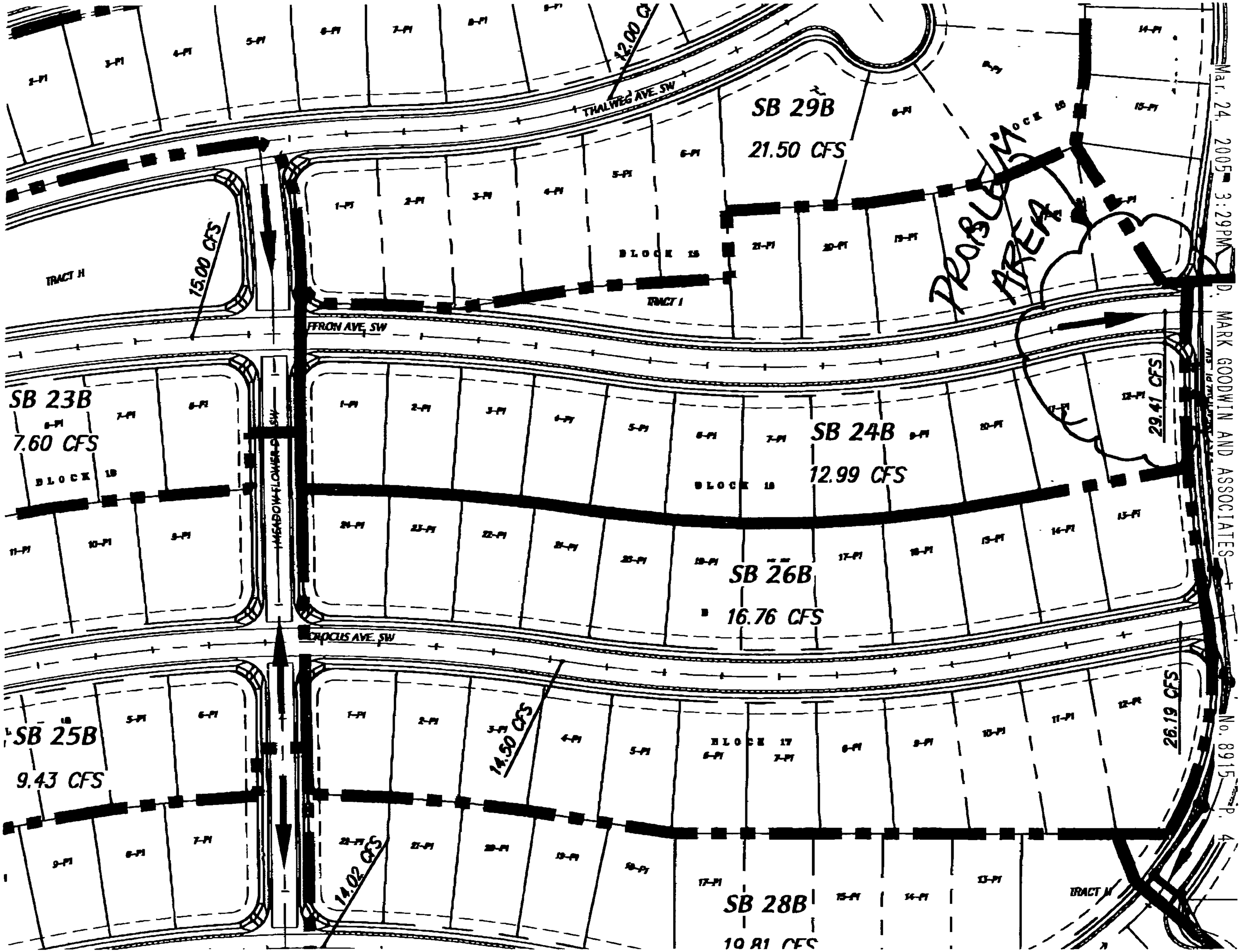
ENGINEER'S SEAL

DUANE HOELZER
NEW MEXICO
11967
REGISTERED PROFESSIONAL ENGINEER

SCALE: 1" = 50'
SAFFRON TRAIL SW
STA. 10+00.00 TO STA. 23+41.49
SCALE: HORZ. 1" = 50'
VERT. 1" = 10'



MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS


THALWEG AVE. SW
12.00 CFS
SB 29B
21.50 CFS
PROBLEM AREA
TRACT H
15.00 CFS
BLOCK 15
TRACT I
FFRON AVE. SW
SB 23B
7.60 CFS
BLOCK 18
MEADOWFLOWER
SB 24B
12.99 CFS
29.41 CFS
SB 26B
16.76 CFS
CROCUS AVE. SW
SB 25B
9.43 CFS
14.50 CFS
BLOCK 17
26.19 CFS
14.02 CFS
SB 28B
TRACT M
Mar. 24. 2005 3:29PM
D. MARK GOODWIN AND ASSOCIATES
No. 8915 P. 4

RIO BRAVO ESTATES
BERNALILLO COUNTY, NEW MEXICO
DISCLOSURE STATEMENT
SEPTEMBER, 1994

Prepared For:
Mr. Jimmie Glenn
Space Homes, Inc.
11209 Paris Avenue N.E.
Albuquerque, N.M. 87111

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

931075

APPENDIX F

DISCLOSURE STATEMENT FORM FOR ALL SUBDIVISIONS CONTAINING 25 OR MORE LOTS OR PARCELS OF LAND

PLEASE READ THIS DISCLOSURE STATEMENT

BEFORE YOU

SIGN ANY DOCUMENT OR AGREE TO ANYTHING

DISCLOSURE STATEMENT

This disclosure statement is intended to provide you with enough information to permit you to make an informed decision on the purchase or lease of property described in this statement. You should read carefully all of the information contained in this statement before you decide to buy or lease the described property. You should be aware of the fact that various state agencies may have issued opinions on both the subdivision proposal and what is said in this disclosure statement about the proposal. These opinions, when required to be issued, whether favorable or unfavorable, are contained in this disclosure statement and should also be read carefully.

The Planning Commission and Board of County Commissioners have examined this disclosure statement to determine whether the subdivider can satisfy what he has said in this disclosure statement. Further, this disclosure statement is not a recommendation or endorsement of the subdivision by either the County or the State. It is informative only.

Finally, the Planning Commission and the Board of County Commissioners recommend that you see the property before buying or leasing it. However, if you do not see the property prior to purchasing or leasing it, you have six months from the time of purchase or lease to inspect the property. Upon inspecting the property, you have three days from the date of inspection to rescind the transaction and receive all of your money back from the subdivider. You must give the subdivider notice of your intent to rescind within three days of your inspection of the property.

1. NAME OF SUBDIVISION

   RIO BRAVO ESTATES

2. NAME AND ADDRESS OF SUBDIVIDER

   SPACE HOMES, INC.
   11209 PARIS N.E.
   ALBUQUERQUE, NEW MEXICO 87111

Sc 2 6 1994

3. NAME AND ADDRESS OF PERSON IN CHARGE OF SALES OR LEASING IN NEW MEXICO

MR. JIMMIE GLENN
SPACE HOMES, INC.
11209 PARIS N.E.
ALBUQUERQUE, NEW MEXICO 87111

4. SIZE OF SUBDIVISION BOTH PRESENT AND ANTICIPATED

Present	Anticipated
1 parcel	119 parcels
31.92 Ac ±	31.92 Ac ±

5. SIZE OF LARGEST PARCEL OFFERED FOR SALE OR LEASE WITHIN THE SUBDIVISION

17,665 sf (0.4055 Ac ±)

6. SIZE OF SMALLEST PARCEL OFFERED FOR SALE OR LEASE WITHIN THE SUBDIVISION

8,000 sf (0.1837 Ac ±)

7. PROPOSED RANGE OF SELLING OR LEASING PRICES

$26,500 IS LOWEST AMOUNT 8,000/sf ± is smallest parcel
$31,000 IS HIGHEST AMOUNT 15,000/sf ± is largest parcel

8. FINANCING TERMS

10% IS MINIMUM DOWN PAYMENT
25 YR. IS MAXIMUM TERM OF LOAN

9. NAME AND ADDRESS OF HOLDER OF LEGAL TITLE

SPACE HOMES, INC. AND SABINO AND ALICE GARCIA
11209 PARIS N.E. 301 BRYN MAWR DRIVE S.E.
ALBUQUERQUE, NM 87111 ALBUQUERQUE, NM 87106

NOTE: IF ANY OF THE PERSONS NAMED ABOVE IS A CORPORATION, PLEASE SET OUT HERE THE NAME AND ADDRESSES OF ALL OFFICERS IN THAT CORPORATION.

JIMMIE GLENN, PRESIDENT AND RICHARD COOK, TREASURER
SPACE HOMES, INC. SPACE HOMES, INC.
11209 PARIS N.E. P.O. BOX 38
ALBUQUERQUE, NM 87111 ESPANOLA, NM 87532

10. NAME AND ADDRESS OF PERSONS HAVING EQUITABLE TITLE

SPACE HOMES, INC AND
11209 PARIS N.E.
ALBUQUERQUE, NM 87111

SABINO AND ALICE GARCIA
301 BRYN MAWR DRIVE S.E.
ALBUQUERQUE, NM 87106

NOTE: IF ANY OF THE PERSONS NAMED ABOVE IS A CORPORATION, PLEASE SET OUT HERE THE NAME AND ADDRESSES OF ALL OFFICERS IN THAT CORPORATION.

JIMMIE GLENN, PRESIDENT
SPACE HOMES, INC.
11209 PARIS N.E.
ALBUQUERQUE, NM 87111

AND

RICHARD COOK, TREASURER
SPACE HOMES, INC.
P.O. BOX 38
ESPANOLA, NM 87532

11. CONDITION OF TITLE

INCLUDE HERE AT LEAST THE FOLLOWING INFORMATION WHERE APPLICABLE:

NUMBER OF MORTGAGES:
ONE MORTGAGE

MORTGAGEE:
FIRST SECURITY BANK

BALANCE OWING ON EACH MORTGAGE:
$328,000.00

SUMMARY OF THE RELEASE PROVISIONS IN EACH MORTGAGE:
PARTIAL OR TOTAL

NUMBER OF ALL REAL ESTATE CONTRACTS ON THE SUBDIVIDED LAND FOR WHICH THE SUBDIVIDER IS MAKING PAYMENTS AS A PURCHASER:
ONE

NAME OF EACH PERSON HOLDING A REAL ESTATE CONTRACT AS OWNER OF THE SUBDIVIDED LAND FOR WHICH THE SUBDIVIDER IS MAKING PAYMENTS AS A PURCHASER:
SCHWARTZMAN ESTATE

BALANCE OWING ON EACH REAL ESTATE CONTRACT:
$60,000.00

SUMMARY OF THE RELEASE PROVISIONS IN EACH REAL ESTATE CONTRACT:
PARTIAL OR TOTAL

STATEMENT OF ANY OTHER ENCUMBRANCES ON THE LAND:
NONE

STATEMENT OF ANY OTHER CONDITIONS RELEVANT TO THE STATE OF THE TITLE:
N/A

12. STATEMENT OF ALL RESTRICTIONS OR RESERVATIONS OF RECORD SUBJECTING THE SUBDIVIDED LAND TO ANY UNUSUAL CONDITIONS AFFECTING ITS USE OR OCCUPANCY

NONE

13. ESCROW AGENT

NONE

14. UTILITIES

TELEPHONE: U.S. WEST COMMUNICATIONS	Estimated Cost Not Yet Available
ELECTRIC: PUBLIC SERVICE CO. OF NM	Estimated Cost Not Yet Available
NATURAL GAS: GAS CO. OF NEW MEXICO	Estimated Cost Not Yet Available
WATER: CITY OF ALBUQUERQUE	Estimated Cost Not Yet Available

(Note: Costs will be borne by Developer)

15. INSTALLATION OF UTILITIES

(water)	will be provided by Developer prior to occupation of each lot
(phone)	will be provided by Developer prior to occupation of each lot
(electric)	will be provided by Developer prior to occupation of each lot
(gas)	will be provided by Developer prior to occupation of each lot
(liquid waste disposal)	will be provided by Developer prior to occupation of each lot
(solid waste disposal)	Not Applicable

16. UTILITY LOCATION

UTILITIES, AS LISTED ABOVE, WILL BE PROVIDED TO EACH LOT. EACH UTILITY WILL BE UNDERGROUND.

17. WATER USE

WATER WILL BE MADE AVAILABLE FOR DOMESTIC (RESIDENTIAL) USE VIA A PUBLIC (CITY OF ALBUQUERQUE) WATERLINE EXTENSION. LIMITATIONS WILL NOT BE IMPOSED BY THE SUBDIVIDER. A COPY OF THE WATER AVAILABILITY STATEMENT FROM THE CITY IS PROVIDED. DESIGN AND CONSTRUCTION WILL BE IN ACCORDANCE WITH THE CITY OF ALBUQUERQUE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1986 EDITION (UPDATE 5).

18. AMOUNT OF WATER

AS STATED ABOVE, WATER IS AVAILABLE FROM THE CITY OF ALBUQUERQUE. THE QUANTITY OF WATER TO BE PROVIDED WILL BE ADEQUATE FOR RESIDENTIAL DOMESTIC USE. WATER WILL BE AVAILABLE PRIOR TO THE SALE OF EACH RESPECTIVE LOT.

19. WATER DELIVERY

WATER WILL BE MADE AVAILABLE TO THIS SUBDIVISION VIA A PUBLIC WATERLINE EXTENSION TO BE MAINTAINED AND OPERATED BY THE CITY OF ALBUQUERQUE. DESIGN AND CONSTRUCTION WILL BE IN ACCORDANCE WITH THE CITY OF ALBUQUERQUE STANDARD SPECIFICATIONS FOR

PUBLIC WORKS CONSTRUCTION, 1986 EDITION (UPDATE 5).

20. WATER SYSTEM EXTENSION

THE PUBLIC WATER SYSTEM EXTENSION DISCUSSED ABOVE WILL BE CONSTRUCTED BY THE SUBDIVIDER AT ITS EXPENSE. PROSPECTIVE LOT OWNERS WILL NOT BE REQUIRED TO MAKE SEPARATE PAYMENTS FOR THESE IMPROVEMENTS. THE WATER SYSTEM EXTENSION WILL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE CITY OF ALBUQUERQUE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION - 1986 EDITION (UPDATE NO. 5).

21. LIFE EXPECTANCY OF THE WATER SUPPLY

THE SOURCE OF WATER FOR THIS SUBDIVISION IS THE CITY OF ALBUQUERQUE. BECAUSE OF THIS, THE LIFE EXPECTANCY OF THE WATER SUPPLY IS BELIEVED TO BE INFINITE.

22. WELLS

NOT APPLICABLE

23. SURFACE WATER

NOT APPLICABLE

24. STATE ENGINEER'S OPINION ON WATER

SEE EXHIBIT 'B'

25. WATER QUALITY

WATER IS AVAILABLE FROM THE CITY OF ALBUQUERQUE AND IS BELIEVED TO MEET OR EXCEED ALL LOCAL, STATE, AND NATIONAL WATER QUALITY PARAMETERS.

26. ENVIRONMENTAL IMPROVEMENT AGENCY'S OPINION ON WATER QUALITY

SEE EXHIBIT 'C'

27. LIQUID WASTE DISPOSAL

SANITARY SEWER IS AVAILABLE FROM THE CITY OF ALBUQUERQUE PER THE STATEMENT OF AVAILABILITY ATTACHED; ONSITE LIQUID WASTE DISPOSAL IS NOT PROPOSED. THE SANITARY SEWER EXTENSION WOULD BE PUBLIC. DESIGN AND CONSTRUCTION WILL BE IN ACCORDANCE WITH THE CITY OF ALBUQUERQUE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1986 EDITION (UPDATE 5).

28. ENVIRONMENTAL IMPROVEMENT AGENCY'S OPINION ON LIQUID WASTE DISPOSAL

SEE EXHIBIT 'C'

29. SOLID WASTE DISPOSAL

SOLID WASTE DISPOSAL WILL BE AVAILABLE BY INDEPENDENT CONTRACTOR. TO BE ENGAGED BY THE HOMEOWNERS ASSOCIATION, SOLID WASTE WILL BE HAULED TO AN APPROVED PUBLIC LANDFILL. CURBSIDE PICK-UP IS PROPOSED.

30. ENVIRONMENTAL IMPROVEMENT AGENCY'S OPINION ON SOLID WASTE

SEE EXHIBIT 'C'

31. TERRAIN MANAGEMENT

THE SOILS PRESENT ON THE SITE, PER SHEET 40 OF THE "SOIL SURVEY OF BERNALILLO COUNTY AND PARTS OF SANDOVAL AND VALENCIA COUNTIES, NEW MEXICO," PREPARED BY THE SOIL CONSERVATION SERVICE, 1977, INDICATES THE PRESENCE OF THREE SOIL TYPES. OF THE THREE TYPES PRESENT, Gm (GLENDALE CLAY LOAM), IS MORE PREVALENT. THE GF (GILA COMPLEX, MODERATELY ALKALI), IS THE LEAST PREVALENT AND LIES IN THE SOUTHEAST CORNER OF THE SITE. FINALLY Gb (GILA LOAM) WHICH EXTENDS FROM THE NORTHEAST CORNER OF THE SITE TO THE SOUTHERN PORTION OF THE SITE, ACTS AS A BUFFER BETWEEN THE Gm AND GF SOIL TYPES.

BASED UPON THE REVIEW OF THE "SOIL SURVEY" AND THE PREDOMINANCE OF RESIDENTIAL DEVELOPMENT SURROUNDING THE SITE, THE SITE SOILS ARE SUITABLE FOR RESIDENTIAL USE WITHOUT SEASONAL RESTRICTIONS.

AS SHOWN ON PANEL 40 OF 50 OF THE NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAPS (F.I.R.M.) FOR THE CITY OF ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO, DATED OCTOBER 14, 1983, THIS SITE LIES IN A DESIGNATED FLOOD HAZARD ZONE. THE TOPOGRAPHY OF THE SITE IS FLAT WITH VERY LITTLE RELIEF. NO LOTS HAVE SLOPES EXCEEDING 8%. LOTS 29, 55, 56, 57, 58, 59, 60, 61, 62, 64, 65, 69, 70, 71, 114, 115, 116, 117, 118, AND 119 LIE IN A FLOOD ZONE.

THE WATER TABLE AT TRACT 3, LOCATED JUST NORTH OF THE SITE IS APPROXIMATELY 11.5' BELOW THE SURFACE, THIS RESULT IS PER TESTING DONE 11/9/91 BE GEO-TEST. THE SAN JOSE DRAIN LIES TO THE NORTHWEST OF THE SITE AND LIES APPROXIMATELY TEN FEET BELOW THE SITE. IT DRAINS FROM NORTH TO SOUTH. THE SAN JOSE LATERAL WHICH LIES ONSITE HAS BEEN ABANDONED AND VACATED. PER FIGURE TM-1A AND TM-1B, THE SITE WILL REQUIRE GRADING TO CONSTRUCT THE NEW ROADS AND STORM DRAIN SYSTEM. THE SITE WILL BE DIVIDED INTO TWO BASINS OF SIMILAR SIZE. EACH BASIN WILL DRAIN TOWARDS SEPARATE STORM DRAIN SYSTEMS LOCATED NEAR THE N.W. CORNER OF THE SITE. THE STORM DRAINS WILL THEN DISCHARGE INTO THE SAN JOSE DRAIN. FREE DISCHARGE INTO THE DRAIN IS PROPOSED FOR THIS SITE. THE AVAILABLE CAPACITY OF THE OF THE SAN JOSE DRAIN ADJACENT TO THIS SITE IS ADEQUATE TO RECEIVE FREE DISCHARGE FROM RIO BRAVO ESTATES. DOWNSTREAM CAPACITY IS 776.6 CFS WHICH IS CALCULATED AS THE HYDRAULIC CAPACITY OF THE DOWNSTREAM 114 INCH CULVERTS. UPSTREAM CAPACITY IS LIMITED BY

THE 60 INCH CULVERTS WHICH ARE CAPABLE OF HANDLING ONLY 401.0 CFS. THIS LEAVES A RESIDUAL CAPACITY OF 375.6 CFS WHICH IS FAR LESS THAN THE CONTRIBUTION CALCULATED FOR THE DEVELOPED SUBDIVISION. FURTHERMORE, THE AVAILABLE CAPACITY IS NOT NEEDED BY OTHERS WITHIN THE WATERSHED. THE LOVELACE URGENT CARE CLINIC AND THE VETERINARY CLINIC ARE BOTH FULLY DEVELOPED SITES WITH 100% RETENTION. THE LATTER DAY SAINTS SITE ALSO CONTAINS ITS RUNOFF. THE LAND WHICH LIES TO THE EAST OF PRINCE STREET S.E. DRAINS TO A DEPRESSION LOCATED AT THE SOUTHEAST CORNER OF THE EXISTING INTERSECTION OF PRINCE STREET AND RIO BRAVO S.E. AND HENCE IS PHYSICALLY INCAPABLE OF DRAINING TO THE SAN JOSE DRAIN. NO OFFSITE FLOWS CONTRIBUTE TO THE BECAUSE 1) THE CLINICS LOCATED TO THE NORTH POND THEIR RUNOFF, 2) THE RAILROAD LIES TOPOGRAPHICALLY HIGHER, ACTING AS A BERM FOR FLOWS FROM THE WEST, 3) PRINCE STREET IS TOPOGRAPHICALLY LOWER ON THE EAST SIDE, AND 4) THE SITE HAS A NATURAL BERM BLOCKING OFFSITE FLOWS FROM THE SOUTH WHERE THE TOPOGRAPHY IS ROUGHLY PARALLEL TO THIS SITE. FIGURE TM-2 CONTAINS THE FOLLOWING MAPS:

A) VICINITY MAP
B) FLOODPLAIN MAP
C) SOILS MAP

THE TERRAIN MANAGEMENT PLAN AND CALCULATIONS ARE ALSO INCLUDED ON FIGURE TM-2.

32. NATURAL RESOURCES CONSERVATION DISTRICT'S OPINION ON TERRAIN MANAGEMENT.

SEE EXHIBIT 'D'

33. SUBDIVISION ACCESS

SITE IS LOCATED WITHIN THE ALBUQUERQUE METROPOLITAN AREA AND IS APPROXIMATELY 6.3 MILES FROM DOWNTOWN. THIS DISTANCE IS MEASURED, FROM GOING EAST ON RIO BRAVO BLVD., NORTH ON I-25, WEST ON GRAND AVE. ACCESS TO THE SUBDIVISION IS AVAILABLE BY CONVENTIONAL VEHICLES, IN ALL SEASONS AND WEATHER CONDITIONS. THE ROADS SHALL BE AT LEAST 24' WIDE AND PAVED WITH ASPHALTIC CONCRETE.

34. STATE HIGHWAY DEPARTMENT'S OPINION ON ACCESS

SEE EXHIBIT 'E'

35. DEVELOPMENT

NO ONSITE RECREATION FACILITIES OR COMMUNITY IMPROVEMENTS ARE PROPOSED; THE DEVELOPER, PER COUNTY ORDINANCE, WILL PAY PARK FEES AS A CONDITION FOR PLAT APPROVAL.

36. MAINTENANCE

THE DEVELOPER WILL CONSTRUCT THAT PUBLIC INFRASTRUCTURE OUTLINED IN THE INFRASTRUCTURE LIST ATTACHED AS EXHIBIT 'F'. UPON ACCEPTANCE OF THE CONSTRUCTED IMPROVEMENTS, THE CITY OF ALBUQUERQUE WILL OPERATE AND MAINTAIN THE PUBLIC WATER AND SANITARY SEWER LINES. THE COUNTY WILL OPERATE AND MAINTAIN THE PUBLIC ROADWAY AND STORM DRAINAGE IMPROVEMENTS.

37. ADVERSE CONDITIONS

NONE

38. RECREATIONAL FACILITIES

A PRIVATE RECREATIONAL FACILITY, OR PARK, IS NOT PROPOSED AS PART OF THIS PLAN. PARK FEES WILL BE PAID TO THE COUNTY PER CURRENT ORDINANCE. THE NEAREST COUNTY PARK IS KINNEY PARK. THE NEAREST COUNTY COMMUNITY CENTER IS MOUNTAIN VIEW COMMUNITY CENTER. BOTH THE PARK AND THE COMMUNITY CENTER ARE LOCATED AT 100 PROSPERITY S.E. THE TENTATIVE COMPLETION DATE FOR THE COMMUNITY CENTER IS SEPTEMBER 1994.

39. FIRE PROTECTION

THE CLOSEST FIRE STATION IS STATION #8 LOCATED AT 4401 BROADWAY, APPROXIMATELY 5 BLOCKS SOUTH OF RIO BRAVO BLVD.

40. POLICE PROTECTION

BERNALILLO COUNTY SHERIFF'S DEPARTMENT PATROLS THIS AREA.

41. PUBLIC SCHOOLS

THE NEAREST ELEMENTARY SCHOOL IS MOUNTAIN VIEW ELEMENTARY LOCATED APPROXIMATELY 2.1 MILES AWAY. THIS WAS CALCULATED BY A ROUTE STARTING AT THE SUBDIVISION, GOING WEST ON RIO BRAVO, SOUTH ON SECOND STREET, AND WEST ON SHIRK, FINALLY REACHING THE SCHOOL. SEE EXHIBIT 'G'.
THE NEAREST MIDDLE SCHOOL IS POLK MIDDLE SCHOOL. IT IS APPROXIMATELY 4.7 MILES AWAY FROM THE SUBDIVISION. THIS WAS CALCULATED BY GOING WEST ON RIO BRAVO, SOUTH ON ISLETA, AND WEST ON RAYMAC, FINALLY REACHING THE SCHOOL. SEE EXHIBIT 'H'.

THE NEAREST HIGH SCHOOL IS RIO GRANDE HIGH SCHOOL. IT IS APPROXIMATELY 5.1 MILES AWAY. THIS WAS CALCULATED BY A ROUTE STARTING AT THE SUBDIVISION, GOING WEST ON RIO BRAVO, NORTH ON ISLETA, THEN WEST ON ARENAL, FINALLY REACHING THE SCHOOL. SEE EXHIBIT 'I'.

42. HOSPITALS

THE NEAREST FULL SERVICE MEDICAL CENTER IS THE PRESBYTERIAN MEDICAL CENTER LOCATED ON 1100 CENTRAL AVENUE S.E. THE HOSPITAL IS LOCATED APPROXIMATELY 4.4 MILES FROM THE SITE. FROM THE SITE, DRIVE EAST ON RIO BRAVO, NORTH ON I-25, UNTIL THE CENTRAL EXIT. THE HOSPITAL IS ON THE SOUTHEAST CORNER OF THE INTERSTATE AND CENTRAL AVENUE. THE PRESBYTERIAN MEDICAL CARE CENTER HAS 484 BEDS. AS AN ASIDE, THE LOVELACE URGENT CARE CLINIC IS LOCATED DIRECTLY NORTH OF THE SITE.

43. SHOPPING FACILITIES

THE NEAREST RETAIL CENTER IS LOCATED APPROXIMATELY 1.5 MILES FROM THE SITE. DRIVE WEST ON RIO BRAVO BLVD. AND THE SHOPPING CENTER IS LOCATED ON THE N.W. CORNER OF RIO BRAVO BLVD. AND ISLETA BLVD. THERE ARE 15 SHOPPING FACILITIES IN THIS AREA.

44. PUBLIC TRANSPORTATION

AIRPLANE SERVICE AVAILABLE VIA THE ALBUQUERQUE INTERNATIONAL AIRPORT (4.7 MILES). INTERSTATE BUS AND TRAIN TERMINAL (4.6 MILES). SUNTRAN (HOURLY) ISLETA TO GUN CLUB (CLOSEST RUN), TAXI CABS (2 MILES).

45. COMPLETION DATES

ALL OF ITEMS REFERENCED IN RESPONSES 38 THROUGH 44 ARE PRESENTLY AVAILABLE.

93107(

EXHIBIT "A"

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 14, 1994

Jeffrey G. Mortensen
Jeff Mortensen & Associates
6010-B, Midway Park Blvd., NE.
Albuquerque, NM. 87109

Re: WATER AND SANITARY SEWER AVAILABILITY STATEMENT,
Zone Atlas #P-13 & P-14

Mr. Mortensen:

This statement of availability is issued in response to your inquiry of December 17, 1994. All statements made herein are contingent upon the information provided in that inquiry.

Subject Property: Tract 4, Unit 1, Schwartzman Industrial Park

Proposed Development: Single family Residential, (Mobile Homes)

City service is contingent upon annexation per City policy. If the property does not currently meet the criteria for annexation, the developer must contract with City to annex at such time that the development meets annexation requirements.

WATER SERVICE:

Water service is available contingent upon developer construction of a 8-inch waterline in Prince St. The line will extend from the existing 14-inch waterline in Rio Bravo Blvd. to the 12-inch line in Prince St., located at the north boundary of East Mountain Subdivision. See City project 26-3393-89, sheet 7, for location of the 12-inch line. The developer will then loop lines through the site so that each lot can be individually served. The loop may tie to the 8-inch in King Rd., and the 8-inch extension in Prince St. Fire hydrants will be at locations approved by the City Fire Marshal. Although the City extension policy would require the developer to cover the southern boundary of the proposed development, the system would not derive any benefit from doing so, therefore, we will not require a southern run. Actual service connection(s) must be coordinated through Customer Services Meter Sales Office at 768-2840. Water service will be subject to Utility Expansion Charges.

At the developer's request, some cost may be prorated to benefitting properties. When such properties take service in the future, assessed pro-rata will be collected by the City and returned to the developer.

EXHIBIT "A"

SANITARY SEWER:

Sewer service is available contingent upon developer construction of 8-inch lines through the site so that each lot can be individually served. The outfall for the development will be at the manhole at the southwest corner of King Rd. See City project 26-4397.90-92 for manhole information. Actual service connection(s) must be coordinated through a licensed plumber. Installation must conform to the plumbing code as adopted, and to effective Department connection requirements. Service will be subject to Utility Expansion Charges.

Where public facilities are constructed outside public right-of-way, exclusive public water and sewer line easements must be established. Design standards specify a minimum 25-foot wide easement for both water and sewer, and a minimum 20-foot width for a single service. Additional easement area will be required for fire hydrants and/or meters constructed outside the line easement.

DESIGN AND CONSTRUCTION:

Design and construction of the required facilities will be at the developer's expense and must be coordinated through the Public Works Department Engineering Group. Designs must be by a New Mexico registered Professional Engineer and must be reviewed and approved by the City's Design Review Committee (DRC). Construction must be by a licensed, bonded Public Utility Contractor under a City Work Order. Upon completion and acceptance of the work, maintenance and operation responsibility will be taken over by the Public Works Department.

UTILITY EXPANSION CHARGES:

In addition to design and construction costs, both water and sewer service will be subject to Utility Expansion Charges (UEC). The charges assessed will be based on the size of metered water service requested and will be payable at the time service connections are actually made.

EXHIBIT "A"

This statement of availability will remain in effect for a period of one year and applies only to the proposed development identified herein. Its validity is in part contingent on the continuing accuracy of the information supplied by the developer. Changes in the proposed development by require re-evaluation of availability and should be brought to our attention as soon as possible. Any outstanding pro-rata and standby assessments must be paid at the time service is taken. All charges assessed and rates collected will be based on applicable ordinances and policies in effect at the time service is actually requested and authorized.

If you have any questions or comments, please do not hesitate to contact me at 768-2730.

Sincerely,

William M. McCall, Jr.
Engineering Technician
Utility Development Section
Public Works Department

APPROVED:
Stuart Reeder, P.E.

Attachments: MAPS

xc: Josie Gutierrez, Customer Services
f/Schwartzman Industrial Park
f/Availability MAP #P-14
f/DRB Case 90-192
f/Readers #31208; LOG #31208

WMC/wmc
WPUDV+ DOCUMENT ID #31208
xc: Jimmie Glenn

NORTH

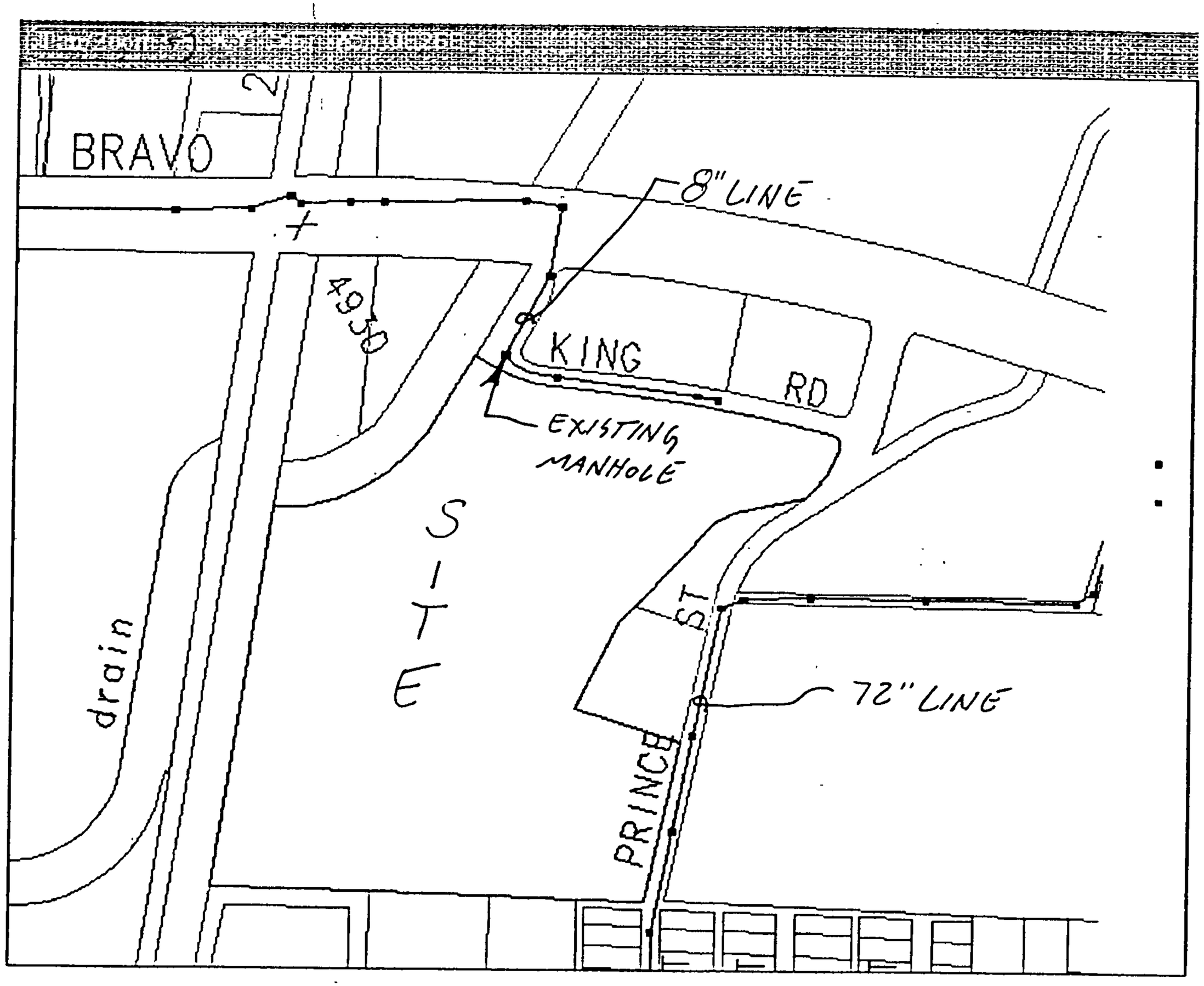


EXHIBIT 'A'

SEWER

MAP P-14

NORTH

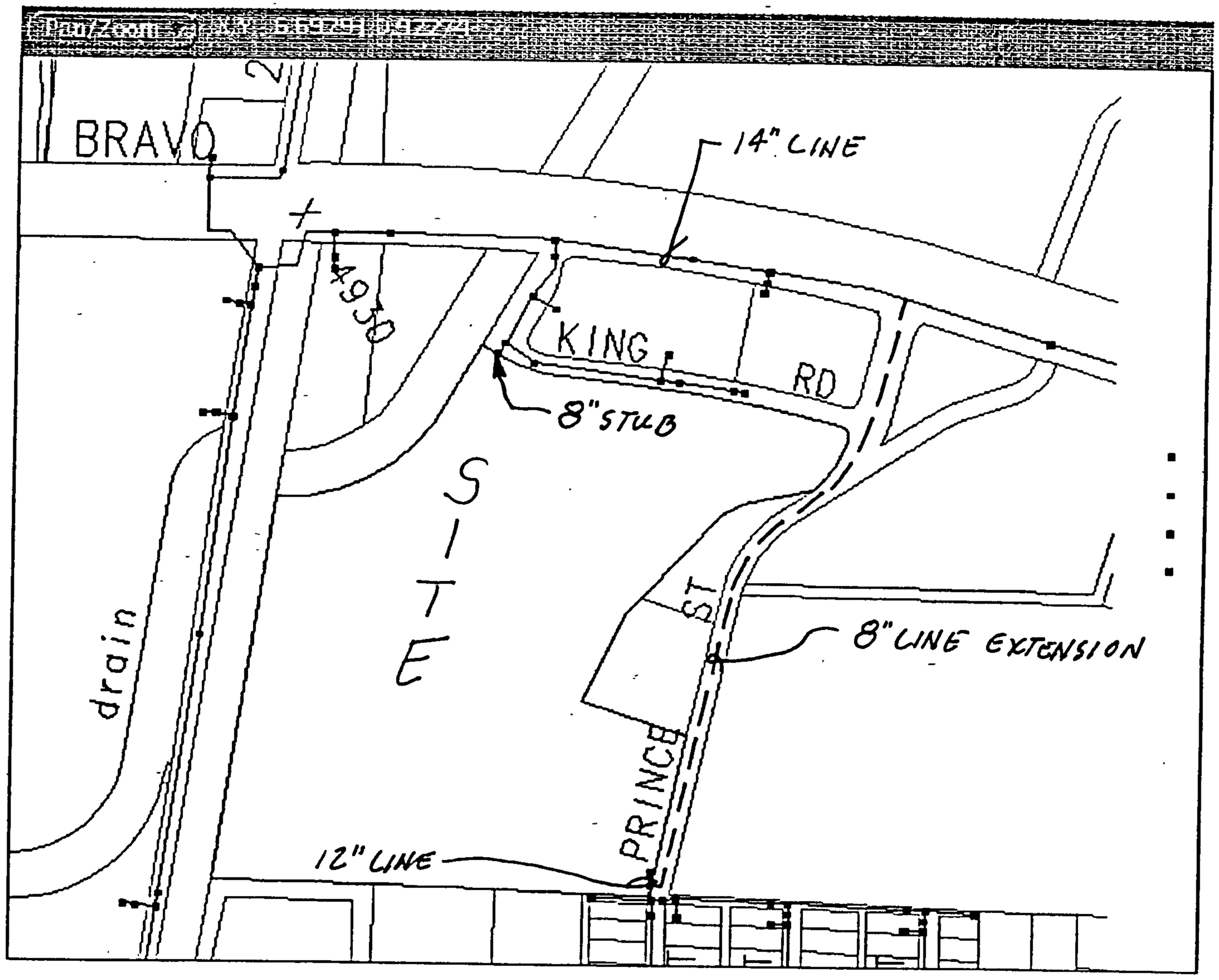


EXHIBIT 'A'

WATER

MAP D-14

EXHIBIT 'B'

OPINION PENDING

EXHIBIT 'C'

OPINION PENDING

EXHIBIT 'D'

OPINION PENDING

EXHIBIT 'E'

OPINION PENDING

COUNTY IMPROVEMENTS

Fentiman Ave SE	N/A	Standard Curb & Gutter	Silver Fox Blvd. S.E.	Fentiman Ave SE Cul-De-Sac
	26' FF	Street Paving	Silver Fox Blvd. S.E.	Fentiman Ave SE Cul-De-Sac
Silver Fox Blvd. S.E.	N/A	Standard Curb & Gutter	King Road SE	Gore Ave. SE
	26' FF	Street Paving	King Road SE	Gore Ave. SE
Zorro Loop S.E.	N/A	Standard Curb & Gutter	Silver Fox Blvd. S.E.	Gore Ave. SE
	26' FF	Street Paving	Silver Fox Blvd. S.E.	Gore Ave. SE
Gore Ave. S.E.	N/A	Standard Curb & Gutter	Zorro Loop SE	Prince St SE
	26' FF	Street Paving	Zorro Loop SE	Prince St SE
Glenn Drive S.E.	N/A	Standard Curb & Gutter	King Road SE	Gore Ave SE
	26' FF	Street Paving	King Road SE	Gore Ave SE
Chamaigne Ct SE	N/A	Standard Curb & Gutter	Glenn Dr. SE	Chamaigne Ct SE Cul-de-Sac
	26' FF	Street Paving	Glenn Dr. SE	Chamaigne Ct SE Cul-de-Sac
Rosson Ct SE	6"	Waterline	Glenn Dr. SE	Rosson Ct SE Cul-de-Sac
	8"	Sanitary Sewerline	Glenn Dr. SE	Rosson Ct SE Cul-de-Sac
King Road SE	N/A	Curb & Gutter and Street Paving	Silver Fox Blvd. S.E.	Prince St. S.E.
Silver Fox Blvd SE Near SW Cor Lot 119	48"	RCP Storm Drain	SW of Lot 119	San Jose Drain
Zorro Loop S.E.	48"	RCP Storm Drain	S of Lot 26	San Jose Drain

Prepared by: _____
Print Name: Jeffrey G. Mortensen, P.E.
Firm: Jeff Mortensen & Associates, Inc.

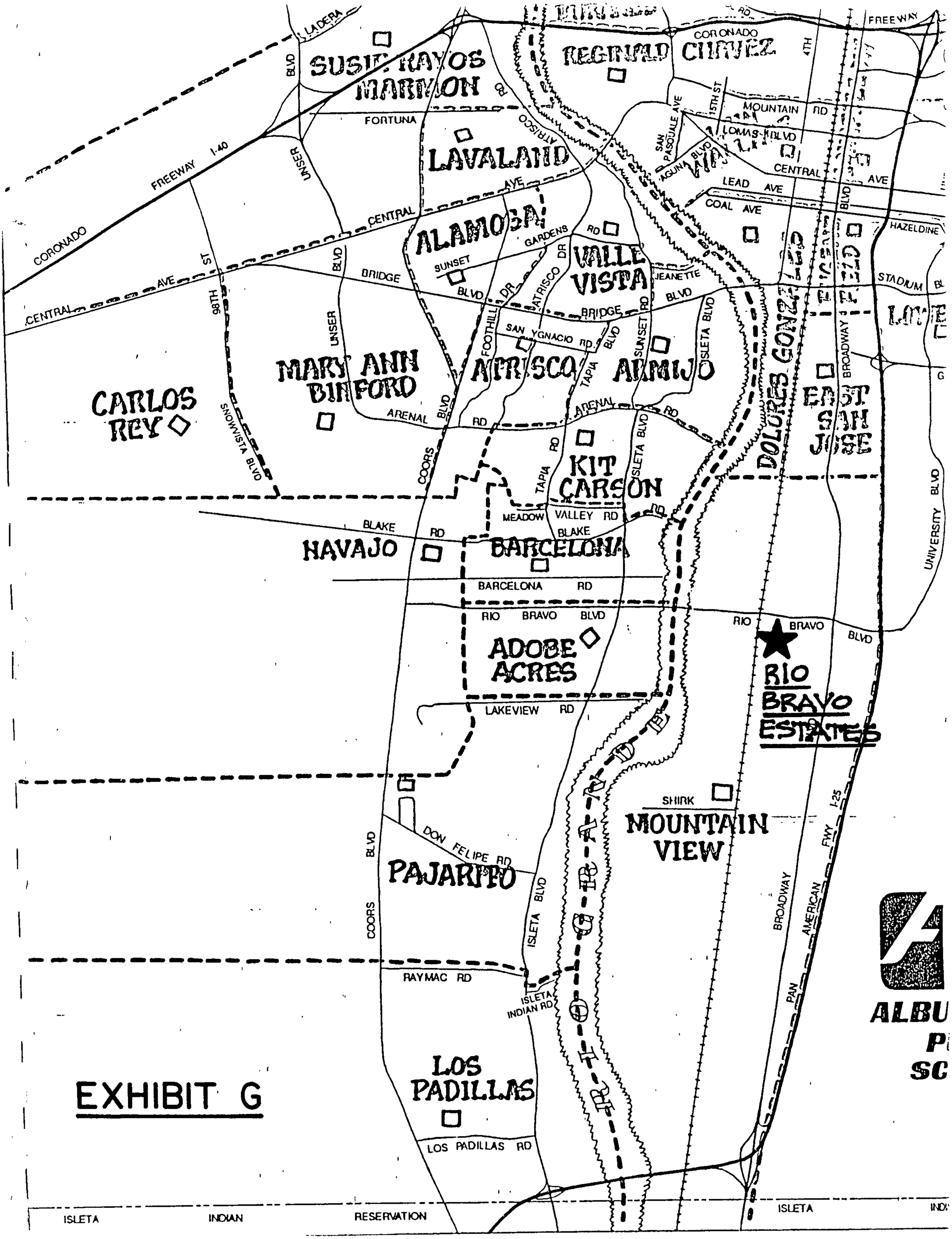
Page 2 of 2

****

Development Review Board Member Approval

Transportation Dev. Date	Utility Dev. Date	Cultural and Recreational Services Date
City Engineer/AMAFCA Date	BCPWD Date	DRB Chairman Date

Rev. 10/85
ID3901D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REGINALD CHAVEZ
LAVALAND
ALAMOSA
VALLE VISTA
MARY ANN BINFORD
ATRISCO
ARMIJO
CARLOS REY
KIT CARSON
HAVAJO
BARCELONA
ADOBE ACRES
DOLORES GONZALES
EAST SAN JOSE
RIO BRAVO ESTATES
MOUNTAIN VIEW
PAJARITO
LOS PADILLAS
ISLETA INDIAN RESERVATION
I-40 FREEWAY
I-25
CORONADO AVE
CENTRAL AVE
BRIDGE BLVD
SUNSET BLVD
ARENAL RD
MEADOW VALLEY RD
BLAKE RD
BARCELONA RD
RIO BRAVO BLVD
LAKEVIEW RD
DON FELIPE RD
RAYMAC RD
ISLETA INDIAN RD
LOS PADILLAS RD
SHIRK
UNIVERSITY BLVD
BROADWAY
AMERICAN FWY
PAN
ISLETA BLVD
COORS BLVD
SNOWVISTA BLVD
98TH ST
UNSER BLVD
ATRISCO DR
FOOTHILL DR
SAN YGNACIO RD
TAPIA RD
SUNSET RD
OSLETA BLVD
SAN PASQUALE AVE
AGUINA BLVD
15TH ST
MOUNTAIN RD
LOMAS BLVD
CENTRAL AVE
LEAD AVE
COAL AVE
HAZELDINE
STADIUM BL
LADERA
FREEWAY
CORONADO
GARDENS RD
JEANETTE
FORTUNA
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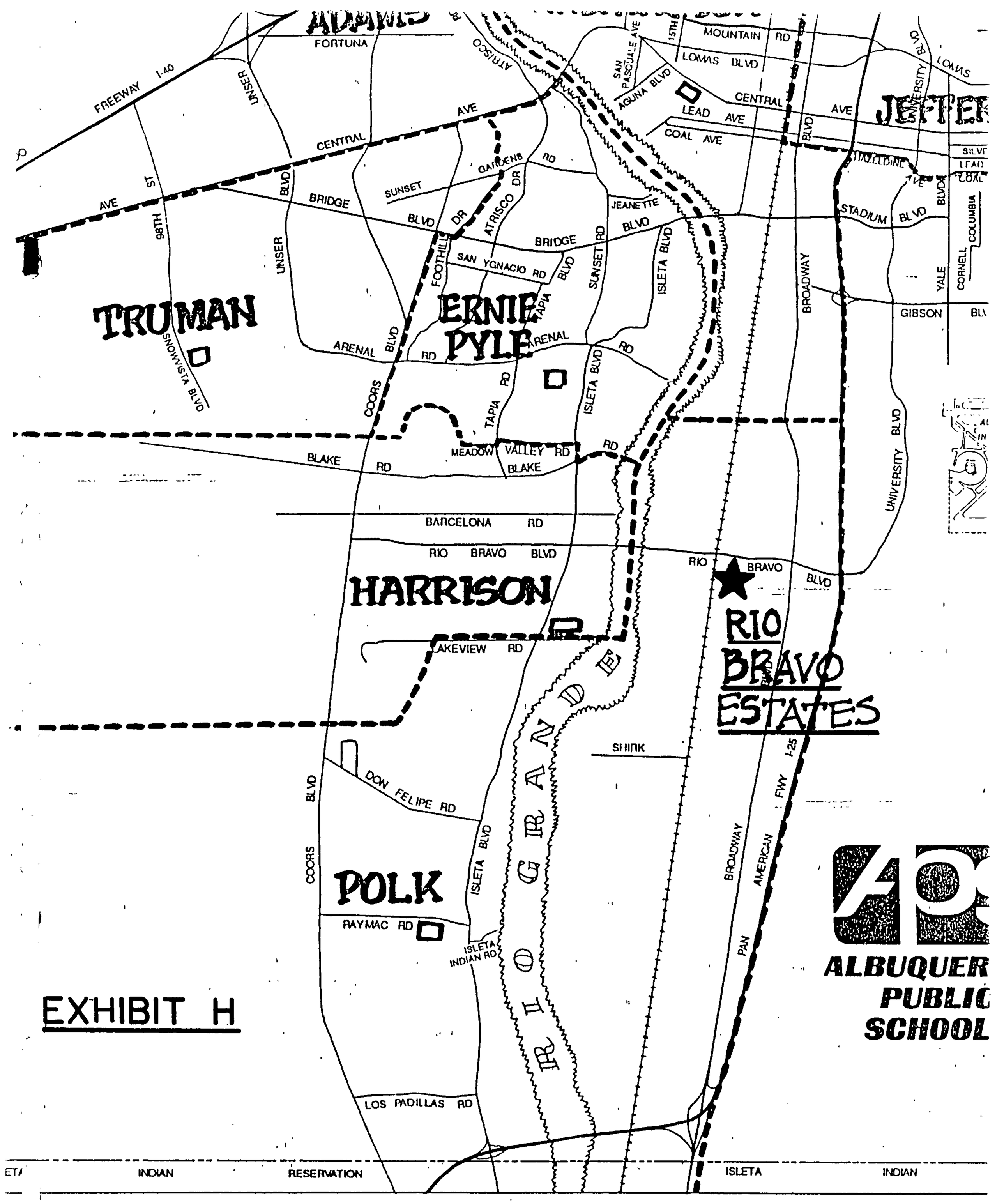
EXHIBIT G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YALE
TRUMAN
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FOOTHILLS
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ERNIE PYLE
TAPIA
SUNSET RD
ISLETA BLVD
BROADWAY
GIBSON BLVD
ARENAL BLVD
ARENAL RD
SNOWVISTA BLVD
COORS
TAPIA RD
MEADOW VALLEY RD
BLAKE RD
UNIVERSITY BLVD
BARCELONA RD
RIO BRAVO BLVD
HARRISON
LAKEVIEW RD
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IRANDE
SHINK
DON FELIPE RD
I-25
FWY
AMERICAN
POLK
RAYMAC RD
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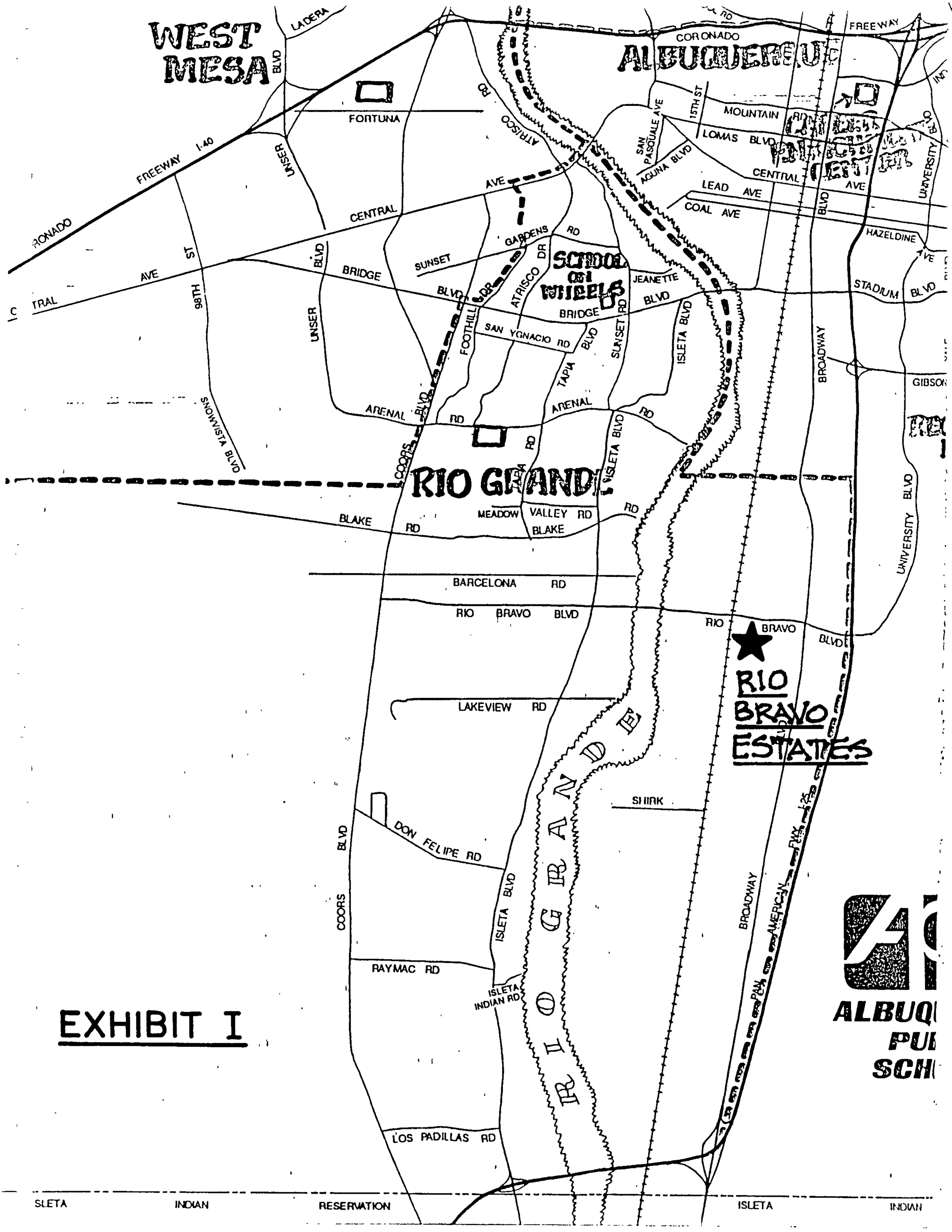
GOIR
LOS PADILLAS RD
ISLETA INDIAN RESERVATION
ALBUQUER
PUBLIC
SCHOOL

EXHIBIT H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ALBUQUERQUE
RIO GRANDE
RIO BRAVO ESTATES
SCHOOL ON WHEELS
LA DERA
FREEWAY
I-40
CORONADO
FORTUNA
UNSER
BLVD
ATRISCO
RD
AVE
CENTRAL
GARDENS
SUNSET
BRIDGE
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RAYMAC RD
ISLETA INDIAN RD
LOS PADILLAS RD
AMERICAN
PAN
FWY
ISLETA INDIAN RESERVATION
ALBUQ
PUB
SCH

EXHIBIT I

NEIGHBORHOOD NOTIFICATION

ADDENDUM TO APPLICATION

This certifies that I, Jeffrey G. Mortensen have notified via certified mail, return receipt request, two representatives of the following Recognized Neighborhood Associations,

_____ZONE MAP AMENDMENT
_____SITE DEVELOPMENT PLAN APPROVAL OR AMENDMENT
_____ANNEXATION
__x__MAJOR SUBDIVISION
_____VACATION OF PUBLIC RIGHT-OF-WAY
_____PRIVATE SECTOR DEVELOPMENT PLAN

for property located at the S.W. corner of King Road S.E. & Prince Street S.E.

Tract 4, Schwartzman Industrial Park, Unit 1
(legal description)

South Valley Improvements Coalition (Neighborhood Association)	Ms. Julie Stephens (Representative) 2109 Paul Road S.W. (Address) NA (Phone)
Mountain View Neighborhood Association (Neighborhood Association)	Ms. Laura Sedore (Representative) 517 Lagunitas S.W. (Address) NA (Phone)
(Neighborhood Association)	(Representative) (Address) (Phone)
(Neighborhood Association)	(Representative) (Address) (Phone)

Certified by _____ (Owner/Agent) For Space Homes Inc. (Owner)

Printed name of person signing Jeffrey G. Mortensen Phone# 345-4250 Date 9-23-94

REV. 11/8/90

CASE#_____

A MEMBER OF CONSULTING
ENGINEERS COUNCIL OF NEW MEXICO

JEFF MORTENSEN & ASSOCIATES, INC. ☐ ENGINEERS & SURVEYORS ☐ (505) 345-4250
6010-B MIDWAY PARK BLVD. N.E. ☐ ALBUQUERQUE ☐ NEW MEXICO 87109 ☐ FAX (505) 345-4254

931075
September 16, 1994
CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Julie Stephens
South Valley Improvements Coalition
2109 Paul Road S.W.
Albuquerque, NM 87105

Re: Rio Bravo Estates

Dear Ms. Stephens:

In accordance with county requirements, we wish to inform you of the above referenced subdivision submitted. A copy of the plat is enclosed for your review.

If you should have any questions or comments regarding the proposed subdivision and the associated development of the property, please do not hesitate to call. We would be happy to meet with you to discuss the project if you desire.

Sincerely,

JEFF MORTENSEN & ASSOCIATES, INC.

Jeffrey G. Mortensen, P.E.
President

JGM:dsj
Enclosure

A MEMBER OF CONSULTING
ENGINEERS COUNCIL OF NEW MEXICO

JEFF MORTENSEN & ASSOCIATES, INC. ☐ ENGINEERS & SURVEYORS ☐ (505) 345-4250
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931075
September 16, 1994
CERTIFIED MAIL
RETURN RECIEPT REQUESTED

Ms. Laura Sedore
Mountain View Neighborhood Association
517 Lagunitas S.W.
Albuquerque, NM 87105

Re: Rio Bravo Estates

Dear Ms. Sedore:

In accordance with county requirements, we wish to inform you of the above refrenced subdivision submitted. A copy of the plat is enclosed for your review.

If you should have any questions or comments regarding the proposed subdivision and the associated development of the property, please do not hesitate to call. We would be happy to meet with you to discuss the project if you desire.

Sincerely,

JEFF MORTENSEN & ASSOCIATES, INC.

Jeffrey G. Mortensen, P.E.
President

JGM:dsj
Enclosure

DRAINAGE INFORMATION SHEET

960871

PROJECT TITLE: Rio Bravo Estates ZONE ATLAS/DRNG. FILE #: P14/D1

DRB #: 94-10 EPC #: WORK ORDER #: 5270.90

LEGAL DESCRIPTION: Lots 1-119 Rio Bravo Estates

CITY ADDRESS: Prince St. N.E.

ENGINEERING FIRM: Jeff Mortensen & Assoc Inc. CONTACT: Michele (Mike) F. DeLilla

ADDRESS: 6010-B Midway Park Blvd N.E. PHONE: 345-4250

OWNER: Rio Bravo Estates, Ltd. CONTACT: Jimmie Glenn

ADDRESS: 11209 Paris N.E. PHONE: 293-7826

ARCHITECT: N/A CONTACT:

ADDRESS: PHONE:

SURVEYOR: Jeff Mortensen & Assoc. Inc. CONTACT: Chuck Cala

ADDRESS: 6010-B Midway Park Blvd NE. PHONE: 345-4250

CONTRACTOR: Sparling Construction CONTACT: Pat Wylie

ADDRESS: PHONE: 821-1034

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
X ENGINEER'S CERTIFICATION
____ OTHER

PRE-DESIGN MEETING:

____ YES
X NO
____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL
____ PRELIMINARY PLAT APPROVAL
____ S. DEV. PLAN FOR SUB'D. APPROVAL
____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
____ SECTOR PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ FOUNDATION PERMIT APPROVAL
____ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ GRADING PERMIT APPROVAL
____ PAVING PERMIT APPROVAL
____ S.A.D. DRAINAGE REPORT
X DRAINAGE REQUIREMENTS
X OTHER Certification (SPECIFY)

DATE SUBMITTED: 11/6/96

BY: Michele (Mike) F. DeLilla

RECEIVED
HYDROLOGY DIV

DRAINAGE PLAN

FOR

BERNALILLO COUNTY METROPOLITAN DETENTION CENTER

ALBUQUERQUE, NEW MEXICO

BPLW Project Number: 98080

June 1, 1999

GUY C. JACKSON
NEW MEXICO
13289
REGISTERED PROFESSIONAL ENGINEER

Prepared by: Guy C. Jackson

RECEIVED
JUN 08 1999
HYDROLOGY SECTION

BPLW

Architects & Engineers

Albuquerque, New Mexico

DRAINAGE PLAN

FOR

BERNALILLO COUNTY
METROPOLITAN DETENTION CENTER

ALBUQUERQUE, NEW MEXICO

BPLW Project Number: 98080

June 1, 1999

GUY C. JACKSON
NEW MEXICO
13289
REGISTERED PROFESSIONAL ENGINEER

Prepared by: Guy C. Jackson

BPLW

Architects & Engineers **Albuquerque, New Mexico**

DRAINAGE PLAN
BERNALILLO COUNTY METROPOLITAN DETENTION CENTER
Albuquerque, New Mexico

BPLW Project Number: 98080

TABLE OF CONTENTS

PURPOSE 1

PROJECT SUMMARY 1

SITE ANALYSIS 2

Soils Investigation 2
Sanitary Sewer System 2

EXISTING CONDITIONS 3

PROPOSED CONDITIONS 3

APPENDIX A

Existing Drainage Basin Map
Proposed Masterplan Drainage Basin Map
Vicinity Map

APPENDIX B

Runoff Volume and Peak Discharge Calculations
Cumulative Flow Rates at Analysis Points
Channel Capacity Calculations
Culvert Capacity Calculations
Pond Volume Calculations

PURPOSE

The purpose of this report is to provide a comprehensive drainage plan for the Bernalillo County Metropolitan Detention Center (BCMDC). This plan will include phased construction for the developed portion of the 156-acre site. The first phase of the construction will consist of three or five housing clusters and support services buildings (Administration, Kitchen, Laundry, Booking, etc.). Phase II will consist of additional housing clusters and small additions to the parking facilities as determined by future needs.

Phase III final buildout will provide a facility with capacity for 5,000 inmates and all support services buildings as shown on the civil Masterplan Drainage Basin Map, located in Appendix "A".

This report includes an analysis of existing drainage patterns, as well as proposed retention areas for new and future developments. All drainage basins within the construction limits have been analyzed as fully developed conditions. Peak discharges were calculated and critical sections checked for adequate flow capacity.

Retention ponds have been sized to retain the 100-year, 6-hour event. Overflow weirs will be constructed to allow flows in excess of the 100 year, 6 hour event to spill into adjacent leaching bed/sod farm areas.

Percolation tests have been performed by the Geotechnical Consultant with an anticipated percolation rate of 15-minutes/1 inch. If the design storm lasts 6 hours, this would account for up to 24 inches of water that will be absorbed/abstracted by the sandy soils on site during the storm.

PROJECT SUMMARY

The County of Bernalillo is constructing a new Metropolitan Detention Center to consolidate the two existing facilities, (downtown, and the temporary facilities located on the west side) into a new, modern, more efficient configuration as described in the phasing above.

The County has acquired the project site which is a 156-acre tract of land adjacent to and east of the Cerro Colorado Landfill. This is located at the east edge of the escarpment dropping off into the Rio Puerco to the west.

The proposed 156-acre site selected for the new Bernalillo County Metropolitan Detention Center has been sited as shown on the site and grading plan. The project site is located approximately 3.6 miles south from Interstate 40 on Nine-Mile-Hill. A boundary survey and topographic survey was obtained from a New Mexico licensed surveyor with boundaries, easements, right of ways, spot elevations of existing land features, and all other applicable information necessary to provide civil design. Re-

zoning of the site was accomplished on February 23, 1999, which changed the existing A-1 zoning and obtained a Special Use Permit for a Correctional Facility (Detention Center). A Site Development Plan package and application was submitted and approved by the Bernalillo County Planning Commission and the Bernalillo County Commissioners. The Site Development package included a dimensioned site plan, a grading and drainage plan, a utility plan, a landscaping plan, and elevations.

SITE ANALYSIS

Access to the Jail site will be from the extension of Shelly Drive to the north. Bernalillo County is currently obtaining a design of the roadway extension from a design consultant. Access into the site will connect the Shelly Road extension at the northeast corner of the site. Paving improvements include access roads into and around the site for ingress, egress, fire protection and security, with accompanying security fencing, gates and sallyports. The required parking for the phasing of the project is as follows:

Phase I: Employee Parking: 276 spaces, Visitor Parking: 24 spaces.

Phase II: Employee Parking: 360 spaces, Visitor Parking: 48 spaces.

Phase III: Employee Parking: 455 spaces, Visitor Parking: 98 spaces.

The three phased parking areas with accompanying landscaping are shown to be located southeast of the support buildings and east of the Phase I and II housing clusters. Adjacent and southwest of the support building are the sallyports and entrances for booking and transfer operations. A transportation yard for the parking of transfer busses is also located nearby. As stated above, a security/fire land access road transverses the perimeter of the site. A site plan with accompanying enlarged paving plans and details will be submitted to Bernalillo County Public Works upon completion of the construction plans.

Soils Investigation

A licensed Geotechnical Engineer has been solicited to provide a subsurface investigation of the existing soils. The report will contain data to be used for the final design of the building foundations, retaining walls, pavement, and roadway design, utility trenching and grading and drainage.

Sanitary Sewer System

Bernalillo County has contracted a wastewater design consultant to assemble a wastewater treatment feasibility report upon compiling information for various systems. Currently, there is not a wastewater collection system near the site from NM Utilities or the City of Albuquerque. The County's wastewater consultants are considering an aerated lagoon system of which have been identified on the site plan located southwest of the support building. The sanitary sewer collection is shown to collect the liquid waste from support buildings and housing clusters at a collection point to be determined

once the decision to use a vacuum system for the housing units is decided upon by the County's management team. If the vacuum system is implemented, a duplex grinder pump system will be installed to deliver the waste to the aerated lagoons listed above. The support buildings will have a conventional gravity sanitary system that will drain to the duplex grinder pump system mentioned above. Once treated, the grey water from the aerated lagoons will be utilized for irrigation. Sod areas have also been identified on the site and grading plan for the disposal of grey water. A utility plan with accompanying enlarged utility plans (water and sewer) will be submitted to Bernalillo County Public Works upon completion of the construction plans.

EXISTING CONDITIONS

The existing 156-acre site is currently undeveloped. The site is bounded by the escarpment to the Rio Puerco to the west. A natural ridge divides the site in the center along the north property line. A Playa contains all offsite water to the northwest of the site and is a closed basin for Basin 1 as shown on the existing drainage basin map located in Appendix "A" of this report. This plan appears on the FIRM (Flood Insurance Rate Map) # 350001, Panel 0325, Suffix D. See copy on existing Drainage Basin Map.

A small portion of the site, ± 1.5% flows off the ridge to the northeast and off site. See basin map for details.

The topography on the east side of the site prevents substantial amounts of water from leaving or entering the site. The fall line of the slope parallels the property line in most areas.

The majority of the site, 123 acres out of 156, will sheet flow to a central point along the south property line and discharge off site. The peak discharge rate is 196.68 cfs for the 100 year, 6 hour storm event.

The site topography makes this project very simple because no off-site basins effect the on-site hydraulics for the construction areas.

PROPOSED CONDITIONS

The 156 acre site will be the future home of a 5,000 inmate detention center. The construction will be phased to provide the level of service (volume of inmates) and to spread out the construction costs as money becomes available.

This submittal is to obtain a rough grading permit. Final fine-tuned calculations will be performed at the same time as the creation of construction documents. The current design assumes that all excess flows from the basins are delivered to drainage bar ditches with accompanying culverts at roadway crossings.

The proposed plan for the building currently uses interior roof drains. These roof drains will need to be collected in a separate underground piping system. As mentioned above once the mechanical design is complete. The attached calculations will be updated to include routing of roof drains.

Based on the above information routing calculations were not performed at this time. routing will only decrease the peak discharge in the bar ditches. If underground piping is installed, then flowrates in the bar ditches will be drastically reduced.

This report is to show:

- How flows are conveyed to retention ponds.
- Adequate space has been provided for drainage systems (bar ditches width and depth)
- Ponds have adequate capacity.
- Site is Masterplanned for final buildout.

The first phase of this construction will be to build the access roads (both permanent and a gravel access road along the west side of the support services building), three (3) or five (5) housing clusters, support services building, warehouse, elevated water storage tank, aerated lagoons, and storm water retention facilities.

All hydrology has been calculated using the City of Albuquerque Developmental Process Manual Section 22.2. A copy of the sample calculations is included in Appendix "B" and a summary sheet shows the soil treatment areas, peak flowrates, and excess runoff volumes for each basin. Existing and proposed drainage basin maps are included in Appendix "A". Each basin is labeled with Basin number, Q100 and V100.

Analysis points are shown at the confluence of drainage ditches and storm drain culverts. Storm drain culverts have been analyzed using the U.S. Department of Transportation's "Hydraulic Design of Highway Culverts". The calculations are shown in Appendix "B". A summary of analysis points, pipe diameter, and headwater to diameter ratios are shown in Appendix "B".

Corrugated metal pipes have been chosen for this analysis because the Manning's Roughness is higher than reinforced concrete pipe. If a problem arises during the creation of construction documents, the decrease in HW/D ratio could provide the safety factor we need. Rough calculations have been performed using 24" through 36" diameter pipes. This will be fine-tuned during construction document preparation. The analysis was broken down into Phase I conditions and Phase II and III (final buildout conditions).

Each major basin contains multiple sub-basins.

The pond on the east side of the site collects flows from basins 11, 12, 13, 14, 15, and part of 16.

The interim pond (to be converted into future aerated lagoon for the sanitary sewer waste treatment system) receives water from basins 3, 4, 5, 6, 7, as well as part of 16.

After the interim pond is converted to an aerated lagoon, the pond on the west side of the site will be used. This future pond will collect run off from basins 3, 4, 5, 6, 7, 8, 9, 10, 20, and part of 16.

Basins 17, 19, and most of 21 are self-contained by the berms and act as closed basins.

Only a small portion of Basin 21 and Basin 18 currently discharge offsite along the south property line. Combined, this flowrate is less than 10 cfs which is much less erosive than the historic peak discharge of 196.68 cfs.

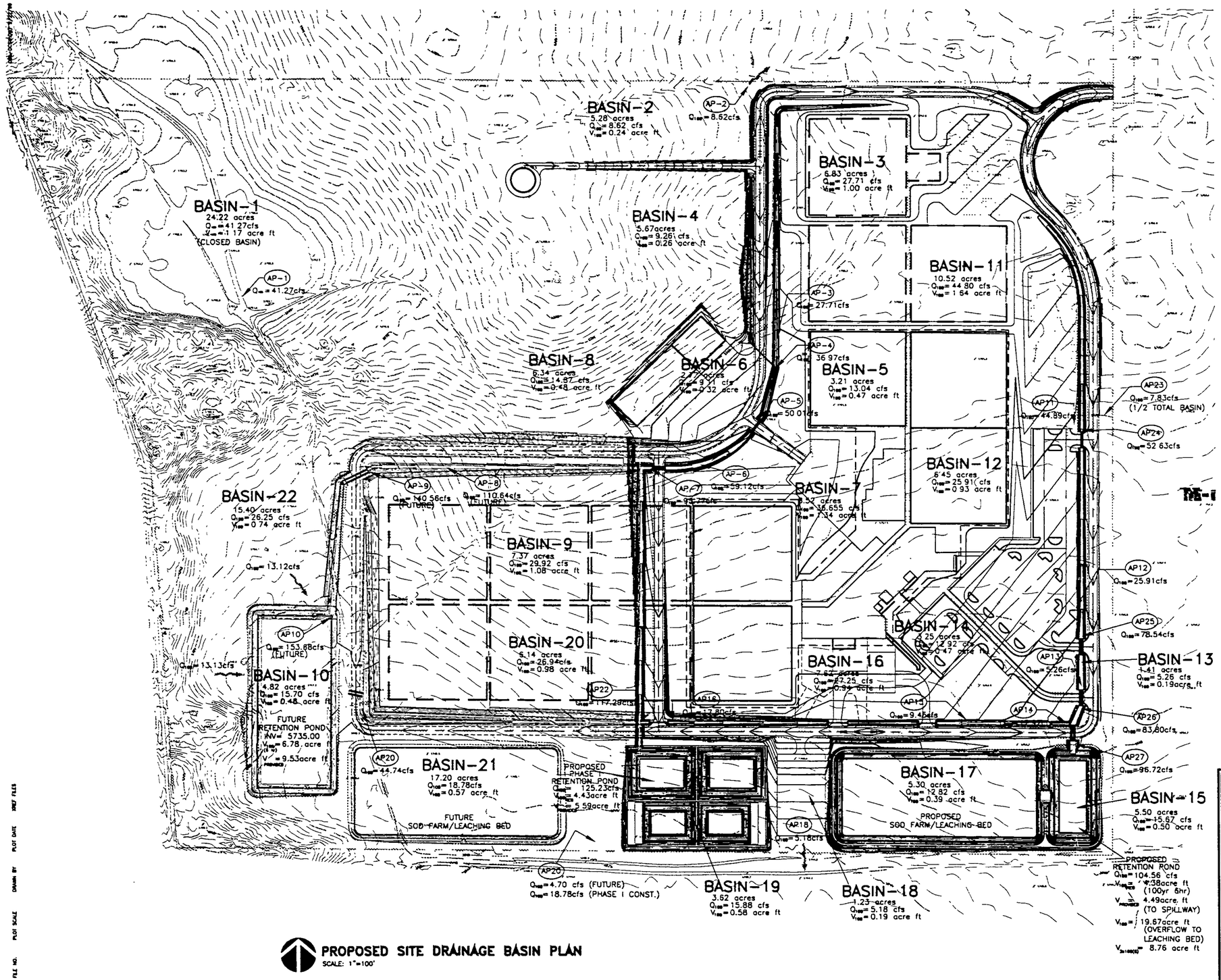
Ponds have been sized to contain the 100 year, 6 hour storm event. This is due to the fact that the ponds are total retention. The DPM requires that ponds that are total retention be sized for 2 times the 100 year 6 hour storm.

This criteria is being accommodated by providing an overflow spillway into leaching bed/sod farm. The leaching bed/sod farm for Phase I construction is approximately 5 acres. The V100 (6) hour = 4.38 acre - ft. If the leaching bed/sod farm is flooded, the excess volume will be less than 1' deep. Fences will be provided around the storm drain pond and sod farm to protect against accidental drowning.

The spillway between the retention pond and the leaching bed/sod farm to the west will be sized for the 100-year peak discharge.

The proposed Phase I pond near the aerated lagoon will be treated similar to the situation described above and the future setting basin will be used for over flow capacity. Adjustment to the pond volumes will be made as the final construction documents are completed.

APPENDIX "A"



PROPOSED SITE DRAINAGE BASIN PLAN
SCALE: 1"=100'

LEGEND

DIRECTION OF SURFACE FLOW

PROPOSED DRAINAGE SWALE

SOILS MAP
NTS

FLOOD HAZARD MAP
NTS

VICINITY MAP
NTS

BPLW
Architects & Engineers, Inc.

Designing to Shape the Future

PROJECT TITLE
BERNALILLO COUNTY
METROPOLITAN
DETENTION CENTER

BERNALILLO COUNTY

BERNALILLO COUNTY, NM

REVISIONS

JOB NUMBER
MDC

SHEET TITLE
PROPOSED BASIN PLAN

CUSTER • BASARICH, LTD. DESIGN COLLABORATIVE SOUTHWEST, INC.
ARCHITECTURE • FACILITIES PLANNING

DCSW

DATE
5/24/99

SHEET NO.
CD.2

FILE NO. PLOT SCALE DRAWN BY PLOT DATE REF FILE

K:\98080\Cgrading\Mdccd2.dwg Wed May 26 16:19:49 1999 5S1 - BPLW

APPENDIX "B"

Drainage Summary

Project: Bernalillo County Metropolitan Detention Center
Project Numbe: 98080
Date: 04/13/99
By: Dave A

Site Location

Precipitaion Zone 2 Per Table A-1 COA DPM Section 22.2

Existing summary

Basin Name	Ex 1	Ex2	Ex3
Soil Treatment (acres)			
Area "A"	19.38	2.45	117.07
Area "B"	4.84	0.00	6.16
Area "C"	0.00	0.00	0.00
Area "D"	0.00	0.00	0.00
Excess Runoff (acre-feet)			
100yr. 6hr.	1.17	0.11	5.57
10yr. 6hr.	0.02	0.01	0.01
2yr. 6hr.	0.00	0.00	0.00
100yr. 24hr.	1.17	0.11	5.57
Peak Discharge (cfs)			
100 yr.	41.27	3.82	196.68
10yr.	11.96	0.93	50.34
2yr.	0.39	0.00	0.49

BPLW

Architects and Engineers

PROJECT **Bernalillo County Metropolitan Detention Center**
PROJECT NO. **98080.00**
DATE **04/13/99**
BY **Dave A**

DPM Section 22.2 - Hydrology

Part A-Watersheds less than 40 acres.
January, 1993

INSTRUCTIONS

* Spread sheet requires three input areas (dark cells):
  - Location
  - >A.1 Precipitation Zone
  - >A.3 Land Treaments
* Values from the tables are automatically placed using "if" statements.
* Table values should be checked for correctness for each use.

SUMMARY

Location	**Ex 1**		
Precipitation Zone		**2**	
Land Area		**24.22**	acres
Excess Precipitation Volume			
	>>> 100-year 6-hour (design)	**1.17**	**acre-ft.**
	10-year 6-hour	**0.02**	acre-ft.
	2-year 6-hour	**0.00**	acre-ft.
	100-year 24-hour	**1.17**	acre-ft.
Peak Discharge Rates (DPM)			
	>>> Q100 (design)	**41.27**	**cfs**
	Q10	**11.96**	cfs
	Q2	**0.39**	cfs
Peak Discharge Rates (DPM-Rational Method)			
	>>> Q100 (design)	**41.34**	**cfs**
	Q10	**11.89**	cfs
	Q2	**0.40**	cfs

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS

	LOCATION	Ex 1	
>A.1	PRECIPITATION ZONE (from Table A-1)	2	
>A.2	DEPTHS		
	(from Table A-2)		
	100-YEAR STORM (P60)	2.01	inches
	100-YEAR STORM (P360)	2.35	inches
	100-YEAR STORM (P1440)	2.75	inches
	10-YEAR (P360) (Calculated: P360*RPF10)	1.57	inches
	2-YEAR (P360) (Calculated: P360*RPF2)	1.02	inches
>A.3	LAND TREATMENTS (AI)		
	Treatment A	19.38	acres
	Treatment B	4.84	acres
	Treatment C	0.00	acres
	Treatment D	0.00	acres
	Total Area	24.22	acres
>A.4	ABSTRACTIONS	See A.5	

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CON'T)

>A.5 EXCESS PRECIPITATION 6 HOUR AND 24 HOUR (Ei) from Table A-8		
100-year 6-hour		
Treatment A	0.53	inches
Treatment B	0.78	inches
Treatment C	1.13	inches
Treatment D	2.12	inches
WEIGHTED E (Sum Ei*Ai/A)	0.58	inches
VOLUME V100:6h (E*A)	1.17	acre-ft.
	50,992.79	ft^3
10-year 6-hour		
Treatment A	0.13	inches
Treatment B	0.28	inches
Treatment C	0.52	inches
Treatment D	1.34	inches
WEIGHTED E (Sum Ei*Ai/A)	0.26	inches
VOLUME V10:6h (E*A)	0.02	acre-ft.
	747.49	ft^3
2-year 6-hour		
Treatment A	0.00	inches
Treatment B	0.02	inches
Treatment C	0.15	inches
Treatment D	0.79	inches
WEIGHTED E (Sum Ei*Ai/A)	0.00	inches
VOLUME V2:6h (E*A)	0.00	acre-ft.
	4.07	ft^3
100-year 24-hour		
VOLUME V100:24h (V100-6h+Ad*P1440-P360)/12)	1.17	acre-ft.
	50,992.79	ft^3

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CON'T)

>A.6 PEAK DISCHARGE RATE FOR SMALL WATERSHEDS (Ql) from Table A-9			
100-year			
Treatment A		1.56	cfs/acre
Treatment B		2.28	cfs/acre
Treatment C		3.14	cfs/acre
Treatment D		4.70	cfs/acre
	Q100 (Sum Ql*Al)	41.27	cfs
10-year			
Treatment A		0.38	cfs/acre
Treatment B		0.95	cfs/acre
Treatment C		1.71	cfs/acre
Treatment D		3.14	cfs/acre
	Q10 (Sum Ql*Al)	11.96	cfs
2-year			
Treatment A		0.00	cfs/acre
Treatment B		0.08	cfs/acre
Treatment C		0.60	cfs/acre
Treatment D		1.86	cfs/acre
	Q2 (Sum Ql*Al)	0.39	cfs

CALCULATIONS FOLLOW

RATIONAL METHOD

PEAK INTENSITY (In/hr at tc=0.2 hour)
from Table A-10

Peak Intensity (I) 100-year	**5.05**
Peak Intensity (I) 10-year	**3.41**
Peak Intensity (I) 2-year	**2.04**

RATIONAL METHOD COEFFICIENT, C
from Table A-11

100-year

Treatment A	**0.31**	cfs/acre
Treatment B	**0.45**	cfs/acre
Treatment C	**0.62**	cfs/acre
Treatment D	**0.93**	cfs/acre
Q100 (Sum QI*I*AI)	**41.34**	cfs

10-year

Treatment A	**0.11**	cfs/acre
Treatment B	**0.28**	cfs/acre
Treatment C	**0.50**	cfs/acre
Treatment D	**0.92**	cfs/acre
Q10 (Sum QI*I*AI)	**11.89**	cfs

2-year

Treatment A	**0.00**	cfs/acre
Treatment B	**0.04**	cfs/acre
Treatment C	**0.29**	cfs/acre
Treatment D	**0.91**	cfs/acre
Q2 (Sum QI*I*AI)	**0.40**	cfs

TABLE 22.3 B-1

VALUES OF MANNING'S n

	n
Reinforced Concrete Pipe	.013
Poured Concrete	.013
No-joint cast in place concrete pipe	.014
Reinforced Concrete Box	.015
Reinforced Concrete Arch	.015
Streets	.017
Flush Grouted Rip-Rap	.020
Corrugated Metal Pipe	.025
Grass Lined Channels (sodded & irrigated)	.025
Earth Lined Channels (smooth)	.030
Arroyo Channels	.030
Wire Tied Rip-Rap	.040
Medium Weight Dumped Riprap	.045
Grouted Rip-Rap (exposed rock)	.045
Arroyo Overbank	.045
Jetty Type Rip-Rap ($D_{50} > 24"$)	.050
RIPRAP ASSUMED	0.035

Drainage Summary

Project: Bernalillo County Metropolitan Detention Center
Project Numbe: 98080
Date: 04/13/99
By: Dave A

Site Location

Precipitaion Zone 2 Per Table A-1 COA DPM Section 22.2

Proposed summary

Basin Name	Pro 1	Pro 2	Pro 3	Pro 4	Pro 5	Pro 6
Soil Treatment (acres)						
Area "A"	19.38	4.75	0.00	5.11	0.00	1.25
Area "B"	4.84	0.53	1.37	0.57	0.64	0.00
Area "C"	0.00	0.00	0.68	0.00	0.32	0.00
Area "D"	0.00	0.00	4.78	0.00	2.25	1.52
Excess Runoff (acre-feet)						
100yr. 6hr.	1.17	0.24	1.00	0.26	0.47	0.32
10yr. 6hr.	0.02	0.01	0 02	0.01	0.02	0.00
2yr. 6hr	0.00	0 00	0.01	0.00	0.01	0.01
100yr. 24hr.	1.17	0.24	1.16	0.26	0.54	0.38
Peak Discharge (cfs)						
100 yr.	41 27	8.62	27.71	9.26	13.04	9.11
10yr.	11.96	2.31	17.46	2.48	8 22	5.26
2yr.	0 39	0 04	9 40	0.05	4.43	2.83

Pro 7	Pro 8	Pro 9	Pro 10	Pro 11	Pro 12	Pro 13	Pro 14	Pro 15	Pro 16
0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.85	0.00	1.47	4.82	1.58	1.61	0.56	0.98	3.85	3 05
0.85	0.63	0.74	0.60	0.53	0.32	0.00	0.00	0.55	0.76
6.82	1.27	5.16	0.60	8.41	4.52	0.85	2.28	1.10	3.81
1.34	0.48	1.08	0.48	1.64	0.93	0.19	0.47	0.50	0.94
0.01	0.01	0.02	0.05	0.01	0.02	0.02	0.02	0.05	0.03
0.02	0 00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0 01
1.57	0.52	1.25	0 50	1.92	1.08	0.21	0.54	0.53	1.07
36.65	14 87	29 92	15.70	44.80	25.91	5.26	12.92	15.67	27.25
23.67	6.75	18.86	7.49	28.82	16.26	3.19	8.07	8.05	16.16
13.26	2.74	10.16	1.87	16.09	8.72	1.62	4.31	2.68	7.79

Pro 17	Pro 18	Pro 19	Pro 20	Pro 21	Pro 22
0.00	0.00	0.00	0.00	0.00	12.32
3.07	0.25	0.00	0.00	5.76	3.08
1.06	0.00	0.72	1.23	0.72	0.00
0.53	0.98	2.90	4.91	0.72	0.00
0.39	0.19	0 58	0.98	0.57	0.74
0.05	0.01	0 02	0.02	0.05	0.02
0.00	0.01	0.02	0.02	0.00	0.00
0.41	0.22	0.68	1 15	0.59	0.74
12.82	5.18	15.88	26.94	18.78	26.25
6.39	3.32	10.33	17.52	8.97	7.61
1.87	1.85	5.82	9.87	2.23	0.25

BPLW

Architects and Engineers

PROJECT **Bernalillo County Metropolitan Detention Center**
PROJECT NO. **98080**
DATE **04/13/99**
BY **Dave A**

DPM Section 22.2 - Hydrology

Part A-Watersheds less than 40 acres.
January, 1993

INSTRUCTIONS

* Spread sheet requires three input areas (dark cells):
  - Location
  - >A.1 Precipitation Zone
  - >A.3 Land Treaments
* Values from the tables are automatically placed using "if" statements.
* Table values should be checked for correctness for each use.

SUMMARY

Location	**Pro 1**		
Precipitation Zone		**2**	
Land Area		**24.22**	acres
Excess Precipitation Volume			
	>>> **100-year 6-hour (design)**	**1.17**	**acre-ft.**
	10-year 6-hour	**0.02**	acre-ft.
	2-year 6-hour	**0.00**	acre-ft.
	100-year 24-hour	**1.17**	acre-ft.
Peak Discharge Rates (DPM)			
	>>> **Q100 (design)**	**41.27**	**cfs**
	Q10	**11.96**	cfs
	Q2	**0.39**	cfs
Peak Discharge Rates (DPM-Rational Method)			
	>>> **Q100 (design)**	**41.34**	**cfs**
	Q10	**11.89**	cfs
	Q2	**0.40**	cfs

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS

	LOCATION	Pro 1	
>A.1	PRECIPITATION ZONE (from Table A-1)	2	
>A.2	DEPTHS		
	(from Table A-2)		
	100-YEAR STORM (P60)	2.01	inches
	100-YEAR STORM (P360)	2.35	inches
	100-YEAR STORM (P1440)	2.75	inches
	10-YEAR (P360) (Calculated: P360*RPF10)	1.57	inches
	2-YEAR (P360) (Calculated: P360*RPF2)	1.02	inches
>A.3	LAND TREATMENTS (AI)		
	Treatment A	19.38	acres
	Treatment B	4.84	acres
	Treatment C	0.00	acres
	Treatment D	0.00	acres
	Total Area	24.22	acres
>A.4	ABSTRACTIONS	See A.5	

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CON'T)

>A.5 EXCESS PRECIPITATION 6 HOUR AND 24 HOUR (Ei) from Table A-8		
100-year 6-hour		
Treatment A	0.53	inches
Treatment B	0.78	inches
Treatment C	1.13	inches
Treatment D	2.12	inches
WEIGHTED E (Sum Ei*Ai/A)	0.58	inches
VOLUME V100:6h (E*A)	1.17	acre-ft.
	50,992.79	ft^3
	==========	
10-year 6-hour		
Treatment A	0.13	inches
Treatment B	0.28	inches
Treatment C	0.52	inches
Treatment D	1.34	inches
WEIGHTED E (Sum Ei*Ai/A)	0.26	inches
VOLUME V10:6h (E*A)	0.02	acre-ft.
	747.49	ft^3
	==========	
2-year 6-hour		
Treatment A	0.00	inches
Treatment B	0.02	inches
Treatment C	0.15	inches
Treatment D	0.79	inches
WEIGHTED E (Sum Ei*Ai/A)	0.00	inches
VOLUME V2:6h (E*A)	0.00	acre-ft.
	4.07	ft^3
	==========	
100-year 24-hour		
VOLUME V100:24h (V100-6h+Ad*P1440-P360)/12)	1.17	acre-ft.
	50,992.79	ft^3
	==========	

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CON'T)

>A.6 PEAK DISCHARGE RATE FOR SMALL WATERSHEDS (Qi) from Table A-9		
100-year		
Treatment A	**1.56**	cfs/acre
Treatment B	**2.28**	cfs/acre
Treatment C	**3.14**	cfs/acre
Treatment D	**4.70**	cfs/acre
Q100 (Sum Qi*Ai)	**41.27**	cfs
10-year		
Treatment A	**0.38**	cfs/acre
Treatment B	**0.95**	cfs/acre
Treatment C	**1.71**	cfs/acre
Treatment D	**3.14**	cfs/acre
Q10 (Sum Qi*Ai)	**11.96**	cfs
2-year		
Treatment A	**0.00**	cfs/acre
Treatment B	**0.08**	cfs/acre
Treatment C	**0.60**	cfs/acre
Treatment D	**1.86**	cfs/acre
Q2 (Sum Qi*Ai)	**0.39**	cfs

CALCULATIONS FOLLOW

RATIONAL METHOD

PEAK INTENSITY (In/hr at tc=0.2 hour)
from Table A-10

Peak Intensity (I) 100-year	**5.05**	
Peak Intensity (I) 10-year	**3.41**	
Peak Intensity (I) 2-year	**2.04**	

RATIONAL METHOD COEFFICIENT, C
from Table A-11

100-year

Treatment A	**0.31**	cfs/acre
Treatment B	**0.45**	cfs/acre
Treatment C	**0.62**	cfs/acre
Treatment D	**0.93**	cfs/acre
Q100 (Sum Qi*I*Ai)	**41.34**	cfs

10-year

Treatment A	**0.11**	cfs/acre
Treatment B	**0.28**	cfs/acre
Treatment C	**0.50**	cfs/acre
Treatment D	**0.92**	cfs/acre
Q10 (Sum Qi*I*Ai)	**11.89**	cfs

2-year

Treatment A	**0.00**	cfs/acre
Treatment B	**0.04**	cfs/acre
Treatment C	**0.29**	cfs/acre
Treatment D	**0.91**	cfs/acre
Q2 (Sum Qi*I*Ai)	**0.40**	cfs

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Arlington, TX 76006
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Project BCMDC
Subject CUMULATIVE FLOWS
Project # 98090 Date 5-25-99 By DAA

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

TOTAL VOLUMES (PHASE I CONSTRUCTION)

WEST SIDE OF SITE

CONTRIBUTING BASIN	BASIN Q_{100}	CUMULATIVE Q_{100}	ANALYSIS POINT	V_{100} (6 hour)
3	27.71	27.71	3	1.60
4	9.26	36.97	4	0.26
5	13.04	50.01	5	0.47
6	9.11	59.12	6	0.32
7	36.65	95.77	7	1.34
8	14.37/4	99.49		0.12
16	27.25/3	117.29	22	0.63
19	15.88/2	125.23		0.29

Q_{100} = 125.23 cfs

$V_{100(6)}$ = 4.43 acre-ft

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Dec. 1993

Designing to Shape the Future

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Project: BCMDC
Subject: CULVERTS
Project #: 950060 Date: 4/15/99 By: [illegible]

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

CULVERT CROSSINGS (INLET CONTROL)
CMP w/ HEADWALL

BASIN OR ANALYSIS POINT	Q100	AVAILABLE HW	# PIPES	ϕ PIPE	HW/D	REQ. HW
BASIN 4	9.26	36"	1	24"	.8	19.2"
AP4	36.97	48"	2	24"	1.36	32.6"
AP5	50.01	48"	2	30"	1.09	32.7"
AP7	95.77	48"	3	30"	1.32	39"
AP22	117.29	60"	3	36"	1.10	39.6'

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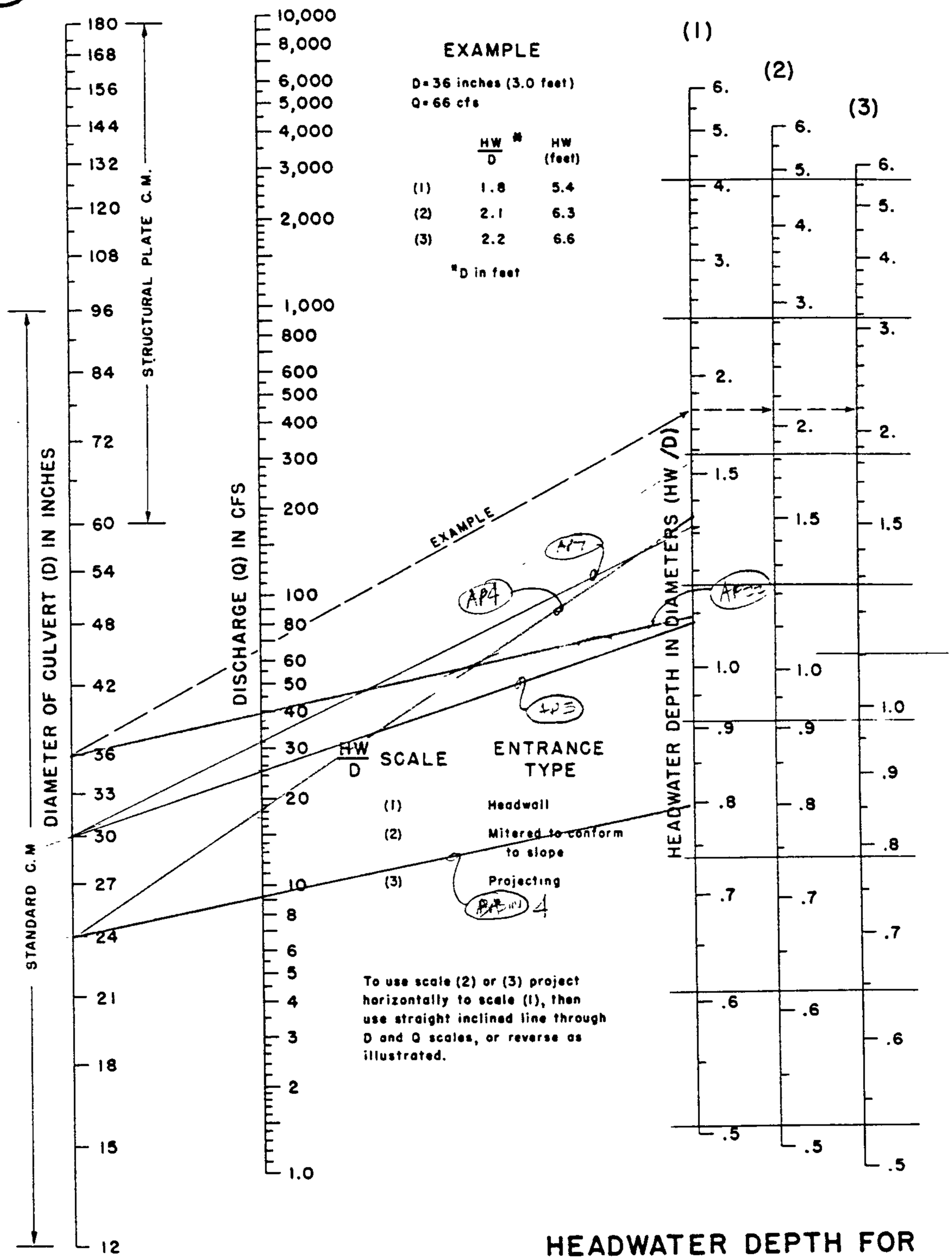
Designing to Shape the Future

CHART 2



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

n = .024

BUREAU OF PUBLIC ROADS JAN. 1963

(AP3)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.413	XSec Area = 10.230
Discharge = 27.71	Critical Depth = 0.998	XSec Area = 5.985
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.009	36.000	0.770	21.000	41.162
21.674	2.894	2.905	33.816	0.819	20.367	37.520
43.459	2.789	2.801	31.699	0.874	19.733	34.109
65.384	2.683	2.697	29.649	0.935	19.100	30.923
87.486	2.578	2.593	27.666	1.002	18.466	27.956
109.817	2.472	2.490	25.750	1.076	17.833	25.201
132.445	2.367	2.387	23.901	1.159	17.199	22.652
155.470	2.261	2.285	22.118	1.253	16.566	20.303
179.032	2.155	2.184	20.403	1.358	15.932	18.150
203.349	2.050	2.084	18.754	1.478	15.299	16.186
228.763	1.944	1.985	17.172	1.614	14.665	14.407
255.859	1.839	1.887	15.657	1.770	14.032	12.809
285.751	1.733	1.792	14.209	1.950	13.398	11.388
320.953	1.627	1.700	12.828	2.160	12.765	10.142
369.464	1.522	1.612	11.514	2.407	12.131	9.070
725.955	1.416	1.529	10.266	2.699	11.498	8.172

(AP4)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.615	XSec Area = 12.666
Discharge = 36.97	Critical Depth = 1.159	XSec Area = 7.503
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.016	36.000	1.027	21.000	41.679
19.316	2.908	2.926	34.090	1.084	20.447	38.515
38.789	2.816	2.836	32.231	1.147	19.894	35.531
58.454	2.723	2.746	30.423	1.215	19.341	32.723
78.360	2.631	2.657	28.666	1.290	18.788	30.086
98.567	2.539	2.568	26.959	1.371	18.235	27.616
119.161	2.447	2.480	25.304	1.461	17.682	25.311
140.258	2.355	2.393	23.700	1.560	17.129	23.167
162.025	2.263	2.306	22.147	1.669	16.576	21.180
184.713	2.170	2.220	20.644	1.791	16.023	19.348
208.711	2.078	2.136	19.193	1.926	15.470	17.668
234.684	1.986	2.053	17.793	2.078	14.917	16.138
263.881	1.894	1.972	16.443	2.248	14.364	14.756
299.106	1.802	1.894	15.145	2.441	13.811	13.522
349.248	1.710	1.820	13.898	2.660	13.258	12.436
741.120	1.617	1.749	12.701	2.911	12.705	11.498

STEADY-STATE WATER-SURFACE PROFILE

(APS)

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.852	XSec Area = 15.852
Discharge = 50.01	Critical Depth = 1.350	XSec Area = 9.518
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.030	36.000	1.389	21.000	42.658
16.669	2.924	2.956	34.414	1.453	20.542	40.069
33.552	2.847	2.883	32.863	1.522	20.084	37.608
50.696	2.771	2.810	31.347	1.595	19.626	35.271
68.155	2.695	2.738	29.866	1.674	19.168	33.057
86.006	2.618	2.666	28.421	1.760	18.710	30.965
104.348	2.542	2.595	27.010	1.852	18.251	28.992
123.317	2.466	2.525	25.634	1.951	17.793	27.137
143.106	2.389	2.455	24.293	2.059	17.335	25.398
164.000	2.313	2.386	22.986	2.176	16.877	23.775
186.443	2.237	2.319	21.715	2.303	16.419	22.267
211.182	2.160	2.253	20.479	2.442	15.961	20.872
239.615	2.084	2.188	19.278	2.594	15.503	19.591
274.873	2.007	2.126	18.112	2.761	15.045	18.423
326.852	1.931	2.066	16.981	2.945	14.587	17.369
759.036	1.855	2.009	15.885	3.148	14.129	16.431

(AP6)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.823	XSec Area = 15.441
Discharge = 59.12	Critical Depth = 1.467	XSec Area = 10.861
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.042	36.000	1.642	21.000	43.515
11.122	2.922	2.968	34.374	1.720	20.530	40.903
22.354	2.843	2.894	32.785	1.803	20.060	38.427
33.718	2.765	2.821	31.233	1.893	19.591	36.085
45.245	2.687	2.748	29.717	1.989	19.121	33.877
56.974	2.608	2.677	28.238	2.094	18.651	31.799
68.957	2.530	2.606	26.796	2.206	18.181	29.851
81.266	2.452	2.536	25.391	2.328	17.711	28.033
94.004	2.374	2.468	24.022	2.461	17.242	26.342
107.322	2.295	2.401	22.691	2.605	16.772	24.778
121.457	2.217	2.336	21.396	2.763	16.302	23.342
136.805	2.139	2.273	20.138	2.936	15.832	22.033
154.114	2.060	2.212	18.917	3.125	15.362	20.852
175.054	1.982	2.155	17.732	3.334	14.892	19.801
204.911	1.904	2.101	16.584	3.565	14.423	18.882
437.880	1.825	2.052	15.473	3.821	13.953	18.097

AP7

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, May 26, 1999

English Units

Length = 1000	Normal Depth = 2.261	XSec Area = 22.113
Discharge = 95.77	Critical Depth = 1.857	XSec Area = 15.910
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.110	36.000	2.660	21.000	48.412
7.919	2.951	3.067	34.974	2.738	20.705	46.899
16.003	2.902	3.025	33.963	2.820	20.410	45.446
24.281	2.852	2.983	32.966	2.905	20.115	44.053
32.792	2.803	2.942	31.984	2.994	19.819	42.721
41.585	2.754	2.902	31.016	3.088	19.524	41.449
50.722	2.705	2.862	30.063	3.186	19.229	40.238
60.292	2.656	2.824	29.124	3.288	18.934	39.088
70.416	2.606	2.786	28.200	3.396	18.639	37.998
81.274	2.557	2.748	27.291	3.509	18.344	36.970
93.143	2.508	2.712	26.396	3.628	18.048	36.004
106.488	2.459	2.678	25.515	3.753	17.753	35.099
122.177	2.410	2.644	24.649	3.885	17.458	34.258
142.148	2.360	2.612	23.797	4.024	17.163	33.480
172.520	2.311	2.581	22.960	4.171	16.868	32.766
437.918	2.262	2.553	22.138	4.326	16.573	32.118

AP22

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, May 26, 1999

English Units

Length = 1000	Normal Depth = 2.227	XSec Area = 26.012
Discharge = 117.57	Critical Depth = 1.816	XSec Area = 18.966
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.122	42.000	2.799	23.000	59.721
8.270	2.949	3.077	40.825	2.880	22.691	57.885
16.710	2.897	3.034	39.666	2.964	22.383	56.122
25.351	2.846	2.990	38.522	3.052	22.074	54.433
34.232	2.794	2.948	37.395	3.144	21.766	52.816
43.402	2.743	2.906	36.283	3.240	21.457	51.273
52.928	2.691	2.865	35.188	3.341	21.148	49.804
62.900	2.640	2.824	34.108	3.447	20.840	48.408
73.444	2.589	2.785	33.044	3.558	20.531	47.086
84.743	2.537	2.747	31.996	3.675	20.222	45.839
97.084	2.486	2.710	30.963	3.797	19.914	44.667
110.945	2.434	2.674	29.947	3.926	19.605	43.571
127.221	2.383	2.639	28.947	4.062	19.297	42.552
147.906	2.331	2.606	27.962	4.205	18.988	41.611
179.305	2.280	2.574	26.993	4.356	18.679	40.749
452.803	2.228	2.545	26.040	4.515	18.371	39.967

BPLW

Architects & Engineers, Inc.

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(505) 881-2759

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Mesa, AZ 85201
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Martin Building, Suite 501
215 North Stanton Street
El Paso, TX 79901
(915) 545-1665

2000 East La Mar
Suite 600
Arlington, TX 76006
(817) 588-3036

Project BCMDC

Subject CUMULATIVE FLOWS

Project # 95050 Date 5-25-95 By DAA

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

TOTAL VOLUMES (FINAL BUILDOUT / MASTERPLAN)

CONTRIBUTING BASIN	BASIN Q_{100}	CUMULATIVE Q_{100}	ANALYSIS POINT	V_{100} (6 hour)
THIS IS A CONTINUATION FROM (PHASE I CONSTRUCTION)				
7	36.65	95.77	7	TOTAL 2.39
8	14.87	110.64	8	0.48
9	29.92	140.56	9	1.08
22	26.25	160.81	10	0.74
END OF CHANNEL TO NORTH WEST OF POND				
SOUTH CHANNEL				
16	27.25 (2/3)	17.80	16	0.63
20	26.94	44.74	20	0.98
10	15.70	60.44		0.48
			POND $-V_{100}$	6.78

Copies to:

Designing to Shape the Future

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Architects & Engineers, Inc.

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Project BCVDC
Subject CULVERTS
Project # [illegible] Date 4/5/[illegible] By [illegible]

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

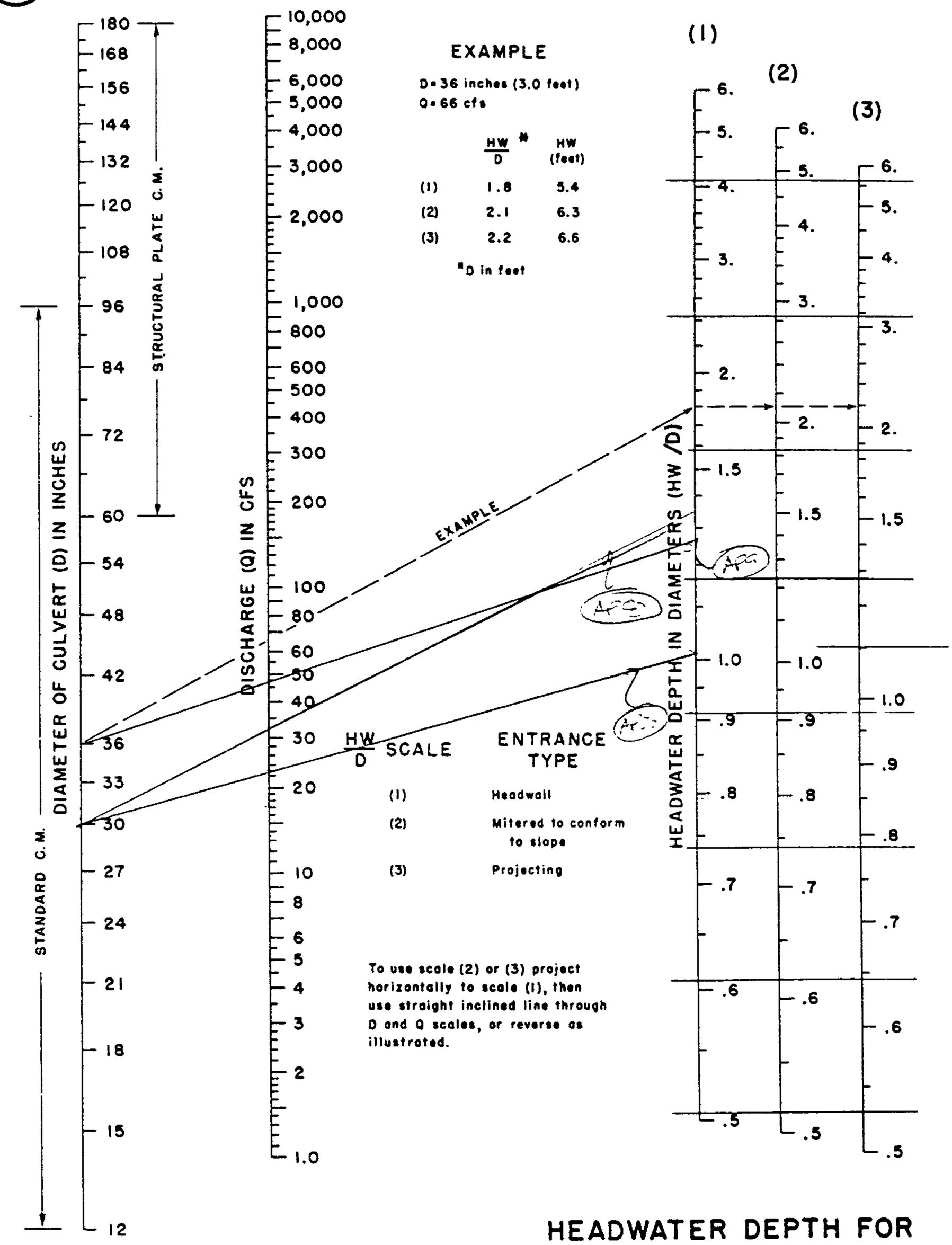
CULVERT CROSSINGS (INLET CONTROL)
CMP w/ HEADWALL

BASIN OR ANALYSIS POINT	Q_{100}	AVAILABLE HW	# PIPES	Φ PIPE	HW/D	HW REQ.
AP8	110.64	48"	3	30	1.35	40.5"
AP9	140.56	60"	3	36"	1.27	45.7"
AP20	46.59	36"	2	30"	1.02	30.6

Copies to:

Designing to Shape the Future

CHART 2



EXAMPLE

D = 36 inches (3.0 feet)
Q = 66 cfs

	HW/D *	HW (feet)
(1)	1.8	5.4
(2)	2.1	6.3
(3)	2.2	6.6

*D in feet

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

n = .024

(AP3)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.413	XSec Area = 10.230
Discharge = 27.71	Critical Depth = 0.998	XSec Area = 5.985
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.009	36.000	0.770	21.000	41.162
21.674	2.894	2.905	33.816	0.819	20.367	37.520
43.459	2.789	2.801	31.699	0.874	19.733	34.109
65.384	2.683	2.697	29.649	0.935	19.100	30.923
87.486	2.578	2.593	27.666	1.002	18.466	27.956
109.817	2.472	2.490	25.750	1.076	17.833	25.201
132.445	2.367	2.387	23.901	1.159	17.199	22.652
155.470	2.261	2.285	22.118	1.253	16.566	20.303
179.032	2.155	2.184	20.403	1.358	15.932	18.150
203.349	2.050	2.084	18.754	1.478	15.299	16.186
228.763	1.944	1.985	17.172	1.614	14.665	14.407
255.859	1.839	1.887	15.657	1.770	14.032	12.809
285.751	1.733	1.792	14.209	1.950	13.398	11.388
320.953	1.627	1.700	12.828	2.160	12.765	10.142
369.464	1.522	1.612	11.514	2.407	12.131	9.070
725.955	1.416	1.529	10.266	2.699	11.498	8.172

AP4

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.615	XSec Area = 12.666
Discharge = 36.97	Critical Depth = 1.159	XSec Area = 7.503
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.016	36.000	1.027	21.000	41.679
19.316	2.908	2.926	34.090	1.084	20.447	38.515
38.789	2.816	2.836	32.231	1.147	19.894	35.531
58.454	2.723	2.746	30.423	1.215	19.341	32.723
78.360	2.631	2.657	28.666	1.290	18.788	30.086
98.567	2.539	2.568	26.959	1.371	18.235	27.616
119.161	2.447	2.480	25.304	1.461	17.682	25.311
140.258	2.355	2.393	23.700	1.560	17.129	23.167
162.025	2.263	2.306	22.147	1.669	16.576	21.180
184.713	2.170	2.220	20.644	1.791	16.023	19.348
208.711	2.078	2.136	19.193	1.926	15.470	17.668
234.684	1.986	2.053	17.793	2.078	14.917	16.138
263.881	1.894	1.972	16.443	2.248	14.364	14.756
299.106	1.802	1.894	15.145	2.441	13.811	13.522
349.248	1.710	1.820	13.898	2.660	13.258	12.436
741.120	1.617	1.749	12.701	2.911	12.705	11.498

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

APS

Length = 1000	Normal Depth = 1.852	XSec Area = 15.852
Discharge = 50.01	Critical Depth = 1.350	XSec Area = 9.518
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.030	36.000	1.389	21.000	42.658
16.669	2.924	2.956	34.414	1.453	20.542	40.069
33.552	2.847	2.883	32.863	1.522	20.084	37.608
50.696	2.771	2.810	31.347	1.595	19.626	35.271
68.155	2.695	2.738	29.866	1.674	19.168	33.057
86.006	2.618	2.666	28.421	1.760	18.710	30.965
104.348	2.542	2.595	27.010	1.852	18.251	28.992
123.317	2.466	2.525	25.634	1.951	17.793	27.137
143.106	2.389	2.455	24.293	2.059	17.335	25.398
164.000	2.313	2.386	22.986	2.176	16.877	23.775
186.443	2.237	2.319	21.715	2.303	16.419	22.267
211.182	2.160	2.253	20.479	2.442	15.961	20.872
239.615	2.084	2.188	19.278	2.594	15.503	19.591
274.873	2.007	2.126	18.112	2.761	15.045	18.423
326.852	1.931	2.066	16.981	2.945	14.587	17.369
759.036	1.855	2.009	15.885	3.148	14.129	16.431

AP6

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.823	XSec Area = 15.441
Discharge = 59.12	Critical Depth = 1.467	XSec Area = 10.861
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.042	36.000	1.642	21.000	43.515
11.122	2.922	2.968	34.374	1.720	20.530	40.903
22.354	2.843	2.894	32.785	1.803	20.060	38.427
33.718	2.765	2.821	31.233	1.893	19.591	36.085
45.245	2.687	2.748	29.717	1.989	19.121	33.877
56.974	2.608	2.677	28.238	2.094	18.651	31.799
68.957	2.530	2.606	26.796	2.206	18.181	29.851
81.266	2.452	2.536	25.391	2.328	17.711	28.033
94.004	2.374	2.468	24.022	2.461	17.242	26.342
107.322	2.295	2.401	22.691	2.605	16.772	24.778
121.457	2.217	2.336	21.396	2.763	16.302	23.342
136.805	2.139	2.273	20.138	2.936	15.832	22.033
154.114	2.060	2.212	18.917	3.125	15.362	20.852
175.054	1.982	2.155	17.732	3.334	14.892	19.801
204.911	1.904	2.101	16.584	3.565	14.423	18.882
437.880	1.825	2.052	15.473	3.821	13.953	18.097

AP7

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, May 26, 1999

English Units

Length = 1000	Normal Depth = 2.261	XSec Area = 22.113
Discharge = 95.77	Critical Depth = 1.857	XSec Area = 15.910
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.110	36.000	2.660	21.000	48.412
7.919	2.951	3.067	34.974	2.738	20.705	46.899
16.003	2.902	3.025	33.963	2.820	20.410	45.446
24.281	2.852	2.983	32.966	2.905	20.115	44.053
32.792	2.803	2.942	31.984	2.994	19.819	42.721
41.585	2.754	2.902	31.016	3.088	19.524	41.449
50.722	2.705	2.862	30.063	3.186	19.229	40.238
60.292	2.656	2.824	29.124	3.288	18.934	39.088
70.416	2.606	2.786	28.200	3.396	18.639	37.998
81.274	2.557	2.748	27.291	3.509	18.344	36.970
93.143	2.508	2.712	26.396	3.628	18.048	36.004
106.488	2.459	2.678	25.515	3.753	17.753	35.099
122.177	2.410	2.644	24.649	3.885	17.458	34.258
142.148	2.360	2.612	23.797	4.024	17.163	33.480
172.520	2.311	2.581	22.960	4.171	16.868	32.766
437.918	2.262	2.553	22.138	4.326	16.573	32.118

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, May 26, 1999

English Units

App

Length = 1000	Normal Depth = 2.408	XSec Area = 24.627
Discharge = 110.64	Critical Depth = 1.989	XSec Area = 17.840
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.147	36.000	3.073	21.000	51.060
6.898	2.961	3.114	35.178	3.145	20.764	49.906
13.978	2.921	3.082	34.365	3.220	20.528	48.793
21.271	2.882	3.051	33.562	3.297	20.292	47.721
28.817	2.843	3.020	32.768	3.376	20.055	46.690
36.668	2.803	2.989	31.983	3.459	19.819	45.701
44.889	2.764	2.959	31.208	3.545	19.583	44.752
53.574	2.724	2.930	30.442	3.634	19.347	43.846
62.849	2.685	2.901	29.685	3.727	19.111	42.981
72.902	2.646	2.873	28.937	3.823	18.875	42.158
84.024	2.606	2.845	28.199	3.924	18.638	41.377
96.699	2.567	2.819	27.470	4.028	18.402	40.640
111.833	2.528	2.793	26.751	4.136	18.166	39.945
131.448	2.488	2.769	26.040	4.249	17.930	39.294
161.928	2.449	2.745	25.339	4.366	17.694	38.687
437.506	2.410	2.722	24.647	4.489	17.458	38.124

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, May 26, 1999

English Units

App

Length = 1000	Normal Depth = 2.542	XSec Area = 29.546
Discharge = 140.56	Critical Depth = 2.103	XSec Area = 21.685
Width = 4	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.202	39.000	3.604	22.000	60.733
6.068	2.970	3.178	38.332	3.667	21.817	59.828
12.336	2.939	3.155	37.669	3.731	21.634	58.950
18.838	2.909	3.132	37.012	3.798	21.451	58.101
25.615	2.878	3.110	36.361	3.866	21.268	57.279
32.723	2.848	3.088	35.715	3.936	21.085	56.485
40.232	2.817	3.066	35.075	4.007	20.902	55.719
48.240	2.787	3.045	34.440	4.081	20.719	54.982
56.882	2.756	3.024	33.811	4.157	20.536	54.273
66.356	2.726	3.004	33.188	4.235	20.353	53.592
76.970	2.695	2.984	32.570	4.316	20.170	52.940
89.237	2.665	2.965	31.958	4.398	19.987	52.317
104.115	2.634	2.946	31.351	4.483	19.804	51.723
123.743	2.604	2.928	30.750	4.571	19.621	51.159
154.873	2.573	2.910	30.154	4.661	19.438	50.624
445.358	2.543	2.894	29.564	4.754	19.255	50.120

A-P10

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, May 26, 1999

English Units

Length = 1000	Normal Depth = 2.523	XSec Area = 31.713
Discharge = 153.68	Critical Depth = 2.082	XSec Area = 23.410
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.208	42.000	3.659	23.000	66.963
6.245	2.968	3.184	41.273	3.723	22.810	65.950
12.693	2.937	3.160	40.552	3.790	22.619	64.967
19.376	2.905	3.136	39.838	3.858	22.429	64.016
26.339	2.873	3.113	39.129	3.928	22.238	63.097
33.635	2.841	3.090	38.426	3.999	22.048	62.209
41.337	2.810	3.067	37.730	4.073	21.858	61.353
49.543	2.778	3.045	37.039	4.149	21.667	60.529
58.390	2.746	3.024	36.354	4.227	21.477	59.738
68.080	2.714	3.003	35.676	4.308	21.286	58.979
78.922	2.683	2.982	35.004	4.390	21.096	58.252
91.436	2.651	2.962	34.337	4.476	20.906	57.559
106.592	2.619	2.943	33.677	4.563	20.715	56.899
126.553	2.587	2.924	33.022	4.654	20.525	56.272
158.153	2.556	2.906	32.374	4.747	20.334	55.679
452.191	2.524	2.888	31.732	4.843	20.144	55.120

STEADY-STATE WATER-SURFACE PROFILE

(AP16)

Trapezoidal Channel

Wednesday, May 26, 1999

English Units

Length = 1000	Normal Depth = 1.039	XSec Area = 6.359
Discharge = 17.80	Critical Depth = 0.789	XSec Area = 4.238
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.004	36.000	0.494	21.000	40.773
17.490	2.870	2.874	33.312	0.534	20.217	36.276
35.005	2.739	2.744	30.725	0.579	19.435	32.125
52.552	2.609	2.615	28.241	0.630	18.652	28.308
70.142	2.478	2.486	25.859	0.688	17.869	24.813
87.791	2.348	2.357	23.579	0.755	17.087	21.626
105.520	2.217	2.228	21.401	0.832	16.304	18.736
123.362	2.087	2.100	19.326	0.921	15.521	16.130
141.367	1.956	1.973	17.352	1.026	14.738	13.797
159.615	1.826	1.846	15.480	1.150	13.956	11.725
178.237	1.696	1.722	13.711	1.298	13.173	9.904
197.468	1.565	1.599	12.043	1.478	12.390	8.325
217.772	1.435	1.479	10.478	1.699	11.608	6.979
240.229	1.304	1.365	9.015	1.974	10.825	5.861
268.343	1.174	1.258	7.654	2.326	10.042	4.969
432.756	1.043	1.164	6.395	2.783	9.260	4.307

STEADY-STATE WATER-SURFACE PROFILE

(AP20)

Trapezoidal Channel

Wednesday, May 26, 1999

English Units

Length = 1000	Normal Depth = 1.606	XSec Area = 12.554
Discharge = 44.74	Critical Depth = 1.277	XSec Area = 8.718
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.024	36.000	1.243	21.000	42.227
12.813	2.907	2.934	34.078	1.313	20.443	39.074
25.707	2.814	2.844	32.207	1.389	19.887	36.107
38.703	2.722	2.755	30.389	1.472	19.330	33.319
51.824	2.629	2.667	28.621	1.563	18.774	30.709
65.104	2.536	2.579	26.906	1.663	18.217	28.273
78.588	2.443	2.492	25.242	1.772	17.661	26.007
92.340	2.351	2.406	23.630	1.893	17.104	23.909
106.449	2.258	2.322	22.069	2.027	16.548	21.976
121.050	2.165	2.239	20.560	2.176	15.991	20.206
136.356	2.072	2.158	19.102	2.342	15.435	18.598
152.725	1.980	2.079	17.696	2.528	14.878	17.150
170.836	1.887	2.003	16.342	2.738	14.322	15.863
192.216	1.794	1.932	15.040	2.975	13.765	14.737
221.699	1.701	1.865	13.789	3.245	13.208	13.776
437.194	1.609	1.805	12.589	3.554	12.652	12.982

BPLW
Architects & Engineers, Inc.

6200 Uptown Blvd. NE, Suite 400, Albuquerque, NM 87110, (505) 881-2759
49 West First Street, Suite 100, Mesa, AZ 85201, (602) 827-2759
Martin Building, Suite 501, 215 North Stanton Street, El Paso, TX 79901, (915) 545-1665
2000 East La Mar, Suite 600, Arlington, TX 76006, (817) 588-3036

Project: BCMDC
Subject: CUMULATIVE FLOWS
Project #: 93020 Date: 1/14/94 By: DAA

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

TOTAL VOLUMES

EAST SIDE OF SITE.

CONTRIBUTING BASIN	BASIN Q_{100}	CUMULATIVE Q_{100}	APOINT	$V_{100(6)}$	$V_{100(24)}$
15	7.83	7.83	23	0.25	0.27
11	44.80	52.63	24	1.64	1.92
12	25.91	78.54	25	0.93	1.08
13	5.26	83.80	26	0.19	0.21
14	12.92	96.72	27	0.47	0.54
16	~~18.90~~ 27.25 /23	106.17		0.65	0.74
15	7.82	113.99		0.25	0.26

Q_{100} = 113.99 cfs TOTAL $V_{100(6)}$ = 4.38 acre-ft

$V_{100(24)}$ = 5.02 acre-ft

Copies to: Page of

BPLW

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Suite 400
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215 North Stanton Street
El Paso, TX 79901
(915) 545-1665

2000 East La Mar
Suite 600
Arlington, TX 76006
(817) 588-3036

Project PCMDC

Subject CULVERTS

Project # 98050 Date 4/15/99 By DAZ

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

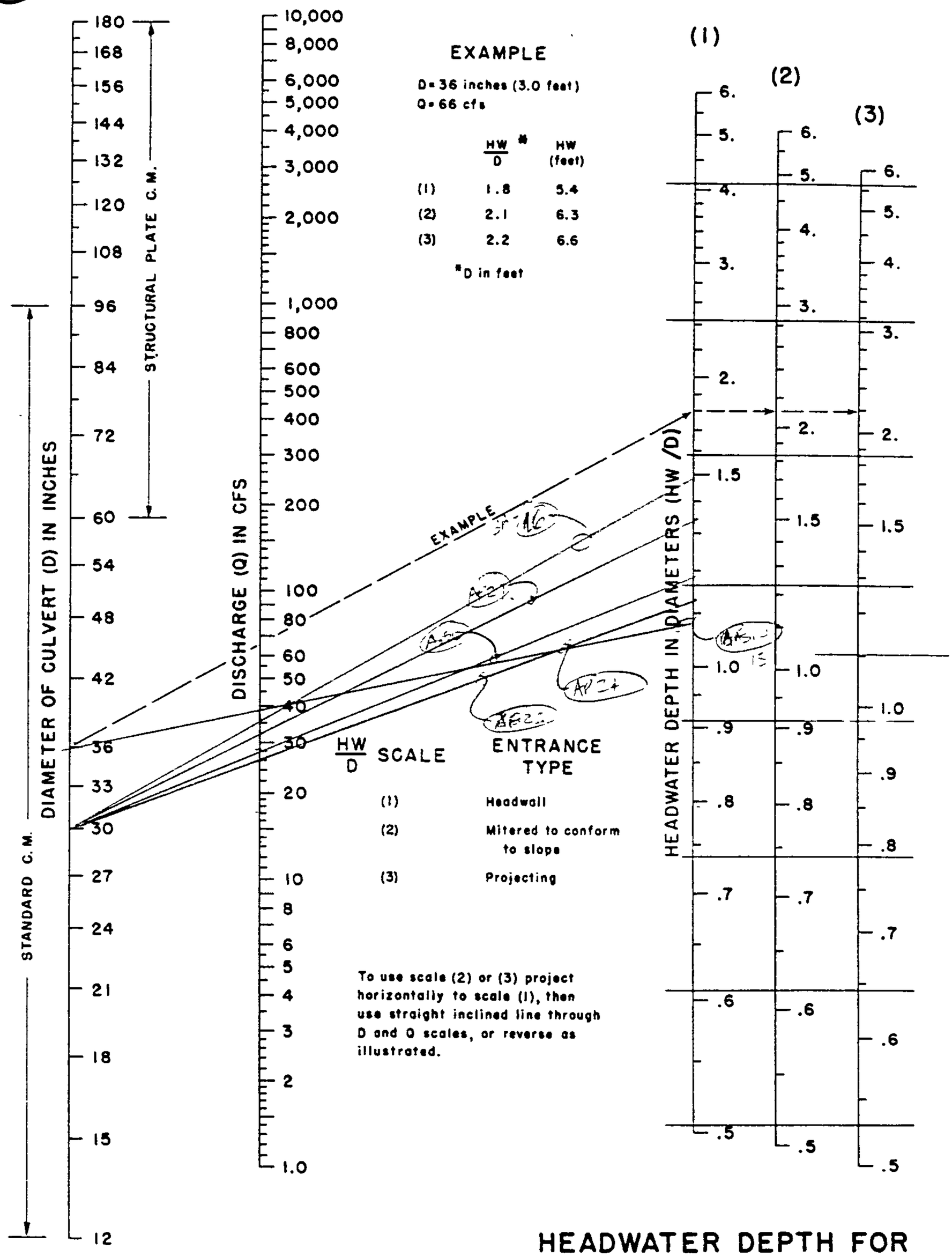
CULVERT CROSSINGS (INLET CONTROL)
CMP W/ HEADWALL

BASIN OR ANALYSIS POINT	Q100	AVAILABLE HW	# PIPES	Φ PIPES	HW/D	HW REQ
24	52.63	48"	2	30	1.13	33.9"
25	73.51	60"	3	30	1.13	33.9"
26	55.50	60"	3	30	1.15	35.4"
27	96.72	50"	3	30	1.34	40.2"
BASIN 1.6	196.17	60"	3	30	1.50	45.0"
BASIN 1.5	1.3.55	60	3	36	1.05	38.9"

Copies to:

Designing to Shape the Future

CHART 2



EXAMPLE

D = 36 inches (3.0 feet)
Q = 66 cfs

	HW/D *	HW (feet)
(1)	1.8	5.4
(2)	2.1	6.3
(3)	2.2	6.6

*D in feet

HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

n = .024

BUREAU OF PUBLIC ROADS JAN. 1963

AP 23

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000
Discharge = 7.83
Width = 5
Manning's n = .035

Normal Depth = 0.295
Critical Depth = 0.401
Control Depth = 3.000
Invert Slope = .075

XSec Area = 1.649
XSec Area = 2.325
Flow Type = subcritical
Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.001	33.000	0.237	17.000	40.558
2.309	2.827	2.828	30.114	0.260	16.307	35.097
4.617	2.653	2.655	27.349	0.286	15.614	30.126
6.924	2.480	2.482	24.703	0.317	14.921	25.626
9.231	2.307	2.309	22.178	0.353	14.228	21.574
11.536	2.134	2.136	19.772	0.396	13.534	17.952
13.839	1.960	1.963	17.487	0.448	12.841	14.738
16.140	1.787	1.791	15.322	0.511	12.148	11.913
18.437	1.614	1.619	13.277	0.590	11.455	9.456
20.727	1.440	1.448	11.352	0.690	10.762	7.348
23.007	1.267	1.278	9.548	0.820	10.069	5.570
25.269	1.094	1.109	7.863	0.996	9.376	4.106
27.495	0.921	0.945	6.298	1.243	8.683	2.941
29.646	0.747	0.788	4.854	1.613	7.989	2.067
31.600	0.574	0.650	3.530	2.218	7.296	1.489
32.763	0.401	0.577	2.325	3.367	6.603	1.263

AP24

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 0.879	XSec Area = 5.940
Discharge = 52.63	Critical Depth = 1.265	XSec Area = 9.530
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .075	Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.039	33.000	1.595	17.000	43.107
1.488	2.884	2.929	31.061	1.694	16.537	39.566
2.967	2.769	2.819	29.175	1.804	16.075	36.263
4.435	2.653	2.711	27.343	1.925	15.612	33.193
5.889	2.537	2.603	25.565	2.059	15.150	30.354
7.327	2.422	2.498	23.840	2.208	14.687	27.741
8.743	2.306	2.394	22.168	2.374	14.225	25.354
10.133	2.191	2.292	20.550	2.561	13.762	23.190
11.489	2.075	2.194	18.985	2.772	13.300	21.250
12.801	1.959	2.100	17.474	3.012	12.837	19.534
14.055	1.844	2.011	16.016	3.286	12.375	18.046
15.229	1.728	1.929	14.612	3.602	11.912	16.792
16.292	1.612	1.857	13.261	3.969	11.449	15.781
17.197	1.497	1.797	11.964	4.399	10.987	15.026
17.862	1.381	1.755	10.720	4.909	10.524	14.549
18.138	1.265	1.739	9.530	5.523	10.062	14.381

AP25

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.095	XSec Area = 7.869
Discharge = 78.54	Critical Depth = 1.585	XSec Area = 12.952
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .075	Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.088	33.000	2.380	17.000	46.305
1.160	2.906	3.003	31.414	2.500	16.623	43.561
2.307	2.811	2.919	29.864	2.630	16.245	40.987
3.438	2.717	2.836	28.350	2.770	15.868	38.585
4.551	2.623	2.755	26.871	2.923	15.491	36.353
5.641	2.528	2.677	25.428	3.089	15.114	34.292
6.706	2.434	2.600	24.020	3.270	14.736	32.401
7.738	2.340	2.526	22.648	3.468	14.359	30.684
8.731	2.245	2.456	21.311	3.685	13.982	29.142
9.676	2.151	2.390	20.010	3.925	13.604	27.778
10.561	2.057	2.329	18.745	4.190	13.227	26.597
11.370	1.962	2.275	17.515	4.484	12.850	25.604
12.080	1.868	2.228	16.321	4.812	12.473	24.809
12.661	1.774	2.190	15.162	5.180	12.095	24.222
13.066	1.680	2.165	14.039	5.594	11.718	23.856
13.224	1.585	2.156	12.952	6.064	11.341	23.729

(AP26)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.134	XSec Area = 8.239
Discharge = 83.80	Critical Depth = 1.643	XSec Area = 13.615
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .075	Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.100	33.000	2.539	17.000	47.109
1.100	2.910	3.020	31.479	2.662	16.638	44.512
2.185	2.819	2.940	29.990	2.794	16.276	42.076
3.255	2.729	2.863	28.534	2.937	15.914	39.800
4.305	2.638	2.787	27.111	3.091	15.553	37.685
5.333	2.548	2.713	25.720	3.258	15.191	35.731
6.334	2.457	2.641	24.362	3.440	14.829	33.938
7.302	2.367	2.572	23.037	3.638	14.467	32.309
8.231	2.276	2.507	21.745	3.854	14.105	30.847
9.113	2.186	2.446	20.485	4.091	13.743	29.554
9.935	2.095	2.389	19.258	4.351	13.382	28.435
10.683	2.005	2.339	18.064	4.639	13.020	27.495
11.337	1.914	2.296	16.903	4.958	12.658	26.744
11.867	1.824	2.262	15.774	5.312	12.296	26.189
12.234	1.734	2.240	14.678	5.709	11.934	25.844
12.375	1.643	2.231	13.615	6.155	11.572	25.725

AP27

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.225	XSec Area = 9.122
Discharge = 96.72	Critical Depth = 1.778	XSec Area = 15.210
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .075	Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.133	33.000	2.931	17.000	49.304
0.958	2.919	3.064	31.628	3.058	16.674	47.053
1.902	2.837	2.995	30.283	3.194	16.348	44.939
2.828	2.756	2.929	28.964	3.339	16.022	42.962
3.734	2.674	2.864	27.672	3.495	15.696	41.123
4.616	2.593	2.801	26.406	3.663	15.370	39.423
5.471	2.511	2.740	25.167	3.843	15.044	37.864
6.293	2.430	2.683	23.954	4.038	14.718	36.447
7.078	2.348	2.628	22.768	4.248	14.393	35.176
7.816	2.267	2.578	21.609	4.476	14.067	34.053
8.498	2.185	2.532	20.476	4.724	13.741	33.082
9.112	2.104	2.491	19.369	4.993	13.415	32.269
9.643	2.022	2.456	18.290	5.288	13.089	31.621
10.066	1.941	2.430	17.236	5.611	12.763	31.144
10.354	1.859	2.412	16.210	5.967	12.437	30.849
10.463	1.778	2.406	15.210	6.359	12.111	30.748

County of Bernalillo

State of New Mexico

BOARD OF COUNTY COMMISSIONERS
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DISTRICT 3
BARBARA J. SEWARD, VICE CHAIR
DISTRICT 4
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STEVE D. GALLEGOS, MEMBER
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LES HOUSTON, MEMBER
DISTRICT 5
JUAN R. VIGIL, COUNTY MANAGER

2400 BROADWAY, S.E.
ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

MARK J. CARRILLO, ASSESSOR
JUDY D. WOODWARD, CLERK
IRA ROBINSON, PROBATE JUDGE
JOE BOWDICH, SHERIFF
ORLANDO VIGIL, TREASURER

May 14, 1999

Lisa Vornholt, P.E.
Bernalillo County Public Works Division
2400 Broadway SE
Albuquerque, New Mexico 87102

RE: Grading and Drainage Plan for Bernalillo County Metropolitan Detention Center (P2/D2) (PWDN 990083) Submitted for Site Development Plan for Building Permit Approval, Building Permit and Grading Permit Release, Engineer's Stamp Dated 4/15/99.

Dear Lisa:

The above referenced plans for the Bernalillo County Detention Center show that no development is proposed in the immediate area of the FEMA floodplain at this time. Therefore, I will defer the approval of this plan to your office.

On the grading plan, the engineer should show the FEMA floodplain limits and note that no construction or grading will be done in that area.

In the future, if development is proposed within the floodplain area, plans for that development must be submitted to and approved by my office at that time.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

RECEIVED
JUN 07 2001
HYDROLOGY SECTION

c: Guy Jackson, P.E., BPLW
Lisa Ann Manwill, Albuquerque Metropolitan Arroyo Flood Control Authority
File

County of Bernalillo

State of New Mexico

BOARD OF COUNTY COMMISSIONERS
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MARK J. CARRILLO, ASSESSOR
JUDY D. WOODWARD, CLERK
IRA ROBINSON, PROBATE JUDGE
JOE BOWDICH, SHERIFF
ORLANDO VIGIL, TREASURER

June 23, 1999

Lisa Vornholt, P.E.
Bernalillo County Public Works Division
2400 Broadway SE
Albuquerque, New Mexico 87102

RE: Drainage Report for Bernalillo County Metropolitan Detention Center (P2/D2) (PWDN 990083) Submitted for Site Development Plan for Building Permit Approval, Building Permit and Grading Permit Release, Engineer's Stamp Dated 6/1/99.

Dear Lisa:

Per my previous letter regarding the above referenced site, I deferred the approval of the plans to your office since no development is proposed in the FEMA floodplain. Therefore, with respect to the floodplain, the plan is adequate for Site Development Plan and Building Permit approval.

The plan is also approved for Grading Permit release, however, the engineer should show the FEMA floodplain limits on the plan and note that no construction or grading will be allowed within that area.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Guy Jackson, P.E., BPLW
Lisa Ann Manwill, Albuquerque Metropolitan Arroyo Flood Control Authority
File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Bernalillo County Metropolitian Detention Center ZONE ATLAS/DRWG. FILE # P-2 & Q-2

DRB#: _____ CPC # CSU-99-3 WORK ORDER #_____

LEGAL DESCRIPTION: Tract A, Town of Atrisco Grant "South Grant"

CITY ADDRESS: 5800 Shelly Drive SW, Albuquerque, NM 87121

ENGINEERING FIRM: BPLW CONTACT: Guy Jackson

ADDRESS: 6200 Uptown Blvd, NE 87110 PHONE: 881-2759

OWNER: Bernalillo County CONTACT: Terry Nighbert or Roger Paul

ADDRESS: 6840 2nd Street NW, 87107 PHONE: 842-4366

ARCHITECT: CBL\DCSW CONTACT: Phil Custer\Marc Schiff

ADDRESS: 6200 Uptown Blvd, NE 87110 PHONE: 881-2759

SURVEYOR: Bohannan Huston CONTACT: Silas Suazo

ADDRESS: 7500 Jefferson NE, 87109 PHONE : 823-1000

CONTRACTOR: --- CONTACT: _____

ADDRESS: --- PHONE: _____

TYPE OF SUBMITTAL:

_x DRAINAGE REPORT
_x DRAINAGE PLAN
__ CONCEPTUAL GRADING & DRAINAGE PLAN
_x GRADING PLAN
__ EROSION CONTROL PLAN
__ ENGINEER'S CERTIFICATION
OTHER _____

PRE-DESIGN MEETING:
X YES
_ NO
__ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

_ SKETCH PLAT APPROVAL
_ PRELIMINARY PLAT APPROVAL
_ S. DEV. PLAN FOR SUB'D APPROVAL
x S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
_ SECTOR PLAN APPROVAL
_ FINAL PLAT APPROVAL
_ FOUNDATION PERMIT APPROVAL
x BUILDING PERMIT APPROVAL
_ CERTIFICATE OF OCCUPANCY APPROVAL
x GRADING PERMIT APPROVALS
_ PAVING PERMIT APPROVAL
_ S.A.B. DRAINAGE REPORT
_ DRAINAGE REQUIREMENTS
OTHER _____ (SPECIFY)

DATE SUBMITTED: 6/4/99
BY: GUY JACKSON

FP

SUSAN

BERNALILLO COUNTY

☐ PWD SUBMITTAL

☐ RESUBMITTAL

☐ FINAL SIGNOFF

PWD SUBMITTAL

Use for all PWD applications EXCEPT Street Excavation

TODAYS DATE 6·4·99

CASE NO: PWDN 990083

OWNER

OWNER Bernalillo County - Terry Nightbert PHONE 342-7939

MAILING ADDRESS 6840 2nd street NW CITY Albuq ZIP 87107

AGENT

AGENT / CONTRACTOR BPLW Architects & Engineers Inc PHONE 881-2759, 881-1230 (Fax)

MAILING ADDRESS 6200 Uptown Blvd NE CITY Albuq. ZIP 87110

STATE LICENSE NO NM 13289 EXP DATE Dec 31, 2000 ~~VOLUME~~ CLASS NM PE

ARCHITECT/ENGINEER Guy Jackson, PE LICENSE NO. 13289 PHONE 881-2759

SITE INFORMATION

SITE ADDRESS / DIRECTIONS 5800 Shelly Drive SW ZONE ATLAS NO. PZ & QZ

Albuq., NM 87121

LEGAL DESCRIPTION TRACT A, Town of Atrisco Grant "South Grant"

LOT SIZE 155.94 AC

EXISTING BUILDING(S) AND USE.

PROPOSED BUILDING(S):

UPC # 1-002-052-265-264-101-15

TYPE OF SUBMITTAL

- ☐ REPLAT
- ☐ MINOR SUBDIVISION
- ☐ MAJOR SUBDIVISION
- ☐ CONSTRUCTION DRAWINGS
- ☒ GRADING & DRAINAGE PLAN
- ☐ AS-CONSTRUCTED GRADING & DRAINAGE PLAN
- ☐ VARIANCE REQUEST
- ☐ LAND DIVISION
- ☐ TRAFFIC IMPACT ANALYSIS / TRAFFIC STUDY
- ☐ INFRASTRUCTURE LIST DESIGN REVIEW
- ☐ SPECIAL USE PERMIT
- ☐ BARRICADING PERMIT
- ☐ BUILDING PERMIT
- ☐ INSPECTION
- ☐ OTHER (Specify):

The issuance of a permit or a review or approval of plan specifications, computations, and shop drawings, shall not be interpreted to be a permit for, or an approval of any variance or violation of any of the provisions of any COUNTY or STATE codes, ordinances, standards, or policies. Nor shall such issuance of a permit or approval of plans, specifications, computations, and shop drawings prevent any authorized COUNTY representative or COUNTY inspector from thereafter requiring the correction of errors in said plans, specifications, computations, or shop drawings or from stopping construction operations which are being carried on thereunder when in violation of any COUNTY or STATE codes, ordinances, standards, or policies.

RECEIVED
JUN 08 1999
HYDROLOGY SECTION

☐ Owner ☒ Agent ☐ Contractor Signature Date 6-4-99

COUNTY

BERNALILLO COUNTY USE ONLY

C/R's:

TOTAL FEE:

Receipt No.:

Received By:

Date: 6/7/01

ATTN: CARLOS MONTOYA

PROJECT: (name, address) BERN CO METRO DET CENTER

PROJECT NO: 980080

BPLW

Architects & Engineers, Inc.

6200 Uptown Blvd. NE, Suite 400
Albuquerque, New Mexico 87110
(505) 881-2759 FAX (505) 881-1230
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e-mail· bplwnm@bplw.com
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2000 East Lamar, Suite 600
Arlington, Texas 76006
(817) 588-3036 FAX (817) 462-4036
e-mail· bplwnm@bplw com
web address· www bplw.com

Martin Building, Suite 501
215 North Stanton Street
El Paso, Texas 79901
e-mail: bplwnm@bplw.com
web address: www bplw com

( ) Acknowledge receipt of enclosures
( ) Return enclosures to us.
( ) Via facsimile fax number· _____

Original will be mailed·
( ) Yes ( ) No

We Transmit the Following:

Copies	Date	Description
1	6/7/01	SITE Plan Showing Proposed Discharge Area.

If enclosures are not noted, please inform us immediately.

Remarks:

RECEIVED
JUN 07 2001
HYDROLOGY SECTION

Copies to:

By David Ash

County of Bernalillo

State of New Mexico

BOARD OF COUNTY COMMISSIONERS
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ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

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JUDY D. WOODWARD, CLERK
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JOE BOWDICH, SHERIFF
ORLANDO VIGIL, TREASURER

June 23, 1999

Lisa Vornholt, P.E.
Bernalillo County Public Works Division
2400 Broadway SE
Albuquerque, New Mexico 87102

RE: Drainage Report for Bernalillo County Metropolitan Detention Center (P2/D2) (PWDN 990083) Submitted for Site Development Plan for Building Permit Approval, Building Permit and Grading Permit Release, Engineer's Stamp Dated 6/1/99.

Dear Lisa:

Per my previous letter regarding the above referenced site, I deferred the approval of the plans to your office since no development is proposed in the FEMA floodplain. Therefore, with respect to the floodplain, the plan is adequate for Site Development Plan and Building Permit approval.

The plan is also approved for Grading Permit release, however, the engineer should show the FEMA floodplain limits on the plan and note that no construction or grading will be allowed within that area.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

RECEIVED
JUN 07 2001
HYDROLOGY SECTION

c: Guy Jackson, P.E., BPLW
Lisa Ann Manwill, Albuquerque Metropolitan Arroyo Flood Control Authority
File

County of Bernalillo

State of New Mexico

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IRA ROBINSON, PROBATE JUDGE
JOE BOWDICH, SHERIFF
ORLANDO VIGIL, TREASURER

May 14, 1999

Lisa Vornholt, P.E.
Bernalillo County Public Works Division
2400 Broadway SE
Albuquerque, New Mexico 87102

RE: Grading and Drainage Plan for Bernalillo County Metropolitan Detention Center (P2/D2) (PWDN 990083) Submitted for Site Development Plan for Building Permit Approval, Building Permit and Grading Permit Release, Engineer's Stamp Dated 4/15/99.

Dear Lisa:

The above referenced plans for the Bernalillo County Detention Center show that no development is proposed in the immediate area of the FEMA floodplain at this time. Therefore, I will defer the approval of this plan to your office.

On the grading plan, the engineer should show the FEMA floodplain limits and note that no construction or grading will be done in that area.

In the future, if development is proposed within the floodplain area, plans for that development must be submitted to and approved by my office at that time.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Guy Jackson, P.E., BPLW
Lisa Ann Manwill, Albuquerque Metropolitan Arroyo Flood Control Authority
File

FP

ERNALILLO COUNTY

PWD SUBMITTAL

Use for all PWD applications EXCEPT Street Excavation

☐ NEW SUBMITTAL

☐ RESUBMITTAL

☐ FINAL SIGNOFF

TODAY'S DATE 4·16·99

CASE NO: PWDN 990083

OWNER

OWNER Bernalillo County - Terry Nightbert PHONE 342·7939

MAILING ADDRESS 6840 2nd street NW CITY Albuq ZIP 87107

AGENT

AGENT / CONTRACTOR BPLW Architects & Engineers Inc PHONE 881-2759, 881-1230 (Fax)

MAILING ADDRESS 6200 Uptown Blvd NE CITY Albuq. ZIP 87110

STATE LICENSE NO NM 13289 EXP DATE Dec 31, 2000 ~~VOLUME~~ CLASS NMPE

ARCHITECT/ENGINEER Guy Jackson, PE LICENSE NO 13289 PHONE 881-2759

SITE INFORMATION

SITE ADDRESS / DIRECTIONS 5800 Shelly Drive SW ZONE ATLAS NO PZ & QZ

Albuq., NM 87121

LEGAL DESCRIPTION TRACT A, Town of Atrisco Grant "South Grant"

LOT SIZE 155.94 AC

EXISTING BUILDING(S) AND USE. NONE PROPOSED BUILDING(S): 5-Metro Jail

UPC # 1-002-052-265-264-101-15

TYPE OF SUBMITTAL

- ☐ REPLAT
- ☐ MINOR SUBDIVISION
- ☐ MAJOR SUBDIVISION
- ☐ CONSTRUCTION DRAWINGS
- ☒ GRADING & DRAINAGE PLAN
- ☐ AS-CONSTRUCTED GRADING & DRAINAGE PLAN
- ☐ VARIANCE REQUEST
- ☐ LAND DIVISION
- ☐ TRAFFIC IMPACT ANALYSIS / TRAFFIC STUDY
- ☐ INFRASTRUCTURE LIST / DESIGN REVIEW
- ☐ SPECIAL USE PERMIT
- ☐ BARRICADING PERMIT
- ☐ BUILDING PERMIT
- ☐ INSPECTION
- ☐ OTHER (Specify):

RECEIVED APR 9 1999 DRAINAGE SECTION

The issuance of a permit or a review or approval of plan specifications, computations, and shop drawings, shall not be interpreted to be a permit for, or an approval of any variance or violation of any of the provisions of any COUNTY or STATE codes, ordinances, standards, or policies. Nor shall such issuance of a permit or approval of plans, specifications, computations, and shop drawings prevent any authorized COUNTY representative or COUNTY inspector form thereafter requiring the correction of errors in said plans, specifications, computations, or shop drawings or from stopping construction operations which are being carried on thereunder when in violation of any COUNTY or STATE codes, ordinances, standards, or policies.

☐ Owner ☒ Agent ☐ Contractor Signature [signature] Date 4-16-99

COUNTY

BERNALILLO COUNTY USE ONLY

C/R's:

TOTAL FEE.	
Receipt No :	
Received By:	

Drainage report? Calcs?
fp limits? Easement?

where is this site?
Exist. roads - access?

plans don't fit in file!
no impact on fp - should show
limits on plan - otherwise ok

BPLW ARCHITECTS & ENGINEERS, INC.
6200 Uptown Blvd., N.E., Suite 400
Albuquerque, New Mexico 87110

FAX COVER SHEET

DATE:	**4/16/99**	**TIME:**	11:38 AM
TO:	Susan Calongne CBL	**PHONE:** **FAX:**	927-3982 924-3864
FROM:	Guy Jackson BPLW	**PHONE:** **FAX:**	(505) 881-2759 (505) 881-1230
RE:	Bernalillo County Metropolitan Detention Center -Grading and Drainage plan and Report		
cc:	Roger Paul		

Number of pages including cover sheet: 2

MESSAGE:

Susan,
As requested (required), I have attached a copy of the Drainage Information Sheet for the referenced project.
Please call David Aube or me if you have questions or comments.
Thanks,
Guy J.

DRAINAGE INFORMATION SHEET

P-2/D2

PROJECT TITLE: Bernalillo County Metropolitian Detention Center ZONE ATLAS/DRWG. FILE # P-2 & Q-2

DRB#: _____ CPC # CSU-99-3 WORK ORDER # _____

LEGAL DESCRIPTION: Tract A, Town of Atrisco Grant "South Grant"

CITY ADDRESS: 5800 Shelly Drive SW, Albuquerque, NM 87121

ENGINEERING FIRM: BPLW CONTACT: Guy Jackson

ADDRESS: 6200 Uptown Blvd. NE 87110 PHONE: 881-2759

OWNER: Bernalillo County CONTACT: Terry Nighbert or Roger Paul
ADDRESS: 6840 2nd Street NW, 87107 PHONE: 842-4366

ARCHITECT: CBL\DCSW CONTACT: Phil Custer\Marc Schiff

ADDRESS: 6200 Uptown Blvd. NE 87110 PHONE: 881-2759
SURVEYOR: Bohannan Huston CONTACT: Silas Suazo

ADDRESS: 7500 Jefferson NE, 87109 PHONE : 823-1000

CONTRACTOR: --- CONTACT: _____

ADDRESS: --- PHONE: _____

TYPE OF SUBMITTAL:

_x DRAINAGE REPORT
_x DRAINAGE PLAN
__ CONCEPTUAL GRADING & DRAINAGE PLAN
_x GRADING PLAN
__ EROSION CONTROL PLAN
__ ENGINEER'S CERTIFICATION
OTHER _____

PRE-DESIGN MEETING:
X YES
__ NO
__ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

__ SKETCH PLAT APPROVAL
__ PRELIMINARY PLAT APPROVAL
__ S. DEV. PLAN FOR SUB'D APPROVAL
x S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
__ SECTOR PLAN APPROVAL
__ FINAL PLAT APPROVAL
__ FOUNDATION PERMIT APPROVAL
x BUILDING PERMIT APPROVAL
CERTIFICATE OF OCCUPANCY APPROVAL
x GRADING PERMIT APPROVALS
__ PAVING PERMIT APPROVAL
__ S.A.B. DRAINAGE REPORT
__ DRAINAGE REQUIREMENTS
OTHER _____ (SPECIFY)

DATE SUBMITTED: 4/16/99
BY: GUY JACKSON

defer to County or take lead?

DRAINAGE PLAN

FOR

BERNALILLO COUNTY
METROPOLITAN DETENTION CENTER

ALBUQUERQUE, NEW MEXICO

BPLW Project Number: 98080

April 15, 1999

Prepared by: Guy C. Jackson

BPLW

Architects & Engineers **Albuquerque, New Mexico**

DRAINAGE PLAN

FOR

BERNALILLO COUNTY
METROPOLITAN DETENTION CENTER

ALBUQUERQUE, NEW MEXICO

BPLW Project Number: 98080

April 15, 1999

Prepared by: Guy C. Jackson

BPLW

Architects & Engineers **Albuquerque, New Mexico**

DRAINAGE PLAN
BERNALILLO COUNTY METROPOLITAN DETENTION CENTER
Albuquerque, New Mexico

BPLW Project Number: 98080

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Existing Drainage Basin Map
Proposed Masterplan Drainage Basin Map
Vicinity Map

APPENDIX B

Runoff Volume and Peak Discharge Calculations
Cumulative Flow Rates at Analysis Points
Channel Capacity Calculations
Culvert Capacity Calculations
Pond Volume Calculations

PURPOSE

The purpose of this report is to provide a comprehensive drainage plan for the Bernalillo County Metropolitan Detention Center (BCMDC). This plan will include phased construction for the developed portion of the 156-acre site. The first phase of the construction will consist of three housing clusters and support services buildings (Administration, Kitchen, Laundry, Booking, etc.). Phase II will consist of additional housing clusters and small additions to the parking facilities as determined by future needs.

Phase III final buildout will provide a facility with capacity for 5,000 inmates and all support services buildings as shown on the civil Masterplan Drainage Basin Map, located in Appendix "A".

This report includes an analysis of existing drainage patterns, as well as proposed retention areas for new and future developments. All drainage basins within the construction limits have been analyzed as fully developed conditions. Peak discharges were calculated and critical sections checked for adequate flow capacity.

Retention ponds have been sized to retain the 100-year, 24-hour event. Overflow weirs will be constructed to allow flows in excess of the 100 year, 24 hour event to spill into adjacent leaching bed/sod farm areas.

Percolation tests have been performed by the Geotechnical Consultant with an anticipated percolation rate of 15-minutes/1 inch. If the design storm lasts 6 hours, this would account for up to 24 inches of water that will be absorbed/abstracted by the sandy soils on site during the storm.

PROJECT SUMMARY

The County of Bernalillo is constructing a new Metropolitan Detention Center to consolidate the two existing facilities, (downtown, and the temporary facilities located on the west side) into a new, modern, more efficient configuration as described in the phasing above.

The County has acquired the project site which is a 156-acre tract of land adjacent to and east of the Cerro Colorado Landfill. This is located at the east edge of the escarpment dropping off into the Rio Puerco to the west.

The proposed 156-acre site selected for the new Bernalillo County Metropolitan Detention Center has been sited as shown on the site and grading plan. The project site is located approximately 3.6 miles south from Interstate 40 on Nine-Mile-Hill. A boundary survey and topographic survey was obtained from a New Mexico licensed surveyor with boundaries, easements, right of ways, spot elevations of existing land features, and all other applicable information necessary to provide civil design. Re-

zoning of the site was accomplished on February 23, 1999, which changed the existing A-1 zoning and obtained a Special Use Permit for a Correctional Facility (Detention Center). A Site Development Plan package and application was submitted and approved by the Bernalillo County Planning Commission and the Bernalillo County Commissioners. The Site Development package included a dimensioned site plan, a grading and drainage plan, a utility plan, a landscaping plan, and elevations.

SITE ANALYSIS

Access to the Jail site will be from the extension of Shelly Drive to the north. Bernalillo County is currently obtaining a design of the roadway extension from a design consultant. Access into the site will connect the Shelly Road extension at the northeast corner of the site. Paving improvements include access roads into and around the site for ingress, egress, fire protection and security, with accompanying security fencing, gates and sallyports. The required parking for the phasing of the project is as follows:

Phase I: Employee Parking: 276 spaces, Visitor Parking: 24 spaces.

Phase II: Employee Parking: 360 spaces, Visitor Parking: 48 spaces.

Phase III: Employee Parking: 455 spaces, Visitor Parking: 98 spaces.

The three phased parking areas with accompanying landscaping are shown to be located southeast of the support buildings and east of the Phase I and II housing clusters. Adjacent and southwest of the support building are the sallyports and entrances for booking and transfer operations. A transportation yard for the parking of transfer busses is also located nearby. As stated above, a security/fire land access road transverses the perimeter of the site. A site plan with accompanying enlarged paving plans and details will be submitted to Bernalillo County Public Works upon completion of the construction plans.

Soils Investigation

A licensed Geotechnical Engineer has been solicited to provide a subsurface investigation of the existing soils. The report will contain data to be used for the final design of the building foundations, retaining walls, pavement, and roadway design, utility trenching and grading and drainage.

Sanitary Sewer System

Bernalillo County has contracted a wastewater design consultant to assemble a wastewater treatment feasibility report upon compiling information for various systems. Currently, there is not a wastewater collection system near the site from NM Utilities or the City of Albuquerque. The County's wastewater consultants are considering an aerated lagoon system of which have been identified on the site plan located southwest of the support building. The sanitary sewer collection is shown to collect the liquid waste from support buildings and housing clusters at a collection point to be determined

once the decision to use a vacuum system for the housing units is decided upon by the County's management team. If the vacuum system is implemented, a duplex grinder pump system will be installed to deliver the waste to the aerated lagoons listed above. The support buildings will have a conventional gravity sanitary system that will drain to the duplex grinder pump system mentioned above. Once treated, the grey water from the aerated lagoons will be utilized for irrigation. Sod areas have also been identified on the site and grading plan for the disposal of grey water. A utility plan with accompanying enlarged utility plans (water and sewer) will be submitted to Bernalillo County Public Works upon completion of the construction plans.

EXISTING CONDITIONS

The existing 156-acre site is currently undeveloped. The site is bounded by the escarpment to the Rio Puerco to the west. A natural ridge divides the site in the center along the north property line. A Playa contains all offsite water to the northwest of the site and is a closed basin for Basin 1 as shown on the existing drainage basin map located in Appendix "A" of this report. This plan appears on the FIRM (Flood Insurance Rate Map) # 350001, Panel 0325, Suffix D. See copy on existing Drainage Basin Map.

A small portion of the site, ± 1.5% flows off the ridge to the northeast and off site. See basin map for details.

The topography on the east side of the site prevents substantial amounts of water from leaving or entering the site. The fall line of the slope parallels the property line in most areas.

The majority of the site, 123 acres out of 156, will sheet flow to a central point along the south property line and discharge off site. The peak discharge rate is 196.68 cfs for the 100 year, 6 hour storm event.

The site topography makes this project very simple because no off-site basins effect the on-site hydraulics for the construction areas.

PROPOSED CONDITIONS

The 156 acre site will be the future home of a 5,000 inmate detention center. The construction will be phased to provide the level of service (volume of inmates) and to spread out the construction costs as money becomes available.

This submittal is to obtain a rough grading permit. Final fine-tuned calculations will be performed at the same time as the creation of construction documents. The current design assumes that all excess flows from the basins are delivered to the drainage bar ditches.

The proposed plan for the building currently uses interior roof drains. These roof drains will need to be collected in a separate underground piping system.

Based on the above information routing calculations were not performed at this time. routing will only decrease the peak discharge in the bar ditches. If underground piping is installed, then flowrates in the bar ditches will be drastically reduced.

This report is to show:

- How flows are conveyed to retention ponds.
- Adequate space has been provided for drainage systems (bar ditches width and depth)
- Ponds have adequate capacity.
- Site is Masterplanned for final buildout.

The first phase of this construction will be to build the access roads (both permanent and a gravel access road along the west side of the support services building), three (3) housing clusters, support services building, warehouse, elevated water storage tank, aerated lagoons, and storm water retention facilities.

All hydrology has been calculated using the City of Albuquerque Developmental Process Manual Section 22.2. A copy of the sample calculations is included in Appendix "B" and a summary sheet shows the soil treatment areas, peak flowrates, and excess runoff volumes for each basin. Existing and proposed drainage basin maps are included in Appendix "A". Each basin is labeled with Basin number, Q100 and V100.

Analysis points are shown at the confluence of drainage ditches and storm drain culverts. Storm drain culverts have been analyzed using the U.S. Department of Transportation's "Hydraulic Design of Highway Culverts". The calculations are shown in Appendix "B". A summary of analysis points, pipe diameter, and headwater to diameter ratios are shown in Appendix "B".

Corrugated metal pipes have been chosen for this analysis because the Manning's Roughness is higher than reinforced concrete pipe. If a problem arises during the creation of construction documents, the decrease in HW/D ratio could provide the safety factor we need. Rough calculations have been performed using 24" through 36" diameter pipes. This will be fine-tuned during construction document preparation. The analysis was broken down into Phase I conditions and Phase II and III (final buildout conditions).

Each major basin contains multiple sub-basins.

The pond on the ease side of the site collects flows from basins 11, 12, 13, 14, 15, and part of 16.

The interim pond (to be converted into future aerated lagoon) receives water from basins 3, 4, 5, 6, 7, as well as parts of 8, 9, and 20.

After the interim pond is converted to an aerated lagoon, the pond on the west side of the site will be used. This future pond will collect run off from basins 3, 4, 5, 6, 7, 8, 9, 10, 20, and part of 16.

Basins 17, 19, and most of 21 are self-contained by the berms and act as closed basins.

Only a small portion of Basin 21 and Basin 18 currently discharge offsite along the south property line. Combined, this flowrate is less than 10 cfs which is much less erosive than the historic peak discharge of 196.68 cfs.

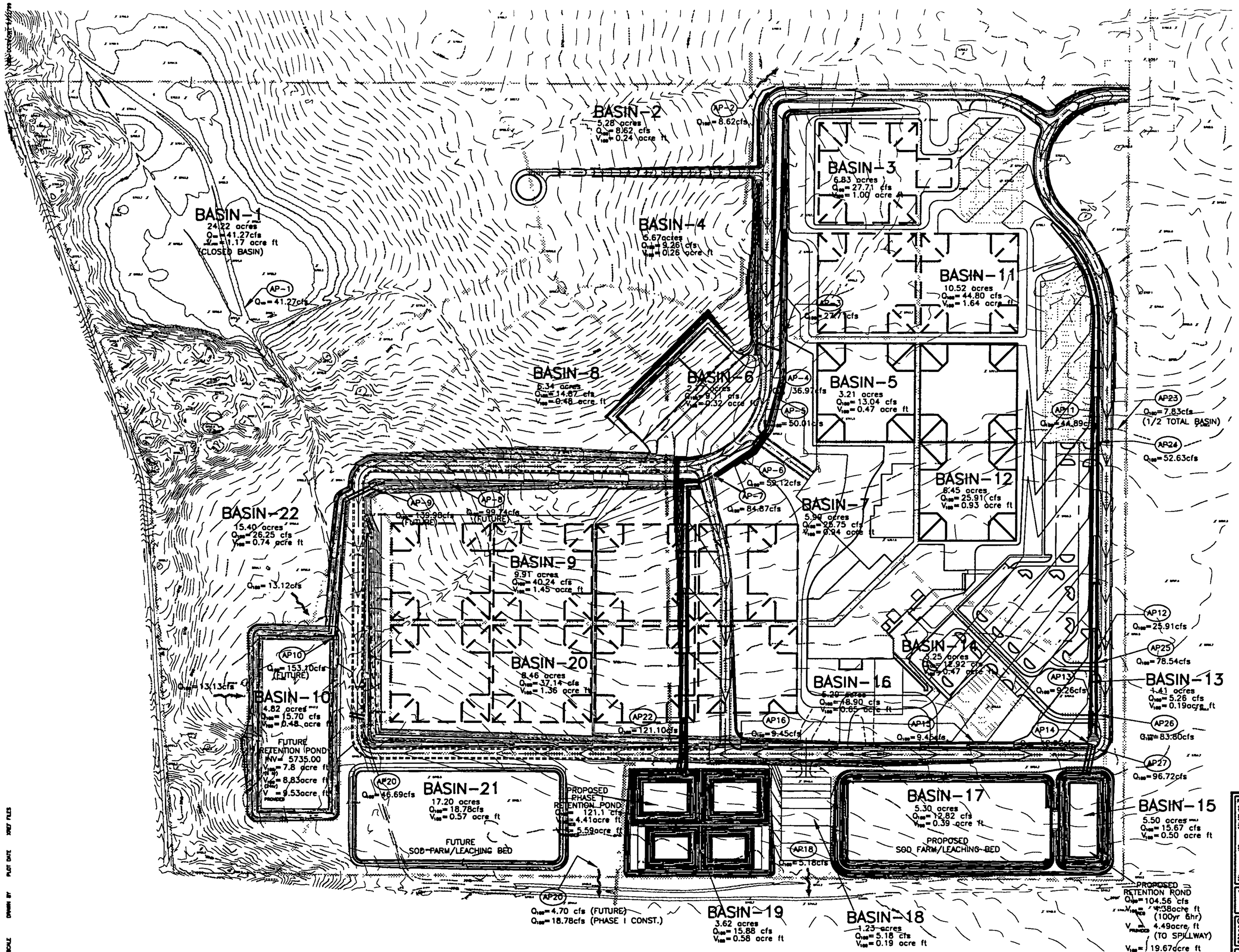
Ponds have been sized to contain the 100 year, 24 hour storm event. This is due to the fact that the ponds are total retention. The DPM requires that ponds that are total retention be sized for 2 times the 100 year 24 hour storm.

This criteria is being accommodated by providing an overflow spillway into leaching bed/sod farm. The leaching bed/sod farm for Phase I construction is approximately 5 acres. The V100 (24) hour = 4.06 acre - ft. If the leaching bed/sod farm is flooded, the excess volume will be less than 1' deep. Fences will be provided around the storm drain pond and sod farm to protect against accidental drowning.

The spillway between the retention pond and the leaching bed/sod farm will be sized for the 100-year peak discharge.

The proposed Phase I pond near the aerated lagoon will be treated similar to the situation described above and the future setting basin will be used for over flow capacity. Adjustment to the pond volumes will be made as the final construction documents are completed.

APPENDIX "A"



PROPOSED SITE DRAINAGE BASIN PLAN
SCALE: 1"=100'

LEGEND

DIRECTION OF SURFACE FLOW

PROPOSED DRAINAGE SWALE

SOILS MAP
NTS

FLOOD HAZARD MAP
NTS

VICINITY MAP
NTS

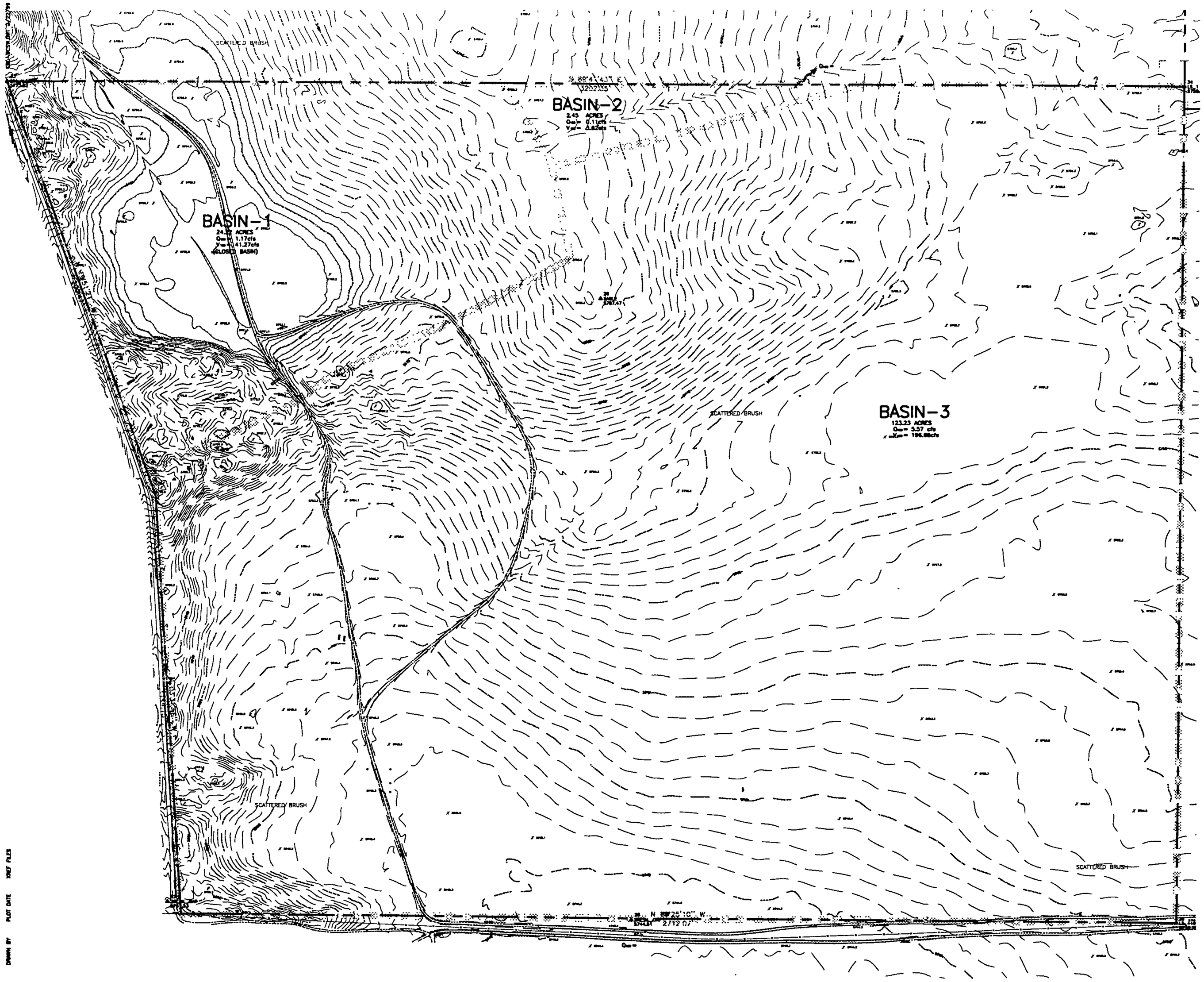
BPLW
Architects & Engineers, Inc.

Designing to Shape the Future

PROJECT TITLE: BERNALILLO COUNTY METROPOLITAN DETENTION CENTER BERNALILLO COUNTY BERNALILLO COUNTY, NM	REVISIONS
	JOB NUMBER: MDC
	SHEET TITLE: PROPOSED BASIN PLAN
CUSTER • BASARICH, LTD. DESIGN COLLABORATIVE SOUTHWEST, INC.	
DCSW ARCHITECTS	DATE: 4/15/99
	SHEET NO. CD.2

FILE NO. PLOT SCALE DRAWN BY PLOT DATE XREF FILES

K:\98080\C\grading\Mdccd2.dwg Thu Apr 15 15:45:52 1999 SSi - BPLW



EXISTING SITE DRAINAGE BASIN PLAN

SCALE: 1"=100'-0"

LEGEND

DIRECTION OF SURFACE FLOW

BPLW
Architects & Engineers, Inc.

Designing to Shape the Future

PROJECT TITLE: BERNALILLO COUNTY METROPOLITAN DETENTION CENTER BERNALILLO COUNTY BERNALILLO COUNTY, NM	REVISIONS
	JOB NUMBER: MDC
SHEET TITLE: EXISTING BASIN PLAN	
CUSTER • BASARICH, LTD. DESIGN COLLABORATIVE SOUTHWEST, INC	
DCSW	DATE: 4/15/99
	SHEET NO. CD.1

FILE NO. PLOT SCALE DRAWN BY PLOT DATE XREF FILES

K:\98080\C\grading\Mdccd1.dwg Thu Apr 15 14:01:53 1999 5Si - BPLW

APPENDIX "B"

Drainage Summary

Project:	Bernalillo County Metropolitan Detention Center
Project Numbe:	98080
Date:	04/13/99
By:	Dave A

Site Location

Precipitaion Zone 2 Per Table A-1 COA DPM Section 22.2

Existing summary

Basin Name	Ex 1	Ex2	Ex3
Soil Treatment (acres)			
Area "A"	19.38	2.45	117.07
Area "B"	4.84	0.00	6.16
Area "C"	0.00	0.00	0.00
Area "D"	0.00	0.00	0.00
Excess Runoff (acre-feet)			
100yr. 6hr.	1.17	0.11	5.57
10yr. 6hr.	0.02	0.01	0.01
2yr. 6hr.	0.00	0.00	0.00
100yr. 24hr.	1.17	0.11	5.57
Peak Discharge (cfs)			
100 yr.	41.27	3.82	196.68
10yr.	11.96	0.93	50.34
2yr.	0.39	0.00	0.49

BPLW

Architects and Engineers

PROJECT Bernalillo County Metropolitan Detention Center
PROJECT NO. 98080.00
DATE 04/13/99
BY Dave A

DPM Section 22.2 - Hydrology

Part A-Watersheds less than 40 acres.
January, 1993

INSTRUCTIONS

* Spread sheet requires three input areas (dark cells):
  - Location
  - >A.1 Precipitation Zone
  - >A.3 Land Treaments
* Values from the tables are automatically placed using "if" statements.
* Table values should be checked for correctness for each use.

SUMMARY

Location	Ex 1		
Precipitation Zone		2	
Land Area		24.22	acres
Excess Precipitation Volume			
	>>> **100-year 6-hour (design)**	1.17	acre-ft.
	10-year 6-hour	0.02	acre-ft.
	2-year 6-hour	0.00	acre-ft.
	100-year 24-hour	1.17	acre-ft.
Peak Discharge Rates (DPM)			
	>>> **Q100 (design)**	41.27	cfs
	Q10	11.96	cfs
	Q2	0.39	cfs
Peak Discharge Rates (DPM-Rational Method)			
	>>> **Q100 (design)**	41.34	cfs
	Q10	11.89	cfs
	Q2	0.40	cfs

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS

	LOCATION	Ex 1	
>A.1	PRECIPITATION ZONE (from Table A-1)	2	
>A.2	DEPTHS		
	(from Table A-2)		
	100-YEAR STORM (P60)	2.01	inches
	100-YEAR STORM (P360)	2.35	inches
	100-YEAR STORM (P1440)	2.75	inches
	10-YEAR (P360) (Calculated: P360*RPF10)	1.57	inches
	2-YEAR (P360) (Calculated: P360*RPF2)	1.02	inches
>A.3	LAND TREATMENTS (AI)		
	Treatment A	19.38	acres
	Treatment B	4.84	acres
	Treatment C	0.00	acres
	Treatment D	0.00	acres
	Total Area	24.22	acres
>A.4	ABSTRACTIONS	See A.5	

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CON'T)

>A.5 EXCESS PRECIPITATION 6 HOUR AND 24 HOUR (Ei) from Table A-8		
100-year 6-hour		
Treatment A	0.53	inches
Treatment B	0.78	inches
Treatment C	1.13	inches
Treatment D	2.12	inches
WEIGHTED E (Sum Ei*Ai/A)	0.58	inches
VOLUME V100:6h (E*A)	1.17	acre-ft.
	50,992.79	ft^3
10-year 6-hour		
Treatment A	0.13	inches
Treatment B	0.28	inches
Treatment C	0.52	inches
Treatment D	1.34	inches
WEIGHTED E (Sum Ei*Ai/A)	0.26	inches
VOLUME V10:6h (E*A)	0.02	acre-ft.
	747.49	ft^3
2-year 6-hour		
Treatment A	0.00	inches
Treatment B	0.02	inches
Treatment C	0.15	inches
Treatment D	0.79	inches
WEIGHTED E (Sum Ei*Ai/A)	0.00	inches
VOLUME V2:6h (E*A)	0.00	acre-ft.
	4.07	ft^3
100-year 24-hour		
VOLUME V100:24h (V100-6h+Ad*P1440-P360)/12)	1.17	acre-ft.
	50,992.79	ft^3

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CON'T)

>A.6 PEAK DISCHARGE RATE FOR SMALL WATERSHEDS (Ql)

from Table A-9

	100-year		
	Treatment A	**1.56**	cfs/acre
	Treatment B	**2.28**	cfs/acre
	Treatment C	**3.14**	cfs/acre
	Treatment D	**4.70**	cfs/acre
	Q100 (Sum Ql*Al)	**41.27**	cfs
	10-year		
	Treatment A	**0.38**	cfs/acre
	Treatment B	**0.95**	cfs/acre
	Treatment C	**1.71**	cfs/acre
	Treatment D	**3.14**	cfs/acre
	Q10 (Sum Ql*Al)	**11.96**	cfs
	2-year		
	Treatment A	**0.00**	cfs/acre
	Treatment B	**0.08**	cfs/acre
	Treatment C	**0.60**	cfs/acre
	Treatment D	**1.86**	cfs/acre
	Q2 (Sum Ql*Al)	**0.39**	cfs

CALCULATIONS FOLLOW

RATIONAL METHOD

PEAK INTENSITY (in/hr at tc=0.2 hour)
from Table A-10

Peak Intensity (I) 100-year	**5.05**
Peak Intensity (I) 10-year	**3.41**
Peak Intensity (I) 2-year	**2.04**

RATIONAL METHOD COEFFICIENT, C
from Table A-11

100-year

Treatment A	**0.31**	cfs/acre
Treatment B	**0.45**	cfs/acre
Treatment C	**0.62**	cfs/acre
Treatment D	**0.93**	cfs/acre
Q100 (Sum Ql*I*Al)	**41.34**	cfs

10-year

Treatment A	**0.11**	cfs/acre
Treatment B	**0.28**	cfs/acre
Treatment C	**0.50**	cfs/acre
Treatment D	**0.92**	cfs/acre
Q10 (Sum Ql*I*Al)	**11.89**	cfs

2-year

Treatment A	**0.00**	cfs/acre
Treatment B	**0.04**	cfs/acre
Treatment C	**0.29**	cfs/acre
Treatment D	**0.91**	cfs/acre
Q2 (Sum Ql*I*Al)	**0.40**	cfs

TABLE 22.3 B-1

VALUES OF MANNING'S n

	n
Reinforced Concrete Pipe	.013
Poured Concrete	.013
No-joint cast in place concrete pipe	.014
Reinforced Concrete Box	.015
Reinforced Concrete Arch	.015
Streets	.017
Flush Grouted Rip-Rap	.020
Corrugated Metal Pipe	.025
Grass Lined Channels (sodded & irrigated)	.025
Earth Lined Channels (smooth)	.030
Arroyo Channels	.030
Wire Tied Rip-Rap	.040
Medium Weight Dumped Riprap	.045
Grouted Rip-Rap (exposed rock)	.045
Arroyo Overbank	.045
Jetty Type Rip-Rap ($D_{50} > 24"$)	.050
RIPRAP ASSUMED	0.035

BPLW

Architects and Engineers

PROJECT **Bernalillo County Metropolitan Detention Center**
PROJECT NO. **98080**
DATE **04/13/99**
BY **Dave A**

DPM Section 22.2 - Hydrology

Part A-Watersheds less than 40 acres.
January, 1993

INSTRUCTIONS

* Spread sheet requires three input areas (dark cells):
  - Location
  - >A.1 Precipitation Zone
  - >A.3 Land Treaments
* Values from the tables are automatically placed using "if" statements.
* Table values should be checked for correctness for each use.

SUMMARY

Location	**Pro 1**		
Precipitation Zone		**2**	
Land Area		**24.22**	acres
Excess Precipitation Volume			
	>>> **100-year 6-hour (design)**	**1.17**	**acre-ft.**
	10-year 6-hour	**0.02**	acre-ft.
	2-year 6-hour	**0.00**	acre-ft.
	100-year 24-hour	**1.17**	acre-ft.
Peak Discharge Rates (DPM)			
	>>> **Q100 (design)**	**41.27**	**cfs**
	Q10	**11.96**	cfs
	Q2	**0.39**	cfs
Peak Discharge Rates (DPM-Rational Method)			
	>>> **Q100 (design)**	**41.34**	**cfs**
	Q10	**11.89**	cfs
	Q2	**0.40**	cfs

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS

	LOCATION	Pro 1	
>A.1	PRECIPITATION ZONE (from Table A-1)	2	
>A.2	DEPTHS		
	(from Table A-2)		
	100-YEAR STORM (P60)	2.01	inches
	100-YEAR STORM (P360)	2.35	inches
	100-YEAR STORM (P1440)	2.75	inches
	10-YEAR (P360) (Calculated: P360*RPF10)	1.57	inches
	2-YEAR (P360) (Calculated: P360*RPF2)	1.02	inches
>A.3	LAND TREATMENTS (Ai)		
	Treatment A	19.38	acres
	Treatment B	4.84	acres
	Treatment C	0.00	acres
	Treatment D	0.00	acres
	Total Area	24.22	acres
>A.4	ABSTRACTIONS	See A.5	

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CON'T)

>A.5 EXCESS PRECIPITATION 6 HOUR AND 24 HOUR (EI) from Table A-8		
100-year 6-hour		
Treatment A	0.53	inches
Treatment B	0.78	inches
Treatment C	1.13	inches
Treatment D	2.12	inches
WEIGHTED E (Sum EI*AI/A)	0.58	inches
VOLUME V100:6h (E*A)	1.17	acre-ft.
	50,992.79	ft^3
10-year 6-hour		
Treatment A	0.13	inches
Treatment B	0.28	inches
Treatment C	0.52	inches
Treatment D	1.34	inches
WEIGHTED E (Sum EI*AI/A)	0.26	inches
VOLUME V10:6h (E*A)	0.02	acre-ft.
	747.49	ft^3
2-year 6-hour		
Treatment A	0.00	inches
Treatment B	0.02	inches
Treatment C	0.15	inches
Treatment D	0.79	inches
WEIGHTED E (Sum EI*AI/A)	0.00	inches
VOLUME V2:6h (E*A)	0.00	acre-ft.
	4.07	ft^3
100-year 24-hour		
VOLUME V100:24h (V100-6h+Ad*P1440-P360)/12)	1.17	acre-ft.
	50,992.79	ft^3

CALCULATIONS FOLLOW

INPUT AND CALCULATIONS (CON'T)

>A.6 PEAK DISCHARGE RATE FOR SMALL WATERSHEDS (QI) from Table A-9		
100-year		
Treatment A	**1.56**	cfs/acre
Treatment B	**2.28**	cfs/acre
Treatment C	**3.14**	cfs/acre
Treatment D	**4.70**	cfs/acre
Q100 (Sum QI*AI)	**41.27**	cfs
10-year		
Treatment A	**0.38**	cfs/acre
Treatment B	**0.95**	cfs/acre
Treatment C	**1.71**	cfs/acre
Treatment D	**3.14**	cfs/acre
Q10 (Sum QI*AI)	**11.96**	cfs
2-year		
Treatment A	**0.00**	cfs/acre
Treatment B	**0.08**	cfs/acre
Treatment C	**0.60**	cfs/acre
Treatment D	**1.86**	cfs/acre
Q2 (Sum QI*AI)	**0.39**	cfs

CALCULATIONS FOLLOW

RATIONAL METHOD

PEAK INTENSITY (in/hr at tc=0.2 hour)
from Table A-10

Peak Intensity (I) 100-year	**5.05**	
Peak Intensity (I) 10-year	**3.41**	
Peak Intensity (I) 2-year	**2.04**	

RATIONAL METHOD COEFFICIENT, C
from Table A-11

100-year		
Treatment A	**0.31**	cfs/acre
Treatment B	**0.45**	cfs/acre
Treatment C	**0.62**	cfs/acre
Treatment D	**0.93**	cfs/acre
Q100 (Sum Qi*I*Ai)	**41.34**	cfs
10-year		
Treatment A	**0.11**	cfs/acre
Treatment B	**0.28**	cfs/acre
Treatment C	**0.50**	cfs/acre
Treatment D	**0.92**	cfs/acre
Q10 (Sum Qi*I*Ai)	**11.89**	cfs
2-year		
Treatment A	**0.00**	cfs/acre
Treatment B	**0.04**	cfs/acre
Treatment C	**0.29**	cfs/acre
Treatment D	**0.91**	cfs/acre
Q2 (Sum Qi*I*Ai)	**0.40**	cfs

Drainage Summary

Project: Bernalillo County Metropolitan Detention Center
Project Numbe: 98080
Date: 04/13/99
By: Dave A

Site Location

Precipitaion Zone 2 Per Table A-1 COA DPM Section 22.2

Proposed summary

Basin Name	Pro 1	Pro 2	Pro 3	Pro 4	Pro 5	Pro 6
Soil Treatment (acres)						
Area "A"	19.38	4.75	0.00	5.11	0.00	1.25
Area "B"	4.84	0.53	1.37	0.57	0.64	0.00
Area "C"	0.00	0.00	0.68	0.00	0.32	0.00
Area "D"	0.00	0.00	4.78	0.00	2.25	1.52
Excess Runoff (acre-feet)						
100yr. 6hr.	1.17	0.24	1.00	0.26	0.47	0.32
10yr. 6hr.	0.02	0.01	0.02	0.01	0.02	0.00
2yr. 6hr.	0.00	0.00	0.01	0.00	0.01	0.01
100yr. 24hr.	1.17	0.24	1.16	0.26	0.54	0.38
Peak Discharge (cfs)						
100 yr.	41.27	8.62	27.71	9.26	13.04	9.11
10yr.	11.96	2.31	17.46	2.48	8.22	5.26
2yr.	0.39	0.04	9.40	0.05	4.43	2.83

Pro 7	Pro 8	Pro 9	Pro 10	Pro 11	Pro 12	Pro 13	Pro 14	Pro 15	Pro 16
0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.60	0.00	1.98	4.82	1.58	1.61	0.56	0.98	3.85	2.12
0.60	0.63	0.99	0.60	0.53	0.32	0.00	0.00	0.55	0.53
4.79	1.27	6.94	0.60	8.41	4.52	0.85	2.28	1.10	2.64
0.94	0.48	1.45	0.48	1.64	0.93	0.19	0.47	0.50	0.65
0.01	0.01	0.02	0.05	0.01	0.02	0.02	0.02	0.05	0.03
0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01
1.10	0.52	1.68	0.50	1.92	1.08	0.21	0.54	0.53	0.74
25.75	14.87	40.24	15.70	44.80	25.91	5.26	12.92	15.67	18.90
16.63	6.75	25.36	7.49	28.82	16.26	3.19	8.07	8.05	11.21
9.31	2.74	13.66	1.87	16.09	8.72	1.62	4.31	2.68	5.40

Pro 17	Pro 18	Pro 19	Pro 20	Pro 21	Pro 22
0.00	0.00	0.00	0.00	0.00	12.32
3.07	0.25	0.00	0.00	5.76	3.08
1.06	0.00	0.72	1.69	0.72	0.00
0.53	0.98	2.90	6.77	0.72	0.00
0.39	0.19	0.58	1.36	0.57	0.74
0.05	0.01	0.02	0.02	0.05	0.02
0.00	0.01	0.02	0.02	0.00	0.00
0.41	0.22	0.68	1.58	0.59	0.74
12.82	5.18	15.88	37.14	18.78	26.25
6.39	3.32	10.33	24.16	8.97	7.61
1.87	1.85	5.82	13.61	2.23	0.25

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Project BCMDC

Subject CUMULATIVE FLOWS

Project # 98080 Date 4-14/99 By DAA

- ❑ Memorandum
- ❑ Telephone Record
- ❑ Note to the File
- ❑ Minutes of Meeting
- ❑ To be Typed
- ❑ _____

TOTAL VOLUMES (PHASE I CONSTRUCTION)

WEST SIDE OF SITE

CONTRIBUTING BASIN.	BASIN Q_{100}	CUMULATIVE Q_{100}	ANALYSIS POINT	V_{100} (6 hour)	V_{100} (24 hour)
3	27.71	27.71	3	1.00	1.16
4	9.26	36.97	4	0.26	0.26
5	13.04	50.01	5	0.47	0.54
6	9.11	59.12	6	0.32	0.38
7	25.75	84.87	7	0.94	1.10
8	14.87/2	92.31		0.24	0.26
9	40.24/4	102.37		0.36	0.42
20	37.14/4	111.65		0.34	0.40
16	18.90/2	121.1	22	0.32	0.37
19	15.88/2	129.04		0.29	0.34

TOTAL $V_{100(6)} = 4.54$ acre-ft

$Q_{100} = 129.04$

TOTAL $V_{100(24)} = 5.23$ acre ft

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Dec. 1993

Designing to Shape the Future

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Project BCMDC
Subject CULVERTS
Project # 980080 Date 4/15/99 By [illegible]

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

CULVERT CROSSINGS (INLET CONTROL)
CMP w/ HEADWALL

BASIN OR ANALYSIS POINT	Q100	AVAILABLE HW	# PIPES	ϕ PIPE	HW/D	REQ. HW
BASIN 4	9.26	36"	1	24"	.8	19.2"
AP4	36.97	48"	2	24"	1.36	32.6"
AP5	50.01	48"	2	30"	1.09	32.7"
AP7	84.87	48"	3	30"	1.20	36"
AP22	121.10	60"	3	36"	1.10	39.6'

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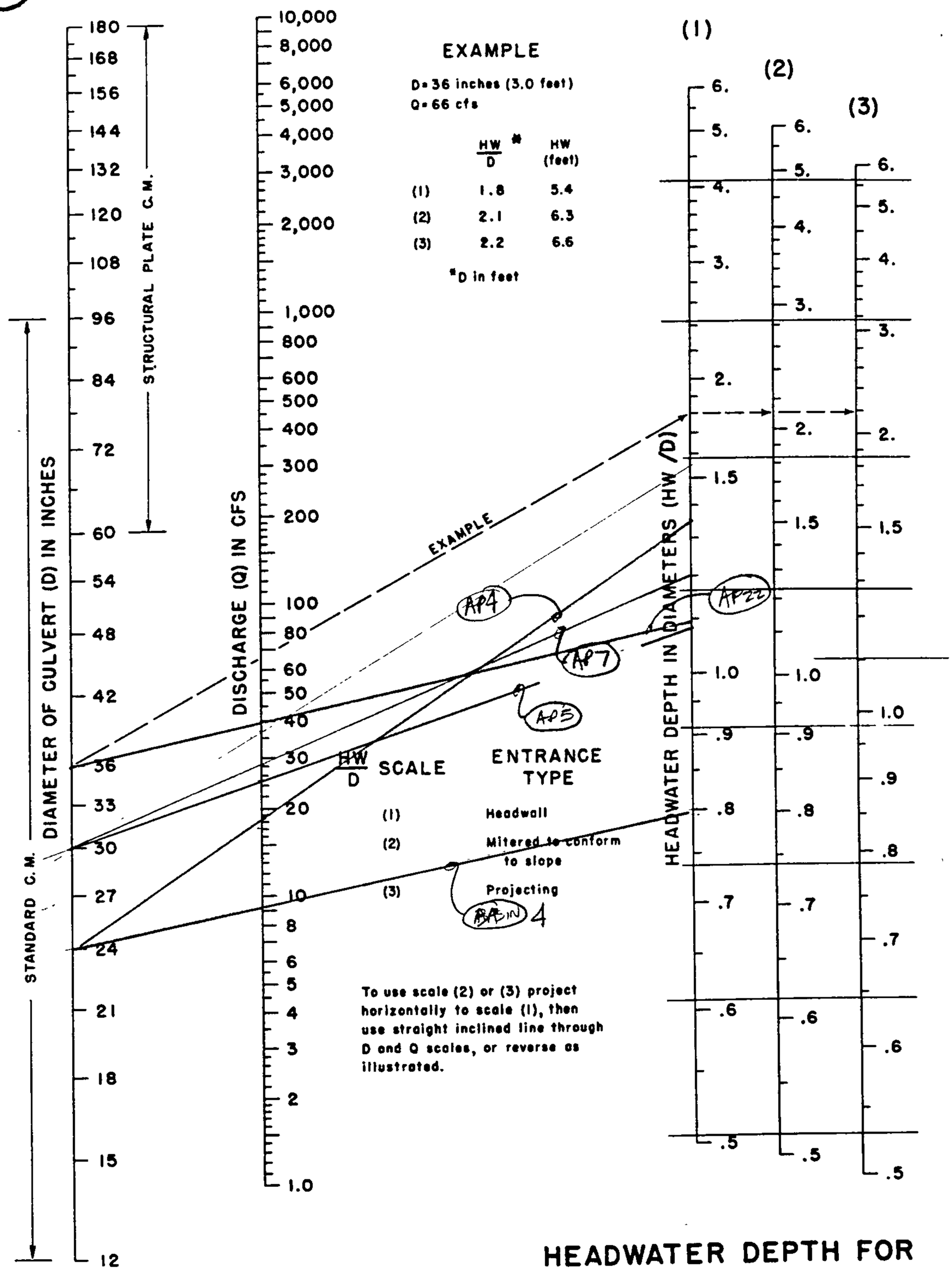
CHART 2



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

n = .024

BUREAU OF PUBLIC ROADS JAN. 1963

(AP3)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.413	XSec Area = 10.230
Discharge = 27.71	Critical Depth = 0.998	XSec Area = 5.985
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.009	36.000	0.770	21.000	41.162
21.674	2.894	2.905	33.816	0.819	20.367	37.520
43.459	2.789	2.801	31.699	0.874	19.733	34.109
65.384	2.683	2.697	29.649	0.935	19.100	30.923
87.486	2.578	2.593	27.666	1.002	18.466	27.956
109.817	2.472	2.490	25.750	1.076	17.833	25.201
132.445	2.367	2.387	23.901	1.159	17.199	22.652
155.470	2.261	2.285	22.118	1.253	16.566	20.303
179.032	2.155	2.184	20.403	1.358	15.932	18.150
203.349	2.050	2.084	18.754	1.478	15.299	16.186
228.763	1.944	1.985	17.172	1.614	14.665	14.407
255.859	1.839	1.887	15.657	1.770	14.032	12.809
285.751	1.733	1.792	14.209	1.950	13.398	11.388
320.953	1.627	1.700	12.828	2.160	12.765	10.142
369.464	1.522	1.612	11.514	2.407	12.131	9.070
725.955	1.416	1.529	10.266	2.699	11.498	8.172

(AP4)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.615	XSec Area = 12.666
Discharge = 36.97	Critical Depth = 1.159	XSec Area = 7.503
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.016	36.000	1.027	21.000	41.679
19.316	2.908	2.926	34.090	1.084	20.447	38.515
38.789	2.816	2.836	32.231	1.147	19.894	35.531
58.454	2.723	2.746	30.423	1.215	19.341	32.723
78.360	2.631	2.657	28.666	1.290	18.788	30.086
98.567	2.539	2.568	26.959	1.371	18.235	27.616
119.161	2.447	2.480	25.304	1.461	17.682	25.311
140.258	2.355	2.393	23.700	1.560	17.129	23.167
162.025	2.263	2.306	22.147	1.669	16.576	21.180
184.713	2.170	2.220	20.644	1.791	16.023	19.348
208.711	2.078	2.136	19.193	1.926	15.470	17.668
234.684	1.986	2.053	17.793	2.078	14.917	16.138
263.881	1.894	1.972	16.443	2.248	14.364	14.756
299.106	1.802	1.894	15.145	2.441	13.811	13.522
349.248	1.710	1.820	13.898	2.660	13.258	12.436
741.120	1.617	1.749	12.701	2.911	12.705	11.498

APS

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.852	XSec Area = 15.852
Discharge = 50.01	Critical Depth = 1.350	XSec Area = 9.518
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.030	36.000	1.389	21.000	42.658
16.669	2.924	2.956	34.414	1.453	20.542	40.069
33.552	2.847	2.883	32.863	1.522	20.084	37.608
50.696	2.771	2.810	31.347	1.595	19.626	35.271
68.155	2.695	2.738	29.866	1.674	19.168	33.057
86.006	2.618	2.666	28.421	1.760	18.710	30.965
104.348	2.542	2.595	27.010	1.852	18.251	28.992
123.317	2.466	2.525	25.634	1.951	17.793	27.137
143.106	2.389	2.455	24.293	2.059	17.335	25.398
164.000	2.313	2.386	22.986	2.176	16.877	23.775
186.443	2.237	2.319	21.715	2.303	16.419	22.267
211.182	2.160	2.253	20.479	2.442	15.961	20.872
239.615	2.084	2.188	19.278	2.594	15.503	19.591
274.873	2.007	2.126	18.112	2.761	15.045	18.423
326.852	1.931	2.066	16.981	2.945	14.587	17.369
759.036	1.855	2.009	15.885	3.148	14.129	16.431

(AP6)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.823	XSec Area = 15.441
Discharge = 59.12	Critical Depth = 1.467	XSec Area = 10.861
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.042	36.000	1.642	21.000	43.515
11.122	2.922	2.968	34.374	1.720	20.530	40.903
22.354	2.843	2.894	32.785	1.803	20.060	38.427
33.718	2.765	2.821	31.233	1.893	19.591	36.085
45.245	2.687	2.748	29.717	1.989	19.121	33.877
56.974	2.608	2.677	28.238	2.094	18.651	31.799
68.957	2.530	2.606	26.796	2.206	18.181	29.851
81.266	2.452	2.536	25.391	2.328	17.711	28.033
94.004	2.374	2.468	24.022	2.461	17.242	26.342
107.322	2.295	2.401	22.691	2.605	16.772	24.778
121.457	2.217	2.336	21.396	2.763	16.302	23.342
136.805	2.139	2.273	20.138	2.936	15.832	22.033
154.114	2.060	2.212	18.917	3.125	15.362	20.852
175.054	1.982	2.155	17.732	3.334	14.892	19.801
204.911	1.904	2.101	16.584	3.565	14.423	18.882
437.880	1.825	2.052	15.473	3.821	13.953	18.097

(AP7)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 2.143	XSec Area = 20.209
Discharge = 84.87	Critical Depth = 1.751	XSec Area = 14.457
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.086	36.000	2.358	21.000	46.714
8.752	2.943	3.035	34.813	2.438	20.658	44.907
17.655	2.886	2.985	33.645	2.523	20.316	43.179
26.737	2.829	2.935	32.496	2.612	19.974	41.529
36.034	2.772	2.886	31.367	2.706	19.632	39.956
45.592	2.715	2.837	30.258	2.805	19.290	38.461
55.472	2.658	2.789	29.168	2.910	18.948	37.044
65.759	2.601	2.743	28.097	3.021	18.606	35.704
76.568	2.544	2.697	27.046	3.138	18.264	34.441
88.074	2.487	2.652	26.015	3.262	17.922	33.257
100.543	2.430	2.609	25.003	3.394	17.579	32.151
114.422	2.373	2.567	24.011	3.535	17.237	31.123
130.549	2.316	2.527	23.038	3.684	16.895	30.176
150.792	2.259	2.488	22.084	3.843	16.553	29.309
181.055	2.202	2.452	21.150	4.013	16.211	28.524
438.073	2.145	2.418	20.236	4.194	15.869	27.822

(AP22)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 2.224	XSec Area = 25.960
Discharge = 121.1	Critical Depth = 1.843	XSec Area = 19.412
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .008	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.129	42.000	2.883	23.000	60.344
7.689	2.948	3.085	40.821	2.967	22.690	58.519
15.528	2.897	3.042	39.657	3.054	22.381	56.770
23.544	2.845	2.999	38.510	3.145	22.071	55.094
31.772	2.794	2.956	37.379	3.240	21.761	53.493
40.257	2.742	2.915	36.263	3.339	21.451	51.967
49.055	2.690	2.874	35.164	3.444	21.142	50.516
58.248	2.639	2.835	34.080	3.553	20.832	49.141
67.945	2.587	2.796	33.013	3.668	20.522	47.841
78.312	2.535	2.758	31.962	3.789	20.212	46.618
89.601	2.484	2.722	30.926	3.916	19.903	45.472
102.236	2.432	2.687	29.907	4.049	19.593	44.404
117.009	2.381	2.653	28.903	4.190	19.283	43.415
135.689	2.329	2.621	27.916	4.338	18.973	42.506
163.860	2.277	2.591	26.944	4.494	18.664	41.678
406.513	2.226	2.563	25.989	4.660	18.354	40.933

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Project BCMDC

Subject CUMULATIVE FLOWS

Project # 98080 Date 4/14/99 By DAA

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

TOTAL VOLUMES (FINAL BUILDOUT / MASTER PLAN)

CONTRIBUTING BASIN	BASIN Q_{100}	CUMULATIVE Q_{100}	ANALYSIS POINT	V_{100} (6 hour)	V_{100} (24 hour)
THIS IS A CONTINUATION FROM (PHASE I CONSTRUCTION)					
				+2.05	+2.34
7	25.75	84.87	7	0.94	1.10
8	14.87	99.74	8	0.48	0.52
9	40.24	139.98	9	1.45	1.68
22	26.25/2	153.12	10	0.74	0.74
END OF CHANNEL TO NORTH WEST OF POND.					
SOUTH CHANNEL @ FINAL BUILD OUT.					
16	18.90/2	9.45	16	0.32	0.37
20	37.14	46.59	20	1.36	1.58
END OF SOUTH CHANNEL.					
10	POND	15.70	15.70	0.40	0.50

V_{100} (6 HOUR) = 7.82

V_{100} (24 HOUR) = 8.83

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Dec. 1993

Designing to Shape the Future

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Project: BCIDC

Subject: CULVERTS

Project #: [illegible] Date: 1/3/[illegible] By: [illegible]

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

CULVERT CROSSINGS (INLET CONTROL)
CMP w/ HEADWALL

BASIN OR ANALYSIS POINT	Q_{100}	AVAILABLE HW	# PIPES	ϕ PIPE	HW/D	HW REQ.
AP8	99.94	48"	3	30	1.35	40.5"
AP9	139.98	60"	3	36"	1.27	45.7"
AP20	46.59	36"	2	30"	1.02	30.6

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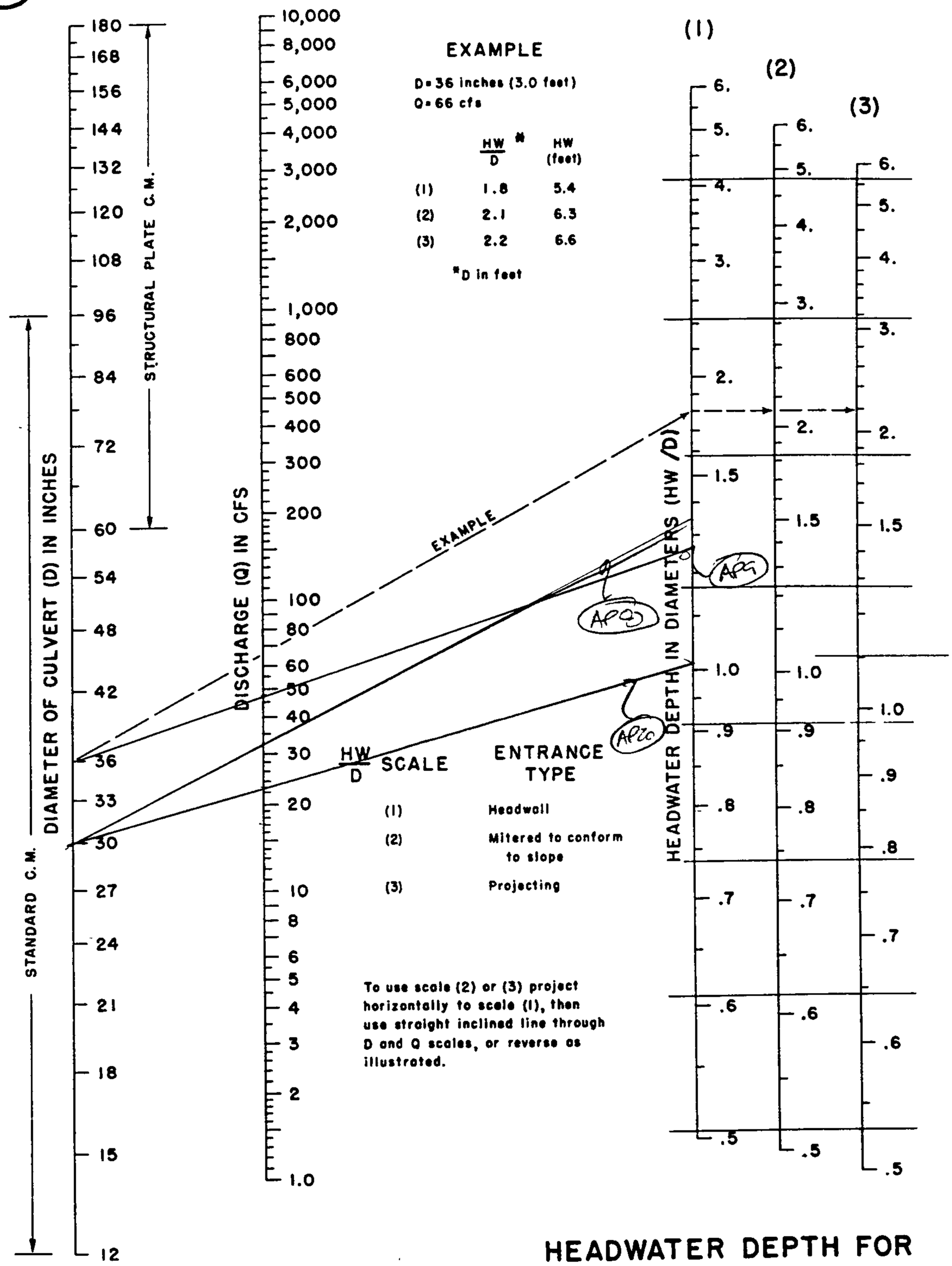
CHART 2



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

n = .024

BUREAU OF PUBLIC ROADS JAN. 1963

(AP3)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.413	XSec Area = 10.230
Discharge = 27.71	Critical Depth = 0.998	XSec Area = 5.985
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.009	36.000	0.770	21.000	41.162
21.674	2.894	2.905	33.816	0.819	20.367	37.520
43.459	2.789	2.801	31.699	0.874	19.733	34.109
65.384	2.683	2.697	29.649	0.935	19.100	30.923
87.486	2.578	2.593	27.666	1.002	18.466	27.956
109.817	2.472	2.490	25.750	1.076	17.833	25.201
132.445	2.367	2.387	23.901	1.159	17.199	22.652
155.470	2.261	2.285	22.118	1.253	16.566	20.303
179.032	2.155	2.184	20.403	1.358	15.932	18.150
203.349	2.050	2.084	18.754	1.478	15.299	16.186
228.763	1.944	1.985	17.172	1.614	14.665	14.407
255.859	1.839	1.887	15.657	1.770	14.032	12.809
285.751	1.733	1.792	14.209	1.950	13.398	11.388
320.953	1.627	1.700	12.828	2.160	12.765	10.142
369.464	1.522	1.612	11.514	2.407	12.131	9.070
725.955	1.416	1.529	10.266	2.699	11.498	8.172

AP4

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.615	XSec Area = 12.666
Discharge = 36.97	Critical Depth = 1.159	XSec Area = 7.503
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.016	36.000	1.027	21.000	41.679
19.316	2.908	2.926	34.090	1.084	20.447	38.515
38.789	2.816	2.836	32.231	1.147	19.894	35.531
58.454	2.723	2.746	30.423	1.215	19.341	32.723
78.360	2.631	2.657	28.666	1.290	18.788	30.086
98.567	2.539	2.568	26.959	1.371	18.235	27.616
119.161	2.447	2.480	25.304	1.461	17.682	25.311
140.258	2.355	2.393	23.700	1.560	17.129	23.167
162.025	2.263	2.306	22.147	1.669	16.576	21.180
184.713	2.170	2.220	20.644	1.791	16.023	19.348
208.711	2.078	2.136	19.193	1.926	15.470	17.668
234.684	1.986	2.053	17.793	2.078	14.917	16.138
263.881	1.894	1.972	16.443	2.248	14.364	14.756
299.106	1.802	1.894	15.145	2.441	13.811	13.522
349.248	1.710	1.820	13.898	2.660	13.258	12.436
741.120	1.617	1.749	12.701	2.911	12.705	11.498

APS

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.852	XSec Area = 15.852
Discharge = 50.01	Critical Depth = 1.350	XSec Area = 9.518
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .005	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.030	36.000	1.389	21.000	42.658
16.669	2.924	2.956	34.414	1.453	20.542	40.069
33.552	2.847	2.883	32.863	1.522	20.084	37.608
50.696	2.771	2.810	31.347	1.595	19.626	35.271
68.155	2.695	2.738	29.866	1.674	19.168	33.057
86.006	2.618	2.666	28.421	1.760	18.710	30.965
104.348	2.542	2.595	27.010	1.852	18.251	28.992
123.317	2.466	2.525	25.634	1.951	17.793	27.137
143.106	2.389	2.455	24.293	2.059	17.335	25.398
164.000	2.313	2.386	22.986	2.176	16.877	23.775
186.443	2.237	2.319	21.715	2.303	16.419	22.267
211.182	2.160	2.253	20.479	2.442	15.961	20.872
239.615	2.084	2.188	19.278	2.594	15.503	19.591
274.873	2.007	2.126	18.112	2.761	15.045	18.423
326.852	1.931	2.066	16.981	2.945	14.587	17.369
759.036	1.855	2.009	15.885	3.148	14.129	16.431

AP6

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.823	XSec Area = 15.441
Discharge = 59.12	Critical Depth = 1.467	XSec Area = 10.861
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.042	36.000	1.642	21.000	43.515
11.122	2.922	2.968	34.374	1.720	20.530	40.903
22.354	2.843	2.894	32.785	1.803	20.060	38.427
33.718	2.765	2.821	31.233	1.893	19.591	36.085
45.245	2.687	2.748	29.717	1.989	19.121	33.877
56.974	2.608	2.677	28.238	2.094	18.651	31.799
68.957	2.530	2.606	26.796	2.206	18.181	29.851
81.266	2.452	2.536	25.391	2.328	17.711	28.033
94.004	2.374	2.468	24.022	2.461	17.242	26.342
107.322	2.295	2.401	22.691	2.605	16.772	24.778
121.457	2.217	2.336	21.396	2.763	16.302	23.342
136.805	2.139	2.273	20.138	2.936	15.832	22.033
154.114	2.060	2.212	18.917	3.125	15.362	20.852
175.054	1.982	2.155	17.732	3.334	14.892	19.801
204.911	1.904	2.101	16.584	3.565	14.423	18.882
437.880	1.825	2.052	15.473	3.821	13.953	18.097

AP7

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 2.143	XSec Area = 20.209
Discharge = 84.87	Critical Depth = 1.751	XSec Area = 14.457
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.086	36.000	2.358	21.000	46.714
8.752	2.943	3.035	34.813	2.438	20.658	44.907
17.655	2.886	2.985	33.645	2.523	20.316	43.179
26.737	2.829	2.935	32.496	2.612	19.974	41.529
36.034	2.772	2.886	31.367	2.706	19.632	39.956
45.592	2.715	2.837	30.258	2.805	19.290	38.461
55.472	2.658	2.789	29.168	2.910	18.948	37.044
65.759	2.601	2.743	28.097	3.021	18.606	35.704
76.568	2.544	2.697	27.046	3.138	18.264	34.441
88.074	2.487	2.652	26.015	3.262	17.922	33.257
100.543	2.430	2.609	25.003	3.394	17.579	32.151
114.422	2.373	2.567	24.011	3.535	17.237	31.123
130.549	2.316	2.527	23.038	3.684	16.895	30.176
150.792	2.259	2.488	22.084	3.843	16.553	29.309
181.055	2.202	2.452	21.150	4.013	16.211	28.524
438.073	2.145	2.418	20.236	4.194	15.869	27.822

AP8

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 2.301	XSec Area = 22.793
Discharge = 99.74	Critical Depth = 1.893	XSec Area = 16.431
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.119	36.000	2.771	21.000	49.082
7.634	2.954	3.079	35.030	2.847	20.721	47.669
15.438	2.907	3.040	34.074	2.927	20.442	46.310
23.443	2.861	3.001	33.130	3.011	20.163	45.007
31.685	2.814	2.963	32.199	3.098	19.884	43.758
40.215	2.768	2.925	31.282	3.188	19.606	42.564
49.098	2.721	2.889	30.377	3.283	19.327	41.426
58.422	2.675	2.852	29.485	3.383	19.048	40.342
68.310	2.628	2.817	28.606	3.487	18.769	39.314
78.945	2.582	2.782	27.740	3.596	18.490	38.342
90.608	2.535	2.749	26.887	3.710	18.211	37.425
103.768	2.489	2.716	26.047	3.829	17.932	36.566
119.305	2.442	2.685	25.220	3.955	17.653	35.763
139.179	2.396	2.655	24.406	4.087	17.374	35.019
169.584	2.349	2.626	23.605	4.225	17.096	34.332
437.858	2.303	2.600	22.817	4.371	16.817	33.706

AP9

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 2.537	XSec Area = 29.456
Discharge = 139.98	Critical Depth = 2.099	XSec Area = 21.615
Width = 4	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.200	39.000	3.589	22.000	60.603
6.099	2.969	3.176	38.325	3.652	21.815	59.687
12.398	2.938	3.153	37.656	3.717	21.630	58.798
18.930	2.908	3.130	36.992	3.784	21.445	57.938
25.737	2.877	3.107	36.334	3.853	21.261	57.107
32.874	2.846	3.085	35.682	3.923	21.076	56.303
40.412	2.815	3.063	35.036	3.995	20.891	55.529
48.447	2.784	3.042	34.395	4.070	20.706	54.783
57.116	2.754	3.020	33.760	4.146	20.521	54.066
66.615	2.723	3.000	33.130	4.225	20.336	53.378
77.253	2.692	2.980	32.507	4.306	20.151	52.719
89.541	2.661	2.960	31.889	4.390	19.967	52.090
104.437	2.630	2.941	31.276	4.476	19.782	51.490
124.077	2.599	2.923	30.670	4.564	19.597	50.921
155.205	2.569	2.905	30.069	4.655	19.412	50.382
445.300	2.538	2.888	29.474	4.749	19.227	49.873

AP10

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 2.519	XSec Area = 31.627
Discharge = 153.12	Critical Depth = 2.078	XSec Area = 23.342
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.206	42.000	3.646	23.000	66.836
6.274	2.968	3.182	41.267	3.710	22.808	65.812
12.749	2.936	3.157	40.540	3.777	22.616	64.818
19.460	2.904	3.134	39.819	3.845	22.424	63.857
26.449	2.872	3.110	39.104	3.916	22.232	62.928
33.772	2.840	3.087	38.395	3.988	22.040	62.031
41.500	2.808	3.064	37.692	4.062	21.847	61.167
49.731	2.776	3.042	36.996	4.139	21.655	60.335
58.602	2.744	3.020	36.306	4.218	21.463	59.536
68.314	2.712	2.999	35.622	4.298	21.271	58.769
79.178	2.680	2.978	34.944	4.382	21.079	58.036
91.711	2.648	2.958	34.272	4.468	20.887	57.337
106.883	2.616	2.938	33.606	4.556	20.695	56.671
126.856	2.584	2.919	32.947	4.647	20.503	56.039
158.454	2.552	2.901	32.294	4.742	20.311	55.442
452.123	2.520	2.883	31.646	4.838	20.119	54.880

AP16

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 0.759	XSec Area = 4.007
Discharge = 9.45	Critical Depth = 0.557	XSec Area = 2.600
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.001	36.000	0.262	21.000	40.577
19.910	2.851	2.852	32.936	0.287	20.105	35.447
39.828	2.702	2.703	30.005	0.315	19.211	30.765
59.760	2.553	2.555	27.208	0.347	18.316	26.512
79.709	2.404	2.406	24.544	0.385	17.422	22.667
99.683	2.255	2.257	22.013	0.429	16.527	19.211
119.693	2.105	2.109	19.616	0.482	15.633	16.125
139.756	1.956	1.961	17.352	0.545	14.738	13.389
159.900	1.807	1.813	15.221	0.621	13.844	10.985
180.172	1.658	1.666	13.224	0.715	12.949	8.894
200.654	1.509	1.520	11.360	0.832	12.055	7.097
221.503	1.360	1.375	9.629	0.981	11.160	5.578
243.044	1.211	1.232	8.032	1.177	10.266	4.321
266.077	1.062	1.094	6.568	1.439	9.371	3.311
293.306	0.913	0.963	5.238	1.804	8.477	2.540
428.331	0.764	0.849	4.041	2.339	7.582	2.007

(AP20)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.636	XSec Area = 12.937
Discharge = 46.59	Critical Depth = 1.303	XSec Area = 9.001
Width = 3	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .0075	Side Slope = 3

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.026	36.000	1.294	21.000	42.373
12.575	2.909	2.938	34.119	1.366	20.455	39.294
25.235	2.818	2.851	32.287	1.443	19.911	36.394
38.000	2.728	2.764	30.505	1.527	19.366	33.667
50.896	2.637	2.678	28.772	1.619	18.822	31.110
63.958	2.546	2.592	27.089	1.720	18.277	28.721
77.230	2.455	2.507	25.455	1.830	17.733	26.497
90.778	2.365	2.424	23.870	1.952	17.188	24.435
104.694	2.274	2.342	22.335	2.086	16.644	22.533
119.114	2.183	2.261	20.849	2.235	16.099	20.789
134.255	2.092	2.182	19.413	2.400	15.555	19.202
150.481	2.002	2.105	18.026	2.585	15.010	17.771
168.481	1.911	2.032	16.688	2.792	14.466	16.495
189.801	1.820	1.962	15.400	3.025	13.921	15.378
219.341	1.729	1.898	14.161	3.290	13.377	14.419
437.316	1.639	1.839	12.972	3.592	12.832	13.625

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215 North Stanton Street
El Paso, TX 79901
(915) 545-1665

2000 East La Mar
Suite 600
Arlington, TX 76006
(817) 588-3036

Project BCMDC
Subject CUMULATIVE FLOWS
Project # 98050 Date 4/14/99 By DAA

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐

TOTAL VOLUMES

EAST SIDE OF SITE.

CONTRIBUTING BASIN	BASIN Q_{100}	CUMULATIVE Q_{100}	APOINT	$V_{100(6)}$	$V_{100(24)}$
15	7.83	7.83	23	0.25	0.27
11	44.80	52.63	24	1.64	1.92
12	25.91	78.54	25	0.93	1.08
13	5.26	83.80	26	0.19	0.21
14	12.92	96.72	27	0.47	0.54
16	18.90/2	106.17		0.65	0.74
15	7.82	113.99		0.25	0.26

Q_{100} = 113.99 cfs TOTAL $V_{100(6)}$ = 4.38 acre ft

$V_{100(24)}$ = 5.02 acre-ft

Copies to:

Designing to Shape the Future

BPLW
Architects & Engineers, Inc.

6200 Uptown Blvd NE
Suite 400
Albuquerque, NM 87110
(505) 881-2759

49 West First Street
Suite 100
Mesa, AZ 85201
(602) 827-2759

Martin Building, Suite 501
215 North Stanton Street
El Paso, TX 79901
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2000 East La Mar
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Arlington, TX 76006
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Project BCMDC
Subject CULVERTS
Project # 98050 Date 4/15/99 By DAA

- ☐ Memorandum
- ☐ Telephone Record
- ☐ Note to the File
- ☐ Minutes of Meeting
- ☐ To be Typed
- ☐ _____

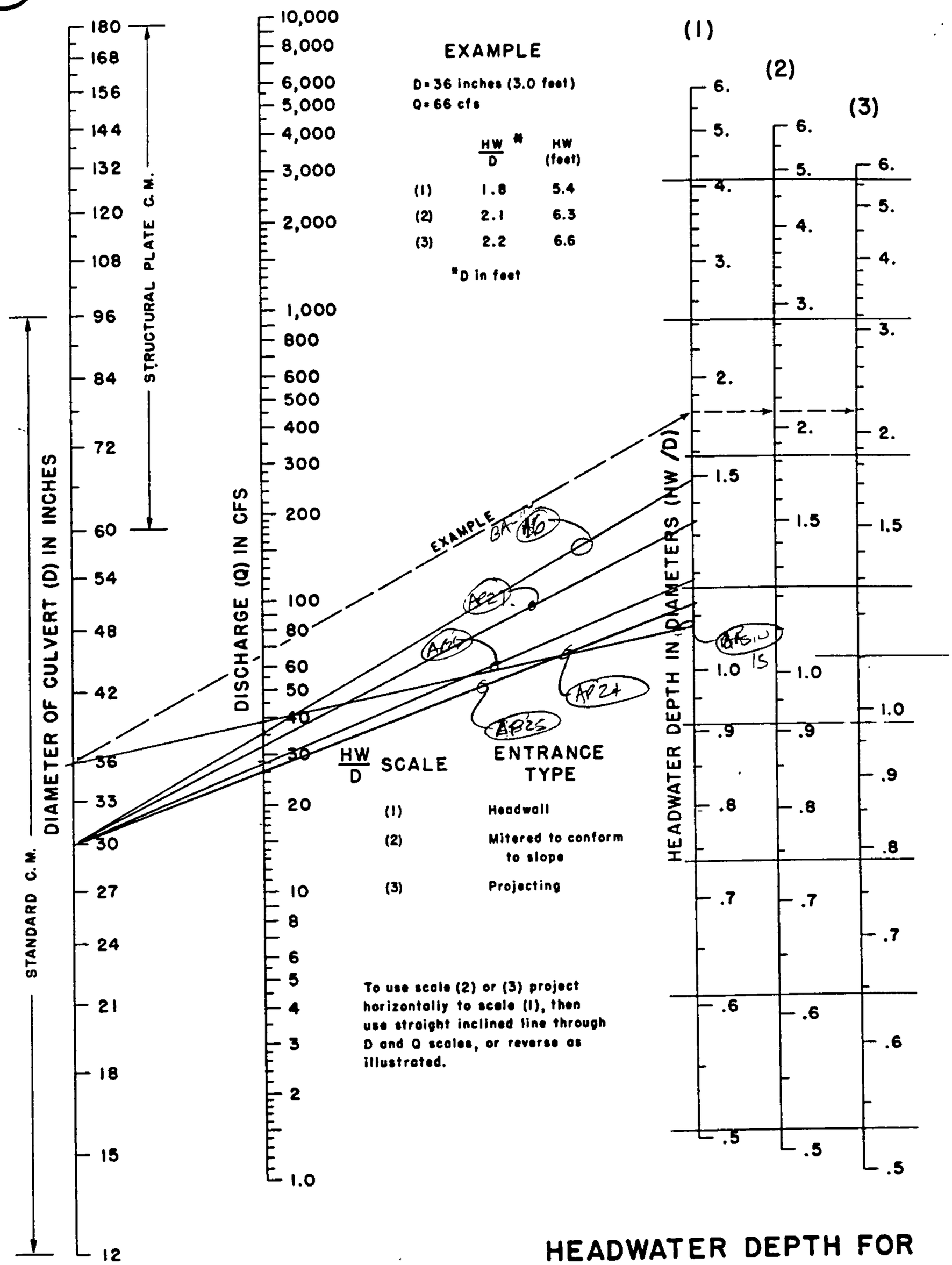
CULVERT CROSSINGS (INLET CONTROL)
CMP W/ HEADWALL.

BASIN OR ANALYSIS POINT.	Q_{100}	AVAILABLE HW	# PIPES	Ø PIPES	HW/D	HW REQD
24	52.63	48"	2	30	1.13	33.9"
25	78.54	60"	3	30	1.13	33.9"
26	53.50	60"	3	30	1.18	35.4"
27	96.72	60"	3	30	1.34	40.2"
BASIN 16	106.17	60"	3	30	1.50	45.0"
BASIN 15	113.99	60"	3	36	1.08	38.9"

Copies to:

Designing to Shape the Future

CHART 2



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

n = .024

BUREAU OF PUBLIC ROADS JAN. 1963

AP 23

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 0.295	XSec Area = 1.649
Discharge = 7.83	Critical Depth = 0.401	XSec Area = 2.325
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .075	Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.001	33.000	0.237	17.000	40.558
2.309	2.827	2.828	30.114	0.260	16.307	35.097
4.617	2.653	2.655	27.349	0.286	15.614	30.126
6.924	2.480	2.482	24.703	0.317	14.921	25.626
9.231	2.307	2.309	22.178	0.353	14.228	21.574
11.536	2.134	2.136	19.772	0.396	13.534	17.952
13.839	1.960	1.963	17.487	0.448	12.841	14.738
16.140	1.787	1.791	15.322	0.511	12.148	11.913
18.437	1.614	1.619	13.277	0.590	11.455	9.456
20.727	1.440	1.448	11.352	0.690	10.762	7.348
23.007	1.267	1.278	9.548	0.820	10.069	5.570
25.269	1.094	1.109	7.863	0.996	9.376	4.106
27.495	0.921	0.945	6.298	1.243	8.683	2.941
29.646	0.747	0.788	4.854	1.613	7.989	2.067
31.600	0.574	0.650	3.530	2.218	7.296	1.489
32.763	0.401	0.577	2.325	3.367	6.603	1.263

AP24

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 0.879	XSec Area = 5.940
Discharge = 52.63	Critical Depth = 1.265	XSec Area = 9.530
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .075	Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.039	33.000	1.595	17.000	43.107
1.488	2.884	2.929	31.061	1.694	16.537	39.566
2.967	2.769	2.819	29.175	1.804	16.075	36.263
4.435	2.653	2.711	27.343	1.925	15.612	33.193
5.889	2.537	2.603	25.565	2.059	15.150	30.354
7.327	2.422	2.498	23.840	2.208	14.687	27.741
8.743	2.306	2.394	22.168	2.374	14.225	25.354
10.133	2.191	2.292	20.550	2.561	13.762	23.190
11.489	2.075	2.194	18.985	2.772	13.300	21.250
12.801	1.959	2.100	17.474	3.012	12.837	19.534
14.055	1.844	2.011	16.016	3.286	12.375	18.046
15.229	1.728	1.929	14.612	3.602	11.912	16.792
16.292	1.612	1.857	13.261	3.969	11.449	15.781
17.197	1.497	1.797	11.964	4.399	10.987	15.026
17.862	1.381	1.755	10.720	4.909	10.524	14.549
18.138	1.265	1.739	9.530	5.523	10.062	14.381

AP25

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.095	XSec Area = 7.869
Discharge = 78.54	Critical Depth = 1.585	XSec Area = 12.952
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .075	Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.088	33.000	2.380	17.000	46.305
1.160	2.906	3.003	31.414	2.500	16.623	43.561
2.307	2.811	2.919	29.864	2.630	16.245	40.987
3.438	2.717	2.836	28.350	2.770	15.868	38.585
4.551	2.623	2.755	26.871	2.923	15.491	36.353
5.641	2.528	2.677	25.428	3.089	15.114	34.292
6.706	2.434	2.600	24.020	3.270	14.736	32.401
7.738	2.340	2.526	22.648	3.468	14.359	30.684
8.731	2.245	2.456	21.311	3.685	13.982	29.142
9.676	2.151	2.390	20.010	3.925	13.604	27.778
10.561	2.057	2.329	18.745	4.190	13.227	26.597
11.370	1.962	2.275	17.515	4.484	12.850	25.604
12.080	1.868	2.228	16.321	4.812	12.473	24.809
12.661	1.774	2.190	15.162	5.180	12.095	24.222
13.066	1.680	2.165	14.039	5.594	11.718	23.856
13.224	1.585	2.156	12.952	6.064	11.341	23.729

(AP26)

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.134	XSec Area = 8.239
Discharge = 83.80	Critical Depth = 1.643	XSec Area = 13.615
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .075	Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.100	33.000	2.539	17.000	47.109
1.100	2.910	3.020	31.479	2.662	16.638	44.512
2.185	2.819	2.940	29.990	2.794	16.276	42.076
3.255	2.729	2.863	28.534	2.937	15.914	39.800
4.305	2.638	2.787	27.111	3.091	15.553	37.685
5.333	2.548	2.713	25.720	3.258	15.191	35.731
6.334	2.457	2.641	24.362	3.440	14.829	33.938
7.302	2.367	2.572	23.037	3.638	14.467	32.309
8.231	2.276	2.507	21.745	3.854	14.105	30.847
9.113	2.186	2.446	20.485	4.091	13.743	29.554
9.935	2.095	2.389	19.258	4.351	13.382	28.435
10.683	2.005	2.339	18.064	4.639	13.020	27.495
11.337	1.914	2.296	16.903	4.958	12.658	26.744
11.867	1.824	2.262	15.774	5.312	12.296	26.189
12.234	1.734	2.240	14.678	5.709	11.934	25.844
12.375	1.643	2.231	13.615	6.155	11.572	25.725

AP27

STEADY-STATE WATER-SURFACE PROFILE

Trapezoidal Channel

Wednesday, April 14, 1999

English Units

Length = 1000	Normal Depth = 1.225	XSec Area = 9.122
Discharge = 96.72	Critical Depth = 1.778	XSec Area = 15.210
Width = 5	Control Depth = 3.000	Flow Type = subcritical
Manning's n = .035	Invert Slope = .075	Side Slope = 2

Distance	Depth	Energy	Area	Velocity	Top Width	Momentum
0.000	3.000	3.133	33.000	2.931	17.000	49.304
0.958	2.919	3.064	31.628	3.058	16.674	47.053
1.902	2.837	2.995	30.283	3.194	16.348	44.939
2.828	2.756	2.929	28.964	3.339	16.022	42.962
3.734	2.674	2.864	27.672	3.495	15.696	41.123
4.616	2.593	2.801	26.406	3.663	15.370	39.423
5.471	2.511	2.740	25.167	3.843	15.044	37.864
6.293	2.430	2.683	23.954	4.038	14.718	36.447
7.078	2.348	2.628	22.768	4.248	14.393	35.176
7.816	2.267	2.578	21.609	4.476	14.067	34.053
8.498	2.185	2.532	20.476	4.724	13.741	33.082
9.112	2.104	2.491	19.369	4.993	13.415	32.269
9.643	2.022	2.456	18.290	5.288	13.089	31.621
10.066	1.941	2.430	17.236	5.611	12.763	31.144
10.354	1.859	2.412	16.210	5.967	12.437	30.849
10.463	1.778	2.406	15.210	6.359	12.111	30.748