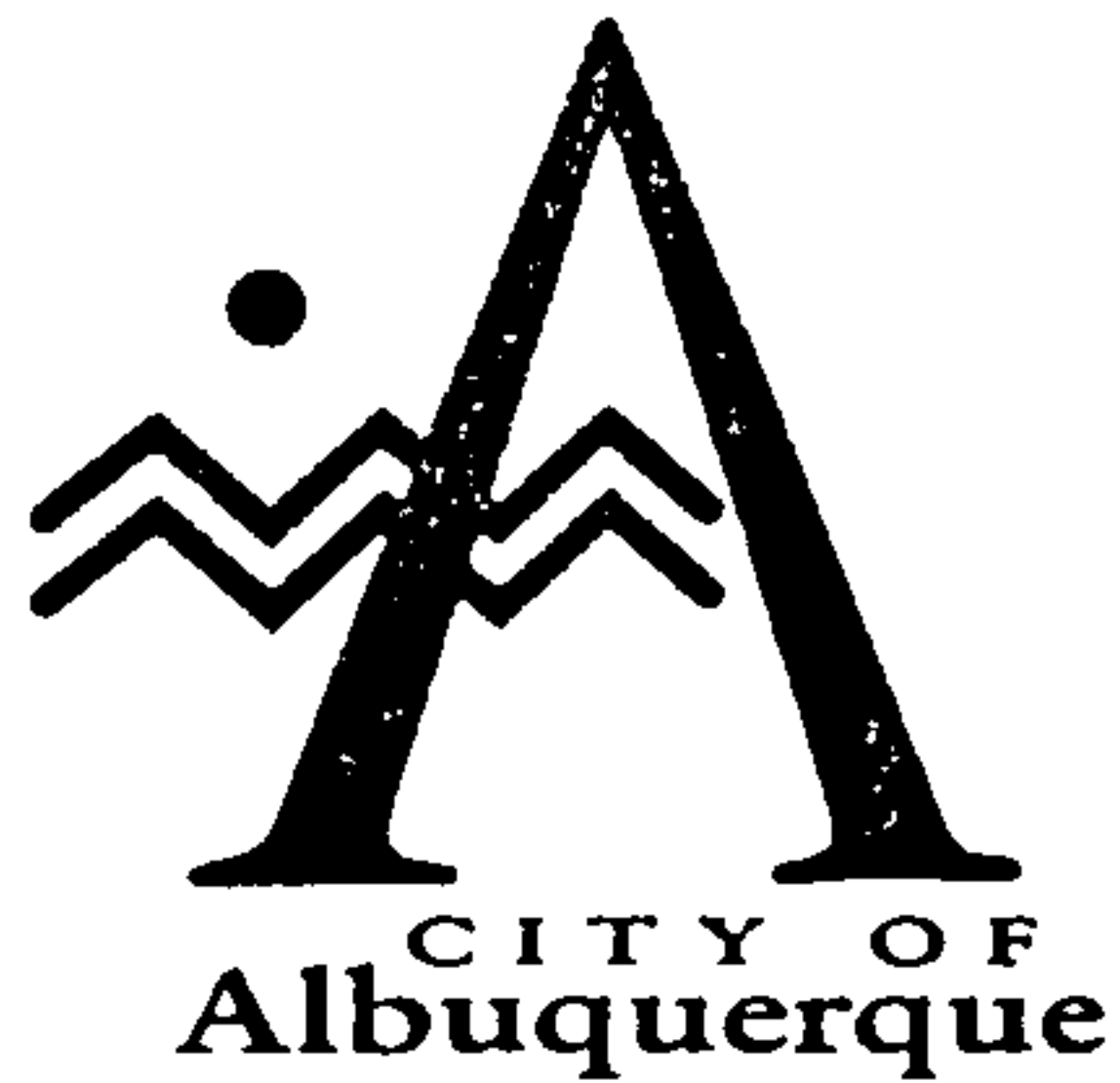




October 26, 1998

James Topmiller
Bohannon-Huston Inc.
7500 Jefferson NE
Albuquerque, New Mexico 87109

RE: REVISED DRAINAGE PLAN FOR SHENANDOAH ESTATES SUBDIVISION
LOTS 106-108, 111-116 (C12-D10) CERTIFICATION STATEMENT DATED
9/24/98

Dear Mr. Topmiller:

Based on the information provided on your September 29, 1998 submittal, as-built information and Engineer Certification for the above referenced lots are acceptable.

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

C: Andrew Garcia
File ✓

Sincerely

Bernie J. Montoya CE
Associate Engineer

Good for You, Albuquerque!



Bayan Johnson

4715 Cumberland Lot 109

(H) 792-2160



City of Albuquerque

P. O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103
PUBLIC WORKS DEPARTMENT

March 13, 1997

CERTIFICATE OF WORK ORDER COMPLETION

Sandia Properties, Ltd.
10 Tramway Loop Rd. NE
Albuquerque, NM 87122

RE: SHENANDOAH ESTATES PHASE II PROJECT NO. 4832.91, (MAP NO. C-11, 12)

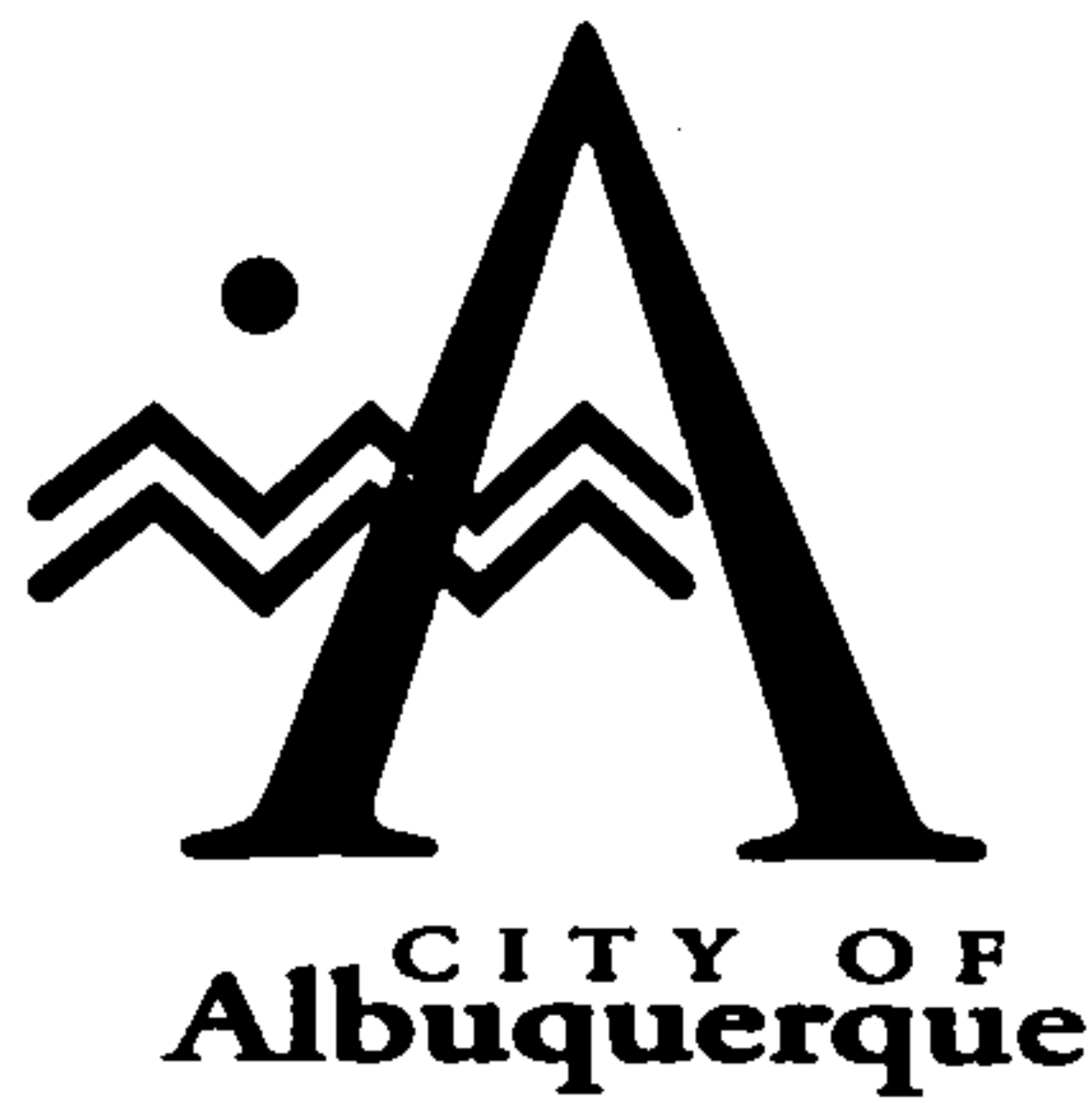
Dear Sir:

This is to certify that the City of Albuquerque accepts Project No. 4832.91 as being completed according to approved plans and construction specifications. Please be advised this certificate of completion and acceptance shall only become effective upon final plat approval and filing in the office of the Bernalillo County Clerk's Office.

The project is described as follows:

- Installation of storm drain, drop inlets, water, sewer, curb and gutter, valley gutter, wheel chair ramps and sidewalk. Also placed asphalt pavement, storm sewer and sanitary sewer manholes. Two desilention ponds were built. Soil cement will be financially guaranteed with a Procedure "C" Agreement for pond #1.

The contractor's correction period began the date of this letter and is effective for a period of one (1) year with the following exceptions:



P.O. Box 1293, Albuquerque, NM 87103

January 3, 1997

Martin J. Chávez, Mayor

Tamara K. Morgan, PE
Bohannon Huston, Inc.
7500 Jefferson NE
Albuquerque, NM 87109

RE: ENGINEER'S CERTIFICATION FOR SHENANDOAH ESTATES, UNIT 2
RECEIVED DECEMBER 24, 1996 FOR FINANCIAL GUARANTY RELEASE
ENGINEER'S STAMP DATED 12/19/96 (C-12/D10)

Dear Ms. Morgan:

Based on the information included in the submittal referenced above & the Infrastructure List approved 11-15-94, City Hydrology accepts the Engineer's Certification of grading & drainage for Financial Guaranty Release.

Contact Terri Martin to obtain the Financial Guaranty Release for City Project Number 4832.91.

It is City Hydrology's understanding that Desiltation Pond #1 has been financially guarantied separately.

It is also understood that the as-built grades shown for Lots 184-195 indicate rough grading and that these lots will not develop at this time.

If I can be of further assistance, You may contact me at 768-2727.

Sincerely,

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Terri Martin, CPN 4832.91

Good for You, Albuquerque!





City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 21, 1995

**Tamara K. Morgan, PE
Bohannon Huston, Inc.
7500 Jefferson NE
Albuquerque, NM 87109**

**RE: ENGINEER'S CERTIFICATION OF SHENANDOAH ESTATES, UNIT 1
RECEIVED NOVEMBER 16, 1995 FOR FINANCIAL GUARANTY RELEASE
ENGINEER'S STAMP DATED 10/4/95 (C12/D10) ~**

Dear Ms. Morgan:

Based on the information included in the submittal referenced above, City Hydrology accepts the Engineer's Certification of grading & drainage for Financial Guaranty Release. Contact Billy Goolsby to obtain the Financial Guaranty Release for City Project Number 4832.90.

It is City Hydrology's understanding that the Drop Structure at Harrisonburg Court will be completed within 30 days. After it has been accepted by Glenn Jurgensen & Stephen Hemphill, a copy of the signed "Modified S.O.19" must be included in the Drainage File.

If I can be of further assistance, You may contact me at 768-2727.

Sincerely,

**John P. Curtin, P.E.
Civil Engineer/Hydrology**

**c: Andrew Garcia
Billy Goolsby, CPN 4832.90
Stephen Hemphill, Construction**



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 17, 1994

Tamara Morgan
Bohannon Huston, Inc.
7500 Jefferson Street N.E.
Albuquerque, NM 87109

RE: GRADING & DRAINAGE & E.C. PLAN FOR SHENANDOAH ESTATES (C-12/D10)
RECEIVED JUNE 3, 1994 FOR WORK ORDER & ROUGH GRADING PERMIT APPROVAL
ENGINEER'S STAMP DATED 6-3-94

Dear Ms. Morgan:

Based on the information included in the submittal referenced above, City Hydrology approves this project for Work Order & Rough Grading Permit.

Engineer's Certification of grading & drainage per DPM checklist must be approved before the Financial Guaranty will be released.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia

AWPHYD/7723/jpc

**DRAINAGE REPORT
FOR**

RIVERVIEW PROPERTIES, TRACTS H-8-A AND H-8-B

**NOW COMPRISING
SHENANDOAH ESTATES SUBDIVISION**

DECEMBER, 1993

PREPARED FOR:

**SANDIA PROPERTIES LTD. CO.
#10 TRAMWAY LOOP
ALBUQUERQUE, NEW MEXICO 87111**

PREPARED BY:

**BOHANNAN-HUSTON, INC.
7500 JEFFERSON NE
COURTYARD 1
ALBUQUERQUE, NM 87109**

JOB NO. 92172.02

**I CERTIFY THAT I AM A REGISTERED PROFESSIONAL ENGINEER
IN THE STATE OF NEW MEXICO AND THAT THIS REPORT WAS
PREPARED BY ME OR UNDER MY SUPERVISION.**

 **12-23-93**
KERRY L. DAVIS, P.E. DATE



TABLE OF CONTENTS

	Page
I. PURPOSE	1
II. SITE LOCATION AND EXISTING CONDITIONS	1
III. FLOOD HAZARD ZONES	2
IV. PROPOSED DEVELOPMENT AND PHASING	2
V. HYDROLOGIC AND HYDRAULIC ANALYSIS	3
VI. DRAINAGE MANAGEMENT PLAN	3
VII. CONCLUSIONS	4

APPENDIX I: MAPS AND FIGURES

SITE VICINITY MAP (C-11 & C-12)	A1-1
FLOOD INSURANCE MAP (from Panel 3500020008)	A1-2
USDA-SOIL CONSERVATION SERVICE: SOILS MAP	A1-3
PASEO DEL NORTE: PROFILE	A1-4
BURSERA DRIVE: WATERBLOCK	A1-5

APPENDIX II: HYDROLOGIC COMPUTATIONS

SUMMARY OF HYDROLOGIC DATA	A2-1
IMPERVIOUS AREA CALCULATIONS	A2-2
AHYMO SUMMARY TABLE:100-YEAR, 6-HOUR STORM	A2-3
AHYMO OUTPUT 100-YEAR, 6-HOUR STORM	A2-7
AHYMO SUMMARY TABLE:10-YEAR, 6-HOUR STORM	A2-53
AHYMO OUTPUT 10-YEAR, 6-HOUR STORM	A2-57

APPENDIX III: HYDRAULIC COMPUTATIONS

STREET SECTION HYDRAULICS AND INLET GRATE CAPACITIES	A3-1
STORM DRAIN PROFILES AND HGL COMPUTATIONS	A3-44
DESILTATION POND 1: DESIGN CALCULATIONS AND DETAILS	A3-61
DESILTATION POND 2: DESIGN CALCULATIONS AND DETAILS	A3-78
TEMPORARY POND A: DESIGN CALCULATIONS AND DETAILS	A3-94
TEMPORARY POND B: DESIGN CALCULATIONS AND DETAILS	A3-103

PLATES

PLATE 1:	OFFSITE BASIN MAP
PLATE 2:	ONSITE BASIN MAP
PLATE 3A-3F:	PRELIMINARY GRADING AND DRAINAGE PLAN
PLATE 4A-4B:	EXCERPTS FROM SHENANDOAH SUBDIVISION UNITS 4, 5 & 6
PLATE 5A-5C:	CALLE NORTENA/GOLF COURSE ROAD STORM DRAIN (LINE B)

I. PURPOSE

The purpose of this report is to present the Drainage Management Plan for rough grading work order and final plat approval for the development of Shenandoah Estates Subdivision, which is currently legally described as Riverview Properties, Tracts H-8-A and H-8-B. The plan has been prepared in accordance with the requirements of the Development Process Manual (DPM) of the City of Albuquerque, including revisions promulgated in January, 1993 (DPM Update). Shenandoah Estates is proposed to be developed into a single-family, detached residential subdivision, with varying lot sizes.

II. SITE LOCATION AND EXISTING CONDITIONS

The subject tracts are located southwest of the intersection of Paseo del Norte, NW and Golf Course Road, NW, within the middle branch of the Piedras Marcadas watershed. They lie within the Riverview Sector Development Plan Area of the City of Albuquerque on the west mesa. The site is bounded by Paseo del Norte on the north, Golf Course Road and the existing right-of-way of the Piedras Marcadas Arroyo on the east, City open space on the west, and Shenandoah Units 4 and 5 and Calle Nortena on the South.

The subject tracts lie within an area that was rezoned from SU-1 for Planned Residential Development to R-LT, which was approved by the EPC in October, 1992 as an amendment to the Riverview Sector Development Plan. The property is presently undeveloped, and has been utilized in the past for gravel excavation and basalt rubble storage. Existing utilities crossing the property include a 20" diameter master waterline from Shenandoah Units 4 and 5 to Paseo del Norte, the 33" diameter Northwest Mesa Sewer Interceptor, and an 8" diameter sanitary sewer outfall from Shenandoah Unit 4 and 5 to the interceptor.

Units 4 and 5 of the Shenandoah Subdivision to the southwest is a single-family, residential subdivision that is approximately 98% built-out at this time. Calle Nortena NW, which lies along the south boundary of the property, is a fully developed collector street with paving, drainage, and utility improvements. Unit 6 of the Shenandoah Subdivision on the west was purchased by the City's Open Space Division on November 26, 1990 and reserved for inclusion into the Petroglyph National Monument.

The site slopes down from west to east and discharges into the Piedras Marcadas Arroyo on the northeast via sheet flow. In its existing condition, the Piedras Marcadas Arroyo is currently unimproved, and passes the site along the east boundary, from its future crossing of Paseo del Norte to its existing crossing at Golf Course Road. The existing arroyo crossing at Golf Course Road consists of a lined concrete channel section with a box culvert top.

Offsite flows enter the site along the south and west boundaries at several locations, as shown in Plate 1, the offsite drainage basin map. An existing 18" storm sewer, from a cul-de-sac within the easternmost portion of Shenandoah Unit 4, discharges approximately 1.5 CFS into the site at a location approximately 350' north of Calle Nortena. Developed runoff from Shenandoah Units 4 and 5 currently enters the site through Cressmont Drive, via both street surface flow and an existing 30" storm sewer. Undeveloped runoff from the City's Open Space, Shenandoah Unit 6, enters the site on the west boundary through two existing, unimproved arroyos. Undeveloped runoff from properties north of Paseo del Norte enters the site within the unimproved middle branch of the Piedras Marcadas Arroyo.

III. FLOOD HAZARD ZONES

As shown by Panel 3500020008 of the National Flood Insurance Program (NFIP) Flood Boundary and Floodway Maps for the City of Albuquerque, dated September 15, 1983, a portion of the subdivision's proposed residential lots lie within a designated Flood Hazard Zone along the middle branch of the Piedras Marcadas Arroyo, adjacent to the easterly boundary of the site. A CLOMR is anticipated to be requested from FEMA to revise this map, concurrently with the design and construction of the second phase of the Piedras Marcadas Channel. The first phase of channel construction includes the downstream reach of the channel for Golf Course Road to the Piedras Marcadas Dam. That phase is now under construction. The revised map will show that the 100-year floodplain is limited to the proposed channel, thus none of the subject properties will lie within a 100-year floodplain. An excerpt from the FIRM panel is included in Appendix I for reference.

IV. PROPOSED DEVELOPMENT AND PHASING

The proposed development consists of a single-family, detached residential subdivision with an overall density of about 3 dwelling units/acre. Proposed lot sizes are a minimum of 105' deep (110' typical), with a width varying from 60' to 75'. Proposed street configurations are shown on Plate 2, the overall drainage basin map, and on the detailed grading plans, Plates 3A-3F.

The project is proposed to be phased as identified on the overall drainage basin map (Plate 2), and on the detailed grading plans (Plates 3A-3F). The first phase of the project consists of all portions of the development which are upstream (north and west) of the Northwest Mesa Sanitary Sewer Interceptor. The paving of one-half of Paseo del Norte, at a nominal width of 24', will be financially guaranteed, but not constructed with phase 1 of the development. That paving is not anticipated to be constructed until the crossing structure at Paseo del Norte of the Piedras Marcadas Arroyo is constructed by the City of Albuquerque, as required by the Drainage Ordinance. Phase 1 construction will also include temporary detention ponds at the downstream ends of street terminations, which will release developed runoff into the

unimproved Piedras Marcadas Arroyo at historic flow rates.

During Phase 2 of the development, the Piedras Marcadas Channel is proposed to be constructed jointly by the owners of Tract H-8-A and the owners of Tract H-9, which is zoned for commercial development. Adjacent to the proposed channel will be a multi-use trail, for bicycling and other recreational uses.

Grading of lots adjacent to the future extension of Paseo del Norte have been coordinated with the profile of this major arterial, as shown on the Location Study Report for the Paseo del Norte Middle Escarpment Crossing. An excerpt from this report is included in Appendix A1-4.

V. HYDROLOGIC AND HYDRAULIC ANALYSIS

The hydrologic calculations which appear herein analyze both the existing and developed discharge for the 100-year, 6-hour rainfall event, as identified within the recent revision to Chapter 22.2 of the Development Process Manual (DPM Update). Peak discharges of runoff have been calculated and routed through the proposed improvements within the development using the modified computerized hydrologic model, AHYMO, as presented within the DPM Update (version 1/93).

The hydraulic calculations which appear herein were computed as follows: street and channel capacities were computed using Manning's equation with Manning's N values as identified within the latest edition of the DPM. The capacities of streets were computed with the maximum water elevation at top of curb, and maximum energy to be contained within the right-of-way. The computed capacities of channel sections have been noted on the detailed grading plans, and the Manning's analyses of these sections are included within this report. Inlet capacities in sump conditions were made using the orifice equation and the weir equation. Inlet capacities on grade were determined in accordance with DPM charts and procedures. Storm Drain capacities and Hydraulic Grade Line calculations are included in the report. All calculations have been made in accordance with DPM procedures.

It is anticipated that a detailed analysis of the Piedras Marcadas Channel will be prepared and submitted concurrently with the design of that facility. This analysis will form the basis for a Conditional Letter of Map Revision (CLOMR), which will be submitted to the Federal Emergency Management Agency (FEMA).

VI. DRAINAGE MANAGEMENT PLAN

Under developed conditions, the site will be graded to deliver runoff from developed lots either directly to the internal street sections, or through side and back yard swales to proposed channel sections. Internal streets will deliver developed runoff to the east, where, at specific intersections, it will be intercepted by the proposed storm

sewer system. Developed runoff from the project will be discharged into the Piedras Marcadas Arroyo via the proposed storm sewer system. Phase 1 construction will also include temporary detention ponds at the downstream ends of street terminations, which will release developed runoff into the unimproved Piedras Marcadas Arroyo at historic flow rates.

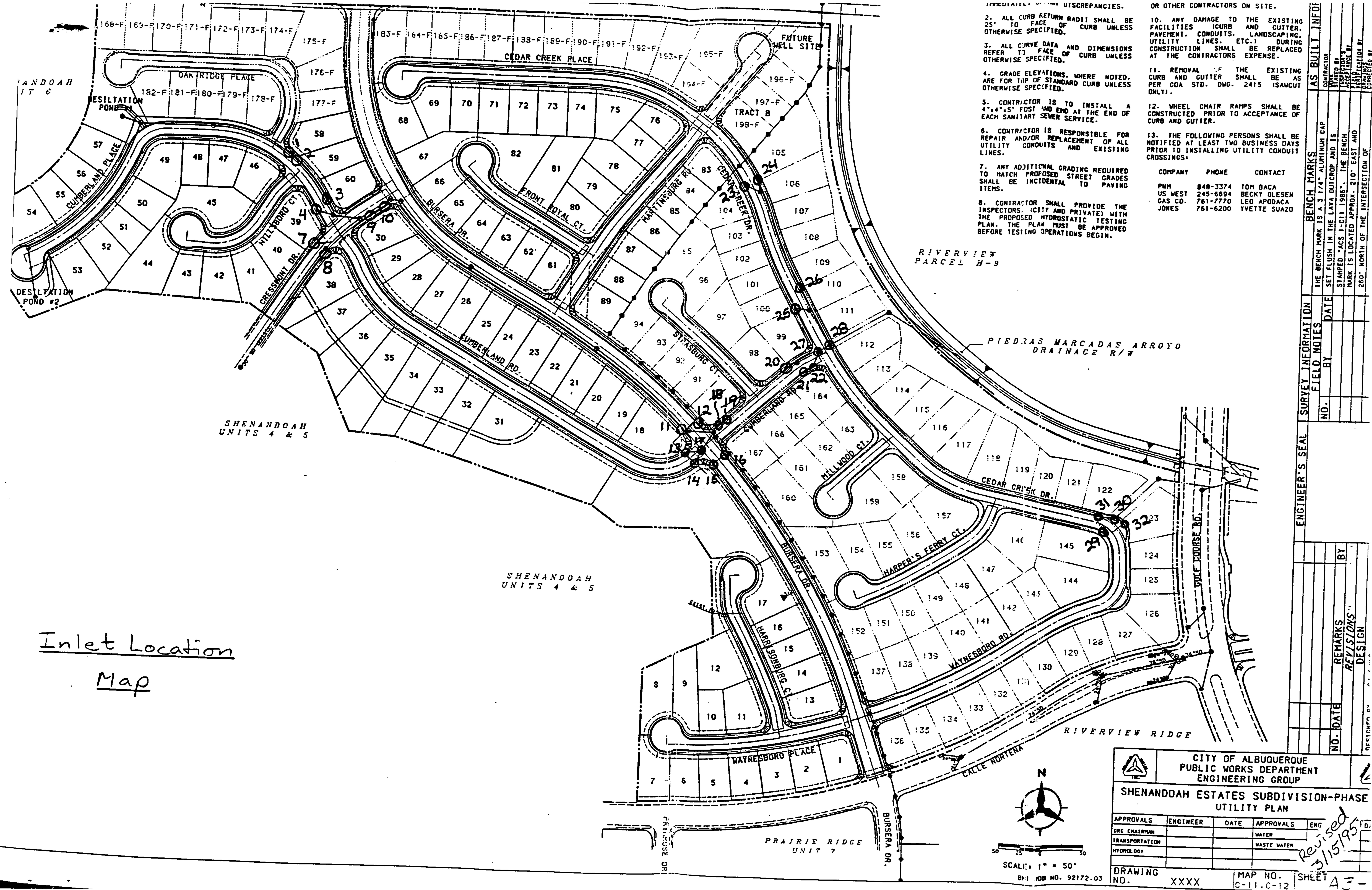
Undeveloped runoff generated by City open space west of the development will be intercepted at two locations, and directed into permanent desiltation and detention basins. These basins include standpipe inlet structures for the purpose of removing sediment and directing flow into the proposed storm sewers within the development. In addition, soil cement weir will direct offsite runoff into the roads and prevent erosion within the arroyo bottom on City Open Space land.

The Drainage and Grading Plan shows: 1) existing grades indicated by spot elevations and contours at 1'0" intervals; 2) proposed grades indicated by spot elevations and slopes; 3) the limit and character of existing improvements; 4) the limit and character of proposed improvements; and 5) continuity between existing and proposed grades. As shown by this Plan, the proposed improvements consist of a 198 lot detached residential subdivision, complete with paving, drainage, and utility improvements.

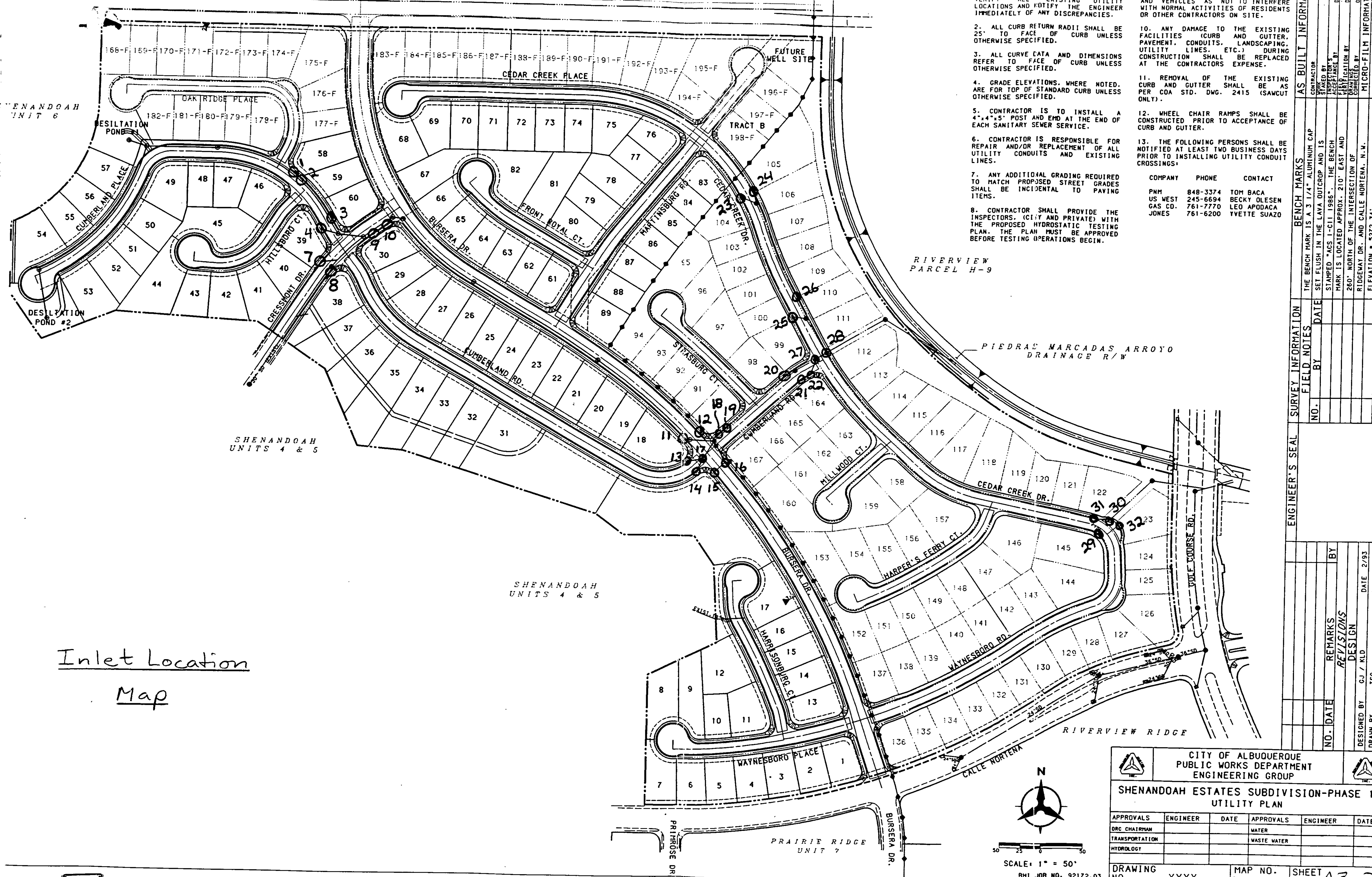
VII. CONCLUSIONS

Based upon the findings of this analysis, the proposed improvements are adequate to convey runoff generated by the design storm through the site and into the Piedras Marcadas Arroyo, without damage to private property, in addition to providing protection from flooding that could occur as a result of sediment or erosional deposition upstream of the site. Grading of the site as shown on Plates 3A-3F is anticipated to allow implementation of the drainage management plan identified in this analysis.

A design analysis report prepared separately for the Piedras Marcadas Arroyo Channel provides additional detailed design data for construction of those facilities, and for submittal to FEMA for the purposes of obtaining a CLOMR.



SHENANDOAH
UNIT 6



Inlet Location
Map

- VERIFY ALL EXISTING UTILITY LOCATIONS AND NOTIFY THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
2. ALL CURB RETURN RADII SHALL BE 25' TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
 3. ALL CURVE DATA AND DIMENSIONS REFER TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
 4. GRADE ELEVATIONS, WHERE NOTED, ARE FOR TOP OF STANDARD CURB UNLESS OTHERWISE SPECIFIED.
 5. CONTRACTOR IS TO INSTALL A 4"x4"x5' POST AND END AT THE END OF EACH SANITARY SEWER SERVICE.
 6. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ALL UTILITY CONDUITS AND EXISTING LINES.
 7. ANY ADDITIONAL GRADING REQUIRED TO MATCH PROPOSED STREET GRADES SHALL BE INCIDENTAL TO PAVING ITEMS.
 8. CONTRACTOR SHALL PROVIDE THE INSPECTORS, (CITY AND PRIVATE) WITH THE PROPOSED HYDROSTATIC TESTING PLAN. THE PLAN MUST BE APPROVED BEFORE TESTING OPERATIONS BEGIN.
 9. ANY DAMAGE TO THE EXISTING FACILITIES (CURB AND GUTTER, PAVEMENT, CONDUITS, LANDSCAPING, UTILITY LINES, ETC.) DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
 10. ANY DAMAGE TO THE EXISTING CURB AND GUTTER SHALL BE AS PER COA STD. DWG. 2415 (SAWCUT ONLY).
 11. REMOVAL OF THE EXISTING CURB AND GUTTER SHALL BE PRIOR TO ACCEPTANCE OF CURB AND GUTTER.
 12. WHEEL CHAIR RAMPS SHALL BE CONSTRUCTED PRIOR TO ACCEPTANCE OF CURB AND GUTTER.
 13. THE FOLLOWING PERSONS SHALL BE NOTIFIED AT LEAST TWO BUSINESS DAYS PRIOR TO INSTALLING UTILITY CONDUIT CROSSINGS:
- | COMPANY | PHONE | CONTACT |
|---------|----------|--------------|
| PNM | 848-3374 | TOM BACA |
| US WEST | 245-6694 | BECKY OLESEN |
| GAS CO. | 761-7770 | LEO APODACA |
| JONES | 761-6200 | YVETTE SUAZO |

SURVEY INFORMATION		ENGINEER'S SEAL		BENCH MARKS		AS BUILT INFO	
FIELD NOTES		NO.		THE BENCH MARK IS A 3 1/4" ALUMINUM CAP SET FLUSH IN THE LAVA OUTCROP AND IS STAMPED "ACS 1-C11 1986". THE BENCH MARK IS LOCATED APPROX. 210' EAST AND 260' NORTH OF THE INTERSECTION OF RIDGEWAY DR. AND CALLE NORTENA, N.M. ELEVATION = 5272.34'		CONTRACTOR	
BY		DATE				REMARKS	
						NO. DATE	
						BY	
						DESIGN	
						DATE 2/93	
						DATE 2/93	



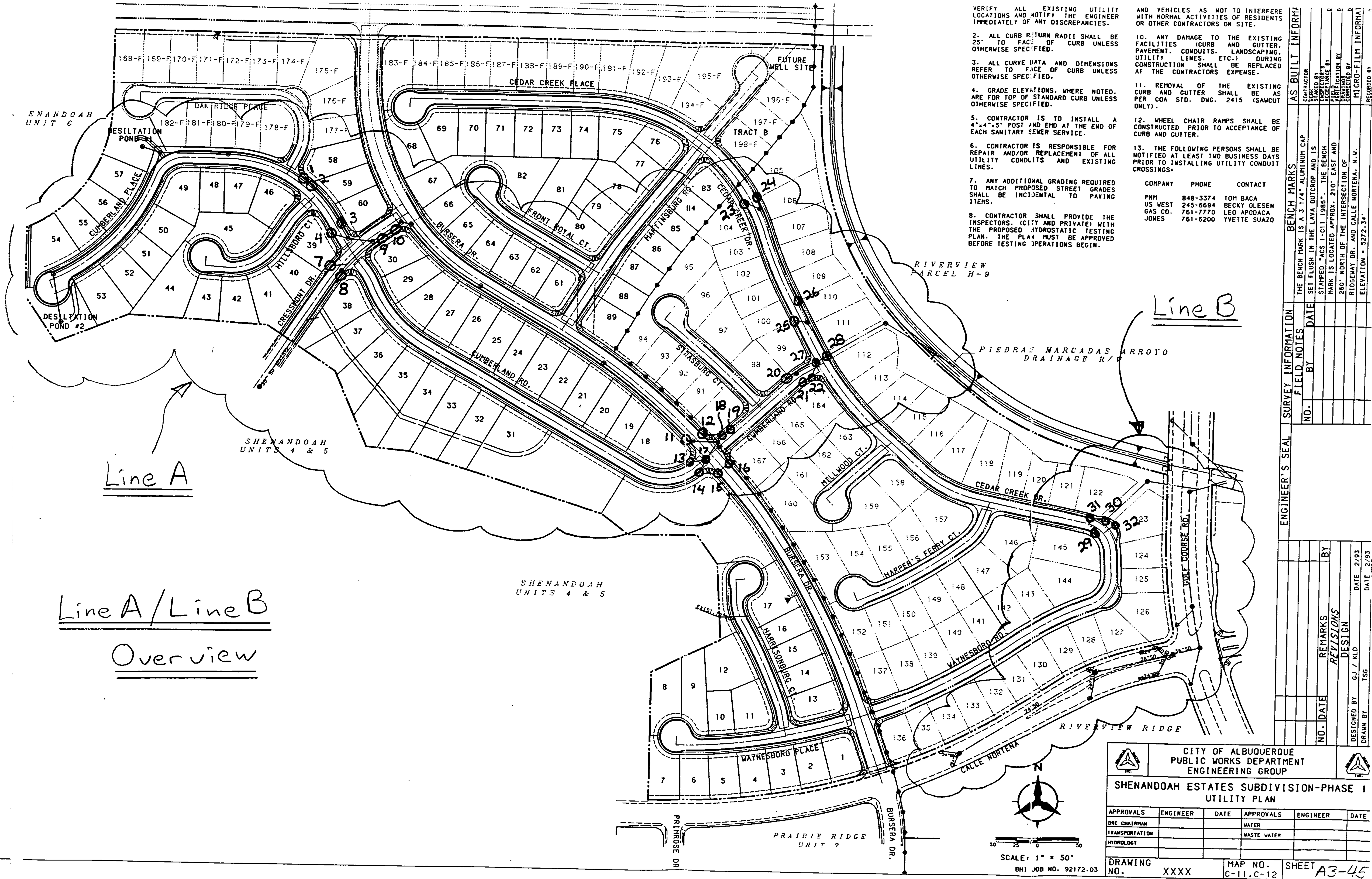
CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP



SHENANDOAH ESTATES SUBDIVISION-PHASE 1
UTILITY PLAN

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
ORC CHAIRMAN			WATER		
TRANSPORTATION			WASTE WATER		
HYDROLOGIST					

DRAWING NO.	XXXX	MAP NO.	C-11.C-12	SHEET	A3-2
-------------	------	---------	-----------	-------	------



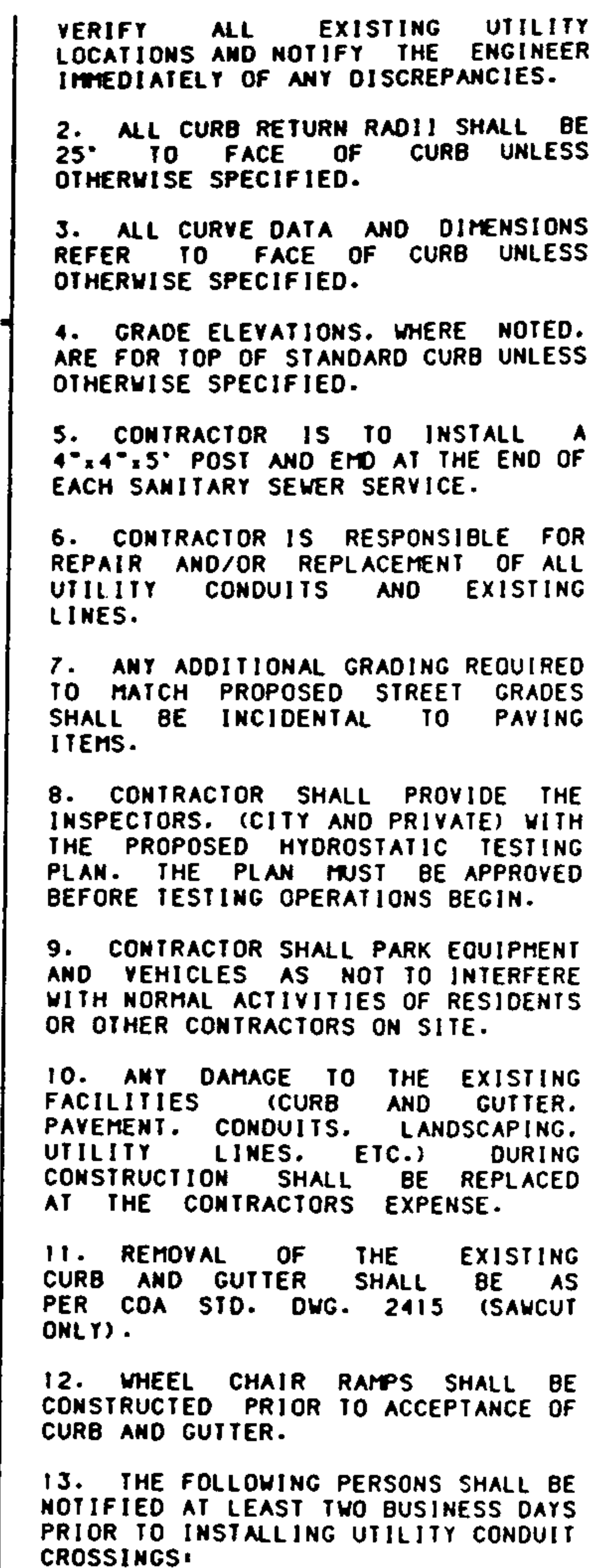
CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

SHENANDOAH ESTATES SUBDIVISION-PHASE I
UTILITY PLAN

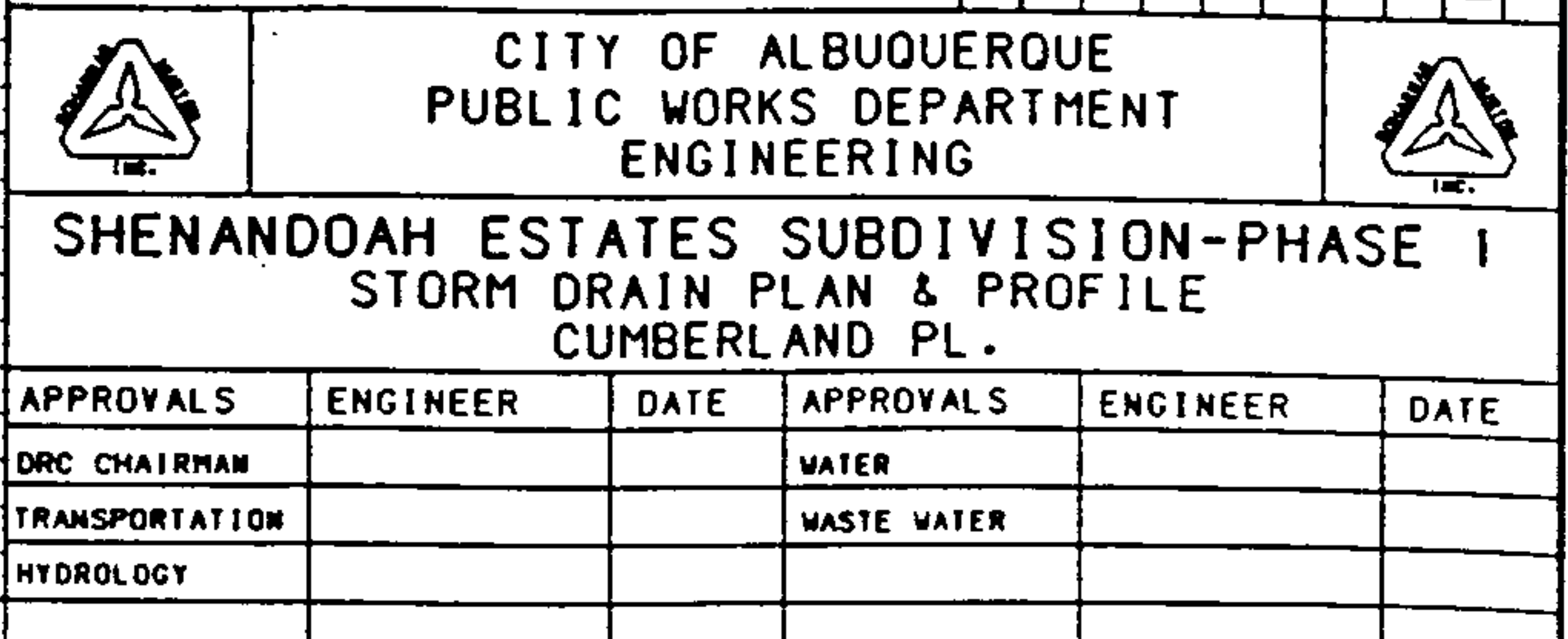
APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN			WATER		
TRANSPORTATION			WASTE WATER		
HYDROLOGY					

DRAWING NO. XXXX	MAP NO. C-11, C-12	SHEET A3-45
---------------------	-----------------------	----------------

INSTALL
1 - SINGLE GRATE TYPE "A" INLET
AS PER STD. DWG. 2201
GRATE 44.49, TC 45.32
INV. 33.00



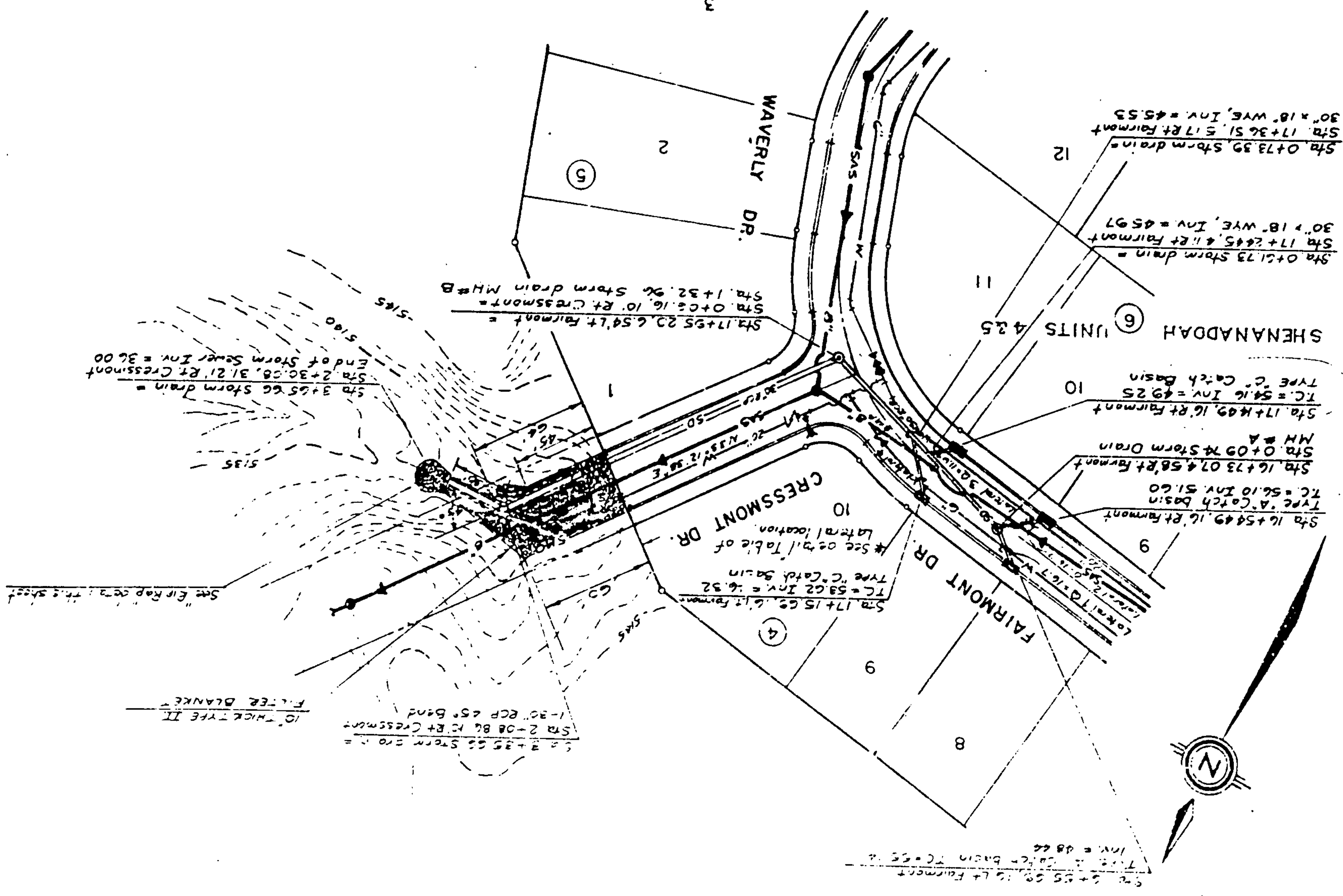
COMPANY	PHONE	CONTACT
PNM	848-3374	TOM BACA
US WEST	245-6694	BECKY OLESEN
GAS CO.	761-7770	LEO APODACA
JONES	761-6200	YVETTE SUAZO



Cressmont Drive
Storm Drain

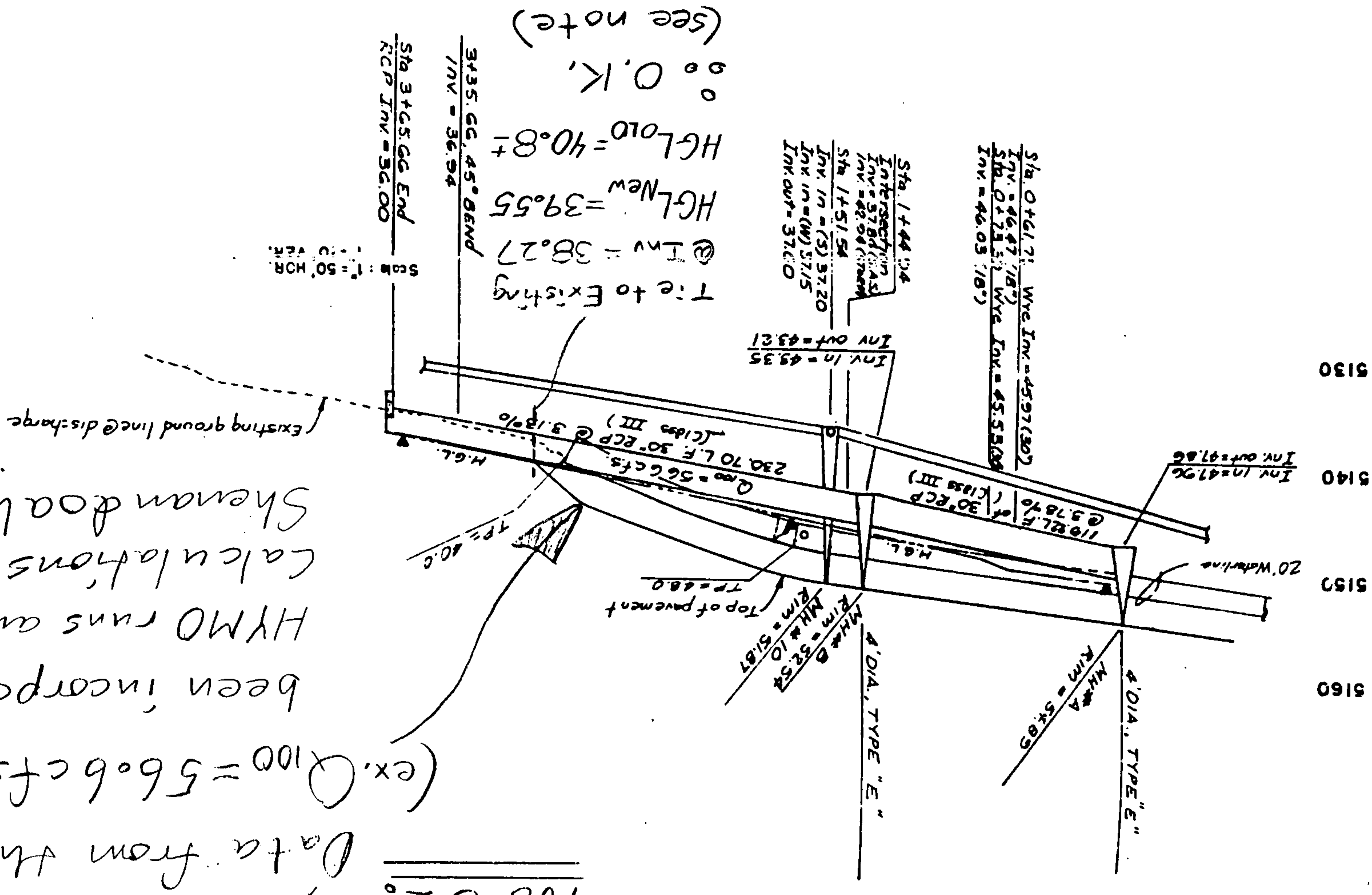
Note 1:

Since the Hydraulic Grade Line of the Proposed Storm Drain In Cressmont Drive ties in at a lower HGL than Existing there will be no adverse effect



STORM DRAIN

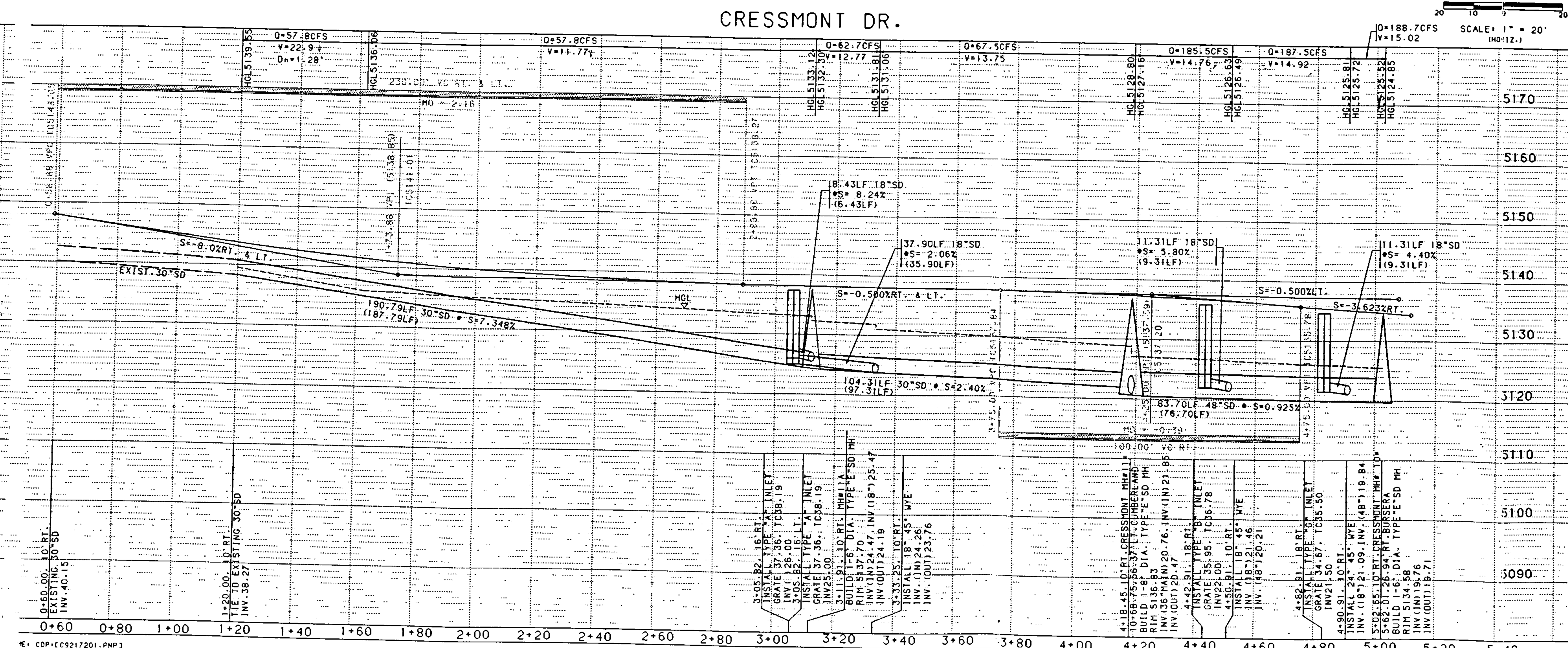
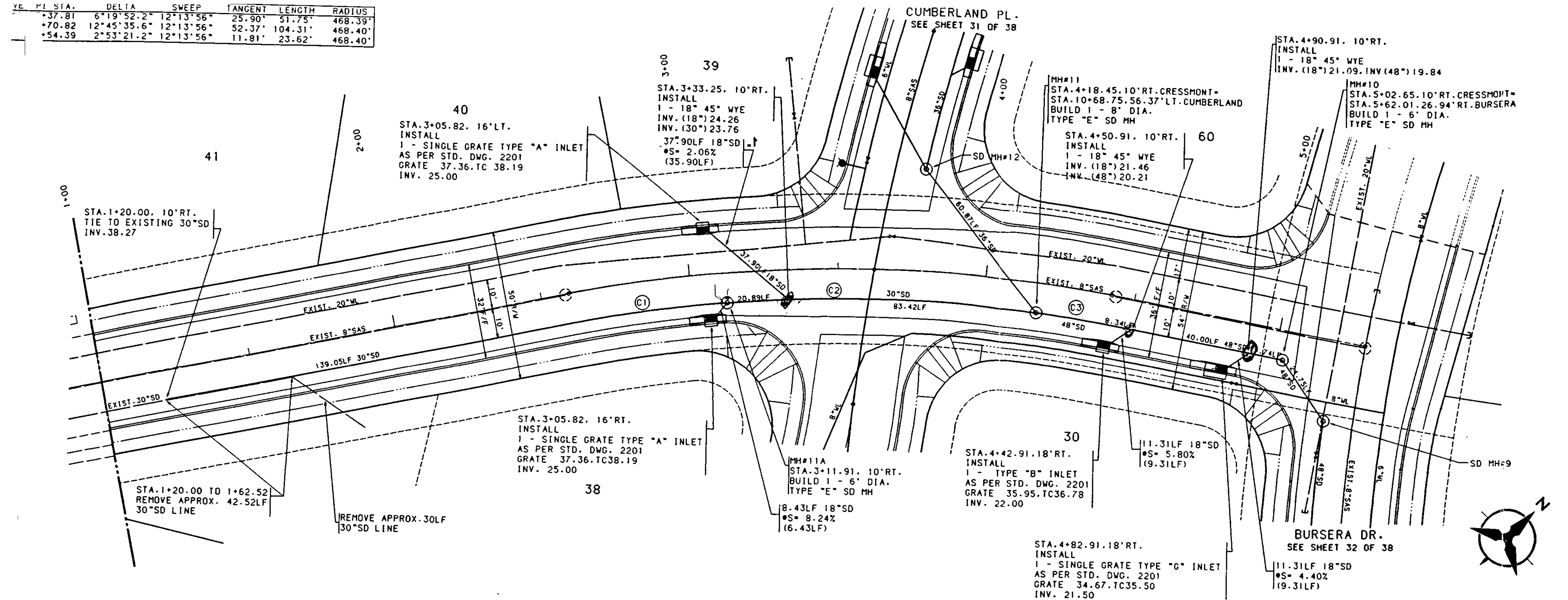
Note 2: Hydraulic & Hydrologic
Data from this sheet

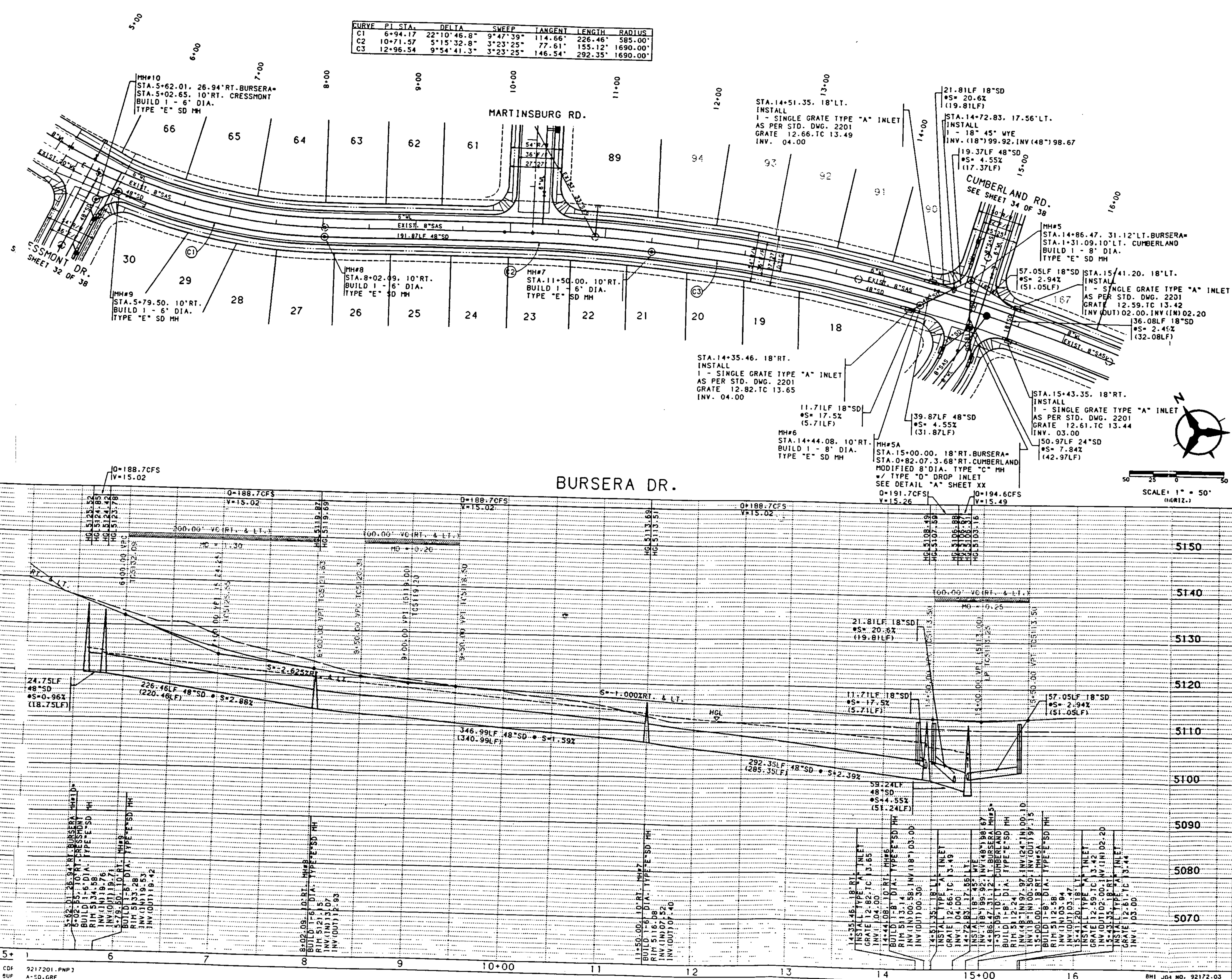


Time to Existence
 $\text{@ } T_{inv} = 38.27$
 $HGL^{New} = 39.55$
 $HGL_{old} = 40.8$
 $\Delta = 0.12$
 (see note)

From: Shenandoah Units 4
City Project #3235

STATION	DELTA	SWEEP	TANGENT	LENGTH	RADIUS
+37.81	6°19'52.2"	12°13'56"	25.90'	51.75'	468.39'
+70.82	12°45'35.6"	12°13'56"	52.37'	104.31'	468.40'
+54.39	2°53'21.2"	12°13'56"	11.81'	23.62'	468.40'





VERIFY ALL EXISTING UTILITY LOCATIONS AND NOTIFY THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.

2. ALL CURB RETURN RADI SHALL BE 25' TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.

3. ALL CURVE DATA AND DIMENSIONS REFER TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.

4. GRADE ELEVATIONS, WHERE NOTED, ARE FOR TOP OF STANDARD CURB UNLESS OTHERWISE SPECIFIED.

5. CONTRACTOR IS TO INSTALL A 4"x4"x5' POST AND END AT THE END OF EACH SANITARY SEWER SERVICE.

6. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ALL UTILITY CONDUITS AND EXISTING LINES.

7. ANY ADDITIONAL GRADING REQUIRED TO MATCH PROPOSED STREET GRADES SHALL BE INCIDENTAL TO PAVING ITEMS.

8. CONTRACTOR SHALL PROVIDE THE INSPECTORS (CITY AND PRIVATE) WITH THE PROPOSED HYDROSTATIC TESTING PLAN. THE PLAN MUST BE APPROVED BEFORE TESTING OPERATIONS BEGIN.

9. CONTRACTOR SHALL PARK EQUIPMENT AND VEHICLES AS NOT TO INTERFERE WITH NORMAL ACTIVITIES OF RESIDENTS OR OTHER CONTRACTORS ON SITE.

10. ANY DAMAGE TO THE EXISTING FACILITIES (CURB AND GUTTER, PAVEMENT, CONDUITS, LANDSCAPING, UTILITY LINES, ETC.) DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.

11. REMOVAL OF THE EXISTING CURB AND GUTTER SHALL BE AS PER COA STD. DWG. 2415 (SAWCUT ONLY).

12. WHEEL CHAIR RAMPS SHALL BE CONSTRUCTED PRIOR TO ACCEPTANCE OF CURB AND GUTTER.

13. THE FOLLOWING PERSONS SHALL BE NOTIFIED AT LEAST TWO BUSINESS DAYS PRIOR TO INSTALLING UTILITY CONDUIT CROSSINGS:

COMPANY	PHONE	CONTACT
PNM	848-3374	TOM BACA
US WEST	245-6694	BECKY OLESEN
GAS CO.	761-7770	LEO APUDACA
JONES	761-6200	YVETTE SUAZO

AS-BUILT INFORMATION		
CONTRACTOR	INSPECTOR'S	DATE

BENCH MARKS		
THE BENCH MARK IS A 3 1/4" ALUMINUM CAP	SET FLUSH IN THE LAVA OUTCROP AND IS	STAMPED "ACS 1-C11 1986"

SURVEY INFORMATION		
FIELD NOTES	DATE	BY

ENGINEER'S SEAL		
NO.	DATE	REMARKS

REVISIONS		
NO.	DATE	REMARKS

DESIGNED BY		
DATE	TH	NO

DRAWN BY		
DATE	TH	NO

CHECKED BY		
DATE	TH	NO

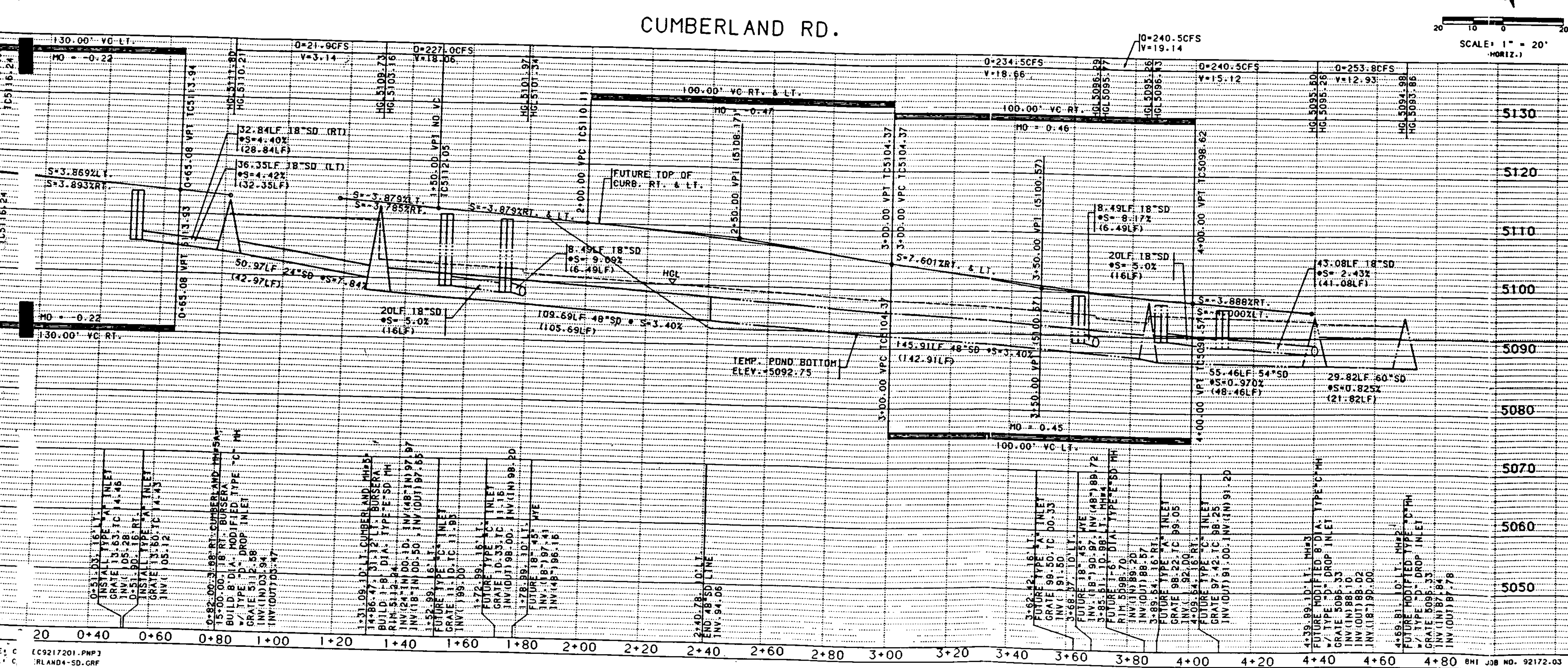
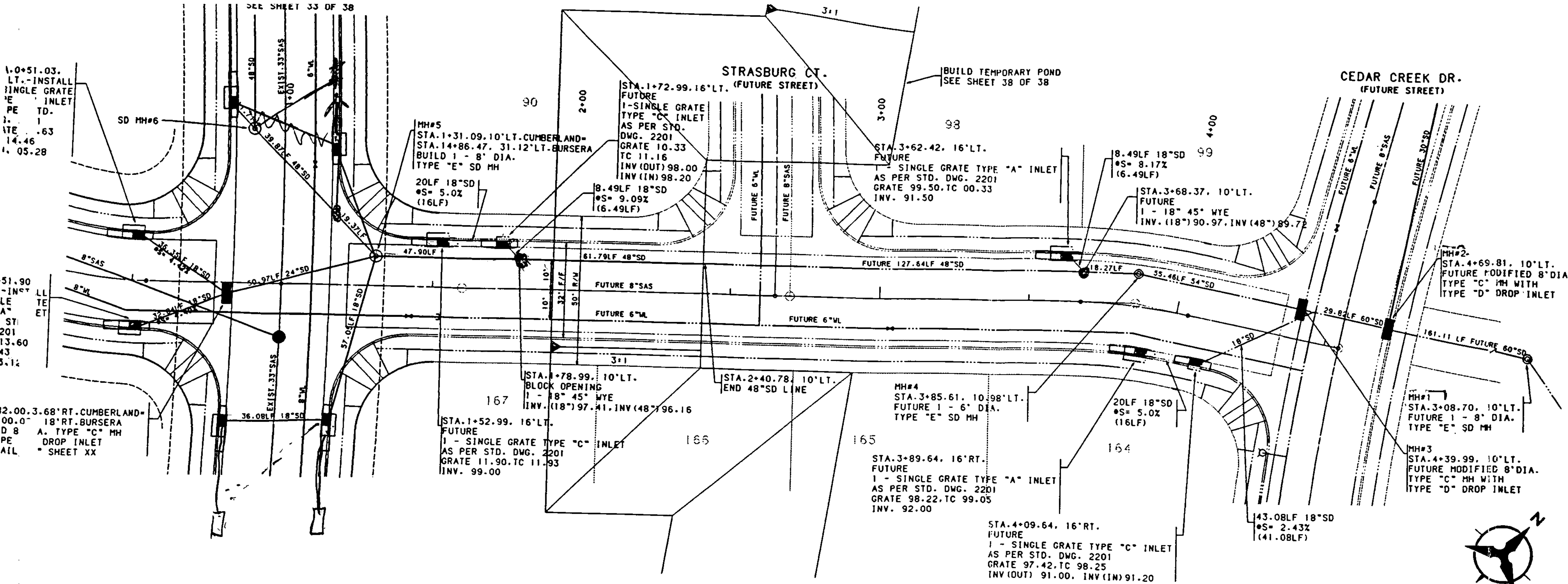
CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING

SHENANDOAH ESTATES SUBDIVISION-PHASE 1
STORM DRAIN PLAN & PROFILE
BURSERA DR.

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE

TRANSPORTATION	WATER	WASTE WATER	HYDROLOGY

DRAWING NO. 0000 MAP NO. C-11.C-12 SHEET A3-50



- VERIFY ALL EXISTING UTILITY LOCATIONS AND NOTIFY THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
2. ALL CURB RETURN RADI I SHALL BE 25° TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
3. ALL CURVE DATA AND DIMENSIONS REFER TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
4. GRADE ELEVATIONS, WHERE NOTED, ARE FOR TOP OF STANDARD CURB UNLESS OTHERWISE SPECIFIED.
5. CONTRACTOR IS TO INSTALL A 4'-4"x5' POST AND END AT THE END OF EACH SANITARY SEWER SERVICE.
6. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ALL UTILITY CONDUITS AND EXISTING LINES.
7. ANY ADDITIONAL GRADING REQUIRED TO MATCH PROPOSED STREET GRADES SHALL BE INCIDENTAL TO PAVING ITEMS.
8. CONTRACTOR SHALL PROVIDE THE INSPECTORS, (CITY AND PRIVATE) WITH THE PROPOSED HYDROSTATIC TESTING PLAN. THE PLAN MUST BE APPROVED BEFORE TESTING OPERATIONS BEGIN.
9. CONTRACTOR SHALL PARK EQUIPMENT AND VEHICLES AS NOT TO INTERFERE WITH NORMAL ACTIVITIES OF RESIDENTS OR OTHER CONTRACTORS ON SITE.
10. ANY DAMAGE TO THE EXISTING FACILITIES (CURB AND GUTTER, PAVEMENT, CONDUITS, LANDSCAPING, UTILITY LINES, ETC.) DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
11. REMOVAL OF THE EXISTING CURB AND GUTTER SHALL BE AS PER COA STD. DWG. 2415 (SAWCUT ONLY).
12. WHEEL CHAIR RAMPS SHALL BE CONSTRUCTED PRIOR TO ACCEPTANCE OF CURB AND GUTTER.
13. THE FOLLOWING PERSONS SHALL BE NOTIFIED AT LEAST TWO BUSINESS DAYS PRIOR TO INSTALLING UTILITY CONDUIT CROSSINGS.

COMPANY	PHONE	CONTACT
PNM	848-3374	TOM BACA
US WEST	245-6694	BECKY OLESEN
GAS CO.	761-7770	LEO APODACA
JONES	761-6200	YVETTE SUAZO

SURVEY INFORMATION			BENCH MARKS	AS-BUILT INFORMATION
FIELD NOTES				
NO.	BY	DATE		
			THE BENCH MARK IS A 3 1/4" ALUMINUM CAP	CONTRACTOR WORK STARTED BY
			SET FLUSH IN THE LAVA OUTCROP AND IS STAMPED "ACS 1-C11 1986". THE BENCH	INSPECTOR'S ACCEPTANCE BY
			MARK IS LOCATED APPROX. 210' EAST AND 260' NORTH OF THE INTERSECTION OF	FIELD CALCULATION BY
			RIDGEWAY DR. AND CALLE NORTENA, N.W.	DRAWINGS CONNECTED BY
			ELEVATION = 5272.34'	MICRO-FILM INFORMATION
				RECORDED BY
				NO.

[illegible]

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING



SHENANDOAH ESTATES SUBDIVISION-PHASE
STROM DRAIN PLAN & PROFILE
CUMBERLAND RD.

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
ORC CHAIRMAN			WATER		
TRANSPORTATION			WASTE WATER		
HYDROLOGY					

	5:40
	DRAWING
	NO.

MAP NO.	
C-11.6-	

SHEET A3-5

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	D	Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)	Dia. 3	Dia. 3 area	Angle
100.00	OUTLET											0.00	0.00	0.00	0.00	0.00		91.27	91.27	91.27	2.11	91.27	93.38	0.00	0.00	0.00
131.74	BEND	66	276.7	23.76	11.65	3358	0.0068	31.74		15 Δ	0.22	0.17	0.00	0.00	0.00	0.17	91.49	91.66	91.46	92.50	2.11	93.59	93.76	0.00	0.00	0.00
131.74	XXX	66	276.7	23.76	11.65	3358	0.0068	0.00			0.00	0.00	0.00	0.00	0.00	0.00	91.66	91.66		92.50	2.11	93.76	93.76	0.00	0.00	0.00
241.74	MH 1	66	276.7	23.76	11.65	3358	0.0068	110.00		8 Δ	0.75	0.43	0.00	0.13	0.20	0.76	92.40	92.18	92.20	98.40	3.08	94.51	95.27	0.00	0.00	0.00
		60	276.7	19.63	14.09	2604	0.0113	161.11			1.82							93.17								
BRANCH FOR CEDAR CREEK ROAD																										
	MH 2	30	26.0	4.91	5.30	410	0.0040	95.81		8 90	0.38	0.29	-1.23	0.07	0.00	-0.86	94.00	95.79	93.00	95.83	0.44	97.09	96.22	5.00	19.63	0.00
	MH 2A	24	19.8	3.14	6.30	226	0.0077	50.47		4 4	0.39	0.02	0.18	0.03	0.04	-0.27	96.17	96.26	94.61	97.24	0.62	96.61	96.87	1.50	1.77	52.00
	WYE	24	13.4	3.14	4.27	226	0.0035	249.53			0.88	0.00	0.17	0.00	0.00	0.17	96.64	97.15	96.93	98.82	0.28	97.26	97.43	1.50	1.77	45.00
	MH 2B	18	6.8	1.77	3.85	105	0.0042	26.17		4	0.11	0.00	0.06	0.01	0.00	0.08	98.02	98.15	109.22	112.32	0.23	98.31	98.38	1.50	1.77	28.00
	INLET 24																									
MAIN LINE CONTINUED																										
402.85	MH 2	60	253.8	19.63	12.93	2604	0.0095	29.82		8	0.28	0.00	0.49	0.14	0.00	0.63	94.00	95.12	93.00	95.83	2.59	97.09	97.72	2.50	4.91	90.00
432.67	MH 3	54	240.5	15.90	15.12	1966	0.0150	55.46		8	0.83	0.00	0.96	0.15	0.19	1.30	95.41	95.75	93.00	95.83	3.55	98.00	99.30	1.50	1.77	67.50
488.13	MH 4	48	240.5	12.57	19.14	1436	0.0280	18.27		6 10	0.51	0.30	0.00	0.23	0.43	0.96	96.58	95.40	93.00	98.70	5.69	100.13	101.09	0.00	0.00	0.00
506.40	WYE	48	234.5	12.57	18.66	1436	0.0267	237.33			6.33	0.00	0.24	0.00	0.00	0.24	95.91	96.44		98.67	5.41	101.60	101.85	1.50	1.77	45.00
743.73	MH 5	48	194.6	12.57	15.49	1436	0.0184	19.37		8 45	0.36	0.64	1.12	0.23	0.00	1.98	102.76	106.43	102.00	108.33	3.72	108.17	110.15	2.50	4.91	45.00
763.10	WYE	48	191.7	12.57	15.26	1436	0.0178	39.87			0.71	0.00	0.10	0.00	0.00	0.10	106.79	107.00		111.96	3.61	110.51	110.61	1.50	1.77	45.00
802.97	MH 6	48	188.7	12.57	15.02	1436	0.0173	291.20		8 45	5.03	0.50	0.10	0.18	0.00	0.78	107.71	108.61	104.60	112.94	3.5	111.32	112.11	1.50	1.77	45.00

Δ HV Also Influences HGL

Normal Depth

VELOCITY HEAD CALCS.

ORIFICE EQUATION CALCS.

#	INLET	TC ELEV	D	Q	A	VEL	K	Sf	LENGTH CONNECTOR	Hf	1.2V ² /2g	C.F.	FREE-BOARD DS MH	MAX. ALLOW HGL IN DS MH	Vmin	H based on Vmin	Qmax from ORIFICE	H req'd based on Q	Vmin based on H	WHICH CONDITION CONTROL Vcont.
1	15	12.77	24	16.4	3.14	5.22	226	0.0053	36.00	0.19	0.51	0.83	0.5	10.74	3.84	2.84	25.48	1.18	2.18	VEL HEAC 3.84
2	16	12.77	24	27.9	3.14	8.88	226	0.0152	61.86	0.94	1.47	0.83	0.5	8.33	5.50	4.50	32.08	3.40	4.40	VEL HEAC 5.50

Revisions:

- Δ Added and or changed bend angles. HGL increases by 0.14'
- Δ Removed wye for Inlets 18 & 19 as well as the inlets. Flows have been adjusted accordingly.

Notes:

Removing Wye for Inlet 18 & 19 causes the downstream HGL to be 0.40' Lower.
Removing Wye for Inlet 18 & 19 causes the upstream HGL to be 0.12' Higher.

11/5/95
DW
13-52A

HYDRAULIC GRADE LINES FOR SHENANDOAH ESTUARIES STORM DRAINS
 FILENAME: CIP:[C9217201.HYDRO] HGL TEST3.W20

Station	Structure	Diam.	Q	Area	Vel.	K	SF	Length	D	Angle	HF	Hb	Hj	Hhh	Ht	Total Losses	HGL(ch)	HGL(up)	Pipe Soffit	Low Point	HV	HGL(ch)	HGL(up)	Dia. 3	area	Angle
100.00	OUTLET																									
		66	276.7	23.76	11.65	3358	0.0068	18.00			0.12	0.00	0.00	0.00	0.00	0.00		91.30	91.30	91.30	2.11	91.30	93.41	0.00	0.00	0.00
118.00		66	276.7	23.76	11.65	3358	0.0068	123.74			0.84	0.00	0.00	0.00	0.00	0.00	91.42	91.42	91.39	98.90	2.11	93.53	93.53	0.00	0.00	0.00
241.74	MH 1	60	276.7	19.63	14.09	2604	0.0113	161.11	8	62.5	1.82	0.43	0.00	0.13	0.20	0.75	92.26	92.04	92.18	98.90	3.08	94.37	95.12	0.00	0.00	0.00

BRANCH 1 - CEDAR CREEK ROAD

MH 2	30	26.0	4.91	5.30	410	0.0040	95.81	8	90	0.38	0.29	-1.23	0.07	0.00	-0.86	93.86	95.64	5000.00	95.83	0.44	96.94	96.08	5.00	19.63	0.00
MH 2A	24	19.8	3.14	6.30	226	0.0077	50.47	4		0.39	0.00	0.19	0.03	0.04	0.25	96.02	96.09	5000.00	97.24	0.62	96.46	96.71	1.50	1.77	56.00
WE	24	13.4	3.14	4.27	226	0.0035	249.53			0.88	0.00	0.17	0.00	0.00	0.17	96.48	96.99	5000.00	98.82	0.28	97.10	97.27	1.50	1.77	45.00
MH 2B	24	6.8	3.14	2.16	226	0.0009	26.17	4		0.02	0.00	-0.01	0.01	0.00	0.00	97.86	98.07	5000.00	112.32	0.07	98.14	98.15	1.50	1.77	28.00

MAIN LINE CONTINUED

402.85	MH 2	60	253.8	19.63	12.93	2604	0.0095	29.82	8	0	0.28	0.00	0.49	0.14	0.00	0.63	93.86	94.98	92.80	95.83	2.59	96.94	97.57	2.50	4.91	90.00
432.67	MH 3	54	240.5	15.90	15.12	1966	0.0150	24.35	8	0	0.36	0.00	0.96	0.15	0.19	1.30	95.26	95.60	93.06	95.83	3.55	97.85	99.15	1.50	1.77	67.50
457.02		54	240.5	15.90	15.12	1966	0.0150	31.11			0.47	0.00	0.00	0.00	0.00	0.00	95.97	95.97	XXXX	500.00	3.55	99.52	99.52	0.00	0.00	45.00
488.13	MH 4	48	240.5	12.57	19.14	1436	0.0280	18.27	6	10	0.51	0.30	0.00	0.23	0.43	0.96	96.43	95.26	93.10	98.70	5.69	99.98	100.94	0.00	0.00	0.00
506.40	WE 1	48	234.5	12.57	18.66	1436	0.0267	189.43			5.05	0.00	0.24	0.00	0.00	0.24	95.77	96.29	93.72	98.67	5.41	101.45	101.70	1.50	1.77	45.00
695.83	WE 2	48	227.0	12.57	18.06	1436	0.0250	47.90			1.20	0.00	0.28	0.00	0.00	0.28	101.34	101.97	97.16	109.21	5.07	106.75	107.03	1.50	1.77	45.00

BRANCH 2 - CLIMBERLAND ROAD

MH 5	24	21.9	3.14	6.97	226	0.0094	50.97	8	15	0.48	0.20	1.94	0.12	0.00	2.26	103.16	109.73	101.79	110.70	0.75	108.23	110.49	4.00	12.57	45.00
MH 5A	18	5.9	1.77	3.34	105	0.0032	32.84	8	15	0.10	0.03	0.95	0.02	0.00	1.01	110.21	111.80	105.78	112.79	0.17	110.97	111.97	3.30	8.55	67.00

MAIN LINE CONTINUED

743.73	MH 5	48	194.6	12.57	15.49	1436	0.0184	19.37	8	45	0.36	0.62	0.97	0.22	0.00	1.81	103.16	106.31	101.79	110.70	3.72	108.23	110.03	2.50	4.91	45.00
763.10	WE 3	48	191.7	12.57	15.26	1436	0.0178	39.87			0.71	0.00	0.10	0.00	0.00	0.10	106.67	106.88	102.67	111.96	3.61	110.39	110.49	1.50	1.77	45.00
802.97	MH 6	48	188.7	12.57	15.02	1436	0.0173	291.20	8	45	5.03	0.50	0.10	0.18	0.00	0.78	107.59	108.49	104.48	112.14	3.5	111.20	111.99	1.50	1.77	45.00

Line A: HGL Calculations

HYDRAULIC GRADE LINES FOR SHENANDOAH ESURIES STORM DRAINS
 FILENAME: CDP:[C9217201.HIDRO] HGL TESTS.W20

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	D	Angle	HF	Hb	Hj	Hhh	Ht	Losses	HGL(dn)	HGL(up)	Pipe	Low	HW	HGL(dn)	HGL(up)	Dia. 3	area	Angle
1094.17	MH 7	48	188.7	12.57	15.02	1436	0.0173	348.15	6	0	6.01	0.00	0.00	0.18	0.00	0.18	113.51	113.69	111.47	116.08	3.5	117.01	117.19	0.00	0.00	0.00
1442.32	MH 8	48	188.7	12.57	15.02	1436	0.0173	226.46	6	0	3.91	0.00	0.00	0.18	0.00	0.18	119.69	119.87	116.98	121.15	3.5	123.20	123.37	0.00	0.00	0.00
1668.78	MH 9	48	188.7	12.57	15.02	1436	0.0173	24.75	6	40	0.43	0.47	0.00	0.18	0.00	0.64	123.78	124.42	123.51	133.28	3.5	127.28	127.92	0.00	0.00	0.00
1693.53	MH 10	48	188.7	12.57	15.02	1436	0.0173	11.74	6	45	0.20	0.50	0.00	0.18	0.00	0.67	124.85	125.52	123.74	134.58	3.5	128.35	129.02	0.00	0.00	0.00
1705.27	WE 4	48	188.7	12.57	15.02	1436	0.0173	40.00			0.68	0.00	0.04	0.00	0.00	0.04	125.72	125.81	123.84	133.74	3.46	129.22	129.26	1.50	1.77	45.00
1745.27	WE 5	48	187.5	12.57	14.92	1436	0.0170	31.95			0.53	0.00	0.07	0.00	0.00	0.07	126.49	126.63	124.21	134.27	3.38	129.94	130.01	1.50	1.77	45.00

BRANCH 3 - CRESSMONT DRIVE

MH 11	30	67.5	4.91	13.75	410	0.0271	83.42	8	0	2.26	0.00	1.04	0.16	0.00	1.19	127.16	128.80	124.50	136.83	2.94	130.55	131.74	3.00	7.07	45.00
WE	30	62.7	4.91	12.77	410	0.0234	20.89			0.49	0.00	0.34	0.00	0.00	0.34	131.06	131.81	126.26	136.62	2.53	134.00	134.34	1.50	1.77	45.00
MH 11A	30	57.8	4.91	11.77	410	0.0199	148.17	6	0	2.94	0.00	0.32	0.12	0.00	0.44	132.30	133.12	126.76	136.69	2.15	134.83	135.27	1.50	1.77	45.00
EXIST HGL	30	57.8	4.91	11.77	410	0.0199	100.00	6	0	1.99	0.00	0.00	0.11	0.00	0.11	136.06	136.17	139.50	139.50	2.15	138.21	138.32	0.00	0.00	0.00

MAIN LINE CONTINUED

1777.22	MH 11	36	119.7	7.07	16.93	667	0.0322	60.87	8	45	1.96	0.55	1.07	0.19	0.21	2.03	127.16	128.12	124.50	136.83	4.45	130.55	132.58	2.50	4.91	0.00
1838.09	MH 12	36	115.5	7.07	16.34	667	0.0300	32.95	6	53	0.99	0.66	0.26	0.21	0.00	1.14	130.08	131.53	127.43	137.79	4.15	134.54	136.68	1.50	1.77	10.00
1871.04	WE 6	36	111.3	7.07	15.75	667	0.0278	116.33			3.24	0.00	0.27	0.00	0.00	0.27	132.52	133.08	128.72	138.40	3.85	136.66	136.93	1.50	1.77	45.00
1987.37	WE 7	36	98.9	7.07	13.99	667	0.0220	225.14			4.95	0.00	0.54	0.00	0.00	0.54	136.32	137.67	133.25	142.16	3.04	140.17	140.71	1.50	1.77	45.00
2212.51	MH 13	36	98.9	7.07	13.99	667	0.0220	165.69	6	0	3.64	0.00	0.00	0.15	0.00	0.15	142.62	142.77	142.02	152.56	3.04	145.66	145.81	0.00	0.00	0.00
2378.20	MH 14	24	24.5	3.14	7.80	226	0.0117	404.22	6	75	4.74	0.34	0.60	0.09	0.00	1.03	146.41	149.54	146.49	159.00	0.94	149.45	150.49	3.00	7.07	17.00
2782.42	MH 15	24	24.5	3.14	7.80	226	0.0117	117.64	4	75	1.38	0.17	0.00	0.05	0.00	0.22	154.28	154.50	157.40	171.70	0.94	155.23	155.45	0.00	0.00	0.00
2900.06	MH 15A											0.00	0.00	0.00	0.00	0.00	155.88	156.83	159.11	173.03	0	156.83	156.83	0.00	0.00	0.00

Cressmont Drive: Normal Depth Analysis

30" STORM DRAIN -- SLOPE = 7.35%

CULVERT RATING TABLE

30. INCH DIAMETER PIPE

N = 0.01300

INCREMENT = 1.00

SLOPE = 0.07350

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
1.00000	0.05020	0.22415	4.46484
2.00000	0.14054	0.98543	7.01185
3.00000	0.25547	2.32160	9.08764
4.00000	0.38908	4.23533	10.88544
5.00000	0.53776	6.71448	12.48613
6.00000	0.69890	9.73798	13.93336
7.00000	0.87048	13.27838	15.25402
8.00000	1.05085	17.30335	16.46611
9.00000	1.23855	21.77658	17.58232
10.00000	1.43233	26.65833	18.61192
11.00000	1.63102	31.90579	19.56188
12.00000	1.83356	37.47333	20.43748
13.00000	2.03894	43.31267	21.24276
14.00000	2.24619	49.37291	21.98075
15.00000	2.45437	55.60047	22.65369
16.00000	2.66255	61.93906	23.26309
17.00000	2.86980	68.32948	23.80987
18.00000	3.07518	74.70930	24.29432
19.00000	3.27772	81.01240	24.71611
20.00000	3.47641	87.16839	25.07426
21.00000	3.67019	93.10168	25.36703
22.00000	3.85789	98.72997	25.59170
23.00000	4.03825	103.96224	25.74437
24.00000	4.20984	108.69530	25.81935
25.00000	4.37098	112.80782	25.80836
26.00000	4.51965	116.14945	25.69875
27.00000	4.65327	118.51775	25.46980
28.00000	4.76820	119.59921	25.08269
29.00000	4.85853	118.75623	24.44282
30.00000	4.90874	111.20103	22.65369

→
Q = 57 cfs

$$D_N = 15.35'' = 1.28'$$

$$V = 22.9 \text{ fps}$$

Cumberland Place: Normal Depth Analysis

24" STORM DRAIN -- SLOPE = 1.50%

CULVERT RATING TABLE

24. INCH DIAMETER PIPE

N = 0.01300

INCREMENT = 1.00

SLOPE = 0.01500

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
1.00000	0.04479	0.09010	2.01165
2.00000	0.12504	0.39393	3.15037
3.00000	0.22665	0.92269	4.07091
4.00000	0.34416	1.67297	4.86097
5.00000	0.47417	2.63505	5.55723
6.00000	0.61418	3.79530	6.17942
7.00000	0.76224	5.13724	6.73961
8.00000	0.91669	6.64214	7.24580
9.00000	1.07605	8.28937	7.70349
10.00000	1.23901	10.05656	8.11660
11.00000	1.40432	11.91974	8.48790
12.00000	1.57079	13.85331	8.81930
13.00000	1.73727	15.83006	9.11204
14.00000	1.90258	17.82098	9.36675
15.00000	2.06554	19.79501	9.58347
16.00000	2.22490	21.71872	9.76165
17.00000	2.37935	23.55560	9.90003
18.00000	2.52741	25.26507	9.99644
19.00000	2.66742	26.80073	10.04742
20.00000	2.79743	28.10700	10.04745
21.00000	2.91494	29.11224	9.98727
22.00000	3.01655	29.71129	9.84943
23.00000	3.09680	29.70298	9.59150
24.00000	3.14159	27.70665	8.81930

→
Q = 24.5

$$D_N = 17.5'' = 1.46'$$

$$U = 9.9 \text{ fps}$$

Cumberland Place : Normal Depth Analysis

24" STORM DRAIN -- SLOPE = 2.70%

CULVERT RATING TABLE

24. INCH DIAMETER PIPE

N = 0.01300

INCREMENT = 1.00

SLOPE = 0.02700

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
1.00000	0.04479	0.12088	2.69891
2.00000	0.12504	0.52851	4.22667
3.00000	0.22665	1.23792	5.46170
4.00000	0.34416	2.24452	6.52168
5.00000	0.47417	3.53529	7.45580
6.00000	0.61418	5.09192	8.29056
7.00000	0.76224	6.89232	9.04214
8.00000	0.91669	8.91137	9.72126
9.00000	1.07605	11.12136	10.33532
10.00000	1.23901	13.49229	10.88957
11.00000	1.40432	15.99200	11.38771
12.00000	1.57079	18.58617	11.83233
13.00000	1.73727	21.23826	12.22509
14.00000	1.90258	23.90935	12.56681
15.00000	2.06554	26.55780	12.85758
16.00000	2.22490	29.13872	13.09663
17.00000	2.37935	31.60315	13.28229
18.00000	2.52741	33.89665	13.41163
19.00000	2.66742	35.95695	13.48003
20.00000	2.79743	37.70950	13.48006
21.00000	2.91494	39.05817	13.39933
22.00000	3.01655	39.86188	13.21440
23.00000	3.09680	39.85073	12.86835
24.00000	3.14159	37.17237	11.83234

$Q = 24.5$
cfs

$$D_N = 14.2'' = 1.19'$$

$$U = 12.6 \text{ fps}$$

Minimum Catch Basin Depth Based on Required Head Velocity Head VS. Orifice Control

#	INLET	TC ELEV	D	Q	A	VEL	K	SF	LENGTH CONNECTOR	HF	VELOCITY HEAD CALCS.					ORIFICE EQUATION CALCS.				WHICH CONDITION CONTROLS	V
											1.2V ² /2g	C.F.	FREE-BOARD	HGL IN	V _{min}	H based on V _{min}	Q _{max} from ORIFICE	H req'd based on Q	V _{min} based on H		
1	23	114.07	18	6.6	1.77	3.73	105	0.0039	39.36	0.16	0.26	0.83	0.5	112.32	3.09	2.34	13.02	0.60	1.35	VEL HEAD	3.09
1	24	113.93	18	6.8	1.77	3.85	105	0.0042	26.17	0.11	0.28	0.83	0.5	112.21	3.11	2.36	13.06	0.64	1.39	VEL HEAD	1
1	25	98.91	18	6.2	1.77	3.51	105	0.0035	31.42	0.11	0.23	0.83	0.5	97.24	3.06	2.31	12.93	0.53	1.28	VEL HEAD	6
1	26	100.43	18	6.4	1.77	3.62	105	0.0037	8.49	0.03	0.24	0.83	0.5	98.82	3.07	2.32	12.97	0.57	1.32	VEL HEAD	.77
1	27	97.00	41	12.3	9.17	1.34	943	0.0002	0.00	0.00	0.03	0.67	0.5	95.80	4.62	2.91	75.33	0.08	1.79	VEL HEAD	4.62
1	28	97.00	41	12.3	9.17	1.34	943	0.0002	0.00	0.00	0.03	0.67	0.5	95.80	4.62	2.91	75.33	0.08	1.79	VEL HEAD	52
1	21	99.05	18	5.7	1.77	3.23	105	0.0029	20.00	0.06	0.19	0.83	0.5	97.47	3.02	2.27	12.83	0.45	1.20	VEL HEAD	12
2	22	98.25	18	7.0	1.77	3.96	105	0.0044	36.77	0.16	0.29	0.83	0.5	96.46	3.12	2.37	13.11	0.68	1.43	VEL HEAD	3.12
1	20	100.33	18	7.0	1.77	3.96	105	0.0044	8.49	0.04	0.29	0.83	0.5	98.67	3.12	2.37	13.11	0.68	1.43	VEL HEAD	2
1	18	111.93	18	4.0	1.77	2.26	105	0.0015	20.00	0.03	0.10	0.83	0.5	110.48	2.93	2.18	12.55	0.22	0.97	VEL HEAD	3
2	19	111.16	18	9.6	1.77	5.43	105	0.0084	8.49	0.07	0.55	0.83	0.5	109.21	3.38	2.63	13.80	1.27	2.02	VEL HEAD	3.38
1	15	113.44	18	5.0	1.77	2.83	105	0.0023	36.08	0.08	0.15	0.83	0.5	111.88	2.98	2.23	12.70	0.35	1.10	VEL HEAD	8
2	16	113.42	18	10.0	1.77	5.66	105	0.0091	57.05	0.52	0.60	0.83	0.5	110.77	3.64	2.89	14.46	1.38	2.13	VEL HEAD	54
1	14	114.43	18	5.9	1.77	3.34	105	0.0032	32.84	0.10	0.21	0.83	0.5	112.79	3.04	2.29	12.87	0.48	1.23	VEL HEAD	3.04
1	13	114.46	18	5.9	1.77	3.34	105	0.0032	36.35	0.11	0.21	0.83	0.5	112.81	3.04	2.29	12.87	0.48	1.23	VEL HEAD	4
1	14	114.43	18	5.9	1.77	3.34	105	0.0032	32.84	0.10	0.21	0.83	0.5	112.79	3.04	2.29	12.87	0.48	1.23	VEL HEAD	4
2	17	113.25	24	21.9	3.14	6.97	226	0.0094	50.97	0.48	0.91	0.67	0.5	110.70	4.08	3.08	26.53	2.10	3.10	VEL HEAD	8
1	11	113.65	18	5.0	1.77	2.83	105	0.0023	11.71	0.03	0.15	0.83	0.5	112.14	2.98	2.23	12.70	0.35	1.10	VEL HEAD	2.98
1	12	113.49	18	5.0	1.77	2.83	105	0.0023	21.81	0.05	0.15	0.83	0.5	111.96	2.98	2.23	12.70	0.35	1.10	VEL HEAD	98
1	10	135.50	18	7.8	1.77	4.41	105	0.0055	11.31	0.06	0.36	0.83	0.5	133.74	3.19	2.44	13.30	0.84	1.59	VEL HEAD	.19
1	9	136.78	18	13.0	1.77	7.36	105	0.0153	11.31	0.17	1.01	0.83	0.5	134.27	3.84	3.09	14.95	2.33	3.08	VEL HEAD	3.84
1	5	138.29	18	0.0	1.77	0.00	105	0.0000	20.00	0.00	0.00	0.83	0.5	136.96	2.83	2.08	12.27	0.00	0.75	VEL HEAD	33
2	7	138.19	18	5.0	1.77	2.83	105	0.0023	37.90	0.09	0.15	0.83	0.5	136.62	2.98	2.23	12.70	0.35	1.10	VEL HEAD	38
1	6	138.29	18	0.0	1.77	0.00	105	0.0000	20.00	0.00	0.00	0.83	0.5	136.96	2.83	2.08	12.27	0.00	0.75	VEL HEAD	2.83
2	8	138.19	18	5.0	1.77	2.83	105	0.0023	8.43	0.02	0.15	0.83	0.5	136.69	2.98	2.23	12.70	0.35	1.10	VEL HEAD	2.98
1	4	139.53	18	6.6	1.77	3.73	105	0.0039	37.88	0.15	0.26	0.83	0.5	137.79	3.09	2.34	13.02	0.60	1.35	VEL HEAD	19
1	3	140.02	18	6.6	1.77	3.73	105	0.0039	8.33	0.03	0.26	0.83	0.5	138.40	3.09	2.34	13.02	0.60	1.35	VEL HEAD	19
1	1	145.32	18	7.2	1.77	4.07	105	0.0047	20.00	0.09	0.31	0.83	0.5	143.59	3.14	2.39	13.15	0.72	1.47	VEL HEAD	14
2	2	144.52	18	12.4	1.77	7.02	105	0.0139	8.33	0.12	0.92	0.83	0.5	142.16	3.75	3.00	14.73	2.12	2.87	VEL HEAD	75

Velocity Head Equations:

Max. Allow. HGL

$$\text{In DownStream Structure} = TC - \left(H_f + \frac{1.2V^2}{2g} + C.F. + \text{Freeboard} \right) \Rightarrow \begin{cases} \text{If 1st Inlet in Series} \\ \text{OR} \\ \text{Max Allow HGL In Structure} \geq TC - C.F. - \text{Freeboard} \\ \text{else,} \end{cases}$$

$$V_{min} = \left(\text{Dia} / 12 \text{ in} \right) + \frac{1.2V^2}{2g} + C.F. + \text{Freeboard}$$

Max Allow. HGL In DownStream Structure = Max Allow HGL In Structure

$$= \left(H_s + \frac{1.2V^2}{2g} \right) \Rightarrow \text{Hydraulics of Upstream Inlet control DownStream Inlet}$$

$$V_{min} = \left(\text{Dia} / 12 \text{ in} \right) + \left(TC - \text{Max Allow HGL In Structure} \right) + \frac{1.2V^2}{2g}$$

Orifice Equations:

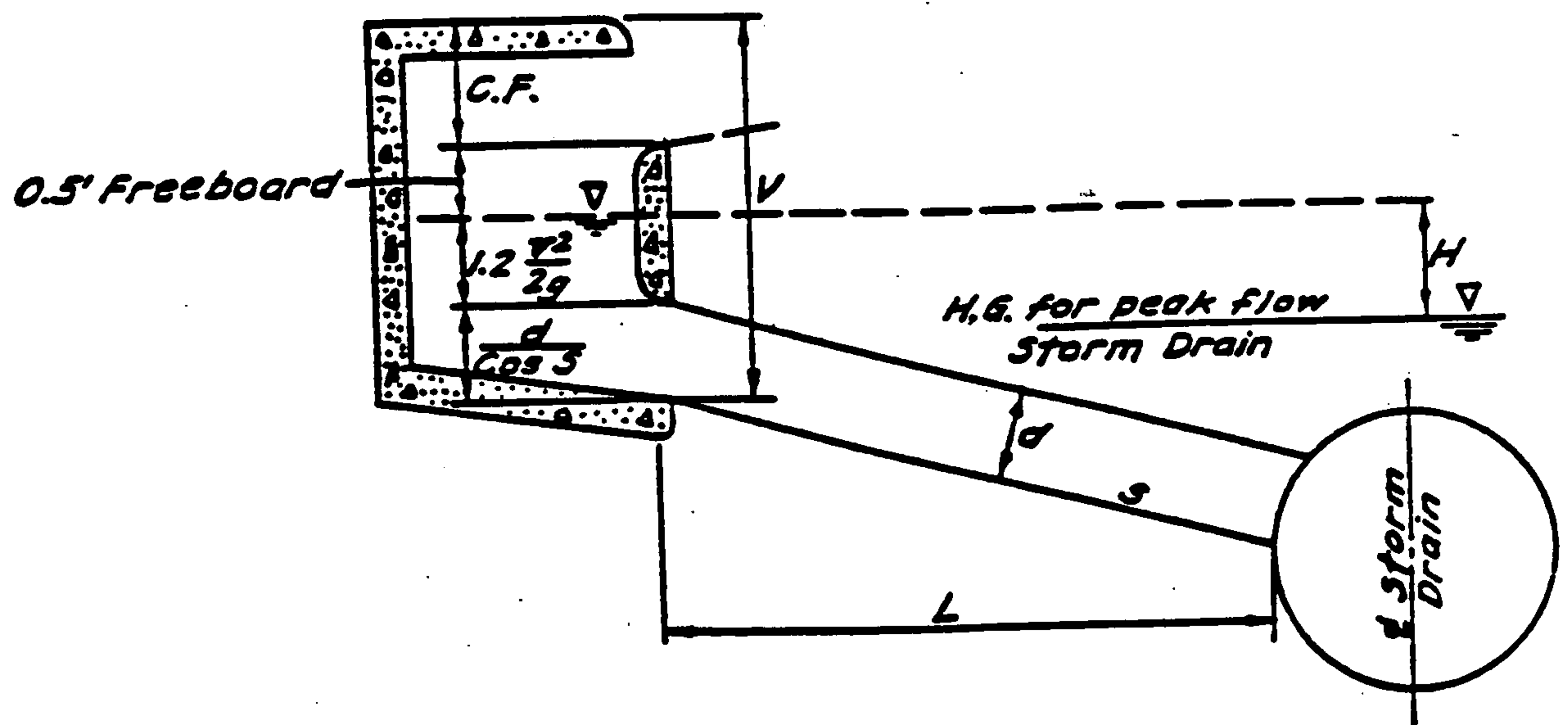
$$H_{req'd} \text{ (Based on Q)} = \frac{Q^2}{2g C^2 A^2} \text{ where } C = .6$$

(for OPM Diagrams)
(see next page)

$$V_{min} \text{ (based on H)} = H + \left(\text{Dia} / 12 \text{ in} \right)$$

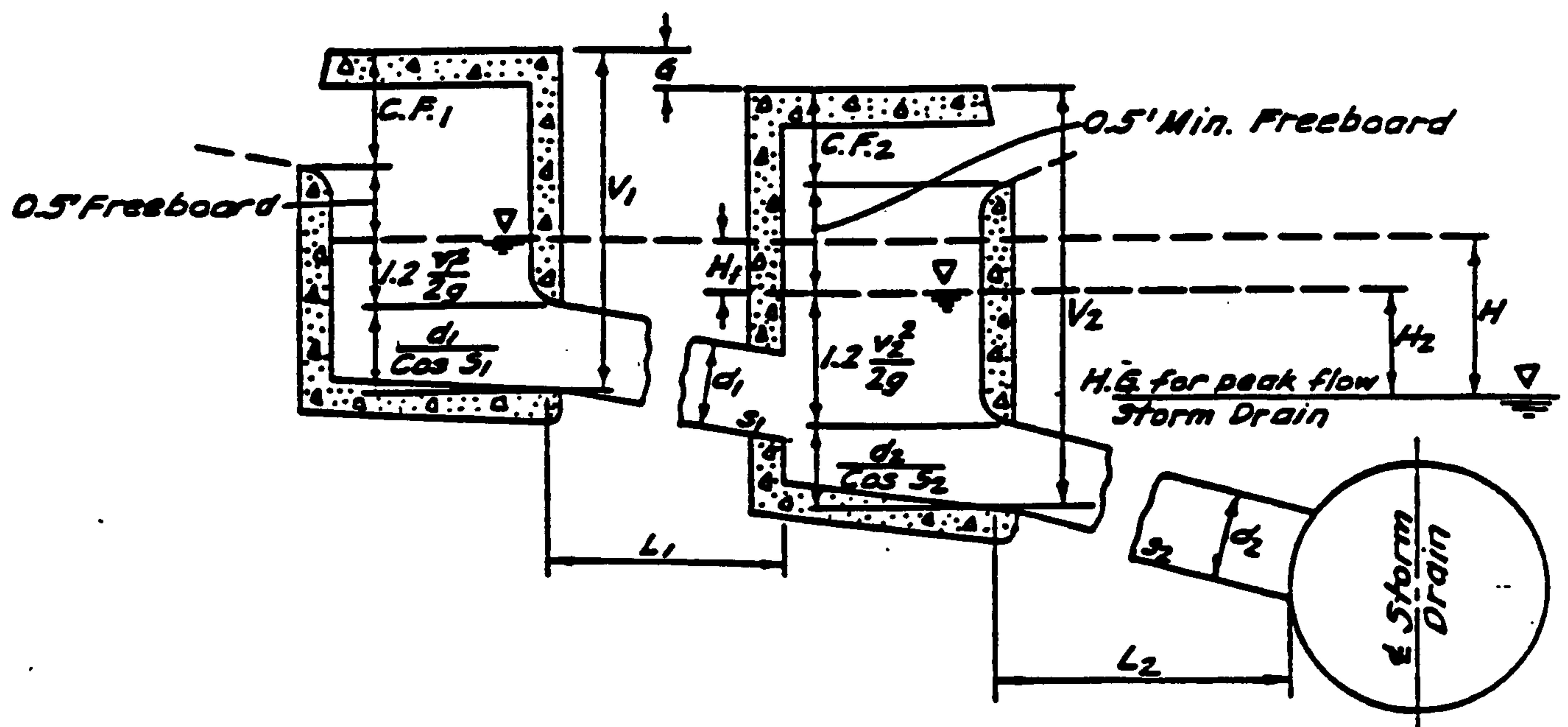
c. Connector Pipe and "V" Depth Calculation

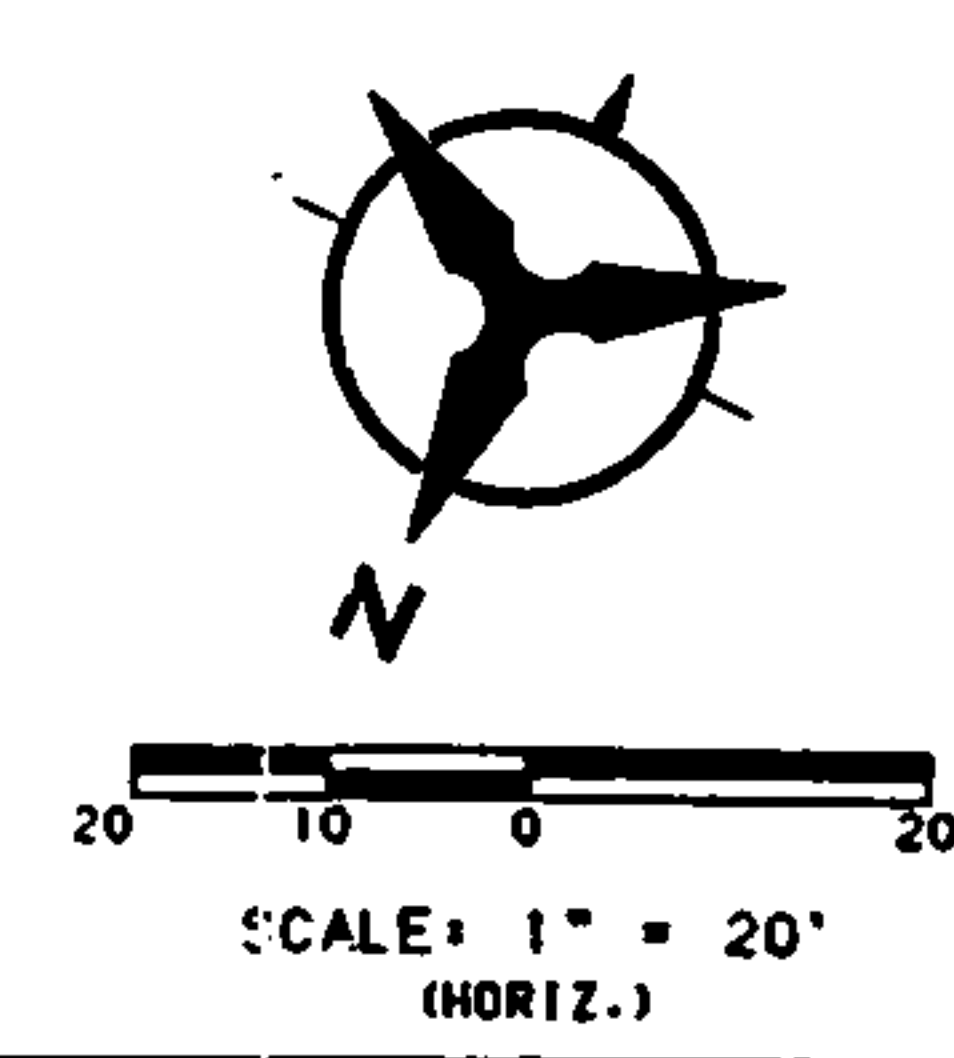
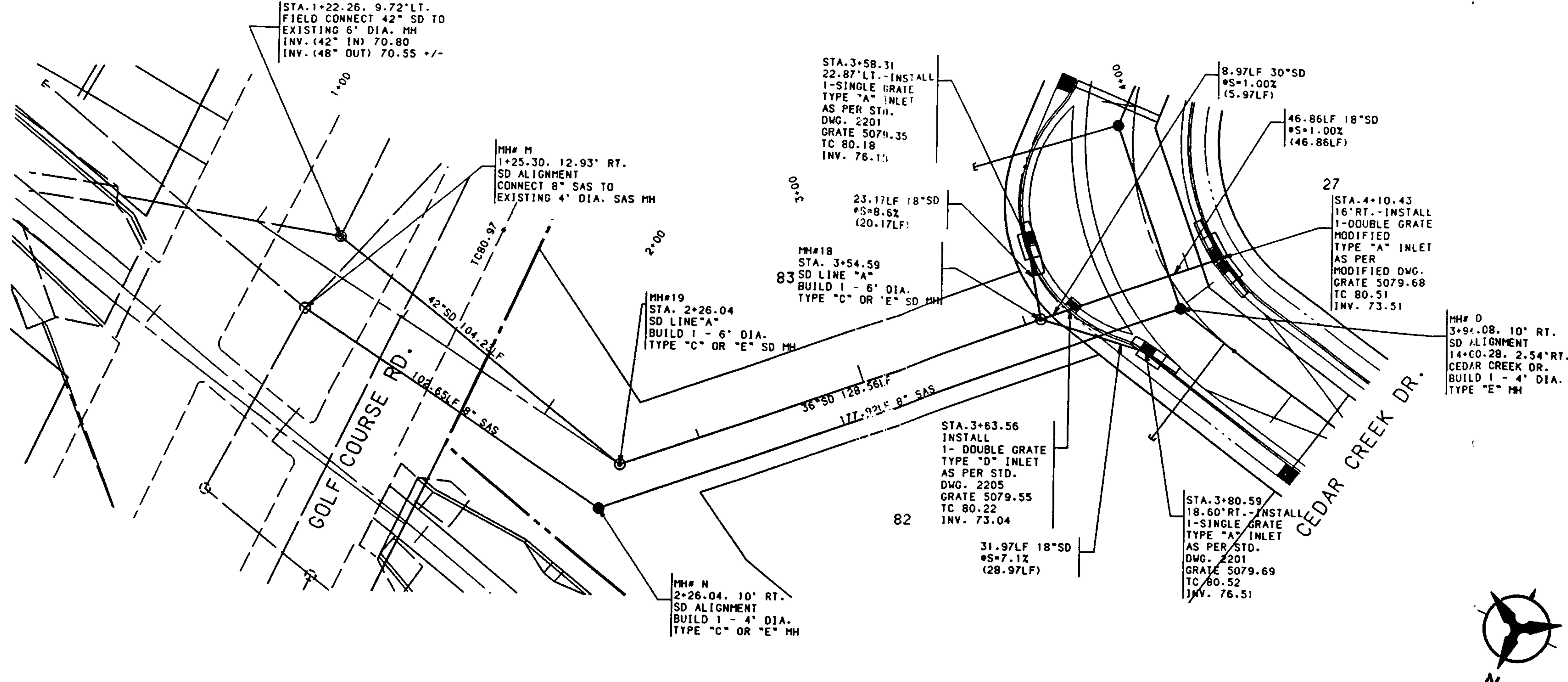
(1) Single Catch Basins



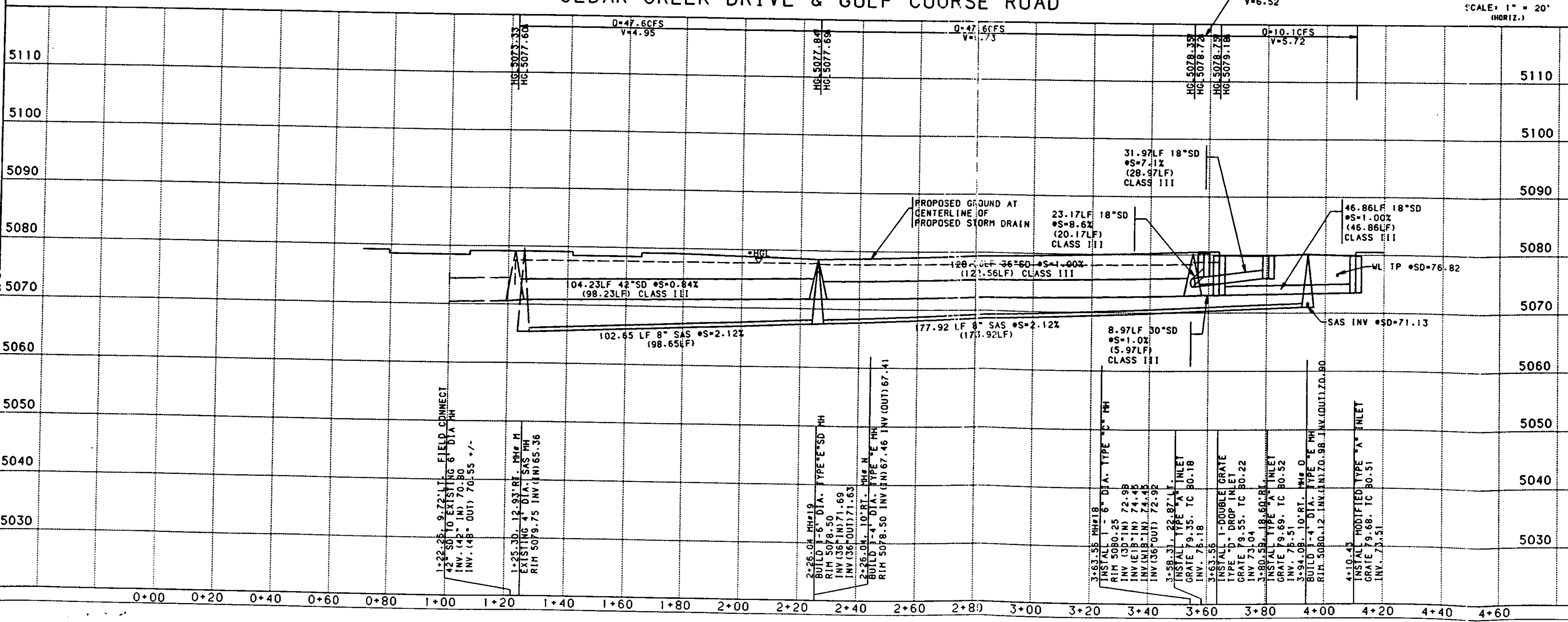
22.3

d. Catch Basins in Series





CEDAR CREEK DRIVE & GOLF COURSE ROAD



NOTES

- THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITY LOCATIONS AND NOTIFY THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
- ALL CURB RETURN RADIUS SHALL BE 25' TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
- ALL CURVE DATA AND DIMENSIONS REFER TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
- GRADE ELEVATIONS, WHERE NOTED, ARE FOR TOP OF STANDARD CURB UNLESS OTHERWISE SPECIFIED.
- CONTRACTOR IS TO INSTALL A 4"x4"x5' POST AND END AT THE END OF EACH SANITARY SEWER SERVICE.
- CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ALL UTILITY CONDUITS AND EXISTING LINES.
- ANY ADDITIONAL GRADING REQUIRED TO MATCH PROPOSED STREET GRADES SHALL BE INCIDENTAL TO PAVING ITEMS.
- CONTRACTOR SHALL PROVIDE THE INSPECTORS (CITY AND PRIVATE) WITH THE PROPOSED HYDROSTATIC TESTING PLAN. THE PLAN MUST BE APPROVED BEFORE TESTING OPERATIONS BEGIN.
- CONTRACTOR SHALL PARK EQUIPMENT AND VEHICLES AS NOT TO INTERFERE WITH NORMAL ACTIVITIES OF RESIDENTS OR OTHER CONTRACTORS ON SITE.
- ANY DAMAGE TO THE EXISTING FACILITIES (CURB AND GUTTER, PAVEMENT, CONDUITS, LANDSCAPING, UTILITY LINES, ETC.) DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
- REMOVAL OF THE EXISTING CURB AND GUTTER SHALL BE AS PER COA STD. DWG. 2465 (SAWCUT ONLY).
- WHEEL CHAIR RAMPS SHALL BE CONSTRUCTED PRIOR TO ACCEPTANCE OF CURB AND GUTTER.
- THE FOLLOWING PERSONS SHALL BE NOTIFIED AT LEAST TWO BUSINESS DAYS PRIOR TO INSTALLING UTILITY CONDUIT CROSSINGS:

AS-BUILT INFORMATION

CONTRACTOR	INSPECTOR'S	DATE	DATE	DATE	DATE

BENCH MARKS

THE BENCH MARK IS A 3 1/4" ALUMINUM CAP	SET FLUSH IN THE LAVA OUTCROP AND IS	STAMPED "ACS 1-C11 1986"	THE BENCH MARK IS LOCATED APPROX. 210' EAST AND 260' NORTH OF THE INTERSECTION OF RIDGEWAY DR. AND CALLE NORTENA, N.M.	ELEVATION = 5272.34'

SURVEY INFORMATION

NO.	BY	DATE

ENGINEER'S SEAL

COMPANY	PHONE	CONTACT
PNM	848-3374	TOM BACA
US WEST	245-6694	BECKY DLESEN
GAS CO.	761-7770	LED APODACA
JONES	761-6200	YVETTE SUAZO

REVISIONS

NO.	DATE	REMARKS	BY

DESIGN

DESIGNED BY	DATE
MJ. TH. KO	12/94

DATE

DATE
12/94

3/17/95
A3-59

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING

SHENANDOAH ESTATES SUBDIVISION
STORM DRAIN PLAN & PROFILE
CEDAR CREEK DR. & GOLF COURSE RD. CONNECTION

APPROVALS

ENGINEER	DATE	APPROVALS	ENGINEER	DATE

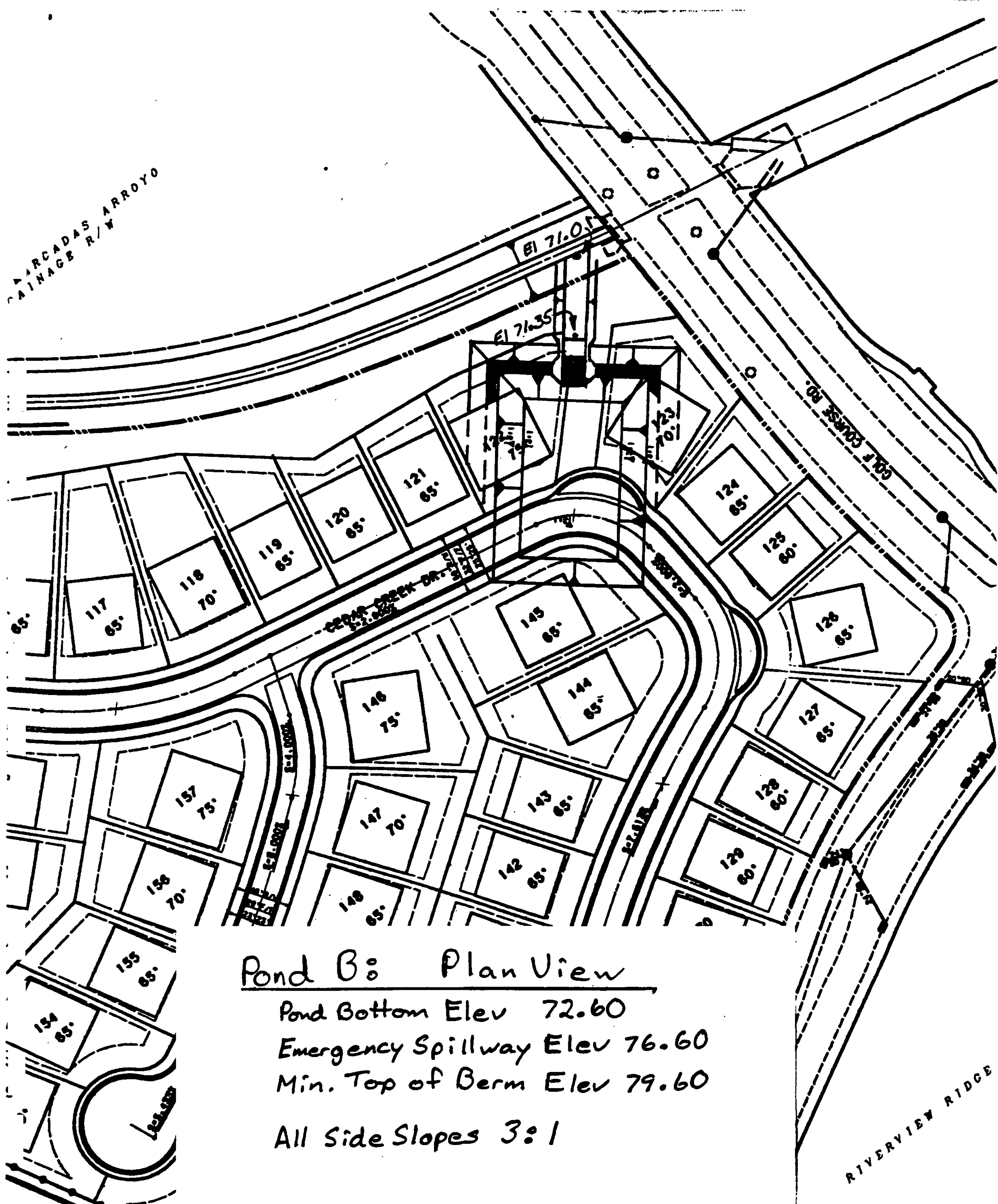
TRANSPORTATION

ENGINEER	DATE

HYDROLOGY

ENGINEER	DATE

ARCADAS ARROYO
DRAINAGE R/W



Pond B: Plan View

Pond Bottom Elev 72.60
Emergency Spillway Elev 76.60
Min. Top of Berm Elev 79.60
All Side Slopes 3:1

RIVERVIEW RIDGE