



May 6, 2015

Dennis Lorenz, PE
Lorenz Design and Consulting, Inc.
2501 Rio Grande Blvd. NW Suite A
Albuquerque, NM 87104

**RE: Bella Vista Assisted Living, 13101 Constitution Avenue NE
Grading Plan and Drainage Plan
Engineer's Stamp Date 4-15-2015 (File: J22-D067)**

Dear Mr. Lorenz:

Based upon the information provided in your submittal received 4-16-15, the above referenced Grading Plan cannot be approved for Building Permit until the following comments are addressed:

PO Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

- 1) On the Grading and Drainage Plan itself, label basins, show basin boundaries, and roof drain locations.
- 2) Basin B-2 appears to be much more than 36% impervious since the new building covers a large portion of Basin B-2 according to Basin Map. Check impervious areas for the basins.
- 3) On the Grading and Drainage Plan, show retention areas with additional proposed contours and/or spot elevations which correspond to Figure 7 of your drainage report. Typically, in areas where the first flush is being retained around inlets, the inlet grates are slightly raised above the proposed ground to create the retention areas. The established retention areas should correspond with the volumes computed in Figure 7.
- 4) On the Grading and Drainage Plan, label all storm drain slopes and flows that correspond to the Drainage Structure Inventory in the report. Label all storm drain inverts.
- 5) Keyed Notes 37 and 36 look are duplicated and look misplaced on the plan view along the east slope of the detention pond.

- 6) On the plan, one of the storm drains changes in size from 12" to 18", but this does not match the Drainage Structure Inventory. If it was meant to change the pipe size to 18", call the location out on plan or else change pipe size to show 12".

If you have any questions, you can contact me at 924-3924.

Sincerely,



Jeanne Wolfenbarger, P.E.
Senior Engineer, Planning Dept.
Development Review Services

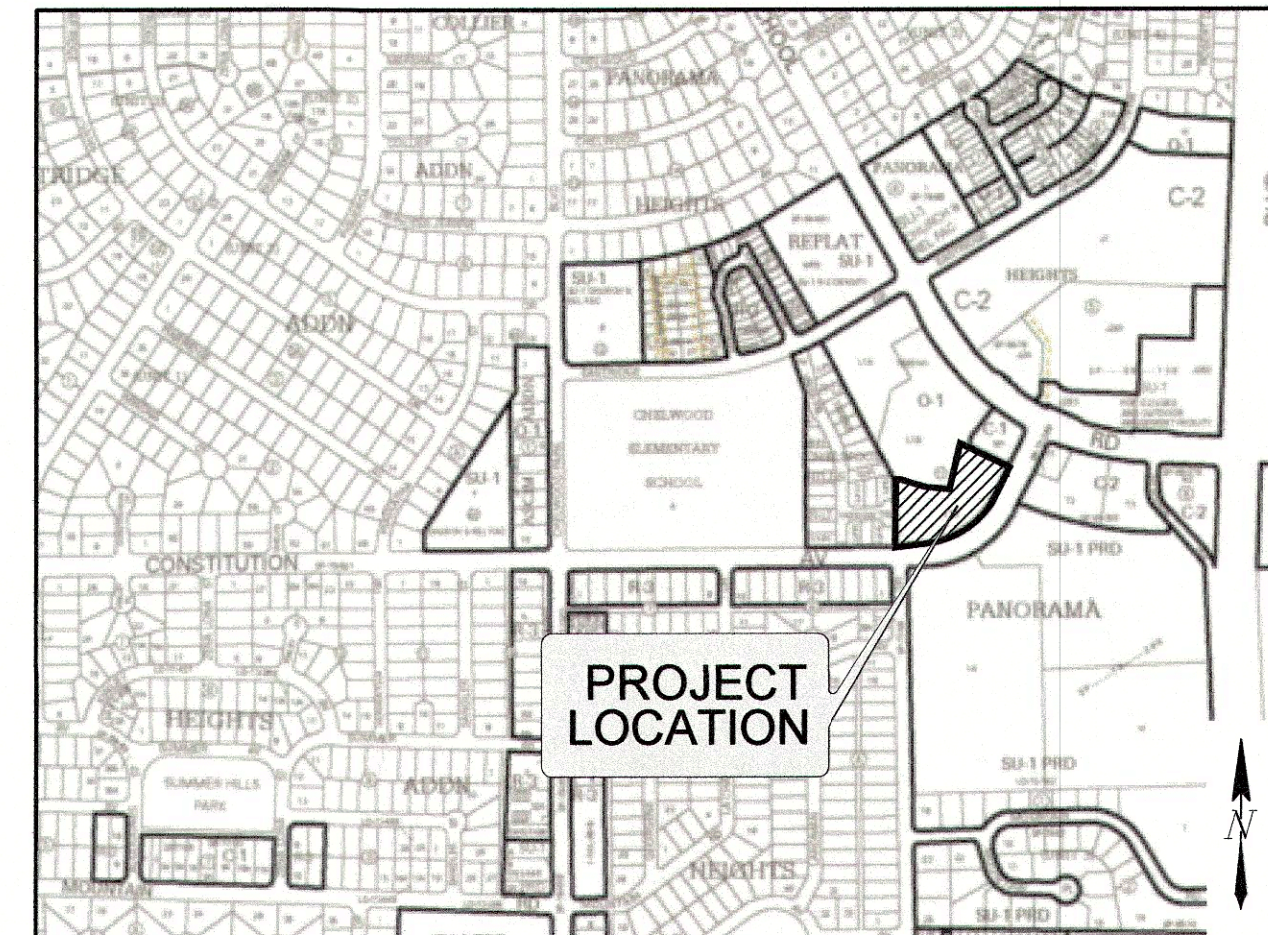
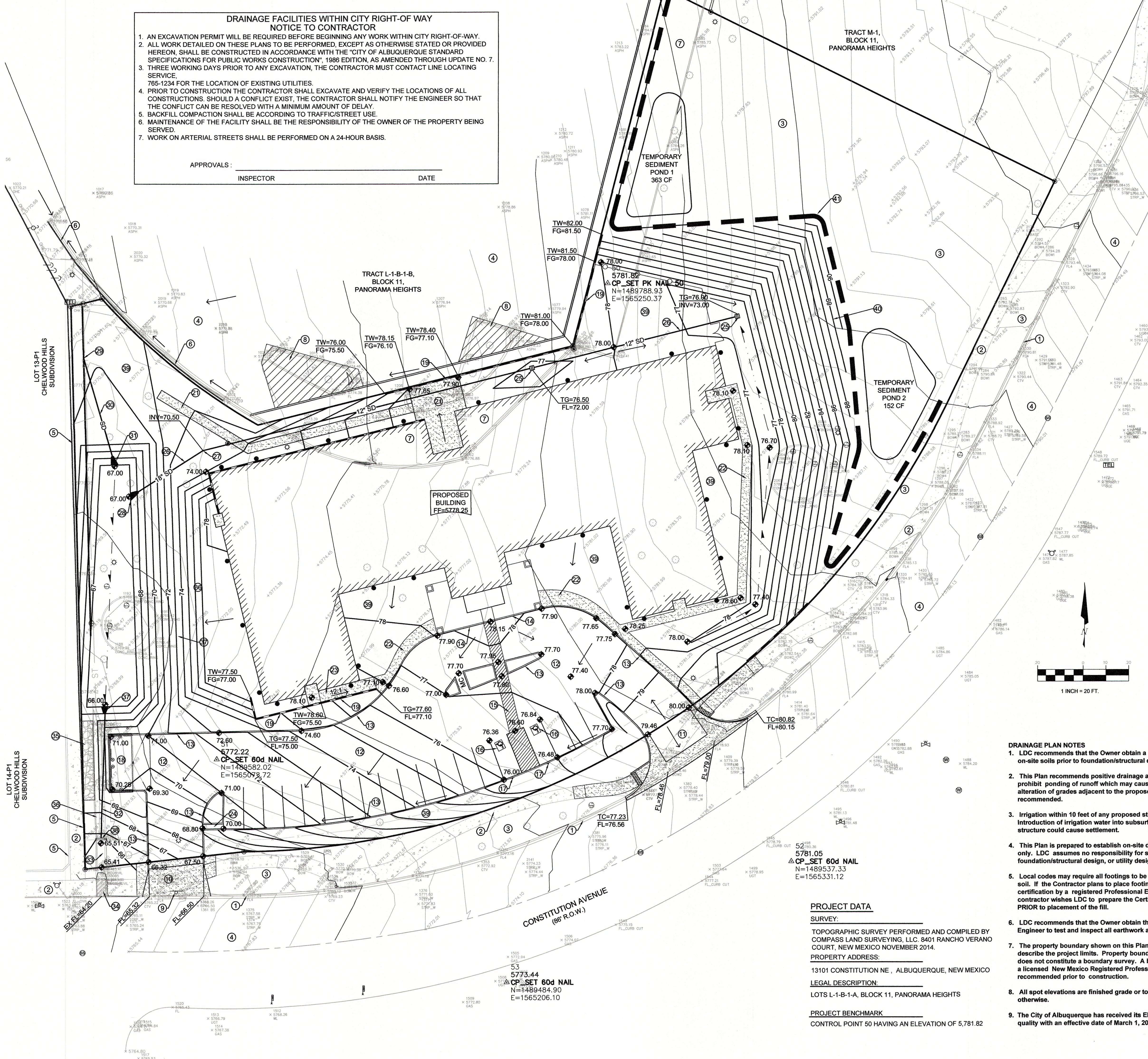
Orig: Drainage file
c.pdf Addressee via Email

DRAINAGE FACILITIES WITHIN CITY RIGHT-OF-WAY
NOTICE TO CONTRACTOR

1. AN EXCAVATION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK WITHIN CITY RIGHT-OF-WAY.
2. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED OR PROVIDED HEREON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE "CITY OF ALBUQUERQUE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION", 1986 EDITION, AS AMENDED THROUGH UPDATE NO. 7.
3. THREE WORKING DAYS PRIOR TO ANY EXCAVATION, THE CONTRACTOR MUST CONTACT LINE LOCATING SERVICE.
4. PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE LOCATIONS OF ALL CONSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
5. BACKFILL COMPACTION SHALL BE ACCORDING TO TRAFFIC/STREET USE.
6. MAINTENANCE OF THE FACILITY SHALL BE THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY BEING SERVED.
7. WORK ON ARTERIAL STREETS SHALL BE PERFORMED ON A 24-HOUR BASIS.

APPROVALS : _____
INSPECTOR _____ DATE _____

56



VICINITY MAP ZONE ATLAS J-22-Z

LEGEND

ITEM	EXISTING	PROPOSED
CURB AND GUTTER		
6" CONCRETE CURB		
CURB ELEVATIONS		
SPOT ELEV.		16.7
RIGHT OF WAY		
EASEMENT		
CENTERLINE		
RETAINING WALL		
TOP OF ASPHALT ELEV.	TA 16.2	TA 16.2
FLOWLINE ELEV	EX FL 16.2	FL 16.2
NEW PAVING		
DRAINAGE SWALE		
DIRECTION OF FLOW		
STORM INLET		
STORM DRAIN PIPE		
DOWNSPOUT		

KEYED NOTES

1. EXISTING CONCRETE STANDARD CURB AND GUTTER.
2. EXISTING PUBLIC SIDEWALK TO REMAIN.
3. EXISTING LANDSCAPING TO REMAIN.
4. EXISTING ASPHALT PAVEMENT TO REMAIN.
5. EXISTING BLOCK WALL TO REMAIN.
6. EXISTING RETAINING WALL TO REMAIN.
7. REMOVE AND DISPOSE EXISTING ASPHALT AND CURBING. SEE DEMOLITION PLAN.
8. REMOVE AND DISPOSE EXISTING ASPHALT AND CURBING TO LIMITS SHOWN. REPLACE WITH ASPHALT PAVEMENT PER SECTION A/C2.0.
9. RELOCATE EXISTING SPEED LIMIT SIGN PER COA TRAFFIC OPERATIONS.
10. REMOVE EXISTING CURB, GUTTER AND SIDEWALK, REPLACE WITH CONCRETE DRIVEPAD. SEE DETAIL A/C3.0.
11. REMOVE EXISTING CURB, GUTTER AND SIDEWALK, REPLACE WITH CONCRETE VALLEY GUTTER. SEE DETAIL B/C3.0.
12. CONSTRUCT ASPHALT PAVEMENT. SEE SECTION A/C-2.0.
13. CONSTRUCT 6-INCH CONCRETE CURB. SEE DETAIL C/C-2.0.
14. CONSTRUCT TURN DOWN SIDEWALK. NO CURB. TOP OF CONCRETE AT TOP OF PAVEMENT. SEE DETAIL B/C-2.0.
15. PROVIDE STRIPED PEDESTRIAN CROSSING PER CODE.
16. PROVIDE HANDICAP PARKING PAVEMENT MARKINGS PER CODE.
17. INSTALL HANDICAP SIGN ASSEMBLY PER CODE. SEE DETAIL F/C-2.0.
18. CONSTRUCT NEW REFUSE ENCLOSURE. SEE DETAIL G/C2.0.
19. CONSTRUCT RETAINING WALL. SEE DETAIL H/C2.0.
20. NOT USED.
21. CONSTRUCT CONCRETE FLATWORK. SEE SITE PLAN.
22. CONSTRUCT CONCRETE SIDEWALK. SEE SITE PLAN.
23. CONSTRUCT ACCESSIBLE RAMP AT 12:1 SLOPE MAX.
24. CONSTRUCT 36-INCH CONCRETE CHANNEL. SEE DETAIL E/C2.0.
25. CONSTRUCT TYPE 'D' INLET PER COA STD DWG 2206.
26. CONSTRUCT 18-INCH SD.
27. CONSTRUCT 18" X 30 DEGREE BEND.
28. INSTALL 18-INCH END SECTION.
29. CUT EXISTING 4-INCH SD. INSTALL 30 DEGREE BEND. REMOVE & DISPOSE SD PIPE DOWNSTREAM FROM CONNECTION.
30. CONSTRUCT 4-INCH SD.
31. INSTALL 4-INCH END SECTION.
32. REMOVE & DISPOSE EXISTING CONCRETE CHANNEL.
33. EXISTING 3.5' WIDE CHANNEL TO REMAIN.
34. EXISTING SIDEWALK CULVERTS TO REMAIN.
35. CONSTRUCT OVERFLOW SPILLWAY SEE DETAIL C/C-3.0.
36. CONSTRUCT 10 INCH SD.
37. INSTALL 10 INCH END SECTION.
38. CONSTRUCT CONCRETE HEADWALL SEE DETAIL E/C-3.0.
39. NEW LANDSCAPING. SEE LANDSCAPE PLAN.
40. CONSTRUCT 3:1 CUT SLOPE. PROVIDE LANDSCAPING/EROSION CONTROL. SEE LANDSCAPE PLAN.
41. PROVIDE EROSION CONTROL BERM OR SILT FENCE. SEE SWPPP.

DRAINAGE PLAN NOTES

1. LDC recommends that the Owner obtain a Geotechnical Evaluation of the on-site soils prior to foundation/structural design.
2. This Plan recommends positive drainage away from all structures to prohibit ponding of runoff which may cause structural settlement. Future alteration of grades adjacent to the proposed structures is not recommended.
3. Irrigation within 10 feet of any proposed structure is not recommended. Introduction of irrigation water into subsurface soils adjacent to the structure could cause settlement.
4. This Plan is prepared to establish on-site drainage and grading criteria only. LDC assumes no responsibility for subsurface analysis, foundation/structural design, or utility design.
5. Local codes may require all footings to be placed in natural undisturbed soil. If the Contractor plans to place footings on engineered fill, a certification by a registered Professional Engineer will be required. If the contractor wishes LDC to prepare the Certification, we must be notified PRIOR to placement of the fill.
6. LDC recommends that the Owner obtain the services of a Geotechnical Engineer to test and inspect all earthwork aspects of the project.
7. The property boundary shown on this Plan is given for information only to describe the project limits. Property boundary information shown hereon does not constitute a boundary survey. A boundary survey performed by a licensed New Mexico Registered Professional Surveyor is recommended prior to construction.
8. All spot elevations are finished grade or top of pavement, unless noted otherwise.
9. The City of Albuquerque has received its EPA MS4 Permit for stormwater quality with an effective date of March 1, 2012.

PROJECT DATA

SURVEY:

TOPOGRAPHIC SURVEY PERFORMED AND COMPILED BY COMPASS LAND SURVEYING, LLC. 8401 RANCHO VERANO COURT, NEW MEXICO NOVEMBER 2014.

PROPERTY ADDRESS:

13101 CONSTITUTION NE, ALBUQUERQUE, NEW MEXICO

LEGAL DESCRIPTION:

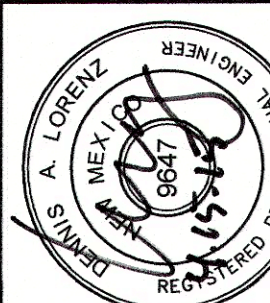
LOTS L-1-B-1-A, BLOCK 11, PANORAMA HEIGHTS

PROJECT BENCHMARK

CONTROL POINT 50 HAVING AN ELEVATION OF 5,781.82

BELLA VISTA ASSISTED LIVING
GRADING AND DRAINAGE PLAN
ALBUQUERQUE, NM
PROJECT #14-017

REVISION DATE

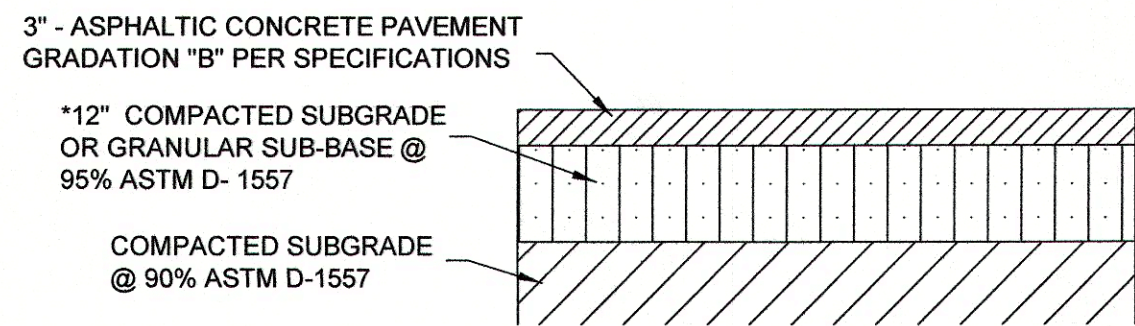


DATE
04/15/2015

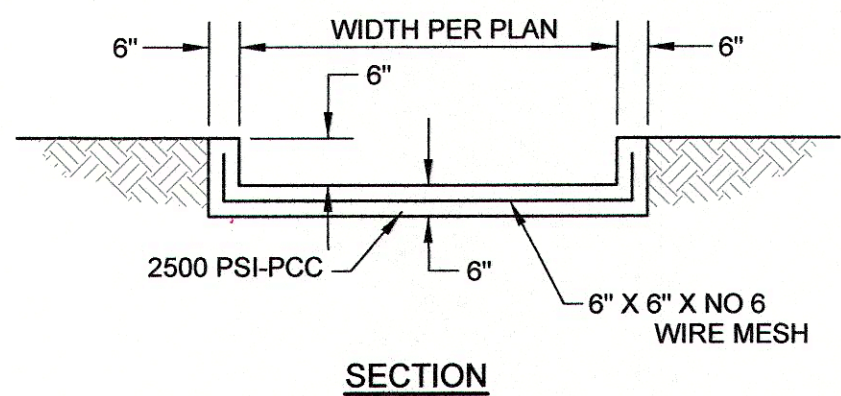
SHEET NUMBER

C-1.0

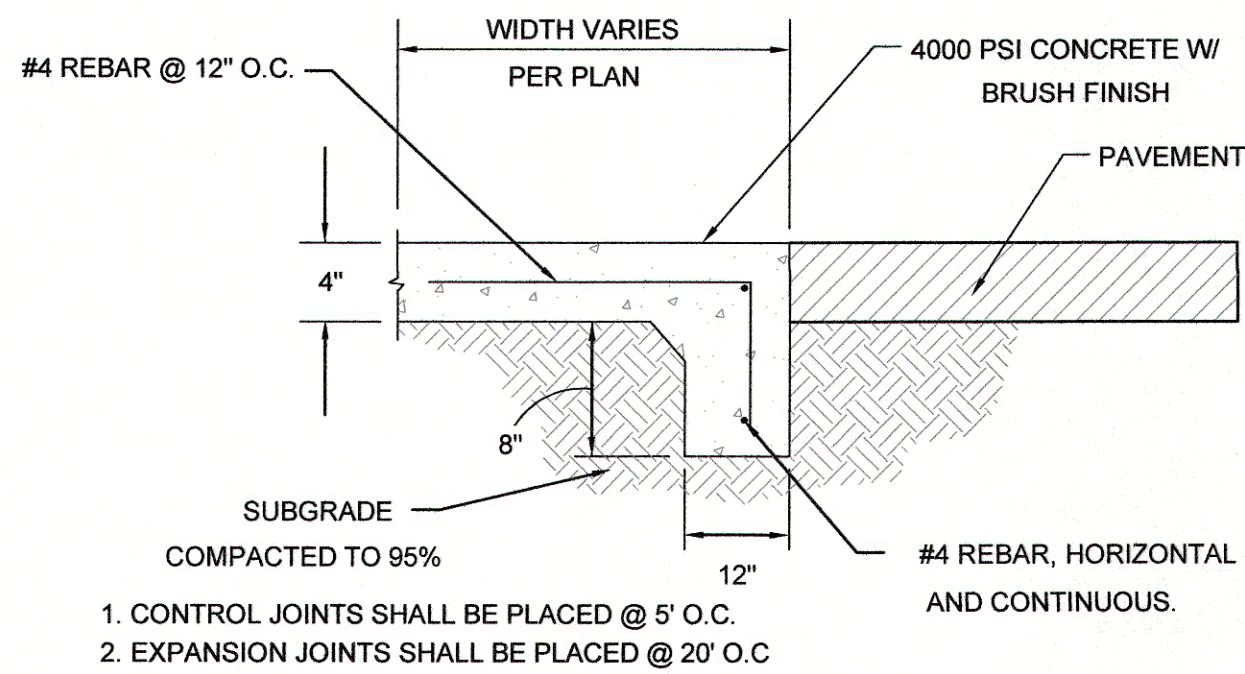
LORENZ
DESIGN & CONSULTING, LLC
Civil Engineering | Construction Management
2501 Rio Grande Blvd NW Suite A Albuquerque, New Mexico 87104
Ph: 505-884-8900 Fax: 505-245-4665



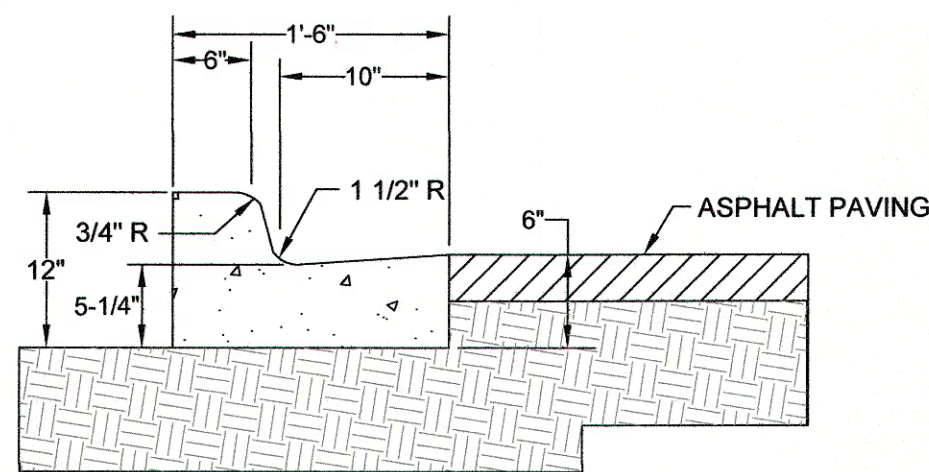
ASPHALT PAVEMENT SECTION A
AUTO/PICKUP TRUCK
NTS
C-2.0



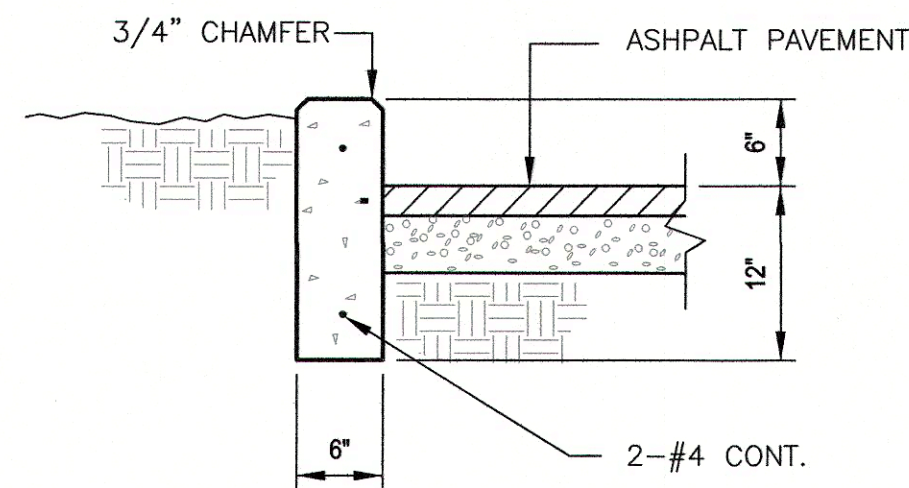
CONCRETE DRAINAGE CHANNEL DETAIL E
NTS
C-2.0



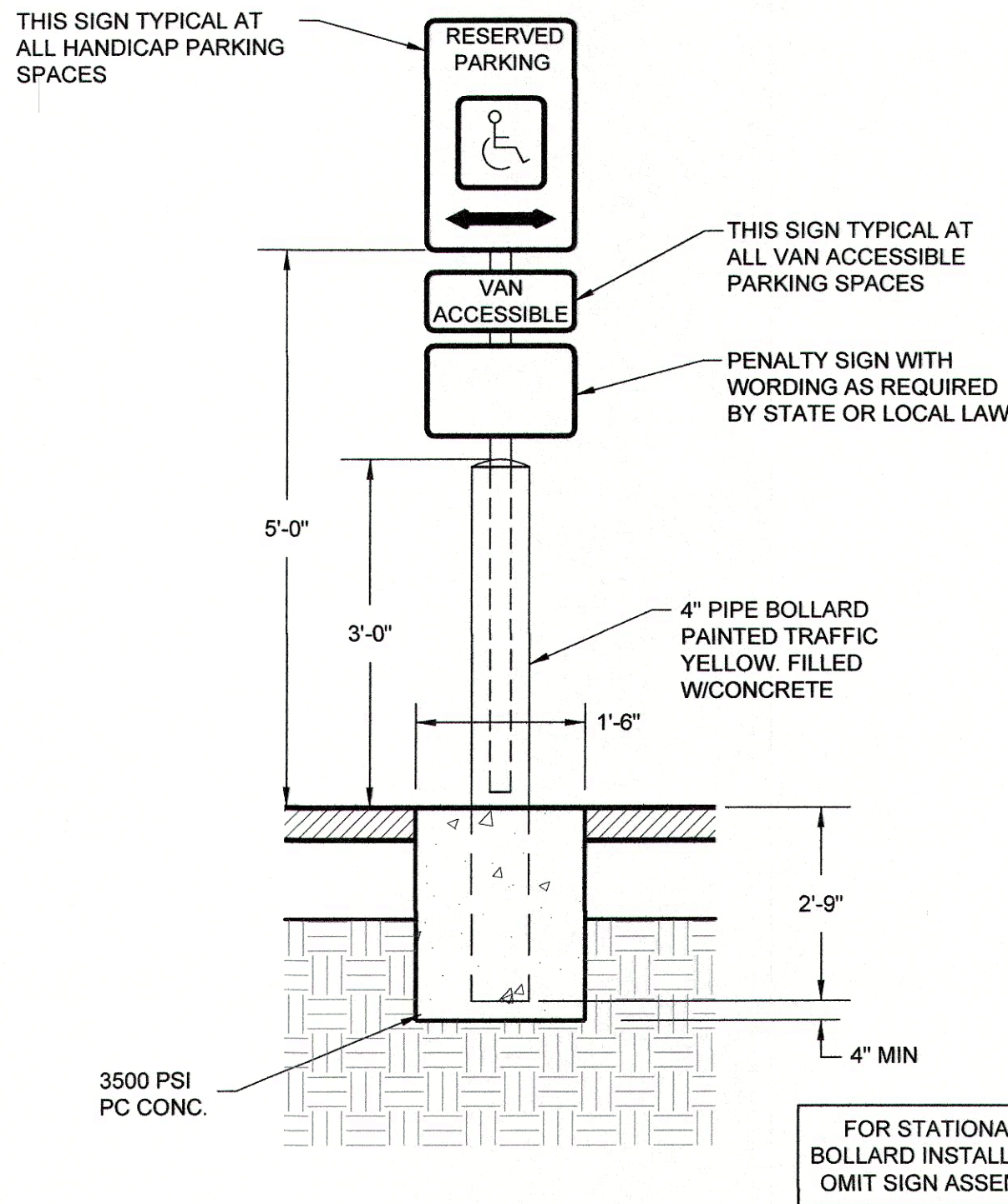
TURN DOWN SIDEWALK AT ACCESSIBLE ZONES B
NTS
C-2.0



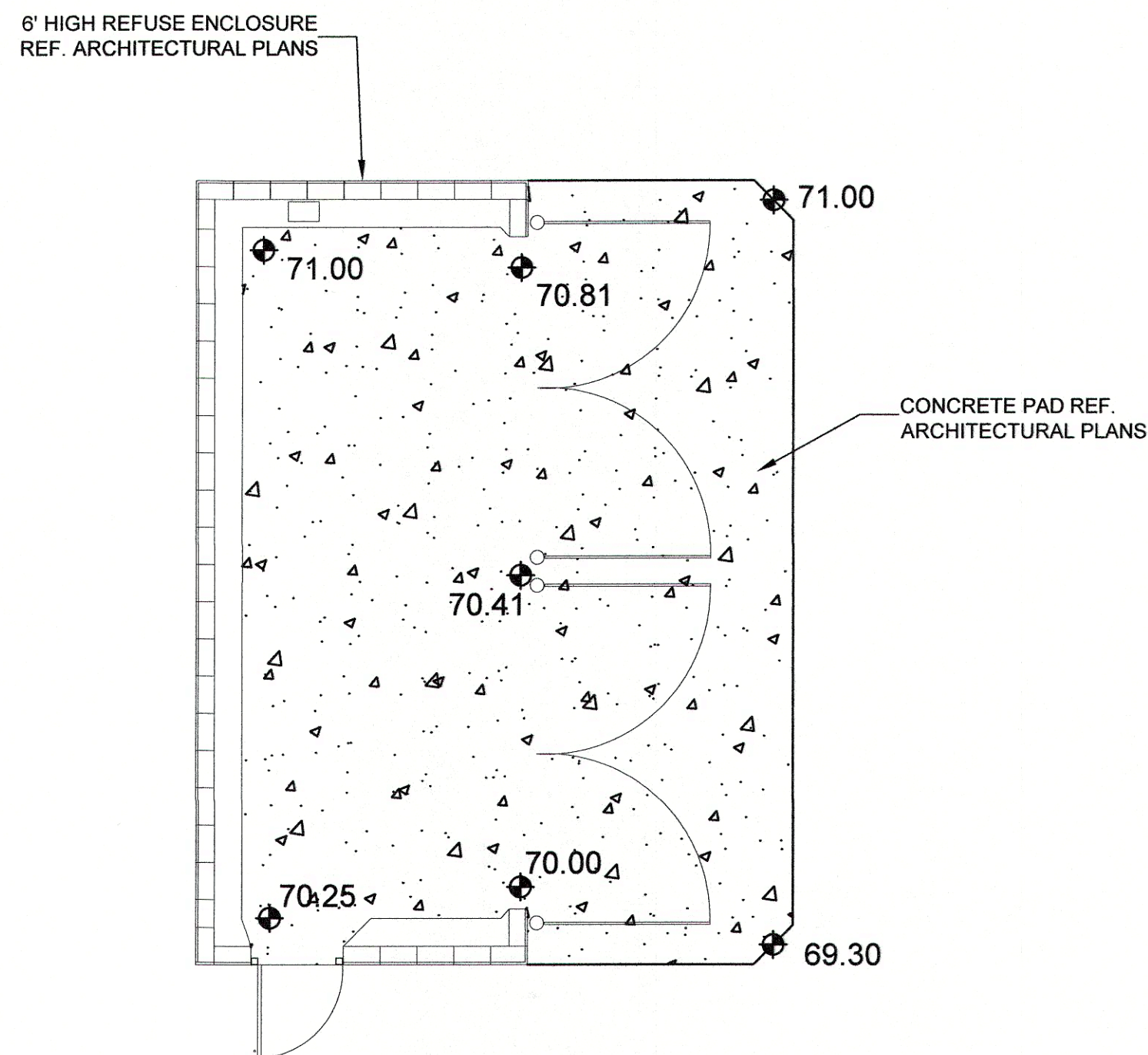
CONCRETE CURB AND GUTTER C
NTS
C-2.0



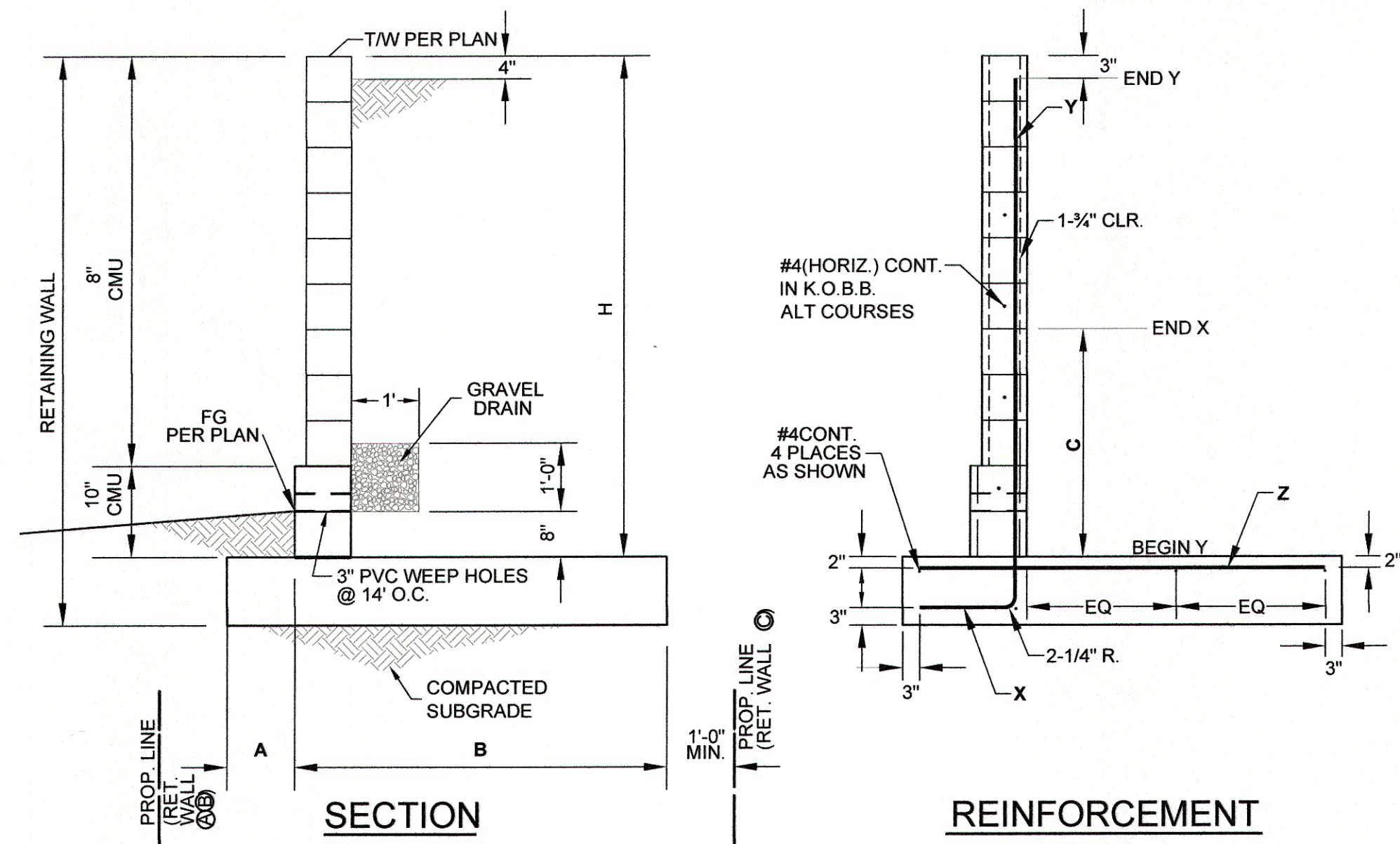
HEADER CURB DETAIL D
NTS
C-2.0



HC SIGN ASSEMBLY / BOLLARD DETAIL F
NTS
C-2.0



REFUSE ENCLOSURE SLAB PLAN G
NTS
C-2.0

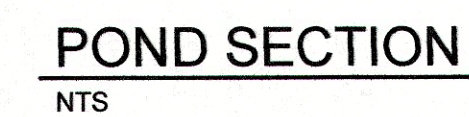
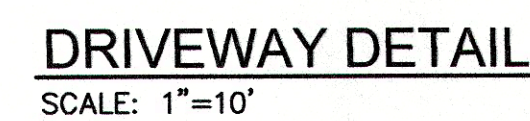


H	A	B	C	10" CMU	8" CMU	X	Y	Z
4'-8"	1'-0"	2'-8"	1'-4"	-	7 CRSES	#5@16"	#4@16"	#4@16"
4'-0"	1'-0"	2'-0"	1'-4"	-	6 CRSES	#4@16"	#4@16"	#4@16"
3'-4"	1'-0"	1'-8"	3'-0"	-	5 CRSES	#4@16"	-	-
2'-8"	1'-0"	1'-8"	2'-4"	-	4 CRSES	#4@16"	-	-
2'-0"	1'-0"	1'-8"	1'-8"	-	3 CRSES	#4@16"	-	-

- RETAINING WALL NOTES:
1. All cells shall be completely filled with concrete.
 2. All wall sections are designed based on special inspection per UBC.
 3. Contractor shall submit to Owner results of masonry test prisms built and tested per UBC STD 24-26, UBC SEC 2405.
 4. Footing subgrade and base shall be compacted to 95% modified proctor per ASTM D-1557.
 5. 1/2" felt expansion joints shall be installed at 30 feet on center and at section changes.
 6. All masonry shall be laid in running bond only.
 7. All masonry surfaces to be backfilled shall be coated with emulsified asphalt, or other moisture barrier as approved by the Engineer.
 8. All reinforced concrete and CMU walls are designed per the following:

f'_c =4000 psi; maximum aggregate size = 3/4"
 f_y =60,000 psi (ASTM A-615 GR 60)
 f_m =1500 psi
 Unit weight of backfill = 110 pcf
 Concrete/soil coeff of friction = 0.30
 Allowable soil bearing pressure = 1500 psf
 Acting pressure = 44 psf/ft
 Slope active pressure = 44 psf/ft
 Passive pressure = 360 psf/ft

CMU RETAINING WALL DETAIL H
NTS
C-2.0



DRAINAGE REPORT FOR BELLA VISTA ASSISTED LIVING

13101 Constitution Avenue NE
Albuquerque, New Mexico 87112

Prepared For:

Construct Southwest
333 Rio Rancho Blvd NE
RIO Rancho, New Mexico 87124

Prepared by:



April 2015



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PURPOSE AND SCOPE

This project involves the development of the subject property for Bella Vista Assisted Living. The project proposes site improvements to support the development, including access, grading, drainage and utility improvements.

The purpose of this report is to outline the criteria for development of the site and demonstrate that this project will not negatively impact the project site, or upstream and downstream properties. This report is prepared and submitted in support of a pending building permit application.

The scope of this report is to provide analysis of the existing and improved conditions utilizing state of the art technological storm drainage modeling tools, thereby demonstrating the before and after behavior of the project site during rainfall events. It will be demonstrated that this project will be developed in accordance with the City of Albuquerque, Development Process Manual, Volume 2, the City of Albuquerque Drainage Ordinance, and the approved drainage master plan for the watershed.

EXISTING CONDITIONS

The project site is located at 13101 Constitution Avenue NE, just southwest from Indian School Road NE (see Figure 1).

The 1.96-acre project site is undeveloped, but has served as a landscaped open space area for several decades. The site is bounded north by developed commercial property, a private playground on the east, Constitution Avenue NE on the south, and developed residential properties on the west.

The site is landscaped with trees, shrubs and grasses. Public gathering areas and seating is provided throughout the site. Site topography slopes at roughly 5% from east to west.

The site is impacted by two off-site drainage areas (See Figure 3). Basin OS.1 is a portion of an existing private playground that drain through the east boundary of the site. Basin OS.2 is a portion of an office/institutional development. An existing detention pond within Basin OS.s drains through the site by a 4-inch drain line that discharges to an existing concrete channel, then on to Constitution Avenue at the southwest corner of the site.

The site is divided into two basins. Basin A drains northwest to Basin OS.2. Basin B drains southwest to Constitution. All runoff from the site and contributing off-site basins drains overland within Constitution to an existing public storm drain system at Chelwood Park NE.

As shown by FIRM Panel 35001C0357H (Figure 2), this property is not located within a mapped 100 year floodplain.

DRAINAGE MASTERPLANS

The ***Panorama Heights Drainage Plan***, prepared by ABQ Engineering, Inc, dated June 25, 2007, supported subdivision of the property. The Plan recommends that discharge from the site be limited to existing conditions. The Drainage Master Plan is provided in the Appendix for review.

PROPOSED CONDITIONS

As shown by the Grading and Drainage Plan (see back pocket), the property is to be developed by constructing an assisted living facility with associated site improvements. Grading, drainage, utility, access and landscaping improvements will be provided to support the development.

In accordance with the Drainage Master Plan, discharge from the site will be limited to existing conditions, 8.35 cfs.

As shown by the Proposed Drainage Basins Map, Figure 4, the developed site is divided into 7 drainage basins, and is impacted by 2 off-site basins. Each drainage basin is described below:

Basin A.1 will remain undeveloped pending future development. Undeveloped runoff from Basins A.1 and OS.1 will be managed by silt fencing and erosion control berms directing runoff to a temporary sedimentation pond at AP-11.

Basin A.2 will remain undeveloped pending future development. Undeveloped runoff will be managed by silt fencing and erosion control berms directing runoff to a temporary sedimentation pond at AP-12.

Basins B.1, B.2 and B.3 drain around the north side of the building to a 12' storm drain that outfalls at the on-site detention pond.

Basins C.1 and C.2 free discharge to Constitution.

Basin OS.1 is a portion of an existing private playground entering the site on the east. This basin combines with Basin A.1 and is managed by a temporary sedimentation pond at AP-11.

Basin OS.2 is a developed office/institutional basin managed by an existing detention pond. The pond drains to the on-site detention pond by a 4" storm drain.

In summary, Basins A.1 and A.2 are undeveloped basins managed by temporary sedimentation ponds. Future development will be limited to existing conditions.

Basins B.1, B.2 and B.3 are managed by an on-site detention pond. As shown by the AHYMO output files and the Pond Routing Calculations, the detention pond discharges at a maximum rate of 3.39 cfs thru 2-16.5-inch sidewalk culverts. Basins C.1 and C.2 free discharge to Constitution as described above at a combine rate of 3.07 cfs. The total combined developed discharge from the project site to Constitution Avenue is 6.46 cfs, which is below the existing rate of 8.35 cfs.

90th Percentile Storm

In accordance with the City of Albuquerque Drainage Ordinance, effective May 12, 2014, all new development projects are required to manage the runoff which occurs during the 90th percentile storm event. In order to comply with this criteria, where practical, all surface drainage shall be routed through landscaped areas before release into downstream drainage facilities. Calculations are provided in the Appendix demonstrating compliance with the ordinance.

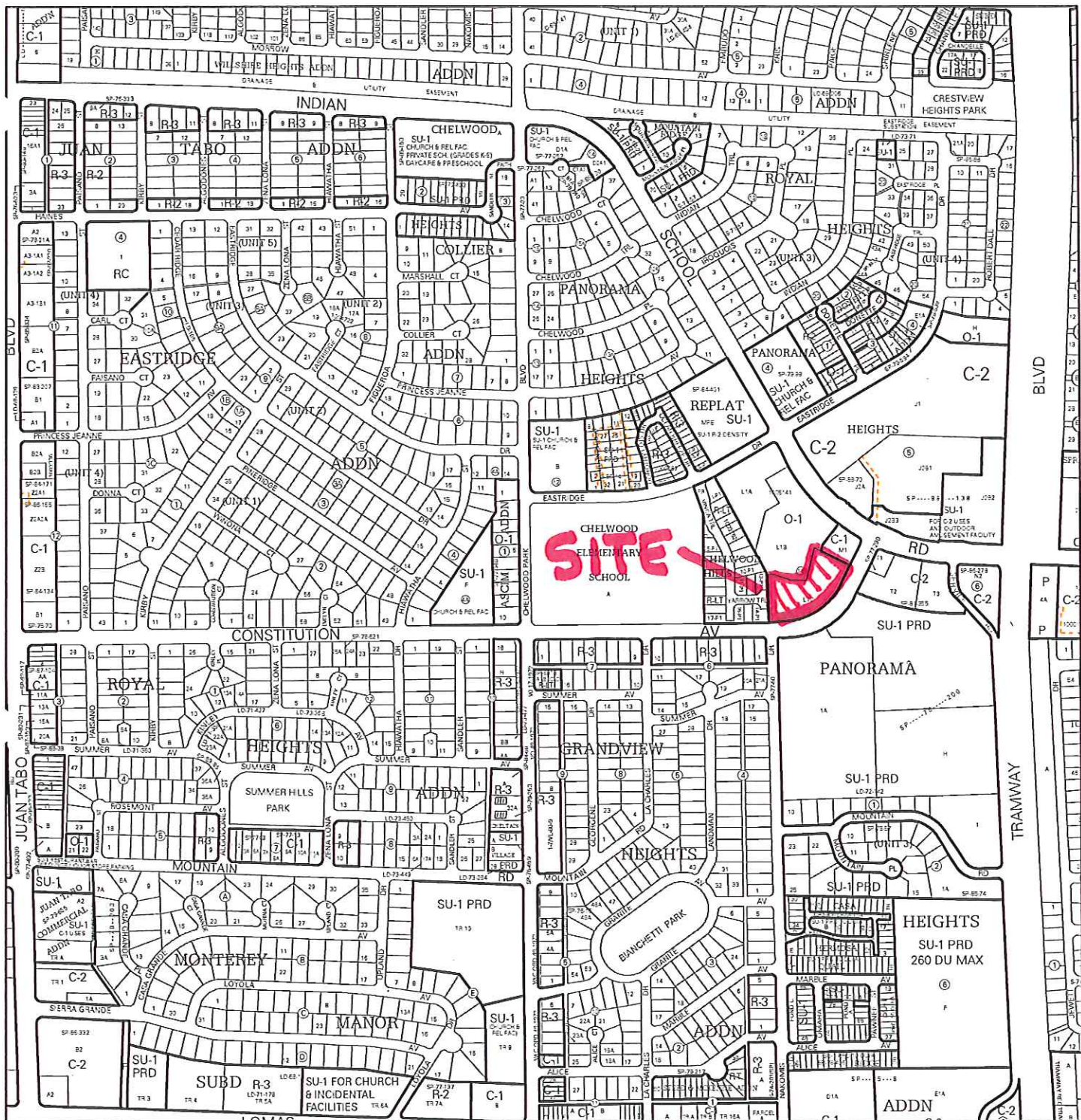
CALCULATIONS

Hydrology

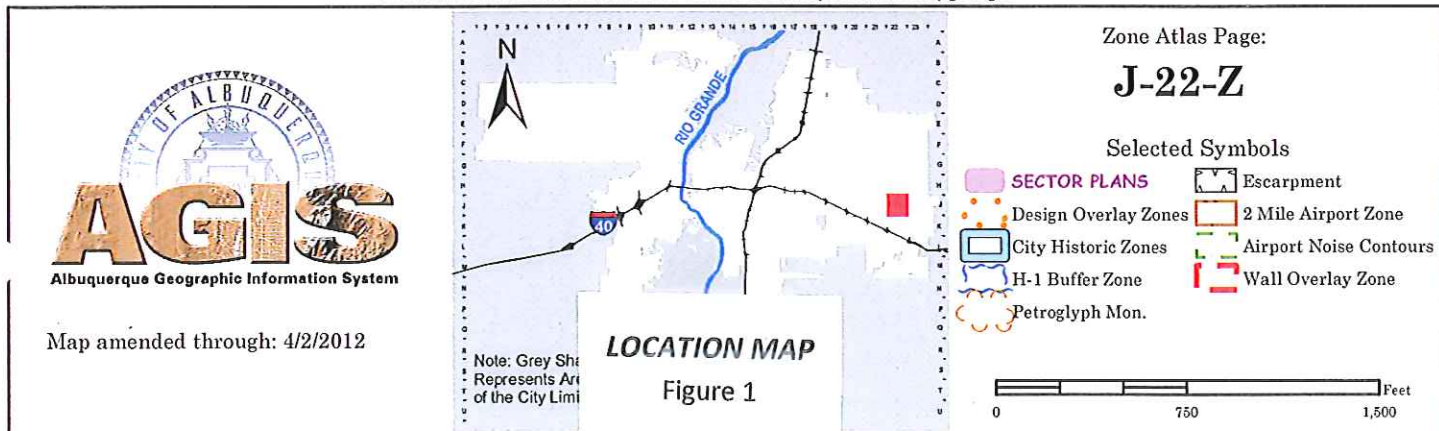
The calculations contained herein define the 100-year/6-hour rainfall event falling within the project site and contributing off-site areas under existing and developed conditions. The hydrology is per the City of Albuquerque, Development Process Manual, Chapter 22, Volume 2, 1997 Revision. The AHYMO 97 model is used to determine peak runoff. The calculations are presented to demonstrate the capacity and function of all proposed storm drainage improvements.

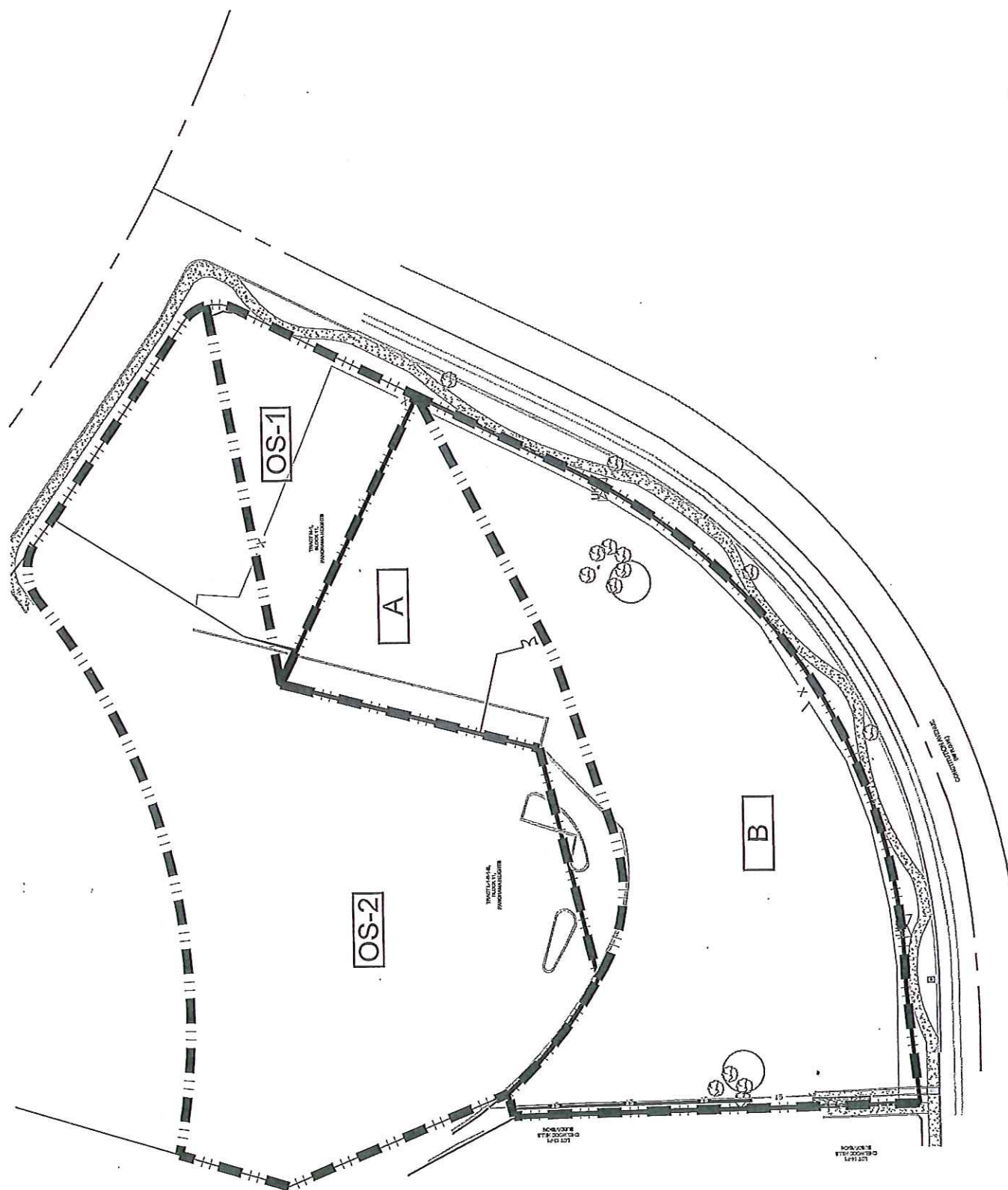
APPENDIX

MAPS

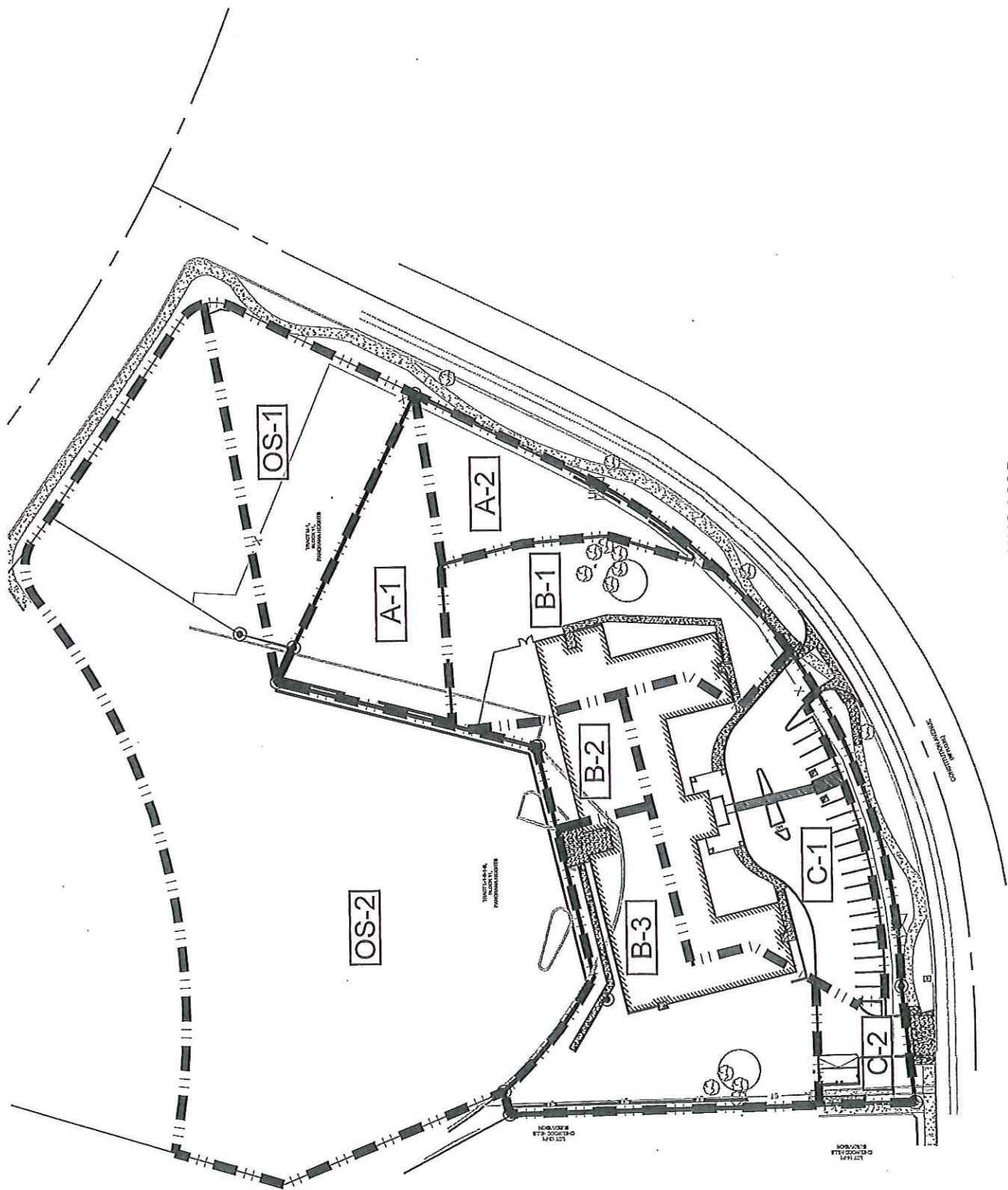


For more current information and details visit: <http://www.cabq.gov/gis>





EXISTING DRAINAGE BASINS MAP



PROPOSED DRAINAGE BASINS MAP

Figure 4



STORM DRAINAGE FACILITIES MAP

Figure 5

CALCULATIONS

PROJECT HYDROLOGY

BELLA VISTA ASSISTED LIVING
HYDROLOGY SUMMARY

	AREA	AREA	LAND TREATMENT AREAS (Percent)				Q 100	VOL 100
	acres	sq. mi.	A	B	C	D	cfs	ac-ft
EX.SITE	1.96	0.00306	0	96	0	4	6.48	0.202
A	0.52	0.00081	0	96	0	4	1.74	0.054
B	1.44	0.00225	0	96	0	4	4.76	0.148
DEV.SITE	1.96	0.00306	0	39	18	42	8.35	0.301
A.1	0.23	0.00036	0	100	0	0	0.75	0.023
A.2	0.17	0.00027	0	100	0	0	0.56	0.017
B.1	0.40	0.00063	0	32	32	36	1.70	0.059
B.2	0.10	0.00016	0	32	32	36	0.44	0.015
B.3	0.46	0.00072	0	32	32	36	1.96	0.068
C.1	0.47	0.00073	0	9	9	82	2.39	0.094
C.2	0.13	0.00020	0	9	9	82	0.68	0.026
OFF-SITE								
OS-1	0.28	0.00044	0	96	0	4	0.94	0.029
OS-2	2.18	0.00341	0	13	14	73	10.68	0.415

PONDING CRITERIA

SITE PONDING CRITERIA

I. FIRST FLUSH

By ordinance the site is required to retain the 90th percentile rainfall depth. In order to comply with this criteria, where practical, all surface areas will be routed through landscaped areas before release to downstream public drainage facilities. The proposed plan is only 42% impervious. Nearly all runoff will be routed through landscaping before discharging from the site. A portion of the site is to remain undeveloped and will be managed by temporary sedimentation ponds until future development. The areas identified on the attached exhibit will be constructed 3" below adjacent paved surfaces. Storage in excess of the 90th percentile rainfall will be provided as illustrated below.

90 th percentile depth	0.44"
Less initial abstraction	0.10"

Total retained depth	0.34"

$$\text{Ponding requirement} = A_d(0.34'') = 0.84 \text{ ac}(43,560 \text{ sf/ac})(0.34''/12''/\text{ft}) = 1,037 \text{ cf}$$

First Flush storage provided:

Area 1	446 cf
Area 2	420 cf
Area 3	1,060 cf
Area 4	250 cf
Area 5	250 cf

Total	2,426 cf

II. DETENTION POND CRITERIA

The DMP for this site recommended on-site detention ponding to limit discharge from the developed site to existing conditions. As determined by Ahymo, the existing conditions discharge from the site is 8.35 cfs.

Basins A.1 and A.2 will remain undeveloped. Temporary sedimentation ponds will be provided sized to retain the 2 year, 6 hour volume. See Drainage Structure Capacities, page 6 for volume calculations.

On-site Basin "B" and off-site Basin OS.2 will drain to an on-site detention Pond. Basin "B" will drain to the pond by yard swales and a 12" storm drain. Basin OS.2 will drain to the pond by an existing 4" storm drain that drains an existing off-site detention pond.

The proposed detention pond capacity is summarized below:

ON-SITE DETENTION POND

ELEVATION feet	Q OUT cfs	AREA sf	VOLUME acre feet
5766.00	0.00	0	0.0000
5767.00	2.00	1785	0.0205
5768.00	3.30	2553	0.0703
5769.00	4.22	3422	0.1391

As illustrated by the AHYMO Output file, the discharge from the Pond is calculated at 3.39 cfs, with a maximum water surface elevation of 5768.10 feet.

Basins "C.1" and "C.2" will free discharge a total of 3.07 cfs thru the west driveway.

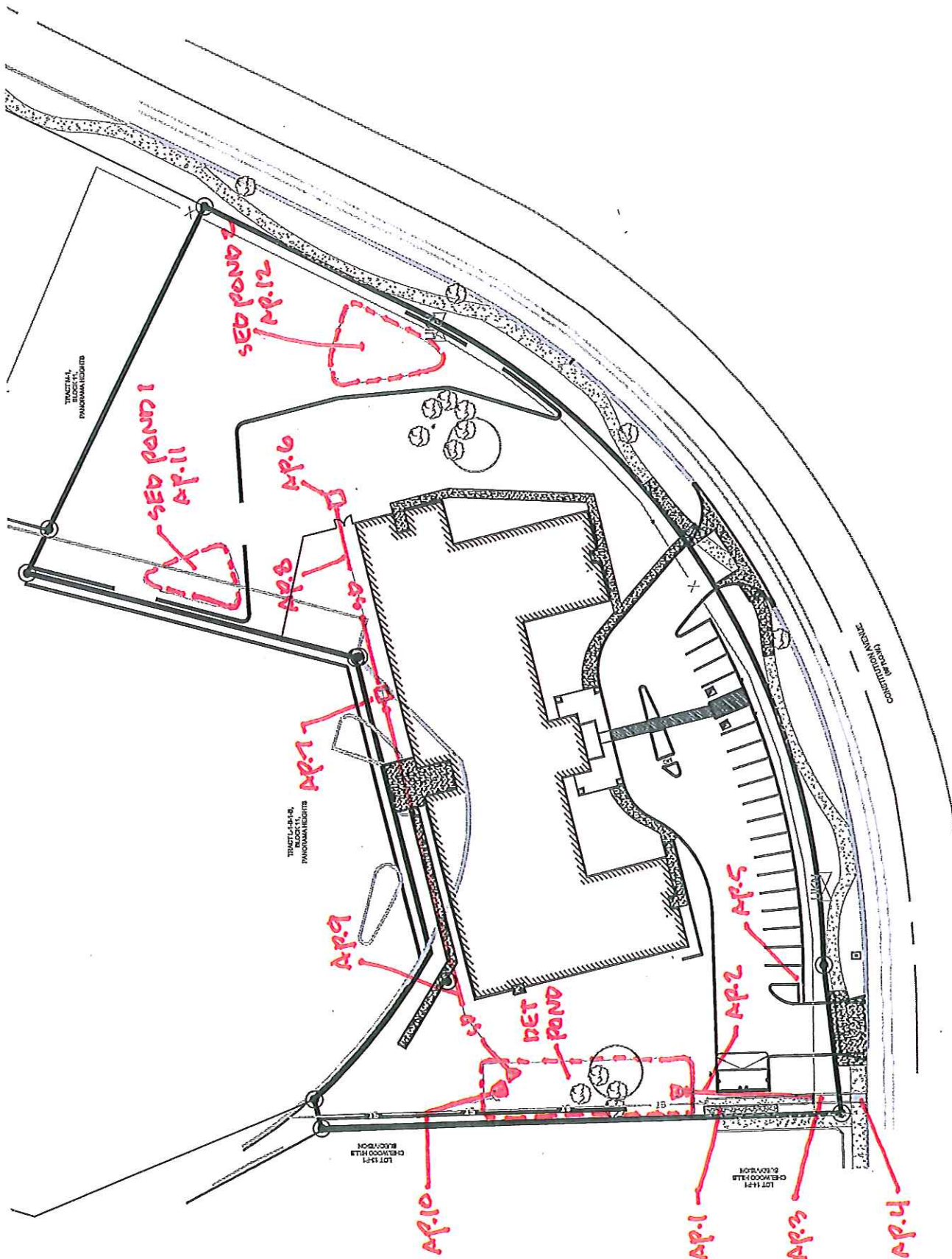
The total developed discharge from the project site is as follows:

On-site Detention Pond	3.39 cfs
Basins "C.1" and "C.2"	3.07 cfs
Total	6.46 cfs < Q100 Existing (8.35 cfs)

DRAINAGE STRUCTURE CAPACITIES

BELL VISTA ASSISTED LIVING
DRAINAGE STRUCTURE INVENTORY

ANALYSIS POINT	Q100 cfs	DRAINAGE STRUCTURE	PIPE SLOPE %	CAPACITY cfs	COMMENTS
1	5.83	POND OVERFLOW SPILLWAY	NA	20.00	RIP RAP OVERFLOW SPILLWAY
2	3.39	10" POND OUTLET PIPE	0.8	3.39	DETENTION POND OUTLET TO CHANNEL AT AP-3
3	3.39	EXIST CONC CHANNEL	NA	37.00	DRAINS FLOW FROM POND OUTLET
4	3.39	EX SWC - 2@16.5"	NA	3.77	DRAINS FLOW FROM EXIST CHANNEL
5	2.39	CURB BLOCKOUT	NA	2.65	CURB BLOCKOUT IN PARKING LOT
6	1.70	TYPE D INLET #1	1.1	5.13 @ H=0.33'	DRAINS TO SD #1
7	0.44	TYPE D INLET #2	2.7	5.13 @ H=0.33'	DRAINS TO SD #2
8	1.70	12" SD #1	1.1	2.80	DRAINS INLET #1
9	2.14	12" SD #2	2.7	4.43	DRAINS INLET #2 TO DETENTION POND
10	1.73	EXISTING SD #3	UNKNOWN	1.73	DRAINS BASIN OS-2 TO DETENTION POND
11	1.69	SED POND #1	NA	363 CF	BASIN A-1 AND OS-1 TEMP SED POND
12	0.56	SED POND #2	NA	152 CF	BASIN A-2 TEMP SED POND



DRAINAGE STRUCTURE INVENTORY MAP

Figure 6

① STORM INLETS

DETERMINE DESIGN CAPACITY

TYPE SINGLE 'D' INLET

(A) BY WEIR

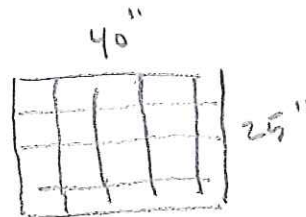
$$Q = CLH^{3/2}$$

$$C = 2.5$$

$$L = 130" = 10.83'$$

$$\text{LET } H = 4" = 0.33'$$

$$Q_{MAX} = 5.13 \text{ CFS} > Q_{100}$$



(B) BY ORIFICE

$$Q = CA\sqrt{2gh}$$

$$C = 0.6$$

$$A = \text{OPEN AREA}$$

$$= 4.31 \text{ SF}$$

$$\text{LET } H = 0.33'$$

$$Q = 11.92 \text{ CFS} > Q_{100}$$

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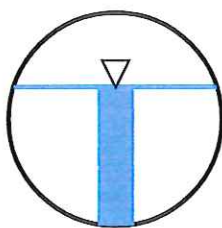
12" dia MP.8 Q100 = 1.70 CFS

Results:

Set units:

Pipe diameter, d_0	12 inches ▼
Manning roughness, n ?	.013
Pressure slope (possibly ? equal to pipe slope), S_0	1.08 % rise/run ▼
Percent of (or ratio to) full depth (100% or 1 if flowing full)	65 % ▼

Flow, q	2.8004	cfs ▼
Velocity, v	5.1821	ft/sec ▼
Velocity head, h_v	0.1272	m ▼
Flow area	0.0502	m ² ▼
Wetted perimeter	0.5717	m ▼
Hydraulic radius	0.0878	m ▼
Top width, T	0.2908	m ▼
Froude number, F	1.21	
Shear stress (tractive force), τ	20.9819	N/m ² ▼



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Set units:

m

mm

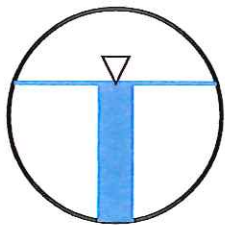
ft

inches

Pipe diameter, d_0	12 inches ▼
Manning roughness, n ?	.013
Pressure slope (possibly ? equal to pipe slope), S_0	2.70 % rise/run ▼
Percent of (or ratio to) full depth (100% or 1 if flowing full)	65 % ▼

Results:

Flow, q	4.4278	cfs ▼
Velocity, v	8.1936	ft/sec ▼
Velocity head, h_v	0.3180	m ▼
Flow area	0.0502	m ² ▼
Wetted perimeter	0.5717	m ▼
Hydraulic radius	0.0878	m ▼
Top width, T	0.2908	m ▼
Froude number, F	1.92	
Shear stress (tractive force), τ	52.4548	N/m ² ▼



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Last Modified 04/15/2015 14:11:28

② TEMP SED PONDS

BASINS A-1 + A-2 REMAIN UNDEVELOPED
SIZE TEMP SED PONDS

PER EPA PROVIDE 2YR STORAGE

PER DPM TABLE A-8 :

$$E = 0.11''$$

$$\Rightarrow \text{SED POND ①} \quad V = 0.11 (0.91 \text{ AC}) / 12 = 0.00834 \text{ MF} \\ = \underline{363 \text{ CF}}$$

$$\Rightarrow \text{SED POND ②} \quad V = 0.11 (0.38 \text{ AC}) / 12 = 0.00348 \text{ MF} \\ = \underline{152 \text{ CF}}$$

AHYMO OUTPUT FILES


```
*****  
*  
*  
* BELLA VISTA  
* PROJECT HYDROLOGY  
*****  
START TIME=0.0 PUNCH CODE=0  
LOCATION ALBUQUERQUE  
RAINFALL TYPE=1 RAIN QUARTER=0.0 RAIN ONE=2.23  
RAIN SIX=2.90 RAIN DAY=3.65 DT=0.03333 HRS  
*****  
*****  
* EXISTING CONDITIONS *  
*****  
* SITE - 1.96 ACRES  
COMPUTE NM HYD ID=1 HYD NO=EX.SITE DA=0.003063 SQ MI  
PER A=0 PER B=96 PER C=0 PER D=4  
TP=0.1333 HR MASS RAIN=-1  
PRINT HYD ID=1 CODE=20  
* BASIN A - 0.52 ACRES  
COMPUTE NM HYD ID=2 HYD NO=EX.A DA=0.000813 SQ MI  
PER A=0 PER B=96 PER C=0 PER D=4  
TP=0.1333 HR MASS RAIN=-1  
PRINT HYD ID=1 CODE=20  
* BASIN B - 1.44 ACRES  
COMPUTE NM HYD ID=3 HYD NO=EX.B DA=0.002250 SQ MI  
PER A=0 PER B=96 PER C=0 PER D=4  
TP=0.1333 HR MASS RAIN=-1  
PRINT HYD ID=3 CODE=20  
* BASIN OS.1 - 0.28 ACRES  
COMPUTE NM HYD ID=4 HYD NO=EX.OS.1 DA=0.000438 SQ MI  
PER A=0 PER B=96 PER C=0 PER D=4  
TP=0.1333 HR MASS RAIN=-1  
PRINT HYD ID=4 CODE=20  
* BASIN OS.2 - 2.18 ACRES  
COMPUTE NM HYD ID=5 HYD NO=EX.OS.2 DA=0.00341 SQ MI  
PER A=0 PER B=13 PER C=14 PER D=73  
TP=0.1333 HR MASS RAIN=-1  
PRINT HYD ID=5 CODE=20  
*****  
* DEVELOPED CONDITIONS *  
*****  
* SITE - 1.96 ACRES  
COMPUTE NM HYD ID=6 HYD NO=DEV.SITE DA=0.003063 SQ MI  
PER A=0 PER B=39 PER C=18 PER D=42  
TP=0.1333 HR MASS RAIN=-1  
PRINT HYD ID=6 CODE=20  
* BASIN A.1 - 0.23 ACRES  
COMPUTE NM HYD ID=7 HYD NO=DEV.A.1 DA=0.000359 SQ MI  
PER A=0 PER B=100 PER C=0 PER D=0  
TP=0.1333 HR MASS RAIN=-1  
PRINT HYD ID=7 CODE=20  
* BASIN A.2 - 0.17 ACRES  
* TEMP SED POND 2  
COMPUTE NM HYD ID=8 HYD NO=DEV.A.2 DA=0.000266 SQ MI
```



```

PER A=0 PER B=100 PER C=0 PER D=0
TP=0.1333 HR MASS RAIN=-1
PRINT HYD ID=8 CODE=20
* BASIN B.1 - 0.40 ACRES
* BASIN B STORM DRAIN AND INLET NO.1
COMPUTE NM HYD ID=9 HYD NO=DEV.B.1 DA=0.000625 SQ MI
PER A=0 PER B=32 PER C=32 PER D=36
TP=0.1333 HR MASS RAIN=-1
PRINT HYD ID=9 CODE=20
* BASIN B.2 - 0.10 ACRES
COMPUTE NM HYD ID=10 HYD NO=DEV.B.2 DA=0.000156 SQ MI
PER A=0 PER B=32 PER C=32 PER D=36
TP=0.1333 HR MASS RAIN=-1
PRINT HYD ID=10 CODE=20
* BASIN B.3 - 0.46 ACRES
COMPUTE NM HYD ID=11 HYD NO=DEV.B.3 DA=0.000719 SQ MI
PER A=0 PER B=32 PER C=32 PER D=36
TP=0.1333 HR MASS RAIN=-1
PRINT HYD ID=11 CODE=20
* BASIN C.1 - 0.47 ACRES
COMPUTE NM HYD ID=12 HYD NO=DEV.C.1 DA=0.000734 SQ MI
PER A=0 PER B=9 PER C=9 PER D=82
TP=0.1333 HR MASS RAIN=-1
PRINT HYD ID=12 CODE=20
* BASIN C.2 - 0.13 ACRES
COMPUTE NM HYD ID=13 HYD NO=DEV.C.2 DA=0.000203 SQ MI
PER A=0 PER B=9 PER C=9 PER D=82
TP=0.1333 HR MASS RAIN=-1
PRINT HYD ID=13 CODE=20
* TEMP SED POND 1
ADD HYD ID=14 HYD NO=DEV.OS.A+A.1 ID I=4 ID II=7
PRINT HYD ID=14 CODE=20
* BASIN B STORM DRAIN AND INLET NO.2
ADD HYD ID=15 HYD NO=DEV.B.1+B.2 ID I=9 ID II=10
PRINT HYD ID=15 CODE=20
* ROUTE BASIN OS.2 THRU 4" SD TO POND B
* DIVIDE HYDROGRAPH TO REPLICATE EX POND OUTLET
* WITH QOUT=1.73 CFS PER DMP
DIVIDE HYD ID=5 Q=1.73 ID I=16 HYD NO=OS.2.POND.OUT
ID II=17 HYD NO=OS.2.POND.STORAGE
PRINT HYD ID=16 CODE=20
* POND B INFLOW
ADD HYD ID=18 HYD NO=DEV.B ID I=15 ID II=11
PRINT HYD ID=18 CODE=20
ADD HYD ID=19 HYD NO=POND.B.INFLOW ID I=16 ID II=18
PRINT HYD ID=19 CODE=20
*****
* ROUTE DEVELOPED SITE THROUGH DETENTION POND B THRU 10" SD TO *
* 3-24 INCH SW CULVERTS. ALLOWABLE DISCHARGE IS 3.41 CFS *
*****
ROUTE RESERVOIR ID=20 HYD NO=POND.B.OUT INFLOW ID=19 CODE=10
OUT (CFS) STORAGE (AC-FT) ELEV (FT)
0.0 0 5766.0
2.00 0.0205 5767.0

```


PRINT HYD
FINISH

3.30 0.0703
4.22 0.1391
ID=20 CODE=20

5768.0
5769.0


```

RUN DATE (MON/DAY/YR) =04/15/2015
USER NO.= Lorenz-NMSingleA33825816

```

[illegible]

AHYMO PROGRAM (AHYMO-S4)
 - Version: S4.01a - Rel: 01a
 RUN DATE (MON/DAY/YR) = 04/15/2015
 START TIME (HR:MIN:SEC) = 15:02:07 USER NO. = Lorenz-NMSingleA33825816
 INPUT FILE = C:\Users\dennis\Desktop\BELLA VISTA.3.DAT

 * BELLA VISTA
 * PROJECT HYDROLOGY

START TIME=0.0 PUNCH CODE=0
 LOCATION ALBUQUERQUE
 City of Albuquerque soil infiltration values (LAND FACTORS) used for computations.
 Land Treatment Initial Abstr.(in) Unif. Infiltr.(in/hour)
 A 0.65 1.67
 B 0.50 1.25
 C 0.35 0.83
 D 0.10 0.04

RAINFALL TYPE=1 RAIN QUARTER=0.0 RAIN ONE=2.23
 RAIN SIX=2.90 RAIN DAY=3.65 DT=0.03333 HRS
 6-HOUR RAINFALL DIST. - BASED ON NOAA ATLAS 14 FOR CONVECTIVE AREAS (NM & AZ) - D1
 DT = 0.033330 HOURS END TIME = 5.999400 HOURS

0.0000	0.0030	0.0059	0.0091	0.0123	0.0156	0.0193
0.0229	0.0268	0.0310	0.0351	0.0444	0.0537	0.0635
0.0739	0.0842	0.0954	0.1066	0.1181	0.1298	0.1415
0.1537	0.1660	0.1789	0.1925	0.2061	0.2214	0.2366
0.2550	0.2765	0.2980	0.3267	0.3556	0.3901	0.4304
0.4707	0.5311	0.5917	0.6740	0.7785	0.8829	1.1605
1.4389	1.6557	1.8099	1.9642	2.0421	2.1196	2.1829
2.2317	2.2806	2.3145	2.3483	2.3777	2.4025	2.4272
2.4460	2.4648	2.4814	2.4958	2.5101	2.5230	2.5359
2.5478	2.5585	2.5693	2.5792	2.5892	2.5990	2.6086
2.6182	2.6227	2.6271	2.6315	2.6358	2.6401	2.6441
2.6481	2.6521	2.6560	2.6598	2.6636	2.6674	2.6710
2.6746	2.6782	2.6816	2.6851	2.6885	2.6918	2.6952
2.6984	2.7016	2.7048	2.7079	2.7110	2.7140	2.7171
2.7201	2.7230	2.7259	2.7287	2.7315	2.7343	2.7371
2.7399	2.7426	2.7453	2.7480	2.7507	2.7534	2.7560
2.7586	2.7612	2.7637	2.7663	2.7688	2.7713	2.7738
2.7763	2.7787	2.7811	2.7836	2.7859	2.7883	2.7907
2.7930	2.7954	2.7977	2.8000	2.8022	2.8045	2.8067
2.8090	2.8112	2.8134	2.8156	2.8178	2.8199	2.8221
2.8242	2.8263	2.8284	2.8305	2.8326	2.8347	2.8367
2.8388	2.8408	2.8428	2.8448	2.8468	2.8488	2.8507
2.8527	2.8546	2.8566	2.8585	2.8604	2.8623	2.8642
2.8661	2.8680	2.8698	2.8717	2.8735	2.8753	2.8772
2.8790	2.8808	2.8826	2.8843	2.8861	2.8879	2.8896
2.8914	2.8931	2.8948	2.8966	2.8983	2.9000	

* EXISTING CONDITIONS *

* SITE - 1.96 ACRES

COMPUTE NM HYD

ID=1 HYD NO=EX.SITE DA=0.003063 SQ MI

PER A=0 PER B=96 PER C=0 PER D=4

TP=0.1333 HR MASS RAIN=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 0.48372 CFS UNIT VOLUME = 0.9751 B = 526.28 P60 = 2.2300
AREA = 0.000123 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

K = 0.134742HR TP = 0.133300HR K/TP RATIO = 1.010815 SHAPE CONSTANT, N = 3.492078
UNIT PEAK = 7.0536 CFS UNIT VOLUME = 0.9983 B = 319.76 P60 = 2.2300
AREA = 0.002940 SQ MI IA = 0.50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=1 CODE=20

HYDROGRAPH FROM AREA EX.SITE

TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS
0.000	0.0	1.333	1.0	2.666	0.1
0.667	0.0	2.000	0.7	3.333	0.0
				4.666	0.0
				5.333	0.0
				5.999	0.0

RUNOFF VOLUME = 1.23454 INCHES = 0.2017 ACRE-FEET
PEAK DISCHARGE RATE = 6.48 CFS AT 1.533 HOURS BASIN AREA = 0.0031 SQ. MI.

* BASIN A - 0.52 ACRES

COMPUTE NM HYD

ID=2 HYD NO=EX.A DA=0.000813 SQ MI

PER A=0 PER B=96 PER C=0 PER D=4

TP=0.1333 HR MASS RAIN=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 0.12839 CFS UNIT VOLUME = 0.9033 B = 526.28 P60 = 2.2300
AREA = 0.000033 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

K = 0.134742HR TP = 0.133300HR K/TP RATIO = 1.010815 SHAPE CONSTANT, N = 3.492078
UNIT PEAK = 1.8722 CFS UNIT VOLUME = 0.9929 B = 319.76 P60 = 2.2300
AREA = 0.000780 SQ MI IA = 0.50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=1 CODE=20

HYDROGRAPH FROM AREA EX.SITE

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	1.0	2.666	0.1	4.000	0.0
0.667	0.0	2.000	0.7	3.333	0.0	4.666	0.0
						5.333	0.0
						5.999	0.0

RUNOFF VOLUME = 1.23454 INCHES = 0.2017 ACRE-Feet
PEAK DISCHARGE RATE = 6.48 CFS AT 1.533 HOURS BASIN AREA = 0.0031 SQ. MI.

* BASIN B - 1.44 ACRES

COMPUTE NM HYD ID=3 HYD NO=EX.B DA=0.002250 SQ MI
PER A=0 PER B=96 PER C=0 PER D=4
TP=0.1333 HR MASS RAIN=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 0.35532 CFS UNIT VOLUME = 0.9664 B = 526.28 P60 = 2.2300
AREA = 0.00090 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

K = 0.134742HR TP = 0.133300HR K/TP RATIO = 1.010815 SHAPE CONSTANT, N = 3.492078
UNIT PEAK = 5.1814 CFS UNIT VOLUME = 0.9976 B = 319.76 P60 = 2.2300
AREA = 0.002160 SQ MI IA = 0.50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=3 CODE=20

HYDROGRAPH FROM AREA EX.B

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	0.7	2.666	0.1	4.000	0.0
0.667	0.0	2.000	0.5	3.333	0.0	4.666	0.0
						5.333	0.0
						5.999	0.0

RUNOFF VOLUME = 1.23454 INCHES = 0.1481 ACRE-Feet
PEAK DISCHARGE RATE = 4.76 CFS AT 1.533 HOURS BASIN AREA = 0.0023 SQ. MI.

* BASIN OS.1 - 0.28 ACRES

COMPUTE NM HYD ID=4 HYD NO=EX.OS.1 DA=0.000438 SQ MI
PER A=0 PER B=96 PER C=0 PER D=4
TP=0.1333 HR MASS RAIN=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 0.69170E-01CFS UNIT VOLUME = 0.8874 B = 526.28 P60 = 2.2300
AREA = 0.000018 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

K = 0.134742HR TP = 0.133300HR K/TP RATIO = 1.010815 SHAPE CONSTANT, N = 3.492078
UNIT PEAK = 1.0086 CFS UNIT VOLUME = 0.9871 B = 319.76 P60 = 2.2300
AREA = 0.000420 SQ MI IA = 0.50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=4 CODE=20

HYDROGRAPH FROM AREA EX.OS.1

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	0.667	0.0	1.333	0.1
				2.000	0.1
				2.666	0.0

RUNOFF VOLUME = 1.23454 INCHES = 0.0288 ACRE-FEET
PEAK DISCHARGE RATE = 0.94 CFS AT 1.533 HOURS BASIN AREA = 0.0004 SQ. MI.

* BASIN OS.2 - 2.18 ACRES
COMPUTE NM HYD ID=5 HYD NO=EX.OS.2 DA=0.00341 SQ MI
PER A=0 PER B=13 PER C=14 PER D=73
TP=0.1333 HR MASS RAIN=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 9.8279 CFS UNIT VOLUME = 0.9982 B = 526.28 P60 = 2.2300
AREA = 0.002489 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

K = 0.121875HR TP = 0.133300HR K/TP RATIO = 0.914292 SHAPE CONSTANT, N = 3.872545
UNIT PEAK = 2.3939 CFS UNIT VOLUME = 0.9946 B = 346.59 P60 = 2.2300
AREA = 0.000921 SQ MI IA = 0.42222 INCHES INF = 1.03222 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=5 CODE=20

HYDROGRAPH FROM AREA EX.OS.2

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	2.000	1.5	4.000	0.1
0.667	0.2	2.666	0.2	4.666	0.1
1.333	3.0	3.333	0.1	5.333	0.1
				5.999	0.1
				6.666	0.0

RUNOFF VOLUME = 2.28032 INCHES = 0.4147 ACRE-FEET
PEAK DISCHARGE RATE = 10.68 CFS AT 1.533 HOURS BASIN AREA = 0.0034 SQ. MI.

* DEVELOPED CONDITIONS *

* SITE - 1.96 ACRES
COMPUTE NM HYD

ID=6 HYD NO=DEV.SITE DA=0.003063 SQ MI
PER A=0 PER B=39 PER C=18 PER D=42
TP=0.1333 HR MASS RAIN=-1

*****WARNING***** SUM OF TREATMENT TYPES DOES NOT EQUAL 100 PERCENT OR TOTAL AREA

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 5.1303 CFS UNIT VOLUME = 0.9973 B = 526.28 P60 = 2.2300
AREA = 0.001299 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

K = 0.126906HR TP = 0.133300HR K/TP RATIO = 0.952030 SHAPE CONSTANT, N = 3.712225
UNIT PEAK = 4.4388 CFS UNIT VOLUME = 0.9971 B = 335.51 P60 = 2.2300
AREA = 0.001764 SQ MI IA = 0.45263 INCHES INF = 1.11737 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=6 CODE=20

HYDROGRAPH FROM AREA DEV.SITE

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	2.0	2.666	0.2
0.667	0.1	2.000	1.1	3.333	0.1

RUNOFF VOLUME = 1.84231 INCHES = 0.3010 ACRE-FEET
PEAK DISCHARGE RATE = 8.35 CFS AT 1.533 HOURS BASIN AREA = 0.0031 SQ. MI.

* BASIN A.1 - 0.23 ACRES
COMPUTE NM HYD

ID=7 HYD NO=DEV.A.1 DA=0.000359 SQ MI
PER A=0 PER B=100 PER C=0 PER D=0
TP=0.1333 HR MASS RAIN=-1

K = 0.134742HR TP = 0.133300HR K/TP RATIO = 1.010815 SHAPE CONSTANT, N = 3.492078
UNIT PEAK = 0.86116 CFS UNIT VOLUME = 0.9848 B = 319.76 P60 = 2.2300
AREA = 0.000359 SQ MI IA = 0.50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=7 CODE=20

HYDROGRAPH FROM AREA DEV.A.1

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	0.667	0.0	1.333	0.1
				2.000	0.1
				2.666	0.0

RUNOFF VOLUME = 1.17587 INCHES = 0.0225 ACRE-FEET
PEAK DISCHARGE RATE = 0.75 CFS AT 1.533 HOURS BASIN AREA = 0.0004 SQ. MI.

* BASIN A.2 - 0.17 ACRES

* TEMP SED POND 2

COMPUTE NM HYD

ID=8 HYD NO=DEV.A.2 DA=0.000266 SQ MI
PER A=0 PER B=100 PER C=0 PER D=0
TP=0.1333 HR MASS RAIN=-1

K = 0.134742HR TP = 0.133300HR K/TP RATIO = 1.010815 SHAPE CONSTANT, N = 3.492078
UNIT PEAK = 0.63807 CFS UNIT VOLUME = 0.9787 B = 319.76 P60 = 2.2300
AREA = 0.000266 SQ MI IA = 0.50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=8 CODE=20

HYDROGRAPH FROM AREA DEV.A.2

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	0.667	0.0	1.333	0.1
				2.000	0.1
				2.666	0.0

RUNOFF VOLUME = 1.17587 INCHES = 0.0167 ACRE-FEET
PEAK DISCHARGE RATE = 0.56 CFS AT 1.533 HOURS BASIN AREA = 0.0003 SQ. MI.

* BASIN B.1 - 0.40 ACRES

* BASIN B STORM DRAIN AND INLET NO.1

COMPUTE NM HYD

ID=9 HYD NO=DEV.B.1 DA=0.000625 SQ MI
PER A=0 PER B=32 PER C=32 PER D=36
TP=0.1333 HR MASS RAIN=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 0.88831 CFS UNIT VOLUME = 0.9862 B = 526.28 P60 = 2.2300
AREA = 0.000225 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

K = 0.122335HR TP = 0.133300HR K/TP RATIO = 0.917739 SHAPE CONSTANT, N = 3.857209

UNIT PEAK = 1.0369 CFS UNIT VOLUME = 0.9871 B = 345.54 P60 = 2.2300
AREA = 0.000400 SQ MI IA = 0.42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=9 CODE=20

HYDROGRAPH FROM AREA DEV.B.1

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	0.4	2.666	0.0
0.667	0.0	2.000	0.2	3.333	0.0
				4.666	0.0
				5.333	0.0
				5.999	0.0

RUNOFF VOLUME = 1.78098 INCHES = 0.0594 ACRE-FEET
PEAK DISCHARGE RATE = 1.70 CFS AT 1.533 HOURS BASIN AREA = 0.0006 SQ. MI.

* BASIN B.2 - 0.10 ACRES
COMPUTE NM HYD

ID=10 HYD NO=DEV.B.2 DA=0.000156 SQ MI
PER A=0 PER B=32 PER C=32 PER D=36
TP=0.1333 HR MASS RAIN=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 0.22172 CFS UNIT VOLUME = 0.9472 B = 526.28 P60 = 2.2300
AREA = 0.000056 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

K = 0.122335HR TP = 0.133300HR K/TP RATIO = 0.917739 SHAPE CONSTANT, N = 3.857209
UNIT PEAK = 0.25881 CFS UNIT VOLUME = 0.9483 B = 345.54 P60 = 2.2300
AREA = 0.000100 SQ MI IA = 0.42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=10 CODE=20

HYDROGRAPH FROM AREA DEV.B.2

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	0.1	2.666	0.0
0.667	0.0	2.000	0.0	3.333	0.0
				4.666	0.0
				5.333	0.0
				5.999	0.0

RUNOFF VOLUME = 1.78098 INCHES = 0.0148 ACRE-FEET
PEAK DISCHARGE RATE = 0.44 CFS AT 1.533 HOURS BASIN AREA = 0.0002 SQ. MI.

* BASIN B.3 - 0.46 ACRES
COMPUTE NM HYD

ID=11 HYD NO=DEV.B.3 DA=0.000719 SQ MI

	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME
CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS

0.000 0.0 1.333 0.7 2.666 0.0 4.000 0.0 5.333 0.0
 0.667 0.0 2.000 0.4 3.333 0.0 4.666 0.0 5.999 0.0

RUNOFF VOLUME = 2.40024 INCHES = 0.0940 ACRE-FEET
 PEAK DISCHARGE RATE = 2.39 CFS AT 1.533 HOURS BASIN AREA = 0.0007 SQ. MI.

* BASIN C.2 - 0.13 ACRES
 COMPUTE NM HYD ID=13 HYD NO=DEV.C.2 DA=0.000203 SQ MI
 PER A=0 PER B=9 PER C=9 PER D=82
 TP=0.1333 HR MASS RAIN=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
 UNIT PEAK = 0.65719 CFS UNIT VOLUME = 0.9815 B = 526.28 P60 = 2.2300
 AREA = 0.000166 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

K = 0.122335HR TP = 0.133300HR K/TP RATIO = 0.917739 SHAPE CONSTANT, N = 3.857209
 UNIT PEAK = 0.94719E-01CFS UNIT VOLUME = 0.8713 B = 345.54 P60 = 2.2300
 AREA = 0.000037 SQ MI IA = 0.42500 INCHES INF = 1.04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033330

PRINT HYD ID=13 CODE=20

HYDROGRAPH FROM AREA DEV.C.2

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	0.2	2.666	0.0	4.000	0.0
0.667	0.0	2.000	0.1	3.333	0.0	4.666	0.0
RUNOFF VOLUME = 2.40024 INCHES = 0.0260 ACRE-FEET PEAK DISCHARGE RATE = 0.68 CFS AT 1.533 HOURS BASIN AREA = 0.0002 SQ. MI.							

* TEMP SED POND 1
 ADD HYD ID=14 HYD NO=DEV.OS.A+A.1 ID I=4 ID II=7
 PRINT HYD ID=14 CODE=20

HYDROGRAPH FROM AREA DEV.OS.A+A.1

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	0.667	0.0	1.333	0.2	2.000	0.2
RUNOFF VOLUME = 1.20464 INCHES = 0.0512 ACRE-FEET PEAK DISCHARGE RATE = 1.69 CFS AT 1.533 HOURS BASIN AREA = 0.0008 SQ. MI.							

* BASIN B STORM DRAIN AND INLET NO.2
 ADD HYD ID=15 HYD NO=DEV.B.1+B.2 ID I=9 ID II=10
 PRINT HYD ID=15 CODE=20

HYDROGRAPH FROM AREA DEV.B.1+B.2

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	0.5	2.666	0.0	4.000	0.0
0.667	0.0	2.000	0.3	3.333	0.0	4.666	0.0
						5.333	0.0
						5.999	0.0

RUNOFF VOLUME = 1.78047 INCHES = 0.0742 ACRE-FEET
 PEAK DISCHARGE RATE = 2.15 CFS AT 1.533 HOURS BASIN AREA = 0.0008 SQ. MI.

* ROUTE BASIN OS.2 THRU 4" SD TO POND B
 * DIVIDE HYDROGRAPH TO REPLICATE EX POND OUTLET
 * WITH QOUT=1.73 CFS PER DMP
 DIVIDE HYD ID=5 Q=1.73 ID I=16 HYD NO=OS.2.POND.OUT
 ID II=17 HYD NO=OS.2.POND.STORAGE
 PRINT HYD ID=16 CODE=20

HYDROGRAPH FROM AREA OS.2.POND.OUT

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	2.000	1.5	4.000	0.1	5.999	0.1
0.667	0.2	2.666	0.2	4.666	0.1	6.666	0.0
1.333	1.7	3.333	0.1	5.333	0.1		

RUNOFF VOLUME = 2.28024 INCHES = 0.2057 ACRE-FEET
 PEAK DISCHARGE RATE = 1.73 CFS AT 1.267 HOURS BASIN AREA = 0.0017 SQ. MI.

* POND B INFLOW
 ADD HYD ID=18 HYD NO=DEV.B ID I=15 ID II=11
 PRINT HYD ID=18 CODE=20

HYDROGRAPH FROM AREA DEV.B

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	1.0	2.666	0.1	4.000	0.0
0.667	0.0	2.000	0.5	3.333	0.0	4.666	0.0
						5.333	0.0
						5.999	0.0

RUNOFF VOLUME = 1.78056 INCHES = 0.1424 ACRE-FEET
PEAK DISCHARGE RATE = 4.10 CFS AT 1.533 HOURS BASIN AREA = 0.0015 SQ. MI.

ADD HYD ID=19 HYD NO=POND.B.INFLOW ID I=16 ID II=18
PRINT HYD ID=19 CODE=20

HYDROGRAPH FROM AREA POND.B.INFLOW

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	2.000	2.0	4.000	0.1
0.667	0.2	2.666	0.3	4.666	0.1
1.333	2.7	3.333	0.1	5.333	0.1

RUNOFF VOLUME = 2.04539 INCHES = 0.3482 ACRE-FEET
PEAK DISCHARGE RATE = 5.83 CFS AT 1.533 HOURS BASIN AREA = 0.0032 SQ. MI.

* ROUTE DEVELOPED SITE THROUGH DETENTION POND B THRU 10" SD TO *
* 3-24 INCH SW CULVERTS. ALLOWABLE DISCHARGE IS 3.41 CFS *

ROUTE RESERVOIR ID=20 HYD NO=POND.B.OUT INFLOW ID=19 CODE=10
OUT (CFS) STORAGE (AC-FT) ELEV (FT)
0.0 0 5766.0
2.00 0.0205 5767.0
3.30 0.0703 5768.0
4.22 0.1391 5769.0

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
0.00	0.00	5766.00	0.000	0.00
0.33	0.00	5766.00	0.000	0.00
0.67	0.21	5766.02	0.000	0.05
1.00	0.78	5766.29	0.006	0.59
1.33	2.68	5766.95	0.020	1.90
1.67	4.16	5768.07	0.075	3.36
2.00	2.03	5767.85	0.063	3.10
2.33	0.84	5767.11	0.026	2.14
2.67	0.29	5766.28	0.006	0.55
3.00	0.15	5766.10	0.002	0.20
3.33	0.11	5766.06	0.001	0.12
3.67	0.10	5766.05	0.001	0.10
4.00	0.09	5766.05	0.001	0.09

4.33 0.09 5766.05 0.001 0.09
 4.67 0.09 5766.05 0.001 0.09
 5.00 0.09 5766.05 0.001 0.09
 5.33 0.09 5766.05 0.001 0.09
 5.67 0.10 5766.05 0.001 0.09
 6.00 0.10 5766.05 0.001 0.10
 6.33 0.01 5766.02 0.000 0.03
 6.67 0.00 5766.00 0.000 0.01
 PEAK DISCHARGE = 3.393 CFS - PEAK OCCURS AT HOUR 1.73
 MAXIMUM WATER SURFACE ELEVATION = 5768.102
 MAXIMUM STORAGE = 0.0773 AC-FT INCREMENTAL TIME= 0.0333330HRS

PRINT HYD ID=20 CODE=20

HYDROGRAPH FROM AREA POND.B.OUT

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	2.000	3.1	4.000	0.1	5.999	0.1
0.667	0.0	2.666	0.6	4.666	0.1	6.666	0.0
1.333	1.9	3.333	0.1	5.333	0.1		

RUNOFF VOLUME = 2.04539 INCHES = 0.3482 ACRE-FEET
 PEAK DISCHARGE RATE = 3.39 CFS AT 1.733 HOURS BASIN AREA = 0.0032 SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 15:02:07

DRAINAGE MASTERPLAN

[illegible]

EXHIBITS