CITY OF ALBUQUERQUE

February 3, 2012

Ronald R. Bohannan, P.E.
Tierra West, LLC
5571 Midway Park Pl NE
Albuquerque, NM 87109

Re: Spectrum Assisted Living, Lot 1 B-1 Golf Course Road
Grading and Drainage Plan
Engineer's Stamp date 01-20-12 (A12/D025)

Dear Mr. Bohannan,

Based upon the information provided in your submittal received 01-24-12, the above referenced plan is approved for Building Permit.

This project requires a National Pollutant Discharge Elimination System (NPDES) permit for storm water discharge and a Topsoil Disturbance Permit since it is disturbing ¾ of an acre or more. Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology. Prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist will be required.

If you have any questions, you can contact me at 924-3695.

Sincerely,

Shahab Biazar, P.E.
Senior Engineer, Planning Dept.
Development and Building Service

C: file

PO Box 1293
Albuquerque
NM 87103
www.cabq.gov

DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/28/2003rd)

PROJECT TITLE: **Spectrum Assisted Living Facility** ZONE MAP/DRG. FILE # **A-12-Z/D025**

DRB #: ***1008528*** EPC #: ***11EPC-40040/40041*** WORK ORDER #:

LEGAL DESCRIPTION **Lot 1B-1, Paradise North**

CITY ADDRESS: **Golf Course Road NW**

ENGINEERING FIRM:	TIERRA WEST, LLC	CONTACT:	JOEL HERNANDEZ
ADDRESS:	5571 MIDWAY PARK PLACE NE	PHONE:	(505) 858-3100
CITY, STATE:	ALBUQUERQUE, NM	ZIP CODE:	87109
OWNER:	Monterey Land Group, III LLC	CONTACT:	
ADDRESS:	111 Lomas Blvd NW, Suite 200	PHONE:	
CITY, STATE:	Albuquerque, NM 87102	ZIP CODE:	
ARCHITECT:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	
SURVEYOR:	PRECISION SURVEYS	CONTACT:	LARRY MEDRANO
ADDRESS:	5571 Midway Park Place NE	PHONE:	(505) 856-5700
CITY, STATE:	ALBUQUERQUE, NM	ZIP CODE:	87109
CONTRACTOR:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	

CHECK TYPE OF SUBMITTAL:

- ___ DRAINAGE REPORT
- ___ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
- X DRAINAGE PLAN RESUBMITTAL
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ___ CLOMR/LOMR
- ___ TRAFFIC CIRCULATION LAYOUT (TCL)
- ___ ENGINEERS CERTIFICATION (TCL)
- ___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ___ OTHER BERNCO PROJECT-CONCURRENT REVIEW

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SIA / FINANACIAL GUARANTEE RELEASE
- ___ PRELIMINARY PLAT APPROVAL
- ___ S. DEV. PLAN FOR SUB'D. APPROVAL
- ___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- X BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY (PERM.)
- ___ CERTIFICATE OF OCCUPANCY (TEMP.)
- ___ GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ WORK ORDER APPROVAL
- ___ SO-19

RECEIVED

JAN 2 4 2012

HYDROLOGY SECTION

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- X YES
- ___ NO
- ___ COPY PROVIDED

DATE SUBMITTED: **12/24/2012** BY: **Cynthia Abeyta**

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of sumbittal may be required based on the following:

1. **Conceptual Grading and Drainage Plans**: Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report**: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

DRAINAGE REPORT

for

Spectrum
Assisted Living Facility

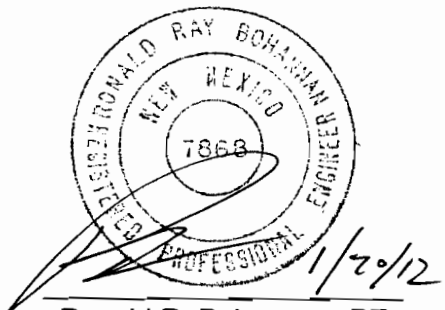
Golf Course Road & McMahon Boulevard N.W.
Albuquerque, New Mexico

Prepared by:

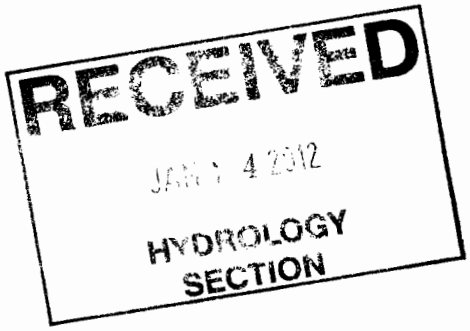
Tierra West, LLC
5571 Midway Park Place NE
Albuquerque, New Mexico 87109

January 20, 2011

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the State of New Mexico in good standing.



Ronald R. Bohannan, PE
NO. 7868



Job No. 2011026

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Map Pockets

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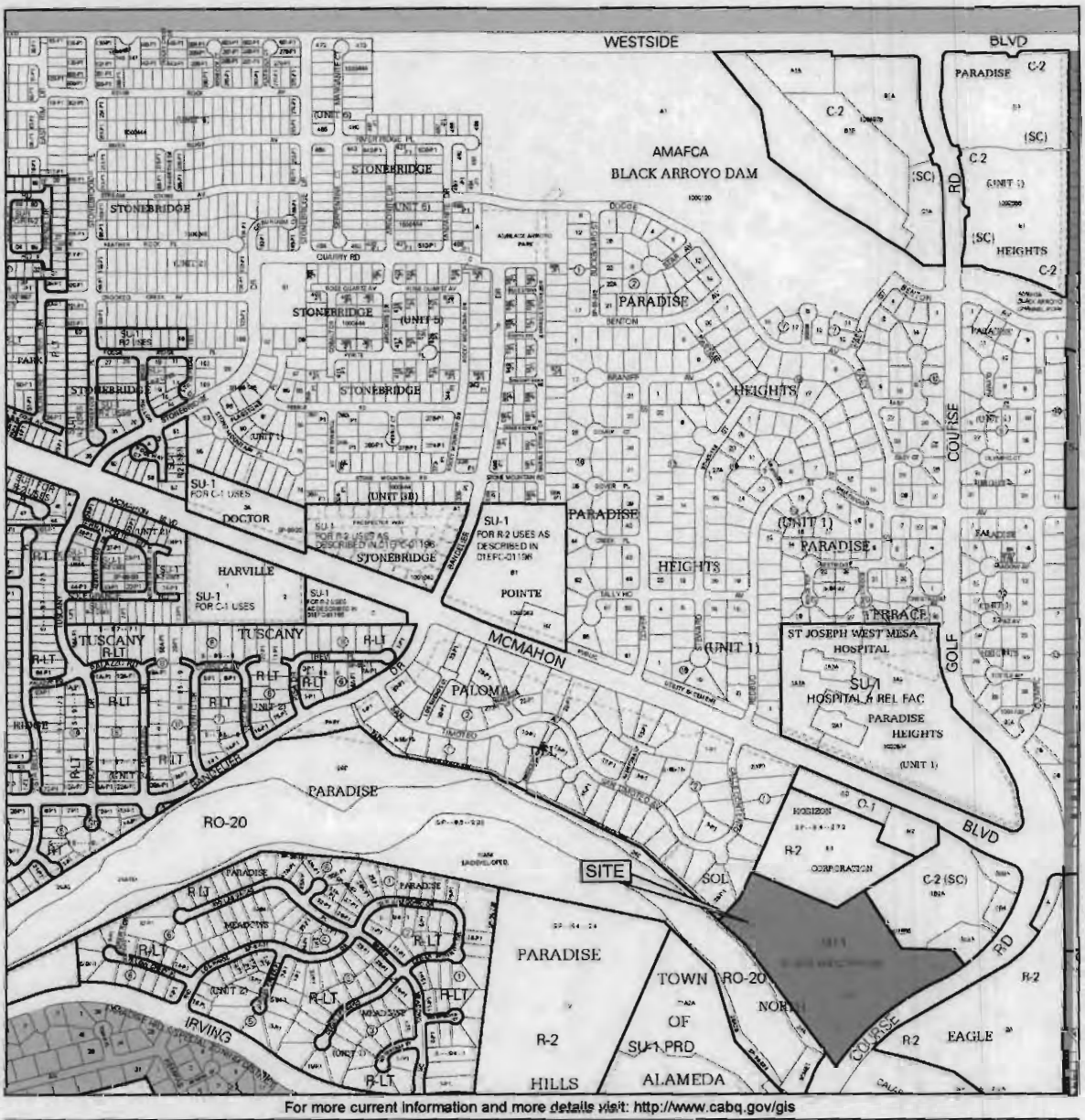
PURPOSE

The purpose of this report is to provide the drainage management plan for a proposed Spectrum Assisted Living Facility within Tract 1B-1 (Development) of Paradise North in accordance with the City of Albuquerque Development Process Manual (DPM) – Chapter 22 – Hydrology Section. This document details the drainage analysis of the existing and proposed conditions for the subject site and describes anticipated implications, and aims to act as an accurate record for future reference. A Conceptual Grading and Drainage Plan was approved by EPC in conjunction with Site Development Plan approval; this report was developed in order to obtain Site Plan Approval by DRB and for Grading Permit.

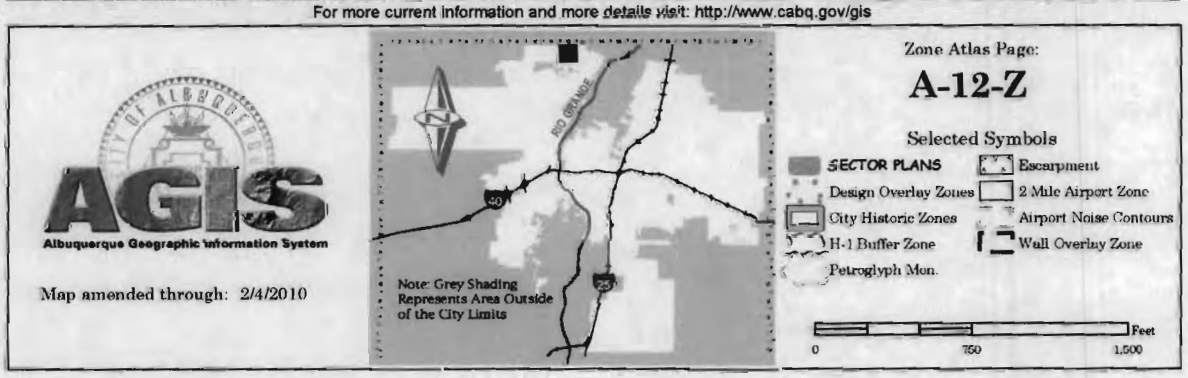
INTRODUCTION

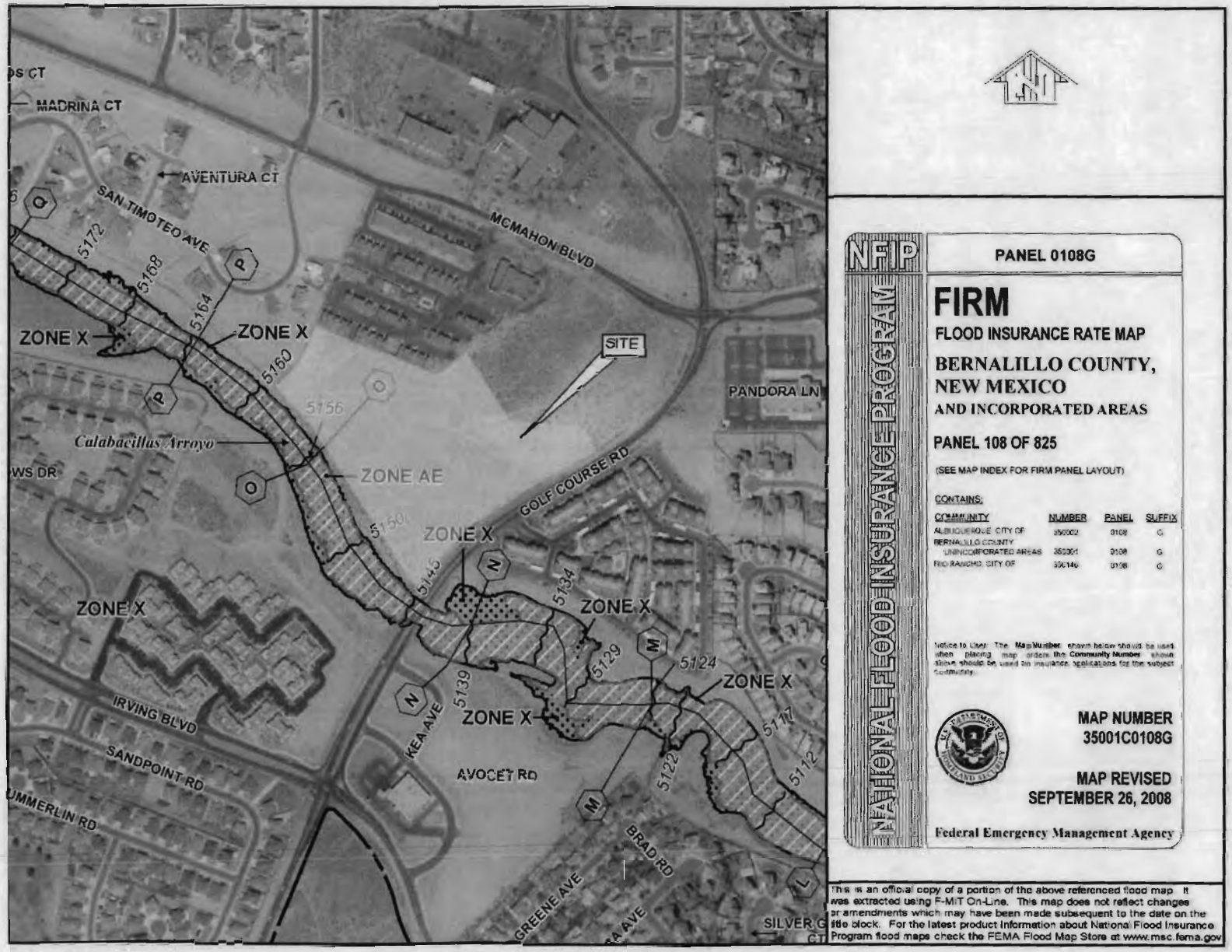
The subject of this report, shown in Exhibit A – Vicinity Map, is a 13.55-acre parcel of undeveloped land identified as Tract 1B-1 of Paradise North, located south of McMahon Boulevard with Golf Course Boulevard bordering the southeast property line. The site appears on Zone Atlas Page A-12-Z, Bernalillo County, Albuquerque New Mexico. As shown in Exhibit B – FIRMap, the subject property lies outside the mapped flood hazard zone. The site is contained in Precipitation Zone 1 according to Table A-1 of the City of Albuquerque DPM. This project will subdivide the parcel into two lots (Lot 1 on the north, Lot 2 on the south) and proposes to develop and build the Facility on Lot 1, while rough grading Lot 2 for future development.

Exhibit A- Vicinity Map



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




MADRINA CT
AVENTURA CT
SAN TIMOTEO AVE
MCMAHON BLVD
ZONE X
ZONE X
SITE
PANDORA LN
Calabacillas Arroyo
ZONE AE
GOLF COURSE RD
ZONE X
ZONE X
ZONE X
ZONE X
ZONE X
IRVING BLVD
SANDPOINT RD
AVOCET RD
KEA AVE
BRAD RD
GREENE AVE
5172
5168
5164
5160
5156
5150
5145
5139
5134
5129
5124
5122
5117
5112
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0108G
FIRM
FLOOD INSURANCE RATE MAP
BERNALILLO COUNTY, NEW MEXICO
AND INCORPORATED AREAS
PANEL 108 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
ALBUQUERQUE, CITY OF 350002 0108 G
BERNALILLO COUNTY
UNINCORPORATED AREAS 350001 0108 G
RIO RANCHO, CITY OF 350146 0108 G
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
35001C0108G
MAP REVISED
SEPTEMBER 26, 2008
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

EXISTING CONDITIONS

The subject parcel is an undeveloped 13.55 acre lot, bound by developed residential land to the west, developed residential and commercial land to the north, Golf Course Road to the southeast, and the Calabacillas Arroyo to the southwest. The existing topography conveys storm water run-off to the Calabacillas Arroyo upstream of the Golf Course Road Bridge. Minor offsite flows discharge onto the site via surface drainage. Flows from the commercial development to the north (Smiths) are conveyed by a storm drain system to an outfall discharging into the Calabacillas Arroyo just downstream of the Golf Course Road Bridge. A portion of this storm drain runs parallel to the Developments' southerly property line, constructed with the *Smith's Golf Course Road Improvements,* which and was designed to accept drainage from the subject property. Similarly, the Puerta del Sol Apartment complex to the north conveys storm water through a 30" pipe which crosses the northern portion of the site and discharges into the arroyo. Appendix A contains tabulations for the existing basin areas and peak discharge rates.

PROPOSED CONDITIONS

A new assisted living facility consisting of a central building and five cottage duplex buildings along with landscaping, concrete and asphalt pavement, and curb and gutter, are proposed for site development on Lot 1. The development will contain buildings with Finished Floor Elevations ranging from 5159.50 to 5167.05, with proposed grading maintaining positive drainage away from all buildings. Lot 2 will be rough graded.

The existing storm drain line from the Puerta del Sol Apartment complex will be lowered to accommodate grading and development of the northwest portion of the site. Offsite surface flows from the Puerta Del Sol Apartments (Basin 6 of PDS Drainage Study, estimated at 1.0 cfs) will also be directed into this same storm drain. An area drain system in the northwest courtyard will be used to connect the roof drain downspouts and convey nuisance flows from landscape

areas, while grading design will provide positive overflow. This area drain system will connect to the realigned apartment complex storm drain and discharge into the Calabacillas Arroyo via the existing channel outfall. Pipe capacity calculations can be found in Appendix A for the proposed storm drain identified as System 1.

The majority of remaining onsite flows will be conveyed to a proposed storm drain system to tie into the existing Smith's storm drain line at the southeast property line. Drainage from roof drains and landscape areas will be connected to the proposed storm drain directly through a private area drain system while the majority of parking lot drainage within Lot 1 will sheet flow toward a vegetated swale and ponds intended to improve water quality. Lot 2 will be rough graded and drainage will be directed to temporary de-silting basins which will be privately maintained until they are removed with future development. The plans for *Golf Course Road by Wilson & Associates* indicates the anticipated flows from the Development to be handled by this existing storm drain line and discharging into the arroyo. The hydraulic analysis for the proposed and existing system combination can be found in Appendix A, indicating adequate capacity for proposed flows to be added to the existing Smith's storm drain line.

Under the developed conditions, two small basins which have historically drained to the Calabacillas Arroyo, will remain undeveloped and continue to discharge run-off directly into the Calabacillas Arroyo (Basin 8 and Basin 9, shown in Appendix A). Offsite flows from the Puerta Del Sol Apartments and the Smith's site will be accommodated by the proposed grading and drainage configuration.

AMAFCA will be constructing drainage improvements within the Calabacillas Arroyo consisting of grade control structures and slope bank protection along the project frontage with the arroyo and has entered into a funding agreement with the developer which was approved by the Board of Directors at AMAFCA's meeting September 15, 2011. A copy of the agreement is included in Appendix C.

SUMMARY AND RECOMMENDATIONS

The proposed development of Tract 1B-1 of Paradise North for a Spectrum Assisted Living Facility, located at the Calabacillas Arroyo and Golf Course Road in Albuquerque New Mexico, has been analyzed according to the Development Process Manual – Chapter 22 – Hydrology Section, does not lie within the mapped flood hazard zone, and has been designed to meet 100-year, 6-hour storm event capacity for all hydraulic structures and grading design.

Historic drainage paths within the site convey run-off to the Calabacillas Arroyo. The proposed development will maintain historic discharge patterns and drainage to the arroyo. Offsite flows from the Puerta Del Sol Apartments and the Smith's site will be accommodated by the proposed grading and drainage configuration. Capacity is available in the existing Smith's storm drain line at the southwest property line, as well as the existing line from the Puerta del Sol Apartment complex, and these existing systems can be utilized to eliminate additional arroyo channel work and penetrations.

Under the proposed conditions and accompanying Grading and Drainage Plan, no surrounding property will be negatively impacted by the Development, onsite drainage design will properly convey the 100-year, 6-hour storm event, and historic tributary areas will not be increased nor will discharge locations be diverted. The proposed drainage management plan thus illustrates capacity to effectively convey the design storm according to the DPM.

MAP POCKET A

SITE GRADING AND DRAINAGE PLAN

APPENDIX A

HYDROLOGIC AND HYDRAULIC ANALYSIS

DPM Weighted E Method

Spectrum Assisted Living Facility - Precipitation Zone 1

Existing Basins

Basin Descriptions												100-Year, 6-Hr			10-Year, 6-Hr			2-Year, 6-Hr		
Basin	Area (sf)	Area (acres)	Area (sq miles)	Treatment A		Treatment B		Treatment C		Treatment D		Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
				%	(acres)	%	(acres)	%	(acres)	%	(acres)									
Basin A	85,364.00	1.960	0.00306	90%	1.763719	0%	0.000	10%	0.195969	0%	0.000	0.495	0.081	2.84	0.116	0.019	0.72	0.012	0.002	0.09
Basin B	526,154.00	12.079	0.01887	90%	10.87095	0%	0.000	10%	1.207883	0%	0.000	0.495	0.498	17.49	0.116	0.117	4.41	0.012	0.012	0.57
	2.80																			
Total	**611,518.00**	**14.039**	**0.02194**										**0.579**	**20.33**		**0.136**	**5.12**		**0.014**	**0.66**

Notes: All site run off assumed to enter the Calabacillas Arroyo

Proposed Developed Basins

Basin Descriptions												100-Year, 6-Hr			10-Year, 6-Hr			2-Year, 6-Hr		
Basin	Area (sf)	Area (acres)	Area (sq miles)	Treatment A		Treatment B		Treatment C		Treatment D		Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
				%	(acres)	%	(acres)	%	(acres)	%	(acres)									
Basin 1	124,424	2.856	0.00446	0%	0	0%	0.000	31%	0.87329	69%	1.983	1.670	0.398	11.17	0.995	0.237	7.03	0.537	0.128	3.76
Basin 2	44,952	1.032	0.00161	0%	0	0%	0.000	43%	0.440517	57%	0.591	1.552	0.133	3.85	0.898	0.077	2.37	0.464	0.040	1.21
Basin 3	61,589	1.414	0.00221	0%	0	0%	0.000	31%	0.443558	69%	0.970	1.663	0.196	5.51	0.989	0.117	3.47	0.532	0.063	1.85
Basin 4	99,017	2.273	0.00355	0%	0	0%	0.000	15%	0.340969	85%	1.932	1.823	0.345	9.42	1.120	0.212	6.09	0.630	0.119	3.43
Basin 5	128,992	2.961	0.00463	0%	0	0%	0.000	54%	1.592053	46%	1.369	1.443	0.356	10.55	0.810	0.200	6.33	0.397	0.098	3.06
Basin 6	78,252	1.796	0.00281	0%	0	0%	0.000	15%	0.269464	85%	1.527	1.823	0.273	7.45	1.120	0.168	4.81	0.630	0.094	2.71
Basin 7	33,284	0.764	0.00119	0%	0	0%	0.000	81%	0.620683	19%	0.143	1.174	0.075	2.41	0.590	0.038	1.34	0.233	0.015	0.53
Basin 8	8,738	0.201	0.00031	0%	0	0%	0.000	100%	0.200587	0%	0.000	0.990	0.017	0.58	0.440	0.007	0.30	0.120	0.002	0.09
Basin 9	3,954	0.091	0.00014	0%	0	0%	0.000	100%	0.090767	0%	0.000	0.990	0.007	0.26	0.440	0.003	0.14	0.120	0.001	0.04
Basin 10	27,632	0.634	0.00099	0%	0	0%	0.000	66%	0.41623	34%	0.218	1.327	0.070	2.15	0.715	0.038	1.25	0.326	0.017	0.56
Total	**610,835**	**14.023**	**0.02191**										**1.870**	**53.35**		**1.096**	**33.12**		**0.577**	**17.25**

Notes:

Equations:

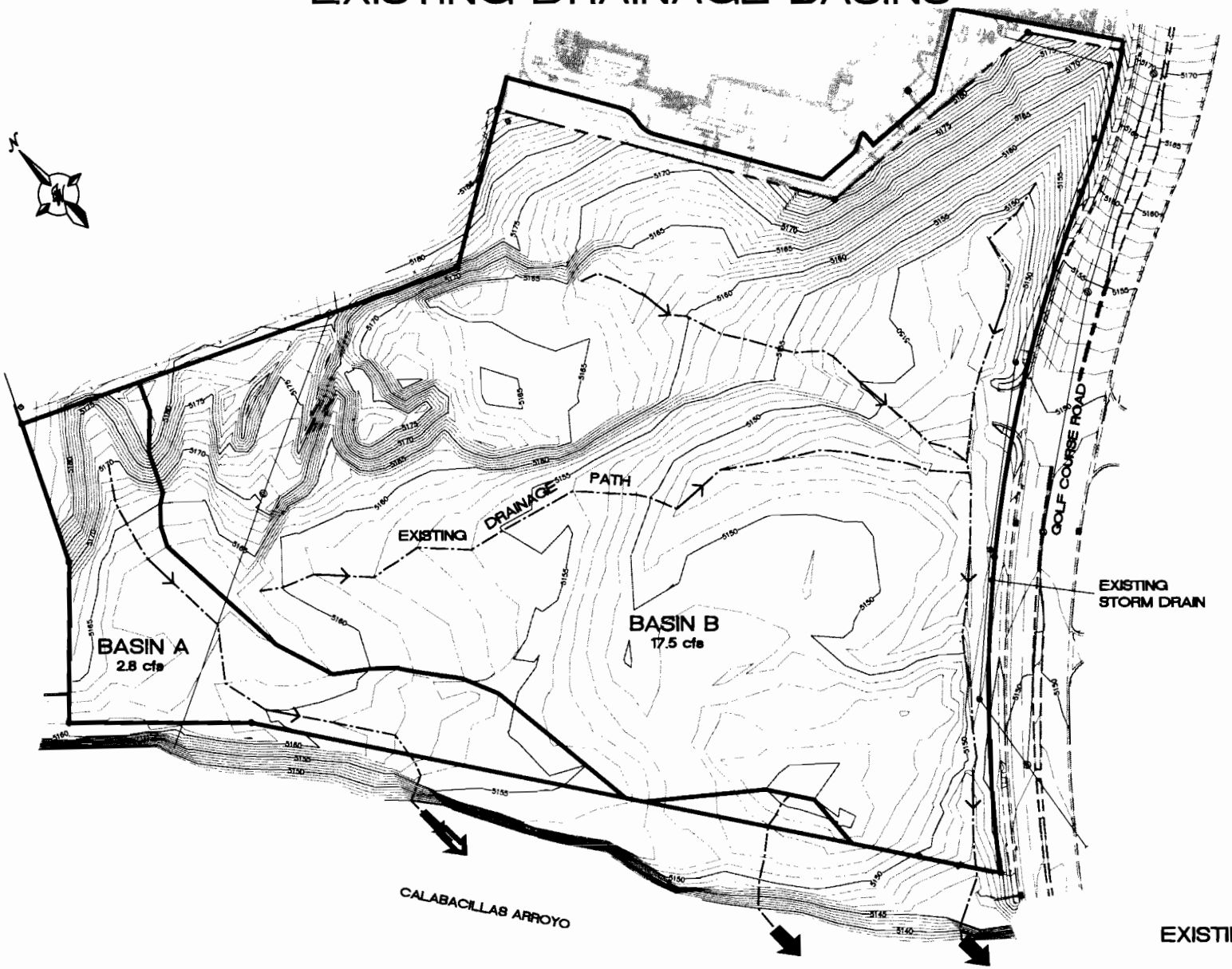
Weighted E = $E_a * A_a + E_b * A_b + E_c * A_c + E_d * A_d$ / (Total Area)

Volume = Weighted D * Total Area

Flow = $Q_a * A_a + Q_b * A_b + Q_c * A_c + Q_d * A_d$

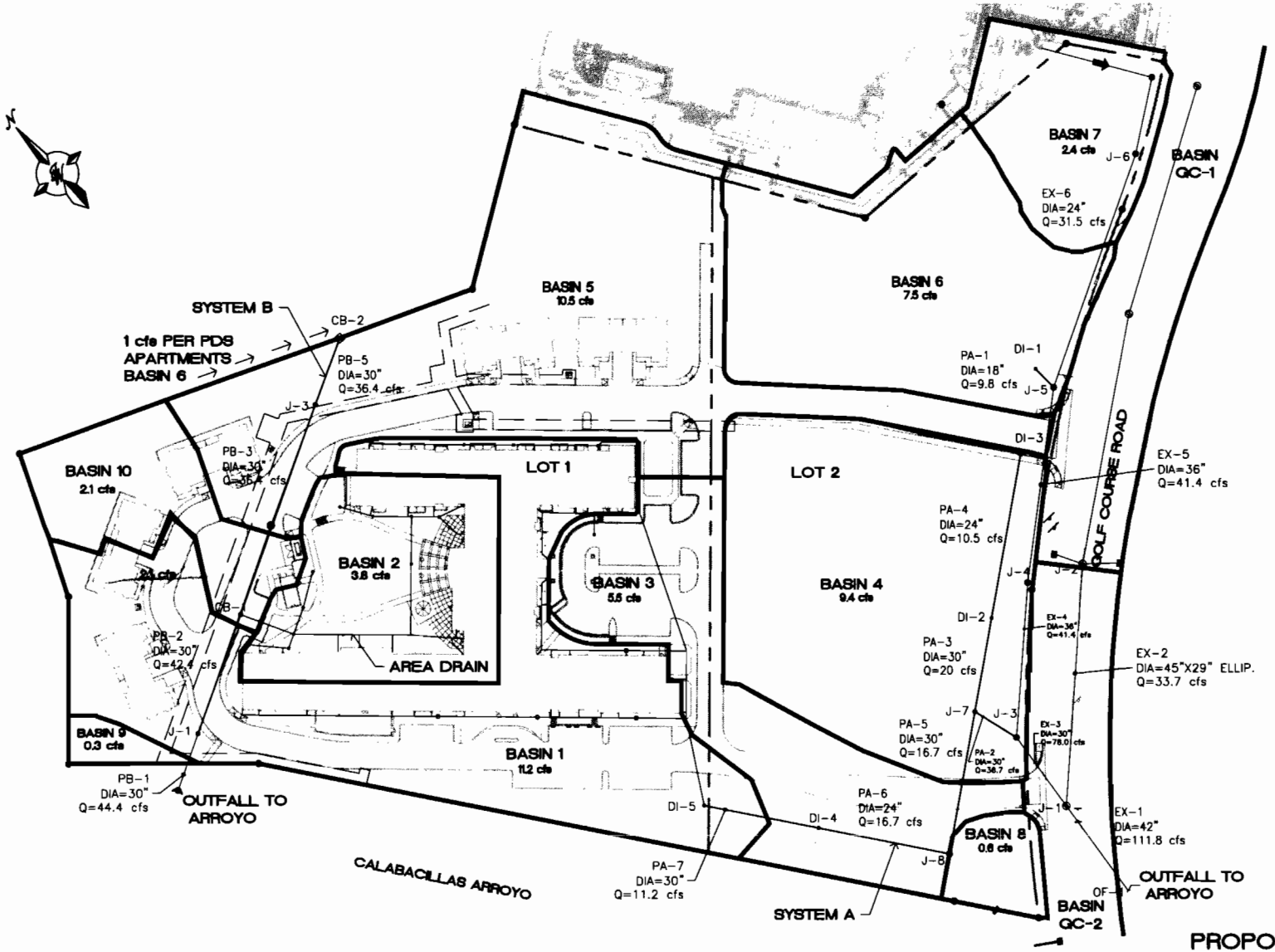
Basin Land Treatment Breakdown					
Basin	Total SF	Treatment C (sf)	Treatment D (sf)	Treatment C %	Treatment D %
Basin 1	124,424.46	38,040.50	86,383.96	31%	69%
Basin 2	44,951.50	19,188.90	25,762.60	43%	57%
Basin 3	61,589.34	19,321.39	42,267.95	31%	69%
Basin 4	99,017.39	14,852.61	84,164.78	15%	85%
Basin 5	128,992.22	69,349.83	59,642.39	54%	46%
Basin 6	78,252.24	11,737.84	66,514.40	15%	85%
Basin 7	33,284.23	27,036.94	6,247.29	81%	19%
Basin 8	8,737.55	8,737.55	0.00	100%	0%
Basin 9	3,953.79	3,953.79	0.00	100%	0%
Basin 10	27,632.00	18,131.00	9,501.00	66%	34%

EXISTING DRAINAGE BASINS



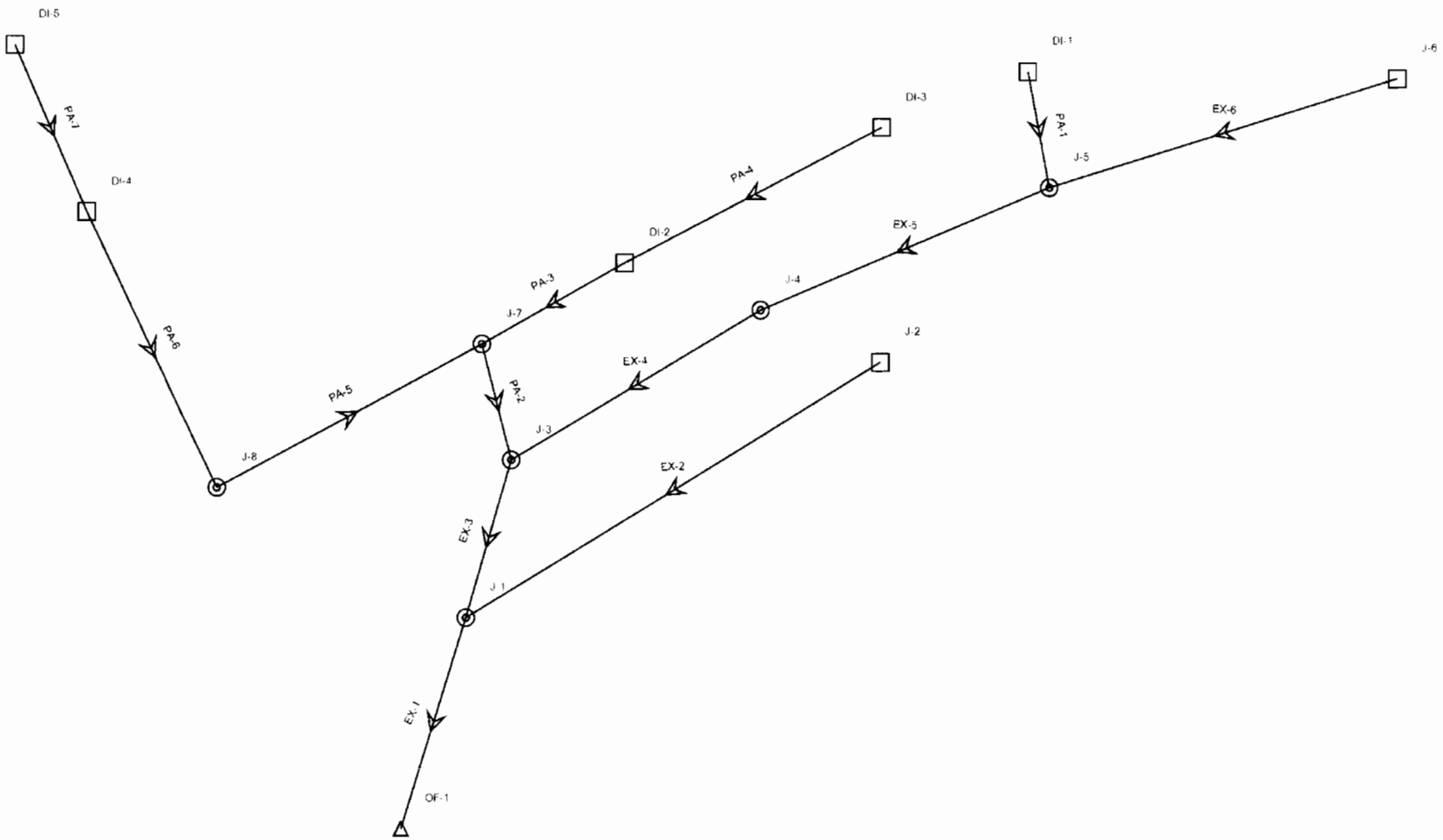
EXISTING DRAINAGE BASINS

PROPOSED DRAINAGE BASINS



PROPOSED DRAINAGE BASINS

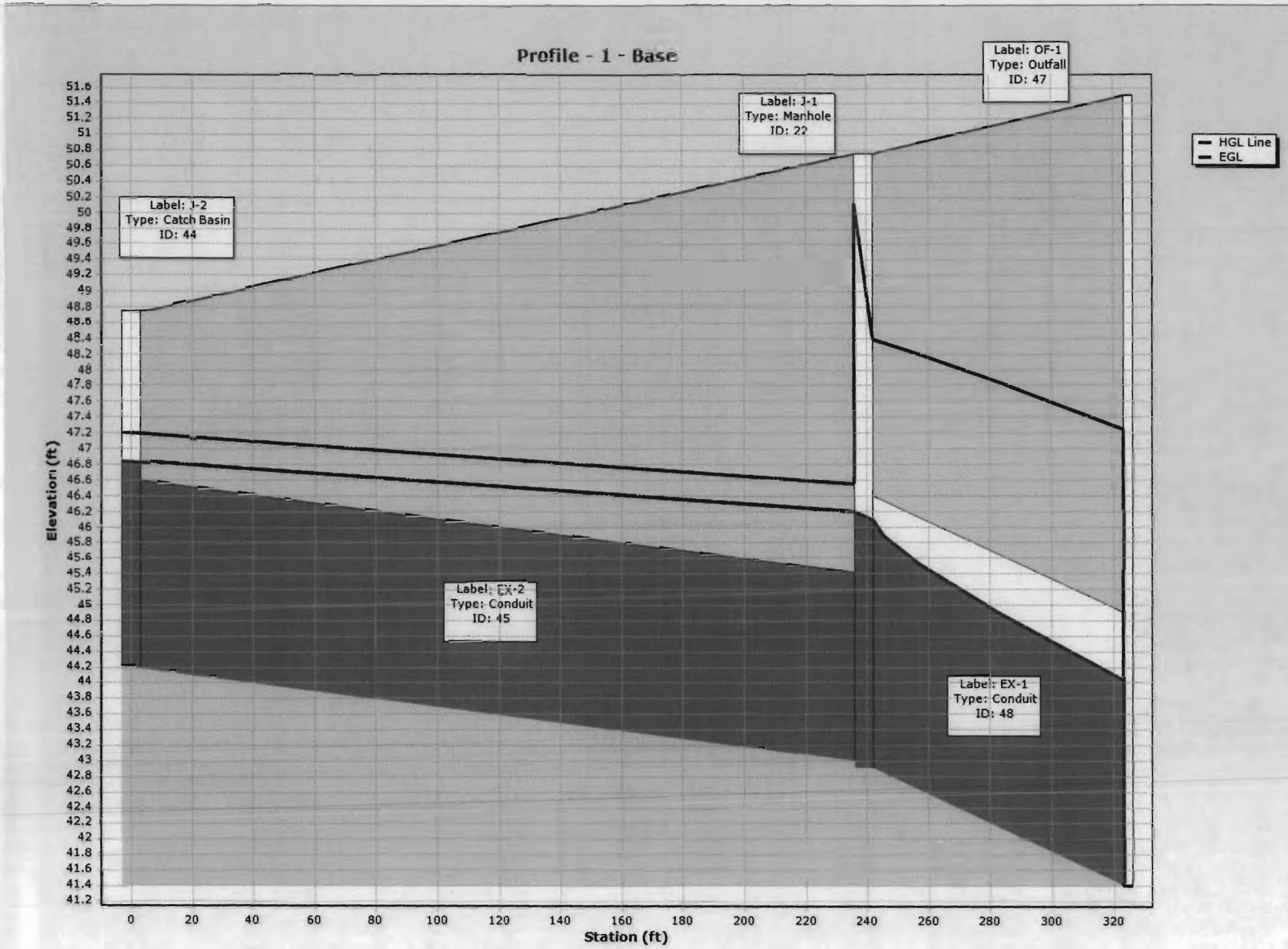
Scenario: Base



Conduit FlexTable: Combined Pipe/Node Report (Spectrum Assisted Living Storm Drain Analysis 2.stc)

Label	Start Node	Stop Node	Length (Unified) (ft)	Capacity (Full Flow) (ft^3/s)	Flow (Link) (ft^3/s)	Velocity (Average) (ft/s)	Invert (Upstream) (ft)	Invert (Downstream) (ft)	Slope (ft/ft)
EX-1	J-1	OF-1	86.0	132.87	111.74	15.47	42.90	41.40	0.017
EX-2	J-2	J-1	239.0	46.32	33.71	4.38	44.18	43.00	0.005
EX-3	J-3	J-1	57.0	66.53	78.03	15.90	44.60	43.10	0.026
EX-4	J-4	J-3	173.8	28.62	41.38	5.85	45.02	44.70	0.002
EX-5	J-5	J-4	194.5	24.85	41.38	5.85	45.49	45.22	0.001
EX-6	J-6	J-5	258.0	36.62	31.52	13.11	54.33	47.57	0.026
PA-1	DI-1	J-5	50.0	7.86	9.86	5.58	48.28	48.00	0.006
PA-2	J-7	J-3	49.3	29.21	36.65	7.47	44.95	44.70	0.005
PA-3	DI-2	J-7	94.7	28.89	19.97	4.07	45.51	45.04	0.005
PA-4	DI-3	DI-2	164.6	15.97	10.55	3.36	46.43	45.61	0.005
PA-5	J-8	J-7	158.7	28.94	16.68	3.40	45.83	45.04	0.005
PA-6	DI-4	J-8	134.5	20.76	16.68	5.31	46.60	45.93	0.005
PA-7	DI-5	DI-4	117.6	20.65	11.17	3.56	47.28	46.70	0.005

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA
+1-203-755-1666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Label: OF-1
Type: Outfall
ID: 47
Label: J-1
Type: Manhole
ID: 22
HGL Line
EGL
Label: J-2
Type: Catch Basin
ID: 44
Label: EX-2
Type: Conduit
ID: 45
Label: EX-1
Type: Conduit
ID: 48
Elevation (ft)
51.6
51.4
51.2
51
50.8
50.6
50.4
50.2
50
49.8
49.6
49.4
49.2
49
48.8
48.6
48.4
48.2
48
47.8
47.6
47.4
47.2
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46
45.8
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44.4
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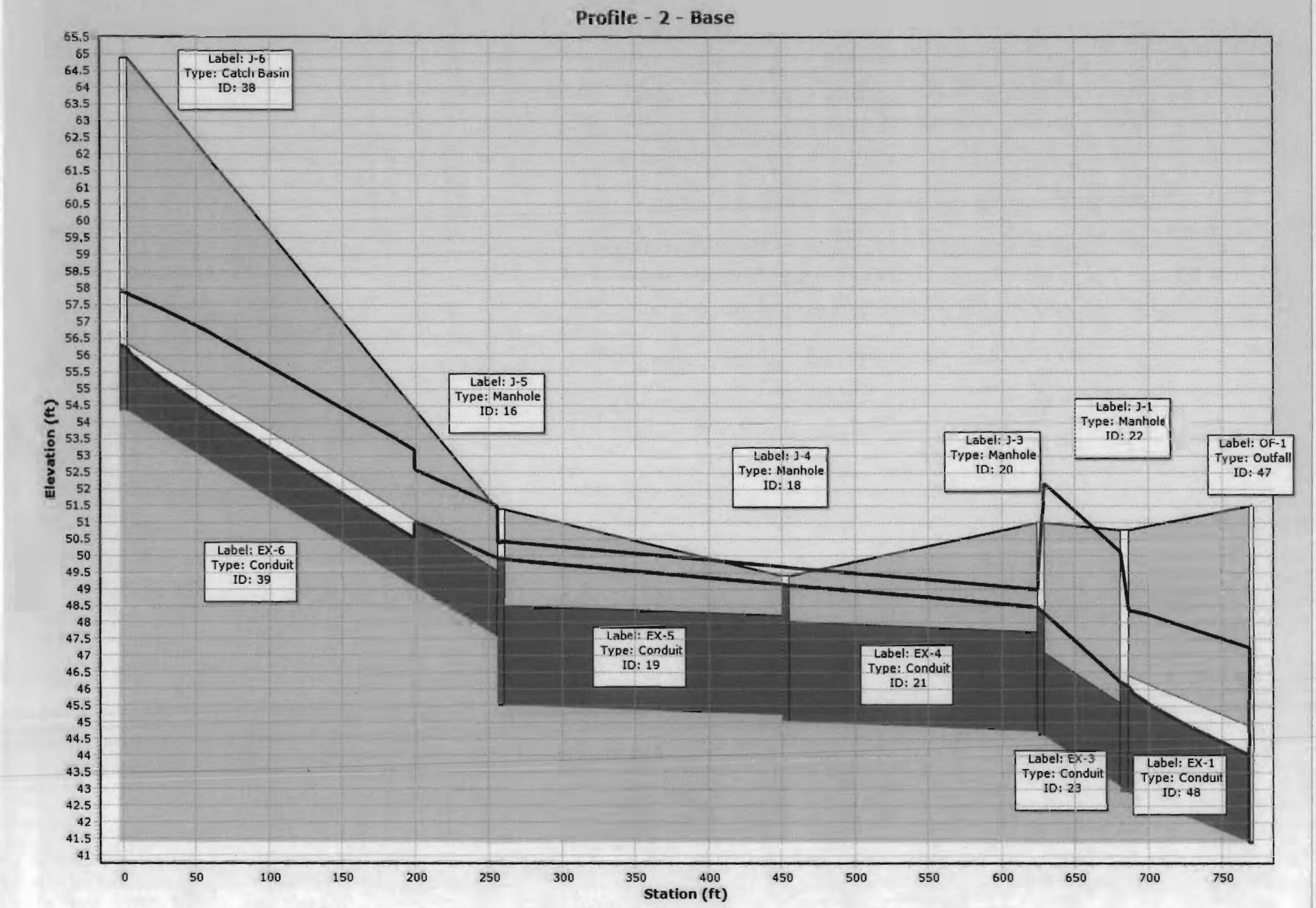
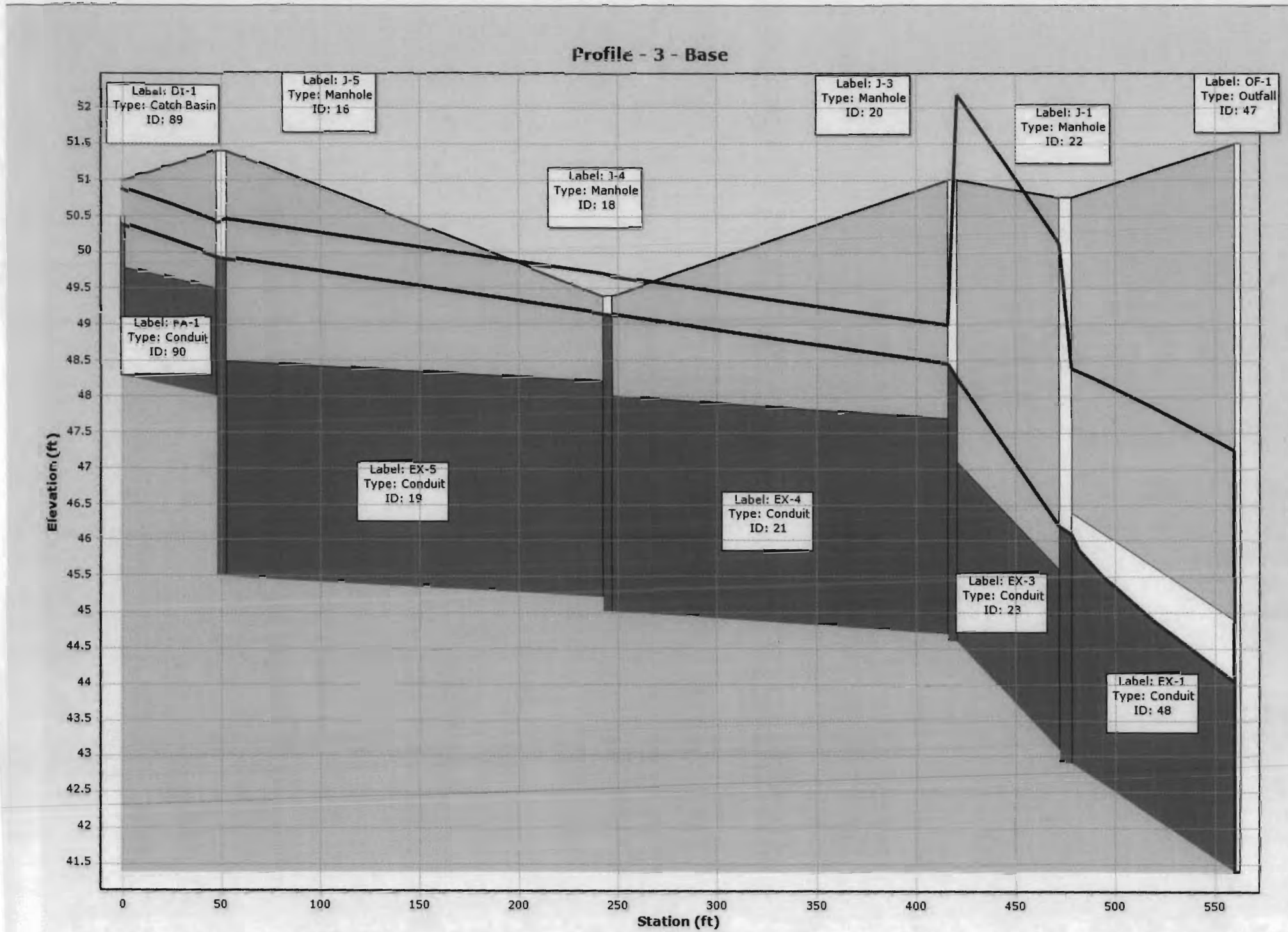
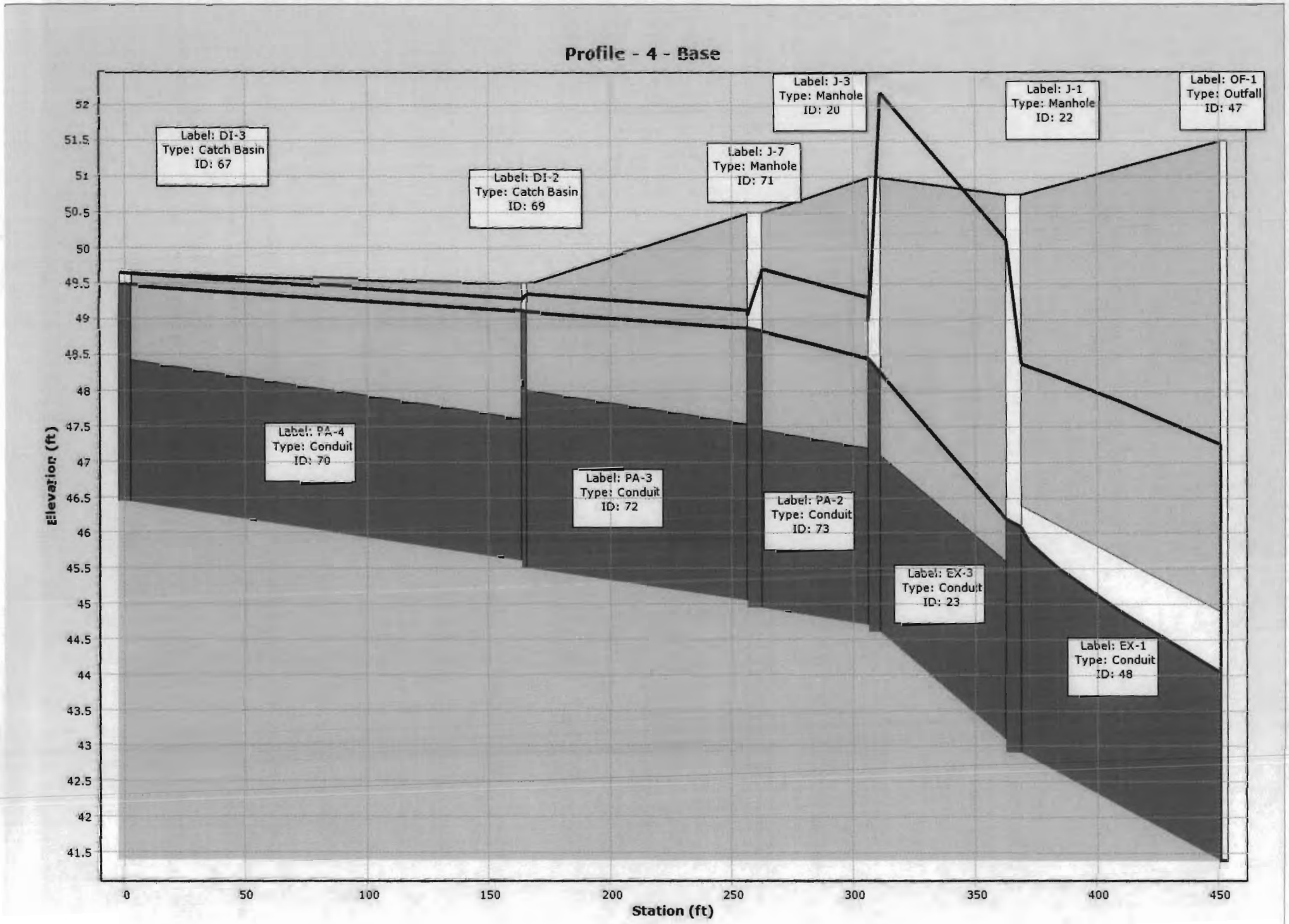
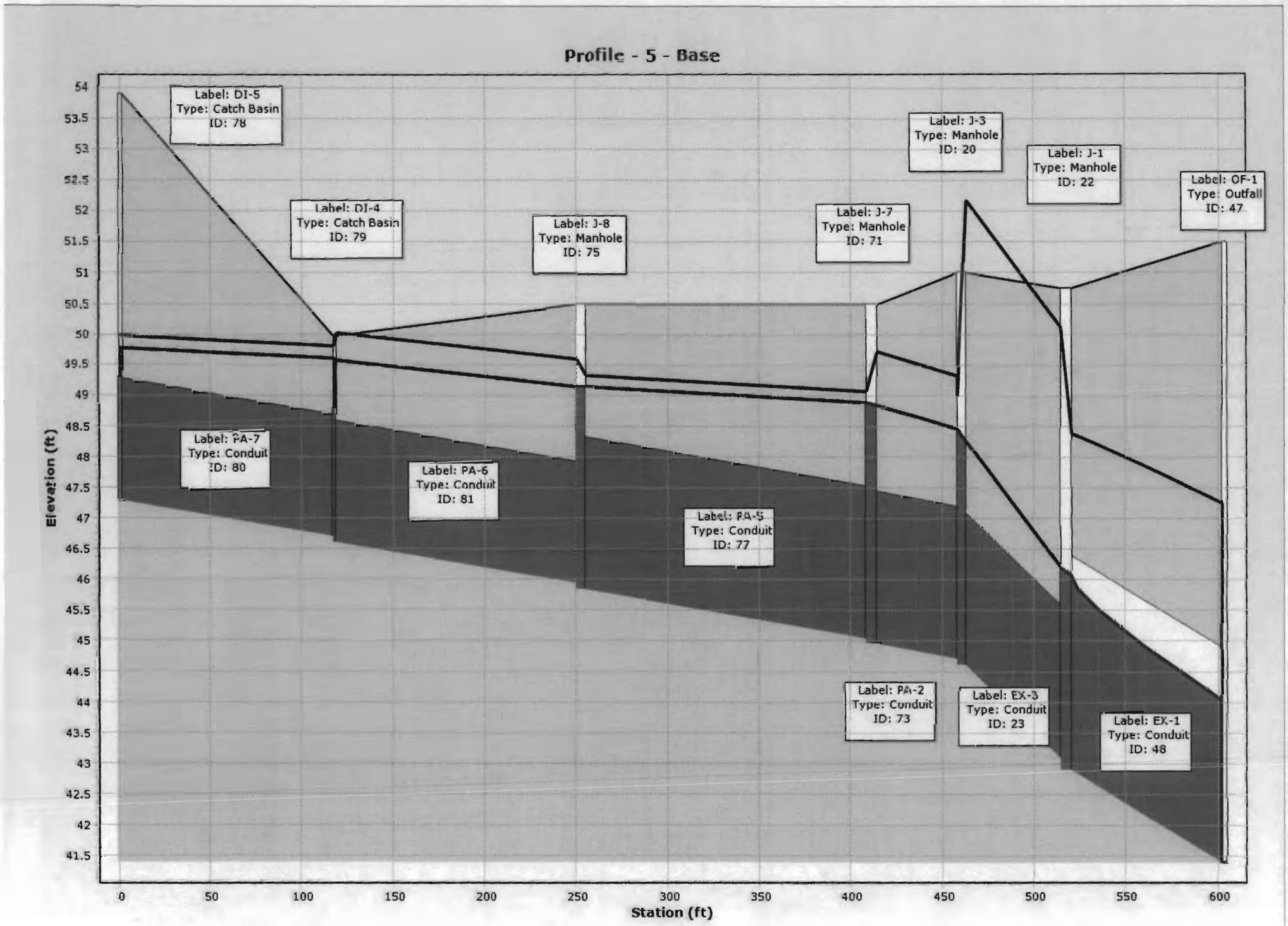
44
43.8
43.6
43.4
43.2
43
42.8
42.6
42.4
42.2
42
41.8
41.6
41.4
41.2
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
Station (ft)


Profile - 2 - Base
Label: J-6
Type: Catch Basin
ID: 38
Label: J-5
Type: Manhole
ID: 16
Label: J-4
Type: Manhole
ID: 18
Label: J-3
Type: Manhole
ID: 20
Label: J-1
Type: Manhole
ID: 22
Label: OF-1
Type: Outfall
ID: 47
Label: EX-6
Type: Conduit
ID: 39
Label: EX-5
Type: Conduit
ID: 19
Label: EX-4
Type: Conduit
ID: 21
Label: EX-3
Type: Conduit
ID: 23
Label: EX-1
Type: Conduit
ID: 48
Elevation (ft)
65.5
65
64.5
64
63.5
63
62.5
62
61.5
61
60.5
60
59.5
59
58.5
58
57.5
57
56.5
56
55.5
55
54.5
54
53.5
53
52.5
52
51.5
51
50.5
50
49.5
49
48.5
48
47.5
47
46.5
46
45.5
45
44.5
44
43.5
43
42.5
42
41.5
41
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
Station (ft)


Profile - 3 - Base
Label: DI-1
Type: Catch Basin
ID: 89
Label: J-5
Type: Manhole
ID: 16
Label: J-4
Type: Manhole
ID: 18
Label: J-3
Type: Manhole
ID: 20
Label: J-1
Type: Manhole
ID: 22
Label: OF-1
Type: Outfall
ID: 47
Label: PA-1
Type: Conduit
ID: 90
Label: EX-5
Type: Conduit
ID: 19
Label: EX-4
Type: Conduit
ID: 21
Label: EX-3
Type: Conduit
ID: 23
Label: EX-1
Type: Conduit
ID: 48
Elevation (ft)
52
51.5
51
50.5
50
49.5
49
48.5
48
47.5
47
46.5
46
45.5
45
44.5
44
43.5
43
42.5
42
41.5
0
50
100
150
200
250
300
350
400
450
500
550
Station (ft)


Profile - 4 - Base
Label: DI-3
Type: Catch Basin
ID: 67
Label: DI-2
Type: Catch Basin
ID: 69
Label: J-7
Type: Manhole
ID: 71
Label: J-3
Type: Manhole
ID: 20
Label: J-1
Type: Manhole
ID: 22
Label: OF-1
Type: Outfall
ID: 47
Label: PA-4
Type: Conduit
ID: 70
Label: PA-3
Type: Conduit
ID: 72
Label: PA-2
Type: Conduit
ID: 73
Label: EX-3
Type: Conduit
ID: 23
Label: EX-1
Type: Conduit
ID: 48
Elevation (ft)
52
51.5
51
50.5
50
49.5
49
48.5
48
47.5
47
46.5
46
45.5
45
44.5
44
43.5
43
42.5
42
41.5
0
50
100
150
200
250
300
350
400
450
Station (ft)


Profile - 5 - Base
Label: DI-5
Type: Catch Basin
ID: 78
Label: DI-4
Type: Catch Basin
ID: 79
Label: J-8
Type: Manhole
ID: 75
Label: J-7
Type: Manhole
ID: 71
Label: J-3
Type: Manhole
ID: 20
Label: J-1
Type: Manhole
ID: 22
Label: OF-1
Type: Outfall
ID: 47
Label: PA-7
Type: Conduit
ID: 80
Label: PA-6
Type: Conduit
ID: 81
Label: PA-5
Type: Conduit
ID: 77
Label: PA-2
Type: Conduit
ID: 73
Label: EX-3
Type: Conduit
ID: 23
Label: EX-1
Type: Conduit
ID: 48
Elevation (ft)
54
53.5
53
52.5
52
51.5
51
50.5
50
49.5
49
48.5
48
47.5
47
46.5
46
45.5
45
44.5
44
43.5
43
42.5
42
41.5
0
50
100
150
200
250
300
350
400
450
500
550
600
Station (ft)

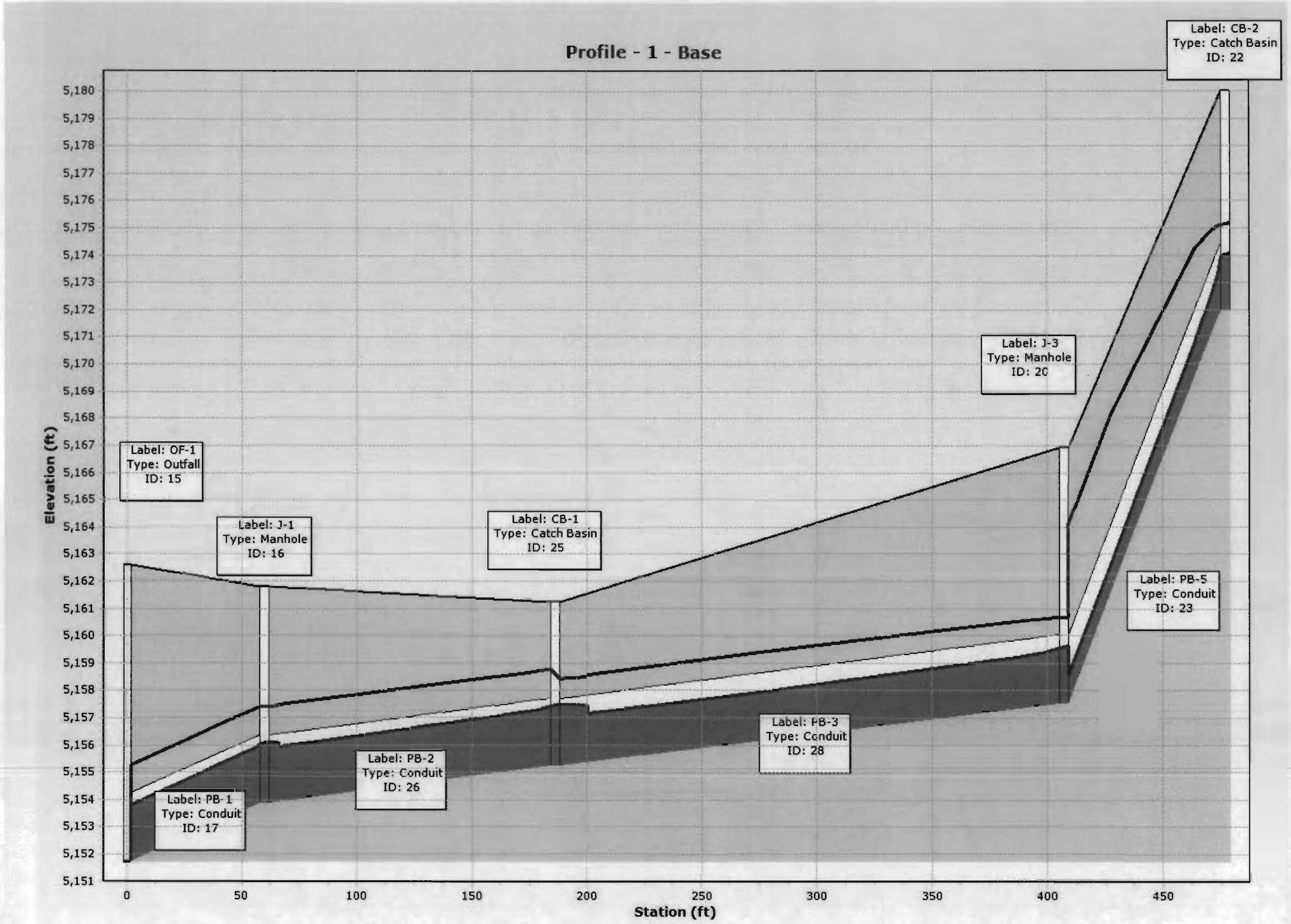
Scenario: Base

Conduit FlexTable: Combined Pipe/Node Report (Exist 30-in from Puerta Del Sol Apts.stc)

Label	Start Node	Stop Node	Length (Unified) (ft)	Capacity (Full Flow) (ft^3/s)	Flow (Link) (ft^3/s)
PB-1	J-1	OF-1	60.0	41.86	42.38
PB-2	CB-1	J-1	126.0	42.61	42.38
PB-3	J-3	CB-1	221.0	41.84	36.38
PB-5	CB-2	J-3	70.0	100.87	36.38

Velocity (Average) (ft/s)	Invert (Upstream) (ft)	Invert (Downstream) (ft)	Slope (ft/ft)
9.72	5,153.87	5,151.74	0.036
9.90	5,155.23	5,153.87	0.011
9.60	5,157.53	5,155.23	0.010
18.88	5,171.96	5,157.53	0.206

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA
+1-203-755-1666


Profile - 1 - Base
Label: CB-2
Type: Catch Basin
ID: 22
Label: J-3
Type: Manhole
ID: 20
Label: OF-1
Type: Outfall
ID: 15
Label: J-1
Type: Manhole
ID: 16
Label: CB-1
Type: Catch Basin
ID: 25
Label: PB-5
Type: Conduit
ID: 23
Label: PB-3
Type: Conduit
ID: 28
Label: PB-2
Type: Conduit
ID: 26
Label: PB-1
Type: Conduit
ID: 17
Elevation (ft)
5,180
5,179
5,178
5,177
5,176
5,175
5,174
5,173
5,172
5,171
5,170
5,169
5,168
5,167
5,166
5,165
5,164
5,163
5,162
5,161
5,160
5,159
5,158
5,157
5,156
5,155
5,154
5,153
5,152
5,151
0
50
100
150
200
250
300
350
400
450
Station (ft)

APPENDIX B

(EXCERPT)

Storm Water Analysis

For

Smith's #463
Golf Course Road and McMahon Boulevard

Albuquerque, NM

August 30, 2005

Prepared for:
Smith's Food & Drug
1550 South Redwood Road
Salt Lake City, Utah 84104

GREAT BASIN ENGINEERING - South
2010 South Redwood Road • P.O. Box 16747 • Salt Lake City, Utah 84116
(801) 521-8529 • (801) 398-7288 • Fax (801) 521-9551 • E-mail gbes@greatbasineng.com

Table of Contents

I. Introduction

Smith's Food and Drug is proposing a new Grocery store at the southwest corner of Golf Course Road and McMahon Boulevard in Albuquerque, New Mexico. The purpose of this analysis is to determine the amount of storm water generated by this site, the appropriate infrastructure to convey these flows and the appropriate grading design of the site to protect the building and the site from flood damage. The City of Albuquerque has indicated that due to the proximity of the nearby arroyo, no detention is required on-site.

II. Existing Conditions

The proposed site consists of 8.0 acres. The site has existing severe slopes across the site with over 30-feet of fall from the corner of McMahon and Golf Course to the back of the site. Sparse vegetation currently covers the site. McMahon Boulevard borders the site on the north with Golf Course Road on the West. A commercial development borders the site on the west. There is no development south of the proposed grocery store, but it is our understanding that there will be some type of development there in the future. The Arroyo De Las Calabacillas is 750 feet south of the site. All existing and proposed drainage will discharge directly to the arroyo.

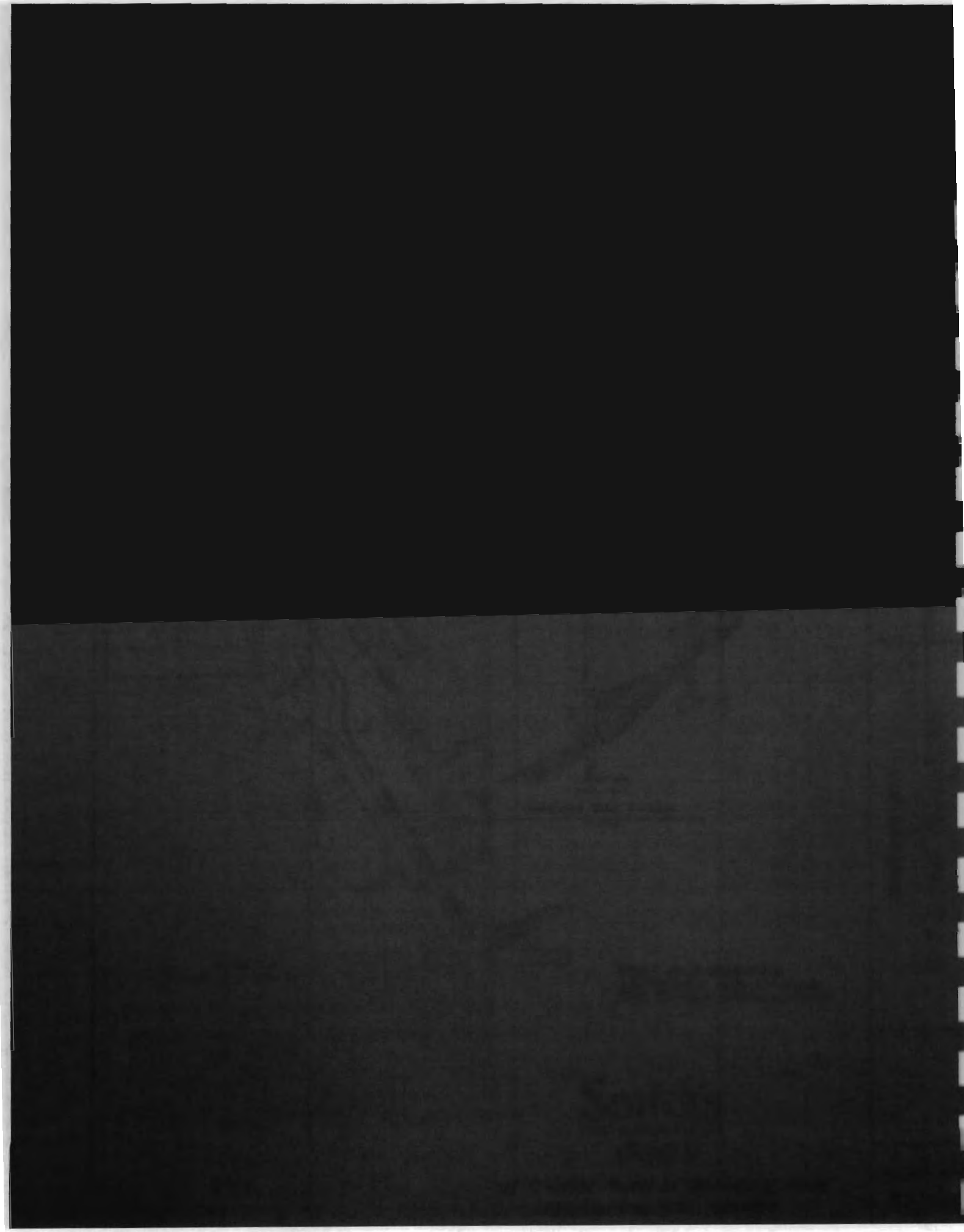
This site is located within Zone 1, designated as areas determined to be outside the 500 year flood plain as identified by the FIRM Map #35001C0108E effective November 19, 2003 (see Figure 1).

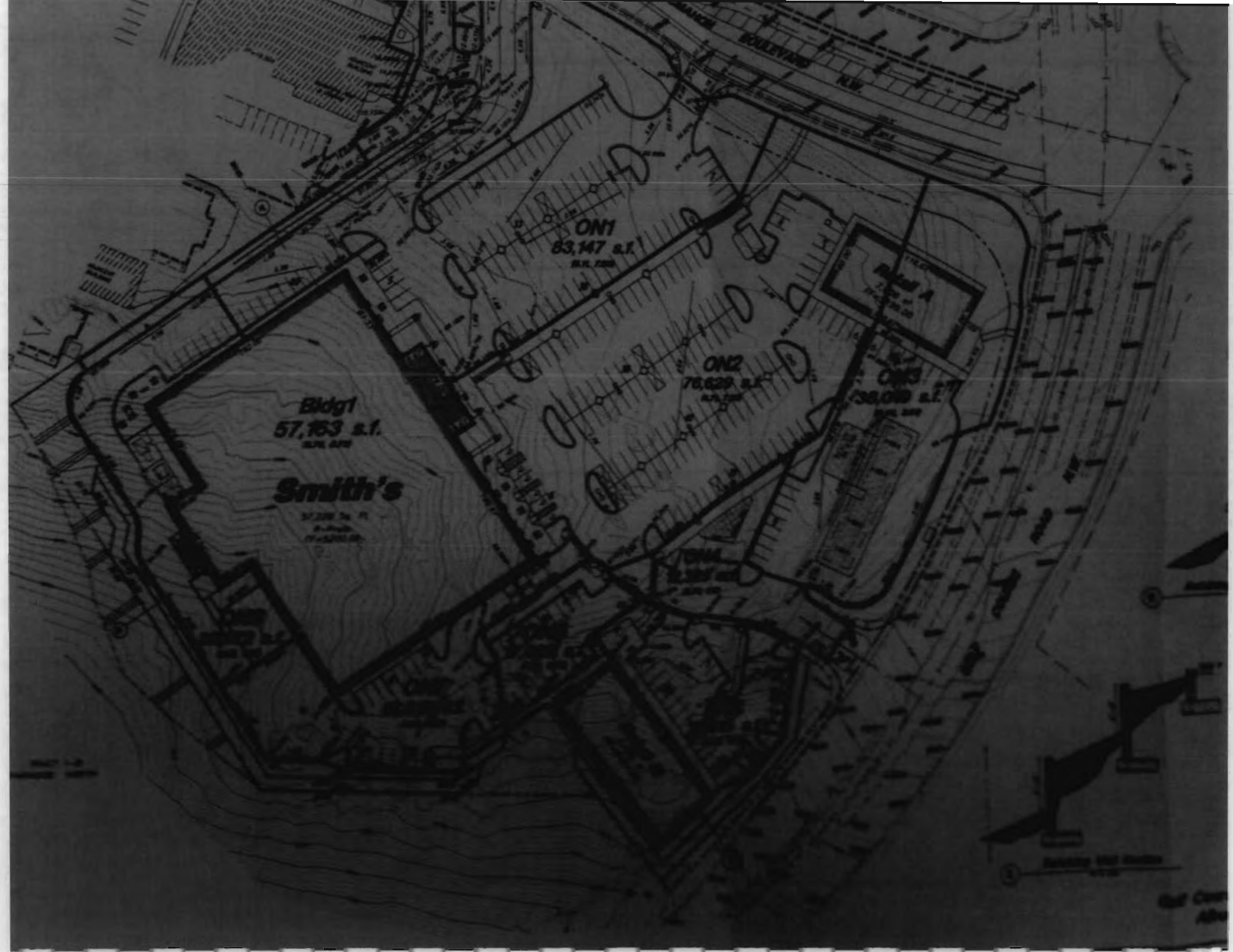
III. Hydrologic Analysis

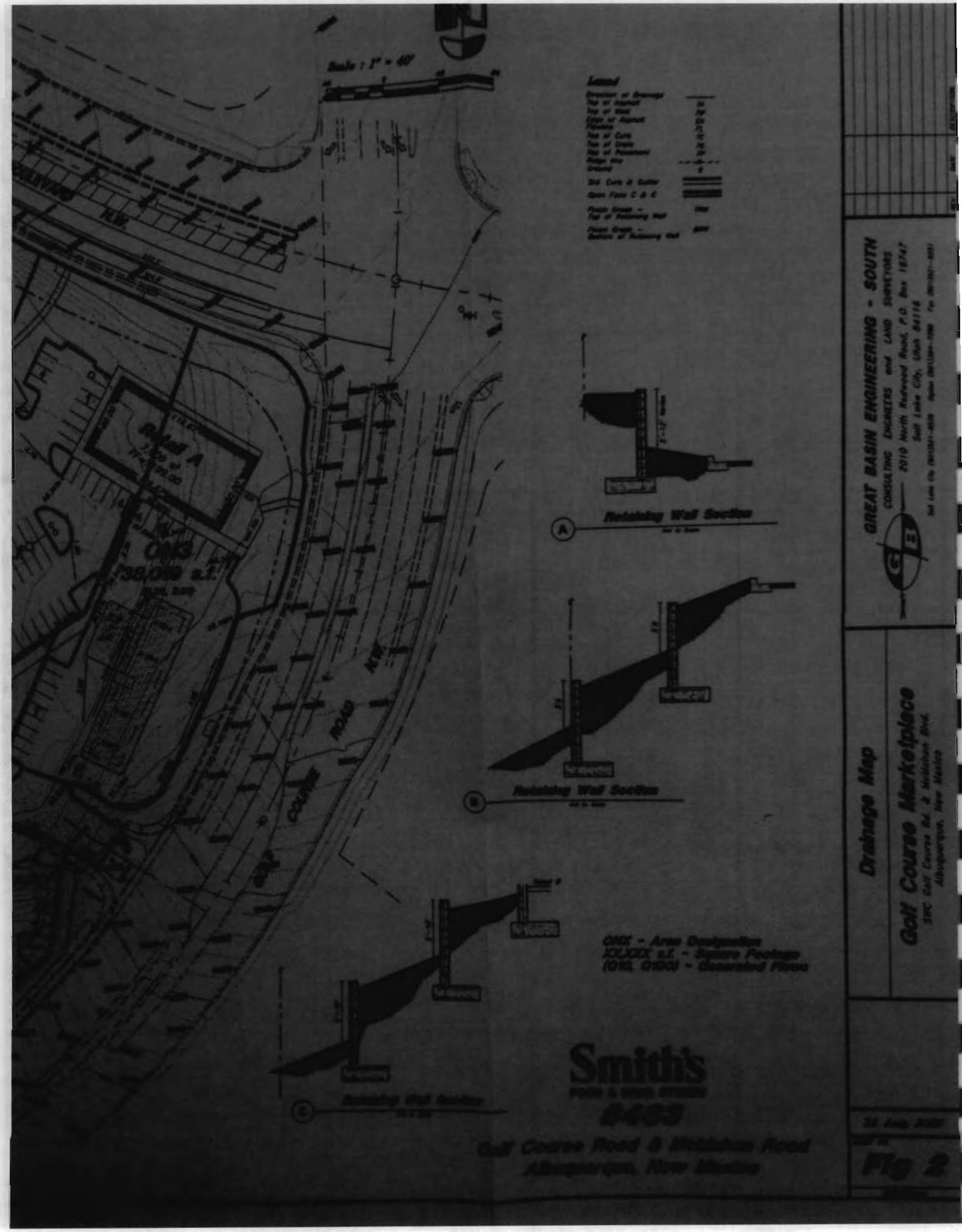
The site falls within Zone 1 for rainfall depths as identified in Section 22.2 of the City of Albuquerque DPM. The site was divided into on-site drainage areas based on the proposed grading plan of the site. Following the procedures proscribed in section 22.2 each area was determined to be 90% impervious with 10% pervious area (see Figure 2). A peak flow rate per acre based on the 90/10 breakdown was then determined per section 22.2 (see Appendix A).

IV. Proposed Conditions and On-Site Storm Water Management Plan

The site has been designed to capture all on-site storm water, with the exception of ON4, in a storm drain system and pipe the flows to the arroyo. Area ON4 will drain 1.17 cfs in a 100-year event directly to Golf Course Road. The on-site piping system has been sized to accommodate the 100-year event. A hydraulic grade line analysis has been completed for each leg of the system. Figure 3 is the outfall line from the arroyo to the first split of the system at the back of Retail B. Figure 4 is the storm drain system from the back of Retail B to the inlet box in the front of the Smith's Fuel Center. Figure 5 is the storm drain system along the front of the grocery store and Figure 6 is the storm drain system along the back of the grocery store, this line also captures all of the storm water from the roof of the store. (See Appendix B for a complete printout of the HGL Analysis)




ON1
83,147 s.f.
ON2
Bldg1
57,153 s.f.
Smith's


Scale : 1" = 40'
Retaining Wall Section
Retaining Wall Section
Retaining Wall Section
GREAT BASIN ENGINEERING - SOUTH
Drainage Map
Golf Course Marketplace
Smith's
#469
Golf Course Road & Middleton Road
Albuquerque, New Mexico
Fig 2

Peak Flow Calculations
Smith's #463 Golf Course & McMahon
Albuqueruque, NM 8/24/05

Treatment Type	Q cfs/acre 10-yr	Q cfs/acre 100-yr (Zone 1)
B	0.76	2.03
D	2.89	4.37

ON1

	S.F.	Acres
Total Area =	83147	1.91
Landscape (10%)	8314.7	0.191
Hardsurface (90%)	74832.3	1.718

Q_{10}= 5.11
Q_{100}= 7.89

ON2

	S.F.	Acres
Total Area =	76629	1.759
Landscape (10%)	7662.9	0.176
Hardsurface (90%)	68966.1	1.583

Q_{10}= 4.71
Q_{100}= 7.28

ON3

	S.F.	Acres
Total Area =	38019	0.873
Landscape (10%)	3801.9	0.087
Hardsurface (90%)	34217.1	0.786

Q_{10}= 2.34
Q_{100}= 3.61

ON4

	S.F.	Acres
Total Area =	12325	0.283
Landscape (10%)	1232.5	0.028
Hardsurface (90%)	11092.5	0.255

Q_{10}= 0.76
Q_{100}= 1.17

ON5

	S.F.	Acres
Total Area =	16615	0.386
Landscape (10%)	1661.5	0.039
Hardsurface (90%)	15133.5	0.347

Q_{10}= 1.03

Q_{100}= 1.60

ON6

	S.F.	Acres
Total Area =	17422	0.400
Landscape (10%)	1742.2	0.040
Hardsurface (90%)	15679.8	0.360

Q_{10}= 1.07

Q_{100}= 1.65

ON7

	S.F.	Acres
Total Area =	18812	0.432
Landscape (10%)	1881.2	0.043
Hardsurface (90%)	16930.8	0.389

Q_{10}= 1.16

Q_{100}= 1.79

ON8

	S.F.	Acres
Total Area =	20772	0.477
Landscape (10%)	2077.2	0.048
Hardsurface (90%)	18694.8	0.429

Q_{10}= 1.28

Q_{100}= 1.97

ON9-1

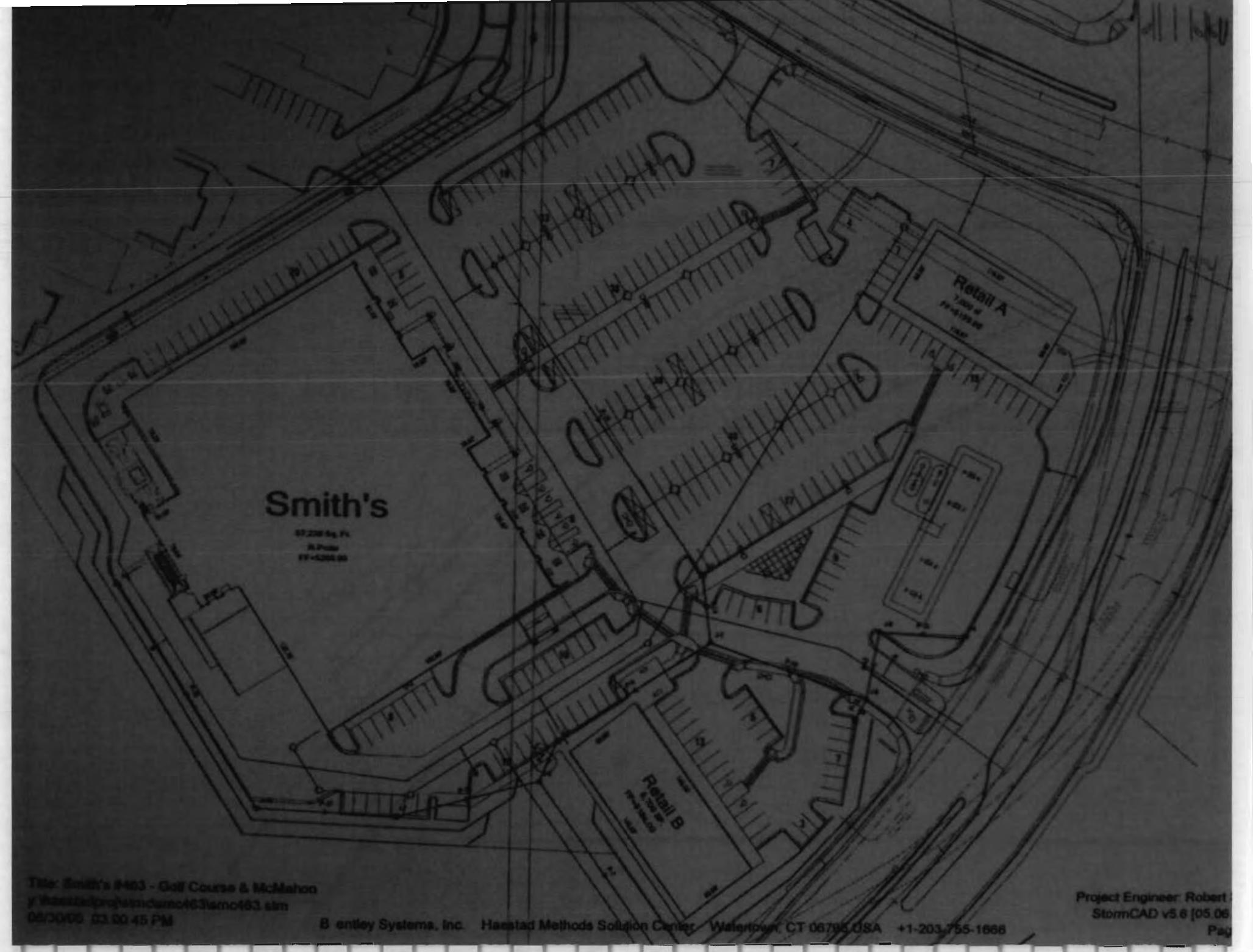
	S.F.	Acres
Total Area =	57163	1.312
Landscape (0%)	0	0.000
Hardsurface (100%)	57163	1.312

Q_{10}= 3.78

Q_{100}= 5.73

Q_{10} = 32.69

Q_{100} = 32.41



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Bentley Systems, Inc. Haestad Methods SolBon Center Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Robert
StormCAD v5.6 [05.06
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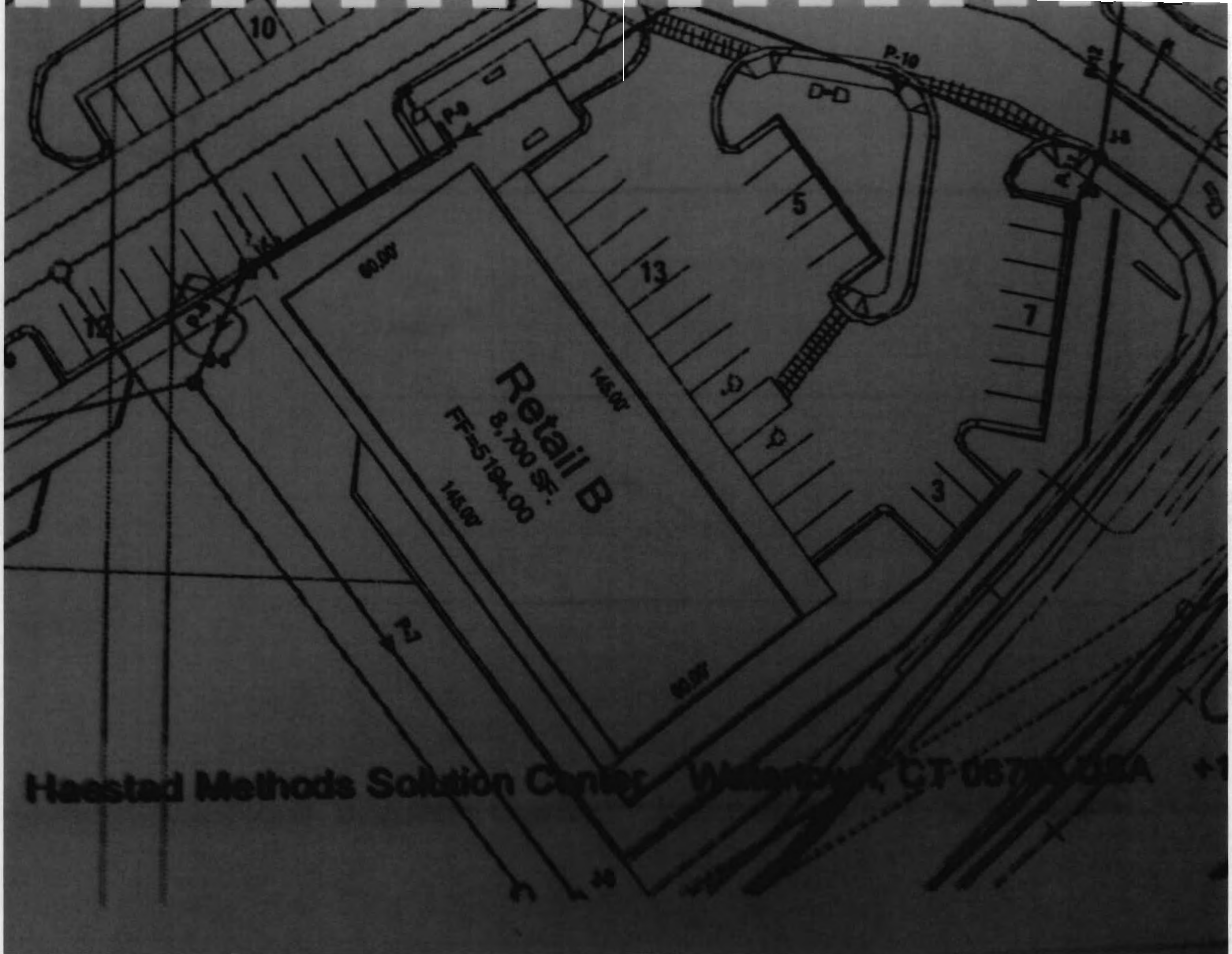
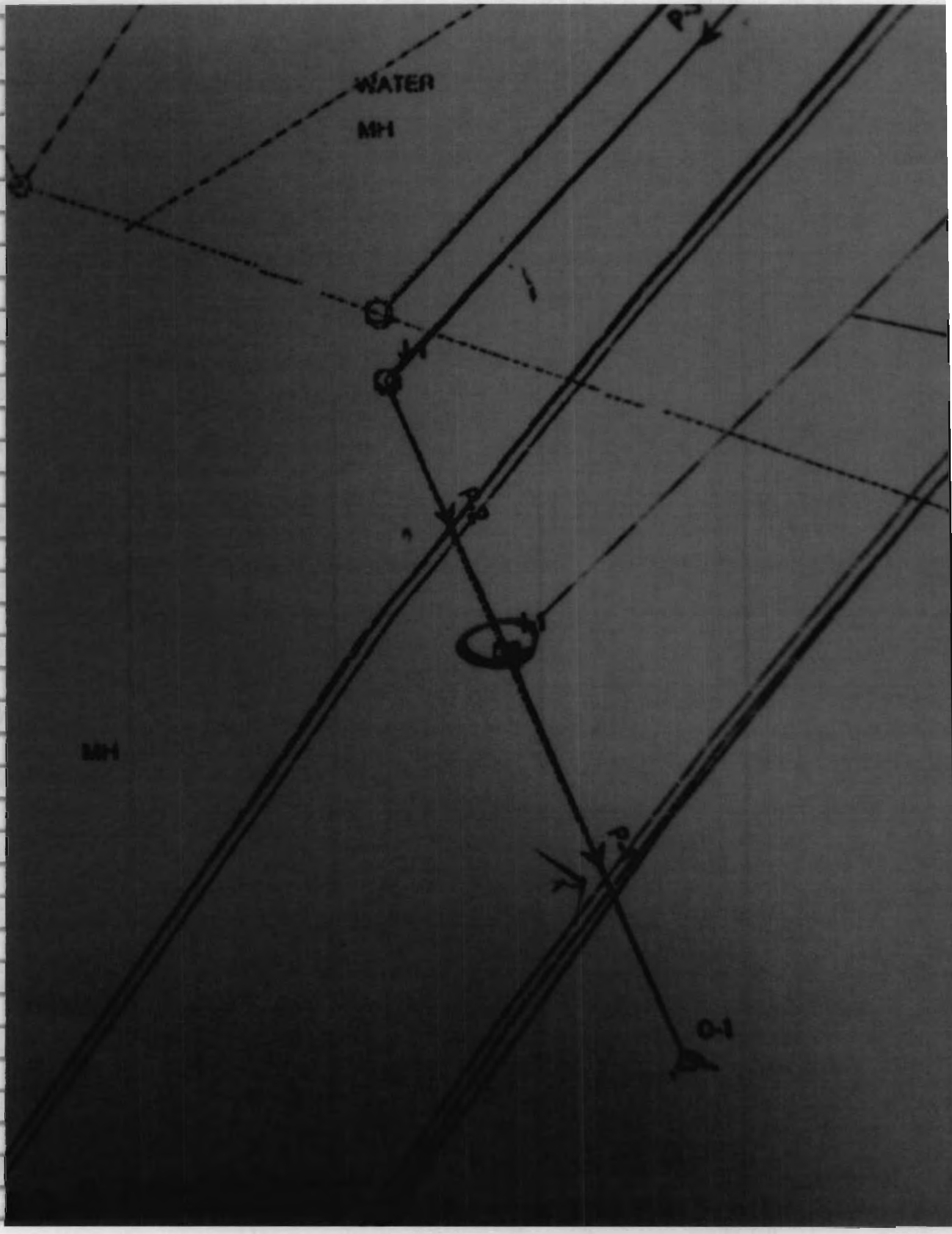
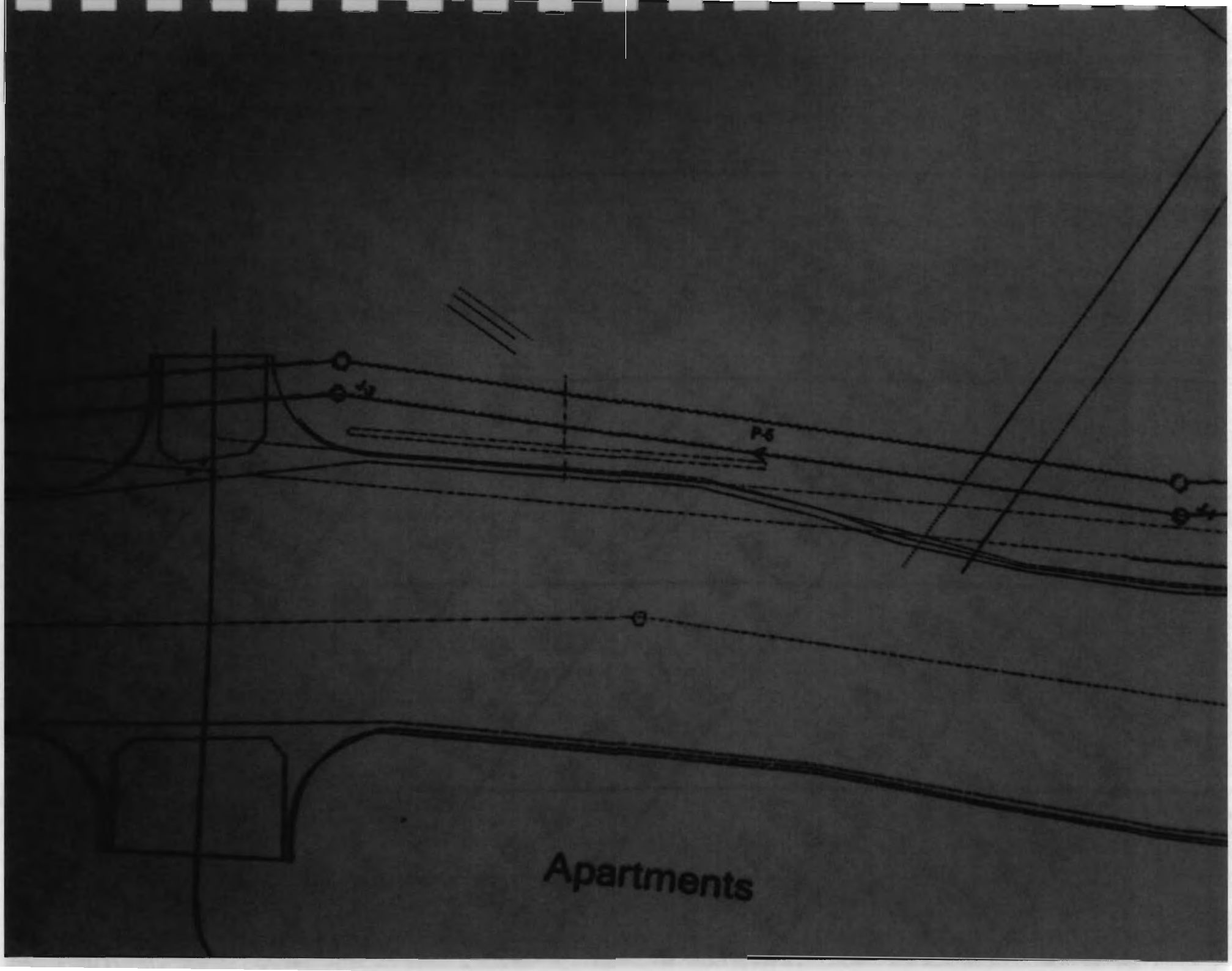


Retail B
8,700 SF.
FF=5194.00
60.00'
145.00'
145.00'
60.00'
P-10
13
5
7
3
10
12
Haestad Methods Solution Center


WATER
MH
MH
O-1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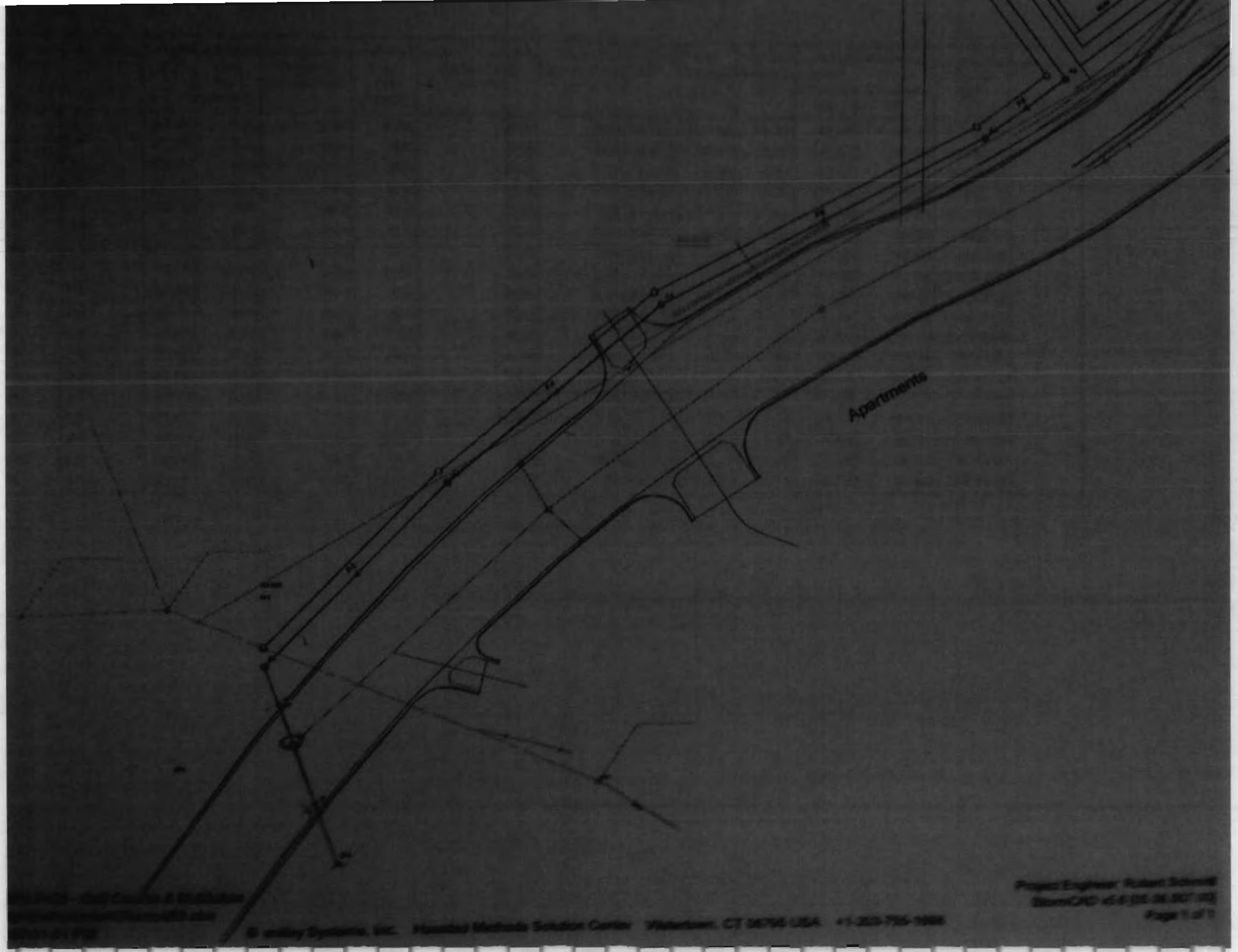
Apartments


Apartments

Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	Upstream Inlet Rational Flow (cfs)	Section Size	Full Capacity (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Des
P-1	I-1	O-1	67.00	0.00	0.00	0.00	0.00	0.00	42 inch	130.33	13.55	42.90	41.44	0.016782	
P-2	J-1	I-1	57.00	N/A	N/A	N/A	0.00	N/A	30 inch	68.72	13.70	44.60	43.00	0.028070	
P-3	J-2	J-1	179.00	N/A	N/A	N/A	0.00	N/A	36 inch	32.31	5.21	45.02	44.60	0.002346	
P-4	J-3	J-2	200.00	N/A	N/A	N/A	0.00	N/A	36 inch	32.33	5.21	45.49	45.02	0.002350	
P-5	J-4	J-3	263.00	N/A	N/A	N/A	0.00	N/A	24 inch	36.27	13.00	54.33	47.57	0.025703	
P-6	J-5	J-4	74.00	N/A	N/A	N/A	0.00	N/A	24 inch	45.55	15.85	62.00	59.00	0.040541	
P-7	J-6	J-5	163.00	N/A	N/A	N/A	0.00	N/A	24 inch	70.87	21.90	78.00	62.00	0.098160	
P-8	I-2	J-6	32.00	0.00	0.00	0.00	0.00	0.00	24 inch	21.90	7.95	82.69	82.39	0.009375	
P-9	J-7	I-2	132.00	N/A	N/A	N/A	0.00	N/A	24 inch	22.45	6.49	83.99	82.69	0.009848	
P-10	J-8	J-7	120.00	N/A	N/A	N/A	0.00	N/A	15 inch	6.38	4.25	85.16	83.99	0.009750	
P-11	I-3	J-8	17.00	0.00	0.00	0.00	0.00	0.00	12 inch	3.35	2.04	85.31	85.16	0.008824	
P-12	J-9	J-8	50.00	N/A	N/A	N/A	0.00	N/A	12 inch	3.53	4.60	85.65	85.16	0.009800	
P-13	I-4	J-9	61.00	0.00	0.00	0.00	0.00	0.00	12 inch	3.50	4.60	86.24	85.65	0.009672	
P-14	I-5	J-7	50.00	0.00	0.00	0.00	0.00	0.00	18 inch	24.32	14.51	91.68	89.00	0.053600	
P-15	I-6	I-5	271.00	0.00	0.00	0.00	0.00	0.00	15 inch	6.44	6.43	94.37	91.68	0.009926	
P-16	I-7	J-6	105.00	0.00	0.00	0.00	0.00	0.00	15 inch	12.81	11.43	86.52	82.39	0.039333	
P-17	J-10	I-7	99.00	N/A	N/A	N/A	0.00	N/A	15 inch	7.79	6.27	87.96	86.52	0.014545	
P-18	I-8	J-10	187.00	0.00	0.00	0.00	0.00	0.00	15 inch	7.85	6.27	90.72	87.96	0.014759	

Label	Upstream Node	Downstream Node	Length (ft)	Upstream Inlet Area (acres)	Up
P-1	I-1	O-1	87.00	0.00	
P-2	J-1	I-1	57.00	N/A	
P-3	J-2	J-1	179.00	N/A	
P-4	J-3	J-2	200.00	N/A	
P-5	J-4	J-3	263.00	N/A	
P-6	J-5	J-4	74.00	N/A	
P-7	J-6	J-5	163.00	N/A	
P-8	I-2	J-6	32.00	0.00	
P-9	J-7	I-2	132.00	N/A	
P-10	J-8	J-7	120.00	N/A	
P-11	I-3	J-8	17.00	0.00	
P-12	J-9	J-8	50.00	N/A	
P-13	I-4	J-9	61.00	0.00	
P-14	I-5	J-7	50.00	0.00	
P-15	I-6	I-5	271.00	0.00	
P-16	I-7	J-6	105.00	0.00	
P-17	J-10	I-7	99.00	N/A	
P-18	I-8	J-10	187.00	0.00	

m	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	Upstream Rational (cfs)
0	0.00	0.00	0.00	
A	N/A	N/A	0.00	
A	N/A	N/A	0.00	
A	N/A	N/A	0.00	
A	N/A	N/A	0.00	
A	N/A	N/A	0.00	
A	N/A	N/A	0.00	
0	0.00	0.00	0.00	
A	N/A	N/A	0.00	
A	N/A	N/A	0.00	
0	0.00	0.00	0.00	
A	N/A	N/A	0.00	
0	0.00	0.00	0.00	
0	0.00	0.00	0.00	
0	0.00	0.00	0.00	
0	0.00	0.00	0.00	
			0.00	
			0.00	

pstream Inle ational Flow (cfs)	Section Size	Full Capacity (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstre Invert Elevatio (ft)
0.00	42 inch	130.33	13.55	42.90	41.
N/A	30 inch	68.72	13.70	44.60	43.
N/A	36 inch	32.31	5.21	45.02	44.
N/A	36 inch	32.33	5.21	45.49	45.
N/A	24 inch	36.27	13.00	54.33	47.
N/A	24 inch	45.55	15.65	62.00	59.
N/A	24 inch	70.87	21.90	78.00	62.
0.00	24 inch	21.90	7.95	82.69	82.
N/A	24 inch	22.45	6.49	83.99	82.
N/A	15 inch	6.38	4.25	85.16	83.
0.00	12 inch	3.35	2.04	85.31	85.
N/A	12 inch	3.53	4.60	85.65	85.
0.00	12 inch	3.50	4.60	86.24	85.
0.00	18 inch	24.32	14.51	91.68	89.
0.00	15 inch	6.44	6.43	94.37	91
0.00	15 inch	12.81	11.43	86.52	82
N/A	15 inch	7.79	6.27	87.96	86
0.00	15 inch	7.85	6.27	90.72	87

Scenario: Base

undersized

missing to the South? 36"

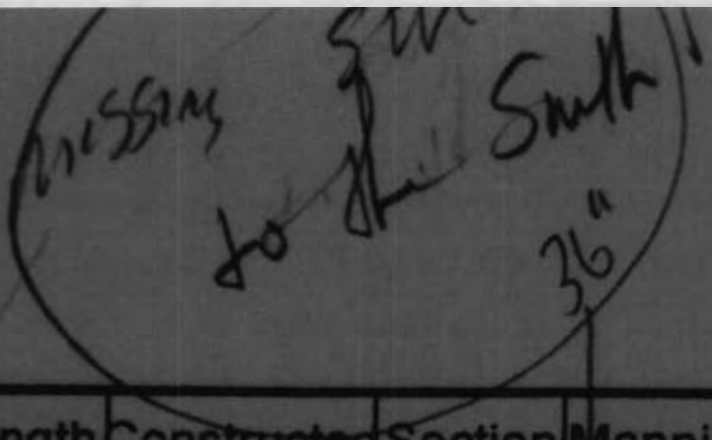
Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)
P-1	I-1	O-1	0.00	0.00	0.00	0.00	0.00	65.23	87.00	0.016782	42 inch	0.013	130.33
P-2	J-1	I-1	N/A	N/A	N/A	0.00	0.00	31.52	57.00	0.028070	30 inch	0.013	68.72
P-3	J-2	J-1	N/A	N/A	N/A	0.00	0.00	31.52	179.00	0.002346	36 inch	0.013	32.31
P-4	J-3	J-2	N/A	N/A	N/A	0.00	0.00	31.52	200.00	0.002350	36 inch	0.013	32.33
P-5	J-4	J-3	N/A	N/A	N/A	0.00	0.00	31.52	263.00	0.025703	24 inch	0.013	36.27
P-6	J-5	J-4	N/A	N/A	N/A	0.00	0.00	31.52	74.00	0.040541	24 inch	0.013	45.55
P-7	J-6	J-5	N/A	N/A	N/A	0.00	0.00	31.52	163.00	0.098160	24 inch	0.013	70.87
P-8	I-2	J-6	0.00	0.00	0.00	0.00	0.00	22.03	32.00	0.009375	24 inch	0.013	21.90
P-9	J-7	I-2	N/A	N/A	N/A	0.00	0.00	20.36	132.00	0.009848	24 inch	0.013	22.45
P-10	J-8	J-7	N/A	N/A	N/A	0.00	0.00	6.21	120.00	0.006750	18 inch	0.013	6.38
P-11	I-3	J-8	0.00	0.00	0.00	0.00	0.00	1.50	17.00	[illegible]	15 inch	0.013	3.35
P-12	J-9	J-8	N/A	N/A	N/A	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P-13	I-4	J-9	0.00	0.00	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P-14	I-5	J-7	0.00	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P-15	I-6	I-5	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P-16	I-7	J-6	0.00	0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P-17	J-10	I-7	N/A	N/A	N/A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
P-18	I-8	J-10	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Ups In (ac
P-1	I-1	O-1	0.00	0.00	
P-2	J-1	I-1	N/A	N/A	
P-3	J-2	J-1	N/A	N/A	
P-4	J-3	J-2	N/A	N/A	
P-5	J-4	J-3	N/A	N/A	
P-6	J-5	J-4	N/A	N/A	
P-7	J-6	J-5	N/A	N/A	
P-8	I-2	J-6	0.00	0.00	
P-9	J-7	I-2	N/A	N/A	
P-10	J-8	J-7	N/A	N/A	
P-11	I-3	J-8	0.00	0.00	
P-12	J-9	J-8	N/A	N/A	
P-13	I-4	J-9	0.00	0.00	
P-14	I-5	J-7	0.00	0.00	
P-15	I-6	I-5	0.00	0.00	
P-16	I-7	J-6	0.00	0.00	
P-17	J-10	I-7	N/A	N/A	
P-18	I-8	J-10	0.00	0.00	

Pipe Report

Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Leng (ft)
0.00	0.00	0.00	0.00	35.23	87.0
N/A	N/A	0.00	0.00	31.52	57.0
N/A	N/A	0.00	0.00	31.52	179.
N/A	N/A	0.00	0.00	31.52	200.
N/A	N/A	0.00	0.00	31.52	263.0
N/A	N/A	0.00	0.00	31.52	74.0
N/A	N/A	0.00	0.00	31.52	163.
0.00	0.00	0.00	0.00	22.03	32.0
N/A	N/A	0.00	0.00	20.38	132.0
N/A	N/A	0.00	0.00	5.21	120.
0.00	0.00	0.00	0.00	1.60	17.
N/A	N/A	0.00	0.00	3.61	50.0
0.00	0.00	0.00	0.00	3.61	61.0
0.00	0.00	0.00	0.00	15.17	50.
0.00	0.00	0.00	0.00	7.56	271.
0.00	0.00	0.00	0.00	9.49	105.0
N/A	N/A	0.00	0.00	7.70	89.
0.00	0.00	0.00	0.00	7.70	187.



System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)
0.00	65.23	87.00	0.016782	42 inch	0.013	130.33
0.00	31.52	57.00	0.028070	30 inch	0.013	68.72
0.00	31.52	179.00	0.002346	36 inch	0.013	32.31
0.00	31.52	200.00	0.002350	36 inch	0.013	32.33
0.00	31.52	263.00	0.025703	24 inch	0.013	36.27
0.00	31.52	74.00	0.040541	24 inch	0.013	45.55
0.00	31.52	163.00	0.098160	24 inch	0.013	70.87
0.00	22.03	32.00	0.009375	24 inch	0.013	21.90
0.00	20.38	132.00	0.009848	24 inch	0.013	22.45
0.00	5.21	120.00	0.009750	15 inch	0.013	6.38
0.00	1.60	17.00	0.008824	12 inch	0.013	3.35
0.00	3.61	50.00	0.009800	12 inch	0.013	3.53
0.00	3.61	61.00	0.009672	12 inch	0.013	3.50
0.00	15.17	50.00	0.053600	18 inch	0.013	24.32
0.00	7.89	271.00	0.009926	15 inch	0.013	8.44
0.00	9.49	105.00	0.039333	15 inch	0.013	12.81
0.00	7.70	99.00	0.014545	15 inch	0.013	7.79
0.00	7.70	187.00	0.014759	15 inch	0.013	7.85

Pipe Report

Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
42.90	41.44	50.76	45.00	4.36	0.06	45.43	43.32	
44.60	43.00	51.00	50.76	3.90	5.26	46.51	46.38	
45.02	44.60	49.39	51.00	1.37	3.40	47.62	47.27	
45.49	45.02	51.40	49.39	2.91	1.37	48.21	47.84	
54.33	47.57	64.90	51.40	8.57	1.83	56.21	49.01	
62.00	59.00	67.50	64.90	3.50	3.90	63.88	60.31	
78.00	62.00	95.00	67.50	15.00	3.50	79.88	65.20	
82.69	82.39	93.22	95.00	8.53	10.61	84.37	84.04	
83.99	82.69	95.00	93.22	9.01	8.53	86.01	84.94	
85.16	83.99	88.56	95.00	2.15	9.76	87.38	86.60	
85.31	85.16	88.74	88.56	2.43	2.40	87.67	[illegible]	
85.65	85.16	91.31	88.56	4.66	2.40	88.14	[illegible]	
86.24	85.65	90.82	91.31	3.58	4.68	89.03	[illegible]	
91.68	89.00	95.58	95.00	2.38	4.50	[illegible]	[illegible]	
94.37	91.68	98.12	96.68	2.50	[illegible]	[illegible]	[illegible]	
86.52	82.39	92.57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
87.96	86.52	93.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
90.72	87.96	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

Scenario: Base

Outlet Report

Label	Station (ft)	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Sump Elevation (ft)	Tailwater Condition	Tailwater Elevation (ft)	Description
O-1	0+00	45.00	true	45.00	41.44	Free Outfa		

Junction Repor

Label	Calculated Station (ft)	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Sump Elevation (ft)	Bolted Cover?	Structure Diameter (ft)	Descripti
J-10	12+27	93.00	true	93.00	87.96	false	4.00	
J-9	13+57	91.31	true	91.31	85.65	false	4.00	
J-8	13+07	88.56	true	88.56	85.16	false	4.00	
J-7	11+87	95.00	true	95.00	83.99	false	6.00	
J-6	10+23	95.00	true	95.00	78.00	false	6.00	
J-5	8+60	67.50	true	67.50	62.00	false	6.00	
J-4	7+86	64.90	true	64.90	64.30	false	6.00	
J-3	5+23	51.40	true	51.40	49.30	false	6.00	
J-2	3+23	49.30	true	49.30	48.00	false	6.00	
J-1	1+44	51.00	true	51.00	49.00	false	6.00	

Scenario: Base

Inlet Report

[illegible]	Calculated Station (ft)	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Sump Elevation (ft)	Area (acres)	Inlet C	Inlet CA (acres)	Time of Concentration (min)	External CA (acres)	External Time of Concentration (min)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Inlet	Inlet Location
	14+14	94.22	true	94.22	90.72	0.00	0.00	0.00	0.00	0.00	0.00	7.70	0.00	0.00	Generic Default 10	In Sag
	11+28	92.57	true	92.57	86.52	0.00	0.00	0.00	0.00	0.00	0.00	1.79	0.00	0.00	Generic Default 10	In Sag
	15+08	98.12	true	98.12	94.37	0.00	0.00	0.00	0.00	0.00	0.00	7.89	0.00	0.00	Generic Default 10	In Sag
	12+37	95.56	true	95.56	91.68	0.00	0.00	0.00	0.00	0.00	0.00	7.26	0.00	0.00	Generic Default 10	In Sag
	14+18	90.82	true	90.82	86.24	0.00	0.00	0.00	0.00	0.00	0.00	3.61	0.00	0.00	Generic Default 10	In Sag
	13+24	88.74	true	88.74	85.31	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.00	0.00	Generic Default 10	In Sag
	10+55	93.22	true	93.22	82.69	0.00	0.00	0.00	0.00	0.00	0.00	1.65	0.00	0.00	Generic Default 10	In Sag
	0+87	50.76	true	50.76	42.90	0.00	0.00	0.00	0.00	0.00	0.00	33.71	0.00	0.00	Generic Default 10	In Sag

Label	Calculated Station (ft)	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?
I-8	14+14	94.22	true
I-7	11+28	92.57	true
I-6	15+08	98.12	true
I-5	12+37	95.56	true
I-4	14+18	90.82	true
I-3	13+24	88.74	true
I-2	10+55	93.22	true
I-1	0+87	50.76	true

Scenario: Base

Inlet Report

	Inlet C	Inlet CA (acres)	Time of Concentration (min)	External CA (acres)	External Time of Concentration (min)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Inlet	Inlet Location	Des
0	0.00	0.00	0.00	0.00	0.00	7.70	0.00	0.00	Generic Default 10	In Sag	
0	0.00	0.00	0.00	0.00	0.00	1.79	0.00	0.00	Generic Default 10	In Sag	
0	0.00	0.00	0.00	0.00	0.00	7.89	0.00	0.00	Generic Default 10	In Sag	
0	0.00	0.00	0.00	0.00	0.00	7.28	0.00	0.00	Generic Default 10	In Sag	
0	0.00	0.00	0.00	0.00	0.00	3.61	0.00	0.00	Generic Default 10	In Sag	
0	0.00	0.00	0.00	0.00	0.00	1.60	0.00	0.00	Generic Default 10	In Sag	
0	0.00	0.00	0.00	0.00	0.00	1.65	0.00	0.00	Generic Default 10	In Sag	
0	0.00	0.00	0.00	0.00	0.00	33.71	0.00	0.00	Generic Default 10	In Sag	

APPENDIX C

(EXCERPT)

DRAINAGE STUDY

FOR THE

PUERTA DEL SOL APARTMENTS

BERNALILLO COUNTY NEW MEXICO

AUGUST, 1984

Approved as meeting
AMAFCA Requirements
Dan Salo
10/19/84

CITY OF ALBUQUERQUE

December 18, 2007

Tom Gattis
Mark Goodwin & Associates, P.A.
P.O. Box 90606
Albuquerque, NM 87199

Re: Paradise North Commerce Center, Tract 1B-1, Site Development Plan
Engineer's Stamp dated: No Stamp Date (A-12/D001)

Mr. Gattis,

Based upon the information provided in your submittal received 12-03-07, the above referenced plan cannot be approved for Site Development Plan until the following comments are addressed:

1. All plans and calculations must be stamped, signed, and dated.
2. Prior to the City's approval, AMAFCA's approval is required for all work adjoining the arroyo.

If you have any questions, you can contact me at 924-3982.

Sincerely,

Timothy Sims
Plan Checker - Hydrology, Planning Dept.
Development and Building Services

C: BLB Bradley L. Bingham
file

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

D. Mark Goodwin & Associates, P.A.
Consulting Engineers
P.O. BOX 90606, ALBUQUERQUE, NM 87199
(505) 828-2200 FAX 797-9539

November 30, 2007

Mr. Brad Bingham
Hydrology Department
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Paradise North Commerce Center

Dear Mr. Bingham:

This package is in reference to the proposed commercial development entitled "Paradise North Commerce Center". This site is located on Golf Course Road approximately 1000 feet south of the intersection of Golf Course and McMahon Boulevard.

I am sending you a copy of the Conceptual Grading & Drainage Plan that was submitted to, and approved by EPC, as well as pertinent information pertaining to the hydrological conditions of the area. We are requesting a Conceptual Grading & Drainage Plan Approval from hydrology in order to obtain Site Pan Approval at DRB.

Off-Site Flows:
The site has one off-site flow source, located to the northwest from the Puerta Del Sol Apartments. The Drainage Study for Puerta Del Sol Apartments (1984), identifies a small portion of the roof drainage from the rear of the apartments (Sub-Basin 6), as draining toward the Paradise North site. The area and land treatment stated in the report was used to develop a new AHYMO model, and a 100-Year flow of 0.5 cfs was calculated exiting the apartments. Approximately 1.0 cfs, was identified on the Conceptual Grading & Drainage Plan as entering our site. It is intended that the final design of the Paradise North site will provide adequate conveyance within the parking area for the 1.0 cfs. A copy of the AHYMO model and an excerpt from the Puerta Del Sol report is included in this package.

Currently, a Smith's Food and Drug is being constructed to the north of the site. Per the Storm Water Analysis for Smith's #463 (2005), all on-site drainage from Smith's will either be contained in an underground pipe system or will drain to McMahon Boulevard to the east. No drainage was identified as leaving the Smith's site to the south.

On-Site Flows:
In order to determine the 100-Year flow for the entire site, the total site area was combined with the flow from the apartments in the AHYMO model. Under developed conditions, a total of 58.5 cfs will approach the site's southern border. The flow will then enter a grated inlet / pipe system, and discharge directly to the Calabacillas Arroyo at one point. It is expected that upon the final design of this site, a second inlet and connector pipe may be needed. However, the single discharge point into the arroyo is not expected to change.

Please feel free to contact our office with any questions you may have.

Sincerely,

MARK GOODWIN & ASSOCIATES, PA

Tom Gattis
Project Engineer

TG/tg

F:\1-Projects\2007\A07059 - Paradise North Commerce\Drainage Ltr.doc

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*S***** BASIN 1 - ONSITE DEVELOPED 13.55 ACRES

COMPUTE NM HYD       ID=1 HYD NO=101 AREA=0.0212 SQ MI
                     PER A=0 PER B=6 PER C=9 PER D=85
                     TP=0.1333 HR MASS RAINFALL=-1

     K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   71.144    CFS   UNIT VOLUME =    .9992       B =   526.28      P60 = 1.9500
     AREA =      .018020 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


     K =   .116607HR    TP =   .133300HR    K/TP RATIO =   .874771     SHAPE CONSTANT, N =  4.059460
     UNIT PEAK =   8.5670    CFS   UNIT VOLUME =    .9989       B =   359.12      P60 = 1.9500
     AREA =      .003180 SQ MI    IA =    .41000 INCHES    INF =    .99800 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300

PRINT HYD            ID=1 CODE=24

                                   PARTIAL HYDROGRAPH   101.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
     .000        .0          1.998      13.7         3.996        .3         5.994        .4
     .666        .0          2.664       1.2         4.662        .3         6.660        .0
    1.332      16.1          3.330        .4         5.328        .3

    RUNOFF VOLUME =     1.86768 INCHES     =       2.1117 ACRE-FEET
    PEAK DISCHARGE RATE =      57.97 CFS  AT   1.499 HOURS   BASIN AREA =   .0212 SQ. MI.


*S
*S*****COMPUTE FLOW FROM SOUTHERN APARTMENTS OF PUERTA DEL
*S*****SOL APARTMENTS

COMPUTE NM HYD       ID=2 HYD NO=102 AREA=0.0002 SQ MI
                     PER A=0 PER B=32.5 PER C=0 PER D=67.5
                     TP=0.1333 HR MASS RAINFALL=-1

     K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   .53299    CFS   UNIT VOLUME =    .9785       B =   526.28      P60 = 1.9500
     AREA =      .000135 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


     K =   .131364HR    TP =   .133300HR    K/TP RATIO =   .985475     SHAPE CONSTANT, N =  3.583083
     UNIT PEAK =   .15913    CFS   UNIT VOLUME =    .9160       B =   326.34      P60 = 1.9500
     AREA =      .000065 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300
```

```
    AHYMO PROGRAM (AHYMO_97) -                          - Version:  1997.02d
         RUN DATE (MON/DAY/YR) = 09/24/2007
         START TIME (HR:MIN:SEC) = 16:19:11     USER NO.= AHYMO-I-9702dGoodwinM-AH
         INPUT FILE = F:\TomG\PARADI~1\PARADI~1.TXT

*S    AHYMO_97 MODEL FOR: PARADISE NORTH COMMERCE CENTER
*S    PREPARED FOR:  TG
*S    PREPARED BY:  MARK GOODWIN & ASSOCIATES
*S
*S    MODEL DESCRIPTION -
*S 1. 100-YEAR 6-HOUR RAINFALL EVENT
*S 2. THIS MODEL ASSUMES DEVELOPED CONDITIONS
*S
START              TIME=0.0
*S***** AHYMO -MCT. DAT
*S***** August 24, 2007
*S***** HYDROLOGY FOR PNCC DEVELOPED ONSITE

RAINFALL           TYPE=1 RAIN QUARTER=0.0 IN
                   RAIN ONE=1.95 IN RAIN SIX=2.27 IN
                   RAIN DAY=2.67 IN DT=0.0333 HR


                COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                DT =     .033300 HOURS       END TIME =     5.994000 HOURS
                   .0000   .0015   .0030   .0045   .0061   .0077   .0093
                   .0110   .0127   .0145   .0163   .0181   .0200   .0220
                   .0240   .0261   .0282   .0304   .0327   .0351   .0375
                   .0401   .0427   .0455   .0483   .0513   .0544   .0577
                   .0612   .0648   .0686   .0740   .0797   .0859   .0986
                   .1277   .1726   .2372   .3256   .4417   .5900   .7747
                  1.0002  1.2168  1.3056  1.3803  1.4467  1.5071  1.5627
                  1.6143  1.6624  1.7076  1.7501  1.7902  1.8281  1.8639
                  1.8979  1.9301  1.9606  1.9896  2.0172  2.0246  2.0304
                  2.0359  2.0411  2.0461  2.0509  2.0555  2.0600  2.0642
                  2.0683  2.0723  2.0761  2.0799  2.0835  2.0870  2.0904
                  2.0937  2.0970  2.1001  2.1032  2.1063  2.1092  2.1121
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                  2.1895  2.1912  2.1928  2.1945  2.1961  2.1977  2.1993
                  2.2009  2.2024  2.2040  2.2055  2.2070  2.2086  2.2100
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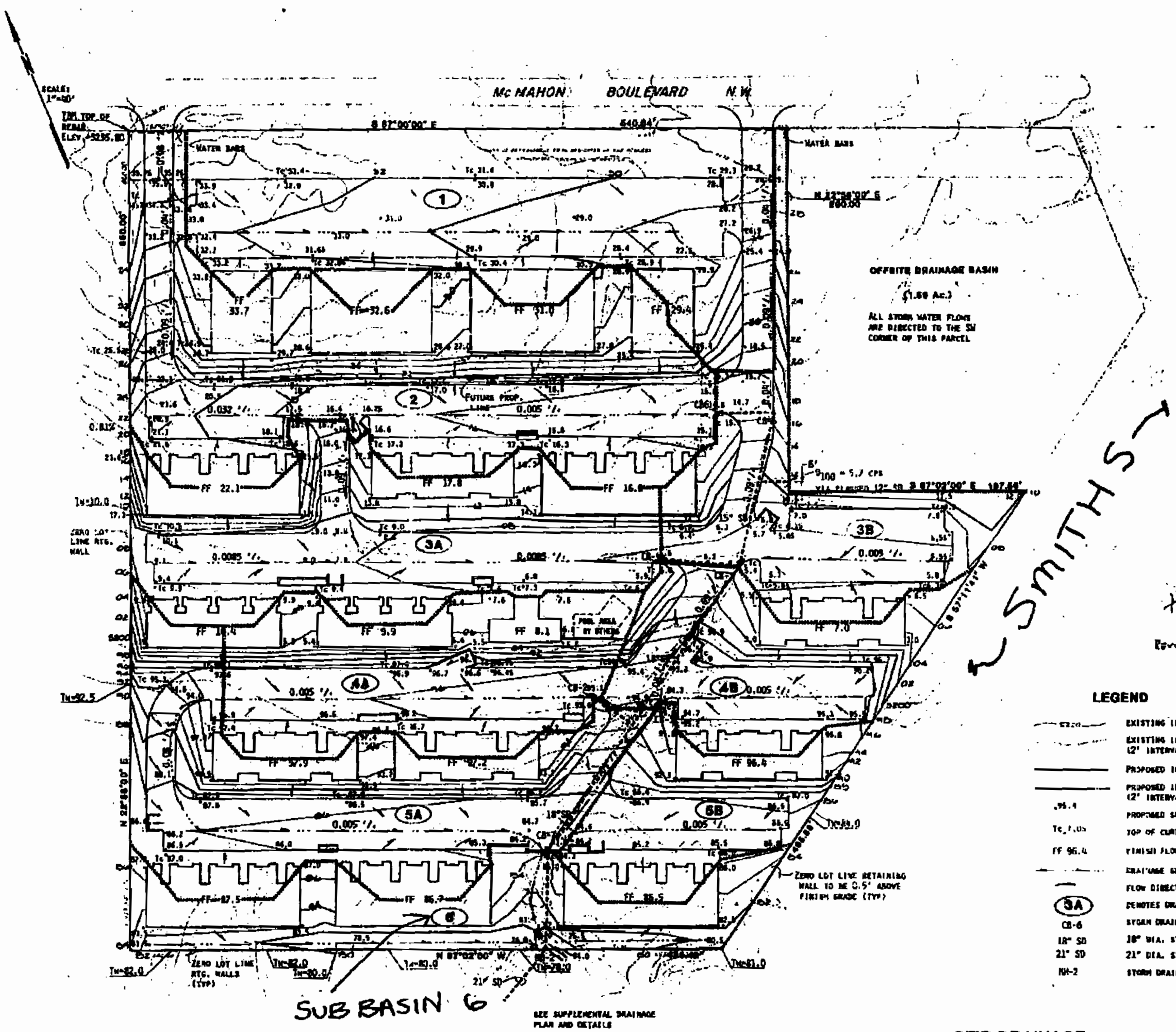


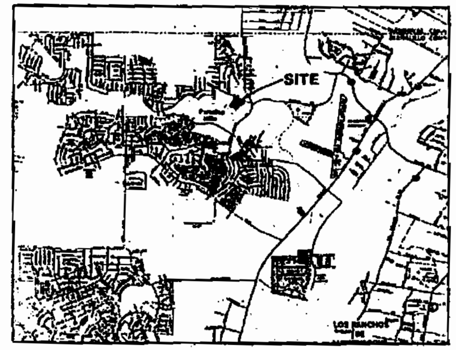
LEGEND

5220	EXISTING INDEX CONTOUR
	EXISTING INTERMEDIATE CONTOUR (2' INTERVALS)
	PROPOSED INDEX CONTOUR
	PROPOSED INTERMEDIATE CONTOUR (2' INTERVALS)
.96.4	PROPOSED SPOT ELEVATION
Tc 7.05	TOP OF CURB ELEVATION
FF 96.4	FINISH FLOOR ELEVATION
	DRAINAGE SWALE
	FLOW DIRECTIONAL ARROW
(5A)	DENOTES DRAINAGE BASIN
CB-6	STORM DRAINAGE CATCH BASIN
18" SD	18" DIA. STORM DRAIN
21" SD	21" DIA. STORM DRAIN
MH-2	STORM DRAIN MANHOLE

SITE DRAINAGE

EXHIBIT 1

← PARADISE NORTH →



VICINITY MAP

[illegible]
8-8-84
Revised 10-9-84 [illegible]

NOTES & CALCULATIONS

1. BENCHMARK: SITE'S NORTHWEST PROPERTY CORNER BEING A 5/8" CAPPED REBAR. ELEV. = 5235.80
2. LEGAL: "SUBDIVISION OF TRACT 2, TOWN OF ALAMEDA GRANT, LANDS OF HORIZON CORPORATION, PARADISE HILLS, BERNALILLO COUNTY, NEW MEXICO"
3. SITE IS NOT PART OF ANY FLOODPLAIN
4. SURVEYOR: HUGG SURVEYING CO.
   1701 CANDE S.E.
   [illegible] 87124
   (505) 892-8660
5. SOILS: SCS BERNALILLO COUNTY SURVEY MAP INDICATES SCC AND BaD (ON LOWER, SOUTHERLY QUARTER) AS FOUND ON SHEET 10.
   BLUEPOINT HAS A PERMEABILITY OF 6.0—20.0"/HR WITH A LOW SHRINK-SWELL POTENTIAL.
   HYDROLOGICAL SOIL GROUP 'A'
6. APARTMENTS SHALL BE CONSTRUCTED IN A SINGLE PHASE
7. TYPICAL ONSITE EROSION PROTECTION DURING CONSTRUCTION WILL BE MAINTAINED

OFFSITE DRAINAGE: AREA CONSISTS OF 1.59 ACRES TO THE NE

AT ULTIMATE DEVELOPMENT C=0.755 I=4.75

Q_{10} = 3.74 CFS Q_{100} = 5.70 CFS

V_{10} = 6,257 CU.FT. V_{100} = 9,523 CU.FT.

ALL OFFSITE FLOWS ARE ACCEPTED VIA A 12" DIA. PIPE AS SHOWN ON THIS PLAN.

ONSITE DRAINAGE (UNDEVELOPED)

BY AGREEMENT AND PROPOSED PLATTED DRAINAGE CROSSING EASEMENT, THIS SITE MUST ACCEPT THOSE DEVELOPED STORM WATERS FROM THE OFFSITE AREA TO THE NORTHEAST (Q_{100} = 5.7 CFS)

'C' = 0.30
I = 3.19 BASED ON 2.2" AND Tc = 22 MIN.

Q_{10} = 4.9 CFS Q_{100} = 7.3 CFS

V_{10} = 12,306 CU.FT. V_{100} = 18,730 CU.FT.

ONSITE DRAINAGE (DEVELOPED)

'C' = 0.65 I = 4.75 WHERE Tc = 10 MIN.

Q_{10} = 19.5 CFS Q_{100} = 29.68 CFS

V_{10} = 32,784 CU.FT. V_{100} = 49,900 CU.FT.

PLUS OFFSITE FLOWS

Q_{10} = 23.25 CFS Q_{100} = 35.38 CFS

V_{10} = 39,040 CU.FT. V_{100} = 59,423 CU.FT.

ALL STORM WATERS ARE ACCEPTED INTO THE STORM DRAIN SYSTEM.

AREA 5A: (75x95)+ (345x105)+ ½(65x35) − 4000+2704+860= 45677# = 1.05 acre

PAVED (2800x2) + 2704+560+ (85x24) + (45x24)+ (335x42)+(75x24) = 28154# = 0.646 ac

% IMPERVIOUS = .646 ÷ 1.05 = 61.6%

5B: (190x100) − 2060 + 2704 = 19644# = 0.451 ac

PAVED 2860+2704+ (165x42) = 12494# = 0.287 ac

% IMPERVIOUS = 0.287 ÷ 0.451 = 63.6%

(6:) (140x65)−2704 = 5996# = 0.138 ac. ←

PAVED 4056# = 0.093

% IMPERVIOUS = 0.093 ÷ 0.138 = 67.5% ←

7: (165x65) − 860 9865# = 0.226 acre

PAVED 2660# = 0.061 ac %IMPERVIOUS = 0.061 ÷ 0.226 = 27%

8: (135x65) − 2680 = 6095# = 0.140 acre

Paved 3380# = 0.078 ac % IMPERVIOUS = .078 ÷ .140 = 55.7%

9: (75x60) = 4500# = 0.103 acre

PAVED 676# = 0.016 ac % IMPERVIOUS = .016 ÷ .103 = 15.1%

OFFSITE: (275 x 252) = 69300# = 1.591 acre
(o) assume fully developed C=0.65

```
PRINT HYD          ID=2 CODE=24

                                PARTIAL HYDROGRAPH   102.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      .000       .0          1.332        .1          2.664        .0          3.996        .0          5.328        .0
      .666       .0          1.998        .1          3.330        .0          4.662        .0          5.994        .0

    RUNOFF VOLUME =     1.61003 INCHES     =        .0172 ACRE-FEET
    PEAK DISCHARGE RATE =         .50 CFS  AT    1.499 HOURS    BASIN AREA =    .0002 SQ. MI.


*S
*S ADD THE ROUTED FLOW FROM APARTMENTS AND PARADISE COMMERCE
*S TO DETERMINE TOTAL FLOW INTO STORM DRAIN
*S
ADD HYD                    ID=3 HYD=103 I=1 II=2
PRINT HYD               ID=3 CODE=10

                                PARTIAL HYDROGRAPH   103.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      .000       .0          1.665       29.9          3.330        .4          4.995        .3          6.660        .0
      .333       .0          1.998       13.8          3.663        .3          5.328        .3          6.993        .0
      .666       .0          2.331        2.9          3.996        .3          5.661        .3
      .999       .0          2.664        1.2          4.329        .3          5.994        .4
     1.332      16.2         2.997         .6          4.662        .3          6.327        .0

    RUNOFF VOLUME =     1.86525 INCHES     =       2.1289 ACRE-FEET
    PEAK DISCHARGE RATE =       58.47 CFS  AT    1.499 HOURS    BASIN AREA =    .0214 SQ. MI.


FINISH

    NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 16:19:11
```

FUNDING AGREEMENT
FOR CALABACILLAS ARROYO IMPROVEMENTS
AS RELATED TO SPECTRUM HOUSING DEVELOPMENT

This Agreement is made and entered into this 12th day of OCTOBER, 2011, by and between the Albuquerque Metropolitan Arroyo Flood Control Authority ("AMAFCA"), a political subdivision of the State of New Mexico, and Spectrum Acquisition - Albuquerque, LLC, a Colorado Limited Liability Company ("OWNER"), collectively referred to as the "PARTIES".

RECITALS:

1. **WHEREAS**, the engineering report entitled "Calabacillas Arroyo Prudent Line Study and Related Work, Evaluation of Existing Erosion-Risk Limits between Coors Road and Swinburne Dam," (the "Mussetter Study") prepared for AMAFCA by Mussetter Engineering, Inc., dated December 1998, identified improvements on the Calabacillas Arroyo ("Arroyo") between Unser Boulevard and Coors Road to maintain the Arroyo within the AMAFCA drainage easement. This easement is based on the erosion setback limit ("Simons and Li prudent line") that was established in the 1980's; and

2. **WHEREAS**, as property has developed along the Arroyo, AMAFCA has required construction of the improvements as identified in the Mussetter Study in order to protect adjacent developed properties from erosion and flood damage; and

3. **WHEREAS**, the OWNER plans to develop 13.5 acres adjacent to the Arroyo at the northwest corner of Golf Course Road as a retirement and assisted living facility (the "Development"), which will require the construction of 900 feet of bank stabilization and a grade control structure ("GCS 3c"), collectively referred to as the "Improvements", the location of which are shown on attached Exhibit "A"; and

4. **WHEREAS**, AMAFCA has identified funding previously collected from the developer of Paloma del Sol Subdivision to construct GCS 3b and related bank stabilization upstream of the Development, and has included this construction in its FY 2012 construction schedule; and

5. **WHEREAS**, it will be a time and cost savings benefit to the OWNER, AMAFCA and the public to combine construction of GCS 3c, GCS 3b and related bank stabilization into one project; and

6. **WHEREAS**, the OWNER has indicated a willingness to participate in the funding of the Improvements adjacent to its Development; and

7. **WHEREAS**, AMAFCA Resolution 1982-4, Cost-Sharing with Land Owners, provides for the private sector to share in the cost of flood control facilities; and

8. **WHEREAS**, the OWNER has indicated a willingness to participate in the funding of the Improvements adjacent to its Development; and

9. **WHEREAS**, the cost share of the Improvements, including One Hundred Percent (100%) of the bank stabilization and Thirty-Three Percent (33%) of GCS 3c, have been previously discussed and agreed upon by the OWNER and AMAFCA, as shown in the attached Cost Summary Table, Exhibit "C"; and

10. **WHEREAS**, AMAFCA has the capability to maintain the Improvements after construction.

NOW THEREFORE, IN CONSIDERATION OF THE PROMISES AND COVENANTS CONTAINED HEREIN, THE PARTIES AGREE AS FOLLOWS:

SECTION ONE - AMAFCA AGREES TO:

1.1. Review and, if appropriate, approve the plans for the Improvements as prepared by the OWNER's engineer.

1.2. Incorporate the plans for the Improvements into AMAFCA's construction plan set for GCS 3b, which will hereinafter be referred to as the "Project".

1.3. Provide specifications, cost estimates and bid documents for the Project.

1.4. Obtain a 404 Permit from the U.S. Army Corps of Engineers for the Project.

1.5. Advertise and bid the Project in compliance with the New Mexico State Procurement Code, Chapter 13.

1.6. Provide periodic inspection of the Project during the construction period by its staff to assure that construction is in conformance with the plans and specifications.

1.7. Administer the construction management of the Project, including surveying, testing, and inspection, and cause the Project to be constructed in substantial compliance with the construction drawings and contract documents.

1.8. Issue a Private Storm Drain License for the storm drain serving the Development, which will outfall to the Arroyo.

1.9. Issue an Encroachment Permit for construction of the storm drain within the AMAFCA easement.

1.10. Accept the OWNER's lump sum contribution of Five Hundred Fifteen Thousand Five Hundred Twenty Six Dollars ($515,526.00) ("OWNER's Contribution") as the prorata share for the Project, as outlined in the attached Cost Summary Table, Exhibit "C".

1.11. Fund all construction costs of the Project, including permitting, construction, and construction management services, in excess of the OWNER's Contribution.

1.12. Accept OWNER's Contribution as satisfying AMAFCA's drainage requirements from the OWNER with respect to the Arroyo and the Development, recognizing that local site drainage improvements for the Development will be required

1.13. Maintain the Arroyo within the limits of the existing AMAFCA drainage easement adjacent to the Development until such time as the Project is complete.

1.14. Maintain the Project upon completion and thereafter.

1.15. To approve release of the Certificate of Occupancy if requested before the Project is completed with the understanding that the occupied portion of the Development will be outside of the Simons and Li prudent line.

SECTION TWO - OWNER AGREES TO:

2.1. Cause to be designed, with an engineer's seal and signature, GCS 3c and related bank stabilization along the north bank of the Arroyo adjacent to the Development, as conceptually shown on attached Exhibit "B".

2.2. Provide to AMAFCA a set of construction plans for the Improvements for AMAFCA's review. The OWNER's engineer will the make necessary changes, if required, to obtain AMAFCA's signature for final approval.

2.3. Deliver to AMAFCA the OWNER's Contribution of Five Hundred Fifteen Thousand Five Hundred Twenty Six Dollars ($515,526.00) no later than seven (7) days prior to the bid of the construction contract for the Project. Payment may be made in the form of a check or money order made payable to "AMAFCA". If the OWNER fails to make payment in a timely manner, AMAFCA will not approve the release of the Certificate of Occupancy for the Development.

2.4. Maintain the storm drain connection from the Development to the Arroyo.

SECTION THREE – THE PARTIES AGREE:

3.1. AMAFCA's commitment to provide funding and to construct the Project identified in this Agreement is subject to the availability of funds and consideration of other flood control priorities in AMAFCA's district.

3.2. This Agreement will not set precedent as the basis of cost sharing for future developments within the area of the Musssetter Study.

3.3. This Agreement does not relieve the OWNER of the requirement to construct or to financially guarantee the construction of related drainage facilities or other improvements that may be required by the City of Albuquerque or any other agency for development of the Property.

3.4. Any circumstance which materially affects this Agreement will be promptly and equitably resolved by the PARTIES, and, if necessary, an amendment to this Agreement shall be executed.

3.5. Disputes under the Agreement, which cannot be resolved by the mutual agreement of the PARTIES, will be referred to binding arbitration under the provisions of the New Mexico Uniform Arbitration Act.

3.6. This Agreement may not be assigned by either PARTY without the written consent of the other PARTY, which consent shall not be unreasonably withheld.

3.7. Except as otherwise specifically provided herein, this Agreement shall be governed by and construed and enforced in accordance with the laws of the State of New Mexico.

3.8. All notices with respect to this Agreement shall be in writing and shall be delivered personally, via confirmed telefax, or sent postage prepaid by United States Mail, via certified mail, return receipt requested, to the addresses set forth below or other such addresses as hereafter specified in writing by one PARTY to the other:

AMAFCA	Spectrum Acquisition–Albuquerque, LLC
2600 Prospect N.E.	200 Spruce Street, Suite 6500
Albuquerque, New Mexico 87107	Denver, Colorado 80230
Attn: Executive Engineer	Attn: Mike Longfellow
Fax: (505) 884-0214	Fax: (303) 360-8814

3.9. This Agreement contains the entire Agreement between the PARTIES hereto, and all prior understandings, oral or written, by the PARTIES hereto with respect to this Agreement are hereby null and void. No variations, modifications, supplements, waivers or changes herein or hereof shall be binding upon any PARTY hereto unless set forth in a document duly executed by or on behalf of such PARTY.

3.10. If any provision of this Agreement, or the application thereof to a person or circumstance, shall be determined to be invalid or unenforceable to any extent, the remainder of the Agreement and the application of such provisions to other persons or circumstances shall

not be affected thereby, and such provisions shall be enforced to the greatest extent permitted by law.

3.11. This Agreement shall inure to the benefit of and shall be binding upon the undersigned PARTIES and their respective successors and assigns. Whenever in this Agreement a reference to the OWNER is made, such reference shall be deemed to include a reference to successors of the OWNER.

3.12. Each individual signing for each of the PARTIES hereunder warrants and represents that he/she is an authorized agent of such PARTY, on whose benefit he/she is executing this Agreement, and is authorized to execute the same.

3.13. Each PARTY agrees to execute such other and further instruments and documents as may be necessary or proper in order to complete the transactions contemplated by this Agreement.

3.15. In the event of any dispute regarding this Agreement, the prevailing PARTY shall be entitled to reimbursement of its costs and reasonable attorney's fees.

3.16. The OWNER shall indemnify and save harmless AMAFCA from all liability from claims for damages arising out of the negligence of the OWNER in performing his or her duties under this Agreement and for all claims arising pursuant to the design or construction of the Improvements. Each PARTY shall defend, indemnify, and hold harmless the other PARTY, its officers and employees, against all liability, claims, damages, losses or expenses arising out of bodily injury to persons or damage to property caused by, or resulting from, the actions and/or inactions of the indemnifying PARTY's and/or its employees', agents' or subcontractors' own negligent and/or intentional wrongful acts, omissions or performance or failure to perform its obligations and duties under the terms and conditions of this Agreement. No PARTY is required to indemnify any other PARTY for the negligent or intentional acts, errors or omissions of the other PARTY or their employees or agents. Each PARTY's indemnification obligation to the other PARTY shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for each PARTY, pursuant to laws, regulations, or policies of insurance, provided, however, this save harmless and indemnification clause is subject to the immunities, provisions and limitations of the Tort Claims Act (Section 41-4-1 et seq., N.M.S.A. 1979 comp.) and any amendments thereto. This Agreement to indemnify shall not extend to liability, claims, damages, losses or expenses, including attorney's fees, arising out of: 1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications by the indemnitee, or the agents or employees of the indemnitee; or 2.) the giving of or the failure to give directions or instructions by the indemnitee, or the agents or employees of the indemnitee, where the giving or failure to give directions or instructions is the primary cause of bodily injury to persons or damage to property. Nothing herein is intended or can be construed as requiring

AMAFCA to assume any liability resulting from the design or construction of the Improvements.

Executed the day and year first set out above.

Albuquerque Metropolitan Arroyo Flood Control Authority

By: _____
Danny Hernandez, Chairman
Board of Directors

ATTEST:

Bruce M Thomson
Bruce M. Thomson, Secretary/Treasurer

Date: 9/15/11

ACKNOWLEDGMENT

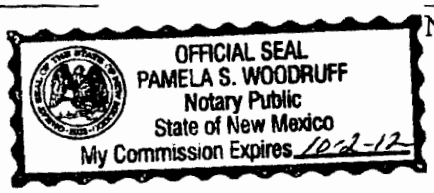
STATE OF NEW MEXICO)
)s.s.
COUNTY OF BERNALILLO)

This instrument was acknowledged before me on September 15, 2011, by Danny Hernandez, as Chairman of the Albuquerque Metropolitan Arroyo Flood Control Authority, a political subdivision of the State of New Mexico, on behalf of said political subdivision.

My Commission Expires:

10-2-12
(SEAL)

Pamela S. Woodruff
Notary Public



FUNDING AGREEMENT
FOR CALABACILLAS ARROYO IMPROVEMENTS
AS RELATED TO SPECTRUM HOUSING DEVELOPMENT

Spectrum Acquisition – Albuquerque, LLC

By: _____
Jeffrey D. Kraus, Manager

ACKNOWLEDGMENT

STATE OF Colorado)
)s.s.
COUNTY OF Denver)

This instrument was acknowledged before me on October 12th, 2011, by Jeffrey D. Kraus, as Manager of Spectrum Acquisition – Albuquerque, LLC, a Colorado limited liability company, on behalf of said company.

My Commission Expires:

1/12/15
(SEAL)

April N Cordova
Notary Public

APRIL N CORDOVA NOTARY PUBLIC STATE OF COLORADO

FUNDING AGREEMENT
FOR CALABACILLAS ARROYO IMPROVEMENTS
AS RELATED TO SPECTRUM HOUSING DEVELOPMENT

EXHIBIT "A"
Location Map

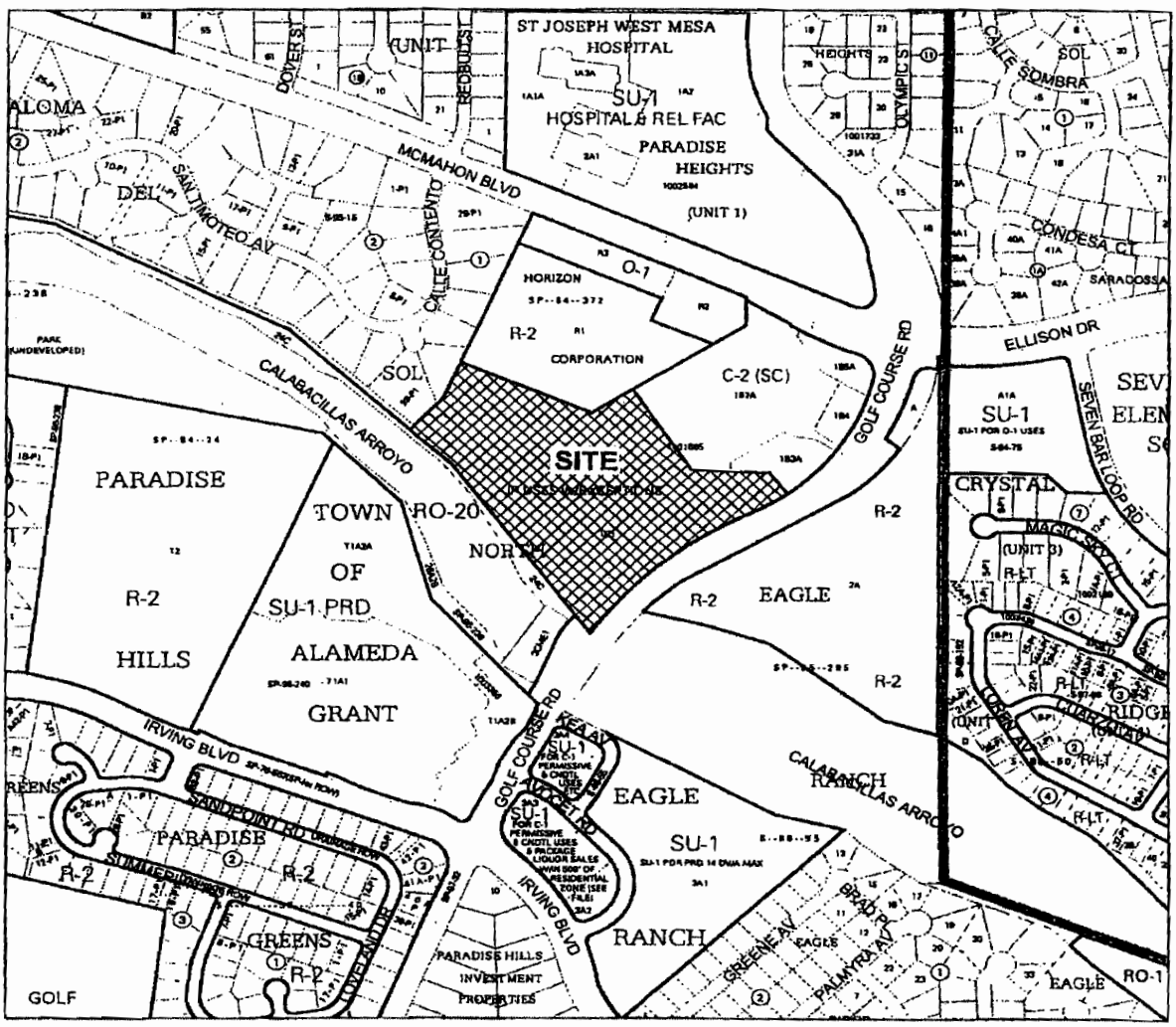


EXHIBIT "B"
Basic Construction Plan

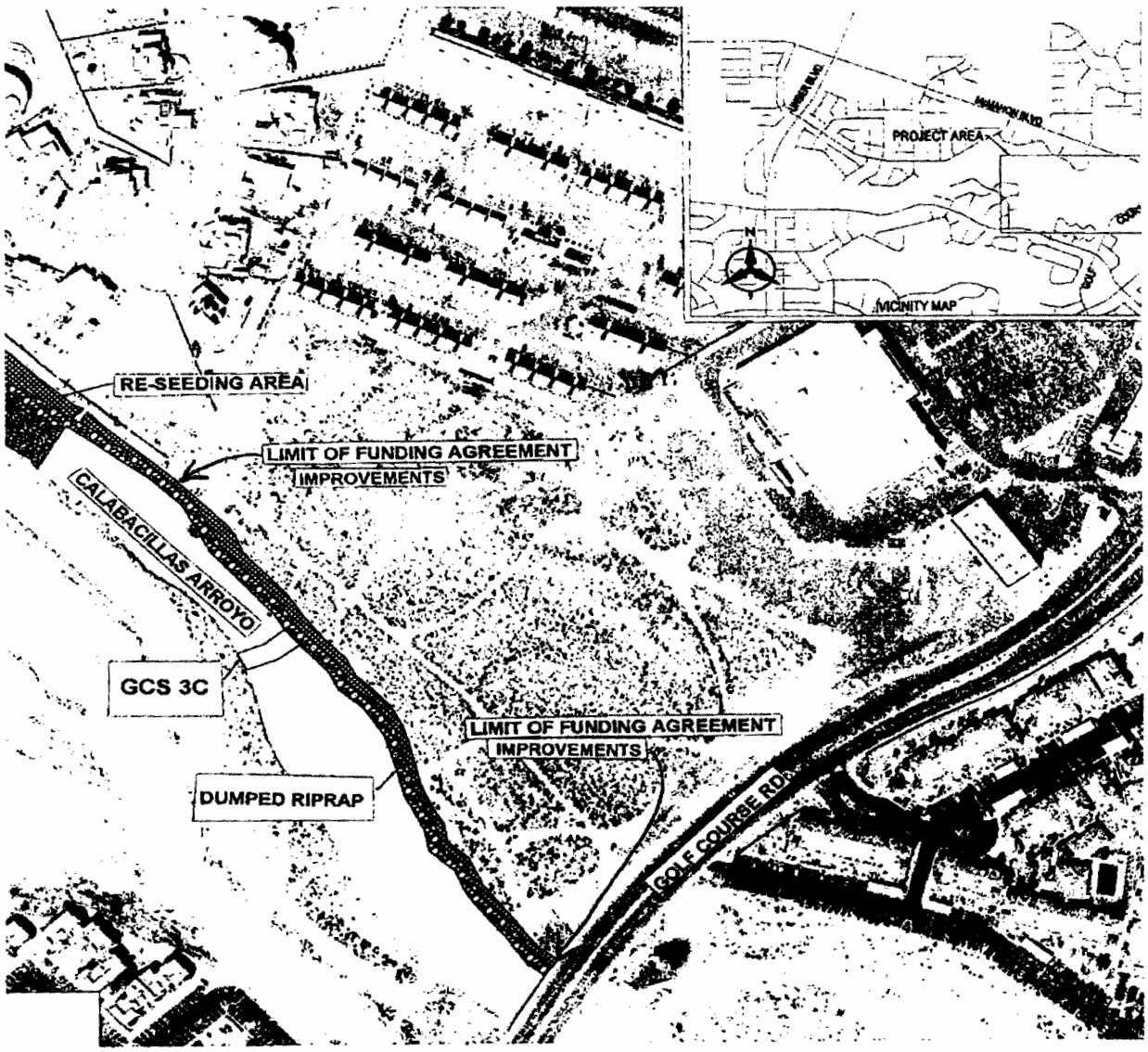


EXHIBIT "C"
Cost Summary Table

North Bank Stabilization		**$269,594**
Grade Control Structure No. 3c ($292,875 x 1/3)		**$ 97,625**
Sanitary Sewer Protection		**$ 5,000**
Habitat Mitigation Contribution		**$ 50,000**
	Subtotal	**$422,219**
	10% Contingency	**$ 42,219**
	Construction Subtotal	**$464,438**
8% Construction Management		**$ 37,155**
3% Testing		**$ 13,933**
Total = Owner's Contribution		**$515,526**