2011005
Drainage
Phase II

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV 02/2013)

Project Title: The Boulders- Phase III City Drainage #:

DRB#: 1002632 EPC#: Work Order#:

Legal Description: A-1 & B-1

City Address: n/a

Engineering Firm: Tierra West, LLC Contact: Ronald R. Bohannan

Address: 5571 Midway Park Place NE Albuquerque, NM 87109

Phone#: 505-858-3100 Fax#: 505-858-1118 E-mail: rrb@tierrawestllc.com

Owner: Flash Resources, LLC Contact: Pierre Amestoy

Address: 4461 Irving Blvd. NW Albuquerque, NM 87114

Phone#: 505-822-0044 Fax#: E-mail: pierre@amestoy.net

Architect: Contact:

Address:

Phone#: Fax#: E-mail:

Surveyor: Precision Surveys, Inc. Contact: Larry Medrano

Address: P.O. Box 90636 Albuquerque, NM 87114

Phone#: 505-856-5700 Fax#: 505-856-7900 E-mail: larry@presurv.com

Contractor: Contact:

Address:

Phone#: Fax#: E-mail:

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT
___ DRAINAGE PLAN 1st SUBMITTAL
X DRAINAGE PLAN RESUBMITTAL
___ CONCEPTUAL G & D PLAN
___ GRADING PLAN
___ EROSION & SEDIMENT CONTROL PLAN (ESC)
___ ENGINEER'S CERT (HYDROLOGY)
___ CLOMR/LOMR
___ TRAFFIC CIRCULATION LAYOUT (TCL)
___ ENGINEER'S CERT (TCL)
___ ENGINEER'S CERT (DRB SITE PLAN)
___ ENGINEER'S CERT (ESC)
___ SO-19
___ OTHER (SPECIFY)

CHECK TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

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

RECEIVED
JAN 31 2014
LAND DEVELOPMENT SECTION

REVISED 2-18-14

WAS A PRE-DESIGN CONFERENCE ATTENDED: ___ Yes ___ No ___ Copy Provided

DATE SUBMITTED: 1-28-14 By:

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

1. **Conceptual Grading and Drainage Plan**: 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 subdivision containing more than ten (10) lots or constituting five (5) acres or more
4. **Erosion and Sediment Control Plan:** Required for any new development and redevelopment site with 1-acre or more of land disturbing area, including project less than 1-acre than are part of a larger common plan of development

DRAINAGE REPORT

For

THE BOULDERS PHASE III SUBDIVISION
ALBUQUERQUE, NEW MEXICO

Prepared by

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

Prepared for

Flash Resources
6340 Coors Boulevard
Albuquerque, New Mexico 87120

January 24, 2014

Vincent P. Carrica, PE 16212

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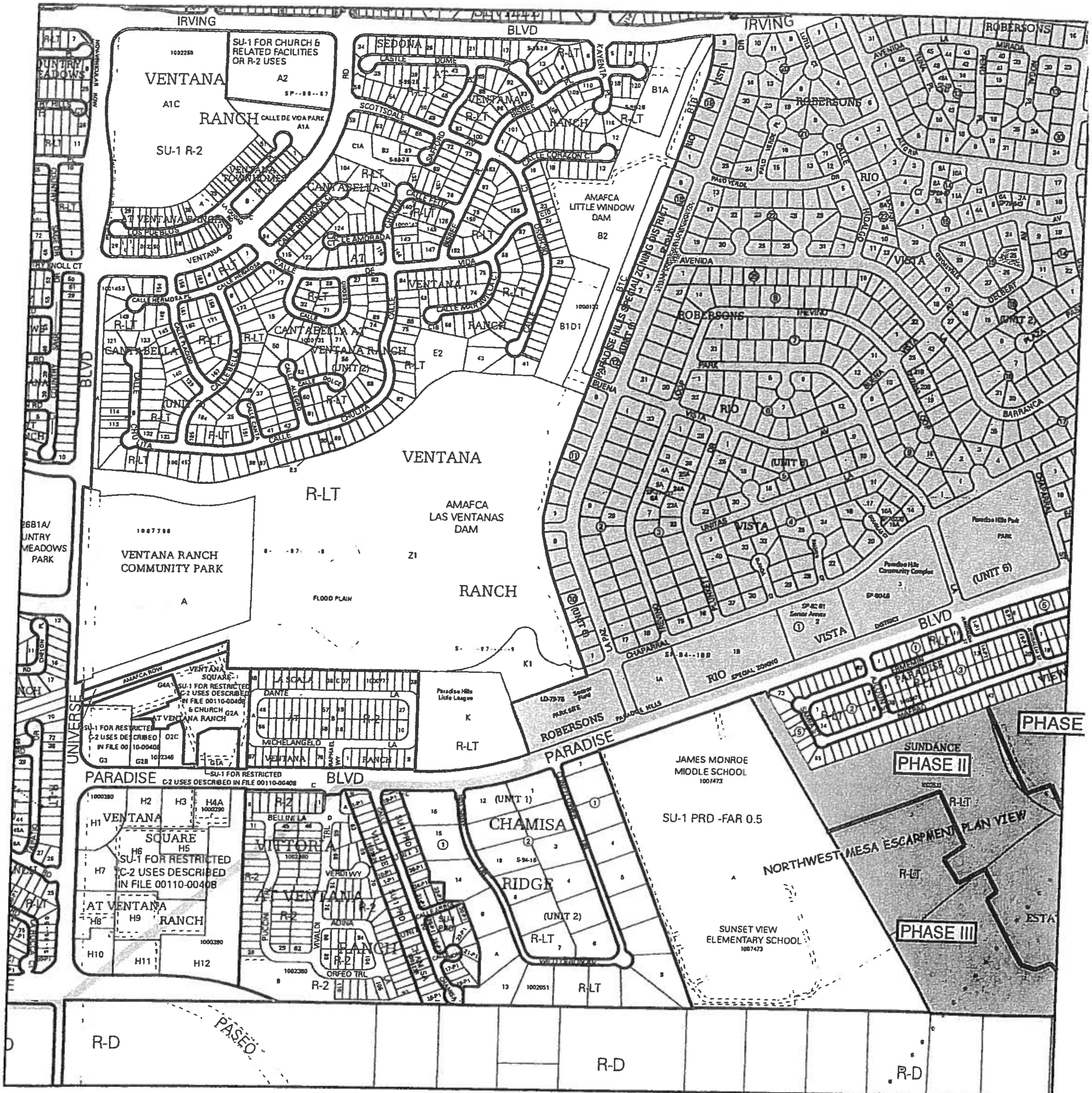
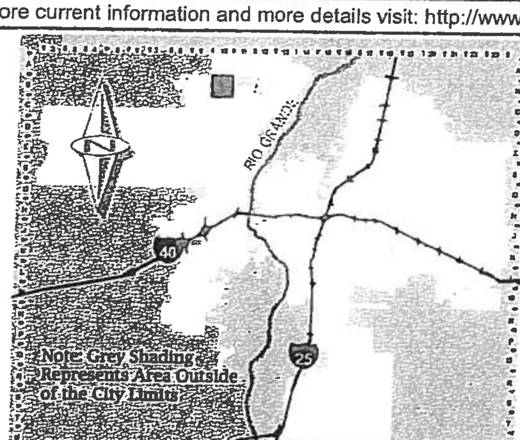


For more current information and more details visit: http://www.cabq.gov/gis

AGIS

Albuquerque Geographic Information System

Map amended through: 2/4/2010



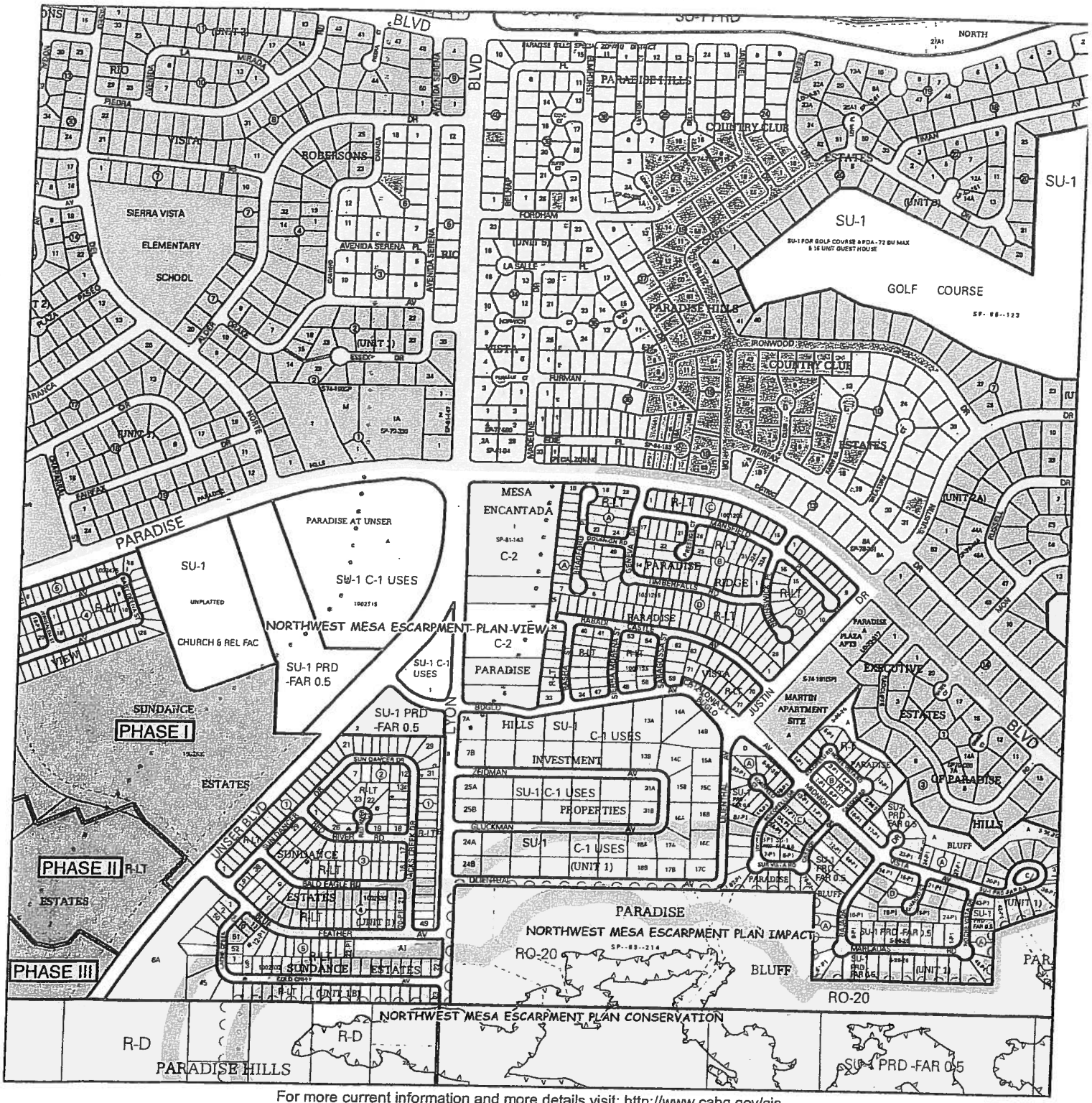
Zone Atlas Page:

B-10-Z

Selected Symbols

- SECTOR PLANS
- Design Overlay Zones
- City Historic Zones
- H-1 Buffer Zone
- Petroglyph Mon.
- Escarpment
- 2 Mile Airport Zone
- Airport Noise Contours
- Wall Overlay Zone

0 — 750 — 1,500 Feet



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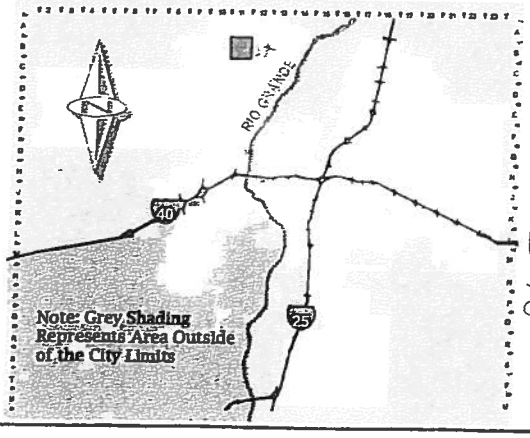


Albuquerque Geographic Information System

Map amended through: 2/4/2010

Zone Atlas Page:

B-11-Z

Selected Symbols

SECTOR PLANS
Design Overlay Zones
City Historic Zones
H-1 Buffer Zone
Petroglyph Mon.
Escarpment
2 Mile Airport Zone
Airport Noise Contours
Wall Overlay Zone

0 750 1,500 Feet

LOCATION

The proposed residential subdivision, The Boulders Phase III, is comprised of approximately 19 acres zoned RLT and is located in the City of Albuquerque, in Bernalillo County. The site is bordered by Unser Boulevard to the east, Paradise View Subdivision to the north, private undeveloped property to the south and Albuquerque Public Schools property to the west. The Phase I of the property is currently developed with residential lots and Phase II of the undeveloped is currently under construction with some grading in Phase III occurring with Phase II construction.

This report represents a drainage management and grading plan for approval by the City of Albuquerque, for grading and Preliminary Plat submittal.

DRAINAGE BASIN DESIGNATION

The drainage basins for proposed conditions are as indicated on the BASIN MAP included in this report. Under historic conditions the entire site drained across the site from northwest to southeast and into the Piedras Marcadas Arroyo. Developed flows from the subdivision to the north, Paradise View, were detained in existing detention ponds on site. Under proposed conditions, all proposed residential lots will flow to the fronting residential streets and no cross lot drainage is anticipated. The temporary ponds and associated cmp's required for Paradise View were removed with Phase II. Tract 6A contains a proposed permanent pond that is retention in the interim and detention ultimately. The outfall for this pond, Chamisa Storm Drain is currently under construction to Paradise Blvd. There is an upstream basin consisting of a portion of a residential subdivision (Paradise View Subdivision) that drains its runoff through the Boulders Subdivision Phases I and II as shown on the basin map.

EXISTING DRAINGE CONDITIONS

The majority of the site historically drains from northwest to southeast to the Petroglyph National Monument located south and east of the proposed subdivision. Runoff under undeveloped conditions surface flows off the site, through the monument

and eventually into the Piedras Marcadas Dam. Originally, the undeveloped flows from onsite, as well as developed and undeveloped flows from offsite basins were partially detained in a natural playa that existed at the southeast corner of the proposed subdivision, at the end of Lyons Boulevard. Previously, the playa discharged into the Monument at a number of locations. An earthen and rock berm was temporarily constructed to convey the flows to a single point of discharge to control erosion in the Monument.

The existing subdivision located east of Unser across from the proposed Boulders, Sundance Estates I & IB were constructed to drain to a permanent detention pond at the corner of Blue Feather and Lyon. The flows are detained in the pond and released at a controlled rate into the Monument via an existing storm drain.

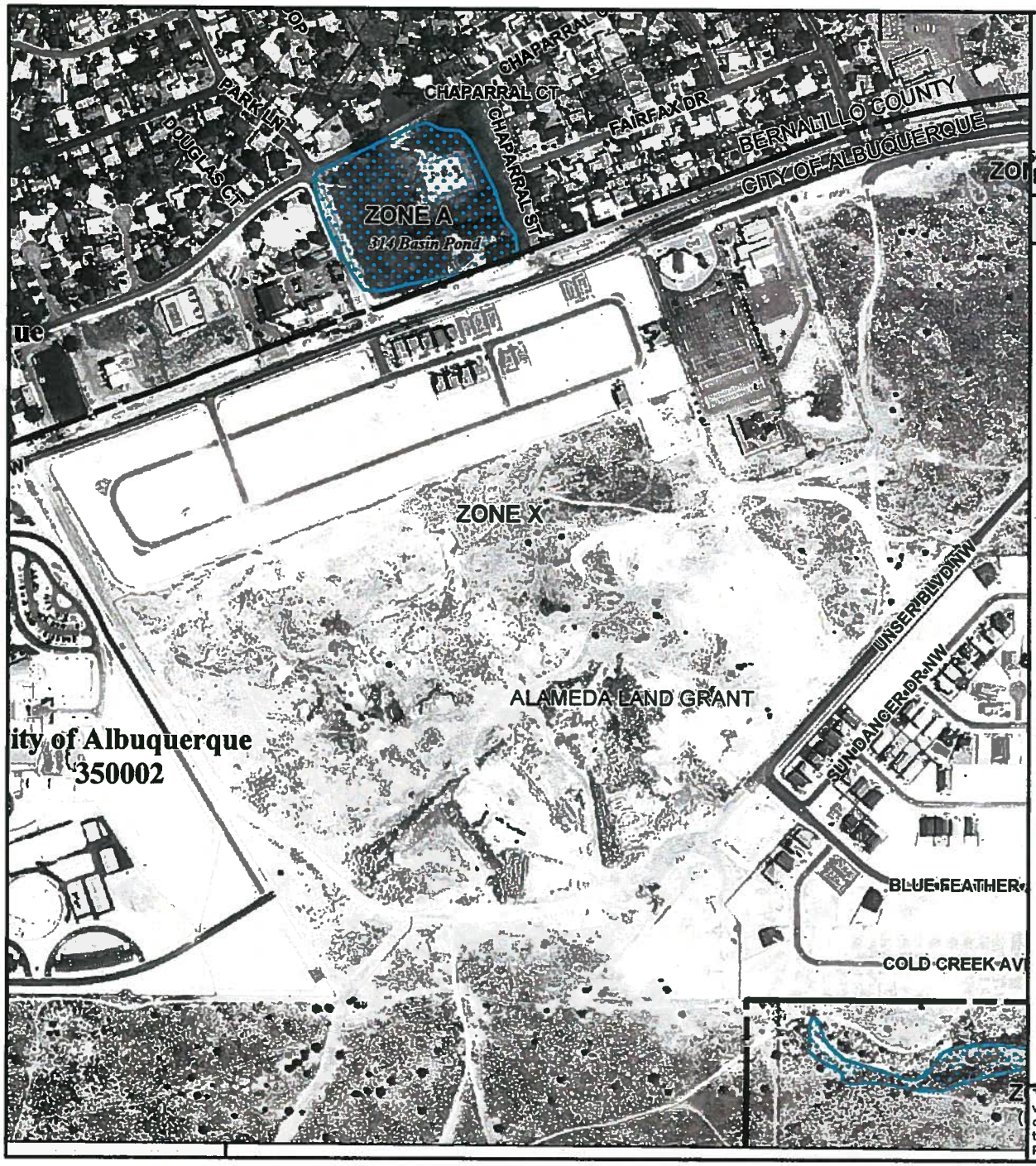
Developed flows from the exist portion of Unser drain to an existing interim retention pond at the southeast corner of Blue Feather and Unser Blvd.

FIRM MAP AND SOIL CONDITIONS

Phase III of the Boulders Subdivision is not located in a designated Flood Hazard Zone per FEMA – (Firm Map 35001C0104 – See Attached Map). Per the USDA Soil Conservation Services (SCS), the soils type for this site is Alameda sandy loam and consists largely of undulating soil on old basalt flows. Numerous basalt rock outcrops are present. Runoff is medium, the hazard of soil blowing is moderate and the hazard of water erosion is slight.

DESIGN-CRITERIA

The drainage plan presented in this report was prepared in accordance with the City of Albuquerque Drainage Ordinances and Chapter 22 of the Development Process Manual DPM. The hydrological analysis is based on the 100-year frequency, 6-hour duration storm, as Represented in Section 22, Part A, Hydrology, of the Development Process Manual. Storage detention ponds are sized for the 100-year, 24-hour storm and ultimately will drain in less than 24 hours. In addition, it is the intent to demonstrate



MAP SCALE 1" = 500'

0 500 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0104H

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO

AND INCORPORATED AREAS

PANEL 104 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0104	H
BERNALILLO COUNTY UNINCORPORATED AREAS	350001	0104	H

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
35001C0104H

MAP REVISED
AUGUST 16, 2012

Federal Emergency Management Agency

existing conditions will be improved by decreasing erosion in the Monument by reducing flows that enter the Monument, by redirecting the majority of the developed runoff to the proposed Paradise Boulevard and Lyons Boulevard storm drain that are programmed to convey flows north to the Calabacillas Arroyo.

Rainfall intensities per this report are as follows:

FREQ	ZONE	P60	P360	P1440
100YR	1	1.87	2.20	2.66

Land Treatments:

Proposed Subdivision:

The proposed subdivision land use values were calculated as follows:

Residential DPM-Eqn a-4, pg 22-n)

n=Residential Units/Acre = 5.0 DU / Acre

A = 0 (Under fully developed conditions, no undisturbed naturally vegetated areas will remain.)

B = 25 % Approx. assuming ½ remaining lot will be grass lawns

C = 25 % Approx. since ½ of lot will be gravel and Xeriscaping

D= 7 * SQ RT [(n)(n) + 5(n)] = 7* SQ RT [(5) (5) + 5(5]

= 49.2 %

DEVELOPED-DRAINAGE CONDITIONS

The Boulders Subdivision was proposed to be developed in approximately three equal phases. The first of these phases consists of approximately 26 acres in Phase I with 23.5 acres in the Phase II and 18.6 acres in Phase III. All three phases will flow via the proposed streets and storm drains to a permanent detention pond located to the east and adjacent to Unser Blvd, under ultimate conditions. The pond outfall is tied to the

north via the Chamisa Storm Drain connection to the Lyon Storm Drain which conveys the flows to the Calabacillas Arroyo. The pond, which was substantially completed with Phase I has a total detention capacity of 9.247 Acre-Feet. This volume is in excess of the required volume of 8.241 Acre-Feet. The total runoff (design storm equal to 100-year, 24-hour) for Phase I, II & III developed will be channeled to the detention pond and will drain in less than 24 hours.

The detention pond adjacent to Unser is a regional pond that is part of the proposed Chamisa master storm drain. The Chamisa drain is proposed to divert approximately 671 cfs from approximately 240 acres to the Calabacillas Arroyo. This area historically drained through the Petroglyph Monument to the Piedras Marcadas Arroyo and eventually to the Piedras Marcadas Dam. The proposed diversion involves a cooperative agreement between several local developers, AMAFCA, the City of Albuquerque and Albuquerque Public Schools in an attempt to reduce the impact of flows channeled through the Monument as well as a method of maintaining the integrity and capacity capabilities of the Piedras Marcadas Dam.

SUMMARY

Phase III of the proposed Boulders Subdivision is a 19-acre residential project with a planned Unser alignment and with the pond in Tract 6A being a permanent detention pond conditions. The single family detached homes will be constructed in lots that meet the RLT zoning ordinances. No adverse impact will result due to developed conditions from the proposed Phases I, II and III of the Boulders Subdivision. Onsite developed flows will be routed via surface flow in the streets and supplemented by a storm sewer to the proposed detention pond in Tract 6A. An emergency overflow structure is provided in the pond. The overflow will be directed toward the northeast and will not impact the lots within the proposed or existing subdivisions.

THE BOULDERS

Weighted E Method

PHASE ONE, TWO & THREE DEVELOPED

Zone #1

Developed Basins

Basin	Area (sf)	Area (acres)	Area (sq miles)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	100-Year Weighted E (ac-ft)	100-Year Volume (ac-ft)	100-Year Flow cfs	10-Year Weighted E (ac-ft)	10-Year Volume (ac-ft)	10-Year Flow cfs	2-Year Weighted E (ac-ft)	2-Year Volume (ac-ft)	2-Year Flow cfs
Upland East-34	578790.00	13.287	0.02076	0%	0	17%	2.259	18%	2.391694	65%	8.637	1.573	1.741	49.19	0.923	1.022	30.24	0.491	0.544	15.79
3	197187.00	4.527	0.00707	0%	0	26%	1.177	25%	1.131698	49%	2.227	1.391	0.525	15.37	0.777	0.293	9.02	0.387	0.146	4.33
4	96049.00	2.205	0.00345	0%	0	26%	0.573	25%	0.551245	49%	1.085	1.391	0.256	7.49	0.777	0.143	4.39	0.387	0.071	2.11
5	52992.00	1.217	0.00190	0%	0	26%	0.316	25%	0.304132	49%	0.599	1.391	0.141	4.13	0.777	0.079	2.42	0.387	0.039	1.16
7	78936.00	1.812	0.00283	0%	0	52%	0.942	0%	0	48%	0.870	1.294	0.195	5.71	0.710	0.107	3.23	0.351	0.053	1.50
8	81003.00	1.860	0.00291	0%	0	50%	0.930	15%	0.278936	35%	0.651	1.173	0.182	5.53	0.610	0.095	3.00	0.275	0.043	1.26
9	51672.00	1.186	0.00185	0%	0	26%	0.308	25%	0.296556	49%	0.584	1.391	0.137	4.03	0.777	0.077	2.36	0.387	0.038	1.13
10	169241.00	3.885	0.00607	0%	0	26%	1.010	25%	0.97131	49%	1.912	1.391	0.450	13.19	0.777	0.252	7.74	0.387	0.125	3.72
11	61236.00	1.406	0.00220	0%	0	26%	0.366	25%	0.351446	49%	0.692	1.391	0.163	4.77	0.777	0.091	2.80	0.387	0.045	1.35
12	47531.00	1.091	0.00170	0%	0	81%	0.884	6%	0.06547	13%	0.142	0.858	0.078	2.60	0.366	0.033	1.18	0.109	0.010	0.30
13	20308.00	0.466	0.00073	100%	0.466208	0%	0.000	0%	0	0%	0.000	0.440	0.017	0.60	0.080	0.003	0.11	0.000	0.000	0.00
14	65898.00	1.513	0.00236	100%	1.51281	0%	0.000	0%	0	0%	0.000	0.440	0.055	1.95	0.080	0.010	0.36	0.000	0.000	0.00
35	75972.00	1.744	0.00273	0%	0	88%	1.535	4%	0.069763	8%	0.140	0.787	0.114	3.93	0.310	0.045	1.67	0.071	0.010	0.31
36	75972.00	1.744	0.00273	0%	0	26%	0.453	25%	0.436019	49%	0.858	1.391	0.202	5.92	0.777	0.113	3.47	0.387	0.056	1.67
37	72150.00	1.656	0.00259	0%	0	26%	0.431	25%	0.414084	49%	0.815	1.391	0.192	5.62	0.777	0.107	3.30	0.387	0.053	1.58
38	162616.00	3.733	0.00583	0%	0	0%	0.000	100%	3.73315	0%	0.000	0.990	0.308	10.71	0.440	0.137	5.56	0.120	0.037	1.75
1	169318.00	3.887	0.00607	0%	0	26%	1.011	25%	0.971752	49%	1.912	1.391	0.451	13.20	0.777	0.252	7.74	0.387	0.125	3.72
2	145603.00	3.343	0.00522	0%	0	26%	0.869	25%	0.835646	49%	1.645	1.391	0.387	11.35	0.777	0.217	6.66	0.387	0.108	3.20
6	33682.00	0.773	0.00121	0%	0	26%	0.201	25%	0.193308	49%	0.380	1.391	0.090	2.63	0.777	0.050	1.54	0.387	0.025	0.74
15	38938.00	0.894	0.00140	0%	0	26%	0.232	25%	0.223473	49%	0.438	1.387	0.103	3.03	0.775	0.058	1.78	0.385	0.029	0.85
16	60009.00	1.378	0.00215	0%	0	26%	0.358	25%	0.344404	49%	0.675	1.387	0.159	4.67	0.775	0.089	2.74	0.385	0.044	1.31
17	110232.00	2.531	0.00395	0%	0	26%	0.658	25%	0.632645	49%	1.240	1.387	0.292	8.57	0.775	0.163	5.03	0.385	0.081	2.41
18	50442.00	1.158	0.00181	0%	0	26%	0.301	25%	0.289497	49%	0.567	1.387	0.134	3.92	0.775	0.075	2.30	0.385	0.037	1.10
28	83113.00	1.908	0.00298	0%	0	26%	0.496	25%	0.477003	49%	0.935	1.387	0.221	6.46	0.775	0.123	3.79	0.385	0.061	1.82
Total North Unser Crossing														194.58			112.44			53.13
Upland West-33	399950.00	9.182	0.01435	0%	0	17%	1.561	18%	1.652686	65%	5.968	1.573	1.203	33.99	0.923	0.706	20.90	0.491	0.376	10.91
19	80203.00	1.841	0.00288	0%	0	43%	0.792	25%	0.460302	32%	0.589	1.166	0.179	5.50	0.601	0.092	2.99	0.265	0.041	1.24
20	130280.00	2.991	0.00467	0%	0	26%	0.778	25%	0.747704	49%	1.466	1.387	0.346	10.13	0.775	0.193	5.94	0.385	0.096	2.85
21	90980.00	2.089	0.00326	0%	0	26%	0.543	25%	0.522153	49%	1.023	1.387	0.241	7.07	0.775	0.135	4.15	0.385	0.067	1.99
22	76127.00	1.748	0.00273	0%	0	26%	0.454	25%	0.436909	49%	0.856	1.387	0.202	5.92	0.775	0.113	3.47	0.385	0.056	1.67
30	186578.00	4.283	0.00669	0%	0	26%	1.114	25%	1.07081	49%	2.099	1.387	0.495	14.51	0.775	0.277	8.51	0.385	0.138	4.08
32A	9648.00	0.221	0.00035	0%	0	26%	0.058	25%	0.055372	49%	0.109	1.387	0.026	0.75	0.775	0.014	0.44	0.385	0.007	0.21
32B	52563.00	1.207	0.00189	0%	0	26%	0.314	25%	0.30167	49%	0.591	1.387	0.139	4.09	0.775	0.078	2.40	0.385	0.039	1.15
23	36207.00	0.830	0.00130	0%	0	26%	0.216	25%	0.2075	49%	0.407	1.387	0.096	2.81	0.775	0.054	1.65	0.385	0.027	0.79
24	111374.00	2.557	0.00399	0%	0	26%	0.665	25%	0.639199	49%	1.253	1.387	0.296	8.66	0.775	0.165	5.08	0.385	0.082	2.44
25	122135.00	2.804	0.00438	0%	0	26%	0.729	25%	0.700958	49%	1.374	1.387	0.324	9.50	0.775	0.181	5.57	0.385	0.090	2.67
26A	173636.00	3.986	0.00623	0%	0	26%	1.036	25%	0.996534	49%	1.953	1.387	0.461	13.50	0.775	0.257	7.92	0.385	0.128	3.80
26B	76431.00	1.755	0.00274	0%	0	26%	0.456	25%	0.438654	49%	0.860	1.387	0.203	5.94	0.775	0.113	3.49	0.385	0.056	1.67
27	169994.00	3.903	0.00610	0%	0	26%	1.015	25%	0.975631	49%	1.912	1.387	0.451	13.22	0.775	0.252	7.75	0.385	0.125	3.72
29	35570.00	0.817	0.00128	0%	0	100%	0.817	0%	0	0%	0.000	0.670	0.046	1.66	0.220	0.015	0.62	0.010	0.001	0.02
31A	45475.00	1.044	0.00163	0%	0	26%	0.271	25%	0.260991	49%	0.512	1.387	0.121	3.54	0.775	0.067	2.07	0.385	0.034	1.00
31B	30402.00	0.698	0.00109	0%	0	26%	0.181	25%	0.174483	49%	0.342	1.387	0.081	2.36	0.775	0.045	1.39	0.385	0.022	0.67
31C	46210.00	1.061	0.00166	0%	0	26%	0.276	25%	0.265209	49%	0.520	1.387	0.123	3.59	0.775	0.068	2.11	0.385	0.034	1.01
APS Surge Pond														20.00						
Total South Unser Crossing														166.73			86.43			41.89

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

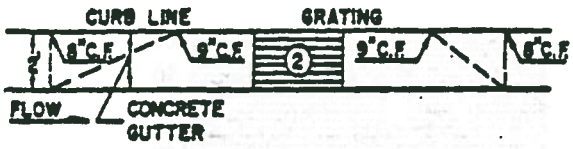
Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

BOULDERS SUBDIVISION
Boulders Phase III Pond Volume Calculation Sheet

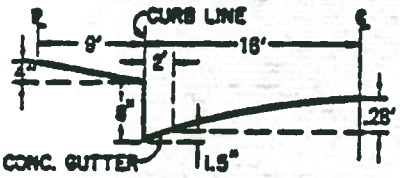
Unser Pond
(Permanent Detention Volume)

Elev	Area	Elev	Avg			
		Change	Area	Volume	Cumulative Volume	
	SF	FT	SF	CU.FT.	CU.FT.	ACRE-FT
32.77	0					
33	24230	0.23	12115	2786.45	2786.45	0.063968
34	45485	1	34857.5	34857.5	37643.95	0.864186
35	85287	1	65386	65386	103029.95	2.365242
36	105211	1	95249	95249	198278.95	4.551858
37	107596	1	106403.5	106403.5	304682.45	6.994547
37.91	108085	0.91	107840.5	98134.85	402817.305	9.247413

GRATING CAPACITIES FOR TYPE 'A' , 'C' and 'D'



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

PLATE 22.3 D-5

Street Capacity Calculations

AP-01

STREET FLOW

Slope= 0.0076

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.21	0.00	0.38	0.0023057
0.02	0.00	0.34	0.01	0.00	0.00	0.34	0.01	0.42	0.0055883
0.04	0.01	0.68	0.02	0.01	0.01	0.54	0.02	0.47	0.0134762
0.06	0.03	1.02	0.03	0.02	0.04	0.71	0.04	0.51	0.0224988
0.08	0.05	1.36	0.04	0.04	0.09	0.85	0.07	0.53	0.0323316
0.1	0.08	1.70	0.05	0.08	0.16	0.99	0.10	0.55	0.0428062
0.12	0.12	2.04	0.06	0.13	0.26	1.12	0.13	0.57	0.0538168
0.125	0.13	2.13	0.06	0.14	0.29	1.15	0.14	0.57	0.0566442

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.15	0.31	1.13	0.15	0.55	0.0553517
0.16	0.23	3.91	0.06	0.26	0.51	1.14	0.18	0.50	0.0587439
0.2	0.42	5.95	0.07	0.54	1.07	1.29	0.26	0.51	0.0753023
0.24	0.69	8.00	0.09	1.02	2.03	1.48	0.36	0.53	0.0971083
0.2804	1.04	10.06	0.10	1.74	3.49	1.68	0.47	0.56	0.1219521
0.303	1.27	11.21	0.11	2.28	4.55	1.79	0.54	0.57	0.1367134
0.3551	1.91	13.87	0.14	3.88	7.76	2.03	0.72	0.60	0.1725397
0.365	2.05	14.37	0.14	4.25	8.50	2.08	0.76	0.61	0.1795894

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3864	2.34	14.39	0.16	5.33	10.66	2.27	0.88	0.64	0.2084466
0.4274	2.92	14.43	0.20	7.66	15.32	2.63	1.12	0.71	0.264451
0.4553	3.31	14.46	0.23	9.43	18.87	2.85	1.30	0.74	0.3030749
0.5205	4.22	14.53	0.29	14.12	28.23	3.34	1.74	0.82	0.3948457
0.551	4.65	14.56	0.32	16.55	33.10	3.56	1.96	0.85	0.4384524
0.6244	5.68	14.63	0.39	23.01	46.02	4.05	2.53	0.90	0.5449957
0.631	5.77	14.64	0.39	23.63	47.26	4.10	2.58	0.91	0.5546796
0.667	**6.27**	**14.67**	**0.43**	**27.13**	**54.26**	**4.32**	**2.88**	**0.93**	**0.6077815**

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	28.64	57.27	4.23	2.96	0.89	0.5998374
0.72	7.09	17.32	0.41	29.75	59.50	4.20	3.02	0.87	0.5981165
0.74	7.43	18.32	0.41	31.01	62.01	4.17	3.09	0.86	0.5983369
0.76	7.79	19.32	0.40	32.40	64.81	4.16	3.16	0.84	0.6002451
0.78	8.17	20.32	0.40	33.94	67.88	4.15	3.24	0.83	0.6036321
0.8	8.58	21.32	0.40	35.62	71.23	4.15	3.32	0.82	0.6083243
0.847	9.60	23.68	0.41	40.10	80.20	4.18	3.54	0.80	0.6236978

Street Capacity Calculations

AP-02

STREET FLOW

Slope= 0.0085

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.23	0.00	0.40	0.0025322
0.02	0.00	0.34	0.01	0.00	0.00	0.36	0.01	0.45	0.0061223
0.04	0.01	0.68	0.02	0.01	0.01	0.57	0.02	0.50	0.0147274
0.06	0.03	1.02	0.03	0.02	0.04	0.75	0.04	0.54	0.024552
0.08	0.05	1.36	0.04	0.05	0.09	0.90	0.07	0.56	0.035246
0.1	0.08	1.70	0.05	0.08	0.17	1.05	0.10	0.58	0.0466276
0.12	0.12	2.04	0.06	0.14	0.27	1.18	0.14	0.60	0.0585833
0.125	0.13	2.13	0.06	0.15	0.30	1.22	0.15	0.61	0.0616522

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.16	0.32	1.19	0.15	0.58	0.0602975
0.16	0.23	3.91	0.06	0.27	0.54	1.20	0.19	0.53	0.0641234
0.2	0.42	5.95	0.07	0.57	1.14	1.37	0.27	0.54	0.0821699
0.24	0.69	8.00	0.09	1.07	2.15	1.57	0.38	0.56	0.1058598
0.2804	1.04	10.06	0.10	1.85	3.69	1.78	0.50	0.59	0.1328098
0.303	1.27	11.21	0.11	2.41	4.81	1.89	0.57	0.61	0.1488095
0.3551	1.91	13.87	0.14	4.10	8.20	2.15	0.76	0.64	0.1876125
0.365	2.05	14.37	0.14	4.49	8.98	2.20	0.80	0.64	0.1952441

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3864	2.34	14.39	0.16	5.64	11.27	2.40	0.93	0.68	0.2263277
0.4274	2.92	14.43	0.20	8.10	16.21	2.78	1.19	0.75	0.2865947
0.4553	3.31	14.46	0.23	9.98	19.95	3.01	1.37	0.79	0.3281263
0.5205	4.22	14.53	0.29	14.93	29.86	3.54	1.84	0.86	0.4267362
0.551	4.65	14.56	0.32	17.50	35.01	3.77	2.07	0.89	0.4735676
0.6244	5.68	14.63	0.39	24.34	48.67	4.29	2.68	0.96	0.5879422
0.631	5.77	14.64	0.39	24.99	49.98	4.33	2.73	0.96	0.5983352
0.667	**6.27**	**14.67**	**0.43**	**28.69**	**57.38**	**4.57**	**3.05**	**0.99**	**0.6553186**

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	30.28	60.57	4.48	3.13	0.94	0.6472578
0.72	7.09	17.32	0.41	31.46	62.92	4.44	3.20	0.92	0.6456584
0.74	7.43	18.32	0.41	32.79	65.58	4.41	3.27	0.90	0.6461226
0.76	7.79	19.32	0.40	34.27	68.54	4.40	3.34	0.89	0.6483817
0.78	8.17	20.32	0.40	35.89	71.79	4.39	3.42	0.88	0.6522143
0.8	8.58	21.32	0.40	37.66	75.33	4.39	3.51	0.87	0.6574362
0.847	9.60	23.68	0.41	42.41	84.81	4.42	3.74	0.85	0.6743376

Street Capacity Calculations

AP-03
STREET FLOW
Slope= 0.0198

For water depths less than 0.125 feet
Y= Water depth
Area = 8*Y^2
P= SQRT(257*Y^2) + Y
n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.34	0.00	0.61	0.0049459
0.02	0.00	0.34	0.01	0.00	0.00	0.55	0.01	0.68	0.011738
0.04	0.01	0.68	0.02	0.01	0.02	0.87	0.03	0.77	0.0277231
0.06	0.03	1.02	0.03	0.03	0.07	1.14	0.07	0.82	0.0457343
0.08	0.05	1.36	0.04	0.07	0.14	1.38	0.11	0.86	0.0651759
0.1	0.08	1.70	0.05	0.13	0.26	1.60	0.16	0.89	0.0857421
0.12	0.12	2.04	0.06	0.21	0.42	1.81	0.22	0.92	0.1072433
0.125	0.13	2.13	0.06	0.23	0.46	1.86	0.23	0.93	0.1127484

For water depths greater than 0.125 ft but less than 0.365 ft
Y1= Y-0.125
A2= A1 + 2*Y1 + 25*Y1^2
P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.25	0.49	1.82	0.24	0.89	0.1109368
0.16	0.23	3.91	0.06	0.41	0.83	1.84	0.29	0.81	0.119693
0.2	0.42	5.95	0.07	0.87	1.73	2.09	0.42	0.82	0.1530008
0.24	0.69	8.00	0.09	1.64	3.28	2.39	0.57	0.86	0.1957308
0.2804	1.04	10.06	0.10	2.82	5.63	2.71	0.76	0.90	0.2438446
0.303	1.27	11.21	0.11	3.67	7.35	2.88	0.87	0.92	0.2722533
0.3551	1.91	13.87	0.14	6.26	12.52	3.28	1.16	0.97	0.3408166
0.365	2.05	14.37	0.14	6.86	13.71	3.35	1.22	0.98	0.3542565

For water depths greater than 0.365 ft but less than 0.667 ft
Y2= Y - 0.365
A3= A2 + Y2*14
P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3864	2.34	14.39	0.16	8.60	17.20	3.67	1.42	1.04	0.4071021
0.4274	2.92	14.43	0.20	12.37	24.73	4.24	1.81	1.14	0.5090229
0.4553	3.31	14.46	0.23	15.23	30.46	4.60	2.10	1.20	0.5789662
0.491	**3.81**	**14.50**	**0.26**	**19.22**	**38.44**	**5.05**	**2.48**	**1.27**	**0.6692034**
0.551	4.65	14.56	0.32	26.72	53.43	5.75	3.17	1.36	0.8227421
0.6244	5.68	14.63	0.39	37.14	74.29	6.54	4.09	1.46	1.013637
0.631	5.77	14.64	0.39	38.14	76.29	6.61	4.17	1.47	1.0309581
0.667	6.27	14.67	0.43	43.79	87.57	6.98	4.66	1.51	1.1258665

For water depths greater than 0.667 ft but less than 0.847 ft
Y3= Y - 0.667
A4= A3 + 14 * Y3 + 25 * Y3^2
P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	46.22	92.44	6.84	4.78	1.44	1.1175833
0.72	7.09	17.32	0.41	48.02	96.03	6.78	4.88	1.41	1.1176861
0.74	7.43	18.32	0.41	50.05	100.09	6.74	4.99	1.38	1.1210174
0.76	7.79	19.32	0.40	52.30	104.60	6.71	5.10	1.36	1.127165
0.78	8.17	20.32	0.40	54.78	109.56	6.70	5.23	1.34	1.1357878
0.8	8.58	21.32	0.40	57.49	114.97	6.70	5.36	1.32	1.1466013
0.847	9.60	23.68	0.41	64.72	129.44	6.74	5.71	1.29	1.1793364

Street Capacity Calculations

AP-04

STREET FLOW

Slope= 0.0142

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.29	0.00	0.51	0.0038326
0.02	0.00	0.34	0.01	0.00	0.00	0.46	0.01	0.58	0.0091618
0.04	0.01	0.68	0.02	0.01	0.02	0.74	0.03	0.65	0.021791
0.06	0.03	1.02	0.03	0.03	0.06	0.96	0.06	0.69	0.036091
0.08	0.05	1.36	0.04	0.06	0.12	1.17	0.09	0.73	0.0515743
0.1	0.08	1.70	0.05	0.11	0.22	1.36	0.14	0.76	0.0679899
0.12	0.12	2.04	0.06	0.18	0.35	1.53	0.18	0.78	0.0851816
0.125	0.13	2.13	0.06	0.20	0.39	1.57	0.20	0.78	0.0895874

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.21	0.42	1.54	0.20	0.75	0.0879513
0.16	0.23	3.91	0.06	0.35	0.70	1.55	0.25	0.68	0.0943817
0.2	0.42	5.95	0.07	0.73	1.47	1.77	0.35	0.70	0.1207578
0.24	0.69	8.00	0.09	1.39	2.78	2.03	0.49	0.73	0.1548903
0.2804	1.04	10.06	0.10	2.39	4.77	2.29	0.64	0.76	0.1934692
0.303	1.27	11.21	0.11	3.11	6.22	2.44	0.74	0.78	0.2162932
0.3551	1.91	13.87	0.14	5.30	10.60	2.78	0.99	0.82	0.2714742
0.365	2.05	14.37	0.14	5.81	11.61	2.84	1.04	0.83	0.2823037

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3864	2.34	14.39	0.16	7.28	14.57	3.11	1.20	0.88	0.3254509
0.4274	2.92	14.43	0.20	10.47	20.95	3.59	1.53	0.97	0.4088073
0.4553	3.31	14.46	0.23	12.90	25.79	3.90	1.77	1.02	0.4660867
0.511	4.09	14.52	0.28	18.30	36.60	4.48	2.29	1.10	0.5818149
0.552	**4.66**	**14.56**	**0.32**	**22.74**	**45.48**	**4.88**	**2.69**	**1.16**	**0.6681437**
0.6244	5.68	14.63	0.39	31.45	62.91	5.54	3.46	1.24	0.8228078
0.631	5.77	14.64	0.39	32.30	64.61	5.60	3.53	1.24	0.8370402
0.667	6.27	14.67	0.43	37.08	74.16	5.91	3.94	1.28	0.9150406

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	39.14	78.29	5.79	4.05	1.22	0.9066986
0.72	7.09	17.32	0.41	40.66	81.33	5.74	4.13	1.19	0.9059539
0.74	7.43	18.32	0.41	42.38	84.76	5.71	4.22	1.17	0.9079231
0.76	7.79	19.32	0.40	44.29	88.58	5.68	4.32	1.15	0.9122574
0.78	8.17	20.32	0.40	46.39	92.78	5.68	4.43	1.13	0.9186689
0.8	8.58	21.32	0.40	48.68	97.36	5.68	4.54	1.12	0.9269174
0.847	9.60	23.68	0.41	54.81	109.62	5.71	4.83	1.09	0.9524363

Street Capacity Calculations

AP-05

STREET FLOW

Slope= 0.018

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.33	0.00	0.58	0.0046022
0.02	0.00	0.34	0.01	0.00	0.00	0.52	0.01	0.65	0.0109445
0.04	0.01	0.68	0.02	0.01	0.02	0.83	0.03	0.73	0.0259
0.06	0.03	1.02	0.03	0.03	0.06	1.09	0.07	0.78	0.0427741
0.08	0.05	1.36	0.04	0.07	0.13	1.32	0.11	0.82	0.0610039
0.1	0.08	1.70	0.05	0.12	0.24	1.53	0.15	0.85	0.0803001
0.12	0.12	2.04	0.06	0.20	0.40	1.72	0.21	0.88	0.1004831
0.125	0.13	2.13	0.06	0.22	0.44	1.77	0.22	0.88	0.1056521

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.24	0.47	1.73	0.23	0.85	0.1038901
0.16	0.23	3.91	0.06	0.39	0.79	1.75	0.28	0.77	0.1119216
0.2	0.42	5.95	0.07	0.83	1.65	1.99	0.40	0.78	0.1431038
0.24	0.69	8.00	0.09	1.56	3.13	2.28	0.55	0.82	0.183204
0.2804	1.04	10.06	0.10	2.69	5.37	2.58	0.72	0.86	0.2284041
0.303	1.27	11.21	0.11	3.50	7.00	2.75	0.83	0.88	0.2551069
0.3551	1.91	13.87	0.14	5.97	11.94	3.13	1.11	0.92	0.3195839
0.365	2.05	14.37	0.14	6.54	13.07	3.20	1.17	0.93	0.3322269

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.3864	2.34	14.39	0.16	8.20	16.40	3.50	1.35	0.99	0.3821222
0.4274	2.92	14.43	0.20	11.79	23.58	4.04	1.73	1.09	0.4783951
0.4553	3.31	14.46	0.23	14.52	29.04	4.39	2.00	1.15	0.5444853
0.507	**4.03**	**14.51**	**0.28**	**20.14**	**40.28**	**4.99**	**2.53**	**1.24**	**0.6682576**
0.552	4.66	14.56	0.32	25.60	51.20	5.49	3.03	1.30	0.7773603
0.6244	5.68	14.63	0.39	35.41	70.83	6.24	3.90	1.39	0.9554358
0.631	5.77	14.64	0.39	36.37	72.74	6.30	3.98	1.40	0.971817
0.667	6.27	14.67	0.43	41.75	83.50	6.66	4.44	1.44	1.0615799

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	44.07	88.14	6.52	4.56	1.37	1.0532594
0.72	7.09	17.32	0.41	45.78	91.57	6.46	4.65	1.34	1.0530934
0.74	7.43	18.32	0.41	47.72	95.43	6.42	4.75	1.32	1.0559998
0.76	7.79	19.32	0.40	49.87	99.73	6.40	4.86	1.29	1.0615857
0.78	8.17	20.32	0.40	52.23	104.46	6.39	4.98	1.28	1.0695262
0.8	8.58	21.32	0.40	54.81	109.62	6.39	5.11	1.26	1.0795501
0.847	9.60	23.68	0.41	61.71	123.42	6.43	5.44	1.23	1.1100698

Street Capacity Calculations

DI #1 & #2

STREET FLOW

Slope= 0.0198

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.34	0.00	0.61	0.0049459
0.02	0.00	0.34	0.01	0.00	0.00	0.55	0.01	0.68	0.011738
0.04	0.01	0.68	0.02	0.01	0.02	0.87	0.03	0.77	0.0277231
0.06	0.03	1.02	0.03	0.03	0.07	1.14	0.07	0.82	0.0457343
0.08	0.05	1.36	0.04	0.07	0.14	1.38	0.11	0.86	0.0651759
0.1	0.08	1.70	0.05	0.13	0.26	1.60	0.16	0.89	0.0857421
0.12	0.12	2.04	0.06	0.21	0.42	1.81	0.22	0.92	0.1072433
0.125	0.13	2.13	0.06	0.23	0.46	1.86	0.23	0.93	0.1127484

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.25	0.49	1.82	0.24	0.89	0.1109368
0.16	0.23	3.91	0.06	0.41	0.83	1.84	0.29	0.81	0.119693
0.2	0.42	5.95	0.07	0.87	1.73	2.09	0.42	0.82	0.1530008
0.24	0.69	8.00	0.09	1.64	3.28	2.39	0.57	0.86	0.1957308
0.2804	1.04	10.06	0.10	2.82	5.63	2.71	0.76	0.90	0.2438446
0.303	1.27	11.21	0.11	3.67	7.35	2.88	0.87	0.92	0.2722533
0.3551	1.91	13.87	0.14	6.26	12.52	3.28	1.16	0.97	0.3408166
0.365	2.05	14.37	0.14	6.86	13.71	3.35	1.22	0.98	0.3542565

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	
0.41	**2.68**	**14.42**	**0.19**	**10.70**	**21.41**	**4.00**	**1.64**	**1.10**	**0.4656495**	DI#2
0.445	**3.17**	**14.45**	**0.22**	**14.14**	**28.29**	**4.47**	**1.99**	**1.18**	**0.5530866**	DI#1
0.4553	3.31	14.46	0.23	15.23	30.46	4.60	2.10	1.20	0.5789662	
0.511	4.09	14.52	0.28	21.61	43.22	5.29	2.70	1.30	0.7201231	
0.562	4.80	14.57	0.33	28.19	56.39	5.87	3.30	1.38	0.8511409	
0.6244	5.68	14.63	0.39	37.14	74.29	6.54	4.09	1.46	1.013637	
0.631	5.77	14.64	0.39	38.14	76.29	6.61	4.17	1.47	1.0309581	
0.667	6.27	14.67	0.43	43.79	87.57	6.98	4.66	1.51	1.1258665	

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	46.22	92.44	6.84	4.78	1.44	1.1175833
0.72	7.09	17.32	0.41	48.02	96.03	6.78	4.88	1.41	1.1176861
0.74	7.43	18.32	0.41	50.05	100.09	6.74	4.99	1.38	1.1210174
0.76	7.79	19.32	0.40	52.30	104.60	6.71	5.10	1.36	1.127165
0.78	8.17	20.32	0.40	54.78	109.56	6.70	5.23	1.34	1.1357878
0.8	8.58	21.32	0.40	57.49	114.97	6.70	5.36	1.32	1.1466013
0.847	9.60	23.68	0.41	64.72	129.44	6.74	5.71	1.29	1.1793364

Street Capacity Calculations

DI #3 & #4
STREET FLOW
Slope= 0.018

For water depths less than 0.125 feet
Y= Water depth
Area = 8*Y^2
P= SQRT(257*Y^2) + Y
n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.33	0.00	0.58	0.0046022
0.02	0.00	0.34	0.01	0.00	0.00	0.52	0.01	0.65	0.0109445
0.04	0.01	0.68	0.02	0.01	0.02	0.83	0.03	0.73	0.0259
0.06	0.03	1.02	0.03	0.03	0.06	1.09	0.07	0.78	0.0427741
0.08	0.05	1.36	0.04	0.07	0.13	1.32	0.11	0.82	0.0610039
0.1	0.08	1.70	0.05	0.12	0.24	1.53	0.15	0.85	0.0803001
0.12	0.12	2.04	0.06	0.20	0.40	1.72	0.21	0.88	0.1004831
0.125	0.13	2.13	0.06	0.22	0.44	1.77	0.22	0.88	0.1056521

For water depths greater than 0.125 ft but less than 0.365 ft
Y1= Y-0.125
A2= A1 + 2*Y1 + 25*Y1^2
P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	
0.13	0.14	2.38	0.06	0.24	0.47	1.73	0.23	0.85	0.1038901	
0.16	0.23	3.91	0.06	0.39	0.79	1.75	0.28	0.77	0.1119216	
0.2	0.42	5.95	0.07	0.83	1.65	1.99	0.40	0.78	0.1431038	
0.24	0.69	8.00	0.09	1.56	3.13	2.28	0.55	0.82	0.183204	
0.2804	1.04	10.06	0.10	2.69	5.37	2.58	0.72	0.86	0.2284041	
0.303	1.27	11.21	0.11	3.50	7.00	2.75	0.83	0.88	0.2551069	
0.347	**1.80**	**13.45**	**0.13**	**5.53**	**11.06**	**3.07**	**1.06**	**0.92**	**0.3093258**	DI # 5&6
0.365	2.05	14.37	0.14	6.54	13.07	3.20	1.17	0.93	0.3322269	

For water depths greater than 0.365 ft but less than 0.667 ft
Y2= Y - 0.365
A3= A2 + Y2*14
P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	
0.419	**2.80**	**14.43**	**0.19**	**11.01**	**22.03**	**3.93**	**1.65**	**1.07**	**0.4585912**	DI # 3&4
0.445	3.17	14.45	0.22	13.49	26.97	4.26	1.90	1.13	0.5200296	
0.4553	3.31	14.46	0.23	14.52	29.04	4.39	2.00	1.15	0.5444853	
0.507	**4.03**	**14.51**	**0.28**	**20.14**	**40.28**	**4.99**	**2.53**	**1.24**	**0.6682576**	Street capacity
0.562	4.80	14.57	0.33	26.88	53.76	5.60	3.15	1.32	0.8017739	
0.6244	5.68	14.63	0.39	35.41	70.83	6.24	3.90	1.39	0.9554358	
0.631	5.77	14.64	0.39	36.37	72.74	6.30	3.98	1.40	0.971817	
0.667	6.27	14.67	0.43	41.75	83.50	6.66	4.44	1.44	1.0615799	

For water depths greater than 0.667 ft but less than 0.847 ft
Y3= Y - 0.667
A4= A3 + 14 * Y3 + 25 * Y3^2
P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	44.07	88.14	6.52	4.56	1.37	1.0532594
0.72	7.09	17.32	0.41	45.78	91.57	6.46	4.65	1.34	1.0530934
0.74	7.43	18.32	0.41	47.72	95.43	6.42	4.75	1.32	1.0559998
0.76	7.79	19.32	0.40	49.87	99.73	6.40	4.86	1.29	1.0615857
0.78	8.17	20.32	0.40	52.23	104.46	6.39	4.98	1.28	1.0695262
0.8	8.58	21.32	0.40	54.81	109.62	6.39	5.11	1.26	1.0795501
0.847	9.60	23.68	0.41	61.71	123.42	6.43	5.44	1.23	1.1100698

Street Capacity Calculations

DI #7 & #8
STREET FLOW
Slope= 0.0176

For water depths less than 0.125 feet
Y= Water depth
Area = 8*Y^2
P= SQRT(257*Y^2) + Y
n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.33	0.00	0.57	0.0045241
0.02	0.00	0.34	0.01	0.00	0.00	0.52	0.01	0.64	0.0107641
0.04	0.01	0.68	0.02	0.01	0.02	0.82	0.03	0.72	0.025485
0.06	0.03	1.02	0.03	0.03	0.06	1.07	0.06	0.77	0.0420998
0.08	0.05	1.36	0.04	0.07	0.13	1.30	0.10	0.81	0.0600532
0.1	0.08	1.70	0.05	0.12	0.24	1.51	0.15	0.84	0.0790596
0.12	0.12	2.04	0.06	0.20	0.39	1.70	0.20	0.87	0.0989418
0.125	0.13	2.13	0.06	0.22	0.44	1.75	0.22	0.87	0.1040341

For water depths greater than 0.125 ft but less than 0.365 ft
Y1= Y-0.125
A2= A1 + 2*Y1 + 25*Y1^2
P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.23	0.47	1.72	0.22	0.84	0.1022839
0.16	0.23	3.91	0.06	0.39	0.78	1.73	0.28	0.76	0.1101515
0.2	0.42	5.95	0.07	0.82	1.63	1.97	0.39	0.77	0.1408493
0.24	0.69	8.00	0.09	1.55	3.09	2.26	0.54	0.81	0.1803493
0.2804	1.04	10.06	0.10	2.66	5.31	2.55	0.72	0.85	0.2248842
0.303	1.27	11.21	0.11	3.46	6.93	2.72	0.82	0.87	0.2511975
0.347	1.80	13.45	0.13	5.47	10.93	3.03	1.05	0.91	0.3046309
0.365	2.05	14.37	0.14	6.46	12.93	3.16	1.15	0.92	0.3272021

For water depths greater than 0.365 ft but less than 0.667 ft
Y2= Y - 0.365
A3= A2 + Y2*14
P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	
0.389	**2.38**	**14.40**	**0.17**	**8.32**	**16.64**	**3.49**	**1.36**	**0.99**	**0.3824177**	**DI # 8**
0.421	**2.83**	**14.43**	**0.20**	**11.07**	**22.15**	**3.91**	**1.65**	**1.06**	**0.4565123**	**DI # 7**
0.4553	3.31	14.46	0.23	14.36	28.71	4.34	1.98	1.13	0.5366116	
0.511	**4.09**	**14.52**	**0.28**	**20.37**	**40.75**	**4.98**	**2.55**	**1.23**	**0.6682607**	**Street capacity**
0.562	4.80	14.57	0.33	26.58	53.16	5.53	3.11	1.30	0.7904946	
0.6244	5.68	14.63	0.39	35.02	70.04	6.17	3.85	1.38	0.9421355	
0.631	5.77	14.64	0.39	35.96	71.93	6.23	3.93	1.38	0.9583017	
0.667	6.27	14.67	0.43	41.28	82.57	6.58	4.39	1.42	1.0468875	

For water depths greater than 0.667 ft but less than 0.847 ft
Y3= Y - 0.667
A4= A3 + 14 * Y3 + 25 * Y3^2
P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	43.58	87.16	6.44	4.51	1.36	1.0385606
0.72	7.09	17.32	0.41	45.27	90.54	6.39	4.60	1.33	1.0383343
0.74	7.43	18.32	0.41	47.18	94.37	6.35	4.70	1.30	1.0411447
0.76	7.79	19.32	0.40	49.31	98.62	6.33	4.81	1.28	1.0466032
0.78	8.17	20.32	0.40	51.65	103.30	6.32	4.93	1.26	1.0543886
0.8	8.58	21.32	0.40	54.20	108.40	6.32	5.06	1.24	1.064233
0.847	9.60	23.68	0.41	61.02	122.04	6.35	5.38	1.22	1.0942479

Street Capacity Calculations

DI #9 & #10
STREET FLOW
Slope= 0.0089

For water depths less than 0.125 feet
Y= Water depth
Area = 8*Y^2
P= SQRT(257*Y^2) + Y
n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.23	0.00	0.41	0.0026307
0.02	0.00	0.34	0.01	0.00	0.00	0.37	0.01	0.46	0.0063541
0.04	0.01	0.68	0.02	0.01	0.01	0.58	0.02	0.51	0.0152693
0.06	0.03	1.02	0.03	0.02	0.04	0.76	0.05	0.55	0.0254402
0.08	0.05	1.36	0.04	0.05	0.09	0.93	0.07	0.58	0.0365056
0.1	0.08	1.70	0.05	0.09	0.17	1.07	0.11	0.60	0.0482783
0.12	0.12	2.04	0.06	0.14	0.28	1.21	0.15	0.62	0.0606413
0.125	0.13	2.13	0.06	0.16	0.31	1.25	0.16	0.62	0.0638143

For water depths greater than 0.125 ft but less than 0.365 ft
Y1= Y-0.125
A2= A1 + 2*Y1 + 25*Y1^2
P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.17	0.33	1.22	0.16	0.60	0.0624341
0.16	0.23	3.91	0.06	0.28	0.56	1.23	0.20	0.54	0.0664509
0.2	0.42	5.95	0.07	0.58	1.16	1.40	0.28	0.55	0.0851404
0.24	0.69	8.00	0.09	1.10	2.20	1.60	0.38	0.58	0.1096423
0.2804	1.04	10.06	0.10	1.89	3.78	1.82	0.51	0.60	0.1374993
0.303	1.27	11.21	0.11	2.46	4.92	1.93	0.59	0.62	0.1540319
0.347	1.80	13.45	0.13	3.89	7.77	2.16	0.75	0.65	0.1877251
0.365	2.05	14.37	0.14	4.60	9.19	2.25	0.82	0.66	0.2019972

For water depths greater than 0.365 ft but less than 0.667 ft
Y2= Y - 0.365
A3= A2 + Y2*14
P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	
0.389	2.38	14.40	0.17	5.92	11.83	2.48	0.97	0.70	0.2379446	
0.416	**2.76**	**14.42**	**0.19**	**7.55**	**15.11**	**2.74**	**1.14**	**0.75**	**0.2787698**	**DI # 9 &10**
0.4553	3.31	14.46	0.23	10.21	20.42	3.09	1.40	0.81	0.3389049	
0.511	4.09	14.52	0.28	14.49	28.98	3.54	1.81	0.87	0.4255173	
0.562	4.80	14.57	0.33	18.90	37.80	3.94	2.21	0.93	0.5061502	
0.6244	5.68	14.63	0.39	24.90	49.80	4.39	2.74	0.98	0.6063853	
0.662	**6.20**	**14.67**	**0.42**	**28.82**	**57.64**	**4.65**	**3.08**	**1.01**	**0.6675527**	**Street capacity**
0.667	6.27	14.67	0.43	29.36	58.71	4.68	3.12	1.01	0.6757277	

For water depths greater than 0.667 ft but less than 0.847 ft
Y3= Y - 0.667
A4= A3 + 14 * Y3 + 25 * Y3^2
P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	30.99	61.98	4.58	3.21	0.97	0.6676244
0.72	7.09	17.32	0.41	32.19	64.39	4.54	3.27	0.94	0.6660813
0.74	7.43	18.32	0.41	33.55	67.11	4.52	3.34	0.93	0.6666539
0.76	7.79	19.32	0.40	35.06	70.13	4.50	3.42	0.91	0.669067
0.78	8.17	20.32	0.40	36.73	73.46	4.49	3.50	0.90	0.673094
0.8	8.58	21.32	0.40	38.54	77.08	4.49	3.59	0.89	0.6785461
0.847	9.60	23.68	0.41	43.39	86.79	4.52	3.83	0.87	0.6961092

Street Capacity Calculations

DI #11 & #12
STREET FLOW
Slope= 0.0089

For water depths less than 0.125 feet
Y= Water depth
Area = 8*Y^2
P= SQRT(257*Y^2) + Y
n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.23	0.00	0.41	0.0026307
0.02	0.00	0.34	0.01	0.00	0.00	0.37	0.01	0.46	0.0063541
0.04	0.01	0.68	0.02	0.01	0.01	0.58	0.02	0.51	0.0152693
0.06	0.03	1.02	0.03	0.02	0.04	0.76	0.05	0.55	0.0254402
0.08	0.05	1.36	0.04	0.05	0.09	0.93	0.07	0.58	0.0365056
0.1	0.08	1.70	0.05	0.09	0.17	1.07	0.11	0.60	0.0482783
0.12	0.12	2.04	0.06	0.14	0.28	1.21	0.15	0.62	0.0606413
0.125	0.13	2.13	0.06	0.16	0.31	1.25	0.16	0.62	0.0638143

For water depths greater than 0.125 ft but less than 0.365 ft
Y1= Y-0.125
A2= A1 + 2*Y1 + 25*Y1^2
P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	
0.13	0.14	2.38	0.06	0.17	0.33	1.22	0.16	0.60	0.0624341	
0.16	0.23	3.91	0.06	0.28	0.56	1.23	0.20	0.54	0.0664509	
0.2	0.42	5.95	0.07	0.58	1.16	1.40	0.28	0.55	0.0851404	
0.24	0.69	8.00	0.09	1.10	2.20	1.60	0.38	0.58	0.1096423	
0.253	0.79	8.66	0.09	1.32	2.64	1.67	0.42	0.59	0.118332	
0.303	1.27	11.21	0.11	2.46	4.92	1.93	0.59	0.62	0.1540319	
0.33	**1.59**	**12.59**	**0.13**	**3.29**	**6.57**	**2.07**	**0.68**	**0.64**	**0.1744942**	**DI # 11&12**
0.365	2.05	14.37	0.14	4.60	9.19	2.25	0.82	0.66	0.2019972	

For water depths greater than 0.365 ft but less than 0.667 ft
Y2= Y - 0.365
A3= A2 + Y2*14
P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	
0.389	2.38	14.40	0.17	5.92	11.83	2.48	0.97	0.70	0.2379446	
0.4553	3.31	14.46	0.23	10.21	20.42	3.09	1.40	0.81	0.3389049	
0.511	4.09	14.52	0.28	14.49	28.98	3.54	1.81	0.87	0.4255173	
0.562	4.80	14.57	0.33	18.90	37.80	3.94	2.21	0.93	0.5061502	
0.6244	5.68	14.63	0.39	24.90	49.80	4.39	2.74	0.98	0.6063853	
0.662	**6.20**	**14.67**	**0.42**	**28.82**	**57.64**	**4.65**	**3.08**	**1.01**	**0.6675527**	**Street capacity**
0.667	6.27	14.67	0.43	29.36	58.71	4.68	3.12	1.01	0.6757277	

For water depths greater than 0.667 ft but less than 0.847 ft
Y3= Y - 0.667
A4= A3 + 14 * Y3 + 25 * Y3^2
P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	30.99	61.98	4.58	3.21	0.97	0.6676244
0.72	7.09	17.32	0.41	32.19	64.39	4.54	3.27	0.94	0.6660813
0.74	7.43	18.32	0.41	33.55	67.11	4.52	3.34	0.93	0.6666539
0.76	7.79	19.32	0.40	35.06	70.13	4.50	3.42	0.91	0.669067
0.78	8.17	20.32	0.40	36.73	73.46	4.49	3.50	0.90	0.673094
0.8	8.58	21.32	0.40	38.54	77.08	4.49	3.59	0.89	0.6785461
0.847	9.60	23.68	0.41	43.39	86.79	4.52	3.83	0.87	0.6961092

TIERRA WEST, LLC

Project BOULDERS PHASE II Date

Project No.

Meeting Purpose Sheet No of

Attendees

SUMP INLET CAPACITY ANALYSIS

GRATE OPENING (AREA) (PER COA STD DWG # 2220, SINGLE GRATE)

GROSS AREA PER GRATE = (25 IN/12)(40 IN/12) =	6.94 sf
LESS BEARING BARS = (0.5 IN/12)(3.33 ft)(13) =	1.80 sf
LESS CROSS BARS = (0.5 IN/12)(7)[(25 IN/12) - 13(0.5 IN/12)] =	0.45 sf
NET GRATE OPEN AREA =	4.69 sf
USE GRATE AREA OPENING @ 50% CLOGGING FACTOR =	2.35 sf

ORIFICE EQUATION $Q = CA(2gh)^{1/2}$

$C = 0.67$

$A = 2.35\ ft^2$

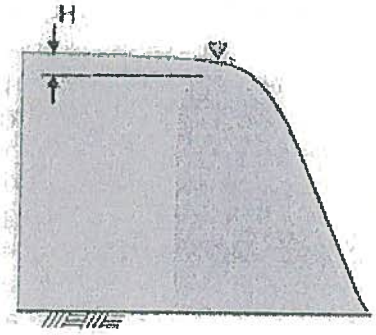
$g = 32.2\ ft/sec^2$

h = height of water above grate

WHERE $h = 0.67$ ft $Q_{CAPACITY} = 0.67(2.35)[2(32.2)(0.67)]^{1/2} = 10.34$ cfs

5571 Midway Park Place NE • Albuquerque, NM 87109 • (505) 858-3100 • (505) 858-1118 Fax • 1-800-245-3102 • twllc@tierrawestllc.com

onlinechannel14.php: Discharge over a broad-crested weir



The broad-crested weir

Formulas:

$$C = (2/3)^{3/2}(g)^{1/2}$$

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

INPUT DATA:

Select: SI units (metric)

Hydraulic head H: 2 ft

Weir length L: 42 ft

INTERMEDIATE CALCS:

Units selected: U.S. Customary

Gravitational acceleration g: 32.17 ft s^{-2}

Discharge coefficient C: 3.087 $ft^{1/2}$ s^{-1}

OUTPUT:

Discharge Q: 366.7 cfs

$\Sigma Q_{REQ} = 361.3$ cfs

Calculate Reset

Your request was processed at 10:37:11 am on February 18th, 2014 [140218 10:37:11].

Thank you for running onlinechannel14.php. Please call again. [060203]

online calc

TIERRA WEST, LLC

Project BOULDERS PHASE III Date 8-16-13

Project No. APS SURGE POND OVERFLOW

Meeting Purpose FLOW DEPTH CALCS Sheet No 1 of 1

Attendees

h = height of FLOODWALL REQUIRED

TRACT "B" :- MINIMUM WIDTH = 25ft
- PERCENT SLOPE = 2.0%

MAXIMUM Q = VICTORIA = 7cfs
VILLA DE LA CHAMISA = 19cfs
CHAMISA RIDGE = 35cfs
APS ELEMENTARY = 64cfs
TOTAL $Q_{REQ.}$ = 125cfs

@ h = 3.0ft $Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$n = 0.0395 (d_{50})^{1/6}$

@ d_{50} = 12" $n = 0.060$

$A = 25h = 25(3) = 75$

$WP = 25 + 2h = 25 + 2(3) = 31$

$R = A/WP = 75/31 = 2.419$

$Q = \left(\frac{1.486}{0.060}\right) .75 (2.419)^{2/3} (.02)^{1/2}$

$Q_{PROD.} = 135cfs \geq Q_{REQ} = 125cfs$ ✓

USE h = 3.0ft = height of FLOOD WALL REQUIRED

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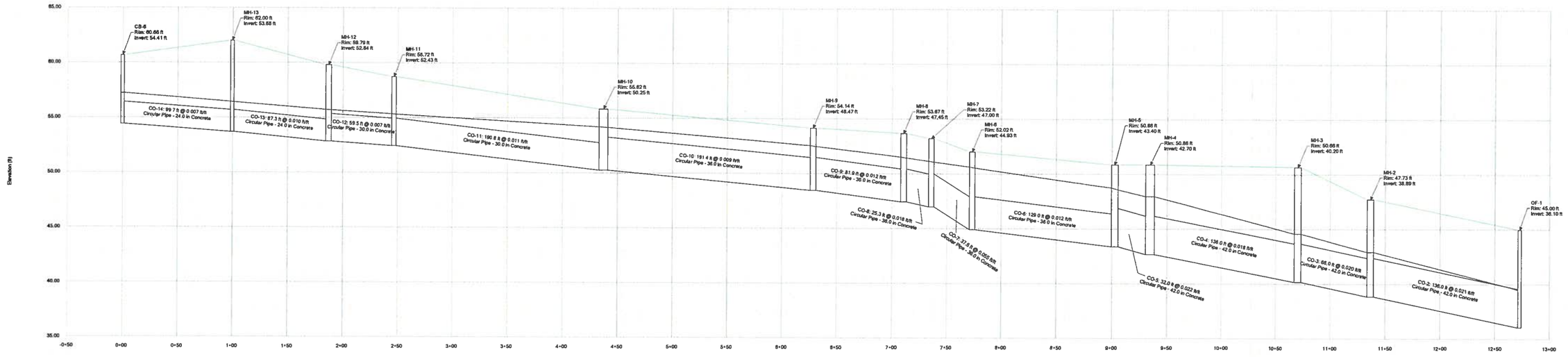
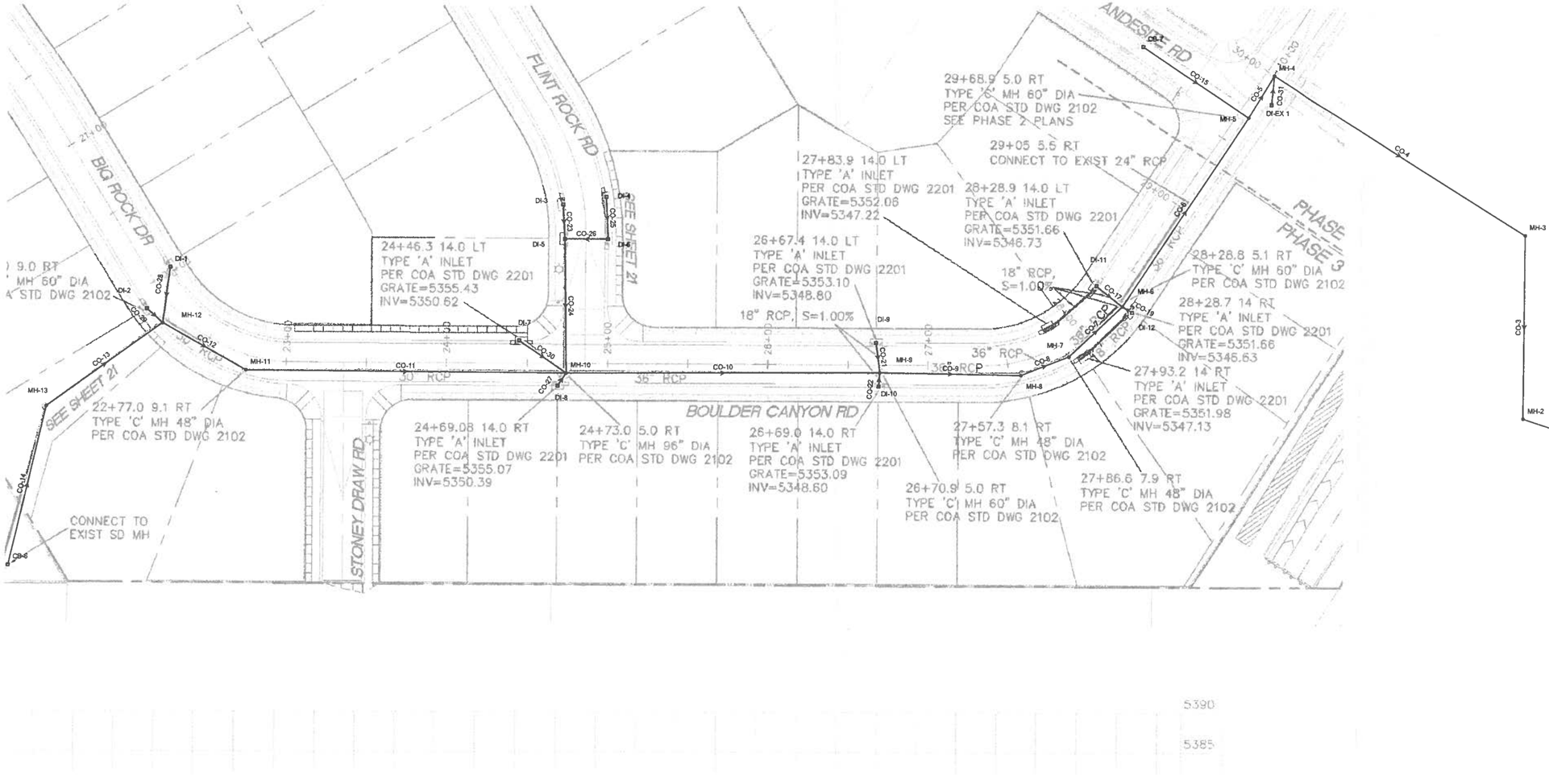
Scenario: Base
Current Time Step: 0.000Hr
Conduit FlexTable: Combined Pipe/Node Report

Label	Start Node	Stop Node	Length (Unified) (ft)	Capacity (Full Flow) (ft^3/s)	Flow (Link) (ft^3/s)	Velocity (Average) (ft/s)	Slope (ft/ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Invert (Downstream) (ft)	Invert (Upstream) (ft)
CO-17	DI-11	MH-6	12.0	40.68	3.30	1.87	0.150	50.64	50.63	44.93	46.73
CO-3	MH-3	MH-2	66.0	141.74	158.90	16.52	0.020	44.59	42.94	38.89	40.20
CO-4	MH-4	MH-3	136.0	136.40	158.90	16.52	0.018	47.98	44.59	40.20	42.70
CO-5	MH-5	MH-4	32.0	148.80	138.80	14.43	0.022	48.59	47.98	42.70	43.40
CO-6	MH-6	MH-5	129.0	72.63	78.40	11.09	0.012	50.54	48.75	43.40	44.93
CO-7	MH-7	MH-6	37.6	156.49	71.80	10.16	0.055	51.07	50.63	44.93	47.00
CO-8	MH-8	MH-7	25.3	88.95	71.80	10.16	0.018	51.44	51.15	47.00	47.45
CO-9	MH-9	MH-8	81.9	74.43	71.80	10.16	0.012	52.47	51.52	47.45	48.47
CO-10	MH-10	MH-9	191.4	64.32	60.80	8.60	0.009	54.14	52.55	48.47	50.25
CO-11	MH-11	MH-10	190.8	43.84	31.30	6.38	0.011	55.31	54.20	50.25	52.43
CO-12	MH-12	MH-11	59.5	34.05	31.30	6.38	0.007	55.69	55.34	52.43	52.84
CO-13	MH-13	MH-12	87.3	22.19	20.00	6.37	0.010	56.40	55.72	52.84	53.68
CO-2	MH-2	OF-1	136.0	144.10	158.90	16.52	0.021	42.94	39.51	36.10	38.89
CO-15	CB-7	MH-5	70.0	66.69	60.40	8.54	0.010	49.33	48.75	43.40	44.10
CO-31	DI-EX 1	MH-4	10.0	39.18	20.10	6.40	0.030	48.06	47.98	42.70	43.00
CO-19	DI-12	MH-6	10.0	43.31	3.30	1.87	0.170	50.64	50.63	44.93	46.63
CO-21	DI-9	MH-9	17.0	14.63	5.50	3.11	0.019	52.60	52.55	48.47	48.80
CO-22	DI-10	MH-9	9.0	12.62	5.50	3.11	0.014	52.58	52.55	48.47	48.60
CO-23	DI-3	DI-5	78.0	11.22	5.50	3.11	0.011	55.01	54.79	51.41	52.30
CO-24	DI-5	MH-10	80.0	27.24	19.00	6.05	0.015	54.76	54.20	50.25	51.41
CO-25	DI-4	DI-6	20.0	13.90	5.50	3.11	0.018	55.04	54.99	51.69	52.04
CO-26	DI-6	DI-5	24.0	11.35	9.50	5.38	0.012	54.99	54.79	51.41	51.69
CO-27	DI-8	MH-10	5.0	17.58	5.00	2.83	0.028	54.21	54.20	50.25	50.39
CO-28	DI-1	MH-12	25.0	43.61	5.80	17.14	0.172	58.08	55.72	52.84	57.15
CO-29	DI-2	MH-12	11.0	46.55	5.50	17.67	0.196	55.90	55.72	52.84	55.00
CO-30	DI-7	MH-10	25.0	12.78	5.50	3.11	0.015	54.27	54.20	50.25	50.62
CO-14	CB-6	MH-13	99.7	19.36	20.00	6.37	0.007	57.21	56.43	53.68	54.41

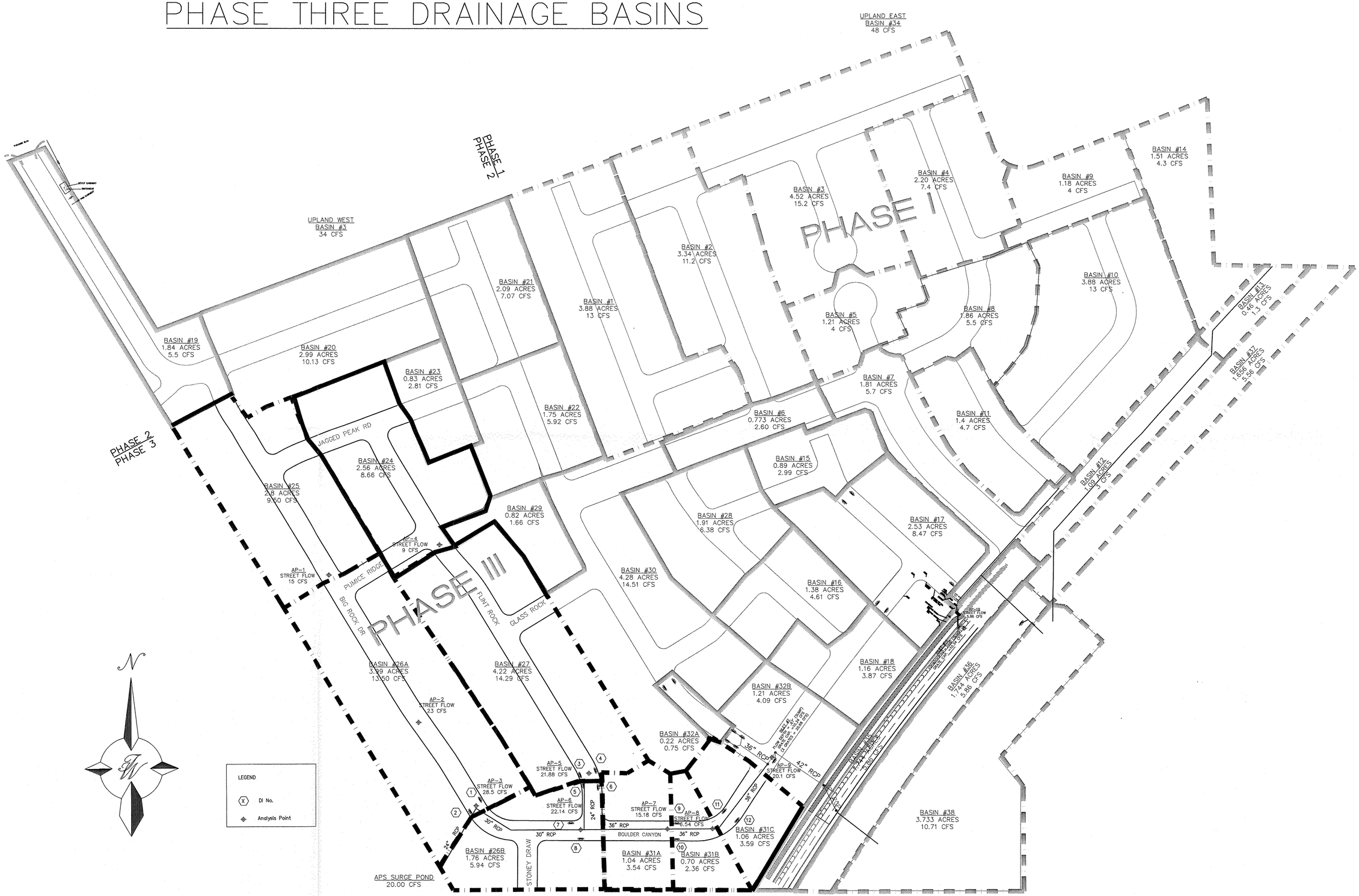
Profile Report
Engineering Profile - Profile - 1 (2011005 Boulder cyn storm.stc)



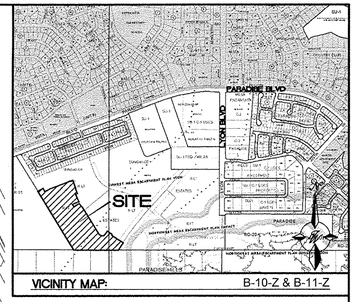
Scenario: Base



THE BOULDERS SUBDIVISION
PHASE THREE DRAINAGE BASINS



A.C.S. MONUMENT "11_B11"
STANDARD A.C.S. BRASS TABLET
(FOUND IN PLACE)
NEW MEXICO STATE PLANE COORDINATES
(CENTRAL ZONE-N.A.D. 1983)
N=1,528,350.344
E=1,504,957.688
EL=5348.50-NGVD 1988
GROUND TO GRID FACTOR=0.999669122
DELTA ALPHA ANGLE=-0°15'40.95"



VICINITY MAP: B-10-Z & B-11-Z

GRAPHIC SCALE
60 0 30 60
(IN FEET)
1 inch = 60 ft.

LEGEND

- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- CENTERLINE
- RIGHT-OF-WAY
- PHASE LINE
- SIDEWALK
- RETAINING WALL
- SCREEN WALL
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- x 5048.25 SPOT ELEVATION
- FLOW ARROW
- EXISTING CURB & GUTTER
- EXISTING BOUNDARY LINE
- 5010 EXISTING CONTOUR MAJOR
- 5011 EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION
- EXISTING RIPRAP

NOTE:
ALL CURB & GUTTER FOR PHASE 3 ARE STANDARD CURB & GUTTER PER COA STD DWG 2415A

SEE SHEET 2 FOR RETAINING WALL ELEVATIONS

EXISTING DRAINAGE POND AND OVERFLOW CONSTRUCTED WITH COA PROJECT NO 662382.
EXISTING CITY OF ALBUQUERQUE EASEMENT (BY PLAT FILED 12/31/2008, BOOK 2008C, PAGE 266)

ENGINEER'S SEAL
VINCENT P. CARRICA
NEW MEXICO
16212
REGISTERED PROFESSIONAL ENGINEER
12-19-14

VINCENT P. CARRICA
P.E. #16212

THE BOULDERS PHASE 3

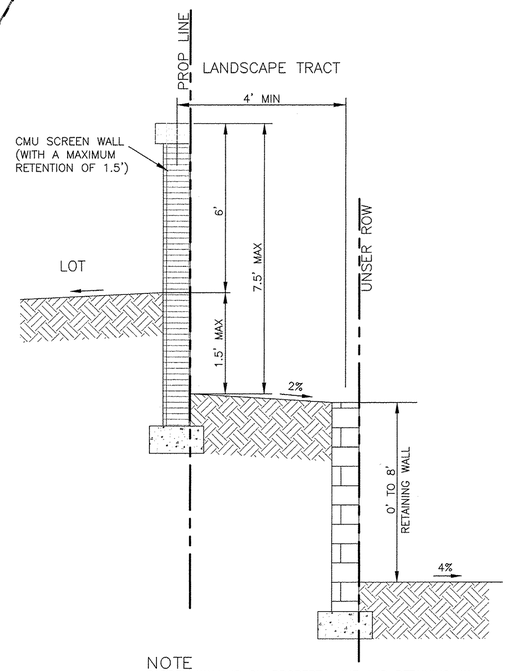
GRADING AND DRAINAGE PLAN

TIERRA WEST, LLC
5571 MIDWAY PARK PLACE NE
ALBUQUERQUE, NM 87109
(505) 858-3100
tierrawestllc.com

DRAWN BY: DY
DATE: 2-12-14
DRAWING: GRADING-PH 3
SHEET #: 1
JOB #: 2011005

LEGEND

- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- CENTERLINE
- RIGHT-OF-WAY
- BUILDING
- SIDEWALK
- RETAINING WALL
- SCREEN WALL
- EXISTING CURB & GUTTER
- EXISTING BOUNDARY LINE
- EXISTING RIPRAP



NOTE
GARDEN WALL IS ON PROPERTY LINE AND RETAINING WALL IS OFFSET 4' (MIN) CENTER TO CENTER.

STEPPED RETAINING WALL W/ SCREEN WALL DETAIL

NTS

GRAPHIC SCALE
60 0 30 60
(IN FEET)
1 inch = 60 ft.

ENGINEER'S SEAL
VINCENT P. CARRICA
NEW MEXICO
16212
PROFESSIONAL ENGINEER
12-14

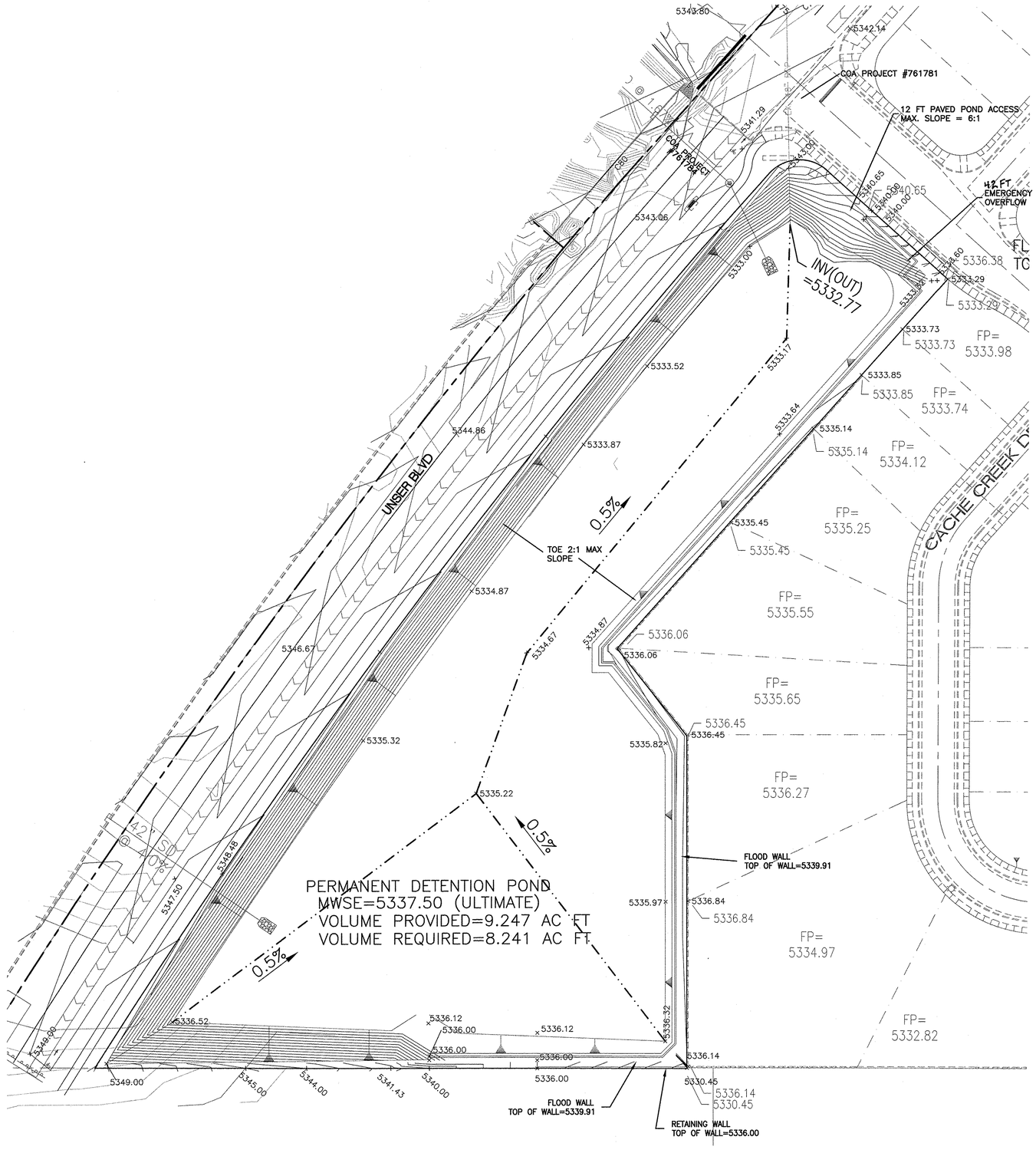
VINCENT P. CARRICA
P.E. #16212

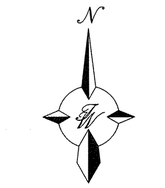
THE BOULDERS PHASE 3

RETAINING WALLS

TIERRA WEST, LLC
5571 MIDWAY PARK PLACE NE
ALBUQUERQUE, NM 87109
(505) 858-3100
tierrawestllc.com

DRAWN BY: DY
DATE: 2-12-14
DRAWING: OVERALL GRADING
SHEET #: 2
JOB #: 2011005





LEGEND

- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- CENTERLINE
- RIGHT-OF-WAY
- BUILDING
- SIDEWALK
- SCREEN WALL
- RETAINING WALL
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- x 5048.25 SPOT ELEVATION
- FLOW ARROW
- EXISTING CURB & GUTTER
- EXISTING BOUNDARY LINE
- EXISTING CONTOUR MAJOR
- 5011 EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION

ROUGH GRADING APPROVAL DATE

ENGINEER'S SEAL

VINCENT P. CARRICA
NEW MEXICO
16212
7-8-14
LICENSED PROFESSIONAL ENGINEER

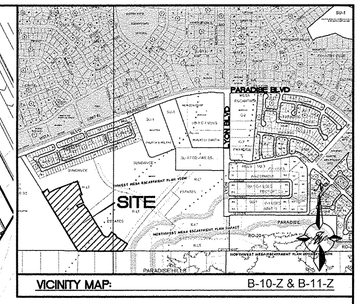
VINCENT P. CARRICA
P.E. #16212

THE BOULDERS PHASE 3

TRACT 6A GRADING AND DRAINAGE PLAN

TIERRA WEST, LLC
5571 MIDWAY PARK PLACE NE
ALBUQUERQUE, NM 87109
(505)858-3100
tierrawestllc.com

DRAWN BY: DY
DATE: 1-27-14
Offsite-Pond
SHEET #: 3
JOB #: 2011005



VICINITY MAP: B-10-Z & B-11-Z

LEGEND

- CURB & GUTTER
- BOUNDARY LINE
- RIGHT-OF-WAY
- PHASE LINE
- SIDEWALK
- RETAINING WALL
- SCREEN WALL
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- EXISTING CURB & GUTTER
- EXISTING BOUNDARY LINE
- 5010 EXISTING CONTOUR MAJOR
- 5011 EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION
- EXISTING RIPRAP

EROSION DETAILS

- CE TEMPORARY STONE CONSTRUCTION EXIT
- SF SF TEMPORARY SILT FENCE
- IP INLET PROTECTION
- SB SB TEMPORARY SEDIMENT BASIN
- SS SWPPP SIGN

EROSION NOTES

- TPS TPS TEMPORARY PARKING AND STORAGE

GENERAL EROSION NOTES

A. THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) IS COMPRISED OF THIS DRAWING ("SITE MAP"), THE STANDARD DETAILS, THE PLAN NARRATIVE, PLUS THE PERMIT AND ALL SUBSEQUENT REPORTS AND RELATED DOCUMENTS.

B. ALL CONTRACTORS AND SUBCONTRACTORS INVOLVED WITH STORM WATER POLLUTION PREVENTION SHALL OBTAIN A COPY OF THE STORM WATER POLLUTION PREVENTION PLAN AND THE STATE OF NEW MEXICO NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT (NPDES PERMIT) AND BECOME FAMILIAR WITH THEIR CONTENTS.

C. CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES AS REQUIRED BY THE SWPPP. ADDITIONAL BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED AS DICTATED BY CONDITIONS AT NO ADDITIONAL COST TO OWNER THROUGHOUT ALL PHASES OF CONSTRUCTION.

D. BEST MANAGEMENT PRACTICES (BMP'S) AND CONTROLS SHALL CONFORM TO FEDERAL, STATE, OR LOCAL REQUIREMENTS OR MANUAL OF PRACTICE, AS APPLICABLE CONTRACTOR SHALL IMPLEMENT ADDITIONAL CONTROLS AS DIRECTED BY PERMITTING AGENCY OR OWNER.

E. SITE MAP MUST CLEARLY DELINEATE ALL STATE WATERS. PERMITS FOR ANY CONSTRUCTION ACTIVITY IMPACTING STATE WATERS OR REGULATED WETLANDS MUST BE MAINTAINED ON SITE AT ALL TIMES.

F. CONTRACTOR SHALL MINIMIZE CLEARING TO THE MAXIMUM EXTENT PRACTICAL OR AS REQUIRED BY THE GENERAL PERMIT.

G. GENERAL CONTRACTOR SHALL DENOTE ON PLAN THE TEMPORARY PARKING AND STORAGE AREA WHICH SHALL ALSO BE USED AS THE EQUIPMENT MAINTENANCE AND CLEANING AREA, EMPLOYEE PARKING AREA, AND AREA FOR LOCATING PORTABLE FACILITIES, OFFICE TRAILERS, AND TOILET FACILITIES.

H. ALL WASH WATER (CONCRETE TRUCKS, VEHICLE CLEANING, EQUIPMENT CLEANING, ETC.) SHALL BE DETAINED AND PROPERLY TREATED OR DISPOSED.

I. SUFFICIENT OIL AND GREASE ABSORBING MATERIALS AND FLOTATION BOOMS SHALL BE MAINTAINED ON SITE OR READLY AVAILABLE TO CONTAIN AND CLEAN-UP FUEL OR CHEMICAL SPILLS AND LEAKS.

J. DUST ON THE SITE SHALL BE CONTROLLED. THE USE OF MOTOR OILS AND OTHER PETROLEUM BASED OR TOXIC LIQUIDS FOR DUST SUPPRESSION OPERATIONS IS PROHIBITED.

K. RUBBISH, TRASH, GARBAGE, LITTER, OR OTHER SUCH MATERIALS SHALL BE DEPOSITED INTO SEALED CONTAINERS. MATERIALS SHALL BE PREVENTED FROM LEAVING THE PREMISES THROUGH THE ACTION OF WIND OR STORMWATER DISCHARGE INTO DRAINAGE DITCHES OR WATERS OF THE STATE.

L. ALL STORM WATER POLLUTION PREVENTION MEASURES PRESENTED ON THIS PLAN, AND IN THE STORM WATER POLLUTION PREVENTION PLAN, SHALL BE INITIATED AS SOON AS PRACTICABLE.

M. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY HAS STOPPED FOR AT LEAST 21 DAYS, SHALL BE TEMPORARILY SEEDED. THESE AREAS SHALL BE SEEDED NO LATER THAN 14 DAYS FROM THE LAST CONSTRUCTION ACTIVITY OCCURING THESE AREAS. PROVIDE ADEQUATE TEMPORARY IRRIGATION FOR GERMINATION.

N. DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY HAS PERMANENTLY STOPPED SHALL BE PERMANENTLY SEEDED. THESE AREAS SHALL BE SEEDED NO LATER THAN 14 DAYS AFTER THE LAST CONSTRUCTION ACTIVITY OCCURRING IN THESE AREAS. REFER TO THE GRADING PLAN AND/OR LANDSCAPE PLAN.

O. IF THE ACTION OF VEHICLES TRAVELING OVER THE GRAVEL CONSTRUCTION ENTRANCES IS NOT SUFFICIENT TO REMOVE THE MAJORITY OF DIRT OR MUD, THEN THE TIRES MUST BE WASHED BEFORE THE VEHICLES ENTER A PUBLIC ROAD. IF WASHING IS USED, PROVISIONS MUST BE MADE TO INTERCEPT THE WASH WATER AND TRAP THE SEDIMENT BEFORE IT IS CARRIED OFF THE SITE.

P. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.

Q. CONTRACTORS OR SUBCONTRACTORS WILL BE RESPONSIBLE FOR REMOVING SEDIMENT IN THE DETENTION POND AND ANY SEDIMENT THAT MAY HAVE COLLECTED IN THE STORM SEWER DRAINAGE SYSTEMS IN CONJUNCTION WITH THE STABILIZATION OFTHE SITE.

R. ON-SITE & OFFSITE SOIL STOCKPILE AND BORROW AREAS SHALL BE PROTECTED FROM EROSION AND SEDIMENTATION THROUGH IMPLEMENTATION OF BEST MANAGEMENT PRACTICES, AS REQUIRED PER THE CONSTRUCTION GENERAL PERMIT. STOCKPILE AND BORROW AREA LOCATIONS SHALL BE NOTED ON THE SITE MAP AND PERMITTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS.

S. SLOPES SHALL BE LEFT IN A ROUGHENED CONDITION DURING THE GRADING PHASE TO REDUCE RUNOFF VELOCITIES AND EROSION.

T. DUE TO THE GRADE CHANGES DURING THE DEVELOPMENT OF THE PROJECT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING THE EROSION CONTROL MEASURES (SILT FENCES, STRAW BALES, ETC.) TO PREVENT EROSION.

U. ALL CONSTRUCTION SHALL BE STABILIZED AT THE END OF EACH WORKING DAY, THIS INCLUDES BACKFILLING OF TRENCHES FOR UTILITY CONSTRUCTION AND PLACEMENT OF GRAVEL OR BITUMINOUS PAVING FOR ROAD CONSTRUCTION.

MAINTENANCE

ALL MEASURES STATED ON THIS EROSION AND SEDIMENT CONTROL PLAN, AND IN THE STORM WATER POLLUTION PREVENTION PLAN, SHALL BE MAINTAINED IN FULLY FUNCTIONAL CONDITION UNTIL NO LONGER REQUIRED FOR A COMPLETED PHASE OF WORK OR FINAL STABILIZATION OF THE SITE. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED BY A QUALIFIED PERSON AT LEAST ONCE EVERY SEVEN CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A 0.5" RAINFALL EVENT, AND CLEANED AND REPAIRED IN ACCORDANCE WITH THE FOLLOWING:

1. INLET PROTECTION DEVICES AND BARRIERS SHALL BE REPAIRED OR REPLACED IF THEY SHOW SIGNS OF UNDERMINING, OR DETERIORATION.
2. ALL SEEDED AREAS SHALL BE CHECKED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED. AREAS SHOULD BE FERTILIZED, WATERED, AND RESEEDED AS NEEDED.
3. SILT FENCES SHALL BE REPAIRED TO THEIR ORIGINAL CONDITIONS IF DAMAGED. SEDIMENT SHALL BE REMOVED FROM THE SILT FENCES WHEN IT REACHES ONE-HALF THE HEIGHT OF THE SILT FENCE.
4. THE CONSTRUCTION ENTRANCES SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE CONSTRUCTION ENTRANCES AS CONDITIONS DEMAND.
5. ANY TEMPORARY PARKING AND STORAGE AREAS SHALL BE KEPT IN GOOD CONDITION (SUITABLE FOR PARKING AND STORAGE). THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE TEMPORARY PARKING AS CONDITIONS DEMAND. ONCE IDENTIFIED, NOTE ON THE SWPPP PLAN.
6. OUTLET STRUCTURES IN THE SEDIMENTATION BASINS SHALL BE MAINTAINED IN OPERATIONAL CONDITIONS AT ALL TIMES. SEDIMENT SHALL BE REMOVED FROM SEDIMENT BASINS OR TRAPS WHEN THE DESIGN CAPACITY HAS BEEN REDUCED BY 50%.

SEQUENCE OF CONSTRUCTION

1. INSTALL STABILIZED CONSTRUCTION ENTRANCES.
2. CONSTRUCT THE SILT FENCES ON THE SITE.
3. PREPARE TEMPORARY PARKING AND STORAGE AREA.
4. CONSTRUCT THE SEDIMENTATION AND SEDIMENT TRAP BASINS.
5. PERFORM DEMOLITION ON THE SITE.
6. UNDERCUT GRADE AS REQUIRED.
7. START CONSTRUCTION OF BUILDING PADS AND INFRA STRUCTURE.
8. FINISH GRADING THE SITE. RAISE GRADES TO INDUCE DRAINAGE TOWARD TEMPORARY SEDIMENT BASINS

ENGINEER'S SEAL

VINCENT P. CARRICA
NEW MEXICO
16212
REGISTERED PROFESSIONAL ENGINEER
12-18-14

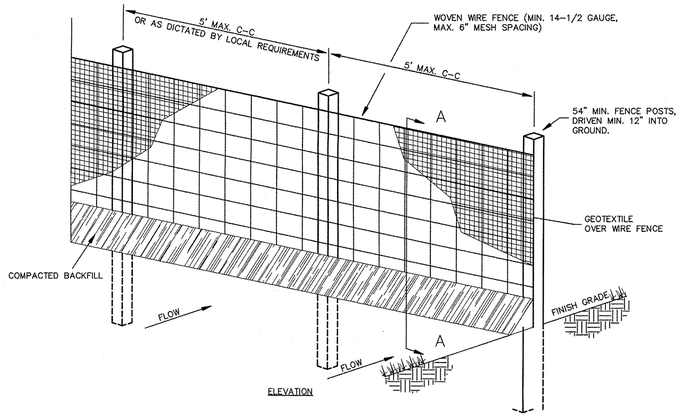
VINCENT P. CARRICA
P.E. #16212

THE BOULDERS PHASE 3

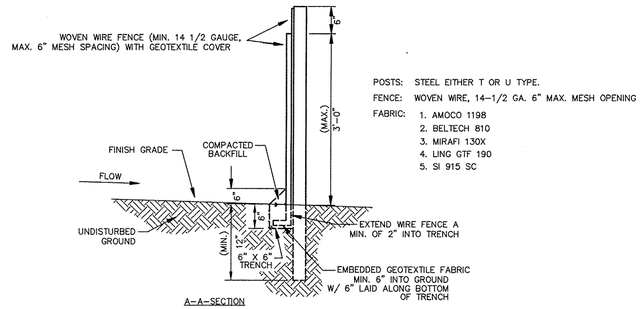
TEMPORARY SEDIMENTATION AND EROSION CONTROL PLAN

TIERRA WEST, LLC
5571 MIDWAY PARK PLACE NE
ALBUQUERQUE, NM 87109
(505) 858-3100
tierrawestllc.com

DRAWN BY	DY
DATE	2-12-14
DRAWING	SWPPP-PH 3
SHEET #	1
JOB #	2011005



ELEVATION



A-A-SECTION

POSTS: STEEL EITHER T OR U TYPE.

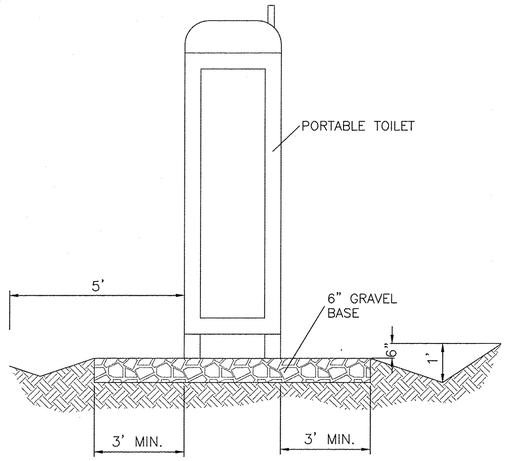
FENCE: WOVEN WIRE, 14-1/2 GA. 6" MAX. MESH OPENING

FABRIC:
1. AMOCO 1198
2. BELTECH 810
3. MIRAFI 130X
4. LING GTF 190
5. SI 915 SC

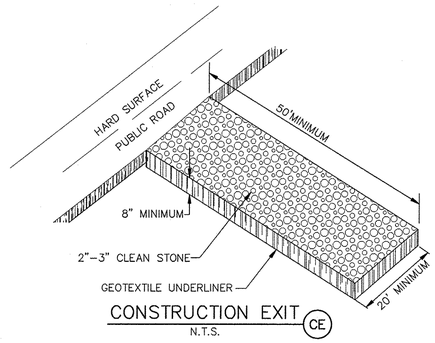
1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES.
2. GEOTEXTILE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF GEOTEXTILE ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NOTED IN THE EROSION CONTROL PLAN. COLLECTED MATERIAL SHALL BE REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
5. ALL SILT FENCE SHALL INCLUDE WIRE SUPPORT UNLESS INDICATED OTHERWISE

SEDIMENTATION/SILT FENCE WITH WIRE SUPPORT (SF)

N.T.S.



PORTABLE TOILET CONTAINMENT DETAIL



CONSTRUCTION EXIT (CE)

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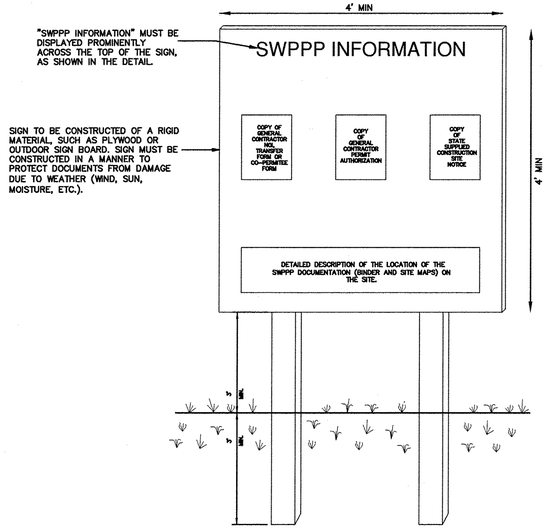
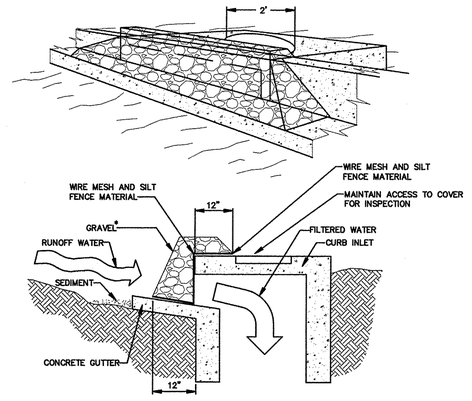


NOTES:
1) THE SWPPP INFORMATION SIGN MUST BE LOCATED NEAR THE CONSTRUCTION EXIT OF THE SITE, SUCH THAT IT IS ACCESSIBLE AND VIEWABLE BY THE GENERAL PUBLIC, BUT NOT OBSTRUCTING VIEWS AS TO CAUSE A SAFETY HAZARD.
2) ALL POSTED DOCUMENTS MUST BE MAINTAINED IN A CLEARLY READABLE CONDITION AT ALL TIMES THROUGHOUT CONSTRUCTION AND UNTIL THE NOTICE-OF-TERMINATION (NOT) IS FILED FOR THE PERMIT.
3) CONTRACTOR SHALL POST OTHER STORM WATER AND/OR EROSION AND SEDIMENT CONTROL RELATED PERMITS ON THE SIGN AS REQUIRED BY THE GOVERNING AGENCY.
4) SIGN SHALL BE LOCATED OUTSIDE OF PUBLIC RIGHT-OF-WAY AND EASEMENTS UNLESS APPROVED BY THE GOVERNING AGENCY.
5) CONTRACTOR IS RESPONSIBLE FOR ENSURING STABILITY OF THE SWPPP INFORMATION SIGN.

SWPPP INFORMATION SIGN (SS)

N.T.S.



SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE PONDING IN FRONT OF THE STRUCTURE IS NOT LIKELY TO CAUSE INCONVENIENCE OR DAMAGE TO ADJACENT STRUCTURES AND UNPROTECTED AREAS.

* GRAVEL SHALL BE 3/4"-2" ANGULAR CLEAN STONE

GRAVEL CURB INLET SEDIMENT FILTER (IP5)

N.T.S.

ENGINEER'S SEAL

VINCENT P. CARRICA — NEW MEXICO — 16212 — PROFESSIONAL ENGINEER — 4-28-14

VINCENT P. CARRICA
P.E. #16212

THE BOULDERS PHASE 3

EROSION CONTROL DETAILS

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5571 MIDWAY PARK PLACE NE
ALBUQUERQUE, NM 87109
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DRAWN BY: DY

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SHEET #: 2

JOB #: 2011005