L210100

Cherne, Curtis

From: Eddings, Scott [seddings@Huitt-Zollars.com]
Sent: Thursday, October 24, 2013 10:41 AM
To: Cherne, Curtis
Subject: RE: Tract C-1 Drainage Exhibit

Hi Curtis –

We will update the exhibit and make a formal submittal. The public drainage easement outside the pond exists to allow at some future time a swale to be installed to allow the water to directly discharge onto Horseshoe trail.

From: Cherne, Curtis [mailto:CCherne@cabq.gov]
Sent: Thursday, October 24, 2013 10:02 AM
To: Eddings, Scott
Cc: Costales, Richard V.
Subject: RE: Tract C-1 Drainage Exhibit

Scott,
I have reviewed the exhibit and provide the following comments:
1. It appears your drainage basins do not account for the landscape area between the wall and the path. Once the water leaves the private landscape area and hits the public area, the water becomes public.
2. Since this is a retention pond, you should use the 100 yr -10 day storm not the 100 yr- 24 hour storm to size the pond.

Aside:
1. Why does the public drainage easement encompass an area outside the pond?

Curtis

From: Eddings, Scott [mailto:seddings@Huitt-Zollars.com]
Sent: Tuesday, October 22, 2013 2:03 PM
To: Cherne, Curtis; Costales, Richard V.
Cc: Porter Allan
Subject: RE: Tract C-1 Drainage Exhibit

This time with the exhibit.

From: Eddings, Scott
Sent: Tuesday, October 22, 2013 1:53 PM
To: 'Cherne, Curtis'; Richard V. Costales
Cc: 'Porter, Allan K.'
Subject: Tract C-1 Drainage Exhibit

Hi Curtis –

Enclosed is the drainage exhibit as discussed. The sanitary sewer line beneath the pond will have at least 5.33 feet of cover over the TOP of the pipe so we should be fine.

Scott

HUITT-ZOLLARS, INC.

Scott Eddings, PE
Associate
333 Rio Rancho Blvd
Suite 101
Rio Rancho, New Mexico 87124
Phone 505.892.5141, extension 10942
Cell 505.235.7211
Fax 505.892.3259
www.huitt-zollars.com

Cherne, Curtis

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Sent: Thursday, October 24, 2013 10:02 AM
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Cc: Costales, Richard V.
Subject: RE: Tract C-1 Drainage Exhibit

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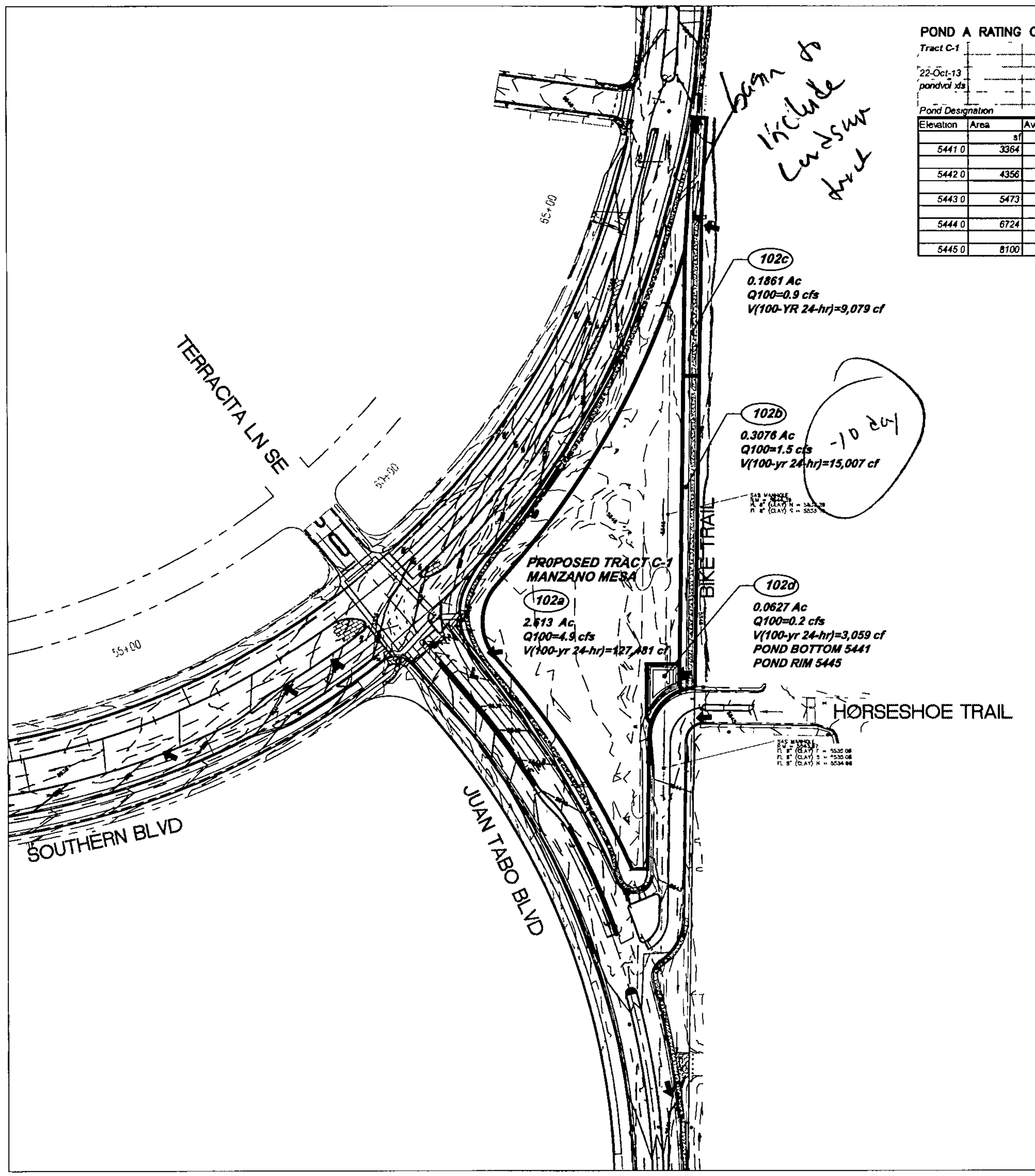
HYDROLOGY — FLOW

Basin	Description	Land Treatements (DEVELOPED) Percentage				AREA	10-YR Peak Discharge (Zone 3) CFS/ACRE				100-YR Peak Discharge (Zone 3) CFS/ACRE				10-YR PEAK FLOW	100-YR PEAK FLOW
		A	B	C	D	AC	A	B	C	D	A	B	C	D	CFS	CFS
102a	Commercial Tract (To release Historic)	100	0	0	0	2 613	0 58	1 19	2 00	3 39	1 87	2 60	3 45	5 02	1 516	4 886
102b	Bike Trail to release to Pond	0	0	15	85	0 308	0 58	1 19	2 00	3 39	1 87	2 60	3 45	5 02	0 979	1 472
102c	Bike Trail to release to Juan Tabo	0	0	15	85	0 186	0 58	1 19	2 00	3 39	1 87	2 60	3 45	5 02	0 592	0 890
102d	Pond	0	0	100	0	0 063	0 58	1 19	2 00	3 39	1 87	2 60	3 45	5 02	0 125	0 216

,5ac

HYDROLOGY — VOLUME

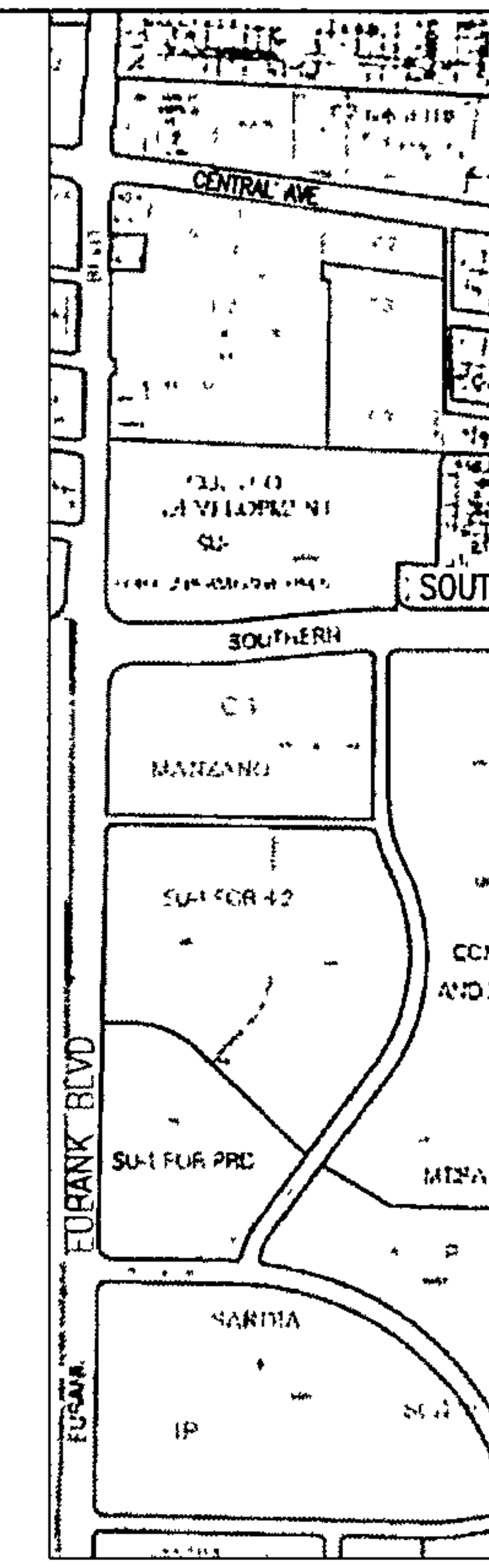
Basin	Description	Land Treatements (DEVELOPED) Percentage				AREA	EXCESS PRECIPITATION IN				Weighted E IN				Volume 100-YR 6-HR	Volume 100-YR 6-HR	Volume 100-YR 24-HR	Volume 100-YR 24-HR
		A	B	C	D	AC	A	B	C	D	A	B	C	D	AC-FT	CF	AC-FT	CF
102a	Commercial Tract (To release Historic)	100	0	0	0	2 613	0 66	0 92	1 29	2 36	1 87	2 60	3 45	5 02	2 818	122738	2 93	127481
102b	Bike Trail (Release to Pond)	0	0	15	85	0 308	0 66	0 92	1 29	2 36	1 87	2 60	3 45	5 02	0 332	14449	0 34	15007
102c	Bike Trail (Release to Juan Tabo Blvd)	0	0	15	85	0 186	0 66	0 92	1 29	2 36	1 87	2 60	3 45	5 02	0 201	8742	0 21	9079
102d	Pond (Retain)	0	0	100	0	0 063	0 66	0 92	1 29	2 36	1 87	2 60	3 45	5 02	0 068	2945	0 07	3059



POND A RATING CURVE

Tract C-1
22-Oct-13
pondvol xls
Pond Designation

Elevation	Area	Average Area	Volume	Accumulative Volume	Accumulative Volume
	sf	sf	Ac-Ft	Ac-Ft	cf
5441 0	3364				
		3860	0 089	0 089	3860
5442 0	4356				
		4915	0 113	0 201	8774 5
5443 0	5473				
		6099	0 140	0 341	14873
5444 0	6724				
		7412	0 170	0 512	22285
5445 0	8100				



VICINITY MAP

ZONE ATLAS MAP L-21-Z

675' lgx 44.3' wide
= 29903/43560 = .69 ac

DRAINAGE STUDY
FOR
Tract C-1 Manzano Mesa

INTRODUCTION
This drainage study addresses the storm water runoff and proposed infrastructure needed to convey the runoff from the Bike Trail within former portions of Juan Tabo Blvd. This study will analyze proposed infrastructure in an effort to show that the project complies with the City of Albuquerque Design Process Manual

FLOOD HAZARD ZONES
Per FEMA's Flood Insurance Rate Map (FIRM) 35001C0358G and 35001C0359G, both dated September 26, 2008, a small portion of the project site (east end of project) is located within a FEMA 100-year Flood Hazard Zone. See attached

RELATED REPORTS
The "Drainage Study for Southern Boulevard Reconstruction" prepared by Huitt-Zollars, Inc in January 2011.

The "Drainage Study for Terracita Subdivision" prepared by Bohannan Huston, Inc in May 2003.

METHODOLOGY
This drainage study is based on the procedures outlined in the Development Process Manual Section 22 2, City of Albuquerque (DPM), October 2006 revision. The precipitation zone is Zone 3. The 10-yr and 100-yr peak discharge rates were calculated using section "A.6 - Peak Discharge Rate for Small Watersheds".

EXISTING CONDITIONS
Basin 102a, which is the unimproved proposed Tract C-1 Manzano Mesa, sheet flows from east to west and discharges non-concentrated flows onto Juan Tabo Boulevard and Southern Boulevard.

Basin 102b, which is a portion of the Bike Trail, drains to the south and discharges concentrated flows into the pond. A rundown into the pond was constructed as part of the Southern Boulevard Reconstruction Project

Basin 102c, which is a portion of the Bike Trail, drains to the north and discharges concentrated flows into Juan Tabo Boulevard.

Basin 102d is Pond A.

POND A
Basin 102b discharges into the pond (Basin 102d). The total volume of water within the pond from the 100-year 24-your is 18,066 cubic feet. The capacity of the pond is 22,285 cubic feet. A drainage easement on the plat is provided to allow future projects to regrade the area and remove the pond.

SCALE 1"=100' (100 50 0 100 200)

- BASIN BOUNDARY
- DISCHARGE LOCATION
- FLOW DIRECTION
- MINOR DESIGN CONTOUR
- MAJOR DESIGN CONTOUR

AS BUILT INFORMATION
CONTRACTOR — DATE
WORK STAKED BY — DATE
INSPECTOR'S ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE

MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

BENCH MARKS
FOUND MONUMENT "X"
NM STATE PLANE COORDINATE SYSTEM
(CENTRAL ZONE)(NAD 1983)
NORTHING= X
EASTING= X
GROUND TO GRID FACTOR= X
MAPPING ANGLE=X

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

ENGINEER'S SEAL
SCOTT EDDINGS, NEW MEXICO, 12856, REGISTERED PROFESSIONAL ENGINEER
10/22/13

NO. | DATE | REMARKS | BY
REVISIONS
DESIGN
DESIGNED BY: DATE:
DRAWN BY: DATE:
DWG NAME: PROJ #:
CHECKED BY: DATE:

Designed By
HUITT-ZOLLARS
Huitt-Zollars, Inc. Rio Rancho
333 Rio Rancho Drive NE, Suite 101
Rio Rancho, New Mexico 87124
Phone (505) 892-5141 Fax (505) 892-3259

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

TITLE: SOUTHERN BLVD. DRAINAGE STUDY
PLAT TRACT C-1 MANZANO MESA

Design Review Committee	City Engineer	Last Update	Mo./Day/Yr.	Mo./Day/Yr.

City Project No.	Zone Map No.	Sheet	Of
7175.91	L-21-Z	1	1

CITY OF ALBUQUERQUE

January 25, 2011

Scott Eddings, P.E.
Huitt-Zollars, Inc.
333 Rio Rancho Blvd
Rio Rancho, NM 87124

Re: Southern Blvd Reconstruction, Drainage Report
Engineer's Stamp date –no stamp, 90%- (L21/D100)

Dear Mr. Eddings,

Based upon the information provided in your submittal received 1-20-11, the above referenced report is approved for Work Order.

A Floodplain Development Permit will be required for the work in the AO zone near Fawn Trail. This work cannot increase the depth in Juan Tabo Blvd.

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

Sincerely,

Curtis A. Cherne

Curtis A. Cherne, P.E.
Senior Engineer, Planning Dept.
Development and Building Services

C: File

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

DRAINAGE INFORMATION SHEET

(REV. 1/28/2003)

UC 1-144

L21/D100

~~L-20 & 21-Z~~

PROJECT TITLE: Southern Blvd Reconstruction ZONE ATLAS/DRNG. FILE #:

DRB #: EPC#: WORK ORDER #:

LEGAL DESCRIPTION: Eubank to Juan Tabo – COA Proj #7175 91

CITY ADDRESS:

ENGINEERING FIRM:	Huitt-Zollars, Inc.	CONTACT:	Scott Eddings
ADDRESS:	333 Rio Rancho Blvd.	PHONE:	892-5141
CITY, STATE:	Rio Rancho, NM	ZIP CODE:	87124
OWNER:	COA DMD	CONTACT:	Richard Costales
ADDRESS:		PHONE:	768-2774
CITY, STATE:		ZIP CODE:	
ARCHITECT:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	
SURVEYOR:	Huitt-Zollars, Inc.	CONTACT:	
ADDRESS:	333 Rio Rancho Blvd	PHONE:	
CITY, STATE:	Rio Rancho, NM	ZIP CODE:	
CONTRACTOR:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	

CHECK TYPE OF SUBMITTAL:

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

CHECK TYPE OF APPROVAL SOUGHT:

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

WAS A PRE-DESIGN MEETING ATTENDED:

- ___ YES
- X NO
- ___ COPY PROVIDED

RECEIVED
DEC 1 2010
HYDROLOGY SECTION

JAN 20 2011
HYDROLOGY SECTION

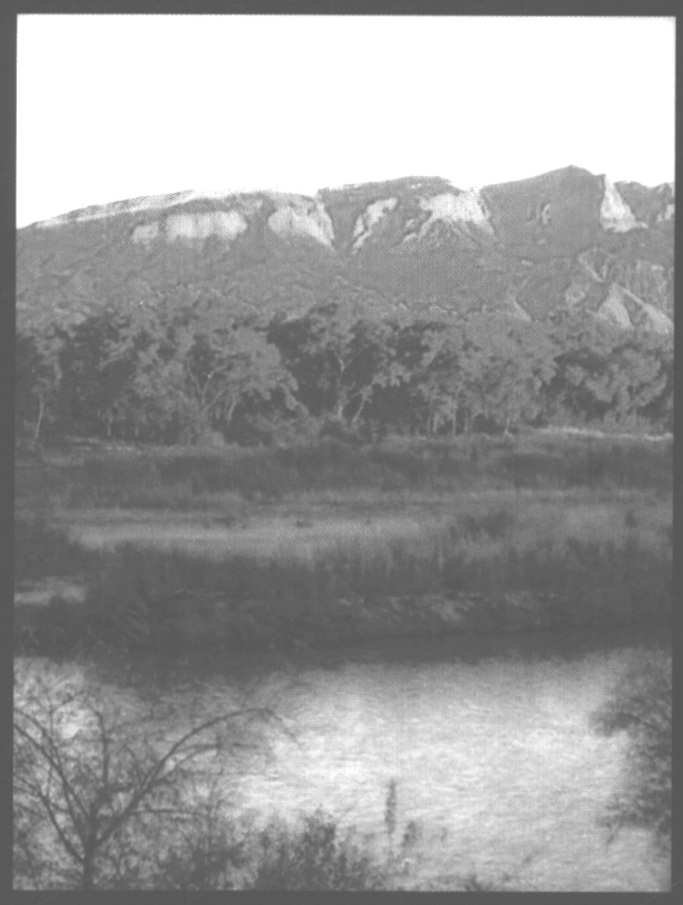
DATE SUBMITTED: 12/1/10 BY: Scott Eddings

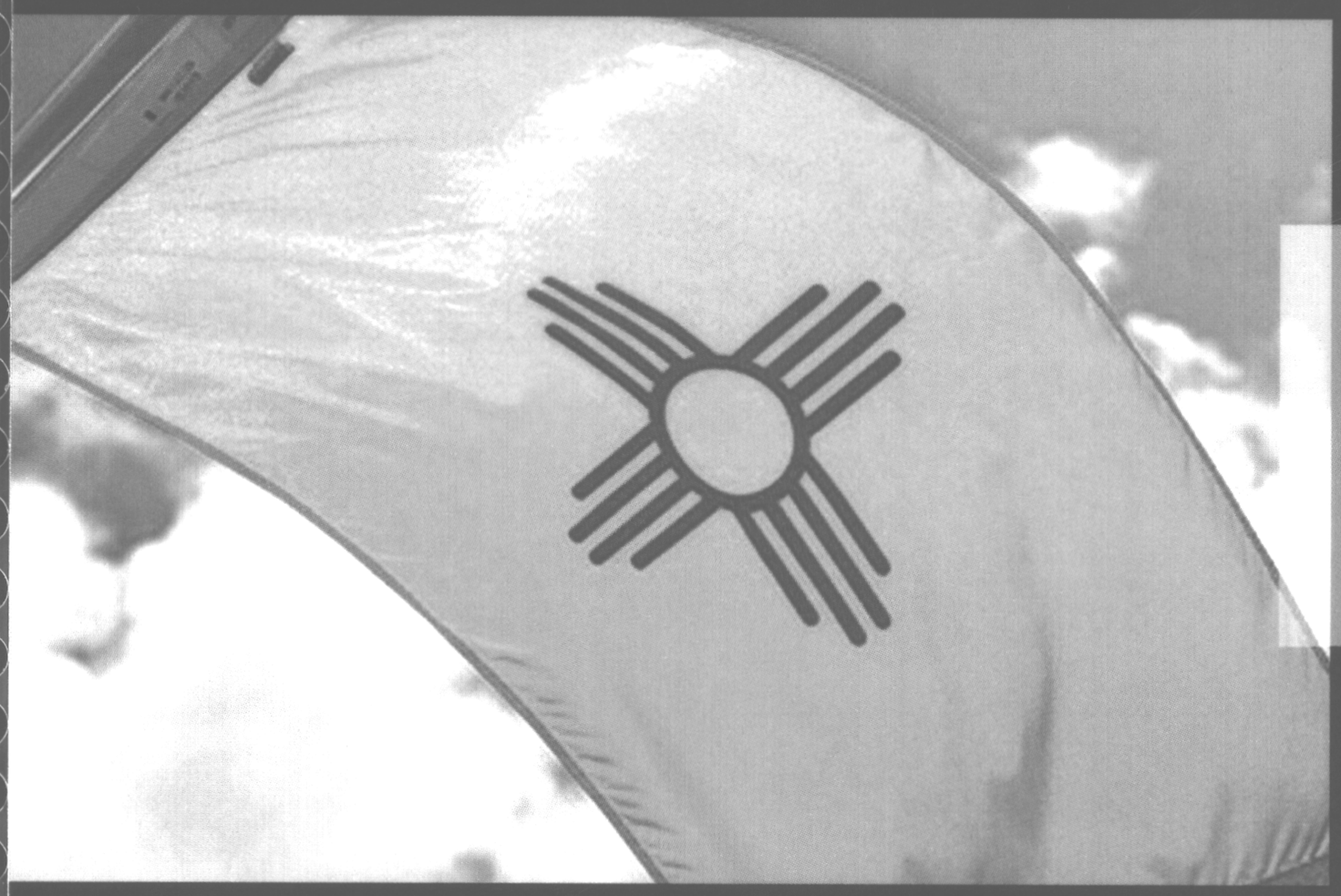
Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope of the proposed development defines the degree of drainage detail. One or More of the following levels of submittal may be required based on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

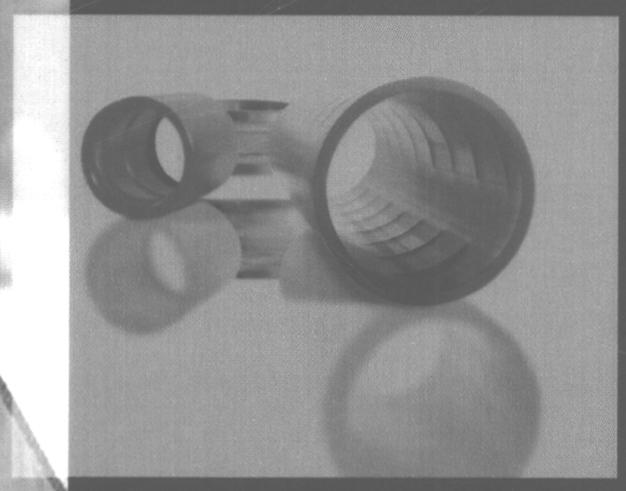
1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5)
3. **Drainage Report:** Required for subdivisions containing more than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

DRAINAGE REPORT FOR SOUTHERN BLVD: 90% SUBMITTAL

Prepared For







Project Location

Southern Blvd. from Eubank Blvd.
to Juan Tabo Blvd.

JANUARY 18, 2011

Prepared By

HUITT-ZOLLARS

ENGINEERING ARCHITECTURE CONSTRUCTION MANAGEMENT SURVEY

333 Rio Rancho Blvd. NE Suite 101, Rio Rancho NM 87124
(505) 892-5141, Fax (505) 892-3259
www.huitt-zollars.com

90% SUBMITTAL
DRAINAGE STUDY

Southern Blvd.

I, Scott A. Eddings being first duly sworn, upon my oath state that I am a registered professional engineer, qualified in Civil engineering, and that the accompanying report was prepared by me or under my supervision and is true and correct to the best of my knowledge and belief.

_____

Registered Professional Engineer

90% SUBMITTAL
DRAINAGE STUDY
FOR
Southern Blvd.

TABLE OF CONTENTS

Appendices

90% Submittal
DRAINAGE STUDY
FOR
Southern Blvd.

INTRODUCTION

This drainage report addresses the storm water runoff and proposed infrastructure needed to convey the runoff from Southern Blvd. and the surrounding subdivisions. This report will analyze existing and proposed infrastructure in an effort to show that the project complies with the City of Albuquerque Design Process Manual.

Southern Blvd. is an existing road that runs east to west and is immediately south of Central Ave. This project is limited on the west by Eubank Blvd. and on the east by Juan Tabo Blvd.

FLOOD HAZARD ZONES

Per FEMA's Flood Insurance Rate Map (FIRM) 35001C0358G and 35001C0359G, both dated September 26, 2008, a small portion of the project site (east end of project) is located within a FEMA 100-year Flood Hazard Zone. See attached.

RELATED REPORTS

The "Drainage Study for Terracita Subdivision" prepared by Bohannan Huston, Inc. in May 2003 shows a discharge of 16.2 cfs onto the project site from Terracita Lane. According to the other reports in the area and site investigation there are no other significant flows discharging onto Southern Blvd. There is significant flow discharging onto Juan Tabo Blvd. from Horseshoe Trail but we were unable to find a report quantifying this flow. 83 cfs

METHODOLOGY

This drainage study is based on the procedures outlined in the Development Process Manual Section 22.2, City of Albuquerque (DPM), October 2006 revision. The precipitation zone is Zone 3. The 10-yr and 100-yr peak discharge rates were calculated using section "A.6 – Peak Discharge Rate for Small Watersheds".

EXISTING CONDITIONS

Southern Blvd. currently slopes from east to west and is a 4 lane (2 lanes in each direction) collector with a 60' – 75' wide median separating the east bound and west bound lanes. The existing median is unimproved (no landscaping or stamped concrete). The existing intersection of Southern Blvd. and Juan Tabo Blvd. is a T intersection with a signal and Juan Tabo Blvd. as the two-way portion of the intersection. Along the west bound lane there is an asphalt walking path between the curb and gutter and the right-of-way boundary. Along the east bound lane there is a concrete sidewalk between the curb and gutter and the right-of-way boundary.

There are currently 8 – Single Type 'C' curb drop inlets in the west bound lane (Inlet Batteries A, B, C, G, H, I, J and K). There are currently 2 – Single Type 'C' curb drop

inlets and 1 – Double Type 'C' curb drop inlets in the east bound lane (Inlet Batteries D, L, M). At the intersection of Southern Blvd. and Elizabeth St. there is a Single Type 'D' inlet. There is a Single Type 'C' curb drop inlet in Stephen Moody St. near the intersection with Southern Blvd. (Inlet Battery N).

The existing storm drain within the project area appears to be adequate and in working order with the exception of the storm drain leaving Inlet Battery A. Based on field survey and as-built information it appears the storm drain leaving Inlet Battery A discharges into the existing median, but the inlet is full of sediment and the outlet of the pipe was not found in the median.

PROPOSED CONDITIONS

Southern Blvd. is proposed to continue to slope from east to west. The proposed east bound lane will shift to the north and the existing asphalt, curb and gutter, and sidewalk will remain in place with the existing asphalt acting as a walking/biking path. It is proposed to install new curb and gutter along the south side of the east bound lane between the new lanes and the new path. Median curb and gutter is proposed for all medians within the project area. Medians shall be depressed as much 18" to create linear ponds. Runoff from the roadway shall enter the medians via 1' curb openings spaced at appropriate intervals. Final design of the medians has not occurred, but the medians were analyzed for ponding volumes, pond volumes are included in Appendix B.

The west bound lanes will remain with the only change being the addition of median curb and gutter. The existing T intersection of Juan Tabo Blvd. and Southern Blvd. is proposed to be removed. The new alignment of this intersection and the new location of the intersection of Horseshoe Trail and Juan Tabo Blvd. are shown on Sheet 2 of 2 in Appendix A.

With the realignment of the Southern Blvd. and Juan Tabo Blvd. intersection the net impervious area discharging to the inlets at the intersection of Juan Tabo Blvd. and Central Ave. will be reduced (located north of proposed intersection of Juan Tabo and Southern). Also with this realignment the net impervious area discharging to the sump inlets (located approximately 300' south of Fawn Trail and Juan Tabo intersection) will be reduced. The capacity of these two inlet locations was not calculated since there is a reduction in flow discharging to these locations.

There is an existing flow of 32.62 cfs (calculated as Basin 201) from Horseshoe Trail discharging onto Juan Tabo Blvd. Horseshoe Trail shall be extended within the remnant Juan Tabo Blvd section. Horseshoe Trail discharges onto Juan Tabo and the flows are conveyed to the south toward the inlet battery in Juan Tabo south of Fawn Trail.

The existing storm drain Inlet Battery A discharges into the median and will continue to do so. The flow will eventually discharge into the 108" storm drain in Elizabeth St.

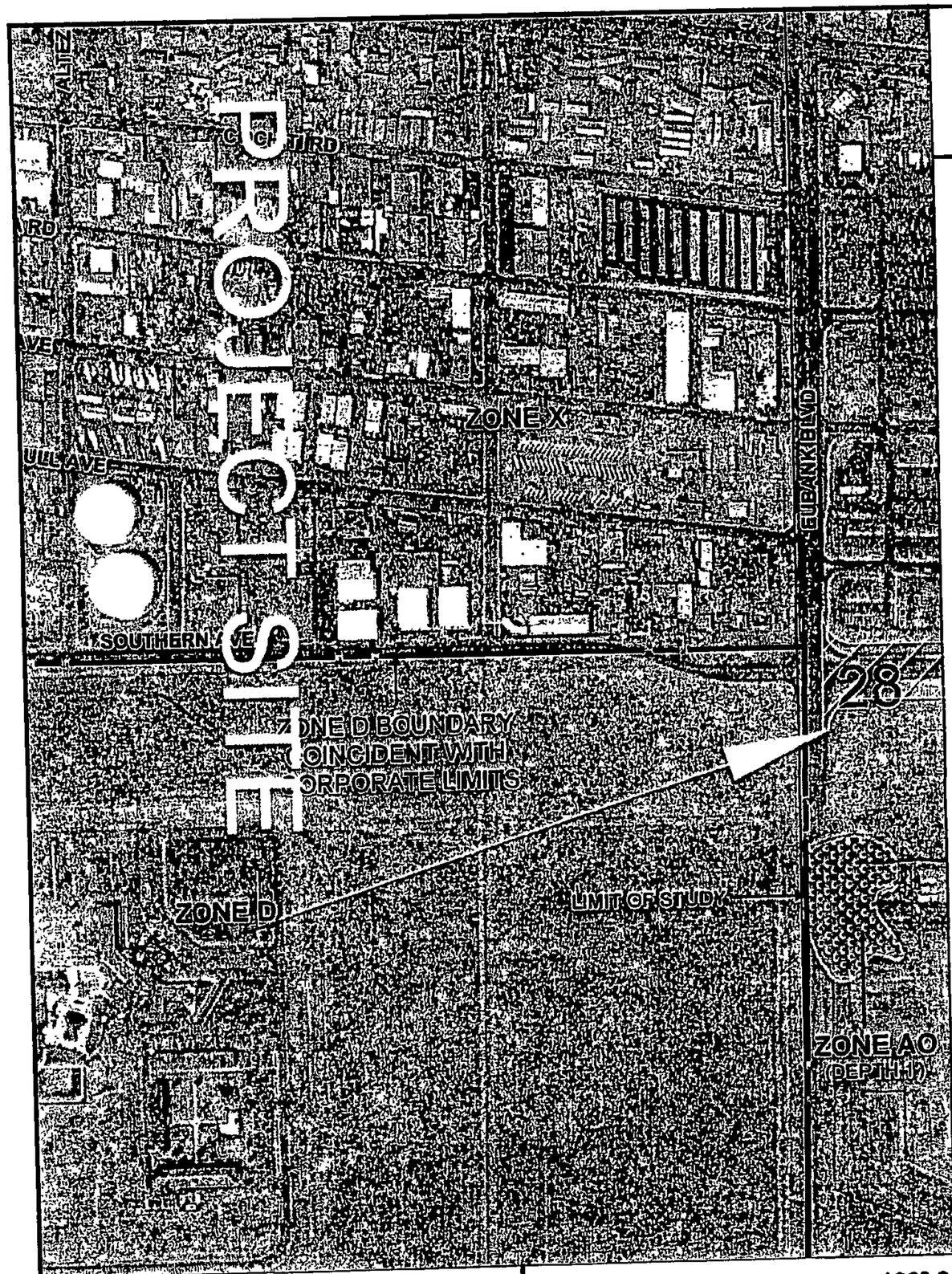
The existing Single Type 'D' inlet at the intersection of Southern Blvd. and Elizabeth St. will remain as a junction for existing storm drain, but if possible can be turned into a manhole. There is an existing stub from this existing junction that will need to be re-aligned to a proposed Single Type 'D' inlet (Inlet Battery F) which will take flow from the proposed landscaped median (Basins 105 and 107). The flow will eventually discharge into the 108" storm drain in Elizabeth St.

There are two proposed inlets for the east bound lanes. The first is Inlet Battery E (Single Type 'C' curb drop inlet) located at the intersection of Southern Blvd. and Elizabeth St. The storm drain to route flows from this inlet will tie into Inlet Battery F and eventually into the 108" storm drain in Elizabeth St. The second is Inlet Battery P (Single Type 'C' curb drop inlet) located at the intersection of Southern Blvd. and Eubank Blvd. Based on as-builts and field survey there is an existing 24" stub to this location and may only need to be extended to drain this inlet. The flow eventually discharges into the storm drain that crosses the COSTCO property to the north.

The hydrologic analysis and basin maps are shown in Appendix A. The street flow and inlet analysis is shown in Appendix B. The existing and proposed storm drain analysis are in Appendix C. The extension of the open channel on the north side of the mobile home park and the sidewalk culverts for Fawn Trail are included in Appendix C.

CONCLUSION

In general the existing infrastructure within Southern Blvd is adequate with the exception of the proposed infrastructure discussed above and two areas were the 10-yr flow in the street does not meet the DPM standards. Per the DPM Section 22.3 – E. Street Hydraulics number 2c states "Flow depths in the event of the 10-year design discharge may not exceed 0.5 feet in any collector or arterial street." There are no locations along Southern Blvd. where the roadway flow depth exceeds the standards.



MAP SCALE 1" = 500'

0 0 500 1000 FEET

NFIP

PANEL 0358G

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO

AND INCORPORATED AREAS

PANEL 358 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0358	G
BERNALILLO COUNTY UNINCORPORATED AREAS	350001	0358	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.

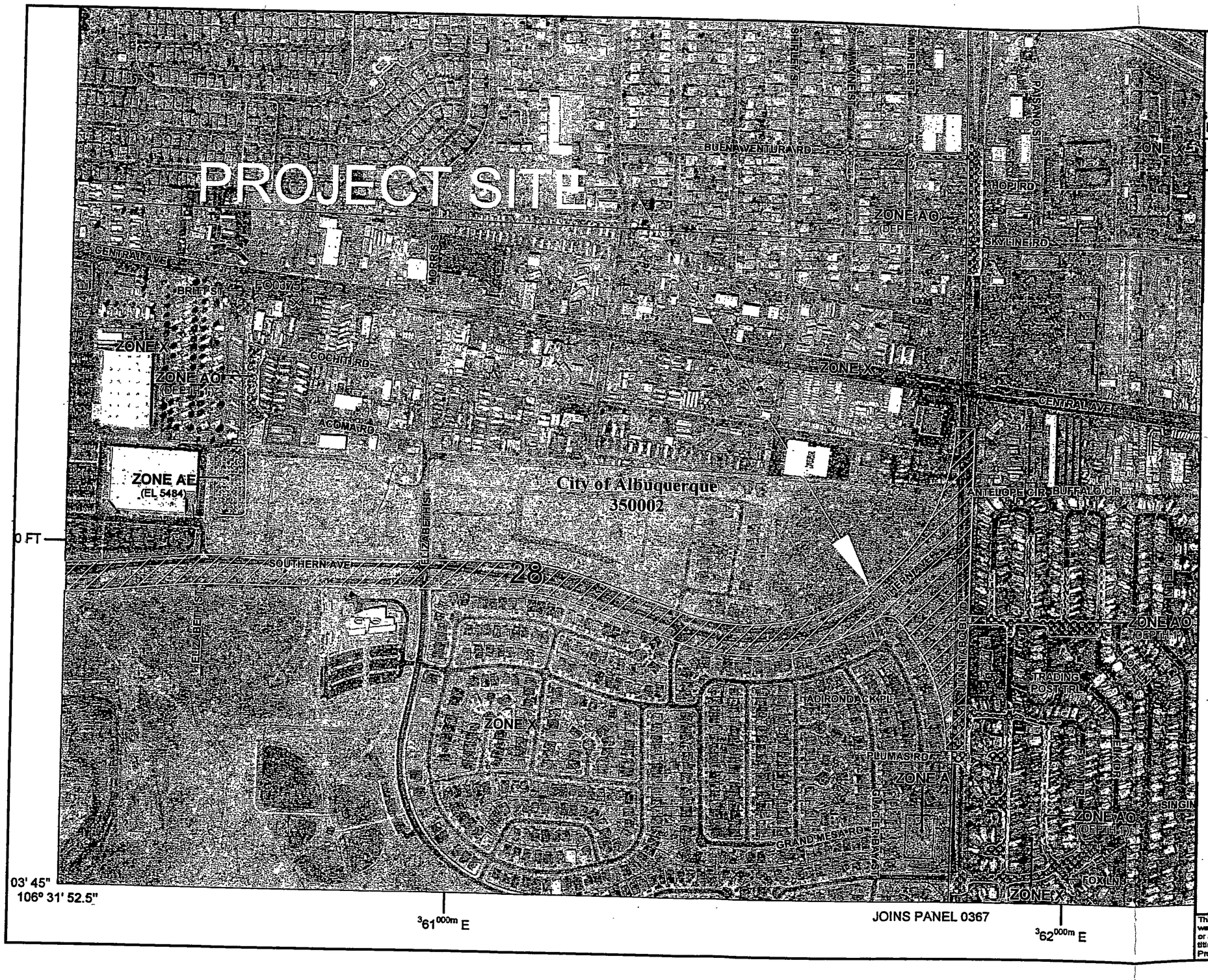
MAP NUMBER
35001C0358G

MAP REVISED
SEPTEMBER 26, 2008

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

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



MAP SCALE 1" = 500'

500 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0359G

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 359 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0359	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
35001C0359G

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

Appendix A

BASIN MAP

BASIN HYDROLOGY

BASIN HYDROLOGY
(RE: BASIN EXHIBITS 1 THRU 3)

developed

Basin	Description	Land Treatements (DEVELOPED) Percentage				AREA	10-YR Peak Discharge (Zone 3) CFS/ACRE				100-YR Peak Discharge (Zone 3) CFS/ACRE				10-YR PEAK FLOW	100-YR PEAK FLOW
		A	B	C	D	AC	A	B	C	D	A	B	C	D	CFS	CFS
101	Landscaped Median	0	50	50	0	0 423	0.58	1 19	2 00	3.39	1.87	2 60	3.45	5.02	0.675	1.280
102	Commercial Tract (To release Historic)	100	0	0	0	3.030	0.58	1 19	2.00	3.39	1.87	2 60	3.45	5.02	1.757	5.666 → 14.4
103	Road	0	0	15	85	2 820	0 58	1.19	2.00	3 39	1.87	2.60	3.45	5 02	8.972	13 492
104	Road	0	0	15	85	2 788	0.58	1.19	2 00	3.39	1.87	2.60	3.45	5.02	8 870	13 339
105	Landscaped Median	0	50	50	0	1.286	0.58	1.19	2.00	3.39	1.87	2.60	3.45	5.02	2.051	3.890
106	Road	0	0	15	85	1.320	0.58	1.19	2 00	3.39	1.87	2 60	3 45	5 02	4.200	6.316
107	Landscaped Median	0	50	50	0	0.758	0 58	1.19	2.00	3.39	1.87	2.60	3 45	5.02	1.209	2 293
108	NOT USED															
109	Road	0	0	15	85	3.000	0 58	1.19	2 00	3 39	1.87	2.60	3 45	5.02	9.545	14.354
110	Trail	0	0	5	95	0.971	0.58	1.19	2.00	3 39	1.87	2 60	3.45	5.02	3 224	4.798
111	Road	0	0	15	85	0 158	0.58	1.19	2.00	3.39	1.87	2.60	3.45	5.02	0 503	0.756
112	Road	0	0	15	85	0.096	0.58	1.19	2.00	3.39	1.87	2.60	3 45	5.02	0.305	0 459
113	Road	0	0	15	85	1.079	0.58	1.19	2.00	3 39	1.87	2 60	3.45	5 02	3.433	5.162
114a	Landscaped Median	0	50	50	0	0 558	0.58	1.19	2.00	3 39	1.87	2 60	3 45	5 02	0.890	1.688
114b	Landscaped Median	0	50	100	0	0 231	0 58	1.19	2.00	3 39	1.87	2 60	3 45	5 02	0.599	1 097
115	Road	0	0	15	85	1.136	0 58	1.19	2.00	3.39	1.87	2.60	3.45	5 02	3 621	5.445
116	Road	0	0	15	85	0.746	0.58	1.19	2.00	3.39	1.87	2.60	3 45	5.02	2 373	3.569
117	Trail	0	0	5	95	1.262	0.58	1.19	2 00	3 39	1.87	2 60	3.45	5.02	4.190	6.236
118	Road	0	0	15	85	0.852	0.58	1.19	2.00	3 39	1.87	2.60	3 45	5.02	2 711	4.076
119a	Landscaped Median	0	50	50	0	0.141	0 58	1.19	2 00	3.39	1.87	2 60	3.45	5 02	0 225	0.427
119b	Landscaped Median	0	50	50	0	0 472	0.58	1.19	2.00	3 39	1.87	2 60	3.45	5.02	0 753	1.428
120	Road	0	0	15	85	0 194	0.58	1 19	2.00	3.39	1.87	2.60	3.45	5.02	0 617	0.928
121	Road	0	0	15	85	1 751	0.58	1 19	2.00	3 39	1.87	2.60	3.45	5 02	5.571	8.378
201	Mobile Home Park (Horseshoe Trails)	60	30	5	5	14 026	0.58	1.19	2 00	3.39	1.87	2.60	3.45	5.02	13.668	32 617
202	Road	0	0	15	85	0 587	0.58	1.19	2 00	3.39	1 87	2 60	3.45	5.02	1.868	2.809
203	Commercial Tract	0	0	15	85	2 300	0 58	1 19	2.00	3.39	1.87	2.60	3.45	5.02	7.317	11 004
204	Mobile Home Park (Conc. Rundown North)	60	30	5	5	18.265	0 58	1.19	2 00	3.39	1.87	2.60	3.45	5.02	17.799	42 475
205	Road	0	0	15	85	1.523	0.58	1 19	2.00	3 39	1.87	2 60	3.45	5 02	4.845	7 287
206	Mobile Home Park (Fawn Trail)	60	30	5	5	4.615	0.58	1.19	2.00	3 39	1.87	2.60	3.45	5 02	4 497	10.732

APPENDIX A

BASIN HYDROLOGY
(RE: BASIN EXHIBITS 1 THRU 3)

Basin	Description	Land Treatements (DEVELOPED) Percentage				AREA	EXCESS PRECIPITATION IN				Weighted E IN				Volume 100-YR 6-HR	Volume 100-YR 6-HR	Volume 100-YR 24-HR	Volume 100-YR 24-HR
		A	B	C	D	AC	A	B	C	D	A	B	C	D	AC-FT	CF	AC-FT	CF
101	Landscaped Median	0	50	50	0	0.42	0.66	0.92	1.29	2.36	0.00	0.46	0.65	0.00	0.04	1697	0.06	2464
102	Commercial Tract (To release Historic)	100	0	0	0	3.03	0.66	0.92	1.29	2.36	0 66	0.00	0 00	0.00	0.17	7259	0.29	12759
103	Road	0	0	15	85	2.82	0.66	0 92	1.29	2.36	0.00	0.00	0.19	2.01	0.52	22515	0 63	27634
104	Road	0	0	15	85	2.79	0 66	0.92	1.29	2.36	0.00	0 00	0.19	2 01	0.51	22260	0.63	27320
105	Landscaped Median	0	50	50	0	1.29	0.66	0.92	1.29	2.36	0.00	0.46	0.65	0 00	0.12	5158	0.17	7492
106	Road	0	0	15	85	1.32	0 66	0 92	1.29	2.36	0.00	0.00	0.19	2 01	0.24	10539	0.30	12935
107	Landscaped Median	0	50	50	0	0.76	0.66	0.92	1.29	2.36	0.00	0 46	0.65	0.00	0.07	3040	0.10	4418
108	NOT USED																	
109	Road	0	0	15	85	3 00	0.66	0 92	1.29	2.36	0 00	0.00	0.19	2.01	0.55	23953	0.67	29398
110	Trail	0	0	5	95	0.97	0.66	0 92	1.29	2.36	0.00	0 00	0.06	2 24	0 19	8130	0 23	9892
111	Road	0	0	15	85	0 16	0 66	0 92	1 29	2.36	0.00	0 00	0.19	2.01	0.03	1262	0.04	1548
112	Road	0	0	15	85	0.10	0.66	0.92	1.29	2 36	0 00	0.00	0.19	2.01	0.02	766	0.02	941
113	Road	0	0	15	85	1.08	0.66	0.92	1 29	2.36	0 00	0 00	0.19	2.01	0.20	8615	0.24	10573
114a	Landscaped Median	0	50	50	0	0.58	0.66	0.92	1.29	2.36	0.00	0.46	0.65	0.00	0 05	2238	0.07	3251
114b	Landscaped Median	0	50	100	0	0.23	0.66	0.92	1.29	2.36	0.00	0.46	1.29	0.00	0.03	1457	0.04	1887
115	Road	0	0	15	85	1.14	0 66	0.92	1.29	2.36	0 00	0.00	0.19	2.01	0.21	9086	0 26	11151
116	Road	0	0	15	85	0.75	0.66	0 92	1 29	2.36	0 00	0.00	0.19	2 01	0 14	5958	0 17	7310
117	Trail	0	0	5	95	1.26	0 66	0 92	1.29	2.36	0.00	0.00	0.06	2 24	0.24	10566	0.30	12857
118	Road	0	0	15	85	0 85	0 66	0.92	1 29	2.36	0 00	0.00	0.19	2.01	0.16	6803	0 19	8349
119a	Landscaped Median	0	50	50	0	0.14	0.66	0.92	1.29	2.36	0.00	0.46	0.65	0.00	0 01	586	0.02	821
119b	Landscaped Median	0	50	50	0	0 47	0.66	0.92	1.29	2.36	0.00	0.46	0.65	0.00	0.04	1893	0.06	2760
120	Road	0	0	15	85	0 19	0.66	0 92	1.29	2.36	0.00	0.00	0.19	2 01	0.04	1549	0.04	1901
121	Road	0	0	15	85	1.75	0 66	0 92	1 29	2.36	0.00	0.00	0.19	2 01	0.32	13980	0.39	17158
201	Mobile Home Park (Horseshoe Trails)	60	30	5	5	14.03	0 66	0.92	1.29	2.36	0.40	0 28	0.06	0 12	1.00	43506	1.58	68964
202	Road	0	0	15	85	0.59	0 66	0.92	1 29	2.36	0 00	0 00	0.19	2.01	0.11	4687	0.13	5752
203	Commercial Tract	0	0	15	85	2.30	0 66	0.92	1 29	2.36	0.00	0 00	0.19	2 01	0.42	18364	0.52	22538
204	Mobile Home Park (Conc. Rundown North)	60	30	5	5	18.27	0 66	0 92	1.29	2.36	0.40	0 28	0.06	0.12	1.30	56655	2 06	89806
205	Road	0	0	15	85	1.52	0 66	0.92	1.29	2.36	0 00	0 00	0 19	2 01	0 28	12160	0.34	14924
206	Mobile Home Park (Fawn Trail)	60	30	5	5	4.62	0 66	0.92	1 29	2.36	0 40	0.28	0 06	0.12	0.33	14315	0.52	22691

2.3 ac 22538

$\frac{2.3\,ac}{22538} = \frac{3.07}{x}$

$x = \frac{3.07}{2.3}(22538) = 29691\ cf$

ANAYLSIS POINTS
(RE: BASIN EXHIBITS 1 THRU 3)

Analysis Point #	Basin #	Flow 10-YR	Flow 100-YR	Volume 10-YR 24-HR	Volume 100-YR 24-HR	Discharges To -	Outlet Structure
		CFS	CFS	CF	CF		
1	101	0 68	1 28	1,697	2,464	Median - No Discharge	None
Total AP #1		**0.68**	**1.28**	**1,697**	**2,464**		
2	102	1.76	5 67	7,259	12,759	29 to 4	12 ea 1' Curb Openings
	103	8.97	13.49	22,515	27,634		
Total AP #2		**10.73**	**19.16**	**29,774**	**40,393**	Median	
						$7325	
3	104	8.87	13.34	22,260	27,320		Existing Inlet - Battery 'A'
Total AP #3		**8.87**	**13.34**	**22,260**	**27,320**	Median	
4	AP #2	10 73	19 16	29,774	40,393		
	105	2.05	3 89	5,158	7,492		
Total AP #4		**12.78**	**23.05**	**34,932**	**47,885**	Median	None
5	106	4.20	6 32	10,539	12,935		7 ea 1' Curb Openings
Total AP #5		**4.20**	**6.32**	**10,539**	**12,935**	Median	
6	107	1.21	2.29	3,040	4,416		New Inlet - Battery 'F'
Total AP #6		**1.21**	**2.29**	**3,040**	**4,416**	Storm Drain	
7	109	9.55	14.35	23,953	29,398		New Inlet - Battery 'E'
Total AP #7.		**9.55**	**14.35**	**23,953**	**29,398**	Storm Drain	
8	110	3 22	4.80	8,130	9,892		Existing Inlet - Battery 'D'
Total AP #8		**3.22**	**4.80**	**8,130**	**9,892**	Storm Drain	
9	113	3 43	5.16	8,615	10,573		Existing Inlet - Battery 'H'
Total AP #9		**3.43**	**5.16**	**8,615**	**10,573**	Storm Drain	
10	114a	0.89	1.69	2,238	3,251		
	114b	0.60	1.10	1,467	1,887		
Total AP #10		**1.49**	**2.79**	**3,705**	**5,138**	Storm Drain	New Inlet -
11	117	4 19	6.24	10,566	12,857		Existing Inlet - Battery 'L'
Total AP #11		**4.19**	**6.24**	**10,566**	**12,857**	Storm Drain	
12	116	2.37	3.57	5,956	13,376		
Total AP #12		**2.37**	**3.57**	**5,956**	**13,376**	Storm Drain	Relocated Inlet
13	118	4.19	6.24	6,803	8,349		Existing Inlets - Batteries 'K' and 'J'
Total AP #13		**4.19**	**6.24**	**6,803**	**8,349**	Storm Drain	
14	115	5.57	8.38	13,980	11,151		
	120	0 62	0 93	1,549	1,901		
	121	5 57	8.38	13,980	17,158		New Inlet - Battery ' P'
Total AP #14		**11.76**	**17.69**	**29,510**	**30,210**	Storm Drain	
15	119a	0.23	0.43	566	821		
	119b	0.75	1 43	1,893	2,750		
Total AP #15		**0.98**	**1.86**	**2,459**	**3,571**	Median	None
16	201	13.67	32.62	43,506	68,964		
	202	1 87	2 81	4,687	5,752		
	203	7.32	11.00	18,364	22,538		
	206	4.50	10 73	14,315	22,691		New Inlet - Battery 'Q'
Total AP #16		**27.36**	**57.16**	**80,872**	**119,945**	Storm Drain	

APPENDIX A

INLET BATTERY
FLOW CALCULATIONS

Inlet Battery Flow Calculations

INLET BATTERY	Analysis Point	Description of contibuting flow	10-YR PEAK FLOW	100-YR PEAK FLOW
			CFS	CFS
Median Opening 1	2	**Total**	**10.73**	**19.16**
		Basin 103	1.76	5.67
		Basin 102	8.97	13.49
A	**3**	**Existing Inlet**	**16.76**	**29.54**
		Basin 104	8.87	13.34
		Terracita	7.89	16.20
Median Opening 3	5	**Total**	**14.57**	**22.77**
		Bypass from Inlet Battery A	11.76	18.54
		Two Thirds of Basin 106	2.81	4.23
B	**5**	**Existing Inlet**	**1.39**	**5.43**
		ByPass from Curb Opening	0.00	3.34
		One Third of Basin 106	1.39	2.09
C	**5**	**Existing Inlet**	**0.00**	**0.00**
		Bypass from Inlet Battery B	0.00	0.00
D		**Existing Inlet**	**3.22**	**4.80**
		Basin 110	3.22	4.80
Median Opening 2	7	**Total**	**4.78**	**8.34**
		Bypass from Med. Curb Open 1	0.00	1.16
		Half of Basin 109	4.78	7.18
E	**7**	**Proposed Inlet**	**4.78**	**7.18**
		Bypass from Median Opening 1	0.00	0.00
		Half of Basin 109	4.78	7.18
F	**6**	**Proposed Inlet**	**8.29**	**13.37**
		Basin 105	2.57	4.44
		Basin 106	4.20	6.32
		Basin 107	1.52	2.62
G	**9**	**Existing Inlet**	**3.43**	**5.16**
		Bypass from Inlet Battery C	0.00	0.00
		Basin 113	3.43	5.16
H	**9**	**Existing Inlet**	**1.43**	**2.36**
		Bypass from Inlet Battery G	1.43	2.36
I	**12**	**Existing Inlet**	**2.37**	**3.57**
		Bypass from Inlet Battery H	0.00	0.00
		Basin 116	2.37	3.57
J	**13**	**Existing Inlet**	**5.06**	**8.31**
		Bypass from Inlet Battery I	0.87	2.07
		Basin 118	4.19	6.24
K	**13**	**Existing Inlet**	**2.06**	**3.81**
		Bypass from Inlet Battery J	2.06	3.81
L	**11**	**Existing Inlet**	**4.19**	**6.24**
		Basin 117	4.19	6.24

APPENDIX A

Inlet Battery Flow Calculations

INLET BATTERY	Analysis Point	Description of contibuting flow	10-YR PEAK FLOW	100-YR PEAK FLOW
			CFS	CFS
M	**11**	**Existing Inlet**	**1.99**	**3.14**
		Bypass from Inlet Battery L	1.99	3.14
N	**Basin 120**	**Existing Inlet**	**0.62**	**0.92**
		Basin 120	0.62	0.92
O		**NOT USED**	**0.00**	**0.00**
Median Opening 4	7	**Total**	**8.77**	**13.46**
		Basin 115	5.57	8.38
		One Third of Basin 121	1.84	2.77
		Bypass from Inlet Battery M	0.74	1.39
		Bypass from Inlet Battery N	0.62	0.92
P	**14**	**Proposed Inlet**	**7.00**	**12.25**
		Bypass from Median Opening 4	3.27	6.64
		Two Thirds of Basin 121	3.73	5.61
Q	**16**	**Proposed Inlet**	**27.36**	**57.16**
	Juan Tabo	Basin 201	13.67	32.62
		Basin 202	1.87	2.81
		Basin 203	7.32	11.00
		Basin 206	4.50	10.73

APPENDIX A

Appendix B

MEDIAN POND VOLUME

MEDIAN VOLUME ANALYSIS

Southern Median East of Juan Tabo
Sta: 60+00
Median Length (ft) = **354**
Begin Width (ft) = **17**
End Width (Ft) = **7**

the back of curb

Analysis Point #1

20-Jan-11

Volume is for 100 feet (assumes individual ponds every 100 feet)

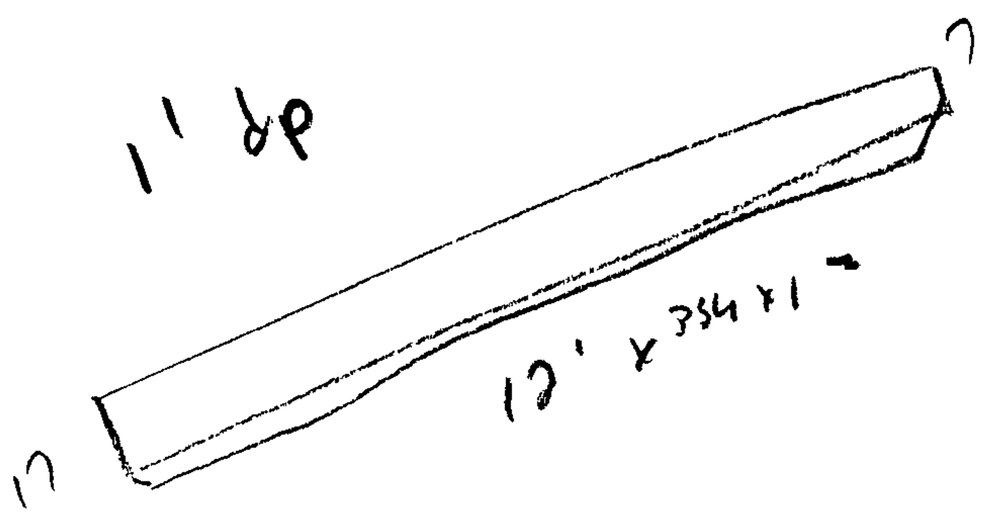
Elevation	Area	Average Area	Volume	Accumulative Volume
	sf	sf	CF	~~Ac-Ft~~
100.0	*1200*			
		1050	1050	1050
99.0	*900*			
		750	750	1800
98.0	*600*			

2850 2850

Effective Volume - 1' depth (cf) = ~~3,717~~

Volume Required (cf): AP #1 **2,464**

Excess Capacity (cf) ~~1,253~~ 406



APPENDIX B

MEDIAN VOLUME ANALYSIS

Southern Median
Sta: 45+00

Median Length (ft) =	**1250**
Begin Width (ft) =	**45**
End Width (Ft) =	**32**

Analysis Point #4

20-Jan-11

Volume is for 100 feet (assumes individual ponds every 100 feet)

Elevation	Area	Average Area	Volume	Accumulative Volume
	sf	sf	CF	Ac-Ft
100.0	*3850*			
		3700	3700	3700
99.0	*3550*			
		3400	3400	7100
98.0	*3250*			

Effective Volume - 1' depth (cf) =	**46,250**
Volume Required (cf): AP #4	**7,492**
Excess Capacity (cf)	**38,758**

not ok
need 5738

APPENDIX B

MEDIAN VOLUME ANALYSIS

Southern Median
Sta: 34+00

Median Length (ft) =	**1000**
Begin Width (ft) =	**32**
End Width (Ft) =	**32**

Analysis Point #6

20-Jan-11

Volume is for 100 feet (assumes individual ponds every 100 feet)

Elevation	Area	Average Area	Volume	Accumulative Volume
	sf	sf	CF	Ac-Ft
100.0	*3200*			
		3050	3050	3050
99.0	*2900*			
		2750	2750	5800
98.0	*2600*			

Effective Volume - 1' depth (cf) =	**30,500**
Volume Required (cf): AP #6	**4,416**
Excess Capacity (cf)	**26,084**

ok

APPENDIX B

MEDIAN VOLUME ANALYSIS

Southern Median
Sta: 24+00

Median Length (ft) =	**800**
Begin Width (ft) =	**32**
End Width (Ft) =	**32**

Analysis Point #10

20-Jan-11

Volume is for 100 feet (assumes individual ponds every 100 feet)

Elevation	Area	Average Area	Volume	Accumulative Volume
	sf	sf	CF	Ac-Ft
100.0	*3200*			
		3050	3050	3050
99.0	*2900*			
		2750	2750	5800
98.0	*2600*			

Effective Volume - 1' depth (cf) =	**24,400**
Volume Required (cf): AP #10	**5,138**
Excess Capacity (cf)	**19,262**

APPENDIX B

MEDIAN VOLUME ANALYSIS

Southern Median
Sta: 12+00

Median Length (ft) =	**700**
Begin Width (ft) =	**18**
End Width (Ft) =	**18**

Analysis Point #13

20-Jan-11

Volume is for 100 feet (assumes individual ponds every 100 feet)

Elevation	Area	Average Area	Volume	Accumulative Volume
	sf	sf	CF	Ac-Ft
100.0	*1800*			
		1650	1650	1650
99.0	*1500*			
		1350	1350	3000
98.0	*1200*			

Effective Volume - 1' depth (cf) =	**11550**
Volume Required (cf): AP #13	**8,349**
Excess Capacity (cf)	**3,201**

APPENDIX B

STREET FLOW AND INLET CALCULATION ANALYSIS

Southern Boulevard
Street Flow and Inlet Calculations Analysis

					10-YR INLET ANALYSIS						
Description	Analysis Point	Q (cfs) (10 YR)	Slope	Cross Slope	Flow Depth (ft)	Velocity (ft/s)	Depth x Velocity	Inlet Type	Q Inlet (cfs)	Q Bypass (cfs)	Notes
Median Curb Opening 1	2	10.73	0.80%	2.00%	0.51	3.09	1.6	1' Median Opening (12 ea)	12.00	-1.27	12 each 1' Median Openings in EB Southern Sta 56+50 to 58+50
Inlet Battery A	3	19.76	0.80%	2.00%	0.51	3.09	1.6	Single C	8.00	11.76	Existing Inlet, Bypass to Inlet Battery 'B'
Inlet Battery B	5	15.96	1.46%	2.00%	0.42	3.67	1.5	Single C	6.50	9.46	Existing Inlet, Bypass to Inlet Battery 'C'
Inlet Battery C	5	9.46	1.46%	2.00%	0.34	3.22	1.1	Single C	3.80	5.66	Existing Inlet, Bypass to Inlet Battery 'G'
Inlet Battery D	8	3.22	1.17%	2.00%	0.25	2.32	0.6	Double D	2.25	0.97	Existing Inlet to remain for Trail, Bypass to Battery 'I'
Median Curb Opening 2 - Upper Basin 109	7	4.78	1.17%	2.00%	0.28	2.5	0.7	1' Median Opening (8 ea)	5.60	-0.82	8 each 1' Median Openings in EB Southern Sta 46+00 to 55+00, Bypass Flows to Battery E
Inlet Battery E - Lower Basin 109	7	4.78	1.17%	2.00%	0.28	2.5	0.7	Single C	4.80	-0.02	Proposed Inlet, Bypass to Battery 'I'
Median Curb Opening 3	5	4.20	1.17%	2.00%	0.28	2.5	0.7	1' Median Opening (7 ea)	8.40	-4.20	7 each 1' Median Openings in EB Southern Sta 35+00 to 42+00, Bypass Flows to Battery C
Inlet Battery F	6	5.41	1.12%	9.00%	0.63	1.79	1.1	Single D	10.00	0.00	Proposed Inlet, Type D in Median, No Bypass
Inlet Battery G	9	3.43	1.19%	2.00%	0.24	2.31	0.6	Single C	2.00	1.43	Existing Inlet, Bypass to Inlet Battery 'H'
Inlet Battery H	9	1.43	1.19%	0.20%	0.07	1.14	0.1	Single C	1.40	0.03	Existing Inlet, Bypass to Inlet Battery 'I'
Inlet Battery I	12	2.37	1.65%	1.00%	0.16	2.03	0.3	Single C	1.50	0.87	Existing Inlet (to be relocated), Bypass to Inlet Battery 'J'
Inlet Battery J	13	5.06	0.40%	2.00%	0.30	2.2	0.7	Single C	3.00	2.06	Existing Inlet, Bypass to Inlet Battery 'K'
Inlet Battery K	13	2.06	0.40%	2.00%	0.22	1.76	0.4	Single C	1.80	0.26	Existing Inlet, Bypass to sump in Eubank north of intersection
Inlet Battery L	11	4.19	1.18%	2.00%	0.26	2.42	0.6	Single C	2.20	1.99	Existing Inlet to remain for Trail, Bypass to Battery 'M'
Inlet Battery M	11	1.99	1.18%	2.00%	0.20	2.01	0.4	Single C	1.25	0.74	Existing Inlet to remain for Trail, Bypass to Battery 'P'
Inlet Battery N	Basin 120	0.62	1.02%	2.00%	0.13	1.42	0.2	Single C	0.00	0.62	Existing Inlet to remain for Stephen Moody, Bypass to Battery 'P'
Inlet Battery O											NOT USED
Median Curb Opening 4	14	9.81	1.17%	2.00%	0.28	2.5	0.7	1' Median Opening (5 ea)	5.50	4.31	5 each 1' Median Openings in WB Southern Sta 14+00 to 18+00, Bypass Flows to Battery P
Inlet Battery P	14	4.31	0.94%	2.00%	0.28	2.24	0.6	Single C	2.20	2.11	Proposed Inlet, Bypass to sump in Eubank south of intersection
Inlet Battery Q	16	27.36	2.90%	2.00%	0.63	3.07	1.9	Triple C	32.00	-4.64	Proposed Inlet, Bypass to existing Juan Tabo SB lane

					100-YR INLET ANALYSIS						
Description	Analysis Point	Q (cfs) (100-YR)	Slope	Slope	Flow Depth (ft)	Velocity (ft/s)	Depth x Velocity	Inlet Type	Q Inlet (cfs)	Q Bypass (cfs)	Notes
Median Curb Opening 1	2	19.16	0.80%	2.00%	0.51	3.09	1.6	1' Median Opening (12 ea)	18.00	1.16	12 each 1' Median Openings in Southern Sta 56+50 to 58+50, Bypass flows into Basin 109
Inlet Battery A	3	29.54	0.80%	2.00%	0.59	3.42	2.0	Single C	11.00	18.54	Existing Inlet, Bypass to Inlet Battery 'B'
Inlet Battery B	5	24.86	1.46%	2.00%	0.49	4.1	2.0	Single C	8.50	16.36	Existing Inlet, Bypass to Inlet Battery 'C'
Inlet Battery C	5	16.36	1.46%	2.00%	0.42	3.9	1.6	Single C	6.50	9.86	Existing Inlet, Bypass to Inlet Battery 'G'
Inlet Battery D	8	4.80	1.17%	2.00%	0.29	2.56	0.7	Double D	3.25	1.55	Existing Inlet to remain for Trail, Bypass to Battery 'I'
Median Curb Opening 2 - Upper Basin 109	7	8.34	1.17%	2.00%	0.34	2.87	1.0	1' Median Opening (8 ea)	8.00	0.33	8 each 1' Median Openings in EB Southern Sta 46+00 to 55+00, Bypass Flows to Battery E
Inlet Battery E - Lower Basin 109	7	6.84	1.17%	2.00%	0.32	2.73	0.9	Single C	3.50	3.34	Proposed Inlet, Bypass to Battery 'I'
Median Curb Opening 3	5	6.32	1.17%	2.00%	0.28	2.5	0.7	1' Median Opening (7 ea)	8.40	-2.08	7 each 1' Median Openings in EB Southern Sta 35+00 to 42+00, Bypass Flows to Battery C
Inlet Battery F	6	8.61	1.12%	9.00%	0.73	1.99	1.5	Single D	15.00	0.00	Proposed Inlet, Type D in Median, No Bypass
Inlet Battery G	9	5.16	1.19%	2.00%	0.28	2.56	0.7	Single C	2.80	2.36	Existing Inlet, Bypass to Inlet Battery 'H'
Inlet Battery H	9	2.36	1.19%	0.20%	0.09	1.4	0.1	Single C	1.50	0.86	Existing Inlet, Bypass to Inlet Battery 'I'
Inlet Battery I	12	3.57	1.65%	1.00%	0.18	2.25	0.4	Single C	1.50	2.07	Existing Inlet (to be relocated), Bypass to Inlet Battery 'J'
Inlet Battery J	13	8.31	0.40%	2.00%	0.37	2.49	0.9	Single C	4.50	3.81	Existing Inlet, Bypass to Inlet Battery 'K'
Inlet Battery K	13	3.81	0.40%	2.00%	0.27	2.05	0.6	Single C	2.50	1.31	Existing Inlet, Bypass to sump in Eubank north of intersection
Inlet Battery L	11	6.24	1.18%	2.00%	0.31	2.68	0.8	Single C	3.10	3.14	Existing Inlet to remain for Trail, Bypass to Battery 'M'
Inlet Battery M	11	3.14	1.18%	2.00%	0.24	2.25	0.5	Single C	1.75	1.39	Existing Inlet to remain for Trail, Bypass to Battery 'P'
Inlet Battery N	Basin 120	0.93	1.02%	2.00%	0.15	1.57	0.2	Single C	0.00	0.93	Existing Inlet to remain for Stephen Moody, Bypass to Battery 'P'
Inlet Battery O											NOT USED
Median Curb Opening 4	14	9.81	1.17%	2.00%	0.44	3.05	1.3	1' Median Opening (5 ea)	7.00	2.81	5 each 1' Median Openings in WB Southern Sta 14+00 to 18+00, Bypass Flows to Battery P
Inlet Battery P	14	2.81	0.94%	2.00%	0.24	2.01	0.5	Single C	1.80	1.01	Proposed Inlet, Bypass to sump in Eubank south of intersection
Inlet Battery Q	16	57.16	2.90%	2.00%	0.89	3.45	3.1	Triple C	32.00	25.16	Proposed Inlet, Bypass to existing Juan Tabo SB lane

Assumptions

1. Street Flow Depths and Velocities taken from Flowmaster Calculations for each Inlet Battery (Attached)
2. Single C Grate Capacities taken from City of Albuquerque Plate 22.3 D-5
3. Double C Grate Capacities taken from City of Albuquerque Plate 22.3 D-6
4. Triple C Grate Capacities were extrapolated from the Double C Capacities.
5. All Grate Capacities do not account for curb opening inflow. Therefore, inlet inflows shown are conservative and provide a safety factor for items such as inlet clogging

APPENDIX B

FLOWMASTER OUTPUT FOR ALL INLET BATTERIES

INLET BATTERY A - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT A 10-YR
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	008047	ft/ft
Discharge	19.76	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.51	ft
Elevation Range	0.00 to 1.10	
Flow Area	6.4	ft²
Wetted Perimeter	25.79	ft
Top Width	25.28	ft
Actual Depth	0.51	ft
Critical Elevation	0.52	ft
Critical Slope	0.006769	ft/ft
Velocity	3.09	ft/s
Velocity Head	0.15	ft
Specific Energy	0.65	ft
Froude Number	1.08	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY A - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT A 100-YF
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	008047	ft/ft
Discharge	29.54	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.59	ft
Elevation Range	0.00 to 1.10	
Flow Area	8.6	ft²
Wetted Perimeter	29.98	ft
Top Width	29.39	ft
Actual Depth	0.59	ft
Critical Elevation	0.61	ft
Critical Slope	0.006390	ft/ft
Velocity	3.42	ft/s
Velocity Head	0.18	ft
Specific Energy	0.77	ft
Froude Number	1.11	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-0+20	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
-0+20	1.07
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY B - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT B 100-YF
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	014640	ft/ft
Discharge	24.86	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.49	ft
Elevation Range	0.00 to 1.10	
Flow Area	6.1	ft²
Wetted Perimeter	25.12	ft
Top Width	24.62	ft
Actual Depth	0.49	ft
Critical Elevation	0.57	ft
Critical Slope	0.006549	ft/ft
Velocity	4.10	ft/s
Velocity Head	0.26	ft
Specific Energy	0.75	ft
Froude Number	1.46	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY B - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT B 10-YR
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	014640	ft/ft
Discharge	15.96	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.42	ft
Elevation Range	0.00 to 1.10	
Flow Area	4.3	ft²
Wetted Perimeter	21.28	ft
Top Width	20.85	ft
Actual Depth	0.42	ft
Critical Elevation	0.48	ft
Critical Slope	0.006947	ft/ft
Velocity	3.67	ft/s
Velocity Head	0.21	ft
Specific Energy	0.63	ft
Froude Number	1.42	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY C - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT C 10-YR
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	014640	ft/ft
Discharge	9.46	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.34	ft
Elevation Range	0.00 to 1.10	
Flow Area	2.9	ft²
Wetted Perimeter	17.49	ft
Top Width	17.14	ft
Actual Depth	0.34	ft
Critical Elevation	0.39	ft
Critical Slope	0.007446	ft/ft
Velocity	3.22	ft/s
Velocity Head	0.16	ft
Specific Energy	0.50	ft
Froude Number	1.37	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY C - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT C 100-YF
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	014640	ft/ft
Discharge	16.36	cfs

Options	
Current Roughness Meth	oved Lotter's Method
Open Channel Weighting	oved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.42	ft
Elevation Range	0.00 to 1.10	
Flow Area	4.4	ft²
Wetted Perimeter	21.47	ft
Top Width	21.05	ft
Actual Depth	0.42	ft
Critical Elevation	0.48	ft
Critical Slope	0.006925	ft/ft
Velocity	3.69	ft/s
Velocity Head	0.21	ft
Specific Energy	0.63	ft
Froude Number	1.42	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY D - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT D 10-YR
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl(	011700	ft/ft
Discharge	3.22	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin(	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.25	ft
Elevation Range	).00 to 0.67	
Flow Area	1.4	ft²
Wetted Perimeter	11.45	ft
Top Width	11.20	ft
Actual Depth	0.25	ft
Critical Elevation	0.26	ft
Critical Slope	0.008519	ft/ft
Velocity	2.32	ft/s
Velocity Head	0.08	ft
Specific Energy	0.33	ft
Froude Number	1.16	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+19	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+19	0.41

INLET BATTERY D - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT D 100-YF
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011700	ft/ft
Discharge	4.80	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.29	ft
Elevation Range	0.00 to 0.67	
Flow Area	1.9	ft²
Wetted Perimeter	13.30	ft
Top Width	13.01	ft
Actual Depth	0.29	ft
Critical Elevation	0.31	ft
Critical Slope	0.008062	ft/ft
Velocity	2.56	ft/s
Velocity Head	0.10	ft
Specific Energy	0.39	ft
Froude Number	1.19	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+19	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+19	0.41

INLET BATTERY E - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT E 10-YR
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011700	ft/ft
Discharge	4.78	cfs

Options	
Current Roughness Meth	oved Lotter's Method
Open Channel Weighting	oved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.28	ft
Elevation Range	0.00 to 1.10	
Flow Area	1.9	ft²
Wetted Perimeter	14.12	ft
Top Width	13.84	ft
Actual Depth	0.28	ft
Critical Elevation	0.30	ft
Critical Slope	0.008158	ft/ft
Velocity	2.50	ft/s
Velocity Head	0.10	ft
Specific Energy	0.37	ft
Froude Number	1.18	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY E - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT E 100-YF
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011700	ft/ft
Discharge	6.84	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.32	ft
Elevation Range	0.00 to 1.10	
Flow Area	2.5	ft²
Wetted Perimeter	16.15	ft
Top Width	15.83	ft
Actual Depth	0.32	ft
Critical Elevation	0.34	ft
Critical Slope	0.007822	ft/ft
Velocity	2.73	ft/s
Velocity Head	0.12	ft
Specific Energy	0.43	ft
Froude Number	1.21	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY F - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT F 10-YR
Flow Element	Irregular Chanı
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011200	ft/ft
Discharge	4.20	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.040	
Water Surface Elev	0.63	ft
Elevation Range	.00 to 1.67	
Flow Area	2.3	ft²
Wetted Perimeter	7.59	ft
Top Width	7.49	ft
Actual Depth	0.63	ft
Critical Elevation	0.50	ft
Critical Slope	0.037752	ft/ft
Velocity	1.79	ft/s
Velocity Head	0.05	ft
Specific Energy	0.68	ft
Froude Number	0.57	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+20	0.040

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	1.67
0+10	0.00
0+20	1.67

INLET BATTERY F - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT F 100-YR
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011200	ft/ft
Discharge	8.61	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.040	
Water Surface Elev	0.82	ft
Elevation Range	.00 to 1.67	
Flow Area	4.0	ft²
Wetted Perimeter	9.94	ft
Top Width	9.80	ft
Actual Depth	0.82	ft
Critical Elevation	0.66	ft
Critical Slope	0.034320	ft/ft
Velocity	2.15	ft/s
Velocity Head	0.07	ft
Specific Energy	0.89	ft
Froude Number	0.59	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+20	0.040

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	1.67
0+10	0.00
0+20	1.67

INLET BATTERY G - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT G 10-YR
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011867	ft/ft
Discharge	3.43	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.24	ft
Elevation Range	0.00 to 1.10	
Flow Area	1.5	ft²
Wetted Perimeter	12.43	ft
Top Width	12.19	ft
Actual Depth	0.24	ft
Critical Elevation	0.26	ft
Critical Slope	0.008537	ft/ft
Velocity	2.31	ft/s
Velocity Head	0.08	ft
Specific Energy	0.33	ft
Froude Number	1.17	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY G -100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT G 100-YF
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011867	ft/ft
Discharge	5.16	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.28	ft
Elevation Range	0.00 to 1.10	
Flow Area	2.0	ft²
Wetted Perimeter	14.49	ft
Top Width	14.20	ft
Actual Depth	0.28	ft
Critical Elevation	0.31	ft
Critical Slope	0.008067	ft/ft
Velocity	2.56	ft/s
Velocity Head	0.10	ft
Specific Energy	0.39	ft
Froude Number	1.20	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.60
0+30	1.10

INLET BATTERY H - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT H 10-YR
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011867	ft/ft
Discharge	1.43	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.07	ft
Elevation Range	.00 to 0.67	
Flow Area	1.3	ft²
Wetted Perimeter	30.08	ft
Top Width	30.00	ft
Actual Depth	0.07	ft
Critical Elevation	0.07	ft
Critical Slope	0.012241	ft/ft
Velocity	1.14	ft/s
Velocity Head	0.02	ft
Specific Energy	0.09	ft
Froude Number	0.99	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.06
0+30	0.56

INLET BATTERY H - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT H 100-YF
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011867	ft/ft
Discharge	2.36	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.09	ft
Elevation Range	0.00 to 0.67	
Flow Area	1.7	ft²
Wetted Perimeter	30.11	ft
Top Width	30.00	ft
Actual Depth	0.09	ft
Critical Elevation	0.09	ft
Critical Slope	0.010961	ft/ft
Velocity	1.40	ft/s
Velocity Head	0.03	ft
Specific Energy	0.12	ft
Froude Number	1.04	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+30	0.06
0+30	0.56

INLET BATTERY I - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT I 10-YR
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	016500	ft/ft
Discharge	2.37	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.16	ft
Elevation Range	0.00 to 0.98	
Flow Area	1.2	ft²
Wetted Perimeter	15.19	ft
Top Width	15.03	ft
Actual Depth	0.16	ft
Critical Elevation	0.17	ft
Critical Slope	0.009721	ft/ft
Velocity	2.03	ft/s
Velocity Head	0.06	ft
Specific Energy	0.22	ft
Froude Number	1.28	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+30	0.31
0+30	0.98

INLET BATTERY I - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT I 100-YR
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl(	016500	ft/ft
Discharge	3.57	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin(	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.18	ft
Elevation Range	).00 to 0.98	
Flow Area	1.6	ft²
Wetted Perimeter	17.71	ft
Top Width	17.53	ft
Actual Depth	0.18	ft
Critical Elevation	0.20	ft
Critical Slope	0.009206	ft/ft
Velocity	2.25	ft/s
Velocity Head	0.08	ft
Specific Energy	0.26	ft
Froude Number	1.32	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+30	0.31
0+30	0.98

INLET BATTERY J - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT J 10-YR
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	008047	ft/ft
Discharge	5.06	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.30	ft
Elevation Range	.00 to 1.54	
Flow Area	2.3	ft²
Wetted Perimeter	15.47	ft
Top Width	15.16	ft
Actual Depth	0.30	ft
Critical Elevation	0.30	ft
Critical Slope	0.008122	ft/ft
Velocity	2.20	ft/s
Velocity Head	0.08	ft
Specific Energy	0.38	ft
Froude Number	1.00	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+52	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+52	1.04
0+52	1.54

INLET BATTERY J - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT J 100-YR
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	008047	ft/ft
Discharge	8.31	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.37	ft
Elevation Range	0.00 to 1.54	
Flow Area	3.3	ft²
Wetted Perimeter	18.63	ft
Top Width	18.27	ft
Actual Depth	0.37	ft
Critical Elevation	0.37	ft
Critical Slope	0.007602	ft/ft
Velocity	2.49	ft/s
Velocity Head	0.10	ft
Specific Energy	0.46	ft
Froude Number	1.03	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+52	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+52	1.04
0+52	1.54

INLET BATTERY K - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT K 10-YR
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	008047	ft/ft
Discharge	2.06	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.22	ft
Elevation Range	.00 to 1.54	
Flow Area	1.2	ft²
Wetted Perimeter	11.05	ft
Top Width	10.83	ft
Actual Depth	0.22	ft
Critical Elevation	0.21	ft
Critical Slope	0.009204	ft/ft
Velocity	1.76	ft/s
Velocity Head	0.05	ft
Specific Energy	0.26	ft
Froude Number	0.94	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+52	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+52	1.04
0+52	1.54

INLET BATTERY K - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT K 100-YF
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	008047	ft/ft
Discharge	3.81	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.27	ft
Elevation Range	.00 to 1.54	
Flow Area	1.9	ft²
Wetted Perimeter	13.91	ft
Top Width	13.63	ft
Actual Depth	0.27	ft
Critical Elevation	0.27	ft
Critical Slope	0.008431	ft/ft
Velocity	2.05	ft/s
Velocity Head	0.07	ft
Specific Energy	0.34	ft
Froude Number	0.98	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+52	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+52	1.04
0+52	1.54

INLET BATTERY L - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT L 10-YR
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011800	ft/ft
Discharge	4.19	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.26	ft
Elevation Range	0.00 to 0.67	
Flow Area	1.7	ft²
Wetted Perimeter	13.42	ft
Top Width	13.15	ft
Actual Depth	0.26	ft
Critical Elevation	0.28	ft
Critical Slope	0.008306	ft/ft
Velocity	2.42	ft/s
Velocity Head	0.09	ft
Specific Energy	0.35	ft
Froude Number	1.18	
Flow Type	Supercritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+18	0.017

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+18	0.36

INLET BATTERY L - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT L 100-YR
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011800	ft/ft
Discharge	6.24	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.31	ft
Elevation Range	0.00 to 0.67	
Flow Area	2.3	ft²
Wetted Perimeter	15.58	ft
Top Width	15.27	ft
Actual Depth	0.31	ft
Critical Elevation	0.33	ft
Critical Slope	0.007861	ft/ft
Velocity	2.68	ft/s
Velocity Head	0.11	ft
Specific Energy	0.42	ft
Froude Number	1.21	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+18	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+18	0.36

INLET BATTERY M - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT M 10-YR
Flow Element	Irregular Chanı
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011800	ft/ft
Discharge	1.99	cfs

Options	
Current Roughness Meth	›ved Lotter's Method
Open Channel Weighting	›ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.20	ft
Elevation Range	).00 to 0.67	
Flow Area	1.0	ft²
Wetted Perimeter	10.15	ft
Top Width	9.95	ft
Actual Depth	0.20	ft
Critical Elevation	0.21	ft
Critical Slope	0.009214	ft/ft
Velocity	2.01	ft/s
Velocity Head	0.06	ft
Specific Energy	0.26	ft
Froude Number	1.12	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+18	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+18	0.36

INLET BATTERY M - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT M 100-YF
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	011800	ft/ft
Discharge	3.14	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.24	ft
Elevation Range	0.00 to 0.67	
Flow Area	1.4	ft²
Wetted Perimeter	12.04	ft
Top Width	11.80	ft
Actual Depth	0.24	ft
Critical Elevation	0.25	ft
Critical Slope	0.008642	ft/ft
Velocity	2.25	ft/s
Velocity Head	0.08	ft
Specific Energy	0.32	ft
Froude Number	1.16	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+18	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+18	0.36

INLET BATTERY N - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT N 10-YR
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	010150	ft/ft
Discharge	0.62	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.13	ft
Elevation Range	.00 to 0.67	
Flow Area	0.4	ft²
Wetted Perimeter	6.74	ft
Top Width	6.61	ft
Actual Depth	0.13	ft
Critical Elevation	0.13	ft
Critical Slope	0.010739	ft/ft
Velocity	1.42	ft/s
Velocity Head	0.03	ft
Specific Energy	0.16	ft
Froude Number	0.97	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+16	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+16	0.32

INLET BATTERY N - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT N 100-YF
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	010150	ft/ft
Discharge	0.93	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.15	ft
Elevation Range	.00 to 0.67	
Flow Area	0.6	ft²
Wetted Perimeter	7.85	ft
Top Width	7.69	ft
Actual Depth	0.15	ft
Critical Elevation	0.15	ft
Critical Slope	0.010181	ft/ft
Velocity	1.57	ft/s
Velocity Head	0.04	ft
Specific Energy	0.19	ft
Froude Number	1.00	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+16	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.67
0+00	0.00
0+16	0.32

INLET BATTERY P - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT P 10-YR
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	009400	ft/ft
Discharge	7.00	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.33	ft
Elevation Range	0.00 to 1.27	
Flow Area	2.8	ft²
Wetted Perimeter	16.97	ft
Top Width	16.64	ft
Actual Depth	0.33	ft
Critical Elevation	0.34	ft
Critical Slope	0.007773	ft/ft
Velocity	2.53	ft/s
Velocity Head	0.10	ft
Specific Energy	0.43	ft
Froude Number	1.09	
Flow Type	Supercritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+30	0.60
0+30	1.27

INLET BATTERY P - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	INLT P 100-YF
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	009400	ft/ft
Discharge	12.05	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.41	ft
Elevation Range	0.00 to 1.27	
Flow Area	4.2	ft²
Wetted Perimeter	20.81	ft
Top Width	20.39	ft
Actual Depth	0.41	ft
Critical Elevation	0.43	ft
Critical Slope	0.007246	ft/ft
Velocity	2.90	ft/s
Velocity Head	0.13	ft
Specific Energy	0.54	ft
Froude Number	1.13	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+30	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	0.50
0+00	0.00
0+30	0.60
0+30	1.27

INLET BATTERY Q (JUAN TABO) - 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	JT-SB LN 10-Y
Flow Element	Irregular Chani
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	005076	ft/ft
Discharge	27.36	cfs

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.63	ft
Elevation Range	.00 to 1.04	
Flow Area	8.9	ft²
Wetted Perimeter	25.72	ft
Top Width	25.00	ft
Actual Depth	0.63	ft
Critical Elevation	0.60	ft
Critical Slope	0.006277	ft/ft
Velocity	3.07	ft/s
Velocity Head	0.15	ft
Specific Energy	0.77	ft
Froude Number	0.91	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
-0+11	0+25	0.017

Natural Channel Points

Station (ft)	Elevation (ft)
-0+11	0.88
0+00	0.67
0+00	0.00
0+25	0.54
0+25	1.04

INLET BATTERY Q (JUAN TABO) - 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	JT-SB LN 100-
Flow Element	Irregular Chan
Method	Manning's For
Solve For	Channel Depth

Input Data		
Channel Sl	004460	ft/ft
Discharge	57.16	cfs

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.017	
Water Surface Elev	0.89	ft
Elevation Range	.00 to 1.04	
Flow Area	16.6	ft²
Wetted Perimeter	36.53	ft
Top Width	35.50	ft
Actual Depth	0.89	ft
Critical Elevation	0.84	ft
Critical Slope	0.005719	ft/ft
Velocity	3.45	ft/s
Velocity Head	0.18	ft
Specific Energy	1.07	ft
Froude Number	0.89	
Flow Type	Subcritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.64150113e-2 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
-0+11	0+25	0.017

Natural Channel Points	
Station (ft)	Elevation (ft)
-0+11	0.88
0+00	0.67
0+00	0.00
0+25	0.54
0+25	1.04

Curb Opening Worksheet: Median Opening 1 - 10 Yr

Objective : Curb Opening 1: 10 year

1 Inlet to median..
Median Curb 6" curb and gutter.

Flow in Street:	10 cfs
Depth:	0.36 ft

2 Calculate Orifice and Weir Flow into curb opening

Orifice Equation		Weir Equation	
Q = 0.6 x A x (2 x g x h)^1/2		Q=2.65 x P x H^1/2	
Where		Where	
A =	0.360 sq. ft.	P=	1.000 ft
g =	32.2 ft ^2/sec	H=	0.36 ft
h =	0.36 ft		
Therefore		Therefore	
Q =	1.0 cfs	Q =	1.6 cfs

Orifice Equation controls

Median Inlet flow =	1 cfs

APPENDIX B

Curb Opening Worksheet: Median Opening 1 - 100 Yr

Objective : Curb Opening 1: 100 year

1 Inlet to median..
Median Curb 6" curb and gutter.
Flow in Street: 19.16 cfs
Depth: 0.45 ft

2 Calculate Orifice and Weir Flow into curb opening

Orifice Equation		Weir Equation	
Q = 0.6 x A x (2 x g x h)^1/2		Q=2.65 x P x H^1/2	
Where		Where	
A =	0.450 sq. ft.	P=	1.000 ft
g =	32.2 ft ^2/sec	H=	0.45 ft
h =	0.45 ft		
Therefore		Therefore	
Q =	1.5 cfs	Q =	1.8 cfs

Orifice Equation controls

Median Inlet flow = 1.5 cfs

APPENDIX B

Curb Opening Worksheet: Median Opening 2 - 10 Yr

Objective : Curb Opening 2: 10 year

1 Inlet to median..
Median Curb 6" curb and gutter.
Flow in Street: 4.78 cfs
Depth: 0.28 ft

2 Calculate Orifice and Weir Flow into curb opening

Orifice Equation		Weir Equation	
Q = 0.6 x A x (2 x g x h)^1/2		Q=2.65 x P x H^1/2	
Where		Where	
A =	0.280 sq. ft.	P=	1.000 ft
g =	32.2 ft ^2/sec	H=	0.28 ft
h =	0.28 ft		
Therefore		Therefore	
Q =	0.7 cfs	Q =	1.4 cfs

Orifice Equation controls
Median Inlet flow = 0.7 cfs

APPENDIX B

Curb Opening Worksheet: Median Opening 2 - 100 Yr

Objective : Curb Opening 2: 100 year

1 Inlet to median..
Median Curb 6" curb and gutter.

Flow in Street:	4.78 cfs
Depth:	0.34 ft

2 Calculate Orifice and Weir Flow into curb opening

Orifice Equation		Weir Equation	
Q = 0.6 x A x (2 x g x h)^1/2		Q=2.65 x P x H^1/2	
Where		Where	
A =	0.340 sq. ft.	P=	1.000 ft
g =	32.2 ft ^2/sec	H=	0.34 ft
h =	0.34 ft		
Therefore		Therefore	
Q =	1.0 cfs	Q =	1.5 cfs

Orifice Equation controls

Median Inlet flow = 1.0 cfs

APPENDIX B

Curb Opening Worksheet: Median Opening 3 - 10 Yr

Objective : Curb Opening 3: 10 year

1 Inlet to median..
Median Curb 6" curb and gutter.

Flow in Street:	6.32 cfs
Depth:	0.4 ft

2 Calculate Orifice and Weir Flow into curb opening

Orifice Equation		Weir Equation	
Q = 0.6 x A x (2 x g x h)^1/2		Q=2.65 x P x H^1/2	
Where		Where	
A =	0.400 sq. ft.	P=	1.000 ft
g =	32.2 ft ^2/sec	H=	0.4 ft
h =	0.4 ft		
Therefore		Therefore	
Q =	1.2 cfs	Q =	1.7 cfs

Orifice Equation controls

Median Inlet flow = 1.2 cfs

APPENDIX B

Curb Opening Worksheet: Median Opening 3 - 100 Yr

Objective : Curb Opening 3: 100 year

1 Inlet to median..
Median Curb 6" curb and gutter.
Flow in Street: 6.32 cfs
Depth: 0.4 ft

2 Calculate Orifice and Weir Flow into curb opening

Orifice Equation		Weir Equation	
Q = 0.6 x A x (2 x g x h)^1/2		Q=2.65 x P x H^1/2	
Where		Where	
A =	0.400 sq. ft.	P=	1.000 ft
g =	32.2 ft ^2/sec	H=	0.4 ft
h =	0.4 ft		
Therefore		Therefore	
Q =	1.2 cfs	Q =	1.7 cfs

Orifice Equation controls

Median Inlet flow = 1.2 cfs

APPENDIX B

Curb Opening Worksheet: Median Opening 4 - 100 Yr

Objective : Curb Opening 4: 100 year

1 Inlet to median..
Median Curb 6" curb and gutter.

Flow in Street:	14.75 cfs
Depth:	0.44 ft

2 Calculate Orifice and Weir Flow into curb opening

Orifice Equation		Weir Equation	
Q = 0.6 x A x (2 x g x h)^1/2		Q=2.65 x P x H^1/2	
Where		Where	
A =	0.440 sq. ft.	P=	1.000 ft
g =	32.2 ft ^2/sec	H=	0.44 ft
h =	0.44 ft		
Therefore		Therefore	
Q =	1.4 cfs	Q =	1.8 cfs

Orifice Equation controls

Median Inlet flow =	1.4 cfs

APPENDIX B

Curb Opening Worksheet: Median Opening 4 - 10 Yr

Objective : Curb Opening 4: 10 year

1 Inlet to median..
Median Curb 6" curb and gutter.
Flow in Street: 9.81 cfs
Depth: 0.38 ft

2 Calculate Orifice and Weir Flow into curb opening

Orifice Equation		Weir Equation	
Q = 0.6 x A x (2 x g x h)^1/2		Q=2.65 x P x H^1/2	
Where		Where	
A =	0.380 sq. ft.	P=	1.000 ft
g =	32.2 ft ^2/sec	H=	0.38 ft
h =	0.38 ft		
Therefore		Therefore	
Q =	1.1 cfs	Q =	1.6 cfs

Orifice Equation controls
Median Inlet flow = 1.1 cfs

APPENDIX B

FLOWMASTER OUTPUT FOR OPEN CHANNEL CALCULATIONS MOBILE HOME PARK DISCHARGE

SIDEWALK CULVERT - FAWN TRAIL
Worksheet for Rectangular Channel

Project Description	
Worksheet	Sidewalk Culvert - Fawn
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Channel Slope	020000	ft/ft
Depth	0.60	ft
Bottom Width	4.00	ft

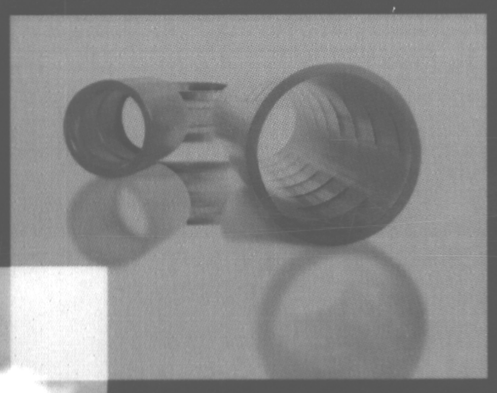
Results		
Discharge	23.17	cfs
Flow Area	2.4	ft²
Wetted Perim	5.20	ft
Top Width	4.00	ft
Critical Depth	1.01	ft
Critical Slope	0.004235	ft/ft
Velocity	9.65	ft/s
Velocity Head	1.45	ft
Specific Energ	2.05	ft
Froude Numb	2.20	
Flow Type	Supercritical	

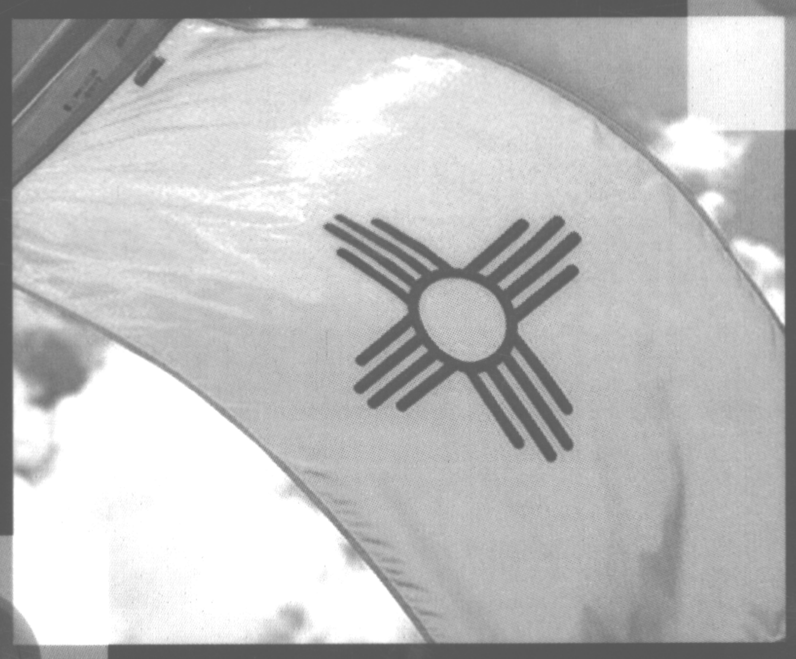
SIDEWALK CULVERT - NORTHERN MOBILE HOME DISCHARGE
Worksheet for Rectangular Channel

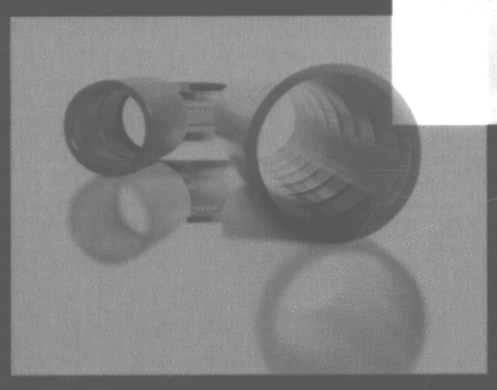
Project Description	
Worksheet	Sidewalk Culvert - North Mobi
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Channel Slope	020000	ft/ft
Depth	0.60	ft
Bottom Width	7.00	ft

Results		
Discharge	43.46	cfs
Flow Area	4.2	ft²
Wetted Perim	8.20	ft
Top Width	7.00	ft
Critical Depth	1.06	ft
Critical Slope	0.003437	ft/ft
Velocity	10.35	ft/s
Velocity Head	1.66	ft
Specific Energ	2.26	ft
Froude Numb	2.36	
Flow Type	Supercritical	







Office Locations

Albuquerque, New Mexico (505) 883-8114

Austin, Texas (512) 231-1119

Dallas, Texas (214) 871-3311

Denton, Texas (214) 871-3311

Denver, Colorado (303) 740-7325

El Paso, Texas (915) 587-4339

Fort Worth, Texas (817) 335-3000

Houston, Texas (281) 496-0066

Irvine, California (714) 734-5100

Ontario, California (909) 390-8400

Phoenix, Arizona (602) 952-9123

Rio Rancho, New Mexico (505) 892-5141

Seattle, Washington (206) 324-5500

Tacoma, Washington (253) 627-9131

Westlake Village, California (805) 418-1802

HUITT-ZOLLARS

CITY OF ALBUQUERQUE

December 7, 2010

Scott Eddings, P.E.
Huitt-Zollars, Inc.
333 Rio Rancho Blvd
Rio Rancho, NM 87124

Re: Southern Blvd Reconstruction, Drainage Report
Engineer's Stamp date –no stamp, 60%- (L21/D100)

Dear Mr. Eddings,

Based upon the information provided in your submittal received 12-1-10, the above referenced report cannot be approved for Work Order until the following comments are addressed:

- Provide a plan-size basin map showing basins, existing storm drain, proposed storm drain, analysis points and capacity of the storm drain. Please include analysis points at: the southern end of Juan Tabo (I calculated 93 cfs), at Cuardo St, at Elizabeth St, and at Eubank Blvd (already included). The inlet analysis already provided is also necessary.
- Why are Basins 102 and 103 programmed for the westbound lane? They are on the south side of the road. In addition, the flow for Basin 102 should be increased to the developed condition (14.4 cfs). This will affect the Street flow calcs. NO 5.7 acct for difference
- Due to the inadequacy of storm drain east of Elizabeth St., the wide median and the cross-slope of the road to the median, ponding in the median is justified.
- Concerning the ponding in the median, one pond could be east of Cuardo St, connected via a culvert to another pond between Cuardo St and Elizabeth St. Small berms or similar could be built in the median to create ponding areas.
- Flows in excess of the detention volume could be picked up at Elizabeth St.
- The Manzano Mesa Park parking lot at the northwest corner of the park contributes 5.9 cfs to Southern Blvd (see Drainage File L21-D037B). A section of Elizabeth St. south of Southern also contributes approximately 2.4 cfs. This was not included in the basin analysis. NO Omitted
- The print on the storm drain profiles (Appendix C) is too small to read.
- Two 24 inch sidewalk culverts do not have the capacity to convey the 17.8 cfs from Fawn Trail. As discussed, storm drain inlets could be built in this location.

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NM 87103
www.cabq.gov

- Flows from the Mobile Home Park, 70.4 cfs, may be estimated too high due to the existing conveyance infrastructure. There may be some ponding that is occurring. It would be acceptable to reduce the estimated flow from this basin with adequate engineering justification.
- The AO Floodplain in Juan Tabo Blvd is 1' at and south of the intersection of Fawn Trail and Juan Tabo Blvd. It seems the flow depth would be greater than 0.5 in Juan Tabo in this area and should be mitigated. The storm drain could be extended north to pick up these flows.
- A Floodplain Development Permit will be required for the work in the AO zone near Fawn Trail. This work cannot increase the depth in Juan Tabo in this area and it should be reduced as discussed above.

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

Sincerely,

Curtis A. Cherne

Curtis A. Cherne, P.E.
Senior Engineer, Planning Dept.
Development and Building Services

C: File

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NM 87103
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DRAINAGE INFORMATION SHEET

(REV. 1/28/2003)

L21/D100

PROJECT TITLE. Southern Blvd Reconstruction ZONE ATLAS/DRNG. FILE #: ~~L-20 & 21-Z~~

DRB #: _____ EPC#: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Eubank to Juan Tabo – COA Proj #7175.91

CITY ADDRESS: _____

ENGINEERING FIRM:	Huitt-Zollars, Inc.	CONTACT:	Scott Eddings
ADDRESS:	333 Rio Rancho Blvd.	PHONE:	892-5141
CITY, STATE:	Rio Rancho, NM	ZIP CODE:	87124
OWNER:	COA DMD	CONTACT:	Richard Costales
ADDRESS:		PHONE:	768-2774
CITY, STATE:		ZIP CODE:	
ARCHITECT:		CONTACT:	
ADDRESS.		PHONE:	
CITY, STATE:		ZIP CODE:	
SURVEYOR:	Huitt-Zollars, Inc.	CONTACT.	
ADDRESS:	333 Rio Rancho Blvd	PHONE.	
CITY, STATE:	Rio Rancho, NM	ZIP CODE:	
CONTRACTOR:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE.	

CHECK TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- _____ DRAINAGE PLAN 1ST SUBMITTAL, *REQUIRES TCL or equal*
- _____ DRAINAGE PLAN RESUBMITTAL
- _____ CONCEPTUAL GRADING & DRAINAGE PLAN
- _____ GRADING PLAN
- _____ EROSION CONTROL PLAN
- _____ ENGINEER'S CERTIFICATION (HYDROLOGY)
- _____ CLOMR/LOMR
- _____ TRAFFIC CIRCULATION LAYOUT (TCL)
- _____ ENGINEER'S CERTIFICATION (TCL)
- _____ ENGINEER'S CERT. (DRB APPR. SITE PLAN)
- _____ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- _____ SIA/FINANCIAL GUARANTEE RELEASE
- _____ PRELIMINARY PLAT APPROVAL
- _____ S. DEV PLAN FOR SUB'D. APPROVAL
- _____ S. DEV. PLAN FOR BLDG. PRMT. APPROVAL
- _____ SECTOR PLAN APPROVAL
- _____ FINAL PLAT APPROVAL
- _____ FOUNDATION PERMIT APPROVAL
- _____ BUILDING PERMIT APPROVAL
- _____ CERTIFICATE OF OCCUPANCY (PERM.)
- _____ CERTIFICATE OF OCCUPANCY (TEMP.)
- _____ GRADING PERMIT APPROVAL
- _____ PAVING PERMIT APPROVAL
- CL X WORK ORDER APPROVAL
- _____ OTHER (SPECIFY)

RECEIVED
DEC 1 2010
HYDROLOGY SECTION

WAS A PRE-DESIGN MEETING ATTENDED:

- _____ YES
- X NO
- _____ COPY PROVIDED

DATE SUBMITTED: 12/1/10 BY: Scott Eddings

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 submittal may be required based on the following:

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