CITY OF ALBUQUERQUE

Richard J. Berry, Mayor

December 3, 2015

David Soule, P.E.
Silver Oak Estates
1606 Central Avenue Suite 201
Albuquerque, NM, 87106

RE: Silver Oak Estates | Grading and Drainage Plan | Stamp 10-21-15 (File: C18D101)

Dear Mr. Soule:

Based upon the information provided in your submittal received 10/28/2015, and information discussed at the December 2, 2015 Development Review Board Meeting, the Site Plan for Subdivision cannot be approved unit the following comments are addressed:

1. Clarify the easement dimensions between the cul-de-sac and Alameda Blvd. The Utility Plan shows a different layout than the Site/Grading Plan.
2. The inlet at the end of the cul-de-sac bulb appears to conflict with the intent to have an access easement to the southernmost lots.
3. At the entrance, there is a low spot on the northbound side curb and gutter; it appears that the intent is to convey flows west into the temporary pond. The plan should clarify to the Contractor that the crown of the road is to be warped so as not to create a sump.
4. The inlets on Oakland and Alameda should have build notes
    a. The inlet on Alameda is referenced as a single grate Type D inlet to capture flows at the flowline of the roadside swale, but shown differently on the plan. Furthemore, his inlet and pipe needs to be planned with the future expanded section of Alameda Blvd in mind.
5. Show the emergency spillway for the pond as referenced in the drainage report.
6. Call out the wall opening that will be needed to convey flows into the pond.
7. Show elevation points at the rear lots that show the intent to install rear lot ponds.
    a. The rear and front yard ponds and typical lot layout showing the first flush ponds should also be shown on the landscaping sheets, since it appears that the fine grading of those facilities might be completed with the installation of graveling and plantings, not with the grading of the lots.
8. Show the calculation that arrives at the 95 cubic foot volume for the first flush management on the worksheet in the Appendix.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Abiel Carrillo, P.E.
Principal Engineer, Planning Dept.
Development Review Services
Orig: Drainage file

C18D101_SPSD_CMMT.docx

PO Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 09/2015)

Project Title: SILVER OAK SUBDIVISION Building Permit #: _____ City Drainage #: _____

DRB#: 1010644 EPC#: _____ Work Order#: _____

Legal Description: LOT 13,14,19,20 BLOCK 28, TRACT A, UNIT B ,NAA

City Address: OAKLAND NE

Engineering Firm: RIO GRANDE ENGINEERING Contact: DAVID SOULE

Address: PO BOX 93924, ALBUQUERQUE, NM 87199

Phone#: 505.321.9099 Fax#: 505.872.0999 E-mail: DAVID@RIOGRANDEENGINEERING.COM

Owner: SILVER OAK DEVELOPERS Contact: _____

Address: PO BOC 20688, ALB NM 87154

Phone#: _____ Fax#: _____ E-mail: _____

Architect: none Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

Other Contact: _____ Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

Check all that Apply:

DEPARTMENT:

x HYDROLOGY/ DRAINAGE
_____ TRAFFIC/ TRANSPORTATION
_____ MS4/ EROSION & SEDIMENT CONTROL

TYPE OF SUBMITTAL:

_____ ENGINEER/ ARCHITECT CERTIFICATION

_____ CONCEPTUAL G & D PLAN
X GRADING PLAN
_____ DRAINAGE MASTER PLAN
_____ DRAINAGE REPORT
_____ CLOMR/LOMR

_____ TRAFFIC CIRCULATION LAYOUT (TCL)
_____ TRAFFIC IMPACT STUDY (TIS)
_____ EROSION & SEDIMENT CONTROL PLAN (ESC)

_____ OTHER (SPECIFY) _____

CHECK TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

_____ BUILDING PERMIT APPROVAL
_____ CERTIFICATE OF OCCUPANCY

X PRELIMINARY PLAT APPROVAL
X SITE PLAN FOR SUB'D APPROVAL
_____ SITE PLAN FOR BLDG. PERMIT APPROVAL
_____ FINAL PLAT APPROVAL
_____ SIA/ RELEASE OF FINANCIAL GUARANTEE
_____ FOUNDATION PERMIT APPROVAL
_____ GRADING PERMIT APPROVAL
_____ SO-19 APPROVAL
_____ PAVING PERMIT APPROVAL
_____ GRADING/ PAD CERTIFICATION
_____ WORK ORDER APPROVAL
_____ CLOMR/LOMR

_____ PRE-DESIGN MEETING
_____ OTHER (SPECIFY) _____

IS THIS A RESUBMITTAL?: _____ Yes X No

DATE SUBMITTED: 10/23/15 By: _____

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED: ___

DRAINAGE REPORT

For

SILVER OAK SUBDIVISION

Albuquerque, New Mexico

Prepared by

Rio Grande Engineering
PO Box 93924
Albuquerque, New Mexico 87199

October 2015

David Soule P.E. No. 14522

TABLE OF CONTENTS

Appendix

Map

PURPOSE

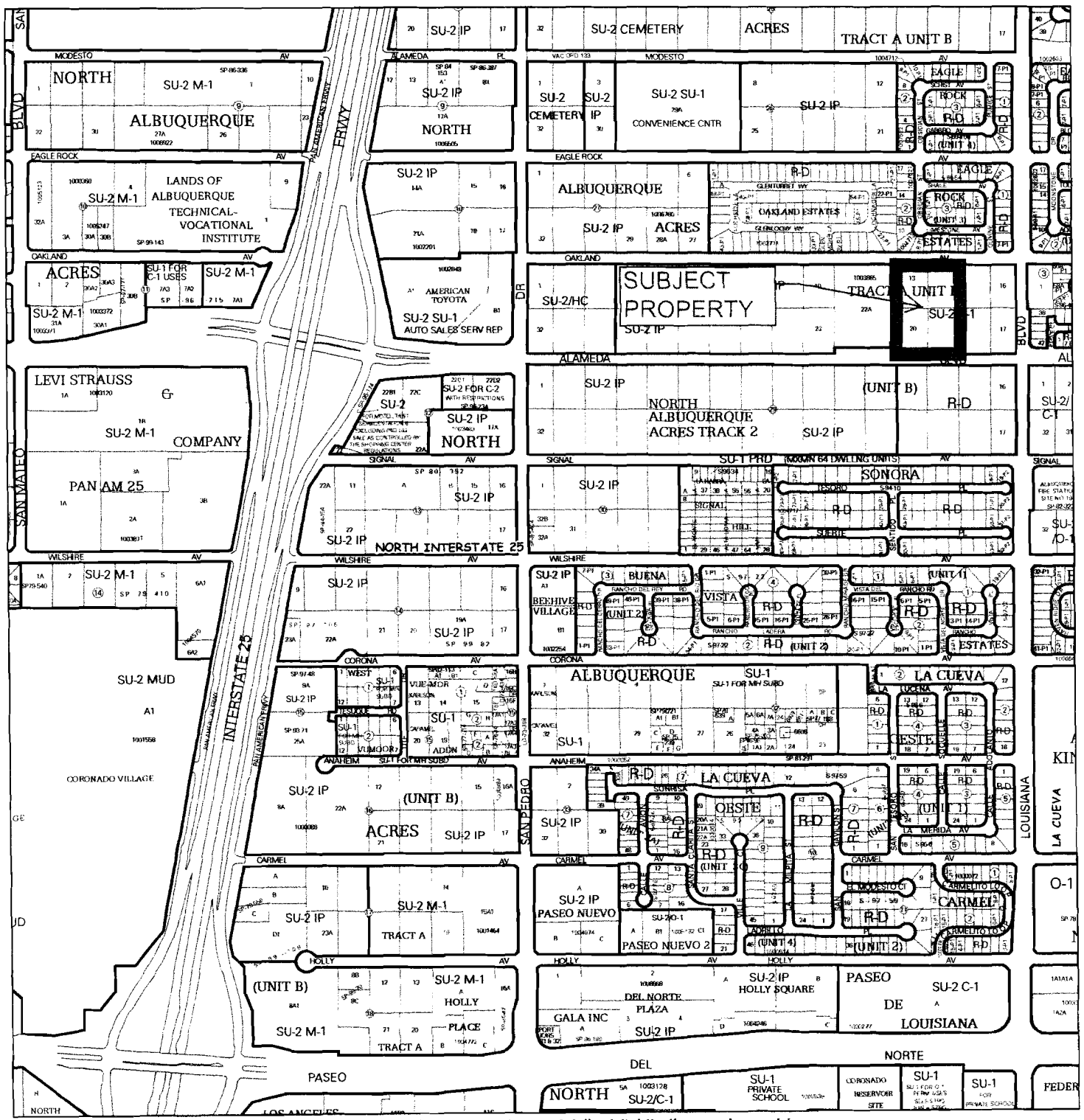
The purpose of this report is to provide the Drainage Management Plan for the development of a 20-lot subdivision located on Oakland Avenue between San Pedro and Louisiana NE. This plan was prepared in accordance with the City of Albuquerque design regulations, utilizing the City of Albuquerque's Development Process Manual drainage guidelines. This report will demonstrate that the grading does not adversely affect the surrounding properties, nor the upstream or downstream facilities.

INTRODUCTION

The subject of this report, as shown on the Exhibit A, is a 3.66-acre parcel of land located on the south side of Oakland Avenue and the north side of Alameda Boulevard between San Pedro and Louisiana. The legal description of this site is Lots 13-14 and 19-20, block 28, tract A, unit B, North Albuquerque Acres. As shown on FIRM map35013C0137H, the entire site is located within Flood Zone X. The site has had significant grading activities upon it over the past years. The site is not in native condition, there are several borrow pits and there are berms and diversion ponds along the west property line. The site is affected by upland flow from 4 undeveloped lots. The site free discharges to the northwest and southwest. The development of the site will require the site to discharge at a rate equal to or less than the fully developed conditions assumed for this site in the governing North Albuquerque Acres Master Drainage Plan (NAAMDP), which relevant excerpts can be found in appendix A.

EXISTING CONDITIONS

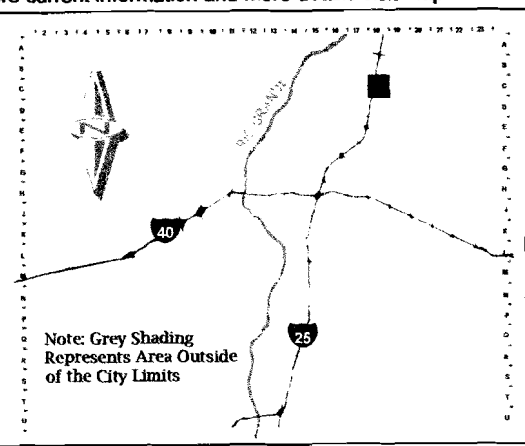
The site currently does not have structures on it and has been impacted by human development over the years. The site was graded with the adjacent storage facility, such that berms and desiltation ponds were created to divert the north half of the site to Oakland and the



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:

C-18-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

south half of the site to Alameda. The site is impacted by upland flows in the amount of 6.5 cfs from the adjacent lots to the east. The flow enters the site as sheet flow. The site currently generates 7.66 cfs. The site currently discharge the 14.16 cfs of combined onsite and upland flows, of which 7.08 cfs discharges to Alameda and 7.08 cfs discharges to Oakland at the west property line.

PROPOSED CONDITIONS

The proposed improvements consist of a new 20-lot subdivision serviced by private paved roadway. The site contains two basins; the northern half contains Basin A, which discharges via surface flow to Oakland. Basin A is located within the NAA developed basin 117.2, and basin B is located within basin 117.2. As shown in appendix A, the anticipated land treatments for these basins are both 0%A, 34%B, 16%C, 50% D. Due to the lack of down stream storm drain connectivity, basin A shall be retained on site in a temporary drainage pond located on lot 1. Basin B contains the southern half and discharges to the Alameda Storm drain via an 18" connection to an existing lateral. The drainage plan calls for rear yard retention for water quality as well as reducing the peak flow leaving the site. Each rear yard will contain a 6" deep 12x45' pond with a volume of 110 cubic feet. This pond will retain the rear yard and harvest this water. The removal of this development area from the contributing site discharge reduces the peak for each onsite basin to less than what is allowed within the North Albuquerque Acres Drainage Master Plan. The NAADMP allows for 7.09 cfs to be discharged for each basin. As shown in appendix B, Basin A will discharge 6.89 cfs, which is .2 cfs less than allowed, and basin B will discharge 6.87 cfs which is .22 cfs less than allowed. In addition to the rear yard ponds, additional 33 cubic foot ponds will be provided in the front yards to further improve the first flush treatment. As shown in appendix B, basin A generates 0.389acre feet during a 100-year, 10-day event. The pond provides for this volume with one foot of freeboard. The pond has an emergency overflow to Oakland. The sidewalk culverts have a capacity of 9.7 cfs, which is

greater than the 6.96 cfs anticipated. The inlet located at Oakland has the capacity to convey the 15.28 cfs that will ultimately discharge to it. In the interim it will be plugged. The cul-de-sac inlet collecting the flow from basin b has a capacity of 34.9 cfs which exceeds the 6.93 cfs anticipated. The 18" rcp has a capacity of 12.91 cfs and is connected to an existing 18" lateral which is designed to accept fully developed flow from this site. The connection to the existing lateral will utilize a single grated D inlet for a junction. This will collect the street flows generated along our frontage, as well as capacity for future basin D. The calculation for these items as well as for the street capacity is located in appendix C

The upland flow consists of 4 undeveloped lots; these lots will be diverted to the streets at this sites east property line. The 3.25 cfs currently discharging from each half will enter the Alameda and Oakland roadways via surface flow. The swale will include sediment basins prior to discharging to the streets.

SUMMARY AND RECOMMENDATIONS

This project is a development of a 20-lot residential subdivision with the North Albuquerque Acres Master Drainage plan. The development is consistent with the land use assumptions of the plan. The site includes water quality volumes in excess of the .34" required. The peak discharge is less than allowed. The inlets, pipes and roadways, culverts and ponds have been shown to provide the required capacity. The site has been designed in accordance with City of Albuquerque Drainage ordinance. This drainage plan and report conforms to the governing drainage regulations of the City. Since the effected area site encompasses more than 1 acre, a NPDES permit will be required prior to any construction activity.

APPENDIX A

North Albuquerque Acres Master Drainage Plan

And

Alameda storm drain design excerpts

FINAL
NORTH ALBUQUERQUE ACRES
MASTER DRAINAGE PLAN

Prepared For:

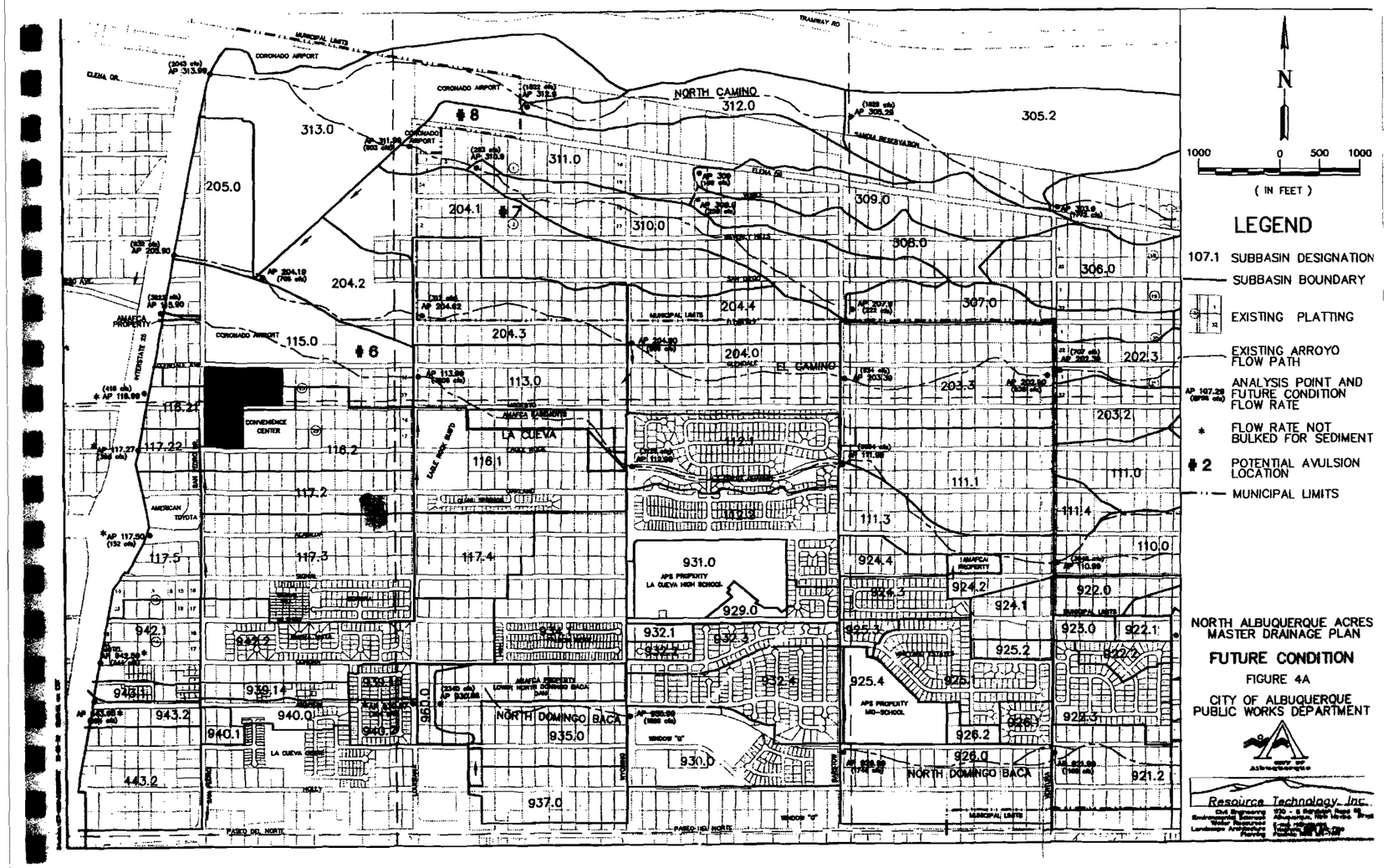
City of Albuquerque

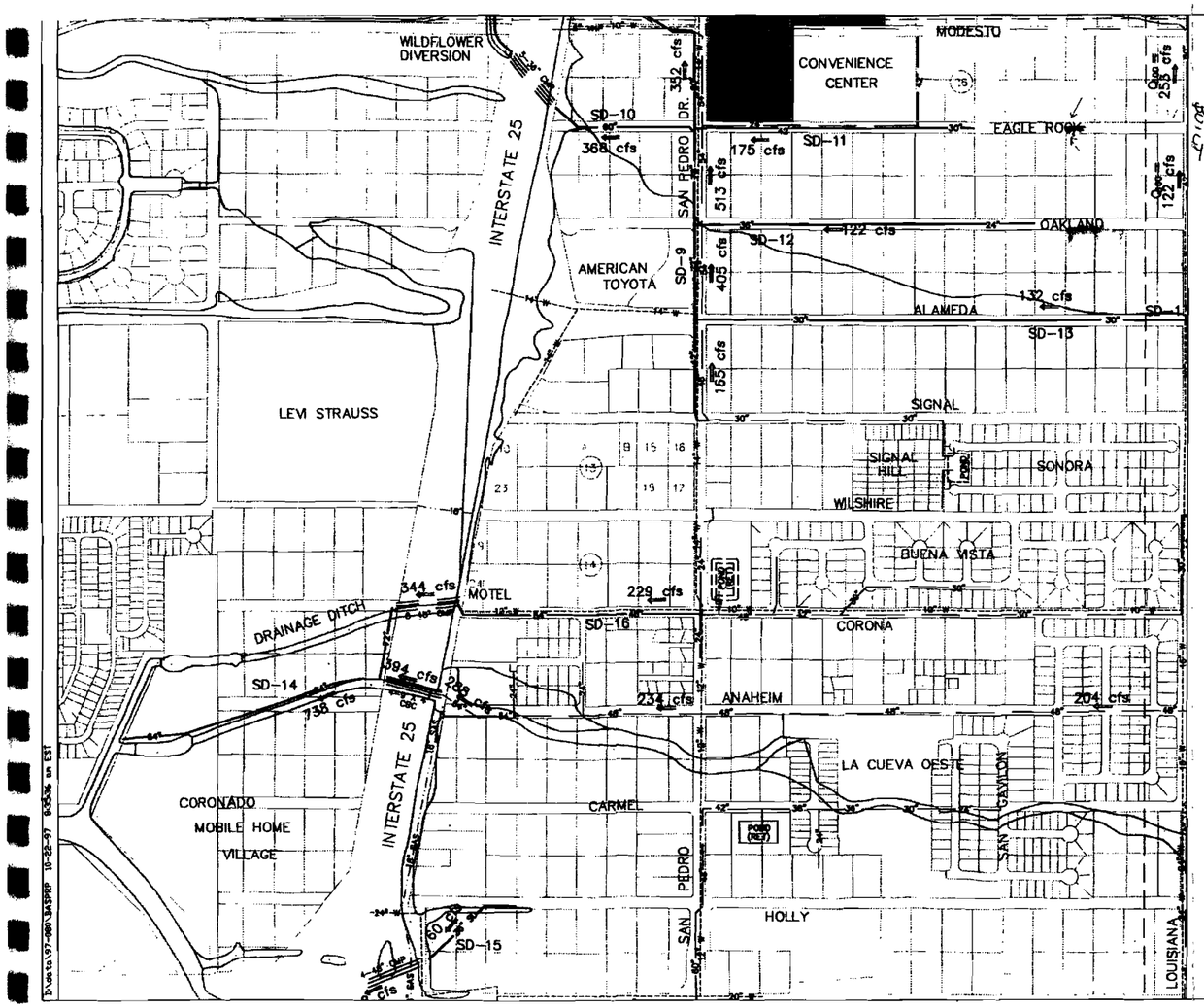
Prepared By:

ENGINEERS AND ENVIRONMENTAL SCIENTISTS
1720-B Randolph Road SE, Albuquerque, NM 87106
Telephone (505) 243-7300
Fax (505) 243-7400
rti@nmia.com

October 1998

DONALD S. ... NEW MEXICO 11043 REGISTERED PROFESSIONAL ENGINEER
10/28/98


N
1000 0 500 1000
(IN FEET)
LEGEND
107.1 SUBBASIN DESIGNATION
SUBBASIN BOUNDARY
EXISTING PLATTING
EXISTING ARROYO FLOW PATH
ANALYSIS POINT AND FUTURE CONDITION FLOW RATE
* FLOW RATE NOT BULKED FOR SEDIMENT
# 2 POTENTIAL AVULSION LOCATION
MUNICIPAL LIMITS
NORTH ALBUQUERQUE ACRES MASTER DRAINAGE PLAN
FUTURE CONDITION
FIGURE 4A
CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT
Resource Technology, Inc.
NORTH CAMINO
EL CAMINO
LA CUEVA
NORTH DOMINGO BACA
CORONADO AIRPORT
6
7
8



NORTH ALBUQUERQUE ACRES
MASTER DRAINAGE PLAN

STORM DRAIN FACILITIES
C-18

FIGURE 5D

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

Resource Technology, Inc.
Civil Engineering
Environmental Sciences
Water Resources
Landscape Architecture
Planning
1720 - B Randolph Road SE
Albuquerque, New Mexico 87106
E-mail: rti@rtinm.com
Telephone (505) 243-7200
Facsimile (505) 243-7400

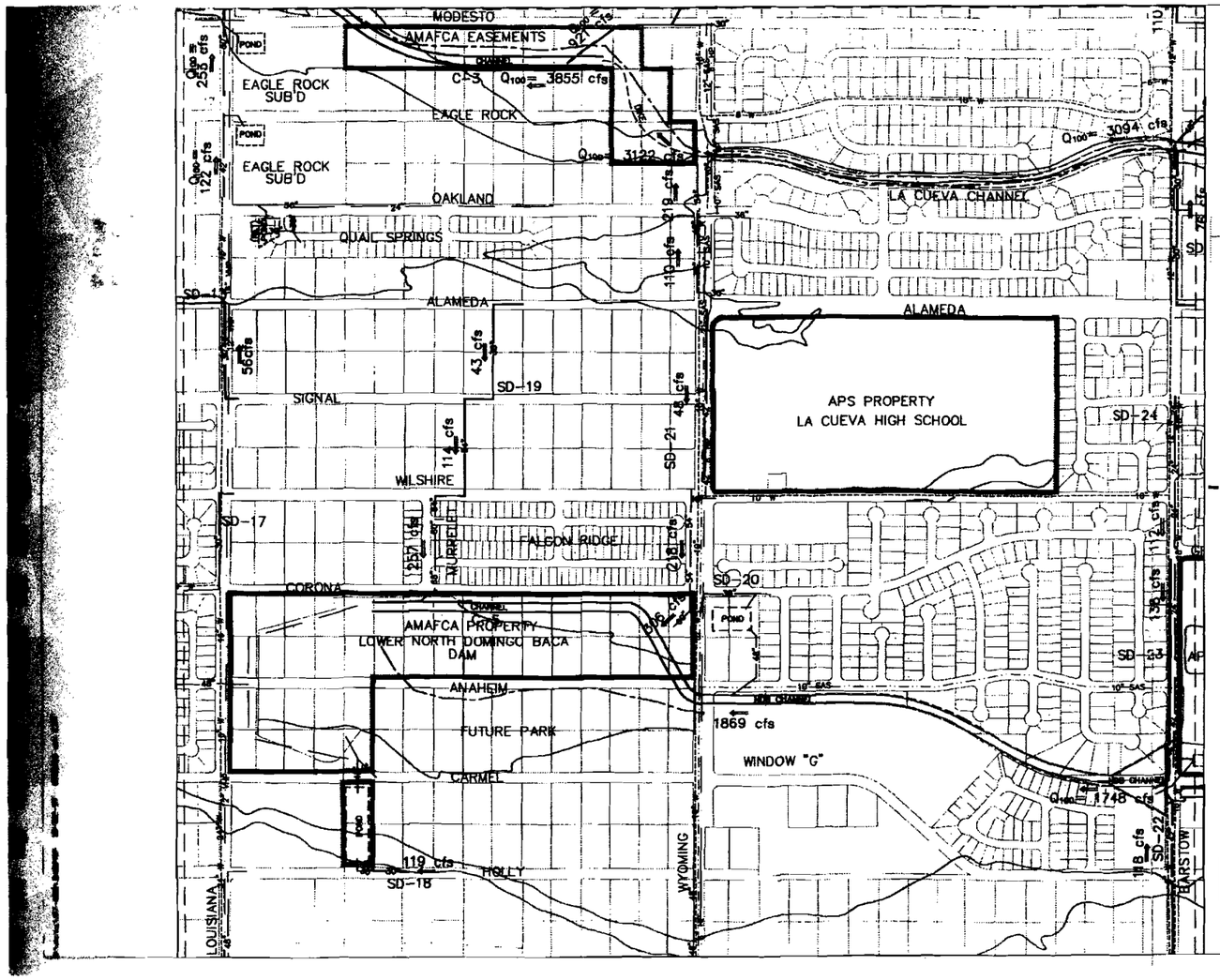
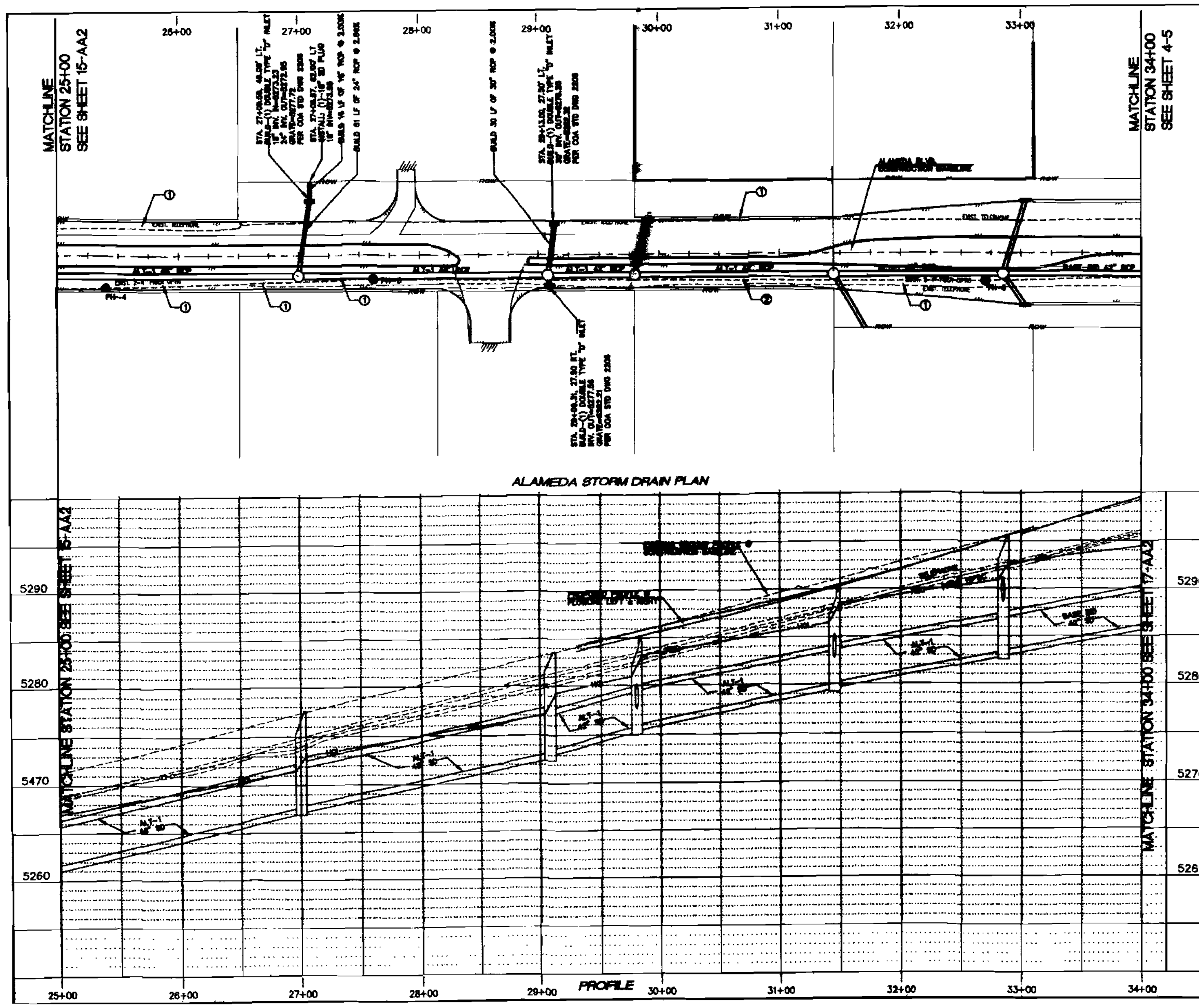

MODESTO
AMAFCA EASEMENTS
POND
EAGLE ROCK SUB'D
EAGLE ROCK
C-5
Q100= 3855 cfs
Q100= 3122 cfs
Q100= 3094 cfs
OAKLAND
LA CUEVA CHANNEL
QUAIL SPRINGS
ALAMEDA
SD-19
SIGNAL
APS PROPERTY
LA CUEVA HIGH SCHOOL
SD-24
SD-21
WILSHIRE
SD-17
TURRELL
FALSON RIDGE
SD-20
CORONA
AMAFCA PROPERTY
LOWER NORTH DOMINGO BACA DAM
ANAHEIM
FUTURE PARK
CARMEL
1869 cfs
WINDOW "G"
Q100= 1748 cfs
SD-22
SD-23
119 cfs
SD-18
HOLLY
LOUISIANA
WYOMING
BARSTOW
N
500 0 250 500
(IN FEET)
LEGEND
MUNICIPAL LIMITS
EXISTING PLATTING
EXISTING ARROYO FLOW PATH
EXISTING WATER LINE
EXISTING SANITARY SEWER
EXISTING GAS LINE
EXISTING STORM DRAIN
PROPOSED STORM DRAIN
PROPOSED CHANNEL
PROPOSED STRUCTURE OR ROAD
PROPOSED DIKE
#5 AV-5 POTENTIAL AVULSION
NOTE:
All flow rates shown are future condition 100-year.
NORTH ALBUQUERQUE ACRES MASTER DRAINAGE PLAN
STORM DRAIN FACILITIES C-19
FIGURE 5E
CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT
Resource Technology, Inc.
Civil Engineering
Environmental Sciences
Water Resources
Landscape Architecture
Planning
1720 - B Randolph Road SE
Albuquerque, New Mexico 87106
E-mail: rti@rtinm.com
Telephone: (505) 243-7300
Facsimile: (505) 243-7400

TABLE A-2 (cont.)

LA CUEVA ARROYO SUB-BASIN CHARACTERISTICS

Basin ID	Hydrologic Condition	Basin Area (mi^2)	Land Treatment (%)				TP (hrs)
			A	B	C	D	
113*	Existing	.1136	80	0	15	5	.133
	Future	.1000	0	25	15	60	.133
115*	Existing	.1337	80	0	15	5	.133
	Future	.1202	0	26	12	62	.133
116*	Existing	.1309	80	0	5	15	.133
116.1	Future	.1000	0	25	15	50	.133
116.2	Future	.0719	0	25	15	60 ~~50~~	.133
116.21	Future	.0344	0	40	20	40	.133
117.2*	Existing	.1391	73	0	7	20	.22
	Future	.0500	0	34	16	50	.133
117.21*	Existing	.0234	0	34	16	50	.133
117.22*	Future	.0156	0	20	10	70	.133
117.3*	Existing	.0863	65	5	15	15	.133
	Future	.1172	0	34	16	50	.133
117.31*	Existing	.0250	0	34	16	50	.133
117.32*	Existing	.0090	0	34	16	50	.133
117.4*	Existing	.0750	85	0	5	10	.133
	Future	.0512	0	25	15	60	.133
117.5*	Existing	.0550	0	10	20	70	.133
	Future	.0550	0	10	20	70	.133
118	Existing	.0649	0	20	10	70	.133
	Future	.0649	0	20	10	70	.133
118.1	Existing	.0306	75	5	10	10	.133
	Future	.0306	0	20	30	50	.133
119	Existing	.0549	0	20	10	70	.133
	Future	.0549	0	20	10	70	.133
120	Existing	.0268	50	0	0	50	.133
	Future	.0268	0	20	10	70	.133
121	Existing	.0489	80	0	15	5	.133
	Future	.0489	0	20	10	70	.133

*Modified for COA NAA MDP 9/97



KEYED NOTES:

1. EXISTING DIRECT BURY TELEPHONE LINE TO BE REMOVED AND DISPOSED BY CENTURYLINK.
2. EXISTING 2-4" PVC FIBER OPTIC LINES TO BE RELOCATED BY CENTURYLINK.

POT-HOLE INFORMATION

NO.	ELEV. AT TOP OF PIPE	DESCRIPTION		
		UTILITY	MATERIAL	DIAMETER
PH-4	[illegible]	FIBER OPT	PVC	2-4"
PH-5	[illegible]	FIBER OPT	PVC	2-4"
PH-6	[illegible]	FIBER OPT	PVC	2-4"

SCALE: 1" = 40'

SCALE: 1" = 5'

Thompson Engineering Consultants, Inc.

AS BUILT INFORMATION

CONTRACTOR

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

Coordinates shown hereon are modified (surface) N.M. State Plane Coordinates - Central Zone, NAD 83 and were derived by scaling State Plane grid coordinates by the project average combined factor of CF = 1.000334961 around an origin of 0,0. Elevations are NAVD 88, and are adjusted to the NGS Control Station "10-C18, 1985" (published elevation = 5222.090'). The coordinates and elevations are US Survey Feet.

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE
11599	SURVEYING CONTROL INC.	11-2010

ENGINEERS SEAL

NO.	DATE	REMARKS	BY

REVISIONS

DESIGN

DESIGNED BY	DBT	DATE	12-2012
DRAWN BY	DEM	DATE	12-2012
CHECKED BY	DBT	DATE	12-2012

CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT
ENGINEERING DIVISION

TITLE: ALAMEDA BLVD. WIDENING

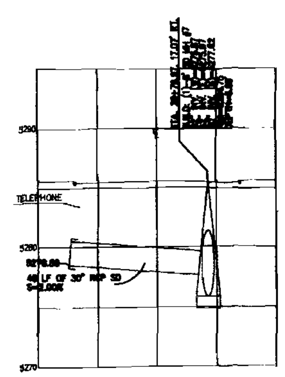
ALAMEDA STORM DRAIN PLAN AND PROFILE STA. 25+00 TO STA. 34+00

Design Review Committee: APPROVED JAN 11 2013 DESIGN REVIEW COMMITTEE

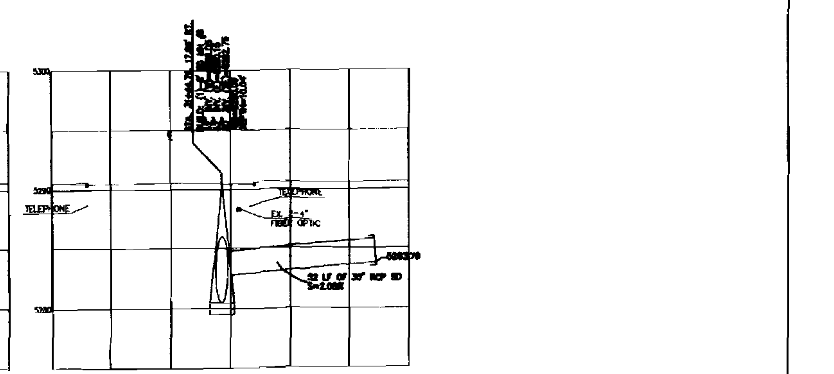
City Engineer Approval: APPROVED JAN 11 2013 CITY ENGINEER

Last Design Update

City Project No.	Zone Map No.	Sequence No.	Sheet	Of
7663.91	C-18/C-19	4-4	16-AA2	25



ALAMEDA STORM DRAIN LATERAL
STA. 29+79.97, 17.07' RT.



ALAMEDA STORM DRAIN LATERAL
STA. 31+44.76, 17.06' RT.

NOTE:
ALL LATERAL STORM DRAINS ARE CLASS IV.

SCALE: 1" = 20'

SCALE: 1" = 5'

Thompson Engineering Consultants, Inc.

CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT
ENGINEERING DIVISION

TITLE: ALAMEDA BLVD. WIDENING
LATERALS

ENGINEER'S SEAL	
SURVEY INFORMATION	FIELD NOTES
BENCH MARKS	Coordinates shown hereon are modified (surface) N.M. State Plane Coordinates – Central Zone, NAD 83 and were derived by scaling State Plane grid coordinates by the project average combined factor of CF = 1.00033...
AS BUILT INFORMATION	CONTRACTOR / DATE
MICRO-FILM INFORMATION	RECORDED BY / DATE / NO.

NO.	BY	DATE
11389	SURVEYING CONTROL INC.	11-2010

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY DBT	DATE	12-2012
DRAWN BY DEW	DATE	12-2012
CHECKED BY DBT	DATE	12-2012

Design Review Committee: APPROVED JAN 11 2013 DESIGN REVIEW COMMITTEE

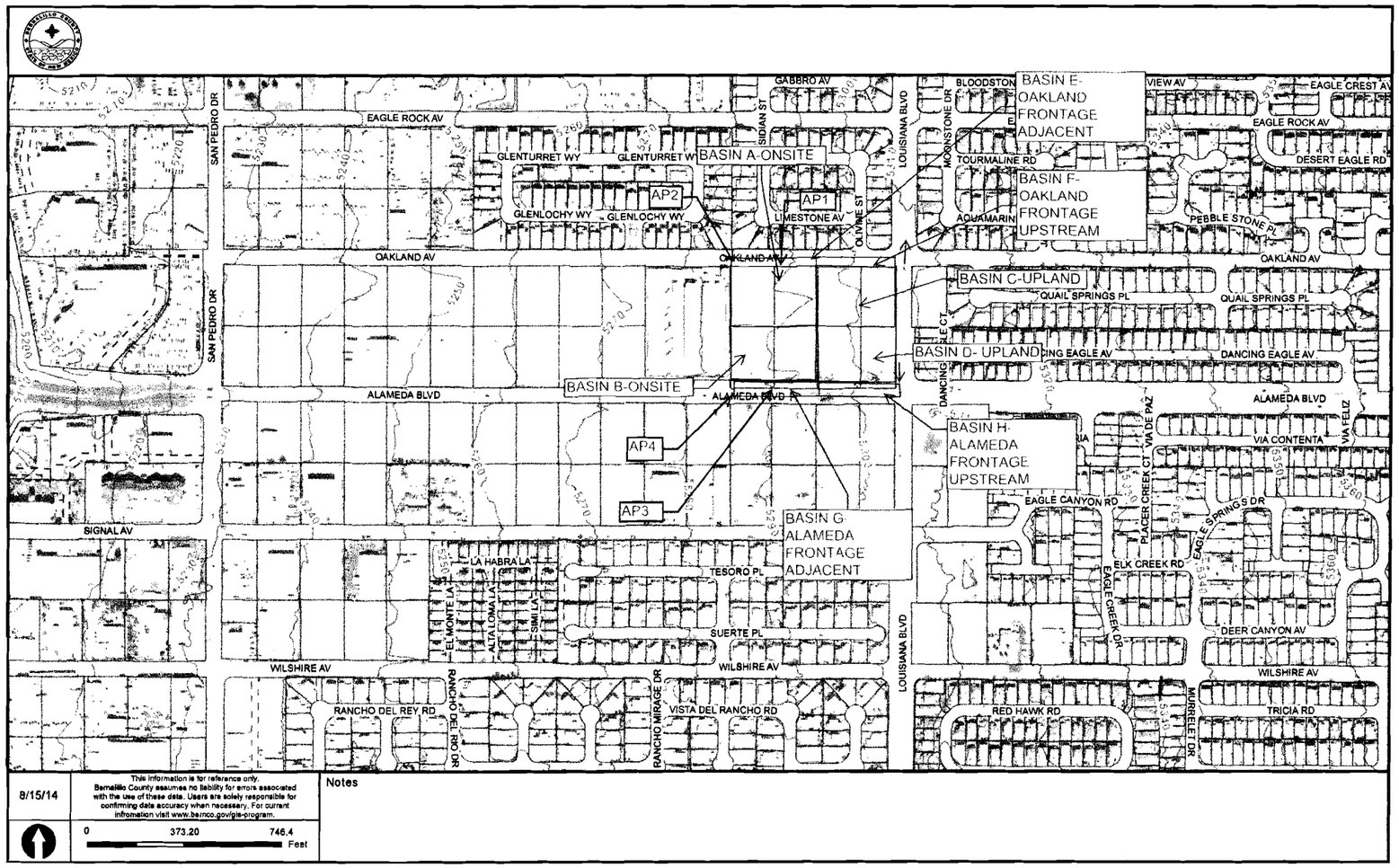
City Engineer Approval: APPROVED JAN 11 2013 CITY ENGINEER

Last Design Update

City Project No.	Zone Map No.	Sequence No.	Sheet	Of
7663.91	C-18/C-19	4-6	11-AA1	11

APPENDIX B

SITE HYDROLOGY



8/15/14

This information is for reference only.
Bernalillo County assumes no liability for errors associated with the use of these data. Users are solely responsible for confirming data accuracy when necessary. For current information visit www.bernco.gov/gis-program.

0 373.20 746.4 Feet

Notes

Weighted E Method

SIVER OAK SUBDIVISION

Existing Basins

											100-Year, 6-hr.			10-day
Basin	Area (sf)	Area (acres)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Volume (ac-ft)
BASIN A	77220	1.773	60%	1.06364	40.0%	0.709	0.0%	0	0%	0.000	0.764	0.113	3.83	0.113
BASIN B	77220	1.773	60%	1.06364	40.0%	0.709	0.0%	0	0%	0.000	0.764	0.113	3.83	0.113
BASIN C	70200	1.612	80%	1.28926	20.0%	0.322	0.0%	0	0%	0.000	0.712	0.096	3.25	0.096
BASIN D	70200	1.612	80%	1.28926	20.0%	0.322	0.0%	0	0%	0.000	0.712	0.096	3.25	0.096
BASIN E	9900	0.227	0%	0	50.0%	0.114	0.0%	0	50%	0.114	1.640	0.031	0.87	0.046
BASIN F	9000	0.207	0%	0	50.0%	0.103	0.0%	0	50%	0.103	1.640	0.028	0.79	0.042
BASIN G	19800	0.455	0%	0	50.0%	0.227	0.0%	0	50%	0.227	1.640	0.062	1.73	0.092
BASIN H	18000	0.413	0%	0	50.0%	0.207	0.0%	0	50%	0.207	0.645	0.022	1.50	0.050

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

4916.34

Where for 100-year, 6-hour storm (zone 3)

Ea= 0.66	Qa= 1.87
Eb= 0.92	Qb= 2.6
Ec= 1.29	Qc= 3.45
Ed= 2.36	Qd= 5.02

FLOW SUMMARY

TOTAL FLOW AT AP1- FLOW LEAVING SITE AT OAKLAND (ULTIMATE)	3.83	CFS	
TOTAL FLOW AT AP2- NEW INLET AT OAKLAND NW AT SITE	8.73	CFS	
TOTAL FLOW AT AP3. LEAVING SITE TO EXISTING STUB	3.83	CFS	
TOTAL FLOW AT AP4- NEW INLET AT ALAMEDA, SW AT SITE	8.81	CFS	* BASIN CAPTURED BY UPSTREAM INLET
TOTAL ALLOWABLE FLOW AT A PER NAA	160	CFS	

Weighted E Method

SIVER OAK SUBDIVISION

Developed Basins

											100-Year, 6-hr.			10-day
Basin	Area (sf)	Area (acres)	Treatment A %	(acres)	Treatment B %	(acres)	Treatment C %	(acres)	Treatment D %	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Volume (ac-ft)
BASIN A*	69220	1.589	0%	0	26.0%	0.413	13.0%	0.20658	64%	1.017	1.917	0.254	6.89	0.389
BASIN B*	69220	1.589	0%	0	26.0%	0.413	14.0%	0.22247	63%	1.001	1.907	0.252	6.87	0.386
BASIN C	70200	1.612	0%	0	34.0%	0.548	17.0%	0.27397	50%	0.806	1.712	0.230	6.41	0.337
BASIN D	70200	1.612	0%	0	34.0%	0.548	16.0%	0.25785	50%	0.806	1.699	0.228	6.36	0.336
BASIN E	9900	0.227	0%	0	20.0%	0.045	0.0%	0	80%	0.182	2.072	0.039	1.03	0.063
BASIN F	9000	0.207	0%	0	20.0%	0.041	0.0%	0	80%	0.165	2.072	0.036	0.94	0.058
BASIN G	19800	0.455	0%	0	30.0%	0.136	0.0%	0	70%	0.318	1.928	0.073	1.95	0.115
BASIN H	18000	0.413	0%	0	30.0%	0.124	0.0%	0	70%	0.289	0.387	0.013	2.42	0.052

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

FIRST FLUSH PER LOT-95 CFS

Where for 100-year, 6-hour storm (zone 3)

Ea= 0.66	Qa= 1.87
Eb= 0.92	Qb= 2.6
Ec= 1.29	Qc= 3.45
Ed= 2.36	Qd= 5.02

* rear yard ponds do not discharge, so area (8,000sf) removed from basins land treatments updated based upon rear yard pond not contributing

FLOW SUMMARY	proposed		allowed	
TOTAL FLOW AT AP1- FLOW LEAVING SITE AT OAKLAND (ULTIMATE)	6.89	CFS	7.09	
TOTAL FLOW AT AP2- NEW INLET AT OAKLAND NW AT SITE	15.28	CFS		
TOTAL FLOW AT AP3. LEAVING SITE TO EXISTING STUB	6.87	CFS	7.09	
TOTAL FLOW AT AP4- NEW INLET AT ALAMEDA, SW AT SITE	15.18	CFS	** BASIN CAPTURED BY UPSTREAM INLE	

INLET FLOWS(ULTIMATE)

INLET AT AP2-	15.28CFS
INLET AT AP4-	=6.87 CFS IN PIPE, 8.31 SURFACE FLOW ASSUMING BASIN D IS NOT PLACED IN PIPE
INLET AT CULDESAC	=6.87 CFS

Weighted E Method

SIVER OAK SUBDIVISION

NAA ALLOWED

											100-Year, 6-hr.			10-day
Basin	Area (sf)	Area (acres)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Volume (ac-ft)
BASIN A	77220	1.773	0%	0	36.0%	0.638	16.0%	0.28364	50%	0.886	1.718	0.254	7.09	0.372
BASIN B	77220	1.773	0%	0	36.0%	0.638	16.0%	0.28364	50%	0.886	1.718	0.254	7.09	0.372
BASIN C	70200	1.612	0%	0	36.0%	0.580	16.0%	0.25785	50%	0.806	1.718	0.231	6.44	0.338
BASIN D	70200	1.612	0%	0	36.0%	0.580	16.0%	0.25785	50%	0.806	1.718	0.231	6.44	0.338
BASIN E	9900	0.227	0%	0	36.0%	0.082	16.0%	0.03636	50%	0.114	1.718	0.033	0.91	0.048
BASIN F	9000	0.207	0%	0	36.0%	0.074	16.0%	0.03306	50%	0.103	1.718	0.030	0.83	0.043
BASIN G	19800	0.455	0%	0	36.0%	0.164	16.0%	0.07273	50%	0.227	1.718	0.065	1.82	0.095
BASIN H	18000	0.413	0%	0	36.0%	0.149	16.0%	0.06612	50%	0.207	0.842	0.029	2.31	0.057

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

16200.76

Where for 100-year, 6-hour storm (zone 3)

Ea= 0.66
Eb= 0.92
Ec= 1.29
Ed= 2.36

Qa= 1.87
Qb= 2.6
Qc= 3.45
Qd= 5.02

APPENDIX C

HYDRAULIC CALCULATIONS

SIDEWALK CULVERT

Weir Equation:

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

Q= 7 cfs
C = 2.95
H = 0.5 ft
L = Length of weir

Q=2.95*2*.67^1.5=3.23

Q =6.89, therefore use 3 with capacity of 9.7 cfs

DROP INLET CALCULATIONS

Inlet	TYPE OF INLET	AREA (SF)	Q (CFS)	H (FT)	H ALLOW (FT)
culdesac	double	8.86	34.9	0.6693	0.67

ORIFICE EQUATION

Q = CA sqrt(2gH) H=(Q/CA)^2)/2G

C = 0.6

g = 32.2

INLET GRATE=40"X25"
CALCULATE FOR BARS
40-(11*.5) 34.5"
25-(13*.5) 18.5"
OPENING IS 4.43 SF PER GRATE
USING DOUBLE FLOW DUE TO SUMP

Pipe Capacity

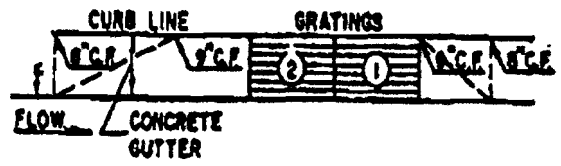
Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
18rcp	18	2	1.77	0.375	12.91	6.03	3.41

Manning's Equation:

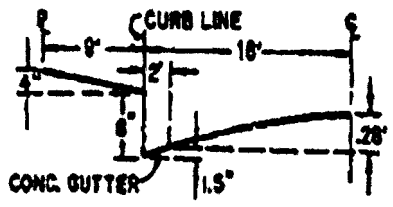
Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
R = D/4
S = Slope
n = 0.015

GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



GRATING & GUTTER PLAN

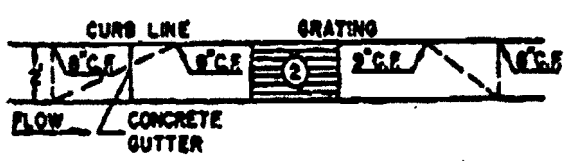


TYPICAL HALF STREET SECTION
(ABOVE BASIN)

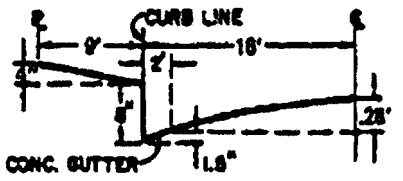
PLATE 22.3 D-6

Q=15.28 CFS, SLOPE=2.5%, DEPTH=.66

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



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

Q=8.31 CFS, SLOPE =.03, DEPT=.475'

PLATE 22.3 D-5

Street Capacity Calculations

SILVER OAKS

28' F-F Street Section with 8" curb

Slope= 0.006

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	0.19	0.00	0.33	0.0018848
0.02	0.00	0.34	0.01	0.00	0.00	0.30	0.01	0.38	0.0045908
0.04	0.01	0.68	0.02	0.01	0.01	0.48	0.02	0.42	0.0111278
0.06	0.03	1.02	0.03	0.02	0.04	0.63	0.04	0.45	0.0186349
0.08	0.05	1.36	0.04	0.04	0.08	0.76	0.06	0.47	0.0268376
0.1	0.08	1.70	0.05	0.07	0.14	0.88	0.09	0.49	0.0355923
0.12	0.12	2.04	0.06	0.11	0.23	1.00	0.12	0.51	0.0448091
0.125	0.13	2.13	0.06	0.13	0.26	1.02	0.13	0.51	0.0471777

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	0.14	0.27	1.00	0.13	0.49	0.0460163
0.16	0.23	3.91	0.06	0.23	0.46	1.01	0.16	0.45	0.0486259
0.2	0.42	5.95	0.07	0.48	0.95	1.15	0.23	0.45	0.0623776
0.24	0.69	8.00	0.09	0.90	1.81	1.32	0.32	0.47	0.0806096
0.2846	1.08	10.27	0.11	1.63	3.26	1.51	0.43	0.50	0.1037171
0.32	1.47	12.08	0.12	2.43	4.87	1.66	0.53	0.52	0.1234692
0.3551	**1.91**	**13.87**	**0.14**	**3.45**	**6.89**	**1.81**	**0.64**	**0.53**	**0.1440036**
0.365	2.05	14.37	0.14	3.77	7.55	1.85	0.67	0.54	0.1499436

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)
0.37	2.12	14.38	0.15	3.99	7.98	1.89	0.70	0.55	0.1556607
0.4556	3.31	14.46	0.23	8.40	16.80	2.54	1.16	0.66	0.2556985
0.4848	3.72	14.49	0.26	10.18	20.37	2.74	1.33	0.69	0.2906669
0.5	3.94	14.51	0.27	11.16	22.33	2.84	1.42	0.71	0.3090234
0.54	4.50	14.55	0.31	13.91	27.82	3.09	1.67	0.74	0.357805
0.5584	4.75	14.56	0.33	15.25	30.50	3.21	1.79	0.76	0.3804643
0.63	5.76	14.64	0.39	20.91	41.83	3.63	2.29	0.81	0.4698487
0.667	6.27	14.67	0.43	24.10	48.21	3.84	2.56	0.83	0.5167338

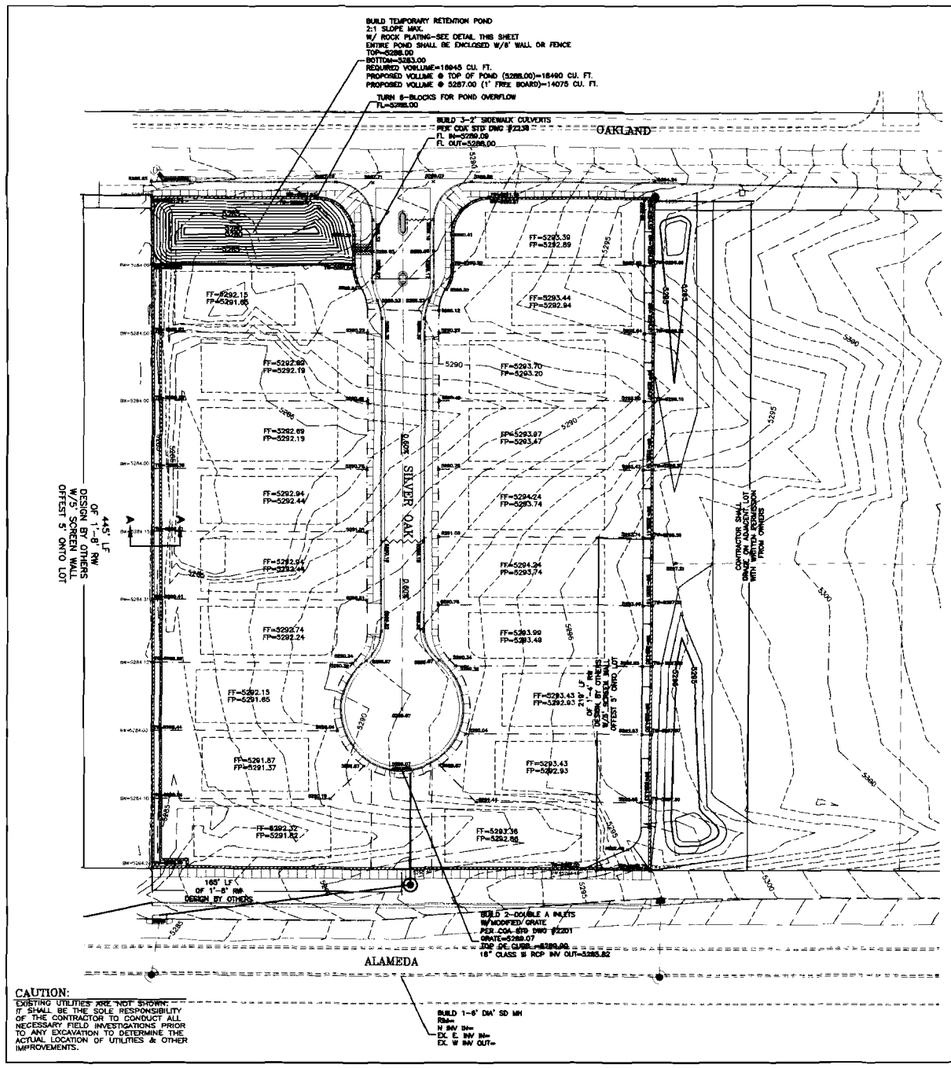
For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

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

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

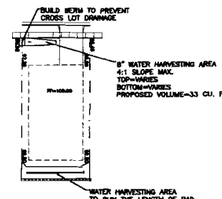
Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	25.44	50.89	3.76	2.63	0.79	0.5090958
0.72	7.09	17.32	0.41	26.43	52.87	3.73	2.69	0.77	0.5071856
0.74	7.43	18.32	0.41	27.55	55.10	3.71	2.74	0.76	0.5069788
0.76	7.79	19.32	0.40	28.79	57.58	3.70	2.81	0.75	0.508251
0.78	8.17	20.32	0.40	30.16	60.31	3.69	2.88	0.74	0.5108175
0.8	8.58	21.32	0.40	31.64	63.29	3.69	2.95	0.73	0.5145251
0.847	9.60	23.68	0.41	35.63	71.26	3.71	3.14	0.71	0.5270333



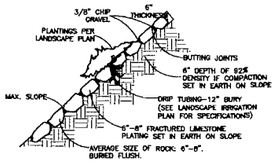
CAUTION:
EXISTING UTILITIES ARE NOT SHOWN. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO ANY EXCAVATION TO DETERMINE THE ACTUAL LOCATION OF UTILITIES & OTHER IMPROVEMENTS.

EROSION CONTROL NOTES:

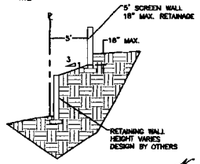
1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINNING WORK.
2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING RUN-OFF ON SITE DURING CONSTRUCTION.
3. CONTRACTOR IS RESPONSIBLE FOR CLEANING ALL SEDIMENT THAT GETS INTO EXISTING RIGHT-OF-WAY.
4. REPAIR OF DAMAGED FACILITIES AND CLEANUP OF SEDIMENT ACCUMULATIONS ON ADJACENT PROPERTIES AND IN PUBLIC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. ALL EXPOSED EARTH SURFACES MUST BE PROTECTED FROM WIND AND WATER EROSION PRIOR TO FINAL ACCEPTANCE OF ANY PROJECT.



TYPICAL WATER HARVETING AREAS
NTS

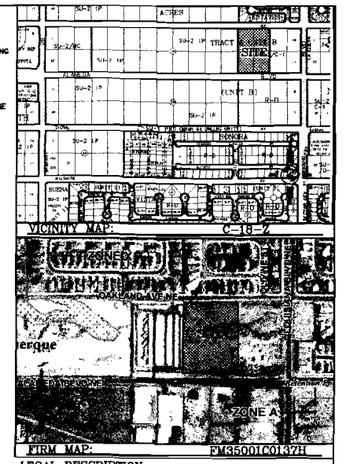


ROCK PLATING DETAIL
NTS



SECTION A-A
NTS

SCALE: 1"=30'



VICINITY MAP: C-16-Z

FIRM MAP: FM35001C0137H

LEGAL DESCRIPTION:
LOTS 13, 14, 19, 20, BLK 28, TR A, UNIT B, NORTH ALBUQUERQUE ACRES

NOTES:
1. ALL SPOT ELEVATIONS REPRESENT FLOWLINE ELEVATION UNLESS OTHERWISE NOTED.

LEGEND

- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- PROPOSED CONTOUR
- PROPOSED INDEX CONTOUR
- 3:1 SLOPE TIE MAX.
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- BOUNDARY
- PROPOSED LOT LINE
- RIGHT-OF-WAY
- PROPOSED CURB AND GUTTER
- EXISTING CURB
- PROPOSED SCREEN WALL
- PROPOSED RETAINING WALL DESIGN BY OTHERS

ENGINEER'S SEAL
DAVID SOULE
NEW MEXICO
10-21-15
DAVID SOULE P.E. #14522

SILVER OAK ESTATES
GRADING AND DRAINAGE PLAN

Rio Grande Engineering
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DRAWN BY: MCWJ
DATE: 10-12-15
SHEET #: 3
JOB #: 21525