

DS #:

4554

APN:

125-09-510-001 to -019

PROJECT:

Coke & Conough Offsite Ransion

SUBMITAL:

1st & Supplement

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: June 12, 2012
TO: Land Development Services Department of Public Works		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	
	Coke & Conough Offsite Revision	
Cross Streets:	NWC of Coke & Maggie	
File Number:	F:\Depot\DSMemos\DS4554.doc	
Parcel Number:	125-09-510-001 to -019	
Zoning Action:		
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X
		COPIES TO: Dwyer Engineering WGP Investment Group Bart Anderson, P.E., DevCo

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal & Supplement	5/8/2012 & 6/4/2012	5/15/2012 & 6/12/2012	See Comments Below	\$400.00	282869: \$400
TOTAL FEES (LDDRS):					----

REMARKS:

The Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

The approval of this drainage update is limited to the revision of the offsite channel (along the north and west boundaries) cross sections and slopes.

In an effort to increase administrative efficiency, the City of Las Vegas Public Works Department requires all soil reports, drainage studies and traffic impact analysis submittals to be accompanied by an electronic copy of the submittal. Electronic documents must be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output replicating your submittal to be used for archival or display purposes. This may be more than one file if necessary. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats, but provided it is a high quality digitized replication of the submittal, other formats may be acceptable. If figures are in color, they must be scanned in color and saved as a separate file. The new submittal requirement is effective on **July 1, 2011**. If there are any questions regarding these new requirements, please contact Albert Sung in the Flood Section at (702) 229-2001 or Rick Schroder in Traffic Engineering at (702) 229-6327.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is

maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see <http://ndep.nv.gov/bwpc/storm01.htm> or call (775) 687-9429.

END OF REMARKS
ays

T/R/S: T19S/R60E/09
AREA G09

Albert Sung

From: Albert Sung
Sent: Wednesday, August 22, 2012 7:47 AM
To: 'Pam Battle'
Cc: 'David Dwyer'; Oh-Sang Kwon
Subject: RE: Coke & Conough: Erosion issue in the channel

Hi Pam,

Thank you for responding to the matter in such a positive manner.

We noticed that erosion also happened on the south edge of the 4'-valley gutter. Can we also place a 2'-wide coverage of d50=3" riprap running along the south edge of the valley gutter.

On my end (Flood Control Section), I only need David to send me a revised plan showing the proposed riprap on both sides of the valley gutter. I'll waive the review fee and once I received the plan from David, I'll approve the plan right the way. If I get the plan today, I'll have it approved in the next hour.

David, you may proceed to Land Development for their plan revision process requirements.

Thank you much again.

Albert Sung, P.E.
Public Works

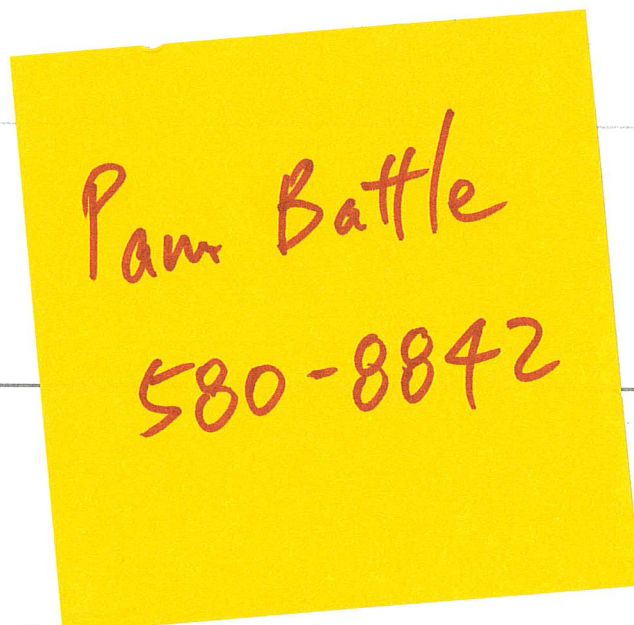
From: Pam Battle [<mailto:pambattle@hotmail.com>]
Sent: Tuesday, August 21, 2012 6:14 PM
To: Albert Sung
Subject: FW: Coke & Conough: Erosion issue in the channel

From: pambattle@hotmail.com
To: ddwyer@dwyerengineering.com
Subject: RE: Coke & Conough: Erosion issue in the channel
Date: Tue, 21 Aug 2012 12:52:20 -0700

Hi Albert,

We will put a 2' wide coverage of 2-3" rip rap running along the north side edge of the 4' valley gutter. This should be more than adequate protection for any subsequent minor erosion that may occur in this area because of not only water, but also the horse activity on the roads edge that we see.

This was the suggestion from Dwyer Engineering and seems to be a reasonable request. Let me know asap if this would be the approved course of action from your department so that I may have our contractor take care of that this thursday so we can meet our timeline for our final walk-through of the off-sites.



I hope as well that in adding this to the grounds that we won't have to do a revision to the civil plans but merely make this improvement as a field adjustment. Please verify as such.

Thank you,
Pam Battle, manager
WGP Investments, LLC

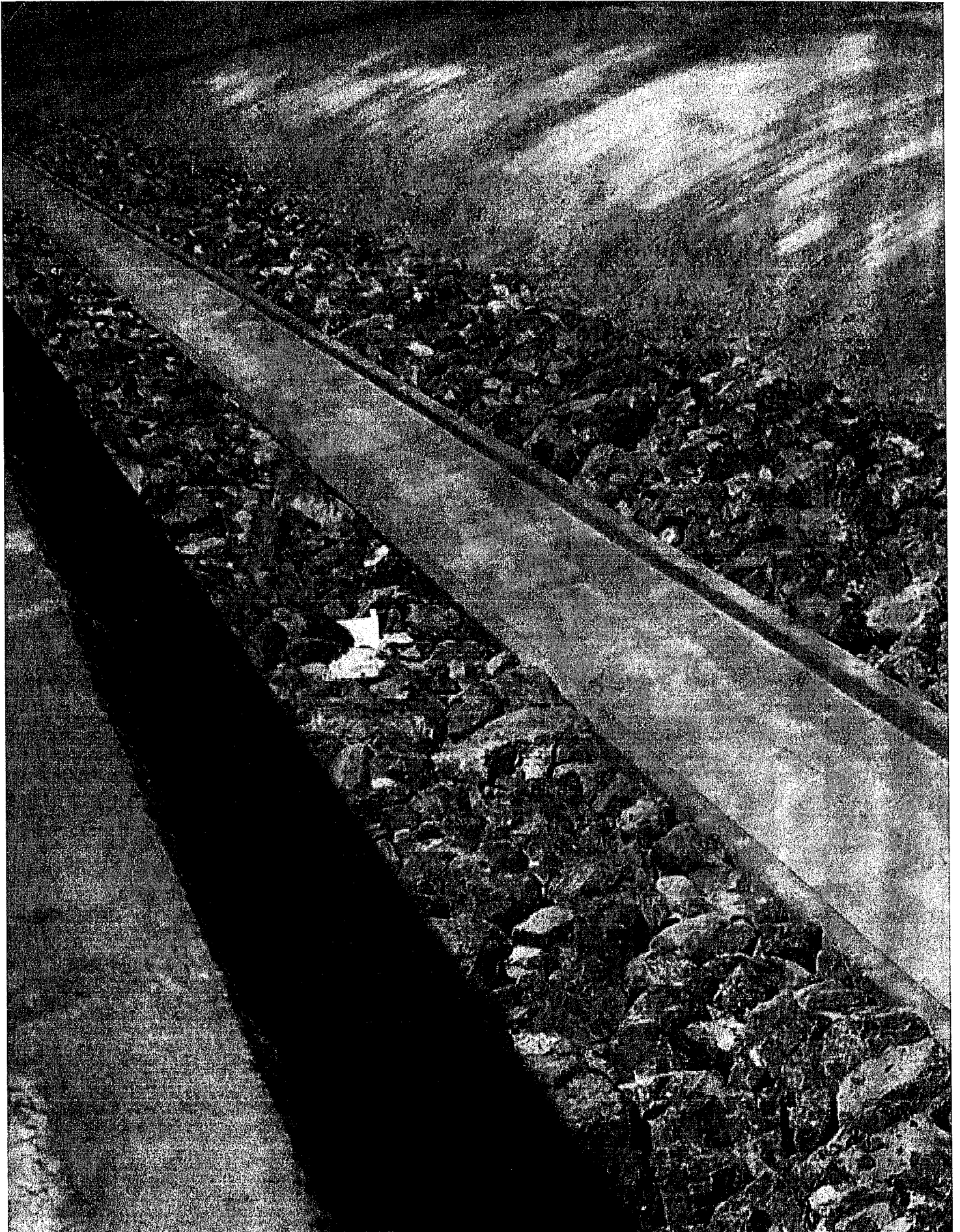
From: ddwyer@dwyerengineering.com
To: pambattle@hotmail.com
Subject: FW: Coke & Conough: Erosion issue in the channel
Date: Tue, 21 Aug 2012 09:22:20 -0700

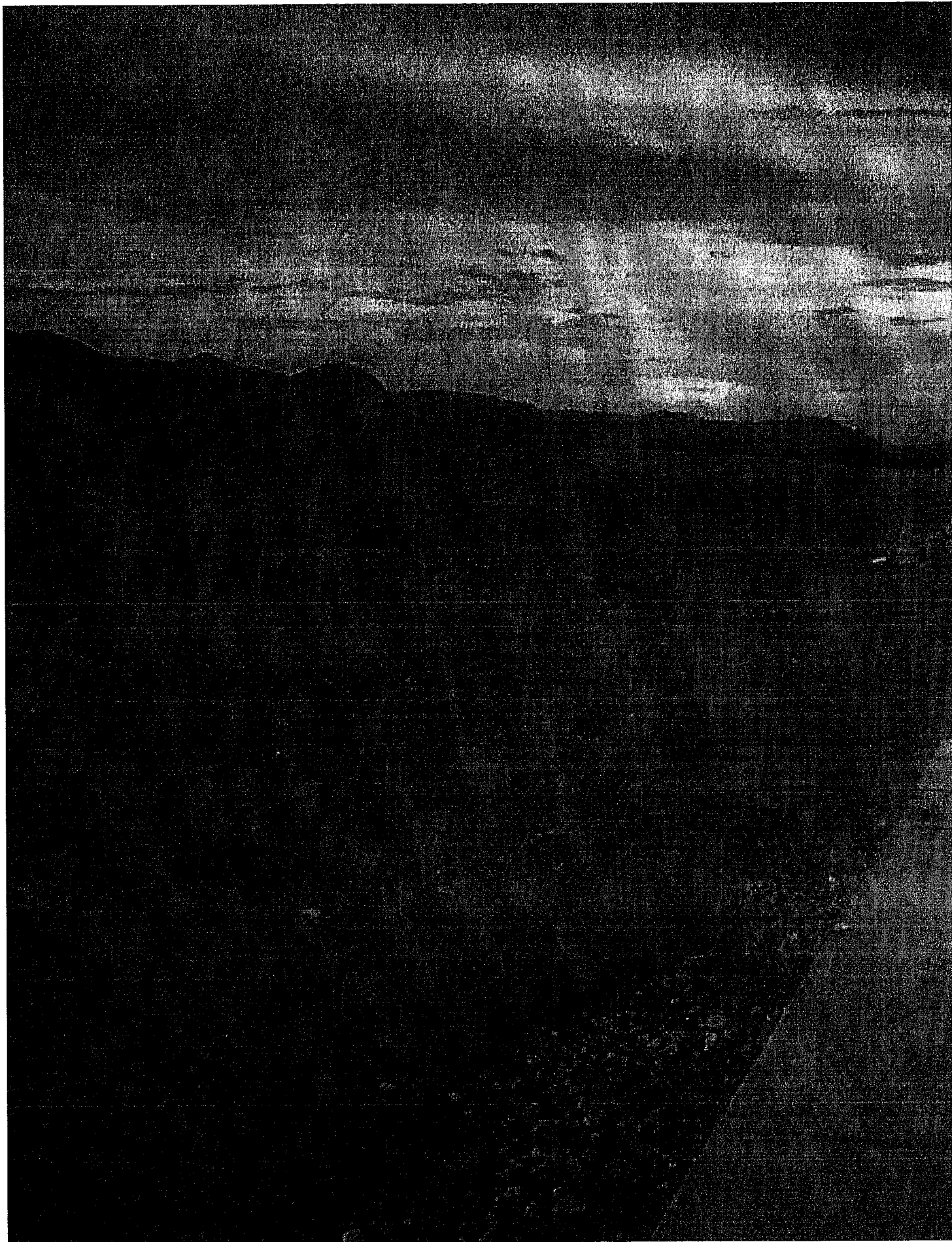
Pam.

Please give me a call to discuss this "problem"

David Dwyer P.E.
Principal
Dwyer Engineering, Inc.
7310 Smoke Ranch Road, Suite E
Las Vegas, NV 89128
702-254-2200 ~~ 702-254-2236
ddwyer@dwyerengineering.com

From: Albert Sung [<mailto:YSung@LasVegasNevada.GOV>]
Sent: Tuesday, August 21, 2012 9:04 AM
To: David Dwyer
Subject: Coke & Conough: Erosion issue in the channel





Hey David,

We got complaint from the HOA of Park Ranch Estates (the neighbor to the east of Coke & Conough) about some erosion in the earth channel to the north. I will call you a bit later to discuss what remedy you can do to fix the problem.

Thank you for your attention.

Albert

Albert Sung

From: Oh-Sang Kwon
Sent: Tuesday, August 21, 2012 8:18 AM
To: Albert Sung
Subject: FW: Park Ranch Estates
Attachments: P1010700.JPG; upstream July 2012.jpg
Expires: Monday, October 29, 2012 12:00 AM

Oh Sang Kwon, P.E.
City of Las Vegas
Department of Public Works
Flood Control Section
333 Rancho Drive, 7th Floor
Las Vegas, NV 89106
Phone: 702-229-1815
Cell: 702-379-9491
Fax: 702-382-8551

From: John S. Ridilla
Sent: Monday, August 20, 2012 4:43 PM
To: Oh-Sang Kwon
Cc: Bart Anderson; Randy Fultz; Greg McDermott
Subject: FW: Park Ranch Estates

Oh-Sang, can you address the question(s) below?

From: Don Turner [<mailto:dmtturner2@cox.net>]
Sent: Monday, August 20, 2012 4:41 PM
To: John S. Ridilla
Subject: RE: Park Ranch Estates

Hi John,

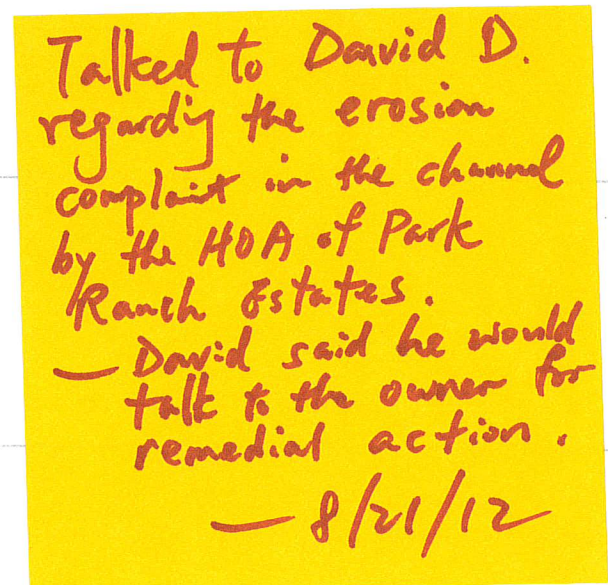
It's a question for your planning/compliance folks I think. The new sub division to our west is draining into the drain behind our houses on Lake Louise Ave. Right now it is a dirt drain and some of the material is being transported downstream due to the rains.

I've been elected (groan) to the Park Ranch HOA and volunteered to find out what standards will the new sub developer be required to build their part of the drain to. We are hoping it will be the same as ours so we don't inherit "upstream" troubles.

I've attached a picture of the concrete bottom, rip rapped drain. The July picture is the upstream concrete the western developer put in to drain from the homes. You can see the material movement.

I assume that the planning/compliance process would determine what is an acceptable drain, and we just need some confirmation that it will be the same so as to not become a problem.

Thanks for your response.



Talked to David D.
regarding the erosion
complaint in the channel
by the HOA of Park
Ranch Estates.
— David said he would
talk to the owner for
remedial action.
— 8/21/12

Ps. We are not concerned about the issues brought up by one of our homeowners.

Best wishes,
Don Turner

From: John S. Ridilla [<mailto:jridilla@LasVegasNevada.GOV>]
Sent: Monday, August 20, 2012 4:15 PM
To: dmturner2@cox.net
Subject: FW: Park Ranch Estates

Hi Don, what can I help you with regarding the drainage to the west?

Thanks,

John S. Ridilla
Deputy City Attorney
City of Las Vegas
Office of the City Attorney
495 S. Main Street, 6th Floor
Las Vegas, NV 89101
Phone 702-229-6629
Fax 702-386-1749
JRidilla@lasvegasnevada.gov

"Well done is better than well said" --Benjamin Franklin

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Please be Green, consider the environment before printing this e-mail

From: Michelle Thackston
Sent: Tuesday, July 31, 2012 7:49 AM
To: John S. Ridilla
Subject: RE: Park Ranch Estates

John,

Don Turner is a city employee and is the HOA presidents for Park Ranch Estates. This is the development that Cheryl Frassa lives in, 7601 Lethbridge Ave. Would you be able to contact Don to discuss the flood channel for the neighborhood located at Maggie/Panda Bear?

Thanks,

Michelle Thackston
Special Assistant
City Councilman Steve Ross, Ward 6
mthackston@lasvegasnevada.gov
(702)229-6154

Our office is closed on Friday's

City Hall is now located at 495 S. Main Street.

From: Tuesday James
Sent: Monday, July 30, 2012 2:34 PM
To: Don Turner
Cc: Michelle Thackston
Subject: RE: Park Ranch Estates

Oh you poor thing, I will do what I can to help you out. Hopefully you don't have too many crazies in your community. Most of the maintenance at our parks is done by our Field Ops staff, however, in this time of budget cuts we also use people who have been required by the courts to do community service, and occasionally inmates guilty of minor offenses.

Let me check with Michelle regarding the development to the west of you. I remember your community abutting Floyd Lamb Park on the west, so please give me cross streets so we know exactly what you are talking about. Michelle does all of the planning and zoning for the Councilman, so she will be a great resource for you.

From: Don Turner [<mailto:dmturner2@cox.net>]
Sent: Thursday, July 26, 2012 5:22 PM
To: Tuesday James
Subject: Park Ranch Estates

Hi Tuesday,

Hope all is going well. In order to help with the Park Ranch Estates issues, the neighbors elected me to the HOA board. Yeahhh...just what I need.

Do have a question.

The Floyd Lamb Park looks like it has some type of grounds maintenance contract as I see people picking up and bagging trash and weeds now and then. Do you know who I could call to find out who over sees that contract or who the contractor is?

I proposed that we consider hiring them to clean out our drainage while they are working on the park since they are there anyways.

Also there is some heart burn about the drainage west of us. Would you know who to contact in the city regarding the development to our west?

Thanks so much Tuesday. I'll bet I'll find out that working for Clark County was more rewarding!!

Best wishes,

Don Turner

Albert Sung

From: JASON RUFF [jruff@dwyerengineering.com]
Sent: Monday, April 23, 2012 12:17 PM
To: Albert Sung
Cc: Peter Jackson; ddwyer@dwyerengineering.com; PAM BATTLE
Subject: Coke and Conough (Site Visit-Re: Drainage study)

Mr. Sung,

This email is to serve as a summary to our on-site visit this morning. Thank you for meeting me out there to discuss the drainage study.

Item #1: Offsite nuisance flows adjacent to the site on the North PL and West PL.

-Visual inspection has determined that there are NO nuisance flows coming toward the subject site from the adjacent property(s). No concrete valley gutters or any concrete drainage facilities will not be needed or required. This will require civil plan revisions to sections U/6, J/6, K/6, and L/6. All said sections show a 4-ft wide u-channel which will not be built.

Item #2: Section M/6.

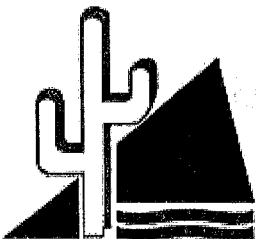
-A 2-ft wide valley gutter is to be built (in lieu of the 4-ft concrete u-channel) in the middle of the section to handle on-site nuisance flows. The 2 ft-wide valley gutter is to transition into a 4 ft-wide valley gutter and the 4 ft-wide valley gutter is to transition into the existing 4 ft-wide U-channel that is located northeast of our project site. Transition details to be provided on the revised civil plans. M/6 will still have riprap as needed for the 100-yr storm. Wrought iron fence is to be built on each end of the channel as shown on the approved civil plans. Mr. Sung said protection bollards are also acceptable (in lieu of the wrought iron fence) on the project street side if so desired by the owner. The owner has indicated that bollards are desired in lieu of the wrought iron fence.

Item #3: North and East PL sections with respect to the 100-yr storm design.

-Drainage calculations will need to be done and incorporated into the drainage study before determining what said sections will be. If it is determined that the 100-yr flows are less than 5 fps (feet per second) then no rip-rap will be needed and the contractor will just have to grade a compacted dirt landscape swale. If the flows are greater than 5 fps then rip-rap will be needed and the riprap size requirements will be determined by the 100-yr flows.

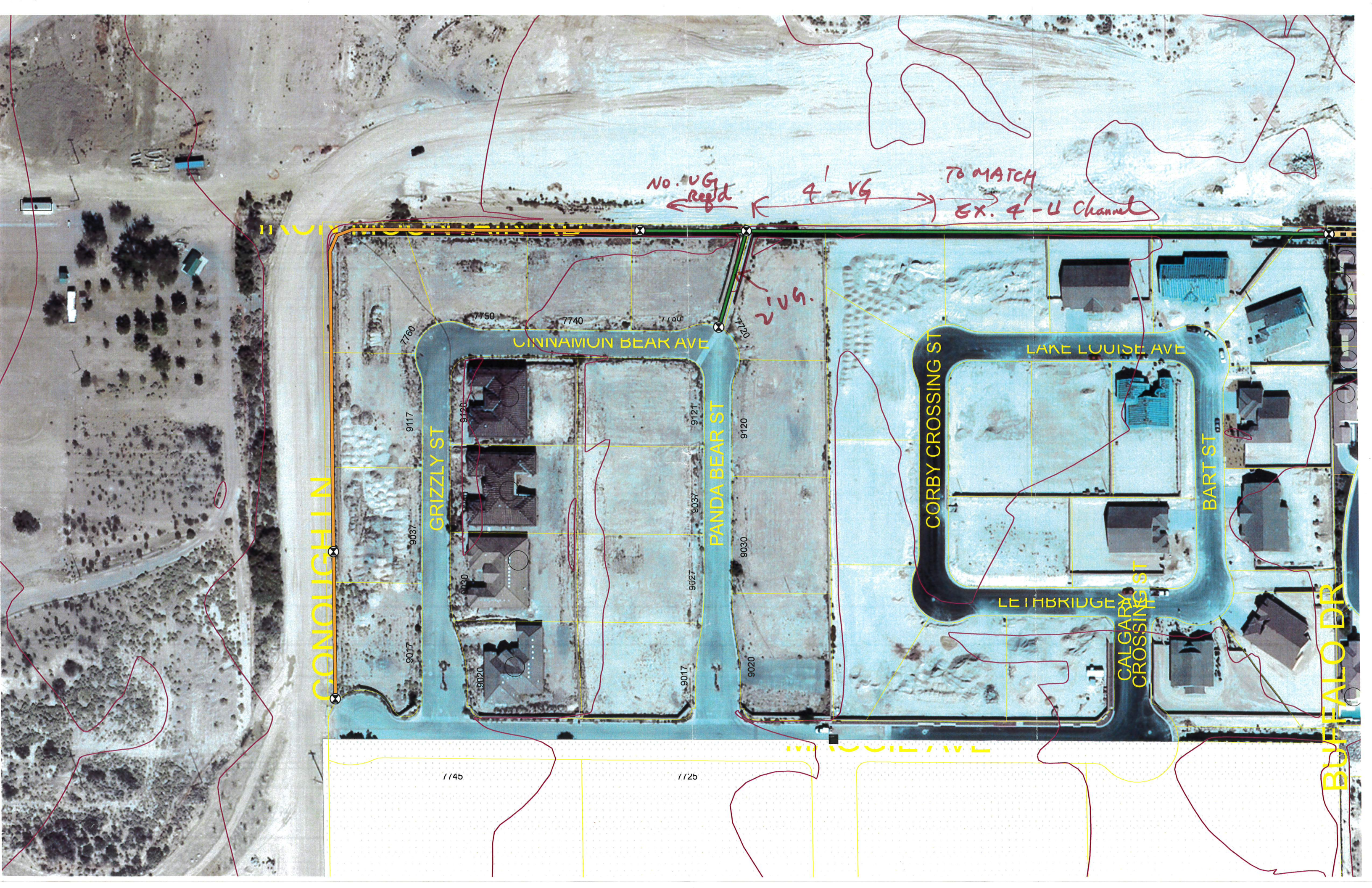
Please let me know if you have any questions/comments.

Thank you,



Jason Ruff, IE
Project Manager

Dwyer Engineering Inc.
7310 Smoke Ranch Road; Suite E
Phone: 702-254-2200
Fax: 702-254-2236
Website: www.dwyerengineering.com



NO. V.G.
Req'd

4' - V.G.

TO MATCH

EX. 4' - U Channel

2' V.G.

CONOLIGHIN

GRIZZLY ST

CINNAMON BEAR AVE

PANDA BEAR ST

CORBY CROSSING ST

LAKE LOUISE AVE

BART ST

LEITHBRIDGE

CALGARY CROSSING ST

BUFFALO DR

7760

7750

7740

7730

7720

9117

9128

9121

9120

9037

9030

9037

9030

9017

9020

9017

9020

7745

7725

Revd: 6/4/12

Dwyer Engineering

DS 4554

Supplement #1 to the Technical Drainage Study for Coke & Conough

G-09
Supp. Info.
N/C

City of Las Vegas, Nevada

Prepared for:

WGP Investment Group
6620 W. Flamingo Road
Las Vegas, NV 89103

Prepared by:

Dwyer Engineering
7310 Smoke Ranch Road, Suite E
Las Vegas, Nevada 89128
Tel: (702) 254-2200
Fax: (702) 254-2236

June 4, 2012

Project No. 12306

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

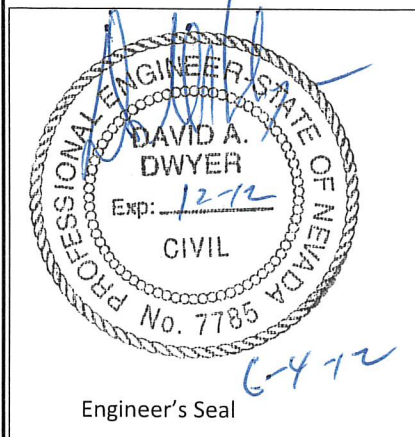
Name of Development: Coke & Conough Date: June 2012
Location of Development: a) Descriptive (Cross Streets) North/South: Coke Street
East/West: Maggie Avenue
b) Section: 9 Township: 19 South Range: 60 East
c) APN : 125-09-510-001 through -019
Name of Owner: WGP Investment Group
Telephone No.: 7025808842 Fax No.: 702-450-3315 E-Mail Address: _____
Address: 6620 W. Flamingo Road, Las Vegas NV 89103

Contact Person-Name: David Dwyer, P.E. Telephone No.: 702-254-2200
* E-Mail Address: ddwyer@dwyerengineering.com Fax No.: 702-254-2236
Firm: Dwyer Engineering
Address: 7310 Smoke Ranch Road, Suite E, Las Vegas NV 89128

Type of Land Development/Land Disturbance Process:

☐ Rezoning	☐ Subdivision Map	☐ Clearing and Grading Only
☐ Parcel Map	☐ Planned Unit Development	☐ Other (Please specify below)
☐ Large Parcel Map	☒ Building Permit	

1. Total Owned Land Area: At Site: 10 +/- acres Being Developed/Disturbed: 10 +/- acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes** ☐ No
4. Proposed type of development (Residential, Commercial, Etc.): Residential
5. Approximate upstream land area which drains to the subject site: 50 acres
6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Technical Drainage Study for Coke & Conough (CLV#3304)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Maggie Avenue and northeast corner of site.
8. Briefly describe your proposed schedule for the subject project: _____



Submit this form as part of the subject property. This is a preliminary study.

*New Required Field
**Review and concurrence

Local Entity File No. _____

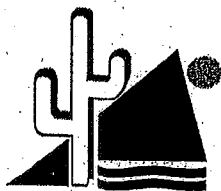
Informed Phil W. to revise the offsite Basin Map to include an offsite basin to the north and revise all pertinent hydraulic calcs. - 5/15/12

Jurisdiction over Conceptual Drainage

Signature is required.
Date _____

REFERENCE:

STANDARD FORM 1



DWYER ENGINEERING, INC

CIVIL ENGINEERS, LAND SURVEYORS, WATER RIGHTS, LAND USE PLANNING

June 4, 2012

Albert Sung, P.E.
City of Las Vegas Flood Control
333 N. Rancho Drive
Las Vegas, Nevada 89106

Re: Supplement #1 to the Technical Drainage Study for Coke & Conough

Mr. Sung:

As discussed, we have further investigated flows impacting the northern boundary. Basins OFF4 and OFF5 have been added and have been delineated based on basins from the Floyd Lamb Park North and South Environmental Enhancement Areas Final Design Report and Clark County 5-foot contours (see revised Figure 2). The following is a summary of the revised flows:

REVISED FLOWS

New Basin	Original Basin Name	Original Basin Size (acres)	Tributary Portion (acres)	Overall Q ₁₀ /Q ₁₀₀ (cfs)	Proportioned Q ₁₀ /Q ₁₀₀ (cfs)
OFF1	NW146E	24	22.9	14/38	13/36
OFF2	NW147	93	29.9	12/67	4/22
OFF3	SDB	136	2.9	22/116	0/2
OFF4	NW146E	24	1.1	14/38	1/2
OFF5	NW147	93	17.7	12/67	2/13

In our original submittal, 43 cfs was conveyed north in the drainage easement along the western boundary and then east in the drainage easement along the northern boundary. The summation of 100-year flows from basins OFF4 and OFF5 (2 cfs and 13 cfs respectively) and onsite flows discharged at the northeast corner of the project (6 cfs) results in a total flow of 64 cfs at the northeast corner of the site. Hydraulic calculation for section 4 has been revised and sections 4A and 4B have been added (see annotated Figure 6 from Orion study for locations). The following table is a summary of the hydraulic calculations:

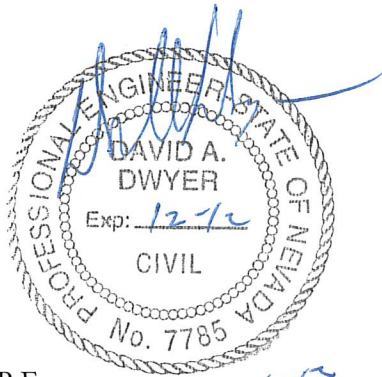
HYDRAULIC CALCULATIONS

SECTION	Q ₁₀ /Q ₁₀₀ (cfs)	D ₁₀ /D ₁₀₀ (ft)	V ₁₀ /V ₁₀₀ (ft/s)	V x D
Maggie Avenue (Section 1)	4/19	0.24/0.42	1.66/2.43	0.40/1.02
20' Drainage Easement (Section 3)	--/15	--/1.20	--/2.98	--/--
20' Drainage Easement (Section 4)	--/58	--/1.85	--/4.86	--/--
20' Drainage Easement (Section 4A)	--/43	--/1.58	--/4.92	--/--
20' Drainage Easement (Section 4B)	--/64	--/1.92	--/4.98	--/--
Maggie Avenue (Section 5)	4/18	0.25/0.33	1.39/2.51	0.35/0.83
20' Drainage Easement Between Lots 7 & 8	1/6	--/0.58	--/3.80	--/--

As a result of the higher flows, the slope was revised in the drainage easement along the northern boundary. The resulting velocities are below 5 ft/s and the easement will not require erosion protection. The plans have been revised and included in the appendix. I trust this satisfies your concerns regarding this project. If there are any questions, or additional information necessary, please contact this office.

Sincerely,

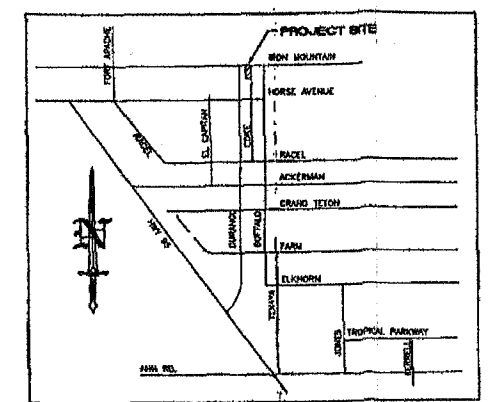
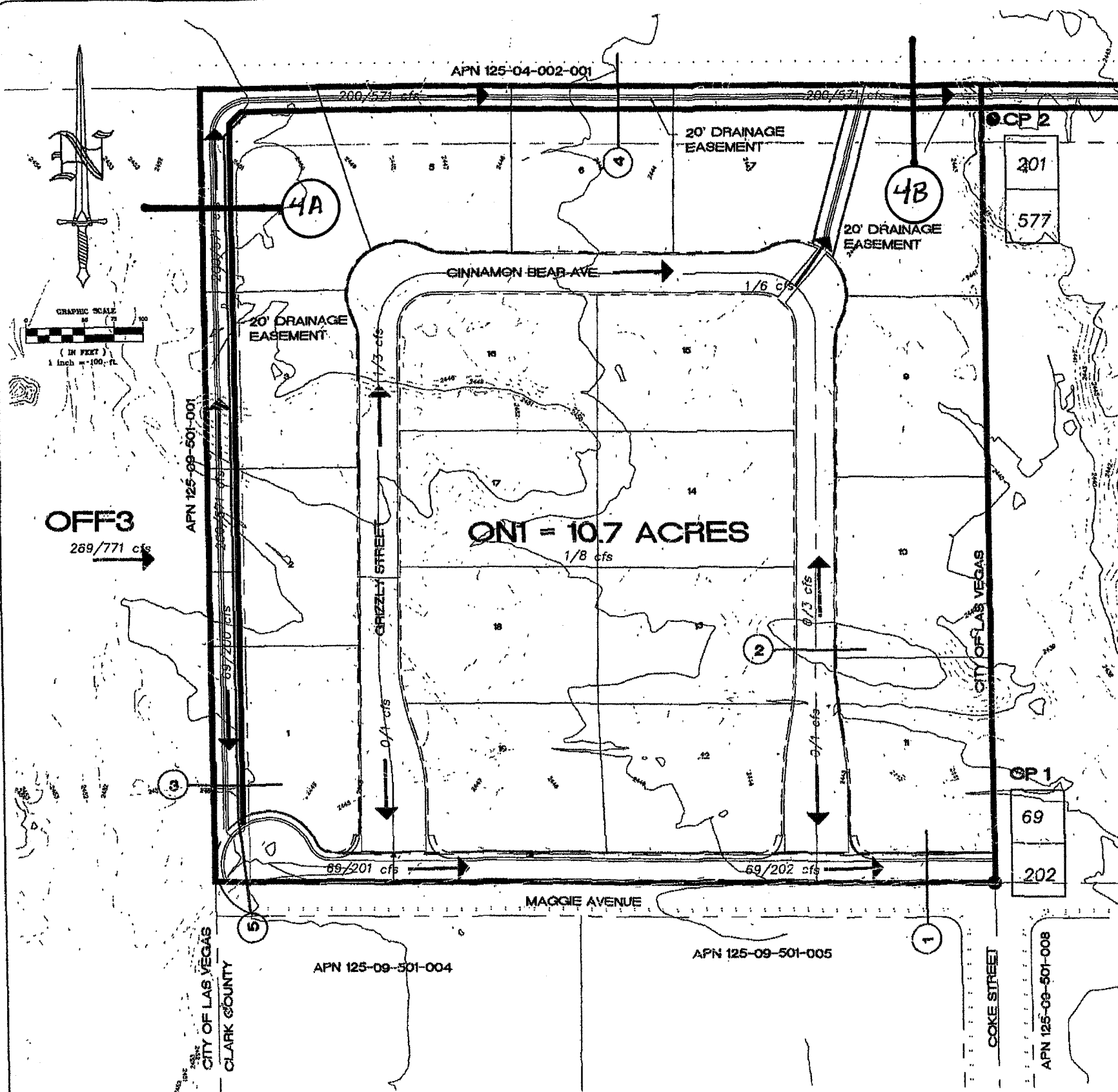
Dwyer Engineering



David Dwyer, P.E.
Principal

APPENDIX

Revised Figures



LEGEND

- EX. 1
Q10/Q100
- CP
10
100
- 10 YR/100 YR FLOW (cfs)
- CONCENTRATION POINT
10-YR. FLOW FOR CONCENTRATION PT.
100-YR. FLOW FOR CONCENTRATION PT.
- EXISTING CONTOUR (1')
EXISTING CONTOUR (5')
- BASIN BOUNDARY
FLOW DIRECTION
- CROSS-SECTION USED FOR FLOW ANALYSIS

STREET PARAMETERS

X-SECTION	D (cfs)	v (ft)	(ft/s)	(d/v)
CS-1 (MAGGIE AVE)				
10-YR.	89	0.63	3.81	2.40
100-YR.	202	0.97	5.77	5.60
CS-2 (PANDA BEAR ST)				
10-YR.	1	0.20	1.49	0.30
100-YR.	8	0.34	2.58	0.88
CS-3 (WEST CHANNEL)				
10-YR.	69	2.27	3.87	N/A
100-YR.	200	3.42	5.37	N/A
CS-4 (NORTH CHANNEL)				
10-YR.	200	3.23	6.13	N/A
100-YR.	571	5.30	8.02	N/A
CS-5 (MAGGIE AVE)				
10-YR.	69	0.51	4.24	2.16
100-YR.	201	0.78	6.22	4.85

BASIN SUMMARY

BASIN	AREA (Acres)	Q10 (CFS)	Q100 (CFS)
QN1	10.7	1	8
OFF3	---	289	771

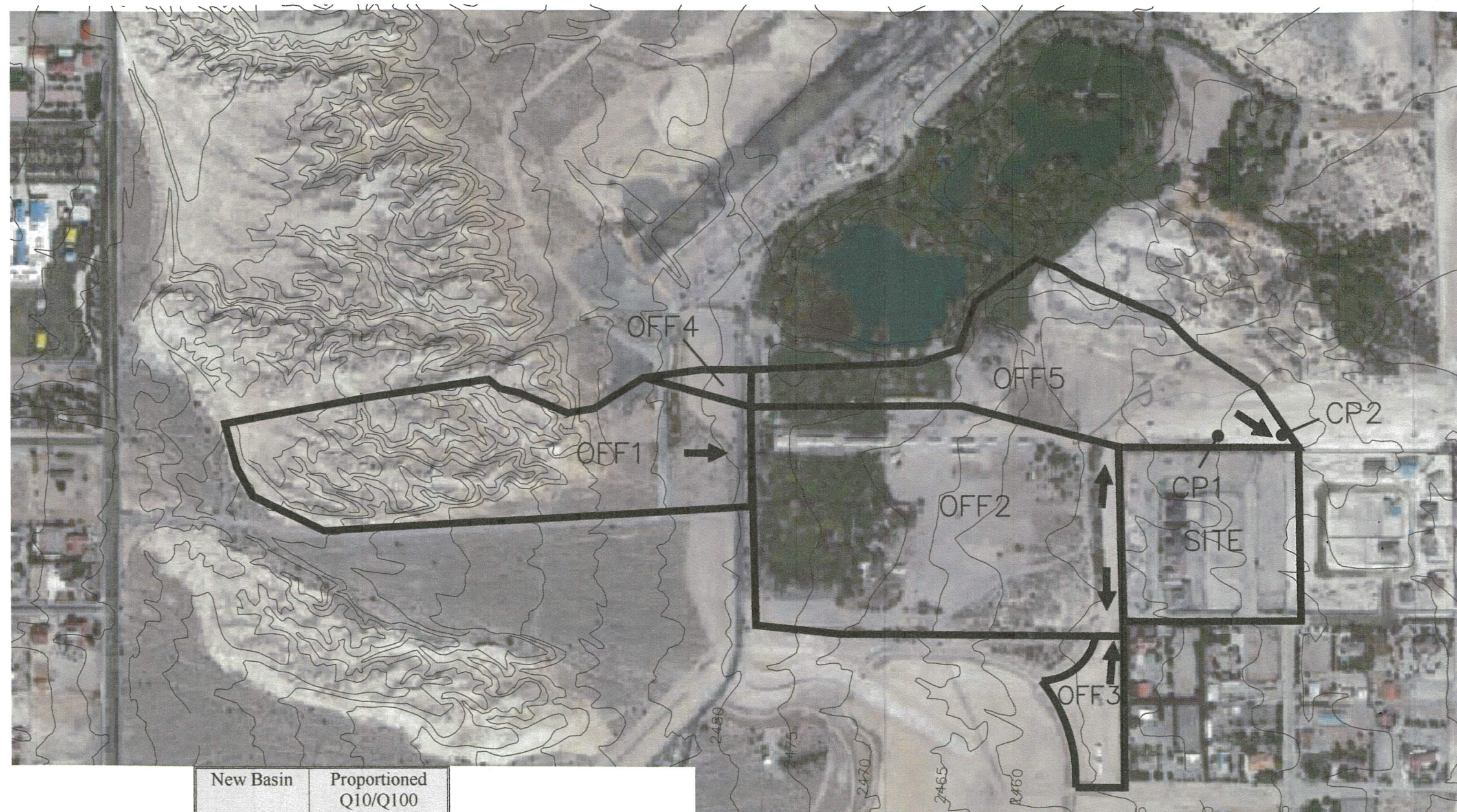
DESIGNED BY: ADB
 DRAWN BY: ADB
 CHECKED BY: JMK
 DATE: 3/17/03
 JOB NUMBER: 128-0201

PROPOSED CONDITION
 COKE AND CONOUGH

BUILDING THE AMERICAN
 DREAM CORPORATION

ORION ENGINEERING AND SURVEYING, INC.
 3068 E. SUNSET ROAD, SUITE 9
 LAS VEGAS, NEVADA, 89120
 (702) 739-5921 FAX (702) 739-5929

FIGURE 6



New Basin	Proportioned Q10/Q100 (cfs)
OFF1	13/36
OFF2	4/22
OFF3	0/2
OFF4	1/2
OFF5	2/13
CP1	--/58
CP2	--/64

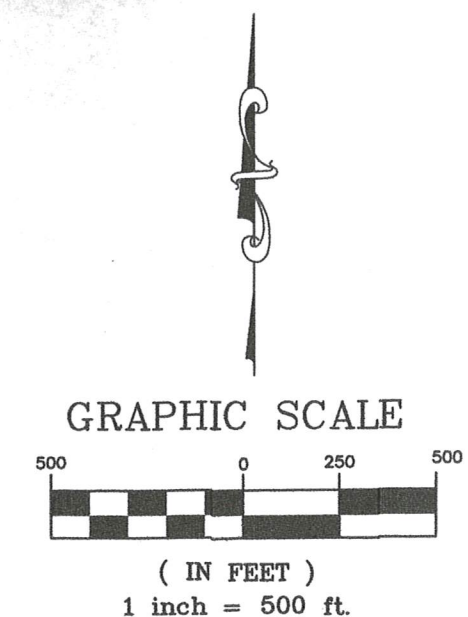


FIGURE 2

OFFSITE BASIN MAP

DWYER **E**NGINEERING
 7310 SMOKE RANCH RD. SUITE E
 LAS VEGAS, NV 89128
 (702) 254-2200 FAX:(702) 254-2236

Revised Calculations

Worksheet for Sup1 Revised CS-4: 20' Drainage Easement

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00790 ft/ft
Discharge 58.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2.00
0+10.00	0.00
0+19.00	4.50
0+20.00	4.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2.00)	(0+20.00, 4.50)	0.025

Results

Normal Depth 1.85 ft
Elevation Range 0.00 to 4.50 ft
Flow Area 11.94 ft²
Wetted Perimeter 13.55 ft
Top Width 12.93 ft
Normal Depth 1.85 ft
Critical Depth 1.76 ft
Critical Slope 0.01011 ft/ft
Velocity 4.86 ft/s
Velocity Head 0.37 ft
Specific Energy 2.21 ft
Froude Number 0.89
Flow Type Subcritical

Worksheet for Sup1 Revised CS-4: 20' Drainage Easement

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.85	ft
Critical Depth	1.76	ft
Channel Slope	0.00790	ft/ft
Critical Slope	0.01011	ft/ft

Cross Section for Sup1 Revised CS-4: 20' Drainage Easement

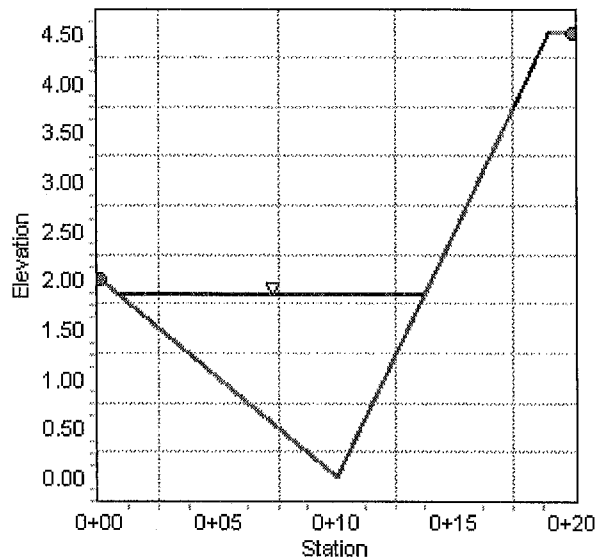
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00790 ft/ft
Normal Depth 1.85 ft
Discharge 58.00 ft³/s

Cross Section Image



Worksheet for Sup1 Revised CS-4A: 20' Drainage Easement

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Discharge 43.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2.00
0+10.00	0.00
0+19.00	4.50
0+20.00	4.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2.00)	(0+20.00, 4.50)	0.025

Results

Normal Depth 1.58 ft
Elevation Range 0.00 to 4.50 ft
Flow Area 8.74 ft²
Wetted Perimeter 11.59 ft
Top Width 11.06 ft
Normal Depth 1.58 ft
Critical Depth 1.56 ft
Critical Slope 0.01052 ft/ft
Velocity 4.92 ft/s
Velocity Head 0.38 ft
Specific Energy 1.96 ft
Froude Number 0.98
Flow Type Subcritical

Worksheet for Sup1 Revised CS-4A: 20' Drainage Easement

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.58	ft
Critical Depth	1.56	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.01052	ft/ft

Cross Section for Sup1 Revised CS-4A: 20' Drainage Easement

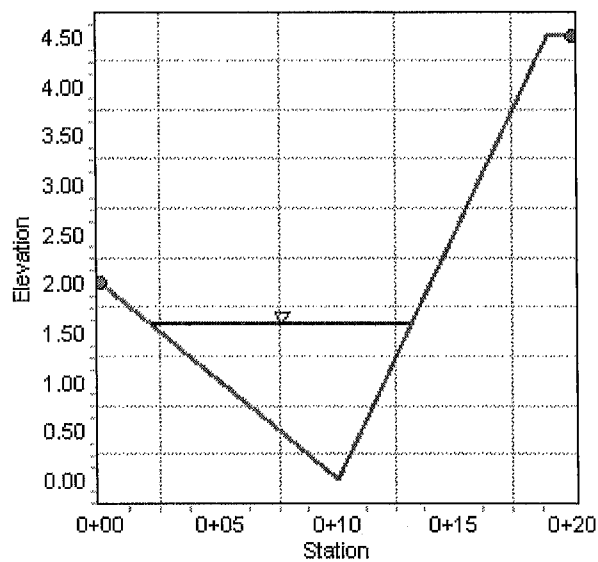
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope	0.01000	ft/ft
Normal Depth	1.58	ft
Discharge	43.00	ft ³ /s

Cross Section Image



Worksheet for Sup1 Revised CS-4B: 20' Drainage Easement

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00790 ft/ft
Discharge 64.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2.00
0+10.00	0.00
0+19.00	4.50
0+20.00	4.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2.00)	(0+20.00, 4.50)	0.025

Results

Normal Depth 1.92 ft
Elevation Range 0.00 to 4.50 ft
Flow Area 12.86 ft²
Wetted Perimeter 14.06 ft
Top Width 13.42 ft
Normal Depth 1.92 ft
Critical Depth 1.83 ft
Critical Slope 0.00998 ft/ft
Velocity 4.98 ft/s
Velocity Head 0.38 ft
Specific Energy 2.30 ft
Froude Number 0.90
Flow Type Subcritical

Worksheet for Sup1 Revised CS-4B: 20' Drainage Easement

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.92	ft
Critical Depth	1.83	ft
Channel Slope	0.00790	ft/ft
Critical Slope	0.00998	ft/ft

Cross Section for Sup1 Revised CS-4B: 20' Drainage Easement

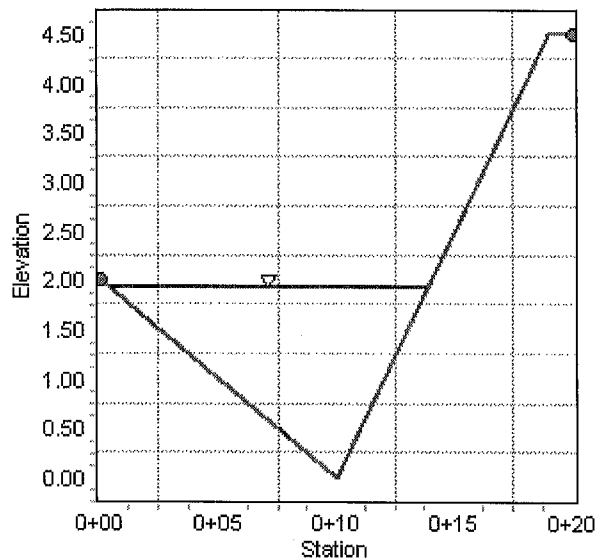
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00790 ft/ft
Normal Depth 1.92 ft
Discharge 64.00 ft³/s

Cross Section Image



Revised Plans

Dwyer Engineering

Technical Drainage Study for Coke & Conough

City of Las Vegas, Nevada

Prepared for:

WGP Investment Group
6620 W. Flamingo Road
Las Vegas, NV 89103

Prepared by:

Dwyer Engineering
7310 Smoke Ranch Road, Suite E
Las Vegas, Nevada 89128
Tel: (702) 254-2200
Fax: (702) 254-2236

May 4, 2012

Project No. 12306

Revised: 5/8/12

DS 4554

G-09

\$400

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Coke & Conough Date: May 2012
Location of Development: a) Descriptive (Cross Streets) North/South: Coke Street
East/West: Maggie Avenue
b) Section: 9 Township: 19South Range: 60 East
c) APN : 125-09-510-001 through -019

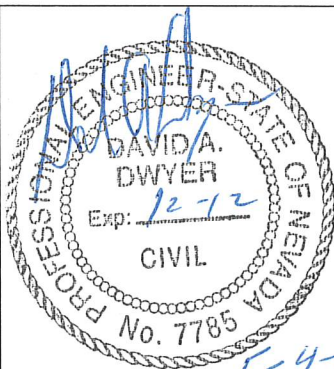
Name of Owner: WGP Investment Group
Telephone No.: 702-580-8842 Fax No.: 702-450-3315 E-Mail Address: _____
Address: 6620 W. Flamingo Road, Las Vegas NV 89103

Contact Person-Name: David Dwyer, P.E. Telephone No.: 702-254-2200
* E-Mail Address: ddwyer@dwyerengineering.com Fax No.: 702-254-2236
Firm: Dwyer Engineering
Address: 7310 Smoke Ranch Road, Suite E, Las Vegas NV 89128

Type of Land Development/Land Disturbance Process:

☐ Rezoning	☐ Subdivision Map	☐ Clearing and Grading Only
☐ Parcel Map	☐ Planned Unit Development	☐ Other (Please specify below)
☐ Large Parcel Map	☒ Building Permit	

1. Total Owned Land Area: At Site: 10 +/- acres Being Developed/Disturbed: 10 +/- acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes** ☐ No
4. Proposed type of development (Residential, Commercial, Etc.): Residential
5. Approximate upstream land area which drains to the subject site: 50 acres
6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Technical Drainage Study for Coke & Conough (CLV#3304)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Maggie Avenue and northeast corner of site.
8. Briefly describe your proposed schedule for the subject project: As soon as possible



Engineer's Seal

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

*New Required Field

**Review and concurrence of the Clark County Regional Flood Control District is required.

Revision	Date

Local Entity File No. _____

REFERENCE:

STANDARD FORM 1

May 4, 2012

Peter Jackson, P.E.
City of Las Vegas Flood Control
333 N. Rancho Drive
Las Vegas, Nevada 89106

Re: Technical Drainage Study for Coke & Conough

Mr. Jackson:

Dwyer Engineering is submitting this study to address the changes to the offsite conditions for the project at Coke & Conough. The project was originally submitted by Orion Engineering and was approved by the City of Las Vegas, Clark County, and Clark County Regional Flood Control District (see appendix). Offsite conditions and flows have subsequently been reduced by the completed improvements as discussed in the Floyd Lamb Park North and South Environmental Enhancement Areas Final Design Report.

The originally approved Technical Drainage Study for Coke & Conough utilized flows determined in the City of Las Vegas Northwest Neighborhood Study. The flows impacted the western boundary of the project and were quantified as 269 cfs and 771 cfs in the 10-year and 100-year conditions, respectively (see TDS for Coke & Conough Figure 6 in the appendix). The flows were conveyed around the project in proposed riprap-lined drainage easements. The current offsite basins impacting the western boundary of the site are a portion of basins NW146E and NW147 as shown in the Floyd Lamb Park North and South Environmental Enhancement Areas Final Design Report (see reference material in the appendix). An additional basin impacts Maggie Lane and is a portion of basin SDB. The basins have been field verified and are acceptable for use in this study with the addition of being further delineated as directly impacting the site. The tributary areas labeled as OFF1, OFF2, and OFF3 have been outlined on the basin map of the Floyd Lamb Park North and South Environmental Enhancement Areas Final Design Report and also an aerial map (see Figures 1 and 2 in the appendix). The basins are only a portion of the previous overall basins as outlined below:

REVISED FLOWS

New Basin	Original Basin Name	Original Basin Size (acres)	Tributary Portion (acres)	Overall Q10/Q100 (cfs)	Proportioned Q10/Q100 (cfs)
OFF1	NW146E	24	22.9	14/38	13/36
OFF2	NW147	93	29.9	12/67	4/22
OFF3	SDB	136	2.9	22/116	0/2

The total flows impacting the western boundary is a summation of basins OFF1 and OFF2. Summation of the two basins yields 17 cfs and 58 cfs in the 10-year and 100-year condition, respectively. It was determined in the approved Technical Drainage Study for Coke & Conough that the original 771 cfs would be split north and south and conveyed around the site. In the approved study, 571 cfs (74%) is conveyed north and east around the northern boundary and 200 cfs (26%) is conveyed south and east along Maggie Avenue. The project proposes the same drainage pattern. Since the flow has been reduced and applying the same flowsplit rates, 43 cfs (74%) is conveyed north and east around the northern

boundary and 15 cfs (26%) is conveyed south and east along Maggie Avenue. A total flow in Maggie Avenue also includes flows from basin OFF3 and onsite basins generating 1 cfs in the 100-year condition discharging from Grizzly Street and Panda Bear Street (see TDS for Coke & Conough Figure 6 in the appendix). The cumulative flow is 4 cfs and 19 cfs at Coke Street and Maggie Avenue in the 10-year condition and 100-year condition, respectively.

The hydraulic calculations for the drainage easements along the northern and western portions of the site have been revised and included in the appendix. The street calculation for Maggie Avenue has also been revised and included in the appendix. The following is a summary of the calculations:

HYDRAULIC CALCULATIONS

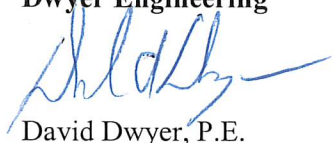
SECTION	Q ₁₀ /Q ₁₀₀ (cfs)	D ₁₀ /D ₁₀₀ (ft)	V ₁₀ /V ₁₀₀ (ft/s)	V x D
Maggie Avenue (Section 1)	4/19	0.24/0.42	1.66/2.43	0.40/1.02
20' Drainage Easement (Section 3)	--/15	--/1.20	--/2.98	--/--
20' Drainage Easement (Section 4)	--/43	--/1.61	--/4.73	--/--
Maggie Avenue (Section 5)	4/18	0.25/0.33	1.39/2.51	0.35/0.83
20' Drainage Easement Between Lots 7 & 8	1/6	--/0.58	--/3.80	--/--

The street calculations for Maggie Avenue show that the *CCRFCD Hydrologic Criteria & Drainage Design Manual* velocity/depth products criteria are met in the future. The velocity/depth products are below 6 and 8 for the 10- and 100-year storms, respectively. A majority of the drainage easement around the northern and western perimeter of the site has been revised to remove the riprap and the concrete valley gutter based on flows being considered non-erosive (less than 5 ft/s). Specifically the valley gutter and riprap along the west property line has been removed and the valley gutter and riprap along the north property line west of the onsite drainage easement at the northeast portion of the site has been removed. The onsite drainage easement at the northeast portion of the site will be changed to a proposed 2-foot valley gutter. The valley gutter will extend through the onsite drainage easement and will continue east to the existing 4-foot flume east of the site. The valley gutter is widened to 4 feet and connects to the existing 4-foot flume east of the site. No riprap is required along this reach.

The plans have been revised and included in the appendix. I trust this satisfies your concerns regarding this project. If there are any questions, or additional information necessary, please contact this office.

Sincerely,

Dwyer Engineering



David Dwyer, P.E.
Principal

APPENDIX

Approval Letters

128.0201
 DATE: AUG 08 REC'D
 August 5, 2003

CITY OF LAS VEGAS				DATE: AUG 08 REC'D	
INTER-OFFICE MEMORANDUM				August 5, 2003	
TO: Land Development Services Department of Public Works				FROM: Albert J. Jankowiak, P.E. Flood Control Civil Engineer Department of Public Works	
SUBJECT: Drainage Study for: Coke and Conough				COPIES TO:	
Cross Streets: Iron Mountain Road & Conough Lane		Bart Anderson, P.E., DEVCO			
FILE NO.: F:\Depot\DSMemo\DS3304C.doc		Matrix Construction Consulting			
Parcel Number: 125-09-501-002		Orion Engineering			
Zoning Action:		CCRFC			
FEMA Flood Zone		YES	No	X	
Proposed Storm Drain		YES	X	No	CC Community Development
HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. #
1 st Submittal	3/28/2003	4/09/2003	Not Accepted	\$250.00	101547:\$250
2 nd Submittal	5/19/2003	5/30/2003	See Comments Below	\$250.00	104503 \$250
3 rd Submittal	7/21/2003	8/05/2003	See Comments Below	\$250.00	108047 \$250
TOTAL FEES (LDDRS):				\$750.00	

REMARKS:

The Drainage Study for the subject project has been reviewed and:

	is approved subject to conformance to all City standards and the following conditions.
	must be resubmitted or supplemented including the following:
X	must have Clark County Regional Flood Control District concurrence
X	must have Clark County Department of Development Services concurrence

1. This drainage study is acceptable in concept, however, the City of Las Vegas will not formally accept the study until the Clark County Regional Flood Control District (CCRFC) has issued a letter of concurrence. The Engineer should contact the CCRFC to confirm that they have begun their review.
2. The site is adjacent to Clark County jurisdiction and therefore requires County concurrence prior to final acceptance of the drainage study.
3. In the future, the flow contained in the 20-foot channel within the Iron Mountain Road alignment will be conveyed within a regional drainage facility and there will be no need for the channel. The engineer must coordinate the grading of the channel with Clark County Community Development.
4. The engineer must submit the floodwalls for structural review to the City of Las Vegas Building Department. No permits will be issued for the project until the Building Department has approved the design and structural details for the walls are included on the plans.
5. This drainage study assumes that the project will be constructed in one phase. If improvement plans are submitted to break the project into separate phases, a drainage study update will be required for each phase addressing the interim condition.
6. All drainage easements must be "Public Drainage Easement to be privately maintained by the Homeowners Association" and must be recorded as such on the final map.

7. *The engineer has provided a table on the grading plans that shows a quantity estimate of all on-site and off-site flood control improvements such as solid grouted stem wall, drainage easements, protection berm, riprap, etc. All drainage improvements must be bonded and inspected.*

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the City of Las Vegas Flood Control Section. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the City of Las Vegas reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

END OF REMARKS

gam/ajj

T/R/S: 19/60/09

AREA G-9

C L A R K C O U N T Y
REGIONAL FLOOD CONTROL DISTRICT



Gale Wm. Fraser, II, P.E.
General Manager/Chief
Engineer

BOARD OF DIRECTORS

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City of Las Vegas

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City of Las Vegas

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City of Mesquite

Bruce L. Woodbury
Clark County

September 8, 2003

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. Fourth St
Las Vegas, NV 89101

DISTRICT CONCURRENCE: COKE AND CONOUGH (DS3304) (RFCD NO. 03-5343)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated March 20, 2003, Addendum No. 1 dated May 16, 2003 and Addendum No. 2 dated July 17, 2003, for the above-mentioned project as submitted by Orion Engineering and Surveying, Inc. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated August 5, 2003.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Public Works.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by Orion Engineering and Surveying, Inc. may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

GALE WM. FRASER, II, P.E.
General Manager/Chief Engineer

BY:

Andrew R. Trelease, P.E.
Senior Civil Engineer

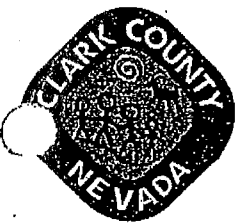
ART:css

c: Jae M. Kim, P. E., Orion Engineering and Surveying, Inc.

File: 19-60-9.ORI

SEP 09 REC'D

Client
File



Department of Development Services

Civil Engineering Division

500 S Grand Central Pky 1st Fl • PO Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550

Phil Rosenquist, Director • Carla J. Pearson, Assistant Director

cc: *Angela*
Dean
Matt
Erik
Kevin
Main
Processing

October 16, 2003

Orion Engineering and Surveying, Inc.
3068 East Sunset, Suite 9
Las Vegas, Nevada 89120

CLARK COUNTY Review for Coke and Conough

Study Dated: March 20, 2003

Addendum # 1 Dated: May 16, 2003

Addendum # 2 Dated: July 18, 2003

Addendum # 3 Dated: October 2, 2003

Location: Northwest corner of Maggie Avenue and Coke Street

SEC. 9, T. 19 S., R. 60 E.

H.T.E. # 03-16381

The above-referenced project is located in the City of Las Vegas adjacent to Clark County. The drainage study was submitted to the County for concurrence. The County has reviewed the submittal, addendum #1, addendum #2, and addendum #3. In addition, the County has received a copy of the Inter-Office Memo from the City of Las Vegas, dated August 5, 2003.

The County concurs with the acceptance of this drainage study by the City of Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas. As set forth in the subject drainage study, the following measures will be taken to mitigate flood hazards.

1. The site shall be graded with respect to drainage as shown on "Coke and Conough Grading Plan," Sheets 15 of 4 and 15 of 3, signed and sealed by Dean S. Rasmuson, P.E., on October 2, 2003;
2. The following drainage facilities shall be constructed as shown on the above-mentioned grading plan:
 - a. A 20-ft wide channel contained within a 32-ft wide drainage easement to be publicly maintained as shown on sheet 15 of 4 and details P/3 and R/3 of sheet 15 of 3. The easement starts at the northeast corner of the site and continues east to the Buffalo Drive ROW. The channel contains a 4-ft wide concrete flume and rip rap lined sideslopes (2:1 maximum slope).

RipRap d50 = 6"
Thickness = 12"

- b. A 20-ft x 20-ft rip rap pad at the outlet of the channel
RipRap d50 = 6"
Thickness = 12"
 - c. Two (2) sections of retaining wall on the north side of the channel one is 110-ft long and one section is 120-ft long
- 3. A bond estimate must be submitted to Clark County Civil Engineering Division for the above-mentioned stormwater management facilities;
- 4. Section 2 of the Clark County Building Office Operations Division Drainage Compliance Report must be completed by the engineer for the facilities listed in Item 2 above;
- 5. There is no apparent paved legal access to the site. If the City of Las Vegas requires paved legal access as a part of the development then any proposed improvements within the Clark County ROW will need to be submitted to Clark County Civil Engineering Division Plan Check for approval;
- 6. The subject site is located within Zone X, as shown on FIRM Community Panel Number 32003C 1734E, revised September 27, 2002. Zone X is determined to be outside the 0.2% annual chance flood plain;
- 7. Clark County Regional Flood Control District (CCRFCD) concurrence is required since the proposed channel affects MPU facility MSIM 0000. As a condition of final approval, the applicant must submit a copy of the drainage study and any addenda to the CCRFCD. Permits will not be issued until concurrence is obtained from the CCRFCD;
- 8. Mylars of the grading plan must be submitted to the Clark County Civil Engineering Division Plan Check for approval signatures prior to permit issuance;
- 9. Right-of-way dedication must be verified;
- 10. A legal description of the drainage easement, for the channel east of the site to Buffalo Drive, must be provided to Clark County Development Services Civil Engineering Division for review;
- 11. The following items must be addressed on the grading plans:
 - a. Revise the easement width callout on sheet 15 of 4 to 32-ft to include the access road and match the details on sheet 15 of 3

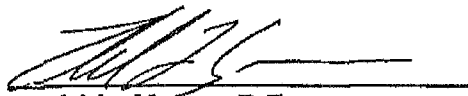
Coke and Conough
October 16, 2003
Page 3 of 3

- b. Move the Rip Rap Pad at the end of the channel back into the channel and out of the Buffalo Drive ROW
- c. Increase the pavement width shown on the plan and section A/3 to conform with USDCCA 208.1

No liability is assumed by the County for information, data, and conclusions of the consulting engineer.

DEPARTMENT OF DEVELOPMENT SERVICES

By


Todd L. Myers, P.E.
Senior Engineer
Civil Engineering Division

TLM/wlw

cc: Albert Sung, P.E.
City of Las Vegas Department of Public Works

Technical Drainage Study
for Coke & Conough
(prepared by Orion Engineering)

CS-1: MAGGIE AVE. (100 YR) **Worksheet for Irregular Channel**

Project Description	
Worksheet	CS-1: MAGGIE AVE (100 YR): UPDATE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.010000 ft/ft
Discharge	202.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.020
Water Surface Elevation	0.97 ft
Elevation Range	0.00 to 0.51
Flow Area	35.0 ft²
Wetted Perimeter	51.95 ft
Top Width	50.00 ft
Actual Depth	0.97 ft
Critical Elevation	1.07 ft
Critical Slope	0.008516 ft/ft
Velocity	5.77 ft/s
Velocity Head	0.52 ft
Specific Energy	1.49 ft
Froude Number	1.22
Flow Type	Supercritical

Calculation Messages:
 Water elevation exceeds lowest end station by 0.96972631 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+01.5	0.013
0+01.5	0+18.8	0.017
0+18.8	0+20.8	0.035
0+20.8	0+50.0	0.022

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.0	0.00
0+01.5	0.13
0+18.8	0.51
0+20.8	0.47
0+50.0	0.00

CS-1: MAGGIE AVE. (100 YR)
Worksheet for Irregular Channel

Notes: DV PRODUCT 5.60 < 8.00 OK
DEPTH OF FLOW 0.97 < 2.00 OK

Title: untitled

m:\project\128\0201\drainage\fmw\0201-fmw.fm2

01/17/05 09:27:25 AM © Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Orion Engineering

Project Engineer: Orion Engineering

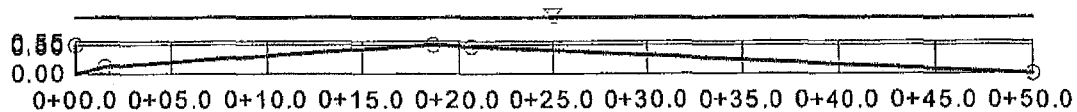
FlowMaster v7.0 [7.0005]

Page 2 of 2

CS-1: MAGGIE AVENUE (100 YR) **Cross Section for Irregular Channel**

Project Description	
Worksheet	CS-1: MAGGIE AVE (100 YR): UPDATE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.020
Channel Slope	0.010000 ft/ft
Water Surface Elevation	0.97 ft
Elevation Range	0.00 to 0.51
Discharge	202.00 cfs



V:3.0
H:1
NTS

CS-1: MAGGIE AVE. (10 YR)
Worksheet for Irregular Channel

Project Description	
Worksheet	CS-1: MAGGIE AVE (10 YR): UPDATE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.010000 ft/ft
Discharge	69.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.020
Water Surface Elevation	0.63 ft
Elevation Range	0.00 to 0.51
Flow Area	18.1 ft ²
Wetted Perimeter	51.28 ft
Top Width	50.00 ft
Actual Depth	0.63 ft
Critical Elevation	0.66 ft
Critical Slope	0.007876 ft/ft
Velocity	3.81 ft/s
Velocity Head	0.23 ft
Specific Energy	0.86 ft
Froude Number	1.11
Flow Type	Supercritical

Calculation Messages:
 Water elevation exceeds lowest end station by 0.63204414 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+01.5	0.013
0+01.5	0+18.8	0.017
0+18.8	0+20.8	0.035
0+20.8	0+50.0	0.022

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.0	0.00
0+01.5	0.13
0+18.8	0.51
0+20.8	0.47
0+50.0	0.00

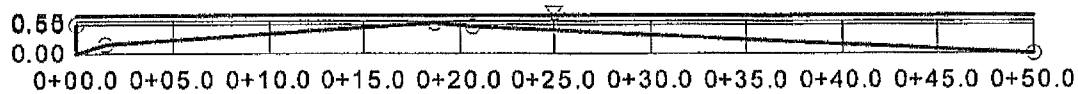
CS-1: MAGGIE AVE. (10 YR)
Worksheet for Irregular Channel

Notes: DV PRODUCT 2.40 < 6.00 OK
DEPTH OF FLOW 0.63 < 1.00 OK

CS-1: MAGGIE AVENUE (10 YR) **Cross Section for Irregular Channel**

Project Description	
Worksheet	CS-1: MAGGIE AVE (10 YR): UPDATE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.020
Channel Slope	0.010000 ft/ft
Water Surface Elevation	0.63 ft
Elevation Range	0.00 to 0.51
Discharge	69.00 cfs



V:3.0
H:1
NTS

CS-5: MAGGIE AVE. (100 YR)
Worksheet for Irregular Channel

Project Description	
Worksheet	CS-5: MAGGIE AVE (100 YR): UPDATE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.010000 ft/ft
Discharge	201.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.015
Water Surface Elevation	50.05 ft
Elevation Range	49.26 to 51.00
Flow Area	32.4 ft ²
Wetted Perimeter	63.06 ft
Top Width	62.30 ft
Actual Depth	0.79 ft
Critical Elevation	50.23 ft
Critical Slope	0.004058 ft/ft
Velocity	6.21 ft/s
Velocity Head	0.60 ft
Specific Energy	50.65 ft
Froude Number	1.52
Flow Type	Supercritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+00.0	0.013
0+00.0	0+05.0	0.022
0+05.0	0+07.0	0.013
0+07.0	0+55.0	0.016
0+55.0	0+70.0	0.022

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	51.00
0+00.0	49.86
0+05.0	49.76
0+05.5	49.76
0+05.5	49.26
0+07.0	49.39
0+07.0	49.43
0+55.0	49.48
0+60.0	50.00

CS-5: MAGGIE AVE. (100 YR)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+70.0	50.20

Notes: DV PRODUCT $4.91 < 8.00$ OK
DEPTH OF FLOW $0.79 < 2.00$ OK

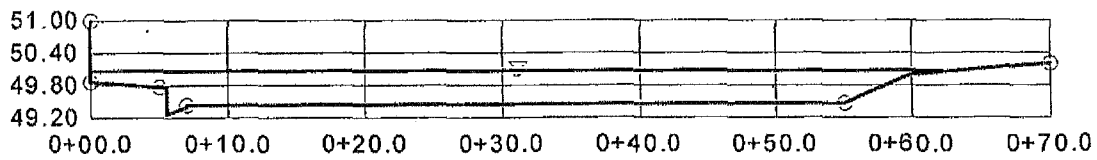
CS-5: MAGGIE AVENUE (100 YR)
Cross Section for Irregular Channel

Project Description

Worksheet	CS-5: MAGGIE AVE (100 YR): UPDATE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	0.010000 ft/ft
Water Surface Elevation	50.05 ft
Elevation Range	49.26 to 51.00
Discharge	201.00 cfs



V:4.0
H:1
NTS

Title: untitled

m:\project\128\0201\drainage\fmw\0201-fmw.fm2

01/17/05 10:18:03 AM © Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Orion Engineering

Project Engineer: Orion Engineering

FlowMaster v7.0 [7.0005]

Page 1 of 1

CS-5: MAGGIE AVE. (10 YR)
Worksheet for Irregular Channel

Project Description	
Worksheet	CS-5: MAGGIE AVE (10 YR): UPDATE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.010000 ft/ft
Discharge	69.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.016
Water Surface Elevation	49.77 ft
Elevation Range	49.26 to 51.00
Flow Area	16.2 ft ²
Wetted Perimeter	53.86 ft
Top Width	53.30 ft
Actual Depth	0.51 ft
Critical Elevation	49.85 ft
Critical Slope	0.005127 ft/ft
Velocity	4.26 ft/s
Velocity Head	0.28 ft
Specific Energy	50.05 ft
Froude Number	1.36
Flow Type	Supercritical

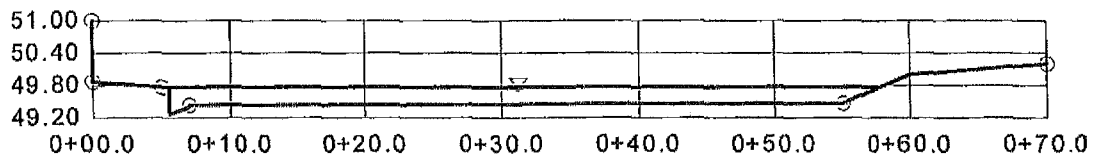
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+00.0	0.013
0+00.0	0+05.0	0.022
0+05.0	0+07.0	0.013
0+07.0	0+55.0	0.016
0+55.0	0+70.0	0.022

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	51.00
0+00.0	49.86
0+05.0	49.76
0+05.5	49.76
0+05.5	49.26
0+07.0	49.39
0+07.0	49.43
0+55.0	49.48
0+60.0	50.00

CS-1: MAGGIE AVENUE (10 YR)
Cross Section for Irregular Channel

Project Description	
Worksheet	CS-5: MAGGIE AVE (10 YR): UPDATE
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	0.010000 ft/ft
Water Surface Elevation	49.77 ft
Elevation Range	49.26 to 51.00
Discharge	69.00 cfs



V:4.0
H:1
NTS

CS-3: 20' EASEMENT CHANNEL - (200 cfs)
Worksheet for Irregular Channel

Project Description	
Project File	m:\project\128\0201\drainage\fmw\0201-fmw.fm2
Worksheet	20' EASEMENT CHANNEL (South)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data					
Channel Slope		0.005300 ft/ft			
Elevation range: 0.00 ft to 4.50 ft.					
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness	
0.00	2.00	0.00	20.00	0.031	
10.00	0.00				
19.00	4.50				
20.00	4.50				
Discharge	200.00	cfs			

Results			
Wtd. Mannings Coefficient	0.031		
Water Surface Elevation	3.50	ft	
Flow Area	37.26	ft ²	
Wetted Perimeter	19.53	ft	
Top Width	17.00	ft	
Height	3.50	ft	
Critical Depth	2.87	ft	
Critical Slope	0.013469 ft/ft		
Velocity	5.37	ft/s	
Velocity Head	0.45	ft	
Specific Energy	3.95	ft	
Froude Number	0.64		
Flow is subcritical.			
Water elevation exceeds lowest end station by 1.50 ft.			

FREEBOARD

$$F_b = 0.5 + \frac{V^2}{2g} = 0.5 + \frac{(5.37)^2}{2(32.2)}$$

$$F_b = 0.95' \text{ say } 1.0'$$

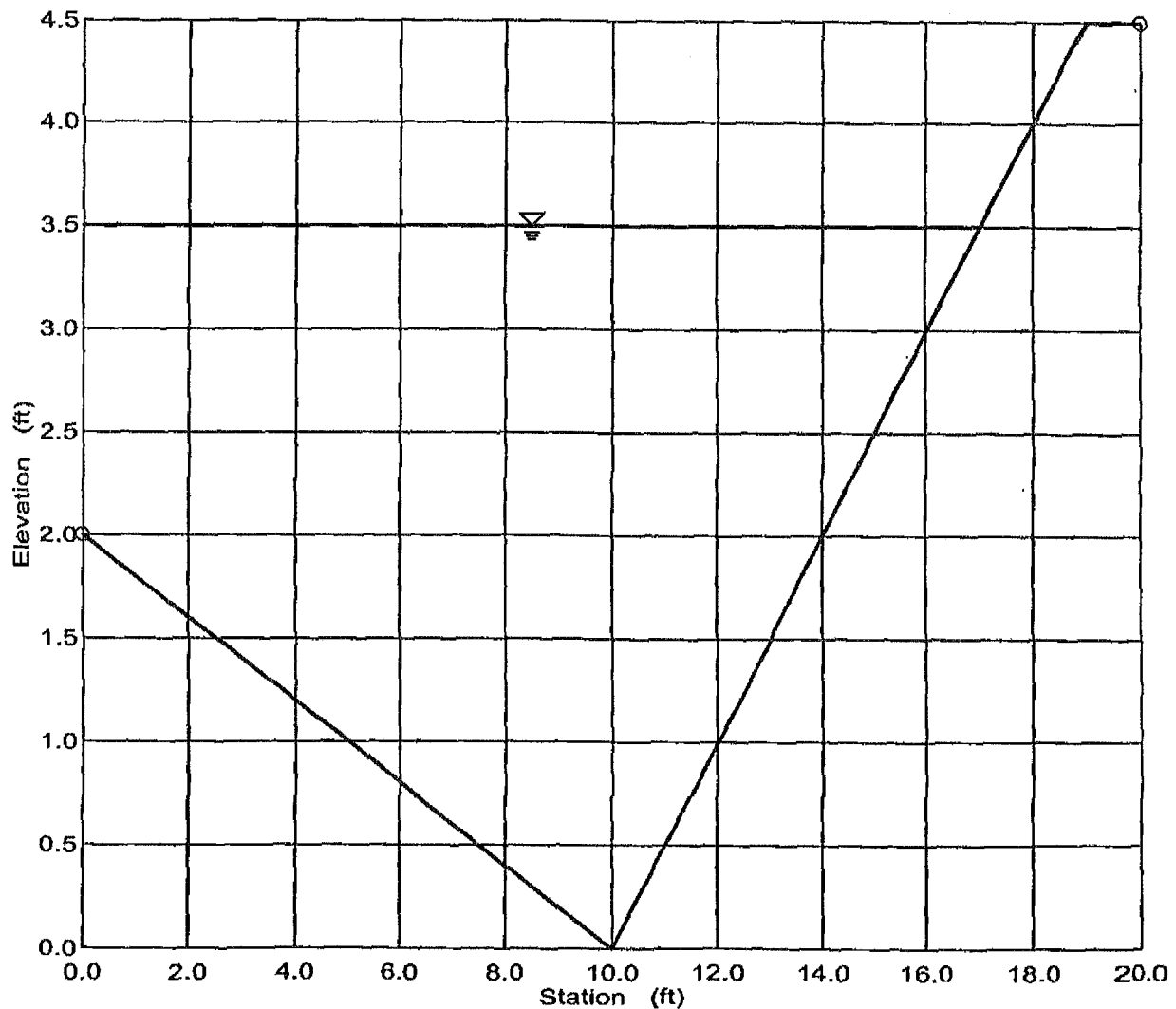
TOTAL FLOOD PROTECTION:

$$3.5' + 1.0' = \underline{4.5' \text{ FROM FLOW LINE}}$$

CS-3: 20' EASEMENT CHANNEL - 200 cfs
Cross Section for Irregular Channel

Project Description	
Project File	m:\project\128\0201\drainage\fmw\0201-fmw.fm2
Worksheet	20' EASEMENT CHANNEL (South)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.031
Channel Slope	0.005300 ft/ft
Water Surface Elevation	3.50 ft
Discharge	200.00 cfs



CS-4: 20' EASEMENT CHANNEL - (571 cfs)
Worksheet for Irregular Channel

Project Description	
Project File	m:\project\128\0201\drainage\fmw\0201-fmw.fm2
Worksheet	20' EASEMENT CHANNEL (north)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	0.009000 ft/ft			
Elevation range: 0.00 ft to 4.50 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	2.00	0.00	20.00	0.035
10.00	0.00			
19.00	4.50			
20.00	4.50			
Discharge	571.00	cfs		

Results		
Wtd. Mannings Coefficient	0.035	
Water Surface Elevation	5.30	ft
Flow Area	71.22	ft ²
Wetted Perimeter	25.36	ft
Top Width	20.00	ft
Height	5.30	ft
Critical Depth	4.67	ft
Critical Slope	0.015992 ft/ft	
Velocity	8.02	ft/s
Velocity Head	1.00	ft
Specific Energy	6.30	ft
Froude Number	0.75	
Flow is subcritical.		
Water elevation exceeds lowest end station by 3.30 ft.		

FREEBOARD

$$F_b = 0.5 + \frac{V^2}{2g}$$

$$F_b = 0.5 + \frac{(8.02)^2}{2(32.2)} =$$

$$F_b = 1.5'$$

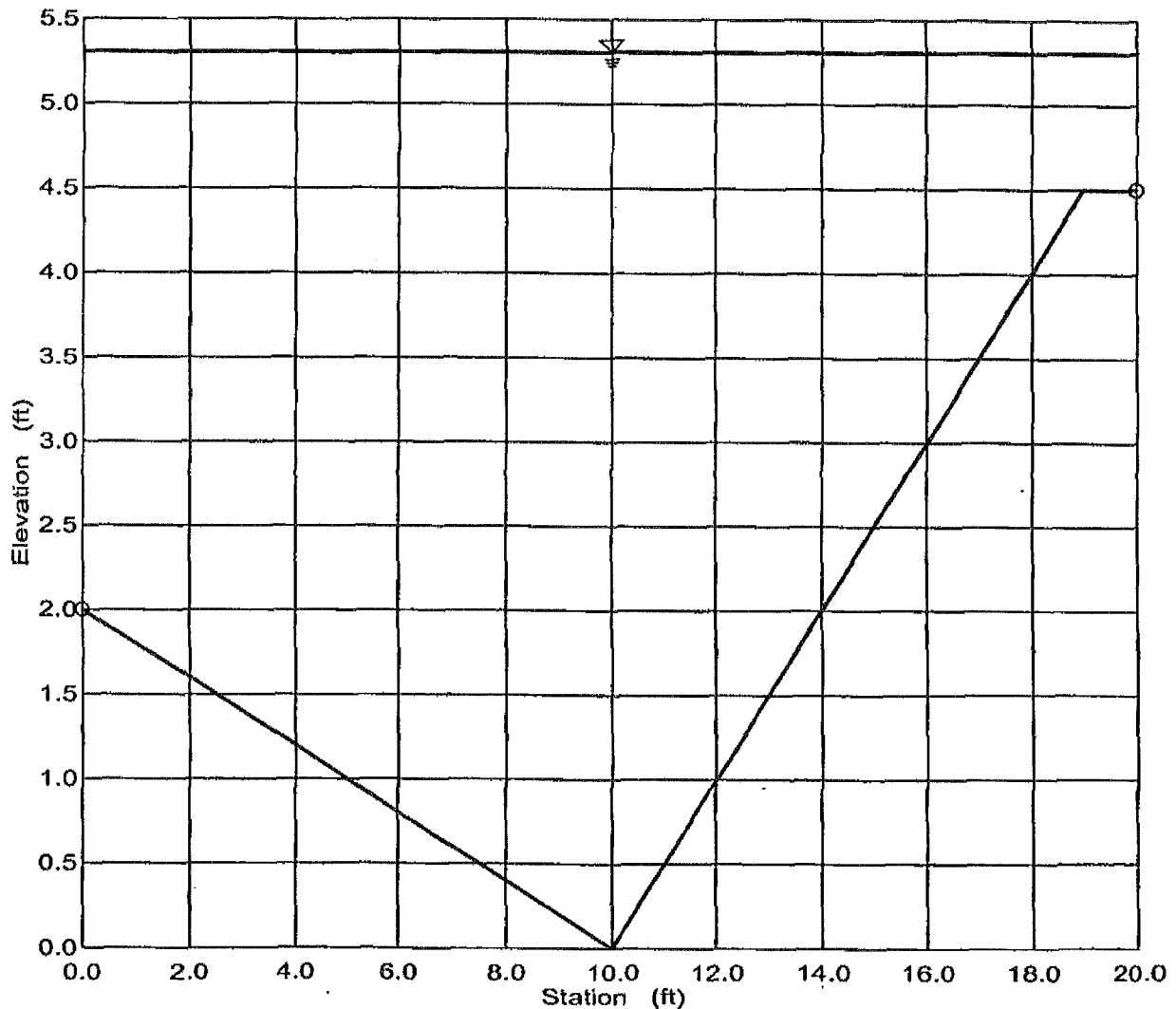
TOTAL FLOOD PROTECTION:

$$5.3' + 1.5' = \underline{6.8' \text{ FROM FLOWLINE.}}$$

CS-4: 20' EASEMENT CHANNEL - 571 cfs
Cross Section for Irregular Channel

Project Description	
Project File	m:\project\128\0201\drainage\fmw\0201-fmw.fm2
Worksheet	20' EASEMENT CHANNEL (north)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.035
Channel Slope	0.009000 ft/ft
Water Surface Elevation	5.30 ft
Discharge	571.00 cfs



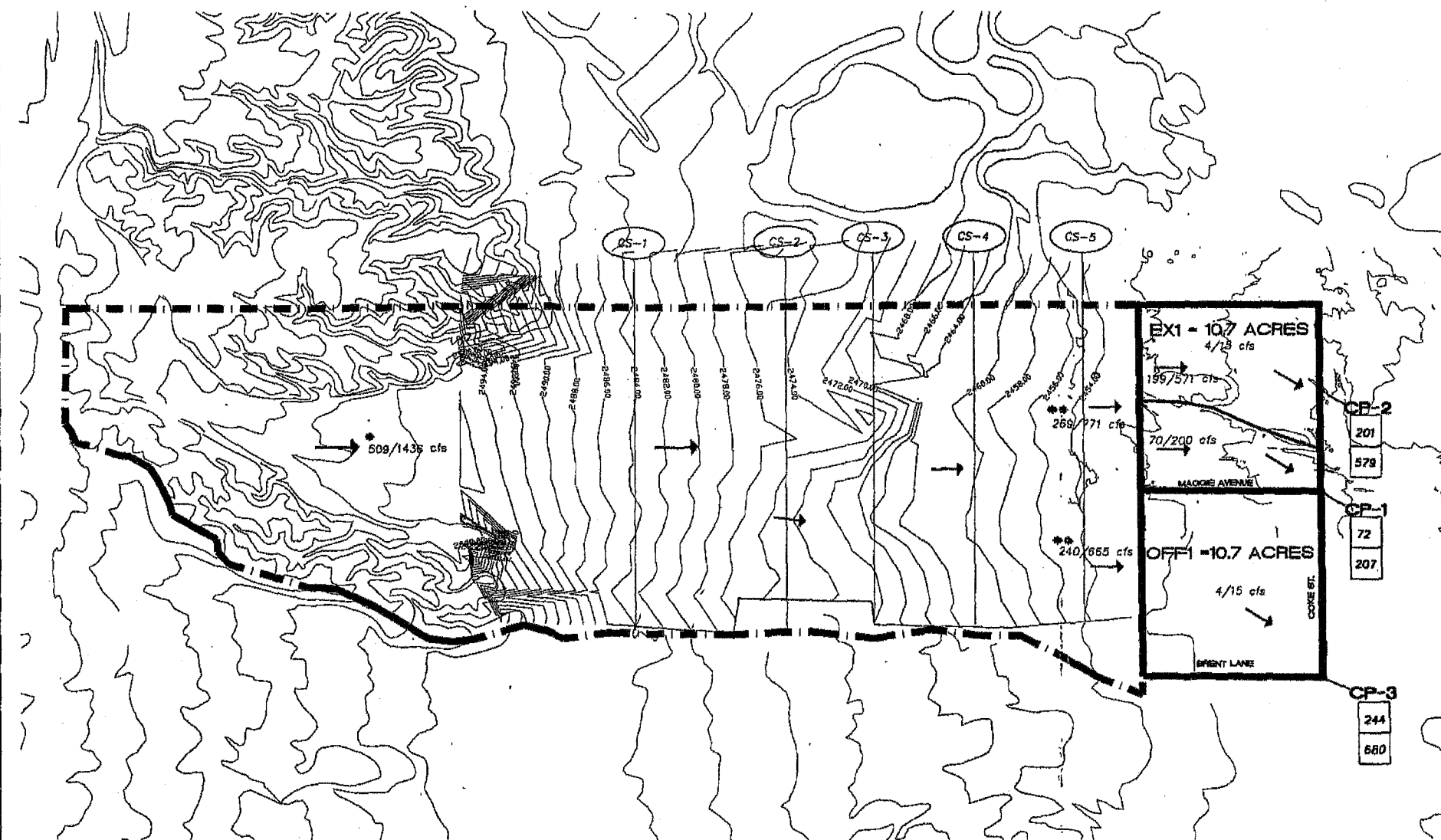


FIGURE 5 REFERENCES:

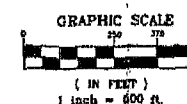
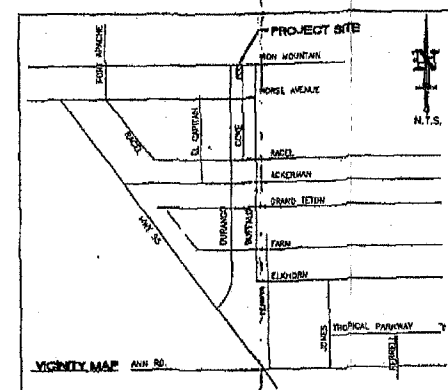
- * NUMBERS REFERENCED FROM (FIGURE E-8) OF THE CITY OF LAS VEGAS NORTHWEST NEIGHBORHOOD FLOOD CONTROL MASTER PLAN PHASE 2: VOLUME II (SEPTEMBER 1999)
- * FROM HEC-RAS CROSS-SECTIONAL ANALYSIS

BASIN SUMMARY

BASIN	AREA (Acres)	Q10 (CFS)	Q100 (CFS)
EX1	10.7	4	15
OFF1	10.7	4	15
CP1		72	272
CP2		201	579
CP2		244	680

LEGEND

- EX. 1 BASIN NAME
- Q10/Q100 10 YR/100 YR FLOW (cfs)
- CONCENTRATION POINT
- 10-YR. FLOW FOR CONCENTRATION PT.
- 100-YR. FLOW FOR CONCENTRATION PT.
- EXISTING CONTOUR (1')
- EXISTING CONTOUR (5')
- BASIN BOUNDARY
- SUB-BASIN BOUNDARY REFERENCED FROM NORTHWEST NEIGHBORHOOD STUDY PHASE 2
- FLOW DIRECTION
- CS-5 HEC-RAS CROSS SECTION



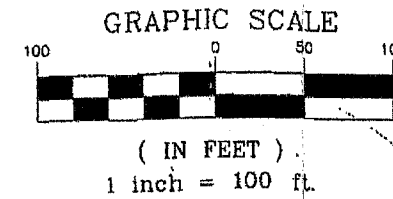
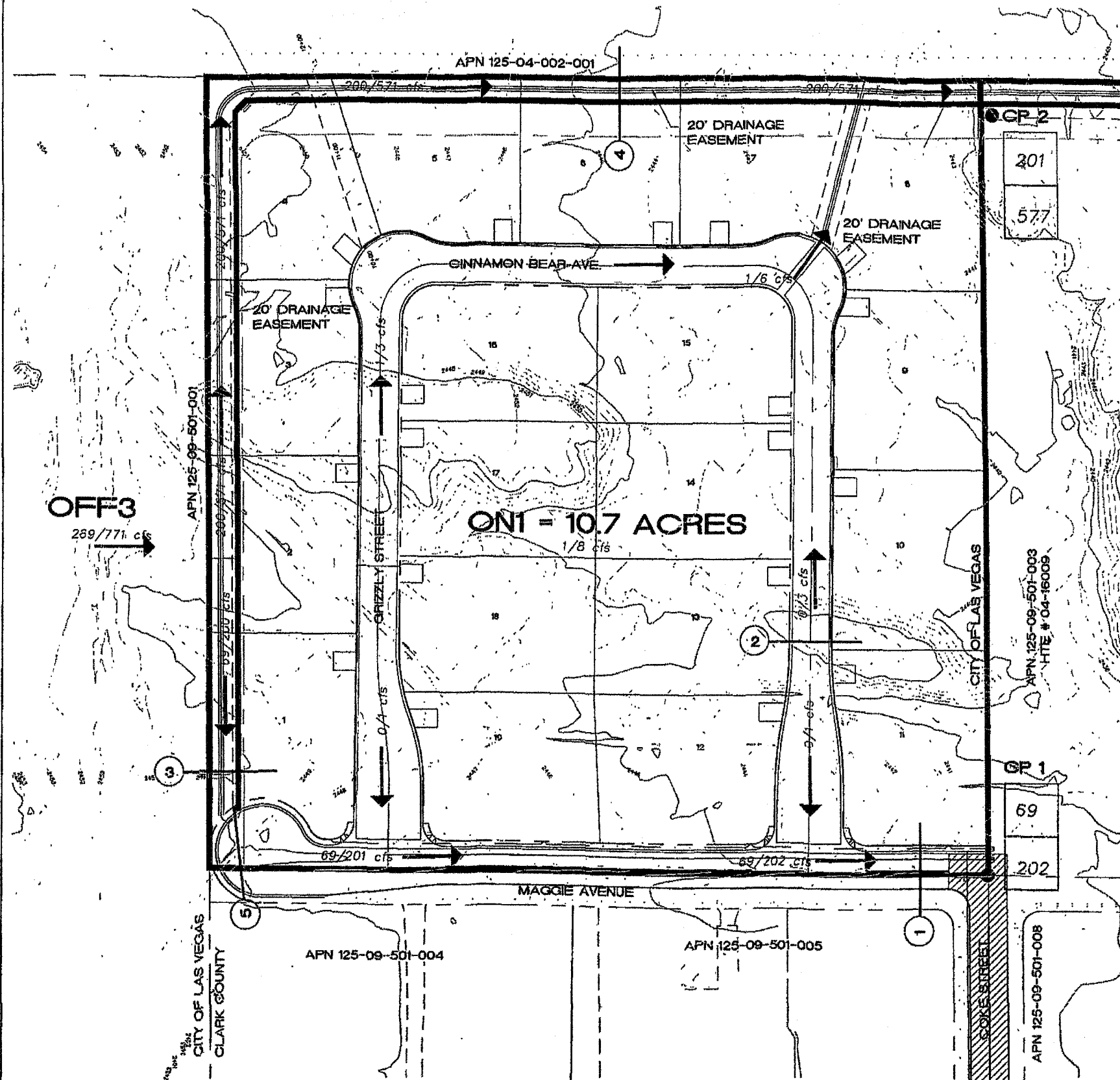
DESIGNED BY: ADB
 DRAWN BY: ADB
 CHECKED BY: JMK
 DATE: 02/20/03
 JOB NUMBER: 128-0201

EXISTING CONDITIONS
 COKE & CONOUGH

MATRIX CONSTRUCTION
 CONSULTING INC.



FIGURE 5



LEGEND

- EX. 1 BASIN NAME
Q10/Q100 10 YR/100 YR FLOW (cfs)
- CP CONCENTRATION POINT
10 10-YR. FLOW FOR CONCENTRATION PT.
100 100-YR. FLOW FOR CONCENTRATION PT.
- EXISTING CONTOUR (1')
EXISTING CONTOUR (5')
- BASIN BOUNDARY
FLOW DIRECTION
- CROSS-SECTION USED FOR FLOW ANALYSIS

STREET PARAMETERS

X-SECTION	Q (cfs)	d (ft)	V (ft/s)	(d*V)
CS-1 (MAGGIE AVE)				
10-YR.	69	0.63	3.81	2.40
100-YR.	202	0.97	5.77	5.60
CS-2 (PANDA BEAR ST)				
10-YR.	1	0.20	1.49	0.30
100-YR.	8	0.34	2.58	0.88
CS-3 (WEST CHANNEL)				
10-YR.	69	2.27	3.87	N/A
100-YR.	200	3.42	5.37	N/A
CS-4 (NORTH CHANNEL)				
10-YR.	200	3.23	5.13	N/A
100-YR.	571	5.30	8.02	N/A
CS-5 (MAGGIE AVE)				
10-YR.	69	0.51	4.26	2.17
100-YR.	201	0.79	6.21	4.91

BASIN SUMMARY

BASIN	AREA (Acres)	Q10 (CFS)	Q100 (CFS)
ON1	10.7	1	8
OFF3	--	269	771

DESIGNED BY: LP
DRAWN BY: LP
CHECKED BY:
DATE: 1/17/05
JOB NUMBER: 128-0201

DEVELOPED DRAINAGE BASIN MAP
COKE AND CONOUGH

BUILDING THE AMERICAN
DREAM CORPORATION

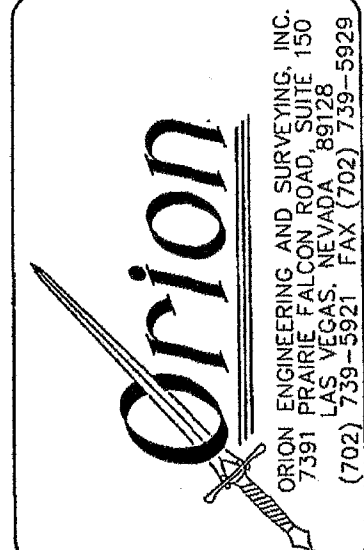


FIGURE 6

**Floyd Lamb Park North and South
Environmental Enhancement Areas Final
Design Report**
(prepared by The Louis Berger Group)

4.0 HYDROLOGIC ANALYSIS

Three hydrologic conditions were evaluated for the purposes of this study: 1) existing; 2) interim; and, 3) future. Under existing and interim conditions, storm water crosses under US 95 and into the project watershed through culverts. In the future, a channel will be constructed along US 95 to divert the flow into the CC 215 (Las Vegas Beltway) channel. The US 95 and beltway channels are identified in the MPU (2007), Figure 2.1, as CN95 and CNWE, respectively. There will be a period of time (approximately 10-years or more) in which the NEEA and SEEA will be operational and the upstream diversion channel will not be in place. In the interim, without the US 95 diversion channel, flow will continue to cross under US 95 and into the detention basins. Under interim conditions, the 100-year flow entering the SEEA and NEEA basins will be approximately 45% and 55% higher than future conditions, respectively. The basins were designed to contain the interim conditions 100-year, 6-hour storm flow volume.

This section presents the steps taken to develop the 2-year, 10-year, and 100-year, and PMF HEC-1 hydrologic models for existing, interim, and future conditions. Figures 4.1a and 4.1b show the watershed limits, basin boundaries, and 2-year, 10-year, and 100-year peak flow rates for interim conditions. Figure 4.2 shows future conditions and Figure 4.3 existing conditions. This section concentrates on the assumptions and data used for preparing the hydrologic model. Discussion of the model results as they relate to the design is reserved until Sections 5, 6, and 7.

4.1 Existing and Interim Conditions Models

The existing conditions model was prepared as a baseline from which to compare the benefits and effects of the project on the regional flow patterns and flow rates. The interim conditions watershed model is based on existing conditions but incorporates the NEEA and SEEA, the Racel Street and El Capitan Way lateral storm drains.

Runoff in the project area watershed generally follows the terrain, flowing from west to east. A major feature that traverses the watershed is the US 95 Freeway, which runs southeast to northwest, situated about 1.5 miles to the west of the project site (See Figures 4.1a and 4.1b). The freeway consists of three roads running in parallel - southbound and northbound lanes, and a frontage road east of the northbound lanes. Under existing and interim conditions, ditches on the upstream side capture and convey runoff parallel to the three roads. Runoff is passed underneath the three roads through a series of culverts and drop inlets. The culverts are generally in series under each of the three roads. The culverts were analyzed exhaustively by VTN (2004) as part of the Conceptual Offsite Hydrology Report for US-95 Environmental Document, Rainbow Boulevard to Kyle Canyon Road (see Volume II of Berger 2007 Preliminary Design Report for excerpts of the study). The analysis prepared by VTN (2004) was incorporated into the existing and interim condition HEC-1 models. Diversions for the

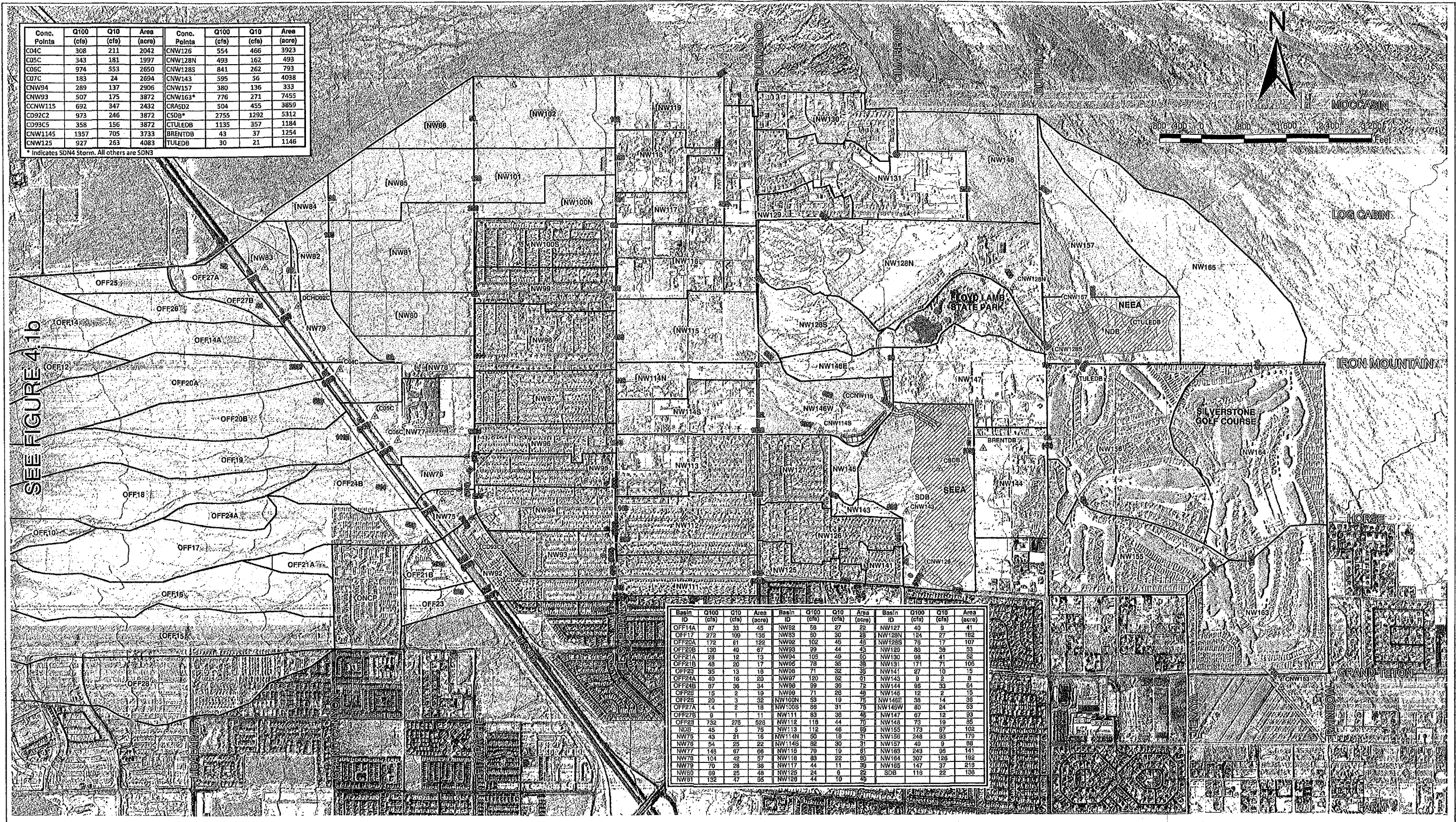


4.3 Hydrologic Modeling Methods and Parameters

Hydrologic modeling was conducted according to the criteria outlined in the Manual, the HEC-1 Flood Hydrograph Package Users Manual (HEC 1998) for the Soil Conservation Service (SCS) Unit Hydrograph Option, and the Las Vegas Valley 2002 Master Plan Update (CCRFCD 2002) for the curve number calculations. Hydrographs were developed for the design storm of 100-year return period and 6-hour duration, 10-year return period and 6-hour duration, 2-year return period and 6-hour duration, and the probable maximum flood (PMF). The 2-year model was developed for the sediment transport analysis and is presented in Appendix A of this report. Direct and indirect input used for model generation included basin area, soils characterization, land use, curve numbers, topographic data, point precipitation, rainfall duration and time distribution, time of concentration, and hydrograph lag time. Procedures for developing input parameters are presented in the following sections, and supporting information is contained in Appendix A.

A future conditions 10- and 100-year model was developed for the Racel Street Storm Drain in order to evaluate the size and location of drop inlets (Appendix B.3.b).





LEGEND

100-YR SURFACE FLOW (cfs)

100-YR FACILITY FLOW (cfs)

SOUTH ENVIRONMENTAL ENHANCEMENT AREA

UNCOLLECTED DRAINAGE AREA

NORTH ENVIRONMENTAL ENHANCEMENT AREA

WEST AREA OF U-95

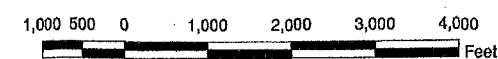
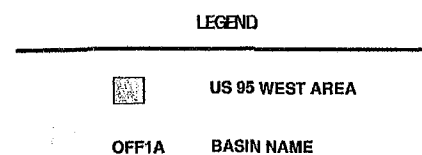
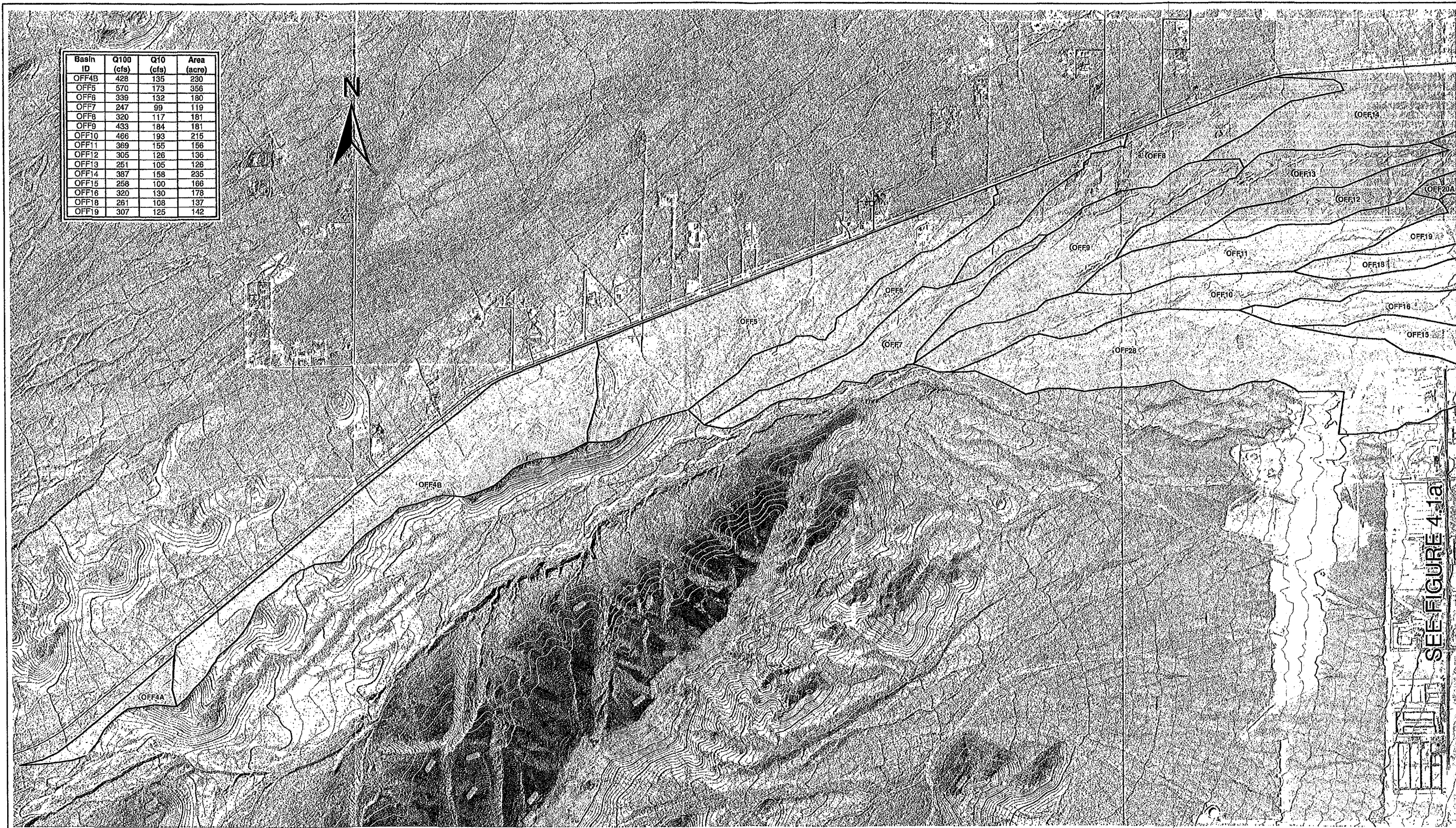
DETENTION BASIN

OFF1A BASIN NAME

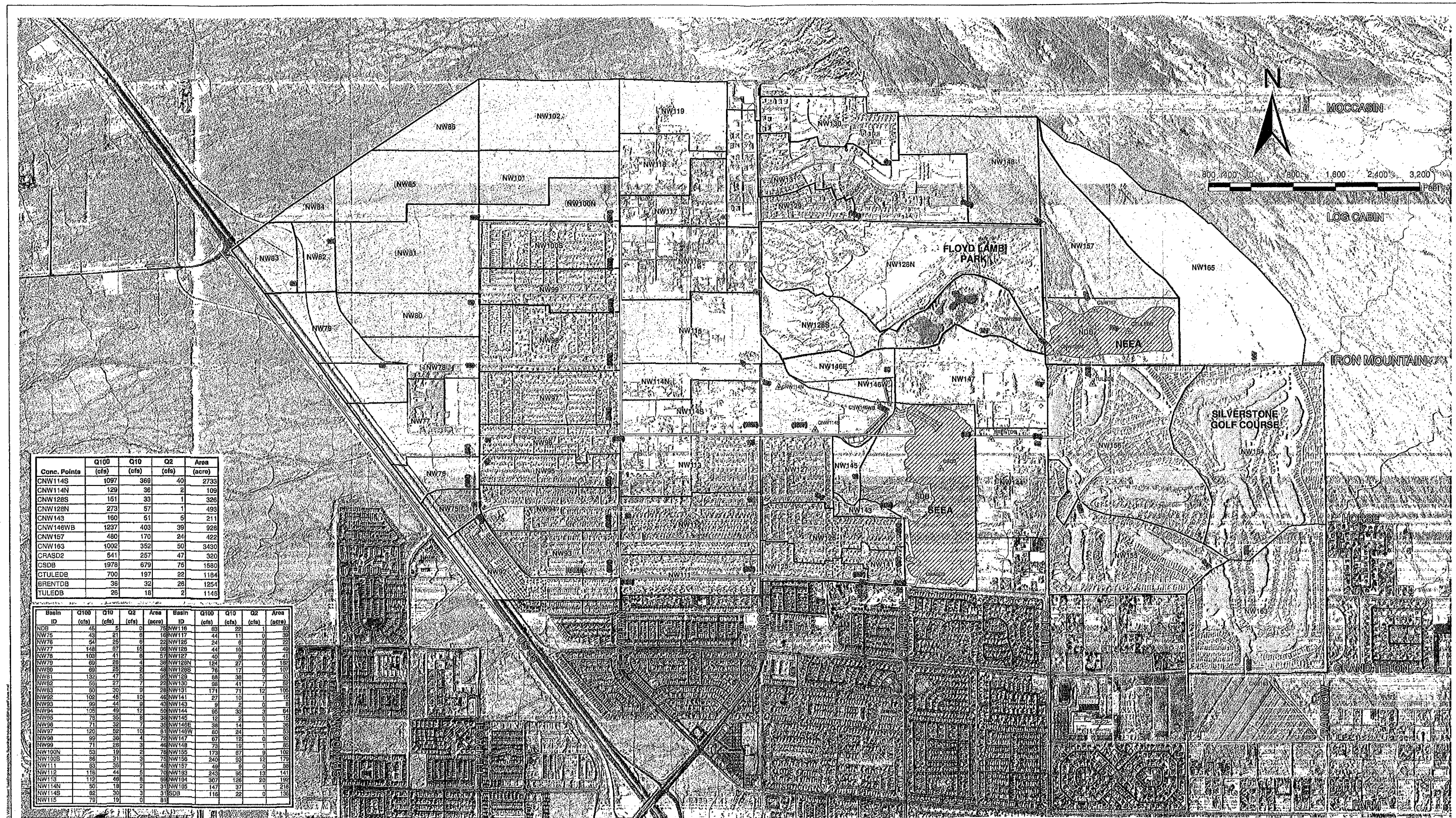
STORM DRAIN

CONCENTRATION POINT

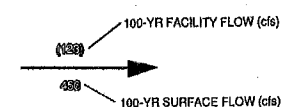
Floyd Lamb Park
North and South
Environmental Enhancement Areas
Interim Conditions Hydrology
Figure 4.1a



Floyd Lamb Park
North and South
Environmental Enhancement Areas
Interim Conditions Hydrology
Figure 4.1b



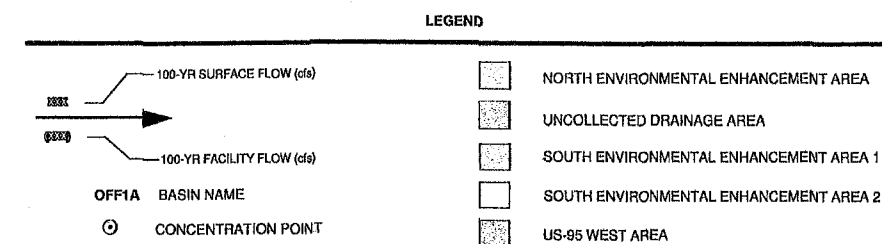
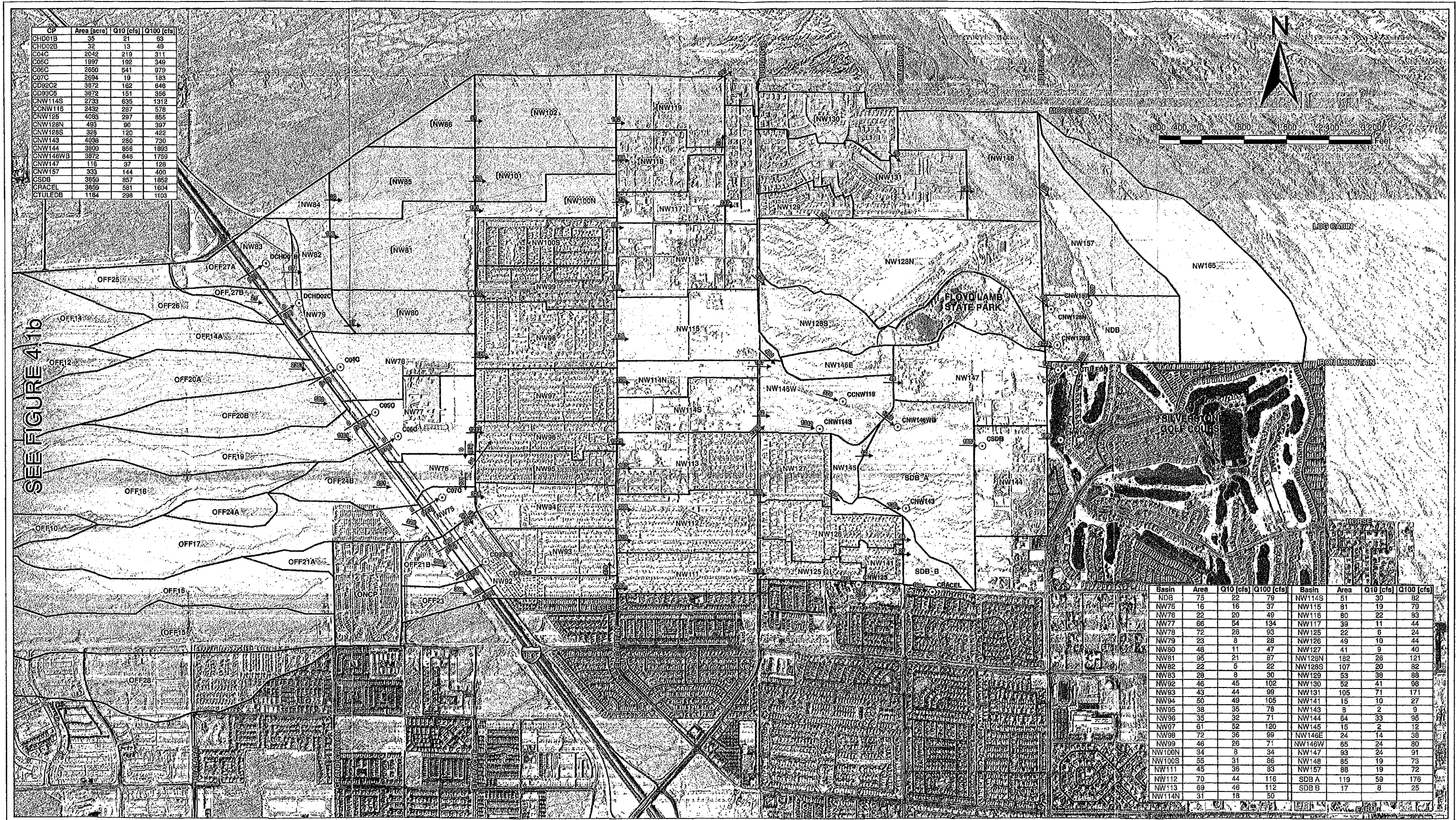
LEGEND



- SOUTH ENVIRONMENTAL ENHANCEMENT AREA
- UNCOLLECTED DRAINAGE AREA
- NORTH ENVIRONMENTAL ENHANCEMENT AREA
- DETENTION BASIN

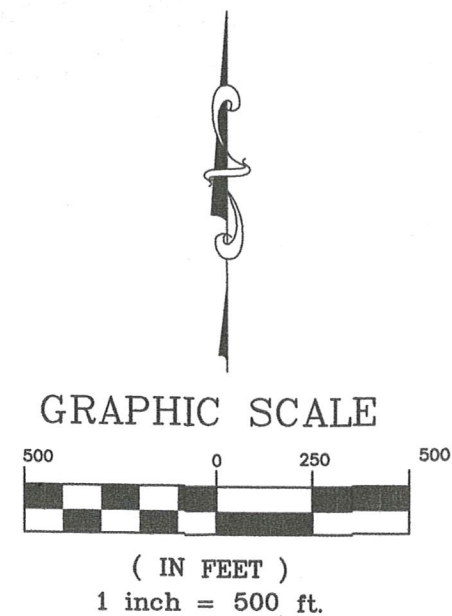
- OFF1A BASIN NAME
- STORM DRAIN
- CONCENTRATION POINT

Floyd Lamb Park
North and South
Environmental Enhancement Areas
Future Conditions Hydrology
Figure 4.2



**Floyd Lamb Park
North and South
Environmental Enhancement Areas
Existing Conditions Hydrology
Figure 4.3**

Figures



New Basin	Proportioned Q10/Q100 (cfs)
OFF1	13/36
OFF2	4/22
OFF3	0/2

FIGURE 2

OFFSITE BASIN MAP

DWYER **E**NGINEERING
7310 SMOKE RANCH RD. SUITE E
LAS VEGAS, NV 89128
(702) 254-2200 FAX:(702) 254-2236

Revised Calculations

Worksheet for Revised CS-1: Maggie Ave (100 Yr)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Discharge 19.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.00	0.00
0+01.50	0.13
0+18.80	0.51
0+20.80	0.47
0+50.00	0.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+18.80, 0.51)	0.017
(0+18.80, 0.51)	(0+20.80, 0.47)	0.035
(0+20.80, 0.47)	(0+50.00, 0.00)	0.022

Results

Normal Depth 0.42 ft
Elevation Range 0.00 to 0.51 ft
Flow Area 7.83 ft²
Wetted Perimeter 41.39 ft
Top Width 40.55 ft
Normal Depth 0.42 ft
Critical Depth 0.41 ft
Critical Slope 0.01060 ft/ft
Velocity 2.43 ft/s

Worksheet for Revised CS-1: Maggie Ave (100 Yr)

Results

Velocity Head	0.09	ft
Specific Energy	0.51	ft
Froude Number	0.97	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.41	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.01060	ft/ft

Cross Section for Revised CS-1: Maggie Ave (100 Yr)

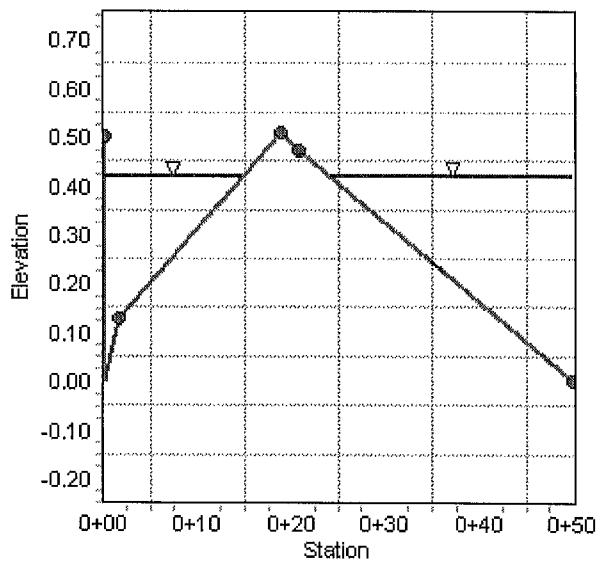
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Normal Depth 0.42 ft
Discharge 19.00 ft³/s

Cross Section Image



Worksheet for Revised CS-1: Maggie Ave (10 Yr)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Discharge 4.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.00	0.00
0+01.50	0.13
0+18.80	0.51
0+20.80	0.47
0+50.00	0.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+01.50, 0.13)	0.013
(0+01.50, 0.13)	(0+18.80, 0.51)	0.017
(0+18.80, 0.51)	(0+20.80, 0.47)	0.035
(0+20.80, 0.47)	(0+50.00, 0.00)	0.022

Results

Normal Depth 0.24 ft
Elevation Range 0.00 to 0.51 ft
Flow Area 2.41 ft²
Wetted Perimeter 22.34 ft
Top Width 21.85 ft
Normal Depth 0.24 ft
Critical Depth 0.23 ft
Critical Slope 0.01316 ft/ft
Velocity 1.66 ft/s

Worksheet for Revised CS-1: Maggie Ave (10 Yr)

Results

Velocity Head	0.04	ft
Specific Energy	0.29	ft
Froude Number	0.88	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.24	ft
Critical Depth	0.23	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.01316	ft/ft

Cross Section for Revised CS-1: Maggie Ave (10 Yr)

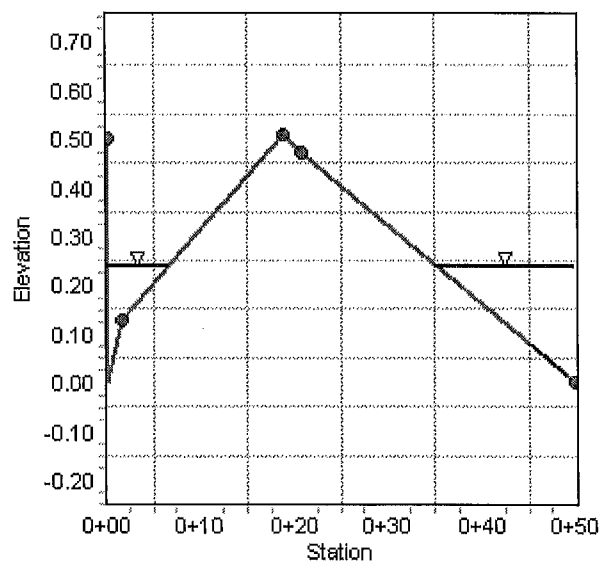
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Normal Depth 0.24 ft
Discharge 4.00 ft³/s

Cross Section Image



Worksheet for Revised CS-3: 20' Drainage Easement

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00530 ft/ft
Discharge 15.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2.00
0+10.00	0.00
0+19.00	4.50
0+20.00	4.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2.00)	(0+20.00, 4.50)	0.025

Results

Normal Depth 1.20 ft
Elevation Range 0.00 to 4.50 ft
Flow Area 5.03 ft²
Wetted Perimeter 8.79 ft
Top Width 8.39 ft
Normal Depth 1.20 ft
Critical Depth 1.03 ft
Critical Slope 0.01211 ft/ft
Velocity 2.98 ft/s
Velocity Head 0.14 ft
Specific Energy 1.34 ft
Froude Number 0.68
Flow Type Subcritical

Worksheet for Revised CS-3: 20' Drainage Easement

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.20	ft
Critical Depth	1.03	ft
Channel Slope	0.00530	ft/ft
Critical Slope	0.01211	ft/ft

Cross Section for Revised CS-3: 20' Drainage Easement

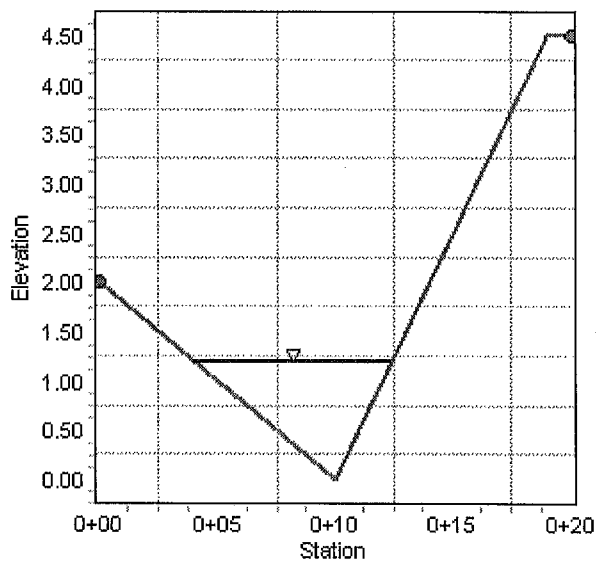
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00530 ft/ft
Normal Depth 1.20 ft
Discharge 15.00 ft³/s

Cross Section Image



Worksheet for Revised CS-4: 20' Drainage Easement

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00900 ft/ft
Discharge 43.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	2.00
0+10.00	0.00
0+19.00	4.50
0+20.00	4.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 2.00)	(0+20.00, 4.50)	0.025

Results

Normal Depth 1.61 ft
Elevation Range 0.00 to 4.50 ft
Flow Area 9.09 ft²
Wetted Perimeter 11.82 ft
Top Width 11.28 ft
Normal Depth 1.61 ft
Critical Depth 1.56 ft
Critical Slope 0.01052 ft/ft
Velocity 4.73 ft/s
Velocity Head 0.35 ft
Specific Energy 1.96 ft
Froude Number 0.93
Flow Type Subcritical

Worksheet for Revised CS-4: 20' Drainage Easement

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.61	ft
Critical Depth	1.56	ft
Channel Slope	0.00900	ft/ft
Critical Slope	0.01052	ft/ft

Cross Section for Revised CS-4: 20' Drainage Easement

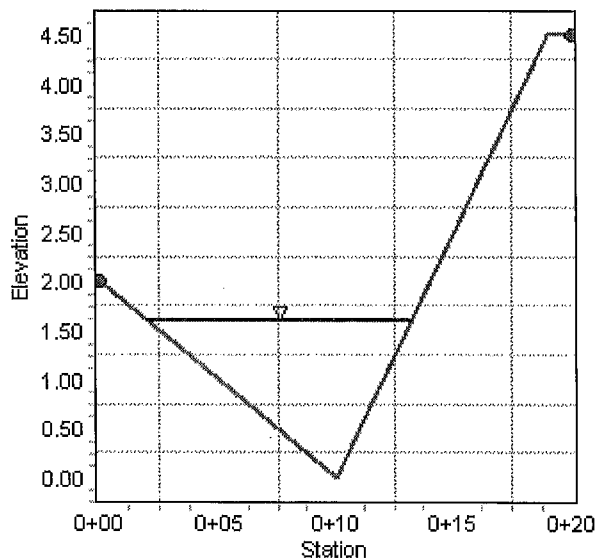
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope	0.00900	ft/ft
Normal Depth	1.61	ft
Discharge	43.00	ft ³ /s

Cross Section Image



Worksheet for Revised CS-5: Maggie Ave (100 Yr)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Discharge 18.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	51.00
0+00.00	49.86
0+05.00	49.76
0+05.50	49.76
0+05.50	49.26
0+07.00	49.39
0+07.00	49.43
0+55.00	49.48
0+60.00	50.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 51.00)	(0+00.00, 49.86)	0.013
(0+00.00, 49.86)	(0+05.00, 49.76)	0.022
(0+05.00, 49.76)	(0+07.00, 49.43)	0.013
(0+07.00, 49.43)	(0+55.00, 49.48)	0.016
(0+55.00, 49.48)	(0+60.00, 50.00)	0.022

Results

Normal Depth 0.33 ft
Elevation Range 49.26 to 51.00 ft
Flow Area 7.18 ft²
Wetted Perimeter 50.99 ft
Top Width 50.60 ft

Worksheet for Revised CS-5: Maggie Ave (100 Yr)

Results

Normal Depth	0.33	ft
Critical Depth	0.35	ft
Critical Slope	0.00703	ft/ft
Velocity	2.51	ft/s
Velocity Head	0.10	ft
Specific Energy	0.43	ft
Froude Number	1.17	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.35	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00703	ft/ft

Cross Section for Revised CS-5: Maggie Ave (100 Yr)

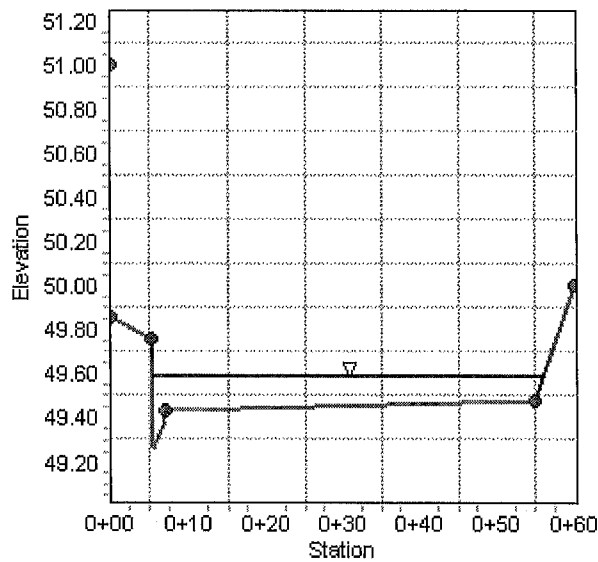
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Normal Depth 0.33 ft
Discharge 18.00 ft³/s

Cross Section Image



Worksheet for Revised CS-5: Maggie Ave (10 Yr)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Discharge 4.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	51.00
0+00.00	49.86
0+05.00	49.76
0+05.50	49.76
0+05.50	49.26
0+07.00	49.39
0+07.00	49.43
0+55.00	49.48
0+60.00	50.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 51.00)	(0+00.00, 49.86)	0.013
(0+00.00, 49.86)	(0+05.00, 49.76)	0.022
(0+05.00, 49.76)	(0+07.00, 49.43)	0.013
(0+07.00, 49.43)	(0+55.00, 49.48)	0.016
(0+55.00, 49.48)	(0+60.00, 50.00)	0.022

Results

Normal Depth 0.25 ft
Elevation Range 49.26 to 51.00 ft
Flow Area 2.89 ft²
Wetted Perimeter 50.08 ft
Top Width 49.78 ft

Worksheet for Revised CS-5: Maggie Ave (10 Yr)

Results

Normal Depth	0.25	ft
Critical Depth	0.25	ft
Critical Slope	0.00961	ft/ft
Velocity	1.39	ft/s
Velocity Head	0.03	ft
Specific Energy	0.28	ft
Froude Number	1.01	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.25	ft
Critical Depth	0.25	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00961	ft/ft

Cross Section for Revised CS-5: Maggie Ave (10 Yr)

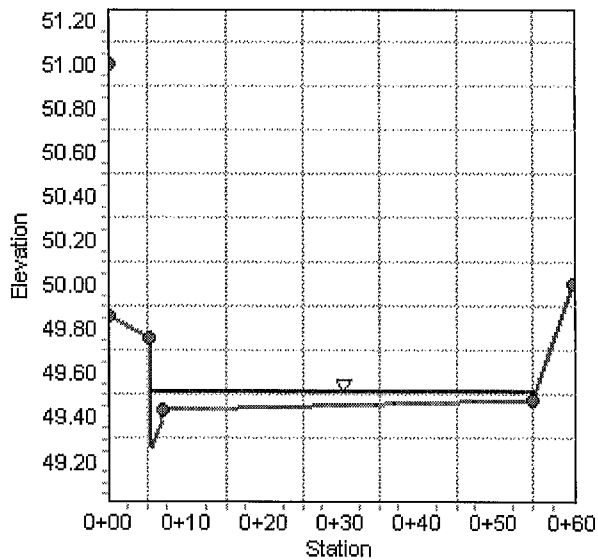
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Normal Depth 0.25 ft
Discharge 4.00 ft³/s

Cross Section Image



Worksheet for 20' Drainage Easement Between Lots 7 and 8

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01000 ft/ft
Discharge 6.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	4.08
0+08.00	0.08
0+09.00	0.00
0+10.00	0.08
0+18.00	4.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 4.08)	(0+08.00, 0.08)	0.025
(0+08.00, 0.08)	(0+10.00, 0.08)	0.013
(0+10.00, 0.08)	(0+18.00, 4.08)	0.025

Results

Normal Depth 0.58 ft
Elevation Range 0.00 to 4.08 ft
Flow Area 1.58 ft²
Wetted Perimeter 4.24 ft
Top Width 4.00 ft
Normal Depth 0.58 ft
Critical Depth 0.60 ft
Critical Slope 0.00872 ft/ft
Velocity 3.80 ft/s
Velocity Head 0.22 ft
Specific Energy 0.80 ft

Worksheet for 20' Drainage Easement Between Lots 7 and 8

Results

Froude Number	1.07
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.58	ft
Critical Depth	0.60	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00872	ft/ft

Cross Section for 20' Drainage Easement Between Lots 7 and 8

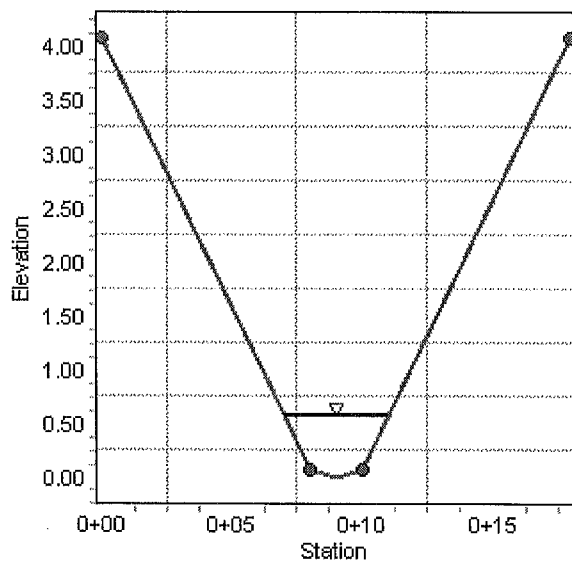
Project Description

Friction Method Manning Formula
Solve For Normal Depth

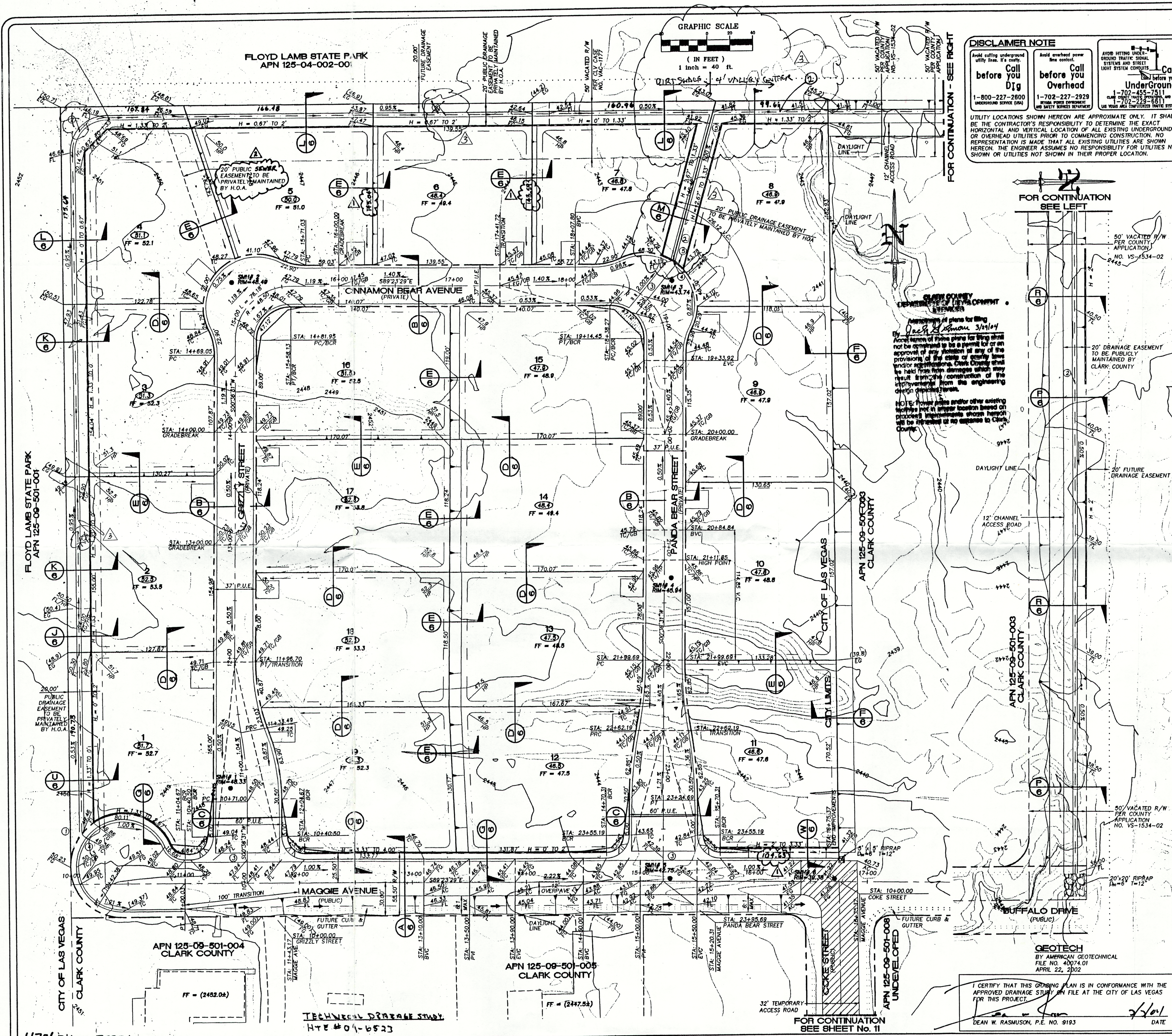
Input Data

Channel Slope 0.01000 ft/ft
Normal Depth 0.58 ft
Discharge 6.00 ft³/s

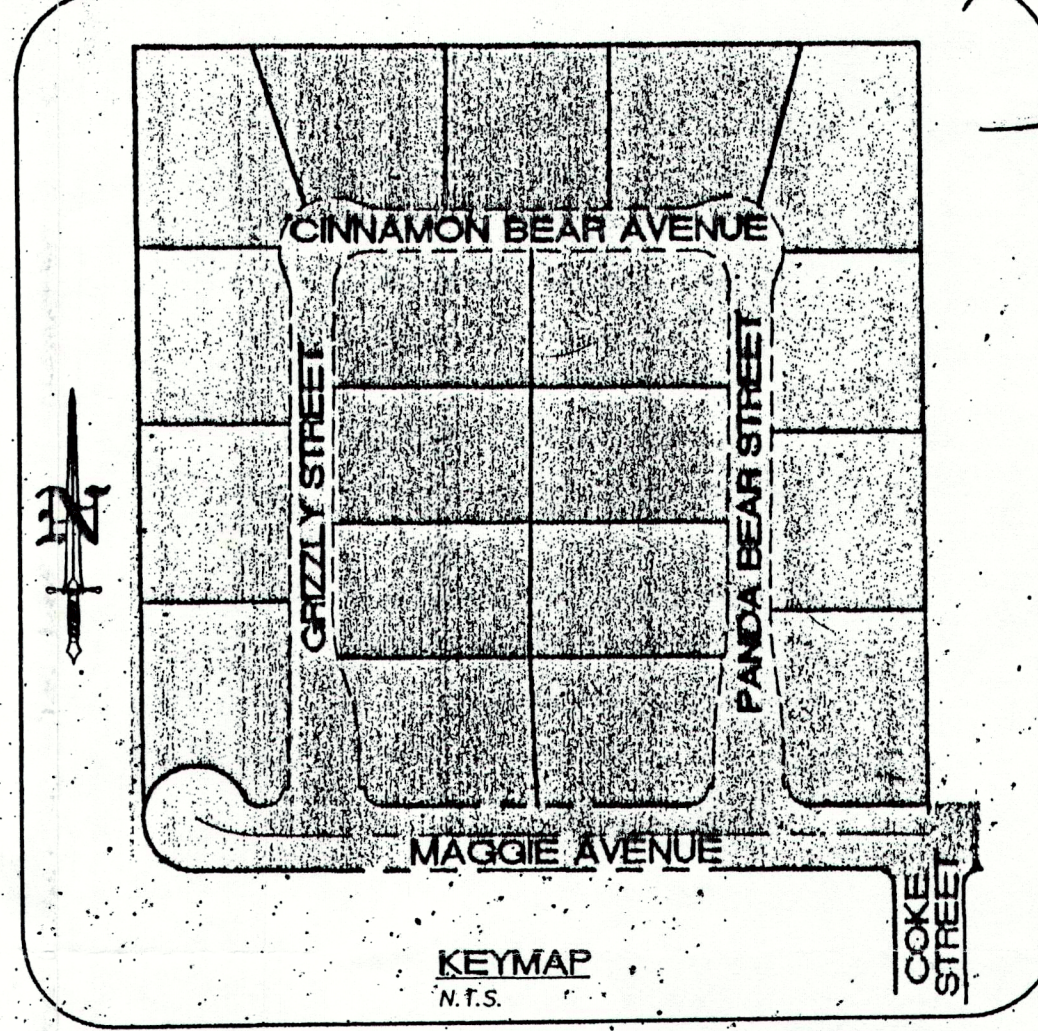
Cross Section Image



Revised Plans



DISCLAIMER NOTE
Avoid cutting underground utility lines. If a conflict exists, call before you dig.
Avoid overhead power line contact. If a conflict exists, call before you dig.
Avoid hitting underground structures. If a conflict exists, call before you dig.
Call before you dig.
1-800-227-2800
UNDERGROUND SERVICE (USA)
1-702-227-2929
CLARK COUNTY DEVELOPMENT SERVICES
1-702-455-1511
CLARK COUNTY DEVELOPMENT SERVICES
1-702-455-1511
CLARK COUNTY DEVELOPMENT SERVICES



- LEGEND**
- LOT LINE
 - PARCEL BOUNDARY
 - EXIST. CONTOUR (1' INTERVAL)
 - EXIST. CONTOUR (5' INTERVAL)
 - PROPOSED TOP OF CURB ELEVATION
 - PROPOSED FLOW LINE ELEVATION
 - PROPOSED FINISHED GRADE ELEVATION
 - EXISTING ELEVATION
 - PROPOSED RETAINING WALL
 - GRADE AND SLOPE DIRECTION
 - HEIGHT OF RETAINING WALL
 - RIP RAP PAD
 - 32' TEMPORARY ACCESS ROAD PER C.C.A.S. DWG. NO. 209
 - FUTURE CURB & GUTTER

- CONSTRUCTION NOTES**
- INSTALL 10' x 20' RIPRAP PAD. D=6", THICKNESS=12"
 - INSTALL 8" CURB PER DETAIL "N" SHEET 6
 - INSTALL 8" CROSS CUTTER PER STD DWG 226
 - INSTALL DEPRESSION CURB PER STD DWG 227
 - INSTALL WROUGHT-IRON GATE PER DETAIL "C" SHEET 6
- NOTES**
- ALL PRIVATE STREETS ARE CITY OF LAS VEGAS PUBLIC SEWER EASEMENTS AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED. THIS PROPERTY IS NOT IN A FLOOD ZONE.

- ADDITIONAL GEOTECHNICAL AND GRADING REQUIREMENTS**
- GEOTECHNICAL CERTIFICATION OF THE COMPLETED EARTHWORK IS REQUIRED IN ACCORDANCE WITH UNIFORM REGULATIONS FOR THE CONTROL OF DRAINAGE
 - TRENCH BACKFILL RECOMMENDATIONS ARE REQUIRED PRIOR TO BACKFILL OF TRENCHES
 - FISSURE REMEDIATION METHODS MUST BE SUBMITTED TO THE CITY OF NORTH LAS VEGAS GEOTECHNICAL ENGINEER FOR APPROVAL PRIOR TO IMPLEMENTATION.
 - ROCK BURIAL METHODS AND SITES MUST BE APPROVED BY THE CITY OF NORTH LAS VEGAS GEOTECHNICAL ENGINEER PRIOR TO IMPLEMENTATION.
 - USE "TYPE V" CEMENT, WITH A MAXIMUM WATER/CEMENT RATIO OF 0.45, AND A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,500 PSI.
 - "R" VALUES SHALL BE DETERMINED AT THE TIME OF GRADING.
- WALL NOTES**
- APPROVAL OF THESE PLANS BY THE CITY ENGINEER DOES NOT PERTAIN TO THE CONSTRUCTION OF NEW WALLS (RETAINING OR NON-RETAINING) OR MODIFICATIONS TO EXISTING WALLS.
 - ALL WALLS, NEW OR EXISTING, ARE REVIEWED BY THE CITY ENGINEER FOR GRADING RELATIONSHIP ONLY.
 - THE CONTRACTOR MUST VERIFY THE LOCATION, HEIGHT AND TYPE OF ALL WALLS PRIOR TO CONSTRUCTION.
 - THE CONTRACTOR MUST VERIFY THAT ALL RETAINING WALL AND DECORATIVE WALL DESIGNS AND CALCULATIONS ARE APPROVED WITH A PERMIT OBTAINED FROM THE DEPARTMENT OF BUILDING AND SAFETY. APPROVAL OF THE CIVIL PLANS BY THE DEVELOPMENT AND FLOOD CONTROL DIVISION DOES NOT IMPLY APPROVAL OF THE WALL DESIGN.
 - SUBGRADE PREPARATION UNDER WALL FOOTINGS AND WALL BACKFILL TO BE IN ACCORDANCE WITH THE APPROVED GEOTECHNICAL REPORT FOR THIS SITE.
 - FOOTING DEPTHS AND SETBACKS OF BLOCK AND/OR RETAINING WALLS ARE PER GEOTECHNICAL REPORT PREPARED BY AMERICAN GEOTECHNICAL, W.O. 40074.01, DATED APRIL 22, 2002.
 - MOISTURE/WATER PROTECTION BARRIERS ARE PER GEOTECHNICAL REPORT PREPARED BY AMERICAN GEOTECHNICAL, W.O. 40074.01, DATED APRIL 22, 2002.

BASIS OF BEARING
BEING THE EAST LINE OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 10, TOWNSHIP 30 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA; SAID LINE BEARS SOUTH 00°25'00" EAST.

BENCHMARK
THE CITY OF LAS VEGAS BENCHMARK NUMBER 1459086S BEING THE USBLM BRASS CAP AT THE INTERSECTION OF BUFFALO AND IRON MOUNTAIN.

PUBLISHED ELEVATION (5/7/1993) = 744.7597 METERS NAVD 88 DATUM
CONVERTED ELEVATION (5/7/1993) = 2443.43 FEET NAVD 88 DATUM

PUBLISHED ELEVATION (2003) = 744.7280 METERS, 2443.33 FEET, NAVD 88 DATUM
DATUM CONVERSION EQUATION TO BE UTILIZED FOR THIS PLANSET IS AS FOLLOWS:
PLAN ELEVATIONS AS DEPICTED UPON PLANSET, MINUS 0.0307 METERS OR PLAN ELEVATIONS MINUS 0.10 FEET EQUALS CITY LAS VEGAS NAVD 88 DATUM (2003)

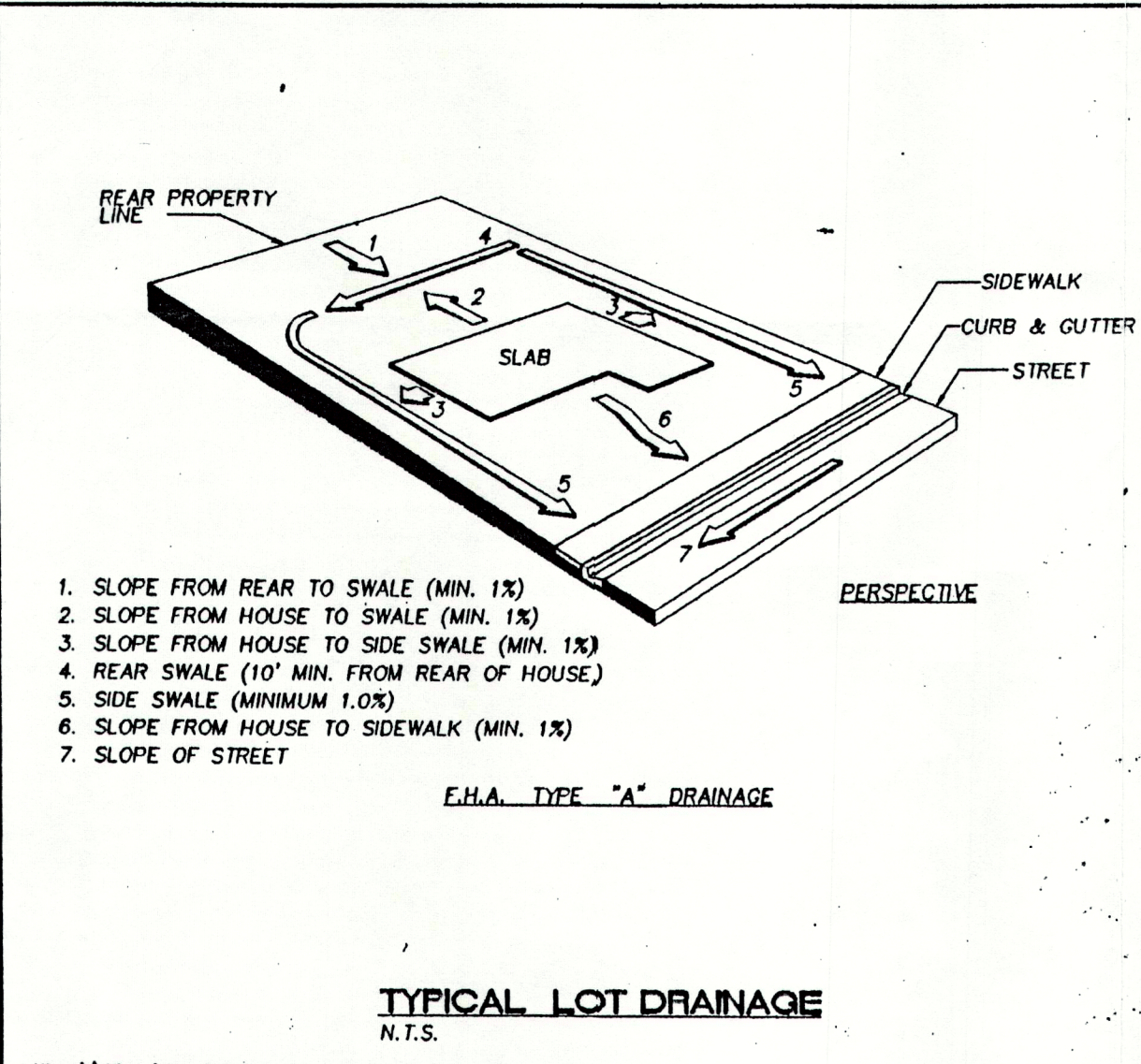
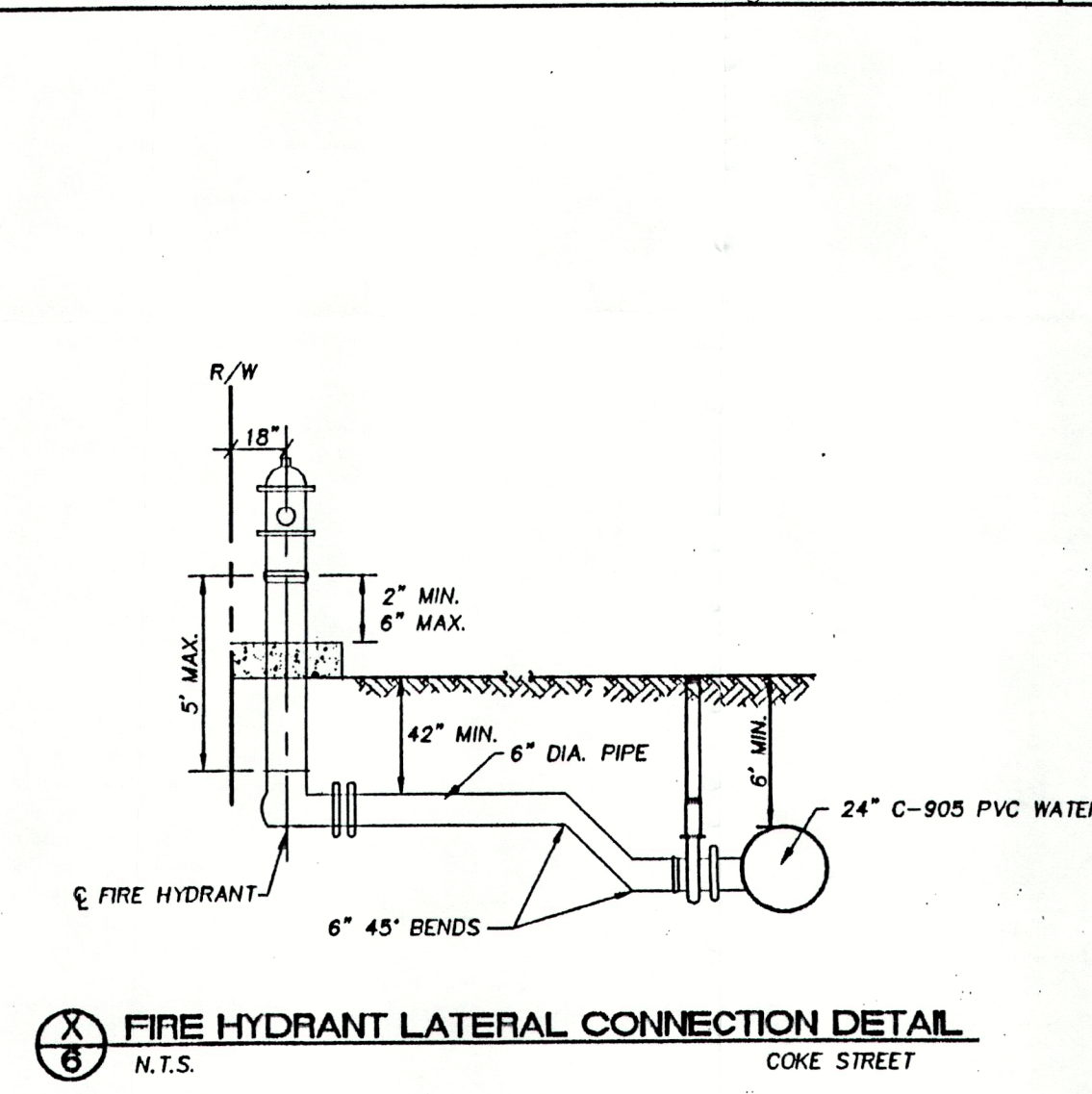
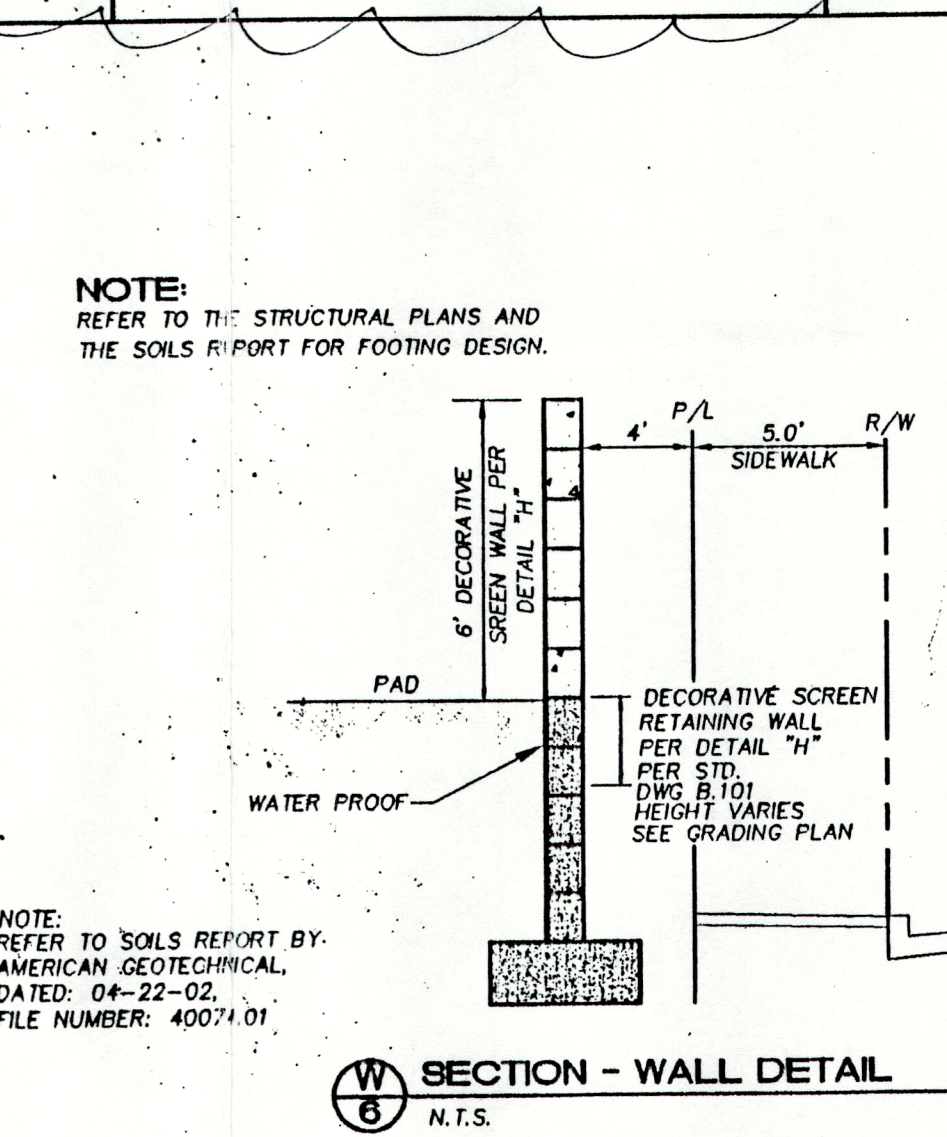
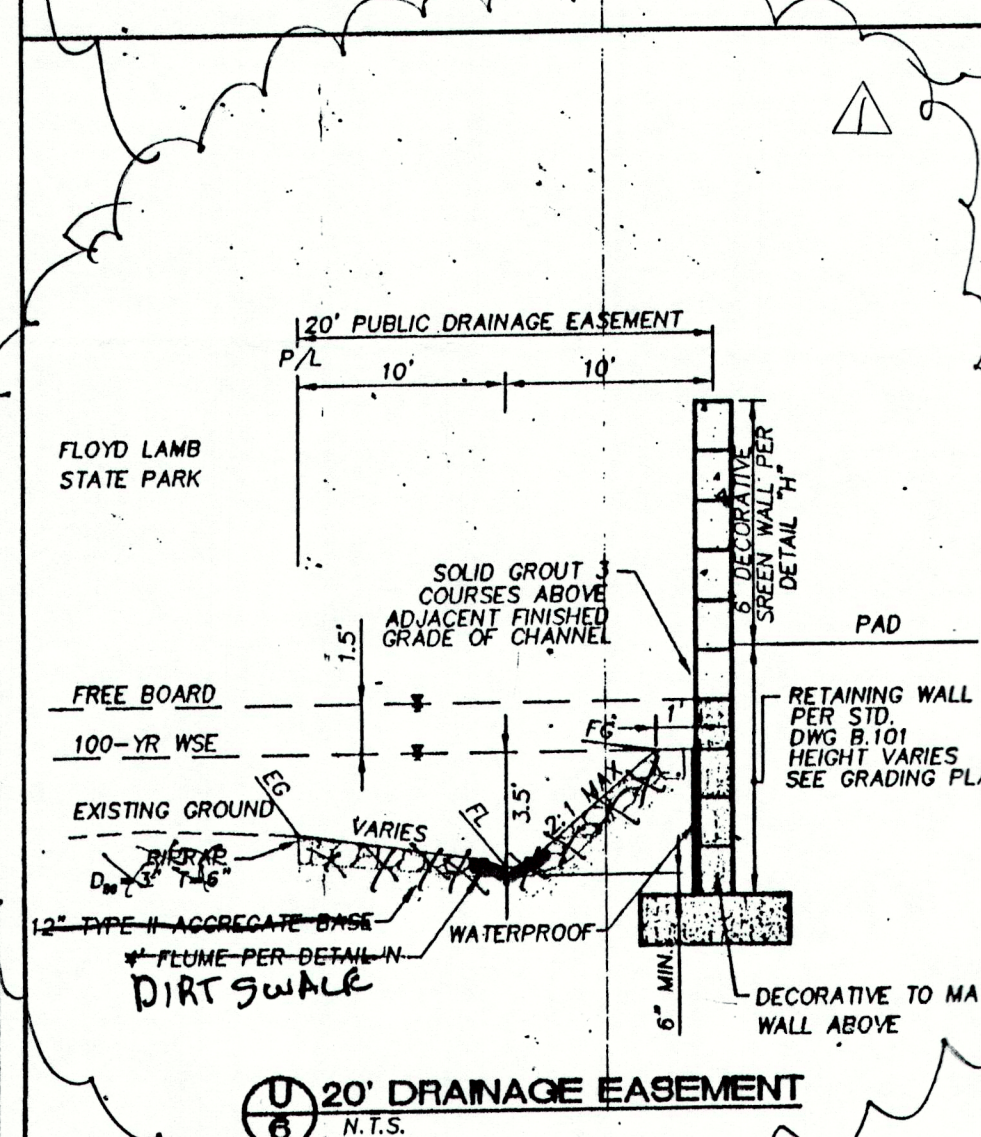
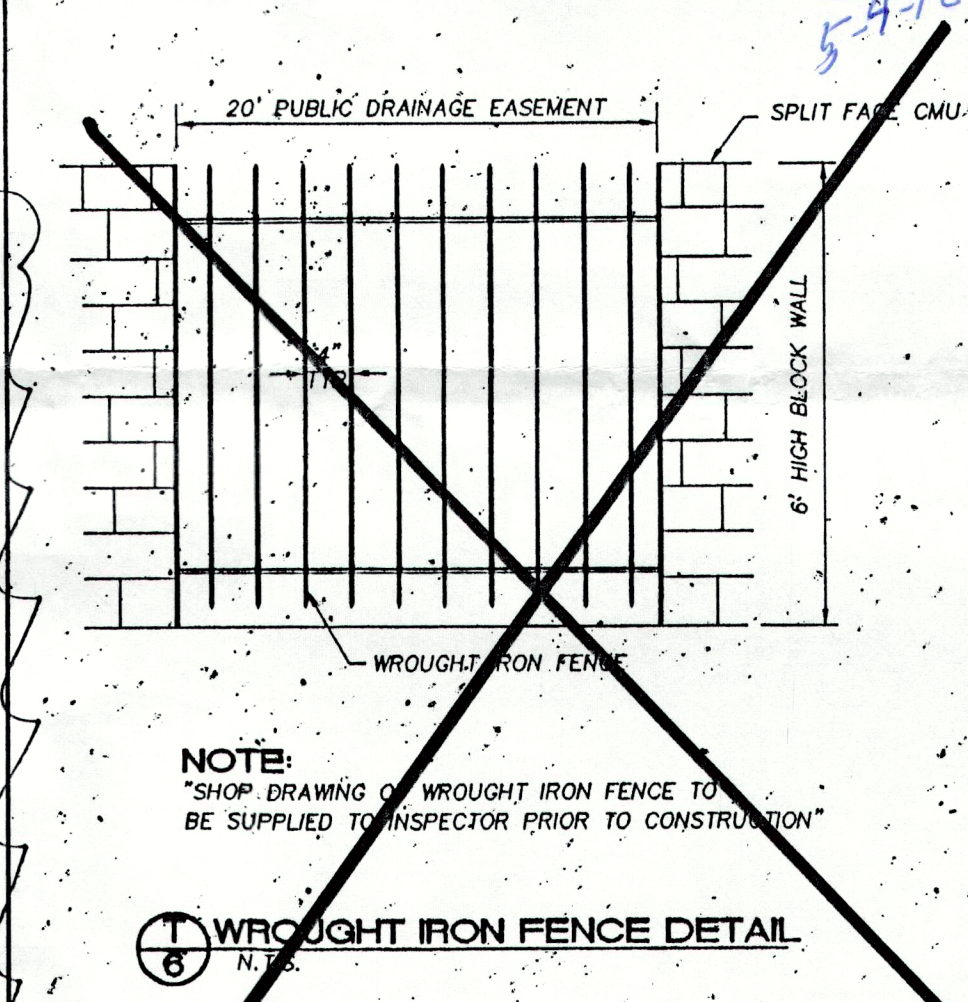
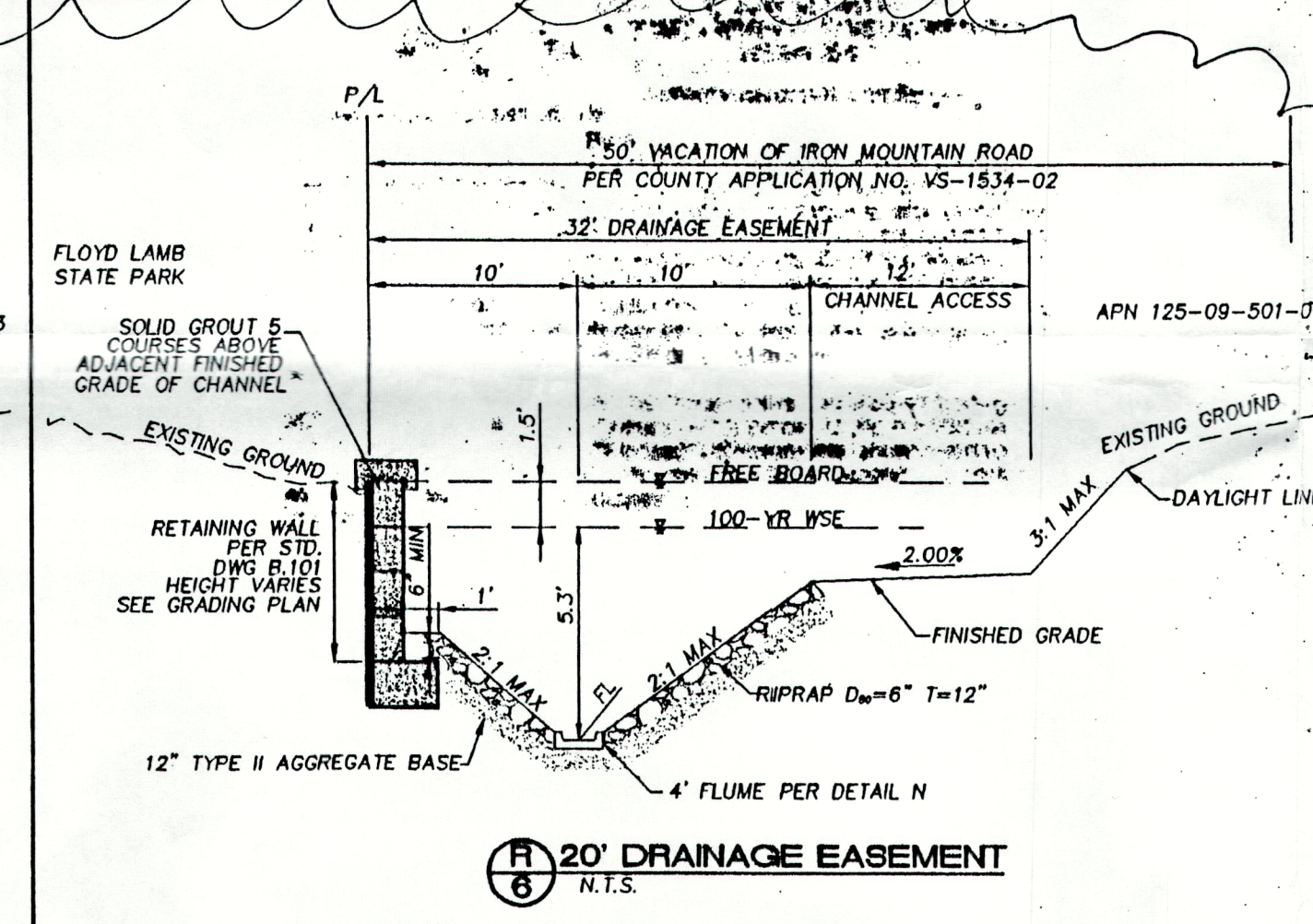
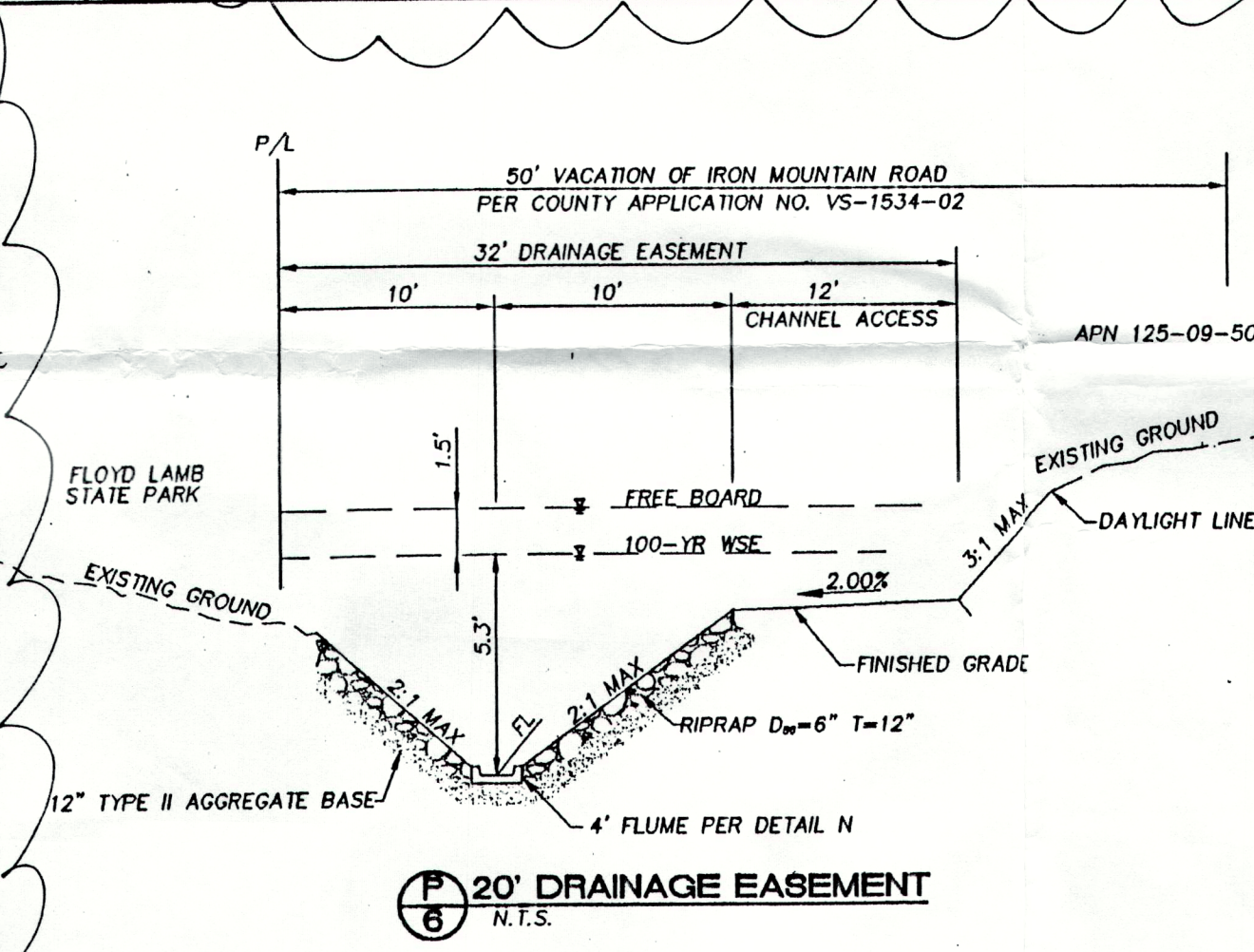
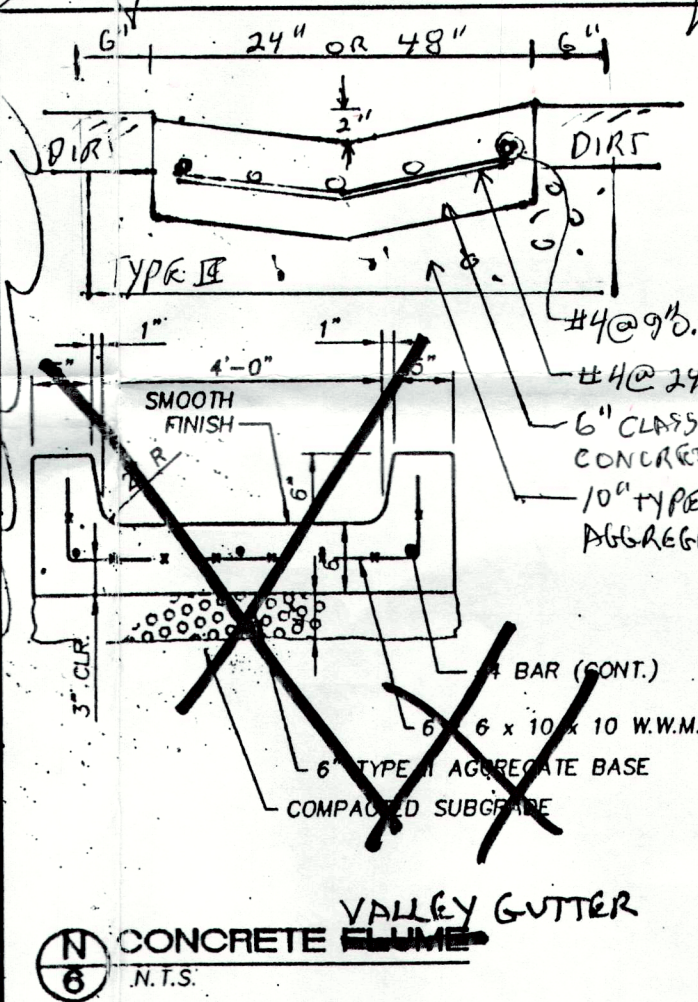
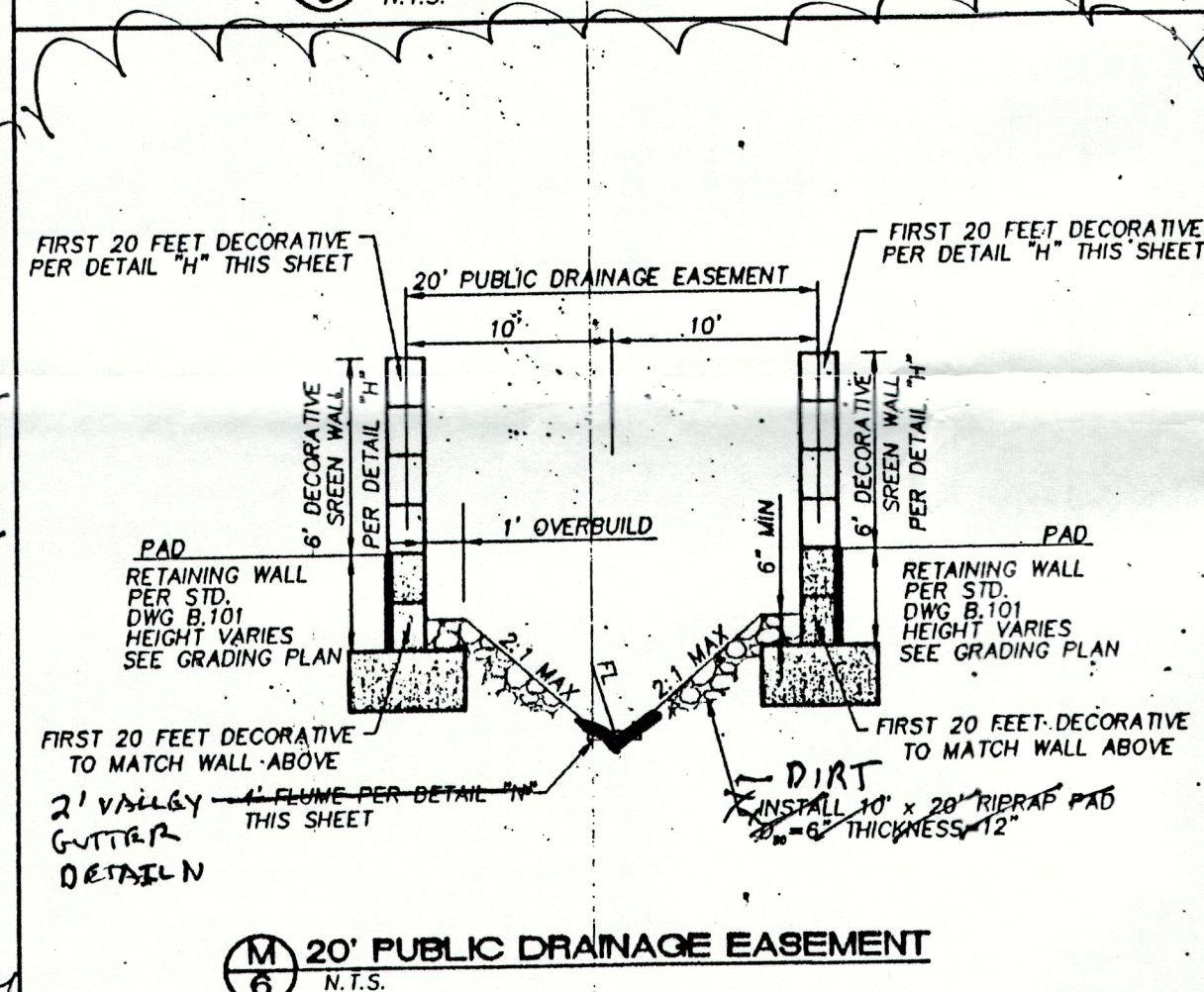
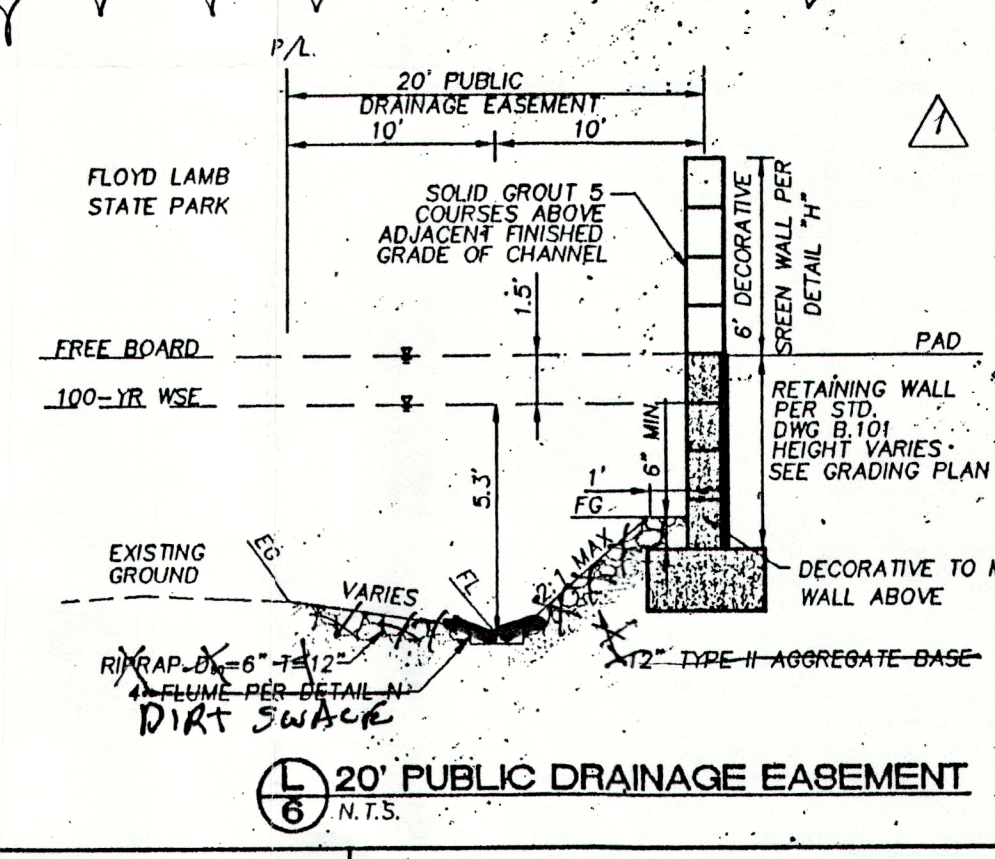
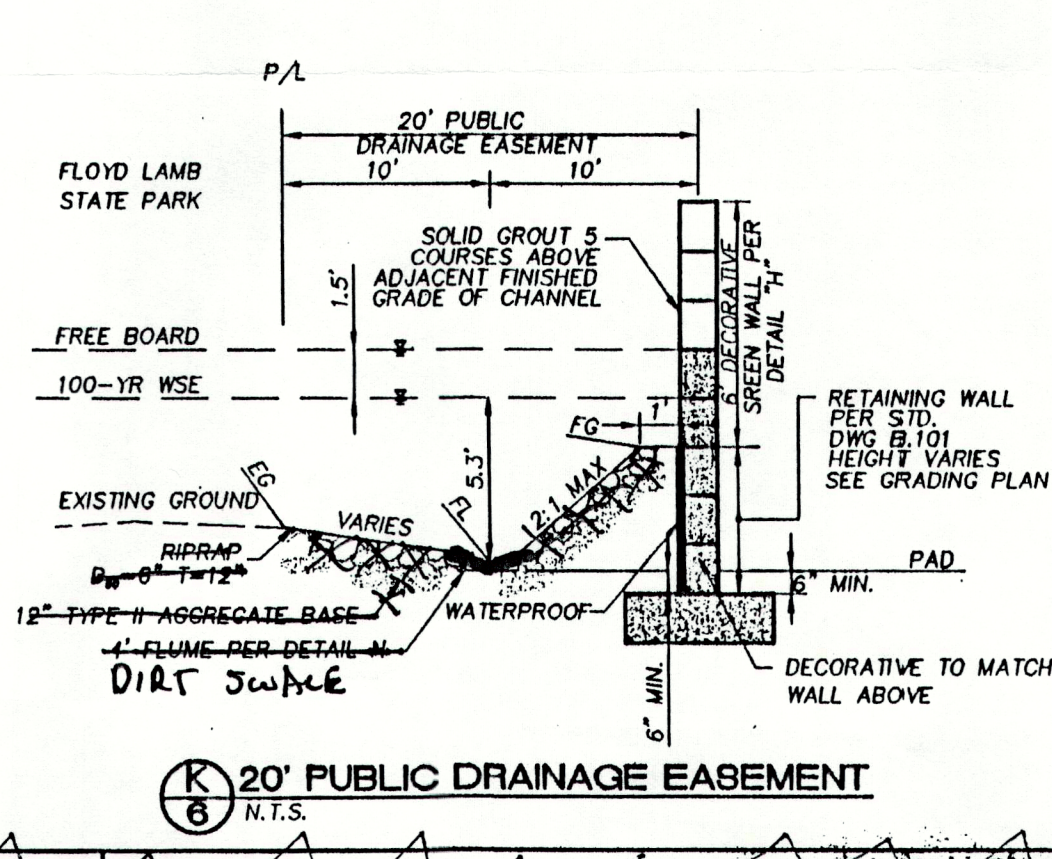
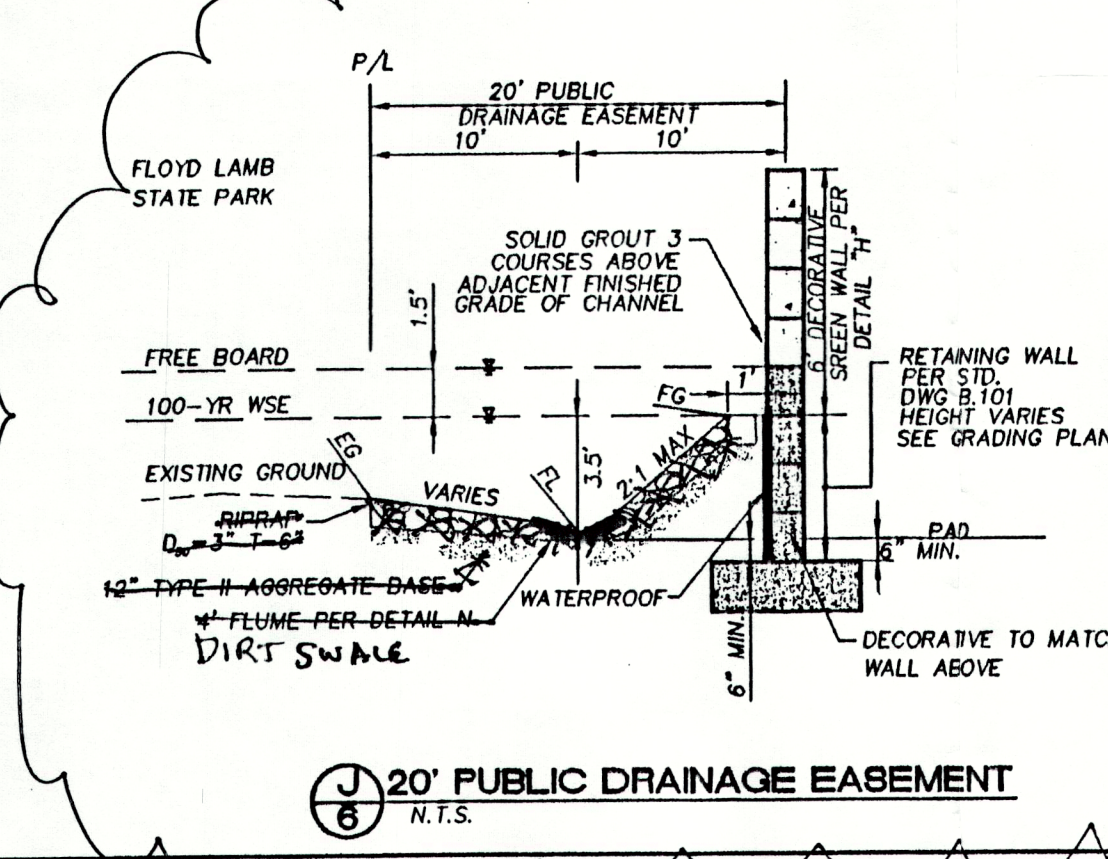
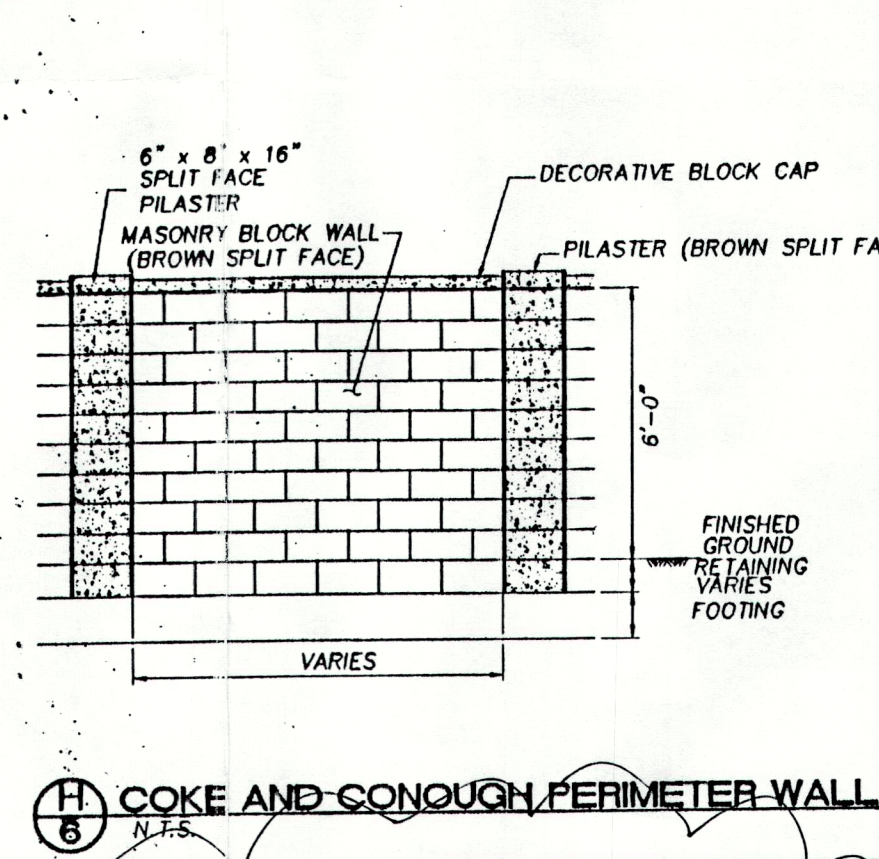
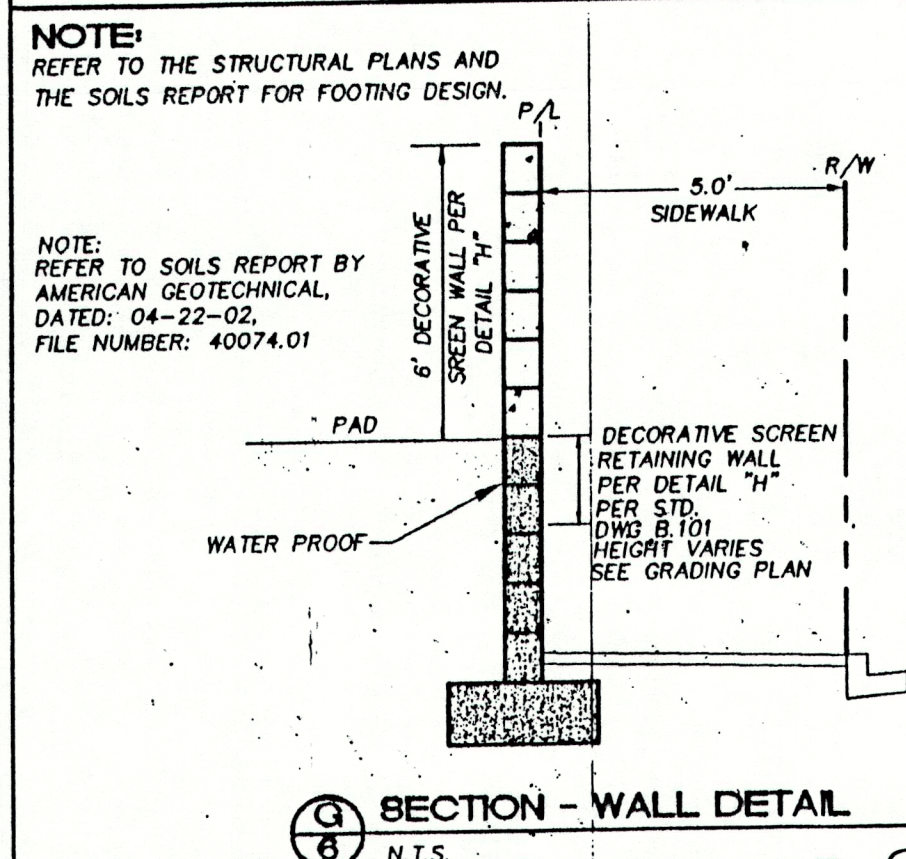
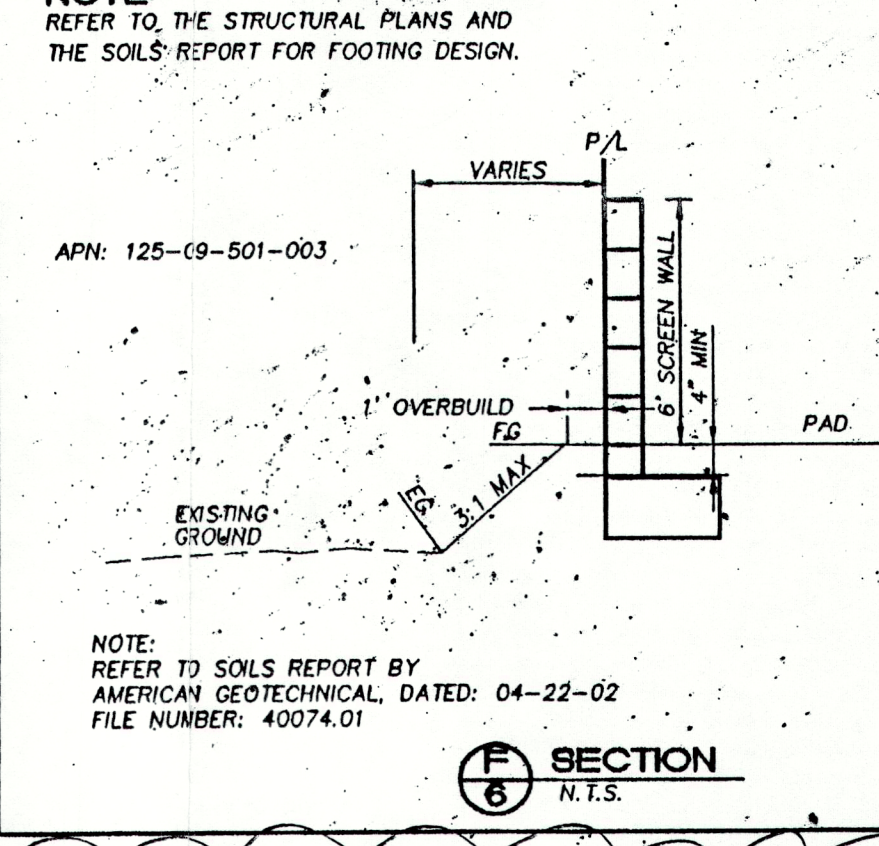
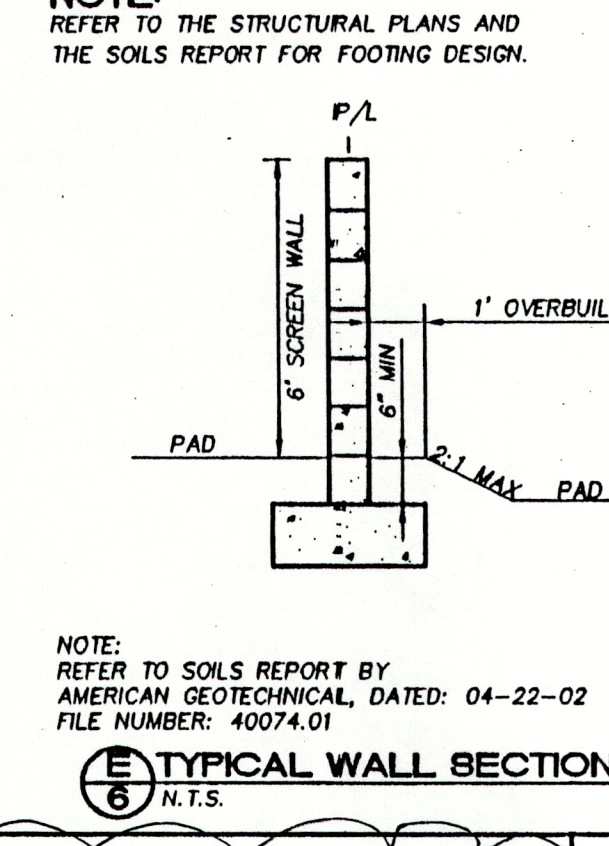
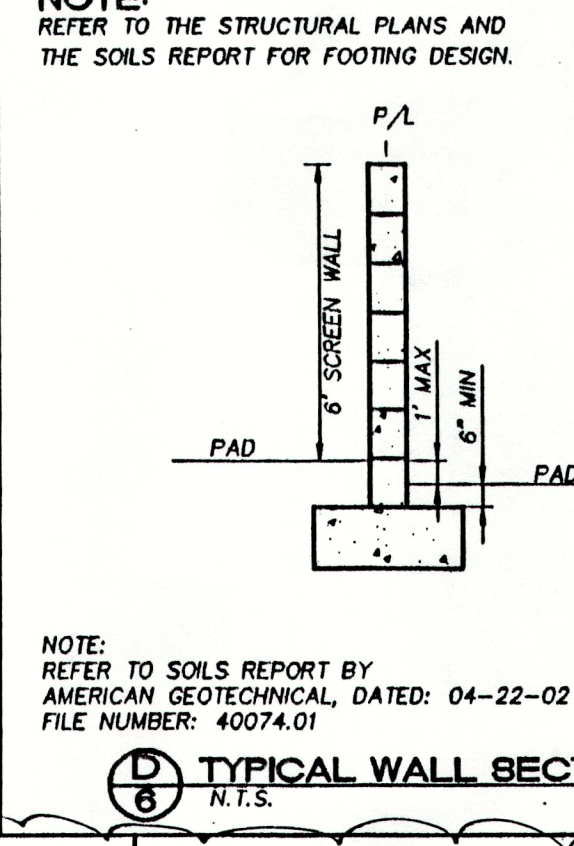
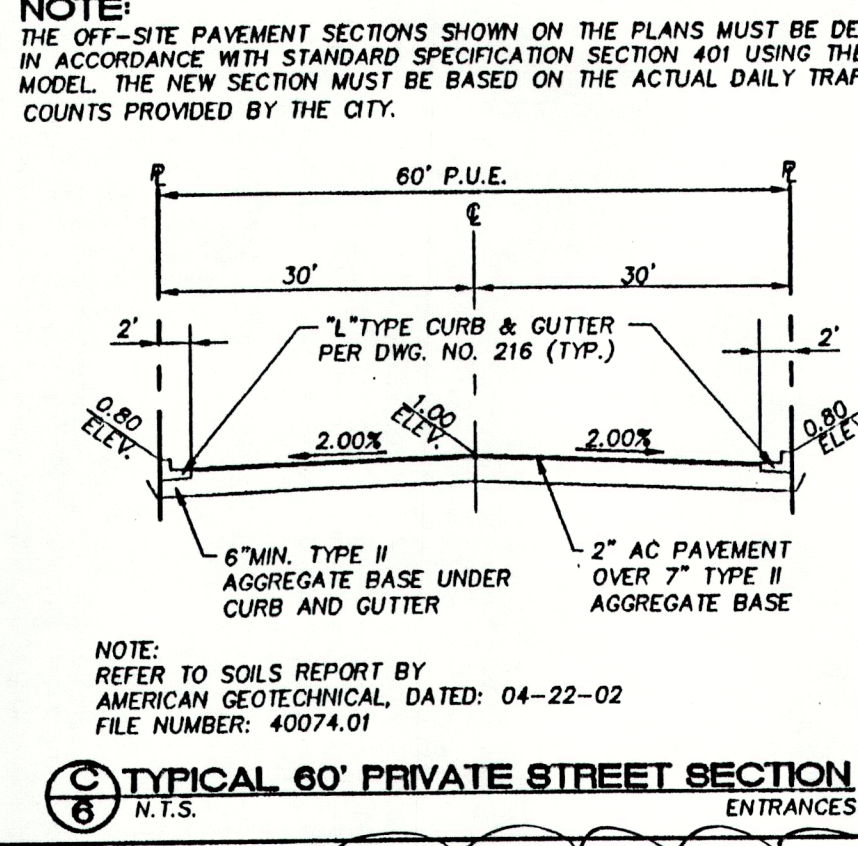
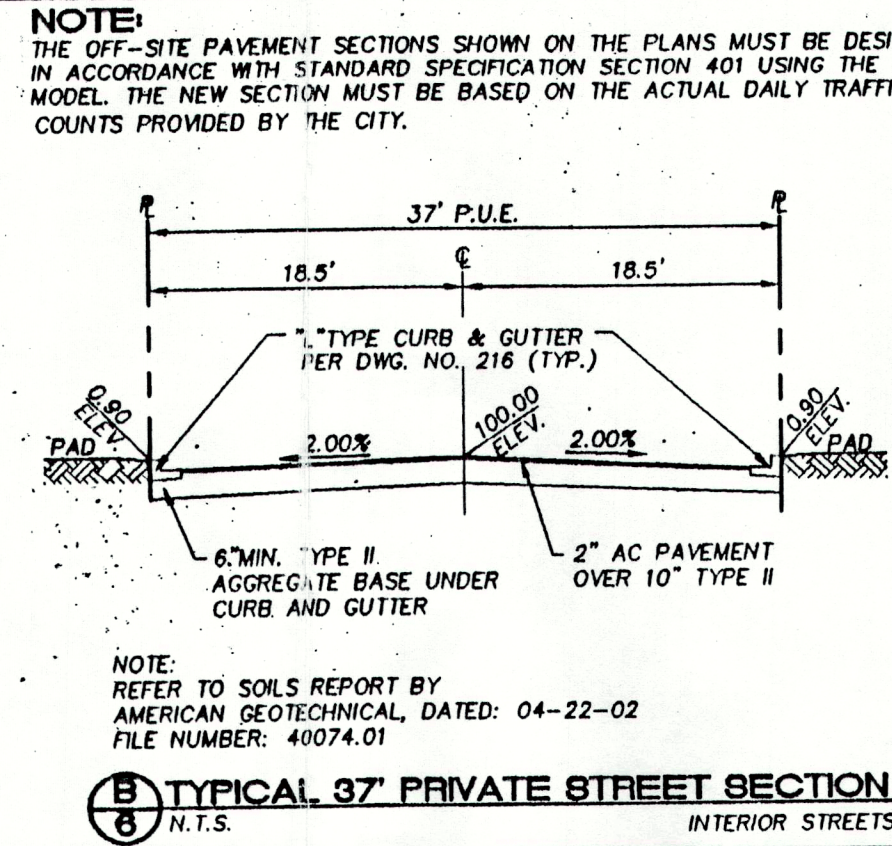
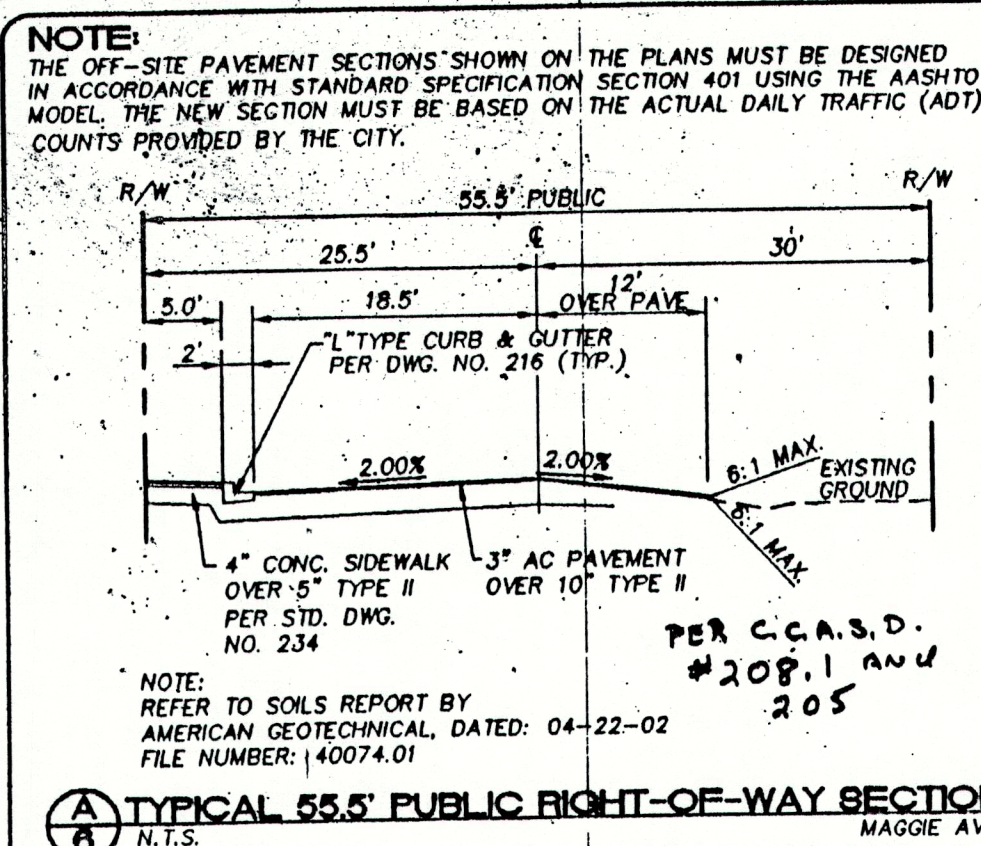
APPROVAL
CLARK COUNTY DEVELOPMENT SERVICES
DATE
CLV PROJECT # 8735

ORION ENGINEERING AND SURVEYING, INC.
3068 E. SUNSET ROAD, SUITE 9
LAS VEGAS, NEVADA 89120
(702) 739-5921 FAX (702) 739-5929

Orion

DESIGNED BY: CLV
CHECKED BY: ASP
DATE: 03-03-04
JOB NUMBER: 128-0201
REVISION:
NO. 1
DATE 6/1/04
BY 6/1/04
REASON: 1. 1/4" SCALE
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99. 1/4" SCALE
100. 1/4" SCALE

This grading plan is a part of drainage study #4554 which was received on 5/15/12 and signed on 5/15/12. Page 1 of 2.



NOTE:

ALL PRIVATE STREETS ARE CITY OF LAS VEGAS PUBLIC SEWER EASEMENTS AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY-MAINTAINED

BENCHMARK

THE CITY OF LAS VEGAS BENCHMARK NUMBER 1LVS098NS
BEING THE USUBA GRASS CAP AT THE INTERSECTION OF BUFFALO
AND IRON MOUNTAIN.

PUBLISHED ELEVATION (5/7/1993) = 744.7597 METERS NAVD 88 DATUM
CONVERTED ELEVATION (5/7/1993) = 2443.43 FEET NAVD 88 DATUM

PUBLISHED ELEVATION (2003) = 2442.790 METERS, 2443.33 FEET, NAVD 88 DATUM
CONVERSION EQUATION TO BE UTILIZED FOR THIS PLANSET IS AS FOLLOWS:
PLAN ELEVATIONS AS DEPICTED UPON PLANSET, MINUS 0.0307 METERS OR PLAN
ELEVATIONS MINUS 0.10 FEET EQUALS CITY LAS VEGAS NAVD 88 DATUM (2003)

BASIS OF BEARINGS

BEING THE WEST LINE OF THE SOUTH HALF (S1/2) OF SECTION 26,
TOWNSHIP 19 SOUTH, RANGE 61 EAST, M.D.M.3, CITY OF NORTH LAS
VEGAS, CLARK COUNTY, NEVADA, AS DEPICTED UPON FILE NO. RAGE
31 OF OFFICE PARCELS, MAPS, OFFICIAL RECORDS, CLARK COUNTY, NEVADA.
SAID LINE BEARS NORTH 0174°59' WEST.

DISCLAIMER NOTE

Utility cutting underground
utility lines. It's costly.
before you Dig

1-800-227-2600
underground service (usa)

Avoid overhead power
line contact.
before you Overhead

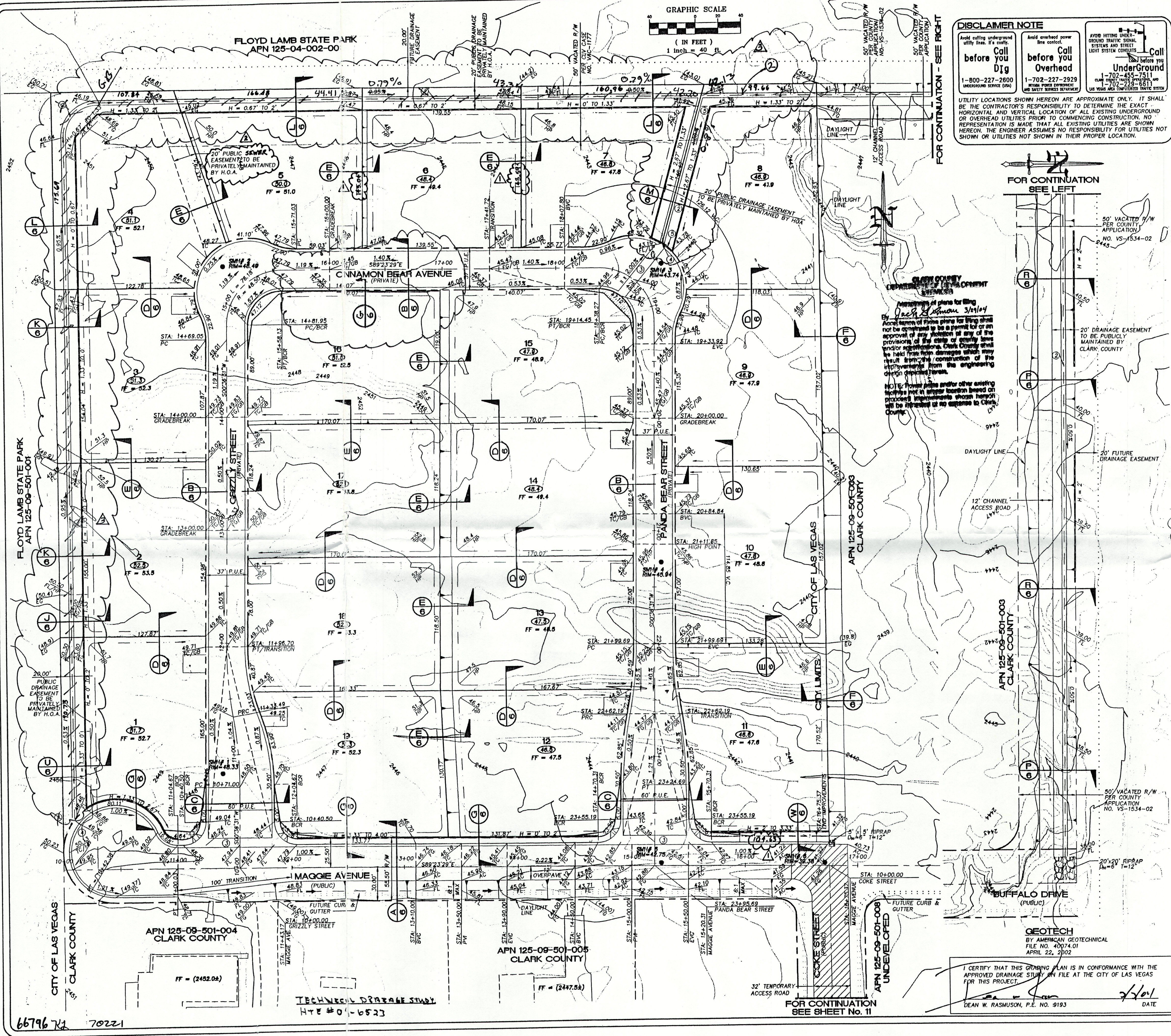
1-702-227-2929
overhead service department

AVOID HITTING UNDER-
GROUND TRAFFIC
SIGNALS AND STREET
LIGHT SYSTEM COMPONENTS

Call before you UnderGround

1-702-655-7575
CLARK COUNTY TRAFFIC OPERATIONS AND
1-702-655-5511
LAS VEGAS AREA COMMUTER TRAFFIC SYSTEMS

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL
BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT
HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND
UTILITIES PRIOR TO ANY CONSTRUCTION OR CONSTRUCTION OF ANY
REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN
HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT
SHOWN ON THIS PLANSET.



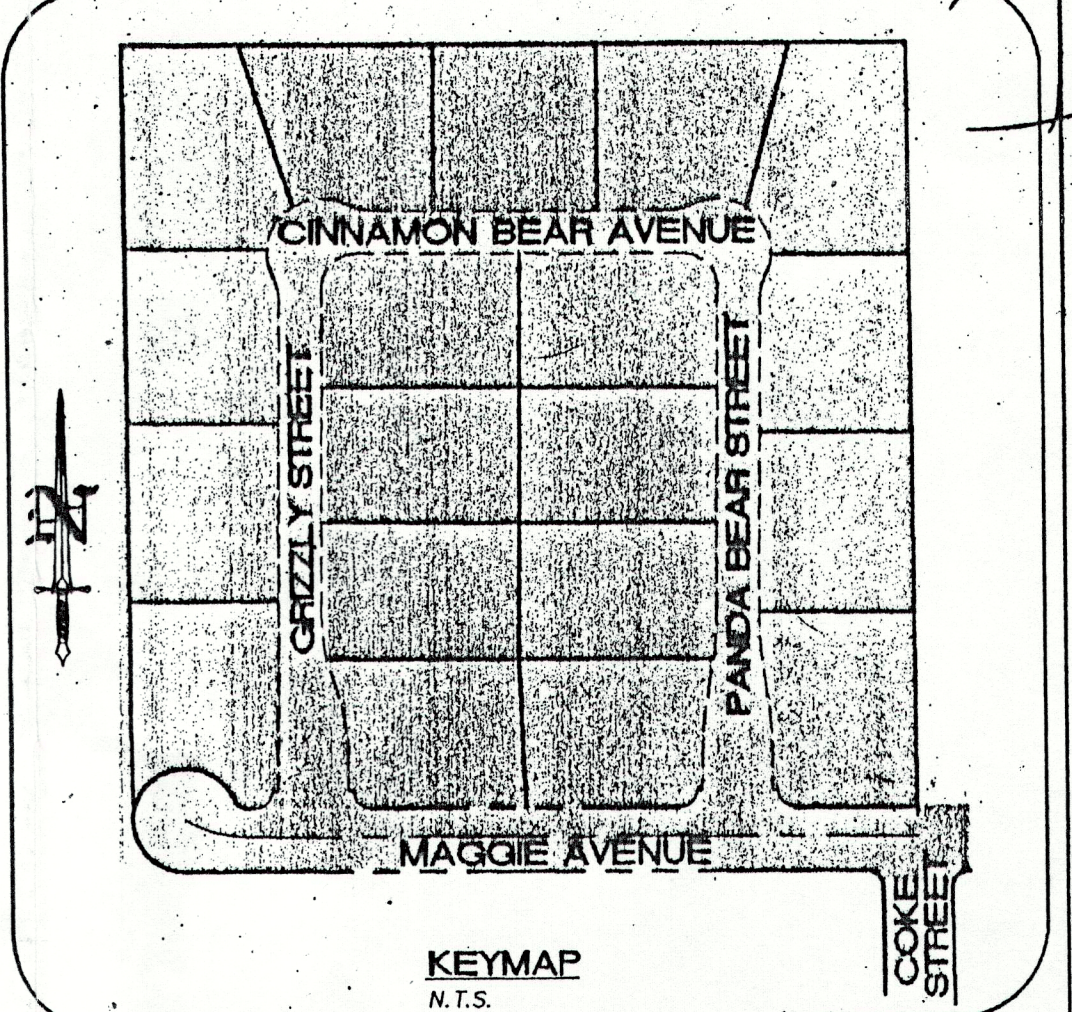
DISCLAIMER NOTE

Utility locations shown hereon are approximate only. It shall be the contractor's responsibility to determine the exact horizontal and vertical location of all existing underground or overhead utilities prior to commencing construction. No representation is made that all existing utilities are shown hereon. The engineer assumes no responsibility for utilities not shown or utilities not shown in their proper location.

Call before you Dig
1-800-227-2600
Underground Service (USA)

Call before you Overhead
1-702-227-2929
Nevada Power Corporation
(NVC) and Nevada Energy (NE)

Call before you UnderGround
1-702-455-7511
Clark County Water Services
(CCWS) and Clark County Sewer Services (CCSS)



- LEGEND**
- LOT LINE
 - PARCEL BOUNDARY
 - EXIST. CONTOUR (1' INTERVAL)
 - EXIST. CONTOUR (5' INTERVAL)
 - PROPOSED TOP OF CURB ELEVATION
 - PROPOSED FLOW LINE ELEVATION
 - PROPOSED FINISHED GRADE ELEVATION
 - EXISTING ELEVATION
 - PROPOSED RETAINING WALL
 - GRADE AND SLOPE DIRECTION
 - HEIGHT OF RETAINING WALL
 - RIP RAP PAD
 - 32' TEMPORARY ACCESS ROAD PER C.C.A.S. DWG. No. 209
 - FUTURE CURB & GUTTER
- NOTE:**
FOR S.V.R.Z. LINE, CURVE AND RADIAL LINE TABLE SEE TRAFFIC CONTROL PLAN - SHEET No. 14

- CONSTRUCTION NOTES**
- INSTALL 10" - 20" RIPRAP PAD - 6" THICKNESS - 12" N.O.T. VALLEY GUTTER
 - INSTALL 8" CROSS GUTTER PER DETAIL "M" SHEET 6
 - INSTALL DEPRESSIONED CURB PER STD DWG 227
 - INSTALL WROUGHT-IRON GATE PER DETAIL "N" SHEET 6
- NOTES:**
1. ALL PRIVATE STREETS ARE CITY OF LAS VEGAS PUBLIC SEWER EASEMENTS AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED.
2. THIS PROPERTY IS NOT IN A FLOOD ZONE.

- ADDITIONAL GEOTECHNICAL AND GRADING REQUIREMENTS**
- GEOTECHNICAL CERTIFICATION OF THE COMPLETED EARTHWORK IS REQUIRED IN ACCORDANCE WITH UNIFORM REGULATIONS FOR THE CONTROL OF DRAINAGE.
 - TRENCH BACKFILL RECOMMENDATIONS ARE REQUIRED PRIOR TO BACKFILL OF TRENCHES.
 - FISSURE REMEDIATION METHODS MUST BE SUBMITTED TO THE CITY OF NORTH LAS VEGAS GEOTECHNICAL ENGINEER FOR APPROVAL PRIOR TO IMPLEMENTATION.
 - ROCK BURIAL METHODS AND SITES MUST BE APPROVED BY THE CITY OF NORTH LAS VEGAS GEOTECHNICAL ENGINEER PRIOR TO IMPLEMENTATION.
 - USE TYPE 1 CEMENT, WITH A MAXIMUM WATER/CEMENT RATIO OF 0.45, AND A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,500 PSI.
 - "R" VALUES SHALL BE DETERMINED AT THE TIME OF GRADING.

- WALL NOTES**
- APPROVAL OF THESE PLANS BY THE CITY ENGINEER DOES NOT PERTAIN TO THE CONSTRUCTION OF NEW WALLS (RETAINING OR NON-RETAINING) OR MODIFICATIONS TO EXISTING WALLS.
 - ALL WALLS, NEW OR EXISTING, ARE REVIEWED BY THE CITY ENGINEER FOR GRADING RELATIONSHIP ONLY.
 - THE CONTRACTOR MUST VERIFY THE LOCATION, HEIGHT AND TYPE OF ALL WALLS PRIOR TO CONSTRUCTION.
 - THE CONTRACTOR MUST VERIFY THAT ALL RETAINING WALL AND DECORATIVE WALL DESIGNS AND CALCULATIONS ARE APPROVED WITH A PERMIT OBTAINED FROM THE DEPARTMENT OF BUILDING AND SAFETY. APPROVAL OF THE CIVIL PLANS BY THE DEVELOPMENT AND FLOOD CONTROL DIVISION DOES NOT IMPLY APPROVAL OF THE WALL DESIGN.
 - SUBGRADE PREPARATION UNDER WALL FOOTINGS AND WALL BACKFILL TO BE IN ACCORDANCE WITH THE APPROVED GEOTECHNICAL REPORT FOR THIS SITE.
 - FOOTING DEPTHS AND SETBACKS OF BLOCK AND/OR RETAINING WALLS ARE PER GEOTECHNICAL REPORT PREPARED BY AMERICAN GEOTECHNICAL, W.O. 40074.01, DATED APRIL 22, 2002.
 - MOISTURE/WATER PROTECTION BARRIERS ARE PER GEOTECHNICAL REPORT PREPARED BY AMERICAN GEOTECHNICAL, W.O. 40074.01, DATED APRIL 22, 2002.

BASIS OF BEARING
BEING THE EAST LINE OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 09, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, SAID LINE BEARS SOUTH 00°25'50" EAST.

BENCHMARK
THE CITY OF LAS VEGAS BENCHMARK NUMBER 11V9098S BEING THE USBLM BRASS CAP AT THE INTERSECTION OF BUFFALO AND IRON MOUNTAIN.

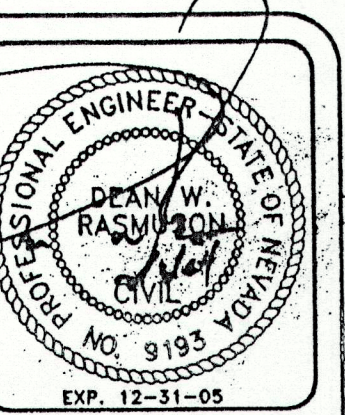
PUBLISHED ELEVATION (5/7/1993) = 744.7597 METERS NAVD 88 DATUM
CONVERTED ELEVATION (5/7/1993) = 2443.43 FEET NAVD 88 DATUM

PUBLISHED ELEVATION (2003) = 744.7290 METERS, 2443.33 FEET, NAVD 88 DATUM
DATUM CONVERSION EQUATION TO BE UTILIZED FOR THIS PLANSET IS AS FOLLOWS:
PLAN ELEVATIONS AS DETICED UPON PLANSET, MINUS 0.0307 METERS OR PLAN ELEVATIONS MINUS 0.10 FEET EQUALS CITY LAS VEGAS NAVD 88 DATUM (2003)

APPROVAL

CLARK COUNTY DEVELOPMENT SERVICES

DATE



DESIGNED BY/C/L	DRAWN BY/C/L	DATE	DATE	DATE
DAVID A. DWYER	DAVID A. DWYER	12/11/04	12/11/04	12/11/04
CHECKED BY/C/L	JOB NUMBER	128-0201	BY	DATE
DAVID A. DWYER	NO.	128-0201	DAVID A. DWYER	12/11/04
REVISION	REVISION	REVISION	REVISION	REVISION
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5

GRADING PLAN

COKE AND CONOUGH

BUILDING THE AMERICAN DREAM CORP.

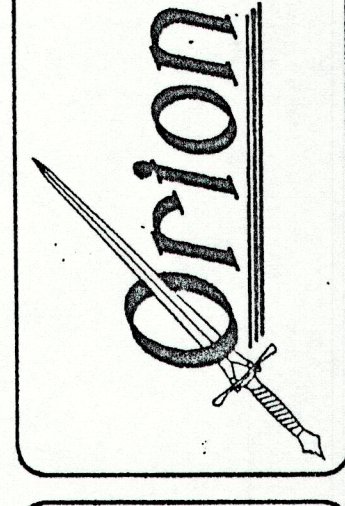
CITY OF LAS VEGAS

ORION ENGINEERING AND SURVEYING, INC.

3068 E. SUNSET ROAD, SUITE 9

LAS VEGAS, NEVADA, 89120

(702) 739-5921 FAX (702) 739-5929



SHEET 5

of 18

This grading plan is a part of drainage study #4554 which was reported on 6/4/12 and App'd on 6/12/12. Page 1 of 2