DS #: 4562

APN: 139-26-201-004

PROJECT: A-Cab

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS **INTER-OFFICE MEMORANDUM**				**DATE:** **August 2, 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: **A-Cab**			**COPIES TO:** APTUS
Cross Streets:	SWQ of Bruce Street & Searles Avenue			Four Fours LLC
File Number:	F:\Depot\DSMemos\DS4562.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-26-201-004			
Zoning Action:	SDR-43399			
FEMA Flood Zone	YES	NO	**X**	
Proposed Storm Drain	YES	NO	**X**	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	7/19/2012	8/2/2012	See Comments Below	$400.00	290121: $400
			TOTAL FEES (LDDRS):	**$400.00**	**----**

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:
X	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

1. Provide a copy of the zoning/planning conditions (**SDR-43399**) associated with this site with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.

2. The notion of 10% split of the Q_{100}=70cfs from Basin B1 into Basin B2 had not been clearly demonstrated in the subject drainage study. The flow split should be done in a few methods to support the final conclusion. Calculations such as weir flow and the Pima County split flow method are acceptable.

   It appears that more survey shots / street grades are needed in Gragson Avenue upstream of the subject site to verify the location and width of the proposed weir for the split flow.

3. The proposed 20'-drainage easement must be labeled as "Public Drainage Easement to be Privately Maintained" on the grading plan and to be granted as such by separate document prior to the final approval of the drainage study.

4. The slope in the proposed drainage easement indicates very flat conveyance, ie, less than 1%. Provide a 2'-wide concrete valley gutter within the drainage easement. Provide hydraulic calculation to verify that the total width of the drainage easement contains the 100-year flow.

5. The FlowMaster calculation for the onsite drainage easement used a channel slope of 1% which as stated in Comment #4 is not correct. The actual slope in the drainage easement ranges from 0.25% to 0.8%. Review and re-calculate accordingly.

6. Revise the bar scale to show "**1 inch = 30 ft**." instead of "1" = 40 ft.".

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: 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: T20S/R61E/26
AREA M-26

****
*** FAX TX REPORT ***
****

TRANSMISSION OK

JOB NO.	4526
DESTINATION ADDRESS	8391213
PSWD/SUBADDRESS	
DESTINATION ID	
ST. TIME	08/02 16:26
USAGE T	02'11
PGS.	2
RESULT	OK

CITY OF LAS VEGAS **INTER-OFFICE MEMORANDUM**				**DATE:** **August 2, 2012**
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   It appears that more survey shots / street grades are needed in Gragson Avenue upstream of the subject site to verify the location and width of the proposed weir for the split flow.

Rec'd: 7/19/12

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

DS4562

Name of Development: **A-Cab** Date: **5/20/2012**

Location of Development: a) Descriptive (Cross Streets) North/South **Searles Ave** East/West **Las Vegas Blvd.**
b) Sect. **26** Twn. **20 S** Rng. **61 E**

M-26

Name of Owner: **Four Fours LLC** Assessors Parcel No: **139-26-201-004**

Telephone No.: **702-277-1333** Facsimile No.:

$400

Address: **1500 Searles Avenue**

Las Vegas NV 89032

Contact Person Name: **Landon Christopherson** Telephone No: **702-839-1200**

SDR-43399

Firm: **APTUS**

Address: **1200 South 4th Street, Las Vegas, Nevada 89104**

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	XX	Building Permit		

1. Total Owned Land Area: At Site: **1.94 +/- ac** Being Developed/Disturbed: **1.94 +/- ac**

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

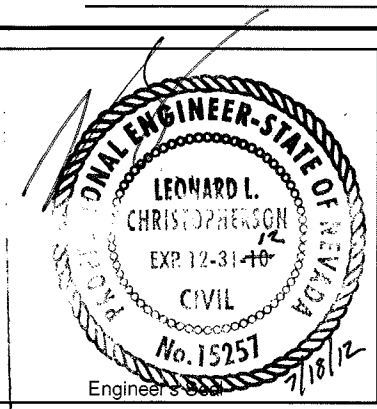
4. Proposed type of development (Residential, Commercial, Etc.)? **Commercial**

5. Approximate upstream land area which drains to the subject site? **28 +/- ac**

6. Has the site drainage been evaluated in the past? YES NO If yes, please identify documentation:

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
Onsite runoff will discharge to right-of-way.

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.

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

Revision	Date

Local Entity File No.

Reference: **STANDARD FORM 1**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: **A-Cab**	Map ID: 139-26-201-004
Firm Name: **APTUS**	Engineer: **Landon Christopherson**
Address: **1200 S. 4th Street**	
City: **Las Vegas**	State: **NV** Zip: **89104**
Phone Number: **702-839-1200**	Fax Number: **702-839-1213**
Property Owner: **Four Fours LLC**	
Address: **1500 Searles Avenue**	
City: **Las Vegas**	State: **NV** Zip: **89032**

Reviewed by:	Date Received:	Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

This document is intended as an aid in preparing Technical Drainage Studies. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all includsive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT

Yes	No	
X		Design Manual **Standard Form 1** with the engineer's seal and signature.
X		Design Manual **Standard Form 4.**
X		2 copies of the 24" x 36" Drainage Plan.
	X	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge. *No Offsite Grading is required

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS

Yes	No	
X		A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
X		A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.
X		Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
X		On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
X		Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes	No	
X		Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
X		Minimum scale: 1" = 50'.
X		Project Name.
X		Vicinity Map with local and major cross streets.
X		Revision box.
X		North arrow and bar scale.
X		Engineer's/consultant's address and phone number.
X		Elevation datum and benchmark.
X		Legend for symbols and abbreviations.
X		Cut/fill scarps, where applicable.
X		Street names, grades, widths.
X		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
X		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where applicable.
X		Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
X		Proposed typical street sections.
N/A		Streets with off-set crowns.
X		Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
X		Property Lines.
X		Right-of-way lines and widths, existing and proposed.
X		Existing improvements and their elevations.
X		Delineation of proposed onsite drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
X		Concentration points and drainage flow direction with Q100 and V100 and D100 in streets.
X		Cumulative flows, velocity , and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
X		Location and cross-section of street capacity calculations.
X		Cross-sectional detail for channels, including cutoff wall locations.
X		Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
X		Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
N/A		Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
N/A		Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
X		Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
X		Building and/or lot numbers.
N/A		Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
X		Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.
N/A		For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
N/A		Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
X		Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.

IV. HYDROLOGIC ANALYSIS

Yes	No	
X		Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
X		Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
X		Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
X		Use of correct precipitation values in and around the McCarran Airport rainfall area.
X		A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
X		A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
X		Copies of supporting technical information referenced form a previously approved study and a statement accepting these results.
X		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
X		Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
X		Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v $\leq$ 8. Q_{10} d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
X		A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
N/A		Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
X		Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection loses, where appropriate.
X		Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, which ever is greater.
X		A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
N/A		Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
N/A		Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
X		The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.

REFERENCE:	STANDARD FORM 2

TECHNICAL DRAINAGE STUDY
FOR
A-CAB TAXI FACILITY
(APN# 139-26-201-004)

Prepared for:
A-Cab
1500 Searles Avenue
Las Vegas, NV 89101

Prepared by:
Aptus
1200 South 4th Street #108
Las Vegas, Nevada 89104

March 2012

TABLE OF CONTENTS

LIST OF APPENDICES

I. INTRODUCTION

This report has been prepared as the *TECHNICAL DRAINAGE STUDY FOR THE A-CAB TAXI FACILITY,* a site located approximately 590 feet west of the intersection of Searles Avenue and Bruce Street within The City of Las Vegas. The objective of this study is to establish a technical analysis of peak flow rates affecting the site under existing drainage conditions. This analysis includes both the proposed and existing conditions of offsite drainage patterns and flow rates for use as the basis of technical design for permanent flood protection facilities, setting finish floor elevations and determination of impacts to adjacent properties.

II. GENERAL INFORMATION

A. Site Location

The existing 1.94-acre commercial development is located within a portion of the northwest quarter (NW 1/4) of Section 26, Township 20 South, Range 61 East M.D.M., Clark County, Nevada (APN# 139-26-201-004). More specifically, the site is located approximately 590 feet west of the intersection of Searles Avenue and Bruce Street within The City of Las Vegas (see **Figure 1**). Full street improvements of Searles Avenue border the site on the north, developed sites to the east, and west with Gragson Avenue to the south.

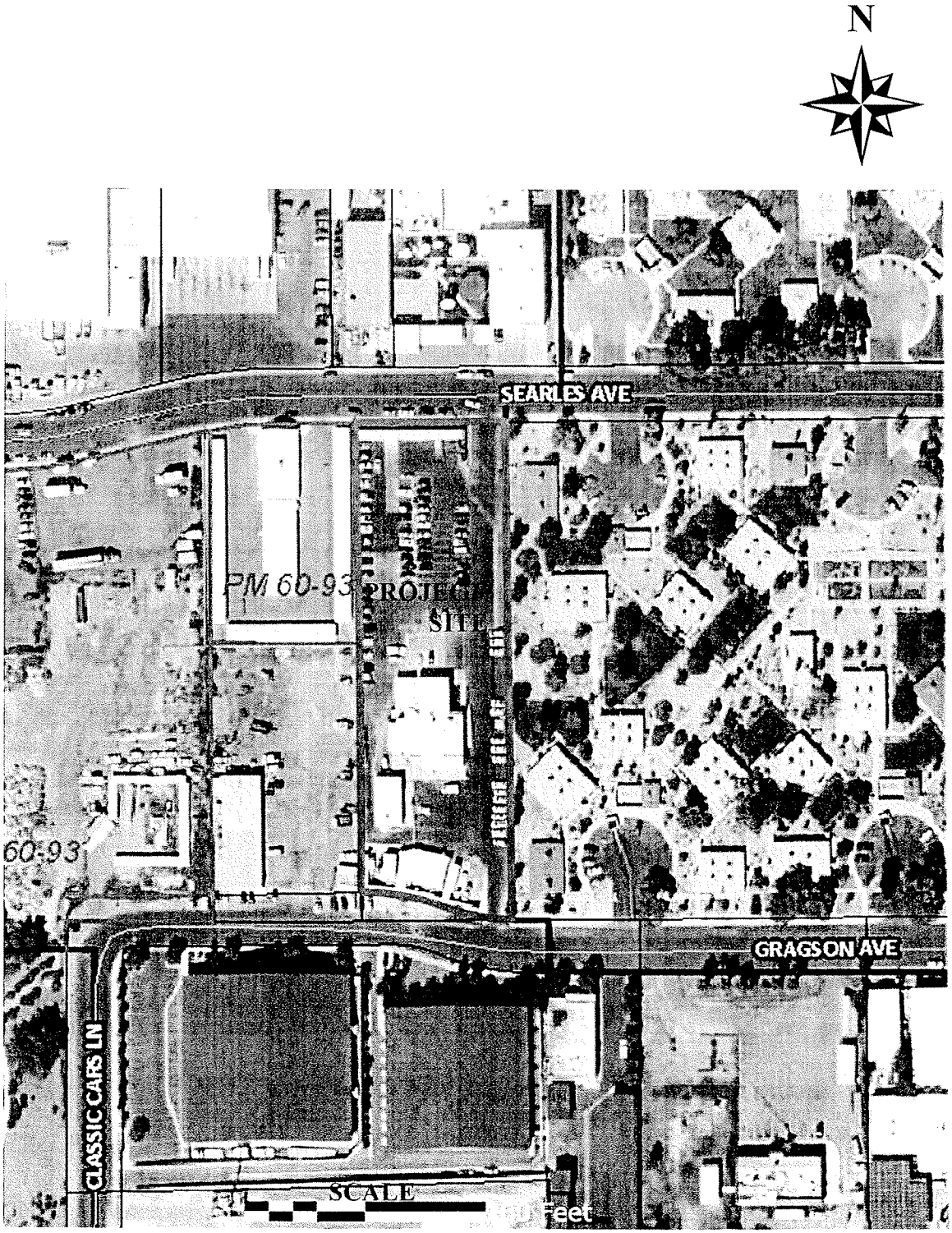
B. Project Description

The existing development is a 1.94-acre, commercial development (APN# 139-26-201-004).

C. CCRFCD Master Plan Information

The subject property is not located near a Clark County Regional Flood Control District (CCRFCD) Master Planned facility (See **Figure 2**)..

Figure 1


N
SEARLES AVE
PM 60-93
PROJECT SITE
60-93
GRAGSON AVE
CLASSIC CARS LN
SCALE
Feet

D. FEMA Floodplain Information

Figure 3 is a reproduction of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for Clark County, Nevada, Community-Panel Number 32003C2170E, effective date November 16, 2011. The site lies within an area designated by FEMA as Zone X. Zone X is described as outside the 100-year event.

III. HYDROLOGIC ANALYSES

The rainfall and runoff data developed in this study was prepared for use with the HEC-1 Flood Hydrograph computer program. This is in accordance with the CCRFCD Hydrologic Criteria and Drainage Design Manual (CCRFCD, 1999). The methodology and calculations used to determine the hydrologic parameters and the HEC-1 runoff models are included in **Appendix**.

IV. EXISTING DRAINAGE CONDITIONS

The site is bordered by existing developments, to the east and west. The site is developed with the flows split and moving to the northeast and southeast to the entrances to the property. The offsite basins do not directly flow to the site, the majority of the flows are channeled to dedicated right-of-way. This flow splits slightly at the property adjacent to the west boundary and those flows are channeled through the site to Searles Avenue.

Using the latest neighborhood master study from the City of Las Vegas and based on meetings with staff, the flows coming from offsite basins "B1" Q100=70 cfs and "B2" Q100=3.4 cfs. Flows from offsite basin "B1" split at the midpoint of "B2" and combines with the flows of that basin and flow through the site. Based on the depth of flow of 0.76' and the flows topping the existing grade by 0.06' the "B1" basin split at SP1 is 90% heading west down Gragson Avenue and 10% flowing through the project site. Therefore the flows are as follows: Gragson Avenue – Q100=63 cfs; Basin "B2" total flow Q100=10.4 cfs. Onsite basin is split into two basins ONE1 Q100=3.2 cfs and ONE2 Q100=3.2 cfs. Flows from B2 combine with ONE1 and flow to Searles Avenue, while ONE2 flows to Gragson Avenue. See Figure F4.

V. FUTURE CONDITIONS

The onsite developed basins maintain the flows of the existing basins; the flows go to the two entrances to the northeast and southeast. The finish floor elevation of the existing building does not change as it is already elevated. The finish floor of the proposed maintenance facility will be raised per the requirements set per the onsite flows and shown on the grading plan included in the **Appendix**.

The depth of flow calculations for onsite, Searles Avenue and Gragson Avenue are included in the **Appendix**. The worst case depth in Gragson Avenue at the southeast corner of the property is 0.62' in the developed 100 year storm. The site keeps the flows in the right-of-way of Gragson Avenue with an existing floodwall that is 0.76' higher than the highest water surface elevation. The onsite flows are conveyed through drainage easement and the depth of flows are included in the **Appendix**.

VI. CONCLUSION

This study presents the findings of a detailed evaluation of the existing and future drainage conditions of the existing 1.94-acre commercial development

This study details offsite and onsite flow patterns. The study demonstrates that the site will be able to convey the 100-year peak flow rate under the conditions set forth by the CCRFCD Hydrologic Criteria and Drainage Design Manual.

The finished floor elevations will be set a minimum vertical distance of twice the depth of flow based on the depth of flow, calculations included in **Appendix,** of the adjacent swales.

The further development of the 1.94-acre commercial development site will not have an adverse impact on downstream properties.

VII. REFERENCES

CCRFCD (1999). *Hydrologic Criteria and Drainage Design Manual.* Prepared by: WRC Engineering, for: Clark County Regional Flood Control District, 1999.

HAESTAD (1994). Flow Master Version 5.11 Haestad Methods, Inc., 1994

HEC (1990). *HEC-1 Flood Hydrograph Package Version 4.0,* U.S. Army Corps of Engineers, Hydrologic Engineering Center, September, 1990.

SCS (1985). *Soil Survey of Las Vegas Valley Area.* U.S. Department of Agriculture, Soils Conservation Services, July, 1985.

APPENDIX I
DEVELOPMENT OF HYDROLOGIC PARAMETERS

RATIONAL FORMULA METHOD RUNOFF COEFFICIENTS AND AVERAGE PERCENT IMPERVIOUS AREA

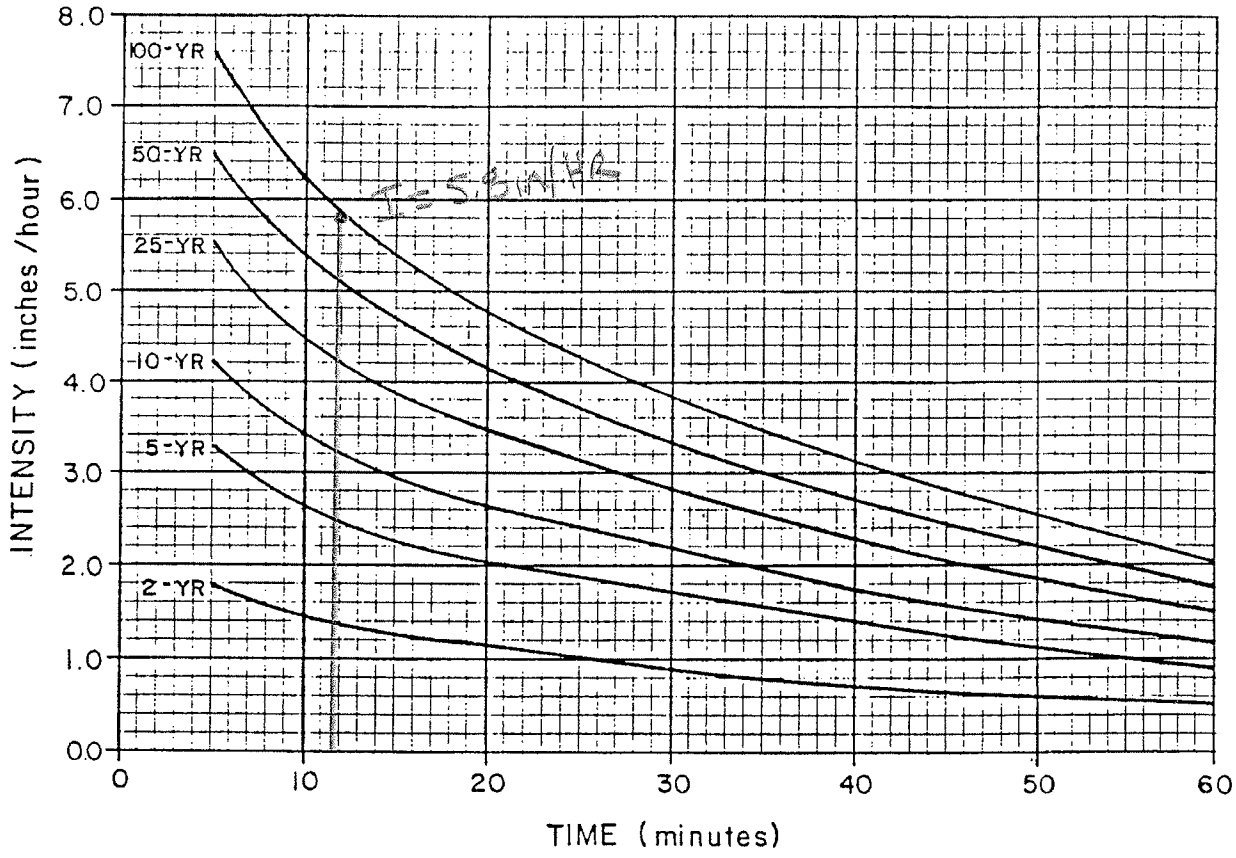
LAND USE OR SURFACE CHARACTERISTICS	AVERAGE PERCENT IMPERVIOUS AREA	RUNOFF COEFFICIENTS 10-YEAR		100-YEAR	
		GRASS[1]	DESERT[2]	GRASS[1]	DESERT[2]
Business and Commercial:					
Downtown Areas	95	.88	.88	.89	.89
Neighborhood Areas	70	.70	.75	.80	.83
Residential (Average Lot Size):					
1/8 Acre or less (Multi-Unit)	65	.68	.73	.78	.80
1/4 Acre	38	.55	.62	.65	.74
1/3 Acre	30	.50	.57	.60	.70
1/2 Acre	25	.45	.53	.55	.67
1 Acre	20	.40	.49	.50	.64
2 Acre	12	.35	.45	.40	.60
Industrial:	72	.72	.76	.82	.84
Open Space: (Lawns, Parks, Golf Courses)	5	.10	-	.30	-
Undeveloped Areas: (Natural Vegetation)	0	-	.25	-	.50
Streets and Roads:					
Paved	100	.90		.93	
Gravel	20	.40		.50	
Drives and Walks:	95	.88		.89	
Roofs:	90	.85		.87	

Notes:

1 Grass - Grassed Landscaping or Irrigated Vegetation
2 Desert - Desert Landscaping or Natural Vegetation

Revision	Date

TIME-INTENSITY-FREQUENCY CURVES FOR McCARRAN AIRPORT RAINFALL AREA

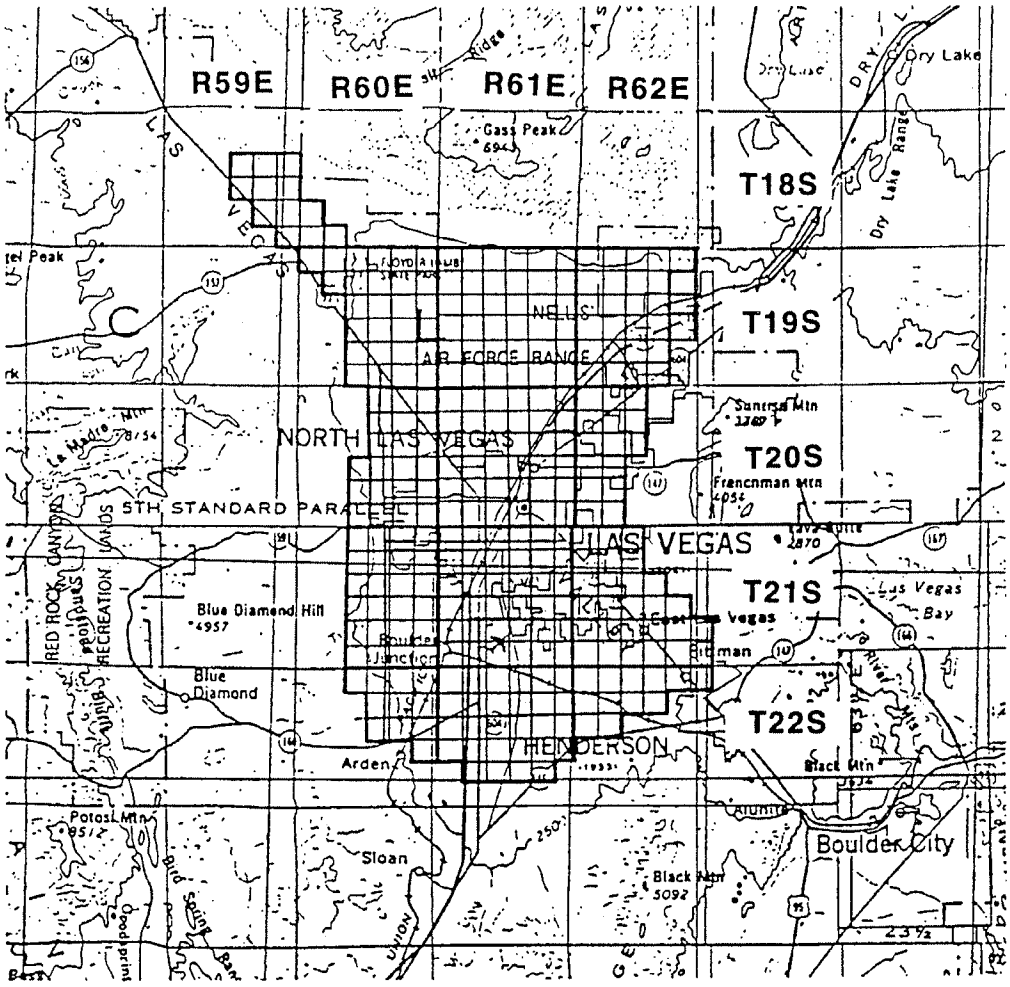


NOTE: 1. Refer to Table 506 for tabulation of Time-Intensity-Frequency Values.

Revision	Date

WRC ENGINEERING	REFERENCE: USACE, Los Angeles District, 1988	FIGURE 517

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP	RANGE	SECTIONS	TOWNSHIP	RANGE	SECTIONS
18 South	59 East	13-15,22-26,36	20 South	62 East	4-9,16-20,29-32
18 South	60 East	30-32	21 South	60 East	1-4,9-16,21-28,33-36
19 South	60 East	1-6,8-16,21-28,33-36	21 South	61 East	ALL SECTIONS
19 South	61 East	ALL SECTIONS	21 South	62 East	4-9,15-23, 25-36
19 South	62 East	2-11,14-23,27-34	22 South	60 East	1-4,10-15,24
20 South	60 East	1-3,10-15,21-28,33-36	22 South	61 East	1-24,26-29
20 South	61 East	ALL SECTIONS	22 South	62 East	1-10,17-18

Notes:
1. Refer to Table 505 and Figure 516 Depth-Duration- Frequency values in the McCarran Airport Rainfall Area.
2. Refer to Table 506 and Figure 517 for Time-Intensity-Frequency values on the McCarran Airport Rainfall Area.

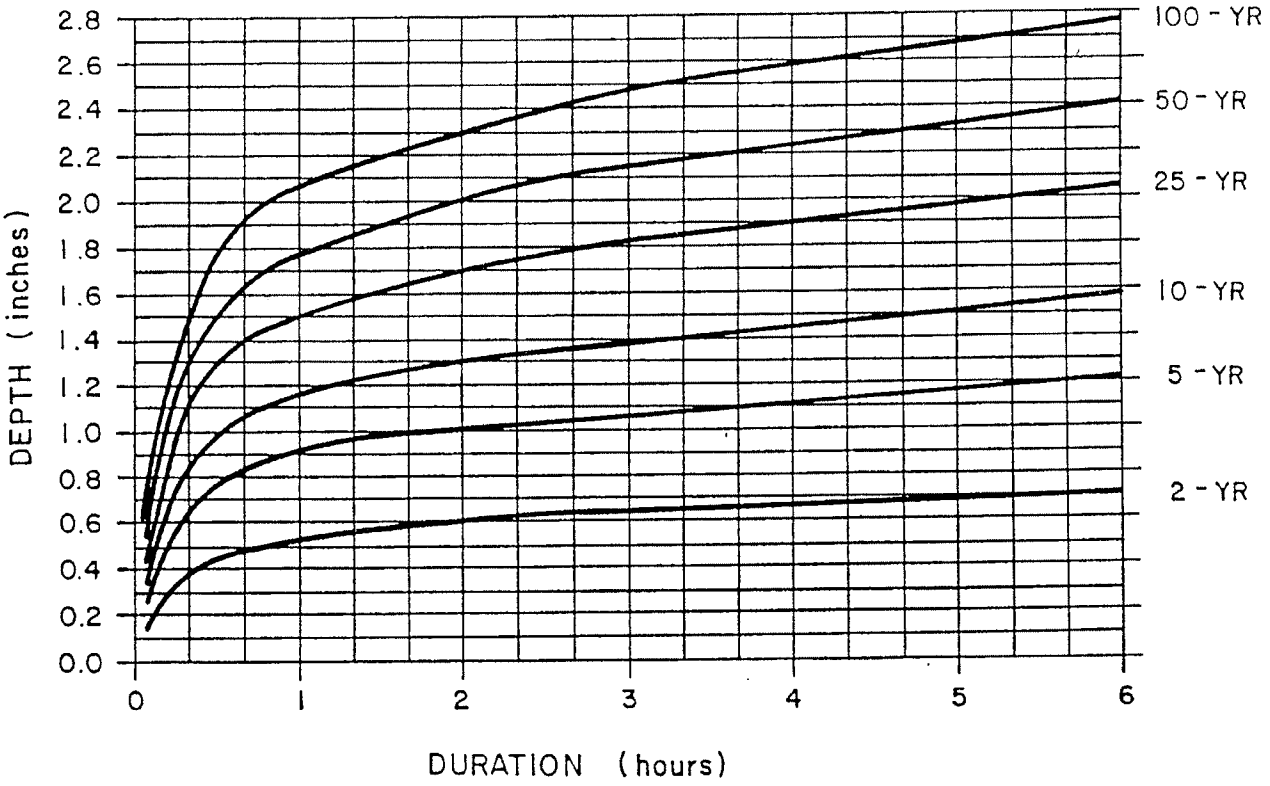
Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

DEPTH-DURATION-FREQUENCY CURVES FOR McCARRAN AIRPORT RAINFALL AREA



NOTES: 1. Refer to Table 505 for tabulation of depth-duration-frequency values.

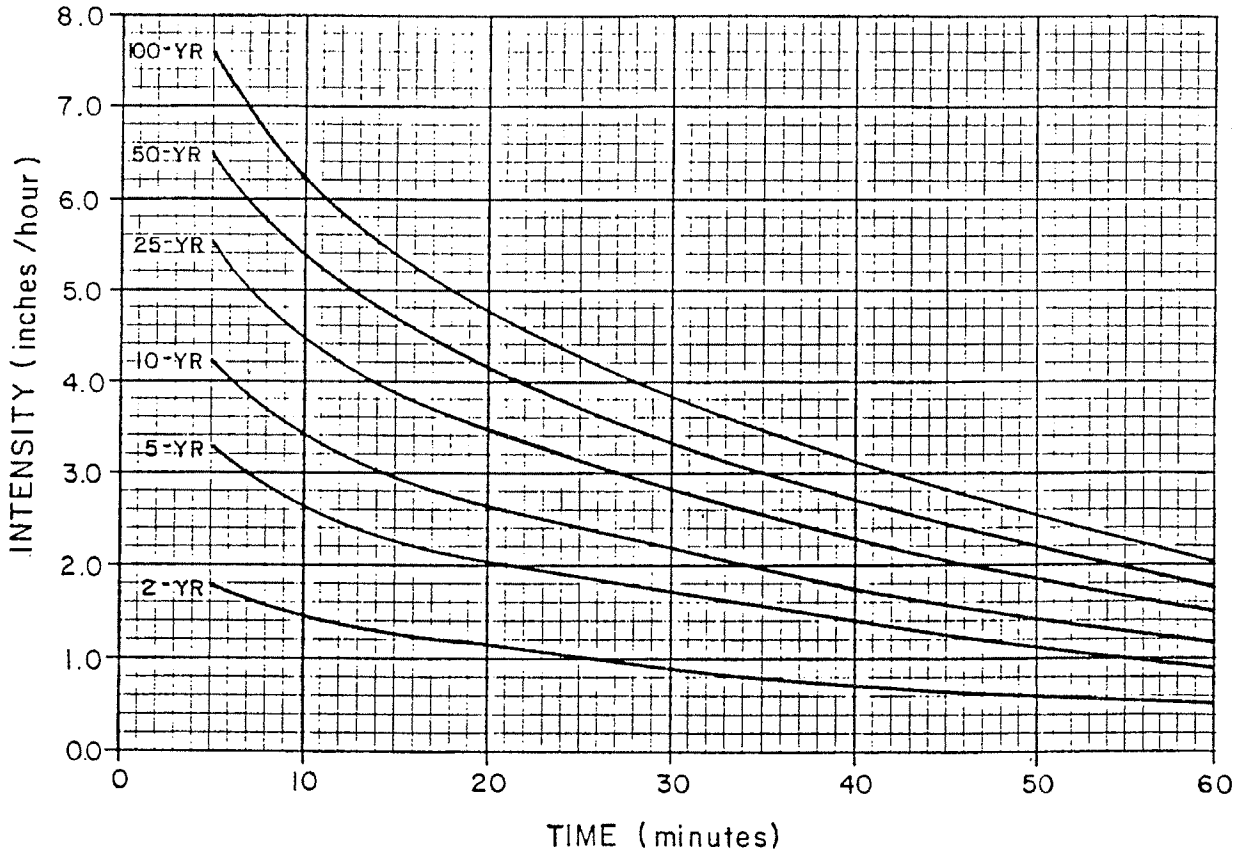
Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 516

TIME-INTENSITY-FREQUENCY CURVES FOR McCARRAN AIRPORT RAINFALL AREA



NOTE: 1. Refer to Table 506 for tabulation of Time-Intensity-Frequency Values.

Revision	Date

WRC ENGINEERING	REFERENCE: USACE, Los Angeles District, 1988	FIGURE 517

RAINFALL METHODOLOGY

A. Point Rainfall

The 100-year, 6-hour depth-duration-frequency values for the area located within the McCarran Airport Rainfall area was obtained from Figure 513 from the CCRFCD Hydrologic Criteria and Drainage Design Manual. Table 501 (CCRFCD, 1999) was used to adjust this value to be 2.77. The above tables and figures are shown within this Appendix.

The HEC-1 multi-ratio option (HEC, 1990) was used to model the 10 and 100-year design storms in the HEC-1 input file. The HEC-1 JR card was used to specify the precipitation by which to multiply the 100-year precipitation (point rainfall) values. The 10 and 100-year ratio are 0.57 and 1.00, respectively.

B. Storm Distribution

Table 503 in CCRFCD Manual specifies that the 6-hour storm distribution, SDN 3 should be used for drainage areas less than ten square miles.

RUNOFF METHODOLOGY

A. Lag Time

A CCRFCD Standard Form 4 (included) was completed to determine the time of concentration for each drainage basin. For all onsite subbasins which comprise less than 1 square mile, the time of concentration was calculated as follows:

$$T_c = T_i + T_t$$

Where: T_c = Time of Concentration
T_i = Initial, inlet or overland flow time
T_t = Travel time in the ditch, gutter, etc.

Initial flow time was calculated as follows:

$$T_i = 1.8(1.1 - K)L_o^{1/2}/S^{1/3}$$

Where: T_i = Initial overland flow time (minutes)

$$K = 0.0132 * CN - 0.39$$

CN = Curve Number

L_o = Length of overland flow (max. 500 feet)

S = average basin slope (percent)

The lag time was calculated as follows:

$$T_{lag} = 0.6Tc \text{ (hours)}$$

B. Soils -- Curve Number Determination

Curve number used from the referenced study.

APPENDIX II
FIGURES

APPENDIX III
TIME OF CONCENTRATION – STANDARD FORM 4
EXISTING/FUTURE CONDITIONS

TIME OF CONCENTRATION

STANDARD FORM 4

DEVELOPMENT: A-Cab CALCULATED BY: CMB DATE: January 19,2010

SUB-BASIN DATA				INITIAL / OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)		FINAL t_c
DES.	C10	AREA	AREA	LEN.	SLOPE	t_i	LEN	SLOPE	VEL (V_1)	VEL (V_2)	t_t	TOTAL LENGTH	t_c=(L/180) +10	
		Ac	Sq Mi	Ft	%	Min	Ft	%	fps	fps	Min	Ft	Min	Min
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10a)	(10b)	(11)	(12)	(13)	(14)
DEVELOPED ONSITE														
B1	0.8800	27.00	0.0422	500	2.00	7.03	950	2.00	2.86	4.33	4.65	1450	18.06	11.68
B2	0.8800	1.00	0.0016	245	2.00	4.92	0	0.00	0.00	N/A	0.00	245	11.36	5.00

	Travel Time Velocity Formulas*		* - See CCRFCD HC&DDM Sec. 602.1
K = 0.0132*CN-0.39 $t_t = t_c*0.6$	Existing	Developed	For the travel time (T_t) calculations:
t_i = 1.8(1.1-K)L^1/2/S^1/3	V_1 = 14.8*(S/100)^1/2	V_1 = 20.2*(S/100)^1/2	V_1 applies to the first 500 feet of travel distance
Velocity obtained from Manning's Equation	V_2 = 29.4*(S/100)^1/2	V_2 = 30.6*(S/100)^1/2	V_2 applies to the remaining travel distance

APPENDIX IV
EXISTING/DEVELOPED FLOW EXHIBIT & OFFSITE BASIN CALCULATIONS

Per a meeting with Peter Jackson on January 19, 2010.....

For basin B1:

Q=KCIA

K=0.5 (Local Factor per Section 604.3 of Hydrological Criteria and Drainage Design Manual)

C=0.89 (Runoff Coefficient for Business and Commercial Downtown Areas in 100 year event)

A= 27 acres

Tc= 11.68 minutes (See attached Standard Form 4)

I_{100}=5.8 in/hr

Q_{100}=(0.5)*(0.89)*(5.8)*(27) =70 cfs

For basin B2:

Q=KCIA

K=0.5 (Local Factor per Section 604.3 of Hydrological Criteria and Drainage Design Manual)

C=0.89 (Runoff Coefficient for Business and Commercial Downtown Areas in 100 year event)

A= 1.0 acres

Tc= 5.0 minutes (See attached Standard Form 4)

I_{100}=7.6 in/hr

Q_{100}=(0.5)*(0.89)*(7.6)*(1.0) =3.4 cfs

NOTES

This map is for assessment use only and does NOT represent a survey.

No liability is assumed for the accuracy of the data delineated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

0 50 100 200 400 600 800

MAP LEGEND

AVERAGE OA VALUE 45

PARCEL BOUNDARY
SUBD BOUNDARY
ROAD EASEMENT
PM/LD BOUNDARY
NON-PARCEL LOT LINE
MATCH LINE / LEADER LINE
ROAD ID NUMBER

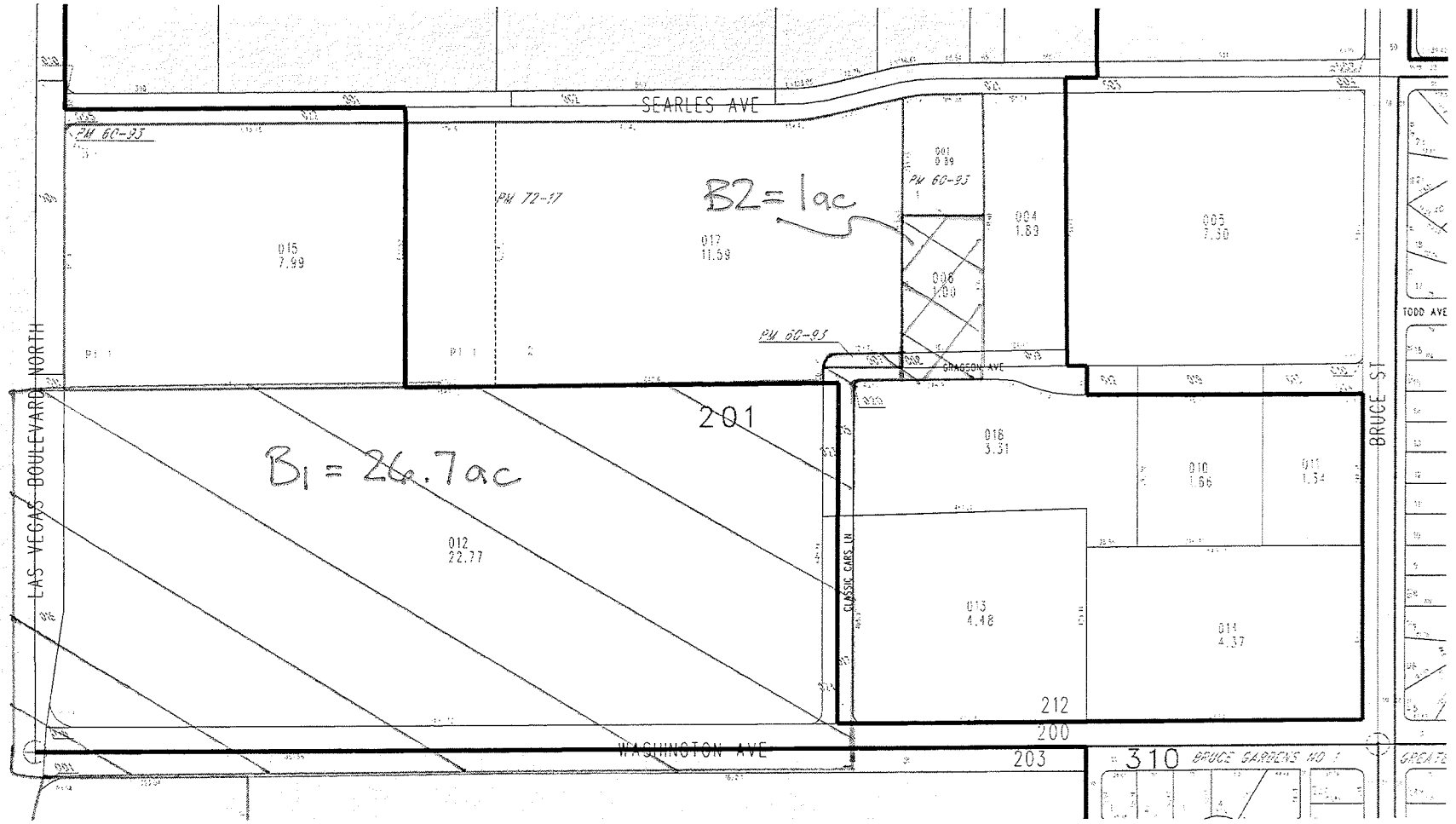
001 1.00 PARCEL NUMBER ACREAGE
202 PARCEL SUB/SEQ NUMBER
PLAT RECORDING NUMBER
5 BLOCK NUMBER
5 LOT NUMBER
GOV. LOT NUMBER

ASSESSOR'S PARCELS - CLARK CO., NV.
M. W. Schofield, Assessor

BOOK T20S R61E | SEC 26 | MAP S 2 NW 4 | 139-26-7

T20S	R60E	R61E	R62E
	125	124	123
	138	139	140
	163	162	161

Scale:1"=200' | Rev:01/31/08



TAX DIST 200,212

APPENDIX V
DEPTH OF FLOW CALCULATIONS

SPLIT POINT 1
Worksheet for Irregular Channel

Project Description	
Project File	c:\old_c\documents and settings\lchristopherson\my documents\misc. items\llc\haestad\fmw\a
Worksheet	existing offsites
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

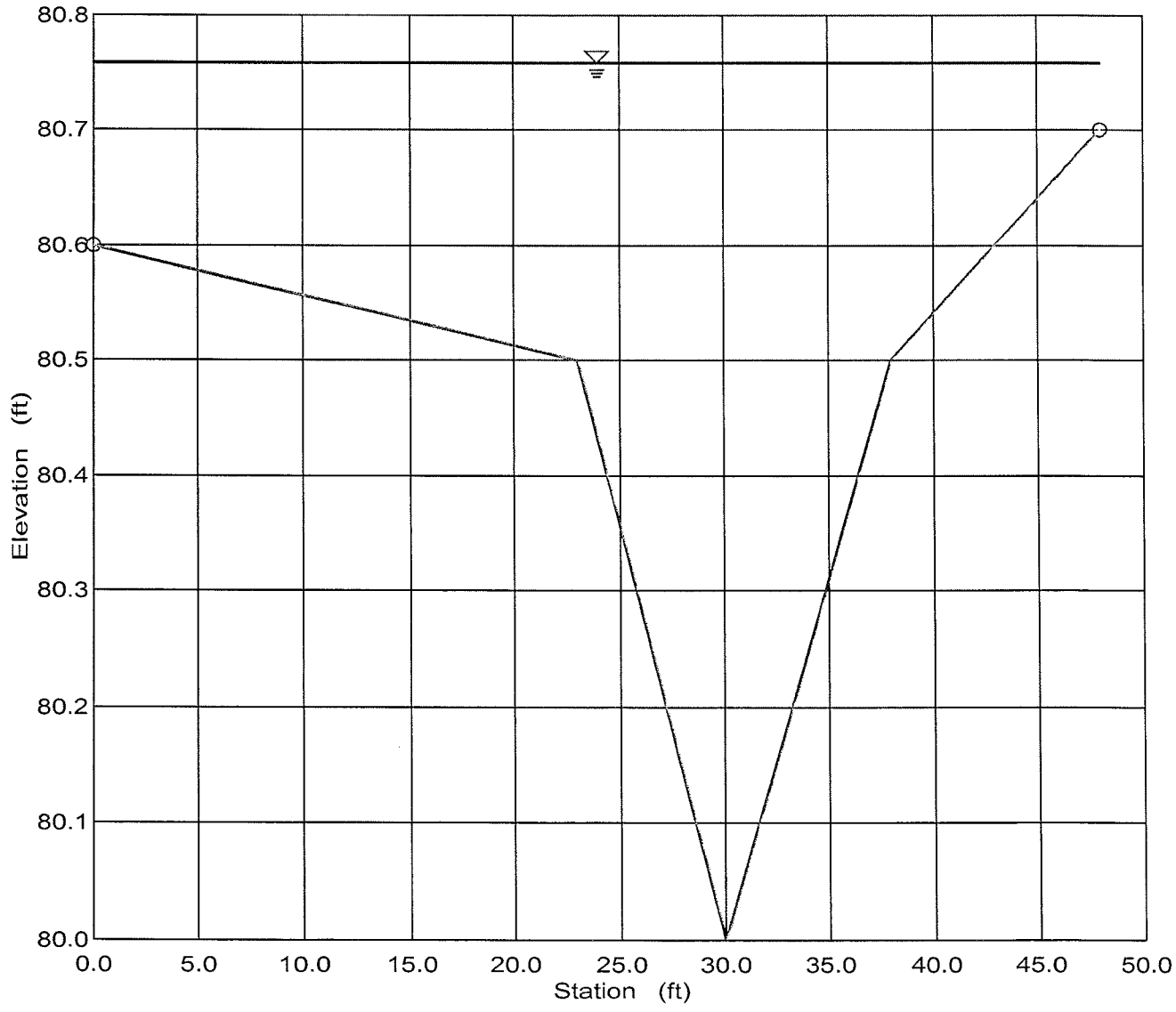
Input Data				
Channel Slope	1.0000 %			
Elevation range: 80.00 ft to 80.70 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	80.60	0.00	48.00	0.013
23.00	80.50			
30.00	80.00			
38.00	80.50			
48.00	80.70			
Discharge	70.00 cfs			

Results		
Wtd. Mannings Coefficient	0.013	
Water Surface Elevation	80.76	ft
Flow Area	13.98	ft²
Wetted Perimeter	48.25	ft
Top Width	48.00	ft
Height	0.76	ft
Critical Depth	80.87	ft
Critical Slope	0.003374	ft/ft
Velocity	5.01	ft/s
Velocity Head	0.39	ft
Specific Energy	81.15	ft
Froude Number	1.63	
Flow is supercritical.		
Water elevation exceeds lowest end station by 0.16 ft.		

SPLIT POINT 1
Cross Section for Irregular Channel

Project Description	
Project File	c:\old_c\documents and settings\lchristopherson\my documents\misc. items\llc\haestad\fmw\a
Worksheet	existing offsites
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.013	
Channel Slope	1.0000	%
Water Surface Elevation	80.76	ft
Discharge	70.00	cfs



Onsite Drainage Easement
Worksheet for Irregular Channel

Project Description	
Project File	c:\old_c\documents and settings\lchristopherson\my documents\misc. items\llc\haestad\fmw\a
Worksheet	Onsite Swale West
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		
Channel Slope	1.0000 %	
Elevation range: 76.43 ft to 77.53 ft.		
Discharge	10.40	cfs

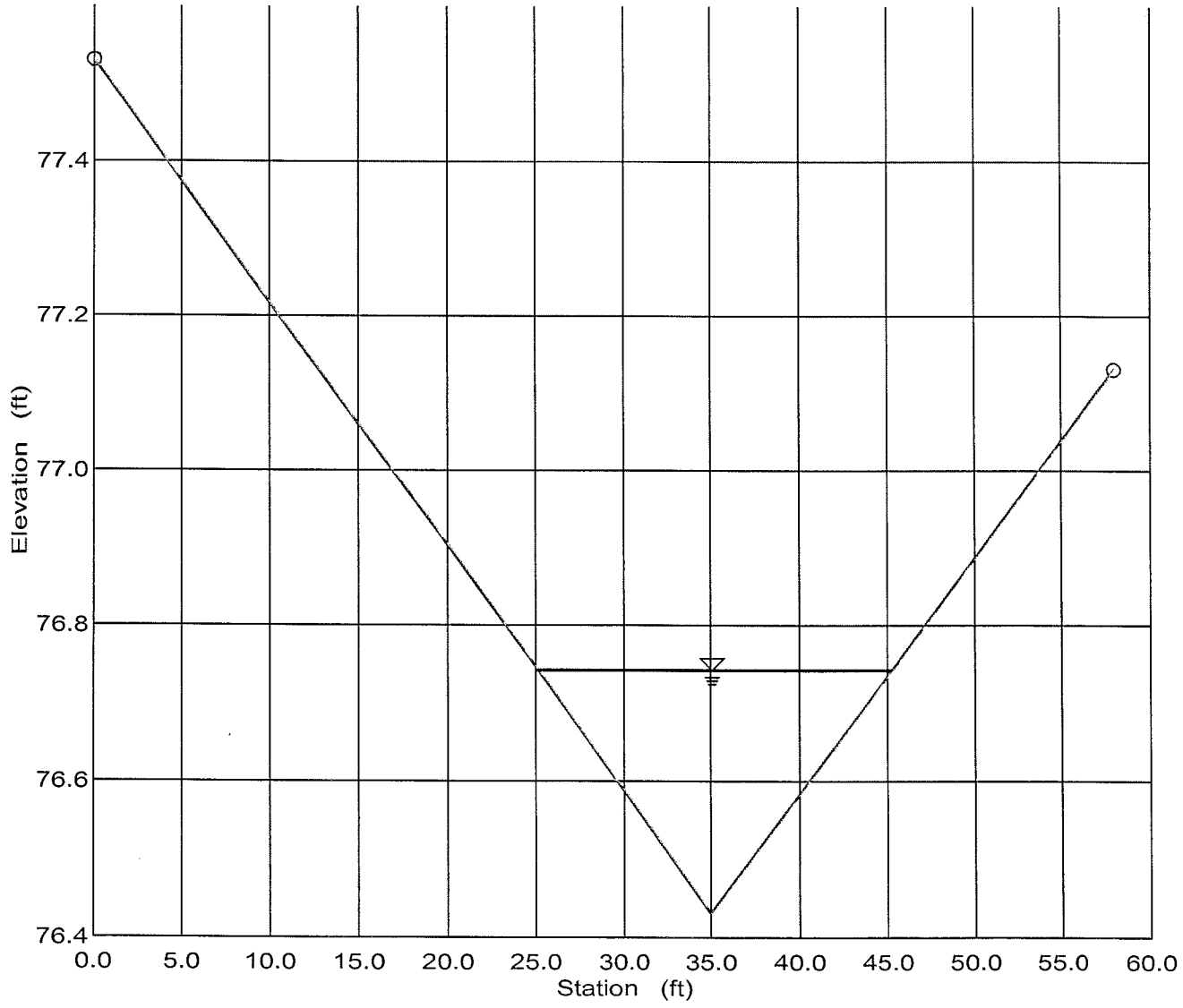
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	77.53	0.00	58.00	0.013
35.00	76.43			
58.00	77.13			

Results		
Wtd. Mannings Coefficient	0.013	
Water Surface Elevation	76.74	ft
Flow Area	3.14	ft²
Wetted Perimeter	20.17	ft
Top Width	20.16	ft
Height	0.31	ft
Critical Depth	76.79	ft
Critical Slope	0.004347	ft/ft
Velocity	3.31	ft/s
Velocity Head	0.17	ft
Specific Energy	76.91	ft
Froude Number	1.48	
Flow is supercritical.		

Onsite Drainage Easement
Cross Section for Irregular Channel

Project Description	
Project File	c:\old_c\documents and settings\lchristopherson\my documents\misc. items\llc\haestad\fmw\a
Worksheet	Onsite Swale West
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.013
Channel Slope	1.0000 %
Water Surface Elevation	76.74 ft
Discharge	10.40 cfs



SECTION A-A GRAGSON AVE: Q100=63 CFS
Worksheet for Irregular Channel

Project Description	
Project File	c:\old_c\documents and settings\lchristopherson\my documents\misc.
Worksheet	60' ROW
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data	
Channel Slope	2.07 %

Elevation range: 0.00 ft to 0.63 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	0.60	0.00	7.00	0.015
5.50	0.50	7.00	53.00	0.016
5.50	0.00	53.00	60.00	0.015
7.00	0.08			
7.00	0.17			
30.00	0.63			
53.00	0.17			
53.00	0.08			
54.50	0.00			
54.50	0.50			
60.00	0.60			

Discharge	63.0 cfs

Results		
Wtd. Mannings Coefficient	0.016	
Water Surface Elevation	0.62	ft
Flow Area	12.98	ft²
Wetted Perimeter	60.95	ft
Top Width	59.71	ft
Height	0.62	ft
Critical Depth	0.73	ft
Critical Slope	0.54	%
Velocity	4.85	ft/s
Velocity Head	0.37	ft
Specific Energy	0.99	ft
Froude Number	1.84	

Flow is supercritical.

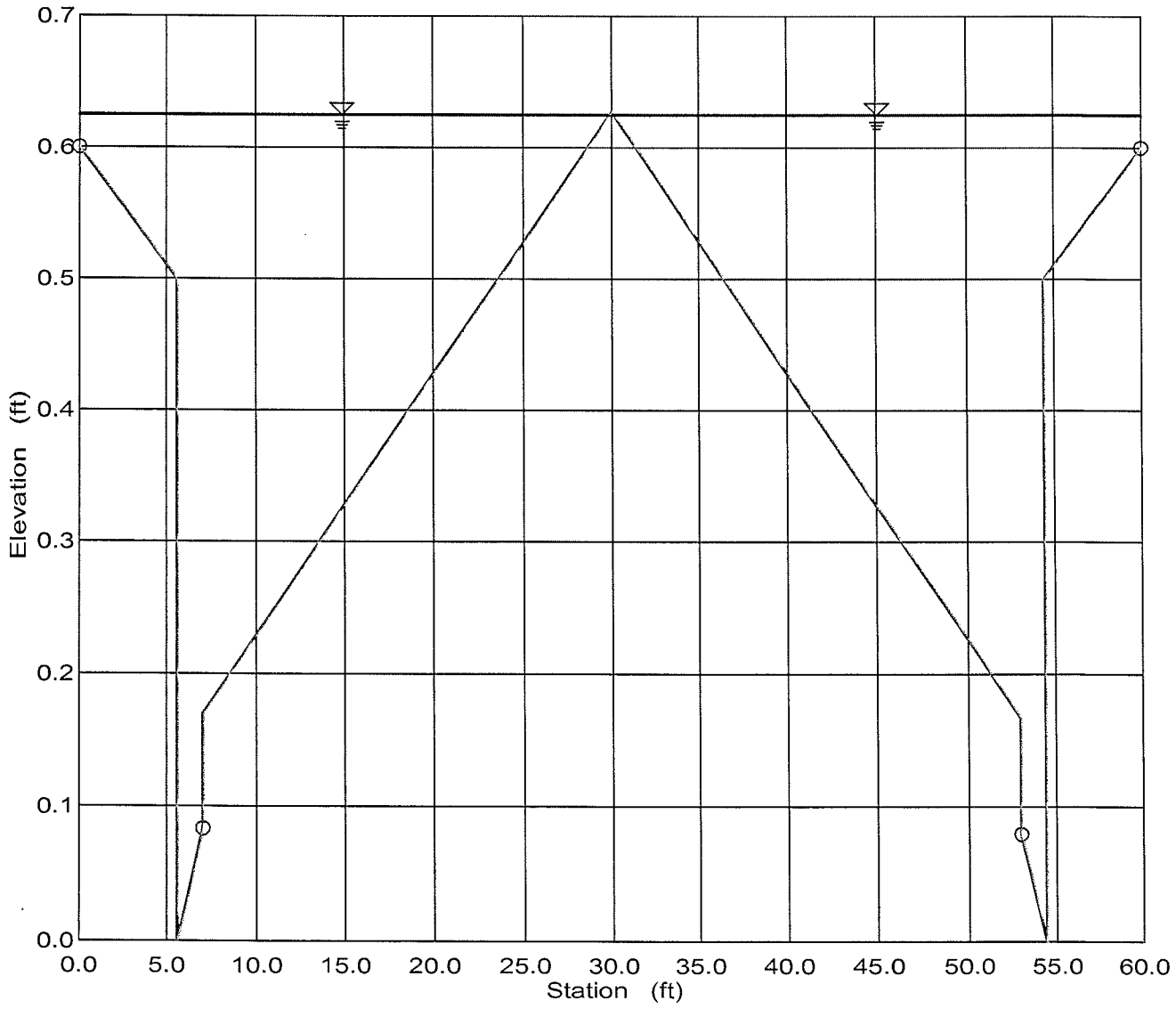
Flow is divided.

Water elevation exceeds lowest end station by 0.02 ft.

SECTION A-A GRAGSON AVE: Q100= 59.2 CFS
Cross Section for Irregular Channel

Project Description	
Project File	c:\old_c\documents and settings\lchristopherson\my documents\misc.
Worksheet	60' ROW
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.016	
Channel Slope	2.07	%
Water Surface Elevation	0.62	ft
Discharge	63.0	cfs



NORTH WALL SECTION
Worksheet for Irregular Channel

Project Description	
Project File	c:\old_c\documents and settings\lchristopherson\my documents\misc. items\llc\haestad\fmw\a
Worksheet	WALL SECTION
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

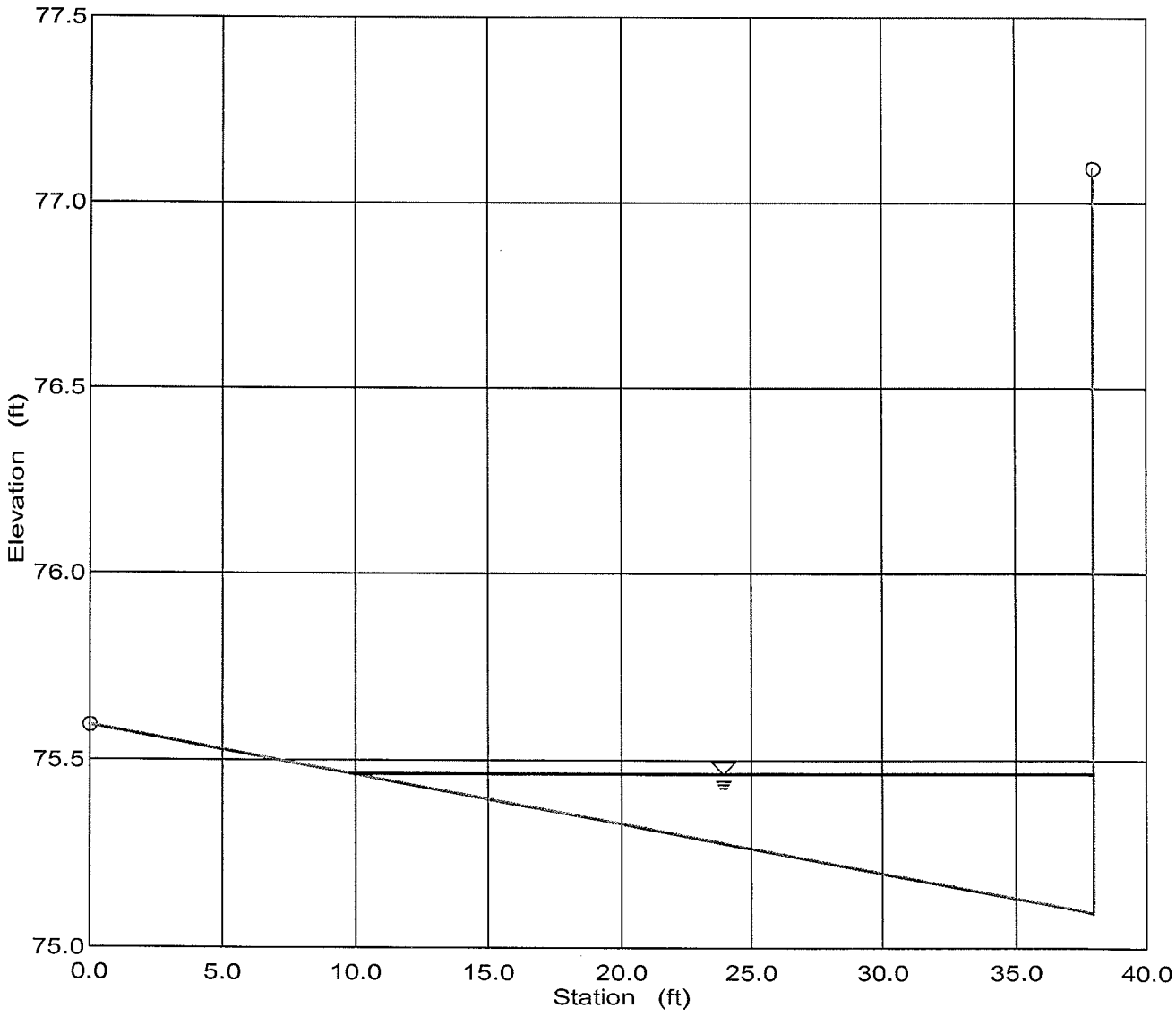
Input Data				
Channel Slope	0.5000 %			
Elevation range: 75.09 ft to 77.09 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	75.59	0.00	38.00	0.013
38.00	75.09			
38.00	77.09			
Discharge	13.60 cfs			

Results		
Wtd. Mannings Coefficient	0.013	
Water Surface Elevation	75.46	ft
Flow Area	5.22	ft²
Wetted Perimeter	28.55	ft
Top Width	28.17	ft
Height	0.37	ft
Critical Depth	75.47	ft
Critical Slope	0.004358	ft/ft
Velocity	2.60	ft/s
Velocity Head	0.11	ft
Specific Energy	75.57	ft
Froude Number	1.07	
Flow is supercritical.		

NORTH WALL SECTION
Cross Section for Irregular Channel

Project Description	
Project File	c:\old_c\documents and settings\lchristopherson\my documents\misc. items\llc\haestad\fmw\a
Worksheet	WALL SECTION
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.013	
Channel Slope	0.5000	%
Water Surface Elevation	75.46	ft
Discharge	13.60	cfs



APPENDIX VI

GRADING PLAN

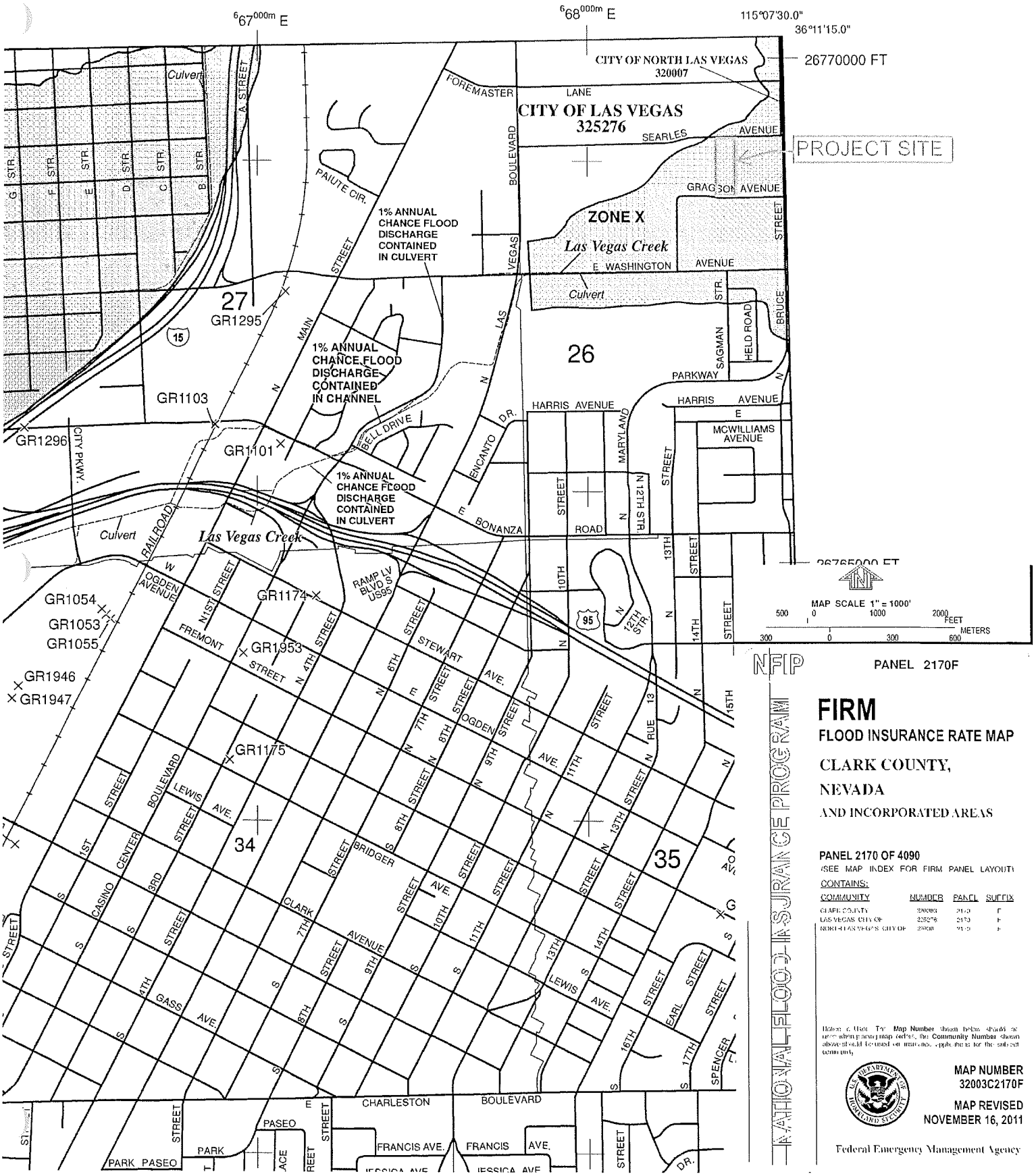

667000m E
668000m E
115°07'30.0"
36°11'15.0"
26770000 FT
CITY OF NORTH LAS VEGAS
320007
CITY OF LAS VEGAS
325276
PROJECT SITE
FOREMASTER LANE
SEARLES AVENUE
GRAGSON AVENUE
ZONE X
Las Vegas Creek
E WASHINGTON AVENUE
Culvert
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
PAIUTE CIR.
A STREET
B STR.
C STR.
D STR.
E STR.
F STR.
G STR.
BOULEVARD
LAS VEGAS
MAIN STREET
N
27
26
34
35
GR1295
GR1103
GR1296
GR1101
GR1174
GR1953
GR1175
GR1054
GR1053
GR1055
GR1946
GR1947
15
95
HELD ROAD
SAGMAN
BRUCE STR.
PARKWAY
HARRIS AVENUE
MCWILLIAMS AVENUE
BELL DRIVE
ENCANTO DR.
MARYLAND
N 12TH STR.
E BONANZA ROAD
RAMP LV BLVD S US95
RAILROAD
Las Vegas Creek
W OGDEN AVENUE
N 1ST STREET
FREMONT STREET
N 4TH STREET
N 6TH STREET
STEWART AVE.
N 7TH STREET
N 8TH STREET
OGDEN AVENUE
N 9TH STREET
N 10TH STREET
N 11TH STREET
N 12TH STREET
N 13TH STREET
N 14TH STREET
N 15TH STREET
RUE 13
LEWIS AVE.
S 1ST STREET
S CENTER STREET
S BOULEVARD
S CASINO CENTER
S 3RD STREET
S 4TH STREET
S 5TH STREET
S 6TH STREET
S 7TH STREET
S 8TH STREET
S 9TH STREET
S 10TH STREET
S 11TH STREET
S 13TH STREET
S 14TH STREET
S 16TH STREET
S 17TH STREET
BRIDGER STREET
CLARK AVENUE
GASS AVE.
EARL STREET
SPENCER
E CHARLESTON BOULEVARD
PASEO PARK
PARK PASEO
FRANCIS AVE.
JESSICA AVE.
MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS
NFIP
PANEL 2170F
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA
AND INCORPORATED AREAS
PANEL 2170 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CLARK COUNTY 320003 2170 F
LAS VEGAS, CITY OF 325276 2170 F
NORTH LAS VEGAS, CITY OF 320007 2170 F
Notice to User: The Map Number shown below should be used when ordering map panels; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
32003C2170F
MAP REVISED
NOVEMBER 16, 2011
Federal Emergency Management Agency
NATIONAL FLOOD INSURANCE PROGRAM

FIGURE 3

REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F-27
FLOOD CONTROL FACILITIES

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin
- Culvert or Bridge Crossing
- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain
Crossing	Crossing

FIGURE 2

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

Refer to Figure G-2 for Aerial Source(s)

US95 I-15 I-215

1	2	3					
4	5	6					
	7	8	9	10			
11	12	13	14	15	16	17	
	18	19	20	21	22	23	
	24	25	26	27	28		
	29	30	31	32	33	34	
	35	36	37	38	39	40	
	41	42	43	44	45	46	
	47	48	49	50	51	52	
	53	54	55	56			
	57	58	59				

PBS&J
PB

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
CABZ		CEDAR AVENUE - BONANZA						
0010	E	60" RCP	1450					0.30
LV15		FREEWAY CHANNEL						
0000	E	Conc Chnl 20'W 10'D 1:1 SS (Replace w/ LV150001)	1800	4778	2CLV1E-3	CWEST4	11.12	0.18
0001	P0	Conc Chnl 55'W 10'D 0:1 SS (Replaces LV150000)	1800	4778	2CLV1E-3	CWEST4	11.12	0.18
0032	E	Conc Chnl 20'W 10'D 1:1 SS (Replace w/ LV150033)	200	4301	2CLV1D-5	CWEST4	10.22	0.18
0033	P0	Conc Chnl 50'W 10'D 0:1 SS (Replaces LV150032)	200	4301	2CLV1D-5	CWEST4	10.22	0.18
0038	E	2: 8' X 10' RCB (Replace w/ LV150039)	2200	4301	2CLV1D-5	CWEST4	10.22	0.75
0039	P0	2: 13' X 10' RCB (Replaces LV150038)	2200	4301	2CLV1D-5	CWEST4	10.22	0.75
0059	E	Conc Chnl 20'W 10'D 1:1 SS (Replace w/ LV150060)	1600	4301	2CLV1D-5	CWEST4	10.22	0.18
0060	P0	Conc Chnl 50'W 10'D 0:1 SS (Replaces LV150059)	1600	4301	2CLV1D-5	CWEST4	10.22	0.18
0080	E	Conc Chnl 20'W 10'D 1:1 SS (Replace w/ LV150081)	4300	3953	CLV1D-4	CWEST4	9.42	0.18
0081	P0	Conc Chnl 45'W 10'D 0:1 SS (Replaces LV150080)	4300	3953	CLV1D-4	CWEST4	9.42	0.18
0190	E	Conc Chnl 20'W 10'D 1:1 SS with Drop Structures	100	3776	CW1C2	NW4SC	8.84	0.18
0191	E	Conc Chnl 20'W 10'D 1:1 SS with Drop Structures	100	3776	CW1C2	NW4SC	8.84	0.18
0193	E	Conc Chnl 20'W 10'D 1:1 SS with Drop Structures	1300	3776	CW1C2	NW4SC	8.84	0.18
0210	E	3: 12' X 9' RCB	900	3123	CCVG24	NW3SC	7.07	0.18
0229	E	2: 7.5' X 3' RCBC @ Lake Mead (Replace w/ LV150230)	125	1011	DRAILRD	NW3	5.22	1.10
0230	P2	12' X 4.5' RCBC @ Lake Mead (Replaces LV150229)	125	1011	DRAILRD	NW3	5.22	1.10
0231	E	Conc Chnl 8'W 8'D 0:1 SS	900	1011	DRAILRD	NW3	5.22	2.50
0248	E	8' X 8' RCBC @ UPRR	350	1011	DRAILRD	NW3	5.22	1.34
0255	E	Conc Chnl 8'W 8'D 0:1 SS	1330	1011	DRAILRD	NW3	5.22	2.00
0280	E	Conc Chnl 30'W 8'D 0:1 SS	200	2022	CCVG10	NW3	5.22	2.00
0284	E	14' X 6' RCB	1790	1221	CVG10-C	NW3	4.84	0.50
0316	E	11' X 6' RCB	3010	985	CWA20-C	NW3	4.46	0.59
0372	E	9' X 6' RCB	1970	985	CWA20-C	NW3	4.46	0.66
LVBR		LAS VEGAS - BROOK						
0000	P1	Conc Chnl 12'W 4.5'D 2:1 SS	285	989	CLV1D-5	WEST3	0.80	2.50
0005	E	Conc Chnl 9'W 5'D 2:1 SS	375	989	CLV1D-5	WEST3	0.80	2.67
0011	E	11' X 3' RCBC @ Losee	150	989	CLV1D-5	WEST3	0.80	2.90
0013	E	Conc Chnl 12'W 4.5'D 2:1 SS	750	989	CLV1D-5	WEST3	0.80	2.60
0014	E	12' X 4' RCBC @ N. 5th St	100	989	CLV1D-5	WEST3	0.80	2.60
0026	P1	Conc Chnl 12'W 4.5'D 2:1 SS	850	989	CLV1D-5	WEST3	0.80	4.30
LVBZ		LAS VEGAS WASH - BONANZA						
0000	P1	2: 12' X 7' RCB	3400	1636	CBN15-C	SW3	2.40	0.40
0064	P1	2: 12' X 6' RCB	2630	1449	CBN12-C	SW3	2.12	0.40
0114	P1	2: 12' X 6' RCB	2740	1256	CBN10-C	SW3	1.79	0.40
0166	E	54" RCP (Replace w/ LVBZ0167)	1095	1051	CBN09	SW3	1.54	0.45
0167	P0	10' X 9' RCB (Replaces LVBZ0166)	1095	1051	CBN09	SW3	1.54	0.45
0187	E	48" RCP (Replace w/ LVBZ0188)	1235	1051	CBN09	SW3	1.54	0.71
0188	P0	9' X 9' RCB (Replaces LVBZ0187)	1235	1051	CBN09	SW3	1.54	0.71
0210	E	42" RCP (Replace w/ LVBZ0211)	704	911	CBN08	SW3	1.30	1.37
0211	P0	8' X 7' RCB (Replaces LVBZ0210)	704	911	CBN08	SW3	1.30	1.37
0223	E	36" RCP (Replace w/ LVBZ0224)	2275	722	CBN03	SW3	1.09	0.72
0224	P0	8' X 7' RCB (Replaces LVBZ0223)	2275	722	CBN03	SW3	1.09	0.72
LVCL		LAS VEGAS WASH - COLTON						
0000	P1	102" RCP	3600	1061	CLV1E-3	WEST3	0.90	1.50
0068	P1	96" RCP	2400	833	CLV1E-2	WEST3	0.71	1.70
LVCS		LAS VEGAS WASH - COMMERCE STREET						
0000	P2	12' x 5' RCB	800	1330	CVG24	NW3	5.70	4.50
0015	P2	12' x 5' RCB	2325	1330	CVG24	NW3	5.70	0.97
LVKC		LAS VEGAS WASH - KING CHARLES CHANNEL						
0000	E	Conc Chnl 35'W 10'D 0:1 SS	592	4633	CLV99B-7	CWEST5	13.76	0.40
0009	E	Conc Chnl 21.8'W 10'D 1.5:1 SS	3280	4633	CLV99B-7	CWEST5	13.76	0.40
LVLA		LAS VEGAS WASH - LAMB						
0000	P1	2: 13' X 9' RCB	2200	2293	CLVW03	WEST3	3.30	0.30
0041	P1	13' X 11' RCB	2600	2171	COA02	WEST3	3.07	0.58
0090	P1	13' X 11' RCB	2700	1953	CLW64-3	WEST3	2.65	0.44
0141	P1	13' X 10' RCB	2650	1680	CLW64-2	WEST3	2.12	0.38
0191	P1	12' X 9' RCB	2700	1494	CLW64-1	WEST3	1.61	0.56

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVLE		LAKE MEAD DRAIN TO LAS VEGAS WASH						
0000	P1	12' X 8' RCB	2500	1030	CLV1B-2	WLS13	1.20	0.40
0047	P1	12' X 6' RCB	2400	845	CLV1B-1	WLS13	0.89	0.50
LVLM		LAS VEGAS WASH - LAKE MEAD						
0000	E	43"X 68" HERCP (Replace w/ LVLM0001)	847	994	CLM20-C	NW3SC	1.36	4.60
0001	P0	12' X 5' RCB (Replaces LVLM0000)	847	994	CLM20-C	NW3SC	1.36	4.60
0016	E	54" RCP (Replace w/ LVLM0017)	965	994	CLM20-C	NW3SC	1.36	4.38
0017	P0	12' X 5' RCB (Replaces LVLM0016)	965	994	CLM20-C	NW3SC	1.36	4.38
0033	E	60" RCP (Replace w/ LVLM0034)	1186	994	CLM20-C	NW3SC	1.36	1.62
0034	P0	12' X 5' RCB (Replaces LVLM0033)	1186	994	CLM20-C	NW3SC	1.36	1.62
0059	E	72" RCP (Replace w/ LVLM0060)	5952	994	CLM20-C	NW3SC	1.36	0.66
0060	P0	12' X 6' RCB (Replaces LVLM0059)	5952	994	CLM20-C	NW3SC	1.36	0.66
LVLV		LAS VEGAS BLVD DRAIN						
0000	P1	2: 10' X 9' RCB	2600	987	CLW075-4	WLS13	1.03	0.10
LVMD		LAS VEGAS WASH - MIDDLE						
1148	E	Earth Chnl 70'W 18'-20'D 1.5:1 SS (Replace w/ LVMD1149)	1675	13944	CCBN15-C	CLVWASH5	112.59	0.41
1149	P1	Conc Chnl 70'W 10'D 1.5:1 SS (Replaces LVMD1148)	1675	13944	CCBN15-C	CLVWASH5	112.59	0.41
1176	E	5 Span Bridge 110'W 20'D 2:1 SS @ Bonanza	120	12690	CLVW04-C	CLVWASH5	106.80	0.57
1178	E	Earth Chnl 30'W 18'-20'D 2:1 SS (Replace w/ LVMD1179)	1500	12690	CLVW04-C	CLVWASH5	106.80	0.57
1179	P1	Conc Chnl 60'W 9.5'D 2:1 SS (Replaces LVMD1178)	1500	12690	CLVW04-C	CLVWASH5	106.80	0.57
1208	E	Bank-Stab Chnl 65'W 15'D 2:1 SS (Replace w/ LVMD1209)	1420	12690	CLVW04-C	CLVWASH5	106.80	0.32
1209	P1	Conc Chnl 60'W 10.5'D 2:1 SS (Replaces LVMD1208)	1420	12690	CLVW04-C	CLVWASH5	106.80	0.32
1230	E	4 Span Bridge 162'W 13'D @ Washington	105	12654	CCLVW03	CLVWASH5	106.53	0.73
1232	E	Bank-Stab. Chnl 48'W 8'D 2:1 SS (Replace w/ LVMD1233)	1900	12654	CCLVW03	CLVWASH5	106.53	0.73
1233	P1	Conc Chnl 90'W 8'D 0:1 SS (Replaces LVMD1232)	1900	12654	CCLVW03	CLVWASH5	106.53	0.73
1271	E	4 Span Bridge 94'W 10'-12'D 2:1 SS @ Lamb	120	11954	CCLVW01C	CLVWASH5	103.23	0.38
1272	E	Earth Chnl 80'W 10'D 2:1 SS (Replace w/ LVMD1273)	2400	11954	CCLVW01C	CLVWASH5	103.23	0.38
1273	P1	Conc Chnl 80'W 9'D 2:1 SS (Replaces LVMD1272)	2400	11954	CCLVW01C	CLVWASH5	103.23	0.38
1320	E	Gabion Chnl 100'W 10'D 2:1 SS (Replace w/ LVMD1321)	1950	8636	CCK-C1	CLVWASH5	100.94	0.38
1321	P1	Conc Chnl 80'W 7.5'D 2:1 SS (Replaces LVMD1320)	1950	8636	CCK-C1	CLVWASH5	100.94	0.38
1354	E	5 Span Bridge 110'W 7'-8'D 2:1 SS @ Owens	120	8504	2CLV1B-2	CCWEST5	78.09	0.58
1355	E	Gabion Chnl 100'W 10'D 2:1 SS	3432	8504	2CLV1B-2	CCWEST5	78.09	0.58
1420	E	7: 8'-12' X 8' RCBC @ Lake Mead (Replace w/ LVMD1421)	200	8291	CLW64-4	CCWEST5	76.89	0.60
1421	P1	2 Span Bridge 84'W 8'D @ Lake Mead (Replaces LVMD1420)	200	8291	CLW64-4	CCWEST5	76.89	0.60
1423	E	Earth Chnl 60'W 8'D 1:1 SS (Replace w/ LVMD1424)	1060	8291	CLW64-4	CCWEST5	76.89	0.60
1424	P2	Conc Chnl 84'W 13'D 0:1 SS (Replaces LVMD1423)	1060	8291	CLW64-4	CCWEST5	76.89	0.34
1443	E	Earth Chnl 60'W 8'D 1:1 SS (Replace w/ LVMD1444)	2000	8291	CLW64-4	CCWEST5	76.89	0.60
1444	P2	Conc Chnl 84'W 8'-9'D 0:1 SS (Replaces LVMD1443)	2000	8291	CLW64-4	CCWEST5	76.89	0.34
1483	E	Earth Chnl 75'W 6'D 2:1 SS (Replace w/ LVMD1484)	1950	8291	CLW64-4	CCWEST5	76.89	0.40
1484	P2	Conc Chnl 84'W 8'-9'D 0:1 SS (Replaces LVMD1483)	1950	8291	CLW64-4	CCWEST5	76.89	0.37
1521	E	Earth Chnl 75'W 6'D 2:1 SS (Replace w/ LVMD1522)	680	8241	2CLW1A-3	CCWEST5	76.53	0.40
1522	P2	Conc Chnl 95'W 8'D 0:1 SS (Replaces LVMD1521)	680	8241	2CLW1A-3	CCWEST5	76.53	0.53
1534	E	1 Span Bridge 72.5'W 7.5'D @ Las Vegas Blvd	120	8067	CLW1A-4	CCWEST5	74.91	0.88
1535	E	Earth Chnl 80'W 6'D 3:1 SS (Replace w/ LVMD1536)	455	8067	CLW1A-4	CCWEST5	74.91	0.90
1536	P2	Conc Chnl 70'W 8'D 0:1 SS (Replaces LVMD1535)	455	8067	CLW1A-4	CCWEST5	74.91	0.49
1542	E	Earth Chnl 80'W 6'D 3:1 SS (Replace w/ LVMD1543)	393	8067	CLW1A-4	CCWEST5	74.91	0.90
1543	P2	Confluence Structure (Replaces LVMD1542)	393	8067	CLW1A-4	CCWEST5	74.91	1.44
1549	E	Earth Chnl 70'W 8'-10'D 1:1 SS (Replace w/ LVMD1550)	2150	7618	CHYPEAK	CCWEST5	73.97	0.50
1550	P2	Conc Chnl 90'W 7.5'D 0:1 SS (Replaces LVMD1549)	2150	7618	CHYPEAK	CCWEST5	73.97	0.45
1594	E	1 Span Bridge 80'W 5'D @ Cheyenne	125	7618	CHYPEAK	CCWEST5	73.97	0.71
1595	E	Conc Chnl 90'W 7'D 0:1 SS	581	7618	CHYPEAK	CCWEST5	73.97	0.40
1606	E	Transition Structure	144	7618	CHYPEAK	CCWEST5	73.97	0.40
1609	E	60' X 7.25' RCB with 2' Center Pier	222	7618	CHYPEAK	CCWEST5	73.97	0.40
1614	E	Conc Chnl 80'W 9'-11'D 0:1 SS	703	11998	CHYPKIN	CCWEST5	73.97	0.15
1626	E	Transition Structure	227	11998	CHYPKIN	CCWEST5	73.97	2.46
1643	E	64,000 cfs PMF Spillway (Replace w/ LVMD1644)		64000	CHYPKIN	CCWEST5	73.97	
1644	P1	Modify Spillway, raise height by 1' (Replaces LVMD1643)		64000	CHYPKIN	CCWEST5	73.97	
1645	E	456 ac-ft Cheyenne Peaking Basin		11998	CHYPKIN	CCWEST5	73.97	
1646	P1	Upgrade to 482 ac-ft Cheyenne Peaking Basin		11998	CHYPKIN	CCWEST5	73.97	
1647	E	Conc Chnl 120'D 10'W 0:1 SS	800	11998	CHYPKIN	CCWEST5	73.97	0.40

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVMD		LAS VEGAS WASH - MIDDLE						
1648	E	3 Span Bridge 95'W 8'-10'D 2:1 SS @ Civil Center	120	11998	CHYPKIN	CCWEST5	73.97	0.70
1663	E	Conc Chnl 80'W 10'D 2:1 SS	700	11966	3C99B-7	CCWEST5	73.66	0.70
1664	E	3 Span Bridge 75'W 10'D 2:1 SS @ I-15	120	11966	3C99B-7	CCWEST5	73.66	0.70
1665	E	Transition Structure	200	7358	CLV99B-5	WLS15	48.77	0.36
1669	E	Free Span Bridge 55'W 12'D @ UPRR	40	7358	CLV99B-5	WLS15	48.77	0.36
1670	E	Conc Chnl 82'W 10'D 0:1 SS	370	7358	CLV99B-5	WLS15	48.77	1.69
1677	E	Conc Chnl 80'W 10'D 2:1 SS	119	7358	CLV99B-5	WLS15	48.77	0.37
1679	E	4 Span Bridge 100'W 12'D 2:1 SS @ Losee	120	7358	CLV99B-5	WLS15	48.77	0.37
1680	E	Conc Chnl 80'W 10'D 2:1 SS	480	7358	CLV99B-5	WLS15	48.77	0.37
LVNC		LAS VEGAS WASH - N CHANNEL						
0000	E	Earth Chnl 40'W 8'-10'D 2:1 SS (Replace w/ LVNC0001)	173	1182	CLW100	CWES15	13.62	0.45
0001	P2	18' X 6' RCB (Replaces LVNC0000)	173	1182	CLW100	CWES15	13.62	0.45
0003	E	Earth Chnl 40'W 8'-10'D 2:1 SS (Replace w/ LVNC0004)	216	1182	CLW100	CWES15	13.62	1.15
0004	P2	Conc Chnl 18'-21'W 8'D 0:1 SS (Replaces LVNC0003)	216	1182	CLW100	CWES15	13.62	1.15
0007	E	Drop Structure 18'W 2.8'D 3:1 SS	50	1182	CLW100	CWES15	13.62	0.70
0008	E	Conc Chnl 18'W 10'D 2:1 SS	1385	1182	CLW100	CWES15	13.62	0.70
0037	E	2: 132" CMPC @ Cheyenne	120	1182	CLW100	CWES15	13.62	0.70
0038	P1	Conc Chnl 12'W 5.5'D 2:1 SS	2590	1182	CLW100	CWES15	13.62	0.70
0090	E	3: 12' X 6' RCB	120	1182	CLW100	CWES15	13.62	0.70
0091	E	14' X 6' RCAP	1325	1182	CLW100	CWES15	13.62	0.52
LVNE		LAS VEGAS WASH - NELLIS						
0000	P1	2: 13' X 10' RCB	4675	2303	CNEL02-C	WEST3	3.39	0.20
0089	P1	13' X 12' RCB	2700	2187	CNEL01-C	WEST3	3.11	0.37
0140	P1	13' X 12' RCB	2700	2094	COA03-C	WEST3	2.83	0.37
0191	P1	12' X 11' RCB	2700	1745	CLV53-2	WEST3	2.27	0.40
0242	P1	12' X 9' RCB	2700	1367	C321A-3	WEST3	1.72	0.56
LVOE		OWENS AVENUE - EAST						
0000	P1	15' X 12' RCB	4700	2728	CK-C1	SW5	24.24	0.47
0085	P1	13' X 12' RCB	2540	2657	CG	SW5	23.92	0.62
0134	P1	12' X 11' RCB	5380	2607	CE-C	SW5	23.69	1.00
0236	P1	13' X 8' RCB	5000	2427	CH-C1	SW5	23.08	1.50
0331	P1	13' X 11' RCB	750	2369	DLVOE	SW5	22.79	0.60
0345	P1	13' X 11' RCB	1685	2369	DLVOE	SW5	22.79	0.60
LVOW		OWENS AVENUE SYSTEM						
0000	E	10' X 6' RCB	145	1089	CLM16B-C	NW3	2.40	0.76
0003	E	96" RCP	7500	1089	CLM16B-C	NW3	2.40	0.70
LVSR		LAS VEGAS WASH - SMOKE RANCH						
0000	E	Conc Chnl 22'W 8'D 0:1 SS	79	1244	CS1-C	NW3SC	1.42	2.32
0001	E	Free Span Bridge 22'W 10'D	50	1244	CS1-C	NW3SC	1.42	2.32
0002	E	Conc Chnl 22'W 8'D 0:1 SS	468	1244	CS1-C	NW3SC	1.42	2.32
0009	E	72" RCP (Replace w/ LVSR0010)	702	1244	CS1-C	NW3SC	1.42	2.32
0010	P1	10' X 6' RCB (Replaces LVSR0009)	702	1244	CS1-C	NW3SC	1.42	2.32
0020	E	60" RCP (Replace w/ LVSR0021)	1320	1244	CS1-C	NW3SC	1.42	3.03
0021	P1	10' X 5' RCB (Replaces LVSR0020)	1320	1244	CS1-C	NW3SC	1.42	3.03
0045	E	54" RCP (Replace w/ LVSR0046)	1180	1244	CS1-C	NW3SC	1.42	3.41
0046	P1	10' X 5' RCB (Replaces LVSR0045)	1180	1244	CS1-C	NW3SC	1.42	3.41
0070	E	66" RCP (Replace w/ LVSR0071)	4118	1244	CS1-C	NW3SC	1.42	0.73
0071	P1	10' X 9' RCB (Replaces LVSR0070)	4118	1244	CS1-C	NW3SC	1.42	0.73
LVWH		WASHINGTON AVENUE CHANNEL						
0086	E	3: 12' X 8' RCB	1210	3851	CLVW01-C	SW5SC	16.77	0.35
0087	E	3: 12' X 8' RCB	1560	3851	CLVW01-C	SW5SC	16.77	0.33
0136	E	3: 12' X 8' RCB	2063	3771	CQ-C	SW5SC	16.53	0.33
0155	E	3: 10' X 8' RCB	3630	3684	CP-C	SW5SC	16.28	0.68
0234	E	2: 12' X 8' RCB	600	3591	CN-C	SW5SC	15.97	0.71
0240	E	2: 12' X 8' RCB	3240	3591	CN-C	SW5SC	15.97	1.50
0305	E	12' X 8' RCB	2950	1607	(1/2) CV1-C	SW5SC	15.16	2.93
0361	E	12' X 8' RCB	548	1607	(1/2) CV1-C	SW5SC	15.16	0.90
0371	E	12' X 8' RCB	590	1607	(1/2) CV1-C	SW5SC	15.16	2.62
0382	E	Conc Chnl 50'W 10'D 0:1 SS	260	1607	(1/2) CV1-C	SW5SC	15.16	0.80
0387	E	12' X 8' RCB	125	1607	(1/2) CV1-C	SW5SC	15.16	7.43

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVWH		WASHINGTON AVENUE CHANNEL						
0389	E	12' X 8' RCB	2110	1607	(1/2) CV1-C	SW5SC	15.16	0.90
0426	E	16' X 8' RCB	150	1607	(1/2) CV1-C	SW5SC	15.16	1.08
0429	E	Splitter Structure (2: 12' X 8' RCB)	190	2870	DCLC21	SW5	22.79	1.90
0431	E	3: 14.33' X 10' RCB	665	2870	DCLC21	SW5	22.79	0.15
0446	E	Junction Structure	69	2870	DCLC21	SW5	22.79	0.15
0447	E	3: 14.33' X 10' RCB	1955	4978	CCAL93	SW5	22.19	0.15
RWSL		RANGE WASH - SLOAN						
0577	P1	Conc Chnl 40'W 8'D 2:1 SS (Replaces RWSL0576)	3000	5187	CCSLNL	RW4SC	8.62	0.38
0670	E	3: 10' X 7' RCBC @ Nellis	100	3178	CCSLNL^	RW4SC	8.62	0.56
0671	P1	Add 3: 12' X 7' RCBC @ Nellis	100	2009	CCSLNL^	RW4SC	8.62	0.56
0672	E	Conc Chnl 14'W 8'D 1.5:1 SS	1130	2924	CC47C-4	RW3SC	3.94	0.56
0694	E	Conc Chnl 10'W 8'D 1.5:1 SS	1500	1696	C47C4	RW3SC	2.40	0.56
0727	E	3: 10' X 8' RCBC	100	1601	C307E3	RW3SC	2.25	0.56
0728	E	Conc Chnl 12'W 8.5'D 1.5:1 SS	1345	1601	C307E3	RW3SC	2.25	0.56
SLEB		SLOAN CHANNEL EAST BRANCH						
0000	E	Conc Chnl 10'W 8'D 1.5:1 SS	840	1322	C310B2	RW3	1.54	0.43
WAGC		WASHINGTON AVENUE CHANNEL - GRAND CENTRAL						
0000	E	2: 12' X 4' RCB	700	557	LC21	SW3	0.60	0.20
0014	E	1: 12' X 4' RCB and 1: 11' X 4' RCB	2440	557	LC21	SW3	0.60	0.20
WAPR		WASHINGTON AVENUE CHANNEL PARALLEL						
0000	E	12' X 8' RCB	2100	1607	(1/2) CV1-C	SW5SC	15.16	2.20
0037	E	12' X 8' RCB	590	1607	(1/2) CV1-C	SW5SC	15.16	5.60
0051	E	12' X 8' RCB	1200	1607	(1/2) CV1-C	SW5SC	15.16	0.80
0074	E	12' X 8' RCB	550	1607	(1/2) CV1-C	SW5SC	15.16	1.60
0089	E	14' X 8' RCB	395	1607	(1/2) CV1-C	SW5SC	15.16	0.55
0097	E	14' X 8' RCB	1835	1607	(1/2) CV1-C	SW5SC	15.16	1.24
0132	E	2: 9' X 8' RCB	387	1607	(1/2) CV1-C	SW5SC	15.16	1.67

** The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.*

*** As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.*

^ For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e., HEC-1 Node flow = existing facility normal depth capacity + proposed parallel facility flow).

FIGURE 2A

REGIONAL FLOOD CONTROL DISTRICT

2008 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 27

LEGEND

ID (Facility Identifier) AABB
- Parent Stream Name
- Stream Name

River Mile 0000
- Distance Above Confluence with Parent Stream (Miles)
- Miles in Hundredths

Existing Facility..... E
Proposed or Modified Facility..... P
Contingency Level
- Category B..... P0
- Master Plan..... P1
- Preliminary Design..... P2
- Design..... P3

Bottom Width..... W
Depth..... D
Side Slope, H:V..... SS

Construction Features

Cast in Place Concrete Pipe..... CIPCP	Reinforced Concrete Arch Culvert..... RCAC
Corrugated Metal Arch Pipe Culvert..... CMAP	Reinforced Concrete Box..... RCB
Corrugated Metal Pipe Culvert..... CMPC	Reinforced Concrete Box Culvert..... RCBC
High Density Polyethylene..... HDPE	Reinforced Concrete Pipe..... RCP
Horizontal Elliptical Reinforced Concrete Pipe..... HERCP	Reinforced Concrete Pipe Culvert..... RCPC
Reinforced Concrete Arch Pipe..... RCAP	Storm Sewer Pipe..... SSP

PBS&J PB

GRAPHIC SCALE

80 0 40 80 160 240

(IN FEET)

1 inch = 80 ft.

N

N. LAS VEGAS BLVD

SEARLES AVE

Q100=13.6 CFS

ONE1

Q100=10.4 CFS

B2

Q100=7 CFS

ONE2

Q100=3.

SP1

Q100=63 CFS

GRAGSON AVE

Q100=70 CFS

B1

GRAGSON AVENUE

WASHINGTON AVE

SEARLES AVE

PROJECT SITE

GRAGSON AVE

WASHINGTON AVE

VICINITY MAP

NOT TO SCALE

CLV #

A Cab Taxi Company

Construction Documents

1500 Searles Avenue
Las Vegas, Nevada 89101

APTUS

1200 South 4th Street
Suite 206
Las Vegas, Nevada 89104
P 702.839.1200
F 702.839.1213

APTUS PROJECT NO. 09.065

ARCHITECT

ENGINEER

LEONARD L. CHRISTOPHERSON
EXP. 12/31/12
CIVIL
No. 13217
PROFESSIONAL ENGINEER
STATE OF NEVADA

NOTES

NO.	DESCRIPTION	DATE

ISSUED

TITLE

EXISTING CONDITION

DRAWING NO.

FIGURE 4

City of Las Vegas

CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

LEGEND

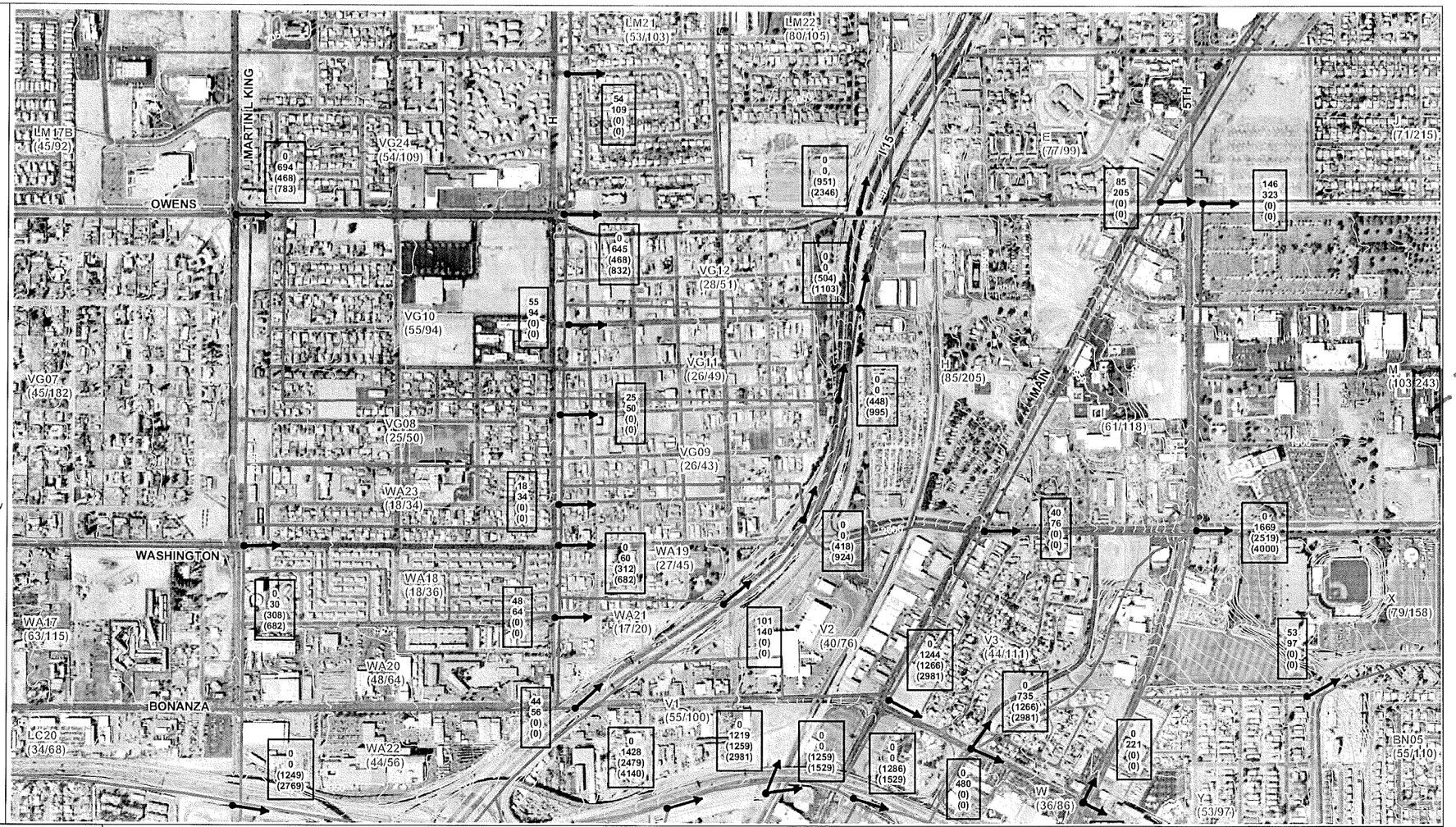
- Sub-basin Boundary
- LV12 — Basin ID
- (10yr./100yr.) — Contributing flow from the basin (cfs)
- Flow Arrow
- 250 / 500 / (300) / (800) — 10-Year Street Flow / 100-Year Street Flow / 10-Year Facility Flow / 100-Year Facility Flow

(Flows in CFS)

Study Area Limit

PHOTO DATE: SPRING 2004

FIGURE E-4



EXISTING DRAINAGE CONDITIONS

PBS&J
2270 Corporate Circle, Suite 100
Henderson, NV 89074
(702) 263-7275
Fax: (702) 263-7200

	Durango	Rainbow	Decatur	Tonopah	5th	Pecos	Nellis
Lake Mead				1	2		
Washington				3	4	5	6
Charleston	7	8	9	10	11	12	
Sahara	13	14	15	16	17		
Desert Inn			18	19			

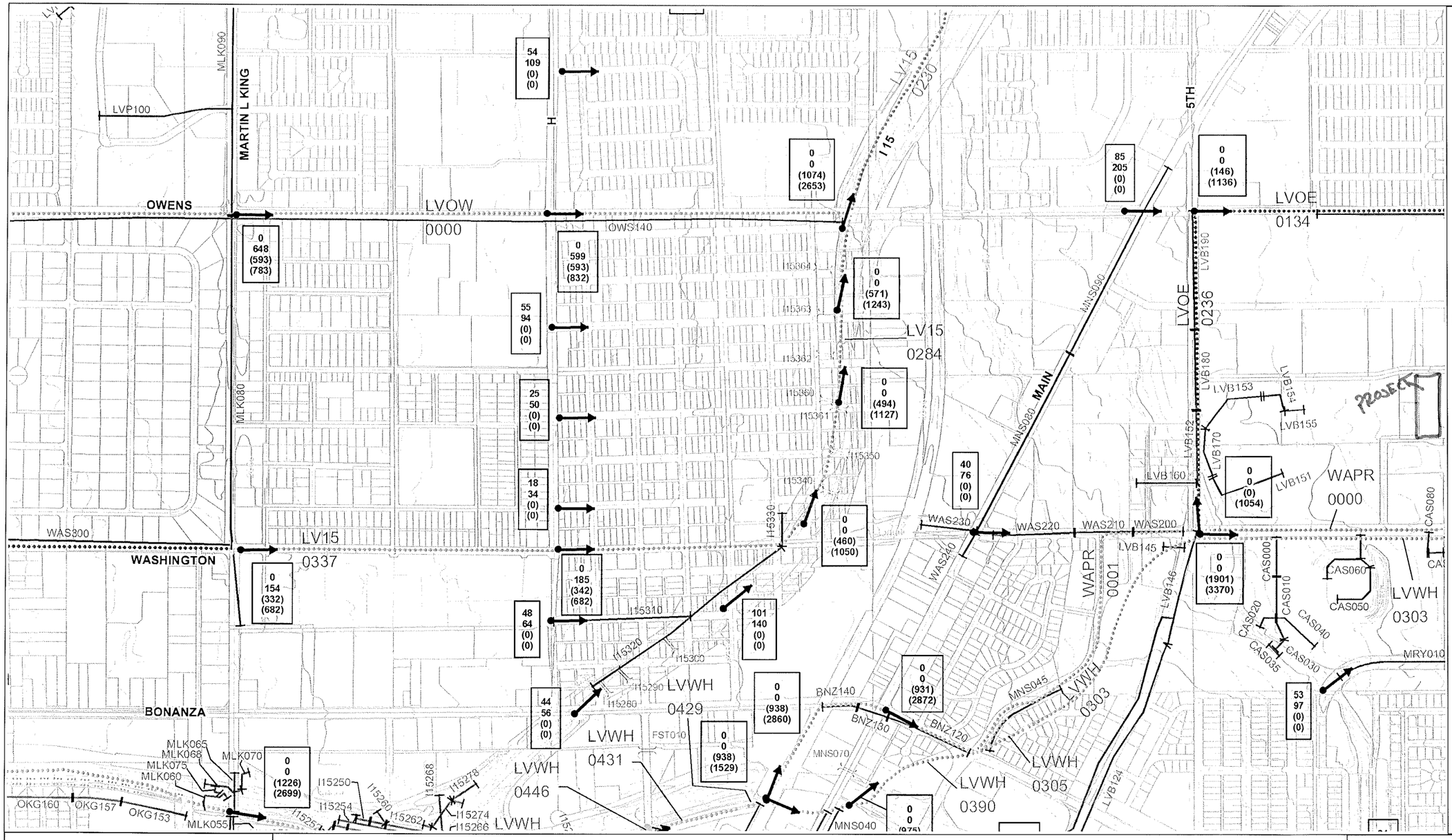
NOTE:
Existing conditions are based on future Curve Number values with only existing local and CCRFCD facilities in place.

100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explaination.

N / W / E / S

0 200 400 800 1,200 1,600
Feet

SCALE: 1 inch = 800 feet



City of Las Vegas

CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

LEGEND

- Existing Regional Facility
- Category A Proposed Regional Facility (2002 MPU)
- Category B Proposed Regional Facility (2002 MPU)
- Category A Proposed Regional Facility (2004 CNFCMP)
- Existing Local Facility
- Proposed Local Facility
- Regional Culvert
- Regional Bridge
- Regional Pipeline
- Regional Channel
- Regional Levee
- Regional Detention Basin
- Local Storm Drain
- Local Culvert
- Proposed Local Storm Drain
- Regional ID-Mile Separator
- Local Facility Separator

FIGURE F-4

N
W E
S

0 200 400 800 1,200 1,600
Feet

SCALE: 1 inch = 800 feet

Flow Arrow

250	10-Year Street Flow
500	100-Year Street Flow
(300)	10-Year Facility Flow
(800)	100-Year Facility Flow

(Flows in CFS)

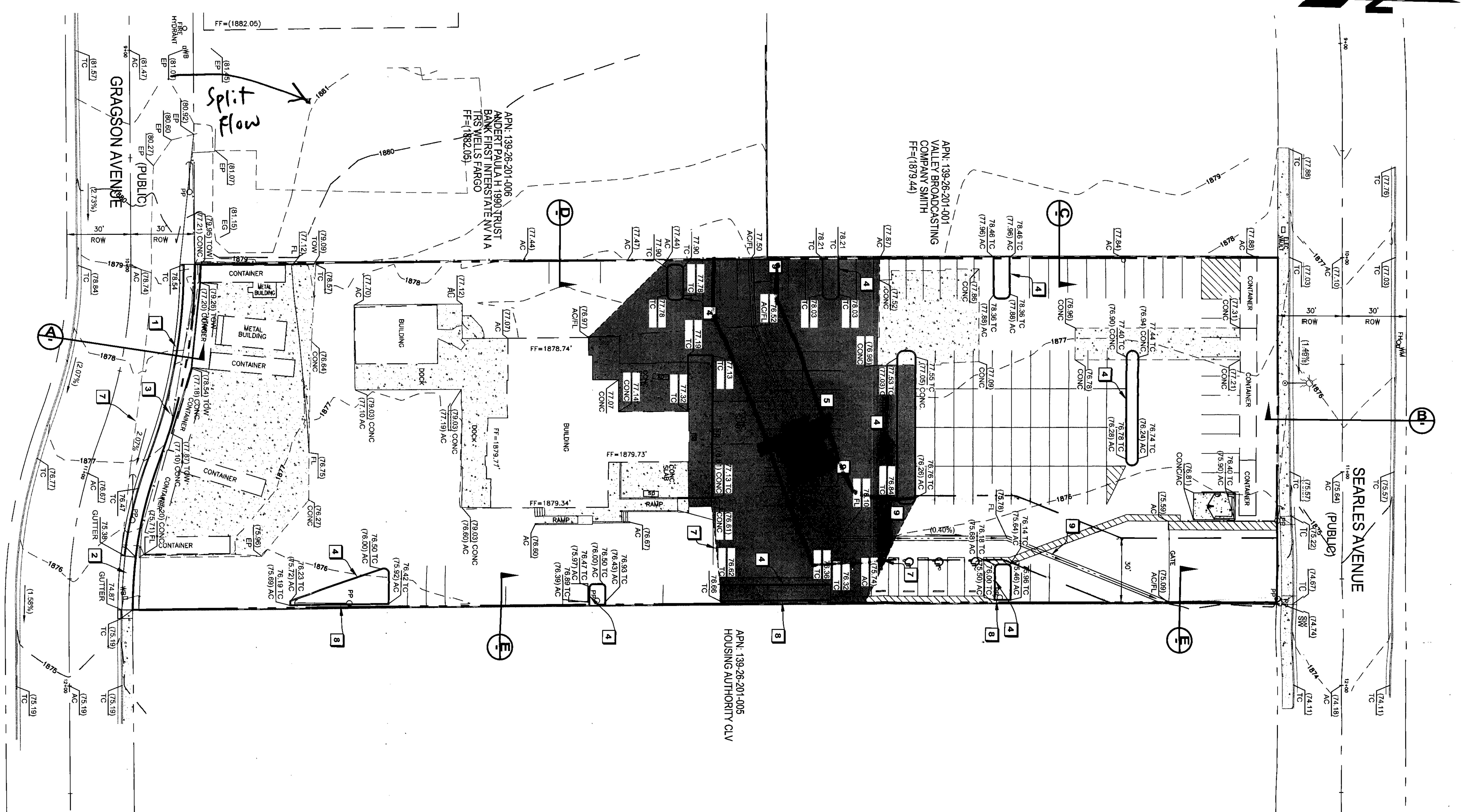
NOTE.
Ultimate drainage conditions are based on future Curve Number values with all flood control facilities in place.

100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explaination.

	Durango	Rainbow	Decatur	Tonopah	5th	Pecos	Nellis
Lake Mead			1	2			
Washington			3	4	5	6	
Charleston	7	8	9	10	11	12	
Sahara	13	14	15	16	17		
Desert Inn		18	19				

FUTURE DRAINAGE CONDITIONS

PBS&J
2270 Corporate Circle, Suite 100
Henderson, NV 89074
(702) 263-7275
Fax: (702) 263-7200



GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)

1 inch = 30 ft.

LEGEND

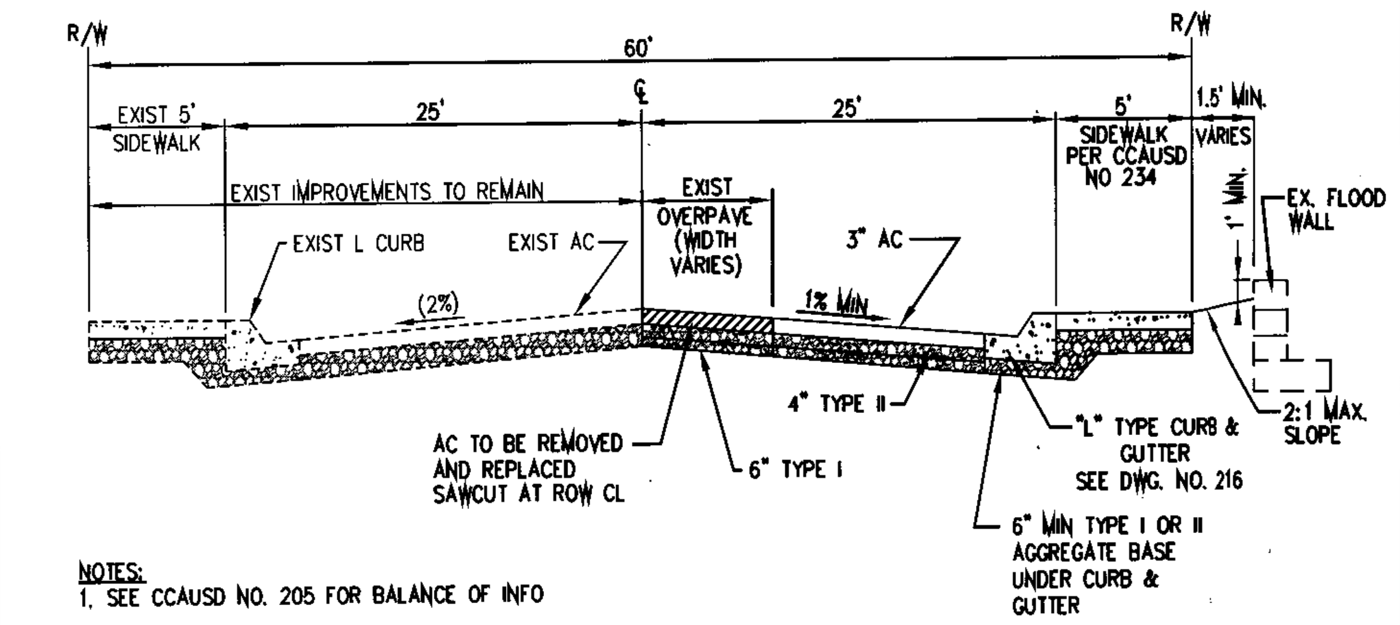
- EXISTING/ ADJACENT RIGHT-OF-WAY LINE
- EXISTING EDGE OF PAVEMENT
- 5' EXISTING GROUND CONTOUR
- 1' EXISTING GROUND CONTOUR
- EXISTING WALL
- PROPERTY LINE
- CENTER LINE
- SAWCUT LINE
- DETAIL NUMBER / SHEET NUMBER
- (14.58) BCR — EXISTING ELEVATION DESCRIPTION
- 14.22 BCR — PROPOSED ELEVATION DESCRIPTION
- 14.22 AC — PROPOSED AC ELEVATION DESCRIPTION
- (0.42%) — EXISTING RATE OF GRADE/ DIRECTION OF FLOW
- EXISTING MANHOLE
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- EXISTING PAVING TO BE REMOVED & REPLACED AS NEEDED WITH 2" MIN. AC PAVING.

GRADING CONSTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB & GUTTER PER C.C.A.U.S.D. STD. DWG. NO. 216.
2. CONSTRUCT COMMERCIAL DRIVEWAY PER C.C.A.U.S.D. STD. DWG. NO. 222A.
3. CONSTRUCT 5' SIDEWALK PER C.C.A.U.S.D. STD. DWG. NO. --.
4. CONSTRUCT ONSITE "A" CURB PER C.C.A.U.S.D. STD. DWG. NO. 219.
5. CONSTRUCT 2" AC MIN. IN PARKING AREA REFER TO SOILS REPORT
6. CONSTRUCT 3" AC MIN. IN ROADWAY REFER TO SOILS REPORT
7. SAWCUT EXISTING AC
8. CONSTRUCT 18" CURB OPENING
9. CONSTRUCT ONSITE 2' VALLEY GUTTER PER DETAIL THIS SHEET

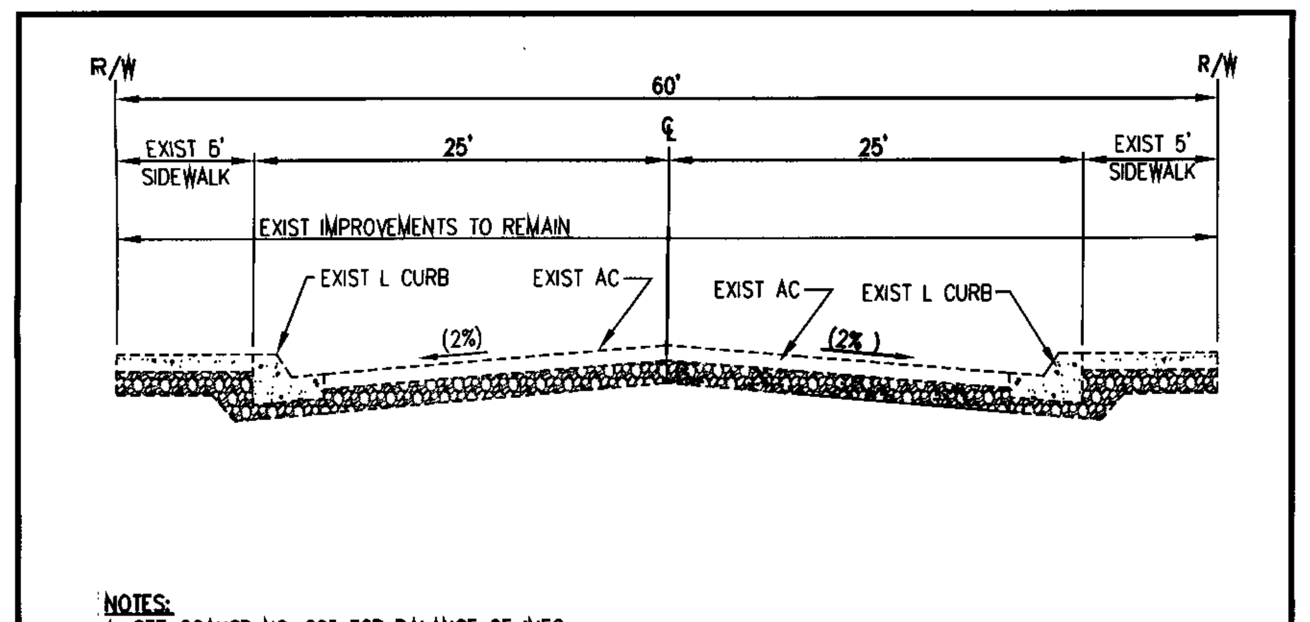
GEOTECHNICAL REPORT

GEOTEK, INC -NEVADA
6835 S. ESCONDIDO STREET, SUITE A
LAS VEGAS, NV 89119
(702) 897-1424, FAX (702) 897-2213
PROJECT NO. 9831-LV6
UPDATED: MAY 05, 2010



NOTES:
1. SEE CCAUSD NO. 205 FOR BALANCE OF INFO

(A) GREGSON AVENUE - 60' ROW (SECTION A-A)
N.T.S. SEE SOILS REPORT



NOTES:
1. SEE CCAUSD NO. 205 FOR BALANCE OF INFO

(B) SEARLES AVENUE - 60' ROW
N.T.S. SEE SOILS REPORT

BENCHMARK

BEING CITY OF LAS VEGAS BENCHMARK NO. OLV0126N6A, RIVET & PLATE IN TOP OF CURB @ SE CORNER OF BRUCE & TODD. BEING NAVD88 ELEVATION OF 1865.70 FEET / 568.66504 METERS AS SHOWN IN THE BENCHMARK BOOK OF THE CITY OF LAS VEGAS, NEVADA.

BASIS OF BEARING

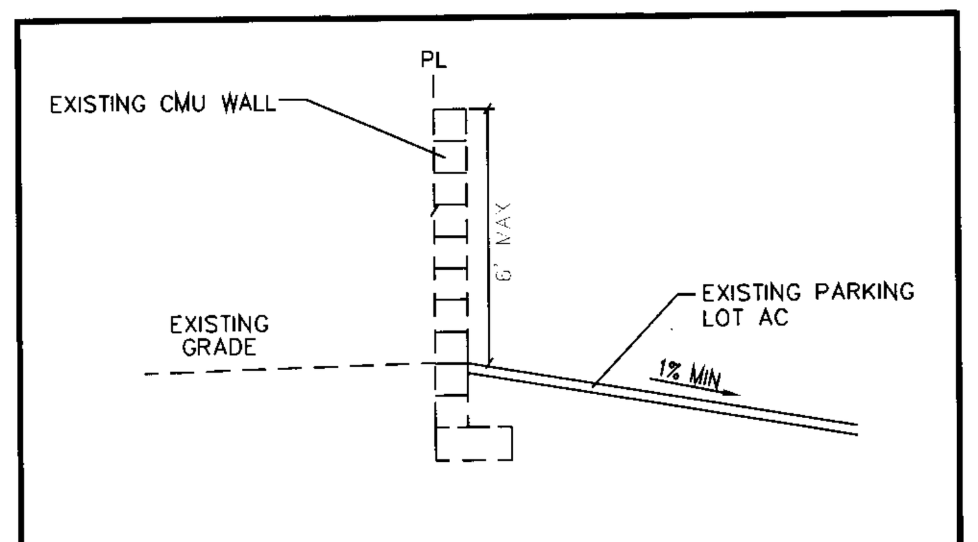
BEING THE NORTH SECTION LINE OF THE (NW 1/4) OF SECTION 26, T. 20 E., R. 61 S., M.D.M. TAKEN AS N89°38'29"W AS SHOWN ON RECORD OF SURVEY MAP, FILE 58 PAGE 61 RECORDED IN THE OFFICIAL RECORDS OF CLARK COUNTY, NEVADA ON MARCH 04, 1991.

GENERAL NOTES

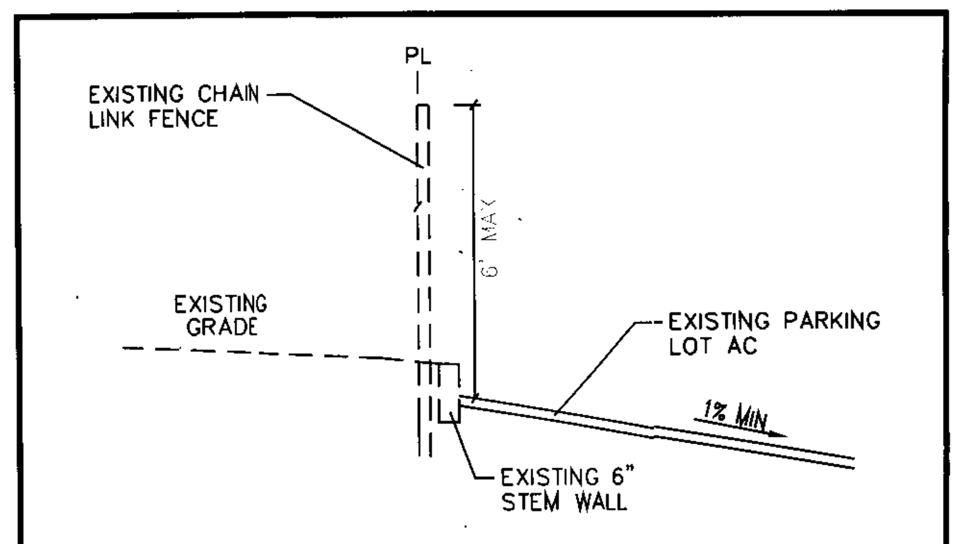
1. ADD 1800 TO ALL PLAN ELEVATIONS.
2. CONTRACTOR TO FIELD VERIFY ALL EXISTING PLAN ELEVATIONS AND NOTIFY THE ENGINEER IMMEDIATELY IF ANY DISCREPANCIES ARE FOUND.
3. THIS SITE IS NOT LOCATED IN A 100 YEAR FLOOD PLAIN PER F.I.R.M. MAP No 32003C2170E REVISED NOVEMBER 16, 2011

EARTHWORKS

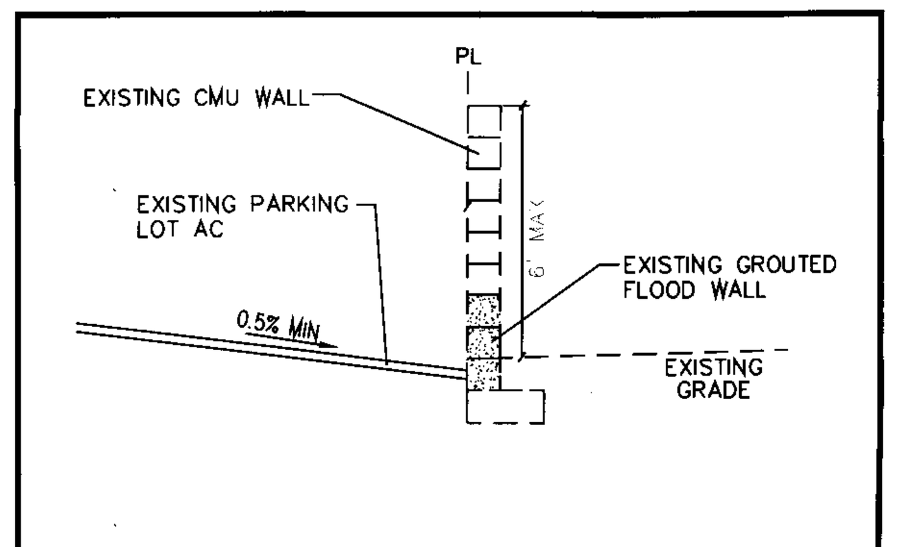
ESTIMATED CUT QUANTITY: 0 CY
ESTIMATED FILL QUANTITY: 228 CY



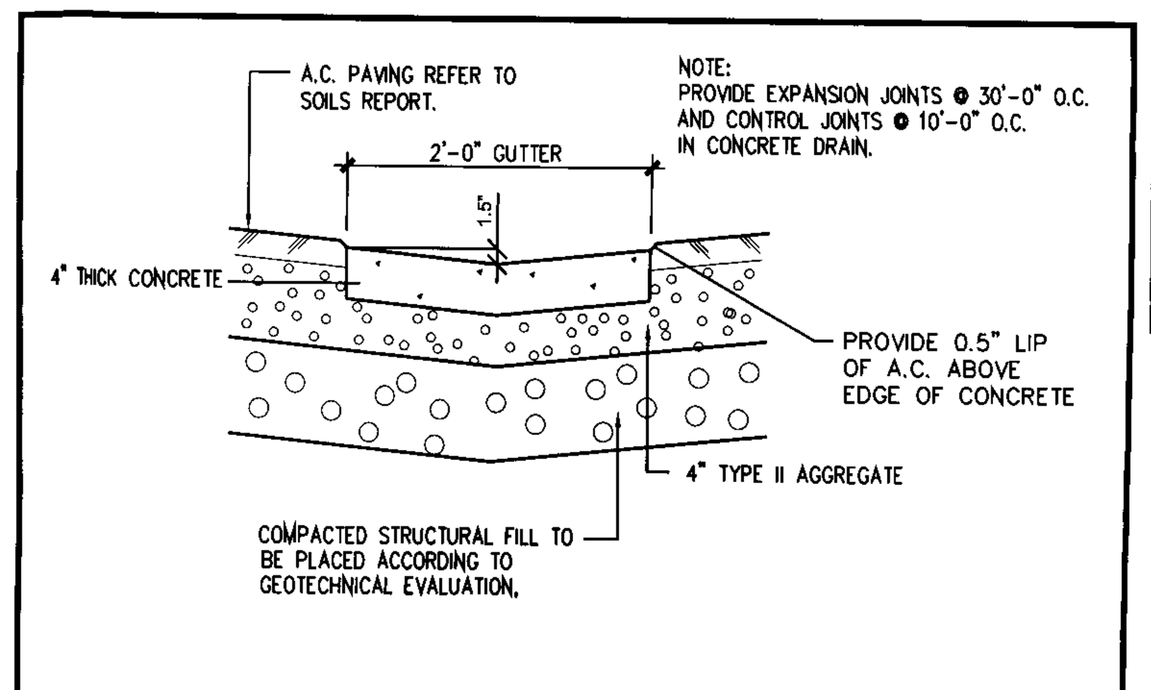
(C) SECTION DETAIL
N.T.S.



(D) SECTION DETAIL
N.T.S.



(E) SECTION DETAIL
N.T.S.



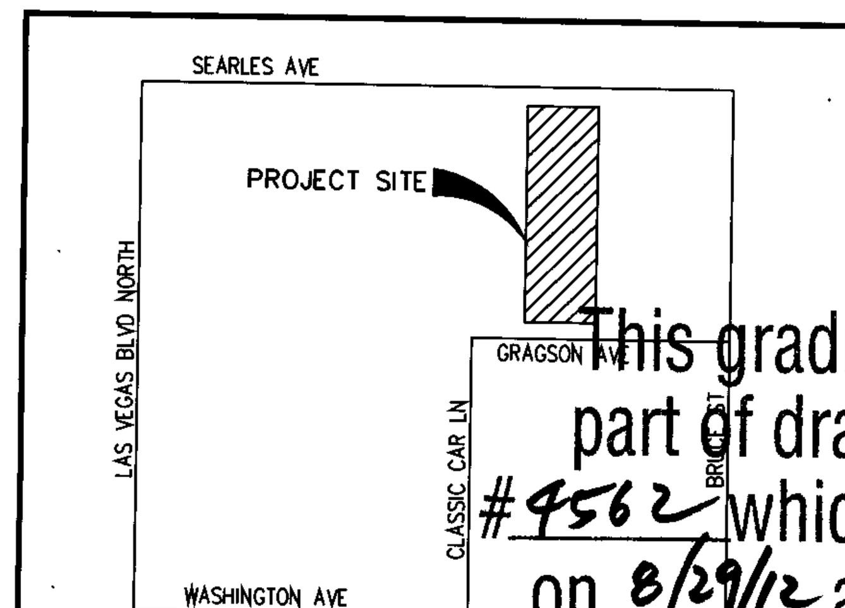
2' CONCRETE VALLEY GUTTER
N.T.S. NOTE : BASE MATERIAL AND CONCRETE THICKNESS TO BE CONFIRMED BY SOILS ENGINEER.

NOTE:
THIS GRADING PLAN COMPLIES WITH THE APPROVED DRAINAGE STUDY # -----

LEONARD L. CHRISTOPHERSON, P.E. No. 15257 DATE:

Call before you Dig. 1-800-227-2600 UNDERGROUND SERVICE ALERT (USA)

Call before you OVERHEAD 1-702-227-2929 NEVADA POWER ENVIRONMENT AND SAFETY SERVICES DEPARTMENT



VICINITY MAP
NOT TO SCALE

This grading plan is a part of drainage study #4562 which was received on 8/29/12 and April on 9/1/12. Page 1 of 1

CLV #

A Cab Taxi Company
Construction Documents
1500 Searles Avenue
Las Vegas, Nevada 89101

APTUS
1200 South 4th Street
Suite 206
Las Vegas, Nevada 89104
P 702.839.1200
F 702.839.1213

APTUS PROJECT NO. 09.065

ARCHITECT

ENGINEER

REGISTERED PROFESSIONAL ENGINEER - STATE OF NEVADA — LEONARD L. CHRISTOPHERSON EXP. 12/31/12 CIVIL No. 15257

NOTES

NO.	DESCRIPTION	DA

ISSUED

TITLE
GRADING PLAN

DRAWING NO.
GP1.0