

DS #: 4547

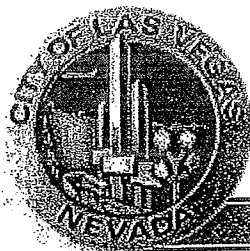
APN: 139-21-313-009

PROJECT: Dollar General

SUBMITTAL: 1st

SCANNED BY/DATE: _____

CHECKED BY/DATE: _____





CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		January 26, 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:	
	Dollar General	
Cross Streets:	SWQ Lake Mead Blvd & Martin L. King Blvd	COPIES TO:
File Number:	F:\Depot\DSMemos\DS4547.doc	Walker Engineering, LLC
Parcel Number:	139-21-313-009	Dynamic Development Company
Zoning Action:	SUP-43927 & SDR-43929	Bart Anderson, P.E., DevCo
FEMA Flood Zone	YES	CCRFCD
	NO	X
Proposed Storm Drain	YES	
	NO	X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	1/18/2012	1/25/2012	See Comments Below	\$400.00	271949: \$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. The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCD) master planned facility in *Lake Mead Boulevard*. Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.
2. The developer/engineer proposed offsite grading in the adjacent parcel to the east and south. Consult with *City of Las Vegas Planning Department* for approval prior to the final acceptance of the drainage study.
3. **Sheet PR-1 (Proposed Conditions Basin Map):** Basin DON1 is proposed to drain through the adjacent parcel to the east which consists of Basins DOF1 and DOF2. This cuts into the future owner of the adjacent parcel to two parts, ie, the proposed design dictates what the future owner can do on his/her land. From the perspective of the future owner, this is not desirable.

With reference to the **Precise Grading Plan G1**, the proposed grade elevation at the southeast corner of the development is high enough to have a positive drainage due south to *Lake Mead Boulevard* for discharge. It appears that the proposed drainage through a swale between DOF1 and DOF2 is not necessary. Please address or review and revise accordingly in the next submittal.

4. Revise Construction Note #14 to specify the proposed solid grouted retaining wall to be built with "8" CMU".

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/21
AREA M-21

TRANSACTION REPORT

P. 01

JAN-26-2012 THU 08:29 AM

FOR: CITY OF LAS VEGAS

7023828551

SEND

DATE	START	RECEIVER	TX TIME	PAGES	TYPE	NOTE	M#	DP
JAN-26	08:28 AM	8735346	56"	2	FAX TX	OK	003	

TOTAL : 56S PAGES: 2

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.

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END OF REMARKS

ays

T/R/S: T20S/R61E/21
AREA M-21

Post-it® Fax Note 7671		Date	1/26/12	# of pages	2
To	Teresa Wolf		From	Albert Sung	
Co./Dept.	Walker Eng		Co.	CEW	
Phone #			Phone #	000 001	

5765 South Rainbow Boulevard
Suite 101
Las Vegas, Nevada 89118
T: 702.873.5197
F: 702.873.5346
www.walker-eng.com

WALKER ENGINEERING, LLC

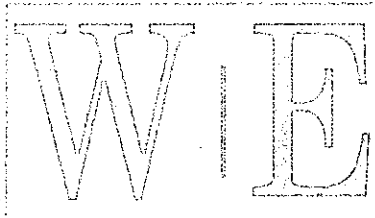
TECHNICAL DRAINAGE STUDY for

DOLLAR GENERAL

@ LAKE MEAD & MLK

APN: 139-21-313-009

CITY OF LAS VEGAS, NEVADA ENTERPRISE PARK



Prepared for:

DYNAMIC DEVELOPMENT COMPANY, LLC

1725 21st Street

Santa Monica, California 90404

Tel: 310.315.5411

Fax: 310.315.5422

Date Prepared:

January 17, 2012



WALKER ENGINEERING, LLC

January 17, 2012
WE Project No. 1217.00

Mr. Peter Jackson
City of Las Vegas Flood Control
333 Rancho Drive
Las Vegas, Nevada 89106

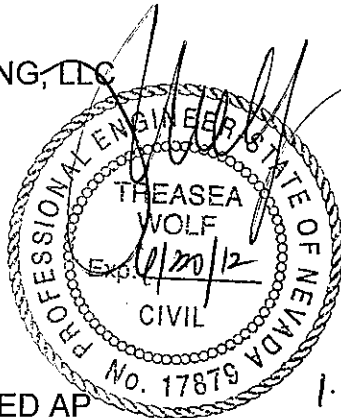
**RE: Technical Drainage Study for Dollar General @ Lake Mead & MLK
(APN: 139-21-313-009)**

Dear Peter,

Attached are (2) copies of the Technical Drainage Study for Dollar General @ Lake Mead & MLK for your review. The site is a proposed retail project located just west of the southwest corner (SWC) of Lake Mead and MLK.

Please feel free to contact me if you have any questions or need any additional information. Thank you.

Sincerely,
WALKER ENGINEERING, LLC



Treasea Wolf, P.E., LEED AP
Project Manager

5765 South Rainbow Blvd.
Suite 101
Las Vegas, Nevada, 89118
Phone: 702.873.5197
Fax: 702.873.5346
www.walker-eng.com

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: DOLLAR GENERAL @ LAKE MEAD & MLK Date: Jan 17, 2012

Location of Development: a) Descriptive (Cross Streets) North/South: STELLA LAKE & MLK
East/West: LAKE MEAD

b) Section: 21 Township: 20 S Range: 61E

c) APN : 139-21-313-009

Name of Owner: CITY OF LAS VEGAS

Telephone No.: 702.229.6276 Fax No.: 702.382.0848 E-Mail Address: _____

Address: 333 RANCHO DRIVE, LAS VEGAS, NV 89106

Contact Person-Name: TREASEA WOLF, P.E., LEED AP Telephone No.: 702.873.5197

* E-Mail Address: twolf@walker-eng.com Fax No.: 702.873.5346

Firm: WALKER ENGINEERING, LLC

Address: 5765 S. RAINBOW BLVD., SUITE 101 LAS VEGAS, NV 89118

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		GRADING PERMIT

1. Total Owned Land Area: At Site: 5.69 ACRES Being Developed/Disturbed: 2.37 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.): COMMERCIAL-RETAIL

5. Approximate upstream land area which drains to the subject site: 0 ACRES

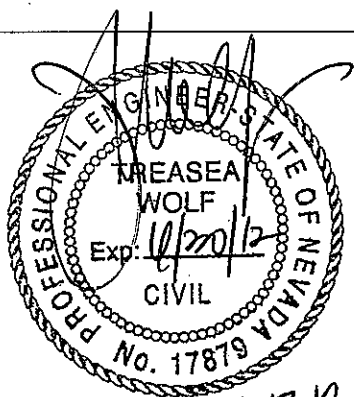
6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: _____

CLV CENTRAL NEIGHBORHOOD STUDY & TDS FOR STELLA LAKE

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: _____

LAKE MEAD VIA PROP. DWY & MLK VIA ACCESS ROAD AND RELOCATED DWY.

8. Briefly describe your proposed schedule for the subject project: ASAP



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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL			
DRAINAGE SUBMITTAL CHECKLIST			
Project Name:	Dollar General @ Lake Mead & MLK		Map ID: 139-21-313-009
Firm Name:	Walker Engineering, LLC		Engineer: Treasea Wolf, P.E., LEED AP
Address:	5765 S. Rainbow Blvd. Suite 101		
City:	Las Vegas	State: Nevada	Zip: 89118
Phone No.:	(702) 873-5197		Fax No. (702) 873-5346
Property Owner:	City of Las Vegas		
Address:	333 Rancho Drive		
City:	Las Vegas	State: NV	Zip: 89106
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 (CCRCD) 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-inclusive 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 N/A

- ☒ ☐ ☐ Design Manual **Standard Form 1** with the Engineer's seal and signature.
- ☒ ☐ ☐ Design Manual **Standard Form 4**.
- ☒ ☐ ☐ 2 copies of the 24" x 36" **Drainage Plan**.
- ☐ ☒ ☐ A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

II. MAPS AND EXHIBITS

YES NO N/A

- ☒ ☐ ☐ A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
- ☒ ☐ ☐ A copy of the current CCRCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.
- ☒ ☐ ☐ Off-site drainage basin maps for existing, interim, and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
- ☒ ☐ ☐ 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.
- ☒ ☐ ☐ Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

YES NO N/A

- | | | | |
|-------------------------------------|--------------------------|-------------------------------------|---|
| ☒ | ☐ | ☐ | Sheet size: 24"x36" sealed by a registered engineer in the State of Nevada. |
| ☒ | ☐ | ☐ | Minimum scale: 1"=60' |
| ☒ | ☐ | ☐ | Project name. |
| ☒ | ☐ | ☐ | Vicinity Map with local and major cross streets. |
| ☒ | ☐ | ☐ | Revision box. |
| ☒ | ☐ | ☐ | North arrow and bar scale. |
| ☒ | ☐ | ☐ | Engineer's/consultant's address and phone number. |
| ☒ | ☐ | ☐ | Elevation datum and benchmark. |
| ☒ | ☐ | ☐ | Legend for symbols and abbreviations. |
| ☒ | ☐ | ☐ | Cut/Fill scarps, where applicable. |
| ☒ | ☐ | ☐ | Street names, grades, widths. |
| ☒ | ☐ | ☐ | 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. |
| ☒ | ☐ | ☐ | Existing contours encompassing the site and 100-feet beyond with spot elevations for important locations, where appropriate. |
| ☒ | ☐ | ☐ | Minimum finish floor elevations with top-of-curb elevations at upstream end of lot. |
| ☒ | ☐ | ☐ | Proposed typical street sections. |
| ☐ | ☐ | ☒ | Streets with offset crowns. |
| ☒ | ☐ | ☐ | Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes. |
| ☒ | ☐ | ☐ | Property lines. |
| ☒ | ☐ | ☐ | Right-of-way lines and widths, existing and proposed. |
| ☒ | ☐ | ☐ | Existing improvements and their elevations. |
| ☒ | ☐ | ☐ | Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year peak flows at basin concentration points. |
| ☒ | ☐ | ☐ | Concentration points and drainage flow directions with Q_{100} and V_{100} and D_{100} in streets. |
| ☒ | ☐ | ☐ | Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows. |
| ☒ | ☐ | ☐ | Location and cross-section of street capacity calculations. |
| ☐ | ☐ | ☒ | Cross-sectional detail for channels, including cutoff wall locations. |

III. DRAINAGE PLAN (CONTINUED)

YES NO N/A

- | | | | |
|-------------------------------------|--------------------------|-------------------------------------|--|
| ☒ | ☐ | ☐ | Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk ditches, swales, storm drain systems, unimproved channels, and culverts, etc.) stating size, material shape, and slope with plan and profile and HGL calculations. |
| ☐ | ☐ | ☒ | Existing and proposed drainage easements and widths shown with sufficient detail. A cross-sectional detail must be provided that shows appropriate lining and reinforcement. |
| ☐ | ☐ | ☒ | Location and detail of existing, proposed, and future block wall openings. Minimum size is 16"x48". Wrought iron gate is required for flows > 10 cfs. |
| ☐ | ☐ | ☒ | Location and detail of flood-wall(s) illustrating depth of flow, proposed grouting height, etc. |
| ☒ | ☐ | ☐ | 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. |
| ☒ | ☐ | ☐ | Building and/or lot numbers. |
| ☒ | ☐ | ☐ | Alignment of all existing, proposed, or future Regional Facilities adjacent to the site. |
| ☐ | ☐ | ☒ | Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information. |
| ☐ | ☐ | ☒ | 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. |
| ☒ | ☐ | ☐ | Appropriately elevated "humps" 6 inches above the 100-year water surface elevation at the accesses where the intent is to protect the site from the Q_{100} flows. |
| ☒ | ☐ | ☐ | Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent. |

IV. HYDROLOGIC ANALYSIS

YES NO N/A

- | | | | |
|-------------------------------------|--------------------------|--------------------------|--|
| ☒ | ☐ | ☐ | Appropriate soil information and Soils Map for existing and future conditions with sub-basins and property delineated. |
| ☒ | ☐ | ☐ | 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. |
| ☒ | ☐ | ☐ | Input and Output information for proposed conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| ☒ | ☐ | ☐ | Use of correct precipitation values in and around the McCarran Airport rainfall area. |
| ☒ | ☐ | ☐ | A discussion in the text of the hydrologic analysis justifying sub-basin boundaries and cutoffs, supporting assumptions, and calculations. |
| ☒ | ☐ | ☐ | A summary table of stormwater flows showing basin area Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable. |
| ☒ | ☐ | ☐ | Copies of supporting technical information referenced from a previously approved study and a statement accepting these results. |
| ☒ | ☐ | ☐ | On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law. |

V. HYDRAULIC ANALYSIS

YES NO N/A

- | | | | |
|-------------------------------------|--------------------------|-------------------------------------|---|
| ☒ | ☐ | ☐ | Flow split calculations and supporting documentation or reference for the method of flow calculation used. |
| ☒ | ☐ | ☐ | 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. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan . |
| ☒ | ☐ | ☐ | 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. |
| ☐ | ☐ | ☒ | Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.) |
| ☐ | ☐ | ☒ | 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 losses, where appropriate. |
| ☒ | ☐ | ☐ | 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. Building adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater. |
| ☐ | ☐ | ☒ | A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. <ul style="list-style-type: none"> • 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. |
| ☐ | ☐ | ☒ | Provide a 50 percent clogging factor in the capacity calculation for drop inlets. |
| ☐ | ☐ | ☒ | Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drainpipes in public rights-of-way, including headwater pool inundation. |
| ☒ | ☐ | ☐ | The mitigation of nuisance water, both during construction and in the fully developed condition must be addressed. |



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

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

I. GENERAL REQUIREMENT		
Yes	No	
	✓	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.) <i>WORKING ON THIS</i>
✓		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
✓		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. <i>(Signature)</i> by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

II. GRADING PLAN INFORMATION		
Yes	No	
✓		(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
✓		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. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
✓		Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
	N/A	Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
✓		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
✓		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
✓		Back of lot elevations and lot drainage pattern for all lots including common lots.
✓		Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study. <i>WORKING ON THIS</i>
✓		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
✓		This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
✓		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
✓		Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
	N/A	Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
	N/A	The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
✓		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
✓		Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

III. Local Entity Criteria - City of Las Vegas -- Manual Section 1600		
Yes	No	
	N/A	Lots with "B and C Type Drainage" that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16" x 24" minimum block wall openings are required for both options.
	N/A	Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.

- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

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

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INTRODUCTION

This report is a Technical Drainage Study for ***Dollar General @ Lake Mead & MLK***, which is a proposed commercial retail development located south of Lake Mead between Stella Lake and MLK within the existing City of Las Vegas Enterprise Park in the City of Las Vegas, Nevada. The purpose of this study is as follows:

1. Determine the 10-year and 100-year on-site and off-site peak runoff for existing and fully developed conditions.
2. Determine the Finish Floor Elevation for the proposed commercial building.

LOCATION AND DEVELOPMENT DESCRIPTION

The site is located in a portion of the North Half (N 1/2) of the Southwest Quarter (SW 1/4) of Section 21, Township 20 South, Range 61 East, M.D.M. Clark County, Nevada. The project site is located within a portion of Assessor's Parcel Number 139-21-313-009. A copy of the *Assessor's Parcel Map* is included in **Appendix A**.

The project site is approximately 2.37 acres of the 5.69 acre parcel and is located south of Lake Mead between Stella Lake and MLK within the existing City of Las Vegas Enterprise Park in the City of Las Vegas, Nevada. The property is being developed under an existing "option, disposition and development agreement" between City of Las Vegas and Laurich Properties. A *Vicinity Map* is included in **Appendix A** for reference. In the existing condition, the undeveloped site conveys runoff to the east of the project site and eventually discharges into MLK. A copy of the *Site Description* is included in **Appendix A**.

PROJECT DESCRIPTION

The project site is approximately 2.67 acres of the 5.69 acre parcel on which a commercial retail development is proposed. The site is bordered by existing commercial (FBI Bldg.) to the west, existing fully developed Lake Mead Blvd. to the north, vacant land and existing fully developed Martin L King Blvd. to the east and vacant land and existing fully developed Mount Mariah to the south.

LAND USE CONDITIONS

The parcel on which the project site is located (139-21-313-009) has a zoning classification of C-1. The Site Plan (SDR 43929) and Special Use Permit (SUP 43927) were approved at CLV Planning Commission on January 10, 2012. The PC Action, Conditions of Approval and Staff Comments are included in **Appendix A** for review. The project has also been submitted to the Las Vegas Enterprise Park Architectural Review Committee and they have approved the initial "meeting 1" and "meeting 2" items. A copy of the approval letter is included in **Appendix A**.

PREVIOUS DRAINAGE STUDIES

Previous hydrology studies that were utilized in the preparation of this report:

Technical Drainage Study for "*Stella Lake*" By Carter Burgess. CLV DS 3581. Dated May 2004. Approved by CLV on June 28, 2004.

Walker Engineering has reviewed the reference study listed above and is in agreement with the referenced material included in this study. The information referenced is for the purpose of determining the existing and future development patterns and quantities of flow upstream of the proposed project site. Flows referenced are indicated throughout this report and are accepted by Walker Engineering for the purpose of this study. Referenced portions of this particular Technical Drainage Study are included in **Appendix D** for your convenience.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD) MASTER PLAN FACILITIES

"*The Las Vegas Valley Flood Control Master Plan Update*", Figure **F-26**, dated September 2008, as prepared by Post, Buckley, Schuh & Jernigan, Inc. (PBS&J), Parsons Brinckerhoff and Louis Berger Group for the Clark County Regional Flood Control District (CCRFCD) illustrates the existing and proposed master planned facilities in the area (**See Appendix A**). As shown on the exhibit, the project site is bordered by any existing and proposed regional master plan facility. Currently, LVLM 0059, which is an existing 72" RCP is in place in Lake Mead. However, this existing facility is undersized and does not accept all the flows in Lake Mead so there is a proposed 12'x6' RCB (LVLM 0060) that will be constructed in the future to replace the existing 72" RCP.

FLOOD HAZARD DESIGNATION

The Special Flood Hazard Areas for both the unincorporated and the incorporated portions of Clark County, Nevada, are outlined in the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps. This subject site is located on Community Panel No. **32003C2160F** dated November 16, 2011. As shown on our *FEMA FIRM Map* Exhibit, the subject site is located within "Zone X". Zone X is an area determined to be outside the 0.2% annual chance flood. (See Appendix A).

HYDROLOGIC METHODOLOGY

The hydrologic model and design of this site development are in compliance with local requirements, including City of Las Vegas (CLV), the CCRFCD's "*Hydraulic Criteria and Drainage Design Manual*", and the CCRFCD's "*Flood Control Master Plan Update*".

HYDROLOGIC MODEL

The hydrologic model utilized in this study is the **HEC-1** Flood Hydrograph Package developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center. **HEC-1** is a rainfall runoff event simulation model utilizing an interconnected system of hydrologic and hydraulic components to simulate the surface runoff response of a drainage area to precipitation. The calculations of this study were performed using the SCS and Kinematics Wave Hydrograph Sub-routing of the **HEC-1** Flood Hydrograph Model. The detailed explanation of the theory and background is presented in Section 4 of the SCS National Engineering Handbook and the **HEC-1** User Manual. Completed hydrographs were routed using the Muskingum-Cunge Routing Method.

PRECIPITATION

According to Figure 513 of the CCRFCD Manual, the project **does** lie within the McCarran Airport Rainfall Area, and therefore, point rainfall values for the 10-year and 100-year, six-hour storm duration are **1.58** inches and **2.77** inches, respectively. (See Figure 513 in Appendix B)

CURVE NUMBER

"The Las Vegas Valley Flood Control Master Plan Update", Figure H-26, dated September 2008, as prepared by Post, Buckley, Schuh & Jernigan, Inc. (PBS&J), Parsons Brinckerhoff and Louis Berger Group for the CCRFCD illustrates the hydrologic subareas, land use and soils in the area (**See Appendix A**). The soil in this site is classified as hydrologic soil group "**B**". This group is characterized as having **moderately low** runoff potentials. In addition, an Existing Soils Map and Proposed Soils Map have been included in **Appendix B**, which reference the "Soil Survey of Las Vegas Valley Area, Nevada, Part of Clark County" performed by the Soil Conservation Service, issued in July 1985.

LAG TIME

The time between a brief, heavy rain and maximum runoff rate is called Lag Time. Lag Time can be estimated from historical hydrographs or it can be estimated from specific watershed characteristics such as watershed length, slope and flow impedance. Based on studies of many storm events for a range of watershed conditions, the following empirical relationship between Lag Time (T) and Time of Concentration (T_c) was derived:

$$T = 0.6T_c$$

$$T_c = \frac{1}{3600}V + T_i$$

Where L=Hydraulic Length

V=Average Velocity

T_i =Initial Flow Time

Channel Flow calculations of velocities for estimating travel time for surface flow were used to develop a Time of Concentration. Calculations for the channel flow velocities are included in **Appendix C** along with the Standard Form 4 and were performed using the formula found in Section 602.1 in the Drainage Design

Manual. To determine flow times, the equation $T_i = \frac{1.8(1.1-K)L^{\frac{1}{2}}}{S^{\frac{1}{3}}}$ was used as

outlined in (Reference 1).

EXISTING CONDITION FLOWS

ON-SITE FLOWS

The project site is delineated and identified as basin EON1, which consists of approximately 2.78 acres. The site is undeveloped land. Basin EON1 generates **1/4 cfs** (10 year and 100 year flow, respectively) and discharges runoff east onto the adjacent vacant land and eventually discharges onto Marin L King Boulevard.

OFF-SITE FLOWS

No off-site flows drain to the project site. However, according to the *2005 CLV Central Neighborhood Flood Control Master Plan Figure E-2* (see **Appendix A**), there is **1,015 cfs** in the 100 year storm event in Lake Mead. According to *CLV Central Neighborhood Flood Control Master Plan Figure F-2* (see **Appendix A**), all the surface flows are to be accepted by the proposed CCRFCD facility in Lake Mead and according to the *2008 CCRFDC MPU*, the proposed facilities are in place. However, per a phone conversation with Peter Jackson with City of Las Vegas Flood Control on January 4, 2012, the existing facilities in Lake Mead do not accept all the flows as previously thought and shown on the *CLV Central Neighborhood Flood Control Master Plan*. Based on this information, Peter stated to assume the 100 year flows in Lake Mead upstream of the project site to be what is shown on Figure E-2 and as referenced from the *TDS for Stella Lake*.

According to the *TDS for Stella Lake* (see **Appendix D**), **29 cfs** of the **1,015 cfs** in Lake Mead upstream of this project site over top the crown at the intersection of Lake Mead/Stella Lake and continue south in Stella Lake. It is assumed that the existing storm drain facility in Lake Mead accepts the 10 year flow so the only flows of concern are the 100 year flows in Lake Mead. After the intersection of Lake Mead/Stella Lake, there are **986 cfs** in Lake Mead. Basin ON1 from the *TDS for Stella Lake* drains to Lake Mead and adds **6 cfs** in the 100 year storm, making the total 100 year flows upstream of the project site **992 cfs**. See Figure 5 in **Appendix D** for the Stella Lake Developed Condition Basin Map.

Since the project site is part of a larger parcel and other vacant parcels within the existing commercial subdivision, the remainder areas were delineated as existing off-site basins EOF1 and EOF2. EOF1 is 3.18 acres and generates **1/4 cfs** and EOF2 is 4.18 acres and generates **1/6 cfs**. In existing conditions, basins EON1, EOF2 and EOF3 all drain east towards Martin L King Boulevard. The total flows discharged into MLK are **3/14 cfs**.

The following table summarizes the basin flows for the existing condition:

TABLE 1
EXISTING CONDITION BASIN FLOWS

BASIN	BASIN AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
EON1	2.78	1	4
EOF1	3.18	1	4
EOF2	4.18	1	6

See **Appendix G** for Existing Drainage Basin Map (EX-1). A copy of the Existing Condition HEC-1 is included in **Appendix C**.

PROPOSED CONDITION FLOWS

ON-SITE FLOWS

The proposed project will develop 2.37 acres of the 5.69 acre parcel. Based on this, the project site is delineated into two (2) proposed onsite drainage basins based on the proposed grading plan and three (3) offsite drainage basins which make up the remainder parcel as well as the other undeveloped parcels within the existing commercial subdivision. Basins DOF1, DOF2 and DOF3 were analyzed as developed commercial to determine the future proposed conditions.

Proposed onsite basin DON1 (1.69 acres) generates **2/5 cfs**, and basin DON2 (0.68 acres) generates **1/2 cfs**. Proposed offsite basin DOF1 (1.10 acres) generates **1/3 cfs**, basin DOF2 (2.08 acres) generates **3/6 cfs** and DOF3 (4.18 acres) generates **5/11 cfs**. Proposed onsite basin DON1 & offsite basin DOF1 both drain to Lake Mead via proposed driveways. The total flows in Lake Mead downstream of DON1 are **2/997 cfs**. The total flows in Lake Mead downstream of DOF1 are **3/1,000 cfs**. There is an existing catch basin just downstream of DOF1 adjacent to the existing McDonald's, so it is assumed that the 10 year flow will be accepted.

Onsite basin DON2 drains east and combines with off-site basin DOF2 and both basins discharge into MLK via an existing driveway that this project will relocate further south. Basin DOF3 discharges into MLK via an existing driveway. The total flows in MLK from these basins are **8/17 cfs**.

OFF-SITE FLOWS

Since the majority of the upstream area is developed, the proposed upstream condition off-site flows are the same as the existing condition.

The following table summarizes the basin flows for the proposed condition:

TABLE 2
PROPOSED CONDITION BASIN FLOWS

BASIN	BASIN AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
DON1	1.69	2	5
DON2	0.68	1	2
DOF1	1.10	1	3
DOF2	2.08	3	6
DOF3	4.18	5	11

See **Appendix G** for Proposed Drainage Basin Map (PR-1). A copy of the Proposed Condition HEC-1 is included in **Appendix C**.

STREETS

Existing

Lake Mead Blvd. is an existing 100' right-of-way that is fully developed with curb, gutter and sidewalk.

Martin L King Blvd. is an existing 100' right-of-way that is fully developed with curb, gutter and sidewalk.

Proposed

The development of this site will include the construction of a new curb return driveway on Lake Mead and will relocate an existing driveway on Martin L King further south.

The following Table 3 displays the existing and proposed flow conditions in the street(s) adjacent to the project site:

**TABLE 3
 STREET FLOWS (EXISTING & PROPOSED CONDITION)**

SECTION ~STREET NAME~	Q10 (cfs)	Flow Depth (ft)	V10 (fps)	V*D	Q100 (cfs)	Flow Depth (ft)	V100 (fps)	V*D	Dry Lane
*B-B LAKE MEAD	-	-	-	-	992	1.85	7.79	14.41	YES
HS-1 (Ex) LAKE MEAD	-	-	-	-	992	2.10	6.76	14.20	YES
HS-2 (Ex) MLK	3	0.40	1.30	0.52	14	0.56	1.74	0.97	YES
HS-1 (Pr) LAKE MEAD	3	0.41	1.59	0.65	1000	2.11	6.78	14.31	YES
HS-2 (Pr) MLK	8	0.49	1.57	0.77	17	0.59	1.82	1.07	YES
HS-3 (Pr) LAKE MEAD	-	-	-	-	992	2.51	7.02	17.62	N/A
HS-4 (Pr) LAKE MEAD	-	-	-	-	997	2.19	6.90	15.11	N/A

It is assumed that the existing CCRFCD facility in Lake Mead accepts the 10 year flows in the street and therefore, the dry lane criteria is met. However, in the 100 year event, Lake Mead does not meet the DxV criteria. This is an existing condition that is not affected by the development of this project. Upon completion of the new CCRFCD facility in the future, this will be rectified. All street calculations and cross section analyses can be found in **Appendix C** for reference. See Existing & Proposed Condition Drainage Basin Map (EX-1 & PR-1) in **Appendix G** for cross section location.

FINISH FLOOR ELEVATION

The Clark County Regional Flood Control District requirement for the finish floor elevation (FF) is that it must be 18" above the centerline grade of the adjacent street or be elevated to twice the depth of flow up to 18-inches above the WSE. Due to the large existing 100 year flows in Lake Mead, the finish floor elevation of

the proposed building is more than 18" above the centerline grade in the adjacent street as well as 18" above the water surface elevation in the street.

The proposed building is adequately protected from the existing and proposed flow conditions. The proposed driveway is humped 6" above the water surface elevation in the street. See Grading Plan in **Appendix G**.

RESULTS

The Dollar General @ Lake Mead and MLK development will not adversely impact the surrounding areas in both the 10-year and 100-year storm events. The development of this project site is in compliance with the *CCRFC D Hydrologic Criteria and Design Manual* and Clark County criteria.

The development of this site increases flows from the undeveloped condition by **2 cfs** in the 10 year and 100 year storm event, which is nominal. The remainder of the vacant parcels within the commercial subdivision when developed will increase flows to the downstream properties by **7/10 cfs**, which for the type and size of development is also nominal. **There are no negative impacts to the downstream properties from the development of this site.**

CONCLUSIONS AND RECOMMENDATIONS

1. This project is in compliance with the applicable drainage laws recognized by the State of Nevada.
2. This project is in compliance with the CCRFC D's "*Master Plan Update*", and will **not** conflict with any Master Planned Facilities.
3. This project is in compliance with the CCRFC D's "*Hydraulic Criteria and Drainage Design Manual*", with the exceptions noted in the study.
4. This project lies within FEMA Flood Zone "X."
5. The drainage facilities for this project have been designed to control and convey the onsite runoff from the 100-year storm safely around the site. In addition, they have been designed based upon generally accepted engineering practices and in accordance with local requirements.
6. The finish floor elevation meets the minimum requirements.

REFERENCES

1. Clark County Regional Flood Control District, "*Hydraulic Criteria and Drainage Design Manual*," August 1999.
2. Clark County Regional Flood Control District, "*2008 Las Vegas Valley Flood Control Master Plan Update*," September 2008.
3. City of Las Vegas, "Central Neighborhood Flood Control Master Plan," 2005.
4. Technical Drainage Study for "Stella Lake" By Carter Burgess. CLV DS 358, Dated May 2004.

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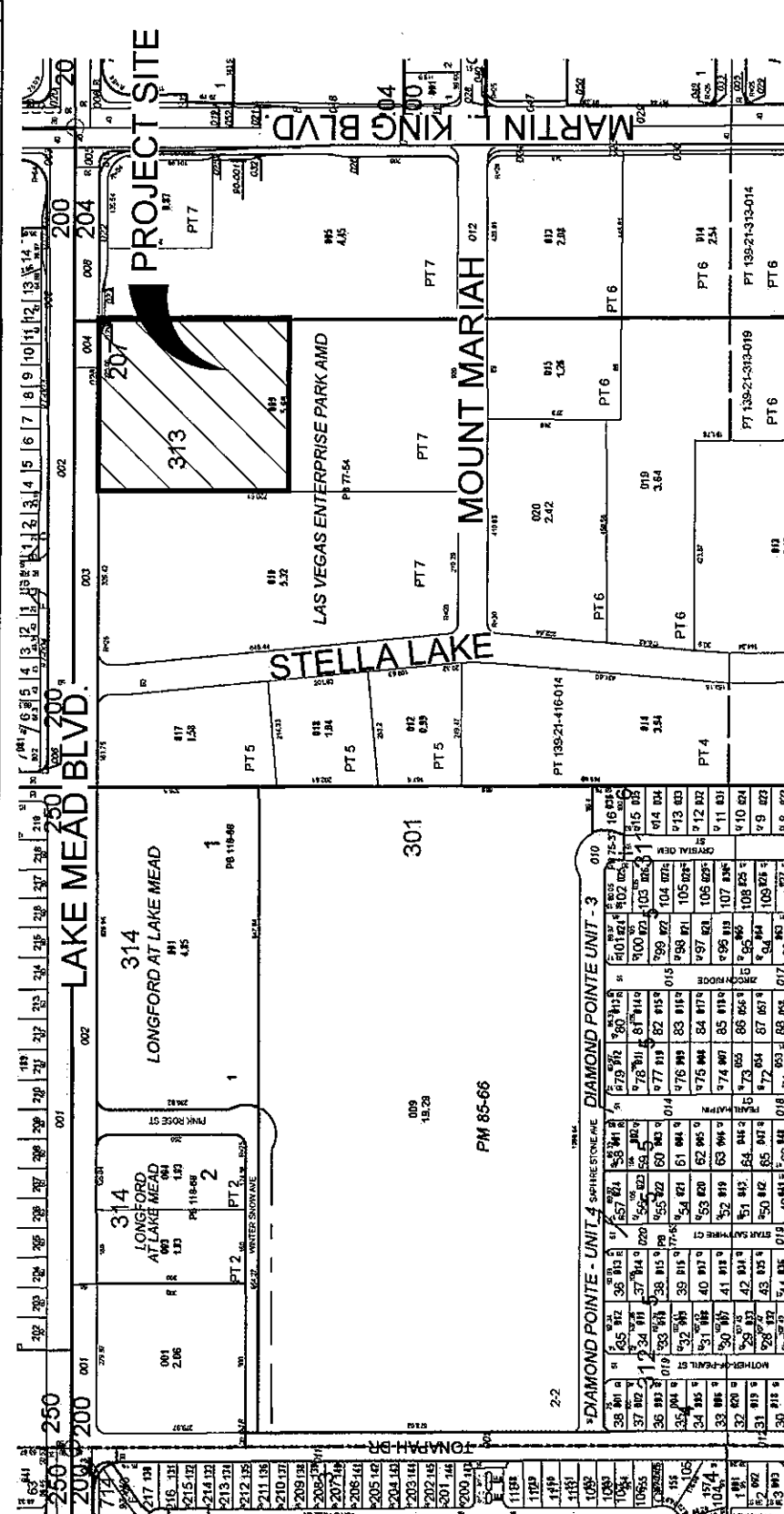
ASSESSOR'S PARCELS - CLARK CO., NV.
Michèle W. Shate - Assessor

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 parcels not 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.

MAP LEGEND
 PARCEL BOUNDARY
 SUB BOUNDARY
 ROAD BOUNDARY
 ROAD EASEMENT
 MATCH/LEADER LINE
 HISTORIC LOT LINE
 HISTORIC ROAD BOUNDARY
 SECTION LINE

CONDOMINIUM UNIT
 001 PARCEL NUMBER
 002 ACRES
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Scale: 1" = 200' Rev. 07/14/2011



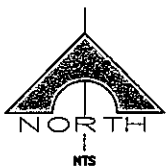
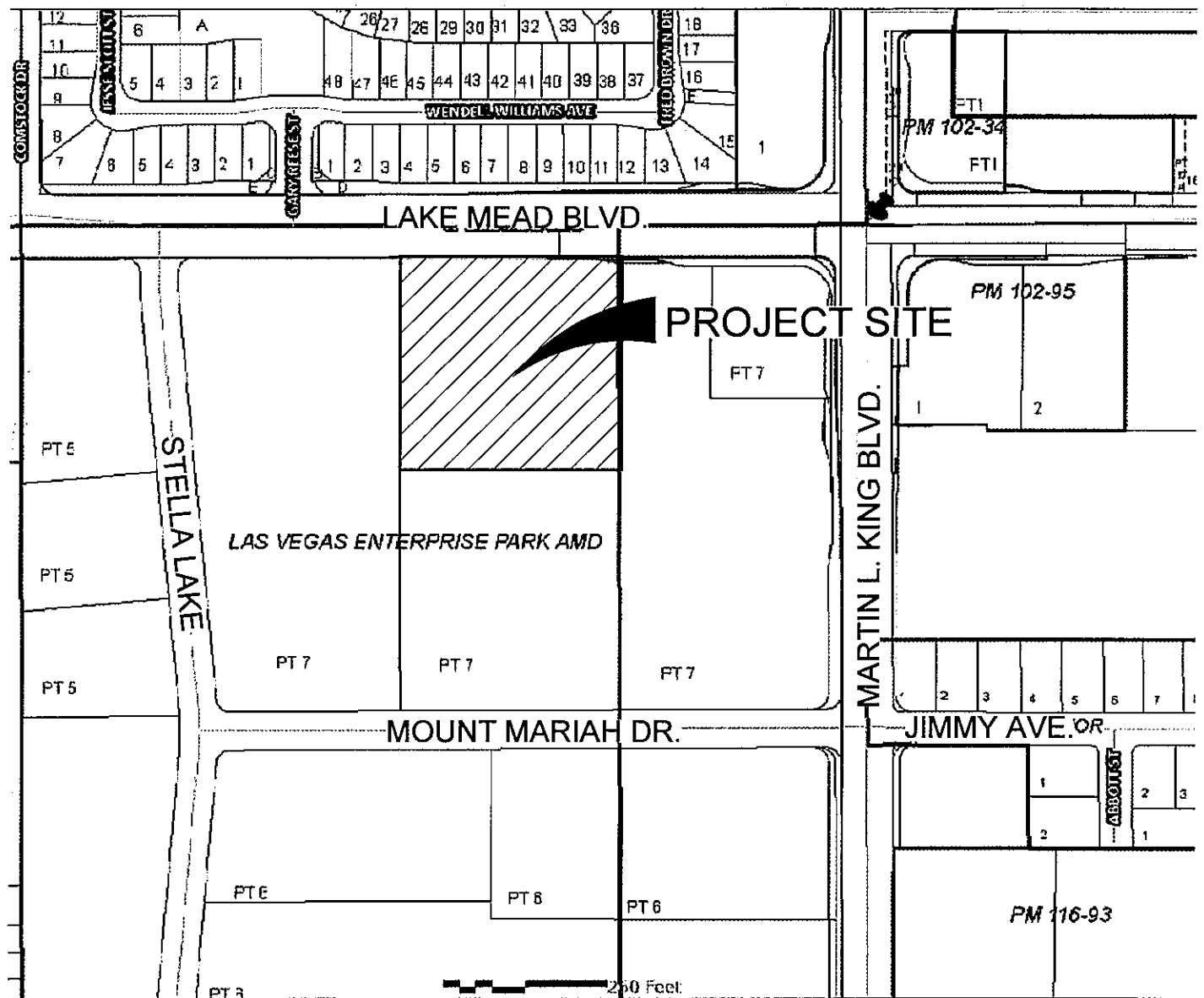
TAX DIST 207,204,200



WALKER ENGINEERING, LLC
 5765 S. RAINBOW BLVD.
 SUITE 101
 LAS VEGAS, NV 89118
 TEL: 702.873.5197
 FAX: 702.873.5346

ASSESSOR'S PARCEL MAP

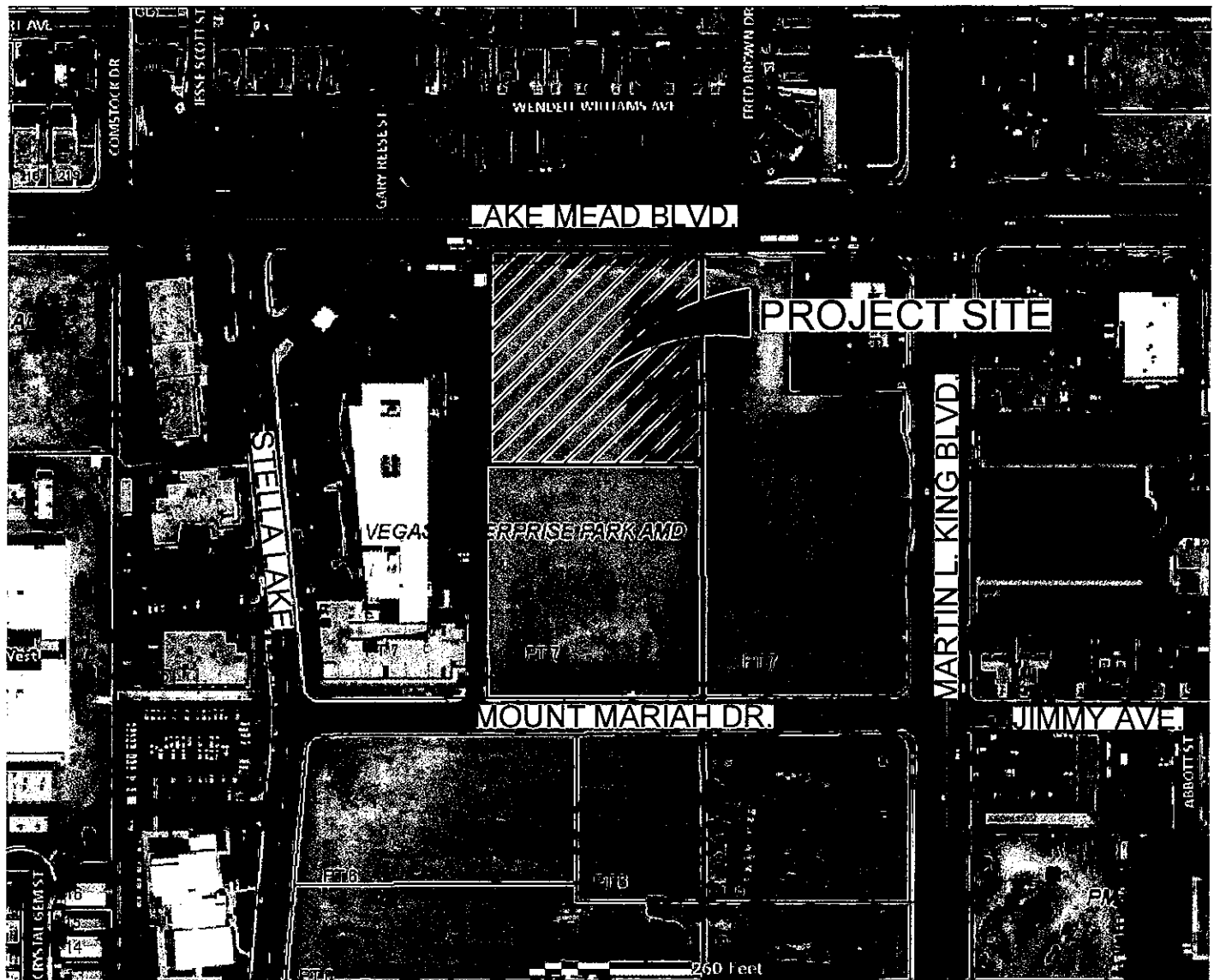
meeting your land development needs



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meeting your land development needs

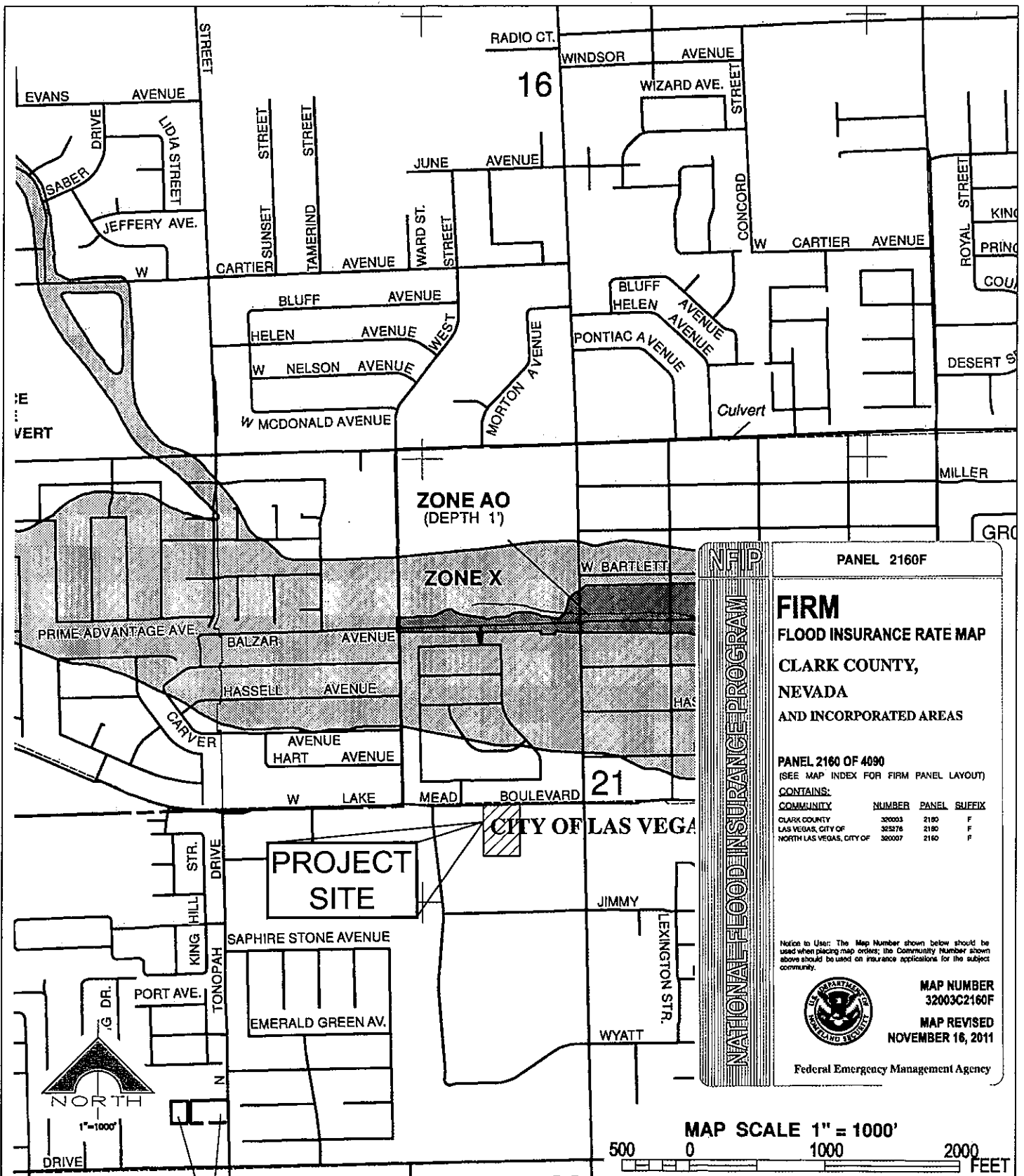
VICINITY MAP



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meeting your land development needs

SITE DESCRIPTION



FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA
AND INCORPORATED AREAS

PANEL 2160 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2160	F
LAS VEGAS, CITY OF	320278	2160	F
NORTH LAS VEGAS, CITY OF	320007	2160	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
32003C2160F
MAP REVISED
NOVEMBER 16, 2011

Federal Emergency Management Agency

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET



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FEMA FIRM MAP



2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F-26

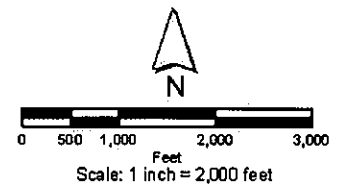
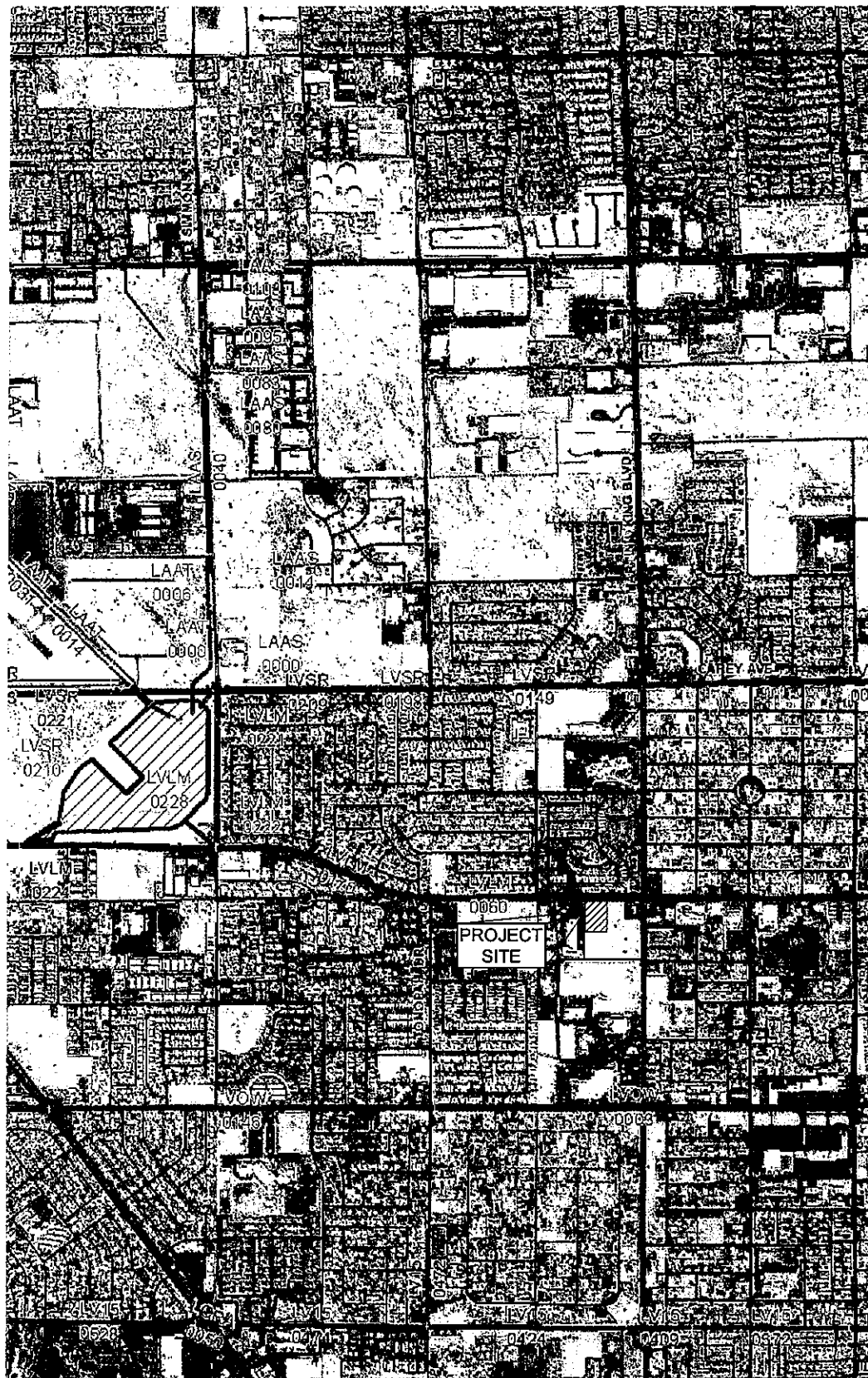
FLOOD CONTROL FACILITIES

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

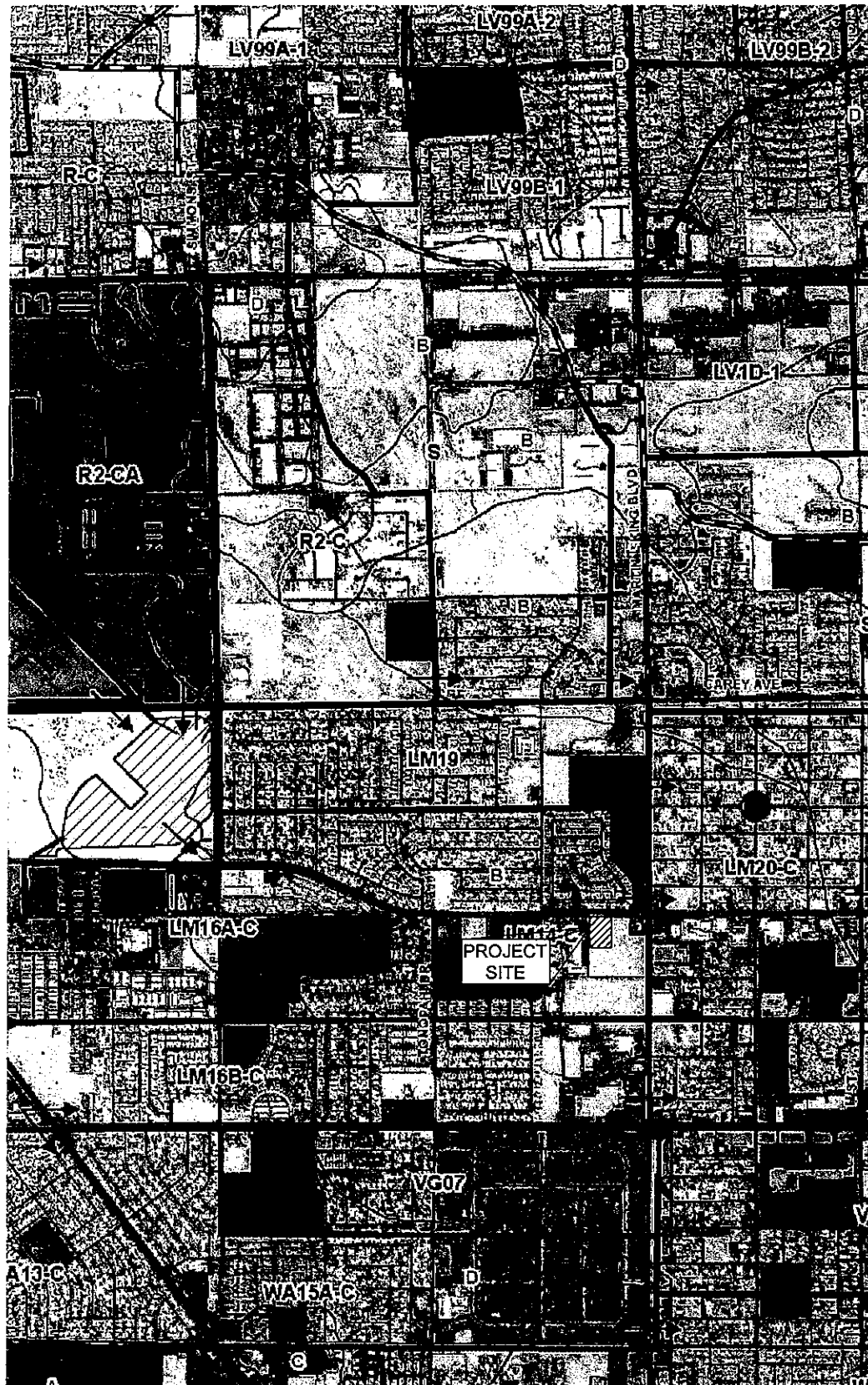
- | Category A | Category B |
|------------|------------|
| Channel | Channel |
| Stormdrain | Stormdrain |
| Crossing | Crossing |



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FLOOD CONTROL FACILITIES



2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE
FIGURE H-26
HYDROLOGIC SUMMARY

LEGEND

- Ultimate Development Boundary
- Watershed Boundary
- Subbasin Boundary
- Drought Ordinance Boundary
- Flow Arrows

Flood Control Facilities

- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Category A Remove & Replace/Parallel Facilities
- Category B Remove & Replace/Parallel Facilities

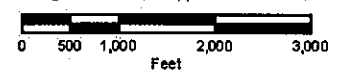
Type Hydrologic Soil Groups

- A Low Runoff Potential
- B Moderately Low Runoff Potential
- C Moderately High Runoff Potential
- D High Runoff Potential/Rock Outcrops

Typical Land Use

- 1 Undeveloped Land, Open Desert
- 2 Parks, Golf Courses
- 3 Rural
- 4 / 14* Low Density Residential
- 5 / 15* Medium Density Residential
- 6 / 16* High Density Residential
- 7 / 17* Public Facility, Residential
- 8 / 18* Very High Density Residential
- 9 / 19* Commercial, Retail, Casino, High Rise Condominiums
- 10 / 20* Light Industrial
- 11 / 21* Heavy Industrial
- 12 / 22* Schools
- 13 Lakes

* Drought Ordinance Applied



Scale: 1 inch = 2,000 feet



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**HYDROLOGIC SUBAREAS,
LAND USE & SOILS**



City of Las Vegas

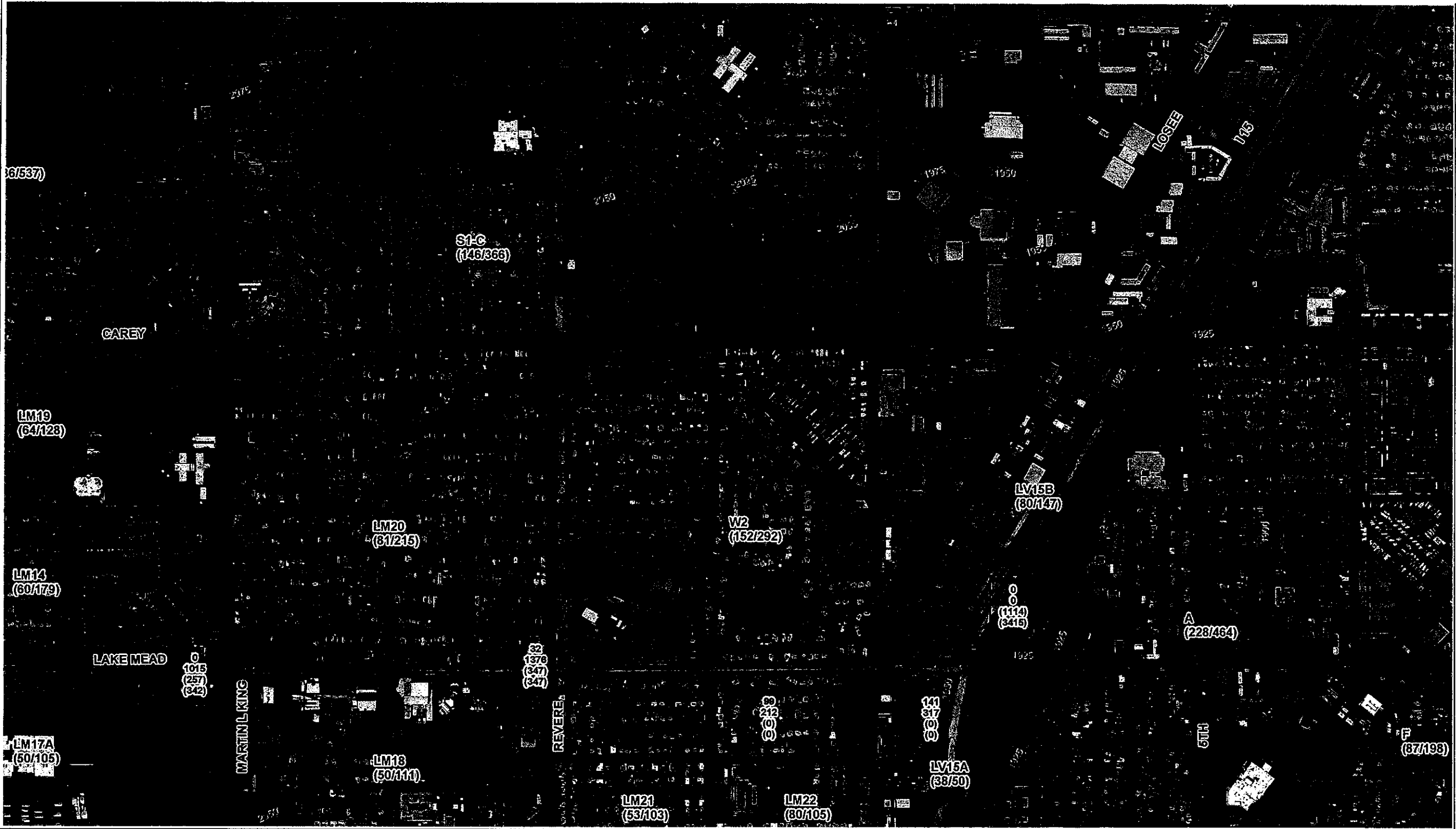
CENTRAL
NEIGHBORHOOD
FLOOD CONTROL
MASTER PLAN

LEGEND

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

PHOTO DATE: SPRING 2004

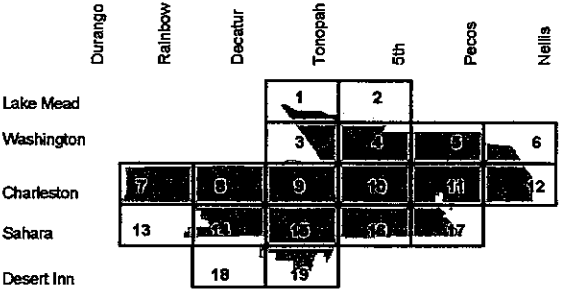
FIGURE E-2



EXISTING DRAINAGE CONDITIONS

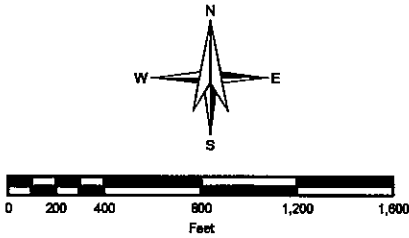


2270 Corporate Circle, Suite 100
Henderson, NV 89074
(702) 263-7275
Fax: (702) 263-7200



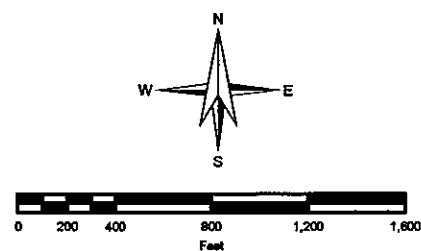
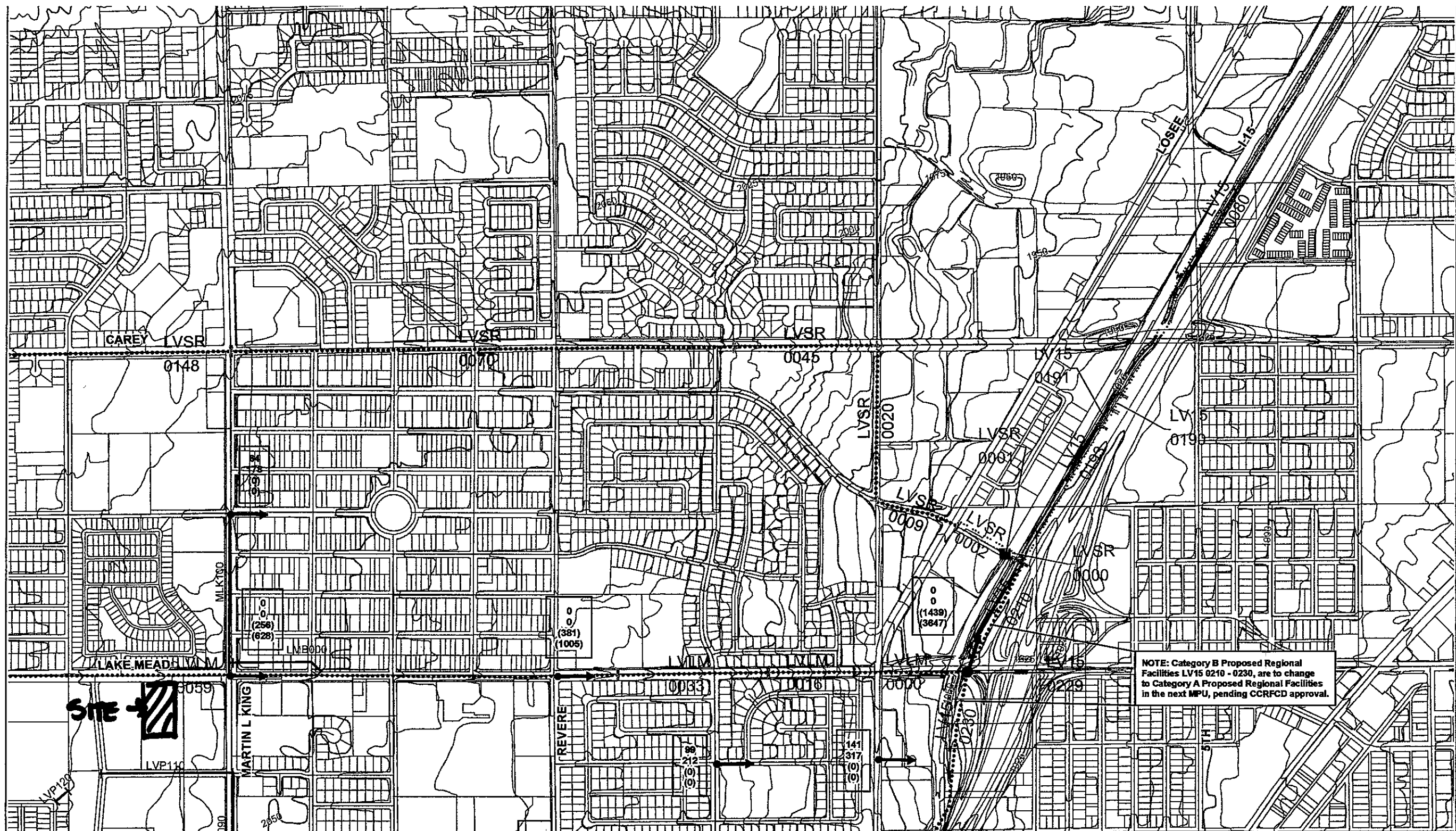
NOTE:
Existing conditions are based on future
Curve Number values with only existing local and
CCRFCD facilities in place.

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 explanation.



SCALE: 1 inch = 800 feet

FIGURE F-2



SCALE: 1 inch = 800 feet

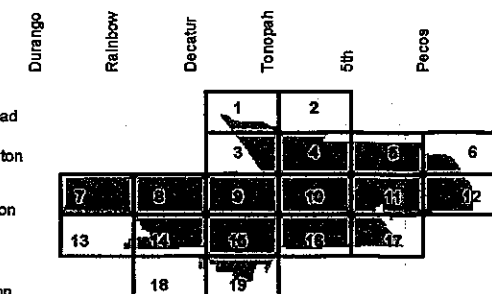
 Flow Arrow

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 explanation.



FUTURE DRAINAGE CONDITIONS



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

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
FW15	E	FREEWAY CHANNEL FROM DESERT INN TO EXPRESSWAY	2170	3728	CAL83	SW4	10.63	0.17
GOOF	E	GOWAN OUTFALL FACILITIES						
0485	E	90" RCP	1160	630	DGOW2A	GW3SC	1.38	0.47
0486	E	8" X 5' RCB	3300	630	DGOW2A	GW3SC	1.38	0.50
0511	E	8" X 5' RCB	8390	699	CPT6B-C	GW3SC	1.08	0.50
LAAS	P3	NORTH LAS VEGAS AIR TERMINAL - SIMMONS						
0000	P3	14' X 8' RCB	760	698	CR2-CA	NW3	2.57	0.80
0014	P3	12' X 8' RCB	1350	698	CR2-CA	NW3	2.57	1.12
0040	P3	10' X 8' RCB	2105	698	CR2-CA	NW3	2.57	1.50
0080	P3	66" RCP	157	285	R-C	NW3	0.27	1.10
0083	P3	60" RCP	620	285	R-C	NW3	0.27	1.40
0085	P3	54" RCP	400	285	R-C	NW3	0.27	1.44
0103	P3	48" RCP	405	285	R-C	NW3	0.27	1.75
LAAT	E	NORTH LAS VEGAS AIR TERMINAL						
0000	E	RCBC - Unknown Characteristics	345	1331	CB3-1	NW3	4.17	0.50
0008	E	Conc Chnl - Unknown Characteristics	375	1331	CB3-1	NW3	4.17	0.50
0013	E	Earth Chnl 27'W 5'-6.5'D 1.5:1 SS (Replace w/ LAAT0014)	934	1331	CB3-1	NW3	4.17	0.50
0014	P3	10' X 6' RCB (Replaces LAAT0013)	934	1331	CB3-1	NW3	4.17	1.84
0030	E	Earth Chnl 27'W 5'-6.5'D 1.5:1 SS (Replace w/ LAAT0031)	1618	1079	CB3-2	NW3	3.87	0.50
0031	P3	10' X 6' RCB (Replaces LAAT0030)	1618	1079	CB3-2	NW3	3.87	1.05
0081	E	Earth Chnl 27'W 5'-6.5'D 1.5:1 SS (Replace w/ LAAT0062)	887	1079	CB3-2	NW3	3.87	0.50
0062	P1	12' X 8' RCB (Replaces LAAT0061)	887	1079	CB3-2	NW3	3.87	0.50
0078	E	10' X 8' RCB	1055	1079	CB3-2	NW3	3.87	0.58
0098	E	10' X 4' RCB	2207	977	CCA1-C	NW3	3.08	0.60
0140	E	Conc Chnl 6'W 4'D 1.5:1 SS	338	977	CCA1-C	NW3	3.08	0.64
0146	E	Conc Chnl 6'W 3'D 1.5:1 SS	1388	977	CCA1-C	NW3	3.08	0.88
0172	E	76" X 48" HERCP	538	480	CA1-C	NW3	2.87	0.75
0182	E	Conc Chnl 6'W 3'D 1.5:1 SS	997	480	CA1-C	NW3	2.87	0.83
0201	E	Conc Chnl 6'W 3'D 1.5:1 SS	184	294	A1-C1	NW3	0.31	0.37
0204	E	76" X 48" RCP	425	294	A1-C1	NW3	0.31	0.37
LANO	E	NORTH LAS VEGAS AIR TERMINAL NORTH						
0000	E	Conc Chnl 6'W 3'D 1.5:1 SS	470	294	A1-C1	NW3	0.31	0.30
LCHC	E	LAS VEGAS CREEK CHANNEL						
0000	E	2: 12' X 7' RCB	730	2894	CLC20-C	MEADOWS4	9.68	1.28
0013	E	2: 12' X 6' RCB	2035	2894	CLC20-C	MEADOWS4	9.68	0.82
0051	E	2: 14' X 7' RCB	3113	2894	CLC20-C	MEADOWS4	9.68	0.60
0110	E	Transition Structure	220	2798	CCLC18-C	MEADOWS4	9.51	
0114	E	2: 14' X 7' RCB	670	2329	CRMEDET	MEADOWS4	8.25	0.80
0127	E	Transition Structure	110	2329	CRMEDET	MEADOWS4	8.25	
0129	E	2: 14' X 7' RCB	1130	2329	CRMEDET	MEADOWS4	8.25	0.50
0150	E	2: 13' X 7' RCB	200	2329	CRMEDET	MEADOWS4	8.25	0.95
0154	E	Transition Structure	190	2329	CRMEDET	MEADOWS4	8.25	
0157	E	2: 12' X 6' RCB	1650	1631	CCLC14-C	SW3	2.99	1.08
0188	E	2: 12' X 6' RCB	2225	1631	CCLC14-C	SW3	2.99	1.38
0230	E	12' X 6' RCB	2140	1381	CLC14-C	SW3	2.54	1.74
0270	E	12' X 6' RCB	1705	774	CCWA02-C	SW3	1.84	0.54
0302	E	8' X 6' RCB	3940	774	CCWA02-C	SW3	1.84	2.49
0377	E	10' X 7' RCB	1226	774	CCWA02-C	SW3	1.84	0.74
0400	E	Transition Structure	110	437	CWA02-C	SW3	1.47	0.49
0402	E	8' X 6' RCB @ Jones	535	437	CWA02-C	SW3	1.47	0.49
0412	E	60" RCP	1370	437	CWA02-C	SW3	1.47	1.08
0438	E	60" RCP	1090	162	CLC01-C	SW3	1.20	1.60
0458	E	60" RCP	1080	162	CLC01-C	SW3	1.20	1.60
0478	E	60" RCP	1110	162	CLC01-C	SW3	1.20	0.55
LCDE	E	LAS VEGAS CREEK - DECATUR						
0000	E	6' X 5' RCB	1800	404	LC11-C	SW3	0.38	1.28
0034	E	72" RCP	700	404	LC11-C	SW3	0.38	0.50
LCJO	E	LAS VEGAS CREEK - JONES						
0000	E	6' X 6' RCB	380	358	AL01B-C	SW3	0.37	0.50
0007	E	6' X 5' RCB	675	358	AL01B-C	SW3	0.37	0.82

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LCIT	E	LAS VEGAS CREEK - LATERAL						
0000	E	6' X 6' RCB	490	250	WA10D	SW3	0.45	0.50
0005	E	Conc Chnl 10'W 4'D 0:1 SS	1364	250	WA10D	SW3	0.45	0.50
0033	E	10' X 4' RCBC @ Washington	96	405	WA10-C	NW3	0.45	0.50
0034	E	Grass Chnl 12'W 5'D 1:1 SS	1750	405	WA10-C	SW3	0.45	0.20
LCME	E	LAS VEGAS CREEK - MEADOWS						
0000	E	14' X 8' RCB	895	1423	MEADOWDB	SW3SC	5.87	0.72
0016	E	Stilling Basin	140	1423	MEADOWDB	SW3SC	5.87	0.21
0017	E	3,300 cfs Spillway (Replace w/ LCME0018)	3300	MEADOWIN	SW3SC	5.67		
0018	P1	Modify Spillway, raise height by 1' (Replaces LCME0017)	3300	MEADOWIN	SW3SC	5.67		
0019	E	1: 11' X 5' RCB and 1: 11.5' X 5' RCB	110	1423	MEADOWDB	SW3SC	5.67	0.81
0020	E	213 ac-ft Meadows Detention Basin	4713	MEADOWIN	SW3SC	5.67		
0021	P1	Upgrade to 235 ac-ft Meadows Detention Basin	4713	MEADOWIN	SW3SC	5.67		
LCRA	E	LAS VEGAS CREEK - RANCHO						
0000	E	12' X 8' RCB	380	783	CLC16-C	SW3	1.71	0.60
0004	E	12' X 6' RCB	2387	783	CLC16-C	SW3	1.71	0.77
0050	E	8' X 6' RCB	355	526	WA13D	SW3	1.40	0.50
LMDE	P1	LAKE MEAD BOULEVARD - DECATUR BRANCH						
0000	P1	10' X 5' RCB	2640	565	DCVG04-C	NW3	1.26	0.90
LV15	E	FREEWAY CHANNEL						
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	0.86
0409	E	7' X 6' RCB	815	542	CWA15A-C	NW3	3.67	0.91
0424	P1	8' X 6' RCB	2500	542	CWA15A-C	NW3	3.67	0.73
0472	P1	2-66" RCP	1200	265	WA15A-C	NW3	0.37	0.42
0474	P1	8' X 6' RCB	2880	322	CCWA13-C	NW3	3.29	0.73
0428	P1	8' X 7' RCB	4620	869	CWA13-C	NW3	1.39	1.19
0602	P1	2-66" RCP	5980	504	CWA09-C	NW3	0.61	1.59
LVLN	E	LAS VEGAS WASH - LAKE MEAD						
0033	E	60" RCP (Replace w/ LVLN0034)	1188	994	CLM20-C	NW3SC	1.36	1.62
0034	P0	12' X 5' RCB (Replaces LVLN0033)	1188	994	CLM20-C	NW3SC	1.36	1.62
0059	E	72" RCP (Replace w/ LVLN0080)	5952	994	CLM20-C	NW3SC	1.36	0.66
0060	P0	12' X 6' RCB (Replaces LVLN0059)	5952	994	CLM20-C	NW3SC	1.36	0.66
0170	E	78" RCP	2421	378	CLM16A-C	NW3SC	0.38	1.17
0221	E	48" RCP Outlet	270	168	DR2	NW4	11.78	
0222	E	48" RCP Outlet	500	208	DOAREY	NW4	11.78	
0224	E	36" RCP	2429					0.53
0225	E	90" RCP (Replace w/ LVLN0226)	641	1933	CLM10-C	NW3	3.02	1.35
0226	P0	2: 10' X 8' RCB (Replaces LVLN0225)	641	1933	CLM10-C	NW3	3.02	0.50
0227	E	10,000 cfs PMF Spillway	10000	CARYLMIN	NW4	11.78		
0228	E	607 ac-ft Carey-Lake Mead Detention Basin	5184	CARYLMIN	NW4	11.78		
0270	E	90" RCP (Replace w/ LVLN0271)	3473	1933	CLM10-C	NW3	3.02	1.35
0271	P0	12' X 8' RCB (Replaces LVLN0270)	3473	1933	CLM10-C	NW3	3.02	1.35
0336	E	84" RCP (Replace w/ LVLN0337)	1050	1652	CLM06-C	NW3	2.61	1.16
0337	P0	12' X 8' RCB (Replaces LVLN0336)	1050	1652	CLM06-C	NW3	2.61	1.16
0355	E	90" RCP (Replace w/ LVLN0356)	1840	1652	CLM06-C	NW3	2.61	0.40
0356	P0	12' X 11' RCB (Replaces LVLN0355)	1840	1652	CLM06-C	NW3	2.61	0.40
0388	E	84" RCP	520	852	CLM05-C	NW3	1.00	1.40
0399	E	78" RCP	803	852	CLM05-C	NW3	1.00	1.07
0418	E	72" RCP	1320	852	CLM05-C	NW3	1.00	1.00
0442	E	60" RCP	725	565	CLM03-C	NW3	0.63	1.28
0453	E	54" RCP	589	565	CLM03-C	NW3	0.63	2.37
0460	E	54" RCP	1464	235	LM02-C	NW3	0.29	2.05
0475	E	48" RCP	2632	235	LM02-C	NW3	0.29	1.24
0525	E	48" RCP	2600	542	CLM01-C	NW3	0.84	1.24
LVOE	E	OWENS AVENUE - EAST						
0345	P1	13' X 11' RCB	1685	2389	DLVOE	SW5	22.79	0.60
LVOW	E	OWENS AVENUE SYSTEM						
0003	E	96" RCP	7500	1089	CLM16B-C	NW3	2.40	0.70
0146	E	84" RCP	4800	570	DCVG20-C	NW3	2.02	0.90
0241	P3	68" RCP	5800	381	CVG20-C	NW3	1.57	1.40

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVOW	E	OWENS AVENUE SYSTEM						
0351	P3	8' X 6' RCB	3000	829	CVG04-C	NW3	1.28	1.44
0360	P1	8' X 6' RCB	2300	829	CVG04-C	NW3	1.28	1.48
0460	P1	7' X 6' RCB	2700	616	CVG03-C	NW3	0.95	1.48
LYPK	E	PEAK DRIVE SYSTEM						
0000	E	Conc Chnl 15'W 6'D 0:1 SS	606	1024	CPD04B-C	NW3	1.59	1.22
0019	E	Conc Chnl 20'W 5.5'D 0:1 SS	2190	1024	CPD04B-C	NW3	1.59	0.57
0056	E	10' X 5' RCB	103	703	CCY04A-C	NW3	1.12	0.40
0058	E	9' X 6' RCB	2542	703	CCY04A-C	NW3	1.12	0.95
0104	E	10' X 6' RCB	76	703	CCY04A-C	NW3	1.12	1.26
0105	E	8' X 6' RCB	1235	703	CCY04A-C	NW3	1.12	0.54
0130	E	7' X 5' RCB	1435	400	CPD01-C	NW3	0.67	0.61
LVRA	E	LAS VEGAS WASH - RANCHO						
0000	E	12' X 8' RCB	612	1317	CCPD048C	NW3	3.87	1.58
0012	E	12' X 8' RCB	2838	1317	CCPD048C	NW3	3.87	0.78
0066	E	14' X 5' RCB	65	1317	CCPD048C	NW3	3.87	1.22
LVSR	E	LAS VEGAS WASH - SMOKE RANCH						
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
0148	E	54" RCP (Replace w/ LVSR0149)	2587	951	CS	NW3SC	0.95	0.58
0149	P1	11' X 7' RCB (Replaces LVSR0148)	2587	951	CS	NW3SC	0.95	0.58
0197	E	30" RCP (Replace w/ LVSR0198)	581	445	CR2-C	NW3SC	0.38	0.86

CONDITIONS OF APPROVAL

AGENDA SUMMARY PAGE - PLANNING
PLANNING COMMISSION MEETING OF: JANUARY 10, 2012

DEPARTMENT: PLANNING
DIRECTOR: FLINN FAGG

☐ Consent ☒ Discussion

SUBJECT:

SUP-43927 - SPECIAL USE PERMIT - PUBLIC HEARING - APPLICANT: DYNAMIC DEVELOPMENT COMPANY, LLC - OWNER: CITY OF LAS VEGAS - For possible action on a request for a Special Use Permit FOR AN ACCESSORY PACKAGE LIQUOR OFF-SALE USE WITHIN A PROPOSED 20,700 SQUARE-FOOT GROCERY STORE WITH WAIVERS TO ALLOW A DISTANCE SEPARATION OF 270 FEET FROM A SCHOOL AND 100 FEET FROM A CHURCH WHERE 400 FEET IS REQUIRED on the south side of Lake Mead Boulevard, approximately 315 feet west of Martin Luther King Boulevard (a portion of APN 139-21-313-009), C-1 (Limited Commercial) Zone, Ward 5 (Barlow). Staff recommends APPROVAL.

FINAL ACTION (Unless Appealed Within 10 Days)

PROTESTS RECEIVED BEFORE:

Planning Commission Mtg.

2

City Council Meeting

0

APPROVALS RECEIVED BEFORE:

Planning Commission Mtg.

1

City Council Meeting

0

RECOMMENDATION:

Staff recommends APPROVAL subject to conditions:

BACKUP DOCUMENTATION:

1. Location and Aerial Maps - SUP-43927 and SDR-43929
2. Special Map
3. Conditions and Staff Report - SUP-43927 and SDR-43929
4. Supporting Documentation
5. Photos - SUP-43927 and SDR-43929
6. Las Vegas Enterprise Park Architectural Review Committee Approval Letter
7. Justification Letter - SUP-43927 and SDR-43929
8. Protest/Support Postcards - SUP-43927 and SDR-43929

Motion made by BYRON GOYNES to Approve subject to conditions

Passed For: 7; Against: 0; Abstain: 0; Did Not Vote: 0; Excused: 0

TODD L. MOODY, GLENN TROWBRIDGE, RICHARD TRUESDELL, VICKI QUINN, GUS FLANGAS, BYRON GOYNES, TRINITY HAVEN SCHLOTTMAN; (Against-None); (Abstain-None); (Did Not Vote-None); (Excused-None)

AGENDA SUMMARY PAGE - PLANNING
PLANNING COMMISSION MEETING OF: JANUARY 10, 2012

DEPARTMENT: PLANNING
DIRECTOR: FLINN FAGG

☐ Consent ☒ Discussion

SUBJECT:

SDR-43929 - SITE DEVELOPMENT PLAN REVIEW RELATED TO SUP-43927 - PUBLIC HEARING - APPLICANT: DYNAMIC DEVELOPMENT COMPANY, LLC - OWNER: CITY OF LAS VEGAS - For possible action on a request for a Site Development Plan Review FOR A PROPOSED 20,700 SQUARE-FOOT GROCERY STORE on 2.38 acres located on the south side of Lake Mead Boulevard, approximately 315 feet west of Martin Luther King Boulevard (a portion of APN 139-21-313-009), C-1 (Limited Commercial) Zone, Ward 5 (Barlow). Staff recommends APPROVAL.

FINAL ACTION (Unless Appealed Within 10 Days)

PROTESTS RECEIVED BEFORE:

Planning Commission Mtg.

2

City Council Meeting

0

APPROVALS RECEIVED BEFORE:

Planning Commission Mtg.

1

City Council Meeting

0

RECOMMENDATION:

Staff recommends APPROVAL, subject to conditions:

BACKUP DOCUMENTATION:

1. Consolidated Backup
2. Supporting Documentation

Motion made by BYRON GOYNES to Approve subject to conditions

Passed For: 7; Against: 0; Abstain: 0; Did Not Vote: 0; Excused: 0

TODD L. MOODY, GLENN TROWBRIDGE, RICHARD TRUESDELL, VICKI QUINN, GUS FLANGAS, BYRON GOYNES, TRINITY HAVEN SCHLOTTMAN; (Against-None); (Abstain-None); (Did Not Vote-None); (Excused-None)

City of Las Vegas

AGENDA MEMO - PLANNING

PLANNING COMMISSION MEETING DATE: JANUARY 10, 2012

DEPARTMENT: PLANNING

ITEM DESCRIPTION: APPLICANT: DYNAMIC DEVELOPMENT COMPANY, LLC -
OWNER: CITY OF LAS VEGAS

**** STAFF RECOMMENDATION(S) ****

<i>CASE NUMBER</i>	<i>RECOMMENDATION</i>	<i>REQUIRED FOR APPROVAL</i>
SUP-43927	Staff recommends APPROVAL, subject to conditions:	
SDR-43929	Staff recommends APPROVAL, subject to conditions:	SUP-43927

**** CONDITIONS ****

SUP-43927 CONDITIONS

Planning

1. Conformance to all Minimum Requirements under LVMC Title 19.12 for a Retail Establishment with Package Liquor Off-Sale use.
2. Approval of and conformance to the approved conditions for Site Development Plan Review (SDR-43929).
3. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.
4. Prior to occupancy, all necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.
5. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
6. Approval of this Special Use Permit does not constitute approval of a liquor license.

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Conditions Page Two
January 10, 2012 - Planning Commission Meeting

7. This business shall operate in conformance to Chapter 6.50 of the City of Las Vegas Municipal Code.
8. All beer and wine coolers shall remain in the original manufacturer's configuration intended for off-sale resale.
9. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

SDR-43929 CONDITIONS

Planning

1. Approval of and conformance to the Conditions of Approval for Special Use Permit (SUP-43927) shall be required, if approved.
2. Conformance to the Conditions of Approval of The Las Vegas Enterprise Park Architectural Review Committee letter dated 09/27/11 shall be required, if approved.
3. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.
4. All development shall be in conformance with the site plan, landscape plan, and building elevations, date stamped 11/17/11, and floor plans date stamped, 11/28/11, except as amended by conditions herein.
5. An Exception from Title 19.08.110(C)(12) is hereby approved, to allow nine, 15-gallon shade trees where 24-inch box trees are required and to allow 11 trees where 15 trees are required within the parking lot.
6. An Exception from Title 19.08.040(F)(8) is hereby approved, to allow nine shade trees along the north perimeter where 12 trees are required.
7. Any changes based upon right-of-way, traffic or drainage studies or street improvements required by the city or public utilities shall not reduce the widths of perimeter landscape buffers, height of walls or quantities of plant materials from that on submitted landscape plans date stamped 11/17/11. Any changes based upon subsequently submitted studies must be accommodated elsewhere on the site.

Conditions Page Three
January 10, 2012 - Planning Commission Meeting

8. Prior to occupancy, all necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.
9. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
10. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time application is made for a building permit. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device. The technical landscape plan shall include the following changes from the conceptual landscape plan: Parking lot diamond island planters shall comply with the requirements of Title 19.08.110.
11. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.
12. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

Public Works

13. In accordance with code requirements of Title 13.16 and 13.56, remove all substandard improvements and replace with new improvements meeting Current City Standards concurrent with development of this site. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site. All new driveways shall meet Uniform Standard Drawing #222a as required by the City Traffic Engineer.
14. Construct a minimum 24-foot wide paved path from this site to driveways on the adjacent parcels to the east, as shown on the approved Site Plan, to accommodate two-way traffic.
15. All landscaping and private improvements installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.
16. This site shall connect to the public sewer line in Lake Mead Boulevard.
17. Meet with the Fire Protection Engineering Section of the Department of Fire Services to discuss fire requirements for the use of the proposed facility.

Conditions Page Four**January 10, 2012 - Planning Commission Meeting**

18. A Traffic Impact Analysis or other information acceptable to the City Traffic Engineer must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or the submittal of any construction drawings for this site. Comply with the recommendations of the approved Traffic Impact Analysis prior to occupancy of the site. The Traffic Impact Analysis shall also include a section addressing Standard Drawings #234.1 #234.2 and #234.3 to determine additional right-of-way requirements for bus turnouts adjacent to this site, if any; dedicate all areas recommended by the approved Traffic Impact Analysis. All additional rights-of-way required by Standard Drawing #201.1 for exclusive right turn lanes and dual left turn lanes shall be dedicated prior to or concurrent with the commencement of on-site development activities unless specifically noted as not required in the approved Traffic Impact Analysis. Phased compliance will be allowed if recommended by the approved Traffic Impact Analysis. No recommendation of the approved Traffic Impact Analysis, nor compliance therewith, shall be deemed to modify or eliminate any condition of approval imposed by the Planning Commission or the City Council on the development of this site.
19. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

Staff Report Page One
January 10, 2012 - Planning Commission Meeting

**** STAFF REPORT ****

PROJECT DESCRIPTION

This is a proposal for a 20,700 square-foot Grocery Store with an Accessory Package Liquor Off-Sale use. The proposed development is on a 2.38-acre portion of a 5.69 acre lot on the south side of Lake Mead Boulevard, approximately 315 feet west of Martin Luther King Boulevard. The proposed 20,700 square-foot Grocery Store is compatible with the Enterprise Park, the surrounding low-intensity commercial area, and is providing a needed resource to the West Las Vegas Plan Master Plan area. The intensity and design of this development provides a good mix between the commercial uses of the commercial subdivision and the nearby residential uses the north and west. The retail display and sales area for Accessory Package Liquor Off-Sales use consists of approximately 235 square feet of the total retail floor area of the proposed Grocery Store. A maximum of 10% is permitted.

Staff recommends approval, with conditions, of the Special Use Permit and Site Development Plan Review requests.

ISSUES

- A Special Use Permit is required for an Accessory Package Liquor Off-Sale use in the C-1 (Limited Commercial) zoning district.
- The subject site is located in the Las Vegas Enterprise Park and has received conditional approval from The Las Vegas Enterprise Park Architectural Review Committee.
- A waiver is required to allow a distance separation of 270 feet from a school to the east, and 100 feet and 280 feet from two churches to the west where 400 feet is required. Staff supports the waiver requests.
- An exception is required to allow nine shade trees along the north perimeter where 12 trees are required and to allow nine 15-gallon trees in select areas within the parking lot where 24-inch box trees are required. Staff supports the exception requests.
- Waivers of the required distance separation are possible, as the proposed Grocery Store has between 20,000 and 50,000 square feet of retail floor space.

BACKGROUND INFORMATION

<i>Related Relevant City Actions by P&D, Fire, Bldg., etc</i>	
12/21/94	The City Council approved a rezoning for this property from R-E (Residence Estates) to C-PB (Planned Business Park) as part of a larger overall request (Z-136-94).

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Staff Report Page Two
January 10, 2012 - Planning Commission Meeting

10/03/95	The City Council approved a Plot Plan and Building Elevation Review for a 41-lot business park within this development [Z-136-94(1)].
06/16/04	The City Council approved a Site Development Plan Review (SDR-4298) for a proposed 120,232 square-foot Office building on 5.32 acres adjacent to the southeast corner of Lake Mead Boulevard and Stella Lake Street.
09/27/11	The Las Vegas Enterprise Park Architectural Review Committee conditionally approved the subject development.

Most Recent Change of Ownership

10/05/95	A deed was recorded for a change in ownership.
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Related Building Permits/Business Licenses

There are no building permits or licenses associated with this undeveloped site.	
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Pre-Application Meeting

09/15/11	A pre-application meeting was held where the submittal requirements for a Site Development Plan review and related Special Use Permit for Accessory Package Liquor Off-Sale use were discussed.
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Neighborhood Meeting

A neighborhood meeting was not required for this application, nor was one held.	
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Field Check

12/01/11	Staff conducted a site visit and found the site graded and free of weeds and debris.
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Details of Application Request

<i>Site Area</i>	
Gross Acres	5.69
Net Acres	2.38

Staff Report Page Three
January 10, 2012 - Planning Commission Meeting

<i>Surrounding Property</i>	<i>Existing Land Use Per Title 19.12</i>	<i>Planned or Special Land Use Designation</i>	<i>Existing Zoning District</i>
Subject Property	Undeveloped	LI/R (Light Industry/Research)	C-1 (Limited Commercial)
North	Single Family, Detached	M (Medium Density Residential)	R-PD8 (Residential Planned Development - 8 Dwelling Units Per Acre)
South	Undeveloped	LI/R (Light Industry/Research)	C-PB (Planned Business Park)
East	Undeveloped	LI/R (Light Industry/Research)	C-1 (Limited Commercial)
West	Office, Other Than Listed	LI/R (Light Industry/Research)	C-1 (Limited Commercial)

<i>Master Plan Areas</i>	<i>Yes</i>	<i>No</i>	<i>Compliance</i>
Master Plan Area			
Las Vegas Enterprise Park	X		Y
West Las Vegas Plan	X		Y
Special Purpose and Overlay Districts	Yes	No	Compliance
Special Purpose and Overlay Districts			
A-O (Airport Overlay) District – 105 Feet	X		N/A
Trails		X	N/A
Rural Preservation Overlay District		X	N/A
Las Vegas Redevelopment Plan Area	X		Y
Development Impact Notification Assessment		X	N/A
Project of Regional Significance		X	N/A

DEVELOPMENT STANDARDS

Pursuant to Title 19.08, the following standards apply:

<i>Standard</i>	<i>Required/Allowed</i>	<i>Provided</i>	<i>Compliance</i>
Min. Lot Width	100 Feet	271 Feet	Y
Min. Setbacks			
• Front	10 Feet	237 Feet	Y
• Side	N/A	10 Feet	N/A
• Rear	N/A	10 Feet	N/A
Max. Lot Coverage	50 %	20 %	Y
Max. Building Height	N/A	26 Feet	N/A
Trash Enclosure	Screened, Gated, w/ a Roof or Trellis	Screened, Gated, w/ a Roof or Trellis	Y

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Mech. Equipment	Screened	Screened	Y
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Staff Report Page Four

January 10, 2012 - Planning Commission Meeting

Pursuant to Title 19.08, the following standards apply:

Landscaping and Open Space Standards				
Standards	Required		Provided	Compliance
	Ratio	Trees		
Buffer Trees: • North	1 Tree / 20 Linear Feet	12 Trees	9 Trees	N*
TOTAL PERIMETER TREES		12 Trees	42 Trees	Y
Parking Area Trees	1 Tree / 6 Uncovered Spaces, plus 1 tree at the end of each row of spaces	15 Trees	11 Trees	N
LANDSCAPE BUFFER WIDTHS				
Min. Zone Width • North	15 Feet		15 Feet	Y

*The proposed perimeter landscaping is in compliance with the Design & Development Standards listed in the Enterprise Park Covenants, Conditions and Restrictions.

Street Name	Functional Classification of Street(s)	Governing Document	Actual Street Width (Feet)	Compliance with Street Section
Lake Mead Boulevard	Primary Arterial	Master Plan of Streets and Highways	100	Y

Pursuant to Title 19.08 and 19.12, the following parking standards apply:

Parking Requirement						
Use	Gross Floor Area or Number of Units	Required		Provided		Compliance
		Parking Ratio	Parking		Parking	
			Regular	Handi-capped	Regular	Handi-capped
Grocery Store	20,700 SF	1:175 SF	119			
Accessory Package Liquor Off-Sale	-	-	-			
TOTAL SPACES REQUIRED			119		121	
Regular and Handicap Spaces Required			114	5	117	5
Loading Spaces	10,000 – 29,999 SF		2		2	

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<i>Waivers</i>		
<i>Requirement</i>	<i>Request</i>	<i>Staff Recommendation</i>
A 400-foot distance separation from a school	270 Feet	Approval
A 400-foot distance separation from a church	100 Feet	Approval
A 400-foot distance separation from a church	280 Feet	Approval

<i>Exceptions</i>		
<i>Requirement</i>	<i>Request</i>	<i>Staff Recommendation</i>
Twelve, 24-inch box trees adjacent to right-of-way	Nine 24-inch box trees adjacent to right-of-way	Approval
One, 24-inch box tree per six uncovered parking spaces feet adjacent to right-of-way	Nine, 15-gallon shade trees	Approval

ANALYSIS

The proposed Grocery Store with Accessory Package Liquor use is located within the C-1 (Limited Commercial) Zoning District, which allows for 10% of the retail floor area to be dedicated for the sale of alcohol. The primary use, the Grocery Store, is consistent with the goals and policies of the West Las Vegas Plan and the Las Vegas Redevelopment Plan. The provided floor plans show approximately 235 square feet of the Accessory Package Liquor use occupying the 20,700 square feet of retail floor area. This amounts to approximately 1.1% of the allowable 10% for alcohol display. Additionally, all the alcohol sales are located in the same general area, allowing for more control over the inventory. The proposed use requires a waiver to the minimum separation distance, as the distance is calculated from the edge of the commercial lot line to the protected uses. In this instance, there are two churches located across Martin Luther King Boulevard, a 100-foot right-of-way, and one school located 270 feet to the west, across Stella Lake Street and the remaining Las Vegas Enterprise Park development. Staff supports this waiver request, as the applicant is proposing less than the allowable amount of floor area for alcohol sales and there is no direct access to the protected uses.

The subject site is located within the Las Vegas Enterprise Park, and is subject to the development standards for the park; the Enterprise Park Architectural Review Committee reviewed and approved the proposed plans on 09/27/11.

The building elevations for the proposed one-story structure show a mixture of painted stucco finish, painted CMU products, and an aluminum storefront window and door system with insulated glazing. The building placement and massing are in compliance with both Title 19.08.070 standards and the Las Vegas Enterprise Park Design and Development Standards.

MH

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Landscaping is only required along the north perimeter; however, the applicant has provided landscaping along the south, east and west property lines. The additional amounts will contribute to the overall Enterprise Park and exceed the current landscaping requirements. A variety of drought tolerant shrubs are shown within the planter areas interspersed among the existing and proposed trees. An exception has been requested to allow nine trees along the north perimeter where twelve trees are required and to allow 15-gallon trees in select planters where 24-inch box trees are required. Staff supports this request, as the proposed tree spacing is in compliance with the one tree per 30 lineal feet as listed in the Enterprise Park Covenants Conditions and Restrictions Design and Development Standards and the 15-gallon size for select tree placement will ensure better adapted trees planted within the parking lot planters. A condition of approval has been placed requiring that the landscape plans replace the 25 square-foot (five-foot by five-foot) diamonds located in the parking lot with 49 square-foot (seven-foot by seven-foot) diamonds to conform to the Title 19 requirements.

The proposed development meets the required amount of parking and loading spaces. The provided site plan references an incorrect compact parking ratio of 35% where 30% is allowable, but the amount of compact spaces shown is still in compliance. Site access is primarily from Lake Mead Boulevard with two cross access points provided along the eastern property line.

The development of the proposed Grocery Store with Accessory Package Liquor provides a needed resource to the surrounding community. The building and landscape design provides a positive contribution to the surrounding commercial uses while remaining sensitive to the nearby residential uses. Staff recommends approval, with conditions, for the proposed development. If denied, the development, as proposed, will not be allowed at this site.

FINDINGS (SUP-43927)

In order to approve a Special Use Permit application, per Title 19.16.110(L) the Planning Commission and City Council must affirm the following:

- 1. The proposed land use can be conducted in a manner that is harmonious and compatible with existing surrounding land uses, and with future surrounding land uses as projected by the General Plan.**

The Accessory Package Liquor Off-Sale use will be operated in conjunction with a proposed 20,700 square-foot Grocery Store, which is compatible with the surrounding commercial uses.

- 2. The subject site is physically suitable for the type and intensity of land use proposed.**

The subject site is currently undeveloped. The proposed site layout for the Grocery store is physically suitable to accommodate the proposed Accessory Package Liquor Off-Sale use. The proposed Grocery Store is a much needed resource for the West Las Vegas Plan Area

and the Accessory Package Liquor Off-Sale use has been designed to minimize the potential impacts to the community.

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3. **Street or highway facilities providing access to the property are or will be adequate in size to meet the requirements of the proposed use.**

Site access is provided from Lake Mead Boulevard, a 120-foot Parkway Arterial. This street is of sufficient size to accommodate the needs of the proposed use.

4. **Approval of the Special Use Permit at the site in question will not be inconsistent with or compromise the public health, safety, and welfare or the overall objectives of the General Plan.**

The proposed Special Use Permit request will not be inconsistent with or compromise the public health, safety, and welfare or overall objectives of the General Plan or the overall objectives of the West Las Vegas Plan. Concerns regarding the potential impacts related to the approval of the requested Special Use Permit are addressed by the applicant by utilizing only 1.1% of the total floor area for liquor sales in a single, contained area.

5. **The use meets all of the applicable conditions per Title 19.12.**

The proposed Accessory Package Liquor Off-Sale use does not meet all of the required distance separation requirements, per Title 19.12. The applicant has requested a waiver to allow a 270-foot separation from a school and a 100-foot separation and 260-foot separation from two churches. A waiver is permissible for this use when it is proposed in connection with an establishment having between 20,000 and 50,000 square feet of retail floor space. Staff supports the applicant's request, as the location and design of the proposed Grocery Store greatly minimizes the negative impacts that an Accessory Package Liquor Off-Sales use could have.

FINDINGS (SDR-43929)

In order to approve a Site Development Plan application, per Title 19.16.100(E) the Planning Commission and/or City Council must affirm the following:

1. **The proposed development is compatible with adjacent development and development in the area;**

The proposed 20,700 square-foot Grocery Store is compatible with the Enterprise Park, the surrounding low-intensity commercial area, and is providing a needed resource to the West Las Vegas Plan Master Plan area. The intensity and design of this development provides a good mix between the commercial uses of the commercial subdivision and the nearby residential uses the north and west.

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2. **The proposed development is consistent with the General Plan, this Title, the Design Standards Manual, the Landscape, Wall and Buffer Standards, and other duly-adopted city plans, policies and standards;**

The development is consistent with The Las Vegas Enterprise Park Plan and Title 19, but requires a waiver and exceptions for landscaping, which staff supports. The proposed landscaping along the north property line will provide much needed improvements to the pedestrian right-of-way along Lake Mead Boulevard by means of adding nine 24-inch box shade trees.

3. **Site access and circulation do not negatively impact adjacent roadways or neighborhood traffic;**

Site access is provided primarily from Lake Mead Boulevard, a 120-foot Parkway Arterial. This street is of sufficient size to accommodate the needs of the proposed use. The location of the proposed Grocery Store will also allow for nearby residents to make walkable trips for purchasing daily goods.

4. **Building and landscape materials are appropriate for the area and for the City;**

The proposed development contains building and landscape materials that will a positive contribution to the overall development of The Las Vegas Enterprise Park, along with ornamental vegetation appropriate for a desert environs and the City.

5. **Building elevations, design characteristics and other architectural and aesthetic features are not unsightly, undesirable, or obnoxious in appearance; create an orderly and aesthetically pleasing environment; and are harmonious and compatible with development in the area;**

Building elevations depict a design that features modern architectural elements that are consistent with revitalization efforts of the both the Redevelopment Plan Area and the West Las Vegas Plan. The development has received conditional approval from The Las Vegas Enterprise Park Architectural Review Committee for the proposed buildings, materials, and landscaping. The applicant will need to secure approval for any exterior lighting, irrigation, or signage plans from the Architectural Review Committee prior to issuance of permits.

6. **Appropriate measures are taken to secure and protect the public health, safety and general welfare.**

The proposed development will be subject to regular inspection and will not result in detrimental effects to human health and public safety.

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NEIGHBORHOOD ASSOCIATIONS NOTIFIED 16

NOTICES MAILED 803

APPROVALS 1

PROTESTS 2

**LV ENTERPRISE PARK
ARC APPROVAL
LETTER**

Las Vegas Enterprise Park Architectural Review Committee

September 27, 2011

Ms. Jody Walker Belsick, President
Walker Engineering, LLC
5765 South Rainbow Blvd., Suite 101
Las Vegas, NV 89118

Re: Dollar General Store
LVEP ARC Approval for Meetings 1 and 2

Dear Ms. Belsick:

Thank you for presenting the Dollar General Store (Project) to the Las Vegas Enterprise Park (LVEP) Architectural Review Committee (ARC) for Meetings 1 and 2 as described in Section VII of the LVEP Covenants, Conditions and Restrictions (CCRs).

Please be advised that the ARC has approved the Project for Meetings 1 and 2 of the CCRs, subject to the following conditions:

- All roof mounted equipment shall be screened from public view looking towards the north, east and south elevations of the building. (The ARC will defer to the City of Las Vegas Planning & Development and/or Building & Safety Departments to determine the acceptable methods and materials to be used for screening the roof mounted equipment.)
- The exterior lighting, irrigation and signage plans for the Project shall be submitted to the ARC for review and approval along with all of the items called for in Meeting 3 of the CCRs.

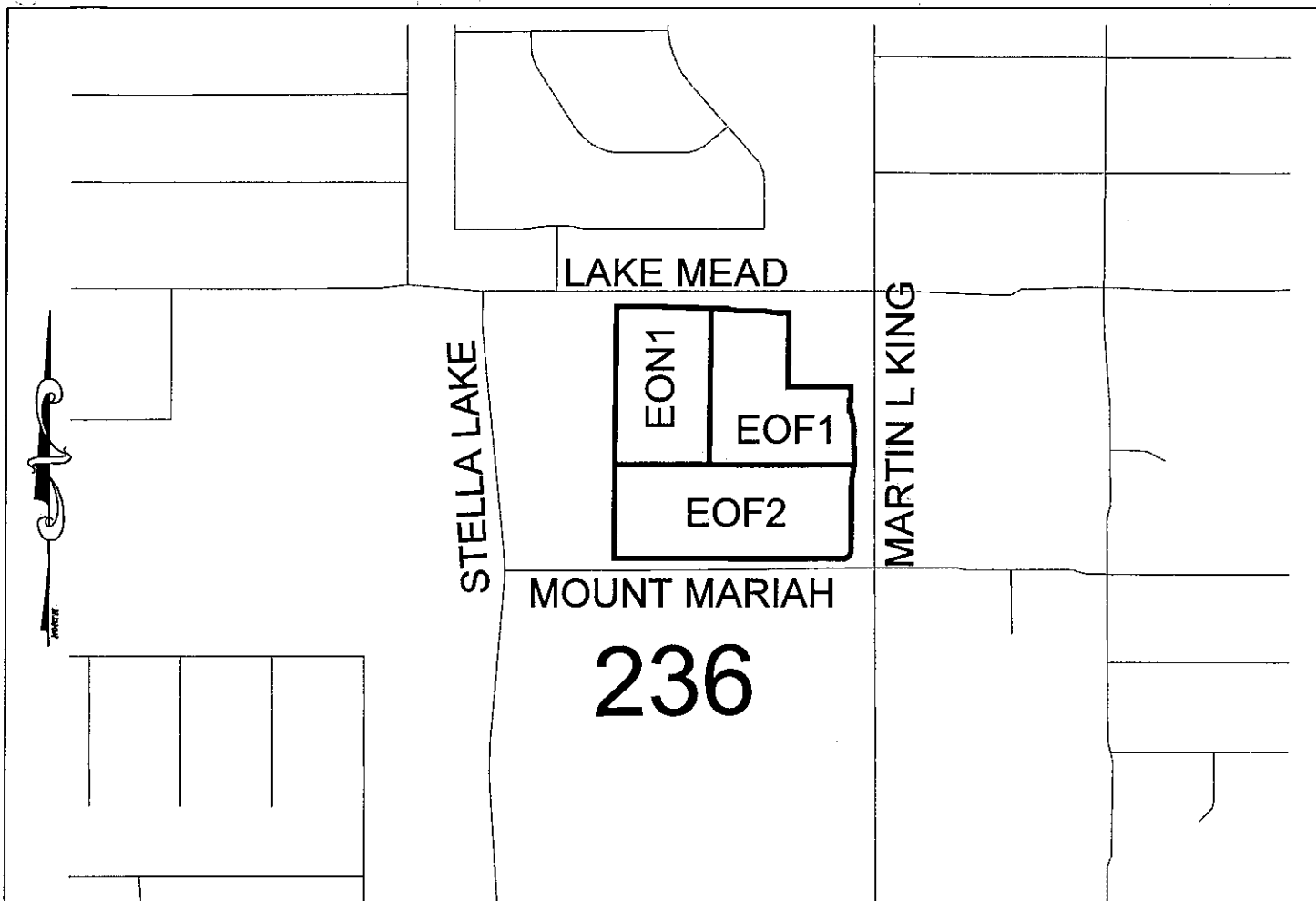
Please contact me to schedule another review meeting when the exterior lighting, irrigation and signage plans as well as all of the items for Meeting 3 are ready for submittal to the ARC.

Best regards.

LAS VEGAS ENTERPRISE PARK
ARCHITECTURAL REVIEW COMMITTEE


SCOTT AUYONG
ACTING CHAIRMAN

APPENDIX B



BASIN	AREA (ACRES)	*SOIL TYPE	SOIL CLASS	WEIGHTED CURVE NO.
EON1	2.78	236	B	77
EOF1	3.18	236	B	77
EOF2	4.18	236	B	77

* SOIL TYPES AND BOUNDARIES ARE REFERENCED FROM THE "SOIL SURVEY OF LAS VEGAS VALLEY AREA, NEVADA, PART OF CLARK COUNTY" PERFORMED BY THE SOIL CONSERVATION SERVICE, ISSUED IN JULY 1985. REFER TO MAP SHEET 6.

GRAPHIC SCALE



(IN FEET)

1 inch = 500 feet

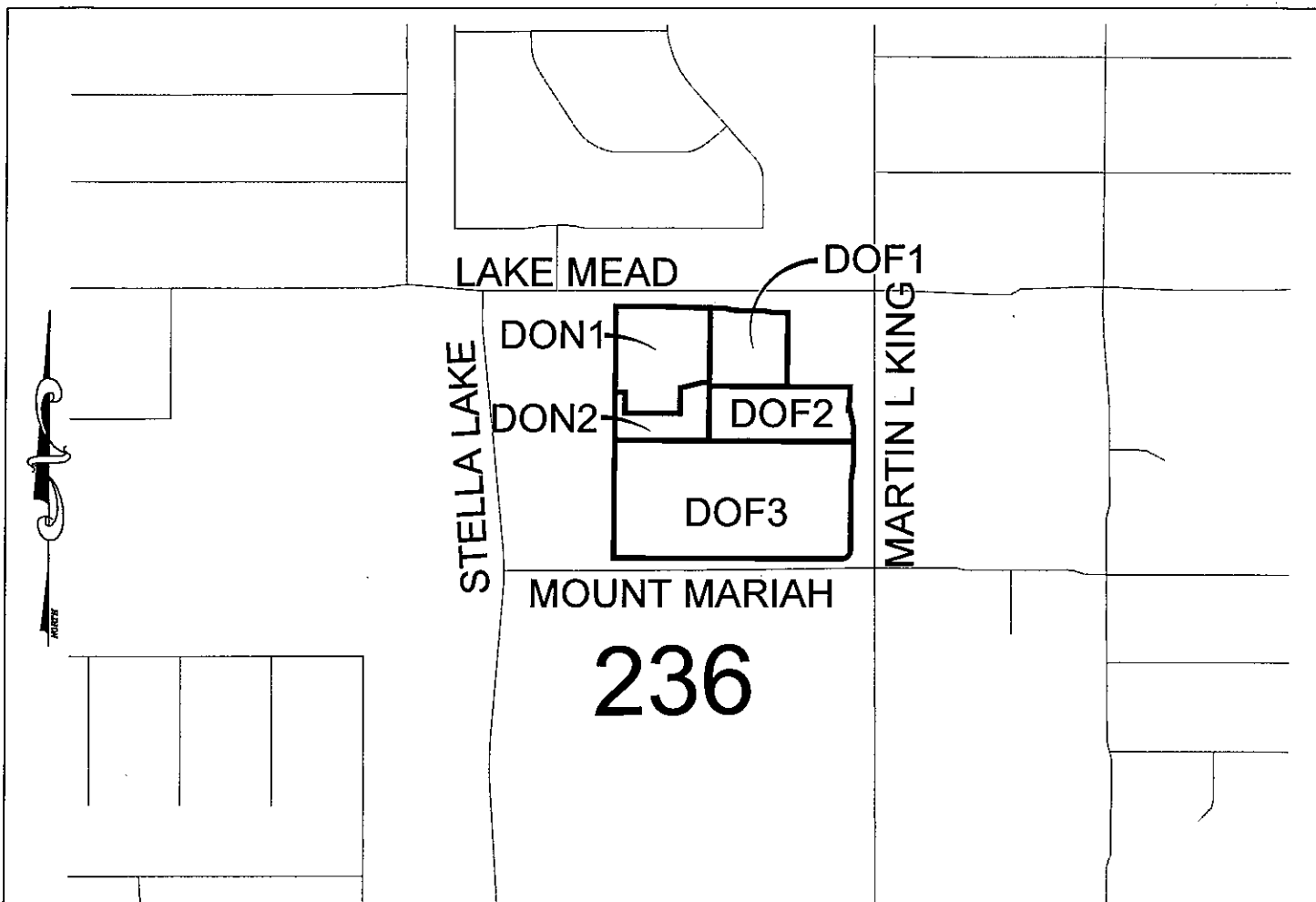


WALKER ENGINEERING, LLC
 5765 S. RAINBOW BLVD.
 SUITE 101
 LAS VEGAS, NV 89118
 TEL: 702.873.5197
 FAX: 702.873.5346

meeting your land development needs

DOLLAR GENERAL @ LAKE MEAD & MLK

EXISTING SOILS MAP



BASIN	AREA (ACRES)	* SOIL TYPE	SOIL CLASS	WEIGHTED CURVE NO.
DON1	1.69	236	B	92
DON2	0.68	236	B	92
DOF1	1.10	236	B	92
DOF2	2.08	236	B	92
DOF3	4.18	236	B	92

*

SOIL TYPES AND BOUNDARIES ARE REFERENCED FROM THE "SOIL SURVEY OF LAS VEGAS VALLEY AREA, NEVADA, PART OF CLARK COUNTY" PERFORMED BY THE SOIL CONSERVATION SERVICE, ISSUED IN JULY 1985. REFER TO MAP SHEET 6.

GRAPHIC SCALE



(IN FEET)

1 inch = 500 feet



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DOLLAR GENERAL @ LAKE MEAD & MLK

PROPOSED SOILS MAP

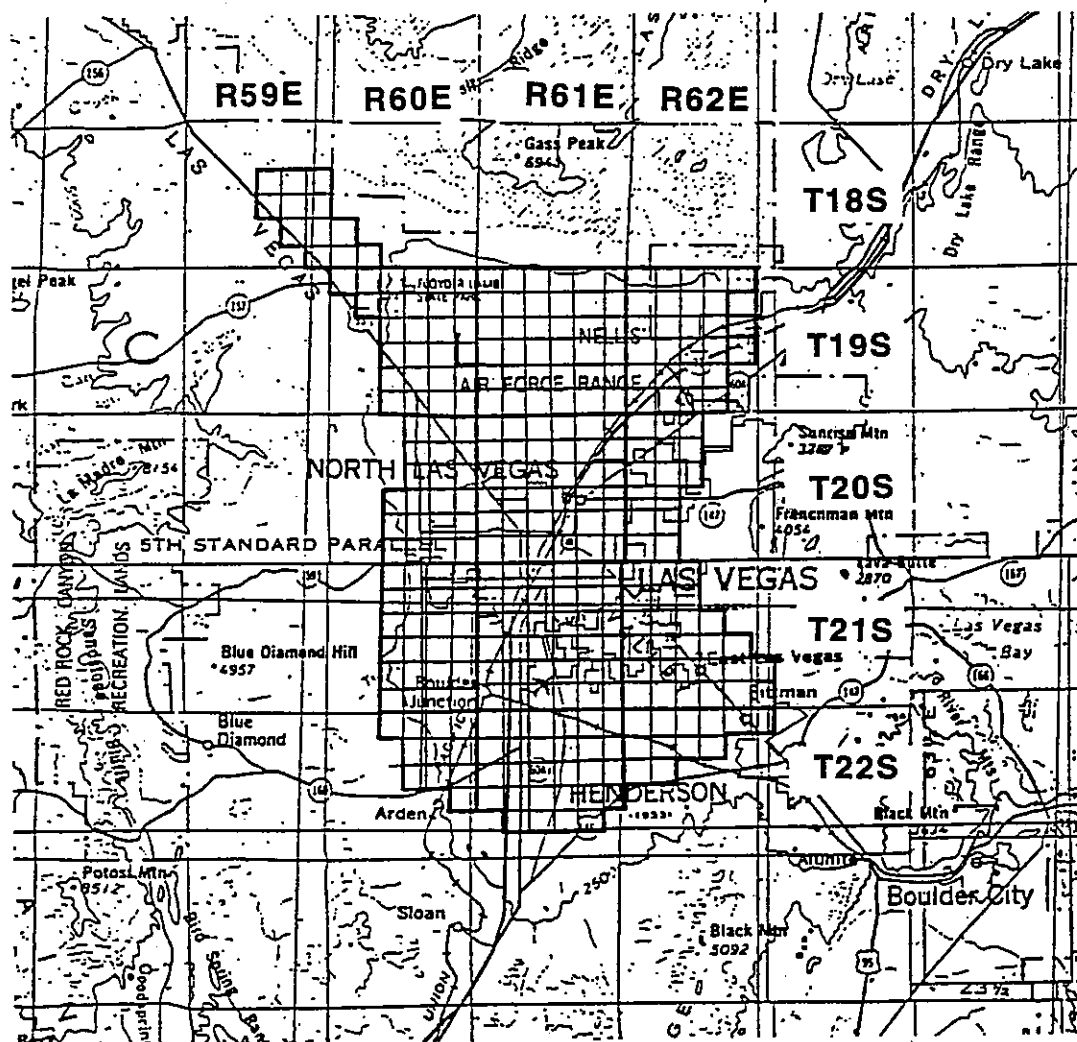
TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding		High water table		Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Months	Depth	Months	Depth	Thick-ness	Depth	Hard-ness	Uncoated steel	Concrete
				<u>Ft</u>		<u>In</u>		<u>In</u>			
182*: Caliza-----	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
Pittman-----	C	None-----	---	>6.0	---	>60	---	20-30	Thick	High-----	Low.
Arizo-----	A	Occasional	Mar-Sep	>6.0	---	>60	---	---	---	High-----	Low.
183----- Caliza	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
184----- Caliza	B	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.
187----- Caliza	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
190----- Dalian	B	None-----	---	>6.0	---	>60	---	---	---	High-----	Low.
191----- Dalian	B	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.
192*: Dalian-----	B	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.
McCullough-----	B	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.
200----- Glencarb	B	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Moderate.
206----- Glencarb	C	Occasional	Jul-Sep	3.0-5.0	Jul-Jun	>60	---	---	---	High-----	High.
222----- Glencarb	C	Rare-----	---	3.0-5.0	Jul-Jun	>60	---	---	---	High-----	High.
* 236----- Glencarb	<u>B</u>	Rare-----	---	>6.0	---	>60	---	---	---	High-----	High.
237----- Glencarb	B	Rare-----	---	>6.0	---	>60	---	40-60	Thick	High-----	Low.
240----- Goodsprings	D	None-----	---	>6.0	---	>60	---	9-20	Thick	High-----	Low.
252, 255----- Grapevine	B	Rare-----	---	>6.0	---	>60	---	---	---	High-----	High.
260----- Jean	A	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.
262*: Jean-----	A	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.
Jean-----	A	Occasional	Jun-Sep	>6.0	---	>60	---	---	---	High-----	Low.
Goodsprings-----	D	Rare-----	---	>6.0	---	>60	---	9-20	Thick	High-----	Low.
263*: Jean-----	A	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.
Jean-----	A	Occasional	Jun-Sep	>6.0	---	>60	---	---	---	High-----	Low.
264----- Jean	A	Rare-----	---	>6.0	---	>60	---	---	---	High-----	Low.

See footnote at end of table.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP RANGE SECTIONS

18 South 59 East 13-15,22-26,36
 18 South 60 East 30-32
 19 South 60 East 1-6,8-16,21-28,33-36
 19 South 61 East ALL SECTIONS
 19 South 62 East 2-11,14-23,27-34
 20 South 60 East 1-3,10-15,21-28,33-36
 * 20 South 61 East ALL SECTIONS *

TOWNSHIP RANGE SECTIONS

20 South 62 East 4-9,16-20,29-32
 21 South 60 East 1-4,9-16,21-28,33-36
 21 South 61 East ALL SECTIONS
 21 South 62 East 4-9,15-23, 25-36
 22 South 60 East 1-4,10-15,24
 22 South 61 East 1-24,26-29
 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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX-HOUR STORM DISTRIBUTIONS

Percent of Total Storm Depth				Percent of Total Storm Depth			
Storm Time (In Minutes)	SDN3	SDN4	SDN5	Storm Time (In Minutes)	SDN3	SDN4	SDN5
0	0.0	0.0	0.0	185	32.2	37.6	43.0
5	2.0	2.0	2.0	190	35.2	41.5	47.7
10	5.7	5.8	5.9	195	40.9	46.2	51.4
15	7.0	7.5	8.0	200	49.9	53.0	56.1
20	8.7	9.9	11.0	205	59.0	61.0	63.0
25	10.8	12.6	14.4	210	71.0	71.0	71.0
30	12.4	13.7	15.0	215	74.4	73.2	72.0
35	13.0	14.5	16.0	220	78.1	75.6	73.1
40	13.0	14.9	16.8	225	81.2	78.2	75.2
45	13.0	15.1	17.1	230	81.9	79.9	77.9
50	13.0	15.5	18.0	235	83.5	81.3	79.0
55	13.0	15.6	18.2	240	85.1	82.3	79.5
60	13.0	15.9	18.7	245	85.6	83.0	80.4
65	13.3	16.2	19.0	250	86.0	83.5	81.0
70	14.0	16.9	19.7	255	86.8	84.4	82.0
75	14.2	17.2	20.2	260	87.6	85.1	82.6
80	14.8	17.9	21.0	265	88.8	86.4	84.0
85	15.8	18.9	22.0	270	91.0	88.5	85.9
90	17.2	20.1	23.0	275	92.6	90.8	88.9
95	18.1	21.1	24.1	280	93.7	92.4	91.0
100	19.0	22.0	25.0	285	95.0	94.4	93.8
105	19.7	22.8	25.9	290	97.0	96.8	96.6
110	19.9	23.2	26.5	295	97.6	97.3	97.0
115	20.0	24.0	28.0	300	98.2	97.8	97.4
120	20.1	24.6	29.0	305	98.5	98.2	97.9
125	20.4	25.2	30.0	310	98.7	98.4	98.1
130	21.4	26.0	30.5	315	98.9	98.6	98.3
135	22.9	26.9	30.9	320	99.0	98.8	98.5
140	24.1	27.6	31.0	325	99.3	99.1	98.9
145	24.9	28.3	31.7	330	99.3	99.2	99.0
150	25.1	28.6	32.1	335	99.4	99.3	99.2
155	25.6	29.2	32.7	340	99.5	99.4	99.3
160	27.0	30.2	33.3	345	99.8	99.7	99.6
165	27.8	31.2	34.6	350	99.8	99.8	99.7
170	28.1	32.1	36.1	355	99.9	99.9	99.9
175	28.3	33.2	38.1	360	100.0	100.0	100.0
180	29.5	35.2	40.8				

- Notes: 1. For drainage areas less than 8 square miles in size, use SDN 3.
 2. For drainage areas greater than or equal to 8 square miles and less than 12 square miles in size, use SDN 4.
 3. For drainage areas greater than or equal to 12 square miles, use SDN 5.
 4. A graphical representation of these values is presented on Figure 515.

Revision	Date

REFERENCE:

TABLE 503

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA (IN INCHES)

TIME	RECURRENCE INTERVAL					
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5 min.	0.15	0.27	0.35	0.46	0.54	0.63
10 min.	0.25	0.44	0.57	0.74	0.89	1.02
15 min.	0.33	0.57	0.74	0.97	1.15	1.32
30 min.	0.44	0.78	1.01	1.31	1.55	1.79
1 hour	0.52	0.89	1.15	1.50	1.78	2.06
2 hour	0.59	1.01	1.30	1.70	2.01	2.30
3 hour	0.64	1.08	1.39	1.82	2.15	2.48
6 hour	0.72	1.22	<u>1.58</u>	2.05	2.41	<u>2.77</u>
24 hour (TR-55)	1.20	1.60	1.80	2.40	2.70	2.96

- NOTE: 1. Refer to Figure 513 for a description and drawing of the area included in the McCarran Airport Rainfall Area.
2. The 24 hour values presented above are for use with TR-55 only.
3. Table 501 adjustments not required.

Revision	Date

**WRC
ENGINEERING**

REFERENCE:

USACE, Los Angeles District, 1988

TABLE 505

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (SEMIARID RANGELANDS¹)

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition ²	A ³	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

¹Average runoff condition, and $I_a = 0.2S$.

²Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: >70% ground cover.

³Curve numbers for group A have been developed only for desert shrub.

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area ²	A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ...		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					

See Table 602A

Developing urban areas

Newly graded areas (pervious areas only, no vegetation) ³	77	86	91	94
--	----	----	----	----

1 Average runoff condition, and $I_a = 0.25$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

APPENDIX C

Development: Dollar General @ Lake Mead & MLK
 Calculated by: Treasea Wolf
 Date: 1/17/2012

TIME OF CONCENTRATION															
SUB-BASIN DATA			INITIAL / OVERLAND TIME: t(i)			TRAVEL TIME t(t)			CONCENTRATION TIME t(c)						
DESIG	AREA Sq. Mi.	EX/DEV EX = 1 DEV = 2	CN	K	LENGTH FL	SLOPE %	t(i) Min	LENGTH Ft	SLOPE %	VEL FPS	t(t) Min	T _L FL	FINAL t(c)	t(c) URBANIZED = (t _L /180)+10 Min	t(lag) = (0.6 * t _L)/60 Hr
EXISTING CONDITIONS:															
EON1	0.00434	1	77	0.626	30	10.00	2.17	270	0.56	2.2	2.05	300	10.00	N/A	0.1000
EOF1	0.00497	1	77	0.626	180	0.50	14.41	400	1.30	3.4	1.99	580	16.40	N/A	0.1640
EOF2	0.00653	1	77	0.626	30	10.00	2.17	500	0.50	2.1	4.01	530	10.00	N/A	0.1000
PROPOSED CONDITIONS:															
DON1	0.00264	2	92	0.824	235	1.00	7.60	190	1.00	3.1	1.03	425	8.64	12.36	0.0864
DON2	0.00106	2	92	0.824	26	2.00	2.01	122	1.00	3.1	0.66	148	5.00	10.82	0.0500
DOF1	0.00172	2	92	0.824	190	1.00	6.84	190	1.00	3.1	1.03	380	7.87	12.11	0.0787
DOF2	0.00325	2	92	0.824	135	1.00	5.76	340	0.83	2.8	2.03	475	7.80	12.64	0.0780
DOF3	0.00653	2	92	0.824	250	1.00	7.84	500	1.00	3.1	2.72	750	10.57	14.17	0.1057

Equations Used...

$$t(f) = 1.8 \times (1.1 - K) \times L^{1/2} / S^{1/3}$$

$$t(f) = L / (60 \times V)$$

$$t(c) = t(f) + t(b)$$

$$K = 0.0132 \times CN - 0.39$$

For Developed Conditions:

Flow depth at top of curb - Velocity = 30.6 X (Slope)^{1/2}

$$n = 0.016$$

$$R = (A/P) \sim 0.187 \text{ ft.}$$



For Existing Conditions:

Wide Rectangular - Velocity = 29.4 X (Slope)^{1/2}

$$n = 0.040$$

$$R = (A/P) \sim y$$



EX. COND. HEC-1


```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 12JAN12 TIME 18:22:05
*
*****

```

```

*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

```

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X X XXXXXX XXXX X
X X X X X XX
X X X X X X
XXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXX XXXX XXX

```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION. NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL, LOSS RATE:GREEN AND AMPT INFILTRATION, KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID
2 ID *****
3 ID * HYDROLOGIC ANALYSIS *
4 ID * FOR *
5 ID * DOLLAR GENERAL @ LAKE MEAD & MLK *
6 ID * EXISTING CONDITION *
7 ID *****
8 ID
9 ID *****
10 ID * 10 & 100 YEAR *
11 ID * STORM EVENT *
12 ID *****
13 ID
14 *DIAGRAM
15 IT 5 0 0 300
16 IO 5 0
17 IN 5
18 JR PREC 0.57 1.00
19
20 KK EON1
21 KM EXISTING ON-SITE BASIN EON1
22 BA .00434
23 PB 2.77
24 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
25 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
26 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
27 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
28 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
29 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
30 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
31 PC .998 .999 1.00
32 LS 0 77
33 UD .1000
34 *
35
36 KK EOF1
37 KM EXISTING OFF-SITE BASIN EOF1
38 BA .00497
39 LS 0 77
40 UD .1640
41 *
42
43 KK EOF2
44 KM EXISTING OFF-SITE BASIN EOF2
45 BA .00653
46 LS 0 77
47 UD .1000
48 *
49 ZZ

```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```

INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
18 EON1
.
.
32 EOF1
.
.
37 EOF2

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
*
* RUN DATE 12JAN12 TIME 18:22:05 *
*

*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*

* HYDROLOGIC ANALYSIS *
* FOR *
* DOLLAR GENERAL @ LAKE MEAD & MLK *
* EXISTING CONDITION *

* 10 & 100 YEAR *
* STORM EVENT *

15 IO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
NMIN 5 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 300 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 2 0 ENDING DATE
NDTIME 0055 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-Feet
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 1.00

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				.57	1.00
HYDROGRAPH AT					
+	EON1	.00	1 FLOW	1.	4.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	EOF1	.00	1 FLOW	1.	4.
			TIME	3.67	3.58
HYDROGRAPH AT					
+	EOF2	.01	1 FLOW	1.	6.
			TIME	3.58	3.58

*** NORMAL END OF HEC-1 ***

PROP. COND. HEC-1

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 13JAN12 TIME 09:46:40
*
*****

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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

```

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X X XXXXXX XXXX X
X X X X X XX
X X X X X X
XXXXXX XXXX X XXXX X
X X X X X X
X X X X X X
X X XXXXXX XXXX XXX

```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL, LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1

HEC-1 INPUT

PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID
2 ID *****
3 ID * HYDROLOGIC ANALYSIS *
4 ID * FOR *
5 ID * DOLLAR GENERAL @ LAKE MEAD & MLK *
6 ID * PROPOSED CONDITION *
7 ID *****
8 ID
9 ID *****
10 ID * 10 & 100 YEAR *
11 ID * STORM EVENT *
12 ID *****
13 ID
14 *DIAGRAM
15 IT 5 0 0 300
16 IO 5 0
17 IN 5
18 JR PREC 0.57 1.00
19 KK DON1
20 KM DEVELOPED ON-SITE BASIN DON1
21 BA .00264
22 PB 2.77
23 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
24 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
25 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
26 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
27 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
28 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
29 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
30 PC .998 .999 1.00
31 LS 0 92
32 UD .0864
33 *
34 KK DOF1
35 KM DEVELOPED OFF-SITE BASIN DOF1
36 BA .00172
37 LS 0 92
38 UD .0787
39 *
40 KK DON2
41 KM DEVELOPED ON-SITE BASIN DON2
42 BA .00106
43 LS 0 92
44 UD .0500
45 *
46 KK DOF2
47 KM DEVELOPED OFF-SITE BASIN DOF2
48 BA .00325
49 LS 0 92
50 UD .0780
51 *

```

1

HEC-1 INPUT

PAGE 2

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

47 KK DOF3
48 KM DEVELOPED OFF-SITE BASIN DOF3
49 BA .00653
50 LS 0 92
51 UD .1057
52 ZZ

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
18 DON1
32 . DOF1
37 . DON2
42 . DOF2
47 . DOF3

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

FLOOD HYDROGRAPH PACKAGE (HEC-1)
JUN 1998
VERSION 4.1
RUN DATE 13JAN12 TIME 09:46:40

U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 756-1104

HYDROLOGIC ANALYSIS
FOR
DOLLAR GENERAL & LAKE MEAD & MLK
PROPOSED CONDITION

10 & 100 YEAR
STORM EVENT

15 IO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
NMIN 5 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 300 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 2 0 ENDING DATE
NDTIME 0055 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-Feet
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 1.00

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT +	DON1	.00	1 FLOW TIME	2. 3.50	5. 3.50
HYDROGRAPH AT +	DOF1	.00	1 FLOW TIME	1. 3.50	3. 3.50
HYDROGRAPH AT +	DON2	.00	1 FLOW TIME	1. 3.50	2. 3.50
HYDROGRAPH AT +	DOF2	.00	1 FLOW TIME	3. 3.50	6. 3.50
HYDROGRAPH AT +	DOF3	.01	1 FLOW TIME	5. 3.50	11. 3.50

*** NORMAL END OF HEC-1 ***

HYDRAULIC CALCULATIONS

EX. CONDITIONS

Worksheet for SECTION HS-1: LAKE MEAD - 100 YR (EX)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00440 ft/ft
Discharge 992.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.17
0+60.00	1.23
0+70.00	1.43
0+70.00	1.93
0+72.00	1.93
0+72.00	1.43
1+05.00	0.77
1+06.50	0.71
1+16.50	0.81
1+16.50	1.31
1+17.00	1.31
1+22.00	1.41

$$d * V = 2.10 * 6.76 = 14.20 > 8$$

NOT OK

* EX. CONDITION *

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.17)	0.013
(0+07.00, 0.17)	(0+70.00, 1.43)	0.017
(0+70.00, 1.43)	(0+72.00, 1.43)	0.013
(0+72.00, 1.43)	(1+05.00, 0.77)	0.017
(1+05.00, 0.77)	(1+22.00, 1.41)	0.013

Worksheet for SECTION HS-1: LAKE MEAD - 100 YR (EX)

Results

Normal Depth	2.10	ft
Elevation Range	0.00 to 1.93 ft	
Flow Area	146.84	ft ²
Wetted Perimeter	126.23	ft
Top Width	122.00	ft
Normal Depth	2.10	ft
Critical Depth	2.17	ft
Critical Slope	0.00367	ft/ft
Velocity	6.76	ft/s
Velocity Head	0.71	ft
Specific Energy	2.81	ft
Froude Number	1.09	
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	2.10	ft
Critical Depth	2.17	ft
Channel Slope	0.00440	ft/ft
Critical Slope	0.00367	ft/ft

Cross Section for SECTION HS-1: LAKE MEAD - 100 YR (EX)

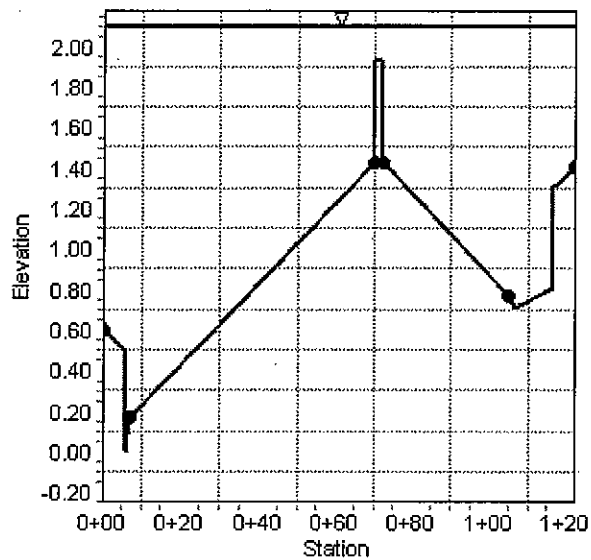
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00440 ft/ft
Normal Depth 2.10 ft
Discharge 992.00 ft³/s

Cross Section Image



Worksheet for SECTION HS-2: MLK - 10 YR (EX)

Results

Normal Depth	0.40	ft
Elevation Range	-0.15 to 1.22 ft	
Flow Area	2.30	ft²
Wetted Perimeter	22.74	ft
Top Width	22.08	ft
Normal Depth	0.40	ft
Critical Depth	0.37	ft
Critical Slope	0.00895	ft/ft
Velocity	1.30	ft/s
Velocity Head	0.03	ft
Specific Energy	0.42	ft
Froude Number	0.71	
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	0.40	ft
Critical Depth	0.37	ft
Channel Slope	0.00440	ft/ft
Critical Slope	0.00895	ft/ft

Cross Section for SECTION HS-2: MLK - 10 YR (EX)

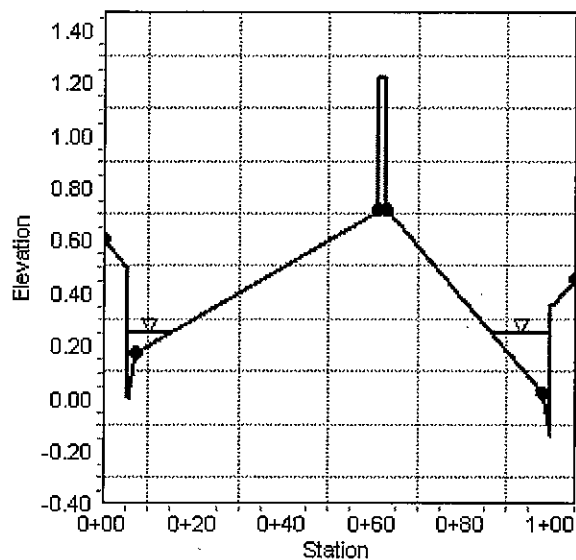
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00440 ft/ft
Normal Depth 0.40 ft
Discharge 3.00 ft³/s

Cross Section Image



Worksheet for SECTION HS-2: MLK - 100 YR (EX)

Results

Normal Depth	0.56	ft
Elevation Range	-0.15 to 1.22 ft	
Flow Area	8.03	ft ²
Wetted Perimeter	51.05	ft
Top Width	50.12	ft
Normal Depth	0.56	ft
Critical Depth	0.53	ft
Critical Slope	0.00768	ft/ft
Velocity	1.74	ft/s
Velocity Head	0.05	ft
Specific Energy	0.61	ft
Froude Number	0.77	
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	0.56	ft
Critical Depth	0.53	ft
Channel Slope	0.00440	ft/ft
Critical Slope	0.00768	ft/ft

Project Description

Manning Formula

Normal Depth

Channel Slope

0.00440 ft/ft

0.56 ft

14.00 ft³/s

The graph shows the elevation profile of a road. The x-axis represents the stationing from 0+00 to 1+00, and the y-axis represents the elevation from -0.40 to 1.40. The proposed profile (solid line) starts at station 0+00 with an elevation of 0.60, drops to 0.40, rises to a peak of 1.20 at station 0+60, and then drops to 0.40 at station 1+00. The existing profile (dashed line) starts at station 0+00 with an elevation of 0.18, rises to 0.70 at station 0+60, and then drops to 0.00 at station 1+00. A vertical curve is shown between stations 0+20 and 0+80, with a peak elevation of 0.40 at station 0+50.

PROP. CONDITIONS

Worksheet for SECTION HS-1: LAKE MEAD - 10 YR (PR)

Results

Normal Depth	0.41	ft
Elevation Range	0.00 to 1.93	ft
Flow Area	1.89	ft ²
Wetted Perimeter	13.78	ft
Top Width	13.36	ft
Normal Depth	0.41	ft
Critical Depth	0.38	ft
Critical Slope	0.00825	ft/ft
Velocity	1.59	ft/s
Velocity Head	0.04	ft
Specific Energy	0.45	ft
Froude Number	0.74	
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	0.41	ft
Critical Depth	0.38	ft
Channel Slope	0.00440	ft/ft
Critical Slope	0.00825	ft/ft

Cross Section for SECTION HS-1: LAKE MEAD - 10 YR (PR)

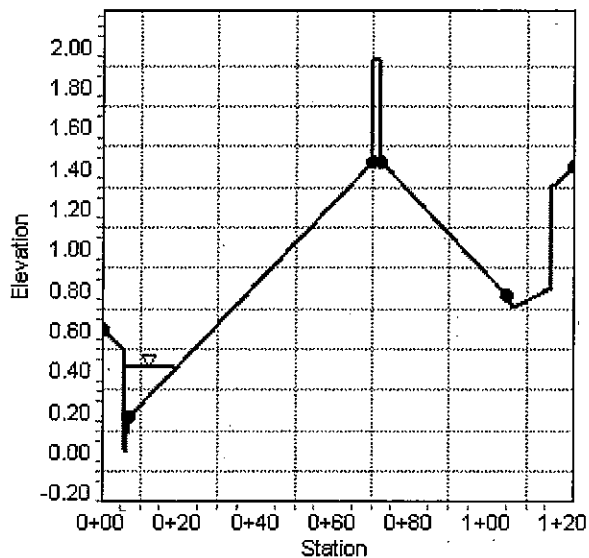
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00440 ft/ft
Normal Depth 0.41 ft
Discharge 3.00 ft³/s

Cross Section Image



Worksheet for SECTION HS-1: LAKE MEAD - 100 YR (PR)

Results

Normal Depth	2.11	ft
Elevation Range	0.00 to 1.93 ft	
Flow Area	147.50	ft ²
Wetted Perimeter	126.24	ft
Top Width	122.00	ft
Normal Depth	2.11	ft
Critical Depth	2.18	ft
Critical Slope	0.00366	ft/ft
Velocity	6.78	ft/s
Velocity Head	0.71	ft
Specific Energy	2.82	ft
Froude Number	1.09	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

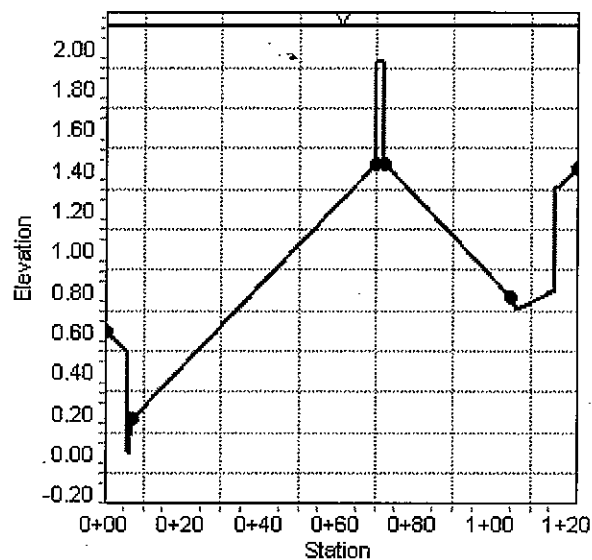
GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.11	ft
Critical Depth	2.18	ft
Channel Slope	0.00440	ft/ft
Critical Slope	0.00366	ft/ft

Project Description

Input Data

Cross Section Image



Worksheet for SECTION HS-2: MLK - 10 YR (PR)

Results

Normal Depth	0.49	ft
Elevation Range	-0.15 to 1.22 ft	
Flow Area	5.08	ft ²
Wetted Perimeter	37.23	ft
Top Width	36.37	ft
Normal Depth	0.49	ft
Critical Depth	0.46	ft
Critical Slope	0.00830	ft/ft
Velocity	1.57	ft/s
Velocity Head	0.04	ft
Specific Energy	0.53	ft
Froude Number	0.74	
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	0.49	ft
Critical Depth	0.46	ft
Channel Slope	0.00440	ft/ft
Critical Slope	0.00830	ft/ft

Project Description

Manning Formula

Normal Depth

8.00 ft³/s

The profile view graph shows the elevation of a road surface relative to a datum. The x-axis represents the stationing from 0+00 to 1+00, and the y-axis represents the elevation from -0.40 to 1.40. The profile consists of several segments: a vertical curve from station 0+00 to 0+10, a horizontal segment from 0+10 to 0+95, and another vertical curve from 0+95 to 1+00. The highest point of the profile is at station 0+60, where the elevation reaches 0.72. There is a significant vertical drop at station 0+60, indicated by a dashed line extending to an elevation of 1.22.

Station	Elevation
0+00	0.60
0+10	0.18
0+60	0.72
0+95	0.02
1+00	0.45

Worksheet for SECTION HS-2: MLK - 100 YR (PR)

Results

Normal Depth	0.59	ft
Elevation Range	-0.15 to 1.22 ft	
Flow Area	9.36	ft ²
Wetted Perimeter	56.12	ft
Top Width	55.16	ft
Normal Depth	0.59	ft
Critical Depth	0.55	ft
Critical Slope	0.00749	ft/ft
Velocity	1.82	ft/s
Velocity Head	0.05	ft
Specific Energy	0.64	ft
Froude Number	0.78	
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	0.59	ft
Critical Depth	0.55	ft
Channel Slope	0.00440	ft/ft
Critical Slope	0.00749	ft/ft

Project Description

Manning Formula

Normal Depth

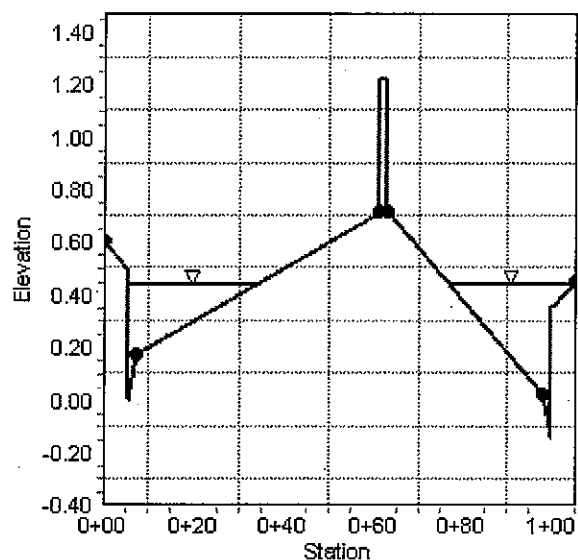
Input Data

0.00440 ft/ft

0.59 ft

17.00 ft³/s

Cross Section Image



Worksheet for SECTION HS-3: LAKE MEAD - 100 YR (PR)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Discharge 992.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	57.94
0+00.00	56.61
0+10.00	55.19
0+15.00	55.09
0+15.50	55.09
0+15.50	54.59
0+17.00	54.76
0+60.00	55.59
1+01.00	54.00
1+02.50	53.83
1+02.50	54.33
1+03.00	54.33
1+08.00	54.41

$$d * V = 2.51 * 7.02 = 17.62 > 8$$

NOT OK

* EX. CONDITION *

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 57.94)	(0+00.00, 56.61)	0.013
(0+00.00, 56.61)	(0+10.00, 55.19)	0.030
(0+10.00, 55.19)	(0+17.00, 54.76)	0.013
(0+17.00, 54.76)	(1+01.00, 54.00)	0.017
(1+01.00, 54.00)	(1+08.00, 54.41)	0.013

Results

Normal Depth 2.51 ft

Worksheet for SECTION HS-3: LAKE MEAD - 100 YR (PR)

Results

Elevation Range	53.83 to 57.94 ft	
Flow Area	141.27	ft ²
Wetted Perimeter	109.14	ft
Top Width	106.07	ft
Normal Depth	2.51	ft
Critical Depth	2.57	ft
Critical Slope	0.00429	ft/ft
Velocity	7.02	ft/s
Velocity Head	0.77	ft
Specific Energy	3.27	ft
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	2.51	ft
Critical Depth	2.57	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00429	ft/ft

Cross Section for SECTION HS-3: LAKE MEAD - 100 YR (PR)

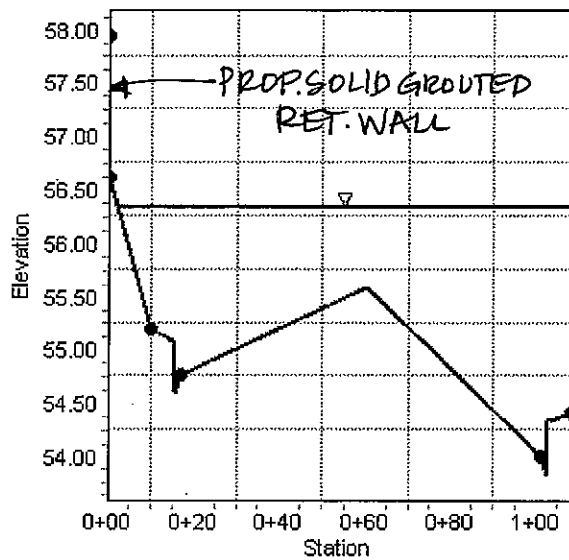
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Normal Depth 2.51 ft
Discharge 992.00 ft³/s

Cross Section Image



$$TW = 57.94'$$

$$WSE = 56.34'$$

$$TW - WSE = 57.94' - 56.34' = 1.6'$$

$$FFE = 59.25'$$

$$FFE - WSE = 59.25' - 56.34' = 2.91'$$

$$2.91' > 1.5' \quad \underline{\underline{OK}}$$

Worksheet for SECTION HS-4: DWY ON LAKE MEAD - 100 YR (PR)

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00600 ft/ft
Discharge 997.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	56.36
0+72.32	54.09
0+76.32	54.02
0+80.32	54.09
1+23.32	55.02
1+65.32	53.44
1+66.82	53.27
1+66.82	53.77
1+67.32	53.77
1+72.32	53.86

$$d * v = 2.19 * 6.90 = 15.1178$$

NOT OK

EX CONDITION

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 56.36)	(0+72.32, 54.09)	0.017
(0+72.32, 54.09)	(0+80.32, 54.09)	0.013
(0+80.32, 54.09)	(1+65.32, 53.44)	0.017
(1+65.32, 53.44)	(1+72.32, 53.86)	0.013

Results

Normal Depth 2.19 ft
Elevation Range 53.27 to 56.36 ft
Flow Area 144.53 ft²
Wetted Perimeter 145.95 ft
Top Width 143.78 ft

Worksheet for SECTION HS-4: DWY ON LAKE MEAD - 100 YR (PR)

Results

Normal Depth	2.19	ft
Critical Depth	2.34	ft
Critical Slope	0.00394	ft/ft
Velocity	6.90	ft/s
Velocity Head	0.74	ft
Specific Energy	2.93	ft
Froude Number	1.21	
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	2.19	ft
Critical Depth	2.34	ft
Channel Slope	0.00600	ft/ft
Critical Slope	0.00394	ft/ft

Cross Section for SECTION HS-4: DWY ON LAKE MEAD - 100 YR (PR)

Project Description

Friction Method

Manning Formula

Solve For

Normal Depth

Input Data

Channel Slope

0.00600 ft/ft

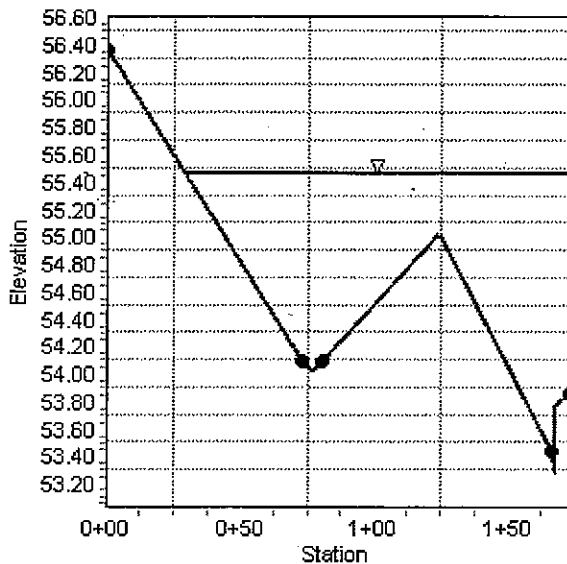
Normal Depth

2.19 ft

Discharge

997.00 ft³/s

Cross Section Image



$$WSE = 55.46'$$

$$DWY \text{ ELEV ON-SITE} = 56.34'$$

$$DWY - WSE = 56.34' - 55.46' = 0.9'$$
$$0.9' > 0.5' \quad \underline{\underline{OK}}$$

$$FFE = 59.25'$$

$$WSE = 55.46'$$

$$FFE - WSE = 59.25' - 55.46' = 3.79'$$

$$3.79' > 1.5' \quad \underline{\underline{OK}}$$

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		June 28, 2004
TO: Land Development Services Department of Public Works		FROM: Peter Jackson Flood Control Section Department of Public Works
SUBJECT:	Drainage Study for:	
	STELLA LAKE OFFICE BUILDING	
Cross Streets:	Lake Mead & Stella Lake	Page Southerland Page L.L.P.
File Number:	F:\Depot\DSMemos\DS3581B.doc	Bart Anderson, P.E., DevCo
Parcel Number:	139-21-313-002	Bill Arent, CLV - OBD
Zoning Action:	SDR 4298	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. No.
1 st Submittal & Supplemental	5/18/2004 & 6/8/2004	6/8/2004	Conditionally Approved	\$400.00	125334: \$400
2nd Submittal	6/28/2004	6/28/2004	See Comments Below	N/C	
TOTAL FEES (LDDRS):				\$400.00	---

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.
	must have Clark County Department of Development Services concurrence

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

PBJ

T/R/S: T20S/R61E/S21
AREA M21

REFERENCE STUDY

TECHNICAL DRAINAGE STUDY

FOR

STELLA LAKE

C&B JOB #241027

Prepared by:

Carter-Burgess

6655 Bermuda Road
Las Vegas, Nevada 89119

Submitted to:

City of Las Vegas
Flood Control Division
731 S. Fourth Street
Las Vegas, Nevada 89101

May 2004

DS 3581
400—
M-21
5/18/04

Carter-Burgess

6655 Bermuda Road
Las Vegas, Nevada 89119-3605
Phone: 702.938.5400
Fax: 702.938.5454
www.c-b.com

May 18, 2004

Mr. Peter Jackson, ~~P.E.~~
Flood Control Division
City of Las Vegas
731 S. Fourth Street
Las Vegas, Nevada 89101

**Subject: Technical Drainage Study for Stella Lake
C&B Job #241027**

Dear Mr. Jackson:

Transmitted herewith for your review and approval is one copy of the above-referenced Technical Drainage Study and one set of grading plans. The Stella Lake project site is located south of Lake Mead Boulevard and east of Stella Lake Boulevard.

If there are any questions concerning this study or additional information is needed, please contact our office at (702) 938-5400.

Sincerely,

Carter-Burgess



Jason Y. Lee, P.E.
Project Engineer

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Stella Lake Date: May 18, 2004
 Location of Development: a) Descriptive (Cross Streets): North/South Stella Lake St. East/West Lake Mead Blvd.
 b) Sect. 21 Twn. 20S Rng. 61E

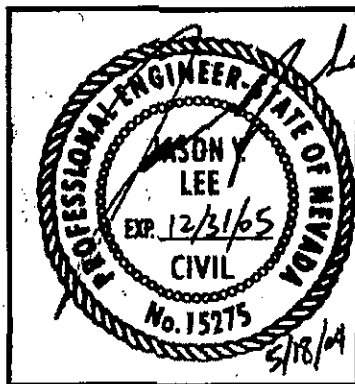
Name of Owner: Page Southerland Page L.L.P. Assessors Parcel Number: 139-21-313-002

Telephone Number: (703) 527-4100 Facsimile Number: (703) 522-8043
 Address: Colonial Place 2107 Wilson Blvd., Suite 410, Arlington, VA 22201-3008
 Contact Person - Name: Jason Y. Lee, P.E. Telephone Number: (702) 938-5400
 Firm: Carter & Burgess, Inc.
 Address: 6655 Bermuda Road, Las Vegas, NV 89119

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	

- Total Owned Land Area: At site: 5.3 acres Being Developed/Disturbed: 5.3 acres
- Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? : YES* NO
- Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control Master Plan Facility? : YES* NO
- Proposed type of development (Residential, Commercial, Etc.): Commercial
- Approximate upstream land area which drains to the subject site: as referenced
- Has the site been evaluated in the past? YES NO If yes, please identify documentation: Central Neighborhood Flood Control Master Plan by PBS&J
- If known, please identify the proposed point(s) of runoff from the site: Lake Mead Blvd. & Mount Mariah Dr.
- Briefly describe your proposed schedule for the subject project: ASAP



Submit this form as part of the required drainage study to the local entity which has jurisdiction over the 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.

Revisions	Date

Local Entity File Number

Engineer's Seal
 REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Stella Lake		Map ID:	
Firm Name: Carter :: Burgess, Inc.		Engineer: Jason Y. Lee, P.E.	
Address: 6655 Bermuda Road			
City: Las Vegas		State: NV	Zip: 89119
Phone Number: (702) 938-5400		Fax Number: (702) 938-5454	
Property Owner: Page Southerland Page L.L.P.			
Address: Colonial Place 2107 Wilson Blvd., Suite 410			
City: Arlington		State: VA	Zip: 22201-3008
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 list 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 inclusive 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.
N/A		A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

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 flows in cfs.
X		Vicinity Map with local and major cross streets identified and a north arrow.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN		
Yes	No	
X		Sheet size: 24"x36" sealed by a registered engineer in the State of Nevada.
X		Minimum scale: 1"=60'.
X		Project name.
X		Vicinity Map with local and major cross streets.
X		Revision box.
X		North arrow and bar scale.
X		Engineer's/consultants 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.
X		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
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 on-site 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 (e.i., 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.
N/A		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 blockwall openings. Minimum size is 16"x48". Wrought iron gate is required for flows > 10 cfs.
X		Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
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.
X		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.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Yes	No	
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.
X		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 Q100 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 Soil 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, Q10 and Q100 for both individual basins and combined basin flows, where applicable.
X		Copies of supporting technical information referenced from 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.
N/A		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 Q100 and Q10 flows representing the worst case for interior and all perimeter streets. Q100 d x v ≤ 8. Q10 d x v ≤ 6 and 12 foot dry lane for rights-of-way ≥ 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, Q100 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.)
N/A		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 losses, 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 easement must always be provided with 18 inches of freeboard above the Q100 weir height or flow depth, whichever is greater.

REFERENCE:

STANDARD FORM 2

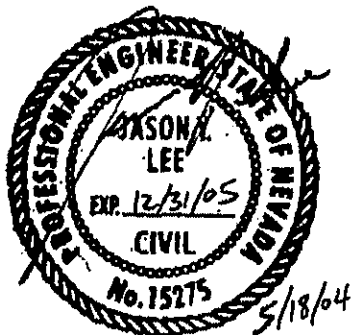
HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Yes	No	
N/A		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.

Submitted By: Jason Y. Lee, P.E.

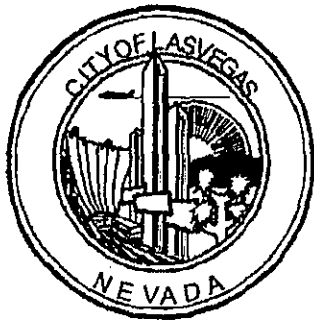
Date: _____



Engineers Seal: _____

REFERENCE:

STANDARD FORM 2



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 06/06/01)

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District Manual Standard Form 2. The listed items are the minimum information required prior to the City 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 (Design Manual).

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

I. GENERAL REQUIREMENT		
Yes	No	
NA		A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
Pending		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.

II. GRADING PLAN INFORMATION		
Yes	No	
✓		(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
✓		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. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
✓		Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)
NA		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
✓		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
✓		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
NA		Back of lot elevations and lot drainage pattern for all lots including common lots.
NA		Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
✓		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
✓		This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
✓		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas -- Manual Section 1600		
Yes	No	
✓		Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
NA		Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
NA		The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
✓		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
NA		Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.
NA		Lots with "B and C Type Drainage" shall be required to install an underground nuisance drainage system or a 2-foot valley gutter through the lot. 16" x 24" minimum block wall openings are required for both options.
NA		Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

- An appointment must be made to preview this checklist in conjunction with Clark County Regional Flood Control District Manual Standard Form 2 prior to the City accepting a new Drainage Study for review. The engineer may contact the Flood Control Section at 229-6541.
- Following the acceptance of the Drainage Study (meeting the minimum acceptable information above), there will be a charge of \$250 for each Drainage Study review submittal. These fees are payable at the time the Grading Permit is obtained.
- The Drainage Study must be accepted prior to submitting grading plans to the Land Development Section for review.

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

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6-Jun-01

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1.0 GENERAL LOCATION AND DEVELOPMENT DESCRIPTION

1.1 Scope

The purpose of this study is to provide detailed hydrologic and hydraulic analyses for the proposed commercial development of Stella Lake. This study will address the existing, interim and future conditions that effect the onsite and offsite drainage. The criteria set forth in the Clark County Regional Flood Control District "Hydrologic Criteria and Drainage Design Manual," hereafter referred to as the "Drainage Criteria Manual," (Reference 5) has been used as the technical basis for this study.

1.2 Location

The site is located in a portion of the Southwest Quarter (SW ¼) of Section 21, Township 20 South, Range 61 East, M. D. M., in Clark County, Nevada. More specifically, it is located south of Lake Mead Boulevard and east of Stella Lake Boulevard in the Las Vegas Enterprise Park (see Figure 1, *Vicinity Map* and Figure 2, *Location Map*).

1.3 Description of Project

The project site will include construction of an office building, a parking structure and open parking areas. Valley gutters will be provided for drainage of the parking areas.

2.0 DRAINAGE BASIN DESCRIPTION

2.1 Existing Drainage Description

In general, the runoff generated by drainage areas upstream of the site flows west to east. The upstream drainage areas which impact the site are mostly developed with only a few open undeveloped parcels. The majority of the offsite flows are conveyed within Lake Mead Boulevard, which is fully improved. All perimeter streets (Lake Mead Boulevard, Stella Lake Boulevard, and Mount Mariah Drive) to the site are fully improved, and they serve to route offsite flows around the site. Other offsite flows that impact the site on Mount Mariah Drive are flows that discharged through a drainage easement from the Lake Mead Tonopah Middle School (basin OFF4). Please see Figure 3 - *Existing Condition Drainage Map*. The flow within Lake Mead Boulevard has been referenced from the latest Central Neighborhood Flood Control Master Plan, which is still pending final approval from the City but has been provided to Carter and Burgess by the City for the purpose of this drainage study. Per Carter and Burgess' meeting with Peter Jackson on May 10, 2004, it was agreed that the surface flow (1015 cfs) within Lake Mead Boulevard from the Central Neighborhood Flood Control Master Plan will be used for the design of this project site. The flow discharging through a drainage easement and impacting Mount Mariah Drive is from offsite basin OFF4 as shown on Figure 3. Basin OFF4 is mostly developed and consists of a school, apartments and single family home residential developments. The other offsite basins are OFF1, OFF2 and OFF3, which contribute flows directly onto Stella Lake Boulevard. The offsite basins have been delineated based on the aerial photos, GIS topography, and field investigation.

The project site is undeveloped desert and slopes from west to east at approximately 1.0%. The site is composed of type B soils (see Figure 3 - *Existing Condition Drainage Map* or Figure H-12 - *Hydrologic Subareas, Land Use & Soils*). The storm flow summary for the existing drainage conditions is summarized in Table 1.

TABLE 1
EXISTING CONDITIONS
PEAK FLOW RATE SUMMARY

BASIN NAME / CONC. POINT	AREA, ACRES	10-YR FLOW, CFS	100-YR FLOW, CFS
SITE	5.32	1	6
OFF1	1.41	2	4
OFFX2	2.42	1	4
OFF3	4.63	6	12
OFF4	77.32	65	140
OFF5	0.42	1	2
CP1 *	-	2	33
CP2 *	-	67	173
CP3 *	-	70	180

* Includes flow (Q100=29 cfs) that overtops Stella Lake high point from flow within Lake Mead Boulevard. See Figure 3.

2.2 FEMA Flood Hazard Zone

The Special Flood Hazard Areas for Clark County, Nevada are outlined in the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps dated September 27, 2002. The project site lies within Community Panel No. 32003 C 2160 E, which has been revised to reflect LOMR dated December 11, 2003. Upon reviewing Panel No. 32003 C 2160 E, the site is located within a Zone "X". A Zone "X" is described as outside of a Special Flood Hazard Area. (See Figure 3, *Flood Insurance Rate Map*.)

2.3 Regional Flood Control Master Plan Update

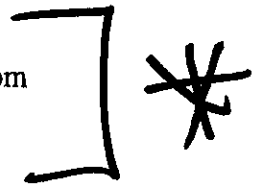
The 2002 Regional Flood Control Master Plan Update shows the site is adjacent to a Master Planned Facility, LVLM 0059, located within Lake Mead Boulevard, north of the project site (see Figure F-12 - *Flood Control Facilities*). In the Regional Flood Control Master Plan Update the facility LVLM 0059 is labeled as both an existing 66" RCP and as a future proposed a 8' x 8' RCB that convey 1005 cfs. Whereas, in the City of Las Vegas' Central Neighborhood Flood Control Master Plan, the facility LVLM 0059 is shown as an existing 72" RCP that conveys 342 cfs.

The project site is located within regional basin LM14-C (see Figure H-12 - *Hydrologic Subareas, Land Use & Soils*).

2.4 Referenced Drainage Studies

The Technical Drainage Study for Las Vegas Enterprise Park Drainage Study and Technical Drainage Study for Lake Mead Tonopah Middle School, prepared in 1995 and 1996, respectively, have been reviewed but not referenced because of the ages of those studies. Those studies quantified flows which discharge onto the drainage easement from the Lake Mead Tonopah Middle School, but from the referenced materials the offsite drainage area in which the flows were determined are unclear. Therefore, the offsite basin OFF4 delineated in this study is believed to more accurately represents the flows that discharge through the drainage easement.

As discussed above, the flow within Lake Mead Boulevard has been referenced from the latest Central Neighborhood Flood Control Master Plan.



3.0 PROPOSED DRAINAGE FACILITIES

3.1 General Description

The project site consists of an office building, a parking structure and open parking areas, and 2-ft concrete valley gutters provided for drainage of the parking areas. Roof drains will drain the building's roof runoff. Stem wall in combination of berm with sufficient freeboard along Lake Mead Boulevard is provided to keep flow within Lake Mead Boulevard from encroaching onto the site.

The developed conditions is shown on Figure 5, *Developed Condition Drainage Map*. The only difference between the interim and future conditions is basin OFFX2 and basin OFFD2, two of the same basin area, whereas OFFX2 is undeveloped and OFFD2 is developed. The developed conditions flow summary is shown below in Table 2.

**TABLE 2
DEVELOPED CONDITIONS
PEAK FLOW RATE SUMMARY**

BASIN NAME / CONC. POINT	AREA, ACRES	10-YR FLOW, CFS	100-YR FLOW, CFS
OFF1	1.41	2	4
OFFD2	2.42	3	7
OFF3	4.63	6	12
OFF4	77.32	65	140
OFF5	0.42	1	2
ON1	0.42	3	6
ON2	0.42	0	1
ON3	0.42	0	1
ON4	0.42	2	4
ON5	0.42	2	3
CP1 *	-	3	34
CP2 *	-	69	175
CP3 *	-	73	184

* Includes flow (Q100=29 cfs) that overtops Stella Lake high point from flow within Lake Mead Boulevard. See Figure 5.

3.2 Compliance with Regulations and Adopted Plans

This study has been prepared in accordance with the CCRFCD's *Hydrologic Criteria and Drainage Design Manual* (Reference 5) and Clark County's *Uniform Regulations for the Control of Drainage*. The study is in compliance with all Master Planned Flood Control Facilities, FEMA flood plain regulations and all proposed modifications to or verifications of the FEMA regulated floodplain through the subject site, and Uniform Regulations.

3.3 Hydrologic Criteria

The watershed was modeled using the generalized storm network computation capabilities of the U.S. Army Corps of Engineer's HEC-1 Flood Hydrograph computer model (Reference 3). The HEC-1 computer program has a wide range of capabilities in modeling gauged and ungauged watersheds, with most of the latest techniques for simulating precipitation, evaporation, surface impoundment, flood routing, flow diversions and splits. Since the study watershed is ungauged, the analysis used to model runoff incorporated the Soil Conservation Service (SCS) unit hydrograph method to develop a hypothetical flood hydrograph (Reference 2).

The Drainage Criteria Manual was used to establish the point precipitation values, rainfall distribution (SDN 3). A review of Figure 513 indicated that the project site is within the McCarran Airport Rainfall Area. The point precipitation values taken from Table 505 are shown in Table 3 for the six-hour duration design storm events. A DARF adjustment value was not used for this study.

TABLE 3
Point Precipitation Values

	Inches (6-Hour Duration)	
	<u>10-Year</u>	<u>100-Year</u>
Adjusted Precipitation Values (McCarran Airport Rainfall Area)	1.58	2.77

The curve numbers were developed based on vegetation, soils group information, land use, and antecedent moisture conditions (AMC II) in accordance with the standard methods of the Soil Conservation Services (SCS). The project site and offsite drainage basins are within type B soils (see Figure 3, *Existing Condition Drainage Map* or Figure H-12 - *Hydrologic Subareas, Land Use & Soils*).

The time between a brief heavy rain and the maximum runoff rate is called lag time. Lag can be estimated from historical hydrographs or it can be estimated from specific watershed characteristics such as watershed length, slope and flow retardance. Based on studies of many storm events for a range of watershed conditions, the following empirical relationship between lag (t_{lag}) and time of concentration (t_c) was derived:

$$t_{lag} = 0.6 t_c$$

$$t_c = \frac{Lws}{3,600V} + t_i$$

where: Lws = Hydraulic length, feet
 V = Average Velocity, feet per second
 t_i = Initial flow time, minute

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

where: K = $0.132(CN) - 0.39$
 CN = Runoff Curve Number
 S = Slope, feet per feet

Average velocities for estimating travel time (T_t) for surface flow were used to develop a time of concentration (Reference 2). The Travel Time Velocity Formulas were used in the Standard Form 4 to determine the overland flow velocities of the drainage basins. For the existing formulas: $V1 = 14.8*(S/100)^{1/2}$ and $V2 = 29.4*(S/100)^{1/2}$. For the developed formulas: $V1 = 20.2*(S/100)^{1.2}$ and $V2 = 30.6*(S/100)^{1/2}$. In the travel time calculations, V1 applies to the first 500 feet of travel distance and V2 applies to the remaining travel distance. To determine initial flow times, the equation $T_i = 1.8(1.1-K)L^{1/2}/S^{1/3}$ was used as outlined in the Criteria Manual.

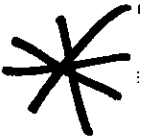
3.4 Facility Design Calculations

The perimeter streets provide storm water conveyance for offsite flows and route offsite flows around the site. Hydraulic calculations for the perimeter streets and onsite flow sections are based on Manning's Equation using *FlowMaster*, and were

performed utilizing a typical street or onsite flow section and the runoff amounts determined by the HEC-1 analyses. All hydraulic calculations have been included in the appendix of this drainage study. Based on the hydraulic calculations, the proposed onsite structure is protected from the perimeter street flows and the finished floor of the structure are at least twice the depth of the adjacent flows. Table 4 below shows the flow section capacity summary of the perimeter streets and the onsite flow sections. It should be noted that Lake Mead Boulevard does not meet the 100-year D x V criteria, but since it is an existing condition and Lake Mead Boulevard is fully improved with an existing Regional Facility in place, no improvements are proposed for Lake Mead Boulevard.

TABLE 4
STREET/SECTION FLOW SUMMARY

SECTION (STREET NAME)	SLOPE (%)	Q100 (CFS)	DEPTH (FT)	VELOCITY (FPS)	D X V
A-A (LAKE MEAD)	1.33	1015.00	1.54	10.58	16.29
B-B (LAKE MEAD)	0.50	992.00	1.85	7.79	14.41
C-C (STELLA LAKE)	0.40	176.00	1.08	4.40	4.75
D-D (MOUNT MARIAH)	0.40	184.00	1.10	4.48	4.93
E-E	0.55	1.00	0.16	1.04	0.17
F-F	0.62	4.00	0.27	1.84	0.50
G-G	0.50	6.00	0.31	1.83	0.57
H-H	0.50	3.00	0.25	1.59	0.40
I-I	4.00	3.00	0.20	1.48	0.30



4.0 CONCLUSIONS AND RECOMMENDATIONS

1. Hydrology was based on the HEC-1 computer model and on generally accepted engineering practices in accordance with the Drainage Criteria Manual.
2. The site is not located within a Special Flood Hazard Zone.
3. The development of this site is in compliance with the Clark County Regional Flood Control District Flood Control Master Plan Update.
4. The offsite flows can be safely conveyed around the site via the existing perimeter street.
5. The onsite flows can be safely conveyed through the site via valley gutters within the parking areas.
5. Finished floor elevations have been set at least twice the depth of the adjacent flows.
6. Combination of stem wall and berm at the back of sidewalk along Lake Mead Boulevard will keep flow within Lake Mead Boulevard from encroaching onto the site.
7. The development of the proposed site is anticipated to have no significant impact to downstream developments. All flows will be discharged onto right-of-way.

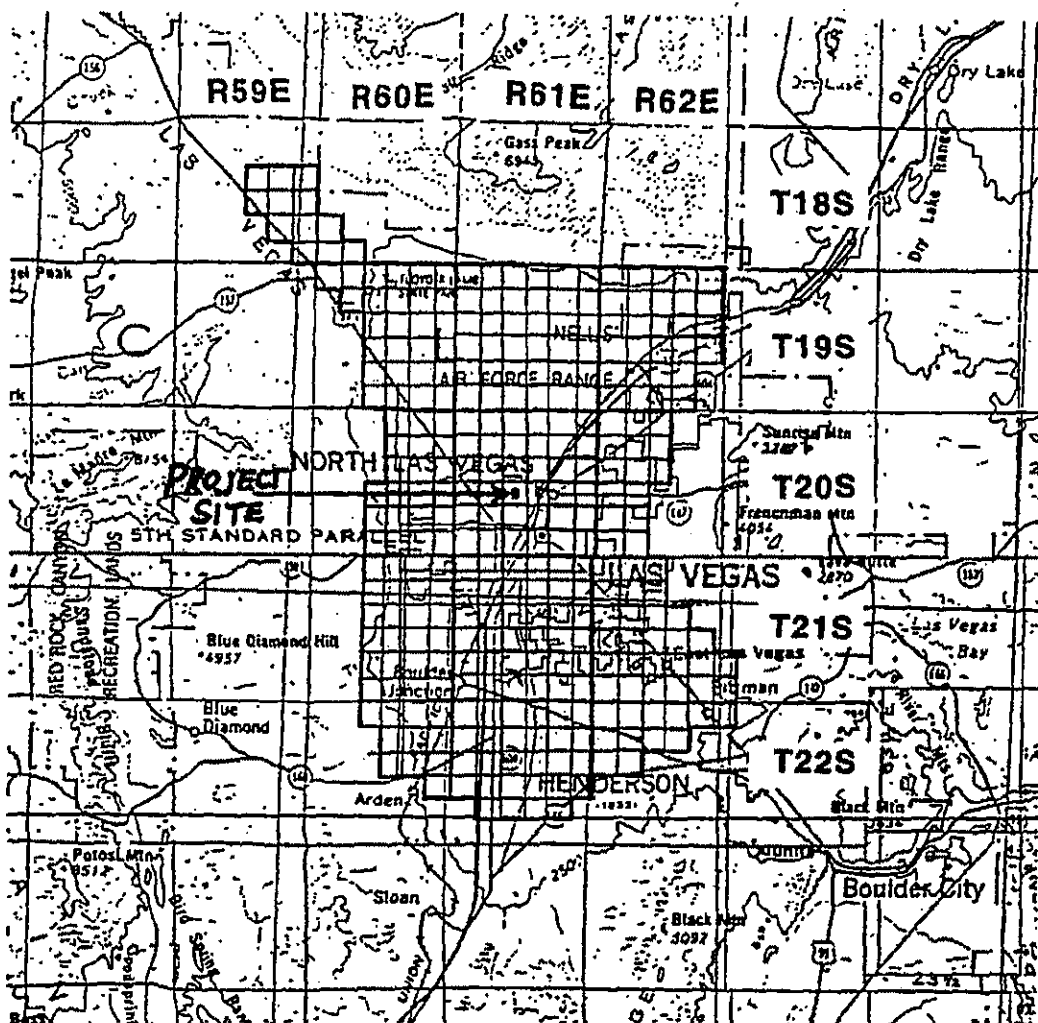
5.0 REFERENCES

1. Department of Public Works, Clark County, Nevada, "Improvement Standards," 1993
2. U.S. Department of Agriculture, Soils Conservation Services, Technical Release 55, "Urban Hydrology for Small Watersheds," Washington, D.C. January 1975, Revised June 1986
3. U.S. Army Corps of Engineers, "HEC-1 Flood Hydrograph Package," September 1981, Revised January 1985
4. PBS&J and G.C. Wallace, "Flood Control Master Plan Update of the Las Vegas Valley," September 2002
5. Clark County Regional Flood Control District, "Hydrologic Criteria and Drainage Design Manual," August 1999
6. PBS&J, The City of Las Vegas Central Neighborhood Flood Control Master Plan, 2004.

HYDROLOGIC ANALYSES

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

Cover description		Curve numbers for hydrologic soil group--			
Cover type and hydrologic condition	Average percent impervious area ²	A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.): ³					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved: curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved: open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ⁴ ...		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					

See Table 602A

Developing urban areas

Newly graded areas (pervious areas only, no vegetation) ⁵	77	86	91	94
--	----	----	----	----

- 1 Average runoff condition, and $I_p = 0.23$.
- 2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.
- 3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
- 4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
- 5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

CURVE NUMBER CALCULATIONS

CN VALUES: DESERT=77, PAVED=98, COMMERCIAL "B" SOILS=92, COMMERCIAL "C" SOILS=94

BASIN	CONDITION	DESERT	PAVED	COMMERCIAL "B" SOILS	COMMERCIAL "C" SOILS	COMPOSITE CN
OFF1	DEVELOPED	0%	20%	80%	0%	93.2
OFFX2	UNDEVELOPED	80%	20%	0%	0%	81.2
OFFD2	DEVELOPED	0%	20%	80%	0%	93.2
OFF3	DEVELOPED	0%	20%	80%	0%	93.2
OFF4	DEVELOPED	0%	0%	91%	9%	92.2
OFF5	DEVELOPED	0%	100%	0%	0%	98.0
SITE	UNDEVELOPED	100%	0%	0%	0%	77.0
ON1	DEVELOPED	0%	0%	100%	0%	92.0
ON2	DEVELOPED	0%	0%	100%	0%	92.0
ON3	DEVELOPED	0%	0%	100%	0%	92.0
ON4	DEVELOPED	0%	0%	100%	0%	92.0
ON5	DEVELOPED	0%	0%	100%	0%	92.0

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Carter-Burgess

6655 Bermuda Road
Las Vegas, Nevada 89119

PROJECT NO.: 241027

FILE: FRM4.XLS

DEVELOPMENT: STELLA LAKE

CALCULATED BY: Jason Lee

DATE: 05/17/04

Sub-Basin Data				Initial/Overland Time (Ti)				Travel Time (Tt)					Tc		Tc Check (Urbanized Basins)		Final Tc	Flag	Remarks				
DESIG	CN	K	AREA (acres)	AREA (mi^2)	LENGTH (ft)	SLOPE (%)	Ti (min)	LENGTH (ft)	SLOPE (%)	V1 (fps)	V2 (fps)	Tt (min)	Tc=Ti+Tt (min)	TOTAL (ft)	Tc (min)	Tc (min)	Flag	Remarks					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)					
UNDEVELOPED CONDITION																							
SITE	77	0.626	5.32	0.0083	100	1.0	8.5	500	0.50	1.05	N/A	8.0	16.5	N/A	N/A	16.5	0.165	Undevelop.					
OFFX2	81.2	0.682	2.42	0.0038	100	1.0	7.5	460	0.50	1.05	N/A	7.3	14.9	N/A	N/A	14.9	0.149	Undevelop.					
DEVELOPED CONDITION																							
ON1	92	0.824	2.14	0.0033	100	1.0	5.0	470	0.57	1.53	N/A	5.1	10.1	570.0	13.2	10.1	0.101	Develop.					
ON2	92	0.824	0.35	0.0005	50	1.0	3.5	165	0.92	1.94	N/A	1.4	4.9	215.0	11.2	4.9	0.050	Develop.					
ON3	92	0.824	0.29	0.0005	50	1.0	3.5	140	1.00	2.02	N/A	1.2	4.7	190.0	11.1	4.7	0.050	Develop.					
ON4	92	0.824	1.27	0.0020	100	1.0	5.0	230	1.00	2.02	N/A	1.9	6.9	330.0	11.8	6.9	0.069	Develop.					
ON5	92	0.824	1.10	0.0017	100	1.0	5.0	290	1.51	2.48	N/A	1.9	6.9	390.0	12.2	6.9	0.069	Develop.					
OFF1	93.2	0.84	1.41	0.0022	100	1.0	4.7	370	0.50	1.43	N/A	4.3	9.0	470.0	12.6	9.0	0.090	Develop.					
OFFD2	93.2	0.84	2.42	0.0038	100	1.0	4.7	460	0.50	1.43	N/A	5.4	10.0	560.0	13.1	10.0	0.100	Develop.					
OFF3	93.2	0.84	4.63	0.0072	100	1.0	4.7	840	0.50	1.43	2.16	8.5	13.1	940.0	15.2	13.1	0.131	Develop.					
OFF4	92.2	0.827	77.32	0.1208	100	1.0	4.9	4950	1.00	2.02	3.06	28.4	33.3	5050.0	38.1	33.3	0.333	Develop.					
OFF5	98	0.904	0.42	0.0007	25	2.0	1.4	300	0.40	1.28	N/A	3.9	5.3	325.0	11.8	5.3	0.053	Develop.					
For the travel time (Ti) calculations, V1 applies to the first 500 feet of travel distance; V2 applies to the remaining travel distance.												Travel Time Velocity Formulas			All basins over one square mile are calculated by the equation Flag=20Kc(L^1.4/S^0.5)^0.33 and denoted by shaded gray (See Worksheet).								
												Existing									Developed		
												V1 = 14.8*(S/100)^1/2									V1 = 20.2*(S/100)^1/2		
												V2 = 29.4*(S/100)^1/2									V2 = 30.6*(S/100)^1/2		
Ti=(1.8*(1.1-K)*(1/2))/(S^1/3)																							
Tc= Ti+Ti																							
K=0.0132(CN)-.39																							
Flag = 0.6Tc																							

REFERENCE:

STANDARD FORM 4

FUTURE CONDITIONS
HEC-1 MODEL

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*****
*****
*
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*
* JUN 1998 *
*
* VERSION 4.1 *
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* RUN DATE 17MAY04 TIME 10:12:46 *
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* U.S. ARMY CORPS OF ENGINEERS
*
* HYDROLOGIC ENGINEERING CENTER
*
* 609 SECOND STREET
*
* DAVIS, CALIFORNIA 95616
*
* (916) 756-1104
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIME- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1

HEC-1 INPUT

PAGE 1

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LYNE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
*DIAGRAM
1 ID
2 ID
3 ID STELLA LAKE TECHNICAL DRAINAGE STUDY
4 ID BY: CARTER BURGESS-JYL
5 ID
6 ID FUTURE CONDITIONS
7 ID DATA FILE=L:\241027\DRAINAGE\HYDROLOGY\FUT.DAT
8 ID
9 ID BASINS MODELED WITH 6-HOUR STORM DISTRIBUTION #3
10 ID
11 ID
12 IT 5 0 0 300
13 IO 5 0 0
14 IN 5 0 0
15 JR PREC 0.57 1
16 KK OFF1
17 BA .0022
18 PB 2.77
19 PC 0.000 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
20 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
21 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
22 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
23 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
24 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
25 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
26 PC 0.998 0.999 1.000
27 LS 0 93.2
28 UD 0.090
*
29 KK ON2
30 BA .0005
31 LS 0 92
32 UD 0.050
*
33 KK ON3
34 BA .0005
35 LS 0 92
36 UD 0.050
*
37 KK CP1

```

38 KM COMBINE BASINS OFF1, ON2 AND ON3
 39 HC 3
 *
 40 KK OFFD2
 41 BA .0038
 42 LS 0 93.2
 43 UD 0.100
 *

HEC-1 INPUT

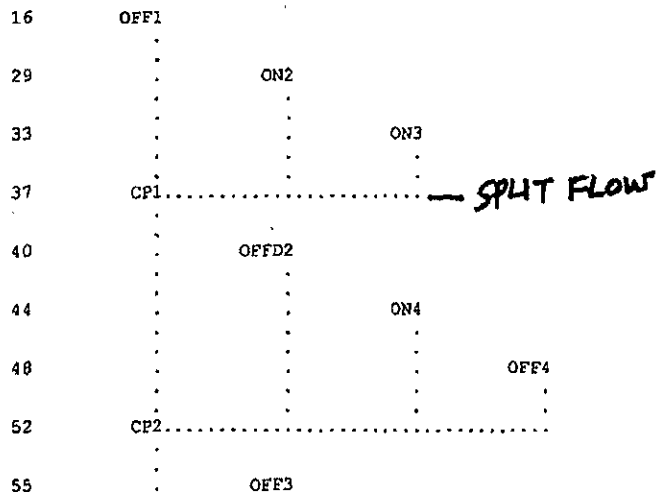
PAGE 2

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

44 KK ON4
 45 BA .0020
 46 LS 0 92
 47 UD 0.069
 *
 48 KK OFF4
 49 BA .1208
 50 LS 0 92.2
 51 UD 0.333
 *
 52 KK CP2
 53 KM COMBINE BASINS OFFD2, ON4 AND OFF4 WITH CP1
 54 HC 4
 *
 55 KK OFF3
 56 BA .0072
 57 LS 0 93.2
 58 UD 0.131
 *
 59 KK OFF5
 60 BA .0007
 61 LS 0 98
 62 UD 0.053
 *
 63 KK ON5
 64 BA .0017
 65 LS 0 92
 66 UD 0.069
 *
 67 KK CP3
 68 KM COMBINE BASINS OFF3, OFF5 AND ON5 WITH CP2
 69 HC 4
 *
 70 KK ON1
 71 BA .0033
 72 LS 0 92
 73 UD 0.101
 *
 74 ZZ

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
 NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW



HYDROGRAPH AT +	OFF1	.00	1	FLOW TIME	2. 3.50	4. 3.50
HYDROGRAPH AT +	ON2	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	ON3	.00	1	FLOW TIME	0. 3.50	1. 3.50
3 COMBINED AT +	CP1	.00	1	FLOW TIME	3. 3.50	6. 3.50 + 29 = 35
HYDROGRAPH AT +	OFFD2	.00	1	FLOW TIME	3. 3.50	7. 3.50
HYDROGRAPH AT +	ON4	.00	1	FLOW TIME	2. 3.50	4. 3.50
HYDROGRAPH AT +	OFF4	.12	1	FLOW TIME	65. 3.75	140. 3.75
4 COMBINED AT +	CP2	.13	1	FLOW TIME	69. 3.75	147. 3.75 + 29 = 176
HYDROGRAPH AT +	OFF3	.01	1	FLOW TIME	6. 3.58	12. 3.58
HYDROGRAPH AT +	OFF5	.00	1	FLOW TIME	1. 3.50	2. 3.50
HYDROGRAPH AT +	ON5	.00	1	FLOW TIME	2. 3.50	3. 3.50
4 COMBINED AT +	CP3	.14	1	FLOW TIME	73. 3.75	155. 3.75 + 29 = 184
HYDROGRAPH AT +	ON1	.00	1	FLOW TIME	3. 3.50	6. 3.50] *

*** NORMAL END OF HEC-1 ***

HYDRAULIC CALCULATIONS

Weir Calculations (100-Year) - Flow Split over Stella Lake High Point Flow Split Location @ Lake Mead/Stella Lake

Total flow at intersection is 1015 cfs

Stella Lake High Point				Stella Lake High Point				Stella Lake High Point			
West Side (Upstream) Sidewalk				West Side (Upstream) Street Section				East Side (Downstream) Sidewalk			
Sect. Length	5.50 ft			Sect. Length	24.50 ft			Sect. Length	5.50 ft		
Weir Length (L)	5.50 ft			Weir Length (L)	24.50 ft			Weir Length (L)	5.50 ft		
WSE Up	59.97 ft			WSE Up	59.91 ft			WSE Up	59.30 ft		
WSE Dn	59.91 ft			WSE Dn	59.61 ft			WSE Dn	59.24 ft		
Crest Up	59.62 ft			Crest Up	59.61 ft			Crest Up	59.62 ft		
Crest Dn	59.52 ft			Crest Dn	59.02 ft			Crest Dn	59.52 ft		
C_w	3.0			C_w	3.0			C_w	3.0		
h	0.37 ft			h	0.45 ft			h	-0.14 ft		
Flow Area	2.2			Flow Area	14.6			Flow Area	-0.4		
Velocity (ft/s)	1.7			Velocity (ft/s)	1.5			Velocity (ft/s)	0.0		
DxV	0.6			DxV	0.7			DxV	0.0		

$$Q = C_w * L * h^{3/2}$$

$$Q = 3.7$$

$$Q = C_w * L * h^{3/2}$$

$$Q = 21.8$$

$$Q = C_w * L * h^{3/2}$$

$$Q = 0.0$$

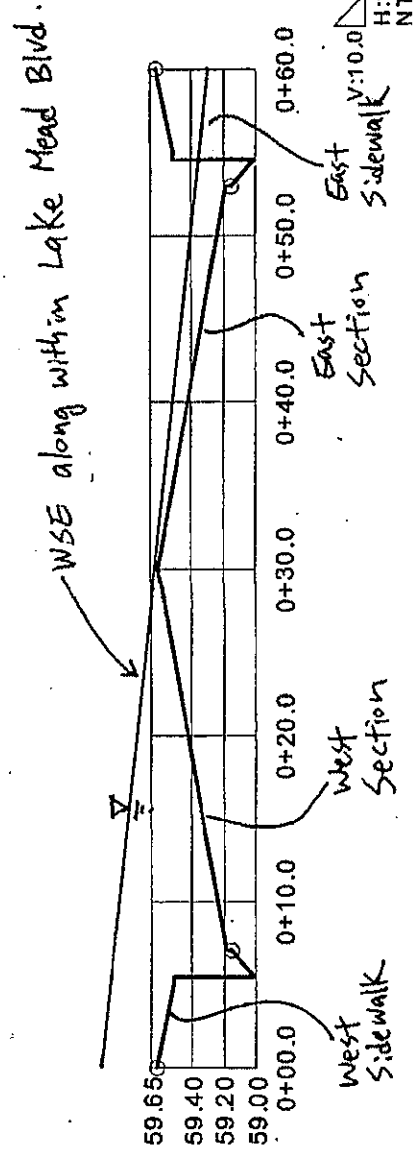
$$Q = C_w * L * h^{3/2}$$

$$Q = 3.9$$



Total Flow overtopping Stella Lake High Point and convey south on Stella Lake
 = 29.4 cfs

WSEs are based on flow depth (1.54-ft) within Lake Mead Boulevard plus the flow line elevation at upstream and downstream of section.



SECTION B-B – LAKE MEAD BLVD. (100-YEAR FLOW)

Worksheet for Irregular Channel

Project Description	
Worksheet	SECTION B-B (LAKE MEAD)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	0.5000 %
Discharge	992.00 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	1.85 ft
Elevation Range	0.00 to 1.03
Flow Area	127.3 ft ²
Wetted Perimeter	103.61 ft
Top Width	100.00 ft
Actual Depth	1.85 ft
Critical Elevation	2.03 ft
Critical Slope	0.3242 %
Velocity	7.79 ft/s
Velocity Head	0.94 ft
Specific Energy	2.79 ft
Froude Number	1.22
Flow Type	Supercritical

Calculation Messages:

Water elevation exceeds lowest end station by 1.25090211 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+07.0	0.013
0+07.0	0+93.0	0.016
0+93.0	1+00.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.60
0+05.0	0.50
0+05.5	0.50
0+05.5	0.00
0+07.0	0.13
0+07.0	0.17
0+50.0	1.03
0+93.0	0.17

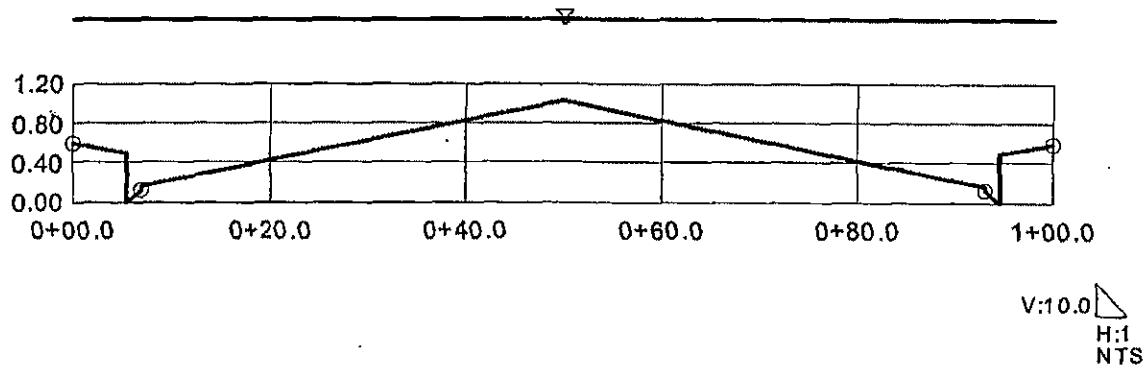
SECTION B-B -- LAKE MEAD BLVD. (100-YEAR FLOW)
Worksheet for Irregular Channel

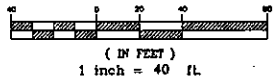
Natural Channel Points	
Station (ft)	Elevation (ft)
0+93.0	0.13
0+94.5	0.00
0+94.5	0.50
0+95.0	0.50
1+00.0	0.60

SECTION B-B -- LAKE MEAD BLVD. (100-YEAR FLOW) Cross Section for Irregular Channel

Project Description	
Worksheet	SECTION B-B (LAKE MEAD)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Slope	0.5000 %
Water Surface Elevation	1.85 ft
Elevation Range	0.00 to 1.03
Discharge	992.00 cfs





LEGEND

- CP1 CONCENTRATION POINT
- OND1 BASIN NAME
- ➔ FLOW DIRECTION
- ▽ FLOW SECTION

PEAK FLOW SUMMARY

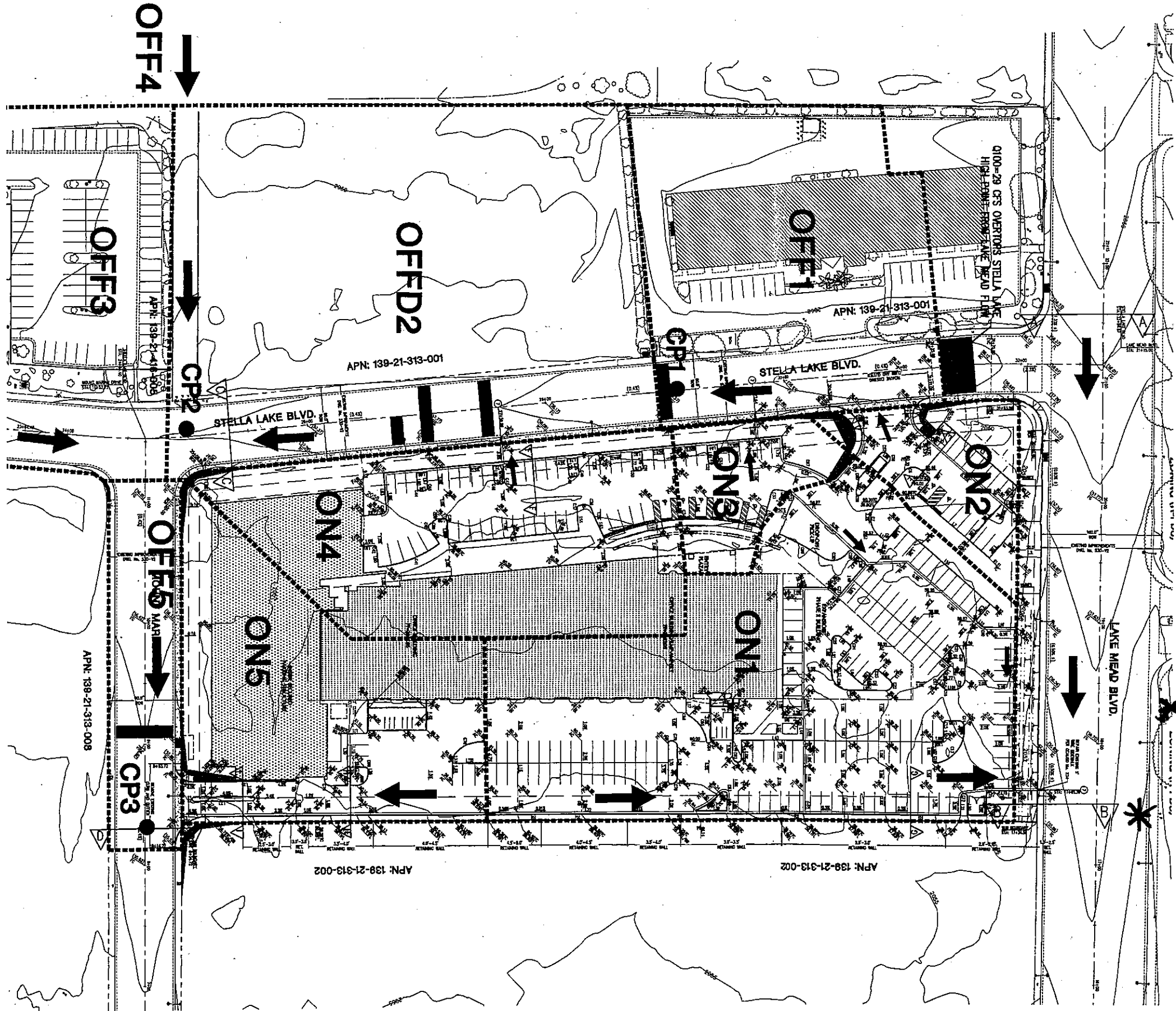
DEVELOPED CONDITION			
BASIN NAME / CONC. POINT	AREA, ACRES	10-YR FLOW, CFS	100-YR FLOW, CFS
OFF1	1.41	2	4
OFFD2	2.42	3	7
OFF3	4.63	6	12
OFF4	77.32	65	140
OFF5	0.42	1	2
ON1	0.42	3	6
ON2	0.42	0	1
ON3	0.42	0	1
ON4	0.42	2	4
ON5	0.42	2	3
CP1 *	-	3	34
CP2 *	-	69	175
CP3 *	-	73	184

* Includes split flow (Q₁₀₀=29 cfs) that overtops Stella Lake high point from flow within Lake Mead Blvd.

SECTION (STREET NAME)	SLOPE (%)	Q100 (CFS)	DEPTH (FT)	VELOCITY (FPS)	D X V
A-A (LAKE MEAD)	1.33	1015.00	1.54	10.58	16.29
B-B (LAKE MEAD)	0.50	992.00	1.85	7.79	14.41
C-C (STELLA LAKE)	0.40	176.00	1.08	4.40	4.75
D-D (MOUNT MARIAH)	0.40	184.00	1.10	4.48	4.93
E-E	0.55	1.00	0.16	1.04	0.17
F-F	0.62	4.00	0.27	1.84	0.50
G-G	0.50	6.00	0.31	1.83	0.57
H-H	0.50	3.00	0.25	1.58	0.40
I-I	4.00	3.00	0.20	1.48	0.30

REF.
This grading plan is a part of drainage study # 2501 which was received on 5/10 and N/A on _____. Page 5 of 5.

FIGURE 5



Page Southernland Page LLP, Colonial Place
207 West Boulevard, Suite 400
Arlington, VA 22201-3008
Phone (703) 527-4000 Fax (703) 522-8043

STELLA LAKE

DEVELOPED CONDITION DRAINAGE MAP

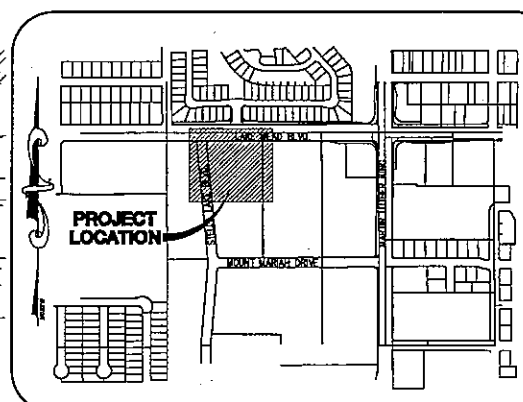
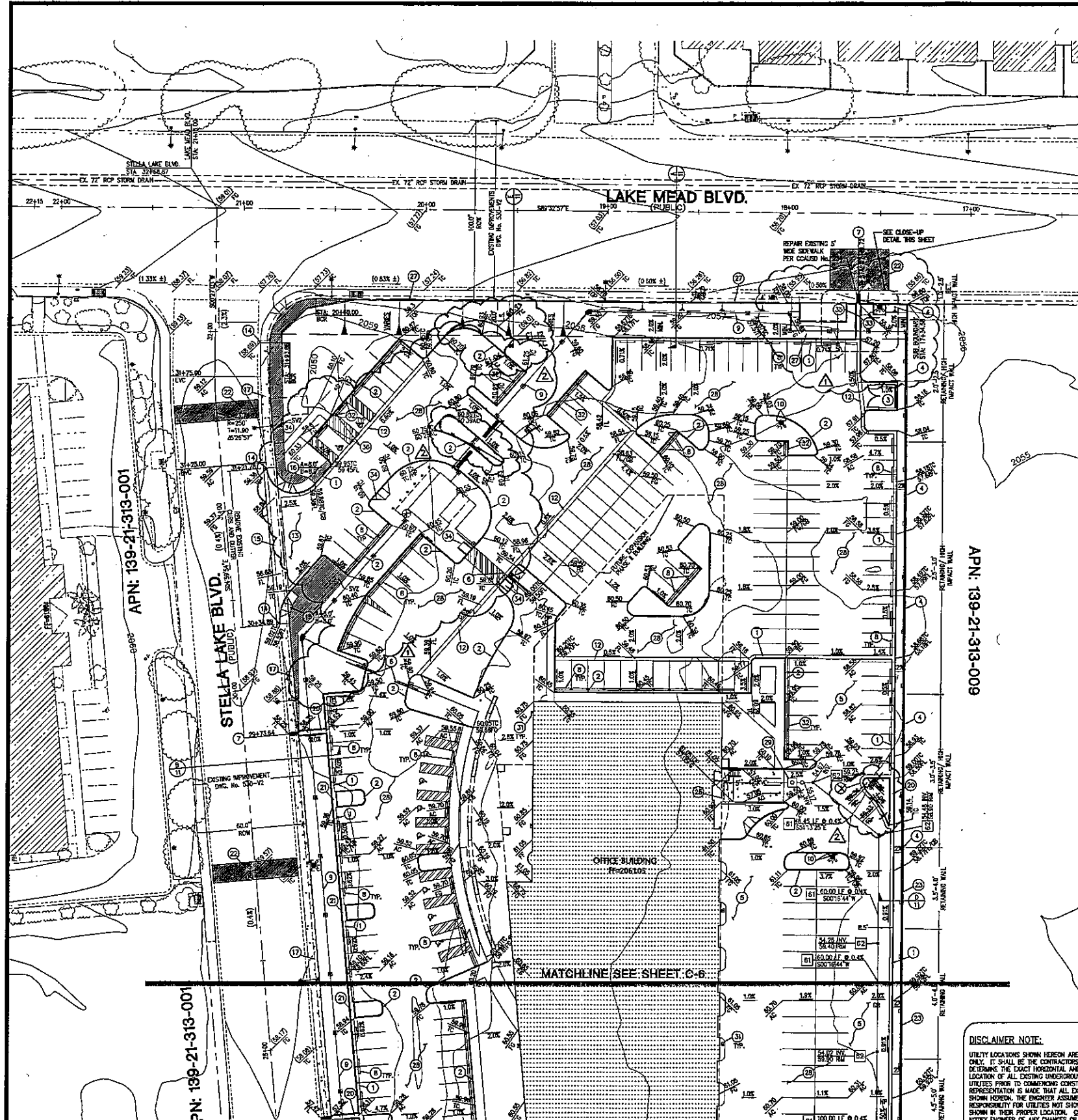
DRAWN BY: 5-17-04
DESIGNED BY:
CHECKED BY:
PROJECT NO: 241027
SCALE: 1" = 40' HORZ.
VERT. N/A

SHEET 1 OF 1 SHEETS
DRAWING NO.

Carter-Burgess
6655 Bermuda Road
Las Vegas, NV 89119
Consulting in Planning, Engineering
Construction Management, and Related Services (702) 938-5400 Fax (702) 938-5454

REV DATE BY

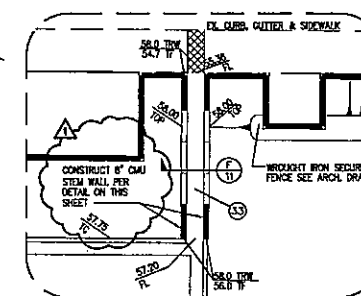
Reference



LOCATION MAP

1 inch = 30 ft

NOTE
REFERENCE SOILS REPORT FOR ON-SITE
SOILS PREPARATION INFORMATION
SOILS REPORT PER TERRACON, INC.
PROJECT NO. 8404585
MAY 6, 2004



CLOSE-UP DETAIL

SCALE 1" = 10'

STORM DRAIN

REFER TO DESIGN & CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS FOR STD. DETAILS

- 161 INSTALL 10" SDR 35 PVC PIPE
- 162 INSTALL CLEAN OUT
- 163 INSTALL 18" CLASS IV RCP
- 164 INSTALL 48" STORM DRAIN MANHOLE
- 165 INSTALL 12" SDR 35 PVC PIPE

STORM DRAIN QUANTITIES

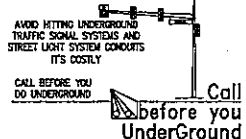
STEM WALL	373 LF
U-CHANNEL	50 LF
SIDEWALK UNDERDRAIN	3 EA.

LEGEND

FINISHED FLOOR ELEVATION	F.F. = 2001.05
PROPOSED GRADE	00.00
EXISTING GRADE	00.00
RIGHT-OF-WAY/PROPERTY LINE	
PROPOSED SLOPE	1.0%
PAVEMENT SHALE	
PROPOSED HEAVY AC PAVEMENT	
PROPOSED CONCRETE	
RIGHT VISIBILITY ZONE	
RETAINING WALL	
2' HIGH STEM WALL	

DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HEREIN 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 HEREIN. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION. CONTRACTOR TO NOTIFY ENGINEER OF ANY CHANGES OR DISCREPANCIES.



ABBREVIATIONS

AC	ASPHALT CONCRETE
FF	FRESH FLOOR
FG	FRESH GRADE
FL	FLOW LINE
GB	GRADE BREAK
HP	HIGH POINT
TC	TOP OF CURB
RCR	RETURN CURB RETURN
END	END CURB RETURN
PROPOSED	PROPOSED
RIGHT VISIBILITY ZONE	RIGHT VISIBILITY ZONE

BASIS OF BEARING

NORTH 89°25'27" WEST BEING THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 10 EAST, N.M.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN IN FILE 116 PAGE 32 OF SURVEYS IN THE RECORDS OF THE CLERK OF CLARK COUNTY, NEVADA.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK NO. 21041-2104 BEING A RIVET AND PLATE IN TOP OF CURB AT THE NORTHEAST CORNER OF MARTIN LUTHER KING BOULEVARD AND LAKE MEAD BOULEVARD. ELEVATION: 2002.45 FEET OR 612.5911 METERS, N.A.V.D. 1988

NOTE:

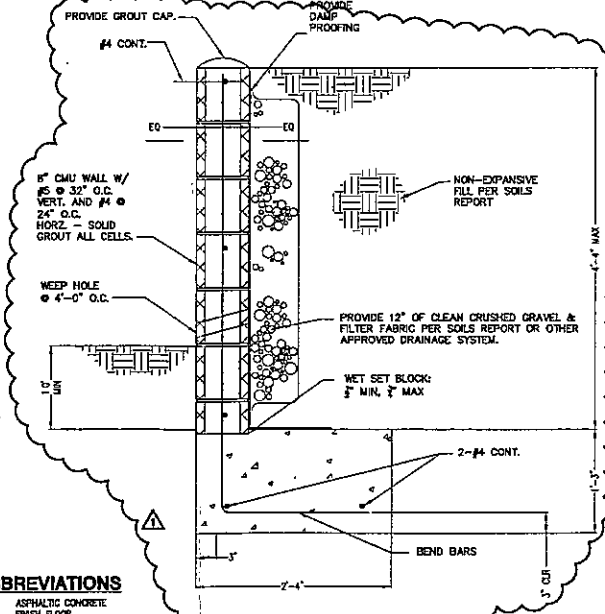
FOR REFERENCE TO STD. DWG. NO.'S SEE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENTS, CLARK COUNTY, NEVADA" MOST CURRENT EDITION.

NOTE

SOILS REPORT PER TERRACON, INC.
PROJECT NO. 8404585
MAY 6, 2004

CONSTRUCTION NOTES

- 1. CONSTRUCT TYPE 1" CURB AND GUTTER PER STD. DWG. NO. 216.
- 2. CONSTRUCT TYPE "A" CURB PER STD. DWG. NO. 216.
- 3. CONSTRUCT TRASH ENCLOSURE PER ARCH. DRAWINGS (REQUIRE SEPARATE PERMIT).
- 4. HIGH IMPACT WALL PER STRUCTURAL DRAWING DETAILS.
- 5. INSTALL 3.5" AC PAVEMENT OVER 10" TYPE 1 AGG. BASE, SEE SHEET C-11.
- 6. VEHICULAR GATE PER ARCH. DRAWING DETAILS.
- 7. INSTALL SIDEWALK DRAIN PER STD. DWG. NO. 236.
- 8. INSTALL 8" PRECAST DRAINER BLOCK PER STD. DWG. NO. 236.
- 9. INSTALL WROUGHT IRON SECURITY FENCE PER ARCHITECTURAL DRAWINGS.
- 10. INSTALL BOLLARDS, SEE SHEET C-11.
- 11. INSTALL 6" CURB TRANSITION TO 0" CURB FACE.
- 12. INSTALL 2" CONCRETE VALLEY GUTTER PER DETAIL ON SHEET C-11.
- 13. CONSTRUCT COMMERCIAL DRIVEWAY PER STD. DWG. NO. 224 (OPTION A).
- 14. MATCH EXISTING CURB AND GUTTER.
- 15. CONSTRUCT 6" WIDE CROSS GUTTER PER STD. DWG. NO. 225.
- 16. CONSTRUCT SIDEWALK RAMP (CASE 1) PER STD. DWG. NO. 235 (A&B-S&T, UNLESS OTHERWISE NOTED).
- 17. CONSTRUCT 8" SIDEWALK PER STD. DWG. NO. 234.
- 18. NOT USED.
- 19. INSTALL 3" AC PAVEMENT OVER 10" TYPE 1 AGG. BASE.
- 20. CONSTRUCT 2" WIDE CHANNEL PER DETAIL ON SHEET C-11.
- 21. CONSTRUCT 2" WIDE CURB OPENING.
- 22. SEE SHEETS C-7 & C-8 FOR TRENCH BACKFILL & PAVEMENT SECTION.
- 23. CONSTRUCT CMU RETAINING WALL PER CITY OF LAS VEGAS GUIDELINES.
- 24. CONSTRUCT 2" CURB CUT.
- 25. PROPOSED TRENCH DRAIN. SEE ARCH. DWG. AND PLUMBING PLANS FOR DETAILS.
- 26. INSTALL RETAINING WALL PER ARCHITECTURAL DRAWINGS.
- 27. CONSTRUCT 8" CMU STEM WALL PER DETAIL ON SHEET C-5.
- 28. INSTALL 2.5" AC PAVEMENT OVER 8" TYPE 1 AGG. BASE, SEE SHEET C-11.
- 29. PROPOSED OIL/WATER INTERCEPTOR. SEE PLUMBING PLANS FOR DETAILS.
- 30. SEE UTILITY PLAN FOR 10" SANITARY SEWER LINE, DETAILS AND INVERTS.
- 31. SEE PLUMBING PLANS FOR 4" ROOF DRAIN PIPE DETAILS.
- 32. INSTALL 7" PRECAST DRAINER BLOCK PER STD. DWG. NO. 236.
- 33. CONSTRUCT 2" WIDE CHANNEL PER DETAIL "T" ON SHEET C-11.
- 34. HANDICAP ACCESS RAMP. SEE ARCH. DWGS. FOR DETAILS.
- 35. INSTALL MAIN BARS @ CHANNEL / SECURITY FENCE PER DETAIL SHEET 11.
- 36. 2" CURB TYPED



STEM WALL DETAIL

KTS

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY ON RECORD WITH THE CITY OF LAS VEGAS.

Signature: [Signature]
DATE: 8/23/05

Page Southernland Page LLP, Colonial Place
207 Wilson Boulevard, Suite 410
Arlington, VA 22201-3008
Phone (703) 527-4000 Fax (703) 522-9043

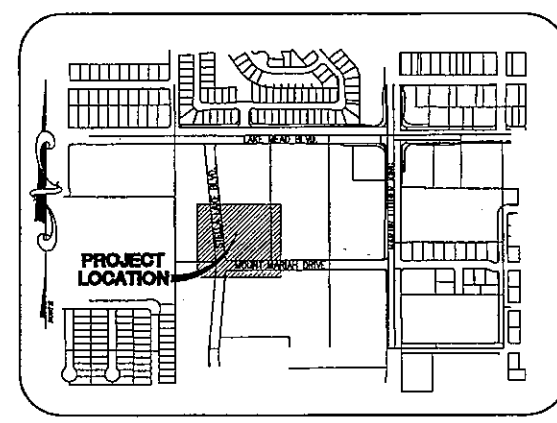
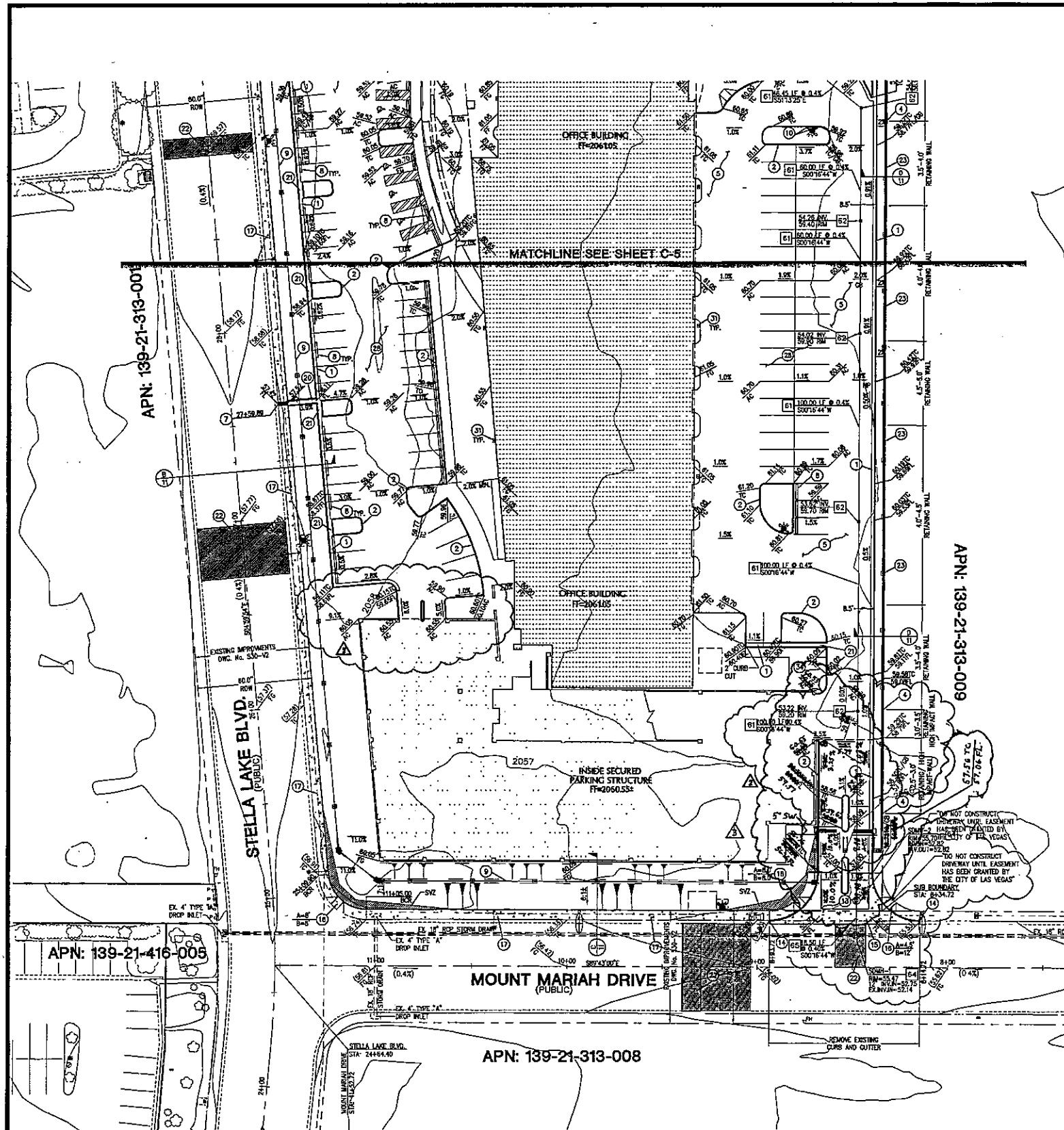
Carter Burgess
Consultants in Planning, Engineering,
Construction Management, and Real Estate Services
6655 Bermuda Road
Las Vegas, NV 89119
(702) 838-5400 Fax (702) 838-5454

DESIGNED BY: E. KUDRINA	CHECKED BY: J. COOPER	PROJECT NO. 21007
DATE: 08/20/04	DATE: 08/20/04	SCALE: 1" = 30' HORIZ. VERT.

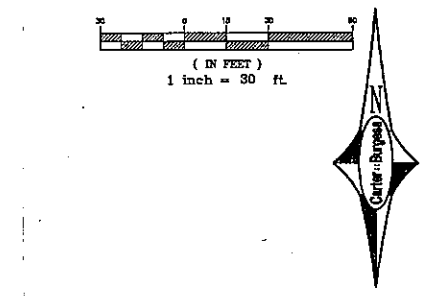
SHEET
C-5
5 OF 11 SHEETS
DRAWING NO.
107V4134

82-748 98253

REPLLOT



NOTE
REFERENCE SOILS REPORT FOR ON-SITE
SOILS PREPARATION INFORMATION.
SOILS REPORT PER TERRACON, INC.
PROJECT NO. 846485
MAY 6, 2004



BASIS OF BEARING
NORTH 89°22'57" WEST BEING THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 81 EAST, ALAMA, CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN IN FILE 116 PAGE 32 OF SURVEY IN THE RECORDS OF THE CLERK OF CLARK COUNTY, NEVADA.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK NO. 2101-2104 BEING A NYET AND PLATE IN TOP OF CURB AT THE NORTHEAST CORNER OF MARTIN LUTHER KING BOULEVARD AND LAKE MEAD BOULEVARD.
ELEVATION: 2052.46 FEET OR 625.5611 METERS, N.A.S.D. 1988

NOTE
FOR REFERENCE TO STD. DWG. NO. 1 SEE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENTS, CLARK COUNTY, NEVADA" MOST CURRENT EDITION.

NOTE
SOILS REPORT PER TERRACON, INC.
PROJECT NO. 846485
MAY 6, 2004

CONSTRUCTION NOTES

- 1. CONSTRUCT TYPE "L" CURB AND GUTTER PER STD. DWG. NO. 216.
- 2. CONSTRUCT TYPE "A" CURB PER STD. DWG. NO. 218.
- 3. CONSTRUCT TRASH ENCLOSURE PER ARCH. DRAWINGS (REMOVE SEPARATE PERMIT).
- 4. HIGH IMPACT WALL PER STRUCTURAL DRAWING DETAILS.
- 5. INSTALL 3.5" AC PAVEMENT OVER 10" TYPE II AGG. BASE, SEE SHEET C-11.
- 6. VEHICULAR GAZE PER ARCH. DRAWING DETAILS.
- 7. INSTALL SIDEWALK DRAIN PER STD. DWG. NO. 236.
- 8. INSTALL 6" PRECAST BUMPER BLOCK PER STD. DWG. NO. 236.
- 9. INSTALL MOUNTED IRON SECURITY FENCE PER ARCHITECTURAL DRAWINGS.
- 10. INSTALL BOLLARDS, SEE SHEET C-11.
- 11. INSTALL 6" CURB TRANSITION TO 0" CURB FACE.
- 12. INSTALL 2" CONCRETE VALLEY GUTTER PER DETAIL ON SHEET C-11.
- 13. CONSTRUCT COMMERCIAL DRIVEWAY PER STD. DWG. NO. 224 (OPTION A).
- 14. MATCH EXISTING CURB AND GUTTER.
- 15. CONSTRUCT 8" WIDE CROSS GUTTER PER STD. DWG. NO. 228.
- 16. CONSTRUCT SIDEWALK RAMP (CASE 1) PER STD. DWG. NO. 235 (AS SHOWN UNLESS OTHERWISE NOTED).
- 17. CONSTRUCT 5" SIDEWALK PER STD. DWG. NO. 234.
- 18. NOT USED.
- 19. INSTALL 2" AC PAVEMENT OVER 10" TYPE II AGG. BASE.
- 20. CONSTRUCT 2" WIDE CHANNEL, PER DETAIL ON SHEET C-11.
- 21. CONSTRUCT 2" WIDE CURB OPENING.
- 22. SEE SHEETS C-7 & C-8 FOR TRENCH BACKFILL & PAVEMENT SECTION.
- 23. CONSTRUCT CMU RETAINING WALL PER CITY OF LAS VEGAS GUIDELINES.
- 24. CONSTRUCT 2" CURB CUT.
- 25. PROPOSED TRENCH DRAIN. SEE ARCH. DWG. AND PLUMBING PLANS FOR DETAILS.
- 26. INSTALL RETAINING WALL PER ARCHITECTURAL DRAWINGS.
- 27. CONSTRUCT 6" CMU STEM WALL PER DETAIL ON SHEET C-5.
- 28. INSTALL 2.5" AC PAVEMENT OVER 8" TYPE I AGG. BASE, SEE SHEET C-11.
- 29. PROPOSED OIL/WATER INTERCEPTOR. SEE PLUMBING PLANS FOR DETAILS.
- 30. SEE UTILITY PLAN FOR 10" SANITARY SEWER LINE, DETAILS AND INVERTS.
- 31. SEE PLUMBING PLANS FOR 4" ROOF DRAIN PIPE DETAILS.
- 32. INSTALL 7" PRECAST BUMPER BLOCK PER STD. DWG. NO. 236.
- 33. CONSTRUCT 2" WIDE CHANNEL, PER DETAIL "T" ON SHEET C-11.
- 34. HANDICAP ACCESS RAMP. SEE ARCH. DWGS. FOR DETAILS.

STORM DRAIN

- REFER TO DESIGN & CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS FOR STD. DETAILS
- 81. INSTALL 10" SUR 35 PVC PIPE
 - 82. INSTALL CLEAN OUT
 - 83. INSTALL 18" CLASS IV RCP
 - 84. INSTALL 48" STORM DRAIN MANHOLE
 - 85. INSTALL 12" SUR 35 PVC PIPE

LEGEND

- FINISHED FLOOR ELEVATION: FF=2494.05
- PROPOSED GRADE: 00.00
- EXISTING GRADE: 00.00
- RIGHT-OF-WAY/PROPERTY LINE: 1.00
- PROPOSED SLOPE: 1.00
- PAVEMENT SWALE: 1.00
- PROPOSED HEAVY AC PAVEMENT: 1.00
- PROPOSED CONCRETE: 1.00
- SIGHT VISIBILITY ZONE: 1.00
- SAWTOOTH AND MATCH: 1.00
- RETAINING WALL: 1.00
- 2" HIGH STEP WALL: 1.00

ABBREVIATIONS

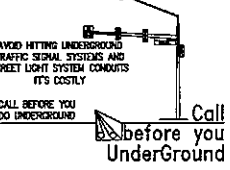
- FF: FINISH FLOOR
- FG: FINISH GRADE
- FL: FLOW LINE
- GB: GRADE BREAK
- HP: HIGH POINT
- TC: TOP OF CURB
- BCR: BEGIN CURB RETURN
- ECR: END CURB RETURN
- R: ROADLINE
- PROP: PROPOSED
- SVZ: SIGHT VISIBILITY ZONE

STORM DRAIN QUANTITIES

- STEM WALL: 373 LF
- U-CHANNEL: 50 LF
- SIDEWALK UNDERDRAIN: 3 EA.

DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HEREIN 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 HEREIN. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION. CONTRACTOR TO NOTIFY ENGINEER OF ANY CHANGES OF CONDITIONS.



Call before you Overhead
1-702-593-6111
CLARK COUNTY TRAFFIC OPERATIONS
LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

Call before you Dig
1-800-227-2800
CLARK COUNTY TRAFFIC OPERATIONS
LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY ON RECORD WITH THE CITY OF LAS VEGAS.

James B. Cooper 8/23/05
JAMES B. COOPER, P.E. NO. 46288

APN: 139-21-313-008		APN: 139-21-313-009	
APN: 139-21-416-005		APN: 139-21-313-008	
GRADING PLAN			
THE STELLA LAKE PARTNERSHIP, LLC OFFICE BUILDING			
DESIGNED BY: J. COOPER	CHECKED BY: M. FAHLER	PROJECT NO. 20027	SCALE: 1" = 30' HORIZ. VERT.
SHEET C-6 OF 11 SHEETS DRAWING NO. 107V4134			

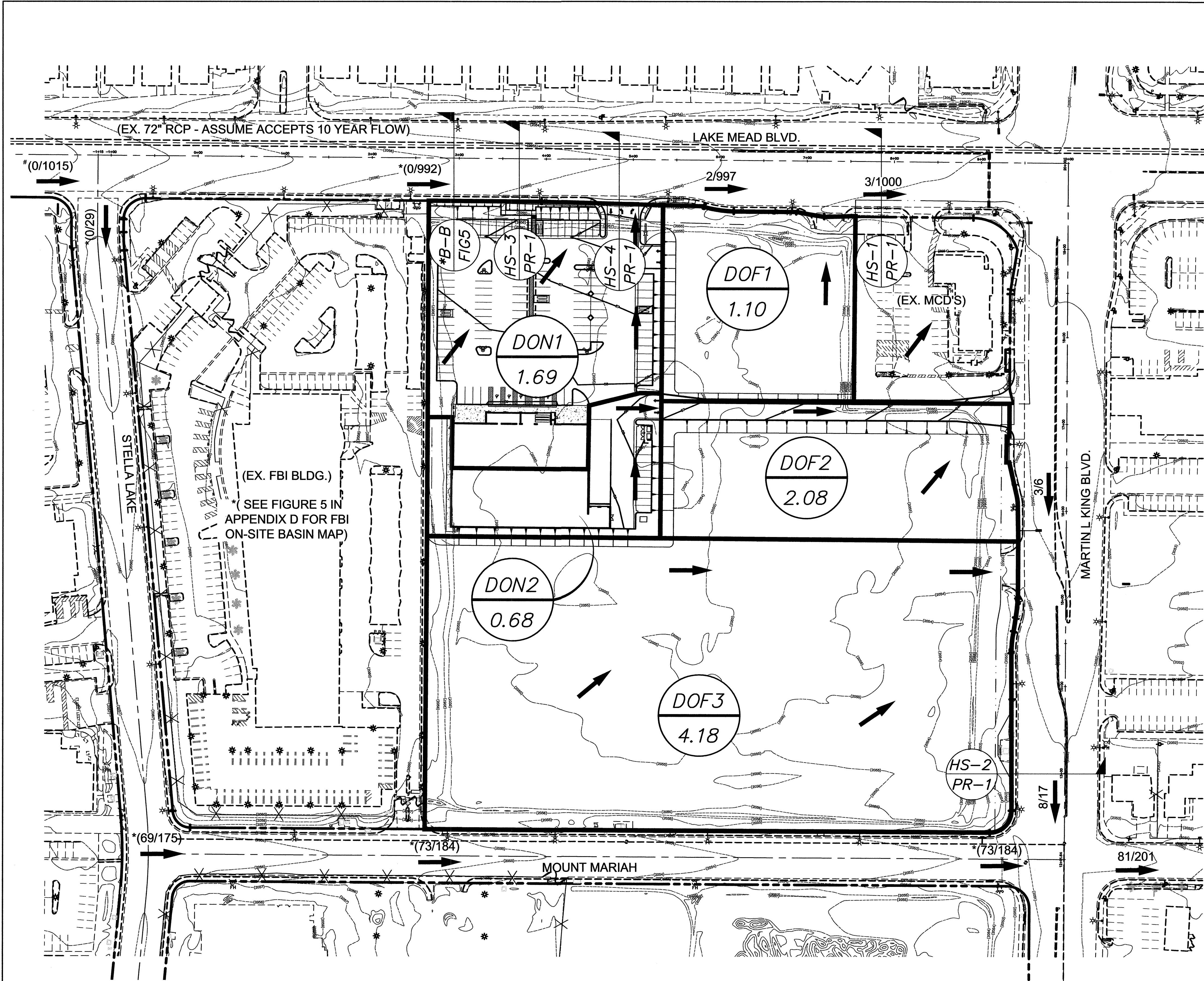
Page Southerland Page LLP, Colonial Place
2807 Wilson Boulevard, Suite 40
Arlington, VA 22201-3008
Phone (703) 527-4000 Fax (703) 522-9043

6855 Bermuda Road
Las Vegas, NV 89139
Phone (702) 505-5400 Fax (702) 505-5464

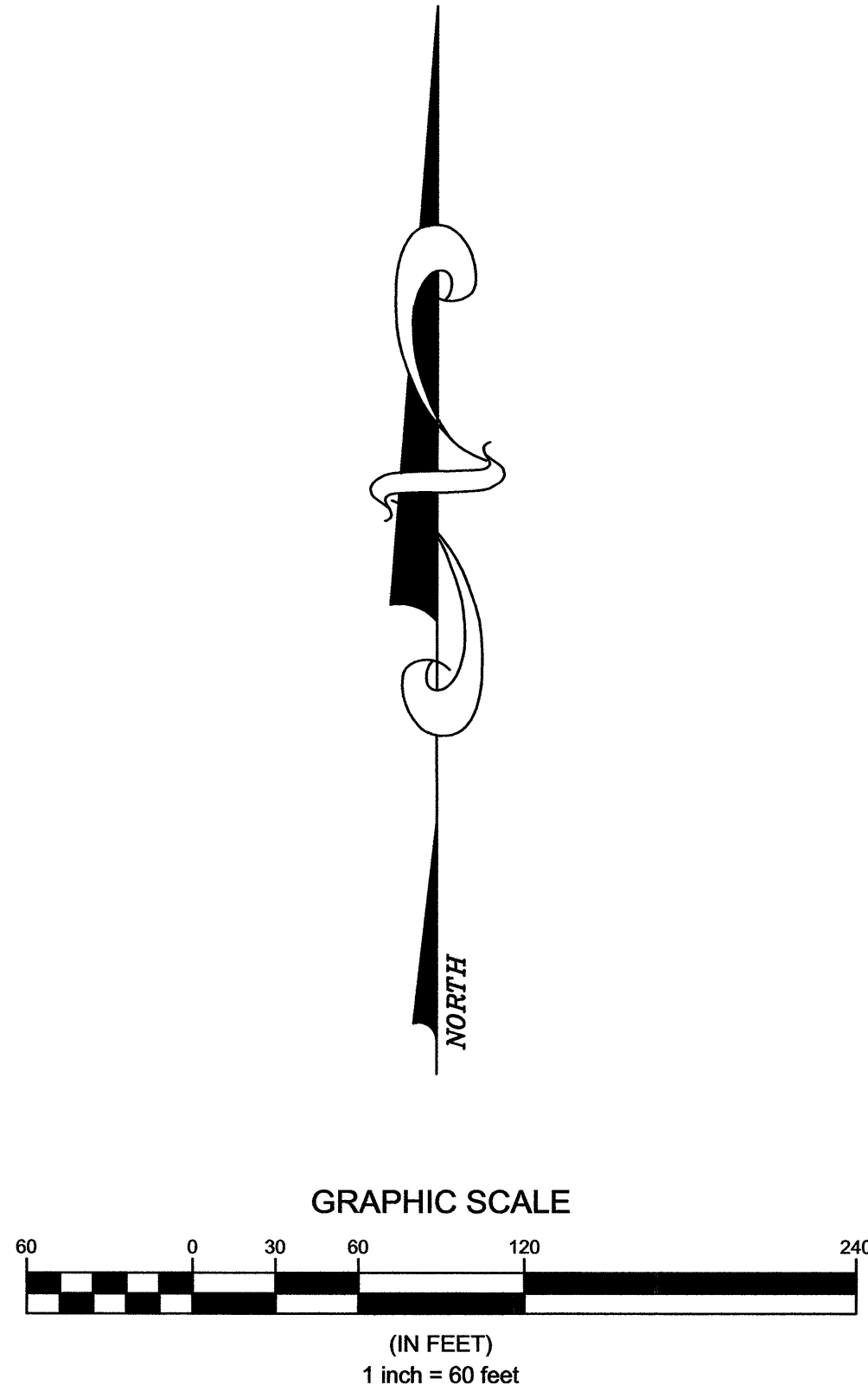
Carter Burgess
Consultants in Planning, Engineering,
Construction Management and Related Services

82749 & 98254

REPLLOT



- LEGEND
- CP1 CONCENTRATION POINT
 - BASIN ID BASIN AREA
 - BASIN BOUNDARY
 - FLOW ARROW
 - 1/2 Q10/Q100 FLOWRATE



DRAINAGE BASINS				
BASIN	AREA (ACRE)	AREA (MILE)	Q10 (CFS)	Q100 (CFS)
DON1	1.69	0.00264	2	5
DON2	0.68	0.00106	1	2
DOF1	1.10	0.00172	1	3
DOF2	2.08	0.00325	3	6
DOF3	4.18	0.00653	5	11

* EXISTING CONDITION FLOW RATES REFERENCED FROM TECHNICAL DRAINAGE STUDY FOR STELLA LAKE BY CARTER BURGESS, DS 3581, MAY 2004.
EXISTING CONDITION FLOW RATES REFERENCED FROM CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN, MARCH 2005.

HYDRAULIC CROSS-SECTIONS

CROSS-SECTION NAME	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)	D ₁₀ (FT)	D ₁₀₀ (FT)	V ₁₀ (FT/S)	V ₁₀₀ (FT/S)	(DxV) ₁₀	(DxV) ₁₀₀	10-YR DRY LANE
*B-B	-	992	-	1.85	-	7.79	-	14.41	YES
HS-1	3	1000	0.41	2.11	1.59	6.78	0.65	14.31	YES
HS-2	8	17	0.49	0.59	1.57	1.82	0.77	1.07	YES
HS-3	-	992	-	2.51	-	7.02	-	17.62	N/A
HS-4	-	997	-	2.19	-	6.90	-	15.11	N/A

WIE

WALKER ENGINEERING, LLC
5765 S. RAINBOW BLVD.
SUITE 101
LAS VEGAS, NV 89118
TEL: 702.873.5197
FAX: 702.873.5346

APPROVAL

REVISIONS

DYNAMIC DEVELOPMENT COMPANY
DG @ LAKE MEAD & MLK

PROPOSED CONDITIONS BASIN MAP

SUBMITTAL NO. DS

DATE: JANUARY 17, 2012

WE PROJECT NO.

1217.00

AGENCY NO.

CLV:

SHEET NO.

PR-1

1 OF 1 SHEETS



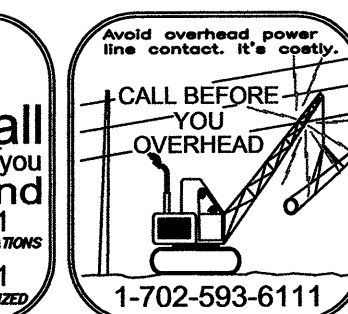
LEGEND

- ## EARTHWORK QUANTITIES

STORMWATER MANAGEMENT NOTES:

- ENGINEER'S NOTES

- TREASEA WOLF, P.E. No. 17879 DATE



DYNAMIC DEVELOPMENT COMPANY
DOLLAR GENERAL @ MLK & LM

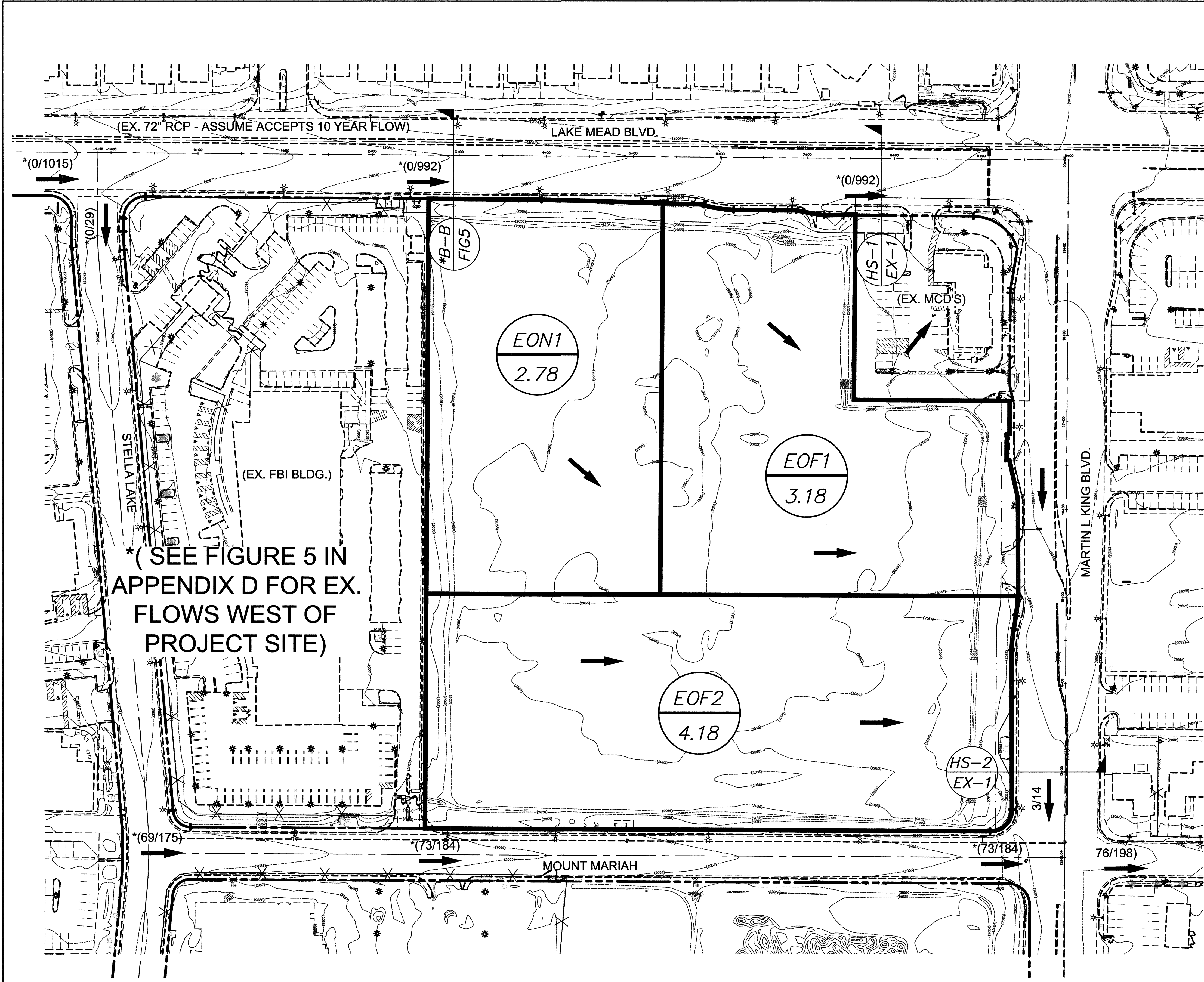
PRECISE GRADING PLAN
SHEET 1 OF 2

SUBMITTAL NO. 1
DATE: JANUARY 17, 2012
WE PROJECT NO. 1217.00
AGENCY NO. CLV:
SHEET NO.: G1
6 OF 8 SHEETS

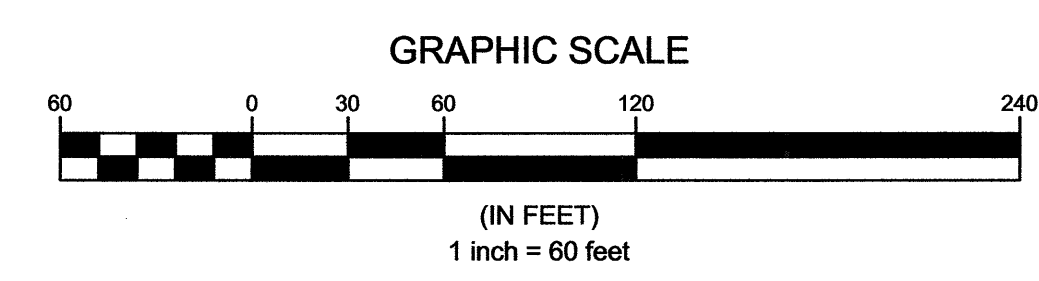
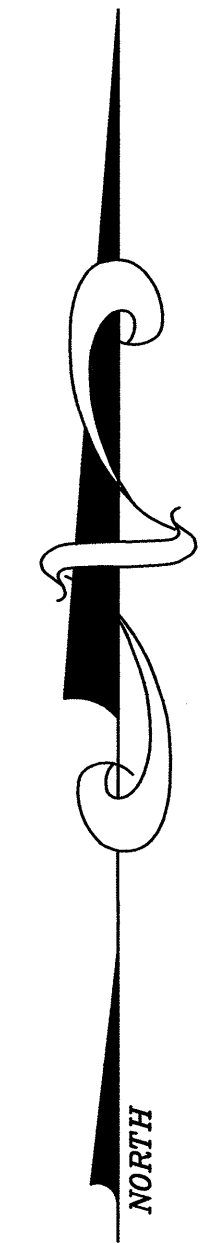
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107V XXXX-X

6 OF 8 SHEETS



- LEGEND**
- CP1 CONCENTRATION POINT
 - ⊙ EON1 5.11 BASIN ID BASIN AREA
 - BASIN BOUNDARY
 - FLOW ARROW
 - 1/2 Q10/Q100 FLOWRATE



DRAINAGE BASINS				
BASIN	AREA (ACRE)	AREA (MILE)	Q10 (CFS)	Q100 (CFS)
EON1	2.78	0.00434	1	4
EOF2	3.18	0.00497	1	4
EOF3	4.18	0.00653	1	6

* EXISTING CONDITION FLOW RATES REFERENCED FROM TECHNICAL DRAINAGE STUDY FOR STELLA LAKE BY CARTER BURGESS, DS 3581, MAY 2004.
EXISTING CONDITION FLOW RATES REFERENCED FROM CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN, MARCH 2005.

HYDRAULIC CROSS-SECTIONS

CROSS-SECTION NAME	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)	D ₁₀ (FT)	D ₁₀₀ (FT)	V ₁₀ (FT/S)	V ₁₀₀ (FT/S)	(DxV) ₁₀	(DxV) ₁₀₀	10-YR DRY LANE
*B-B	-	992	-	1.85	-	7.79	-	14.41	YES
HS-1	-	992	-	2.10	-	6.76	-	14.20	YES
HS-2	3	14	0.40	0.56	1.30	1.74	0.52	0.97	YES

W E

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5765 S. RAINBOW BLVD.
SUITE 101
LAS VEGAS, NV 89118
TEL: 702.873.5197
FAX: 702.873.5346

APPROVAL

REVISIONS

DATE

REV

DESCRIPTION OF REVISION

INITIALS

DYNAMIC DEVELOPMENT COMPANY

DG @ LAKE MEAD & MLK

EXISTING CONDITIONS BASIN MAP

SUBMITTAL NO. DS

DATE: JANUARY 17, 2012

WE PROJECT NO.

1217.00

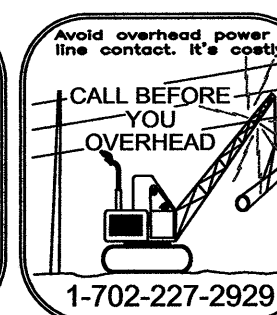
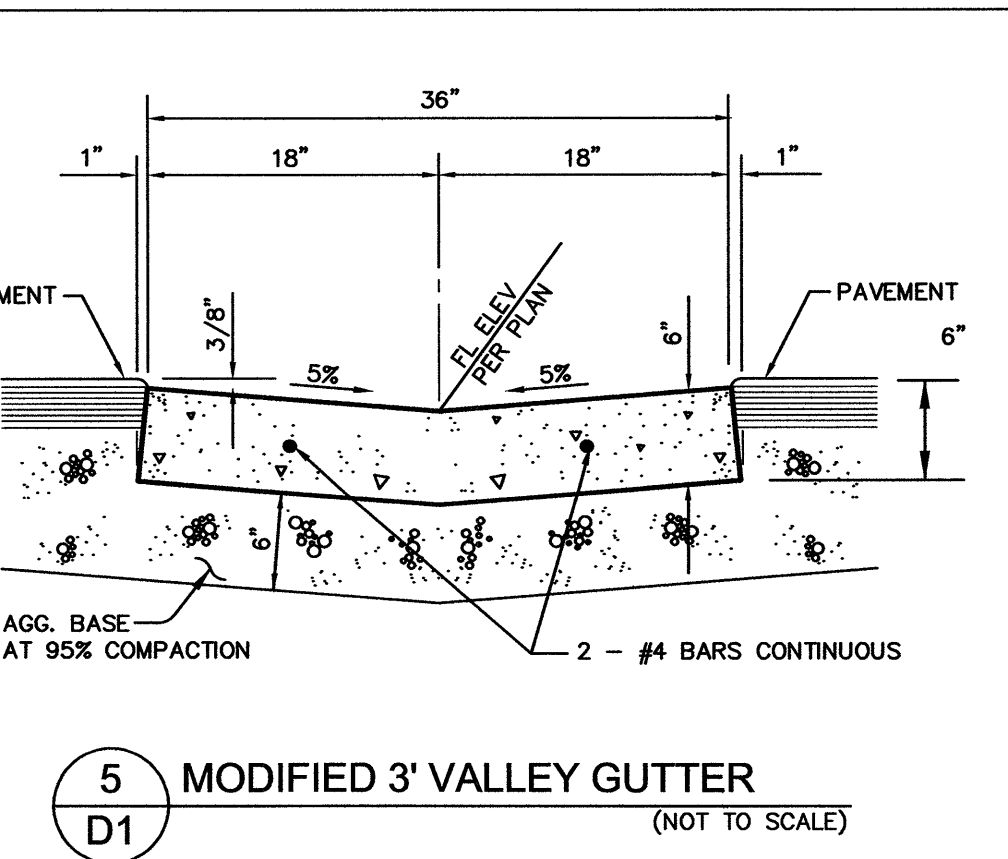
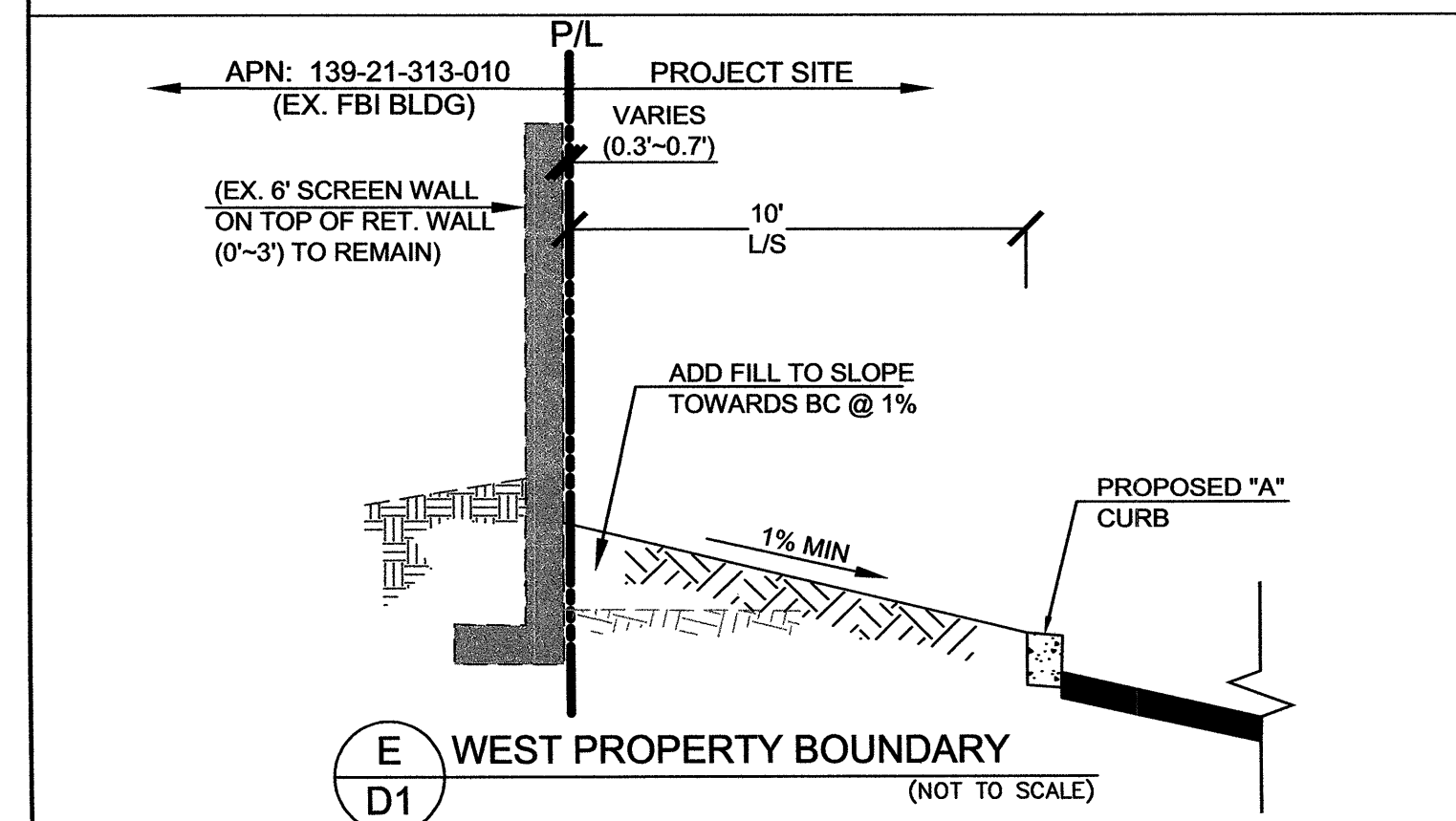
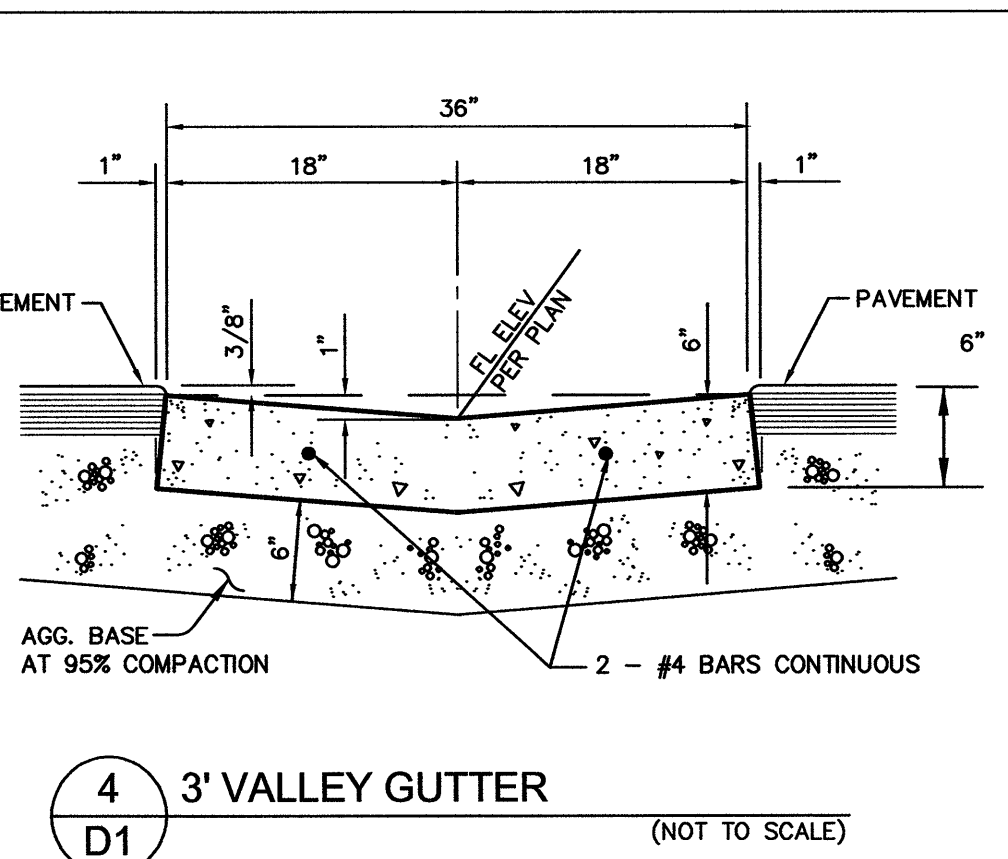
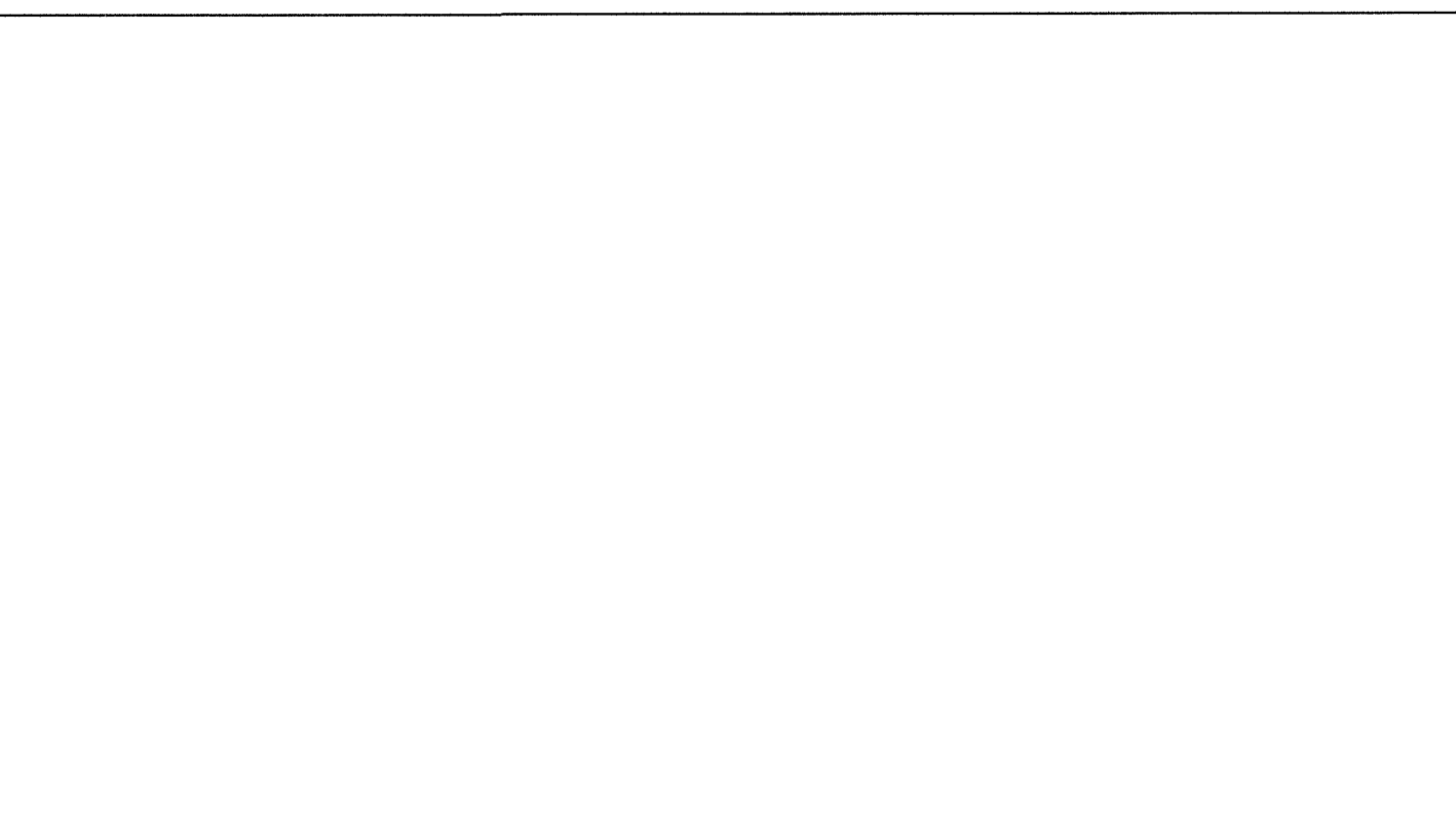
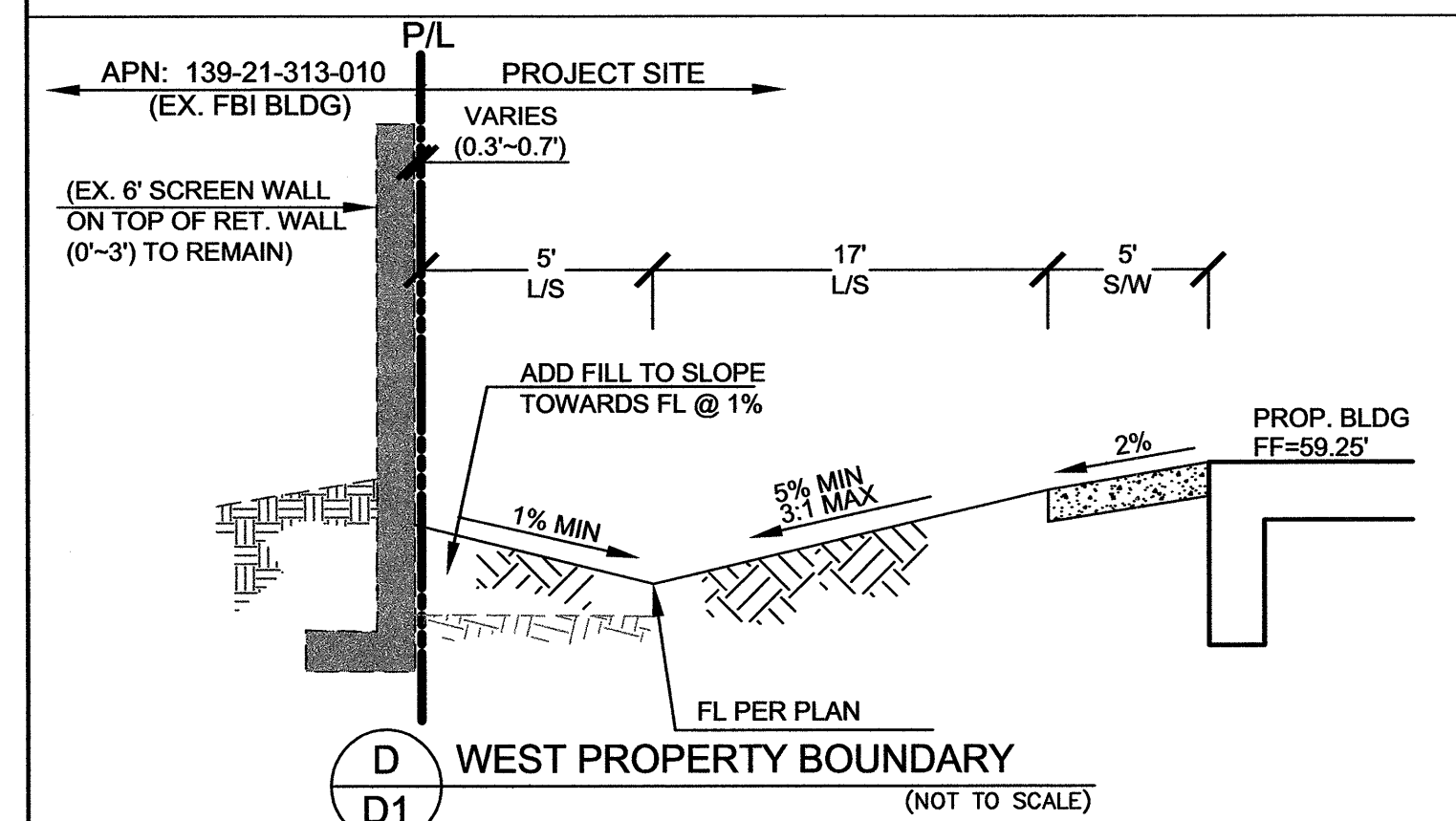
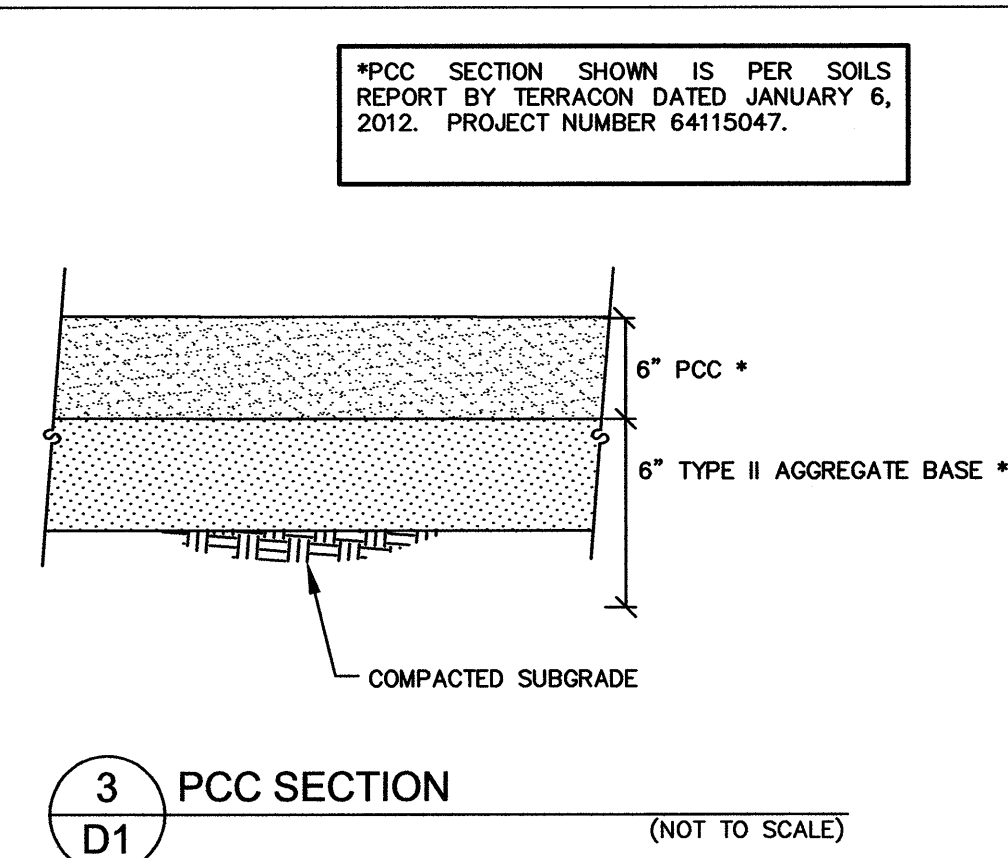
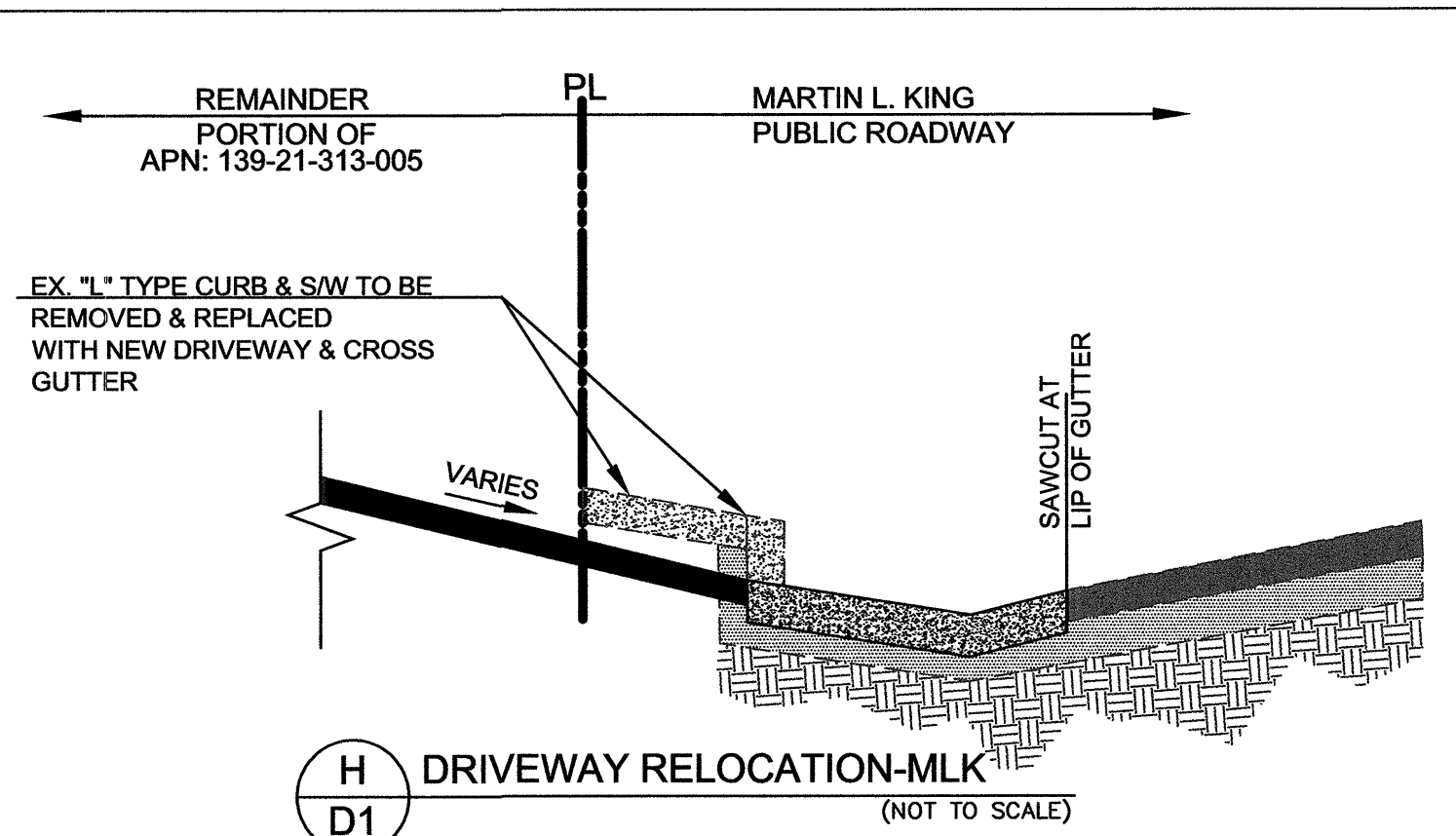
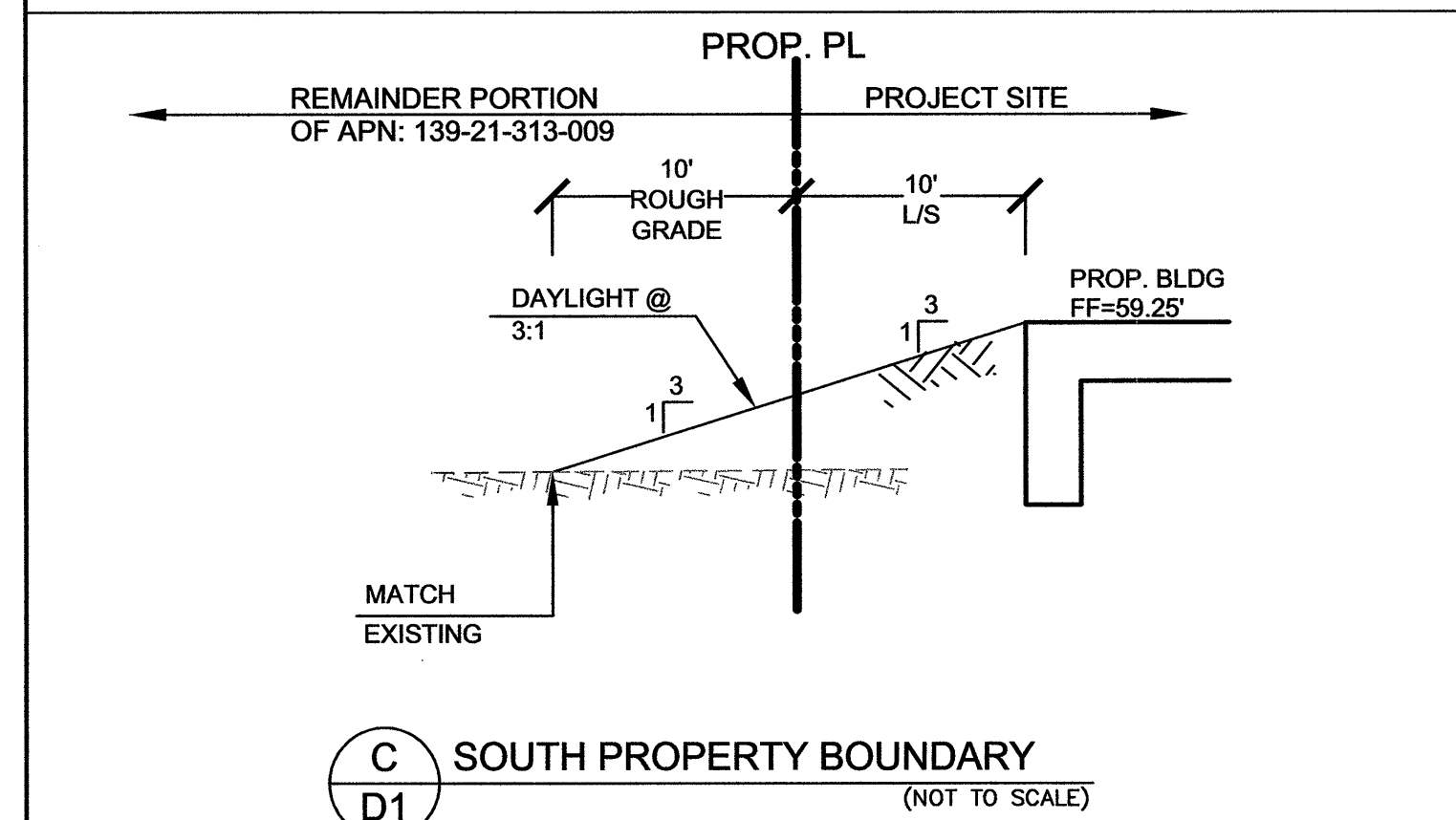
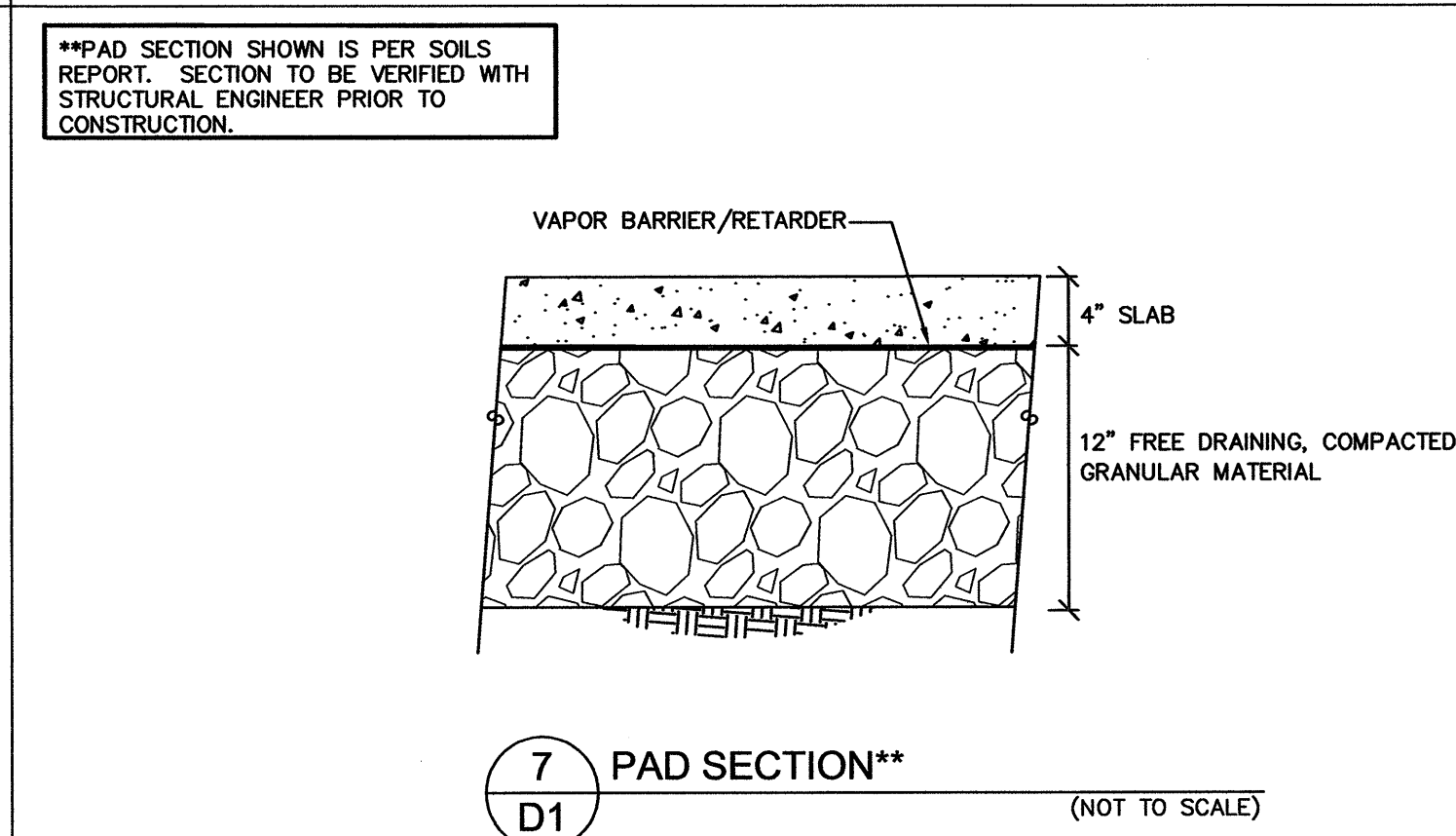
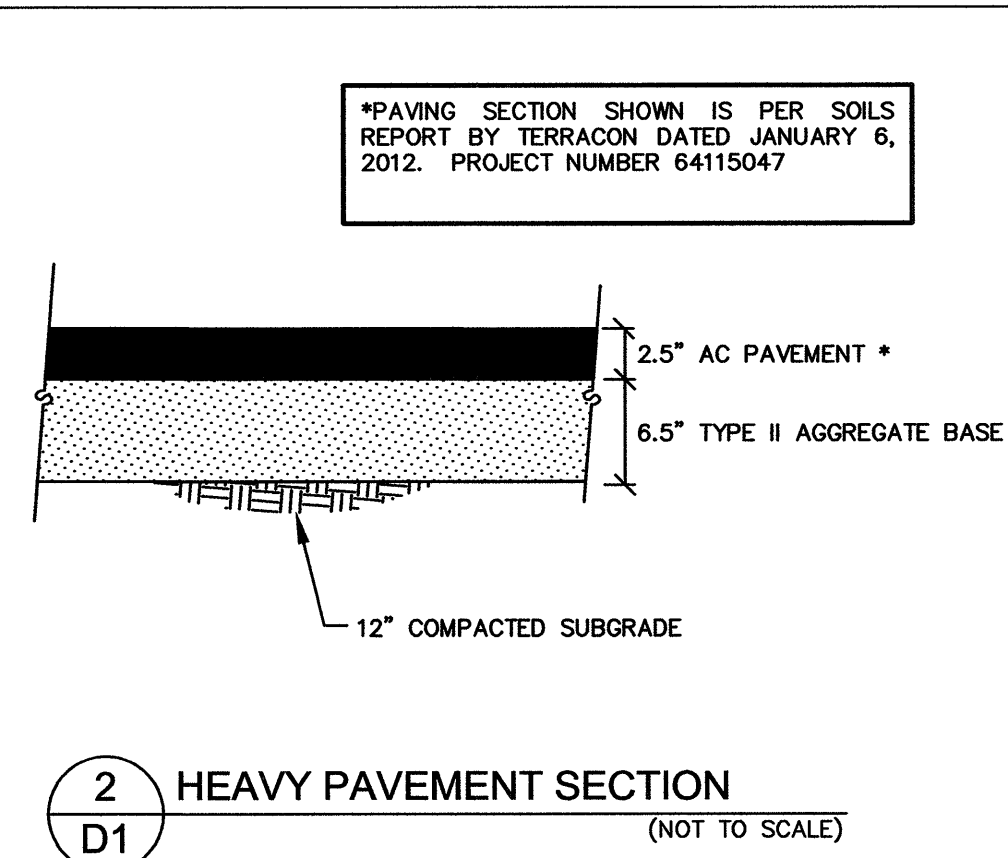
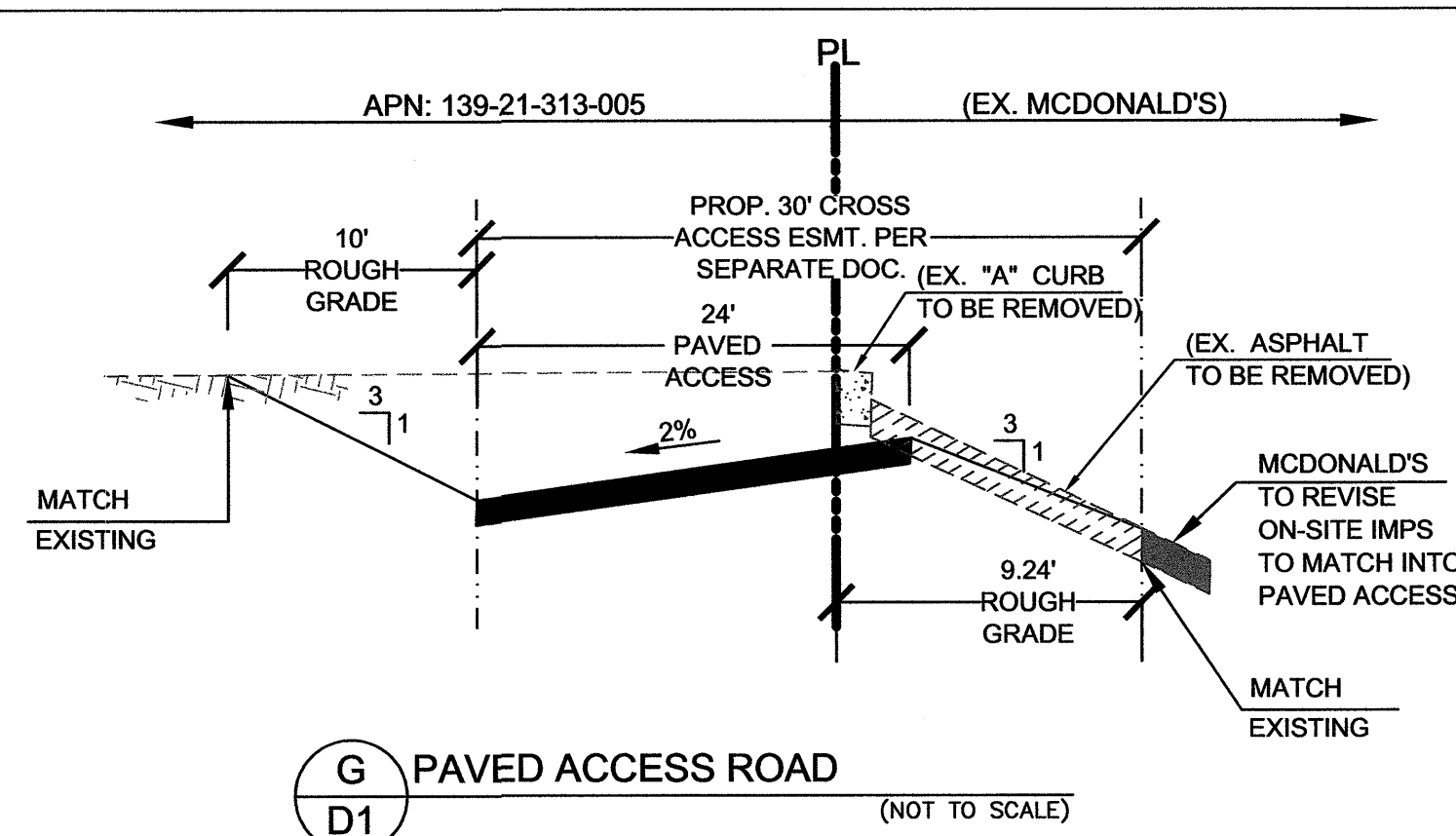
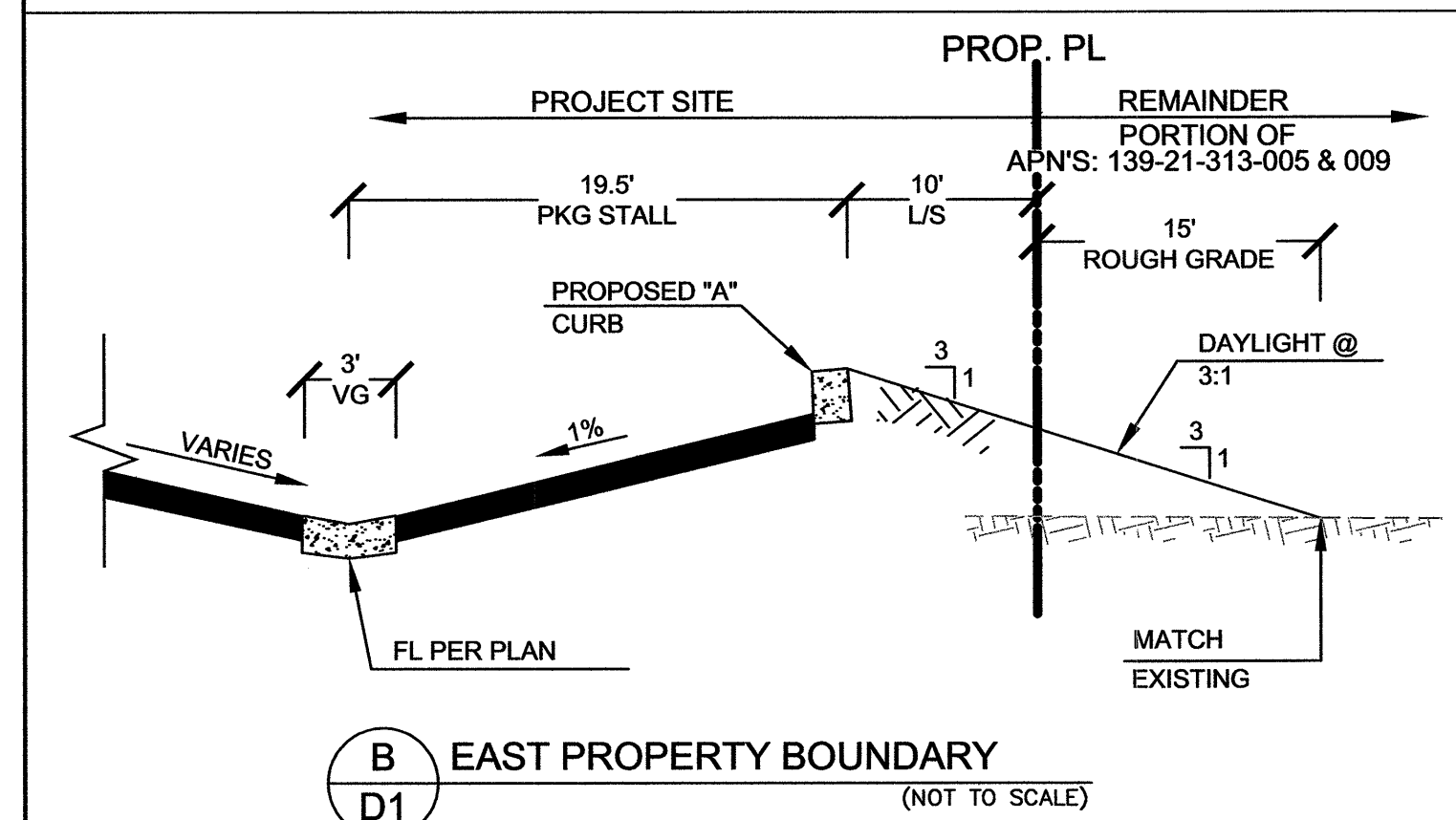
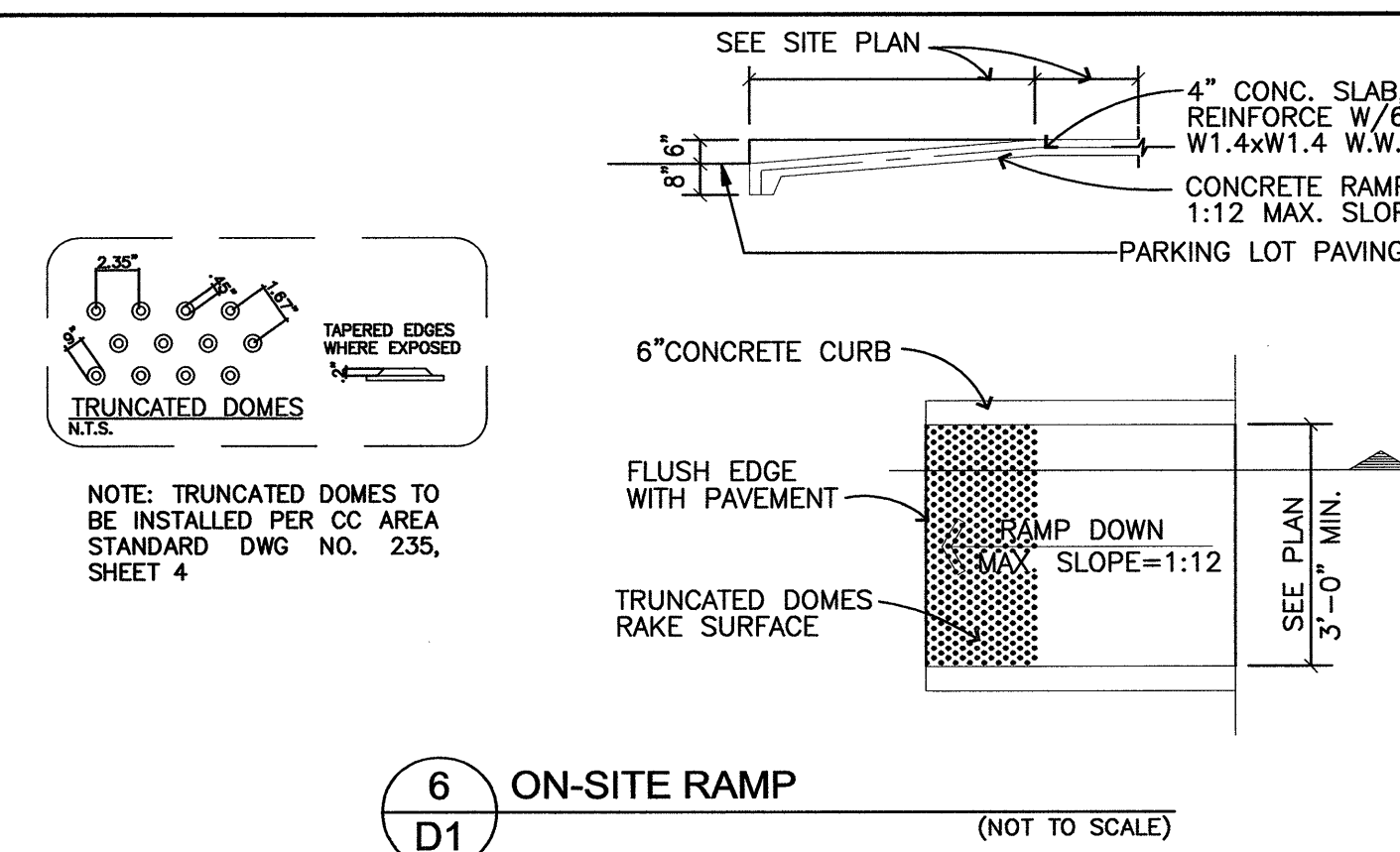
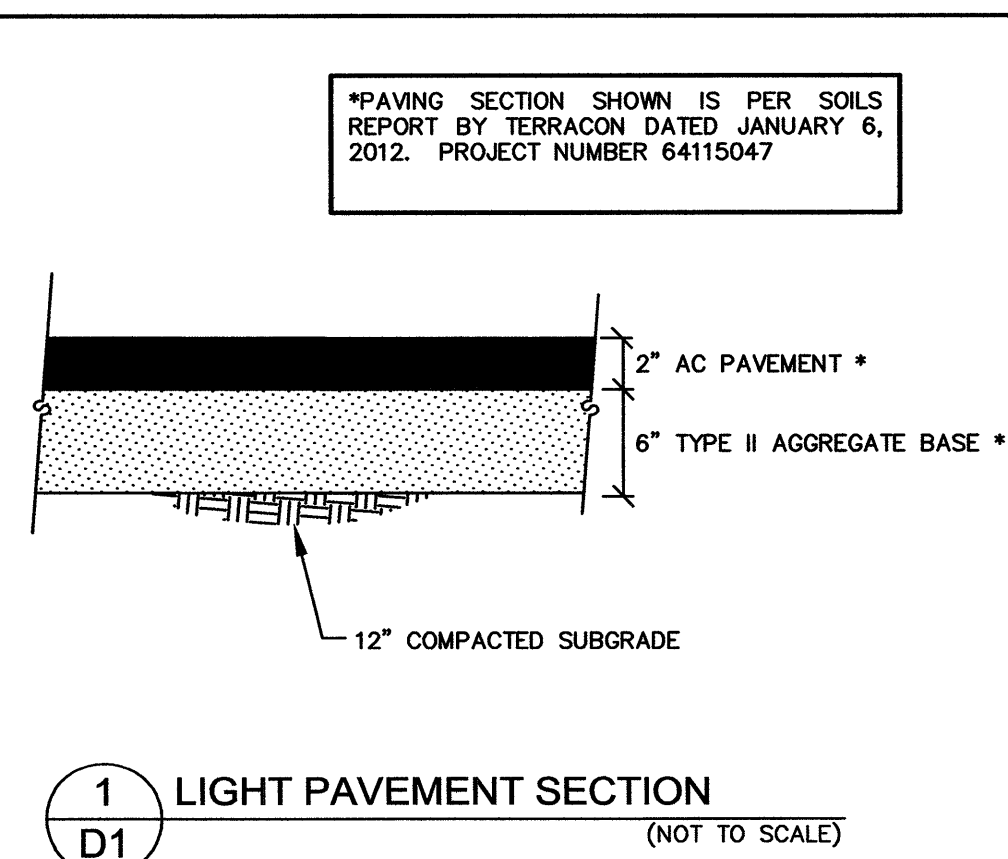
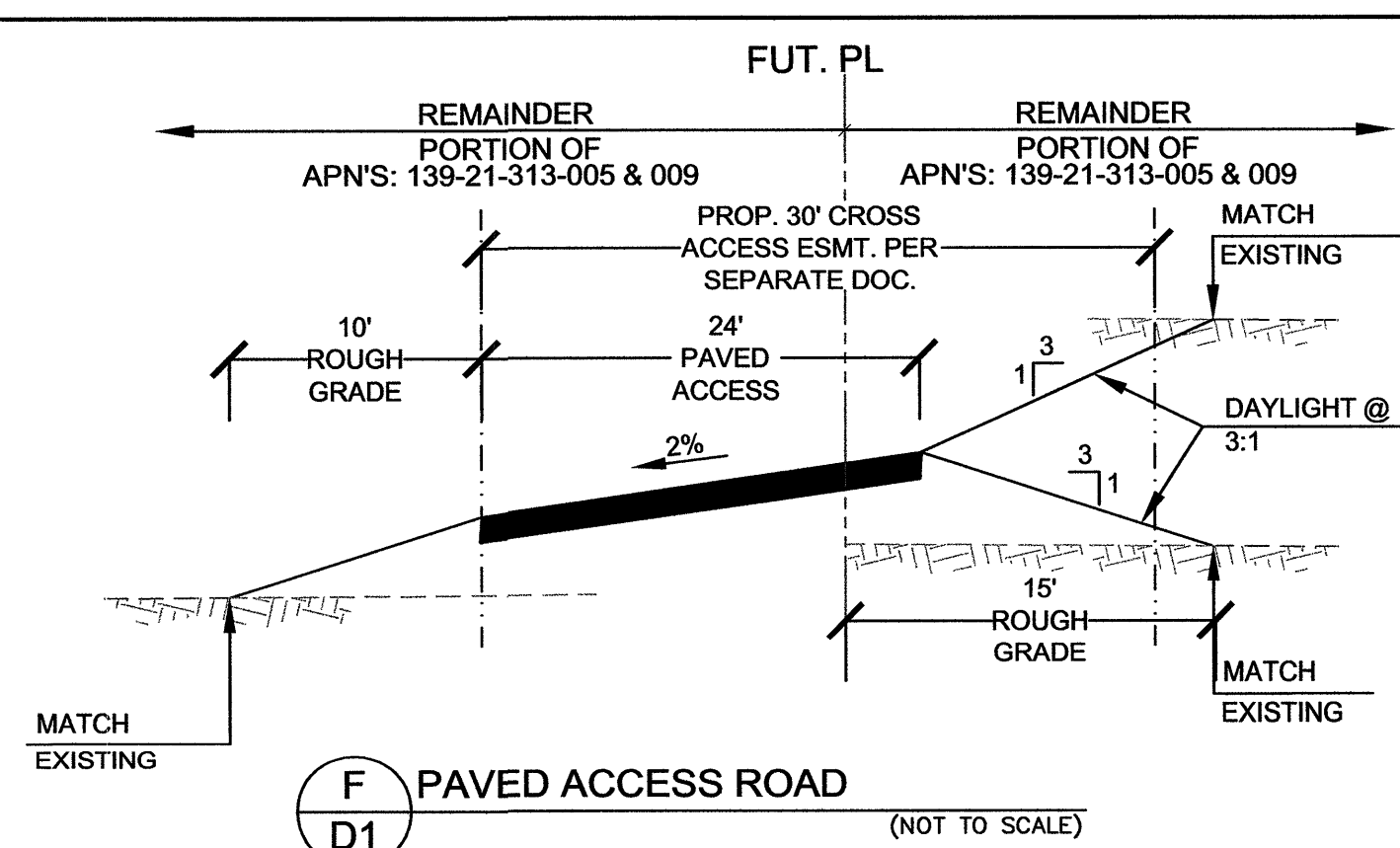
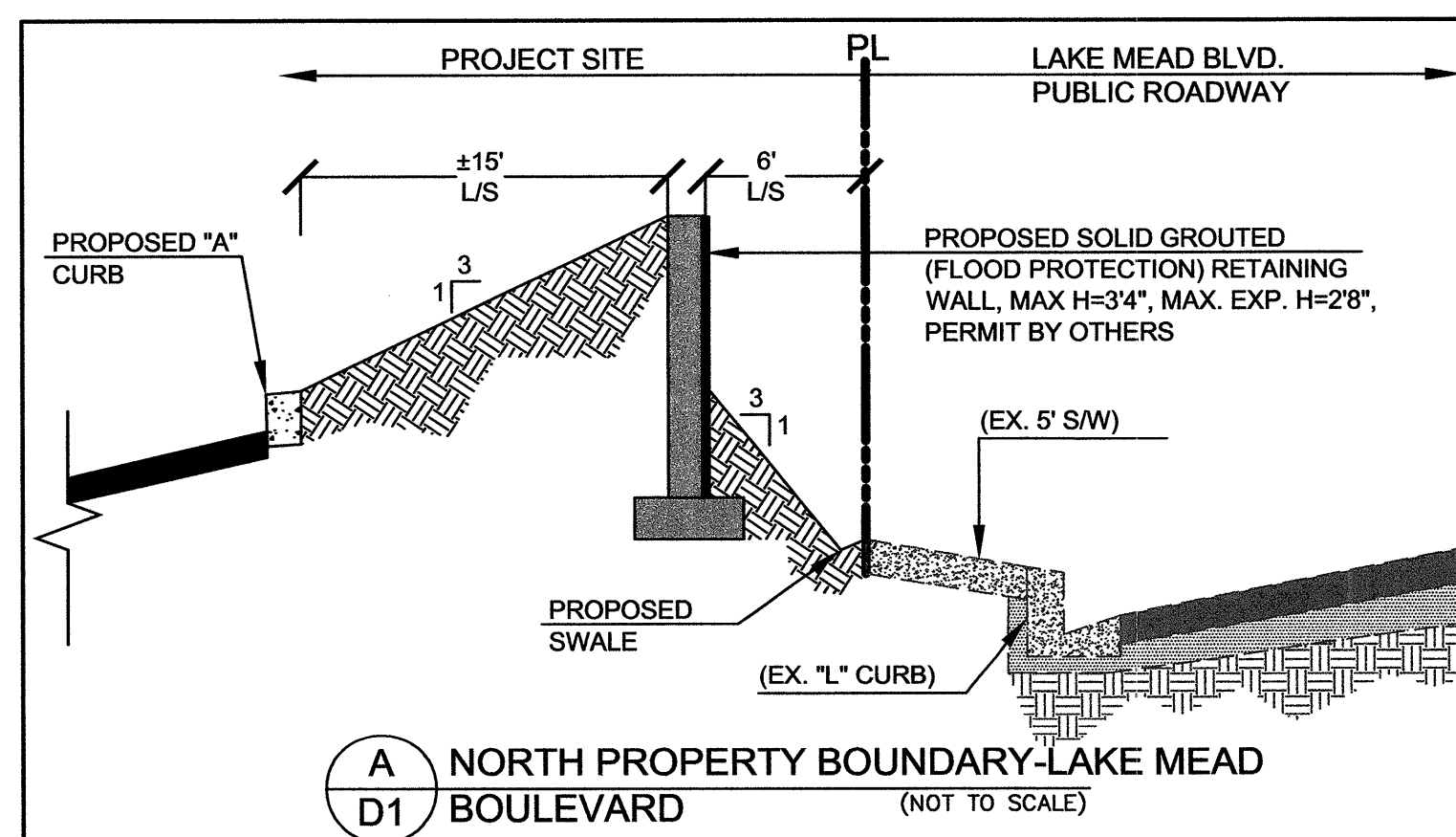
AGENCY NO.

CLV:

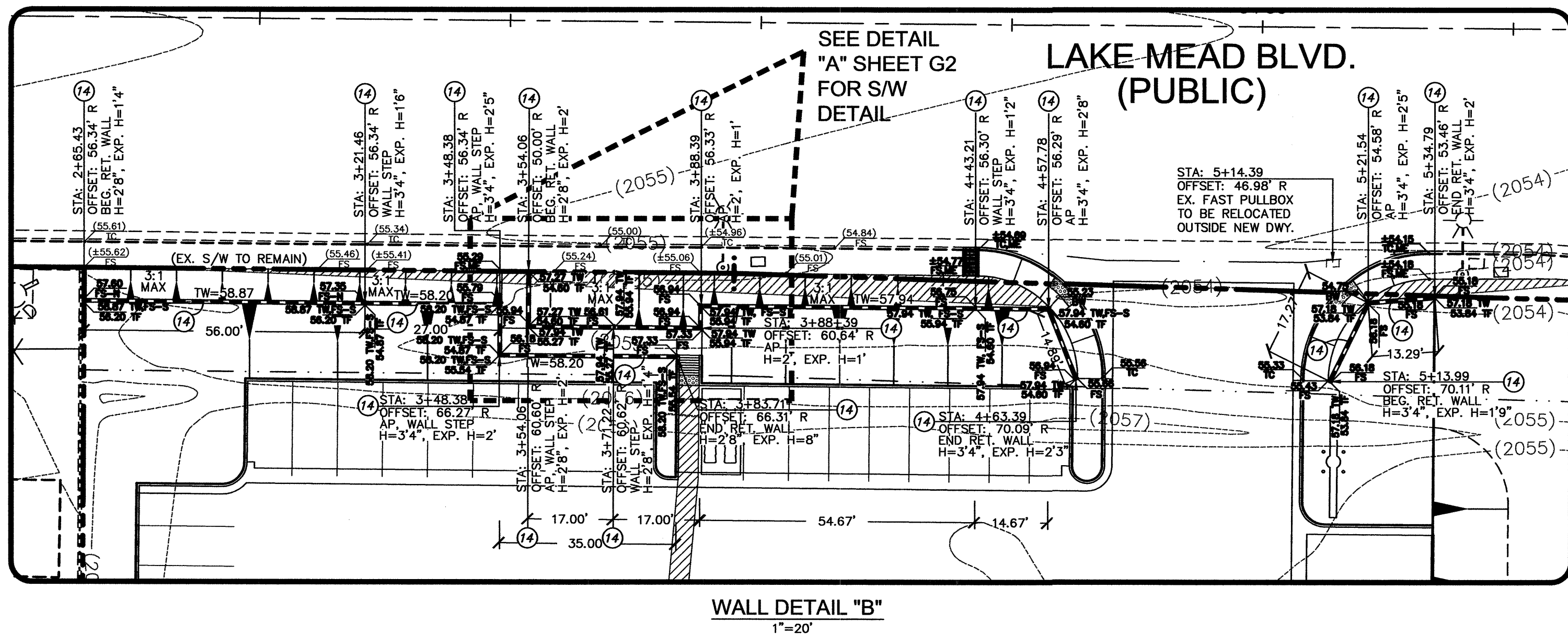
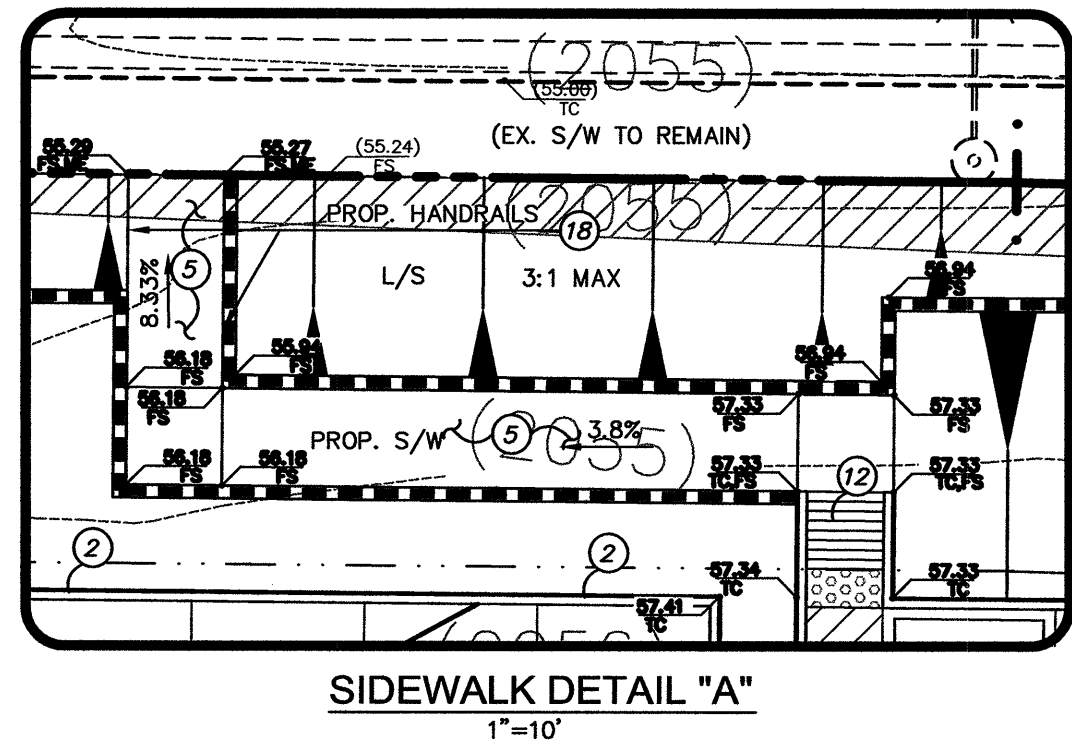
SHEET NO.:

EX-1

1 OF 1 SHEETS

[illegible]

MATCHLINE-SEE SHEET G1
FOR ON-SITE GRADING



LEGAL DESCRIPTION

PARCEL 1:

LOT SEVEN (7) IN LAS VEGAS ENTERPRISE PARK, A COMMERCIAL SUBDIVISION, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 70 OF PLATS, PAGE 98, AND AMENDED MAP FOR LAS VEGAS ENTERPRISE PARK, A COMMERCIAL SUBDIVISION, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 77 OF PLATS, PAGE 54, IN THE OFFICE OF THE COUNTY RECORDER, CLARK COUNTY, NEVADA.

EXCEPTING THEREFROM THAT PORTION CONVEYED TO MCDONALD'S CORPORATION, A DELAWARE CORPORATION, BY DEED RECORDED JULY 17, 1997 IN BOOK 970717 AS DOCUMENT NO. 01452.

FURTHER EXCEPTING THEREFROM THAT PORTION CONVEYED BY GRANT, BARGAIN AND SALE DEED RECORDED JUNE 15, 2004 IN BOOK 20040815 AS DOCUMENT NO. 01423, OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

FURTHER EXCEPTING THEREFROM THAT PORTION CONVEYED BY DEDICATION DEED RECORDED AUGUST 29, 2006 IN BOOK 20060829 AS DOCUMENT NO. 02701, OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

FURTHER EXCEPTING THEREFROM THAT PORTION CONVEYED BY QUITCLAIM DEED RECORDED MARCH 17, 2008 IN BOOK 20080317 AS DOCUMENT NO. 03104, OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

FURTHER EXCEPTING THEREFROM THAT PORTION CONVEYED BY QUITCLAIM DEED RECORDED MARCH 17, 2008 IN BOOK 20080317 AS DOCUMENT NO. 03105 OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

ALL OF THOSE CERTAIN EASEMENT RIGHTS AS PROVIDED IN THE DOCUMENT ENTITLED DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS RECORDED NOVEMBER 10, 1999 IN BOOK 991110, AS DOCUMENT NO. 01268.

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS RECORD OF SURVEY IS NORTH 89°32'57" WEST, BEING THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., AS SHOWN BY THE AMENDED MAP OF LAS VEGAS ENTERPRISE PARK, A COMMERCIAL SUBDIVISION, RECORDED IN BOOK 77, PAGE 54 OF PLATS IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDER.

BENCHMARK

THE ELEVATION DATA SHOWN HEREON ARE U.S. SURVEY FEET REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, CITY OF LAS VEGAS BENCHMARK NO. NV01 21W4 BEING A RIVET AND ROUND ALUMINUM WASHER IN THE TOP OF CURB, IN THE NORTHEAST CORNER OF TONOPAH DRIVE AND LAKE MEAD BOULEVARD.

ELEVATION 630.402 METERS - PUBLISHED
ELEVATION 2068.24 U.S. SURVEY FEET - COMPUTED

FLOODZONE

PANEL #32003C2160F DATED NOVEMBER 16, 2011, THE SITE IS LOCATED WITHIN FLOOD ZONE X (NON-SHADED). FLOOD ZONE X IS OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

NOTE

OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS SHOWN AND TO REPLACE ALL SURVEY MONUMENTATION DAMAGED, DISTURBED, DESTROYED, OR OBSCURED DURING CONSTRUCTION.

SIGHT VISIBILITY ZONES NOTE:

NO WALLS, FENCES, TREES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM THE TOP OF CURB.

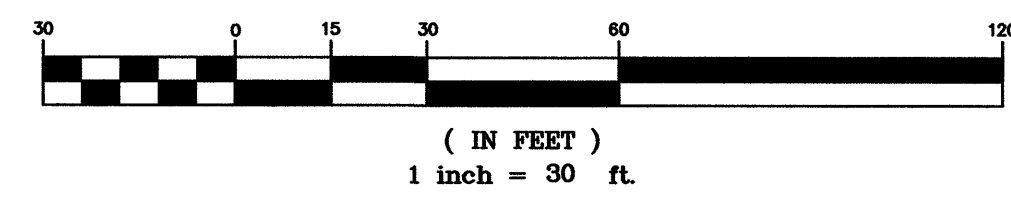
NOTE:

ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.

CLV DRAWING NO.

107V XXXX-X

GRAPHIC SCALE



CURVE & LINE DATA

LINE TABLE				
LINE	LENGTH	BEARING		
L1	12.48	500°15'54"E		
L2	5.10	N00°00'36"E		
L3	5.10	N00°00'36"E		

CURVE TABLE				
CURVE	LENGTH	RADIUS	DELTA	TANGENT
C1	39.32	25.00	90°06'35"	25.00
C2	39.22	25.00	89°53'10"	24.95
C3	39.51	25.00	90°32'54"	25.24
C4	23.53	15.00	89°52'45"	14.97

CONSTRUCTION NOTES	
NO	ITEM
1	CONSTRUCT "L" TYPE CURB AND GUTTER PER STD DWG NO. 216.
2	CONSTRUCT "A" TYPE CURB PER STD. DWG. NO. 219.
3	CONSTRUCT 8" CONCRETE CROSS GUTTER PER STD DWG NO 228
4	CONSTRUCT COMMERCIAL DRIVEWAY PER STD DWG NO 222A & 225
5	CONSTRUCT 4" SIDEWALK PER STD DWG NO. 234.
6	CONSTRUCT ADA RAMPS WITH ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER STD DWG NO 235, CASE 1
7	CONSTRUCT 2" MIN AC OVER 6" TYPE II AGG. BASE PER SOILS REPORT BY TERRACON. SEE DETAIL 1 ON SHEET D1
8	CONSTRUCT 2.5" MIN AC OVER 6.5" TYPE II AGG. BASE PER SOILS REPORT BY TERRACON. SEE DETAIL 2 ON SHEET D1
9	CONSTRUCT 6" MIN PCC OVER 6" TYPE II AGG. BASE PER SOILS REPORT BY TERRACON. SEE DETAIL 3 ON SHEET D1
10	CONSTRUCT 3" WIDE VALLEY GUTTER PER DETAIL 4 ON SHEET D1
11	CONSTRUCT 3" WIDE MODIFIED VALLEY GUTTER PER DETAIL 5 ON SHEET D1
12	CONSTRUCT ON-SITE RAMP PER DETAIL 6 ON SHEET D1.
13	CONSTRUCT TRASH ENCLOSURE PER ARCHITECTURAL PLAN (BY OTHERS)
14	INSTALL SOLID GROUTED RETAINING WALL ALONG LAKE MEAD PER CLV STD. DETAIL B-100-2. MAX H=3'4", MAX EXP. H=2'8". PERMIT BY OTHERS.
15	CONSTRUCT 0" CURB
16	TRANSITION FROM 6" CF TO 0" OF IN 10' OR AS INDICATED ON PLANS
17	INSTALL 6" SCREEN WALL OVER RETAINING WALL FOR LOADING DOCK PER CLV STD. DETAIL B-100-1 & 2. MAX RET. H=4'. PERMIT BY OTHERS.
18	INSTALL HANDRAILS PER ARCHITECTURAL PLAN (BY OTHERS)
19	INSTALL ARMOR TILE TRUNCATED DOMES OR EQUIVALENT
20	SAWCUT AT LIP OF GUTTER AND MATCH EXISTING
21	INSTALL 2" WIDE SIDEWALK UNDERDRAIN PER STD DWG NO. 236

EARTHWORK QUANTITIES

*NOTE: THESE QUANTITIES ARE APPROXIMATE AND ARE RAW VOLUMES ONLY. OVERCUT/UNDERCUT, SHRINKAGE, & BULKING FACTORS ARE NOT TAKEN INTO ACCOUNT.

CUT = TBD CY
FILL = TBD CY

STORMWATER MANAGEMENT NOTES:

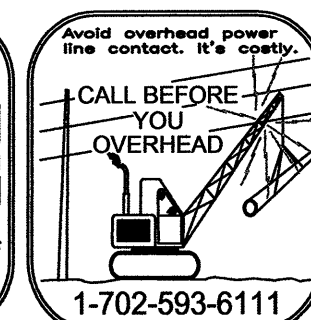
- THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF THE CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
- ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE CLARK COUNTY BUILDING, ADMINISTRATIVE CODE 24.60 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
- TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NV100000, SECTION III.A.5.
- AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NV100000, SECTION III.A.12.
- ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

ENGINEER'S NOTES:

- ALL WORK SHALL CONFORM TO THE SOILS REPORT PREPARED BY TERRACON DATED JANUARY 6, 2012, PROJECT NO. 64115047.
- ALL OFF-SITE IMPROVEMENT CONSTRUCTION SHALL CONFORM TO THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, LATEST EDITION.
- FINAL ASPHALTIC CONCRETE (AC) PAVEMENT SURFACES SHALL BE ONE-HALF INCH ABOVE THE TOP OF THE GUTTER (INCLUDING OPEN GRADE).
- CONTRACTOR IS RESPONSIBLE FOR DUST AND EROSION CONTROL DURING CONSTRUCTION.
- THIS PLAN SHALL NOT, IN PART OR IN WHOLE, BE USED FOR CONSTRUCTION UNLESS APPROVED AND SIGNED BY ALL APPLICABLE GOVERNMENT AGENCIES.
- ENGINEER TO BE NOTIFIED OF ANY DISCREPANCIES IMMEDIATELY.
- MATCH ELEVATIONS SHOWN TO BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION.
- THIS PROJECT IS LOCATED WITHIN THE LAS VEGAS ENTERPRISE PARK AND SHALL CONFORM TO LAS VEGAS ENTERPRISE PARK STANDARDS.

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE WITH CITY OF LAS VEGAS FOR THIS PROJECT, XXXXXXXX.

TREASEA WOLF, P.E. No. 17879 DATE

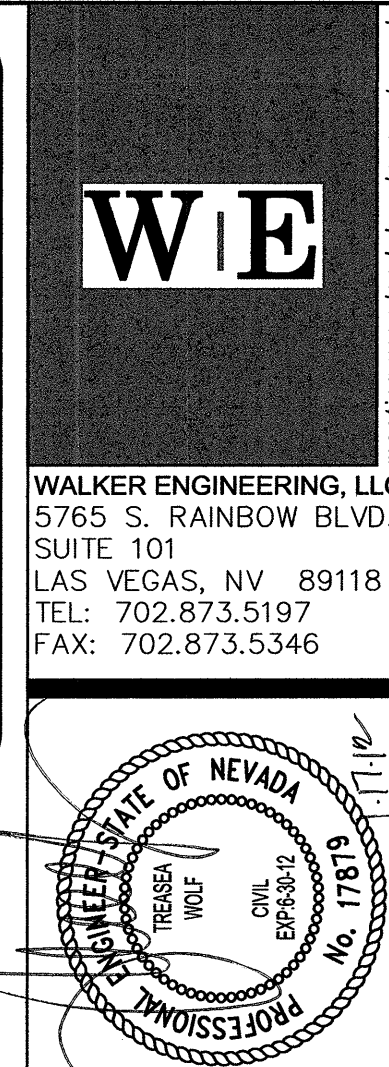
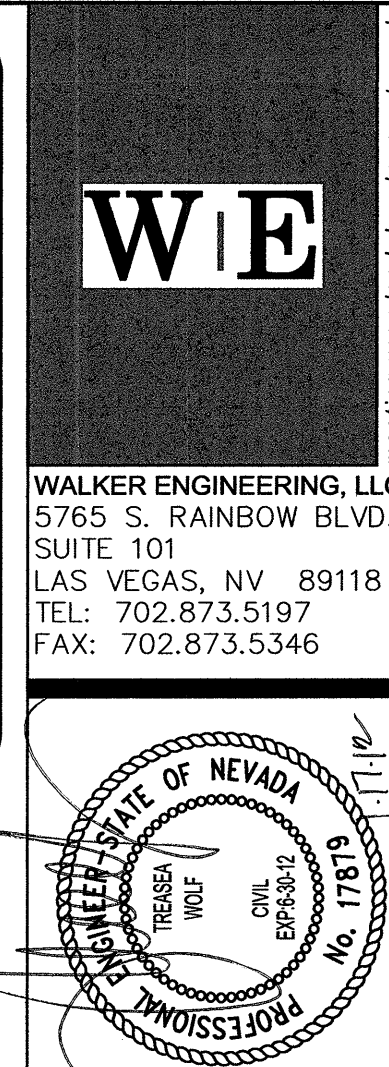


DYNAMIC DEVELOPMENT COMPANY
DOLLAR GENERAL @ MLK & LM

PRECISE GRADING PLAN
SHEET 2 OF 2

SUBMITTAL NO. 1
DATE: JANUARY 17, 2012
WE PROJECT NO.
1217.00
AGENCY NO.
CLV:

SHEET NO.:
G2
7 OF 8 SHEETS



WALKER ENGINEERING, LLC
5765 S. RAINBOW BLVD.
SUITE 101
LAS VEGAS, NV 89118
TEL: 702.873.5197
FAX: 702.873.5346