DS #: 5400

APN: 139-15-401-006

PROJECT: NEC Carey & Revere

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: January 13, 2021
TO: **Land Development Services** Department of Building & Safety				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **NEC Carey & Revere** **(Project in CNLV for City of Las Vegas Concurrence)**			**COPIES TO:** ACG Design
Cross Streets:	NEC of Carey Avenue & Revere Street			Armstrong Sammie
File Number:	F:\Depot\DSMemos\DS5400A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-15-401-006			CNLV
Zoning Action:	N/A			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	12/30/2020	1/13/2021	See Comments Below	$400.00	4115818: $400
			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.
	is conditionally approved subject to Clark County Public Works Department concurrence.

City of Las Vegas Flood Control* staff has reviewed the Technical Drainage Study for the subject development "*Northeast Corner of Carey Avenue & Revere Street*" within the jurisdiction of *the City of North Las Vegas. City of Las Vegas* concurs with the acceptance of the drainage study by the *City of North Las Vegas Public Works Department.* The review of this project was limited to issues of flood control significance to the *City of Las Vegas.

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.

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 Update and accepted by the *City of Las Vegas Flood Control Section.* Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

END OF REMARKS
ays

T/R/S: T20S/R61E/15
AREA M-15

Mayor
John J. Lee

Council Members
Isaac E. Barron
Pamela A. Goynes-Brown
Scott Black
Richard J. Cherchio

CITY OF NORTH LAS VEGAS
Your Community of Choice

City Manager
Ryann Juden

Department of Public Works
2250 N. Las Vegas Boulevard, Suite 200 • North Las Vegas, Nevada 89030
Telephone: (702) 633-1200 • Fax: (702) 649-4696 • TDD: (800) 326-6868
www.cityofnorthlasvegas.com

December 9, 2020 Mailed Via: E-mail

Randy Skopinski, P.E.
Hailey Shinton
AGC Design
4310 Cameron Street, Suite12-A
Las Vegas, NV, 89106

Re: **TDS for NEC of Carey Ave. & Revere St.**
(CNLV # 364-2020)

CNLV staff has reviewed of the above referenced study, submitted November 10, 2020, and found it to meet the minimum accepted standards for a technical drainage study. This acceptance is contingent upon the following conditions:

1. Concurrence by City Las Vegas Public Works (CLVPW) will be required, prior to improvement plans approval, since the project is located adjacent to a jurisdictional boundary.

2. The site is also adjacent to an existing Clark County Regional Flood Control District (CCRFCD) facility. CCRFCD concurrence must be obtained prior to improvement plans approval.

Please be advised that all land surface area disturbances over 1 acre and/or adjacent to a water way must submit a "Notice of Intent" to discharge to the Nevada Division of Environmental Protection, which certifies that a stormwater pollution prevention plan has been developed and is maintained on site. For more information, including forms and applications, see http://ndep.nv.gov/bwpc/storm01.htm.

Acceptance of this drainage study does not imply approval of the improvement plans and calculations associated with the drainage for this site. A detailed review of the improvement plans will be performed by staff during the improvement plans review process. Any future changes in the proposed design (or design assumptions) as outlined in the approved drainage study which affect drainage must be addressed in a drainage study amendment and accepted by the CNLV Development and Flood Control Division. 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, CNLV 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 that the CCRDFD has begun efforts to update the Hydrological Criteria and Drainage Design Manual (HCDDM) and is requesting participation from the engineering community. The CCRFCD is collecting comments and suggestions on errors, clarifications, or changes needed to the current Manual and/or content and usability enhancements to be incorporated into the updated Manual. Additional information on procedures and deadline to provide feedback and comments are available online at (http://www.ccrfcd.org/hcddmupdate.html).

Sincerely,



Dan Le, P.E., CFM
Senior Engineer/Development and Flood Control Division

TRANSMITTAL

ARCHITECTURAL CIVIL GROUP
www.ACG.design

TO:	City of Las Vegas 495 S Main St Las Vegas, NV 89101	**DATE:**	December 23, 2020
		PROJECT:	Revere/Carey C-Store
		RE:	DS Concurrence Submittal
ATTN:	Albert Sung	**JOB #:**	190259

ARE FORWARDING

☐	ENCLOSED	☐	OVERNIGHT MAIL	☒	BY MESSENGER
☐	BY MAIL	☐	FEDERAL EXPRESS	☐	FOR PICKUP

DESCRIPTION
One (1) Check# 10319 for $400.00
One (1) Copy of CNLV DS Approval Letter
One (1) DS Report

☒	FOR REVIEW AND COMMENT	☐	FOR YOUR USE
☐	FOR SIGNATURE	☐	AS REQUESTED

REMARKS: If you have any questions, please don't hesitate to contact me! Thanks!

RECEIVED BY: _____

Hailey Shinton
Project Coordinator
(702) 931-2992
hshinton@acg.design

ARCHITECTURAL CIVIL GROUP
www.ACG.design

TECHNICAL DRAINAGE STUDY
FOR
NORTHEAST CORNER
OF
CAREY AVENUE & REVERE STREET

JOB NO. 190259
OCTOBER 2020

Prepared by:

ACG Design
4310 Cameron St, Suite 12-A
Las Vegas, NV 89103

Prepared for:

Armstrong Sammie
1920 Sutro Lane
Las Vegas, NV 89106
P: (702) 400-7550



HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: NEC of Carey Ave. & Revere St. Date: 10/19/19

Location of Development: a) Descriptive (Cross Streets) North/South: Revere St.

East/West: Carey Ave.

b) Section: 15 Township: 20 S Range: 61E

c) APN : 139-15-401-006

Name of Owner: Armstrong Sammie

Telephone No.: 702-400-7550 Fax No.: N A E-Mail Address:

Address: 1920 Sutro Lane Las Vegas, NV 89106

Contact Person-Name: Hailey Shinton **Telephone No.:** 702-931-2992

* **E-Mail Address:** hshinton@acg.design **Fax No.:** N.A

Firm: ACG DESIGN

Address: 4310 CAMERON STREET, SUITE 12-A, LAS VEGAS 89103

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	X	Building Permit		

1. Total Owned Land Area: At Site: 1.22 ACRES Being Developed/Disturbed: 1.22 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
5. Approximate upstream land area which drains to the subject site: 0 ACRES
6. Has the site drainage been evaluated in the past? ☐ **YES** X **NO** If yes, please identify documentation:
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Carey Avenue
8. Briefly describe your proposed schedule for the subject project: ASAP

PROFESSIONAL ENGINEER STATE OF NEVADA
RANDOLPH A. SKORPINSKI
EXP: 06-30-22
CIVIL
No. 14985

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

Updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: NEC of Carey Ave & Revere St.	Map ID: 139-15-401-006
Firm Name: ACG DESIGN	Engineer: RANDOLPH SKORPINSKI
Address: 4310 CAMERON STREET, SUITE 12-A	
City: LAS VEGAS	State: NV Zip: 89131
Phone Number: 702-569-9157	Fax Number: N/A
Property Owner: Armstrong Sammie	
Address: 1920 Sutro Lane Las Vegas, NV 89106	
City:	State: Zip:

Reviewed By:	Date Received:	Date Accepted for Review:

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

This document is intended as an aid in preparing Technical Drainage Studies. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all 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.

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

Yes	No	
X		Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
X		On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
X		Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes	No	
X		Sheet size: 24” x 36” sealed by a registered engineer in the State of Nevada.
X		Minimum scale: 1” = 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/consultant’s address and phone number.
X		Elevation datum and benchmark.
X		Legend for symbols and abbreviations.
X		Cut/fill scarps, where applicable.
X		Street names, grades, widths.
X		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street.
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.

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
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 Q_{100} and V_{100} and D_{100} in streets.
X		Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
X		Location and cross-section of street capacity calculations.
X		Cross-sectional detail for channels, including cutoff wall locations.
X		Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
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 block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
N/A		Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
N/A		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**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes / N/A	No	
_____	_____	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 Q_{100} flows.
X	_____	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
X	_____	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

Yes	No	
X	_____	Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
X	_____	Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
X	_____	Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
X	_____	Use of correct precipitation values in and around the McCarran Airport rainfall area.
X	_____	A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
X	_____	A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
X	_____	Copies of supporting technical information referenced 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.
X	_____	Calculation for impervious area for parking lots and LIDs (if required).

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
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 the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v $\leq$ 8. Q_{10} d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
X		A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
N/A		Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
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.
N/A		Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
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.
X		Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:	**STANDARD FORM 2**

DEPARTMENT OF PUBLIC WORKS

Drainage Study Checklist

Background

The City of North Las Vegas strives to provide the development community with adequate information to ensure the successful completion of any project in the City. To aid in the submittal of a complete, thorough drainage study, the following checklist has been compiled to assist the design engineer. This checklist focuses on requirements specific to the City of North Las Vegas. When preparing a drainage study, the engineer will still be required to adhere to all local criterion and guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) *Hydrologic Criteria and Drainage Design Manual* (HCDDM) and the *Uniform Standard Drawings for Public Works= Construction Off-site Improvements* for Clark County Area, Nevada. **In order to have a complete drainage study for submittal to the City, this checklist must be completed, signed, and stamped by the engineer in responsible charge for the completion of the drainage**. Incomplete submittals will not be accepted at the front counter.

Checklist

Provide N/A to an item that is not applicable for the subject site.

I. General Requirement		
Yes	No	
X		Ensure that the new Standard Form 1 and 2 are utilized for all incoming drainage study submittals. The form can be acquired from the CCRFCD's website at http://www.ccrfcd.org/engineering.htm.
X		Ensure that the new 2008 CCRFCD=s Master Plan Update (MPU) is utilized for all incoming drainage study submittals. Both the Flood Control Facilities and Facility Inventory Maps must be included with the drainage study.
X		A copy of the approved zoning/planning conditions associated with this site must be included with the initial submittal to verify compliance with conditions.
n/a		If offsite grading is anticipated, a notarized permission letter to construct from the property owner is required prior to the approval of this technical drainage study.
n/a		If the site is proposing to increase or concentrate storm flow and/or nuisance flows onto the adjacent property. A notarized permission letter to accept from the property owner is required prior to the approval of this technical drainage study.
n/a		The City of North Las Vegas (CNLV) does not allow valley gutters to be constructed across streets with right-of-way widths of 80 feet or greater.
X		Provide map pockets in the back of the drainage study in order to keep the improvement plans with the study.
X		Include a CD-ROM that contains a pdf of the entire study, including improvement plans.
n/a		When submitting flow split analysis for a site, staff suggests using the Pima County flow split calculations. Make sure to provide all supporting documents.

n/a		The project proposes to construct facilities and/or discharge flows within Nevada Department of Transportation (NDOT) right of way. The engineer must contact NDOT for an encroachment permit for the proposed project and it must be received prior to approval of the improvement plans. NOTE: NDOT does not allow for development to increase the 100-year flow rate into their ROW - onsite detention may be required.
n/a		Where right-of-way does not exist, a roadway or drainage easement must be obtained from the adjacent property owner(s) prior to improvement plans approval. Roadway and drainage easement dedication documentation must be processed through the CNLV Real Property Services Division. For more information, please contact Lorena Candelario at 633-2396.
	X	This report serves as a master drainage study for the site. A separate technical drainage study will be required by the City of North Las Vegas upon development of areas shown on the conceptual site plan. Each technical drainage study should provide more detailed design information, including final grading plans with corresponding drainage facility details, hydraulic design calculations, etc.
X		Ensure that the longitudinal slope used to calculate the 100-year flow depth for a given street matches with the slope indicated on the grading plans.
n/a		The City of North Las Vegas (CNLV) is a member of the Community Rating System, which requires Base Flood Elevations (BFE's) to be indicated for any structures located within a Special Flood Hazard Area (SFHA) Zone A, AO, AE, etc. Please indicate the extent of the effective regulatory SFHA on the grading plan and show the BFE's of the affected lots.
X		If a site is adjacent to a future Clark County Regional Flood Control Facility, the developer is required to construct drop inlets at the site's discharge point along the alignment, which will collect 100% of the site's 100-year discharge.
n/a		If the proposed development is required to construct flood control facilities that are depicted on the Clark County Regional Flood Control District's Master Plan Update, structural drawings must be submitted with the drainage study for review and approval by the City of North Las Vegas prior to submitting to CCRFCD for concurrence.
X		The City of North Las Vegas North Neighborhood Flood Control Master Plan (NNFCMP) has established centerline intersection grades with corresponding street slopes. Please ensure that the street intersection designs are compatible with the NNFCMP.
n/a		For rectangular shaped culverts, the minimum shall be 6 feet in height and 5 feet in width.
n/a		The City of North Las Vegas requires that all local drainage facilities identified on the North Neighborhood Flood Control Master Plan (NNFCMP) to be constructed by the developer for the full frontage of the site.
	X	This property is adjacent to Unincorporated Clark County. Please note that a copy of this study and any addenda must be submitted to Clark County Development Services for their review and concurrence.
	X	This property is adjacent to the City of Las Vegas. Please note that a copy of this study and any addenda must be submitted to City of Las Vegas for their review and concurrence.
n/a		Side lot easement for all residential development will need to meet all the requirements as set forth in the City of North Las Vegas Municipal Code under Title 17.24.210.D.4

n/a		"Arizona" style crossing is not permitted within CNLV right-of-way. Culvert crossings, sized to convey the 100-year flow without any backwater effects, must be designed to convey the flow back to its historical path.
n/a		The minimum pipe diameter to be constructed within public drainage easement or right-of-way shall be 18-inch in reinforced concrete pipe. HDPE pipes are allowed with the caveat that it must be slurry back fill.
n/a		Backwater ponding limits that extend outside of the public right-of-way shall be delineated on the grading plans and a public drainage easement or right-of-way be obtained from the property owner. Roadway and drainage easement dedication documentation must be processed through the CNLV Real Property Services Division. For more information, please contact Lorena Candelario at 633-2396.
X		When referencing other drainage studies, all relevant information such as approval letters, drainage basin maps, HEC-1 analyses, details, plans, etc. must be included with the study. The material being referenced should be highlighted in some manner to indicate what is being referenced.
n/a		Provide a discussion and necessary analyses regarding Best Management Practice per Section 1500 of the Clark County Regional Flood Control District Hydrological Criteria and Drainage Design Manual.

II. Grading Plan Information		
Yes	No	
X		24"X36" copies of Grading Plans including Detail Sheets. Additionally, Plan and Profile sheets must be provided for all public offsite streets and/or storm drain/channel system improvements. The information provided in profile shall include: stationing, length, slope, size, discharge (Q100), material, class of pipe (Class III, IV, V, etc.), hydraulic grade line, inlet locations, finished grade over the pipe and etc.
n/a		On a 100' right-of-way street, the developer is required to build their half of the street, the median island, and one lane on the opposite side of the median. Additionally, the median island will be required to be landscaped.
X		Alignment of all existing, proposed, or future Regional Flood Control Facilities adjacent to the site must be shown on the grading plans.
X		Appropriate elevated "humps" 6 inches above the 100-year water surface elevation at all driveways location where the intent is to protect the site from the Q100 flows.
X		Erosion protection must be provided at the upstream and downstream terminus of all public roadway improvements.
X		Landscape berms used to protect property from flows in the adjacent streets must meet the criterium of being twice the depth of flow above the adjacent flowline up to 18 inches above the adjacent water surface.
n/a		Temporary pavements used to satisfy Clark County PM-10 requirements cannot be used to establish centerline grades for any proposed streets. All proposed street improvements must be designed per the Uniform Standard Drawings for Public Works Construction, Offsite Improvements, Clark County Area, Nevada.
X		Show cross sections along all project boundaries showing the elevational relationship, property line, and any existing or proposed walls.

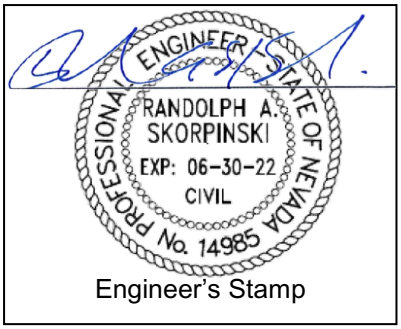
X		Verify all finished floor elevations of the proposed development meet Section 304.4 of the HCDDM.
X		All onsite drainage swale must maintain a minimum of 1% slope. If< 1% is anticipated, concrete valley gutter is required.
n/a		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), utilities conflict (if any), design hydraulic grade line (HGL) and the 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying the off-site flows.
X		Identify all adjacent parcels with the appropriate assessor parcel number and ownership information.
X		The Engineer must show existing and proposed development at least 100-feet beyond the project site limits. Finished floor elevations of existing buildings, centerline grades, centerline slopes, and top of existing curb elevations must be shown. Reference all adjacent existing improvements with a CNLV Project #. Ensure that it matches with the approved civil plans.
X		Make every effort to provide plan sheets that are clean and clear to review. Be sure to eliminate superimposed text.
X		Due to air quality regulations, all proposed streets must maintain a total of 32' asphalt area. For instance, a 60' half-street improvements will require an additional of 9-foot of overpaving from the centerline.
n/a		Full intersection designs abutting the proposed development must be provided to ensure that all quadrants of the intersection will drain properly.
X		Provide slopes of driveway fronting all public right-of-ways. Per CNLV Fire Code, the angles of approach and angles of departure must not exceed 6%.
X		For commercial and industrial developments, landscape areas are not allowed to sheet flow over the sidewalk. Provide flow lines with grades and sidewalk under drains for all landscape areas draining to the streets.

III. Hydrologic and Hydraulic Analyzes		
Yes	No	
X		Verify that the street capacity calculations for “ABC” and “XYZ” streets were completed for the worst case scenario for both water surface elevation and velocity (flattest and steepest slopes). In the interim condition, provide street capacity calculations for the 100-year event. In the ultimate condition, provide street capacity calculations for the 10-year and 100-year events.
X		For 100-year street flows with depths greater than 0.6' and velocities higher than 5 fps, erosion resistant landscaping or pony walls at the back of sidewalk (to the height of the flow in the street) must be provided.
n/a		If a CNLV modified 60' standard street section with offset sidewalk is to be proposed with the development. Ensure that the Flowmaster calculations and improvement drawings are reflected with the correct cross section.
X		For 80' and greater streets, if a median island is proposed with the site, ensure that the street capacity calculations are reflected with a median island.

X		For 80' and greater streets, the actual 12' dry lane determination must be shown on the Q10 street capacity calculations. CNLV only requires this criterion to be met in the FUTURE condition. Please note that the dual left turn lane and center median island cannot be used to satisfy the 12' dry lane criterion. Therefore, a minimum of 19' on each half of the street must be achieved for the entire stretch of the site.
X		All drainage studies for sites located within the North Neighborhood Flood Control Master Plan (NNFCMP) area must analyze four (4) separate conditions. a. A pure existing condition analysis that quantifies the amount of flow impacting the site in the existing condition. This condition has existing improvements and curve numbers for both onsite and offsite basins. Offsite basins should generally follow contours or existing development drainage patterns. b. An interim condition, where the offsite basins are the same as in the pure existing condition and the onsite basins are developed. The flows in this condition are modeled in the proposed half-streets being constructed with the development and homes/buildings must be at or above the WSE in the street. c. The NNFCMP existing condition flows are analyzed assuming a full street section, the CCRFCD street flow criterion does not need to be met, and the adjacent finished floor elevations must be above the associated WSE. d. The NNFCMP future condition flows are analyzed assuming a full street section, all CCRFCD street flow criteria must be met, and the finished floor elevations must have the required freeboard above the associated WSE.
X		For parcels impacted by a FEMA Special Flood Hazard Area, analyses of the floodzone, utilizing the FEMA effective flowrate must be completed for both pre- and post-development cases. The post-development analysis must tie into the effective SFHA in both width and water surface elevation.
X		For proposed storm drain connecting into other existing storm drain system, supporting documents must be provided for the beginning HGL used in the hydraulic modeling.
X		For the purpose of establishing adequate finished floor elevations for those structures adjacent to the proposed drainage easement, the City requires that submerged weir calculations are submitted. As the sidewalks at the upstream entrance of the drainage easement will effectively act as a broad-crested weir with a submerged tailwater, the water surface elevations at the easement entrances must be calculated as such.
n/a		The engineer must provide inlet control nomograph (see HCDDM) calculations for all proposed drop inlets to ensure that the storm sewer will have the capacity to convey the anticipated 100-year peak flow.
n/a		The CNLV requires that all drop inlet sizing to be performed with the HEC-22 software which can be acquired from the Federal Highway Administration's website at http://www.fhwa.dot.gov/engineering/hydraulics/software.cfm
n/a		Concrete headwalls are required at the inlet and outlet of all culvert installations. Flare end sections are acceptable for culvert less than 30-inch.
n/a		Erosion protection and/or cut off walls may be required at the upstream and downstream of a culvert.
n/a		For the ease of maintainability and constructability, all storm drain pipes must be designed with a soffit to soffit connections.

n/a		Swales that are designed to carry the 100-year flow must maintain a minimum freeboard of six inches above the depth of flow. Provide hydraulic calculations for verification.
n/a		For project sites that are 40 acres or greater, flow values must be labeled at the outlet point of each individual drainage basin and concentration points on all drainage basin maps.
X		The soil's map must include both the off-site and on-site sub-basin delineations for all drainage conditions.
IV. Local Entity Criteria - City of North Las Vegas - HCDDM Section 1603		
Yes	No	
n/a		Within the interior streets of a residential subdivision, the depth times velocity for the major storm event shall be less than or equal to 6.
n/a		When downstream storm sewer facilities are not available, the City of North Las Vegas requires bubbler laterals for the conveyance of storm water under streets with right-of-way widths greater than or equal to 80 feet. The bubbler laterals must consist of a minimum 18-inch diameter reinforced concrete pipe. To accommodate the draining of the bubbler system prior to future downstream extension of the storm sewer system, a minimum 6-inch diameter PVC pipe must be daylighted downstream.
n/a		The City of North Las Vegas does not permit the construction of permanent structures within a Federal Emergency Management Agency (FEMA) designated Special Flood Hazard Area (SFHA). Under this policy, any developer/builder proposing to place structures within a SFHA must meet the following requirements prior to the issuance of various permits and certificates-of-occupancy: 1. Grading and off-site construction permits may be issued by the CNLV Department of Public Works once the improvement plans and drainage study have been approved and a copy of the completed Conditional Letter of Map Revision (CLOMR) application has been submitted to FEMA for processing. 2. Building permits can be issued once a favorable CLOMR has been obtained from FEMA. 3. Certificates-of-occupancy can be issued once a Letter of Map Revision (LOMR) has been obtained from FEMA.
n/a		The City of North Las Vegas requires that stormwater drop inlet signage be affixed to any installed drop inlets. The plaque must read "Don't pollute - drains to Lake Mead" in English and Spanish. CNLV Quality Control/Offsite inspectors will verify that the signs are properly installed.
n/a		The City of North Las Vegas requires surface nuisance flows be mitigated for all residential developments. All proposed residential subdivisions greater than 10 acres must disconnect surface nuisance flows through design to minimize impact to the downstream developments. Also nuisance drop inlets must also be sized to match the capacity of the outleting storm drain pipe size.
X		A minimum longitudinal street slope of 0.4 percent (0.004 ft/ft) shall be used. If the Engineer can demonstrate, to the satisfaction and approval of the City Engineer, severe topographic constraints or other mitigating factors, the design of streets with slopes less than 0.4 percent may be permitted.
n/a		Side lot drainage easements are generally discouraged unless the engineer can demonstrate design constraints that render alternative site layout and drainage facility design options as impossible or impractical.

n/a	All wall openings must be designed to pass the 100-year storm event flows using the assumption that the bottom 50% of the openings are obstructed.
n/a	When a storm drain system is proposed at a sump area, a non-damaging emergency surface flow path must be provided to convey the 100-year flows. Adjacent finished floor elevations must be adequately protected.
n/a	For any ground-mounted air-conditioning pad that encroaches to within three (3) feet of a property line, the engineer must indicate on the plot plans how lot drainage will be accommodated beneath the pad. This can include, but is not limited to, the placement of a 4-inch diameter PVC pipe, with the inlet and outlet inverts of the pipe constructed to correspond with the flow line of the obstructed lot drainage swale.



Engineer's Stamp

Randolph Skorpinski

Engineer in Responsible Charge Name (Printed)

Approved by CNLV Development and Flood Control *Date*

TABLE OF CONTENTS

I. INTRODUCTION 1
II. LOCATION AND DESCRIPTION 1
III. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD ANALYSIS. 1
IV. CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD) FACILITIES 2
V. REVIEWED/REFERENCED DRAINAGE STUDIES 2
VI. HYDROLOGY 8
VII. EXISTING CONDITION 9
VIII. DEVELOPED CONDITION 12
IX. FINISH FLOOR ELEVATION 15
X. CONCLUSIONS AND RECOMMENDATIONS 15
XI. REFERENCES 15

TABLES

TABLE 1 - SUMMARY OF EXISTING CONDITIONS 9
TABLE 2 – EXISTING CROSS-SECTION CHARACTERISTICS: 10-YR & 100-YR 9
TABLE 3 - SUMMARY OF DEVELOPED CONDITIONS 12
TABLE 4 – DEVELOPED CROSS-SECTION CHARACTERISTICS: 10-YR & 100-YR 12

FIGURES

FIGURE 1 – VICINITY MAP 3
FIGURE 2 – ASSESSOR'S PARCEL MAP 4
FIGURE 3 – FLOOD INSURANCE RATE MAP 5
FIGURE 4A – CCRFCD FACILITIES MAP 6
FIGURE 4B – CCRFCD FACILITIES INVENTORY TABLE 7
FIGURE 5 – EXISTING CONDITIONS 11
FIGURE 6 – DEVELOPED CONDITIONS 14

I. INTRODUCTION

Armstrong Sammie is proposing to construct commercial improvements at the northeast corner of Carey Avenue and Revere Street. The purpose of this report is to present a detailed hydrologic and hydraulic analysis for the existing and developed onsite and offsite conditions and determine adequate protection for the project from offsite and onsite flows. The following tasks were performed in the preparation of this report:

- Identify previous drainage studies for the project site and surrounding areas.
- Identify the FEMA floodplain designation for the project site.
- Identify existing and proposed regional drainage facilities adjacent to the site.
- Estimate runoff generated for the peak 10-year, and 100-year return period storms for proposed conditions.
- Recommend drainage facilities to protect the site from storm runoff.

II. LOCATION AND DESCRIPTION

The project site is located in Section 15, Township 20 South, Range 61 East, M.D.M., within City of North Las Vegas, Nevada. The Assessor's Parcel Number is 139-15-401-006. The site is bordered on the North and East by existing residential development, the South by Carey Avenue, and the West by Revere Street. Please refer to **Figures 1 and 2** for the vicinity and location of the project site. The existing site is comprised of undeveloped land. The project site generally slopes south towards Carey Avenue. The existing site consists of approximately 1.22 acres zoned Single Family Low Density (R-1). The project is proposed for commerical use.

III. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD ANALYSIS

The Special Flood Hazard Areas (SFHA) for Clark County, Nevada and incorporated areas are outlined in the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM effective November 16, 2011). The project lies within FIRM Community Panel 32003C2160F. Per the FIRM panel, the site lies in unshaded Zone X, area determined to be outside the 0.2% annual chance floodplain. Refer to Figure 3 for FIRM Panel.

IV. CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD) FACILITIES

Figure 4A and 4B are reproduced from Figure F-25 of the 2018 Clark County Regional Flood Control District (CCRFCD) Master Plan Update (Reference 3). This figure depicts the project site in relation to existing and proposed CCRFCD Facilities. As shown on the figure, the Las Vegas Wash – Smoke Ranch Facility (LVSR0070) currently existing in Carey Avenue as a 66" RCP. The Las Vegas Wash – Smoke Ranch Facility (LVSR 0071) will replace the existing storm drain in Carey Avenue with a 10' x 8' RCB. Clark County Regional Flood Control concurrence will be obtained upon approval from City of North Las Vegas for the subject drainage study.

V. REVIEWED/REFERENCED DRAINAGE STUDIES

Numerous approved drainage studies and set of improvement plans were reviewed and utilized in the completion of this study. The studies and improvement plan below have been reviewed and are considered acceptable for reference.

1. Technical Drainage Study and Addendum for Desert Mesa, by Aztec Engineering. (CNLV#7480)
2. Technical Drainage Study Update for Desert Mesa, by Dwyer Engineering. (CNLV#62213)
3. Technical Drainage Study for Revere Estates, by L. Bruce Nybo Inc.
4. Technical Drainage Study for Las Vegas Heights, by Civiltec Engineering
5. Technical Drainage Study for SEC of Carey Avenue and Revere Street, by ACG Design



FIGURE 1

VICINITY MAP

NOTES

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

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

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

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

0 100 200 400 600 800

MAP LEGEND

- PARCEL BOUNDARY
- SUB BOUNDARY
- PM/LD BOUNDARY
- ROAD EASEMENT
- MATCH / LEADER LINE
- HISTORIC LOT LINE
- HISTORIC SUB BOUNDARY
- HISTORIC PM/LD BOUNDARY
- SECTION LINE
- CONDOMINIUM UNIT
- AIR SPACE PCL
- RIGHT OF WAY PCL
- SUB-SURFACE PCL

ASSESSOR'S PARCELS - CLARK COUNTY, NV.

Briana Johnson - Assessor

001 ROAD PARCEL NUMBER
001 PARCEL NUMER
1.00 ACREAGE
202 PARCEL SUB/SEQ NUMBER
PB 24-45 PLAT RECORDING NUMBER
5 BLOCK NUMBER
5 LOT NUMBER
GL5 GOV. LOT NUMBER

BOOK T20S R61E

125	124	123
138	139	140
163	162	161

Scale: 1" = 200'

SEC. 15

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

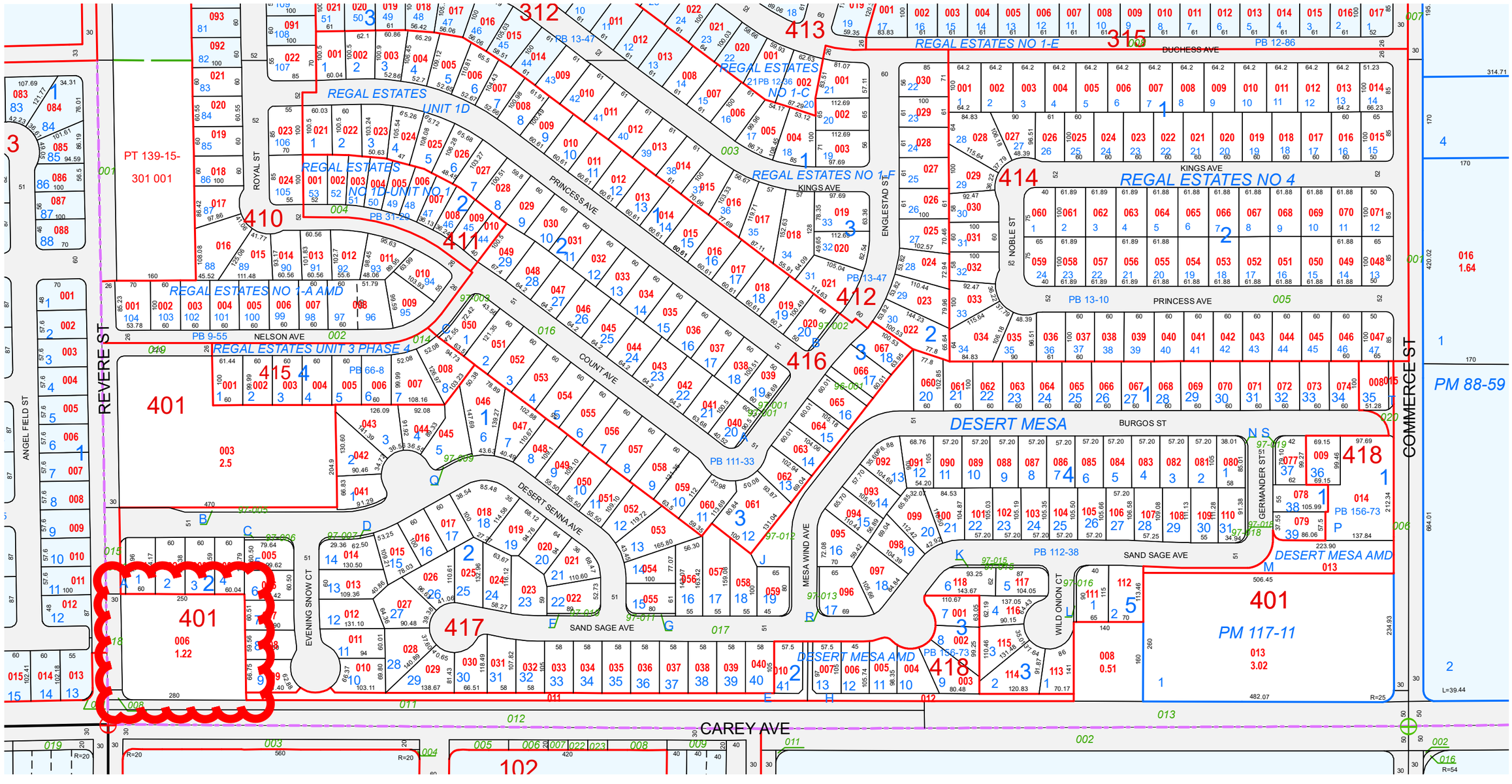
Rev: 3/3/2020

MAP S 2 SW 4

8	4	8	4
5	1	5	1
6	2	6	2
7	3	7	3
8	4	8	4
5	1	5	1

139-15-4

CLARK COUNTY NEVADA



TAX DIST 250

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole–foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC–3, #9202
1315 East–West Highway
Silver Spring, MD 20910–3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713–3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the Clark County GIS Management Office (GISMO).

This map reflects more detailed and up–to–date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de–annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

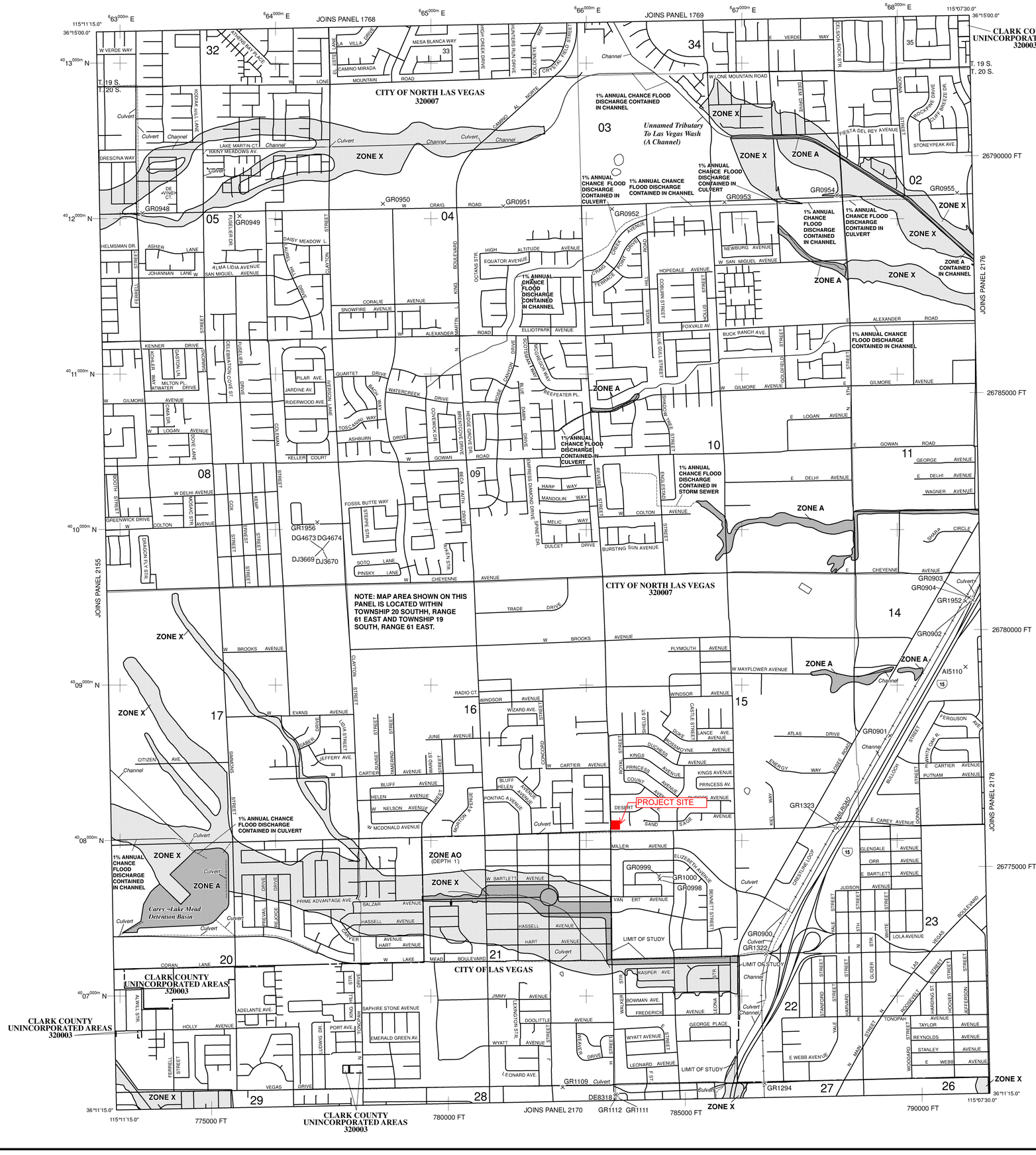
For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

The Digital Flood Insurance Rate Map (DFIRM) was produced through a unique partnership between Clark County and the Federal Emergency Management Agency (FEMA). Clark County has developed a long-term approach of floodplain management to decrease the costs associated with flooding. This is demonstrated by the Clark County commitment to share and maintain floodplain layers within their Geographic Information System Management Office (GISMO).

This DFIRM reflects several innovative features. These include:
+ Southern Nevada GIS–Cooperation among local government agencies throughout Clark County. The foundation of cooperation is the GIS Interlocal Agreements formed between fourteen regional participants. In part, the agreements specify that the Clark County GIS Management Office (GISMO) will be responsible for maintaining a GIS data warehouse and associated Southern Nevada GIS metadata.

+ The GISMO's responsibilities go beyond maintaining the GIS data warehouse. GISMO also maintains the Street Centerline Database used by 911 dispatch services. This centerline database serves as the basemap for this DFIRM.

DIGITAL DATA AVAILABILITY: http://www.co.clark.nv.us/ceit/gismo/gismo.htm



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referred to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 11
- 6000000 FT — 5000-foot grid ticks: Nevada State Plane coordinate system, east zone (FIPSZONE 2701), Transverse Mercator
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 16, 1995
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 27, 2002

November 16, 2011 --to reflect updated topographic information, to change floodway, to add Base Flood Elevations, to update corporate limits, to change Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to delete Special Flood Hazard Areas, to change zone designations, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2160F

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	325276	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.

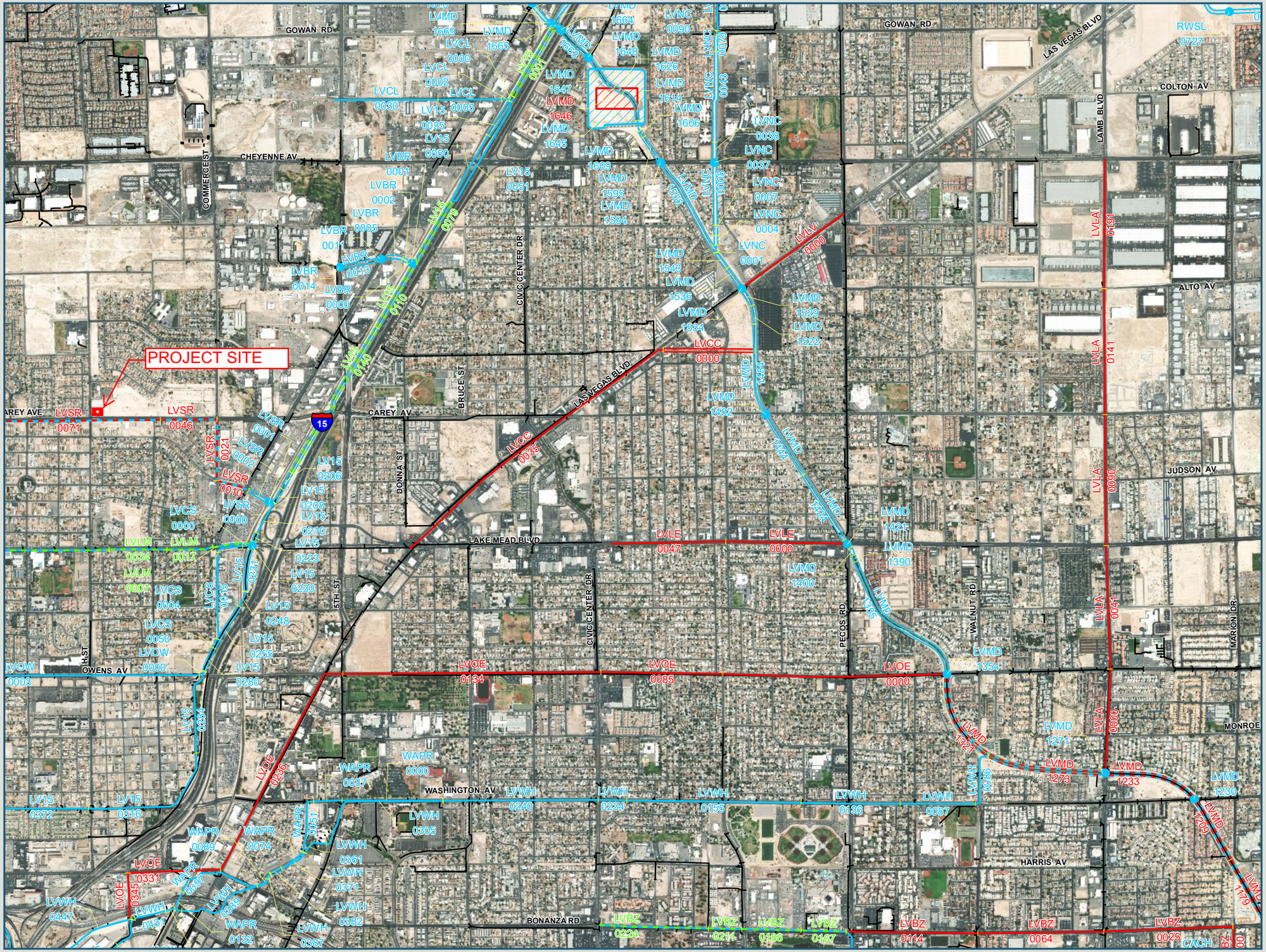
MAP NUMBER
32003C2160F

MAP REVISED
NOVEMBER 16, 2011

Federal Emergency Management Agency

REGIONAL FLOOD CONTROL DISTRICT

CLARK COUNTY NEVADA



REGIONAL FLOOD CONTROL DISTRICT

2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F-25
FLOOD CONTROL FACILITIES

LEGEND

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

Remove & Replace/Parallel Facilities

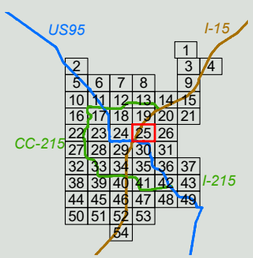
Category A	Category B
Channel	Channel
Stormdrain	Stormdrain
Crossing	Crossing

N

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

Scale: 1 inch = 2,000 feet

AerialSource:Esri World Imagery 2017



ATKINS
Member of the SNC-Lavalin Group

Louis Berger

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
CABZ		**CEDAR AVENUE - BONANZA**						
0010	E	60" RCP	1450					0.30
LCCH		**LAS VEGAS CREEK CHANNEL**						
0013	E	2: 12' X 6' RCB	2035	3050	CLC20-C	MEADOWS4	9.60	0.82
LV15		**FREEWAY CHANNEL**						
0000	E	CONC CHNL 20'W 10'D 1.5:1 SS (REPLACE W/ LV150001)	1759	5012	2CLV1E-3	CWEST4	11.19	0.12
0001	P0	CONC CHNL 55'W 11'D 0:1 SS (REPLACES LV150000)	1759	5012	2CLV1E-3	CWEST4	11.19	0.12
0035	E	CONC CHNL 20'W 10'D 1.5: SS	899	1404^	2CLV1D-5^	CWEST4	10.29	0.16
0050	E	2: 8' X 10' RCB	1504	1404^	2CLV1D-5^	CLVMD4	10.29	0.75
0051	E	12' X 10' RCB	2524	3275^	2CLV1D-5^	CLVMD4	10.29	5.20
0078	E	CONC CHNL 20'W 10'D 1.5:1 SS (REPLACE W/ LV150079)	1608	4679	2CLV1D-5	CWEST4	10.29	0.14
0079	P0	CONC CHNL 50'W 11'D 0:1 SS (REPLACES LV150078)	1608	4679	2CLV1D-5	CWEST4	10.29	0.14
0109	E	CONC CHNL 15-20'W 10'D 1.5:1 SS (REPLACE W/ LV150110)	1576	4353	CLV1D-4	CWEST4	9.49	0.11
0110	P0	CONC CHNL 45'W 11.5'D 0:1 SS (REPLACES LV150109)	1576	4353	CLV1D-4	CWEST4	9.49	0.11
0139	E	CONC CHNL 15'W 10'D 1.5:1 SS (REPLACE W/ LV150140)	3565	4353	CLV1D-4	CWEST4	9.49	0.18
0140	P0	CONC CHNL 45'W 11'D 0:1 SS (REPLACES LV150139)	3565	4353	CLV1D-4	CWEST4	9.49	0.18
0206	E	CONC CHNL 48'W 13'D 0:1 SS	329	4081	CW1C2	NW4SC	8.92	0.46
0208	E	CONFLUENCE STRUCTURE 64'-48'W 10-13'D 0:1 SS	298	4081	CW1C2	NW4SC	8.92	0.42
0210	E	3: 12' X 9' RCB	725	3689	CCVG24	NW3SC	7.14	0.25
0223	E	CONFLUENCE STRUCTURE 40'W 9'D 0:1 SS	185	3689	CCVG24	NW3SC	7.14	0.25
0230	E	12' X 4.5' RCBC @ LAKE MEAD	177	1265	DRAILRD	NW3	5.30	1.16
0231	E	CONC CHNL 8'W 8'D 0:1 SS	900	1265	DRAILRD	NW3	5.30	2.50
0248	E	8' X 8' RCBC @ UPRR	350	1265	DRAILRD	NW3	5.30	1.34
0255	E	CONC CHNL 8'W 8'D 0:1 SS	1330	1265	DRAILRD	NW3	5.30	2.00
0280	E	CONC CHNL 21'W 8'D 0:1 SS	550	2530	CCVG10	NW3	5.30	2.00
0284	E	14' X 6' RCB	1790	1444	CVG10-C	NW3	4.91	0.50
0316	E	11' X 6' RCB	3010	1152	CWA20-C	NW3	4.52	0.59
0372	E	9' X 6' RCB	1970	1152	CWA20-C	NW3	4.52	0.66
LVBR		**LAS VEGAS - BROOK**						
0000	E	96" CMPC @ UPRR	107	346^	CLV1D-5^	WEST3	0.80	0.35
0001	E	8' X 4' RCB @ UPRR	107	530^	CLV1D-5^	WEST3	0.80	0.93
0002	E	CONC CHNL 27'W 9'D 0:1 SS	125	876	CLV1D-5	WEST3	0.80	1.57
0005	E	CONC CHNL 18'W 4.75'D 0:1 SS	367	876	CLV1D-5	WEST3	0.80	2.43
0011	E	2: 9' X 3' RCBC @ LOSEE	135	876	CLV1D-5	WEST3	0.80	0.71
0013	E	CONC CHNL 12'W 4.5'D 2:1 SS	750	876	CLV1D-5	WEST3	0.80	1.50
0014	E	12' X 4' RCBC @ N. 5TH ST	100	876	CLV1D-5	WEST3	0.80	2.60
LVBZ		**LAS VEGAS WASH - BONANZA**						
0000	P	2: 12' X 7' RCB	1760	1753	CBN15-C	SW3	2.15	0.40
0025	P	2: 12' X 7' RCB	2700	1753	CBN15-C	SW3	2.15	0.40
0064	P	2: 12' X 7' RCB	2630	1603	CBN12-C	SW3	1.87	0.40
0114	P	2: 12' X 6' RCB	2740	1311	CBN10-C	SW3	1.54	0.40
0166	E	54" RCP (REPLACE W/ LVBZ0167)	930	1106	CBN09	SW3	1.29	0.45
0167	P0	10' X 9' RCB (REPLACES LVBZ0166)	930	1106	CBN09	SW3	1.29	0.45
0187	E	48" RCP (REPLACE W/ LVBZ0188)	1235	1106	CBN09	SW3	1.29	0.71
0188	P0	9' X 9' RCB (REPLACES LVBZ0187)	1235	1106	CBN09	SW3	1.29	0.71
0210	E	42" RCP (REPLACE W/ LVBZ0211)	704	1004	CBN08	SW3	1.05	1.37
0211	P0	8' X 8' RCB (REPLACES LVBZ0210)	704	1004	CBN08	SW3	1.05	1.37
0223	E	36" RCP (REPLACE W/ LVBZ0224)	2275	856	CBN03	SW3	0.84	0.72
0224	P0	8' X 8' RCB (REPLACES LVBZ0223)	2275	856	CBN03	SW3	0.84	0.72
LVCC		**LAS VEGAS WASH CARTIER CHANNEL**						
0000	P	CONC CHNL 12'W 9.5'D 0:1 SS	1900	995	CLW1A-3	CCWEST3	1.00	0.40
0035	P	10' X 5' RCB	6750	417	A-C	WEST3	0.40	0.32
LVCL		**LAS VEGAS WASH - COLTON**						
0000	E	CONC CHNL 9'W 13'D 0:1 SS	102	1071	CLV1E-3	WEST3	0.90	0.63
0002	E	102" RCP	157	1071	CLV1E-3	WEST3	0.90	0.62
0005	E	9' X 6' RCB	1320	1071	CLV1E-3	WEST3	0.90	0.94
0030	E	7' X 6' RCB	2148	1071	CLV1E-3	WEST3	0.90	2.22
LVCS		**LAS VEGAS WASH - COMMERCE STREET**						
0000	E	12' X 5' RCB	290	1590	CVG24	NW3	5.78	1.64
0004	E	10' X 6' RCB	510	1590	CVG24	NW3	5.78	4.84
0015	E	10' X 8' RCB	1700	1590	CVG24	NW3	5.78	0.97
0050	E	CONC CHNL 10'W 8'D 0:1 SS	200	1265	DCCVG10	NW3	5.30	2.27

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVKC		**LAS VEGAS WASH - KING CHARLES CHANNEL**						
0000	E	CONC CHNL 35'W 10'D 0:1 SS	592	5518	CLV99B-7	CWEST5	14.74	0.40
0009	E	CONC CHNL 21.8'W 10'D 1.5:1 SS	3280	5518	CLV99B-7	CWEST5	14.74	0.40
LVLA		**LAS VEGAS WASH - LAMB**						
0000	P	2: 13' X 9' RCB	2200	2461	CLVW03	WEST3	3.30	0.30
0041	P	13' X 11' RCB	2600	2320	COA02	WEST3	3.07	0.58
0090	P	13' X 11' RCB	2700	2047	CLW64-3	WEST3	2.65	0.44
0141	P	13' X 10' RCB	2650	1693	CLW64-2	WEST3	2.12	0.38
0191	P	12' X 9' RCB	2700	1452	CLW64-1	WEST3	1.61	0.56
LVLE		**LAKE MEAD DRAIN TO LAS VEGAS WASH**						
0000	P	12' X 6' RCB	2600	660	CLV1B-2	WEST3	0.78	0.40
0047	P	12' X 4' RCB	2400	458	LV1B-1	WEST3	0.49	0.50
LVLM		**LAS VEGAS WASH - LAKE MEAD**						
0000	E	43"X 68" HERCP (REPLACE W/ LVLM0001)	847	1159	CLM20-C	NW3SC	1.36	4.60
0001	P0	12' X 4' RCB (REPLACES LVLM0000)	847	1159	CLM20-C	NW3SC	1.36	4.60
0016	E	54" RCP (REPLACE W/ LVLM0017)	965	1159	CLM20-C	NW3SC	1.36	4.38
0017	P0	12' X 4' RCB (REPLACES LVLM0016)	965	1159	CLM20-C	NW3SC	1.36	4.38
0033	E	60" RCP (REPLACE W/ LVLM0034)	1186	1159	CLM20-C	NW3SC	1.36	1.62
0034	P0	12' X 5' RCB (REPLACES LVLM0033)	1186	1159	CLM20-C	NW3SC	1.36	1.62
0059	E	72" RCP (REPLACE W/ LVLM0060)	5952	1159	CLM20-C	NW3SC	1.36	0.66
0060	P0	12' X 7' RCB (REPLACES LVLM0059)	5952	1159	CLM20-C	NW3SC	1.36	0.66
LVLV		**LAS VEGAS BLVD DRAIN**						
0000	P	2: 10' X 8' RCB	2600	823	CLW075-4	WEST3	1.03	0.10
LVMD		**LAS VEGAS WASH - MIDDLE**						
1178	E	EARTH CHNL 30'W 18'-20'D 2:1 SS (REPLACE W/ LVMD1179)	1500	13206	CLVW04-C	CLVWASH5	109.77	0.57
1179	P	CONC CHNL 60'W 9.5'D 2:1 SS (REPLACES LVMD1178)	1500	13206	CLVW04-C	CLVWASH5	109.77	0.57
1208	E	BANK-STAB. CHNL 65'W 15'D 2:1 SS (REPLACE W/ LVMD1209)	1420	13206	CLVW04-C	CLVWASH5	109.77	0.32
1209	P	CONC CHNL 60'W 11'D 2:1 SS (REPLACES LVMD1208)	1420	13206	CLVW04-C	CLVWASH5	109.77	0.32
1230	E	4 SPAN BRIDGE 162'W 13'D @ WASHINGTON	105	13172	CCLVW03	CLVWASH5	109.50	0.73
1232	E	BANK-STAB. CHNL 48'W 8'D 2:1 SS (REPLACE W/ LVMD1233)	1900	13172	CCLVW03	CLVWASH5	109.50	0.73
1233	P	CONC CHNL 90'W 8'D 0:1 SS (REPLACES LVMD1232)	1900	13172	CCLVW03	CLVWASH5	109.50	0.73
1271	E	4 SPAN BRIDGE 94'W 10'-12'D 2:1 SS @ LAMB	120	12412	CCLVW01C	CLVWASH5	106.21	0.38
1272	E	EARTH CHNL 80'W 10'D 2:1 SS (REPLACE W/ LVMD1273)	2400	12412	CCLVW01C	CLVWASH5	106.21	0.38
1273	P	CONC CHNL 80'W 9'D 2:1 SS (REPLACES LVMD1272)	2400	12412	CCLVW01C	CLVWASH5	106.21	0.38
1320	E	GABION CHNL 100'W 10'D 2:1 SS (REPLACE W/ LVMD1321)	1950	9070	CCK-C1	CLVWASH5	103.98	0.38
1321	P	CONC CHNL 80'W 8.5'D 2:1 SS (REPLACES LVMD1320)	1950	9070	CCK-C1	CLVWASH5	103.98	0.38
1354	E	5 SPAN BRIDGE 110'W 7'-8'D 2:1 SS @ OWENS	120	7810	2CLV1B-2	CLVWASH5	169.06	0.58
1355	E	GABION CHNL 100'W 10'D 2:1 SS	3122	7810	2CLV1B-2	CLVWASH5	169.06	0.58
1390	E	ENERGY DISSIPATOR	137	7692	CLW64-4	CLVWASH5	168.27	0.10
1400	E	CONC CHNL 90' W 12'D 0:1	173	7692	CLW64-4	CLVWASH5	168.27	5.00
1421	E	2 SPAN BRIDGE 84'W 8'D @ LAKE MEAD	200	8906	CLW64-4	CCWEST5	80.53	0.60
1424	E	CONC CHNL 78'W 8.5'D 0:1 SS	1615	8906	CLW64-4	CCWEST5	80.53	0.34
1444	E	CONC CHNL 84'W 8'D 0:1 SS	1450	8906	CLW64-4	CCWEST5	80.53	0.34
1482	E	1 SPAN BRIDGE 84'W 7'D @ CAREY	72	8906	CLW64-4	CCWEST5	80.53	1.00
1484	E	CONC CHNL 84'W 8'-9'D 0:1 SS	1880	8906	CLW64-4	CCWEST5	80.53	0.37
1522	E	CONC CHNL 90'W 10'D 0:1 SS	376	8866	2CLW1A-3	CCWEST5	80.16	0.53
1529	E	CONC CHNL 90'W 9/8'D 0:1 SS	360	8866	2CLW1A-3	CCWEST5	80.16	0.53
1534	E	1 SPAN BRIDGE 72.5'W 7.5'D @ LAS VEGAS BLVD	120	8742	CLW1A-4	CCWEST5	78.13	0.88
1536	E	CONC CHNL 70'W 8'D 0:1 SS	455	8742	CLW1A-4	CCWEST5	78.13	0.49
1543	E	CONFLUENCE STRUCTURE	393	8742	CLW1A-4	CCWEST5	78.13	1.44
1550	E	CONC CHNL 90'W 7.5'-9'D 0:1 SS	2150	8260	CHYPKOT	CCWEST5	77.19	0.45
1594	E	1 SPAN BRIDGE 90'W 5'D @ CHEYENNE	124	8260	CHYPKOT	CCWEST5	77.19	0.71
1595	E	CONC CHNL 90'W 7'D 0:1 SS	580	8260	CHYPKOT	CCWEST5	77.19	0.40
1606	E	TRANSITION STRUCTURE	144	8260	CHYPKOT	CCWEST5	77.19	0.40
1609	E	60' X 7.25' RCB WITH 2' CENTER PIER	221	8260	CHYPKOT	CCWEST5	77.19	0.40
1614	E	CONC CHNL 60'W 9'-11'D 0:1 SS	703	13796	CHYPKIN	CCWEST5	77.19	0.15
1626	E	TRANSITION STRUCTURE	227	13796	CHYPKIN	CCWEST5	77.19	2.46
1643	E	64,000 CFS PMF SPILLWAY (REPLACE W/ LVMD1644)		64000	CHYPKIN	CCWEST5	77.19	
1644	P	MODIFY 64,000 CFS PMF SPILLWAY, RAISE BY 1' (REPL LVMD1643)		64000	CHYPKIN	CCWEST5	77.19	
1645	E	456 AC-FT CHEYENNE PEAKING BASIN		13796	CHYPKIN	CCWEST5	77.19	
1646	P	UPGRADE TO 590 AC-FT CHEYENNE PEAKING BASIN		13796	CHYPKIN	CCWEST5	77.19	
1647	E	CONC CHNL 120'D 10'W 0:1 SS	800	13796	CHYPKIN	CCWEST5	77.19	0.40

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVMD		**LAS VEGAS WASH - MIDDLE**						
1648	E	3 SPAN BRIDGE 95'W 8'-10'D 2:1 SS @ CIVIC CENTER	120	13796	CHYPKIN	CCWEST5	77.19	0.70
1663	E	CONC CHNL 80'W 10'D 2:1 SS	700	13715	3C99B-7	CCWEST5	76.87	0.70
1664	E	3 SPAN BRIDGE 75'W 10'D 2:1 SS @ I-15	120	13715	3C99B-7	CCWEST5	76.87	0.70
1665	E	TRANSITION STRUCTURE	200	8157	CLV99B-5	WEST5	48.36	0.36
1669	E	FREE SPAN BRIDGE 55'W 12'D @ UPRR	40	8157	CLV99B-5	WEST5	48.36	0.36
1670	E	CONC CHNL 82'W 10'D 0:1 SS	370	8157	CLV99B-5	WEST5	48.36	1.69
1677	E	CONC CHNL 80'W 10'D 2:1 SS	119	8157	CLV99B-5	WEST5	48.36	0.37
1679	E	4 SPAN BRIDGE 100'W 12'D 2:1 SS @ LOSEE	120	8157	CLV99B-5	WEST5	48.36	0.37
LVNC		**LAS VEGAS WASH - N CHANNEL**						
0001	E	18' X 7' RCB	150	1059	CLW100	CWEST5	14.59	0.33
0004	E	CONC CHNL 18'W 8.5'D 0:1 SS	200	1059	CLW100	CWEST5	14.59	0.33
0007	E	DROP STRUCTURE 18'W 2.8'D 3:1 SS	200	1059	CLW100	CWEST5	14.59	0.70
0008	E	CONC CHNL 18'W 10'D 2:1 SS	1250	1059	CLW100	CWEST5	14.59	0.70
0037	E	2: 14' X 7'-6' CMAP @ CHEYENNE	120	1059	CLW100	CWEST5	14.59	0.70
0038	E	CONC CHNL 32'W 8.5'D 2:1 SS	363	1059	CLW100	CWEST5	14.59	0.30
0043	E	CONC CHNL 12'W 6'-8'D 2:1 SS	1930	1059	CLW100	CWEST5	14.59	0.50
0079	E	TRANSITION CONC CHNL	350	1059	CLW100	CWEST5	14.59	1.00
0090	E	3: 12' X 6' RCB	120	1059	CLW100	CWEST5	14.59	0.70
0091	E	14' X 6' RCAP	1324	1059	CLW100	CWEST5	14.59	0.52
LVOE		**OWENS AVENUE - EAST**						
0000	P	15' X 12' RCB	4700	3018	CK-C1	SW5	24.06	0.47
0085	P	14' X 12' RCB	2540	2908	CG	SW5	23.74	0.62
0134	P	12' X 11' RCB	5380	2833	CE-C	SW5	23.51	1.00
0236	P	13' X 9' RCB	5000	2643	CH-C1	SW5	22.90	1.50
0331	P	13' X 12' RCB	1940	2576	DLVOE	SW5	22.61	0.60
0345	P	13' X 12' RCB	990	2576	DLVOE	SW5	22.61	0.60
LVOW		**OWENS AVENUE SYSTEM**						
0000	E	10' X 6' RCB	145	1219	CLM16B-C	NW3	2.43	0.76
0003	E	96" RCP	7500	1219	CLM16B-C	NW3	2.43	0.70
LVSR		**LAS VEGAS WASH - SMOKE RANCH**						
0000	E	CONC CHNL 22'W 8'D 0:1 SS	79	1086	CS1-C	NW3SC	1.42	2.32
0001	E	FREE SPAN BRIDGE 22'W 10'D	50	1086	CS1-C	NW3SC	1.42	2.32
0002	E	CONC CHNL 22'W 8'D 0:1 SS	468	1086	CS1-C	NW3SC	1.42	2.32
0009	E	72" RCP (REPLACE W/ LVSR0010)	702	1086	CS1-C	NW3SC	1.42	2.32
0010	P	10' X 5' RCB (REPLACES LVSR0009)	702	1086	CS1-C	NW3SC	1.42	2.32
0020	E	60" RCP (REPLACE W/ LVSR0021)	1320	1086	CS1-C	NW3SC	1.42	3.03
0021	P	10' X 5' RCB (REPLACES LVSR0020)	1320	1086	CS1-C	NW3SC	1.42	3.03
0045	E	54" RCP (REPLACE W/ LVSR0046)	1180	1086	CS1-C	NW3SC	1.42	3.41
0046	P	10' X 5' RCB (REPLACES LVSR0045)	1180	1086	CS1-C	NW3SC	1.42	3.41
0070	E	66" RCP (REPLACE W/ LVSR0071)	4118	1086	CS1-C	NW3SC	1.42	0.73
0071	P	10' X 8' RCB (REPLACES LVSR0070)	4118	1086	CS1-C	NW3SC	1.42	0.73
LVWH		**WASHINGTON AVENUE CHANNEL**						
0086	E	3: 12' X 8' RCB	1210	3825	CLVW01-C	SW5SC	16.58	0.35
0087	E	3: 12' X 8' RCB	1560	3825	CLVW01-C	SW5SC	16.58	0.33
0136	E	3: 12' X 8' RCB	2063	3728	CQ-C	SW5SC	16.35	0.33
0155	E	3: 10' X 8' RCB	3630	3618	CP-C	SW5SC	16.09	0.68
0234	E	2: 12' X 8' RCB	600	3502	CN-C	SW5SC	15.78	0.71
0240	E	2: 12' X 8' RCB	3240	3502	CN-C	SW5SC	15.78	1.50
0305	E	12' X 8' RCB	2950	1562^	CV1-C^	SW5SC	14.95	2.93
0361	E	12' X 8' RCB	548	1562^	CV1-C^	SW5SC	14.95	0.90
0371	E	12' X 8' RCB	590	1562^	CV1-C^	SW5SC	14.95	2.62
0382	E	CONC CHNL 50'W 10'D 0:1 SS	260	3124	CV1-C	SW5SC	14.95	0.80
0387	E	12' X 8' RCB	125	1562^	CV1-C^	SW5SC	14.95	7.43
0389	E	12' X 8' RCB	2110	1562^	CV1-C^	SW5SC	14.95	0.90
0426	E	16' X 8' RCB	150	1562^	CV1-C^	SW5SC	14.95	1.08
0429	E	SPLITTER STRUCTURE (2: 12' X 8' RCB)	190	2870	DCLC21	SW5	22.61	1.90
0431	E	3: 14.33' X 10' RCB	665	2870	DCLC21	SW5	22.61	0.15
0446	E	JUNCTION STRUCTURE	69	2870	DCLC21	SW5	22.61	0.15
0447	E	3: 14.33' X 10' RCB	1955	5193	CCAL93	SW5	22.05	0.15
RWSL		**RANGE WASH - SLOAN**						
0694	E	CONC CHNL 10'W 8'D 1.5:1 SS	1500	1686	C47C4	RW3SC	2.40	0.56

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
RWSL		**RANGE WASH - SLOAN**						
0727	E	3: 10' X 8' RCBC	100	1592	C307E3	RW3SC	2.25	0.56
0728	E	CONC CHNL 12'W 8.5'D 1.5:1 SS	1345	1592	C307E3	RW3SC	2.25	0.56
WAGC		**WASHINGTON AVENUE CHANNEL - GRAND CENTRAL**						
0000	E	2: 12' X 4' RCB	700	505	LC21	SW3	0.56	0.20
0014	E	1: 12' X 4' RCB AND 1: 11' X 4' RCB	2440	505	LC21	SW3	0.56	0.20
WAPR		**WASHINGTON AVENUE CHANNEL PARALLEL**						
0000	E	12' X 8' RCB	2100	1562^	CV1-C^	SW5SC	14.95	2.20
0037	E	12' X 8' RCB	590	1562^	CV1-C^	SW5SC	14.95	5.60
0051	E	12' X 8' RCB	1200	1562^	CV1-C^	SW5SC	14.95	0.80
0074	E	12' X 8' RCB	550	1562^	CV1-C^	SW5SC	14.95	1.60
0089	E	14' X 8' RCB	395	1562^	CV1-C^	SW5SC	14.95	0.55
0097	E	14' X 8' RCB	1835	1562^	CV1-C^	SW5SC	14.95	1.24
0132	E	2: 9' X 8' RCB	387	1562^	CV1-C^	SW5SC	14.95	1.67

*The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.
**As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.
^ For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e. HEC-1 Node flow = existing facility normal depth capacity + proposed parallel facility flow).

REGIONAL FLOOD CONTROL DISTRICT

2018 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F-25

LEGEND

ID (Facility Identifier) AABB
Parent Stream Name
Stream Name
Mile 0000
Distance Above Confluence with Parent Stream (Miles)
Miles in Hundredths

ExistingFacility..... E
Proposed or Modified Facility..... P
Contingency Level
Category A..... P
Catgory B..... P0

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

Construction Features

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

ATKINS
Member of the SNC-Lavalin Group
Louis Berger

VI. HYDROLOGY

The methodology presented in this study is in compliance with the CCRFCD Hydrologic Criteria and Drainage Design Manual (Reference 3, hereinafter referred to as the Manual).

The existing and developed drainage basins were determined from aerial photography, field investigations and boundary and topographical survey. The watersheds were modeled using the SCS Unit Hydrograph method within the U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package.

Precipitation - The project site is located within the McCarran Rainfall Area as identified in the Manual, Figure 513. The 6-hour depths used for the HEC-1 analysis are 1.58 in. for the 10-year storm event and 2.77 for the 100-year storm event, per Depth-Duration-Frequency Values for McCarran Airport Rainfall Area, Table 505. Reference material has been provided in Appendix C.

Curve Numbers (CN) - The runoff curve number for the Existing condition is 85 and 94 for the Developed condition per Table 602, 1 of 4 for Soil Group C. For the Developed condition, the runoff curve number was conservative and accounted for the entire site with no reduction factor for the landscape areas. The Soil Group determination was provided based on the soil survey found in Appendix C.

Drainage Areas and Flow Patterns - The subbasins and flow patterns used for the hydrologic modeling were determined from digital grading and design files for site.

Onsite & Offsite Basin Analysis – Two conditions were utilized to estimate onsite and offsite flows impacting the proposed site. The conditions are Existing and Developed, which are further explained.

Lag Time - The lag time (TLAG) is described as the time between the center of mass of rainfall and the time of peak discharge from a basin. Lag Time can be related to time of concentration (Tc) by the following relationship: TLAG = 0.6 (Tc). The time of concentration (Tc) is defined as the time required for runoff to flow from the most hydraulically distant area of the basin to the outlet of the basin or a design point. The procedure for calculating (Tc) is outlined in Section 602 of the Manual. Lag Time calculations for the drainage subbasins have been included in Appendix A on Standard Form 4.

VII. EXISTING CONDITION

For the Existing condition, the hydrologic analysis consists of one onsite basin and two referenced combination points. The site will generate a total of 3 cfs under Existing Conditions for the 100-year storm event for onsite basin EX1. **Figure 5** depicts the basins and drainage patterns used in the Existing Condition hydrologic analysis. An Existing Condition HEC-1 model has been included in Appendix A. **Table 1** summarizes the HEC-1 results for Existing Conditions.

Combination Point CP7, is referenced from the approved Technical Drainage Study Update for Desert Mesa (CNLV#62213) on the north side of Carey Avenue. This combination point represents the combined flows from the Desert Mesa residential subdivision that are conveyed into Carey Avenue.

Combination Point CP8, is referenced from the approved Technical Drainage Study Update for Desert Mesa (CNLV#62213) on the north and west sides of the subject site. This combination point represents the flow conveyed south within Revere Street before entering Carey Avenue.

Table 1: Summary of Existing Conditions

SUBBASIN	AREA (AC)	Q_{10} (cfs)	Q_{100} (cfs)
EX1	1.22	1	3
CP7*	n/a	57	217
CP8*	n/a	2	3

* Referenced from the *Technical Drainage Study Update for Desert Mesa (CNLV#62213)*

Existing Condition Street Flow Summary:

Cross-section characteristics for the Existing Condition are presented below. **Figure 5** shows the locations of the cross sections corresponding to the calculations included in **Table 2**. Refer to Appendix B for street flow hydraulic calculations.

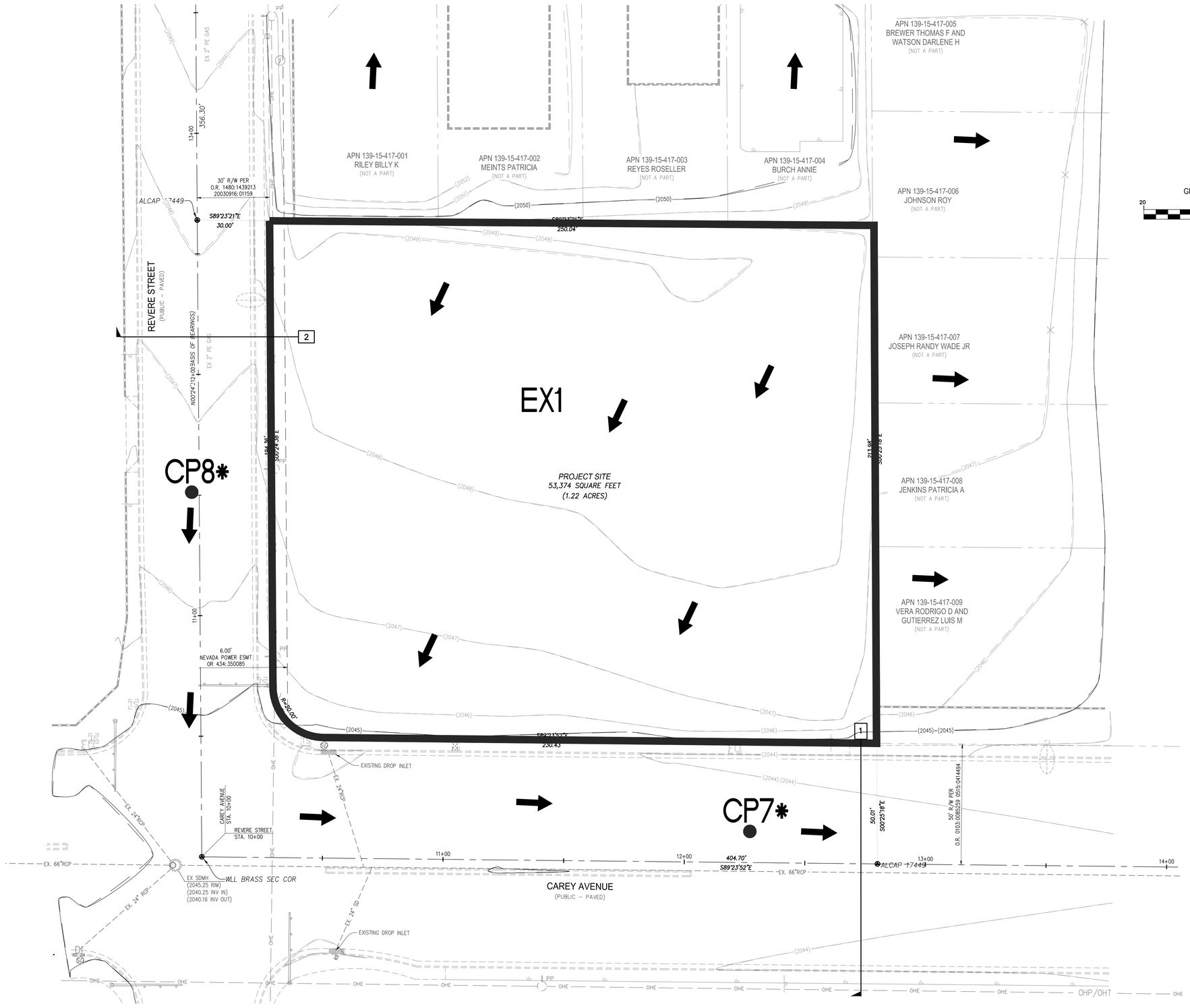
Table 2: Existing Cross-Section Characteristics: 10-year and 100-year

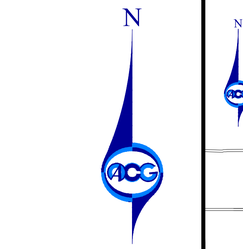
Street Name	Slope, %	Q_{100}, cfs	D_{100}, ft	V_{100}, fps	$D*V_{100}$	Q_{10}, cfs	D_{10}, ft	V_{10}, fps	$D*V_{10}$
1 (Carey Ave. – CP7)*	0.40	217	1.12	3.98	4.46	57	0.75	2.67	2.00
2A/2B (Revere St. – CP8)*	1.70	3	0.28	2.44	0.68	2	0.25	2.29	0.57

* Referenced from the *Technical Drainage Study Update for Desert Mesa (CNLV#62213)*

Cross Section 1 is located within Carey Avenue and is referenced from the approved Technical Drainage Study Update for Desert Mesa. For **Q_{100}**, the flow depth, D, is 1.12 feet, the flow velocity, V, is 3.98 feet per second using a slope of 0.40%. The product of D*V is 4.46. See Appendix C for Cross Section reference calculations.

Cross Section 2A/2B is located within Revere Street and represents the flow referenced from the approved Technical Drainage Study Update for Desert Mesa. The flow within Revere Street is conveyed south towards Carey Avenue. For $\mathbf{Q_{100}}$, the flow depth, D, is 0.28 feet, the flow velocity, V, is 2.44 feet per second using a slope of 1.70%. The product of D*V is 0.68. See Appendix B for Cross Section calculations.





VICINITY MAP
NTS

GRAPHIC SCALE
20 0 10 20 40
(IN FEET)
1" = 20'

LEGEND

- SUBBASIN BOUNDARY
- OFF1 — SUBBASIN NAME
- FLOW DIRECTION
- (2555) — EXISTING CONTOURS
- CP1 — COMBINATION POINT
- 1 — FLOWMASTER SECTION

SUMMARY OF EXISTING CONDITIONS

BASIN NAME	AREA (AC)	Q_{10} (CFS)	Q_{100} (CFS)
EX1	1.22	1	3
CP7*	N/A	57	217
CP8*	N/A	2	3

FLOW CHARACTERISTICS – EXISTING CONDITION (10 YEAR)

SECTION NUMBER	SLOPE (%)	Q_{10} (cfs)	DEPTH (ft)	VELOCITY (ft/s)	D*V
1*	0.40	57	0.75	2.67	2.00
2A*	1.70	2	0.25	2.29	0.57

FLOW CHARACTERISTICS – EXISTING CONDITION (100 YEAR)

SECTION NUMBER	SLOPE (%)	Q_{100} (cfs)	DEPTH (ft)	VELOCITY (ft/s)	D*V
1*	0.40	217	1.12	3.98	4.46
2B*	1.70	3	0.28	2.44	0.68

- REFERENCED FROM THE TECHNICAL DRAINAGE STUDY UPDATE FOR DESERT MESA (CNLV#62213)

APPROVAL

REV.	DESCRIPTION	APRVD. BY	DATE

REVISIONS

REVERE AND CAREY

EXISTING CONDITIONS

APN: 139-15-401-006
NEC REVERE STREET & CAREY AVENUE
NORTH LAS VEGAS, NEVADA 89030

ACG DESIGN
4310 CAMERON ST, SUITE 12-A
LAS VEGAS, NEVADA 89103
OFFICE: 702.448.8737
WEBSITE: WWW.ACG.DESIGN

ENGINEER'S SEAL

DATE:	10/14/20
PROJ. NO:	190259
DRAWN BY:	ARB
CHECKED BY:	RAS
SCALE:	AS NOTED
JURISDICTION:	CNLV

DRAWING NUMBER:
FIG 5

AGENCY NUMBER:

VIII. DEVELOPED CONDITION

For the Developed Condition, the hydrologic analysis consists of one onsite basin and two referenced combination points. The site will generate a total of 6 cfs under Developed Conditions for the 100-year storm event for onsite basin ON1. **Figure 6** depicts the basins and drainage patterns used in the Developed Condition hydrologic analysis. A Developed Condition HEC-1 model has been included in Appendix A. **Table 3** summarizes the HEC-1 results for Developed Conditions.

Basin ON1 represents the onsite flow, which is conveyed south towards Carey Avenue. There is an increase of 1 cfs between the Existing and Developed conditions onsite, which conveys into Carey Avenue. This flow is negligible and is less than a 1% increase to the overall flow within Carey Avenue. There is a negligible amount of flow that is conveyed from the northwest driveway into Revere Street.

Combination Point CP7, is referenced from the approved Technical Drainage Study Update for Desert Mesa (CNLV#62213) on the north side of Carey Avenue. This combination point represents the combined flows from the Desert Mesa residential subdivision that are conveyed into Carey Avenue.

Combination Point CP8, remains the same as indicated in the Existing Condition. This flow is referenced from the approved Technical Drainage Study Update for Desert Mesa (CNLV#62213) on the north and west sides of the subject site. This combination point represents the flow conveyed south within Revere Street before entering Carey Avenue.

Table 3: Summary of Developed Conditions

SUBBASIN	AREA (AC)	Q_{10} (cfs)	Q_{100} (cfs)
ON1	1.22	2	4
CP7*	n/a	57	217
CP8*	n/a	2	3

* Referenced from the *Technical Drainage Study Update for Desert Mesa (CNLV#62213)*

Developed Condition Street Flows:

Cross-section characteristics for the Developed Condition are presented below**. Figure 6** shows the locations of the cross sections corresponding to the calculations included in **Table 4**. Hydraulic calculations have been included in Appendix B.

Table 4: Developed Cross-Section Characteristics: 10-year and 100-year

Street Name	Slope, %	Q_{100}, cfs	D_{100}, ft	V_{100}, fps	$D*V_{100}$	Q_{10}, cfs	D_{10}, ft	V_{10}, fps	$D*V_{10}$
1 (Carey Ave. – CP7)*	0.40	217	1.12	3.98	4.46	57	0.75	2.67	2.00
2A/2B (Revere St. – CP8)*	1.70	3	0.28	2.44	0.68	2	0.25	2.29	0.57
3 – Onsite Calc	0.50	4	0.41	1.39	0.57	-	-	-	-
4 – Onsite Calc	0.60	4	0.37	2.22	0.82	-	-	-	-

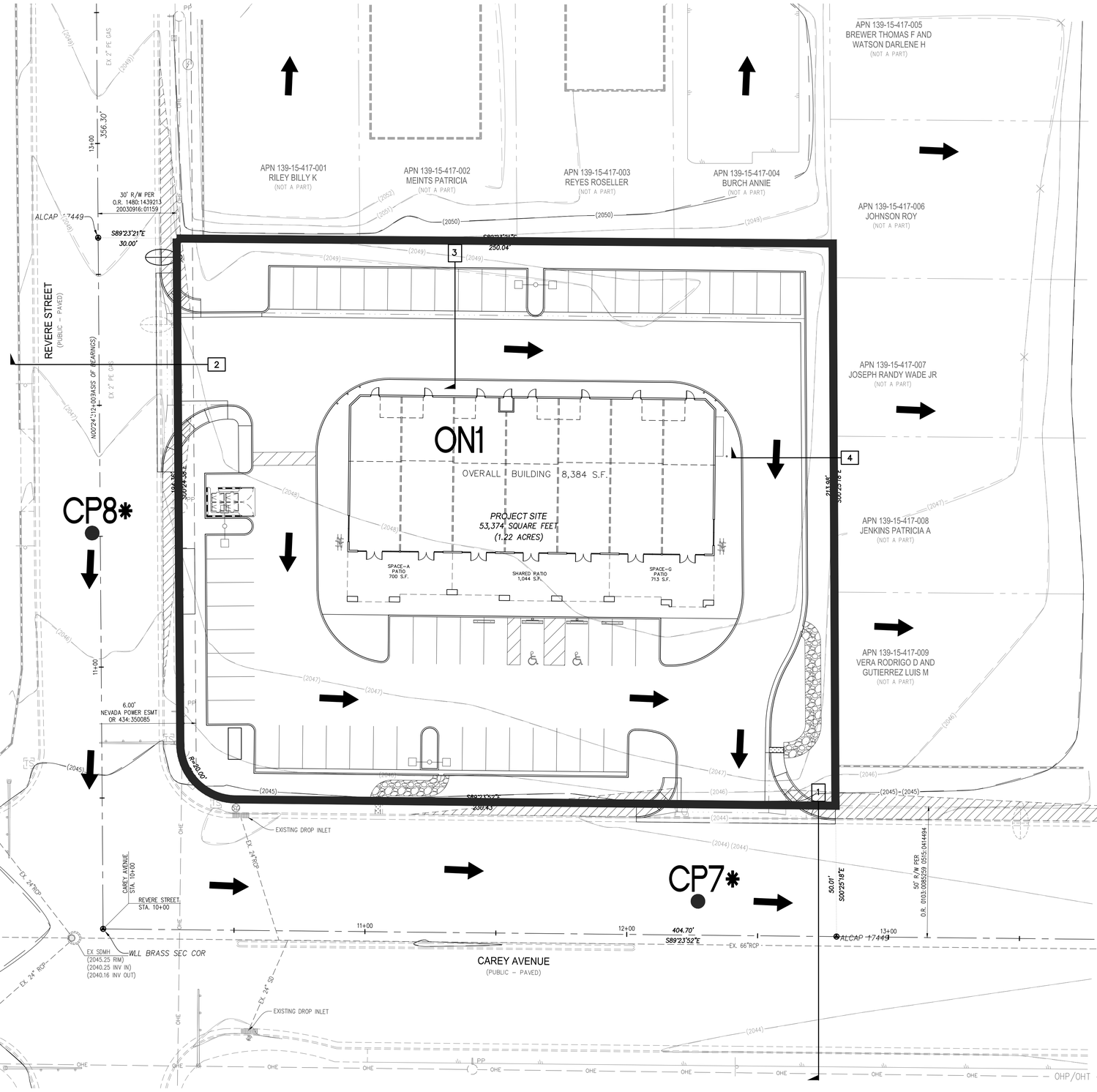
Cross Section 1 is located within Carey Avenue and is referenced from the approved Technical Drainage Study Update for Desert Mesa. There are no modifications as referenced in the Existing Condition scenario. For $\mathbf{Q_{100}}$, the flow depth, D, is 1.12 feet, the flow velocity, V, is 3.98 feet per second using a slope of 0.40%. The product of D*V is 4.46. See Appendix C for Cross Section reference calculations. As indicated in the approved Technical Drainage Study for Desert Mesa, the velocity/depth results are below 6 and 8 for the 10-year and 100-year storm events. The worst-case depth of flow results in a 0.75' depth, which provides a 14-foot dry lane from the centerline in which 19' is required for 100' ROW.

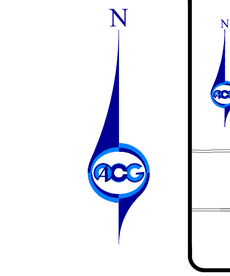
Cross Section 3 is located on the north side of the proposed building and represents the flow that is conveyed east within the proposed drive aisle. For $\mathbf{Q_{100}}$, the flow depth, D, is 0.41 feet, the flow velocity, V, is 1.39 feet per second using a slope of 0.50%. The product of D*V is 0.57. See Appendix B for Cross Section calculations.

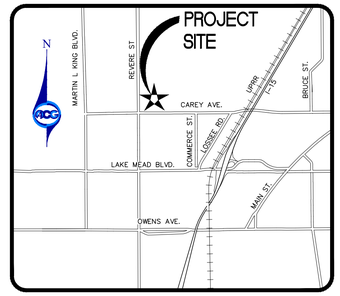
Cross Section 4 is located on the east side of the proposed building and represents the flow that is conveyed south within the proposed drive aisle. For $\mathbf{Q_{100}}$, the flow depth, D, is 0.37 feet, the flow velocity, V, is 2.22 feet per second using a slope of 0.60%. The product of D*V is 0.82. See Appendix B for Cross Section calculations.

LID Measures

Parking Lot LID measures have been incorporated into the proposed design. The total site area is 1.22 acres, of which approximately 0.88 acres is paved/parking area. Based on this calculation, 75% would be approximately 0.66 acres would require LID measurements implemented. The proposed design exceeds the minimum requirements and includes LID measures for the entire 0.88 acres of paved/parking area. Developed Basin ON1 has two proposed BMP swales, both of which convey into Carey Avenue. The Parking LOT LID measures provided are adequate.







VICINITY MAP
NTS

LEGEND

- SUBBASIN BOUNDARY
- OFF1 — SUBBASIN NAME
- FLOW DIRECTION
- (2555) — EXISTING CONTOURS
- CP1 — COMBINATION POINT
- 1 — FLOWMASTER SECTION

SUMMARY OF DEVELOPED CONDITIONS

BASIN NAME	AREA (AC)	Q_{10} (CFS)	Q_{100} (CFS)
ON1	1.22	2	4
CP7*	N/A	57	217
CP8*	N/A	2	3

FLOW CHARACTERISTICS – DEVELOPED CONDITION (10 YEAR)

SECTION NUMBER	SLOPE (%)	Q_{10} (cfs)	DEPTH (ft)	VELOCITY (ft/s)	D*V
1*	0.40	57	0.75	2.67	2.00
2A*	1.70	2	0.25	2.29	0.57

FLOW CHARACTERISTICS – DEVELOPED CONDITION (100 YEAR)

SECTION NUMBER	SLOPE (%)	Q_{100} (cfs)	DEPTH (ft)	VELOCITY (ft/s)	D*V
1*	0.40	217	1.12	3.98	4.46
2B*	1.70	3	0.28	2.44	0.68
3	0.50	4	0.41	1.39	0.57
4	0.60	4	0.37	2.22	0.82

* REFERENCED FROM THE TECHNICAL DRAINAGE STUDY UPDATE FOR DESERT MESA (CNLV#62213)

REVISIONS			APPROVAL
REV.	DESCRIPTION	APRVD. BY	DATE

REVERE AND CAREY

DEVELOPED CONDITIONS

APN: 139-15-401-006
NEC REVERE STREET & CAREY AVENUE
NORTH LAS VEGAS, NEVADA 89030

ACG DESIGN
4310 CAMERON ST., SUITE 12-A
LAS VEGAS, NEVADA 89103
OFFICE: 702.448.8737
WEBSITE: WWW.ACG.DESIGN

ENGINEER'S SEAL

DATE:	10/14/20
PROJ. NO:	190259
DRAWN BY:	ARB
CHECKED BY:	RAS
SCALE:	AS NOTED
JURISDICTION:	CNLV

DRAWING NUMBER:
FIG 6

AGENCY NUMBER:

IX. FINISHED FLOOR ELEVATION

The site has been designed as a Retail Center with multiple buildings and associated parking. The Finish Floor elevations of each building have been set at a minimum of 6" above the highest flowline adjacent to the building.

The proposed Finish Floor Elevation also meets the requirement of the Manual criteria for non-special flood hazard areas in which the minimum finished floor elevation shall be at least twice the depth of flow above the gutter line.

X. CONCLUSIONS AND RECOMMENDATIONS

1. Methodology used in this report complies with Clark County Regional Flood Control District (CCRFCD) and Clark County criteria.
2. This project site is not located within a FEMA designated SFHA.
3. The proposed development will not have a negative impact on downstream or adjacent properties or facilities.
4. The proposed development does not alter the existing flow patterns.
5. The proposed finished floor elevations have been placed at elevations greater than 18 inches above the highest centerline or top of curb elevation of the addressed street at the center of the building.

XI. REFERENCES

1. Clark County Regional Flood Control District – The 2018 Las Vegas Valley Flood Control Master Plan Update, 2018.
2. Post, Buckley, Schuh & Jernigan Inc., Louis Berger Group, Clark County Regional Flood Control District – The 2018 Las Vegas Valley Flood Control Master Plan Update, 2018.
3. Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual, updated August 12, 1999.
4. U.S. Army Corps of Engineers, HEC-1 Flood Hydrograph Package, June 1998.
5. Soil Survey of Las Vegas Valley Area, Nevada. U.S. Department of Agriculture, Soil Conservation Service, July 1985.
6. Update to Technical Drainage Study for Desert Mesa, by Dwyer Engineering, Dated January 2018 (CNLV#62213)

Appendices

Appendix A:

- Standard Form 4 – Existing Condition
- HEC-1 Calculation – Existing Condition
- Standard Form 4 – Developed Condition
- HEC-1 Calculations – Developed Condition

Appendix B:

- Section 3 - Onsite Calc (ON1) - 100 Year (Developed)
- Section 4 - Onsite Calc (ON1) - 100 Year (Developed)

Appendix C:

- Figure 513 – McCarran Airport Rainfall Area
- Table 502 – Six Hour Depth-Area Reduction Factors
- Table 503 – Six-Hour Storm Distribution – SDN3
- Table 505 – Depth-Duration-Frequency Values for McCarran Airport Rainfall Area
- Table 602, 1 of 4 – Runoff Curve Numbers (Urban Areas)
- Soil Survey Map for NEC of Carey Ave. & Revere St.
- CCRCFD 2018 Excerpt from Figure W-5 Central Watershed

Appendix D:

- Referenced Documents

Appendix E:

- Proposed Improvement Plan Package

APPENDIX A

TIME OF CONCENTRATION

NEC of Carey Ave. & Revere St.

EXISTING CONDITION

ACG Design
Project No: 190259

Date: 10/14/20 Calculated by: SDS
Date: 10/14/20 Checked by: RAS

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN	K (2)	AREA Ac (3)	AREA Mi^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	Ti Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V1 VELOCITY FPS (9a)	V2 VELOCITY FPS (9b)	Tt Min (10)	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours	RAINFALL Inches (10-yr/100-yr)
EX1	E	85.0	0.7320	1.22	0.0019	50	1.20	4.4	200	1.5	1.8	2.7	1.8	6.2	N/A	**0.062**	1.58 / 2.77

Tc = Ti + Tt Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39
Tc Check = L/180+10

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2
Existing V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

STANDARD FORM 4

Existing

```
1*****************************************                 ****************************************
*                                       *                 *                                      *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                 *    U.S. ARMY CORPS OF ENGINEERS      *
*            JUN  1998                  *                 *  HYDROLOGIC ENGINEERING CENTER       *
*         VERSION 4.1                   *                 *       609 SECOND STREET              *
*                                       *                 *    DAVIS, CALIFORNIA 95616           *
*  RUN DATE  14OCT20  TIME  05:33:22    *                 *         (916) 756-1104               *
*                                       *                 *                                      *
*****************************************                 ****************************************

                                X   X XXXXXXX  XXXXX       X
                                X   X X      X   X      XX
                                X   X X      X          X
                                XXXXXXX XXXX   X     XXXXX  X
                                X   X X      X          X
                                X   X X      X   X      X
                                X   X XXXXXXX  XXXXX      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

                *DIAGRAM
        1       ID   ******************************************************************
        2       ID   * ..................................................................
        3       ID   * :
        4       ID   * :          NEC OF CAREY AVE AND REVERE ST                : *
        5       ID   * :          DRAINAGE STUDY
        6       ID   * :          EXISTING CONDITIONS
        7       ID   * :..................................................................
        8       ID   * :          RETURN PERIOD_100-YEAR & 10-YEAR              : *
        9       ID   * :          DISTRIBUTION_ _ _ _ 6-HOUR SDN3               : *
       10       ID   * :          PROJECT NO_ _ _ _ _ 190259                    : *
       11       ID   * :          FILENAME_ _ _ _ _ _ EXISTING.H1               : *
       12       ID   * :          DATE MODELED_ _ _ _ 10/14/20                  : *
       13       ID   * :          MODELED BY_ _ _ _ _ SDS                       :
       14       ID   * :..................................................................
       15       ID   ******************************************************************
       16       ID
       17       IT     5     0     0    300
       18       IO     5
       19       IN     5     0     0
       20       JR   PREC    .57     1
                *
       21       KK   EX1
       22       KM   SUBBASIN EX1
       23       KM         AREA   1.22 AC
       24       PB   2.77
       25       PC   .000   .020   .057   .070   .087   .108   .124   .130   .130   .130
```

```
                                                                                                  Existing
         26        PC   .130   .130   .130   .133   .140   .142   .148   .158   .172   .181
         27        PC   .190   .197   .199   .200   .201   .204   .214   .229   .241   .249
         28        PC   .251   .256   .270   .278   .281   .283   .295   .322   .352   .409
         29        PC   .499   .590   .710   .744   .781   .812   .819   .835   .851   .856
         30        PC   .860   .868   .876   .888   .910   .926   .937   .950   .970   .976
         31        PC   .982   .985   .987   .989   .990   .993   .993   .994   .995   .998
         32        PC   .998   .999   1.00
         33        BA   .0019
         34        LS     0    85.0
         35        UD   .062
                  *
         36        ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

   NO.     (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

    21      EX1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
*            JUN   1998                *                    *   HYDROLOGIC ENGINEERING CENTER      *
*          VERSION 4.1                 *                    *         609 SECOND STREET            *
*                                      *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   14OCT20  TIME  05:33:22  *                    *           (916) 756-1104             *
*                                      *                    *                                      *
****************************************                    ****************************************



                  ************************************************************
                  * .........................................................
                  * :
                  * :          NEC OF CAREY AVE AND REVERE ST               : *
                  * :          DRAINAGE STUDY
                  * :          EXISTING CONDITIONS
                  * :.........................................................
                  * :          RETURN PERIOD_100-YEAR & 10-YEAR             : *
                  * :          DISTRIBUTION_ _ _ _ 6-HOUR SDN3              : *
                  * :          PROJECT NO_ _ _ _ _ 190259                   : *
                  * :          FILENAME_ _ _ _ _ _ EXISTING.H1              : *
                  * :          DATE MODELED_ _ _ _ 10/14/20                 : *
                  * :          MODELED BY_ _ _ _ _ SDS                      :
                  * :.........................................................
                  ************************************************************


  18 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


                                                RATIOS APPLIED TO PRECIPITATION
 OPERATION      STATION     AREA    PLAN          RATIO 1  RATIO 2
                                                  .57     1.00

 HYDROGRAPH AT
+               EX1         .00     1   FLOW          1.       3.
                                       TIME        3.50     3.50



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

TIME OF CONCENTRATION

NEC of Carey Ave. & Revere St.

DEVELOPED CONDITION

ACG Design — **Date: 10/14/20** **Calculated by: SDS**

Project No: 190259 — **Date: 10/14/20** **Checked by: RAS**

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN	K (2)	AREA Ac (3)	AREA Mi^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	Ti Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V1 VELOCITY FPS (9a)	V2 VELOCITY FPS (9b)	Tt Min (10)	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours	RAINFALL Inches (10-yr/100-yr)
ON1	D	94.0	0.8508	1.22	0.0019	200	0.50	8.0	150	0.8	1.8	2.7	1.4	9.4	11.9	**0.094**	1.58 / 2.77

Tc = Ti + Tt Tlag = 0.6 Tc

Ti = 1.8 (1.1 - K) L^1/2 / S^1/3

K = 0.0132 (CN) - 0.39

Tc Check = L/180+10

For the travel time (Tt) calculations, V1 applies to the first 500 feet of travel distance; V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2

Existing V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

STANDARD FORM 4

```
                                                                  Developed
1****************************************                          ****************************************
*                                      *                        *                                      *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                        *  U.S. ARMY CORPS OF ENGINEERS        *
*           JUN  1998                  *                       *  HYDROLOGIC ENGINEERING CENTER       *
*         VERSION 4.1                  *                       *       609 SECOND STREET              *
*                                      *                       *  DAVIS, CALIFORNIA 95616             *
* RUN DATE  16OCT20  TIME  14:30:18    *                       *       (916) 756-1104                 *
*                                      *                       *                                      *
****************************************                          ****************************************

                                X    X XXXXXXX  XXXXX       X
                                X    X X      X   X      XX
                                X    X X      X          X
                                XXXXXXX XXXX   X     XXXXX  X
                                X    X X      X          X
                                X    X X      X   X      X
                                X    X XXXXXXX  XXXXX      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

                *DIAGRAM
        1       ID  ******************************************************************
        2       ID  * .....
        3       ID  * :
        4       ID  * :          SEC OF CAREY AVE AND REVERE ST                : *
        5       ID  * :          DRAINAGE STUDY
        6       ID  * :          DEVELOPED CONDITIONS                          : *
        7       ID  * :.....
        8       ID  * :          RETURN PERIOD_100-YEAR & 10-YEAR              : *
        9       ID  * :          DISTRIBUTION_ _ _ _ 6-HOUR SDN3               : *
       10       ID  * :          PROJECT NO_ _ _ _ _ 170185                    : *
       11       ID  * :          FILENAME_ _ _ _ _ _ DEVELOPED.H1              : *
       12       ID  * :          DATE MODELED_ _ _ _ 10/14/20                  : *
       13       ID  * :          MODELED BY_ _ _ _ _ SDS                       :
       14       ID  * :.....
       15       ID  ******************************************************************
       16       ID
       17       IT     5      0      0    300
       18       IO     5
       19       IN     5      0      0
       20       JR   PREC    .57     1
                *
       21       KK  ON1
       22       KM  SUBBASIN ON1
       23       KM         AREA   1.22 AC
       24       PB   2.77
       25       PC   .000   .020   .057   .070   .087   .108   .124   .130   .130   .130
```

```
                                                                  Developed
        26        PC   .130   .130   .130   .133   .140   .142   .148   .158   .172   .181
        27        PC   .190   .197   .199   .200   .201   .204   .214   .229   .241   .249
        28        PC   .251   .256   .270   .278   .281   .283   .295   .322   .352   .409
        29        PC   .499   .590   .710   .744   .781   .812   .819   .835   .851   .856
        30        PC   .860   .868   .876   .888   .910   .926   .937   .950   .970   .976
        31        PC   .982   .985   .987   .989   .990   .993   .993   .994   .995   .998
        32        PC   .998   .999   1.00
        33        BA   .0019
        34        LS     0    94.0
        35        UD   .094
                  *
        36        ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

   NO.     (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

    21      ON1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
*            JUN   1998                *                    *   HYDROLOGIC ENGINEERING CENTER      *
*          VERSION 4.1                 *                    *         609 SECOND STREET            *
*                                      *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   16OCT20  TIME  14:30:18  *                    *           (916) 756-1104             *
*                                      *                    *                                      *
****************************************                    ****************************************



                  ************************************************************
                  * .....................................................
                  * :
                  * :          SEC OF CAREY AVE AND REVERE ST              : *
                  * :          DRAINAGE STUDY
                  * :          DEVELOPED CONDITIONS                        : *
                  * :.....................................................
                  * :          RETURN PERIOD_100-YEAR & 10-YEAR            : *
                  * :          DISTRIBUTION_ _ _ _ 6-HOUR SDN3             : *
                  * :          PROJECT NO_ _ _ _ _ 170185                  : *
                  * :          FILENAME_ _ _ _ _ _ DEVELOPED.H1            : *
                  * :          DATE MODELED_ _ _ _ 10/14/20                : *
                  * :          MODELED BY_ _ _ _ _ SDS                     :
                  * :.....................................................
                  ************************************************************


 18 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

				RATIOS APPLIED TO PRECIPITATION	
OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2
				.57	1.00
HYDROGRAPH AT					
+	ON1	.00	1 FLOW	2.	4.
			TIME	3.50	3.50

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

APPENDIX B

Section 3 - Onsite Calc (ON1) - 100 Year (Developed)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.005
Discharge	4.00

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	47.88
0+00.50	47.88
0+00.50	47.38
0+23.50	47.21
0+25.00	46.95
0+26.50	47.21
0+42.50	47.53

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 47.88)	(0+00.50, 47.88)	0.013
(0+00.50, 47.88)	(0+00.50, 47.38)	0.016
(0+00.50, 47.38)	(0+23.50, 47.21)	0.016
(0+23.50, 47.21)	(0+25.00, 46.95)	0.013
(0+25.00, 46.95)	(0+26.50, 47.21)	0.013
(0+26.50, 47.21)	(0+42.50, 47.53)	0.016

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.41
Elevation Range	46.95 to 47.88 ft
Flow Area	2.9
Wetted Perimeter	30.61
Hydraulic Radius	0.09
Top Width	30.57
Normal Depth	0.41
Critical Depth	0.39
Critical Slope	0.008
Velocity	1.39
Velocity Head	0.03
Specific Energy	0.44
Froude Number	0.795
Flow Type	Subcritical

Section 3 - Onsite Calc (ON1) - 100 Year (Developed)

Results

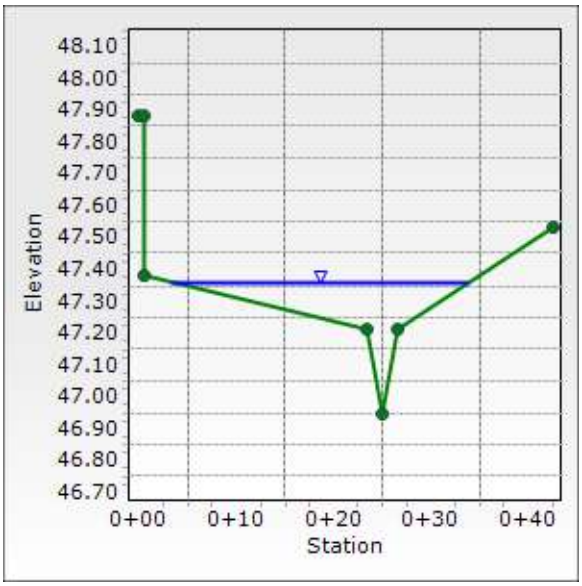
GVF Input Data	
Downstream Depth	0.00
Length	0.00
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00
Profile Description	N/A
Profile Headloss	0.00
Downstream Velocity	0.00
Upstream Velocity	0.00
Normal Depth	0.41
Critical Depth	0.39
Channel Slope	0.005
Critical Slope	0.008

Cross Section for Section 3 - Onsite Calc (ON1) - 100 Year (Developed)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.005
Normal Depth	0.41
Discharge	4.00



Section 4 - Onsite Calc (ON1) - 100 Year (Developed)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.006
Discharge	4.00

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	47.80
0+00.50	47.80
0+00.50	47.30
0+26.00	46.50
0+27.50	46.42
0+27.50	46.92
0+28.00	46.92
0+35.00	47.00

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00.00, 47.80)	(0+00.50, 47.80)	0.013
(0+00.50, 47.80)	(0+00.50, 47.30)	0.013
(0+00.50, 47.30)	(0+26.00, 46.50)	0.016
(0+26.00, 46.50)	(0+27.50, 46.42)	0.013
(0+27.50, 46.42)	(0+27.50, 46.92)	0.013
(0+27.50, 46.92)	(0+35.00, 47.00)	0.016

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.37
Elevation Range	46.42 to 47.80 ft
Flow Area	1.8
Wetted Perimeter	11.02
Hydraulic Radius	0.16
Top Width	10.65
Normal Depth	0.37
Critical Depth	0.36
Critical Slope	0.007
Velocity	2.22
Velocity Head	0.08
Specific Energy	0.44
Froude Number	0.950

Section 4 - Onsite Calc (ON1) - 100 Year (Developed)

Results	
Flow Type	Subcritical

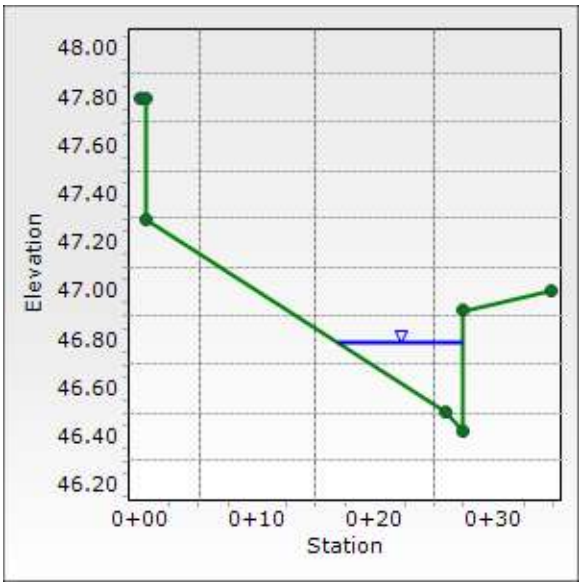
GVF Input Data	
Downstream Depth	0.00
Length	0.00
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00
Profile Description	N/A
Profile Headloss	0.00
Downstream Velocity	0.00
Upstream Velocity	0.00
Normal Depth	0.37
Critical Depth	0.36
Channel Slope	0.006
Critical Slope	0.007

Cross Section for Section 4 - Onsite Calc (ON1) - 100 Year (Developed)

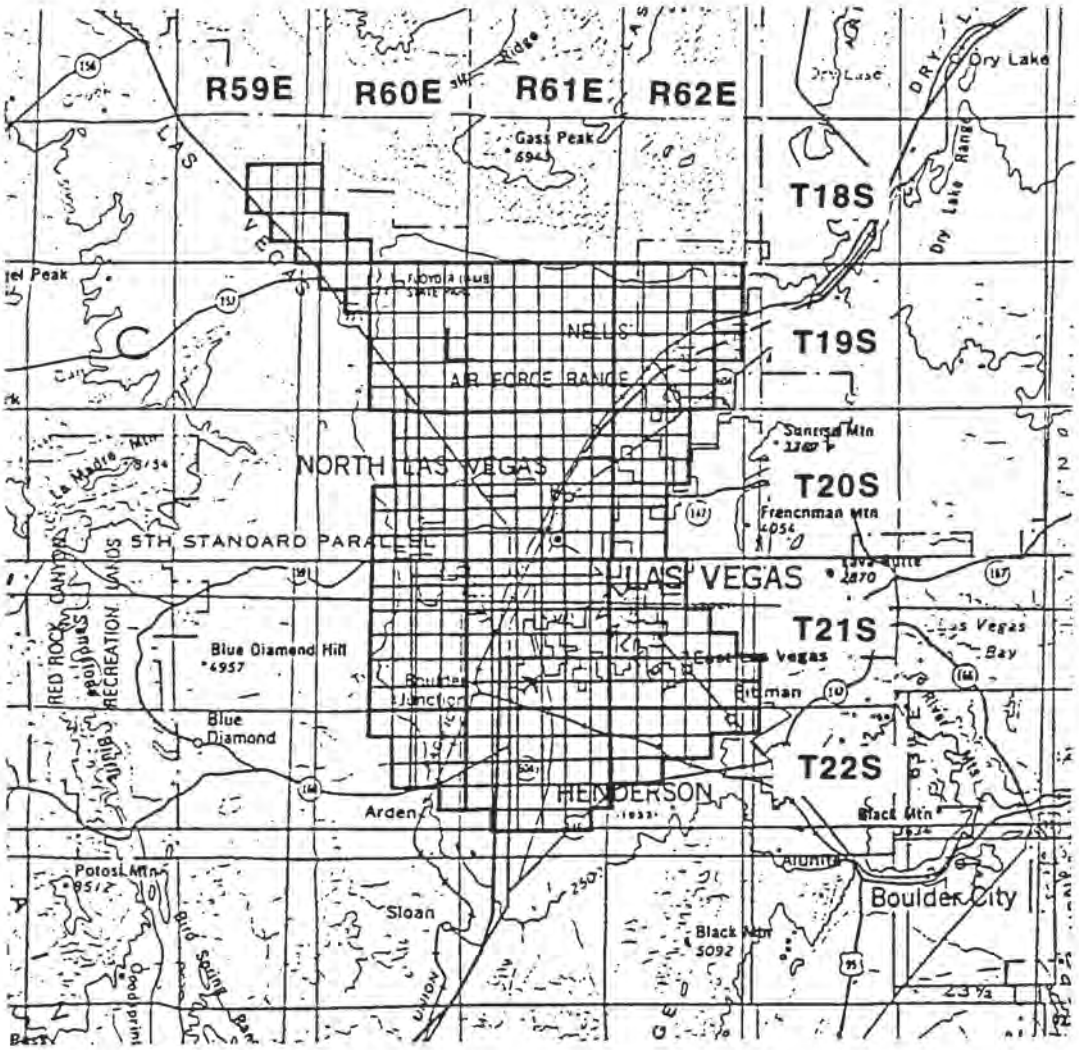
Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.006
Normal Depth	0.37
Discharge	4.00



APPENDIX C

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

SIX HOUR DEPTH-AREA REDUCTION FACTORS

Drainage Area (Square Miles)	Six-Hour Depth-Area Reduction Factor
0.0	1.00
0.5	0.98
1.0	0.97
2.0	0.93
4.0	0.91
6.0	0.90
8.0	0.88
10.0	0.86
20.0	0.79
30.0	0.74
50.0	0.68
100.0	0.60
150.0	0.55
200.0	0.51
300.0	0.46
400.0	0.42
500.0	0.39

NOTES: 1. A graphical representation of these factors is presented in Figure 514.

2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

Revision	Date

SIX-HOUR STORM DISTRIBUTIONS

Storm Time (In Minutes)	Percent of Total Storm Depth SDN3	SDN4	SDN5
0	0.0	0.0	0.0
5	2.0	2.0	2.0
10	5.7	5.8	5.9
15	7.0	7.5	8.0
20	8.7	9.9	11.0
25	10.8	12.6	14.4
30	12.4	13.7	15.0
35	13.0	14.5	16.0
40	13.0	14.9	16.8
45	13.0	15.1	17.1
50	13.0	15.5	18.0
55	13.0	15.6	18.2
60	13.0	15.9	18.7
65	13.3	16.2	19.0
70	14.0	16.9	19.7
75	14.2	17.2	20.2
80	14.8	17.9	21.0
85	15.8	18.9	22.0
90	17.2	20.1	23.0
95	18.1	21.1	24.1
100	19.0	22.0	25.0
105	19.7	22.8	25.9
110	19.9	23.2	26.5
115	20.0	24.0	28.0
120	20.1	24.6	29.0
125	20.4	25.2	30.0
130	21.4	26.0	30.5
135	22.9	26.9	30.9
140	24.1	27.6	31.0
145	24.9	28.3	31.7
150	25.1	28.6	32.1
155	25.6	29.2	32.7
160	27.0	30.2	33.3
165	27.8	31.2	34.6
170	28.1	32.1	36.1
175	28.3	33.2	38.1
180	29.5	35.2	40.8

Storm Time (In Minutes)	Percent of Total Storm Depth SDN3	SDN4	SDN5
185	32.2	37.6	43.0
190	35.2	41.5	47.7
195	40.9	46.2	51.4
200	49.9	53.0	56.1
205	59.0	61.0	63.0
210	71.0	71.0	71.0
215	74.4	73.2	72.0
220	78.1	75.6	73.1
225	81.2	78.2	75.2
230	81.9	79.9	77.9
235	83.5	81.3	79.0
240	85.1	82.3	79.5
245	85.6	83.0	80.4
250	86.0	83.5	81.0
255	86.8	84.4	82.0
260	87.6	85.1	82.6
265	88.8	86.4	84.0
270	91.0	88.5	85.9
275	92.6	90.8	88.9
280	93.7	92.4	91.0
285	95.0	94.4	93.8
290	97.0	96.8	96.6
295	97.6	97.3	97.0
300	98.2	97.8	97.4
305	98.5	98.2	97.9
310	98.7	98.4	98.1
315	98.9	98.6	98.3
320	99.0	98.8	98.5
325	99.3	99.1	98.9
330	99.3	99.2	99.0
335	99.4	99.3	99.2
340	99.5	99.4	99.3
345	99.8	99.7	99.6
350	99.8	99.8	99.7
355	99.9	99.9	99.9
360	100.0	100.0	100.0

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

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA

(IN INCHES)

	RECURRENCE INTERVAL					
TIME	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	1.58	2.05	2.41	2.77
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

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
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 $I_a = 0.2S$.

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

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Las Vegas Valley Area, Nevada, Part of Clark County

NEC Carey & Revere



October 13, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....12
Map Unit Descriptions.....12
Las Vegas Valley Area, Nevada, Part of Clark County.....14
380—Skyhaven very fine sandy loam, 0 to 4 percent slopes.....14
References.....15

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:575 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 16, Aug 26, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 3, 2019—May 14, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
380	Skyhaven very fine sandy loam, 0 to 4 percent slopes	1.3	100.0%
Totals for Area of Interest		**1.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Las Vegas Valley Area, Nevada, Part of Clark County

380—Skyhaven very fine sandy loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: hrbz
Elevation: 1,800 to 2,300 feet
Mean annual precipitation: 4 to 6 inches
Mean annual air temperature: 63 to 68 degrees F
Frost-free period: 220 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Skyhaven and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Skyhaven

Setting

Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 1 inches: very fine sandy loam
H2 - 1 to 8 inches: clay loam
H3 - 8 to 37 inches: gravelly silty clay loam
H4 - 37 to 41 inches: indurated

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 24 to 39 inches to petrocalcic
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 90 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water capacity: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Other vegetative classification: SHALLOW LIMESTONE SLOPE 5-8 P.Z. (030XB030NV_2)
Hydric soil rating: No

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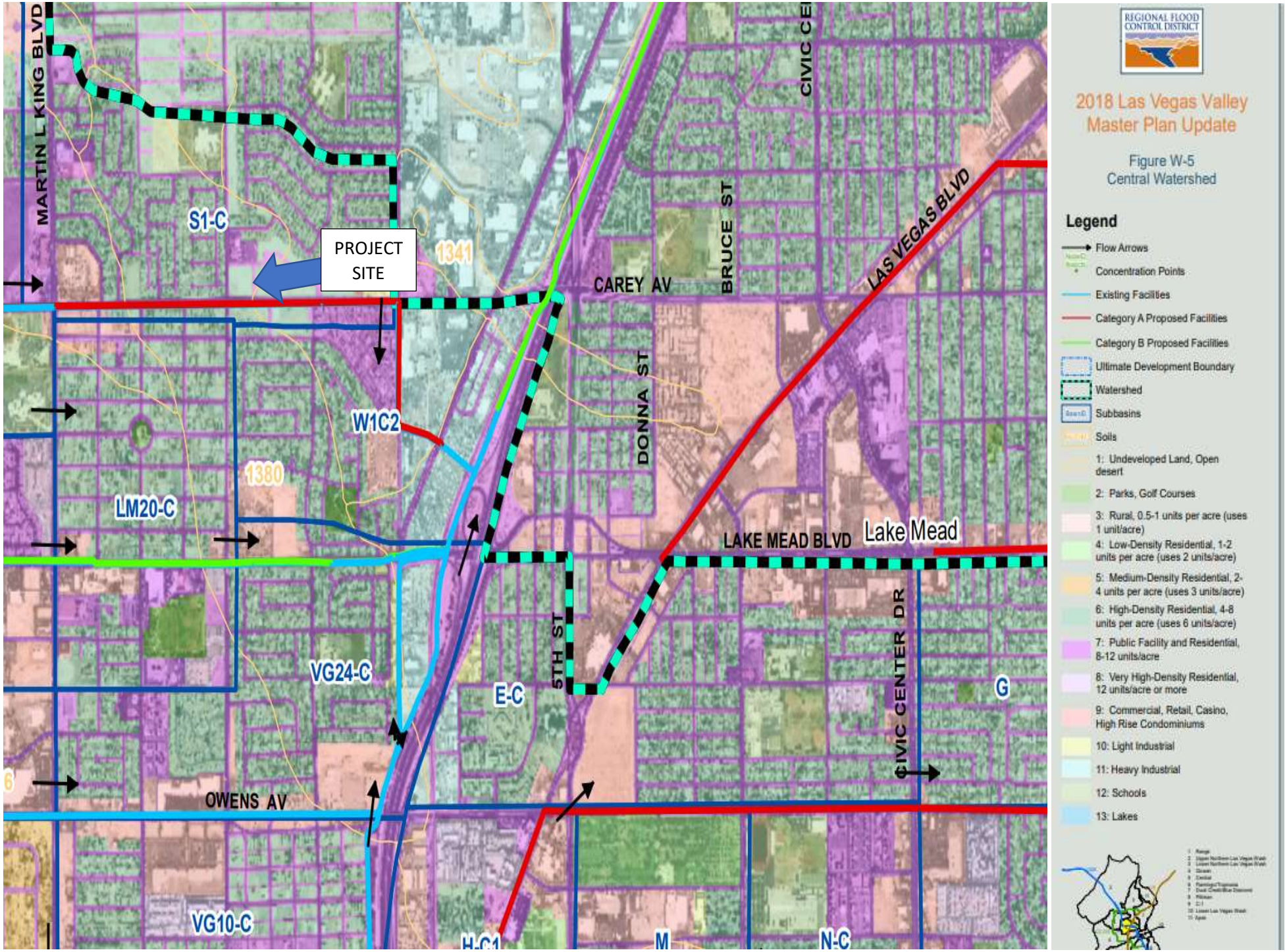
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MARTIN L KING BLVD
S1-C
PROJECT SITE
1341
CAREY AV
BRUCE ST
CIVIC CE
LAS VEGAS BLVD
DONNA ST
W1C2
1380
LM20-C
LAKE MEAD BLVD
Lake Mead
5TH ST
CIVIC CENTER DR
VG24-C
E-C
G
OWENS AV
VG10-C
H-C1
M
N-C
REGIONAL FLOOD CONTROL DISTRICT
2018 Las Vegas Valley Master Plan Update
Figure W-5
Central Watershed
Legend
Flow Arrows
Concentration Points
Existing Facilities
Category A Proposed Facilities
Category B Proposed Facilities
Ultimate Development Boundary
Watershed
Subbasins
Soils
1: Undeveloped Land, Open desert
2: Parks, Golf Courses
3: Rural, 0.5-1 units per acre (uses 1 unit/acre)
4: Low-Density Residential, 1-2 units per acre (uses 2 units/acre)
5: Medium-Density Residential, 2-4 units per acre (uses 3 units/acre)
6: High-Density Residential, 4-8 units per acre (uses 6 units/acre)
7: Public Facility and Residential, 8-12 units/acre
8: Very High-Density Residential, 12 units/acre or more
9: Commercial, Retail, Casino, High Rise Condominiums
10: Light Industrial
11: Heavy Industrial
12: Schools
13: Lakes

APPENDIX D

Dwyer Engineering

Update #1 to the Technical Drainage Study for Desert Mesa

North Las Vegas, Nevada

Prepared for:

KB Home LV Desert Mesa LLC
5795 Badura Ave, Suite 180
Las Vegas NV 89118

Prepared by:

Dwyer Engineering
7310 Smoke Ranch Road, Suite E
Las Vegas, Nevada 89128
Tel: (702) 254-2200
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January 30, 2018

Project No. 17258

Mayor

John J. Lee

Council Members
Isaac E. Barron
Pamela A. Goynes-Brown
Scott Black
Richard J. Cherchio

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March 7, 2018

Mailed via: E-mail

David Dwyer, P.E.
Phillip Wakefield, P.E.

Dwyer Engineering
7310 Smoke Ranch Rd. Suite E
Las Vegas, Nevada 89128

Re: Update to Technical Drainage Study for Desert Mesa
CNLV No. 62213

Dear Phil/David:

The City of North Las Vegas (CNLV) has reviewed the above referenced Technical Drainage Study Update received February 13,, 2018 and found it to meet the minimum accepted standards for a technical drainage study. This acceptance is contingent upon the following conditions:

1. All proposed drainage easements must be recorded prior to civil plan approval.

2. Please provide approval letters for each study being referenced with this study.

3. Please address erosion protection requirements necessary for the landscape adjacent to Carey Avenue due to the high velocities established in the street sections provided with the study.

4. The study must address the potential for erosion of front yards adjacent to Burgos Avenue due to the high velocities within the street. Specifically lots 1-12 and lots 20-37 appear to be impacted.

5. The study must address the momentum of the flow discharging from the drainage easement discharging into Commerce Street (Sheet 16). The extremely steep slope of the easement will produce high velocities which could produce unsafe flow conditions as the water discharges into the street. It is recommended that energy dissipation be provide prior to the flows discharging into the street to reduce momentum as flow discharges into the street. Consider the use of a 6 inch curb at the end of the easement to create a weir condition prior to flow entering the street. Please also revise riprap on each side of the main channel to extend to the water surface elevation as determined in the hydraulic analysis submitted with the study.

6. Based on the existing topography shown on the grading plan the channel discharging into Burgos Avenue (Mesa Wind Avenue) adjacent to lot 20 may have a steep slope. Flow with high velocities entering the residential street may create a burden to residences and a traffic safety concern. It is suggested that a 6 inch curb be placed in the channel upstream of the discharge point into the street to create a weir structure and reduce velocities prior to flows discharging into the street. The curb can be notched in the center to provide low flow conveyance.

7. Please revise the valley gutter discharging flows from Germander Street and Sand Sage Avenue into the drainage easement at the southeast corner of the site. The current design forces flows in Sand Sage Avenue to turn into Germander Street to enter the valley gutter and then make a sharp bend to direct flows back towards the easement. Most of the flow is in Sand Sage Avenue and if the valley gutter is moved to a location near the center of the BRC at the two streets the flow discharge into the easement will be more hydraulically efficient.

8. Please continue to coordinate with Duane McNelly, Development and Flood Control Project Coordinator, to incorporate the above revisions to the Civil Improvement Plans for this project. Mr. McNelly can be reached at 633-2312.

Please be advised that all land surface area disturbances over 1 acre and/or adjacent to a water way must submit a "Notice of Intent" to discharge to the Nevada Division of Environmental Protection, which certifies that a storm water pollution prevention plan has been developed and is maintained on site. For more information including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm.

Any future changes in the proposed design (or design assumptions) as outlined in the approved drainage study update and the attached preliminary grading plans which affect drainage must be addressed in a drainage study update and accepted by the CNLV Development and Flood Control Division. 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, CNLV 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.

The City of North Las Vegas, its officials, or employees assume no liability for information, data, calculations and conclusions presented by the consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review. If you have any questions concerning this matter, please contact me at (702)633-1932.

Sincerely,



Dan Le, P.E., CFM
Senior Engineer
Development and Flood Control Division

Study Overview and Purpose

Dwyer Engineering has prepared this drainage study as an update to the approved Technical Drainage Study for Desert Mesa (CNLV# 7480). This study addresses the changes to the improvements for the project since it was last approved. The improvements include modifications to the access of the site. The project entryway Carey Avenue has been removed and replaced with additional lots. The northern street intersecting Commerce Street (Burgos Avenue) will have the cul-de-sac removed and will now provide additional access to the project. Sand Sage Avenue is the southern street that previously intersected Commerce Street. The street has been closed off for public access.

Location

The project area is within the Southwest Quarter (SW 1/4) of Section 15, Township 20 South, Range 61 East, Mount Diablo Meridian, North Las Vegas, Nevada. The site is located on the northeast corner of the intersection of Carey Avenue and Revere Street (APN 139-15-417-001 thru -124). See Figures 1 and 1A, *Vicinity Map* and *APN Map*.

Existing Site Description

The Desert Mesa site is currently partially developed as it has been rough graded. The site consists of approximately 29 acres in moderate hydrologic condition. The general area slopes to the east at approximately 2 to 3 percent. The properties adjacent to the site are generally a patchwork of residential lots and undeveloped parcels. See Figure 2, *Site Description Map*.

FEMA Floodplain Information

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) Community-Panel Number 32003C2160F, effective date November 16, 2011, indicates the site is located within a FEMA Zone 'X'. A Zone 'X' is described by FEMA as areas outside of the 0.2% annual chance floodplain. A map depicting the FEMA flood zones in the vicinity of the site is included in the appendix of this study. (Figure 3- FIRM Map)

CCRFCD Master Plan Information

As shown on Figure F-27 from the *Flood Control Master Plan Update of the Las Vegas Valley* (see Figures 4 and 5 in the Appendix), prepared by PBS&J, Louis Berger Group, etc, the subject site is adjacent to a proposed Master Plan Flood Control Facility. The Las Vegas Wash—Smoke Ranch Facility (LVSR 0045 and 0070) currently exists in Carey Avenue as a 54" RCP and 66" RCP. The Las Vegas Wash—Smoke Ranch Facility (LVSR 0046 and 0071) will replace the existing improvments with a 10' x 5' RCB and a 10' x 9' RCB. Figure H-27 has also been provided (see Figure 6 in the appendix) and the site is a part of basins S1-C.

Existing Drainage Description

The existing condition was analyzed in the approved Technical Drainage Study for Desert Mesa (CNLV# 7480). The existing condition was not re-evaluated. The existing condition information has been placed in the appendix for informational purposes only.

Future Drainage Description

The future condition was determined in the approved Technical Drainage Study for Desert Mesa (CNLV# 7480). As shown in the approved study, flows were referenced from the approved Technical Drainage

Study for Revere Estates to the immediate west. Offsite flows were determined at the intersection of Carey Avenue and Revere Street to be 53 cfs and 209 cfs in the 10-year and 100-year condition, respectively. The local offsite basins and offsite basins have been re-evaluated. Basins OFF1 and OFF2 is the residential area to the north of the site. The basins have been modified from the original approved study. Basin OFF1 is conveyed to Commerce Street just north of the site. The flows are conveyed ssouth in Commerce Street. Basin OFF2 is conveyed through the site and also is eventually discharged to Commerce Street. A highpoint exists at the intersection of Revere Street and Nelson Avenue. Basin OFF3 was delineated as part of the existing church on the southeast corner of Revere Street and Nelson Avenue that is conveyed to Revere Street. Basin DEV1 is the onsite basin conveyed west to Revere Street. Basins OFF3 and DEV1 are conveyed south in Revere Street. Basin OFF4 is a portion of the existing church and is conveyed through the site within basin DEV3. Basin DEV2 is an onsite basin and is conveyed to Carey Avenue. Onsite basins DEV3 through DEV6 and OFF4 are conveyed to Commerce Street. Flows impacting the site are shown on the offsite and onsite basin maps included in the appendix (Figures 7 and 8). The following table shows a summary of the runoff amounts determined in the future condition:

10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
FUTURE RUNOFF AMOUNTS

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
DEV1	0.27	0	1
DEV2	2.76	4	8
DEV3	5.17	8	16
DEV4	4.46	6	12
DEV5	7.00	9	19
DEV6	8.02	10	21
OFF1	24.41	27	57
OFF2	32.87	39	81
OFF3	0.70	1	2
OFF4	1.74	3	6
CP1	--	47	99
CP2	--	74	156
CP3	--	10	21
CP4	--	16	34
CP5	--	26	55
CP6	--	97	203
CP7*	--	57	217
CP8	--	2	3

- Summation of DEV2 and flows taken from the TDS for Revere Estates (Q10/Q100=53/209 cfs)

Offsite street flow calculations for the 10-year and 100-year, 6-hour storm events are summarized in the following tables:

OFFSITE STREET FLOW CALCULATIONS

STREET	Slope (%)	Q_{10}/Q_{100} (cfs)	D_{10}/D_{100} (ft)	V_{10}/V_{100} (ft\s)	V x D
Revere St (Section 1) CP8	1.70	2/3	0.25/0.28	2.29/2.44	0.57/0.68
Carey Ave (Section 2) CP7	0.40	57/217	0.75/1.12	2.67/3.98	2.00/4.46
Carey Ave (Section 2) CP7	4.10	57/217	0.55/0.79	6.33/8.95	3.48/7.07
Commerce St (Section 3) CP6	2.20	97/203	0.68/0.83	5.96/7.99	4.05/6.63
Commerce St (Section 3) CP6	3.50	97/203	0.65/0.78	6.85/9.19	4.45/7.17

Onsite street flow calculations for the 10-year and 100-year, 6-hour storm events are summarized in the following tables:

ONSITE STREET FLOW CALCULATIONS

STREET	Slope (%)	Q_{10}/Q_{100} (cfs)	D_{10}/D_{100} (ft)	V_{10}/V_{100} (ft\s)	V x D
Desert Senna Ave (Section 4) DEV1	0.50	0/1	0.00/0.24	0.00/1.24	0.00/0.30
Evening Snow Ct (Section 5) DEV2	0.86	4/8	0.33/0.40	1.99/2.33	0.66/0.93
Desert Senna Ave (Section 6) CP3	1.49	10/21	0.39/0.48	3.02/3.60	1.18/1.73
Desert Senna Ave (Section 6) CP3	2.21	10/21	0.37/0.45	3.53/4.18	1.31/1.88
Sand Sage Ave (Section 7) CP4	2.00	16/34	0.43/0.53	3.78/4.35	1.63/2.31
Sand Sage Ave (Section 7) CP4	5.15	16/34	0.38/0.46	5.45/6.47	2.07/2.98
Burgos Ave (Section 8A) 25% DEV5	2.33	2/5	0.24/0.31	2.66/3.10	0.64/0.96
Burgos Ave (Section 8) CP1	2.33	47/99	0.57/0.68	4.94/6.54	2.82/4.45
Sand Sage Ave (Section 9) CP5	1.38	26/55	0.52/0.63	3.57/4.42	1.86/2.78
Sand Sage Ave (Section 9) CP4 + 25% DEV6	3.87	19/39	0.41/0.50	5.07/5.92	2.08/2.96
Section 10 CP5	1.32	26/55	0.49/0.68	5.15/6.77	2.52/4.60
Section 10 CP5	9.30	26/55	0.34/0.44	9.32/12.52	3.17/5.51

Conclusions

The street calculations show that the *CCRFCD Hydrologic Criteria & Drainage Design Manual* velocity/depth products criteria are met in the future wth the exception of dry lane in Carey Avenue. The

velocity/depth products are below 6 and 8 for the 10- and 100-year storms, respectively. Carey Avenue is a 100 foot right-of-way and requires 12 feet of dry lane outside of the two-way left turn lane. The worst case depth of flow shows that the water surface elevation is 0.75 feet. This provides for 14 feet of dry lane from the centerline in which 19 feet is required. This is an existing condition and the site contributes an insignificant amount of flow to Carey Avenue. All finished floor elevations have been raised a minimum of twice the depth of flow up to 18 inches above the water surface elevation in the street along the frontage. .

There are a few areas in which the water surface is above the back of sidewalk and is considered erosive (more than 5 ft//s). Additional curbing at the back of sidewalk will be provided along Carey Avenue and Commerce Street. Riprap will be provided at the downstream end of the 30-foot drainage easement just east of Sand Sage Avneue.

Two concrete lined flumes have been provided for the conveyance of flow. The first flume is the outlet for basin DEV2. The second flume enters the site near the west end of Burgos Avenue. The flows are contained within the flumes and calculations have been provided in the appendix.

I trust this satisfies your concerns regarding this project. If there are any questions, or additional information necessary, please contact this office.

Sincerely,

Dwyer Engineering



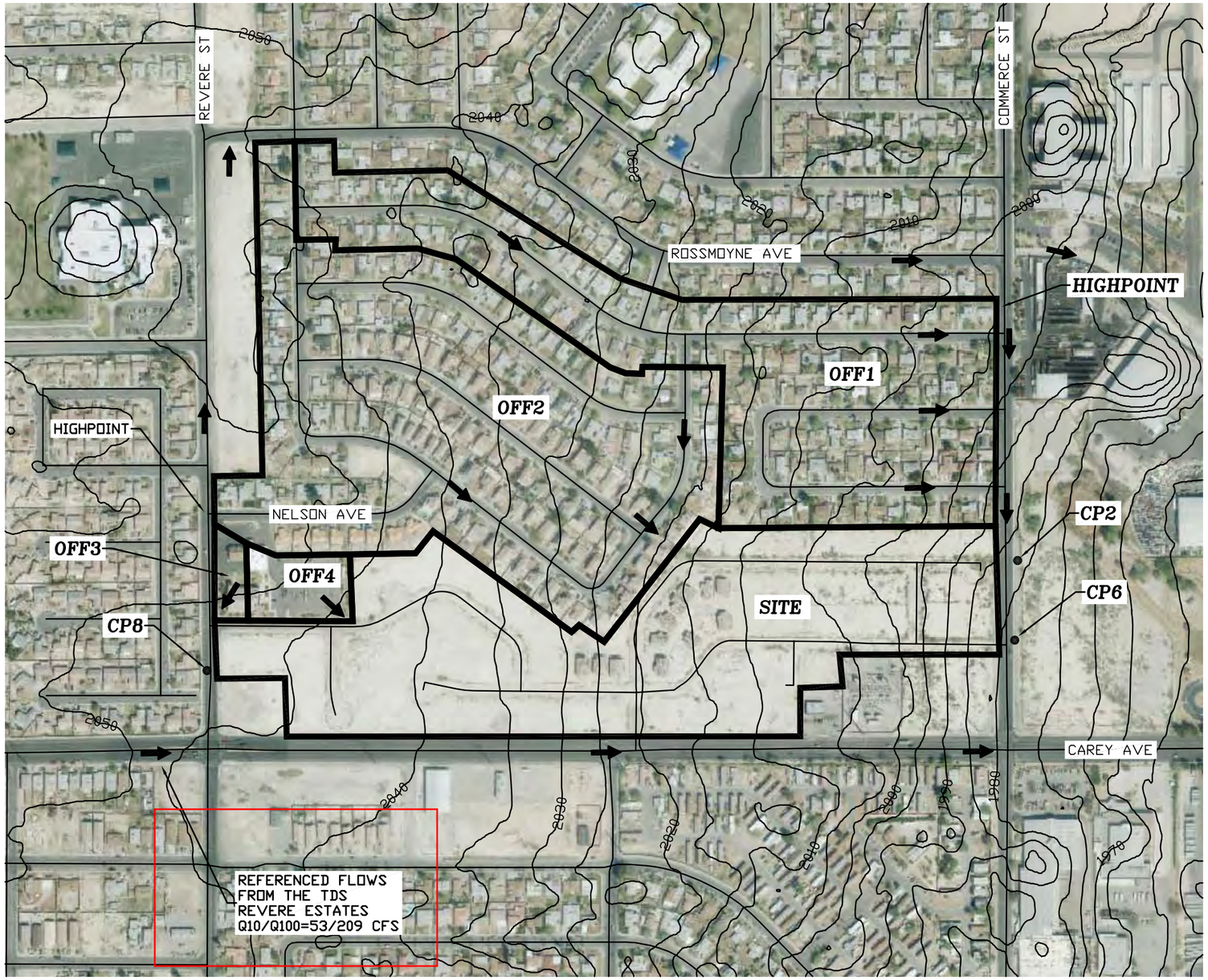
David A. Dwyer, P.E.
Principal



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

FIGURE 2

SITE DESCRIPTION MAP



GRAPHIC SCALE

400 0 200 400

(IN FEET)

1 inch = 400 ft.

10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
FUTURE RUNOFF AMOUNTS

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
DEV1	0.27	0	1
DEV2	2.76	4	8
DEV3	5.17	8	16
DEV4	4.46	6	12
DEV5	7.00	9	19
DEV6	8.02	10	21
OFF1	24.41	27	57
OFF2	32.87	39	81
OFF3	0.70	1	2
OFF4	1.74	3	6
CP1	--	47	99
CP2	--	74	156
CP3	--	10	21
CP4	--	16	34
CP5	--	26	55
CP6	--	97	203
CP7	--	57	217
CP8	--	2	3

- Summation of DEV2 and flows taken from the TDS for Revere Estates (Q10/Q100=53/209 cfs)

LEGEND

DEV1 BASIN NAME

CONCENTRATION POINT

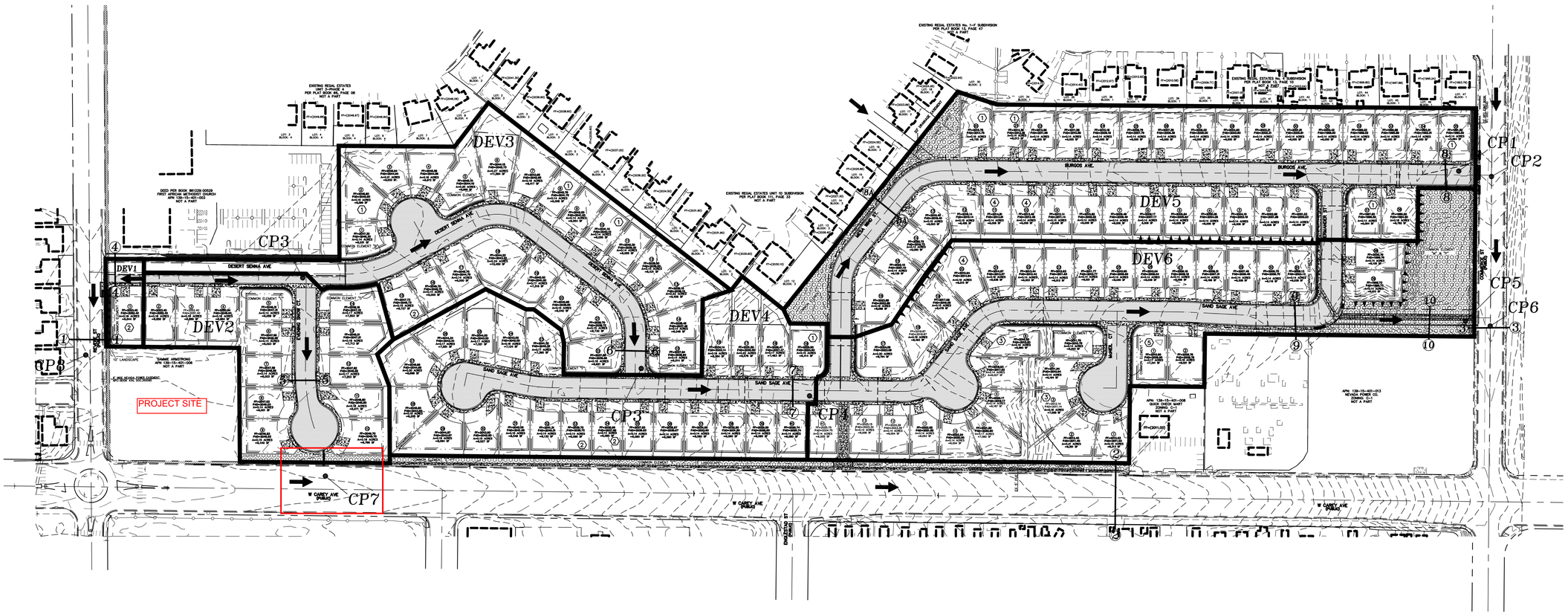
FLOW DIRECTION

BASIN BOUNDARY

FIGURE 7

OFFSITE BASIN MAP

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



GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

LEGEND

- DEV1 BASIN NAME
- CONCENTRATION POINT
- FLOW DIRECTION
- BASIN BOUNDARY

10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
FUTURE RUNOFF AMOUNTS

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
DEV1	0.27	0	1
DEV2	2.76	4	8
DEV3	5.17	8	16
DEV4	4.46	6	12
DEV5	7.00	9	19
DEV6	8.02	10	21
OFF1	24.41	27	57
OFF2	32.87	39	81
OFF3	0.70	1	2
OFF4	1.74	3	6
CP1	--	47	99
CP2	--	74	156
CP3	--	10	21
CP4	--	16	34
CP5	--	26	55
CP6	--	97	203
CP7*	--	57	217
CP8	--	2	3

- Summation of DEV2 and flows taken from the TDS for Revere Estates (Q10/Q100=53/209 cfs)

OFFSITE STREET FLOW CALCULATIONS

STREET	Slope (%)	Q_{10}/Q_{100} (cfs)	D_{10}/D_{100} (ft)	V_{10}/V_{100} (ft/s)	V x D
Revere St (Section 1) CP8	1.70	2/3	0.25/0.28	2.29/2.44	0.57/0.68
Carey Ave (Section 2) CP7	0.40	57/217	0.75/1.12	2.67/3.98	2.00/4.46
Carey Ave (Section 2) CP7	4.10	57/217	0.55/0.79	6.33/8.95	3.48/7.07
Commerce St (Section 3) CP6	2.20	97/203	0.68/0.83	5.96/7.99	4.05/6.63
Commerce St (Section 3) CP6	3.50	97/203	0.65/0.78	6.85/9.19	4.45/7.17

ONSITE STREET FLOW CALCULATIONS

STREET	Slope (%)	Q_{10}/Q_{100} (cfs)	D_{10}/D_{100} (ft)	V_{10}/V_{100} (ft/s)	V x D
Desert Senna Ave (Section 4) DEV1	0.50	0/1	0.00/0.24	0.00/1.24	0.00/0.30
Evening Snow Ct (Section 5) DEV2	0.86	4/8	0.33/0.40	1.99/2.33	0.66/0.93
Desert Senna Ave (Section 6) CP3	1.49	10/21	0.39/0.48	3.02/3.60	1.18/1.73
Desert Senna Ave (Section 6) CP3	2.21	10/21	0.37/0.45	3.53/4.18	1.31/1.88
Sand Sage Ave (Section 7) CP4	2.00	16/34	0.43/0.53	3.78/4.35	1.63/2.31
Sand Sage Ave (Section 7) CP4	5.15	16/34	0.38/0.46	5.45/6.47	2.07/2.98
Burgos Ave (Section 8A) 25% DEV5	2.33	2/5	0.24/0.31	2.66/3.10	0.64/0.96
Burgos Ave (Section 8) CP1	2.33	47/99	0.57/0.68	4.94/6.54	2.82/4.45
Sand Sage Ave (Section 9) CP5	1.38	26/55	0.52/0.63	3.57/4.42	1.86/2.78
Sand Sage Ave (Section 9) CP4 + 25% DEV6	3.87	19/39	0.41/0.50	5.07/5.92	2.08/2.96
Section 10 CP5	1.32	26/55	0.49/0.68	5.15/6.77	2.52/4.60
Section 10 CP5	9.30	26/55	0.34/0.44	9.32/12.52	3.17/5.51

Job No.

FILE No.

REUSE OF DOCUMENTS

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APPROVED

REVISIONS

NO.	DATE	DESCRIPTION

STAMP

DWYER ENGINEERING INC.
CIVIL ENGINEERS
LAND PLANNERS
WATER RIGHTS
SURVEYORS
LAND DEVELOPMENT CONSULTANTS
7310 SMOKE RANCH RD. SUITE E
LAS VEGAS, NEVADA 89128
(702) 254-2200
fax: (702) 254-2236

ONSITE BASIN MAP

DESERT MESA

NORTH LAS VEGAS, NEVADA

A.P.N. XXX-XX-XXX-XXX

JOB No. 17258
DATE: 1/20/18
VERT. SCALE: N/A
HORIZ. SCALE: 1"=100'
DRAWN BY: PDW
CHECKED BY: DAD

SHEET
FIGURE 8

Hydrologic Parameters

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Project No. : 17258

DEVELOPMENT : Desert Mesa
Future Conditions
CALCULATED BY : PDW

DATE: January 2018

Dwyer Engineering

SUB-BASIN DATA					INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc CHECK URBANIZED BASINS		FINAL Tc	Min Tc	Tlag	REMARKS
DESIG:	CN	K	AREA (acres)	AREA (mi^2)	LENGTH (ft)	SLOPE (%)	Ti (min)	LENGTH (ft)	SLOPE (%)	LAND COVER k	VELOCITY* (fps)	Tt (min)	Tc = Ti + Tt (min)	TOTAL LENGTH (ft)	Tc = (L/180)+10 (min)	(min)	(min)	Tlag= 0.6Tc/60 (hrs)	
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)	(11)		(12)	(13)	(14)			
Future Onsite Basins																			
DEV1	94.0	0.8508	0.27	0.0004	160	1.00	5.67	10	0.50	DEV	2.16	0.1	5.8	170.0	10.944	5.75	5.00	**0.058**	
DEV2	93.8	0.8482	2.76	0.0043	160	1.00	5.73	610	1.11	DEV	3.22	3.2	8.9	770.0	14.278	8.89	5.00	**0.089**	
DEV3	93.4	0.8429	5.17	0.0081	20	2.00	1.64	1230	1.22	DEV	3.38	6.1	7.7	1250.0	16.944	7.71	5.00	**0.077**	
DEV4	92.5	0.8310	4.46	0.0070	195	1.00	6.76	735	2.50	DEV	4.84	2.5	9.3	930.0	15.167	9.29	5.00	**0.093**	
DEV5	92.5	0.8310	7.00	0.0109	130	1.00	5.52	1340	2.77	DEV	5.09	4.4	9.9	1470.0	18.167	9.91	5.00	**0.099**	
DEV6	92.5	0.8310	8.02	0.0125	150	1.00	5.93	1340	3.09	DEV	5.38	4.2	10.1	1490.0	18.278	10.08	5.00	**0.101**	
Future Offsite Basins																			
OFF1	92.5	0.8310	24.41	0.0381	140	1.00	5.73	3150	1.90	DEV	4.22	12.4	18.2	3290.0	28.278	18.18	5.00	**0.182**	
OFF2	92.8	0.8350	32.87	0.0514	160	1.00	6.03	2300	1.52	DEV	3.77	10.2	16.2	2460.0	23.667	16.20	5.00	**0.162**	
OFF3	94.0	0.8508	0.70	0.0011	85	0.50	5.21	--	--	DEV	--	--	5.2	85.0	10.472	5.21	5.00	**0.052**	
OFF4	94.0	0.8508	1.74	0.0027	230	1.73	5.67	160	1.88	DEV	4.20	0.6	6.3	390.0	12.167	6.30	5.00	**0.063**	

Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
Tc = Ti + Tt
K = 0.0132 (CN) - 0.39 Tlag = 0.6Tc

*** The velocity in column 9 was computed using the equation V = CS^.5**
C is a coefficient and S is the travel slope, as outlined in section 602.1 of the CCRFCD Manual.

***As recommended in the CCRFCD Manual, C = 30.6 under developed conditions and C = 29.4 under undeveloped conditions.**

REFERENCE :

STANDARD FORM 4

Future Hec-1 Model

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   17JAN18  TIME  01:22:01  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X                X
                                        XXXXXXX  XXXX     X        XXXXX   X
                                        X     X  X        X                X
                                        X     X  X        X     X          X
                                        X     X  XXXXXXX   XXXXX          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


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

   1          ID
   2          ID                TECHNICAL DRAINAGE STUDY FOR DESERT MESA
   3          ID                     CITY OF NORTH LAS VEGAS, NEVADA
   4          ID
   5          ID        PREPARED FOR:
   6          ID
   7          ID        PREPARED BY:
   8          ID                     DWYER ENGINEERING
   9          ID                     7310 SMOKE RANCH ROAD, SUITE E
  10          ID                     LAS VEGAS, NV  89128
  11          ID
  12          ID
  13          ID    FUTURE 100-YEAR & 10-YEAR MODEL
  14          ID    FILENAME:DM-FUTA.DAT
  15          ID    JOB#17258
  16          ID
  17          ID
  18          ID
              *DIAGRAM
  19          IT       5       0       0     300
  20          IO       5
  21          IN       5
  22          JR    PREC    1.00    0.57
              *

  23          KK    OFF1
  24          KM   FUTURE OFFSITE BASIN OFF1
  25          BA  0.0381
  26          PB    2.77
  27          PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
  28          PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
  29          PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
  30          PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
  31          PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
  32          PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
  33          PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
  34          PC    .998    .999    1.00
  35          LS       0    92.5
  36          UD   0.182
              *

  37          KK    OFF2
  38          KM   FUTURE OFFSITE BASIN OFF2
  39          BA  0.0514
  40          LS       0    92.8
  41          UD   0.162
              *

  42          KK   DEV5
  43          KM   DEVELOPED ONSITE BASIN DEV5
  44          BA  0.0109
  45          LS       0    92.5
  46          UD   0.099
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
             47           KK     CP1
             48           KM   COMBINE OFF2 AND DEV5
             49           HC       2
                          *

             50           KK     CP2
             51           KM   COMBINE OFF1 AND CP1
             52           HC       2
                          *

             53           KK    OFF4
             54           KM   FUTURE OFFSITE BASIN OFF4
             55           BA  0.0027
             56           LS       0    94.0
             57           UD   0.063
                          *

             58           KK    DEV3
             59           KM   DEVELOPED ONSITE BASIN DEV3
             60           BA  0.0081
             61           LS       0    93.4
             62           UD   0.077
                          *

             63           KK     CP3
             64           KM   COMBINE OFF4 AND DEV3
             65           HC       2
                          *

             66           KK    DEV4
             67           KM   DEVELOPED ONSITE BASIN DEV4
             68           BA  0.0070
             69           LS       0    92.5
             70           UD   0.093
                          *

             71           KK     CP4
             72           KM   COMBINE CP3 AND DEV4
             73           HC       2
                          *

             74           KK    DEV6
             75           KM   DEVELOPED ONSITE BASIN DEV6
             76           BA  0.0125
             77           LS       0    92.5
             78           UD   0.101
                          *

             79           KK     CP5
             80           KM   COMBINE CP4 AND DEV6
             81           HC       2
                          *
1                                                HEC-1 INPUT                                                PAGE  3

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

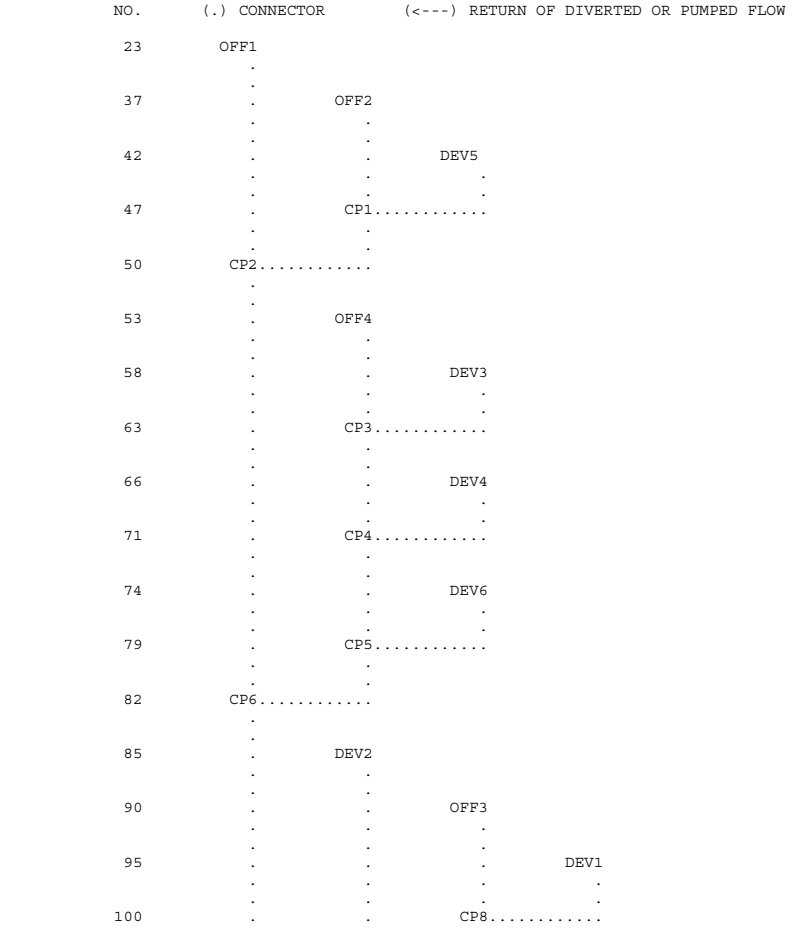

             82           KK     CP6
             83           KM   COMBINE CP2 AND CP5
             84           HC       2
                          *

             85           KK    DEV2
             86           KM   DEVELOPED ONSITE BASIN DEV2
             87           BA  0.0043
             88           LS       0    93.8
             89           UD   0.089
                          *

             90           KK    OFF3
             91           KM   FUTURE OFFSITE BASIN OFF3
             92           BA  0.0011
             93           LS       0    94.0
             94           UD   0.052
                          *

             95           KK    DEV1
             96           KM   ONSITE DEVELOPED BASIN DEV1
             97           BA  0.0004
             98           LS       0    94.0
             99           UD   0.058
                          *

            100           KK     CP8
            101           KM   COMBINE OFF3 AND DEV1
            102           HC       2
                          *
            103           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   17JAN18  TIME  01:22:01   *
*                                       *
*****************************************
```

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

TECHNICAL DRAINAGE STUDY FOR DESERT MESA
CITY OF NORTH LAS VEGAS, NEVADA

PREPARED FOR:

PREPARED BY:

DWYER ENGINEERING
7310 SMOKE RANCH ROAD, SUITE E
LAS VEGAS, NV 89128

FUTURE 100-YEAR & 10-YEAR MODEL
FILENAME:DM-FUTA.DAT
JOB#17258

```
  20 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
                  1.00       .57
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


                                                                        RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN                        RATIO 1  RATIO 2
                                                                    1.00      .57

 HYDROGRAPH AT
+                  OFF1       .04     1   FLOW                      57.      27.
                                           TIME                    3.58     3.58

 HYDROGRAPH AT
+                  OFF2       .05     1   FLOW                      81.      39.
                                           TIME                    3.58     3.58

 HYDROGRAPH AT
+                  DEV5       .01     1   FLOW                      19.       9.
                                           TIME                    3.50     3.50

  2 COMBINED AT
+                   CP1       .06     1   FLOW                      99.      47.
                                           TIME                    3.58     3.58

  2 COMBINED AT
+                   CP2       .10     1   FLOW                     156.      74.
                                           TIME                    3.58     3.58

 HYDROGRAPH AT
+                  OFF4       .00     1   FLOW                       6.       3.
                                           TIME                    3.50     3.50

 HYDROGRAPH AT
+                  DEV3       .01     1   FLOW                      16.       8.
                                           TIME                    3.50     3.50

  2 COMBINED AT
+                   CP3       .01     1   FLOW                      21.      10.
                                           TIME                    3.50     3.50

 HYDROGRAPH AT
+                  DEV4       .01     1   FLOW                      12.       6.
                                           TIME                    3.50     3.50

  2 COMBINED AT
+                   CP4       .02     1   FLOW                      34.      16.
                                           TIME                    3.50     3.50

 HYDROGRAPH AT
+                  DEV6       .01     1   FLOW                      21.      10.
                                           TIME                    3.50     3.50

  2 COMBINED AT
+                   CP5       .03     1   FLOW                      55.      26.
                                           TIME                    3.50     3.50

  2 COMBINED AT
+                   CP6       .13     1   FLOW                     203.      97.
                                           TIME                    3.58     3.58

 HYDROGRAPH AT
+                  DEV2       .00     1   FLOW                       8.       4.
                                           TIME                    3.50     3.50

 HYDROGRAPH AT
+                  OFF3       .00     1   FLOW                       2.       1.
                                           TIME                    3.50     3.50

 HYDROGRAPH AT
```

```
+                    DEV1        .00     1   FLOW           1.       0.
                                             TIME         3.50     3.50

  2 COMBINED AT
+                     CP8        .00     1   FLOW           3.       2.
                                             TIME         3.50     3.50


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

Hydraulic Calculations

Worksheet for 10 Yr Carey Ave @ 0.40% (Section 2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Discharge	57.00	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	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+93.00, 0.13)	0.016
(0+93.00, 0.13)	(1+00.00, 0.60)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for 10 Yr Carey Ave @ 0.40% (Section 2)

Results

Normal Depth		0.75	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		21.38	ft²
Wetted Perimeter		73.76	ft
Hydraulic Radius		0.29	ft
Top Width		72.35	ft
Normal Depth		0.75	ft
Critical Depth		0.72	ft
Critical Slope		0.00546	ft/ft
Velocity		2.67	ft/s
Velocity Head		0.11	ft
Specific Energy		0.86	ft
Froude Number		0.86	
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	0.75	ft
Critical Depth	0.72	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00546	ft/ft

Cross Section for 10 Yr Carey Ave @ 0.40% (Section 2)

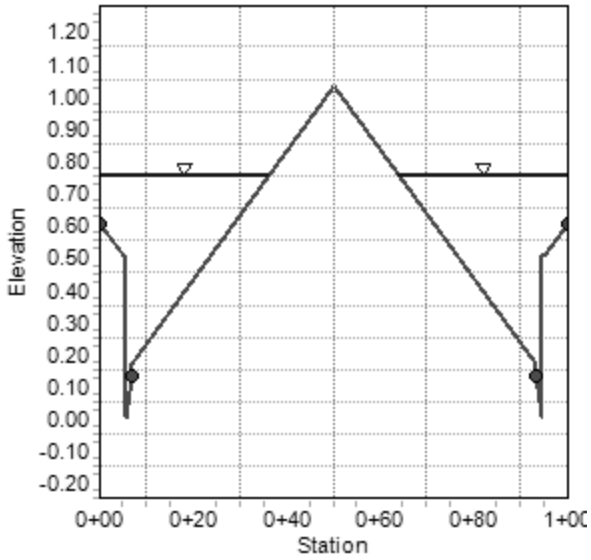
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	0.75	ft
Discharge	57.00	ft³/s

Cross Section Image



Worksheet for 100 Yr Carey Ave @ 0.40% (Section 2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Discharge	217.00	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	0.13
0+07.00	0.17
0+50.00	1.03
0+93.00	0.17
0+93.00	0.13
0+94.50	0.00
0+94.50	0.50
0+95.00	0.50
1+00.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+93.00, 0.13)	0.016
(0+93.00, 0.13)	(1+00.00, 0.60)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for 100 Yr Carey Ave @ 0.40% (Section 2)

Results

Normal Depth		1.12	ft
Elevation Range	0.00 to 1.03 ft		
Flow Area		54.57	ft²
Wetted Perimeter		102.16	ft
Hydraulic Radius		0.53	ft
Top Width		100.00	ft
Normal Depth		1.12	ft
Critical Depth		1.10	ft
Critical Slope		0.00450	ft/ft
Velocity		3.98	ft/s
Velocity Head		0.25	ft
Specific Energy		1.37	ft
Froude Number		0.95	
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	1.12	ft
Critical Depth	1.10	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00450	ft/ft

Cross Section for 100 Yr Carey Ave @ 0.40% (Section 2)

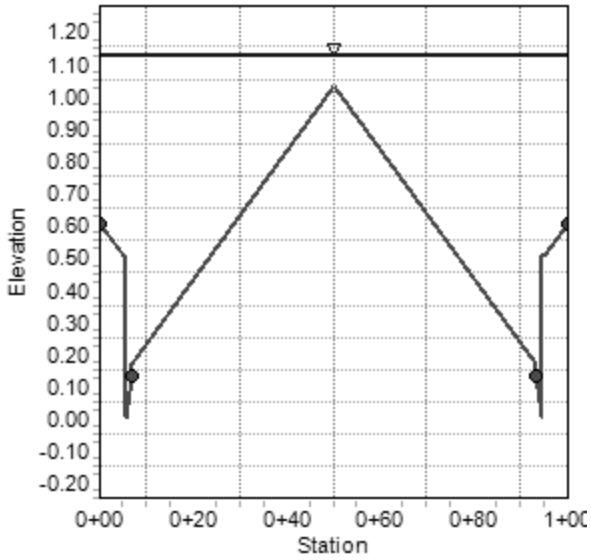
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	1.12	ft
Discharge	217.00	ft³/s

Cross Section Image



Excerpts from Technical Drainage Study for Desert Mesa

(prepared by Aztec Engineering)

Date: 24-May-02
Project Name: Desert Mesa
Project No.: AZ02023
Project Location: Township 20 South, Range 61 East, Section 15

Calculated By: RAC
Checked By: AEP

STORM RUNOFF CALCULATION

1. Determine Runoff Coefficient (From Table 601, CCRFCD Manual)

Basin	C_{10}	C_{100}	Condition
Existing Conditions			
EX1A	0.25	0.50	Undeveloped Area
EX1B	0.25	0.50	Undeveloped Area
OFF1	0.88	0.89	Commercial/Downtown
Developed Conditions			
ON1	0.62	0.74	1/4 Acre Residential
ON2	0.62	0.74	1/4 Acre Residential
ON3	0.62	0.74	1/4 Acre Residential
ON4	0.62	0.74	1/4 Acre Residential
ON5	0.62	0.74	1/4 Acre Residential
ON6	0.62	0.74	1/4 Acre Residential
ON7	0.62	0.74	1/4 Acre Residential
ON8	0.62	0.74	1/4 Acre Residential
ON9	0.62	0.74	1/4 Acre Residential
ON10	0.62	0.74	1/4 Acre Residential
ON11	0.62	0.74	1/4 Acre Residential
ON12	0.62	0.74	1/4 Acre Residential
ON13	0.62	0.74	1/4 Acre Residential
ON2+ON3	0.62	0.74	1/4 Acre Residential
OFF1+ON4	0.62	0.74	1/4 Acre Residential
(OFF1+ON4)+ON5+ON6	0.62	0.74	1/4 Acre Residential
(OFF1+ON4+ON5+ON6)+ON7	0.62	0.74	1/4 Acre Residential
(OFF1+ON4+ON5+ON6+ON7)+ON8	0.62	0.74	1/4 Acre Residential
ON9+ON10	0.62	0.74	1/4 Acre Residential
ON12+ON13	0.62	0.74	1/4 Acre Residential

2. Determine Time of Concentration (see Standard Form 4)

3. Determine Rainfall Intensity

From Figure 513 (CCRFCD Manual), project site lies within McCarran Rainfall Area

From **Figure 517** (CCRFCD Manual), the following **rainfall intensities** were obtained:

Basin	$t_{c\ 10\text{-}YR}$ (min)	i_{10} (in/hr)	i_{100} (in/hr)	$t_{c\ 100\text{-}YR}$ (min)
Existing Conditions				
EX1A	59.70	1.2	3.1	39.71
EX1B	61.14	1.2	3.2	39.58
OFF1	10.00	3.4	6.4	8.86
Developed Conditions				
ON1	8.60	3.6	7.0	6.79
ON2	10.43	3.3	6.5	8.20
ON3	11.32	3.2	6.4	8.75
ON4	12.35	3.1	6.2	9.61
ON5	9.66	3.4	6.8	7.55
ON6	6.57	3.9	7.4	5.40
ON7	13.06	3.0	6.0	10.30
ON8	8.81	3.6	7.0	6.86
ON9	9.88	3.4	6.6	7.71
ON10	8.72	3.5	7.0	6.96
ON11	15.48	3.0	5.6	12.32
ON12	11.74	3.2	6.2	9.23
ON13	8.29	3.6	7.2	6.27
ON2+ON3	13.79	3.0	6.0	10.98
OFF1+ON4	15.00	2.9	5.6	12.96
(OFF1+ON4)+ON5+ON6	16.18	2.8	5.5	14.31
(OFF1+ON4+ON5+ON6)+ON7	22.21	2.6	4.8	19.34
(OFF1+ON4+ON5+ON6+ON7)+ON8	23.51	2.5	4.7	20.56
ON9+ON10	11.09	3.3	6.4	9.04
ON12+ON13	9.55	3.4	6.1	10.23

4. Determine Peak Flow

Use Modified Rational Method: Q=kCIA k = 0.50

Existing Conditions (10-year frequency storm)					
Basin	**Area (acres)**	**Tc (min)**	**Intensity$_{10}$ (in/hr)**	**C_{10}**	**Q_{10} (cfs)**
EX1A	21.4	59.70	1.2	0.25	3.21
EX1B	6.5	61.14	1.2	0.25	0.98
OFF1	2.3	10.00	3.4	0.88	3.44

Existing Conditions (100-year frequency storm)					
Basin	**Area (acres)**	**Tc (min)**	**Intensity$_{100}$ (in/hr)**	**C_{100}**	**Q_{100} (cfs)**
EX1A	21.4	39.71	3.1	0.50	16.59
EX1B	6.5	39.58	3.2	0.50	5.20
OFF1	2.3	8.86	6.4	0.89	6.55

Developed Conditions (10-year frequency storm)					
Basin	**Area (acres)**	**Tc (min)**	**Intensity$_{10}$ (in/hr)**	**C_{10}**	**Q_{10} (cfs)**
ON1	0.28	8.60	3.6	0.62	0.31
ON2	0.96	10.43	3.3	0.62	0.98
ON3	1.98	11.32	3.2	0.62	1.96
ON4	4.76	12.35	3.1	0.62	4.57
ON5	1.29	9.66	3.4	0.62	1.36
ON6	1.08	6.57	3.9	0.62	1.31
ON7	3.01	13.06	3.0	0.62	2.80
ON8	0.85	8.81	3.6	0.62	0.95
ON9	1.67	9.88	3.4	0.62	1.76
ON10	1.03	8.72	3.5	0.62	1.12
ON11	3.71	15.48	3.0	0.62	3.45
ON12	5.81	11.74	3.2	0.62	5.76
ON13	1.51	8.29	3.6	0.62	1.69
ON2+ON3	2.94	13.79	3.0	0.62	2.73
OFF1+ON4	7.06	15.00	2.9	0.62	6.35
(OFF1+ON4)+ON5+ON6	9.43	16.18	2.8	0.62	8.19
(OFF1+ON4+ON5+ON6)+ON7	12.44	22.21	2.6	0.62	10.03
(OFF1+ON4+ON5+ON6+ON7)+ON8	13.29	23.51	2.5	0.62	10.30
ON9+ON10	2.70	11.09	3.3	0.62	2.76
ON12+ON13	7.32	9.55	3.4	0.62	7.72

Developed Conditions (100-year frequency storm)					
Basin	**Area (acres)**	**Tc (min)**	**Intensity$_{100}$ (in/hr)**	**C_{100}**	**Q_{100} (cfs)**
ON1	0.28	6.79	7.0	0.74	0.73
ON2	0.96	8.20	6.5	0.74	2.31
ON3	1.98	8.75	6.4	0.74	4.69
ON4	4.76	9.61	6.2	0.74	10.92
ON5	1.29	7.55	6.8	0.74	3.25
ON6	1.08	5.40	7.4	0.74	2.96
ON7	3.01	10.30	6.0	0.74	6.68
ON8	0.85	6.86	7.0	0.74	2.20
ON9	1.67	7.71	6.6	0.74	4.08
ON10	1.03	6.96	7.0	0.74	2.67
ON11	3.71	12.32	5.6	0.74	7.69
ON12	5.81	9.23	6.2	0.74	13.33
ON13	1.51	6.27	7.2	0.74	4.02
ON2+ON3	2.94	10.98	6.0	0.74	6.53
OFF1+ON4	7.06	12.96	5.6	0.74	14.63
(OFF1+ON4)+ON5+ON6	9.43	14.31	5.5	0.74	19.19
(OFF1+ON4+ON5+ON6)+ON7	12.44	19.34	4.8	0.74	22.09
(OFF1+ON4+ON5+ON6+ON7)+ON8	13.29	20.56	4.7	0.74	23.11
ON9+ON10	2.70	9.04	6.4	0.74	6.39
ON12+ON13	7.32	10.23	6.1	0.74	16.52

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Project Name: Desert Mesa
Project Location: North Side of Carey Avenue, between Revere Street and Commerce Street
Project No.: AZ02023

CALCULATED BY: RAC
CHECKED BY: AEP
DATE: 05/24/02

SUB-BASIN DATA					INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)				Tc CHECK URBANIZED BASINS		Tc		REMARKS
BASIN (1)	DEV./EX. (D or E)	C (2)	AREA Ac (3)	AREA Mi^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	Ti Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V VELOCITY FPS (9)	Tt Min (10)	TOTAL LENGTH Ft (11)	Tc = (L/180)+10 Min (12)	Min (13)		Use Tc
10-YEAR																
EX1A	E	0.25	21.40	0.0334	850	1.53	38.71	1650	3.48	1.31	20.99	2500	N/A	59.70		**59.70**
EX1B	E	0.25	6.50	0.0102	385	0.91	30.98	1520	2.43	0.84	30.16	1905	N/A	61.14		**61.14**
OFF1	E & D	0.88	2.30	0.0036	200	1.00	5.60	420	1.19	1.59	4.40	620	N/A	10.00		**10.00**
ON1	D	0.62	0.28	0.0004	120	2.00	7.51	75	0.46	1.15	1.09	195	11.08	8.60		**8.60**
ON2	D	0.62	0.96	0.0015	120	2.00	7.51	310	1.29	1.77	2.92	430	12.39	10.43		**10.43**
ON3	D	0.62	1.98	0.0031	135	2.00	7.97	320	0.78	1.59	3.35	455	12.53	11.32		**11.32**
ON4	D	0.62	4.76	0.0074	115	2.00	7.35	750	1.56	2.50	5.00	865	14.81	12.35		**12.35**
ON5	D	0.62	1.29	0.0020	100	2.00	6.86	370	2.00	2.20	2.80	470	12.61	9.66		**9.66**
ON6	D	0.62	1.08	0.0017	62	2.00	5.40	300	5.16	4.26	1.17	362	12.01	6.57		**6.57**
ON7	D	0.62	3.01	0.0047	105	2.00	7.03	945	2.25	2.61	6.03	1050	15.83	13.06		**13.06**
ON8	D	0.62	0.85	0.0013	120	2.00	7.51	350	9.30	4.48	1.30	470	12.61	8.81		**8.81**
ON9	D	0.62	1.67	0.0026	100	2.00	6.86	415	2.00	2.29	3.02	515	12.86	9.88		**9.88**
ON10	D	0.62	1.03	0.0016	120	2.00	7.51	290	5.16	3.99	1.21	410	12.28	8.72		**8.72**
ON11	D	0.62	3.71	0.0058	120	2.00	7.51	1300	2.25	2.72	7.97	1420	17.89	15.48		**15.48**
ON12	D	0.62	5.81	0.0091	80	2.00	6.13	1080	2.60	3.21	5.61	1160	16.44	11.74		**11.74**
ON13	D	0.62	1.51	0.0024	105	2.00	7.03	250	4.50	3.30	1.26	355	11.97	8.29		**8.29**
ON2+ON3	D	0.62	2.94	0.0046	430		10.43	320	0.78	1.59	3.35	750	14.17	13.79		**13.79**
OFF1+ON4	D	0.62	7.06	0.0110	620		10.00	750	1.56	2.50	5.00	1370	17.61	15.00		**15.00**
(OFF1+ON4)+ON5+ON6	D	0.62	9.43	0.0147	1370		15.00	300	5.16	4.26	1.17	1670	19.28	16.18		**16.18**
(OFF1+ON4+ON5+ON6)+ON7	D	0.62	12.44	0.0194	1670		16.18	945	2.25	2.61	6.03	2615	24.53	22.21		**22.21**
(OFF1+ON4+ON5+ON6+ON7)+ON8	D	0.62	13.29	0.0208	2615		22.21	350	9.30	4.48	1.30	2965	26.47	23.51		**23.51**
ON9+ON10	D	0.62	2.70	0.0042	515		9.88	290	5.16	3.99	1.21	805	14.47	11.09		**11.09**
ON12+ON13	D	0.62	7.32	0.0114	1160		8.29	250	4.50	3.30	1.26	1410	17.83	9.55		**9.55**
100-YEAR																
EX1A	E	0.50	21.40	0.0334	850	1.53	27.33	1650	3.48	2.22	12.39	2500	N/A	39.71		**39.71**
EX1B	E	0.50	6.50	0.0102	385	0.91	21.87	1520	2.43	1.43	17.72	1905	N/A	39.58		**39.58**
OFF1	E & D	0.89	2.30	0.0036	200	1.00	5.35	420	1.19	1.99	3.52	620	N/A	8.86		**8.86**
ON1	D	0.74	0.28	0.0004	120	2.00	5.63	75	0.46	1.08	1.16	195	11.08	6.79		**6.79**
ON2	D	0.74	0.96	0.0015	120	2.00	5.63	310	1.29	2.01	2.57	430	12.39	8.20		**8.20**
ON3	D	0.74	1.98	0.0031	135	2.00	5.98	320	0.78	1.92	2.78	455	12.53	8.75		**8.75**
ON4	D	0.74	4.76	0.0074	115	2.00	5.52	750	1.56	3.05	4.10	865	14.81	9.61		**9.61**
ON5	D	0.74	1.29	0.0020	100	2.00	5.14	370	2.00	2.56	2.41	470	12.61	7.55		**7.55**
ON6	D	0.74	1.08	0.0017	62	2.00	4.05	300	5.16	3.71	1.35	362	12.01	5.40		**5.40**
ON7	D	0.74	3.01	0.0047	105	2.00	5.27	945	2.25	3.13	5.03	1050	15.83	10.30		**10.30**
ON8	D	0.74	0.85	0.0013	120	2.00	5.63	350	9.30	4.77	1.22	470	12.61	6.86		**6.86**
ON9	D	0.74	1.67	0.0026	100	2.00	5.14	415	2.00	2.69	2.57	515	12.86	7.71		**7.71**
ON10	D	0.74	1.03	0.0016	120	2.00	5.63	290	5.16	3.65	1.32	410	12.28	6.96		**6.96**
ON11	D	0.74	3.71	0.0058	120	2.00	5.63	1300	2.25	3.24	6.69	1420	17.89	12.32		**12.32**
ON12	D	0.74	5.81	0.0091	80	2.00	4.60	1080	2.60	3.89	4.63	1160	16.44	9.23		**9.23**
ON13	D	0.74	1.51	0.0024	105	2.00	5.27	250	4.50	4.17	1.00	355	11.97	6.27		**6.27**
ON2+ON3	D	0.74	2.94	0.0046	430		8.20	320	0.78	1.92	2.78	750	14.17	10.98		**10.98**
OFF1+ON4	D	0.74	7.06	0.0110	620		8.86	750	1.56	3.05	4.10	1370	17.61	12.96		**12.96**
(OFF1+ON4)+ON5+ON6	D	0.74	9.43	0.0147	1370		12.96	300	5.16	3.71	1.35	1670	19.28	14.31		**14.31**
(OFF1+ON4+ON5+ON6)+ON7	D	0.74	12.44	0.0194	1670		14.31	945	2.25	3.13	5.03	2615	24.53	19.34		**19.34**
(OFF1+ON4+ON5+ON6+ON7)+ON8	D	0.74	13.29	0.0208	2615		19.34	350	9.30	4.77	1.22	2965	26.47	20.56		**20.56**
ON9+ON10	D	0.74	2.70	0.0042	515		7.71	290	5.16	3.65	1.32	805	14.47	9.04		**9.04**
ON12+ON13	D	0.74	7.32	0.0114	1160		9.23	250	4.50	4.17	1.00	1410	17.83	10.23		**10.23**

Tc = Ti + Tt
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3;
$K = C_{10}$

REFERENCE :

STANDARD FORM 4

AZTEC

Date: 29-Aug-02 **Calculated By:** RAC
Project Name: Desert Mesa **Checked By:** AEP
Project No.: AZ02023
Project Location: Township 20 South, Range 61 East, Section 15

STORM RUNOFF CALCULATION

1. Determine Runoff Coefficient (From Table 601, CCRFCD Manual)

Basin	C_{10}	C_{100}	Condition
Existing Conditions			
OFF2	0.73	0.80	1/8 Acre or Less

2. Determine Time of Concentration (see Standard Form 4)

3. Determine Rainfall Intensity

From Figure 513 (CCRFCD Manual), project site lies within McCarran Rainfall Area
From **Figure 517** (CCRFCD Manual), the following **rainfall intensities** were obtained:

Basin	$t_{c\ 10\text{-}YR}$ (min)	i_{10} (in/hr)	i_{100} (in/hr)	$t_{c\ 100\text{-}YR}$ (min)
Existing Conditions				
OFF2	46.10	1.5	3.4	35.75

4. Determine Peak Flow

Use Modified Rational Method: Q=kCIA k = 0.50

Existing Conditions (10-year frequency storm)					
Basin	**Area (acres)**	**Tc (min)**	**Intensity$_{10}$ (in/hr)**	**C_{10}**	**Q_{10} (cfs)**
OFF2	39	46.10	1.5	0.73	21.35

Existing Conditions (100-year frequency storm)					
Basin	**Area (acres)**	**Tc (min)**	**Intensity$_{100}$ (in/hr)**	**C_{100}**	**Q_{100} (cfs)**
OFF2	39	35.75	3.4	0.80	53.04

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Project Name: Desert Mesa
Project Location: North Side of Carey Avenue, between Revere Street and Commerce Street
Project No.: AZ02023

CALCULATED BY: RAC
CHECKED BY: AEP
DATE: 09/06/02

SUB-BASIN DATA					INITIAL / OVERLAND TIME (TI)			TRAVEL TIME (Tt)				Tc CHECK URBANIZED BASINS		Tc		REMARKS
BASIN (1)	DEV./EX. (D or E)	C (2)	AREA Ac (3)	AREA Mi^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	TI Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V VELOCITY FPS (9)	Tt Min (10)	TOTAL LENGTH Ft (11)	Tc = (L/180)+10 Min (12)	Min (13)		Use Tc
10-YEAR																
OFF2	E & D	0.73	39.00	0.0609	500	0.40	20.21	4380	1.59	2.82	25.89	4880	N/A	46.10		46.10
100-YEAR																
OFF2	E & D	0.80	39.00	0.0609	500	0.40	16.39	4380	1.59	3.77	19.36	4880	N/A	35.75		35.75

Tc = Ti + Tt
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3;
$K = C_{10}$

REFERENCE :

STANDARD FORM 4

LEGEND

BASIN IDENTIFICATION — EX1A

CONCENTRATION POINT — PT1

FLOW DIRECTION

BASIN BOUNDARY

PROPERTY LINE

BASIN / POINT	AREA (AC)	Q_{10} (CFS)	Q_{100} (CFS)
EX1A	21.4	3.2	17
EX1B	6.5	1.0	5.2
OFF1	2.3	3.4	6.5
PT1	----	6.6	22
PT2	----	1.0	5.2

NORTH

SCALE: 1" = 100'

100 0 100 200

SCALE FEET

HIGH POINT

REGAL ESTATES UNIT 3 -PHASE 4
APN 139-15-415

-004 FF 2052.84 | -005 FF 2049.88 | -006 FF 2048.97 | -007 FF 2046.84 | -008 FF 2046.09

OFF1

NOT A PART
APN 139-15-401-003

EXISTING REVERE ESTATES

REVERE STREET

APN. 139-15-401-004
5.19 ACRES

NOT A PART
APN 139-15-401-006

EX1B

APN. 139-15-401-007
6.75 ACRES

Q_{10} = 53 CFS
Q_{100} = 209 CFS
(PER TECHNICAL DRAINAGE STUDY FOR REVERE ESTATES, OCTOBER 1995 BY L. BRUCE NYBO, INC.)

EXISTING DROP INLETS — EXISTING DROP INLETS — CAREY AVENUE — EXISTING DROP INLET — EXISTING DROP INLETS

NOT A PART
APN 139-15-401-001

Q_{10} = 32 CFS
Q_{100} = 117 CFS
(PER HYDROLOGY STUDY FOR REGAL ESTATES - 1D, OCTOBER 2001 BY BAUGHMAN & TURNER, INC)

APN 139-15-412-002

EXISTING REGAL ESTATES No. 4 SUBDIVISION
PER PLAT BOOK 13, PAGE 10
APN 139-15-414

034 FF 2014.72 | 035 FF 2014.40 | 036 FF 2012.67 | 037 FF 2012.82 | 038 FF 2010.58 | 039 FF 2009.71 | 040 FF 2007.05 | 041 FF 2003.60 | 042 FF 2003.04 | 043 FF 2001.44 | 044 FF 1999.80 | 045 FF 1997.88 | 046 FF 1995.24 | 047 FF 1993.79

EX1A

APN. 139-15-401-005
15.52 ACRES

COMMERCE STREET

EXIST. BLOCK WALL TO REMAIN

EXISTING NEVADA POWER SUBSTATION
APN 139-15-401-009
NOT A PART OF THIS SURVEY

LOT 1 PER FILE 102 PAGE 21 OF PARCEL MAPS
NOT A PART OF THIS SURVEY

EXISTING CONVENIENCE STORE
APN 139-15-401-008
FF= 2011.00

MCNIEL ST

PT1

PT2

PROJ. NO: AZ08123
DESIGN: RAC
DATE: 05/24/22
SCALE: AS SHOWN
FILE: FIG_5

STAMP DATE:

AZTEC ENGINEERING
3320 N. Buffalo Dr. # 105, Las Vegas, NV 89129
Tel (702) 396-3426 Fax (702) 396-3758
Email: aztec@azteceng.com

DESERT MESA
CAREY AVENUE AND REVERE STREET

EXISTING CONDITIONS
DRAINAGE BASIN PLAN

SHEET
FIG_5
1 OF 1 SHEETS

PROJECT NO

LEGEND

BASIN IDENTIFICATION — EX1A

CONCENTRATION POINT — PT1

FLOW DIRECTION

BASIN BOUNDARY

SECTION — 1

BASIN	AREA (AC)	Q_{10} (CFS)	Q_{100} (CFS)
OFF1	2.3	3.4	6.5
ON1	0.28	0.3	0.7
ON2	0.96	1.0	2.3
ON3	1.98	2.0	4.7
ON4	4.76	4.6	11
ON5	1.29	1.4	3.2
ON6	1.08	1.3	3.0
ON7	3.01	2.8	6.7
ON8	0.85	0.9	2.2
ON9	1.67	1.8	4.1
ON10	1.03	1.1	2.7
ON11	3.71	3.4	7.7
ON12	5.81	5.8	13
ON13	1.51	1.7	4.0

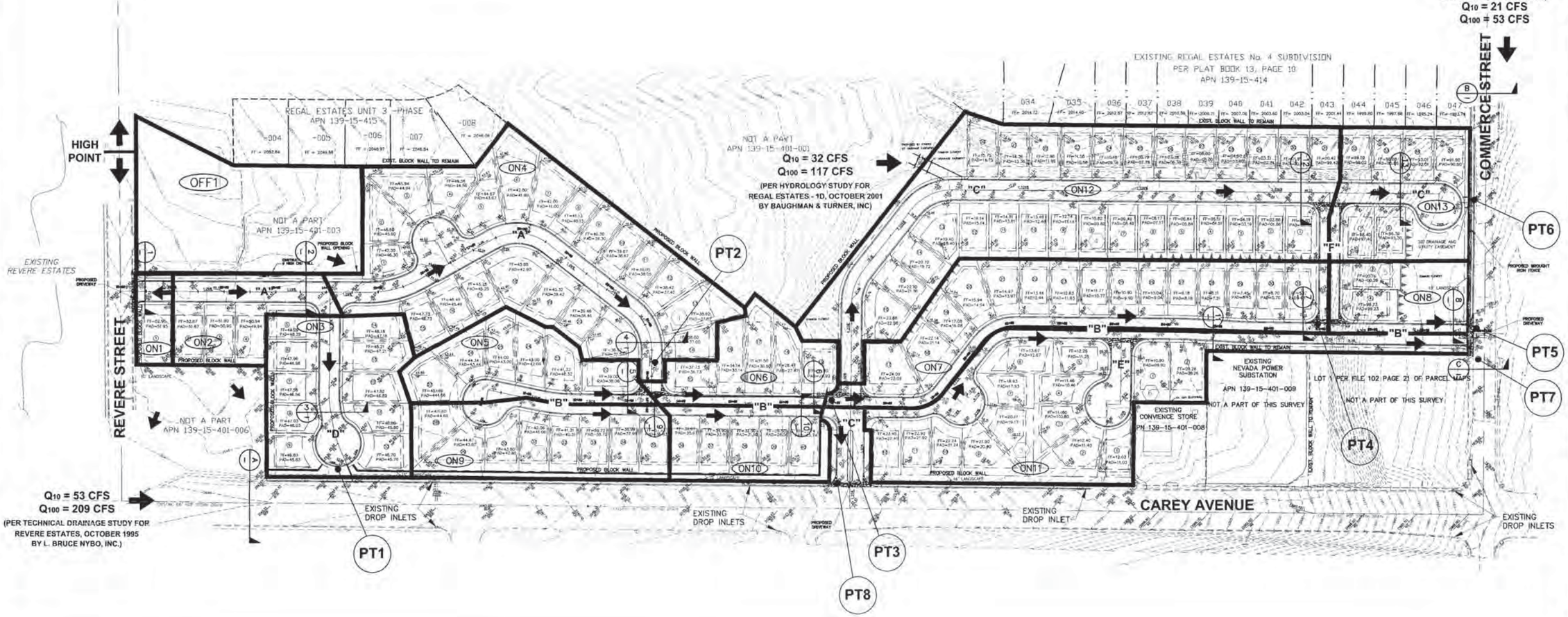
POINT	AREA (AC)	Q_{10} (CFS)	Q_{100} (CFS)
PT1	----	2.7	6.5
PT2	----	6.3	15
PT3	----	8.2	19
PT4	----	10	22
PT5	----	13	30
PT6	----	40	133
PT7	----	64	195
PT8	----	2.8	6.4

NORTH

SCALE: 1" = 100'

100 0 100 200

SCALE FEET



AZTEC ENGINEERING
3320 N Buffalo Dr. # 108, Las Vegas, NV 89129
Tel (702) 396-3426 Fax(702) 396-3758
Email: aztec@azteceng.com

PROJ NO: AZ02023
DESIGN: RAC
DATE: 09/16/02
SCALE: AS SHOWN
FILE: FIGURE6

STAMP DATE:

DESERT MESA
CAREY AVENUE AND REVERE STREET

DEVELOPED CONDITIONS
DRAINAGE BASIN PLAN

SHEET
FIG_6
1 OF 1 SHEETS

PROJECT NO.

LEGEND

BASIN IDENTIFICATION — OFF2

CONCENTRATION POINT — PT1

FLOW DIRECTION

BASIN BOUNDARY

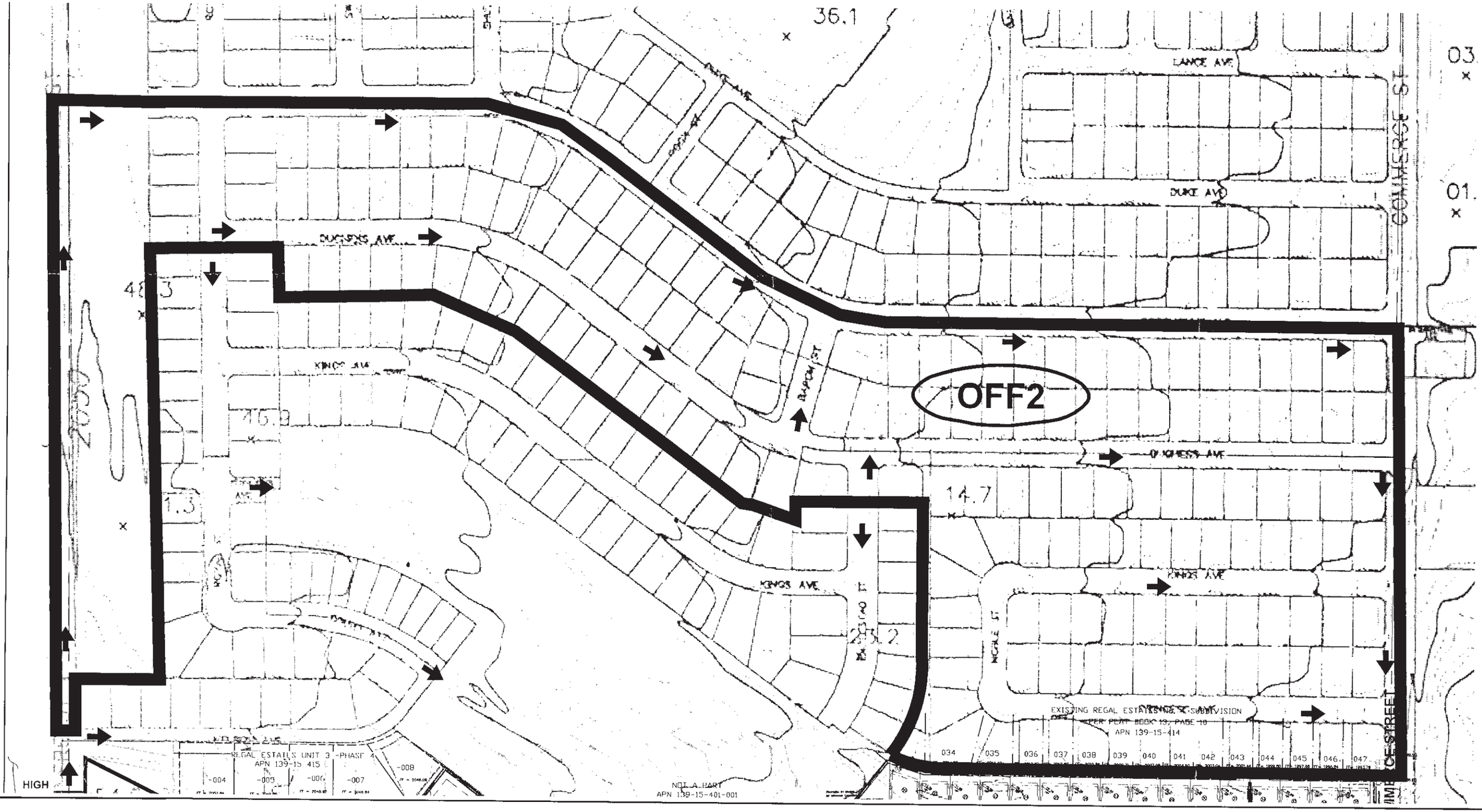
BASIN	AREA (AC)	Q_{10} (CFS)	Q_{100} (CFS)
OFF2	39	21	53

NORTH

SCALE: 1" = 100'

100 0 100 200

SCALE FEET



PROJ NO: AZ02023
DESIGN: RAC
DATE: 09/16/02
SCALE: AS SHOWN
FILE: FIGURE6A

REV | DESCRIPTION | BY | DATE | AGEN APP | DATE

STAMP DATE:

AZTEC ENGINEERING
3320 N Buffalo Dr., # 106, Las Vegas, NV 89129
Tel (702) 396-3426 Fax(702) 396-3758
Email: aztec@azteceng.com

DESERT MESA
CAREY AVENUE AND REVERE STREET

DEVELOPED CONDITIONS
OFFSITE DRAINAGE BASIN PLAN

SHEET
FIG_6A
1 OF 1 SHEETS

PROJECT NO.

Excerpts from Technical Drainage Study for Revere Estates

(prepared by L. Bruce Nybo Inc.)

****
FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
****

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

1 HEC-1 INPUT

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

          *DIAGRAM
    1     ID   Revere Estates Existing and Proposed Condition
    2     ID                6-Hour SDN-3     October 2, 1995
    3     ID   100-YR AND 10 YR EVENT         File: CARV.H1
    4     IT      2       0       0     300
    5     IO      5       0
    6     IN      5       0       0
    7     JR   PREC     .57     .99       1

    8     KK      A
    9     KM   Offsite Basin A
   10     BA   .460
   11     PC   .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   12     PC   .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   13     PC   .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   14     PC   .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   15     PC   .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   16     PC   .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   17     PC   .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   18     PC   .998    .999   1.00
   19     PB   2.77
   20     LS      0   85.8
   21     UD    .37

   22     KK   SPLIT
   23     KM    Flow Split at Martin Luther King/Helen
   24     KM    Assume Diverted Flow is South
   25     DT   SEEYA
   26     DI      0     110     200     300     400
   27     DQ      0     110     120     195     270

   28     KK   ROUTE
   29     KM    Route Flow Through Subdivision (Basin B) to Basin D
   30     RK   1300     .01    .016       0    TRAP      50       0

   31     KK      B
   32     KM   Offsite Basin B
   33     BA   .038
   34     LS      0   77.4
   35     UD    .18
```

```
 36          KK      CP
 37          KM    Combine Flows at End of Street
 38          HC       2

 39          KK   ROUTE
 40          KM    Route Flow through Basin D to Southwest property Line
 41          RK     600     .01     .03       0    TRAP      10       5

 42          KK       C
 43          KM    Offsite Basin C
 44          BA    .048
 45          LS       0    86.1
 46          UD    .23
```



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

 47          KK   Split
 48          KM    Assume Existing Dirt Road Will Be 50/50 Flow Split
 49          DT   SPLIT
 50          DI       0      20      30      50     100
 51          DQ       0      10      15      25      50

 52          KK       D
 53          KM    Offsite Basin D
 54          BA    .027
 55          LS       0      85
 56          UD    .16

 57          KK      CP
 58          KM    Combine at Southwest Property Line
 59          HC       3

 60          KK    On-2
 61          KM     Existing Southern Portion
 62          BA    .016
 63          LS       0      85
 64          UD    .22

 65          KK      CP
 66          KM    Combine all at Carey/Revere
 67          HC       2

 68          KK     RET
 69          KM    Retrieve Flows Split at Cartier
 70          DR   SPLIT

 71          KK       E
 72          KM    Offsite Basin E
 73          BA    .008
 74          LS       0      94
 75          UD    .14

 76          KK    On-1
 77          KM    Existing Northern Portion
 78          BA    .011
 79          LS       0      85
 80          UD    .18
```

```
          81          KK      CP
          82          KM    Combine at Cartier/Revere
          83          HC       3

          84          KK    ON-1
          85          KM    Proposed Onsite Basin 1
          86          BA    .012
          87          LS       0      83
          88          UD    .16
1                                        HEC-1 INPUT                                                    PAGE  3

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


          89          KK    ON-2
          90          KM    Proposed Onsite Basin 2
          91          BA    .016
          92          LS       0      83
          93          UD    .19
          94          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    8           A
                .
                .
   25           .-------->   SEEYA
   22        SPLIT
                V
                V
   28        ROUTE
                .
                .
   31           .            B
                .            .
                .            .
   36          CP............
                V
                V
   39        ROUTE
                .
                .
   42           .            C
                .            .
                .            .
   49           .            .-------->   SPLIT
   47           .         Split
                .            .
                .            .
   52           .            .            D
                .            .            .
                .            .            .
   57          CP.........................
                .
                .
   60           .         On-2
```

```
                .         .
                .         .
65          CP.............
                .
                .
70              .<-------   SPLIT
68              .       RET
                .         .
                .         .
71              .         .       B
                .         .       .
                .         .       .
76              .         .       .       On-1
                .         .       .         .
                .         .       .         .
81              .       CP.........................
                .         .
                .         .
84              .         .     ON-1
                .         .       .
                .         .       .
89              .         .       .       ON-2
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1 ****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
****

Revere Estates Existing and Proposed Condition
6-Hour SDN-3 October 2, 1995
100-YR AND 10 YR EVENT File: CARV.H1

5 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	2	MINUTES IN COMPUTATION INTERVAL
IDATE	1 0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	1 0	ENDING DATE
NDTIME	0958	ENDING TIME

COMPUTATION INTERVAL .03 HOURS
TOTAL TIME BASE 9.97 HOURS

ENGLISH UNITS

JP MULTI-PLAN OPTION

NPLAN	1	NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 .99

1.00

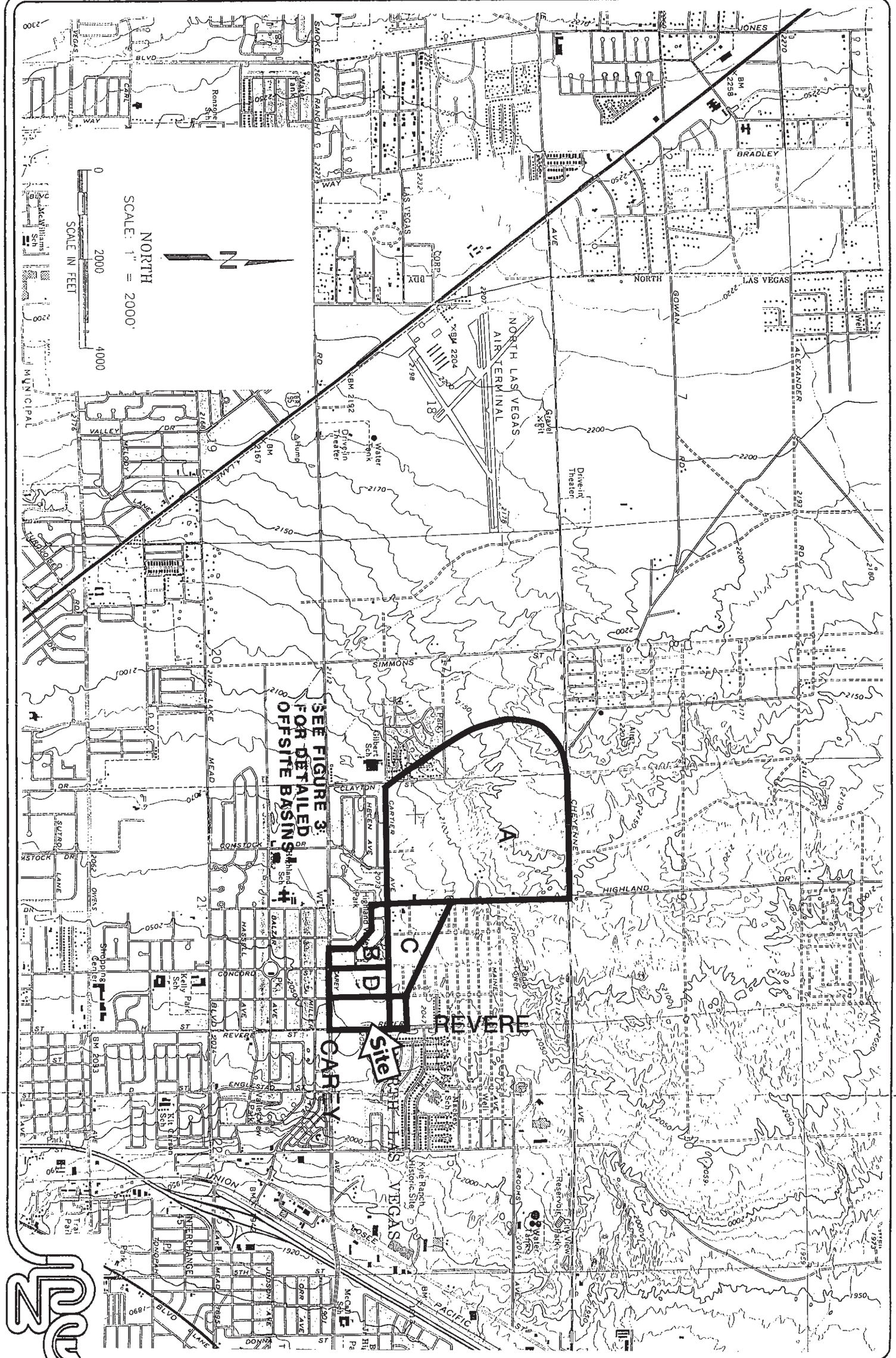
1

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 .57	RATIO 2 .99	RATIO 3 1.00
HYDROGRAPH AT							
	A	.46	1	FLOW	149.	395.	402.
				TIME	3.83	3.80	3.80
DIVERSION TO							
	SEEYA	.46	1	FLOW	114.	267.	271.
				TIME	3.83	3.80	3.80
HYDROGRAPH AT							
	SPLIT	.46	1	FLOW	35.	129.	130.
				TIME	3.83	3.80	3.80
ROUTED TO							
	ROUTE	.46	1	FLOW	33.	129.	130.
				TIME	3.90	3.83	3.83
HYDROGRAPH AT							
	B	.04	1	FLOW	7.	29.	30.
				TIME	3.67	3.63	3.63
2 COMBINED AT							
	CP	.50	1	FLOW	38.	148.	150.
				TIME	3.90	3.80	3.80
ROUTED TO							
	ROUTE	.50	1	FLOW	38.	148.	150.
				TIME	3.93	3.80	3.80
HYDROGRAPH AT							
	C	.05	1	FLOW	20.	52.	53.
				TIME	3.67	3.67	3.67
DIVERSION TO							
	SPLIT	.05	1	FLOW	10.	26.	27.
				TIME	3.67	3.67	3.67
HYDROGRAPH AT							
	Split	.05	1	FLOW	10.	26.	27.
				TIME	3.67	3.67	3.67
HYDROGRAPH AT							
	D	.03	1	FLOW	12.	32.	33.
				TIME	3.60	3.60	3.60
3 COMBINED AT							
	CP	.57	1	FLOW	49.	191.	194.
				TIME	3.90	3.73	3.73

HYDROGRAPH AT							
+	On-2	.02	1	FLOW	6.	17.	17.
				TIME	3.67	3.63	3.63
2 COMBINED AT							
+	CP	.59	1	FLOW	53.	206.	209.
				TIME	3.90	3.73	3.73
HYDROGRAPH AT							
	RET	.00	1	FLOW	10.	26.	27.
				TIME	3.67	3.67	3.67
HYDROGRAPH AT							
	E	.01	1	FLOW	7.	14.	14.
				TIME	3.57	3.57	3.57
HYDROGRAPH AT							
	On-1	.01	1	FLOW	5.	13.	13.
				TIME	3.63	3.60	3.60
3 COMBINED AT							
+	CP	.02	1	FLOW	21.	51.	52.
				TIME	3.63	3.60	3.60
HYDROGRAPH AT							
+	ON-1	.01	1	FLOW	4.	13.	13.
				TIME	3.60	3.60	3.60
HYDROGRAPH AT							
+	ON-2	.02	1	FLOW	6.	16.	17.
				TIME	3.63	3.63	3.63

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



L. BRUCE NYBO, INC.
civil engineering • planning • land surveying
6700 South Paradise Road • Suite A-1
Las Vegas • Nevada • 89119
(702) 896 - 3262

CAREY / REVERE

OFFSITE BASIN MAP
FIGURE 2

RED SOX AVENUE

ANGEL FIELD STREET

YANKEE AVENUE

RED SOX AVENUE

RADER COURT

ASTRO COURT

COMER COURT

RAMS STREET

LEGEND

- FLOW DIRECTION
- CONCENTRATION POINT
- EXISTING HIGHPOINT
- BASIN BOUNDARY
- ON 1 BASIN IDENTIFIER

FIGURE C

CONCORDIA HOMES
PROPOSED CONDITION DRAINAGE MAP
METES ESTATES

L. BRUCE NYGO

APPENDIX E

REVERE AND CAREY

NEC REVERE STREET AND CAREY AVENUE
NORTH LAS VEGAS, NEVADA 89030

1.22 ACRES

ENGINEERING FIRM

ACG DESIGN
RANDOLPH SKORPINSKI
4310 CAMERON ST. STE. 12-A
LAS VEGAS, NV 89103
PHONE: (702) 448-8737
EMAIL: njones@acg.design

OWNER/DEVELOPER

ARMSTRONG SAMMIE
1920 SUTRO LANE
LAS VEGAS, NV 89106
PHONE: (702) 400-7550
EMAIL: sergio@scadesign.com

CAUTION TO CONTRACTOR

THE CONTRACTOR SHALL BE RESPONSIBLE TO INVESTIGATE AND VERIFY THE ACTUAL LOCATION AND DEPTH OF ALL EXISTING UNDERGROUND FACILITIES AT LEAST 48 HOURS IN ADVANCE OF THE PERFORMANCE OF ANY WORK.

NOTE

THESE PLANS SHALL NOT, IN PART OR IN WHOLE, BE USED FOR CONSTRUCTION UNTIL APPROVED AND SIGNED BY THE GOVERNING AGENCY.

ENGINEER TO BE NOTIFIED OF ANY DISCREPANCIES IMMEDIATELY.

ACG DESIGN ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS, SHOWN OR NOT SHOWN. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM RECORD INFORMATION AND ARE FOR THE CONVENIENCE OF THE CONTRACTOR ONLY. THE CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY THE LOCATIONS AND DEPTHS OF ALL RELEVANT UTILITIES PRIOR TO COMMENCING WITH CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY THE ENGINEER OF WORK, IN WRITING, OF ANY CONFLICTS OR DISCREPANCIES.

BASIS OF BEARINGS

NORTH 00°24'38" WEST
BEING THE WEST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 15, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA, SHOWN AS THE CENTERLINE OF REVERE STREET IN BOOK 112 OF PLATS, PAGE 38, CLARK COUNTY, NEVADA OFFICIAL RECORDS.

BENCHMARK

5LV012INES
CITY OF LAS VEGAS RIVET AND PLATE IN THE TOP
OF CURB AT THE SOUTHWEST CORNER OF CAREY AVE. AND REVERE ST.
ELEVATION = 623.298 METERS = 2044.94 U.S. SURVEY FEET (NAVD 88)

LEGAL DESCRIPTION

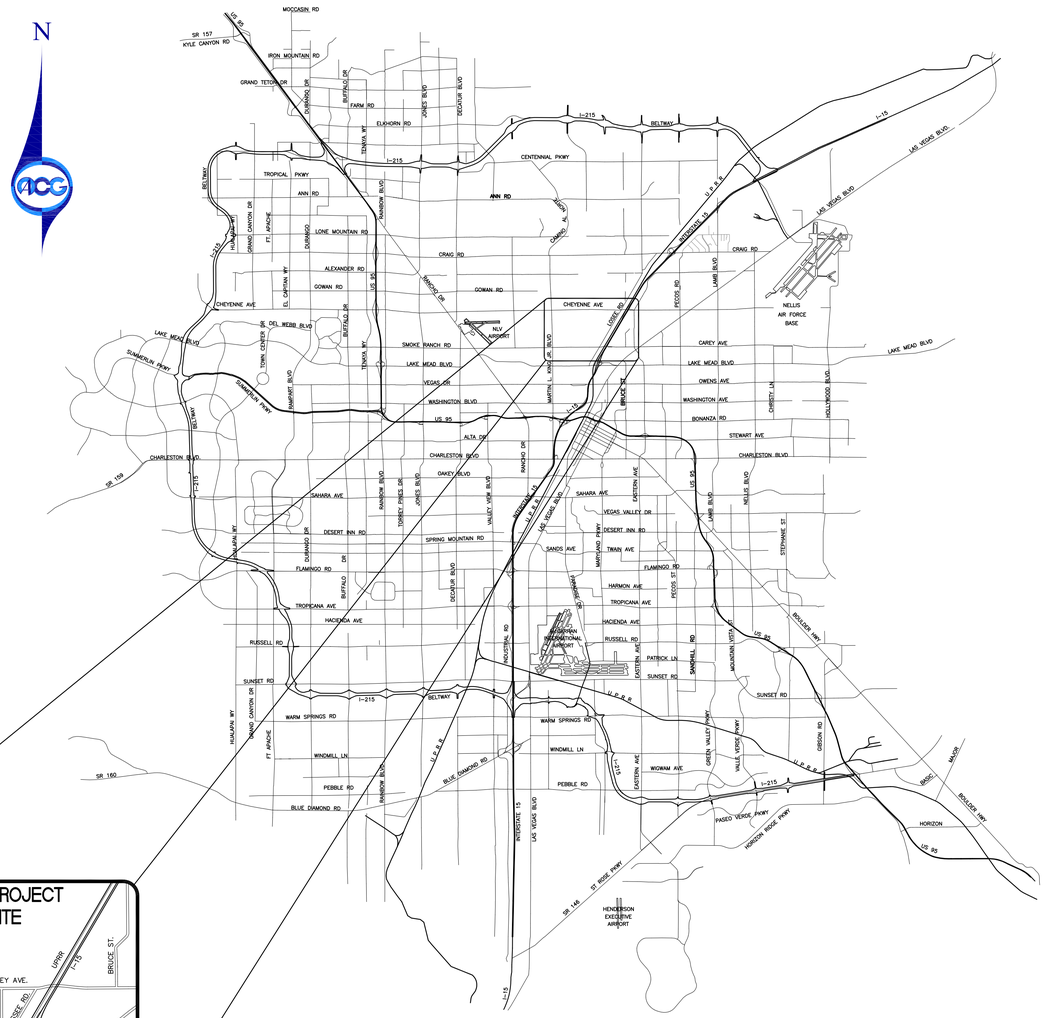
THAT PORTION OF THE SOUTHWEST QUARTER (SW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 15, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CLARK COUNTY, NEVADA.

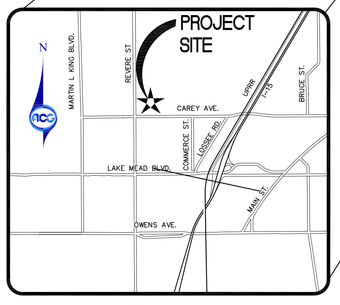
SURVEY MONUMENTATION NOTE

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

FLOOD ZONE INFORMATION

AS SHOWN BY FLOOD INSURANCE RATE MAP 32003C2160F, DATED NOVEMBER 16, 2011. THE ENTIRE SITE LIES WITHIN APN 139-15-401-006, WHICH LIES WITHIN A FEMA ZONE X (UNSHADED), DEFINED AS: "AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD."





VICINITY MAP
NTS

UTILITY SERVICE PROVIDERS

CITY OF NORTH LAS VEGAS UTILITIES	(702)633-1204
COX COMMUNICATIONS:	(702)383-4000
EMBARQ:	(702)244-7400
NV ENERGY:	(702)367-5555
REPUBLIC SERVICES:	(702)735-5151
SOUTHWEST GAS:	(702)365-1555

FAST — Call before you UnderGround — 1-702-432-5300 — FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD — 1-702-227-2929

Call before you Dig — AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 or 1-800-227-2600

SHEET INDEX

DRAWING NO.	DESCRIPTION
C1	COVER SHEET
C2	GENERAL NOTES 1
C3	GENERAL NOTES 2
C4	LEGEND & ABBREVIATIONS
C5	
C6	GRADING PLAN
C7	
C8	
C9	CROSS SECTIONS
C10	DETAILS

APPROVALS

NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

NEVADA POWER COMPANY, A NEVADA CORPORATION D.B.A. NV ENERGY — DATE

THE CENTRAL TELEPHONE COMPANY, D.B.A. CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

CENTRAL TELEPHONE COMPANY D.B.A. CENTURYLINK — DATE

COX COMMUNICATIONS LAS VEGAS, INC. — DATE

SOUTHWEST GAS CORPORATION — DATE

DALE DAFFERN, P.E. — DATE
DIRECTOR, PUBLIC WORKS DEPARTMENT

ROBERT A. MCLAUGHLIN, P.E. CFM — DATE
MANAGER, DEVELOPMENT AND FLOOD CONTROL DIVISION

LORENA CANDELARIO, SR/WA — DATE
MANAGER, REAL PROPERTY SERVICES

CNLV BUILDING AND FIRE SAFETY — DATE

ENGINEER'S SEAL

I hereby certify that this plan, Specification, or report was prepared by me or under my direct supervision, and that I am a licensed professional engineer under the laws of the State of Nevada.

License # 14985

Date: 12/30/2020

REVISIONS

REV.	DESCRIPTION	APRVD. BY	DATE

APPROVAL

REVERE AND CAREY

COVER SHEET
APN: 139-15-401-006
NEC REVERE STREET & CAREY AVENUE
NORTH LAS VEGAS, NEVADA 89030

ACG DESIGN
4310 CAMERON ST. SUITE 12-A
LAS VEGAS, NEVADA 89103
OFFICE: 702.448.8737
WEBSITE: WWW.ACG.DESIGN

ENGINEER'S SEAL
PROFESSIONAL ENGINEER STATE OF NEVADA
RANDOLPH A. SKORPINSKI
EXP: 06-30-22
CIVIL
No. 14985
12/30/2020

DATE:	9/25/2020
PROJ. NO:	190259
DRAWN BY:	ARB
CHECKED BY:	RAS
SCALE:	AS NOTED
JURISDICTION:	CNLV

DRAWING NUMBER: C1
SHEET 1 OF 10

AGENCY NUMBER:

Z:\PROJECTS_CURRENT\COMMERCIAL CLIENTS\SCA DESIGN\190259- REVERE & CAREY C- STORE\ENGINEERING\CIVIL DRAWINGS\IMPROVEMENT PLANS\190259 C1-CV.DWG 9/25/2020 1:22 PM

NOTICE TO CONTRACTOR

1. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR SHALL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONALS HARMLESS FROM ALL LIABILITY, REAL OR ALLEGED IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.
2. CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.
3. THE EXISTENCE AND APPROXIMATE LOCATION OF ANY UNDERGROUND FACILITIES SHOWN HEREON WERE OBTAINED FROM A SEARCH OF AVAILABLE RECORDS. THERE MAY, HOWEVER BE EXISTING UTILITIES NOT SHOWN ON THE PLANS. THE CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT THE UTILITIES OR STRUCTURES SHOWN HEREON AND ANY OTHER NOT OF RECORD OR NOT SHOWN ON THESE PLANS.
4. 14 GAUGE SOLID COPPER WIRE FOR LINE LOCATION SHALL BE REQUIRED OVER ALL SERVICE LATERALS NOT INSTALLED PERPENDICULAR TO THE MAIN IN ACCORDANCE WITH UDACS PLATE No. 27.
5. SEE PLAN AND PROFILE AND MASTER UTILITY SHEETS FOR COMPLETE WATER AND SEWER DESIGN.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR DUST AND EROSION CONTROL DURING CONSTRUCTION.
7. SEE LANDSCAPE PLANS FOR LANDSCAPING. (SEE ARCH PACKAGE– COMPLETED BY OTHERS)

CITY OF NORTH LAS VEGAS GENERAL PROJECT REQUIREMENTS AND GENERAL NOTES

I. PREFACE

A. ALL MAPS, TECHNICAL STUDIES, REPORTS, DESIGNS, CONSTRUCTION DRAWINGS, SPECIFICATIONS AND SPECIAL TECHNICAL REQUIREMENTS ASSOCIATED WITH THE PROJECT AND IMPROVEMENTS PRESENTED HEREIN HAS BEEN ACCOMPLISHED UNDER THE SUPERVISION OF RESPONSIBLE PROFESSIONAL(S) HAVING THE APPROPRIATE REGISTRATION TO SERVE IN THIS CAPACITY BASED ON THE SCOPE OF THIS SPECIFIC PROJECT, AND IN ACCORDANCE WITH THE STATUTORY PROVISIONS OF THE NEVADA REVISED STATUTES (NRS) AND THE NEVADA ADMINISTRATIVE CODE (NAC) INCLUDING:

NRS 278, 338, NRS 623, NRS 625; NAC 338, NAC 623 AND NAC 625

CERTIFICATION SIGNIFYING COMPLIANCE WITH STATUTORY AND RELATED ADMINISTRATIVE CODE REQUIREMENTS IS HEREBY PROVIDED BY THE RESPONSIBLE PROFESSIONAL(S) IN THE FORM OF A STAMP OR SEAL PLACED ON THE PROJECT DOCUMENTS.

B. THE PROJECT AND ALL IMPROVEMENTS RELATED THERETO AS ILLUSTRATED ON THE PROJECT DRAWINGS MUST CONFORM TO NORTH LAS VEGAS MUNICIPAL CODE INCLUDING THE TITLES AND CHAPTERS NOTED BELOW:

TITLE 2, CHAPTER 2.36	ADMINISTRATIVE FEES
TITLE 8, CHAPTER 8.16, 8.50	FIRE CODE AND STORMWATER REGULATIONS
TITLE 10, CHAPTER 10.16	TRAFFIC CONTROL DEVICES
TITLE 10, CHAPTER 10.52	TEMPORARY TRAFFIC CONTROL REGULATIONS
TITLE 12 CHAPTER 12.08	PUBLIC WORKS PROJECT PERMIT AND PERFORMANCE REGULATIONS
TITLE 13	PUBLIC SERVICES
TITLE 15	UNIFORM REGULATIONS FOR THE CONTROL OF DRAINAGE
TITLE 16	SUBDIVISIONS

IT IS EXPECTED THAT THESE TITLES AND CHAPTERS, AS A MINIMUM, WILL BE APPLIED ON A PROJECT SPECIFIC BASIS AND NOT CONSTRUED TO BE ALL INCLUSIVE OR EXCLUSIVE. THE PROJECT IS ALSO EXPECTED TO CONFORM WITH REVISIONS IN THE NORTH LAS VEGAS MUNICIPAL CODE AS IT MAY BE REVISED FROM TIME TO TIME.

C. PROJECT REVIEW BY REPRESENTATIVES OF THE CITY OF NORTH LAS VEGAS IS INTENDED TO COMPLEMENT AND ASSIST THE RESPONSIBLE PROFESSIONAL(S) IN ADVANCING A PROJECT THAT IS IN COMPLIANCE WITH THE CITY OF NORTH LAS VEGAS REQUIREMENTS, AND IS CONSISTENT WITH PUBLIC BENEFIT, HEALTH, SAFETY, AND WELFARE. REVIEW IS NOT AN ASSURANCE OF PROJECT FEASIBILITY, PROFESSIONAL AND TECHNICAL ACCURACY, OR CONFORMANCE WITH SPECIAL CONDITIONS IMPOSED BY PUBLIC AGENCIES, INCLUDING THE NORTH LAS VEGAS PLANNING COMMISSION.

D. APPROVAL OF THESE IMPROVEMENT PLANS AND SPECIFICATIONS IS MADE BASED ON THE REPRESENTATIONS MADE BY THE PROFESSIONAL(S) THAT THEY HAVE DISCHARGED THEIR RESPONSIBILITIES AND PREPARED COMPLETE DOCUMENTS WHICH COMPLY WITH CITY OF NORTH LAS VEGAS REQUIREMENTS FOR CONSTRUCTION OF THE IMPROVEMENTS DEPICTED HEREIN.

E. IF CONSTRUCTION HAS NOT COMMENCED WITHIN, OR IN THE EVENT OF AN INTERRUPTION IN CONSTRUCTION FOR A PERIOD OF, ONE (1) YEAR AFTER THE MOST RECENT APPROVAL DATE NOTED HEREON, THESE IMPROVEMENT PLANS MUST BE RESUBMITTED FOR EVALUATION BY THE CITY OF NORTH LAS VEGAS FOR POSSIBLE DESIGN UPDATE.

II. STANDARD SPECIFICATIONS AND STANDARD DRAWINGS FOR GENERAL CONSTRUCTION

A. ALL IMPROVEMENTS SHOWN ON THESE CONSTRUCTION DRAWINGS SHALL BE IMPLEMENTED IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF–SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA," LATEST EDITION. APPROVED REVISIONS TO THESE STANDARDS ARE POSTED ON THE REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA WEBSITE.

B. EXCEPTIONS TO THESE STANDARDS ARE NOTED BELOW:

1. ALL PROVISIONS DIRECTLY RELATED TO THOSE PROCEDURES USED TO SOLICIT COMPETITIVE BIDS AND TO AWARD AND EXECUTE CONTRACTS FOR PUBLIC AGENCY PROJECTS.
2. THE CITY OF NORTH LAS VEGAS TRENCH BACKFILL POLICY DATED AUGUST 15, 1996, SHALL BE IMPLEMENTED FOR THIS PROJECT. COPIES OF THE TRENCH BACKFILL POLICY CAN BE OBTAINED FROM THE DEPARTMENT OF PUBLIC WORKS, CONSTRUCTION SERVICES DIVISION, 2250 LAS VEGAS BLVD, N., SUITE 610, NORTH LAS VEGAS, NEVADA 89030, 633–1206.
3. THE CITY OF NORTH LAS VEGAS POLICY REGARDING GRADING AND CONSTRUCTION ON OR IN CLOSE PROXIMITY TO GEOLOGIC FAULTS AND GROUND FISSURES. COPIES OF THE POLICY CAN BE OBTAINED FROM THE DEPARTMENT OF PUBLIC WORKS, CONSTRUCTION SERVICES DIVISION, 2250 LAS VEGAS BLVD, N., SUITE 610, NORTH LAS VEGAS, NEVADA 89030, 633–1206.
4. WHERE ALLOWED, CURB AND GUTTER HAVING A DESIGN GRADE OF 0.5 PERCENT OR LESS SHALL BE CONSTRUCTED BY FORMING. FORM GRADES AND ELEVATIONS SHALL BE VERIFIED PRIOR TO PLACEMENT OF CONCRETE AND WATER FLOW TESTED AS SOON AFTER PLACEMENT AS CURING ALLOWS.
5. "NO PARKING" ZONES AT CURB RETURNS, FIRE HYDRANT ZONES AND SCHOOL ZONES SHALL BE PAINTED RED TO THE LIMITS NOTED ON THE PLANS, OR IF NOT SHOWN ON THE PLANS, TO THE LIMITS ESTABLISHED BY THE CITY OF NORTH LAS VEGAS TRAFFIC ENGINEER.

C. MODIFICATIONS AND CLARIFICATIONS TO THESE STANDARDS ARE NOTED BELOW:

1. THE CONTRACTOR SHALL MAKE A PROJECT SITE VISIT WITH PLANS–IN–HAND PRIOR TO CONSTRUCTION TO CONFIRM PROJECT CONSTRUCTABILITY, AND SHALL IMMEDIATELY NOTIFY THE PROFESSIONAL OF ANY CONSTRUCTABILITY PROBLEMS.
2. INFORMATION NOTED ON THE PLANS CONCERNING THE EXISTENCE AND LOCATION OF EXISTING WET UNDERGROUND UTILITIES AND OTHER UNDERGROUND STRUCTURES WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THE CITY OF NORTH LAS VEGAS, PROFESSIONAL, AND OWNER MAKE NO ASSURANCES CONCERNING THE ACCURACY OF SUCH INFORMATION. THE CONTRACTOR SHALL EXERCISE CAUTION AND USE BEST AVAILABLE CONSTRUCTION TECHNIQUES TO DETERMINE THE ACTUAL LOCATION OF AND PROTECTION FOR ALL UNDERGROUND UTILITIES WHETHER OR NOT THEY ARE SHOWN ON THE PLANS. AT A MINIMUM, THE CONTRACTOR SHALL:
   CALL BEFORE YOU DIG 1–800–227–2600
   CALL BEFORE YOU OVERHEAD 1–702–227–2929
3. THE CONTRACTOR IS RESPONSIBLE FOR SECURING ALL PROJECT PERMITS AND COMPLYING WITH ALL TERMS AND CONDITIONS IMPOSED BY THE PERMITTING AGENCIES. AGENCIES OTHER THAN THE NORTH LAS VEGAS PUBLIC WORKS DEPARTMENT THAT MAY HAVE JURISDICTION OR REGULATORY AUTHORITY CONCERNING THE PROJECT INCLUDE:
   CITY OF NORTH LAS VEGAS BUILDING DEPARTMENT
   CLARK COUNTY HEALTH DISTRICT – DIVISION OF AIR QUALITY MANAGEMENT
   NEVADA DEPARTMENT OF TRANSPORTATION
   NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION
   US ARMY CORPS OF ENGINEERS
   NEVADA DIVISION OF WATER RESOURCES
4. THE CONTRACTOR SHALL PROVIDE AT LEAST SEVENTY–TWO (72) HOURS NOTICE TO EACH OF THE FOLLOWING AGENCIES CONFIRMING THE SCHEDULED START OF CONSTRUCTION:

CITY OF NORTH LAS VEGAS UTILITIES DIVISION	(702)633–1290
COX COMMUNICATION	(702)385–3644
NV ENERGY	(800)227–2600
CENTURYLINK	(702)244–8004
SOUTHWEST GAS CORPORATION	(702)651–2111

5. THE CONTRACTOR SHALL EXERCISE CAUTION AND USE CONSTRUCTION TECHNIQUES TO PROTECT AND PRESERVE EXISTING PERMANENT SURVEY MONUMENTS. ALL SURVEY MONUMENTS DISTURBED SHALL BE REPLACED AND/OR REHABILITATED IN ACCORDANCE WITH STANDARDS BY A PROFESSIONAL LAND SURVEYOR RETAINED BY THE CONTRACTOR.
6. THE CONTRACTOR SHALL EXERCISE CAUTION AND USE CONSTRUCTION TECHNIQUES TO PROTECT AND PRESERVE EXISTING PUBLIC AND PRIVATE FEATURES LOCATED IN CLOSE PROXIMITY TO OR ABUTTING IMPROVEMENTS SHOWN ON THESE PLANS. RESTORATION OF DAMAGED FEATURES SHALL BE ACCOMPLISHED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
7. THE LOCATION OF ALL SAWCUT LINES FOR THE PROJECT MAY BE DETERMINED BY THE CITY OF NORTH LAS VEGAS IF THE LOCATION IS NOT CLEARLY SHOWN ON THE PLANS OR IF EXISTING CONDITIONS REQUIRE ADJUSTMENT TO THE LOCATION SHOWN ON THE PLANS.
8. THE CONTRACTOR SHALL COOPERATE AND COORDINATE WITH THE CITY OF NORTH LAS VEGAS' REPRESENTATIVE IN PROVIDING INGRESS AND EGRESS TO ABUTTING PROPERTIES, AND SHALL PROTECT SUCH PROPERTIES FROM PROJECT RELATED STORM WATER AND NUISANCE RUNOFF BY PROVIDING TEMPORARY POSITIVE DRAINAGE CONTROL.
9. PLANTMIX BITUMINOUS SHALL BE FINISHED TO A HEIGHT OF BETWEEN ⅛ INCHES AND ⅝ INCHES ABOVE THE LIP OF CURB GUTTERS AND VALLEY GUTTERS.
10. FOG SEAL SHALL BE APPLIED TO PLANTMIX BITUMINOUS SURFACES AFTER ALL CORRECTIONS AND ADJUSTMENTS HAVE BEEN MADE.
11. TYPE V CEMENT SHALL BE USED FOR ALL OFF–SITE IMPROVEMENTS AND THE MIX SHALL BE DESIGNED FOR SOLUBLE SULFATES IN THE SUBGRADE OF 1.5 PERCENT OR GREATER BASED ON SUBGRADE MATERIAL SAMPLING AND TESTING. ALL MIX DESIGNS SHALL BE PROJECT SPECIFIC AND APPROVED BY THE CITY OF NORTH LAS VEGAS REPRESENTATIVE PRIOR TO PLACEMENTS.
12. ALL MANHOLES, VALVE BOXES, JUNCTION STRUCTURES, VAULTS AND CLEANOUTS THAT ARE LOCATED WITHIN THE ROADWAY LIMITS SHALL BE CONSTRUCTED TO, AND PLATED AT SUBGRADE LEVEL UNTIL SUCH TIME AS THE AGGREGATE BASE AND PLANTMIX BITUMINOUS SURFACE HAS BEEN COMPLETED. THEREAFTER, THESE ITEMS SHALL BE ADJUSTED TO FINISH GRADE.
13. UTILITY BOXES AND VAULTS LOCATED IN THE SIDEWALK AREA ARE TO BE CONSTRUCTED TO THE FINISH DESIGN GRADE. THE ELEVATION SHALL BE CONSISTENT WITH THAT REQUIRED FOR THE STANDARD CONCRETE CITY OF NORTH LAS VEGAS SIDEWALK EVEN IF THE CONCRETE SIDEWALK CONSTRUCTION IS DEFERRED TO A FUTURE DATE.
14. THE CONTRACTOR SHALL PROVIDE REASONABLE ACCOMMODATIONS FOR CITY OF NORTH LAS VEGAS PERSONNEL TO OBTAIN GPS/GIS DATA ON ALL UNDERGROUND UTILITIES AND INFRASTRUCTURE.
15. ALL OFF–SITE IMPROVEMENT SUBGRADE MUST BE CERTIFIED BY THE GEOTECHNICAL ENGINEER OF RECORD.

III. STANDARD SPECIFICATIONS AND STANDARD DRAWINGS FOR WATER LINE CONSTRUCTION

A. ALL WATER IMPROVEMENTS SHOWN ON THESE CONSTRUCTION DRAWINGS SHALL CONFORM TO THE STANDARDS DESCRIBED BELOW, AND IN ORDER OF THE PRECEDENCE SHOWN.

1. "CITY OF NORTH LAS VEGAS MUNICIPAL WATER SERVICE DISTRICT SERVICE RULES AND REGULATIONS," LATEST EDITION.
2. "UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS, CLARK COUNTY NEVADA," LATEST EDITION.
3. "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF–SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA," LATEST EDITION.

B. EXCEPTIONS TO THESE STANDARDS ARE NOTED BELOW:

1. NO WATER MAIN MAY BE SHUT DOWN TO MAKE CONNECTIONS WITHOUT PRIOR APPROVAL OF THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
2. MATERIALS USED FOR WATER DISTRIBUTION FACILITIES SHALL BE INCLUDED ON THE "CITY OF NORTH LAS VEGAS APPROVED MATERIALS LIST," LATEST REVISION, OR SPECIFICALLY IDENTIFIED AND APPROVED ON THESE PLANS.
3. ALL WATER METERS TWO (2) INCHES AND SMALLER SHALL BE INSTALLED BY THE CITY OF NORTH LAS VEGAS. NOTE THAT ALL LOCATIONS MUST BE CLEARLY IDENTIFIED AND MARKED AT THE SITE. THE SERVICE LINES, LATERALS, METER BOXES AND SIDEWALKS OR COLLARS MUST ALL BE INSTALLED AND SET AT GRADE OR THE METER WILL NOT BE SET.
4. THE CITY OF NORTH LAS VEGAS' TRENCH BACKFILL POLICY, DATED AUGUST 15, 1996, SHALL BE ADHERED TO FOR THIS PROJECT.

C. MODIFICATIONS AND CLARIFICATIONS TO THESE STANDARDS ARE AS NOTED BELOW:

1. WATER METERING REQUIREMENTS FOR NEW DEVELOPMENT:
   a. SEPARATE DOMESTIC AND FIRE SERVICES (WHERE APPLICABLE) ARE REQUIRED FOR EACH DWELLING UNIT, PUBLIC, QUASI–PUBLIC, COMMERCIAL, AND/OR INDUSTRIAL OCCUPANCY LOCATED ON A SINGLE PARCEL OR LOT.
   b. IN THE EVENT THAT A BUILDING WITHIN AN INDUSTRIAL OR COMMERCIAL SUBDIVISION IS DIVIDED, SEPARATE DOMESTIC SERVICES ARE REQUIRED FOR EACH UNIT.
   c. EACH PARCEL OR LOT OF A COMMERCIAL OR RESIDENTIAL SUBDIVISION WILL HAVE A MINIMUM OF ONE (1) METERED DOMESTIC SERVICE. WHEN A FIRE SERVICE IS REQUIRED, EACH PARCEL OR LOT WILL HAVE A MINIMUM OF ONE (1) FIRE SERVICE. THE CITY, AS ITS OPTION, MAY ALLOW A COMMUNAL FIRE SERVICE PROVIDED THE PROPERTY OWNERS FIRST ESTABLISH A PROPERTY MANAGEMENT ASSOCIATION WHICH ACCEPTS RESPONSIBILITY FOR THE PAYMENT OF WATER BILLS AND THE MAINTENANCE AND OPERATION OF THE FIRE LINES AND THE BACKFLOW PREVENTION ASSEMBLY.
2. FIRE AND DOMESTIC WATER SERVICES AS APPROVED ON THIS PLAN, ARE INTENDED SPECIFICALLY FOR THE LOT AND USE SHOWN, AND ARE NOT INTENDED TO SERVE ADDITIONAL PARCELS OR STRUCTURES WHICH MAY BE CREATED IN THE FUTURE. IN THE EVENT THAT THE PARCELS AND/OR LOTS SHOWN ON THIS PLAN ARE FURTHER DIVIDED TO CREATE ADDITIONAL PARCELS OR LOTS, THE OWNER IS REQUIRED TO PROVIDE SEPARATE FIRE AND DOMESTIC WATER SERVICES TO EACH.
3. CONNECTION TO PUBLIC FIRE HYDRANTS SHALL NOT BE MADE FOR DOMESTIC AND/OR PRIVATE FIRE SERVICE.
4. ALL SERVICE LATERALS TWO (2) INCHES AND SMALLER SHALL BE COPPER TUBING WITH APPROVED SERVICE SADDLES. CORPORATION STOPS AND ANGLE METER STOPS SHALL BE THE SAME SIZE AS THE SERVICES LATERAL. ANGLE METER STOPS AND METER SHALL BE CENTERED IN THE METER BOX.
5. UDACS PLATES NO. 1 AND 3–REVISE NOTE TO READ "COUPLINGS ARE NOT ALLOWED BETWEEN THE CORPORATION STOP AND THE ANGLE METER".
6. ALL METERS TO BE INSTALLED IN THE CITY OF NORTH LAS VEGAS WATER SYSTEM, INCLUDING DCDAS MUST BE COMPATIBLE WITH THE SENSUS AMR PROTOCOL (A.K.A. INVENSYS) AND MUST BE INSTALLED WITH THE ENCODED REGISTER. METERS THAT ARE FULLY COMPATIBLE ARE: SENSO/INVENSYS ECR/MP MODELS (5/8" AND LARGER) NEPTUNE AUTOREAD MODELS (3" AND LARGER) & METRON/T2 INNOV8 (ALL SIZES).
7. ANY PARCEL RECEIVING WATER FROM THE PUBLIC DISTRIBUTION SYSTEM FROM MULTIPLE CONNECTIONS IS REQUIRED TO UTILIZE THE SAME METER MANUFACTURER. FOR MASTER METERED MULTI–FAMILY RESIDENTIAL, THE METERS SHALL BE OF THE SAME MANUFACTURER, MODEL, AND SIZE.
8. ALL METER BOXES SHALL BE EQUIPPED WITH TRAFFIC BEARING COVERS AND INSTALLED TO FINISH DESIGN GRADE AND ELEVATION. IF SUCH IS NOT SHOWN ON THE PLANS, THE ELEVATION WILL BE ESTABLISHED BY THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
9. ANY BLOCK WALL OR OTHER FENCE SHALL BE DESIGNED AND CONSTRUCTED AROUND THE OUTSIDE OF THE EASEMENT(S), TO ALLOW THE CITY DIRECT ACCESS TO VAULT(S) AND INLET PIPING FROM THE ADJACENT RIGHT–OF–WAY.
10. NO UTILITY BOXES SHALL BE LOCATED IN DRIVEWAY APPROACHES, UNLESS APPROVED BY THE UTILITIES DIVISION.
11. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE CITY OF NORTH LAS VEGAS REPRESENTATIVE.
12. THE ON–SITE WATER LINES AND APPURTENANCES ARE PRIVATE FACILITIES NOT TO BE OPERATED OR MAINTAINED BY THE CITY OF NORTH LAS VEGAS, UNLESS OTHERWISE SPECIFIED ON CIVIL IMPROVEMENTS PLANS.
13. ALL VALVES WILL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY GUTTERS, AND CURB GUTTERS.
14. A MINIMUM OF TWO (2) VALVES SHALL BE LOCATED AT EVERY MAINLINE TEE, OR THREE (3) VALVES AT EVERY MAINLINE CROSS.
15. ALL NEW FIRE HYDRANTS SHALL HAVE A 5–1/4 INCH VALVE OPENING.
16. TWO SOURCES OF WATER SUPPLY ARE REQUIRED FOR ANY DEVELOPMENT WITH ANY COMBINATION OF MORE THAN THREE (3) FIRE HYDRANTS (PUBLIC OR PRIVATE) OF FIRE SERVICES.
17. MINIMUM SEPARATIONS BETWEEN FIRE SYSTEMS AND DOMESTIC WATER MAINS SHALL BE SIX (6)–FEET HORIZONTALLY FROM EXTERIOR PIPE WALLS AND EIGHTEEN (18)–INCHES VERTICALLY. MINIMUM SEPARATION FROM SEWER LINES SHALL BE TEN (10)–FEET HORIZONTALLY.
18. PIPE DETECTOR RIBBON AND LOCATOR BALLS SHALL BE REQUIRED ABOVE ALL WATER MAINS, SERVICE LATERALS THAT ARE SIX (6) INCHES AND LARGER, AND ANY SERVICE LATERAL NOT INSTALLED PERPENDICULAR TO THE MAIN LINE.
19. ALL WATER MAINS SHALL BE FILLED, PRESSURE TESTED TO 200 PSI, DISINFECTED, FLUSHED, REFILLED AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION BY THE CITY. CONTACT THE CITY OF NORTH LAS VEGAS UTILITY DIVISION TWENTY–FOUR (24) HOURS IN ADVANCE TO SCHEDULE SAMPLING.
20. ALL BACKFLOW PREVENTION ASSEMBLIES SHALL BE TESTED AND CERTIFIED BY THE CITY OF NORTH LAS VEGAS PRIOR TO PLACING THE WATER SYSTEM IN SERVICE. NO WATER SHALL BE TAKEN FROM A SERVICE REQUIRING BACKFLOW PREVENTION UNTIL THE REDUCED PRESSURE PRINCIPLE ASSEMBLY HAS BEEN SUCCESSFULLY TESTED BY THE CNLV. CONTACT CITY OF NORTH LAS VEGAS TWENTY–FOUR (24) HOURS IN ADVANCE TO SCHEDULE TESTING.
21. LIMITS OF ASPHALT PATCHES TO BE DETERMINED IN THE FIELD BY A CITY OF NORTH LAS VEGAS INSPECTOR. PATCHES WILL BE A MINIMUM OF TWELVE (12)–FEET MACHINE REPLACED.
22. TO SCHEDULE UTILITY INSPECTIONS, PLEASE EMAIL util–insp@cityofnorthlasvegas.com. UTILITY INSPECTION REQUESTS MUST BE RECEIVED BY 2:00 P.M. FOR INSPECTIONS TO OCCUR THE FOLLOWING NORMAL WORKING DAY (MONDAY THROUGH FRIDAY). FOR AFTER HOURS UTILITY INSPECTIONS, INCLUDING WEEKENDS, CALL THE INSPECTION LINE AT 702–390–4407.
23. RECORD DRAWINGS SHALL BE PREPARED, SIGNED AND SUBMITTED TO THE CITY OF NORTH LAS VEGAS REPRESENTATIVE PRIOR TO FINAL ACCEPTANCE OF ANY WATER DISTRIBUTION FACILITIES TO BE OWNED, OPERATED OR MAINTAINED BY THE CITY OF NORTH LAS VEGAS.

D. SHUTDOWN REQUIREMENTS AND INFORMATION:

1. CONTACT THE UTILITIES DEPARTMENT SEVEN (7) WORKING DAYS PRIOR TO ANY ANTICIPATED SHUTDOWN FOR COORDINATION PURPOSES. THE CONTRACTOR SHALL NOT OPEN/CLOSE ANY VALVES WITHIN THE CITY'S WATER DISTRIBUTION SYSTEM. THE UTILITIES DEPARTMENT CONTACT NUMBER IS 633–1285.
2. FOR COMMERCIAL PROPERTIES, PROVIDE WRITTEN NOTIFICATION AND VERBAL COORDINATION BETWEEN THE UTILITIES DEPARTMENT AND THE COMMERCIAL PROPERTY OWNER(S) A MINIMUM OF SEVEN (7) WORKING DAYS PRIOR TO ANTICIPATED SHUTDOWN. THE COMMERCIAL OWNER(S) SHALL HAVE THE ABILITY TO PROVIDE INPUT IN SCHEDULING SHUTDOWNS.
3. FOR RESIDENTIAL PROPERTIES, PROVIDE WRITTEN NOTIFICATION TO RESIDENTIAL PROPERTIES A MINIMUM OF 48 HOURS PRIOR TO ANTICIPATED SHUTDOWN.
4. WORKING DAYS ARE DEEMED TO BE MONDAY THROUGH THURSDAY FOR SHUTDOWN PURPOSES.
5. SHUTDOWNS ARE ANTICIPATED TO BE NIGHT WORK. FINAL DECISIONS SHALL BE AT THE DISCRETION OF THE UTILITIES DEPARTMENT.
6. THE SHUTDOWN, RELOCATION, AND/OR ADJUSTMENT OF WATER LINES SHALL BE AS APPROVED BY THE CITY OF NORTH LAS VEGAS UTILITIES DEPARTMENT. SHUTDOWNS CANNOT BE GUARANTEED BY THE DEPARTMENT. LINE STOPS OR "INSERT–A–VALVES" MAY BE REQUIRED TO COMPLETE THE WORK, AT THE DISCRETION OF THE UTILITIES DEPARTMENT. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE WORK.

IV. STANDARD SPECIFICATIONS AND STANDARD DRAWINGS FOR SEWER LINE CONSTRUCTION

A. ALL SEWER LINES (WASTEWATER COLLECTION SYSTEMS) SHOWN ON THESE CONSTRUCTION DRAWINGS SHALL CONFORM TO THE STANDARDS DESCRIBED BELOW, AND IN ACCORDANCE WITH THE PRECEDENT SHOWN:

1. "DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS, SOUTHERN NEVADA," LATEST EDITION.
2. "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF–SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA," LATEST EDITION.

B. EXCEPTIONS TO THESE STANDARDS ARE NOTED BELOW:

1. MATERIALS USED FOR WASTEWATER COLLECTION SYSTEMS SHALL BE INCLUDED ON THE CITY OF NORTH LAS VEGAS APPROVED MATERIALS LIST, LATEST EDITION, OR SPECIFICALLY IDENTIFIED AND APPROVED ON THESE PLANS.
2. THE CITY OF NORTH LAS VEGAS TRENCH BACKFILL POLICY, DATED AUGUST 15, 1996 SHALL BE ADHERED FOR THIS PROJECT.
3. THE CONTRACTOR SHALL INSCRIBE "S", 3–INCHES IN HEIGHT INTO THE CURB AT THE POINT WHERE THE SEWER LATERAL ENTERS EACH SUBDIVISION LOT OR PRIVATE LAND PARCEL.

C. MODIFICATIONS AND CLARIFICATIONS TO THESE STANDARDS ARE NOTED BELOW:

1. ALL SANITARY SEWER MANHOLE BASES FOR NEW PIPE MUST BE PRECAST PER DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS PLATES SD–1A, 1B AND 9.
2. LIMITS OF ASPHALT PATCHES TO BE DETERMINED IN THE FIELD BY A CITY OF NORTH LAS VEGAS INSPECTOR. PATCHES WILL BE A MINIMUM OF TWELVE (12)–FEET, MACHINE REPLACED.
3. THE ON–SITE SEWER LINES AND APPURTENANCES ARE PRIVATE FACILITIES NOT TO BE OPERATED OR MAINTAINED BY THE CITY OF NORTH LAS VEGAS, UNLESS OTHERWISE SPECIFIED ON CIVIL IMPROVEMENT PLANS.
4. SEWER SERVICES AS APPROVED ON THIS PLAN, ARE INTENDED SPECIFICALLY FOR THE LOT AND USE SHOWN, AND ARE NOT INTENDED TO SERVE ADDITIONAL PARCELS OR STRUCTURES WHICH MAY BE CREATED IN THE FUTURE. IN THE EVENT THAT THE PARCELS AND/OR LOTS SHOWN ON THIS PLAN ARE FURTHER DIVIDED TO CREATE ADDITIONAL PARCELS OR LOTS, THE OWNER IS REQUIRED TO PROVIDE SEPARATE SEWER SERVICES TO EACH.
5. TO SCHEDULE UTILITY INSPECTIONS, PLEASE EMAIL util–insp@cityofnorthlasvegas.com. UTILITY INSPECTION REQUESTS MUST BE RECEIVED BY 2:00 P.M. FOR INSPECTIONS TO OCCUR THE FOLLOWING NORMAL WORKING DAY (MONDAY THROUGH FRIDAY). FOR AFTER HOURS UTILITY INSPECTIONS, INCLUDING WEEKENDS, CALL THE INSPECTION LINE AT 702–390–4407.
6. RECORD DRAWINGS SHALL BE PREPARED, SIGNED AND SUBMITTED TO THE CITY OF NORTH LAS VEGAS PRIOR TO ACCEPTANCE OF ANY WASTEWATER COLLECTION SYSTEMS TO BE OWNED, OPERATED OR MAINTAINED BY THE CITY OF NORTH LAS VEGAS.
7. PIPE DETECTOR RIBBON AND LOCATOR BALLS SHALL ALSO BE REQUIRED ABOVE ALL SEWER MAINS.

D. ADJUSTING MANHOLES

1. WHEN ADJUSTING MANHOLES, THE CONTRACTOR SHALL INSTALL PLYWOOD COVERS IN SANITARY SEWER MANHOLE INVERTS AS WELL AS STEEL PLATE COVERS OVER MANHOLES (AFTER MANHOLE RINGS.FRMAES ARE REMOVED) TO PREVENT DEBRIS FROM ENTERING SEWER MANHOLES AND CORRESPONDING LINES. DEBRIS IN THE MANHOLES SHALL BE REMOVED PRIOR TO PLYWOOD REMOVAL.
2. PLYWOOD AND STEEL COVERS FOR MANHOLES SHALL BE INSTALLED AND REMOVED IN THE PRESENCE OF THE UTILITIES INSPECTOR. ALL DEBRIS DROPPED INTO THE SEWER MANHOLES AND CORRESPONDING LINES SHALL BE RETRIEVED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL CLEAN (E.G., JET VAC OR EQUIVALENT) THE DEBRIS OUT OF THE AFFECTED MANHOLES AND/OR SEWER LINES IN THE PRESENCE OF THE UTILITIES INSPECTOR.

V. OTHER GENERAL NOTES

A. GENERAL GRADING AND DRAINAGE NOTES

1. PURSUANT TO CITY OF NORTH LAS VEGAS ORDINANCE NUMBER 1172, THE CONTRACTOR IS REQUIRED TO SECURE A GRADING PERMIT TO COMMENCING WORK.
2. THE CONTRACTOR SHALL SECURE A PERMIT FOR ANY OFF–SITE CONSTRUCTION.
3. THE CONTRACTOR'S OPERATIONS SHALL NOT TRESPASS BEYOND THE PROJECT PROPERTY LINES UNLESS A PERMIT OR WRITTEN AUTHORIZATION HAS BE OBTAINED FROM THE PROPERTY OWNER(S) INVOLVED. COPIES OF SUCH WRITTEN AUTHORIZATION SHALL BE FURNISHED TO THE CITY OF NORTH LAS VEGAS REPRESENTATIVE PRIOR TO START OF CONSTRUCTION.
4. THE CITY OF NORTH LAS VEGAS CONSTRUCTION SERVICES SHALL BE NOTIFIED ONE (1) WORKING DAY BEFORE ANY ON–SITE CONSTRUCTION WORK BEGINS.
5. AN APPROVED GRADING AND DRAINAGE PLAN SHALL BE ON THE JOB SITE AT ALL TIMES. DEVIATIONS FROM THE APPROVED PLAN WILL REQUIRE SUBMITTAL OF A FORMAL REVISED PLAN FOR REVIEW AND APPROVAL.
6. ALL CONSTRUCTION SURVEY CONTROL SHALL BE DONE BY A LICENSED PROFESSIONAL LAND SURVEYOR IN ACCORDANCE WITH APPLICABLE STATUTES AND CODES. THE CONTRACTOR SHALL PROVIDE COMPETENT RESOURCES TO ASSURE BUILDING PAD AND BUILDING FLOOR ELEVATIONS CONFORM TO THOSE SHOWN ON THE CONSTRUCTION DRAWINGS. FURTHERMORE, THE CONTRACTOR SHALL PROVIDE THE CITY OF NORTH LAS VEGAS BUILDING DEPARTMENT WITH:
   a. CERTIFICATION

SOUTHWEST GAS CORPORATION
GENERAL NOTES

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020.
2. MINIMUM HORIZONTAL AND VERTICAL CLEARANCE BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND UTILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRIC SHALL BE AT LEAST 12-INCHES OR GREATER AS DICTATED BY LOCAL CODES AND STANDARDS.
   (A) ANY DEVIATION FROM SPECIFIED MINIMUM CLEARANCES MUST BE APPROVED BY ALL AFFECTED UTILITIES AND/OR MUNICIPALITIES.
3. FOR VALVE ADJUSTMENT CONTACT (702)528-7881 14 DAYS PRIOR TO CONSTRUCTION.
4. IN THE EVENT OF A NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND STRUCTURES CONTACT (702)365-2099.

CAUTION: HIGH PRESSURE GAS!!!

CALL SOUTHWEST GAS AT (702)278-8451 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES 48 HOURS PRIOR TO CONSTRUCTION.

REVISED 3/04/2020

FAST — Call before you UnderGround — 1-702-432-5300 — FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD — 1-702-227-2929

Call before you Dig — AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-227-2600

V. OTHER GENERAL NOTES (CONTINUED)

D. GENERAL FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH NORTH LAS VEGAS' STANDARD SPECIFICATIONS AND DRAWINGS.
2. THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH THE 2012 INTERNATIONAL FIRE CODE, CHAPTER 33, DURING CONSTRUCTION.
3. WHERE ACCESS TO OR WITHIN A STRUCTURE OR AREA IS RESTRICTED BECAUSE OF SECURED OPENINGS OR WHERE IMMEDIATE ACCESS IS NECESSARY FOR LIFE-SAVING OR FIRE-FIGHTING PURPOSES, THE FIRE CODE OFFICIAL IS AUTHORIZED TO REQUIRE A KEY BOX TO BE INSTALLED IN AN APPROVED LOCATION. BUILDINGS WITH FIRE SPRINKLER OR FIRE ALARM SYSTEMS, OR BUILDINGS NOT EQUIPPED WITH EXTERIOR MEANS OF ELECTRICAL DISCONNECT, SHALL BE PROVIDED WITH A KEY BOX. THE KEY BOX SHALL BE OF AN APPROVED TYPE, INSTALLED WITH THE TOP OF THE BOX BEING 5 FEET TO 6 1/2 FEET ABOVE FINISHED GRADE AND SHALL CONTAIN KEYS TO GAIN NECESSARY ACCESS. FOR MORE INFORMATION AND AN APPLICATION, PLEASE CALL 633-1102.
4. A MINIMUM OF ONE FIRE DEPARTMENT APPARATUS ACCESS ROAD IS REQUIRED TO ALL BUILDINGS. THE FIRE CODE OFFICIAL IS AUTHORIZED TO REQUIRE MORE THAN ONE FIRE APPARATUS ACCESS ROAD WHEN IT IS DETERMINED THAT A SINGLE MEANS OF ACCESS IS INSUFFICIENT. APPROVED SECONDARY ACCESS SHALL BE PROVIDED FOR GROUPS OF 20 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FEET AND FOR ALL COMMERCIAL AND INDUSTRIAL DEVELOPMENTS. FIRE APPARATUS ROADS SHALL HAVE AN UNOBSTRUCTED WIDTH OF NOT LESS THAN 24 FEET, EXCLUSIVE OF SHOULDER, EXCEPT FOR APPROVED ACCESS GATES IN ACCORDANCE WITH SECTION 503.6 OF THE INTERNATIONAL FIRE CODE, PROVIDED NO PARKING IS ALLOWED, NOT LESS THAN 40 FEET IF PARALLEL PARKING IS ALLOWED ON BOTH SIDES AND AN UNOBSTRUCTED VERTICAL CLEARANCE OF NOT LESS THAN 13 FEET 6 INCHES. FOR GROUP R, DIVISION 3 RESIDENTIAL SUBDIVISION, THE MINIMUM WIDTH OF THE FIRE APPARATUS ACCESS ROAD IS 36 FEET, MEASURED FACE OF CURB TO FACE OF CURB..
5. FIRE APPARATUS ACCESS ROADS SHALL BE MARKED WHERE REQUIRED TO PROHIBIT PARING AND OTHER OBSTRUCTIONS. MARKING SHALL CONSIST OF PAINTING THE CURB, OR THE SIDE OF THE STREET, WHERE NO CURB IS PRESENT, WITH A SUITABLE COAT OF INDUSTRIAL RED ENAMEL ALONG THE ENTIRE LENGTH OF ROAD WHERE PARKING IS PROHIBITED. EACH SECTION OF CURB THAT IS PAINTED RED SHALL ALSO BE MARKED BY SIGNAGE STATING "NO PARKING FIRE LANE". SIGNS ARE TO BE INSTALLED NO HIGHER THAN 10 FEET OR LESS THAN 6 FEET FROM THE SURFACE OF THE ROADWAY. SIGNS SHALL BE LOCATED AT EACH END OF PAINTED CURB, AND ADDITIONALLY IN BETWEEN SO THAT THE MAXIMUM SEPARATION BETWEEN SIGNS IS 100 FEET, MEASURED ALONG THE CENTERLINE OF THE FIRE APPARATUS ROAD.
6. GATES RESTRICTING TRAFFIC ACROSS ACCESS LANES SHALL BE OPERABLE BY THE FIRE DEPARTMENT. GATES SHALL BE ELECTRICALLY POWERED, PROVIDED WITH AN AVI LOOP, AND HAVE A BACK-UP BATTERY SYSTEM IN CASE OF NORMAL POWER LOSS. THE AVI LOOP SHALL BE LOCATED 10 FEET PERPENDICULARLY FROM THE FACE OF THE ACCESS GATE ALONG THE ROUTE OF ARRIVAL, 10 FEET FROM THE PUBLIC RIGHT-OF-WAY, AND THE LOOP SHALL BE MARKED BY WAY OF A GREEN REFLECTIVE MARKER ON THE ACCESS LANE. A FIRE DEPARTMENT PERMIT IS REQUIRED TO INSTALL A GATE THAT OBSTRUCTS A FIRE APPARATUS ACCESS ROAD. A SEPARATE PERMIT IS REQUIRED FOR EACH GATED ENTRANCE.
7. DEAD-ENDS LONGER THAN 150 FEET SHALL BE PROVIDED WITH A CLEAR TURNAROUND WITH A DIAMETER OF 104 FEET FOR COMMERCIAL AND MULTI-FAMILY R-1 AND R-2 OCCUPANCIES AND 90 FEET FOR R-3 OCCUPANCIES AND SINGLE-FAMILY DWELLINGS (BUILT UNDER THE IRC ONLY).
8. IN ALL RESIDENTIAL AREAS (R-3 OCCUPANCIES AND SINGLE-FAMILY DWELLING BUILT UNDER THE IRC ONLY), HYDRANTS SHALL BE SPACED NOT TO EXCEED 500 FEET, OR 600 FEET IF ALL HOMES ARE PROTECTED BY APPROVED AUTOMATIC FIRE SPRINKLERS SYSTEMS. IN ALL COMMERCIAL AND INDUSTRIAL AREAS, INCLUDING MULTI-FAMILY R-1 AND R-2 OCCUPANCIES, HYDRANTS SHALL BE SPACED NOT TO EXCEED 300 FEET, OR 400 FEET IF ALL BUILDINGS ARE PROTECTED BY APPROVED AUTOMATIC SPRINKLER SYSTEMS AND 1000 FEET WHERE NOT REQUIRED FOR STRUCTURES TO PROVIDE FOR TRANSPORTATION HAZARDS. HYDRANT SPACING MAY BE INCREASED BY 100 FEET IF ALL STRUCTURES WITHIN THE DEVELOPMENT ARE PROVIDED WITH SPRINKLER PROTECTION. THERE IS NO ALLOWABLE INCREASE FOR HYDRANTS INSTALLED FOR TRANSPORTATION HAZARDS.
9. ON ANY RESIDENTIAL OR COMMERCIAL CONSTRUCTION PROJECT, ACCESSIBLE FIRE HYDRANTS SHALL BE INSTALLED BEFORE ACTUAL CONSTRUCTION COMMENCES. FIRE HYDRANTS SHALL BE PROVIDED WITHIN 300 FEET OF COMBUSTIBLE MATERIAL STORAGE AND FRAMING CONSTRUCTION. A HYDRANT FLOW TEST IS REQUIRED, WHICH SHALL INCLUDE STATIC PRESSURE AND WATER FLOW VOLUME SHOWING THE ABILITY TO MEET THE REQUIRED FIRE FLOW, AND MUST BE PRESENTED TO THE NORTH LAS VEGAS FIRE DEPARTMENT AND PUBLIC WORKS.
10. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN SIX (6) FEET OF A DRIVEWAY, POWER POLE, LIGHT STANDARD, OR ANY OTHER OBSTRUCTION OR WITHIN FIFTEEN (15) FEET OF A CURB RETURN OR DRIVEWAY IN AN INDUSTRIAL OR COMMERCIAL AREA. FOR WALL, FENCE AND PLANTER LOCATIONS, A PERIMETER AROUND THE HYDRANT MEASURING A MINIMUM OF 3 FEET FROM ITS EXTERIOR SHALL BE MAINTAINED CLEAR OF ALL OBSTRUCTIONS AT ALL TIMES. FIRE HYDRANTS SHALL BE LOCATED 4 FEET TO 7 FEET FROM THE BACK OF CURB. WHERE IT IS NOT POSSIBLE TO LOCATE THE HYDRANT, A MINIMUM OF 4 FEET FROM THE BACK OF THE CURB, THE HYDRANT SHALL BE PROTECTED AGAINST VEHICULAR IMPACT IN ACCORDANCE WITH SECTION 312 OF THE 2009 INTERNATIONAL FIRE CODE.
11. THE MINIMUM FIRE-FLOW AND FLOW DURATION FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS SHALL BE AS SPECIFIED IN TABLE B105.1. FOR BUILDINGS OTHER THAN HIGH-RISE BUILDINGS, A REDUCTION IN REQUIRED FIRE-FLOW OF UP TO 50 PERCENT, AS APPROVED, IS ALLOWED WHEN THE BUILDING IS PROVIDED WITH AN APPROVED AUTOMATIC SPRINKLER SYSTEM INSTALLED IN ACCORDANCE WITH SECTION 903.3.1.1 OR 903.3.1.2. A REDUCTION IN THE REQUIRED FIRE FLOW OF UP TO 25 PERCENT IS PERMITTED IN HIGH-RISE BUILDINGS. THE RESULTING FIRE FLOW SHALL NOT BE LESS THAN 1,500 GALLONS PER MINUTE (5678 L/m in) FOR THE PRESCRIBED DURATION AS SPECIFIED IN TABLE B105.1.
12. WHEN AUTOMATIC FIRE PROTECTION IS REQUIRED, THE FIRE DEPARTMENT CONNECTION (FDC) SHALL BE SO LOCATED THAT FIRE APPARATUS AND HOSE CONNECTED TO SUPPLY THE SYSTEM WILL NOT OBSTRUCT ACCESS TO THE BUILDING FOR OTHER FIRE APPARATUS. IT SHALL BE LOCATED ON THE STREET SIDE OF BUILDINGS, FULLY VISIBLE AND RECOGNIZABLE FROM THE STREET OR NEAREST POINT OF FIRE DEPARTMENT VEHICLE ACCESS. IMMEDIATE ACCESS TO FDC SHALL BE MAINTAINED AT ALL TIMES AND WITHOUT OBSTRUCTION BY FENCES, BUSHES, TREES, WALLS OR ANY OTHER FIXED OR MOVEABLE OBJECT. A WORKING SPACE OF NOT LESS THAN 36 INCHES IN WIDTH, 36 INCHES IN DEPTH AND 78 INCHES IN HEIGHT NOT INCLUDING ANY DOORS OR WINDOWS, SHALL BE PROVIDED AND MAINTAINED IN FRONT OF AND TO THE SIDES OF WALL-MOUNTED FIRE DEPARTMENT CONNECTIONS AND AROUND THE CIRCUMFERENCE OF FREE-STANDING FIRE DEPARTMENT CONNECTIONS. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FDC SUPPLYING FIRE SPRINKLERS AND/OR STANDPIPES SHALL NOT EXCEED 100 FEET, AS MEASURED BY AN APPROVED ROUTE. AN APPROVED ROUTE IS DEFINED AS AN UNOBSTRUCTED PATH OF TRAVEL ON WHICH FIRE APPARATUS CAN MANEUVER AND ON WHICH HOSE CAN EASILY BE LAID.

E. GENERAL STORMWATER NOTES

1. 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 AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPEMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER OR HIS/HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE CITY OF NORTH LAS VEGAS AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. 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 NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OR 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 SUPPRESSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. 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.

F. AMERICANS WITH DISABILITIES ACT (A.D.A.) NOTES

1. COMPLIANCE WITH THE U.S. DEPARTMENT OF JUSTICE – AMERICAN WITH DISABILITIES ACT (ADA) REGULATIONS, GUIDELINES AND STANDARDS FOR ALL ON-SITE DEVELOPMENT IS ENTIRELY THE RESPONSIBILITY OF THE DESIGN PROFESSIONAL. THE CITY OF NORTH LAS VEGAS DOES NOT APPROVE OR ENDORSE ANY ADA DETAILS SHOWN HEREON. A SEPARATE ACCESSIBILITY PLAN THAT MEETS THE REQUIREMENTS SET FORTH IN THE 2012 IBC CHAPTER 11 AND 2012 ICC/ANSI A117.1, INCLUDING SITE ACCESS TO AND FROM THE PUBLIC RIGHT-OF-WAY, MUST BE SUBMITTED TO THE BUILDING & SAFETY DIVISION FOR REVIEW PRIOR TO CONSTRUCTION OF ANY ON-SITE ACCESSIBILITY IMPROVEMENTS. ANY ACCESSIBILITY DETAILS SHOWN HEREON ARE FOR REFERENCE ONLY.

SOUTHWEST GAS CORPORATION _____ DATE

REVISIONS			
REV.	DESCRIPTION	APRVD. BY	DATE
		APPROVAL	

REVERE AND CAREY

GENERAL NOTES 2

APN: 139-15-401-006
NEC REVERE STREET & CAREY AVENUE
NORTH LAS VEGAS, NEVADA 89030

ACG DESIGN
4310 CAMERON ST. SUITE 12-A
LAS VEGAS, NEVADA 89103
OFFICE: 702.448.8737
WEBSITE: WWW.ACG.DESIGN

ENGINEER'S SEAL
PROFESSIONAL ENGINEER STATE OF NEVADA
RANDOLPH A. SKORPINSKI
EXP: 06-30-22
CIVIL
No. 14985
12/30/2020

DATE:	9/25/2020
PROJ. NO:	190259
DRAWN BY:	ARB
CHECKED BY:	RAS
SCALE:	AS NOTED
JURISDICTION:	CNLV

DRAWING NUMBER:
C3
SHEET 3 OF 10

AGENCY NUMBER:

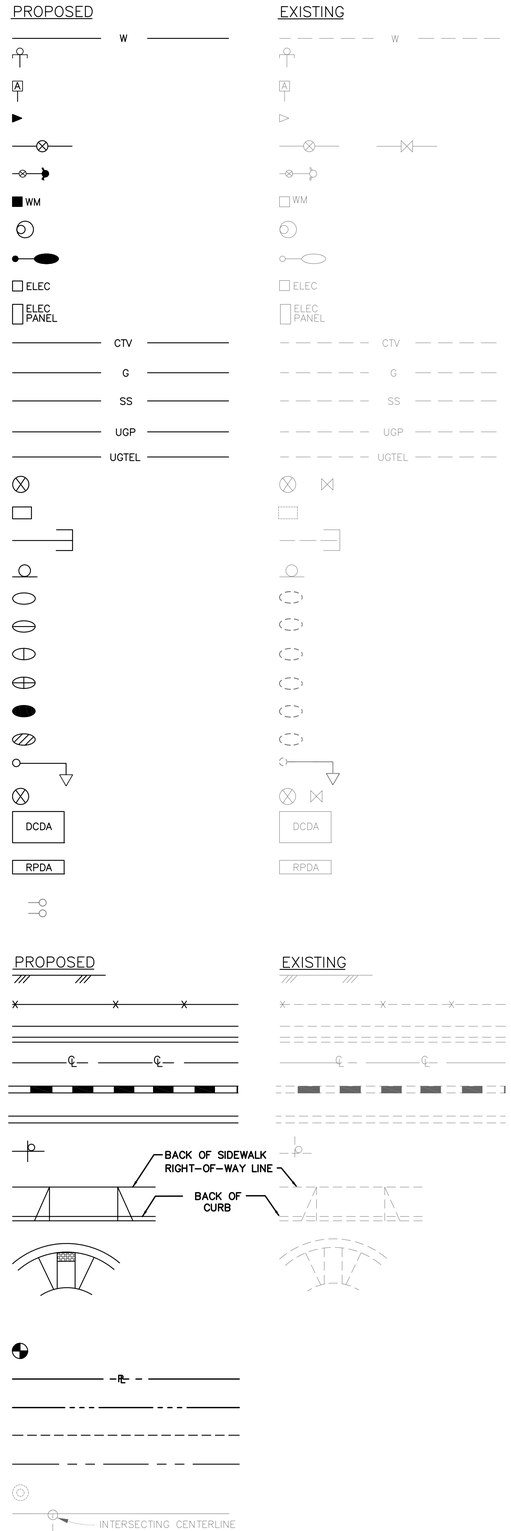
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ABBREVIATIONS

ABAN	ABANDON
AB	AGGREGATE BASE
ABS	ABSOLUTE
AC	ASPHALTIC CONCRETE
ACKV	AUTOMATIC CHECK VALVE
ADA	AMERICAN DISABILITY ACT
ADDL	ADDITIONAL
ADDM	ADDENDUM
ADJ	ADJUSTABLE
AGG	AGGREGATE
AL	ALUMINUM
AMT	AMOUNT
&	AND
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APN	ASSESSOR PARCEL NUMBER
APPROX	APPROXIMATE
APPVD	APPROVED
ASPH	ASPHALT
ASSN	ASSOCIATION
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS
AVE	AVENUE
AWWA	AMERICAN WATER WORKS ASSOCIATION
BC	BOLT CIRCLE/BACK OF CURB
BCR	BACK OF CURB RADIUS BEGINNING OF CURVE RETURN
BDRY LINE	BOUNDARY LINE
BETW, B/W	BETWEEN
BK	BOOK/BACK
BLDG	BUILDING
BLK	BLOCK
BLM	BUREAU OF LAND MANAGEMENT
BLVD	BOULEVARD
BM	BENCHMARK
BO	BLOW OFF ASSEMBLY
BC, BOC	BACK OF CURB
BOT	BOTTOM
BW, BOW	BACK OF WALK
BPV	BACK PRESSURE VALVE
BRG	BEARING
BS	BACK SIGHT
BVC	BEGINNING OF VERTICAL CURVE
BSW	BACK OF SIDEWALK
C	CONDUIT
C&G	CURB & GUTTER
CAP	CAPACITY
CATV	CABLE TELEVISION
CAV	COMBINATION AIR VALVE
CC	CLARK COUNTY
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT
CI	CAST IRON
CIP	CAST IRON PIPE/CAST IN PLACE
CIR	CIRCLE
CIRCUM	CIRCUMFERENCE
CL OR ℄	CENTERLINE
CO	COUNTY/COMPANY/CONTRACT
COL	COLUMN
CONC	CONCRETE
CONST	CONSTRUCTION
COR	CORNER
CONC	CONCRETE
CONN	CONNECTION
CONT	CONTINUE OR CONTINUOUS
CTR	CENTER
CU	CUBIC
CY	CUBIC YARD
D OR △	DELTA ANGLE
D/W	DRIVEWAY
DBO	DESIGNED BY OTHERS
DCSWCS	DESIGN AND CONSTRUCTION STANDARDS FOR WASTE WATER COLLECTION SYSTEMS
DEMO	DEMOLITION
DEPT	DEPARTMENT
DET	DETAIL
DEV	DEVELOPMENT
DI	DROP INLET OR DUCTILE IRON
DIA OR Ø	DIAMETER
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DIR	DIRECTION
DIST	DISTANCE
DMH	DROP MANHOLE
DOM	DOMESTIC
DR	DRIVE
DWG	DRAWING
DWY	DRIVEWAY
E	EAST
EC	EXISTING CONCRETE
ECR	END OF CURVE RETURN
EOC	END OF CURVE
EOP	EDGE OF PAVEMENT
EOS	EDGE OF SHOULDER
ESMT	EASEMENT
EVC	END OF VERTICAL CURVE
EX	EXISTING
FC	FACE OF CURB
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FL OR ℄	FLOW LINE
FN	FENCE
FOW	FACE OF WALL
FSTNR	FASTENER
FT	FOOT OR FEET
FUT	FUTURE
GB	GRADE BREAK
GM	GAS METER
GPM	GALLONS PER MINUTE
GRD	GRADE
GRT	GRATE
GUT	GUTTER
GV	GATE VALVE
HERCP	HORIZONTAL/ELLIPTICAL REINFORCED CONCRETE PIPE
HP	HIGH POINT
IN	INCH
INSTR	INSTRUMENT
INT	INTERIOR
INV	INVERT
IRR	IRRIGATION
LEN OR L	LENGTH OF CURVATURE
LF	LINEAR FOOT
LT	LEFT/LIGHT
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
M	METER
MAX	MAXIMUM
N	NORTH
NAP	NOT-A-PART
NDOT	NEVADA DEPARTMENT OF TRANSPORTATION
NE	NORTHEAST
NG	NATURAL GROUND
NO. #	NUMBER
NPC	NEVADA POWER COMPANY
NTS	NOT TO SCALE
NW	NORTHWEST
MH	MANHOLE
MIN	MINIMUM
OHP	OVER HEAD POWER
OHTEL	OVER HEAD TELEPHONE
P	POLE/PRESSURE/PIPE/POWER
P/L / ℄	PROPERTY LINE
PERP	PERPENDICULAR
PG	PRESSURE GAGE
PKWY	PARKWAY
PRIV	PRIVATE
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE PIPE
QTY	QUANTITY
R	RADIUS
(R)	RADIAL
R.D.O.	ROOF DRAIN OUTLET PIPE LOCATION
RPDA	REDUCED PRESSURE DETECTOR ASSEMBLY
RPPA	REDUCED PRESSURE PRINCIPLE ASSEMBLY
RR	RAILROAD
ROW	RIGHT OF WAY
S/C	SAW CUT
SCCP	STEEL CYLINDER CONCRETE PIPE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SW, SDWK	SIDEWALK
SE	SOUTHEAST
SEC	SECTION/SECOND(ARY)
SHT	SHEET
SIG	SIGNAL
SF, SQ FT	SQUARE FOOT (FEET)
SY, SQ YD	SQUARE YARD
SNBORS	SOUTHERN NEVADA BUILDING OFFICIALS REGIONAL STANDARD
SS	SANITARY SEWER
ST	STREET
STA	STATION
STD	STANDARD
SL, STLT	STREET LIGHT
SUR	SURVEY
SVZ	SITE VISIBILITY ZONE
T	TELEPHONE/TANGENT
TAN	TANGENT
TC	TOP OF CURB
TF	TOP OF FOOTING
TFW	TOP OF FLOOD WALL
TMH	TOP OF MANHOLE
TR.DR.	TRENCH DRAIN
TRW	TOP OF RETAINING WALL
TOT	TOTAL
TW	TOP OF WALL
TS	TRAFFIC SIGNAL
TRANS	TRANSITION/TRANSMISSION
(TYP)	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
USD	UNIFORM STANDARD DRAWINGS
VC	VERTICAL CURVE
VERT	VERTICAL
VG	VALLEY GUTTER
W/	WITH
WM	WATER METER
W	WATER
WV	WATER VALVE
YD	YARD

NOTE:
THIS IS A STANDARD ABBREVIATION SHEET.
SOME ABBREVIATIONS MAY APPEAR ON THIS SHEET
BUT NOT USED IN THE PLANS. ALL ABBREVIATIONS
USED ON THE PLANS MUST APPEAR ON THIS SHEET.

UTILITY



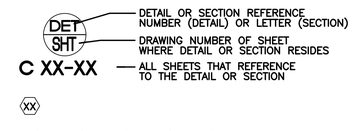
GEOMETRIC

SURVEY

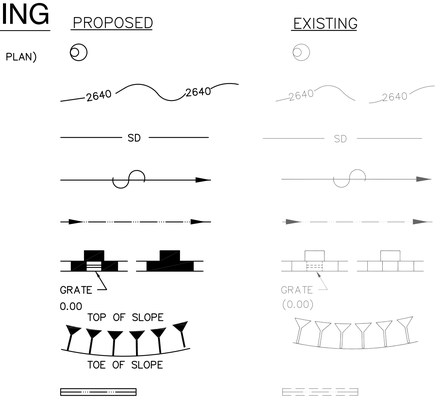
SITE PLAN



MISCELLANEOUS



DRAINAGE / GRADING



SPECIAL SURVEY LEGEND & ABBREVIATIONS

W	WATER PULLBOX/ METER/SHUT OFF		FIRE HYDRANT
E	ELECTRIC PULLBOX/ METER/TRANSFORMER	WV	WATER VALVE
T	TELEPHONE PULLBOX/HANDHOLE	GAS	GAS METER
FO	FIBER OPTIC PULLBOX/HANDHOLE	SS	SEWER MANHOLE
SL	STREETLIGHT PULLBOX/HANDHOLE	GV	GAS VALVE
TS	TRAFFIC SIGNAL PULLBOX/HANDHOLE	SSCO	SEWER CLEANOUT
ICV	IRRIGATION CONTROL VALVE		AREA LIGHT
SS	SANITARY SEWER		STREET LIGHT
CTV	CATV PULLBOX/HANDHOLE		SIGN
AL	AREA LIGHT PULLBOX/HANDHOLE	IM	INTERCEPTOR MANHOLE
RB	RED BOX DVD RENTAL KIOSK		TILE WALKWAY
			DESERT LANDSCAPE AREA
		B	8" CONCRETE BOLLARD
			TRAFFIC SIGNAL POLE
			AREA LIGHT
		SD	STORM MANHOLE
			SHRUB
			FLOWERS/PLANT
			TREE
			PALM TREE
			BUILDING COLUMN
		TC	TRASH CAN

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Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-227-2600

REVISIONS			APPROVAL	
REV.	DESCRIPTION	APRVD. BY	DATE	

REVERE AND CAREY

LEGEND AND ABBREVIATIONS

APN: 139-15-401-006
NEC REVERE STREET & CAREY AVENUE
NORTH LAS VEGAS, NEVADA 89030

ACG DESIGN
4310 CAMERON ST, SUITE 12-A
LAS VEGAS, NEVADA 89103
OFFICE: 702.448.8737
WEBSITE: WWW.ACG.DESIGN

ENGINEER'S SEAL



12/30/2020

DATE:	9/25/2020
PROJ. NO:	190259
DRAWN BY:	ARB
CHECKED BY:	RAS
SCALE:	AS NOTED
JURISDICTION:	CNLV

DRAWING NUMBER:
C4
SHEET 4 OF 10

AGENCY NUMBER:

Z:\PROJECTS_CURRENT\COMMERCIAL CLIENTS\SCA DESIGN\190259- REVERE & CAREY C- STORE\ENGINEERING\CIVIL DRAWINGS\IMPROVEMENT PLANS\190259 C4-L&A.DWG 9/25/2020 1:22 PM

HANDICAP ACCESSIBILITY NOTE:

CONTRACTOR TO COMPLY WITH ALL ADA REQUIREMENTS. IF CONTRACTOR FINDS DISCREPANCIES WITH ANY INFORMATION INDICATED ON THESE PLANS, ACG DESIGN IS TO BE NOTIFIED BY CONTRACTOR IMMEDIATELY.

STORMWATER MANAGEMENT NOTES:

1. 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 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.
2. 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 THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND THE LAS VEGAS CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. 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 NVR100000, SECTION III.A.5.
4. 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 A 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 NVR100000, SECTION III.A.12.
5. 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.

NOTE

THESE PLANS SHALL NOT, IN PART OR IN WHOLE, BE USED FOR CONSTRUCTION UNTIL APPROVED AND SIGNED BY THE GOVERNING AGENCY. ENGINEER TO BE NOTIFIED OF ANY DISCREPANCIES IMMEDIATELY.

CAUTION TO CONTRACTOR

THE CONTRACTOR SHALL BE RESPONSIBLE TO INVESTIGATE AND VERIFY THE ACTUAL LOCATION AND DEPTH OF ALL EXISTING UNDERGROUND FACILITIES AT LEAST 48 HOURS IN ADVANCE OF THE PERFORMANCE OF ANY WORK.

IRRIGATION SYSTEM NOTE

ALL IRRIGATION FEATURES SUCH AS CONTROL VALVES, IRRIGATION BOXES, SPRINKLER HEADS, SPRINKLER LINES, ELECTRICAL LINES, AND OTHER IRRIGATION APPURTANCES THAT ARE IN CONFLICT WITH THESE PROPOSED IMPROVEMENTS SHALL BE REMOVED AND RELOCATED IN A MANOR NECESSARY FOR PROPER OPERATION OF THE EXISTING IRRIGATION SYSTEM.

ROOF DRAIN OUTLET NOTE:

REFER TO ARCHITECTURAL PLANS FOR THE TREATMENT OF ROOF DRAIN OUTLET SPLASH AREA.

FLOOD ZONE INFORMATION

AS SHOWN BY FLOOD INSURANCE RATE MAP 32003C2160F, DATED NOVEMBER 16, 2011. THE ENTIRE SITE LIES WITHIN APN 139-15-401-006, WHICH LIES WITHIN A FEMA ZONE X (UNSHADED), DEFINED AS: "AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD."

LANDSCAPE NOTE:

REMOVE ALL EXISTING LANDSCAPE FEATURES SUCH AS TREES, SHRUBS, GRASS, DECORATIVE ROCK, TREE WELLS, ETC IN CONFLICT WITH PROPOSED IMPROVEMENTS. REFER TO ARCHITECTURAL LANDSCAPE PLAN.

BASIS OF BEARINGS

NORTH 00°24'38" WEST
BEING THE WEST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 15, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA, SHOWN AS THE CENTERLINE OF REVERE STREET IN BOOK 112 OF PLATS, PAGE 38, CLARK COUNTY, NEVADA OFFICIAL RECORDS.

BENCHMARK

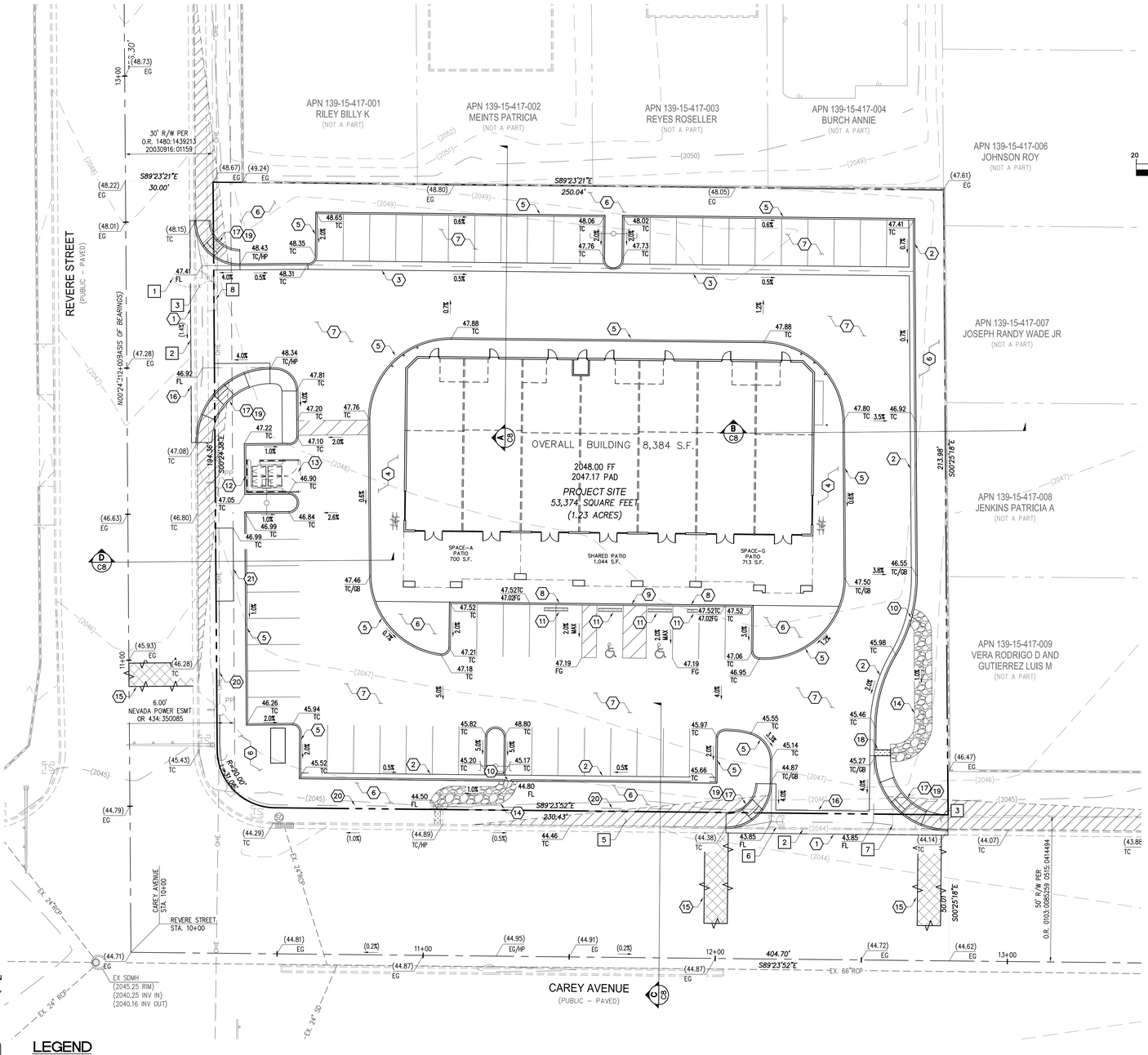
5LV012INES
CITY OF LAS VEGAS RIVET AND PLATE IN THE TOP
OF CURB AT THE SOUTHWEST CORNER OF CAREY AVE. AND REVERE ST.
ELEVATION = 623.298 METERS = 2044.94 U.S. SURVEY FEET (NAVD 88)

LEGAL DESCRIPTION

THAT PORTION OF THE SOUTHWEST QUARTER (SW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 15, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CLARK COUNTY, NEVADA.

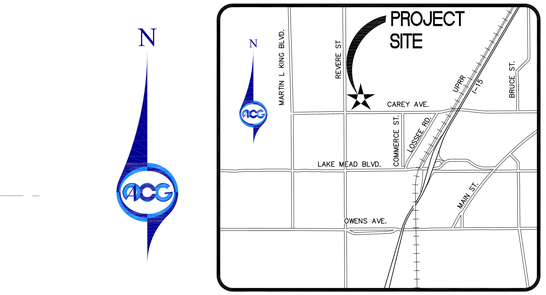
NOTE

ACG DESIGN ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS, SHOWN OR NOT SHOWN. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM RECORD INFORMATION AND ARE FOR THE CONVENIENCE OF THE CONTRACTOR ONLY. THE CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY THE LOCATIONS AND DEPTHS OF ALL RELEVANT UTILITIES PRIOR TO COMMENCING WITH CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY THE ENGINEER OF WORK, IN WRITING, OF ANY CONFLICTS OR DISCREPANCIES.



LEGEND

- PROPOSED AC PAVEMENT
- PROPOSED CONCRETE
- RIPRAP LINED SWALE
- PROPOSED NO PARKING AREA AND ADA ACCESSIBLE ROUTE
- PROPOSED PAVEMENT RESTORATION



VICINITY MAP
NTS

GRAPHIC SCALE
20 0 10 20 40
(IN FEET)
1" = 20'

REMOVAL NOTES

1. RELOCATE EXISTING STREETLIGHT, EXISTING SPEED LIMIT SIGN AND EXISTING RTC BUS STOP SIGN. REFER TRAFFIC PLAN.
2. REMOVE EXISTING "L"-TYPE C&G.
3. REMOVE EXISTING SIDEWALK.
4. RELOCATE EXISTING ELECTRICAL VAULT PER APPROVED NV ENERGY PLAN.
5. REMOVE EXISTING AC SIDEWALK.
6. RELOCATE EXISTING FIBER OPTIC PULL BOX. COORDINATE WITH F.A.S.T.
7. RELOCATE EXISTING SPEED LIMIT SIGN. REFER TO TRAFFIC PLAN.
8. RELOCATE EXISTING RTC BUS STOP.

CONSTRUCTION NOTES

1. SAWCUT & MATCH EXISTING PAVEMENT.
2. CONSTRUCT "L" CURB AND GUTTER PER CCAUSD NO. 216.
3. CONSTRUCT 3' WIDE VALLEY GUTTER. REFER TO DETAIL 5, SHEET C10.
4. CONSTRUCT ON-SITE CONCRETE SIDEWALK PER DETAIL 6, SHEET C10.
5. CONSTRUCT MODIFIED "A" TYPE CURB PER DETAIL 1, SHEET C10.
6. LANDSCAPE AREA (DESIGNED BY OTHERS)
7. CONSTRUCT ON-SITE PAVEMENT (2" AC FOR AUTO PARKING, 3" AC FOR MAIN CORRIDOR AND TRUCK ACCESS) OVER 4" TYPE II AGGREGATE BASE (95% COMPACTION). 6" MINIMUM SCARIFICATION AND COMPACTION. REFER TO DETAIL 2, SHEET C10.
8. CONSTRUCT 0-INCH TO 6-INCH CURB FACE TRANSITION. REFER TO DETAIL 9, SHEET C10.
9. CONSTRUCT ZERO-INCH CURB FACE PER DETAIL 8, SHEET C10.
10. PROVIDE 2' CURB OPENING TO ALLOW RUN-OFF TO SPILL OUT OF CURB. REFER TO DETAIL 7, SHEET C10.
11. INSTALL 8' X 6.5" PRECAST BUMPER BLOCKS PER CCAUSD NO. 238.
12. CONSTRUCT TRASH ENCLOSURE PER ARCHITECTURAL PLANS.
13. CONSTRUCT CONCRETE APRON FOR TRASH ENCLOSURE (6" CONCRETE SLAB WITH 6X6/1.4X1.4 W.W.F.) OVER 8" TYPE II AGGREGATE BASE. REFER TO DETAIL 3, SHEET C10.
14. PROPOSED SWALE PER BMP DESIGN CRITERIA. D_{BF}=3 INCHES MIN., THICKNESS = 9 INCHES, 4:1 MAXIMUM SIDE SLOPES, 40' LONG X 6' WIDE MINIMUM. REFER TO LIMITS SHOWN ON PLAN AND DETAIL 11, SHEET C10.
15. LIMITS OF PAVEMENT RESTORATION PER CCAUSD NO. 500.5. TRENCH AND BACKFILL PER CCAUSD NO. 503.
16. CONSTRUCT 8' CONCRETE CROSS GUTTER AND SPANDRELS PER CCAUSD NO. 228 FOR COMMERCIAL DRIVEWAY PER CCAUSD NO. 222A & 225.
17. CONSTRUCT CONCRETE SIDEWALK RAMP WITH DETECTABLE TACTILE WARNINGS PER CCAUSD NO. 235. (CASE I, A=8', B=8' UNLESS OTHERWISE NOTED). 2% MAX. SLOPE IN LANDING AREA.
18. CONSTRUCT SIDEWALK DRAIN PER CCAUSD NO. 236.
19. INSTALL CONTINUOUS DETECTABLE TACTILE WARNINGS CONSISTING OF RAISED TRUNCATED DOMES WHICH CONTRACT VISUALLY WITH ADJOINING SURFACES. REFER TO ADAAG SECTION 4.29.
20. FLOWLINE OF LANDSCAPE SWALE. ENSURE POSITIVE FLOW PER GRADES ON PLAN.
21. CONSTRUCT CONCRETE BUS STOP LOADING SHELTER PAD. 5" CONCRETE SLAB OVER 5" TYPE II AGGREGATE BASE PER CCAUSD NO. 234.2.

FAST — Call before you UnderGround — 1-702-432-5300 — FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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Call before you Dig — AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-227-2600

REV.	DESCRIPTION	APRVD. BY	DATE

APPROVAL
REVISIONS

REVERE AND CAREY

GRADING PLAN
APN: 139-15-401-006
NEC REVERE STREET & CAREY AVENUE
NORTH LAS VEGAS, NEVADA 89030

ACG DESIGN
4310 CAMERON ST, SUITE 12-A
LAS VEGAS, NEVADA 89103
OFFICE: 702.448.8737
WEBSITE: WWW.ACG.DESIGN

ENGINEER'S SEAL
PROFESSIONAL ENGINEER STATE OF NEVADA
RANDOLPH A. SKORPINSKI
EXP: 06-30-22
CIVIL
No. 14985
12/30/2020

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT CITY OF NORTH LAS VEGAS.

CNLV #

RANDOLPH A. SKORPINSKI, P.E.
(NV #14985)

(DATE)

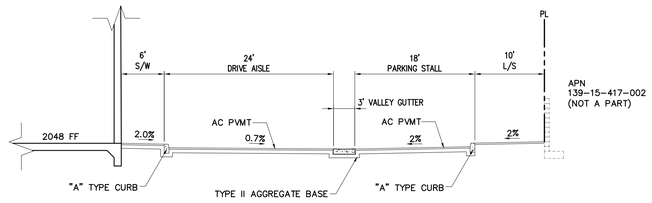
APPROVED BY:

ROBERT A. McLAUGHLIN, P.E. CFM — DATE
MANAGER, DEVELOPMENT AND FLOOD CONTROL DIVISION

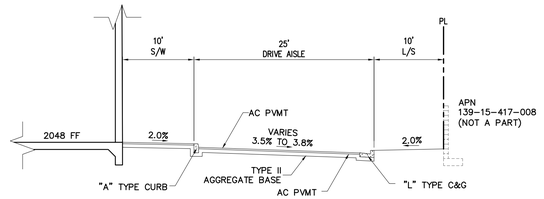
DATE:	9/25/2020
PROJ. NO:	190259
DRAWN BY:	ARB
CHECKED BY:	RAS
SCALE:	AS NOTED
JURISDICTION:	CNLV

DRAWING NUMBER:
C6
SHEET 6 OF 10
AGENCY NUMBER:

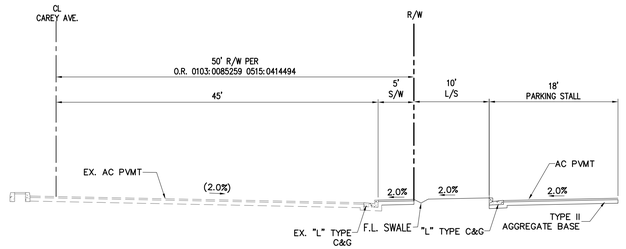
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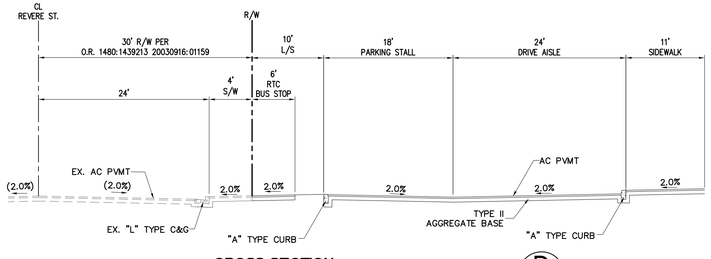
CROSS SECTION A
NTS



CROSS SECTION B
NTS



CROSS SECTION C
NTS



CROSS SECTION D
NTS

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REVISIONS

REV.	DESCRIPTION	APRVD. BY	DATE
		APPROVAL	

REVERE AND CAREY

CROSS SECTIONS
APN: 139-15-401-006
NEC REVERE STREET & CAREY AVENUE
NORTH LAS VEGAS, NEVADA 89030

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4310 CAMERON ST, SUITE 12-A
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EXP: 06-30-22
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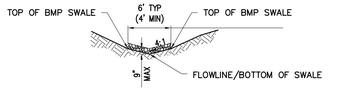
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DRAWING NUMBER:
C9
SHEET 9 OF 10
AGENCY NUMBER:

FAST
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1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

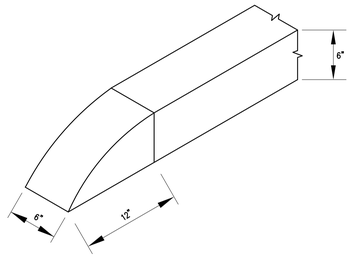
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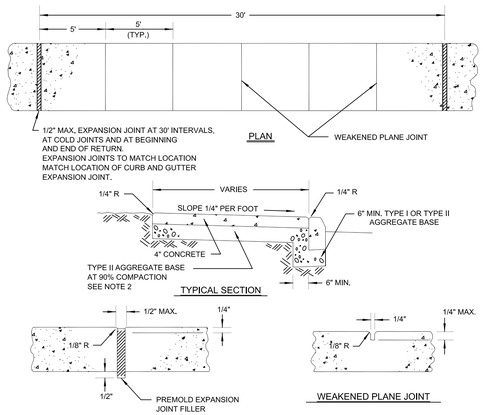


TRIBUTARY AREA > 0.5 AC, SWALE SLOPE ≤1% SIDE SLOPES 4:1 MAXIMUM, MINIMUM LENGTH 40 FT, MAXIMUM DEPTH 9" FOR 2 YEAR FLOW ROCK LINED, D50=6", THICKNESS = 12"

BMP SWALE DETAIL 11
NTS

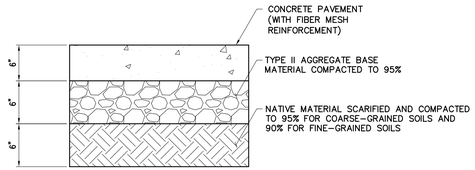


1-FOOT CURB TRANSITION DETAIL 9
NTS



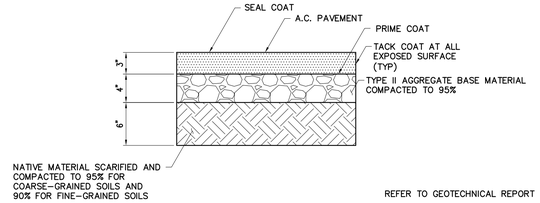
NOTES:
1. ON ALL CURB RETURNS A 1/2" MAX. EXPANSION JOINT SHALL BE CONSTRUCTED BETWEEN THE BACK OF CURB AND THE SIDEWALK FOR THE ENTIRE LENGTH OF THE RETURN.
2. THE TYPE II AGGREGATE BASE THICKNESS IS SHOWN ON THE TYPICAL SECTION DRAWINGS PER USD NO. 202 -207.
3. LONGITUDINAL WEAKENED PLANE JOINT REQUIRED AT MIDPOINT OF SIDEWALK 10' OR WIDER.

ON-SITE SIDEWALK CONSTRUCTION DETAIL 6
NTS



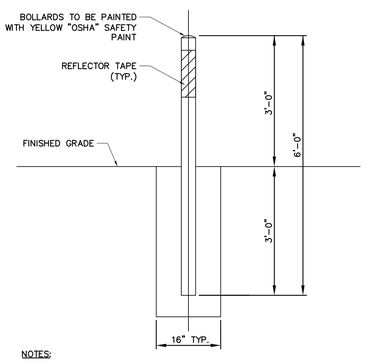
NOTE:
PROVIDE WEAKENED PLANE CONTROL JOINTS AND PREMOLDED EXPANSION JOINTS PER GEO-TECHNICAL REPORT, SECTION 5.7.1
REFER TO GEOTECHNICAL REPORT BEFORE PLACEMENT OF PCC PAVEMENT

ON-SITE CONCRETE SECTION 3
NTS



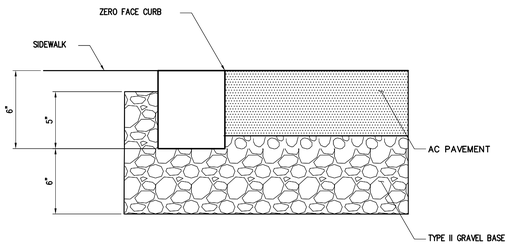
REFER TO GEOTECHNICAL REPORT

ON-SITE AC PAVEMENT SECTION 2
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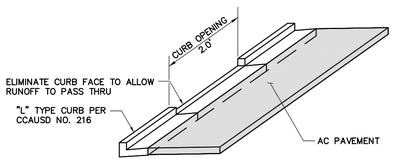


NOTES:
1. BOLLARD TO BE 4" SCH. 40 STEEL PIPE, 6'-0" LONG AND FILLED WITH CONCRETE.
2. BOLLARDS ON SIDE NOT ACCESSIBLE TO VEHICLES MAY BE OMITTED BY THE APPROVING AGENCY.
3. PLACE 6" WIDE, YELLOW CLASS 4 REFLECTIVE TAPE (PER STANDARD SPECIFICATIONS, SECTION 716), 4" DOWN FROM TOP, FOR FULL DIAMETER ON ALL BOLLARDS.
4. CONTRACTOR TO ASSURE THAT BOLLARDS ARE PLACED TO ALLOW FULL ACCESS TO THE PROTECTED AGENCY.

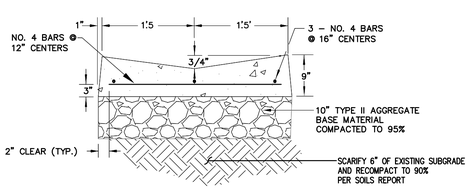
VEHICULAR PROTECTION BOLLARD 10
N.T.S



ZERO FACE CURB 8
NTS

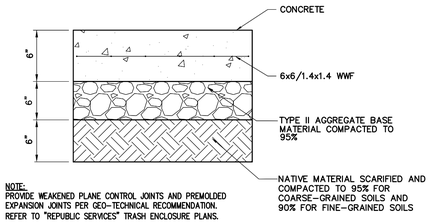


2' CURB OPENING 7
NTS



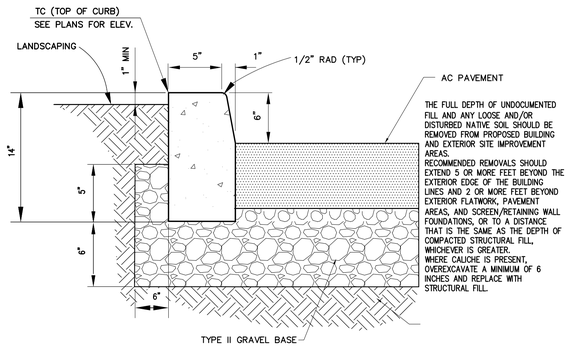
NOTES:
1. FINISHED ASPHALT CONCRETE SURFACE TO BE FLUSH WITH VALLEY GUTTER LIP.

3' VALLEY GUTTER 5
NTS



NOTE:
PROVIDE WEAKENED PLANE CONTROL JOINTS AND PREMOLDED EXPANSION JOINTS PER GEO-TECHNICAL RECOMMENDATION. REFER TO "REPUBLIC SERVICES" TRASH ENCLOSURE PLANS.

CONCRETE SECTION FOR TRASH ENCLOSURE APRON 4
NTS



THE FULL DEPTH OF UNDOCUMENTED FILL AND ANY LOOSE AND/OR DISTURBED NATIVE SOIL SHOULD BE REMOVED FROM PROPOSED BUILDING AND EXTERIOR SITE IMPROVEMENT AREAS.
RECOMMENDED REMOVALS SHOULD EXTEND 5 OR MORE FEET BEYOND THE EXTERIOR EDGE OF THE BUILDING LINES AND 2 OR MORE FEET BEYOND EXTERIOR FLATWORK, PAVEMENT AREAS, AND SCREEN/RETAINING WALL FOUNDATIONS, OR TO A DISTANCE THAT IS THE SAME AS THE DEPTH OF COMPACTED STRUCTURAL FILL, WHICHEVER IS GREATER.
WHERE CALICHE IS PRESENT, OVEREXCAVATE A MINIMUM OF 6 INCHES AND REPLACE WITH STRUCTURAL FILL.

MODIFIED "A" CURB 1
NTS

APPROVAL

REV.	DESCRIPTION	APRVD. BY	DATE

REVISIONS

REVERE AND CAREY

DETAILS

APN: 139-15-401-006
NEC REVERE STREET & CAREY AVENUE
NORTH LAS VEGAS, NEVADA 89030

ACG DESIGN
4310 CAMERON ST, SUITE 12-A
LAS VEGAS, NEVADA 89103
OFFICE: 702.448.8737
WEBSITE: WWW.ACG.DESIGN

ENGINEER'S SEAL
PROFESSIONAL ENGINEER STATE OF NEVADA No. 14965
RANDOLPH A. SKORPINSKI
EXP: 06-30-22
CIVIL
12/30/2020

DATE:	9/25/2020
PROJ. NO:	190259
DRAWN BY:	ARB
CHECKED BY:	RAS
SCALE:	AS NOTED
JURISDICTION:	CNLV

DRAWING NUMBER:
C10
SHEET 10 OF 10
AGENCY NUMBER:

Z:\PROJECTS_CURRENT\COMMERCIAL CLIENTS\GCA DESIGN\190259- REVERE & CAREY C- STORE\ENGINEERING\CIVIL DRAWINGS\IMPROVEMENT PLANS\190259 C9-C10-DT.DWG 9/25/2020 2:59 PM