DS #: 4817

APN: 139.35.809.015

PROJECT: Taco Bell @ Eastern & Charleston

SUBMITTAL: 1st Submittal

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS
NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: August 22, 2016
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: **Taco Bell @ Eastern & Charleston**			**COPIES TO:** CivilWorks Inc.
Cross Streets:	NWQ of Charleston Blvd. & Eastern Ave.			Bartsas Mary 22 LLC
File Number:	F:\Depot\DSMemos\DS4817A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-35-803-015			CCRFCD
Zoning Action:	SDR-64855			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	7/21/2016	8/22/2016	See Comments Below	$400.00	452138: $400
			TOTAL FEES (LDDRS):	**$400.00**	**----**

REMARKS:

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

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

1. Provide a copy of the zoning/planning conditions associated with this site (**SDR-64855**) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.

2. Sites with a grade difference of 2 feet above or below existing are required to have approval from the *City Planning and Development Department*. The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department* (229-6301). The engineer must provide Planning approval with the next submittal.

3. The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCD) master planned facility. Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.

4. The study used outdated hydrologic information from a *1997 Citywide Master Plan* which has been replaced by the ***2005 Central Neighborhood Flood Control Master Plan.*** The accepted 10-year/100-year flows in *Charleston Boulevard* are 611cfs/2375cfs. The flows in *Fremont Street* quoted in the study are also incorrect. Review and revise all hydrologic basin maps and hydraulic calculations and set the proposed finish floor elevations accordingly.

5. Revise **Standard Form 1** to show a correct "Section" number in "Item b" of "Location of Development".

6. Show an existing storm drain in *Charleston Boulevard* and label with *City of Las Vegas* recorded drawing number on the grading plan.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
ays

T/R/S: T20S/R61E/35
AREA M-35

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

TRANSMISSION OK

JOB NO.	1051
DESTINATION ADDRESS	7025341825
PSWD/SUBADDRESS	
DESTINATION ID	
ST. TIME	08/22 16:26
USAGE T	00'35
PGS.	2
RESULT	OK

CITY OF LAS VEGAS
INTER-OFFICE MEMORANDUM

DATE: August 22, 2016

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:
Taco Bell @ Eastern & Charleston

COPIES TO:
CivilWorks Inc.
Bartsas Mary 22 LLC
Bart Anderson, P.E., DevCo
CCRFCD

Cross Streets:	NWQ of Charleston Blvd. & Eastern Ave.		
File Number:	F:\Depot\DSMemos\DS4817A.doc		
Parcel Number:	139-35-803-015		
Zoning Action:	SDR-64855		
FEMA Flood Zone	YES	NO	X
Proposed Storm Drain	YES	NO	X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
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			TOTAL FEES (LDDRS):	**$400.00**	**----**

REMARKS:

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

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

1. Provide a copy of the zoning/planning conditions associated with this site (**SDR-64855**) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.

2. Sites with a grade difference of 2 feet above or below existing are required to have approval from the *City Planning and Development Department*. The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department* (229-6301). The engineer must provide Planning approval with the next submittal.

139 35 803 015/G-82

PLANS APPROVED
PLANNING
Building & Safety Dept.
City of Las Vegas, Nevada

LHM OCT 03 2016

Conforms to the minimum requirements of LVMC Title 19, applicable Master Plan development standards and/or Conditions of Approval. Make No Change Without Approval. Plan is Not a Permit to Violate Any Ordinance.

September 29, 2016
Ms. Linda Hartman
City of Las Vegas, Planning and Development Department
333 N. Rancho Road
Las Vegas, Nevada 89106

RE: ***TACO BELL @ CHARLESTON BLVD. AND EASTERN AVENUE – GRADING JUSTIFICATION LETTER***
SDR# 64855

Ms. Hartman:

Civilworks received the City of Las Vegas drainage review comments on the subject project, dated August 22, 2016. Comment #2 states "Sites with a grade difference of 2 feet above or below existing are required to have approval from the City Planning and Development Department. The Engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the City Planning Department (702-229-6301). The engineer must provide Planning approval with the next submittal."

Per the comment above, we have enclosed copies of the grading plans and detail sheets for the proposed Taco Bell project located on Charleston Boulevard, just west of Eastern Avenue. The finished floor elevation of the proposed development is approximately 3.2' above the existing elevations in Charleston Boulevard. The building is elevated above the existing grade to provide protection from a significant amount of stormwater surface flows conveyed within Charleston Boulevard during a major storm event. The proposed development is consists of one commercial, although there is also an existing nightclub located on the north end of the property. The proposed Taco Bell pad will be elevated to meet minimum flood control protection requirements. The elevation difference will be accomplished through the sloping of the onsite access road and by installation of a decorative landscape buffer.

The Taco Bell building will be a standard fast food establishment with a drive-through lane and window. Traffic will be generally routed through the site from south to the north. A landscape buffer having a minimum width of 10 feet will be constructed around the proposed taco bell building along the eastern boundary of the site. An existing block wall separates the proposed commercial development from the existing adjacent commercial fast food development. The property located west of the development is an existing commercial strip mall with frontage and access on Charleston Boulevard. The existing stores within the strip mall and/or associated parking will not be impacted by the elevated finished floor. As previously mentioned, an existing nightclub is situated on the north end of the site. Access to the nightclub is from Fremont Street to the north. Because the parcel is generally narrow and long, there's enough distance between the existing and proposed development to provide a natural slope buffer.

To conclude, the finished floors of the proposed Taco Bell are elevated to meet minimum drainage requirements. Gradual slopes away from perimeter walls, decorative landscape walls, landscape buffer areas and perimeter walls will all be constructed to accommodate the difference in elevation while maintaining aesthetics and functionality of the site traffic.

CivilWorks Inc
Engineering with "sensible" solutions tailored to your "specific" needs.
4945 W. Patrick Lane Las Vegas, NV 89118
Office: (702) 534-7555 Fax: (702) 534-1825

TECHNICAL DRAINAGE STUDY
FOR
TACO BELL
@EASTERN & CHARLESTON

Project No. 118016010.00

PREPARED FOR:

Bartsas Mary 22 LLC
601 S. RANCHO DRIVE, SUITE C-23
Las Vegas, NV 89106

PREPARED BY:

CivilWorksInc
Engineering with "sensible" solutions tailored to your "specific" needs.
4945 W. Patrick Lane Las Vegas, NV 89118
Office: (702) 534-7555 Fax: (702) 534-1825

JULY 2016

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Taco Bell @ Charleston and Eastern DATE: July 21, 2016

Location of development: a) Descriptive (Cross Streets) North/South Eastern Avenue East/West Fremont/Charleston

b) Sect. 21 Twn. 20 S Rng 61 E

Name of Owner: Bartsas Mary 22 LLC Assessors Parcel No.: 139-35-803-015

Telephone No.: (702) 735-6377 Facsimile No.:

Address: 601 S. RANCHO DRIVE, SUITE C-23

Las Vegas, NV 89106

Contact Person-Name: Jodi E. Jorjorian, P.E. Telephone No: 702-683-5172

Email: jej@civilworksonline.com

Firm: Civilworks

Address: 4945 W. Patrick Lane, Las Vegas, Nevada 89118

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 1.72 +/- acres Being Developed/Disturbed 1.72 +/- 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? 2.5 square miles
6. Has the site drainage been evaluated in the past? YES ☒ NO ☐ If yes, please documentation:
   Site previously contained the Blue Angel Motel which has been demolished and an existing night club that still remains
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
   North half of the site drains to Fremont and the south half of the site drains to Charleston Blvd.
   Developed conditions follow existing drainage patterns
8. Briefly describe your proposed schedule for the subject project: Proposed construction to start in November 2016

Engineer's Seal

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

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

Local Entity File No.

Revision	Date

REFERENCE: **STANDARD FORM 1**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Taco Bell@Charleston/Eastern	Map ID:
Firm Name: Civilworks	Engineer: Jodi E. Jorjorian, P.E.
Address: 4945 W. Patrick Lane	
City: Las Vegas	State: NV Zip: 89118
Phone Number: 702-683-5172	Fax Number: 702-534-1825
Property Owner: Bartsas Mary 22 LLC	
Address: 601 S. RANCHO DRIVE, SUITE C-23	
City: Las Vegas	State: NV 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 property evaluate the intended land use.

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

I. GENERAL REQUIREMENTS

YES	NO	
☒	☐	Design Manual **Standard Form 1** with the engineer's seal and signature.
☒	☐	Design Manual **Standard Form 4.**
☒	☐	2 copies of the 24" x 36" Drainage Plan.
N/A	☐	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

II. MAPS AND EXHIBITS

YES	NO	
☒	☐	A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated
☒	☐	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	
☒	☐	Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
☒	☐	On-site drainage basin maps for existing interim and future conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
☒	☐	Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

YES	NO	
☒	☐	Sheet size 24"x36" sealed by a registered engineer in the State of Nevada.
☒	☐	Minimum scale: 1"=60'.
☒	☐	Project name.
☒	☐	Vicinity Map with local and major cross streets
☒	☐	Revision box.
☒	☐	North arrow and bar scale.
☒	☐	Engineer's /consultant's address and phone number.
☒	☐	Elevation datum and benchmark.
☒	☐	Legend for symbols and abbreviations.
N/A	☐	Cut/fill scarps, where applicable.
☒	☐	Street names, grades, widths.
☒	☐	Proposed future and existing spot grades for top of curbs and street crown at lot lines, grade breaks, and along curb returns on both sides of the street.
☒	☐	Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
☒	☐	Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
☒	☐	Proposed typical street sections.

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

YES	NO	
N/A	☐	Streets with off-set crowns.
☒	☐	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
☒	☐	Property lines.
☒	☐	Right-of-way lines and widths, existing and proposed.
☒	☐	Existing improvements and their elevations.
☒	☐	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm Peak flows at basin concentration points.
☒	☐	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
☒	☐	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
☒	☐	Location and cross-section of street capacity calculations.
N/A	☐	Cross-sectional detail for channels, including cutoff wall locations.
☒	☐	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalks, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, materials, shape, and slope with plan and profile and HGL calculations.
☒	☐	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
☒	☐	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16"X48". Wrought iron gate is required for flows > 10 cfs.
☒	☐	Location and detail of floodwalls illustrating depth of flow, proposed grouting height, etc.
☒	☐	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
☒	☐	Building and/or lot numbers.
☒	☐	Alignment of all existing, proposed, or future Regional Facilities. Adjacent to the site.
N/A	☐	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	NO	
N/A	☐	For areas in Zone A, AE,AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
N/A	☐	Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from Q_{100} flows.
☒	☐	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
☒	☐	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

YES	NO	
☒	☐	Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
☒	☐	Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
☒	☐	Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
☒	☐	Use of correct precipitation values in and around the McCarran Airport rainfall area.
☒	☐	A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
☒	☐	A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
N/A	☐	Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
☒	☐	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.
☒	☐	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.
☒	☐	Normal depth street flow calculations and cross-section diagrams for all interior and perimeter streets. Provide "dxv" 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.
☒	☐	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.
☒	☐	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 requirements is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, which ever is greater.
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 right-of-way, including headwater pool inundation.
☒	☐	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed
☒	☐	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:	**STANDARD FORM 2**

CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA
STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

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

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

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

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

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

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

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

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

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

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

I. INTRODUCTION

A. Study Overview and Purpose

This study is intended to serve as the technical hydrology study for a proposed Taco Bell development. The overall site comprises approximately 2.68 acres. This study is a stand-alone document that presents the findings of a hydrologic analysis of the site and contributing watershed area.

This report will identify any natural washes as well as any existing/proposed drainage facilities that contribute stormwater runoff or impact the site during a 100- and 10-year, 6-hour storm event. This study has been conducted in accordance with the criteria set forth by the Clark County Regional Flood Control District's (CCRFCD) *Hydrologic Criteria and Drainage Design Manual* (Reference #1).

B. Location

The project is generally located within the northern central part of the Las Vegas valley (See ***FIGURE 1 – VICINITY MAP***). More specifically, the site is located on 2100 Fremont Street, Las Vegas, NV 89101. The site is located between Fremont Street and Charleston Boulevard, approximately 250 feet west of Eastern Avenue within the southeast quarter (SE ¼) of the southeast quarter (SE ¼) of Section 35, Township 20 South, Range 61 East. The project site is located on APN 139-35-803-015.

C. Existing Site Description

The overall site encompasses approximately 2.68 acres. Of that, approximately 1.4 acres of the existing site is partially developed with a commercial nightclub. Previously, the remainder of the site contained the Blue Angel Motel which was demolished in 2015 leaving the southern portion of the site undeveloped. The proposed Taco Bell site is proposed to encompass approximately 0.51 acres of existing site. Additionally, the remainder of the site (approximately 0.77 acres) will be used for a future commercial pad. This study specifically analyzes the drainage criteria and design for the Taco Bell Development. A separate drainage update will be completed for any future development.

The overall site is bound by Fremont Street on the north, Charleston Boulevard on the south, an existing Carl's Jr. Commercial development to the east and a commercial strip mall development to the west (See ***FIGURE 2 – SITE MAP*** and ***FIGURE 3 – ASSESSOR'S PARCEL MAP***). The existing site covering is natural desert terrain in poor hydrologic condition. The existing terrain generally slopes from southwest to northeast at a slope of 1.1%.

D. FEMA Flood Plain Information

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) Community-Panel Number 32003C2186F,, effective date November 16, 2011 (Reference #5), 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 (See ***FIGURE 4- FEMA FIRM MAP***).

E. CCRFCD Master Plan Information

As shown on Figure F-32 from the *Flood Control Master Plan Update of the Las Vegas Valley* (see ***FIGURE 5 – MPU FACILITIES*** in the **APPENDIX**), prepared by PBS&J, Louis Berger Group, etc. (Reference #4), the subject site is adjacent to a proposed CCRFCD Master Plan facility in east Charleston Boulevard. The facility is labeled FLBN 0180 and is a Category A storm drain. **FIGURE 5A** is the facility inventory list for F-32.

F. City of Las Vegas City-Wide Hydrology Analysis

The 100-year and 10-year flows in Charleston were previously analyzed by PBS&J in the City of Las Vegas City-Wide Facilities Study. **FIGURE 6 – CLV CITY-WIDE FACILITIES** and **FIGURE 6A – CLV CITY-WIDE FACILITIES INVENTORY** have been included in the **APPENDIX** and indicate that there is an existing 33" RCP in Charleston that extends approximately 5000 linear feet and has a maximum capacity of 75 cfs. **FIGURE 7 – CLV HYDROLOGY STUDY UPDATE** is a reproduction of Figure H-15 from the City Wide Hydrology Study Update completed by PBS&J. FIGURE 7 shows that the 100-year and 10-year flows in Charleston Boulevard, adjacent to the project site, are approximately 1211 cfs and 500 cfs, respectively. These flowrates have been reduced by 75 cfs to account for the capacity of the existing storm drain described above.

G. Previous Drainage Studies

As mentioned in the previous section, the proposed site was part of the analysis area included and analyzed in the City of Las Vegas *Central Neighborhood Flood Control Master Plan* and the City Wide Hydrology Study Update – 1997. The existing and future offsite flows within adjacent streets were obtained from the study.

II. METHODOLOGY

A. Compliance with Regulations

This study complies with the standards set forth within Reference #1, and City of Las Vegas drainage requirements.

B. Hydrologic Criteria

1. Rainfall Criteria

The project site is located within the McCarran Airport Rainfall Area. The depth-duration-frequency values for the 6-hour, 10-year and 100-year storm events were obtained from Figure 505 and are 1.58 and 2.77, for the 10- and 100-year values, respectively. The McCarran Airport Rainfall Area precipitation values do not require any adjustments. Since the tributary drainage area encompasses less than 8-square miles, a Storm Distribution Number three (SDN #3) was used in the HEC-1 model. The precipitation values are provided in **TABLE 1** below:

TABLE 1
DRAINAGE BASIN PARAMETERS

BASIN	AREA (acres)	CN	POINT PRECIP. (10 yr/100 yr)	PRECIP. RATIO	LAG (hr)
ONEX1	1.86	90	1.58/2.77	0.57/1.00	0.1000
ONEX2	0.82	89	1.58/2.77	0.57/1.00	0.1000
ONDEV1	1.84	93	1.58/2.77	0.57/1.00	0.1349
ONDEV2	0.84	92	1.58/2.77	0.57/1.00	0.1172

2. Runoff Computations

The U. S. Army Corps of Engineers HEC-1 flood hydrograph package was used to determine the peak runoff generated during the 100- and 10-year, 6-hour storm event. The HEC-1 computer model simulates the surface runoff response of a given watershed to rainfall. The HEC-1 program represents the watershed as an interconnected system of hydraulic components. Each component represents an aspect of the rainfall runoff process within a portion of the watershed. The smaller portion is referred to as a sub-basin. The computed hydrographs from each sub-basin are then combined at appropriate locations to obtain the final discharge hydrograph. The HEC-1 parameter calculations are located in appendix of this study.

The SCS curve number method was used to determine the infiltration rates for the drainage basins. The soil groups for the project site were determined using the SCS Soil Survey of the Las Vegas Valley. Curve numbers for the undeveloped onsite were determined using Table 615 (4 of 4) urban land in poor condition for the existing condition drainage analysis. Curve numbers for the developed onsite were determined using Table 615 (1 of 4) for areas assumed to be a commercial development, paved roadways and pervious desert landscaped areas. Soils information as well as a soils map depicting the soil type boundaries are located in the **APPENDIX** of this study in the section entitled *Hydrologic Parameters*.

Basin areas for the onsite drainage basins were determined using a scaled site plan. The existing and developed conditions include contours and existing spot elevations extending a minimum of 100 feet past the centerline of the adjacent roadways.

Lag Time T_L is defined as the time measured from the centroid of effective rainfall to the peak of the outflow hydrograph. It is a measure of the watershed's response time, and is a coherent property to basin length, slope, roughness characteristics, and land use. The lag-times for this study were estimated by calculating the drainage basins' time of concentration, T_C. The time of concentration consists of two components; the initial overland flow time, T_i, and the gutter or channel flow time, T_t. The equation for the time of concentration is $T_C = T_i + T_t$. The equation for lag time is $T_L = 0.6T_C$.

Precipitation in the Las Vegas Valley is characterized typically by long-duration, low-intensity winter storms and by short-duration, high-intensity summer storms. The winter storms, in general, do not produce major flooding events. The summer storms however can and do produce major flash flooding hazards in the Las Vegas Valley Area.

III. DRAINAGE BASIN DESCRIPTIONS

A. Existing Drainage Basins

1. Onsite Drainage Conditions

The existing area within the proposed parcel boundary consists of two distinct drainage basins labeled ONEX1 and ONEX2 (see **FIGURE 8 – EXISTING DRAINAGE CONDITIONS)** in the **APPENDIX** at the back of this report. Basin ONEX1 consists primarily of the northern portion of the overall site. Runoff from ONEX1 traverses the project site from the southwest to the northeast and continues northeast on to the adjacent undeveloped property, eventually being discharged in to Fremont Street. According to FIGURE 7, existing 10- and 100-year flows within Fremont Street are approximately 57 cfs and 139 cfs, respectively. Existing basin ONEX2 generally consists of the southern portion of the site. Stormwater flows from ONEX2 cross the site to the southeast corner of the site and are discharged in to the existing Charleston Boulevard improved street section. The onsite flow generated within ONEX2 combines with the existing 10- and 100-year flows within Charleston Blvd., although the calculated flow rate adjacent to the site will not change due to the difference in size between the onsite area and the tributary offsite basin. The 10- and 100-year flow rates for basins ONEX1 and ONEX2 are 2 cfs/5 cfs and 1 cfs/2 cfs, respectively. The HEC-1 parameters, input data and output for the existing analysis are included in the **APPENDIX**. A flow summary showing the existing onsite basins is included below in **TABLE 2**.

2. Offsite Drainage Conditions

The City of Las Vegas Central Neighborhood Flood Control Master Plan was used to identify existing offsite flow rates adjacent to the proposed site. ***FIGURES 6, 6A and 7*** were reproduced from the aforementioned reference study and indicate that the ultimate 10- and 100-year flows in Fremont Street are 57 cfs and 139 cfs and the ultimate flows in

Charleston Boulevard are 500 cfs and 1211 cfs, respectively. The flows in Charleston have been reduced by 75 cfs to account for the flows being conveyed in the existing 33" RCP storm drain. This study addresses development of the onsite area consisting of approximately 0.51 acres. The onsite development will include construction of a proposed Taco Bell restaurant located in the southeast area of the overall site. Onsite developed flows were calculated but were not included in the ultimate flow rate in Charleston or Fremont and the analysis completed by PBS&J accounted for flows generated within private parcels adjacent to the roadways. Flowmaster software was used to calculate the normal depth for the existing cross-section of Charleston Boulevard adjacent to the site. The resulting depth of flow was used to set the minimum allowable finished floor of the proposed Taco Bell development. The results, using a maximum 100-year flow rate of 1211 cfs, show a normal depth of 1.70 feet being conveyed at a velocity of 11.83 fps. The resulting depth times velocity product is 20.11, indicating that the maximum capacity of Charleston Boulevard will be greatly exceeded during a 100-year storm event and the depth will overtop the back of sidewalk, inundating adjacent parcels. Since this development is anticipated to be constructed prior to the completion of flood improvements in the upstream area, we are proposing to elevate the proposed Taco Bell to twice the depth of flow as calculated at the highest curb elevation located adjacent to the proposed building.

TABLE 2
10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
EXISTING RUNOFF AMOUNTS

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
ONEX1	1.86	2	5
ONEX2	0.82	1	2

B. Developed Drainage Conditions

1. *Developed Offsite*

The *City of Las Vegas Central Neighborhood Flood Control Master Plan* was used to identify existing offsite flow rates adjacent to the proposed site. ***FIGURE F-2*** was reproduced from the aforementioned reference study and indicates that in the future, Lake Mead is projected to carry no surface flows within the right-of-way. The CCRFCD Master Plan update indicates that a proposed box culvert will be constructed within Lake Mead that will capture the majority of the existing flows and route them below the surface to a downstream CCRFCD Regional detention facility. Other portions of the existing flows in Lake Mead will be diverted or routed away from Lake Mead and discharged in to new or improved drainage facilities located upstream of the site.

FIGURE F-2 from the *City of Las Vegas Central Neighborhood Flood Control Master Plan* has been included in the **APPENDIX** at the end of this report for your reference.

2. *Developed Onsite*

The onsite developed condition includes the construction of a Taco Bell restaurant and all adjacent parking, median and landscaping improvements as required to be completed per the anticipated final development conditions from CLV Planning. The site contains an existing night club and associated parking in the northern half of the site. The southern half of the site will contain the proposed Taco Bell development and associated parking and landscaping in the southeast portion of the site. The southwest portion of the site will be improved in the future with a commercial development. A separate drainage update will be completed for the future development prior to construction.

The developed site will generally be divided in to two drainage basins labeled ONDEV1 and ONDEV2 (see **FIGURE 9 – ONSITE DEVELOPED DRAINAGE BASINS** in the **APPENDIX** at the back of this report). ONDEV1 is comprised of the northerly portion of the site and includes the existing nightclub and its parking as well as the northeast portion of the site which is undeveloped. The majority of the northern portion of the site contains asphalt cover. A small portion of the north half of the site has natural desert terrain. Runoff from ONDEV1 will travel within the paved parking area and be discharged to the northeast in to an adjacent undeveloped property and will eventually be discharged in to Fremont Street. Basin ONDEV1 contains no new development and; therefore, the developed flows and flow patterns match those of the developed conditions and will not be increased.

Runoff within ONDEV2 is comprised of the proposed Taco Bell development and an undeveloped area in the southwest that is designated to contain a future commercial development. For the purposes of this report, grading of ONDEV2 will include a wide shallow swale along the western boundary of the site that will temporarily intercept flow from the undeveloped area in the southwest and convey it south to Charleston Boulevard The swale will terminate at a proposed valley gutter which runs east/west across the proposed Taco Bell site and conveys all flows generated within basin ONDEV2 to a proposed rip-rap lined swale at the southeast corner of the site where they are discharged via a proposed sidewalk underdrain in to Charleston Boulevard. The onsite basins are depicted in **FIGURE 9 – ONSITE DEVELOPED CONDITIONS**. A summary of the onsite flows is provided below in **TABLE 3**:

TABLE 3
10-YEAR / 100-YEAR - DEVELOPED RUNOFF AMOUNTS

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
ONDEV1	1.84	2	5
ONDEV2	0.84	1	2

C. Street Flow Calculations

Offsite street flow calculations for the 10-year and 100-year, 6-hour storm events were completed for Charleston Boulevard. Since the proposed site development is solely in the south half of the site, no additional improvements will be completed in the north half of the site and no additional flows are assumed to be added to the Fremont Street roadway section. A normal depth calculation was completed for Charleston Boulevard to determine the minimum required finished floor elevation. The depth times velocity calculations for the 10- and 100- year flowrates within Charleston Boulevard are summarized in the following **TABLE 4.** It should be noted that the depth times velocity product exceeds the maximum allowable values of 6 and 8 for both the 10- and 100-year flows. As previously mentioned, a CCRFCD storm drain improvement is proposed to be constructed within Charleston Boulevard. The construction of the future storm drain will alleviate the excessive flows in Charleston Boulevard. The Taco Bell development will not increase the flow rate being discharged in to the Charleston Boulevard as the existing site is covered by a significant amount of asphalt that is remaining from the previous Blue Angel Motel development. Therefore, installation of new asphalt for the Taco Bell development results in the same flow rates for the 10- and 100-year storms for both the existing and developed condition.

TABLE 4
OFFSITE STREET FLOW CALCULATIONS

STREET SECTION	Q_{10}/Q_{100} (cfs)	D_{10}/D_{100} (ft)	V_{10}/V_{100} (ft\s)	V x D
CHARLESTON BLVD.	500/1211*	1.28/1.70	8.33/11.83	10.66/20.11

**The flows in Charleston Blvd. do not meet the depth times velocity criteria for the existing or the developed condition. However, this criteria is an existing condition that is not being created by the proposed site development. This condition is temporary pending construction of a CCRFCD facility in Charleston Blvd. that will capture the majority of the current surface flows and convey them underground to a CCRFCD detention facility.*

This project has provided BMP improvements per section 1500 of the CCRFCD Hydrologic Criteria & Drainage Design Manual. To meet the requirements outlined in Section 1500, the majority of onsite runoff will be diverted through shallow, rock-lined swales as part of the proposed landscaping. Discharge from northerly and southerly basin areas will be routed through these onsite swales prior to being discharged in to Fremont Street or Charleston Boulevard (See grading plans in the map pocket at the back of this report).

IV. CONCLUSIONS

The following recommendations are provided to facilitate safety, both public and private, for the proposed commercial development:

1. Elevate the proposed building to a finished floor elevation that is a minimum of 18 inches above the water surface elevation as measured at highest flowline elevation adjacent to the southern boundary of the site or a minimum of twice the existing 100-year depth of flow in Charleston Boulevard; whichever is greater.

2. Construct all proposed street and gutter improvements to allow proper conveyance of storm water.

3. Construct all swales for conveyance and mitigation of stormwater.

4. Nuisance water shall be captured onsite so adjacent properties are not affected during construction.

V. REFERENCES

1. *CCRFCD Hydrologic Criteria and Drainage Design Manual*, WRC Engineering, 1999.

2. *5-Foot Contours*, GISMO, Clark County.

3. *Soil Survey of Las Vegas Valley Area, Nevada, Part of Clark County*, Soil Conservation Service, 1985.

4. *2013 CCRFCD Flood Control Master Plan*, Post, Buckley, Schuh, and Jernigan, Inc., et al., 2013.

5. *Flood Insurance Rate Map, Community Panel Number* 32003C2186F*, Clark County, Nevada*, Federal Emergency Management Agency, effective November 16, 2011.

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

7. *FlowMaster User's Manual Version 8.0*, Haestad Methods, Inc., 2005.

APPENDIX

FIGURES

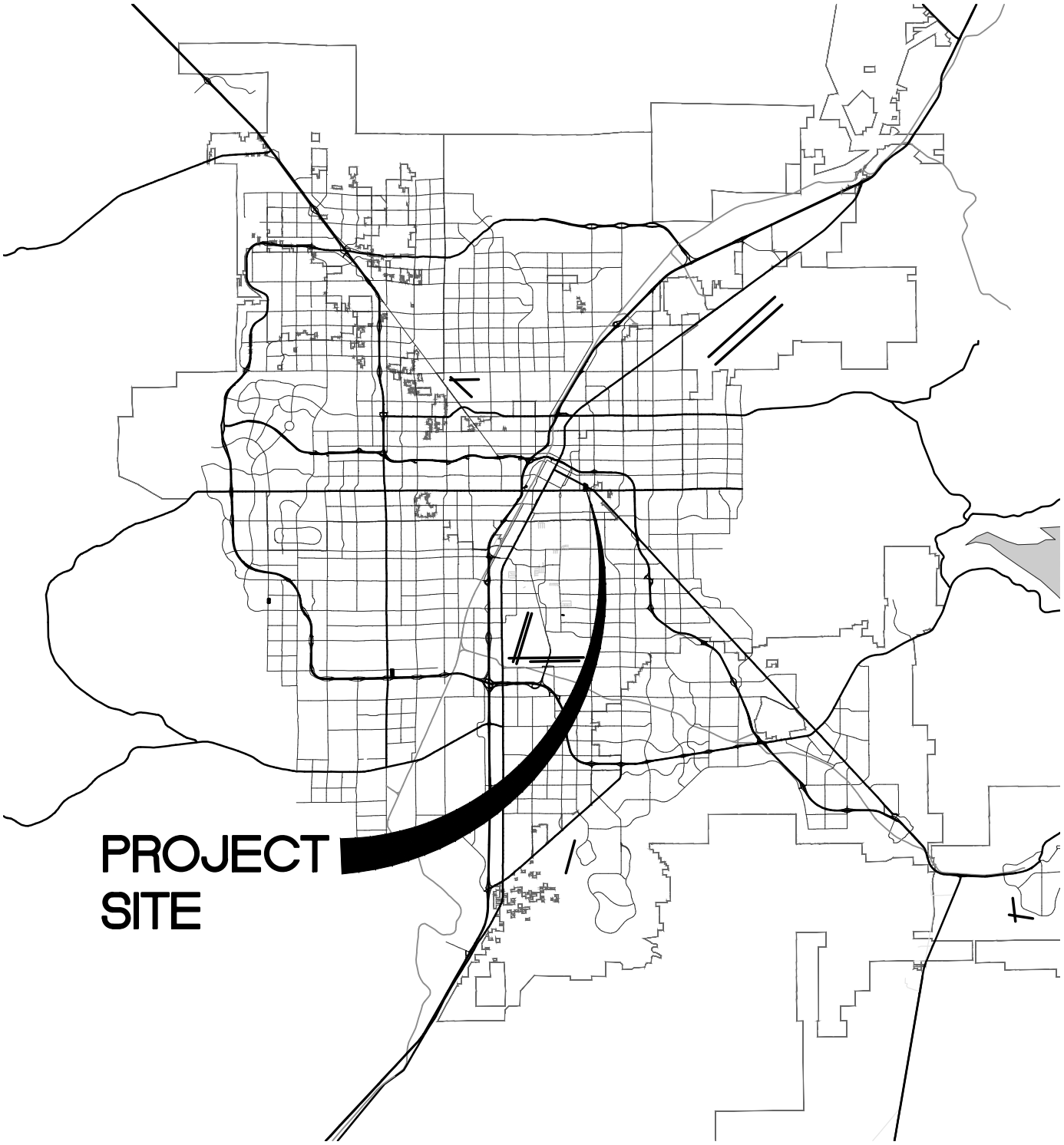

FIGURE 1

VICINITY MAP

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4945 W. Patrick Lane Las Vegas, NV 89118
Office#: (702)534-1816 Fax#: (702)534-1825

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

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

ASSESSOR'S PARCELS - CLARK CO., NV.

Michele W. Shafe - Assessor

BOOK	SEC.	MAP
T20S R61E	35	S 2 SE 4

125	124	123	122
138	139	140	141
163	162	161	160
176	177	178	179

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

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

139-35-8

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

Scale: 1" = 200 ' Rev: 02/09/2011

PROJECT SITE

FIGURE 3 - APN MAP TAX DIST 203

FIGURE 3

SITE MAP

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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

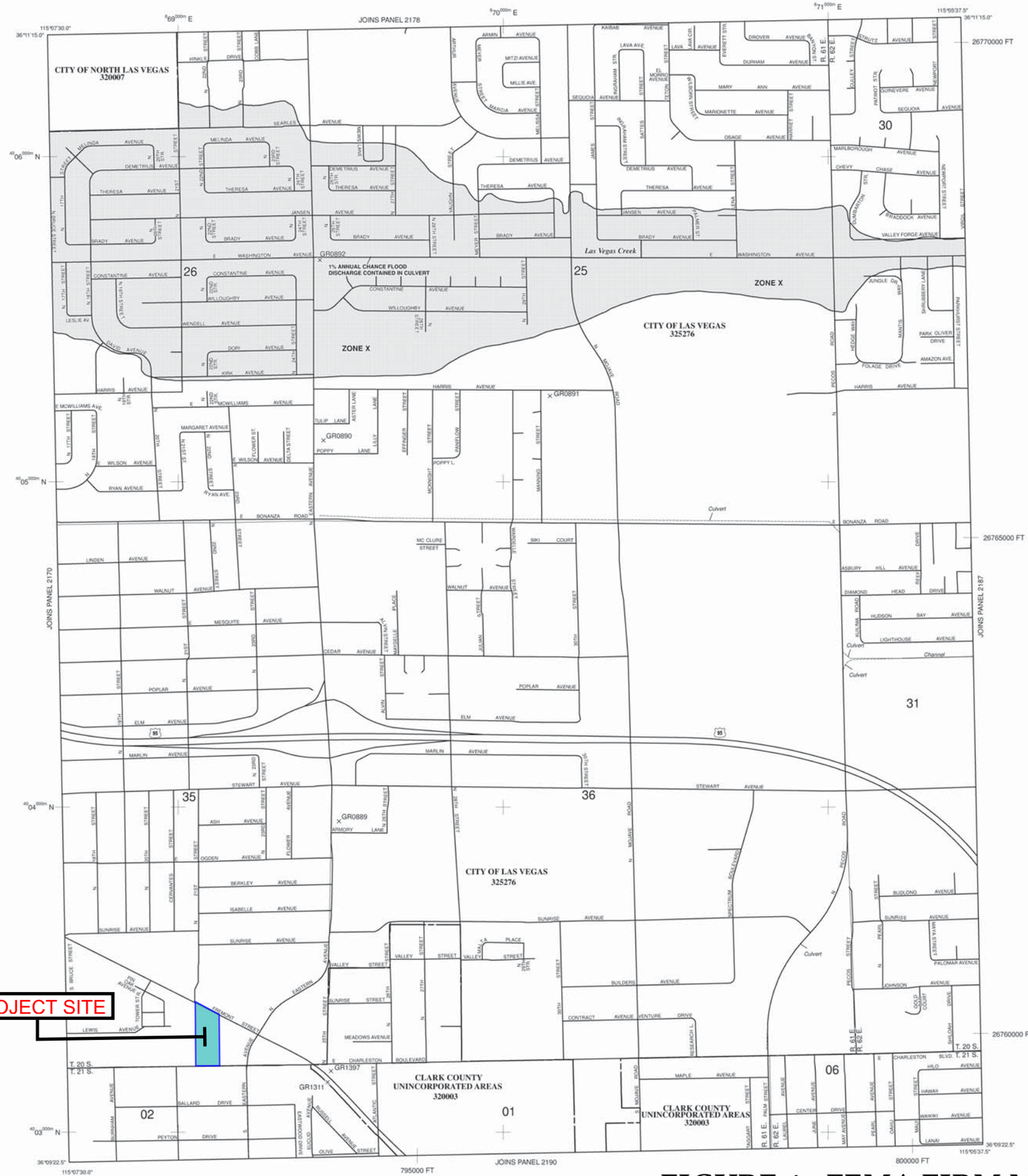


FIGURE 4 - FEMA FIRM MAP

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*

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

- Cross section line
- 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" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2186F

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

PANEL 2186 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2186	F
LAS VEGAS, CITY OF	325276	2186	F
NORTH LAS VEGAS, CITY OF	320007	2186	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
32003C2186F
MAP REVISED
NOVEMBER 16, 2011

Federal Emergency Management Agency

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 32
FLOOD CONTROL FACILITIES

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin
- 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

N

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

Scale: 1 inch = 2,000 feet

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

US95 I-15 I-215

	1	2	3		A1	A2
	4	5	6		A3	A4
		7	8	9	10	A5	A6
11	12	13	14	15	16	17
	18	19	20	21	22	23
	24	25	26	27	28	
	29	30	31	32	33	34
	35	36	37	38	39	40
	41	42	43	44	45	46
	47	48	49	50	51	52
	53	54	55	56		
	57	58	59			

FIGURE 5 - CCRFCD MPU FACILITIES

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BHSA		**BOULDER HIGHWAY SAHARA AVENUE**						
0000	P2	14' X 10' RCB	1350	3837	CSA13*	SW3	7.93	0.50
0026	P1	14' X 11' RCB	4000	3837	CSA13*	SW3	7.93	1.30
0075	P1	12' X 11' RCB	5280	3837	CSA13*	SW3	7.93	2.11
0175	P1	14' X 14' RCB	6000	3837	CSA13	SW3	7.93	0.67
CABZ		**CEDAR AVENUE - BONANZA**						
0000	E	72" RCP	525					0.30
0010	E	60" RCP	1450					0.30
CACH		**CEDAR AVENUE CHANNEL**						
0000	E	Conc Chnl 10'W 8'D 1.5:1 SS	1681	1544	CCA10-C	SW3	1.81	0.20
0027	E	2: 15'X5' RCBC @ Marion	82	1544	CCA10-C	SW3	1.81	0.35
0029	E	Conc Chnl 10'W 8'D 1.5:1 SS	1284	1544	CCA10-C	SW3	1.81	0.37
0051	E	2: 15'X5' RCBC @ Page	64	1544	CCA10-C	SW3	1.81	0.38
0053	E	Conc Chnl 10'W 6'D 1.5:1 SS	1275	1544	CCA10-C	SW3	1.81	0.38
0079	E	2: 12' X 6' RCBC @ Lamb	100	1387	CCA08-C	SW3	1.61	0.38
0081	E	Conc Chnl 12'W 6'D 1.5:1 SS	2562	1387	CCA08-C	SW3	1.61	0.20
0127	E	3: 12'X4' RCBC @ Sandhill	80	1387	CCA08-C	SW3	1.61	0.20
0129	E	Conc Chnl 10'W 8'D 1.5:1 SS	971	1387	CCA08-C	SW3	1.61	0.26
0146	E	2: 12' X 5.5' RCBC @ Honolulu	62	1387	CCA08-C	SW3	1.61	0.53
0148	E	Conc Chnl 10'W 8'D 1.5:1 SS	959	1387	CCA08-C	SW3	1.61	0.53
CACN		**CEDAR AVENUE - CHARLESTON**						
0000	E	72" RCP (Replace w/ CACN0001)	1867	933	CCA05	SW3	0.96	0.41
0001	P1	10 'X 9' RCB (Replaces CACN0000)	1867	933	CCA05	SW3	0.96	0.41
0034	E	2: 48" RCP (Replace w/ CACN0035)	685	254	CA05	SW3	0.24	0.30
0035	P0	6' X 6' RCB (Replaces CACN0034)	685	254	CA05	SW3	0.24	0.30
0049	E	66" RCP (Replace w/ CACN0050)	2146	254	CA05	SW3	0.24	0.60
0050	P0	6' X 5' RCB (Replaces CACN0049)	2146	254	CA05	SW3	0.24	0.60
CNST		**CEDAR AVENUE CHANNEL - STEWART**						
0000	P1	8' X 7' RCB	2120	690	CCA04	SW3	0.72	0.90
COLM		**COLORADO / LAMB**						
0000	E	72" RCP	1500	470	CCH94	SW3	0.63	0.87
FLAG		**FLAMINGO WASH - ALGONQUIN**						
0000	E	72" RCP	1080	513	FW21	FLAM3A	0.47	0.50
0020	E	66" RCP	460	513	FW21	FLAM3A	0.47	1.00
FLBN		**FLAMINGO - BOULDER HIGHWAY NORTH**						
0001	E	5: 10' X 6' RCB	350	4784	CCFR03	BOULDER4	11.13	0.58
0008	E	3: 14' X 12' RCB	1055	4784	CCFR03	BOULDER4	11.13	0.20
0028	E	3: 14' X 12' RCB	275	4784	CCFR03	BOULDER4	11.13	0.20
0033	E	3: 14' X 12' RCB	500	4784	CCFR03	BOULDER4	11.13	0.20
0038	P1	15' X 10' RCB	6600	2448	CFR03	SW3	3.46	0.59
0167	P1	2: 10' X 6' RCB	700	2046	CCH68-C	SW3	2.86	1.14
0180	P1	2: 10' X 6' RCB	1300	1799	CCCH67-C	SW3	2.55	1.31
0205	P1	10' X 6' RCB	4000	1461	CCH63-C	SW3	1.88	2.30
0281	P1	10' X 7' RCB	3100	1259	CCH56	SW3	1.64	1.33
0312	P1	7' X 4' RCB	1800	555	CCH52	SW3	0.55	4.20
0342	P1	7' X 4'" RCB	2500	555	CCH52	SW3	0.55	4.20
FLBS		**FLAMINGO - BOULDER HIGHWAY SOUTH**						
0000	E	Unlined Median Chnl 0'W 6.5'D 4.5:1 SS	4060	945	CB4	FLAM3A	1.38	1.30
0167	E	Unlined Median Chnl 0'W 3.5'D 9:1 SS	8850	452	CB4N	FLAM3A	0.63	0.90
FLDN		**DESERT INN DRAIN EAST**						
0000	E	60" RCP (Replace w/ FLDN0001)	6160	1267	CFW30AW	FLAM3A	2.12	1.22
0001	P0	12' X 6' RCB (Replaces FLDN0000)	6160	1267	CFW30AW	FLAM3A	2.12	1.22
0116	E	54" RCP (Replace w/ FLDN0117)	2330	1178	CFW29	FLAM3A	1.82	1.77
0117	P0	10' X 6' RCB (Replaces FLDN0116)	2330	1178	CFW29	FLAM3A	1.82	1.77
0160	E	48" RCP (Replace w/ FLDN0160)	2950	906	CFW28	FLAM3A	1.51	1.28
0161	P0	10' X 6' RCB (Replaces FLDN0161)	2950	906	CFW28	FLAM3A	1.51	1.28

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
FLMP		**FLAMINGO WASH-MARYLAND PARKWAY SYSTEM**						
0000	P1	8' X 6' RCB	3800	492	CCH60A-C	SW3	0.75	0.49
FLSP		**FLAMINGO WASH - SPENCER**						
0000	E	48" RCP	420	513	FW21	FLAM3A	0.47	1.10
FLWA		**FLAMINGO WASH**						
0000	E	Grass Chnl 107'W 5'D 2:1 SS (Replace w/ FLWA0001)	4570	10952	CFW36*	FLAM5B	36.14	0.40
0001	P1	Conc Chnl 100'W 7.5'D 1:1 SS (Replaces FLWA0000)	4570	10952	CFW36*	FLAM5B	36.14	0.40
0078	E	3 Span Bridge 108.25'W 5.5'D @ Nellis	120	10952	CFW36	FLAM5B	36.14	0.70
0080	E	Conc Chnl 50'W 8.5'D 1:1 SS	5080	10952	CFW36	FLAM5B	36.14	1.20
0174	E	9: 10' X 6' RCBC @ Lamb	110	10822	CFW34	FLAM5B	35.66	1.40
0176	E	Conc Chnl 60'W 9'D 1:1 SS	1180	10822	CFW34	FLAM5B	35.66	0.70
0200	E	Conc Chnl 70'W 8'D to 12'D w/ Pier 0:1 SS	1245	10822	CFW34	FLAM5B	35.66	0.50
0226	E	Free Span Bridge 100'W 10'D @ I-515	170	10822	CFW34	FLAM5B	35.66	0.80
0228	E	Conc Chnl 70'W 8'D to 12'D 0:1 SS	1500	10788	CFW33	FLAM5B	35.36	0.80
0255	E	2 Span Bridge 150'W 9'D @ Boulder Hwy	65	10788	CFW33	FLAM5B	35.36	1.00
0256	E	Conc Chnl 60'W 7.5'D 0:1 SS	40	8146	CFW33W	FLAM5B	24.23	1.00
0257	E	2 Span Bridge 150'W 9'D @ Boulder Hwy	60	8146	CFW33W	FLAM5B	24.23	1.00
0258	E	Conc Chnl 60'W 7.5'D 0:1 SS	750	8146	CFW33W	FLAM5B	24.23	0.44
0273	E	Free Span Bridge 60'W 9'D @ MMMHP	20	8146	CFW33W	FLAM5B	24.23	0.40
0274	E	Conc Chnl 60'W 8.1'D 0:1 SS	1370	8146	CFW33W	FLAM5B	24.23	1.00
0295	E	Conc Chnl 60'W 8.1'D 0:1 SS	430	7669	CFW31	FLAM5B	22.62	0.80
0307	E	Conc Chnl 60'W 8.1'D 2:1 SS	410	7669	CFW31	FLAM5B	22.62	0.70
0314	E	Conc Chnl 60'W 8.1'D 2:1 SS	1500	7195	CFW30B	FLAM5B	21.25	0.90
0347	E	5: 10' X 8' RCBC @ Mojave	80	7195	CFW30B	FLAM5B	21.25	0.94
0348	E	Conc Chnl 30'W 12'D 1:1 SS	1150	7195	CFW30B	FLAM5B	21.25	0.70
0375	E	5: 10' X 8' RCBC @ Desert Inn	140	7102	CFW30A	FLAM5B	20.96	2.70
0377	E	Conc Chnl 50'W 9.5'D 0:1 SS	1372	6964	CFW23	FLAM5B	19.36	1.04
0399	E	Free Span Bridge 60'W 16'D @ McLeod	120	6964	CFW23	FLAM5B	19.36	0.50
0401	E	Conc Chnl 50'W 11.5'D 0:1 SS	123	6964	CFW23	FLAM5B	19.36	0.50
0406	E	Conc Chnl 33'W 11.5'D 0:1 SS	690	6964	CFW23	FLAM5B	19.36	1.01
0419	E	Conc Chnl 33'-50'W 9.8'D 0:1 SS	200	6964	CFW23	FLAM5B	19.36	2.00
0423	E	Conc Chnl 50'W 9.8'D 0:1 SS	1686	6964	CFW23	FLAM5B	19.36	0.76
0455	E	Conc Chnl 50'-75'W 9.8'D 0:1 SS	169	6964	CFW23	FLAM5B	19.36	1.83
0458	E	Conc Chnl 75'-80'W 9.8'D 0:1 SS	347	6964	CFW23	FLAM5B	19.36	1.50
0471	E	5: 10' X 8' RCBC @ Eastern	110	5781	CFW22W	FLAM5B	14.95	1.30
0472	P1	Add 1: 22' X 8' RCBC @ Eastern	110	5781	CFW22W	FLAM5B	14.95	0.50
0473	E	Grass Chnl 60'W 15'D 2:1 SS	100	5781	CFW22W	FLAM5B	14.95	0.47
0477	E	3 Span Bridge 47'W 15'D	10	5781	CFW22W	FLAM5B	14.95	0.80
0478	E	Grass Chnl 60'W 15'D 2:1 SS	520	5781	CFW22W	FLAM5B	14.95	0.47
0481	E	3: 90° CMAP @ Tioga (Replace w/ FLWA0482)	60	5781	CFW22W	FLAM5B	14.95	0.87
0482	P1	4: 20' X 8' RCBC @ Tioga (Replaces FLWA0481)	60	5781	CFW22W	FLAM5B	14.95	0.87
0483	E	Grass Chnl 60'W 15'D 2:1 SS	300	5781	CFW22W	FLAM5B	14.95	0.63
0492	E	3 Span Bridge 47'W 15'D	10	5781	CFW22W	FLAM5B	14.95	0.50
0493	E	Grass Chnl 60'W 15'D 2:1 SS	1520	5781	CFW22W	FLAM5B	14.95	0.46
0555	E	3 Span Bridge 47'W 15'D	10	5701	CFW21	FLAM5B	14.55	0.50
0556	E	Earth Chnl 60'W 15'D 2:1 SS (Replace w/ FLWA0557)	520	5701	CFW21	FLAM5B	14.55	0.54
0557	P1	Gabion Chnl 30'W 10.5'D 2:1 SS (Replaces FLWA0556)	520	5701	CFW21	FLAM5B	14.55	0.54
LVBZ		**LAS VEGAS WASH - BONANZA**						
0000	P1	2: 12' X 7' RCB	3400	1636	CBN15-C	SW3	2.40	0.40
0064	P1	2: 12' X 6' RCB	2630	1449	CBN12-C	SW3	2.12	0.40
0114	P1	2: 12' X 6' RCB	2740	1256	CBN10-C	SW3	1.79	0.40
0166	E	54" RCP (Replace w/ LVBZ0167)	1095	1051	CBN09	SW3	1.54	0.45
0167	P0	10' X 9' RCB (Replaces LVBZ0166)	1095	1051	CBN09	SW3	1.54	0.45
0187	E	48" RCP (Replace w/ LVBZ0188)	1235	1051	CBN09	SW3	1.54	0.71
0188	P0	9' X 9' RCB (Replaces LVBZ0187)	1235	1051	CBN09	SW3	1.54	0.71
0210	E	42" RCP (Replace w/ LVBZ0211)	704	911	CBN08	SW3	1.30	1.37
0211	P0	8' X 7' RCB (Replaces LVBZ0210)	704	911	CBN08	SW3	1.30	1.37
0223	E	36" RCP (Replace w/ LVBZ0224)	2275	722	CBN03	SW3	1.09	0.72
0224	P0	8' X 7' RCB (Replaces LVBZ0223)	2275	722	CBN03	SW3	1.09	0.72

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVCA		**LAS VEGAS WASH - CHARLESTON**						
0000	P1	12' X 9' RCB	4600	1104	CCH77-C	SW3	1.34	0.30
LVCO		**COLORADO AVENUE SYSTEM**						
0000	E	18' X 8' RCB	610	1015	CNEL06	SW3	1.30	0.24
0012	E	14' X 8' RCB	2560	1015	CNEL06	SW3	1.30	0.24
0064	E	10' X 8' RCB	2165	827	CCCH94	SW3	0.98	0.24
0106	E	10' X 8' RCB	590	394	CCH92-C	SW3	0.35	0.24
0109	E	10' X 5' RCB	2350	394	CCH92-C	SW3	0.35	0.67
LVMD		**LAS VEGAS WASH - MIDDLE**						
1032	E	Earth Chnl 75'W 10'-12'D 1:1 SS (Replace w/ LVMD1033)	715	15156	CNLWY	CLVWASH5	118.28	0.30
1033	P1	Conc Chnl 75'W 11'D 1:1 SS (Replaces LVMD1032)	739	15156	CNLWY	CLVWASH5	118.28	0.30
1045	E	5 Span Bridge 75'W 10'D 1:1 SS (Replace w/ LVMD1046)	120	15156	CNLWY	CLVWASH5	118.28	0.52
1046	P1	Bridge 75'W 9.5'D 1:1 SS @ Nellis (Replaces LVMD1045)	120	15156	CNLWY	CLVWASH5	118.28	0.52
1047	E	Earth Chnl 80'W 8'D 2:1 SS (Replace w/ LVMD1048)	340	15083	CCNEL06	CLVWASH5	117.81	0.50
1048	P1	Conc Chnl 120'W 8'D 0:1 SS (Replaces LVMD1047)	340	15083	CCNEL06	CLVWASH5	117.81	0.50
1053	E	Earth Chnl 80'W 8'D 2:1 SS (Replace w/ LVMD1054)	860	14811	CNEL04-2	CLVWASH5	116.51	0.50
1054	P1	Conc Chnl 120'W 8'D 0:1 SS (Replaces LVMD1053)	860	14811	CNEL04-2	CLVWASH5	116.51	0.50
1068	E	5 Span Bridge 90'W 6'D 2:1 SS (Replace w/ LVMD1069)	120	14438	CCST03-C	CLVWASH5	114.87	0.50
1069	P1	5 Span Bridge 110'W 8'D 2:1 SS (Replaces LVMD1068)	120	14438	CCST03-C	CLVWASH5	114.87	0.50
1070	E	Earth Chnl 90'W 10'-12'D 1.5:1 SS (Replace w/ LVMD1071)	2587	14438	CCST03-C	CLVWASH5	114.87	0.43
1071	P1	Conc Chnl 90'W 9'D 1.5:1 SS (Replaces LVMD1070)	2587	14438	CCST03-C	CLVWASH5	114.87	0.43
1119	E	5 Span Bridge 90'W 12'D 2:1 SS @ Stewart	120	14354	CCCA10-C	CLVWASH5	114.40	0.20
1120	E	Earth Chnl 90'W 12'D 1:1 SS (Replace w/ LVMD1121)	1400	14354	CCCA10-C	CLVWASH5	114.40	0.20
1121	P1	Conc Chnl 90'W 10.5'D 1:1 SS (Replaces LVMD1120)	1400	14354	CCCA10-C	CLVWASH5	114.40	0.20
1148	E	Earth Chnl 70'W 18'-20'D 1.5:1 SS (Replace w/ LVMD1149)	1675	13944	CCBN15-C	CLVWASH5	112.59	0.41
1149	P1	Conc Chnl 70'W 10'D 1.5:1 SS (Replaces LVMD1148)	1675	13944	CCBN15-C	CLVWASH5	112.59	0.41
1176	E	5 Span Bridge 110'W 20'D 2:1 SS @ Bonanza	120	12690	CLVW04-C	CLVWASH5	106.80	0.57
1178	E	Earth Chnl 30'W 18'-20'D 2:1 SS (Replace w/ LVMD1179)	1500	12690	CLVW04-C	CLVWASH5	106.80	0.57
1179	P1	Conc Chnl 60'W 9.5'D 2:1 SS (Replaces LVMD1178)	1500	12690	CLVW04-C	CLVWASH5	106.80	0.57
LVNE		**LAS VEGAS WASH - NELLIS**						
0000	P1	2: 13' X 10' RCB	4675	2303	CNEL02-C	WEST3	3.39	0.20
LVOE		**OWENS AVENUE - EAST**						
0345	P1	13' X 11' RCB	1685	2369	DLVOE	SW5	22.79	0.60
LVWH		**WASHINGTON AVENUE CHANNEL**						
0389	E	12' X 8' RCB	2110	1607	(1/2) CV1-C	SW5SC	15.16	0.90
0426	E	16' X 8' RCB	150	1607	(1/2) CV1-C	SW5SC	15.16	1.08
0429	E	Splitter Structure (2: 12' X 8' RCB)	190	2870	DCLC21	SW5	22.79	1.90
0431	E	3: 14.33' X 10' RCB	665	2870	DCLC21	SW5	22.79	0.15
0446	E	Junction Structure	69	2870	DCLC21	SW5	22.79	0.15
0447	E	3: 14.33' X 10' RCB	1955	4978	CCAL93	SW5	22.19	0.15
NLFL		**NELLIS FLAMINGO STORM DRAIN**						
0028	P0	Add 1: 7' X 6' RCB	1530	338^	CM3^	FLAM3A	1.27	0.39
0029	E	76" & 48" RCP	1530	391^	CM3^	FLAM3A	1.27	0.39
0059	E	60" RCP	1370	143^	CM3^	FLAM3A	1.27	0.30
0060	P0	Add 1: 12' X 6' RCB	1370	586^	CM3^	FLAM3A	1.27	0.34
0084	E	48" RCP	2490	79^	CM2^	FLAM3A	0.98	0.30
0085	P0	Add 1: 11' X 6' RCB	2490	505^	CM2^	FLAM3A	0.98	0.30
0131	E	42" RCP	650	350	M1	FLAM3A	0.51	0.23
0144	E	36" RCP	620	350	M1	FLAM3A	0.51	0.20
NLWY		**NELLIS - WYOMING CHANNEL**						
0000	E	Conc Chnl 8'W 4'D 1.3:1 SS	260	338	FW35	FLAM3A	0.47	1.71
0004	E	15' X 6' RCAC	80	338	FW35	FLAM3A	0.47	1.30
0006	E	Conc Chnl 8'W 4'D 1.3:1 SS	400	338	FW35	FLAM3A	0.47	0.38
0014	E	12' X 4' RCBC @ Winterwood	70	338	FW35	FLAM3A	0.47	0.40
0015	E	Conc Chnl 8'W 4'D 1.3:1 SS	720	338	FW35	FLAM3A	0.47	0.38
0028	E	12' X 4' RCBC @ Wyoming	90	338	FW35	FLAM3A	0.47	0.80
0030	E	Conc Chnl 8'W 4'D 1.3:1 SS	250	338	FW35	FLAM3A	0.47	0.38
SAEA		**SAHARA AVENUE - EASTERN LATERAL**						
0000	P1	10' X 8' RCB	1440	564	CFR02	SW3	0.66	0.20

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
VAVD		**VEGAS VALLEY DRIVE**						
0000	P1	8' X 6' RCB	1300	606	CFW32WW	FLAM3A	0.84	2.10
0025	P1	84" RCP	5300	606	CFW32WW	FLAM3A	0.84	1.60
VBCH		**VAN BUSKIRK CHANNEL**						
0000	E	12' X 3' RCB	500	888	CVB16	FLAM3A	1.16	1.00
0008	E	8' X 5' RCB	5490	888	CVB16	FLAM3A	1.16	1.00
VBEA		**VAN BUSKIRK - EASTERN AVE**						
0000	P1	14' X 6' RCB	3020	1561	CVB11	FLAM3A	3.35	1.30
VBMC		**VAN BUSKIRK - McLEOD DRIVE**						
0000	E	2: 8' X 8' RCB	3850	997	CVB13	FLAM3A	3.43	0.50
VBTW		**VAN BUSKIRK - TWAIN**						
0000	E	18" RCP	6640	541	CB2	FLAM3A	0.74	0.70
WAGC		**WASHINGTON AVENUE CHANNEL - GRAND CENTRAL**						
0000	E	2: 12' X 4' RCB	700	557	LC21	SW3	0.60	0.20
0014	E	1: 12' X 4' RCB and 1: 11' X 4' RCB	2440	557	LC21	SW3	0.60	0.20
WAPR		**WASHINGTON AVENUE CHANNEL PARALLEL**						
0132	E	2: 9' X 8' RCB	387	1607	(1/2) CV1-C	SW5SC	15.16	1.67

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

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

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

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 32

LEGEND

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

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

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

Bottom Width.....W

Depth.....D

Side Slope, H:V.....SS

Construction Features

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

FIGURE 5A - CCRFCD MPU FACILITIES INVENTORY

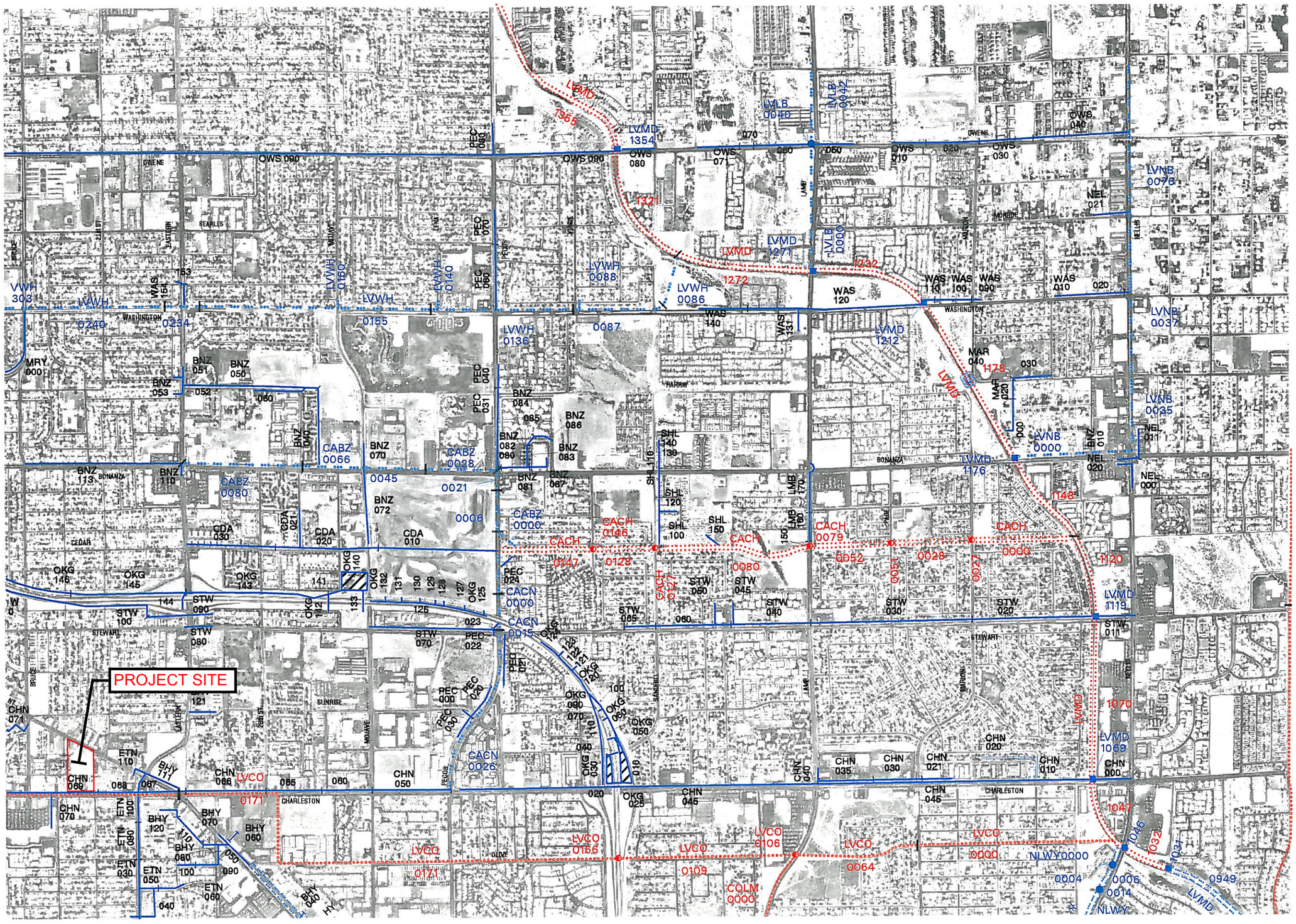


FIGURE 6 - CLV CITY-WIDE FACILITIES

City of Las Vegas

CITY - WIDE HYDROLOGY ANALYSIS

LEGEND

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS
- EXISTING LOCAL DETENTION BASINS
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- EXISTING LOCAL BRIDGES
- EXISTING REGIONAL CULVERT
- PROPOSED REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- EXISTING LOCAL PIPELINE
- EXISTING REGIONAL CHANNEL
- PROPOSED REGIONAL CHANNEL
- EXISTING LOCAL CHANNEL
- EXISTING REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE
- EXISTING LOCAL DIKE/LEVEE
- EXISTING STORM WATER PUMPING STATION
- PROPOSED BELTWAY ALIGNMENT

FIGURE F-15

	1	2		
	3	4		
	5	6		
7	8	9	10	
11	12	13	14	15
	16	17	18	19

Scale: 1 inch = 1600 feet

FLOOD CONTROL FACILITIES

PBS&J POST, BUCKLEY, SCHUH & JERNIGAN

ID	ID No.	E/P	Plan No.	Facility Description	Fac Length	Slope (%)	Flow (cfs)
LOCAL FACILITIES							
BHY	040	E	HWY BK #B-2	24" RCP	150		30
BHY	050	E	107-V594	66" RCP	500		237
BHY	060	E	HWY BK #B-2	24" RCP	120		30
BHY	070	E	327-86	66" RCP	520		260
BHY	080	E	100-51-D1	30" RCP	155		29
BHY	090	E	100-51-D5	24" RCP	600		16
BHY	100	E	100-51-D5	18" RCP	300		7
BHY	110	E	327-86	66" RCP	700		237
BHY	111	E	117-V595	27" RCP	800		11
BHY	120	E	327-86	66" RCP	570		212
BHY	121	E	107-V594	4' x 0.5' RCBC	325		12
BNZ	010	E	107-V349	Conc Chnl 3'D 7'W 1.5:1 SS	225		533
BNZ	040	E	107-V849A	33" RCP	1,050		29
BNZ	050	E	107-V1211	30" RCP	2,444		20
BNZ	051	E	107-V1211	18" RCP	85		7
BNZ	052	E	107-V1211	24" RCP	370		20
BNZ	053	E	107-V1211	18" RCP	70		
BNZ	060	E	327-V132	8" CMP	608		0
BNZ	070	E	107-V849A	27" SSP	133		26
BNZ	072	E	107-V849A	10" VCP	1,563	0.30	1
BNZ	080	E	107-V2325	27" RCP	130	0.25	13
BNZ	081	E	107-V2325	27" RCP	460	0.22	13
BNZ	082	E	107-V2325	24" RCP	150	0.30	11
BNZ	083	E	107-V2325	18" RCP	135	0.30	5
BNZ	084	E	107-V2325	15" RCP	130	0.30	3
BNZ	085	E	107-V2325	15" RCP	140	0.30	3
BNZ	086	E	107-V2325	12" RCP	240	0.30	2
BNZ	087	E	107-V2325	12" RCP	570	0.22	1
BNZ	110	E	107-V849A	36" RCP	100		37
BNZ	113	E	107-V1515	12" PVC	2,490		5
CDA	010	E	307-V640	60" RCP	2,025		239
CDA	020	E	307-V640	48" RCP	1,725		124
CDA	021	E	107-V2209	18" RCP	675	0.005	1
CDA	030	E	307-V640	36" RCP	1,275		105
CHN	000	E	107-V943	18" RCP	525		47
CHN	010	E	107-V943	18" RCP	9,957		5
CHN	020	E	107-V1129-11	Conc Chnl 3'D 3'W 0:1 SS	1,158		109
CHN	021	E	107-V943	18" RCP	525		15
CHN	030	E	107-V943	24" RCP	825		32
CHN	035	E	107-V510	21" RCP	825		22
CHN	040	E	107-V510	18" RCP	300		15
CHN	045	E	107-V943	18" RCP	10,482		15
CHN	050	E	107-V943	54" RCP	1,299		160
CHN	060	E	107-V943	48" RCP	705		128
CHN	065	E	107-V943	42" RCP	740		121
CHN	066	E	HWY BK # C-1	39" RCP	1,500		83
CHN	067	E	107-V594	36" RCP	750		82
CHN	068	E	107-V829B	36" RCP	675		94
CHN	069	E	107-V829B	33" RCP	5,560		75
CHN	070	E	107-V1632	12" PVC	678		2
CHN	071	E	327-V192/W11, 107V-1901	24" VCP	471		30
ETN	030	E	107-V835A	18" RCP	1,529		6
ETN	040	E	327-73	12" VCP	555		3
ETN	050	E	327-73	15" RCP	293		7
ETN	060	E	327-73	18" RCP	518		11
ETN	090	E	107-V835A	24" RCP	628		16
ETN	100	E	107-V594	27" RCP	790		22
ETN	110	E	HWY BK # F-1	18" RCP	94		7
LMB	150	E	107-V849B	42" RCP	72	0.40	55
LMB	160	E	107-V849B	53" x 34" RCP	397	0.35	57
LMB	170	E	107-V849B	45" x 29" RCP	752	0.43	41
MAR	000	E	327-V136	21" ACP	696		10
MAR	020	E	327-V136	18" ACP	381		5
MAR	030	E	327-V136	18" ACP	617		5
MAR	040	E		130' x 8' Pedestrian Bridge	130		
MRY	000	E	107V-789B	24" RCP	1,125		23
NEL	000	E	107-V989	15" RCP	450		9
NEL	011	E	107-V989	60" RCP	475		116
NEL	020	E	107-V849B	15" RCP	100		6
NEL	021	E	327-V194	18" RCP	450		6
OKG	010	E		Basin - Size Unknown			
OKG	020	E	Bk 6, Sht 4	Basin - Size Unknown			
OKG	025	E	Bk 6, Sht 4	12" RCP	150		3
OKG	030	E	Bk 6, Sht 4	15" RCP	675		5
OKG	040	E	Bk 6, Sht 4	15" RCP	40		5
OKG	050	E	Bk 6, Sht 4	15" RCP	58		5

ID	ID No.	E/P	Plan No.	Facility Description	Fac Length	Slope (%)	Flow (cfs)
LOCAL FACILITIES							
OKG	060	E	Bk 6, Sht 4	15" RCP	300		5
OKG	070	E	Bk 6, Sht 4	15" RCP	150		5
OKG	090	E	Bk 6, Sht 4	15" RCP	56		5
OKG	100	E	Bk 6, Sht 4	24" RCP	500		16
OKG	110	E	Bk 6, Sht 4	15" RCP	625		5
OKG	120	E	Bk 6, Sht 4	18" RCP	675		7
OKG	121	E	Bk 6, Sht 4	15" RCP	58		5
OKG	122	E	Bk 6, Sht 4	15" RCP	300		5
OKG	123	E	Bk 6, Sht 4	15" RCP	58		5
OKG	124	E	Bk 6, Sht 4	15" RCP	118		5
OKG	125	E	Bk 6, Sht 6	15" RCP	118		5
OKG	126	E	Bk 6, Sht 6	36" CMP	1,958		29
OKG	127	E	Bk 6, Sht 6	15" RCP	118		5
OKG	128	E	Bk 6, Sht 6	15" RCP	118		5
OKG	129	E	Bk 6, Sht 6	15" RCP	118		5
OKG	130	E	Bk 6, Sht 6	15" RCP	118		5
OKG	131	E	Bk 6, Sht 6	15" RCP	118		5
OKG	132	E	Bk 6, Sht 6	15" RCP	118		5
OKG	133	E	Bk 6, Sht 6	15" RCP			
OKG	140	E	Bk 1, Sht 25-26	Detention Basin - Size Unknown			
OKG	141	E	Bk 1, Sht 15-17	42" RCP	190		84
OKG	142	E	Bk 6, Sht 8	15" RCP	220		5
OKG	143	E	Bk 1, Sht 15-17	42" RCP	2,400		82
OKG	144	E	Bk 1, Sht 17	15" RCP	240		5
OKG	145	E	Bk 1, Sht 17-18	36" RCP	1,600		82
OKG	146	E	Bk 1 Sht 18-23	30" RCP	1,200		16
OWS	010	E	107-V858	24" RCP	373		14
OWS	020	E	107-V858	30" RCP	937		20
OWS	030	E	107-V858	36" RCP	950		42
OWS	040	E	107-V858	42" RCP	1,677		56
OWS	050	E	107-V858	24" RCP	670		12
OWS	060	E	107-V858	36" RCP	1,050		45
OWS	070	E	107-V858	30" RCP	235		30
OWS	071	E	107-V858	24" RCP	750		16
OWS	080	E	107-V858	24" RCP	528		14
OWS	090	E	107-V708/107-V864	18" RCP	12,066		7
PEC	000	E	107-V1890	18" RCP	60		7
PEC	020	E	107-V1890	29" x 45" RCPA	525		44
PEC	021	E	107-V1245	18" RCP	750		6
PEC	022	E	107-V1245	39" RCP	90		45
PEC	023	E	107-V1245	38" x 60" RCPA	120		79
PEC	024	E	107-V1245	66" RCP	120		184
PEC	030	E	107-V1890	2: 30" x 19" RCP	225		15
PEC	031	E	107-V1245	24" RCP	1,197		10
PEC	040	E	107-V1245	18" RCP	490		6
PEC	060	E	107-V1245	39" RCP	1,209		40
PEC	070	E	107-V1245	24" RCP	635		12
PEC	080	E	107-V864	18" RCP	340		6
SHL	100	E	107-V849B	53" x 34" SSP	146	0.30	
SHL	110	E	107-V849B	42" SSP	1,075	0.30	
SHL	120	E	107Y-4296-3	18" RCP	34	2.00	13
SHL	130	E	107-V849B	53" x 34" SSP	52	0.30	
SHL	140	E	107-V849B	36" SSP	85	0.35	
SHL	150	E	107Y-4296-3	18" RCP	198	0.50	6
STW	011	E	107-V819A	18" RCP	2,175		
STW	020	E	107-V819A	48" RCP	600		6
STW	030	E	107-V819A	42" RCP	2,625		60
STW	040	E	107-V819A	36" RCP	1,350		50
STW	045	E	327-V138	15" RCP	488		7
STW	050	E	327-V151	12" RCP	449		2
STW	060	E	107-V819A	24" RCP	1,800		45
STW	065	E	107-V819A	18" RCP	555		11
STW	070	E	107-V819A	24" RCP	2,175		40
STW	080	E	107-V819C	18" RCP	375		9
STW	090	E	Hwy Bk I-515 #4	36" RCP	1,275		56
STW	100	E	Hwy Bk I-515 #4	36" RCP	3,300		67
WAS	010	E	107-V1982	36" RCP	1,281		47
WAS	020	E	107-V1982	29" x 45" RCPA	85		39
WAS	090	E	107-V1982	12" RCP	147		
WAS	100	E	107-V1982	36" RCP	628		47
WAS	110	E	107-V1982	48" RCP	58		110
WAS	120	E	107-V1982	36" RCP	2,930		42
WAS	131	E	107-V833	12" RCP	36		2
WAS	140	E	107-V1982	24" RCP	905		14
WAS	153	E	731-54C	30" RCP	99	0.30	19
WAS	154	E	731-54C	48" RCP	351	0.30	68

FIGURE 6A -
CLV CITY-WIDE FACILITIES INVENTORY

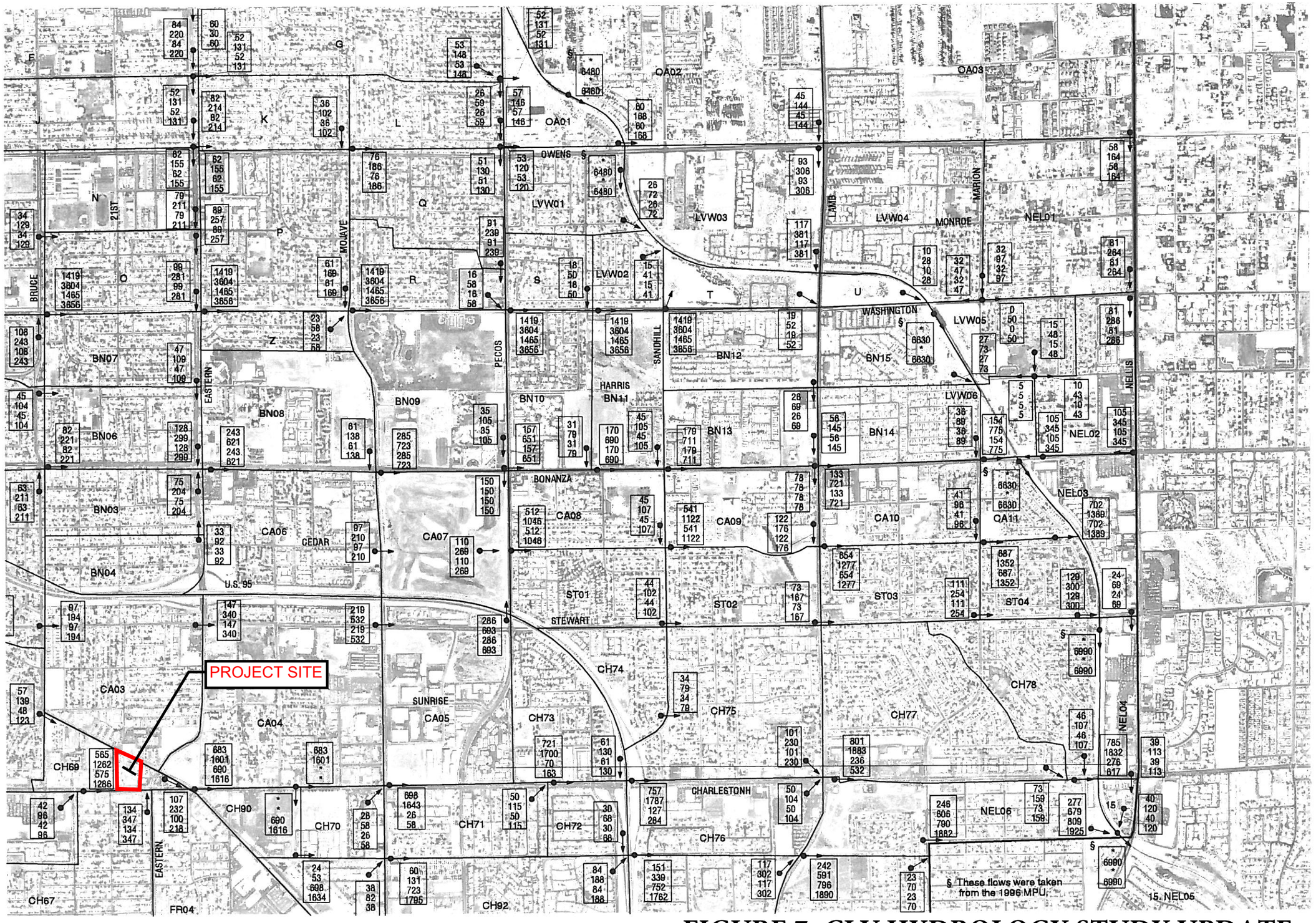


PHOTO DATE: APRIL 1996

FIGURE 7- CLV HYDROLOGY STUDY UPDATE

CITY OF LAS VEGAS NEVADA

CITY WIDE HYDROLOGY STUDY UPDATE - 1997

LEGEND

SUB-BASIN BOUNDARY

FLOW ARROW

250	10-YEAR EXISTING FLOW
500	100-YEAR EXISTING FLOW
300	10-YEAR ULTIMATE FLOW
800	100-YEAR ULTIMATE FLOW

(FLOWS IN CFS)

NOTE:
Facility flows must be subtracted from flows shown to determine surface flows. (See "F" sheets for facility flows)

§ These flows were taken from the 1996 MPU.

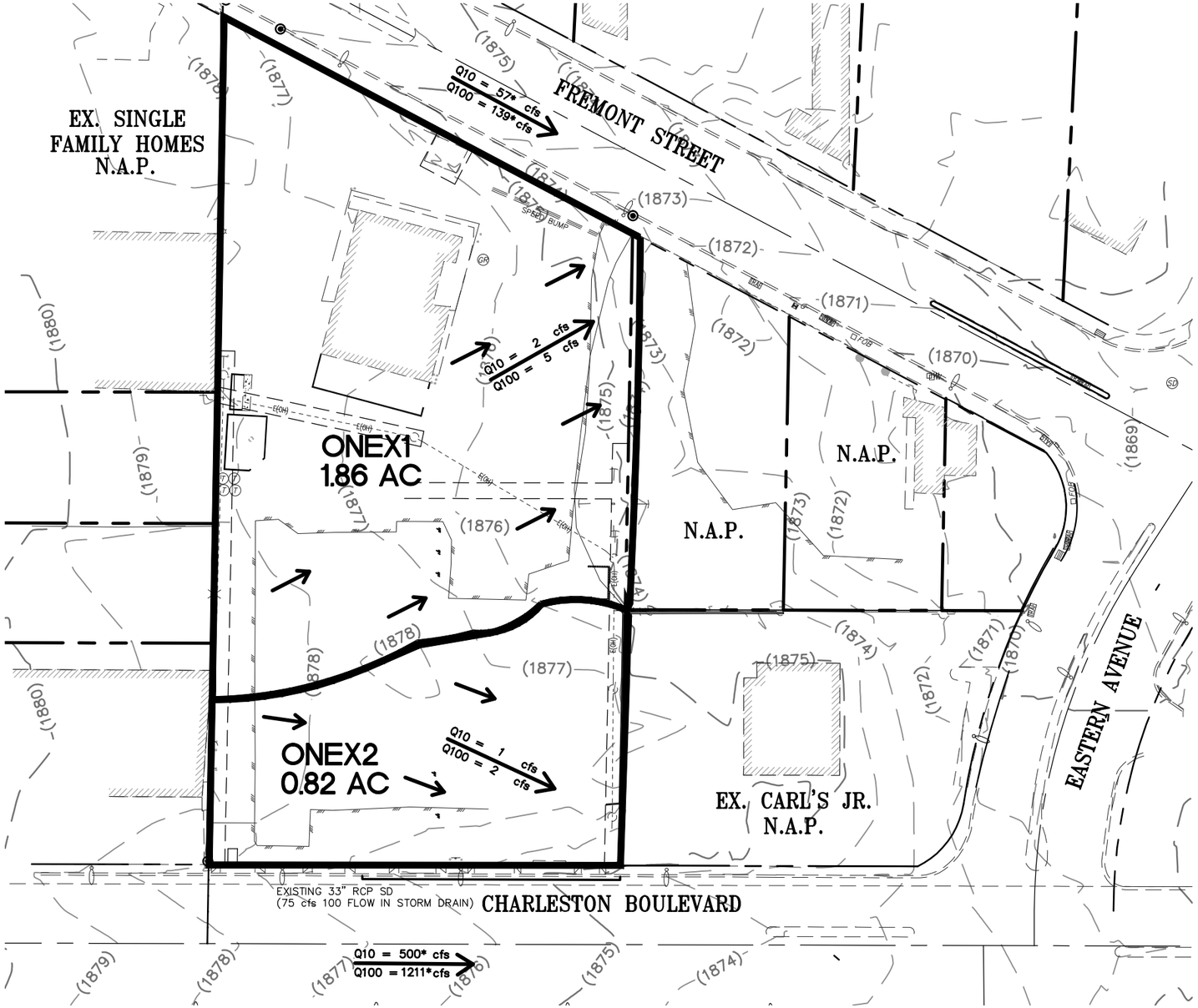
N W E S

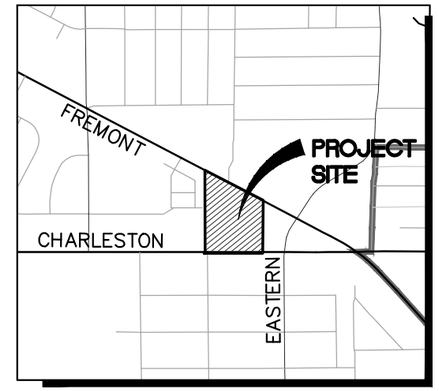
1 INCH = 1600 FEET

FIGURE H-15

1	2			
3	4			
5	6			
7	8	9	10	
11	12	13	14	15
	16	17	18	19

PBSJ POST, BUCKLEY, SCHUH & JERNIGAN, INC.





VICINITY MAP

LEGEND

0.5 AC	BASIN AREA IN ACRES
→	FLOW DIRECTION
Q10 = xx cfs	10–YEAR FLOW RATE
Q100 = xx cfs	100–YEAR FLOW RATE
———	BASIN DELINEATION
ONEX1	BASIN DESIGNATION
CP-1 ●	COMBINATION POINT
1 — 1	HYDRAULIC CROSS SECTION

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
ONEX1	1.86	2	5
ONEX2	0.82	1	2

*NOTE
FLOWS PREVIOUSLY ANALYZED IN THE CITY OF LAS VEGAS CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN.

N

GRAPHIC SCALE

80 0 40 80 160

(IN FEET)
1 inch = 80 ft.

FIGURE 8

EXISTING CONDITIONS BASIN MAP

CivilWorksInc
Engineering with "sensible" solutions tailored to your "specific" needs.
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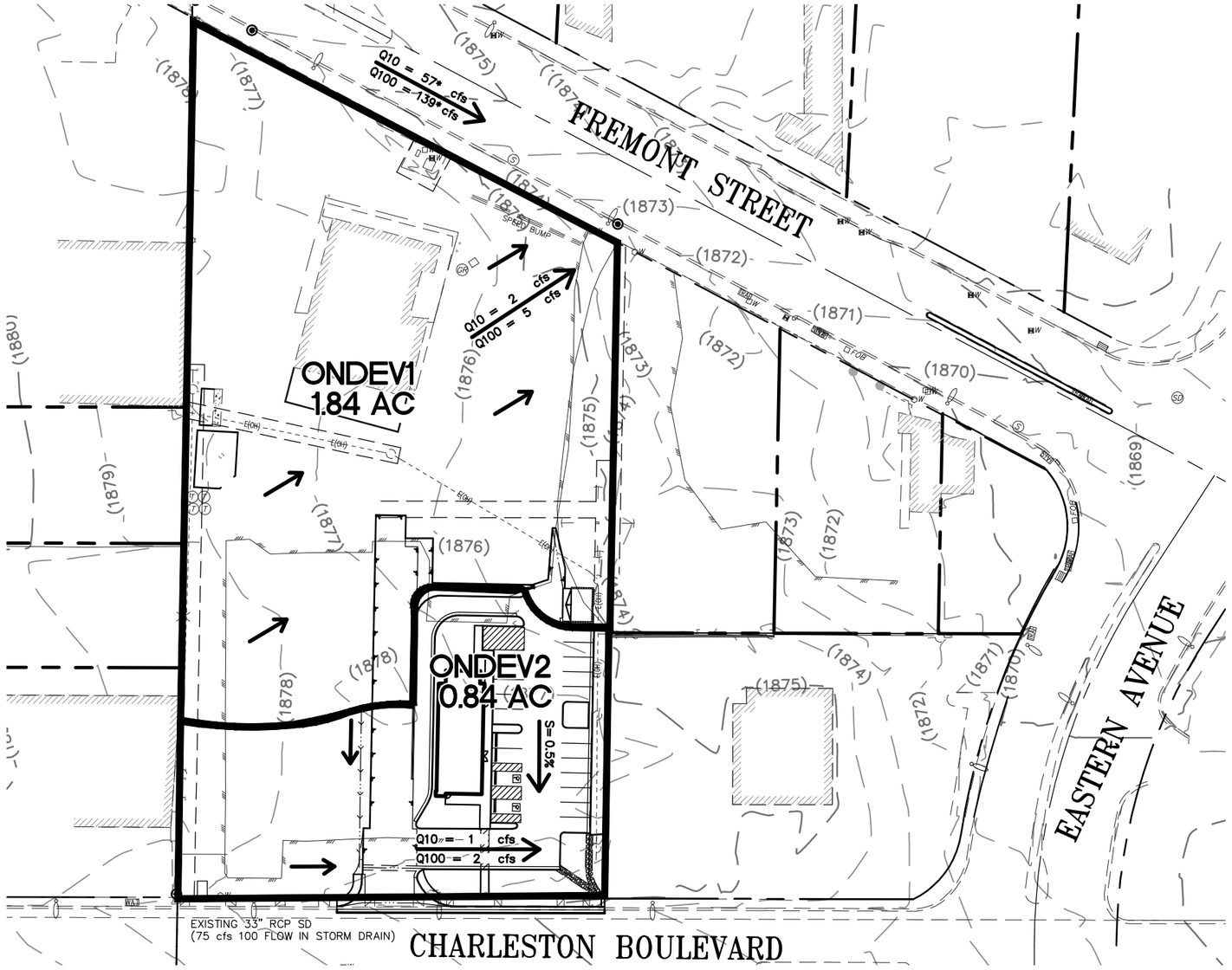
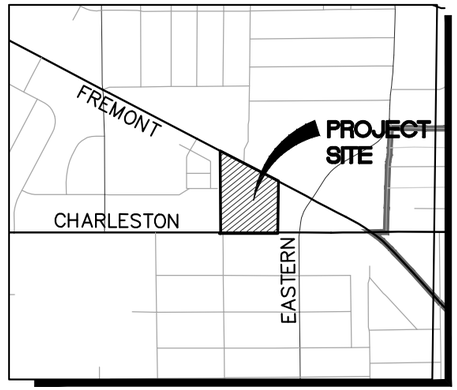
Office #:(702) 876-3474 Fax #:(702) 876-1323





VICINITY MAP

N

GRAPHIC SCALE

80 0 40 80 160

(IN FEET)
1 inch = 80 ft.

*NOTE
FLOWS PREVIOUSLY ANALYZED IN THE CITY OF LAS VEGAS CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN.

LEGEND

0.5 AC	BASIN AREA IN ACRES
→	FLOW DIRECTION
Q10 = xx cfs	10-YEAR FLOW RATE
Q100 = xx cfs	100-YEAR FLOW RATE
▬	BASIN DELINEATION
ONEX1	BASIN DESIGNATION
CP-1 ●	COMBINATION POINT
① — ①	HYDRAULIC CROSS SECTION

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
ONDEV1	1.84	2	5
ONDEV2	0.84	1	2

STREET SECTION	Q_{10}/Q_{100} (cfs)	D_{10}/D_{100} (ft)	V_{10}/V_{100} (ft\s)	V x D
CHARLESTON BLVD.	500/1211*	1.28/1.70	8.33/11.83	10.66/20.11

FIGURE 9

DEVELOPED CONDITIONS BASIN MAP

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HYDROLOGIC PARAMETERS

Rainfall Data
Curve Numbers
Soils Information
Standard Form 4

STANDARD FORM 4

MODIFIED USING AVERAGE VELOCITY METHOD

Project: Taco Bell @ Charleston
Job No.: 16010
Date: 07/20/2016
Calculated by: jej

CivilWorksInc
Engineering with "sensible" solutions tailored to your "specific" needs.
4945 W. Patrick Lane Las Vegas, NV 89118
Office: (702) 534-7555 Fax: (702) 534-1825

SUB-BASIN DATA			INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK (URBANIZED BASINS)		Tc		TLAG	HEC-INPUT		REMARKS
Designation	K (Default by CN)	Area (Acres)	Length (feet)	Slope (%)	Ti (Min)	Length (feet)	Slope (%)	V1 (FPS) (Manning)	V2 (FPS) (Manning)	Tt (Min)	Total Length (feet)	Tc= (L/180)+10 (Min)	Final Tc = Ti +Tt (Min)	Min Tc	(Tc*0.6)	Composite	Drainage Area (Sq. Mi.)	Tc>=10 for Non Urban Tc>=5 for Urban
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)		(Hr)	CN		
ONEX1	0.80	1.86	111	0.72	6.40	341	1.40	1.75	3.48	3.25	452.91	N/A	9.65	10.00	0.097	90.0	0.0029	min. Tc used
ONEX2	0.78	0.82	101	1.50	4.99	258	1.20	1.62	3.22	2.65	359.40	N/A	7.64	10.00	0.076	89.0	0.0013	min. Tc used
ONDEV1	0.93	1.84	174	1.14	3.86	455	1.14	2.16	3.27	3.52	629.00	13.49	7.38	5.00	0.074	93.0	0.0029	Use 0.1349
ONDEV2	0.92	0.84	31	2.00	1.43	278	0.50	1.43	2.16	3.24	309.00	11.72	4.68	5.00	0.047	92.0	0.0013	Use 0.1172

K = 0.0132*Cn-0.39

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

Tt = L/(60*V)

Velocity values for Manning's estimates:

Existing Conditions
V1 = 14.8*(S/100)^0.5
V2 = 29.4*(S/100)^0.5

Developed Conditions
V1 = 20.2*(S/100)^0.5
V2 = 30.6*(S/100)^0.5

* V1 is used for the first 500 feet of length in column (7). V2 is used for the remainder.

CURVE NUMBER CALCULATIONS

ONSITE EXISTING AND DEVELOPED CONDITIONS

BASIN I.D.		SOIL TYPE	CURVE NUMBER	BASIN AREA (acres)	% OF AREA	WEIGHTED CURVE NUMBER	CUMULATIVE CURVE NUMBER
ONEX1	Desert Terrain	615	85	0.31	46	39	**90**
	Commercial	615	94	1.55	54	51	
ONEX2	Desert Terrain	615	85	0.58	71	60	**89**
	Ashpalt	615	98	0.24	29	28	
ONDEV1	Desert Terrain	615	85	0.21	11	9	**93**
	Commercial	615	94	1.63	89	84	
ONDEV2	Desert Terrain	615	85	0.17	20	17	**92**
	Commercial	615	94	0.67	80	75	

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

July 19, 2016

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 (http://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

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: 1:997 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

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: http://websoilsurvey.nrcs.usda.gov
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 10, Aug 22, 2014

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

Date(s) aerial images were photographed: Sep 26, 2013—Feb 25, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Las Vegas Valley Area, Nevada, Part of Clark County (NV788)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
615	Urban land	2.8	100.0%
Totals for Area of Interest		**2.8**	**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

615—Urban land

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Valleys
Down-slope shape: Convex
Across-slope shape: Convex

Properties and qualities

Frequency of flooding: Rare

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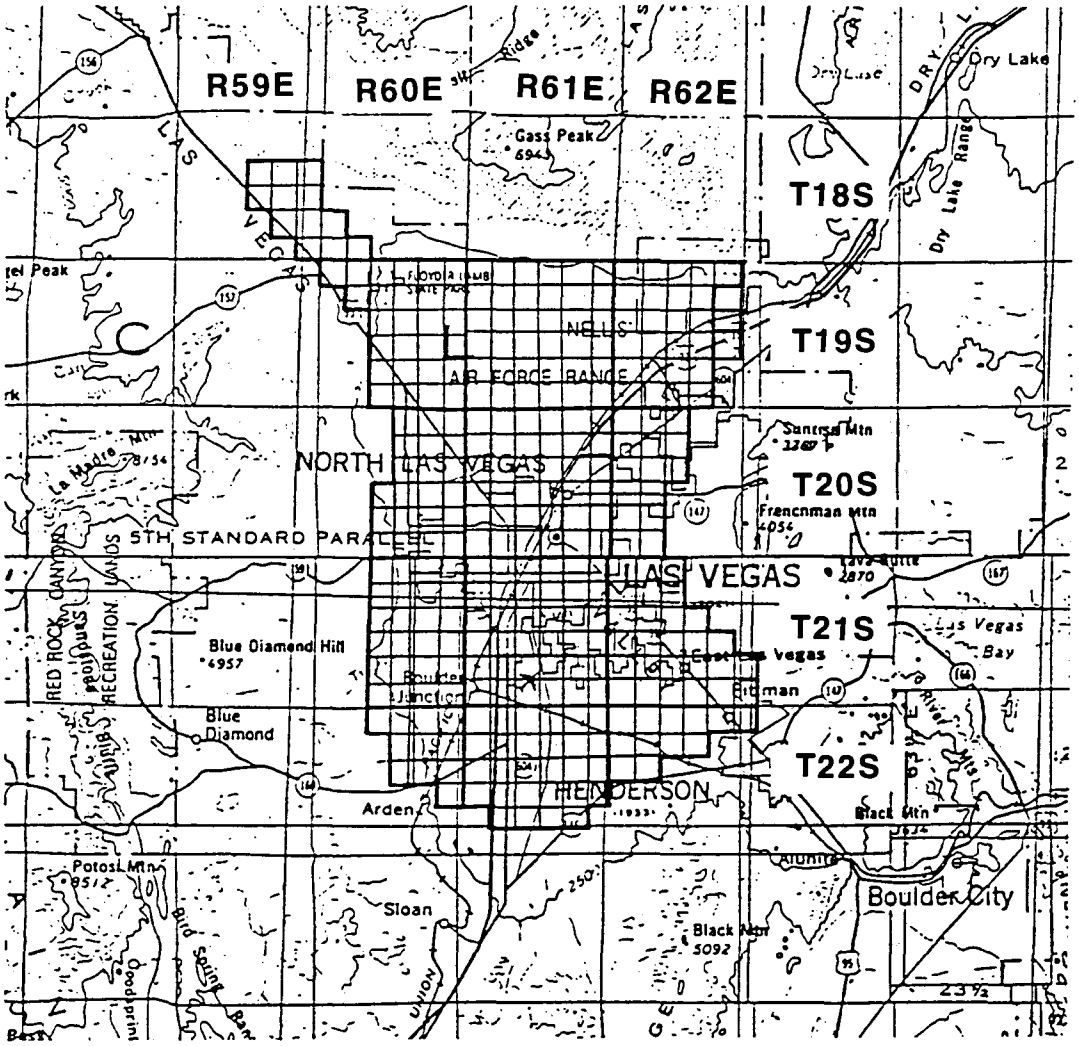
McCARRAN AIRPORT RAINFALL AREA



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

TOWNSHIP	RANGE	SECTIONS
20 South	62 East	4-9,16-20,29-32
21 South	60 East	1-4,9-16,21-28,33-36
21 South	61 East	ALL SECTIONS
21 South	62 East	4-9,15-23, 25-36
22 South	60 East	1-4,10-15,24
22 South	61 East	1-24,26-29
22 South	62 East	1-10,17-18

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

Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

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

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
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

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

RATIONAL FORMULA METHOD RUNOFF COEFFICIENTS AND AVERAGE PERCENT IMPERVIOUS AREA

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

Notes:

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

Revision	Date

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

RUNOFF CURVE NUMBERS
(CULTIVATED AGRICULTURE LANDS[1])

Cover description			Curve numbers for hydrologic soil group—			
Cover type	Treatment[2]	Hydrologic condition[3]	A	B	C	D
Fallow	Bare soil	–	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T + CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1]Average runoff condition, and $I_a = 0.2S$.
[2]*Crop residue cover* applies only if residue is on at least 5% of the surface throughout the year.
[3]Hydrologic condition is based on combination of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.
Poor: Factors impair infiltration and tend to increase runoff.
Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Revision	Date

RUNOFF CURVE NUMBERS
(AGRICULTURE LANDS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing.[2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element.[3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	[4]30	48	65	73
Woods—grass combination (orchard or tree farm).[5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods.[6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	[4]30	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

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

[2]*Poor:* <50% ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: >75% ground cover and lightly or only occasionally grazed.

[3]*Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

[4]Actual curve number is less than 30; use CN = 30 for runoff computations.

[5]CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

[6]*Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Revision	Date

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

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

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

[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

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

Revision	Date

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

Average Lot Size or Usage[1]	Percent Impervious[2]	Curve Number for Hydrologic Soil Groups			
		A	B	C	D
Apartments/Condos	72	81	88	91	93
Townhouses/6,000 sq ft lots or less[3]	69	80	87	90	92
7,000 sq ft lots	63	76	84	89	91
8,000 sq ft lots	58	73	82	88	90
10,000 sq ft lots	38	61	75	83	87
14,000 sq ft lots	30	57	72	81	86
20,000 sq ft lots	25	54	70	80	85
40,000 sq ft lots	20	51	68	79	84
80,000 sq ft lots	12	46	65	77	82

1 Lot size should represent the size of the average lot and not the gross acreage divided by the number of lots.

2 Actual percent impervious value should be compared to selected land use type.

3 In cases where average residential lots are smaller than 6,000 sq ft, commercial/business/industrial land use should be used.

Revision	Date

REFERENCE:

TABLE 602A

HEC-1 ANALYSES

Existing Condition
Developed Condition

EXISTING CONDITIONS

```
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   20JUL16  TIME  17:08:05  *                    *           (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

            1       ID         TECHNICAL DRAINAGE STUDY FOR
            2       ID                    Taco Bell Fremont & E. Charleston
            3       ID                    Addendum No. 3
            4       ID                    Clark County, NV
            5       ID
            6       ID
            7       ID        PREPARED BY:
            8       ID                     CIVILWORKS
            9       ID                     4945 W. PATRICK LANE
           10       ID                     LAS VEGAS, NV  89118
           11       ID
           12       ID
           13       ID   EXISTING 100- & 10-YEAR MODEL
           14       ID    FILENAME: TBeast.txt
           15       ID    JOB#16010.00
           16       ID
           17       ID
           18       ID
                    *DIAGRAM
           19       IT       5       0       0     300
           20       IO       5
           21       IN       5
           22       JR    PREC     1.0    0.57
                    *

           23       KK  ONEX1
           24       KM  ONSITE EXISTING BASIN ONEX1
           25       BA   .0029
           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   90.0
           36       UD   .1000
                    *

           37       KK  ONEX2
           38       KM  ONSITE EXISTING BASIN ONEX2
```

```
            39           BA   .0013
            40           LS       0   89.0
            41           UD   .1000
                         *
            42           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    23      ONEX1
                .
                .
    37          .      ONEX2

 (***) 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   20JUL16  TIME  17:08:05  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************
```

TECHNICAL DRAINAGE STUDY FOR
Taco Bell Fremont & E. Charleston
Addendum No. 3
Clark County, NV

PREPARED BY:
CIVILWORKS
4945 W. PATRICK LANE
LAS VEGAS, NV 89118

EXISTING 100- & 10-YEAR MODEL
FILENAME: TBeast.txt
JOB#16010.00

```
  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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1	RATIO 2
					1.00	.57
HYDROGRAPH AT						
+	ONEX1	.00	1	FLOW	5.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ONEX2	.00	1	FLOW	2.	1.
				TIME	3.50	3.50

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

DEVELOPED CONDITIONS

```
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   20JUL16  TIME  17:21:07  *                    *           (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         TECHNICAL DRAINAGE STUDY FOR TACO BELL
            2       ID              @CHARLESTON AND EASTERN
            3       ID                   CITY OF LAS VEGAS, NV
            4       ID
            5       ID        PREPARED FOR: BARTSAS MARY 22 LLC
            6       ID
            7       ID        PREPARED BY:
            8       ID                      CIVILWORKS
            9       ID                      4945 W. PATRICK LANE
           10       ID                      LAS VEGAS, NV  89118
           11       ID
           12       ID
           13       ID    FUTURE 100- & 10-YEAR MODEL
           14       ID    FILENAME: TACO BELL DEV
           15       ID    JOB#15042.00
           16       ID    TACO BELL DEVELOPED CONDITIONS
           17       ID
           18       ID
                    *DIAGRAM
           19       IT       5       0       0     300
           20       IO       5
           21       IN       5
           22       JR    PREC     1.0    0.57
                    *

           23       KK  ONDEV1
           24       KM  ONSITE DEVELOPED BASIN ONDEV1
           25       BA   .0029
           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   93.0
           36       UD   .1349
                    *

           37       KK  ONDEV2
           38       KM  ONSITE DEVELOPED BASIN ONDEV2
```

```
            39           BA   .0013
            40           LS       0    92.0
            41           UD   .1172
                         *
            42           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    23      ONDEV1
                .
                .
    37          .      ONDEV2

 (***) 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   20JUL16  TIME  17:21:07   *                *           (916) 756-1104            *
 *                                   *                    *                                   *
 *************************************                    *************************************
```

TECHNICAL DRAINAGE STUDY FOR TACO BELL
@CHARLESTON AND EASTERN
CITY OF LAS VEGAS, NV

PREPARED FOR: BARTSAS MARY 22 LLC

PREPARED BY:
CIVILWORKS
4945 W. PATRICK LANE
LAS VEGAS, NV 89118

FUTURE 100- & 10-YEAR MODEL
FILENAME: TACO BELL DEV
JOB#15042.00
TACO BELL DEVELOPED CONDITIONS

```
  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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1	RATIO 2
					1.00	.57
HYDROGRAPH AT						
+	ONDEV1	.00	1	FLOW	5.	2.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ONDEV2	.00	1	FLOW	2.	1.
				TIME	3.58	3.58

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

HYDRAULIC ANALYSES

FlowMaster Cross Sections
Grate Capacity Calculations
Pipe Capacity Calculations

Worksheet for CHARLESTON_100-YEAR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01300	ft/ft
Discharge	1286.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	1878.18
0+05	1877.93
0+06	1877.18
0+51	1878.23
0+94	1877.63
0+95	1878.38
1+00	1878.43

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 1878.18)	(0+05, 1877.93)	0.013
(0+05, 1877.93)	(0+06, 1877.18)	0.013
(0+06, 1877.18)	(0+51, 1878.23)	0.013
(0+51, 1878.23)	(0+94, 1877.63)	0.016
(0+94, 1877.63)	(0+95, 1878.38)	0.013
(0+95, 1878.38)	(1+00, 1878.43)	0.013

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	1.74	ft

Worksheet for CHARLESTON_100-YEAR

Results

Elevation Range	1877.18 to 1878.43 ft		
Flow Area		106.12	ft²
Wetted Perimeter		102.05	ft
Hydraulic Radius		1.04	ft
Top Width		100.00	ft
Normal Depth		1.74	ft
Critical Depth		2.40	ft
Critical Slope		0.00262	ft/ft
Velocity		12.12	ft/s
Velocity Head		2.28	ft
Specific Energy		4.02	ft
Froude Number		2.07	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.74	ft
Critical Depth	2.40	ft
Channel Slope	0.01300	ft/ft
Critical Slope	0.00262	ft/ft

Cross Section for CHARLESTON_100-YEAR

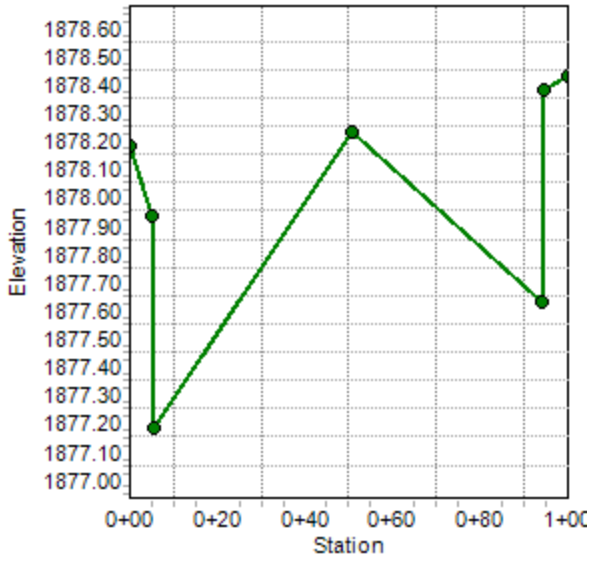
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01300	ft/ft
Normal Depth	1.74	ft
Discharge	1286.00	ft³/s

Cross Section Image



Worksheet for ONSITE CROSS SECTION "D" - 10 YEAR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	1.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	77.30
0+06	77.19
0+67	75.97
0+69	75.85
0+69	76.35
0+76	76.83

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 77.30)	(0+06, 77.19)	0.013
(0+06, 77.19)	(0+67, 75.97)	0.016
(0+67, 75.97)	(0+69, 75.85)	0.013
(0+69, 75.85)	(0+69, 76.35)	0.013
(0+69, 76.35)	(0+76, 76.83)	0.035

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	0.23	ft
Elevation Range	75.85 to 77.30 ft	
Flow Area	0.72	ft²

Worksheet for ONSITE CROSS SECTION "D" - 10 YEAR

Results

Wetted Perimeter		8.21	ft
Hydraulic Radius		0.09	ft
Top Width		7.98	ft
Normal Depth		0.23	ft
Critical Depth		0.21	ft
Critical Slope		0.00785	ft/ft
Velocity		1.38	ft/s
Velocity Head		0.03	ft
Specific Energy		0.26	ft
Froude Number		0.81	
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	0.23	ft
Critical Depth	0.21	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00785	ft/ft

Cross Section for ONSITE CROSS SECTION "D" - 10 YEAR

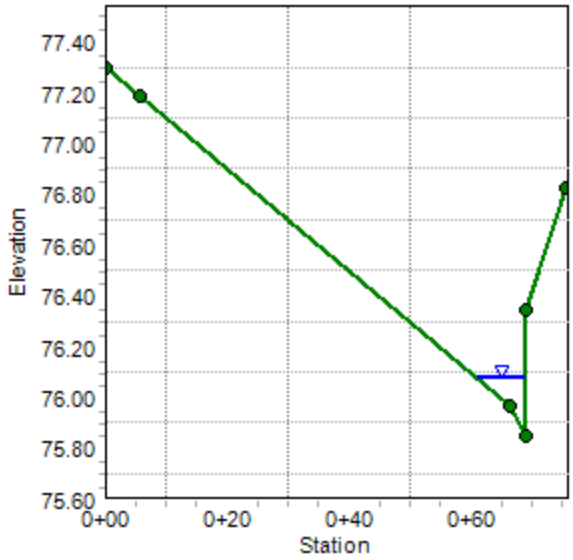
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.23	ft
Discharge	1.00	ft³/s

Cross Section Image



Worksheet for ONSITE CROSS SECTION "D" - 100 YEAR

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Discharge	1.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	77.30
0+06	77.19
0+67	75.97
0+69	75.85
0+69	76.35
0+76	76.83

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 77.30)	(0+06, 77.19)	0.013
(0+06, 77.19)	(0+67, 75.97)	0.016
(0+67, 75.97)	(0+69, 75.85)	0.013
(0+69, 75.85)	(0+69, 76.35)	0.013
(0+69, 76.35)	(0+76, 76.83)	0.035

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	0.23	ft
Elevation Range	75.85 to 77.30 ft	
Flow Area	0.72	ft²

Worksheet for ONSITE CROSS SECTION "D" - 100 YEAR

Results

Wetted Perimeter		8.21	ft
Hydraulic Radius		0.09	ft
Top Width		7.98	ft
Normal Depth		0.23	ft
Critical Depth		0.21	ft
Critical Slope		0.00785	ft/ft
Velocity		1.38	ft/s
Velocity Head		0.03	ft
Specific Energy		0.26	ft
Froude Number		0.81	
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		0.23	ft
Critical Depth		0.21	ft
Channel Slope		0.00500	ft/ft
Critical Slope		0.00785	ft/ft

Cross Section for ONSITE CROSS SECTION "D" - 100 YEAR

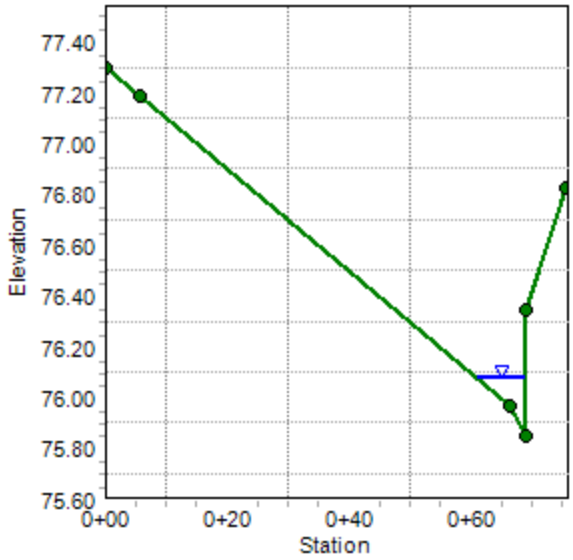
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.23	ft
Discharge	1.00	ft³/s

Cross Section Image



DRAINAGE PLANS

TACO BELL
AT CHARLESTON & EASTERN
APN: 139-35-803-015
2100 FREMONT STREET

ABBREVIATIONS
(SEE CVR. SHT. FOR COMPLETE LIST)

AC	ASPHALTIC CONCRETE
ADJ	ADJUST
AGG	AGGREGATE
BC	BACK OF CURB
BCR	BEGINNING OF CURB RETURN
BEG	BEGIN
BSW	BACK OF SIDEWALK
CATV	CABLE TV
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING
CCRFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
CL	CENTERLINE
CLV	CITY OF LAS VEGAS
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COMM	COMMUNICATIONS
CONC	CONCRETE
COND	CONDUIT
CULV	CULVERT
DC	DEPRESSED CURB
DG	DECOMPOSED GRANITE
DIP	DUCTILE IRON PIPE
DOM	DOMESTIC
ELEC	ELECTRIC
EAC	EDGE OF AC
EC	END OF CURVE
ECR	END OF CURB RETURN
ELEV	ELEVATION
EP	EDGE OF PAVEMENT
EVC	END OF VERTICAL CURVE
EX	EXISTING
FAST	FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION
FF	FINISH FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FO	FIBER OPTICS
FS	FINISHED SURFACE
GB	GRADE BREAK
HDPE	HIGH DENSITY POLYETHYLENE
HDWL	HEADWALL
HGL	HYDRAULIC GRADE LINE
HP	HIGH POINT
INV	INVERT
IRR	IRRIGATION
LAT	LATERAL
LF	LINEAL FEET
LS	LANDSCAPE
LT	LEFT
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MTR	METER
PB	PULL BOX
PL	PROPERTY LINE
PP	POWER POLE
PROP	PROPOSED
PVC	POLY VINYL CHLORIDE PIPE
PVMT	PAVEMENT
RIM	TOP OF MANHOLE OR CLEANOUT
RT	RIGHT
ROW	RIGHT-OF-WAY
SS	SANITARY SEWER
SD	STORM DRAIN
SNWA	SOUTHERN NEVADA WATER AUTHORITY
STA	STATION
STLT	STREET LIGHT
SVZ	SIGHT VISIBILITY ZONE
SW	SIDEWALK
TEL	TELEPHONE
TC	TOP OF CURB
TF	TOP OF FOOTING
TW	TOP OF WALL
TYP	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
VG	VALLEY GUTTER
WL	WATER LINE

LEGEND

DESCRIPTION	EXISTING	PROPOSED
UTILITIES		
B.O. VALVE		
FIRE HYDRANTS		
CLEAN OUT		
GATE VALVE		
METER		
REDUCER		
CAP		
11.25° ELBOW		
22.5° ELBOW		
45° ELBOW		
90° ELBOW		
CROSS		
TEE		
MANHOLES		
ELECTRICAL	(E)	(E)
SANITARY SEWER	(S)	(S)
STORM DRAIN	(D)	(D)
TELEPHONE	(T)	(T)
STREET LIGHTS		
100W HPS STLT.		
150W HPS STLT.		
200W HPS STLT.		
250W HPS STLT.		
400W HPS STLT.		
GRADING		
SPOT ELEV.	12.3± (TC)	12.34 TC
SLOPE	(1.2%±)	1.23%
5' CONT.	(2005)	2005
1' CONT.	(2007)	2007
SITE		
SIGN		
"L" CURB		
"A" CURB		
EDGE OF PVMT.		
WALL		
LINE TYPES		
CL OR SECTION LINE		
PROPERTY LINE		
RIGHT OF WAY LINE		
EASEMENT LINE		
SAWCUT LINE		
FLOW LINE		
SHADES		
HEAVY AC PAVEMENT		
LIGHT AC PAVEMENT		
CONCRETE PAVEMENT		

SHEET INDEX

ABBREVIATIONS

ABAN	ABANDON	HP	HIGH POINT
AC	ASPHALTIC CONCRETE	HPS	HIGH PRESSURE SODIUM
ACP	ASBESTOS CEMENT PIPE	ID	INSIDE DIAMETER
ADJ	ADJUST	INT	INTERSECTION
AGG	AGGREGATE	INV	INVERT
AIP	ABANDON IN PLACE	IRR	IRRIGATION
ALT	ALTERNATE	LAT	LATERAL
BC	BACK OF CURB	LF	LINEAL FEET
BCR	BEGINNING OF CURB RETURN	LS	LANDSCAPE
BDRY	BOUNDARY	LT	LEFT
BFE	BASE FLOOD ELEVATION	LVVWD	LAS VEGAS VALLEY WATER DISTRICT
BEG	BEGIN	MAX	MAXIMUM
BM	BENCHMARK	MH	MANHOLE
BSW	BACK OF SIDEWALK	MIN	MINIMUM
BVC	BEGINNING OF VERTICAL CURVE	MTR	METER
CATV	CABLE TV	NAP	NOT A PART
C&G	CURB AND GUTTER	NG	NATURAL GRADE
CBC	CITY OF BOULDER CITY	NDOT	NEVADA DEPARTMENT OF TRANSPORTATION
CC	CLARK COUNTY	NTS	NOT TO SCALE
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING	O/S	OFFSET
CCRFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT	OC	ON CENTER
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT	OD	OUTSIDE DIAMETER
CIP	CAST IRON PIPE	OHP	OVERHEAD POWER LINE
CL	CENTERLINE	PB	PULL BOX
CLV	CITY OF LAS VEGAS	PC	POINT OF CURVATURE
CM	CITY OF MESQUITE	PCC	POINT OF COMPOUND CURVE
CMP	CORRUGATED METAL PIPE	PI	POINT OF INTERSECTION
CMU	CONCRETE MASONRY UNIT	PL	PROPERTY LINE
CNLV	CITY OF NORTH LAS VEGAS	PP	POWER POLE
CO	CLEAN OUT	PRC	POINT OF REVERSE CURVE
COH	CITY OF HENDERSON	PROP	PROPOSED
COMM	COMMUNICATIONS	PT	POINT OF TANGENT
CONC	CONCRETE	PVC	POLY VINYL CHLORIDE PIPE
COND	CONDUIT	PVI	POINT OF VERTICAL INTERSECTION
CONST	CONSTRUCT OR CONSTRUCTION	PVMT	PAVEMENT
CULV	CULVERT	Q	RATE OF FLOW
DC	DEPRESSED CURB	R or RAD	RADIUS
DI	DROP INLET	RCB	REINFORCED CONCRETE BOX
DIA	DIAMETER	RCP	REINFORCED CONCRETE PIPE
DIP	DUCTILE IRON PIPE	RR	RAILROAD
DMH	DROP MANHOLE	RT	RIGHT
DOM	DOMESTIC	ROW	RIGHT-OF-WAY
DWY	DRIVEWAY	SS	SANITARY SEWER
E or ELEC	ELECTRIC	SD	STORM DRAIN
EAC	EDGE OF AC	SHT	SHEET
EC	END OF CURVE	SIG	SIGNAL
ECR	END OF CURB RETURN	SNWA	SOUTHERN NEVADA WATER AUTHORITY
EL or ELEV	ELEVATION	STA	STATION
EP	EDGE OF PAVEMENT	SL or STLT	STREET LIGHT
EVC	END OF VERTICAL CURVE	STD	STANDARD
EW	EACH WAY	SVZ	SIGHT VISIBILITY ZONE
EX or EXIST	EXISTING	SW	SIDEWALK
FAST	FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION	T or TEL	TELEPHONE
FC	FACE OF CURB	TC	TOP OF CURB
FF	FINISH FLOOR	TF	TOP OF FOOTING
FG	FINISH GRADE	TMH	TOP OF MANHOLE
FH	FIRE HYDRANT	TRANS	TRANSITION
FL	FLOW LINE	TS	TRAFFIC SIGNAL
FO	FIBER OPTICS	TW	TOP OF WALL
FS	FINISHED SURFACE	TYP	TYPICAL
FTG	FOOTING	UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
G	GAS	VC	VERTICAL CURVE
GALV	GALVANIZED	VCP	VITRIFIED CLAY PIPE
GB	GRADE BREAK	VERT	VERTICAL
H	HIGH OR HEIGHT	VG	VALLEY GUTTER
HDPE	HIGH DENSITY POLYETHYLENE	WL	WATER LINE
HDWL	HEADWALL	W/	WITH
HGL	HYDRAULIC GRADE LINE	W/O	WITHOUT
HOR	HORIZONTAL	W	WIDE OR WIDTH

UTILITY PROVIDERS

WATER: _____ LAS VEGAS VALLEY WATER DISTRICT

SEWER: _____ CITY OF LAS VEGAS

GAS: _____ SOUTHWEST GAS CORPORATION

ELECTRIC: _____ NV ENERGY

TELEPHONE: _____ CENTRAL TELEPHONE COMPANY DBA CENTURYLINK

CABLE TV: _____ COX COMMUNICATIONS OF LAS VEGAS

TRASH: _____ REPUBLIC SERVICES, INC.

VICINITY MAP

N

OWNER
FSD LAKE MEAD LLC
2929 E. CAMELBACK ROAD
PHOENIX, AZ 85016
CONTACT: CHRIS CZYZ
PHONE: (602) 714-3099

DEVELOPER
SILVER STATE BELL
2929 E. CAMELBACK ROAD
PHOENIX, AZ 85016
CONTACT: CHRIS CZYZ
PHONE: (602) 714-3099

ENGINEER
CIVILWORKS, INC.
4945 W. PATRICK LANE
LAS VEGAS, NEVADA 89118
CONTACT: JODI E. JORJORIAN, P.E.
PHONE: (702) 534-7555
FAX: (702) 534-1825

BENCHMARK
#OLV0135SESA ELEVATION = 536.511 METERS/1872.90 FEET BEING A RIVET AND SQUARE ALUMINUM PLATE IN TOP OF CURB AT THE NORTHWEST CORNER OF CHARLESTON AND EASTERN AVENUE.

BASIS OF BEARING
NORTH 00°13'16" WEST BEING THE WEST LINE OF LOCATED IN THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN IN BOOK 117 PAGE 75 OF PLATS, RECORDED IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA.

APPROVALS

_____ _____
ALLEN PAVELKA, PE #9029 DATE
CITY ENGINEER

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHT-OF-WAY AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARD. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARDS DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA, NEVADA.

_____ _____
CHRIS KNIGHT, DIRECTOR – BUILDING AND SAFETY DEPARTMENT DATE

THESE PLANS MEET THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

_____ _____
LAS VEGAS FIRE AND RESCUE DATE

_____ _____
SOUTHWEST GAS CORPORATION DATE

_____ _____
NV ENERGY DATE

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.

_____ _____
COX COMMUNICATIONS LAS VEGAS, INC. DATE

_____ _____
CENTRAL TELEPHONE COMPANY DBA CENTURYLINK DATE

THE AFFIXED CENTRAL TELEPHONE COMPANY, DBA 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 STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

_____ _____
LAS VEGAS VALLEY WATER DISTRICT SERVICES MANAGER DATE

PROJECT # _____ SHEETS C1, C2, C5, C6
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

architecture/engineering/site planning/interior design
GARY GUY WILSON AIA ARCHITECTS, PC
4945 West Patrick Lane (702)534-7888
Las Vegas, Nevada 89118 professional corp / certified n.c.a.r.b.

CivilWorks Inc
Engineering with "attitude" solutions tailored to your "specific" needs
4945 W. Patrick Lane Las Vegas, NV 89118
Office#: (702)534-1816 Fax#: (702)534-1825

TACO BELL
AT CHARLESTON AND EASTERN
NEW COMMERCIAL CONSTRUCTION
FOR: FIRST STREET DEVELOPMENT
LAS VEGAS, NEVADA

PROJ.NO.	15401608.01
PRIN.ARCH.	G.G.WILSON,AIA
PROJ.ARCH.	GGW
JOB CAPT.	JJC
PROJ. ENGR.	JEJ
PROJ. DESGR	JLC/TND
PH-2/3	-
PH-4	-
PH-5	-

REVISIONS

COVER SHEET

PRINTS REQUIRE ENGINEER'S SEAL & SIGN. FOR PROOF OF VALIDITY

PROFESSIONAL ENGINEER-STATE OF NEVADA
JODI E. JORJORIAN
Exp: 6/30/17
CIVIL
NO 13816

CLV #_____

SHT.NO C1 OF 9

Call before you dig
Avoid cutting underground utility lines. It's costly.
Call 811 OR 1-800-227-2600

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

CITY OF LAS VEGAS FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. AUTHORIZED FIRE HYDRANTS ARE AS FOLLOWS:
   KENNEDY – GUARDIAN MODELS K81A AND K81D
   MUELLER – SUPER CENTURION 250, MODEL A-423
   CLOW – MEDALLION MODEL F-2546LVD
   U.S. PIPE – METROFLOW/M-03
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. [IFC 105.7.12]
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [IFC 3310, 3312.]
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTERLINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. [IFC 507.5.7.3]
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. [IFC 106.3]
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A. APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. [IFC 507.2.1, NFPA 24]
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. [IFC 507]
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. [IFC 507.5.7.1]
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. [IFC 507]
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: IFC C102
    RESIDENTIAL – 500 FEET UNSPRINKLERED; 600 FEET SPRINKLERED.
    COMMERCIAL – 300 FEET UNSPRINKLERED; 400 FEET SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT MAXIMUM 1,000 FOOT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. [IFC C102.8]
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FEET OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREET LIGHT OR ANY OTHER OBSTRUCTION. [IFC C102.12]
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC C102.4]
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC C102.7]
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [IFC C102.6]
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [IFC C104]
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [IFC 503.2.3]
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12%. ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FEET PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [IFC 503.2.7; 503.2.8]
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. [IFC 503.2.4]
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13 FT 6 INS. [IFC 503.2.1]
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES. NOT LESS THAN 32 FT WIDE, FLOW LINE TO FLOW LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ROAD. NOT LESS THAN 24 FT WIDE, FLOW LINE TO FLOW LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 250 FT IF THE BUILDING IS SPRINKLERED. [IFC 503.1.1]
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. [IFC 503.1.1]
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. [IFC 503.1.2]
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. [IFC 503.2.5]
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [IFC 503.3]
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC 503.6 AND IFC APPENDIX M.

REVISED 7/1/2014

DEVIATIONS FROM STANDARDS

NONE.

CITY OF LAS VEGAS TRAFFIC NOTES (REVISED 4/15/10)

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN A RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE, THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SAFE ROUTE TO SCHOOL" IS ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALL ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL BE FABRICATED WITH DIAMOND GRADE VIP CLASS 6 REFLECTIVE SHEETING OR APPROVED EQUAL. ALL NEW TRAFFIC SIGNS, EXCEPT STREETNAME AND SCHOOL SPEED LIMIT SIGNS, SHALL HAVE 3M SERIES 1160 OR APPROVED EQUIVALENT ANTI-GRAFFITI PROTECTIVE OVERLAY FILM; SCHOOL ZONE SIGNS SHALL HAVE 3M SERIES 1150 ANTI-GRAFFITI PROTECTIVE OVERLAY FILM. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITH FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON THE SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALL PER CITY STANDARD SPECIFICATIONS FOR THE PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO ENSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET-UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZENS AREA TRANSIT (CAT) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE #828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET UP BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPECTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

GENERAL UTILITY NOTES

1. ALL WATER LINES 4" OR GREATER TO BE CL. 150, C900 PVC. ALL WATER LINES SMALLER THAN 4" TO BE SCH. 40 PVC. ALL WATER LINES CONNECTED TO REMOTE FIRE DEPT. CONNECTIONS TO BE CL. 200, C900 PVC.
2. ALL GRAVITY SANITARY SEWER LINES TO BE SDR-35 PVC. ALL FORCE MAIN SANITARY SEWER LINES TO BE SCH. 40 PVC.
3. WATER LINES TO HAVE THRUST BLOCKS CONSTRUCTED PER U.D.A.C.S. PLATE No. 5. THRUST BLOCKS TO BE LOCATED AT ALL ANGLE FITTINGS (BENDS), TEE'S, AND FIRE HYDRANTS. ANCHOR BLOCKS TO BE CONSTRUCTED, PER U.D.A.C.S. PLATE No. 3. ANCHOR BLOCKS TO BE LOCATED AT ALL IN-LINE REDUCERS AND GATE VALVES.
4. WET TAPS TO BE CONSTRUCTED IN CONFORMANCE WITH U.D.A.C.S. PLATE No. 22.
5. THE FIRE SAFETY CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING THE SIZE OF PIPING THAT IS REQUIRED TO CONNECT FROM THE FIRE WATER LOOP TO THE FIRE SPRINKLER RISER. LINE SIZE SHOWN FOR INFORMATION PURPOSES ONLY.
6. TRENCH BACKFILL FOR WATER LINES TO BE CONSTRUCTED PER U.D.A.C.S. PLATE No. 6A, 6B, 6C OR 6D.
7. TRENCH BACKFILL FOR STORM DRAIN LINES TO BE CONSTRUCTED PER D.C.S.W.C.S. DRAWING No. SD-16B.
8. ONLY SEWER LINES AND LATERALS MAY BE INSTALLED IN TRENCHES EXCAVATED FOR SEWER LINES. SEE D.C.S.W.C.S. SECTION 2.2.18 (TYPICAL).
9. WATER AND SEWER SEPARATION OF TRENCHES MUST BE AT LEAST 10' MINIMUM (TYPICAL). SEE D.C.S.W.C.S. SECTION 2.2.21 "A1", U.D.A.C.S. SECTION 2.19.01 "A".
10. CONTRACTOR TO SAWCUT AND REMOVE EXISTING ASPHALT AND CONCRETE AS NECESSARY FOR UTILITY TRENCHES, BACKFILL AND PATCH ALL TRENCHES AS INDICATED ON DETAILS AND/OR ACCORDING TO THE GOVERNING ENTITY.
11. THESE DRAWINGS MAY NOT INDICATE ALL EXISTING BURIED UTILITY LINES. CONTRACTOR IS TO EXERCISE GREAT CARE DURING EXCAVATION IN ORDER TO AVOID MAKING CONTACT WITH ANY EXISTING UTILITY LINES. IF UTILITY LINES ARE DAMAGED BY THE CONTRACTOR, SUCH DAMAGE SHALL BE REPLACED TO THE SATISFACTION OF THE OWNER AT THE CONTRACTOR'S EXPENSE.
12. CONTRACTOR TO LOCATE AND VERIFY SIZE, LINE TYPE, CONDITION, DEPTH, PRESSURE, AND LOCATION OF ALL EXISTING UTILITY LINES WITHIN THE CONSTRUCTION AREA PRIOR TO CONSTRUCTION. THE CIVIL ENGINEER SHALL BE CONTACTED ONCE THE UTILITY LINE IS LOCATED.
13. CONTRACTOR/OWNER TO OBTAIN C.C.P.W. OFF-SITE IMPROVEMENT PERMIT FOR ALL WORK WITHIN PUBLIC RIGHT-OF-WAY.
14. CONTRACTOR TO VERIFY UTILITY STUB LOCATIONS AND SIZE WITH PLUMBING PLANS PRIOR TO INSTALLATION OF NEW UTILITIES.
15. LATERALS SHALL NOT BE CONNECTED INTO STUBS EXTENDING FROM MANHOLES, SERVICE LATERALS 6" OR SMALLER WILL NOT BE ALLOWED TO CONNECT INTO MANHOLES. SEE D.C.S.W.C.S. SECTION 2.2.19 (TYPICAL).
16. ALL EXISTING STREET LIGHTS INDICATED ON THESE PLANS ARE SHOWN FOR INFORMATION PURPOSES ONLY. LOCATION IS APPROXIMATE UNLESS NOTED WITH STATION AND OFFSET.
17. ALL EXISTING GAS LINE LOCATIONS SHOWN ON THESE PLANS ARE APPROXIMATIONS ONLY. PROPOSED GAS LINES SHOWN ON THESE PLANS ARE FOR COORDINATION ONLY. SEE SOUTHWEST GAS PLANS FOR CONSTRUCTION.
18. ALL EXISTING ELECTRICAL LINES SHOWN ON THESE PLANS ARE APPROXIMATIONS ONLY. PROPOSED ELECTRICAL LINES SHOWN ON THESE PLANS ARE FOR COORDINATION ONLY. SEE ELECTRICAL PLANS FOR CONSTRUCTION.
19. SEE LEGEND FOR EXISTING AND PROPOSED UTILITY SYMBOLS.
20. ALL DIMENSIONS TO UTILITIES LINES ARE TO CENTERLINE OF PIPE UNLESS INDICATED OTHERWISE.
21. ALL LINEAR FEET OF STORM DRAIN AND SANITARY SEWER PIPE NOTED ON PLANS IS MEASURED FROM CENTER OF MANHOLE TO CENTER OF MANHOLE.

CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME, THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES, AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGN TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWINGS 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY NOVA GEOTECHNICAL, PROJECT NO.: E-15-001, DATED: JAN. 20, 2015, APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC., TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC, THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINTIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).

   OR

   SANITARY SEWER AND STORM DRAIN FACILITIES SHOWN ON THESE PLANS SHALL BE USED TO MEET THE REQUIREMENTS OF NRS 455 AND SHALL SHOW AT A MINIMUM THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, AND THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY. ANY DEVIATIONS FROM THE INFORMATION SHOWN SHALL BE NOTED AND SUBMITTED AS A REVISION TO THE PLANS AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION.
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST ADDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED 02/03/15

ENGINEER'S GENERAL NOTES

1. THE CONTRACTOR IS TO VISIT THE SITE AND VERIFY ALL DIMENSIONS AND SITE CONDITIONS BEFORE BIDDING AND STARTING WORK, AND ACCEPT THEM AS HE FINDS THEM. UNLESS NOTIFYING THE ARCHITECT, ENGINEER AND/OR OWNER IN WRITING AND RECEIVING WRITTEN INSTRUCTIONS PRIOR TO BIDDING THE WORK, NO EXTRA COST TO THE CONSTRUCTION CONTRACT, THE ARCHITECT, ENGINEER AND/OR OWNER SHALL BE ALLOWED DUE TO THE PRIOR CONDITIONS.
2. SHOULD CONFLICT AND/OR DISCREPANCY APPEAR IN/OR BETWEEN THE DRAWINGS AND THE SPEC'S, OR WORK PERFORMED BY OTHERS, WHICH AFFECTS THE WORK, THE CONTRACTOR IS TO NOTIFY THE ARCHITECT, ENGINEER AND/OR OWNER IN WRITING AT ONCE AND RECEIVE WRITTEN INSTRUCTIONS PRIOR TO PROCEEDING. SHOULD THE CONTRACTOR PROCEED PRIOR TO RECEIPT OF THE ARCHITECT'S, ENGINEER'S AND/OR OWNER'S WRITTEN INSTRUCTIONS, THE CONTRACTOR SHALL MAKE GOOD AND CORRECT ANY WORK AND/OR DAMAGES RESULTING FROM THE PROCEDURE. NO EXTRA COST TO THE CONSTRUCTION CONTRACT, THE ARCHITECT, ENGINEER AND/OR OWNER SHALL BE ALLOWED FOR SUCH CORRECTIONS.
3. SHOULD CONFLICT AND/OR DISCREPANCY APPEAR IN/OR BETWEEN THE DRAWINGS AND SPEC'S, IT IS DEEMED THE CONTRACTOR TO HAVE ESTIMATED THE MOST EXPENSIVE CONSTRUCTION METHOD OR MATERIAL INVOLVED UNLESS THE CONTRACTOR HAD ASKED FOR AND RECEIVED WRITTEN DECISIONS FROM THE ARCHITECT, ENGINEER AND/OR OWNER PRIOR TO SIGNING OF THE CONSTRUCTION AGREEMENT AS TO THE METHOD OR MATERIALS TO BE EMPLOYED, NO EXTRA COST TO THE CONSTRUCTION CONTRACT, THE ARCHITECT, ENGINEER AND/OR OWNER SHALL BE ALLOWED FOR THESE ITEMS.
4. SHOULD DIMENSIONAL ERRORS OCCUR THE CONTRACTOR SHALL NOTIFY THE ARCHITECT, ENGINEER AND/OR OWNER PRIOR TO COMMENCEMENT OF THAT PORTION OF THE WORK. DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALE MEASUREMENTS AND DETAIL DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL SMALL SCALE DRAWINGS. DETAILS REPRESENTATIONS HAVING THE LARGER SCALE SHALL GOVERN. WORK INDICATED BUT NOT PARTICULARLY DETAILED OR SPECIFIED SHALL BE EQUAL TO SIMILAR PARTS THAT ARE DETAILED OR SPECIFIED. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD BEFORE SHOP DRAWINGS ARE MADE AND BEFORE ANY WORK IS CONSTRUCTED OR FABRICATED.
5. THE CONTRACTOR IS TO CONFIRM ADA ACCESS RAMPS AND AREAS ARE WITHIN THE ADA STANDARDS/REQUIREMENTS FOR CROSS SLOPE AND RUNNING SLOPE PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT, ENGINEER AND/OR OWNER, IN WRITING IMMEDIATELY OF ANY ADA ACCESS AREAS THAT DO NOT MEET ADA STANDARDS/REQUIREMENTS. SHOULD THE CONTRACTOR PROCEED PRIOR TO RECEIPT OF THE ARCHITECT'S, ENGINEER'S AND/OR OWNER'S WRITTEN INSTRUCTIONS, THE CONTRACTOR SHALL CORRECT THE WORK RESULTING FROM PROCEDURE. NO EXTRA LOST TO THE CONSTRUCTION CONTRACT SHALL BE ALLOWED FOR SUCH CORRECTIONS.

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE "DESIGN & CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS" AND THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACK FILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES IN PAVED STREETS EIGHTY (80') ROW AND LARGER, SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT ROW WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" 'S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/15/10

CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREA INDICATED:

HORIZONTAL	VERTICAL	COMPACTION
A. PAVEMENT AREA SUBGRADE SEE SOILS REPORT	0.1'+	+0.0' TO -0.1'
B. ENGINEERED FILL	0.5+	+0.1' TO -0.1'

SEE SOILS REPORT

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.

7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED 4/15/10

LAS VEGAS VALLEY WATER DISTRICT NOTES

LVVWD PROJECT # ______________ - ______________

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVWD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO THE LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPESEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
9. ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED, AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVVWD DISTRIBUTION SYSTEM.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVWD PRE-APPROVED MATERIALS AND MANUFACTURER'S LISTING FOR NEW FACILITIES, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.
13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.
14. THE INSTALLATION OF LAS VEGAS VALLEY WATER DISTRICT (LVVWD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORM STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR PATCH ON THE STREET SURFACE.

ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ABUTTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF IT'S FACILITIES, WILL BE REPLACED BY LVVWD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT SERVICES MANAGER ______ DATE: ______

LVVWD PROJECT # ________ SHEETS C1, C2, C5

CITY OF LAS VEGAS STREETLIGHT NOTES

1. ALL STREET LIGHTING INSTALLATION SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION, AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION.
2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS (ETC.) LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC/ELECTRICAL FIELD OPERATIONS DIVISION AND THE CONSTRUCTION PROJECT REPRESENTATIVE. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623.L0.03 (e) OF THE SPECIFICATIONS.
3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.
4. ALL EMPTY CONDUIT SHALL HAVE PULL STRINGS INSTALLED PRIOR TO FINAL INSPECTION.
5. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM OF EIGHTEEN INCHES (18") TO THE FACE OF STREET LIGHTING POLE ON ALL SIDES WHEN STREETLIGHT IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.
6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE ELECTRICAL SERVICES SECTION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWINGS NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
7. SERVICE POINT SHALL BE COORDINATED WITH NEVADA POWER COMPANY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.
8. IT SHALL BE ASSUMED THAT IN THE ABSENCE OF AN EXISTING, WORKABLE CIRCUIT TO ATTACH TO, ALL INSTALLATIONS SHALL REQUIRE A NEW SERVICE FOR OPERATION OF THE CIRCUIT.
9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREET LIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREETLIGHT BASES ARE INSTALLED AT NO EXPENSE TO THE CITY OF LAS VEGAS.
10. THE CONTRACTOR SHALL FURNISH COMPLETE SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON PLANS.
11. THE DEVELOPER/OWNER WILL BE REQUIRED TO SUPPLY POWER TO ALL NEW PUBLIC STREET LIGHTS INSTALLED UNDER THIS DESIGN PRIOR TO BOND RELEASE OR PROJECT COMPLETION. THE DEVELOPER/OWNER WILL BE RESPONSIBLE FOR ALL ITEMS ASSOCIATED WITH THE INSTALLATION CONSTRUCTION, ENERGIZING, MAINTENANCE AND OPERATIONAL COST OF SAID STREET LIGHTS PRIOR TO PROJECT COMPLETION. REFER TO THE PLAN FOR ANY NEW SERVICE REQUIREMENTS. THE TRANSFER OF OWNERSHIP FROM THE DEVELOPER/OWNER TO THE CITY OF LAS VEGAS FOR ALL NEW PUBLIC STREET LIGHT/S AND/OR SERVICE/S INSTALLED UNDER THIS PLAN DESIGN WILL BE IN CONJUNCTION WITH THIS PROJECT COMPLETION. COORDINATE ALL MAINTENANCE AND OPERATIONAL TRANSFERS WITH THE CITY OF LAS VEGAS TRAFFIC ENGINEERING DEPARTMENT (TEFO) AT (702) 229-6331.

REVISED 4/15/10

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Call 811
1-800-227-2600

FAST
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UnderGround
1-702-432-5300

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CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

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TACO BELL AT CHARLESTON AND EASTERN
NEW COMMERCIAL CONSTRUCTION
FOR: FIRST STREET DEVELOPMENT
LAS VEGAS, NEVADA

PROJ.NO.	15401608.01
PRIN.ARCH.	G.G.WILSON,AIA
PROJ.ARCH.	GGW
JOB CAPT.	JJC
PROJ. ENGR.	JEJ
PROJ. DESGR	JLC/TND
PH-2/3	–
PH-4	–
PH-5	–

REVISIONS

PRINTS REQUIRE ENGINEER'S SEAL & SIGN. FOR PROOF OF VALIDITY

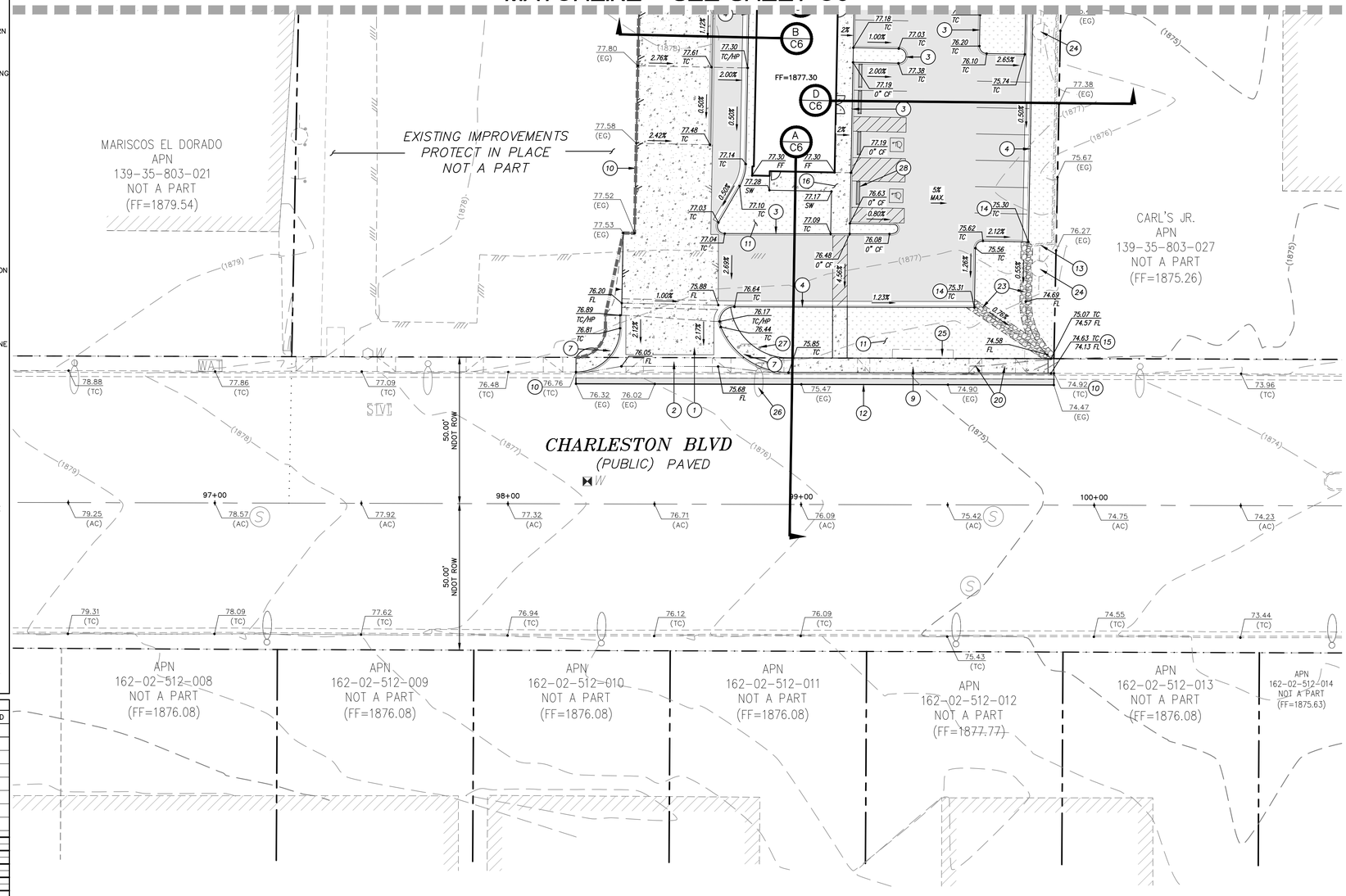
PROFESSIONAL ENGINEER – STATE OF NEVADA
JODI E. JORJORIAN
Exp: 6/30/17
CIVIL
No. 13816

NOTE SHEET

CLV #__________

SHT.NO. C2 OF 9

MATCHLINE - SEE SHEET C5



ABBREVIATIONS
(SEE CVR. SHT. FOR COMPLETE LIST)

AC	ASPHALTIC CONCRETE
ADJ	ADJUST
AGG	AGGREGATE
BC	BACK OF CURB
BCR	BEGINNING OF CURB RETURN
BEG	BEGIN
BSW	BACK OF SIDEWALK
CATV	CABLE TV
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING
CCRFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
CL	CENTERLINE
CLV	CITY OF LAS VEGAS
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COMM	COMMUNICATIONS
CONC	CONCRETE
COND	CONDUIT
CULV	CULVERT
DC	DEPRESSED CURB
DG	DECOMPOSED GRANITE
DIP	DUCTILE IRON PIPE
DOM	DOMESTIC
ELEC	ELECTRIC
EAC	EDGE OF AC
EC	END OF CURVE
ECR	END OF CURB RETURN
ELEV	ELEVATION
EP	EDGE OF PAVEMENT
EVC	END OF VERTICAL CURVE
EX	EXISTING
FAST	FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION
FF	FINISH FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FO	FIBER OPTICS
FS	FINISHED SURFACE
GB	GRADE BREAK
HDPE	HIGH DENSITY POLYETHYLENE
HDWL	HEADWALL
HGL	HYDRAULIC GRADE LINE
HP	HIGH POINT
INV	INVERT
IRR	IRRIGATION
LAT	LATERAL
LF	LINEAL FEET
LS	LANDSCAPE
LT	LEFT
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MTR	METER
PB	PULL BOX
PL	PROPERTY LINE
PP	POWER POLE
PROP	PROPOSED
PVC	POLY VINYL CHLORIDE PIPE
PVMT	PAVEMENT
RIM	TOP OF MANHOLE OR CLEANOUT
RT	RIGHT
ROW	RIGHT-OF-WAY
SS	SANITARY SEWER
SD	STORM DRAIN
SNWA	SOUTHERN NEVADA WATER AUTHORITY
STA	STATION
STLT	STREET LIGHT
SVZ	SIGHT VISIBILITY ZONE
SW	SIDEWALK
TEL	TELEPHONE
TC	TOP OF CURB
TF	TOP OF FOOTING
TW	TOP OF WALL
TYP	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
VG	VALLEY GUTTER
WL	WATER LINE

LEGEND

DESCRIPTION	EXISTING	PROPOSED
UTILITIES		
B.O. VALVE		
FIRE HYDRANTS		
CLEAN OUT		
GATE VALVE		
METER		
REDUCER		
CAP		
11.25° ELBOW		
22.5° ELBOW		
45° ELBOW		
90° ELBOW		
CROSS		
TEE		
MANHOLES		
ELECTRICAL	(E)	(E)
SANITARY SEWER	(S)	(S)
STORM DRAIN	(D)	(D)
TELEPHONE	(T)	(T)
STREET LIGHTS		
100W HPS STLT.		
150W HPS STLT.		
200W HPS STLT.		
250W HPS STLT.		
400W HPS STLT.		
GRADING		
SPOT ELEV.	12.3± (TC)	12.34 TC
SLOPE	(1.2%±)	1.23%
5' CONT.	(2005)	2005
1' CONT.	(2007)	2007
SITE		
SIGN		
"L" CURB		
"A" CURB		
EDGE OF PVMT.		
WALL		
LINE TYPES		
CL OR SECTION LINE		
PROPERTY LINE		
RIGHT OF WAY LINE		
EASEMENT LINE		
SAWCUT LINE		
FLOW LINE		
SHADES		
HEAVY AC PAVEMENT		
LIGHT AC PAVEMENT		
CONCRETE PAVEMENT		

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, NEVADA 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 SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 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 OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR 100000, SECTION III.A.12.

5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER 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.

GRADING NOTES:

1. SLOPES 4:1 OR STEEPER AND FINE-GRAINED MATERIALS THAT HAVE BEEN DISTURBED (SANDY AND SILTY MATERIALS) SHOULD BE PROTECTED WITH BURLAP OR OTHER EROSION CONTROL FABRIC/MATERIAL, UNLESS OTHERWISE SPECIFIED BY LANDSCAPE DRAWINGS AND SPECIFICATIONS OR THE SOILS REPORT.

2. CONTRACTOR SHALL DETERMINE HIS OWN FOOTING OR BASEMENT EXCAVATION QUANTITIES, EVEN THOUGH SHOWN ON ROUGH GRADING PLANS. ADDITIONALLY, STRUCTURE BACKFILL COSTS SHOULD BE INCLUDED IN THE COST OF THE STRUCTURE, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

3. CONTRACTOR SHALL NOTIFY CIVILWORKS INC WITHIN 24 HOURS OF OMISSIONS AND ERRORS DISCOVERED ON PLANS. CIVILWORKS INC WILL NOT BE RESPONSIBLE FOR ANY "CORRECTIVE" WORK DONE BY OTHERS.

EARTHWORK QUANTITIES

NOTE: THIS QUANTITY IS FOR ESTIMATING PURPOSES ONLY.CONTRACTOR TO DETERMINE INDEPENDENT ESTIMATIONS.

CUT _____ CY

FILL _____ CY

LEGEND:

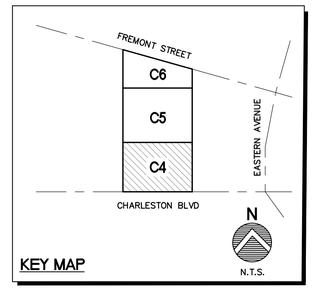
LIMITS OF GRADING

N

GRAPHIC SCALE

20 0 10 20 40

(IN FEET)
1 inch = 20 ft.



KEY MAP

CONSTRUCTION NOTES

1. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225 WITH GEOMETRICS PER CCAUSD #222.1.
2. CONSTRUCT CROSS GUTTER PER CCAUSD #228.
3. CONSTRUCT 'A' TYPE CURB PER CCAUSD #219.
4. CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD #216.
5. CONSTRUCT X" AC PAVEMENT OVER X" TYPE II AGGREGATE BASE. (ONSITE)
6. CONSTRUCT X" CONCRETE PAVEMENT OVER X" AGGREGATE BASE.
7. CONSTRUCT ADA RAMPS PER CCAUSD #235, CASE I, A&B=8', UNLESS OTHERWISE NOTED.
8. SAWCUT, TRENCH, BACKFILL AND PAVEMENT REPAIR PER CCAUSD #500.1, #500.2, AND #503.
9. CONSTRUCT 5' WIDE CONCRETE SIDEWALK PER CCAUSD #234.
10. MATCH EXIST. ELEVATION
11. LANDSCAPE AREA. SEE LANDSCAPE ARCHITECT'S PLANS.
12. SAWCUT AND MATCH EXISTING SECTION.
13. REMOVE EXISTING WALL.
14. CONSTRUCT CURB OPENING PER DETAIL-X, ON SHEET CX
15. CONSTRUCT UNDER SIDEWALK DRAIN PER CCAUSD #238
16. CONSTRUCT CONCRETE WALKWAY
19. TRASH ENCLOSURE SEE ARCHITECTURAL PLANS
20. REMOVE AND REPLACE EXISTING CURB GUTTER SIDEWALK AND DRIVEWAY APPROACH AS SHOWN. REFER TO HORIZONTAL CONTROL PLAN FOR LINE AND CURVE TABLES.
21. CONSTRUCT ISLAND MEDIAN CURB PER CCAUSD #_____
22. NOT USED
23. CONSTRUCT BMP SWALE PER DETAIL-X, ON SHEET CX
24. EXISTING POWER POLES PROTECT IN PLACE
25. EXISTING BUS STOP STRUCTURE PROTECT IN PLACE.
26. REMOVE AND RELOCATE STREET LIGHT.
27. REMOVE EXISTING SIGN AND BOLLARDS.
28. INSTALL PRECAST BUMPER BLOCK PER CCAUSD #238

GRADING PLAN CERTIFICATION

JODI E. JORJORIAN PE #13816 DATE:

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH APPROVED DRAINAGE STUDY HTE #00-0000 FOR THIS SITE ON FILE AT CLARK COUNTY FOR THIS PROJECT.

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811 OR
1-800-227-2600

FAST
Call before you UnderGround
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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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TACO BELL
@ CHARLESTON
NEW COMMERCIAL CONSTRUCTION
FOR: FIRST STREET DEVELOPMENT
LAS VEGAS, NEVADA

GRADING PLAN 1

PROJ.NO.	15401608.01
PRIN.ARCH.	G.G.WILSON,AIA
PROJ.ARCH.	GGW
JOB CAPT.	JJC
TECH'N	JEJ
ARCH.CHK.	JLC/TND
PH-2/3	-
PH-4	-
PH-5	-

REVISIONS

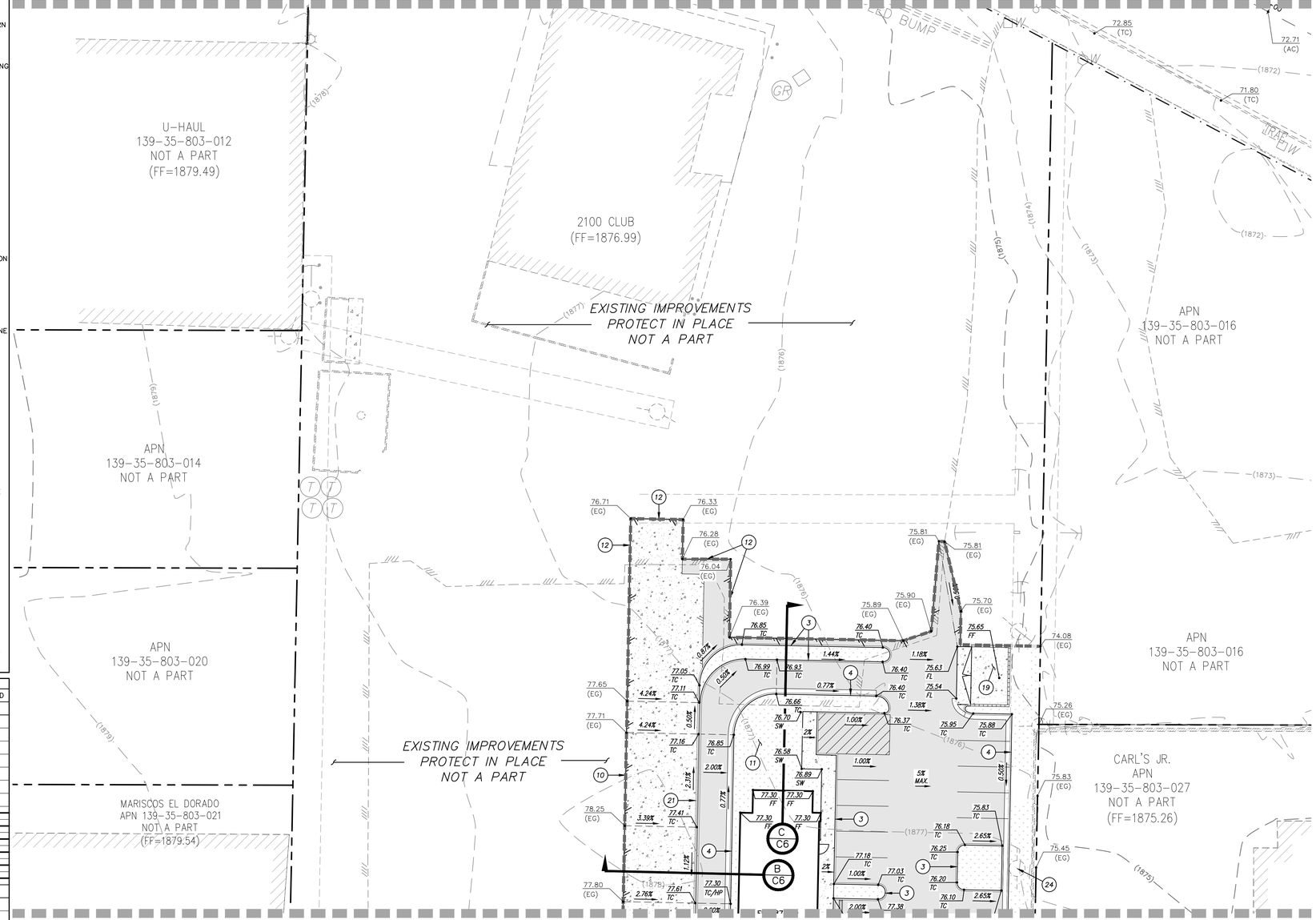
PRINTS REQUIRE ENGINEER'S SEAL & SIGN. FOR PROOF OF VALIDITY

PROFESSIONAL ENGINEER - STATE OF NEVADA
JODI E. JORJORIAN
Exp: 6/30/17
CIVIL
No. 13816

CLV #_____

SHT.NO. C4 OF x

MATCHLINE - SEE SHEET C6



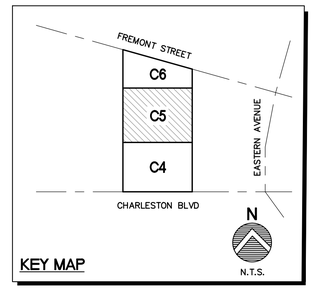
MATCHLINE - SEE SHEET C4

N

GRAPHIC SCALE

20 0 10 20 40

(IN FEET)
1 inch = 20 ft.



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JODI E. JORJORIAN PE #13816 DATE:

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HDWL	HEADWALL
HGL	HYDRAULIC GRADE LINE
HP	HIGH POINT
INV	INVERT
IRR	IRRIGATION
LAT	LATERAL
LF	LINEAL FEET
LS	LANDSCAPE
LT	LEFT
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MTR	METER
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PVC	POLY VINYL CHLORIDE PIPE
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SS	SANITARY SEWER
SD	STORM DRAIN
SNWA	SOUTHERN NEVADA WATER AUTHORITY
STA	STATION
STLT	STREET LIGHT
SVZ	SIGHT VISIBILITY ZONE
SW	SIDEWALK
TEL	TELEPHONE
TC	TOP OF CURB
TF	TOP OF FOOTING
TW	TOP OF WALL
TYP	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
VG	VALLEY GUTTER
WL	WATER LINE

LEGEND

DESCRIPTION	EXISTING	PROPOSED
UTILITIES		
B.O. VALVE		
FIRE HYDRANTS		
CLEAN OUT		
GATE VALVE		
METER		
REDUCER		
CAP		
11.25° ELBOW		
22.5° ELBOW		
45° ELBOW		
90° ELBOW		
CROSS		
TEE		
MANHOLES		
ELECTRICAL	(E)	(E)
SANITARY SEWER	(S)	(S)
STORM DRAIN	(D)	(D)
TELEPHONE	(T)	(T)
STREET LIGHTS		
100W HPS STLT.		
150W HPS STLT.		
200W HPS STLT.		
250W HPS STLT.		
400W HPS STLT.		
GRADING		
SPOT ELEV.	12.3± (TC)	12.34 TC
SLOPE	(1.2%±)	1.23%
5' CONT.	(2005)	2005
1' CONT.	(2007)	2007
SITE		
SIGN		
"L" CURB		
"A" CURB		
EDGE OF PVMT.		
WALL		
LINE TYPES		
CL OR SECTION LINE		
PROPERTY LINE		
RIGHT OF WAY LINE		
EASEMENT LINE		
SAWCUT LINE		
FLOW LINE		
SHADES		
HEAVY AC PAVEMENT		
LIGHT AC PAVEMENT		
CONCRETE PAVEMENT		

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TACO BELL @ CHARLESTON

NEW COMMERCIAL CONSTRUCTION
FOR: FIRST STREET DEVELOPMENT
LAS VEGAS, NEVADA

PROJ.NO.	15401608.01
PRIN.ARCH.	G.G.WILSON,AIA
PROJ.ARCH.	GGW
JOB CAPT.	JJC
TECH'N	JEJ
ARCH.CHK.	JLC/TND
PH-2/3	-
PH-4	-
PH-5	-

REVISIONS

PRINTS REQUIRE ENGINEER'S SEAL & SIGN. FOR PROOF OF VALIDITY

PROFESSIONAL ENGINEER-STATE OF NEVADA
JODI E. JORJORIAN
Exp: 6/30/17
CIVIL
NO. 13816

CLV #_____

SHT.NO C5 OF x

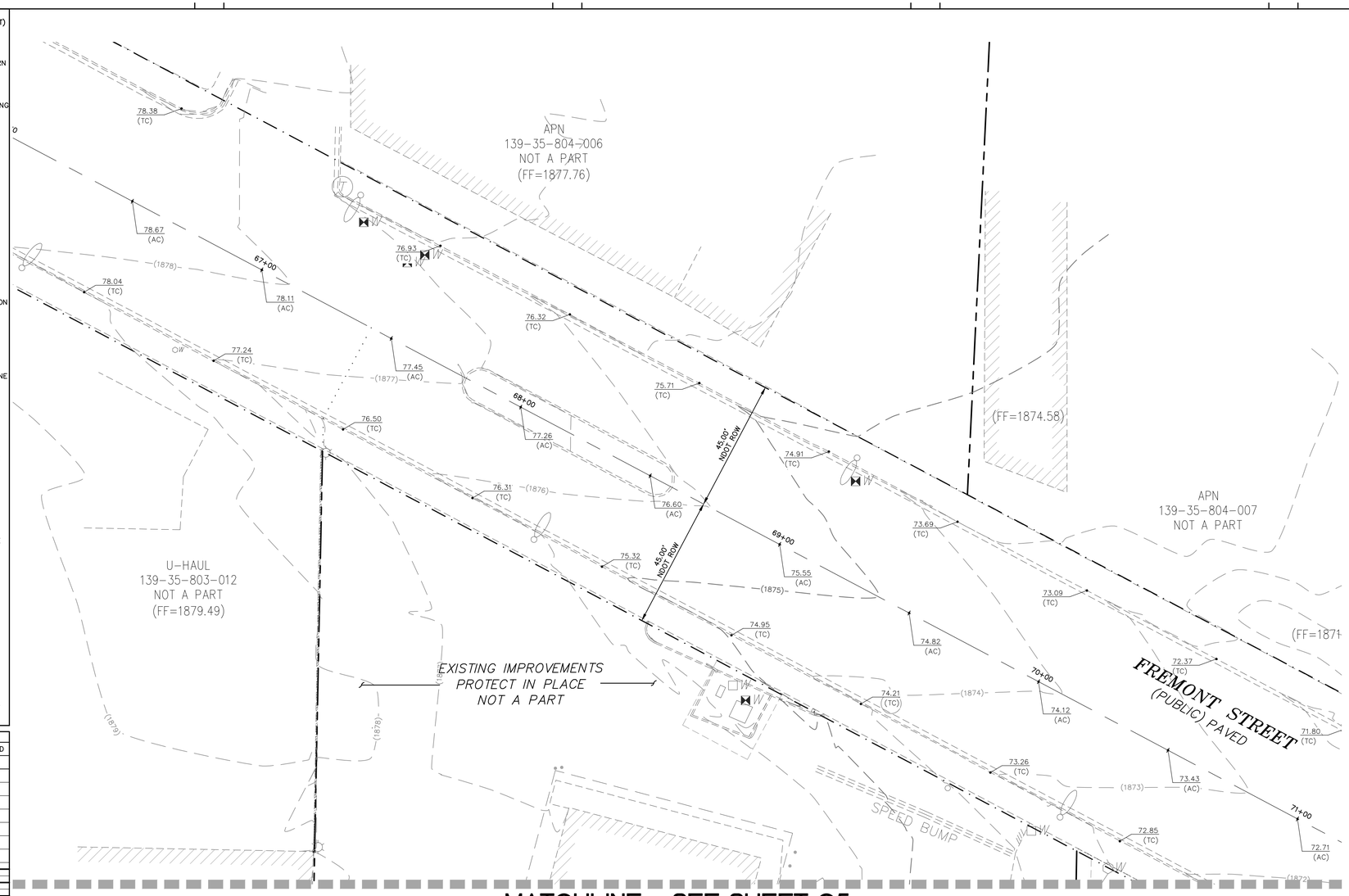
GRADING PLAN 2

ABBREVIATIONS
(SEE CVR. SHT. FOR COMPLETE LIST)

AC	ASPHALTIC CONCRETE
ADJ	ADJUST
AGG	AGGREGATE
BC	BACK OF CURB
BCR	BEGINNING OF CURB RETURN
BEG	BEGIN
BSW	BACK OF SIDEWALK
CATV	CABLE TV
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING
CCRFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
CL	CENTERLINE
CLV	CITY OF LAS VEGAS
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COMM	COMMUNICATIONS
CONC	CONCRETE
COND	CONDUIT
CULV	CULVERT
DC	DEPRESSED CURB
DG	DECOMPOSED GRANITE
DIP	DUCTILE IRON PIPE
DOM	DOMESTIC
ELEC	ELECTRIC
EAC	EDGE OF AC
EC	END OF CURVE
ECR	END OF CURB RETURN
ELEV	ELEVATION
EP	EDGE OF PAVEMENT
EVC	END OF VERTICAL CURVE
EX	EXISTING
FAST	FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION
FF	FINISH FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FO	FIBER OPTICS
FS	FINISHED SURFACE
GB	GRADE BREAK
HDPE	HIGH DENSITY POLYETHYLENE
HDWL	HEADWALL
HGL	HYDRAULIC GRADE LINE
HP	HIGH POINT
INV	INVERT
IRR	IRRIGATION
LAT	LATERAL
LF	LINEAL FEET
LS	LANDSCAPE
LT	LEFT
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MTR	METER
PB	PULL BOX
PL	PROPERTY LINE
PP	POWER POLE
PROP	PROPOSED
PVC	POLY VINYL CHLORIDE PIPE
PVMT	PAVEMENT
RIM	TOP OF MANHOLE OR CLEANOUT
RT	RIGHT
ROW	RIGHT-OF-WAY
SS	SANITARY SEWER
SD	STORM DRAIN
SNWA	SOUTHERN NEVADA WATER AUTHORITY
STA	STATION
STLT	STREET LIGHT
SVZ	SIGHT VISIBILITY ZONE
SW	SIDEWALK
TEL	TELEPHONE
TC	TOP OF CURB
TF	TOP OF FOOTING
TW	TOP OF WALL
TYP	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
VG	VALLEY GUTTER
WL	WATER LINE

LEGEND

DESCRIPTION	EXISTING	PROPOSED
UTILITIES		
B.O. VALVE		
FIRE HYDRANTS		
CLEAN OUT		
GATE VALVE		
METER		
REDUCER		
CAP		
11.25° ELBOW		
22.5° ELBOW		
45° ELBOW		
90° ELBOW		
CROSS		
TEE		
MANHOLES		
ELECTRICAL	(E)	(E)
SANITARY SEWER	(S)	(S)
STORM DRAIN	(D)	(D)
TELEPHONE	(T)	(T)
STREET LIGHTS		
100W HPS STLT.		
150W HPS STLT.		
200W HPS STLT.		
250W HPS STLT.		
400W HPS STLT.		
GRADING		
SPOT ELEV.	12.34 (TC)	12.34 TC
SLOPE	(1.2%±)	1.23%
5' CONT.	(2005)	2005
1' CONT.	(2007)	2007
SITE		
SIGN		
"L" CURB		
"A" CURB		
EDGE OF PVMT.		
WALL		
LINE TYPES		
CL OR SECTION LINE		
PROPERTY LINE		
RIGHT OF WAY LINE		
EASEMENT LINE		
SAWCUT LINE		
FLOW LINE		
SHADES		
HEAVY AC PAVEMENT		
LIGHT AC PAVEMENT		
CONCRETE PAVEMENT		



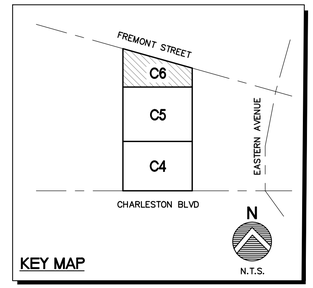
MATCHLINE - SEE SHEET C5

N

GRAPHIC SCALE

20 0 10 20 40

(IN FEET)
1 inch = 20 ft.



KEY MAP

CONSTRUCTION NOTES

1. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225 WITH GEOMETRICS PER CCAUSD #222.1.
2. CONSTRUCT CROSS GUTTER PER CCAUSD #228.
3. CONSTRUCT 'A' TYPE CURB PER CCAUSD #219.
4. CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD #216.
5. CONSTRUCT X" AC PAVEMENT OVER X" TYPE II AGGREGATE BASE. (ONSITE)
6. CONSTRUCT X" CONCRETE PAVEMENT OVER X" AGGREGATE BASE.
7. CONSTRUCT ADA RAMPS PER CCAUSD #235, CASE I, A&B=8', UNLESS OTHERWISE NOTED.
8. SAWCUT, TRENCH, BACKFILL AND PAVEMENT REPAIR PER CCAUSD #500.1, #500.2, AND #503.
9. CONSTRUCT 5' WIDE CONCRETE SIDEWALK PER CCAUSD #234.
10. MATCH EXIST. ELEVATION
11. LANDSCAPE AREA. SEE LANDSCAPE ARCHITECT'S PLANS.
12. SAWCUT AND MATCH EXISTING SECTION.
13. REMOVE EXISTING WALL.
14. CONSTRUCT CURB OPENING PER DETAIL-X, ON SHEET CX
15. CONSTRUCT UNDER SIDEWALK DRAIN PER CCAUSD #238
16. CONSTRUCT CONCRETE WALKWAY
17. TRASH ENCLOSURE SEE ARCHITECTURAL PLANS
18. REMOVE AND REPLACE EXISTING CURB GUTTER SIDEWALK AND DRIVEWAY APPROACH AS SHOWN. REFER TO HORIZONTAL CONTROL PLAN FOR LINE AND CURVE TABLES.
19. CONSTRUCT ISLAND MEDIAN CURB PER CCAUSD #_____
20. NOT USED
21. CONSTRUCT BMP SWALE PER DETAIL-X, ON SHEET CX
22. EXISTING POWER POLES PROTECT IN PLACE
23. EXISTING BUS STOP STRUCTURE PROTECT IN PLACE.
24. REMOVE AND RELOCATE STREET LIGHT.
25. REMOVE EXISTING SIGN AND BOLLARDS.
26. INSTALL PRECAST BUMPER BLOCK PER CCAUSD #238

GRADING PLAN CERTIFICATION

JODI E. JORJORIAN PE #13816 DATE:

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH APPROVED DRAINAGE STUDY HTE #00-0000 FOR THIS SITE ON FILE AT CLARK COUNTY FOR THIS PROJECT.

Call before you dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-227-2600

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

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SHT.NO. C6 OF x

GRADING PLAN 3

ABBREVIATIONS

(SEE CVR. SHT. FOR COMPLETE LIST)

AC	ASPHALTIC CONCRETE
ADJ	ADJUST
AGG	AGGREGATE
BC	BACK OF CURB
BCR	BEGINNING OF CURB RETURN
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BSW	BACK OF SIDEWALK
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FIRE HYDRANTS		
CLEAN OUT		
GATE VALVE		
METER		
REDUCER		
CAP		
11.25° ELBOW		
22.5° ELBOW		
45° ELBOW		
90° ELBOW		
CROSS		
TEE		
MANHOLES		
ELECTRICAL	Ⓔ	Ⓔ
SANITARY SEWER	Ⓢ	Ⓢ
STORM DRAIN	Ⓓ	Ⓓ
TELEPHONE	Ⓣ	Ⓣ
STREET LIGHTS		
100W HPS STLT.		
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SLOPE	0.2%±	1.23%
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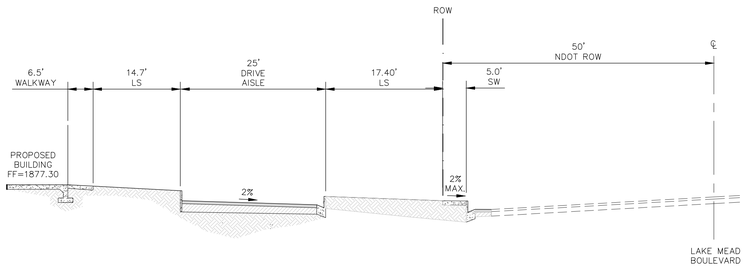
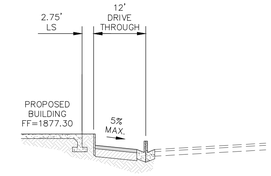


A SECTION
NO SCALE



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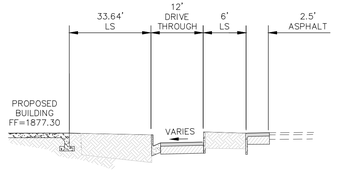

C SECTION
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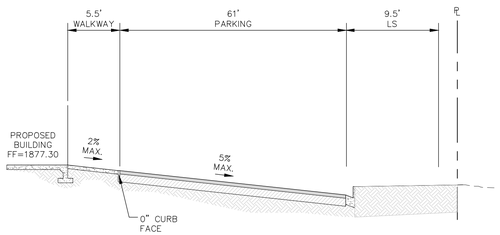

D SECTION
NO SCALE

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DETAIL SHEET

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SHT.NO. C9 OF 9