

DS #:

5124

APN:

162-03-801-005

PROJECT:

Fremont K8 School

SUBMITTAL:

1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		May 2, 2019
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: Fremont K-8 School	
Cross Streets:	SWQ of Maryland Pkwy. & St. Louis Avenue	COPIES TO: Lochsa Engineering
File Number:	F:\Depot\DSMemos\DS5124A.doc	Clark County School District
Parcel Number:	162-03-801-005	Bart Anderson, P.E., DevCo
Zoning Action:	SDR-76201 & VAR-76200	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	4/15/2019	5/2/2019	See Comments Below	\$400.00	3091475: \$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-76201 & VAR-76200**) 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 "**Las Vegas Valley 2018 Flood Control Master Plan Update**" (LVVMPU) is officially adopted for public use. Replace all the pertinent MPU exhibits such as the F-Maps and H-Maps (replaced by the W-Maps) with the 2018 version in the next submittal.
4. *Sheet DR1 (Existing Condition Basin Map)*: It appears that concentration point CPX2 is wrongly located at the east end of the parking lot. Should it be located exactly at the northeast corner of the school site? Review and revise accordingly.
5. *Sheet DR2 (Interim / Developed Basin Map)*: It also appears that the location of concentration point CPD1 is not correct. Review and revise accordingly.

6. Per the *Baker Park Improvement Plans*, it appears that the Park is basically drain through the subject school site which does not agree with the depiction of only *Basin OFD1* is impacting the school site as shown in the subject DR1 and DR2 Basin Maps.

The engineer should reference the drainage basin maps of the *Baker Park* project and include additional offsite basins other than *OFD1* into DR1 and DR2 in the next submittal.

7. Provide a Demolition Plan in the next submittal.
8. A berm is provided at the back of sidewalk in *St. Louis Avenue* for onsite flood protection. The 100-year flow velocity in *St. Louis* is 6.5 ft/s which is erosive. Provide erosion protection measures on the side of the berm facing the street. Revise the plans, construction callout and *Detail Sections A/C6.02* and *B/C6.02* accordingly.
9. Address in the next submittal whether an overflow path is provided if the onsite storm drain system is totally clogged and the proposed finished floor elevations will still meet the criteria.
10. The proposed onsite storm drain is a bubbler system. Provide a bleeder line to release the residual water in the inlet.

If bleeder line is not possible, the engineer should consider raising the finished floor elevations and provide gravity flow in the courtyard area with or without a storm drain system.

Address and resolve in the next submittal.

11. Provide a note on the grading plan: *All Onsite Storm Drain Systems and the associated facilities are Privately Owned and to be Privately Maintained by the School.*
12. Label finished floor elevation of all adjacent houses in the grading plans in the next submittal.
13. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

In an effort to increase administrative efficiency, for all original and re-submittal packages including updates and the addenda, the City of Las Vegas Public Works Department requires both a hardcopy and a digital copy (PDF) on CD for the drainage study.

A letter sealed and signed by a Nevada registered civil engineer must be included in every submittal certifying documents on the electronic CD matches 100% of the hardcopy submittal. The new submittal requirement is effective on May 1, 2019. If there are any questions regarding these new requirements, please contact Albert Sung in the City Flood Control Section at (702) 229-6541.



Sample Letter to
certify CD.pdf

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: T21S/R61E/03
AREA R-03

**Technical Drainage Study
For
Fremont K-8 School
(MPID#1623)**

Lochsa Job No. 181203

April 2019

Prepared for:

Clark County School District
1180 Military Tribute Place
Henderson, NV 89074

Prepared by:

Lochsa Engineering
6345 South Jones Boulevard
Suite 100
Las Vegas, Nevada 89118
(702) 365-9312

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Fremont K-8 School Date: April 11, 2019

Location of Development: a) Descriptive (Cross Streets) North/South: Maryland Parkway
East/West: St. Louis Avenue

b) Section: 3 Township: 21 South Range: 61 East

c) APN: 162-03-801-005

Name of Owner: Clark County School District Board of Trustees

Telephone No.: 702-799-6450 Fax No.: _____ E-Mail Address: _____

Address: 1180 Military Tribute Place Henderson, NV 89074

Contact Person-Name: Abdul Bakhshi Telephone No.: (702) 365-9312

* E-Mail Address: Abdul.bakhshi@lochsa.com Fax No.: (702) 365-9317

Firm: Lochsa Engineering

Address: 6345 South Jones Boulevard, Suite 100, Las Vegas, Nevada 89118

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 8.0 +/- Acres Being Developed/Disturbed: 8.0 +/- 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.): School buildings, play area and parking addition

5. Approximate upstream land area which drains to the subject site: 70.0 +/- Acres

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

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Northeasterly towards St. Louis Avenue

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



Engineer's Seal

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

*New Required Field

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

Local Entity File No.	Revision	Date

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Fremont K-8 School	Map ID:
Firm Name: Lochsa Engineering	Engineer: Lazell Preator, PE
Address: 6345 South Jones Boulevard, Ste. 100	
City: Las Vegas	State: NV Zip: 89118
Phone Number: 702-365-9312	Fax Number: 702-365-9317
Property Owner: Clark County School District	
Address: 1180 Military Tribute Place	
City: Henderson	State: NV Zip: 89074
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 (CCRFCDD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

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

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

I. GENERAL REQUIREMENT

- | Yes | No | |
|-------------------------------------|---|--|
| ☒ | ☐ | 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 CCRFCDD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated. |

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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 and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs. |
| ☒ | ☐ | Vicinity Map with local and major cross streets identified and a north arrow. |

III. DRAINAGE PLAN

- | Yes | No | |
|-------------------------------------|---|---|
| ☒ | ☐ | Sheet size: 24" x 36" 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 crowns at lot lines, grade breaks, and along curb returns on both sides of the street. |
| ☒ | ☐ | Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate. |
| ☒ | ☐ | Minimum finish floor elevations with top-of-curb elevations at upstream end of lot. |
| ☐ | ☒ N/A | Proposed typical street sections. |

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
☒	☒	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.
☒	☒	Cross-sectional detail for channels, including cutoff wall locations.
☒	☒	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
☒	☒	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" x 48". Wrought iron gate is required for flows > 10 cfs.
☒	☒	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
☒	☒	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
☒	☒	Building and/or lot numbers.
☒	☒	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
☒	☒	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

- | Yes | No | |
|-------------------------------------|-------------------------------------|--|
| ☒ | ☒ | For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE. |
| ☒ | ☐ | Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows. |
| ☒ | ☐ | 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. |
| ☒ | ☐ | 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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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 "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan. |
| ☒ | A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria. |
| ☐ 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 requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater. |
| ☐ N/A | A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. <ul style="list-style-type: none"> • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report. |
| ☐ N/A | Provide a 50 percent clogging factor in the capacity calculation for drop inlets. |
| ☐ N/A | Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation. |
| ☒ | 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.)
	✓	Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
✓		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.
	N/A	All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
✓		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
✓		Back of lot elevations and lot drainage pattern for all lots including common lots.
✓		Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
✓		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.
✓		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
	N/A	Lots with "B and C Type Drainage" that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16" x 24" minimum block wall openings are required for both options.
✓		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.

Technical Drainage Study For Fremont K-8 School

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A	Hydrologic Analysis
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1. GENERAL LOCATION AND DEVELOPMENT DESCRIPTION

1.1 Purpose

Lochsa Engineering has been retained by Clark County School District Board of Trustees to provide a Technical Drainage Study for the proposed school campus located southwest corner of St. Louis Avenue and Maryland Parkway intersection. The proposed improvements are limited to the three school buildings, play area, surface parking, driveway entrance from St. Louis Avenue and an onsite storm drain. The majority of the proposed improvements are located within the already existing school campus to be demolished and cleared.

The purpose of this study is to provide a detailed hydrologic analysis of the site and watershed impacting it, and to substantiate the flood control design for the proposed improvements. The Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (HCDDM) and the 2008 Las Vegas Valley Flood Control Master Plan Update (2008 MPU) have been compiled and utilized to prepare this study. This report presents summary of the hydrologic and hydraulic analyses, methodology and results of the study.

1.2 Location of Property

The project site occupies the parcel APN 162-03-801-005 and is located at the southwest corner of St. Louis Avenue and Maryland Parkway intersection. The site occupies a portion of the Southern Half (S1/2) of the Southeast Quarter (SE 1/4) of Section 3, Township 21 South, Range 61 East, of the M.D.M., in the City of Las Vegas, Nevada. Please refer to the copy of the Assessor's Parcel Map provided in the appendix. Figure 1, in Appendix C also provides the

location of the subject site in relation to the surrounding major streets.

1.3 Description of Property

The subject project site occupies approximately $8.0 \pm$ acres. Currently the project area is an existing school campus to be demolished and cleared. The site generally slopes to the northeast at approximately 1.0%. A review of the 2008 MPU's Figure H-32 indicates that the site is located within the hydrologic soil group 'C', defined as soils with "moderately high runoff potential." Review of the Natural Resources Conservation Service (NRCS) Web Soil Survey 2.0 (Reference 3) indicates that the site is located within soil type 615. As shown in the attached referenced information, soil type 615 is not classified under soil type 'A', 'B', 'C' or 'D'. However, we have utilized soil type 'C' per Figure H-32 of the 2008 MPU.

2. DRAINAGE DESCRIPTION

In the CCRFCD's 2008 MPU (Reference 2), the valley was hydrologically divided into ten watersheds and each watershed was further subdivided into sub-basins. The onsite and offsite basins impacting the subject project area fall within the Central watershed. As shown in Figure H-32 of the 2008 MPU, the project site is all located within sub-basin FR01.

2. Existing Drainage Condition

The project site currently consists of existing school buildings, play area and surface parking. The subject site is surrounded by the developed park to the west, St Louis Avenue to the north, existing church and multifamily residential developments to the south and access street to east.

There were no prior drainage studies for the existing school campus or any relevant

adjacent studies. However, the subject site references flow from "*City of Las Vegas Central Neighborhood Flood Control Master Plan*" by PBS&J along St Louis Avenue. Per Figure E-16 located in Appendix C, the offsite basin FR01-A (86/220cfs for both the 10 and 100-year storm runoff, respectively) encompasses the subject site and the area upstream. Per the Figure E-16 and the updated aerial view of offsite basin FR01-A (approximately $70 \pm$ acres), is fully developed with residential and commercial developments.

We utilized the Clark County Gismo website to delineate offsite basin OFD1 (3/5cfs) west of the subject site. Per DR1, Existing Condition Basin Map, a portion of the play area from the existing park west of the subject site does enter the subject site through a gate.

Per the HEC-1 analysis for the existing condition, the subject site was divided into two onsite basins, 'EX1 (7/12cfs, 4.0acres) and 'EX2' (6/11cfs 4.0acres). In the analysis, the developed offsite basin OFD-1 travels easterly and is combined with onsite basin 'EX2' at combination point CPX1 (9/16cfs). The flow generated from onsite basin 'EX1' consisting of surface parking and existing school buildings, travels northeasterly and discharge onto St Louis Avenue. Combining all the flows from onsite and existing 'OFD1' at combination point 'CPX2' (15/28cfs) indicates the existing impact from the subject site at the northeast corner of site.

Lochsa has concurred and have accepted the approved offsite analysis from "*City of Las Vegas Central Neighborhood Flood Control Master Plan*" (St Louis Avenue) which represents the existing, interim and developed condition street flow for our project site, within St. Louis Avenue. The flows are 86/220cfs per the MPU which includes the subject site.

The offsite basin is located within the McCarran Airport Rainfall Area, hence the point

precipitation values for the 10-year and 100-year 6-hour storms are 1.58" and 2.77" respectively.

The HEC-1 Flood Hydrograph Package is utilized to determine the relevant onsite runoff flows. Utilizing the 1-ft topographic map for the project site, the site is delineated into onsite basins and offsite basins. The delineation of the onsite basins as well as offsite basins are depicted on Exhibit DR1, labeled as the 'Existing Condition Basin Map'. Referenced flows labeled on the Drainage plan. Excerpts of the basin maps and hydrologic analysis from the referenced studies have been included in the appendix.

2.2 Interim Drainage Condition

For the interim condition, the analysis of the offsite basins will remain the same as in the existing conditions. The existing condition of the offsite basins assumed full development due to improvements that have already occurred. Therefore, the estimated flow rates from the offsite basins will remain the same as analyzed in the existing condition.

Utilizing the grading plan for the project, the project site is delineated into three onsite basins labeled as 'OND1' (6/11cfs), 'OND2' (4/7cfs), and 'OND3' (4/6cfs). The delineation of onsite basins is depicted on Exhibit DR2 labeled as the 'Interim/Developed Basin Map'.

Basin 'OND1' (3.81ac - 6/11cfs) consists of rooftops of the building and surface parking. The onsite basin 'OND1' shall combine with offsite basin 'OFD1' at combination point 'CPD1' (9/16cfs) and conveyed onsite by the proposed valley gutter and discharged through the BMP swale and ultimately onto St Louis Avenue.

Basin OND3 (2.07ac - 4/6cfs) consists of rooftop portion of the proposed buildings and the common area where the flow is collected into the trench drain. As the trench drain traverses east, a storm drain pipe 18-inches is connected to it to convey the flow northerly and onto the

proposed onsite grate inlet bubbler. The onsite drop inlet shall act as a bubbler and discharge the flow through the curb cut onsite and ultimately towards the proposed BMP swale.

The storm runoff generated from onsite basin 'OND2' (2.12 acres-4/7cfs) consisting of small portions of the roof top and majority of the play area shall sheet flow easterly and discharge through the proposed sidewalk underdrain and onto the access road, following its historic pattern. The runoff from onsite basin 'OND2' shall travel northerly along the access road and ultimately onto St. Louis Avenue.

The HEC-1 Flood Hydrograph Package is utilized to determine the relevant onsite runoff flows. Similar to the existing conditions, the onsite developed conditions of the project site follow their historical drainage patterns as much as possible. Utilizing the 1-ft topographic map for the project site, the site is delineated into onsite basins and offsite basins. The delineation of the onsite basins as well as offsite basins are depicted on Exhibit DR2, labeled as the 'Interim/Developed Drainage Plan'. Referenced flows are also labeled on the Drainage plan.

The subject site shall provide a landscaping berm all along the southern portion of St Louis Avenue. The flow depth, both in the existing and interim condition is the same (0.66-ft for the 100-year storm runoff on the south side), per hydraulic section 'A'. All of the flow from the west along St Louis Avenue hits the berm and is conveyed easterly and does not impact our site. This is for the existing and interim conditions of our site.

To estimate the 10-year and 100-year WSE within St Louis Avenue (Section A) and access street (Sections B), normal depth calculations are provided. The normal depth calculations illustrate that the flows within the perimeter street are well below the maximum allowable velocity x depth (v x d) value of 6.0 and 8.0 during 10-year and 100-year storm events.

However, section 'A' (for both existing and interim/developed conditions) which represent the 80-ft right of way for St Louis Avenue, does not meet the 12-ft dry lane criteria.

2.3 Future Drainage Condition

For the future condition, both the site and all the local offsite basins are assumed to be fully developed. There is no change from the interim analysis for the onsite basins; therefore, no re-analysis is necessary for the future for onsite basins.

2.4 Master Planning Information

The "2008 Las Vegas Valley Flood Control Master Plan Update" (2008 MPU, Reference 2), dated September 2008, as prepared by Post Buckley Schuh and Jernigan, Inc. (PBS&J), in association with Louis Berger Group and Parsons Brinckerhoff, illustrates the existing and proposed regional master planned facilities. The CCRFCD facility exhibits and inventory tables were updated in 2018. Review of Figure F-30 of the 2018 MPU indicates that proposed improvements are not adjacent to a regional facility.

2.5 Floodplain Information

The project site is covered by Flood Insurance Rate Map (FIRM) for the Clark County, Nevada, and incorporated areas, Community Panel Number: 32003C2170F, Effective Date: November 16, 2011. Review of the FIRM indicates that subject project site falls within Zone "X" (unshaded), described by FEMA as: *"Areas determined to be outside the 0.2% annual chance floodplain."* Please refer to the attached Figure 2 for the location of the site on a portion of the above referenced FIRM in Appendix C.

2.6 Previous Drainage Studies

The overall area is covered within the CCRFCD “*2008 Las Vegas Valley Flood Control Master Plan Update, Volume I and II*” (Reference 2) and the Natural Resources Conservation Service (NRCS), “*1985 Soil Survey of the Las Vegas Valley*”, Issued in July 1985, in conjunction with the Web Soil Survey (Reference 3). The site is also covered in the FIRM for the Clark County, Nevada and incorporated areas, Community Panel Number: 32003C2170F, Effective Date: November 16, 2011.

There are no previous hydrology studies for the existing school site. The most current hydrologic analysis for the subject site includes the “*City of Las Vegas Central Neighborhood Flood Control Master Plan*”, Spring 2004, by Post Buckley, Schuh & Jernigan (PBS&J), Inc.

The PBS&J Master Plan, reference 5 analyzed the existing and future runoff flow patterns for offsite flow in relation to our site. Per Figure E-16, referenced basin FR01-A (86/220cfs for the 10 and 100-year storm runoff) encompasses the upstream area impacting the subject site. The offsite delineation area is approximately $70 \pm$ acres.

Lochsa Engineering generally concurs with all the pertinent referenced analyses and results utilized in this study.

2.7 Compliance with CCRFCD Best Management Practices (BMP)

To satisfy the water quality BMP requirement in Section 1500 of the CCRFCD Drainage Design Manual, the project site is designed to accommodate as much as possible Low Impact Development (LID) measures. As shown in the grading plan, a riprap-lined swale is being proposed northeast corner of the project site. The swale is designed to settle out sediment and pollutant of the water quality design flows, prior to exiting the project site. Per drainage exhibit

DR2, the subject site was delineated into three onsite basins OND1 (3.81acres), OND2 (2.12acres) and OND3 (2.07acres).

As shown in the attached excerpts from Section 1500 of the HCDDM, since the parking lot area of the project site is more than 1 acre, the parking lot is categorized as 'Large' parking. For Large parking lot, water quality BMPs are required for at least 75% of the proposed parking lot.

Onsite basin OND2 represents the majority of the play area, a small portion of the rooftop and no proposed surface parking. For onsite basin OND3, the storm runoff from onsite basin OND3 is generated from the rooftops and eventually collected into the storm drain. Therefore, only runoff generated from onsite basin OND1 is not fully treated.

Onsite basin OND1 consist of portions of the play area, rooftops and surface parking. With our site layout and limitations, we are treating approximately 79% (3acres treated /3.81acres) of the site, which meet the minimum requirement of 75% of the parking lot area through water quality-lined swales. A Normal depth calculation (capacity) has been provided for the water quality swale (6ft wide, 4:1 SS) to illustrate its sufficient capacity to convey the 10 year flows (developed). The BMP swale is only needed to convey the 2yr flow.

Per the design guidelines of Section 1503.4.5, the proposed water quality riprap-lined swale for the site is set to a minimum 80ft long. The swale is designed with 0.70% slope, 4(horizontal):1(vertical) side slope, riprap lining with D50=4", and a 0.75ft depth.

3. PROPOSED DRAINAGE FACILITIES

3.1 General Description

The proposed improvements are limited to the proposed building, the associated surface parking, driveway entrance from St Louis Avenue and an onsite storm drain. The proposed improvements are at the northwest corner of St Louis Avenue and Maryland Parkway.

To satisfy the water quality BMP requirement in Section 1500 of the CCRFCD Drainage Design Manual, runoff from the onsite basins are designed to travel through riprap-lined swale prior to exiting the site. The swales are designed to settle out sediment and pollutant for the water quality design flows, prior to exiting the project site.

3.2 Compliance with Regulations and Adopted Plans

The hydrologic analysis and drainage design of this development is in compliance with local requirements, including the CCRFCD “*Hydrologic Criteria and Drainage Design Manual*” (HCDDM) (Reference 1), and the CCRFCD “*2008 Las Vegas Valley Flood Control Master Plan Update*” (Reference 2). The site design is also in compliance with the Natural Resources Conservation Service (NRCS) Web Soil Survey and the 1995 SCS Soil Survey of Las Vegas Area (Reference 3), as well as FEMA’s FIRM with panel number 32003C2170F (Reference 4).

3.3 Hydrologic Criteria

The onsite basins of the subject project area all fall within the Central watershed. The hydrologic and hydraulic analyses presented in this report are carried out in accordance with the CCRFCD’s HCDDM (Reference 1). The rainfall values used for the hydrologic analysis of the

site represent the 10-year and 100-year storm recurrence events, each with six-hour duration. The site is within the boundary for using the McCarran Airport Rainfall Data. Therefore, point precipitation values were determined using Table 505 of the HCDDM. The adjusted point rainfall values for the 6-hour, 10-year and 100-year storm events are determined from Table 505 as 1.58 and 2.77 inches, respectively.

The rainfall losses due to infiltration, interception, etc. are represented using the SCS curve number (CN) method recommended in the CCRFCD HCDDM (Reference 1). The SCS method divides the soils into four hydrologic groups as A, B, C and D. Review of the 2008 MPU's Figure H-32 indicates that the site is located within the hydrologic soil group 'C', defined as soils with "moderately high runoff potential." However, review of the Natural Resources Conservation Service (NRCS) Web Soil Survey 2.0 (Reference 3) indicates that the site is located within soil type 615. As shown in the attached information, soil type 615 (unclassified soil type) covers 100% of the site. The CN values for the different land use were determined from Table 602 of the CCRFCD HCDDM. The runoff hydrograph is determined from the design precipitation for each sub-basin using the Soil Conservation Service (SCS) unit hydrograph method. Calculations used in the hydrologic analysis for the onsite basins for existing and proposed conditions are attached in Appendix A.

3.4 Facility Design Calculations

All drainage facilities within this project have been designed in accordance with the CCRFCD “*Hydrologic Criteria and Drainage Design Manual*” (Reference 1). The onsite drainage plan has been developed to closely resemble existing drainage patterns, and to minimize any impact to the adjacent properties.

The swale is proposed to satisfy the water quality BMP requirement in Section 1500 of the CCRFCD Drainage Design Manual as much as possible.

The proposed finished floor elevation for the proposed building is not set 18-inches above the centerline elevation of St Louis Avenue, thus a Finish Floor waiver will be submitted.

4. CONCLUSIONS AND RECOMMENDATIONS

1. This project is in compliance with the applicable drainage laws as recognized by the State of Nevada.
2. This project is in compliance with the CCRFCD "2008 Las Vegas Valley Flood Control Master Plan", as well as the CCRFCD "*Hydrologic Criteria and Drainage Design Manual*".
3. The site and the proposed improvements are located entirely within areas designated by FEMA as Zone "X" (shaded).
4. The drainage facilities for this project have been designed to convey runoff from the 100-year storm safely through the site. In addition, they have been designed based on generally accepted engineering practices.
5. The proposed finished floor elevations for the proposed buildings are not set a minimum 18-inches above the centerline of St Louis Avenue. A Finish Floor Waiver will be submitted after approval of the drainage study.

5. REFERENCES

1. Clark County Regional Flood Control District, "*Hydrologic Criteria and Drainage Design Manual*", August 1999.
2. Post Buckley, Schuh & Jernigan (PBS&J), Inc., in association with, G. C. Wallace Inc, and Louis Berger Group, "*2008 Las Vegas Valley Flood Control Master Plan Update, Volume 1 and II*", September 2008.
3. Natural Resources Conservation Service (NRCS), "*1985 Soil Survey of the Las Vegas Valley*", Issued July 1985, in conjunction with the Web Soil Survey.
4. Federal Emergency Management Agency, "*Flood Insurance Rate Maps; Community Panel Numbers 32003C2170F; Clark County, Nevada and Incorporated Areas*," Effective Date November 16, 2011.
5. Post Buckley, Schuh & Jernigan (PBS&J) Inc. "*City of Las Vegas Central Neighborhood Flood Control Master Plan*", Spring 2004.

Street Flow Summary
(Interim/Developed Condition)

10-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	10-Year Flow [Q10] (cfs)	10-year Velocity [v] (fps)	10-year Flow Depth [d] (ft)	10-year Velocity x Depth [v x d]
*St. Louis Ave	80	A	86	5.15	0.38	1.96

Street Flow Summary
(Interim/Developed Condition)

100-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	100-Year Flow [Q100] (cfs)	100-year Velocity [v] (fps)	100-year Flow Depth [d] (ft)	100-year Velocity x Depth [v x d]
*St. Louis Ave	80	A	220	6.51	0.66	4.30

**Peak Flow Summary
Existing Condition**

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	
OFD1	1.83	3	5	
EX2	4.00	6	11	
CPX1		9	16	(OFD1+EX2)
EX1	4.00	7	12	
CPX2		15	28	(CPX1+EX1)

**Peak Flow Summary
Interim/Development Condition**

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	
OFD1	1.83	3	5	
OND1	3.81	6	11	
CPD1		9	16	(OFD1+OND1)
OND2	2.12	4	7	
OND3	2.07	4	6	
CPD2		16	30	(OND2+OND3+CPD1)

APPENDIX A

HYDROLOGIC ANALYSIS

HYDROLOGIC CHARTS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX-HOUR STORM DISTRIBUTIONS

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

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

Revision	Date

REFERENCE:

TABLE 503

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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

TIME	RECURRENCE INTERVAL					
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5 min.	0.15	0.27	0.35	0.46	0.54	0.63
10 min.	0.25	0.44	0.57	0.74	0.89	1.02
15 min.	0.33	0.57	0.74	0.97	1.15	1.32
30 min.	0.44	0.78	1.01	1.31	1.55	1.79
1 hour	0.52	0.89	1.15	1.50	1.78	2.06
2 hour	0.59	1.01	1.30	1.70	2.01	2.30
3 hour	0.64	1.08	1.39	1.82	2.15	2.48
6 hour	0.72	1.22	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

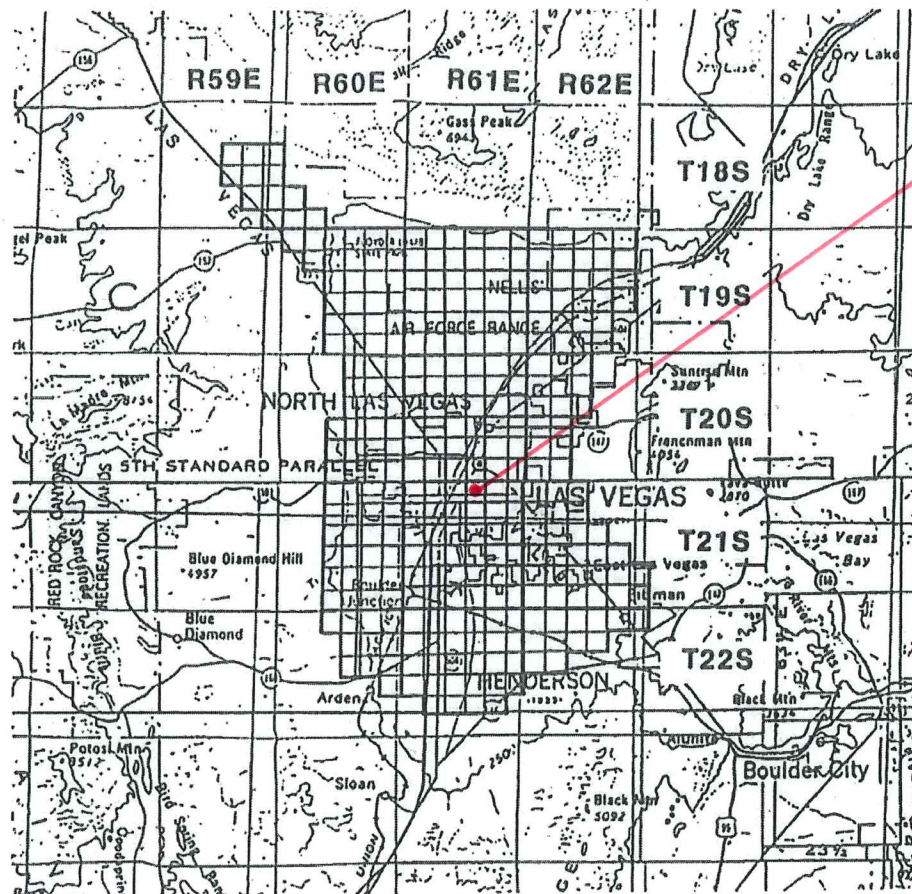
WRC
ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

TABLE 505

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

McCARRAN AIRPORT RAINFALL AREA



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

Notes:

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

Revision	Date

WRC
ENGINEERING

REFERENCE:

USACE, Los Angeles District, 1988

FIGURE 513

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

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

See Table 602A

Developing urban areas

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

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

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

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

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

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

Revision	Date

WRC
ENGINEERING

REFERENCE:
SCS TR-55, USDA, June 1986.

TABLE 602
1 of 4

HYDROLOGY

FREMONT K-8 SCHOOL
AB
181203

DATE: April 4, 2019

[illegible]

$$t_i = 1.8 (1.1 - K) L^{0.5} / S^{1/3}$$

$$K = 0.0132 \text{ CN} - 0.39$$

$$t = L / (60 \text{ V})$$

$$t_C = t_i + t_t$$

$$t_L = t_{LAG} = 0.6 \text{ tc}$$

LOCATION:

HYDROLOGIC CONDITION:

TRIAL: Final Iteration

Onsite & Offsite

Existing/Developed

Curve Number Calculations
FREMONT K-8 SCHOOL

Sub-Basin: OND1
Total Area: 3.81 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Crue Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	3.81	C	100%	98	98.0
Total:	3.81	-	100%	-	98.0

Curve Number Calculations
FREMONT K-8 SCHOOL

Sub-Basin: OND2
Total Area: 2.12 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Crue Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	2.12	C	100%	98	98.0
Total:	2.12	-	100%	-	98.0

Curve Number Calculations
FREMONT K-8 SCHOOL

Sub-Basin: OND3
Total Area: 2.07 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Crue Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	2.07	C	100%	98	98.0
Total:	2.07	-	100%	-	98.0

Curve Number Calculations
FREMONT K-8 SCHOOL

Sub-Basin: OFD1
Total Area: 1.83 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Crue Number [CN]	Product {CN x P}
Artificial desert landscaping	1.83	C	100%	96	96.0

Total: 1.83 - 100% - 96.0

Curve Number Calculations
FREMONT K-8 SCHOOL

Sub-Basin: EX1
Total Area: 5.58 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Crue Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	5.58	C	100%	98	98.0

Total: 5.58 - 100% - 98.0

Curve Number Calculations
FREMONT K-8 SCHOOL

Sub-Basin: EX2
Total Area: 2.42 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Crue Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	2.42	A	100%	98	98.0

Total: 2.42 - 100% - 98.0

[illegible]

* NOTE : HALF OF THE 100-YEAR STORM RUNOFF FLOWS IS USED TO DETERMINE THE BASIN TRAVEL VELOCITY REQUIRED FOR THE LAG TIME CALCULATIONS

WEB SOIL SURVEY



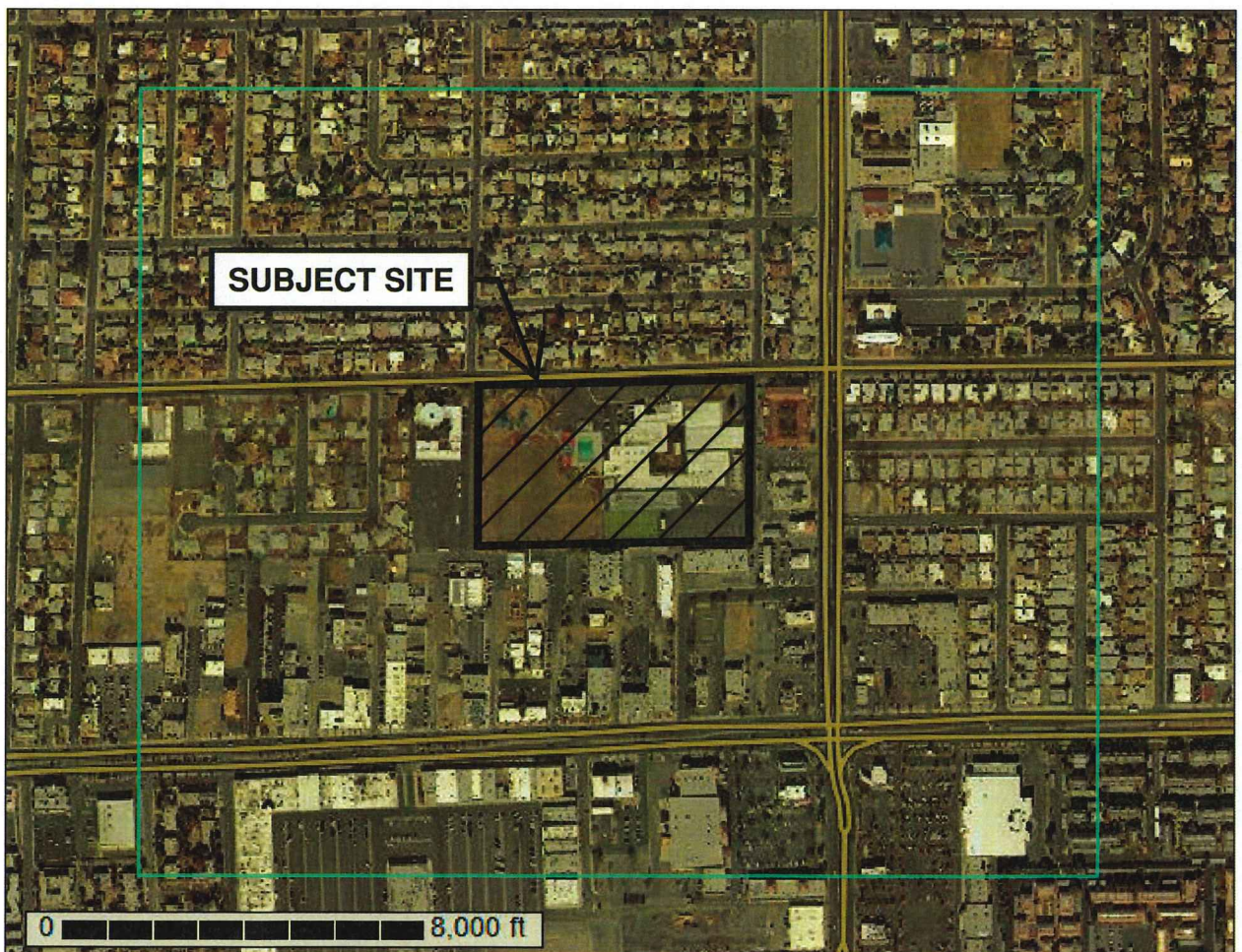
United States
Department of
Agriculture

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



February 7, 2019

Custom Soil Resource Report Soil Map



Map Scale: 1:7,580 if printed on A landscape (11" x 8.5") sheet.



Custom Soil Resource Report Map—Drainage Class



Map Scale: 1:7,580 if printed on A landscape (11" x 8.5") sheet.



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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
325	McCarran fine sandy loam, 0 to 4 percent slopes	6.5	2.7%
390	Spring clay loam	118.9	49.0%
615	Urban land	117.3	48.3%
Totals for Area of Interest		242.7	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

Custom Soil Resource Report

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

325—McCarran fine sandy loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: hrbv
Elevation: 1,600 to 2,400 feet
Mean annual precipitation: 4 to 6 inches
Mean annual air temperature: 63 to 66 degrees F
Frost-free period: 235 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Mccarran

Setting

Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 48 inches: gypsiferous material
H3 - 48 to 62 inches: gypsiferous material

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 70 percent
Gypsum, maximum in profile: 40 percent
Salinity, maximum in profile: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Other vegetative classification: SHALLOW LIMY 5-8 P.Z. (030XB031NV_2)
Hydric soil rating: No

390—Spring clay loam

Map Unit Setting

National map unit symbol: hrc0

Elevation: 1,600 to 2,000 feet

Mean annual precipitation: 4 to 6 inches

Mean annual air temperature: 66 to 68 degrees F

Frost-free period: 240 to 260 days

Farmland classification: Not prime farmland

Map Unit Composition

Spring and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Spring

Setting

Landform: Alluvial flats

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Lacustrine deposits derived from gypsum

Typical profile

H1 - 0 to 11 inches: clay loam

H2 - 11 to 43 inches: gypsiferous material

H3 - 43 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Moderately well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 15 percent

Gypsum, maximum in profile: 30 percent

Salinity, maximum in profile: Strongly saline (16.0 to 32.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 30.0

Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): 6s

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C

Ecological site: SALINE BOTTOM (R030XY024NV)

Hydric soil rating: No

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
325	McCarran fine sandy loam, 0 to 4 percent slopes	A	6.5	2.7%
390	Spring clay loam	C	118.9	49.0%
615	Urban land		117.3	48.3%
Totals for Area of Interest			242.7	100.0%

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

HEC-1 MODEL OUTPUT

(EXISTING CONDITION)

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 07APR19 TIME 18:28:59
*
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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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

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

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

1

HEC-1 INPUT

PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID FREMONT K-8 SCHOOL
2 ID ***** TECHNICAL DRAINAGE STUDY *****
3 ID EXISTING CONDITION - ONSITE
4 ID USING SCS METHODS AND KINEMATIC WAVE ROUTING
5 ID MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
6 ID
7 ID LOCHSA JOB # 181203
8 ID
9 ID
10 ID INPUT FILE NAME: E.DAT
11 ID
12 ID APRIL 2019
13 ID
14 ID *****
15 ID *****
16 ID MCCARRAN AIRPORT RAINFALL AREA
17 ID 10 & 100 YEAR - 6 HOUR STORM EVENT
18 ID PRECIPITATION:
19 ID 10-YEAR : 1.58 INCHES
20 ID 100-YEAR : 2.77 INCHES
21 ID 10-YEAR/100-YEAR : 1.58/2.77= 0.5704
22 ID
23 ID *****
24 ID *****
25 ID *DIAGRAM
26 IT 5 200
27 IO 5 0
28 IN 5
29 JR PREC .5704 1.0
30
31 KK OFD1
32 KM THE DEVELOPED OFFSITE BASIN FROM BAKER PARK TRAVELING EASTERLY TOWARDS ONSITE
33 PB 2.770
34 PC 0.0 .02 .057 .07 .087 .108 .124 .13 .13 .13
35 PC .13 .13 .13 .133 .14 .142 .148 .158 .172 .181
36 PC .19 .197 .199 .2 .201 .204 .214 .229 .241 .249
37 PC .251 .256 .27 .278 .281 .283 .295 .322 .352 .409
38 PC .499 .59 .71 .744 .781 .812 .819 .835 .851 .856
39 PC .86 .868 .876 .888 .91 .926 .937 .95 .97 .976
40 PC .982 .985 .987 .989 .99 .993 .993 .994 .995 .998
41 PC .998 .999 1.0
42 BA .00286
43 LS 0 96.0
44 UD .114
45 *
46
47 KK EX2
48 KM EXISTING ONSITE BASIN TRAVELING NORTHEASTERLY
49 BA .00625
50 LS 0 98.0
51 UD 0.160
52 *

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1

HEC-1 INPUT

PAGE 2

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
48 KK CPX1
49 KM COMBINE OFD1 AND EX2
50 KM FLOWS EXITING THE PROJECT SITE AT NEC
51 HC 2
52
53 KK EX1
54 KM ONSITE EXISTING BASIN TRAVELING NORTHEASTERLY
55 BA .00625
56 LS 0 98.0
57 UD 0.102
58 *

```


57 KK CPX2
58 KM COMBINE CPX1 AND EX1
59 KM TOTAL FLOWS FOR ONSITE BASINS AND OFD1
60 HC 2
*
61 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
29 OFD1
43 . EX2
48 CPX1.....
52 . EX1
57 CPX2.....

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 07APR19 TIME 18:28:59 *

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

FREMONT K-8 SCHOOL
***** TECHNICAL DRAINAGE STUDY *****
EXISTING CONDITION - ONSITE
USING SCS METHODS AND KINEMATIC WAVE ROUTING
MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
LOCHSA JOB # 181203

INPUT FILE NAME: E.DAT

APRIL 2019

MCCARRAN AIRPORT RAINFALL AREA
10 & 100 YEAR - 6 HOUR STORM EVENT
PRECIPITATION:
10-YEAR : 1.58 INCHES
100-YEAR : 2.77 INCHES
10-YEAR/100-YEAR : 1.58/2.77= 0.5704

26 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 0200 STARTING TIME
NQ 101 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 1 0 ENDING DATE
NDTIME 1020 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 8.33 HOURS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 1.00

1

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

OPERATION STATION AREA PLAN RATIOS APPLIED TO PRECIPITATION
RATIO 1 RATIO 2

					.57	1.00
HYDROGRAPH AT						
+	OFD1	.00	1	FLOW TIME	3. 3.50	5. 3.50
HYDROGRAPH AT						
+	EX2	.01	1	FLOW TIME	6. 3.58	11. 3.58
2 COMBINED AT						
+	CPX1	.01	1	FLOW TIME	9. 3.58	16. 3.58
HYDROGRAPH AT						
+	EX1	.01	1	FLOW TIME	7. 3.50	12. 3.50
2 COMBINED AT						
+	CPX2	.02	1	FLOW TIME	15. 3.58	28. 3.50

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

HEC-1 MODEL OUTPUT

(INTERIM/DEVELOPED CONDITION)


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* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 11APR19 TIME 14:18:12
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*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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      X  X 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 -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION

NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION

KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1

HEC-1 INPUT

PAGE 1

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1          ID      FREMONT K-8 SCHOOL
2          ID      ***** TECHNICAL DRAINAGE STUDY *****
3          ID      INTERIM / DEVELOPED CONDITION - ONSITE
4          ID      USING SCS METHODS AND KINEMATIC WAVE ROUTING
5          ID      MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
6          ID
7          ID      LOCHSA JOB # 181203
8          ID
9          ID
10         ID      INPUT FILE NAME: D.DAT
11         ID
12         ID      APRIL 2019
13         ID
14         ID      *****
15         ID      *****
16         ID      MCCARRAN AIRPORT RAINFALL AREA
17         ID      10 & 100 YEAR - 6 HOUR STORM EVENT
18         ID      PRECIPITATION:
19         ID          10-YEAR      : 1.58 INCHES
20         ID          100-YEAR     : 2.77 INCHES
21         ID          10-YEAR/100-YEAR : 1.58/2.77= 0.5704
22         ID
23         ID      *****
24         ID      *****
25         ID      *DIAGRAM
26         IT      5      200
27         IO      5
28         IN      5
29         JR      PREC .5704 1.0
30
31         KK      OFD1
32         KM      THE DEVELOPED OFFSITE BASIN FROM BAKER PARK TRAVELING EASTERLY TOWARDS ONSITE
33         PB      2.770
34         PC      0.0      .02      .057      .07      .087      .108      .124      .13      .13      .13
35         PC      .13      .13      .13      .133      .14      .142      .148      .158      .172      .181
36         PC      .19      .197      .199      .2      .201      .204      .214      .229      .241      .249
37         PC      .251      .256      .27      .278      .281      .283      .295      .322      .352      .409
38         PC      .499      .59      .71      .744      .781      .812      .819      .835      .851      .856
39         PC      .86      .868      .876      .888      .91      .926      .937      .95      .97      .976
40         PC      .982      .985      .987      .989      .99      .993      .993      .994      .995      .998
41         PC      .998      .999      1.0
42         BA      .00286
43         LS      0      96.0
44         UD      .114
45         *
46
47         KK      OND1
48         KM      ONSITE BASIN TRAVELING NORTHERLY
49         BA      .00595
50         LS      0      98.0
51         UD      0.115
52         *

```

1

HEC-1 INPUT

PAGE 2

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
48         KK      CPD1
49         KM      COMBINE OND1 AND OFD1
50         KM      FLOWS EXITING THE PROJECT SITE AT NEC
51         HC      2
52         *
53
54         KK      OND2
55         KM      ONSITE BASIN TRAVELING EASTERLY AND THEN NORTHERLY
56         BA      .00331
57         LS      0      98.0
58         UD      0.082
59         *

```

```

57      KK      OND3
58      KM      ONSITE BASIN TRAVELING EASTERLY AND THEN NORTHERLY
59      BA      .00323
60      LS      0      98.0
61      UD      0.104
        *
62      KK      CPD2
63      KM      COMBINE OND2 AND OND3 WITH CPD1
64      KM      TOTAL FLOWS FOR ONSITE
65      HC      3
        *
66      ZZ

```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```

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

29      OFD1
        .
43      .      OND1
        .
48      CPD1.....
        .
52      .      OND2
        .
57      .      .      OND3
        .
62      CPD2.....

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 11APR19 TIME 14:18:12
*
*****

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

```

FREMONT K-8 SCHOOL
***** TECHNICAL DRAINAGE STUDY *****
INTERIM / DEVELOPED CONDITION - ONSITE
USING SCS METHODS AND KINEMATIC WAVE ROUTING
MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
LOCHSA JOB # 181203

INPUT FILE NAME: D.DAT

APRIL 2019

```

*****
MCCARRAN AIRPORT RAINFALL AREA
10 & 100 YEAR - 6 HOUR STORM EVENT
PRECIPITATION:
10-YEAR      : 1.58 INCHES
100-YEAR     : 2.77 INCHES
10-YEAR/100-YEAR : 1.58/2.77= 0.5704
*****

```

26 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     0200 STARTING TIME
NQ        101 NUMBER OF HYDROGRAPH ORDINATES
NDDATE    1 0 ENDING DATE
NDTIME    1020 ENDING TIME
ICENT     19 CENTURY MARK

```

```

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE      8.33 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

.57 1.00

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION	
					RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT						
+	OFD1	.00	1	FLOW	3.	5.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	OND1	.01	1	FLOW	6.	11.
				TIME	3.50	3.50
2 COMBINED AT						
+	CPD1	.01	1	FLOW	9.	16.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	OND2	.00	1	FLOW	4.	7.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	OND3	.00	1	FLOW	4.	6.
				TIME	3.50	3.50
3 COMBINED AT						
+	CPD2	.02	1	FLOW	16.	30.
				TIME	3.50	3.50

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

APPENDIX B

HYDRAULIC ANALYSIS

Normal Depth Street Calculations

St Louis Avenue - full street Section (10-yr) Worksheet for Irregular Channel

Project Description	
Worksheet	St Louis Avenue (Full St
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	.011000 ft/ft
Discharge	86.00 cfs

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

Results	
Mannings Coefficient	0.013
Water Surface Elev	5.07 ft
Elevation Range	4.09 to 5.67
Flow Area	16.7 ft²
Wetted Perimeter	56.64 ft
Top Width	55.17 ft
Actual Depth	0.98 ft
Critical Elevation	5.20 ft
Critical Slope	0.003733 ft/ft
Velocity	5.15 ft/s
Velocity Head	0.41 ft
Specific Energy	5.48 ft
Froude Number	1.65
Flow Type	supercritical

→ REF. FROM 'CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN' ($86/220 \text{ cfs} = \frac{Q_{10}}{Q_{100}}$)

↙ d_{10}
↙ y_{10}

$$V \times D = 5.15 \times 0.98 = 5.05$$

$$= 5.15 \times 0.38 = \underline{1.96'} \rightarrow \text{ON OUR SIDE}$$

$$\underline{1.96} < 6$$

Calculation Messages:

Water elevation exceeds lowest end station by 0.48299228 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+02.00	0.013
0+02.00	0+36.00	0.016
0+36.00	0+39.00	0.013
0+39.00	0+63.00	0.016
0+63.00	0+65.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	4.59
0+00.50	4.59
0+00.50	4.09
0+02.00	4.22
0+02.00	4.26

St Louis Avenue - full street Section (10-yr)
Worksheet for Irregular Channel

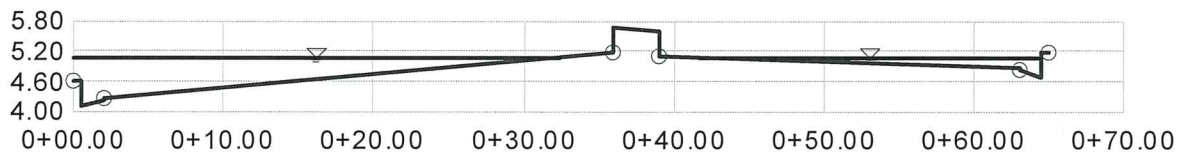
Natural Channel Points	
Station (ft)	Elevation (ft)
0+36.00	5.17
0+36.00	5.67
0+39.00	5.60
0+39.00	5.10
0+63.00	4.86
0+63.00	4.82
0+64.50	4.69
0+64.50	5.19
0+65.00	5.19

St Louis Avenue - full street Section (10-yr) **Cross Section for Irregular Channel**

Project Description	
Worksheet	St Louis Avenue (Full St
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Slope	0.011000 ft/ft
Water Surface Elev	5.07 ft
Elevation Range	.09 to 5.67
Discharge	86.00 cfs

d = 0.98' SITE
d = 0.38'



V:3.33333333
H:1
NTS

St Louis Avenue - full street Section (100-yr) Worksheet for Irregular Channel

Project Description	
Worksheet	St Louis Avenue (Full St
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	011000 ft/ft
Discharge	220.00 cfs

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

Results	
Mannings Coefficient	0.016
Water Surface Elev	5.35 ft
Elevation Range	4.09 to 5.67
Flow Area	33.8 ft²
Wetted Perimeter	64.47 ft
Top Width	62.00 ft
Actual Depth	1.26 ft
Critical Elevation	5.54 ft
Critical Slope	0.004193 ft/ft
Velocity	6.51 ft/s
Velocity Head	0.66 ft
Specific Energy	6.01 ft
Froude Number	1.55
Flow Type	supercritical

→ REF. FROM 'CLV CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN'

← d₁₀₀
← V₁₀₀

$$V \times D = 6.51 \times 1.26 = 8.2 > 8$$

$$V \times D = 6.51 \times 0.66 = 4.30 < 8 : \text{on our side}$$

Calculation Messages:
Water elevation exceeds lowest end station by 0.76297464 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+02.00	0.013
0+02.00	0+36.00	0.016
0+36.00	0+39.00	0.013
0+39.00	0+63.00	0.016
0+63.00	0+65.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	4.59
0+00.50	4.59
0+00.50	4.09
0+02.00	4.22
0+02.00	4.26

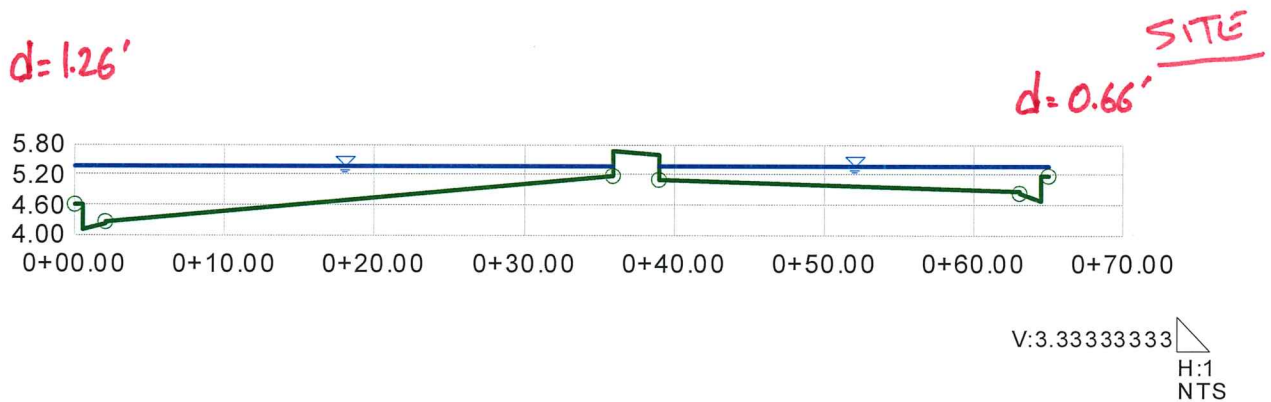
St Louis Avenue - full street Section (100-yr)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+36.00	5.17
0+36.00	5.67
0+39.00	5.60
0+39.00	5.10
0+63.00	4.86
0+63.00	4.82
0+64.50	4.69
0+64.50	5.19
0+65.00	5.19

St Louis Avenue - full street Section (100-yr) **Cross Section for Irregular Channel**

Project Description	
Worksheet	St Louis Avenue (Full St
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Slope	0.011000 ft/ft
Water Surface Elev	5.35 ft
Elevation Range	.09 to 5.67
Discharge	220.00 cfs



Hydraulic Onsite Section (100-yr Storm)

Hydraulic Section 'B'

Worksheet for Irregular Channel

Project Description	
Worksheet	Hydraulic Section 'B'
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	.007200 ft/ft
Discharge	7.00 cfs

→ 100-YR FLOW FROM BASIN 'OND2' ($4/7 \text{ cfs} = Q_{10} / Q_{100}$)

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

Results	
Mannings Coefficient	0.015
Water Surface Elev	1.79 ft
Elevation Range	1.59 to 3.58
Flow Area	3.6 ft²
Wetted Perimeter	33.01 ft
Top Width	32.86 ft
Actual Depth	0.20 ft
Critical Elevation	1.80 ft
Critical Slope	0.006758 ft/ft
Velocity	1.94 ft/s
Velocity Head	0.06 ft
Specific Energy	1.85 ft
Froude Number	1.03
Flow Type	Supercritical

← d_{100}
← V_{100}

$$V \times D = 1.94 \times 0.20 = 0.39 < 6$$

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+10.50	0.013
0+10.50	0+48.00	0.016
0+48.00	0+51.50	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	3.58
0+00.00	2.55
0+10.00	2.35
0+10.50	2.35
0+10.50	1.85
0+48.00	1.59
0+51.50	1.64
0+51.50	2.14

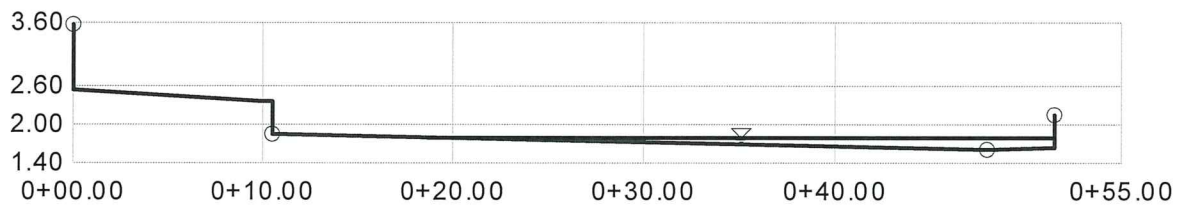
Hydraulic Section 'B'

Cross Section for Irregular Channel

Project Description	
Worksheet	Hydraulic Section 'B'
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Slope	0.007200 ft/ft
Water Surface Elev	1.79 ft
Elevation Range	.59 to 3.58
Discharge	7.00 cfs

SITE



V:3.33333333
H:1
NTS

Onsite Storm Drain Section with Nomograph

Onsite Storm Drain Capacity Worksheet for Circular Channel

Project Description	
Worksheet	onsite storm drain
Flow Element	Circular Channel
Method	Manning's Form
Solve For	Full Flow Capacity

Input Data	
Mannings Coeff	0.013
Slope	0.005000 ft/ft
Diameter	18 in

MIN. SLOPE
SIZE OF RCP

Results	
Depth	1.50 ft
Discharge	7.43 cfs
Flow Area	1.8 ft ²
Wetted Perime	4.71 ft
Top Width	0.00 ft
Critical Depth	1.06 ft
Percent Full	100.0 %
Critical Slope	0.07032 ft/ft
Velocity	4.20 ft/s
Velocity Head	0.27 ft
Specific Energ	1.77 ft
Froude Numbe	0.00
Maximum Disc	7.99 cfs
Discharge Full	7.43 cfs
Slope Full	0.005000 ft/ft
Flow Type	N/A

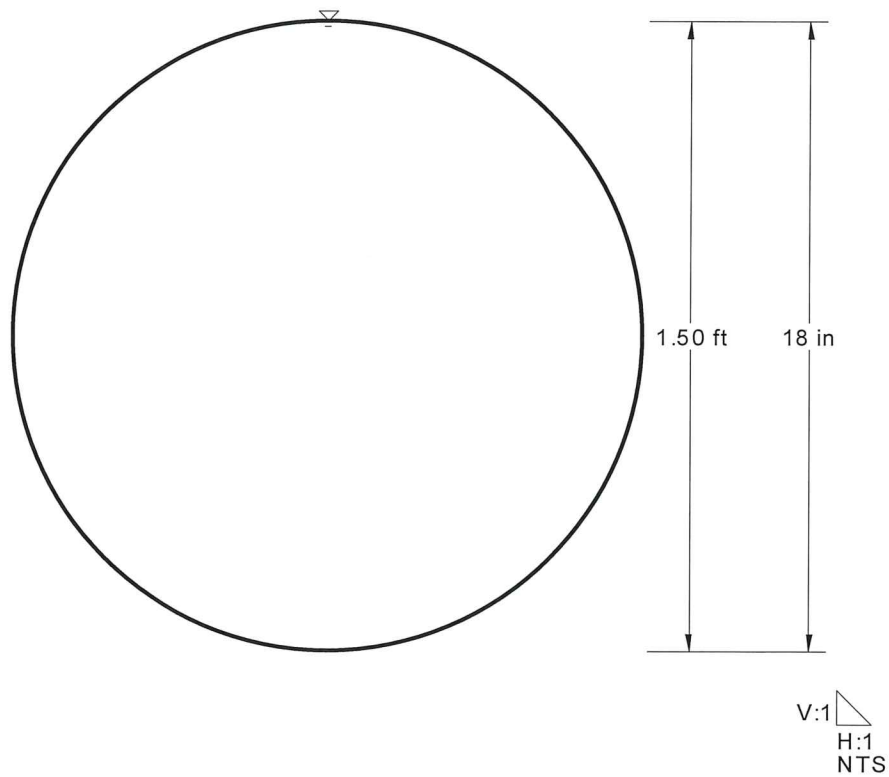
SD CAPACITY

Cross Section

Cross Section for Circular Channel

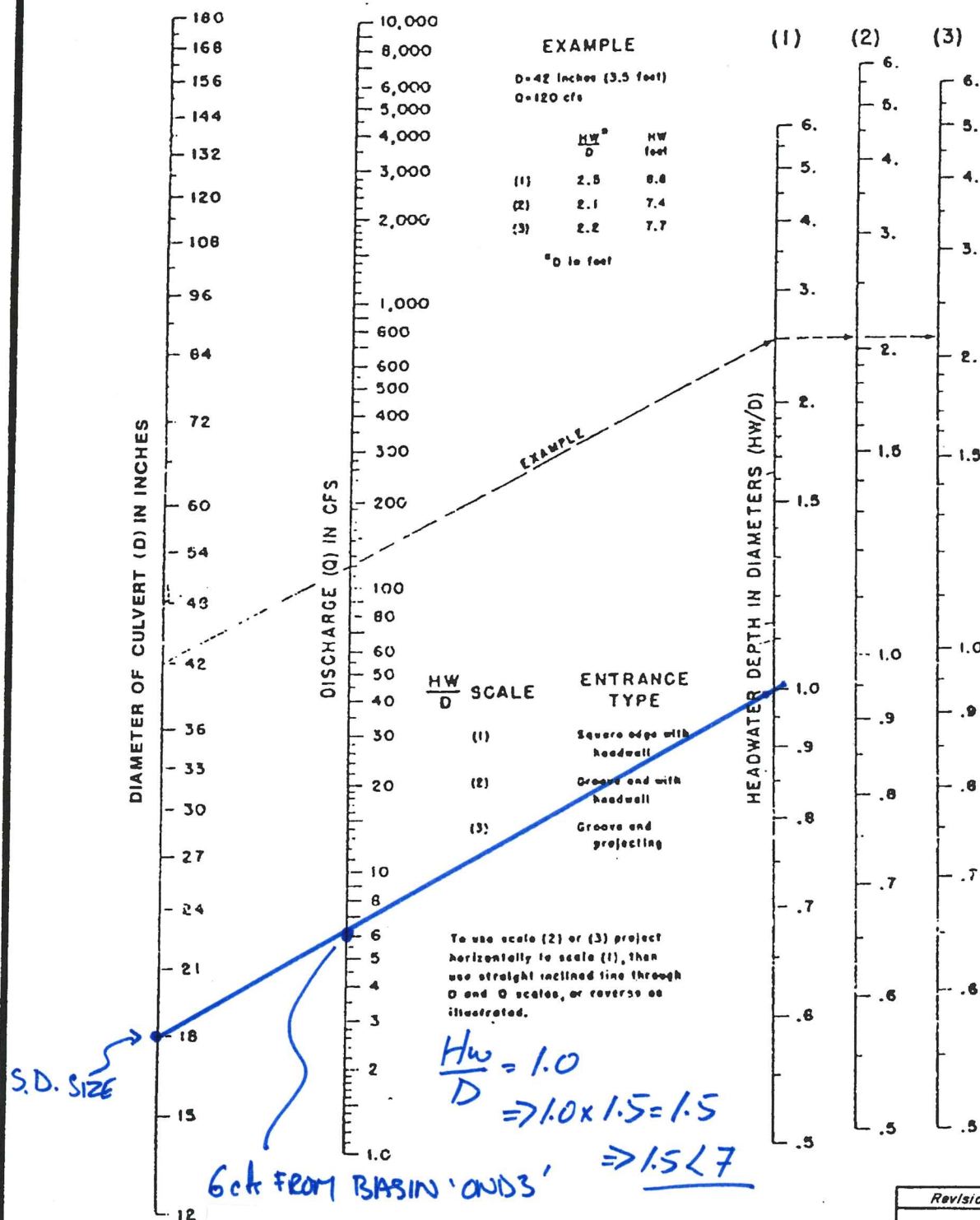
Project Description	
Worksheet	onsite storm dr
Flow Element	Circular Channe
Method	Manning's Form
Solve For	Full Flow Capac

Section Data	
Mannings Coeff	0.013
Slope	.005000 ft/ft
Depth	1.50 ft
Diameter	18 in
Discharge	7.43 cfs



HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP



Revision	Date

Section 1500 of the CCRFCD Drainage Design Manual

for the Best Management Practices

Section 1500

Structural Best Management Practices

1501 INTRODUCTION

Presented in this section are design criteria for structural Best Management Practices (BMPs) for the control of surface water quality in Las Vegas Valley. These BMPs have been identified as having potential effectiveness in Las Vegas Valley based on the types of water quality conditions expected in this area, and on documented BMP performance in other areas. Criteria for the following BMPs are presented:

- Parking Lot Low Impact Development (LID)
- General Low Impact Development (LID)
 - Disconnected Impervious Areas
 - Landscape Swale
 - Depressed Medians
 - Depressed Landscaping
 - Buffer Strip
 - Pervious Overflow Parking
 - Sand / Media Filters
 - Oil / Water Separators
 - Oil / Grit Separators
 - On-Site Water Quality Basin
 - Infiltration Trench

There are currently no federal, state or local stormwater regulations which require the installation of specific water quality features in most new or existing developments in the Las Vegas Valley. The exception is new and redeveloped non-residential sites larger than 1.0 acre, for which low impact development (LID) measures are required by the Storm Water Management Plan. LID measures for sites smaller than 1 acre are encouraged for developers desiring to mitigate the impacts of urban development on surface water resources in the Las Vegas Valley.

There are three general categories of conditions for which urban stormwater quality management practices may be applied: (1) existing urban development; (2) new urban development and substantial redevelopment; and (3) construction activity. The BMPs in this section are primarily applicable to areas of new urban development, where land is available to devote to installations of this type and where design flexibility exists. In certain cases, these structural BMPs may be effective in retrofitting existing developed areas to control water quality problems. However, it is generally more cost-effective to rely on nonstructural BMPs (e.g., source controls, housekeeping practices, public education, and employee training) in these applications. BMPs related to construction activity are primarily directed toward erosion control. This issue

1502 Parking Lot LID Measures

1502.1 Description

Low impact development (LID) measures can be used for managing runoff from areas of new development and significant redevelopment (NDSR). LID measures must be applied to parking lots for all new non-residential sites of 1 acre and larger in the Las Vegas Valley. For the purpose of LID measures, a parking lot is defined as all of the impervious area outside the building footprint. Parking lot LID policies and design criteria are discussed in more detail in *Proposed Parking Lot Low Impact Development Program for Las Vegas Valley*, Las Vegas Valley Stormwater Quality Management Committee, February 2013.

1502.2 Design Criteria

Parking lot designs must be submitted to local entities with the technical drainage study required by Municipal code. A list of accepted parking lot BMPs that can be used in the Las Vegas Valley is provided in Table 1501.

BMP requirements shall adhere to this manual. A stepped approach to determine whether a parking lot is categorized as small, medium or large for the purpose of determining required BMPs is shown below. Any project site that is less than 1 acre in size is categorized as small; parking lot size is not a factor in determining required BMPs for small sites. For project sites that are greater than or equal to 1 acre, the parking lot size is used to determine if the category is medium or large. Sites having parking lots that are less than or equal to 1 acre are categorized as medium. Sites with parking lots greater than 1 acre are categorized as large.

<u>Total Site Size</u>	<u>Parking Lot Size</u>	<u>Parking Lot Category</u>
< 1 acre	Not Applicable	Small
≥ 1 acre	≤ 1 acre	Medium
≥ 1 acre	> 1 acre	Large

Once the parking lot category is determined, the BMP requirements for the parking lot design can be determined as shown in Table 1502. BMP requirements are more stringent as the parking lot size increases.

The designer may choose how to meet the parking lot BMP design requirements depending on specific site characteristics. In order to maximize the water quality benefit of the parking lot BMPs, the designer is encouraged to locate BMPs to capture runoff from portions of the site with the highest potential to generate pollutants.

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There are no specific BMP requirements for small parking lots; however, the designer is encouraged to install any of the BMPs that are listed for parking lots in the medium or large categories. || ←

For the Medium parking lot category, the design requirements consist of disconnecting impervious areas for at least 75 percent of the parking lot area from the onsite drainage network. This may be accomplished by directing runoff to pervious areas such as landscaping, depressed medians, parking strips, or stormwater retention basins. The design criteria are based on meeting the accepted minimum standards for the BMPs selected. The designer may choose to install a treatment BMP listed in the Large parking lot category.

For the Large parking lot category, treatment BMPs are required to treat stormwater runoff from at least 75 percent of the parking lot. Because typical site drainage layouts must account for application of flood control criteria, treatment BMPs may need to be sized to accommodate runoff from the contributing building area as well. BMPs are to be sized for the 85th percentile storm, and hydrologic and hydraulic calculations are required to be submitted for the BMP design.

The requirement to treat 75 percent of the parking lot area, either through disconnecting impervious areas or installing treatment devices, recognizes that grading and other site conditions will prevent directing all site runoff to some type of BMP. However, designers are encouraged to exceed the minimum standard when this can be done cost effectively in order to maximize the potential water quality benefits of the BMP system.

LID measures that are incorporated in the parking lot design should be planned during the site design process. Certain LID measures, including depressed medians, islands, and rock-lined swales, help to disconnect impervious areas and remove suspended particles in the stormwater runoff, prior to connection to the MS4. Parking Lot BMPs can be integrated into perimeter landscaped areas (e.g., buffers) and interior landscaped areas (e.g., medians) required by local development standards whenever possible. When incorporated into landscaping features, tributary areas to individual BMPs should be kept to less than 0.5 acres whenever possible, and should never exceed 1.0 acre. →

Figure 1501 through Figure 1503, provide ideas on how parking lots can be designed to comply with the water quality regulations. The designer is required to comply with the planning code for the municipality in which the site is located. The conceptual layouts incorporate general planning requirements, however, specific planning requirements such as those for landscape buffers are determined based in part on the adjacent property. The conceptual layouts are designed to represent a commercial property that is approximately 5 acres in size, with the total parking lot area of approximately 3.3 acres.

Figure 1501, Conceptual Layout 1, represents a parking lot that can be designed so that the runoff can be directed towards the perimeter landscape buffer areas that incorporate a landscaped swale. These swales are designed as rock or xeriscaped swales to convey runoff to a low point, which discharges either directly to the MS4 or to a main drainage pipe and then into the MS4. Figure 1502, Conceptual Layout 2, represents a parking lot that is not designed to direct all runoff towards swales installed in the perimeter landscape buffer areas. One example could be that the adjacent right-of-way at this area is higher in elevation than the onsite grade. In order to still use the landscape swale BMP, the Developer could use swales in depressed medians within the site, combined with perimeter swales where feasible.

Treatment control devices rather than BMP swales may be used, however, the amount of parking lot area required to be treated would need to be calculated. Figure 1503, Conceptual Layout 3, shows a conceptual level layout for this scenario, which relies on a combination of modular pavers, sand/oil separators, and underground detention to provide treatment for at least 75 percent of the parking lot area. To size the treatment control BMPs, the approaches described in section 1502.3 should be used. Note that for treatment devices, hydraulic sizing may need to account for the contribution of runoff from building areas draining through the parking lot.

1502.3 Water Quality Design Storm

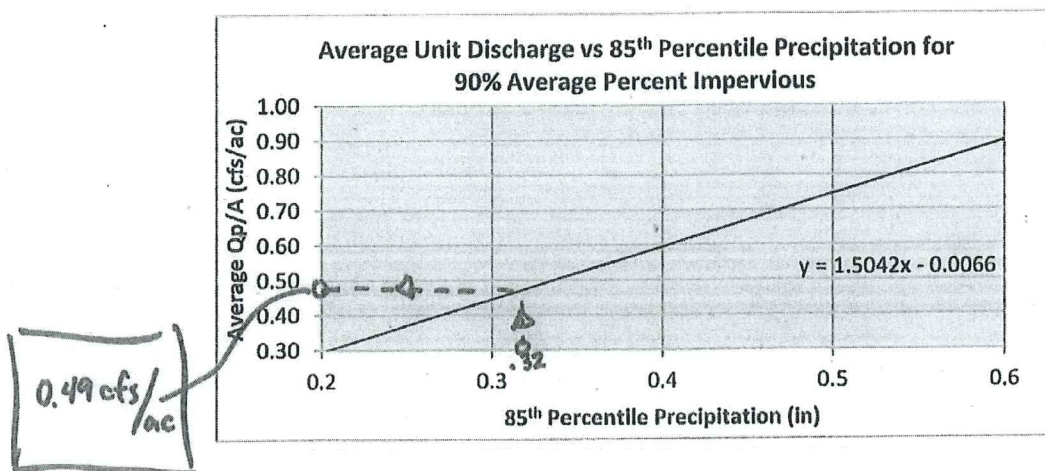
This section describes the steps to be followed to determine the design hydrology for sizing parking lot BMPs in the Las Vegas Valley.

- 1. Determine BMP Design Precipitation - 85th Percentile Rainfall Depth
 - a. Locate site on CCRFCD Design Rainfall Map for 2-year, 6-hour storm
 - b. Determine the adjusted 2-year rainfall depth (D_2) for site, per CCRFCD methods
 - c. Compute ratio of D_2 site to D_2 for the McCarran Airport Area
 - d. Compute 85th percentile rainfall depth (D_{85}) as $0.32 \times D_2$ ratio (0.32 is D_{85} for McCarran Area)
- 2. Calculate BMP Design Peak Discharge
 - a. Use the following chart or regression equation to calculate the unit discharge (Q_p/A) for the 90 percent average percent impervious area condition based on the D_{85} value.

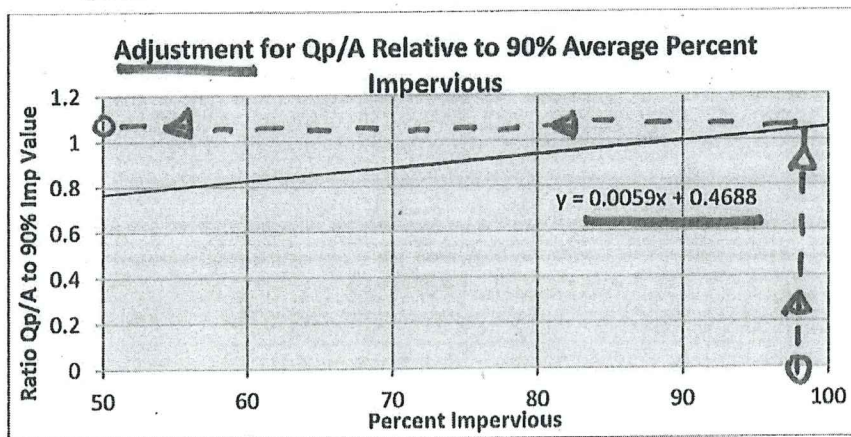
D_{85}

Q_p / area

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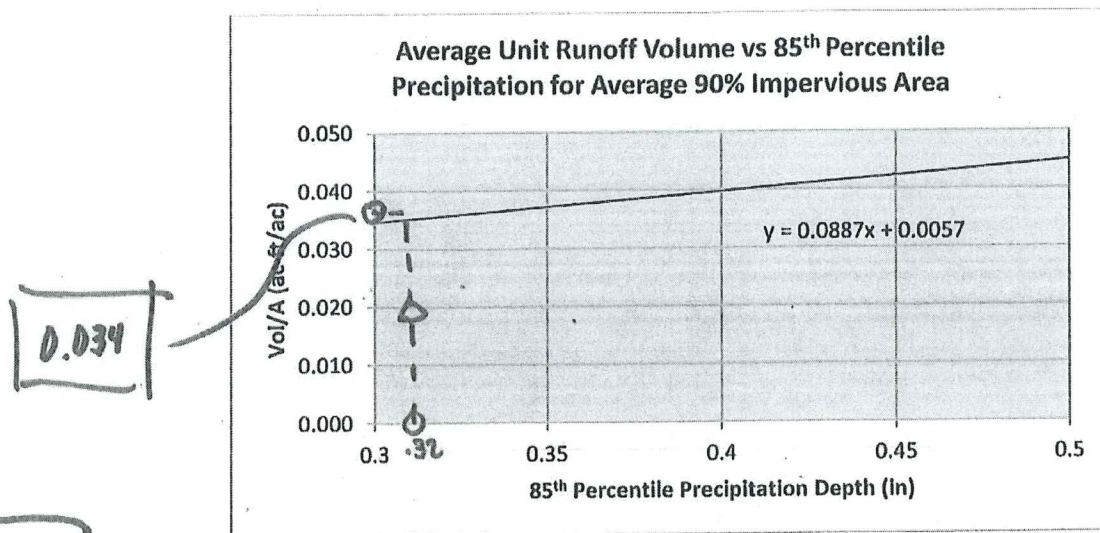


- b. Use the following chart or regression equation to calculate the unit discharge for the site based on the actual percent impervious area of the parking lot and associated landscaped areas.



- c. Calculate the peak design discharge in cfs as $Q_P = Q_P/A \times A$ where Q_P/A is from step (2b) and A is in acres.
3. Calculate BMP Design Runoff Volume
- a. Use the following chart or regression equation to calculate the unit runoff volume (Vol/A) for the 90 percent impervious condition based on the D_{85} value.

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- b. Use the chart or regression equation in step (2b) to calculate the unit runoff volume for the site based on the actual average percent impervious area of the parking lot and associated landscaped areas.
- c. Calculate the design runoff volume in acre-feet as $Vol = Vol/A \times A$ where Vol/A is from step (3b) and A is in acres

Sample Calculation

Given: New Commercial Center in Summerlin area

Site Area = 100 acres

D₂ site / D₂ McCarran Area = 1.25

percent impervious area = 85% (parking lot and associated landscaped area)

1. Determine BMP Design Precipitation - 85th Percentile Rainfall Depth (D₈₅)

$$D_{85} = 1.25 \times 0.32 = 0.40 \text{ inches}$$

2. Calculate BMP Design Discharge

$$Q_P/A (90\%) = 1.5042 \times (0.40) + 0.0066 = 0.60$$

Find Adjustment factor for percent impervious

$$Q_P/A = 0.60 \times [(0.0059[85]) + 0.4688] = 0.58$$

$$Q_P = 0.58 \times 100 \text{ acres} = 58 \text{ cfs}$$

3. Calculate BMP Design Runoff Volume

$$\text{Vol/A (90\%)} = 0.0887 \times 0.40 + 0.0057 = 0.04$$

$$\text{Vol/A} = 0.04 \times (0.0059 \times [85] + 0.4688) = 0.04; \text{Vol} = 0.04 \times 100 \text{ acres} = 4.0 \text{ ac-ft.}$$

1503 LOW IMPACT DEVELOPMENT (LID) ←

1503.1 Description

LID measures can be used for managing runoff from areas of new development and significant redevelopment (NDSR). LIDs consist of a variety of site planning and site design measures or practices to minimize the impact of individual urban developments on stormwater quality and quantity. Developers proposing the use of measures that rely on infiltration to dispose of stormwater must perform studies to demonstrate that infiltration will be effective and will not adversely affect groundwater or downstream surface water quality. LID measures determined to be feasible for use in the Las Vegas Valley NDSR program can be found in Table 1503.

The BMPs presented in this section can be utilized for sites complying with the Parking Lot LID program or other site designs requiring BMPs. These BMPs are recommendations and the designer is not limited to the BMPs in this section. The designer is encouraged to contact the local entity when alternative BMPs are considered for use.

1503.2 Water Quality Benefits

Managing site runoff can significantly reduce the amount of pollutants conveyed to receiving waters. By incorporating the LID measures described below into site planning, runoff water quality can be improved by using simple technologies, employing basic practices, and educating those present on the site. Reducing pollutants in site runoff can reduce the need for downstream treatment to meet water quality goals.

1503.3 Disconnected Impervious Areas

1503.3.1 Description

This BMP consists of disconnecting impervious areas from downstream storm drainage infrastructure. Any surface in the landscape that cannot effectively absorb or infiltrate rainfall is an impervious area. This includes driveways, roads, parking lots, rooftops, and sidewalks. On natural landscapes, rainfall is absorbed into the soil and vegetation which naturally slows down, spreads out, and soaks up precipitation and runoff. A stable supply of groundwater is provided from water percolating into the soil, and the runoff is naturally filtered of impurities before it reaches creeks, streams, rivers, and bays.

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The amount of impervious cover increases as areas become more developed. Natural filter systems are no longer in place to intercept the runoff which has serious implications for water quality and flood control. Typical pollutants in runoff from impervious areas include oil, litter, sediment, bacteria and in some cases, herbicides and pesticides.

1503.3.2 Water Quality Benefits

Concentrations and loads of the following pollutants are typically reduced by the LID BMP described in this section:

- Trace metals
- Hydrocarbons
- Litter

1503.3.3 Applications

This BMP applies to all urban areas. A beneficial way of mitigating stormwater runoff from impervious areas is to direct the runoff from parking lots and roads to pervious and vegetated soils.

1503.3.4 Limitations

Limitations may occur in areas with poor soils, where infiltration would not occur or could exacerbate groundwater quality problems. Limitations may also occur in ultra-urban areas where the site has no pervious area, including but not limited to high density areas.

1503.3.5 Design Criteria

Ways to mitigate the stormwater runoff by disconnecting impervious areas include:

- Breaking up flow directions from paved surfaces – Impervious surfaces are designed to allow stormwater to run off in a dispersed manner in several directions. The drainage off impervious surfaces is directed onto adjacent vegetated soil and not onto other pavements or into storm sewers.
- Minimize directly connected impervious areas - The impact of impervious surfaces is reduced by minimizing directly connected impervious areas, directing runoff from the impervious areas to pervious areas and/or small depressions, and in the process disconnecting hydrologic flow paths.
- Locating impervious surfaces to drain to natural systems - Existing zones of vegetation, from forested zones to scrub vegetation, are used

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for management of stormwater runoff, often with some sort of landforming to achieve volume control. The scale of this technique can vary from microcontrol by redirecting sidewalk and driveway runoff to adjacent vegetation to conveyance of runoff from larger impervious surfaces to natural areas on the development site.

1503.3.6 Maintenance

Sweep impervious areas regularly to collect loose particles and litter. Wipe up spills with rags and other absorbent material immediately, but do not hose down the area to a storm drain. Pervious areas receiving runoff should be cleared regularly of litter and accumulated sediment.

→ 1503.4 Landscape Swale ←

1503.4.1 Description of Facility

The purpose of the swale is to settle out sediment, which has the potential to have urban pollutants bound to the particulate matter. The required length of the swale to settle out particulate pollutants is dependent on multiple factors, including velocity, characteristics of the stormwater, characteristics of the swale, and length of the swale. For the Parking Lot LID program, sizing of swales will be based on minimizing the slope of the swale to minimize the swale length and flow velocities. Xeriscaped or rock swales can be sized using the standard sizing requirements, as shown in Section 1503.4.5.

Runoff from any impervious areas on a developed site can be directed to swales, including parking lots, roof tops, parking covers, etc. The swales can be installed either within the parking lot area or at the perimeter of the site.

1503.4.2 Water Quality Benefits

Concentrations and loads of the following pollutants are typically reduced by the LID BMP described in this section:

-
- Sediment
 - Total Phosphorus
 - Trace Metals
 - Hydrocarbons

Estimated pollutant removal efficiencies for vegetated landscape swales are given below. Pollutant removal efficiencies for rock lined or xeriscaped swales are expected to be lower.

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<u>Pollutant</u>	<u>Removal Efficiency</u>
→ TSS	77%
Total Phosphorus	8%
Total Nitrogen	67%
Trace Metals	83-90%

Source: CASQA New Development and Redevelopment Handbook, 2003

1503.4.3 Applications

Landscape swales are typically located in parks, parkways, private landscaped areas, or in development buffers, and can also be used as pre-treatment devices for other structural treatment controls. They are primarily used as stormwater conveyance systems; however they are limited in their ability to mitigate large storms. Landscape swales are best utilized in low to moderate sloped areas as an alternative to ditches and curb and gutter drainage.

1503.4.4 Limitations

The effectiveness of landscape swales is decreased by compacted soils, frozen ground conditions, short grass heights, steep slopes, large storm events, high discharge rates, high velocities, and a short runoff contact time. Landscape swales also require a sufficient amount of available land area and they may not be appropriate for industrial sites or locations where spills may occur. In areas where burrowing animals are abundant, landscape swales may not perform effectively. Additionally, the infiltration rates of local soils can limit the application of landscape swales, unless underdrains are installed. Another possible issue is the formation of mosquito breeding habitat if water does not drain or infiltrate.

1503.4.5 Design Criteria

<u>Tributary Area (ac)</u>	<u>Swale Slope</u>	<u>Minimum Swale Length (ft)</u>	<u>Size of Swale</u>
≤ 0.5	≤ 1%	30	9" deep maximum, 6 ft wide at top average, 4ft wide at top minimum, 4:1 side slope
0.5 - 1.0	≤ 1%	40	9" deep maximum, 6 ft wide at top average, 4ft wide at top minimum, 4:1 side slope

Minimum criteria for sizing landscaped swales for parking lot BMPs using xeriscaped surface treatments are provided below. Sizing was based on minimizing flow velocities and maximizing flow paths to encourage settlement of sediment.

BMP swales should be as long as practically feasible to provide as much treatment as possible. The minimum length is 30 ft for tributary areas up to 0.5 acres, and 40 ft for tributary areas of up to 1.0 acre. When incorporating swales into landscaping features, tributary areas to individual BMPs should be kept to less than 0.5 acre whenever possible, and should never exceed 1.0 acre unless hydrologic and hydraulic calculations are provided. BMP swales should have a minimum average top width of 6 ft, with a minimum top width at any point of 4 ft and a maximum flow depth of 9 inches for water quality flows (approximately 2-yr storm). When combined with a larger flood control facility these dimensions should apply to the portion of the swale carrying low flows. When lined with rock, landscaped swale BMPs should have a minimum rock size of 3-inch D₅₀. When combined with a larger flood control facility, rock lining should be sized based on the anticipated flood velocities in the facility.

The Developer may propose to use an alternative size swale, if supporting calculations are submitted.

1503.4.6 Maintenance

Remove any sediment or debris build-up when the depths exceed 3 inches. Inspect for pools of standing water. At regular intervals, re-grade to restore design grade and re-vegetate.

Use of heavy equipment for mowing and removing plants/debris should be avoided to minimize soil compaction. Disturbed areas should be stabilized with seed and mulch, or rock lining, as necessary.

If a spill occurs and hazardous materials contaminate soils in the swales, the affected areas should be removed immediately and disposed of in a manner that complies with federal and state regulations. The swale soils and materials should be replaced as soon as possible.

1503.5 Depressed Median

1503.5.1 Description of Facility

Medians come in the depressed or raised form, or are made flush with the surface of the carriageways. Only the depressed medians are discussed in this section.

PARKING LOT BMP DESIGN REQUIREMENTS BY PARKING LOT CATEGORY

[illegible]

BMP Swale Capacity

BMP Swale Capacity Worksheet for Triangular Channel

Project Description	
Worksheet	BMP Swale Cap
Flow Element	Triangular Char
Method	Manning's Form
Solve For	Discharge

Input Data	
Mannings Coeff	0.033
Slope	007000 ft/ft
Depth	0.75 ft
Left Side Slope	4.00 H : V
Right Side Slope	4.00 H : V

← MANNING'S CALC. = $d_{50} = 4"$

Results	
Discharge	4.32 cfs
Flow Area	2.2 ft ²
Wetted Perim	6.18 ft
Top Width	6.00 ft
Critical Depth	0.59 ft
Critical Slope	0.024798 ft/ft
Velocity	1.92 ft/s
Velocity Head	0.06 ft
Specific Energy	0.81 ft
Froude Number	0.55
Flow Type	Subcritical

← BMP SWALE CAPACITY

← WIDTH

← NON-EROSIVE

$$2 \text{ yr} = 0.5 \text{ cfs / acre}$$

$$\Rightarrow \text{BASIN 'OND1'} = 3.81 \text{ Acres}$$

$$\Rightarrow 3.81 \times 0.5 = 1.91 \text{ cfs} < 4.32 \text{ cfs}$$

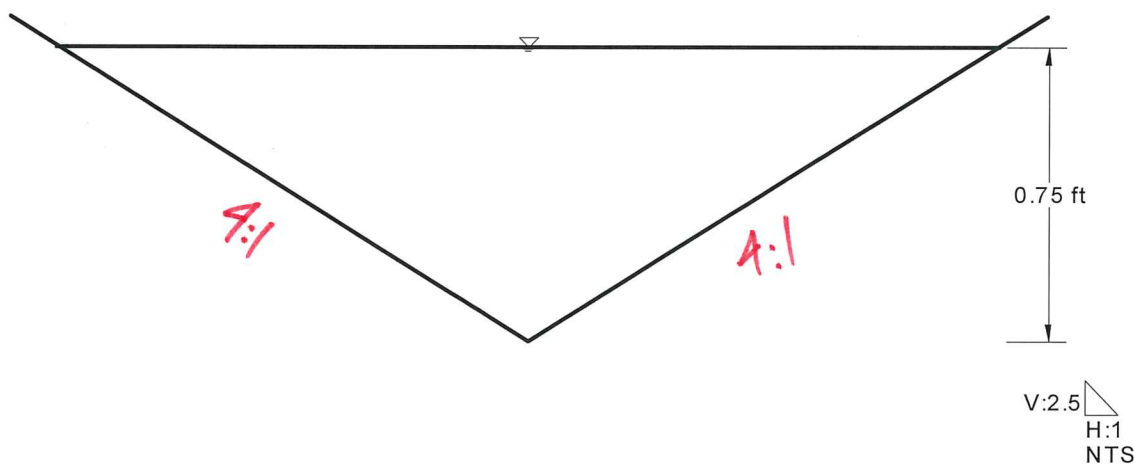
✓

BMP Swale Capacity

Cross Section for Triangular Channel

Project Description	
Worksheet	BMP Swale Cap
Flow Element	Triangular Char
Method	Manning's Form
Solve For	Discharge

Section Data	
Mannings Coeff	0.033
Slope	007000 ft/ft
Depth	0.75 ft
Left Side Slope	4.00 H : V
Right Side Slope	4.00 H : V
Discharge	4.32 cfs



Manning's Calculations

Manning's Calculation

Fremont K-8 School

Date: April, 2019

Calculated By: Abdul Bakhshi

From Section 705.4.4 of Hydrologic Criteria and Drainage Design Manual (HCDDM)
Equation 732:

$$n = 0.0395(D50)^{1/6}$$

n = Manning's coefficient

D50 = Mean stone size in ft, rock size for which 50% (by weight) of the riprap is smaller

Solve for n: D50= 4.0 inches

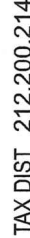
$$n = 0.0395(D50)^{1/6}$$

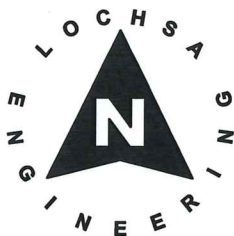
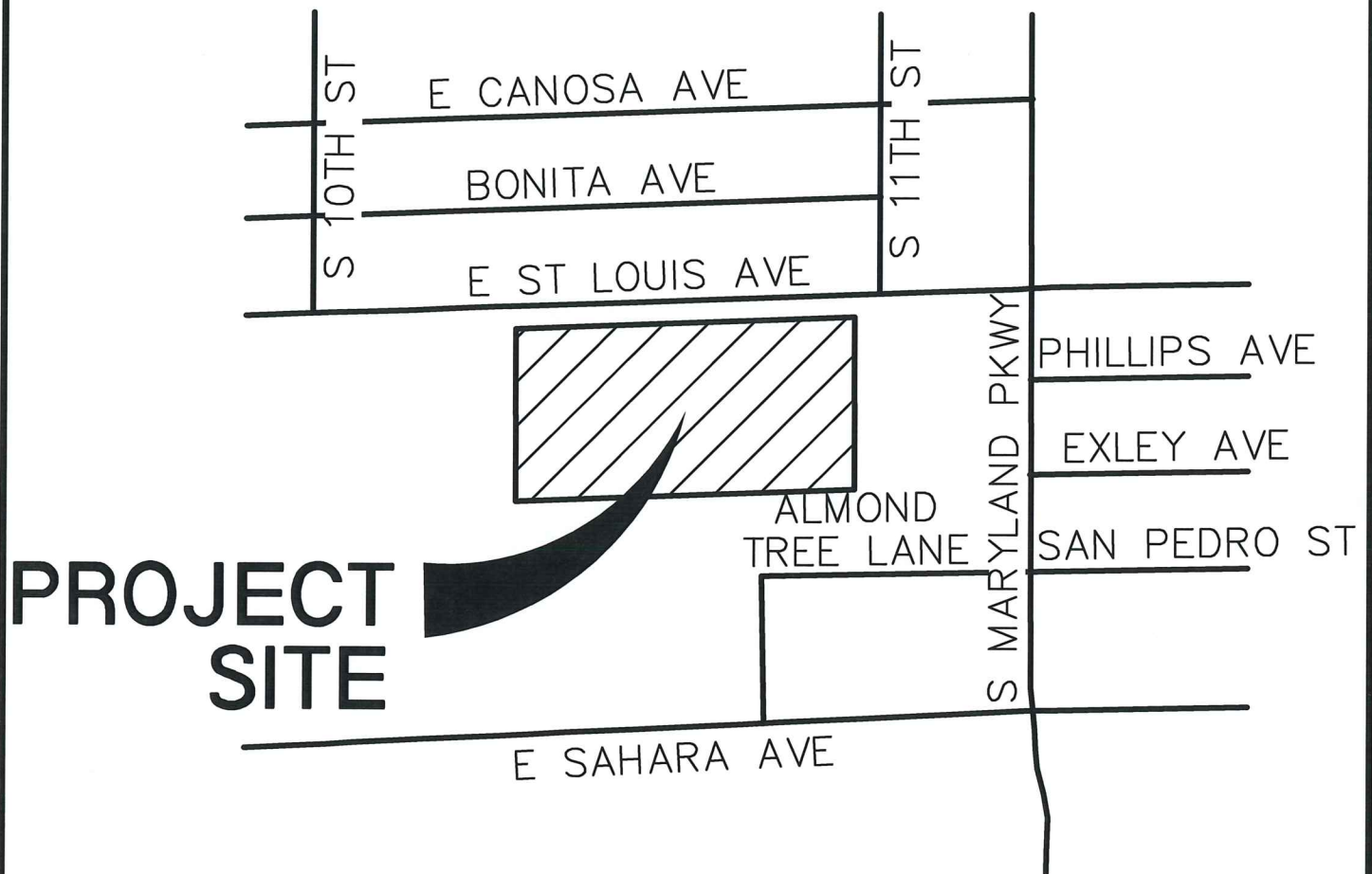
D50= 0.333 ft

n = **0.033** <<<< Manning's n-value for 3-inch Loose Riprap

APPENDIX C

FIGURES





VICINITY MAP

NOT TO SCALE

DRAWN BY: JMD SCALE: N.T.S.

CHECKED BY: HMN DATE: 4/8/19

Lochsa
engineering

6345 South Jones Blvd. Suite 100

Las Vegas, NV 89118

Phone (702) 365-9312 - Fax (702) 365-9317

**VICINITY MAP
(FIGURE 1)**

**FREMONT
K-8 SCHOOL**

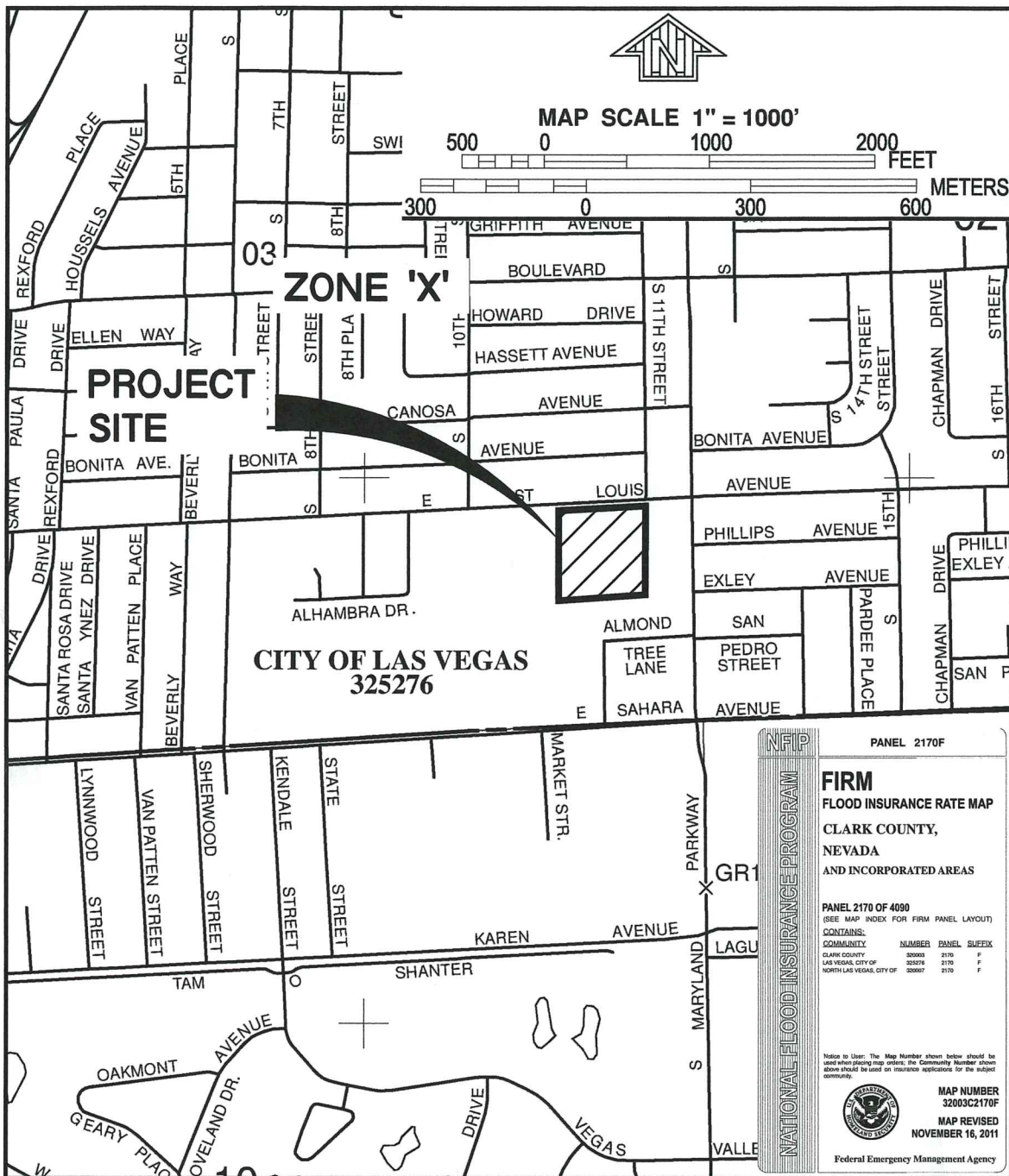
PROJECT No.:

181203

SHEET No.

1

SHEET **1** OF **1**



DRAWN BY: JMD SCALE: 1"=1000'

CHECKED BY: HMN DATE: 4/3/19

Lochsa
engineering

6345 South Jones Blvd. Suite 100
Las Vegas, NV 89118
Phone (702) 365-9312 - Fax (702) 365-9317

**FLOOD INSURANCE
RATE MAP
(FIGURE 2)**

**FREMONT
K-8 SCHOOL**

PROJECT No.:

181203

SHEET No.

2

SHEET 1 OF 1



2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

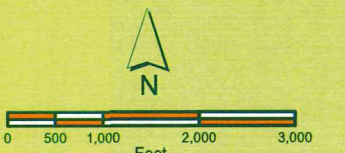
FIGURE F-30
FLOOD CONTROL FACILITIES

LEGEND

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

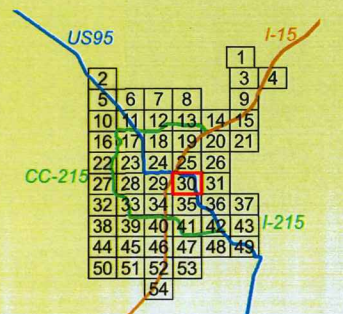
Remove & Replace/Parallel Facilities

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



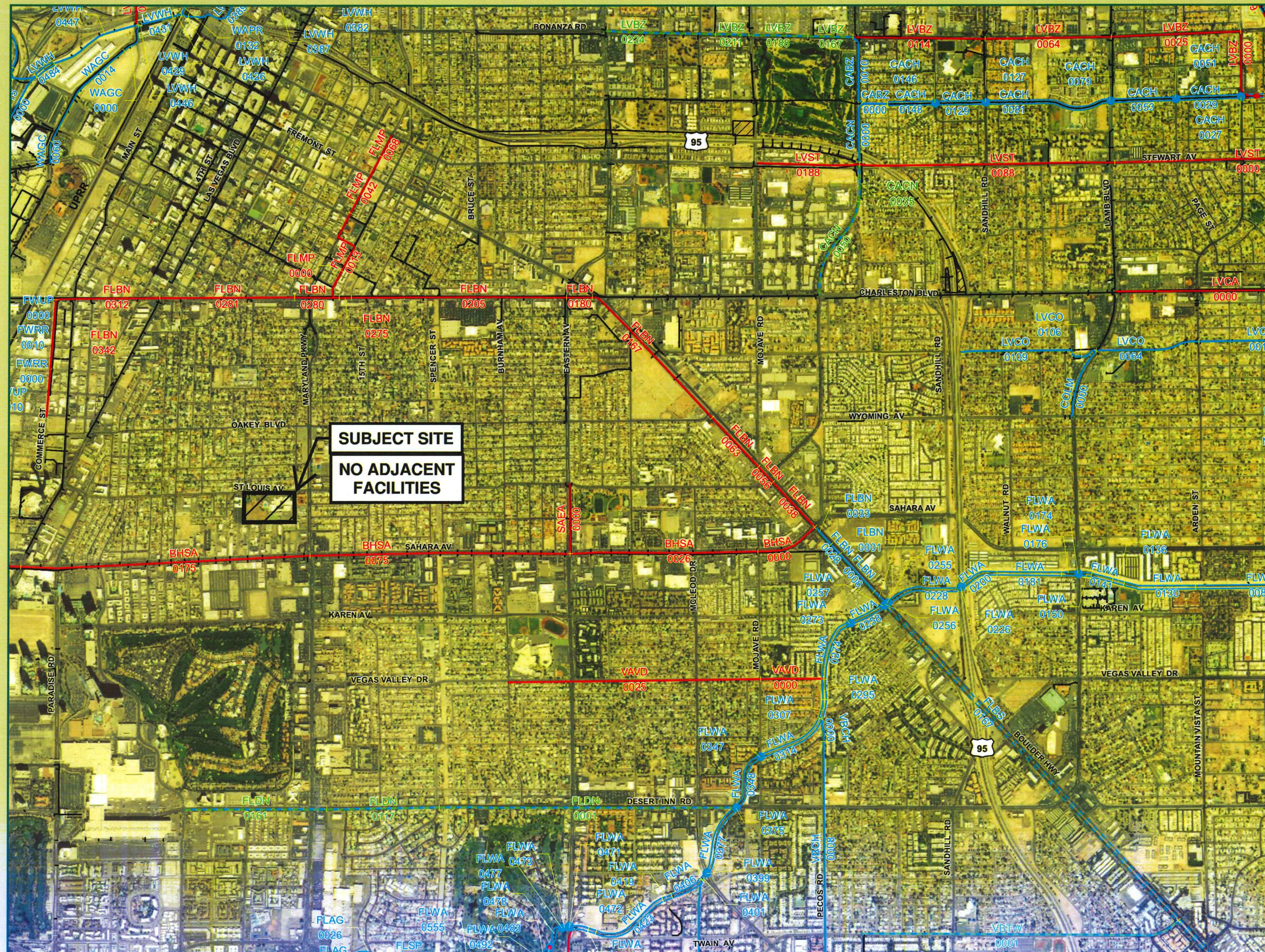
Scale: 1 inch = 2,000 feet

AerialSource: Esri World Imagery 2017



ATKINS
Member of the SNC-Lavalin Group

Louis Berger



ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BHSA		BOULDER HIGHWAY SAHARA AVENUE						
0000	P	16' X 14' RCB	1350	3952	CSA13*	SW3	7.93	0.50
0026	P	14' X 11' RCB	4000	3952	CSA13*	SW3	7.93	1.30
0075	P	12' X 11' RCB	5280	3952	CSA13	SW3	7.93	2.11
0175	P	14' X 14' RCB	6000	3952	CSA13	SW3	7.93	0.67
0289	P	14' X 12' RCB	2300	3669	CSA11	SW3	7.55	0.87
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 (REPLACED W/ CACH0001)	1681	2427	CCCA10-C	SW3	3.05	0.20
0001	P	CONC CHNL 22'W 12'D 0:1SS (REPLACES CACH0000)	1055	2427	CCCA10-C	SW3	3.05	0.20
0020	P	CONC CHNL 31'W 6.50-12'D 0:1SS (REPLACES CACH0000)	460	766	CCA10-C	SW3	0.90	2.19
0027	E	2: 15' X 5' RCBC @ MARION	82	766	CCA10-C	SW3	0.90	0.35
0029	E	CONC CHNL 10'W 8'D 1.5:1 SS	1284	766	CCA10-C	SW3	0.90	0.37
0051	E	2: 15' X 5' RCBC @ PAGE	64	766	CCA10-C	SW3	0.90	0.38
0053	E	CONC CHNL 10'W 8'D 1.5:1 SS	1275	766	CCA10-C	SW3	0.90	0.38
0079	E	2: 15' X 6' RCBC @ LAMB	100	594	CCA08-C	SW3	0.70	0.38
0081	E	CONC CHNL 12'W 6'D 1.5:1 SS	2562	594	CCA08-C	SW3	0.70	0.20
0127	E	1: 12' X 4' RCBC 2:11' X 4' RCBC @ SANDHILL	80	594	CCA08-C	SW3	0.70	0.20
0129	E	CONC CHNL 10'W 8'D 1.5:1 SS	971	594	CCA08-C	SW3	0.70	0.26
0146	E	2: 12' X 5.5' RCBC @ HONOLULU	62	594	CCA08-C	SW3	0.70	0.53
0148	E	CONC CHNL 10'W 8'D 1.5:1 SS	959	594	CCA08-C	SW3	0.70	0.53
CACN		CEDAR AVENUE - CHARLESTON						
0000	E	72" RCP	1867					0.41
0034	E	2: 48" RCP (REPLACE W/ CACN0035)	685	430	CCH70C	SW3	0.40	0.30
0035	PO	8' X 6' RCB (REPLACES CACN0034)	685	430	CCH70C	SW3	0.40	0.30
0049	E	66" RCP (REPLACE W/ CACN0050)	2146	430	CCH70C	SW3	0.40	0.60
0050	PO	6' X 7' RCB (REPLACES CACN0049)	2146	430	CCH70C	SW3	0.40	0.60
COLM		COLORADO / LAMB						
0000	E	72" RCP	1500	275	CH94	SW3	0.36	0.87
FLAG		FLAMINGO WASH - ALGONQUIN						
0026	E	60" RCP	427	432	FW21	FLAM3A	0.47	1.30
FLBN		FLAMINGO - BOULDER HIGHWAY NORTH						
0001	E	4: 10' X 6' RCB	350	4898	CCFR03	Boulder4	11.25	0.58
0008	E	2: 12' X 12' RCB	1055	4898	CCFR03	Boulder4	11.25	0.20
0028	E	3: 16' X 6' RCB	275	4898	CCFR03	Boulder4	11.25	0.20
0033	E	1: 15' X 10' RCB AND 1: 16' X 10' RCB	405	4898	CCFR03	Boulder4	11.25	0.20
0038	P	15' X 10' RCB	987	2471	CFR03	SW3	3.40	0.20
0056	P	24' X 6' RCB	391	2471	CFR03	SW3	3.40	7.00
0063	P	20' X 8' RCB	1393	2372	CFR04	SW3	3.21	0.68
0167	P	18' X 8' RCB	3565	2372	CFR04	SW3	3.21	0.38
0180	P	14' X 8' RCB	494	2013	CCH67A	SW3	2.43	1.80
0205	P	10' X 8' RCB	4478	2013	CCH67A	SW3	2.43	2.00
0275	P	12' X 8' RCB	223	1584	CCCH56	SW3	1.75	2.50
0280	P	10' X 6' RCB	925	928	CCH56	SW3	1.00	2.22
0281	P	10' X 7' RCB	2800	928	CCH56	SW3	1.00	1.33
0312	P	7' X 4' RCB	2160	621	CCH52	SW3	0.62	4.20
0342	P	7' X 4' RCB	2425	621	CCH52	SW3	0.62	4.20
FLBS		FLAMINGO - BOULDER HIGHWAY SOUTH						
0000	E	UNLINED MEDIAN CHNL 0'W 6.5'D 4.5:1 SS	4060	684	CB4	FLAM3A	1.38	1.30
0167	E	UNLINED MEDIAN CHNL 0'W 3.5'D 9:1 SS	8850	348	CB4N	FLAM3A	0.63	0.90
FLDN		DESERT INN DRAIN EAST						
0000	E	60" RCP (REPLACE W/ FLDN0001)	6160	959	CFW30AW	FLAM3A	2.12	1.22
0001	PO	12' X 5' RCB (REPLACES FLDN0000)	6160	959	CFW30AW	FLAM3A	2.12	1.22
0116	E	54" RCP (REPLACE W/ FLDN0117)	2330	954	CFW29	FLAM3A	1.82	1.77
0117	PO	10' X 5' RCB (REPLACES FLDN0116)	2330	954	CFW29	FLAM3A	1.82	1.77
0160	E	48" RCP (REPLACE W/ FLDN0161)	2950	742	CFW28	FLAM3A	1.51	1.28
0161	PO	10' X 5' RCB (REPLACES FLDN0160)	2950	742	CFW28	FLAM3A	1.51	1.28
FLMP		FLAMINGO WASH-MARYLAND PARKWAY SYSTEM						
0000	P	12' X 6' RCB	664	689	CCH60A	SW3	0.75	0.78
0013	P	12' X 4' RCB	1535	689	CCH60A	SW3	0.75	0.48

ID / 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						
0042	P	6' X 4' RCB	1345	245	DFLAM	SW3	0.31	0.95
0068	P	42" RCP	475	245	DFLAM	SW3	0.31	0.61
FLWA		FLAMINGO WASH						
0080	E	CONC CHNL 90'W 8'D 0:1 SS	2665	9548	CFW36	FLAM5B	35.21	0.40
0130	E	CONC CHNL 70'W 10'D 0:1 SS	1470	9548	CFW36	FLAM5B	35.21	0.40
0136	E	TRANSITION CONC CHNL 104'W 12'D TO 70'W 10'D 0:1 SS	255	9548	CFW36	FLAM5B	35.21	3.79
0141	E	CONC CHNL 104'W 12'D 0:1 SS	450	9548	CFW36	FLAM5B	35.21	0.96
0150	E	CONC CHNL 104'W 9'D 0:1 SS	225	9548	CFW36	FLAM5B	35.21	6.00
0174	E	9: 10' X 6' RCBC @ LAMB	110	9504	CFW34	FLAM5B	34.77	1.40
0176	E	TRANSITION CONC CHNL 70'W 9'D TO 104'W 9'D 0:1 SS	290	9504	CFW34	FLAM5B	34.77	0.36
0181	E	CONC CHNL 70'W 9'D 0:1 SS	1270	9504	CFW34	FLAM5B	34.77	0.36
0200	E	CONC CHNL 70'W 12'D TO 12'D W/ PIER 0:1 SS	755	9504	CFW34	FLAM5B	34.77	0.50
0226	E	FREE SPAN BRIDGE 100'W 10'D @ I-515	170	9504	CFW34	FLAM5B	34.77	0.80
0228	E	CONC CHNL 70'W 8'D TO 12'D 0:1 SS	1500	9371	CFW33	FLAM5B	34.43	0.80
0255	E	2 SPAN BRIDGE 150'W 9'D @ BOULDER HWY	65	9371	CFW33	FLAM5B	34.43	1.00
0256	E	CONC CHNL 60'W 7.5'D 0:1 SS	40	6750	CFW33W	FLAM5B	23.17	1.00
0257	E	2 SPAN BRIDGE 150'W 9'D @ BOULDER HWY	60	6750	CFW33W	FLAM5B	23.17	1.00
0258	E	CONC CHNL 60'W 7.5'D 0:1 SS	750	6750	CFW33W	FLAM5B	23.17	0.44
0273	E	FREE SPAN BRIDGE 60'W 9'D @ MMHP	20	6750	CFW33W	FLAM5B	23.17	0.40
0274	E	CONC CHNL 60'W 8.1'D 0:1 SS	1370	6750	CFW33W	FLAM5B	23.17	1.00
0285	E	CONC CHNL 60'W 8.1'D 0:1 SS	430	6416	CFW31	FLAM5B	21.56	0.80
0307	E	CONC CHNL 60'W 8.1'D 2:1 SS	410	6416	CFW31	FLAM5B	21.56	0.70
0314	E	CONC CHNL 60'W 8.1'D 2:1 SS	1500	6106	CFW30B	FLAM5B	20.19	0.90
0347	E	5: 10' X 8' RCBC @ MOJAVE	80	6106	CFW30B	FLAM5B	20.19	0.94
0348	E	CONC CHNL 30'W 12'D 1:1 SS	1150	6106	CFW30B	FLAM5B	20.19	0.70
0375	E	5: 10' X 8' RCBC @ DESERT INN	140	6074	CFW23	FLAM5B	18.30	2.70
0377	E	CONC CHNL 50'W 9.5'D 0:1 SS	1372	6074	CFW23	FLAM5B	18.30	1.04
0399	E	FREE SPAN BRIDGE 60'W 16'D @ MCLEOD	130	6074	CFW23	FLAM5B	18.30	0.50
0401	E	CONC CHNL 50'W 11.5'D 0:1 SS	107	6074	CFW23	FLAM5B	18.30	0.50
0406	E	CONC CHNL 33'W 11.5'D 0:1 SS	716	5277	CFW23W	FLAM5B	17.42	0.79
0419	E	CONC CHNL 33'-50'W 9.8'D 0:1 SS	206	5277	CFW23W	FLAM5B	17.42	2.00
0423	E	CONC CHNL 50'W 9.8'D 0:1 SS	1686	5277	CFW23W	FLAM5B	17.42	0.76
0455	E	CONC CHNL 50'-75'W 9.8'D 0:1 SS	170	5277	CFW23W	FLAM5B	17.42	1.83
0458	E	CONC CHNL 75'-30'W 9.8'D 0:1 SS	347	5277	CFW23W	FLAM5B	17.42	1.50
0471	E	5: 10' X 8' RCBC @ EASTERN	110	1841*	CFW22W*	FLAM5B	14.32	1.30
0472	E	22' X 8' RCBC @ EASTERN	110	3406*	CFW22W*	FLAM5B	14.32	0.50
0473	E	GRASS CHNL 60'W 15'D 2:1 SS	100	5247	CFW22W	FLAM5B	14.32	0.47
0477	E	3 SPAN BRIDGE 47'W 15'D	10	5247	CFW22W	FLAM5B	14.32	0.80
0478	E	GRASS CHNL 60'W 15'D 2:1 SS	520	5247	CFW22W	FLAM5B	14.32	0.47
0481	E	3: 90" CMAP @ TIOGA (REPLACE W/ FLWA0482)	60	5247	CFW22W	FLAM5B	14.32	0.87
0482	P	4: 20' X 6' RCBC @ TIOGA (REPLACES FLWA0481)	60	5247	CFW22W	FLAM5B	14.32	0.87
0483	E	GRASS CHNL 60'W 15'D 2:1 SS	300	5247	CFW22W	FLAM5B	14.32	0.63
FW15		FREEWAY CHANNEL FROM DESERT INN TO EXPRESSWAY						
0000	E	3: 12' X 10' RCB	2170	3685	CAL93	Boulder4	8.93	0.17
LCCH		LAS VEGAS CREEK CHANNEL						
0000	E	2: 12' X 7' RCB	730	3212	CAL93C	MEADOWS4	9.90	1.28
0013	E	2: 12' X 6' RCB	2035	3050	CLC20-C	MEADOWS4	9.60	0.82
LVBS		LAS VEGAS WASH - BONANZA						
0000	P	2: 12' X 7' RCB	1760	1753	CBN15-C	SW3	2.15	0.40
0025	P	2: 12' X 7' RCB	2700	1753	CBN15-C	SW3	2.15	0.40
0064	P	2: 12' X 7' RCB	2630	1603	CBN12-C	SW3	1.87	0.40
0114	P	2: 12' X 6' RCB	2740	1311	CBN10-C	SW3	1.54	0.40
0166	E	54" RCP (REPLACE W/ LVBS0167)	930	1106	CBN09	SW3	1.29	0.45
0167	PO	10' X 9' RCB (REPLACES LVBS0166)	930	1106	CBN09	SW3	1.29	0.45
0187	E	48" RCP (REPLACE W/ LVBS0188)	1235	1106	CBN09	SW3	1.29	0.71
0188	PO	9' X 9' RCB (REPLACES LVBS0187)	1235	1106	CBN09	SW3	1.29	0.71
0210	E	42" RCP (REPLACE W/ LVBS0211)	704	1004	CBN08	SW3	1.05	1.37
0211	PO	8' X 8' RCB (REPLACES LVBS0210)	704	1004	CBN08	SW3	1.05	1.37
0223	E	36" RCP (REPLACE W/ LVBS0224)	2275	858	CBN03	SW3	0.84	0.72
0224	PO	8' X 8' RCB (REPLACES LVBS0223)	2275	858	CBN03	SW3	0.84	0.72

ID / 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	P	12' X 8' RCB	4600	985	CCH77-C	SW3	1.16	0.30
LVCO		COLORADO AVENUE SYSTEM						
0012	E	14' X 8' RCB	2560	1144	CNEL06	SW3	1.32	0.24
0064	E	10' X 8' RCB	2165	901	CCH94	SW3	1.00	0.24
0106	E	10' X 8' RCB	590	402	CCH92-C	SW3	0.37	0.24
0109	E	10' X 5' RCB	2350	402	CCH92-C	SW3	0.37	0.67
LVOE		OWENS AVENUE - EAST						
0345	P	13' X 12' RCB	990	2576	DLVOE	SW5	22.61	0.60
LVST		LAS VEGAS WASH - STEWART						
0000	P	10' X 10' RCB	4684	1316	CST03-C	SW3	1.40	0.56
0088	P	10' X 9' RCB	4654	1135	CST01-C	SW3	1.18	0.56
0188	P	8' X 8' RCB	1980	601	CCA04	SW3	0.59	0.40
LVWH		WASHINGTON AVENUE CHANNEL						
0389	E	12' X 8' RCB	2110	1562*	CV1-C*	SW5SC	14.95	0.90
0426	E	16' X 8' RCB	150	1562*	CV1-C*	SW5SC	14.95	1.08
0429	E	SPLITTER STRUCTURE (2: 12' X 8' RCB)	190	2870	DCLC21	SW5	22.61	1.90
0431	E	3: 14.33' X 10' RCB	665	2870	DCLC21	SW5	22.61	0.15
0446	E	JUNCTION STRUCTURE	69	2870	DCLC21	SW5	22.61	0.15
0447	E	3: 14.33' X 10' RCB	1955	5193	CCAL93	SW5	22.05	0.15
0484	E	CONFLUENCE STRUCTURE	455	5193	CCAL93	SW5	22.05	0.15
SAEA		SAHARA AVENUE - EASTERN LATERAL						
0000	P	10' X 7' RCB	1440	492	CFR02	SW3	0.65	0.20
VAVD		VEGAS VALLEY DRIVE						
0000	P	7' X 5' RCB	1300	649	CFW41	FLAM3A	1.30	2.10
0025	P	84" RCP	5300	649	CFW41	FLAM3A	1.30	1.60
VBCH		VAN BUSKIRK CHANNEL						
0000	E	12' X 3' RCB	500	637	CVB16	FLAM3A	1.16	1.00
0008	E	8' X 5' RCB	5490	637	CVB16	FLAM3A	1.16	1.00
VBEA		VAN BUSKIRK - EASTERN AVE						
0000	P	10' X 6' RCB	3020	896	CVB11	FLAM3A	2.85	1.30
VBCM		VAN BUSKIRK - MCLEOD DRIVE						
0000	E	2: 8' X 8' RCB	3850	931	CVB13	FLAM3A	2.99	0.50
VBTW		VAN BUSKIRK - TWAIN						
0000	E	18" RCP (REPLACE W/ VBTW0001)	6640	379	CB2	FLAM3A	0.74	0.70
0001	P0	84" RCP (REPLACES VBTW0000)	6640	379	CB2	FLAM3A	0.74	0.70
WAGC		WASHINGTON AVENUE CHANNEL - GRAND CENTRAL						
0000	E	2: 12' X 4' RCB	700	505	LC21	SW3	0.56	0.20
0014	E	1: 12' X 4' RCB AND 1: 11' X 4' RCB	2440	505	LC21	SW3	0.56	0.20
0060	E	12' X 4' RCB	455	505	LC21	SW3	0.56	0.20
WAPR		WASHINGTON AVENUE CHANNEL PARALLEL						
0132	E	2: 9" X 8' RCB	387	1562*	CV1-C*	SW5SC	14.95	1.67



2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H-32
HYDROLOGIC SUMMARY

LEGEND

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

Flood Control Facilities

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

Type Hydrologic Soil Groups

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

Typical Land Use

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

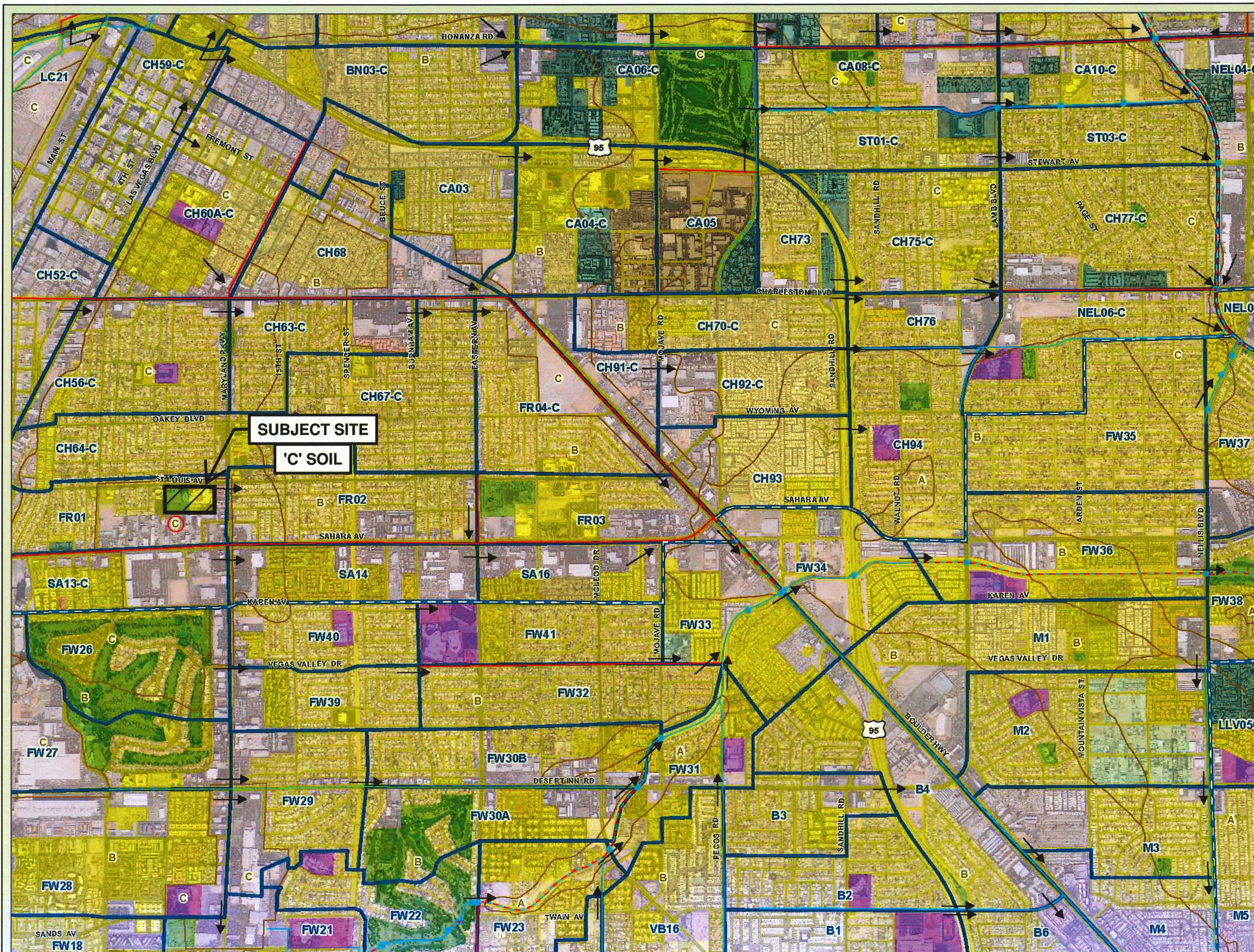
* Drought Ordinance Applied

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	1	2	3			
	4	5	6			
	7	8	9	10	11	12
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				





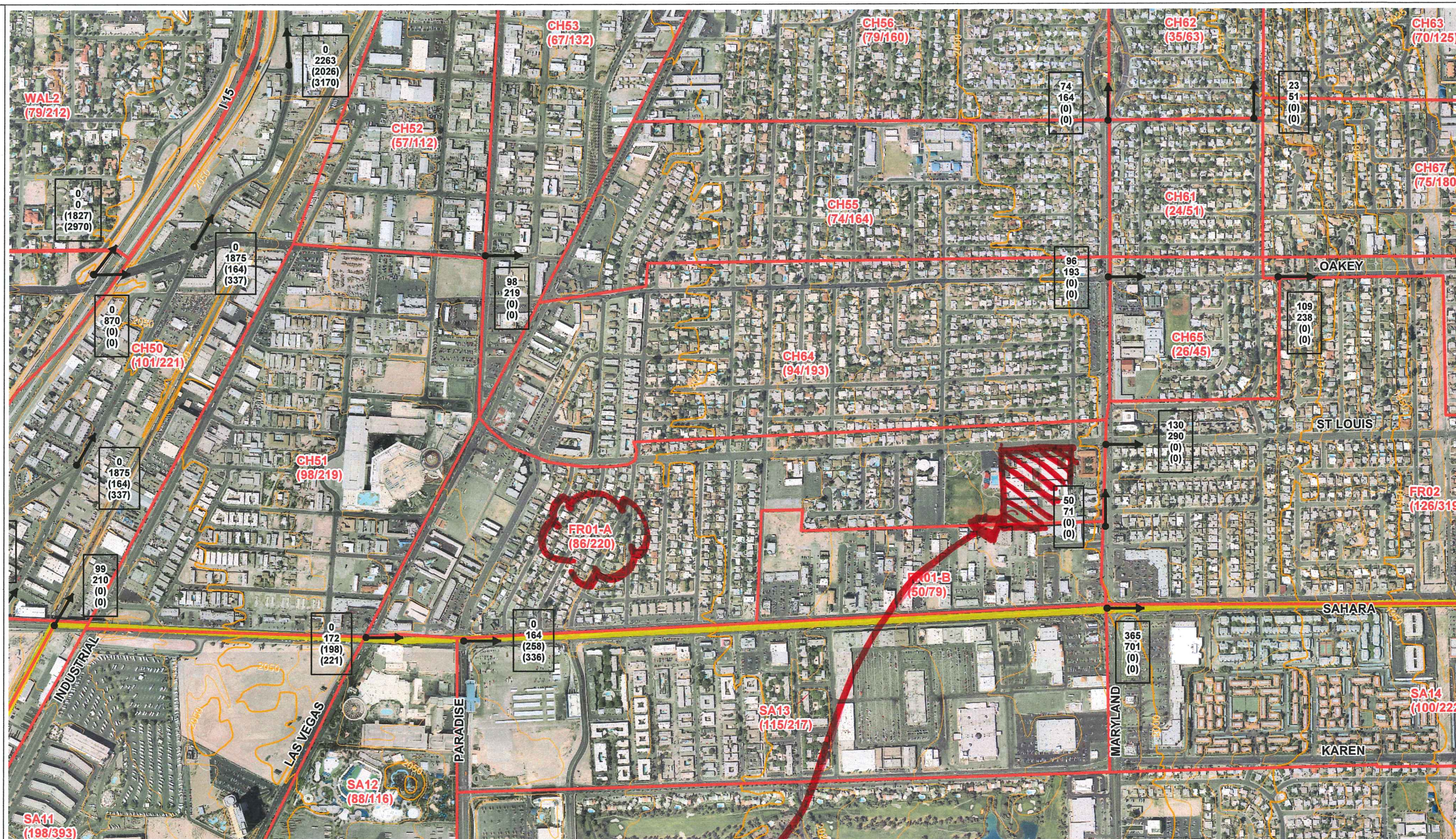
CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

LEGEND

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

PHOTO DATE: SPRING 2004

FIGURE E-16



EXISTING DRAINAGE CONDITIONS



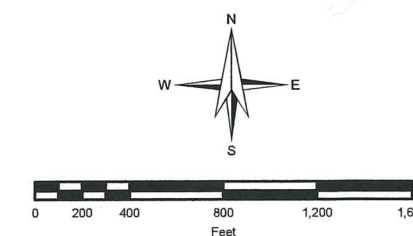
**2270 Corporate Circle, Suite 100
Henderson, NV 89074
(702) 263-7275
Fax: (702) 263-7200**

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

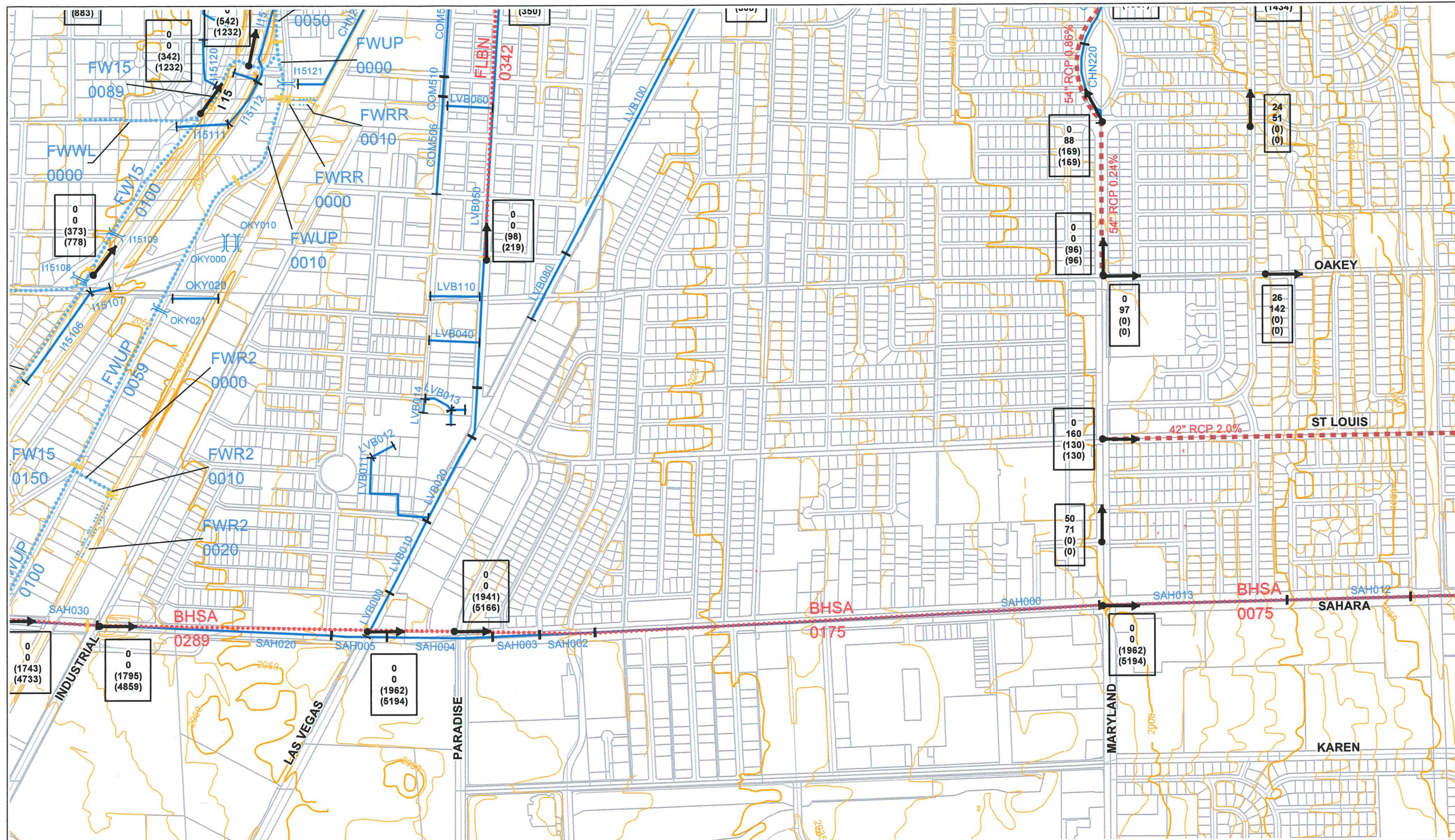
PROJEK
STĚ

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

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



SCALE: 1 inch = 800 feet

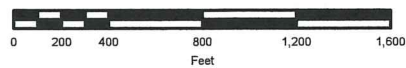
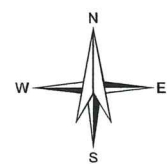


City of Las Vegas **CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN**

LEGEND

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

FIGURE F-16



SCALE: 1 inch = 800 feet

Flow Arrow

250
500
(300)
(800)

10-Year Street Flow
100-Year Street Flow
10-Year Facility Flow
100-Year Facility Flow

(Flows in CFS)

NOTE:

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

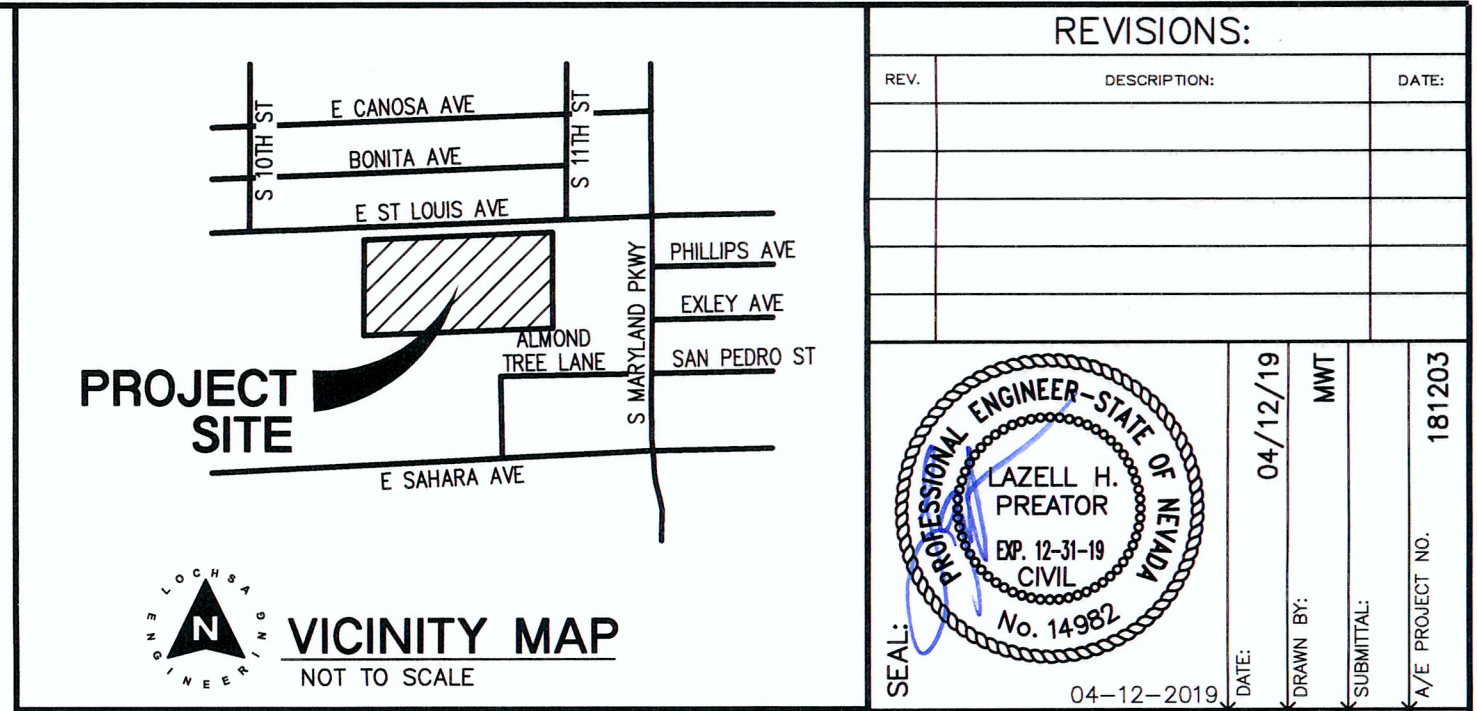
100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explanation.

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

FUTURE DRAINAGE CONDITIONS



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(702) 263-7275
Fax: (702) 263-7200



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 RIGHT-OF-WAY OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIAL 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 OR OTHER CONSTRUCTION ACTIVITIES THAT DO NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE CITY OF LAS VEGAS AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER CONSTRUCTION ACTIVITIES BEGIN ON ANY DISTURBED AREA. WHEN TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NWT00000, 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 AND AREAS EXPOSED TO PUBLIC ACCESS AT LEAST ONCE EACH WEEK AT SEVERAL LOCATIONS, AND BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OR 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE THE BMP PLAN AS NECESSARY. WHEN TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NWT00000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMP'S SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER EVENT OR THE NEXT ANTICIPATED STORMWATER EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

SAFETY ALERT

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1-702-227-2929



Call before you Overhead

Call before you Overhead

Avoid cutting underground utility lines. It's costly.

Call 811

1-702-432-5300

FREQUENCY AND AERIAL SYSTEMS OF TRANSMISSION 1-800-227-2800

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS AND LAS VEGAS HIGH ELEVATION ZONES, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 115°48' WEST OF THE GREENWICH MERIDIAN.

ZONE: LAS VEGAS ELEVATION ZONE

DATUM (REFERENCE FRAME): NAD 1983(2011) EPOCH 2010.0

SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

PROJECTION: TRANSVERSE MERCATOR
STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°55'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID ORIGIN: 100,000.00 M (555,168.68667 FEET)
EASTING AT CENTRAL MERIDIAN: 100,000.00 M (328,083.3333 FEET) US
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

NOTES:

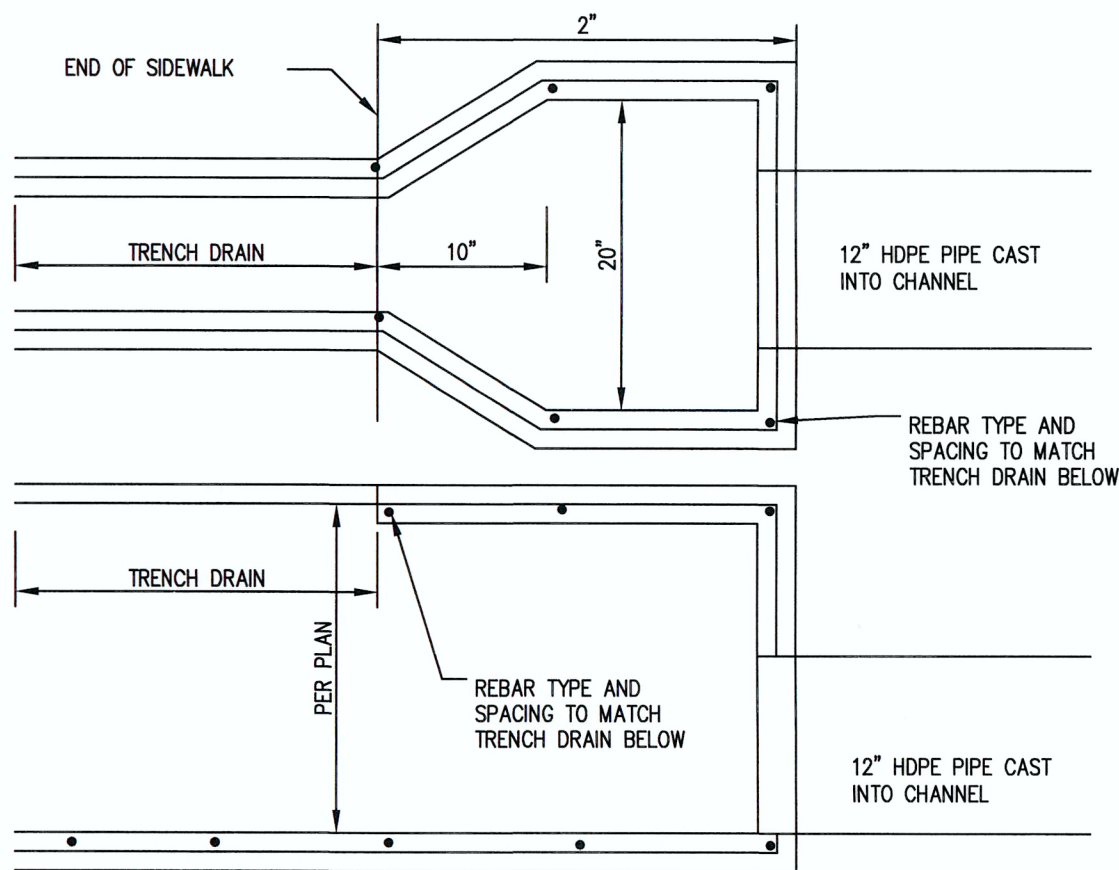
1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO "GROUND" DISTANCES IN THE PROJECT AREA.

2. GRID BEARING SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARING DUE TO MERIDIAN CONVERGENCE.

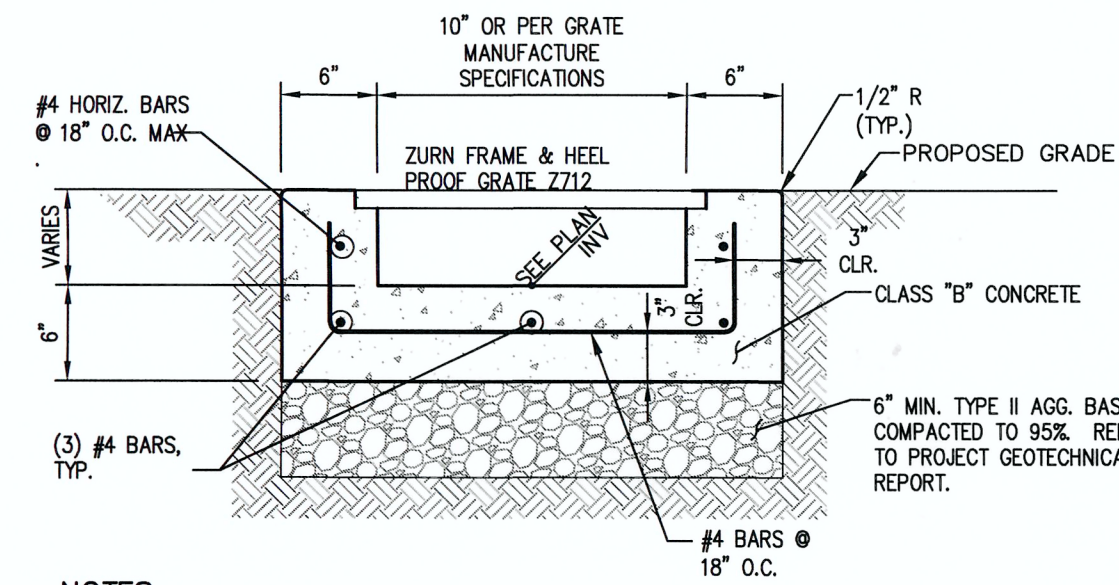
MANHOLE DESCRIPTIONS	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS
⑤ = SANITARY SEWER		⊗	▷	
⑩ = STORM DRAIN	⬇			
③ = ELECTRICAL		⦿	▶	
⑦ = TELEPHONE				

N OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100w HPS STREETLIGHTS	150w HPS STREETLIGHT
○	□			
●	□			

[illegible]

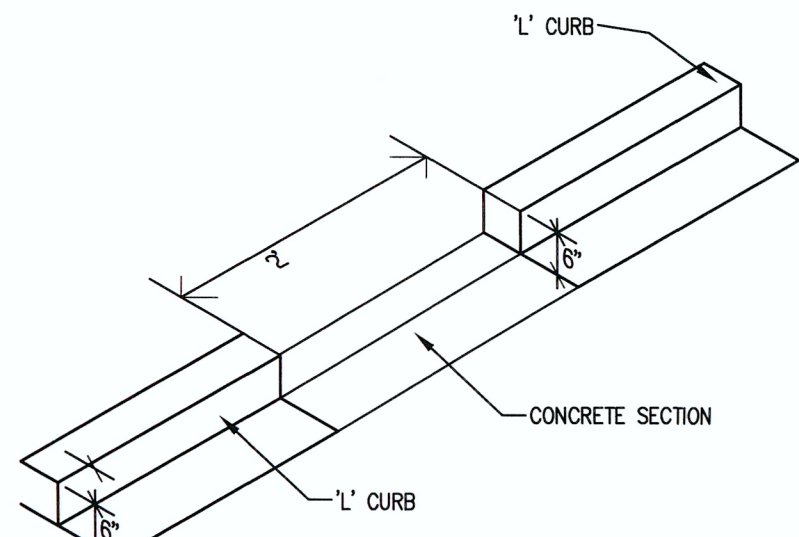


12" SD CONNECTION TO TRENCH DRAIN

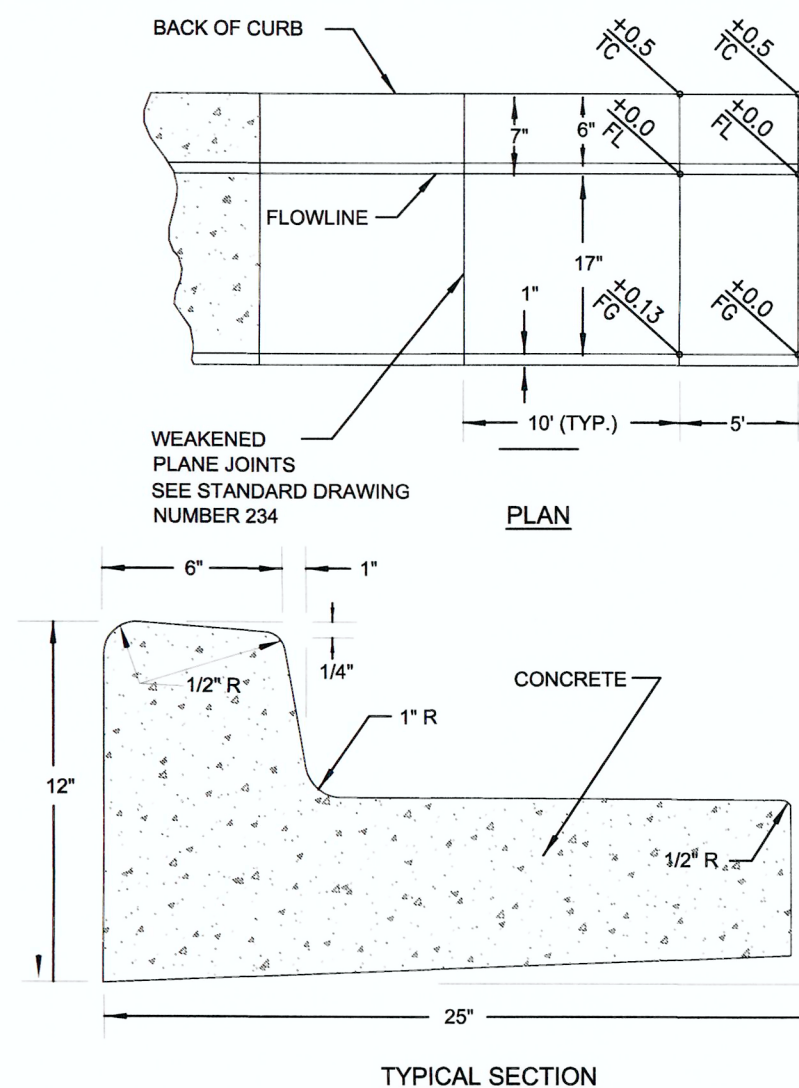


- NOTES:
- WEAKENED PLANE JOINTS REQUIRED AT 10' MAX. SPACING.
 - REFER TO PROJECT GEOTECHNICAL REPORT FOR TYPE II AGGREGATE OR SELECTED MATERIAL DEPTH AND COMPACTION, SUB-GRADE PREPARATION, MEMBRANES AND OTHER PLACEMENT RECOMMENDATIONS.

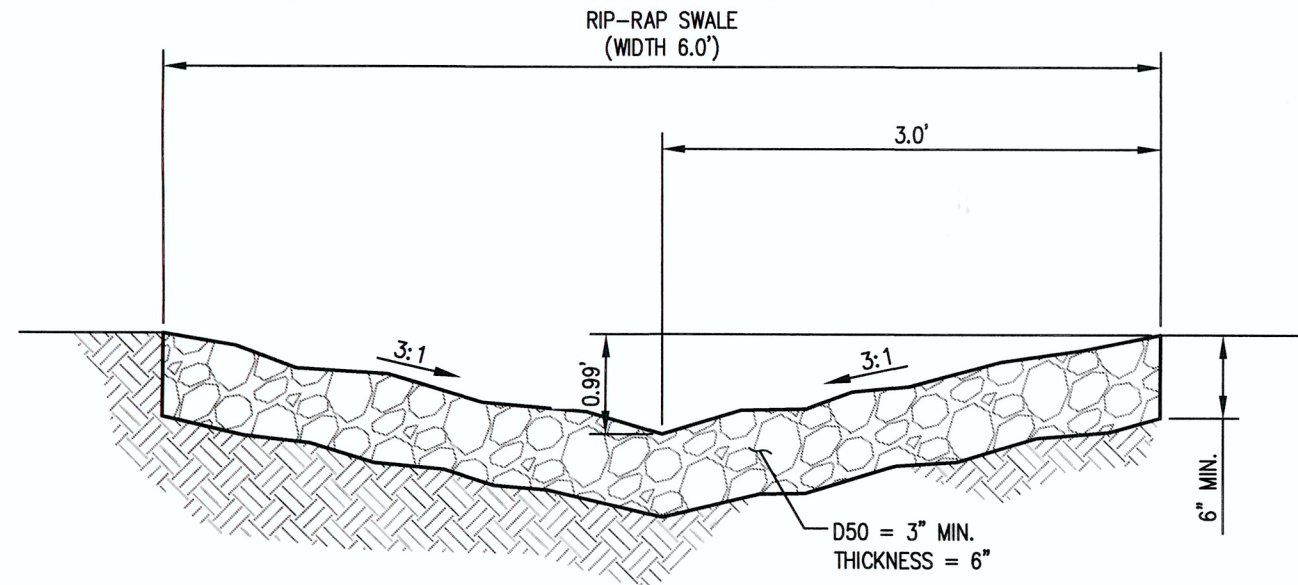
16 TRENCH DRAIN



15 2' CURB OPENING



14 "L" CURB TRANSITION TO LAYING GUTTER FLAT



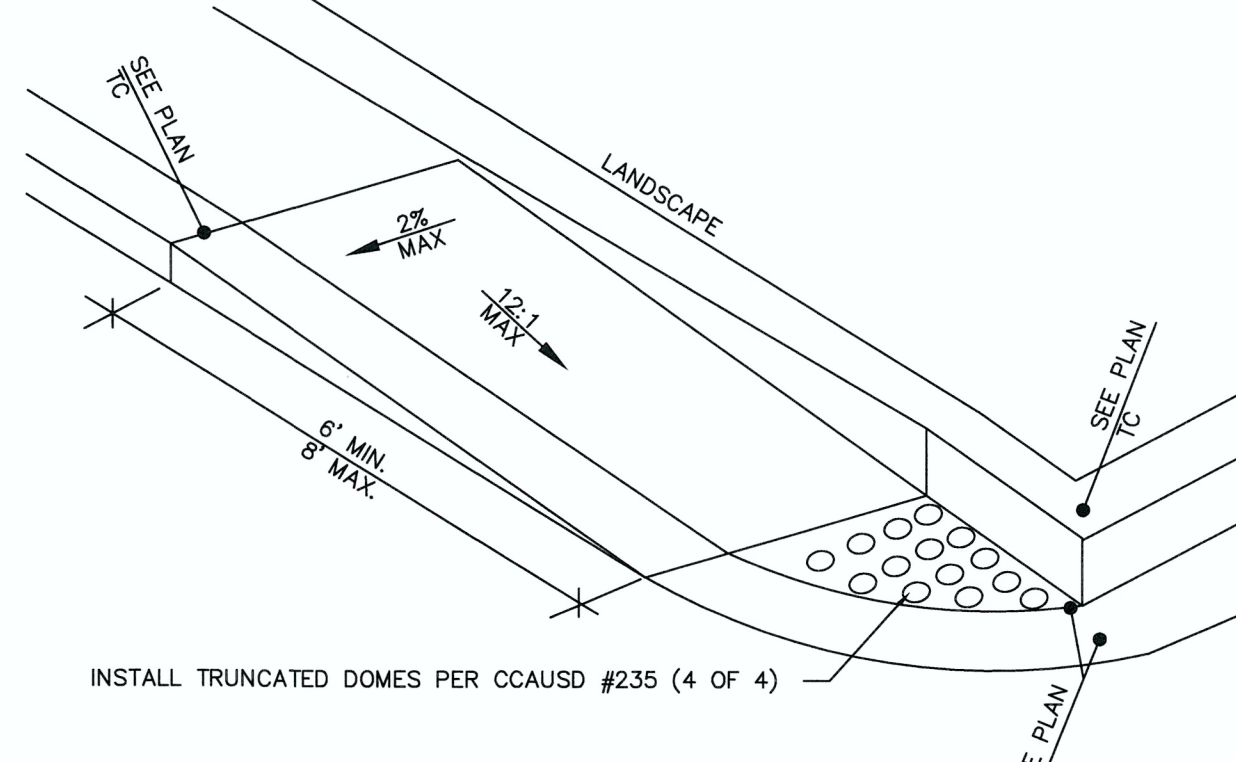
13 RIP-RAP SWALE

19 NOT USED

NOT TO SCALE

18 NOT USED

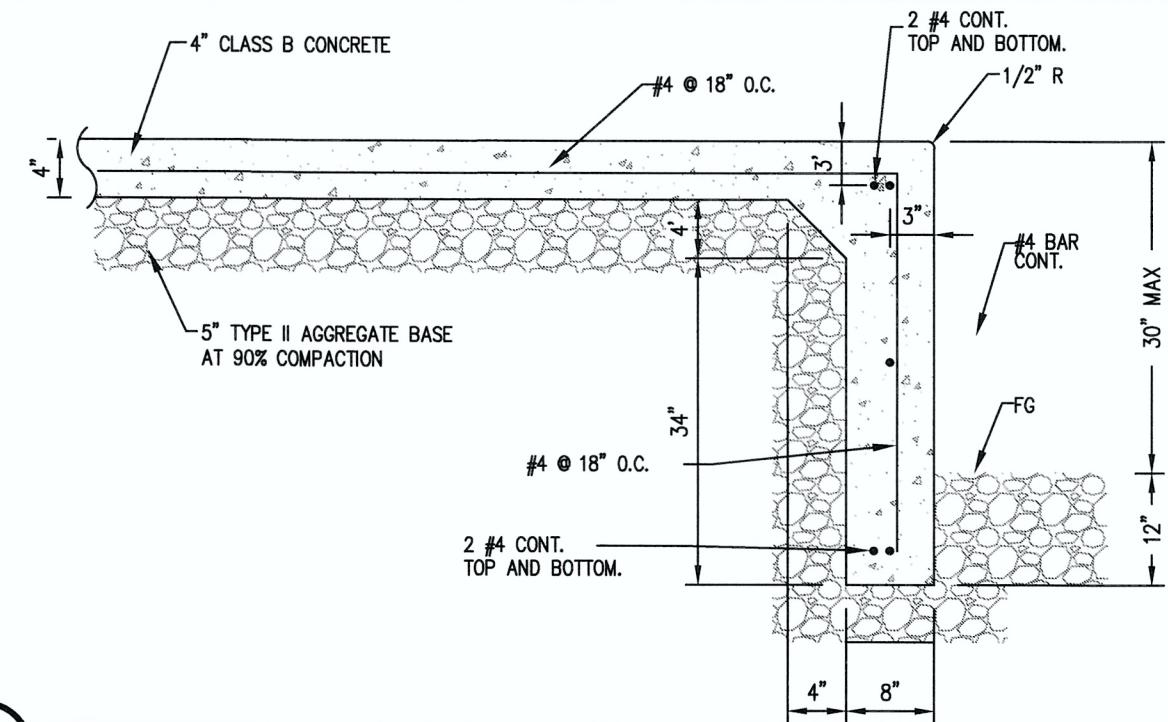
NOT TO SCALE



- RAMP NOTES: (FOR ALL ACCESSIBLE ROUTE SLOPES GREATER THAN 1:20)
- RAMP LENGTHS SHALL BE 6'-0" (72") MAXIMUM FOR EACH 6" RISE
 - RAMP LANDINGS SHALL BE FLAT FOR A MINIMUM DISTANCE OF 5'-0"
 - RAMP CROSS SLOPES SHALL NOT EXCEED 1:48
 - RAMP SLOPES SHALL NOT EXCEED 1:12
 - HEIGHT OF CURBS (OR EDGES) SHALL NOT EXCEED 6"
 - RAMP CLEAR WIDTHS TO BE 3'-0" MINIMUM
 - RAMP HEIGHTS ARE NOT INTENDED TO EXCEED 6" IN HT. PER EA. RUN.
 - RAMP SHALL HAVE A BROOM FINISH.

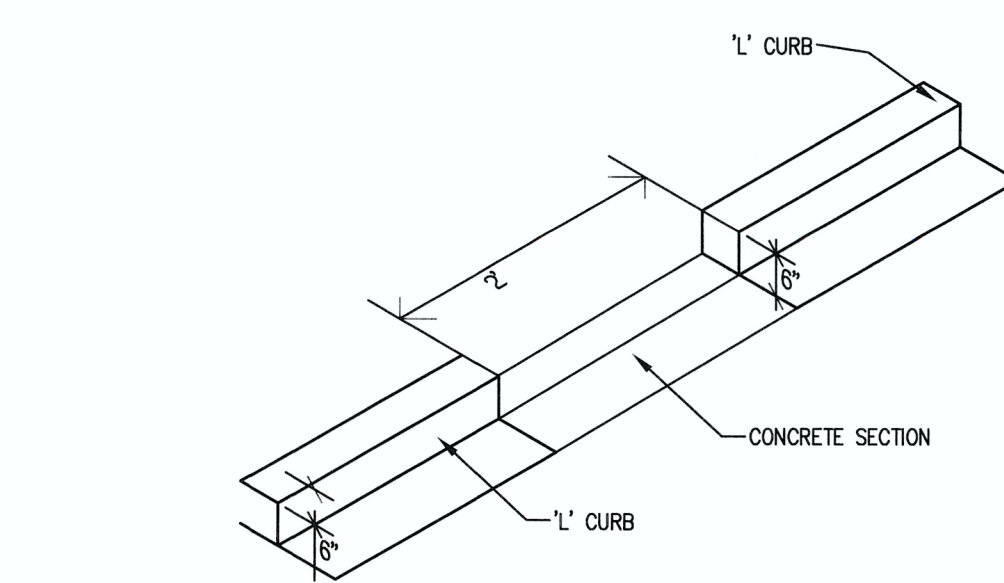
12 ON-SITE RAMP

NOT TO SCALE



11 TURNED DOWN SIDEWALK

NOT TO SCALE

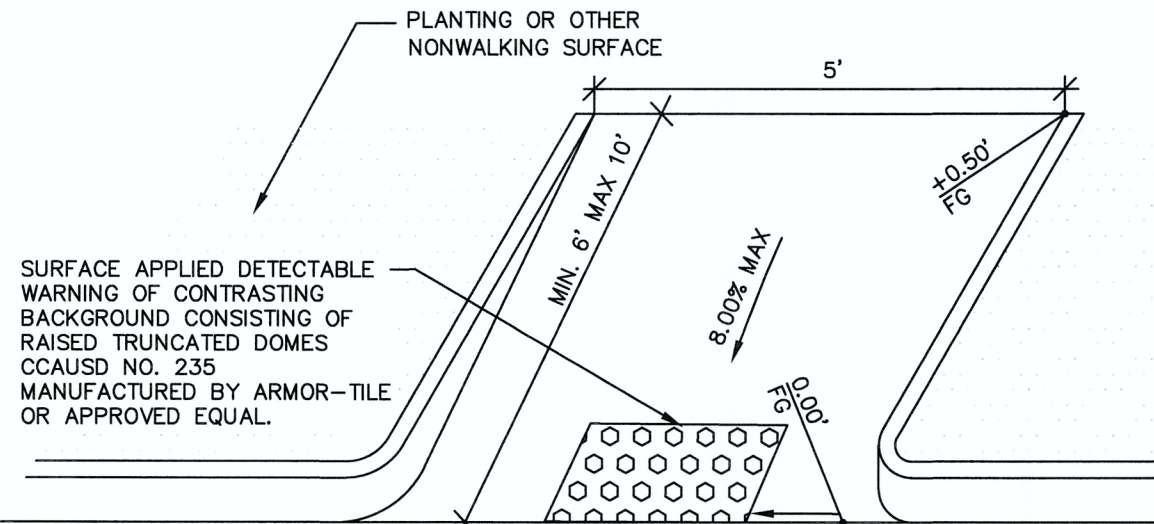


6 3' VALLEY GUTTER

NOT TO SCALE

5 NOT USED

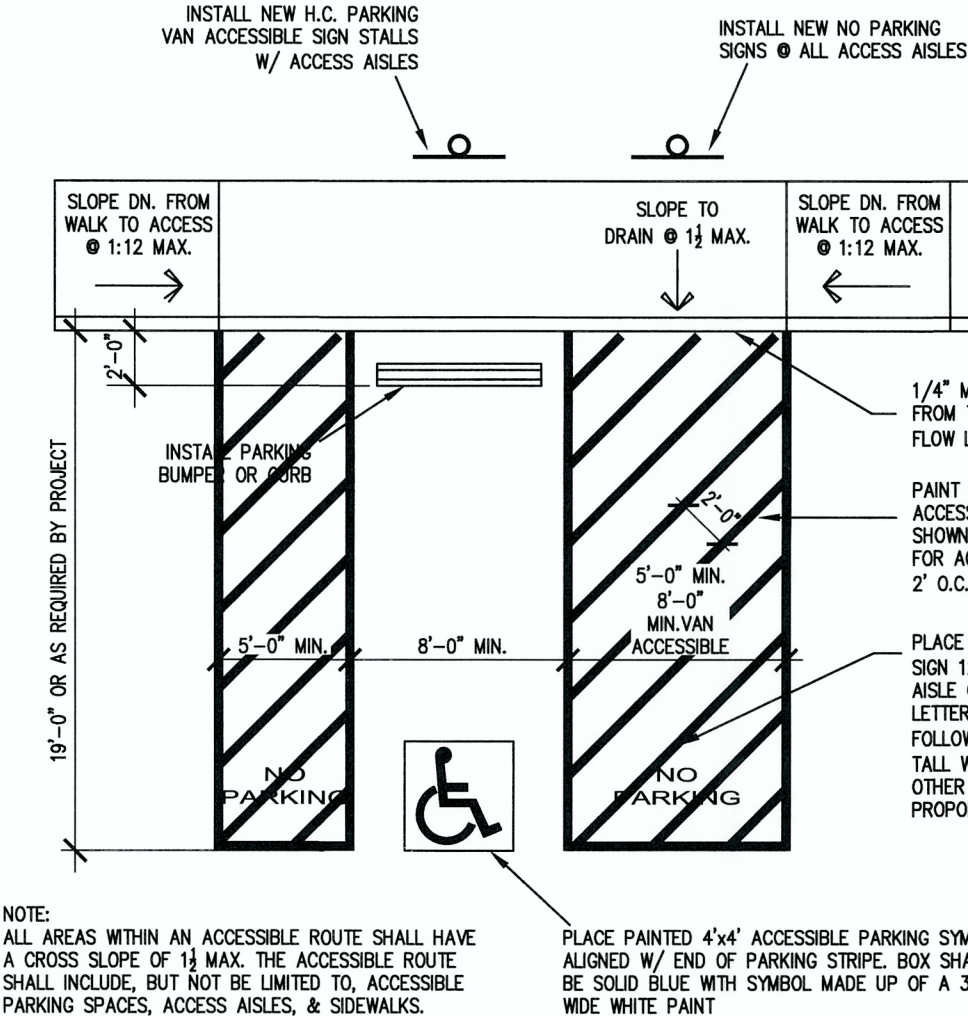
NOT TO SCALE



- RAMP NOTES: (FOR ALL ACCESSIBLE ROUTE SLOPES GREATER THAN 1:20)
- RAMP LENGTHS SHALL BE 6'-0" (72") MAXIMUM FOR EACH 6" RISE
 - RAMP LANDINGS SHALL BE FLAT FOR A MINIMUM DISTANCE OF 5'-0"
 - RAMP CROSS SLOPES SHALL NOT EXCEED 1:48
 - RAMP SLOPES SHALL NOT EXCEED 1:12
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 - RAMP HEIGHTS ARE NOT INTENDED TO EXCEED 6" IN HT. PER EA. RUN.
 - RAMP SHALL HAVE A BROOM FINISH.

9 ON-SITE RAMP

NOT TO SCALE



8 ACCESSIBLE PARKING DETAIL

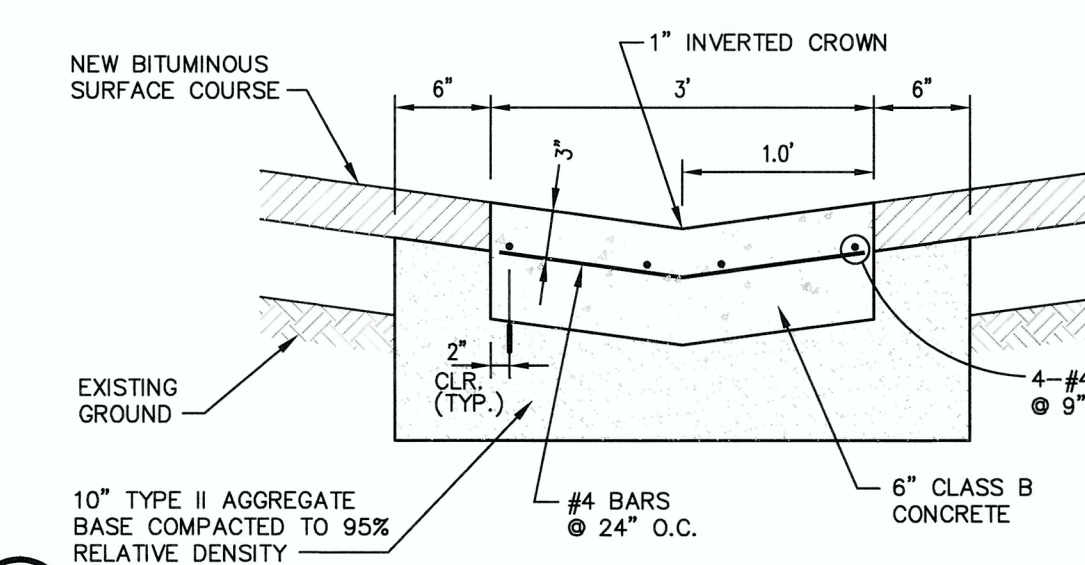
NOT TO SCALE

TYPE OF TRAFFIC	ASPHALT (inches)	TYPE II BASE COURSE (inches)
LIGHT DUTY	4	4
HANDICAP PARKING	6	6
TRASH AND HEAVY DUTY	7	6

1. REFER TO PROJECT GEOTECHNICAL REPORT FOR ALL SUB-GRADE PREPARATION AND COMPACTION.

7 CONCRETE PAVEMENT SECTION

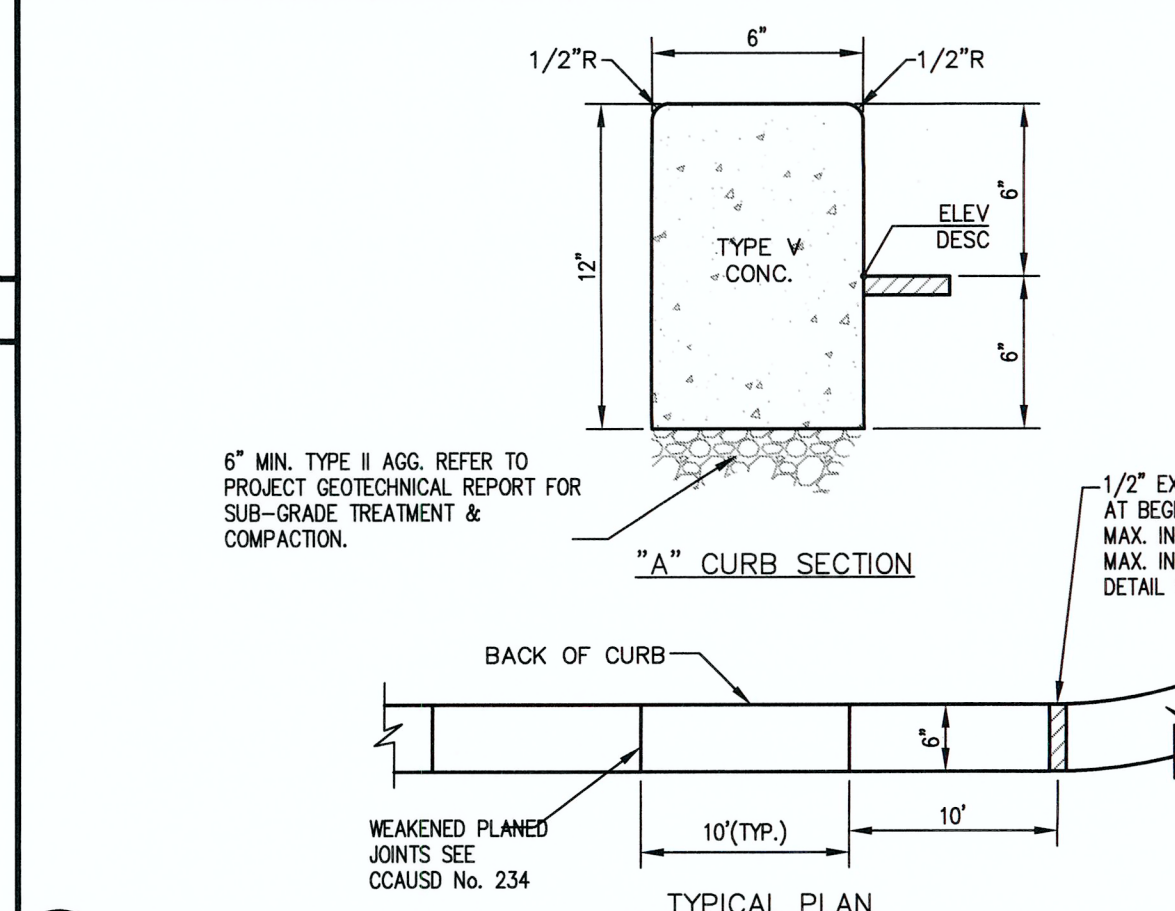
NOT TO SCALE



1. REFER TO PROJECT GEOTECHNICAL REPORT FOR ALL SUB-GRADE PREPARATION AND COMPACTION.

2 AC PAVEMENT SECTION

NOT TO SCALE

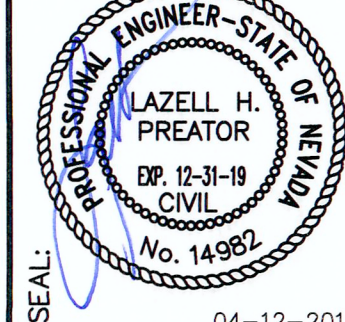


1 ON-SITE "A" TYPE CURB

NOT TO SCALE

REVISIONS:

REV.	DESCRIPTION	DATE

SEAL: 

DATE: 04-12-2019
DRAWN BY: MMT
SUBMITTAL: 181203
PROJECT NO. 181203

STUDIO

Simpson Coulter | STUDIO
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Las Vegas, Nevada 89119
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Lochsa
engineering
6345 South Jones Blvd.
Suite 100
Las Vegas, NV 89118
Phone (702) 365-8312
Fax (702) 365-8317
www.lochsa.com

CONSTRUCTION MGMT. DATE:

PROJECT MANAGER:

COORDINATOR:

BUILDING DEPARTMENT:

CODE COMPLIANCE:

ASBESTOS WORK IS:

REQUIRED ☐ NOT REQUIRED ☐

JOB# XXXXXXXX

CLARK COUNTY SCHOOL DISTRICT

CONSTRUCTION MANAGEMENT DEPARTMENT 1180 MILITARY TRIBUTE PL HENDERSON NV 89074 PHONE: 702-799-8710

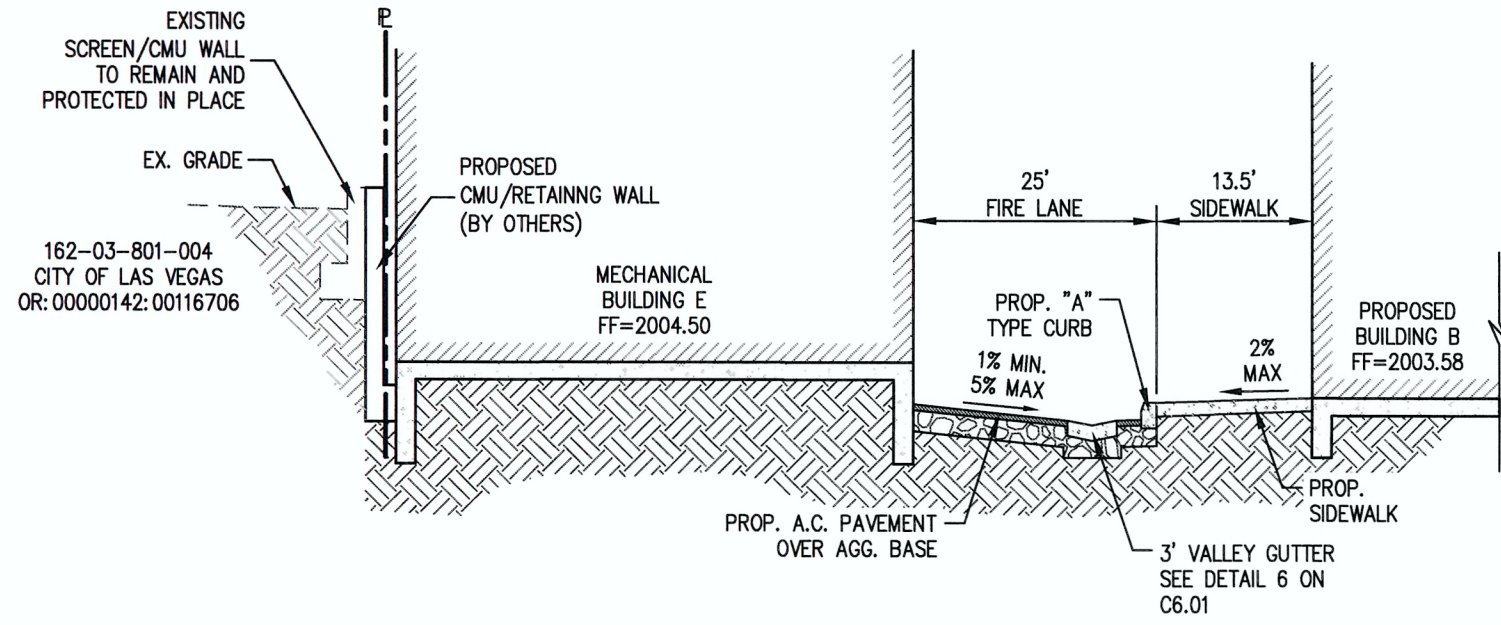
PROJECT: ---

DRAWING TITLE: DETAIL SHEETS DETAIL SHEET 1 OF 2

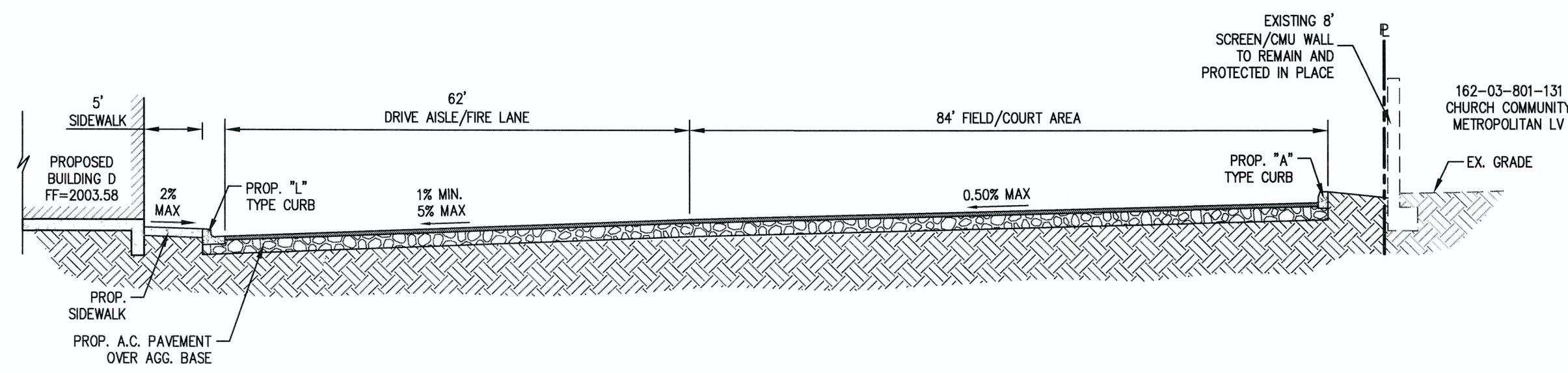
FACILITY: FREMONT K-8 SCHOOL MPID #1623

SHEET NO: C6.01

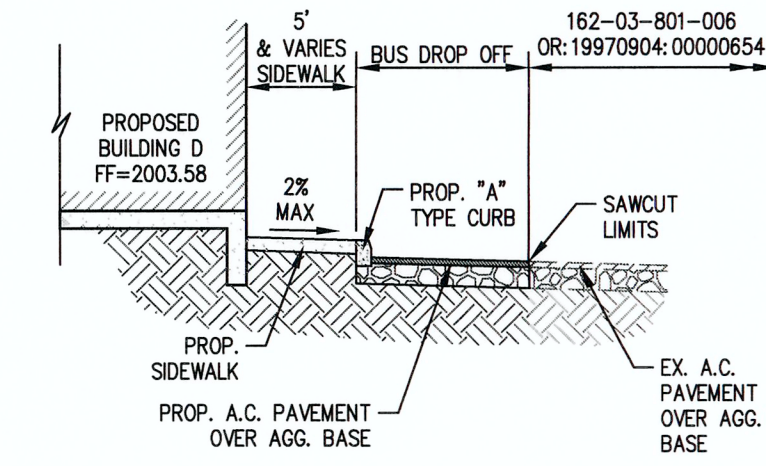
SHEET 21 OF 22



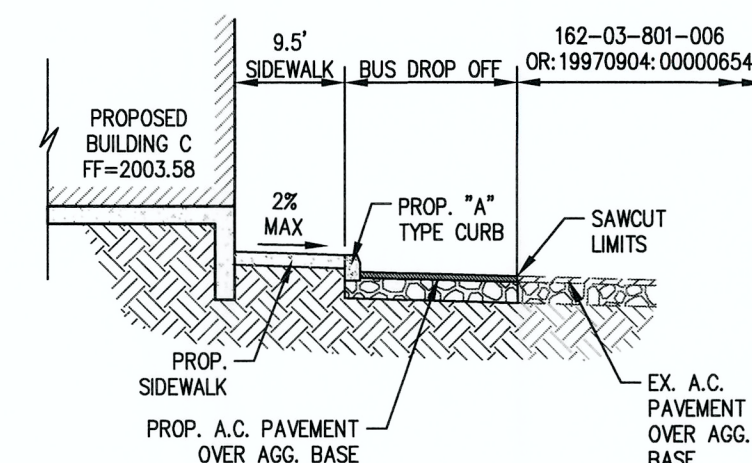
G WEST SECTION



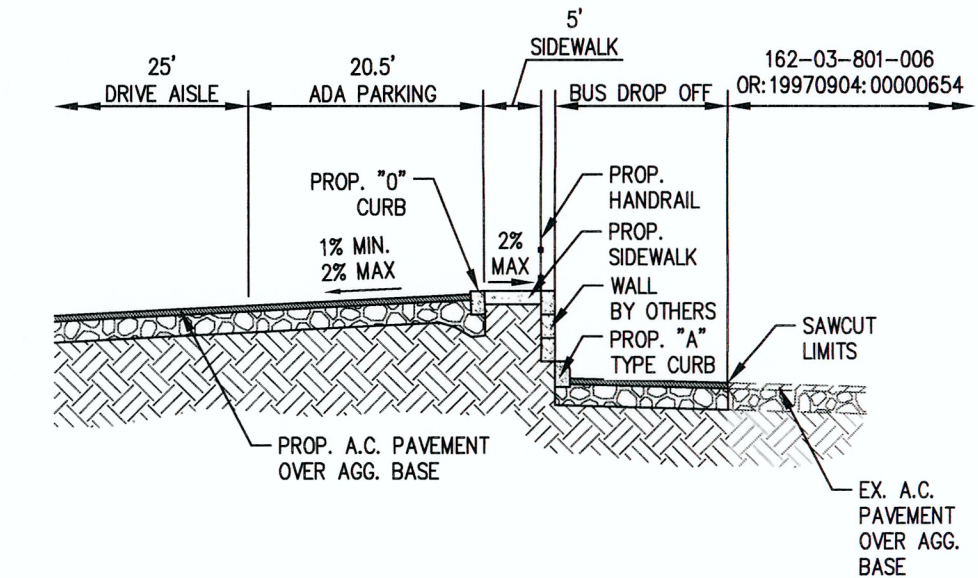
F SOUTHEAST SECTION



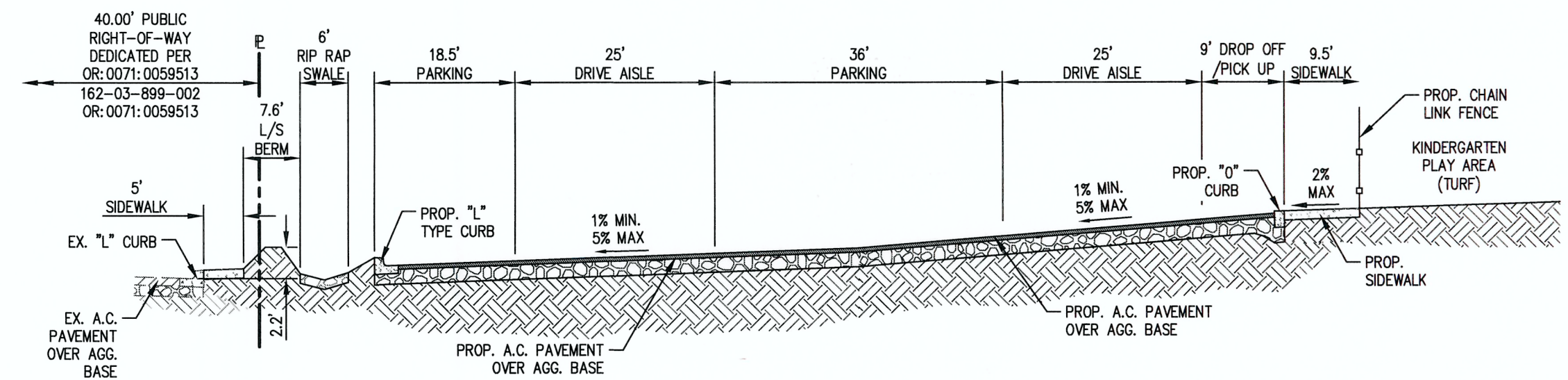
E EAST SECTION @ BUILDING D



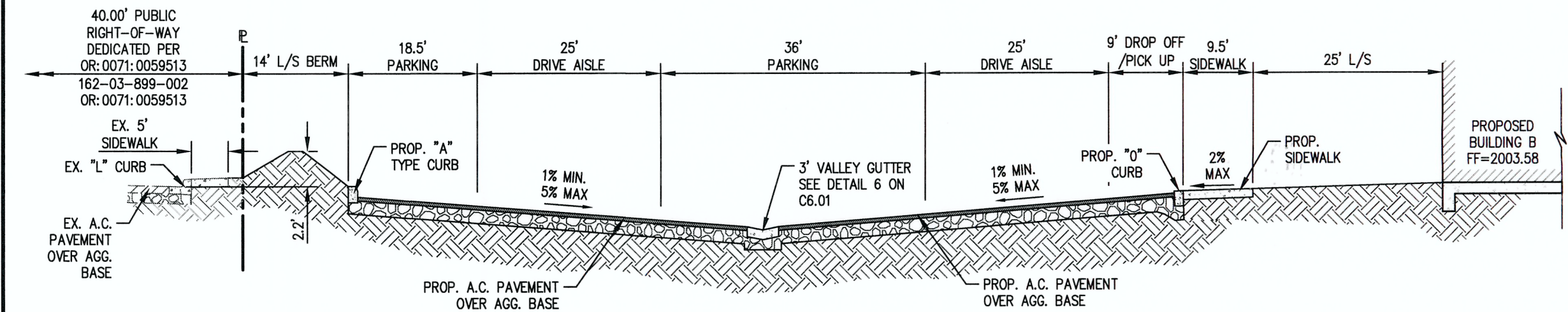
D EAST SECTION @ BUILDING C



C EAST SECTION @ ADA PARKING AREA



B NORTHEAST SECTION



A NORTHWEST SECTION

D WEST SECTION

REVISIONS:		
REV.	DESCRIPTION:	DATE:

04-12-2019

DATE: 04/12/19

DRAWN BY: WMT

SUBMITTAL: 181203

DATE: 04-12-2019

DATE: 04-12-2019

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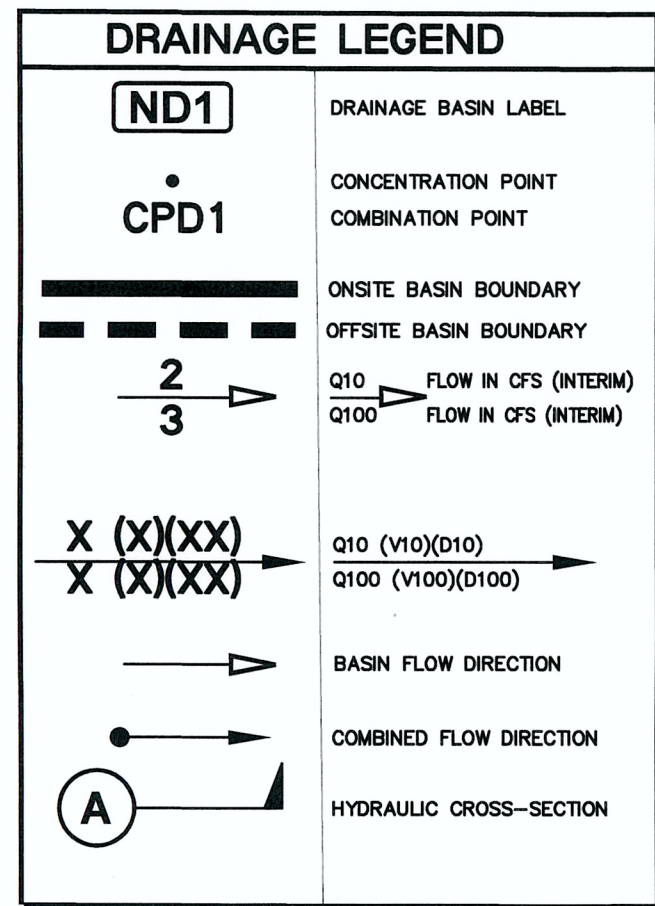
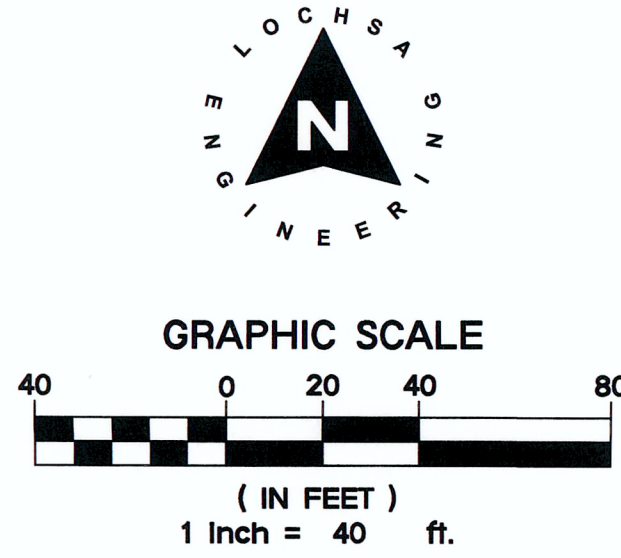
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www.simpsoncoulter.com

Lochsa Engineering

1044 South Jones Blvd.
Suite 100 Las Vegas, NV 89108
www.lochsa.com

PROJECT:	CLARK COUNTY SCHOOL DISTRICT
CONSTRUCTION MGMT:	CONSTRUCTION MANAGEMENT 1180 MILITARY TRIBUTE PL HENDERSON NV 89074 PHONE: 702-799-8710
COORDINATOR:	
BUILDING DEPARTMENT:	
ASBESTOS WORK IS:	REQUIRED ☐ NOT REQUIRED ☐
JOB#	XXXXXXX
DRAWING TITLE:	DETAIL SHEETS DETAIL SHEET 2 OF 2
FACILITY:	FREMONT K-8 SCHOOL MPID #1623
SHEET NO:	C6.02
SHEET 22 OF 22	



Street Flow Summary
(Interim/Developed Condition)
10-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	10-Year Flow [Q10] (cfs)	10-year Velocity [V] (fps)	10-year Flow Depth [d] (ft)	10-year Velocity x Depth [v x d]
*St. Louis Ave	80	A	*86	5.15	0.38	1.96

Street Flow Summary
(Interim/Developed Condition)
100-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	100-Year Flow [Q100] (cfs)	100-year Velocity [V] (fps)	100-year Flow Depth [d] (ft)	100-year Velocity x Depth [v x d]
*St. Louis Ave	80	A	*220	6.51	0.66	4.30

* CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

Peak Flow Summary

Interim/Development Condition

HEC-1 ID.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
OFD1	1.83	3	5
OND1	3.81	6	11
CPD1	9	16	
OND2	2.12	4	7
OND3	2.07	4	6
CPD2	16	30	

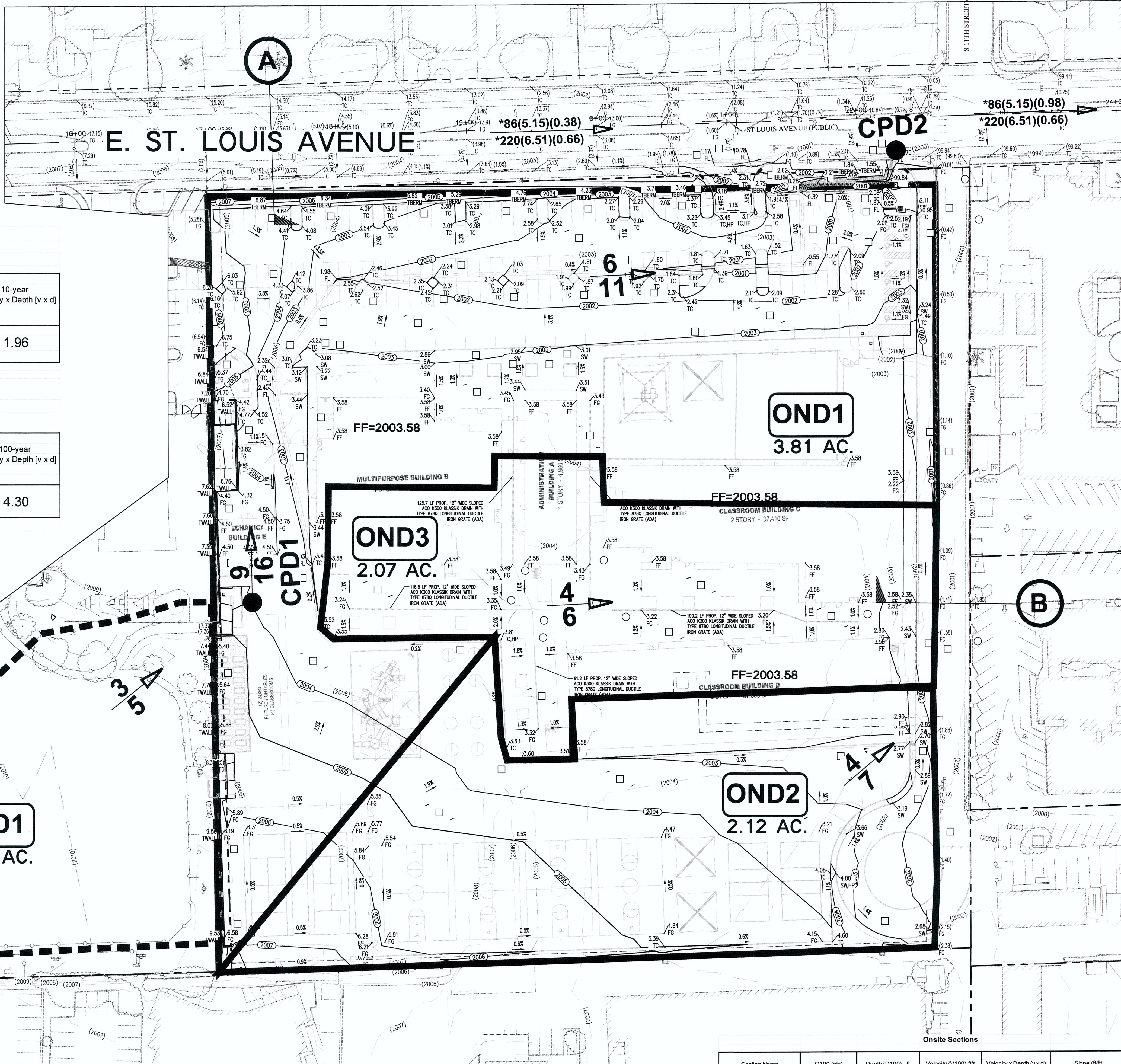
(OFD1+OND1)
(OND2+OND3+CPD1)

OFD1
1.83 AC.

OND3
2.07 AC.

OND1
3.81 AC.

OND2
2.12 AC.



Section Name	Q100 (cfs)	Depth (D100) - ft	Velocity (V100) - ft/s	Velocity x Depth (v x d)	Slope (ft/ft)
B	7	0.2	1.94	0.39	0.007

REVISIONS:

REV.	DESCRIPTION	DATE

SEAL: 04-08-2019

DATE: 04/08/19
DRAWN BY: MMT
SUBMITTAL: 181203
PROJECT NO.: 181203

Simpson Coulter | STUDIO
PLANNING • ARCHITECTURE • INTERIOR DESIGN
151 East Warm Springs Road
Las Vegas, Nevada 89119
P: 702-435-1150 F: 702-435-7699
www.simpsoncoulter.com

Lochsa Engineering
6545 South Jones Blvd., Suite 100
Las Vegas, NV 89118
www.lochsa.com

CONSULTANT:

CONSTRUCTION MGMT: DATE:

BUILDING DEPARTMENT:

ASBESTOS WORK IS:
REQUIRED ☐ NOT REQUIRED ☐

JOB# XXXXXXXX

CLARK COUNTY SCHOOL DISTRICT
CONSTRUCTION MANAGEMENT DEPARTMENT 1180 MILITARY TRIBUTE PL HENDERSON NV 89074 PHONE: 702-799-8710

PROJECT: **FREMONT K-8 SCHOOL**

DRAWING TITLE: **INTERIM/DEVELOPED BASIN MAP**

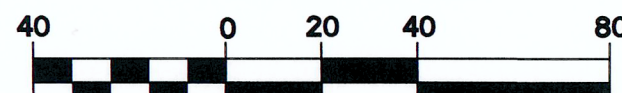
FACILITY:

SHEET NO: **DR2**

SHEET -- OF --



GRAPHIC SCALE



(IN FEET)
1 Inch = 40 ft.

Street Flow Summary
(Interim/Developed Condition)

10-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	10-Year Flow [Q10] (cfs)	10-year Velocity [v] (fps)	10-year Flow Depth [d] (ft)	10-year Velocity x Depth [v x d]
*St. Louis Ave	80	A	*86	5.15	0.38	1.96

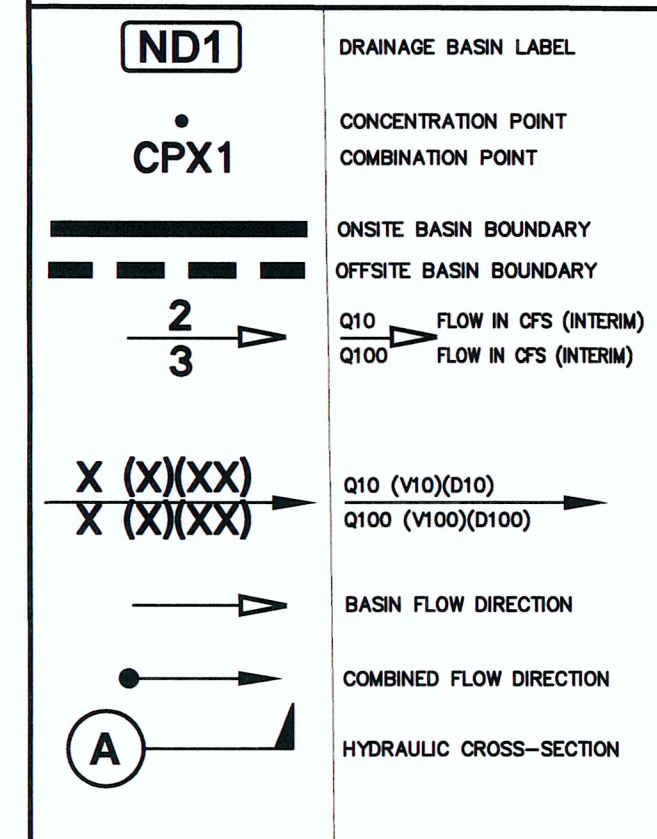
Street Flow Summary
(Interim/Developed Condition)

100-year, 6-hour Storm

Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	100-Year Flow [Q100] (cfs)	100-year Velocity [v] (fps)	100-year Flow Depth [d] (ft)	100-year Velocity x Depth [v x d]
*St. Louis Ave	80	A	*220	6.51	0.66	4.30

* CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

DRAINAGE LEGEND



Peak Flow Summary
Existing Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
OFD1	1.83	3	5
EX2	4.00	6	11
CPX1	9	16	16
EX1	4.00	7	12
CPX2	15	28	28

OFD1

1.83 ACRES

EX2

4.00 ACRES

EX1

4.00 ACRES

*86(5.15)(0.38)

*86(5.15)(0.38)

*220(6.51)(0.66)

*220(6.51)(0.66)

CPX2

CPX1

ASBESTOS WORK IS:

REQUIRED ☐ NOT REQUIRED ☐

JOB# XXXXXXXX

CLARK COUNTY SCHOOL DISTRICT

CONSTRUCTION MANAGEMENT 1180 MILITARY TRIBUTE PL HENDERSON NV 89074 PHONE: 702-799-8710

PROJECT: FREMONT K-8 SCHOOL

DRAWING TITLE: EXISTING CONDITION BASIN MAP

FACILITY:

SHEET NO:

DR1

SHEET 1 OF 1

REVISIONS:

REV	DESCRIPTION	DATE

SEAL:



A/E: Simpson Coulter | STUDIO

PLANNING • ARCHITECTURE • INTERIOR DESIGN

151 East Warm Springs Road

Las Vegas, Nevada 89119

P: 702-435-1150 F: 702-435-7699

www.simpsoncoulter.com

CONSULTANT:



6345 South Janelle Blvd.
Las Vegas, NV 89118
Phone: (702) 365-9312
Fax: (702) 365-9317
www.lochsa.com

DATE: 04/08/19

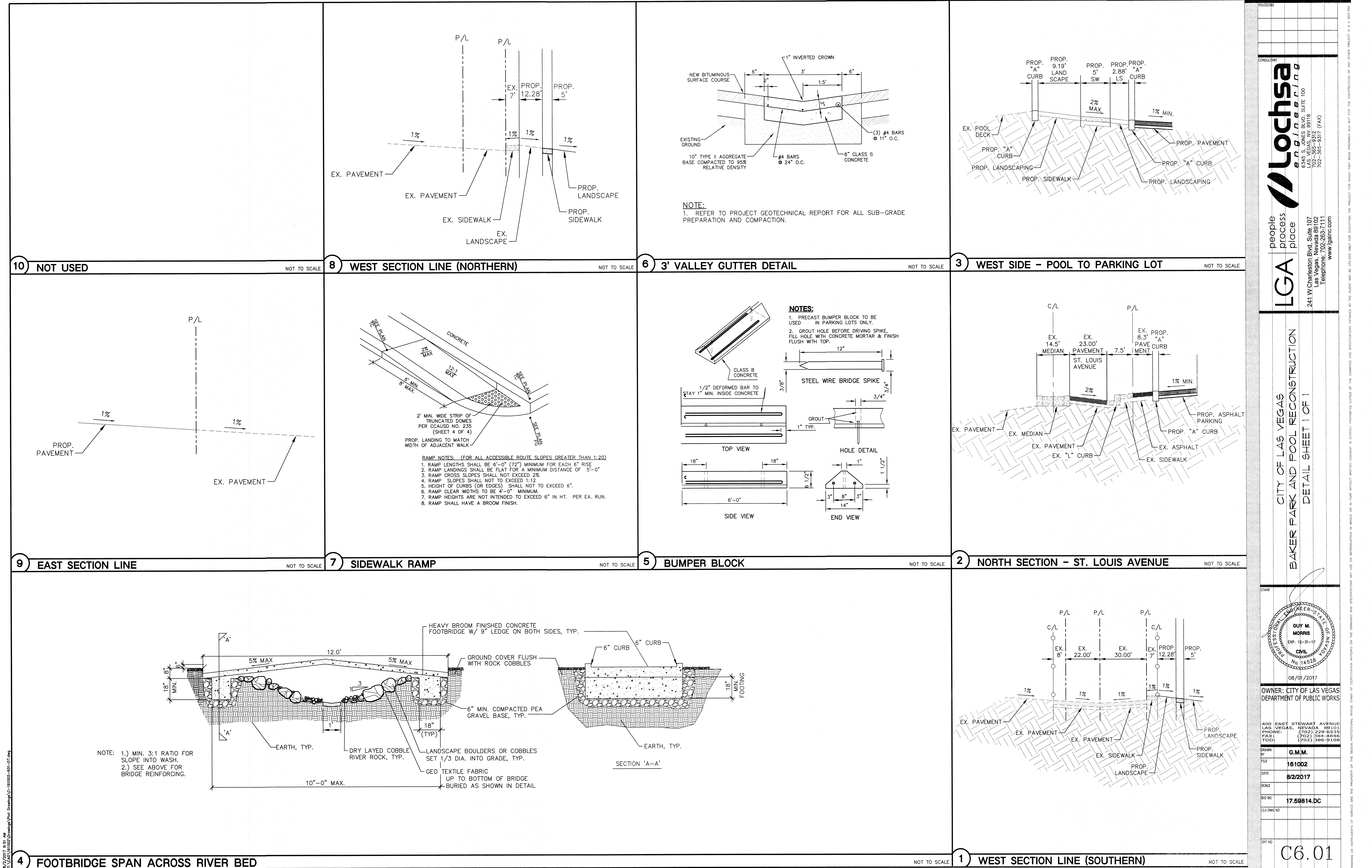
BY: MWT

SUBMITTAL:

PROJECT NO: 181203

T:\CAD\161002\Drawings\Plot Drawings\C-161002-101-CV.dwg

REVISÉ 8/27/03



REVISIONS

CONSULTANT

Lochsa

engineering

people place process

6345 S. JONES BLVD, SUITE 100
LAS VEGAS, NV 89118
702-365-3312 (PHONE)
702-365-3311 (FAX)
www.lganc.com

CITY OF LAS VEGAS
BAKER PARK AND POOL RECONSTRUCTION
DETAIL SHEET 1 OF 1

STAMP

GUY M. MORRIS

PROFESSIONAL ENGINEER-STATE OF NEVADA

EXP. 12-31-17

CIVIL

No. 14526

08/01/2017

OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-6535
FAX: (702) 384-4846
TDD: (702) 386-9108

DRAWN BY: G.M.M.

FILE: 161002

DATE: 8/2/2017

SCALE:

BID NO: 17.59814.DC

CLV DWG NO:

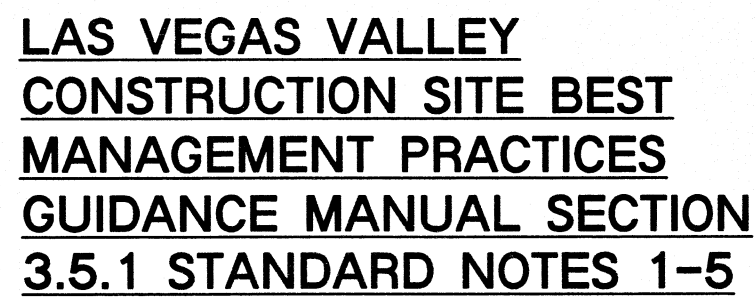
SHT NO:

C6.01

9/2/2017 9:51 AM
C:\Users\jmorris\Documents\Drawings\Pool Drawings\DC-161002-001-01.dwg

REVISIONS
CONSULTANT
Lochsa engineering
people place process
6345 S. JONES BLVD, SUITE 100
LAS VEGAS, NV 89118
702-365-3312 (PHONE)
702-365-3311 (FAX)
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CITY OF LAS VEGAS
BAKER PARK AND POOL RECONSTRUCTION
DETAIL SHEET 1 OF 1
STAMP
GUY M. MORRIS
PROFESSIONAL ENGINEER-STATE OF NEVADA
EXP. 12-31-17
CIVIL
No. 14526
08/01/2017
OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS
400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-6535
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DRAWN BY: G.M.M.
FILE: 161002
DATE: 8/2/2017
SCALE:
BID NO: 17.59814.DC
CLV DWG NO:
SHT NO:
C6.01
REVISIONS 8/2/2017

A.P.N.: 162-03-801-005
SCHOOL BOARD OF TRUSTEES
OR: 00000027:00024625
(NOT A PART)



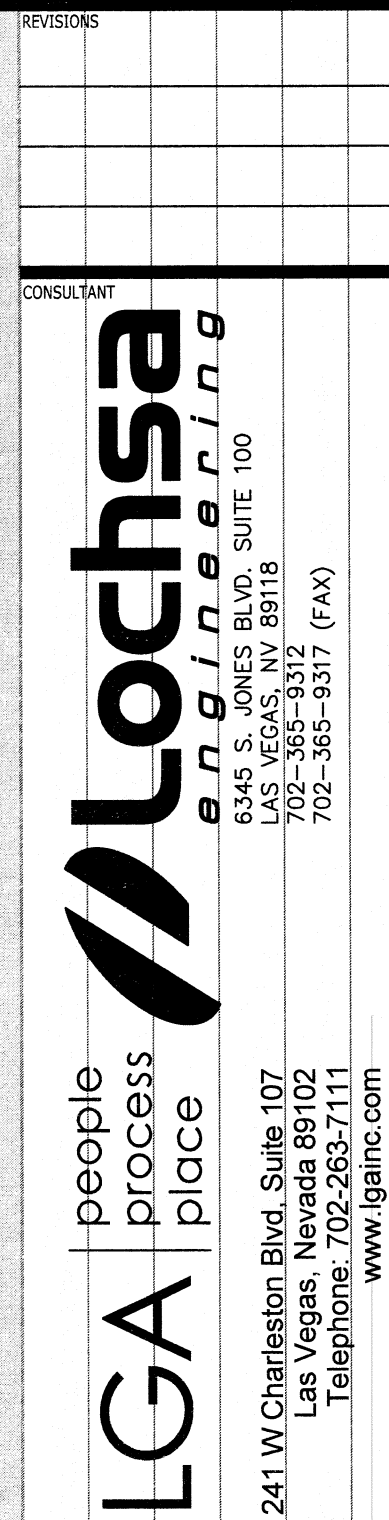
- ## CONSTRUCTION NOTES:
- ALL CONSTRUCTION TO BE DONE IN ACCORDANCE WITH LARGEST CITY AREA URBAN STANDARD DRAWINGS (C.C.A.U.S.D.)' LATEST EDITION (OR REGULATING ENTITY) HAVING JURISDICTION.
 - NOT ALL NOTES USED ON THIS SHEET -
- | | |
|---|---|
| 1 | CONSTRUCT AC PAVEMENT PER DETAIL ON THIS PAGE. |
| 2 | CONSTRUCT "A" TYPE CURB PER CCAUSD NO. 219. |
| 3 | CONSTRUCT CONC. SIDEWALK PER CCAUSD NO. 234. REFER TO ARCH. PLANS FOR FINISHING SPECIFICATIONS. |
| 4 | CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD NO. 225. |
| 5 | CONSTRUCT SIDEWALK RAMP CCAUSD NO. 235 CASE I. |
| 6 | INSTALL FOOTBRIDGE PER DETAIL 4 ON C8.01. |
| 7 | STEWALK UNDERDRAIN PER CCAUSD #XXXXXXXX. |
| 8 | INSTALL 3" WIDE VALLEY GUTTER PER DETAIL 6 ON C8.01. |
| 9 | CONSTRUCT SIDEWALK RAMP PER DETAIL 7 ON C8.01. |

A=SURFACE
PER SCHEDULE

B=TYPE II AGG. BASE

COMPACTED SUBGRADE PER
GEOTECHNICAL REPORT

NOTE:
LOCHSA ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS PLAN ARE FROM THE BEST AVAILABLE INFORMATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES, INCLUDING BUT NOT LIMITED TO, THE WATER, FIRE, SANITARY SEWER, STORM SEWER, TELEPHONE, POWER, GAS, AND IRRIGATION LINES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. IF CONFLICT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE PROJECT ARCHITECT, OWNER'S REPRESENTATIVE AND THE PROJECT ENGINEER IMMEDIATELY.



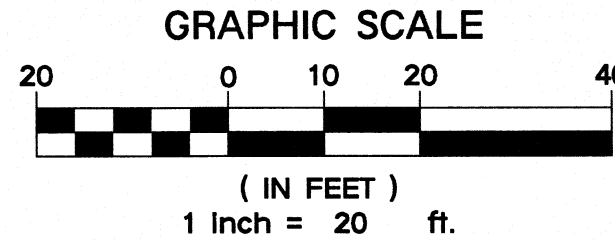
400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-6533
FAX: (702) 384-4846
TDD: (702) 386-9108

SHT NO	C4.02
--------	-------

LEGEND	CL OR SURVEY LINE		EASEMENT LINE		DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
	PROPERTY LINE	SAWCUT LINE	SAWCUT LINE	SCARP LINE	EXISTING:	(2210)	---	---	---	---	---	---	---	112.34 BC	12.34 BC	⑤	⑤ = SANITARY SEWER ⑥ = STORM DRAIN ⑦ = ELECTRICAL ⑧ = TELEPHONE	☼	⊙	▷	●	□	BWW	☉	☉	☉	☉
	ROW LINE	SCARP LINE	PROPOSED:	(2122)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	BWW	☉	☉	☉

SUBJECT PROPERTY

A.P.N.: 162-03-801-004
CITY OF LAS VEGAS
OR: 00000142: 00116706
6.58 ACRES



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 RIGHT-OF-WAY OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIAL SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POLLUTING MATERIALS WHICH HAVE BEEN OR MAY BE DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHT-OF-WAY OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS DEVELOPMENT. SUCH MATERIAL SHALL BE REMOVED SUCH MATERIAL 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 OF THE SUBMITTED PLAN DOES NOT COVER THE PERFORMANCE STANDARDS SPECIFIED IN THE CITY OF LAS VEGAS AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE BECOMES PERMANENTLY OR TEMPORARILY STABILIZED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NRW10000, 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 AREAS WHERE THERE ARE EXPOSURE TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN HOURS AFTER ANY RAIN EVENT OR 0.5 INCHES OR MORE OF THE CONTIGUOUS RAIN OR AGENT SHALL REMOVE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF CONSTRUCTION OR PERMANENT STABILIZATION OF THE AREA. STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NRW10000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMP'S SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BENTHIC BIOMASS CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

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 THE SLOPE GRADING PLANS 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 LOCHSA ENGINEERING WITHIN 24 HOURS OF OBSERVING ANY ERRORS DISCOVERED ON PLANS. LOCHSA ENGINEERING WILL NOT BE RESPONSIBLE FOR ANY "CORRECTIVE" WORK DONE BY OTHERS.

THE PROJECT SITE IS COVERED BY THE FLOOD INSURANCE RATE MAP (FIRM) FOR THE CLARK COUNTY, NEVADA, AND INCORPORATED AREAS, COMMUNITY PANEL NUMBER: 32003C2170F, EFFECTIVE DATE: NOVEMBER 16, 2011. THE ENTIRE SITE FALLS WITHIN ZONE "X" (UNSHADED), DESCRIBED BY FEMA AS: "AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN".

CONTRACTOR TO ADJUST ALL EXISTING UTILITIES TO MATCH
PROPOSED FINISH GRADE ELEVATIONS.

PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES SUCH AS BUT NOT LIMITED TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF THE VEGETATION.

SUBGRADE UNDER SYNTHETIC TURF TO BE SCARIFIED AND RECOMPACTED TO AN 8-INCH DEPTH. SUBGRADE TO BE KEPT MOIST AT OPTIMUM MOISTURE CONTENT, UNTIL THE PLACEMENT OF THE TURF SYSTEM.

	A	B
TRAFFIC AREA	SURFACE	BASE COURSE
AUTOMOBILE PARKING	3" AC	6"
TRASH ENCLOSURE	5.5" CONCRETE	6"
SIDEWALKS	5" CONCRETE	4"

B

COURSE
6"
6"
4"

A=SURFACE
PER SCHEDULE

B=TYPE II AGG. BASE

BASIS OF BEARINGS:
THE BASIS OF BEARING FOR THE SURVEY IS THE NORTH LINE OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHEAST QUARTER (SE1/4) SECTION 3, TOWNSHIP 21 SOUTH, RANGE 61 EAST M.D.M., AS SHOWN IN FILE 7 OF SURVEYS PAGE 7, IN THE OFFICE OF THE RECORDER, CLARK COUNTY, NEVADA. SAID LINE BEARS NORTH 87°50'18" EAST.

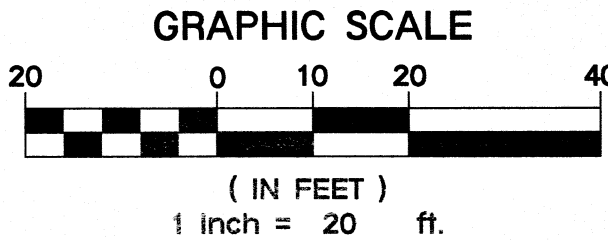
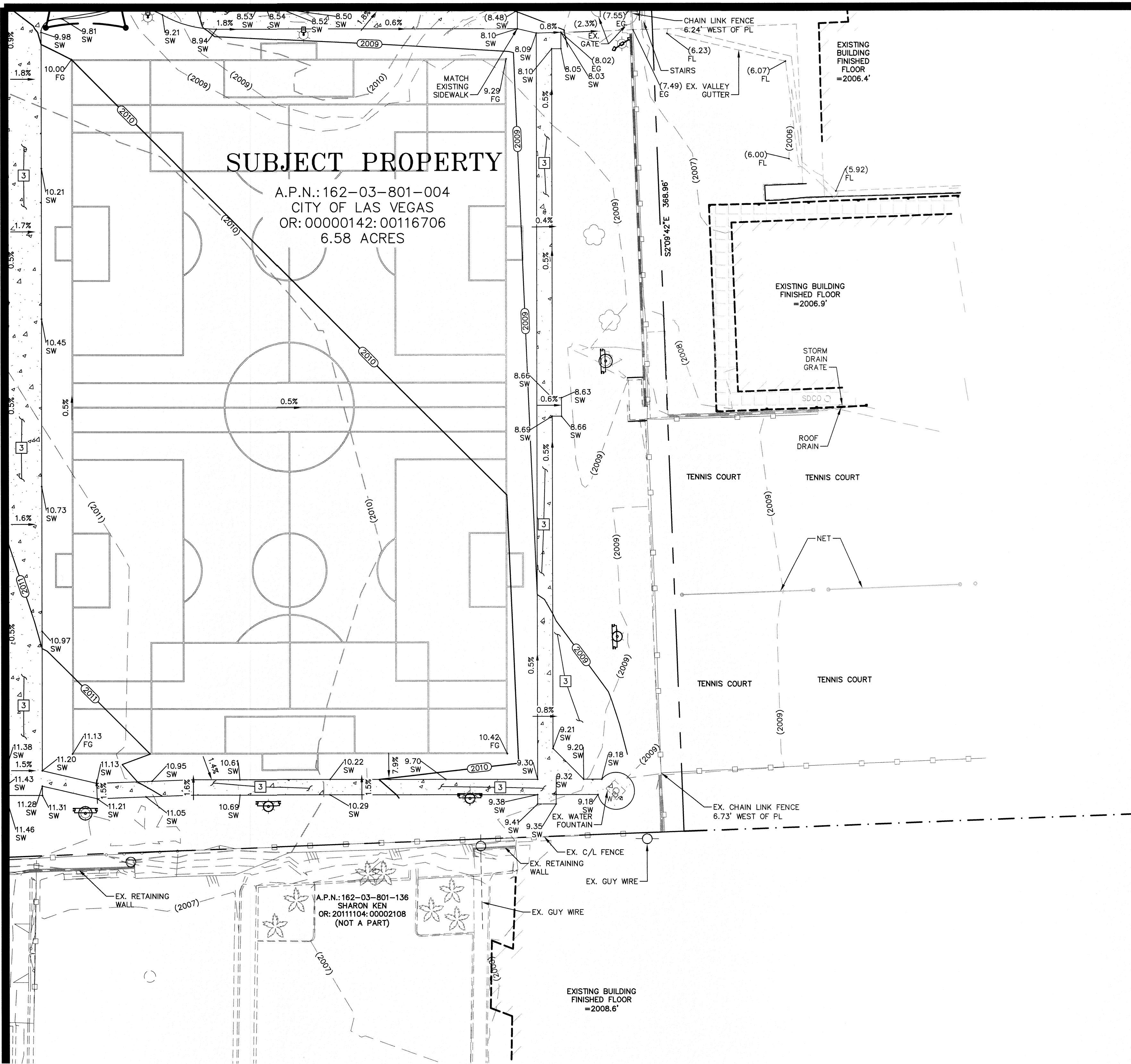
BENCHMARK NO: 8LV113SE RIVET & PLATE TOP OF CURB SE
CORNER 10TH ST. LOUIS AV. ELEVATION: 2010.03 FEET (NAVD
'88)

LOCHSA ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS PLAN ARE FROM THE BEST AVAILABLE INFORMATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES, INCLUDING BUT NOT LIMITED TO, THE WATER, FIRE, SANITARY AND STORM SEWER SYSTEMS. THE CONTRACTOR SHALL STOP ALL IRRIGATION LINE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. IF CONFLICT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE PROJECT ARCHITECT, OWNER'S REPRESENTATIVE AND THE PROJECT ENGINEER IMMEDIATELY.

CL OR SURVEY LINE	EASEMENT LINE	DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS = SANITARY SEWER = STORM DRAIN = ELECTRICAL = TELEPHONE	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
PROPERTY LINE	SAWTOOTH LINE	EXISTING: - (2210) -	- (2210) -		=====	=====	=====	=====	[Pattern]	[Pattern]	(12.34) BC	(12-34) BC	⑤	⑥	⦿	⊗	▷	○	□	BWW	⦿	⦿	⦿	⦿
ROW LINE	SCARP LINE	PROPOSED: - (2122) -	- (2122) -	=====	=====	=====	=====	=====	[Pattern]	[Pattern]	(12.34) BC	(12-34) BC	⑤	⑥	⦿	⊗	▷	○	□	BWW	⦿	⦿	⦿	⦿

MATCHLINE - SEE SHEET: C4.03

MATCHLINE - SEE SHEET: C4.02



**LAS VEGAS VALLEY
CONSTRUCTION SITE BEST
MANAGEMENT PRACTICES
GUIDANCE MANUAL SECTION
3.5.1 STANDARD NOTES 1-5**

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 RIGHT-OF-WAY OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIAL 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 THE CITY OF LAS VEGAS AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR10000, 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 OR 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMP'S SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

CONSTRUCTION NOTES:

- ALL CONSTRUCTION TO BE DONE IN ACCORDANCE WITH CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS (C.C.A.U.S.D.) LATEST EDITION AND/OR REGULATING ENTITY HAVING JURISDICTION.
- NOT ALL NOTES USED ON THIS SHEET -

1. CONSTRUCT AC PAVEMENT PER DETAIL ON THIS PAGE.
2. CONSTRUCT "A" TYPE CURB PER CCAUSD No. 219.
3. CONSTRUCT CONC. SIDEWALK PER CCAUSD No. 234. REFER TO ARCH. PLANS FOR FINISHING SPECIFICATIONS.
4. CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD No. 225.
5. CONSTRUCT SIDEWALK RAMP CCAUSD No. 235 CASE 1.
6. INSTALL FOOTBRIDGE PER DETAIL 4 ON C6.01.
7. SIDEWALK UNDERDRAIN PER CCAUSD #XXXXXX.
8. INSTALL 3' WIDE VALLEY GUTTER PER DETAIL 6 ON C6.01.
9. CONSTRUCT SIDEWALK RAMP PER DETAIL 7 ON C6.01.

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 LOCHSA ENGINEERING WITHIN 24 HOURS OF OMISSIONS AND ERRORS DISCOVERED ON PLANS. LOCHSA ENGINEERING WILL NOT BE RESPONSIBLE FOR ANY "CORRECTIVE" WORK DONE BY OTHERS.
4. CONTRACTOR TO ENSURE POSITIVE DRAINAGE. NO PONDING ALLOWED. CONTRACTOR TO FOLLOW RECOMMENDATIONS AS OUTLINED IN THE PROJECT GEOTECHNICAL REPORT, INCLUDING BUT NOT LIMITED TO EXCAVATION, GRADING AND COMPACTION. REFER TO THE REPORT PREPARED BY: NOVA GEOTECHNICAL, PROJECT No. E-04-166, DATED: NOVEMBER 24, 2015.

FLOOD ZONE NOTE:

THE PROJECT SITE IS COVERED BY THE FLOOD INSURANCE RATE MAP (FIRM) FOR THE CLARK COUNTY, NEVADA, AND INCORPORATED AREAS, COMMUNITY PANCAKE NUMBER: 32003C2170F, EFFECTIVE DATE: NOVEMBER 16, 2011. THE ENTIRE SITE FALLS WITHIN ZONE "X" (UNSHADED), DESCRIBED BY FEMA AS: "AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN".

EXISTING UTILITY NOTE:

CONTRACTOR TO ADJUST ALL EXISTING UTILITIES TO MATCH PROPOSED FINISH GRADE ELEVATIONS.

NOTE:

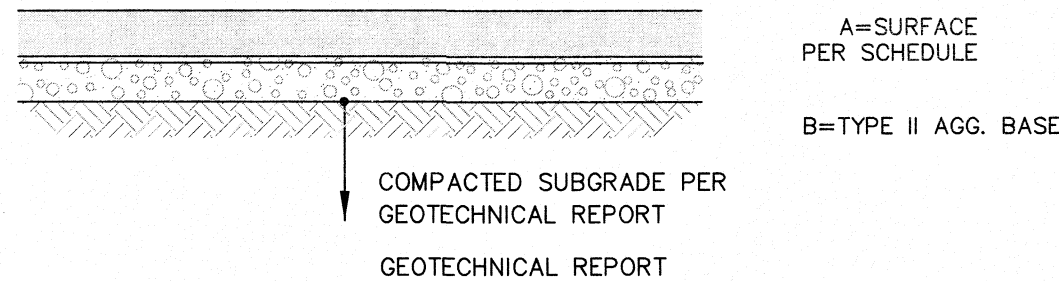
PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES SUCH AS BUT NOT LIMITED TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF THE VEGETATION.

NOTE TO CONTRACTOR:

SUBGRADE UNDER SYNTHETIC TURF TO BE SCARIFIED AND RECOMPACTED TO AN 8-INCH DEPTH. SUBGRADE TO BE KEPT MOIST AT OPTIMUM MOISTURE CONTENT, UNTIL THE PLACEMENT OF THE TURF SYSTEM.

AC PAVEMENT THICKNESS SCHEDULE

TRAFFIC AREA	A B	
	SURFACE	BASE COURSE
AUTOMOBILE PARKING	3" AC	6"
TRASH ENCLOSURE	5.5" CONCRETE	6"
SIDEWALKS	5" CONCRETE	4"



A.P.N.:
162-03-801-004

BASIS OF BEARINGS:

THE BASIS OF BEARING FOR THE SURVEY IS THE NORTH LINE OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHEAST QUARTER (SE1/4) SECTION 3, TOWNSHIP 21 SOUTH, RANGE 61 EAST M.D.M., AS SHOWN IN FILE 7 OF SURVEYS PAGE 7, IN THE OFFICE OF THE RECORDER, CLARK COUNTY, NEVADA. SAID LINE BEARS NORTH 87°50'18" EAST.

BENCHMARK:

BENCHMARK NO: BLV1135E RIVET & PLATE TOP OF CURB SE CORNER 10TH ST. LOUIS AV. ELEVATION: 2010.03 FEET (NAVD 88)

NOTE:

LOCHSA ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS PLAN ARE FROM THE BEST AVAILABLE INFORMATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES, INCLUDING BUT NOT LIMITED TO, THE WATER, FIRE, SANITARY SEWER, STORM SEWER, TELEPHONE, POWER, GAS, AND IRRIGATION LINES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. IF CONFLICT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE PROJECT ARCHITECT, OWNER'S REPRESENTATIVE AND THE PROJECT ENGINEER IMMEDIATELY.

LEGEND	CL OR SURVEY LINE	EASEMENT LINE	DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
	PROPERTY LINE ROW LINE	SAWCUT LINE SCARP LINE	EXISTING: PROPOSED:	--- (2210) --- --- (2122) ---	=====	=====	=====	=====	=====	=====	=====	(12.34) BC 12.34 BC	⑤ ⑥	⑤ = SANITARY SEWER ⑥ = STORM DRAIN ⑦ = ELECTRICAL ⑧ = TELEPHONE	⑤ = SANITARY SEWER ⑥ = STORM DRAIN ⑦ = ELECTRICAL ⑧ = TELEPHONE	⑤ ⑥	⑤ ⑥	⑤ ⑥	⑤ ⑥	⑤ ⑥	⑤ ⑥	⑤ ⑥	⑤ ⑥	⑤ ⑥	⑤ ⑥

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Las Vegas, Nevada 89102
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**CITY OF LAS VEGAS
BAKER PARK AND POOL RECONSTRUCTION
GRADING PLAN SHEET 5 OF 6**

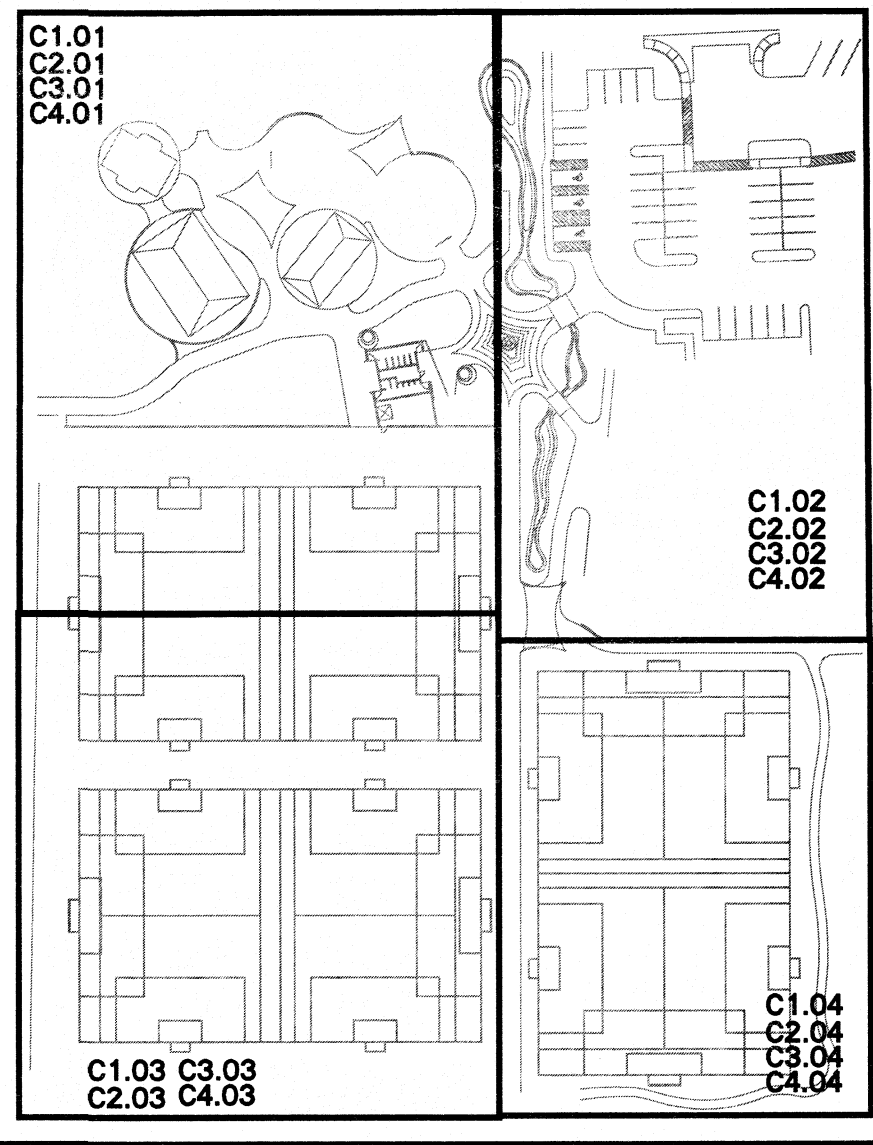
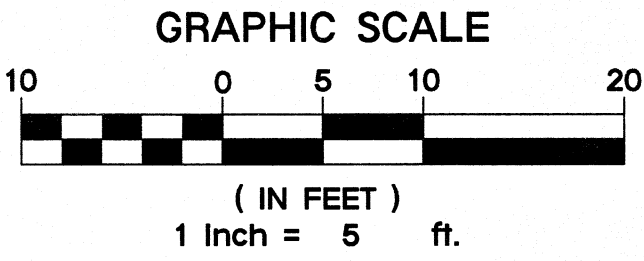
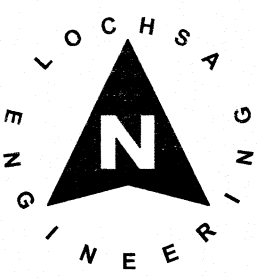
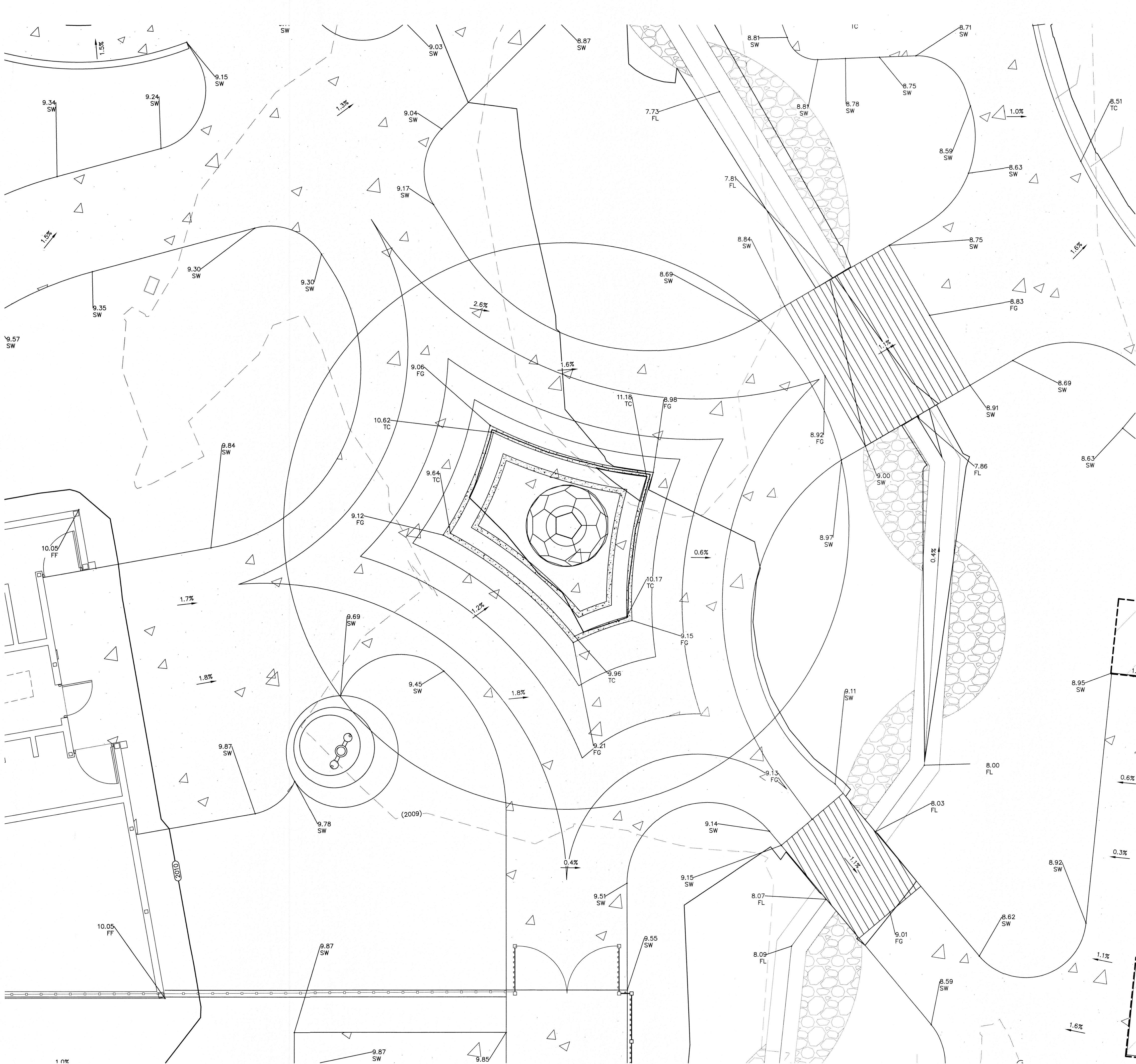
PROFESSIONAL ENGINEER - STATE OF NEVADA
GUY M. MORRIS
EXP. 12-31-17
CIVIL
No. 14526

OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-6535
FAX: (702) 384-1846
TDD: (702) 386-9108

DRAWN BY	G.M.M.
FILE	161002
DATE	8/14/2017
SCALE	1"=20'
BID NO	17.59814.DC
CLV DWD NO	

C4.04



REVISIONS

CONSULTANT

people

process

place

LGA

Lochsa Engineering

6340 S. JONES BLVD., SUITE 100
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CITY OF LAS VEGAS
BAKER PARK AND POOL RECONSTRUCTION
GRADING PLAN SHEET 6 OF 6

OWNER: CITY OF LAS VEGAS
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DRAWN BY: G.M.M.
FILE: 161002
DATE: 8/14/2017
SCALE: 1"=10'
SHEET NO: 17.59814.DC
CLV DWG NO:
SHT NO:

C4.05

A.P.N.:
162-03-801-004

BASIS OF BEARINGS:

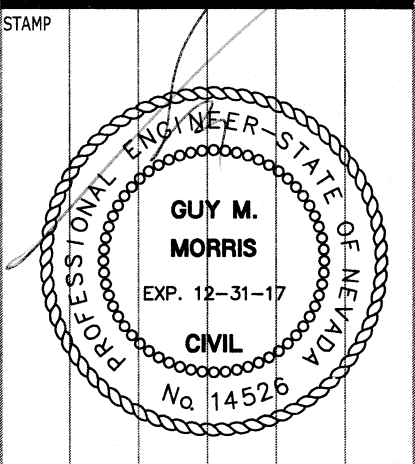
THE BASIS OF BEARING FOR THE SURVEY IS THE NORTH LINE OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHEAST QUARTER (SE1/4) SECTION 3, TOWNSHIP 21 SOUTH, RANGE 61 EAST M.D.M., AS SHOWN IN FILE 7 OF SURVEYS PAGE 7, IN THE OFFICE OF THE RECORDER, CLARK COUNTY, NEVADA. SAID LINE BEARS NORTH 87°50'18" EAST.

BENCHMARK:

BENCHMARK NO: BLV1335 RIVET & PLATE TOP OF CURB SE CORNER 10TH ST. LOUIS AV. ELEVATION: 2010.03 FEET (NAVD '88)

NOTE:

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08/14/2017

OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

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C4.05

CL OR SURVEY LINE	EASEMENT LINE	DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
PROPERTY LINE	SAWCUT LINE	EXISTING:	-- (2210) --								(12.34) BC		⊙	⊙ = STORM DRAIN	⊙	⊙	▷	○	□	⊙	⊙	⊙	⊙	⊙
ROW LINE	SCARP LINE	PROPOSED:	-- (2122) --								(12.34) AC		⊙	⊙ = ELECTRICAL	⊙	⊙	▷	○	□	⊙	⊙	⊙	⊙	⊙
													⊙	⊙ = TFI FPHONF	⊙	⊙	▷	○	□	⊙	⊙	⊙	⊙	⊙

CITY OF LAS VEGAS STREETLIGHT NOTES

1. ALL STREET LIGHTING INSTALLATIONS 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 SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION, AND ANY ADOPTED SPECIAL AREA STANDARDS.
2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS (ETC.) LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF TRAFFIC ENGINEERING AND THE CITY ENGINEER.
3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.
4. ALL STREET LIGHTING CONDUITS STUB SHALL HAVE AT LEAST ONE GREEN #10 TH WIRE INSTALLED, AS TRACER WIRE (CONDUIT IS COMPLETELY INSTALLED FROM PB TO PB, IT SHALL HAVE MINIMUM OF 2 #4 AND 1 #8 THW WIRE WITH THE ENDS TAPED OR "SAFE OFF" PRIOR TO FINAL INSPECTION.
5. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM CLEARANCE IN ACCORDANCE WITH THE USD NO. 320A.
6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TEF0 PRIOR TO ANY PRE-FINAL INSPECTION. THE ASBUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
7. SERVICE POINT SHALL BE COORDINATED WITH NV ENERGY COMPANY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE CIVIL 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, AT NO EXPENSE TO THE CITY OF LAS VEGAS, BEFORE STREETLIGHT BASES ARE INSTALLED.
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, MAINTENANCE, AND OPERATIONAL COST OF ALL 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 LIGHTS AND/OR SERVICE/2S 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 (TEF0) AT (702) 229-6331.

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 TO LIFT OR REMOVED 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 AREAS INDICATED:

	HORIZONTAL	VERTICAL	COMPACTION
A. PAVEMENT AREA SUBGRADE	0.1+/-	+0.0 TO -0.1'	SEE SOILS REPORT
B. ENGINEERED FILL	0.3+/-	+0.1 TO -0.1'	SEE SOILS REPORT
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, BERM, ROAD SIGNS AND BARRICADES, ETC.

REVISED 04/15/10

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND 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 BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80) FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80) FOOT R/W 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 C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/15/10

CITY OF LAS VEGAS FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE & RESCUE ADOPTED FIRE CODE ORDINANCE #6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S - APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE & 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. [FC § 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. [FC § 3310, § 3312]
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF STREET ADJACENT TO THE FIRE HYDRANTS. [FC § 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. [FC § 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. [FC § 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. [FC § 507]
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. [FC § 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. [FC § 507]
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: [FC § C102]

	RESIDENTIAL	COMMERCIAL
500 FEET UNSPRINKLERED	600 FEET SPRINKLERED	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 STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT 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. [FC § C102.8]
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT 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, STREETLIGHT OR ANY OTHER OBSTRUCTION. [FC § C102.12]
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [FC § 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. [FC § C102.7]
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [FC § 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. [FC § 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. [FC § 503.2.3]
20. THE GRADIENT FOR THE FIRE APPARATUS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURE GRADIENT SHALL NOT EXCEED 6%. [FC § 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. [FC § 503.2.4]
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13 FT 6 INS. [FC § 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 ACCESS 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 NOT BE LESS THAN 24 FT. [FC § 503.2.1.1]
24. 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. [FC § 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 800 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORES OR 30 FT IN HEIGHT, OR EXCEEDING 62,000 SQ FT IN AREA. [FC § 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. [FC § 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 NECESSARY 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 RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [FC § 503.3]
28. ELECTRONICALLY 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.

EFFECTIVE DATE 03-01-2016

SOUTHERN NEVADA - SOUTHWEST GAS CORPORATION GENERAL NOTES:

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020.
2. THERE SHALL BE A MINIMUM HORIZONTAL AND VERTICAL CLEARANCE OF 12-INCHES BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND FACILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRIC.
3. FOR VALVE ADJUSTMENT CONTACT 702-668-6107 48 HOURS PRIOR TO CONSTRUCTION..
4. IN THE EVENT OF A NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND/OR STRUCTURES CONTACT 702-365-2099.

ALL CIVIL IMPROVEMENT PLANS MUST INCLUDE SOUTHWEST GAS CORPORATION HIGH PRESSURE NOTES ON THE NOTES SHEET AND ALL SHEETS DEPICTING HIGH PRESSURE NATURAL GAS MAINS AS INDICATED BELOW.

CAUTION: HIGH PRESSURE GAS!
CALL SOUTHWEST GAS AT 702-400-1789 FOR STANBY
WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS
LINES 48 HOURS PRIOR TO CONSTRUCTION.

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 INTERFERENCES WITHIN THE AREA OF 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 SATISFACTORILY 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 DESIGNS 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 DRAWING 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 THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY THE (COMPANY) - REPORT #, DATE) 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 NOTOT 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 POSITIVE CERTAINITIES 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).
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 EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED 02/03/15

DEVIATIONS FROM STANDARDS

NONE.

CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICAADING, 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 THE 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 GRADING WORK IS COMPLETED, 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 TO BE PRESENT FOR THE FULL DURATION OF THE 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 INSTALLING ALL PERMANENT SIGNS SHOWN ON THESE PLANS AND ALL NEW TRAFFIC SIGNS SHALL BE FABRICATED WITH CHARCOAL OR 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. ALL 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 THESE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL 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 STOPS SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE 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 (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL INCIDENTS DIVISION (PHONO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET 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 OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. THE 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 THICKNESS, FINISHES, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE ACHIEVED.
16. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.

REVISED 04/15/10

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. AFTER 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 LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2012 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERSEDE 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 SPECIALLY 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 ITS 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.

15. NO LEAD COMPLIANCE NOTE:
TO COMPLY WITH THE FEDERAL SAFE DRINKING WATER ACT, ALL WATER WORKS BRASS PRODUCTS PROPOSED TO BE RELOCATED, OR INSTALLED AS NEW MUST BE INSTALLED WITH THE LEAD FREE APPROVED PRODUCT. THE OLD LEADED PRODUCT MAY NOT BE REUSED.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT No. _____ DATE: _____

QUANTITIES

DESCRIPTION	PUBLIC QUANTITY	PRIVATE QUANTITY
2-INCH ASPHALTIC CONCRETE PAVING	SY	SY
3-INCH ASPHALTIC CONCRETE PAVING	SY	SY
5-INCH ASPHALTIC CONCRETE PAVING	SY	SY
OPEN GRADE	SY	SY
TYPE I GRAVEL	CY	CY
TYPE I GRAVEL	CY	CY
EXCAVATION & EMBANKMENTS	133 CY	CY
CURB & GUTTER "A" CURB	LF	LF
CURB & GUTTER "ROLL" CURB	LF	SF
CONCRETE VALLEY GUTTER	SF	SF
5-INCH CONCRETE SIDEWALK	SF	SF
6-INCH SEWER (PRIVATE)	LF	LF
12-INCH SEWER (PRIVATE)	LF	LF
15-INCH SEWER (PRIVATE)	LF	LF
18-INCH SEWER (PRIVATE)	LF	LF
24-INCH SEWER (PRIVATE)	LF	LF
48-INCH SEWER MANHOLES (PRIVATE)	EA	EA
60-INCH SEWER MANHOLES (PRIVATE)	EA	EA
SEWER MANHOLE ADJUSTMENTS	EA	EA
2-INCH WATER MAIN	LF	LF
4-INCH WATER MAIN	LF	LF
6-INCH WATER MAIN	72 LF	LF
12-INCH WATER MAIN	LF	LF
WATER MAIN (- INCH DIAMETER)	LF	LF
FIRE HYDRANT ASSEMBLY	1 EA	EA
FIRE HYDRANT RELOCATION	EA	EA
2" WATER METER	EA	EA
10" RPPA	EA	EA
2" x 4" TEE	EA	EA
12" x 10" TEE	EA	EA
12" x 6" TEE	EA	EA
6" x 6" TEE	1 EA	EA
6" GATE VALVE	1 EA	EA
10" GATE VALVE	EA	EA
8" GATE VALVE	EA	EA
12" 90° BEND	EA	EA
4" 45° BEND	EA	EA
2" 45° BEND	EA	EA
4" 90° BEND	EA	EA
8" 90° BEND	EA	EA
8" 45° BEND	EA	EA
8" 22.5° BEND	EA	EA
8" 11.25° BEND	EA	EA
6" 90° BEND	EA	EA
4" x 1-1/2" REDUCER	EA	EA
2" x 4" REDUCER	EA	EA
10" x 8" REDUCER	EA	EA
8" x 6" REDUCER	EA	EA
2" MANUAL BLOWOFF ASSEMBLY	EA	EA
POWER SERVICE TO LOTS	EA	EA
SIDEWALK UNDERDRAIN	1 EA	EA
TRAFFIC SIGNAL AND/OR BASE	EA	EA
TRAFFIC SIGNAL UNDERGROUND	LS	LS
TRAFFIC CONTROL DEVICES	EA	EA
SURVEY MONUMENTS	EA	LS

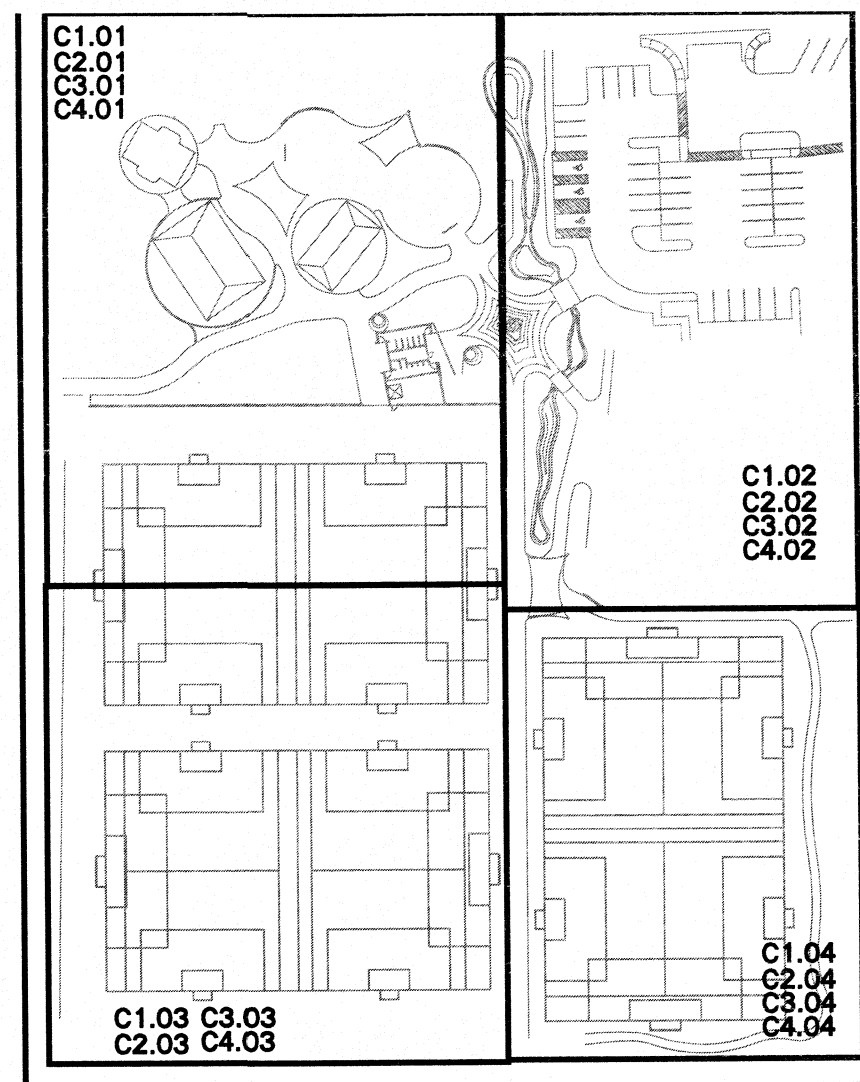
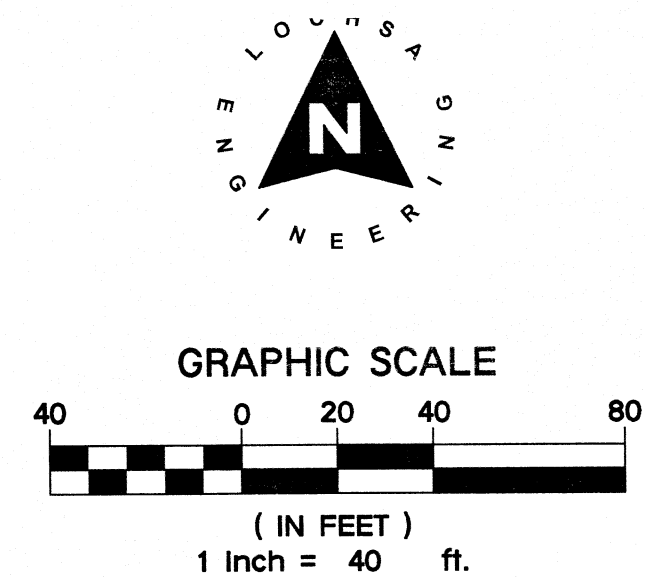
NOTE:
THIS QUANTITY ESTIMATE IS FOR BONDING PURPOSES ONLY.
CONTRACTOR TO DETERMINE INDEPENDENT ESTIMATIONS.

THE QUANTITY ESTIMATE SHOWN HERE IS FOR EXAMPLE ONLY. ALL DRAFTERS NEED TO CHECK WITH THEIR PROJECT MANAGER BEFORE USING THIS QUANTITY ESTIMATE. SOME PROJECT MANAGERS MAY LIKE IT AND SOME MAY NOT. IT IS NOT REQUIRED IN CLARK COUNTY TO SHOW A QUANTITY ESTIMATE ON THE NOTES SHEET. IT IS MANDATORY, HOWEVER, TO SHOW A QUANTITY ESTIMATE ON THE NOTES SHEET IN CITY OF LAS VEGAS JURISDICTION. IF AND ONLY IF YOUR PROJECT ENGINEER WANTS THE QUANTITY ESTIMATE TO SHOW, THEN CHANGE IT TO THE APPROPRIATE LAYERS ALREADY DEFINED IN THIS DRAWING.

A.P.N.:
182-03-801-004

BASIS OF BEARINGS:

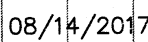
THE BASIS OF BEARING FOR THE SURVEY IS THE NORTH LINE OF THE SOUTHEAST QUARTER (SE1/4) OF THE SOUTHEAST QUARTER (SE1/4) SECTION 3, TOWNSHIP 21 SOUTH, RANGE 61 EAST N.D.M.,



LOCHSA ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS PLAN ARE FROM THE BEST AVAILABLE INFORMATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES, INCLUDING BUT NOT LIMITED TO, THE WATER, FIRE, SANITARY SEWER, STORM SEWER, TELEPHONE, POWER, GAS AND CABLE TELEVISION LINES. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, IF CONFLICT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE PROJECT ARCHITECT, OWNER'S REPRESENTATIVE AND THE PROJECT ENGINEER IMMEDIATELY.

241 W Charleston Blvd, Suite 107
Las Vegas, Nevada 89102
Telephone: 702-263-7111
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CITY OF LAS VEGAS
BAKER PARK AND POOL RECONSTRUCTION
OVERALL GRADING PLAN SHEET 1 OF 6



OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-6535
FAX: (702) 384-4846
TDD: (702) 386-9108

DRAWN BY	G.M.M.
FILE	161002
DATE	8/14/2017
SCALE	1" = 40'
BID NO	17.59814.C

C4.00

[illegible]