

DS #: 4930

APN: 162-04-412-008

PROJECT: Retail at Sahara and Rancho - Update

SUBMITTAL: 1st Submittal & Supplement

SCANNED BY/DATE: \_\_\_\_\_

CHECKED BY/DATE: \_\_\_\_\_



|                                                                            |                                      |                                                                                                   |
|----------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>CITY OF LAS VEGAS</b>                                                   |                                      | <b>DATE:</b>                                                                                      |
| <b>INTER-OFFICE MEMORANDUM</b>                                             |                                      | <b>November 16, 2017</b>                                                                          |
| <b>TO:</b><br>Land Development Services<br>Department of Building & Safety |                                      | <b>FROM:</b><br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| <b>SUBJECT:</b>                                                            | Drainage Study for:                  | <b>COPIES TO:</b>                                                                                 |
|                                                                            | Retail at Sahara and Rancho - Update | Lochsa Engineering                                                                                |
| <b>Cross Streets:</b>                                                      | NEC of Sahara Avenue & Rancho Drive  | David Steinberg                                                                                   |
| <b>File Number:</b>                                                        | F:\Depot\DSMemos\DS4930A.doc         | Bart Anderson, P.E., DevCo                                                                        |
| <b>Parcel Number:</b>                                                      | 162-04-412-008                       |                                                                                                   |
| <b>Zoning Action:</b>                                                      | SDR-71834                            |                                                                                                   |
| <b>FEMA Flood Zone</b>                                                     | YES NO <b>X</b>                      |                                                                                                   |
| <b>Proposed Storm Drain</b>                                                | YES NO <b>X</b>                      |                                                                                                   |

| HISTORY                                | DATE RECEIVED           | DATE REVIEWED | COMMENTS                   | REVIEW FEES     | FEES PAID<br>Payment Trn # |
|----------------------------------------|-------------------------|---------------|----------------------------|-----------------|----------------------------|
| 1 <sup>st</sup> Submittal & Supplement | 10/30/2017 & 11/16/2017 | 11/16/2017    | See Comments Below         | \$400.00        | 490921: \$400              |
|                                        |                         |               | <b>TOTAL FEES (LDDRS):</b> | <b>\$400.00</b> | ----                       |

#### REMARKS:

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

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

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

**NOTE:** Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

**END OF REMARKS**

ays

T/R/S: T21S/R61E/04  
AREA R-04





**LAS VEGAS  
CITY COUNCIL**

CAROLYN G. GOODMAN  
Mayor

LOIS TARKANIAN  
Mayor Pro Tem

RICKI Y. BARLOW  
STAVROS S. ANTHONY

BOB COFFIN  
STEVEN G. SEROKA  
MICHELE FIORE

SCOTT D. ADAMS  
City Manager

**DEVELOPMENT  
SERVICES CENTER**

DEPARTMENT OF PLANNING

333 N. RANCHO DRIVE  
3RD FLOOR  
LAS VEGAS, NV 89106  
702.229.6301 | VOICE  
702.474.7463 | FAX  
711 | TTY



cityoflasvegas  
lasvegasnevada.gov

**November 13, 2017**

Sahara Rancho Office Ctr LLC  
2200 S. Rancho Drive, Ste. 130  
Las Vegas, Nevada 89102

**RE: SDR-71834 [PRJ-71756] – ADMINISTRATIVE SITE DEVELOPMENT  
PLAN REVIEW - ADMINISTRATIVE CYCLE – OCTOBER 2017**

Dear Applicant:

Your request for a Minor Site Development Plan Review FOR PARKING LOT RECONFIGURATION AND ADDITION on 12.61 acres at the northeast corner of Rancho Drive and Sahara Avenue (APN 162-04-412-005 through 009), C-1 (Limited Commercial) Zone, Ward 1 (Tarkanian) [PRJ-71756], has been considered administratively by the Department of Planning staff.

The Department of Planning has administratively **APPROVED** your request subject to the following:

**Planning**

1. Conformance to the Conditions of Approval for Site Development Plan Review (SDR-59931) shall be required, except as amended herein.
2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.
3. All development shall be in conformance with the site plan and landscape plan, date stamped 11/02/17, except as amended by conditions herein.
4. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.
5. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

6. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time application is made for a building permit. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device.
7. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.
8. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

**Public Works**

9. Maintain paved access to the existing public sewer manhole located in a public sewer easement granted by recorded document 20040526:02146 and not vacated by documents 20050120:03093 or 20160615:00522. No landscaping over 3 feet tall and no covered parking may be installed within the public sewer easement.
10. An update to the previously approved Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to submittal of any construction drawings or the issuance of any building or grading permits, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage study update.

This action by the Department of Planning staff on **November 13, 2017** is final unless a written appeal is filed with the Director of the Department of Planning within ten days of the date of this letter.

Sincerely,



Steve Gebeke, AICP  
Planning Supervisor  
Case Planning Division

SG:nl

c.c.: AJ Plank  
IN2IT Architecture  
5135 South Durango Drive, Ste. 103  
Las Vegas, Nevada 89113

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

TRANSMISSION OK

JOB NO. 0933  
 DESTINATION ADDRESS 7023659317  
 PSWD/SUBADDRESS  
 DESTINATION ID  
 ST. TIME 11/16 16:06  
 USAGE T 00' 37  
 PGS. 1  
 RESULT OK

|                                                                            |                                      |                                                                                                   |
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| <b>CITY OF LAS VEGAS</b>                                                   |                                      | <b>DATE:</b>                                                                                      |
| <b>INTER-OFFICE MEMORANDUM</b>                                             |                                      | November 16, 2017                                                                                 |
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|                                                                            | Retail at Sahara and Rancho - Update | Lochsa Engineering                                                                                |
| <b>Cross Streets:</b>                                                      | NEC of Sahara Avenue & Rancho Drive  | David Steinberg                                                                                   |
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| <b>Parcel Number:</b>                                                      | 162-04-412-008                       |                                                                                                   |
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| <b>FEMA Flood Zone</b>                                                     | YES NO X                             |                                                                                                   |
| <b>Proposed Storm Drain</b>                                                | YES NO X                             |                                                                                                   |

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|          |                                                                                                |
|----------|------------------------------------------------------------------------------------------------|
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**NOTE:** Any future changes to the proposed design (or design assumptions) as outlined in the approved



# **Update to the Technical Drainage Study for Retail at Sahara and Rancho**

October 2017

Prepared for:

Dr. David Steinberg  
7301 Peak Dr #200  
Las Vegas, Nevada 89128  
(702) 240-1232

Prepared by:

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

Job No. 171143

# HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

## DRAINAGE STUDY INFORMATION FORM

Name of Development: Retail at Sahara and Rancho Date: 10/25/17

Location of Development: a) Descriptive (Cross Streets) North/South: Rancho Dr  
 East/West: Sahara Ave

b) Section: 4 Township: 21 S Range: 61 E

c) APN : portions of 162-04-412-006, 162-04-412-007, 162-04-412-009, 162-04-412-008

Name of Owner: David Steinberg

Telephone No.: 702-240-1232 Fax No.: \_\_\_\_\_ E-Mail Address: david@sdmi-lv.com

Address: 7301 Peak Dr #200 Las Vegas, NV 89128

Contact Person-Name: James G. Reynolds, P.E. Telephone No.: 702-365-9312

\* E-Mail Address: james.reynolds@lochsa.com Fax No.: 702-365-9317

Firm: Lochsa Engineering

Address: 6345 S Jones Blvd Ste 100 Las Vegas NV 89118

Type of Land Development/Land Disturbance Process:

|                          |                  |                          |                          |                                     |                                             |
|--------------------------|------------------|--------------------------|--------------------------|-------------------------------------|---------------------------------------------|
| <input type="checkbox"/> | Rezoning         | <input type="checkbox"/> | Subdivision Map          | <input type="checkbox"/>            | Clearing and Grading Only                   |
| <input type="checkbox"/> | Parcel Map       | <input type="checkbox"/> | Planned Unit Development | <input checked="" type="checkbox"/> | Other (Please specify below)                |
| <input type="checkbox"/> | Large Parcel Map | <input type="checkbox"/> | Building Permit          |                                     | grading for changes to existing parking lot |

- Total Owned Land Area: At Site: 15 acres Being Developed/Disturbed: 1.9 acres
- Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes\*\* ☒ No
- Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes\*\* ☐ No
- Proposed type of development (Residential, Commercial, Etc.): commercial onsite
- Approximate upstream land area which drains to the subject site: see report
- Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: DS 4746, DS 2738
- If known, please briefly identify the proposed discharge point(s) of runoff from the site: northeast corner of subject site  
 (existing and proposed conditions)
- Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal

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

\*New Required Field

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

| Revision | Date |
|----------|------|
|          |      |
|          |      |
|          |      |

Local Entity File No.

REFERENCE:

STANDARD FORM 1

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## DRAINAGE SUBMITTAL CHECKLIST

|                                                                             |                  |                                   |
|-----------------------------------------------------------------------------|------------------|-----------------------------------|
| Project Name: <b>RETAIL AT SAHARA AND RANCHO</b>                            |                  | Map ID:                           |
| Firm Name: <b>LOCHSA ENGINEERING</b>                                        |                  | Engineer: <b>TED T. EHERTON</b>   |
| Address: <b>6345 S JONES BLVD STE 100</b>                                   |                  |                                   |
| City: <b>LAS VEGAS</b>                                                      | State: <b>NV</b> | Zip: <b>89118</b>                 |
| Phone Number: <b>(702) 365-9312</b>                                         |                  | Fax Number: <b>(702) 365-9317</b> |
| Property Owner: <b>SAHARA RANCHO OFFICE CENTER, LLC c/o DAVID STEINBERG</b> |                  |                                   |
| Address: <b>7301 PEAK DR #200</b>                                           |                  |                                   |
| City: <b>LAS VEGAS</b>                                                      | State: <b>NV</b> | Zip: <b>89128</b>                 |
| Reviewed By:                                                                | Date Received:   | Date Accepted for Review:         |

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

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

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

### I. GENERAL REQUIREMENT

- | Yes                                 | No                                             |                                                                                                |
|-------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/>                       | Design Manual <b>Standard Form 1</b> with the engineer's seal and signature.                   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>                       | Design Manual <b>Standard Form 4</b> .                                                         |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>                       | 2 copies of the 24" x 36" Drainage Plan.                                                       |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> <b>N/A</b> | A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge. |

### II. MAPS AND EXHIBITS

- | Yes                                 | No                       |                                                                                                                                               |
|-------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.                                                                 |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated. |

REFERENCE:

**STANDARD FORM 2**



# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## DRAINAGE SUBMITTAL CHECKLIST

### II. MAPS AND EXHIBITS (Continued)

| Yes                      | No                       |                                                                                                                                                                                  |
|--------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <u>N/A</u>               | Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.              |
| <u>X</u>                 | <input type="checkbox"/> | 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. |
| <u>X</u>                 | <input type="checkbox"/> | Vicinity Map with local and major cross streets identified and a north arrow.                                                                                                    |

### III. DRAINAGE PLAN

| Yes                      | No                       |                                                                                                                                                             |
|--------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>X</u>                 | <input type="checkbox"/> | Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.                                                                               |
| <u>X</u>                 | <input type="checkbox"/> | Minimum scale: 1" = 60'.                                                                                                                                    |
| <u>X</u>                 | <input type="checkbox"/> | Project name.                                                                                                                                               |
| <u>X</u>                 | <input type="checkbox"/> | Vicinity Map with local and major cross streets.                                                                                                            |
| <u>X</u>                 | <input type="checkbox"/> | Revision box.                                                                                                                                               |
| <u>X</u>                 | <input type="checkbox"/> | North arrow and bar scale.                                                                                                                                  |
| <u>X</u>                 | <input type="checkbox"/> | Engineer's/consultant's address and phone number.                                                                                                           |
| <u>X</u>                 | <input type="checkbox"/> | Elevation datum and benchmark.                                                                                                                              |
| <u>X</u>                 | <input type="checkbox"/> | Legend for symbols and abbreviations.                                                                                                                       |
| <u>X</u>                 | <input type="checkbox"/> | Cut/fill scarps, where applicable.                                                                                                                          |
| <u>X</u>                 | <input type="checkbox"/> | Street names, grades, widths.                                                                                                                               |
| <u>X</u>                 | <input type="checkbox"/> | 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. |
| <u>X</u>                 | <input type="checkbox"/> | Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.                                |
| <input type="checkbox"/> | <u>N/A</u>               | Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.                                                                         |
| <input type="checkbox"/> | <u>N/A</u>               | Proposed typical street sections.                                                                                                                           |

REFERENCE:

STANDARD FORM 2

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## DRAINAGE SUBMITTAL CHECKLIST

### III. DRAINAGE PLAN (Continued)

| Yes           | No            |                                                                                                                                                                                                                                                                             |
|---------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>      </u> | <u>N/A</u>    | Streets with off-set crowns.                                                                                                                                                                                                                                                |
| <u>X</u>      | <u>      </u> | Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.                                                                                                                                                                 |
| <u>X</u>      | <u>      </u> | Property lines.                                                                                                                                                                                                                                                             |
| <u>X</u>      | <u>      </u> | Right-of-way lines and widths, existing and proposed.                                                                                                                                                                                                                       |
| <u>X</u>      | <u>      </u> | Existing improvements and their elevations.                                                                                                                                                                                                                                 |
| <u>X</u>      | <u>      </u> | Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.                                                                                                                                    |
| <u>      </u> | <u>N/A</u>    | Concentration points and drainage flow direction with $Q_{100}$ and $V_{100}$ and $D_{100}$ in streets.                                                                                                                                                                     |
| <u>X</u>      | <u>      </u> | Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.                                                                                                                                               |
| <u>      </u> | <u>N/A</u>    | Location and cross-section of street capacity calculations.                                                                                                                                                                                                                 |
| <u>X</u>      | <u>      </u> | Cross-sectional detail for channels, including cutoff wall locations.                                                                                                                                                                                                       |
| <u>X</u>      | <u>      </u> | 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. |
| <u>X</u>      | <u>      </u> | Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.                                                                                                |
| <u>      </u> | <u>N/A</u>    | 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.                                                                                                                     |
| <u>      </u> | <u>N/A</u>    | Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.                                                                                                                                                                               |
| <u>      </u> | <u>N/A</u>    | 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.                                                                              |
| <u>X</u>      | <u>      </u> | Building and/or lot numbers.                                                                                                                                                                                                                                                |
| <u>X</u>      | <u>      </u> | Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.                                                                                                                                                                                    |
| <u>      </u> | <u>N/A</u>    | 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

- N/A For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
- N/A Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the  $Q_{100}$  flows.
- X        Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
- X        Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

### IV. HYDROLOGIC ANALYSIS

Yes No

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

REFERENCE:

STANDARD FORM 2



# 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.
- \_\_\_\_\_ N/A 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  $\geq 80$  feet. Calculations must be labeled by street name as indicated on the Grading Plan.
- \_\_\_\_\_ N/A A summary table of interior and exterior street capacity calculations showing the street name,  $Q_{100}$  flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
- \_\_\_\_\_ N/A Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
- \_\_\_\_\_ N/A Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
- \_\_\_\_\_ N/A Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the  $Q_{100}$  weir height or flow depth, whichever is greater.
- \_\_\_\_\_ N/A A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones.
- Field survey data.
  - Input and output information.
  - Plotted cross-sections based on survey with proper encroachments.
  - A map showing the location of the cross-sections.
  - Analysis of both sub and super-critical flow segments.
  - A summary table and a discussion of the results in the text of the report.
- \_\_\_\_\_ N/A Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
- \_\_\_\_\_ N/A Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
- X \_\_\_\_\_ The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
- X \_\_\_\_\_ Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2



# 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 (CCRFCDD) 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 CCRFCDD Hydrologic Criteria and Drainage Design Manual (Design Manual).

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

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

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

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



## CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

| III. Local Entity Criteria - City of Las Vegas – Manual Section 1600 |     |                                                                                                                                                                                                          |
|----------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yes                                                                  | No  |                                                                                                                                                                                                          |
| X                                                                    |     | Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.             |
|                                                                      | N/A | Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.  |
|                                                                      | N/A | The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.                             |
|                                                                      | N/A | 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. |
|                                                                      | N/A | Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.                                                 |

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

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

October 25, 2017

Mr. Albert Sung, P.E.  
City of Las Vegas Public Works Department  
Flood Control Division  
333 N. Rancho Drive  
Las Vegas, NV 89106

Subject: **Update to the Technical Drainage Study for Retail at Sahara and Rancho)**  
**(DS 4746)**  
Lochsa Job #171143

Dear Mr. Sung:

This report is intended as an update to the approved "*Technical Drainage Study for Retail at Sahara and Rancho*," hereinafter referred to as the 'Original Study.' The Original Study was prepared by Walker Engineering and initially approved on November 9, 2015 (DS 4746) for proposed commercial development on the northeast corner of Sahara Ave and Rancho Dr. The Original Study comprised two commercial buildings – a Chick-fil-A at the southwest corner and office building to the north, adjacent to the existing site entrance from Rancho Dr – concrete curb, gutter, and sidewalk, asphalt pavement and landscaping within the existing Sahara/Rancho Office Park. Two subsequent updates that addressed minor grading revisions were approved on February 8, 2016, and October 11, 2016, respectively. All offsite improvements were existing at the time of the Original Study's submittal.

Changes to parking areas and drive-aisles north of the existing Chick-fil-A (labeled Building D in the initial submittal of the Original Study) and east of Building E are required to improve traffic circulation. Additionally, new parking areas comprising asphalt pavement and concrete curb and gutter are proposed in the east and northeast portions of the site with this report. Note no new buildings are proposed with this update, nor are any changes to overall site drainage design proposed.

The project area comprises approximately 1.9 acres within the existing Sahara/Rancho Office Park located on the northeast corner of West Sahara Ave (public ROW) and Rancho Dr (public ROW). The Sahara/Rancho Office Park is approx. 15 acres in area, and is currently developed except for an approx. 3-acre pad along its eastern boundary. The subject site occupies a portion of the Southern Half (S 1/2) of the Southwest Quarter (SW 1/4) of Section 4, Township 21 South, Range 61 East, of the M.D.M., within the City of Las Vegas. Proposed improvements are located on portions of Assessor's Parcel Numbers (APNs) 162-04-412-007 and 162-04-412-008. Refer to the copy of the annotated Assessor's parcel map provided in the Appendix. The

Vicinity Map for the subject site, in relation to the surrounding streets, is also provided in Figure 1 contained in the Appendix.

## **1.0 Hydrology**

### **Offsite**

Offsite runoff impacting the project area was presented in the previously approved “*Technical Drainage Study for Sahara/Rancho Office Park*,” herein referred to as the ‘Office Park Study,’ prepared by The Keith Companies and initially approved November 9, 2000 (DS 2738). An update to the study for grading revisions was approved on June 12, 2002. The Office Park Study referenced offsite flows from the Hydraulic Design Report for the I-15 Widening Project, performed by The Louis Berger Group, Inc. in 1999 for the Nevada Department of Transportation (NDOT) (DS 3008). At the time of submittal of the Office Park Study, the subject site was partially developed. The Office Park Study provided onsite drainage analysis for the entire site. Lochsa Engineering has reviewed the Office Park Study and concurs with its findings.

The Original Study utilized the offsite flows presented in the Office Park Study and I-15 Widening Project report to establish finish floor elevations of the proposed buildings. No buildings are proposed with this update, nor are any changes to the existing onsite drainage design. As such, no offsite analysis was performed nor is one presented in this update.

### **Onsite**

The proposed onsite condition as presented in the Original Study represents both the existing and proposed conditions for the areas north of the existing Chick-fil-A and east of Building E in which site revisions are proposed per this report. This area is fully-developed, and comprises asphalt pavement, concrete curb and gutter, and landscaping, which includes three (3) rock-lined swales as specified in the Original Study as a BMP for stormwater treatment. The project areas are part of onsite basin PRON1 as shown on Sheet PR-1 from the Original Study contained in the Reference Appendix. PRON1 as delineated in the Original Study is a portion of larger onsite basin PR-5 as analyzed in the Office Park Study and shown on Figure 7, also contained in the Reference Appendix. PRON1 was determined to generate 3/7 cfs, which increased the 100-year peak flow rate for PR-5 from the Office Park Study from 12 to 13 cfs.

The area of proposed new parking near the middle of the east property line comprises existing asphalt pavement, concrete curb and gutter, and a portion of a vacant pad on which a



previous building has since been demolished. The area is part of PR-4 as shown on the aforementioned Figure 7. The northeast corner of the office park where a new parking area is proposed comprises mostly asphalt pavement in poor condition. This area is located within portions of both PR-1 and PR-4 as shown on aforementioned Figure 7 from the Office Park Study. Note some of the existing buildings in the office park were originally constructed in the 1970s and 1980s; the asphalt pavement in the northeast corner appears to be from this time.

Per the Office Park Study, the site was designed and graded to discharge all developed onsite runoff (20/42 cfs) at its northeast corner into an existing natural swale adjacent to Interstate 15 and within NDOT right-of-way. In the existing condition, onsite runoff generated in the southern half of the office park, which includes PRON1 from the Original Study, is conveyed northeasterly along the east property line in concrete L-curb, and discharged into the NDOT right-of-way at approx. the midpoint of the east property line where the L-curb ends. For the purpose of this report, the site is considered fully developed. Peak runoff of 20/43 cfs, which includes the 1-cfs increase in 100-year peak flow from PRON1 from the Original Study, is assumed to discharge at the northeast corner over asphalt pavement.

## **2.0 Master Planning Information**

The “2008 Las Vegas Valley Flood Control Master Plan Update,” as prepared by Post Buckley Schuh and Jernigan, Inc. (PBS&J), in association with Louis Berger Group and Parsons Brinckerhoff, for the Clark County Regional Flood Control District (CCRFC) illustrates the existing and proposed master planned facilities. The CCRFC facility exhibits and inventory tables were updated in 2013. As shown in Figure F-31 of the 2013 MPU, the subject site is adjacent to existing 10' x 8' RCBs (ID FW15 0175 and FW15 0150) within the I-15 corridor. A CCRFC Category A facility is proposed in Sahara Ave adjacent to the subject site. The facility is identified as a 7' x 5' RCB (ID FWSA 0000).

Review of the 2008 MPU's Figure H-50 shows the project site is located within subbasin OK11-C of the Central Watershed. The entire project site comprises hydrologic soil group “C,” defined as soils with “moderately high runoff potential.” The Soil Resource Report obtained from the Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) indicates that the project area with onsite basin PRON1 consists entirely of soil 325, named: *McCarraan fine sandy loam, 0 to 4 percent slopes*, which is assigned hydrologic soil group ‘A,’ and the project areas along the east property line and northeast corner consist of soil 390, named: *Spring clay loam* and assigned hydrologic soil group, ‘C.’

### **3.0 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 (Reference 4). The FIRM panel is shown with the project site delineated in Figure 2 in the Appendix, and shows the site lies entirely within a FEMA Flood Zone “X” (unshaded), defined as: “*Areas determined to be outside the 0.2% annual chance floodplain.*”

### **4.0 Facility Design Calculations**

The proposed site revisions in the area north of Chick-fil-A and east of Building E do not alter existing grades or flow paths established in the Original Study. Hydraulic cross-sections HS-3 and HS-4 have been reprinted from the Original Study and are contained in the Reference Appendix. Their locations are highlighted on the aforementioned Figure PR-1. Additionally, the existing BMP swales will remain. Per the Original Study, the minimum area to be treated is 1.19 acres; 1.26 acres are treated by the existing swales. Any reduction in swale lengths that result from the proposed changes to the parking lot and drive-aisles is not considered significant. The BMP calculations from the Original Study are provided in the Reference Appendix. Given the above, no additional or new hydraulic calculations have been prepared.

The area of proposed parking lot improvements in the northeast corner is approx. 0.7 acres. As such, it is considered small per Section 1500 of the HCDDM. Proposed grades allow for a minimum 0.50% slope to convey runoff from the southern portion of the office park along the east property line for future development on the remaining pad per previously approved onsite drainage patterns. As was done in the Office Park Study, a normal depth calculation for the 27' wide opening at the northeast corner is provided to ensure the 100-year peak runoff from the office park site (43 cfs), which includes the additional 1 cfs per the Original Study, is conveyed without overtopping the proposed curb. Refer to the FlowMaster worksheet contained in the Appendix.

### **5.0 Compliance with Regulations and Adopted Plans**

The proposed site changes are in compliance with current regulations and adopted plans, and are consistent with previously approved drainage studies and grading plans for the subject site.

## **6.0 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, Louis Berger Group and Parsons Brinckerhoff, "*2008 Las Vegas Valley Flood Control Master Plan Update, Volume 1 and IP*", September 2008.
3. Federal Emergency Management Agency, "*Flood Insurance Rate Map; Community Panel Number 32003C2170F; Clark County, Nevada and Incorporated Areas*", Effective Date: November 16, 2011.
4. Walker Engineering, "*Technical Drainage Study for Retail @ Sahara and Rancho*", approved on November 9, 2015 (DS 4746).
5. The Keith Companies., "*Technical Drainage Study for Sahara/Rancho Office Park*", approved on November 9, 2000 (DS 2378).

If you require any additional information, please contact our office.

Respectfully submitted,

**LOCHSA ENGINEERING**



James G. Reynolds, P.E.



## APPENDIX

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United States  
Department of  
Agriculture

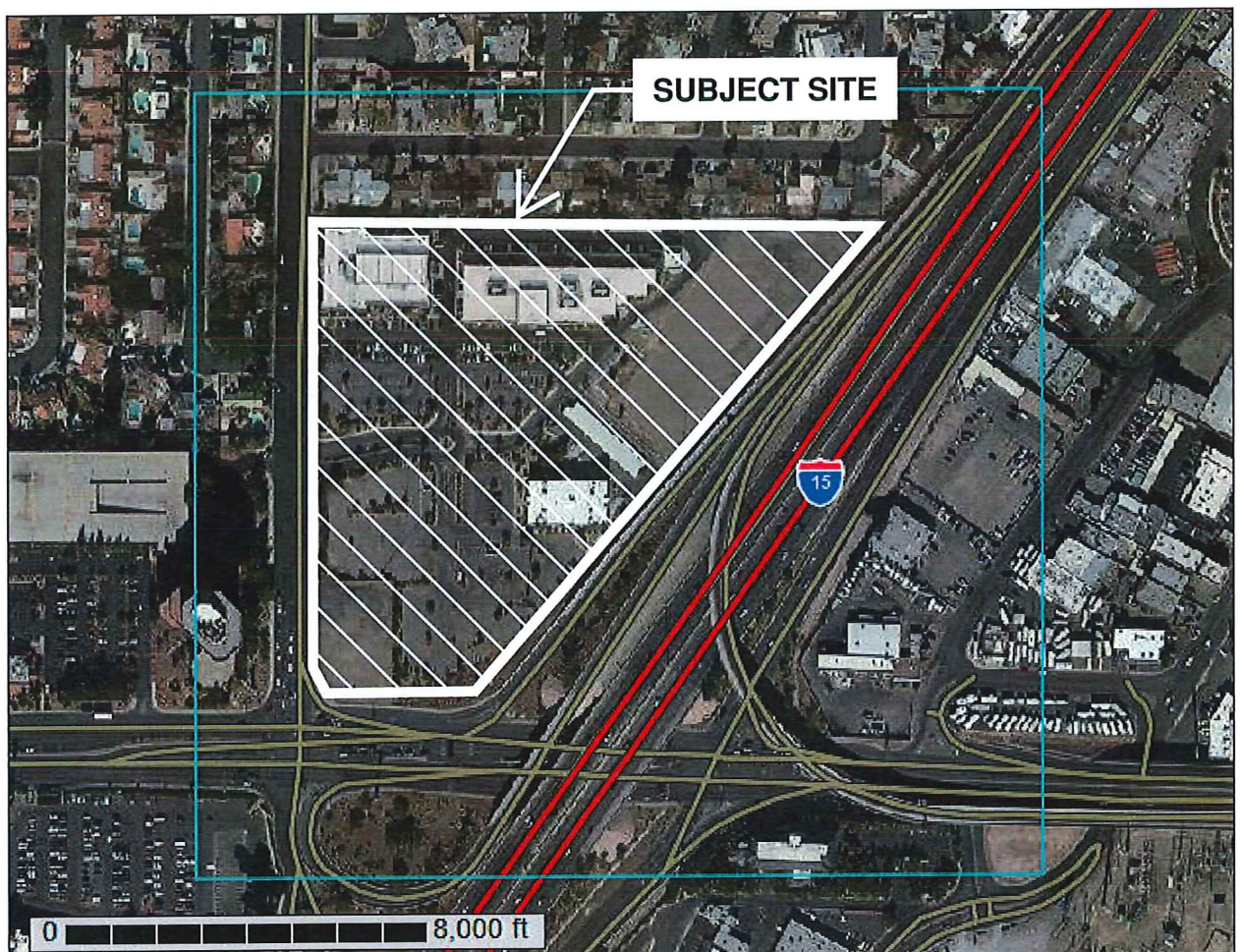
**NRCS**

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

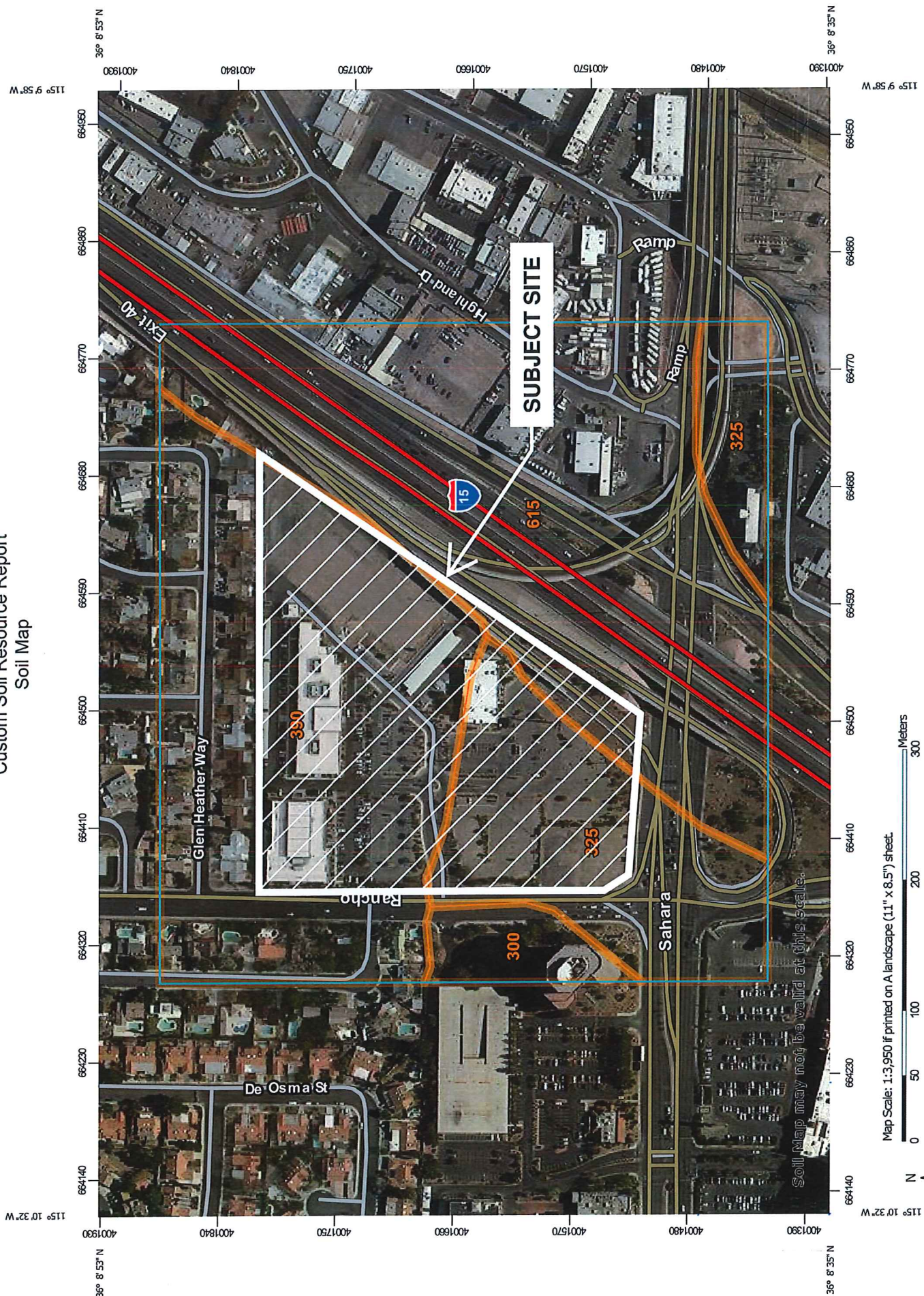
**Sahara Rancho Office Park**



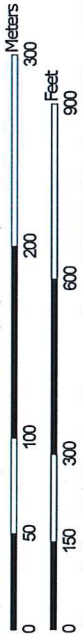
October 13, 2017



# Custom Soil Resource Report Soil Map



Map Scale: 1:3,950 if printed on A landscape (11" x 8.5") sheet.



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

## Las Vegas Valley Area, Nevada, Part of Clark County

### 300—Las Vegas gravelly fine sandy loam, 0 to 2 percent slopes

#### Map Unit Setting

*National map unit symbol:* hrbp  
*Elevation:* 1,800 to 2,600 feet  
*Mean annual precipitation:* 4 to 6 inches  
*Mean annual air temperature:* 63 to 68 degrees F  
*Frost-free period:* 220 to 260 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

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

#### Description of Las Vegas

##### Setting

*Landform:* Basin-floor remnants  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium derived from limestone

##### Typical profile

*H1 - 0 to 1 inches:* gravelly fine sandy loam  
*H2 - 1 to 7 inches:* fine sandy loam  
*H3 - 7 to 11 inches:* gravelly sandy clay loam  
*H4 - 11 to 15 inches:* indurated

##### Properties and qualities

*Slope:* 0 to 2 percent  
*Depth to restrictive feature:* 3 to 14 inches to petrocalcic  
*Natural drainage class:* Well drained  
*Runoff class:* Very high  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 85 percent  
*Gypsum, maximum in profile:* 5 percent  
*Salinity, maximum in profile:* Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)  
*Sodium adsorption ratio, maximum in profile:* 12.0  
*Available water storage in profile:* Very low (about 1.5 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7s  
*Hydrologic Soil Group:* D  
*Other vegetative classification:* LIMY 3-5" P.Z. (030XB019NV\_3)  
*Hydric soil rating:* No



### **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*

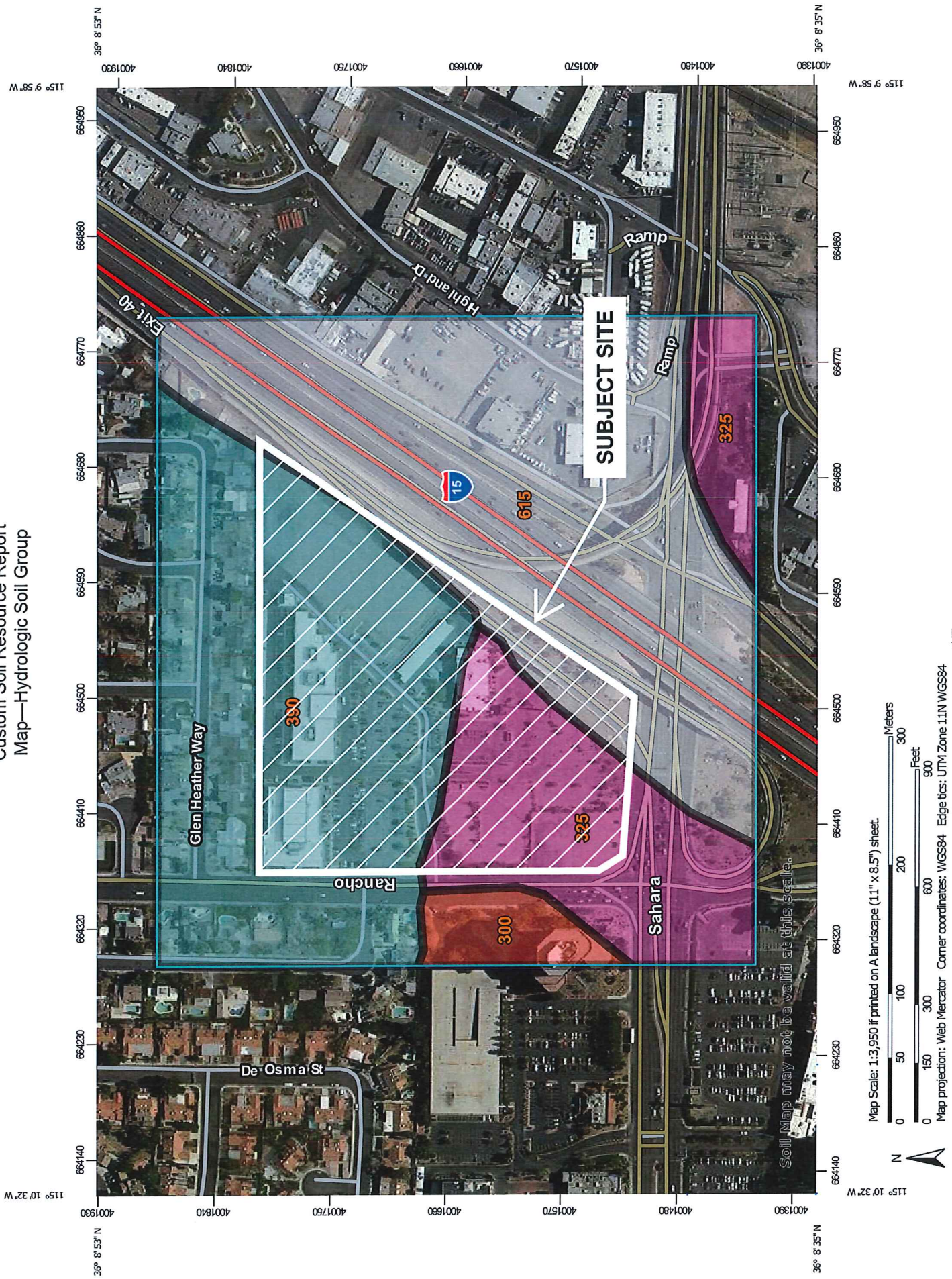
*Across-slope shape: Convex*

#### **Properties and qualities**

*Frequency of flooding: Rare*



Custom Soil Resource Report  
Map—Hydrologic Soil Group



**Table—Hydrologic Soil Group**

| Map unit symbol                    | Map unit name                                             | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|-----------------------------------------------------------|--------|--------------|----------------|
| 300                                | Las Vegas gravelly fine sandy loam, 0 to 2 percent slopes | D      | 1.9          | 3.2%           |
| 325                                | McCarran fine sandy loam, 0 to 4 percent slopes           | A      | 11.3         | 19.4%          |
| 390                                | Spring clay loam                                          | C      | 21.1         | 36.1%          |
| 615                                | Urban land                                                |        | 24.2         | 41.4%          |
| <b>Totals for Area of Interest</b> |                                                           |        | <b>58.5</b>  | <b>100.0%</b>  |

**Rating Options—Hydrologic Soil Group**

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

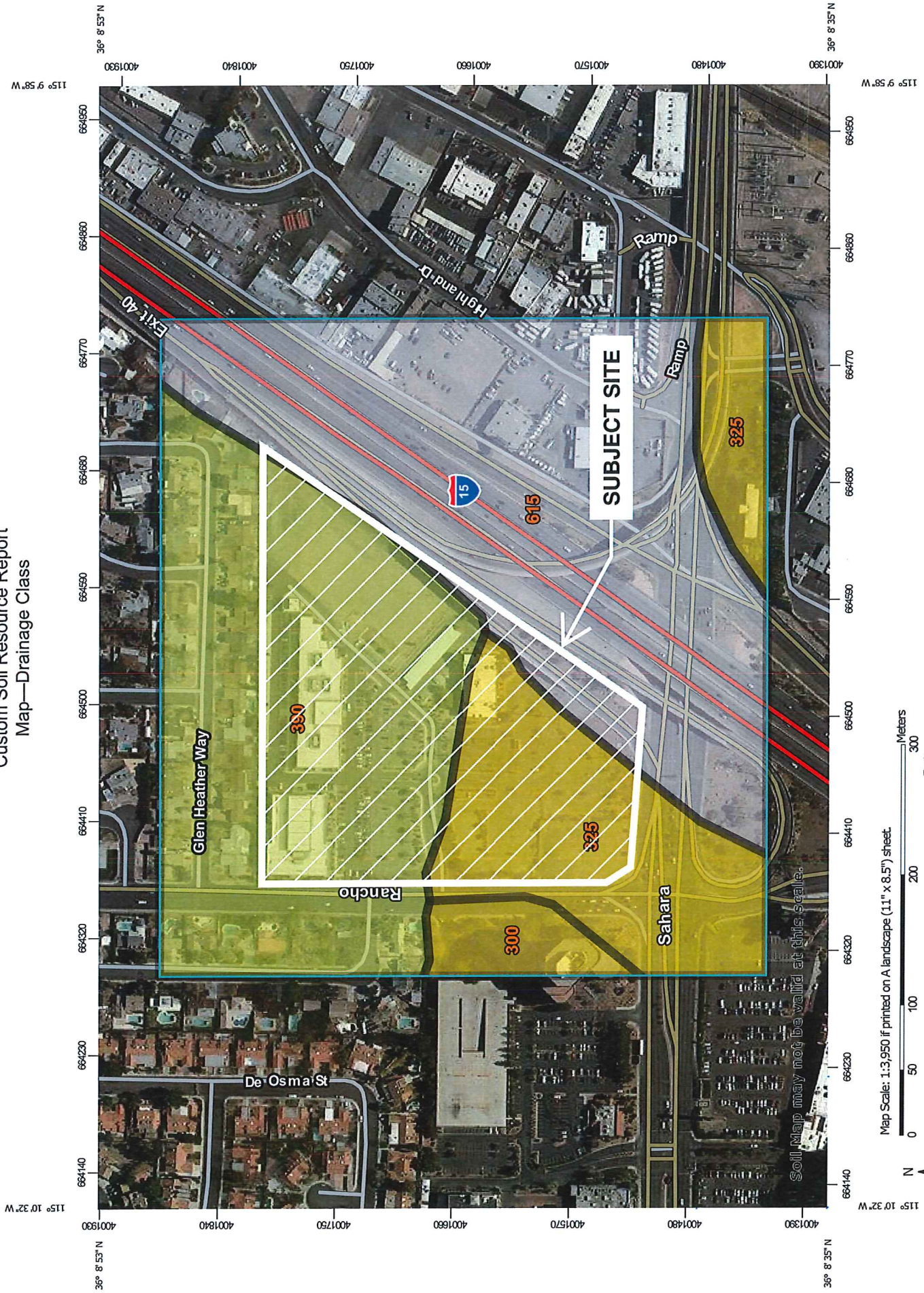
*Tie-break Rule:* Higher

**Drainage Class**

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."



# Custom Soil Resource Report Map—Drainage Class





**Table—Drainage Class**

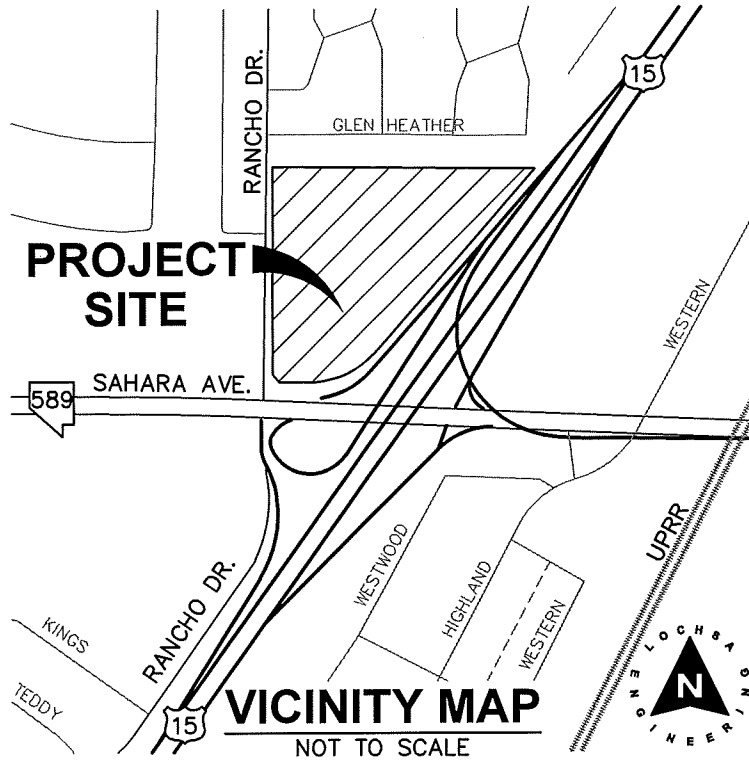
| Map unit symbol                    | Map unit name                                             | Rating                  | Acres in AOI | Percent of AOI |
|------------------------------------|-----------------------------------------------------------|-------------------------|--------------|----------------|
| 300                                | Las Vegas gravelly fine sandy loam, 0 to 2 percent slopes | Well drained            | 1.9          | 3.2%           |
| 325                                | McCarran fine sandy loam, 0 to 4 percent slopes           | Well drained            | 11.3         | 19.4%          |
| 390                                | Spring clay loam                                          | Moderately well drained | 21.1         | 36.1%          |
| 615                                | Urban land                                                |                         | 24.2         | 41.4%          |
| <b>Totals for Area of Interest</b> |                                                           |                         | <b>58.5</b>  | <b>100.0%</b>  |

**Rating Options—Drainage Class**

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher



|                 |                |
|-----------------|----------------|
| DRAWN BY: JGR   | SCALE: NTS     |
| CHECKED BY: HMN | DATE: 10/16/17 |

**Lochsa**  
engineering

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

**VICINITY MAP  
(FIGURE 1)**

**UPDATE TO RETAIL AT  
SAHARA AND RANCHO**

PROJECT No.:

171143

SHEET No.

**V-M**

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







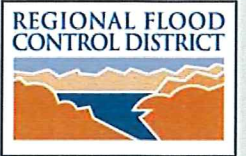


| ID / River Mile | Status | Facility Description                          | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%)** |
|-----------------|--------|-----------------------------------------------|--------------|------------|------------|-------------|-------------------------|---------------------|
| BHSA            |        | BOULDER HIGHWAY SAHARA AVENUE                 |              |            |            |             |                         |                     |
| 0175            | P1     | 14' X 14' RCB                                 | 6000         | 3837       | CSA13      | SW3         | 7.93                    | 0.67                |
| 0289            | P1     | 14' X 12' RCB                                 | 2300         | 3566       | CSA11      | SW3         | 7.55                    | 0.87                |
| 0331            | P1     | 14' X 11' RCB                                 | 2000         | 3232       | CSA10-1    | SW3         | 7.15                    | 1.00                |
| CHRA            |        | WEST CHARLESTON DRAINS - RANCHO               |              |            |            |             |                         |                     |
| 0000            | E      | 6' X 5' RCB                                   | 310          | 286        | CAL95      | SW3         | 0.62                    | 1.92                |
| 0006            | E      | 5' X 5' RCB                                   | 420          | 286        | CAL95      | SW3         | 0.62                    | 1.00                |
| 0014            | E      | 5' X 4' RCB                                   | 600          | 286        | CAL95      | SW3         | 0.62                    | 1.50                |
| FLBN            |        | FLAMINGO - BOULDER HIGHWAY NORTH              |              |            |            |             |                         |                     |
| 0281            | P1     | 10' X 7' RCB                                  | 1300         | 1259       | CCH56      | SW3         | 1.64                    | 1.33                |
| 0312            | P1     | 7' X 4' RCB                                   | 1800         | 555        | CCH52      | SW3         | 0.55                    | 4.20                |
| 0342            | P1     | 7' X 4' RCB                                   | 2500         | 555        | CCH52      | SW3         | 0.55                    | 4.20                |
| FLFA            |        | FLAMINGO - FASHION                            |              |            |            |             |                         |                     |
| 0000            | E      | 12' X 5' RCB                                  | 2050         | 747        | CFW17N     | FLAM3A      | 0.72                    | 0.28                |
| 0037            | E      | 8' X 5' RCB                                   | 3060         | 526        | FW14       | FLAM3A      | 0.44                    | 0.45                |
| FW15            |        | FREEWAY CHANNEL FROM DESERT INN TO EXPRESSWAY |              |            |            |             |                         |                     |
| 0000            | E      | 3: 12' X 10' RCB                              | 2170         | 3728       | CAL93      | SW4         | 10.63                   | 0.17                |
| 0010            | E      | 3: 12' X 10' RCB                              | 677          | 3403       | CAL96      | SW4         | 10.10                   | 0.17                |
| 0038            | E      | 3: 12' X 10' RCB                              | 1945         | 3344       | CCCH22     | SW4         | 9.92                    | 0.17                |
| 0050            | E      | 3: 12' X 10' RCB                              | 870          | 2613       | CCH50      | SW4         | 8.54                    | 0.17                |
| 0089            | E      | 3: 12' X 10' RCB                              | 980          | 2448       | CCWAL2     | SW4         | 8.28                    | 0.17                |
| 0100            | E      | 3: 12' X 9' RCB                               | 1575         | 2295       | COK11C     | SW3         | 7.83                    | 0.17                |
| 0125            | E      | 2: 10' X 8' RCB                               | 1350         | 1450       | DCCSA08    | SW3         | 6.67                    | 0.80                |
| 0150            | E      | 2: 10' X 8' RCB                               | 1067         | 1450       | DCCSA08    | SW3         | 6.67                    | 0.80                |
| 0175            | E      | 2: 10' X 8' RCB                               | 985          | 1450       | DCCSA08    | SW3         | 6.67                    | 0.75                |
| 0214            | P1     | 2: 12' X 10' RCB                              | 1610         | 4104       | CED10-C    | SW3         | 6.25                    | 0.73                |
| 0242            | P1     | 2: 12' X 9' RCB                               | 1500         | 3968       | CCPS08     | SW3         | 6.03                    | 0.93                |
| 0271            | P1     | 2: 12' X 10' RCB                              | 1520         | 3674       | CPS08      | SW3         | 5.59                    | 0.59                |
| 0301            | P1     | Conc Chnl 12'W 4'D 2:1 SS                     | 1300         | 433        | CCE3FD-C   | SW3         | 0.54                    | 0.42                |
| FWCH            |        | WEST CHARLESTON DRAIN                         |              |            |            |             |                         |                     |
| 0000            | E      | 10' X 7' RCB                                  | 1710         | 1008       | CCH22      | SW3         | 1.38                    | 0.74                |
| 0020            | E      | 10' X 7' RCB                                  | 840          | 783        | CCCH18-C   | SW3         | 1.15                    | 0.40                |
| 0036            | E      | 9' X 7' RCB                                   | 425          | 783        | CCCH18-C   | SW3         | 1.15                    | 0.40                |
| 0044            | E      | 9' X 7' RCB                                   | 145          | 538        | CCH18-C    | SW3         | 0.53                    | 0.40                |
| 0047            | E      | 7' X 5' RCB                                   | 710          | 538        | CCH18-C    | SW3         | 0.53                    | 2.05                |
| 0060            | E      | 5' X 4' RCB                                   | 400          | 538        | CCH18-C    | SW3         | 0.53                    | 0.40                |
| FWOK            |        | OAKLEY DRAIN                                  |              |            |            |             |                         |                     |
| 0000            | E      | 10' X 8' RCB                                  | 1350         | 928        | 1COK11C    | SW3         | 1.16                    | 0.62                |
| 0020            | E      | 10' X 8' RCB                                  | 1025         | 928        | 1COK11C    | SW3         | 1.16                    | 0.60                |
| 0040            | E      | 8' X 8' RCB                                   | 960          | 721        | COK10      | SW3         | 0.85                    | 1.00                |
| 0060            | E      | 5' X 5' RCB                                   | 970          | 453        | COK09-C    | SW3         | 0.55                    | 1.50                |
| 0076            | E      | 6' X 6' RCB                                   | 1175         | 453        | COK09-C    | SW3         | 0.55                    | 9.40                |
| 0100            | E      | 6' X 6' RCB                                   | 980          | 453        | COK09-C    | SW3         | 0.55                    | 1.98                |
| FWPS            |        | PALMYRA / SIRIUS DRAIN                        |              |            |            |             |                         |                     |
| 0000            | P1     | 12' X 11' RCB                                 | 3000         | 3240       | CCPS06     | SW3         | 4.88                    | 1.50                |
| 0057            | P1     | 10' X 10' RCB                                 | 5220         | 1941       | CPS06      | SW3         | 2.78                    | 1.28                |
| 0157            | P1     | 2: 66" RCP                                    | 5100         | 521        | CPS03      | SW3         | 0.60                    | 1.15                |
| FWR2            |        | FREEWAY CHANNEL - RAILROAD CHANNEL            |              |            |            |             |                         |                     |
| 0000            | E      | 5' X 5' RCB                                   | 377          |            |            |             |                         | 1.60                |
| 0020            | E      | Earth Chnl 10'W 4'D 2:1 SS                    | 650          |            |            |             |                         | 0.50                |
| FWRR            |        | FREEWAY CHANNEL BYPASS FACILITY RR BRANCH     |              |            |            |             |                         |                     |
| 0000            | E      | 48" RCP                                       | 70           |            |            |             |                         | 1.22                |
| 0010            | E      | Conc Chnl 4'W 4'D 0:1 SS                      | 220          |            |            |             |                         | 1.22                |
| FWSA            |        | FREEWAY CHANNEL - SAHARA                      |              |            |            |             |                         |                     |
| 0000            | P1     | 7' X 5' RCB                                   | 5700         | 486        | CSA08      | SW3         | 0.42                    | 1.49                |
| FWSH            |        | SHADOW LANE DRAIN                             |              |            |            |             |                         |                     |
| 0000            | E      | 7' X 4' RCB                                   | 950          | 253        | CH22-C     | SW3         | 0.23                    | 0.20                |

| ID / River Mile | Status | Facility Description                                    | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%)** |
|-----------------|--------|---------------------------------------------------------|--------------|------------|------------|-------------|-------------------------|---------------------|
| FWUP            |        | FREEWAY CHANNEL BYPASS FACILITY                         |              |            |            |             |                         |                     |
| 0000            | E      | 10' X 9' RCB                                            | 350          | 242        | CH50       | SW3         | 0.26                    | 0.37                |
| 0010            | E      | 10' X 8' RCB                                            | 804          | 242        | CH50       | SW3         | 0.26                    | 0.37                |
| 0059            | E      | 10' X 6' RCB                                            | 2680         | 242        | CH50       | SW3         | 0.26                    | 0.40                |
| 0100            | E      | 8' X 4' RCB                                             | 1440         | 242        | CH50       | SW3         | 0.26                    | 0.47                |
| FWVV            |        | VALLEY VIEW DRAIN                                       |              |            |            |             |                         |                     |
| 0000            | P1     | 12' X 11' RCB                                           | 1320         | 1475       | CCE3FA     | SW3         | 2.67                    | 0.30                |
| 0025            | P1     | 10' X 10' RCB                                           | 2665         | 1006       | CR4C1      | SW3         | 1.74                    | 0.30                |
| 0050            | P1     | 8' X 6' RCB                                             | 7785         | 712        | DFW5       | SW3         | 1.34                    | 1.50                |
| FWWL            |        | FREEWAY CHANNEL-WALDMAN AVENUE                          |              |            |            |             |                         |                     |
| 0000            | E      | 6' X 6' RCB                                             | 1000         | 418        | CWAL2      | SW3         | 0.45                    | 0.20                |
| LCCH            |        | LAS VEGAS CREEK CHANNEL                                 |              |            |            |             |                         |                     |
| 0000            | E      | 2: 12' X 7' RCB                                         | 730          | 2894       | CLC20-C    | MEADOWS4    | 9.68                    | 1.28                |
| 0013            | E      | 2: 12' X 6' RCB                                         | 2035         | 2894       | CLC20-C    | MEADOWS4    | 9.68                    | 0.82                |
| 0051            | E      | 2:14' X 7' RCB                                          | 3113         | 2894       | CLC20-C    | MEADOWS4    | 9.68                    | 0.60                |
| 0110            | E      | Transition Structure                                    | 220          | 2798       | CCLC16-C   | MEADOWS4    | 9.51                    |                     |
| 0114            | E      | 2: 14' X 7' RCB                                         | 670          | 2329       | CRMEDET    | MEADOWS4    | 8.25                    | 0.80                |
| 0127            | E      | Transition Structure                                    | 110          | 2329       | CRMEDET    | MEADOWS4    | 8.25                    |                     |
| 0129            | E      | 2: 14' X 7' RCB                                         | 1130         | 2329       | CRMEDET    | MEADOWS4    | 8.25                    | 0.50                |
| 0150            | E      | 2: 13' X 7' RCB                                         | 200          | 2329       | CRMEDET    | MEADOWS4    | 8.25                    | 0.95                |
| 0154            | E      | Transition Structure                                    | 190          | 2329       | CRMEDET    | MEADOWS4    | 8.25                    |                     |
| 0157            | E      | 2: 12' X 6' RCB                                         | 1650         | 1631       | CCLC14-C   | SW3         | 2.99                    | 1.06                |
| 0230            | E      | 12' X 6' RCB                                            | 2140         | 1381       | CLC14-C    | SW3         | 2.54                    | 1.74                |
| 0270            | E      | 12' X 6' RCB                                            | 1705         | 774        | CCWA02-C   | SW3         | 1.84                    | 0.54                |
| 0302            | E      | 8' X 6' RCB                                             | 3940         | 774        | CCWA02-C   | SW3         | 1.84                    | 2.49                |
| 0377            | E      | 10' X 7' RCB                                            | 1226         | 774        | CCWA02-C   | SW3         | 1.84                    | 0.74                |
| 0400            | E      | Transition Structure                                    | 110          | 437        | CWA02-C    | SW3         | 1.47                    | 0.49                |
| 0402            | E      | 8' X 6' RCB @ Jones                                     | 535          | 437        | CWA02-C    | SW3         | 1.47                    | 0.49                |
| 0412            | E      | 60" RCP                                                 | 1370         | 437        | CWA02-C    | SW3         | 1.47                    | 1.08                |
| 0438            | E      | 60" RCP                                                 | 1090         | 162        | CLC01-C    | SW3         | 1.20                    | 1.60                |
| 0458            | E      | 60" RCP                                                 | 1060         | 162        | CLC01-C    | SW3         | 1.20                    | 1.60                |
| 0478            | E      | 60" RCP                                                 | 1110         | 162        | CLC01-C    | SW3         | 1.20                    | 0.55                |
| LCDE            |        | LAS VEGAS CREEK - DECATUR                               |              |            |            |             |                         |                     |
| 0000            | E      | 6' X 5' RCB                                             | 1800         | 404        | LC11-C     | SW3         | 0.38                    | 1.26                |
| 0034            | E      | 72" RCP                                                 | 700          | 404        | LC11-C     | SW3         | 0.38                    | 0.50                |
| LCJO            |        | LAS VEGAS CREEK - JONES                                 |              |            |            |             |                         |                     |
| 0000            | E      | 6' X 6' RCB                                             | 380          | 358        | AL01B-C    | SW3         | 0.37                    | 0.50                |
| 0007            | E      | 6' X 5' RCB                                             | 675          | 358        | AL01B-C    | SW3         | 0.37                    | 0.62                |
| LCME            |        | LAS VEGAS CREEK - MEADOWS                               |              |            |            |             |                         |                     |
| 0000            | E      | 14' X 8' RCB                                            | 895          | 1423       | MEADOWDB   | SW3SC       | 5.67                    | 0.72                |
| 0016            | E      | Stilling Basin                                          | 140          | 1423       | MEADOWDB   | SW3SC       | 5.67                    | 0.21                |
| 0017            | E      | 3,300 cfs Spillway (Replace w/ LCME0018)                |              | 3300       | MEADOWIN   | SW3SC       | 5.67                    |                     |
| 0018            | P1     | Modify Spillway, raise height by 1' (Replaces LCME0017) |              | 3300       | MEADOWIN   | SW3SC       | 5.67                    |                     |
| 0019            | E      | 1: 11' X 5' RCB and 1: 11.5' X 5' RCB                   | 110          | 1423       | MEADOWDB   | SW3SC       | 5.67                    | 0.81                |
| 0020            | E      | 213 ac-ft Meadows Detention Basin                       |              | 4713       | MEADOWIN   | SW3SC       | 5.67                    |                     |
| 0021            | P1     | Upgrade to 235 ac-ft Meadows Detention Basin            |              | 4713       | MEADOWIN   | SW3SC       | 5.67                    |                     |
| 0026            | E      | Energy Dissipator                                       | 110          | 4713       | MEADOWIN   | SW3SC       | 5.67                    | 2.94                |
| 0028            | E      | Conc Chnl 42'W 9'D 0:1 SS                               | 922          | 4713       | MEADOWIN   | SW3SC       | 5.67                    | 0.40                |
| 0040            | E      | Conc Chnl 40'W 10'D 0:1 SS                              | 525          | 4593       | CAL90-C    | SW3SC       | 5.44                    | 0.40                |
| 0070            | E      | Conc Chnl 40'W 8.5'D 0:1 SS                             | 255          | 4593       | CAL90-C    | SW3SC       | 5.44                    | 0.40                |
| 0076            | E      | Free Span Bridge 18'W 8'D @ Alla                        | 100          | 4441       | CCAL16     | SW3SC       | 5.27                    | 1.89                |
| 0077            | E      | Conc Chnl 18'W 8'D 1:1 SS                               | 618          | 4441       | CCAL16     | SW3SC       | 5.27                    | 1.89                |
| 0085            | E      | 10' X 6' RCB @ Valley View                              | 275          | 1661       | 1CAL16     | SW3         | 2.09                    | 1.89                |
| LCRA            |        | LAS VEGAS CREEK - RANCHO                                |              |            |            |             |                         |                     |
| 0000            | E      | 12' X 8' RCB                                            | 380          | 783        | CLC16-C    | SW3         | 1.71                    | 0.60                |
| 0004            | E      | 12' X 6' RCB                                            | 2367         | 783        | CLC16-C    | SW3         | 1.71                    | 0.77                |
| LVOE            |        | OWENS AVENUE - EAST                                     |              |            |            |             |                         |                     |
| 0345            | P1     | 13' X 11' RCB                                           | 1685         | 2369       | DLVOE      | SW5         | 22.79                   | 0.60                |

| ID / River Mile | Status | Facility Description                      | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%) ** |
|-----------------|--------|-------------------------------------------|--------------|------------|------------|-------------|-------------------------|----------------------|
| LVWH            |        | WASHINGTON AVENUE CHANNEL                 |              |            |            |             |                         |                      |
| 0431            | E      | 3: 14.33' X 10' RCB                       | 665          | 2870       | DCLC21     | SW5         | 22.79                   | 0.15                 |
| 0446            | E      | Junction Structure                        | 69           | 2870       | DCLC21     | SW5         | 22.79                   | 0.15                 |
| 0447            | E      | 3: 14.33' X 10' RCB                       | 1955         | 4978       | CCAL93     | SW5         | 22.19                   | 0.15                 |
| 0484            | E      | Confluence Structure                      | 455          | 4978       | CCAL93     | SW5         | 22.19                   | 0.15                 |
| MEAL            |        | MEADOWS ALTA                              |              |            |            |             |                         |                      |
| 0000            | E      | Conc Chnl 8'W 11'D 1:1 SS                 | 700          | 1207       | CAL13-3    | SW3         | 1.48                    | 1.58                 |
| 0012            | E      | 12' X 6' RCBC @ Red Sky                   | 160          | 1161       | CAL10-C    | SW3         | 1.42                    | 3.03                 |
| 0013            | E      | Conc Chnl 8'W 11'D 1:1 SS                 | 320          | 1161       | CAL10-C    | SW3         | 1.42                    | 3.03                 |
| 0015            | E      | 72" RCP                                   | 2500         | 1126       | CAL11-C    | SW3         | 1.38                    | 1.94                 |
| 0060            | E      | 60" RCP                                   | 905          | 792        | CBR3       | SW3         | 1.08                    | 1.00                 |
| 0100            | E      | 72" RCP                                   | 1160         | 792        | CBR3       | SW3         | 1.08                    | 1.00                 |
| 0120            | E      | 60" RCP                                   | 3500         | 733        | CAL05-C    | SW3         | 1.01                    | 1.00                 |
| 0130            | E      | 6' X 4' RCB                               | 1150         | 186        | AL04-C     | SW3         | 0.18                    | 0.40                 |
| 0150            | E      | 60" RCP                                   | 285          | 499        | CCUS       | SW3         | 0.74                    | 1.40                 |
| 0160            | E      | 36" RCP                                   | 2600         | 331        | CUS        | SW3         | 0.56                    | 1.25                 |
| 0209            | E      | 48" RCP                                   | 2500         | 150        | DCR2       | SW3         | 0.41                    | 1.70                 |
| MECH            |        | EXTENSION OF MEADOWS / CHARLESTON         |              |            |            |             |                         |                      |
| 0059            | E      | 36" RCP                                   | 1310         |            |            |             |                         | 0.25                 |
| 0084            | E      | 30" RCP                                   | 2960         |            |            |             |                         | 1.26                 |
| 0108            | E      | 30" RCP                                   | 8550         | 32         | OAKKEYOT   | SW3         | 1.88                    | 1.43                 |
| 0310            | E      | 24" RCP                                   | 1000         | 32         | OAKKEYOT   | SW3         | 1.88                    | 1.43                 |
| 0323            | E      | 15" RCP Outlet                            | 200          | 32         | OAKKEYDB   | SW3         | 1.88                    |                      |
| 0324            | E      | 201 ac-ft Oakley Detention Basin          |              | 1652       | OAKKEYIN   | SW3         | 1.88                    |                      |
| 0334            | E      | 11' X 6' RCB                              | 200          | 573        | C5-OAK-C   | SW3         | 0.56                    | 0.50                 |
| 0337            | E      | 9' X 6' RCB                               | 520          | 573        | C5-OAK-C   | SW3         | 0.56                    | 0.50                 |
| 0338            | E      | 10' X 8' RCB                              | 2060         | 1131       | C3A-OAKC   | SW3         | 1.32                    | 1.62                 |
| 0351            | E      | 90" RCP                                   | 1350         | 573        | C5-OAK-C   | SW3         | 0.56                    | 0.50                 |
| MECN            |        | MEADOWS - CHARLESTON                      |              |            |            |             |                         |                      |
| 0000            | P1     | 9' X 8' RCB                               | 1570         | 1105       | CCH10      | SW3         | 1.00                    | 1.09                 |
| 0061            | P1     | 8' X 7' RCB                               | 3300         | 1105       | CCH10      | SW3         | 1.00                    | 1.82                 |
| 0123            | P1     | 8' X 6' RCB                               | 5200         | 821        | CCH09-C    | SW3         | 0.72                    | 1.64                 |
| 0223            | P1     | 6' X 5' RCB                               | 2700         | 422        | CCH05-C    | SW3         | 0.34                    | 2.04                 |
| MEOK            |        | OAKY MEADOWS STORMDRAIN                   |              |            |            |             |                         |                      |
| 0000            | E      | 19' X 7' RCB                              | 900          | 2718       | COK13      | SW3SC       | 2.94                    | 0.91                 |
| 0017            | E      | 19' X 8' RCB                              | 1550         | 2718       | COK13      | SW3SC       | 2.94                    | 0.80                 |
| 0048            | E      | 18' X 9' RCB                              | 1700         | 2718       | COK13      | SW3SC       | 2.94                    | 0.50                 |
| 0070            | E      | 7' X 6' RCB                               | 1320         | 226        | CH14B      | SW3         | 0.22                    | 0.44                 |
| 0079            | E      | 18' X 8' RCB                              | 630          | 2450       | COK12      | SW3SC       | 2.62                    | 0.50                 |
| 0091            | E      | 18' X 8' RCB                              | 850          | 2450       | COK12      | SW3SC       | 2.62                    | 0.50                 |
| 0110            | E      | 12' X 8' RCB                              | 2304         | 1491       | COK08      | SW3         | 1.58                    | 0.77                 |
| 0150            | P3     | 12' X 8' RCB                              | 642          | 1491       | COK08      | SW3         | 1.58                    | 0.77                 |
| 0166            | P3     | 12' X 9' RCB                              | 1350         | 1491       | COK08      | SW3         | 1.58                    | 0.45                 |
| 0191            | P3     | 12' X 7' RCB                              | 660          | 957        | COK07      | SW3         | 0.93                    | 0.71                 |
| 0204            | P3     | 12' X 6' RCB                              | 655          | 957        | COK07      | SW3         | 0.93                    | 0.71                 |
| 0217            | P3     | 12' X 5' RCB                              | 1276         | 556        | CSA06      | SW3         | 0.52                    | 0.44                 |
| MEPA            |        | MEADOWS PARALLEL                          |              |            |            |             |                         |                      |
| 0000            | E      | 10' X 6' RCB                              | 1370         | 259        | CCH14A     | SW3         | 0.25                    | 0.50                 |
| 0022            | E      | 6' X 5' RCB                               | 200          | 259        | CCH14A     | SW3         | 0.25                    | 1.45                 |
| 0025            | E      | 78" RCP                                   | 470          | 259        | CCH14A     | SW3         | 0.25                    | 1.16                 |
| PSDE            |        | PALMYRA / SIRIUS DRAIN - DECATUR LATERAL  |              |            |            |             |                         |                      |
| 0000            | P1     | 12' X 8' RCB                              | 1330         | 1018       | CED02      | SW3         | 1.21                    | 0.38                 |
| 0025            | P1     | 10' X 8' RCB                              | 1320         | 598        | CED13      | SW3         | 0.65                    | 0.25                 |
| WAGC            |        | WASHINGTON AVENUE CHANNEL - GRAND CENTRAL |              |            |            |             |                         |                      |
| 0000            | E      | 2: 12' X 4' RCB                           | 700          | 557        | LC21       | SW3         | 0.60                    | 0.20                 |
| 0014            | E      | 1: 12' X 4' RCB and 1: 11' X 4' RCB       | 2440         | 557        | LC21       | SW3         | 0.60                    | 0.20                 |
| 0060            | E      | 12' X 4' RCB                              | 455          | 557        | LC21       | SW3         | 0.60                    | 0.20                 |





2013  
LAS VEGAS VALLEY  
FLOOD CONTROL  
MASTER PLAN UPDATE

**FIGURE F- 31**  
**FLOOD CONTROL FACILITIES**

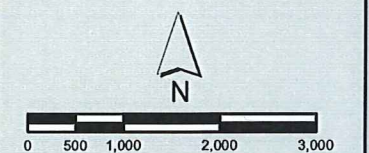
**LEGEND**

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

- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

**Remove & Replace/Parallel Facilities**

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



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

The map displays a grid of numbered locations (1-59) arranged in a roughly rectangular pattern. The locations are numbered as follows:

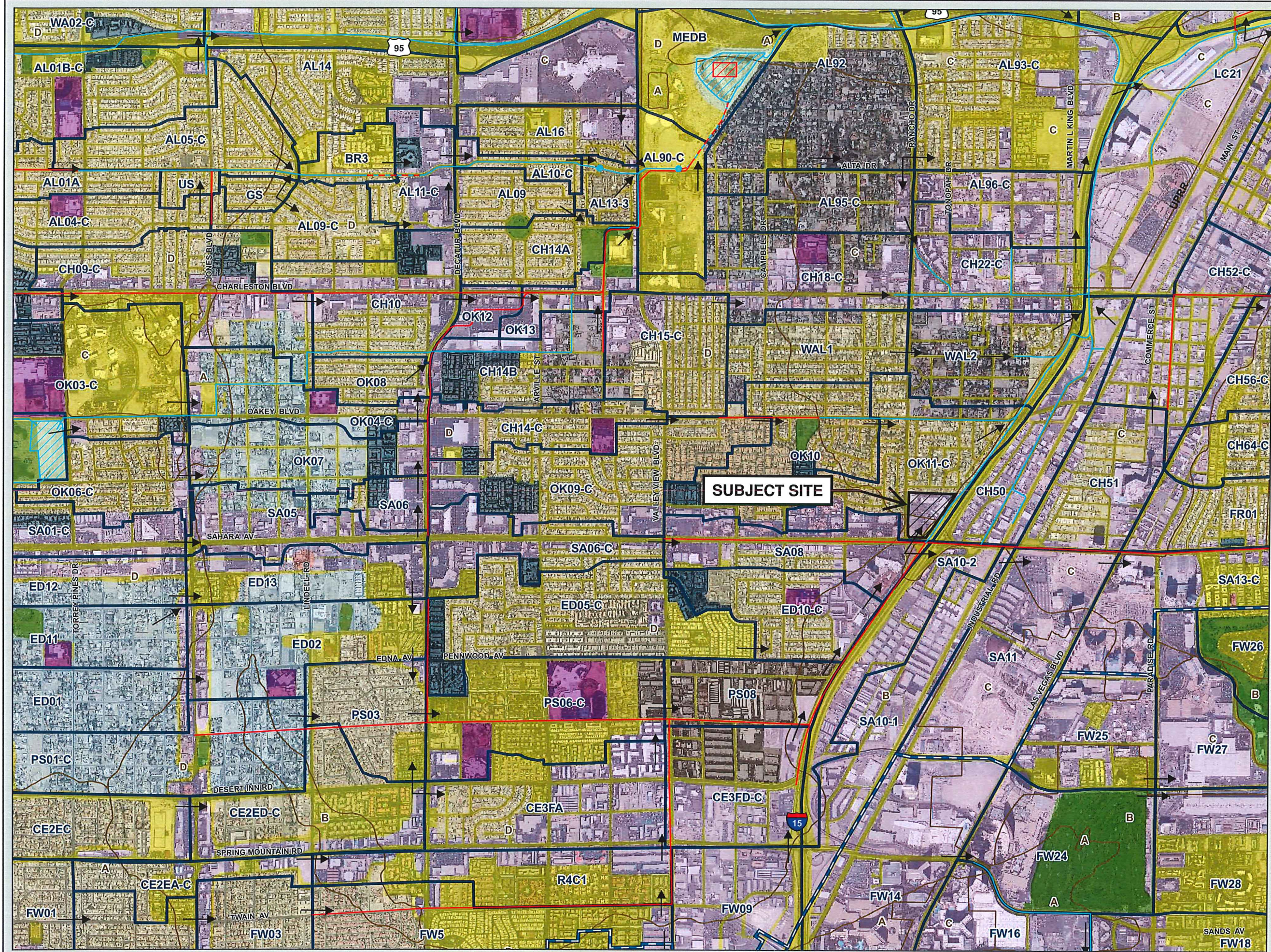
- Row 1: 1, 2, 3
- Row 2: 4, 5, 6
- Row 3: 7, 8, 9, 10
- Row 4: 11, 12, 13, 14, 15, 16, 17
- Row 5: 18, 19, 20, 21, 22, 23
- Row 6: 24, 25, 26, 27, 28
- Row 7: 29, 30, 31, 32, 33, 34
- Row 8: 35, 36, 37, 38, 39, 40
- Row 9: 41, 42, 43, 44, 45, 46
- Row 10: 47, 48, 49, 50, 51, 52
- Row 11: 53, 54, 55,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

Key features and labels include:

- US95:** A blue line running diagonally from the top left towards the bottom right, passing through locations 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58.
- I-15:** A brown line running diagonally from the top right towards the bottom left, passing through locations 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58.
- I-215:** A green line running horizontally across the middle of the grid, passing through locations 24, 25, 26, 27, 28.
- Red Box:** A red box highlights the area around location 32, specifically covering locations 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46.

**SUBJECT SITE**





2008  
LAS VEGAS VALLEY  
FLOOD CONTROL  
MASTER PLAN UPDATE  
**FIGURE H-31**  
**HYDROLOGIC SUMMARY**

**LEGEND**

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

**Flood Control Facilities**

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

**Type Hydrologic Soil Groups**

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

**Typical Land Use**

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

\* Drought Ordinance Applied

Scale: 1 inch = 2,000 feet  
Refer to Figure G-2 for Aerial Source(s)





# **Site Outlet at NEC** **Worksheet for Rectangular Channel**

| Project Description |                     |
|---------------------|---------------------|
| Worksheet           | Site Outlet         |
| Flow Element        | Rectangular Channel |
| Method              | Manning's Formula   |
| Solve For           | Channel Depth       |

| Input Data           |                |
|----------------------|----------------|
| Mannings Coefficient | 0.016          |
| Slope                | 0.012000 ft/ft |
| Bottom Width         | 27.00 ft       |
| Discharge            | 43.00 cfs      |

| Results          |                |
|------------------|----------------|
| Depth            | 0.33 ft        |
| Flow Area        | 9.0 ft²        |
| Wetted Perimeter | 27.66 ft       |
| Top Width        | 27.00 ft       |
| Critical Depth   | 0.43 ft        |
| Critical Slope   | 0.005158 ft/ft |
| Velocity         | 4.80 ft/s      |
| Velocity Head    | 0.36 ft        |
| Specific Energy  | 0.69 ft        |
| Froude Number    | 1.47           |
| Flow Type        | Supercritical  |

42 CFS PER OFFICE PARK STUDY  
 + 1 CFS ADDED PER ORIGINAL STUDY

←  $Q_{100} = 43 \text{ CFS}$

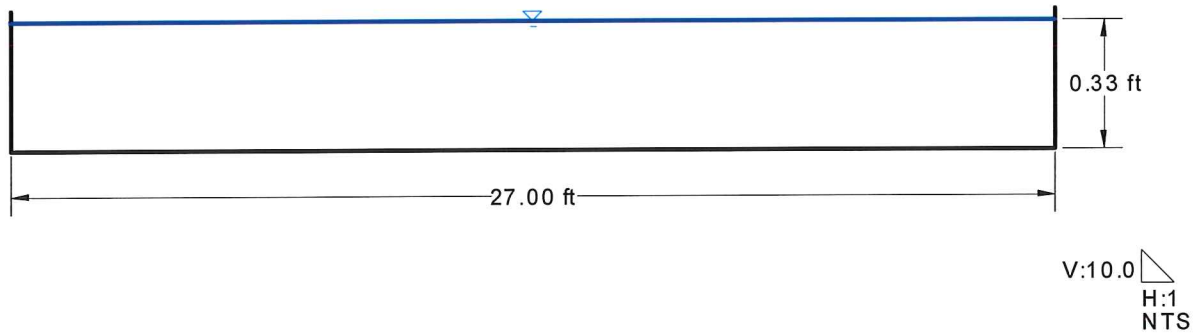
←  $D < 0.5'$



**Site Outlet at NEC**  
**Cross Section for Rectangular Channel**

| Project Description |                     |
|---------------------|---------------------|
| Worksheet           | Site Outlet         |
| Flow Element        | Rectangular Channel |
| Method              | Manning's Formula   |
| Solve For           | Channel Depth       |

| Section Data         |                |
|----------------------|----------------|
| Mannings Coefficient | 0.016          |
| Slope                | 0.012000 ft/ft |
| Depth                | 0.33 ft        |
| Bottom Width         | 27.00 ft       |
| Discharge            | 43.00 cfs      |



## REFERENCE APPENDIX

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REFERENCE 4 – ORIGINAL STUDY

---

*“Technical Drainage Study for Retail at Sahara and Rancho”*  
(DS 4746)

|                                                                            |                                                 |                                                                                                   |
|----------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>CITY OF LAS VEGAS<br/>INTER-OFFICE MEMORANDUM</b>                       |                                                 | <b>DATE:</b><br>October 11, 2016                                                                  |
| <b>TO:</b><br>Land Development Services<br>Department of Building & Safety |                                                 | <b>FROM:</b><br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| <b>SUBJECT:</b>                                                            | Drainage Study for:                             |                                                                                                   |
|                                                                            | <b>Retail @ Sahara &amp; Rancho – Update #2</b> |                                                                                                   |
| <b>Cross Streets:</b>                                                      | NEC of Sahara Avenue & Rancho Drive             |                                                                                                   |
| <b>File Number:</b>                                                        | F:\Depot\DSMemos\DS4746E.doc                    |                                                                                                   |
| <b>Parcel Number:</b>                                                      | 162-04-412-005                                  |                                                                                                   |
| <b>Zoning Action:</b>                                                      | SDR-59931                                       |                                                                                                   |
| <b>FEMA Flood Zone</b>                                                     | YES                                             | NO <b>X</b>                                                                                       |
| <b>Proposed Storm Drain</b>                                                | YES                                             | NO <b>X</b>                                                                                       |
| <b>COPIES TO:</b>                                                          |                                                 |                                                                                                   |
|                                                                            |                                                 | Walker Engineering, LLC                                                                           |
|                                                                            |                                                 | Sahara Rancho Office Center, LLC                                                                  |
|                                                                            |                                                 | Bart Anderson, P.E., DevCo                                                                        |
|                                                                            |                                                 | CCRFCD                                                                                            |
|                                                                            |                                                 | NDOT                                                                                              |

| HISTORY                                   | DATE RECEIVED             | DATE REVIEWED | COMMENTS                   | REVIEW FEES       | FEES PAID<br>Payment Trn # |
|-------------------------------------------|---------------------------|---------------|----------------------------|-------------------|----------------------------|
| 1 <sup>st</sup> Submittal                 | 7/28/2015                 | 8/6/2015      | Not Approved               | \$400.00          | 407748: \$400              |
| 2 <sup>nd</sup> Submittal<br>& Supplement | 9/16/2015 &<br>10/12/2015 | 10/12/2015    | Conditional Approval       | \$400.00          | 414989: \$400              |
| CCRFCD                                    | 11/3/2015                 | 11/9/2015     | Concurrence Recv'd         | N/C               | N/C                        |
| 3 <sup>rd</sup> Submittal                 | 1/20/2016                 | 2/8/2016      | Approved                   | \$100.00          | 429859: \$100              |
| 4 <sup>th</sup> Submittal                 | 9/29/2016                 | 10/11/2016    | See Comments Below         | \$100.00          | 460122: \$100              |
|                                           |                           |               | <b>TOTAL FEES (LDDRS):</b> | <b>\$1,000.00</b> | <b>----</b>                |

**REMARKS:**

**4<sup>th</sup> Submittal: Update #2 for minor onsite grading revision**

**3<sup>rd</sup> Submittal: Update #1 for minor revision to site layout of Building "E"**

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

|          |                                                                                                |
|----------|------------------------------------------------------------------------------------------------|
| <b>X</b> | is approved subject to conformance to all City standards and the following conditions:         |
|          | must be resubmitted or supplemented including the following:                                   |
|          | is conditionally approved subject to Clark County Regional Flood Control District concurrence. |

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

**NOTE:** Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

**END OF REMARKS**

ays

T/R/S: T21S/R61E/04  
AREA R-04



5765 South Rainbow Boulevard  
Suite 101  
Las Vegas, Nevada 89118  
T: 702.873.5197  
F: 702.873.5346  
[www.walker-eng.com](http://www.walker-eng.com)

---

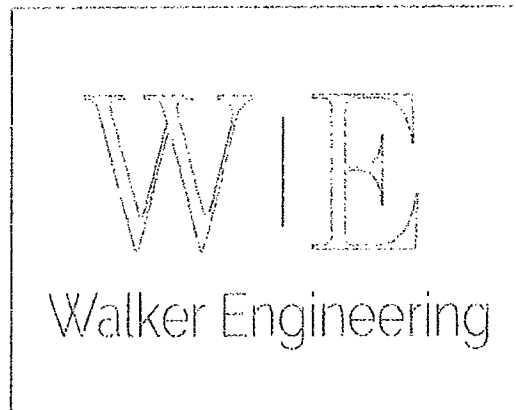
## **WALKER ENGINEERING, LLC**

*TECHNICAL DRAINAGE STUDY*  
*for*

**RETAIL @ SAHARA & RANCHO**

**APN: 162-04-412-005**

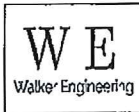
**City of Las Vegas, Nevada**



***Prepared for:***  
**AFFORDABLE CONCEPTS, INC.**  
2975 W. Lake Mead Blvd.  
North Las Vegas, NV 89032

**Date Prepared:**  
July 28, 2015

---



WALKER ENGINEERING, LLC  
5765 South Rainbow Boulevard  
Suite 101  
Las Vegas, Nevada 89118  
T: 702.873.5197  
F: 702.873.5346

**Table 1**  
**EXISTING CONDITION BASIN FLOWS**

| BASIN                             | BASIN AREA<br>(ACRES)                  | 10-YEAR FLOW<br>(CFS) | 100-YEAR FLOW<br>(CFS) |
|-----------------------------------|----------------------------------------|-----------------------|------------------------|
| OFF1                              | 0.83                                   | 2                     | 3                      |
| EON1                              | 1.86                                   | 3                     | 6                      |
| EON2                              | 0.82                                   | 1                     | 2                      |
| REMAINING OF PR-5<br>(NOT A PART) | 2.02                                   | 3                     | 6                      |
| TOTAL                             | EON1+REMAINING OF<br>PR-5 (NOT A PART) | 6                     | 12                     |

See **Appendix F** for **Figure EX-1, Existing Condition Basin Map**. A copy of the Existing Condition HEC-1 is included in **Appendix B**.

## **PROPOSED CONDITION FLOWS**

### ***Off-site Flows***

The off-site drainage patterns discussed previously remain valid during the proposed condition, as the tributary areas are developed and do not change upon the development of the site.

### ***On-site Flows***

Due to the site plan, area at the SWC of the site is now conveyed northeast and therefore the project site is delineated as one (1) basin; see **Figure PR-1, Proposed Condition Basin Map** in **Appendix F**. **PRON1** (approximately **2.68 acres**) generates **3/7 cfs** during the 10 and 100-year storm events, respectively, and drains from the west to the east. These flows combine with the runoff generated by the remaining portion of *Office Park Study's* basin PR-5, resulting in a total of **6/13 cfs**; ultimately these flows outlet at the NEC of the site into an existing swale within the I-15 right-of-way consistent with the general drainage pattern established by the *Office Park Study*. The total flows are an increase of **1 cfs** during the major storm event only from existing to proposed conditions which is negligible; therefore, **the proposed development does not adversely impact the existing downstream Sahara/Rancho Office development or drainage facilities**. This was also verified by analyzing an existing cross section taken





WALKER ENGINEERING, LLC  
5765 South Rainbow Boulevard  
Suite 101  
Las Vegas, Nevada 89118  
T: 702.873.5197  
F: 702.873.5346

along the east side of existing building #4 of the Sahara/Rancho Office center and is discussed further in the next section.

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

**Table 2**  
**PROPOSED CONDITION BASIN FLOWS**

| BASIN                             | BASIN AREA<br>(ACRES)                  | 10-YEAR FLOW<br>(CFS) | 100-YEAR FLOW<br>(CFS) |
|-----------------------------------|----------------------------------------|-----------------------|------------------------|
| OFF1                              | 0.83                                   | 2                     | 3                      |
| PRON1                             | 2.68                                   | 3                     | 7                      |
| REMAINING OF PR-5<br>(NOT A PART) | 2.02                                   | 3                     | 6                      |
| TOTAL                             | EON1+REMAINING OF<br>PR-5 (NOT A PART) | 6                     | 13                     |

See **Appendix F** for **Figure PR-1**, *Proposed Condition Basin Map*. A copy of the Proposed Condition HEC-1 is included in **Appendix B**.

## **HYDRAULIC CALCULATIONS**

**There are no off-site improvements proposed with the development of this multi-building commercial retail center.** Both Sahara Avenue and Rancho Drive are fully improved with asphalt pavement, curb, gutter, and sidewalk which are to remain upon development of the site.

The hydraulic cross sections presented in this report are for the purpose of ensuring that the proposed building are adequately protected from onsite and offsite peak flows. All street calculations and cross section analyses can be found in **Appendix C** for reference. See **Figure PR-1** in **Appendix F** for the locations of the cross sections.

The following table displays the existing and proposed flow conditions for onsite conveyance systems, Rancho Drive and Sahara Avenue:



## **PARKING LOT LOW IMPACT DEVELOPMENT (LID)**

Per Section 1502.2 of the CCRFCD *"Hydrologic Criteria and Drainage Design Manual"*, this project is categorized as a Large Parking Lot since the size of the site is approximately 2.68 acres.

For large parking lot category, treatment BMPs are required to treat stormwater runoff from at least 75 percent of the parking lot. BMPs are sized for the 85<sup>th</sup> Percentile Rainfall. Excerpts from Section 1500 of the CCRFCD *"Hydrologic Criteria and Drainage Design Manual"* appropriate for this report are included in **Appendix D** of this report for reference.

**Two BMPs are incorporated into the project design: disconnected impervious areas and landscaped swales.** The parking lot sub-areas are shown on **Figure LID, Parking Lot LID Exhibit**, included in **Appendix F**. Due to site design and grading constraints, the three (3) sub-areas, drainage area "A", drainage area "B", and drainage area "C", consists of approximately **0.15 acres**, **0.95 acres**, and **0.16 acres**, respectively. Runoff from drainage area "A" drains to **Swale #1**, which is located within the landscaped parking finger northeast of proposed Building D; **Swale #1** is approximately **8-inches deep, 43-feet long, and slopes at 0.40 percent**. Similarly, runoff from drainage area "B" drains to **Swale #2**, which is located within the landscaped parking island that traverses the middle of the proposed parking lot; **Swale #2** is approximately **8-inches deep, 109-feet long, and slopes at 0.60 percent**. Runoff from drainage area "C" drains to **Swale #3**, which is located within the landscaped parking island just south of the proposed Building E; **Swale #3** is approximately **8-inches deep, 86-feet long, and slopes at 0.40 percent**. These landscape swales are **rock-lined (d50=3 inches, thickness=6 inches)** and based on hydraulic analyses, they will convey, contain, and treat the peak BMP discharge (QBMP).

The proposed treatment BMPs are adequately sized to treat 75 percent of the parking lot area (1.19 acres) in accordance with Section 1502 of the CCRFCD HCDDM. The proposed BMPs are shown on the Grading Plan in **Appendix F** and calculations to determine the QBMP as well as the hydraulic analyses of the swales are included in **Appendix D**.





WALKER ENGINEERING, LLC  
5765 South Rainbow Boulevard  
Suite 101  
Las Vegas, Nevada 89118  
T: 702.873.5197  
F: 702.873.5346

**Table 5**  
**PARKING LOT DATA**

| PARKING LOT DATA                     | ACREAGE |
|--------------------------------------|---------|
| PROPERTY SIZE (PS)                   | 2.68    |
| BUILDING AREA (BA)                   | 0.43    |
| TOTAL PERVIOUS AREA (TPA)            | 0.67    |
| PARKING LOT AREA (PLA)=PS-BA-TPA     | 1.58    |
| MIN. PLA TO BE TREATED=(MIN. X 0.75) | 1.19    |
| TOTAL AREA TREATED BY PROP. BMPS     | 1.26    |

### **FINISHED FLOOR ELEVATION**

The Clark County Regional Flood Control District requirement for the finished floor elevation (FFE) is that it must be 18 inches above the centerline grade of the adjacent street or be elevated to twice the depth of flow up to 18-inches above the water surface elevation (WSE). The proposed finished floor elevations for Building D is **2078.00 feet** and meets the twice the depth of flow up to 18-inches requirement along Rancho and is therefore adequately flood protected. At the location of Building E, Rancho Drive is at a higher elevation than the site in existing conditions. As a result, the proposed finished floor elevation for Building E (**2075.00 feet**) does not meet the minimum criteria. However, there is an existing 2-foot max high retaining wall constructed by the *Office Park Study* that will remain along the west side of Building E. Additionally, the 100-year peak flow remains below the existing top of curb elevation and is therefore contained in Rancho Drive. Building's D and E are also adequately protected from onsite peak flows. Please refer to the Grading Plan in **Appendix F** for reference.

### **CONCLUSIONS AND RECOMMENDATIONS**

1. This project is in compliance with the applicable drainage laws recognized by the State of Nevada.
2. This project is in compliance with the CCRFCD's "*Master Plan Update*", and will **not** conflict with any Master Planned Facilities.
3. This project is in compliance with the CCRFCD's "*Hydrologic Criteria and Drainage Design Manual*", with the exceptions noted in the study.
4. This project lies within FEMA unshaded Zone "X."

## HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL - STANDARD FORM 4

Development: RETAIL @ SAHARA & RANCHO  
Calculated by: CAJO  
Checked by: DY  
Date: 7/7/2015

[illegible]



```

1*****
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*
* JUN 1998
*
* VERSION 4.1
*
* RUN DATE 11JUL15 TIME 13:45:27
*
*****
*****

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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 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 -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1

## HEC-1 INPUT

PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID *****
2 ID *****
3 ID * HYDROLOGIC ANALYSIS *
4 ID * FOR *
5 ID * RETAIL DEVELOPMENT @ *
6 ID * SAHARA & RANCHO *
7 ID * PROPOSED CONDITIONS *
8 ID *****
9 ID *****
10 ID *****
11 ID * 10 & 100 YEAR *
12 ID * STORM EVENT *
13 ID *****
14 ID *****
15 IT 5 0 0 300
16 IO 5 0
17 IN 5
18 JR PREC 0.57 1.00
19 KK PRON1
20 KM ON-SITE BASIN PRON1
21 BA .00419
22 PB 2.77
23 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
24 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
25 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
26 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
27 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
28 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
29 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
30 PC .998 .999 1.00
31 LS 0 92
32 UD .0879
*
33 KK OFF1
34 KM OFF-SITE BASIN OFF1
35 BA .00130
36 LS 0 98
37 UD .0500
*
38 ZZ

```

1

## SCHEMATIC DIAGRAM OF STREAM NETWORK

```

INPUT LINE (V) ROUTING (----->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
19 PRON1
33 OFF1

```

(\*\*\*) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*****

```

PR1347.OUT

\*  
\* FLOOD HYDROGRAPH PACKAGE (HEC-1) \*  
\* JUN 1998 \*  
\* VERSION 4.1 \*  
\*  
\* RUN DATE 11JUL15 TIME 13:45:27 \*  
\*  
\*\*\*\*\*  
\*\*\*\*\*

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

\*\*\*\*\*  
\* HYDROLOGIC ANALYSIS \*  
\* FOR \*  
\* RETAIL DEVELOPMENT @ \*  
\* SAHARA & RANCHO \*  
\* PROPOSED CONDITIONS \*  
\*\*\*\*\*  
\*\*\*\*\*  
\* 10 & 100 YEAR \*  
\* STORM EVENT \*  
\*\*\*\*\*

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

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

COMPUTATION INTERVAL .08 HOURS  
TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION  
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION  
RATIOS OF PRECIPITATION  
.57 1.00

1

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

| OPERATION          | STATION | AREA | PLAN           | RATIOS APPLIED TO PRECIPITATION |                 |
|--------------------|---------|------|----------------|---------------------------------|-----------------|
|                    |         |      |                | RATIO 1<br>.57                  | RATIO 2<br>1.00 |
| HYDROGRAPH AT<br>+ | PRON1   | .00  | 1 FLOW<br>TIME | 3.<br>3.50                      | 7.<br>3.50      |
| HYDROGRAPH AT<br>+ | OFF1    | .00  | 1 FLOW<br>TIME | 2.<br>3.50                      | 3.<br>3.50      |

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

← Q100 1 CFS GREATER  
THAN IN OFFICE PARK STUDY



## Cross Section for HS-3 ONSITE U/S 100YR

### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

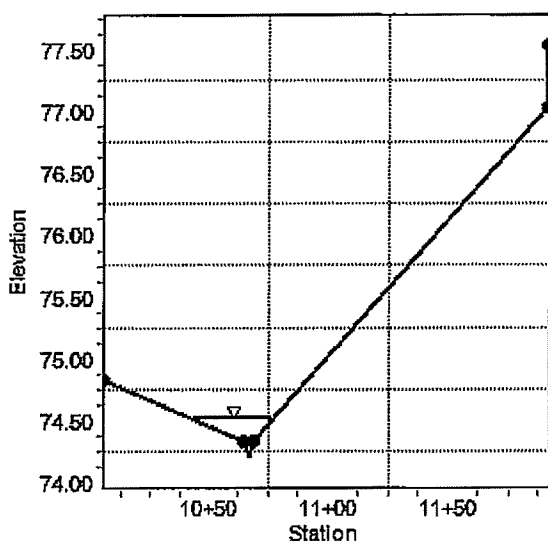
### Input Data

Channel Slope                                              0.00910    ft/ft  
Normal Depth                                              0.31       ft  
Discharge                                                  7.00       ft<sup>3</sup>/s

*\* CONSERVATIVELY*

### Cross Section Image

*ANALYZED W/ ENTIRE PROPRI*



### FTE CHECK

FL @ THIS LOCATION = 74.23

$2 \times D = (2)(0.31) = 0.62$  ← *CONTROLS*

$D + 18" = 0.31 + 1.5 = 1.81$

$FL + 2D = 74.23 + 0.62 = 74.85$

FTE OF PROP BLDG D = 78.00

BLDG E = 75.00

SINCE 75' & 78' > 74.85',  
PROP BLDG'S D & E ARE  
PROTECTED

## Worksheet for HS-3 ONSITE U/S 100YR

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.00910    ft/ft  
Discharge                                                      7.00    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 10+05.00     | 74.83          |
| 10+05.50     | 74.83          |
| 10+64.50     | 74.33          |
| 10+66.50     | 74.20          |
| 10+68.50     | 74.33          |
| 11+91.50     | 77.03          |
| 11+91.50     | 77.53          |

### Roughness Segment Definitions

| Start Station     | Ending Station    | Roughness Coefficient |
|-------------------|-------------------|-----------------------|
| (10+05.00, 74.83) | (10+64.50, 74.33) | 0.017                 |
| (10+64.50, 74.33) | (10+68.50, 74.33) | 0.013                 |
| (10+68.50, 74.33) | (11+91.50, 77.03) | 0.017                 |
| (11+91.50, 77.03) | (11+91.50, 77.53) | 0.013                 |

### Options

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

### Results

Normal Depth                                              0.31    ft  
Elevation Range                                              74.20 to 77.53 ft  
Flow Area                                                      3.60    ft<sup>2</sup>



## Worksheet for HS-3 ONSITE U/S 100YR

### Results

|                  |               |       |
|------------------|---------------|-------|
| Wetted Perimeter | 33.31         | ft    |
| Hydraulic Radius | 0.11          | ft    |
| Top Width        | 33.30         | ft    |
| Normal Depth     | 0.31          | ft    |
| Critical Depth   | 0.31          | ft    |
| Critical Slope   | 0.00836       | ft/ft |
| Velocity         | 1.94          | ft/s  |
| Velocity Head    | 0.06          | ft    |
| Specific Energy  | 0.37          | ft    |
| Froude Number    | 1.04          |       |
| Flow Type        | Supercritical |       |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.31     | ft    |
| Critical Depth      | 0.31     | ft    |
| Channel Slope       | 0.00910  | ft/ft |
| Critical Slope      | 0.00836  | ft/ft |

## Cross Section for HS-4 ONSITE D/S 100YR

### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope

0.00400 ft/ft

Normal Depth

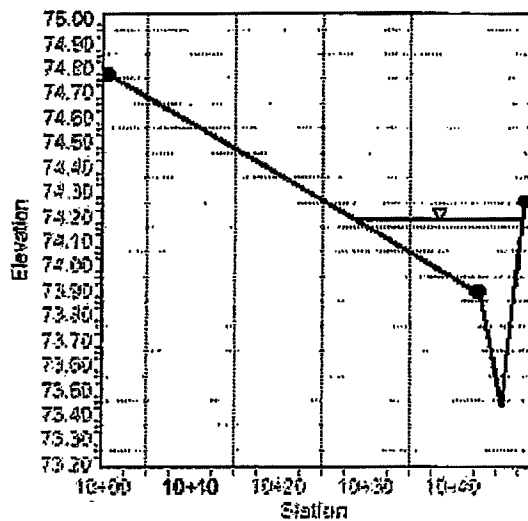
0.75 ft

Discharge

7.00 ft<sup>3</sup>/s

*\* CONSERVATIVELY  
ANALYZED W/ ENTIRE PROJ*

### Cross Section Image



### FFE CHECK

FL @ THIS LOCATION: 73.32

$2 * D = (2)(0.75) = 1.5$

$D + 1.8' = (0.75) + 1.5 = 2.25$

$FL + 2D = 73.32 + 1.5 = 74.82$

FFE OF BLDG E = 75

SINCE  $75.00' > 74.82$ ,

BLDG E. IS PROTECTED



### Project Description

### Manning Formula

### Normal Depth

## 0.00400 ft/ft

7.00 ft<sup>3</sup>/s

## Elevation (ft)

|          |       |
|----------|-------|
| 10+00.00 | 74.77 |
| 10+00.50 | 74.77 |
| 10+42.50 | 73.89 |
| 10+43.00 | 73.89 |
| 10+45.50 | 73.43 |
| 10+48.00 | 74.26 |
| 10+48.50 | 74.26 |

### Roughness Coefficient

|                   |                   |       |
|-------------------|-------------------|-------|
| (10+00.00, 74.77) | (10+00.50, 74.77) | 0.013 |
| (10+00.50, 74.77) | (10+42.50, 73.89) | 0.017 |
| (10+42.50, 73.89) | (10+43.00, 73.89) | 0.013 |
| (10+43.00, 73.89) | (10+48.00, 74.26) | 0.031 |
| (10+48.00, 74.26) | (10+48.50, 74.26) | 0.013 |

### Pavlovski's Method

### Pavlovski's Method

### Pavlovski's Method

## 0.75 ft

73.43 to 74.77 ft

---

## Worksheet for HS-4 ONSITE D/S 100YR

---

### Results

|                  |             |       |
|------------------|-------------|-------|
| Flow Area        | 4.32        | ft²   |
| Wetted Perimeter | 19.33       | ft    |
| Hydraulic Radius | 0.22        | ft    |
| Top Width        | 19.16       | ft    |
| Normal Depth     | 0.75        | ft    |
| Critical Depth   | 0.66        | ft    |
| Critical Slope   | 0.01170     | ft/ft |
| Velocity         | 1.62        | ft/s  |
| Velocity Head    | 0.04        | ft    |
| Specific Energy  | 0.79        | ft    |
| Froude Number    | 0.60        |       |
| Flow Type        | Subcritical |       |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.75     | ft    |
| Critical Depth      | 0.66     | ft    |
| Channel Slope       | 0.00400  | ft/ft |
| Critical Slope      | 0.01170  | ft/ft |



## **APPENDIX D – PARKING LOT LID CALCULATIONS**

- QBMP Calculations
- Landscape Swale Calculations
- Reference Information from Section 1502 of the CCRFCD HCDDM, Revised 2013
- Disconnected Impervious Areas and Landscape Swale Information from Section 1503 of the CCRFCD HCDDM, Revised 2013

PROJECT NAME: RETAIL @ SAHARA & RANCHO  
 CALC'D BY: JO CHECKED BY: DY  
 DATE: 7/11/15 WE No. 1347.00

# PARKING LOT DATA CALCULATIONS

Note: Stormwater Quality Design Volume calculated using steps from Section 1500 Figures 1501-1503 of the CCRFCD HCDDM, Revised 2013

GIVEN:

|                                             |                               |         |       |
|---------------------------------------------|-------------------------------|---------|-------|
| Project Description:                        | COMMERCIAL-RETAIL DEVELOPMENT |         |       |
| Parking Lot Data                            |                               | Acreage |       |
| Property Size (PS)                          | =                             | 2.68    |       |
| Building Area (BA)                          | =                             | 0.43    |       |
| Total Pervious Area (TPA)                   | =                             | 0.67    |       |
| Parking Lot Area (PLA) = (PS - BA - TPA)    | =                             | 1.58    |       |
| Minimum PLA to be treated = (PLA * 0.75)    | =                             | 1.19    | acres |
| Area to be treated by the proposed LID BMPs |                               |         |       |
| Drainage Area "A"                           | =                             | 0.15    |       |
| Drainage Area "B"                           | =                             | 0.95    |       |
| Drainage Area "B"                           | =                             | 0.16    |       |
| Total                                       | =                             | 1.26    | acres |

Since 1.26 ac >= 1.19 ac then site satisfies Parking Lot LID criteria



PROJECT NAME: **RETAIL @ SAHARA & RANCHO**  
 CALC'D BY: **JO** CHECKED BY: **DY**  
 DATE: **7/11/15** WE No. **1347.00**

**PARKING LOT LID CALCULATIONS - Peak QBMP FOR DRAINAGE AREA "A"**

Note: Stormwater Quality Design Volume calculated using steps from Section 1502.3 of the CCRFCD HCDDM, Revised 2013

**GIVEN:**

Project Description: **COMMERCIAL-RETAIL DEVELOPMENT**  
 Drainage Area = **0.15** acres  
 Avg % Impervious = **88** %

**Determine BMP Design Precipitation - 85th Percentile Rainfall Depth**

Is site located within McCarran Airport Rainfall Area? (Yes/No?) **YES**  
 If yes, use Table 505 to obtain 2-year 6-hour rainfall depth; this is your D2  
 If no, use Figure 501 to obtain 2-year 6-hour rainfall depth; this is your D2

D2 = **0.72**

Compute ratio of D2 of site to D2 for the McCarran Area

$D2_{site}/D2_{McCarran}$  = **1**

Compute 85th Percentile Rainfall depth  $D_{85}$  using following equation

$D_{85}$  =  $0.32 * D2_{site}/D2_{McCarran}$   
 = **0.32**

**Calculate BMP Design Peak Discharge, QBMP**

Use the following regression equation to calculate the unit discharge ( $Qp/A$ ) for the 90 percent average percent impervious area condition based on  $D_{85}$  value

$$Y = 1.5042X - 0.0066$$

where, Y = Average  $Qp/A$  in cfs/ac  
 X =  $D_{85}$  in inches  
 $Qp/A$  = **0.47** cfs/ac

Adjust the  $Qp/A$  for site based on actual percent impervious using the following regression equation

$$Y = 0.0059X + 0.4688$$

where, Y = Ratio  $Qp/A$  to 90% Impervious Value (unitless)  
 X = Percent Impervious  
 Y = **0.99**  
 $Qp/A$  (adjusted) = **0.47** cfs/ac

QBMP =  $Qp/A$  (adjusted) \* Area  
 = **0.07** cfs

PROJECT NAME: RETAIL @ SAHARA & RANCHO  
 CALC'D BY: JO CHECKED BY: DY  
 DATE: 7/11/15 WE No. 1347.00

**PARKING LOT LID CALCULATIONS - Peak QBMP FOR DRAINAGE AREA "B"**

Note: Stormwater Quality Design Volume calculated using steps from Section 1502.3 of the CCRFCD HCDDM, Revised 2013

GIVEN:

Project Description: COMMERCIAL-RETAIL DEVELOPMENT  
 Drainage Area = 0.95 acres  
 Avg % Impervious = 92 %

Determine BMP Design Precipitation - 85th Percentile Rainfall Depth

Is site located within McCarran Airport Rainfall Area? (Yes/No?) YES  
 If yes, use Table 505 to obtain 2-year 6-hour rainfall depth; this is your D2  
 If no, use Figure 501 to obtain 2-year 6-hour rainfall depth; this is your D2

D2 = 0.72

Compute ratio of D2 of site to D2 for the McCarran Area

$D2_{site}/D2_{McCarran}$  = 1

Compute 85th Percentile Rainfall depth  $D_{85}$  using following equation

$D_{85}$  =  $0.32 * D2_{site}/D2_{McCarran}$   
 = 0.32

Calculate BMP Design Peak Discharge, QBMP

Use the following regression equation to calculate the unit discharge ( $Qp/A$ ) for the 90 percent average percent impervious area condition based on  $D_{85}$  value

$$Y = 1.5042X - 0.0066$$

where, Y = Average  $Qp/A$  in cfs/ac

X =  $D_{85}$  in inches

$Qp/A$  = 0.47 cfs/ac

Adjust the  $Qp/A$  for site based on actual percent impervious using the following regression equation

$$Y = 0.0059X + 0.4688$$

where, Y = Ratio  $Qp/A$  to 90% Impervious Value (unitless)

X = Percent Impervious

Y = 1.01

$Qp/A$  (adjusted) = 0.48 cfs/ac

QBMP =  $Qp/A$  (adjusted) \* Area

= 0.46 cfs



PROJECT NAME: RETAIL @ SAHARA & RANCHO  
 CALC'D BY: JO CHECKED BY: DY  
 DATE: 7/11/15 WE No. 1347.00

**PARKING LOT LID CALCULATIONS - Peak QBMP FOR DRAINAGE AREA "C"**

Note: Stormwater Quality Design Volume calculated using steps from Section 1502.3 of the CCRFCD HCDDM, Revised 2013

**GIVEN:**

Project Description: COMMERCIAL-RETAIL DEVELOPMENT  
 Drainage Area = 0.16 acres  
 Avg % Impervious = 87 %

**Determine BMP Design Precipitation - 85th Percentile Rainfall Depth**

Is site located within McCarran Airport Rainfall Area? (Yes/No?) YES  
 If yes, use Table 505 to obtain 2-year 6-hour rainfall depth; this is your D2  
 If no, use Figure 501 to obtain 2-year 6-hour rainfall depth; this is your D2  
 D2 = 0.72

Compute ratio of D2 of site to D2 for the McCarran Area

$$D2_{site}/D2_{McCarran} = \underline{1}$$

Compute 85th Percentile Rainfall depth  $D_{85}$  using following equation

$$D_{85} = 0.32 * D2_{site}/D2_{McCarran}$$

$$= \underline{0.32}$$

**Calculate BMP Design Peak Discharge, QBMP**

Use the following regression equation to calculate the unit discharge ( $Q_p/A$ ) for the 90 percent average percent impervious area condition based on  $D_{85}$  value

$$Y = 1.5042X - 0.0066$$

where, Y = Average  $Q_p/A$  in cfs/ac  
 X =  $D_{85}$  in inches  
 $Q_p/A = 0.47$  cfs/ac

Adjust the  $Q_p/A$  for site based on actual percent impervious using the following regression equation

$$Y = 0.0059X + 0.4688$$

where, Y = Ratio  $Q_p/A$  to 90% Impervious Value (unitless)  
 X = Percent Impervious  
 Y = 0.98  
 $Q_p/A$  (adjusted) = 0.47 cfs/ac

$$QBMP = Q_p/A \text{ (adjusted)} * \text{Area}$$

$$= \underline{0.07 \text{ cfs}}$$

## Cross Section for LS SWALE #1 FOR DMA "A" -QBMP

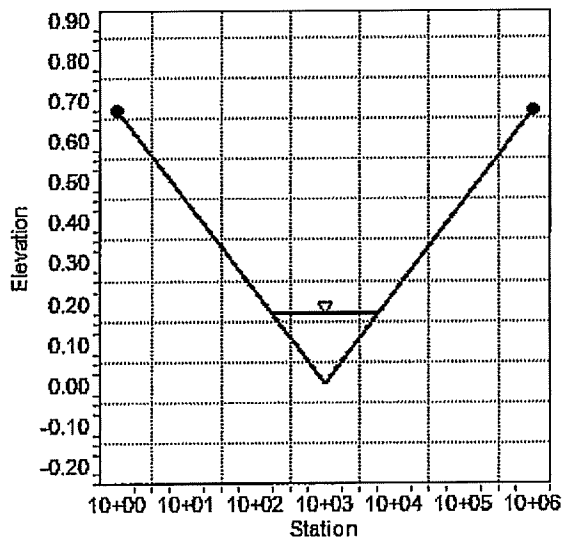
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope                                              0.00400    ft/ft  
Normal Depth                                              0.17       ft  
Discharge                                                    0.07       ft<sup>3</sup>/s

### Cross Section Image



## Worksheet for LS SWALE #1 FOR DMA "A" -QBMP

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                              0.00400    ft/ft  
Discharge                                  0.07    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 10+00.00     | 0.67           |
| 10+03.00     | 0.00           |
| 10+06.00     | 0.67           |

### Roughness Segment Definitions

| Start Station    | Ending Station   | Roughness Coefficient |
|------------------|------------------|-----------------------|
| (10+00.00, 0.67) | (10+06.00, 0.67) | 0.031                 |

### Options

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

### Results

Normal Depth                              0.17    ft  
Elevation Range                              0.00 to 0.67 ft  
Flow Area                                      0.12    ft<sup>2</sup>  
Wetted Perimeter                              1.52    ft  
Hydraulic Radius                              0.08    ft  
Top Width                                      1.49    ft  
Normal Depth                                      0.17    ft  
Critical Depth                                      0.11    ft  
Critical Slope                                      0.03821    ft/ft  
Velocity                                          0.57    ft/s



## Worksheet for LS SWALE #1 FOR DMA "A" -QBMP

### Results

|                 |             |    |
|-----------------|-------------|----|
| Velocity Head   | 0.01        | ft |
| Specific Energy | 0.17        | ft |
| Froude Number   | 0.35        |    |
| Flow Type       | Subcritical |    |

### GVF Input Data

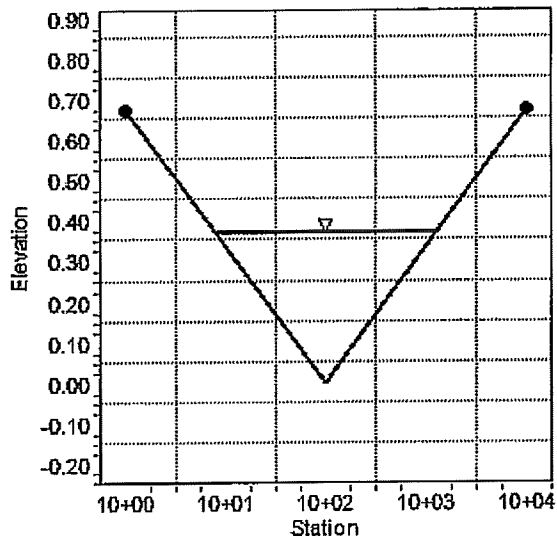
|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.17     | ft    |
| Critical Depth      | 0.11     | ft    |
| Channel Slope       | 0.00400  | ft/ft |
| Critical Slope      | 0.03821  | ft/ft |

## Project Description

Normal Depth

0.46 ft<sup>3</sup>/s

## Worksheet for LS SWALE #2 FOR DMA "B" -QBMP

### Project Description

Friction Method                      Manning Formula

Solve For                              Normal Depth

### Input Data

Channel Slope                              0.00600    ft/ft

Discharge                                  0.46    ft<sup>3</sup>/s

### Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 10+00.00     | 0.67           |
| 10+02.00     | 0.00           |
| 10+04.00     | 0.67           |

### Roughness Segment Definitions

| Start Station    | Ending Station   | Roughness Coefficient |
|------------------|------------------|-----------------------|
| (10+00.00, 0.67) | (10+04.00, 0.67) | 0.031                 |

### Options

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

### Results

Normal Depth                              0.37    ft  
Elevation Range                              0.00 to 0.67 ft  
Flow Area                                      0.40    ft<sup>2</sup>  
Wetted Perimeter                              2.30    ft  
Hydraulic Radius                              0.17    ft  
Top Width                                      2.18    ft  
Normal Depth                                      0.37    ft  
Critical Depth                                      0.27    ft  
Critical Slope                                      0.02925    ft/ft  
Velocity                                          1.16    ft/s



## Worksheet for LS SWALE #2 FOR DMA "B" -QBMP

### Results

|                 |             |    |
|-----------------|-------------|----|
| Velocity Head   | 0.02        | ft |
| Specific Energy | 0.39        | ft |
| Froude Number   | 0.48        |    |
| Flow Type       | Subcritical |    |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.37     | ft    |
| Critical Depth      | 0.27     | ft    |
| Channel Slope       | 0.00600  | ft/ft |
| Critical Slope      | 0.02925  | ft/ft |

|                     |  |
|---------------------|--|
| Project Description |  |
|---------------------|--|

### Manning Formula

### Normal Depth

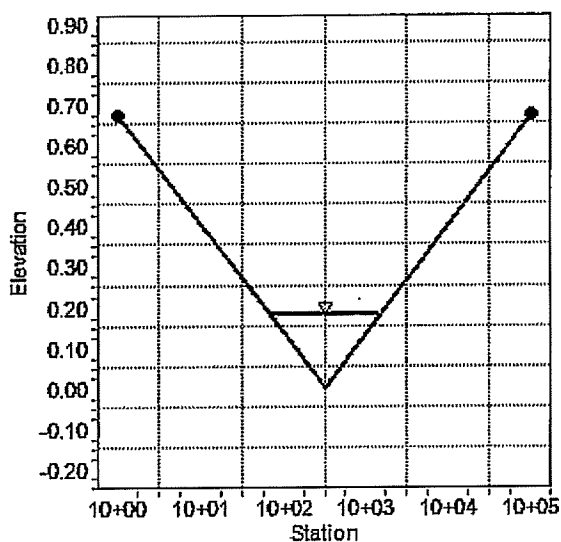
Channel Slope 0.00400 ft/ft

0.00400 ft/ft

0.18 ft

0.07 ft<sup>3</sup>/s

\_\_\_\_\_



## Worksheet for LS SWALE #3 FOR DMA "C" -QBMP

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.00400    ft/ft  
Discharge                                                      0.07    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 10+00.00     | 0.67           |
| 10+02.50     | 0.00           |
| 10+05.00     | 0.67           |

### Roughness Segment Definitions

| Start Station    | Ending Station   | Roughness Coefficient |
|------------------|------------------|-----------------------|
| (10+00.00, 0.67) | (10+05.00, 0.67) | 0.031                 |

### Options

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

### Results

Normal Depth                                              0.18    ft  
Elevation Range                                              0.00 to 0.67 ft  
Flow Area                                                      0.12    ft<sup>2</sup>  
Wetted Perimeter                                              1.38    ft  
Hydraulic Radius                                              0.09    ft  
Top Width                                                      1.33    ft  
Normal Depth                                              0.18    ft  
Critical Depth                                              0.12    ft  
Critical Slope                                              0.03781    ft/ft  
Velocity                                                      0.59    ft/s



## Worksheet for LS SWALE #3 FOR DMA "C" -QBMP

### Results

|                 |             |    |
|-----------------|-------------|----|
| Velocity Head   | 0.01        | ft |
| Specific Energy | 0.18        | ft |
| Froude Number   | 0.35        |    |
| Flow Type       | Subcritical |    |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.18     | ft    |
| Critical Depth      | 0.12     | ft    |
| Channel Slope       | 0.00400  | ft/ft |
| Critical Slope      | 0.03781  | ft/ft |

## Cross Section for LS SWALE #1 FOR DMA "A" -Q100

### Project Description

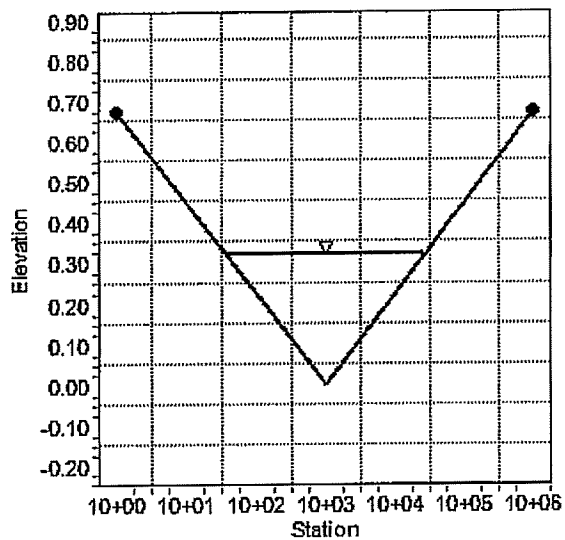
Friction Method                      Manning Formula

Solve For                                Normal Depth

### Input Data

|               |         |                    |
|---------------|---------|--------------------|
| Channel Slope | 0.00400 | ft/ft              |
| Normal Depth  | 0.32    | ft                 |
| Discharge     | 0.39    | ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for LS SWALE #1 FOR DMA "A" -Q100

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.00400    ft/ft  
Discharge                                                      0.39    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 10+00.00     | 0.67           |
| 10+03.00     | 0.00           |
| 10+06.00     | 0.67           |

### Roughness Segment Definitions

| Start Station    | Ending Station   | Roughness Coefficient |
|------------------|------------------|-----------------------|
| (10+00.00, 0.67) | (10+06.00, 0.67) | 0.031                 |

### Options

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

### Results

Normal Depth                                              0.32    ft  
Elevation Range                                              0.00 to 0.67 ft  
Flow Area                                                      0.45    ft<sup>2</sup>  
Wetted Perimeter                                              2.90    ft  
Hydraulic Radius                                              0.15    ft  
Top Width                                                      2.83    ft  
Normal Depth                                              0.32    ft  
Critical Depth                                              0.22    ft  
Critical Slope                                              0.03037    ft/ft  
Velocity                                                      0.87    ft/s



---

## Worksheet for LS SWALE #1 FOR DMA "A" -Q100

---

### Results

|                 |             |    |
|-----------------|-------------|----|
| Velocity Head   | 0.01        | ft |
| Specific Energy | 0.33        | ft |
| Froude Number   | 0.39        |    |
| Flow Type       | Subcritical |    |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.32     | ft    |
| Critical Depth      | 0.22     | ft    |
| Channel Slope       | 0.00400  | ft/ft |
| Critical Slope      | 0.03037  | ft/ft |

## Cross Section for LS SWALE #2 FOR DMA "B" -Q100

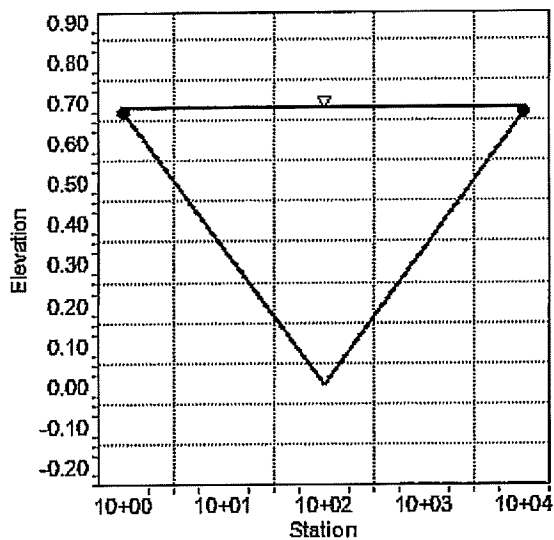
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

|               |         |                    |
|---------------|---------|--------------------|
| Channel Slope | 0.00600 | ft/ft              |
| Normal Depth  | 0.68    | ft                 |
| Discharge     | 2.48    | ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for LS SWALE #2 FOR DMA "B" -Q100

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                                              0.00600    ft/ft  
Discharge                                                      2.48    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 10+00.00     | 0.67           |
| 10+02.00     | 0.00           |
| 10+04.00     | 0.67           |

### Roughness Segment Definitions

| Start Station    | Ending Station   | Roughness Coefficient |
|------------------|------------------|-----------------------|
| (10+00.00, 0.67) | (10+04.00, 0.67) | 0.031                 |

### Options

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

### Results

Normal Depth                                              0.68    ft  
Elevation Range                                              0.00 to 0.67 ft  
Flow Area                                                      1.40    ft<sup>2</sup>  
Wetted Perimeter                                              4.25    ft  
Hydraulic Radius                                              0.33    ft  
Top Width                                                      4.00    ft  
Normal Depth                                              0.68    ft  
Critical Depth                                              0.53    ft  
Critical Slope                                              0.02336    ft/ft  
Velocity                                                      1.77    ft/s



## Worksheet for LS SWALE #2 FOR DMA "B" -Q100

### Results

|                 |             |    |
|-----------------|-------------|----|
| Velocity Head   | 0.05        | ft |
| Specific Energy | 0.73        | ft |
| Froude Number   | 0.53        |    |
| Flow Type       | Subcritical |    |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.68     | ft    |
| Critical Depth      | 0.53     | ft    |
| Channel Slope       | 0.00600  | ft/ft |
| Critical Slope      | 0.02336  | ft/ft |

## Cross Section for LS SWALE #3 FOR DMA "C" -Q100

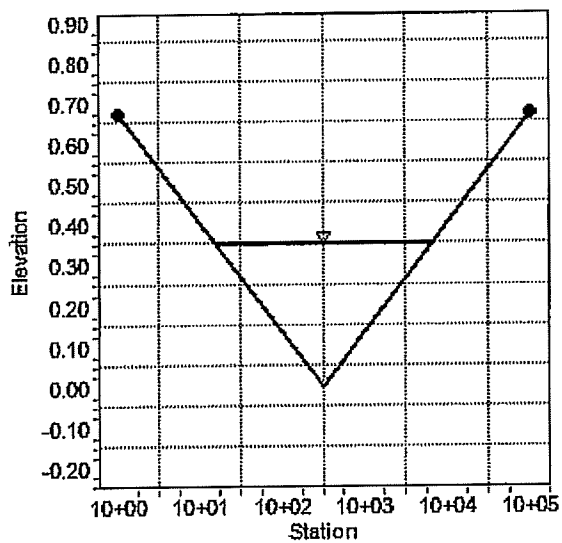
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

|               |         |                    |
|---------------|---------|--------------------|
| Channel Slope | 0.00400 | ft/ft              |
| Normal Depth  | 0.35    | ft                 |
| Discharge     | 0.42    | ft <sup>3</sup> /s |

### Cross Section Image



## Worksheet for LS SWALE #3 FOR DMA "C" -Q100

### Project Description

Friction Method                      Manning Formula  
Solve For                              Normal Depth

### Input Data

Channel Slope                              0.00400    ft/ft  
Discharge                                  0.42    ft<sup>3</sup>/s  
Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 10+00.00     | 0.67           |
| 10+02.50     | 0.00           |
| 10+05.00     | 0.67           |

### Roughness Segment Definitions

| Start Station    | Ending Station   | Roughness Coefficient |
|------------------|------------------|-----------------------|
| (10+00.00, 0.67) | (10+05.00, 0.67) | 0.031                 |

### Options

Current roughness weighted      Pavlovskii's Method  
Method  
Open Channel Weighting Method      Pavlovskii's Method  
Closed Channel Weighting Method      Pavlovskii's Method

### Results

Normal Depth                              0.35    ft  
Elevation Range                      0.00 to 0.67 ft  
Flow Area                                  0.45    ft<sup>2</sup>  
Wetted Perimeter                      2.70    ft  
Hydraulic Radius                      0.17    ft  
Top Width                                  2.60    ft  
Normal Depth                              0.35    ft  
Critical Depth                              0.24    ft  
Critical Slope                              0.02975    ft/ft  
Velocity                                      0.92    ft/s



---

## Worksheet for LS SWALE #3 FOR DMA "C" -Q100

---

### Results

|                 |             |    |
|-----------------|-------------|----|
| Velocity Head   | 0.01        | ft |
| Specific Energy | 0.36        | ft |
| Froude Number   | 0.39        |    |
| Flow Type       | Subcritical |    |

### GVF Input Data

|                  |      |    |
|------------------|------|----|
| Downstream Depth | 0.00 | ft |
| Length           | 0.00 | ft |
| Number Of Steps  | 0    |    |

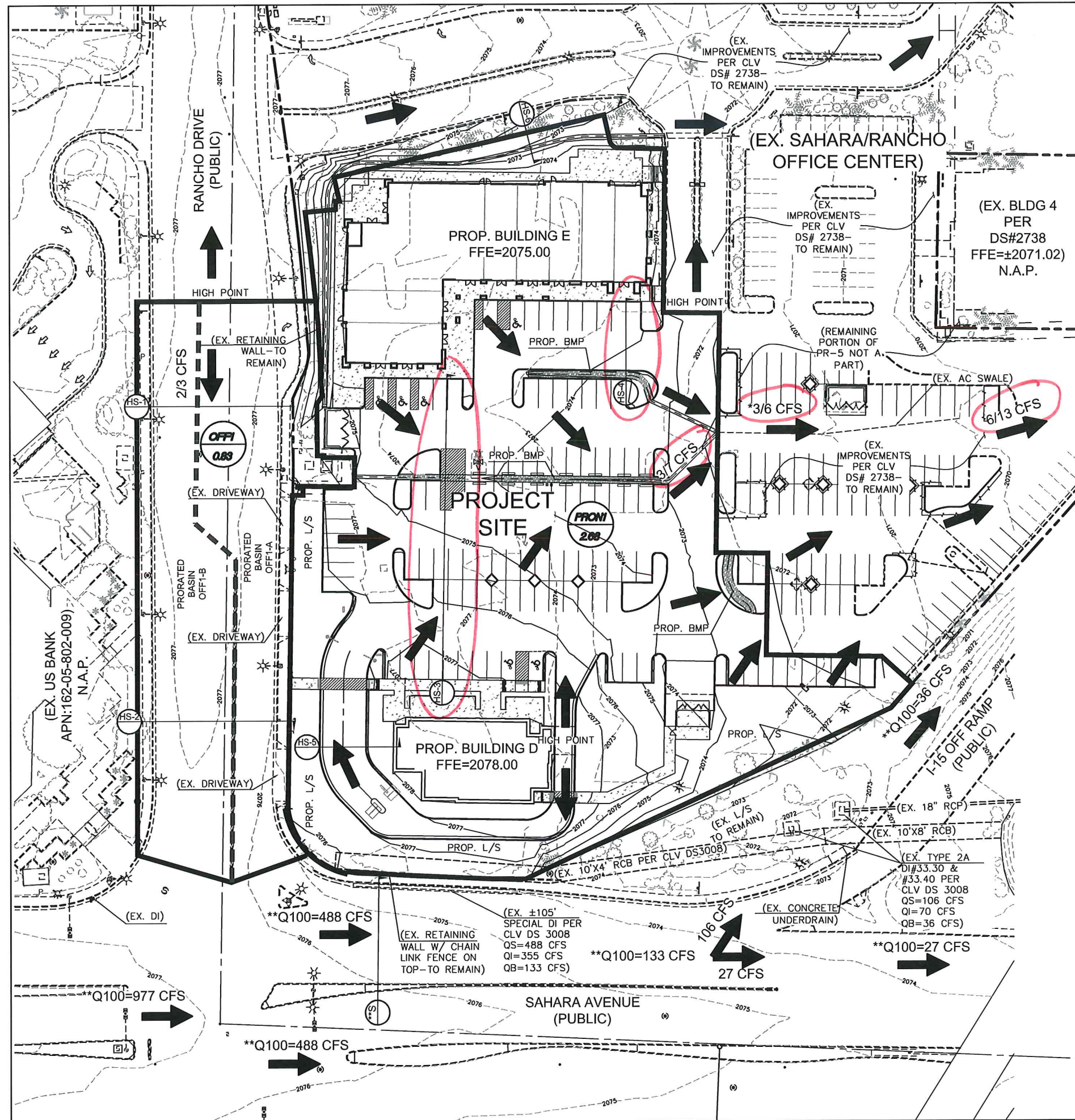
### GVF Output Data

|                     |          |       |
|---------------------|----------|-------|
| Upstream Depth      | 0.00     | ft    |
| Profile Description |          |       |
| Profile Headloss    | 0.00     | ft    |
| Downstream Velocity | Infinity | ft/s  |
| Upstream Velocity   | Infinity | ft/s  |
| Normal Depth        | 0.35     | ft    |
| Critical Depth      | 0.24     | ft    |
| Channel Slope       | 0.00400  | ft/ft |
| Critical Slope      | 0.02975  | ft/ft |



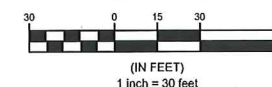




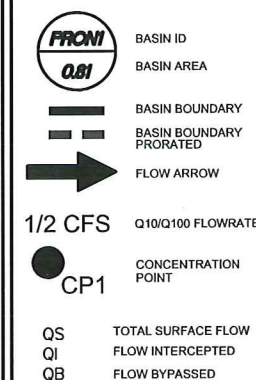


VICINITY MAP  
N.T.S.

GRAPHIC SCALE



### LEGEND



## BASIN FLOW SUMMARY

| BASIN                                  | BASIN AREA<br>(ACRES)                        | 10-YEAR<br>FLOW<br>(CFS) | 100-YEAR<br>FLOW<br>(CFS) |
|----------------------------------------|----------------------------------------------|--------------------------|---------------------------|
| OFF1                                   | 0.83                                         | 2                        | 3                         |
| PRON1                                  | 2.86                                         | 3                        | 7                         |
| REMAINING PART OF PR-5<br>(NOT A PART) | 2.02                                         | 3                        | 6                         |
| TOTAL                                  | PRON1+REMAINING PART OF PR-5<br>(NOT A PART) | 6                        | 13                        |

## PRORATED FLOW SUMMARY

| BASIN  | BASIN AREA<br>(ACRES) | 10-YEAR<br>FLOW | 100-YEAR<br>FLOW |
|--------|-----------------------|-----------------|------------------|
| OFF1-A | 0.42                  | 1.01            | 1.52             |
| OFF1-B | 0.41                  | 0.99            | 1.48             |
| TOTAL  | 0.83                  | 2               | 3                |

## HYDRAULIC SUMMARY

| SECTION | Q10<br>(cfs) | Flow<br>Depth<br>(ft) | V10<br>(fps) | V'D  | Q100<br>(cfs) | Flow<br>Depth<br>(ft) | V100<br>(fps) | V'D  | DR<br>LAN |
|---------|--------------|-----------------------|--------------|------|---------------|-----------------------|---------------|------|-----------|
| **S     |              | N/A                   |              |      | 977           | 1.60                  | N/A           | N/A  |           |
| HS-1    | 1.01         | 0.34                  | 0.84         | 0.29 | 1.52          | 0.38                  | 0.92          | 0.35 | YES       |
| HS-2    | 0.99         | 0.32                  | 1.40         | 0.45 | 1.48          | 0.36                  | 1.53          | 0.55 | YES       |
| HS-3    |              | N/A                   |              |      | 7             | 0.31                  | 1.94          | N/A  | N/A       |
| HS-4    |              | N/A                   |              |      | 7             | 0.75                  | 1.62          | N/A  | N/A       |
| HS-5    |              | N/A                   |              |      | 0.50          | 0.26                  | 0.93          | N/A  | N/A       |
| HS-6    |              | N/A                   |              |      | 0.91          | 0.23                  | 1.12          | N/A  | N/A       |

NOTES:

- \* EXISTING CONDITION FLOW RATES REFERENCED FROM TECHNICAL DRAINAGE STUDY, ADDENDA, & UPDATE FOR "SAHARA/RANCHO OFFICE PARK" BY THE KEITH COMPANIES CLV DS# 2738 APPROVED JUN 12, 2002.
- \*\* EXISTING CONDITION FLOW RATES REFERENCED FROM FINAL HYDRAULIC REPORT FOR "I-15 WIDENING PROJECT" BY LOUIS BERGER GROUP INC. CLV DS# 3008 DATED NOVEMBER 22, 1999.

W E

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

[illegible]

**AFFORDABLE CONCEPTS, INC.  
RETAIL @ SAHARA & RANCHO**

PROPOSED BASIN MAP

|                           |
|---------------------------|
| SUBMITTAL NO. TDS1        |
| DATE: JULY 28, 2015       |
| WE PROJECT NO.<br>1347.00 |
| AGENCY NO.<br>CLV:        |
| SHEET NO.:                |

PR-1

3 OF 3 SHEETS

\* FROM INITIAL SUBMITTAL OF ORIGINAL STUDY



ORIGINAL GRADING PLANS

---

Original Study





| BOUNDARY LINE TABLE |        |             |
|---------------------|--------|-------------|
| LINE                | LENGTH | BEARING     |
| L1                  | 15.39' | N41°59'00"E |
| L2                  | 31.00' | S00°54'17"W |
| L3                  | 38.94' | N00°54'27"E |
| L4                  | 50.45' | S89°25'34"E |
| L5                  | 17.32' | N24°24'39"E |
| L6                  | 44.02' | N04°43'33"W |
| L7                  | 23.20' | N05°17'58"W |
| L8                  | 25.73' | N06°40'29"W |
| L9                  | 23.38' | S89°05'43"E |
| L10                 | 62.00' | S00°54'17"W |

|      |                                  |
|------|----------------------------------|
|      | PROPERTY LINE                    |
|      | STREET CENTERLINE                |
|      | PROPOSED RETAINING WALL          |
|      | PROPOSED BUILDING                |
|      | EXISTING CONTOUR                 |
|      | PROPOSED CONTOUR                 |
|      | PROPOSED CURB & GUTTER           |
|      | PROPOSED CURB                    |
|      | PROPOSED EDGE OF PAVEMENT        |
|      | EXISTING CURB & GUTTER           |
|      | EXISTING CURB                    |
|      | EXISTING BUILDING                |
|      | CONSTRUCTION NOTE                |
|      | CUT FILL TRANSITION              |
|      | SAWCUT LIMITS                    |
|      | CONSTRUCTION LIMITS<br>BY OTHERS |
|      | SCARP                            |
|      | SLOPE                            |
|      | FLOW LINE                        |
|      | EASEMENT LINE                    |
|      | HANDICAP PARKING                 |
| FS   | FINISHED SURFACE                 |
| CF   | CURB FACE                        |
| FF   | FINISH FLOOR                     |
| EP   | EDGE OF PAVEMENT                 |
| TG   | TOP OF GRATE                     |
| I.E. | INVERT ELEVATION                 |
| FL   | FLOW LINE                        |
| ME   | MATCH EXISTING                   |
|      | PROPOSED GRADE                   |
|      | EXISTING GRADE                   |
|      | PROPOSED GRADE BY OTHERS         |
|      | PROP. AC PAVEMENT                |
|      | PROP. PCC PAVEMENT               |



| CONSTRUCTION NOTES |                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------|
| NO                 | ITEM                                                                                                                      |
| 1                  | CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD STD DWG NO. 216                                                               |
| 2                  | CONSTRUCT "A" TYPE CURB PER CCAUSD STD DWG NO. 219                                                                        |
| 3                  | CONSTRUCT "A" SIDEWALK PER CCAUSD DWG NO. 234                                                                             |
| 4                  | SAWCUT NEAT & MATCH EXISTING AC                                                                                           |
| 5                  | CONSTRUCT SIDEWALK DRAIN PER CCAUSD DWG NO. 236                                                                           |
| 6                  | CONSTRUCT HEAVY "A" PAVEMENT PER SOLS REPORT BY NOVA GEOTECHNICAL INSPECTION SERVICES SEE DETAIL "1" ON SHEET D2.         |
| 7                  | CONSTRUCT LIGHT "A" PAVEMENT PER SOLS REPORT BY NOVA GEOTECHNICAL INSPECTION SERVICES SEE DETAIL "2" ON SHEET D2.         |
| 8                  | CONSTRUCT TRASH ENCLOSURE PER SEPARATE ARCHITECTURAL PLANS & DETAILS (BY OTHERS)                                          |
| 9                  | INSTALL PRECAST BUMPER BLOCK PER CCAUSD STD DWG NO. 238                                                                   |
| 10                 | CONSTRUCT 4.0' WIDE VALLEY GUTTER PER DETAIL "J" ON SHEET D2                                                              |
| 11                 | MATCH EXISTING CURB AND GUTTER                                                                                            |
| 12                 | CONSTRUCT 2.0' WIDE VALLEY GUTTER PER DETAIL "A" ON SHEET D2                                                              |
| 13                 | INSTALL ROCK LINED SWALE RIP RAP (D50=3", T=6") PER DETAIL "5" ON SHEET D2                                                |
| 14                 | CONSTRUCT 0" CURB                                                                                                         |
| 15                 | CONSTRUCT 2.0' WIDE CURB OPENING PER DETAIL "6" ON SHEET D2                                                               |
| 16                 | TRANSITION FROM 6" CURB TO 0" CURB PER DETAIL "8" ON SHEET D2                                                             |
| 17                 | CONSTRUCT ON-SITE ADA RAMP PER DETAIL "9" ON SHEET D2                                                                     |
| 18                 | CONSTRUCT ADA ACCESSIBLE HANDICAP RAMP WITH HANDRAILS AND LANDINGS PER SEPARATE ARCHITECTURAL PLANS & DETAILS (BY OTHERS) |
| 19                 | EXISTING DRIVEWAY TO BE REMOVED AND REPLACED WITH CURB, GUTTER & SIDEWALK PER CCAUSD DWG NOS 216 & 234                    |
| 20                 | REMOVE AND REPLACE EXISTING RAMP LANDINGS AND INSTALL TRUNCATED DOMES PER DETAIL "7" ON SHEET D2                          |
| 21                 | CONSTRUCT 1" CONCRETE STRIP                                                                                               |
| 22                 | CONSTRUCT 4.0' MAX HEIGHT RETAINING WALL PER SEPARATE STRUCTURAL PLANS & DETAILS (BY OTHERS)                              |

**EARTHWORK QUANTITIES**

\*NOTE: THESE QUANTITIES ARE APPROXIMATE AND ARE RAW VOLUMES ONLY. OVEREXCAVATION SUBSIDENCE, SHRINKAGE, & BULKING FACTORS ARE NOT TAKEN INTO ACCOUNT.

|        |            |
|--------|------------|
| CUT =  | 2,129 C.Y. |
| FILL = | 1,668 C.Y. |

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE  
APPROVED DRAINAGE STUDY 4746A ON FILE WITH THE CITY OF LAS VEGAS  
FOR THIS PROJECT.

CLV DRAWING NO.

[illegible]

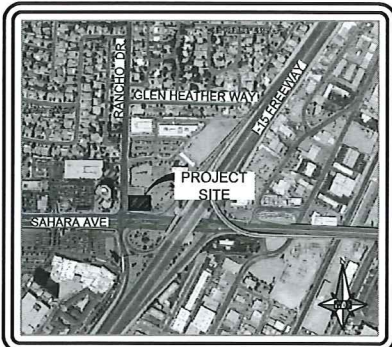
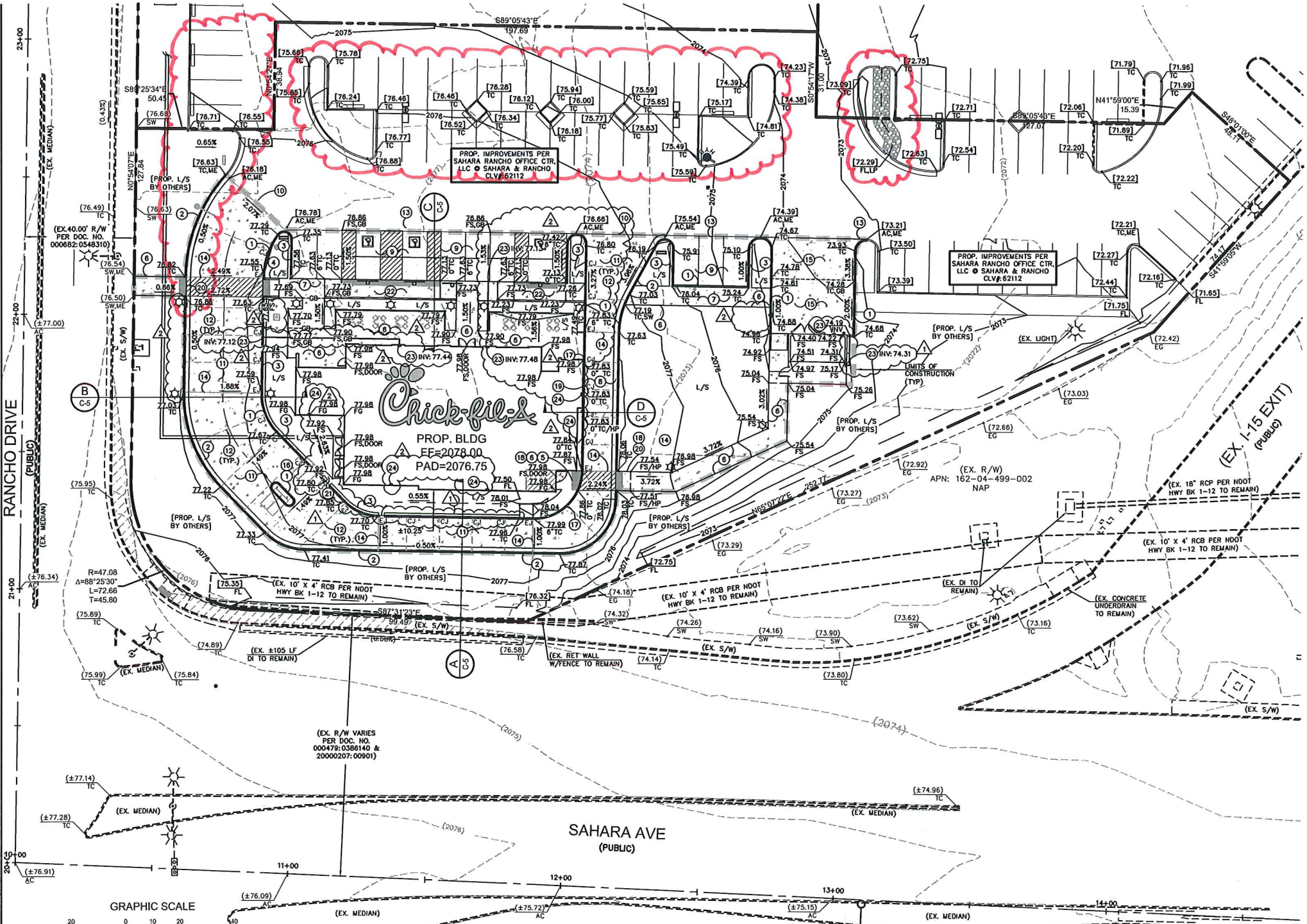
# PRECISE GRADING PLAN 1

G1

7 OF 12 SHEETS

\* FROM UPDATE 1 TO ORIGINAL STUDY





VICINITY MAP  
N.T.S.

| CONSTRUCTION NOTES |                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------|
| NO                 | ITEM                                                                                                                         |
| 1                  | CONSTRUCT "A" TYPE CURB PER DETAIL 7A, SHEET C-6                                                                             |
| 2                  | CONSTRUCT "L" TYPE CURB & GUTTER PER DETAIL 7B, SHEET C-6                                                                    |
| 3                  | CONSTRUCT 1" CONCRETE STRIP                                                                                                  |
| 4                  | CONSTRUCT RETURNED CURB ACCESSIBLE RAMP PER DETAIL 9, SHEET C-6                                                              |
| 5                  | CONSTRUCT TRUNCATED DOMES PER DETAIL 10, SHEET C-6                                                                           |
| 6                  | CONSTRUCT SIDEWALK PER DETAIL 11, SHEET C-6                                                                                  |
| 7                  | CONSTRUCT SIDEWALK WITH CURB SECTION PER DETAIL 12, SHEET C-6                                                                |
| 8                  | DRIVE-THRU PLAN VIEW & ISOMETRIC PER DETAILS 13 & 14, SHEET C-7                                                              |
| 9                  | CONSTRUCT STANDARD AC PAVEMENT PER SOILS REPORT BY GILES ENGINEERING ASSOCIATES, INC. SEE DETAIL 15 ON SHEET C-7             |
| 10                 | CONSTRUCT CONCRETE/AC EDGE PER DETAIL 16, SHEET C-7                                                                          |
| 11                 | CONSTRUCT CONCRETE PAVING DRIVE-THRU LANE PER SOILS REPORT BY GILES ENGINEERING ASSOCIATES, INC. SEE DETAIL 17 ON SHEET C-7  |
| 12                 | CONSTRUCT CONTRACTION JOINT (CJ) PER DETAIL 18, SHEET C-7                                                                    |
| 13                 | SAWCUT NEAT & MATCH EXISTING PER DETAIL 19, SHEET C-7                                                                        |
| 14                 | CONSTRUCT EXPANSION JOINT (EJ) PER DETAIL 20, SHEET C-7                                                                      |
| 15                 | CONSTRUCT CONCRETE APRON @ TRASH ENCLOSURE PER SOILS REPORT BY GILES ENGINEERING ASSOCIATES, INC. SEE DETAIL 21 ON SHEET C-7 |
| 16                 | DRIVE-THRU ORDER POINT ISLAND CURB PER DETAIL 25, SHEET C-8                                                                  |
| 17                 | TRANSITION FROM 6" CURB TO 0" CURB PER DETAIL 30 ON SHEET C-8                                                                |
| 18                 | CONSTRUCT ACCESSIBLE ROUTE PER DETAIL 27, SHEET C-8                                                                          |
| 19                 | CONSTRUCT 0" CURB                                                                                                            |
| 20                 | CONSTRUCT SIDEWALK CURB OPENING PER DETAIL 28, SHEET C-8                                                                     |
| 21                 | CONSTRUCT 2.0' WIDE CURB OPENING PER DETAIL 31 ON SHEET C-8                                                                  |
| 22                 | CONSTRUCT CURB RAMP WITH FLARED SIDES PER DETAIL 32, SHEET C-8                                                               |
| 23                 | CONSTRUCT ROOF DRAIN TO OUTLET THROUGH CURB PER PLAN - SEE SEPARATE ARCH. PLANS & DETAILS                                    |
| 24                 | CONSTRUCT ROOF DRAIN AT 12" ABOVE GRADE WITH DOWNSPOUT & SPLASH BLOCK PER ARCH PLANS & DETAILS. SIZE PER ARCH PLANS.         |

**STORMWATER MANAGEMENT NOTES:**

- THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF THE CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
- ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE CLARK COUNTY BUILDING ADMINISTRATION CODE 23.00 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
- TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
- AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
- ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

**DRAINAGE STUDY NOTE:**

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY 4746A ON FILE WITH THE CITY OF LAS VEGAS FOR THIS PROJECT.

TRACESA WOLF, P.E. No. 17879 DATE

CLV DRAWING NO. 107V657 H62229

**NOTES:**

ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.

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

**LEGAL DESCRIPTION:**

SEE SHEET C1 FOR FULL LEGAL DESCRIPTION

**EARTHWORK QUANTITIES:**

\*NOTE: THESE QUANTITIES ARE APPROXIMATE AND ARE RAW VOLUMES ONLY. OVEREXCAVATION SUBSIDENCE, SHRINKAGE, & BULKING FACTORS ARE NOT TAKEN INTO ACCOUNT.

CUT= 211 C.Y.  
FILL= 118 C.Y.

**FLOODZONE:**

THE PARCEL DESCRIBED HEREON LIES WITHIN THE FLOOD HAZARD ZONE HAVING A ZONE DESIGNATION OF UNSHADED "X" (AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN), AS SHOWN ON FIRM MAP NO. 32003C 2107F DATED NOVEMBER 16, 2011.

**ENGINEERS NOTES:**

- ALL WORK SHALL CONFORM TO THE SOILS REPORT BY NOVA GEOTECHNICAL & INSPECTION SERVICES DATED APRIL 6, 2015. PROJ. NO. E-15-045 FOR THIS PROJECT.
- ALL OFF-SITE IMPROVEMENT CONSTRUCTION SHALL CONFORM TO THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST EDITION.
- FINAL ASPHALTIC CONCRETE (AC) PAVEMENT SURFACES SHALL BE ONE-HALF INCH ABOVE THE LIP OF THE GUTTER (INCLUDING OPEN GRADE).
- CONTRACTOR IS RESPONSIBLE FOR DUST AND EROSION CONTROL DURING CONSTRUCTION.
- THIS PLAN SHALL NOT, IN PART OR IN WHOLE, BE USED FOR CONSTRUCTION UNTIL APPROVED AND SIGNED BY ALL APPLICABLE GOVERNMENT AGENCIES.
- ENGINEER TO BE NOTIFIED OF ANY DISCREPANCIES IMMEDIATELY.
- MATCH ELEVATIONS SHOWN TO BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION.

**SIGHT VISIBILITY ZONES NOTE:**

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

| LEGEND: |                           |
|---------|---------------------------|
|         | PROPERTY LINE             |
|         | STREET CENTERLINE         |
|         | PROPOSED RETAINING WALL   |
|         | PROPOSED BUILDING         |
|         | EXISTING CONTOUR          |
|         | PROPOSED CONTOUR          |
|         | PROPOSED CURB & GUTTER    |
|         | PROPOSED CURB             |
|         | PROPOSED EDGE OF PAVEMENT |
|         | EXISTING CURB & GUTTER    |
|         | EXISTING CURB             |
|         | EXISTING BUILDING         |
|         | CUT FILL TRANSITION       |
|         | SAWCUT LIMITS             |
|         | CONSTRUCTION LIMITS       |
|         | FLOW LINE                 |
|         | EASEMENT LINE             |
|         | PROP. AC PAVEMENT         |
|         | PROP. PCC PAVEMENT        |
|         | HANDICAP PARKING          |
|         | FINISHED SURFACE          |
|         | CURB FACE                 |
|         | FINISH FLOOR              |
|         | EDGE OF PAVEMENT          |
|         | TOP OF GRATE              |
|         | INVERT ELEVATION          |
|         | FLOW LINE                 |
|         | MATCH EXISTING            |
|         | CONSTRUCTION NOTE         |
|         | SCARP                     |
|         | SLOPE                     |
|         | PROPOSED GRADE            |
|         | EXISTING GRADE            |
|         | PROPOSED GRADE BY OTHERS  |

**BENCHMARK:**

CITY OF LAS VEGAS BENCHMARK: 11V11 55S; A RIVET AND ALUMINUM PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF SAHARA AND RANCHO = 632.900 m = 2076.44 ft.

BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

**BASIS OF BEARING:**

SOUTH 87°31'34" EAST, BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 4, TOWNSHIP 21 SOUTH, RANGE 61 EAST, N.D.M., CLARK COUNTY, NEVADA AS SHOWN BY MAP RECORDED IN FILE 121 OF PLATS, PAGE 100 IN THE OFFICE OF THE COUNTY RECORDER, CLARK COUNTY, NEVADA.

CALL BEFORE YOU DIG  
1-702-227-2929

**FAST**  
Call before you dig  
UnderGround  
1-702-432-5300

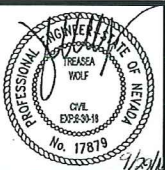
Call before you dig  
811  
1-800-227-2600



5200 Buffington Rd.  
Atlanta Georgia,  
30349-2998

Revisions:  
Mark Date By  
2 6/30/16 RC  
CLIENT REV

Mark Date By  
2 6/30/16 RC  
CLIENT REV



**WIE**

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

STORE  
SAHARA @ I-15

NEC SAHARA &  
S. RANCHO DR.  
LAS VEGAS, NV

SHEET TITLE  
GRADING PLAN

VERSION: FINAL  
ISSUE DATE:

Job No. : 14-265  
Store : 03729  
Date : 02/29/16  
Drawn By : RC  
Checked By : TW

Sheet

C-4  
4 OF 10 SHEETS

\* FROM UPDATE 2 TO ORIGINAL STUDY



REFERENCE 5

---

*"Technical Drainage Study for Sahara/Rancho Office Park"*  
(DS 2378)

|                                                                       |                                       |                                                                                                   |
|-----------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>CITY OF LAS VEGAS</b>                                              |                                       | <b>DATE:</b>                                                                                      |
| <b>INTER-OFFICE MEMORANDUM</b>                                        |                                       | June 12, 2002 <i>MS</i>                                                                           |
| <b>TO:</b><br>Land Development Services<br>Department of Public Works |                                       | <b>FROM:</b><br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| <b>SUBJECT:</b>                                                       | <b>COPIES TO:</b>                     |                                                                                                   |
| Drainage Study for:                                                   | JMA Architecture Studios              |                                                                                                   |
| Sahara / Rancho Office Park                                           | The Keith Companies, Inc.             |                                                                                                   |
| <b>Cross Streets:</b>                                                 | NE corner of Sahara Ave. & Rancho Dr. | Cheri Edelman, DEVCO                                                                              |
| <b>File Number:</b>                                                   | F:\Depot\DSMEMOS\DS2738G.doc          | CCRFGD                                                                                            |
| <b>Parcel Number:</b>                                                 | 164-04-401-001, 002, 003 & 004        | NDOT                                                                                              |
| <b>Zoning Action:</b>                                                 |                                       |                                                                                                   |
| <b>FEMA Flood Zone</b>                                                | YES                                   | NO X                                                                                              |
| <b>Proposed Storm Drain</b>                                           | YES                                   | NO X                                                                                              |

| HISTORY                    | DATE RECEIVED       | DATE REVIEWED | COMMENTS               | REVIEW FEES       |
|----------------------------|---------------------|---------------|------------------------|-------------------|
| 1 <sup>st</sup> Submittal  | 7/13/2000           | 7/24/2000     | Not Accepted           | \$250.00          |
| 2 <sup>nd</sup> Submittal  | 9/7/2000            | 9/15/2000     | Not Accepted           | \$250.00          |
| 3 <sup>rd</sup> Submittal  | 9/25/2000           | 9/29/2000     | Conditionally Accepted | \$250.00          |
| CCRFGD                     | 11/8/2000           | 11/9/2000     | Accepted               | N/C               |
| 4 <sup>th</sup> Submittal  | 1/11/2002           | 1/24/2002     | Not Accepted           | \$250.00          |
| 5 <sup>th</sup> Submittal  | 3/25 &<br>4/16/2002 | 4/16/2002     | Conditionally Accepted | \$250.00          |
| CCRFGD                     | 6/11/2002           | 6/12/2002     | Concurrence            | N/C               |
| <b>TOTAL FEES (LDDRS):</b> |                     |               |                        | <b>\$1,250.00</b> |

**REMARKS:**

**4<sup>th</sup> and 5<sup>th</sup> Submittals: Update to the drainage study**

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

|   |                                                                                                     |
|---|-----------------------------------------------------------------------------------------------------|
| X | is acceptable in concept subject to conformance to all City standards and the following conditions. |
|   | must be resubmitted or supplemented including the following:                                        |
|   | must have Clark County Regional Flood Control District concurrence                                  |

The following is repeated until it is complete:

1. This update stated that a curb cut opening is located under the chain link fence to pass the flow from the site at the northwest corner. Sheet GP-1 must show and label the location and extent of the chain link fence and curb cut opening.

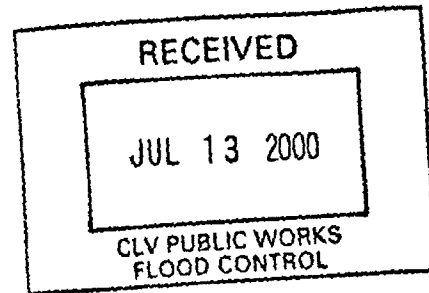
**NOTE:** Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the City of Las Vegas Flood Control Section. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the City of Las Vegas reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

**END OF REMARKS**

Jwb/ays

**T/R/S: T21S/R61E/4**

**AREA R-04**



The Keith Companies

**TKC**

2738  
R-04

# TECHNICAL DRAINAGE STUDY

\$250

FOR

CCRFCO

## SAHARA/RANCHO OFFICE PARK

July 11, 2000

*Prepared For*

### JMA ARCHITECTURE STUDIOS

10150 Covington Cross  
Las Vegas, NV 89144  
(702) 731-2033

*Prepared By*

### THE KEITH COMPANIES, INC.

444 E. Warm Springs Road  
Suite 110  
Las Vegas, NV 89119  
(702) 263-8206

PLANNING • ENGINEERING • LAND SURVEYING • DEVELOPER SERVICES  
WATER RESOURCES • PUBLIC WORKS



# STANDARD FORM #4

DEVELOPMENT\_RANCHO/SAHARA

CALCULATED BY\_MW DATE 7/6/00

| TIME OF CONCENTRATION |      |      |          |             |                          |         |         |           |         |                 |         |                 |                   |         |
|-----------------------|------|------|----------|-------------|--------------------------|---------|---------|-----------|---------|-----------------|---------|-----------------|-------------------|---------|
| SUB-BASIN DATA        |      |      |          |             | INITIAL/OVERLAND TIME(H) |         |         |           |         | TRAVEL TIME(ft) |         |                 |                   |         |
| BASIN DESC.           | CN   | K    | AREA AC. | AREA SQ.MI. | LENGTH FT                | SLOPE % | TI MIN. | LENGTH FT | SLOPE % | VEL F/S         | TI MIN. | TOTAL LENGTH FT | Tc=(L/180)+10 MIN | Tc CALC |
| EX-A                  | 94.0 | 0.85 | 6.07     | 0.0095      | 200                      | 1.66%   | 5.36    | 1080      | 1.20%   | 2.89            | 6.23    | 428             | 1280              | 11.59   |
| EX-B                  | 88.0 | 0.77 | 5.04     | 0.0079      | 100                      | 3.00%   | 4.11    | 400       | 1.63%   | 2.81            | 2.37    | 524             | 500               | 6.48    |
| EX-C                  | 92.8 | 0.83 | 2.40     | 0.0037      | 120                      | 2.00%   | 4.15    | 400       | 1.00%   | 2.30            | 2.90    | 456             | 520               | 7.05    |
| EX-D                  | 94.0 | 0.85 | 1.12     | 0.0018      | 100                      | 3.75%   | 2.89    | 400       | 1.00%   | 2.34            | 2.85    | 552             | 500               | 5.74    |
| PR-1                  | 94.0 | 0.85 | 3.01     | 0.0047      | 100                      | 2.00%   | 3.56    | 785       | 1.00%   | 2.45            | 5.34    | 1164            | 885               | 8.90    |
| PR-2                  | 94.0 | 0.85 | 2.26     | 0.0035      | 50                       | 2.00%   | 2.52    | 325       | 0.50%   | 1.77            | 3.06    | 600             | 375               | 5.58    |
| PR-3                  | 93.4 | 0.84 | 3.13     | 0.0049      | 100                      | 2.00%   | 3.67    | 680       | 0.50%   | 1.89            | 6.00    | 741             | 780               | 9.67    |
| PR-4                  | 94.0 | 0.85 | 2.35     | 0.0037      | 150                      | 2.00%   | 4.50    | 440       | 1.00%   | 2.30            | 3.19    | 840             | 600               | 7.69    |
| PR-5                  | 92.4 | 0.83 | 3.88     | 0.0061      | 50                       | 2.00%   | 2.73    | 470       | 1.00%   | 2.63            | 2.98    | 720             | 520               | 5.71    |
| OE-1                  | 98.0 | 0.90 | 1.08     | 0.0017      | 40                       | 2.00%   | 1.77    | 630       | 0.40%   | 1.40            | 7.50    | 630             | 670               | 9.27    |
|                       |      |      |          |             |                          |         |         |           |         |                 |         |                 |                   | 0.093   |

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*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*
* SEPTEMBER 1990
*
* VERSION 4.0
*
* RUN DATE 07/06/2000 TIME 16:53:46
*
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*
* U.S. ARMY CORPS OF ENGINEERS
*
* HYDROLOGIC ENGINEERING CENTER
*
* 609 SECOND STREET
*
* DAVIS, CALIFORNIA 95616
*
* (916) 756-1104
*

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

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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 *****
2 ID * HYDROLOGIC ANALYSIS *
3 ID * FOR *
4 ID * RANCHO/SAHARA *
5 ID *
6 ID * PROPOSED CONDITION *
7 ID *****
8 ID
9 ID *****
10 ID * 10 YR & 100 YR *
11 ID * STORM EVENT *
12 ID *****
13 IT 5 6JUL00 300
14 IO 5 0
15 IN 5
16 JR PREC .57 1.0
17 KK PR-1
18 KM PROPOSED ONSITE BASIN 1
19 PB 2.77
20 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
21 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
22 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
23 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
24 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
25 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
26 PC .982 .985 .987 .999 .990 .993 .993 .994 .995 .998
27 PC .998 .999 1.00
28 BA .0047
29 LS 0 94
30 UD .089
31 KK PR-2
32 KM PROPOSED ONSITE BASIN 2
33 BA .0035
34 LS 0 94
35 UD .056
36 KK RL1
37 RK 350 .01 .016 TRAP .1 25
38 KK CP-1A
39 KM COMBINE FLOWS FROM PR-1 AND PR-2
40 HC 2
41 KK PR-3
42 KM PROPOSED ONSITE BASIN 3
43 BA .0049
44 LS 0 93.4
45 UD .097

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1

#### HEC-1 INPUT

PAGE 2

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

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|    |    |                                         |       |      |      |    |    |
|----|----|-----------------------------------------|-------|------|------|----|----|
| 46 | KK | RK2                                     |       |      |      |    |    |
| 47 | KK | 790                                     | .0075 | .016 | TRAP | .1 | 30 |
| 48 | KK | PR-4                                    |       |      |      |    |    |
| 49 | KM | PROPOSED ONSITE BASIN 4                 |       |      |      |    |    |
| 50 | BA | .0037                                   |       |      |      |    |    |
| 51 | LS | 0                                       | 94    |      |      |    |    |
| 52 | UD | .077                                    |       |      |      |    |    |
| 53 | KK | PR-5                                    |       |      |      |    |    |
| 54 | KM | PROPOSED ONSITE BASIN 5                 |       |      |      |    |    |
| 55 | BA | .0061                                   |       |      |      |    |    |
| 56 | LS | 0                                       | 92.4  |      |      |    |    |
| 57 | UD | .057                                    |       |      |      |    |    |
| 58 | KK | RK3                                     |       |      |      |    |    |
| 59 | KK | 680                                     | .005  | .016 | TRAP | .1 | 25 |
| 60 | KK | CP-1B                                   |       |      |      |    |    |
| 61 | KM | COMBINE FLOWS FROM PR-3, PR-4, AND PR-5 |       |      |      |    |    |
| 62 | HC | 3                                       |       |      |      |    |    |
| 63 | KK | CP-1                                    |       |      |      |    |    |
| 64 | KM | COMBINE FLOW FROM CP-1A AND CP-1B       |       |      |      |    |    |
| 65 | HC | 2                                       |       |      |      |    |    |
| 66 | ZZ |                                         |       |      |      |    |    |

1

# SCHEMATIC DIAGRAM OF STREAM NETWORK

| INPUT<br>LINE | (V) ROUTING   | (--->) DIVERSION OR PUMP FLOW            |
|---------------|---------------|------------------------------------------|
| NO.           | (.) CONNECTOR | (<---) RETURN OF DIVERTED OR PUMPED FLOW |
| 17            | PR-1          |                                          |
| 31            | PR-2          |                                          |
| 36            | RK1           |                                          |
| 38            | CP-1A         |                                          |
| 41            | PR-3          |                                          |
| 46            | RK2           |                                          |
| 48            | PR-4          |                                          |
| 53            | PR-5          |                                          |
| 58            | RK3           |                                          |
| 60            | CP-1B         |                                          |
| 63            | CP-1          |                                          |

(\*\*\*) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

*****
* FLOOD HYDROGRAPH PACKAGE (REC-1) *
* SEPTEMBER 1990 *
* VERSION 4.0 *
* RUN DATE 07/06/2000 TIME 16:53:46 *
*****

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

```

```

*****
* HYDROLOGIC ANALYSIS *
* FOR *
* RANCHO/SAHARA *
* PROPOSED CONDITION *
*****
* 10 YR & 100 YR *
* STORM EVENT *

```



```

*****
14 IO      OUTPUT CONTROL VARIABLES
          IPRT  5 PRINT CONTROL
          IPLOT 0 PLOT CONTROL
          QSCAL 0. HYDROGRAPH PLOT SCALE

IT         HYDROGRAPH TIME DATA
          NMIN  5 MINUTES IN COMPUTATION INTERVAL
          IDATE 6JUL 0 STARTING DATE
          ITIME 0000 STARTING TIME
          NQ    300 NUMBER OF HYDROGRAPH ORDINATES
          NDDATE 7JUL 0 ENDING DATE
          NDTIME 0055 ENDING TIME
          ICENT  19 CENTURY MARK

          COMPUTATION INTERVAL .08 HOURS
          TOTAL TIME BASE 24.92 HOURS

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

JP         MULTI-PLAN OPTION
          NPLAN 1 NUMBER OF PLANS

JR         MULTI-RATIO OPTION
          RATIOS OF PRECIPITATION
          .57 1.00

```

1

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

| OPERATION     | STATION | AREA | PLAN         | RATIOS APPLIED TO PRECIPITATION |                 |
|---------------|---------|------|--------------|---------------------------------|-----------------|
|               |         |      |              | RATIO 1<br>.57                  | RATIO 2<br>1.00 |
| HYDROGRAPH AT |         |      |              |                                 |                 |
| + PR-1        | .00     | 1    | FLOW<br>TIME | 4.<br>3.50                      | 9.<br>3.50      |
| HYDROGRAPH AT |         |      |              |                                 |                 |
| + PR-2        | .00     | 1    | FLOW<br>TIME | 4.<br>3.50                      | 7.<br>3.50      |
| ROUTED TO     |         |      |              |                                 |                 |
| + RK1         | .00     | 1    | FLOW<br>TIME | 3.<br>3.50                      | 7.<br>3.50      |
| 2 COMBINED AT |         |      |              |                                 |                 |
| + CP-1A       | .01     | 1    | FLOW<br>TIME | 8.<br>3.50                      | 16.<br>3.50     |
| HYDROGRAPH AT |         |      |              |                                 |                 |
| + PR-3        | .00     | 1    | FLOW<br>TIME | 4.<br>3.50                      | 9.<br>3.50      |
| ROUTED TO     |         |      |              |                                 |                 |
| + RK2         | .00     | 1    | FLOW<br>TIME | 4.<br>3.58                      | 8.<br>3.58      |
| HYDROGRAPH AT |         |      |              |                                 |                 |
| + PR-4        | .00     | 1    | FLOW<br>TIME | 4.<br>3.50                      | 7.<br>3.50      |
| HYDROGRAPH AT |         |      |              |                                 |                 |
| + PR-5        | .01     | 1    | FLOW<br>TIME | 6.<br>3.50                      | 12.<br>3.50     |
| ROUTED TO     |         |      |              |                                 |                 |
| + RK3         | .01     | 1    | FLOW<br>TIME | 5.<br>3.50                      | 11.<br>3.50     |
| 3 COMBINED AT |         |      |              |                                 |                 |
| + CP-1B       | .01     | 1    | FLOW<br>TIME | 12.<br>3.50                     | 26.<br>3.50     |
| 2 COMBINED AT |         |      |              |                                 |                 |
| + CP-1        | .02     | 1    | FLOW<br>TIME | 20.<br>3.50                     | 42.<br>3.50     |

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING

(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

| ISTAQ | ELEMENT | DT | INTERPOLATED TO<br>COMPUTATION INTERVAL |                 |        |    |      |                 |        |
|-------|---------|----|-----------------------------------------|-----------------|--------|----|------|-----------------|--------|
|       |         |    | PEAK                                    | TIME TO<br>PEAK | VOLUME | DT | PEAK | TIME TO<br>PEAK | VOLUME |


 Q<sub>100</sub> = 43 cfs  
 ORIGINAL STUDY ADDED 1 cfs

|                         | (MIN) | (CFS) | (MIN)  | (IN) | (MIN) | (CFS) | (MIN)  | (IN) |
|-------------------------|-------|-------|--------|------|-------|-------|--------|------|
| FOR PLAN = 1 RATIO= .57 |       |       |        |      |       |       |        |      |
| RK1 MANE                | .75   | 3.64  | 211.06 | 1.01 | 5.00  | 3.50  | 210.00 | 1.01 |

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1881E+00 EXCESS= .0000E+00 OUTFLOW= .1883E+00 BASIN STORAGE= .8021E-10 PERCENT ERROR= -.1

|                          |     |      |        |      |      |      |        |      |
|--------------------------|-----|------|--------|------|------|------|--------|------|
| FOR PLAN = 1 RATIO= 1.00 |     |      |        |      |      |      |        |      |
| RK1 MANE                 | .65 | 7.24 | 210.69 | 2.13 | 5.00 | 7.05 | 210.00 | 2.13 |

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3973E+00 EXCESS= .0000E+00 OUTFLOW= .3977E+00 BASIN STORAGE= .6358E-10 PERCENT ERROR= -.1

|                         |      |      |        |     |      |      |        |     |
|-------------------------|------|------|--------|-----|------|------|--------|-----|
| FOR PLAN = 1 RATIO= .57 |      |      |        |     |      |      |        |     |
| RK2 MANE                | 1.67 | 4.22 | 214.32 | .97 | 5.00 | 4.17 | 215.00 | .97 |

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2519E+00 EXCESS= .0000E+00 OUTFLOW= .2524E+00 BASIN STORAGE= .1471E-08 PERCENT ERROR= -.2

|                          |      |      |        |      |      |      |        |      |
|--------------------------|------|------|--------|------|------|------|--------|------|
| FOR PLAN = 1 RATIO= 1.00 |      |      |        |      |      |      |        |      |
| RK2 MANE                 | 1.37 | 8.65 | 212.34 | 2.08 | 5.00 | 8.42 | 215.00 | 2.07 |

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5414E+00 EXCESS= .0000E+00 OUTFLOW= .5431E+00 BASIN STORAGE= .1569E-08 PERCENT ERROR= -.3

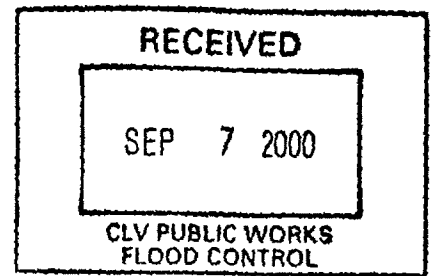
|                         |      |      |        |     |      |      |        |     |
|-------------------------|------|------|--------|-----|------|------|--------|-----|
| FOR PLAN = 1 RATIO= .57 |      |      |        |     |      |      |        |     |
| RK3 MANE                | 1.56 | 5.61 | 212.16 | .90 | 5.00 | 5.02 | 210.00 | .90 |

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2910E+00 EXCESS= .0000E+00 OUTFLOW= .2920E+00 BASIN STORAGE= .3335E-08 PERCENT ERROR= -.4

|                          |      |       |        |      |      |       |        |      |
|--------------------------|------|-------|--------|------|------|-------|--------|------|
| FOR PLAN = 1 RATIO= 1.00 |      |       |        |      |      |       |        |      |
| RK3 MANE                 | 1.29 | 11.82 | 212.87 | 1.99 | 5.00 | 10.95 | 210.00 | 1.99 |

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6443E+00 EXCESS= .0000E+00 OUTFLOW= .6469E+00 BASIN STORAGE= .2302E-08 PERCENT ERROR= -.4

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



The Keith Companies

**TKC**

2738

R-04

\$250

CCRFCA

**ADDENDUM # 1**

**TO THE**

**TECHNICAL DRAINAGE STUDY**

**FOR**

**SAHARA/RANCHO OFFICE PARK**

September 5, 2000

*Prepared For*

**JMA ARCHITECTURE STUDIOS**

10150 Covington Cross  
Las Vegas, NV 89144  
(702) 731-2033

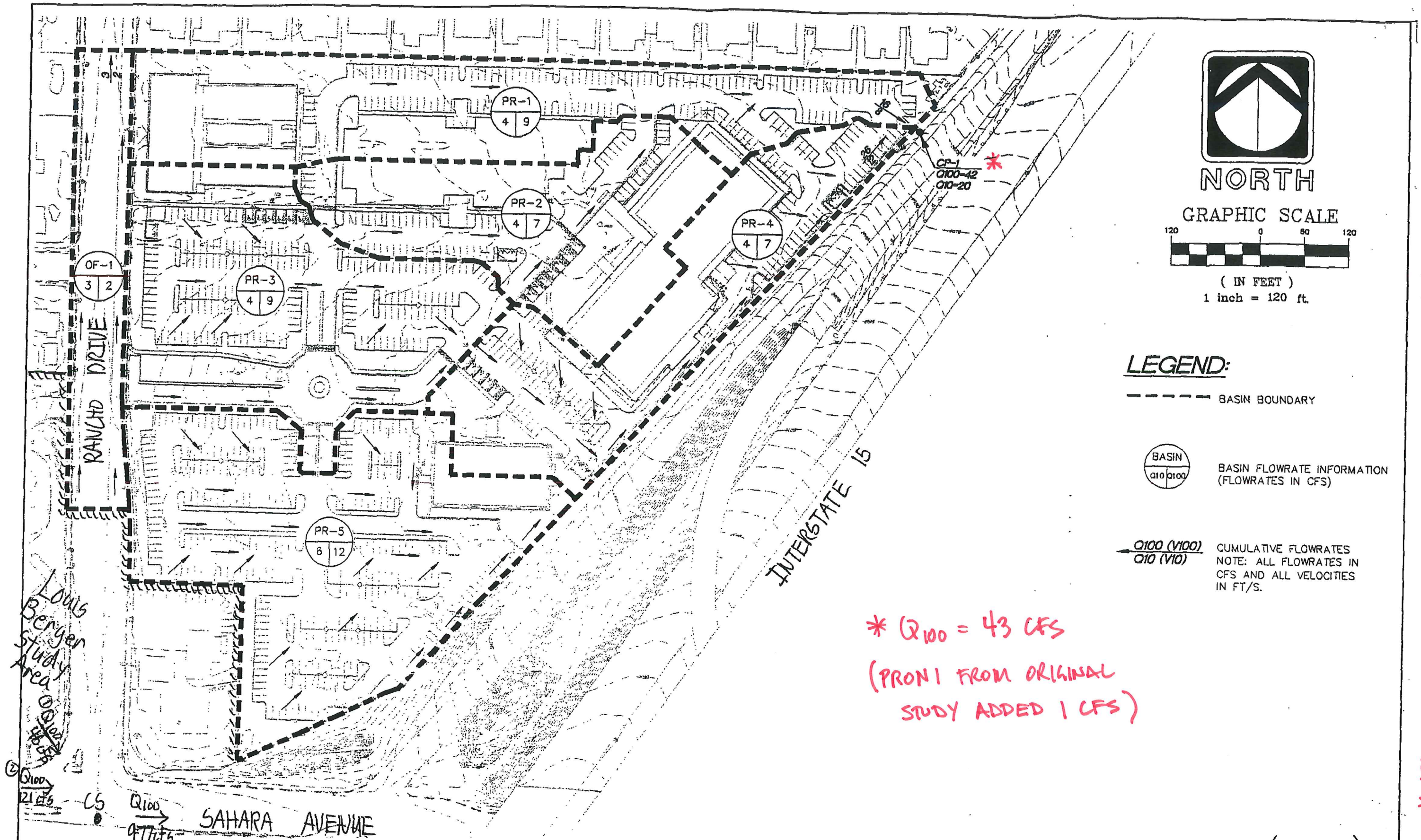
*Prepared By*

**THE KEITH COMPANIES, INC.**

444 E. Warm Springs Road  
Suite 110  
Las Vegas, NV 89119  
(702) 263-8206

PLANNING • ENGINEERING • LAND SURVEYING • DEVELOPER SERVICES  
WATER RESOURCES • PUBLIC WORKS





Louis  
Bengen  
Study  
Area

②  $Q_{100}$   
21 CFS

③  $Q_{100}$   
660 CFS

- ① Flow @ NWL of Intersection (Basin SN3)
- ② Flow From North Routed to Intersection (Basins SN1+SN2)
- ③ Flow From South Routed to Intersection

The Keith Companies **TKC**

444 East Warm Springs Road, Suite 110, Las Vegas, Nevada 89118 (702) 263-0208  
Water Resources Land Planning Civil Engineering Land Surveying Mapping Environmental Services

(UPDATED)

**SAHARA/RANCHO OFFICE PARK  
PROPOSED ONSITE BASINS  
FIGURE 7**

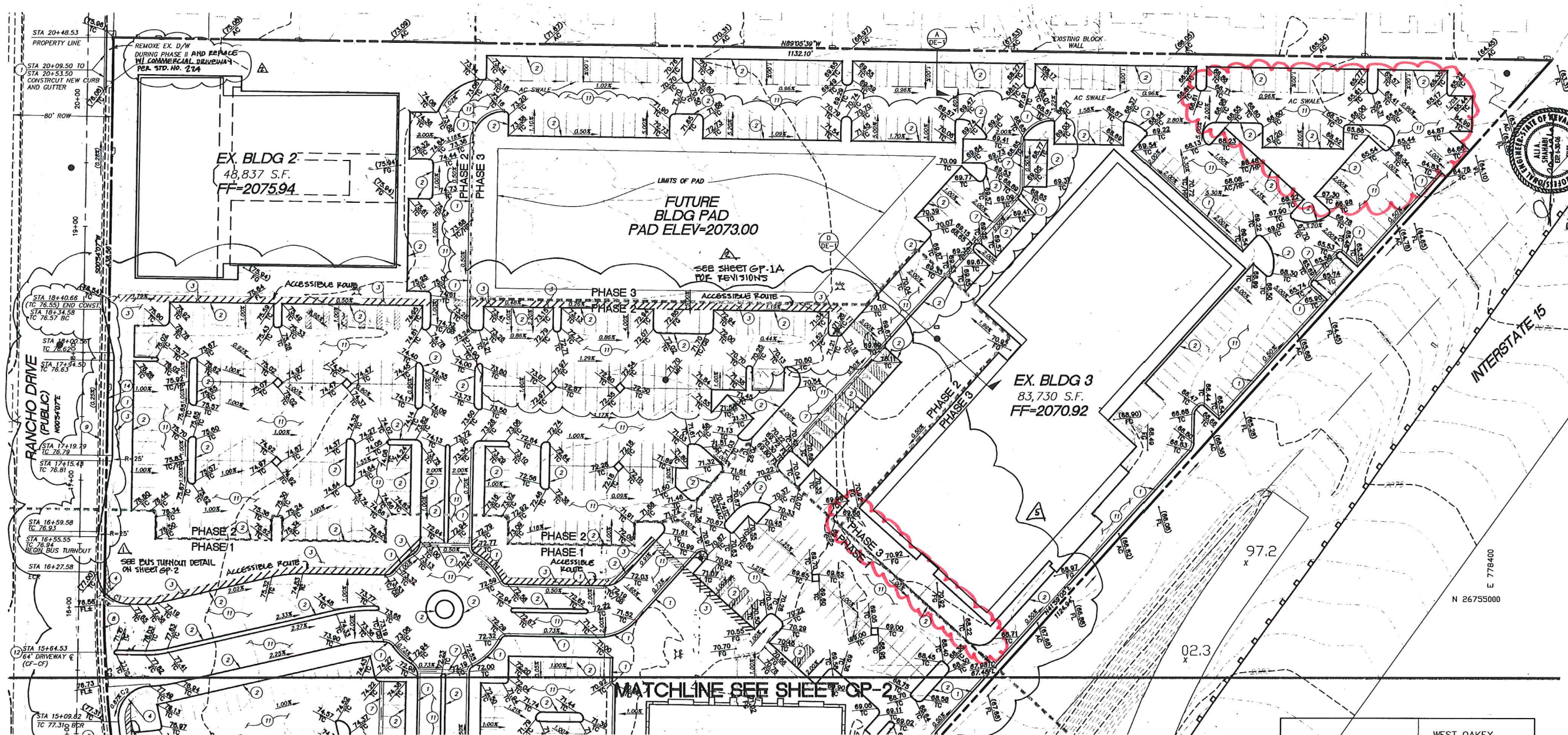
\* FROM APPENDUM 1 TO OFFICE PARK STUDY

ORIGINAL GRADING PLANS

---

Offsite Improvement Plans for Sahara/Rancho Office Park





### CONSTRUCTION NOTES

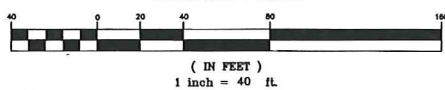
| No. | ITEM                                                                    |
|-----|-------------------------------------------------------------------------|
| 1   | CONSTRUCT "L" TYPE CURB AND GUTTER PER STD DWG NO. 216                  |
| 2   | CONSTRUCT "A" TYPE CURB PER STD DWG NO. 219                             |
| 3   | CONSTRUCT SIDEWALK PER STD DWG NO. 234                                  |
| 4   | CONSTRUCT SIDEWALK RAMP PER STD DWG NO. 235, CASE I (A=8', B=8' U.N.O.) |
| 5   | DEMOLISH AND REMOVE EXISTING ASPHALT AS NECESSARY                       |
| 6   | SAW CUT EXISTING AC TO SMOOTH FACE AND TACK COAT                        |
| 7   | CONSTRUCT VALLEY GUTTER PER DETAIL X ON SHEET DE-1                      |
| 8   | CONSTRUCT 8" CROSS GUTTER PER STD DWG 228                               |
| 9   | SAWCUT AND REMOVE EXISTING "L" TYPE CURB & GUTTER                       |
| 10  | CONSTRUCT CHANNEL PER DETAIL 3 ON SHEET DE-1                            |
| 11  | CONSTRUCT 2.5" MIN. AC OVER 6.5" TYPE II AB                             |
| 12  | CONSTRUCT COMMERCIAL DRIVEWAY PER CC AREA STD. DWG. NO. 222-A           |
| 13  | CONSTRUCT CHANNEL PER DETAIL 6 ON SHEET DE-1                            |
| 14  | CONSTRUCT BUS TURNOUT PER STD. DWG. #234.1                              |

### LEGEND

|                                 |                            |
|---------------------------------|----------------------------|
| --- PROPERTY LINE               | (X) CONSTRUCTION NOTE      |
| --- STREET CENTERLINE           | (15.00) EXISTING GRADE     |
| --- 2125 EXISTING INDEX CONTOUR | --- DIRECTION OF FLOW      |
| --- 2124 EXISTING CONTOUR       | (S) EXISTING STREET LIGHT  |
| --- EXISTING BUILDING           | (S) EXISTING AREA LIGHTING |
| --- EX. CURB & GUTTER           | (S) EXISTING UTILITY POLE  |
| --- EX. CURB                    | (S) EXISTING FIRE HYDRANT  |
| --- AREA OF DEMOLITION          |                            |
| --- EXISTING CHAIN LINK FENCE   |                            |
| --- EXISTING BLOCK WALL         |                            |



### GRAPHIC SCALE



### EARTHWORK QUANTITIES

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

CUT = 16,800 CY  
FILL = 8,400 CY

### NOTE

ALL CONSTRUCTION SHALL CONFORM WITH THE SOILS REPORT PREPARED BY KLEINFELDER DATED JULY 10, 2000. PROJECT No. 31-150407-001.

### FEMA FLOOD ZONE

FEMA MAP DATED AUGUST 16, 1995 (PANEL No. 32003C2170 D)

PROJECT SITE LIES WITHIN AND AREA WHICH IS NOT LOCATED IN A DESIGNATED SPECIAL FLOOD HAZARD AREA, ALSO IDENTIFIED AS ZONE X.

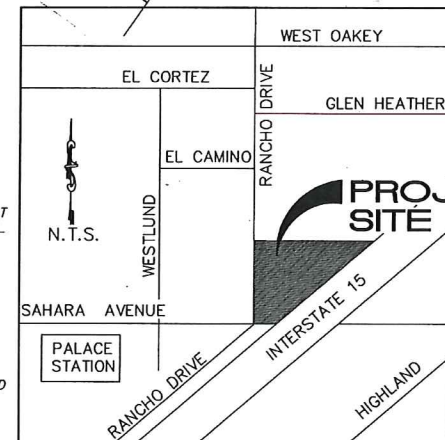
### BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS PROJECT IS GRID NORTH, AS DEFINED BY THE NEVADA COORDINATE SYSTEM OF 1983 (NCS83), EAST ZONE, AS DETERMINED BY PUBLISHED VALUES BY NATIONAL GEODETIC SURVEY HIGH ACCURACY REFERENCE NETWORK AS SHOWN BY MAP ON FILE IN FILE 88, PAGE 53 OF SURVEYS IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

### BENCHMARK

CITY OF LAS VEGAS BENCHMARK STATION 7C11 4SW5

DESCRIPTION  
A RIVET & PLATE IN THE TOP OF CURB ON THE NORTHEAST RETURN OF RANCHO ROAD AND SAHARA AVENUE  
NAVD '88 ELEV. = 632.6872 METERS (2075.74 FEET)



### VICINITY MAP

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

Joe P. Gwerder, P.E. NO. 13636  
DATE 2-23-01



| REV. | DATE    | DESCRIPTION                          |
|------|---------|--------------------------------------|
| 1    | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 2    | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 3    | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 4    | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 5    | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 6    | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 7    | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 8    | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 9    | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 10   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 11   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 12   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 13   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 14   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 15   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 16   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 17   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 18   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 19   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 20   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 21   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 22   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 23   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 24   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 25   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 26   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 27   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 28   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 29   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |
| 30   | 7/11/01 | ADD PARTIAL LANE AND BUS TURN DETAIL |



The Keith Companies

SAHARA RANCHO OFFICE CENTER, LLC  
RANCHO OFFICE PARK

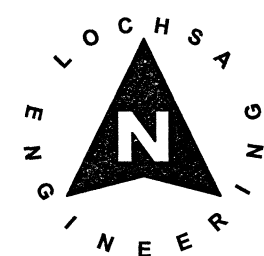
NORTH GRADING PLAN

JOB # 51386.00  
SHEET NO.:

GP-1  
OF 15 SHEETS  
DATE 2-23-01

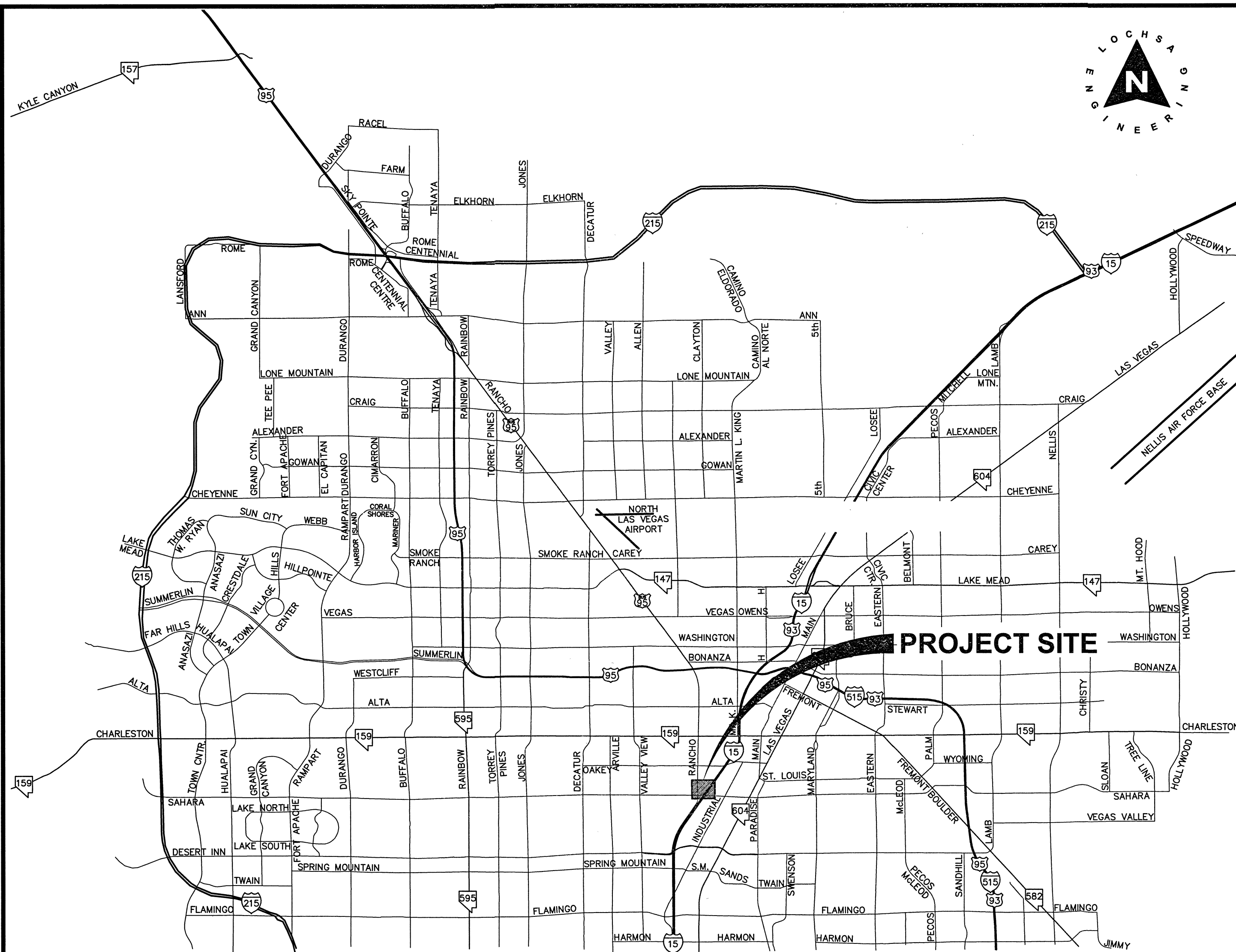
\* FROM APPROVED PLANS FOR RANCHO OFFICE PARK  
(PLANS FROM STUDY NOT AVAILABLE)





# IMPROVEMENT PLANS FOR SAHARA RANCHO OFFICE CENTER NEC SAHARA AND RANCHO CITY OF LAS VEGAS, NEVADA

A PORTION OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 4,  
TOWNSHIP 21 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS,  
CLARK COUNTY, NEVADA  
A.P.N.: 162-04-412-006, 007, 008 & 009  
AFFECTED AREA = 1.68± ACRES OF 12.61± TOTAL



| REV # | REVISION DESCRIPTION | SHEET(S) | APPD BY | DATE APPD |
|-------|----------------------|----------|---------|-----------|
|       |                      |          |         |           |
|       |                      |          |         |           |
|       |                      |          |         |           |
|       |                      |          |         |           |
|       |                      |          |         |           |
|       |                      |          |         |           |
|       |                      |          |         |           |
|       |                      |          |         |           |
|       |                      |          |         |           |

## ABBREVIATIONS

|           |                                         |           |                                       |
|-----------|-----------------------------------------|-----------|---------------------------------------|
| ABAN      | ABANDON                                 | INV       | INVERT                                |
| AIP       | ABANDON IN PLACE                        | ISL       | ISLAND                                |
| AGG       | AGGREGATE                               | JB        | JUNCTION BOX                          |
| ALT       | ALTERNATE                               | LJC       | LENGTH OF CURB                        |
| A         | ANODE, GAS                              | LT        | LEFT                                  |
| ACP       | ASBESTOS CEMENT PIPE                    | LF        | LINEAR FEET                           |
| ACP       | ASPHALTIC CONCRETE                      | LFVWD     | LAS VEGAS VALLEY WATER DISTRICT       |
| AVE       | AVENUE                                  | MH        | MANHOLE                               |
| BC        | BACK OF CURB                            | MAX       | MAXIMUM                               |
| BCR       | BACK OF CURB RADIUS                     | MIN       | MINIMUM                               |
| BVC       | BEGINNING OF VERTICAL CURVE             | MON       | MONOLITHIC                            |
| BM        | BENCHMARK                               | N/O       | NORTH OF                              |
| BORY LINE | BOUNDARY LINE                           | NTS       | NOT TO SCALE                          |
| CATV      | CABLE TELEVISION                        | OG        | OPEN-GRADED PAVEMENT, ORIGINAL GROUND |
| C-C       | CENTER TO CENTER                        | PVMT      | PAVEMENT                              |
| CL        | CENTERLINE                              | PI        | POINT OF INTERSECTION                 |
| CBC       | CITY OF BOULDER CITY                    | PI        | POINT OF REVERSE CURVE                |
| CLV       | CITY OF LAS VEGAS                       | PC        | POINT OF CURVE                        |
| COH       | CITY OF HENDERSON                       | PT        | POINT OF TANGENCY                     |
| CM        | CITY OF MESQUITE                        | PCC       | POINT OF COMPOUND CURVE               |
| CHLV      | CITY OF NORTH LAS VEGAS                 | PCC, CONC | PORTLAND CEMENT CONCRETE              |
| CC        | CLARK COUNTY                            | PP        | POWER POLE                            |
| CCWRD     | CLARK COUNTY WATER RECLAMATION DISTRICT | P         | POWER                                 |
| CO        | CLEAN OUT, SEWER                        | PL        | PROPERTY LINE                         |
| COMM      | COMMERCIAL                              | PROP      | PROPOSED                              |
| CONC      | CONCRETE                                | PB        | PULL BOX                              |
| CONST     | CONSTRUCTION OR CONSTRUCT               | RP        | RADIUS POINT                          |
| COR       | CORNER                                  | R         | RADIUS                                |
| CMP       | CORRUGATED METAL PIPE                   | RR        | RAILROAD                              |
| CSAP      | CORRUGATED STEEL ARCH PIPE              | REINF     | REINFORCED                            |
| CSAP      | CORRUGATED STEEL PIPE                   | RC        | REINFORCED CONCRETE                   |
| C&G       | CURB & GUTTER                           | RCB       | REINFORCED CONCRETE BOX               |
| CIP       | CAST IRON PIPE                          | RCB       | REINFORCED CONCRETE PIPE              |
| COL       | COLUMN                                  | RELOC     | RELOCATE                              |
| CU YD, CY | CUBIC YARD                              | RT        | RIGHT                                 |
| CU FT, CF | CUBIC FOOT                              | R/W       | RIGHT-OF-WAY                          |
| CULV      | CULVERT                                 | RD        | ROAD                                  |
| CF        | CURB FACE                               | SD        | SANITARY SEWER                        |
| DEPT      | DEPARTMENT                              | SHT       | SHEET                                 |
| DIA       | DIAMETER                                | S/O       | SOUTH OF                              |
| DWY       | DRIVEWAY                                | SW        | SIDEWALK                              |
| DI        | DROP INLET                              | SQ FT, SF | SQUARE FOOT                           |
| ESMT      | EASEMENT                                | SQ YD, SY | SQUARE YARD                           |
| E/O       | EAST OF                                 | STA       | STATION                               |
| EO        | EDGE OF PAVEMENT                        | SHIP      | STEEL, HIGH-PRESSURE PIPE             |
| E         | EDGE OF OIL                             | SD        | STORM DRAIN                           |
| EM        | ELECTRIC                                | STD       | STANDARD                              |
| ELEV      | ELECTRIC METER                          | STRUCT    | STRUCTURAL OR STRUCTURE               |
| EMBK      | EMBANKMENT                              | SURV      | SURVEY                                |
| ECR       | END OF CURB RETURN                      | SLT       | STREETLIGHT                           |
| EC        | END OF CURVE                            | TEL       | TELEPHONE                             |
| EB        | END OF BUSY                             | TEMP      | TEMPORARY                             |
| ETS       | CATHODE PROTECTION BOND STATION         | TBA       | TO BE ADJUSTED                        |
| EVC       | CATHODE PROTECTION TEST STATION         | TBR       | TO BE REMOVED                         |
| EXIST     | EXISTING                                | TOP       | TOP OF CURB                           |
| FEET/FOOT | FEET/FOOT                               | TP        | TOP OF PIPE                           |
| FG        | FINISH GRADE                            | TS        | TRAFFIC SIGNAL                        |
| FA        | FIRE ALARM                              | TSI       | TRAFFIC SIGNAL INTERCONNECT           |
| FH        | FIRE HYDRANT                            | TRANS     | TRANSITION                            |
| FL        | FLOW LINE                               | TYP       | TYPICAL                               |
| GALV      | GALVANIZED                              | UG        | UNDERGROUND                           |
| GM        | GAS METER                               | VAR       | VARIABLE                              |
| GR        | GAS PRESSURE REGULATOR                  | VERT      | VERTICAL                              |
| PL-G      | PLASTIC GAS                             | VC        | VERTICAL CURVE                        |
| SG        | STEEL GAS                               | VC        | VALLEY GUTTER                         |
| GB        | GRADE BREAK                             | VCP       | VITRIFIED CLAY PIPE                   |
| GUT       | GUTTER                                  | W         | WATER                                 |
| HDWL      | HEADWALL                                | WM        | WATER METER                           |
| INT       | INTERSECTION                            | W/O       | WEST OF                               |
| INT       | INTERSECTION                            | YD        | YARD                                  |

## DEVELOPER

DR. DAVID STEINBERG  
7301 PEAK DRIVE #200  
LAS VEGAS, NV 89128

CONTACT: DR. DAVID STEINBERG  
PHONE: 702-240-1232  
FAX: ----

## OWNER

DR. DAVID STEINBERG  
7301 PEAK DRIVE #200  
LAS VEGAS, NV 89128  
CONTACT: DR. DAVID STEINBERG  
PHONE: 702-240-1232

## UTILITY PROVIDERS

NOTE: UTILITY LOCATIONS SHOWN ARE APPROXIMATE.

|            |                                        |
|------------|----------------------------------------|
| WATER:     | LAS VEGAS VALLEY WATER DISTRICT        |
| SEWER:     | CITY OF LAS VEGAS                      |
| GAS:       | SOUTHWEST GAS CORPORATION              |
| ELECTRIC:  | NV ENERGY                              |
| TELEPHONE: | CENTURYLINK                            |
| CABLE TV:  | COX COMMUNICATIONS LAS VEGAS, INC.     |
| TRASH:     | REPUBLIC SILVER STATE DISPOSAL SERVICE |

## APPROVALS

ALLEN PAVELKA, P.E., #9029  
CITY ENGINEER  
DATE  
APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHT-OF-WAY AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARD. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARDS DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA, NEVADA.

CITY OF LAS VEGAS PLANNING DEPARTMENT  
DATE  
NOTE:  
THIS PLAN CONFORMS TO THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

LAS VEGAS FIRE AND RESCUE  
DATE  
LAS VEGAS VALLEY WATER DISTRICT  
APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER  
PROJECT NO. XXXX SHEETS: XXXXX  
LVVWD APPROVED FIRE FLOW = XXXX GPM AT 20 PSI RESIDUAL  
DATE

SOUTHWEST GAS CORPORATION  
DATE  
NV ENERGY  
DATE

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

COX COMMUNICATIONS LAS VEGAS, INC.  
DATE

CENTRAL TELEPHONE COMPANY D.B.A. CENTURY LINK  
DATE

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

## SHEET INDEX

| Sheet Number     | Sheet Title       | DRAWING NUMBER |
|------------------|-------------------|----------------|
| General          |                   |                |
| C1.01            | COVER SHEET       | 1              |
| C1.02            | NOTE SHEET        | 2              |
| C1.03            | OVERALL SITE PLAN | 3              |
| Demolition Plans |                   |                |
| C2.01            | SHEET 1 OF 2      | 4              |
| C2.02            | SHEET 2 OF 2      | 5              |
| Grading Plans    |                   |                |
| C3.01            | SHEET 1 OF 2      | 6              |
| C3.02            | SHEET 2 OF 2      | 7              |
| Detail Sheets    |                   |                |
| C5.01            | SHEET 1           | 10             |

## GENERAL SITE INFORMATION

### UTILITY 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.

Call before you Dig  
Avoid cutting underground utility lines. It's costly.

FAST  
Call before you Dig  
Underground

Call before you Dig  
Overhead  
Avoid hitting overhead power lines. It's costly.

### A.P.N.:

162-04-412-006, 007, 008 & 009

### BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE WEST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 4, TOWNSHIP 21 SOUTH, RANGE 61 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN ON FILE IN BOOK 121, PAGE 100 OF PLATS IN THE CLARK COUNTY RECORDERS OFFICE, CLARK COUNTY, NEVADA, SAID LINE BEARS NORTH 00°54'07" EAST

### BENCHMARK:

TLV155ES, BEING A RIVET AND PLATE IN TOP OF CURB, NORTHWEST CORNER OF SAHARA AVENUE AND RANCHO DRIVE, ELEVATION: 2076.57 FEET / 632.9391 METERS (NAVD 88)

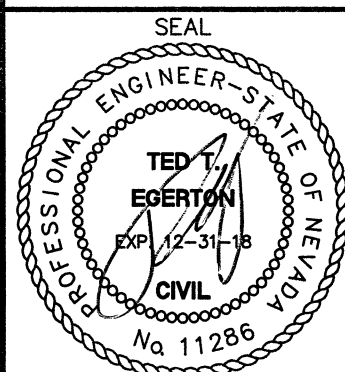
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1-702-432-5300

1-702-227-2929

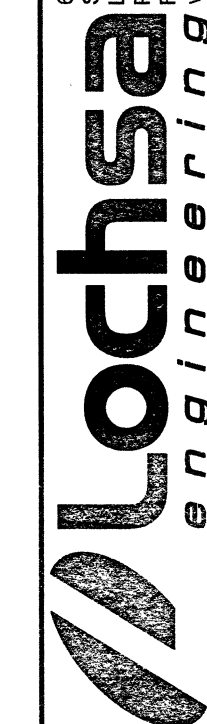
GENERAL  
COVER SHEET

PROJECT No.: 171143  
DATE: 10/25/2017  
SCALE: NO SCALE  
DRAWN BY: JNC  
DESIGNED BY: JNC  
CHECKED BY: JLI



10/25/2017  
SHEET No. C1.01  
SHEET 1 of 10  
OFFSITE HTE No.

6545 South Jones Blvd.  
Las Vegas, NV 89118  
Phone (702) 866-9312  
Fax (702) 866-9317  
www.lochsa.com



SAHARA RANCHO OFFICE CENTER  
NEC SAHARA AND RANCHO  
CITY OF LAS VEGAS, NEVADA



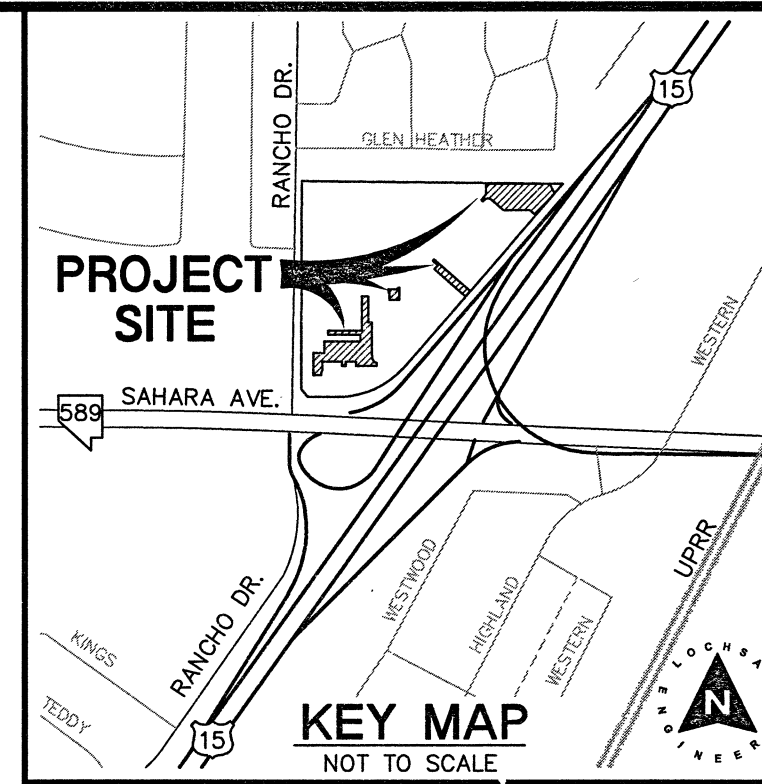
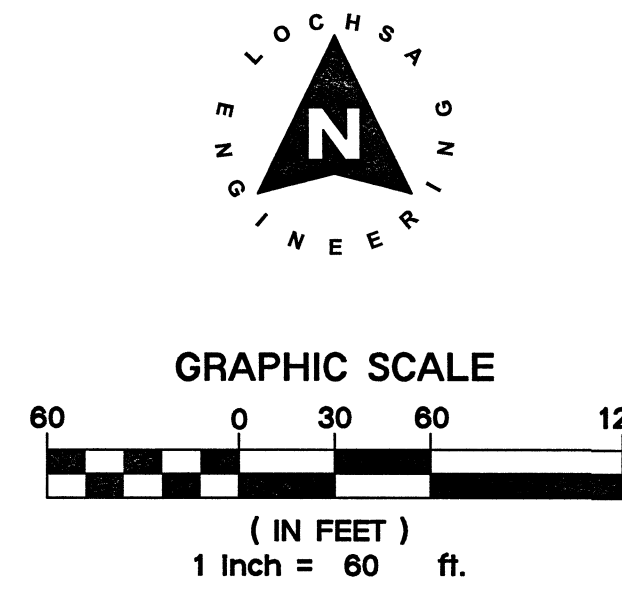
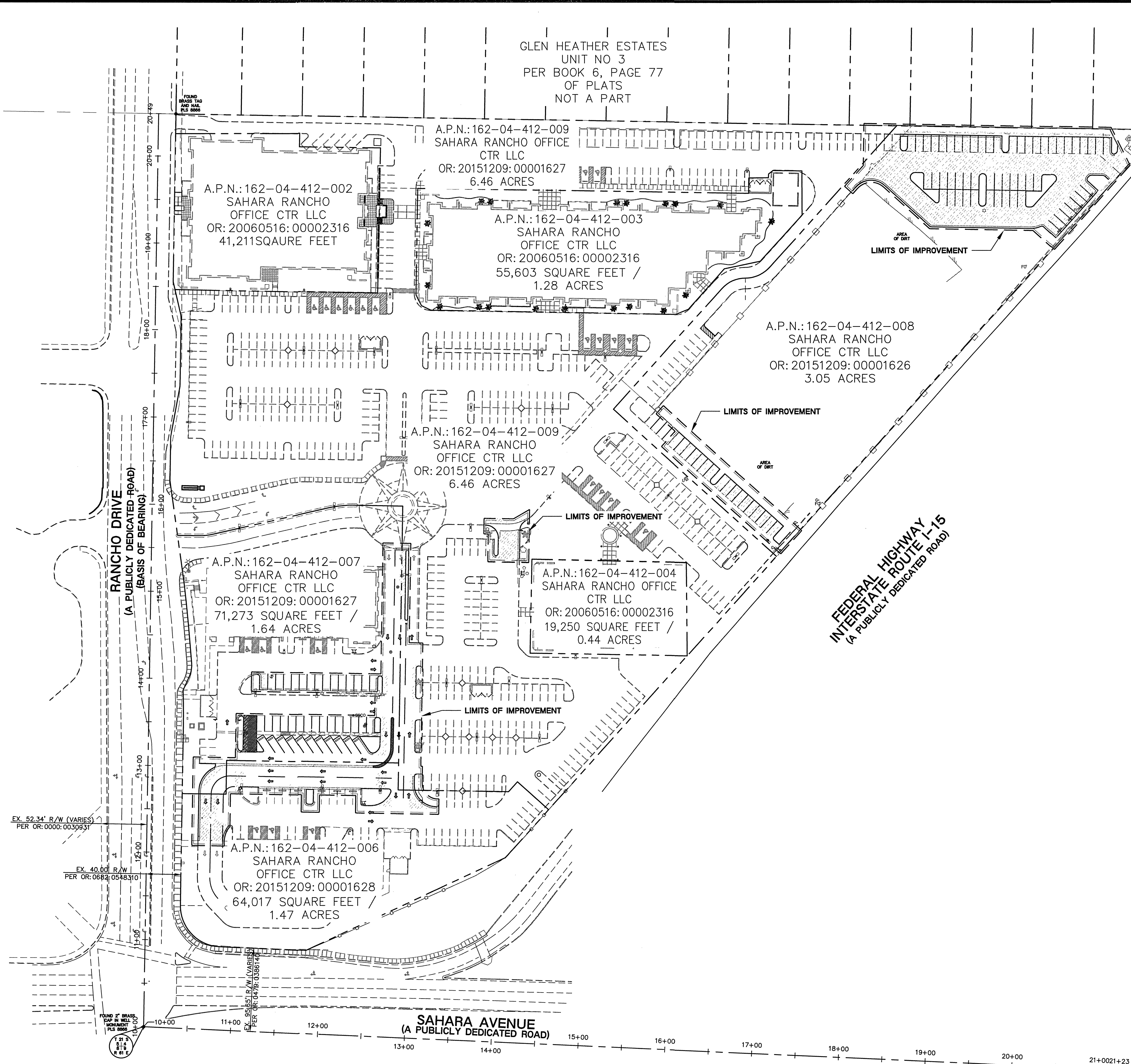




10/25/2017 9:30 AM  
C:\Users\jlo\OneDrive\Projects\171143-01-00-00\171143-01-00-00.dwg

LEGEND

|                   |               |              |                  |                  |                |                |       |               |             |          |                 |       |                        |                      |                |               |          |            |                      |                       |                       |                       |                       |                       |
|-------------------|---------------|--------------|------------------|------------------|----------------|----------------|-------|---------------|-------------|----------|-----------------|-------|------------------------|----------------------|----------------|---------------|----------|------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| CL OR SURVEY LINE | EASEMENT LINE | DESCRIPTION: | BUILDING OUTLINE | EDGE OF PAVEMENT | "A" TYPE CURBS | "L" TYPE CURBS | WALLS | CONTOUR LINES | AC PAVEMENT | CONCRETE | SPOT ELEVATIONS | SIGNS | MANHOLE W/ DESCRIPTION | MANHOLE DESCRIPTIONS | FIRE HYDRANTS  | GATE VALVES   | REDUCERS | CLEAN OUTS | UTILITY BOX OR VAULT | 100w HPS STREETLIGHTS | 150w HPS STREETLIGHTS | 200w HPS STREETLIGHTS | 250w HPS STREETLIGHTS | 400w HPS STREETLIGHTS |
| PROPERTY LINE     | SAWCUT LINE   | EXISTING:    |                  |                  |                |                |       | (-2120)-      |             |          | (12.34) BC      |       | ⊙ = SANITARY SEWER     | ⊙ = STORM DRAIN      | ⊙ = ELECTRICAL | ⊙ = TELEPHONE |          |            |                      |                       |                       |                       |                       |                       |
| ROW LINE          | SCARP LINE    | PROPOSED:    |                  |                  |                |                |       | (-2122)-      |             |          | (12.34) BC      |       | ⊙ = SANITARY SEWER     | ⊙ = STORM DRAIN      | ⊙ = ELECTRICAL | ⊙ = TELEPHONE |          |            |                      |                       |                       |                       |                       |                       |



**A.P.N.:**  
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**BENCHMARK:**  
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**FAST**  
Call before you Dig

**Call before you Dig**  
Avoid hitting overhead power lines. It's costly.

**1-800-227-2800**  
OR  
**1-702-432-6300**  
FIREARM & AERIAL SYSTEM OF TRANSPORTATION  
**1-702-227-2929**

|              |  |               |  |                 |  |
|--------------|--|---------------|--|-----------------|--|
| SHEET        |  | PROJECT No.:  |  | 171143          |  |
| DATE:        |  | 10/25/2017    |  |                 |  |
| SCALE:       |  | 1" = 20'      |  |                 |  |
| DRAWN BY:    |  | JNC           |  |                 |  |
| DESIGNED BY: |  | JNC           |  |                 |  |
| CHECKED BY:  |  | JLI           |  |                 |  |
| SEAL         |  | 10/25/2017    |  | SHEET No.       |  |
| C1.03        |  | SHEET 3 of 10 |  | OFFSITE HTE No. |  |

**Lochsa**  
engineering

6545 South Jones Blvd  
Las Vegas, NV 89118  
Phone (702) 365-9312  
Fax (702) 365-9317  
www.lochsa.com

**GENERAL SITE PLAN**  
**OVERALL SITE PLAN**  
**SAHARA RANCHO OFFICE CENTER**  
**NEC SAHARA AND RANCHO**  
**CITY OF LAS VEGAS, NEVADA**



15/07/2017 8:52 AM  
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LEGEND

|                   |               |              |                  |                  |                |                |       |               |             |          |                 |       |                        |                      |                |               |          |            |                      |                       |                       |                       |                       |                       |
|-------------------|---------------|--------------|------------------|------------------|----------------|----------------|-------|---------------|-------------|----------|-----------------|-------|------------------------|----------------------|----------------|---------------|----------|------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| CL OR SURVEY LINE | EASEMENT LINE | DESCRIPTION: | BUILDING OUTLINE | EDGE OF PAVEMENT | "A" TYPE CURBS | "L" TYPE CURBS | WALLS | CONTOUR LINES | AC PAVEMENT | CONCRETE | SPOT ELEVATIONS | SIGNS | MANHOLE W/ DESCRIPTION | MANHOLE DESCRIPTIONS | FIRE HYDRANTS  | GATE VALVES   | REDUCERS | CLEAN OUTS | UTILITY BOX OR VAULT | 100w HPS STREETLIGHTS | 150w HPS STREETLIGHTS | 200w HPS STREETLIGHTS | 250w HPS STREETLIGHTS | 400w HPS STREETLIGHTS |
| PROPERTY LINE     | SAWCUT LINE   | EXISTING:    |                  |                  |                |                |       | (2210)        |             |          | (12.34)         |       | ⊙ = SANITARY SEWER     | ⊙ = STORM DRAIN      | ⊙ = ELECTRICAL | ⊙ = TELEPHONE |          |            |                      |                       |                       |                       |                       |                       |
| ROW LINE          | SCARP LINE    | PROPOSED:    |                  |                  |                |                |       | (2122)        |             |          | (12.34) BC      |       |                        |                      |                |               |          |            |                      |                       |                       |                       |                       |                       |

DESCRIPTION:

BUILDING OUTLINE

EDGE OF PAVEMENT

"A" TYPE CURBS

"L" TYPE CURBS

WALLS

CONTOUR LINES

AC PAVEMENT

CONCRETE

SPOT ELEVATIONS

SIGNS

MANHOLE W/ DESCRIPTION

MANHOLE DESCRIPTIONS

FIRE HYDRANTS

GATE VALVES

REDUCERS

CLEAN OUTS

UTILITY BOX OR VAULT

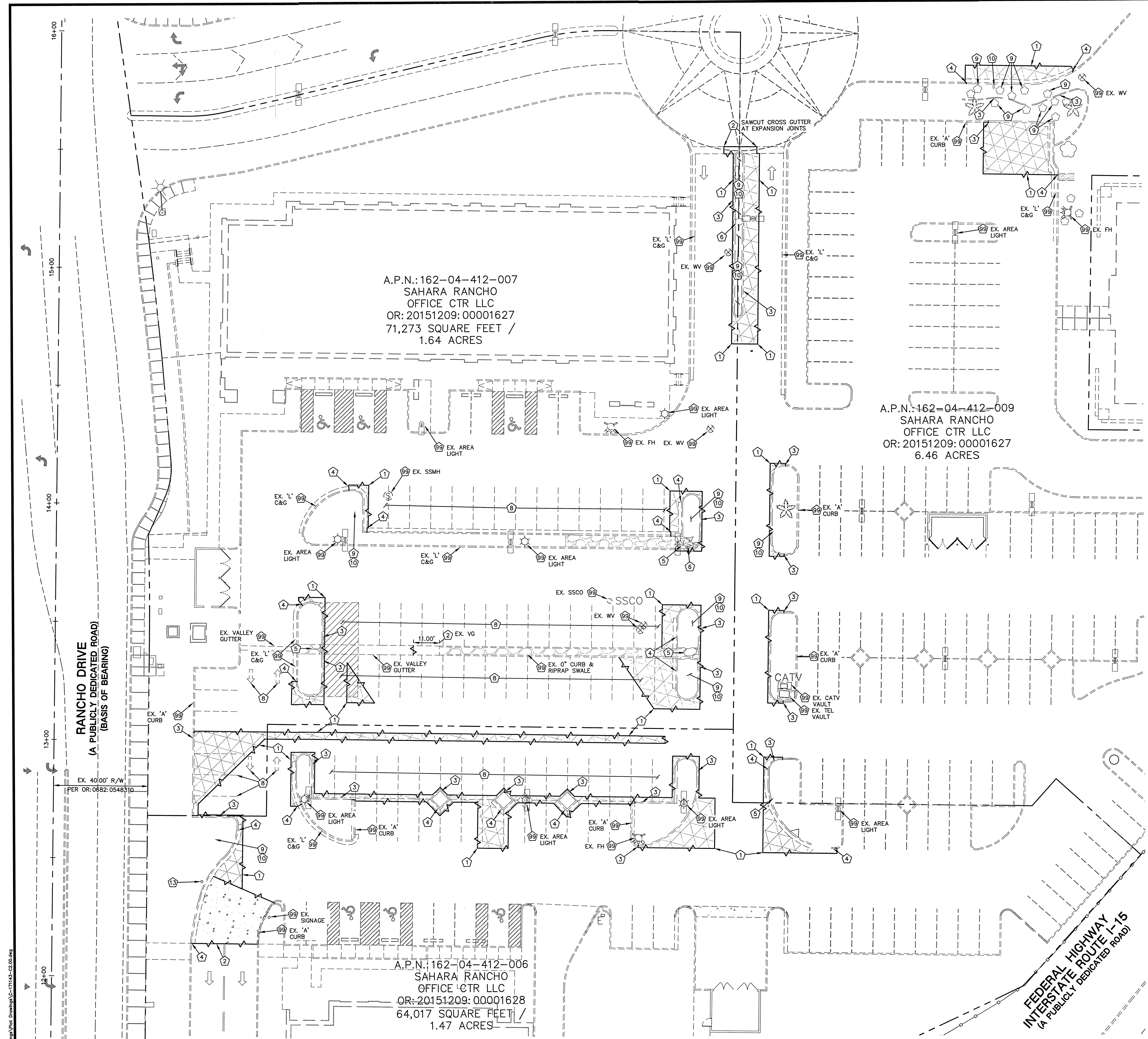
100w HPS STREETLIGHTS

150w HPS STREETLIGHTS

200w HPS STREETLIGHTS

250w HPS STREETLIGHTS

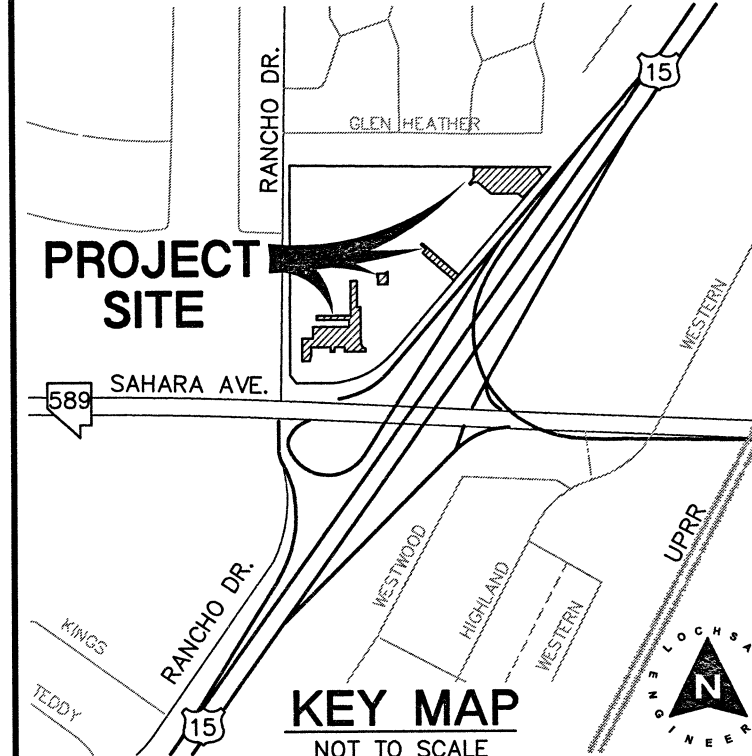
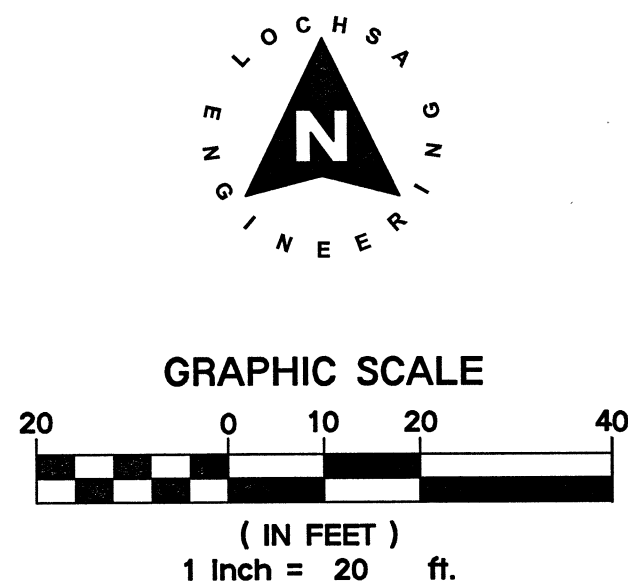
400w HPS STREETLIGHTS



A.P.N.: 162-04-412-007  
SAHARA RANCHO  
OFFICE CTR LLC  
OR: 20151209: 00001627  
71,273 SQUARE FEET /  
1.64 ACRES

A.P.N.: 162-04-412-009  
SAHARA RANCHO  
OFFICE CTR LLC  
OR: 20151209: 00001627  
6.46 ACRES

A.P.N.: 162-04-412-006  
SAHARA RANCHO  
OFFICE CTR LLC  
OR: 20151209: 00001628  
64,017 SQUARE FEET /  
1.47 ACRES



#### DEMOLITION NOTES:

- ALL CONSTRUCTION TO BE DONE IN ACCORDANCE WITH AREA UNIFORM STANDARD DRAWINGS LATEST EDITION AND/OR REGULATING ENTITY HAVING JURISDICTION.
- NOT ALL NOTES USED ON THIS SHEET -
- 1 SAWCUT CLEAN STRAIGHT LINE, FULL DEPTH AND REMOVE EXISTING AC PAVEMENT.
- 2 SAWCUT CLEAN STRAIGHT LINE, FULL DEPTH AND REMOVE EXISTING CONCRETE PAVEMENT.
- 3 REMOVE EXISTING "A" CURB.
- 4 REMOVE EXISTING "L" CURB.
- 5 REMOVE EXISTING RIP RAP, STORE ONSITE FOR REUSE.
- 6 REMOVE EXISTING AREA LIGHT, POLE AND BASE. STORE LIGHT AND POLE ONSITE FOR REUSE.
- 7 REMOVE EXISTING AREA LIGHT, POLE AND BASE.
- 8 OBLITERATE EXISTING PAVEMENT MARKINGS.
- 9 REMOVE EXISTING LANDSCAPING IMPROVEMENTS.
- 10 IRRIGATION IMPROVEMENTS TO BE RELOCATED PER LANDSCAPE PLANS.
- 11 REMOVE EXISTING FENCING / GATES. RELOCATE PER ARCHITECTURAL SITE PLAN.
- 12 SAWCUT CLEAN STRAIGHT LINE, FULL DEPTH AND REMOVE EXISTING SIDEWALK.
- 13 REMOVE EXISTING SIGNAGE. STORE ONSITE FOR REUSE.
- 99 PROTECT IN PLACE.

AC PAVEMENT REMOVAL



#### UTILITY 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.

Call before you Dig  
Avoid cutting underground utility lines. It's costly.

FAST  
Call before you Undergo  
Avoid hitting overhead power lines. It's costly.

CALL BEFORE YOU DIG  
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1-702-432-5300  
1-702-227-2929

#### A.P.N.:

162-04-412-006, 007, 008 & 009

#### BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE WEST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 4, TOWNSHIP 21 SOUTH, RANGE 61 EAST M.D.M., CLARK COUNTY, NEVADA, AS SHOWN ON FILE IN BOOK 121, PAGE 100 OF PLATS IN THE CLARK COUNTY RECORDERS OFFICE, CLARK COUNTY, NEVADA. SAID LINE BEARS NORTH 00°54'07" EAST

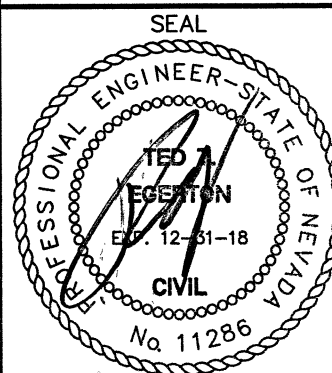
#### BENCHMARK:

11V1555, BEING A RIVET AND PLATE IN TOP OF CURB, NORTHWEST CORNER OF SAHARA AVENUE AND RANCHO DRIVE. ELEVATION: 2076.57 FEET / 632.9391 METERS. (NAVD '88)

#### DEMOLITION PLANS SHEET 1 OF 2

SAHARA RANCHO OFFICE CENTER  
NEC SAHARA AND RANCHO  
CITY OF LAS VEGAS, NEVADA

PROJECT No.: 171143  
DATE: 10/25/2017  
SCALE: 1" = 20'  
DRAWN BY: JNC  
DESIGNED BY: JNC  
CHECKED BY: JLI



SHEET No. C2.01  
SHEET 4 OF 10  
OFFSITE HTE No.



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LEGEND

|                    |               |              |                  |                  |                |                |       |               |             |          |                 |       |                        |                      |               |             |          |            |                      |                        |                        |                        |                        |                        |
|--------------------|---------------|--------------|------------------|------------------|----------------|----------------|-------|---------------|-------------|----------|-----------------|-------|------------------------|----------------------|---------------|-------------|----------|------------|----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| CL. OR SURVEY LINE | EASEMENT LINE | DESCRIPTION: | BUILDING OUTLINE | EDGE OF PAVEMENT | "A" TYPE CURBS | "L" TYPE CURBS | WALLS | CONTOUR LINES | AC PAVEMENT | CONCRETE | SPOT ELEVATIONS | SIGNS | MANHOLE W/ DESCRIPTION | MANHOLE DESCRIPTIONS | FIRE HYDRANTS | GATE VALVES | REDUCERS | CLEAN OUTS | UTILITY BOX OR VAULT | 100w. HPS STREETLIGHTS | 150w. HPS STREETLIGHTS | 200w. HPS STREETLIGHTS | 250w. HPS STREETLIGHTS | 400w. HPS STREETLIGHTS |
| PROPERTY LINE      | SAWCUT LINE   | EXISTING:    |                  |                  |                |                |       | (2121)        |             |          | (12.34) BC      |       | ⑤ = SANITARY SEWER     | ⑤ = STORM DRAIN      |               | ⊗           | ▷        | ○          | □                    | ○                      | ○                      | ○                      | ○                      | ○                      |
| ROW LINE           | SCARP LINE    | PROPOSED:    |                  |                  |                |                |       | (2122)        |             |          | (12.34) BC      |       | ⑥ = ELECTRICAL         | ⑥ = TELEPHONE        |               |             |          |            |                      |                        |                        |                        |                        |                        |

A.P.N.: 162-04-412-009  
SAHARA RANCHO  
OFFICE CTR LLC  
OR: 20151209:00001627  
6.46 ACRES

A.P.N.: 162-04-412-008  
SAHARA RANCHO  
OFFICE CTR LLC  
OR: 20151209:00001626  
3.05 ACRES

A.P.N.: 162-04-412-008  
SAHARA RANCHO  
OFFICE CTR LLC  
OR: 20151209:00001626  
3.05 ACRES

GRAPHIC SCALE  
(IN FEET)  
1 inch = 20 ft.

PROJECT SITE

KEY MAP  
NOT TO SCALE

#### DEMOLITION NOTES:

- ALL CONSTRUCTION TO BE DONE IN ACCORDANCE WITH AREA UNIFORM STANDARD DRAWINGS, LATEST EDITION AND/OR REGULATING ENTITY HAVING JURISDICTION.
- NOT ALL NOTES USED ON THIS SHEET -
- ① SAWCUT CLEAN STRAIGHT LINE, FULL DEPTH AND REMOVE EXISTING AC PAVEMENT.
- ② SAWCUT CLEAN STRAIGHT LINE, FULL DEPTH AND REMOVE EXISTING CONCRETE PAVEMENT.
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- ④ REMOVE EXISTING "L" CURB.
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- ⑨ REMOVE EXISTING LANDSCAPING IMPROVEMENTS.
- ⑩ IRRIGATION IMPROVEMENTS TO BE RELOCATED PER ARCHITECTURAL SITE PLAN.
- ⑪ REMOVE EXISTING FENCING / GATES. RELOCATE PER ARCHITECTURAL SITE PLAN.
- ⑫ SAWCUT CLEAN STRAIGHT LINE, FULL DEPTH AND REMOVE EXISTING SIDEWALK.
- ⑬ REMOVE EXISTING SIGNAGE. STORE ONSITE FOR REUSE.
- 99 PROTECT IN PLACE.

AC PAVEMENT REMOVAL



#### UTILITY NOTE:

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CALL BEFORE YOU DIG  
811

FAST  
before you dig  
Underground

CALL BEFORE YOU DO OVERHEAD  
Avoid hitting overhead power lines. It's costly.

A.P.N.:

162-04-412-006, 007, 008 & 009

#### BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE WEST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 4, TOWNSHIP 21 SOUTH, RANGE 61 EAST M.D.M., CLARK COUNTY, NEVADA, AS SHOWN ON FILE IN BOOK 121, PAGE 100 OF PLATS IN THE CLARK COUNTY RECORDERS OFFICE, CLARK COUNTY, NEVADA. SAID LINE BEARS NORTH 00°54'07" EAST.

#### BENCHMARK:

TLTVTSSSES, BEING A RIVET AND PLATE IN TOP OF CURB, NORTHWEST CORNER OF SAHARA AVENUE AND RANCHO DRIVE. ELEVATION: 2076.57 FEET / 632.9391 METERS. (NAVD 88)

1-800-227-2800

1-702-432-5300

1-702-227-2929

DEMOLITION PLANS  
SHEET 2 OF 2

SAHARA RANCHO OFFICE CENTER  
NEC SAHARA AND RANCHO  
CITY OF LAS VEGAS, NEVADA

TITLE

PROJECT No.: 171143

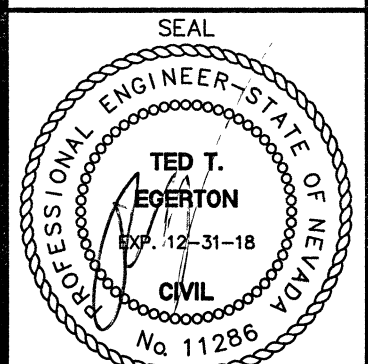
DATE: 10/25/2017

SCALE: 1" = 20'

DRAWN BY: JNC

DESIGNED BY: JNC

CHECKED BY: JLI



10/25/2017

SHEET No. C2.02

OFFSITE HTE No.

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

Lochsa  
engineering

DESCRIPTION:  
BY:  
DATE:  
REV:



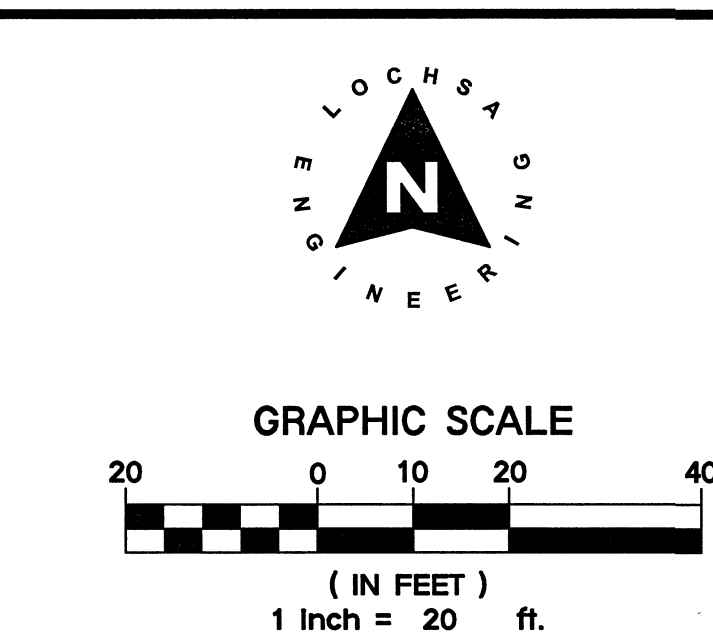
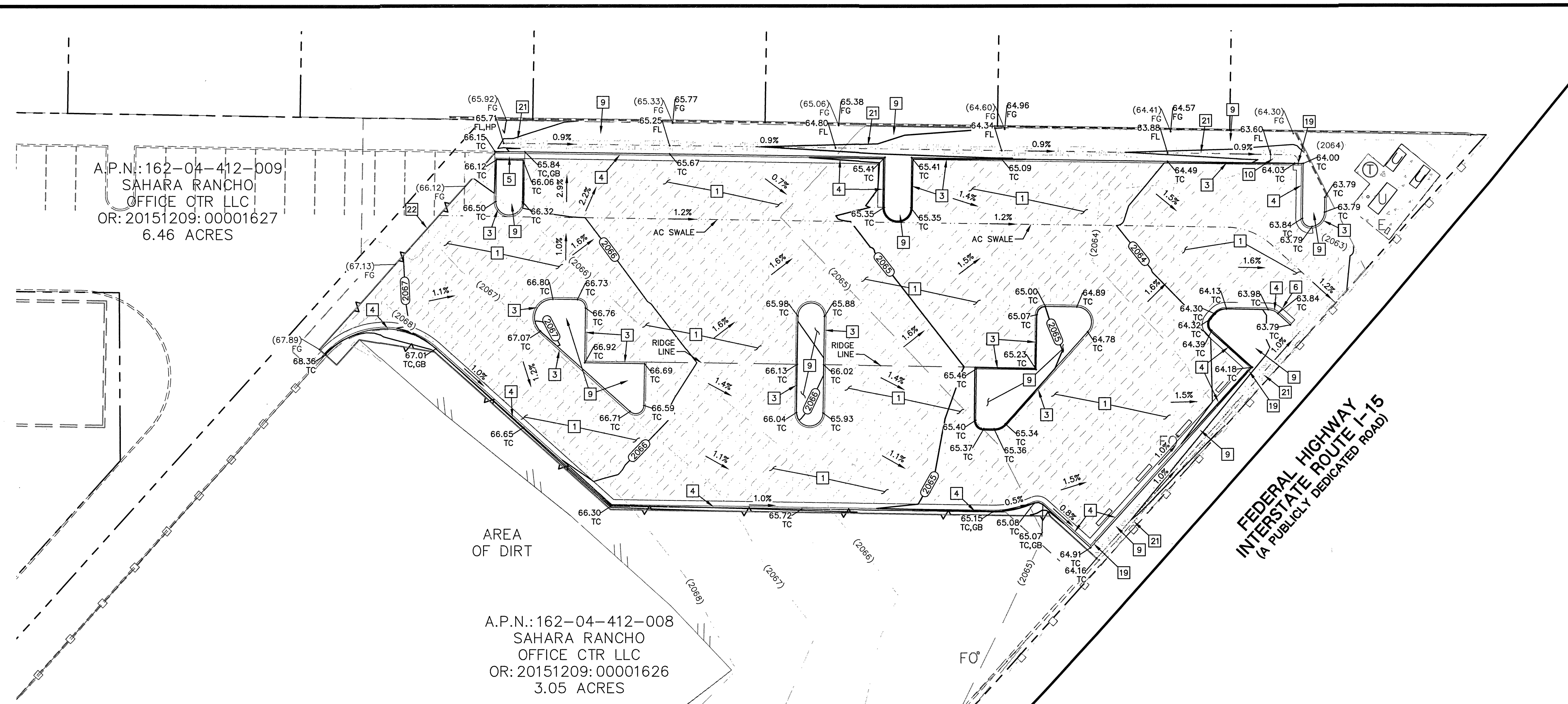
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LEGEND

|                   |               |              |                  |                  |                |                |       |               |             |          |                 |       |                        |                      |               |              |          |            |                      |                       |                       |                       |                       |                       |
|-------------------|---------------|--------------|------------------|------------------|----------------|----------------|-------|---------------|-------------|----------|-----------------|-------|------------------------|----------------------|---------------|--------------|----------|------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| CL OR SURVEY LINE | EASEMENT LINE | DESCRIPTION: | BUILDING OUTLINE | EDGE OF PAVEMENT | "A" TYPE CURBS | "L" TYPE CURBS | WALLS | CONTOUR LINES | AC PAVEMENT | CONCRETE | SPOT ELEVATIONS | SIGNS | MANHOLE W/ DESCRIPTION | MANHOLE DESCRIPTIONS | FIRE HYDRANTS | WATER VALVES | REDUCERS | CLEAN OUTS | UTILITY BOX OR VAULT | 100w HPS STREETLIGHTS | 150w HPS STREETLIGHTS | 200w HPS STREETLIGHTS | 250w HPS STREETLIGHTS | 400w HPS STREETLIGHTS |
| PROPERTY LINE     | SAWCUT LINE   | EXISTING:    |                  |                  |                |                |       | (-2120)-      |             |          | (12.34) BC      |       | ⑥ = SANITARY SEWER     | ⑥ = SANITARY SEWER   |               |              |          |            |                      |                       |                       |                       |                       |                       |
| ROW LINE          | SCARP LINE    | PROPOSED:    |                  |                  |                |                |       | (-2122)-      |             |          | (12.34) BC      |       | ⑥ = STORM DRAIN        | ⑥ = STORM DRAIN      |               |              |          |            |                      |                       |                       |                       |                       |                       |
|                   |               |              |                  |                  |                |                |       |               |             |          |                 |       | ⑥ = ELECTRICAL         | ⑥ = ELECTRICAL       |               |              |          |            |                      |                       |                       |                       |                       |                       |
|                   |               |              |                  |                  |                |                |       |               |             |          |                 |       | ⑦ = TELEPHONE          | ⑦ = TELEPHONE        |               |              |          |            |                      |                       |                       |                       |                       |                       |



### 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 OR NDOT 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 CLARK COUNTY TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT 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.

### 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 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-15-045, DATED: APR. 06, 2015.

### FLOOD ZONE NOTE:

THE PROJECT SITE IS COVERED BY FLOOD INSURANCE RATE MAP (FIRM) FOR THE CLARK COUNTY, NEVADA, AND INCORPORATED AREAS, COMMUNITY PANEL NUMBER: 320002C170F, EFFECTIVE DATE: NOVEMBER 16, 2011. THE SUBJECT 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.

### GRADING PLAN CERTIFICATION

NAME: PE # DATE  
CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT CLARK COUNTY FOR THIS PROJECT. HTE #

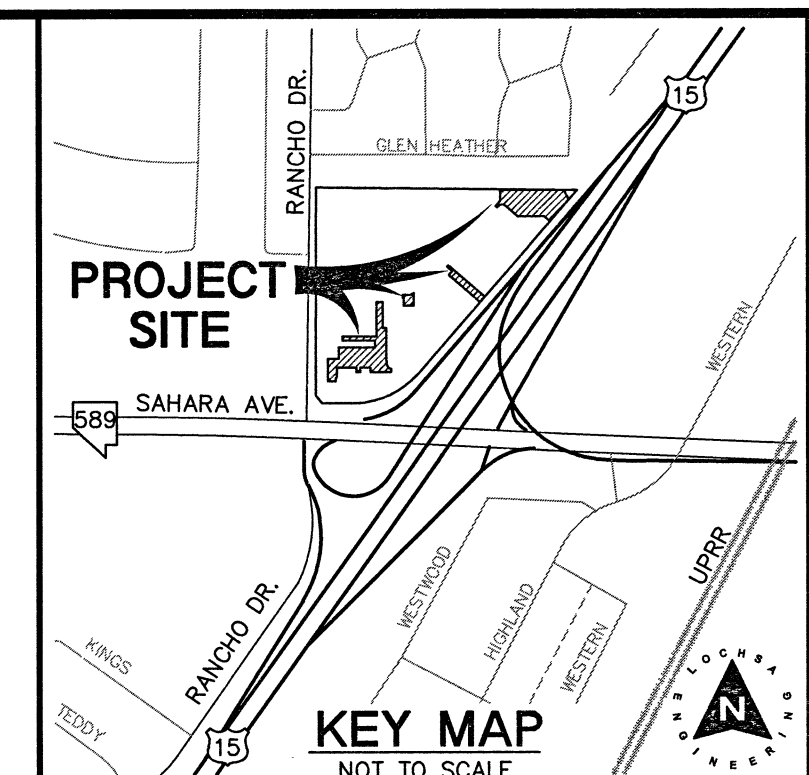
### A.P.N.: 162-04-412-008, 007, 008 & 009

### BASIS OF BEARINGS:

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### BENCHMARK:

TLT1555S, BEING A RIVET AND PLATE IN TOP OF CURB, NORTHWEST CORNER OF SAHARA AVENUE AND RANCHO DRIVE. ELEVATION: 2076.57 FEET / 632.9391 METERS (NAVD 88)



### 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 1 ON C5.01.
  2. CONSTRUCT CONC. PAVEMENT PER DETAIL 2 ON C5.01.
  3. CONSTRUCT "A" TYPE CURB PER DETAIL 3 ON C5.01.
  4. CONSTRUCT "L" TYPE CURB PER CCAUSD No. 216.
  5. CONSTRUCT "L+A" U-CHANNEL PER DETAIL 4 ON C5.01.
  6. FLATTEN GUTTER PER DETAIL 5 ON C5.01.
  7. NOT USED
  8. CONSTRUCT CROSS GUTTER PER CCAUSD No. 228.
  9. LANDSCAPING, REFER TO LANDSCAPE ARCH. PLANS FOR SPECIFICATIONS.
  10. CONSTRUCT RIP RAP SWALE, D50=3" T=6". SEE DETAIL 7 ON C5.01.
  11. INSTALL PARKING BUMPER PER DETAIL 8 ON C5.01.
  12. INSTALL AREA LIGHT PER ELECTRICAL PLANS.
  13. CONSTRUCT 3' VALLEY GUTTER PER DETAIL 10 ON C5.01.
  14. CONSTRUCT 4' VALLEY GUTTER PER DETAIL 9 ON C5.01.
  15. TIE NEW VALLEY GUTTER TO EXISTING PER DETAIL 9 TIE-IN SECTION ON C5.01.
  16. INSTALL BREAK-AWAY TRAFFIC LANE DIVIDER POSTS PER ARCHITECTURAL PLANS.
  17. 2' CURB OPENING PER DETAIL 6 ON C5.01.
  18. 4' CURB OPENING PER DETAIL 6 ON C5.01.
  19. 2' CURB OPENING PER DETAIL 11 ON C5.01.
  20. CONSTRUCT 0" "A" TYPE CURB PER DETAIL 3 ON C5.01.
  21. CONSTRUCT 3' WIDE EARTHEN SWALE, 4" DEEP.
  22. SAWCUT AND MATCH EXISTING.

MAX. 2% H.S. BUILDING FF  
MIN. 5% L.S.

TYPICAL GRADING IN LANDSCAPE AND HARDSCAPE AREAS AWAY FROM BUILDING

### EARTHWORK QUANTITIES

CUT: 372.3 CU.YD.  
FILL: 162.6 CU.YD.  
NET: 209.7 CU.YD. CUT

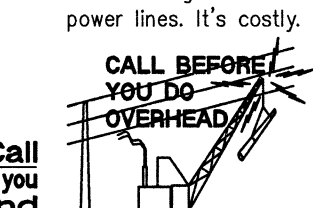
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Call before you Dig  
Avoid cutting underground utility lines. It's costly.



FAST  
Call before you Dig  
Avoid hitting overhead power lines. It's costly.



PROJECT No.: 171143  
DATE: 10/25/2017  
SCALE: 1" = 20'  
DRAWN BY: JNC  
DESIGNED BY: JNC  
CHECKED BY: JLI

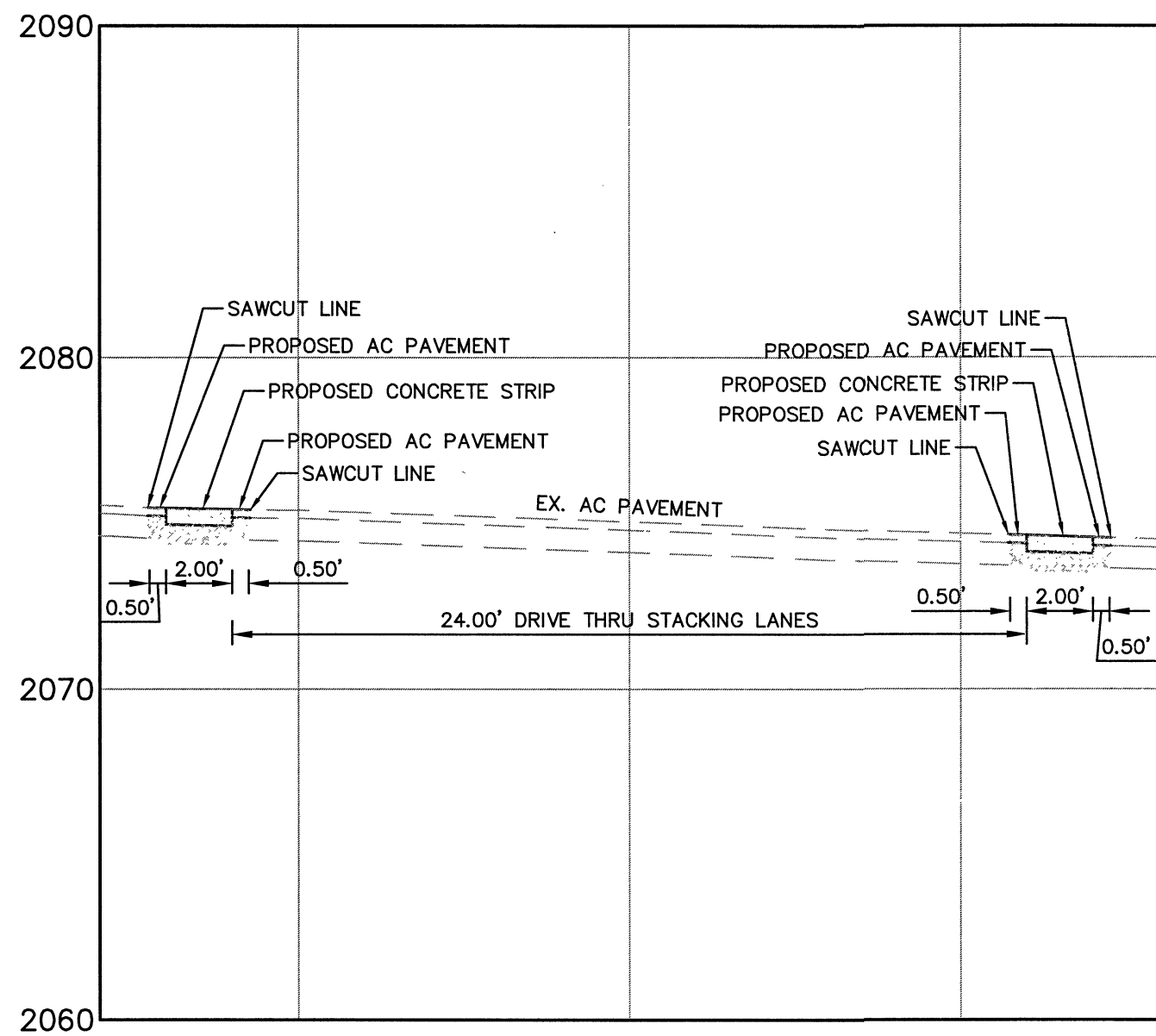
10/25/2017  
SHEET No. C3.02  
SHEET 7 of 10  
OFFSITE HTE No.

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Las Vegas, NV 89118  
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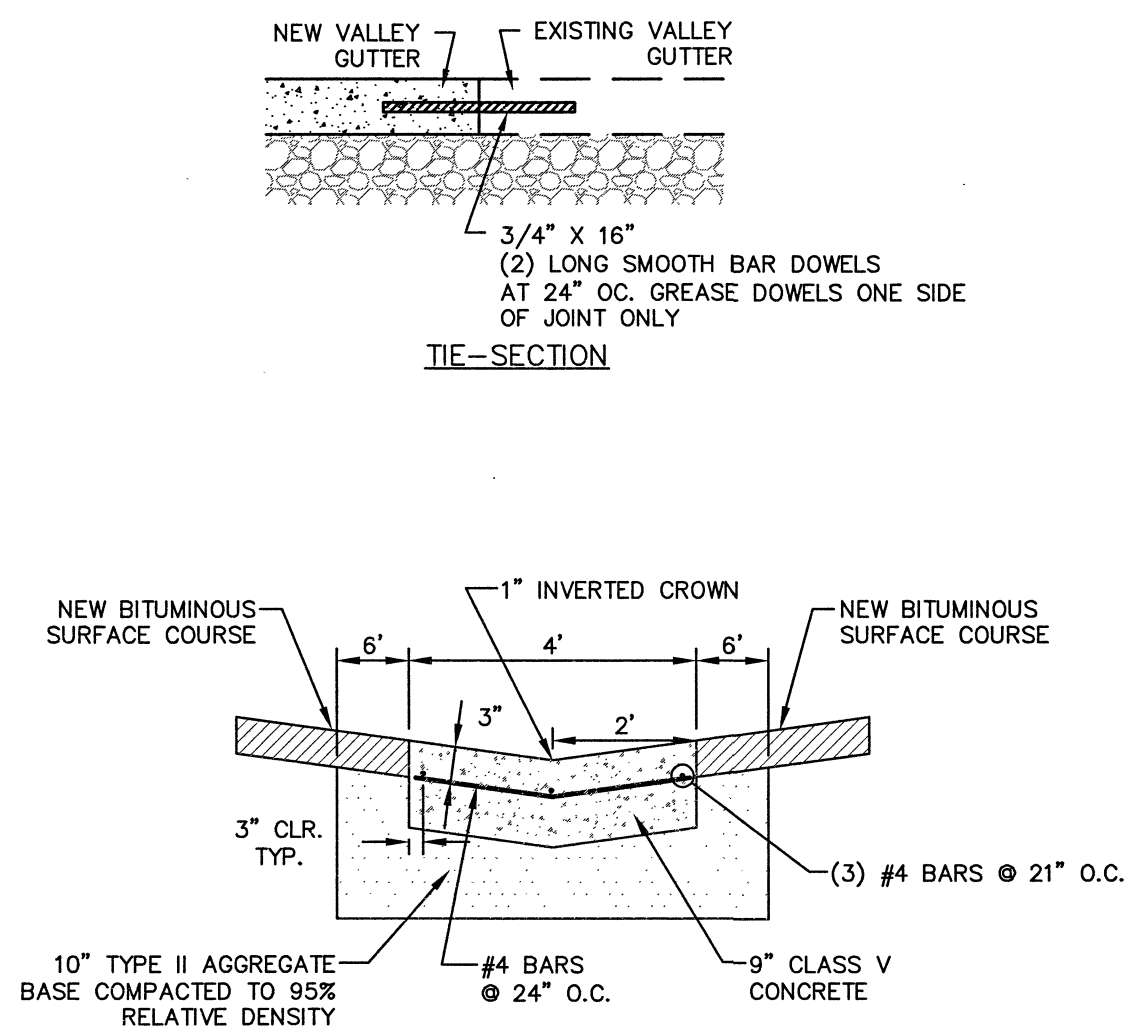
SAHARA RANCHO OFFICE CENTER  
NEC SAHARA AND RANCHO  
CITY OF LAS VEGAS, NEVADA





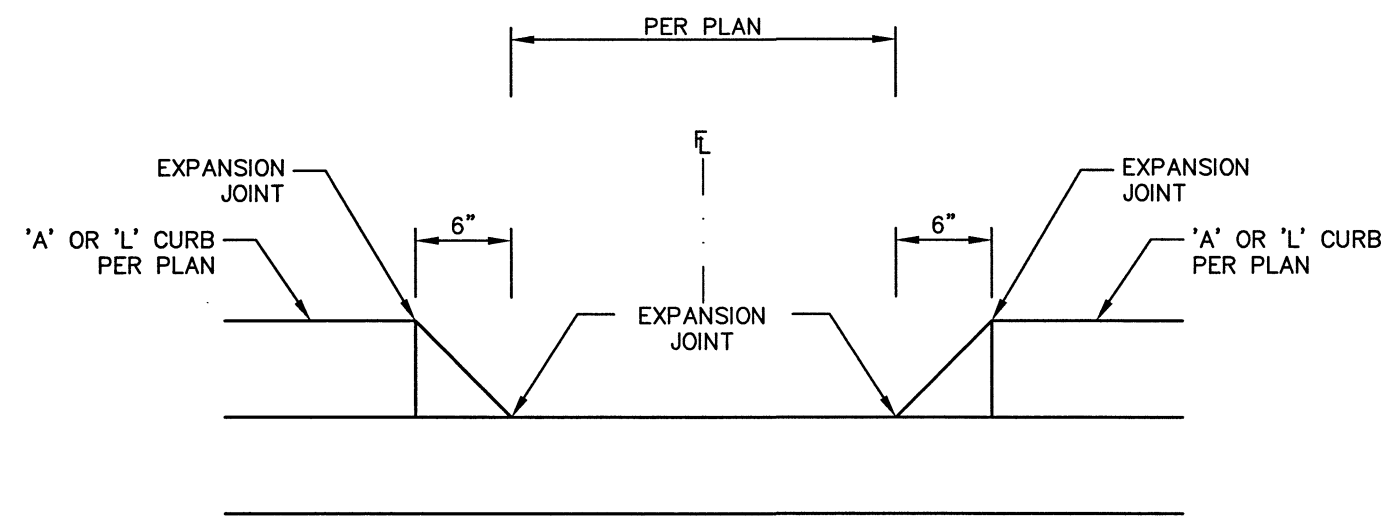
SECTION A - C3.01

NOT TO SCALE



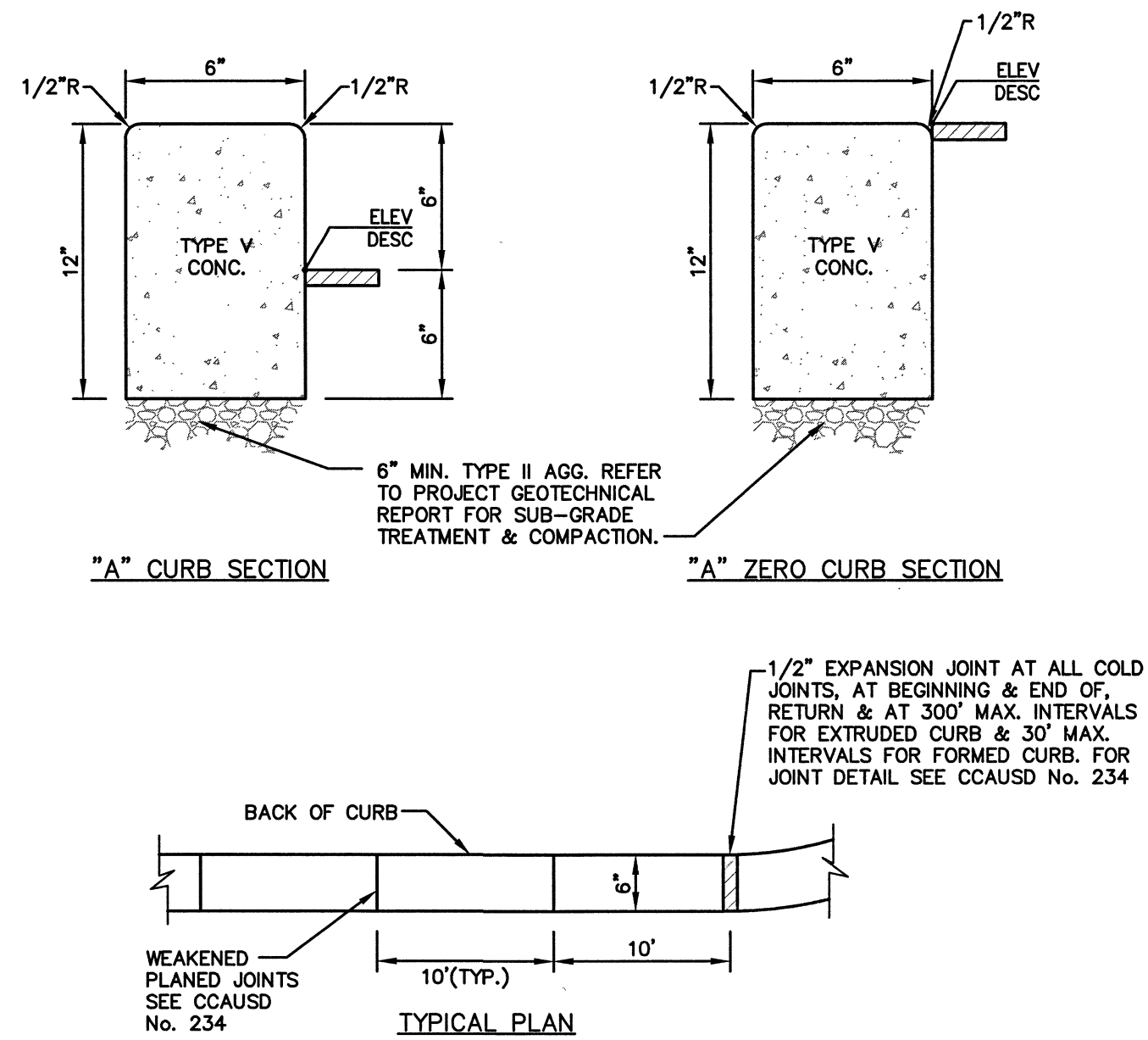
4' VALLEY GUTTER

NOT TO SCALE



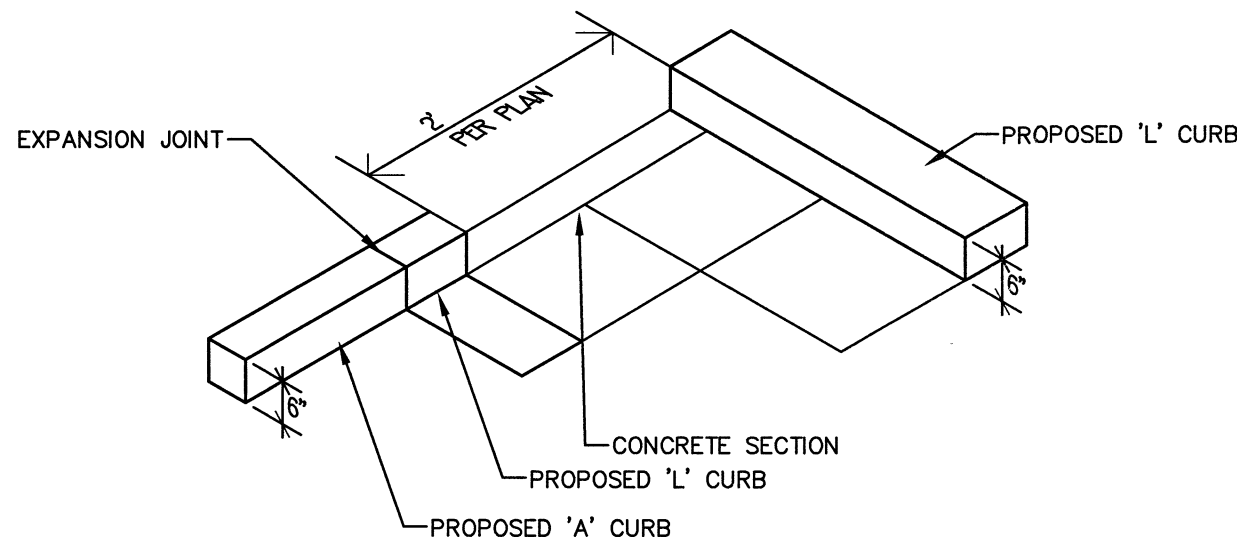
ALTERNATE CURB OPENING

NOT TO SCALE



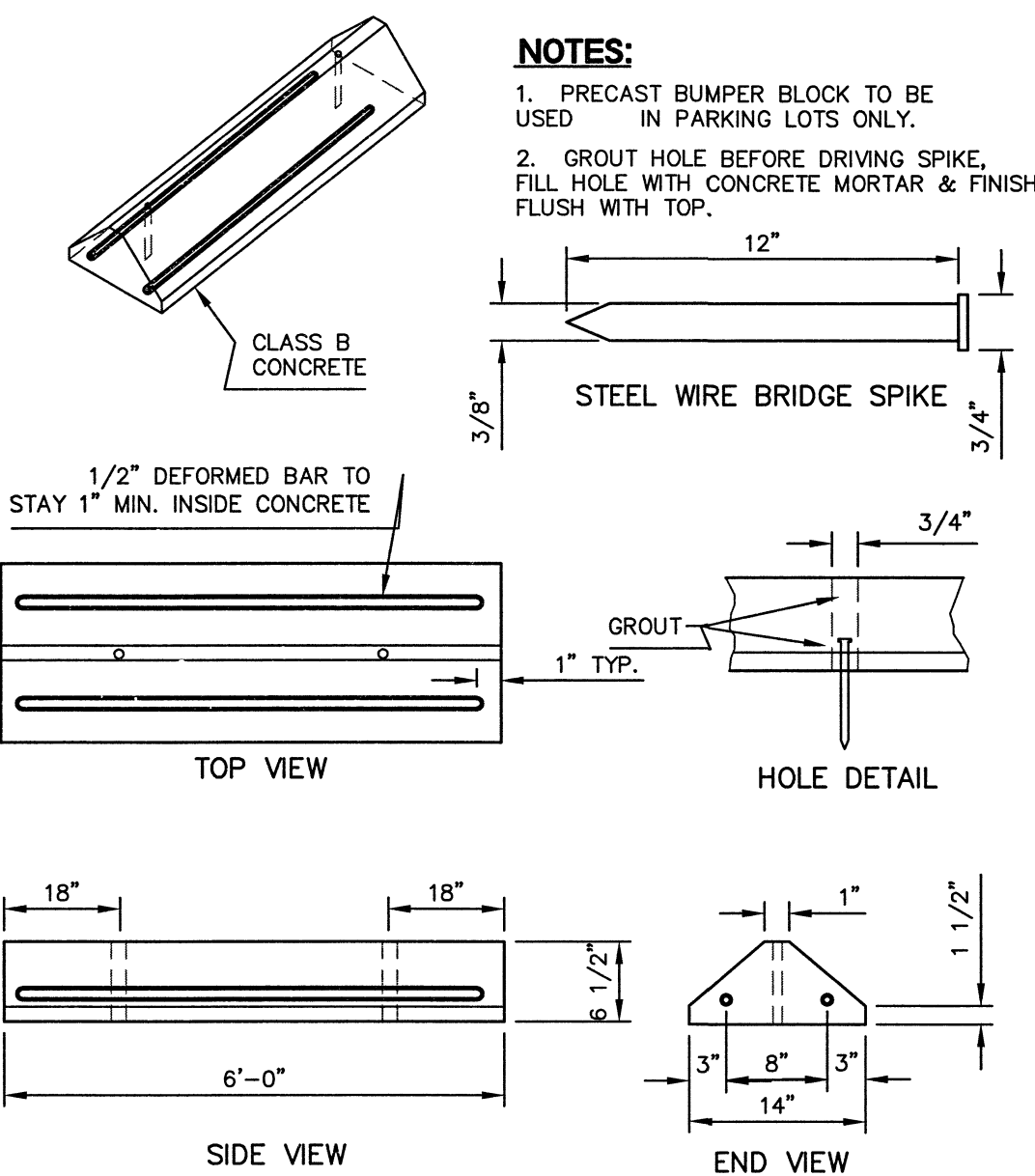
ONSITE 'A' CURB

NOT TO SCALE



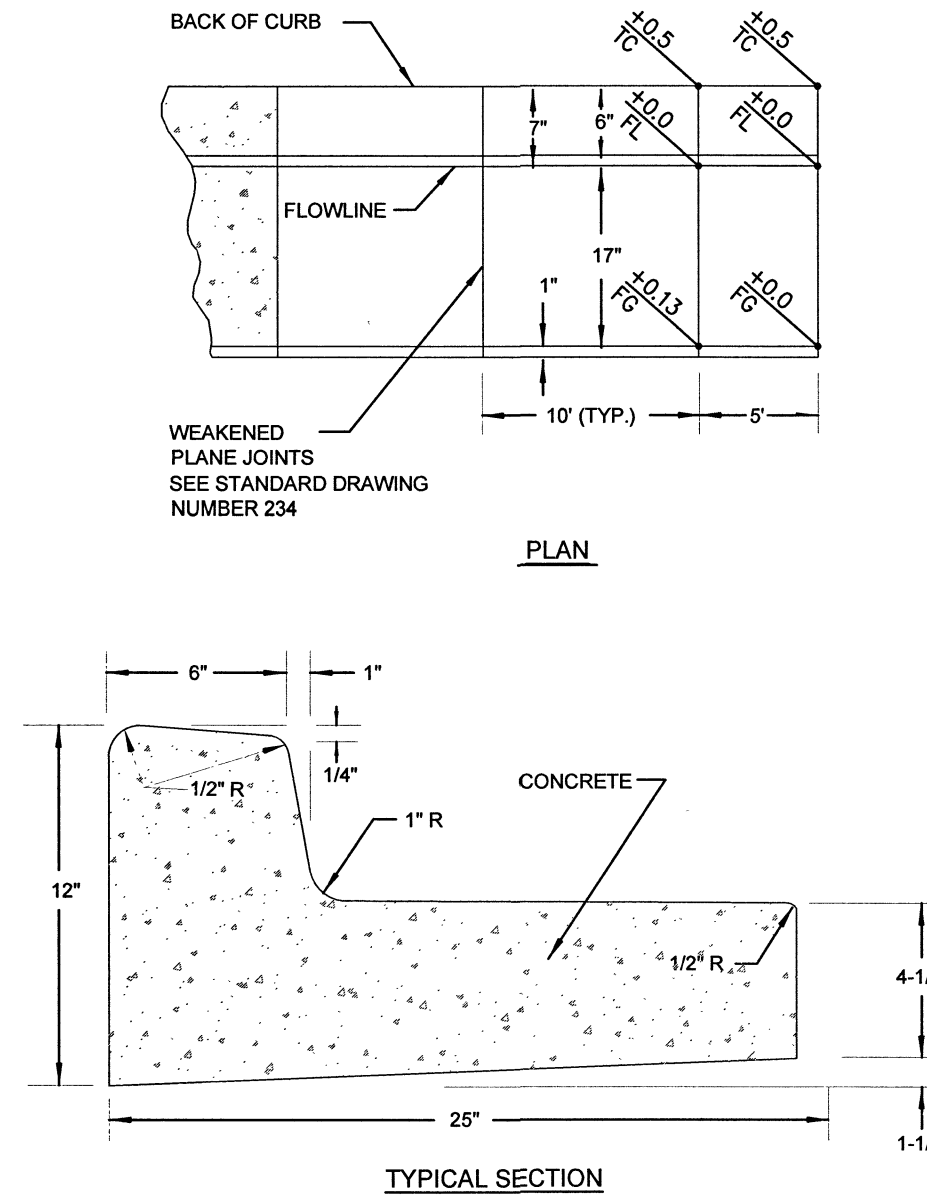
2' CURB OPENING

NOT TO SCALE



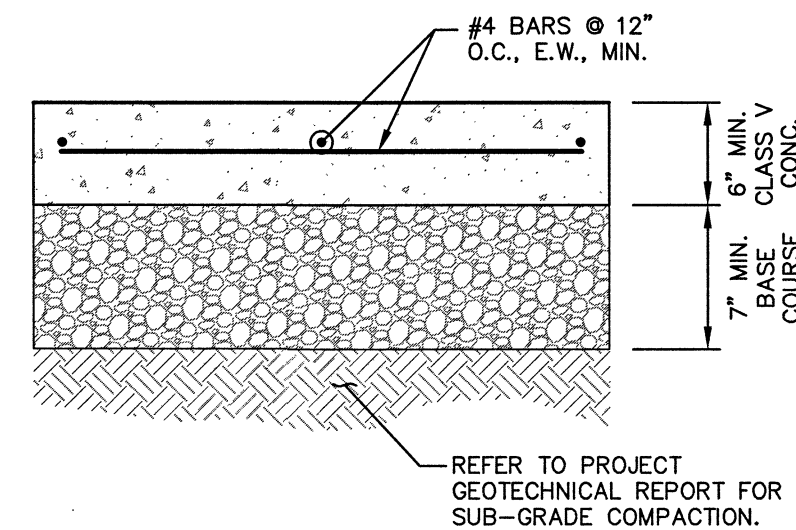
ONSITE PARKING BUMPER

NOT TO SCALE



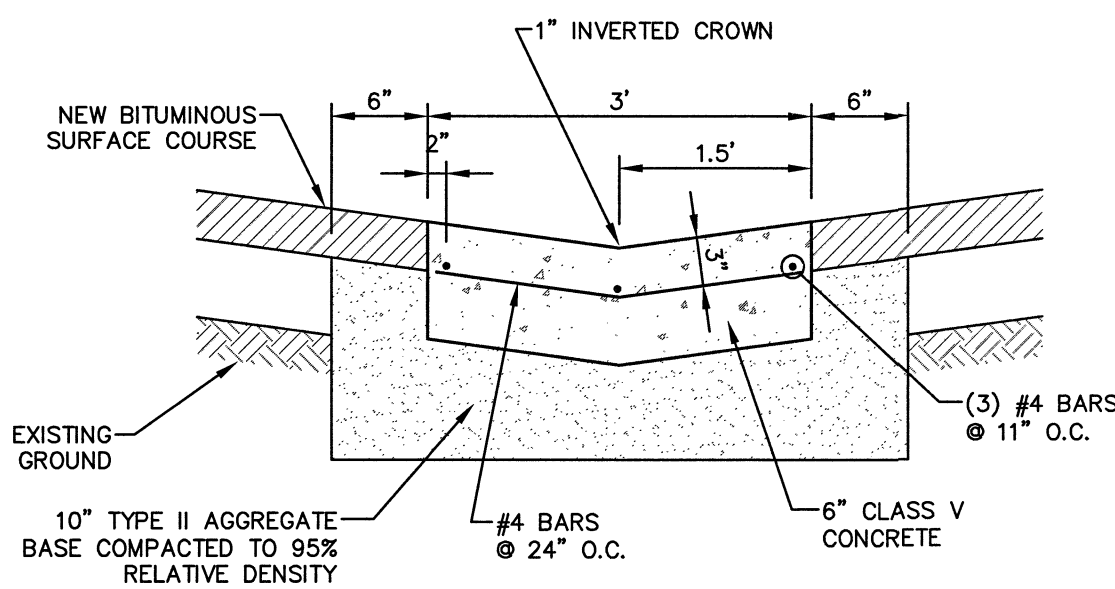
"L" CURB TRANSITION TO LAYING GUTTER FLAT

NOT TO SCALE



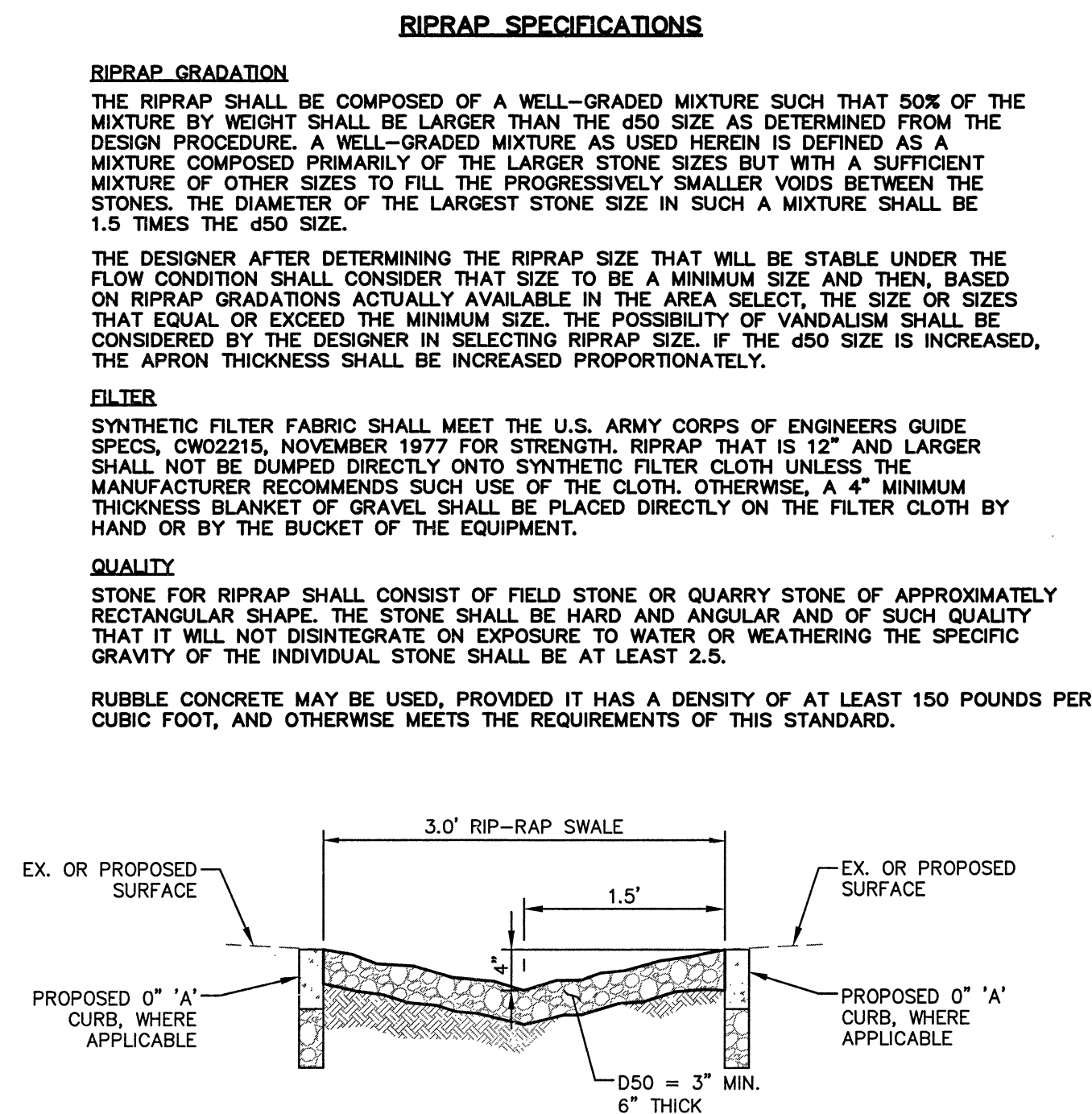
ONSITE PAVEMENT SECTION

NOT TO SCALE



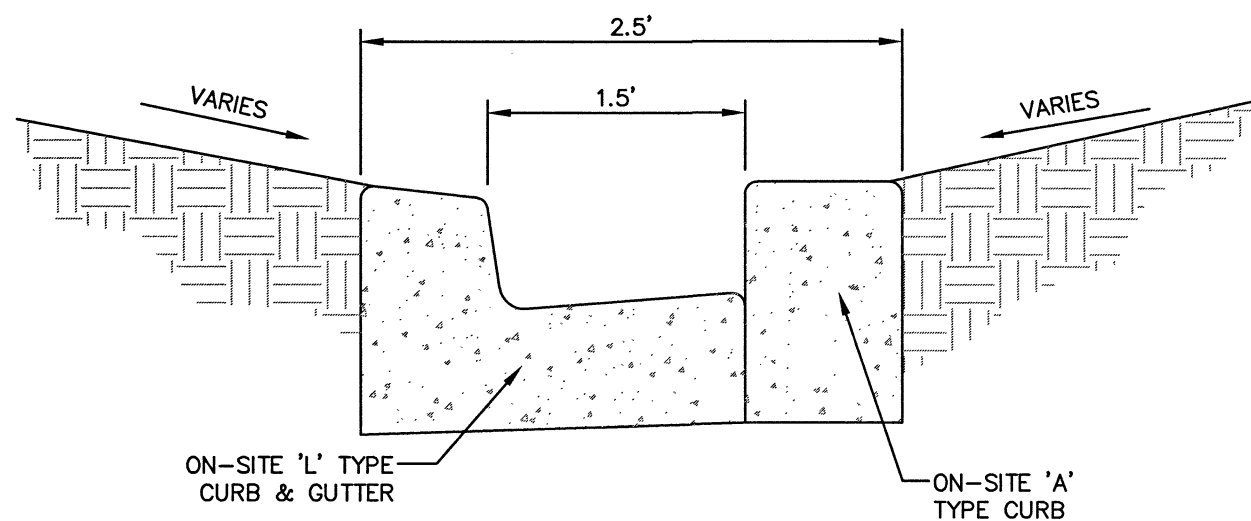
3' VALLEY GUTTER

NOT TO SCALE



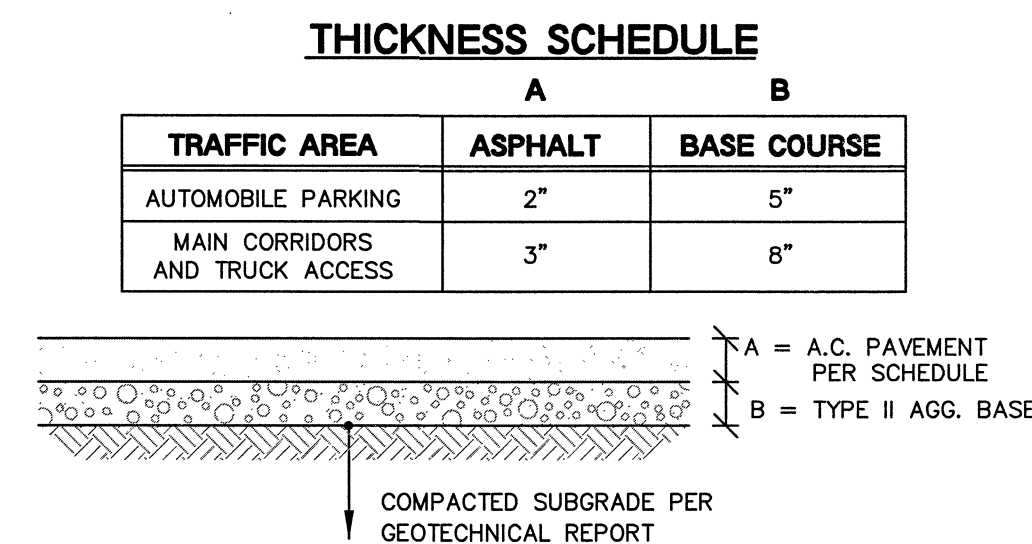
RIPRAP SWALE

NOT TO SCALE



"L" + "A" U-CHANNEL

NOT TO SCALE



ONSITE PAVEMENT SECTION

NOT TO SCALE

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DETAIL SHEETS  
SHEET 1

SHEET  
PROJECT No.: 171143  
DATE: 10/25/2017  
SCALE: NO SCALE  
DRAWN BY: JNC  
DESIGNED BY: JNC  
CHECKED BY: JLI  
10/25/2017  
SHEET No. C5.01  
SHEET 10 OF 10  
OFFSITE HTE No. -----

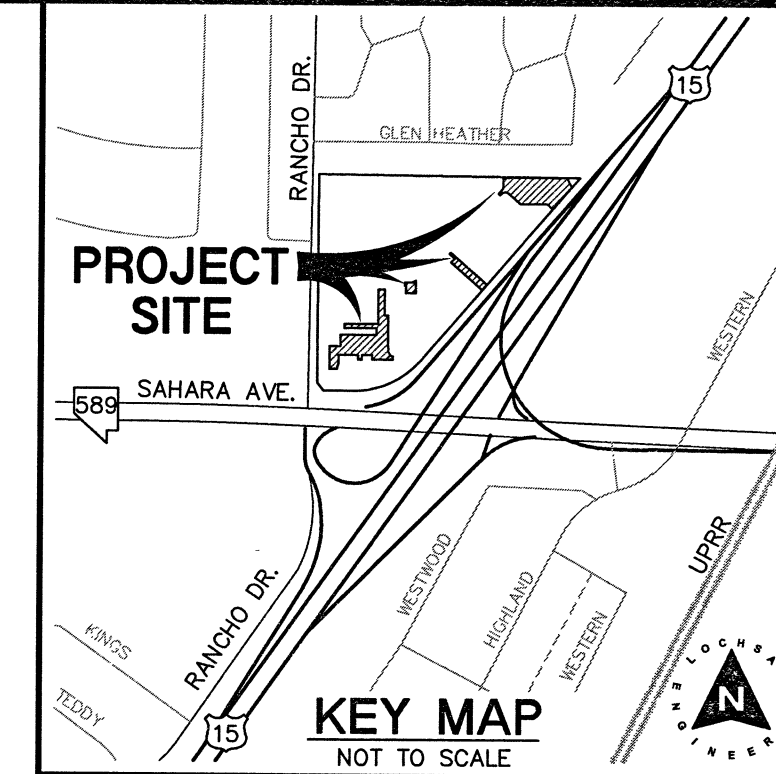
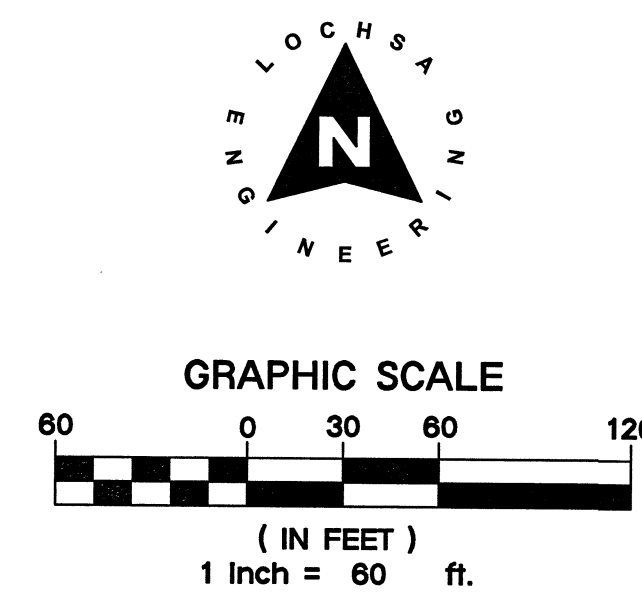
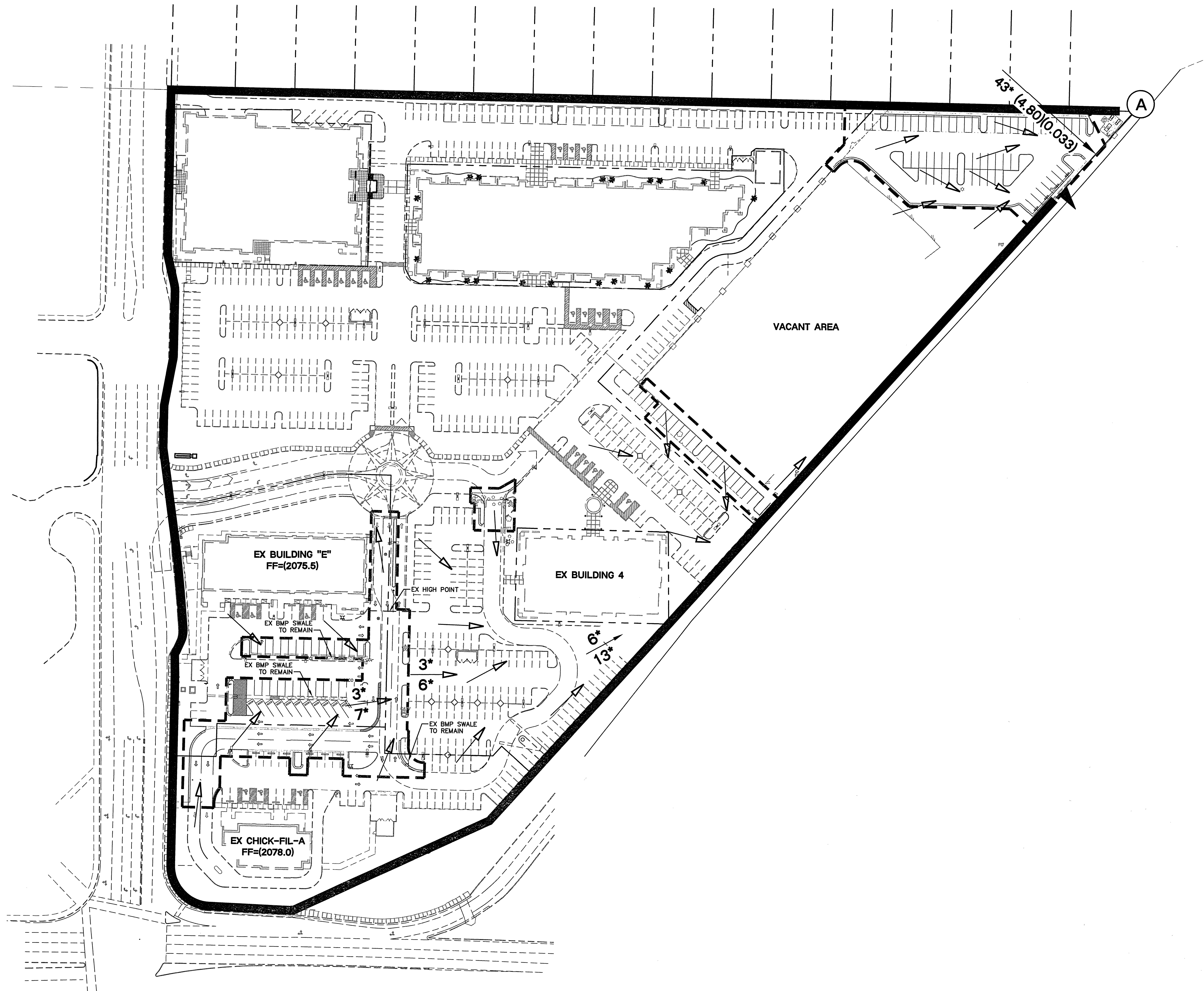
SEAL  
PROFESSIONAL ENGINEER-STATE OF NEVADA  
TED T. EBERSON  
Exp. 12-31-18  
CIVIL  
No. 11286  
10/25/2017  
SHEET No. C5.01  
SHEET 10 OF 10  
OFFSITE HTE No. -----



10/25/2017 10:21 AM  
T:\00\171143\Drawings\171143-DR1.dwg

LEGEND

|                   |               |              |                  |                  |                |                |       |               |             |          |                 |       |                        |                                                                          |               |             |          |            |                      |                       |                       |                       |                       |                       |
|-------------------|---------------|--------------|------------------|------------------|----------------|----------------|-------|---------------|-------------|----------|-----------------|-------|------------------------|--------------------------------------------------------------------------|---------------|-------------|----------|------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| CL OR SURVEY LINE | EASEMENT LINE | DESCRIPTION: | BUILDING OUTLINE | EDGE OF PAVEMENT | "A" TYPE CURBS | "L" TYPE CURBS | WALLS | CONTOUR LINES | AC PAVEMENT | CONCRETE | SPOT ELEVATIONS | SIGNS | MANHOLE W/ DESCRIPTION | MANHOLE DESCRIPTIONS                                                     | FIRE HYDRANTS | GATE VALVES | REDUCERS | CLEAN OUTS | UTILITY BOX OR VAULT | 100w HPS STREETLIGHTS | 150w HPS STREETLIGHTS | 200w HPS STREETLIGHTS | 250w HPS STREETLIGHTS | 400w HPS STREETLIGHTS |
| PROPERTY LINE     | SAWCUT LINE   | EXISTING:    |                  |                  |                |                |       | (2210)        |             |          | (12.34)<br>BC   |       | ⊙                      | ⊙ = SANITARY SEWER<br>⊙ = STORM DRAIN<br>⊙ = ELECTRICAL<br>⊙ = TELEPHONE | ⊙             | ⊙           | ▷        | ○          | □                    | ○                     | ○                     | ○                     | ○                     | ○                     |
| ROW LINE          | SCARP LINE    | PROPOSED:    |                  |                  |                |                |       | (2122)        |             |          | 12.34<br>BC     |       | ⊙                      |                                                                          |               |             |          |            |                      |                       |                       |                       |                       |                       |



| DRAINAGE LEGEND                     |                            |
|-------------------------------------|----------------------------|
| ND1                                 | DRAINAGE BASIN LABEL       |
| CMD1                                | CONCENTRATION POINT        |
| ---                                 | COMBINATION POINT          |
| ---                                 | ONSITE BASIN BOUNDARY      |
| ---                                 | OFFSITE BASIN BOUNDARY     |
| 2<br>3                              | Q10 FLOW IN CFS (10 YR.)   |
| 1 (1.0)(1.2)<br>1 (1.0)(1.2)        | Q100 FLOW IN CFS (100 YR.) |
| Q10 (V10)(D10)<br>Q100 (V100)(D100) | Q10 (V10)(D10)             |
| →                                   | Q100 (V100)(D100)          |
| →                                   | BASIN FLOW DIRECTION       |
| →                                   | COMBINED FLOW DIRECTION    |
| ①                                   | HYDRAULIC CROSS-SECTION    |

AREA OF PROPOSED IMPROVEMENTS

| Onsite Sections<br>(Interim/Ultimate Conditions) |                                  |                                   |                                    |                        |
|--------------------------------------------------|----------------------------------|-----------------------------------|------------------------------------|------------------------|
| Hydraulic<br>Cross-Section<br>Identifier         | 100-Year Flow<br>[Q100]<br>(cfs) | 100-Year Velocity<br>[v]<br>(fps) | 100-Year Flow Depth<br>[d]<br>(ft) | 2x 100-Year<br>2 x [d] |
| A                                                | 43                               | 4.80                              | 0.33                               | 0.66                   |

\*REFERENCED FROM APPROVED TDS FOR RETAIL AT SAHARA AND RANCHO, I.E. ORIGINAL STUDY (DS 4647) AND APPROVED TDS FOR SAHRA/RANCHO OFFICE PARK (DS 2378)

|                                                                                                               |                                      |
|---------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| <b>Lochsa</b><br>engineering                                                                                  |                                      |
| GENERAL<br>DRAINAGE PLAN                                                                                      |                                      |
| SAHARA RANCHO OFFICE CENTER<br>NEC SAHARA AND RANCHO<br>CITY OF LAS VEGAS, NEVADA                             |                                      |
| SHEET                                                                                                         | PROJECT No.: 171143                  |
| TITLE                                                                                                         | DATE: 10/25/2017                     |
|                                                                                                               | SCALE: 1"=60'                        |
|                                                                                                               | DRAWN BY: JGR                        |
|                                                                                                               | DESIGNED BY: JGR                     |
|                                                                                                               | CHECKED BY: JLI                      |
|                                                                                                               | 10/25/2017                           |
|                                                                                                               | SHEET No. DR1                        |
|                                                                                                               | SHEET 1 OF 1                         |
|                                                                                                               | OFFSITE HTE. No.                     |