

DS #:

5042

APN:

163-05-116.007

PROJECT:

Fort Apache Commons Office

SUBMITTAL:

1st

SCANNED BY/DATE:

CHECKED BY/DATE:



|                                                                            |                                                          |                                                                                                   |
|----------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>CITY OF LAS VEGAS</b>                                                   |                                                          | <b>DATE:</b>                                                                                      |
| <b>INTER-OFFICE MEMORANDUM</b>                                             |                                                          | October 15, 2018                                                                                  |
| <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:<br><b>Fort Apache Commons Office</b> |                                                                                                   |
| <b>Cross Streets:</b>                                                      | SWC of Charleston Blvd. & Fort Apache Rd.                |                                                                                                   |
| <b>File Number:</b>                                                        | F:\Depot\DSMemos\DS5042A.doc                             |                                                                                                   |
| <b>Parcel Number:</b>                                                      | 163-05-116-007                                           |                                                                                                   |
| <b>Zoning Action:</b>                                                      | SDR-71400                                                |                                                                                                   |
| <b>FEMA Flood Zone</b>                                                     | YES                                                      | NO <b>X</b>                                                                                       |
| <b>Proposed Storm Drain</b>                                                | YES                                                      | NO <b>X</b>                                                                                       |
| <b>COPIES TO:</b>                                                          |                                                          | Momeni Engineers, LLC                                                                             |
|                                                                            |                                                          | Fort Apache Commons Park, LLC                                                                     |
|                                                                            |                                                          | Bart Anderson, P.E., DevCo                                                                        |

| HISTORY                    | DATE RECEIVED | DATE REVIEWED | COMMENTS           | REVIEW FEES     | FEES PAID<br>Payment Trn # |
|----------------------------|---------------|---------------|--------------------|-----------------|----------------------------|
| 1 <sup>st</sup> Submittal  | 10/2/2018     | 10/15/2018    | See Comments Below | \$400.00        | 499738: \$400              |
| <b>TOTAL FEES (LDDRS):</b> |               |               |                    | <b>\$400.00</b> | ----                       |

#### REMARKS:

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

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

1. Provide a copy of the zoning/planning conditions associated with this site (**SDR-71400**) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.
2. The *Study* stated that the offsite flow from the adjacent development to the west would be conveyed by the existing 18"-storm drain underground and would not impact the proposed development. Provide documentation to verify that there will be no offsite surface flow to impact the proposed building in the next submittal. If there are additional offsite surface flows, review and revise all pertinent hydrologic and hydraulic calculations and adjust the proposed finished floor elevation accordingly.
3. Provide architectural/structural plans for the proposed extended flood proof stem wall and the building footing in the next submittal.
4. Provide water proofing membrane at the flood proof stem wall in *Detail Sections C/D-1* and *D/D-1*.
5. Label the existing 18"-storm drain with *City of Las Vegas* recorded drawing number on the grading plan.

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

**END OF REMARKS**

ays

T/R/S: T21S/R60E/05  
AREA Q-05

# TECHNICAL DRAINAGE STUDY UPDATE

## **Fort Apache Commons**

Clark County, Nevada

Job No.: 137102

Date: October 2018

### **Prepared For:**

Fort Apache Commons Park, LLC  
1215 S. Fort Apache Road, #120  
Las Vegas, Nevada 89117  
(702) 940-6931

### **Prepared By:**

Momeni Engineers, LLC  
3110 South Durango Drive, Suite 205  
Las Vegas, Nevada 89117  
Phone: 702-902-2444  
Fax: 702-248-8495

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL  
**DRAINAGE STUDY INFORMATION FORM**

Name of Development: \_\_\_\_\_ Date: \_\_\_\_\_  
 Location of Development: a) Descriptive (Cross Streets): \_\_\_\_\_ North/South: \_\_\_\_\_  
 East/West: \_\_\_\_\_  
 b) Section: \_\_\_\_\_ Township: \_\_\_\_\_ Range: \_\_\_\_\_  
 c) APN: \_\_\_\_\_

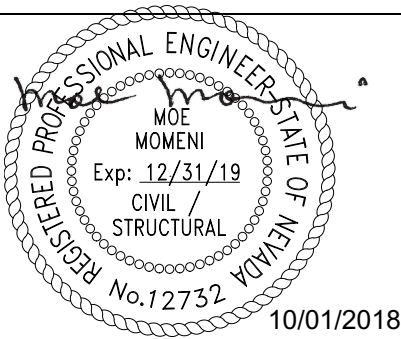
Name of Owner: \_\_\_\_\_  
 Telephone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_ E-mail Address: \_\_\_\_\_  
 Address: \_\_\_\_\_

Contact Person – Name: \_\_\_\_\_ Telephone No.: \_\_\_\_\_  
 \*E-mail Address: \_\_\_\_\_ Fax No.: \_\_\_\_\_  
 Firm: \_\_\_\_\_  
 Address: \_\_\_\_\_

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 type="checkbox"/> Other (Please specify below) |
| <input type="checkbox"/> Large Parcel Map | <input type="checkbox"/> Building Permit          |                                                       |

1. Total Owned Land Area: At Site: \_\_\_\_\_ Being Developed/Disturbed: \_\_\_\_\_
2. Is a portion or all of the subject property located in a FEMA Flood Hazard Area? ☐ Yes\*\* ☐ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes\*\* ☐ No
4. Proposed type of development (Residential, Commercial, Etc.): \_\_\_\_\_
5. Approximate upstream land area which drains to the subject site: \_\_\_\_\_
6. Has the site drainage been evaluated in the past? ☐ Yes\*\* ☐ No If yes, please identify documentation: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
8. Briefly describe your proposed schedule for the subject project: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



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.

**\*Newly Required Field**

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

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

Local Entity File No. \_\_\_\_\_

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008



# 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 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                        |    | A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                        |    | Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                        |    | An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file.<br><br>_____ by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas. |

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

## CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

### CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## DRAINAGE SUBMITTAL CHECKLIST

Project Name:

Map ID:

Firm Name:

Engineer:

Address:

City:

State:

Zip:

Phone Number:

Fax Number:

Property Owner:

Address:

City:

State:

Zip:

Reviewed By:

Date Received:

Date Accepted for Review:

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

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

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

### I. GENERAL REQUIREMENT

Yes No

\_\_\_\_\_ \_\_\_\_\_ Design Manual **Standard Form 1** with the engineer's seal and signature.

\_\_\_\_\_ \_\_\_\_\_ Design Manual **Standard Form 4**.

\_\_\_\_\_ \_\_\_\_\_ 2 copies of the 24" x 36" Drainage Plan.

\_\_\_\_\_ \_\_\_\_\_ A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

### II. MAPS AND EXHIBITS

Yes No

\_\_\_\_\_ \_\_\_\_\_ A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.

\_\_\_\_\_ \_\_\_\_\_ A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.

**REFERENCE:**

**STANDARD FORM 2**

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## DRAINAGE SUBMITTAL CHECKLIST

### II. MAPS AND EXHIBITS (Continued)

Yes No

- |       |       |                                                                                                                                                                                  |
|-------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| _____ | _____ | Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.              |
| _____ | _____ | On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs. |
| _____ | _____ | Vicinity Map with local and major cross streets identified and a north arrow.                                                                                                    |

### III. DRAINAGE PLAN

Yes No

- |       |       |                                                                                                                                                             |
|-------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| _____ | _____ | Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.                                                                               |
| _____ | _____ | Minimum scale: 1" = 60'.                                                                                                                                    |
| _____ | _____ | Project name.                                                                                                                                               |
| _____ | _____ | Vicinity Map with local and major cross streets.                                                                                                            |
| _____ | _____ | Revision box.                                                                                                                                               |
| _____ | _____ | North arrow and bar scale.                                                                                                                                  |
| _____ | _____ | Engineer's/consultant's address and phone number.                                                                                                           |
| _____ | _____ | Elevation datum and benchmark.                                                                                                                              |
| _____ | _____ | Legend for symbols and abbreviations.                                                                                                                       |
| _____ | _____ | Cut/fill scarps, where applicable.                                                                                                                          |
| _____ | _____ | Street names, grades, widths.                                                                                                                               |
| _____ | _____ | Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. |
| _____ | _____ | Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.                                |
| _____ | _____ | Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.                                                                         |
| _____ | _____ | Proposed typical street sections.                                                                                                                           |

**REFERENCE:**

**STANDARD FORM 2**

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## DRAINAGE SUBMITTAL CHECKLIST

### III. DRAINAGE PLAN (Continued)

Yes No

- |                          |                          |                                                                                                                                                                                                                                                                             |
|--------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | Streets with off-set crowns.                                                                                                                                                                                                                                                |
| <input type="checkbox"/> | <input type="checkbox"/> | Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.                                                                                                                                                                 |
| <input type="checkbox"/> | <input type="checkbox"/> | Property lines.                                                                                                                                                                                                                                                             |
| <input type="checkbox"/> | <input type="checkbox"/> | Right-of-way lines and widths, existing and proposed.                                                                                                                                                                                                                       |
| <input type="checkbox"/> | <input type="checkbox"/> | Existing improvements and their elevations.                                                                                                                                                                                                                                 |
| <input type="checkbox"/> | <input type="checkbox"/> | Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.                                                                                                                                    |
| <input type="checkbox"/> | <input type="checkbox"/> | Concentration points and drainage flow direction with $Q_{100}$ and $V_{100}$ and $D_{100}$ in streets.                                                                                                                                                                     |
| <input type="checkbox"/> | <input type="checkbox"/> | Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.                                                                                                                                               |
| <input type="checkbox"/> | <input type="checkbox"/> | Location and cross-section of street capacity calculations.                                                                                                                                                                                                                 |
| <input type="checkbox"/> | <input type="checkbox"/> | Cross-sectional detail for channels, including cutoff wall locations.                                                                                                                                                                                                       |
| <input type="checkbox"/> | <input type="checkbox"/> | 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. |
| <input type="checkbox"/> | <input type="checkbox"/> | Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.                                                                                                |
| <input type="checkbox"/> | <input type="checkbox"/> | 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.                                                                                                                     |
| <input type="checkbox"/> | <input type="checkbox"/> | Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.                                                                                                                                                                               |
| <input type="checkbox"/> | <input type="checkbox"/> | 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.                                                                              |
| <input type="checkbox"/> | <input type="checkbox"/> | Building and/or lot numbers.                                                                                                                                                                                                                                                |
| <input type="checkbox"/> | <input type="checkbox"/> | Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.                                                                                                                                                                                    |
| <input type="checkbox"/> | <input type="checkbox"/> | Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.                                                                                                                      |

**REFERENCE:**

**STANDARD FORM 2**

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## DRAINAGE SUBMITTAL CHECKLIST

### III. DRAINAGE PLAN (Continued)

Yes      No

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

### IV. HYDROLOGIC ANALYSIS

Yes      No

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

**REFERENCE:**

**STANDARD FORM 2**

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## DRAINAGE SUBMITTAL CHECKLIST

### V. HYDRAULIC ANALYSIS

Yes No

- |       |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| _____ | _____ | Flow split calculations and supporting documentation or reference for the method of flow split calculations used.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| _____ | _____ | Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q <sub>100</sub> and Q <sub>10</sub> flows representing the worst case for interior and all perimeter streets. Q <sub>100</sub> d x v ≤ 8. Q <sub>10</sub> d x v ≤ 6 and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.                                                                                    |
| _____ | _____ | A summary table of interior and exterior street capacity calculations showing the street name, Q <sub>100</sub> flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.                                                                                                                                                                                                                                                                                      |
| _____ | _____ | Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)                                                                                                                                                                                                                                                                                                                                                                     |
| _____ | _____ | Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.                                                                                                                                                                                                                                                                                       |
| _____ | _____ | Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q <sub>100</sub> weir height or flow depth, whichever is greater.                                                                                     |
| _____ | _____ | A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. <ul style="list-style-type: none"> <li>• Field survey data.</li> <li>• Input and output information.</li> <li>• Plotted cross-sections based on survey with proper encroachments.</li> <li>• A map showing the location of the cross-sections.</li> <li>• Analysis of both sub and super-critical flow segments.</li> <li>• A summary table and a discussion of the results in the text of the report.</li> </ul> |
| _____ | _____ | Provide a 50 percent clogging factor in the capacity calculation for drop inlets.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| _____ | _____ | Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.                                                                                                                                                                                                                                                                                                                                                    |
| _____ | _____ | The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.                                                                                                                                                                                                                                                                                                                                                                                                               |
| _____ | _____ | Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).                                                                                                                                                                                                                                                                                                                                                                                                                                       |

REFERENCE:

STANDARD FORM 2

137102-000

October 1, 2018

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

Re: Technical Drainage Study Update for Fort Apache Commons  
(Previous DS3347)

Dear Mr. Sung:

Momeni Engineers, LLC., is pleased to submit this Technical Drainage Study Update for Fort Apache Commons. The purpose of this update is to support the design of a proposed two-story building addition over an existing parking lot. The site is located at the southwest corner of the intersection of Fort Apache Road and Charleston Boulevard within the developed commercial subdivision known as Fort Apache Commons. The project site had been analyzed by prior approved technical drainage studies. The Original *Technical Drainage Study for Fort Apache Commons Development* (DS3347); hereinafter referred to as the Original Study is the most current study pertinent to the site. The Original Study addressed the existing parking lot improvement on the site over which the proposed building will be constructed in place of. The site is located within a portion of Section 05, Township 21 South, and Range 60 East of the MDM in the City of Las Vegas, Nevada. The Vicinity Map (Figure 1) indicating the approximate location of the site in relation to the surrounding major streets has been provided in the appendix. The project parcel is identified by Assessor's Parcel Number (APN) 163-05-116-007. The entire project parcel currently consists a paved parking lot with median islands and drive aisles.

### **Flood Zone Designation**

The project is covered by the Flood Insurance Rate Map (FIRM) Community Panel Number 32003C22145F, effective date; November 16, 2011. The site is located within an area designated as Zone "X" (unshaded). Zone "X" (unshaded) is described by the Federal Emergency Management Agency (FEMA) as areas determined to be outside the 0.2% annual chance floodplain. A copy of the FIRM (Figure 2) depicting the location of the project site has been provided in the appendix for reference.

### **Soils Data**

Note that since the approval of the Original Study, the soils survey of the Las Vegas Valley has been updated. Although, a revised hydrologic analysis is not necessary for this study as the parking lot area is being replaced with a building, an updated soils map has been provided for

informational purposes and to analyze an area directly south that will drain thru the drive aisle adjacent to the proposed building. The updated soils map indicates that the entire site and its tributary area is located within Soil Type 152 which comprises of 100% Hydrologic Soil Group (HSG) "D". The current 2016 Soil Survey Area of the Las Vegas Valley indicates no change in the soil type and/or composition of the soil within the watershed. A copy of the Soils Map (Figure 3) indicating the location of the project site has been provided in the appendix.

### **CCRFCFCD Master Plan & Facilities**

The project is covered by the 2013 CCRFCFCD Las Vegas Valley Master Plan Update (MPU). Review of Figure F-30 of the MPU Flood Control Facilities map shows that the project parcel is not adjacent to or traversed by any existing or proposed CCRFCFCD master plan facilities. A portion of Figure F-30 identifying the project site has been reproduced as Figure 5 and has been included in the appendix for reference.

### **Drainage Pattern & Hydraulics**

The existing condition of the site is currently developed as paved parking lot and drive aisles which drains northeasterly towards Fort Apache Road. The proposed building will be constructed over a portion of the parking lot and the grading around the building will maintain the existing drainage patterns. Therefore, the proposed development will not cause any increase in runoff or change in drainage patterns over the existing condition. Consequently, a hydrologic analysis will not be necessary. However, a portion of the existing building and parking lot directly south of the site is conveyed north thru the site. In order to ensure that the proposed finished floor will be adequately protected from localized onsite flows, the area has been analyzed as Basin "A" and is determined to generate a 100-year peak flow of 4 cfs.

Based on the estimated flow rate, hydraulic Section D1 is provided to determine a conservative onsite flow depth conveyed adjacent to the proposed building. Please note that the hydraulic section was conservatively confined within the drive aisle by assuming that the parking stalls are blocked off as required by Section 903.6 of the HCDDM. A drainage map (Figure 7) has been provided to indicate the tributary drainage area and the location of hydraulic Section D1. Please refer to the appendix for the drainage map, HEC-1 model output and hydraulic section calculation. Note that a portion of the adjacent Avondale Apartment Complex (formerly Blackhorse Apartments) impacts the project site. However, the offsite flows are captured and conveyed below ground by existing inlet and storm drain facilities. Therefore, the offsite flows do not negatively impact the site.

### **Finished Floor Elevation**

The finished floor elevation of the proposed building has been analyzed based on the adjacent drive aisle flow depth and have been flood protected to meet the required CCRFCFCD HCDDM as well as the local CLV criteria. Although, the finished floor elevation is below grade, the building wall has been specified to be flood proofed to more than twice the flow depth in the adjacent drive aisle conveying the onsite flows measured at the high side of the building. Therefore, the finished floor elevation will be flood protected from the 100-year storm event and satisfies the criteria per the CCRFCFCD manual.

### **Parking Lot LID Measures**

Parking lot LID design is not required for this project as the entire project parcel is only approximately 1.20 acres and the proposed building footprint will reduce the number of overall parking area on the site. Therefore, parking lot LID computations are not necessary and have not been provided with this update.

### **Conclusion**

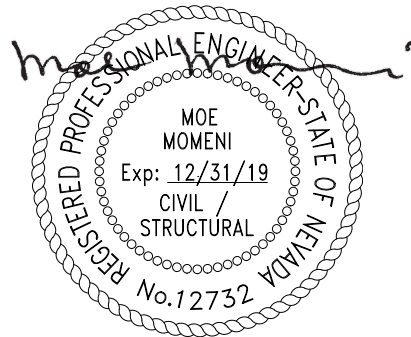
Based on the hydrologic and hydraulic evaluations provided, it has been concluded that the proposed design of the project site is in conformance with the previously approved Original Study. The proposed building finished floor elevation has been designed to be adequately flood protected and to satisfy the criteria set forth in the CCRFCD HCDDM. The development of the project site will not cause any negative impacts to the adjacent and downstream properties.

If you have any questions or require additional information, please do not hesitate to contact our office at (702) 902-2444.

Sincerely,  
**MOMENI ENGINEERS, LLC**



Moe Momeni, P.E., S.E.  
Project Manager



10/01/2018

## **APPENDIX**

### **Appendix A – Drainage Maps & Exhibits**

### **Appendix B – Precipitation, Curve Number & Lag Time Data**

- HCDDM Reference Rainfall Data Figure & Tables
- HCDDM Reference Runoff Curve Number Table 602
- NRCS Reference Soil Data
- Composite and Weighted Curve Number Computations
- Standard Form 4 Lag Time Computations

### **Appendix C – HEC-1 Analysis - Existing/Proposed Condition**

### **Appendix D – Hydraulic Calculations**

- Onsite Drive Aisle Normal Depth Computation

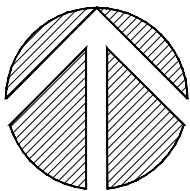
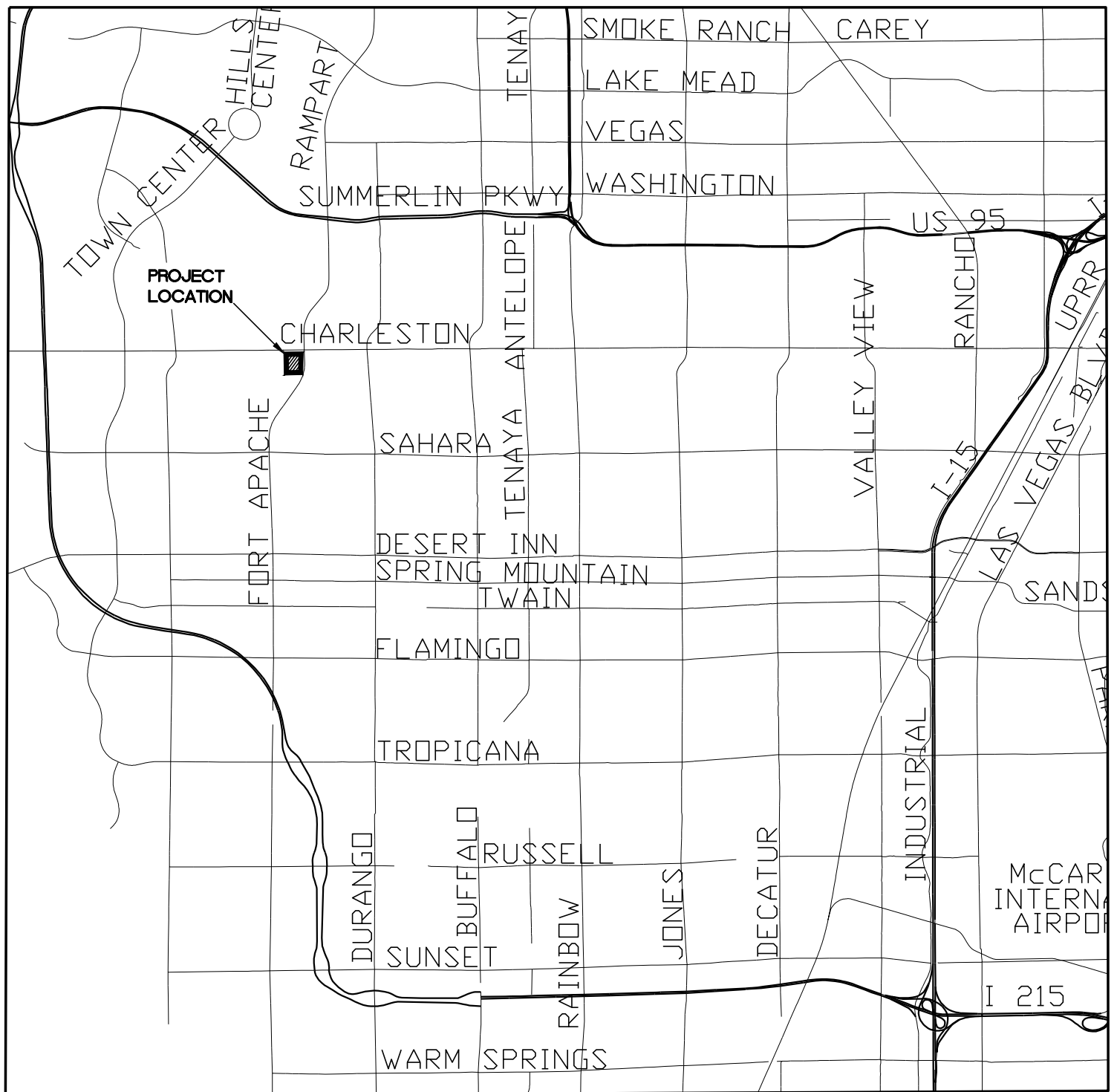
### **Appendix E – Reference Materials**

### **Appendix F – Improvement Plans**

### **Appendix G – CD of Technical Drainage Study Update for Fort!Apache Commons**

# APPENDIX A

## Drainage Maps & Exhibits



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CIVIL & STRUCTURAL ENGINEERING

3110 S. DURANGO DRIVE, SUITE 205

LAS VEGAS, NEVADA 89117

TEL: (702) 902-2444 | FAX: (702) 248-8495 | MOE@MHMENGINEERS.COM

**PROJECT No.** 137102

**SCALE** N.T.S.

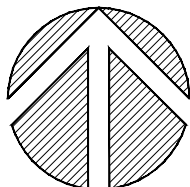
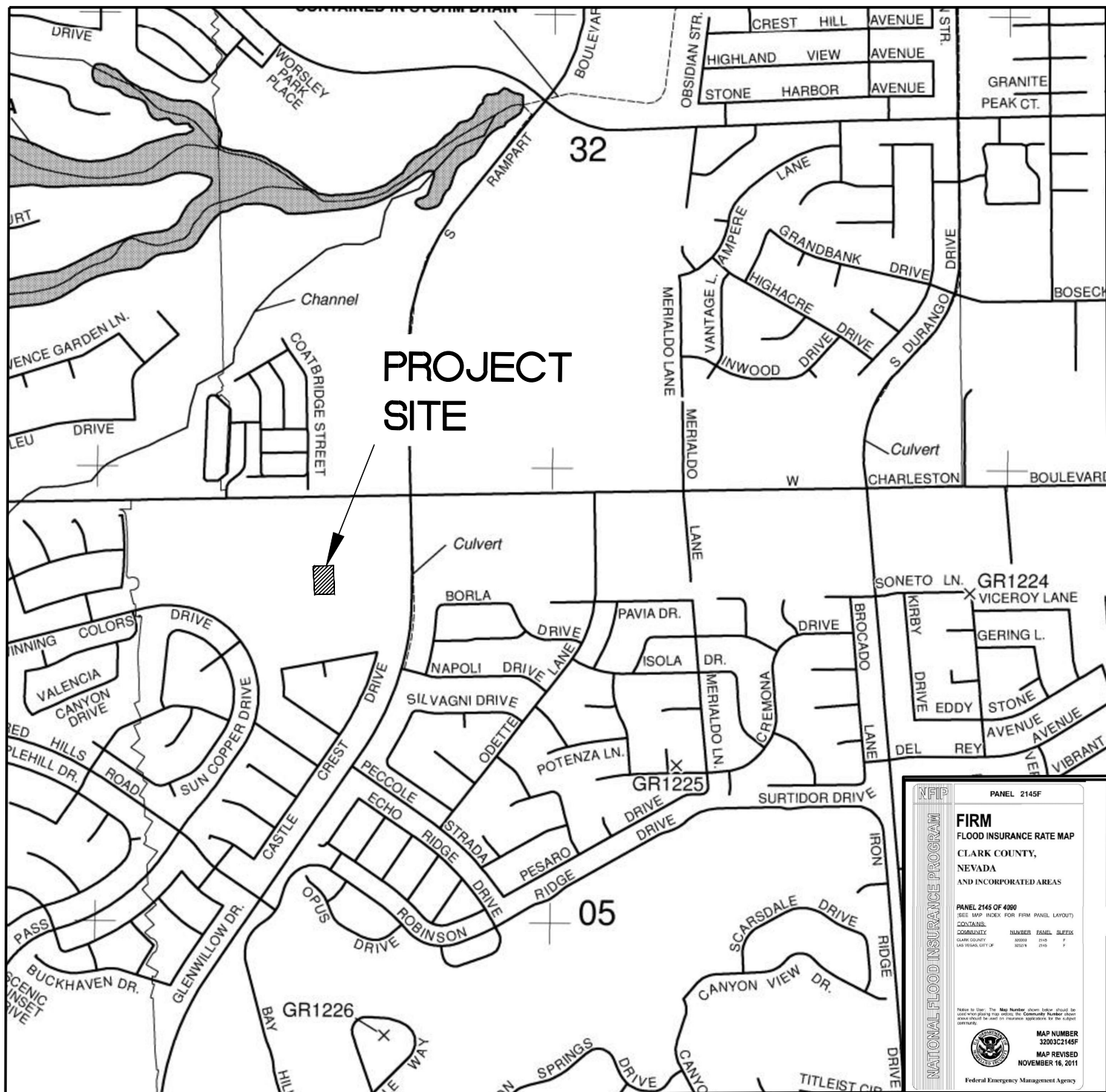
**DATE** SEPT. 2018

**DRAWN BY** TLD

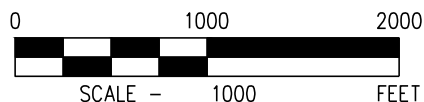
**FORT APACHE COMMONS  
VICINITY MAP  
(FIGURE 1)**

**EXHIBIT**

**1 OF 6**



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TEL: (702) 902-2444 | FAX: (702) 248-8495 | MOE@MHMENGINEERS.COM

PROJECT No. 137102

SCALE 1"=1000'

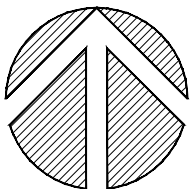
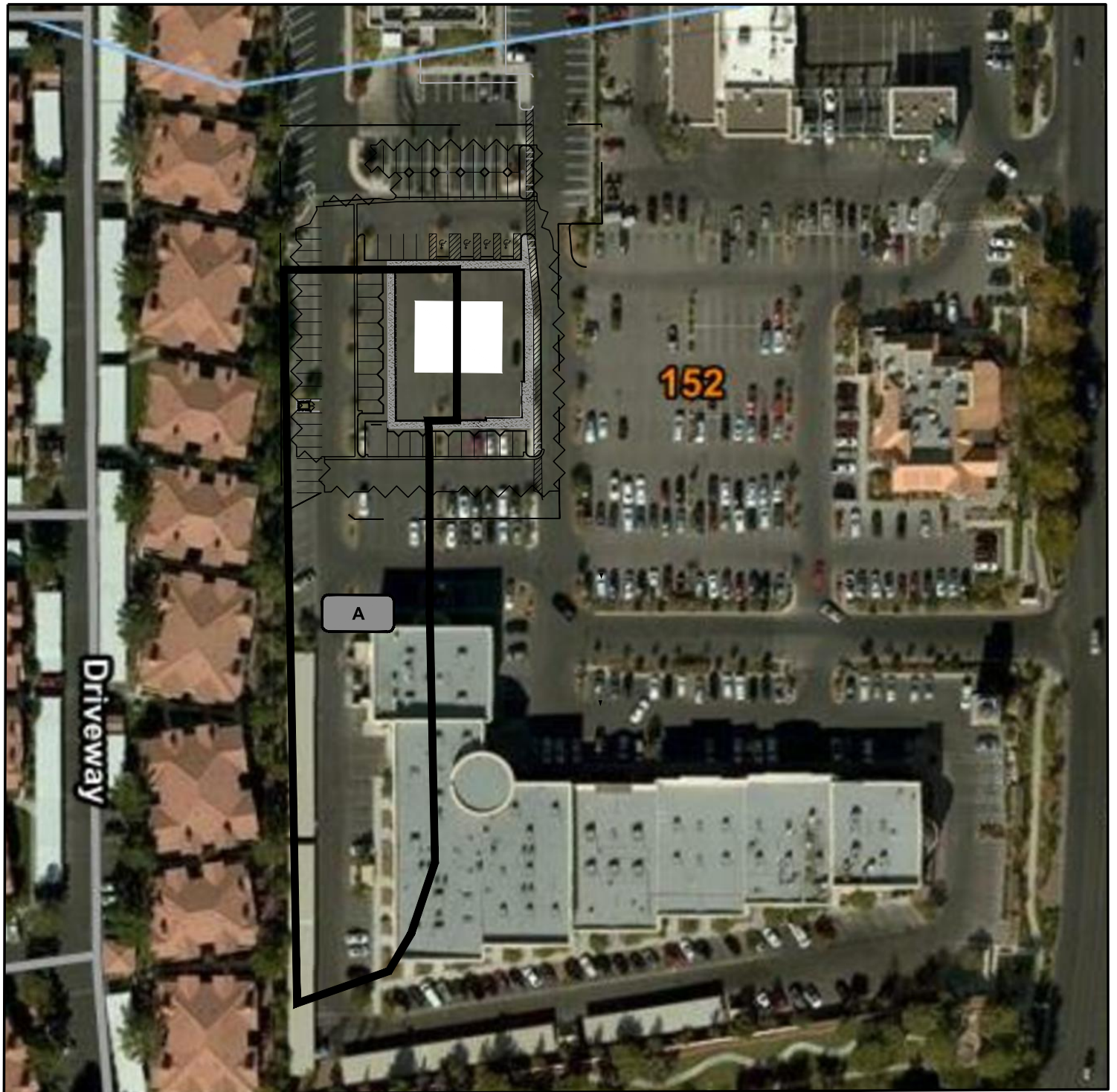
DATE SEPT. 2018

DRAWN BY TLD

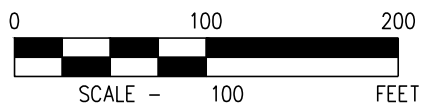
**FORT APACHE COMMONS  
FIRM MAP  
(FIGURE 2)**

**EXHIBIT**

**2 OF 6**



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TEL: (702) 902-2444 | FAX: (702) 248-8495 | MOE@MHMENGINEERS.COM

**PROJECT No.** 137102

**SCALE** 1"=100'

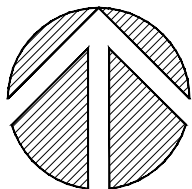
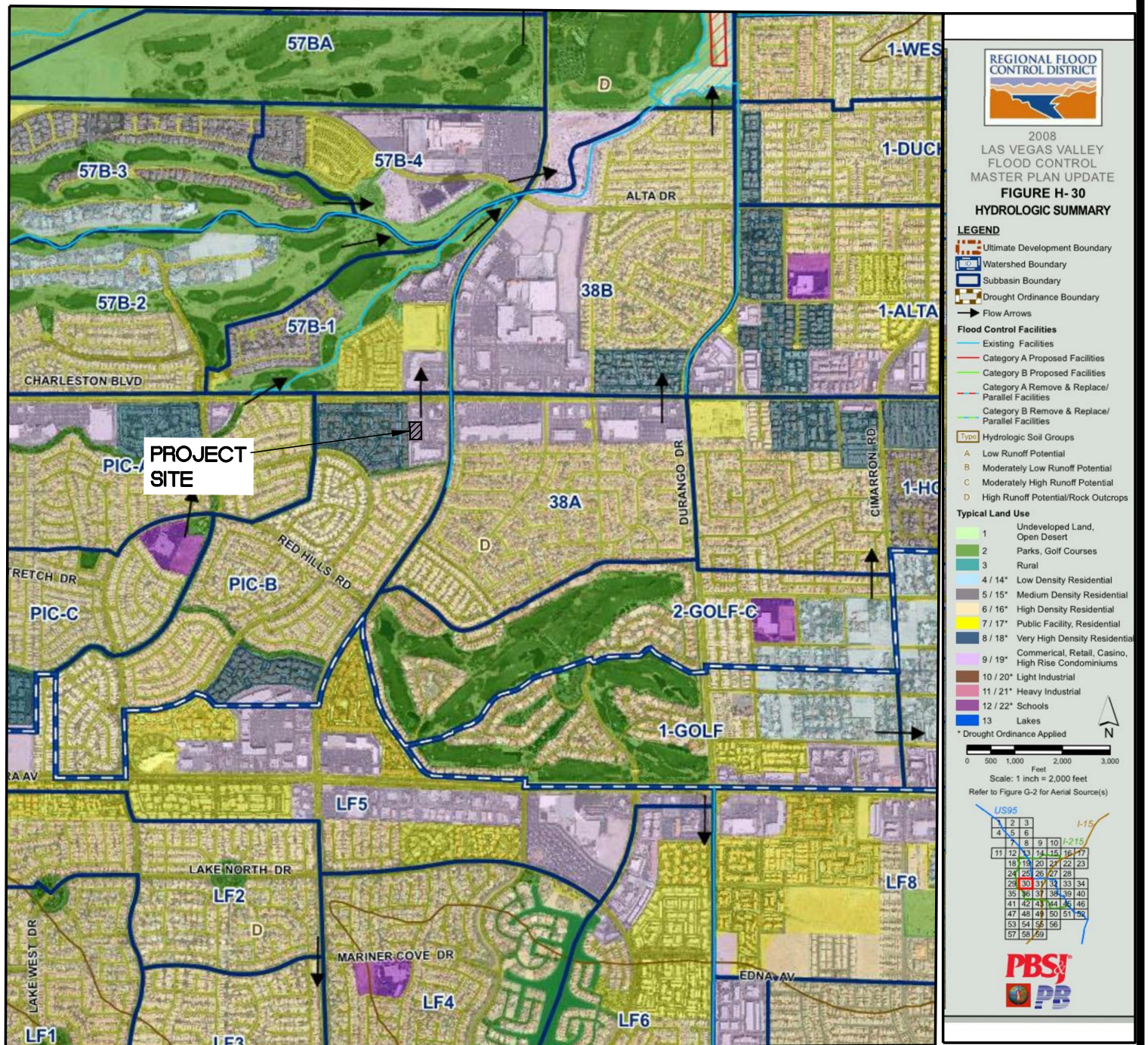
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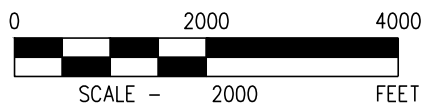
**FORT APACHE COMMONS  
SOIL MAP  
(FIGURE 3)**

**EXHIBIT**

**3 OF 6**



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TEL: (702) 902-2444 | FAX: (702) 248-8495 | MOE@MHMENGINEERS.COM

**PROJECT No.** 137102

**SCALE** 1"=2000'

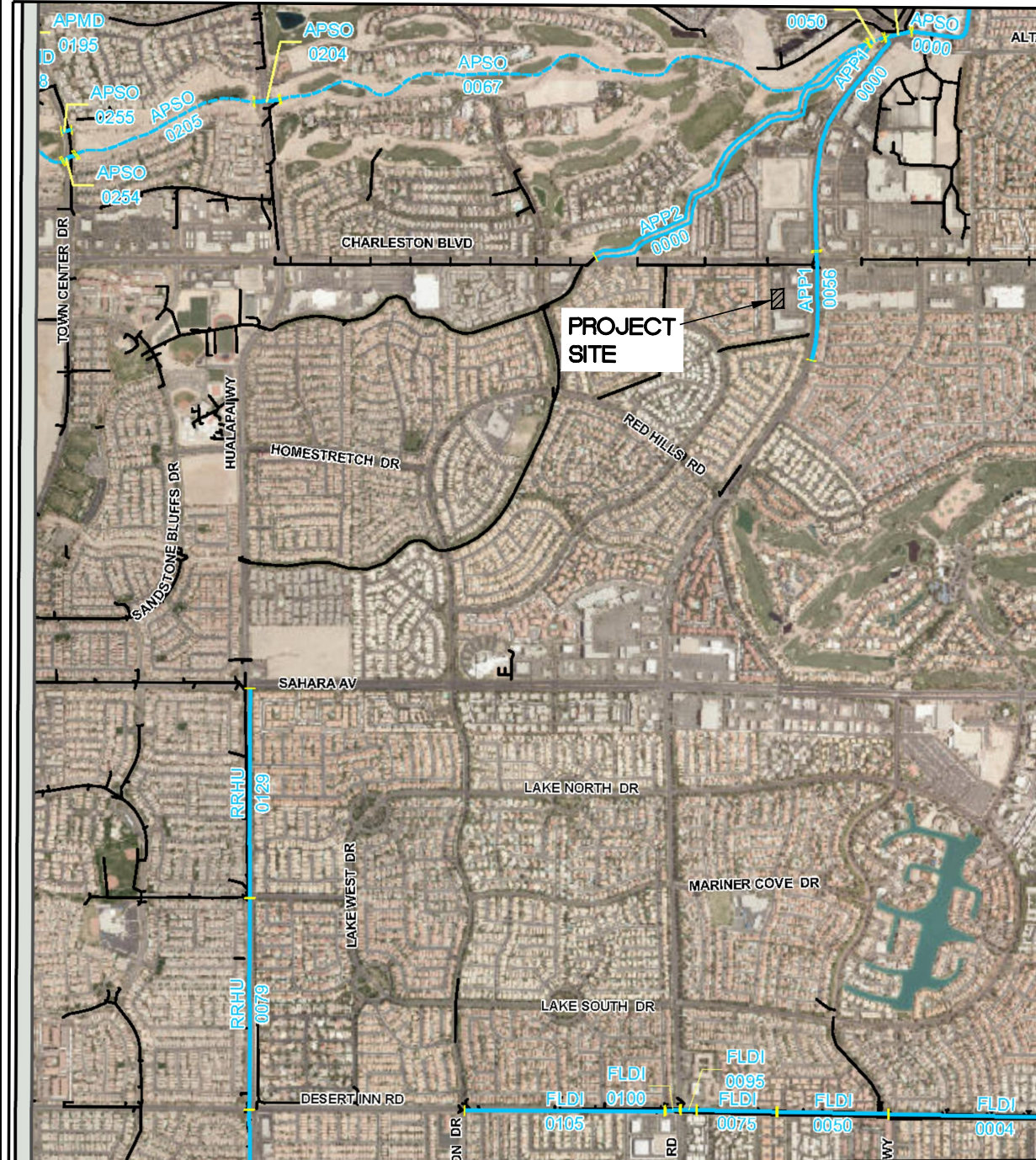
**DATE** SEPT. 2018

**DRAWN BY** TLD

**FORT APACHE COMMONS  
MPU HYDROLOGY MAP  
(FIGURE 4)**

**EXHIBIT**

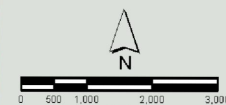
**4 OF 6**



2013  
LAS VEGAS VALLEY  
FLOOD CONTROL  
MASTER PLAN UPDATE

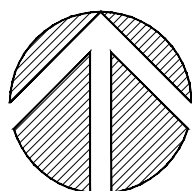
**FIGURE F- 30**  
**FLOOD CONTROL FACILITIES**

- LEGEND**
- Ultimate Development Boundary
  - Existing Facilities
  - Category A Proposed Facilities
  - Category B Proposed Facilities
  - Local Existing Facilities
  - 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 |

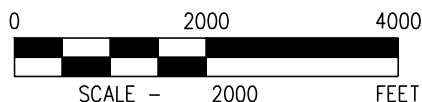


Scale: 1 inch = 2,000 feet

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



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**PROJECT No.** 137102

**SCALE** 1"=2000'

**DATE** SEPT. 2018

**DRAWN BY** TLD

**FORT APACHE COMMONS**  
**MPU FACILITIES MAP**  
**(FIGURE 5)**

**EXHIBIT**

**5 OF 6**

| ID / River Mile | Status | Facility Description                           | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%) ** | ID / River Mile | Status |                             |
|-----------------|--------|------------------------------------------------|--------------|------------|------------|-------------|-------------------------|----------------------|-----------------|--------|-----------------------------|
| APDG 0000       | E      | ANGEL PARK - DURANGO                           | 2600         | 842        | C38B       | ALLGOW3     | 0.79                    | 0.70                 | FLMN 0000       | E      | FLAMINGO WASH 78" RCP       |
| 0060            | E      | 72" RCP                                        | 1901         | 374        | 38A        | ALLGOW3     | 0.35                    | 0.96                 | 0025            | E      | 72" RCP                     |
| APMD 0027       | E      | ANGEL PARK - MIDDLE BRANCH                     |              |            |            |             |                         |                      | 0050            | E      | 66" RCP                     |
| 0030            | E      | 1: 12' X 10' and 2: 12' X 2' RCBC @ Canyon Run | 170          | 6048       | C11A-3*    | ALLGOW4     | 11.31                   | 3.00                 | 0060            | E      | 54" RCP                     |
| 0132            | E      | Natural Wash                                   | 7000         | 6048       | C11A-3*    | ALLGOW4     | 11.31                   | 3.00                 | 0075            | E      | 48" RCP                     |
| 0133            | E      | 2: 12'x10' RCBC @ Hualapai                     | 120          | 6048       | C11A-3*    | ALLGOW4     | 11.31                   | 1.00                 | FLMS 0000       | E      | FLAMINGO WASH 54" RCP       |
|                 | E      | Natural Wash                                   | 3015         | 6048       | C11A-3*    | ALLGOW4     | 11.31                   | 3.00                 | FLSM 0000       | E      | SPRING MOUNTAIN 60" RCP     |
| APNO 0001       | E      | ANGEL PARK NORTH                               |              |            |            |             |                         |                      | 0083            | E      | 36" RCP                     |
|                 | E      | 1,512 ac-ft Angel Park Detention Basin         |              | 9199       | ANGLPKIN   | ALLGOW5     | 21.99                   |                      | 0086            | E      | 36" RCP Outlet              |
| APP1 0000       | E      | ANGEL PARK - PECCOLE 1                         |              |            |            |             |                         |                      | 0087            | E      | 143 ac-ft Lakes Dete        |
|                 | E      | 72" RCP                                        | 2982         | 442        | PIC-B      | ALLGOW3     | 0.44                    | 2.40                 | 0088            | P1     | Upgrade to 165 ac-ft        |
| 0056            | E      | 2: 60" RCP                                     | 1385         | 442        | PIC-B      | ALLGOW3     | 0.44                    | 2.40                 | 0100            | E      | 12' X 8' RCB                |
| APP2 0000       | E      | ANGEL PARK - PECCOLE 2                         |              |            |            |             |                         |                      | 0125            | E      | 96" RCP                     |
|                 | E      | Grass Chnl 10'W 5'D 2:1 SS                     | 4793         | 2004       | C57B-1     | ALLGOW3     | 1.93                    | 2.10                 | 0180            | E      | 90" RCP                     |
| APSO 0000       | E      | ANGEL PARK - SOUTH BRANCH                      |              |            |            |             |                         |                      | GOSO 0297       | E      | GOWAN SOUTH FA 12' X 7' RCB |
| 0020            | E      | 2: 12' X 12' RCB                               | 2506         | 4628       | CC57B-4    | ALLGOW3     | 5.24                    | 1.62                 | 0336            | E      | 12' X 7' RCB                |
| 0050            | E      | 2: 12' X 12' RCBC @ Rampart                    | 350          | 4628       | CC57B-4    | ALLGOW3     | 5.24                    | 1.80                 | 0352            | E      | 2: 8' X 5' RCB              |
| 0067            | E      | Natural Wash                                   | 209          | 4628       | CC57B-4    | ALLGOW3     | 5.24                    | 1.84                 | 0404            | E      | 2: 8' X 4' RCB              |
| 0204            | E      | Natural Wash                                   | 8300         | 2384       | C57B-2     | ALLGOW3     | 2.67                    | 2.10                 | 0455            | E      | 2: 12' X 4' RCB             |
| 0205            | E      | 2: 8' X 8' RCBC @ Hualapai                     | 326          | 2056       | C12B       | ALLGOW3     | 2.00                    | 2.66                 | 0462            | E      | 12' X 4' RCB                |
| 0205            | E      | Natural Wash                                   | 2380         | 2056       | C12B       | ALLGOW3     | 2.00                    | 3.46                 | GOWC 0000       | E      | GOWAN SOUTH FA 24" RCP      |
| 0254            | E      | 2: 8' X 8' RCBC @ Town Center Dr.              | 190          | 1932       | C12A       | ALLGOW3     | 1.74                    | 3.00                 | LCCH 0438       | E      | LAS VEGAS CREEK 60" RCP     |
| 0255            | E      | 24' X 12' RCAC @ Town Center Dr.               | 140          | 1932       | C12A       | ALLGOW3     | 1.74                    | 3.00                 | 0458            | E      | 60" RCP                     |
| FLBF 0152       | E      | FLAMINGO WASH - BUFFALO                        |              |            |            |             |                         |                      | 0478            | E      | 60" RCP                     |
| 0228            | E      | 10' X 7' RCB                                   | 3460         | 814        | CLF11      | FLAM3A      | 4.29                    | 0.32                 | 0499            | E      | 42" RCP Outlet              |
| 0252            | E      | 96" RCP                                        | 1330         | 746        | CLF9       | FLAM3A      | 0.94                    | 1.00                 | 0513            | E      | 102 ac-ft Rainbow D         |
| 0258            | E      | 9' X 6' RCB                                    | 170          | 746        | CLF9       | FLAM3A      | 0.94                    | 1.00                 | 0518            | E      | 60" RCP Connector           |
| 0278            | E      | 96" RCP                                        | 1140         | 746        | CLF9       | FLAM3A      | 0.94                    | 0.50                 |                 |        |                             |
| 0278            | E      | 90" RCP                                        | 2640         | 506        | LF8        | FLAM3A      | 0.51                    | 0.50                 |                 |        |                             |
| 0328            | E      | 54" RCP                                        | 660          | 506        | LF8        | FLAM3A      | 0.51                    | 0.30                 |                 |        |                             |
| FLDI 0000       | E      | DESERT INN DRAIN                               |              |            |            |             |                         |                      |                 |        |                             |
|                 | E      | 9' X 6' RCB                                    | 190          | 1145       | CLF4       | FLAM3A      | 1.38                    | 2.71                 |                 |        |                             |
| 0004            | E      | 06" RCP                                        |              |            |            |             |                         |                      |                 |        |                             |



2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 30

Legend:

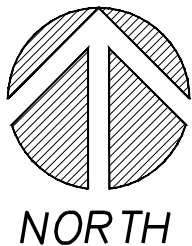
- L ID (Facility Identifier)
- E Parent Stream Name
- G Stream Name
- R River Mile
- E Distance Above Confluence with Parent Stream (Miles)
- N Miles in Hundredths
- D

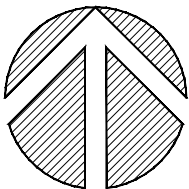
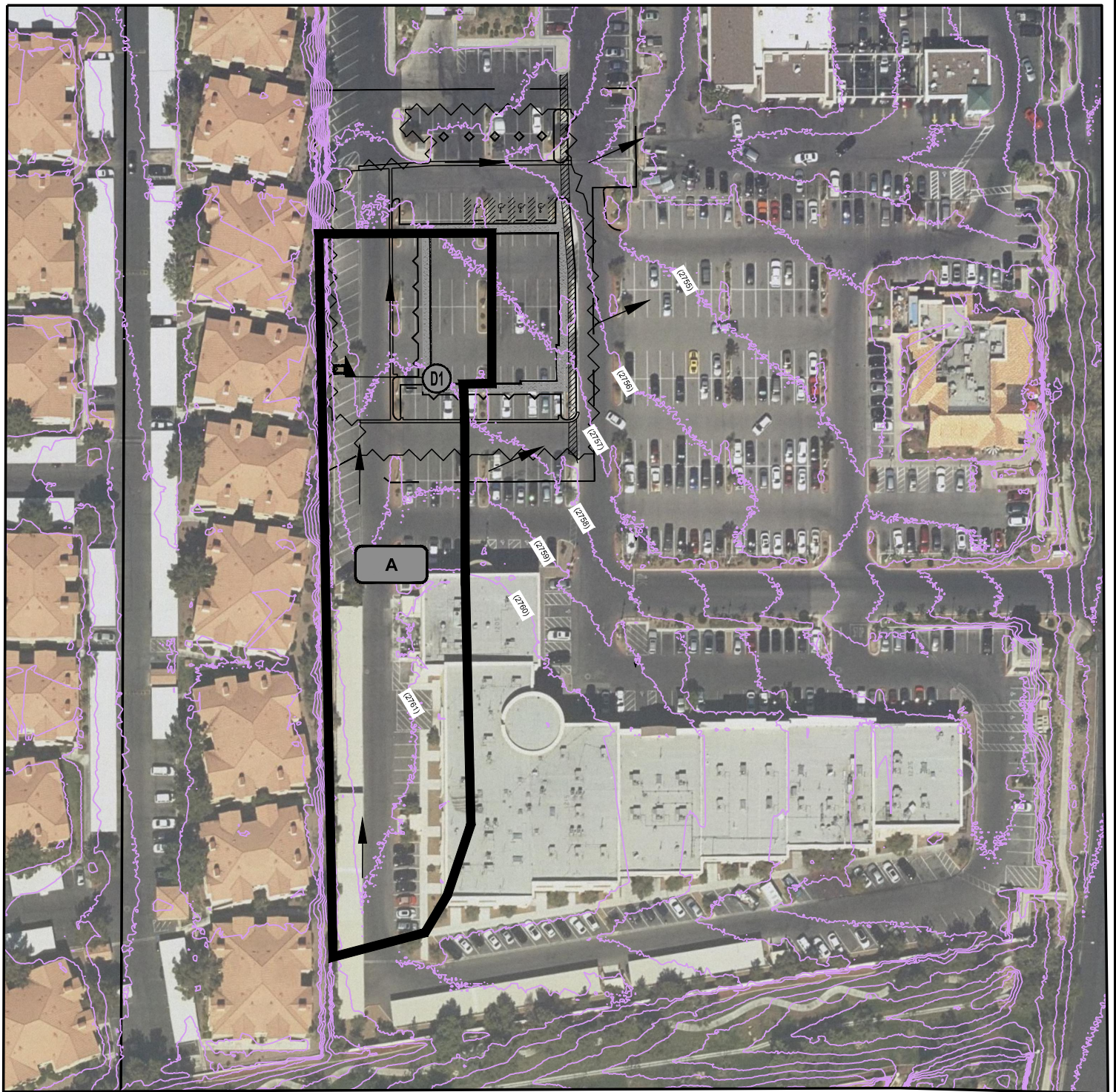
Existing Facility:

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

Construction Features:

- Bottom Width: W
- Depth: D
- Side Slope: H:V, SS
- Cast in Place Concrete Pipe: CIPCP
- Corrugated Metal Arch Pipe Culvert: CMAP
- Corrugated Metal Pipe Culvert: CMP
- High Density Polyethylene: HDPE
- Horizontal Elliptical Reinforced Concrete Pipe: HERCP
- Reinforced Concrete Arch Pipe: RCAP
- Reinforced Concrete Arch Culvert: RCAC
- Reinforced Concrete Box Culvert: RCBC
- Reinforced Concrete Box Culvert: RCBC
- Reinforced Concrete Pipe Culvert: RCP
- Reinforced Concrete Pipe Culvert: RCP
- Storm Sewer Pipe: SSP





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TEL: (702) 902-2444 | FAX: (702) 248-8495 | MOE@MHMENGINEERS.COM

**PROJECT No.** 137102

**SCALE** 1"=1000'

**DATE** SEPT. 2018

**DRAWN BY** TLD

**FORT APACHE COMMONS  
DRAINAGE MAP  
(FIGURE DR)**

**DR  
1 OF 1**

## APPENDIX B

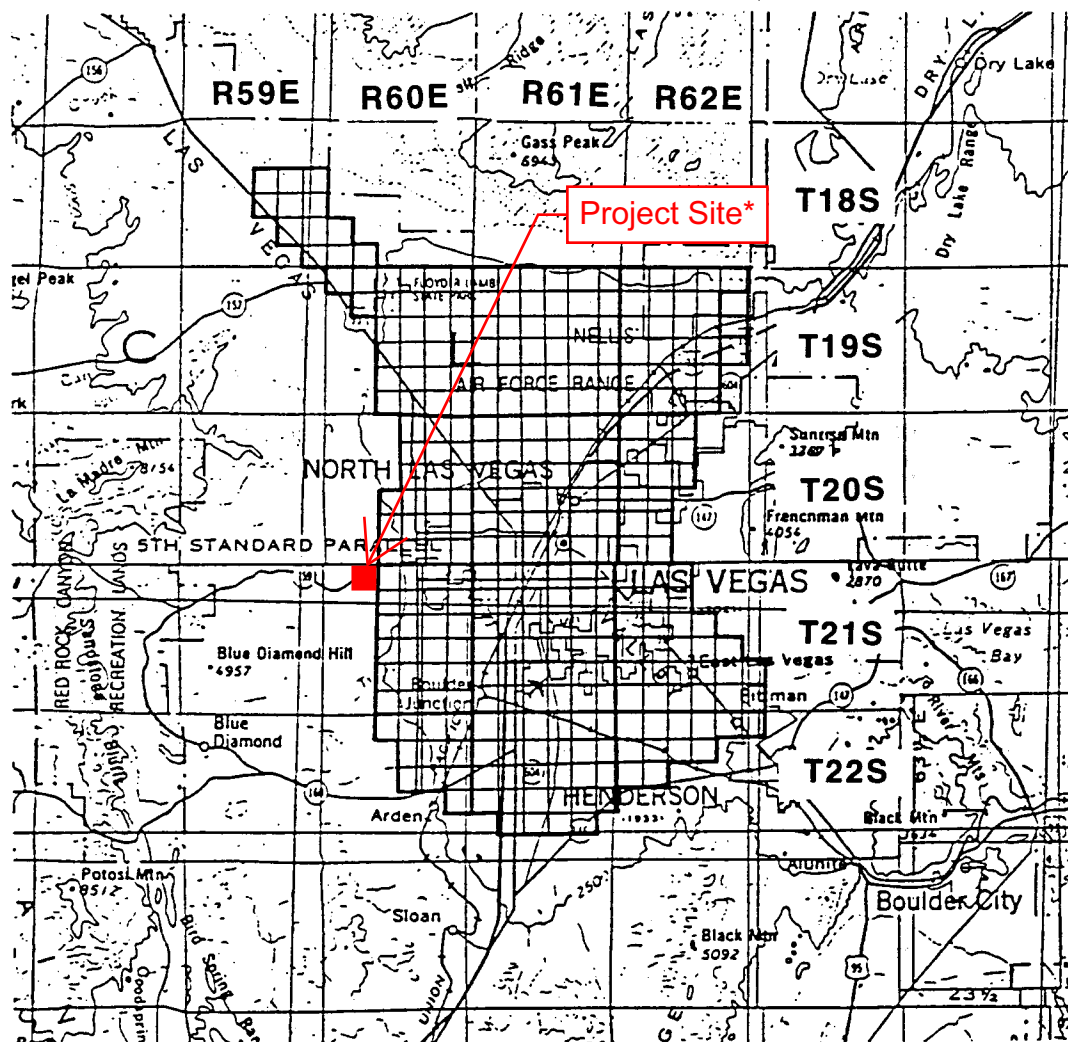
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### Precipitation, Curve Number & Lag Time Data

## HCDDM Reference Rainfall Data Figure & Tables

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## McCARRAN AIRPORT RAINFALL AREA



\*Project site not located within the McCarran Airport Rainfall area (T21S-R60E-S05)

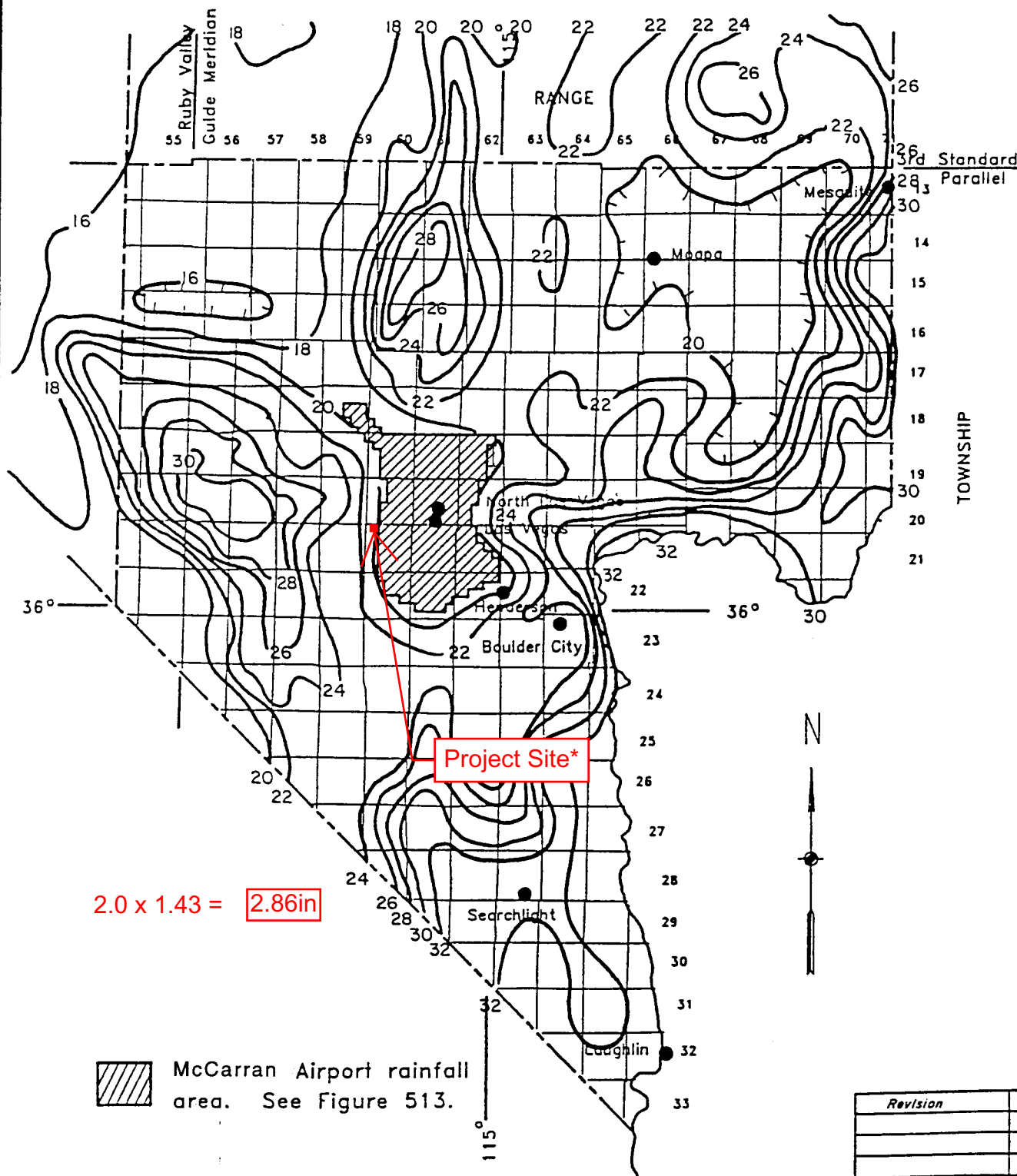
| TOWNSHIP | RANGE   | SECTIONS              | TOWNSHIP | RANGE   | SECTIONS             |
|----------|---------|-----------------------|----------|---------|----------------------|
| 18 South | 59 East | 13-15,22-26,36        | 20 South | 62 East | 4-9,16-20,29-32      |
| 18 South | 60 East | 30-32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

Notes:

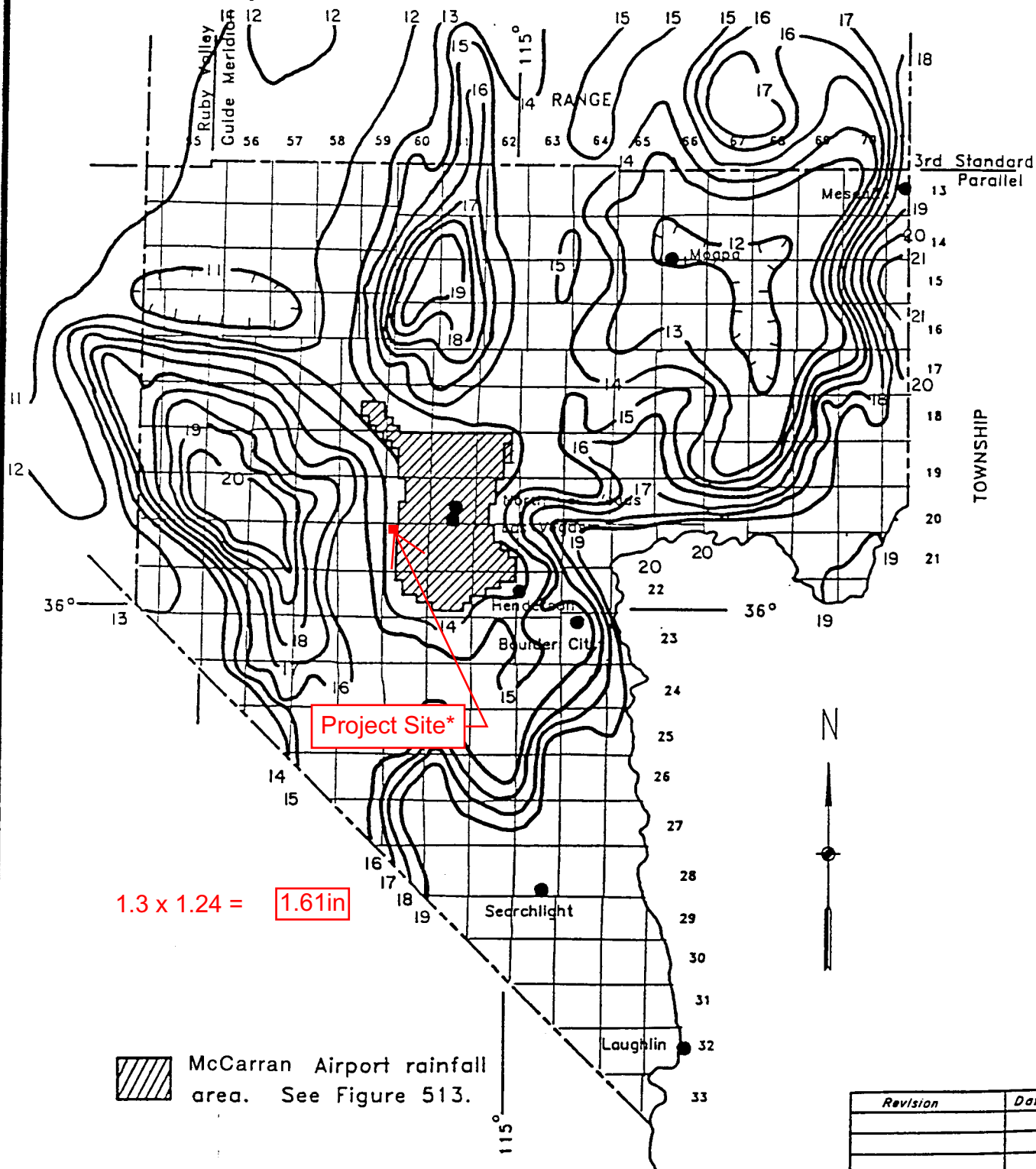
1. Refer to Table 505 and Figure 516 Depth-Duration- Frequency values in the McCarran Airport Rainfall Area.
2. Refer to Table 506 and Figure 517 for Time-Intensity-Frequency values on the McCarran Airport Rainfall Area.

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

## RAINFALL DEPTH-DURATION-FREQUENCY 100-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)



## RAINFALL DEPTH-DURATION-FREQUENCY 10-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)



## PRECIPITATION ADJUSTMENT RATIOS

| <u>Recurrence<br/>Interval</u> | <u>Ratio to<br/>NOAA Atlas 2</u> |
|--------------------------------|----------------------------------|
| 2-year                         | 1.00                             |
| 5-year                         | 1.16                             |
| 10-year                        | 1.24                             |
| 25-year                        | 1.33                             |
| 50-year                        | 1.39                             |
| 100-year                       | 1.43                             |

- NOTE: 1. Multiply the values obtained from the NOAA Atlas 2 by the above ratios to obtain the adjusted precipitation values.
2. NOAA Atlas 2 values for use with TR-55 shall not be adjusted by the above ratios.
3. Tables 505 and 506 require no adjustments.

| <i>Revision</i> | <i>Date</i> |
|-----------------|-------------|
|                 |             |
|                 |             |
|                 |             |
|                 |             |

## SIX HOUR DEPTH-AREA REDUCTION FACTORS

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

- NOTES: 1. A graphical representation of these factors is presented in Figure 514.
2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

| <i>Revision</i> | <i>Date</i> |
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# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## SIX-HOUR STORM DISTRIBUTIONS

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

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

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

REFERENCE:

TABLE 503

## HCDDM Reference Runoff Curve Number Table 602

## RUNOFF CURVE NUMBERS (URBAN AREAS<sup>1</sup>)

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

**See Table 602A**

### *Developing urban areas*

|                                                                            |    |    |    |    |
|----------------------------------------------------------------------------|----|----|----|----|
| Newly graded areas (pervious areas only, no vegetation) <sup>5</sup> ..... | 77 | 86 | 91 | 94 |
|----------------------------------------------------------------------------|----|----|----|----|

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

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

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

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

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

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

## NRCS Reference Soil Data



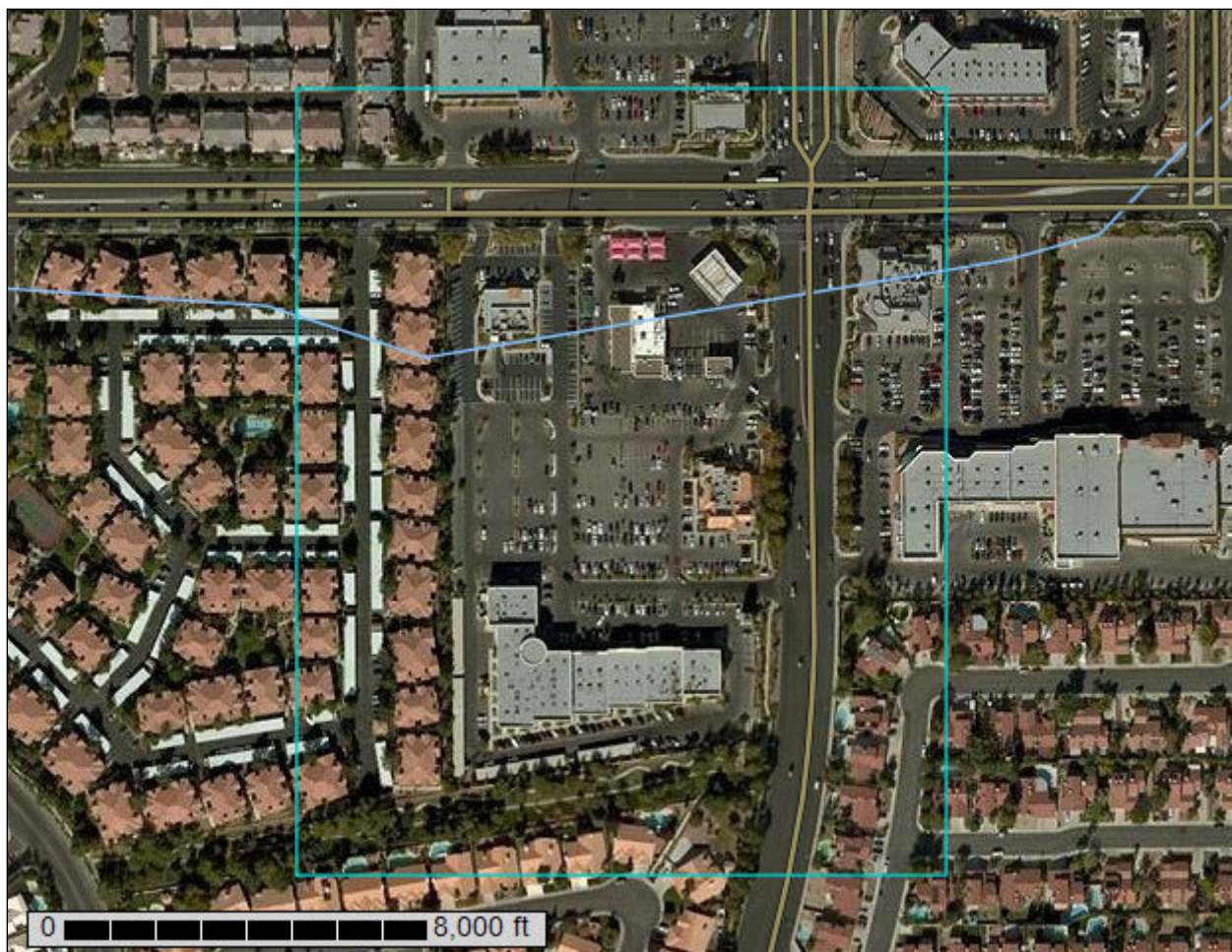
United States  
Department of  
Agriculture

**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



September 17, 2018

# Preface

---

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

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

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

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

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

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

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# How Soil Surveys Are Made

---

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

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

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

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

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

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

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

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

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

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

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

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

## Custom Soil Resource Report

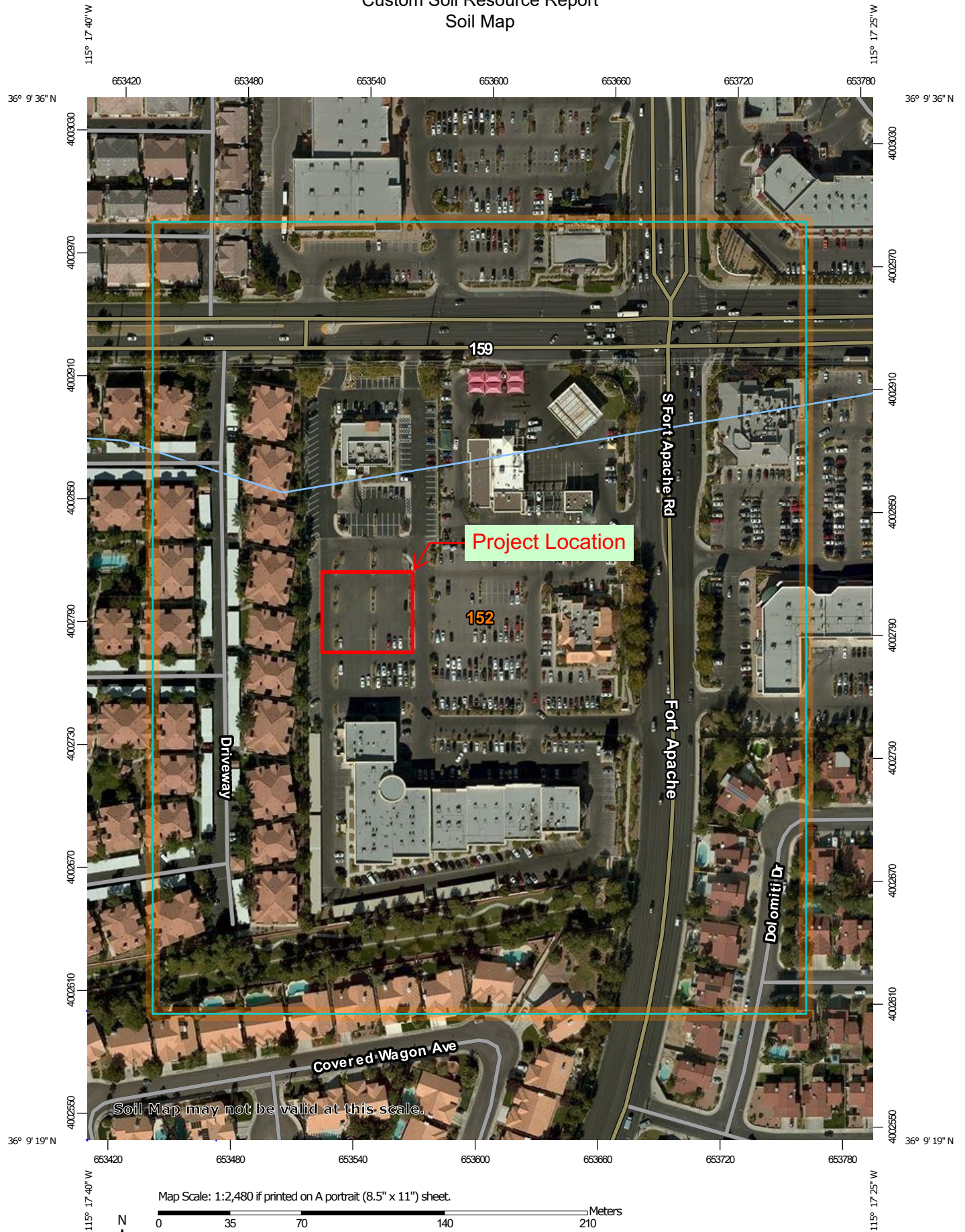
identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

---

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

# Custom Soil Resource Report Soil Map



MAP LEGEND

**Area of Interest (AOI)**

Area of Interest (AOI)

**Soils**

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

**Special Point Features**

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

**Water Features**

Streams and Canals

**Transportation**

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

**Background**

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County  
Survey Area Data: Version 12, Sep 15, 2017

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

Date(s) aerial images were photographed: May 7, 2011—Feb 25, 2014

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

|                   |                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------|
| <b>MAP LEGEND</b> | <b>MAP INFORMATION</b>                                                                                   |
|                   | imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident. |

## Map Unit Legend

| Map Unit Symbol                    | Map Unit Name                                           | Acres in AOI | Percent of AOI |
|------------------------------------|---------------------------------------------------------|--------------|----------------|
| 152                                | Cave gravelly fine sandy loam,<br>0 to 4 percent slopes | 30.7         | 100.0%         |
| <b>Totals for Area of Interest</b> |                                                         | <b>30.7</b>  | <b>100.0%</b>  |

## Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

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

### 152—Cave gravelly fine sandy loam, 0 to 4 percent slopes

#### Map Unit Setting

*National map unit symbol:* hr9v  
*Elevation:* 2,000 to 4,800 feet  
*Mean annual precipitation:* 4 to 12 inches  
*Mean annual air temperature:* 57 to 70 degrees F  
*Frost-free period:* 180 to 280 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

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

#### Description of Cave

##### Setting

*Landform:* Fan remnants  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex  
*Parent material:* Mixed alluvium

##### Typical profile

*H1 - 0 to 12 inches:* gravelly fine sandy loam  
*H2 - 12 to 36 inches:* indurated  
*H3 - 36 to 60 inches:* very gravelly sandy loam

##### Properties and qualities

*Slope:* 0 to 4 percent  
*Depth to restrictive feature:* 4 to 20 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 to 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:* 40 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 1.2 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

# Soil Information for All Uses

---

## Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

## Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

## Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or

## Custom Soil Resource Report

soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

*Surface runoff* refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

### Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

| Hydrologic Soil Group and Surface Runoff—Las Vegas Valley Area, Nevada, Part of Clark County |                  |                |                       |
|----------------------------------------------------------------------------------------------|------------------|----------------|-----------------------|
| Map symbol and soil name                                                                     | Pct. of map unit | Surface Runoff | Hydrologic Soil Group |
| 152—Cave gravelly fine sandy loam, 0 to 4 percent slopes                                     |                  |                |                       |
| Cave                                                                                         | 100              | Very high      | D                     |

# References

---

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
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- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
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- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053577](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577)
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- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2\\_053374](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374)
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053624](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624)

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_052290.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf)

## Composite and Weighted Curve Number Computations

## Soil & Curve Number Computation

**Project Name:** Fort Apache Commons

**Date:** 9/19/2018 0:00

**File Name:** Curve Number Calcs v120529.xlsx

**By:** TLD

### Data: Developed Condition

### Reference:

| Soil Type & Description |                                                      | A  | B  | C  | D    |
|-------------------------|------------------------------------------------------|----|----|----|------|
| 152                     | Cave gravelly fine sandy loam, 0 to 4 percent slopes | 0% | 0% | 0% | 100% |

Exhibit 7  
SCS Soil Data

| Land Use     |  | A  | B  | C  | D  |
|--------------|--|----|----|----|----|
| Commercial   |  | 89 | 92 | 94 | 95 |
| Newly Graded |  | 77 | 86 | 91 | 94 |

### Proposed Condition

| BASIN ID      | SOIL TYPE | SUBAREA PERCENT | LAND USE   | HYDROLOGIC SOIL GROUP |    |    |      | LAND USE CN |    |    |    | SUBAREA ACRES | CALCULATED CN |
|---------------|-----------|-----------------|------------|-----------------------|----|----|------|-------------|----|----|----|---------------|---------------|
|               |           |                 |            | A                     | B  | C  | D    | A           | B  | C  | D  |               |               |
| OND           | 152       | 100.0%          | Commercial | 0%                    | 0% | 0% | 100% | 89          | 92 | 94 | 95 | 1.16          | 95.00         |
| TOTAL PERCENT |           | 100.0%          | TOTAL AREA |                       |    |    |      |             |    |    |    | 1.16          | 95.00         |

## Standard Form 4 Lag Time Computations



## APPENDIX C

### HEC-1 Analysis

Existing/Proposed Condition

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 19SEP18 TIME 19:14:33
*
*****

D

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

```

```

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

```

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

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

1 HEC-1 INPUT PAGE 1

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

```

*DIAGRAM
1 ID FORT APACHE COMMONS - TECHNICAL DRAINAGE STUDY UPDATE
2 ID 10-YR & 100-YR, 6 HOUR STORM
3 ID EXISTING/PROPOSED CONDITION
4 ID @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
5 ID
6 ID Project Number: 18-0020
7 ID MOMENI ENGINEERS, LLC
8 ID 3110 S. DURANGO DRIVE, SUITE 205
9 ID LAS VEGAS, NEVADA 89117
10 ID
11 ID FILENAME ----- D.H1
12 ID DATE ----- SEPTEMBER 2018
13 ID MODELED BY ----- DHL
14 ID
15 ID *****
16 ID * SDN 3 VALUES - OUTSIDE McCARRAN AIRPORT RAINFALL AREA *
17 ID *****
18 ID
19 ID
20 ID IT 5 0 0 300
21 ID IO 5 0 0
22 ID IN 5 0 0
23 ID JR PREC 1.00 0.56
*
24 KK A
25 KM EXISTING COMMERCIAL SITE BASIN
26 BA .0018
27 PB 2.86
28 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
29 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
30 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
31 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
32 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
33 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
34 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
35 PC 0.998 0.999 1.000
36 LS 0 95.0
37 UD 0.088
*
38 ZZ

```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW

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

24 A

D

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

```
1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 19SEP18 TIME 19:14:33 *
*
*****
```

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

FORT APACHE COMMONS - TECHNICAL DRAINAGE STUDY UPDATE  
10-YR & 100-YR, 6 HOUR STORM  
EXISTING/PROPOSED CONDITION  
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@

Project Number: 18-0020  
MOMENI ENGINEERS, LLC  
3110 S. DURANGO DRIVE, SUITE 205  
LAS VEGAS, NEVADA 89117

FILENAME ----- D.H1  
DATE ----- SEPTEMBER 2018  
MODELED BY ----- DHL

\*\*\*\*\*  
\* SDN 3 VALUES - OUTSIDE McCARRAN AIRPORT RAINFALL AREA \*  
\*\*\*\*\*

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

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

          COMPUTATION INTERVAL .08 HOURS
          TOTAL TIME BASE 24.92 HOURS

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

JP         MULTI-PLAN OPTION
          NPLAN      1  NUMBER OF PLANS

JR         MULTI-RATIO OPTION
          RATIOS OF PRECIPITATION
          1.00      .56
```

1

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

| OPERATION     | STATION | AREA | PLAN | RATIOS APPLIED TO PRECIPITATION |            |
|---------------|---------|------|------|---------------------------------|------------|
|               |         |      |      | RATIO 1                         | RATIO 2    |
|               |         |      |      | 1.00                            | .56        |
| HYDROGRAPH AT |         |      |      |                                 |            |
| +             | A       | .00  | 1    | FLOW<br>TIME                    | 4.<br>3.50 |
|               |         |      |      |                                 | 2.<br>3.50 |

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

---

## APPENDIX D

### Hydraulic Calculations

## Onsite Drive Aisle Normal Depth Computation

## Project Description

| Solve For | Normal Depth |
|-----------|--------------|
|-----------|--------------|

### Input Data

Discharge 4.00 ft<sup>3</sup>/s

## Section Definitions

| Station (ft) | Elevation (ft) |
|--------------|----------------|
| 0+00         | 59.02          |
| 0+00         | 58.52          |
| 0+24         | 57.88          |
| 0+24         | 58.38          |

### Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---------------|----------------|-----------------------|
| (0+00, 59.02) | (0+24, 58.38)  | 0.016                 |

## Options

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

## Results

|                  |                   |       |
|------------------|-------------------|-------|
| Normal Depth     | 0.33              | ft    |
| Elevation Range  | 57.88 to 59.02 ft |       |
| Flow Area        | 2.05              | ft²   |
| Wetted Perimeter | 12.75             | ft    |
| Hydraulic Radius | 0.16              | ft    |
| Top Width        | 12.41             | ft    |
| Normal Depth     | 0.33              | ft    |
| Critical Depth   | 0.31              | ft    |
| Critical Slope   | 0.00720           | ft/ft |

## Worksheet for Section D1 - Drive Aisle

### Results

|                 |             |      |
|-----------------|-------------|------|
| Velocity        | 1.95        | ft/s |
| Velocity Head   | 0.06        | ft   |
| Specific Energy | 0.39        | ft   |
| Froude Number   | 0.84        |      |
| 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        | 0.33     | ft    |
| Critical Depth      | 0.31     | ft    |
| Channel Slope       | 0.50000  | %     |
| Critical Slope      | 0.00720  | ft/ft |

## Project Description

### Manning Formula

Normal Depth

4.00 ft<sup>3</sup>/s

The graph shows the vertical alignment of a road. The ground profile is represented by a dashed line, and the proposed profile is represented by a solid line. The proposed profile includes a vertical curve between stations 12+00 and 18+00, where the elevation remains constant at 58.20. The ground profile starts at approximately 59.02 at station 0+00 and decreases to 57.88 at station 23+00. The proposed profile starts at 58.55 at station 0+00, decreases to 58.20 at station 12+00, remains constant at 58.20 until station 18+00, and then rises to 58.38 at station 23+00.

| Station | Ground Elevation (ft) | Proposed Elevation (ft) |
|---------|-----------------------|-------------------------|
| 0+00    | 59.02                 | 58.55                   |
| 0+05    | 58.85                 | 58.45                   |
| 0+10    | 58.68                 | 58.35                   |
| 0+15    | 58.51                 | 58.25                   |
| 0+20    | 58.34                 | 58.20                   |
| 0+23    | 57.88                 | 58.38                   |

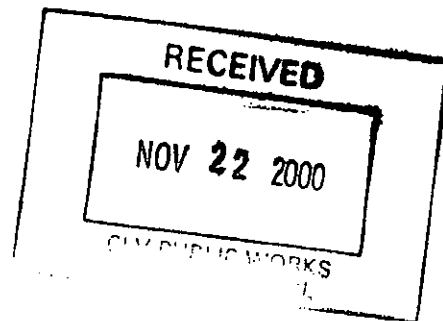
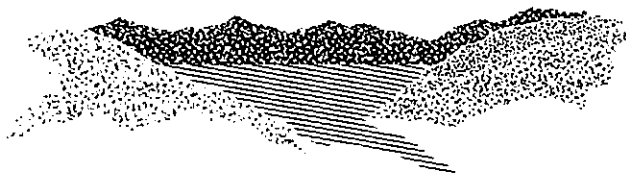
---

## APPENDIX E

### Reference Materials



C L A R K C O U N T Y  
REGIONAL FLOOD CONTROL DISTRICT



Gale Wm. Fraser, II, P.E.  
General Manager/Chief Engineer

**BOARD OF DIRECTORS**

Larry Brown  
Chairman  
City of Las Vegas

Crescent Hardy  
Vice-Chairman  
City of Mesquite

Dario Herrera  
Clark County

Mayor Oscar Goodman  
City of Las Vegas

Bryan A. Nix  
City of Boulder City

John K. Rhodes  
City of North Las Vegas

Mayor James Gibson  
City of Henderson

Bruce L. Woodbury  
Clark County

November 20, 2000

Mr. Randy Fultz, P. E.  
City of Las Vegas Public Works  
731 4<sup>th</sup> Street  
Las Vegas, NV 89101

**DISTRICT CONCURRENCE: FORT APACHE COMMONS  
(DS2779)**

Dear Mr. Fultz:

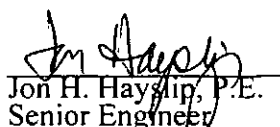
The District has reviewed the Technical Drainage Study dated September 29, 2000, and Addendum No. 1 dated October 19, 2000, for the above-captioned project as submitted by Pentacore Engineering, Inc. In addition, the District is in receipt of the Conditional Letter of Acceptance from the City of Las Vegas Public Works dated October 25, 2000.

The District concurs with the acceptance of this Technical Drainage Study by the City of Las Vegas Public Works.

The District's review of this project was limited to issues of Regional Flood Control Significance as defined in the Uniform Regulations for the Control of Drainage.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, the information submitted by Pentacore Engineering, Inc. may be superseded. Compliance with the regulatory elements and design standards specified in the Uniform Regulations for the Control of Drainage does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for the information, data, or conclusions presented by the consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

GALE WM. FRASER II, P.E.  
General Manager/Chief Engineer

BY:   
Jon H. Hayship, P.E.  
Senior Engineer

cc: Pentacore Engineering, Inc.

JHH:jms

File: 21-60-06.pen



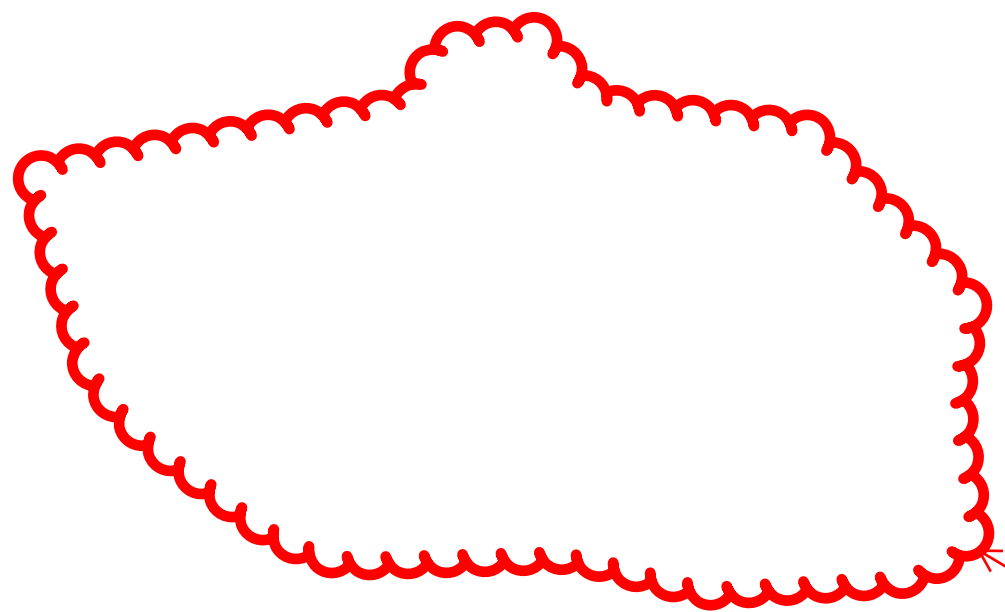
## APPENDIX F

### Improvement Plans

LOCATION OF  
PROPOSED  
BUILDIN ADDITION

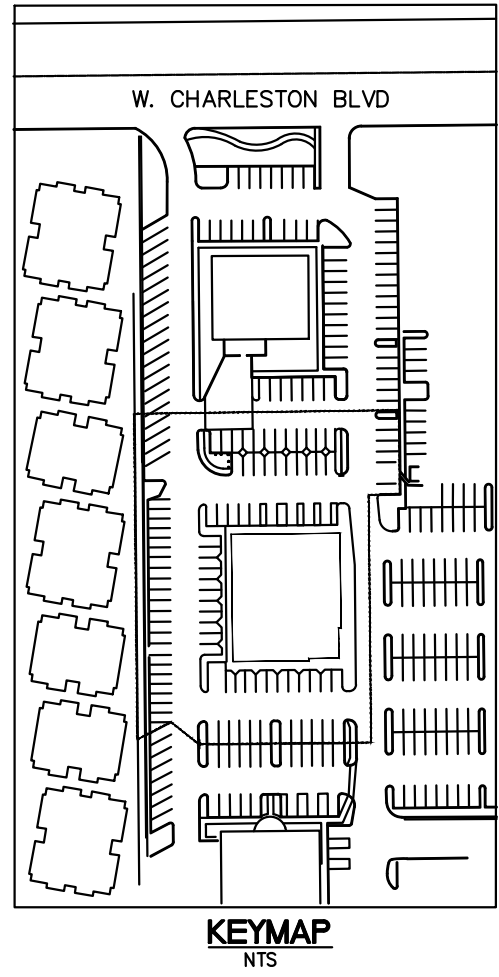
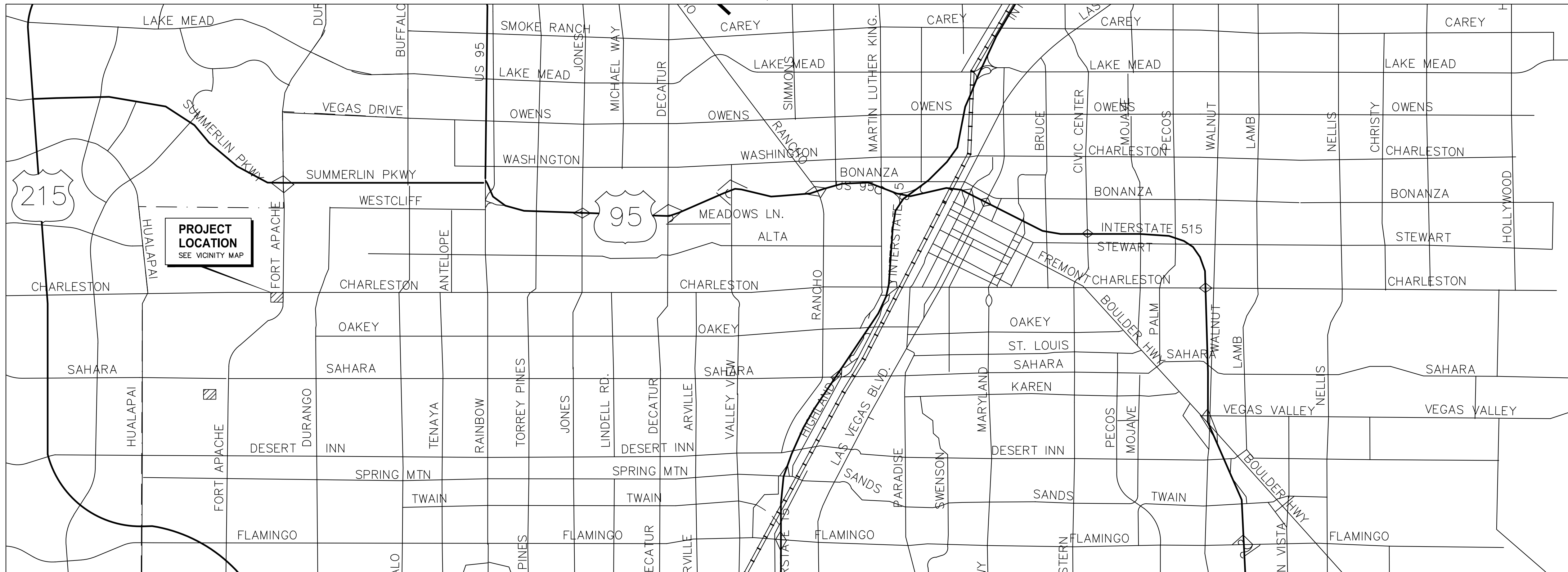


Ex. SD Conveys Offsite Flows from  
the Adjacent Avondale Apartments.





IMPROVEMENT PLANS FOR  
FORT APACHE COMMONS OFFICE  
APN 163-05-116-007  
TOTAL ACREAGE 1.27 ACRES, DISTURBED ACREAGE 0.95 ACRES



| REVISIONS | DESCRIPTION | DATE | BY | APPROVAL |
|-----------|-------------|------|----|----------|
|           |             |      |    |          |
|           |             |      |    |          |
|           |             |      |    |          |
|           |             |      |    |          |

OWNER/DEVELOPER:

APN: 163-05-116-007  
NAME: FORT APACHE COMMONS PARK L L C  
1215 S FORT APACHE RD #120  
LAS VEGAS, NV 89117  
PHONE (702) 253-5371  
FAX (702) 255-4656

UTILITY PROVIDERS:

WATER: LAS VEGAS VALLEY WATER DISTRICT  
SEWER: CITY OF LAS VEGAS  
GAS: SOUTHWEST GAS CORPORATION  
ELECTRIC: NEVADA POWER COMPANY  
TELEPHONE: CENTRAL TELEPHONE COMPANY, d/b/a CENTURYLINK  
CABLE: COX COMMUNICATIONS OF LAS VEGAS, INC.  
TRASH: REPUBLIC SERVICES OF NEVADA

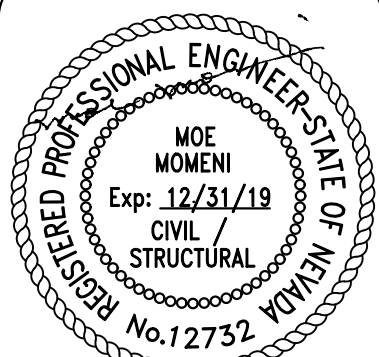
GEOTECHNICAL NOTE:

GEOTECHNICAL REPORT PREPARED BY:  
CONSTRUCTION TESTING SERVICES, LLC  
3842 EAST POST ROAD  
LAS VEGAS, NEVADA 89120  
PROJECT No.: J5851  
DATED: FEB. 7, 2018

**momeni** ENGINEERS, LLC

CIVIL & STRUCTURAL ENGINEERING  
3110 S. DURANGO DRIVE, SUITE 205  
LAS VEGAS, NEVADA 89117

TEL: (702) 902-2444 | FAX: (702) 248-8495 | MOE@MHEENGINEERS.COM



09/26/2018

ABBREVIATIONS

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

APPROVALS

CLV 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 STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

CITY FIRE MARSHAL DATE

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER DATE

PROJECT NO.: ### SHEETS:

SOUTHWEST GAS DATE

CENTRAL TELEPHONE COMPANY, d/b/a CENTURYLINK 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.

COX COMMUNICATIONS LAS VEGAS, INC. DATE

SHEET INDEX

1. COVER SHEET . . . . . C-1
2. NOTE SHEET . . . . . C-2
3. DEMOLITION PLAN . . . . . DEM-1
4. GRADING PLAN . . . . . G-1
5. DETAIL SHEET . . . . . D-1

LEGAL DESCRIPTION:

APN 163-05-116-007  
THE PARCEL SHOWN IN FILE 196, PAGE 66 OF SURVEYS, LYING WITHIN THE NORTHWEST QUARTER (NW 1/4) OF SECTION 5, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

BENCHMARK:

7LV00325SW - RIVET AND PLATE IN TOP OF CURB @ NW CORNER OF RAMPART AND CHARLESTON

ELEVATION: 2747.45' (FEET)

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

BASIS OF BEARINGS:

NORTH 89°26'21" EAST, BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER

(SW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 32, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., AS SHOWN IN FILE 196, PAGE 66 OF SURVEYS, CLARK COUNTY RECORDS, NEVADA.

LEGEND

|                                 |            |
|---------------------------------|------------|
| CL OR SECTION LINE              | ---        |
| PROPERTY LINE                   | ---        |
| RIGHT OF WAY LINE               | ---        |
| EASEMENT LINE                   | ---        |
| SAWCUT LINE                     | ---        |
| HEAVY AC PAVEMENT               | ---        |
| CONCRETE PAVEMENT               | ---        |
| EDGE OF PAVEMENT                | ---        |
| "A" TYPE CURB                   | ---        |
| "L" TYPE CURB                   | ---        |
| WALLS                           | ---        |
| FENCE                           | ---        |
| SIGN                            | ---        |
| CONTOUR                         | ---        |
| SPOT ELEVATION                  | (12.34) TC |
| MANHOLE - SEE DESCRIPTION BELOW | ⊙          |
| 100W HPS STL.                   | ⊙          |
| 150W HPS STL.                   | ⊙          |
| 200W HPS STL.                   | ⊙          |
| 250W HPS STL.                   | ⊙          |
| 400W HPS STL.                   | ⊙          |
| FIRE HYDRANT                    | ⊙          |
| GATE VALVE                      | ⊙          |
| REDUCER                         | ▷          |
| CLEAN OUT                       | ○          |
| UTILITY BOX/ VAULT              | □          |

S=SANITARY SEWER, D=STORM DRAIN, E=ELECTRICAL, T=TELEPHONE

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

AVOID HITTING UNDERGROUND UTILITY LINES. IT'S COSTLY.

Call Before You Dig  
Before You Dig  
1-702-227-2929

Call Before You Dig  
Before You Dig  
1-702-432-5300

811  
OR  
1-800-227-2600

PROJECT: Ft. Apache Commons Office  
City of Las Vegas  
SWC of W. Charleston Boulevard & Fort Apache Road

COVER SHEET

SHEET:

C-1

1 OF 5

## DEVIATIONS FROM STANDARDS

NONE.

## QUANTITIES

| SEWER IMPROVEMENTS         |        |         |  |
|----------------------------|--------|---------|--|
| DESCRIPTION                | PUBLIC | PRIVATE |  |
| 8-INCH SEWER               | LF     | LF      |  |
| SEWER MANHOLE UNDER 6 FEET | EA     | EA      |  |

| WATER AND FIRE IMPROVEMENTS |        |         |  |
|-----------------------------|--------|---------|--|
| DESCRIPTION                 | PUBLIC | PRIVATE |  |
| 8" WATER MAIN               | LF     | LF      |  |
| WATER LATERAL               | LF     | EA      |  |
| LANDSCAPE WATER SERVICE     | EA     | EA      |  |
| 2" WATER MAIN               | LF     | LF      |  |
| IRRIGATION SLEEVES          | LF     | LF      |  |
| WATER MAIN TAP              | EA     | LF      |  |
| WATER SERVICE TO LOTS       | EA     | EA      |  |
| FIRE HYDRANT                | EA     | EA      |  |

| ROADWAY IMPROVEMENTS           |        |         |  |
|--------------------------------|--------|---------|--|
| DESCRIPTION                    | PUBLIC | PRIVATE |  |
| CURB & GUTTER (TYPE "L" & "A") | LF     | LF      |  |
| DRIVEWAY RESIDENTIAL           | SF     | SF      |  |
| SIDEWALK 4"                    | SF     | SF      |  |
| SIDEWALK RAMP                  | EA     | EA      |  |
| SIDEWALK UNDERDRAIN            | EA     | EA      |  |
| TYPE II GRAVEL BASE            | CY     | CY      |  |
| 2" ASPHALTIC CONCRETE PAVING   | SY     | SY      |  |
| 3" ASPHALTIC CONCRETE PAVING   | SY     | SY      |  |
| PWMT BUTTON (REFLECTIVE)       | EA     | EA      |  |
| PAVEMENT STRIPING COLLECTOR    | LF     | LF      |  |

| TRAFFIC IMPROVEMENTS     |        |         |  |
|--------------------------|--------|---------|--|
| DESCRIPTION              | PUBLIC | PRIVATE |  |
| PULL BOX                 | EA     | EA      |  |
| STREETLIGHT (STNDR BASE) | EA     | EA      |  |
| 1 1/4" ST/LT CONDUIT     | LF     | LF      |  |

| DRAINAGE IMPROVEMENTS |        |         |  |
|-----------------------|--------|---------|--|
| DESCRIPTION           | PUBLIC | PRIVATE |  |
| RIP RAP (D50-04")     | CY     | CY      |  |

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

## CITY OF LAS VEGAS GENERAL NOTES

- ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST REVISION (CROSS), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA" (USD), LATEST REVISION.
- THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS AS SHOWN FROM CIVIL PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCES WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
- THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
- ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
- TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY AND VETED, PRIOR TO THE USE ON THE PROJECT. THE CITY OF LAS VEGAS HAS A MIX DESIGNS LIBRARY.
- PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
- EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300 IN EXTRUDED-TYPE CURB.
- AS PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE UP OF ALL OUTLIES AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
- CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
- SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
- CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
- ALL GRADING WORK SHALL CONFORM TO THE SOLS REPORT AS PREPARED BY THE (COMPANY, REF #, DATE) APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
- EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
- THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND SUPPORT AS PROVIDED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
- UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APPROX. FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER. WALL NOTES.
- ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS. FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS, NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
- ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
- CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE. WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
- MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF MDT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
- WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC., THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
- SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTANTIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S), OR SANITARY SEWER AND STORM DRAIN FACILITIES SHOWN ON THESE PLANS SHALL BE USED TO MEET THE REQUIREMENTS OF MRS 455 AND SHALL SHOW AT A MINIMUM THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, AND THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY. ANY DEVIATIONS FROM THE INFORMATION SHOWN SHALL BE NOTED AND SUBMITTED AS A REVISION TO THE PLANS AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION.
- CITY VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAIN. CITY VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
- A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

## LAS VEGAS VALLEY WATER DISTRICT NOTES

- LVVWD PROJECT # - ####**
- NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVWD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
  - ALL WORK SHALL CONFORM TO LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE "UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS)", THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND SPECIFICATIONS.
  - ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA."
  - A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.
  - ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.
  - WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
  - ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
  - A WATER MAIN AND STORM DRAIN OR SANITARY SEWER CROSSESS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
  - WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED, AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVVWD DISTRIBUTION SYSTEM.
  - THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
  - ANY INTERRUPTION OF SERVICE MUST BE PREPARED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTICES MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
  - ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVWD PRE-APPROVED MATERIALS AND MANUFACTURERS LISTING FOR NEW FACILITIES. LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.
  - TELEPHONE "CALL BEFORE YOU DIG" AT 701 OR 1-800-227-2600.
  - THE INSTALLATION OF LAS VEGAS VALLEY WATER DISTRICT (LVVWD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE "UNIFORM STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR PATCH ON THE STREET SURFACE.
  - ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ADJUTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVVWD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, OR ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.
  - NO LEAD COMPLIANCE NOTE:  
TO COMPLY WITH THE FEDERAL SAFE DRINKING WATER ACT, ALL WATER WORKS BRASS PRODUCTS PROPOSED TO BE RELOCATED, OR INSTALLED AS NEW MUST BE INSTALLED WITH THE LEAD FREE APPROVED PRODUCT. THE OLD LEADED PRODUCT MAY NOT BE REUSED.

## CITY OF LAS VEGAS SEWER NOTES

- ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
- CHISEL S/O OR S/O IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
- POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
- ALL MANHOLES PAVED IN STREETS EIGHTY (80) FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80) FOOT R/W WILL REQUIRE RETROFIT.
- TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" S SHALL BE USED ON LINES TWELVE INCHES (12") AND ABOVE.
- WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
- ALL CONTRACTORS INSTALLING SEWER MAINS THAT ARE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
- THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
- INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

## CITY OF LAS VEGAS STREETLIGHT NOTES

- ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION (CROSS), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA" (USD), LATEST REVISION.
- NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS, ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC AND CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623 OF THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA".
- ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION IN ACCORDANCE WITH SECTION 623 G.03.01 OF THE USS.
- ALL CONDUIT SHALL HAVE AT LEAST ONE GREEN NO. 18 AWG WIRE INSTALLED AS TRACER WIRE IN ACCORDANCE WITH SECTION 623 G.02.01 OF THE USS PRIOR TO BACKFILLING AND FINAL INSPECTION.
- ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM CLEARANCE IN COMPLIANCE WITH USD NO. 320A WHEN POLE IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE POLE.
- AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TRAFFIC ENGINEERING DIVISION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
- GROUNDING AND GROUNDING SUPPORT SHALL BE COORDINATED WITH NV ENERGY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICEPOINTS SHALL BE SHOWN ON THE PLANS.
- WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREETLIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREETLIGHT BASES ARE INSTALLED. AT NO EXPENSE TO THE CITY OF LAS VEGAS.
- THE CONTRACTOR SHALL FURNISH COMPLETE CONDUIT, WIRE, ETC. FROM SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS.

## CITY OF LAS VEGAS TRAFFIC SIGNAL NOTES

- ALL WORK PERFORMED ON ANY TRAFFIC SIGNAL COMPONENT MUST BE UNDER THE DIRECT ON-SITE SUPERVISION OF AN IMSA CERTIFIED TECHNICIAN. THE LEVEL OF CERTIFICATION REQUIRED SHALL BE LEVEL II.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO ALL EXISTING UTILITIES. THE LOCATIONS OF UNDERGROUND UTILITIES AS SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES TO VERIFY IN THE FIELD THE LOCATIONS OF THEIR INSTALLATIONS 72 HOURS PRIOR TO CONSTRUCTION.  
CALL-BEFORE-YOU-OVERHEAD 1-702-227-2829  
CALL-BEFORE-YOU-DIG 1-800-227-2600  
STREETLIGHTS 1-702-229-6331  
FAST 1-702-432-5300
- ALL TRAFFIC SIGNAL INSTALLATIONS SHALL CONFORM TO THE "UNIFORM STANDARD DRAWINGS SPECIFICATIONS AND SPECIAL PROVISIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, VOLUMES I AND II," ADOPTED BY THE REGIONAL TRANSPORTATION COMMISSION APRIL 8, 1992 WITH ALL SUBSEQUENT REVISIONS. BRACKET MOUNTED (SIDE-MOUNTED) VEHICLE SIGNAL ASSEMBLIES WITH 2 OR MORE SIGNAL HEADS SHALL HAVE AN ADDITIONAL ELBOW AS SHOWN IN UNIFORM STANDARD DRAWING NUMBER 863 AND SHOWN AS OPTION B IN UNIFORM STANDARD DRAWING NUMBER 844, AND SHALL HAVE A MINORALAS CABLE SUPPORT AS SHOWN IN UNIFORM STANDARD DRAWING NUMBER 863 IF ONE OF THE SIGNAL HEADS CONTAINS 4 OR MORE SIGNAL MODULES.
- SERVICE SHALL HAVE 1-60 AMP SINGLE POLE BREAKER FOR SIGNAL, AND ONE 40 AMP SINGLE POLE BREAKERS FOR STREET LIGHTS. SERVICE SHALL BE 200 AMP PADMOUNT.
- LINE SIZE OF METER TO BE WIRED WITH THREE #3/0 AWG THW. LOAD SIDE SHALL BE WIRED WITH FOUR #4 AWG THW (2 BLACK, 2 WHITE) AND ONE #8 AWG THW (GREEN).
- LUMINAIRES ON ALL SIGNAL POLES SHALL BE L.E.D. AS APPROVED BY THE CITY OF LAS VEGAS (CLV). INTERSECTION LIGHTING SHALL MEET THE REQUIREMENTS OF UNIFORM STANDARD DRAWING NUMBER 300.53. EACH LUMINAIRE SHALL HAVE AN INDIVIDUAL 1000 WATT P.E. CONTROL. FOR LUMINAIRES THERE SHALL BE 21000-#4 AWG THW CONDUCTORS FROM THE SERVICE TO THE CABINET. IN #4 AWG THW CONDUCTORS SHALL BRANCH OFF INTO #10 AWG THW CONDUCTORS INDIVIDUALLY FUSED WITH 10 AMP FUSES. THERE SHALL BE NO SPLICES BETWEEN THE CABINET AND LUMINAIRE FIXTURES.
- THE INTERNALLY ILLUMINATED STREET NAME SIGNS SHALL BE WIRED TO THE LUMINAIRE PHOTO CELL FOR CONTROL WITH #10 AWG THW COPPER STRANDED WIRE (TYPICAL). THE SIGN SHALL BE WIRED DIRECTLY ABOVE IT. IN THE EVENT THERE IS NO LUMINAIRE ON THE TRAFFIC SIGNAL POLE, THE 1000 WATT P.E. CONTROL SHALL BE MOUNTED ON THE POLE CAP. ALL NEW ILLUMINATED STREET NAME SIGNS SHALL HAVE LIGHT EMITTING DIODE (LED) LAMPS PER SECTION 623 T.02.16 OF THE SPECIAL PROVISIONS.
- CHECK CONDUIT AND CABLE SCHEDULE FOR CONDUIT, CABLE, AND WIRE SIZE. VERIFY ALL EXISTING CONDUIT RUNS.
- ALL PULBUXES SHALL BE IN ACCORDANCE WITH UNIFORM STANDARD DRAWINGS NO. 705, NO. 706, AND NO. 707.
- TRAFFIC SIGNAL CABLE SHALL BE 15 OR 25 CONDUCTOR #14 AWG SOLID (TYPICAL) CABLE AND SHALL CONFORM TO IMSA SPEC. NO. 20-1.
- PEDESTRIAN PUSH BUTTONS SHALL BE AUDIBLE TACTILE "POLARA NAVIGATOR" TYPE (2-WIRE PEDESTRIAN PUSHBUTTON SYSTEM WITH IN2 PUSH BUTTON STATIONS AND SHELF-MOUNT BIPOLAR CONTROL UNIT WITH SOLID CABLE) OR CAMPBELL COMPANY MAPPS WIRELESS PEDESTRIAN PUSHBUTTON SYSTEM WITH APC IN ACCORDANCE WITH CITY OF LAS VEGAS SPECIAL PROVISIONS AND SECTION 623 OF THE CCA USS. PUSH BUTTON STATIONS SHALL BE R10-3E PER MUTCD, 2008 EDITION, WITH FULL MOUNTING BRACKETS, AS MODIFIED BY THE MANUFACTURER TO FIT ON A 5/8" X 1/2" SIGN, AND SHALL BE PORCELAIN-ENAMELED METAL. ALL PUSH BUTTONS TO BE MOUNTED 42" ABOVE SIDEWALK. THE MAXIMUM HORIZONTAL REACH DISTANCE IS TO BE 10". SIDEWALK RAMPS WILL BE ACCORDING TO U.S.D. NO. 235 (1-4) LATEST EDITION. WHEN AN EXISTING SIGN WITH EXISTING AUDIBLE-TACTILE PUSH BUTTONS IS MODIFIED, THE CONTRACTOR SHALL VERIFY NEW PEDESTRIAN PUSH BUTTONS OR CABINET OR EQUIPMENT MATCHES THE MANUFACTURE AND MODEL OF ANY EXISTING EQUIPMENT SCHEDULED TO REMAIN, TO PROVIDE A FULLY FUNCTIONING SYSTEM. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL CABINET EQUIPMENT, INCLUDING THE PEDESTRIAN PUSH BUTTON CONTROL UNIT, INTERFACE PANEL AND ANY REQUIRED HARNESSSES, TO PROVIDE A FULLY FUNCTIONING SYSTEM.
- THE ROUTING AND TERMINATION OF CONDUITS AND THE PLACING OF POLES AND CABINETS SHALL BE AS INDICATED ON THE PLANS. ALL CHANGES SHALL BE APPROVED BY THE ENGINEER.
- MAST ARM R10-12 SIGNS TO BE ADJACENT (NO GAP) TO THE M-5 SIGNAL HEAD. WHEN FLASHING YELLOW ARROW LEFT TURN SIGNALS ARE PLACED ON MAST ARM R10-12 LEFT TURN YIELD ON FLASHING YELLOW ARROW SIGN SHALL BE MOUNTED ADJACENT TO THE M-5 SIGNAL HEAD.
- TRAFFIC SIGNAL CABINET SHALL BE A TYPE III CABINET UNLESS OTHERWISE SPECIFIED IN THE PLANS. THIS IS COMMONLY REFERRED TO AS A "B" CABINET. THE CABINET SHALL CONFORM TO THE CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS AND THE CITY OF LAS VEGAS SPECIAL PROVISIONS. INSTALL CABINET NEAR THE M-5. ONE START ON THE DRAWINGS. THE TRAFFIC SIGNAL CONTROLLER CABINET, SHALL BE EQUIPPED WITH 16 LOAD BAY POSITIONS, SHALL BE A 48 DETECTOR CHANNEL R CABINET AND SHALL INCLUDE TWO (2) RACK-MOUNTED, 12 SLOT, LOOP DETECTION RACKS, WITH 2 DETECTOR LOOP CHANNELS PER DETECTOR. THE CABINET SHALL BE EQUIPPED WITH 1280S ROMENIS DRIVE, ACCOMMODATE VIDEO DETECTOR CARDS. THE CABINET SHALL CONTAIN A 768 OPTIMUM PHASE SELECTOR IN A 768 RACK, WITH A 768 AUXILIARY INTERFACE PANEL MOUNTED IN THE CABINET AND FULLY WIRED FOR GREEN SEEN CAPABILITIES.
- THE CONTRACTOR SHALL SUPPLY A MALFUNCTION MANAGEMENT UNIT (MMU) AND TRAFFIC SIGNAL CONTROLLER TO THE CITY OF LAS VEGAS TRAFFIC SIGNAL REPAIR SHOP. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF FOURTEEN DAYS PRIOR TO THE START OF A NEW PHASING SCHEME, FOR TESTING AND PROGRAMMING PURPOSES. THE CONTROLLER SHALL BE A NATEC 980 ATS T2 TYPE 2 NTOP COMPLIANT SIGNAL CONTROLLER WITH INSTALLED AND LICENSED APOGE CONTROLLER SOFTWARE, LATEST VERSION, AND THE MMU SHALL BE A MODEL MMU-16000E (AS MANUFACTURED BY RENO AKE, OR APPROVED EQUAL. THE CONTRACTOR SHALL DELIVER THE CONTROLLER AND MMU TO, AND PICKUP THE CONTROLLER AT 2805 ROMENIS DRIVE. CONTRACTOR SHALL NOTIFY THE TRAFFIC SIGNAL REPAIR SHOP (229-6076) SEVEN DAYS PRIOR TO PICK UP. THE CITY, AT ITS DISCRETION, MAY PROVIDE A DIFFERENT MODEL OF MMU OR CONTROLLER FOR INITIAL TURN-ON, IN WHICH CASE CITY PERSONNEL WILL SWAP THE CONTROLLER OR MMU AFTER THE PROJECT IS ACCEPTED.
- CONTRACTOR SHALL POSTHOLE SIGNAL POLE LOCATIONS PRIOR TO ORDERING OF POLES.
- ALL MAST ARMS TO BE HOT-DIP GALVANIZED BY THE MANUFACTURER. THE MAST ARM IS TO BE FABRICATED WITH END TENON ONLY. THE END TENON SHALL BE FACTORY INSTALLED AND THE REMAINING TENONS SHALL BE FABRICATED IN THE FIELD AT THE LOCATION SHOWN ON THE PLANS OR AS DIRECTED BY THE TRAFFIC ENGINEER. THE CONTRACTOR SHALL PROVIDE REPRESENTATIVE FOR TENON FABRICATION DETAILS SEE CLARK COUNTY AREA U.S.D. NO. 808 SHEET 2. ALL WELDING SHALL CONFORM TO AWS D 2.0, "SPECIFICATION FOR WELDED HIGHWAYS AND RAILWAY BRIDGES", AND TO ANY ADDITIONAL REQUIREMENTS OF SECTION 623 OF THE SPECIFICATIONS. ALL EXPOSED WELDS, SHALL BE PAINTED AS PROVIDED FOR REPAIRING DAMAGED GALVANIZED SURFACES.
- ALL VEHICLE AND PEDESTRIAN SIGNAL INDICATIONS SHALL HAVE LIGHT EMITTING DIODE (LED) TYPE INDICATIONS, IN CONFORMANCE WITH CITY OF LAS VEGAS SPECIAL PROVISIONS AND TO SECTION 623 OF THE CCA USS. ALL PEDESTRIAN SIGNAL FACES SHALL PROVIDE WALKING PERSON, HAND, AND COUNTDOWN MESSAGES AS PROVIDED BY DURAKULIGHT MODEL. LEAD-400-WELL OR DAUGHT MOUNT. THE CONTRACTOR SHALL PROVIDE THE FOLLOWING INFORMATION TO THE CITY: WHEN EXISTING SIGNALS ARE MODIFIED, THE CONTRACTOR SHALL VERIFY THAT LED PEDESTRIAN INDICATIONS FOR A SPECIFIC PHASE ARE OF THE SAME MANUFACTURE SO THAT THEY FUNCTION CORRECTLY, OR SHALL REPLACE ALL PEDESTRIAN INDICATIONS FOR THAT PHASE.
- VIDEO DETECTION SYSTEMS WILL BE EITHER ETHERS EDGE 2 WITH EDGECONNECT PAK (PC ADDRESSABLE); KEEK VIDEOEAK IO (WITH ETHERNET PORT OR TRAFICON VIP WITH VIEWCOM (PC ADDRESSABLE). WHEN VIDEOETECTION IS NECESSARY ON THE TRAFFIC SIGNAL PLANS, ALL VIDEO DETECTION SYSTEMS WILL BE STAND ALONE SYSTEMS TO INCLUDE ALL SPECIFIED EQUIPMENT TO PROGRAM THE VIDEO DETECTION SYSTEM. A PROGRAMMING "MOUSE", KEYPAD OR LAPTOP COMPUTER (IF REQUIRED FOR PROGRAMMING THE VIDEO DETECTION SYSTEM) AND APPROPRIATE SOFTWARE WILL BE SUPPLIED WITH EACH VIDEO SYSTEM. PERSONAL COMPUTERS (PCS) MAY NOT BE SUBSTITUTED FOR LAPTOPS. A VIDEO MONITOR (COLOR FLAT SCREEN) 9" TO 13" WILL BE SUPPLIED WITH EACH VIDEO DETECTION SYSTEM. EACH VIDEO CAMERA WILL HAVE POWER AND VIDEO CABLE DIRECTLY FROM THE CABINET. COAXIAL CABLE WILL BE TYPE 8281 (SOLID CENTER CONDUCTOR). CAMERAS THAT USE A PREFABRICATED CABLE INTEGRATING POWER AND COAXIAL CABLE INTO A SINGLE WEATHERPROOF CONNECTOR ARE ACCEPTABLE. "BNC" ARE THE ONLY ACCEPTABLE TERMINATION OF COAXIAL CABLES. CAMERAS WILL BE MOUNTED PER MANUFACTURER'S RECOMMENDATIONS AND PER CIVIL TRAFFIC ENGINEER APPROVAL. VIDEO CAMERAS SHALL BE COLOR AND SHALL BE MOUNTED ON A MINIMUM 6 FOOT RISER ON THE SIGNAL MAST ARM WITH EXTENSION BRACKETS (TYPE AB-0166-5-62 OR EQUIVALENT). THE LOCATION OF THE CAMERA ON THE MAST ARM SHALL BE APPROVED BY THE TRAFFIC SIGNAL SUPERVISOR. A VIDEO FILTER (C06G-BNVC OR EQUIVALENT) WILL BE INSTALLED IN THE SIGNAL CABINET FOR EACH CAMERA VIDEO INPUT. VIDEOETECTION PROCESSORS AND COMMUNICATIONS CARDS SHALL BE PROVIDED WITH THE LATEST VERSIONS OF THE MANUFACTURERS SOFTWARE. THE CONTRACTOR SHALL AM CAMERAS AND PROGRAM AND CONFIGURE THE VIDEO DETECTION PROCESSORS TO PROVIDE A FULLY FUNCTIONING SYSTEM.
- WHEN NEW LOOPS WILL BE OVERLAP WITH NEW PAVEMENT, LOOP DETECTORS SHALL BE PREPARED LOOPS AS MANUFACTURED BY RENO A & E OR NEVER-FAIL LOOP SYSTEMS, AND ALL LOOPS SHALL BE INSTALLED IN THE ROADWAY PRIOR TO PLACEMENT OF THE FINAL PAVEMENT LIFT. WHERE NEW LOOPS ARE INSTALLED THAT ARE NOT OVERLAP WITH NEW PAVEMENT, LOOPS SHALL BE CABLE-IN-DUCT PER SECTION 623 T.02.04.C OF THE CITY OF LAS VEGAS SPECIAL PROVISIONS. LOOP LEAD-IN CABLE SHALL BE 6-PAIR 18 AWG MULTIPLE CONDUCTOR CABLE AS SPECIFIED IN SECTION 623T.02.04 OF THE CLV SPECIAL PROVISIONS. ALL WIRING HARNESSSES, RACK POSITIONS, AND LOOP LEAD-IN CABLE SHALL BE CLEARLY MARKED AS TO THE APPROPRIATE PHASE AND LETTER DESIGNATION TO WHICH IT BELONGS AS SHOWN ON THE TRAFFIC SIGNAL PLANS. LOOPS SHALL BE LOCATED AS SHOWN ON THE TRAFFIC SIGNAL PLANS AND APPROVED BY THE CIVIL TRAFFIC ENGINEERING DIVISION PRIOR TO INSTALLATION. REFER TO SECTION 623T.02.04 OF THE CLV SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.
- OPTICAL PREEMPTION UNITS WILL BE GLOBAL TRAFFIC TECHNOLOGIES (EXCOUNIC CAPABLE), MODEL 76A OPTIMUM PHASE SELECTOR INSTALLED IN A MODEL 760 RACK WITH A MODEL 768 AUXILIARY INTERFACE PANEL (AIP) MOUNTED IN THE CABINET AND FULLY WIRED FOR GREEN SEEN CAPABILITIES. OPTICAL SENSORS WILL BE MODEL 721 WITH ONE DETECTOR PER DIRECTION, UNLESS SHOWN OTHERWISE IN THE PLANS, AND WILL BE INTERFACED TO THE TRAFFIC SIGNAL CONTROLLER CABINET WITH #18-48 CAP THE SOUTHWEST GAS ROAD(S) SHALL BE MARKED BY PLACING THE SIGN AT THE END OF THE DESIGNATED FIRE LANE. ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANE. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 11 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. SIGNS ALONG OR ON THE PAVEMENT CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [FC § 503.3]
- ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC § 503.6 AND IFC APPENDIX M.

### CAUTION: HIGH PRESSURE GAS

CALL SOUTHWEST GAS AT 702-400-1789 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES 48 HOURS PRIOR TO CONSTRUCTION

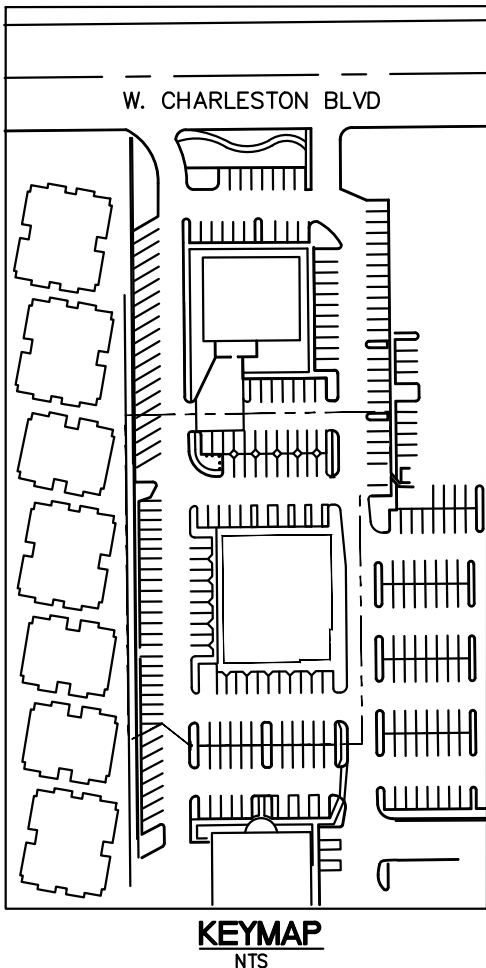
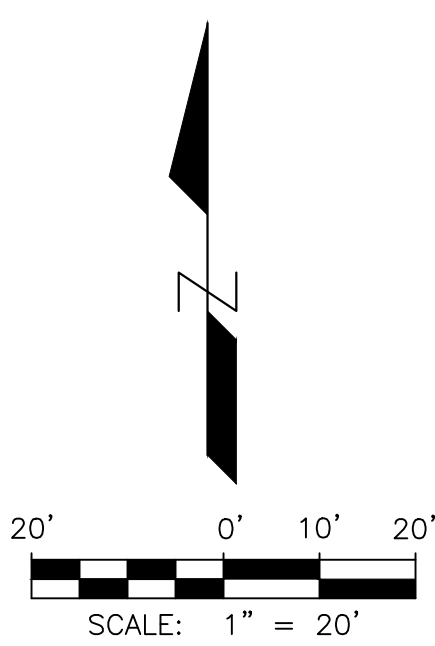
## LAS VEGAS FIRE & RESCUE FIRE PREVENTION FIRE HYDRANT AND ACCESS GENERAL NOTES

- ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
- ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S-APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED
- A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE THE COMMENCEMENT OF WORK.
- ROADS, RESIDENTIAL, OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS, OR COMMERCIAL INSTALLATIONS, FIRE APPARATUS ACCESS ROADS ARE REQUIRED FOR CONFORMANCE OF ANY COMMISSIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW.
- TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANT.
- ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TEST WITH PRIOR FIRE PREVENTION APPROVAL.
- ALL ON-SITE UNDERGROUND WORK MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.M.A. APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE.
- PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF SRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL OF LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION.
- PRIVATE HYDRANTS SHALL BE PAINTED RED.
- PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVALIABILITY OF THE REQUIRED FIRE FLOW.
- FIRE HYDRANT SPACING SHALL BE AS FOLLOWS:
  - RESIDENTIAL-500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
  - COMMERCIAL-300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
- WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500FT ON AN ALTERNATING BASIS. [FC § C102.6]
- NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
- NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [FC § C102.12]
- A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [FC § C102.4]
- THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [FC § C102.7]
- THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [FC § C102.6]
- TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS A 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [FC § C104]
- FIRE APPARATUS ACCESS ROADS SHALL BE PAINTED TO PROVIDE ALL WEATHER DRYING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [FC § 503.2.3]
- THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADED SHALL NOT EXCEED 6%. [FC § 503.2.7 & 503.2.8]
- THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADII. [FC § 503.2.4]
- VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. [FC § 503.2.1]
- THE FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES, NOT LESS THAN 32 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD, NOT LESS THAN 24 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. [FC § 503.2.1.1]
- A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. [FC § 503.1.1]
- APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. [FC § 503.1.2]
- ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. [FC § 503.2.5]
- ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING THE SIGN AT THE END OF THE DESIGNATED FIRE LANE. ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 11 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. SIGNS ALONG OR ON THE PAVEMENT CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [FC § 503.3]
- ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC § 503.6 AND IFC APPENDIX M.

## SOUTHWEST GAS CONSTRUCTION NOTES

- IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-602.
- THERE SHALL BE A MINIMUM HORIZONTAL AND VERTICAL CLEARANCE OF 12-18 INCHES BETWEEN NATURAL GAS FAC



[illegible]

|    |                                                                                                                                                                                         |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | ALL CONSTRUCTION TO BE DONE IN ACCORDANCE WITH "CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS" (CCAUSD) LATEST EDITION AND/OR REGULATING ENTITY HAVING JURISDICTION    |
| 1  | CONSTRUCT 3" AC PAVEMENT SECTION OVER 4" TYPE II AGGREGATE COMPACTED TO 95% OF MAXIMUM DENSITY, OVER 12" NATIVE CLEANED GRAVEL COMPACTED TO 90% MAX. DENSITY. SEE DETAIL 4 ON SHEET D-1 |
| 2  | CONSTRUCT "L" CURB AND GUTTER PER CCAUSD 216                                                                                                                                            |
| 3  | CONSTRUCT MODIFIED 6" "A" TYPE CURB PER DETAIL 1 ON SHEET D-1                                                                                                                           |
| 4  | CONSTRUCT 2' WIDE CONCRETE VALLEY GUTTER, SEE DETAIL 2 SHEET D-1                                                                                                                        |
| 5  | CONSTRUCT 3' WIDE CONCRETE VALLEY GUTTER, SEE DETAIL 2 SHEET D-1                                                                                                                        |
| 6  | SAW CUT AC PAVEMENT PER PLAN AND MATCH EXISTING GRADE                                                                                                                                   |
| 7  | BEGIN 0" CURB TRANSITION AND INSTALL 0" CURB. SEE DETAIL 3 ON SHEET D-1                                                                                                                 |
| 8  | CONSTRUCT 4" THICK CONCRETE WALKWAY PER CCAUSD 234 (WIDTH PER PLAN). SEE SEPARATE ARCHITECTURAL PLANS FOR DETAILS                                                                       |
| 9  | EXISTING CURB TO REMAIN                                                                                                                                                                 |
| 10 | EXISTING UTILITIES TO BE PROTECTED AND TO REMAIN                                                                                                                                        |
| 11 | CONSTRUCT 2" AC PAVEMENT SECTION OVER 4" TYPE II AGGREGATE COMPACTED TO 95% OF MAXIMUM DENSITY, OVER 12" NATIVE CLEANED GRAVEL COMPACTED TO 90% MAX. DENSITY                            |

GEOTECHNICAL REPORT PREPARED BY:  
CONSTRUCTION TESTING SERVICES, LLC  
3842 EAST POST ROAD  
LAS VEGAS, NEVADA 89120  
JOB NO.: J5851, DATED: FEB. 7, 2018

CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN  
EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

ALL ONSITE STORM DRAINS AND THE ASSOCIATED FACILITIES ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE PROPERTY OWNER.

EARTHWORK QUANTITIES:  
CUT = 129 C.Y.  
FILL = 404 C.Y.

A. THE ABOVE QUANTITIES DO NOT REFLECT LOSSES DUE TO SHRINKAGE.  
B. ALL ONSITE GRADING SHALL COMPLY WITH THE CONDITIONS SET FORTH IN THE PROJECT GEOTECHNICAL REPORT.

FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP, COMMUNITY PANEL 32003C2145F, EFFECTIVE NOVEMBER 16, 2011, INDICATED THAT THE SUBJECT SITE LIES WITHIN ZONE "X". (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD ZONE)

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED FLOOD STUDY DS#: ~~XXXXXX~~ ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

MOE MOMENI, P.E. #12732

1. REPLACE ALL TRAFFIC CONTROL DEVICES (SIGNS AND/OR PAVEMENT MARKINGS), UNDER CITY OF LAS VEGAS JURISDICTION, THAT ARE DISTURBED, DESTROYED, MOVED OR MODIFIED BY TRAFFIC ACTIVITIES TO THE CITY OF LAS VEGAS'S SATISFACTION. ALL MATERIAL USED SHALL MEET THE CITY OF LAS VEGAS'S SPECIFICATIONS OR WILL WILL BE AN APPROVED EQUIVALENT.
2. IN THE EVENT THAT THE TRAFFIC SIGNAL CONDUITS, LOOP DETECTORS OR ASSOCIATED EQUIPMENT ARE DAMAGED BY CONTRACTOR, THE CONTRACTOR WILL HIRE AN IMSA LEVEL 1 ELECTRICAL CONTRACTOR TO MAKE REPAIRS PER UNIFORM SPECIFICATION NO. 623.3.01.02.
3. CONTRACTOR SHALL CONTACT CITY OF LAS VEGAS DIRECTLY - TO SCHEDULE STAFF TO LOCATE UNDERGROUND STREET LIGHTING AND SIGNAL FACILITIES IN THE PROJECT AREA A MINIMUM OF 48 HRS NOTICE IS REQUIRED PRIOR TO LOCATES.

1. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS OF EXISTING STRUCTURES INCLUDING LOCATION, ELEVATION, AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER IMMEDIATELY.
2. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION DURING CONSTRUCTION THROUGH THE USE OF A STORM WATER POLLUTION PREVENTION PLAN (SWPPP).
3. ADD 2500 TO PLAN GRADES WITH THE EXCEPTION OF FINISHED FLOORS UNLESS NOTED OTHERWISE.
4. CONTRACTOR TO VERIFY ALL HANDICAP ACCESSIBLE ROUTINES AND PARKING SITES ARE IN CONFORMANCE WITH ADA ACCESSIBILITY GUIDELINES AND NOT EXCEED ANY DISCREPANCIES IN CONFORMANCE WITH THE CONSTRUCTION CONTRACT TO NOTIFY ENGINEER OF ANY DISCREPANCIES.
5. MOMEN ENGINEERS ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND DEPTHS. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS AND DEPTHS AVAILABLE INFORMATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES, INCLUDING BUT NOT LIMITED TO, WATER, GAS, FIBER, FUEL, SANITATION, SEWER, STORM SEWER, TELEPHONE, POWER, GAS, AND IRRIGATION LINES ALL EXISTING UTILITIES ARE SHOWN HEREON. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTHS OF ALL UTILITIES. IF POWER LOCATION, IF CONFLICTS EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE PROJECT ARCHITECT, OWNER'S REPRESENTATIVE, AND THE PROJECT ENGINEER IMMEDIATELY.
6. NO WALLS, FENCES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHTS SHALL BE MAINTAINED WITHIN THE TRAVEL LANE OR TRAVEL LANE BUFFER ZONE UNLESS SAID OBJECT IS MAINTAINED AT LEAST 24 INCHES IN HEIGHT, MEASURED FROM THE TOP OF CURB, OR WHERE NO CURB EXISTS A HEIGHT OF 27 INCHES. NO WALLS OR FENCES SHALL BE MAINTAINED WITHIN THE TRAVEL LANE OR TRAVEL SURFACE STRIP. THE RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE.
7. CONSTRUCTION OF BLOCK WALLS REQUIRES SEPARATE BUILDING PERMIT AND APPROVAL BY THE CLARK COUNTY BUILDING DEPARTMENT.

ELEVATION: 2747.45' (FEET)

NORTH 89°26'21" EAST, BEING THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW ¼) OF THE SOUTHWEST QUARTER (SW ¼) OF SECTION 32, TOWNSHIP 20 SOUTH, RANGE 6 EAST, M.D.M., AS SHOWN IN FILE 196, PAGE 66 OF SURVEYS, CLARK COUNTY RECORD NEVADA.

THE PARCEL SHOWN IN FILE 196, PAGE 66 OF SURVEYS, LYING WITHIN THE NORTHWEST QUARTER (NW 1/4) OF SECTION 5, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

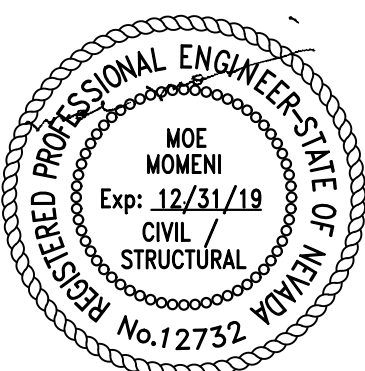
|                                                                                                                                                                                                     |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.</p> <p> Call Before You Overhead</p> <p>1-702-227-2929</p> | <p></p> <p>AVOID HITTING UNDERGROUND TRAFFIC SIGNAL AND SIGNAL CONDUITS. IT'S COSTLY.</p> <p>Call before you UnderGround</p> <p>1-702-432-5300</p> | <p>Call before you Dig</p> <p>AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.</p> <p>CALL</p> <p> 811</p> <p>OR</p> <p>1-702-227-2600</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**momen<sup>®</sup> ENGINEERS, LLC.**

**CIVIL & STRUCTURAL ENGINEERING**

3110 S. DURANGO DRIVE, SUITE 205  
LAS VEGAS, NEVADA 89117

TEL: (702) 902-2444 FAX: (702) 248-9495 TMOE@MHIENGINEERS.COM



09/26/2018

|                |
|----------------|
| 09/26/2018     |
| DATE           |
| 137102         |
| PROJECT NUMBER |
| BP             |
| DRAWN BY       |
| MM             |
| CHECKED BY     |

PROJECT: **Ft. Apache Commons Office**  
City of Las Vegas  
1500 W. Charleston Boulevard & Fort Apache Road

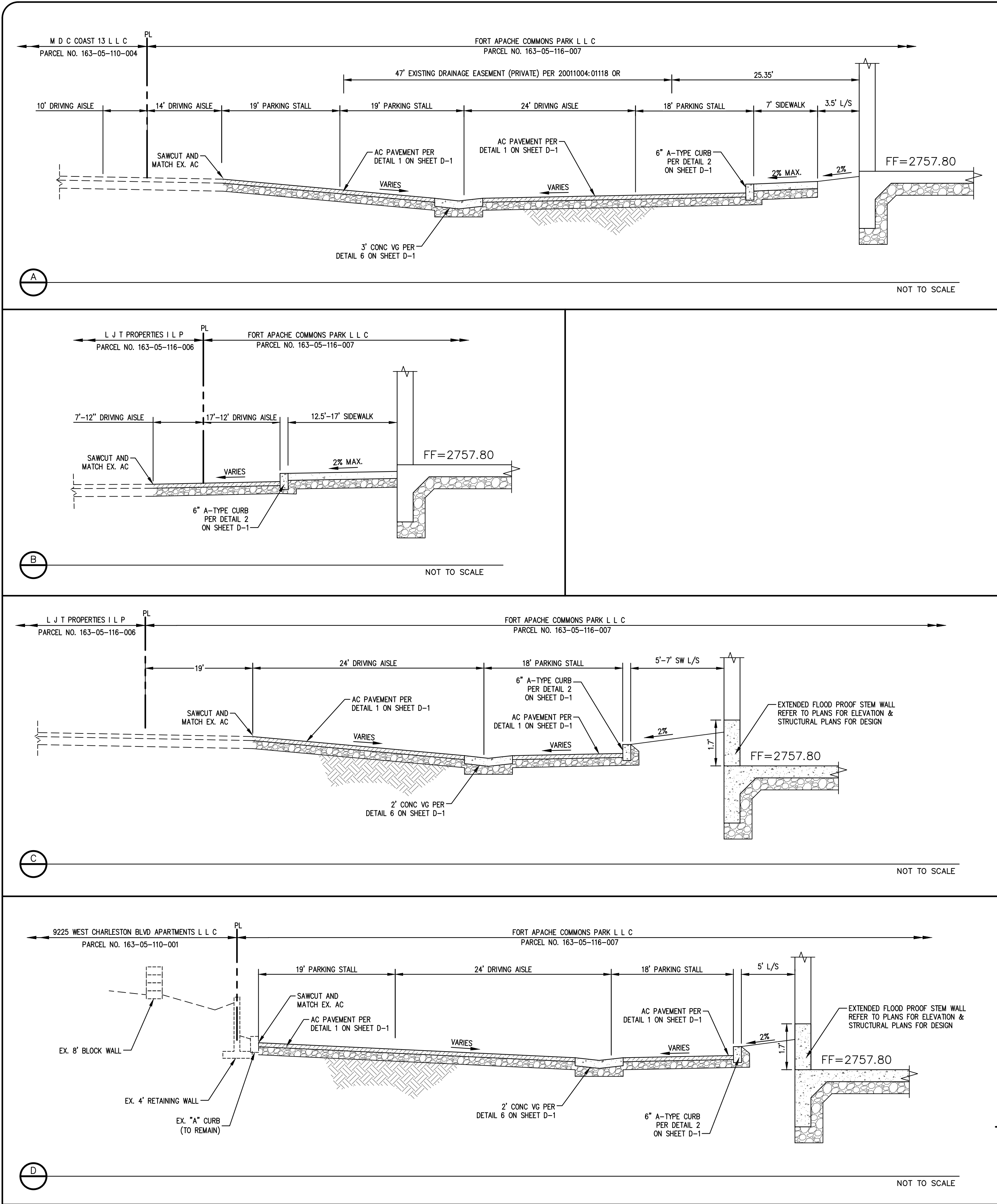
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**GRADING PLAN 1**

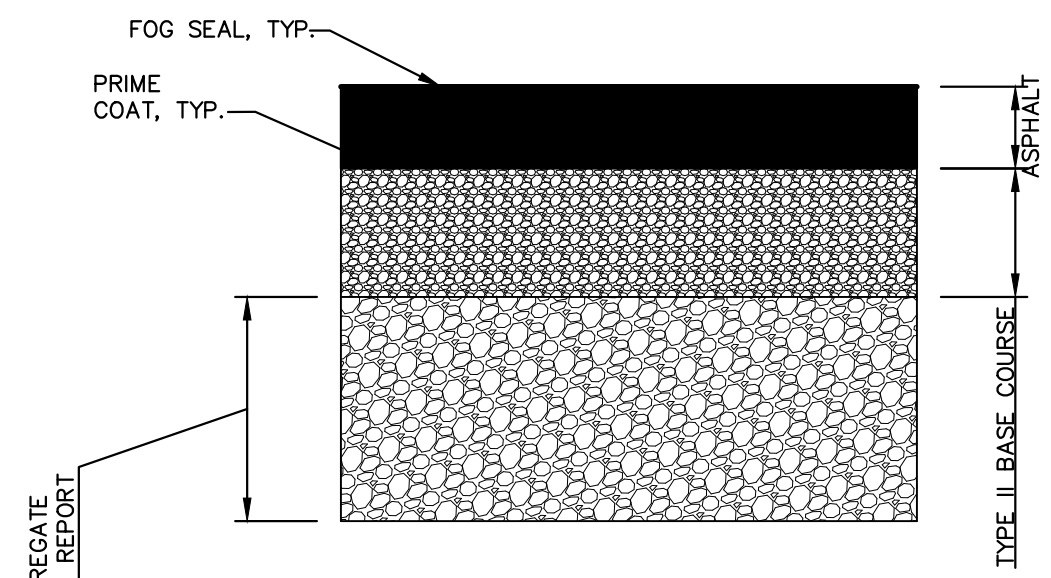
SHEET:

**G-1**

4 OF 5



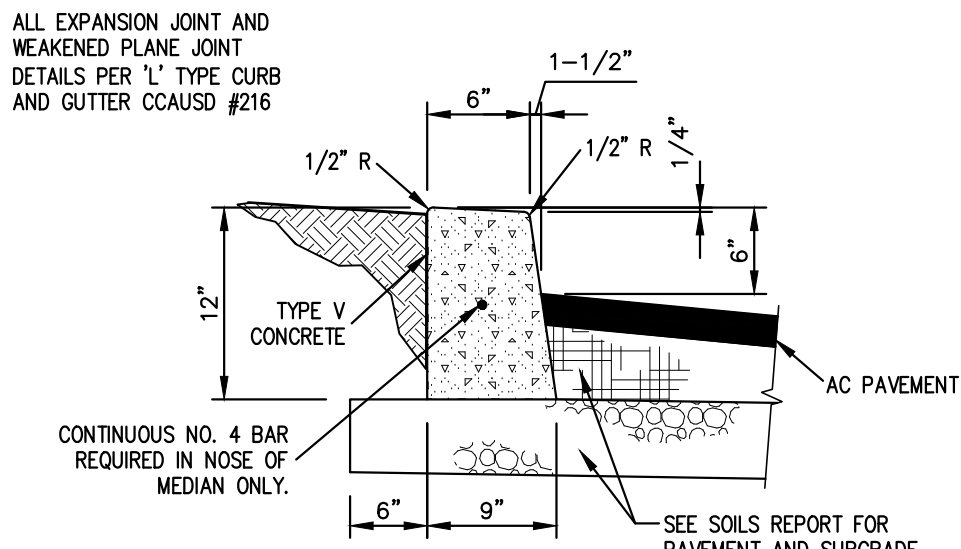
NOTE: ALL CONCRETE USED ON SITE SHALL BE SULFATE RESISTANT CONCRETE (TYPE V PORTLAND CEMENT). PAVEMENT SECTIONS, CONCRETE AND ALL AGGREGATE BASE COMPACTIONS SHALL BE BASED ON GEOTECHNICAL REPORT BY CONSTRUCTION TESTING SERVICES JOB NO. J5851 AND CLV REQUIREMENT



| TYPE OF TRAFFIC | ASPHALT (inches) | TYPE II BASE COURSE (inches) |
|-----------------|------------------|------------------------------|
| DRIVE ASLE      | 3.0              | 4.0                          |
| PARKING         | 2.0              | 4.0                          |

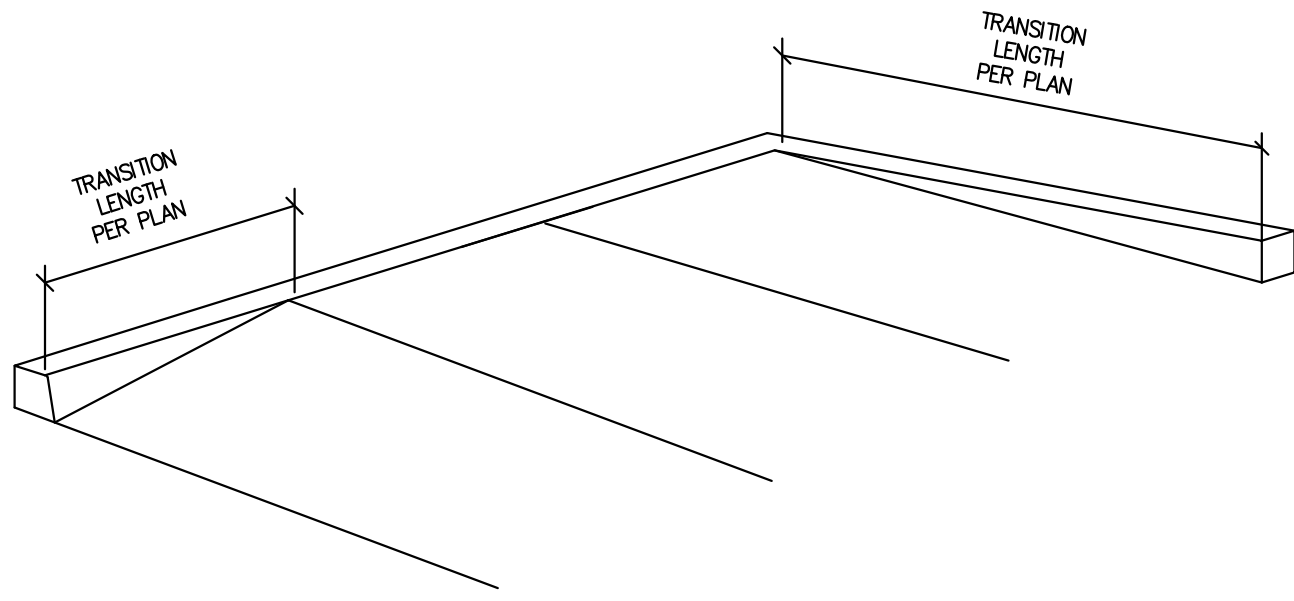
1 ASPHALT PAVEMENT SECTIONS (ON-SITE)

NOT TO SCALE



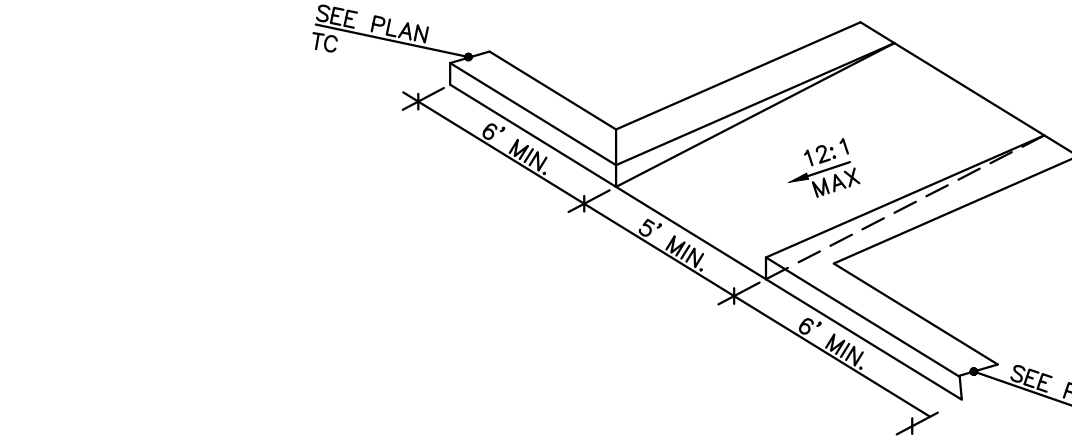
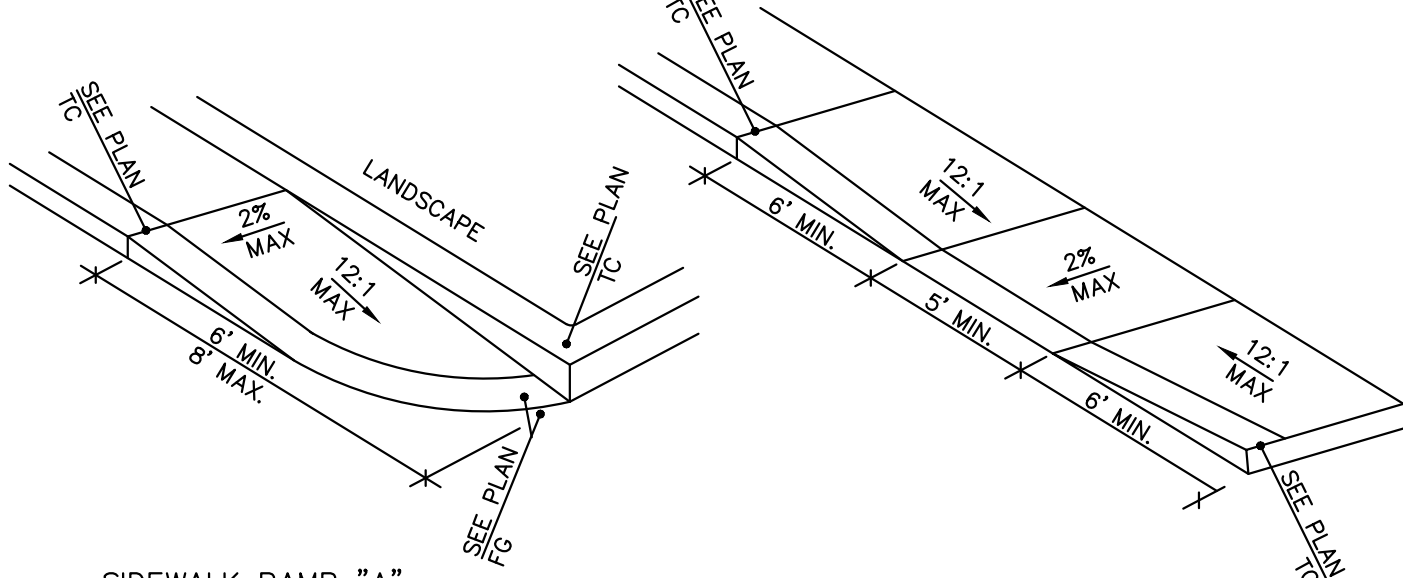
2 "A" TYPE CURB

NOT TO SCALE



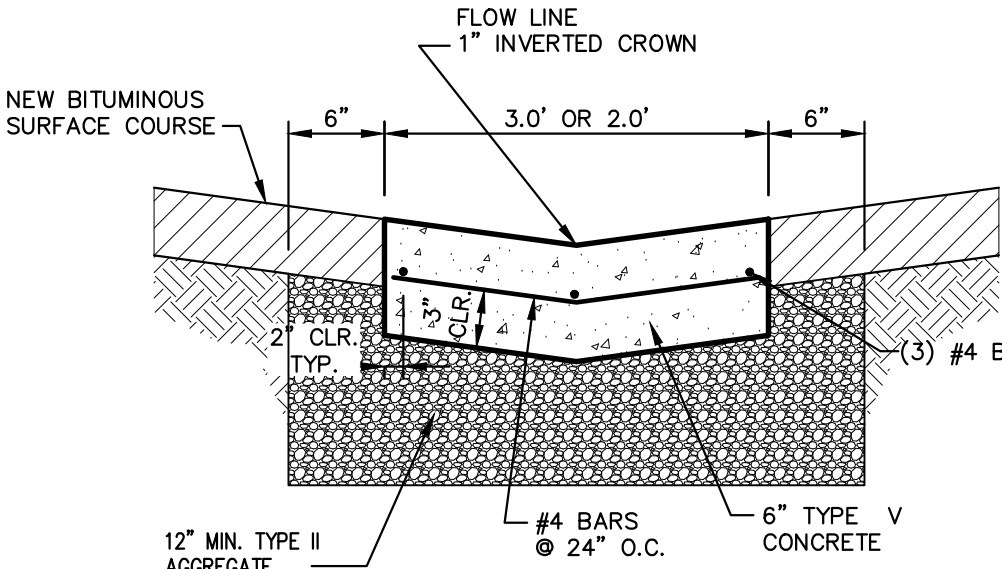
3 PARKING STALL CURB DETAIL

NOT TO SCALE



4 SIDEWALK RAMPS (ON-SITE)

NOT TO SCALE



4 CONCRETE VALLEY GUTTER

NOT TO SCALE

| REVISIONS | DATE | DESCRIPTION | APPROVAL |
|-----------|------|-------------|----------|
|           |      |             |          |
|           |      |             |          |
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TEL: (702) 902-2444 | FAX: (702) 248-8495 | MOE@MHIENGINEERS.COM

REGISTERED PROFESSIONAL ENGINEER - STATE OF NEVADA  
MOE MOMENI  
Exp: 12/31/19  
CIVIL / STRUCTURAL  
No. 12752  
09/26/2018

09/26/2018  
DATE  
137102  
PROJECT NUMBER  
BP  
DRAWN BY  
MM  
CHECKED BY

PROJECT: **Ft. Apache Commons Office**  
City of Las Vegas  
SWC of W. Charleston Boulevard & Fort Apache Road  
DETAIL SHEET

SHEET:  
**D-1**  
5 OF 5