DS #: 5145

APN: 125-21-299-01

PROJECT: Montecito Offsite Oso Blanca Road

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS NEVADA

| CITY OF LAS VEGAS<br>INTER-OFFICE MEMORANDUM | | | | DATE:<br>June 27, 2019 |
|---|---|---|---|---|
| TO:<br>**Land Development Services**<br>Department of Building & Safety | | | | FROM:<br>Jennifer Shinn, P.E.<br>Flood Control, Engr. Associate<br>Department of Public Works |
| **SUBJECT:** | Drainage Study for:<br>**Montecito Offsite Oso Blanca Road** | | | **COPIES TO:**<br>SHG |
| **Cross Streets:** | NEC of Oso Blanca Road and Deer Springs Way | | | KB Home |
| **File Number:** | F:\Depot\DSMemos\DS5145A.doc | | | Bart Anderson, P.E., DevCo |
| **Parcel Number:** | 125-21-299-001 | | | CCRFCD<br>NDOT |
| **Zoning Action:** | TMP-74639 | | | |
| **FEMA Flood Zone** | YES | NO **X** | | |
| **Proposed Storm Drain** | YES **X** | NO | | |

| HISTORY | DATE RECEIVED | DATE REVIEWED | COMMENTS | REVIEW FEES | FEES PAID Payment Trn # |
|---|---|---|---|---|---|
| 1st Submittal | 5/28/2019 | 6/25/2019 | See Comments Below | $400.00 | 3147347: $400 |
| | | | **TOTAL FEES (LDDRS):** | **$400.00** | **----** |

**REMARKS:**

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

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

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

   When it is applicable, structural calculations of facilities must be approved by the City prior to submittal to Clark County Regional Flood Control District for their review and concurrence.

   Please note that effective March 15, 2019, the CCRFCD adopted new requirements for drainage study concurrence submittals. Follow the link below for specific guidance.

   http://gustfront.ccrfcd.org/LandDeve/LandDev.aspx

2. The project proposes to construct facilities and/or increase flows within Nevada Department of Transportation (NDOT) right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project.

3. Project assumes Montecito Storm Drain Infrastructure is constructed. The drainage study cannot be conditionally approved prior to the conditional approval of the Montecito Storm Drain Infrastructure study (DS5108).

4. Remove references to CIPCP, including Construction Note 12. The City currently does not allow CIPCP.

5. Storm drain manhole required where two or more storm drains converge. Per NDOT standards, care should be taken to ensure manholes are not located within the normal vehicle wheel path.

6. Continue coordination with NDOT Project Engineer for existing utility locations and proposed relocations within NDOT right-of-way.

7. The FlowMaster sections for OA-S and OA-N does not appear to match Section Detail D/D-1 (roadside swale). Review and revise accordingly.

8. Provide FlowMaster sections to demonstrate NDOT design criteria for Roadway Surfaces, specifically, provide sections downstream of drop inlets where flows bypass the system and remain in the right-of-way.

**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**
JKS

T/R/S: T19S/R60E/21
AREA G-20

# TECHNICAL DRAINAGE STUDY

**Montecito Offsite Oso Blanca Road**

City of Las Vegas, Nevada

Job No.: KBH1805.006
Date: May 2019

**Prepared For:**
KB Home
5795 Badura Avenue, Ste 180
Las Vegas, NV 89118
Phone: 702-266-8400 ▪ Fax: 702-266-8623

**Prepared By:**
Slater Hanifan Group, Inc.
5740 S. Arville Street, Suite 216
Las Vegas, Nevada 89118
Phone: 702-284-5300 ▪ Fax: 702-284-5399




05/28/19

Stanley Okey Amadi, P.E., CFM
NV Professional Engineer No. 21724

Assisted by: Jonathan Rocha, E.I.

KBH1805-006

May 28, 2019

Albert Sung, P.E.– Flood Control Project Engineer
City of Las Vegas Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

**Subject: Technical Drainage Study for Montecito Offsite – Oso Blanca Road**

Mr. Sung:

This letter certifies that all items provided on the *Technical Drainage Study for Montecito Offsite – Oso Blanca Road* submittal CD match the paper version bound into the study.

Respectfully Submitted,
SLATER HANIFAN GROUP

Stanley Okey Amadi, P.E., CFM
Project Manager – Flood Control Division

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

# DRAINAGE STUDY INFORMATION FORM

Name of Development: Montecito Offsite - Oso Blanca Road Date: May 2019

Location of Development:
a) Descriptive (Cross Streets): North/South: Oso Blanca Road
East/West: Deer Springs Way
b) Section: 21 Township: 19 South Range: 60 East
c) APN: 125-21-299-001

Name of Owner: Public Right-of-way/KB Home
Telephone No.: (702) 266-8400 Fax No.: (702) 266-8623 E-mail Address: pchao@kbhome.com
Address: 5795 Badura Ave Ste 180 Las Vegas NV 89118

Contact Person – Name: Stanley Okey Amadi, P.E., CFM Telephone No.: (702) 284-5300
*E-mail Address: Samadi@shg-inc.com Fax No.: (702) 284-5399
Firm: Slater Hanifan Group, A Westwood Team
Address: 5740 S. Arville #216 Las Vegas NV 89118

Type of Land Development/Land Disturbance Process:

| | | | | | |
|---|---|---|---|---|---|
| ☐ | Rezoning | ☐ | Subdivison Map | ☐ | Clearing and grading Only |
| ☐ | Parcel Map | ☐ | Planned Unit Development | ☒ | Other (Please specify below) |
| ☐ | Large Parcel Map | ☐ | Building Permit | ☒ | Roadway Improvements |

1. Total Owned Land Area: At Site: 52.4 +/- acres Being Developed/Disturbed: 3.28 +/- acres

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

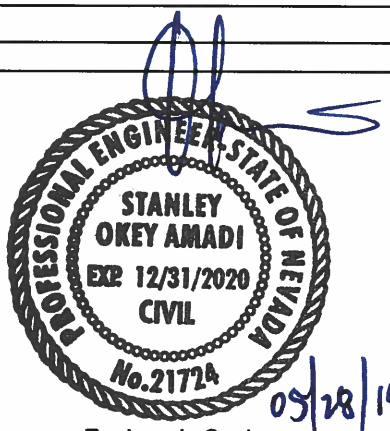
4. Proposed type of development (Residential, Commercial, Etc.): Roadway Improvements

5. Approximate upstream land area which drains to the subject site: 86 +/- acres

6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation:
TDS for Montecito Storm Drain Infrastructure (DS-5108)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: To CCRFCD (CN95 000) facility along US95

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



05/28/19

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 (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

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

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

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

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

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

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

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

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

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

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

# DRAINAGE SUBMITTAL CHECKLIST

| | | |
|---|---|---|
| Project Name: Montecito Offsite - Oso Blanca Road | Map ID: | |
| Firm Name: Slater Hanifan Group, A Westwood Team | Engineer: Stanley Okey Amadi, P.E., CFM | |
| Address: 5740 S. Arville #216 | | |
| City: Las Vegas | State: NV | Zip: 89118 |
| Phone Number: (702) 284-5300 | Fax Number: (702) 284-5399 | |
| Property Owner: Public Right-of-way/KB Home | | |
| Address: 5795 Badura Ave Ste 180 | | |
| City: Las Vegas | State: NV | Zip: 89118 |
| Reviewed By: | Date Received: | Date Accepted for Review: |

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

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

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

## I. GENERAL REQUIREMENT

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

## II. MAPS AND EXHIBITS

| Yes | No | |
|---|---|---|
| X | - | A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated. |
| X | - | A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated. |

| | |
|---|---|
| **REFERENCE:** | **STANDARD FORM 2** |

# DRAINAGE SUBMITTAL CHECKLIST

## II. MAPS AND EXHIBITS (Continued)

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

## III. DRAINAGE PLAN

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

| REFERENCE: | STANDARD FORM 2 |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

**III. DRAINAGE PLAN (Continued)**

| Yes | No | |
|---|---|---|
| - | N/A | Streets with off-set crowns. |
| X | - | Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes. |
| X | - | Property lines. |
| X | - | Right-of-way lines and widths, existing and proposed. |
| X | - | Existing improvements and their elevations. |
| X | - | Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points. |
| X | - | Concentration points and drainage flow direction with $Q_{100}$ and $V_{100}$ and $D_{100}$ in streets. |
| X | - | Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows. |
| X | - | Location and cross-section of street capacity calculations. |
| - | N/A | Cross-sectional detail for channels, including cutoff wall locations. |
| X | - | Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations. |
| - | N/A | Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement. |
| - | N/A | Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs. |
| - | N/A | Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc. |
| - | N/A | Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit. |
| - | N/A | Building and/or lot numbers. |
| X | - | Alignment of all existing, proposed, or future Regional Facilities adjacent to the site. |
| - | N/A | Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information. |

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

## III. DRAINAGE PLAN (Continued)

| Yes | No | |
|---|---|---|
| - | N/A | For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE. |
| - | N/A | Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the $Q_{100}$ flows. |
| X | - | Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent. |
| - | N/A | Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required). |

## IV. HYDROLOGIC ANALYSIS

| Yes | No | |
|---|---|---|
| X | - | Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated. |
| X | - | Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| X | - | Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| X | - | Use of correct precipitation values in and around the McCarran Airport rainfall area. |
| X | - | A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations. |
| X | - | A summary table of stormwater flows showing basin area, $Q_{10}$ and $Q_{100}$ for both individual basins and combined basin flows, where applicable. |
| X | - | Copies of supporting technical information referenced from a previously approved study and a statement accepting these results. |
| X | - | On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law. |
| - | N/A | Calculation for impervious area for parking lots and LIDs (if required). |

| REFERENCE: | STANDARD FORM 2 |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

## V. HYDRAULIC ANALYSIS

| Yes | No | |
|---|---|---|
| - | N/A | Flow split calculations and supporting documentation or reference for the method of flow split calculations used. |
| X | - | Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the $Q_{100}$ and $Q_{10}$ flows representing the worst case for interior and all perimeter streets. $Q_{100}$ d x v $\leq$ 8. $Q_{10}$ d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan. |
| X | - | A summary table of interior and exterior street capacity calculations showing the street name, $Q_{100}$ flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria. |
| - | N/A | Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.) |
| - | N/A | Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate. |
| - | N/A | Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the $Q_{100}$ weir height or flow depth, whichever is greater. |
| - | N/A | A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones.<br>• Field survey data.<br>• Input and output information.<br>• Plotted cross-sections based on survey with proper encroachments.<br>• A map showing the location of the cross-sections.<br>• Analysis of both sub and super-critical flow segments.<br>• A summary table and a discussion of the results in the text of the report. |
| X | - | Provide a 50 percent clogging factor in the capacity calculation for drop inlets. |
| X | - | Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation. |
| X | - | The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed. |
| - | N/A | Provide BMP type, size and supporting calculations for parking lots and LIDs (if required). |

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# Table of Contents

**1 INTRODUCTION ..... 1**

*1.1 Project Overview & Study Purpose ..... 1*
*1.2 FEMA Flood Zone Designation ..... 1*
*1.3 CCRFCD 2018 Master Plan Update ..... 1*
*1.4 City of Las Vegas Northwest Neighborhood Study ..... 1*
*1.5 Reference Studies ..... 2*

**2 METHODOLOGY ..... 2**

*2.1 Compliance ..... 2*
*2.2 Hydrologic Modeling ..... 2*
*2.3 Hydraulic Modeling ..... 3*

**3 EXISTING CONDITION ..... 4**

*3.1 Definition of Existing Drainage Condition ..... 4*
*3.2 Discussion of Existing Drainage Condition ..... 4*
*3.3 Summary of Existing Drainage Condition Flows ..... 4*

**4 DEVELOPED CONDITION ..... 5**

*4.1 Definition of Developed Drainage Condition ..... 5*
*4.2 Discussion of Developed Drainage Condition ..... 5*
*4.3 Summary of Developed Drainage Condition Flows ..... 5*

**5 SUMMARY OF DRAINAGE FACILITIES ..... 5**

**6 CONCLUSIONS & RECOMMENDATIONS ..... 5**

**7 REFERENCES ..... 6**

## List of Appendices

**Appendix A – Exhibits**

- Exhibit A – Location Map
- Exhibit B – FEMA FIRM Map
- Exhibit C1 – 2018 CCRFCD MPU Facilities Map
- Exhibit C2 – 2018 CCRFCD MPU Facilities Inventory Table
- Exhibit C3 – 2018 CCRFCD MPU Hydrologic Watershed Map
- Exhibit D – Soils Map
- Exhibit E1 – Northwest Neighborhood Study Existing Drainage Condition Map
- Exhibit E2 – Northwest Neighborhood Study Future Drainage Condition Map
- Exhibit F – Hydraulic and Facility Map

**Appendix B – Hydraulic Computations**

- Street Flow Depth Computations
- Drop Inlet Sizing Computations
- Standard Form 6 Calculations

**Appendix C – Reference Material:**
**Technical Drainage Study for Montecito Storm Drain Infrastructure (CLV DS 5108)**

- Report Excerpts
- Soils Data
- Curve Number Calculations
- Standard Form 4 Calculation
- HEC-1 Model
- Referenced Exhibits
- Referenced Improvement Plans

**Appendix D – Reference Material:**
**Centennial Parkway Channel West – US95, CC215 to Durango Drive (CLV DS 4893)**

- Referenced Improvement Plans

**Appendix E – NOFA**

**Appendix F – CD of Electronic Files & Improvement Plans**

# 1 INTRODUCTION

## 1.1 Project Overview & Study Purpose

KB Home is proposing to develop Oso Blanca Road adjacent to the proposed Montecito development. A prior approved technical drainage study for Montecito Storm Drain Infrastructures has addressed the conveyance of all onsite and offsite flows tributary to the Montecito site. This study will specifically address the improvements along Oso Blanca Road and the drainage facilities necessary to mitigate flows along the road. The Oso Blanca Roadway project site spans approximately 2.80 acres and is located within Section 21 of Township 19 South, Range 60 East of the MDM in the City of Las Vegas, Nevada. The project parcels are identified by Assessor's Parcel Numbers (APN) 125-21-299-001 and portions of 125-21-299-004 and 125-21-101-002.

This study will provide a detailed hydrologic and hydraulic analysis for the road in order to ensure that the roadway design criteria are satisfied in accordance with local storm water management criteria. A Location Map identified as Exhibit A is provided in Appendix A for reference.

## 1.2 FEMA Flood Zone Designation

Per the Flood Insurance Rate Map (FIRM) panel 32003C1745E dated September 27, 2002, the project site is located within a Zone 'X' (unshaded). Zone 'X' (unshaded) is defined by FEMA as an area determined to be outside the 0.2% annual chance floodplain. Exhibit B identifying the project site on the FIRM Panel has been included in Appendix A for reference.

## 1.3 CCRFCD 2018 Master Plan Update

Per the 2018 CCRFCD Master Plan Update (hereinafter referred to as the 2018 MPU, Reference 2), the surface flows generated by the roadway are intercepted by existing field inlets and discharged to the existing CCRFCD MPU regional facility along US-95 and Oso Blanca Road, (CN95 0000). Exhibit C1 identifies the project site on the 2018 MPU facility figure. Additionally, the project site has been identified on the current 2018 MPU hydrologic figure identified as Exhibit C3. Exhibits C1 thru C3, identifying the project site on the 2018 MPU figures, have been included in Appendix A for reference.

## 1.4 City of Las Vegas Northwest Neighborhood Study

The project area is also covered by the City of Las Vegas Northwest Neighborhood Study (hereinafter referred to as the CLV Study). The existing and future condition drainage maps from the CLV Study were reviewed for comparison of peak flows and drainage patterns. The referenced drainage maps with the project site location are identified as Exhibits E1 and E2 and included in Appendix A.

Review of the CLV Study exhibits show that they no longer reflect the existing condition or future condition of the area. Subsequent studies have altered the drainage patterns and

flow rates in the vicinity of the project site. Therefore, the results of the CLV Study exhibits are not utilized for design.

## 1.5 Reference Studies

This document was prepared in coordination with various relevant documents, studies and improvement plans previously reviewed and approved by CLV and Nevada Department of Transportation (NDOT) and concurred by CCRFCD. The following drainage studies and improvement plans were utilized in the preparation of this study. SHG has reviewed and concurs with the relevant referenced materials considered acceptable for reference with exceptions where noted.

1. *Technical Drainage Study for Montecito Storm Drain Infrastructure* (DS5108) prepared by SHG, hereinafter referred to as the Infrastructure Study established the existing and ultimate condition hydrology and drainage pattern of the tributary to Oso Blanca Road alignment. The study provided the design of the mainline storm drain facilities that conveys majority of the tributary flows and established the conceptual location and design of facilities along Oso Blanca Road. The peak flow rates and ultimate developed drainage patterns have been referenced from the study. The relevant reference materials have been included in Appendix C.

2. *Centennial Parkway Channel West – US95, CC215 to Durango Drive Final Design Report,* (DS 4893 & CLV Plan No. 107V6574) prepared by CH2M, hereinafter referred to as the Centennial Channel Study, established the future drainage pattern for the watershed impacting US-95. The study provided the design for the mainline 20'x7' RCB storm drain facility along the US-95 and Oso Blanca Road alignment and also sized the lateral stubs to the facility. The improvement plans for the existing 8'x5' RCB at the southern boundary of Oso Blanca Roadway improvement has been referenced to establish proposed drop inlet connection elevations as well as controlling downstream HGLs at the points of connection. The relevant reference materials are included in Appendix D.

# 2 METHODOLOGY

## 2.1 Compliance

The methodologies utilized in the preparation of this study are in compliance with the Clark County Regional Flood Control District's Hydrologic and Drainage Design Manual (CCRFCD Manual, Reference 1) as well as the local entity criteria.

## 2.2 Hydrologic Modeling

**Modeling**: The SCS Unit Hydrograph Method (SCS Method) was utilized to determine peak flow rates. The SCS Method utilizes precipitation, drainage area, curve number and lag time parameters to determine peak flow rates. The SCS Method routine within the U.S. Army Corp of Engineer's HEC-1 Flood Hydrograph Package program (Version 4.1, June 1998) was utilized to model the drainage basins analyzed by this study.

**Precipitation**: The project site is located within the McCarran Airport Rainfall Area. The precipitation values for the site per the CCRFCD Manual Figures 513 and Table 505, are 1.58 and 2.77 inches for the 10-year and 100-year storm events, respectively. However, the entire Montecito site was conservatively analyzed utilizing the rainfall depth 2.80-inches for the areas outside of the McCarran Airport Rainfall Area as estimated from Figures 503 and 506 and adjusted per Table 501 of the HCDDM and has been referenced as such. In addition, since the drainage area of the contributing watershed is less than 8 square miles, the SDN 3 design storm distribution as taken from Table 503 in the CCRFCD Manual was used. Precipitation data has been included in Appendix B.

**Curve Number**: The SCS curve number loss rate methodology was utilized to approximate infiltration for the drainage basins. The soils information within the watershed was obtained from the US Department of Agriculture (USDA) Natural Resources Conservation Service NRCS Soil Survey of the Las Vegas Valley Area, Nevada, Part of Clark County (Soil Survey, Reference 3). Exhibit D depicts the project site boundary on the soils map and have been included in Appendix A. Per the Soil Survey, the project site and all tributary areas lie within the following soil type:

- Soil Type 191, which is comprised of 100% Hydrologic Soil Group (HSG) 'A'. Soil Type 191 is described as Dalian very cobbly fine sandy loam, 2 to 8 percent slopes.

The following land use were utilized for the referenced ultimate condition analysis:

- "Streets and Road" land use for developed roadway.

The referenced soil and curve number data and computations, including CCRFCD Manual reference tables, have been included in Appendix C.

**Lag Time**: The lag time is defined as the time measured from the center of mass of excess rainfall to the time to peak of the outflow hydrograph. The lag time is related to the time of concentration as 0.6 times the time of concentration. The time of concentration is defined as the time required for runoff to flow from the hydraulically most distant point of a basin to the outlet point of the basin. The lag time computations have been included in Appendix C.

## 2.3 Hydraulic Modeling

**Drop Inlets:** The proposed curb inlets have been assessed using an in-house computation spreadsheet which utilizes equations outlined in Section 805 of the CCRFCD Manual, that includes a 50% clogging factor in determining sizes.

**Storm Drain:** The hydraulic gradient line (HGL) for the proposed drop inlet laterals were determined utilizing the CCRFCD Standard Form 6. As outlined in the CCRFCD Manual, storm drain facilities are designed to maintain a hydraulic gradient line (HGL) at a minimum of 1-ft below the finished grade and/or rim elevations and limit the flow velocities in the facility to less than 25 ft/s.

**Street Flow:**
Street flow analyses have been provided utilizing the FlowMaster Version 8i software by Bentley Systems. In accordance with the CCRFCD Manual, the depth times velocity factor

(D x V) for street flow for the 10-year storm event must be less than or equal to 6, with a maximum depth of 1-ft. The depth times velocity factor (D x V) for street flow for the 100-year storm event must be less than or equal to 8, with a maximum depth of 2-ft. Additionally, the Nevada Department of Transportation (NDOT) 10-year flow spread criteria of one-half of the travel lane for frontage roads has also been check on Oso Blanca Road adjacent to the site. Drop inlets have been proposed at every location where the 10-year spread exceeds one-half of a travel lane.

# 3 EXISTING CONDITION

## 3.1 Definition of Existing Drainage Condition

The existing drainage condition is defined as the current state of the onsite and offsite watershed. The offsite watershed is mostly fully developed while the site is currently a developed access road with roadside swales. The analysis of the site and its offsite tributary has been referenced from the Infrastructure Study.

## 3.2 Discussion of Existing Drainage Condition

The project site (Oso Blanca Road) was analyzed as one drainage basin identified as OSO and conservatively assumed to be fully developed in in the existing condition. Basin OSO extends north past the Montecito Site. Note that Oso Blanca Road adjacent to the site is currently an access road; however, the hydrologic analysis of the existing street (basin OSO) conservatively assumes full improvement of the right-of-way utilizing a roadway curve number (98). There are other existing storm drain stubs to the Centennial Parkway Channel which includes a 6'x3' RCB at the northeast corner of the site, a 30" RCP located approximately 300-ft south of the 6'x3' RCB. An NDOT Type 7 field inlet connected to a 36" RCP storm drain that ties into the existing 8'x5' RCB at the southeast corner of the site. Therefore, all the surface flows generated along the west half of Oso Blanca Road are intercepted and discharged into the Centennial Parkway Channel. Refer to the referenced Drainage Map (Exhibit F) provided Appendix A for the drainage pattern of the street basin described above.

## 3.3 Summary of Existing Drainage Condition Flows

A summary table of existing condition flow rates was provided on the referenced Exhibit F, provided in Appendix A. The associated referenced HEC-1 analysis utilized to determine the flow rates identified on Exhibit F has been included in Appendix C. It should also be noted that since the existing condition utilized an ultimate developed curve number of 98 for basin OSO, no additional increase in peak flow is anticipated as a result of the roadway improvement.

# 4 DEVELOPED CONDITION

## 4.1 Definition of Developed Drainage Condition

The developed condition of this project is defined as the condition with the roadway improvements including curb, gutter and sidewalk as well as median islands and drainage facilities have been fully installed. The existing NDOT Type 7 field inlet and the flared end section will be replaced with curb inlets. Additional curb inlets will also be installed as necessary to intercept surface flows from the roadway.

## 4.2 Discussion of Developed Drainage Condition

Refer to Exhibit F, included in Appendix A, for a detailed illustration of the developed condition drainage patterns.

Note that the hydrologic analysis referenced in the existing condition addressed the ultimate developed condition hydrology of Oso Blanca Road. Therefore, additional hydrology will not be necessary for the proposed and ultimate conditions. The drainage pattern will remain the same as discussed in the existing condition. However, drop inlets and lateral storm drains will be provided to capture and drain street flows.

## 4.3 Summary of Developed Drainage Condition Flows

A summary table of developed condition flow rates is provided on Exhibit F, included in Appendix A. The associated referenced HEC-1 analysis utilized to determine the flow rates identified on has been included in Appendix C. It should also be noted that since the existing condition utilized an ultimate developed curve number 98 for basin OSO, no additional increase in peak flow is anticipated as a result of the roadway improvement.

# 5 SUMMARY OF DRAINAGE FACILITIES

The drainage facilities proposed with Oso Blanca Road improvements consists of curb inlets and their associated laterals. The facilities have been identified on Exhibit E and have been designed to capture the surface flows in Oso Blanca Road as necessary to meet the criteria stipulated in the HCDDM. The drop inlet capacities have been designed with an in-house spreadsheet that utilizes the equations specified in the HCDDM while accounting for a 50% clogging factor. A standard for 6 lateral computation has been utilized to size the laterals. Please refer to Appendix B for the drop inlet and lateral storm drain computations. Refer to Exhibit F, provided in Appendix A, for an illustration of the facility locations and a summary table of the facilities.

# 6 CONCLUSIONS & RECOMMENDATIONS

1. The project site is not located within a FEMA designated SFHA. Therefore, notification to FEMA will not be required for this study.

2. The project is in compliance with the Clark County Regional Flood Control District's Master Plan Update (MPU) of the Las Vegas Valley. The project proposes to penetrate and discharge flows into the existing 8'x5' RCB lateral to the CCRFCD facility (CN95 0000) located along Oso Blanca Road and the US-95 right-of-way.

3. The methodologies utilized in the preparation of this study are in compliance with the Clark County Regional Flood Control District's Hydrologic and Drainage Design Manual and local entity criteria.

4. The proposed storm drain facilities have been designed to accommodate the anticipated ultimate developed condition flows conveyed along Oso Blanca Road adjacent to the Montecito development. The facilities have been sized to ensure that the developed flows from the site will be captured without bypass to the areas downstream of the site.

5. The recommended facilities including the curb inlets and storm drain laterals have been designed to the meet CCRFCD Manual criteria.

6. An electronic copy (PDF format) of this study with all the exhibits and the improvement plans (roadway plan and profiles) with detail sheets to support the drainage patterns, conclusions and recommendations detailed in this study have been provided in Appendix F.

# 7 REFERENCES

1. *Hydrologic Criteria and Drainage Design Manual.* Clark County Regional Flood Control District, 1999.

2. *Las Vegas Valley Flood Control Master Plan Update.* Clark County Regional Flood Control District, 2018.

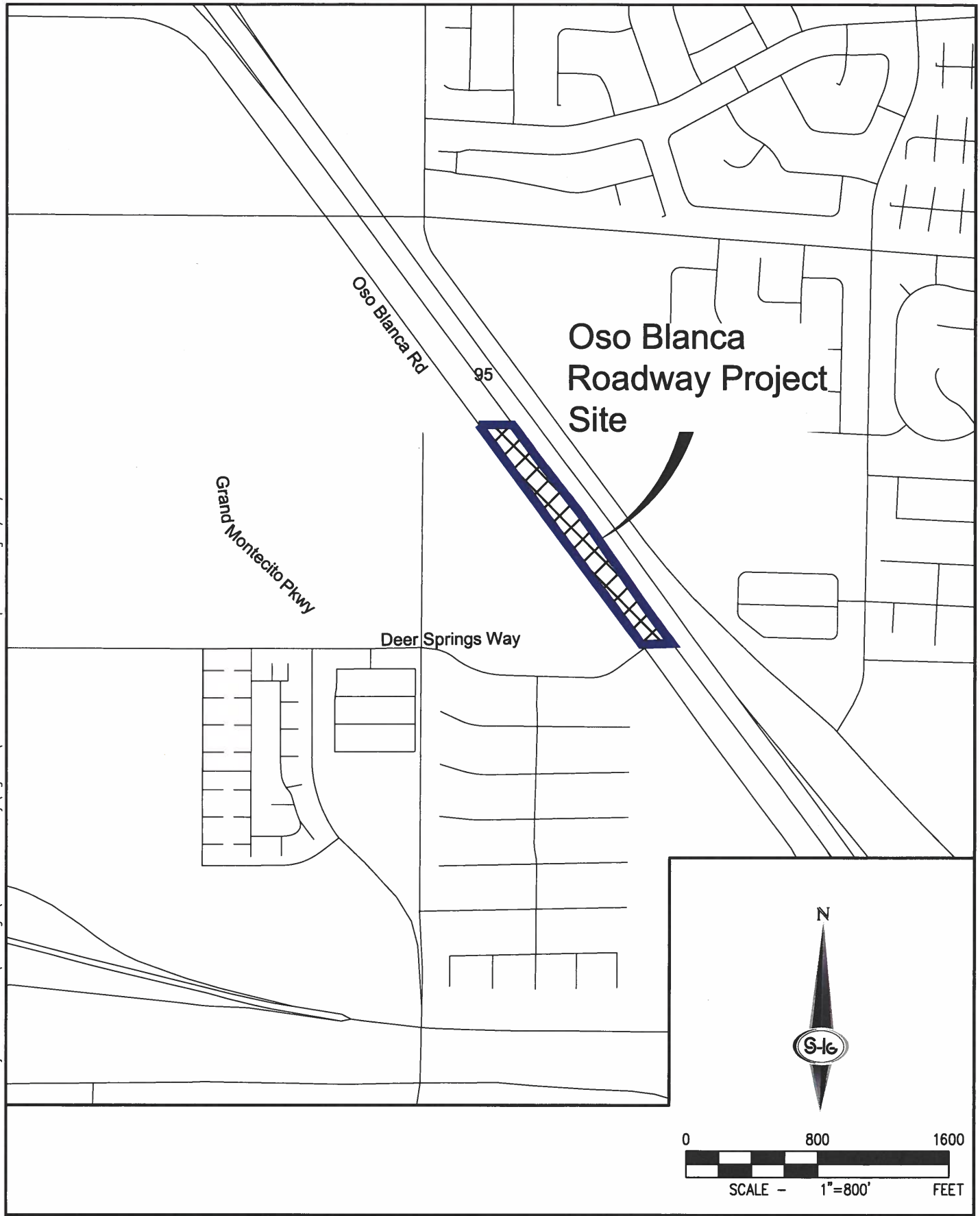
3. *Soil Survey of Clark County Area, Nevada.* U.S. Department of Agriculture, Natural Resources Conservation Service, 2018.

4. *Technical Drainage Study for Montecito Storm Drain Infrastructure,* SHG March 2019.

5. *Improvement Plans from the Centennial Parkway Channel West – US95, CC215 to Durango Drive Final Design Report,* CH2M, November 2016.

# APPENDIX A

Exhibits



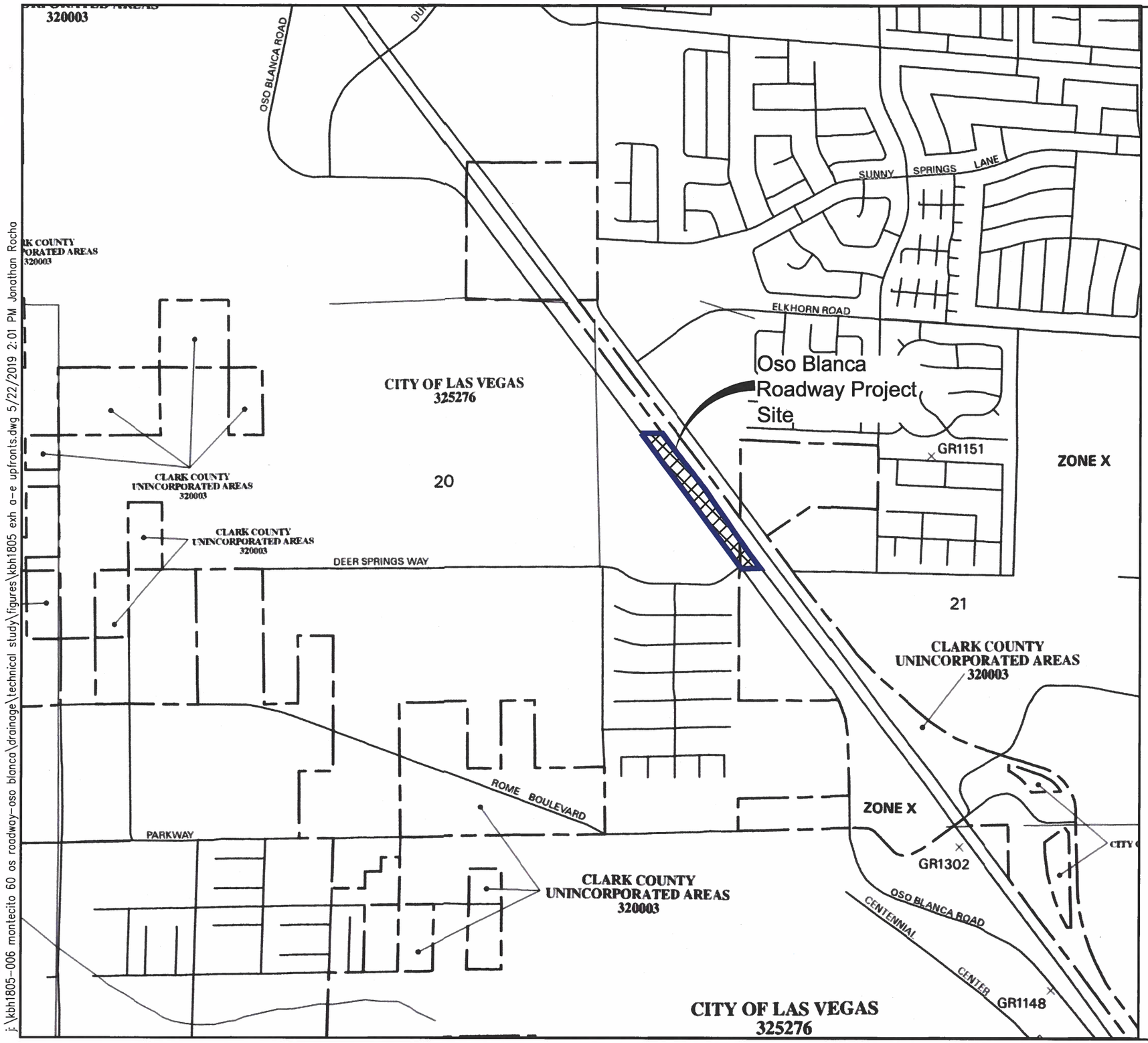

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KB HOME

OSO BLANCA ROADWAY
LOCATION MAP

| | |
|---|---|
| DATE: MAY 2019 | PROJECT NO. KBH1805.006 |
| DRAFTER: AGM | |
| DESIGNER: AGM | EXHIBIT A |
| CHECKED: SOA | SHEET 1 OF 1 |




## LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

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

| | |
|---|---|
| ZONE A | No base flood elevations determined. |
| ZONE AE | Base flood elevations determined. |
| ZONE AH | Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined. |
| ZONE AO | Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined. |
| ZONE AR | Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event. |
| ZONE A99 | Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined. |
| ZONE V | Coastal flood zone with velocity hazard (wave action); no base flood elevations determined. |
| ZONE VE | Coastal flood zone with velocity hazard (wave action); base flood elevations determined. |

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

| | |
|---|---|
| ZONE X | Areas determined to be outside the 0.2% annual chance floodplain. |
| ZONE D | Areas in which flood hazards are undetermined, but possible. |

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

| | |
|---|---|
| | Floodplain Boundary |
| | Floodway Boundary |
| | Zone D Boundary |
| | Coastal Barrier Boundary |
| | Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities. |
| 513 | Base Flood Elevation line and value; elevation in feet* |
| (EL 987) | Base Flood Elevation value where uniform within zone; elevation in feet* |
| *Referenced to the North American Vertical Datum of 1988 | |
| A — A | Cross Section Line |
| 23 — 23 | Transect Line |
| 97 07 30 , 32 22 30 | Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) |
| 4276000M | 1000-meter Universal Transverse Mercator grid values, zone 11 |
| 600000 FT | 5000-foot grid ticks |
| DX5510 | Bench mark (see explanation in Notes to Users section of this FIRM panel) |
| M1.5 | River Mile |

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1745 E

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

**PANEL 1745 OF 4090**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| LAS VEGAS, CITY OF | 325276 | 1745 | E |
| CLARK COUNTY, UNINCORPORATED AREAS | 320003 | 1745 | E |

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER 32003C1745 E**

**MAP REVISED: SEPTEMBER 27, 2002**

Federal Emergency Management Agency

SLATER HANIFAN GROUP
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PHONE (702) 284-5300 FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP |
|---|---|---|---|---|---|
| | | | | | |

KB HOME

OSO BLANCA ROADWAY
FEMA FIRM PANEL

| | |
|---|---|
| DATE: | MAY 2019 |
| DRAFTER: | AGM |
| DESIGNER: | AGM |
| CHECKED: | SOA |
| PROJECT NO. | KBH1805.006 |

EXHIBIT B
SHEET 1 OF 1

J:\kbh1805-006 montecito 60 os roadway-oso blanca\drainage\technical study\figures\kbh1805 exh a-e upfronts.dwg 5/22/2019 2:01 PM Jonathan Rocha

CN95 0167
CN95 0104
CNFR 0000
CN95 0102
CN95 0068
CIMARRON RD
BUFFALO DR
EKBU 0000
EKDB 0070
FORT APACHE RD
RCHB 0275
CAMPBELL RD
RCHB 0250
DURANGO DR
Oso Blanca Roadway Project Site
RILEY
CN95 0000
OSO BLANCA RD
CNWE 0314
CNWE 0304
CNWE 0301
RCBC 0004
RCBC 0009
RCBC 0002
RCBC 0000
RCHB 0227
RCHB 0198
RCHB 0175
RCHB 0171
RCHB 0151
RCHB 0149
RCHB 0130
RCHB 0122
RCHB 0120
RCHB 0101
RCHB 0083
RCHB 0075
RCHB 0074
RCHB 0054
RCHB

REGIONAL FLOOD CONTROL DISTRICT

2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

**FIGURE F-11**
**FLOOD CONTROL FACILITIES**

**LEGEND**

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

**Remove & Replace/Parallel Facilities**

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


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| NO. | DESCRIPTION | DATE | BY | APP DATE | APP |
|---|---|---|---|---|---|
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KB HOME

OSO BLANCA ROADWAY
CCRFCD MPU FACILITY MAP

DATE: MAY 2019
DRAFTER: AGM
DESIGNER: AGM
CHECKED: SOA
PROJECT NO. KBH1805.006

**EXHIBIT C1**
SHEET 1 OF 1

j:\kbh1805-006 montecito 60 os roadway-oso blanca\drainage\technical study\figures\kbh1805 exh a-e upfronts.dwg 5/22/2019 2:01 PM Jonathan Rocha

| ID / Mile | Status | Facility Description | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%) ** |
|---|---|---|---|---|---|---|---|---|
| **BCHU** | | **BELTWAY CHANNEL - HUALAPAI** | | | | | | |
| 0000 | E | 12' X 5' RCAP | 853 | 206 | DBA3-C | WEST3 | 0.84 | 1.11 |
| 0017 | E | 8' X 5' RCAP | 1216 | 218 | CBA3-C | WEST3 | 0.84 | 1.33 |
| 0040 | E | 66" RCP | 60 | 57 | DNW26-C | WEST3 | 0.51 | 1.04 |
| 0042 | E | 60" RCP | 615 | 57 | DNW26-C | WEST3 | 0.51 | 1.42 |
| 0054 | E | 54" RCP | 615 | 57 | DNW26-C | WEST3 | 0.51 | 1.23 |
| **BRDB** | | **BRENT DRAINAGE SYSTEM** | | | | | | |
| 0000 | E | 36" RCP WITH 18" ORIFICE PLATE | 2170 | 36 | BRDB | WEST3 | 2.37 | 0.40 |
| 0031 | E | 45,080 CFS PMF SPILLWAY | | 45080 | CSRDB | WEST3 | 2.37 | |
| 0032 | E | 450 AC-FT SOUTH ENVIRONMENTAL ENHANCEMENT AREA | | 1685 | CSRDB | WEST3 | 2.37 | |
| 0033 | E | ENERGY DISSIPATOR | 100 | 1052 | CNW147W | WEST3 | 1.75 | |
| 0043 | E | 20' X 7' RCBC | 135 | 1052 | CNW147W | WEST3 | 1.75 | 0.50 |
| 0045 | E | CONC CHNL 12'W 7'D 2:1 SS | 983 | 1052 | CNW147W | WEST3 | 1.75 | 2.00 |
| 0058 | E | 12' X 6' RCB | 1688 | 951 | CNW113-C | WEST3 | 1.47 | 1.81 |
| 0107 | P | 8' X 6' RCB | 2560 | 951 | CNW113-C | WEST3 | 1.47 | 2.40 |
| 0157 | P | 12' X 7' RCB | 2580 | 621 | CNW96-C | WEST3 | 0.84 | 0.25 |
| **CN95** | | **CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH** | | | | | | |
| 0000 | E | 20' X 7' RCB | 3335 | 2778 | CNWB83-C | WEST3 | 3.35 | 2.00 |
| 0068 | E | 20' X 7' RCB | 2300 | 2725 | CNW103-C | WEST3 | 3.04 | 2.10 |
| 0102 | E | CONC CHNL 20'W 9'D 0:1 SS | 375 | 2548 | 2CNW89-C | WEST3 | 2.65 | 1.77 |
| 0104 | E | 2- 12' X 10' RCB | 300 | 2548 | 2CNW89-C | WEST3 | 2.65 | 1.10 |
| 0167 | E | 16' X 8' RCB | 3521 | 2548 | 2CNW89-C | WEST3 | 2.65 | 1.58 |
| 0199 | E | 15' X 9' RCB | 407 | 1467 | 2CNW72-C | WEST3 | 1.13 | 0.41 |
| 0218 | E | 15' X 9' RCB | 1227 | 1467 | 2CNW72-C | WEST3 | 1.13 | 0.82 |
| 0257 | E | TRANSITION STRUCTURE | 59 | 1467 | 2CNW72-C | WEST3 | 1.13 | 0.77 |
| 0259 | E | 15' X 9' RCB | 284 | 599 | CNW74-C | WEST3 | 0.40 | 0.77 |
| 0313 | E | 10' X 6' RCB | 2680 | 599 | CNW74-C | WEST3 | 0.40 | 2.50 |
| 0318 | E | TRANSISTION STRUCTURE | 60 | 599 | CNW74-C | WEST3 | 0.40 | 1.50 |
| 0333 | E | 5' X 5' RCB | 670 | 259 | NW62-S | WEST3 | 0.16 | 1.50 |
| **CNFR** | | **CENTENNIAL PKWY CHANNEL WEST / FARM ROAD** | | | | | | |
| 0000 | P | 8' X 6' RCB | 8350 | 776 | CNW89-C | WEST3 | 1.05 | 2.00 |
| **CNGT** | | **CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH** | | | | | | |
| 0000 | E | 10' X 5' RCB | 2376 | 543 | CNW71-E | WEST3 | 0.47 | 2.58 |
| 0020 | E | 10' X 5' RCB | 1570 | 543 | CNW71-E | WEST3 | 0.47 | 3.50 |
| 0043 | E | 8' X 6' RCB | 2470 | 543 | CNW71-E | WEST3 | 0.47 | 3.60 |
| 0118 | E | 6' X 5' RCAP | 5472 | 349 | KYLEDET | KYLEDB | 58.61 | 3.72 |
| **CNKC** | | **CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH** | | | | | | |
| 0000 | E | 12' X 4' RCB | 377 | 954 | CNW72-C | WEST3 | 0.74 | 4.58 |
| 0007 | E | 10' X 5' RCB | 874 | 954 | CNW72-C | WEST3 | 0.74 | 3.28 |
| 0024 | E | 8' X 5' RCB | 1385 | 954 | CNW72-C | WEST3 | 0.74 | 2.40 |
| 0050 | E | 72" RCP | 2757 | 437 | NW45-S | WEST3 | 0.31 | 3.60 |
| **CNWE** | | **CENTENNIAL PKWY CHANNEL WEST** | | | | | | |
| 0195 | E | CONC CHNL 36'W 9'D 0:1 SS | 1130 | 3771 | CNW3B3-C | WEST3 | 5.64 | 0.60 |
| 0200 | E | CONC CHNL 36'W 9'D 0:1 SS | 1340 | 3523 | CNW2D4-C | WEST3 | 5.14 | 1.00 |
| 0226 | E | 2- 18' X 8.5' RCBC @ RIO VISTA | 100 | 3523 | CNW2D4-C | WEST3 | 5.14 | 0.51 |
| 0241 | E | CONC CHNL 36'W 9.5'D 0:1 SS | 405 | 3523 | CNW2D4-C | WEST3 | 5.14 | 0.51 |
| 0251 | E | CONC CHNL 36'W 9'D 0:1 SS | 575 | 3234 | CNW2D3-C | WEST3 | 4.64 | 0.51 |
| 0271 | E | CONC CHNL 32'W 10'D 0:1 SS | 229 | 3234 | CNW2D3-C | WEST3 | 4.64 | 0.51 |
| 0274 | E | 32' X 10' RCBC @ TENAYA | 142 | 3234 | CNW2D3-C | WEST3 | 4.64 | 0.51 |
| 0277 | E | CONC CHNL 32'W 9'D 0:1 SS | 579 | 3234 | CNW2D3-C | WEST3 | 4.64 | 0.64 |
| 0287 | E | CONC CHNL 32'W 8'D 0:1 SS | 865 | 2992 | CNW2B2-C | WEST3 | 3.83 | 1.59 |
| 0301 | E | 2- 15' X 7' RCB | 1738 | 2992 | CNW2B2-C | WEST3 | 3.83 | 1.30 |
| 0304 | E | 22' X 7' RCB | 3410 | 2992 | CNW2B2-C | WEST3 | 3.83 | 1.85 |
| 0314 | E | 22' X 7' RCB | 703 | 2822 | CNWB02-N | WEST3 | 3.45 | 1.94 |
| **EKBU** | | **ELKHORN SPRINGS AND BUFFALO** | | | | | | |
| 0000 | E | 60" RCP | 1046 | 255 | NW134-C | WEST3 | 0.46 | 0.89 |
| **EKDB** | | **ELKHORN SPRINGS DETENTION BASIN** | | | | | | |
| 0000 | E | GRASS CHNL 15'W 5.8'D 3.5:1 SS | 2575 | 221 | CNW150-C | WEST3 | 1.41 | 0.39 |
| 0025 | E | 4' X 3' RCB | 180 | 108 | ELKBASIN | WEST3 | 0.84 | 0.50 |
| 0026 | E | 48" RCP | 1270 | 106 | ELKBASIN | WEST3 | 0.84 | 1.23 |
| 0049 | E | 60" RCP | 1095 | 106 | ELKBASIN | WEST3 | 0.84 | 0.13 |
| 0070 | E | 48 AC-FT ELKHORN SPRINGS DETENTION BASIN | | 456 | CNW133-C | WEST3 | 0.84 | |

| ID / Mile | Status | Facility Description | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%) ** |
|---|---|---|---|---|---|---|---|---|
| **EKHU** | | **ELKHORN AND HUALAPAI** | | | | | | |
| 0003 | E | 6' X 4' RCAP | 980 | 393 | CNW26-C | WEST3 | 0.51 | 3.61 |
| 0020 | E | 6' X 5' RCAP | 150 | 393 | CNW26-C | WEST3 | 0.51 | 3.61 |
| 0023 | E | 8' X 5' RCAP | 1200 | 393 | CNW26-C | WEST3 | 0.51 | 0.90 |
| **GOEC** | | **GOWAN NORTH - EL CAPITAN BRANCH** | | | | | | |
| 0176 | P | 78" RCP | 1320 | 190 | CCPFR-C | GOW3A | 0.46 | 1.15 |
| **GONO** | | **GOWAN NORTH SYSTEM** | | | | | | |
| 0511 | P | 6' X 5' RCB | 1320 | 326 | CCPHW-C | GOW3A | 0.60 | 1.14 |
| **LVMD** | | **LAS VEGAS WASH - MIDDLE** | | | | | | |
| 2507 | E | 2- 13' X 9' RCB | 2831 | 1808 | CNW168-C | CWEST3 | 4.43 | 0.36 |
| 2525 | E | 24' X 8' RCB | 1140 | 1598 | CNW159-C | CWEST3 | 3.92 | 0.40 |
| 2550 | E | 24' X 8' RCB | 1445 | 1312 | CD161-C | CWEST3 | 3.42 | 0.40 |
| 2574 | E | 24' X 8' RCB | 1430 | 1312 | CD161-C | CWEST3 | 3.42 | 0.41 |
| 2599 | E | CONC CHNL 24'W 7'D 2:1 SS | 1577 | 1268 | CNW162-C | CWEST3 | 3.10 | 0.51 |
| 2632 | E | 18' X 5' RCB | 1443 | 695 | CNW138-C | WEST3 | 1.16 | 0.47 |
| 2661 | E | 18' X 5' RCB | 3003 | 695 | CNW138-C | WEST3 | 1.16 | 0.78 |
| 2711 | E | 10' X 5' RCB | 2440 | 560 | CNW139-C | WEST3 | 0.93 | 2.00 |
| 2737 | E | 8' X 5' RCB | 265 | 560 | CNW139-C | WEST3 | 0.93 | 2.25 |
| 2763 | E | 6' X 5' RCB | 1565 | 560 | CNW139-C | WEST3 | 0.93 | 2.41 |
| 2789 | E | 6' X 5' RCB | 910 | 560 | CNW139-C | WEST3 | 0.93 | 2.00 |
| **MOHU** | | **MOCCASIN-HUALAPAI BRANCH** | | | | | | |
| 0000 | P0 | 13' X 6' RCB | 1476 | 924 | 2CNW33-C | LOWER3 | 2.08 | 1.80 |
| 0026 | P0 | 11' X 6' RCB | 1654 | 560 | CNW45-N | LOWER3 | 1.25 | 0.50 |
| 0061 | P0 | 9' X 6' RCB | 779 | 560 | CNW45-N | LOWER3 | 1.25 | 0.50 |
| 0076 | P0 | 60" RCP | 1000 | 263 | CNW45-C | LOWER3 | 1.03 | 3.00 |
| 0095 | P0 | NATURAL WASH | 865 | 263 | CNW45-C | LOWER3 | 1.03 | 3.00 |
| 0111 | P0 | 6' X 5' RCBC @ EGAN CREB DR | 164 | 263 | CNW45-C | LOWER3 | 1.03 | 6.10 |
| 0116 | P0 | NATURAL WASH | 1900 | 263 | CNW45-C | LOWER3 | 1.03 | 3.00 |
| 0151 | P0 | 54" RCPC @ SHAUMBER | 438 | 72 | MODB1 | LOWER3 | 0.86 | 2.00 |
| **MOIR** | | **MOCCASIN - IRON MOUNTAIN BRANCH** | | | | | | |
| 0000 | P0 | 60" RCP | 1060 | 410 | CNW33-C | LOWER3 | 0.83 | 4.50 |
| 0020 | P0 | 54" RCP | 1161 | 71 | MODB2 | LOWER3 | 0.56 | 3.20 |
| 0041 | P0 | 42" RCP | 1236 | 71 | MODB2 | LOWER3 | 0.56 | 5.00 |
| 0065 | P0 | 60" RCP | 1099 | 71 | MODB2 | LOWER3 | 0.56 | 0.40 |
| **MOKC** | | **MOCCASIN AND KYLE CANYON** | | | | | | |
| 0000 | P0 | 9' X 6' RCB | 6140 | 1072 | CNW35-C | LOWER3 | 2.69 | 3.40 |
| **MOLC** | | **MOCCASIN - LOG CABIN BRANCH** | | | | | | |
| 0000 | P0 | 20' X 10' RCB | 2206 | 2265 | 2CNW64 | LOWER3 | 6.06 | 0.65 |
| 0072 | P0 | 12' X 8' RCB | 4493 | 2265 | 2CNW64 | LOWER3 | 6.06 | 2.66 |
| 0149 | E | 13' X 8' RCB | 520 | 1817 | CNW62-N | LOWER3 | 4.88 | 2.00 |
| 0157 | P | 13' X 8' RCB | 288 | 1817 | CNW62-N | LOWER3 | 4.88 | 1.40 |
| 0162 | P0 | 13' X 8' RCB | 435 | 1817 | CNW62-N | LOWER3 | 4.88 | 1.80 |
| **MSNV** | | **MOUNTAIN SPA/VISTA RANCH** | | | | | | |
| 0000 | E | 6 12' X 5' RCBC @ GRAND TETON | 273 | 639 | CNW163-C | CWEST3 | 1.69 | 0.40 |
| 0005 | E | GRASS CHNL 100'W 4.5'D 10:1 SS | 6325 | 259 | CNW155-C | WEST3 | 4.46 | 0.40 |
| 0125 | E | GRASS CHNL 100'W 4.5'D 10:1 SS | 1300 | 88 | CNW147E | WEST3 | 1.55 | 0.40 |
| **RACO** | | **RACEL STREET COLLECTOR** | | | | | | |
| 0000 | E | 14' X 7' RCB BAFFLED ENERGY DISSIPATOR | 87 | 424 | CNW111S | WEST3 | 0.55 | 0.29 |
| 0001 | E | 78" RCP | 3245 | 424 | CNW111S | WEST3 | 0.55 | 2.46 |
| 0064 | E | 78" RCP | 2650 | 347 | DNW111S | WEST3 | 0.44 | 2.09 |
| **RCBC** | | **RANCHO ROAD SYSTEM - BELTWAY CHANNEL** | | | | | | |
| 0000 | E | 6' X 5' RCB | 1082 | 173 | FADB | WEST3 | 1.54 | 1.04 |
| 0002 | E | 54" RCP OUTLET WITH 41" ORIFICE | 503 | 173 | FADB | WEST3 | 1.54 | 2.38 |
| 0003 | E | 2,341 CFS PMF SPILLWAY | | 2341 | FADBIN | WEST3 | 1.54 | |
| 0004 | E | 76 AC-FT FORT APACHE DETENTION BASIN | | 658 | FADBIN | WEST3 | 1.54 | |
| 0007 | E | ENERGY DISSIPATOR | 100 | 658 | FADBIN | WEST3 | 1.54 | |
| 0009 | E | 12' X 6' RCBC @ FORT APACHE DETENTION BASIN | 133 | 658 | FADBIN | WEST3 | 1.54 | 1.79 |
| 0012 | E | CONC CHNL 12'W 6'-7'D 0:1 SS | 1937 | 658 | FADBIN | WEST3 | 1.54 | 3.15 |
| 0048 | E | 12' X 6' RCBC @ GRAND CANYON | 140 | 559 | CMNA1 | WEST3 | 1.27 | 3.15 |
| 0051 | E | CONC CHNL 12'W 6'-8'D 0:1 SS | 2660 | 559 | CMNA1 | WEST3 | 1.27 | 3.44 |
| 0095 | E | 1: 10' X 6' AND 1: 6' X 6' RCBC @ HUALAPAI WAY | 190 | 559 | CMNA1 | WEST3 | 1.27 | 1.93 |
| 0100 | E | CONC CHNL 12'W 5.5'D 0:1 SS | 2085 | 475 | CDMNA1 | WEST3 | 0.43 | 2.88 |

| ID / Mile | Status | Facility Description | Length (ft.) | Flow (cfs) | HEC-1 Node | HEC-1 Model | Tributary Area (sq.mi.) | Channel Slope (%) ** |
|---|---|---|---|---|---|---|---|---|
| **RCBC** | | **RANCHO ROAD SYSTEM - BELTWAY CHANNEL** | | | | | | |
| 0140 | E | CONC CHNL 10'W 5'D 0:1 SS | 2155 | 475 | CDMNA1 | WEST3 | 0.43 | 1.65 |
| **RCHB** | | **RANCHO ROAD SYSTEM - BELTWAY** | | | | | | |
| 0053 | E | 2- 12' X 6' RCBC @ SOUTH RAMP CONNECTOR | 85 | 1465 | CDW1C1-C | WEST3 | 3.55 | 1.40 |
| 0054 | E | CONC CHNL 21'W 8'D 0:1 SS | 432 | 1465 | CDW1C1-C | WEST3 | 3.55 | 1.51 |
| 0062 | E | TRANSITION STRUCTURE | 130 | 1465 | CDW1C1-C | WEST3 | 3.55 | 1.51 |
| 0065 | E | 24' X 7' RCB | 480 | 1465 | CDW1C1-C | WEST3 | 3.55 | 0.30 |
| 0074 | E | 24' X 6' RCB | 50 | 1414 | CNWBC6-C | WEST3 | 3.41 | 0.30 |
| 0075 | E | 20' X 6' RCBC @ BELTWAY | 428 | 1414 | CNWBC6-C | WEST3 | 3.41 | 2.81 |
| 0083 | P | 20' X 4' RCB | 950 | 1414 | CNWBC6-C | WEST3 | 3.41 | 2.49 |
| 0101 | P | CONC CHNL 20'W 5'D 0:1 SS | 980 | 1414 | CNWBC6-C | WEST3 | 3.41 | 2.38 |
| 0120 | E | 20' X 6' RCBC @ GRAND MONTECITO | 120 | 1414 | CNWBC6-C | WEST3 | 3.41 | 1.00 |
| 0122 | P | CONC CHNL 16'-20'W 6'D 0:1 SS | 350 | 1414 | CNWBC6-C | WEST3 | 3.41 | 1.84 |
| 0130 | P | CONC CHNL 16'W 5.5'D 0:1 SS | 1012 | 1414 | CNWBC6-C | WEST3 | 3.41 | 2.67 |
| 0149 | P | CONC CHNL 16'W 5-5.5'D 0:1 SS | 87 | 1115 | CNWBC3 | WEST3 | 2.99 | 2.27 |
| 0151 | P | CONC CHNL 16'W 5'D 0:1 SS | 1255 | 1115 | CNWBC3 | WEST3 | 2.99 | 2.65 |
| 0171 | E | 16' X 6' RCBC @ EL CAPITAN WAY | 234 | 1115 | CNWBC3 | WEST3 | 2.99 | 1.75 |
| 0175 | E | CONC CHNL 14'W 7'D 0:1 SS | 1220 | 1115 | CNWBC3 | WEST3 | 2.99 | 2.93 |
| 0198 | E | CONC CHNL 14'W 7'D 0:1 SS | 225 | 788 | CNWBA6-C | WEST3 | 1.88 | 2.93 |
| 0227 | E | 12' X 6' RCB | 995 | 788 | CNWBA6-C | WEST3 | 1.88 | 1.73 |
| 0250 | E | 12' X 6' RCB | 4020 | 788 | CNWBA6-C | WEST3 | 1.88 | 1.12 |
| 0275 | E | 7' X 6' RCB | 2650 | 535 | CNW66-C | WEST3 | 1.04 | 3.30 |
| 0286 | P | 7' X 6' RCB | 2980 | 431 | CNW53-C | WEST3 | 0.80 | 3.60 |
| **TSDB** | | **TULE SPRINGS DRAINAGE SYSTEM** | | | | | | |
| 0000 | E | 2- 10' X 4' RCBC @ ECHO GRANDE | 100 | 25 | TULEDB | WEST3 | 1.37 | 1.04 |
| 0002 | E | 36" RCP WITH 22" ORIFICE PLATE | 320 | 25 | TULEDB | WEST3 | 1.37 | 0.33 |
| 0010 | E | 14,013 CFS PMF SPILLWAY | | 14013 | CTULEDB | WEST3 | 1.37 | |
| 0011 | E | 117 AC-FT NORTH ENVIRONMENTAL ENHANCEMENT AREA | | 551 | CTULEDB | WEST3 | 1.37 | |
| 0012 | E | ENERGY DISSIPATOR | 260 | 333 | CNW148-C | WEST3 | 0.59 | |
| 0023 | P | 78" RCP | 1320 | 333 | CNW148-C | WEST3 | 0.59 | 0.80 |
| 0059 | P | 72" RCP | 2640 | 333 | CNW148-C | WEST3 | 0.59 | 1.03 |

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

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

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

REGIONAL FLOOD CONTROL DISTRICT

**2018 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE**

**FACILITY INVENTORY FIGURE F-11**

**LEGEND**

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

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

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

**Construction Features**

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

ATKINS
Member of the SNC Lavalin Group
Louis Berger


SLATER HANIFAN GROUP
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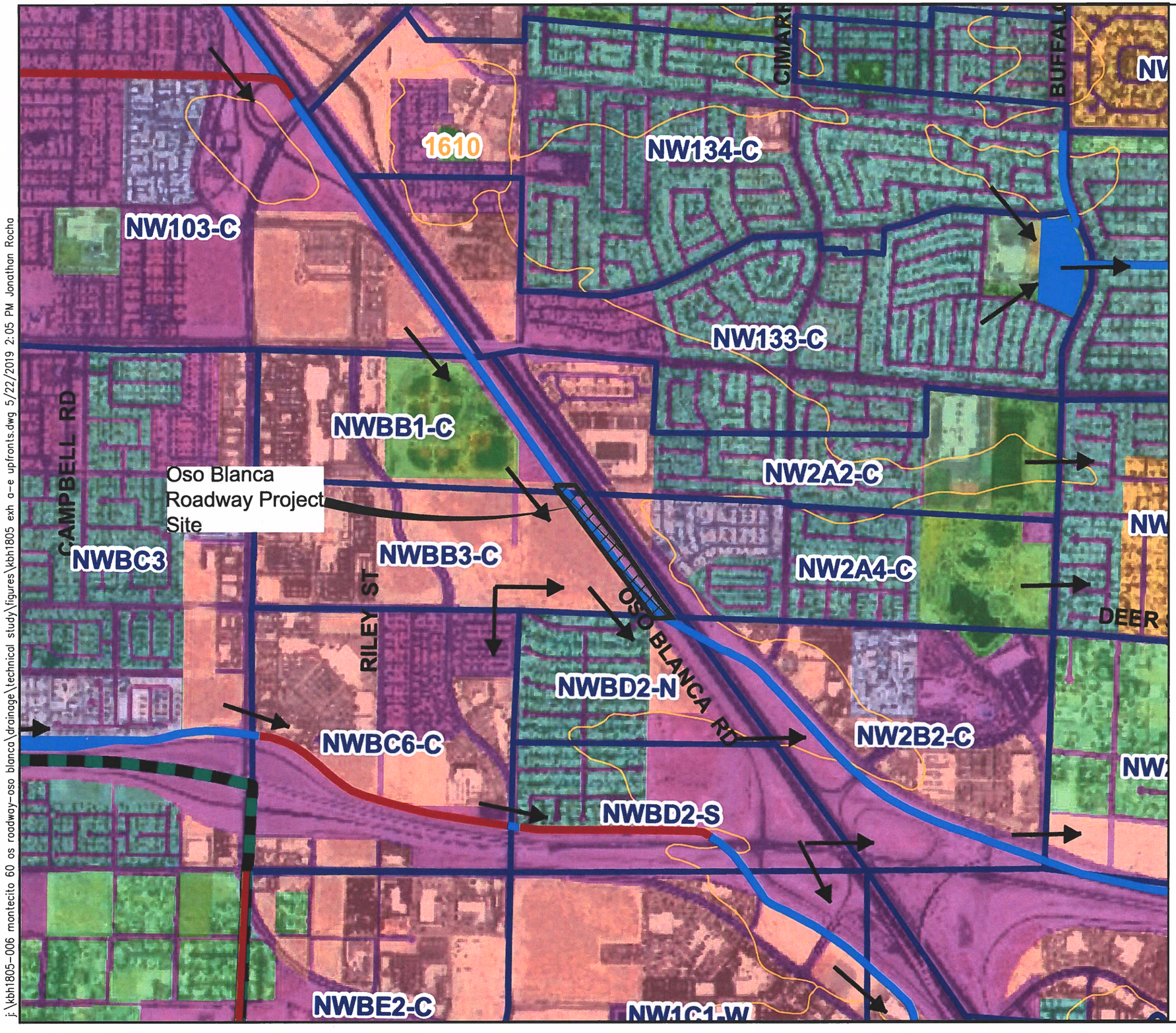
KB HOME

OSO BLANCA ROADWAY
CCRFCD MPU FACILITY SUMMARY

DATE: MAY 2019
DRAFTER: AGM
DESIGNER: AGM
CHECKED: SOA
PROJECT NO. KBH1805.006

EXHIBIT C2
SHEET 1 OF 1

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REGIONAL FLOOD CONTROL DISTRICT

## 2018 Las Vegas Valley Master Plan Update

Figure W-2B
Upper Northern Las Vegas Wash Watershed

**Legend**

- Flow Arrows
- NodeID flow(cfs) Concentration Points
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Ultimate Development Boundary
- Watershed
- BasinID Subbasins
- MUSYM Soils
- 1: Undeveloped Land, Open desert
- 2: Parks, Golf Courses
- 3: Rural, 0.5-1 units per acre (uses 1 unit/acre)
- 4: Low-Density Residential, 1-2 units per acre (uses 2 units/acre)
- 5: Medium-Density Residential, 2-4 units per acre (uses 3 units/acre)
- 6: High-Density Residential, 4-8 units per acre (uses 6 units/acre)
- 7: Public Facility and Residential, 8-12 units/acre
- 8: Very High-Density Residential, 12 units/acre or more
- 9: Commercial, Retail, Casino, High Rise Condominiums
- 10: Light Industrial
- 11: Heavy Industrial
- 12: Schools
- 13: Lakes

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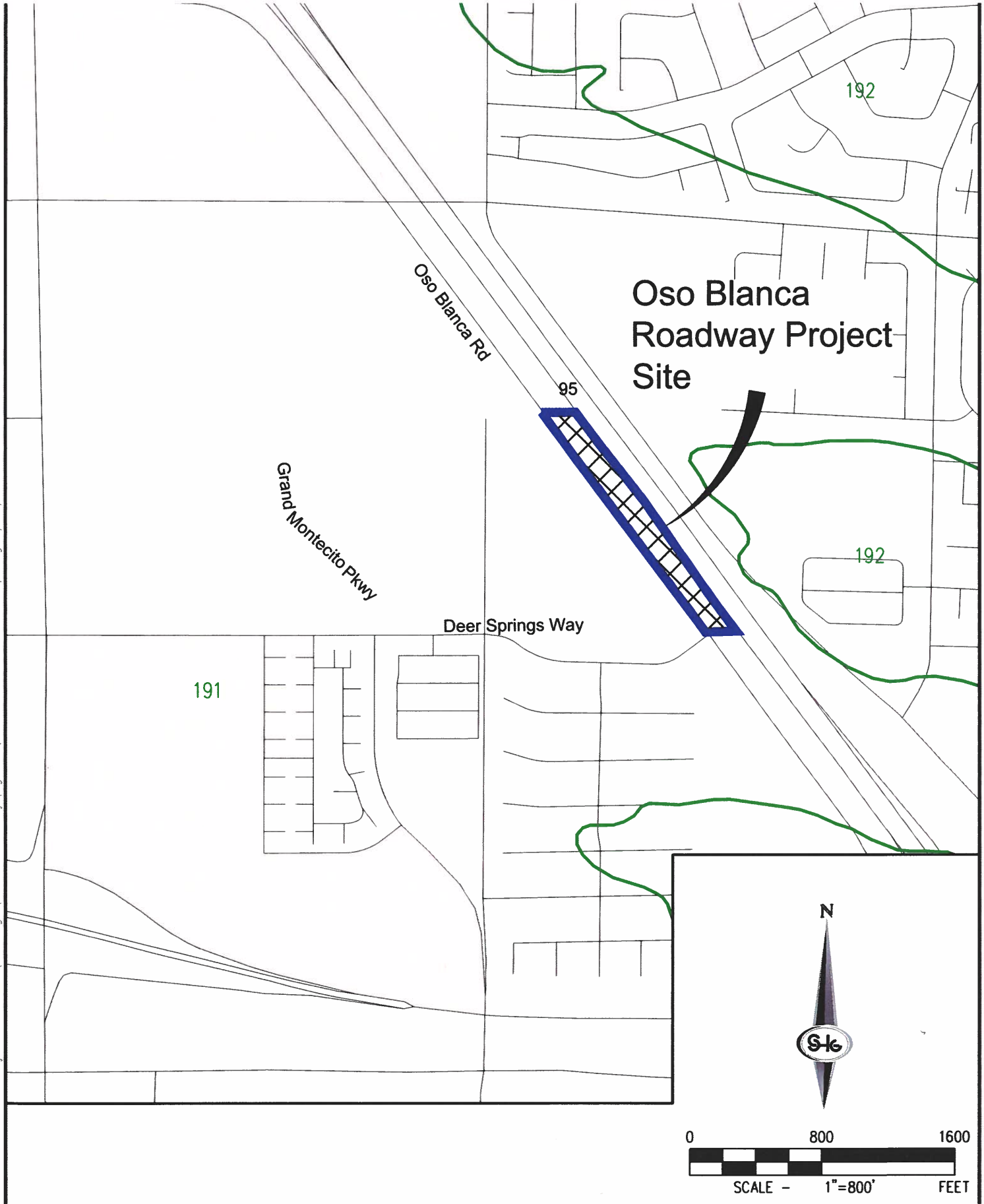
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OSO BLANCA ROADWAY
CCRFCD MPU WATERSHED MAP

| | |
|---|---|
| DATE: | MAY 2019 |
| DRAFTER: | AGM |
| DESIGNER: | AGM |
| CHECKED: | SOA |
| PROJECT NO. | KBH1805.006 |

EXHIBIT C3
SHEET 1 OF 1

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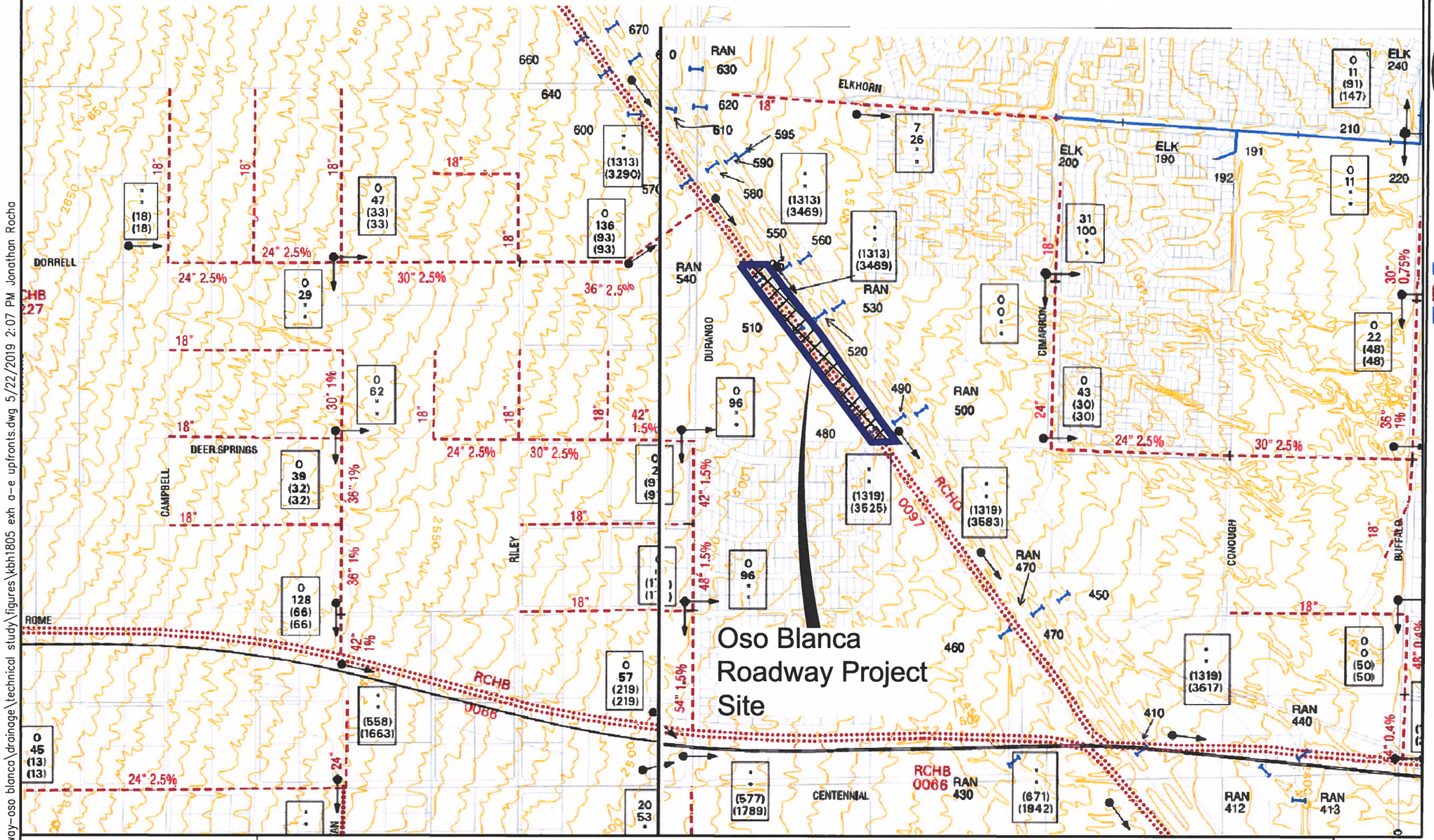
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OSO BLANCA ROADWAY

SOILS MAP

| | |
|---|---|
| DATE: MAY 2019 | PROJECT NO. KBH1805.006 |
| DRAFTER: AGM | |
| DESIGNER: AGM | EXHIBIT D |
| CHECKED: SOA | SHEET 1 OF 1 |

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FLOW ARROW

| | |
|---|---|
| 250 | 10-YEAR STREET FLOW |
| 500 | 100-YEAR STREET FLOW |
| (300) | 10-YEAR FACILITY FLOW |
| (800) | 100-YEAR FACILITY FLOW |

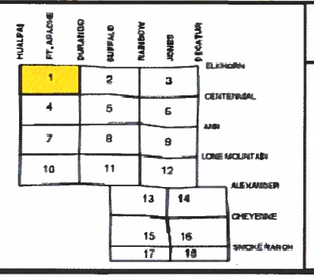
(FLOWS IN CFS)

**NOTE:**

Ultimate drainage conditions are based on future CN values with all flood control facilities in place

See the "September 1999 City of Las Vegas Northwest Neighborhood Study Phase 2" for proposed facilities in and north of Elkhorn.

**REVISED SEPTEMBER 1999**




FUTURE DRAINAGE CONDITIONS

PBSJ
001 North Green Valley Parkway, Suite 300
Henderson, Nevada 89014-6139
Phone: 702/263-7276
Fax: 702/263-7200
ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES

CITY OF LAS VEGAS NEVADA

## NORTHWEST NEIGHBORHOOD STUDY

LEGEND

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS
- EXISTING LOCAL DETENTION BASINS
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- EXISTING LOCAL BRIDGES
- EXISTING REGIONAL CULVERT
- PROPOSED REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- EXISTING LOCAL PIPELINE
- PROPOSED LOCAL PIPLINE
- EXISTING REGIONAL CHANNEL
- PROPOSED REGIONAL CHANNEL
- EXISTING LOCAL CHANNEL
- PROPOSED REGIONAL PIPELINE (Not Included in 1986 MPU)
- PROPOSED REGIONAL CHANNEL (Not Included in 1986 MPU)
- EXISTING REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE
- EXISTING LOCAL DIKE/LEVEE
- EXISTING STORM WATER PUMPING STATION
- PROPOSED BELTWAY ALIGNMENT

FIGURE F-1

FIGURE F-2

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OSO BLANCA ROADWAY

NORTHWEST NEIGHBORHOOD STUDY FUTURE DRAINAGE CONDITION MAP

| | |
|---|---|
| DATE: | MAY 2019 |
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| DESIGNER: | AGM |
| CHECKED: | SOA |
| PROJECT NO. | KBH1805.006 |

EXHIBIT E2

SHEET 1 OF 1

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CITY OF LAS VEGAS NEVADA

# NORTHWEST NEIGHBORHOOD STUDY

LEGEND

- SUB-BASIN BOUNDARY
- FLOW ARROW
- 250 / 500 / 300 / 800 — 10-YEAR STREET FLOW / 100-YEAR STREET FLOW / 10-YEAR FACILITY FLOW / 100-YEAR FACILITY FLOW (FLOWS IN CFS)
- BWJS — Basin-ID
- ( 13 / 59 ) — Contributing flow ( 10-Year / 100-Year) from the basin (cfs)

PHOTO DATE: APRIL 1996

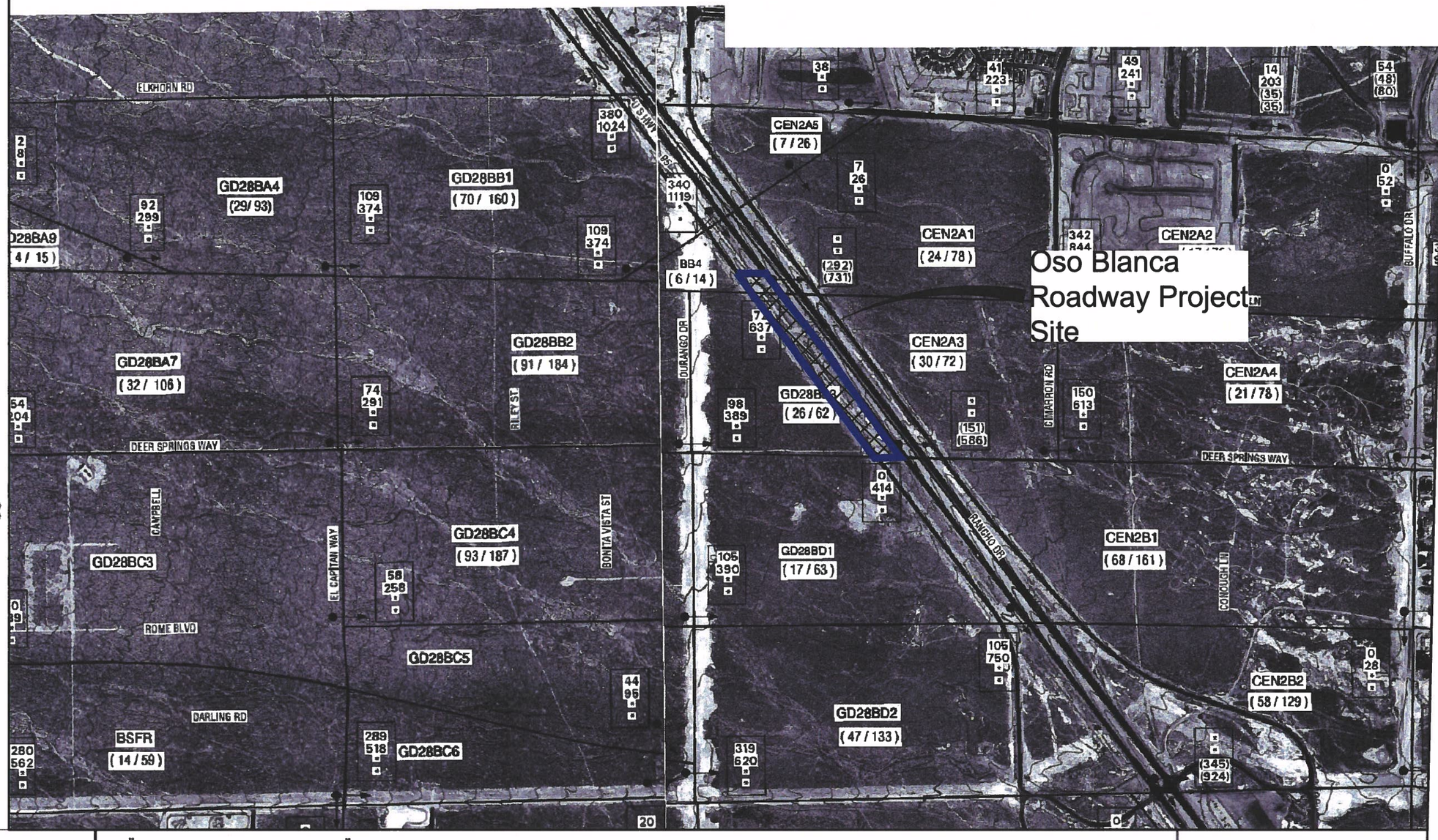
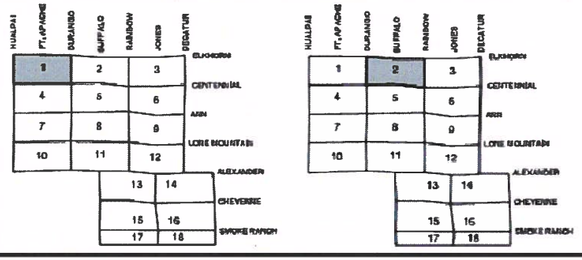



FIGURE E-1
FIGURE E-2

## EXISTING DRAINAGE CONDITIONS

PBS&J
POST, BUCKLEY, SCHUH & JERNIGAN, INC.
ENGINEERING PLANNING SURVEYING GIS
901, N. Green Valley Pkwy, Ste 100, Henderson NV 89014
Phone: (702) 263-7275 Fax: (702) 263-7200

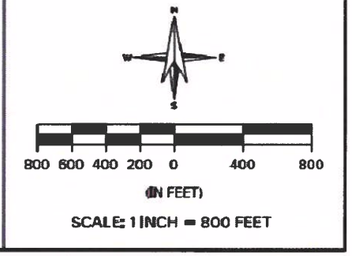






REVISED SEPTEMBER 1999

**NOTE:**
Existing conditions are based on future CN values with only existinig local and CCRFCD facilities in place




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| | | | | | |

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OSO BLANCA ROADWAY

NORTHWEST NEIGHBORHOOD STUDY EXISTING DRAINAGE CONDITION MAP

| | |
|---|---|
| DATE: | MAY 2019 |
| DRAFTER: | AGM |
| DESIGNER: | AGM |
| CHECKED: | SOA |
| PROJECT NO. | KBH1805.006 |

EXHIBIT E1
SHEET 1 OF 1

# APPENDIX B

Hydraulic Computations

# Street Flow Depth Computations

# Worksheet for OA-N - 100Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.80 | % |
| Discharge | 3.50 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+23.50 | 1.01 |
| 0+35.50 | 1.01 |
| 0+35.50 | 0.60 |
| 0+57.00 | 0.17 |
| 0+57.00 | 0.13 |
| 0+58.50 | 0.00 |
| 0+58.50 | 0.48 |
| 0+59.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+23.50, 1.01) | (0+35.50, 0.60) | 0.013 |
| (0+35.50, 0.60) | (0+57.00, 0.13) | 0.016 |
| (0+57.00, 0.13) | (0+59.00, 0.50) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.34 | ft |
| Elevation Range | 0.00 to 1.01 ft | |
| Flow Area | 1.18 | ft² |

# Worksheet for OA-N - 100Yr

## Results

| | | | |
|---|---|---|---|
| Wetted Perimeter | | 10.61 | ft |
| Hydraulic Radius | | 0.11 | ft |
| Top Width | | 10.22 | ft |
| Normal Depth | | 0.34 | ft |
| Critical Depth | | 0.39 | ft |
| Critical Slope | | 0.00716 | ft/ft |
| Velocity | | 2.97 | ft/s |
| Velocity Head | | 0.14 | ft |
| Specific Energy | | 0.48 | ft |
| Froude Number | | 1.54 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.34 | ft |
| Critical Depth | 0.39 | ft |
| Channel Slope | 1.80 | % |
| Critical Slope | 0.00716 | ft/ft |

# Cross Section for OA-N - 100Yr

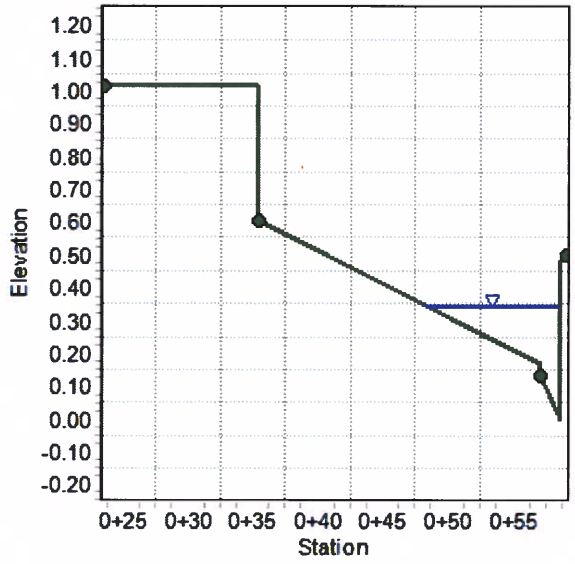
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.80 | % |
| Normal Depth | 0.34 | ft |
| Discharge | 3.50 | ft³/s |

## Cross Section Image



# Worksheet for OB-N - 100Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Discharge | 2.50 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+23.50 | 1.01 |
| 0+35.50 | 1.01 |
| 0+35.50 | 0.60 |
| 0+57.00 | 0.17 |
| 0+57.00 | 0.13 |
| 0+58.50 | 0.00 |
| 0+58.50 | 0.48 |
| 0+59.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+23.50, 1.01) | (0+35.50, 0.60) | 0.013 |
| (0+35.50, 0.60) | (0+57.00, 0.13) | 0.016 |
| (0+57.00, 0.13) | (0+59.00, 0.50) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.31 | ft |
| Elevation Range | 0.00 to 1.01 ft | |
| Flow Area | 0.84 | ft² |

# Worksheet for OB-N - 100Yr

## Results

| | | | |
|---|---|---|---|
| Wetted Perimeter | | 8.74 | ft |
| Hydraulic Radius | | 0.10 | ft |
| Top Width | | 8.38 | ft |
| Normal Depth | | 0.31 | ft |
| Critical Depth | | 0.35 | ft |
| Critical Slope | | 0.00740 | ft/ft |
| Velocity | | 2.98 | ft/s |
| Velocity Head | | 0.14 | ft |
| Specific Energy | | 0.45 | ft |
| Froude Number | | 1.66 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.31 | ft |
| Critical Depth | 0.35 | ft |
| Channel Slope | 2.19 | % |
| Critical Slope | 0.00740 | ft/ft |

# Cross Section for OB-N - 100Yr

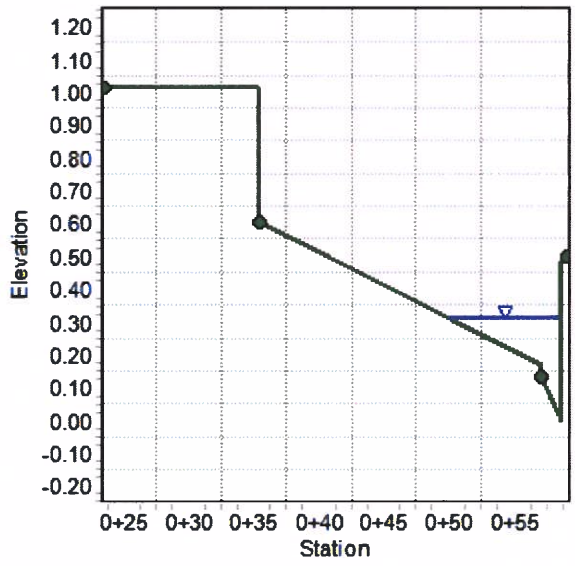
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Normal Depth | 0.31 | ft |
| Discharge | 2.50 | ft³/s |

## Cross Section Image



# Worksheet for OC-N - 100Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Discharge | 3.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+23.50 | 1.01 |
| 0+35.50 | 1.01 |
| 0+35.50 | 0.60 |
| 0+57.00 | 0.17 |
| 0+57.00 | 0.13 |
| 0+58.50 | 0.00 |
| 0+58.50 | 0.48 |
| 0+59.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+23.50, 1.01) | (0+35.50, 0.60) | 0.013 |
| (0+35.50, 0.60) | (0+57.00, 0.13) | 0.016 |
| (0+57.00, 0.13) | (0+59.00, 0.50) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.32 | ft |
| Elevation Range | 0.00 to 1.01 ft | |
| Flow Area | 0.97 | ft² |

# Worksheet for OC-N - 100Yr

## Results

| | | | |
|---|---|---|---|
| Wetted Perimeter | | 9.49 | ft |
| Hydraulic Radius | | 0.10 | ft |
| Top Width | | 9.12 | ft |
| Normal Depth | | 0.32 | ft |
| Critical Depth | | 0.37 | ft |
| Critical Slope | | 0.00726 | ft/ft |
| Velocity | | 3.10 | ft/s |
| Velocity Head | | 0.15 | ft |
| Specific Energy | | 0.47 | ft |
| Froude Number | | 1.68 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.32 | ft |
| Critical Depth | 0.37 | ft |
| Channel Slope | 2.19 | % |
| Critical Slope | 0.00726 | ft/ft |

# Cross Section for OC-N - 100Yr

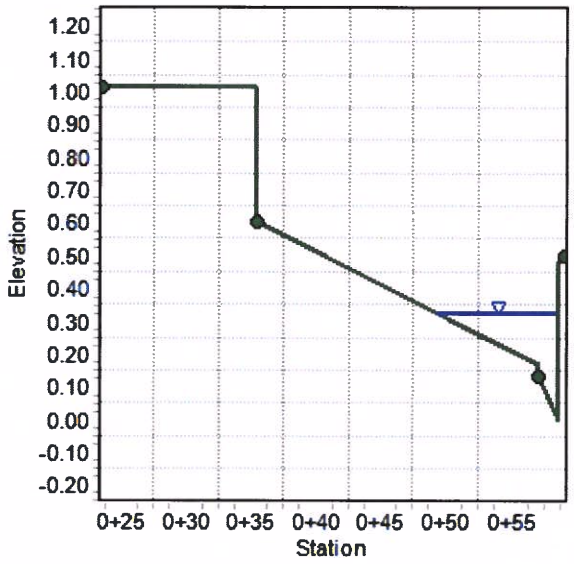
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Normal Depth | 0.32 | ft |
| Discharge | 3.00 | ft³/s |

## Cross Section Image



# Worksheet for OD-N - 100Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.06 | % |
| Discharge | 2.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+23.50 | 1.01 |
| 0+35.50 | 1.01 |
| 0+35.50 | 0.60 |
| 0+57.00 | 0.17 |
| 0+57.00 | 0.13 |
| 0+58.50 | 0.00 |
| 0+58.50 | 0.48 |
| 0+59.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+23.50, 1.01) | (0+35.50, 0.60) | 0.013 |
| (0+35.50, 0.60) | (0+57.00, 0.13) | 0.016 |
| (0+57.00, 0.13) | (0+59.00, 0.50) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.29 | ft |
| Elevation Range | 0.00 to 1.01 ft | |
| Flow Area | 0.72 | ft² |

# Worksheet for OD-N - 100Yr

## Results

| | | | |
|---|---|---|---|
| Wetted Perimeter | | 7.97 | ft |
| Hydraulic Radius | | 0.09 | ft |
| Top Width | | 7.63 | ft |
| Normal Depth | | 0.29 | ft |
| Critical Depth | | 0.33 | ft |
| Critical Slope | | 0.00756 | ft/ft |
| Velocity | | 2.79 | ft/s |
| Velocity Head | | 0.12 | ft |
| Specific Energy | | 0.41 | ft |
| Froude Number | | 1.60 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.29 | ft |
| Critical Depth | 0.33 | ft |
| Channel Slope | 2.06 | % |
| Critical Slope | 0.00756 | ft/ft |

# Cross Section for OD-N - 100Yr

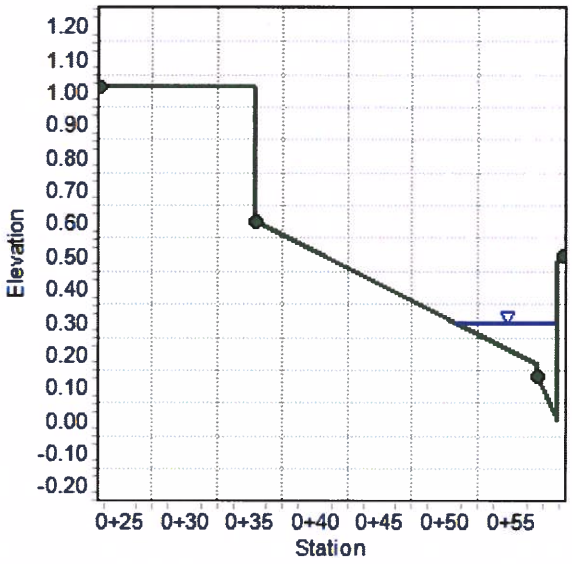
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.06 | % |
| Normal Depth | 0.29 | ft |
| Discharge | 2.00 | ft³/s |

## Cross Section Image



# Worksheet for OA-S - 100Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.80 | % |
| Discharge | 11.50 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.48 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+23.50 | 0.60 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+23.50, 0.60) | 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 | 0.48 | ft |
| Elevation Range | 0.00 to 0.60 ft | |
| Flow Area | 2.94 | ft² |
| Wetted Perimeter | 17.29 | ft |
| Hydraulic Radius | 0.17 | ft |
| Top Width | 16.76 | ft |

# Worksheet for OA-S - 100Yr

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.48 | ft |
| Critical Depth | | 0.55 | ft |
| Critical Slope | | 0.00626 | ft/ft |
| Velocity | | 3.90 | ft/s |
| Velocity Head | | 0.24 | ft |
| Specific Energy | | 0.71 | ft |
| Froude Number | | 1.64 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.48 | ft |
| Critical Depth | 0.55 | ft |
| Channel Slope | 1.80 | % |
| Critical Slope | 0.00626 | ft/ft |

# Cross Section for OA-S - 100Yr

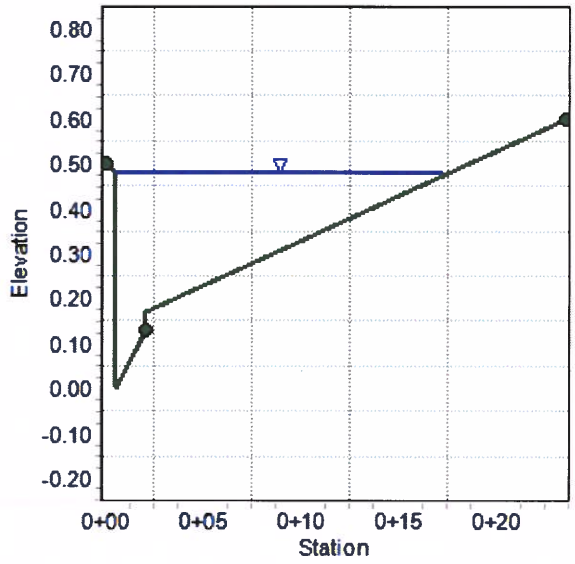
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.80 | % |
| Normal Depth | 0.48 | ft |
| Discharge | 11.50 | ft³/s |

## Cross Section Image



# Worksheet for OB-S - 100Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Discharge | 8.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.48 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+33.50 | 0.80 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+33.50, 0.80) | 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 | 0.42 | ft |
| Elevation Range | 0.00 to 0.80 ft | |
| Flow Area | 2.07 | ft² |
| Wetted Perimeter | 14.38 | ft |
| Hydraulic Radius | 0.14 | ft |
| Top Width | 13.91 | ft |

# Worksheet for OB-S - 100Yr

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.42 | ft |
| Critical Depth | | 0.50 | ft |
| Critical Slope | | 0.00653 | ft/ft |
| Velocity | | 3.87 | ft/s |
| Velocity Head | | 0.23 | ft |
| Specific Energy | | 0.65 | ft |
| Froude Number | | 1.77 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.42 | ft |
| Critical Depth | 0.50 | ft |
| Channel Slope | 2.19 | % |
| Critical Slope | 0.00653 | ft/ft |

# Cross Section for OB-S - 100Yr

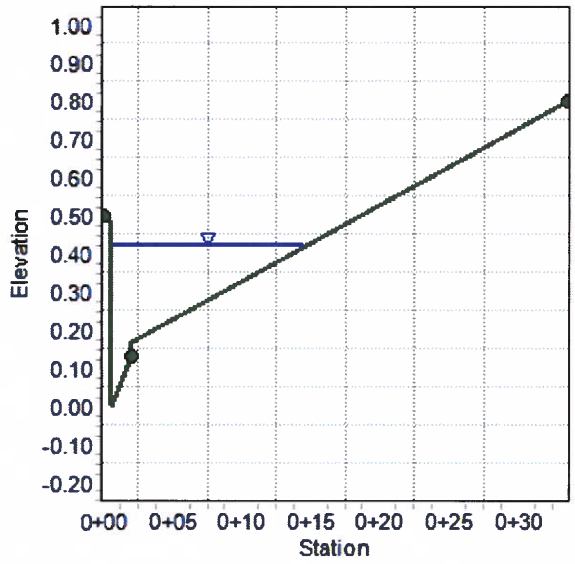
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Normal Depth | 0.42 | ft |
| Discharge | 8.00 | ft³/s |

## Cross Section Image



# Worksheet for OC-S - 100Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Discharge | 5.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.48 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+23.50 | 0.60 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+23.50, 0.60) | 0.016 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.37 | ft |
| Elevation Range | 0.00 to 0.60 ft | |
| Flow Area | 1.44 | ft² |
| Wetted Perimeter | 11.86 | ft |
| Hydraulic Radius | 0.12 | ft |
| Top Width | 11.44 | ft |

# Worksheet for OC-S - 100Yr

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.37 | ft |
| Critical Depth | | 0.43 | ft |
| Critical Slope | | 0.00687 | ft/ft |
| Velocity | | 3.46 | ft/s |
| Velocity Head | | 0.19 | ft |
| Specific Energy | | 0.56 | ft |
| Froude Number | | 1.72 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.37 | ft |
| Critical Depth | 0.43 | ft |
| Channel Slope | 2.19 | % |
| Critical Slope | 0.00687 | ft/ft |

# Cross Section for OC-S - 100Yr

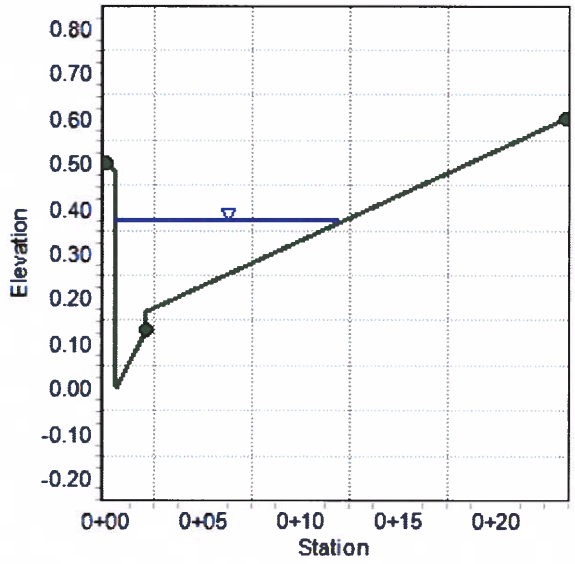
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Normal Depth | 0.37 | ft |
| Discharge | 5.00 | ft³/s |

## Cross Section Image



# Worksheet for OD-S - 100Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.06 | % |
| Discharge | 4.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.48 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+23.50 | 0.60 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+23.50, 0.60) | 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 | 0.35 | ft |
| Elevation Range | 0.00 to 0.60 ft | |
| Flow Area | 1.24 | ft² |
| Wetted Perimeter | 10.91 | ft |
| Hydraulic Radius | 0.11 | ft |
| Top Width | 10.51 | ft |

# Worksheet for OD-S - 100Yr

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.35 | ft |
| Critical Depth | | 0.40 | ft |
| Critical Slope | | 0.00705 | ft/ft |
| Velocity | | 3.23 | ft/s |
| Velocity Head | | 0.16 | ft |
| Specific Energy | | 0.51 | ft |
| Froude Number | | 1.66 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.35 | ft |
| Critical Depth | 0.40 | ft |
| Channel Slope | 2.06 | % |
| Critical Slope | 0.00705 | ft/ft |

# Cross Section for OD-S - 100Yr

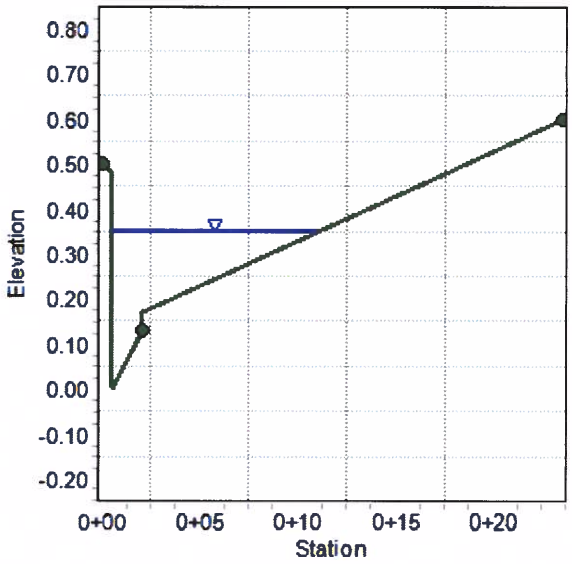
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.06 | % |
| Normal Depth | 0.35 | ft |
| Discharge | 4.00 | ft³/s |

## Cross Section Image



# Worksheet for OA-N - 10Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.80 | % |
| Discharge | 2.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+23.50 | 1.01 |
| 0+35.50 | 1.01 |
| 0+35.50 | 0.60 |
| 0+57.00 | 0.17 |
| 0+57.00 | 0.13 |
| 0+58.50 | 0.00 |
| 0+58.50 | 0.48 |
| 0+59.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+23.50, 1.01) | (0+35.50, 0.60) | 0.013 |
| (0+35.50, 0.60) | (0+57.00, 0.13) | 0.016 |
| (0+57.00, 0.13) | (0+59.00, 0.50) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.30 | ft |
| Elevation Range | 0.00 to 1.01 ft | |
| Flow Area | 0.76 | ft² |

# Worksheet for OA-N - 10Yr

## Results

| | | | |
|---|---|---|---|
| Wetted Perimeter | | 8.24 | ft |
| Hydraulic Radius | | 0.09 | ft |
| Top Width | | 7.89 | ft |
| Normal Depth | | 0.30 | ft |
| Critical Depth | | 0.33 | ft |
| Critical Slope | | 0.00758 | ft/ft |
| Velocity | | 2.64 | ft/s |
| Velocity Head | | 0.11 | ft |
| Specific Energy | | 0.41 | ft |
| Froude Number | | 1.50 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.30 | ft |
| Critical Depth | 0.33 | ft |
| Channel Slope | 1.80 | % |
| Critical Slope | 0.00758 | ft/ft |

# Cross Section for OA-N - 10Yr

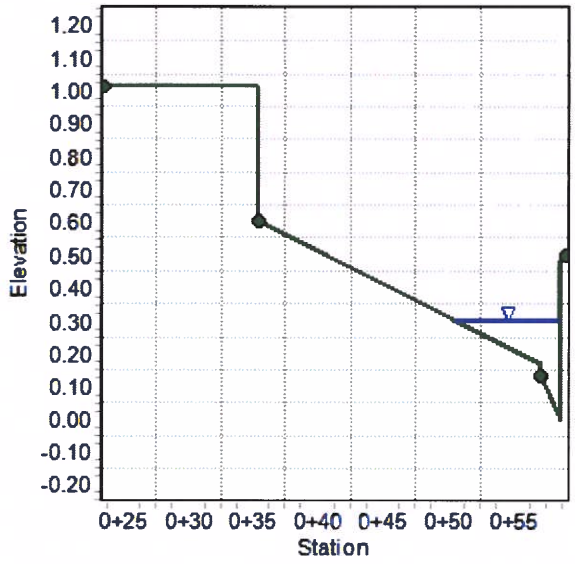
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.80 | % |
| Normal Depth | 0.30 | ft |
| Discharge | 2.00 | ft³/s |

## Cross Section Image



# Worksheet for OB-N - 10Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Discharge | 1.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+23.50 | 1.01 |
| 0+35.50 | 1.01 |
| 0+35.50 | 0.60 |
| 0+57.00 | 0.17 |
| 0+57.00 | 0.13 |
| 0+58.50 | 0.00 |
| 0+58.50 | 0.48 |
| 0+59.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+23.50, 1.01) | (0+35.50, 0.60) | 0.013 |
| (0+35.50, 0.60) | (0+57.00, 0.13) | 0.016 |
| (0+57.00, 0.13) | (0+59.00, 0.50) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.24 | ft |
| Elevation Range | 0.00 to 1.01 ft | |
| Flow Area | 0.39 | ft² |

# Worksheet for OB-N - 10Yr

## Results

| | | | |
|---|---|---|---|
| Wetted Perimeter | | 5.35 | ft |
| Hydraulic Radius | | 0.07 | ft |
| Top Width | | 5.07 | ft |
| Normal Depth | | 0.24 | ft |
| Critical Depth | | 0.28 | ft |
| Critical Slope | | 0.00794 | ft/ft |
| Velocity | | 2.55 | ft/s |
| Velocity Head | | 0.10 | ft |
| Specific Energy | | 0.34 | ft |
| Froude Number | | 1.62 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.24 | ft |
| Critical Depth | 0.28 | ft |
| Channel Slope | 2.19 | % |
| Critical Slope | 0.00794 | ft/ft |

# Cross Section for OB-N - 10Yr

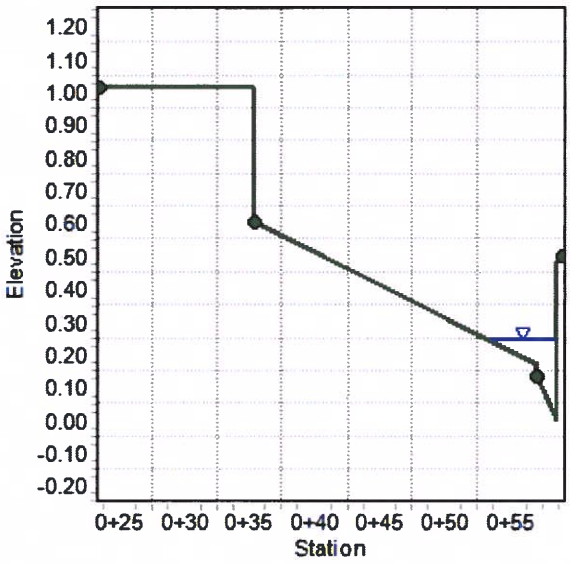
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Normal Depth | 0.24 | ft |
| Discharge | 1.00 | ft³/s |

## Cross Section Image



# Worksheet for OC-N - 10Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Discharge | 1.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+23.50 | 1.01 |
| 0+35.50 | 1.01 |
| 0+35.50 | 0.60 |
| 0+57.00 | 0.17 |
| 0+57.00 | 0.13 |
| 0+58.50 | 0.00 |
| 0+58.50 | 0.48 |
| 0+59.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+23.50, 1.01) | (0+35.50, 0.60) | 0.013 |
| (0+35.50, 0.60) | (0+57.00, 0.13) | 0.016 |
| (0+57.00, 0.13) | (0+59.00, 0.50) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.24 | ft |
| Elevation Range | 0.00 to 1.01 ft | |
| Flow Area | 0.39 | ft² |

# Worksheet for OC-N - 10Yr

## Results

| | | | |
|---|---|---|---|
| Wetted Perimeter | | 5.35 | ft |
| Hydraulic Radius | | 0.07 | ft |
| Top Width | | 5.07 | ft |
| Normal Depth | | 0.24 | ft |
| Critical Depth | | 0.28 | ft |
| Critical Slope | | 0.00794 | ft/ft |
| Velocity | | 2.55 | ft/s |
| Velocity Head | | 0.10 | ft |
| Specific Energy | | 0.34 | ft |
| Froude Number | | 1.62 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | | |
|---|---|---|---|
| Upstream Depth | | 0.00 | ft |
| Profile Description | | | |
| Profile Headloss | | 0.00 | ft |
| Downstream Velocity | | Infinity | ft/s |
| Upstream Velocity | | Infinity | ft/s |
| Normal Depth | | 0.24 | ft |
| Critical Depth | | 0.28 | ft |
| Channel Slope | | 2.19 | % |
| Critical Slope | | 0.00794 | ft/ft |

# Cross Section for OC-N - 10Yr

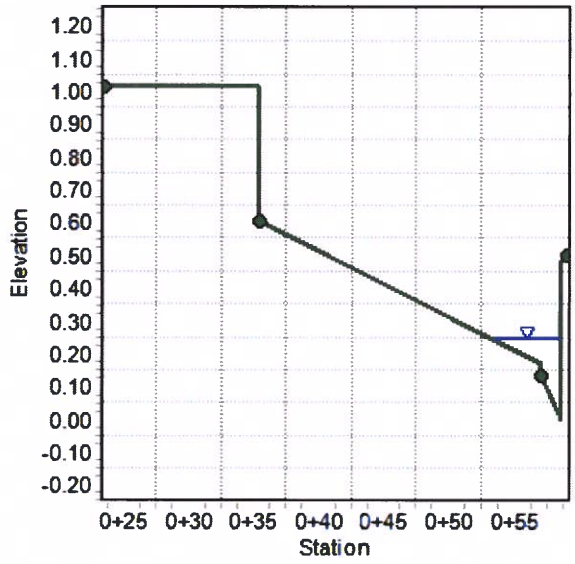
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Normal Depth | 0.24 | ft |
| Discharge | 1.00 | ft³/s |

## Cross Section Image



# Worksheet for OD-N - 10Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.06 | % |
| Discharge | 1.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+23.50 | 1.01 |
| 0+35.50 | 1.01 |
| 0+35.50 | 0.60 |
| 0+57.00 | 0.17 |
| 0+57.00 | 0.13 |
| 0+58.50 | 0.00 |
| 0+58.50 | 0.48 |
| 0+59.00 | 0.50 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+23.50, 1.01) | (0+35.50, 0.60) | 0.013 |
| (0+35.50, 0.60) | (0+57.00, 0.13) | 0.016 |
| (0+57.00, 0.13) | (0+59.00, 0.50) | 0.013 |

## Options

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

## Results

| | | |
|---|---|---|
| Normal Depth | 0.24 | ft |
| Elevation Range | 0.00 to 1.01 ft | |
| Flow Area | 0.40 | ft² |

# Worksheet for OD-N - 10Yr

## Results

| | | | |
|---|---|---|---|
| Wetted Perimeter | | 5.46 | ft |
| Hydraulic Radius | | 0.07 | ft |
| Top Width | | 5.17 | ft |
| Normal Depth | | 0.24 | ft |
| Critical Depth | | 0.28 | ft |
| Critical Slope | | 0.00796 | ft/ft |
| Velocity | | 2.48 | ft/s |
| Velocity Head | | 0.10 | ft |
| Specific Energy | | 0.34 | ft |
| Froude Number | | 1.57 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.24 | ft |
| Critical Depth | 0.28 | ft |
| Channel Slope | 2.06 | % |
| Critical Slope | 0.00796 | ft/ft |

# Cross Section for OD-N - 10Yr

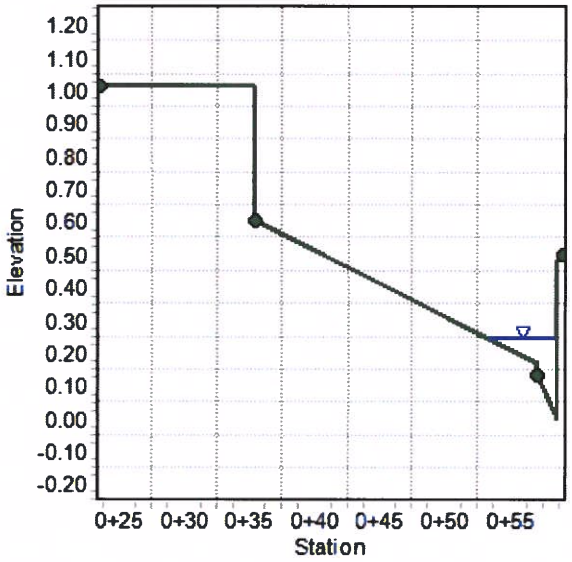
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.06 | % |
| Normal Depth | 0.24 | ft |
| Discharge | 1.00 | ft³/s |

## Cross Section Image



# Worksheet for OA-S - 10Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.80 | % |
| Discharge | 6.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.48 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+23.50 | 0.60 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+23.50, 0.60) | 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 | 0.40 | ft |
| Elevation Range | 0.00 to 0.60 ft | |
| Flow Area | 1.79 | ft² |
| Wetted Perimeter | 13.30 | ft |
| Hydraulic Radius | 0.13 | ft |
| Top Width | 12.86 | ft |

# Worksheet for OA-S - 10Yr

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.40 | ft |
| Critical Depth | | 0.45 | ft |
| Critical Slope | | 0.00674 | ft/ft |
| Velocity | | 3.35 | ft/s |
| Velocity Head | | 0.17 | ft |
| Specific Energy | | 0.57 | ft |
| Froude Number | | 1.59 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | | |
|---|---|---|---|
| Upstream Depth | | 0.00 | ft |
| Profile Description | | | |
| Profile Headloss | | 0.00 | ft |
| Downstream Velocity | | Infinity | ft/s |
| Upstream Velocity | | Infinity | ft/s |
| Normal Depth | | 0.40 | ft |
| Critical Depth | | 0.45 | ft |
| Channel Slope | | 1.80 | % |
| Critical Slope | | 0.00674 | ft/ft |

# Cross Section for OA-S - 10Yr

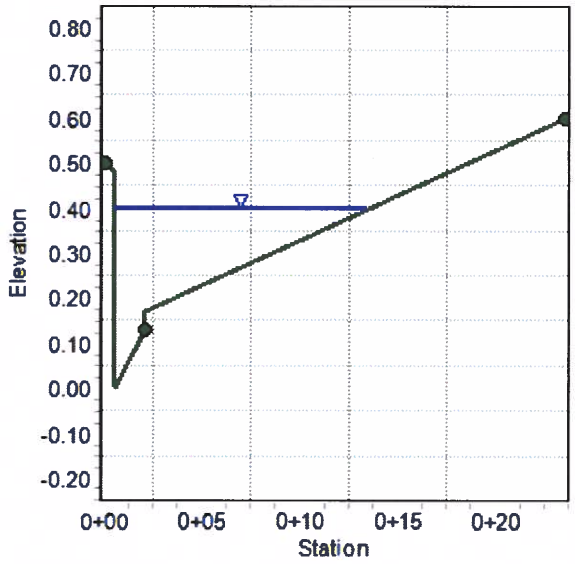
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 1.80 | % |
| Normal Depth | 0.40 | ft |
| Discharge | 6.00 | ft³/s |

## Cross Section Image



# Worksheet for OB-S - 10Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Discharge | 3.50 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.48 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+23.50 | 0.60 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+23.50, 0.60) | 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 | 0.34 | ft |
| Elevation Range | 0.00 to 0.60 ft | |
| Flow Area | 1.09 | ft² |
| Wetted Perimeter | 10.16 | ft |
| Hydraulic Radius | 0.11 | ft |
| Top Width | 9.78 | ft |

# Worksheet for OB-S - 10Yr

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.34 | ft |
| Critical Depth | | 0.39 | ft |
| Critical Slope | | 0.00714 | ft/ft |
| Velocity | | 3.21 | ft/s |
| Velocity Head | | 0.16 | ft |
| Specific Energy | | 0.50 | ft |
| Froude Number | | 1.69 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.34 | ft |
| Critical Depth | 0.39 | ft |
| Channel Slope | 2.19 | % |
| Critical Slope | 0.00714 | ft/ft |

# Cross Section for OB-S - 10Yr

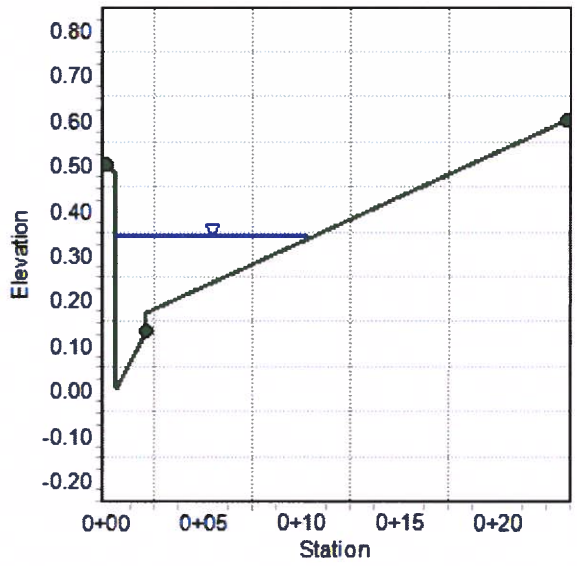
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Normal Depth | 0.34 | ft |
| Discharge | 3.50 | ft³/s |

## Cross Section Image



# Worksheet for OC-S - 10Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Discharge | 1.50 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.48 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+23.50 | 0.60 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+23.50, 0.60) | 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 | 0.27 | ft |
| Elevation Range | 0.00 to 0.60 ft | |
| Flow Area | 0.55 | ft² |
| Wetted Perimeter | 6.78 | ft |
| Hydraulic Radius | 0.08 | ft |
| Top Width | 6.47 | ft |

# Worksheet for OC-S - 10Yr

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.27 | ft |
| Critical Depth | | 0.31 | ft |
| Critical Slope | | 0.00774 | ft/ft |
| Velocity | | 2.71 | ft/s |
| Velocity Head | | 0.11 | ft |
| Specific Energy | | 0.38 | ft |
| Froude Number | | 1.63 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.27 | ft |
| Critical Depth | 0.31 | ft |
| Channel Slope | 2.19 | % |
| Critical Slope | 0.00774 | ft/ft |

# Cross Section for OC-S - 10Yr

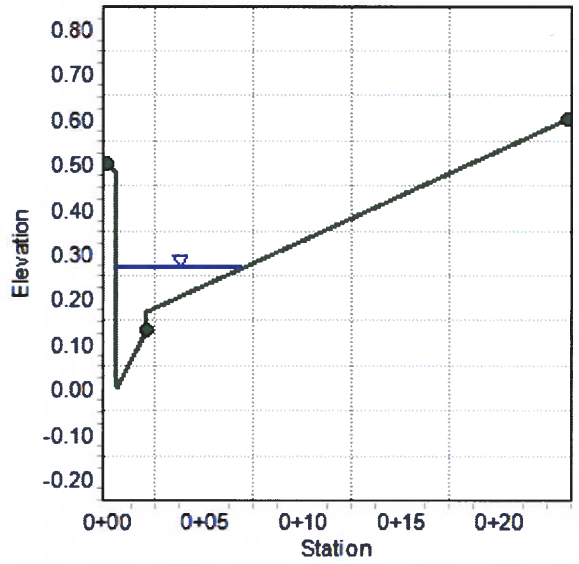
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.19 | % |
| Normal Depth | 0.27 | ft |
| Discharge | 1.50 | ft³/s |

## Cross Section Image



# Worksheet for OD-S - 10Yr

## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.06 | % |
| Discharge | 1.00 | ft³/s |

Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00.00 | 0.50 |
| 0+00.50 | 0.48 |
| 0+00.50 | 0.00 |
| 0+02.00 | 0.13 |
| 0+02.00 | 0.17 |
| 0+23.50 | 0.60 |

Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00.00, 0.50) | (0+02.00, 0.13) | 0.013 |
| (0+02.00, 0.13) | (0+23.50, 0.60) | 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 | | 0.24 | ft |
| Elevation Range | 0.00 to 0.60 ft | | |
| Flow Area | | 0.40 | ft² |
| Wetted Perimeter | | 5.48 | ft |
| Hydraulic Radius | | 0.07 | ft |
| Top Width | | 5.19 | ft |

# Worksheet for OD-S - 10Yr

## Results

| | | | |
|---|---|---|---|
| Normal Depth | | 0.24 | ft |
| Critical Depth | | 0.28 | ft |
| Critical Slope | | 0.00796 | ft/ft |
| Velocity | | 2.48 | ft/s |
| Velocity Head | | 0.10 | ft |
| Specific Energy | | 0.34 | ft |
| Froude Number | | 1.56 | |
| Flow Type | Supercritical | | |

## GVF Input Data

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

## GVF Output Data

| | | |
|---|---|---|
| Upstream Depth | 0.00 | ft |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 0.24 | ft |
| Critical Depth | 0.28 | ft |
| Channel Slope | 2.06 | % |
| Critical Slope | 0.00796 | ft/ft |

# Cross Section for OD-S - 10Yr

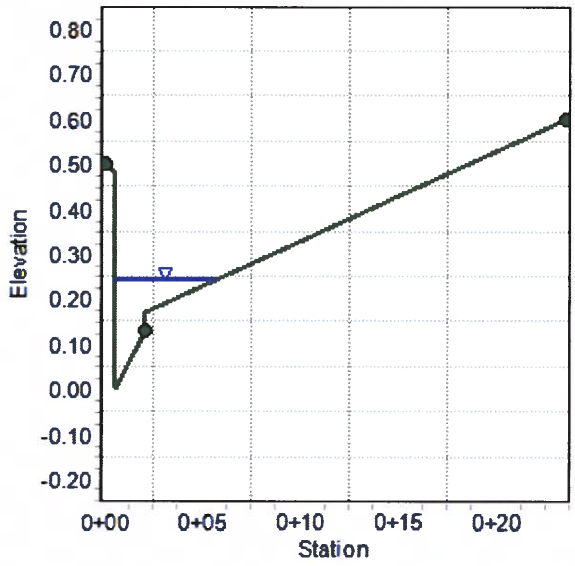
## Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

## Input Data

| | | |
|---|---|---|
| Channel Slope | 2.06 | % |
| Normal Depth | 0.24 | ft |
| Discharge | 1.00 | ft³/s |

## Cross Section Image



# Drop Inlet Sizing Computations

# Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
a Westwood team

| | |
|---|---|
| **Project Name & Number:** | **KBH1805.006 Montecito Oso Blanca Road** |
| **Date:** | **5/20/2019** |
| **By:** | **J. Rocha** |

| | | | | |
|---|---|---|---|---|
| **Notes:** | | | | |
| Facility ID: | Facility FD5-North | | | |
| Source of Flow: | Q100 (Ult): | (1/2)*OSO(A) | | |
| | Q10 (Ult): | (1/2)*OSO(A) | | |
| Inlet Type: | Type CM2 (Continuous Grade) | | | |
| Inlet Length: | 7.5-ft | | | |
| Number of Grates | 2 | | | |

| | **Input:** | **Variable:** | **Q100 (Ult):** | **Q10 (Ult):** |
|---|---|---|---|---|
| | Street Flow (cfs) | Q | 3.5 | 2.0 |
| | Longitudinal Slope (ft/ft) | $S_o$ | 0.0180 | |
| | Manning's Coefficient | n | 0.016 | |
| | Street Flow Velocity (fps) | V | 2.97 | 2.64 |
| | Street Flow Depth (ft) | D | 0.34 | 0.30 |
| | Street Cross Slope (ft/ft) | $S_x$ | 0.02 | |
| | Grate Width (ft) | W | 1.5 | |
| | Grate Depression (in) | $D_g$ | 2.0 | |
| | Length of Grate (ft) | $L_g$ | 5.0 | |
| | Length of Curb Opening (ft) | $L_c$ | 7.50 | |
| | Clogging Factor - Grate (%) | $CF_g$ | 50% | |
| | Clogging Factor - Curb (%) | $CF_c$ | 50% | |
| | Effective Grate Length (ft) | $L_{ge}$ | 2.5 | |
| | Effective Curb Opening Length (ft) | $L_{ce}$ | 3.75 | |
| | **Output (Grate):** | **Equation:** | **Output (Grate):** | |
| [1] | $R_f$ - Frontal Flow Factor | 1-0.09*(V-$V_x$) if V>$V_x$; else Frontal Flow Factor=1 | 1.00 | 1.00 |
| [2] | $V_o$ - Splash Over Velocity (fps) | $V_x$=p+q*Lg-r*$L_{ge}$^2+sy*$L_{ge}$^3 ; where | 6.58 | |
| | | p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | | |
| [1] | E - Grate Flow Ratio | Frontal Flow/Side Flow | 0.40 | 0.49 |
| [2] | $Q_w$ - Frontal Flow (cfs) | $Q_w = Q[1-(1-(W/T))^{2.67}]$ | 1.39 | 0.99 |
| [1] | $Q_s$ - Side Flow (cfs) | $Q_s$ = Q-Qw | 2.1 | 1.0 |
| | T - Side Flow Spread (ft) | $(D-D_g)/S_x$ | 8.67 | 6.67 |
| [1] | $R_s$ - Side Flow Factor | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$ | 0.13 | 0.16 |
| [1] | $Q_{gi}$ - Intercepted Flow (cfs) | $(R_f*E+R_s*(1-E))*Q$ | 1.7 | 1.1 |
| | **Output (Curb):** | **Equation:** | **Output (Curb):** | |
| [1] | $S_e$ - Equivalent Cross Slope (ft/ft) | $S_x+S_g*E$ | 0.064 | 0.075 |
| | $Q_{sx}$ - Remaining Flow After Grate Interception | Q-$Q_{gi}$ | 1.825 | 0.850 |
| | $S_g$ - Gutter Cross Slope (ft/ft) | $D_g/W$ | 0.111 | |
| [1] | $L_t$ - Effective Interception Length (ft) | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ | 14.37 | 9.51 |
| [1] | $Q_{ci}$ - Intercepted Flow (cfs) | $(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$ | 0.8 | 0.5 |
| | | or $Q_{sx}$ if $L_t$ is less than $L_{ce}$ | | |
| | **Output (Combination):** | **Equation:** | **Q100 (Ult):** | **Q10 (Ult):** |
| | Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | **2.4** | **2** |
| | Bypass Flow (cfs) | Street Flow - Total Intercepted Flow | **1.1** | **0** |

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
a Westwood team

| | |
|---|---|
| **Project Name & Number:** | **KBH1805.006 Montecito Oso Blanca Road** |
| **Date:** | **5/20/2019** |
| **By:** | **J. Rocha** |

| | | | | |
|---|---|---|---|---|
| **Notes:** | | | | |
| Facility ID: | Facility FD6-North | | | |
| Source of Flow: | Q100 (Ult): | FD5-N BYPASS + (1/2)*OSO(B) | | |
| | Q10 (Ult): | FD5-N BYPASS + (1/2)*OSO(B) | | |
| Inlet Type: | Type CM2 (Continuous Grade) | | | |
| Inlet Length: | 5.-ft | | | |
| Number of Grates | 1 | | | |

| | **Input:** | **Variable:** | **Q100 (Ult):** | **Q10 (Ult):** |
|---|---|---|---|---|
| | Street Flow (cfs) | Q | 2.5 | 1.0 |
| | Longitudinal Slope (ft/ft) | $S_o$ | 0.0219 | |
| | Manning's Coefficient | n | 0.016 | |
| | Street Flow Velocity (fps) | V | 2.98 | 2.55 |
| | Street Flow Depth (ft) | D | 0.31 | 0.24 |
| | Street Cross Slope (ft/ft) | $S_x$ | 0.02 | |
| | Grate Width (ft) | W | 1.5 | |
| | Grate Depression (in) | $D_g$ | 2.0 | |
| | Length of Grate (ft) | $L_g$ | 2.5 | |
| | Length of Curb Opening (ft) | $L_c$ | 5.00 | |
| | Clogging Factor - Grate (%) | $CF_g$ | 50% | |
| | Clogging Factor - Curb (%) | $CF_c$ | 50% | |
| | Effective Grate Length (ft) | $L_{ge}$ | 1.3 | |
| | Effective Curb Opening Length (ft) | $L_{ce}$ | 2.50 | |
| | **Output (Grate):** | **Equation:** | **Output (Grate):** | |
| [1] | $R_f$ - Frontal Flow Factor | 1-0.09*(V-$V_x$) if V>$V_x$; else Frontal Flow Factor=1 | 1.00 | 1.00 |
| [2] | $V_o$ - Splash Over Velocity (fps) | $V_x$=p+q*Lg-r*$L_{ge}$^2+sy*$L_{ge}$^3 ; where | 4.61 | |
| | | p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | | |
| [1] | E - Grate Flow Ratio | Frontal Flow/Side Flow | 0.47 | 0.75 |
| [2] | $Q_w$ - Frontal Flow (cfs) | $Q_w = Q[1-(1-(W/T))^{2.67}]$ | 1.16 | 0.75 |
| [1] | $Q_s$ - Side Flow (cfs) | $Q_s$ = Q-Qw | 1.3 | 0.2 |
| | T - Side Flow Spread (ft) | $(D-D_g)/S_x$ | 7.17 | 3.67 |
| [1] | $R_s$ - Side Flow Factor | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$ | 0.03 | 0.04 |
| [1] | $Q_{gi}$ - Intercepted Flow (cfs) | $(R_f*E+R_s*(1-E))*Q$ | 1.2 | 0.8 |
| | **Output (Curb):** | **Equation:** | **Output (Curb):** | |
| [1] | $S_e$ - Equivalent Cross Slope (ft/ft) | $S_x+S_g*E$ | 0.072 | 0.104 |
| | $Q_{sx}$ - Remaining Flow After Grate Interception | Q-$Q_{gi}$ | 1.295 | 0.236 |
| | $S_g$ - Gutter Cross Slope (ft/ft) | $D_g/W$ | 0.111 | |
| [1] | $L_t$ - Effective Interception Length (ft) | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ | 12.34 | 4.83 |
| [1] | $Q_{ci}$ - Intercepted Flow (cfs) | $(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$ | 0.4 | 0.2 |
| | | or $Q_{sx}$ if $L_t$ is less than $L_{ce}$ | | |
| | **Output (Combination):** | **Equation:** | **Q100 (Ult):** | **Q10 (Ult):** |
| | Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | **1.6** | **1** |
| | Bypass Flow (cfs) | Street Flow - Total Intercepted Flow | **1** | **0** |

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
a Westwood team

| | |
|---|---|
| **Project Name & Number:** | **KBH1805.006 Montecito Oso Blanca Road** |
| **Date:** | **5/20/2019** |
| **By:** | **J. Rocha** |

| | | | | |
|---|---|---|---|---|
| **Notes:** | | | | |
| Facility ID: | Facility FD7-North | | | |
| Source of Flow: | Q100 (Ult): | FD6-N BYPASS + (1/2)*OSO(C) | | |
| | Q10 (Ult): | FD6-N BYPASS + (1/2)*OSO(C) | | |
| Inlet Type: | Type CM2 (Continuous Grade) | | | |
| Inlet Length: | 5.-ft | | | |
| Number of Grates | 1 | | | |
| **Input:** | | **Variable:** | **Q100 (Ult):** | **Q10 (Ult):** |
| Street Flow (cfs) | | Q | 3.0 | 1.0 |
| Longitudinal Slope (ft/ft) | | $S_o$ | 0.0219 | |
| Manning's Coefficient | | n | 0.016 | |
| Street Flow Velocity (fps) | | V | 3.10 | 2.55 |
| Street Flow Depth (ft) | | D | 0.32 | 0.24 |
| Street Cross Slope (ft/ft) | | $S_x$ | 0.02 | |
| Grate Width (ft) | | W | 1.5 | |
| Grate Depression (in) | | $D_g$ | 2.0 | |
| Length of Grate (ft) | | $L_g$ | 2.5 | |
| Length of Curb Opening (ft) | | $L_c$ | 5.00 | |
| Clogging Factor - Grate (%) | | $CF_g$ | 50% | |
| Clogging Factor - Curb (%) | | $CF_c$ | 50% | |
| Effective Grate Length (ft) | | $L_{ge}$ | 1.3 | |
| Effective Curb Opening Length (ft) | | $L_{ce}$ | 2.50 | |
| **Output (Grate):** | | **Equation:** | **Output (Grate):** | |
| [1] $R_f$ - Frontal Flow Factor | | 1-0.09*(V-$V_x$) if V>$V_x$; else Frontal Flow Factor=1 | 1.00 | 1.00 |
| [2] $V_o$ - Splash Over Velocity (fps) | | $V_x$=p+q*Lg-r*$L_{ge}$^2+sy*$L_{ge}$^3 ; where | 4.61 | |
| | | p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | | |
| [1] E - Grate Flow Ratio | | Frontal Flow/Side Flow | 0.44 | 0.75 |
| [2] $Q_w$ - Frontal Flow (cfs) | | $Q_w = Q[1-(1-(W/T))^{2.67}]$ | 1.32 | 0.75 |
| [1] $Q_s$ - Side Flow (cfs) | | $Q_s$ = Q-Qw | 1.7 | 0.2 |
| T - Side Flow Spread (ft) | | $(D-D_g)/S_x$ | 7.67 | 3.67 |
| [1] $R_s$ - Side Flow Factor | | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$ | 0.03 | 0.04 |
| [1] $Q_{gi}$ - Intercepted Flow (cfs) | | $(R_f*E+R_s*(1-E))*Q$ | 1.4 | 0.8 |
| **Output (Curb):** | | **Equation:** | **Output (Curb):** | |
| [1] $S_e$ - Equivalent Cross Slope (ft/ft) | | $S_x+S_g*E$ | 0.069 | 0.104 |
| $Q_{sx}$ - Remaining Flow After Grate Interception | | Q-$Q_{gi}$ | 1.630 | 0.236 |
| $S_g$ - Gutter Cross Slope (ft/ft) | | $D_g/W$ | 0.111 | |
| [1] $L_t$ - Effective Interception Length (ft) | | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ | 13.92 | 4.83 |
| [1] $Q_{ci}$ - Intercepted Flow (cfs) | | $(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$ | 0.5 | 0.2 |
| | | or $Q_{sx}$ if $L_t$ is less than $L_{ce}$ | | |
| **Output (Combination):** | | **Equation:** | **Q100 (Ult):** | **Q10 (Ult):** |
| Total Intercepted Flow (cfs) | | Intercepted (Grate) + Intercepted (Curb) | **2** | **1** |
| Bypass Flow (cfs) | | Street Flow - Total Intercepted Flow | **1** | **0** |

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
a Westwood team

| | |
|---|---|
| **Project Name & Number:** | **KBH1805.006 Montecito Oso Blanca Road** |
| **Date:** | **5/20/2019** |
| **By:** | **J. Rocha** |

| | | | | |
|---|---|---|---|---|
| **Notes:** | | | | |
| Facility ID: | Facility FD8-North | | | |
| Source of Flow: | Q100 (Ult): | FD7-N BYPASS + (1/2)*OSO(D) | | |
| | Q10 (Ult): | FD7-N BYPASS + (1/2)*OSO(D) | | |
| Inlet Type: | Type CM2 (Continuous Grade) | | | |
| Inlet Length: | 10.-ft | | | |
| Number of Grates | 3 | | | |

| | **Input:** | **Variable:** | **Q100 (Ult):** | **Q10 (Ult):** |
|---|---|---|---|---|
| | Street Flow (cfs) | Q | 3.0 | 1.0 |
| | Longitudinal Slope (ft/ft) | $S_o$ | 0.0206 | |
| | Manning's Coefficient | n | 0.016 | |
| | Street Flow Velocity (fps) | V | 2.78 | 2.48 |
| | Street Flow Depth (ft) | D | 0.29 | 0.24 |
| | Street Cross Slope (ft/ft) | $S_x$ | 0.02 | |
| | Grate Width (ft) | W | 1.5 | |
| | Grate Depression (in) | $D_g$ | 2.0 | |
| | Length of Grate (ft) | $L_g$ | 7.5 | |
| | Length of Curb Opening (ft) | $L_c$ | 10.00 | |
| | Clogging Factor - Grate (%) | $CF_g$ | 50% | |
| | Clogging Factor - Curb (%) | $CF_c$ | 50% | |
| | Effective Grate Length (ft) | $L_{ge}$ | 3.8 | |
| | Effective Curb Opening Length (ft) | $L_{ce}$ | 5.00 | |
| | **Output (Grate):** | **Equation:** | **Output (Grate):** | |
| [1] | $R_f$ - Frontal Flow Factor | 1-0.09*(V-$V_x$) if V>$V_x$; else Frontal Flow Factor=1 | 1.00 | 1.00 |
| [2] | $V_o$ - Splash Over Velocity (fps) | $V_x$=p+q*Lg-r*$L_{ge}$^2+sy*$L_{ge}$^3 ; where | 7.98 | |
| | | p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | | |
| [1] | E - Grate Flow Ratio | Frontal Flow/Side Flow | 0.52 | 0.75 |
| [2] | $Q_w$ - Frontal Flow (cfs) | $Q_w = Q[1-(1-(W/T))^{2.67}]$ | 1.57 | 0.75 |
| [1] | $Q_s$ - Side Flow (cfs) | $Q_s$ = Q-Qw | 1.4 | 0.2 |
| | T - Side Flow Spread (ft) | $(D-D_g)/S_x$ | 6.17 | 3.67 |
| [1] | $R_s$ - Side Flow Factor | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$ | 0.31 | 0.35 |
| [1] | $Q_{gi}$ - Intercepted Flow (cfs) | $(R_f*E+R_s*(1-E))*Q$ | 2.0 | 0.8 |
| | **Output (Curb):** | **Equation:** | **Output (Curb):** | |
| [1] | $S_e$ - Equivalent Cross Slope (ft/ft) | $S_x+S_g*E$ | 0.078 | 0.104 |
| | $Q_{sx}$ - Remaining Flow After Grate Interception | Q-$Q_{gi}$ | 0.988 | 0.159 |
| | $S_g$ - Gutter Cross Slope (ft/ft) | $D_g/W$ | 0.111 | |
| [1] | $L_t$ - Effective Interception Length (ft) | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ | 10.26 | 4.02 |
| [1] | $Q_{ci}$ - Intercepted Flow (cfs) | $(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$ | 0.7 | 0.2 |
| | | or $Q_{sx}$ if $L_t$ is less than $L_{ce}$ | | |
| | **Output (Combination):** | **Equation:** | **Q100 (Ult):** | **Q10 (Ult):** |
| | Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | **3** | **1** |
| | Bypass Flow (cfs) | Street Flow - Total Intercepted Flow | **0** | **0** |

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
a Westwood team

| | |
|---|---|
| **Project Name & Number:** | **KBH1805.006 Montecito Oso Blanca Road** |
| **Date:** | **5/20/2019** |
| **By:** | **J. Rocha** |

| | | | | |
|---|---|---|---|---|
| **Notes:** | | | | |
| Facility ID: | Facility FD5-South | | | |
| Source of Flow: | Q100 (Ult): | NWBB1-4(B) + (1/2)*OSO(A) | | |
| | Q10 (Ult): | (1/2)*OSO(A) | | |
| Inlet Type: | Type CM2 (Continuous Grade) | | | |
| Inlet Length: | 7.5-ft | | | |
| Number of Grates | 2 | | | |
| | | | | |
| **Input:** | | **Variable:** | **Q100 (Ult):** | **Q10 (Ult):** |
| Street Flow (cfs) | | Q | 11.5 | 6.0 |
| Longitudinal Slope (ft/ft) | | $S_o$ | 0.0180 | |
| Manning's Coefficient | | n | 0.016 | |
| Street Flow Velocity (fps) | | V | 3.90 | 3.35 |
| Street Flow Depth (ft) | | D | 0.48 | 0.40 |
| Street Cross Slope (ft/ft) | | $S_x$ | 0.02 | |
| Grate Width (ft) | | W | 1.5 | |
| Grate Depression (in) | | $D_g$ | 2.0 | |
| Length of Grate (ft) | | $L_g$ | 5.0 | |
| Length of Curb Opening (ft) | | $L_c$ | 7.50 | |
| Clogging Factor - Grate (%) | | $CF_g$ | 50% | |
| Clogging Factor - Curb (%) | | $CF_c$ | 50% | |
| Effective Grate Length (ft) | | $L_{ge}$ | 2.5 | |
| Effective Curb Opening Length (ft) | | $L_{ce}$ | 3.75 | |
| | | | | |
| **Output (Grate):** | | **Equation:** | **Output (Grate):** | |
| [1] $R_f$ - Frontal Flow Factor | | 1-0.09*(V-$V_x$) if V>$V_x$; else Frontal Flow Factor=1 | 1.00 | 1.00 |
| [2] $V_o$ - Splash Over Velocity (fps) | | $V_x$=p+q*Lg-r*$L_{ge}$^2+sy*$L_{ge}$^3 ; where | 6.58 | |
| | | p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | | |
| [1] E - Grate Flow Ratio | | Frontal Flow/Side Flow | 0.24 | 0.31 |
| [2] $Q_w$ - Frontal Flow (cfs) | | $Q_w = Q[1-(1-(W/T))^{2.67}]$ | 2.71 | 1.85 |
| [1] $Q_s$ - Side Flow (cfs) | | $Q_s$ = Q-Qw | 8.8 | 4.2 |
| T - Side Flow Spread (ft) | | $(D-D_g)/S_x$ | 15.67 | 11.67 |
| [1] $R_s$ - Side Flow Factor | | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$ | 0.09 | 0.11 |
| [1] $Q_{gi}$ - Intercepted Flow (cfs) | | $(R_f*E+R_s*(1-E))*Q$ | 3.5 | 2.3 |
| | | | | |
| **Output (Curb):** | | **Equation:** | **Output (Curb):** | |
| [1] $S_e$ - Equivalent Cross Slope (ft/ft) | | $S_x+S_g*E$ | 0.046 | 0.054 |
| $Q_{sx}$ - Remaining Flow After Grate Interception | | Q-$Q_{gi}$ | 8.030 | 3.695 |
| $S_g$ - Gutter Cross Slope (ft/ft) | | $D_g/W$ | 0.111 | |
| [1] $L_t$ - Effective Interception Length (ft) | | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ | 32.63 | 21.40 |
| [1] $Q_{ci}$ - Intercepted Flow (cfs) | | $(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$ | 1.6 | 1.1 |
| | | or $Q_{sx}$ if $L_t$ is less than $L_{ce}$ | | |
| | | | | |
| **Output (Combination):** | | **Equation:** | **Q100 (Ult):** | **Q10 (Ult):** |
| Total Intercepted Flow (cfs) | | Intercepted (Grate) + Intercepted (Curb) | **5.1** | **3.4** |
| Bypass Flow (cfs) | | Street Flow - Total Intercepted Flow | **6.4** | **2.6** |

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
a Westwood team

| | |
|---|---|
| **Project Name & Number:** | **KBH1805.006 Montecito Oso Blanca Road** |
| **Date:** | **5/20/2019** |
| **By:** | **J. Rocha** |

| | | | | |
|---|---|---|---|---|
| **Notes:** | | | | |
| Facility ID: | Facility FD6-South | | | |
| Source of Flow: | Q100 (Ult): | FD5-S BYPASS + (1/2)*OSO(B) | | |
| | Q10 (Ult): | FD5-S BYPASS + (1/2)*OSO(B) | | |
| Inlet Type: | Type CM2 (Continuous Grade) | | | |
| Inlet Length: | 5.-ft | | | |
| Number of Grates | 1 | | | |

| **Input:** | **Variable:** | **Q100 (Ult):** | **Q10 (Ult):** |
|---|---|---|---|
| Street Flow (cfs) | Q | 8.0 | 3.5 |
| Longitudinal Slope (ft/ft) | $S_o$ | 0.0219 | |
| Manning's Coefficient | n | 0.016 | |
| Street Flow Velocity (fps) | V | 2.98 | 2.55 |
| Street Flow Depth (ft) | D | 0.31 | 0.24 |
| Street Cross Slope (ft/ft) | $S_x$ | 0.02 | |
| Grate Width (ft) | W | 1.5 | |
| Grate Depression (in) | $D_g$ | 2.0 | |
| Length of Grate (ft) | $L_g$ | 2.5 | |
| Length of Curb Opening (ft) | $L_c$ | 5.00 | |
| Clogging Factor - Grate (%) | $CF_g$ | 50% | |
| Clogging Factor - Curb (%) | $CF_c$ | 50% | |
| Effective Grate Length (ft) | $L_{ge}$ | 1.3 | |
| Effective Curb Opening Length (ft) | $L_{ce}$ | 2.50 | |

| **Output (Grate):** | **Equation:** | **Output (Grate):** | |
|---|---|---|---|
| [1] $R_f$ - Frontal Flow Factor | 1-0.09*(V-$V_x$) if V>$V_x$; else Frontal Flow Factor=1 | 1.00 | 1.00 |
| [2] $V_o$ - Splash Over Velocity (fps) | $V_x$=p+q*Lg-r*$L_{ge}$^2+sy*$L_{ge}$^3 ; where | 4.61 | |
| | p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | | |
| [1] E - Grate Flow Ratio | Frontal Flow/Side Flow | 0.47 | 0.75 |
| [2] $Q_w$ - Frontal Flow (cfs) | $Q_w = Q[1-(1-(W/T))^{2.67}]$ | 3.73 | 2.64 |
| [1] $Q_s$ - Side Flow (cfs) | $Q_s$ = Q-Qw | 4.3 | 0.9 |
| T - Side Flow Spread (ft) | $(D-D_g)/S_x$ | 7.17 | 3.67 |
| [1] $R_s$ - Side Flow Factor | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$ | 0.03 | 0.04 |
| [1] $Q_{gi}$ - Intercepted Flow (cfs) | $(R_f*E+R_s*(1-E))*Q$ | 3.9 | 2.7 |

| **Output (Curb):** | **Equation:** | **Output (Curb):** | |
|---|---|---|---|
| [1] $S_e$ - Equivalent Cross Slope (ft/ft) | $S_x+S_g*E$ | 0.072 | 0.104 |
| $Q_{sx}$ - Remaining Flow After Grate Interception | Q-$Q_{gi}$ | 4.144 | 0.825 |
| $S_g$ - Gutter Cross Slope (ft/ft) | $D_g/W$ | 0.111 | |
| [1] $L_t$ - Effective Interception Length (ft) | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ | 20.12 | 8.18 |
| [1] $Q_{ci}$ - Intercepted Flow (cfs) | $(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$ | 0.9 | 0.4 |
| | or $Q_{sx}$ if $L_t$ is less than $L_{ce}$ | | |

| **Output (Combination):** | **Equation:** | **Q100 (Ult):** | **Q10 (Ult):** |
|---|---|---|---|
| Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | **5** | **3.1** |
| Bypass Flow (cfs) | Street Flow - Total Intercepted Flow | **3** | **0.4** |

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
a Westwood team

| | |
|---|---|
| **Project Name & Number:** | KBH1805.006 Montecito Oso Blanca Road |
| **Date:** | 5/20/2019 |
| **By:** | J. Rocha |

| | | | | |
|---|---|---|---|---|
| **Notes:** | | | | |
| Facility ID: | Facility FD7-South | | | |
| Source of Flow: | Q100 (Ult): | FD6-S BYPASS + (1/2)*OSO(C) | | |
| | Q10 (Ult): | FD6-S BYPASS + (1/2)*OSO(C) | | |
| Inlet Type: | Type CM2 (Continuous Grade) | | | |
| Inlet Length: | 7.5-ft | | | |
| Number of Grates | 2 | | | |

| | **Input:** | **Variable:** | **Q100 (Ult):** | **Q10 (Ult):** |
|---|---|---|---|---|
| | Street Flow (cfs) | Q | 5.0 | 1.5 |
| | Longitudinal Slope (ft/ft) | $S_o$ | 0.0219 | |
| | Manning's Coefficient | n | 0.016 | |
| | Street Flow Velocity (fps) | V | 3.46 | 2.71 |
| | Street Flow Depth (ft) | D | 0.37 | 0.27 |
| | Street Cross Slope (ft/ft) | $S_x$ | 0.02 | |
| | Grate Width (ft) | W | 1.5 | |
| | Grate Depression (in) | $D_g$ | 2.0 | |
| | Length of Grate (ft) | $L_g$ | 5.0 | |
| | Length of Curb Opening (ft) | $L_c$ | 7.50 | |
| | Clogging Factor - Grate (%) | $CF_g$ | 50% | |
| | Clogging Factor - Curb (%) | $CF_c$ | 50% | |
| | Effective Grate Length (ft) | $L_{ge}$ | 2.5 | |
| | Effective Curb Opening Length (ft) | $L_{ce}$ | 3.75 | |
| | **Output (Grate):** | **Equation:** | **Output (Grate):** | |
| [1] | $R_f$ - Frontal Flow Factor | 1-0.09*(V-$V_x$) if V>$V_x$; else Frontal Flow Factor=1 | 1.00 | 1.00 |
| [2] | $V_o$ - Splash Over Velocity (fps) | $V_x$=p+q*Lg-r*$L_{ge}$^2+sy*$L_{ge}$^3 ; where | 6.58 | |
| | | p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | | |
| [1] | E - Grate Flow Ratio | Frontal Flow/Side Flow | 0.35 | 0.60 |
| [2] | $Q_w$ - Frontal Flow (cfs) | $Q_w = Q[1-(1-(W/T))^{2.67}]$ | 1.74 | 0.90 |
| [1] | $Q_s$ - Side Flow (cfs) | $Q_s$ = Q-Qw | 3.3 | 0.6 |
| | T - Side Flow Spread (ft) | $(D-D_g)/S_x$ | 10.17 | 5.17 |
| [1] | $R_s$ - Side Flow Factor | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$ | 0.11 | 0.15 |
| [1] | $Q_{gi}$ - Intercepted Flow (cfs) | $(R_f*E+R_s*(1-E))*Q$ | 2.1 | 1.0 |
| | **Output (Curb):** | **Equation:** | **Output (Curb):** | |
| [1] | $S_e$ - Equivalent Cross Slope (ft/ft) | $S_x+S_g*E$ | 0.059 | 0.087 |
| | $Q_{sx}$ - Remaining Flow After Grate Interception | Q-$Q_{gi}$ | 2.922 | 0.508 |
| | $S_g$ - Gutter Cross Slope (ft/ft) | $D_g/W$ | 0.111 | |
| [1] | $L_t$ - Effective Interception Length (ft) | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ | 19.63 | 7.44 |
| [1] | $Q_{ci}$ - Intercepted Flow (cfs) | $(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$ | 0.9 | 0.4 |
| | | or $Q_{sx}$ if $L_t$ is less than $L_{ce}$ | | |
| | **Output (Combination):** | **Equation:** | **Q100 (Ult):** | **Q10 (Ult):** |
| | Total Intercepted Flow (cfs) | Intercepted (Grate) + Intercepted (Curb) | **3** | **1.4** |
| | Bypass Flow (cfs) | Street Flow - Total Intercepted Flow | **2** | **0** |

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Curb Inlet Sizing Computation

SLATER HANIFAN GROUP
a Westwood team

| | |
|---|---|
| **Project Name & Number:** | **KBH1805.006 Montecito Oso Blanca Road** |
| **Date:** | **5/20/2019** |
| **By:** | **J. Rocha** |

| | | | | |
|---|---|---|---|---|
| **Notes:** | | | | |
| Facility ID: | Facility FD8-South | | | |
| Source of Flow: | Q100 (Ult): | FD7-S BYPASS + (1/2)*OSO(D) | | |
| | Q10 (Ult): | FD7-S BYPASS + (1/2)*OSO(D) | | |
| Inlet Type: | Type CM2 (Continuous Grade) | | | |
| Inlet Length: | 12.5-ft | | | |
| Number of Grates | 4 | | | |
| | | | | |
| **Input:** | | **Variable:** | **Q100 (Ult):** | **Q10 (Ult):** |
| Street Flow (cfs) | | Q | 4.0 | 1.0 |
| Longitudinal Slope (ft/ft) | | $S_o$ | 0.0206 | |
| Manning's Coefficient | | n | 0.016 | |
| Street Flow Velocity (fps) | | V | 3.23 | 2.48 |
| Street Flow Depth (ft) | | D | 0.35 | 0.24 |
| Street Cross Slope (ft/ft) | | $S_x$ | 0.02 | |
| Grate Width (ft) | | W | 1.5 | |
| Grate Depression (in) | | $D_g$ | 2.0 | |
| Length of Grate (ft) | | $L_g$ | 10.0 | |
| Length of Curb Opening (ft) | | $L_c$ | 12.50 | |
| Clogging Factor - Grate (%) | | $CF_g$ | 50% | |
| Clogging Factor - Curb (%) | | $CF_c$ | 50% | |
| Effective Grate Length (ft) | | $L_{ge}$ | 5.0 | |
| Effective Curb Opening Length (ft) | | $L_{ce}$ | 6.25 | |
| | | | | |
| **Output (Grate):** | | **Equation:** | **Output (Grate):** | |
| [1] $R_f$ - Frontal Flow Factor | | 1-0.09*(V-$V_x$) if V>$V_x$; else Frontal Flow Factor=1 | 1.00 | 1.00 |
| [2] $V_o$ - Splash Over Velocity (fps) | | $V_x$=p+q*Lg-r*$L_{ge}$^2+sy*$L_{ge}$^3 ; where | 10.55 | |
| | | p=0.30,q=4.85,r=1.31,sy=0.15 (for Vane Grate) | | |
| [1] E - Grate Flow Ratio | | Frontal Flow/Side Flow | 0.38 | 0.75 |
| [2] $Q_w$ - Frontal Flow (cfs) | | $Q_w = Q[1-(1-(W/T))^{2.67}]$ | 1.52 | 0.75 |
| [1] $Q_s$ - Side Flow (cfs) | | $Q_s$ = Q-Qw | 2.5 | 0.2 |
| T - Side Flow Spread (ft) | | $(D-D_g)/S_x$ | 9.17 | 3.67 |
| [1] $R_s$ - Side Flow Factor | | $1/(1+(0.15*V^{1.8})/(S_x*L_{ge}^{2.3}))$ | 0.40 | 0.51 |
| [1] $Q_{gi}$ - Intercepted Flow (cfs) | | $(R_f*E+R_s*(1-E))*Q$ | 2.5 | 0.9 |
| | | | | |
| **Output (Curb):** | | **Equation:** | **Output (Curb):** | |
| [1] $S_e$ - Equivalent Cross Slope (ft/ft) | | $S_x+S_g*E$ | 0.062 | 0.104 |
| $Q_{sx}$ - Remaining Flow After Grate Interception | | Q-$Q_{gi}$ | 1.500 | 0.120 |
| $S_g$ - Gutter Cross Slope (ft/ft) | | $D_g/W$ | 0.111 | |
| [1] $L_t$ - Effective Interception Length (ft) | | $0.60*Q_{sx}^{0.42}*S_o^{0.30}*(1/n*S_e)^{0.6}$ | 14.05 | 3.57 |
| [1] $Q_{ci}$ - Intercepted Flow (cfs) | | $(1-(1-L_{ce}/L_t)^{1.8})*Q_{sx}$ | 1.0 | 0.1 |
| | | or $Q_{sx}$ if $L_t$ is less than $L_{ce}$ | | |
| | | | | |
| **Output (Combination):** | | **Equation:** | **Q100 (Ult):** | **Q10 (Ult):** |
| Total Intercepted Flow (cfs) | | Intercepted (Grate) + Intercepted (Curb) | **3.5** | **1** |
| | | | | |
| Bypass Flow (cfs) | | Street Flow - Total Intercepted Flow | **0.5** | **0** |

[1] Formula referenced from the CCRFCD Manual

[2] Formula referenced from FHWA Urban Drainage Design Manual (HEC-22)

# Standard Form 6 Calculations

| | |
|---|---|
| **Project Name:** | Montecito Oso Blanca Road |
| **Project Number:** | KBH1805.006 |
| **Date:** | 5/22/2019 11:55 |
| **By:** | J. Rocha |

a Westwood team

# STORM SEWER HYDRAULIC CALCULATIONS

| CONDUIT DATA | | | | | | FLOW DATA | | | | | | | LOSS | HGL | | COMMENTS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | | SIZE / TYPE | INVERTS | | LENGTH | A | R | Φ | Q | V | $H_V = V^2/2g$ | $S_f$ | PIPE | PIPE | | PRESS. FLOW? | OTHER |
| FROM | TO | | D / S ELEV. | U / S ELEV. | | ($FT^2$) | (FT) | | (CFS) | (FPS) | (FT) | (FT/FT) | $H_f$ (FT) | D/S HGL ELEV. | U/S HGL ELEV. | | |
| 1000 | 1047.18 | Round 30" RCP | 2508.04 | 2508.51 | 47.18 | 4.908738 | 0.625 | 0.004925 | 27.0 | 5.500395 | 0.469788 | 0.004322766 | 0.204 | 2511.66 | 2511.864 | Yes | LATERAL #1 (FD5-S) |
| 1000 | 1072.06 | Round 18" RCP | 2510.58 | 2511.30 | 72.06 | 1.767146 | 0.375 | 0.004925 | 2.5 | 1.414711 | 0.031078 | 0.000564116 | 0.041 | 2511.78 | 2511.821 | No | LATERAL #2 (FD5-N) |
| 1000 | 1077.10 | Round 18" RCP | 2504.00 | 2504.77 | 77.1 | 1.767146 | 0.375 | 0.004925 | 1.5 | 0.848826 | 0.011188 | 0.000203082 | 0.016 | 2505.50 | 2505.516 | No | LATERAL #3 (FD6-N) |
| 1000 | 1019.95 | Round 18" RCP | 2504.00 | 2504.20 | 19.95 | 1.767146 | 0.375 | 0.004925 | 5.0 | 2.829421 | 0.124311 | 0.002256462 | 0.045 | 2505.50 | 2505.545 | No | LATERAL #4 (FD6-S) |
| 1000 | 1009.76 | Round 36" RCP | 2484.00 | 2484.71 | 9.76 | 7.068583 | 0.75 | 0.004925 | 2.0 | 0.282942 | 0.001243 | 8.97549E-06 | 0.000 | 2488.11 | 2488.110 | Yes | LATERAL #5-L (FD7-N) |
| 1000 | 1071.69 | Round 18" RCP | 2485.50 | 2486.52 | 71.69 | 1.767146 | 0.375 | 0.004925 | 3.0 | 1.697653 | 0.044752 | 0.000812326 | 0.058 | 2488.11 | 2488.168 | Yes | LATERAL #5-R (FD7-S) |
| 1000 | 1023.95 | Round 18" RCP | 2479.76 | 2480.00 | 23.95 | 1.767146 | 0.375 | 0.004925 | 3.5 | 1.980595 | 0.060912 | 0.001105666 | 0.026 | 2481.26 | 2481.286 | No | LATERAL #6 (FD8-S) |
| 1000 | 1012.87 | Round 18" RCP | 2475.87 | 2476.00 | 12.87 | 1.767146 | 0.375 | 0.004925 | 3.0 | 1.697653 | 0.044752 | 0.000812326 | 0.010 | 2477.37 | 2477.380 | No | LATERAL #7 (FD8-N) |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

$Sf = \Phi Hv / R^{1.33}$

$\Phi = 2g (n^2) / 2.21$

**1 - Where pipes are not under pressure, assume U/S HGL is at top of pipe**

# APPENDIX C

Reference Material
Technical Drainage Study for Montecito Storm Drain
Infrastructure (CLV DS 5108)

# TECHNICAL DRAINAGE STUDY

**Montecito Storm Drain Infrastructure**

City of Las Vegas, Nevada

Job No.: KBH1805.004
Date: March 2019

**Prepared For:**
KB Home
5795 Badura Avenue, Ste 180
Las Vegas, NV 89118
Phone: 702-266-8400 ▪ Fax: 702-266-8623

**Prepared By:**
Slater Hanifan Group, Inc.
5740 S. Arville Street, Suite 216
Las Vegas, Nevada 89118
Phone: 702-284-5300 ▪ Fax: 702-284-5399




03/06/19

Stanley Okey Amadi, P.E.
NV Professional Engineer No. 21724

Assisted by: Cameron Bencini, P.E.
Jonathan S. Rocha, E.I.
Caitlyn Alcantara, E.I.
D'Amato Hyche

# Report Excerpts

**Curve Number Comparison**: The Centennial Channel Study had previously analyzed the onsite and offsite watershed impacting the project site based on the anticipated development of the site. The conceptual curve numbers utilized in the hydrologic computations and HEC-1 modeling have been determined to be more conservative in comparison to the curve numbers proposed for development of the project site. Therefore, this study has referenced the ultimate developed condition hydrologic computations and peak flow rates from the Centennial Channel Study as the previous analysis remains accurate and more conservative to the proposed improvements. Refer to Appendix B for the hydrologic computations and to Appendix F for relevant referenced hydrologic computations from the Centennial Channel Study.

**Lag Time**: The lag time is defined as the time measured from the center of mass of excess rainfall to the time to peak of the outflow hydrograph. The lag time is related to the time of concentration as 0.6 times the time of concentration. The time of concentration is defined as the time required for runoff to flow from the hydraulically most distant point of a basin to the outlet point of the basin. The lag time computations have been included in Appendix B.

## 2.3 Hydraulic Modeling

**Drop Inlets:** The proposed field inlets and future curb inlets have been assessed using an in-house computation spreadsheet which utilizes equations outlined in Section 805 of the CCRFCD Manual, that includes a 50% clogging factor in determining sizes.

The temporary sump inlets are sized with the CCRFCD Manual inlet control nomographs.

**Storm Drain:** The hydraulic gradient line (HGL) for the proposed storm drain flows was determined utilizing the Water Surface and Pressure Gradient (WSPGW) Hydraulic Analysis System software by the Los Angeles County Department of Public Works. As outlined in the CCRFCD Manual, storm drain facilities are designed to maintain a hydraulic gradient line (HGL) at a minimum of 1-ft below the finished grade and/or rim elevations and limit the flow velocities in the facility to less than 25 ft/s.

The main line storm drain systems were designed utilizing the peak basin flows, concentration points flows and/or prorated basins flows from the hydrologic models.

**Temporary Berms & Ditches:** All temporary ditches have been analyzed utilizing the Flowmaster Version 8 software by Bentley Systems, Inc. The ditches have been designed to maintain the flow velocities below 5 ft/sec for unlined ditches.

**Street Flow:**
Conceptual street flow analyses have been provided utilizing the FlowMaster Version 8i software by Bentley Systems. In accordance with the CCRFCD Manual, the depth times velocity factor (D x V) for street flow for the 10-year storm event must be less than or equal to 6, with a maximum depth of 1-ft. The depth times velocity factor (D x V) for street flow for the 100-year storm event must be less than or equal to 8, with a maximum depth of 2-ft. Additionally, the Nevada Department of Transportation (NDOT) 10-year flow spread criteria of one-half of the travel lane for frontage roads has also been check on Oso Blanca Road adjacent to the site.

# 3 EXISTING CONDITION

## 3.1 Definition of Existing Drainage Condition

The existing drainage condition is defined as the current state of the onsite and offsite watershed. The offsite watershed is mostly fully developed while the site is currently undeveloped comprising of the characteristic desert shrub and stock piled materials. The analysis of the offsite tributary has been referenced from the Centennial Channel Study.

## 3.2 Discussion of Existing Drainage Condition

The project site in the existing condition accepts offsite flows from three distinct locations along the west, north and south boundaries. Runoff from the west impacts the site thru the existing 8'x5' RCB culvert in Grand Montecito Parkway. The Centennial Channel Study provided an ultimate condition hydrologic analysis of all the watershed tributary to the receiving CCRFCD storm drain (20'x2' RCB) along US-95 and Oso Blanca Road alignment. The flows impacting the site thru the existing 8'x5' RCB culvert in Grand Montecito Parkway is estimated at concentration point CNWBB1-1 to be approximately 224 cfs during the 100-year storm event.

The flows impacting the site from the north boundary comprises of surface runoff generated by the adjacent Mountain Ridge Park and the Montecito Town Center North Condominiums which are currently fully developed. The drainage area from the north is analyzed as basin NWBB1-4 by the Centennial Channel Study. The perimeter grades along the north boundary of the site indicate that only a portion of basin NWBB1-4 directly impacts the site thru a localized minor wash while the remainder continues east towards Oso Blanca Road. Therefore, basin NWBB1-4 has been prorated into subareas A & B to determine the portion of the flow conveyed onsite.

The offsite flows impacting the site from the south discharges onsite thru the existing 36" RCP that daylights into the site. Runoff conveyed by the storm drain comprises of the flows captured at the existing low point along Grand Montecito Parkway west of the site and is estimated by the study for the Grand Montecito Parkway improvements to be approximately 32 cfs during the 100-year storm event.

As previously stated, the Centennial Channel Study provided the ultimate developed condition analysis of the site based on the anticipated land use. The site was analyzed as basin NWBB3-B. For the existing condition, the site is also analyzed as one drainage basin identified as NWBB3-B to be consistent with the naming convention of the Centennial Channel Study. All the onsite and offsite flows impacting the site is conveyed southeasterly to the existing 8'x5' RCB stub at the southeast corner of the site.

Note that Oso Blanca Road adjacent to the site is currently an access road; however, the hydrologic analysis of the existing street (basin OSO) conservatively assumes full improvement of the right-of-way utilizing a roadway curve number (98). There are other existing storm drain stubs to the Centennial Parkway Channel which includes a 6'x3' RCB at the northeast corner of the site, a 30" RCP located approximately 300-ft south of the 6'x3' RCB. An NDOT Type 7 field inlet connected to a 36" RCP storm drain that ties into the existing 8'x5' RCB at the southeast corner of the site. Therefore, all the surface flows generated along the west half of Oso Blanca Road are intercepted and discharged into the

has been prorated into subareas A thru D representing the southwest, northwest, northeast and southeast quadrants respectively.

Subareas A and D will be captured in a local onsite storm drain system that will tie into the proposed 48" RCP stub at the southeast corner of the site. Subarea B will discharge and convey east along the middle private road that connects Grand Montecito Parkway to Oso Blanca Road. The caped 36" RCP in the alignment of the middle private road will be extended upstream and connected to a series drop inlets to capture the flows within the road. A storm drain stub will be provided thru the back of one of the inlets to capture the entire flows from Subarea C. Therefore, all the flows generated by the site will be captured and conveyed by storm drain and will not discharge surface runoff into Oso Blanca Road. Refer to Appendix B for the ultimate condition hydrologic computations and to Appendix F for the hydrologic model referenced from the Centennial Channel Study.

The offsite flows from the existing 8'x5' RCBC in Grand Montecito Parkway will be conveyed by the proposed 54" CIPCP as described in the proposed condition. However, the storm drain alignment will ultimately become the internal subdivision roadway and onsite drive aisle of the future multi-family development. The lateral offsite flows from a portion of the Mountain Ridge Park will still be captured by the proposed 24" RCP lateral. Likewise, the proposed field inlet at the northeast corner of the site will be replaced with a curb inlet upon full improvement of Oso Blanca Road to still capture the entire flows tributary to northeast corner of the site. Other existing laterals along Oso Blanca Road will be provided with curb inlets in the future upon Oso Blanca Road improvement.

### 5.3 Summary of Ultimate Drainage Condition

A summary of the ultimate condition flow rates has been provided in a table on Exhibit H, included in Appendix A. A summary table of the prorated subbasins is also provided on Exhibit H. The associated HEC-1 analysis utilized to determine the peak flow rates identified on Exhibit H has been included in Appendix B and Appendix F for the basins referenced from the Centennial Channel Study.

## 6 CENTENNIAL CHANNEL MAINLINE FACILITY

The existing 20'x7' RCB (CN95 0000 CCRFCD Facility) is the receiving channel designed to capture the onsite and offsite flows that conveys thru the site. Majority of the flows were designed to be captured by the existing 8'x5' RCB stub at the southeast corner of the site. However, with the proposed storm drain improvements, peak flows discharging into the channel has been altered from the channel design. Specifically, the channel design proposed to capture approximately 12 cfs thru the existing 6'x3' RCB stub at the northeast corner of the site and 243 cfs thru the existing 8'x5' RCB at the southeast corner of the site based on peak flow contribution when the mainline is peaking. To evaluate the impact to the channel hydraulics, a revised hydrologic and hydraulic models have been provided for review and comparison as described below.

### 6.1 Revised Centennial Channel Hydrology

Review of the HEC-1 output file from the Centennial Channel Study indicates some minor errors due to "invalid Card Identification or Card out of Sequence" noted at some routing

WSE elevations normalized prior to the next upstream lateral and did not change for the rest model upstream. Therefore, the proposed discharge modification to the Centennial Channel will not cause any negative impacts to the system. Refer to Appendix E for the output files of the HEC-1 and WSPGW models described above. The "Original" models are those referenced from the Centennial Channel Study and are located in Appendix F.

# 7 SUMMARY OF DRAINAGE FACILITIES

As described in Section 1.1 of the report, the main purpose of this study is to support the design and construction the proposed storm drain infrastructures to serve the ultimate development of the Montecito site. The main line storm drains are aligned along the northern, central and southern portions of the site and are described in detail below. Lateral stubs and field inlets are also proposed to intercept localized flows tributary to the mainline systems. Refer to Exhibit I, provided in Appendix A, for an illustration of the facility locations and a summary table of the facilities.

## 7.1 Northern Mainline

The northern mainline is approximately 0.35 ± miles (1,800 LF) and will intercept flows from the existing 8'x5' RCB culvert in Grand Montecito Parkway and connects to the existing 20'x7' RCB (CN95 0000 CCRFCD Facility). The storm drain system is proposed to consist of a 54" Cast-In-Place Concrete Pipe (CIPCP) and will include two (2) lateral stubs consisting of a 30" RCP and an 18" RCP. The storm drain intercepts the offsite flows impacting the site thru the existing 8'x5' RCBC in Grand Montecito Parkway. The 30" RCP lateral will capture localized flows from a portion of the adjacent Mountain Ridge Park while the 18" RCP lateral will capture the flows within the roadside swale in Oso Blanca Road. A WSPGW (SDN) model has been provided for the system which indicate that the HGLs will maintain more than 1.0-ft below finished grade elevations above the pipe and the velocities at less than 25 fps.

Cast-In-Place Concrete Pipe (CIPCP): It is acknowledged that the Cast-In-Place Concrete Pipe (CIPCP) manufactured by BluCor Contracting is not a standard product within the CCAUSD. Therefore, some of the specification documents from the manufacturer including the curve radius data regarding the concrete pipe has been provided within the reference portion of this study. Please refer to Appendix H for the Specification Documents from the manufacturer (BluCor Contracting).

## 7.2 Central Stub

The Central Stub comprises of approximately 400 lineal feet of 36" RCP that ties in with a manhole to the 36" RCP lateral of an existing NDOT Type 7 field inlet. The storm drain will extend north along Oso Blanca Road and turns west to stub into the site near the center of the site. Note that the storm drain has been aligned with the future onsite private street that will connect Grand Montecito Parkway to Oso Blanca Road. The Central Stub will be caped onsite for future connection upon development of the site. However, a conceptual hydraulic analysis of the system has been provide utilizing the WSPGW to ensure that it is adequately sized for the anticipated discharge. Conceptual inlet capacity computations have also been provided to ensure that the anticipated flows will be captured and not bypass into Oso Blanca Road. The WSPGW (SDM) analysis shows that the storm drain system has adequate capacity to convey the flows while maintain the HGLs ate more than 1.0-ft below the finished grade elevations.

DISCUSSION OF EXISTING DRAINAGE FACILITIES PER MONTECITO STORM DRAIN INFRASTRUCTURE STUDY

### 7.3 Southern Stub

The Southern Stub comprises of approximately 135 lineal feet of 48" RCP that ties into the existing 8'x5' RCB stub from the 20'x7' RCB (CN95 0000 CCRFCD Facility) located at the southeast corner of the site. The existing 8'x5' RCB stub is proposed to be capped with structural concrete wall that will be penetrated by the 48" RCP. The inlet of the 48" RCP stub will comprise of an open sump in the interim pending future connection upon development of the site. A WSPGW (SDS) model has been provided to ensure that the system is adequately sized for the anticipated flows. The analysis also shows that the storm drain system has adequate capacity to convey the flows while maintain the HGLs ate more than 1.0-ft below the finished grade elevations.

### 7.4 Field Inlets

DISCUSSION OF OSO BLANCA ROADWAY FACILITIES

Two NDOT Type 2 field inlets (a 3.5'x4' & 2.5'x4') with 30" RCP and 18" RCP laterals respectively are proposed along the northern boundary of the site to capture localized flows tributary to the Northern Mainline. The 3.5'x4' inlet will capture flows from the adjacent Mountain Ridge Park while the 2.5'x4' will capture flows within the roadside swale in Oso Blanca Road. The field inlet in Oso Blanca Road will ultimately be replaced with a curb inlet upon development of the northeast quadrant of the site which will include full offsite improvement of the right-of-way. Inlet capacity calculations have been provided for the field inlets to ensure that adequate sumps have been provided for the design flows. Hydraulic Analysis of the field inlet laterals utilizing the Standard Form 6 spreadsheet have also been provided to show that the laterals have adequate capacity to convey the tributary flows. Refer to Appendix D for the lateral loss computations.

### 7.5 Temporary Ditches/Berms

Minor interim swales and berms have been provided to direct flows to the intended conveyance facilities. Normal depth calculations have also been provided for the swales to show that they have adequate capacity for the flows and demonstrate that the flow conveyance will be non-erosive. Refer to the normal depth calculations provided in Appendix C.

## 8 CONCLUSIONS & RECOMMENDATIONS

1. The project site is not located within a FEMA designated SFHA. Therefore, notification to FEMA will not be required for this study.

2. The project proposes to penetrate and discharge flows into the existing CCRFCD regional facilities (CN95 0000) located along the US-95 right-of-way. Therefore, concurrence from CCRFCD is anticipated.

3. The methodologies utilized in the preparation of this study are in compliance with the Clark County Regional Flood Control District's Hydrologic and Drainage Design Manual and local entity criteria.

4. The project is in compliance with the Clark County Regional Flood Control District's Master Plan Update (MPU) of the Las Vegas Valley. The drainage pattern and discharge locations presented in the Centennial Channel Study will remain the same with the exception that the expected flows have been redistributed between the existing

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# Rainfall and Precipitation Computation

**Project Name:** KBH1805.004 Montecito Offsite Storm Drain
**Date:** 3/2/2019
**File Name:** KBH1805.004 SD TDS Precipitation Calcs.xls
**By:** J. Rocha

## Data:

**Reference:**

Project is located in: Township: 19 S. Range: 60 E. Section: 20 — APN Map

**Site is NOT located in the McCarran Airport Rainfall Area** — Figure 513*

Rainfall Depth-Duration-Frequency 10-Year, 6-Hour: 1.25 inches — Figure 503*

Rainfall Depth-Duration-Frequency 100-Year, 6-Hour: 1.96 inches — Figure 506*

Precipitation Adjustment Ratios:

10-Year: 1.24 — Table 501*
100-Year: 1.43 — Table 501*

Six Hour Depth Area Reduction Factors (DARF):
Area (gross acres): 53.0 = 0.0828 square miles — Table 502*
DARF = 1.00

## Calculations:

$P_{10}$ = 1.55 10-Year Precipitation (in)
$P_{100}$ = 2.80 100-Year Precipitation (in)

P10/P100= 0.55 HEC-1 Multiple Ratio Value

Site lies within 100-yr Precipitation values of 2.80 and 2.77. Therefore, 2.80 has been utilized for project site.

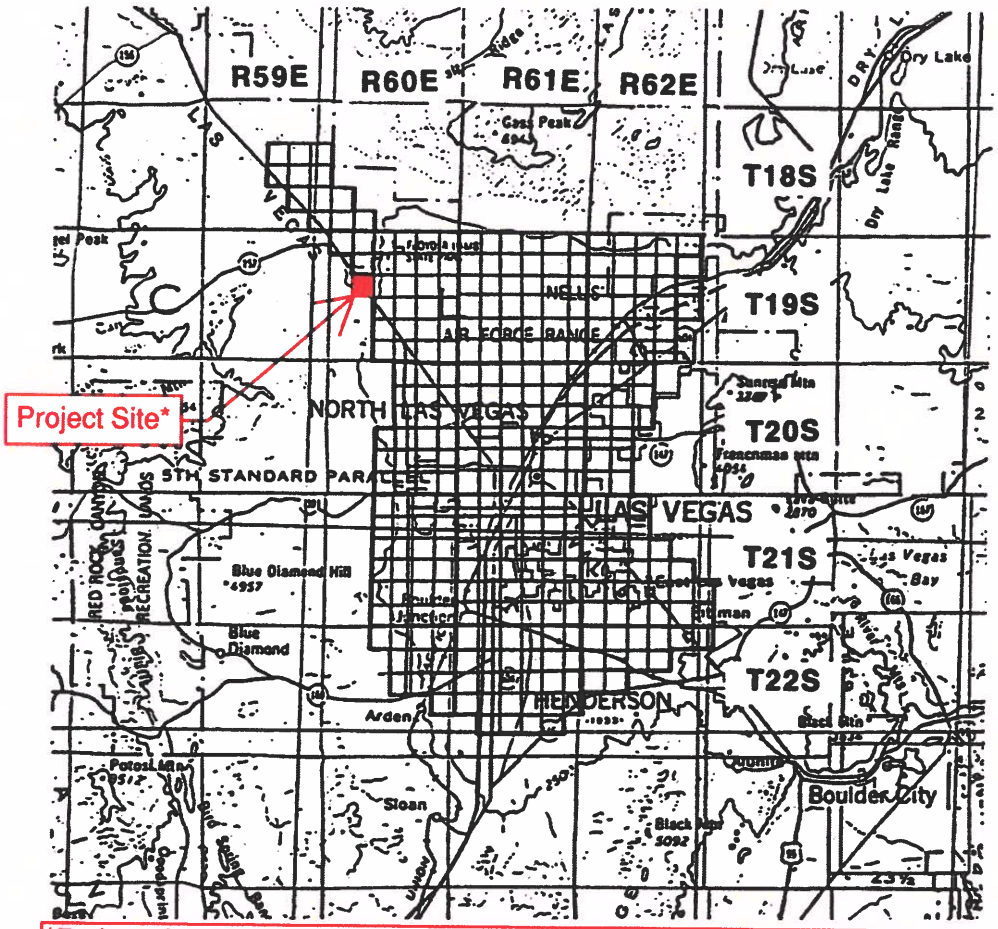
## Equations:

P=(Rainfall)*(Precipitation Adjustment Ratio)*(Depth Area Reduction Factor)

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Desi

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# McCARRAN AIRPORT RAINFALL AREA




*Project site not located within the McCarran Rainfall area (T19-R60-S20)

| 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 |
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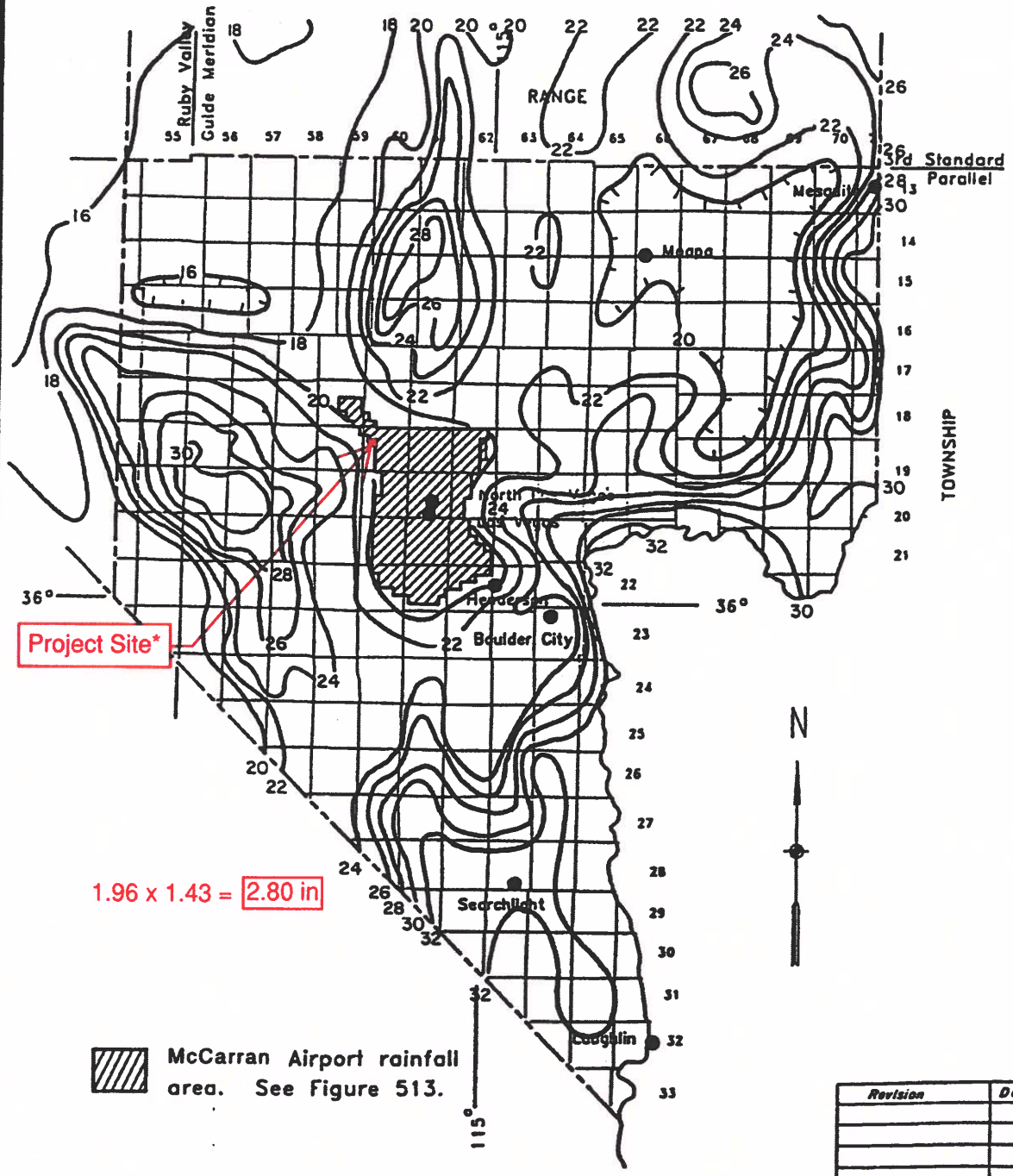
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REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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

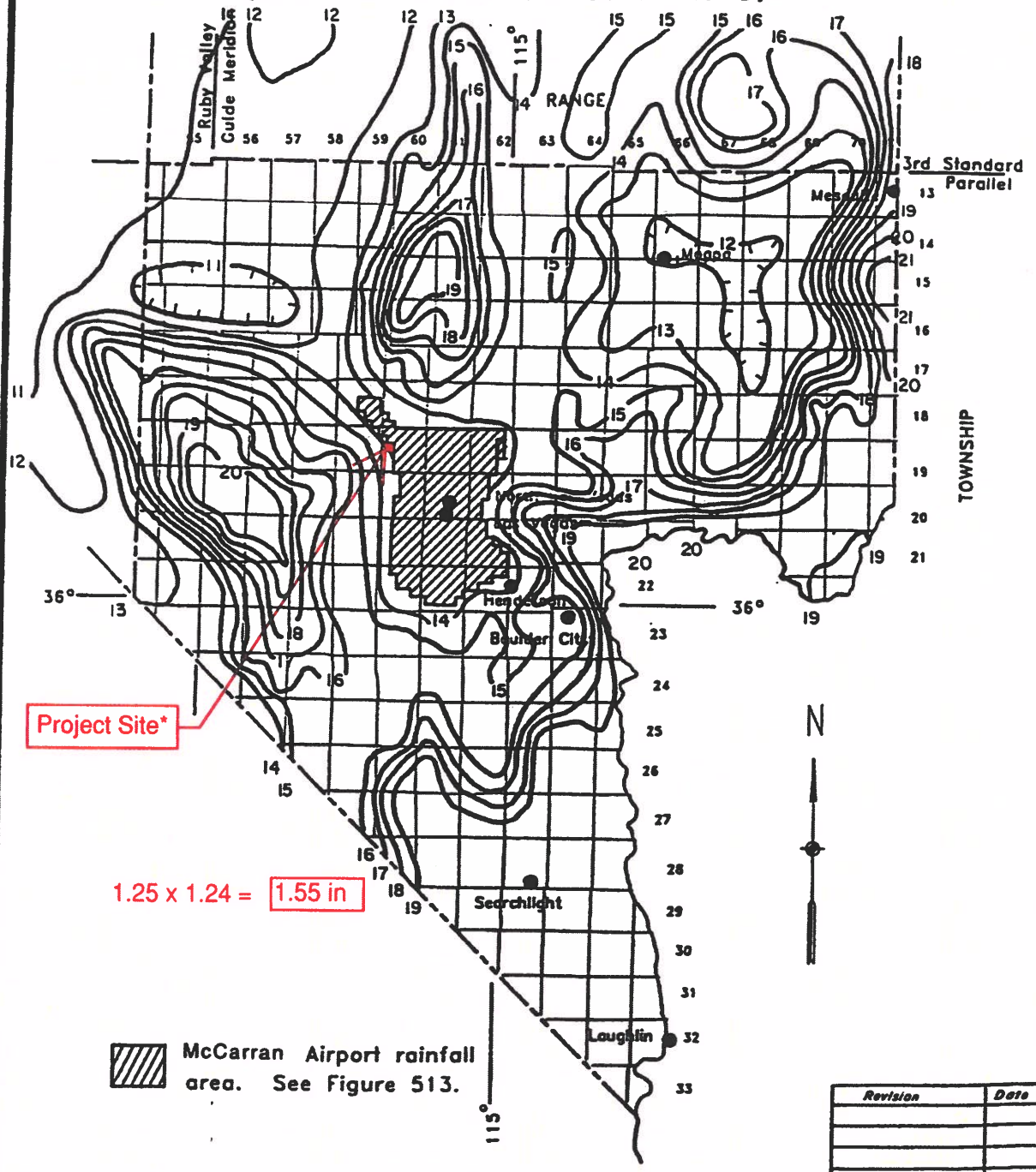



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| WRC ENGINEERING | REFERENCE: NOAA ATLAS 2, VOLUME VII NEVADA, 1973 | FIGURE 506 |
|---|---|---|

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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




| Revision | Date |
|---|---|
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WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 503

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# Rainfall and Precipitation Computation

**Project Name:** KBH1805.004 Montecito Offsite Storm Drain
**Date:** 2/14/2019
**File Name:** Precipitation Calcs v180117.xls
**By:** J. Rocha

## Data:

**Reference:**

Project is located in: Township: 19 S. Range: 60 E. Section: 21 — APN Map

**Site is located in the McCarran Airport Rainfall Area** — Figure 513*

Six Hour Depth Area Reduction Factors (DARF):

Area (gross acres): 6.3 = 0.0098 square miles — Table 502*

DARF = 1.00

## Calculations:

$P_{10}$ = 1.58 — 10-Year Precipitation (in)

$P_{100}$ = 2.77 — 100-Year Precipitation (in)

P10/P100= 0.57 — HEC-1 Multiple Ratio Value

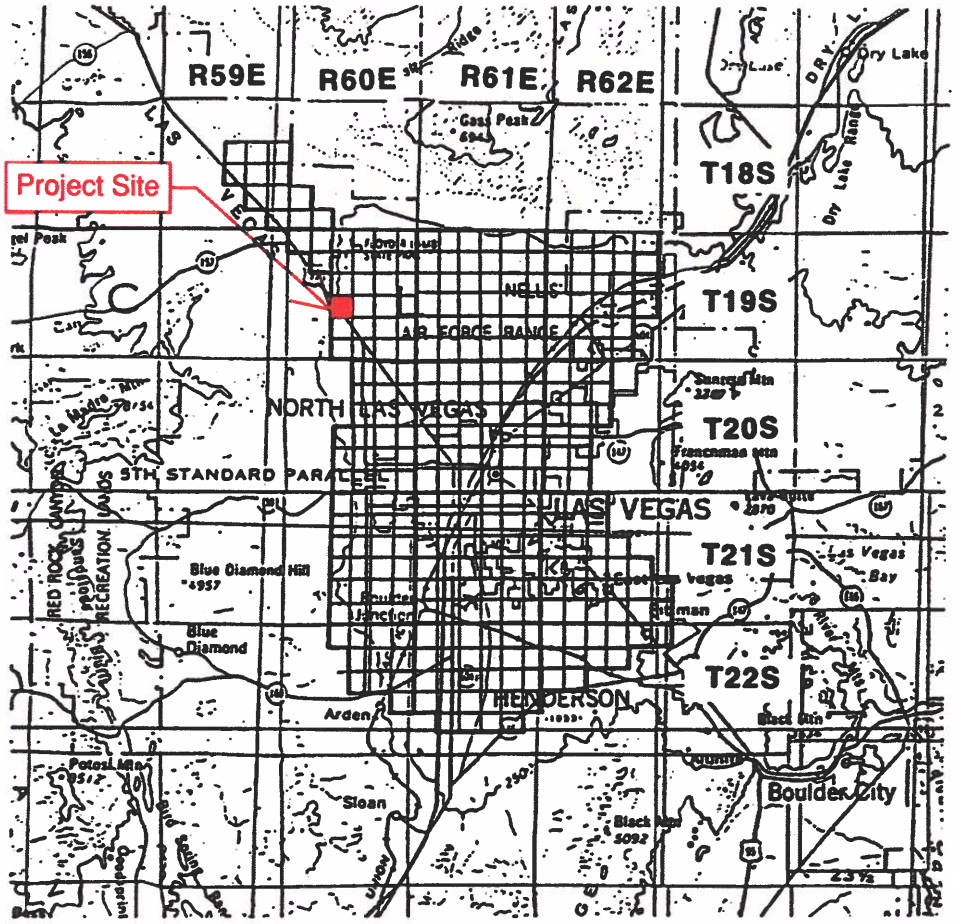
## Equations:

P=(Rainfall)*(Precipitation Adjustment Ratio)*(Depth Area Reduction Factor)

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Desi

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# McCARRAN AIRPORT RAINFALL AREA




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

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

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

| Revision | Date |
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WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

# DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA

## (IN INCHES)

| | RECURRENCE INTERVAL | | | | | |
|---|---|---|---|---|---|---|
| TIME | 2-YR | 5-YR | 10-YR | 25-YR | 50-YR | 100-YR |
| 5 min. | 0.15 | 0.27 | 0.35 | 0.46 | 0.54 | 0.63 |
| 10 min. | 0.25 | 0.44 | 0.57 | 0.74 | 0.89 | 1.02 |
| 15 min. | 0.33 | 0.57 | 0.74 | 0.97 | 1.15 | 1.32 |
| 30 min. | 0.44 | 0.78 | 1.01 | 1.31 | 1.55 | 1.79 |
| 1 hour | 0.52 | 0.89 | 1.15 | 1.50 | 1.78 | 2.06 |
| 2 hour | 0.59 | 1.01 | 1.30 | 1.70 | 2.01 | 2.30 |
| 3 hour | 0.64 | 1.08 | 1.39 | 1.82 | 2.15 | 2.48 |
| 6 hour | 0.72 | 1.22 | 1.58 | 2.05 | 2.41 | 2.77 |
| 24 hour (TR-55) | 1.20 | 1.60 | 1.80 | 2.40 | 2.70 | 2.96 |

NOTE: 1. Refer to Figure 513 for a description and drawing of the area included in the McCarran Airport Rainfall Area.

2. The 24 hour values presented above are for use with TR-55 only.

3. Table 501 adjustments not required.

| Revision | Date |
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REFERENCE: USACE, Los Angeles District, 1988

TABLE 505

# SIX HOUR DEPTH-AREA REDUCTION FACTORS

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

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

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

| Revision | Date |
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WRC ENGINEERING

REFERENCE: USACE, Los Angeles District, 1988

TABLE 502

# SIX-HOUR STORM DISTRIBUTIONS

| Storm Time (In Minutes) | Percent of Total Storm Depth SDN3 | SDN4 | SDN5 | Storm Time (In Minutes) | Percent of Total Storm Depth 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 |
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REFERENCE:

TABLE 503

# RUNOFF CURVE NUMBERS
## (URBAN AREAS[1])

| Cover description | | Curve numbers for hydrologic soil group— | | | |
|---|---|---|---|---|---|
| Cover type and hydrologic condition | Average percent impervious area[2] | A | B | C | D |
| *Fully developed urban areas (vegetation established)* | | | | | |
| Open space (lawns, parks, golf courses, cemeteries, etc.)[3]: | | | | | |
| Poor condition (grass cover < 50%) | | 68 | 79 | 86 | 89 |
| Fair condition (grass cover 50% to 75%) | | 49 | 69 | 79 | 84 |
| Good condition (grass cover > 75%) | | 39 | 61 | 74 | 80 |
| Impervious areas: | | | | | |
| Paved parking lots, roofs, driveways, etc. (excluding right-of-way) | | 98 | 98 | 98 | 98 |
| Streets and roads: | | | | | |
| Paved: curbs and storm sewers (excluding right-of-way) | | 98 | 98 | 98 | 98 |
| Paved: open ditches (including right-of-way) | | 83 | 89 | 92 | 93 |
| Gravel (including right-of-way) | | 76 | 85 | 89 | 91 |
| Dirt (including right-of-way) | | 72 | 82 | 87 | 89 |
| Western desert urban areas: | | | | | |
| Natural desert landscaping (pervious areas only)[4] | | 63 | 77 | 85 | 88 |
| Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders) | | 96 | 96 | 96 | 96 |
| Urban districts: | | | | | |
| Commercial and business | 85 | 89 | 92 | 94 | 95 |
| Industrial | 72 | 81 | 88 | 91 | 93 |
| Residential districts by average lot size: | | | | | |
| **See Table 602A** | | | | | |
| *Developing urban areas* | | | | | |
| Newly graded areas (pervious areas only, no vegetation)[5] | | 77 | 86 | 91 | 94 |

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

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

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

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

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

| Revision | Date |
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# RUNOFF CURVE NUMBERS
## (SEMIARID RANGELANDS[1])

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

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

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

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

| Revision | Date |
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REFERENCE: SCS TR-55, USDA, June 1986.

TABLE 602
4 of 4

## RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

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

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

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

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

| Revision | Date |
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REFERENCE:

TABLE 602A

# Soils Data

United States Department of Agriculture

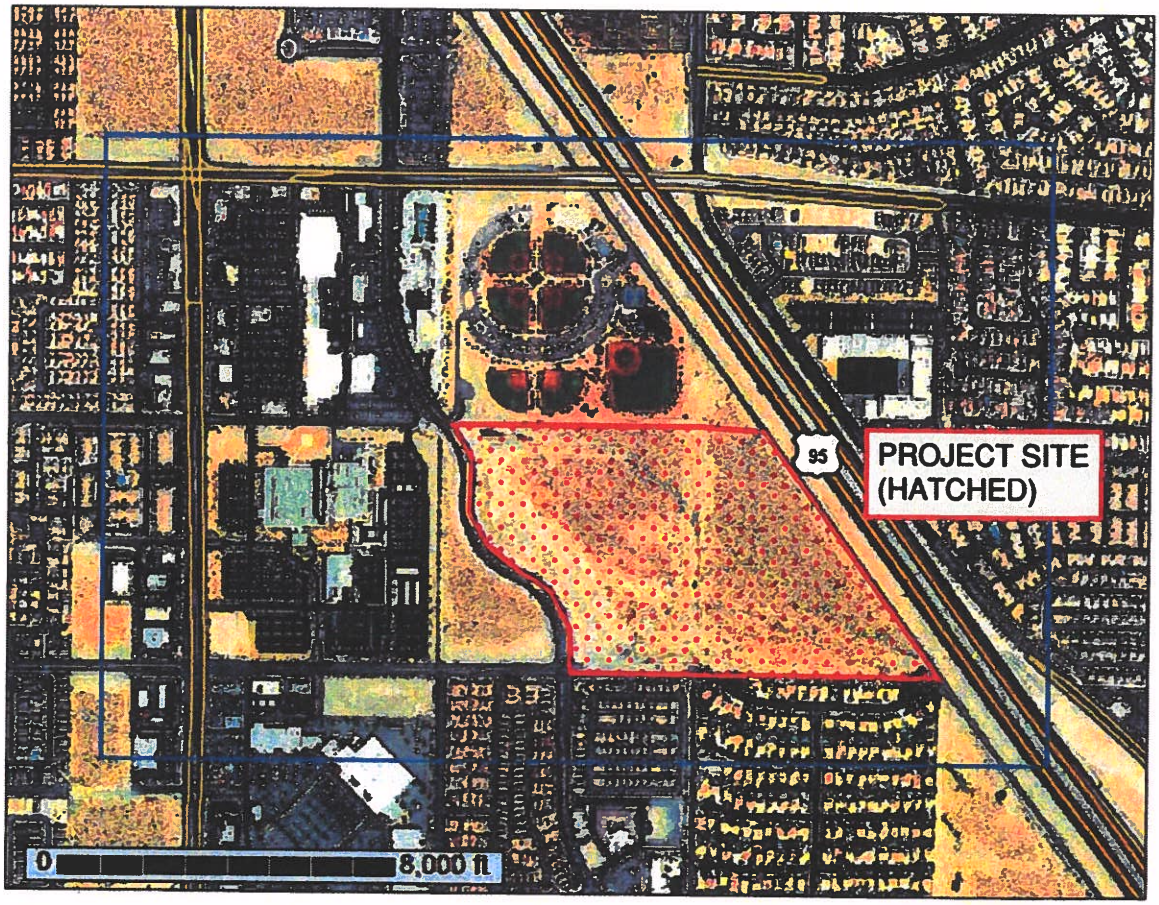
NRCS

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

## Montecito




February 11, 2019

# Preface

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

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

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

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

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

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

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# Contents

**Preface** ..... 2
**How Soil Surveys Are Made** ..... 5
**Soil Map** ..... 8
Soil Map ..... 9
Legend ..... 10
Map Unit Legend ..... 12
Map Unit Descriptions ..... 12
Las Vegas Valley Area, Nevada, Part of Clark County ..... 14
191—Dalian very cobbly fine sandy loam, 2 to 8 percent slopes ..... 14
192—Dalian-McCullough complex, 0 to 4 percent slopes ..... 15
**Soil Information for All Uses** ..... 18
Soil Reports ..... 18
Water Features ..... 18
Hydrologic Soil Group and Surface Runoff ..... 18
**References** ..... 20

# How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

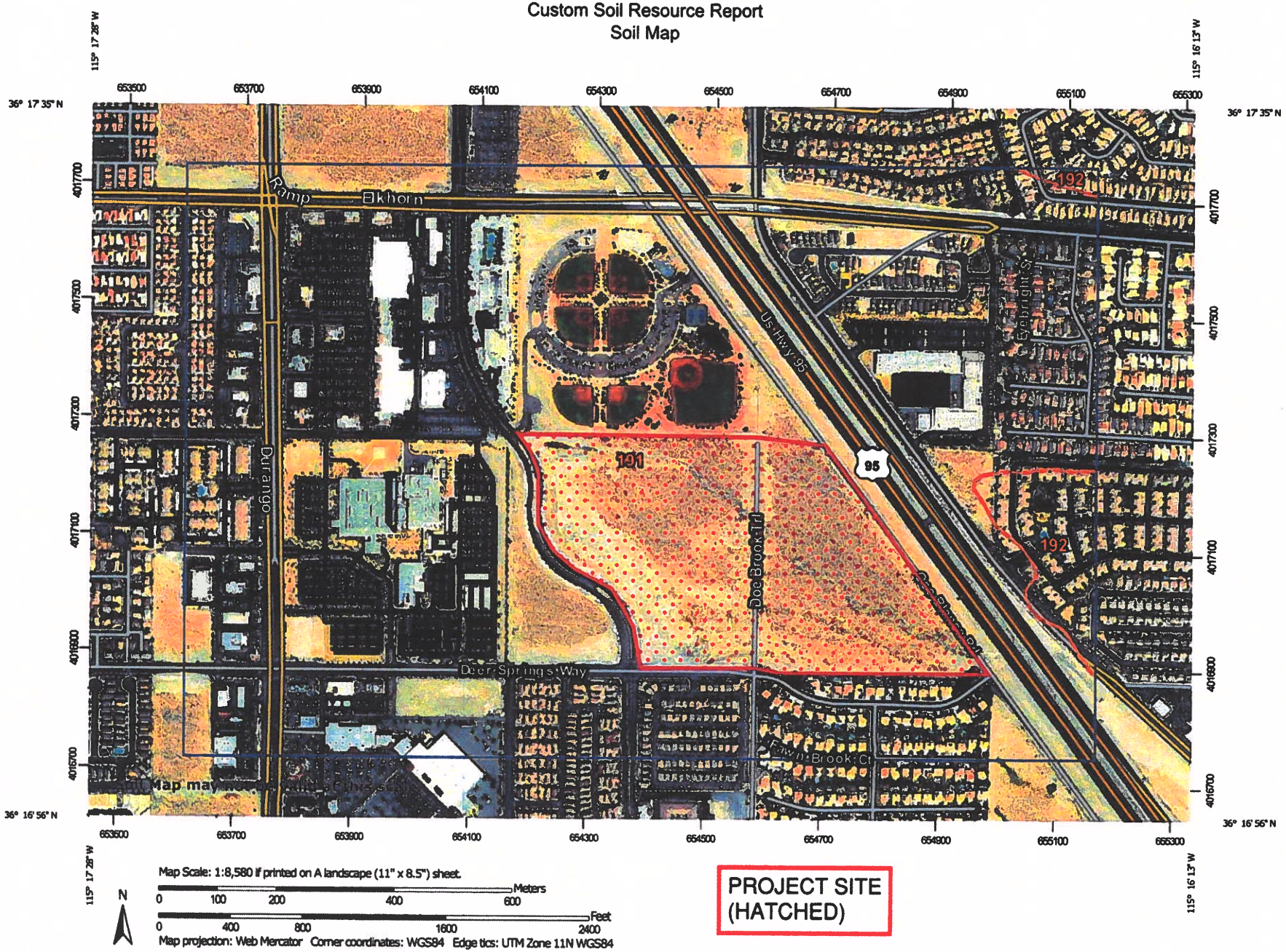
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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

# Soil Map

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

# Custom Soil Resource Report
## Soil Map




PROJECT SITE
(HATCHED)

## 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 13, Sep 14, 2018

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

Date(s) aerial images were photographed: Jul 3, 2016—Oct 1, 2017

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

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

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 191 | Dalian very cobbly fine sandy loam, 2 to 8 percent slopes | 378.8 | 97.2% |
| 192 | Dalian-McCullough complex, 0 to 4 percent slopes | 11.0 | 2.8% |
| **Totals for Area of Interest** | | **389.8** | **100.0%** |

# Map Unit Descriptions

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

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

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

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

onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

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

## 191—Dalian very cobbly fine sandy loam, 2 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* hrb4
*Elevation:* 2,200 to 3,400 feet
*Mean annual precipitation:* 4 to 6 inches
*Mean annual air temperature:* 61 to 66 degrees F
*Frost-free period:* 210 to 250 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Dalian

#### Setting

*Landform:* Fan skirts
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Parent material:* Alluvium derived from limestone and dolostone

#### Typical profile

*H1 - 0 to 5 inches:* very cobbly fine sandy loam
*H2 - 5 to 60 inches:* very gravelly fine sandy loam

#### Properties and qualities

*Slope:* 2 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 60 percent
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Available water storage in profile:* Low (about 4.2 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 7s
*Hydrologic Soil Group:* A
*Hydric soil rating:* No

## 192—Dalian-McCullough complex, 0 to 4 percent slopes

**Map Unit Setting**

*National map unit symbol:* hrb5
*Elevation:* 1,800 to 5,700 feet
*Mean annual precipitation:* 4 to 10 inches
*Mean annual air temperature:* 57 to 68 degrees F
*Frost-free period:* 170 to 260 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Dalian and similar soils:* 55 percent
*Mccullough and similar soils:* 35 percent
*Minor components:* 10 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Dalian**

**Setting**

*Landform:* Fan skirts
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Parent material:* Alluvium derived from limestone and dolostone

**Typical profile**

*H1 - 0 to 5 inches:* very gravelly fine sandy loam
*H2 - 5 to 60 inches:* very gravelly fine sandy loam

**Properties and qualities**

*Slope:* 0 to 4 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 60 percent
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Available water storage in profile:* Low (about 4.2 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 7s
*Hydrologic Soil Group:* A
*Hydric soil rating:* No

## Description of Mccullough

### Setting

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

### Typical profile

*H1 - 0 to 5 inches:* very gravelly very fine sandy loam
*H2 - 5 to 30 inches:* stratified sandy loam to loam
*H3 - 30 to 40 inches:* stratified coarse sand to loamy fine sand
*H4 - 40 to 60 inches:* extremely gravelly loamy sand

### Properties and qualities

*Slope:* 0 to 4 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.57 to 1.98 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 20 percent
*Gypsum, maximum in profile:* 15 percent
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 5.0
*Available water storage in profile:* Low (about 5.8 inches)

### Interpretive groups

*Land capability classification (irrigated):* 4s
*Land capability classification (nonirrigated):* 7s
*Hydrologic Soil Group:* B
*Other vegetative classification:* LIMY 3-5" P.Z. (030XB019NV_3)
*Hydric soil rating:* No

## Minor Components

### Las vegas

*Percent of map unit:* 5 percent
*Landform:* Basin-floor remnants
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Other vegetative classification:* LIMY 3-5" P.Z. (030XB019NV_3)
*Hydric soil rating:* No

### Tencee

*Percent of map unit:* 5 percent
*Landform:* Fan remnants
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*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

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** |
| 191—Dalian very cobbly fine sandy loam, 2 to 8 percent slopes | | | |
| Dalian | 100 | Low | A |
| 192—Dalian-McCullough complex, 0 to 4 percent slopes | | | |
| Dalian | 55 | Very low | A |
| Mccullough | 35 | Low | B |
| Las vegas | 5 | Very high | D |
| Tencee | 5 | Very high | D |

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# Curve Number Calculations

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

## Soil Data & Curve Number Computatio

**Project Name & Number:** KBH1805.004 MONTECITO STORM DRAIN INFRASTRUCTURE
**Date:** 3/1/2019
**By:** J.Rocha

**Data:**

**Reference:**
NRCS Soil Data

| Soil Type - Soil Survey Area & Version, Soil Description | | | | A | B | C | D |
|---|---|---|---|---|---|---|---|
| LV | 191 | Las Vegas Valley 2016 | Dalian very cobbly fine sandy loam, 2 to 8 percent slopes | 100% | 0% | 0% | 0% |

| Land Use | A | B | C | D |
|---|---|---|---|---|
| Desert Shrub (poor) | 63 | 77 | 85 | 88 |
| Residential (<6,000 sf)* | 89 | 92 | 94 | 95 |
| Commercial | 89 | 92 | 94 | 95 |
| Roadway | 98 | 98 | 98 | 98 |

*Commercial land use per Note 3

**BASIN OSO HAS BEEN ANALYZED AS A ROADWAY BASIN. ALL ROADWAY BASINS HAVE BEEN ANALYZED WITH A CN = 98.0**

**EXISTING CONDITION**

| BASIN ID | SURVEY AREA | SOIL TYPE | SUBAREA PERCENT | LAND USE | HYDROLOGIC SOIL GROUP PERCENTS | | | | LAND USE CN | | | | SUBAREA ACRES | CURVE NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D | A | B | C | D | | |
| NWBB3-B | LV | 191 | 100.0% | Desert Shrub (poor) | 100% | 0% | 0% | 0% | 63 | 77 | 85 | 88 | 52.96 | 63.00 |
| | | TOTAL PERCENT | 100.0% | TOTAL AREA & COMPOSITE CURVE NUMBER: | | | | | | | | | 52.96 | 63.0 |

**ULTIMATE CONDITION**

| BASIN ID | SURVEY AREA | SOIL TYPE | SUBAREA PERCENT | LAND USE | HYDROLOGIC SOIL GROUP PERCENTS | | | | LAND USE CN | | | | SUBAREA ACRES | CURVE NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D | A | B | C | D | | |
| NWBB3-B | LV | 191 | 73.9% | Residential (<6,000 sf)* | 100% | 0% | 0% | 0% | 89 | 92 | 94 | 95 | 39.13 | 65.76 |
| | LV | 191 | 26.1% | Apartments & Condos | 100% | 0% | 0% | 0% | 81 | 88 | 91 | 93 | 13.83 | 21.15 |
| | | TOTAL PERCENT | 100.0% | TOTAL AREA & COMPOSITE CURVE NUMBER: | | | | | | | | | 52.96 | 86.9 |

5740 S. Arville St., Suite 216 - Las Vegas, NV 89118
Ph. 702-284-5300 - Fx. 702-284-5399

# Standard Form 4 Calculation

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
## TIME OF CONCENTRATION

**Project Name & Number:** KBH1805.004 MONTECITO OFFSITE STORM DRAIN
**Description:** STANDARD FORM 4
**By:** J.Rocha
**Date:** 3/1/2019

| SUB-BASIN DATA | | | | | | INITIAL / OVERLAND TIME (Ti) | | | TRAVEL TIME (Tt) | | | | | Tc | Tc Check Urbanized Basins | | Tlag |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIG: | DEV./EX. (D or E) | CN | K [1] | AREA Ac | AREA Mi^2 [2] | INITIAL LENGTH Feet | SLOPE % | Ti Min [3] | TRAVEL LENGTH Feet | SLOPE % | V1 VELOCITY FPS [4] | V2 VELOCITY FPS [5] | Tt Min [6] | Tc Calc. [7] | Total Length Feet [8] | Tc Check [9] | Tlag Hours [10] |
| EXISTING CONDITION | | | | | | | | | | | | | | | | | |
| NWBB3-B | E | 63.0 | 0.442 | 53.0 | 0.0828 | 300 | 3.16 | 13.99 | 2830 | 2.12 | 2.15 | 4.28 | 12.94 | 26.93 | | | 0.269 |
| ULTIMATE CONDITION | | | | | | | | | | | | | | | | | |
| NWBB3-B | D | 86.9 | 0.757 | 53.0 | 0.0828 | 100 | 1.00 | 6.17 | 3440 | 1.98 | 2.84 | 4.30 | 14.32 | 20.50 | 3540 | 29.667 | 0.205 |
| OSO | D | 98.0 | 0.904 | 6.3 | 0.0098 | 45 | 2.00 | 1.88 | 2805 | 2.00 | 2.86 | 4.33 | 11.79 | 13.68 | 2850 | 25.833 | 0.137 |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

[1] K = 0.0132 (CN) - 0.39
[2] A = Area/640
[3] Ti = (1.8 (1.1-K) L^0.5)/S^0.33
[4] For Existing Conditions: V1 = 14.8 * (S/100)^0.5
For Developed Conditions: V1 = 20.2 * (S/100)^0.5
[5] For Existing Conditions: V2 = 29.4 * (S/100)^0.5
For Developed Conditions: V2 = 30.6 * (S/100)^0.5
[6] Tt = L/(60*V)
[7] Tc = Ti + Tt
[8] Total L = Initial L + Travel L
[9] Tc = (L/180) + 10
[10] Tlag = (0.6*Tc)/60
[11] Min Tlag =0.05
Note: For Travel Time Calcs: V1 applies to first 500 feet and V2 applies to remaining distance.

REFERENCE :

STANDARD FORM 4

# HEC-1 Model

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   01MAR19  TIME  15:27:41   *
*                                       *
*****************************************
```

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

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

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

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

1 HEC-1 INPUT PAGE 1

```
         LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
                   *DIAGRAM
*** FREE ***
             1     ID    SLATER HANIFAN GROUP
             2     ID    MONTECITO 60 SD INFRASTRUCTURE
             3     ID    TECHNICAL DRAINAGE STUDY
             4     ID    FEB 2019
             5     ID    ULTIMATE DRAINAGE CONDITION
             6     ID
             7     ID    RETURN PERIOD ------- 100 & 10-YEAR
             8     ID    DISTRIBUTION -------- 6-HOUR SDN3
             9     ID    PROJECT NO. --------- KBH1805.004
            10     ID    FILENAME ------------ HEC.H1
            11     ID    DATE ---------------- 02/12/2019
            12     ID    MODELED BY ---------- JSR
            13     ID
            14     ID       PRECIPITATION STORM EVENT RATIOS
            15     ID       STORM EVENT            RATIO
            16     ID       100-YR                 1.00
            17     ID       10-YR                  0.57
            18     ID
            19     IT      5       0       0     300
            20     IO      5       0       0
            21     IN      5       0       0
            22     JR    PREC    1.00    0.57
                   *
            23     KK     OSO
            24     KM   ROADWAY BASIN
            25     BA  0.0098
            26     PB    2.77
            27     PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
            28     PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
            29     PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
            30     PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
            31     PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
            32     PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
            33     PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
            34     PC   0.998   0.999   1.000
            35     LS       0    98.0
            36     UD   0.137
                   *
            37     KK NWBB3-B
            38     KM   ONSITE BASIN
            39     BA  0.0828
            40     LS       0    86.9
            41     UD   0.205
                   *
            42     ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    23         OSO
                .
                .
    37          .     NWBB3-B

  (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   01MAR19  TIME  15:27:41   *
*                                       *
*****************************************

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

                          SLATER HANIFAN GROUP
                          MONTECITO 60 SD INFRASTRUCTURE
                          TECHNICAL DRAINAGE STUDY
                          FEB 2019
                          ULTIMATE DRAINAGE CONDITION

                          RETURN PERIOD ------- 100 & 10-YEAR
                          DISTRIBUTION -------- 6-HOUR SDN3
                          PROJECT NO. --------- KBH1805.004
                          FILENAME ------------ HEC.H1
                          DATE ---------------- 02/12/2019
                          MODELED BY ---------- JSR

                             PRECIPITATION STORM EVENT RATIOS
                             STORM EVENT            RATIO
                             100-YR                 1.00
                             10-YR                  0.57

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

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

                    COMPUTATION INTERVAL     .08 HOURS
                         TOTAL TIME BASE   24.92 HOURS

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

      JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00       .57
1

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

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

 HYDROGRAPH AT
+                  OSO        .01     1   FLOW         18.      10.
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | TIME | 3.58 | 3.58 | ULT.OUT |
| HYDROGRAPH AT | | | | | | | |
| + | NWBB3-B | .08 | 1 | FLOW | 94. | 37. | |
| | | | | TIME | 3.67 | 3.67 | |

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

PER TDS ADDENDUM

```
                                                                SDN
T1 KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS ADD
T2 SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)
T3 STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL
SO  -2917.6902501.500 63                          2505.180
R   -2894.4402506.530 63      .013                                  .000 -15.000 0
TS  -2884.4402506.780 60      .013                                  .000
R   -2821.5502508.020 60      .013                                         .000 0
JX  -2821.5502508.020 60 30   .013   37.000         2508.020         60.0       .000
R   -2780.3802508.860 60      .013                                  .000  12.000 1
R   -2512.1002516.940 60      .013                                  .000    .000 0
R   -2437.3502517.310 60      .013                                  .000    .000 0
R   -2411.0902517.440 60      .013                                22.797    .000 0
R   -2381.8102517.590 60      .013                               -25.419    .000 0
R   -2275.5502518.120 60      .013                                  .000    .000 0
R   -2206.6602518.460 60      .013                               -59.805    .000 1
R   -2137.7602518.880 60      .013                                59.813    .000 0
R   -1913.3802520.220 60      .013                                          0.0 1
R   -1632.8402527.480 60      .013                                          0.0 1
R   -1368.0002533.440 60      .013                                  .000    .000 0
R   -1296.4802535.050 60      .013                                62.088    .000 0
R   -1252.8002536.030 60      .013                                  .000 -15.000 1
R   -1252.7992536.031 60      .013                                  .000 -12.000 0
R   -1225.8112536.819 60      .013                                  .000 -15.000 1
R   -1225.8092536.820 60      .013                                  .000 -15.000 0
R   -1225.8082536.821 60      .013                                  .000 -15.000 0
R   -1140.0002539.320 60      .013                                  .000    .000 1
TS  -1130.0002539.610 85      .013                                  .000
R   -1129.9992539.611 85      .013                                  .000  15.000 0
R   -1129.9982539.612 85      .013                                  .000   1.200 0
R   -1005.0302543.720 85      .013                                         0.0 0
SH  -1005.0302543.720 85
CD  18  4   1   0.000   1.500    0.000 0.000 0.000  0.0000.00  0.00
CD  24  4   1   0.000   2.000    0.000 0.000 0.000  0.0000.00  0.00
CD  30  4   1   0.000   2.500    0.000 0.000 0.000  0.0000.00  0.00
CD  36  4   1   0.000   3.000    0.000 0.000 0.000  0.0000.00  0.00
CD  54  4   1   0.000   4.500    0.000 0.000 0.000  0.0000.00  0.00
CD  60  4   1   0.000   5.000    0.000 0.000 0.000  0.0000.00  0.00
CD  63  3   0   0.000   3.000    6.000 0.000 0.000  0.0000.00  0.00
CD  85  3   0   0.000   5.000    8.000 0.000 0.000  0.0000.00  0.00
Q           227.000   .0
```

FILE: SDN.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 5-13-2019 Time:11:21:30

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

| CARD CODE | SECT NO | CHN TYPE | NO OF PIER/PIP | AVE PIER WIDTH | HEIGHT 1 DIAMETER | BASE WIDTH | ZL | ZR | INV DROP | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD | 18 | 4 | 1 | | 1.500 | | | | | | | | | | | | | | |
| CD | 24 | 4 | 1 | | 2.000 | | | | | | | | | | | | | | |
| CD | 30 | 4 | 1 | | 2.500 | | | | | | | | | | | | | | |
| CD | 36 | 4 | 1 | | 3.000 | | | | | | | | | | | | | | |
| CD | 54 | 4 | 1 | | 4.500 | | | | | | | | | | | | | | |
| CD | 60 | 4 | 1 | | 5.000 | | | | | | | | | | | | | | |
| CD | 63 | 3 | 0 | .000 | 3.000 | 6.000 | .000 | .000 | .00 | | | | | | | | | | |
| CD | 85 | 3 | 0 | .000 | 5.000 | 8.000 | .000 | .000 | .00 | | | | | | | | | | |

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS ADD

HEADING LINE NO 2 IS -

SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)

HEADING LINE NO 3 IS -

STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

| U/S DATA | STATION | INVERT | SECT | W S ELEV |
|---|---|---|---|---|
| | -2917.690 | 2501.500 | 63 | 2505.180 |

ELEMENT NO 2 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2894.440 | 2506.530 | 63 | .013 | .000 | .000 | -15.000 | 0 |

ELEMENT NO 3 IS A TRANSITION * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE |
|---|---|---|---|---|---|---|
| | -2884.440 | 2506.780 | 60 | .013 | .000 | .000 |

ELEMENT NO 4 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2821.550 | 2508.020 | 60 | .013 | .000 | .000 | .000 | 0 |

ELEMENT NO 5 IS A JUNCTION * * * * * * *

| U/S DATA | STATION | INVERT | SECT | LAT-1 | LAT-2 | N | Q3 | Q4 | INVERT-3 | INVERT-4 | PHI 3 | PHI 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | -2821.550 | 2508.020 | 60 | 30 | 0 | .013 | 37.000 | .000 | 2508.020 | .000 | 60.000 | .000 |

| RADIUS | ANGLE |
|---|---|
| .000 | .000 |

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 6 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2780.380 | 2508.860 | 60 | .013 | .000 | .000 | 12.000 | 1 |

ELEMENT NO 7 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2512.100 | 2516.940 | 60 | .013 | .000 | .000 | .000 | 0 |

ELEMENT NO 8 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2437.350 | 2517.310 | 60 | .013 | .000 | .000 | .000 | 0 |

ELEMENT NO 9 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2411.090 | 2517.440 | 60 | .013 | 65.999 | 22.797 | .000 | 0 |

ELEMENT NO 10 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2381.810 | 2517.590 | 60 | .013 | 65.999 | -25.419 | .000 | 0 |

ELEMENT NO 11 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2275.550 | 2518.120 | 60 | .013 | .000 | .000 | .000 | 0 |

W S P G W PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 12 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2206.660 | 2518.460 | 60 | .013 | 66.000 | -59.805 | .000 | 1 |

ELEMENT NO 13 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -2137.760 | 2518.880 | 60 | .013 | 66.000 | 59.813 | .000 | 0 |

ELEMENT NO 14 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -1913.380 | 2520.220 | 60 | .013 | .000 | .000 | .000 | 1 |

ELEMENT NO 15 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -1632.840 | 2527.480 | 60 | .013 | .000 | .000 | .000 | 1 |

ELEMENT NO 16 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -1368.000 | 2533.440 | 60 | .013 | .000 | .000 | .000 | 0 |

ELEMENT NO 17 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -1296.480 | 2535.050 | 60 | .013 | 66.000 | 62.088 | .000 | 0 |

ELEMENT NO 18 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -1252.800 | 2536.030 | 60 | .013 | .000 | .000 | -15.000 | 1 |

ELEMENT NO 19 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -1252.799 | 2536.031 | 60 | .013 | .000 | .000 | -12.000 | 0 |

ELEMENT NO 20 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | -1225.811 | 2536.819 | 60 | .013 | .000 | .000 | -15.000 | 1 |

```
ELEMENT NO  21 IS A REACH              *          *     *
                  U/S DATA   STATION    INVERT  SECT              N                    RADIUS    ANGLE     ANG PT  MAN H
                            -1225.809 2536.820   60              .013                    .000     .000   -15.000     0
ELEMENT NO  22 IS A REACH              *          *     *
                  U/S DATA   STATION    INVERT  SECT              N                    RADIUS    ANGLE     ANG PT  MAN H
                            -1225.808 2536.821   60              .013                    .000     .000   -15.000     0
ELEMENT NO  23 IS A REACH              *          *     *
                  U/S DATA   STATION    INVERT  SECT              N                    RADIUS    ANGLE     ANG PT  MAN H
                            -1140.000 2539.320   60              .013                    .000     .000      .000     1
ELEMENT NO  24 IS A TRANSITION         *          *     *
                  U/S DATA   STATION    INVERT  SECT              N                    RADIUS   ANGLE
                            -1130.000 2539.610   85              .013                    .000     .000
                                                    W S P G W                                                PAGE NO   4
                                WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  25 IS A REACH              *          *     *
                  U/S DATA   STATION    INVERT  SECT              N                    RADIUS    ANGLE     ANG PT  MAN H
                            -1129.999 2539.611   85              .013                    .000     .000    15.000     0
ELEMENT NO  26 IS A REACH              *          *     *
                  U/S DATA   STATION    INVERT  SECT              N                    RADIUS    ANGLE     ANG PT  MAN H
                            -1129.998 2539.612   85              .013                    .000     .000     1.200     0
ELEMENT NO  27 IS A REACH              *          *     *
                  U/S DATA   STATION    INVERT  SECT              N                    RADIUS    ANGLE     ANG PT  MAN H
                            -1005.030 2543.720   85              .013                    .000     .000      .000     0
ELEMENT NO  28 IS A SYSTEM HEADWORKS                   *                *
                  U/S DATA   STATION    INVERT  SECT                                 W S ELEV
                            -1005.030 2543.720   85                                    .000
```

♠ FILE: SDN.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-13-2019 Time:11:21:32

KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS ADD

SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)

STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

| Station / L/Elem | Invert Elev / Ch Slope | Depth (FT) / SF Ave | Water Elev / HF | Q (CFS) / SE Dpth | Vel (FPS) / Froude N | Vel Head / Norm Dp | Energy Grd.El. / "N" | Super Elev / X-Fall | Critical Depth / ZR | Flow Top Width | Height/Dia.-FT / Base Wt or I.D. / ZL | No Wth Prs/Pip / Type Ch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -2917.690 | 2501.500 | 1.648 | 2503.148 | 264.00 | 26.69 | 11.06 | 2514.21 | .00 | 3.00 | 6.00 | 3.000 | 6.000 .00 0 .0 |
| 4.482 | .2163 | | | | | .0476 | .21 | 1.65 | 3.66 | 1.00 | .013 | .00 .00 BOX |
| -2913.208 | 2502.469 | 1.713 | 2504.183 | 264.00 | 25.68 | 10.24 | 2514.43 | .00 | 3.00 | 6.00 | 3.000 | 6.000 .00 0 .0 |
| 4.866 | .2163 | | | | | .0421 | .21 | 1.71 | 3.46 | 1.00 | .013 | .00 .00 BOX |
| -2908.342 | 2503.522 | 1.797 | 2505.319 | 264.00 | 24.49 | 9.31 | 2514.63 | .00 | 3.00 | 6.00 | 3.000 | 6.000 .00 0 .0 |
| 4.227 | .2163 | | | | | .0368 | .16 | 1.80 | 3.22 | 1.00 | .013 | .00 .00 BOX |
| -2904.115 | 2504.437 | 1.884 | 2506.321 | 264.00 | 23.35 | 8.47 | 2514.79 | .00 | 3.00 | 6.00 | 3.000 | 6.000 .00 0 .0 |
| 3.680 | .2163 | | | | | .0322 | .12 | 1.88 | 3.00 | 1.00 | .013 | .00 .00 BOX |
| -2900.436 | 2505.233 | 1.976 | 2507.209 | 264.00 | 22.26 | 7.70 | 2514.91 | .00 | 3.00 | 6.00 | 3.000 | 6.000 .00 0 .0 |
| 3.205 | .2163 | | | | | .0282 | .09 | 1.98 | 2.79 | 1.00 | .013 | .00 .00 BOX |
| -2897.230 | 2505.926 | 2.073 | 2507.999 | 264.00 | 21.23 | 7.00 | 2515.00 | .00 | 3.00 | 6.00 | 3.000 | 6.000 .00 0 .0 |
| 2.790 | .2163 | | | | | .0247 | .07 | 2.07 | 2.60 | 1.00 | .013 | .00 .00 BOX |
| -2894.440 | 2506.530 | 2.174 | 2508.704 | 264.00 | 20.24 | 6.36 | 2515.06 | .00 | 3.00 | 6.00 | 3.000 | 6.000 .00 0 .0 |
| TRANS STR | .0250 | | | | | .0190 | .19 | 2.17 | 2.42 | | .013 | .00 .00 BOX |
| -2884.440 | 2506.780 | 3.464 | 2510.244 | 264.00 | 18.19 | 5.14 | 2515.38 | .00 | 4.50 | 4.61 | 5.000 | .000 .00 1 .0 |
| 9.271 | .0197 | | | | | .0150 | .14 | 3.46 | 1.81 | 3.15 | .013 | .00 .00 PIPE |
| -2875.169 | 2506.963 | 3.483 | 2510.446 | 264.00 | 18.08 | 5.07 | 2515.52 | .00 | 4.50 | 4.60 | 5.000 | .000 .00 1 .0 |
| 53.619 | .0197 | | | | | .0141 | .75 | 3.48 | 1.79 | 3.15 | .013 | .00 .00 PIPE |



| Station / L/Elem | Invert Elev / Ch Slope | Depth (FT) / SF Ave | Water Elev / HF | Q (CFS) / SE Dpth | Vel (FPS) / Froude N | Vel Head / Norm Dp | Energy Grd.El. / "N" | Super Elev / X-Fall | Critical Depth / ZR | Flow Top Width | Height/Dia.-FT / Base Wt or I.D. / ZL | No Wth Prs/Pip / Type Ch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -2821.550 | 2508.020 | 3.641 | 2511.661 | 264.00 | 17.24 | 4.61 | 2516.27 | .00 | 4.50 | 4.45 | 5.000 | .000 .00 1 .0 |
| JUNCT STR | .0000 | | | | | .0187 | .00 | 3.64 | 1.64 | | .013 | .00 .00 PIPE |
| -2821.550 | 2508.020 | 2.677 | 2510.697 | 227.00 | 21.21 | 6.98 | 2517.68 | .00 | 4.26 | 4.99 | 5.000 | .000 .00 1 .0 |
| 41.170 | .0204 | | | | | .0246 | 1.01 | 2.68 | 2.55 | 2.82 | .013 | .00 .00 PIPE |
| -2780.380 | 2508.860 | 2.646 | 2511.507 | 227.00 | 21.52 | 7.19 | 2518.70 | .00 | 4.26 | 4.99 | 5.000 | .000 .00 1 .0 |
| 1.701 | .0301 | | | | | .0251 | .04 | 2.65 | 2.61 | 2.51 | .013 | .00 .00 PIPE |
| -2778.679 | 2508.911 | 2.648 | 2511.559 | 227.00 | 21.50 | 7.18 | 2518.74 | .00 | 4.26 | 4.99 | 5.000 | .000 .00 1 .0 |
| 84.139 | .0301 | | | | | .0236 | 1.98 | 2.65 | 2.61 | 2.51 | .013 | .00 .00 PIPE |
| -2694.540 | 2511.445 | 2.751 | 2514.197 | 227.00 | 20.50 | 6.53 | 2520.72 | .00 | 4.26 | 4.97 | 5.000 | .000 .00 1 .0 |
| 52.112 | .0301 | | | | | .0208 | 1.08 | 2.75 | 2.42 | 2.51 | .013 | .00 .00 PIPE |
| -2642.427 | 2513.015 | 2.860 | 2515.875 | 227.00 | 19.55 | 5.93 | 2521.81 | .00 | 4.26 | 4.95 | 5.000 | .000 .00 1 .0 |
| 36.217 | .0301 | | | | | .0184 | .67 | 2.86 | 2.25 | 2.51 | .013 | .00 .00 PIPE |
| -2606.211 | 2514.106 | 2.975 | 2517.081 | 227.00 | 18.64 | 5.39 | 2522.48 | .00 | 4.26 | 4.91 | 5.000 | .000 .00 1 .0 |
| 26.642 | .0301 | | | | | .0163 | .43 | 2.98 | 2.09 | 2.51 | .013 | .00 .00 PIPE |

2511.66 HGL UTILIZED FOR FD5-S

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -2579.569 | 2514.908 | | 3.097 | 2518.005 | | 227.00 | 17.77 | | 4.90 | 2522.91 | | .00 | 4.26 | | 4.86 | 5.000 | | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | | | | | | |
| 20.171 | .0301 | | | | | | | | .0144 | | .29 | 3.10 | 1.93 | | 2.51 | .013 | | .00 | .00 | PIPE | |
| -2559.397 | 2515.516 | | 3.226 | 2518.742 | | 227.00 | 16.94 | | 4.46 | 2523.20 | | .00 | 4.26 | | 4.78 | 5.000 | | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | | | | | | |
| 15.442 | .0301 | | | | | | | | .0128 | | .20 | 3.23 | 1.78 | | 2.51 | .013 | | .00 | .00 | PIPE | |





| Station / L/Elem | Invert Elev / Ch Slope | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head / SF Ave | Energy Grd.El. / HF | Super Elev / SE Dpth | Critical Depth / Froude N | Flow Top Width / Norm Dp | Height/ Dia.-FT or "N" | Base Wt or I.D. / X-Fall | ZL / ZR | No Wth Prs/Pip / Type Ch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -2543.956 | 2515.981 | 3.364 | 2519.345 | 227.00 | 16.16 | 4.05 | 2523.40 | .00 | 4.26 | 4.69 | 5.000 | .000 | .00 | 1 .0 |
| 11.776 | .0301 | | | | | .0114 | .13 | 3.36 | 1.65 | 2.51 | .013 | .00 | .00 | PIPE |
| -2532.179 | 2516.335 | 3.512 | 2519.848 | 227.00 | 15.40 | 3.68 | 2523.53 | .00 | 4.26 | 4.57 | 5.000 | .000 | .00 | 1 .0 |
| 8.777 | .0301 | | | | | .0102 | .09 | 3.51 | 1.51 | 2.51 | .013 | .00 | .00 | PIPE |
| -2523.402 | 2516.600 | 3.672 | 2520.272 | 227.00 | 14.69 | 3.35 | 2523.62 | .00 | 4.26 | 4.42 | 5.000 | .000 | .00 | 1 .0 |
| 6.181 | .0301 | | | | | .0091 | .06 | 3.67 | 1.38 | 2.51 | .013 | .00 | .00 | PIPE |
| -2517.221 | 2516.786 | 3.847 | 2520.633 | 227.00 | 14.00 | 3.05 | 2523.68 | .00 | 4.26 | 4.21 | 5.000 | .000 | .00 | 1 .0 |
| 3.781 | .0301 | | | | | .0082 | .03 | 3.85 | 1.26 | 2.51 | .013 | .00 | .00 | PIPE |
| -2513.440 | 2516.900 | 4.041 | 2520.940 | 227.00 | 13.35 | 2.77 | 2523.71 | .00 | 4.26 | 3.94 | 5.000 | .000 | .00 | 1 .0 |
| 1.340 | .0301 | | | | | .0075 | .01 | 4.04 | 1.13 | 2.51 | .013 | .00 | .00 | PIPE |
| -2512.100 | 2516.940 | 4.263 | 2521.203 | 227.00 | 12.73 | 2.52 | 2523.72 | .00 | 4.26 | 3.55 | 5.000 | .000 | .00 | 1 .0 |
| 20.301 | .0050 | | | | | .0069 | .14 | 4.26 | 1.00 | 5.00 | .013 | .00 | .00 | PIPE |
| -2491.799 | 2517.041 | 4.531 | 2521.572 | 227.00 | 12.14 | 2.29 | 2523.86 | .00 | 4.26 | 2.92 | 5.000 | .000 | .00 | 1 .0 |
| 54.449 | .0050 | | | | | .0066 | .36 | 4.53 | .84 | 5.00 | .013 | .00 | .00 | PIPE |
| -2437.350 | 2517.310 | 4.757 | 2522.067 | 227.00 | 11.77 | 2.15 | 2524.22 | .07 | 4.26 | 2.15 | 5.000 | .000 | .00 | 1 .0 |
| 26.260 | .0049 | | | | | .0066 | .17 | 4.83 | .69 | 5.00 | .013 | .00 | .00 | PIPE |
| -2411.090 | 2517.440 | 4.835 | 2522.275 | 227.00 | 11.68 | 2.12 | 2524.39 | .06 | 4.26 | 1.78 | 5.000 | .000 | .00 | 1 .0 |
| 29.280 | .0051 | | | | | .0067 | .20 | 4.89 | .62 | 5.00 | .013 | .00 | .00 | PIPE |





| Station / L/Elem | Invert Elev / Ch Slope | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head / SF Ave | Energy Grd.El. / HF | Super Elev / SE Dpth | Critical Depth / Froude N | Flow Top Width / Norm Dp | Height/ Dia.-FT or "N" | Base Wt or I.D. / X-Fall | ZL / ZR | No Wth Prs/Pip / Type Ch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -2381.810 | 2517.590 | 4.907 | 2522.497 | 227.00 | 11.61 | 2.09 | 2524.59 | .00 | 4.26 | 1.35 | 5.000 | .000 | .00 | 1 .0 |
| 36.029 | .0050 | | | | | .0071 | .25 | 4.91 | .54 | 5.00 | .013 | .00 | .00 | PIPE |
| -2345.781 | 2517.770 | 5.000 | 2522.770 | 227.00 | 11.56 | 2.08 | 2524.85 | .00 | 4.26 | .00 | 5.000 | .000 | .00 | 1 .0 |
| 70.231 | .0050 | | | | | .0075 | .52 | 5.00 | .00 | 5.00 | .013 | .00 | .00 | PIPE |
| -2275.550 | 2518.120 | 5.183 | 2523.303 | 227.00 | 11.56 | 2.08 | 2525.38 | .00 | 4.26 | .00 | 5.000 | .000 | .00 | 1 .0 |
| 68.890 | .0049 | | | | | .0076 | .52 | .00 | .00 | 5.00 | .013 | .00 | .00 | PIPE |
| -2206.660 | 2518.460 | 5.809 | 2524.269 | 227.00 | 11.56 | 2.08 | 2526.34 | .00 | 4.26 | .00 | 5.000 | .000 | .00 | 1 .0 |
| 68.900 | .0061 | | | | | .0076 | .52 | .00 | .00 | 5.00 | .013 | .00 | .00 | PIPE |
| -2137.760 | 2518.880 | 6.251 | 2525.131 | 227.00 | 11.56 | 2.08 | 2527.21 | .00 | 4.26 | .00 | 5.000 | .000 | .00 | 1 .0 |
| 224.380 | .0060 | | | | | .0076 | 1.70 | 6.25 | .00 | 5.00 | .013 | .00 | .00 | PIPE |
| -1913.380 | 2520.220 | 6.719 | 2526.939 | 227.00 | 11.56 | 2.08 | 2529.01 | .00 | 4.26 | .00 | 5.000 | .000 | .00 | 1 .0 |

SDN

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.628 | .0259 | | | | | .0076 | .01 | 6.72 | .00 | 2.62 | .013 | .00 | .00 | PIPE | | | | | |
| -1911.752 | 2520.262 | 6.690 | 2526.952 | 227.00 | 11.56 | 2.08 | 2529.03 | .00 | 4.26 | .00 | 5.000 | .000 | .00 | 1 | .0 | | | | |
| HYDRAULIC JUMP | | | | | | | | | | | | | | | | | | | |
| -1911.752 | 2520.262 | 2.644 | 2522.906 | 227.00 | 21.55 | 7.21 | 2530.12 | .00 | 4.26 | 4.99 | 5.000 | .000 | .00 | 1 | .0 | | | | |
| 44.669 | .0259 | | | | | .0251 | 1.12 | 2.64 | 2.61 | 2.62 | .013 | .00 | .00 | PIPE | | | | | |
| -1867.083 | 2521.418 | 2.650 | 2524.067 | 227.00 | 21.49 | 7.17 | 2531.24 | .00 | 4.26 | 4.99 | 5.000 | .000 | .00 | 1 | .0 | | | | |
| 234.243 | .0259 | | | | | .0235 | 5.51 | 2.65 | 2.60 | 2.62 | .013 | .00 | .00 | PIPE | | | | | |



Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-13-2019 Time:11:21:32

KBH180S-004 Montecito 60 Storm Drain Infrastructure - TDS ADD

SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)

STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
| -1632.840 | 2527.480 | 2.753 | 2530.233 | 227.00 | 20.49 | 6.52 | 2536.75 | .00 | 4.26 | 4.97 | 5.000 | .000 | .00 | 1 .0 |
| 264.840 | .0225 | | | | | .0211 | 5.58 | 2.75 | 2.42 | 2.74 | .013 | .00 | .00 | PIPE |
| -1368.000 | 2533.440 | 2.834 | 2536.274 | 227.00 | 19.77 | 6.07 | 2542.34 | .91 | 4.26 | 4.96 | 5.000 | .000 | .00 | 1 .0 |
| 71.520 | .0225 | | | | | .0195 | 1.40 | 3.75 | 2.29 | 2.74 | .013 | .00 | .00 | PIPE |
| -1296.480 | 2535.050 | 2.887 | 2537.937 | 227.00 | 19.33 | 5.80 | 2543.74 | .00 | 4.26 | 4.94 | 5.000 | .000 | .00 | 1 .0 |
| 43.680 | .0224 | | | | | .0185 | .81 | 2.89 | 2.21 | 2.74 | .013 | .00 | .00 | PIPE |
| -1252.799 | 2536.031 | 2.933 | 2538.964 | 227.00 | 18.96 | 5.58 | 2544.55 | .00 | 4.26 | 4.92 | 5.000 | .000 | .00 | 1 .0 |
| 26.988 | .0292 | | | | | .0172 | .46 | 2.93 | 2.14 | 2.53 | .013 | .00 | .00 | PIPE |
| -1225.808 | 2536.821 | 3.031 | 2539.852 | 227.00 | 18.23 | 5.16 | 2545.01 | .00 | 4.26 | 4.89 | 5.000 | .000 | .00 | 1 .0 |
| 14.367 | .0291 | | | | | .0158 | .23 | 3.03 | 2.01 | 2.53 | .013 | .00 | .00 | PIPE |
| -1211.441 | 2537.240 | 3.097 | 2540.336 | 227.00 | 17.77 | 4.90 | 2545.24 | .00 | 4.26 | 4.86 | 5.000 | .000 | .00 | 1 .0 |
| 21.535 | .0291 | | | | | .0144 | .31 | 3.10 | 1.93 | 2.53 | .013 | .00 | .00 | PIPE |
| -1189.906 | 2537.867 | 3.226 | 2541.093 | 227.00 | 16.94 | 4.46 | 2545.55 | .00 | 4.26 | 4.78 | 5.000 | .000 | .00 | 1 .0 |
| 16.382 | .0291 | | | | | .0128 | .21 | 3.23 | 1.78 | 2.53 | .013 | .00 | .00 | PIPE |
| -1173.524 | 2538.344 | 3.364 | 2541.708 | 227.00 | 16.16 | 4.05 | 2545.76 | .00 | 4.26 | 4.69 | 5.000 | .000 | .00 | 1 .0 |
| 12.437 | .0291 | | | | | .0114 | .14 | 3.36 | 1.65 | 2.53 | .013 | .00 | .00 | PIPE |
| -1161.087 | 2538.706 | 3.512 | 2542.218 | 227.00 | 15.40 | 3.68 | 2545.90 | .00 | 4.26 | 4.57 | 5.000 | .000 | .00 | 1 .0 |
| 9.237 | .0291 | | | | | .0102 | .09 | 3.51 | 1.51 | 2.53 | .013 | .00 | .00 | PIPE |



Program Package Serial Number: 7189

WATER SURFACE PROFILE LISTING Date: 5-13-2019 Time:11:21:32

KBH180S-004 Montecito 60 Storm Drain Infrastructure - TDS ADD

SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)

STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
| -1151.850 | 2538.975 | 3.672 | 2542.647 | 227.00 | 14.69 | 3.35 | 2546.00 | .00 | 4.26 | 4.42 | 5.000 | .000 | .00 | 1 .0 |
| 6.488 | .0291 | | | | | .0091 | .06 | 3.67 | 1.38 | 2.53 | .013 | .00 | .00 | PIPE |
| -1145.362 | 2539.164 | 3.847 | 2543.011 | 227.00 | 14.00 | 3.05 | 2546.06 | .00 | 4.26 | 4.21 | 5.000 | .000 | .00 | 1 .0 |
| 3.961 | .0291 | | | | | .0082 | .03 | 3.85 | 1.26 | 2.53 | .013 | .00 | .00 | PIPE |
| -1141.402 | 2539.279 | 4.041 | 2543.320 | 227.00 | 13.35 | 2.77 | 2546.09 | .00 | 4.26 | 3.94 | 5.000 | .000 | .00 | 1 .0 |
| 1.402 | .0291 | | | | | .0075 | .01 | 4.04 | 1.13 | 2.53 | .013 | .00 | .00 | PIPE |
| -1140.000 | 2539.320 | 4.263 | 2543.583 | 227.00 | 12.73 | 2.52 | 2546.10 | .00 | 4.26 | 3.55 | 5.000 | .000 | .00 | 1 .0 |

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                                                                                                                SDN
 TRANS STR   .0290                                                          .0014      .01    4.26    1.00              .013       .00    .00  PIPE
         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1130.000  2539.610    6.380  2545.990    227.00    5.68     .50  2546.49     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1129.998  2539.612    6.404  2546.016    227.00    5.68     .50  2546.52     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
   44.605    .0329                                                 .0014      .06    6.40    .45    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1085.393  2541.078    5.000  2546.078    227.00    5.68     .50  2546.58     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
    5.713    .0329                                                 .0008      .00    5.00    .45    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1079.681  2541.266    4.766  2546.032    227.00    5.95     .55  2546.58     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
    4.266    .0329                                                 .0010      .00    4.77    .48    1.36    .013       .00    .00  BOX
                   -------------------- WARNING - Flow depth near top of box conduit --------------------
         |         |         |         |         |         |         |         |         |         |         |         |         |         |
-1075.414  2541.406    4.587  2545.993    227.00    6.19     .59  2546.59     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
HYDRAULIC JUMP
                   -------------------- WARNING - Flow depth near top of box conduit --------------------
♠ FILE: SDN.WSW                                W S P G W - CIVILDESIGN Version 14.08                                    PAGE    7
                                    Program Package Serial Number: 7189
                                                WATER SURFACE PROFILE LISTING                    Date: 5-13-2019  Time:11:21:32
                                  KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS ADD
                                    SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)
                                      STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL
**********************************************************************************************************************************
         | Invert  | Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|       |No Wth
 Station |  Elev   |  (FT) |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev | Depth  | Width  |Dia.-FT|or I.D.|  ZL   |Prs/Pip
         |         |       |         |         |          SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR   |Type Ch
**********|*********|*******|*********|*********|*******|*******|*********|*******|********|********|*******|*******|*******|*******
         |         |       |         |         |       |       |         |       |        |        |       |       |       |
-1075.414  2541.406    1.723  2543.130    227.00   16.46    4.21  2547.34     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
    1.009    .0329                                                 .0161      .02    1.72    2.21    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1074.406  2541.439    1.731  2543.170    227.00   16.40    4.17  2547.34     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
   16.463    .0329                                                 .0150      .25    1.73    2.20    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1057.942  2541.980    1.815  2543.796    227.00   15.63    3.79  2547.59     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
   12.910    .0329                                                 .0130      .17    1.82    2.04    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1045.032  2542.405    1.904  2544.308    227.00   14.91    3.45  2547.76     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
   10.245    .0329                                                 .0113      .12    1.90    1.90    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1034.787  2542.741    1.997  2544.738    227.00   14.21    3.14  2547.87     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
    8.159    .0329                                                 .0099      .08    2.00    1.77    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1026.628  2543.010    2.094  2545.104    227.00   13.55    2.85  2547.95     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
    6.470    .0329                                                 .0086      .06    2.09    1.65    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1020.158  2543.222    2.196  2545.419    227.00   12.92    2.59  2548.01     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
    5.064    .0329                                                 .0075      .04    2.20    1.54    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1015.094  2543.389    2.303  2545.692    227.00   12.32    2.36  2548.05     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
    3.868    .0329                                                 .0066      .03    2.30    1.43    1.36    .013       .00    .00  BOX
♠ FILE: SDN.WSW                                W S P G W - CIVILDESIGN Version 14.08                                    PAGE    8
                                    Program Package Serial Number: 7189
                                                WATER SURFACE PROFILE LISTING                    Date: 5-13-2019  Time:11:21:32
                                  KBH1805-004 Montecito 60 Storm Drain Infrastructure - TDS ADD
                                    SDN - STORM DRAIN NORTHERN MAINLINE SYSTEM (FAC. E1 TO E2)
                                      STARTING WATER SURFACE ELEVATION PER CENTENNIAL MODEL
**********************************************************************************************************************************
         | Invert  | Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|       |No Wth
 Station |  Elev   |  (FT) |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev | Depth  | Width  |Dia.-FT|or I.D.|  ZL   |Prs/Pip
         |         |       |         |         |          SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR   |Type Ch
**********|*********|*******|*********|*********|*******|*******|*********|*******|********|********|*******|*******|*******|*******
         |         |       |         |         |       |       |         |       |        |        |       |       |       |
-1011.226  2543.516    2.416  2545.932    227.00   11.75    2.14  2548.07     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
    2.830    .0329                                                 .0057      .02    2.42    1.33    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1008.395  2543.609    2.534  2546.143    227.00   11.20    1.95  2548.09     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
    1.915    .0329                                                 .0050      .01    2.53    1.24    1.36    .013       .00    .00  BOX
         |         |         |         |         |         |         |         |         |         |         |         |         |
-1006.480  2543.672    2.657  2546.330    227.00   10.68    1.77  2548.10     .00    2.92    8.00    5.000    8.000    .00   0   .0
         -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-      -|-      -|-     |-
```

```
                                                                                                                SDN
    1.096    .0329                                                                .0044      .00     2.66    1.15    1.36    .013       .00   .00  BOX
      |        |       |        |        |                                        |         |        |       |       |       |        |     |
-1005.384  2543.708    2.787  2546.495    227.00   10.18    1.61  2548.10      .00    2.92    8.00    5.000   8.000   .00   0   .0
      -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     -|-     -|-     -|-    |-
    .354    .0329                                                                .0038      .00     2.79    1.07    1.36    .013       .00   .00  BOX
      |        |       |        |        |                                        |         |        |       |       |       |        |     |
-1005.030  2543.720    2.924  2546.644    227.00    9.70    1.46  2548.11      .00    2.92    8.00    5.000   8.000   .00   0   .0
      -|-      -|-      -|-      -|-      -|-     -|-     -|-      -|-     -|-     -|-     -|-     -|-     -|-     -|-    |-
```

PER TDS

SDM.WSW

```
T1 KBH1805-004 Montecito 60 Storm Drain Infrastructure
T2 SDM - STORM DRAIN CENTRAL STUB SYSTEM (FAC. P4 TO E3)
T3 STARTING WATER SURFACE ELEVATION PER SDS MODEL
SO    529.34 2478.00  36                          2478.75
R     872.05 2484.50  36      .013                                .000   0.0   0
JX    872.05 2484.50  36 36   .013    8.0           2484.500      -59.0
R    1184.10 2490.27  36      .013                                    -53.0   1
R    1218.28 2490.91  36      .013                                    -32.0   1
R    1278.44 2492.02  36      .013                                      0.0   1
SH   1278.44 2492.02  36
CD  36  4   1   0.000   3.000    0.000 0.000 0.000  0.0000.00  0.00
CD  62  3   1   1.000   2.000    6.000 0.000 0.000  0.0000.00  0.00
CD  73  3   1   1.000   3.000    7.000 0.000 0.000  0.0000.00  0.00
Q           68.000   .0
```

SDM.EDT

FILE: SDM.WSW  W S P G W - EDIT LISTING - Version 14.10  Date: 3- 6-2019 Time:10:20:11

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING  PAGE 1

| CARD CODE | SECT NO | CHN TYPE | NO OF PIER/PIP | AVE PIER WIDTH | HEIGHT 1 DIAMETER | BASE WIDTH | ZL | ZR | INV DROP | Y(1) | Y(2) | Y(3) | Y(4) | Y(5) | Y(6) | Y(7) | Y(8) | Y(9) | Y(10) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD | 18 | 4 | 1 | | 1.500 | | | | | | | | | | | | | | |
| CD | 24 | 4 | 1 | | 2.000 | | | | | | | | | | | | | | |
| CD | 30 | 4 | 1 | | 2.500 | | | | | | | | | | | | | | |
| CD | 36 | 4 | 1 | | 3.000 | | | | | | | | | | | | | | |
| CD | 54 | 4 | 1 | | 4.500 | | | | | | | | | | | | | | |
| CD | 60 | 4 | 1 | | 5.000 | | | | | | | | | | | | | | |
| CD | 62 | 3 | 1 | 1.000 | 2.000 | 6.000 | .000 | .000 | .00 | | | | | | | | | | |
| CD | 73 | 3 | 1 | 1.000 | 3.000 | 7.000 | .000 | .000 | .00 | | | | | | | | | | |

W S P G W  PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

KBH1805-004 Montecito 60 Storm Drain Infrastructure

HEADING LINE NO 2 IS -

SDM - STORM DRAIN CENTRAL STUB SYSTEM (FAC. P4 TO E3)

HEADING LINE NO 3 IS -

STARTING WATER SURFACE ELEVATION PER SDS MODEL

W S P G W  PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

| U/S DATA | STATION | INVERT | SECT | W S ELEV |
|---|---|---|---|---|
| | 529.340 | 2478.000 | 36 | 2478.750 |

ELEMENT NO 2 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | 872.050 | 2484.500 | 36 | .013 | .000 | .000 | .000 | 0 |

ELEMENT NO 3 IS A JUNCTION * * * * * * *

| U/S DATA | STATION | INVERT | SECT | LAT-1 | LAT-2 | N | Q3 | Q4 | INVERT-3 | INVERT-4 | PHI 3 | PHI 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 872.050 | 2484.500 | 36 | 36 | 0 | .013 | 8.000 | .000 | 2484.500 | .000 | -59.000 | .000 |

| RADIUS | ANGLE |
|---|---|
| .000 | .000 |

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 4 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | 1184.100 | 2490.270 | 36 | .013 | .000 | .000 | -53.000 | 1 |

ELEMENT NO 5 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | 1218.280 | 2490.910 | 36 | .013 | .000 | .000 | -32.000 | 1 |

ELEMENT NO 6 IS A REACH * * *

| U/S DATA | STATION | INVERT | SECT | N | RADIUS | ANGLE | ANG PT | MAN H |
|---|---|---|---|---|---|---|---|---|
| | 1278.440 | 2492.020 | 36 | .013 | .000 | .000 | .000 | 1 |

ELEMENT NO 7 IS A SYSTEM HEADWORKS * *

| U/S DATA | STATION | INVERT | SECT | W S ELEV |
|---|---|---|---|---|
| | 1278.440 | 2492.020 | 36 | .000 |

KBH1805-004 Montecito 60 Storm Drain Infrastructure
SDM - STORM DRAIN CENTRAL STUB SYSTEM (FAC. P4 TO E3)
STARTING WATER SURFACE ELEVATION PER SDS MODEL

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
| 529.340 | 2478.000 | 2.087 | 2480.087 | 76.00 | 14.48 | 3.26 | 2483.34 | .00 | 2.73 | 2.76 | 3.000 | .000 | .00 | 1 .0 |
| 143.762 | .0190 | | | | | .0185 | 2.66 | 2.09 | 1.85 | 2.08 | .013 | .00 | .00 | PIPE |
| 673.102 | 2480.727 | 2.113 | 2482.840 | 76.00 | 14.28 | 3.17 | 2486.01 | .00 | 2.73 | 2.74 | 3.000 | .000 | .00 | 1 .0 |
| 112.413 | .0190 | | | | | .0173 | 1.94 | 2.11 | 1.81 | 2.08 | .013 | .00 | .00 | PIPE |
| 785.516 | 2482.859 | 2.210 | 2485.068 | 76.00 | 13.62 | 2.88 | 2487.95 | .00 | 2.73 | 2.64 | 3.000 | .000 | .00 | 1 .0 |
| 44.760 | .0190 | | | | | .0155 | .69 | 2.21 | 1.65 | 2.08 | .013 | .00 | .00 | PIPE |
| 830.276 | 2483.708 | 2.315 | 2486.023 | 76.00 | 12.98 | 2.62 | 2488.64 | .00 | 2.73 | 2.52 | 3.000 | .000 | .00 | 1 .0 |
| 24.059 | .0190 | | | | | .0139 | .34 | 2.31 | 1.50 | 2.08 | .013 | .00 | .00 | PIPE |
| 854.334 | 2484.164 | 2.432 | 2486.596 | 76.00 | 12.38 | 2.38 | 2488.98 | .00 | 2.73 | 2.35 | 3.000 | .000 | .00 | 1 .0 |
| 13.088 | .0190 | | | | | .0127 | .17 | 2.43 | 1.35 | 2.08 | .013 | .00 | .00 | PIPE |
| 867.423 | 2484.412 | 2.566 | 2486.979 | 76.00 | 11.80 | 2.16 | 2489.14 | .00 | 2.73 | 2.11 | 3.000 | .000 | .00 | 1 .0 |
| 4.627 | .0190 | | | | | .0117 | .05 | 2.57 | 1.19 | 2.08 | .013 | .00 | .00 | PIPE |
| 872.050 | 2484.500 | 2.730 | 2487.230 | 76.00 | 11.25 | 1.97 | 2489.20 | .00 | 2.73 | 1.72 | 3.000 | .000 | .00 | 1 .0 |
| JUNCT STR | .0000 | | | | | .0109 | .00 | 2.73 | 1.00 | | .013 | .00 | .00 | PIPE |
| 872.050 | 2484.500 | 3.613 | 2488.113 | 68.00 | 9.62 | 1.44 | 2489.55 | .00 | 2.63 | .00 | 3.000 | .000 | .00 | 1 .0 |
| 37.580 | .0185 | | | | | .0104 | .39 | 3.61 | .00 | 1.94 | .013 | .00 | .00 | PIPE |
| 909.630 | 2485.195 | 3.399 | 2488.594 | 68.00 | 9.62 | 1.44 | 2490.03 | .00 | 2.63 | .00 | 3.000 | .000 | .00 | 1 .0 |
| HYDRAULIC JUMP | | | | | | | | | | | | | | |

2488.11 UTILIZED FOR HGL AT PROPOSED LATERAL.

KBH1805-004 Montecito 60 Storm Drain Infrastructure
SDM - STORM DRAIN CENTRAL STUB SYSTEM (FAC. P4 TO E3)
STARTING WATER SURFACE ELEVATION PER SDS MODEL

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
| 909.630 | 2485.195 | 1.941 | 2487.136 | 68.00 | 14.06 | 3.07 | 2490.20 | .00 | 2.63 | 2.87 | 3.000 | .000 | .00 | 1 .0 |
| 162.158 | .0185 | | | | | .0181 | 2.94 | 1.94 | 1.91 | 1.94 | .013 | .00 | .00 | PIPE |
| 1071.787 | 2488.193 | 1.964 | 2490.157 | 68.00 | 13.87 | 2.99 | 2493.14 | .00 | 2.63 | 2.85 | 3.000 | .000 | .00 | 1 .0 |
| 112.313 | .0185 | | | | | .0168 | 1.89 | 1.96 | 1.86 | 1.94 | .013 | .00 | .00 | PIPE |
| 1184.100 | 2490.270 | 2.048 | 2492.318 | 68.00 | 13.22 | 2.72 | 2495.03 | .00 | 2.63 | 2.79 | 3.000 | .000 | .00 | 1 .0 |
| 34.180 | .0187 | | | | | .0152 | .52 | 2.05 | 1.72 | 1.93 | .013 | .00 | .00 | PIPE |
| 1218.280 | 2490.910 | 2.117 | 2493.026 | 68.00 | 12.76 | 2.53 | 2495.55 | .00 | 2.63 | 2.73 | 3.000 | .000 | .00 | 1 .0 |
| 12.751 | .0185 | | | | | .0142 | .18 | 2.12 | 1.61 | 1.94 | .013 | .00 | .00 | PIPE |
| 1231.031 | 2491.145 | 2.152 | 2493.297 | 68.00 | 12.53 | 2.44 | 2495.74 | .00 | 2.63 | 2.70 | 3.000 | .000 | .00 | 1 .0 |
| 23.175 | .0185 | | | | | .0132 | .31 | 2.15 | 1.56 | 1.94 | .013 | .00 | .00 | PIPE |
| 1254.206 | 2491.573 | 2.252 | 2493.825 | 68.00 | 11.95 | 2.22 | 2496.04 | .00 | 2.63 | 2.60 | 3.000 | .000 | .00 | 1 .0 |
| 13.881 | .0185 | | | | | .0119 | .16 | 2.25 | 1.42 | 1.94 | .013 | .00 | .00 | PIPE |
| 1268.087 | 2491.829 | 2.362 | 2494.191 | 68.00 | 11.39 | 2.01 | 2496.21 | .00 | 2.63 | 2.46 | 3.000 | .000 | .00 | 1 .0 |
| 7.728 | .0185 | | | | | .0107 | .08 | 2.36 | 1.29 | 1.94 | .013 | .00 | .00 | PIPE |
| 1275.815 | 2491.972 | 2.485 | 2494.457 | 68.00 | 10.86 | 1.83 | 2496.29 | .00 | 2.63 | 2.26 | 3.000 | .000 | .00 | 1 .0 |
| 2.625 | .0185 | | | | | .0098 | .03 | 2.49 | 1.15 | 1.94 | .013 | .00 | .00 | PIPE |
| 1278.440 | 2492.020 | 2.630 | 2494.650 | 68.00 | 10.35 | 1.66 | 2496.31 | .00 | 2.63 | 1.97 | 3.000 | .000 | .00 | 1 .0 |

| | |
|---|---|
| **Project Name:** | MONTECITO 60 STORM DRAIN INFRASTRUCTURE |
| **Project Number:** | KBH1805.004 |
| **Date:** | Apr-2019 |
| **By:** | J. ROCHA |

a Westwood team

# STORM SEWER HYDRAULIC CALCULATIONS

| CONDUIT DATA | | | | | | FLOW DATA | | | | | | | LOSS | HGL | | COMMENTS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | | SIZE / TYPE | INVERTS | | LENGTH | A | R | Φ | Q | V | $H_v$ = | $S_f$ | PIPE | PIPE | | | |
| FROM | TO | | D / S ELEV. | U / S ELEV. | | ($FT^2$) | (FT) | | (CFS) | (FPS) | $V^2/2g$ (FT) | (FT/FT) | $H_f$ (FT) | D/S HGL ELEV. | U/S HGL ELEV. | PRESS. FLOW? | OTHER |
| NORTHERN SYSTEM | | | | | | | | | | | | | | | | | |
| 1000.00 | 1047.18 | Round 30" RCP | 2508.04 | 2508.51 | 47.18 | 4.908738 | 0.625 | 0.004925 | 37 | 7.537578 | 0.882222 | 0.008117787 | 0.383 | 2511.78 | 2512.161 | Yes | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

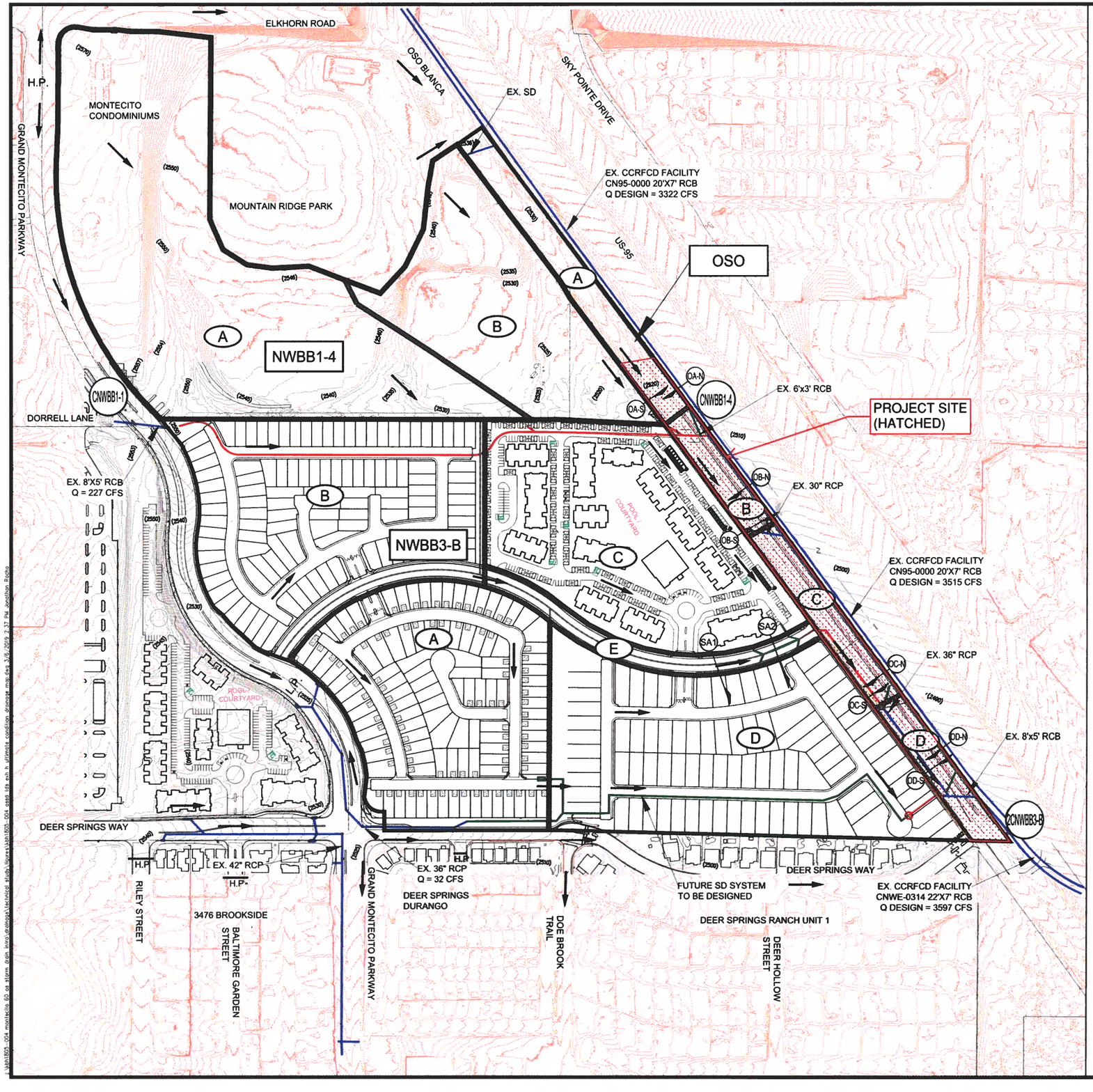
$Sf = \Phi Hv / R^{1.33}$

$\Phi = 2g (n^2) / 2.21$

1 - Where pipes are not under pressure, assume U/S HGL is at top of pipe

2511.78 UTILIZED FOR HGL AT PROPOSED LATERAL FD5-N

# Referenced Exhibits




N

0 150 300
SCALE – 1"=150' FEET

**LEGEND**

- BASIN BOUNDARY
- PRO-RATED SUBBASIN BOUNDARY
- EXISTING DRAINAGE FACILITIES
- PROPOSED DRAINAGE FACILITIES
- FUTURE DRAINAGE FACILITIES
- ID — BASIN ID
- ID — PRO-RATED SUBBASIN ID
- ID — CONCENTRATION POINT ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID

**Ultimate Condition Flow Rate Summary**

| Basin/Concentration Point ID | Area (ac) | $Q_{100}$ (cfs) | $Q_{10}$ (cfs) |
|---|---|---|---|
| NWBB3-B* | 53.0 | 135 | (74) |
| NWBB1-4* | 33.0 | 30 | (17) |
| ROFF1 | 7.9 | 23 | 9 |
| RON1 | 2.7 | 10 | 5 |
| OSO | 6.3 | 18 | 10 |
| CNWBB1-1 Q = REF* | N/A | 227 | (125) |
| CNBB1-4 Q = REF* | N/A | 3334 | (1834) |
| 2CNWBB3-B* Q = REF* | N/A | 3579 | (1968) |

(Q10) VALUES DENOTED IN PARENTHESIS HAVE BEEN
* DENOTES REFERENCED FROM CENTENNIAL CHANNEL STUDY

**Ultimate Condition Prorated Flow Summary**

| Basin ID | $Q_{100}$ (cfs) | $Q_{10}$ (cfs) | Area (acres) | 100-yr Unit Flow (cfs/acre) | 10-yr Unit Flow (cfs/acre) |
|---|---|---|---|---|---|
| NWBB1-4 | 30 | 17 | 33.0 | 0.9 | 0.5 |
| NWBB3-B | 135 | 74 | 53.0 | 2.5 | 1.4 |
| OSO | 18 | 10 | 6.3 | 2.9 | 1.6 |
| **Subbasin ID** | **$Q_{100}$ (cfs)** | **$Q_{10}$ (cfs)** | **Area (acres)** | **100-yr Unit Flow (cfs/acre)** | **10-yr Unit Flow (cfs/acre)** |
| NWBB1-4(A) | 22 | 13 | 24.5 | 0.9 | 0.5 |
| NWBB1-4(B) | 8 | 4 | 8.6 | 0.9 | 0.5 |
| ***TOTAL*** | ***30*** | ***17*** | ***33.0*** | | |
| NWBB3-B(A) | 30 | 16 | 11.6 | 2.5 | 1.4 |
| NWBB3-B(B) | 33 | 18 | 13.0 | 2.5 | 1.4 |
| NWBB3-B(C) | 31 | 17 | 12.2 | 2.5 | 1.4 |
| NWBB3-B(D) | 37 | 20 | 14.6 | 2.5 | 1.4 |
| NWBB3-B(E) | 4 | 2 | 1.7 | 2.5 | 1.4 |
| ***TOTAL*** | ***135*** | ***74*** | ***53.0*** | | |
| OSO(A) | 7 | 4 | 2.5 | 2.9 | 1.6 |
| OSO(B) | 3 | 2 | 1.0 | 2.9 | 1.6 |
| OSO(C) | 4 | 2 | 1.5 | 2.9 | 1.6 |
| OSO(D) | 4 | 2 | 1.3 | 2.9 | 1.6 |
| ***TOTAL*** | ***18*** | ***10*** | ***6.3*** | | |

**Ultimate Condition 100-Year Street Flow Summary**

| Section ID | $Q_{100}$ (cfs) | Slope (%) | Depth (ft) | Velocity (fps) | DxV |
|---|---|---|---|---|---|
| SA1** Q = NWBB3-B(B+E) + ASSUMED 2-CFS FROM (C) | 39 | 1.00 | 0.60 | 3.63 | 2.2 |
| SA2 Q = DI BYPASS | 1.0 | 1.00 | 0.22 | 1.68 | 0.4 |
| OA-N Q = (1/2)OSO(A) | 3.5 | 2.00 | 0.34 | 3.09 | 1.1 |
| OB-N Q = (1/2)OSO(B) | 1.5 | 2.00 | 0.27 | 2.61 | 0.7 |
| OC-N Q = (1/2)OSO(C) | 2.0 | 2.00 | 0.29 | 2.76 | 0.8 |
| OD-N Q = (1/2)OSO(D) | 2.0 | 2.00 | 0.29 | 2.76 | 0.8 |
| OA-S Q = (1/2)OSO(A) | 3.5 | 2.00 | 0.34 | 3.09 | 1.1 |
| OB-S Q = (1/2)OSO(B) | 1.5 | 2.00 | 0.27 | 2.61 | 0.7 |
| OC-S Q = (1/2)OSO(C) | 2.0 | 2.00 | 0.29 | 2.76 | 0.8 |
| OD-S Q = (1/2)OSO(D) | 2.0 | 2.00 | 0.29 | 2.76 | 0.8 |

** ASSUMES 2-CFS BYPASS INTO STREET FROM THE FUTURE MULTI-UNIT DEVELOPMENT

**Ultimate Condition 10-Year Street Flow Summary**

| Section ID | $Q_{10}$ (cfs) | Slope (%) | Depth (ft) | Velocity (fps) | DxV | Dry Lane (ft) |
|---|---|---|---|---|---|---|
| OA-N Q = (1/2)OSO(A) | 2 | 2.00 | 0.29 | 2.8 | 0.8 | 16.5 |
| OB-N Q = (1/2)OSO(B) | 1 | 2.00 | 0.24 | 2.5 | 0.6 | 19.0 |
| OC-N Q = (1/2)OSO(C) | 1 | 2.00 | 0.24 | 2.5 | 0.6 | 19.0 |
| OD-N Q = (1/2)OSO(D) | 1 | 2.00 | 0.24 | 2.5 | 0.6 | 19.0 |
| OA-S Q = (1/2)OSO(A) | 2 | 2.00 | 0.29 | 2.8 | 0.8 | 16.5 |
| OB-S Q = (1/2)OSO(B) | 1 | 2.00 | 0.24 | 2.5 | 0.6 | 19.0 |
| OC-S Q = (1/2)OSO(C) | 1 | 2.00 | 0.24 | 2.5 | 0.6 | 19.0 |
| OD-S Q = (1/2)OSO(D) | 1 | 2.00 | 0.24 | 2.5 | 0.6 | 19.0 |


SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399


| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|

CITY OF LAS VEGAS, NV

KB HOMES

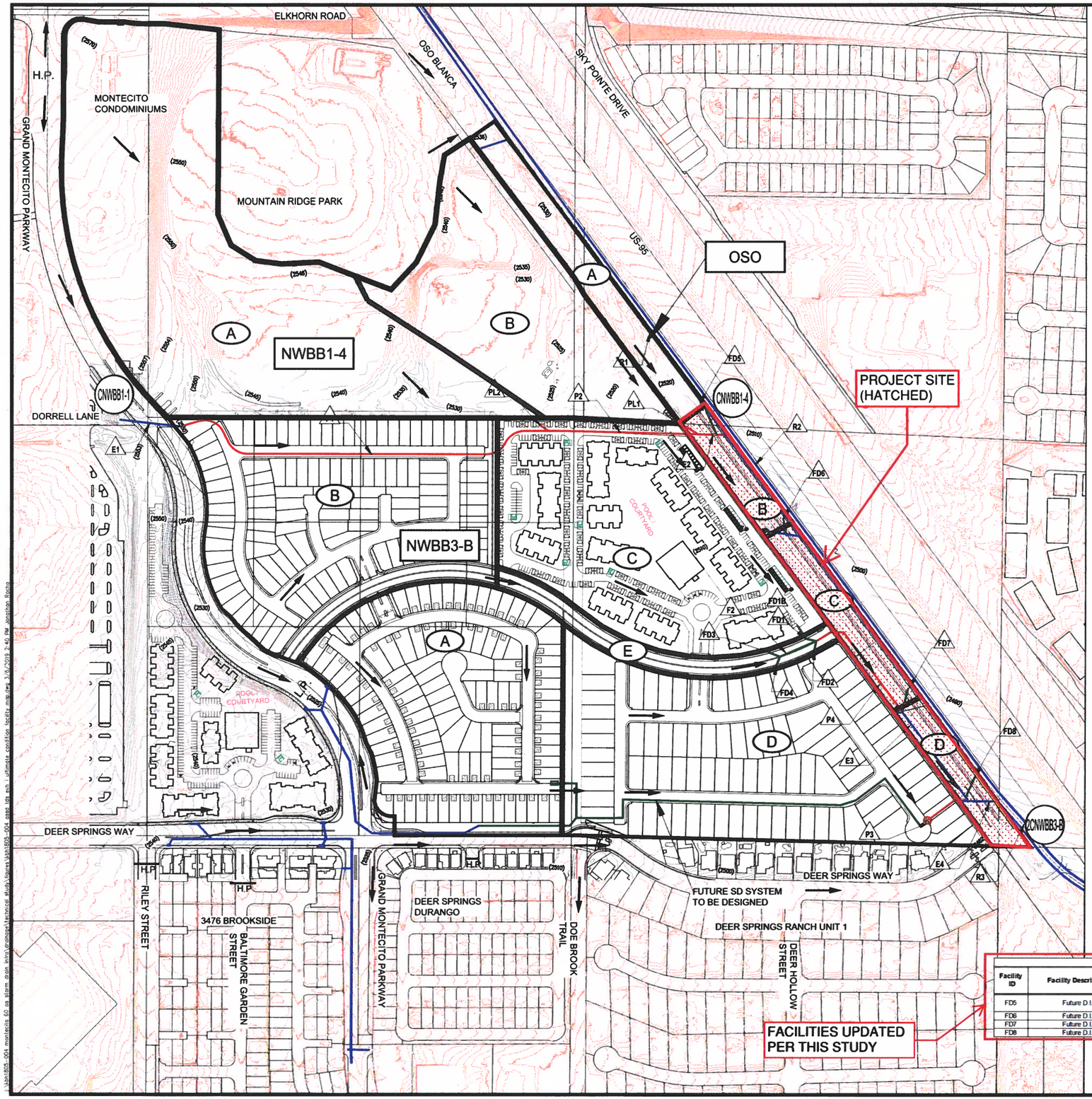
# MONTECITO STORM DRAIN INFRASTRUCTURE
# ULTIMATE CONDITION DRAINAGE MAP

S-T-R
21-19S
R 60E

DATE: MARCH 2019
DRAFTER: JSR
DESIGNER: JSR
CHECKED: SOA
PROJECT NO.
KBH1805.004

**EXHIBIT H**
SHEET 1 OF 1


\\KBH1805 - 004 montecito 60 ac interim drain (xrefs-drainage)\Mandated drains\Drains\KBH1805_004_ultimate_condition_drainage_map.dwg, 3/6/2019 2:37 PM, Jonathon Rocha




**Ultimate Condition Flow Rate Summary**

| Basin/Concentration Point ID | Area (ac) | $Q_{100}$ (cfs) | $Q_{10}$ (cfs) |
|---|---|---|---|
| NWBB3-B* | 53.0 | 135 | (74) |
| NWBB1-4* | 33.0 | 30 | (17) |
| ROFF1 | 7.9 | 23 | 9 |
| RON1 | 2.7 | 10 | 5 |
| OSO | 6.3 | 18 | 10 |
| CNWBB1-1 Q = REF* | N/A | 227 | (125) |
| CNBB1-4 Q = REF* | N/A | 3334 | (1834) |
| 2CNWBB3-B* Q = REF* | N/A | 3579 | (1968) |

(Q10) VALUES DENOTED IN PARENTHESIS HAVE BEEN
* DENOTES REFERENCED FROM CENTENNIAL CHANNEL STUDY

**Ultimate Condition Prorated Flow Summary**

| Basin ID | $Q_{100}$ (cfs) | $Q_{10}$ (cfs) | Area (acres) | 100-yr Unit Flow (cfs/acre) | 10-yr Unit Flow (cfs/acre) |
|---|---|---|---|---|---|
| NWBB1-4 | 30 | 17 | 33.0 | 0.9 | 0.5 |
| NWBB3-B | 135 | 74 | 53.0 | 2.5 | 1.4 |
| OSO | 18 | 10 | 6.3 | 2.9 | 1.6 |
| **Subbasin ID** | **$Q_{100}$ (cfs)** | **$Q_{10}$ (cfs)** | **Area (acres)** | **100-yr Unit Flow (cfs/acre)** | **10-yr Unit Flow (cfs/acre)** |
| NWBB1-4(A) | 22 | 13 | 24.5 | 0.9 | 0.5 |
| NWBB1-4(B) | 8 | 4 | 8.6 | 0.9 | 0.5 |
| ***TOTAL*** | ***30*** | ***17*** | ***33.0*** | | |
| NWBB3-B(A) | 30 | 16 | 11.6 | 2.5 | 1.4 |
| NWBB3-B(B) | 33 | 18 | 13.0 | 2.5 | 1.4 |
| NWBB3-B(C) | 31 | 17 | 12.2 | 2.5 | 1.4 |
| NWBB3-B(D) | 37 | 20 | 14.6 | 2.5 | 1.4 |
| NWBB3-B(E) | 4 | 2 | 1.7 | 2.5 | 1.4 |
| ***TOTAL*** | ***135*** | ***74*** | ***53.0*** | | |
| OSO(A) | 7 | 4 | 2.5 | 2.9 | 1.6 |
| OSO(B) | 3 | 2 | 1.0 | 2.9 | 1.6 |
| OSO(C) | 4 | 2 | 1.5 | 2.9 | 1.6 |
| OSO(D) | 4 | 2 | 1.3 | 2.9 | 1.6 |
| ***TOTAL*** | ***18*** | ***10*** | ***6.3*** | | |

**LEGEND**

- BASIN BOUNDARY
- PRO-RATED SUBBASIN BOUNDARY
- EXISTING DRAINAGE FACILITIES
- PROPOSED DRAINAGE FACILITIES
- FUTURE DRAINAGE FACILITIES
- ID — BASIN ID
- ID — PRO-RATED SUBBASIN ID
- ID — CONCENTRATION POINT ID
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID

**Ultimate Condition Recommended Flood Control Facility Summary**

| Facility ID | Facility Description | Total/Approaching Flow (cfs) $Q_{100}$ | Facility Flow (cfs) $Q_{100}$ | Surface/Bypass Flow (cfs) $Q_{100}$ | Notes |
|---|---|---|---|---|---|
| R3 | Existing 20'x7' RCB | - | 3597 | - | CCRFCD Regional Facility |
| E4 | Existing 8'x5' RCB | - | 175 | - | |
| P3 | Proposed 48" RCP | 99 | 99 | - | Connect to Facility E4 |
| E3 | Existing NDOT Type 7 D.I. & 36" RCP | - | 76 | - | Collects flow from Facility FD7 & FD8 |
| P4 | Proposed 36" RCP | - | 68 | - | Connect to Facility E3. |
| FD1B | Future D.I. | 31 | 31 | 0 | Collects all NWBB3-B(C) Connects into Facility FD1. |
| FD1 | Future 7.5' Type CM2 D.I. | 0.5 | 0.5 | 0 | |
| FD2 | Future 7.5' Type CM2 D.I. | 0.5 | 0.5 | 0 | |
| F2 | Future 30" RCP | - | 38 | - | |
| FD3 | Future 20' Type CM2 D.I. | 19.5 | 19 | 0.5 | 0.5-cfs bypass to DI3&4. Assumed 2-cfs collection from NWBB3-B(C) |
| FD4 | Future 20' Type CM2 D.I. | 19.5 | 19 | 0.5 | 0.5-cfs bypass to DI3&4. Assumed 2-cfs collection from NWBB3-B(C) |
| R2 | Existing 20'x7' RCB | - | 3515 | - | CCRFCD Regional Facility |
| E2 | Existing 6'X2' RCB | - | 264 | - | Remove and replace for extension of Proposed Facility P2 |
| PL2 | Proposed NDOT Type 2 2.5'x4' & 30" RCP Lateral | 22 | 22 | 0 | |
| P2 | Proposed 54" RCP | - | 242 | - | |
| PL1 | Proposed NDOT Type 2 3.5'x4' & 18" RCP Lateral | 15 | 15 | 0 | |
| P1 | Proposed 54" CIPCP | - | 227 | - | |
| E1 | Existing 8'X5' RCB | 227 | 227 | 0 | |
| R1 | Existing 20'x7' RCB | - | 3322 | - | CCRFCD Regional Facility |

**Proposed Condition Recommended Flood Control Facility Summary**

| Facility ID | Facility Description | Total/Approaching Flow (cfs) $Q_{100}$ | Facility Flow (cfs) $Q_{100}$ | Surface/Bypass Flow (cfs) $Q_{100}$ | Notes |
|---|---|---|---|---|---|
| R3 | Existing 20'x7' RCB | - | 3597 | - | CCRFCD Regional Facility |
| E4 | Existing 8'x5' RCB | - | 115 | - | |
| P3 | Proposed 48" RCP | 49 | 49 | - | Improved open inlet in proposed condition. |
| E3 | Existing NDOT Type 7 D.I. & 36" RCP | - | 68 | - | |
| P4 | Proposed 36" RCP | - | - | - | Capped stub in proposed condition. Intended for future development. |
| FD1B | Future D.I. | - | - | - | |
| FD1 | Future 7.5' Type CM2 D.I. | - | - | - | |
| FD2 | Future 7.5' Type CM2 D.I. | - | - | - | |
| F2 | Future 30" RCP | - | - | - | |
| FD3 | Future 20' Type CM2 D.I. | - | - | - | |
| FD4 | Future 20' Type CM2 D.I. | - | - | - | |
| R2 | Existing 20'x7' RCB | - | 3515 | - | CCRFCD Regional Facility |
| E2 | Existing 6'X2' RCB | - | 264 | - | Remove and replace for extension of Proposed Facility P2 |
| PL2 | Proposed NDOT Type 2 2.5'x4' & 30" RCP Lateral | 22 | 22 | 0 | |
| P2 | Proposed 54" RCP | - | 242 | - | |
| PL1 | Proposed NDOT Type 2 3.5'x4' & 18" RCP Lateral | 15 | 15 | 0 | |
| P1 | Proposed 54" CIPCP | - | 227 | - | |
| E1 | Existing 8'X5' RCB | 227 | 227 | 0 | |
| R1 | Existing 20'x7' RCB | - | 3322 | - | CCRFCD Regional Facility |

**OSO BLANCA DRAINAGE FACILITIES**

| Facility ID | Facility Description | Total/Approaching Flow (cfs) $Q_{100}$ | Facility Flow (cfs) $Q_{100}$ | Surface/Bypass Flow (cfs) $Q_{100}$ | Notes |
|---|---|---|---|---|---|
| FD5 | Future D.I. | 7.5 | 7.5 | 0 | D.I.s to be designed with future Oso Blanca ROW improvements. |
| FD6 | Future D.I. | 3 | 3 | 0 | See Notes from Facility FD5 |
| FD7 | Future D.I. | 4 | 4 | 0 | See Notes from Facility FD5 |
| FD8 | Future D.I. | 4 | 4 | 0 | See Notes from Facility FD5 |

N

0 150 300
SCALE - 1"=150' FEET

SLATER HANIFAN GROUP
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5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|
| | | | | | |

CITY OF LAS VEGAS, NV

KB HOMES

# MONTECITO STORM DRAIN INFRASTRUCTURE
## ULTIMATE CONDITION FACILITY MAP

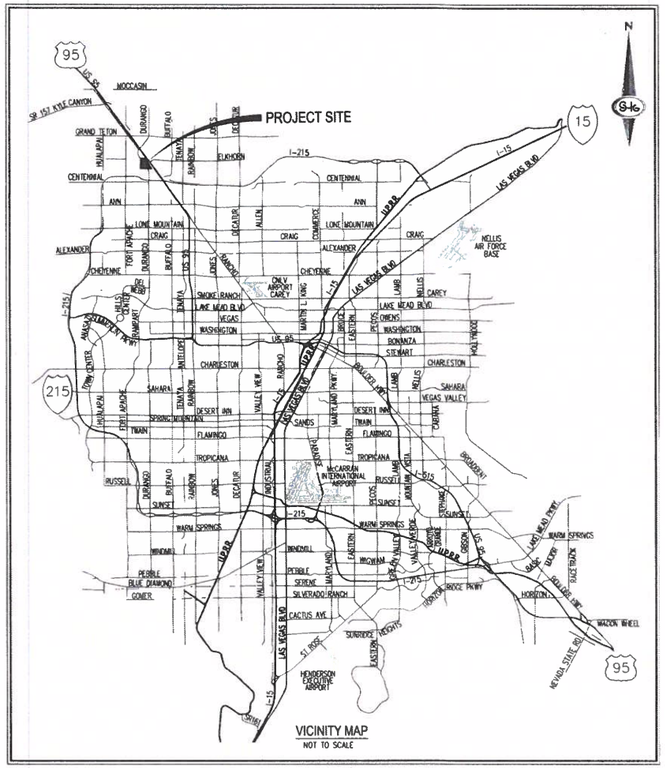
SEC 21 T19S R60E

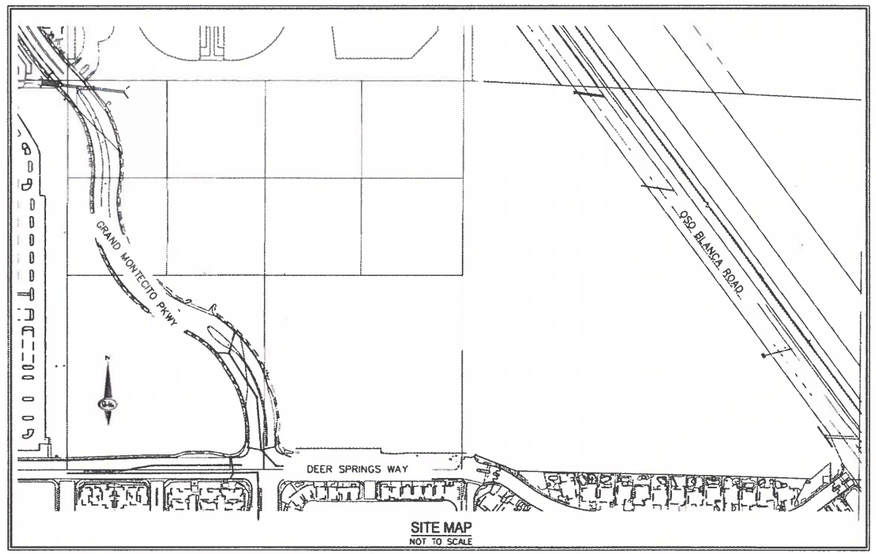
DATE: MARCH 2019
DRAFTER: JSR
DESIGNER: JSR
CHECKED: SOA
PROJECT NO. KBH1805.004

**EXHIBIT I**
SHEET 1 OF 1

K:\kbh1805-004 montecito 60 ac storm drain infrastructure\hydrology\kbh1805-004 sstm fclty mstr plan ultimate condition facility map.dwg 3/6/2019 2:41 PM josephus Rocha

# Referenced Improvement Plans




KB HOME

# IMPROVEMENT PLANS FOR MONTECITO STORM DRAIN INFRASTRUCTURE

CITY OF LAS VEGAS, NEVADA

APN: 125-20-601-003, -006, 125-20-602-002, -005, -009, -010, 125-20-603-001, -002, -003, -004, 125-21-201-001

| SHEET INDEX | | |
|---|---|---|
| NO. | SHEET | DESCRIPTION |
| 1 | C-1 | COVER SHEET |
| 2 | C-2 | GENERAL NOTES |
| 3 | C-3 | LEGEND, ABBREVIATIONS, AND QUANTITIES |
| 4 | PP-1 | PLAN & PROFILE – STORM DRAIN STA 9+00 TO 13+50 |
| 5 | PP-2 | PLAN & PROFILE – STORM DRAIN STA 13+50 TO 17+50 |
| 6 | PP-3 | PLAN & PROFILE – STORM DRAIN STA 17+50 TO 21+50 |
| 7 | PP-4 | PLAN & PROFILE – STORM DRAIN STA 21+50 TO 25+50 |
| 8 | PP-5 | PLAN & PROFILE – STORM DRAIN STA 25+50 TO 29+50 |
| 9 | PP-6 | PLAN & PROFILE – OSO BLANCA RD STA 11+50 TO 13+50 |
| 10 | PP-7 | PLAN & PROFILE – OSO BLANCA RD STA 6+50 TO 11+50 |
| 11 | PP-8 | PLAN & PROF – OSO BLANCA RD STA 5+00 TO 6+50 & SD LAT 1 |
| 12 | PP-9 | PLAN & PROFILE – STORM DRAIN SOUTH SYSTEM |
| 13 | D-1 | DETAIL SHEET I |
| 14 | D-2 | DETAIL SHEET II |

## APPROVALS

CITY ENGINEER- ALLEN PAVELKA PE, #9029 DATE

APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED OF RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIALLY LISTED UNDER DEVIATIONS FORM STANDARDS. 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

LAS VEGAS FIRE AND RESCUE DATE

CITY OF LAS VEGAS – PLANNING DEPARTMENT DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT

CENTRAL TELEPHONE CO. DBA 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 STATUES AND / OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

SHEETS: _____

APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM LAS VEGAS VALLEY WATER DISTRICT

NV ENERGY DATE

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

SOUTHWEST GAS CORPORATION DATE

COX COMMUNICATIONS LAS VEGAS, INC DATE

| DEVELOPER | ENGINEER |
|---|---|
| KB HOME<br>5295 BADURA AVE, SUITE 180<br>LAS VEGAS, NV 89118<br>PH: 702-265-8400<br>CONTACT: PAUL CHAO | SLATER HANIFAN GROUP, INC.<br>5740 S. ARVILLE STREET, SUITE 218<br>LAS VEGAS, NV 89118<br>PH: (702) 284-5300<br>FX: (702) 284-5399<br>CONTACT: STANLEY OKEY AMADI, P.E. |

## LEGAL DESCRIPTION

A PORTION OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 20, TOGETHER WITH A PORTION OF THE SOUTHWEST QUARTER (SW ¼) OF THE NORTHWEST QUARTER (NW ¼) OF SECTION 21, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

## BENCHMARK

BENCHMARK NUMBER: 6LV90 17NW6
RIVET AND PLATE IN TOP OF CURB AT SW CORNER
GILCREASE AVENUE AND OSO BLANCA ROAD
(W FRONTAGE ROAD)
ELEVATION = 2631.88 FEET, 802.1998 METERS, N.A.V.D. 88 DATUM

## BASIS OF BEARINGS

NORTH 89°56'20" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 20, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN FILE 118, PAGE 89 OF SURVEYS

## FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745 E, DATED SEPTEMBER 27 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

## DEVIATIONS FROM STANDARDS

USE OF CAST-IN-PLACE CONCRETE PIPE – BLUCOR OR CLV APPROVED EQUIVALENT

## SWPPP NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: HTTP://WWW.STATE.NV.US/SHPC/STORMH2O.HTM PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH THE APPROPRIATE FILING FEE.

## GEOTECHNICAL ENGINEER

PREPARED BY: SOUTHWEST GEOTECHNICAL
ADDRESS: 5275 ARVILLE STREET, SUITE 108, LAS VEGAS, NV 89118
PHONE: 702-323-6000
PROJECT No. 182358
DATED: OCT. 17, 2018










SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP DATE | APP |
|---|---|---|---|---|---|
| | | | | | |

LAS VEGAS, NEVADA

KB HOME

MONTECITO STORM DRAIN INFRASTRUCTURE
COVER SHEET

T 19 S
R 60 E
S 20, 21

DATE: 4/22/19
DRAFTER: HN
DESIGNER: HN
CHECKED: SOA

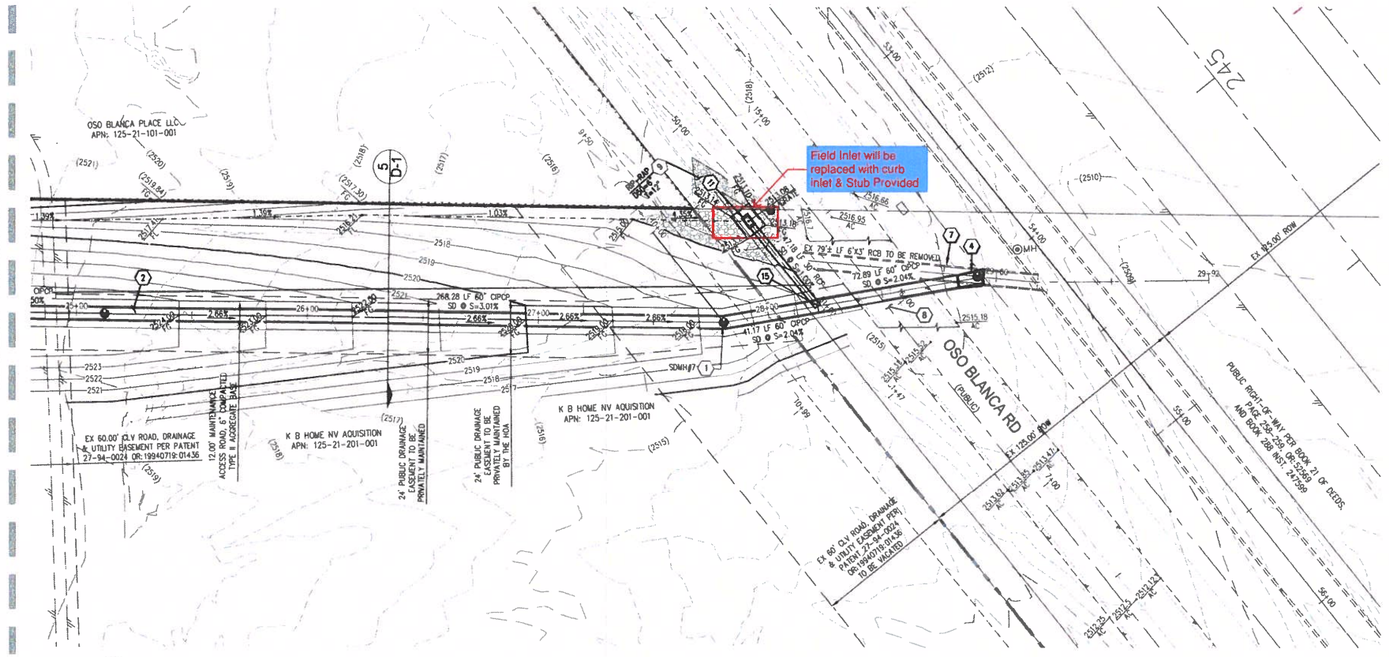
PROJECT NO.
KBH1805-004

PROFESSIONAL ENGINEER STATE OF NEVADA
STANLEY OKEY AMADI
Exp. 12/31/2020
CIVIL
No. 21724
4/23/19

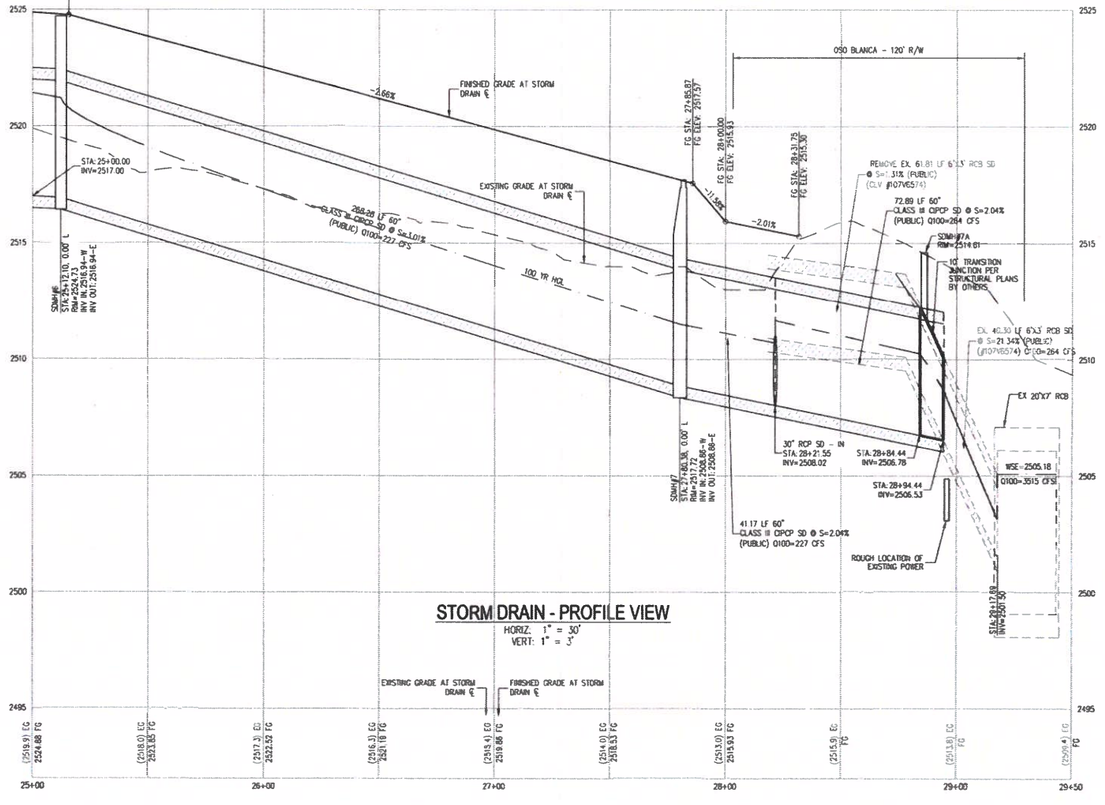
C-1
SHEET 1 OF 14

J:\kbh1805-004 montecito 60 ac storm drain infra\Vegas\Vontrack\kbh1805-004 cvr sheet 5.13.2019 1:03 PM Hung Nguyen

MATCHLINE AT STA: 25+50
SEE SHEET PP-4 FOR CONTINUATION




STORM DRAIN - PLAN VIEW




STORM DRAIN - PROFILE VIEW
HORIZ: 1" = 30'
VERT: 1" = 3'

0 30 60
SCALE - 1"=30' FEET

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

## SURVEY NOTE

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

## ELEVATION NOTE

ADD 2500 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 2501.00)

## SOILS REPORT

SOILS REPORT BY SOUTHWEST GEOTECHNICAL

PROJECT NO. 182358 DATED OCT. 17, 2018

## EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= _____ CU YDS
FILL= _____ CU YDS

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.

## DISCLAIMER NOTE

1) EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

2) FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

## GRADING NOTES

1 FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.

2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.

3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP

4 MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.

5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.

6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED

7 CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.

8. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLEVING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING

9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.

## LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.

2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.

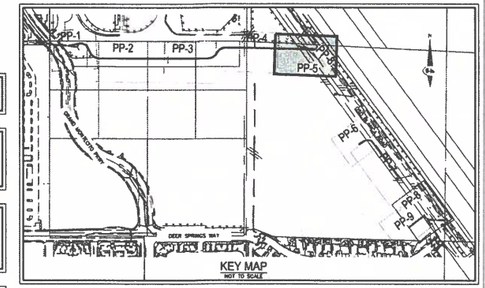
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.

4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.

5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

## FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745 E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.




## CONSTRUCTION NOTES

1. INSTALL BLUCOR ECCENTRIC MH - SEE SHEET D-2 FOR DETAIL
2. MAINTENANCE ACCESS ROAD WITH 6" COMPACTED TYPE II AGGREGATE
3. INSTALL 48" TYPE II SDMH
4. INSTALL 10' TRANSITION JUNCTION PER STRUCTURAL DESIGN BY OTHERS
5. INSTALL 36" RINKER REINFORCED CONC. SPIGOT PLUG DETAIL SEE DETAIL BB ON SHEET D-1
6. EXISTING FENCE TO BE REMOVED
7. EXISTING CULVERT AND HEADWALL TO BE REMOVED
8. SAWCUT REMOVE AND RESTORE AC PAVEMENT
9. INSTALL RIP-RAP SEE PLAN FOR SIZE
10. INSTALL CONCRETE PAD - SEE DETAIL AA ON SHEET D-1
11. INSTALL 4.5'x6.0' NDOT INLET TYPE II AND CONCRETE APRON - SEE SHEET D-2 FOR DETAILS AND STORMWATER QUALITY STAMP PER USDCCA DWG NO. 421
12. 12' WIDE MAINTENANCE ACCESS ROAD WITH 2" AC PAVEMENT
13. EX RIPRAP AND HEADWALL TO BE REMOVED
14. INSTALL REINFORCED CONCRETE WALL CAP PER STRUCTURAL DESIGN BY OTHERS
15. INSTALL CIPCP LATERAL PIPE CONNECTION PER BLUCOR DETAIL ON SHEET D-1

## GRADING NOTE

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

## QUANTITIES

| | | | PRIVATE | PUBLIC |
|---|---|---|---|---|
| DRAINAGE | | | | |
| 1. | 48" TYPE II STORM DRAIN MANHOLE | EA | - | 4 |
| 2. | BLUCOR ECCENTRIC MANHOLE | EA | - | 7 |
| 3. | 30" RCP CLASS III STORM DRAIN | LF | - | 48 |
| 4. | 36" RCP CLASS III STORM DRAIN | LF | - | 406 |
| 5. | 48" RCP CLASS III STORM DRAIN | LF | - | 115 |
| 6 | 60" CIPCP STORM DRAIN | LF | - | 1690 |
| 7. | RIPRAP D50=6", THK=12" | SF | - | 4,300 |
| 8. | 4.5' X 6' NDOT TYPE II INLET | EA | - | 1 |

## FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS-5108 ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT

STANLEY OREY AMADI, P.E. 21724 DATE


FAST
Call before you UnderGround
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

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

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



SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399


| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP |
|---|---|---|---|---|---|

LAS VEGAS, NEVADA

KB HOME

MONTECITO STORM DRAIN INFRASTRUCTURE

PLAN & PROFILE - STORM DRAIN STA 25+50 TO 29+50

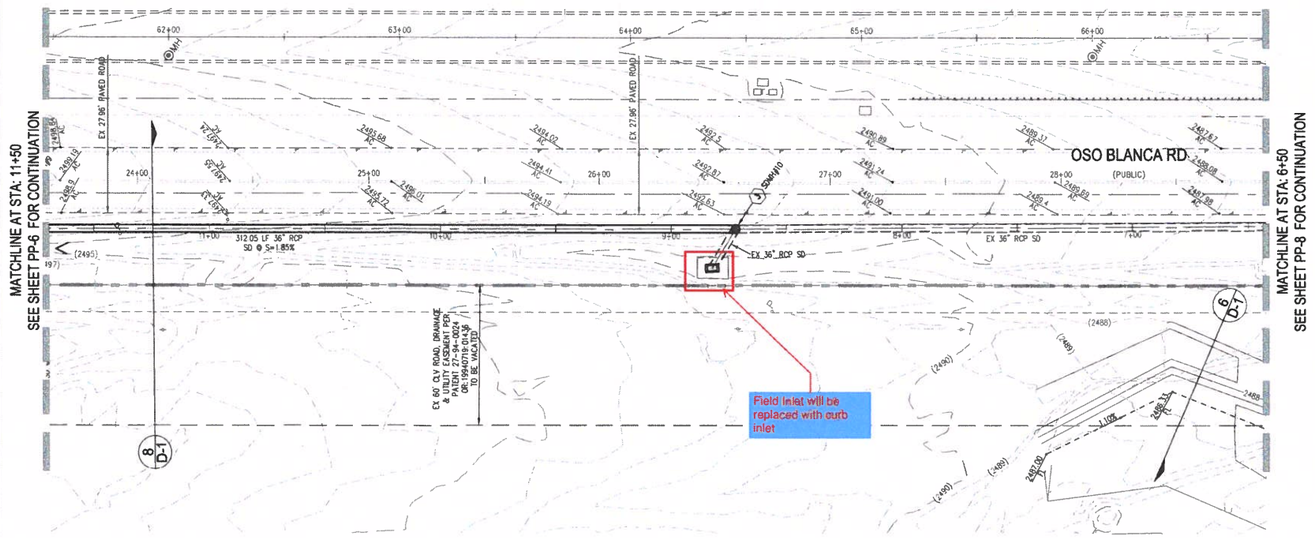
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R-64 EZ 21
DC-93

DATE: 4/22/19
DRAFTER: HN
DESIGNER: HN
CHECKED: SOA
PROJECT NO.
KBH1805-004

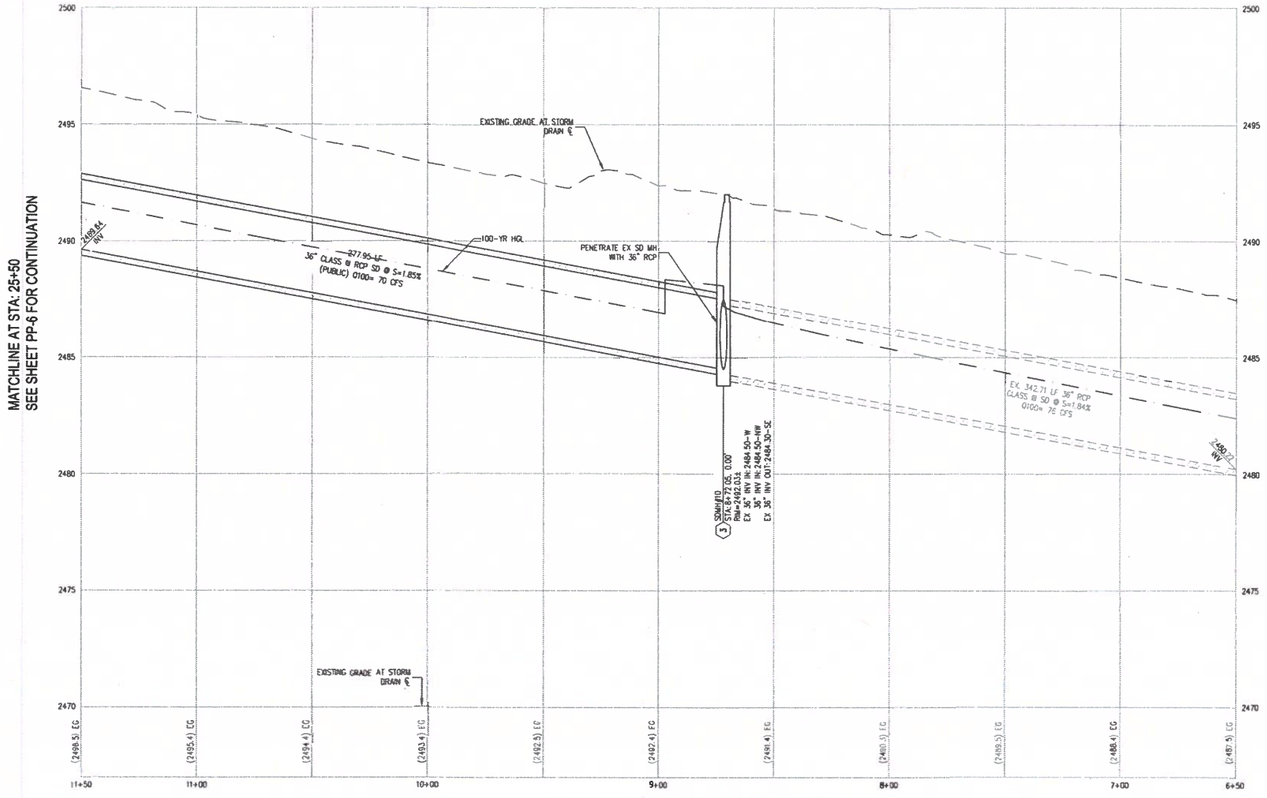
PROFESSIONAL ENGINEER STATE OF NEVADA
STANLEY OREY AMADI
Exp. 12/31/2020
CIVIL
No. 21724
04/23/19

PP-5
SHEET 8 OF 14


K:\kbh1805-004_montecito 60 ac storm drain_sl\dwg\design\kbh1805-004 proj dwg 5/13/2019 1:05 PM Hung Nguyen




OSO BLANCA RD - PLAN VIEW
(PUBLIC)




OSO BLANCA RD - PROFILE VIEW
HORIZ: 1" = 30'
VERT: 1" = 3'

SCALE - 1"=30' (0, 30, 60 FEET)

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

## SURVEY NOTE

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

## ELEVATION NOTE

ADD 2500 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E 01.00 REPRESENTS 2501.00)

## SOILS REPORT

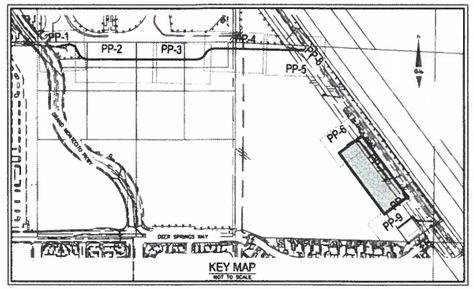
SOILS REPORT BY SOUTHWEST GEOTECHNICAL

PROJECT NO. 182358 DATED OCT. 17, 2018

## EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= _____ CU YDS
FILL= _____ CU YDS

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT




## CONSTRUCTION NOTES

1. INSTALL BLUCOR ECCENTRIC MH SEE SHEET D-2 FOR DETAIL
2. MAINTENANCE ACCESS ROAD WITH 6" COMPACTED TYPE II AGGREGATE
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## GRADING NOTES

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2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
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## QUANTITIES

| | | | PRIVATE | PUBLIC |
|---|---|---|---|---|
| **DRAINAGE** | | | | |
| 1. | 48" TYPE II STORM DRAIN MANHOLE | EA | - | 4 |
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| 3. | 30" RCP CLASS III STORM DRAIN | LF | - | 48 |
| 4. | 36" RCP CLASS III STORM DRAIN | LF | - | 406 |
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| 6. | 60" CIPCP STORM DRAIN | LF | - | 1690 |
| 7. | RIPRAP D50=6", THK=12" | SF | - | 4300 |
| 8. | 4.5' X 6' NDOT TYPE II INLET | EA | - | 1 |

## FLOOD CERTIFICATION

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STANLEY GREY AMADI, P.E. 21724 DATE

FAST Call before you UnderGround 1-702-432-5300 FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T)

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

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

SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP |
|---|---|---|---|---|---|
| | | | | | |

LAS VEGAS, NEVADA

KB HOME

MONTECITO STORM DRAIN INFRASTRUCTURE

PLAN & PROFILE - OSO BLANCA RD STA 6+50 TO 11+50

T 19 S
R 60 E
S 20, 21

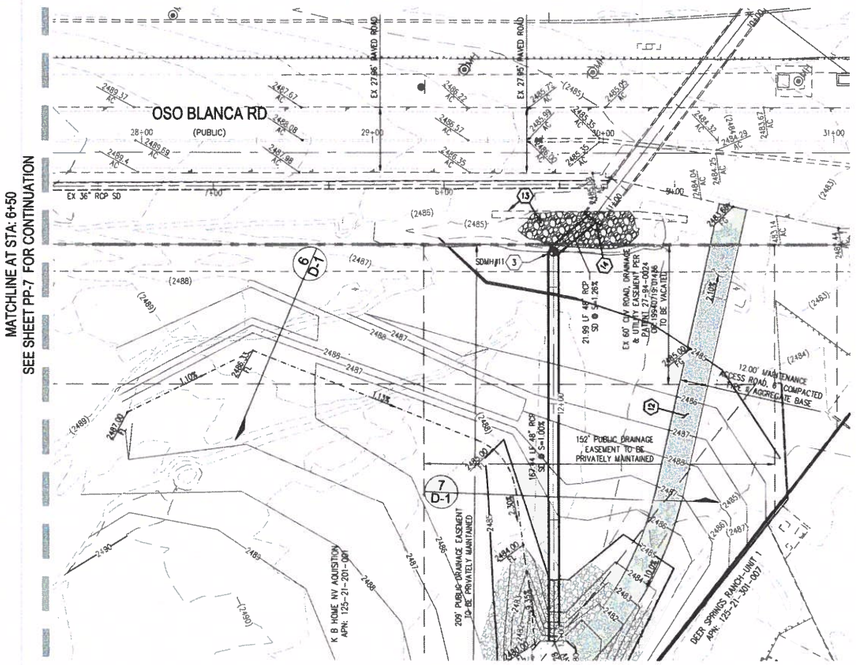
DATE: 4/22/19
DRAFTER: HN
DESIGNER: HN
CHECKED: SOA

PROJECT NO
KBH1805/004

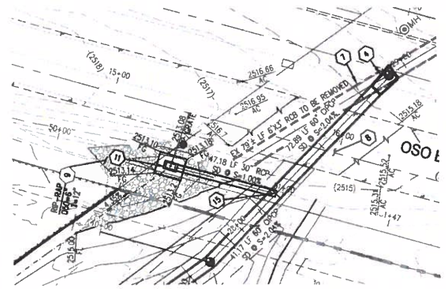
PROFESSIONAL ENGINEER STATE OF NEVADA STANLEY OKEY AMADI Exp. 12/31/2020 CIVIL No. 21724 — 04/23/19

PP-7
SHEET 10 OF 14

K:\kbh1805_1004 montecito 60 ac storm drain infra\dwg\swppp\kbh1805_004 proj.dwg 5/13/2019 1:05 PM Hung Nguyen




OSO BLANCA RD - PLAN VIEW
(PUBLIC)




STORM DRAIN LAT 1 - PLAN VIEW




OSO BLANCA RD - PROFILE VIEW
HORIZ: 1" = 30'
VERT: 1" = 3'




STORM DRAIN LAT 1 - PROFILE VIEW
HORIZ: 1" = 30'
VERT: 1" = 3'

0 30 60
SCALE - 1"=30' FEET

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

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ADD 2500 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E 01.00 REPRESENTS 2501.00)

## SOILS REPORT

SOILS REPORT BY SOUTHWEST GEOTECHNICAL

PROJECT NO. 182358 DATED OCT 17, 2018

## EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= _____ CU YDS
FILL= _____ CU YDS

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.

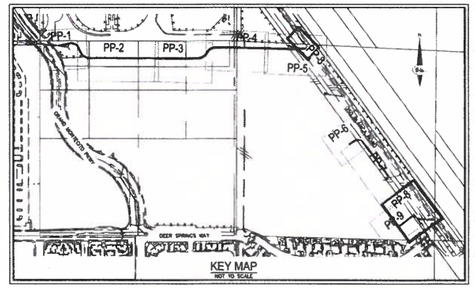
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## GRADING NOTES

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## CONSTRUCTION NOTES

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## LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION II.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION II.A.12.
5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

## GRADING NOTE

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

## QUANTITIES

| | | PRIVATE | PUBLIC |
|---|---|---|---|
| **DRAINAGE** | | | |
| 1. | 48" TYPE II STORM DRAIN MANHOLE | EA | - | 4 |
| 2. | BLUCOR ECCENTRIC MANHOLE | EA | - | 7 |
| 3. | 30" RCP CLASS III STORM DRAIN | LF | - | 48 |
| 4. | 36" RCP CLASS III STORM DRAIN | LF | - | 406 |
| 5. | 48" RCP CLASS III STORM DRAIN | LF | - | 115 |
| 6. | 60" CIPCP STORM DRAIN | LF | - | 1690 |
| 7. | RIPRAP D50=6", THK=12" | SF | - | 4300 |
| 8. | 4.5' x 6' NDOT TYPE II INLET | EA | - | 1 |

## FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745 E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

## FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS-5108 ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

STANLEY OKEY AMADI, P.E. 21724 DATE

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

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

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

SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5388 FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP DATE | APP |
|---|---|---|---|---|---|
| | | | | | |

LAS VEGAS, NEVADA

KB HOME

MONTECITO STORM DRAIN INFRASTRUCTURE

PLAN & PROF - OSO BLANCA RD STA 5+00 TO 6+50 & SD LAT 1

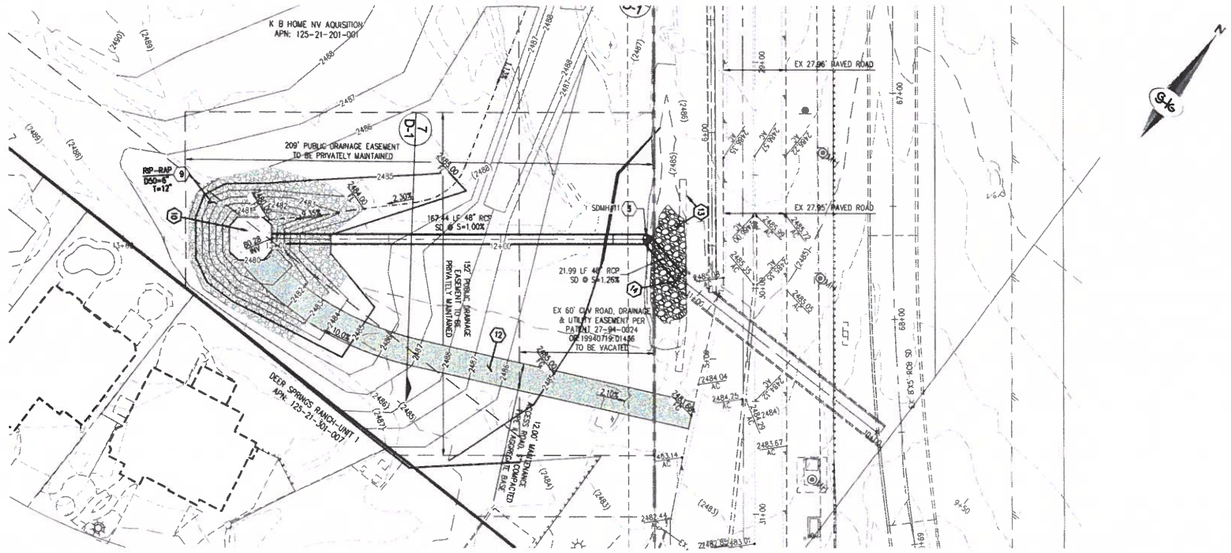
T 19 S
R 60 E
SEC 20, 21

DATE: 4/22/19
DRAFTER: HN
DESIGNER: HN
CHECKED: SOA
PROJECT NO.
KBH1805-004

PROFESSIONAL ENGINEER — STATE OF NEVADA — STANLEY OKEY AMADI — Exp. 12/31/2020 — CIVIL — No. 21724 — 8/13/19

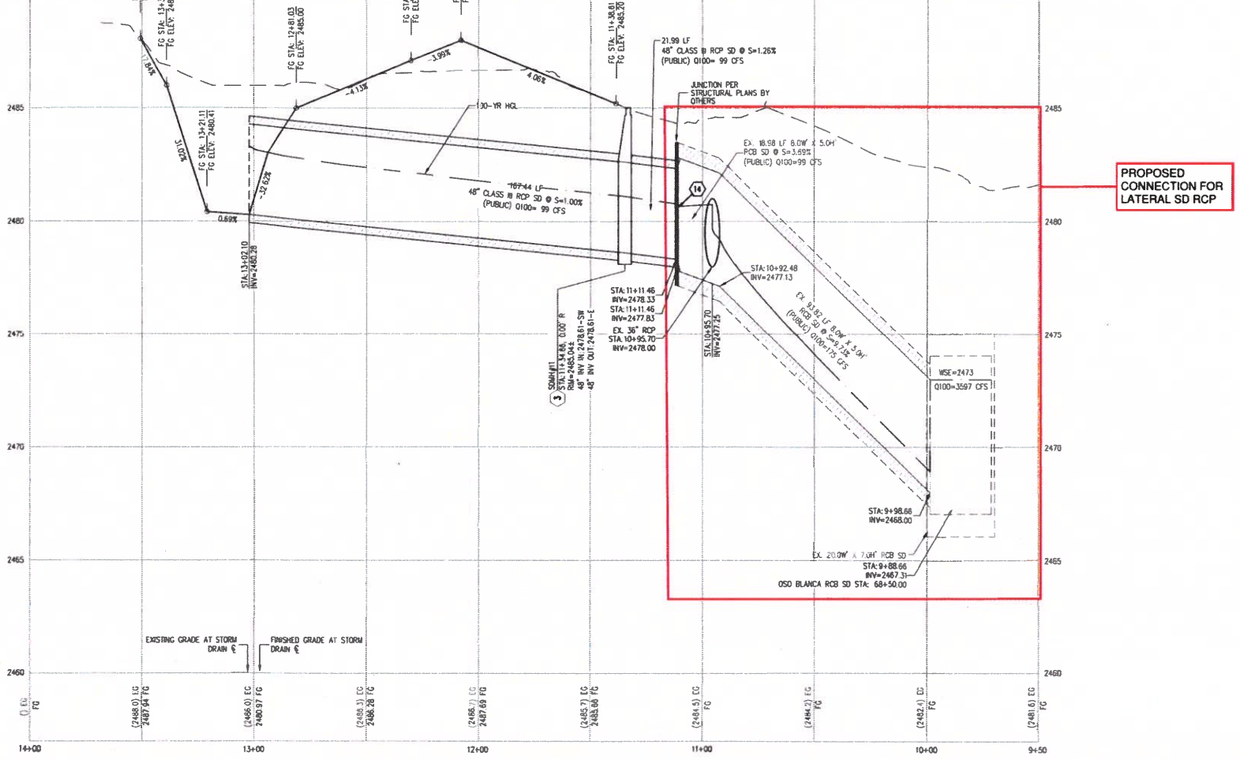
PP-8
SHEET 11 OF 14

V:\kbh1805-004 montecito 60 acs storm drain plans\dwg\improv\kbh1805-004 prof.dwg, 5/13/2019 1:00 PM, Hung Nguyen




## STORM DRAIN SOUTH SYSTEM - PLAN VIEW

(PUBLIC)




## STORM DRAIN SOUTH SYSTEM - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 3'

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

### SURVEY NOTE

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

### ELEVATION NOTE

ADD 2500 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E 01.00 REPRESENTS 2501.00)

### SOILS REPORT

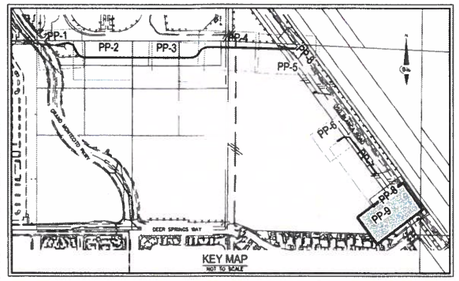
SOILS REPORT BY SOUTHWEST GEOTECHNICAL

PROJECT NO. 182358 DATED OCT. 17, 2018

### EARTHWORKS

EARTHWORK QUANTITIES (RAW):
CUT= _____ CU YDS
FILL= _____ CU YDS

EXPORTED MATERIAL TO BE DISPOSED OF AT AN APPROVED LICENSED DISPOSAL FACILITY OR AT A SITE WITH AN APPROVED AND ACTIVE GRADING PERMIT.




### CONSTRUCTION NOTES

1. INSTALL BLUCOR ECCENTRIC MH - SEE SHEET D-2 FOR DETAIL
2. MAINTENANCE ACCESS ROAD WITH 6" COMPACTED TYPE II AGGREGATE
3. INSTALL 48" TYPE II SDMH
4. INSTALL 10' TRANSITION JUNCTION PER STRUCTURAL DESIGN BY OTHERS
5. INSTALL 36" RANKER REINFORCED CONC. SPIGOT PLUG DETAIL - SEE DETAIL BB ON SHEET D-1
6. EXISTING FENCE TO BE REMOVED
7. EXISTING CULVERT AND HEADWALL TO BE REMOVED
8. SAWCUT REMOVE AND RESTORE AC PAVEMENT
9. INSTALL RIP-RAP SEE PLAN FOR SIZE
10. INSTALL CONCRETE PAD - SEE DETAIL AA ON SHEET D-1
11. INSTALL 4.5'x6.0' NDOT INLET TYPE II AND CONCRETE APRON - SEE SHEET D-2 FOR DETAILS AND STORMWATER QUALITY STAMP PER USDCCA DWG NO. 421
12. 12' WIDE MAINTENANCE ACCESS ROAD WITH 2" AC PAVEMENT
13. EX RIPRAP AND HEADWALL TO BE REMOVED
14. INSTALL REINFORCED CONCRETE WALL CAP PER STRUCTURAL DESIGN BY OTHERS
15. INSTALL CIPCP LATERAL PIPE CONNECTION PER BLUCOR DETAIL ON SHEET D-1

### DISCLAIMER NOTE

1) EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION

2) FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROJECTED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM OR MAXIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

### GRADING NOTES

1. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.
2. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER
3. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP
4. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT
5. SEE DETAIL SHEET FOR STREET SECTIONS AND DETAILS.
6. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED
7. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE CITY OF LAS VEGAS BUILDING DEPARTMENT.
8. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLEMING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING
9. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.

### LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT))

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4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER A RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
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### QUANTITIES

| | DRAINAGE | | PRIVATE | PUBLIC |
|---|---|---|---|---|
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| 2. | BLUCOR ECCENTRIC MANHOLE | EA | - | 7 |
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STANLEY OKEY AMADI, P.E. 21724 DATE


FAST Call before you UnderGround 1-702-432-5300 FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T)

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

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



SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399


| NO. | DESCRIPTION | DATE | BY | APP | APP DATE |
|---|---|---|---|---|---|
| | | | | | |

LAS VEGAS, NEVADA

KB HOME

MONTECITO STORM DRAIN INFRASTRUCTURE

PLAN & PROFILE - STORM DRAIN SOUTH SYSTEM

17198
R 8 20 21

DATE: 4/22/19
DRAFTER: HN
DESIGNER: HN
CHECKED: SOA

PROJECT NO.
KBH1805-004

PROFESSIONAL ENGINEER STATE OF NEVADA — STANLEY OKEY AMADI — Exp. 12/31/2020 — CIVIL — No. 21724 — 04/22/19

PP-9
SHEET 12 OF 14

K:\kbh1805_004 montecito dd\ns storm drain sd\ns dwg\improv\kbh1805-004 pap.dwg, 5/13/2019 1:06 PM, Hung Nguyen

# APPENDIX D

Reference Material

Centennial Parkway Channel West – US95, CC215 to Durango Drive (CLV DS 4893)

# Referenced Improvement Plans

# DEPARTMENT OF PUBLIC WORKS

**Mayor:**
CAROLYN G. GOODMAN

**City Council:**
STEVEN D. ROSS (Mayor Pro-Tem)
LOIS TARKANIAN
RICKI Y. BARLOW
STAVROS S. ANTHONY
BOB COFFIN
BOB BEERS

**City Manager:**
ELIZABETH N. FRETWELL

**Director of Public Works:**
DAVID N. BOWERS, P.E., P.T.O.E.

**City Engineer:**
ALLEN E. PAVELKA, P.E.

# CENTENNIAL PARKWAY CHANNEL WEST
# US95, 215 TO DURANGO

FUNDED BY:

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

**Reviewed By:**

CLV CITY ENGINEER — DATE 6-26-17

CLV PROJECT MANAGER — DATE 6/26/17

CLV CITY TRAFFIC ENGINEER — DATE 6.26.17

CLV CONSTRUCTION MANAGER — DATE 6/26/17

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT — DATE 06/22/2017

N/A
REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA — DATE

SOUTHWEST GAS CORPORATION — DATE 06/15/17

CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK — DATE 5/11/17

THE AFFIXED CENTURYLINK NEVADA 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 STANDARD REGULATIONS.

COX COMMUNICATIONS LAS VEGAS, INC. — DATE 5-9-17

NV ENERGY – DISTRIBUTION — DATE 5-9-17

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

NV ENERGY - TRANSMISSION — DATE 5-9-17

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER — DATE 6/26/17
PROJECT# 124974
SHEETS: CHG1, CHG2, CHG3, CHG4, CHRP2, CHRP5, CHRP8, CHSD2, CHSD5, CHSD6, CHGR2, CHGR5, CHGR8, CHRD2, CHRD5 & CHRD6

THE SIGNATURE ABOVE ACKNOWLEDGES THAT THE UTILITY COMPANY REPRESENTATIVE HAS REVIEWED THE PLANS, AND THAT TO THE BEST OF HIS OR HER KNOWLEDGE THE UTILITY LINES ARE SHOWN IN THE CORRECT LOCATIONS AND ARE THE CORRECT SIZES. WHILE SUCH DATA HAS BEEN COLLECTED WITH REASONABLE CARE, THERE IS NO EXPRESSED OR IMPLIED GUARANTEE THAT THE LOCATIONS ARE EXACT. THE CONTRACTOR SHALL BEAR THE RESPONSIBILITY OF OBTAINING THE ACTUAL FIELD LOCATIONS.

THE SIGNATURE ABOVE FURTHER ACKNOWLEDGES THAT THE UTILITY COMPANY DOES NOT ANTICIPATE CONSTRUCTION OR MAINTENANCE IN THE PROJECT AREA FOR FIVE (5) YEARS IN CONFORMANCE WITH THE CLV NO-CUT POLICY.

PREPARED BY: ch2m: 2485 VILLAGE VIEW DRIVE, SUITE 350 HENDERSON, NEVADA 89074

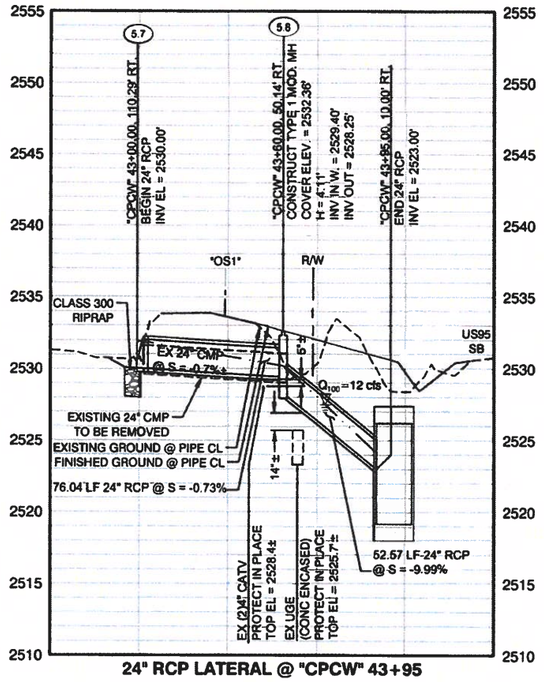
PREPARED FOR CITY OF LAS VEGAS
H# 60222 BDW
DATE: May 8, 2017 DESIGNED BY:
SUBMITTAL STAGE: DRAWN BY: B. MAHAN

TITLE CENTENNIAL PARKWAY CHANNEL WEST US95, 215 TO DURANGO
SHEET COVER SHEET

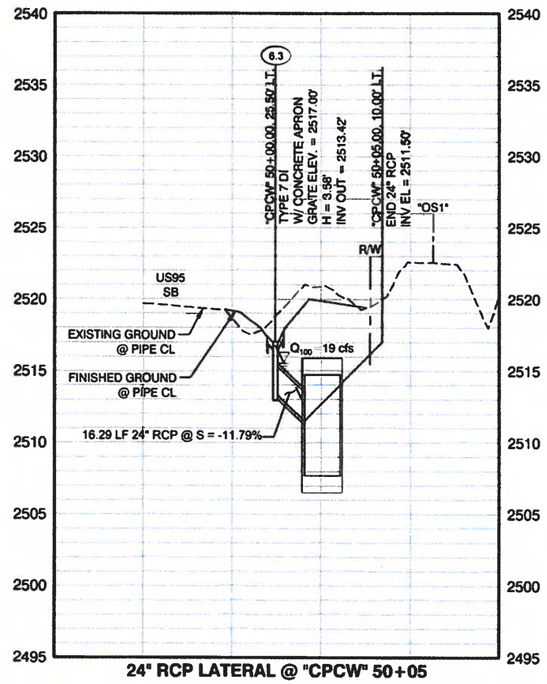
JEFFREY N. GRIEST EXP. 06/30/19 CIVIL No. 17198

SHEET CHG1
1 OF 87
DRAWING NO 107v6574

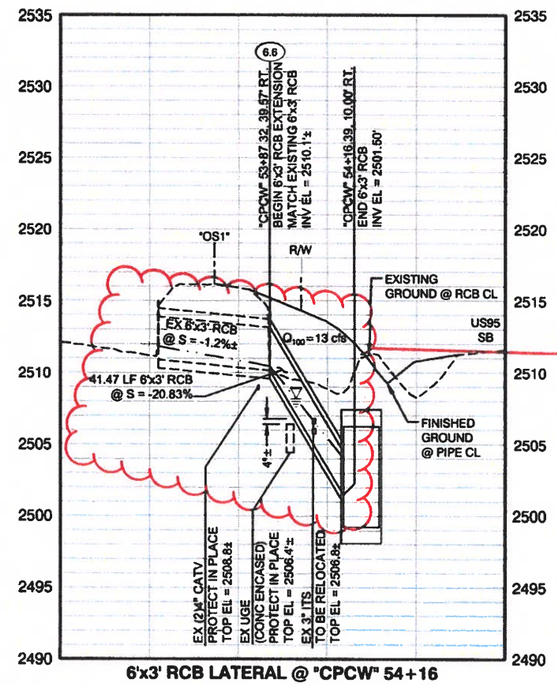
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24" RCP LATERAL @ "CPCW" 43+95



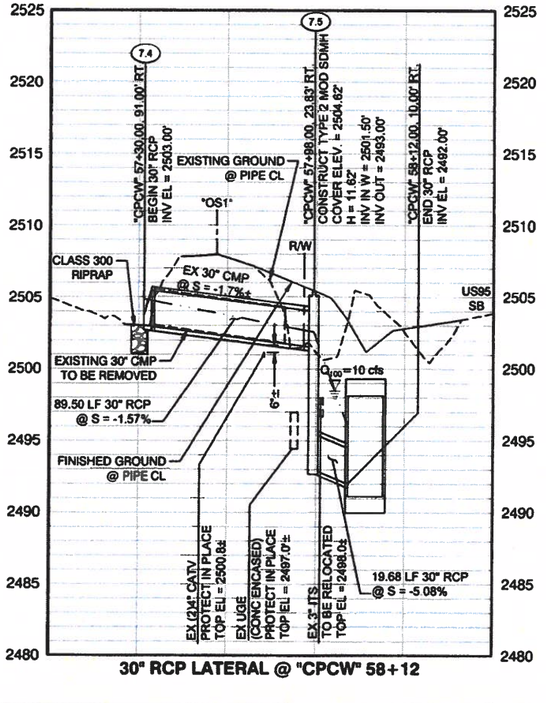

24" RCP LATERAL @ "CPCW" 50+05



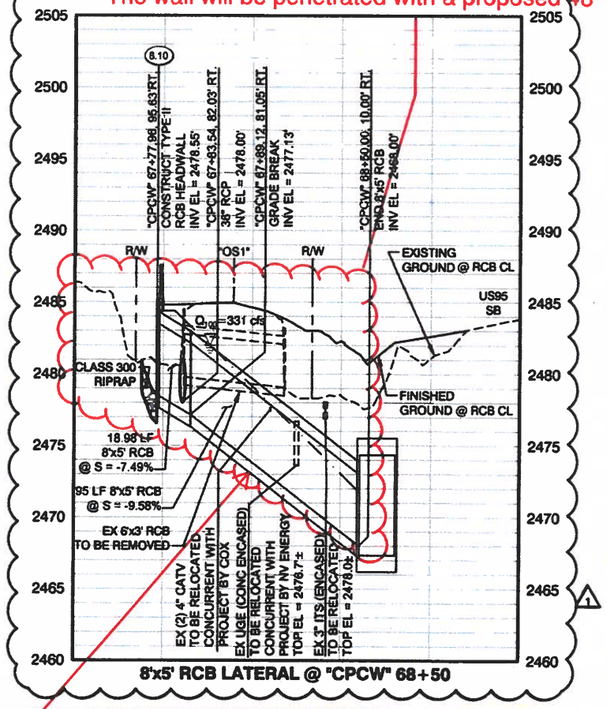

6'x3' RCB LATERAL @ "CPCW" 54+16

Existing Lateral will be removed and replaced with the proposed 54" CIPCP Connection

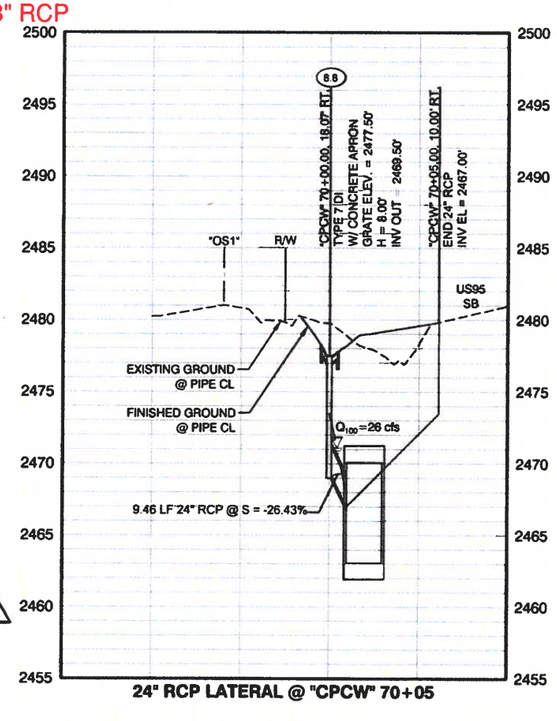
Existing RCB will be Capped with structural concrete wall.
The wall will be penetrated with a proposed 48" RCP




30" RCP LATERAL @ "CPCW" 58+12




8'x5' RCB LATERAL @ "CPCW" 68+50




24" RCP LATERAL @ "CPCW" 70+05

Lateral penetrations proposed for curb inlets

| CALL BEFORE CONSTRUCTION | | |
|---|---|---|
| BEFORE YOU DIG | USA NORTH | 811 OR 800-227-2600 |
| BEFORE YOU UNDERGROUND | F.A.S.T. | 702-432-5300 |
| | CLARK COUNTY TRAFFIC OPERATIONS | 702-455-7511 |
| | CITY OF LAS VEGAS T.E.F.O | 702-229-6811 |
| BEFORE YOU OVERHEAD | NV ENERGY | 702 227-2929 |

PREPARED BY: ch2m: 2485 VILLAGE VIEW DRIVE, SUITE 350

PREPARED FOR CITY OF LAS VEGAS

BID# H# 60222 DATE: June 14, 2018 DESIGNED BY: B. MAHAN

TITLE CENTENNIAL PARKWAY CHANNEL WEST US95, 215 TO DURANGO

SHEET CHSD 31 OF

DRAWING NO. 107v657

JEFFREY GRIEST EXP. 06/30/19 CIVIL No. 17869

S:\Z2M\Drainage_Plans.dwg

# APPENDIX E

NOFA

MONTECITO

January 17, 2019

Mr. Frank Pankratz
MS Northwest Land, LLC
1215 S. Fort Apache Road, Ste. 120
Las Vegas, Nevada 89117

***RE: SDR-74638 [PRJ-74608] - SITE DEVELOPMENT PLAN REVIEW RELATED TO GPA-74633, VAR-75154, SUP-74637 AND TMP-74639***
***CITY COUNCIL MEETING OF JANUARY 16, 2019***

Dear Applicant:

The City Council at a regular meeting held on January 16, 2019 voted to ***APPROVE*** a request for a Site Development Plan Review FOR A PROPOSED 303-LOT SINGLE FAMILY DETACHED RESIDENTIAL SUBDIVISION AND TWO, MULTI-FAMILY RESIDENTIAL DEVELOPMENTS, CONSISTING OF THREE-STORY BUILDINGS WITH A TOTAL UNIT COUNT OF 491 APARTMENTS on 60.39 acres at the northwest and northeast corners of Deer Springs Way and Grand Montecito Parkway (APNs 125-21-201-001; 125-20-601-003, 005 and 006; 125-20-602-002, 005, 006, 009, 010 and 011; and 125-20-603-001 through 004), T-C (Town Center) Zone [MC-TC (Montecito - Town Center) and UC-TC (Urban Center - Town Center) Special Land Use Designations], Ward 6 (Fiore) [PRJ-74608].

This approval is subject to the following amended conditions:

Planning

1. The applicant shall work with staff to provide preventative measures to mitigate the potential for errant balls from the existing park to the north from impacting the proposed residents along the northern property line of the development.

2. The setbacks for Units 1, 2 and 3 within the development shall be a minimum of 10 feet to the front of the house, 18 feet to the front of the garage as measured from back of sidewalk or from back of curb if no sidewalk is provided, 5 feet on the side, 10 feet on the corner side, 10 feet in the rear to the house, and 5 feet in the rear to a patio.

**LAS VEGAS CITY COUNCIL**
CAROLYN G. GOODMAN
*Mayor*
LOIS TARKANIAN
*Mayor Pro Tem*
STAVROS S. ANTHONY
BOB COFFIN
STEVEN G. SEROKA
MICHELE FIORE
CEDRIC CREAR

SCOTT D. ADAMS
*City Manager*

DEPARTMENT OF PLANNING
**ROBERT SUMMERFIELD**
DIRECTOR

**DEVELOPMENT SERVICES CENTER**
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3. The Site Development Plan Review is approved for a total of 306 multi-family units for Multi-Family Unit 4 only. Multi-Family Unit 5 shall not be part of this approval.

4. Approval of General Plan Amendment (GPA-74633) and conformance to the Conditions of Approval for Variance (VAR-75154), Special Use Permit (SUP-74637) and Tentative Map (TMP-74639) shall be required.

5. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

6. Trash enclosures shall be provided in sufficient size and numbers to meet the needs of each multi-family development.

7. Trash and refuse collection areas, and mechanical equipment located within each multi-family development shall be designed and screened in accordance with Title 19.08.

8. All perimeter walls, fences, screen and retaining walls shall be designed and constructed in conformance with Town Center Development Standards Manual, except as amended herein.

9. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

10. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

11. The applicant shall coordinate with the City Surveyor and other city staff to determine the most appropriate mapping action necessary to consolidate the existing lots. The mapping action shall be completed and recorded prior to the issuance of any building permits.

12. A technical landscape plan, signed and/or sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time as Final Map submittal. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device.

13. No turf shall be permitted in the non-recreational common areas, such as medians and amenity zones in this development.

14. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

15. A Comprehensive Construction Staging Plan shall be submitted to the Department of Planning for review and approval prior to the issuance of any building permits. The Construction Staging Plan shall include the following information: Design and location of construction trailer(s); design and location of construction fencing; all proposed temporary construction signage; location of materials staging area; and the location and design of parking for all construction workers.

16. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

Public Works

17. Dedicate additional right-of-way up to a total width of 80 feet for Oso Blanca Road as a Town Center Arterial prior to issuance of permits for adjacent development. No dedication is required if an 80-foot dedication for Oso Blanca Road already exists. Additionally, grant 9-foot wide easements adjacent to the western edge of Oso Blanca Road for roadway, public sewer, and public drainage prior to issuance of permits for adjacent development. This 9-foot easement includes the required 6-foot perimeter landscape buffer and may be reduced or eliminated if it is determined by the City Engineer that it is not required.

18. Unless otherwise allowed by the City Engineer, submit all required documentation and support materials to the Right of way Section of the Department of Public Works to modify the City's Bureau of Land Management (BLM) Plan of development to include the construction of storm drain facilities on the south side of Assessor's Parcel (APN) #125-20-501-007 to obtain legal right to construct the proposed off-site storm drain prior to constructing improvements on APN #125-20-501-007. If legal right cannot be obtained, Unit 2 of this Site Plan shall be revised to addresses accommodation for existing storm drain facilities on this site. No permits for areas dependent on the proposed storm drain facility shall be issued until such legal right is obtained.

19. Street "A" between Grand Montecito and Oso Blanca shall be constructed as shown on the approved Site Plan to include traffic signal underground infrastructure at both the intersection with Grand Montecito Parkway and Oso Blanca Road. A Public Access Easement for vehicular, bicycle and pedestrian traffic shall be granted across the entire length of Street "A". Street "A" shall be privately maintained and shall not be gated. Any public easements needed to accommodate future traffic signals at both ends of this street shall be granted concurrent with the development of this site. This street may be dedicated to the City at the request of the applicant if the Director of Public Works determines it is necessary for regional street network connectivity.

20. Construct full-width street improvements per Title 19.04.120.B including appropriate transition paving on Oso Blanca Road as a Town Center Arterial and as modified by the City Engineer to match Nevada Department of Transportation's (NDOT's) construction on Oso Blanca Road with a 12-foot trail on the west side of Oso Blanca Road along the entire frontage. Provide written documentation that this project has been coordinated with NDOT and the City Engineer. Additionally, construct all incomplete half street improvements on Deer Springs Road adjacent to this site and modify the Deer Springs Way/Grand Montecito Parkway intersection and the Deer Springs Way/Doe Brook Trail intersection to meet the approval of the City Traffic Engineer concurrent with the development of this site. Deer Springs Way modifications associated with Unit 5 shall be finalized through the required Traffic Impact Analysis. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.

21. All landscaping and private improvements installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.

22. Provide public sewer easements for all public sewers not located within existing public street right-of-way prior to the issuance of any permits. Improvement Drawings submitted to the City for review shall not be approved for construction until all required Public Sewer Easements necessary to connect this site to the existing public sewer system have been granted to the City.

23 Construct off-site sewer in Oso Blanca Road to the intersection of Centennial Center Boulevard at a depth and location acceptable to the Sanitary Sewer Section of the Department of Public Works concurrent with development of any portion of this site that cannot be serviced by gravity to the existing public sewer system. Alternatively, the City Engineer may approve an alternate public sewer route that can be serviced by gravity.

24. No structures (covered parking) and no trees or vegetation taller than three feet shall be allowed within any Public Sewer Easements or Public Drainage Easements. Permanent structures shall be set back sufficient distance from public infrastructure to meet required excavation limits.

25. Modify the existing downstream public sewer at the intersection of Deer Springs Way and Doe Brook Trail to send flow southward to existing manhole LT-62.

26. The applicant shall maintain the approved landscaping in Deer Springs Way and Grand Montecito Parkway, including the median, adjacent to this site, per the existing recorded Encroachment Agreement. The applicant shall either amend the existing agreement, or submit a new License Agreement for landscaping and private improvements in the Deer Springs Road public right-of-way, if any, prior to the issuance of permits for these improvements. The applicant must carry an insurance policy for the term of the License Agreement and add the City of Las Vegas as an additionally insured entity on this insurance policy. If requested by the City, the applicant shall remove property encroaching in the public right-of-way at the applicant's expense pursuant to the terms of the City's License Agreement. The installation and maintenance of all private improvements in the public right of way shall be the responsibility of the applicant and any successors in interest to the property and assigns pursuant to the terms of the License Agreement. Coordinate all requirements for the License Agreement with the Land Development Section of the Department of Building and Safety (229-4836).

27. A Traffic Impact Analysis must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits, submittal of any construction drawings or the recordation of a Map subdividing this site, whichever may occur first. Comply with the recommendations of the approved Traffic Impact Analysis prior to occupancy of the site. The Traffic Impact Analysis shall also include a section addressing Standard Drawings #234.1 #234.2 and #234.3 to determine additional right-of-way requirements for bus turnouts adjacent to this site, if any; dedicate all areas recommended by the approved Traffic Impact Analysis. All additional rights of way required by Standard Drawing #201.1 for exclusive right turn lanes and dual left turn lanes shall be dedicated prior to or concurrent with the commencement of on site development activities unless specifically noted as not required in the approved Traffic Impact Analysis. Phased compliance will be allowed if recommended by the approved Traffic Impact Analysis. No recommendation of the approved Traffic Impact Analysis, nor compliance therewith, shall be deemed to modify or eliminate any condition of approval imposed by the Planning Commission or the City Council on the development of this site. Private Street "A" shall not be gated.

28. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

29. Site Development to comply with all applicable conditions of approval for TMP-74639.

The Notice of Final Action was filed with the Las Vegas City Clerk on January 17, 2019.

Sincerely,

Robert Summerfield

Robert Summerfield, AICP
Director
Department of Planning

RTS:nl

cc:

Christa Bilbrey
KB Home
5795 W. Badura Ave., Ste. 180
Las Vegas, Nevada 89118

Ms. Roxanne Leigh
Slater Hanifan Group
5740 S. Arville St., Ste. 216
Las Vegas, Nevada 89118

MONTECITO

January 17, 2019

Mr. Frank Pankratz
MS Northwest Land, LLC
1215 S. Fort Apache Road, Ste. 120
Las Vegas, Nevada 89117

***RE: GPA-74633 [PRJ-74608] - GENERAL PLAN AMENDMENT RELATED TO VAR-75154, SUP-74637, SDR-74638 AND TMP-74639***
***CITY COUNCIL MEETING OF JANUARY 16, 2019***

Dear Applicant:

The City Council at a regular meeting held on January 16, 2019 voted to ***APPROVE*** a request for a General Plan Amendment to amend the Trails Element of the Las Vegas 2020 Master Plan and all related maps on 60.39 acres at the northwest and northeast corners of Deer Springs Way and Grand Montecito Parkway (APNs 125-21-201-001; 125-20-601-003, 005 and 006; 125-20-602-002, 005, 006, 009, 010 and 011; and 125-20-603-001 through 004), T-C (Town Center) Zone [MC-TC (Montecito - Town Center) and UC-TC (Urban Center - Town Center) Special Land Use Designations], Ward 6 (Fiore) [PRJ-74608].

The Notice of Final Action was filed with the Las Vegas City Clerk on January 17, 2019.

Sincerely,

Robert Summerfield

Robert Summerfield, AICP
Director
Department of Planning

RTS:nl

cc:

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**LAS VEGAS CITY COUNCIL**
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January 17, 2019

Mr. Frank Pankratz
MS Northwest Land, LLC
1215 S. Fort Apache Road, Ste. 120
Las Vegas, Nevada 89117

***RE: SUP-74637 [PRJ-74608] - SPECIAL USE PERMIT RELATED TO GPA-74633, VAR-75154, SDR-74638 AND TMP-74639***
***CITY COUNCIL MEETING OF JANUARY 16, 2019***

Dear Applicant:

The City Council at a regular meeting held on January 16, 2019 voted to ***APPROVE*** a request for a Special Use Permit FOR A PROPOSED PRIVATE STREET WITHOUT A GATE AND MULTIPLE GATED COMMUNITIES WITH PRIVATE STREETS WITHIN TOWN CENTER at the northwest and northeast corners of Deer Springs Way and Grand Montecito Parkway (APNs 125-21-201-001; 125-20-601-003, 005 and 006; 125-20-602-002, 005, 006, 009, 010 and 011; and 125-20-603-001 through 004), T-C (Town Center) Zone [MC-TC (Montecito - Town Center) and UC-TC (Urban Center - Town Center) Special Land Use Designations], Ward 6 (Fiore) [PRJ-74608].

This approval is subject to the following conditions:

Planning

1. Conformance to all requirements under the Town Center Development Standards Manual for a Gated Community with Private Street use.

2. Approval of General Plan Amendment (GPA-74633) and conformance to the Conditions of Approval for Variance (VAR-75154), Site Development Plan Review (SDR-74638) and Tentative Map (TMP-74639) shall be required.

3. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

4. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

**LAS VEGAS CITY COUNCIL**
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January 17, 2019

Mr. Frank Pankratz
MS Northwest Land, LLC
1215 S. Fort Apache Road, Ste. 120
Las Vegas, Nevada 89117

***RE: VAR-75154 [PRJ-74608] - VARIANCE RELATED TO GPA-74633, SUP-74637, SDR-74638 AND TMP-74639***
***CITY COUNCIL MEETING OF JANUARY 16, 2019***

Dear Applicant:

The City Council at a regular meeting held on January 16, 2019 voted to ***APPROVE*** a request for a Variance TO ALLOW 641 PARKING SPACES WHERE 811 IS THE MINIMUM REQUIRED FOR TWO MULTI-FAMILY DEVELOPMENTS on 60.39 acres at the northwest and northeast corners of Deer Springs Way and Grand Montecito Parkway (APNs 125-21-201-001; 125-20-601-003, 005 and 006; 125-20-602-002, 005, 006, 009, 010 and 011; and 125-20-603-001 through 004), T-C (Town Center) Zone [MC-TC (Montecito - Town Center) and UC-TC (Urban Center - Town Center) Special Land Use Designations], Ward 6 (Fiore) [PRJ-74608].

This approval is subject to the following conditions:

Planning

1. The Variance is approved for a total of 460 parking spaces where 501 parking spaces are required for the Multi-Family Unit 4 development only. The Multi-Family Unit 5 requested parking variance is not a part of this approval.

2. Approval of General Plan Amendment (GPA-74633) and conformance to the Conditions of Approval for Special Use Permit (SUP-74637), Site Development Plan Review (SDR-74638) and Tentative Map (TMP-74639) shall be required, if approved.

3. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

4. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

5. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

6. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

The Notice of Final Action was filed with the Las Vegas City Clerk on January 17, 2019.

Sincerely,

Robert Summerfield

Robert Summerfield, AICP
Director
Department of Planning

pp
RTS:nl

cc:

Christa Bilbrey
KB Home
5795 W. Badura Ave., Ste. 180
Las Vegas, Nevada 89118

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Las Vegas, Nevada 89118

MONTECITO

January 17, 2019


**LAS VEGAS CITY COUNCIL**

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Mr. Frank Pankratz
MS Northwest Land, LLC
1215 S. Fort Apache Road, Ste. 120
Las Vegas, Nevada 89117

***RE: TMP-74639 [PRJ-74608] - TENTATIVE MAP RELATED TO GPA-74633, VAR-75154, SUP-74637 AND SDR-74638***
***CITY COUNCIL MEETING OF JANUARY 16, 2019***

Dear Applicant:

The City Council at a regular meeting held on January 16, 2019 voted to ***APPROVE*** a request for a Tentative Map FOR A PROPOSED 303-LOT SINGLE FAMILY RESIDENTIAL SUBDIVISION AND TWO, 491-UNIT MULTI-FAMILY RESIDENTIAL DEVELOPMENTS WITH A WAIVER TO ALLOW PRIVATE STREETS TO TERMINATE IN DEAD-END STUBS AND MODIFIED HAMMERHEADS WHERE CULS-DE-SAC OR HAMMERHEADS ARE REQUIRED on 60.39 acres at the northwest and northeast corners of Deer Springs Way and Grand Montecito Parkway (APNs 125-21-201-001; 125-20-601-003, 005 and 006; 125-20-602-002, 005, 006, 009, 010 and 011; and 125-20-603-001 through 004), T-C (Town Center) Zone [MC-TC (Montecito - Town Center) and UC-TC (Urban Center - Town Center) Special Land Use Designations], Ward 6 (Fiore) [PRJ-74608].

This approval is subject to the following amended conditions:

Planning

1. Multi-Family Unit 5 shall not be part of the Tentative Map approval.

2. Approval of the Tentative Map shall be for no more than four (4) years. If a Final Map is not recorded on all or a portion of the area embraced by the Tentative Map within four (4) years of the approval of the Tentative Map, this action is void.

3. Approval of General Plan Amendment (GPA-74633) and conformance to the Conditions of Approval for Variance (VAR-75154), Special Use Permit (SUP-74637) and Site Development Plan Review (SDR-74638) shall be required.

4. Prior to the submittal of any Final Map, the applicant shall coordinate with the City Surveyor and other city staff to determine the most appropriate mapping action necessary to create a separate parcel from APNs 125-20-603-002 and 004. Subsequent to that new parcel's creation the applicant shall modify the existing land use district as depicted on Map 4 Town Center Land Use to that of the district found on APN 125-21-201-001 for the newly created parcel. The applicant shall file a Major Modification with the Department in accordance with the procedures and standards applicable to a rezoning application as set forth in LVMC 19.16.090.

5. Street names must be provided in accordance with the City's Street Naming Regulations.

6. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

7. In conjunction with creation, declaration and recordation of the subject common-interest community, and prior to recordation of the Covenants, Codes and Restrictions ("CC&R"), or conveyance of any unit within the community, the Developer is required to record a Declaration of Private Maintenance Requirements ("DPMR") as a covenant on all associated properties, and on behalf of all current and future property owners. The DPMR is to include a listing of all privately owned and/or maintained infrastructure improvements, along with assignment of maintenance responsibility for each to the common interest community or the respective individual property owners, and is to provide a brief description of the required level of maintenance for privately maintained components. The DPMR must be reviewed and approved by the City of Las Vegas Department of Field Operations prior to recordation, and must include a statement that all properties within the community are subject to assessment for all associated costs should private maintenance obligations not be met, and the City of Las Vegas be required to provide for said maintenance. Also, the CC&R are to include a statement of obligation of compliance with the DPMR. Following recordation, the Developer is to submit copies of the recorded DPMR and CC&R documents to the City of Las Vegas Department of Field Operations.

8. All development is subject to the conditions of City Departments and State Subdivision Statutes.

Public Works

9. Prior to the recordation of a Final Map for this site, a Petition of Vacation for any public right-of-way or City easements in conflict with the recordation of such a Final Map must be recorded. The Order of Vacation for such conflicts must record immediately prior to and concurrent with the recordation of the appropriate Final Map.

10. Prior to the recordation of a Final Map for individual lots along the southern property line east of the Doe Brook Trail alignment, the applicant shall determine the final disposition of the existing private improvements on Assessor's Parcel Number 125-21-201-001 that are not maintained by the applicant. Any solution that involves the areas in question becoming public right-of-way shall meet the approval of the City Engineer.

11. Dedicate additional right-of-way up to a total width of 80 feet for Oso Blanca Road as a Town Center Arterial on the Final Map for this site. Additionally, dedicate 10 feet on Deer Springs Road to accommodate the cross section provided on the approved site plan. No dedication on Oso Blanca Road is required if an 80-foot dedication for Oso Blanca Road already exists. Grant a 9-foot wide easement adjacent to the western edge of Oso Blanca Road for roadway, public sewer, and public drainage on the Final Map for this site. This 9-foot easement includes the required 6-foot perimeter landscape buffer and may be reduced or eliminated if it is determined by the City Engineer that it is not required.

12. Unless otherwise allowed by the City Engineer, submit all required documentation and support materials to the Right of way Section of the Department of Public Works to modify the City's Bureau of Land Management (BLM) Plan of development to include the construction of storm drain facilities on the south side of Assessor's Parcel (APN) #125 20 501-007 to obtain legal right to construct the proposed off-site storm drain prior to constructing improvements on APN #125-20-501-007. If legal right cannot be obtained, Unit 2 of this Tentative Map shall be revised to addresses accommodation for existing storm drain facilities on this site. No permits for areas dependent on the proposed storm drain facility shall be issued until such legal right is obtained.

13. Street "A" between Grand Montecito and Oso Blanca shall be constructed as shown on the approved Site Plan to include traffic signal underground infrastructure at both the intersection with Grand Montecito Parkway and Oso Blanca Road. A Public Access Easement for vehicular, bicycle and pedestrian traffic shall be granted across the entire length of Street "A". Street "A" shall be privately maintained and shall not be gated. Any public easements needed to accommodate future traffic signals at both ends of this street shall be granted concurrent with the development of this site. This street may be dedicated to the City at the request of the applicant if the Director of Public Works determines it is necessary for regional street network connectivity.

14. Internal private streets must be granted and labeled on the Final Map for this site as Public Utility Easements (P.U.E.), Public Sewer Easements, and Public Drainage Easements to be privately maintained by the Homeowner's Association.

15. Construct full-width street improvements per Title 19.04.120.B including appropriate transition paving on Oso Blanca Road as a Town Center Arterial and as modified by the City Engineer to match Nevada Department of Transportation's (NDOT's) construction on Oso Blanca Road with a 12-foot trail on the west side of Oso Blanca Road along the entire frontage. Provide written documentation that this project has been coordinated with NDOT and the City Engineer. Additionally, construct all incomplete half street improvements on Deer Springs Road adjacent to this site and modify the Deer Springs Way/Grand Montecito Parkway intersection and the Deer Springs Way/Doe Brook Trail intersection to meet the approval of the City Traffic Engineer concurrent with the development of this site. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.

16. All landscaping and private improvements installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.

17. Provide public sewer easements for all public sewers not located within existing public street right-of-way prior to the issuance of any permits. Improvement Drawings submitted to the City for review shall not be approved for construction until all required off-site Public Sewer Easements necessary to connect this site to the existing public sewer system have been granted to the City.

18. Construct off-site sewer in Oso Blanca Road to the intersection of Centennial Center Boulevard at a depth and location acceptable to the Sanitary Sewer Section of the Department of Public Works concurrent with development of any portion of this site that cannot be serviced by gravity to the existing public sewer system. Alternatively, the City Engineer may approve an alternate public sewer route that can be serviced by gravity.

19. The onsite public sewers within public easements must comply with current City standards. Meet with the Sanitary Sewer Section of the Department of Public Works to discuss sewer setbacks from property lines and parking spaces.

20. Modify the existing downstream public sewer at the intersection of Deer Springs Way and Doe Brook Trail to send flow southward to existing manhole LT-62.

21. Grant a 30-foot wide "Public Sewer Easement and Public Utility Easement, Surface to be Privately Maintained over the Common Element "Y".

22. Construct a minimum 5-foot wide paved surface over the proposed public sewer in Common Element "DD". The width of Common Element "DD" may need to be increased during civil plan review.

23. Construct a minimum 12-foot wide paved surface over the proposed public sewer in Common Element "Y" to provide maintenance vehicle access to all public sewer manholes. Construct vehicular access gates at the north and south ends of Common Element "Y" for city maintenance vehicles.

24. Grant a "Public Sewer Easement, Surface to be Privately Maintained" over the entirety of Common Element "Y". No trees and no landscaping over 3-feet tall shall be allowed within any of the proposed sewer easements.

25. A working sanitary sewer connection shall be in place prior to final inspection of any units within this development. Full permanent improvements on all major access streets, including all required landscaped areas between the perimeter wall and adjacent public street, shall be constructed and accepted by the City prior to issuance of any building permits beyond 50% of all units within this development. All off-site improvements adjacent to this site, including all required landscaped areas between the perimeter walls and adjacent public streets, shall be constructed and accepted prior to issuance of building permits beyond 75%. The above thresholds notwithstanding, all required Improvements shall be constructed in accordance with Title19.02.130.D.

26. The applicant shall maintain the approved landscaping in Grand Montecito Parkway, including the median, adjacent to this site, per the existing recorded Encroachment Agreement. The applicant shall either amend the existing agreement, or submit a new License Agreement for landscaping and private improvements in the Deer Springs Road public right-of-way, if any, prior to the issuance of permits for these improvements. The applicant must carry an insurance policy for the term of the License Agreement and add the City of Las Vegas as an additionally insured entity on this insurance policy. If requested by the City, the applicant shall remove property encroaching in the public right-of-way at the applicant's expense pursuant to the terms of the City's License Agreement. The installation and maintenance of all private improvements in the public right of way shall be the responsibility of the applicant and any successors in interest to the property and assigns pursuant to the terms of the License Agreement. Coordinate all requirements for the License Agreement with the Land Development Section of the Department of Building and Safety (229-4836).

27. A Traffic Impact Analysis must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits, submittal of any construction drawings or the recordation of a Map subdividing this site, whichever may occur first. Comply with the recommendations of the approved Traffic Impact Analysis prior to occupancy of the site. The Traffic Impact Analysis shall also include a section addressing Standard Drawings #234.1 #234.2 and #234.3 to determine additional right-of-way requirements for bus turnouts adjacent

to this site, if any; dedicate all areas recommended by the approved Traffic Impact Analysis. All additional rights of way required by Standard Drawing #201.1 for exclusive right turn lanes and dual left turn lanes shall be dedicated prior to or concurrent with the commencement of on site development activities unless specifically noted as not required in the approved Traffic Impact Analysis. Phased compliance will be allowed if recommended by the approved Traffic Impact Analysis. No recommendation of the approved Traffic Impact Analysis, nor compliance therewith, shall be deemed to modify or eliminate any condition of approval imposed by the Planning Commission or the City Council on the development of this site. Private Street "A" shall not be gated.

28. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

29. The approval of all Public Works related improvements shown on this Tentative Map is in concept only. Specific design and construction details relating to size, type and/or alignment of improvements, including but not limited to street, sewer and drainage improvements, shall be resolved prior to approval of the construction plans by the City. No deviations from adopted City Standards shall be allowed unless specific written approval for such is received from the City Engineer prior to the recordation of a Final Map or the approval of subdivision-related construction plans, whichever may occur first. Approval of this Tentative Map does not constitute approval of any deviations. If such approval cannot be obtained, a revised Tentative Map must be submitted showing elimination of such deviations.

The Notice of Final Action was filed with the Las Vegas City Clerk on January 17, 2019.

Sincerely,

Robert Summerfield

Robert Summerfield, AICP
Director
Department of Planning

PRTS:nl

cc:

Christa Bilbrey
KB Home
5795 W. Badura Ave., Ste. 180
Las Vegas, Nevada 89118

Ms. Roxanne Leigh
Slater Hanifan Group
5740 S. Arville St., Ste. 216
Las Vegas, Nevada 89118

# APPENDIX F

## CD of Electronic Files & Improvement Plans

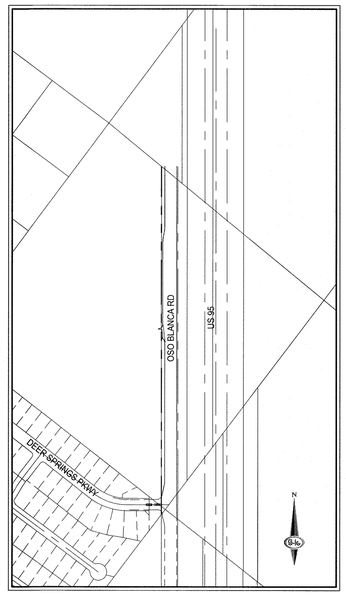



| REVISION | SHEETS | DESCRIPTION |
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# IMPROVEMENT PLANS FOR MONTECITO - OFFSITE OSO BLANCA ROAD

CITY OF LAS VEGAS, NEVADA

APN: 125-21-101-002, 125-21-299-001, & 125-21-299-004




SITE MAP
NOT TO SCALE

| SHEET INDEX | | |
|---|---|---|
| NO | SHEET | TITLE |
| 1 | C-1 | COVER SHEET |
| 2 | C-2 | GENERAL NOTES |
| 3 | C-3 | LEGEND, ABBREVIATIONS, AND QUANTITIES |
| 4 | PP-1 | PLAN & PROFILE - OSO BLANCO RD STA 67+50 TO 62+50 |
| 5 | PP-2 | PLAN & PROFILE - OSO BLANCO RD STA 62+50 TO 57+50 |
| 6 | PP-3 | PLAN & PROFILE - OSO BLANCO RD STA 57+50 TO 52+50 |
| 7 | PP-4 | PLAN & PROFILE - OSO BLANCO RD STA 52+50 TO 48+00 |
| 8 | PP-5 | PLAN & PROFILE - OSO BLANCO RD STA 48+00 TO 43+50 |
| 9 | SD-1 | PLAN & PROFILE - STORM DRAIN I |
| 10 | SD-2 | PLAN & PROFILE - STORM DRAIN II |
| 11 | SD-3 | PLAN & PROFILE - STORM DRAIN III |
| 12 | D-1 | STREET SECTIONS & GRADING DETAILS I |

## DISCLAIMER NOTE

EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXCEPT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

## DEVIATIONS FROM STANDARDS

NONE

## SWPPP NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: HTTP://WWW.STATE.NV.US/BWPC/STORM01.HTM PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH THE APPROPRIATE FILING FEE.










## APPROVALS

CITY ENGINEER-ALLEN PAVELKA PE, #9029 DATE

APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED OF RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIALLY LISTED UNDER DEVIATIONS FORM STANDARDS. 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.

LAS VEGAS FIRE AND RESCUE DATE

CITY OF LAS VEGAS - DATE
PLANNING DEPARTMENT

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

CENTRAL TELEPHONE CO. DBA 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 STATUES AND / OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. N/A. FIRST APPROVED DATE:
LVVWD APPROVED FIRE FLOW 1,500 GPM AT 20 PSI RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW N/A GPM

SHEETS: N/A

APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM LAS VEGAS VALLEY WATER DISTRICT.

NV ENERGY DATE

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

SOUTHWEST GAS CORPORATION DATE

COX COMMUNICATIONS LAS VEGAS, INC. DATE

| OWNER/DEVELOPER | ENGINEER |
|---|---|
| KB HOME<br>5795 BADURA AVE. SUITE 180<br>LAS VEGAS, NV 89118<br>PH: 702-266-8400<br>FX: 702-266-8623<br>CONTACT: PAUL CHAO | SLATER HANIFAN GROUP, INC.<br>5740 S. ARVILLE STREET, SUITE 216<br>LAS VEGAS, NV 89118<br>PH: (702) 284-5300<br>FX: (702) 284-5399<br>CONTACT: TIMOTHY MULROONEY |

## LEGAL DESCRIPTION

A PORTION OF THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 21, TOGETHER WITH A PORTION OF THE NORTHWEST QUARTER (NW 1/4) AND SOUTH HALF (S 1/2) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 21, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

## BENCHMARK

BENCHMARK NUMBER: 6LV90 17NW6
RIVET AND PLATE IN TOP OF CURB AT SW CORNER GILCREASE AVENUE AND OSO BLANCA ROAD
(W FRONTAGE ROAD)
ELEVATION = 2631.88 FEET, 802.1998 METERS, N.A.V.D. 88 DATUM

## BASIS OF BEARINGS

NORTH 89°56'20" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 20, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN FILE 118, PAGE 89 OF SURVEYS.

## FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|
| | | | | | |

CITY OF LAS VEGAS, NV

KB HOME

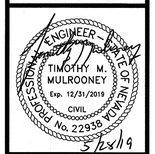
MONTECITO - OFFSITE OSO BLANCA ROAD

COVER SHEET

S21 E60

DATE: 5/28/19
DRAFTER: BCS
DESIGNER: BCS
CHECKED: MAK

PROJECT NO.
KBH1805-006




C-1
SHEET 1 OF 12

J:\kbh1805-006 montecito 60 es roadway-oso blanca\dwg\improv\kbh1805-006 cvr.dwg 5/28/2019 12:39 PM Bryn Sammieto

## STORMWATER RUNOFF MANAGEMENT

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT ,MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAYS OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION OR OTHER SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY ACTUAL OR EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

## LEGAL DESCRIPTION

A PORTION OF THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 21, TOGETHER WITH A PORTION OF THE NORTHWEST QUARTER (NW 1/4) AND SOUTH HALF (S 1/2) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 21, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

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## SOUTHERN NEVADA - SOUTHWEST GAS CORPORATION GENERAL NOTES

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

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

### SOUTHWEST GAS APPROVAL

SOUTHWEST GAS CORPORATION DATE

## 2.2 CITY OF LAS VEGAS SEWER NOTES

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

## LAS VEGAS VALLEY WATER DISTRICT (LVVWD) STANDARD NOTES

LVVWD PROJECT # N/A (REVISED 08/01/2017)

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

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

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

## GRADING NOTES

1. INDICATED GRADES OTHER THAN T.C., F.G. & GUTTER F.L. ARE ROUGH GRADES.
2. THE ROUGH GRADING PLANS SHALL BE ON THE JOB SITE AT ALL TIMES. THE ROUGH GRADING SHALL BE FINISHED IN CONFORMANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS. THE GRADING QUANTITIES ARE BASED ON THE ELEVATION AND DETAILS SHOWN ON THE PLANS. ANY DEVIATIONS FROM THE PLANS WILL RESULT IN QUANTITY CHANGES.
3. CARE SHALL BE EXERCISED IN GRADING CORNER LOTS.
4. ROUGH PAD ELEVATIONS SHALL BE GRADED TO WITHIN 0.1' OF THE PAD ELEVATIONS SHOWN ON THE PLANS. WHEN GRADING IS COMPLETE PER THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE LOTS CAN BE INSPECTED. AT THAT TIME THE ENGINEER SHALL ALSO DECIDE IF ANY ADDITIONAL DITCHES OR BERMS ARE REQUIRED. THE CONTRACTOR IS REQUESTED NOT TO REMOVE ANY OF HIS ROUGH GRADING EQUIPMENT UNTIL HE RECEIVES GRADING APPROVAL FROM THE ENGINEER.
5. SOILS REPORT PREPARED BY N/A, PROJECT NO. N/A, DATED N/A.
6. EARTHWORK QUANTITIES (RAW):
   -CUT = N/A CUBIC YARDS.
   -FILL = N/A CUBIC YARDS

   A) THE ABOVE QUANTITIES DO NOT REFLECT LOSSES DUE TO SUBSIDENCE OR SHRINKAGE.
   B) THE ABOVE QUANTITIES DO REFLECT USING NATIVE MATERIAL IN LIEU OF TYPE I GRAVEL BASE MATERIAL FOR STREET SECTIONS.
   C) THE ABOVE QUANTITIES DO NOT REFLECT ANY EARTHWORK WHICH MAY BE REQUIRED BY THE ENGINEER TO CONSTRUCT ADDITIONAL PROTECTIVE DITCHES OR BERMS NOT SHOWN ON THESE DRAWINGS.

## CITY OF LAS VEGAS FIRE AND RESCUE GENERAL NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE # 6331, FOR HYDRANT SPECIFICATIONS, AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S – **APPROVED PRODUCTS LIST** ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK [IFC 105.7.12]
4. ON ANT RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [IFC 3310, 3312]
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. [IFC 507.5.7.3]
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. [IFC 106.3]
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. [IFC 507.2.1, NFPA 24]
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER NECESSARY FIRE PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. [IFC 507]
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. [IFC 507.5.7.1]
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. [IFC 507]
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: [IFC C102]
    - RESIDENTIAL- 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
    - COMMERCIAL- 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE NEW 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 1,000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. [IFC C102.8]
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FEET OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [IFC C102.12]
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC C102.4]
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC C102.7]
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [IFC C102.6]
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE ARE 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [IFC C104]
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [IFC 503.2.3]
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FEET PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [IFC 503.2.7, 503.2.8]
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FEET OUTSIDE AND 28 FEET INSIDE TURNING RADIUS. [IFC 503.2.4]
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13 FT 6 INS. [IFC 503.2.1]
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES. NOT LESS THAN 32 FT WIDE, FLOW LINE TO FLOW LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS 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. [IFC 503.2.1.1]
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THE DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. [IFC 503.1.1]
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. [IFC 503.1.2]
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. [IFC 503.2.5]
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FEET ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [IFC 503.3]
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC 503.6 AND IFC APPENDIX M.

## 2.5 CITY OF LAS VEGAS GRADING NOTES

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

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

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

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

## UTILITY LOCATION NOTE TO CONTRACTOR

EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS. CALL BEFORE YOU DIG: 1 (800) 227-2600; SOUTHWEST GAS CORPORATION: 702-400-1789 (STANDBY CONTACT NUMBER)

## 2.1 CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300'IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (½") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED

## ABBREVIATIONS

| | | | | | |
|---|---|---|---|---|---|
| AC | ASPHALTIC CONCRETE OR ACRE | FL | FLOWLINE | PVI | POINT OF VERTICAL INTERSECTION |
| AGG | AGGREGATE BASE | FT | FEET OR FOOT | QTY | QUANTITY |
| APN | ASSESSORS PARCEL NUMBER | FUT | FUTURE | R | RADIUS |
| APPROX OR ~ | APPROXIMATE | GRD | GRADE OR GROUND | RCA | REINFORCED CONCRETE ARCH |
| AVE | AVENUE | GB | GRADE BREAK OR GRADE CHANGE | RCB | REINFORCED CONCRETE BOX |
| @ | AT | GV | GATE VALVE | RCP | REINFORCED CONCRETE PIPE |
| BC | BEGIN CURVE OR BACK OF CURB | HDPE | HIGH DENSITY POLYETHYLENE | RD | ROAD |
| BCR | BEGINNING OF CURB RETURN | HOA | HOME OWNERS ASSOCIATION | RDWY ESMT | ROADWAY EASEMENT |
| BHW | BOTTOM OF HEADWALL | HORZ | HORIZONTAL | REQD | REQUIRED |
| BLDG | BUILDING | HP | HIGH POINT | REV | REVISION |
| BLVD | BOULEVARD | HWL | HIGH WATER LEVEL | RG | ROUGH GRADE |
| BM | BENCHMARK | HDWL OR HW | HEADWALL | RT OR R | RIGHT |
| BVC | BEGIN VERTICAL CURVE | HYD | HYDRAULIC OR HYDRANT | R/W, ROW | RIGHT OF WAY |
| BWV | BACK WATER VALVE | ID | INSIDE DIAMETER | S | SLOPE |
| CC | CLARK COUNTY | IN | INCH | SCH | SCHEDULE |
| CCAUSD | CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS | INT | INTERSECTION | SD | STORM DRAIN |
| CCPW | CLARK COUNTY PUBLIC WORKS | INV | INVERT ELEVATION | SDDI | STORM DRAIN DROP INLET |
| CCRFCD | CLARK COUNTY REGIONAL FLOOD DISTRICT | IP | IRON PIPE | SDMH | STORM DRAIN MANHOLE |
| CCWRD | CLARK COUNTY WATER RECLAMATION DISTRICT | IRRG | IRRIGATION | SEC | SECTION |
| CE | COMMON ELEMENT | LF | LINEAR FEET | SF | SQUARE FEET |
| CL,C/L,C | CENTERLINE | LMC | LANDSCAPE MAINTENANCE CORPORATION | SHT | SHEET |
| CLR | CLEAR OR CLEARANCE | LP | LOW POINT | SLTC | STREET LIGHT & TRAFFIC CONTROL ESMT |
| CLSM | CONTROLLED LOW STRENGTH MATERIAL | LT OR L | LEFT | SNWA | SOUTHERN NEVADA WATER AUTHORITY |
| CLV | CITY OF LAS VEGAS | LVVWD | LAS VEGAS VALLEY WATER DISTRICT | SPECS | SPECIFICATIONS |
| CML&C | CEMENT MORTAR LINED AND COATED | LWL | LOW WATER LEVEL | ST | STREET |
| CMU | CONCRETE MASONRY UNIT | MAX | MAXIMUM | SSMH | SANITARY SEWER MANHOLE |
| CNLV | CITY OF NORTH LAS VEGAS | MECH | MECHANICAL | STA | STATION |
| COH | CITY OF HENDERSON | MH | MANHOLE | STD | STANDARD |
| CONC | CONCRETE | MIN | MINIMUM | STL | STEEL |
| CT | COURT | MISC | MISCELLANEOUS | STLT | STREET LIGHT |
| CY OR CU YD | CUBIC YARD | MUE | MUNICIPAL UTILITY EASEMENT | SW | SIDEWALK |
| DCWCS | DESIGN AND CONSTRUCTION FOR WASTEWATER COLLECTION SYSTEMS | NDOT | NEVADA DEPARTMENT OF TRANSPORTATION | SWG | SOUTHWEST GAS |
| | | NTS | NOT TO SCALE | SWR OR SS | SANITARY SEWER |
| DET | DETAIL | NUE | NONEXCLUSIVE UTILITY EASEMENT | SY | SQUARE YARD |
| DI | DUCTILE IRON OR DRAIN INLET | NVE | NV ENERGY | TAN | TANGENT |
| DIA, ø | DIAMETER | OC | ON CENTER | TC | TOP OF CURB |
| DIP | DUCTILE IRON PIPE | OD | OUTSIDE DIAMETER OR OVERALL DIMENSION | TF | TOP OF FLOOR OR TOP OF FOOTING |
| DR | DRIVE | OFF | OFFSET | TG | TOP OF GRATE |
| DWG(S) | DRAWING | ORIG | ORIGINAL | THRU | THROUGH |
| DWY | DRIVEWAY | PAE | PUBLIC OR PEDESTRIAN ACCESS EASEMENT | THW | TOP OF HEADWALL |
| EA | EACH | PB | PULL BOX | TP | TOP OF PIPE |
| ECR | END CURB RETURN | PC | POINT OF CURVE | TW | TOP OF WALL |
| EG | EXISTING GROUND | PCC | POINT OF COMPOUND CURVE | TRW | TOP OF RETAINING WALL |
| ELEV | ELEVATION | PDE | PUBLIC DRAINAGE EASEMENT | TSW | TOP OF SCREEN WALL |
| ESMT | EASEMENT | P OR PL | PROPERTY LINE | TYP | TYPICAL |
| EP | EDGE OF PAVEMENT | POB | POINT OF BEGINNING | UDACS | UNIFORM DESIGN AND CONSTRUCTION STANDARDS |
| ERU | EQUIVALENT RESIDENTIAL UNIT | POC | POINT OF CURVATURE | | |
| EVC | END VERTICAL CURVE | POE | POINT OF ENDING | VC | VERTICAL CURVE |
| EX OR EXIST | EXISTING | PRC | POINT OF REVERSE CURVATURE | VERT | VERTICAL |
| FC | FACE OF CURB | PRELIM | PRELIMINARY | VG | VALLEY GUTTER |
| FF | FINISHED FLOOR | PROP | PROPOSED | WI | WROUGHT IRON |
| FG | FINISHED GRADE | PRV | PRESSURE REDUCING VALVE | WL | WATER LINE |
| FGH | FINISHED GRADE, HIGH SIDE | PUE | PUBLIC UTILITY EASEMENT | WPZ | WATER PRESSURE ZONE |
| FGL | FINISHED GRADE, LOW SIDE | PT | POINT OF TANGENT OR POINT | WT | WEIGHT |
| FH | FIRE HYDRANT | PVC | POLYVINYL CHLORIDE | WTR | WATER LINE |

## SPECIAL NOTE

IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED WHICH IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY OF LAS VEGAS DEPT. OF PUBLIC WORKS. TEMPORARY CONSTRUCTION ITEMS INCLUDE: PAVEMENT TRANSITIONS, PROTECTIVE DITCHES AND BERMS, ROAD SIGNS AND BARRICADES, ETC.

## NOTICE TO CONTRACTOR

-QUANTITIES SHOWN ARE ESTIMATES ONLY AND ARE INTENDED TO ILLUSTRATE SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE EXACT QUANTITIES INVOLVED.

-EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS. CALL BEFORE YOU DIG: (800) 227-2600

## LEGEND

| EXISTING | PROPOSED | DESCRIPTION |
|---|---|---|
| (1900) | 1900 | 5' CONTOUR |
| | | 1' CONTOUR |
| | | STRIPING |
| | | SEWER MANHOLE |
| | | CURB AND GUTTER |
| EX 8" PVC SS | 8" PVC SS | SANITARY SEWER PIPE AND FLOW ARROW |
| EX 8" PVC WTR | 8" PVC WTR | WATER PIPE |
| | | WATER GATE VALVE |
| | | FIRE HYDRANT |
| | | WATER BLOW-OFF |
| | | WATER LATERAL W/ METER |
| | | SANITARY SEWER LATERAL |
| | | STREETLIGHT |
| | | EDGE OF PAVEMENT |
| | | TRAFFIC SIGN |
| PAD= XXX.X<br>FF = XXX.X | PAD= XXX.X<br>FF = XXX.X | PAD ELEVATION<br>FINISHED FLOOR ELEVATION |
| TC | TC | ELEVATION |
| | | RETAINING WALL |
| | | STORM DRAIN W/ MANHOLE |

| | |
|---|---|
| | EXISTING GAS GATE VALVE |
| @MH | EXISTING UNKNOWN MANHOLE |
| GAS | EXISTING GAS, SIZE PER PLAN |
| | EXISTING POWER POLE |
| | EXISTING TRAFFIC SIGNAL |
| | EXISTING WALL |
| | WATER PIPE FITTING |
| POC | WATER POINT OF CONNECTION |
| POC | SEWER POINT OF CONNECTION |
| | DAYLIGHT LINE |
| | STREET CENTERLINE |
| | RIGHT-OF-WAY |
| | MATCHLINE |
| | BOUNDARY LINE |
| | PHASE LINE |
| P | PROPERTY LINE |
| | FLOWLINE |
| | SAWCUT |
| FILL / CUT | CUT/FILL TRANSITION LINE |
| | SIDEWALK |
| | EX STRIPING TO BE OBLITERATED |
| | GRADE BREAK LINE |
| ID | REFLECTIVE RAISED PAVEMENT MARKERS |
| BWV | BACK WATER VALVE |
| | WROUGHT IRON FENCE |
| | PONY WALL |
| | DECORATIVE PERIMETER WALL |
| | DECORATIVE PERIMETER RETAINING WALL |
| | PROPOSED CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB |
| | EXISTING CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB |
| | FUTURE CURB AND GUTTER WITH RIGHT-OF-WAY AT BACK OF CURB |
| | PROPOSED SCARP AREA |
| | DRIVEWAY |
| | PROPOSED RIP RAP |
| | SIGHT VISIBILITY ZONE PER STD DWG NO. 201.2 |
| | HANDICAP RAMP |

## QUANTITIES

| | | | PRIVATE | PUBLIC |
|---|---|---|---|---|
| **DRAINAGE** | | | | |
| 1. | 48" TYPE III STORM DRAIN MANHOLE | EA | – | 1 |
| 2. | 5.0' TYPE "CM2" DROP INLET | EA | – | 3 |
| 3. | 7.5' TYPE "CM2" DROP INLET | EA | – | 3 |
| 4. | 10.0' TYPE "CM2" DROP INLET | EA | – | 1 |
| 5. | 12.5' TYPE "CM2" DROP INLET | EA | – | 1 |
| 6. | 18" RCP CLASS IV STORM DRAIN | LF | – | 278 |
| 7. | 24" RCP CLASS IV STORM DRAIN | LF | – | – |
| 8. | 30" RCP CLASS IV STORM DRAIN | LF | – | 18 |
| 9. | 36" RCP CLASS IV STORM DRAIN | LF | – | – |
| 10. | RIPRAP D50=8", THK=16" | SF | – | – |
| 11. | 8' WIDE CONCRETE VALLEY GUTTER W/10" TYPE I AGGREGATE BASE | SF | – | 681 |
| 12. | SIDEWALK UNDER DRAIN | SF | – | – |
| 13. | | | | |










SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|
| | | | | | |

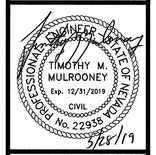
CITY OF LAS VEGAS, NV

KB HOME

# MONTECITO - OFFSITE OSO BLANCA ROAD
# LEGEND, ABBREVIATIONS, AND QUANTITIES

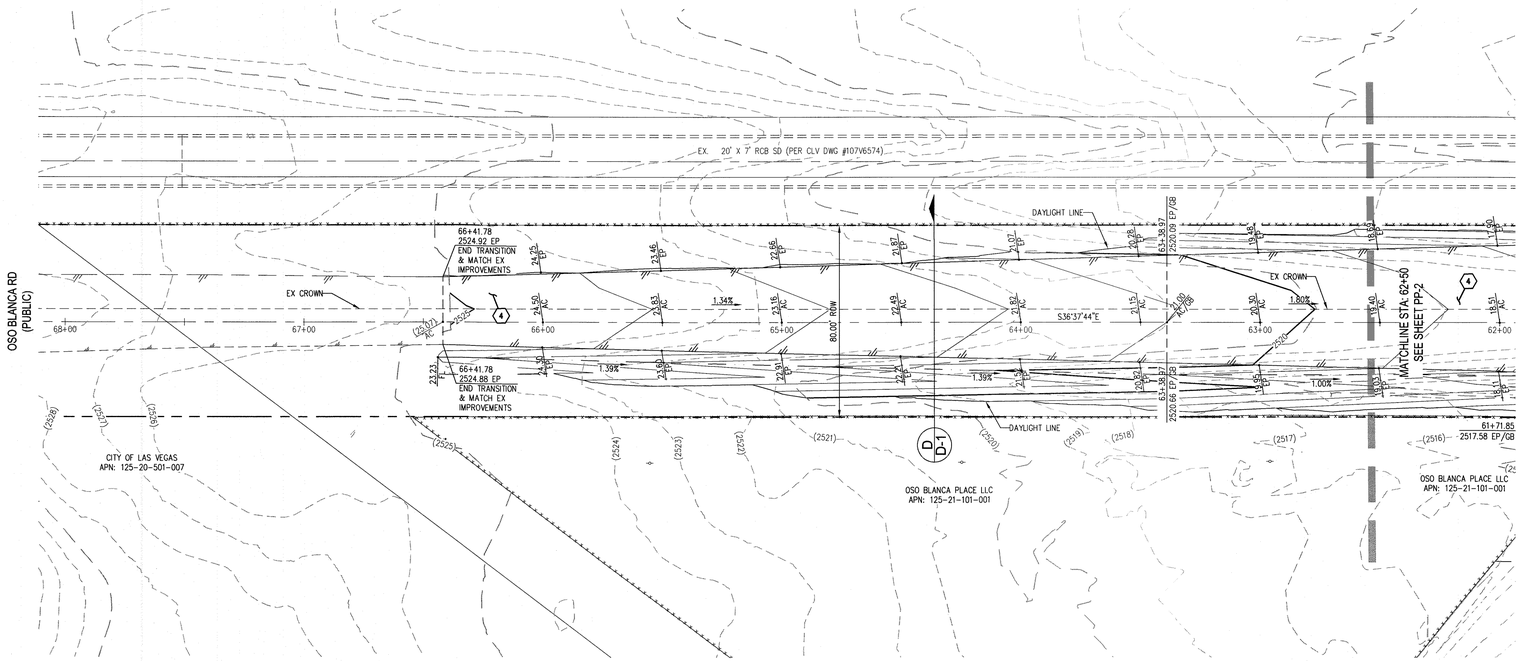
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DATE: 5/28/19
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DESIGNER: BCS
CHECKED: MAK
PROJECT NO. KBH1805-006

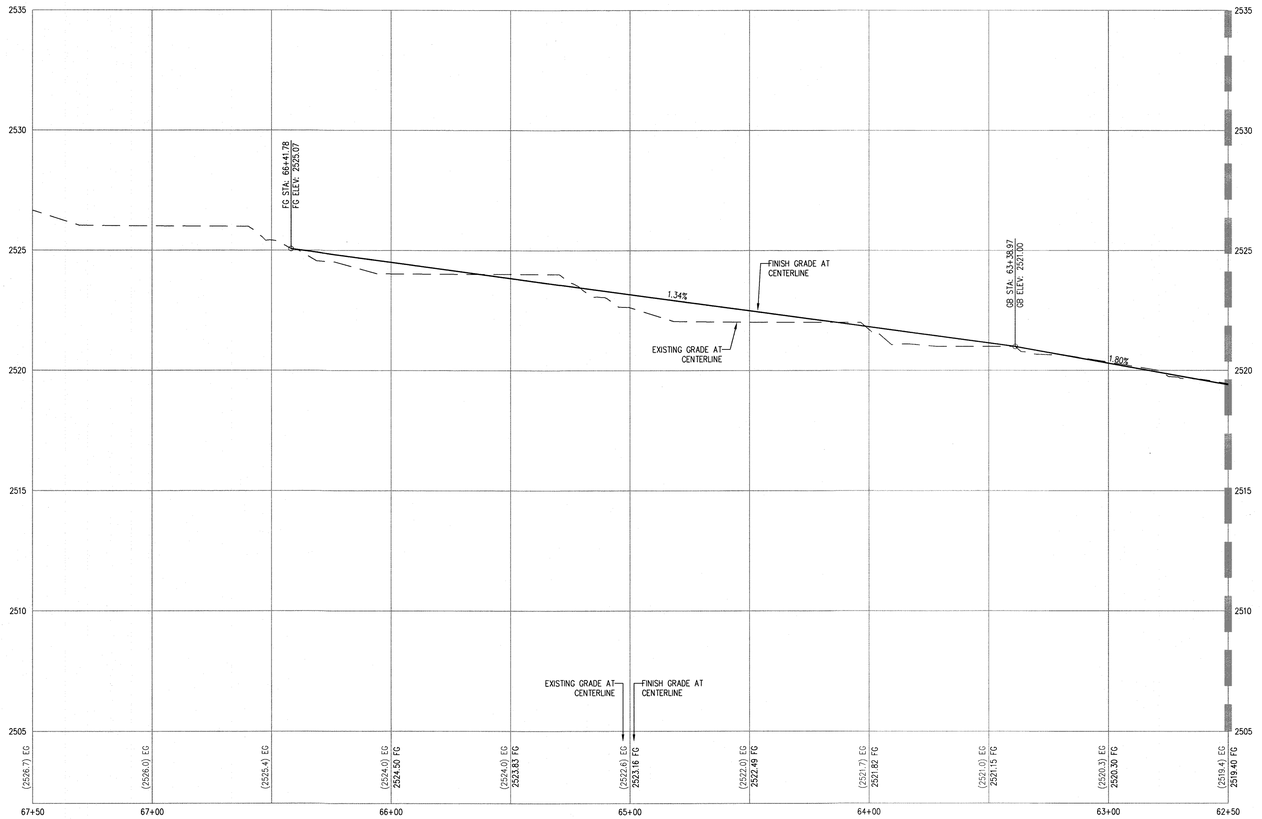



C-3
SHEET 3 OF 12

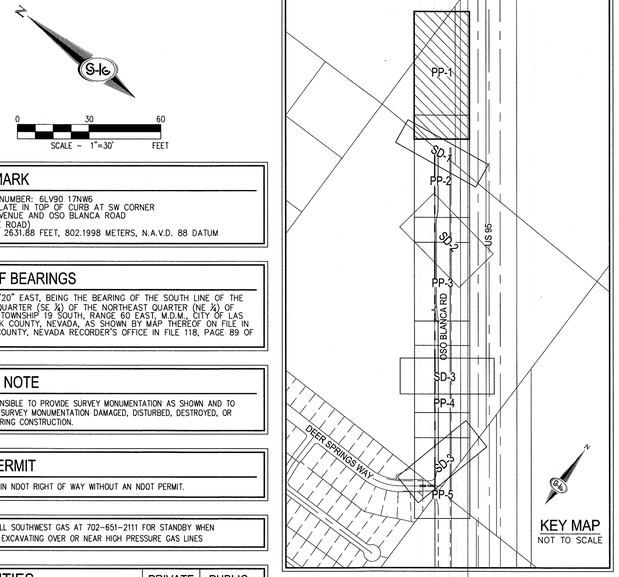
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## OSO BLANCA RD - PLAN VIEW
(PUBLIC)




## OSO BLANCA RD - PROFILE VIEW
HORIZ: 1" = 30'
VERT: 1" = 3'




## BENCHMARK

BENCHMARK NUMBER: 6LV90 17NW6
RIVET AND PLATE IN TOP OF CURB AT SW CORNER
GILCREASE AVENUE AND OSO BLANCA ROAD
(W FRONTAGE ROAD)
ELEVATION = 2631.88 FEET, 802.1998 METERS, N.A.V.D. 88 DATUM

## BASIS OF BEARINGS

NORTH 89°56'20" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 20, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN FILE 118, PAGE 89 OF SURVEYS.

## SURVEY NOTE

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## QUANTITIES

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|---|---|---|---|---|
| **DRAINAGE** | | | | |
| 1. | 48" TYPE II STORM DRAIN MANHOLE | EA | – | 1 |
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| 10. | | | | |

## CONSTRUCTION NOTES

1. EXISTING IMPROVEMENTS TO BE RELOCATED
2. INSTALL "A" TYPE ISLAND CURB PER CCAUSD NO. 219
3. INSTALL "L" TYPE CURB & GUTTER PER CCAUSD NO. 216
4. INSTALL 1" OPEN GRADE OVER 6" DENSE GRADE OVER 13" TYPE I AGGREGATE BASE
5. INSTALL 12' WIDE, CONCRETE SHARED USE PATH W/ 4" TYPE II AGGREGATE BASE
6. INSTALL SIDEWALK RAMP PER CCAUSD NO. 235, CASE I AND CCAUSD NO. 235.1
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17. INSTALL 30" RINKER REINFORCED CONCRETE SPIGOT PLUG. SEE DETAIL ON SHEET D-1




KEY MAP
NOT TO SCALE

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| | | |
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## FLOOD ZONE

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TIMOTHY M. MULROONEY, P.E. 22938 — DATE










SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|
| | | | | | |

CITY OF LAS VEGAS, NV

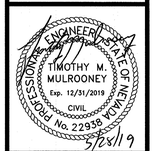
KB HOME

# MONTECITO - OFFSITE OSO BLANCA ROAD
## PLAN & PROFILE - OSO BLANCO RD STA 67+50 TO 62+50

S21 T19S R60E

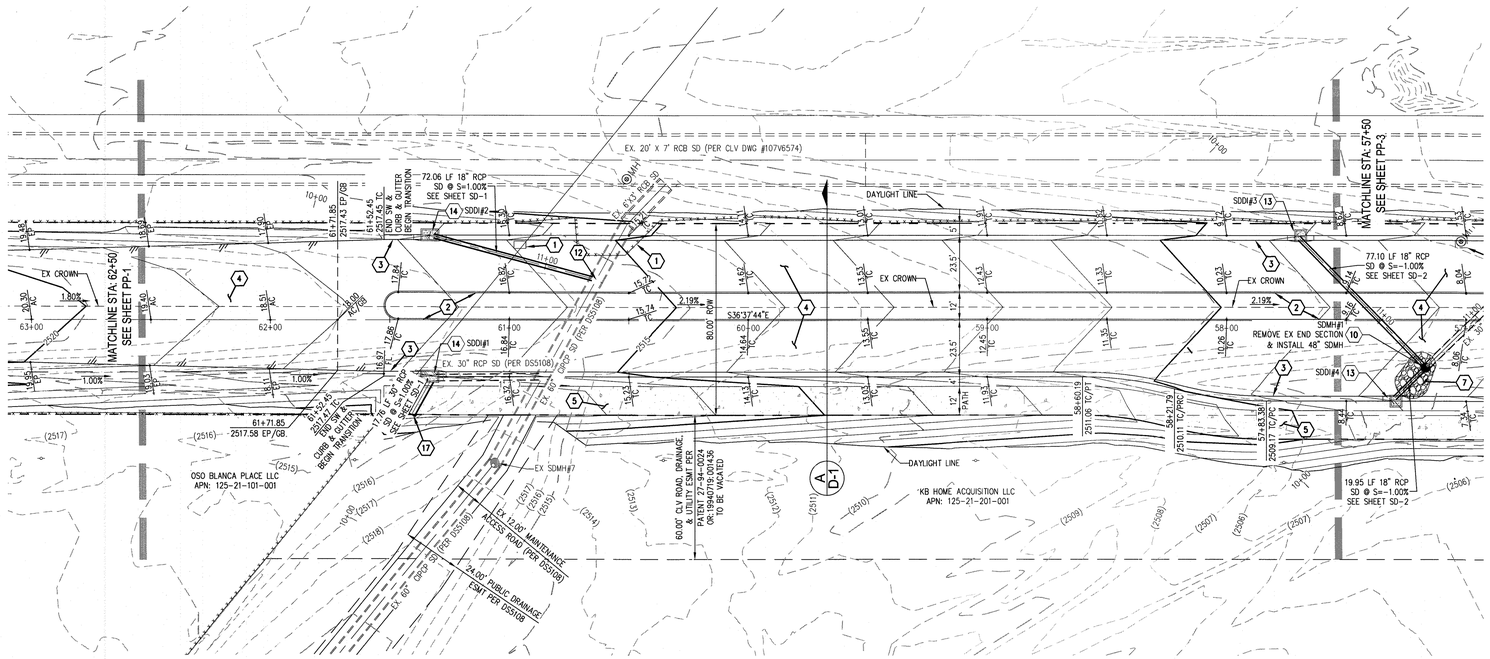
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DESIGNER: BCS
CHECKED: MAK

PROJECT NO.
**KBH1805-006**

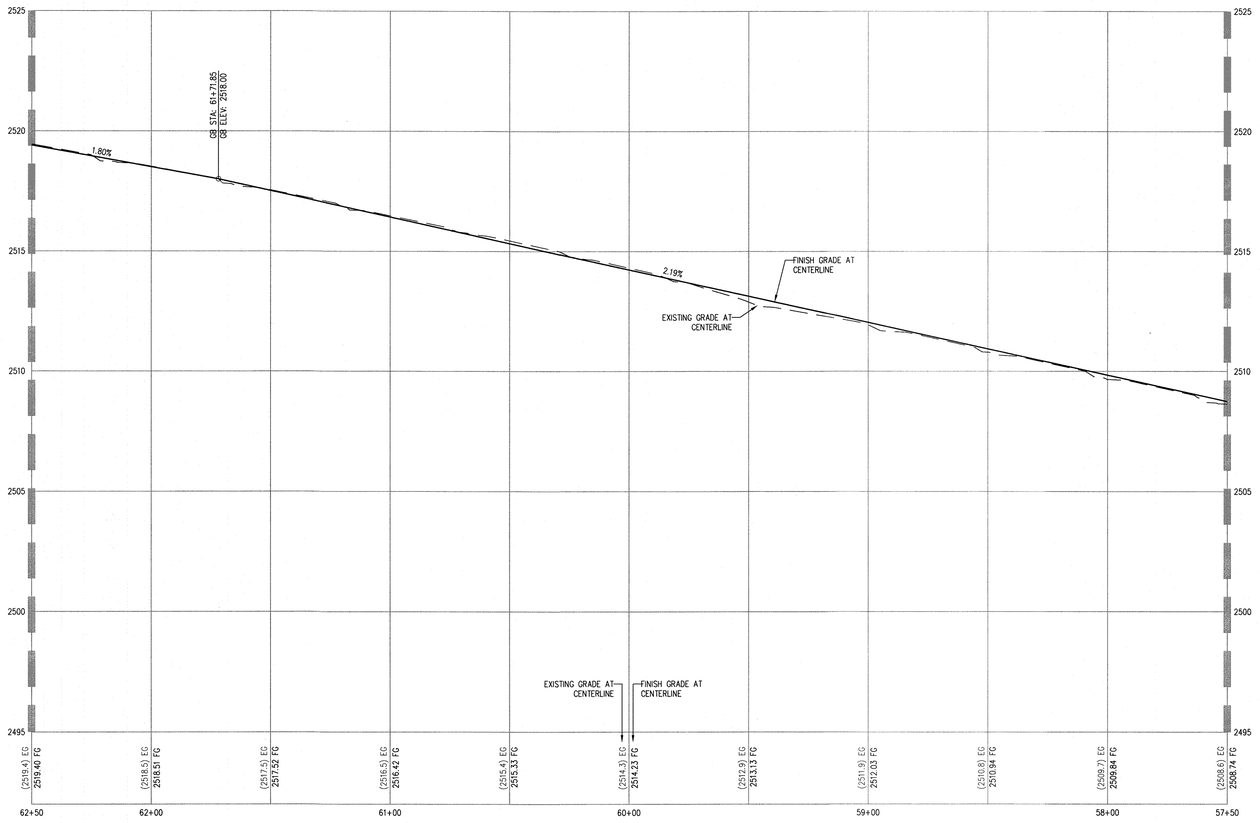



**PP-1**
SHEET 4 OF 12

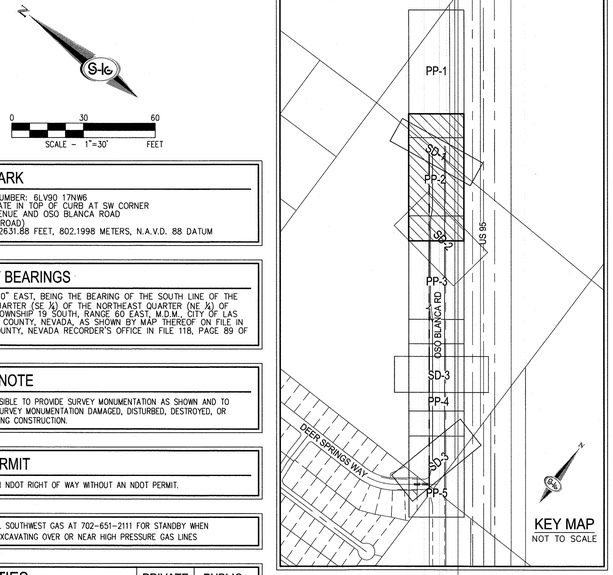
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## OSO BLANCA RD - PLAN VIEW
(PUBLIC)




## OSO BLANCA RD - PROFILE VIEW
HORIZ: 1" = 30'
VERT: 1" = 3'




## BENCHMARK
BENCHMARK NUMBER: 6LV90 17NW6
RIVET AND PLATE IN TOP OF CURB AT SW CORNER GILCREASE AVENUE AND OSO BLANCA ROAD
(W FRONTAGE ROAD)
ELEVATION = 2631.88 FEET, 802.1998 METERS, N.A.V.D. 88 DATUM

## BASIS OF BEARINGS
NORTH 89°56'20" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 20, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN FILE 118, PAGE 89 OF SURVEYS.

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## QUANTITIES

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|---|---|---|---|---|
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a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
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| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|

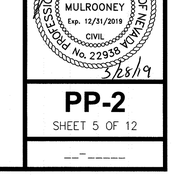
CITY OF LAS VEGAS, NV

KB HOME

# MONTECITO - OFFSITE OSO BLANCA ROAD
## PLAN & PROFILE - OSO BLANCO RD STA 62+50 TO 57+50

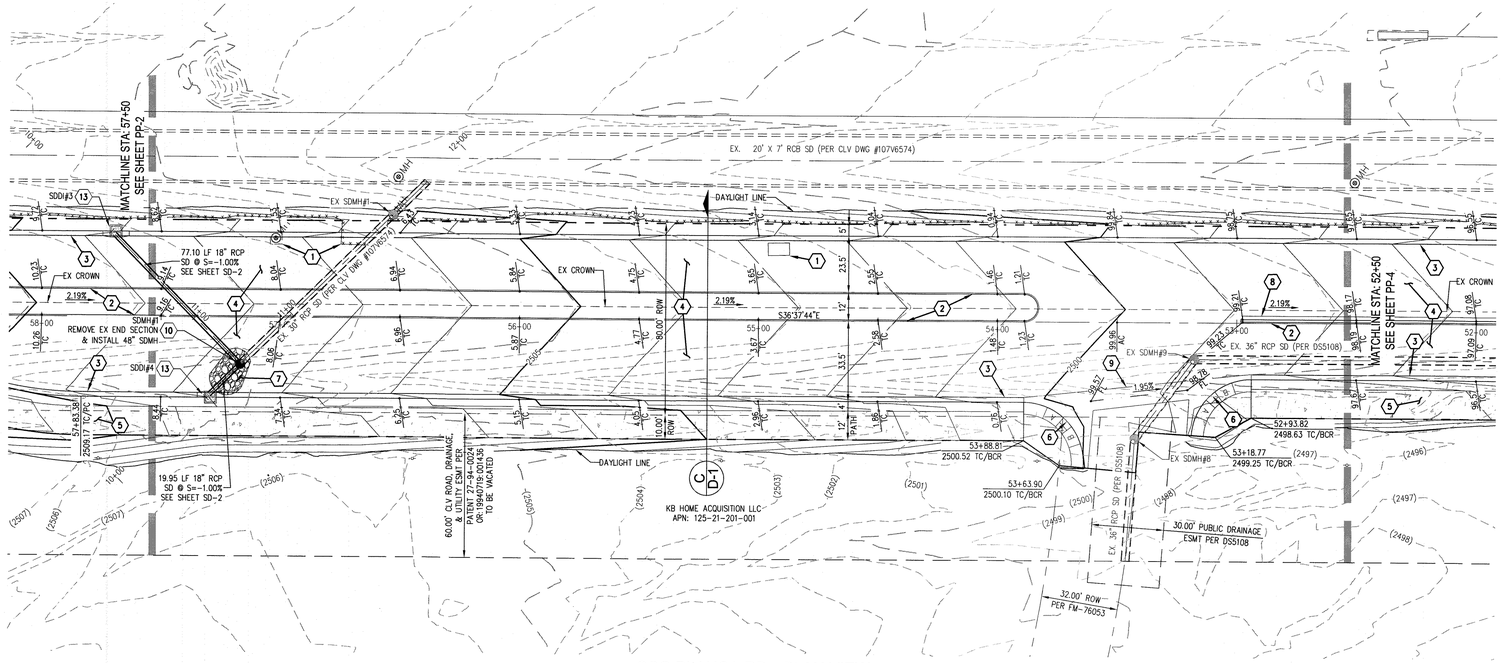
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DRAFTER: BCS
DESIGNER: BCS
CHECKED: MAK
PROJECT NO. KBH1805-006

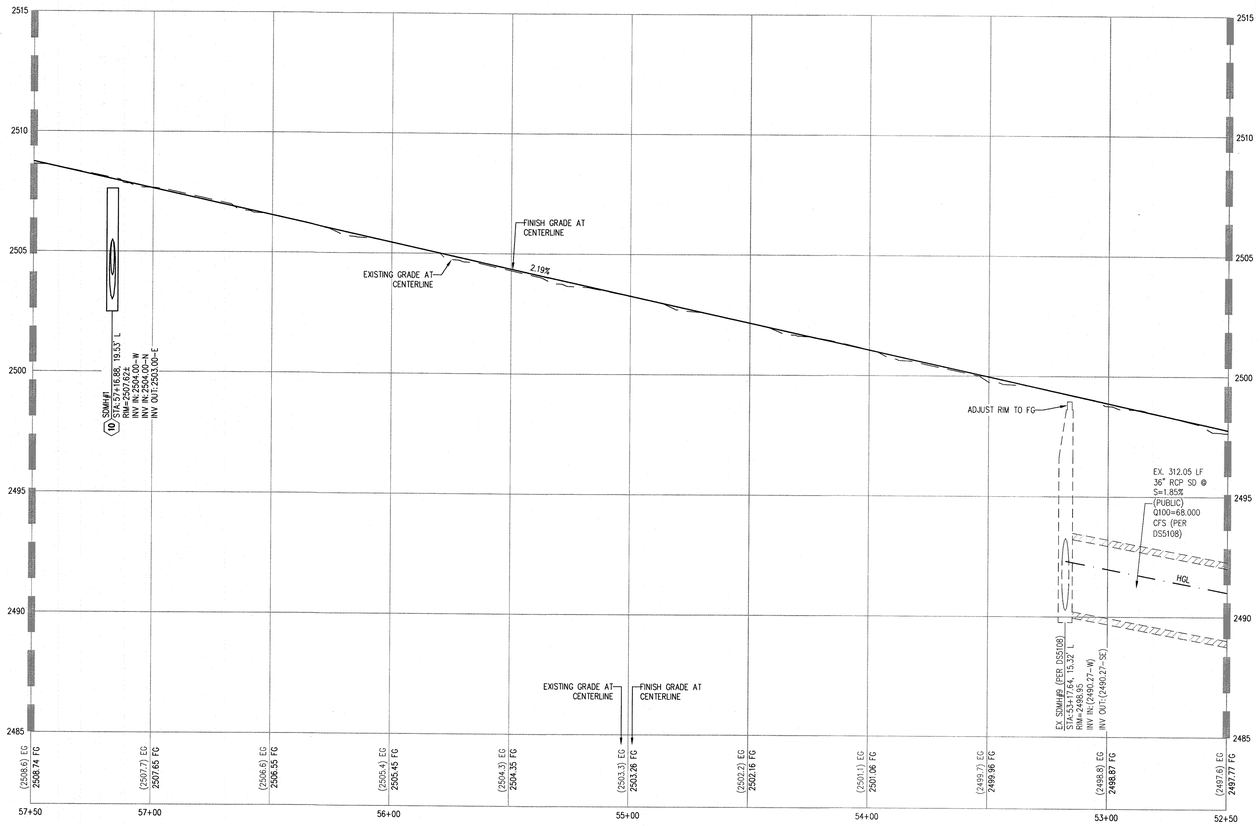



**PP-2**
SHEET 5 OF 12

J:\KBH1805-006 montecito 60 os roadway-osbl blanca\Dwg\Improv\KBH1805-006 prp.dwg 5/28/2019 12:40 PM Bryon Sorrentino




OSO BLANCA RD - PLAN VIEW
(PUBLIC)




OSO BLANCA RD - PROFILE VIEW
HORIZ: 1" = 30'
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0 30 60
SCALE - 1"=30' FEET

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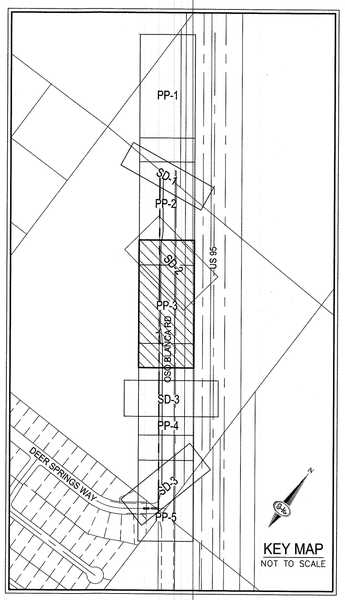
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## FLOOD CERTIFICATION

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

TIMOTHY M. MULROONEY, P.E. 22938 DATE

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

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T)

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

SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. | APP. DATE |
|---|---|---|---|---|---|
| | | | | | |

CITY OF LAS VEGAS, NV

KB HOME

MONTECITO - OFFSITE OSO BLANCA ROAD

PLAN & PROFILE - OSO BLANCO RD STA 57+50 TO 52+50

S21 T19S R60E

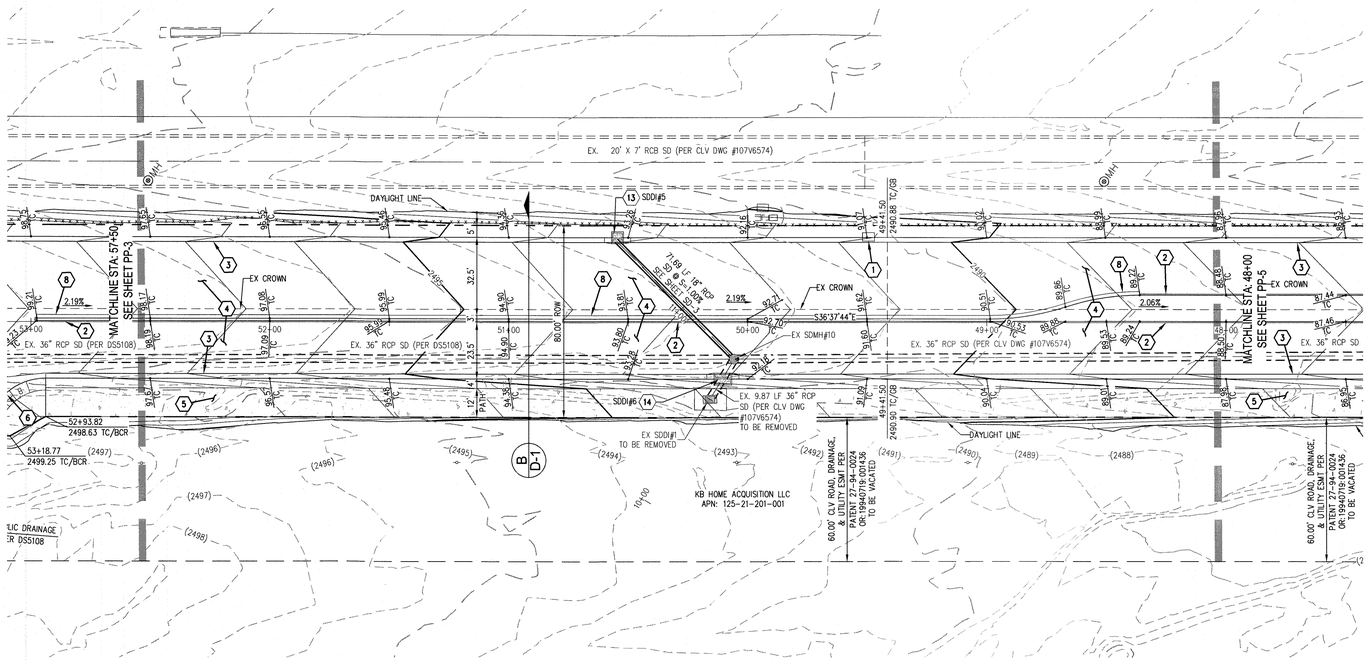
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DRAFTER: BCS
DESIGNER: BCS
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PROJECT NO.
KBH1805-006

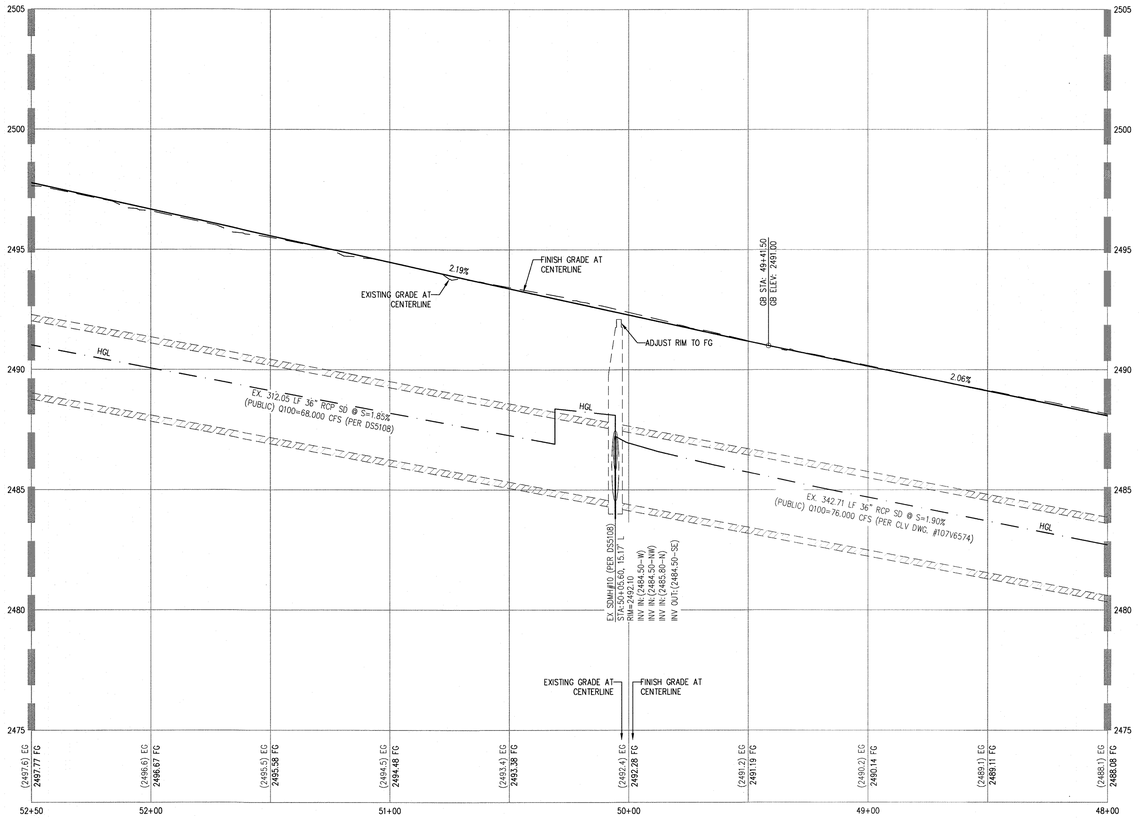
PROFESSIONAL ENGINEER STATE OF NEVADA TIMOTHY M. MULROONEY Exp. 12/31/2019 CIVIL No. 22938
5/28/19

PP-3
SHEET 6 OF 12

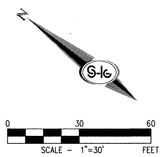
J:\kbh1805-006 montecito 60 os roadway-oso blanca\dwg\mxrox\kbh1805-006 pnp.dwg 5/28/2019 12:40 PM Bryan Sorrentino




OSO BLANCA RD - PLAN VIEW
(PUBLIC)




OSO BLANCA RD - PROFILE - VIEW
HORIZ: 1" = 30'
VERT: 1" = 3'




## BENCHMARK

BENCHMARK NUMBER: 6LV90 17NW6
RIVET AND PLATE IN TOP OF CURB AT SW CORNER GILCREASE AVENUE AND OSO BLANCA ROAD (W FRONTAGE ROAD)
ELEVATION = 2631.88 FEET, 802.1998 METERS, N.A.V.D. 88 DATUM

## BASIS OF BEARINGS

NORTH 89°56'20" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 20, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN FILE 118, PAGE 89 OF SURVEYS

## SURVEY NOTE

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

## NDOT PERMIT

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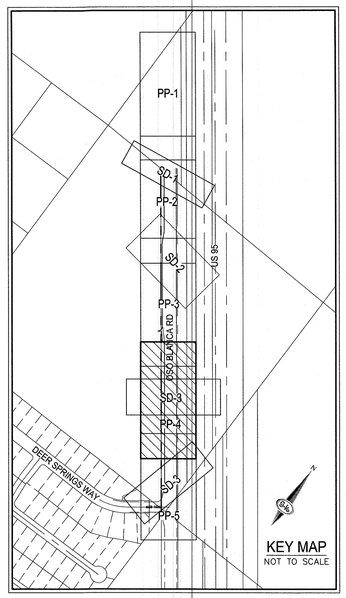
CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

## QUANTITIES

| | | | PRIVATE | PUBLIC |
|---|---|---|---|---|
| **DRAINAGE** | | | | |
| 1. | 48" TYPE II STORM DRAIN MANHOLE | EA | – | 1 |
| 2. | 8' WIDE CONCRETE VALLEY GUTTER | SF | – | 681 |
| 3. | 18" RCP CLASS III STORM DRAIN | LF | – | 278 |
| 4. | 30" RCP CLASS III STORM DRAIN | LF | – | 18 |
| 5. | 30" CONCRETE SPIGOT PLUG | EA | – | 1 |
| 6. | 5.0' DROP INLET TYPE "CM2" | EA | – | 3 |
| 7. | 7.5' DROP INLET TYPE "CM2" | EA | – | 3 |
| 8. | 10.0' DROP INLET TYPE "CM2" | EA | – | 1 |
| 9. | 12.5' DROP INLET TYPE "CM2" | EA | – | 1 |
| 10. | | | | |

## CONSTRUCTION NOTES

1. EXISTING IMPROVEMENTS TO BE RELOCATED
2. INSTALL "A" TYPE ISLAND CURB PER CCAUSD NO. 219
3. INSTALL "L" TYPE CURB & GUTTER PER CCAUSD NO. 216
4. INSTALL 1" OPEN GRADE OVER 6" DENSE GRADE OVER 13" TYPE I AGGREGATE BASE
5. INSTALL 12' WIDE, CONCRETE SHARED USE PATH W/ 4" TYPE II AGGREGATE BASE
6. INSTALL SIDEWALK RAMP PER CCAUSD NO. 235, CASE I AND CCAUSD NO. 235.1
7. REMOVE EXISTING RIPRAP
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12. INSTALL LATERAL PIPE CONNECTION PER BLUCOR DETAIL ON SHEET D-1
13. INSTALL 5.0' DROP INLET TYPE "CM2" PER CCAUSD NO. 412.1 AND 421
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17. INSTALL 30" RINKER REINFORCED CONCRETE SPIGOT PLUG. SEE DETAIL ON SHEET D-1




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2) THE DENSE-GRADED PLANTMIX BITUMINOUS SURFACE, EXCLUDING THE OPEN GRADE LAYER, SHALL BE 6-INCHES OF TYPE 2C CONFORMING TO THE REQUIREMENTS AS SET FORTH IN SUBSECTION 705.03.01 OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. BITUMINOUS SURFACE, EXCLUDING THE OPEN GRADE LAYER, SHALL BE 6-INCHES OF TYPE 2C CONFORMING TO THE REQUIREMENTS

3) THE GRADE OF ASPHALT FOR BOTH OPEN AND DENSE GRADE MIXTURES SHALL BE PG76-22NV OR PG76-22NVTR, CONFORMING TO SUBSECTION 703.03.02 OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

4) APPLY FULL-WIDTH OPEN GRADE.

5) SUBGRADE PREPARATION SHALL CONFORM TO SUBSECTION 302.03.01OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

6) TACK COAT SHALL BE EMULSIFIED ASPHALT, TYPE SS-1H (DILUTED) AT THE FOLLOWING APPLICATIONS RATES:

| | | |
|---|---|---|
| i. | TACK BETWEEN DENSE GRADE LIFTS | 0.06 GAL/YD$^2$ |
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I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY ???????? ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

TIMOTHY M. MULROONEY, P.E. 22938 — DATE










SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|
| | | | | | |

CITY OF LAS VEGAS, NV

KB HOME

# MONTECITO - OFFSITE OSO BLANCA ROAD
## PLAN & PROFILE - OSO BLANCO RD STA 52+50 TO 48+00

S21 E59 08E

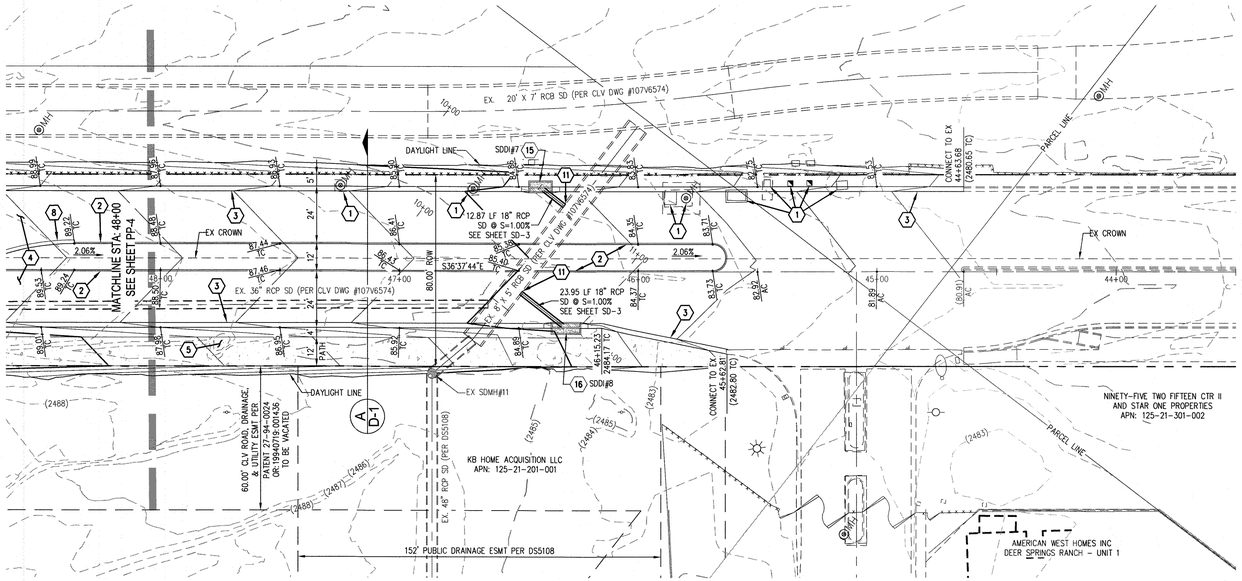
DATE: 5/28/19
DRAFTER: BCS
DESIGNER: BCS
CHECKED: MAK

PROJECT NO.
KBH1805-006

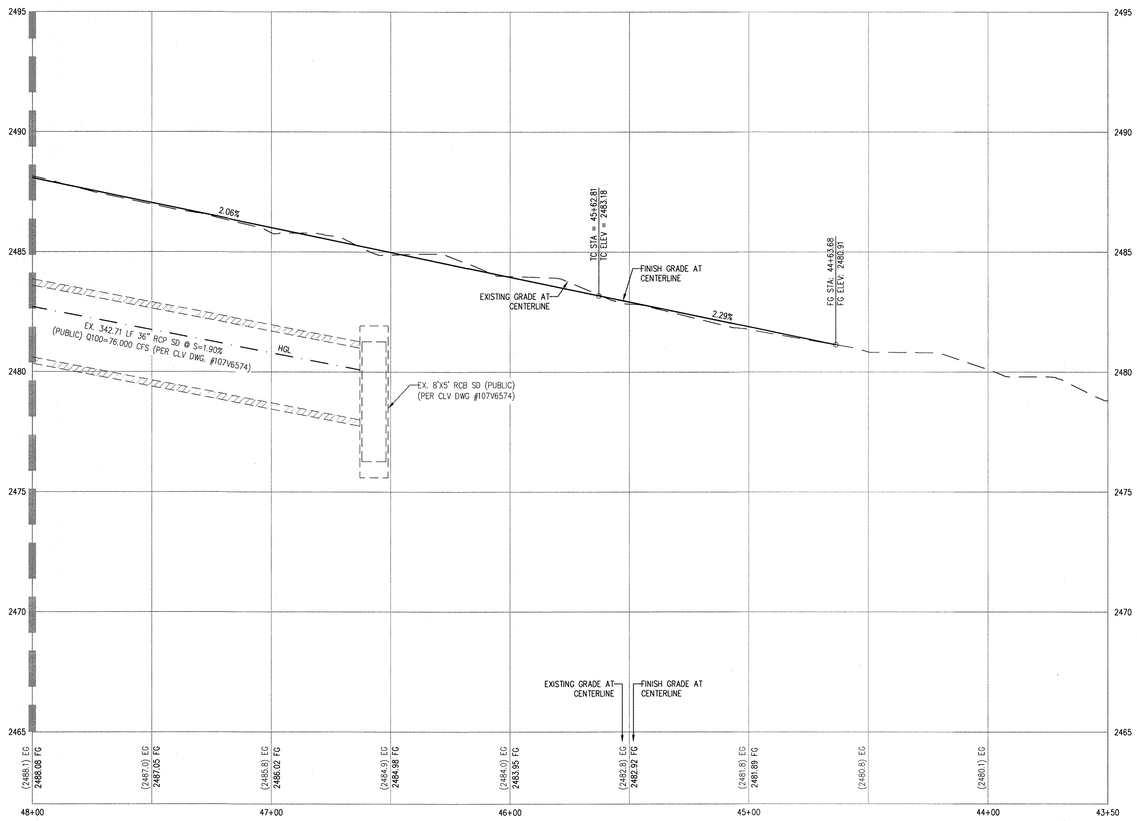
ENGINEER — STATE OF NEVADA — TIMOTHY M. MULROONEY — Exp. 12/31/2019 — CIVIL — No. 22938 — PROFESSIONAL — 5/28/19

**PP-4**
SHEET 7 OF 12

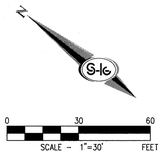
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## OSO BLANCA RD - PLAN VIEW
(PUBLIC)




## OSO BLANCA RD - PROFILE VIEW
HORIZ: 1" = 30'
VERT: 1" = 3'




## BENCHMARK
BENCHMARK NUMBER: 6LV90 17NW6
RIVET AND PLATE IN TOP OF CURB AT SW CORNER GILCREASE AVENUE AND OSO BLANCA ROAD (W FRONTAGE ROAD)
ELEVATION = 2631.88 FEET, 802.1998 METERS, N.A.V.D. 88 DATUM

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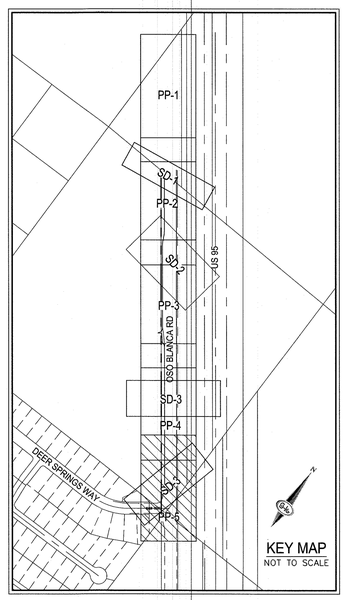
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## QUANTITIES

| | | | PRIVATE | PUBLIC |
|---|---|---|---|---|
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TIMOTHY M. MULROONEY, P.E. 22938 DATE










SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|
| | | | | | |

CITY OF LAS VEGAS, NV

KB HOME

# MONTECITO - OFFSITE OSO BLANCA ROAD
## PLAN & PROFILE - OSO BLANCO RD STA 48+00 TO 43+50

S21 T19S R60E

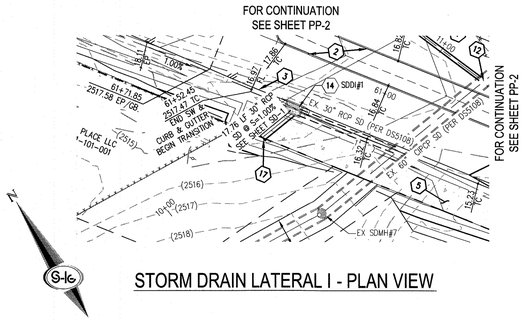
DATE: 5/28/19
DRAFTER: BCS
DESIGNER: BCS
CHECKED: MAK

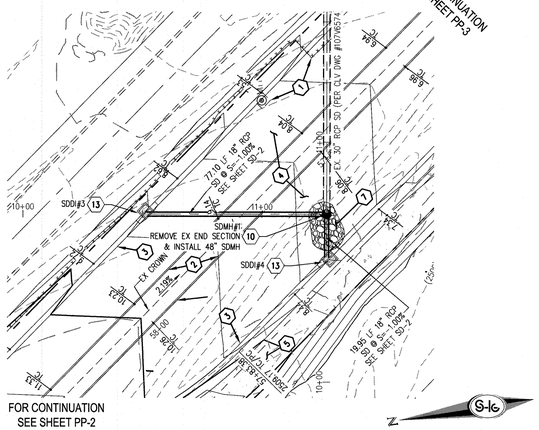
PROJECT NO.
**KBH1805-006**

PROFESSIONAL ENGINEER — TIMOTHY M. MULROONEY — Exp. 12/31/2019 — CIVIL — No. 22938 — STATE OF NEVADA — 5/28/19

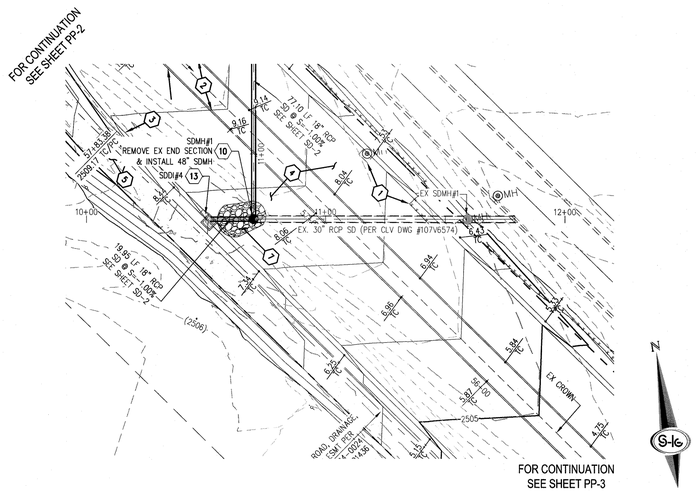
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SHEET 8 OF 12

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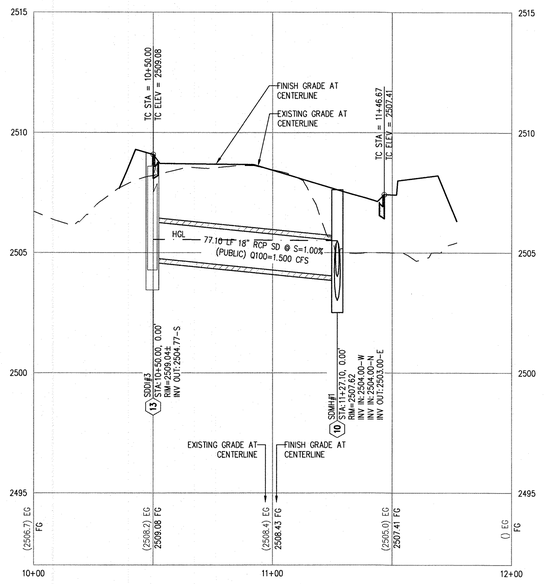

FOR CONTINUATION
SEE SHEET PP-2
FOR CONTINUATION
SEE SHEET PP-2
PLACE LLC
-101-001
(2515)
(2516)
(2517)
(2518)
EX. 30" RCP SD (PER DS5108)
EX. 60" CIPCP SD (PER DS5108)
EX SDMH#7
CURB & GUTTER BEGIN TRANSITION
SDD#1
SDD#2
17.76 LF 30" RCP SD @ S=1.00% SEE SHEET SD-1
T.00%
B1+71.85
2317.58 EP/GB
2317.47 FE
2317.45 SW &
2317.45 TC
2317.42 TC
2317.38 TC
2317.36 GUTTER
2317.36 GUTTER TRANSITION
2317.36 CURB
2317.36 GB
2317.36 TC
2317.36 SW
2317.36




## STORM DRAIN LATERAL III - PLAN VIEW

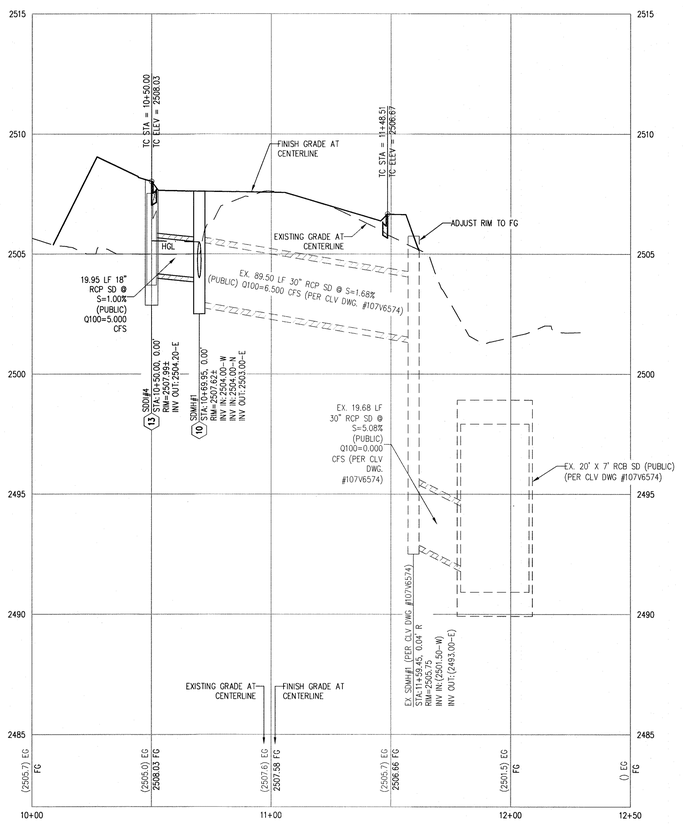



## STORM DRAIN LATERAL IV - PLAN VIEW




## STORM DRAIN LATERAL III - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 3'




## STORM DRAIN LATERAL IV - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 3'

0 30 60
SCALE - 1"=30' FEET

## BENCHMARK

BENCHMARK NUMBER: 6LV90 17NW6
RIVET AND PLATE IN TOP OF CURB AT SW CORNER GILCREASE AVENUE AND OSO BLANCA ROAD
(W FRONTAGE ROAD)
ELEVATION = 2631.68 FEET, 802.1998 METERS, N.A.V.D. 88 DATUM

## BASIS OF BEARINGS

NORTH 89°56'20" EAST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SECTION 20, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN THE CLARK COUNTY, NEVADA RECORDER'S OFFICE IN FILE 118, PAGE 89 OF SURVEYS.

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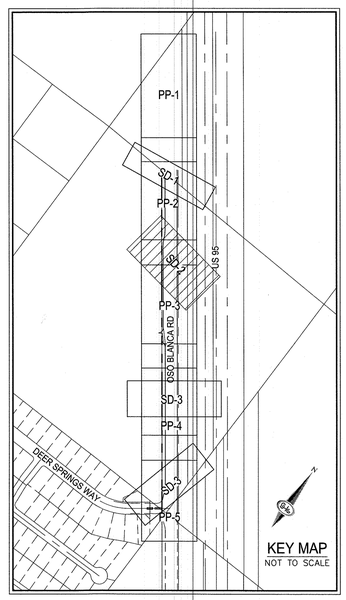
CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

## QUANTITIES

| | | | PRIVATE | PUBLIC |
|---|---|---|---|---|
| DRAINAGE | | | | |
| 1. | 48" TYPE II STORM DRAIN MANHOLE | EA | – | 1 |
| 2. | 8' WIDE CONCRETE VALLEY GUTTER | SF | – | 681 |
| 3. | 18" RCP CLASS III STORM DRAIN | LF | – | 278 |
| 4. | 30" RCP CLASS III STORM DRAIN | LF | – | 18 |
| 5. | 30" CONCRETE SPIGOT PLUG | EA | – | 1 |
| 6. | 5.0' DROP INLET TYPE "CM2" | EA | – | 3 |
| 7. | 7.5' DROP INLET TYPE "CM2" | EA | – | 3 |
| 8. | 10.0' DROP INLET TYPE "CM2" | EA | – | 1 |
| 9. | 12.5' DROP INLET TYPE "CM2" | EA | – | 1 |
| 10. | | | | |

## CONSTRUCTION NOTES

1. EXISTING IMPROVEMENTS TO BE RELOCATED
2. INSTALL "A" TYPE ISLAND CURB PER CCAUSD NO. 219
3. INSTALL "L" TYPE CURB & GUTTER PER CCAUSD NO. 216
4. INSTALL 1" OPEN GRADE OVER 6" DENSE GRADE OVER 13" TYPE I AGGREGATE BASE
5. INSTALL 12' WIDE, CONCRETE SHARED USE PATH W/ 4" TYPE II AGGREGATE BASE
6. INSTALL SIDEWALK RAMP PER CCAUSD NO. 235, CASE I AND CCAUSD NO. 235.1
7. REMOVE EXISTING RIPRAP
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11. CONSTRUCT PENETRATION INTO EX RCB SD PER DETAIL ON SHEET D-1
12. INSTALL LATERAL PIPE CONNECTION PER BLUCOR DETAIL ON SHEET D-1
13. INSTALL 5.0' DROP INLET TYPE "CM2" PER CCAUSD NO. 412.1 AND 421
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15. INSTALL 10.0' DROP INLET TYPE "CM2" PER CCAUSD NO. 412.1 AND 421
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17. INSTALL 30" RINKER REINFORCED CONCRETE SPIGOT PLUG. SEE DETAIL ON SHEET D-1




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## GENERAL NOTES:

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2. REFER TO CCAUSD DWG NO. 501 FOR TYPICAL UNDERGROUND UTILITY LOCATIONS. THE WATER SERVICE LATERALS ARE GENERALLY LOCATED PERPENDICULAR TO THE WATER MAIN AND IN-LINE WITH THE WATER METER. CONTRACTOR TO REPLACE WATER SERVICE LATERAL FROM THE MAIN TO THE ANGLE METER STOP PER UDACS IF DAMAGED DURING CONSTRUCTION.
3. REPLACE ALL TRAFFIC CONTROL DEVICES (SIGNS OR PAVEMENT MARKINGS) THAT ARE DISTRUBED, DESTROYED, MOVED OR MODIFIED BY TRENCHING ACTIVITY TO CLARK COUNTY SATISFACTION. ALL MATERIAL USED SHALL BEET CLARK COUNTY'S SPECIFICATIONS, OR WILL BE APPROVED EQUIVALENT.
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5) SUBGRADE PREPARATION SHALL CONFORM TO SUBSECTION 302.03.01OF THE NDOT 2014 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

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|---|---|---|
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| iii. | TACK COLD MILLED SURFACE | 0.10 GAL/YD$^2$ |

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## FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C1745E, DATED SEPTEMBER 27, 2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

## FLOOD CERTIFICATION

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

TIMOTHY M. MULROONEY, P.E. 22938 DATE

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

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

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

SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|
| | | | | | |

CITY OF LAS VEGAS, NV

KB HOME

# MONTECITO - OFFSITE OSO BLANCA ROAD
# PLAN & PROFILE - STORM DRAIN II

S21
E65
60E

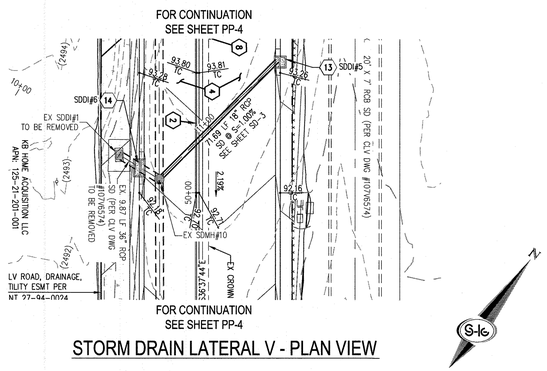
DATE: 5/28/19
DRAFTER: BCS
DESIGNER: BCS
CHECKED: MAK

PROJECT NO.
KBH1805-006

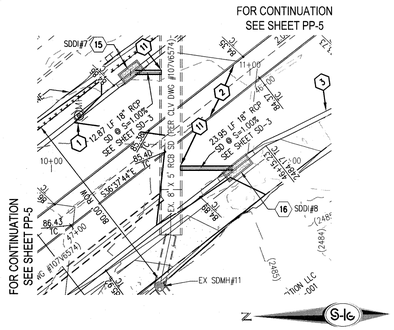
TIMOTHY M. MULROONEY — Exp. 12/31/2019 — CIVIL — No. 22938 — STATE OF NEVADA — PROFESSIONAL ENGINEER
5/28/19

**SD-2**
SHEET 10 OF 12

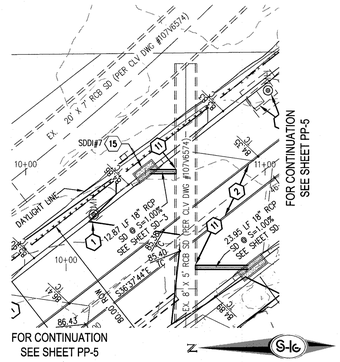
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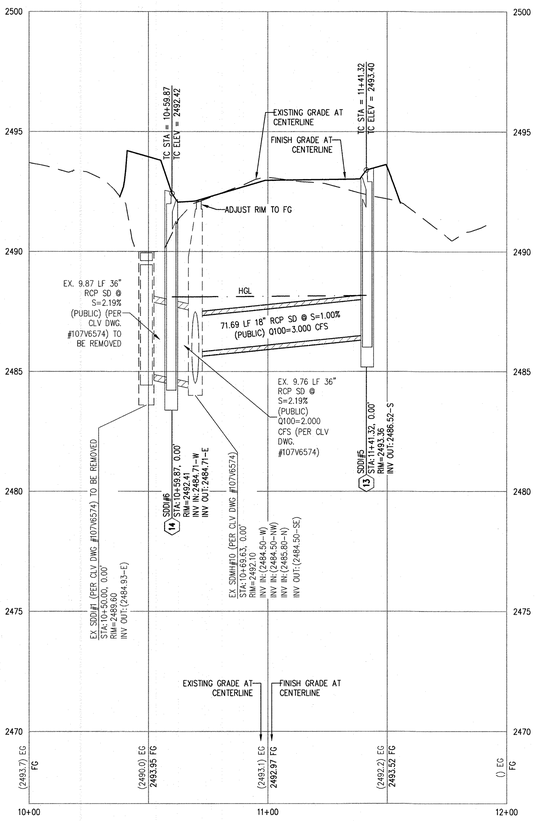

## STORM DRAIN LATERAL V - PLAN VIEW




## STORM DRAIN LATERAL VI - PLAN VIEW

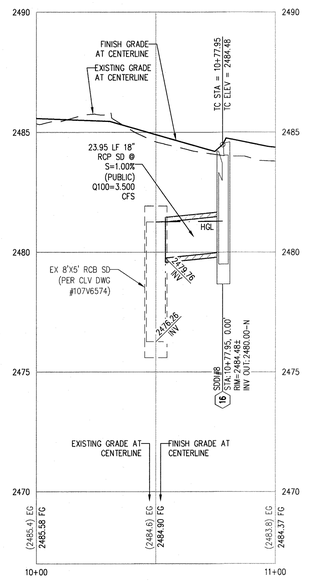



## STORM DRAIN LATERAL VII - PLAN VIEW



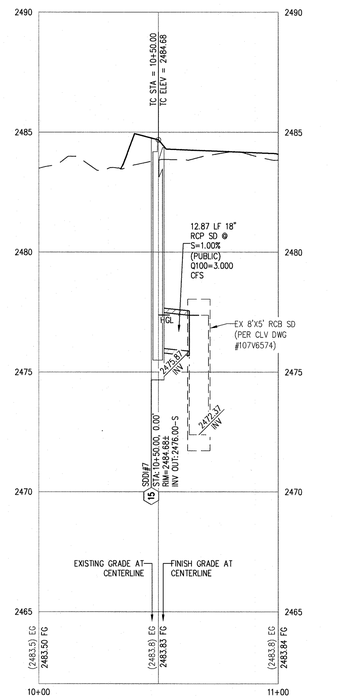

## STORM DRAIN LATERAL V - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 3'




## STORM DRAIN LATERAL VI - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 3'




## STORM DRAIN LATERAL VII - PROFILE VIEW

HORIZ: 1" = 30'
VERT: 1" = 3'

SCALE – 1"=30' FEET (0, 30, 60)

## BENCHMARK

BENCHMARK NUMBER: 6LV90 17NW6
RIVET AND PLATE IN TOP OF CURB AT SW CORNER
GILCREASE AVENUE AND OSO BLANCA ROAD
(W FRONTAGE ROAD)
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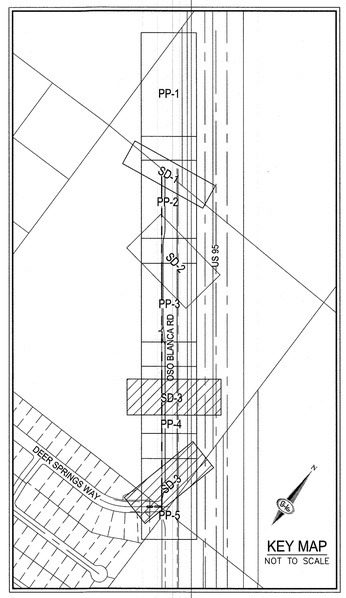
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SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|

CITY OF LAS VEGAS, NV

KB HOME

MONTECITO - OFFSITE OSO BLANCA ROAD
PLAN & PROFILE - STORM DRAIN III

S21
19S
60E

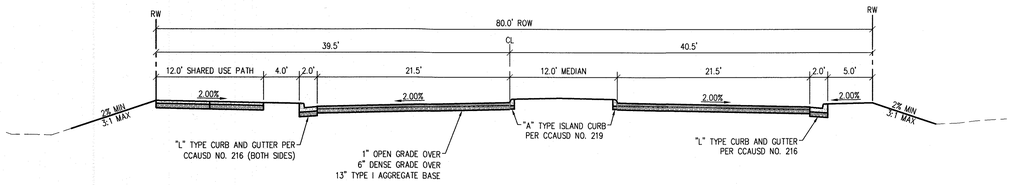
DATE: 5/28/19
DRAFTER: BCS
DESIGNER: BCS
CHECKED: MAK

PROJECT NO.
KBH1805-006

PROFESSIONAL ENGINEER STATE OF NEVADA
TIMOTHY M. MULROONEY
Exp. 12/31/2019
CIVIL
No. 22938
5/28/19

SD-3
SHEET 11 OF 12

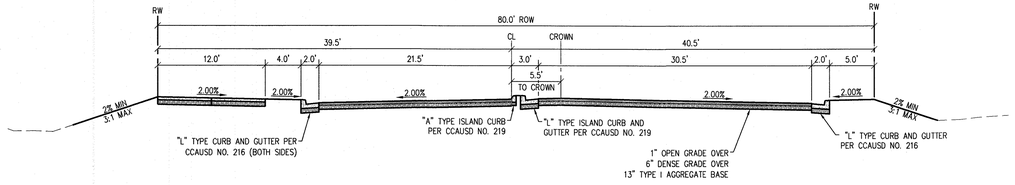
A:\kbh1805-006 montecito 60 os roadway-oso blanca\dwg\improv\kbh1805-006 pnp.dwg 5/28/2019 12:41 PM Byron Sarmiento




A. 80' PUBLIC STREET SECTION

NOT TO SCALE

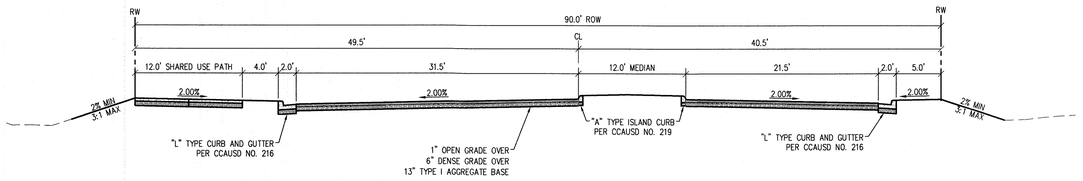
OSO BLANCA ROAD




C. 80' PUBLIC STREET SECTION

NOT TO SCALE

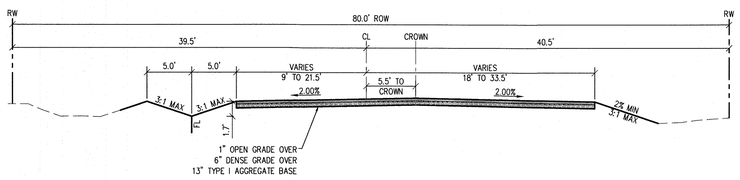
OSO BLANCA ROAD




C. 90' PUBLIC STREET SECTION

NOT TO SCALE

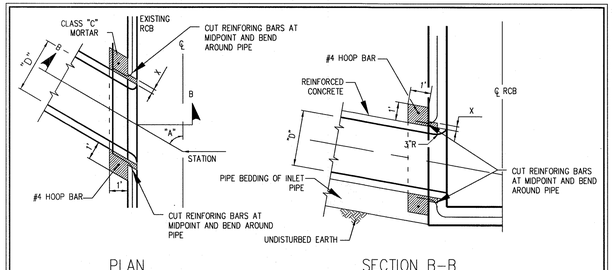
OSO BLANCA ROAD




D. 80' PUBLIC STREET SECTION

NOT TO SCALE

OSO BLANCA ROAD

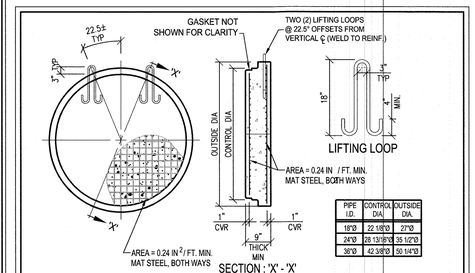



NOTES:

1. ANGLE "A" SHALL BE BETWEEN 45° AND 90°.
2. DIMENSION "D" SHALL BE EQUAL TO OR LESS THAN 1/2 THE INSIDE DIAMETER OF THE MAINLINE RCB.
3. DIMENSION "X" SHALL BE 1" MINIMUM AND 3" MAXIMUM.
4. TRIM EXCESS OF INLET PIPE TO FLUSH WITH INNER SURFACE OF DROP INLET STRUCTURE, ROUND EDGES OF STRUCTURES AND PIPES.

PENETRATION DETAIL

NOT TO SCALE

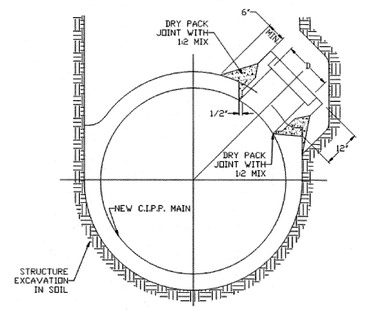



| PIPE I.D. | CONTROL DIA | OUTSIDE DIA. |
|---|---|---|
| 18"Ø | 22 1/8"Ø | 27"Ø |
| 24"Ø | 28 13/16"Ø | 35 1/2"Ø |
| 36"Ø | 42 3/8"Ø | 50 1/4"Ø |

**RINKER REINFORCED CONC. SPIGOT PLUG DETAIL**

NOT TO SCALE

BLUCOR CONTRACTING




NOTES:

1. PRECAST TEE SHALL BE INSTALLED WHERE THE MAINLINE PIPE IS SMALLER THAN THE MINIMUM OR THE CONNECTING PIPE IS LARGER THAN 24".
2. THE BELL END OFTHE PRECAST CONCRETE PIPE SHALL BE INSTALLED AS SHOWN WHILE CONCRETE OF MAINLINE PIPE IS WET.
3. TRENCH WALL TO BE EXCAVATED AS NECESSARY PRIOR TO POURING MAINLINE PIPE TO ACCOMMODATE LATERAL STUB.
4. AXIS OF LATERAL STUB SHALL BE AS PER PLAN AND CROSS SECTION.
5. THE LATERAL STUB SHALL SATISFY STRENGTH REQUIREMENTS AS SPECIFIED FOR THE LATERAL PIPE.
6. LATERALS FOR FUTURE CONNECTION SHALL BE MARKED. (SEE MAG DETAIL 427)

| MINIMUM SIZE MAIN | CONNECTING PIPE SIZE |
|---|---|
| 30" | 15" |
| 36" | 18" |
| 42" | 21" |
| 48" | 24" |
| 54" | 30" |
| 60" | 30" |
| 66" | 36" |
| 72" | 36" |
| 78" | 42" |
| 84" | 42" |
| 96" | 48" |
| 108" | 54" |
| 114" | 60" |
| 120" | 60" |

CIPCP LATERAL PIPE CONNECTION

NOT TO SCALE










SLATER HANIFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

| NO. | DESCRIPTION | DATE | BY | APP. DATE | APP. |
|---|---|---|---|---|---|
| | | | | | |

CITY OF LAS VEGAS, NV

KB HOME

MONTECITO - OFFSITE OSO BLANCA ROAD

STREET SECTIONS & GRADING DETAILS I

S21
T19S
R59E

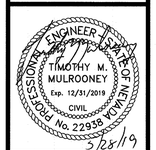
DATE: 5/28/19

DRAFTER: BCS

DESIGNER: BCS

CHECKED: MAK

PROJECT NO.
KBH1805-006




D-1

SHEET 12 OF 12

P:\KBH1805-006 montecito 60 os roadway-oso blanca\dwg\Vmgrov\KBH1805-006 dtl.dwg 5/28/2019 12:41 PM Bryan Sorrento