

Summerlin West Village 22

Kestrel Creek Avenue (Street I): Desert Foothills Drive to Kettle Ridge Drive (Street J)

August 5, 2019

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Kestrel Creek Avenue (Street I): Desert Foothills Drive to Kettle Ridge Drive (Street J) Date: August 5, 2019
Location of Development: a) Descriptive (Cross Streets) West: Kettle Ridge Drive (Street J)
East: Desert Foothills Drive
b) Section: 23 and 14 Township: 20S Range: 59E
c) APN : 137-14-401-006, 137-23-101-002

Name of Owner: Howard Hughes Company, LLC
Telephone No.: (702) 791-4000 Fax No.: (702) 791-4450 E-Mail Address: chris.anderson@howardhughes.com
Address: 10801 West Charleston Blvd, Ste 300, Las Vegas, NV 89135

Contact Person-Name: Molly Anderson, PE Telephone No.: (702) 551-0330
* E-Mail Address: molly.anderson@atkinsglobal.com Fax No.: (702) 263-7200
Firm: Atkins
Address: 2270 Corporate Circle, Ste 200, Henderson, NV 89074

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: +/- 446 acres Being Developed/Disturbed: 7.58 acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? Yes** ☒ No
4. Proposed type of development (Residential, Commercial, Etc.): Public - Roadway Improvements
5. Approximate upstream land area which drains to the subject site: 0 acres
6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Master Conceptual Drainage Study for Summerlin West Village 22, LMB: DS#5155, Street J: DS#5156
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Existing CC-215 Western Beltway Channel
8. Briefly describe your proposed schedule for the subject project: ASAP

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

***New Required Field**

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

	Revision	Date

Engineer's Seal

Local Entity File No.

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Kestrel Creek Avenue (Street I):Desert Foothills Drive to Kettle Ridge Drive

Map ID:

Firm Name: **Atkins**

Engineer: **Molly Anderson, PE**

Address: 2270 Corporate Circle, Ste 200

City: **Henderson**

State:

NV

Zip: **89074**

Phone Number: **(702) 551-0330**

Fax Number: **(702) 263-7200**

Property Owner: **Howard Hughes Company, LLC**

Address: 10801 West Charleston Blvd, Ste 300

City: **Las Vegas**

State: **NV**

Zip: **89135**

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

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.

 X

_____ Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.

 X

_____ Proposed typical street sections.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
<u>X</u>	<u> </u>	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.
<u>X</u>	<u> </u>	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.
<u>X</u>	<u> </u>	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
<u>X</u>	<u> </u>	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
☐	☒ N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
☒ 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. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
☒ 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. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
☒ 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



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

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

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

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

I. GENERAL REQUIREMENT		
Yes	No	
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
X		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
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. <u>MMA</u> by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
	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.
X		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.
X		The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
	N/A	Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
	N/A	Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

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

Engineer's Certification

Atkins certifies that the information contained herein has been prepared in accordance with generally accepted engineering principles and practices, and to the best of our knowledge, is true and correct.

This letter certifies that all items in the **Technical Drainage study for Kestrel Creek Avenue (Street I): Desert Foothills Drive to Kettle Ridge Drive (Street J)** electronic submittal matches the paper version bound into the study.

Molly M. Anderson, PE (NV #24365)
Senior Engineer

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Executive Summary

This Technical Drainage Study (TDS), prepared on behalf of Howard Hughes Company, LLC represents the hydrologic and hydraulic analysis for the Kestrel Creek Avenue (Street I) roadway improvements of the Summerlin West Village 22 development. Summerlin West Village 22 is located in the northwest Las Vegas Valley west of the CC-215 beltway and is bounded by Lake Mead Boulevard and Summerlin Parkway. A vicinity map is provided in Figure 1. Kestrel Creek Avenue roadway improvements are located between Desert Foothills Drive and Kettle Ridge Drive (Street J) and are shown on the location map on Figure 2.

A Master Conceptual Drainage Study (MCDS) for Summerlin West Village 22 (W.O. 7861-3A) was approved November 28, 2018. Addendum #2 to Update #1 of the MCDS was approved May 29, 2019. Portions of the TDS, such as parcel names, rainfall depths, and facility locations are directly referenced from the MCDS and the relevant information is included in Appendix A.



Figure 1 Vicinity Map

Kestrel Creek Avenue (Street I): Desert Foothills Drive to Kettle Ridge Drive (Street J)

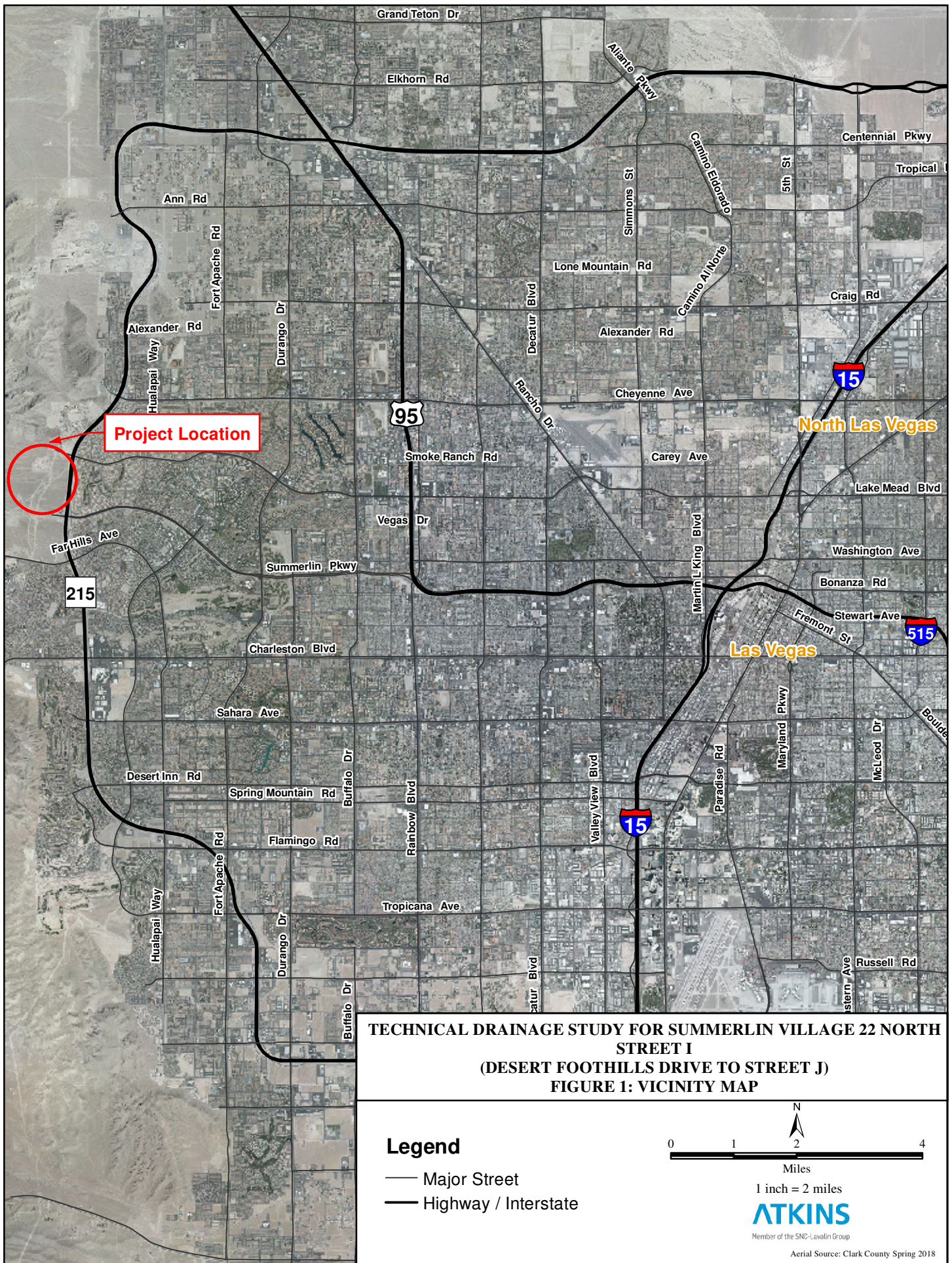
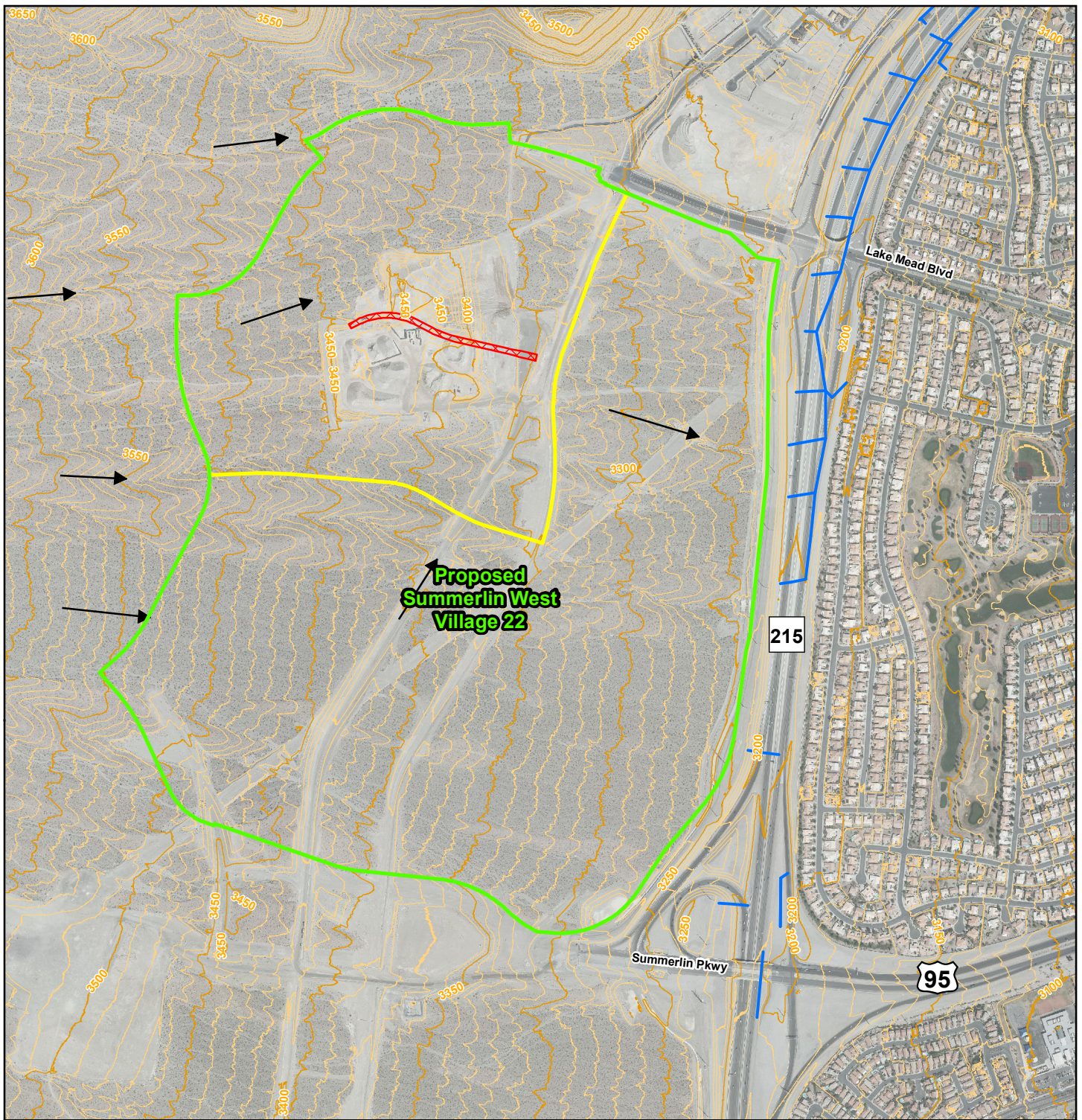


Figure 2 Site Map

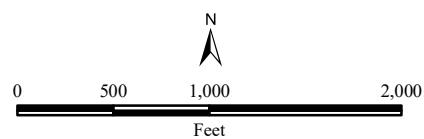
Kestrel Creek Avenue (Street I): Desert Foothills Drive to Kettle Ridge Drive (Street J)



TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22
KESTREL CREEK AVE (STREET I)
(DESERT FOOTHILLS DRIVE TO STREET J)
FIGURE 2: EXISTING CONDITIONS SITE MAP

Legend

- Existing Storm Water Facilities
- ▨ Proposed Roadway
- Summerlin West Village 22 Boundary
- Summerlin West Village 22 Street I Project Boundary
- ➔ Existing Flow Direction
- 10-ft Contours
- 50-ft Contours



1 inch = 1,000 feet

ATKINS
 Member of the SNC-Lavalin Group

Aerial Source: Clark County Spring 2018

1. Hydrologic Analysis

1.1. Existing Condition

The existing site condition is undeveloped desert land. As established in the Master Conceptual Drainage Study (MCDS), there is one existing downstream storm drain facility that collects runoff from the proposed street improvements and adjacent development. The Western Beltway Channel to the east of the project is fully developed and includes a 20-foot wide concrete channel that conveys flow north to the Village 26 Detention Basin.

In the existing condition, runoff generated by the project and the undeveloped areas west of the project drains east as sheet flow to the Western Beltway Channel. According to the 2002 Conceptual Drainage Study and Western Beltway Study, the existing channel has been designed to accept both the existing and ultimate condition flows from Village 22. The Village 22 site was included in the area previously analyzed in the Western Beltway Study. In addition, the allowable discharge flow rates for the project have been established in the 2017 Summerlin West Planning Area (SWPA) MPU study. Therefore, an additional existing condition hydrologic model was not required as part of this study.

1.2. Interim Condition

The proposed roadway is referred to as “Kestrel Creek Avenue” in this study and on the plans. The MCDS refers to the proposed roadway by a letter name, “Street I”. Now that the roadways have been named, the plans and report refer to the roadways by name. Table 1 compares the roadway names to their letter name in the MCDS.

The proposed Kestrel Creek Avenue improvements will be constructed prior to the development of adjacent onsite parcels (C, D, G, and H). As a result, an interim condition exists for the proposed improvements. Refer to Figure 3 to see the interim conditions in the hydrology workmap.

The proposed street improvements and interim grading have been designed to ensure that the existing drainage patterns are maintained in the interim condition and that none of the existing downstream facilities are adversely affected by the proposed improvements.

Construction of Kettle Ridge Drive is to be completed prior to the interim conditions of Kestrel Creek Avenue. Drainage basins to the west of the newly constructed Kettle Ridge Drive will be intercepted before entering Kestrel Creek Avenue in the interim and ultimate conditions. There are no offsite flows tributary to Kestrel Creek Avenue in the interim or ultimate conditions. There are several drainage basins on the north and south side of Kestrel Creek Avenue that collect flows in the interim condition which are either intercepted by interim swales or drop inlets; flows from these adjacent interim subbasins do not enter Kestrel Creek Avenue. Interim subbasins Int-I2 and Int-I4 (Figure 3) are included in this study to ensure that the Rip-Rap (Section 2.4) in the Kestrel Creek Avenue roadside swales is sized accordingly.

The interim subbasins were modeled using HEC-1. The results are summarized in Table 2 and Figure 3.

The proposed Kestrel Creek Avenue storm drain discharges east to the existing 36-inch stub that discharges into the 60-inch storm drain facility in Desert Foothills Drive. The tailwater elevation for the hydraulic model was taken from the upstream hydraulic grade line (HGL) in the approved plans. The plan sheets that reference the HGL information is included in the reference information in Appendix A.

Table 1 – Village 22 MCDS and TDS Roadway Names

MCDS Street Name	TDS Street Name
Street E	Flight Range Avenue
Street EE	Flight Edge Way
Street F	Kindle Rise Way
Street FF	Hive Bluff Lane
Street G	Fleet Wing Avenue
Street H	Clowder Pass Way
Street I	Kestrel Creek Avenue
Street J	Kettle Ridge Drive
Street L	Bask Ridge Drive
Street N	Scurry Bend Drive
Summerlin Parkway WB/Street Q	Sunset Run Drive
Carriage Hill Drive	Kettle Bend Road

Table 2 – Interim Condition HEC-1 Model Results

Basin ID	Tributary Area (sq mi)	Tributary Area (ac)	100-year Flow (cfs)	10-year Flow (cfs)
Int-I1	0.01517	9.71	29	13
Int-I2	0.00112	0.72	2	1
Int-I3	0.00553	3.54	11	5
Int-I4	0.00831	5.32	16	7
STI-1	0.00232	1.48	6	3
STI-2	0.00209	1.34	5	3

1.3. Ultimate Condition

The ultimate condition flows were directly referenced from the approved MCDS as shown in the HEC-1 output and in the Ultimate Condition Basin Map, Figure 6, of Appendix A. Table 3, below, summarizes the ultimate conditions results from the MCDS for the Kestrel Creek Avenue study. Ultimate conditions are also displayed on Figure 3.

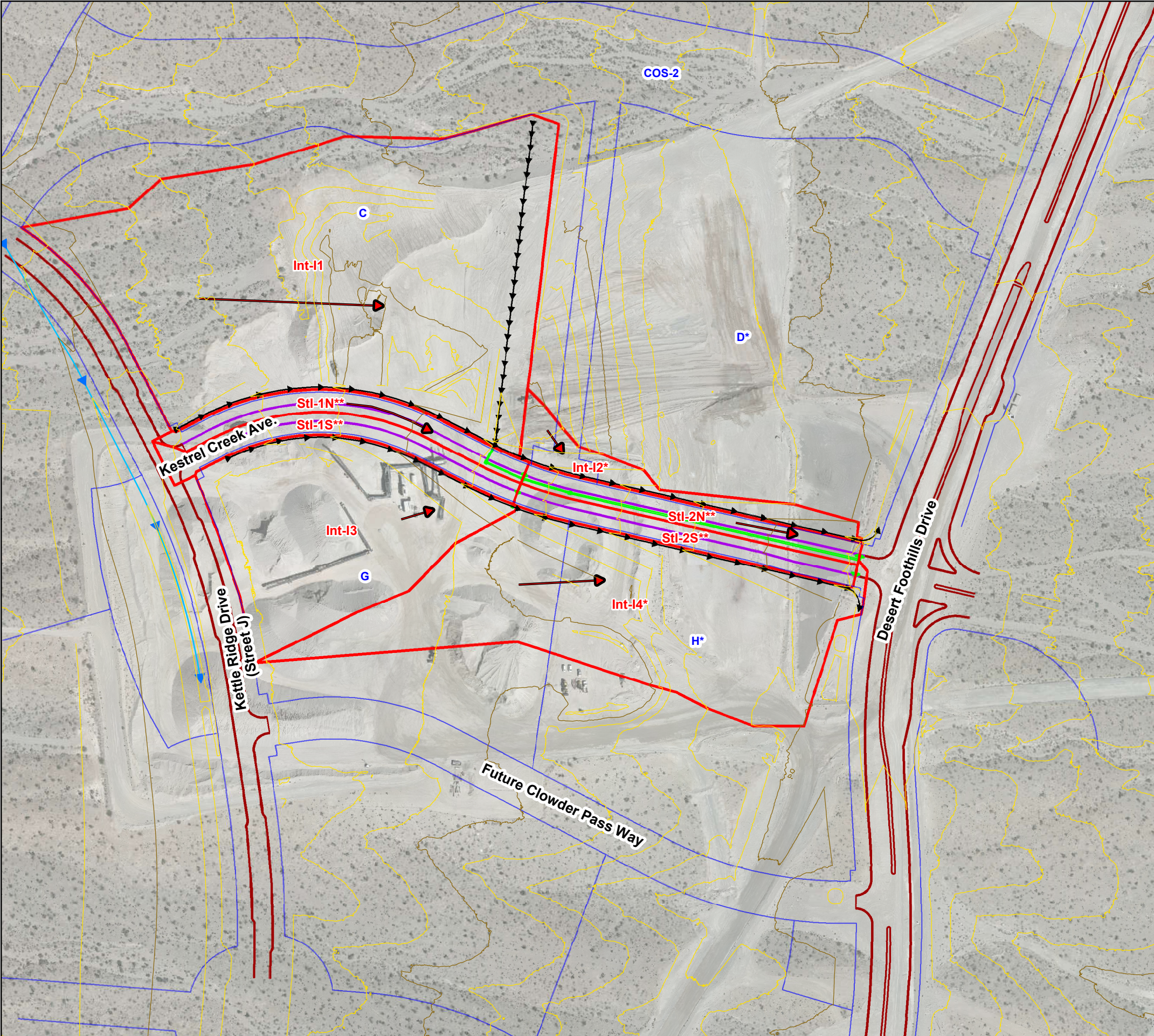
Table 3 – Ultimate Condition MCDS Reference Information

Parcel ID	Tributary Area (sq mi)	Tributary Area (ac)	100-year Flow (cfs)
C	0.01825	11.68	50
D*	0.01761	11.27	47
G	0.01106	7.08	30
H*	0.01195	7.65	33
STI	0.00384	2.46	11

* D & H Drain to Desert Foothills Drive in Ultimate Conditions

Figure 3 Interim Condition Subbasin Workmap

Kestrel Creek Avenue (Street I): Desert Foothills Drive to Kettle Ridge Drive (Street J)



Interim Conditions				
Basin Id	Tributary Area (sq mi)	Tributary Area (acres)	100-Year Discharge (cfs)	10-Year Discharge (cfs)
Int-I1	0.01517	9.71	29	13
Int-I2*	0.00112	0.72	2	1
Int-I3	0.00553	3.54	11	5
Int-I4*	0.00831	5.32	16	7
St-1	0.00232	1.48	6	3
St-2	0.00209	1.34	5	3
St-1N**	0.00114	0.73	3	1.5
St-1S**	0.00117	0.75	3	1.5
St-2N**	0.00104	0.66	2.5	1.5
St-2S**	0.00105	0.67	2.5	1.5
* Drains only to roadside interim swale. Flow does not enter Street I.				
** North/South Street 1/2 sections split from above HEC-1 Nodes				

Ultimate Conditions				
Basin Id	Tributary Area (sq mi)	Tributary Area (acres)	100-Year Discharge (cfs)	10-Year Discharge (cfs)
C	0.01825	11.68	50	-
D*	0.01761	11.27	47	-
G	0.01106	7.08	30	-
H*	0.01195	7.65	33	-
STI	0.00384	2.46	11	-
* D & H Drain to Desert Foothills Drive in Ultimate Conditions				

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22
KESTREL CREEK AVENUE
STREET I (DESERT FOOTHILLS DRIVE TO STREET J)
FIGURE 3: HYDROLOGY WORKMAP

Interim Flow Paths

Street J Flowline

Ultimate Condition Parcels

Street I Interim Swales

Street I Interim Subbasins

Proposed Storm Drain Network

Proposed Roadway Improvements

Existing Roadway Improvements

10-ft Contours

50-ft Contours

Existing Storm Water Facilities

N

1 inch = 200 feet

Member of the SNC-Lavalin Group

Aerial Source: Clark County Spring 2018

0 100 200 400 600 800 Feet

2. Hydraulic Analysis

2.1. Drop Inlet Calculations

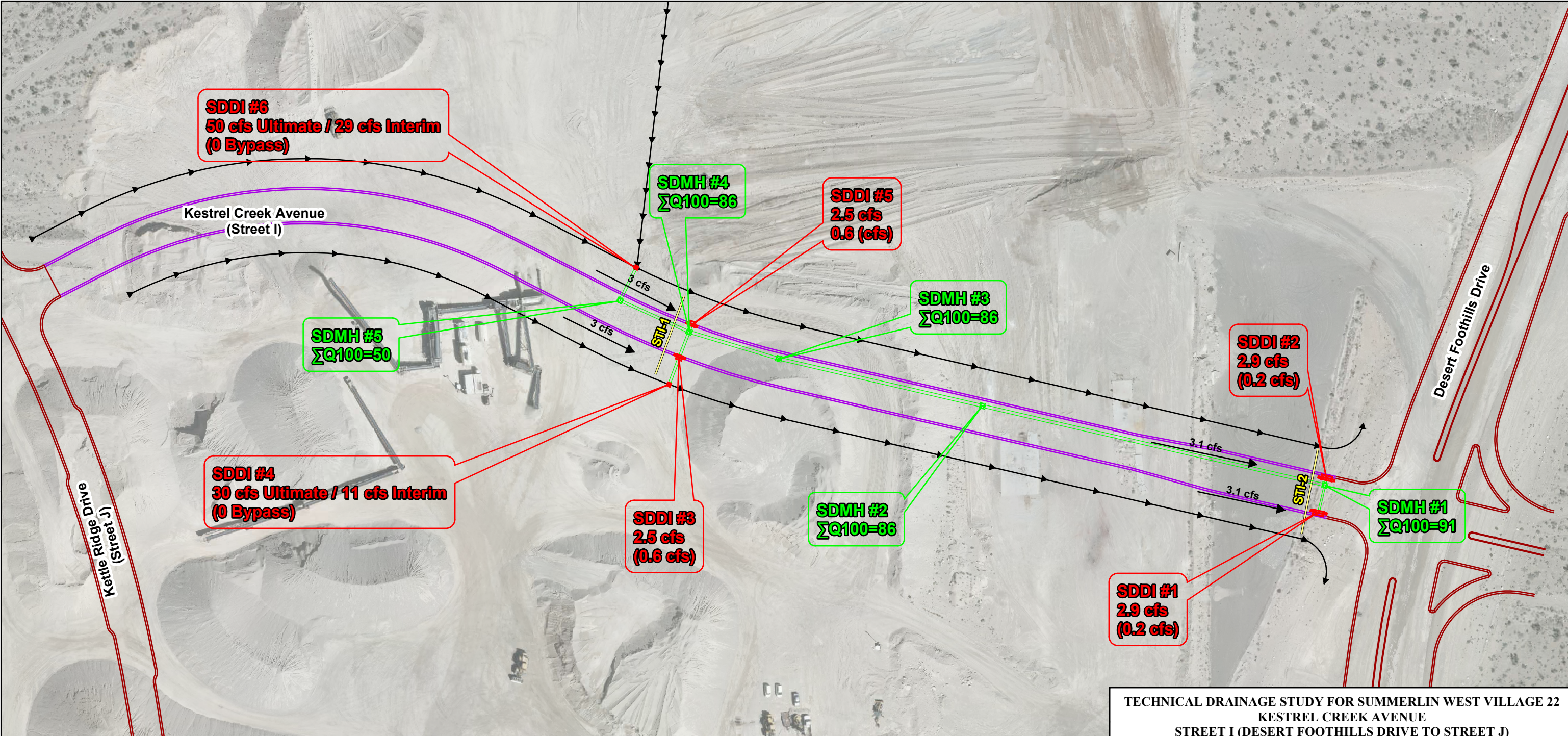
The computer program Bentley FlowMaster V10.2 was utilized to perform calculations for the six proposed drop inlets along Kestrel Creek Avenue. The storm drains SDDI #4 and SDDI #6, are in the proposed ditches to the south and north of Kestrel Creek Avenue, respectively. SDDI #4 and SDDI #6 were sized conservatively for the worst-case scenario of the 100-year ultimate conditions flow. The remaining proposed drop inlets capture runoff along Kestrel Creek Avenue where the interim condition flows are equal to the ultimate conditions flows. Drop inlet calculations are provided in Appendix C. Table 4 provides a summary of the drop inlet calculations. Drop inlet locations and calculations are shown on Figure 4.

Table 4 – Drop Inlet Calculations

ID	Improvement Plans Station (ft)	Total Flow (cfs)	Discharge Source	Intercepted Flow (cfs)	Bypass Flow (cfs)
100-year					
SDDI #1	11+00	3.1	STI-2S + Bypass SDDI #3	2.9	0.2
SDDI #2	11+00	3.1	STI-2N + Bypass SDDI #5	2.9	0.2
SDDI #3	17+60	3.0	STI 1S	2.5	0.6
SDDI #4	17+60	*30 (ult) / 11 (int)	Ultimate Parcel G / Int-I1	30.0	0.0
SDDI #5	17+60	3.00	STI 1N	2.5	0.6
SDDI #6	18+40	*50 (ult) / 29 (int)	Ultimate Parcel C / Int-I3	50.0	0.0

Figure 4 Street Flow Workmap

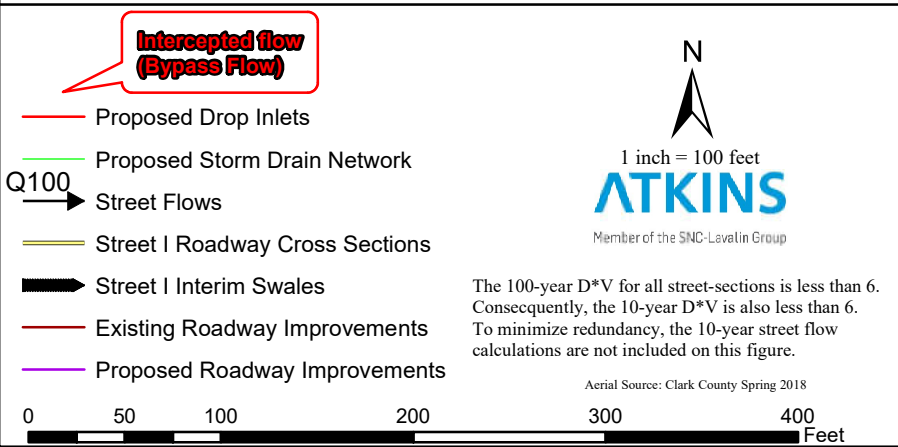
Kestrel Creek Avenue (Street I): Desert Foothills Drive to Kettle Ridge Drive (Street J)



Interim/Ultimate Condition (100-Year) Street Flow and Drop Inlet Calculations Summary Table										
XS/SD ID	Improvement Plans Station(ft)	Total Discharge Source	Total Discharge (cfs)	Drop Inlet				Flow Depth in Street (ft)	Velocity of Flow in Street (ft/s)	Depth*Velocity (must be less than 8)
				Intercepted Flow (cfs)	Bypass Flow (cfs)	Intercepted Facility	Sump Depth (ft)			
STI-1	17+75	STI-1	6.0	N/A	N/A	N/A	N/A	0.2	5.0	1.0
STI-2	11+00	STI1-2 (5cfs) + SDDI #3 & #5 Bypass (0.55*2 cfs)	6.1	N/A	N/A	N/A	N/A	0.2	5.0	1.0
SDDI #1	11+00	STI-2S + Bypass SDDI #3	3.1	2.9	0.2	1.5'x10' Inlet on grade	N/A	N/A	N/A	N/A
SDDI #2	11+00	STI-2N + Bypass SDDI #5	3.1	2.9	0.2	1.5'x10' Inlet on grade	N/A	N/A	N/A	N/A
SDDI #3	17+60	STI-1S	3.0	2.5	0.6	1.5'x5' Inlet on grade	N/A	N/A	N/A	N/A
SDDI #4	17+60	Ultimate Parcel G / Int-I3	*30 (ult) /11 (int)	30	0.0	4'x4' Grate in sag	0.9	N/A	N/A	N/A
SDDI #5	17+60	STI-1N	3.00	2.5	0.6	1.5'x5' Inlet on grade	N/A	N/A	N/A	N/A
SDDI #6	18+40	Ultimate Parcel C / Int-I1	*50 (ult) / 29 (int)	50	0.0	4'x4' Grate in sag	2.1	N/A	N/A	N/A

* Interim flows = Ultimate flows unless noted in table

TECHNICAL DRAINAGE STUDY FOR SUMMERLIN WEST VILLAGE 22
KESTREL CREEK AVENUE
STREET I (DESERT FOOTHILLS DRIVE TO STREET J)
FIGURE 4: HYDRAULIC WORKMAP



2.2. Normal Depth Calculations

The computer program Bentley FlowMaster V10.2 was utilized to perform normal depth calculations for the proposed roadway. These normal depth calculations were utilized to ensure that the proposed storm drain facility is adequately designed and that all local street flow criteria are met.

Two full street cross-sections were analyzed as roadway flow and storm drain capture were equal on north and south sides of the street. The cross-section locations were specified based on the flow patterns and utilized the worst-case slope or roadway width when applicable for the calculations. Street roadway flows are equal in both the interim and ultimate conditions.

Table 5 summarizes the normal depth calculations for the 100-year storm events. Depth*Velocity must be less than 8 for the 100-year event and less than 6 for the 10-year event. The 100-year D*V for all street cross-sections is less than 6. Therefore, the 10-year D*V is also less than 6. To minimize redundancy, the 10-year calculations are not included. Print-outs of all normal depth calculations for the ultimate condition are provided in Appendix C. Cross section locations and calculation summaries are shown on Figure 4.

Table 5 – Normal Depth Calculations

ID	Total Flow (cfs)	Discharge Source	Slope (%)	Flow Depth (ft)	Velocity (ft/s)	D* V
100-year						
STI-1	6.00	STI-1	6.89	0.20	4.98	1.00
STI-2	6.04	STI-1 + Bypass SDDI #3 & #5	6.89	0.20	4.99	1.00

2.3. Storm Drain System Modeling

The proposed storm drain systems were modeled using Water Surface Pressure Gradient for Windows (WSPG-W). A print-out of the WSPG-W models are provided in Appendix C. Because the ultimate condition flows are higher than or equal to the interim condition flows in all areas, only the ultimate conditions were analyzed in the WSPG-W models. The Q₁₀₀ and HGLs are shown on the improvement plans in Appendix D. Table 6 summarizes the WSPG-W model at the mainline manholes.

Table 6 – WSPG-W Mainline Summary Table

SDMH#	WSPG-W Station	100-yr Ultimate Condition		
		Q ₁₀₀	ΣQ ₁₀₀	HGL (Ft)
Upstream	785.97	50.0	50.0	3381.53
SDMH #5	744.59	0.0	50.0	3379.88
SDMH #4	667.17	36.0	86.0	3375.45
SDMH #3	571.64	0.0	86.0	3367.63
SDMH #2	358.38	0.0	86.0	3352.80
SDMH #1	1.00	5.0	91.0	3328.49
Downstream	-107.16	-	-	3321.14

The downstream end of the proposed storm drain is 36" RCP. The maximum velocity modeled is 24.66 ft/s and is observed just upstream of SDMH#1, the system outlet of the Kestrel Creek Avenue WSPG-W model. Hydraulic jumps are modeled in the Kestrel Creek Avenue storm drain on the mainline approximately 30 feet upstream of SDMH#4, and on the lateral structures between SDMH#1 and SDDI#1 and SDDI #2, immediately upstream of SDMH#1 on the North and South sides. All HGLs modeled including the hydraulic jumps, are greater than 1-foot below existing and proposed surfaces.

2.4. Riprap Calculations

Normal depth calculations determined that channel velocities along the north-south oriented interim berm separating future parcels C and D were less than 3 ft/s, as such no riprap is needed for the temporary interim conditions. For the roadside swales parallel to Kestrel Creek Avenue channel velocities were determined to exceed 5 ft/s, thus requiring the implementation of riprap. The riprap calculations were performed utilizing shear stress calculations based on HCDDM Section 705 using HEC-11 methodology. Shear stress calculations show that a median riprap particle size (D_{50}), for interim roadside swales parallel to Kestrel Creek Avenue, of 8 inches is required to resist the average channel shear stress for the channel velocities along the ditch. Results are shown in Appendix C.

3. Differences between Village 22 MCDS and Proposed TDS

The MCDS shows the flow from Parcel H discharging into the proposed storm drain in Kestrel Creek Avenue. However, the Parcel H flow was analyzed as part of the Desert Foothills Drive TDS and is picked up on the west side of Desert Foothills Drive. Table 1 compares the proposed names in the TDS to the MCDS letter.

Appendices



Appendix A. Summerlin West Village 22 Master Conceptual Drainage Study Reference

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: May 29, 2019
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT: Drainage Study for: Master Conceptual Drainage Study for – Update #1 Summerlin West Village 22		COPIES TO: VTN Nevada
Cross Streets:	I-215 Western Beltway & Summerlin Parkway	Howard Hughes Company, LLC
File Number:	F:\Depot\DSMemos\DS5005F.doc	Bart Anderson, P.E., DevCo
Parcel Number:	137-14-401-006, 137-23-101-002	CCRFCD
Zoning Action:	MDR-73901	CCPW
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES X NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	6/12/2018	6/28/2018 & 7/13/2018	Not Approved	\$400.00	49696: \$400
2 nd Submittal	7/31/2018	8/22/2018	Not Approved	\$400.00	497790: \$400
3 rd Submittal	11/5/2018	11/27/2018	Conditional Approval	\$400.00	500639: \$400
Memo Revision	12/3/2018	12/3/2018	Conditional Approval	N/C	N/C
CCRFCD	1/10/2019	1/10/2019	Concurrence Recv'd	N/C	N/C
4 th Submittal	2/12/2019	3/6/2019	Not Approved	\$100.00	503164: \$100
5 th Submittal	3/21/2019	4/4/2019	Conditional Approval	\$400.00	3057847: \$400
CCPW & CCRFCD	4/25/2019 & 5/23/2019	5/29/2019	Concurrence Received	N/C	N/C
TOTAL FEES (LDDRS):				\$1,700.00	----

REMARKS:

4th & 5th Submittals: Update #1 & Addendum #1 to revise Village 22 in accordance to the Update of the latest overall Summerlin West Master Plan Drainage Study

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

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

1. The *Master Drainage Study Update* for *Summerlin West Planning Area* proposes a modification to internal flow patterns that alters the flow patterns to the *Beltway Channel* system downstream of the *Summerlin Parkway* interchange. The modification proposes a storm drain system within *Summerlin Village 22* area (Storm Drain F) that will collect flows from the Gowan channel tributary area and route them into the *Beltway Channel* (MPU Facility APBE 0122). This resulted in increased flows in the *Beltway Channel* segment between *Summerlin Parkway* and *Far Hills Boulevard*, ie, mitigation measures are required for the impacted *Beltway Channel* segment.

A technical drainage study for the analysis, design and construction plans for the Beltway Channel modifications must be submitted and approved by the City prior to the individual onsite parcel developments.

2. The *Grand Park Detention Basin* is proposed to regulate and meter outflow to match the previously approved downstream flow conditions at the junction of *Far Hills* storm drain and the *Beltway Channel*. Without the *Grand Park Detention Basin*, there will be a net increase in flows at the *Beltway Channel* downstream of *Far Hills* intersection exceeding the previously approved flow.

A technical drainage study for the analysis, design and construction plans for the *Grand Park Detention Basin* must be submitted and approved by the City prior to the individual onsite parcel developments.

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

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
WSP/AYS

T/R/S: T20S/R59E/14
AREA K-14

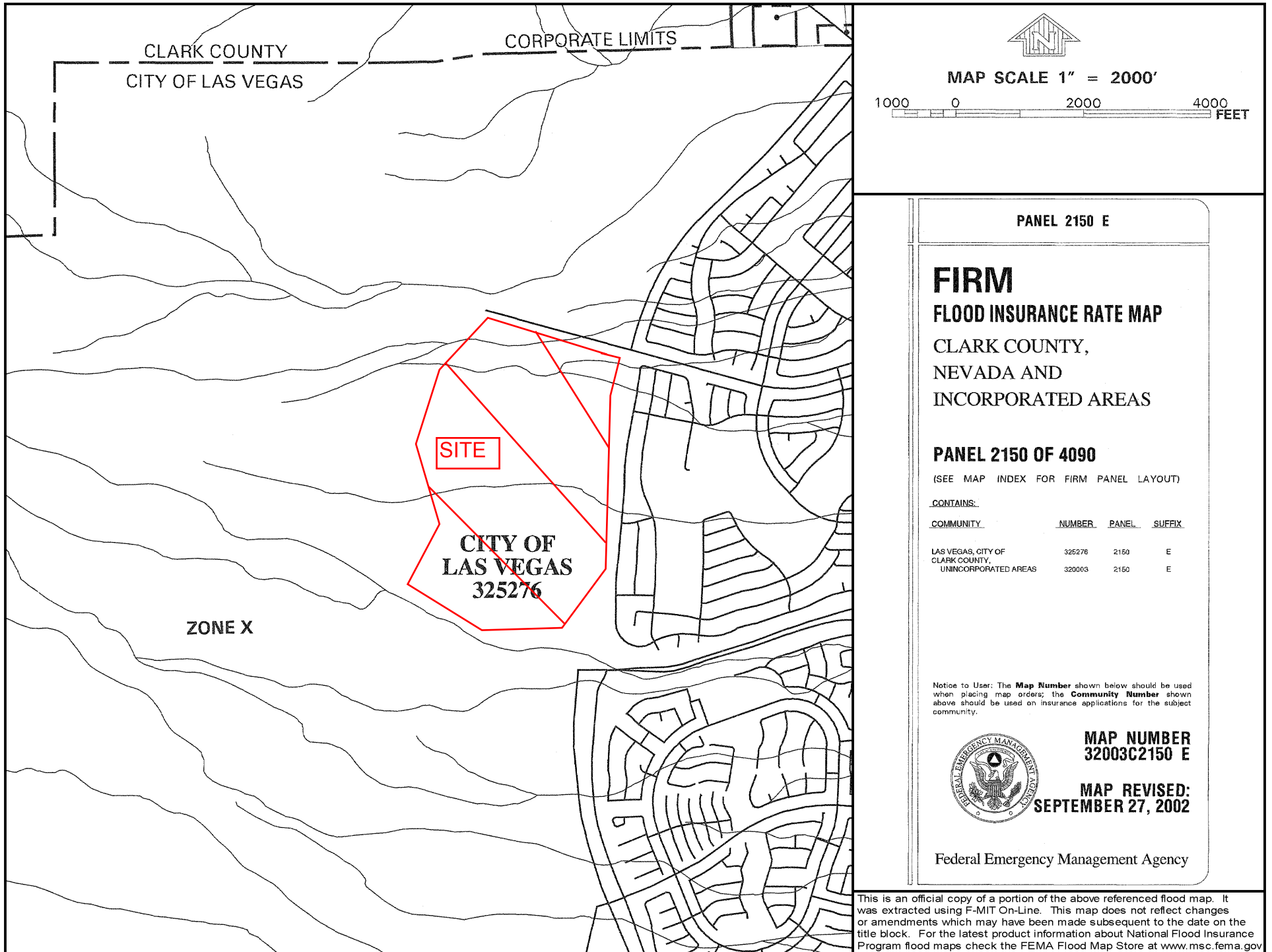
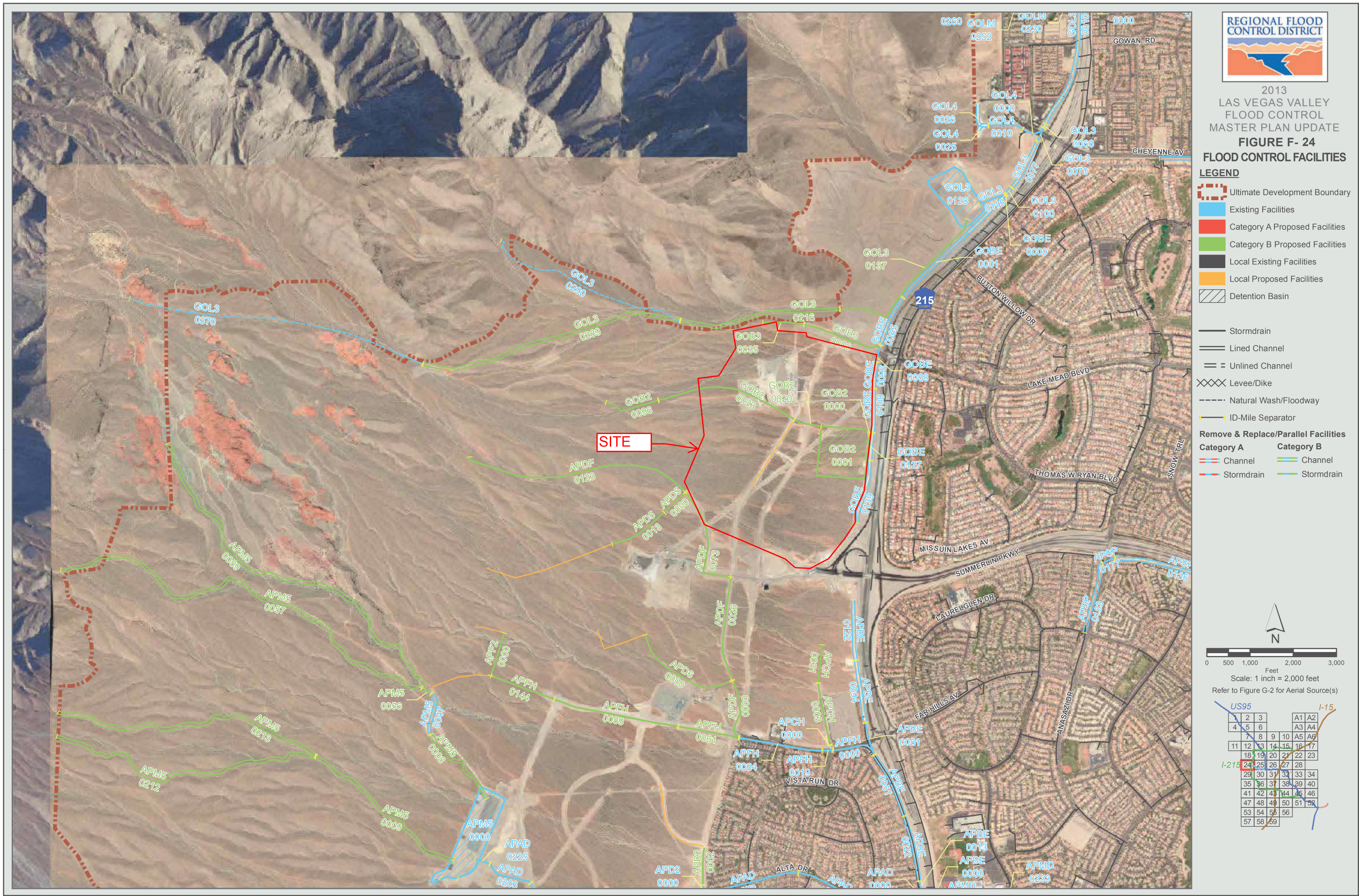


FIGURE 3



ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
APAD		ANGEL PARK - ALTA DRIVE BRANCH						
0044	E	11' X 8' RCAP	1565	3140	CSWAA-3	ALLGOW4	8.26	4.24
0073	E	11' X 8' RCAP	2220	2917	CSWAA-2	ALLGOW3	7.68	3.50
0146	E	10' X 8' RCB	3010	2220	CSWAA-1	ALLGOW3	6.98	4.40
0203	E	2: 7' X 5.5' RCB	1136	2220	CSWAA-1	ALLGOW3	6.98	5.28
0225	E	2: 7' X 5.5' RCB Outlet	360	2149	SUMSDB	ALLGOW3	6.74	3.40
APBE		ANGEL PARK - BELTWAY BRANCH						
0013	E	3: 12' X 8' RCB	489	4060	CSWFH-9	ALLGOW3	2.65	6.50
0022	E	Conc Chnl 20"W 7'D 2:1 SS	1556	4060	CSWFH-9	ALLGOW3	2.65	1.81
0051	E	Conc Chnl 20"W 7'D 2:1 SS	1583	4060	CSWFH-9	ALLGOW3	2.65	2.77
0081	E	8' X 8' RCBC @ Far Hills	777	423	SWFH-9	ALLGOW3	0.17	2.32
0094	E	Conc Chnl 10"W 5'D 2:1 SS	1465	423	SWFH-9	ALLGOW3	0.17	1.88
0122	E	Conc Chnl 10"W 4'D 2:1 SS	1409	423	SWFH-9	ALLGOW3	0.17	0.80
APCH		ANGEL PARK - CARRIAGE HILL BRANCH						
0000	E	8' X 6' RCB	152	585	SWFH-8	ALLGOW3	0.29	0.87
0003	P0	8' X 7' RCB	1461	585	SWFH-8	ALLGOW3	0.29	2.39
0031	P0	8' X 5' RCB	896	585	SWFH-8	ALLGOW3	0.29	0.60
APD2		ANGEL PARK - DESERT FOOTHILLS 2 BRANCH						
0002	P0	7' X 7' RCB	964	948	SWAA-2	ALLGOW3	0.70	2.00
APD5		ANGEL PARK - DESERT FOOTHILLS 5 BRANCH						
0000	P0	8' X 6' RCB	685	1701	CSWFH-2	ALLGOW3	1.09	1.89
0013	P0	72" RCP	1436	1701	CSWFH-2	ALLGOW3	1.09	4.18
APD6		ANGEL PARK - DESERT FOOTHILLS 6 BRANCH						
0000	P0	6' X 6' RCB	2604	1076	CSWFH-6	ALLGOW3	0.56	6.15
APDF		ANGEL PARK - DESERT FOOTHILLS BRANCH						
0000	P0	12' X 10' RCB	1356	2897	CSWFH-7	ALLGOW3	1.81	2.20
0026	P0	12' X 10' RCB	2463	1962	CSWFH-3	ALLGOW3	1.25	1.62
0073	P0	10' X 8' RCB	2679	1962	CSWFH-3	ALLGOW3	1.25	4.10
0123	P0	6' X 5' RCB	5355	1701	CSWFH-2	ALLGOW3	1.09	6.53
APF2		ANGEL PARK - FAR HILLS 2 BRANCH						
0000	P0	8' X 6' RCB	1046	669	CSWFH-5	ALLGOW3	0.38	1.00
APFH		ANGEL PARK - FAR HILLS BRANCH						
0000	E	2: 8' X 8' RCB	995	3862	CSWFH-8	ALLGOW3	2.48	3.50
0019	E	2: 8' X 8' RCB	250	3392	CCSWFH-7	ALLGOW3	2.18	4.19
0024	E	16' X 8' RCAP	1943	3392	CCSWFH-7	ALLGOW3	2.18	5.10
0061	P0	8' X 6' RCB	1492	669	CSWFH-5	ALLGOW3	0.38	2.00
0089	P0	8' X 6' RCB	2902	669	CSWFH-5	ALLGOW3	0.38	2.00
0144	P0	7' X 6' RCB	1556	669	CSWFH-5	ALLGOW3	0.38	5.50
APM5		ANGEL PARK - MIDDLE 5 BRANCH						
0000	E	384 ac-ft Detention Basin #5		7001	SUM5IN	ALLGOW3	6.74	
0001	E	12,153 cfs PMF Spillway		12153	SUM5IN	ALLGOW3	6.74	
0008	P0	Conc Chnl 50"W 4.5'D 2:1 SS	2102	3725	CDB54-6R	ALLGOW3	4.30	5.20
0009	P0	Conc Chnl 50"W 4.5'D 2:1 SS	4180	3624	CDB55-8	ALLGOW3	2.45	5.80
0047	E	Diversion Berm with Gabion Bank Protection	1000	3725	CDB54-6R	ALLGOW3	4.30	1.30
0056	P0	Conc Chnl 80"W 4'D 2:1 SS	264	3725	CDB54-6R	ALLGOW3	4.30	1.30
0057	P0	Conc Chnl 50"W 3'D 2:1 SS	9922	1821	CDB54-4	ALLGOW3	1.01	6.80
0059	P0	Conc Chnl 100"W 3'D 2:1 SS	8923	2358	CDB54-5	ALLGOW3	2.45	7.00
0212	P0	Conc Chnl 30"W 3.5'D 2:1 SS	6695	1238	CDB55-2	ALLGOW3	0.74	7.50
0213	P0	Conc Chnl 50"W 2.5'D 2:1 SS	6522	1125	CDB55-5	ALLGOW3	0.62	7.30
APSP		ANGEL PARK - SUMMERLIN PARKWAY						
0135	E	Conc Chnl 10"W 6'D 2:1 SS	2030	1173	C8B-1	ALLGOW3	1.14	2.40
0177	E	9' X 8' RCBC @ Anasazi	330	867	C11B-1	ALLGOW3	0.84	1.70
0183	E	Conc Chnl 10"W 6'D 2:1 SS	1680	867	C11B-1	ALLGOW3	0.84	1.70
GO02		GOWAN SOUTH FACILITIES (CHEYENNE CHANNEL)						
0257	E	Conc Chnl 10"W 6.75'D 1.5:1 SS	4293	2577	CCJ-C	ALLGOW3	2.97	4.10
GOB2		GOWAN LONE MOUNTAIN SYST. 2 BELTWAY						
0000	P0	36" RCP Outlet	118	75	DET22	ALLGOW3	0.76	6.76
0001	P0	123 ac-ft Village 22 Detention Basin		1344	CSV22-DB	ALLGOW3	0.76	
0020	P0	8' X 7' RCB	657	1247	SV22-2	ALLGOW3	0.70	8.30
0033	P0	8' X 6' RCB	3359	1247	SV22-2	ALLGOW3	0.70	6.90
0096	P0	6' X 5' RCB	1332	1247	SV22-2	ALLGOW3	0.70	6.00

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOB3		GOWAN LONE MOUNTAIN SYST. 3 BELTWAY						
0000	P0	66" RCP	1877	530	SV22-3	ALLGOW3	0.28	6.60
0035	P0	54" RCP	965	530	SV22-3	ALLGOW3	0.28	6.40
GOBE		GOWAN LONE MOUNTAIN SYST. BELTWAY						
0000	E	20' X 10' RCBC @ Access Rd	30	958	CSV22-3	GW3SC	0.28	5.67
0001	E	Conc Chnl 20"W 5'D 2:1 SS	3355	958	CSV22-3	GW3SC	0.28	6.50
0065	E	Conc Chnl 20"W 6'D 2:1 SS	1220	958	CSV22-3	GW3SC	0.28	1.90
0088	E	2: 10'X9' RCBC @ Lake Mead	400	471	CDET22	ALLGOW3	0.96	0.50
0096	E	Conc Chnl 20"W 9'D 2:1 SS	627	471	CDET22	ALLGOW3	0.96	0.50
0108	E	Conc Chnl 20"W 6'D 2:1 SS	1021	471	CDET22	ALLGOW3	0.96	0.50
0127	E	Conc Chnl 20"W 6'D 2:1 SS	638	442	SV22-1	ALLGOW3	0.20	0.50
0139	E	Conc Chnl 10"W 5.5'D 2:1 SS	1500	442	SV22-1	ALLGOW3	0.20	1.02
GOL3		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3						
0010	E	Conc Chnl 20"W 10'D 0:1 SS	3037	2946	CRCLMT1R	GW3SC	2.61	2.78
0068	E	Transition Structure	100	2946	CRCLMT1R	GW3SC	2.61	3.50
0070	E	20' X 6' RCBC @ Cliff Shadows	350	1162	CRCSV223	ALLGOW3	5.68	2.44
0077	E	Conc Chnl 20"W 6'D 0:1 SS	1229	1162	CRCSV223	ALLGOW3	5.68	6.11
0100	E	Conc Chnl 20"W 10'D 0:1 SS	200	1162	CRCSV223	ALLGOW3	5.68	5.67
0115	E	66" RCP Outlet	670	679	DET26	ALLGOW3	4.43	
0128	E	333 ac-ft Village 26 Detention Basin		3767	VIL26IN	ALLGOW3	4.43	
0137	P0	14' X 14' RCB	4335	3767	VIL26IN	ALLGOW3	4.43	0.50
0216	P0	Conc Chnl 50"W 4.5'D 2:1 SS	3761	3693	CSV26-1	ALLGOW3	4.15	6.08
0289	P0	Conc Chnl 50"W 3.5'D 2:1 SS	6215	2396	30	ALLGOW3	2.51	7.95
0290	E	Natural Wash 363"W	4850	1465	SV26-1	ALLGOW3	1.64	22.50
0370	E	Natural Wash 450"W	7000	2396	30	ALLGOW3	2.51	8.50
GOL4		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 4						
0000	E	14' X 8' RCB	554	2257	CLMT1R	ALLGOW3	2.33	2.50
0010	E	2: 9' X 8' RCB	820	2257	CLMT1R	ALLGOW3	2.33	4.74
0025	E	Soil Cement Chnl 60"W 8'D 3-4:1 SS	320	2257	CLMT1R	ALLGOW3	2.33	2.00
0026	E	Soil Cement Chnl 42"W 6'D 3-4:1 SS	700	2257	CLMT1R	ALLGOW3	2.33	1.00

* 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).



2013 LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FACILITY INVENTORY
FIGURE F - 24

L
E
G
E
N
D

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

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

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

Construction Features

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

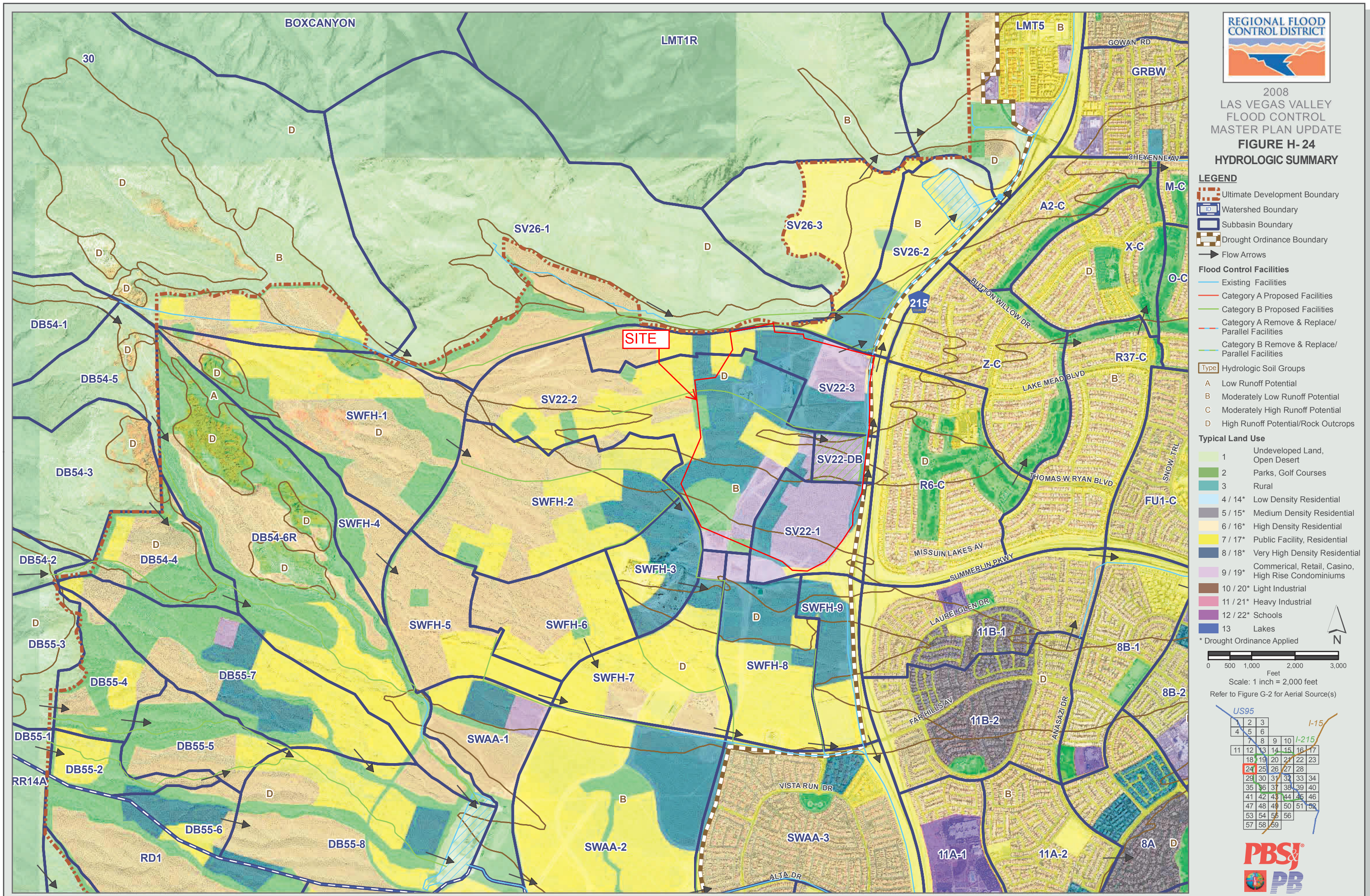


FIGURE 4B - MPU HYDROLOGIC SUMMARY

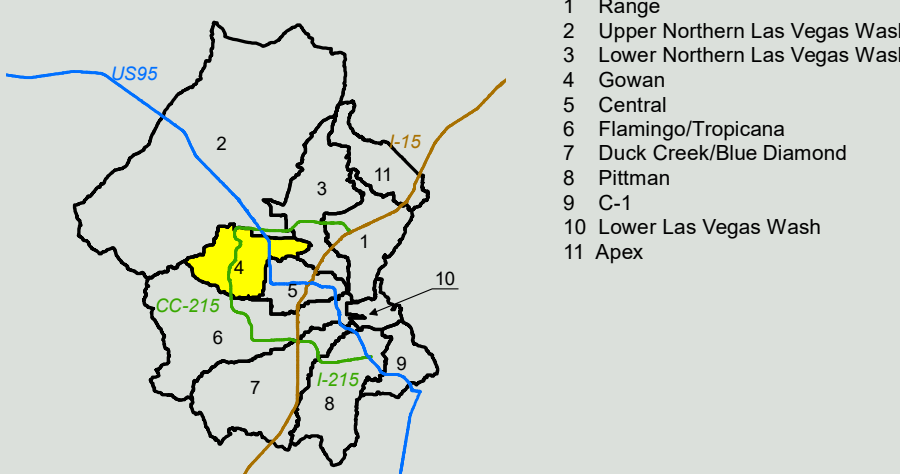


2018 Las Vegas Valley Master Plan Update

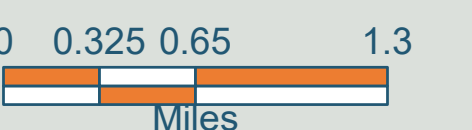
Figure W-4
Gowan Watershed

Legend

- Flow Arrows
- NodeID flow(cfs)
- Concentration Points
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Ultimate Development Boundary
- Watershed
- BasinID
- Subbasins
- 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

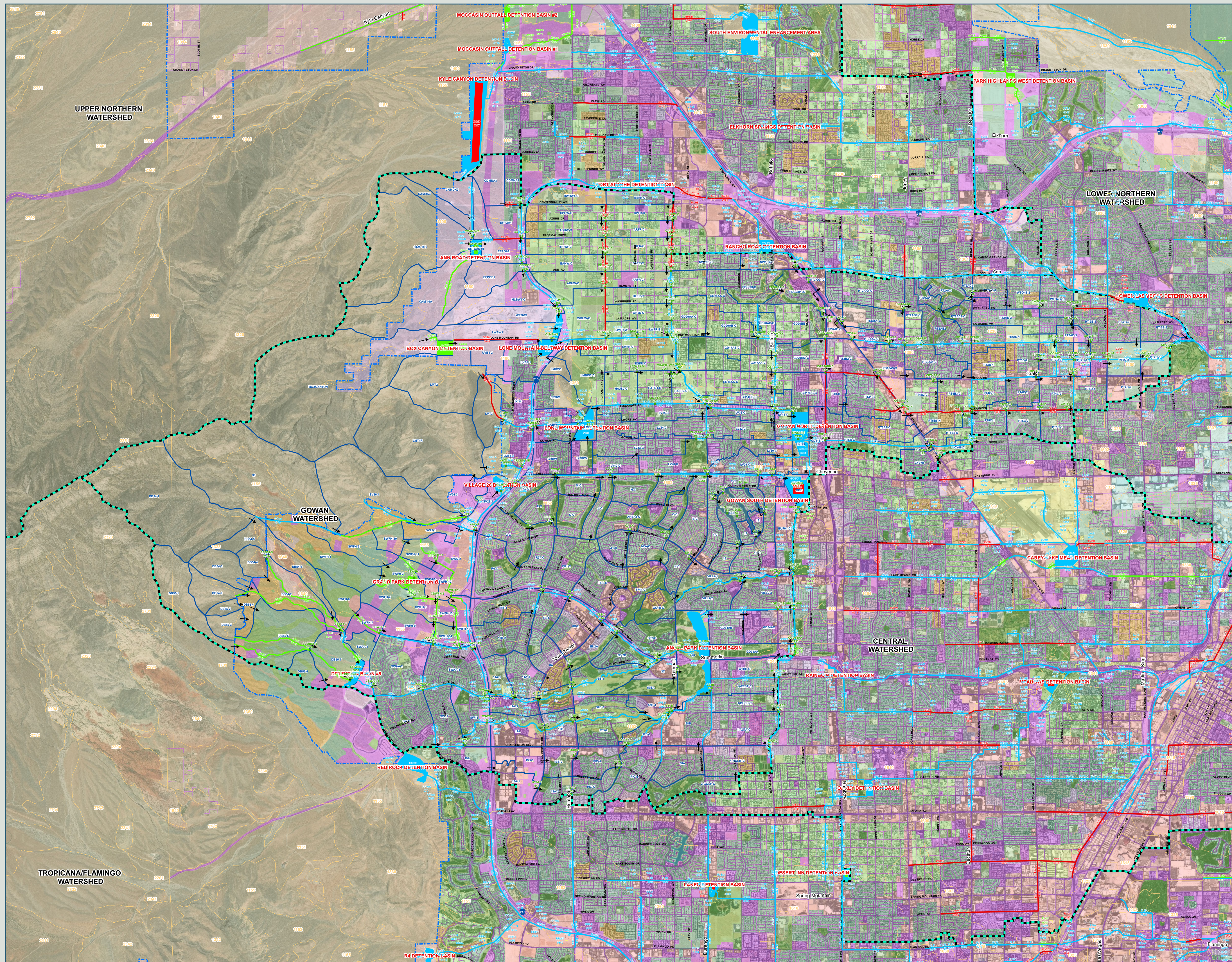


Scale: 1 inch = 0.65 mile



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ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
APAD 0203	E	ANGEL PARK - ALTA DRIVE BRANCH						
	E	2: 7' X 5.5' RCB	1104	2200	CSWAA-1	GOW3A	6.95	5.28
0225	E	2: 7' X 5.5' RCB OUTLET	360	2137	SUMSDB	GOW3A	6.73	3.40
APBE 0022	E	ANGEL PARK - BELTWAY BRANCH						
	E	CONC CHNL 20"W 7'D 2:1 SS	1556	3366	CCSWFH15	GOW3A	3.39	1.81
	E	CONC CHNL 20"W 7'D 2:1 SS	1583	3366	CCSWFH15	GOW3A	3.39	2.77
	E	8' X 8' RCBC @ FAR HILLS	777	1048	CSWFH-15	GOW3A	0.59	2.32
	E	CONC CHNL 10"W 5'D 2:1 SS	1465	1048	CSWFH-15	GOW3A	0.59	1.88
	E	CONC CHNL 10"W 4'D 2:1 SS	1685	1048	CSWFH-15	GOW3A	0.59	0.80
	P0	8' X 6' RCB	5012	781	CSWFH-12	GOW3A	0.41	1.30
	P0	6' X 5' RCB	2858	606	CSWFH-11	GOW3A	0.31	3.00
APCH 0000	E	ANGEL PARK - CARRIAGE HILL BRANCH						
	E	8' X 6' RCB	152	399	CSWFH-14	GOW3A	0.21	0.87
	E	72" RCP	1685	399	CSWFH-14	GOW3A	0.21	2.00
0031	P0	60" RCP	2008	206	SWFH-13	GOW3A	0.10	1.38
APD2 0002	E	ANGEL PARK - DESERT FOOTHILLS 2 BRANCH						
	E	7' X 6' RCB	883	674	SWAA-2	GOW3A	0.68	1.08
APDF 0000	P0	ANGEL PARK - DESERT FOOTHILLS BRANCH						
	P0	10' X 6' RCB	1788	1428	CSWFH-9	GOW3B	0.80	3.55
	P0	8' X 6' RCB	1813	968	CSWFH-8	GOW3A	1.80	2.00
	P0	6' X 4' RCB	1922	486	CSWFH-4	GOW3A	1.52	4.40
	P0	42" RCP	1076	141	GPDB	GOW3A	1.29	6.00
	P0	130 AC-FT GRAND PARK DETENTION BASIN		1543	CSWFH-3	GOW3A	1.29	
	P0	6' X 6' RCB	2977	853	SWFH-1	GOW3A	0.69	3.80
	P0	5' X 4' RCB	2197	509	SWFH-2	GOW3A	0.37	5.70
APFH 0000	E	ANGEL PARK - FAR HILLS BRANCH						
	E	2: 8' X 8' RCB	1070	2494	CCSWFH14	GOW3B	1.51	3.50
	E	2: 8' X 8' RCB	250	2149	CCSWFH9	GOW3B	1.30	4.19
	E	16' X 8' RCAP	1951	2149	CCSWFH-9	GOW3B	1.30	5.10
	E	8' X 6' RCB	1435	839	CSWFH-7	GOW3A	0.50	2.00
	E	8' X 6' RCB	2946	839	CSWFH-7	GOW3A	0.50	2.00
0144	P0	5' X 4' RCB	2497	456	SWFH-6	GOW3A	0.28	5.50
APM5 0000	E	DETENTION BASIN #5						
	P0	384 AC-FT DETENTION BASIN #5		6856	SUM5IN	GOW3A	6.73	
	P0	CONC CHNL 50"W 4.5'D 2:1 SS	2102	3634	CCDB54-7	GOW3A	4.13	5.20
	P0	CONC CHNL 50"W 4'D 2:1 SS	4180	3495	CDB55-7	GOW3A	2.60	5.80
	E	DIVERSION BERM WITH GABION BANK PROTECTION	1000	3634	CCDB54-7	GOW3A	4.13	1.30
	P0	CONC CHNL 80"W 4'D 2:1 SS	264	3634	CCDB54-7	GOW3A	4.13	1.30
	P0	CONC CHNL 50"W 3'D 2:1 SS	9922	1664	CDB54-4	GOW3A	0.81	6.80
	P0	CONC CHNL 100"W 3'D 2:1 SS	9075	2606	CDB54-7	GOW3A	3.31	7.00
	P0	CONC CHNL 30"W 3'D 2:1 SS	6695	1092	DB55-1	GOW3A	0.64	7.50
0213	P0	CONC CHNL 50"W 3'D 2:1 SS	6522	1729	CDB55-5	GOW3A	1.30	7.30
APSP 0183	E	ANGEL PARK - SUMMERLIN PARKWAY						
	E	CONC CHNL 10"W 6'D 2:1 SS	1680	884	C11B-1	GOW3A	0.84	1.70
GOB3 0000	E	GOWAN LONE MOUNTAIN SYST. 3 BELTWAY						
	E	66" RCP	1370	341	SV22-1	GOW3A	0.18	4.50
GOBE 0000	E	GOWAN LONE MOUNTAIN SYST. BELTWAY						
	E	20' X 10' RCBC @ ACCESS RD	30	1044	CSV22	GOW3A	0.67	5.67
	E	CONC CHNL 20"W 5'D 2:1 SS	1100	1044	CSV22	GOW3A	0.67	6.50
	E	CONC CHNL 11"W 6.8'D 0:1 SS	2143	1044	CSV22	GOW3A	0.67	6.50
	E	CONC CHNL 15"W 7.5'D 0:1 SS	487	1044	CSV22	GOW3A	0.67	3.93
	E	CONC CHNL 17"W 7.5'D 0:1 SS	844	1044	CSV22	GOW3A	0.67	0.76
	E	2: 10' X 9' RCBC @ LAKE MEAD	400	782	SV22-2	GOW3A	0.49	0.50
	E	CONC CHNL 20"W 9'D 2:1 SS	627	782	SV22-2	GOW3A	0.49	0.50
	E	CONC CHNL 20"W 6'D 2:1 SS	1021	782	SV22-2	GOW3A	0.49	0.50
	E	CONC CHNL 20"W 6'D 2:1 SS	638	782	SV22-2	GOW3A	0.49	0.50
0139	E	CONC CHNL 10"W 5.5'D 2:1 SS	1500	782	SV22-2	GOW3A	0.49	1.02
GOL3 0010	E	GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3						
	E	CONC CHNL 20"W 10'D 0:1 SS	3037	3277	CRLCLMT1R	GOW3A	7.31	2.78
	E	TRANSITION STRUCTURE	100	3277	CRLCLMT1R	GOW3A	7.31	3.50
	E	20' X 6' RCBC @ CLIFF SHADOWS	350	1271	CRCSV22	GOW3A	4.99	2.44
0077	E	CONC CHNL 20"W 6'D 0:1 SS	1229	1271	CRCSV22	GOW3A	4.99	6.11

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOL3 0100	E	GOWAN LONE MOUNTAIN SYSTEM-BRANCH 3						
	E	CONC CHNL 20"W 10'D 0:1 SS	200	1271	CRCSV22	GOW3A	4.99	5.67
	E	96" RCP OUTLET	670	666	DET26	GOW3A	4.31	0.29
	E	305 AC-FT VILLAGE 26 DETENTION BASIN		3615	VIL26IN	GOW3A	4.31	
	E	CONC CHNL 20"W 7.5'D 0:1 SS	2720	3615	VIL26IN	GOW3A	4.31	6.50
	E	CONC CHNL 20"W 8'D 0:1 SS	563	3615	VIL26IN	GOW3A	4.31	3.91
	E	14' X 14' RCB	890	3615	VIL26IN	GOW3A	4.31	0.88
	E	Dual 10' X 14' RCB	124	3615	VIL26IN	GOW3A	4.31	0.57
	P0	CONC CHNL 50"W 4'D 2:1 SS	4060	3524	CSV26-1	GOW3A	4.02	6.08
	P0	CONC CHNL 50"W 3.5'D 2:1 SS	6215	2281	30	GOW3A	2.44	7.95
0289	E	NATURAL WASH 363"W	4850	1410	SV26-1	GOW3A	1.59	22.50
0370	E	NATURAL WASH 450"W	7000	2281	30	GOW3A	2.44	8.50
GOL4 0000	E	GOWAN LONE MOUNTAIN SYSTEM-BRANCH 4						
	E	14' X 8' RCB	554	2243	CLMT1R	GOW3A	2.33	2.50
	E	2: 9' X 8' RCB	820	2243	CLMT1R	GOW3A	2.33	4.74
	E	SOIL CEMENT CHNL 60"W 8'D 3-4:1 SS	320	2243	CLMT1R	GOW3A	2.33	2.00
	E	SOIL CEMENT CHNL 42"W 6'D 3-4:1 SS	700	2243	CLMT1R	GOW3A	2.33	1.00

*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).



2018 LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FACILITY INVENTORY
FIGURE F-22

L E G E N D	ID (Facility Identifier)	AABB
	Parent Stream Name	
	Stream Name	
	Mile	0000
	Distance Above Confluence with Parent Stream (Miles)	
	Miles in Hundredths	
	Existing Facility.....E	Bottom Width..... W
	Proposed or Modified Facility..... P	Depth..... D
	Contingency Level	Side Slope, H:V..... SS
	Category A.....P	
	Category B.....P0	
	Construction Features	
	Cast in Place Concrete Pipe.....	CIPCP
	Corrugated Metal Arch Pipe Culvert.....	CMP
	Corrugated Metal Pipe Culvert.....	CMPC
	High Density Polyethylene.....	HDPE
	Horizontal Elliptical Reinforced Concrete Pipe.....	HERCP
	Reinforced Concrete Arch Pipe.....	RCAP
	Reinforced Concrete Arch Culvert.....	RCAC
	Reinforced Concrete Box.....	RCB
	Reinforced Concrete Box Culvert.....	RCBC
	Reinforced Concrete Pipe.....	RCP
	Reinforced Concrete Pipe Culvert.....	RCPC
	Storm Sewer Pipe.....	SSP





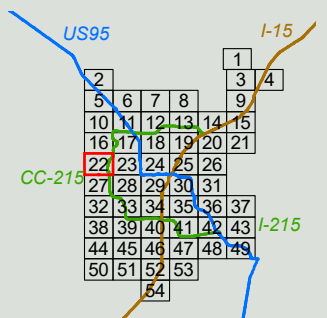
2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

**FIGURE F-22
FLOOD CONTROL FACILITIES**

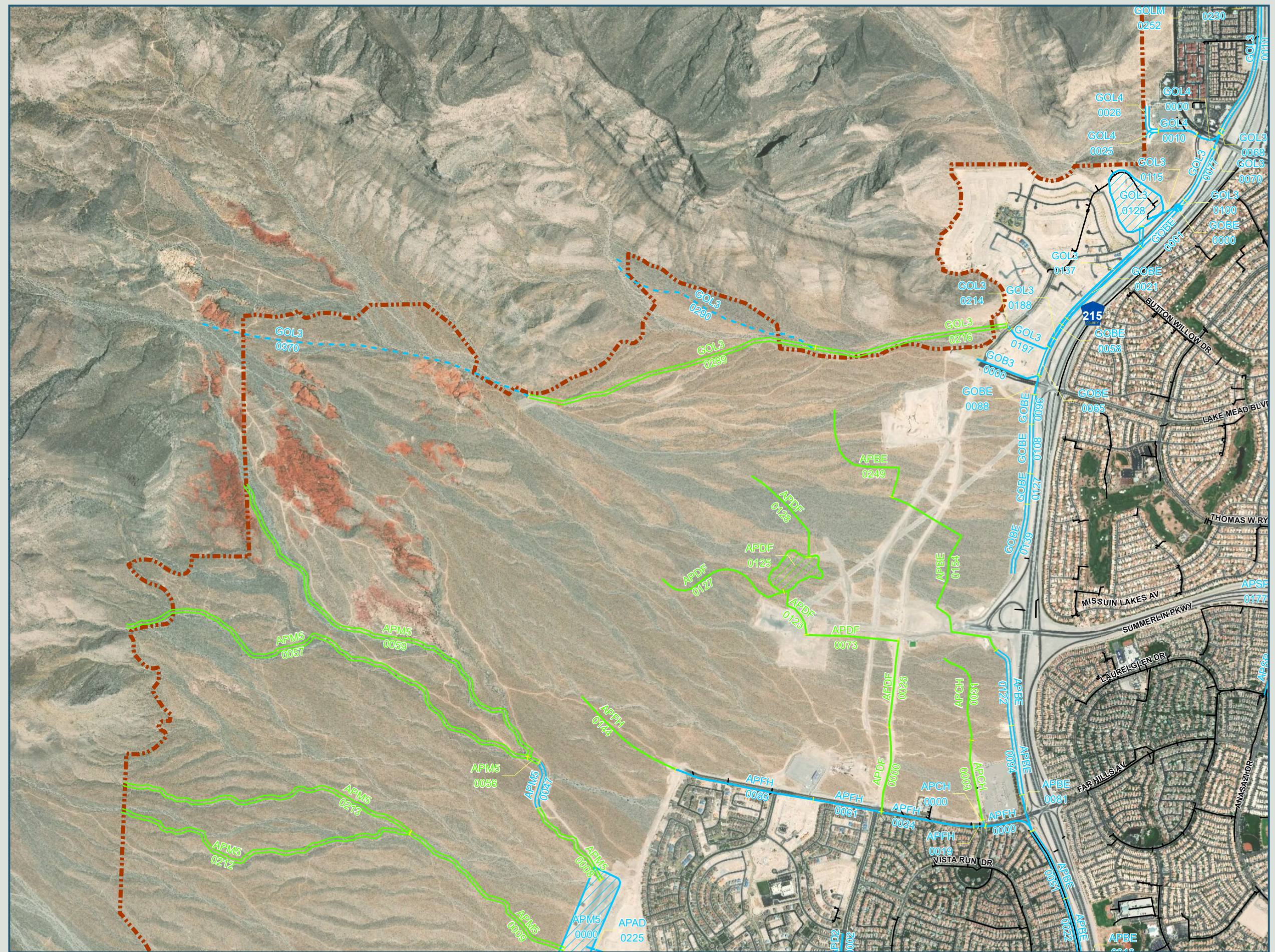
- LEGEND**
- Ultimate Development Boundary
 - Existing Facilities
 - Category A Proposed Facilities
 - Category B Proposed Facilities
 - Local Existing Facilities
 - Detention Basin
 - Culvert or Bridge Crossing
 - Stormdrain
 - Lined Channel
 - Unlined Channel
 - Levee/Dike
 - Natural Wash/Floodway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

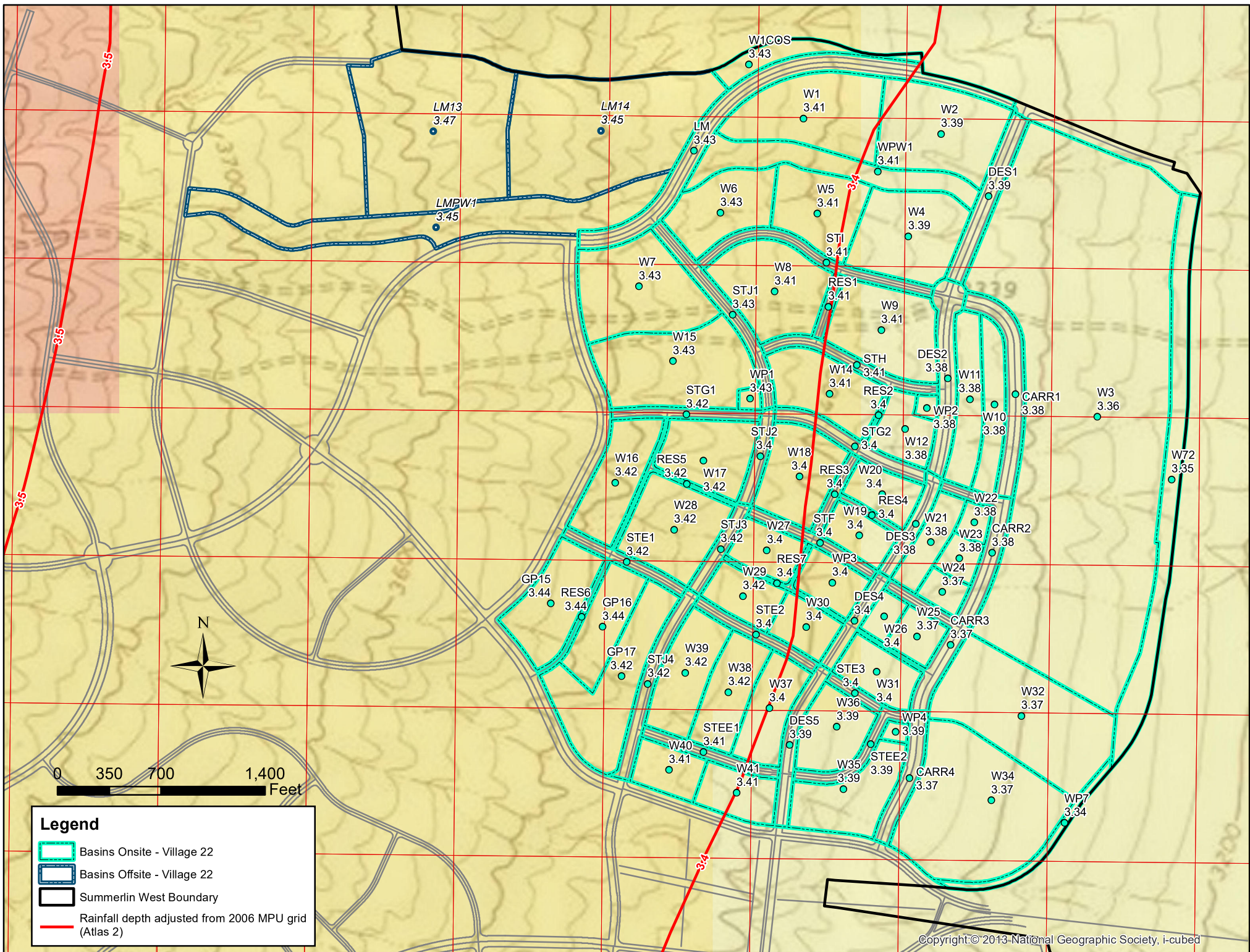


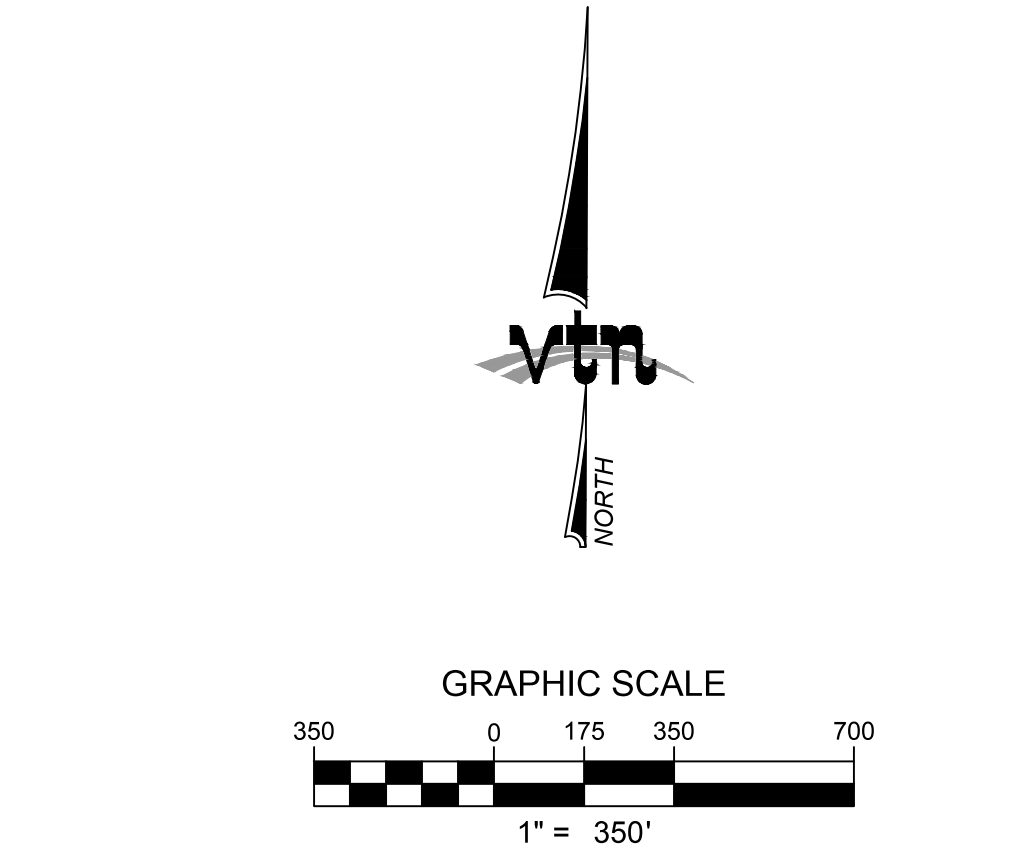
Scale: 1 inch = 2,000 feet
AerialSource: Esri World Imagery 2017



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- LEGEND**
- BASIN BOUNDARY
 - BASIN DESIGNATION
 - CONCENTRATION POINT
 - FLOW ARROW

ULTIMATE CONDITION HEC-1 SUMMARY TABLE					
BASIN ID	AREA (ac)	Q100 (CFS)	BASIN ID	AREA (ac)	Q100 (CFS)
LM	9.16	41	STJ1	3.76	17
D	11.27	47	CSTJ1	-	317
DES1	3.76	14	NP-2	1.53	6
CDES1	-	62	ES-1	14.05	59
COS-2	10.17	32	CES-1	-	382
CCOS-2	-	93	OFF4	52.68	209
A	16.92	66	L	8.09	35
CA	-	160	STL1	1.78	8
CP1	-	201	CSTL1	-	43
STI	2.46	11	STG1	1.77	8
C	11.68	50	CSTG1	-	260
CSTI	-	61	M	11.24	48
G	7.08	30	STJ2	3.10	13
CG	-	91	S	3.01	11
H	7.65	33	STF	1.83	8
CH	-	124	NP-3	3.61	9
STH	2.29	10	U	3.49	11
J	5.8	25	DES4	1.72	8
CJ	-	35	CDES4	-	19
K	5.17	22	V	3.85	14
CK	-	58	W	3.97	15
NP-1	0.49	2	CVW	-	29
CNP-1	3.40	59	CARR3	2.95	13
DES2	3.40	15	STE3	1.11	5
CDES2	-	74	EE	6.65	24
CP2	-	198	STEE3	1.49	7
CARR1	6.68	29	HH	4.60	19
I	10.56	38	CARR4	3.10	13
CCARR1	-	265	OFF5	12.73	53
N	6.67	28	STE1	1.72	8
STFF	1.08	5	Y	8.07	31
CSTFF	-	33	CY	-	92
STG2	2.83	13	STL2	1.79	8
CSTG2	-	46	CSTL2	-	100
O	3.25	13	Z	7.04	22
P	3.37	13	STJ3	2.44	11
COP	-	26	CSTJ3	-	33
DES3	1.84	8	STE2	1.78	8
CDES3	-	34	DD	6.18	23
CP3	-	80	T	4.02	16
Q	3.62	14	CC	5.50	20
R	3.49	15	DD	4.57	16
CQR	-	29	DES5	1.80	8
CARR2	3.58	15	NP-4	0.71	2
CCARR2	-	44	AA	4.64	19
CP4	-	389	STJ4	1.05	4
II	19.56	77	CSTJ4	-	23
X	16.47	56	STEE1	1.45	7
B	87.12	328	CSTEE2	-	30
DC-1	10.84	48	STEE2	2.40	11
COS-3	1.75	4	FF	3.08	13
3-O*	-	189	CFF	-	53
OFF-COS2	19.16	53	GG	3.74	16
COFFCOS2	-	242	DES6	1.11	5
E	13.96	58			

THE HOWARD HUGHES CORPORATION
10801 WEST CHARLESTON BLVD, 3RD FLOOR
LAS VEGAS, NEVADA 89135

FIGURE 6

ULTIMATE CONDITION BASIN MAP

DRAWN BY: AH

DESIGNED BY: J/A

CHECKED BY: J/A

PROJECT NO: 2801

AUGUST 2018

SCALE: 1" = 300' HORIZ.
N/A VERT.

SHEET

OF SHEETS

DRAWING NO.

REVISION

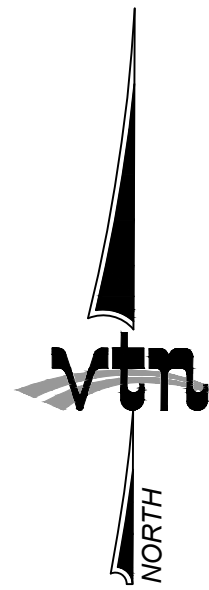
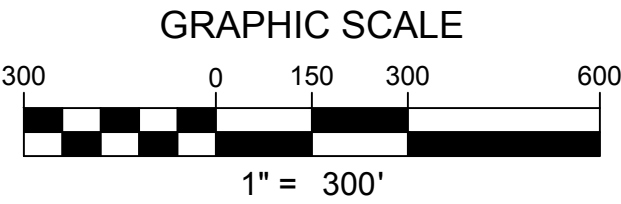
DATE

BY

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 873-7500 FAX: (702) 362-2897 WEB: WWW.VTNV.COM

CONSULTING ENGINEERS & LAND SURVEYORS

H:\17861 Village 22 Master\Drawings\4_ADD1 TO UP\A_Figure\Figure 6 - Village 22 Drainage Basin Map.dwg



LEGEND

- CCRFCD STORM DRAIN ALIGNMENT
- EXISTING FACILITY
- VILLAGE 22 LOCAL STORM DRAIN
- W51 BASIN DESIGNATION
- CONCENTRATION POINT
- LOCAL FACILITY DESIGNATION
- DEVELOPED CONDITION FLOW ARROW

VILLAGE 22 LOCAL FLOOD PROTECTION FACILITIES									
Facility #	Design Slope %	Q100 cfs	Velocity ft/s	Facility	Facility #	Design Slope %	Q100 cfs	Velocity ft/s	Facility
4	5.4	41	18.69	30" RCP	56	1.5	44	11.54	30" RCP
5	2.0	47	13.16	30" RCP	58	1.5	15	8.93	30" RCP
6	2.7	62	15.58	30" RCP	61	3.1	389	26.21	60" RCP
7	2.0	32	12.11	30" RCP	62	8.0	35	20.39	30" RCP
8	2.9	93	17.93	36" RCP	63	1.5	43	11.50	30" RCP
9	8.0	66	14.44	36" RCP	64	8.0	48	22.29	36" RCP
10	3.0	160	20.54	42" RCP	65	8.2	260	33.90	42" RCP
11	N/A	201	N/A	EX 66" RCP**	66	3.1	11	10.63	30" RCP
12A	8.0	53	22.91	36" RCP	68	1.3	9	7.36	30" RCP
12B	2.6	53	15.05	36" RCP	69	8.0	11	14.88	30" RCP
13	8.0	58	10.63	36" RCP	72	7.0	29	18.72	30" RCP
19	0.5	50	8.01	42" RCP	74	6.3	5	10.83	30" RCP
20	5.8	61	20.97	42" RCP	77A	8.0	53	22.91	36" RCP
21	0.5	30	7.07	36" RCP	77B	7.4	209	31.33	42" RCP
22	9.7	91	28.22	42" RCP	78	8.0	31	20.01	30" RCP
23	0.8	33	8.46	30" RCP	79	8.1	92	26.52	36" RCP
24	10.1	124	31.13	42" RCP	80	3.1	8	9.69	30" RCP
25	1.5	6	6.89	30" RCP	81	8.0	100	27.08	36" RCP
27	2.3	59	14.86	36" RCP	82	2.9	22	12.60	30" RCP
29	0.5	25	6.65	30" RCP	83	3.2	23	13.22	30" RCP
30	7.0	35	19.71	30" RCP	84	0.5	16	6.05	30" RCP
33	0.6	22	6.99	30" RCP	85	2.3	20	11.29	30" RCP
34	5.0	58	19.78	36" RCP	86	8.0	16	16.59	30" RCP
35	1.0	2	4.32	30" RCP	87	8.0	19	17.43	30" RCP
36	1.0	74	11.43	42" RCP	88	7.8	30	19.83	30" RCP
37	0.9	198	13.98	60" RCP	89	8.0	13	15.62	30" RCP
40	7.6	38	20.77	30" RCP	90	7.8	53	22.70	36" RCP
41	0.9	265	13.39	6'x6' RCB	91	0.5	2	3.39	30" RCP
43	0.5	28	6.73	30" RCP	92	2.7	16	11.25	30" RCP
44	3.3	33	14.72	30" RCP	93	7.4	24	18.12	30" RCP
45	6.8	46	20.97	30" RCP	94	6.2	19	15.91	30" RCP
50	7.9	26	18.97	30" RCP	95	4.0	77	19.52	42" RCP
51	2.5	34	13.37	30" RCP	96	5.0	56	23.05	36" RCP
52	7.1	80	24.48	36" RCP	97	5.0	339	30.51	54" RCP
55	7.3	29	19.01	30" RCP	98	N/A	138	N/A	EX 48" RCP***

*Replaces existing 30" RCP stub provided in Lake Mead Study
**Existing 66" RCP per Lake Mead Blvd Study
***Existing Facility (Per Lake Mead Blvd Study) can accept 138 cfs and may be used for flexibility

THE HOWARD HUGHES CORPORATION
10801 WEST CHARLESTON BLVD, 3RD FLOOR
LAS VEGAS, NEVADA 89135

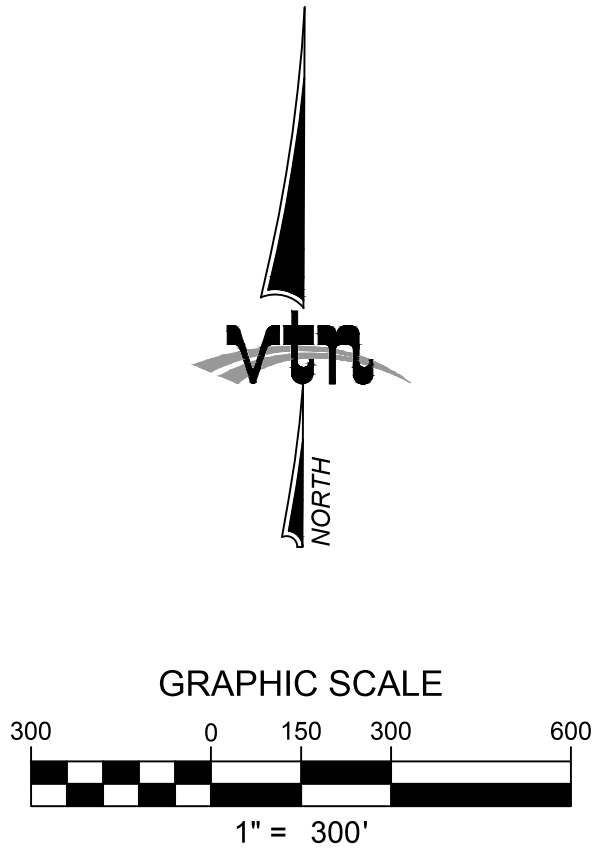
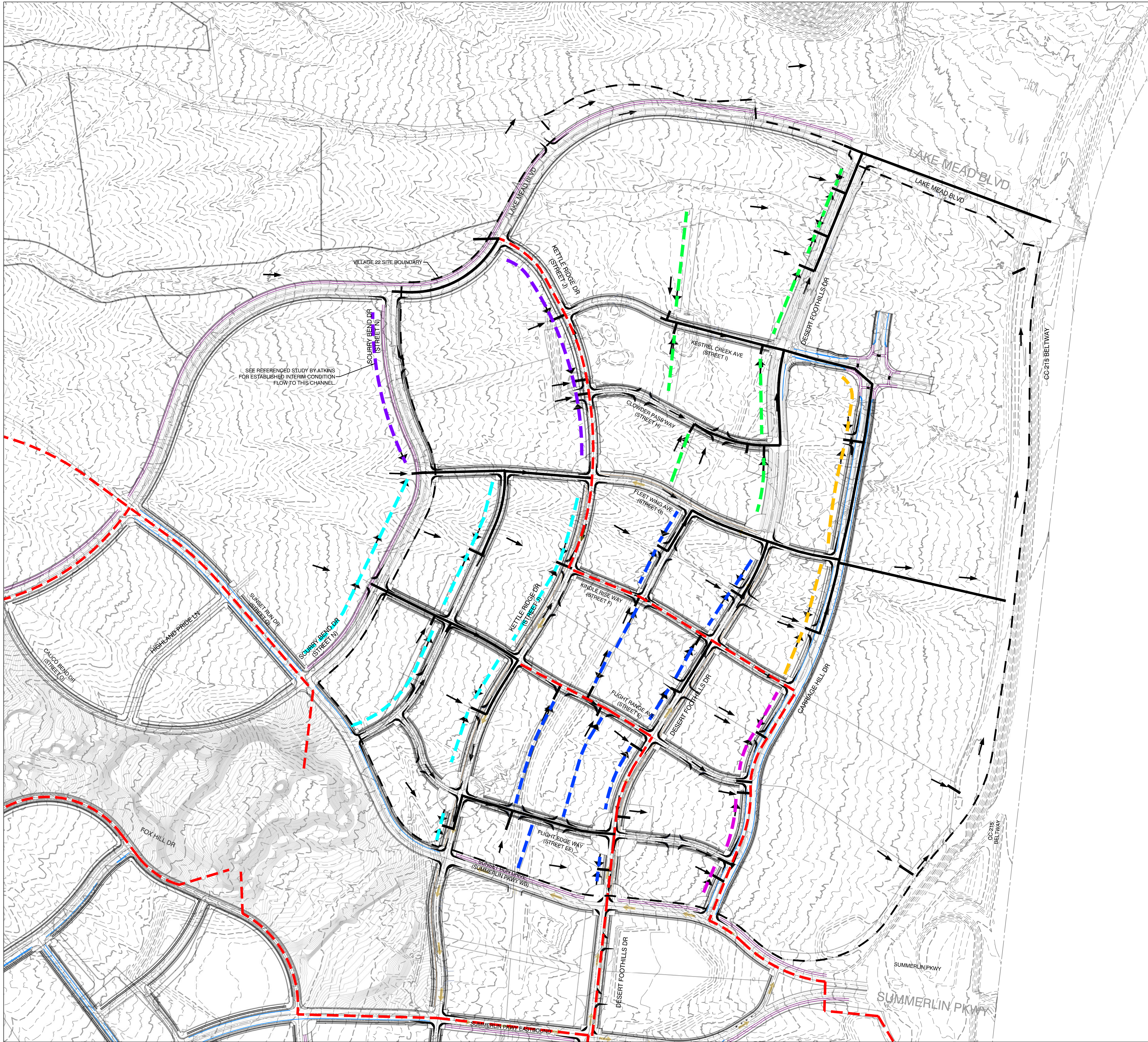
FIGURE 7
LOCAL STORM DRAIN
FACILITIES MAP

SUMMERLIN WEST VILLAGE 22

DRAWN BY: ATM	MAY 2018
DESIGNED BY: STG/TA	MAY 2018
CHECKED BY: JYA	MAY 2018
PROJECT NO: 2801	SCALE: 1"=300' HORIZ. VERT.

SHEET
OF SHEETS
DRAWING NO.

H:\7861 Village 22 Master\Drawings\4_ADD1 TO UP\1A_Figures\Figure 7 - Local Flood Control Facilities Map.dwg



CHANNEL FACILITY LEGEND

- TO BE CONSTRUCTED WITH CARRIAGE HILL DR (KESTREL CREEK AVE TO KINDLE RISE WAY)
- TO BE CONSTRUCTED WITH CARRIAGE HILL DR (SUNSET RUN DR TO KINDLE RISE WAY)
- TO BE CONSTRUCTED WITH DESERT FOOTHILLS DR (LAKE MEAD BLVD TO FLEET WING AVE)
- TO BE CONSTRUCTED WITH DESERT FOOTHILLS DR (SUNSET RUN DR TO FLEET WING AVE)
- TO BE CONSTRUCTED WITH KETTLE RIDGE DR (LAKE MEAD BLVD TO FLEET WING AVE)
- TO BE CONSTRUCTED WITH KETTLE RIDGE DR (SUNSET RUN DR TO FLEET WING AVE)

STORM DRAIN LEGEND

- CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT STORM DRAIN
- VILLAGE 22 LOCAL STORM DRAIN

FIGURE 8
INTERIM CONDITION
DITCH LOCATIONS

THE HOWARD HUGHES CORPORATION
10801 WEST CHARLESTON BLVD, 3RD FLOOR
LAS VEGAS, NEVADA 89135

DESIGNED BY:
Z/A

CHECKED BY:
J/A

PROJECT NO.
2801

DRAWN BY:
AH

DATE:
AUGUST 2018

SCALE:
1" = 300' HORIZ.
N/A VERT.

SHEET

OF SHEETS

DRAWING NO.

BY

DATE

REV

REVISION

2727 SOUTH RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146-5148
PH: (702) 873-7500 FAX: (702) 362-2897 WEB: WWW.VTNV.COM
CONSULTING ENGINEERS & LAND SURVEYORS

SUMMERLIN WEST VILLAGE 22

H:\7881 Village 22 Master\Drawings\4_ADD1 TO UPA\A_Figures\Figure 8 - Interim Condition Basin Map.dwg


```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 19MAR19 TIME 11:17:59
*
*****

V22.OUT

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

```

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

```

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

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

1 HEC-1 INPUT PAGE 1

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

*DIAGRAM

*** FREE ***

```

1 ID ULTIMATE CONDITION HYDROLOGIC MODEL
2 ID INPUT FILE DATE = NOVEMBER 1, 2018
3 ID DESIGN STORM = 100-YEAR 6-HR STORM
4 ID STORM DISTRIBUTION = SDN #3
5 ID MODELED BY VTN (JYA)
6 ID
7 ID
8 ID * UPDATE #1 - SUMMERLIN WEST VILLAGE 22 *
9 ID *****
10 ID
11 ID
12 ID
13 ID
14 ID JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
15 ID
16 ID 100-YEAR, 6-HOUR STORM, SDN3
17 ID
18 IT 5 0 0 100
19 IO 5 0 0
20 IN 5 0 0
21 JR PREC 1.00
*

22 KK LM
23 BA 0.0143
24 PB 3.41
25 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
26 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
27 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
28 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
29 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
30 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
31 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
32 PC 0.998 0.999 1
33 LS 0 98.0
34 UD 0.050
*

35 KK D
36 BA 0.0176
37 PB 3.39
38 LS 0 95.0
39 UD 0.058
*

40 KK DES1
41 BA .0059
42 PB 3.39
43 LS 0 98.0

```


1

44 UD 0.100
*
HEC-1 INPUT PAGE 2

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

45 KK CDES1
46 KM COMBINE D AND DES1
47 HC 2
*
48 KK COS-2
49 BA 0.0159
50 PB 3.41
51 LS 0 89.0
52 UD 0.100
*
53 KK CCOS-2
54 KM COMBINE CDES1 AND COS-2
55 HC 2
*
56 KK A
57 BA 0.0264
58 PB 3.41
59 LS 0 95.0
60 UD 0.078
*
61 KK CA
62 KM COMBINE CCOS-2 AND A
63 HC 2
*
64 KK CP1
65 KM COMBINE LM AND CA
66 HC 2
*
67 KK STI
68 KM STREET I
69 BA 0.0038
70 PB 3.41
71 LS 0 98.0
72 UD 0.050
*
73 KK C
74 BA 0.0183
75 PB 3.41
76 LS 0 95.0
77 UD 0.054
*

1

HEC-1 INPUT PAGE 3

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

78 KK CSTI
79 KM COMBINE C AND STI
80 HC 2
*
81 KK G
82 BA 0.0111
83 PB 3.41
84 LS 0 95.0
85 UD 0.056
*
86 KK CG
87 KM COMBINE CSTI AND CG
88 HC 2
*
89 KK H
90 BA 0.0120
91 PB 3.41
92 LS 0 95.0
93 UD 0.053
*
94 KK CH
95 KM COMBINE CG AND CH
96 HC 2
*

V22.OUT

97 KK STH
 98 KM STREET H
 99 BA 0.0036
 100 PB 3.41
 101 LS 0 98.0
 102 UD 0.057
 *
 103 KK J
 104 BA 0.0091
 105 PB 3.41
 106 LS 0 95.0
 107 UD 0.051
 *
 108 KK CJ
 109 KM COMBINE J AND STH
 110 HC 2
 *

1 HEC-1 INPUT PAGE 4

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

111 KK K
 112 BA 0.0081
 113 PB 3.40
 114 LS 0 95.0
 115 UD 0.050
 *
 116 KK CK
 117 KM COMBINE CJ AND K
 118 HC 2
 *
 119 KK NP-1
 120 BA 0.0008
 121 PB 3.38
 122 LS 0 89.0
 123 UD 0.097
 *
 124 KK CNP-1
 125 KM COMBINE CK AND NP-1
 126 HC 2
 *
 127 KK DES2
 128 BA .0053
 129 PB 3.38
 130 LS 0 98.0
 131 UD 0.058
 *
 132 KK CDES2
 133 KM COMBINE DES2 & CNP-1
 134 HC 2
 *
 135 KK CP2
 136 KM COMBINE CDES2 & CH
 137 HC 2
 *
 138 KK CARR1
 139 BA 0.0104
 140 PB 3.38
 141 LS 0 98.0
 142 UD 0.056
 *
 143 KK I
 144 BA 0.0165
 145 PB 3.38
 146 LS 0 92.0
 147 UD 0.083
 *

1 HEC-1 INPUT PAGE 5

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

148 KK CCARR1
 149 KM COMBINE CP2, I, CARR1
 150 HC 3
 *
 151 KK N

V22.OUT

152	BA	0.0104	
153	PB	3.40	
154	LS	0	95.0
155	UD	0.054	
	*		
156	KK	STFF	
157	BA	0.0017	
158	PB	3.40	
159	LS	0	98.0
160	UD	0.050	
	*		
161	KK	CSTFF	
162	KM	COMBINE N AND STFF	
163	HC	2	
	*		
164	KK	STG2	
165	BA	0.0044	
166	PB	3.40	
167	LS	0	98.0
168	UD	0.050	
	*		
169	KK	CSTG2	
170	KM	COMBINE CSTFF AND STG2	
171	HC	2	
	*		
172	KK	0	
173	BA	0.0051	
174	PB	3.40	
175	LS	0	92.2
176	UD	0.055	
	*		
177	KK	P	
178	BA	0.0053	
179	PB	3.40	
180	LS	0	92.2
181	UD	0.060	
	*		

1 HEC-1 INPUT PAGE 6

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

182	KK	COP	
183	KM	COMBINE P AND O	
184	HC	2	
	*		
185	KK	DES3	
186	BA	0.0029	
187	PB	3.38	
188	LS	0	98.0
189	UD	0.069	
	*		
190	KK	CDES3	
191	KM	COMBINE COP & DES3	
192	HC	2	
	*		
193	KK	CP3	
194	KM	COMBINES CSTG2 & CDES3	
195	HC	2	
	*		
196	KK	Q	
197	BA	0.0057	
198	PB	3.38	
199	LS	0	92.2
200	UD	0.057	
	*		
201	KK	R	
202	BA	0.0055	
203	PB	3.37	
204	LS	0	94.3
205	UD	0.053	
	*		
206	KK	CQR	
207	KM	COMBINE R AND Q	
208	HC	2	
	*		

V22.OUT

209	KK	CARR2		
210	BA	0.0056		
211	PB	3.38		
212	LS	0	98.0	
213	UD	0.075		
	*			
214	KK	CCARR2		
215	KM	COMBINE CQR AND CARR2		
216	HC	2		
	*			

1 HEC-1 INPUT PAGE 7

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

217	KK	CP4		
218	KM	COMBINE CP3, CCARR1, AND CCARR2		
219	HC	3		
	*			
220	KK	II		
221	BA	0.0306		
222	PB	3.37		
223	LS	0	92.7	
224	UD	0.062		
	*			
225	KK	X		
226	BA	0.0257		
227	PB	3.37		
228	LS	0	90.0	
229	UD	0.080		
	*			
230	KK	B		
231	BA	0.1361		
232	PB	3.36		
233	LS	0	93.5	
234	UD	0.077		
	*			
235	KK	DC-1		
236	BA	0.0169		
237	PB	3.35		
238	LS	0	98.0	
239	UD	0.050		
	*			
240	KK	COS-3		
241	BA	0.0027		
242	PB	3.36		
243	LS	0	84.7	
244	UD	0.140		
	*			
245	KK	DUMMY1		
246	KM	REGIONAL FACILITY - BELTWAY CHANNEL NORTH		
247	KM	COMBINE CP1, CP4, II, X, B, DC1, AND COS-3		
248	HC	7		
	*			
249	KK	3-0*		
250	KM	REFERENCED FROM THE OVERALL SWPA MPU		
251	BA	0.0805		
252	PB	3.48		
253	LS	0	94.5	
254	UD	0.103		
	*			

1 HEC-1 INPUT PAGE 8

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

255	KKOFF-COS2			
256	KM	OFFSITE BASIN		
257	BA	.0299		
258	PB	3.45		
259	LS	0	86.0	
260	UD	0.110		
	*			
261	KKCOFFCOS2			
262	KM	COMBINE 3-0 AND OFF-COS2		
263	HC	2		
	*			
264	KK	E		
265	BA	0.0218		

V22.OUT

266	PB	3.43	
267	LS	0	95.0
268	UD	0.062	
	*		
269	KK	STJ1	
270	KM	STREET J1	
271	BA	0.0059	
272	PB	3.43	
273	LS	0	98.0
274	UD	0.050	
	*		
275	KK	CSTJ1	
276	KM	COMBINE OFF-COS2, E, AND STJ1	
277	HC	3	
	*		
278	KK	NP-2	
279	BA	0.0024	
280	PB	3.43	
281	LS	0	89.0
282	UD	0.059	
	*		
283	KK	ES-1	
284	BA	0.0220	
285	PB	3.43	
286	LS	0	95.0
287	UD	0.063	
	*		
288	KK	CES-1	
289	KM	COMBINE CSTJ, NP-2, AND ES-1	
290	HC	3	
	*		

1

HEC-1 INPUT

PAGE 9

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
291	KK OFF4
292	BA 0.0823
293	PB 3.44
294	LS 0 94.8
295	UD 0.077
	*
296	KK L
297	BA 0.0126
298	PB 3.42
299	LS 0 94.6
300	UD 0.050
	*
301	KK STL1
302	BA 0.0028
303	PB 3.42
304	LS 0 98.0
305	UD 0.050
	*
306	KK CSTL1
307	KM COMBINE L AND STL1
308	HC 2
	*
309	KK STG1
310	BA 0.0028
311	PB 3.42
312	LS 0 98.0
313	UD 0.050
	*
314	KK CSTG1
315	KM COMBINE OFF4, CSTL, AND STG1
316	HC 3
	*
317	KK M
318	BA 0.0176
319	PB 3.42
320	LS 0 94.3
321	UD 0.053
	*
322	KK STJ2
323	BA 0.0048
324	PB 3.42

325 LS 0 98.0
 326 UD 0.072
 *

1

HEC-1 INPUT

PAGE 10

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

327 KK DUMMY2
 328 KM REGIONAL FACILITY
 329 HC 4
 *

330 KK S
 331 BA 0.0047
 332 PB 3.40
 333 LS 0 88.3
 334 UD 0.064
 *

335 KK STF
 336 BA 0.0029
 337 PB 3.40
 338 LS 0 98.0
 339 UD 0.050
 *

340 KK NP-3
 341 BA 0.0056
 342 PB 3.4
 343 LS 0 80.3
 344 UD 0.079
 *

345 KK U
 346 BA 0.0055
 347 PB 3.40
 348 LS 0 86.3
 349 UD 0.069
 *

350 KK DES4
 351 BA 0.0027
 352 PB 3.40
 353 LS 0 98.0
 354 UD 0.050
 *

355 KK CDES4
 356 KM COMBINE U AND DES4
 357 HC 2
 *

358 KK DUMMY3
 359 KM COMBINE S, STF, NP-3, CDES4
 360 HC 5
 *

1

HEC-1 INPUT

PAGE 11

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

361 KK V
 362 BA 0.0060
 363 PB 3.37
 364 LS 0 90.0
 365 UD 0.060
 *

366 KK W
 367 BA 0.0062
 368 PB 3.40
 369 LS 0 90.0
 370 UD 0.065
 *

371 KK CVW
 372 KM COMBINE W AND V
 373 HC 2
 *

374 KK CARR3
 375 BA 0.0046
 376 PB 3.37
 377 LS 0 98.0
 378 UD 0.050
 *

379 KK DUMMY4

V22.OUT

380 KM REGIONAL FACILITY
 381 HC 3
 *
 382 KK STE3
 383 BA 0.0017
 384 PB 3.40
 385 LS 0 98.0
 386 UD 0.050
 *
 387 KK EE
 388 BA 0.0104
 389 PB 3.39
 390 LS 0 90.5
 391 UD 0.075
 *
 392 KK DUMMY5
 393 KM REGIONAL FACILITY
 394 HC 3
 *

1 HEC-1 INPUT PAGE 12

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

395 KK STEE3
 396 BA 0.0023
 397 PB 3.39
 398 LS 0 98.0
 399 UD 0.050
 *
 400 KK HH
 401 BA 0.0072
 402 PB 3.39
 403 LS 0 94.2
 404 UD 0.055
 *
 405 KK CARR4
 406 BA 0.0048
 407 PB 3.37
 408 LS 0 98.0
 409 UD 0.056
 *
 410 KK DUMMY6
 411 KM REGIONAL FACILITY - BELTWAY CHANNEL SOUTH
 412 HC 4
 *
 413 KK OFF5
 414 BA 0.0199
 415 PB 3.44
 416 LS 0 92.2
 417 UD 0.050
 *
 418 KK STE1
 419 BA 0.0027
 420 PB 3.42
 421 LS 0 98.0
 422 UD 0.050
 *
 423 KK Y
 424 BA 0.0126
 425 PB 3.44
 426 LS 0 92.4
 427 UD 0.071
 *
 428 KK CY
 429 KM COMBINES OFF5, Y, AND STE1
 430 HC 3
 *

1 HEC-1 INPUT PAGE 13

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

431 KK STL2
 432 BA 0.0028
 433 PB 3.44
 434 LS 0 98.0
 435 UD 0.050
 *

436	KK	CSTL2		
437	KM	COMBINES CY AND STL2		
438	HC	2		
	*			
439	KK	Z		
440	BA	0.0110		
441	PB	3.42		
442	LS	0	87.6	
443	UD	0.086		
	*			
444	KK	STJ3		
445	BA	0.0038		
446	PB	3.42		
447	LS	0	98.0	
448	UD	0.058		
	*			
449	KK	CSTJ3		
450	KM	COMBINE Z AND STJ3		
451	HC	2		
	*			
452	KK	DUMMY7		
453	KM	REGIONAL FACILITY		
454	HC	2		
	*			
455	KK	STE2		
456	BA	0.0028		
457	PB	3.40		
458	LS	0	98.0	
459	UD	0.050		
	*			
460	KK	BB		
461	BA	0.0097		
462	PB	3.42		
463	LS	0	91.0	
464	UD	0.074		
	*			

1

HEC-1 INPUT

PAGE 14

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

465	KK	T		
466	BA	0.0063		
467	PB	3.42		
468	LS	0	92.0	
469	UD	0.055		
	*			
470	KK	CC		
471	BA	0.0086		
472	PB	3.42		
473	LS	0	90.7	
474	UD	0.079		
	*			
475	KK	DD		
476	BA	0.0071		
477	PB	3.40		
478	LS	0	90.6	
479	UD	0.079		
	*			
480	KK	DUMMY8		
481	KM	REGIONAL FACILITY		
482	HC	6		
	*			
483	KK	DESS		
484	BA	0.0028		
485	PB	3.40		
486	LS	0	98.0	
487	UD	0.050		
	*			
488	KK	NP-4		
489	BA	0.0011		
490	PB	3.39		
491	LS	0	84.1	
492	UD	0.071		
	*			
493	KK	DUMMY9		

494 KM REGIONAL FACILITY V22.OUT
 495 HC 3
 *
 496 KK AA
 497 BA 0.0073
 498 PB 3.43
 499 LS 0 93.0
 500 UD 0.065
 *

1 HEC-1 INPUT PAGE 15

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

501 KK STJ4
 502 BA 0.0016
 503 PB 3.41
 504 LS 0 98.0
 505 UD 0.059
 *
 506 KK CSTJ4
 507 KM COMBINE AA AND STJ4
 508 HC 2
 *
 509 KK STEE1
 510 BA 0.0023
 511 PB 3.44
 512 LS 0 98.0
 513 UD 0.050
 *
 514 KK CSTEE2
 515 KM COMBINES CSTJ4 AND STEE1
 516 HC 2
 *
 517 KK STEE2
 518 BA 0.0038
 519 PB 3.41
 520 LS 0 98.0
 521 UD 0.050
 *
 522 KK FF
 523 BA 0.0048
 524 PB 3.41
 525 LS 0 94.2
 526 UD 0.059
 *
 527 KK CFF
 528 KM COMBINES CSTEE2,STEE2, AND FF
 529 HC 3
 *
 530 KK DUMMY10
 531 KM REGIONAL FACILITY
 532 HC 2
 *
 533 KK GG
 534 BA 0.0058
 535 PB 3.41
 536 LS 0 94.2
 537 UD 0.050
 *

1 HEC-1 INPUT PAGE 16

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

538 KK DES6
 539 BA 0.0017
 540 PB 3.39
 541 LS 0 98.0
 542 UD 0.053
 *
 543 KK DUMMY11
 544 KM REGIONAL FACILITY - DESERT FOOTHILLS
 545 HC 3
 *
 546 ZZ

1 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT

LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
22	LM	
	.	
35	.	D
	.	
40	.	DES1
	.	
45	CDES1.....	
	.	
48	.	COS-2
	.	
53	CCOS-2.....	
	.	
56	.	A
	.	
61	CA.....	
	.	
64	CP1.....	
	.	
67	STI	
	.	
73	.	C
	.	
78	CSTI.....	
	.	
81	.	G
	.	
86	CG.....	
	.	
89	.	H
	.	
94	CH.....	
	.	
97	.	STH
	.	
103	.	J
	.	
108	CJ.....	
	.	
111	.	K
	.	
116	CK.....	
	.	
119	.	NP-1
	.	
124	CNP-1.....	
	.	
127	.	DES2
	.	
132	CDES2.....	
	.	
135	CP2.....	
	.	
138	.	CARR1
	.	
143	.	I
	.	
148	CCARR1.....	

151	.	.	N				
156	.	.		STFF			
161	.	.	CSTFF.....				
164	.	.		STG2			
169	.	.	CSTG2.....				
172	.	.		O			
177	.	.			P		
182	.	.		COP.....			
185	.	.			DES3		
190	.	.		CDES3.....			
193	.	.	CP3.....				
196	.	.		Q			
201	.	.			R		
206	.	.		CQR.....			
209	.	.			CARR2		
214	.	.		CCARR2.....			
217	.	.	CP4.....				
220	.	.	II				
225	.	.		X			
230	.	.			B		
235	.	.				DC-1	
240	.	.					COS-3
245	DUMMY1.....						
249		3-O*					
255			OFF-COS2				
261		COFFCOS2.....					
264			E				
269				STJ1			
275		CSTJ1.....					

278	.	.	NP-2					
	.	.	.					
283	.	.	.	ES-1				
	.	.	.					
288	.	CES-1						
	.	.						
291	.	.	OFF4					
	.	.	.					
296	.	.	.	L				
	.	.	.	.				
301	.	.	.	.	STL1			
	.	.	.	.	.			
306	.	.	.	CSTL1				
	.	.	.	.				
309	.	.	.	.	STG1			
	.	.	.	.	.			
314	.	.	CSTG1					
	.	.	.					
317	.	.	.	M				
	.	.	.	.				
322	.	.	.	.	STJ2			
	.	.	.	.	.			
327	.	DUMMY2						
	.	.						
330	.	.	S					
	.	.	.					
335	.	.	.	STF				
	.	.	.	.				
340	.	.	.	.	NP-3			
	.	.	.	.	.			
345	.	.	.	.	.	U		
	.	.	.	.	.	.		
350	.	.	.	.	.	.	DES4	
	.	.	.	.	.	.	.	
355	.	.	.	.	.	.	CDES4	
	.	.	.	.	.	.	.	
358	.	DUMMY3						
	.	.						
361	.	.	V					
	.	.	.					
366	.	.	.	W				
	.	.	.	.				
371	.	.	CVW					
	.	.	.					
374	.	.	.	CARR3				
	.	.	.	.				
379	.	DUMMY4						
	.	.						
382	.	.	STE3					
	.	.	.					
387	.	.	.	EE				
	.	.	.	.				
392	.	DUMMY5						
	.	.						
395	.	.	STEE3					
	.	.	.					
400	.	.	.	HH				
	.	.	.	.				
405	.	.	.	.	CARR4			
	.	.	.	.	.			

410	.	DUMMY6.....	.	.	.	.
413	.	.	OFF5	.	.	.
418	.	.	.	STE1	.	.
423	.	.	.	.	.	Y
428	.	.	CY.....	.	.	.
431	.	.	.	STL2	.	.
436	.	.	CSTL2.....	.	.	.
439	.	.	.	.	Z	.
444	.	.	.	.	.	STJ3
449	.	.	.	CSTJ3.....	.	.
452	.	.	DUMMY7.....	.	.	.
455	.	.	.	STE2	.	.
460	.	.	.	.	BB	.
465	.	.	.	.	.	T
470	.	.	.	.	.	CC
475	.	.	.	.	.	DD
480	.	.	DUMMY8.....	.	.	.
483	.	.	.	DESS	.	.
488	.	.	.	.	NP-4	.
493	.	.	DUMMY9.....	.	.	.
496	.	.	.	AA	.	.
501	.	.	.	.	STJ4	.
506	.	.	.	CSTJ4.....	.	.
509	.	.	.	.	STEE1	.
514	.	.	.	CSTEE2.....	.	.
517	.	.	.	.	STEE2	.
522	.	.	.	.	.	FF
527	.	.	.	CFF.....	.	.
530	.	.	DUMMY10.....	.	.	.
533	.	.	.	GG	.	.

V22.OUT

```

      .      .      .      .
538    .      .      .      .      DES6
      .      .      .      .
543    .      .      DUMMY11.....

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   JUN 1998                  *
*   VERSION 4.1               *
* RUN DATE 19MAR19 TIME 11:17:59 *
*
*****

```

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

```

ULTIMATE CONDITION HYDROLOGIC MODEL
INPUT FILE DATE = NOVEMBER 1, 2018
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3
MODELED BY VTN (JYA)

```
*****
* UPDATE #1 - SUMMERLIN WEST VILLAGE 22 *
*****

```

JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)

100-YEAR, 6-HOUR STORM, SDN3

```
19 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         100 NUMBER OF HYDROGRAPH ORDINATES
          NDDATE      1  0  ENDING DATE
          NDTIME      0815 ENDING TIME
          ICENT      19  CENTURY MARK

```

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 8.25 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

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION
				RATIO 1
				1.00
HYDROGRAPH AT				
+	LM	.01	1 FLOW	41.
			TIME	3.50
HYDROGRAPH AT				
+	D	.02	1 FLOW	47.

				TIME	3.50
HYDROGRAPH AT					
+	DES1	.01	1	FLOW TIME	14. 3.50
2 COMBINED AT					
+	CDES1	.02	1	FLOW TIME	62. 3.50
HYDROGRAPH AT					
+	COS-2	.02	1	FLOW TIME	32. 3.50
2 COMBINED AT					
+	CCOS-2	.04	1	FLOW TIME	93. 3.50
HYDROGRAPH AT					
+	A	.03	1	FLOW TIME	66. 3.50
2 COMBINED AT					
+	CA	.07	1	FLOW TIME	160. 3.50
2 COMBINED AT					
+	CP1	.08	1	FLOW TIME	201. 3.50
HYDROGRAPH AT					
+	STI	.00	1	FLOW TIME	11. 3.50
HYDROGRAPH AT					
+	C	.02	1	FLOW TIME	50. 3.50
2 COMBINED AT					
+	CSTI	.02	1	FLOW TIME	61. 3.50
HYDROGRAPH AT					
+	G	.01	1	FLOW TIME	30. 3.50
2 COMBINED AT					
+	CG	.03	1	FLOW TIME	91. 3.50
HYDROGRAPH AT					
+	H	.01	1	FLOW TIME	33. 3.50
2 COMBINED AT					
+	CH	.05	1	FLOW TIME	124. 3.50
HYDROGRAPH AT					
+	STH	.00	1	FLOW TIME	10. 3.50
HYDROGRAPH AT					
+	J	.01	1	FLOW TIME	25. 3.50
2 COMBINED AT					
+	CJ	.01	1	FLOW TIME	35. 3.50
HYDROGRAPH AT					
+	K	.01	1	FLOW TIME	22. 3.50
2 COMBINED AT					
+	CK	.02	1	FLOW TIME	58. 3.50
HYDROGRAPH AT					
+	NP-1	.00	1	FLOW TIME	2. 3.50
2 COMBINED AT					
+	CNP-1	.02	1	FLOW TIME	59. 3.50
HYDROGRAPH AT					
+	DES2	.01	1	FLOW TIME	15. 3.50

V22.OUT

2 COMBINED AT					
+	CDES2	.03	1	FLOW TIME	74. 3.50
2 COMBINED AT					
+	CP2	.07	1	FLOW TIME	198. 3.50
HYDROGRAPH AT					
+	CARR1	.01	1	FLOW TIME	29. 3.50
HYDROGRAPH AT					
+	I	.02	1	FLOW TIME	38. 3.50
3 COMBINED AT					
+	CCARR1	.10	1	FLOW TIME	265. 3.50
HYDROGRAPH AT					
+	N	.01	1	FLOW TIME	28. 3.50
HYDROGRAPH AT					
+	STFF	.00	1	FLOW TIME	5. 3.50
2 COMBINED AT					
+	CSTFF	.01	1	FLOW TIME	33. 3.50
HYDROGRAPH AT					
+	STG2	.00	1	FLOW TIME	13. 3.50
2 COMBINED AT					
+	CSTG2	.02	1	FLOW TIME	46. 3.50
HYDROGRAPH AT					
+	O	.01	1	FLOW TIME	13. 3.50
HYDROGRAPH AT					
+	P	.01	1	FLOW TIME	13. 3.50
2 COMBINED AT					
+	COP	.01	1	FLOW TIME	26. 3.50
HYDROGRAPH AT					
+	DES3	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT					
+	CDES3	.01	1	FLOW TIME	34. 3.50
2 COMBINED AT					
+	CP3	.03	1	FLOW TIME	80. 3.50
HYDROGRAPH AT					
+	Q	.01	1	FLOW TIME	14. 3.50
HYDROGRAPH AT					
+	R	.01	1	FLOW TIME	15. 3.50
2 COMBINED AT					
+	CQR	.01	1	FLOW TIME	29. 3.50
HYDROGRAPH AT					
+	CARR2	.01	1	FLOW TIME	15. 3.50
2 COMBINED AT					
+	CCARR2	.02	1	FLOW TIME	44. 3.50
3 COMBINED AT					
+	CP4	.15	1	FLOW TIME	389. 3.50

HYDROGRAPH AT +	II	.03	1	FLOW TIME	77. 3.50
HYDROGRAPH AT +	X	.03	1	FLOW TIME	56. 3.50
HYDROGRAPH AT +	B	.14	1	FLOW TIME	328. 3.50
HYDROGRAPH AT +	DC-1	.02	1	FLOW TIME	48. 3.50
HYDROGRAPH AT +	COS-3	.00	1	FLOW TIME	4. 3.58
7 COMBINED AT +	DUMMY1	.44	1	FLOW TIME	1103. 3.50
HYDROGRAPH AT +	3-O*	.08	1	FLOW TIME	189. 3.50
HYDROGRAPH AT +	OFF-COS2	.03	1	FLOW TIME	53. 3.50
2 COMBINED AT +	COFFCOS2	.11	1	FLOW TIME	242. 3.50
HYDROGRAPH AT +	E	.02	1	FLOW TIME	58. 3.50
HYDROGRAPH AT +	STJ1	.01	1	FLOW TIME	17. 3.50
3 COMBINED AT +	CSTJ1	.14	1	FLOW TIME	317. 3.50
HYDROGRAPH AT +	NP-2	.00	1	FLOW TIME	6. 3.50
HYDROGRAPH AT +	ES-1	.02	1	FLOW TIME	59. 3.50
3 COMBINED AT +	CES-1	.16	1	FLOW TIME	382. 3.50
HYDROGRAPH AT +	OFF4	.08	1	FLOW TIME	209. 3.50
HYDROGRAPH AT +	L	.01	1	FLOW TIME	35. 3.50
HYDROGRAPH AT +	STL1	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT +	CSTL1	.02	1	FLOW TIME	43. 3.50
HYDROGRAPH AT +	STG1	.00	1	FLOW TIME	8. 3.50
3 COMBINED AT +	CSTG1	.10	1	FLOW TIME	260. 3.50
HYDROGRAPH AT +	M	.02	1	FLOW TIME	48. 3.50
HYDROGRAPH AT					

V22.OUT

+	STJ2	.00	1	FLOW TIME	13. 3.50
4 COMBINED AT +	DUMMY2	.29	1	FLOW TIME	702. 3.50
HYDROGRAPH AT +	S	.00	1	FLOW TIME	11. 3.50
HYDROGRAPH AT +	STF	.00	1	FLOW TIME	8. 3.50
HYDROGRAPH AT +	NP-3	.01	1	FLOW TIME	9. 3.50
HYDROGRAPH AT +	U	.01	1	FLOW TIME	11. 3.50
HYDROGRAPH AT +	DES4	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT +	CDES4	.01	1	FLOW TIME	19. 3.50
5 COMBINED AT +	DUMMY3	.31	1	FLOW TIME	749. 3.50
HYDROGRAPH AT +	V	.01	1	FLOW TIME	14. 3.50
HYDROGRAPH AT +	W	.01	1	FLOW TIME	15. 3.50
2 COMBINED AT +	CVW	.01	1	FLOW TIME	29. 3.50
HYDROGRAPH AT +	CARR3	.00	1	FLOW TIME	13. 3.50
3 COMBINED AT +	DUMMY4	.32	1	FLOW TIME	791. 3.50
HYDROGRAPH AT +	STE3	.00	1	FLOW TIME	5. 3.50
HYDROGRAPH AT +	EE	.01	1	FLOW TIME	24. 3.50
3 COMBINED AT +	DUMMY5	.34	1	FLOW TIME	820. 3.50
HYDROGRAPH AT +	STEE3	.00	1	FLOW TIME	7. 3.50
HYDROGRAPH AT +	HH	.01	1	FLOW TIME	19. 3.50
HYDROGRAPH AT +	CARR4	.00	1	FLOW TIME	13. 3.50
4 COMBINED AT +	DUMMY6	.35	1	FLOW TIME	859. 3.50
HYDROGRAPH AT +	OFF5	.02	1	FLOW TIME	53. 3.50
HYDROGRAPH AT +	STE1	.00	1	FLOW	8.

				TIME	3.50
HYDROGRAPH AT					
+	Y	.01	1	FLOW TIME	31. 3.50
3 COMBINED AT					
+	CY	.04	1	FLOW TIME	92. 3.50
HYDROGRAPH AT					
+	STL2	.00	1	FLOW TIME	8. 3.50
2 COMBINED AT					
+	CSTL2	.04	1	FLOW TIME	100. 3.50
HYDROGRAPH AT					
+	Z	.01	1	FLOW TIME	22. 3.50
HYDROGRAPH AT					
+	STJ3	.00	1	FLOW TIME	11. 3.50
2 COMBINED AT					
+	CSTJ3	.01	1	FLOW TIME	33. 3.50
2 COMBINED AT					
+	DUMMY7	.05	1	FLOW TIME	133. 3.50
HYDROGRAPH AT					
+	STE2	.00	1	FLOW TIME	8. 3.50
HYDROGRAPH AT					
+	BB	.01	1	FLOW TIME	23. 3.50
HYDROGRAPH AT					
+	T	.01	1	FLOW TIME	16. 3.50
HYDROGRAPH AT					
+	CC	.01	1	FLOW TIME	20. 3.50
HYDROGRAPH AT					
+	DD	.01	1	FLOW TIME	16. 3.50
6 COMBINED AT					
+	DUMMY8	.09	1	FLOW TIME	215. 3.50
HYDROGRAPH AT					
+	DES5	.00	1	FLOW TIME	8. 3.50
HYDROGRAPH AT					
+	NP-4	.00	1	FLOW TIME	2. 3.50
3 COMBINED AT					
+	DUMMY9	.09	1	FLOW TIME	225. 3.50
HYDROGRAPH AT					
+	AA	.01	1	FLOW TIME	19. 3.50
HYDROGRAPH AT					
+	STJ4	.00	1	FLOW TIME	4. 3.50
2 COMBINED AT					
+	CSTJ4	.01	1	FLOW TIME	23. 3.50
HYDROGRAPH AT					
+	STEE1	.00	1	FLOW TIME	7. 3.50
2 COMBINED AT					
+	CSTEE2	.01	1	FLOW TIME	30. 3.50

V22.OUT

HYDROGRAPH AT					
+	STEE2	.00	1	FLOW	11.
				TIME	3.50
HYDROGRAPH AT					
+	FF	.00	1	FLOW	13.
				TIME	3.50
3 COMBINED AT					
+	CFF	.02	1	FLOW	53.
				TIME	3.50
2 COMBINED AT					
+	DUMMY10	.11	1	FLOW	279.
				TIME	3.50
HYDROGRAPH AT					
+	GG	.01	1	FLOW	16.
				TIME	3.50
HYDROGRAPH AT					
+	DES6	.00	1	FLOW	5.
				TIME	3.50
3 COMBINED AT					
+	DUMMY11	.12	1	FLOW	299.
				TIME	3.50

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

Appendix B. Hydrology Appendix

B.1. Parameters

B.2. HEC-1 Model

B.1 Parameters

SUMMERLIN WEST VILLAGE 22
Kestrel Creek Avenue (Street I)
Desert Foothills Drive to Kettle Ridge Drive (Street J)

BASIN ID	LAND USE INDEX NUMBER	LAND USE DESCRIPTION	SOIL MAP UNIT #	SUBREGION CN	SUBREGION AREA (SQ FT)	SUBBASIN AREA (SQ FT)	PERCENT OF SUBBASIN	CUMULATIVE PERCENT	AREAL WEIGHTED CN	CUMULATIVE CN	COMPOSITE CN
Stl-1N	6	High-Density Residential, 4-8 units per acre (uses 6 units/acre)	1155	91	31821	31821	100.0%	100.0%	91.00	91.00	91.0
Stl-2S	6	High-Density Residential, 4-8 units per acre (uses 6 units/acre)	1155	91	29187	29187	100.0%	100.0%	91.00	91.00	91.0
Stl-1S	6	High-Density Residential, 4-8 units per acre (uses 6 units/acre)	1155	91	32718	32718	100.0%	100.0%	91.00	91.00	91.0
Stl-2N	6	High-Density Residential, 4-8 units per acre (uses 6 units/acre)	1155	91	28940	28940	100.0%	100.0%	91.00	91.00	91.0
Int-I1	1	Undeveloped Land, Open Desert	1155	88	422905	422905	100.0%	100.0%	88.00	88.00	88.0
Int-I2	1	Undeveloped Land, Open Desert	1155	88	31283	31283	100.0%	100.0%	88.00	88.00	88.0
Int-I3	1	Undeveloped Land, Open Desert	1155	88	154039	154039	100.0%	100.0%	88.00	88.00	88.0
Int-I4	1	Undeveloped Land, Open Desert	1155	88	231703	231703	100.0%	100.0%	88.00	88.00	88.0

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Summerlin West Village 22 Kestrel Creek Avenue (Street I) (Desert Foothills Drive to Kettle Ridge Dr (Street J))

DATE: 8/1/19

INTERIM CONDITION

ATKINS

Member of the SNC-Lavalin Group

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS	V2 VELOCITY FPS	Tt Min	Min	Min	Tlag= 0.6Tc/60 Hours
(1)			(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(13)	(14)	
Stl-1	D	91.0	0.811	1.48	0.00232	19.0	2.0	1.8	760	6.9	5.3	8.0	2.1	3.9	14.3	0.05*
Stl-2	D	91.0	0.811	1.34	0.00209	19.0	2.0	1.8	660	6.9	5.3	8.0	1.9	3.7	13.8	0.05*
Int-I1	E	88.0	0.772	9.71	0.01517	100.0	7.7	3.0	1600	3.8	2.9	5.7	6.1	9.1	N/A	0.1**
Int-I2	E	88.0	0.772	0.72	0.00112	100.0	7.5	3.0	730	7.5	4.1	8.1	2.5	5.5	N/A	0.1**
Int-I3	E	88.0	0.772	3.54	0.00553	100.0	6.3	3.2	650	5.4	3.4	6.8	2.8	6.0	N/A	0.1**
Int-I4	E	88.0	0.772	5.32	0.00831	100.0	7.0	3.1	1200	6.7	3.8	7.6	3.7	6.8	N/A	0.1**
Tc = Ti + Tt Tlag = 0.6 Tc						For the travel time (Tt) calculations,					V1 = 14.8*(S/100)^1/2		Developed		V1 = 20.2*(S/100)^1/2	
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3						V1 applies to the first 500 feet of travel distance;										
K = 0.0132 (CN) - 0.39						V2 applies to the remaining travel distance.					V2 = 29.4*(S/100)^1/2		Developed		V2 = 30.6*(S/100)^1/2	
Tc Check = L/180+10																
REFERENCE :													STANDARD FORM 4			

*Minimum recommended Tc for developed subbasins is 5 mins. A value of 0.05 was use for the Tlag where the calculated Tc was less than 5 mins.

**Minimum recommended Tc for undeveloped subbasins is 10 mins. A value of 0.10 was use for the Tlag where the calculated Tc was less than 10 mins.

B.2 HEC-1 Model


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1*****
*
*   FLOOD HYDROGRAPH PACKAGE   (HEC-1)
*       JUN   1998
*       VERSION 4.1
*
*   RUN DATE   10JUL19   TIME   13:49:04
*
*****

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

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

```

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -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  TECHNICAL DRAINAGE STUDY
2   ID  SUMMERLIN WEST VILLAGE 22
3   ID  KESTREL CREEK AVENUE (STREET I) (DESERT FOOTHILLS DRIVE TO STREET J)
4   ID  DESIGN STORM 100-YEAR 6 HOUR
5   ID
6   ID  JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES
7   ID
8   ID      AREA (SQUARE MILES)          DARF
9   ID
10  ID      0 - 0.5                      0.99
11  ID      Estimated 10-year            0.57
12  ID
13  IT      5      0      0      300
14  IO      5      0      0
15  IN      5      0      0
16  JR      PREC    0.99    0.57
17
18  KK  Int-I1
19  BA  0.01517
20  PB  3.43
21  PC  0.000    0.020    0.057    0.070    0.087    0.108    0.124    0.130    0.130    0.130
22  PC  0.130    0.130    0.130    0.133    0.140    0.142    0.148    0.158    0.172    0.181
23  PC  0.190    0.197    0.199    0.200    0.201    0.204    0.214    0.229    0.241    0.249
24  PC  0.251    0.256    0.270    0.278    0.281    0.283    0.295    0.322    0.352    0.409
25  PC  0.499    0.590    0.710    0.744    0.781    0.812    0.819    0.835    0.851    0.856
26  PC  0.860    0.868    0.876    0.888    0.910    0.926    0.937    0.950    0.970    0.976
27  PC  0.982    0.985    0.987    0.989    0.990    0.993    0.993    0.994    0.995    0.998
28  PC  0.998    0.999    1.000
29  LS      0      88.0
30  UD      0.1
31
32  KK  Int-I3
33  BA  0.00553
34  PB  3.41
35  LS      0      88.0
36  UD      0.1
37
38  KK  Int-I2
39  BA  0.00112
40  PB  3.41
41  LS      0      88.0
42  UD      0.1

```


43 LS 0 88.0
44 UD 0.1
*

1

HEC-1 INPUT

PAGE 2

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

45 KK StI-1
46 BA 0.00232
47 PB 3.41
48 LS 0 91.0
49 UD 0.050
*

50 KK StI-2
51 BA 0.00209
52 PB 3.41
53 LS 0 91.0
54 UD 0.050
*

55 KK CP1
56 HC 6
*
57 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
17 Int_I1
.
30 . Int-I3
.
35 . . Int-I2
.
40 . . . Int-I4
.
45 StI-1
.
50 StI-2
.
55 CP1.....

(**) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
*
* RUN DATE 10JUL19 TIME 13:49:04 *
*

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

TECHNICAL DRAINAGE STUDY
SUMMERLIN VILLAGE 22 NORTH
STREET I (DESERT FOOTHILLS DRIVE TO STREET J)
DESIGN STORM 100-YEAR 6 HOUR

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES

AREA (SQUARE MILES)	DARF
0 - 0.5	0.99
Estimated 10-year	0.57

14 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	
	.99	.57

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				.99	.57
HYDROGRAPH AT					
+	Int-I1	.02	1 FLOW	29.	13.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	Int-I3	.01	1 FLOW	11.	5.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	Int-I2	.00	1 FLOW	2.	1.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	Int-I4	.01	1 FLOW	16.	7.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	StI-1	.00	1 FLOW	6.	
3.			TIME	3.50	3.50
HYDROGRAPH AT					
+	StI-2	.00	1 FLOW	5.	
3.			TIME	3.50	3.50
6 COMBINED AT					
+	CP1	.03	1 FLOW	69.	31.
			TIME	3.50	3.50

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

Appendix C. Hydraulics Appendix

- C.1. Drop Inlet Calculations
- C.2. Normal Depth Calculations
- C.3. Ultimate Condition WSPG-W Model
- C.4. Riprap Calculations

C.1 Drop Inlet Calculations

Worksheet for SDDI#1 10' Combo Inlet On Grade at 6.89% 100 yr

Project Description	
Solve For	Efficiency
Input Data	
Discharge	3.05 cfs
Slope	0.069 ft/ft
Gutter Width	1.50 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Local Depression	4.0 in
Local Depression Width	24.0 in
Grate Width	1.50 ft
Grate Length	7.5 ft
Grate Type	Curved Vaned
Clogging	50.0 %
Curb Opening Length	10.0 ft
Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None
Results	
Efficiency	94.27 %
Intercepted Flow	2.88 cfs
Bypass Flow	0.17 cfs
Spread	6.8 ft
Depth	0.2 ft
Flow Area	0.5 ft ²
Gutter Depression	1.1 in
Total Depression	5.1 in
Velocity	5.72 ft/s
Splash Over Velocity	8.05 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.108
Grate Flow Ratio	0.618
Equivalent Cross Slope	0.151 ft/ft
Active Grate Length	3.8 ft
Length Factor	0.391
Total Interception Length	16.0 ft
Messages	

Worksheet for SDDI#1 10' Combo Inlet On Grade at 6.89% 100 yr

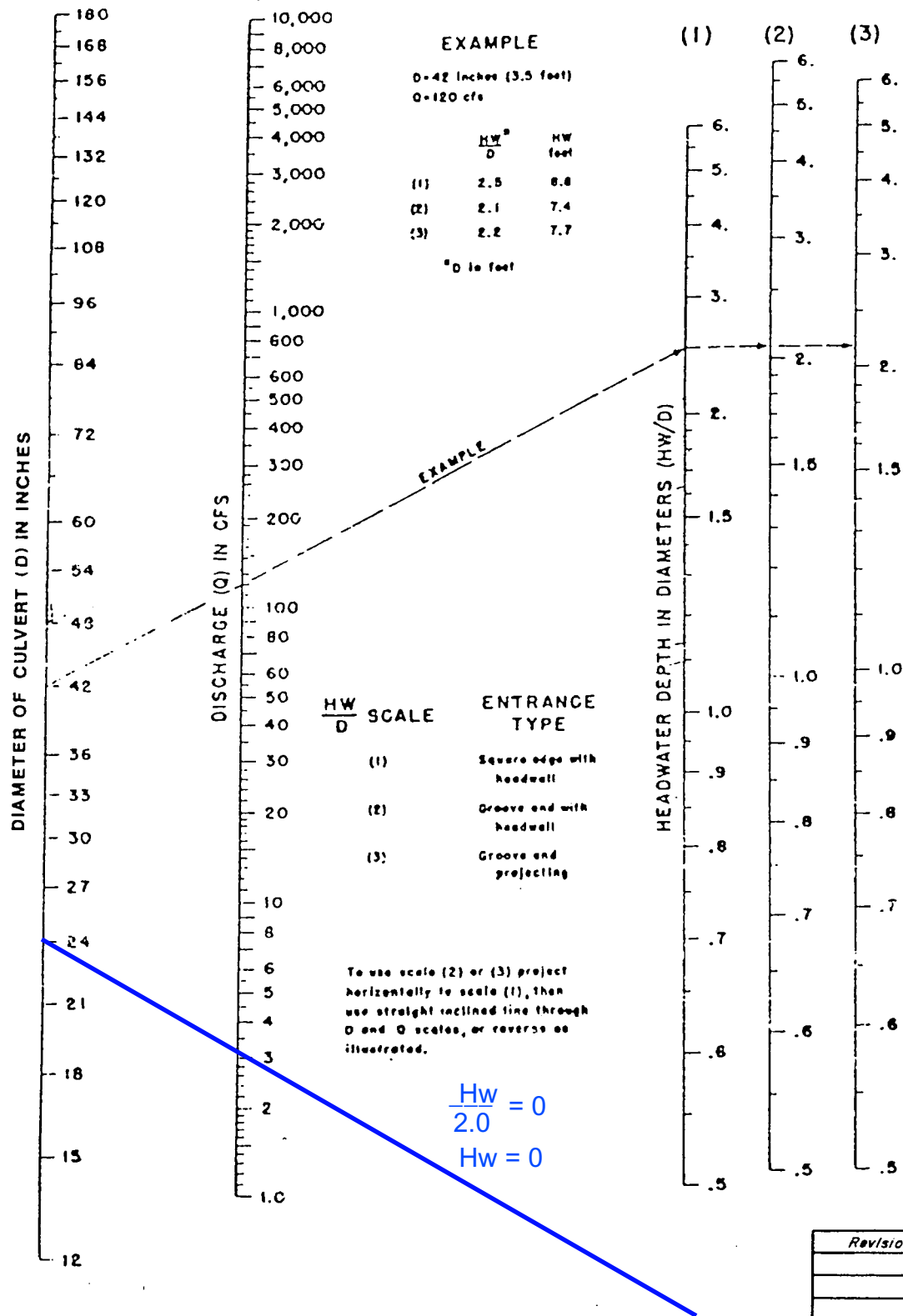
Messages

Messages	Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5- 4.5 ft / 0.15- 1.35 m).
----------	---

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

DROP INLET SDDI#1 / Street I



Total Discharge
Q = 3.1-CFS
24" RCP
LATERAL

Revision	Date

WRC
ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI#2 10' Combo Inlet On Grade at 6.89% 100 yr

Project Description	
Solve For	Efficiency
Input Data	
Discharge	3.05 cfs
Slope	0.069 ft/ft
Gutter Width	1.50 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Local Depression	4.0 in
Local Depression Width	24.0 in
Grate Width	1.50 ft
Grate Length	7.5 ft
Grate Type	Curved Vaned
Clogging	50.0 %
Curb Opening Length	10.0 ft
Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None
Results	
Efficiency	94.27 %
Intercepted Flow	2.88 cfs
Bypass Flow	0.17 cfs
Spread	6.8 ft
Depth	0.2 ft
Flow Area	0.5 ft ²
Gutter Depression	1.1 in
Total Depression	5.1 in
Velocity	5.72 ft/s
Splash Over Velocity	8.05 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.108
Grate Flow Ratio	0.618
Equivalent Cross Slope	0.151 ft/ft
Active Grate Length	3.8 ft
Length Factor	0.391
Total Interception Length	16.0 ft
Messages	

Worksheet for SDDI#2 10' Combo Inlet On Grade at 6.89% 100 yr

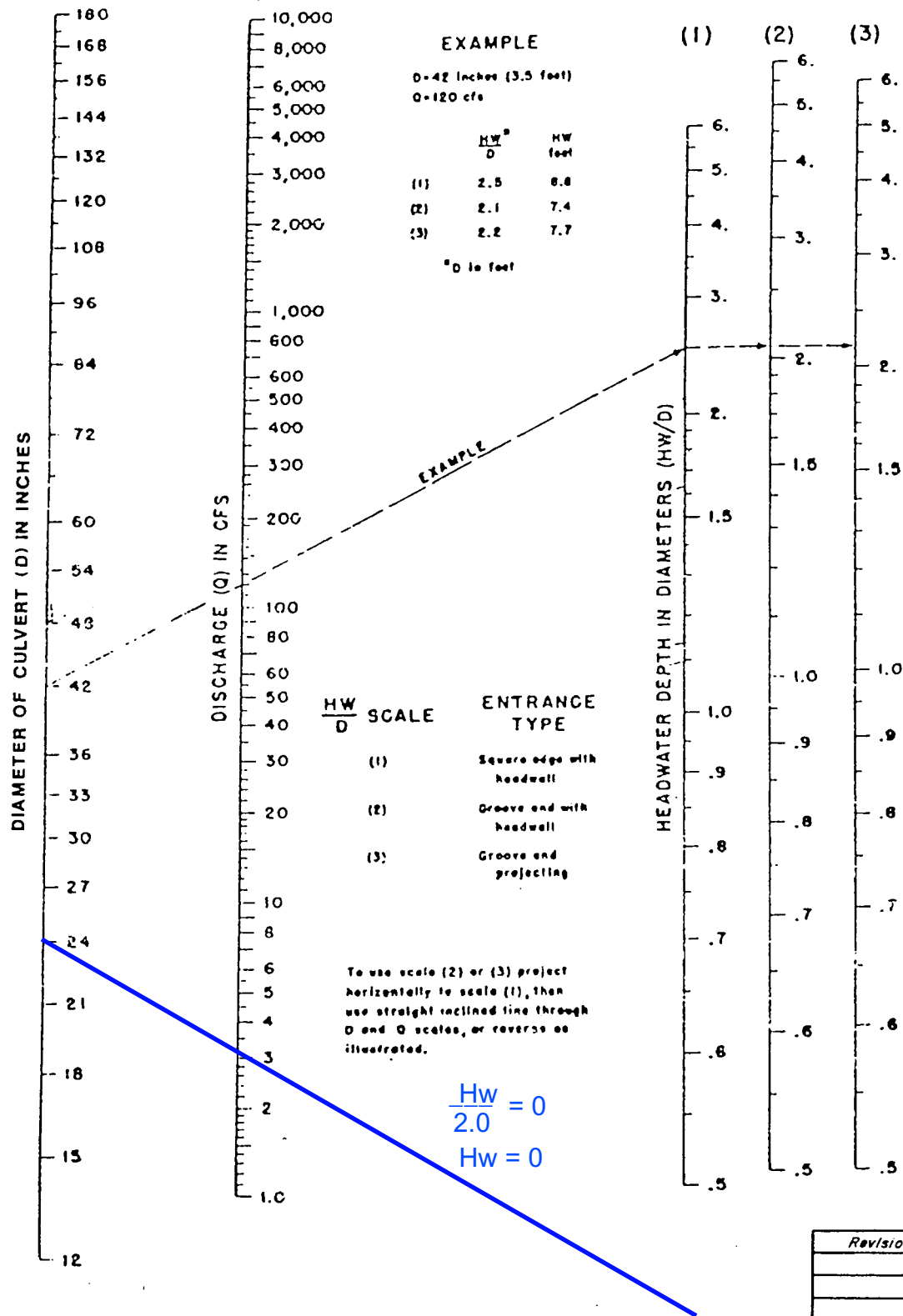
Messages

Messages	Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5- 4.5 ft / 0.15- 1.35 m).
----------	---

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

DROP INLET SDDI#2 / Street I



Total Discharge
 $Q = 3.1$ -CFS
 24" RCP
 LATERAL

Revision	Date

WRC
 ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI#3 5' Combo Inlet On Grade at 6.89% 100 yr

Project Description	
Solve For	Efficiency
Input Data	
Discharge	3.00 cfs
Slope	0.069 ft/ft
Gutter Width	1.50 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Local Depression	4.0 in
Local Depression Width	24.0 in
Grate Width	1.50 ft
Grate Length	2.5 ft
Grate Type	Curved Vaned
Clogging	50.0 %
Curb Opening Length	5.0 ft
Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None
Results	
Efficiency	81.56 %
Intercepted Flow	2.45 cfs
Bypass Flow	0.55 cfs
Spread	6.8 ft
Depth	0.2 ft
Flow Area	0.5 ft ²
Gutter Depression	1.1 in
Total Depression	5.1 in
Velocity	5.71 ft/s
Splash Over Velocity	4.61 ft/s
Frontal Flow Factor	0.902
Side Flow Factor	0.010
Grate Flow Ratio	0.622
Equivalent Cross Slope	0.152 ft/ft
Active Grate Length	1.3 ft
Length Factor	0.237
Total Interception Length	15.8 ft
Messages	

Worksheet for SDDI#3 5' Combo Inlet On Grade at 6.89% 100 yr

Messages

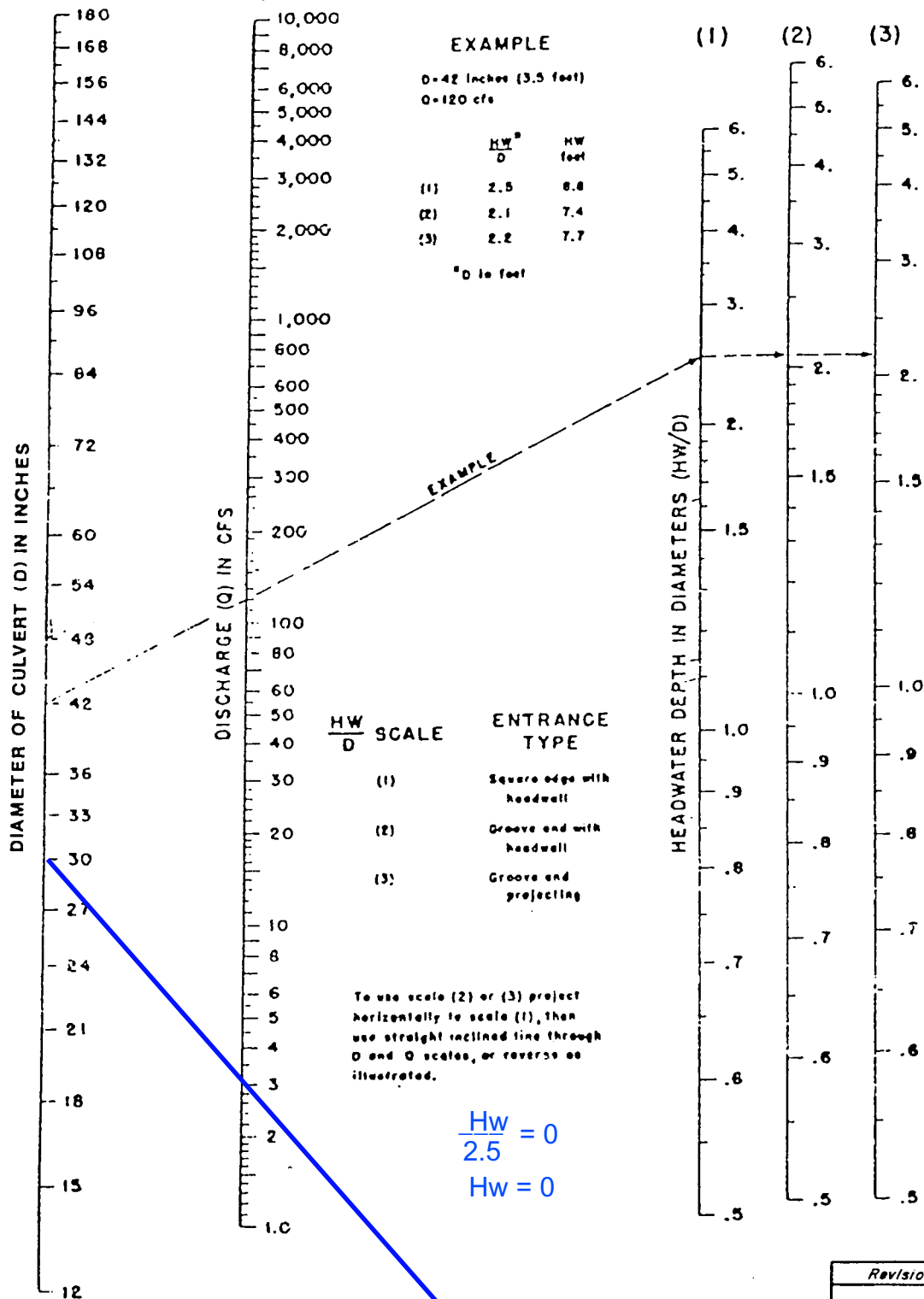
Messages

Grate Length
should be
within the
defined range
of HEC-22's
Chart 5
(approx. 0.5-
4.5 ft / 0.15-
1.35 m).

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

DROP INLET SDDI#3 / Street I



Total Discharge
 $Q = 3.00$ -CFS
 30" RCP
 LATERAL

Revision	Date

WRC
ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

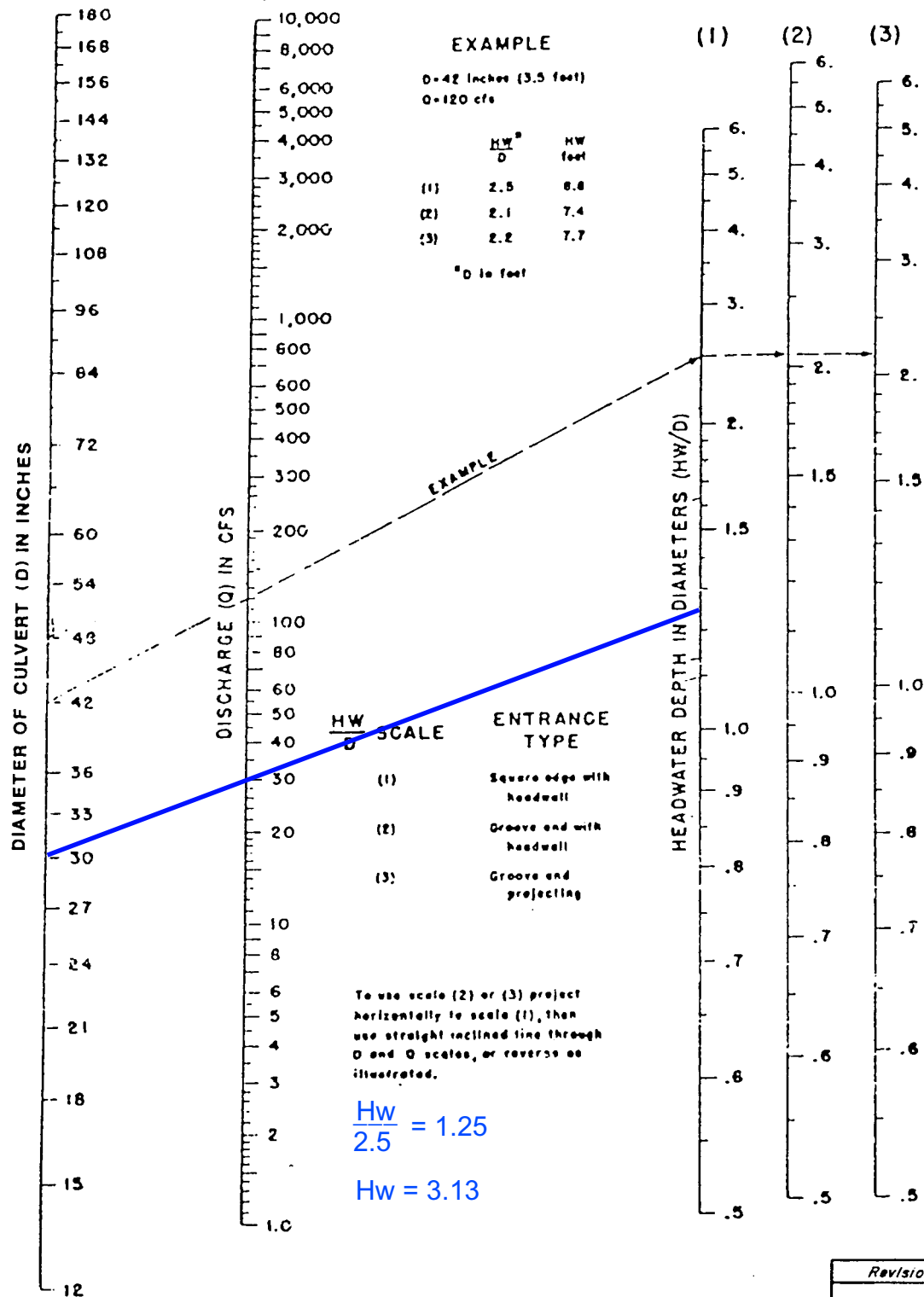
Worksheet for SDDI#4 Ditch Inlet In Sag 4'x4' 100 yr - P-50x100

Project Description	
Solve For	Spread
Input Data	
Discharge	30.00 cfs
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	0.00 ft
Grate Width	4.00 ft
Grate Length	4.0 ft
Local Depression	0.0 in
Local Depression Width	24.0 in
Grate Type	P-50 mm x 100 mm (P-1- 7/8"-4")
Clogging	50.0 %
Results	
Spread	5.3 ft
Depth	0.9 ft
Wetted Perimeter	5.6 ft
Top Width	5.31 ft
Open Grate Area	6.4 ft ²
Active Grate Weir Length	12.0 ft

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

DROP INLET SDDI#4 / Street I



Total Discharge
 $Q = 30.0$ - CFS
 30" RCP
 LATERAL

Revision	Date

WRC
 ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Worksheet for SDDI#5 5' Combo Inlet On Grade at 6.89% 100 yr

Project Description	
Solve For	Efficiency
Input Data	
Discharge	3.00 cfs
Slope	0.069 ft/ft
Gutter Width	1.50 ft
Gutter Cross Slope	0.080 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.016
Local Depression	4.0 in
Local Depression Width	24.0 in
Grate Width	1.50 ft
Grate Length	2.5 ft
Grate Type	Curved Vaned
Clogging	50.0 %
Curb Opening Length	5.0 ft
Options	
Calculation Option	Use Both
Grate Flow Option	Exclude None
Results	
Efficiency	81.56 %
Intercepted Flow	2.45 cfs
Bypass Flow	0.55 cfs
Spread	6.8 ft
Depth	0.2 ft
Flow Area	0.5 ft ²
Gutter Depression	1.1 in
Total Depression	5.1 in
Velocity	5.71 ft/s
Splash Over Velocity	4.61 ft/s
Frontal Flow Factor	0.902
Side Flow Factor	0.010
Grate Flow Ratio	0.622
Equivalent Cross Slope	0.152 ft/ft
Active Grate Length	1.3 ft
Length Factor	0.237
Total Interception Length	15.8 ft
Messages	

Worksheet for SDDI#5 5' Combo Inlet On Grade at 6.89% 100 yr

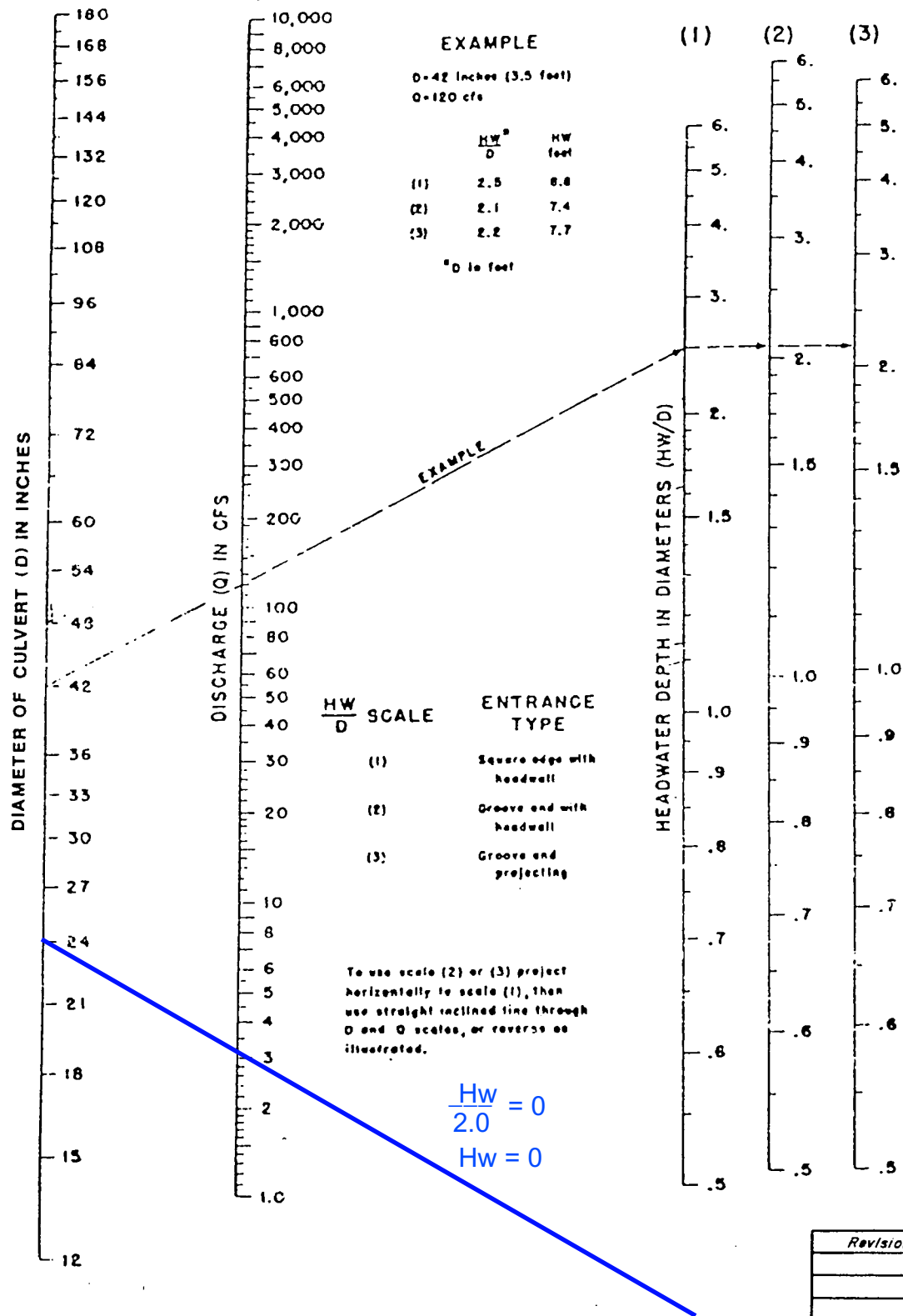
Messages

Messages	Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5- 4.5 ft / 0.15- 1.35 m).
----------	---

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

DROP INLET SDDI#5 / Street I



Total Discharge
 $Q = 3.00$ -CFS
 24" RCP
 LATERAL

Revision	Date

WRC
 ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

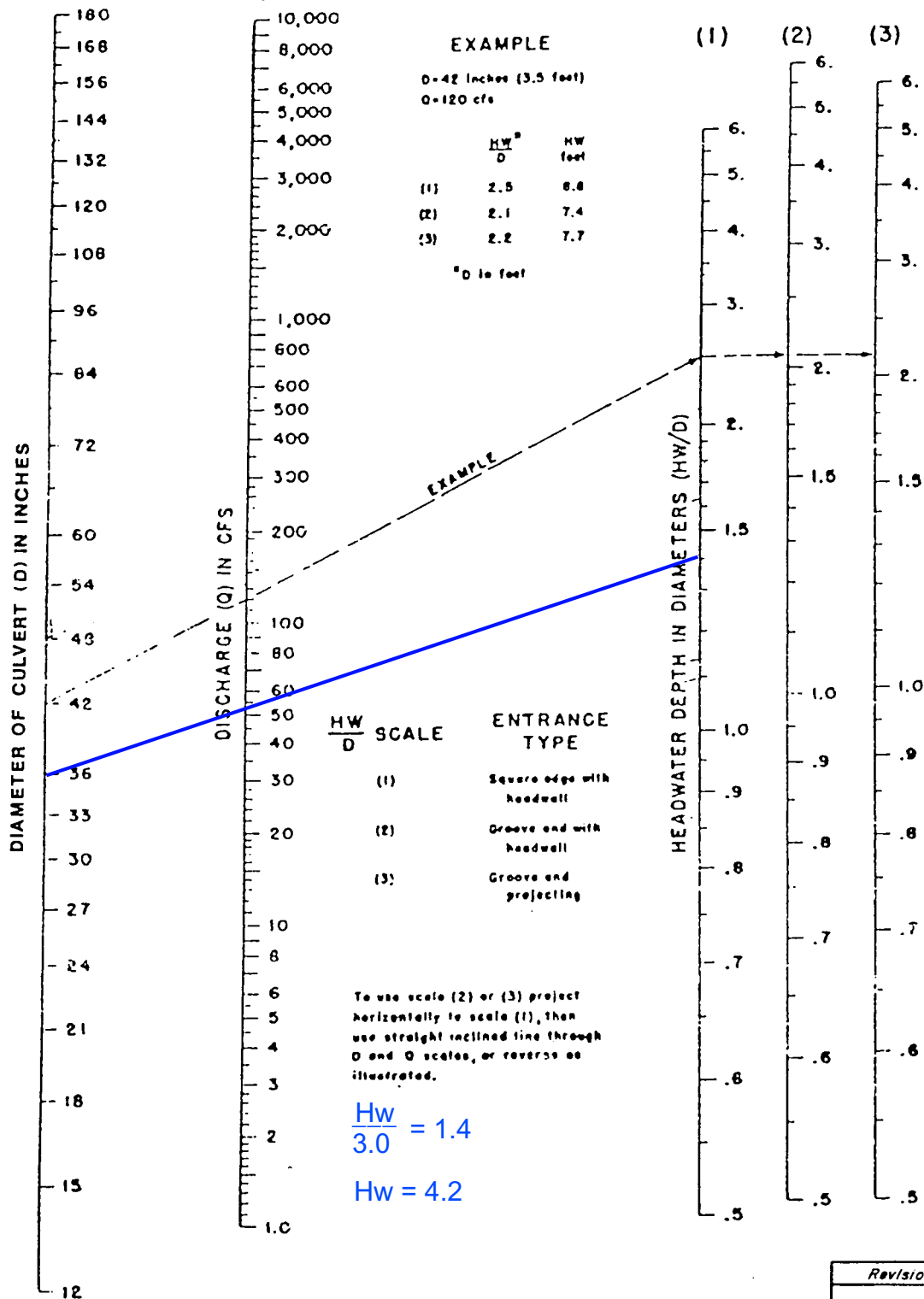
Worksheet for SDDI #6 Ditch Inlet In Sag 4'x4' 100 yr - P-50x100

Project Description	
Solve For	Spread
Input Data	
Discharge	50.00 cfs
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	0.00 ft
Grate Width	4.00 ft
Grate Length	4.0 ft
Local Depression	0.0 in
Local Depression Width	24.0 in
Grate Type	P-50 mm x 100 mm (P-1- 7/8"-4")
Clogging	50.0 %
Results	
Spread	12.7 ft
Depth	2.1 ft
Wetted Perimeter	13.4 ft
Top Width	12.68 ft
Open Grate Area	6.4 ft ²
Active Grate Weir Length	12.0 ft

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

NOMOGRAPH - INLET CONTROL RCP

DROP INLET SDDI#6 / Street I



Total Discharge
 $Q = 50.0$ - CFS
 36" RCP
 LATERAL

Revision	Date

WRC
 ENGINEERING

REFERENCE:

USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

C.2 Normal Depth Calculations

Worksheet for Kestrel Creek Ave - STI-1 - 100 yr

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	0.069 ft/ft
Discharge	6.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.50
0+01	0.00
0+02	0.08
0+02	0.10
0+22	0.50
0+42	0.10
0+42	0.08
0+43	0.00
0+44	0.50
0+44	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+02, 0.08)	0.013
(0+02, 0.08)	(0+42, 0.08)	0.015
(0+42, 0.08)	(0+44, 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	0.2 ft
Elevation Range	0.00 to 0.50 ft
Flow Area	1.2 ft ²
Wetted Perimeter	15.1 ft
Hydraulic Radius	0.1 ft
Top Width	14.63 ft
Normal Depth	0.2 ft
Critical Depth	0.3 ft

Worksheet for Kestrel Creek Ave - STI-1 - 100 yr

Results

Critical Slope	0.006 ft/ft
Velocity	4.98 ft/s
Velocity Head	0.39 ft
Specific Energy	0.61 ft
Froude Number	3.061
Flow Type	Supercritical

GVF Input Data

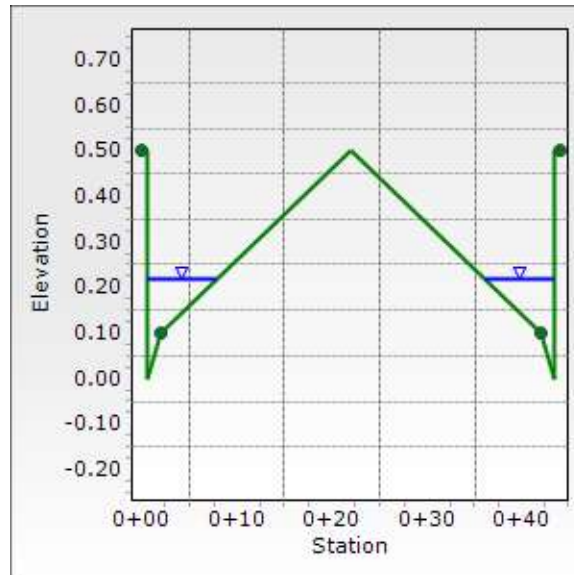
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.2 ft
Critical Depth	0.3 ft
Channel Slope	0.069 ft/ft
Critical Slope	0.006 ft/ft

Cross Section for Kestrel Creek Ave - STI-1 - 100 yr

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.069 ft/ft
Normal Depth	0.2 ft
Discharge	6.00 cfs



Worksheet for Kestrel Creek Ave - STI-2 - 100 yr

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	0.069 ft/ft
Discharge	6.10 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.50
0+01	0.00
0+02	0.08
0+02	0.10
0+19	0.43
0+35	0.10
0+35	0.08
0+36	0.00
0+37	0.50
0+37	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+02, 0.08)	0.013
(0+02, 0.08)	(0+35, 0.08)	0.015
(0+35, 0.08)	(0+37, 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	0.2 ft
Elevation Range	0.00 to 0.50 ft
Flow Area	1.2 ft ²
Wetted Perimeter	15.2 ft
Hydraulic Radius	0.1 ft
Top Width	14.74 ft
Normal Depth	0.2 ft
Critical Depth	0.3 ft

Worksheet for Kestrel Creek Ave - STI-2 - 100 yr

Results

Critical Slope	0.006 ft/ft
Velocity	4.99 ft/s
Velocity Head	0.39 ft
Specific Energy	0.61 ft
Froude Number	3.059
Flow Type	Supercritical

GVF Input Data

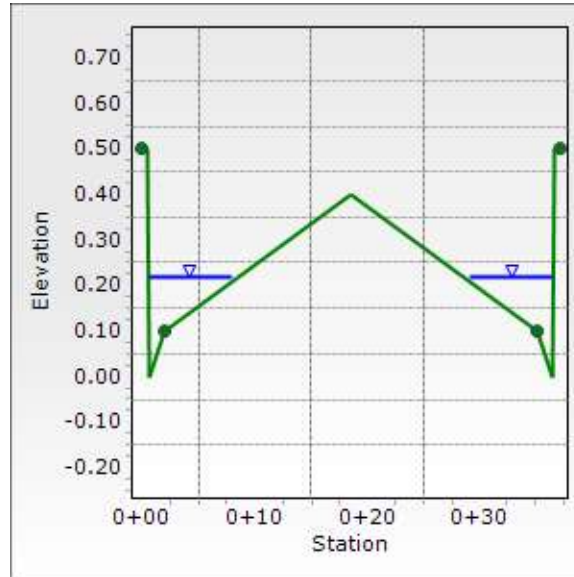
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.2 ft
Critical Depth	0.3 ft
Channel Slope	0.069 ft/ft
Critical Slope	0.006 ft/ft

Cross Section for Kestrel Creek Ave - STI-2 - 100 yr

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.069 ft/ft
Normal Depth	0.2 ft
Discharge	6.10 cfs



C.3 Ultimate Condition WSPG-W Model

STREET-I-ULT.OUT

FILE: STREET-I-ULT_z.WSW

W S P G W - CIVILDESIGN Version 14.06

PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 8- 2-2019 Time: 6:49:58

SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) DFD TO KETTLE RIDGE DR (STREET J)

ATKINS / ULTIMATE CONDITIONS

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
      | Elev | (FT) | Elev | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
L/Elem | Ch Slope | | | | | | | | | | | | | | |
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|
-107.160 | 3319.570 | 1.573 | 3321.143 | 91.00 | 24.24 | 9.13 | 3330.27 | .00 | 2.85 | 3.00 | 3.000 | .000 | .00 | 1 .0
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
23.426 | .0677 | | | | | | | | | | | | | | |
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
-83.734 | 3321.155 | 1.581 | 3322.736 | 91.00 | 24.08 | 9.00 | 3331.74 | .00 | 2.85 | 3.00 | 3.000 | .000 | .00 | 1 .0
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
83.734 | .0677 | | | | | | | | | | | | | | |
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
.000 | 3326.820 | 1.643 | 3328.464 | 91.00 | 22.96 | 8.18 | 3336.65 | .00 | 2.85 | 2.99 | 3.000 | .000 | .00 | 1 .0
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
1.000 | .0300 | | | | | | | | | | | | | | |
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
1.000 | 3326.850 | 1.641 | 3328.491 | 91.00 | 23.00 | 8.22 | 3336.71 | .00 | 2.85 | 2.99 | 3.000 | .000 | .00 | 1 .0
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
JUNCT STR | .0249 | | | | | | | | | | | | | | |
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
3.000 | 3326.900 | 1.485 | 3328.385 | 86.00 | 24.66 | 9.44 | 3337.82 | .00 | 2.82 | 3.00 | 3.000 | .000 | .00 | 1 .0
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
1.000 | .1001 | | | | | | | | | | | | | | |
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
4.000 | 3327.000 | 1.487 | 3328.487 | 86.00 | 24.61 | 9.41 | 3337.89 | .00 | 2.82 | 3.00 | 3.000 | .000 | .00 | 1 .0
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
160.449 | .0686 | | | | | | | | | | | | | | |
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
164.449 | 3338.002 | 1.487 | 3339.489 | 86.00 | 24.61 | 9.41 | 3348.90 | .00 | 2.82 | 3.00 | 3.000 | .000 | .00 | 1 .0
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
193.931 | .0686 | | | | | | | | | | | | | | |
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
358.380 | 3351.300 | 1.502 | 3352.802 | 86.00 | 24.28 | 9.16 | 3361.96 | .00 | 2.82 | 3.00 | 3.000 | .000 | .00 | 1 .0
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
4.000 | .0500 | | | | | | | | | | | | | | |
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
362.380 | 3351.500 | 1.498 | 3352.998 | 86.00 | 24.38 | 9.23 | 3362.23 | .00 | 2.82 | 3.00 | 3.000 | .000 | .00 | 1 .0
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
118.399 | .0691 | | | | | | | | | | | | | | |
      |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

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STREET-I-ULT.OUT

FILE: STREET-I-ULT_z.WSW

W S P G W - CIVILDESIGN Version 14.06

PAGE 2

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 8- 2-2019 Time: 6:49:58

SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) DFD TO KETTLE RIDGE DR (STREET J)

ATKINS / ULTIMATE CONDITIONS

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev   | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
L/Elem | Ch Slope | | | | | | | | | | | | | | |
***** |*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|
480.779 | 3359.681 | 1.544 | 3361.226 | 86.00 | 23.44 | 8.53 | 3369.76 | .00 | 2.82 | 3.00 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
57.351 | .0691 | | | | | | | | | | | | | | |
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
538.130 | 3363.644 | 1.604 | 3365.248 | 86.00 | 22.35 | 7.76 | 3373.00 | .00 | 2.82 | 2.99 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
33.510 | .0691 | | | | | | | | | | | | | | |
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
571.640 | 3365.960 | 1.668 | 3367.627 | 86.00 | 21.31 | 7.05 | 3374.68 | .00 | 2.82 | 2.98 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
4.000 | .0500 | | | | | | | | | | | | | | |
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
575.640 | 3366.160 | 1.669 | 3367.828 | 86.00 | 21.29 | 7.04 | 3374.87 | .00 | 2.82 | 2.98 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
5.182 | .0707 | | | | | | | | | | | | | | |
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
580.822 | 3366.526 | 1.682 | 3368.208 | 86.00 | 21.07 | 6.90 | 3375.10 | .00 | 2.82 | 2.98 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
20.100 | .0707 | | | | | | | | | | | | | | |
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
600.922 | 3367.947 | 1.749 | 3369.696 | 86.00 | 20.09 | 6.27 | 3375.96 | .00 | 2.82 | 2.96 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
15.203 | .0707 | | | | | | | | | | | | | | |
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
616.125 | 3369.021 | 1.820 | 3370.842 | 86.00 | 19.16 | 5.70 | 3376.54 | .00 | 2.82 | 2.93 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
11.925 | .0707 | | | | | | | | | | | | | | |
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
628.051 | 3369.865 | 1.895 | 3371.760 | 86.00 | 18.27 | 5.18 | 3376.94 | .00 | 2.82 | 2.89 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
9.526 | .0707 | | | | | | | | | | | | | | |
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
637.576 | 3370.538 | 1.976 | 3372.514 | 86.00 | 17.42 | 4.71 | 3377.22 | .00 | 2.82 | 2.84 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
7.756 | .0707 | | | | | | | | | | | | | | |
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

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STREET-I-ULT.OUT

FILE: STREET-I-ULT_z.WSW

W S P G W - CIVILDESIGN Version 14.06

PAGE 3

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 8- 2-2019 Time: 6:49:58

SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) DFD TO KETTLE RIDGE DR (STREET J)

ATKINS / ULTIMATE CONDITIONS

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
         | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
L/Elem | Ch Slope |
***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |***** |*****
645.332 | 3371.086 | 2.061 | 3373.147 | 86.00 | 16.61 | 4.28 | 3377.43 | .00 | 2.82 | 2.78 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
6.307 | .0707 |         |         |         |         | .0236 | .15 | 2.06 | 2.14 | 1.47 | .013 | .00 | .00 | PIPE
651.639 | 3371.532 | 2.153 | 3373.685 | 86.00 | 15.83 | 3.89 | 3377.58 | .00 | 2.82 | 2.70 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
5.115 | .0707 |         |         |         |         | .0211 | .11 | 2.15 | 1.97 | 1.47 | .013 | .00 | .00 | PIPE
656.754 | 3371.894 | 2.253 | 3374.147 | 86.00 | 15.10 | 3.54 | 3377.69 | .00 | 2.82 | 2.59 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
4.070 | .0707 |         |         |         |         | .0189 | .08 | 2.25 | 1.80 | 1.47 | .013 | .00 | .00 | PIPE
660.824 | 3372.181 | 2.364 | 3374.545 | 86.00 | 14.39 | 3.22 | 3377.76 | .00 | 2.82 | 2.45 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
3.163 | .0707 |         |         |         |         | .0171 | .05 | 2.36 | 1.62 | 1.47 | .013 | .00 | .00 | PIPE
663.987 | 3372.405 | 2.487 | 3374.892 | 86.00 | 13.72 | 2.92 | 3377.82 | .00 | 2.82 | 2.26 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
2.196 | .0707 |         |         |         |         | .0156 | .03 | 2.49 | 1.45 | 1.47 | .013 | .00 | .00 | PIPE
666.183 | 3372.560 | 2.632 | 3375.192 | 86.00 | 13.08 | 2.66 | 3377.85 | .00 | 2.82 | 1.97 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
.987 | .0707 |         |         |         |         | .0147 | .01 | 2.63 | 1.26 | 1.47 | .013 | .00 | .00 | PIPE
667.170 | 3372.630 | 2.820 | 3375.449 | 86.00 | 12.47 | 2.42 | 3377.87 | .00 | 2.82 | 1.43 | 3.000 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
JUNCT STR | .0500 |         |         |         |         | .0146 | .03 | 2.82 | 1.00 |         | .013 | .00 | .00 | PIPE
669.170 | 3372.730 | 5.713 | 3378.443 | 50.00 | 10.19 | 1.61 | 3380.05 | .00 | 2.30 | .00 | 2.500 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
2.000 | .0500 |         |         |         |         | .0149 | .03 | 5.71 | .00 | 1.32 | .013 | .00 | .00 | PIPE
671.170 | 3372.830 | 5.777 | 3378.607 | 50.00 | 10.19 | 1.61 | 3380.22 | .00 | 2.30 | .00 | 2.500 | .000 | .00 | 1 .0
         |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
32.783 | .0715 |         |         |         |         | .0149 | .49 | 5.78 | .00 | 1.18 | .013 | .00 | .00 | PIPE

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STREET-I-ULT.OUT

FILE: STREET-I-ULT_z.WSW

W S P G W - CIVILDESIGN Version 14.06

PAGE 4

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 8- 2-2019 Time: 6:49:58

SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) DFD TO KETTLE RIDGE DR (STREET J)

ATKINS / ULTIMATE CONDITIONS

```

*****
| 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 |
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
*****
703.953 | 3375.174 | 3.919 | 3379.094 | 50.00 | 10.19 | 1.61 | 3380.70 | .00 | 2.30 | .00 | 2.500 | .000 | .00 | 1 .0
| | | | | | | | | | | | | | | |
HYDRAULIC JUMP
703.953 | 3375.174 | 1.411 | 3376.586 | 50.00 | 17.50 | 4.76 | 3381.34 | .00 | 2.30 | 2.48 | 2.500 | .000 | .00 | 1 .0
| | | | | | | | | | | | | | | |
10.180 | .0715 | | | | | .0378 | .38 | 1.41 | 2.87 | 1.18 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
714.133 | 3375.902 | 1.461 | 3377.363 | 50.00 | 16.78 | 4.37 | 3381.74 | .00 | 2.30 | 2.46 | 2.500 | .000 | .00 | 1 .0
| | | | | | | | | | | | | | | |
8.939 | .0715 | | | | | .0336 | .30 | 1.46 | 2.69 | 1.18 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
723.072 | 3376.541 | 1.520 | 3378.061 | 50.00 | 16.00 | 3.97 | 3382.04 | .00 | 2.30 | 2.44 | 2.500 | .000 | .00 | 1 .0
| | | | | | | | | | | | | | | |
7.151 | .0715 | | | | | .0298 | .21 | 1.52 | 2.49 | 1.18 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
730.223 | 3377.053 | 1.583 | 3378.636 | 50.00 | 15.25 | 3.61 | 3382.25 | .00 | 2.30 | 2.41 | 2.500 | .000 | .00 | 1 .0
| | | | | | | | | | | | | | | |
5.800 | .0715 | | | | | .0264 | .15 | 1.58 | 2.30 | 1.18 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
736.023 | 3377.468 | 1.650 | 3379.118 | 50.00 | 14.54 | 3.28 | 3382.40 | .00 | 2.30 | 2.37 | 2.500 | .000 | .00 | 1 .0
| | | | | | | | | | | | | | | |
4.740 | .0715 | | | | | .0235 | .11 | 1.65 | 2.13 | 1.18 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
740.763 | 3377.806 | 1.721 | 3379.528 | 50.00 | 13.87 | 2.99 | 3382.51 | .00 | 2.30 | 2.32 | 2.500 | .000 | .00 | 1 .0
| | | | | | | | | | | | | | | |
3.827 | .0715 | | | | | .0209 | .08 | 1.72 | 1.96 | 1.18 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
744.590 | 3378.080 | 1.799 | 3379.879 | 50.00 | 13.22 | 2.71 | 3382.59 | .00 | 2.30 | 2.25 | 2.500 | .000 | .00 | 1 .0
| | | | | | | | | | | | | | | |
4.000 | .0500 | | | | | .0190 | .08 | 1.80 | 1.80 | 1.32 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
748.590 | 3378.280 | 1.860 | 3380.140 | 50.00 | 12.77 | 2.53 | 3382.67 | .00 | 2.30 | 2.18 | 2.500 | .000 | .00 | 1 .0
| | | | | | | | | | | | | | | |
16.328 | .0254 | | | | | .0174 | .28 | 1.86 | 1.68 | 1.64 | .013 | .00 | .00 | PIPE

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STREET-I-ULT.OUT

FILE: STREET-I-ULT_z.WSW

W S P G W - CIVILDESIGN Version 14.06

PAGE 5

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 8- 2-2019 Time: 6:49:58

SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) DFD TO KETTLE RIDGE DR (STREET J)

ATKINS / ULTIMATE CONDITIONS

```

*****
| 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
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
| | | | | | | | | | | | | | | |
764.918 | 3378.695 | 1.943 | 3380.638 | 50.00 | 12.21 | 2.32 | 3382.95 | .00 | 2.30 | 2.08 | 2.500 | .000 | .00 | 1 | .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
11.505 | .0254 | | | | | .0157 | .18 | 1.94 | 1.53 | 1.64 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
776.423 | 3378.987 | 2.042 | 3381.029 | 50.00 | 11.64 | 2.11 | 3383.14 | .00 | 2.30 | 1.93 | 2.500 | .000 | .00 | 1 | .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
6.887 | .0254 | | | | | .0143 | .10 | 2.04 | 1.38 | 1.64 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
783.310 | 3379.162 | 2.157 | 3381.319 | 50.00 | 11.10 | 1.91 | 3383.23 | .00 | 2.30 | 1.72 | 2.500 | .000 | .00 | 1 | .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
2.660 | .0254 | | | | | .0133 | .04 | 2.16 | 1.21 | 1.64 | .013 | .00 | .00 | PIPE
| | | | | | | | | | | | | | | |
785.970 | 3379.230 | 2.300 | 3381.530 | 50.00 | 10.58 | 1.74 | 3383.27 | .00 | 2.30 | 1.36 | 2.500 | .000 | .00 | 1 | .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-

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STREET-I-ULT.WSW

[illegible]

SI_Lateral-MH1N_ULT.OUT

FILE: SI_Lateral-MH1N_ULT_z.WSW

W S P G W - CIVILDESIGN Version 14.06

PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 8- 2-2019 Time: 7:14:35

SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 NORTH, SDDI #2

ATKINS / ULTIMATE CONDITIONS

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*****
| 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 |
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
*****
| 4.000 | 3327.000 | 1.487 | 3328.487 | 2.50 | 1.00 | .02 | 3328.50 | .00 | .55 | 1.75 | 2.000 | .000 | .00 | 1 | .0 | |
| | | | | | | | | | | | | | | | | |
| .197 | .3277 | | | | | .0002 | .00 | 1.49 | .15 | .19 | .013 | .00 | .00 | PIPE |
| 4.197 | 3327.064 | 1.421 | 3328.486 | 2.50 | 1.05 | .02 | 3328.50 | .00 | .55 | 1.81 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .178 | .3277 | | | | | .0002 | .00 | 1.42 | .16 | .19 | .013 | .00 | .00 | PIPE |
| 4.375 | 3327.123 | 1.361 | 3328.484 | 2.50 | 1.10 | .02 | 3328.50 | .00 | .55 | 1.87 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .165 | .3277 | | | | | .0002 | .00 | 1.36 | .18 | .19 | .013 | .00 | .00 | PIPE |
| 4.540 | 3327.177 | 1.305 | 3328.482 | 2.50 | 1.15 | .02 | 3328.50 | .00 | .55 | 1.90 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .156 | .3277 | | | | | .0002 | .00 | 1.31 | .19 | .19 | .013 | .00 | .00 | PIPE |
| 4.695 | 3327.228 | 1.252 | 3328.480 | 2.50 | 1.21 | .02 | 3328.50 | .00 | .55 | 1.94 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .146 | .3277 | | | | | .0003 | .00 | 1.25 | .21 | .19 | .013 | .00 | .00 | PIPE |
| 4.841 | 3327.276 | 1.202 | 3328.478 | 2.50 | 1.27 | .02 | 3328.50 | .00 | .55 | 1.96 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .133 | .3277 | | | | | .0003 | .00 | 1.20 | .22 | .19 | .013 | .00 | .00 | PIPE |
| 4.974 | 3327.319 | 1.156 | 3328.475 | 2.50 | 1.33 | .03 | 3328.50 | .00 | .55 | 1.98 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .126 | .3277 | | | | | .0003 | .00 | 1.16 | .24 | .19 | .013 | .00 | .00 | PIPE |
| 5.100 | 3327.361 | 1.112 | 3328.473 | 2.50 | 1.39 | .03 | 3328.50 | .00 | .55 | 1.99 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .031 | .3277 | | | | | .0003 | .00 | 1.11 | .26 | .19 | .013 | .00 | .00 | PIPE |
| 5.131 | 3327.371 | 1.112 | 3328.483 | 2.50 | 1.39 | .03 | 3328.51 | .00 | .55 | 1.99 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
HYDRAULIC JUMP

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SI_Lateral-MH1N_ULT.OUT

FILE: SI_Lateral-MH1N_ULT_z.WSW

W S P G W - CIVILDESIGN Version 14.06

PAGE 2

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 8- 2-2019 Time: 7:14:35

SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 NORTH, SDDI #2

ATKINS / ULTIMATE CONDITIONS

*****																	*****	
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/ 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				
*****																	*****	
5.131	3327.371	.231	3327.602	2.50	12.37	2.38	3329.98	.00	.55	1.28	2.000	.000	.00	1	.0			
	.276	.3277				.1422	.04	.23	5.48	.19	.013	.00	.00	PIPE				
5.407	3327.461	.239	3327.700	2.50	11.74	2.14	3329.84	.00	.55	1.30	2.000	.000	.00	1	.0			
	.912	.3277				.1232	.11	.24	5.11	.19	.013	.00	.00	PIPE				
6.319	3327.760	.247	3328.007	2.50	11.20	1.95	3329.95	.00	.55	1.32	2.000	.000	.00	1	.0			
	.767	.3277				.1075	.08	.25	4.79	.19	.013	.00	.00	PIPE				
7.086	3328.011	.255	3328.266	2.50	10.68	1.77	3330.04	.00	.55	1.33	2.000	.000	.00	1	.0			
	.649	.3277				.0938	.06	.26	4.49	.19	.013	.00	.00	PIPE				
7.735	3328.224	.264	3328.488	2.50	10.18	1.61	3330.10	.00	.55	1.35	2.000	.000	.00	1	.0			
	.562	.3277				.0819	.05	.26	4.21	.19	.013	.00	.00	PIPE				
8.298	3328.408	.272	3328.681	2.50	9.70	1.46	3330.14	.00	.55	1.37	2.000	.000	.00	1	.0			
	.480	.3277				.0715	.03	.27	3.95	.19	.013	.00	.00	PIPE				
8.778	3328.566	.282	3328.848	2.50	9.25	1.33	3330.18	.00	.55	1.39	2.000	.000	.00	1	.0			
	.422	.3277				.0625	.03	.28	3.70	.19	.013	.00	.00	PIPE				
9.199	3328.704	.291	3328.995	2.50	8.82	1.21	3330.20	.00	.55	1.41	2.000	.000	.00	1	.0			
	.366	.3277				.0545	.02	.29	3.47	.19	.013	.00	.00	PIPE				
9.565	3328.824	.301	3329.125	2.50	8.41	1.10	3330.22	.00	.55	1.43	2.000	.000	.00	1	.0			
	.321	.3277				.0476	.02	.30	3.25	.19	.013	.00	.00	PIPE				

SI_Lateral-MH1N_ULT.OUT

FILE: SI_Lateral-MH1N_ULT_z.WSW

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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

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SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 NORTH, SDDI #2

ATKINS / ULTIMATE CONDITIONS

*****																	*****	
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/ 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				
*****																	*****	
9.886	3328.929	.311	3329.240	2.50	8.02	1.00	3330.24	.00	.55	1.45	2.000	.000	.00	1	.0			
.282	.3277					.0416	.01	.31	3.05	.19	.013	.00	.00	PIPE				
10.168	3329.021	.321	3329.343	2.50	7.65	.91	3330.25	.00	.55	1.47	2.000	.000	.00	1	.0			
.245	.3277					.0363	.01	.32	2.86	.19	.013	.00	.00	PIPE				
10.413	3329.102	.332	3329.434	2.50	7.29	.83	3330.26	.00	.55	1.49	2.000	.000	.00	1	.0			
.216	.3277					.0317	.01	.33	2.68	.19	.013	.00	.00	PIPE				
10.630	3329.173	.343	3329.516	2.50	6.95	.75	3330.27	.00	.55	1.51	2.000	.000	.00	1	.0			
.187	.3277					.0277	.01	.34	2.51	.19	.013	.00	.00	PIPE				
10.817	3329.234	.355	3329.589	2.50	6.63	.68	3330.27	.00	.55	1.53	2.000	.000	.00	1	.0			
.165	.3277					.0242	.00	.36	2.35	.19	.013	.00	.00	PIPE				
10.982	3329.288	.367	3329.656	2.50	6.32	.62	3330.28	.00	.55	1.55	2.000	.000	.00	1	.0			
.145	.3277					.0211	.00	.37	2.20	.19	.013	.00	.00	PIPE				
11.127	3329.336	.379	3329.715	2.50	6.03	.56	3330.28	.00	.55	1.57	2.000	.000	.00	1	.0			
.124	.3277					.0185	.00	.38	2.06	.19	.013	.00	.00	PIPE				
11.250	3329.376	.392	3329.768	2.50	5.75	.51	3330.28	.00	.55	1.59	2.000	.000	.00	1	.0			
.108	.3277					.0161	.00	.39	1.93	.19	.013	.00	.00	PIPE				
11.358	3329.412	.405	3329.817	2.50	5.48	.47	3330.28	.00	.55	1.61	2.000	.000	.00	1	.0			
.090	.3277					.0141	.00	.41	1.81	.19	.013	.00	.00	PIPE				

SI_Lateral-MH1N_ULT.OUT

FILE: SI_Lateral-MH1N_ULT_z.WSW

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Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

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SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 NORTH, SDDI #2

ATKINS / ULTIMATE CONDITIONS

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*****
| 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 |
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
*****
| 11.449 | 3329.441 | .419 | 3329.860 | 2.50 | 5.22 | .42 | 3330.28 | .00 | .55 | 1.63 | 2.000 | .000 | .00 | 1 | .0 | |
| | | | | | | | | | | | | | | | | |
| .078 | .3277 | | | | | .0123 | .00 | .42 | 1.70 | .19 | .013 | .00 | .00 | PIPE |
| 11.526 | 3329.467 | .433 | 3329.900 | 2.50 | 4.98 | .39 | 3330.28 | .00 | .55 | 1.65 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .063 | .3277 | | | | | .0108 | .00 | .43 | 1.59 | .19 | .013 | .00 | .00 | PIPE |
| 11.589 | 3329.487 | .448 | 3329.935 | 2.50 | 4.75 | .35 | 3330.29 | .00 | .55 | 1.67 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .053 | .3277 | | | | | .0094 | .00 | .45 | 1.49 | .19 | .013 | .00 | .00 | PIPE |
| 11.642 | 3329.505 | .463 | 3329.968 | 2.50 | 4.53 | .32 | 3330.29 | .00 | .55 | 1.69 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .040 | .3277 | | | | | .0082 | .00 | .46 | 1.39 | .19 | .013 | .00 | .00 | PIPE |
| 11.683 | 3329.518 | .479 | 3329.997 | 2.50 | 4.32 | .29 | 3330.29 | .00 | .55 | 1.71 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .029 | .3277 | | | | | .0072 | .00 | .48 | 1.31 | .19 | .013 | .00 | .00 | PIPE |
| 11.712 | 3329.527 | .496 | 3330.023 | 2.50 | 4.12 | .26 | 3330.29 | .00 | .55 | 1.73 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .022 | .3277 | | | | | .0063 | .00 | .50 | 1.22 | .19 | .013 | .00 | .00 | PIPE |
| 11.733 | 3329.534 | .513 | 3330.048 | 2.50 | 3.92 | .24 | 3330.29 | .00 | .55 | 1.75 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .015 | .3277 | | | | | .0055 | .00 | .51 | 1.15 | .19 | .013 | .00 | .00 | PIPE |
| 11.748 | 3329.539 | .530 | 3330.069 | 2.50 | 3.74 | .22 | 3330.29 | .00 | .55 | 1.77 | 2.000 | .000 | .00 | 1 | .0 |
| | | | | | | | | | | | | | | | | |
| .002 | .3277 | | | | | | | | | | | | | | | |

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SI_Lateral-MH1N_ULT.WSW

T1 SUMMERLIN WEST VILLAGE 220
T2 KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 NORTH, SDDI #2
T3 ATKINS / ULTIMATE CONDITIONS
SO4.0003327.000 13328.487
R11.7503329.540 20.0130.000 0.000 1
SH11.7503329.540 23329.540
CD 1 4 10.000 3.0000.000 0.000 0.0000.00
CD 2 4 10.000 2.0000.000 0.000 0.0000.00
CD 3 4 10.000 1.5000.000 0.000 0.0000.00
Q2.5000

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FILE: SI_Lateral-MH1S_ULT.WSW

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SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 SOUTH, SDDI #1

ATKINS / ULTIMATE CONDITIONS

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/ 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
4.000	3327.000	1.487	3328.487	2.50	1.00	.02	3328.50	.00	.55	1.75	2.000	.000	.00	1 .0
.715	.0903					.0002	.00	1.49	.15	.26	.013	.00	.00	PIPE
4.715	3327.064	1.421	3328.486	2.50	1.05	.02	3328.50	.00	.55	1.81	2.000	.000	.00	1 .0
.647	.0903					.0002	.00	1.42	.16	.26	.013	.00	.00	PIPE
5.362	3327.123	1.361	3328.484	2.50	1.10	.02	3328.50	.00	.55	1.87	2.000	.000	.00	1 .0
.601	.0903					.0002	.00	1.36	.18	.26	.013	.00	.00	PIPE
5.963	3327.177	1.305	3328.482	2.50	1.15	.02	3328.50	.00	.55	1.90	2.000	.000	.00	1 .0
.566	.0903					.0002	.00	1.31	.19	.26	.013	.00	.00	PIPE
6.529	3327.228	1.252	3328.480	2.50	1.21	.02	3328.50	.00	.55	1.94	2.000	.000	.00	1 .0
.530	.0903					.0003	.00	1.25	.21	.26	.013	.00	.00	PIPE
7.059	3327.276	1.202	3328.478	2.50	1.27	.02	3328.50	.00	.55	1.96	2.000	.000	.00	1 .0
.484	.0903					.0003	.00	1.20	.22	.26	.013	.00	.00	PIPE
7.543	3327.320	1.156	3328.476	2.50	1.33	.03	3328.50	.00	.55	1.98	2.000	.000	.00	1 .0
.459	.0903					.0003	.00	1.16	.24	.26	.013	.00	.00	PIPE
8.002	3327.361	1.112	3328.473	2.50	1.39	.03	3328.50	.00	.55	1.99	2.000	.000	.00	1 .0
.434	.0903					.0004	.00	1.11	.26	.26	.013	.00	.00	PIPE
8.436	3327.400	1.070	3328.470	2.50	1.46	.03	3328.50	.00	.55	2.00	2.000	.000	.00	1 .0
.408	.0903					.0004	.00	1.07	.28	.26	.013	.00	.00	PIPE

SI_LATERAL-MH1S_ULT.OUT

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SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 SOUTH, SDDI #1

ATKINS / ULTIMATE CONDITIONS

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*****
| 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 |
| L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch |
*****
| 8.844 | 3327.437 | 1.030 | 3328.467 | 2.50 | 1.53 | .04 | 3328.50 | .00 | .55 | 2.00 | 2.000 | .000 | .00 | 1 | .0 |
| .354 | .0903 | | | | | .0005 | .00 | 1.03 | .30 | .26 | .013 | .00 | .00 | PIPE |
| 9.198 | 3327.469 | .992 | 3328.461 | 2.50 | 1.61 | .04 | 3328.50 | .00 | .55 | 2.00 | 2.000 | .000 | .00 | 1 | .0 |
HYDRAULIC JUMP
| 9.198 | 3327.469 | .272 | 3327.741 | 2.50 | 9.75 | 1.48 | 3329.22 | .00 | .55 | 1.37 | 2.000 | .000 | .00 | 1 | .0 |
| 6.201 | .0903 | | | | | .0721 | .45 | .27 | 3.97 | .26 | .013 | .00 | .00 | PIPE |
| 15.399 | 3328.029 | .282 | 3328.311 | 2.50 | 9.25 | 1.33 | 3329.64 | .00 | .55 | 1.39 | 2.000 | .000 | .00 | 1 | .0 |
| 4.024 | .0903 | | | | | .0625 | .25 | .28 | 3.70 | .26 | .013 | .00 | .00 | PIPE |
| 19.423 | 3328.392 | .291 | 3328.683 | 2.50 | 8.82 | 1.21 | 3329.89 | .00 | .55 | 1.41 | 2.000 | .000 | .00 | 1 | .0 |
| 2.795 | .0903 | | | | | .0545 | .15 | .29 | 3.47 | .26 | .013 | .00 | .00 | PIPE |
| 22.218 | 3328.645 | .301 | 3328.946 | 2.50 | 8.41 | 1.10 | 3330.04 | .00 | .55 | 1.43 | 2.000 | .000 | .00 | 1 | .0 |
| 2.108 | .0903 | | | | | .0476 | .10 | .30 | 3.25 | .26 | .013 | .00 | .00 | PIPE |
| 24.326 | 3328.835 | .311 | 3329.146 | 2.50 | 8.02 | 1.00 | 3330.14 | .00 | .55 | 1.45 | 2.000 | .000 | .00 | 1 | .0 |
| 1.659 | .0903 | | | | | .0416 | .07 | .31 | 3.05 | .26 | .013 | .00 | .00 | PIPE |
| 25.985 | 3328.984 | .321 | 3329.305 | 2.50 | 7.65 | .91 | 3330.21 | .00 | .55 | 1.47 | 2.000 | .000 | .00 | 1 | .0 |
| 1.326 | .0903 | | | | | .0363 | .05 | .32 | 2.86 | .26 | .013 | .00 | .00 | PIPE |
| 27.311 | 3329.104 | .332 | 3329.436 | 2.50 | 7.29 | .83 | 3330.26 | .00 | .55 | 1.49 | 2.000 | .000 | .00 | 1 | .0 |
| 1.094 | .0903 | | | | | .0317 | .03 | .33 | 2.68 | .26 | .013 | .00 | .00 | PIPE |

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SI_LATERAL-MH1S_ULT.OUT

FILE: SI_Lateral-MH1S_ULT.WSW

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WATER SURFACE PROFILE LISTING

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SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 SOUTH, SDDI #1

ATKINS / ULTIMATE CONDITIONS

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/I.D.	ZL	No Wth	*****	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	*****	
28.404	3329.203	.343	3329.546	2.50	6.95	.75	3330.30	.00	.55	1.51	2.000	.000	.00	1	.0	
	.899	.0903				.0277	.02	.34	2.51	.26	.013	.00	.00	PIPE		
29.303	3329.284	.355	3329.639	2.50	6.63	.68	3330.32	.00	.55	1.53	2.000	.000	.00	1	.0	
	.757	.0903				.0242	.02	.36	2.35	.26	.013	.00	.00	PIPE		
30.060	3329.352	.367	3329.719	2.50	6.32	.62	3330.34	.00	.55	1.55	2.000	.000	.00	1	.0	
	.642	.0903				.0211	.01	.37	2.20	.26	.013	.00	.00	PIPE		
30.702	3329.410	.379	3329.789	2.50	6.03	.56	3330.35	.00	.55	1.57	2.000	.000	.00	1	.0	
	.533	.0903				.0185	.01	.38	2.06	.26	.013	.00	.00	PIPE		
31.235	3329.458	.392	3329.850	2.50	5.75	.51	3330.36	.00	.55	1.59	2.000	.000	.00	1	.0	
	.453	.0903				.0161	.01	.39	1.93	.26	.013	.00	.00	PIPE		
31.688	3329.499	.405	3329.904	2.50	5.48	.47	3330.37	.00	.55	1.61	2.000	.000	.00	1	.0	
	.372	.0903				.0141	.01	.41	1.81	.26	.013	.00	.00	PIPE		
32.060	3329.533	.419	3329.952	2.50	5.22	.42	3330.38	.00	.55	1.63	2.000	.000	.00	1	.0	
	.314	.0903				.0123	.00	.42	1.70	.26	.013	.00	.00	PIPE		
32.375	3329.561	.433	3329.994	2.50	4.98	.39	3330.38	.00	.55	1.65	2.000	.000	.00	1	.0	
	.252	.0903				.0108	.00	.43	1.59	.26	.013	.00	.00	PIPE		
32.626	3329.584	.448	3330.032	2.50	4.75	.35	3330.38	.00	.55	1.67	2.000	.000	.00	1	.0	
	.208	.0903				.0094	.00	.45	1.49	.26	.013	.00	.00	PIPE		

SI_LATERAL-MH1S_ULT.OUT

FILE: SI_Lateral-MH1S_ULT.WSW

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WATER SURFACE PROFILE LISTING

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SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 SOUTH, SDDI #1

ATKINS / ULTIMATE CONDITIONS

*****																	*****	
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/ 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				
*****																	*****	
32.835	3329.603	.463	3330.066	2.50	4.53	.32	3330.38	.00	.55	1.69	2.000	.000	.00	1	.0			
	.158	.0903				.0082	.00	.46	1.39	.26	.013	.00	.00	PIPE				
32.992	3329.617	.479	3330.096	2.50	4.32	.29	3330.39	.00	.55	1.71	2.000	.000	.00	1	.0			
	.112	.0903				.0072	.00	.48	1.31	.26	.013	.00	.00	PIPE				
33.104	3329.627	.496	3330.123	2.50	4.12	.26	3330.39	.00	.55	1.73	2.000	.000	.00	1	.0			
	.082	.0903				.0063	.00	.50	1.22	.26	.013	.00	.00	PIPE				
33.187	3329.634	.513	3330.147	2.50	3.92	.24	3330.39	.00	.55	1.75	2.000	.000	.00	1	.0			
	.056	.0903				.0055	.00	.51	1.15	.26	.013	.00	.00	PIPE				
33.242	3329.639	.530	3330.169	2.50	3.74	.22	3330.39	.00	.55	1.77	2.000	.000	.00	1	.0			
	.008	.0903				.0048	.00	.53	1.07	.26	.013	.00	.00	PIPE				
33.250	3329.640	.550	3330.190	2.50	3.56	.20	3330.39	.00	.55	1.79	2.000	.000	.00	1	.0			

SI_LATERAL-MH1S_ULT.WSW

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T1 SUMMERLIN WEST VILLAGE 22 .....0
T2 KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 1 SOUTH, SDDI #1
T3 ATKINS / ULTIMATE CONDITIONS .....
SO .....4.0003327.000 1 .....3328.487
R .....33.2503329.640 2 .....0.013 .....0.000 0.000 1 .....
SH .....33.2503329.640 2 .....3329.640
CD 1 4 1 .....0.000 3.000 .....0.000 0.000 0.000 .....0.00
CD 2 4 1 .....0.000 2.000 .....0.000 0.000 0.000 .....0.00
CD 3 4 1 .....0.000 1.500 .....0.000 0.000 0.000 .....0.00
Q .....2.500 .....0

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SI_LATERAL-MH4N_ULT.OUT

FILE: SI_Lateral-MH4N_ULT.WSW

W S P G W - CIVILDESIGN Version 14.06

PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 7-31-2019 Time: 11: 1:39

SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 4 NORTH, SDDI #5

ATKINS / ULTIMATE CONDITIONS

```

*****
| 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
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
| | | | | | | | | | | | | | | |
671.170 3372.830 5.770 3378.600 3.00 .95 .01 3378.61 .00 .60 .00 .00 2.000 .000 .00 1 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
9.050 .1226 | | | | | .0002 .00 5.77 .00 .27 .013 .00 .00 PIPE
| | | | | | | | | | | | | | | |
680.220 3373.940 4.662 3378.602 3.00 .95 .01 3378.62 .00 .60 .00 .00 2.000 .000 .00 1 .0
-|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-

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SI_LATERAL-MH4N_ULT.WSW

T1 SUMMERLIN WEST VILLAGE 220
T2 KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 4 NORTH, SDDI #5
T3 ATKINS / ULTIMATE CONDITIONS
SO ...671.1703372.830...2.....3378.600
R ...680.2203373.940...2......013......000...0.000...1.....
SH ...680.2203373.940...2.....3373.94
CD...1...4...1......000...3.000......000...0.000...0.000...0.00
CD...2...4...1......000...2.000......000...0.000...0.000...
.00.....
Q3.000...0

SI_LATERAL-MH4S_ULT.OUT

FILE: SI_Lateral-MH4S_ULT.WSW

W S P G W - CIVILDESIGN Version 14.06

PAGE 1

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 7-31-2019 Time:11: 4:20

SUMMERLIN WEST VILLAGE 22

KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 4 SOUTH, SDDI #4

ATKINS / ULTIMATE CONDITIONS

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/ 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			

671.170	3372.830	5.770	3378.600	33.00	10.50	1.71	3380.31	.00	1.90	.00	2.000	.000	.00	1	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
23.950	.0463					.0213	.51	5.77	.00	1.21	.013	.00	.00	PIPE			
695.120	3373.940	5.255	3379.195	33.00	10.50	1.71	3380.91	.00	1.90	.00	2.000	.000	.00	1	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0500					.0194	.04	5.26	.00		.013	.00	.00	PIPE			
697.120	3374.040	5.771	3379.811	30.00	9.55	1.42	3381.23	.00	1.86	.00	2.000	.000	.00	1	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.000	.0499					.0176	.04	5.77	.00	1.11	.013	.00	.00	PIPE			
699.120	3374.140	5.777	3379.917	30.00	9.55	1.42	3381.33	.00	1.86	.00	2.000	.000	.00	1	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
29.510	.0499					.0172	.03	5.78	.00	1.11	.013	.00	.00	PIPE			
728.630	3375.310	5.777	3381.087	30.00	9.55	1.42	3382.50	.00	1.86	.00	2.000	.000	.00	1	.0		
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

SI_LATERAL-MH4S_ULT.WSW

T1 SUMMERLIN WEST VILLAGE 220
T2 KESTREL CREEK AVENUE (STREET I) / LATERAL AT MH 4 SOUTH, SDDI #4
T3 ATKINS / ULTIMATE CONDITIONS
SO ...671.1703372.830 23378.600
R ...695.1203373.940 20130.000 0.000 1
JX ...697.1203374.040 2 30133.0003374.0400.00.000
R ...699.1203374.140 20130.000 0.000 1
SH ...728.6303375.310 23375.31
CD ...1 4 ...10.0003.0000.0000.0000.000.0
CD ...2 4 ...10.0002.0000.0000.0000.000.0
CD ...3 4 ...10.0002.5000.0000.0000.000.0
Q30.0000

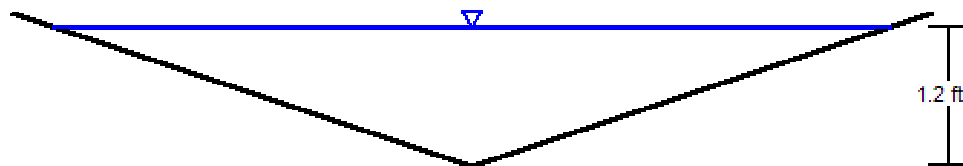
C.4 Riprap Calculations

Worksheet for Interim Triangular Roadside Swale

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.037
Channel Slope	0.069 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	29.00 cfs
Results	
Normal Depth	1.2 ft
Flow Area	4.1 ft ²
Wetted Perimeter	7.4 ft
Hydraulic Radius	0.6 ft
Top Width	7.00 ft
Critical Depth	1.4 ft
Critical Slope	0.024 ft/ft
Velocity	7.10 ft/s
Velocity Head	0.78 ft
Specific Energy	1.95 ft
Froude Number	1.639
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.2 ft
Critical Depth	1.4 ft
Channel Slope	0.069 ft/ft
Critical Slope	0.024 ft/ft

Cross Section for Interim Triangular Roadside Swale

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.037
Channel Slope	0.069 ft/ft
Normal Depth	1.2 ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	29.00 cfs



V: 1
H: 1

HEC-11 RIPRAP SIZING CALCULATIONS

Location: Summerlin West Village 22 Street I Interim Triangular Roadside Swale
 Conditions: $Q < 50$ cfs

Equations:

$$K_1 = [1 - (\sin^2 \theta / \sin^2 \Phi)]^{0.5} \quad (\text{eq. 7, pg. 30})$$

$$d_{\text{avg}} = \text{Flow Area} / \text{Top Width}$$

$$n = 0.39 S_f^{0.38} R^{-0.16} \quad (\text{eq. 4, pg. 23})$$

(slopes > 0.002 ft/ft and $D_{50} > 0.2$ ft)

$$\text{Bank \& Bed } D_{50} = 0.001 V_a^3 / (d_{\text{avg}}^{0.5} K_1^{1.5}) \quad (\text{eq. 6, pg. 30})$$

$$C_{\text{sg}} = 2.12 / (S_g - 1)^{1.5} \quad (\text{eq. 8, pg. 31})$$

$$C_{\text{sf}} = (SF / 1.2)^{1.5} \quad (\text{eq. 9, pg. 31})$$

$$\text{Stability Factor} = 1.3 \quad (\text{Table 1 pg 31})$$

Gradually Varying Flow; Moderate Bed Curvature ($30 > \text{curve radius/channel width} > 10$)
 Impact from waves or floating debris moderate

$$C = C_{\text{sg}} C_{\text{sf}}$$

$$D'_{50} = C D_{50}$$

Input Variables:

Channel BW =	0	ft	
Energy Grade Slope "S _f " =	0.069	ft/ft	
Hydraulic Radius "R" =	0.6	ft	
Flow area =	4.1	sqft	Balance w/ Manning's n until
Wetted perimeter =	7.4	ft	results match input FlowMaster
Top width =	7	ft	
Average channel velocity =	7.1	fps	
Depth of flow =	1.2	ft	
Side slope horizontal (H:1) =	3		
Riprap angle of repose "Φ" =	41	degrees	(Chart 4, pg. 129 HEC-11)
Rock riprap specific gravity =	2.65		
Stability Factor =	1.3		
D ₅₀ =	0.67	ft	

Calculations:

$$\theta = 18.4 \text{ degrees}$$

$$K_1 = 0.876$$

$$d_{\text{avg}} = 0.59 \text{ ft}$$

$$\text{Manning's } n = 0.153$$

$$\text{Bank } D_{50} = 0.38 \text{ ft}$$

$$\text{Bed } D_{50} = 0.47$$

$$C_{\text{sf}} = 1.128$$

$$C_{\text{sg}} = 1.000$$

$$C = 1.128$$

$$\text{Bank } D'_{50} = 0.43 \text{ ft}$$

$$\text{Bed } D'_{50} = 0.53 \text{ ft}$$

Stable? **Yes**

$$t_o = 2.4 \text{ lb/ft}^2 \text{ (average shear stress on channel)}$$

$$t_c = 2.8 \text{ lb/ft}^2 \text{ (critical shear stress-resistance to movement)}$$

Stable? **Yes**

CCRFCD Equations (d₅₀ Eq.s use Eq. 732 for Manning's n)

R _h =	0.54	ft (Eq. 732 for R _h > 2d ₅₀)
n =	0.037	Formula Under Predicts n Value
Y/d ₅₀ =	1.8	(Eq. 733 for 1.5 < Y/d ₅₀ < 185)
n =	0.076	Yes
d ₅₀ =	0.83	ft (Eq. 734)
d ₅₀ =	1.19	ft (Eq. 735, generally larger sizes)
d ₅₀ =	1.74	ft (Eq. 736 for S _e =S)

Stability Factor:

- 1.0 - 1.2 Uniform flow; straight or mildly curving reach (curve radius/channel width > 30); impact from wave action and floating debris is minimal; little or no uncertainty in design parameters.
- 1.3 - 1.6 Gradually varying flow; moderate bend curvature ($30 > \text{curve radius/channel width} > 10$); impact from waves or floating debris moderate.
- 1.6 - 2.0 Approaching rapidly varying flow; sharp bend curvature ($10 > \text{curve radius/channel width}$); significant impact potential from floating debris and/or ice; significant wind and/or boat generated waves (1-2 ft); high flow turbulence; turbulently mixing flow at bridge abutments; significant uncertainty in design parameters.

= Values referenced in flow master

Spreadsheet not for pier scour or wave action

Worksheet for Interim Berm - Bare Earth

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.010 ft/ft
Discharge	29.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.00
0+06	0.00
0+56	1.00
0+59	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.00)	(0+59, 2.00)	0.025

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	0.6 ft
Elevation Range	0.0 to 2.0 ft
Flow Area	10.5 ft ²
Wetted Perimeter	33.5 ft
Hydraulic Radius	0.3 ft
Top Width	33.44 ft
Normal Depth	0.6 ft
Critical Depth	0.6 ft
Critical Slope	0.014 ft/ft
Velocity	2.75 ft/s
Velocity Head	0.12 ft
Specific Energy	0.75 ft
Froude Number	0.863
Flow Type	Subcritical

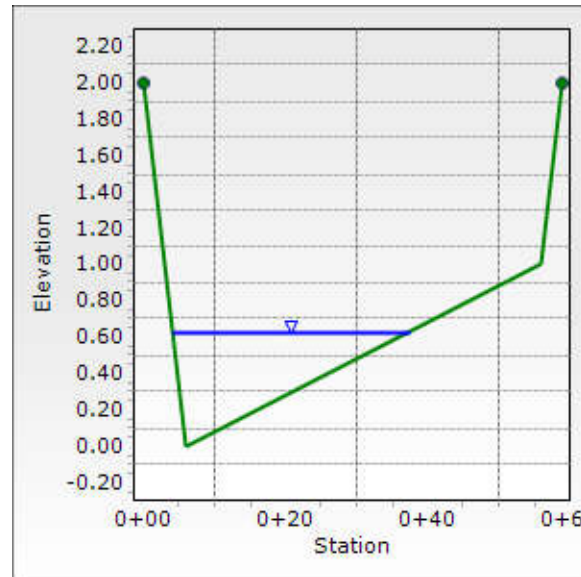
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.0 ft

Worksheet for Interim Berm - Bare Earth

GVF Input Data	
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.6 ft
Critical Depth	0.6 ft
Channel Slope	0.010 ft/ft
Critical Slope	0.014 ft/ft

Cross Section for Interim Berm - Bare Earth

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.010 ft/ft
Normal Depth	0.6 ft
Discharge	29.00 cfs



Appendix D. CD-ROM

CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE 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 CONTRACTORS. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON 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 UP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY THE (NOVA, G-18-176, 12/03/18) APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH STAS 100, 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE UDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APPROX. FLOW LINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.
- WALL NOTES:
16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF MDT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC, THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. AFTER HAUNCHING AND PRIOR TO BACKFILL OPERATIONS WHICH WOULD COVER SANITARY SEWER AND STORM DRAIN FACILITIES, CONTRACTOR IS REQUIRED TO SCHEDULE CIVIL OPEN-TRENCH UTILITY SURVEY INSPECTION FOR DETERMINATION OF FINAL LOCATION COORDINATES. FACILITIES TO BE LOCATED BY CLV SHALL INCLUDE: AT A MINIMUM THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIST THE PUBLIC RIGHT-OF-WAY, SEWER AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS.
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED 06/04/2018

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 BARRIAGES, ETC.

REVISED 04/15/10

CONSTRUCTION CONCURRENCY NOTE

THE FOLLOWING SEPARATE VILLAGE 22 ROADWAY IMPROVEMENT PLANS ARE ASSUMED TO BE CONSTRUCTED CONCURRENTLY AND ARE SHOWN AS FUTURE (BY OTHERS):

- KETTLE RIDGE DRIVE (FLEET WING DRIVE TO LAKE MEAD BLVD)
- DESERT FOOTHILLS DRIVE (FLEET WING DRIVE TO LAKE MEAD BLVD)
- LAKE MEAD BOULEVARD (DESERT FOOTHILLS DRIVE TO SCURRY BEND DRIVE)
- CLOWDER PASS WAY (DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE)

DEVIATIONS FROM STANDARDS

NONE.

CITY OF LAS VEGAS FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A CITY INSPECTOR SHALL VERIFY THAT LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. IFC § 105.7.12
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS SHALL BE INSTALLED BEFORE COMMENCEMENT OF ANY CONSTRUCTION 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 § 507.2.1, NFPA 24
6. ALL UNDERGROUND VERIFICATION OF CONSTRUCTION, AND FLUSH VERIFICATION 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 § 207.2.1, NFPA 24
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. IFC § 507
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. IFC § 507.5.7.1
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. IFC § 507
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: IFC § C102
- RESIDENTIAL - 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
 - COMMERCIAL - 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 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 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION.
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 § 102.4
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. IFC § C102.7
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. IFC § C102.6
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LINES TO BE INSTALLED. ONE SOURCE SHALL BE PROVIDED BY THE CITY OF LAS VEGAS. 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 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. IFC § 503.2.7, 503.2.8
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. IFC § 503.2.4
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 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 24FT WIDE, FLOW LINE TO FLOW LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LINES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. IFC § 503.2.1.1
24. FIRE APPARATUS ACCESS ROADS SHALL BE REPORTED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. IFC § 503.1.1
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WITH BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. IFC § 503.1.2
16. 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 FLOW LINE TO FLOW LINE, ONE SIGN AT THE END OF FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY. THE SIGNS SHALL BE PAINTED OR PAID WITH PAVENTMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. IFC § 503.3
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC § 503.6 AND IFC APPENDIX M.

REVISED MARCH 1, 2016

CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN SCURRY BEND DRIVEWAYS AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE STOP SIGN. THE CONTRACTOR SHALL INSTALL THE STOP SIGN AT THE END OF THE NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SUGGESTED ROUTE TO SCHOOL" IS ENCLOSED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD", THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL UTILIZE TYPE XI RETROREFLECTIVE SHEETING IN ACCORDANCE WITH CCAUS 627 AND 716 AND SHALL HAVE AN ANTI-GRAFFITI PROTECTIVE OVERLAY FILM THAT IS A MATCHING COMPONENT TO, AND OF THE SAME MANUFACTURER AS THE RETROREFLECTIVE SHEETING TO WHICH IT IS APPLIED. SCURRY BEND DRIVEWAY SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY VEHICLE TRAFFIC ONTO THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF SCURRY BEND DRIVEWAY SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR MAY WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA (RTC), IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE PAVING TO REQUEST THE TRAFFIC ENGINEER TO REVIEW THE EXISTING TRAFFIC SIGNALS AND TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNING, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

REVISED JUNE 4, 2018

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") AND LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE 12" S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVWMD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/15/10

CITY OF LAS VEGAS STREET LIGHT NOTES

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION (USS), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA" (USD), LATEST REVISION.
2. DESIGN PROFESSIONAL AND CONTRACTOR SHALL VERIFY CITY'S LATEST LED FIXTURE SPECIFICATIONS AND APPROVED FIXTURES PER CLV WEBSITE, UNDER BUILDING AND SAFETY FORMS, PRIOR TO ORDERING MATERIALS.
3. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS, ETC., LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC AND CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623 OF THE USS.
4. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION IN ACCORDANCE WITH SECTION 623 G.03.01 OF THE USS.
5. ALL EMPTY CONDUIT SHALL HAVE AT LEAST ONE GREEN NO. #8 AWG WIRE INSTALLED AS TRACER WIRE IN ACCORDANCE WITH SECTION 623 G.02.01 OF THE USS PRIOR TO BACKFILLING AND FINAL INSPECTION.
6. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, SHALL LEAVE A MINIMUM CLEARANCE IN COMPLIANCE WITH USD NO. 320A WHEN POLE IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHT POLES.
7. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TRAFFIC ENGINEERING DIVISION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
8. SERVICE POINTS SHALL BE COORDINATED WITH NV ENERGY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICEPOINTS SHALL BE SHOWN ON THE PLANS.
9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREETLIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREETLIGHT BASES ARE INSTALLED, AT NO EXPENSE TO THE CITY OF LAS VEGAS.
10. THE CONTRACTOR SHALL FURNISH COMPLETE CONDUIT, WIRE, ETC. FROM SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS.

REVISED 6/4/2018 (LD VERSION)

LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

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 NVRI00000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS MAY APPLY. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVRI00000, 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.

SOUTHWEST NEVADA - SOUTHWEST GAS CORPORATION

GENERAL NOTES

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

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

CAUTION: HIGH PRESSURE GAS!
CALL SOUTHWEST GAS AT 702-400-7289 FOR STANDBY WHEN EXCAVATING OVER OR
NEAR HIGH PRESSURE GAS LINES 48 HOURS PRIOR TO CONSTRUCTION

SOUTHWEST GAS CORPORATION

GRADING NOTES

- INDICATED GRADES OTHER THAN TC, FG & GUTTER FL ARE ROUGH GRADES.
- 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 PLAN WILL RESULT IN QUANTITY CHANGES.
- SOILS REPORT PREPARED BY: NOVA GEOTECHNICAL & INSPECTION SERVICES 4480 W. HACIENDA AVENUE, SUITE 104, LAS VEGAS, NV 89118, PHONE: 702-873-3478, PROJECT NO.: G-18-176, DATED: DATED: DECEMBER 3, 2018.
- EARTHWORK QUANTITIES (RAW):
 - CUT = 102,100 CUBIC YARDS
 - FILL = 19,400 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.

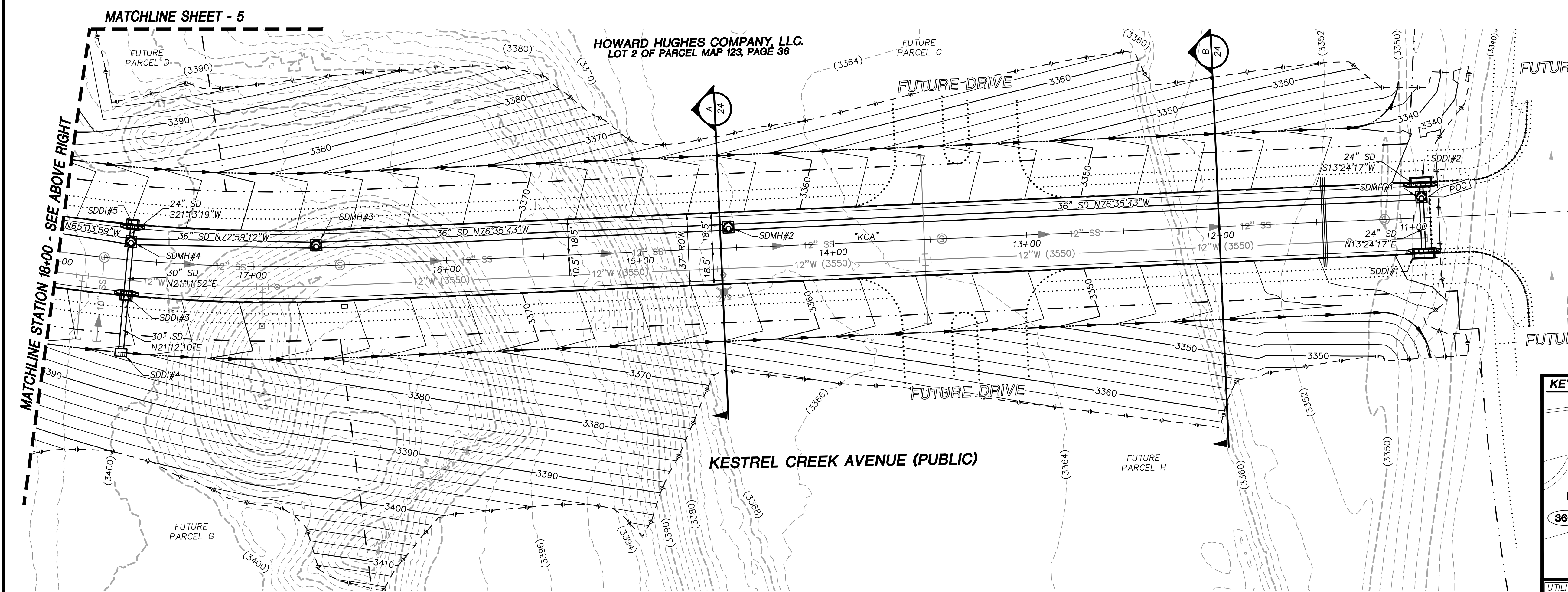
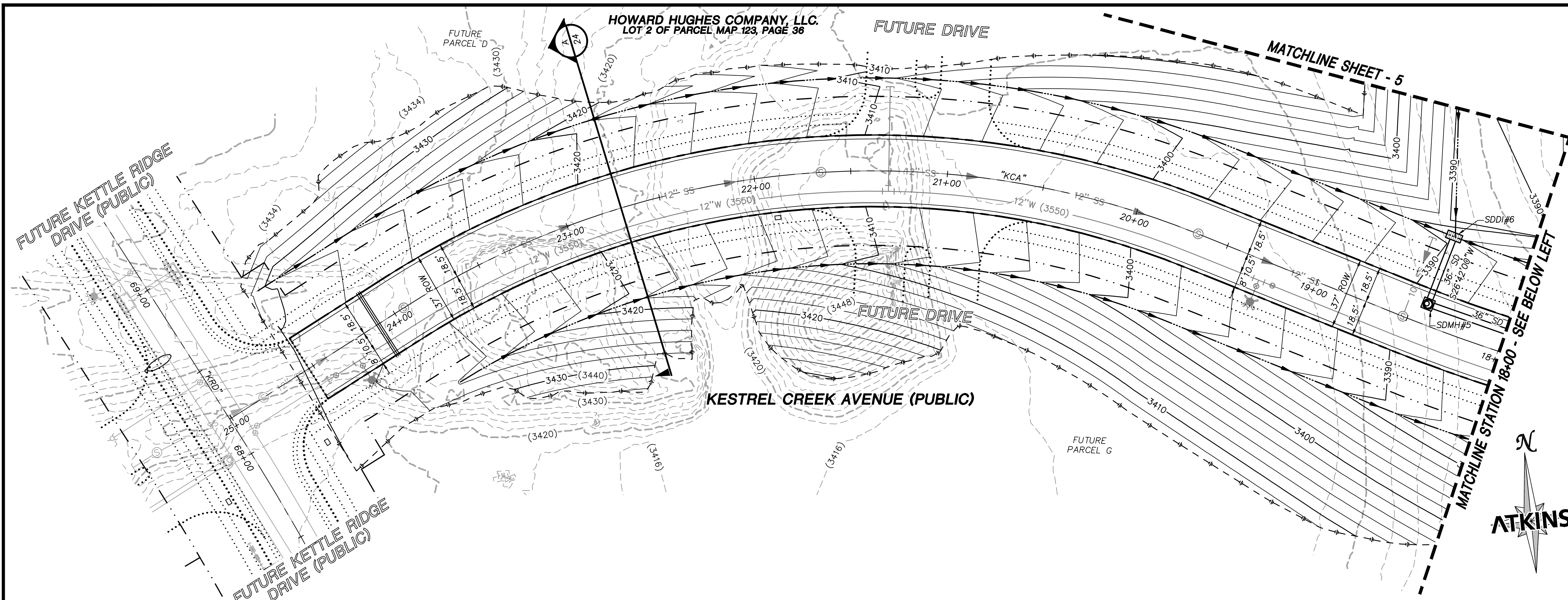
GENERAL NOTES

1. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED PUBLIC ENTITIES, THE PROJECT ENGINEER AND CLARK COUNTY AT LEAST 48 HOURS PRIOR TO THE COMMENCEMENT OF WORK.
2. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE CONTRACT DRAWINGS. ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE PROJECT ENGINEER.
3. 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 ISSUE; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE.
4. LOCATIONS OF UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM INFORMATION RECEIVED FROM THE APPLICABLE UTILITY COMPANIES. NEITHER THE OWNER NOR ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES OR STRUCTURES NOT SHOWN, OR NOT IN THE LOCATION SHOWN ON THE DRAWINGS. CONTRACTOR TO VERIFY EXACT LOCATION OF UTILITIES PRIOR TO START OF CONSTRUCTION. THE CONTRACTOR'S RESPONSIBILITY REGARDING UTILITIES SHALL BE AS REQUIRED UNDER SECTION 107.17 OF THE "UNIFORM STANDARD SPECIFICATIONS FOR CLARK COUNTY AREA, NEVADA" AND AS PROVIDED IN THE SPECIFICATIONS.
5. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES TO PROTECT EXISTING UTILITY LINES, STRUCTURES, AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE. ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE COUNTY ENGINEER OR OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
6. THE CONTRACTOR SHALL NOT REMOVE TREES, SHRUBS, LAWNS, FENCES, SIGNS, STRUCTURES, LIGHTS, OR ANY OTHER EXISTING IMPROVEMENTS OUTSIDE OF STREET RIGHT-OF-WAY, EXCEPT WHERE REQUIRED TO DO SO BY THE CONTRACT DRAWINGS OR THE PROJECT ENGINEER. REPLACEMENT, RELOCATION OR RECONSTRUCTION OF ALL EXISTING IMPROVEMENTS INCLUDING SPRINKLER SYSTEMS, LAWNS, FENCES, WALLS, SIGNS, STEPS, SIDEWALKS, DRIVEWAYS, LAWN LIGHTS, AND ALL OTHER ITEMS APPLICABLE TO THIS CONTRACT SHALL BE REQUIRED BY THE PROJECT ENGINEER.
7. THE CONTRACTOR SHALL BACKFILL AND FINE GRADE ALL CUT OR FILL SLOPES TO MATCH EXISTING CONDITIONS TO THE SATISFACTION OF THE PROJECT ENGINEER. WHERE EXISTING LAWNS ARE DAMAGED BY THE CONTRACTOR'S OPERATIONS THE CONTRACTOR WILL SOD THE AFFECTED AREA TO A CONDITION EQUAL TO OR BETTER THAN THAT WHICH EXISTED PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF TRANSITIONS TO BE AS SHOWN PER CONTRACT DRAWINGS.
9. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.550.
10. THE ACTUAL LOCATIONS OF SAW CUT LINES, LIMITS OF COLD MILLING, LIMITS OF DRIVEWAY TRANSITIONS, AND LANDSCAPE REPAIR SHALL BE DETERMINED IN THE FIELD BY THE RESIDENT PROJECT REPRESENTATIVE.
11. THE ACTUAL LIMITS OF EXISTING OPEN GRADE REMOVAL AND UDACS APPLICATION SHALL BE DETERMINED IN THE FIELD BY THE RESIDENT PROJECT REPRESENTATIVE.
12. ALL STANDARD DRAWINGS REFERENCED IN THIS SET ARE BASED ON THE CURRENT "UNIFORM STANDARD DRAWINGS REVISION SET I-1997 RELEASE".
13. UNLESS OTHERWISE SHOWN ON THE CONTRACT DRAWINGS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OR RELOCATION OF ALL WATER SERVICES AND METERS WHICH INTERFERE WITH IMPROVEMENTS SHOWN ON THE CONTRACT DRAWINGS.
14. THE CONTRACTOR SHALL MAINTAIN AN ONGOING REMOVAL PROCESS OF ALL SPILLAGE OF EXCAVATION MATERIAL ON ALL PAVED STREETS.
15. CURB AND GUTTER OF A GRADE OF LESS THAN 4/10 OF ONE PERCENT SHALL BE CONSTRUCTED BY FORMING. EACH JOINT SHALL BE CHECKED FOR GRADE PRIOR TO CONSTRUCTION AND WATER TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION.
16. THE CONTRACTOR SHALL VERIFY IN THE FIELD ALL DIMENSIONS, EXISTING CONDITIONS AND POINTS OF CONNECTION WITH ADJOINING PROPERTY (PUBLIC AND PRIVATE). ANY DISCREPANCIES SHALL BE CALLED TO THE ATTENTION OF THE PROJECT ENGINEER PRIOR TO PROCEEDING WITH THE WORK.
17. REMOVAL OR RELOCATION OF POWER POLES, TELEPHONE POLES, JOINTLY-OWNED POLES, AND APPURTENANCES WHICH INTERFERE WITH IMPROVEMENTS REQUIRED TO BE CONSTRUCTED UNDER THIS CONTRACT, SHALL BE THE RESPONSIBILITY OF THE RESPECTIVE UTILITY COMPANY. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH THE UTILITY COMPANIES FAR ENOUGH IN ADVANCE SO AS TO NOT IMPACT THE SCHEDULE.
18. COX COMMUNICATIONS SHALL BE RESPONSIBLE FOR THE VERTICAL OR HORIZONTAL ADJUSTMENT OF ALL CATV FACILITIES WHICH INTERFERE WITH IMPROVEMENTS SHOWN ON THE CONTRACT DRAWINGS, UNLESS NOTED OTHERWISE.
19. NV ENERGY SHALL BE RESPONSIBLE FOR THE RELOCATION OF UNDERGROUND OR OVERHEAD POWER LINES THAT INTERFERE WITH THE REQUIRED IMPROVEMENTS AS SHOWN ON THE CONTRACT DRAWINGS.
20. EMBARQ SHALL BE RESPONSIBLE FOR THE VERTICAL OR HORIZONTAL ADJUSTMENT OF ALL TELEPHONE FACILITIES WHICH INTERFERE WITH IMPROVEMENTS SHOWN ON CONTRACT DRAWINGS, UNLESS NOTED OTHERWISE.

LAS VEGAS VALLEY WATER DISTRICT (LVWVD) NOTES

LVWVD PROJECT XXXXX

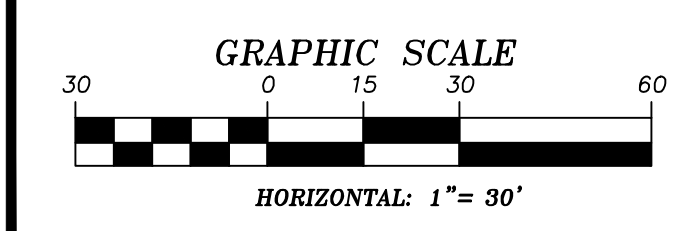
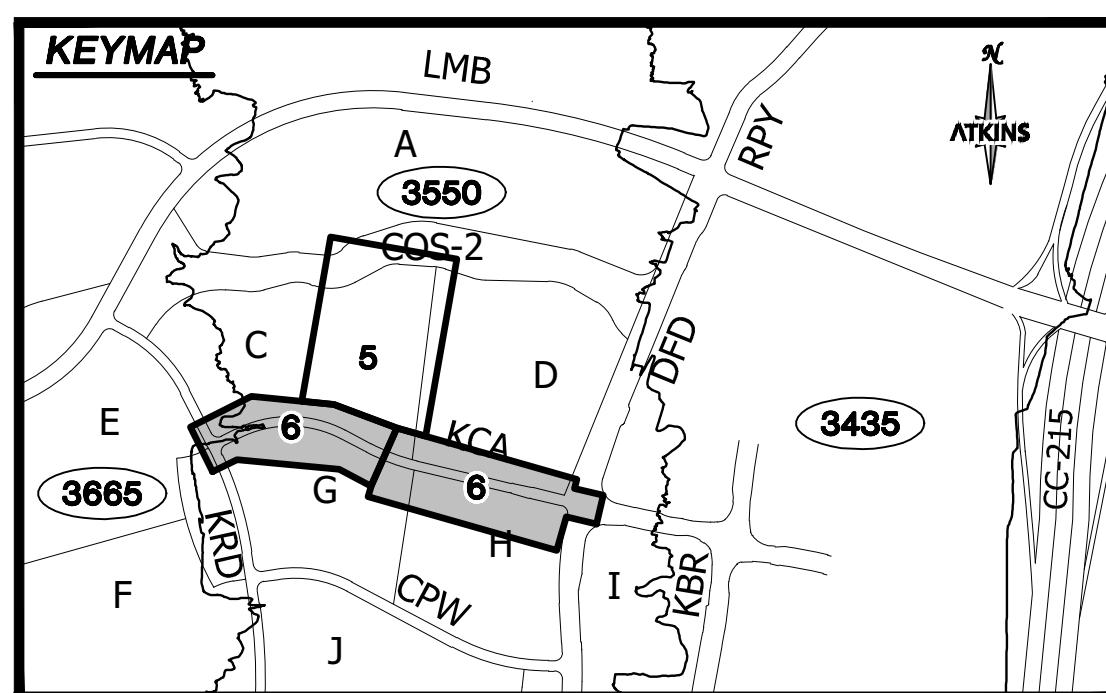
- NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVWVD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVWVD COMMUNICATION SUPPORT CENTER (238-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY THE CONTRACTOR PRIOR TO THE REQUESTED LVWVD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
- ALL WORK SHALL CONFORM TO LVWVD 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 SUPERCEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
- ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
- A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVWVD.
- ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVWVD APPROVED SERVICE SADDLES.
- ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
- ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
- ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
- ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED, AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVWVD DISTRIBUTION SYSTEM.
- THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVWVD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802 TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
- ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01 AND APPROVED BY THE LVWVD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
- ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVWVD PRE-APPROVED MATERIALS AND MANUFACTURER'S LISTING FOR NEW FACILITIES, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.
- TELEPHONE "CALL BEFORE YOU DIG" AT 1-800-642-2444 OR 811.
- THE INSTALLATION OF LAS VEGAS VALLEY WATER DISTRICT (LVWVD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS AS SHOWN TO BE IN COMPLIANCE WITH THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA. ANY REPAIR WORK DONE BY THE LV



SUMMARY OF QUANTITIES		
DESCRIPTION	QUANTITY	UNIT
DRAINAGE		
36" RCP CLASS III	755	LF
30" RCP CLASS III	55	LF
24" RCP CLASS III	25	LF
10' TYPE CM2 SDDI	2	EA
5' TYPE CM2 SDDI	2	EA
4' X 6' NDOT TYPE 2 DROP INLET	1	EA
4' X 8' NDOT TYPE 2 DROP INLET	1	EA
TYPE III SDMH	5	EA

MASTER PLAN NOTE
THIS SHEET IS FOR INFORMATIONAL PURPOSES ONLY. IT IS AN OVERALL REPRESENTATION OF THE UTILITY FOR REVIEW AND COORDINATION WITH OTHER PROJECT DETAILS WITHIN THIS PLAN SET.

- STORM DRAIN NOTES**
- SEE ROADWAY PLAN AND PROFILE SHEETS FOR CONSTRUCTION DETAILS.
 - ALL STORM DRAIN MATERIAL TO BE CLASS III REINFORCED CONCRETE PIPE, UNLESS OTHERWISE NOTED IN PROFILES.
 - CONTRACTOR TO PROVIDE 6" MINIMUM OF CLEARANCE BETWEEN OUTSIDE OF PIPE TO INSIDE WALL OF STORM DRAIN STRUCTURES.



SOILS REPORT
BY NOVA
PROJECT NO. G-18-176
DATED 12/03/18
EARTHWORK QUANTITIES (RAW):
CUT= 102,100 CU YDS
FILL= 19,400 CU YDS

GRADING PLAN CERTIFICATION
PAUL BATES PE#18723 DATE
CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.
DS#XXX-0000

BASIS OF BEARING
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

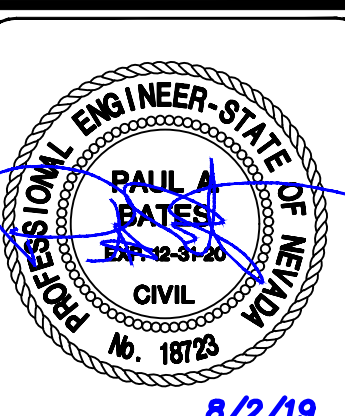
BENCHMARK
CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAV088 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
underground
1-702-432-5300

Call before you Dig
underground
1-800-642-2444

Call before you Dig
underground
1-702-227-2929

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2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200

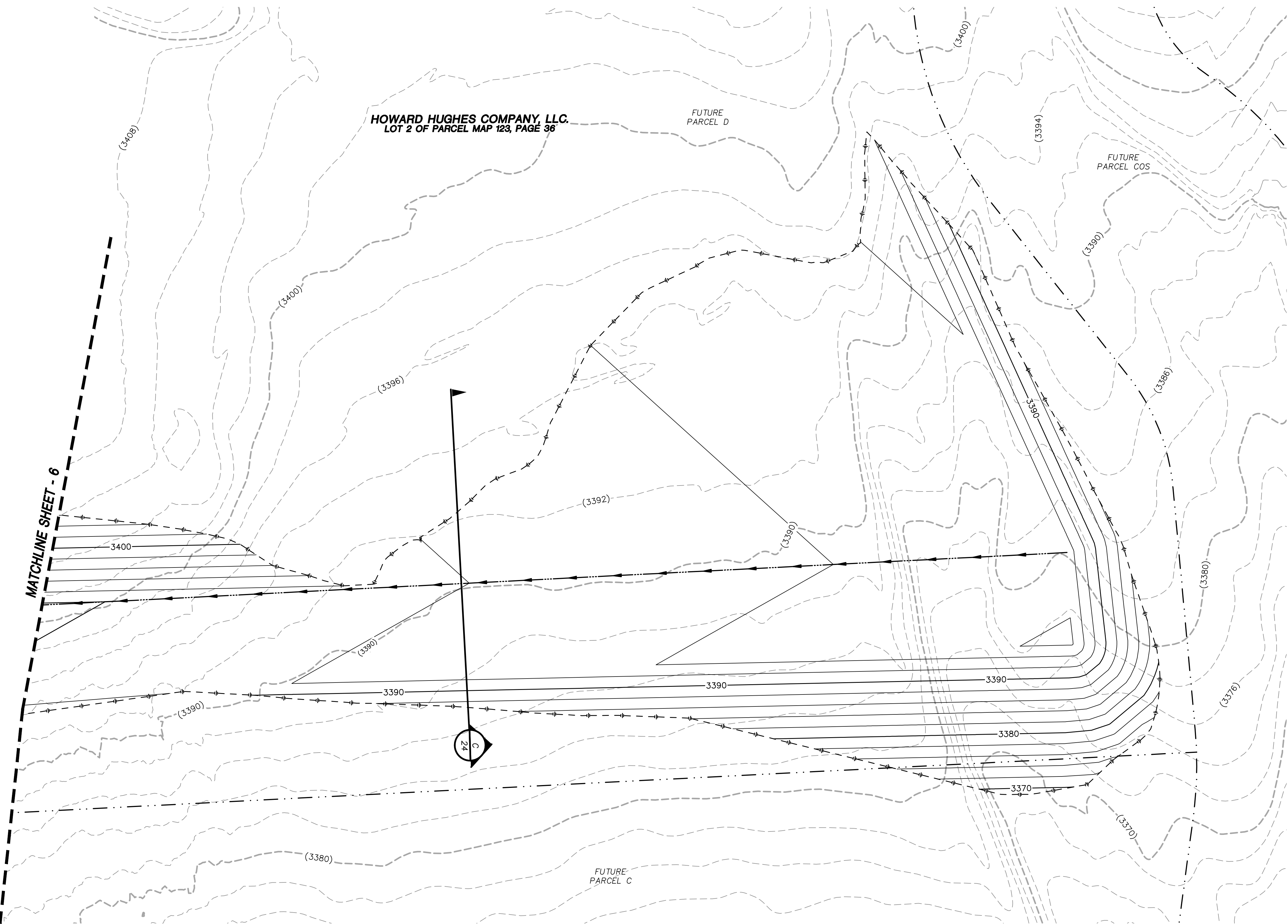
SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET I)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

MASTER DRAINAGE PLAN

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
DRAWING NO. 5 / 27
VERT.: NONE

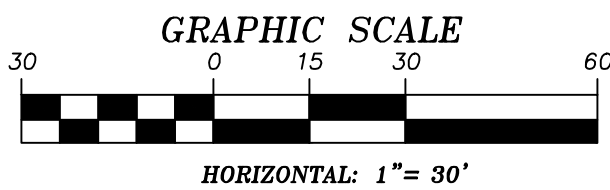
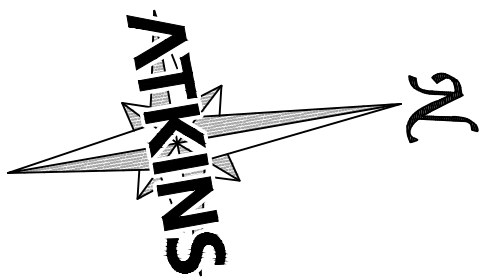
JOB NO. 100060654
CLV 00-00000

X:\Projects\Summerlin\ Village 22\100060654 - V22N Street I (Desert Foothills to Street J)\Sheets\60654-06-STRW-SDI.dwg LAYOUT: MASTER DRAINAGE PLAN Aug 02, 2019 - 10:31AM



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SOILS REPORT

BY NOVA
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DATED 12/03/18
EARTHWORK QUANTITIES (RAW):
CUT= 102,100 CU YDS
FILL= 19,400 CU YDS

GRADING PLAN CERTIFICATION

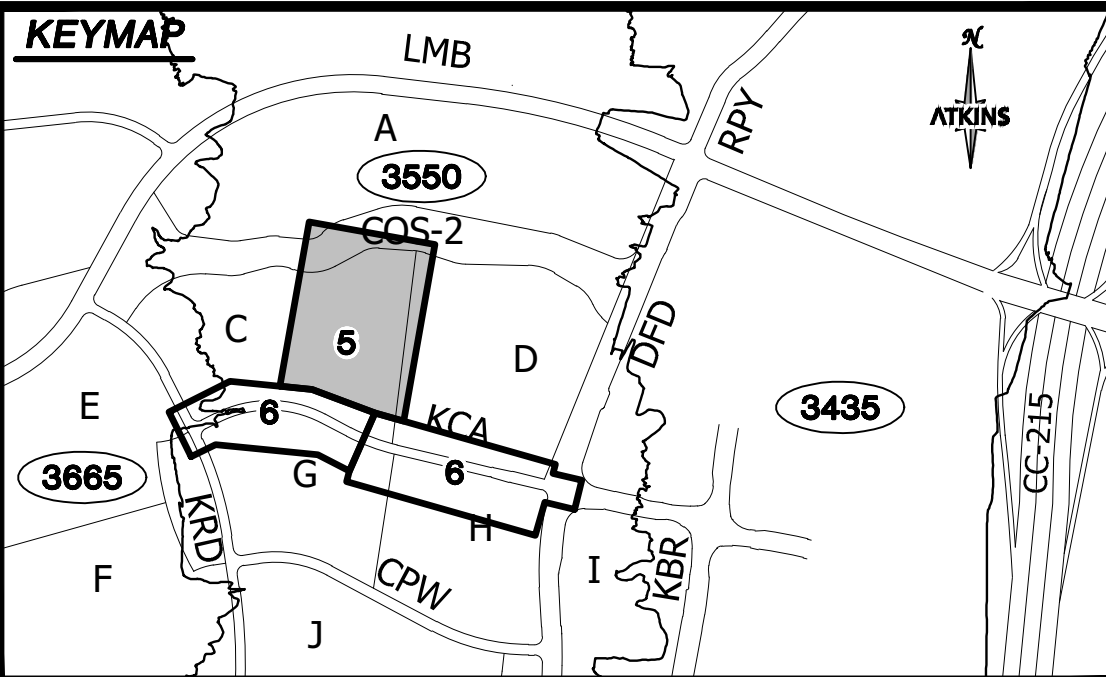
PAUL BATES PE#18723 DATE
CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.
DS#XXX-0000

BASIS OF BEARING

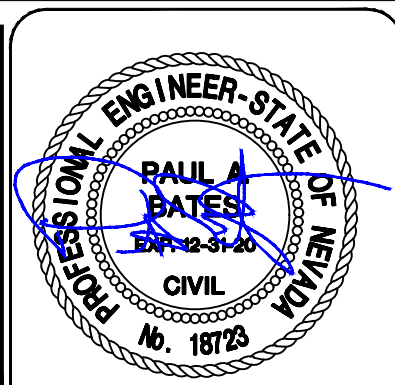
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BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
TZ15R59E.S03



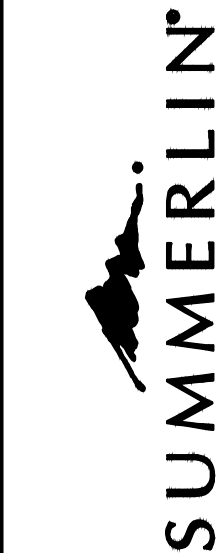
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DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
DRAWING NO. 6 / 27
JOB NO. 100060654
CLV 00-00000

SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET I)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

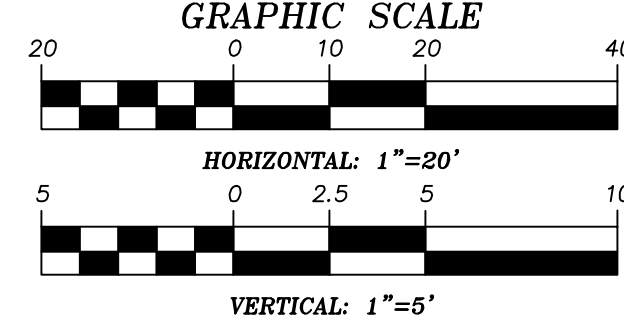
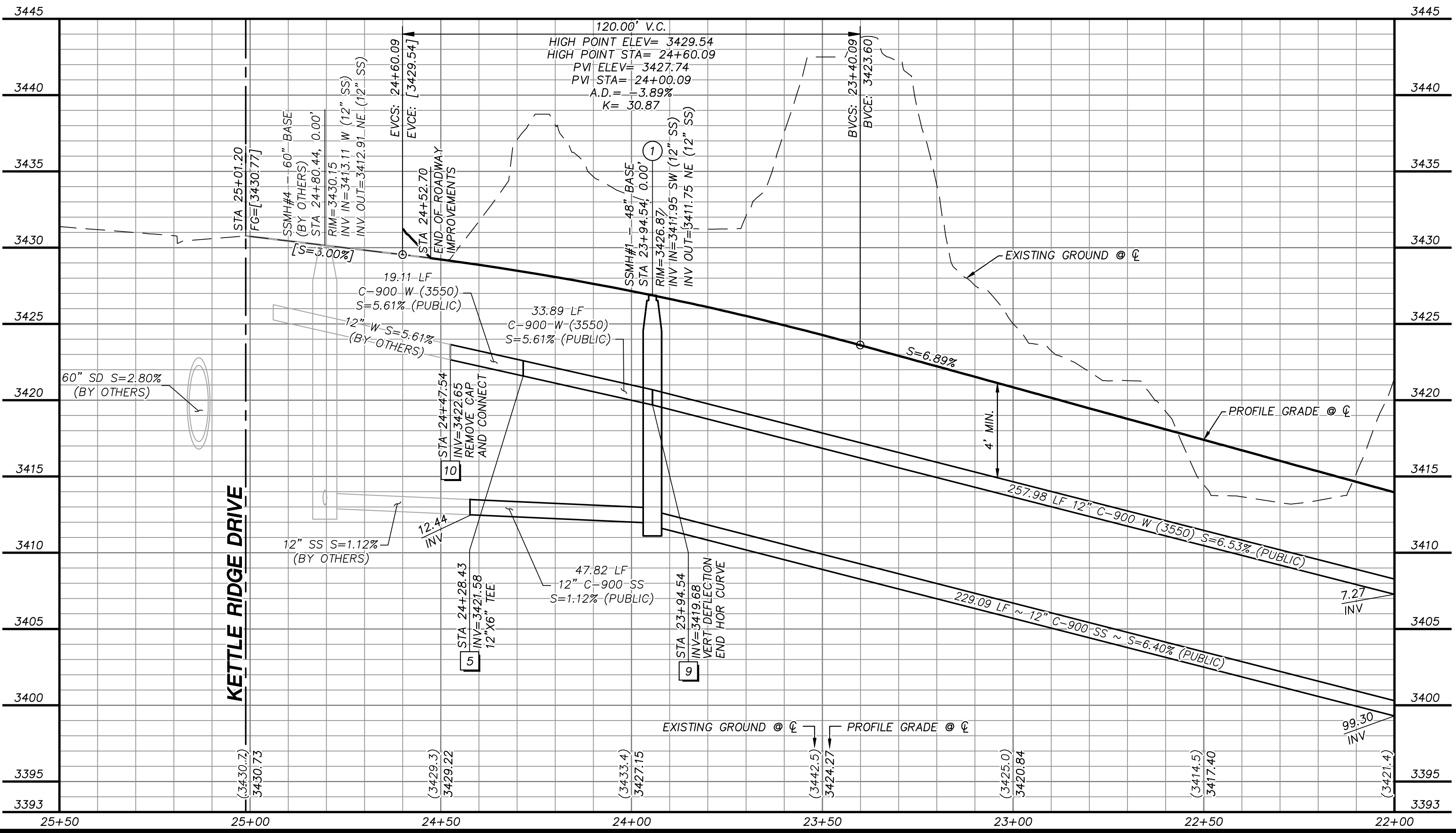
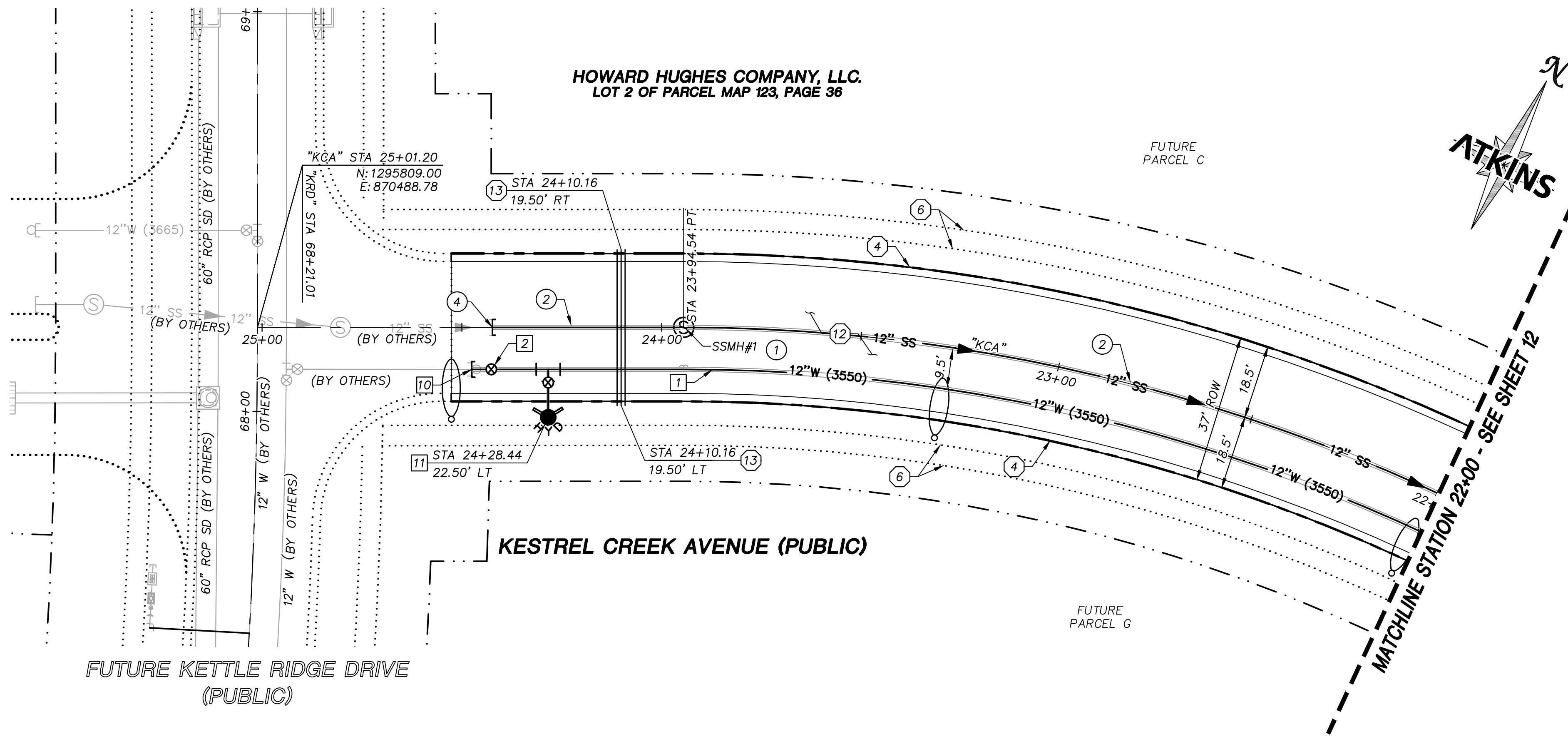
MASTER DRAINAGE PLAN



ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 0000000 FIRST APPROVED DATE: _____

BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

BENCHMARK

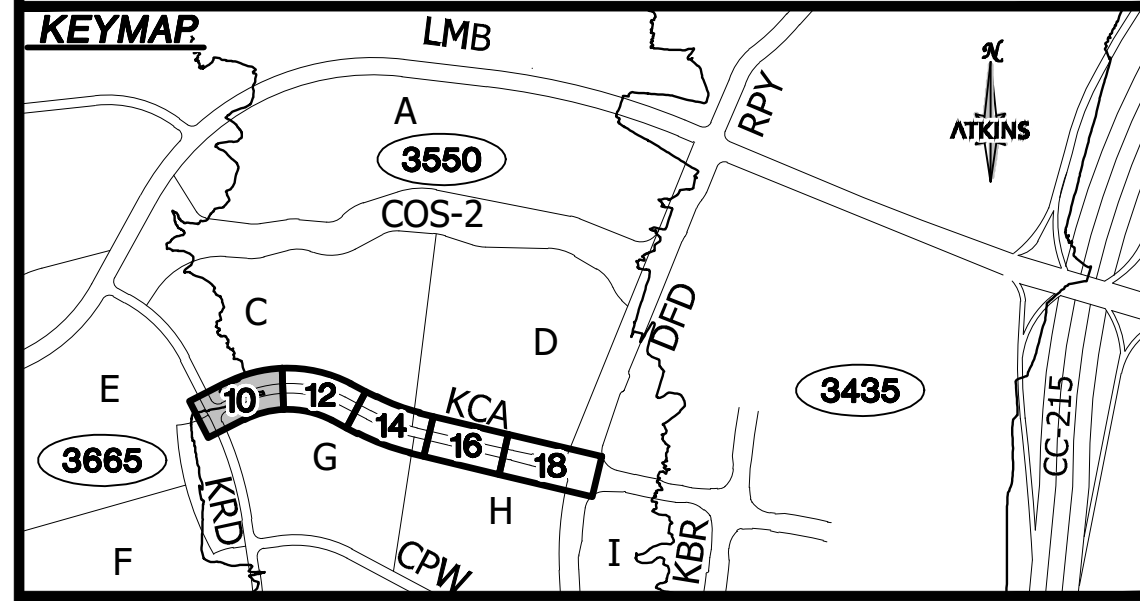
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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
Call 811
1-702-432-5300
1-800-642-2444

CALL BEFORE YOU DIG
1-702-227-2929

- ### STORM DRAIN CONSTRUCTION NOTES
1. INSTALL STORM DRAIN. SEE SHEET ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
 2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
 3. INSTALL NDOT TYPE II DROP INLET PER NDOT R-4.2.1 (SEE SHEET 24)
 4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403
 5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
 6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406
 7. INSTALL TYPE "A" DROP INLET PER CCAUSD #411 & #421
 8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
 9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
 10. INSTALL RIP-RAP (D50=8", THICKNESS=24")
- ### SEWER CONSTRUCTION NOTES
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1, AND SD-4
 2. INSTALL SEWER MAIN PER DCSWCS SD-17
 3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"x4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
 4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
 5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
 6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
- ### WATERLINE CONSTRUCTION NOTES
1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
 2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
 3. INSTALL CROSS PER UDACS PLATE #31
 4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
 5. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
 7. INSTALL 11.25" HORIZONTAL BEND PER UDACS PLATE #31
 8. INSTALL COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
 9. INSTALL DEFLECTION AT PIPE JOINTS (MAXIMUM 1")
 10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
 11. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL, VALVE, AND TEE) PER UDACS PLATES #30, #31, #39, AND #40

- ### ROADWAY CONSTRUCTION NOTES
1. SAWCUT AND MATCH EXISTING
 2. NOT USED
 3. NOT USED
 4. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
 5. NOT USED
 6. FUTURE SIDEWALK BY OTHERS
 7. CONSTRUCT CONCRETE SIDEWALK PER CCAUSD #234
 8. CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5').
 9. CONSTRUCT 0" FLUSH CURB
 10. TRANSITION CURB FROM FULL HEIGHT (6") TO FLUSH (0")
 11. NOT USED
 12. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT. SEE SHEET 24 FOR TYPICAL PAVEMENT SECTION.
 13. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX



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DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
DRAWING NO. 10/27
CLV 00-00000

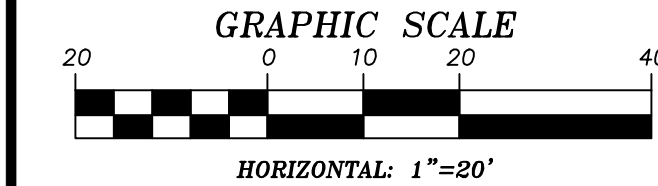
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200

SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET I)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

ROADWAY PLAN AND PROFILE
STA 22+00 TO END

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
DRAWING NO. 10/27
CLV 00-00000

PROJECT: Village 22\100060654 - V22N Street (Desert Foothills to Street J)\Sheets\60654-09-PLAN-PI.dwg LAYOUT: ROADWAY PLAN AND PROFILE 1 Aug 02, 2019 - 10:31AM



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE _____

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

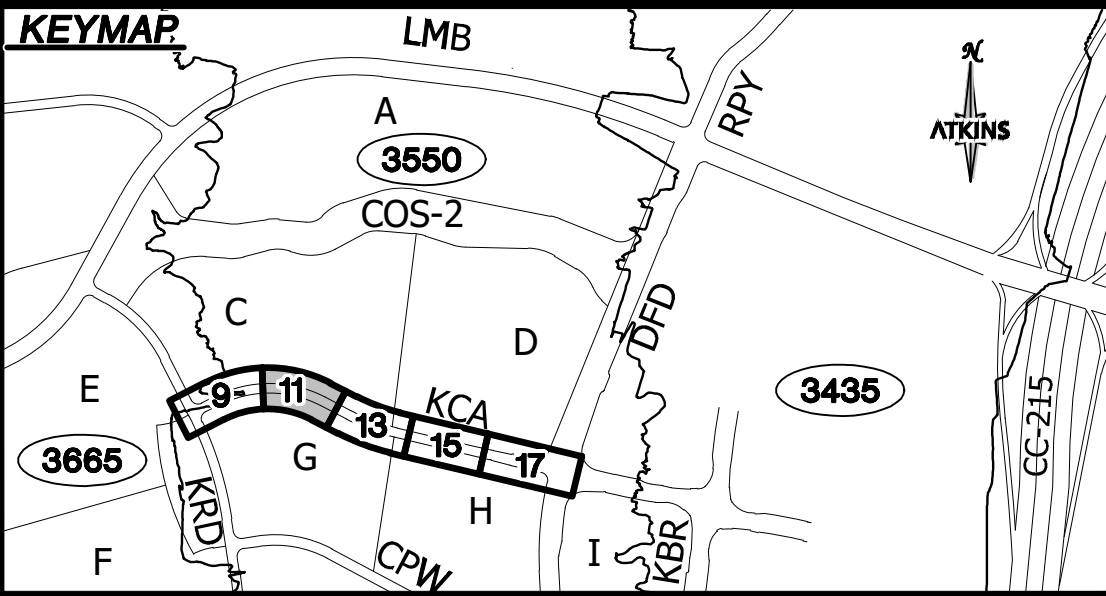
DS#XXX-0000

BASIS OF BEARING

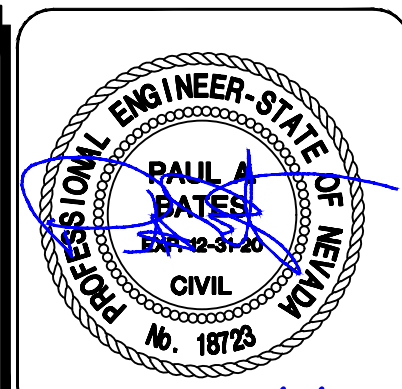
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BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03



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DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 1000060654
CLV 00-00000

DRAWING NO. 11 / 27

SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET I)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

ROADWAY GRADING PLAN
STA 19+00 TO STA 22+00



ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7775
Fax: +1702.263.7200

REVISIONS

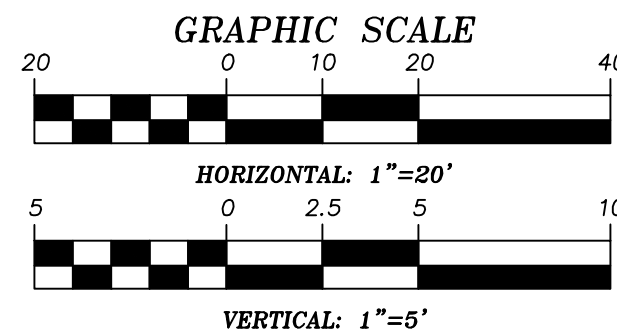
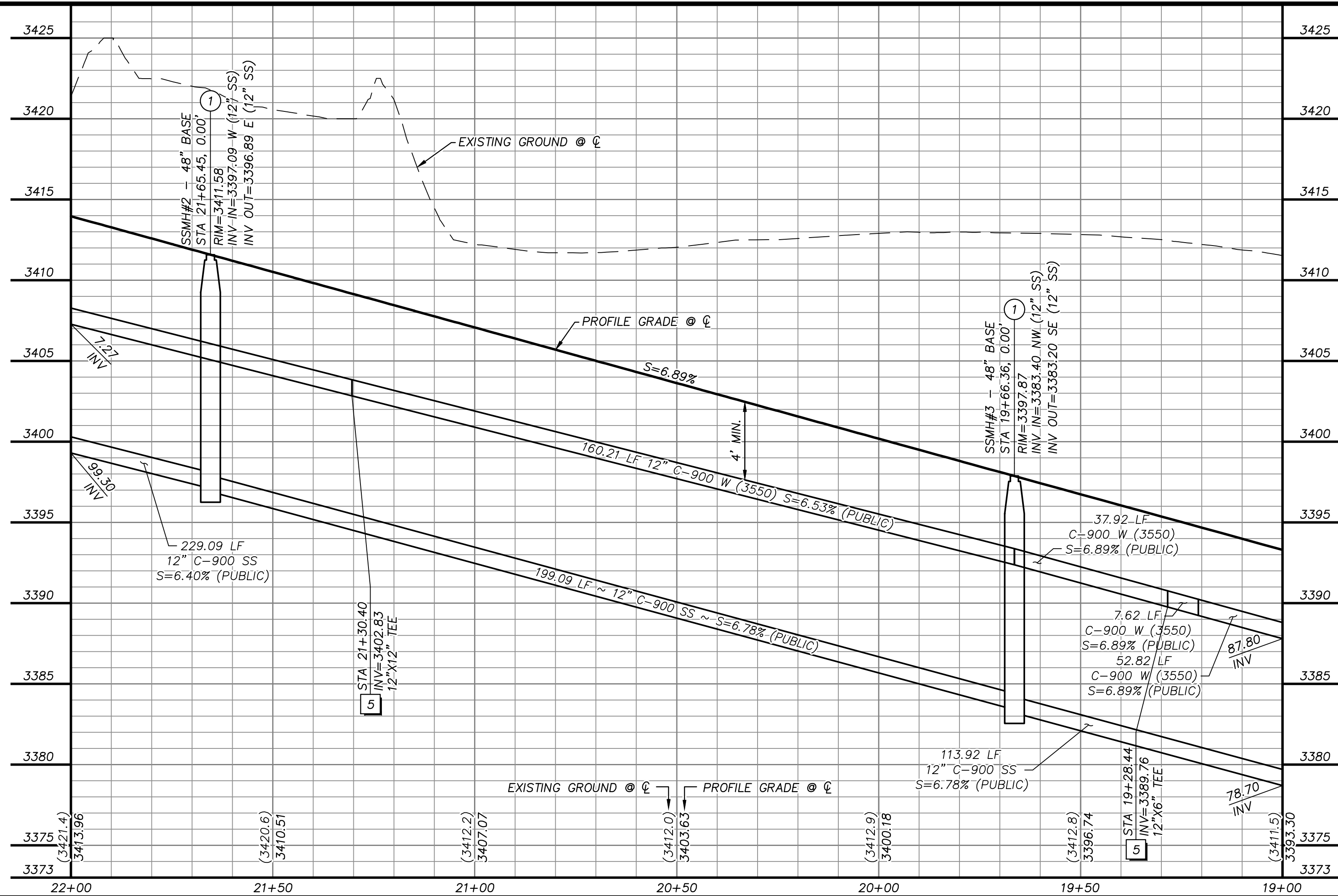
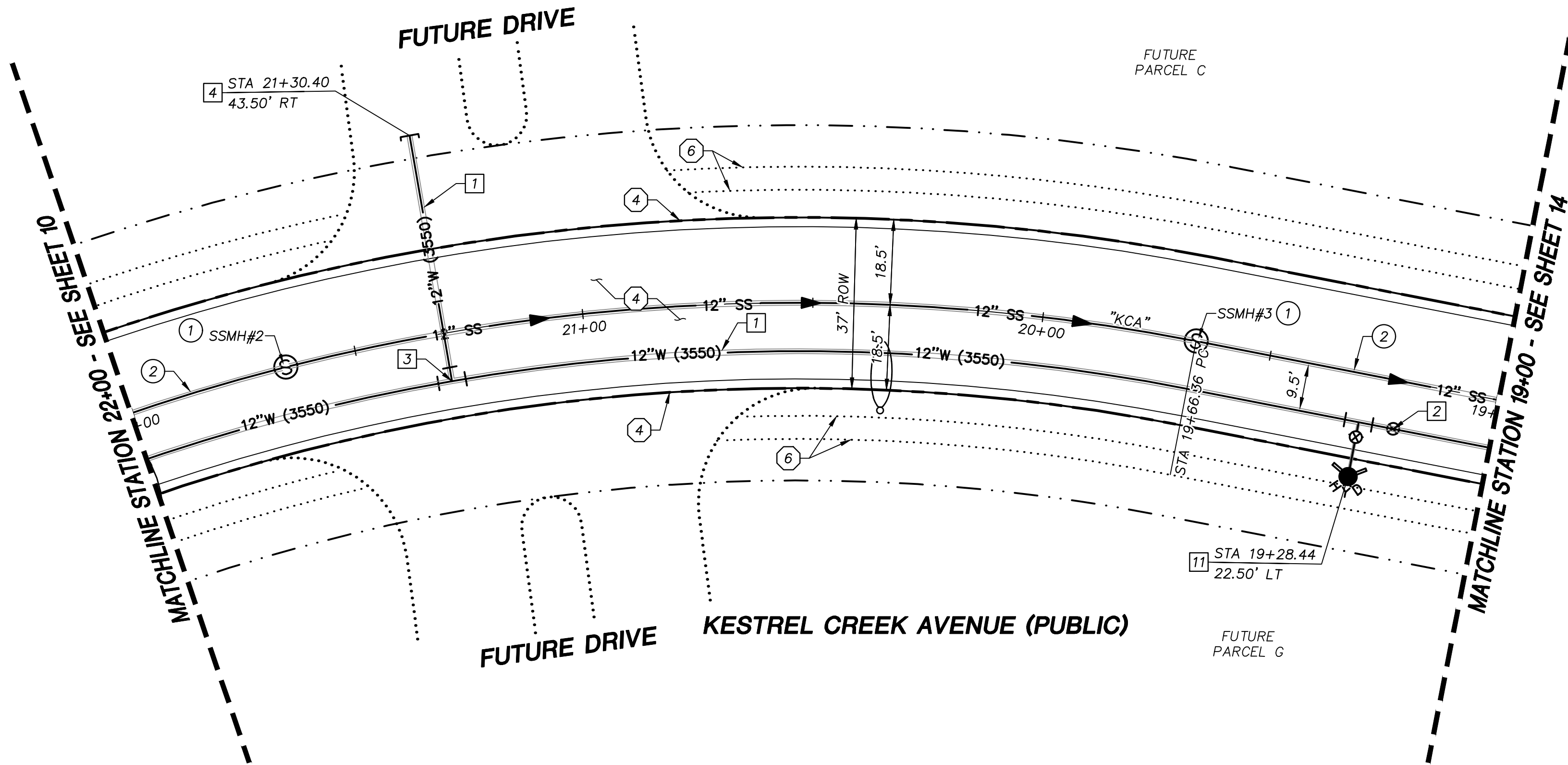
REV.	DESCRIPTION	BY	DATE	APPROVAL

STORM DRAIN CONSTRUCTION NOTES

- 1 INSTALL STORM DRAIN. SEE SHEET ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
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HOWARD HUGHES COMPANY, LLC.
LOT 2 OF PARCEL MAP 123, PAGE 36



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 0000000 FIRST APPROVED DATE: _____

BASIS OF BEARING

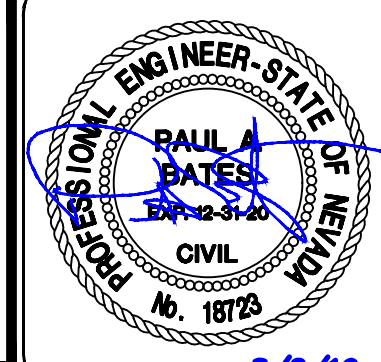
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DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
DRAWING NO. 12 / 27
CLV 00-00000

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5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.2
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406
7. INSTALL TYPE "A" DROP INLET PER CCAUSED #411 & #421
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. INSTALL RIP-RAP (D50=8", THICKNESS=24")

SEWER CONSTRUCTION NOTES

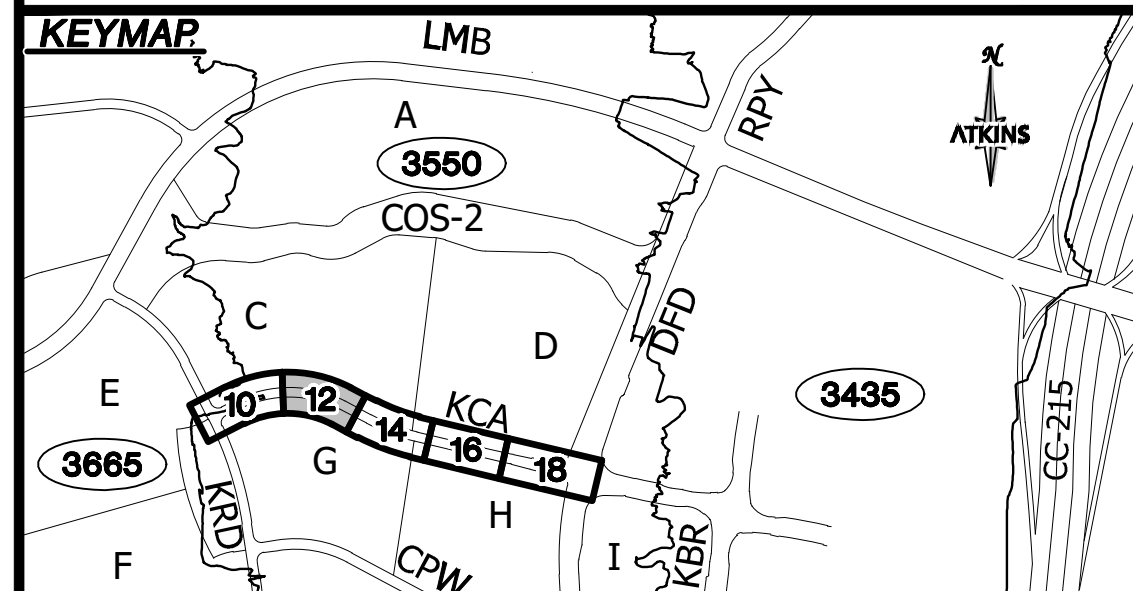
1. INSTALL SEWER MANHOLE PER DCSWCS SD-1, AND SD-4
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"x4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17 AND PLATE #19
2. INSTALL GATE VALVE PER UDACS PLATES #30 AND #39
3. INSTALL CROSS PER UDACS PLATE #31
4. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
5. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #30, #31 AND #39
7. INSTALL 11.25" HORIZONTAL BEND PER UDACS PLATE #31
8. INSTALL COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
9. INSTALL DEFLECTION AT PIPE JOINTS (MAXIMUM 1")
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
11. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL, VALVE, AND TEE) PER UDACS PLATES #30, #31, #39, AND #40

ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. NOT USED
3. NOT USED
4. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
5. NOT USED
6. FUTURE SIDEWALK BY OTHERS
7. CONSTRUCT CONCRETE SIDEWALK PER CCAUSD #234
8. CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5').
9. CONSTRUCT 0" FLUSH CURB
10. TRANSITION CURB FROM FULL HEIGHT (6") TO FLUSH (0")
11. NOT USED
12. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT. SEE SHEET 24 FOR TYPICAL PAVEMENT SECTION.
13. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX



SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET J)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

ROADWAY PLAN AND PROFILE
STA 19+00 TO STA 22+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
DRAWING NO. 12 / 27
CLV 00-00000

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200



SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET J)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

ROADWAY PLAN AND PROFILE
STA 19+00 TO STA 22+00

DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
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DATE: AUGUST, 2019
DRAWING NO. 12 / 27
CLV 00-00000

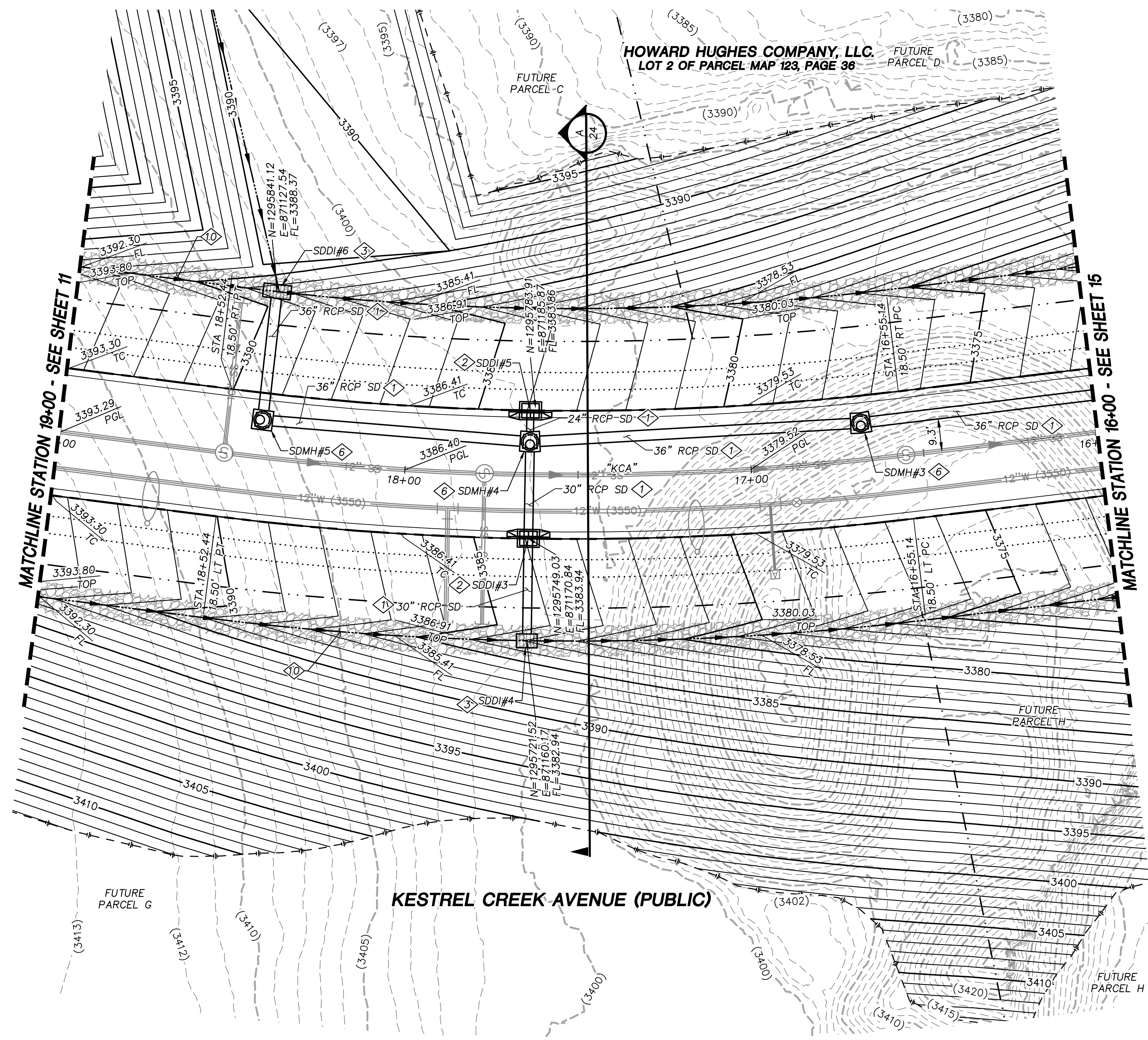
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200



SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET J)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

ROADWAY PLAN AND PROFILE
STA 19+00 TO STA 22+00

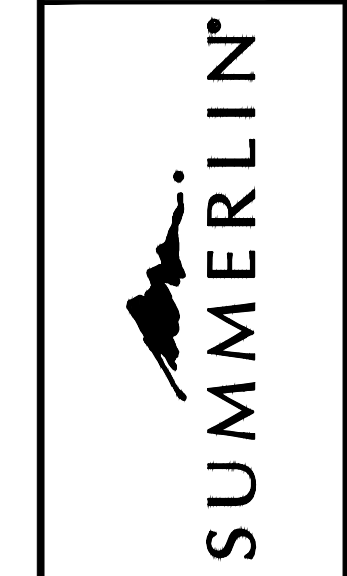
DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
DRAWING NO. 12 / 27
CLV 00-00000



- STORM DRAIN CONSTRUCTION NOTES**
- 1. INSTALL STORM DRAIN. SEE SHEET ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
 - 2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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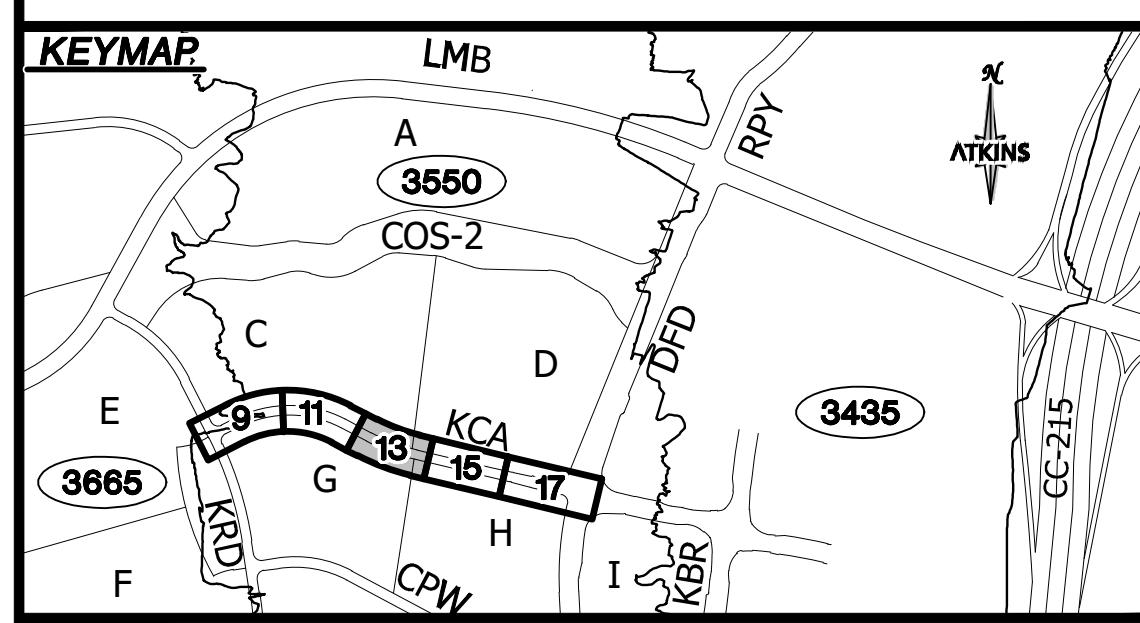
REVISIONS	
REV.	DESCRIPTION

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7775
Fax: +1702.263.7200

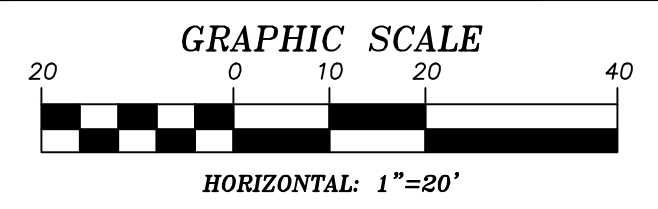
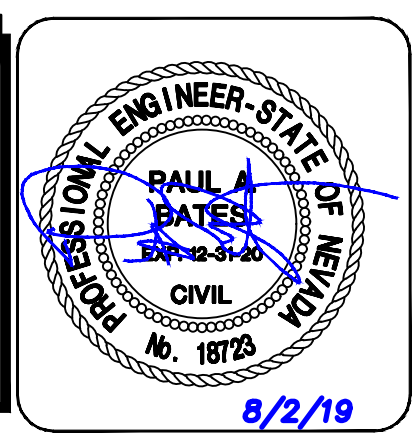


SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET J)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
ROADWAY GRADING PLAN
STA 16+00 TO STA 19+00

DESIGNED BY: N. BARCOS	DATE: AUGUST, 2019	DRAWING NO. 13 / 27
DRAWN BY: L. MAMACLAY	CHECKED BY: L. MAMACLAY	VERT.: NONE
JOB NO. 100060654	CLV 00-00000	



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 LOCATION.



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE _____

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

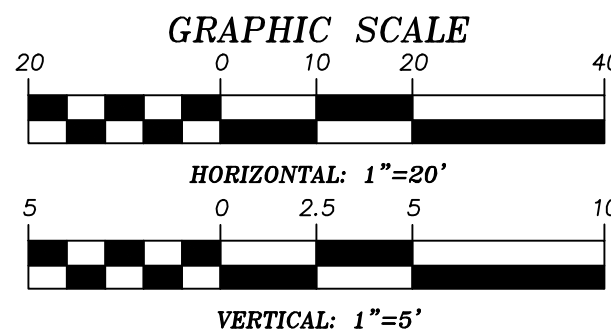
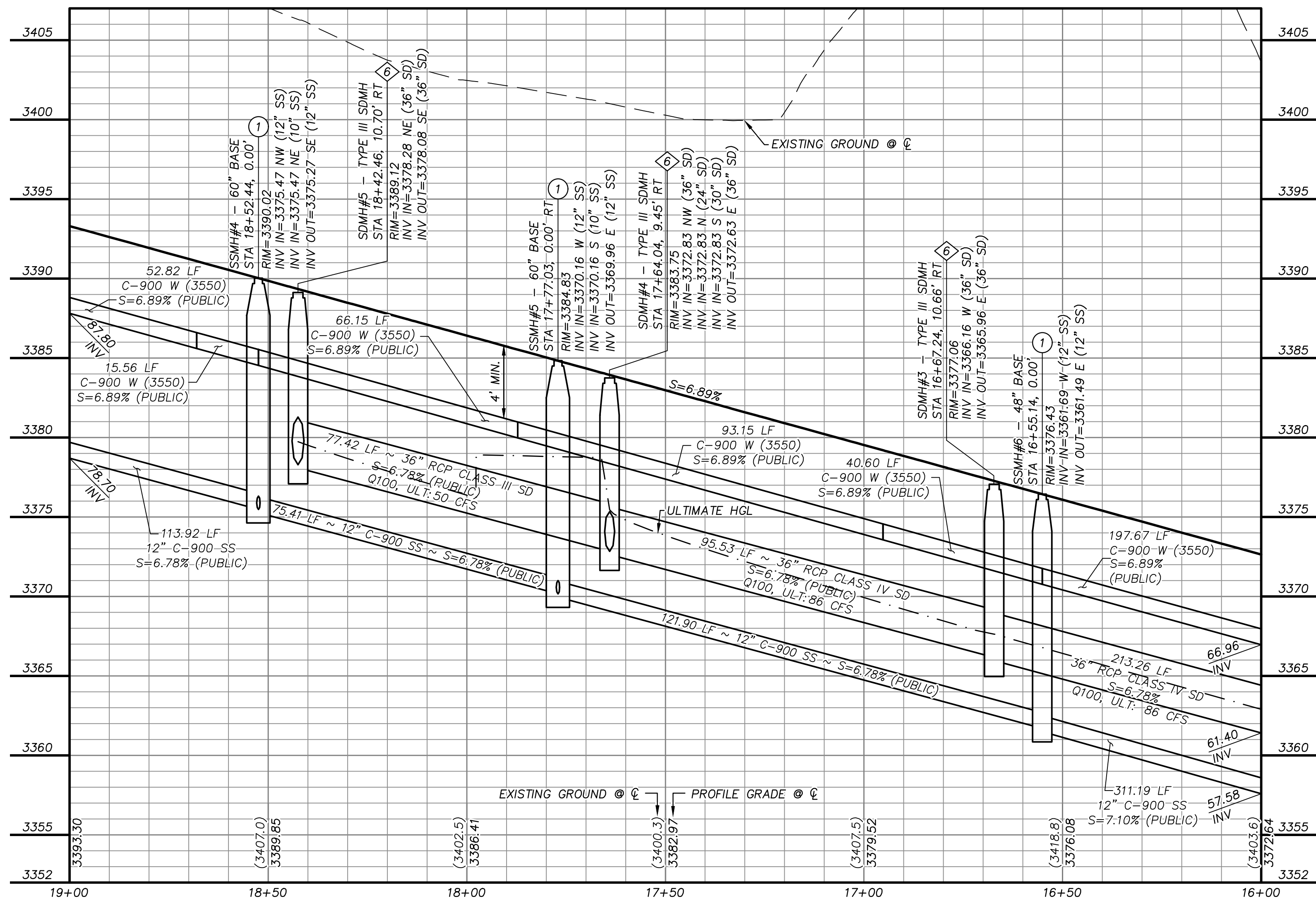
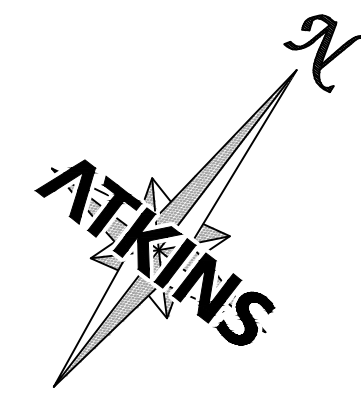
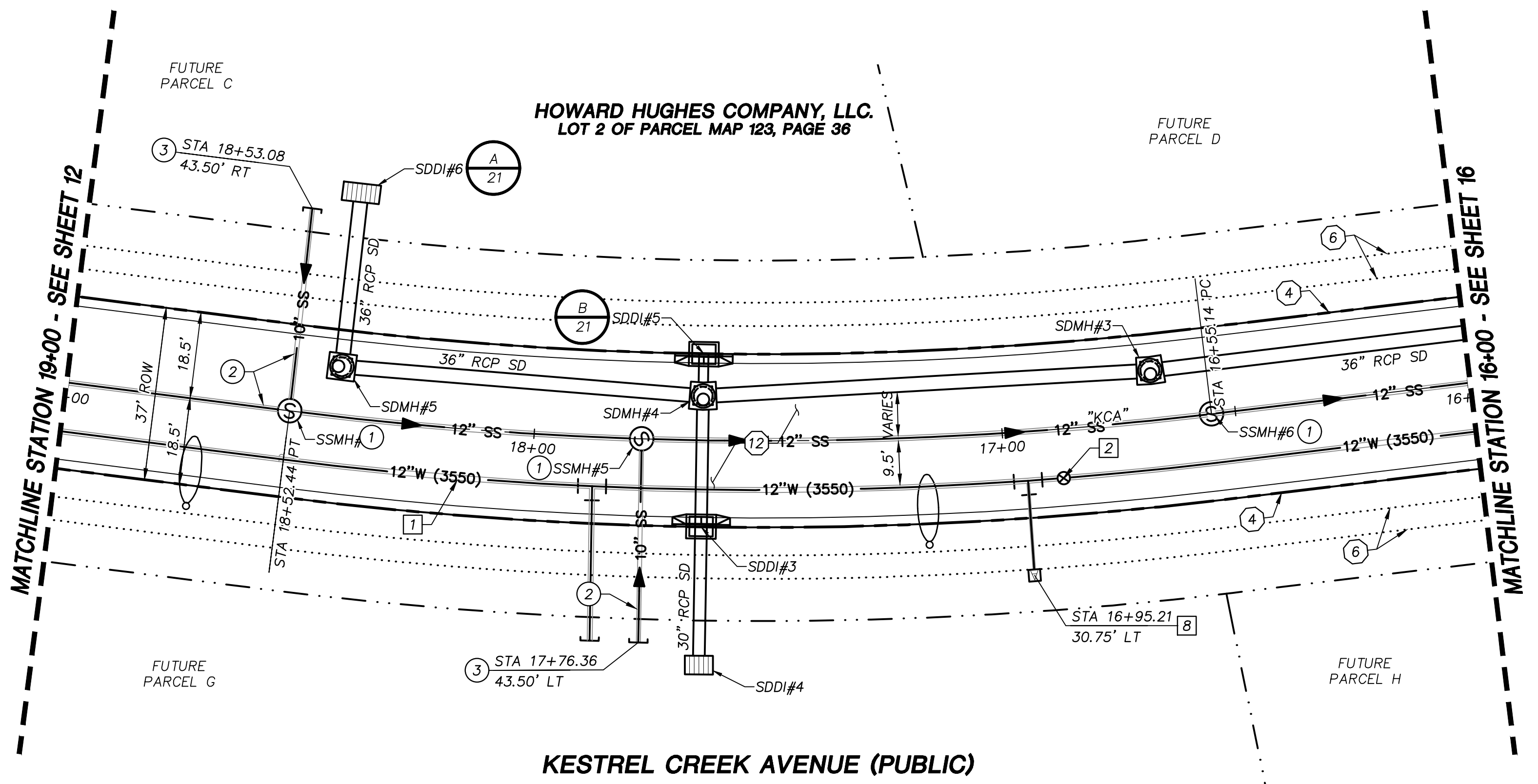
DS#XXX-0000

BASIS OF BEARING
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
Call 811
1-702-432-5300
1-800-642-2444

CALL BEFORE YOU DIG
1-702-227-2929



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 00000000 FIRST APPROVED DATE: _____

BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03



STORM DRAIN CONSTRUCTION NOTES

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SEWER CONSTRUCTION NOTES

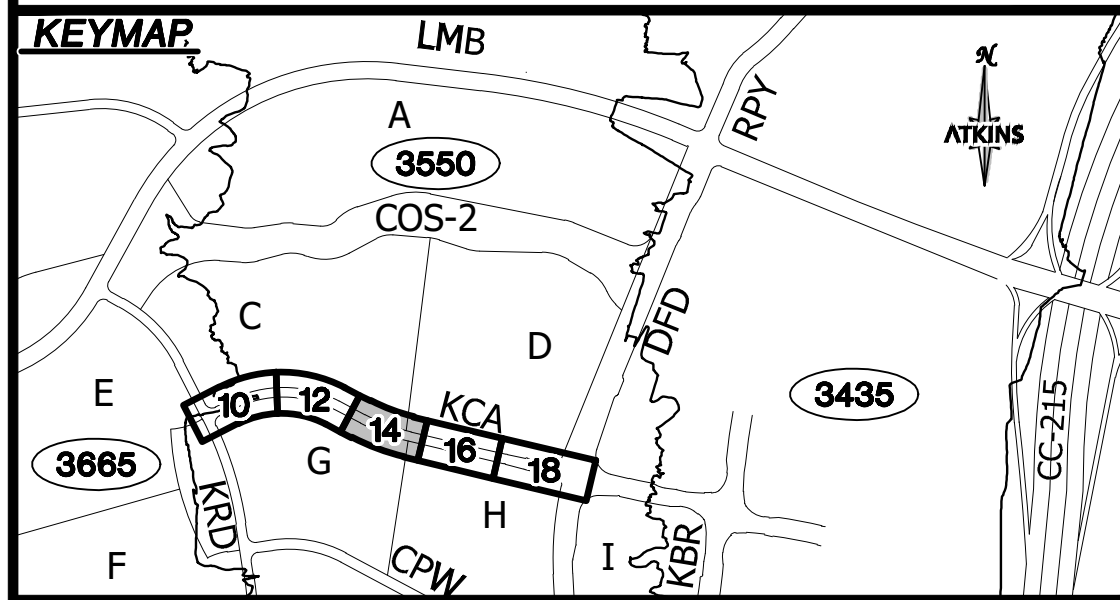
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- 5 ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
- 6 PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19

WATERLINE CONSTRUCTION NOTES

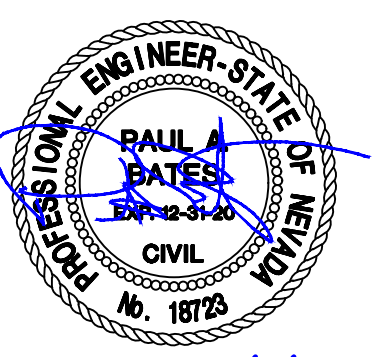
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ROADWAY CONSTRUCTION NOTES

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- 2 NOT USED
- 3 NOT USED
- 4 CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
- 5 NOT USED
- 6 FUTURE SIDEWALK BY OTHERS
- 7 CONSTRUCT CONCRETE SIDEWALK PER CCAUSD #234
- 8 CONSTRUCT CURB RAMP, TYPE A, PER NDOT STANDARD PLAN R-5.2.1 (A=B=6.5').
- 9 CONSTRUCT 0" FLUSH CURB
- 10 TRANSITION CURB FROM FULL HEIGHT (6") TO FLUSH (0")
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- 12 CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER SOILS REPORT. SEE SHEET 24 FOR TYPICAL PAVEMENT SECTION.
- 13 INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET XX



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 LOCATION.



DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
DRAWING NO. 14 / 27
JOB NO. 100060654
CLV 00-00000

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200

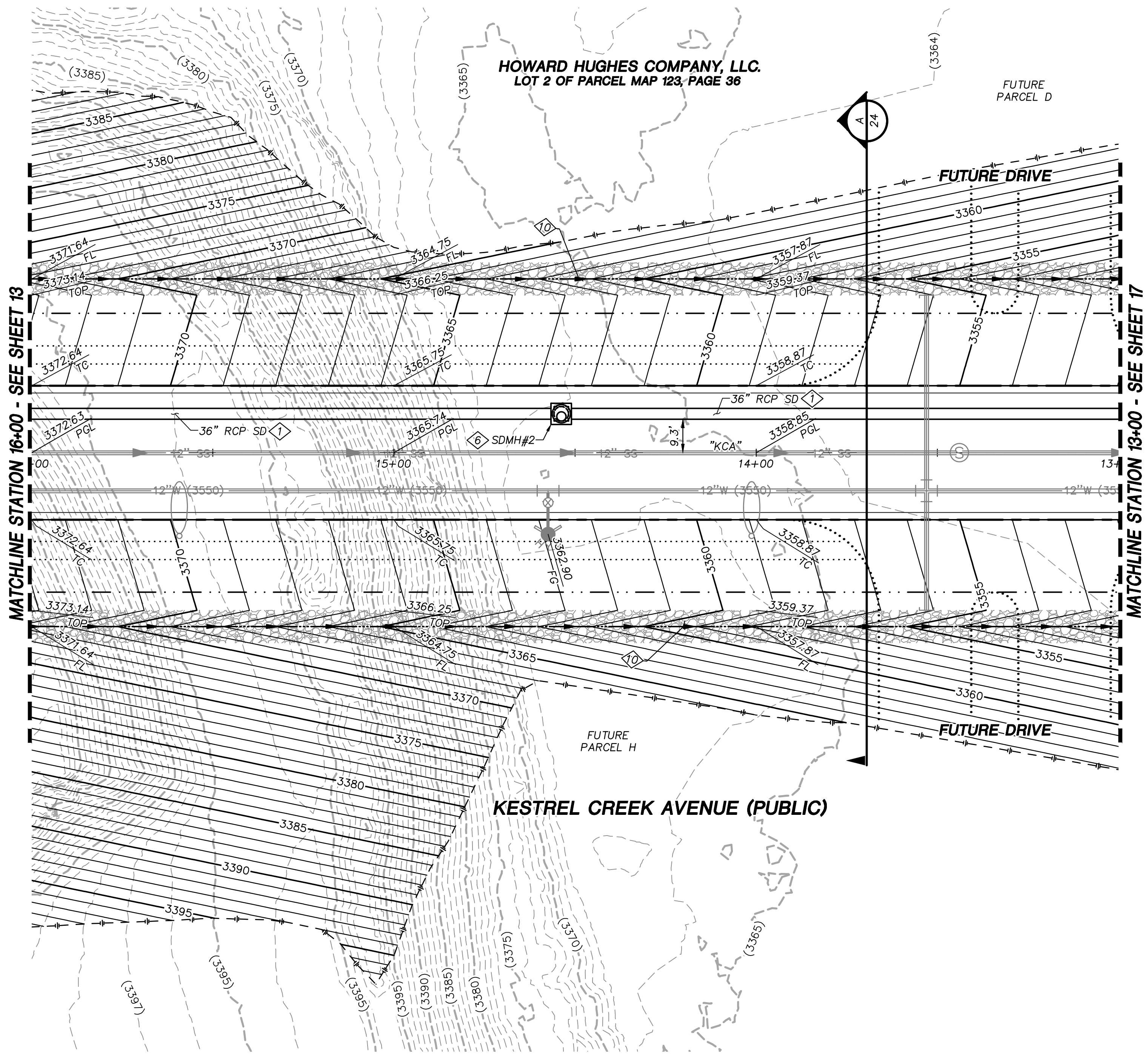
SUMMERLIN
KESTREL CREEK AVENUE (STREET J)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET J)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
ROADWAY PLAN AND PROFILE
STA 16+00 TO STA 19+00

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

X:\Projects\Summerlin\Summerlin Village 22\100060654 - V22N Street (Desert Foothills to Street J)\Sheets\60654-09-PLAN-PI.dwg LAYOUT: ROADWAY PLAN AND PROFILE 3 Aug 02, 2019 - 10:31AM



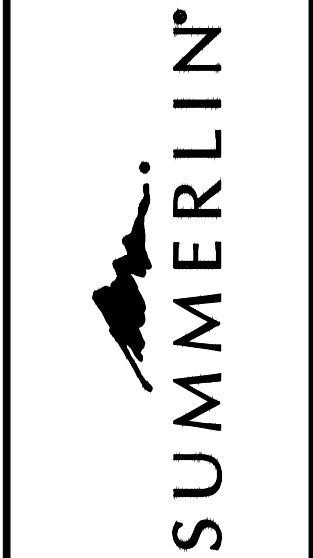
STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE SHEET ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
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REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7775
Fax: +1702.263.7200



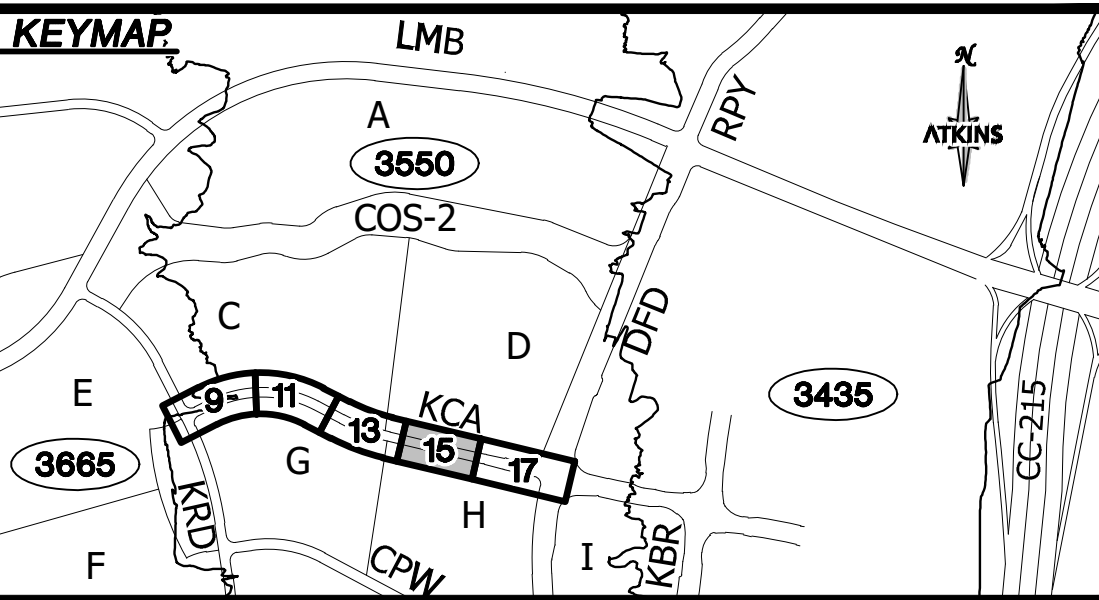
SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET I)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

ROADWAY GRADING PLAN
STA 13+00 TO STA 16+00

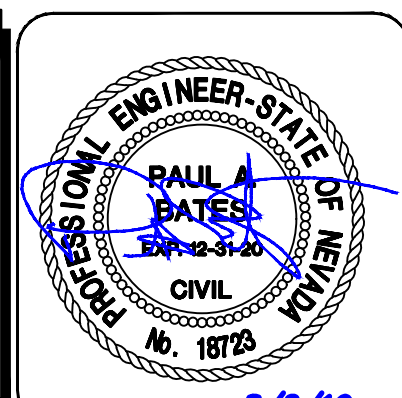
DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060654
CLV 00-00000

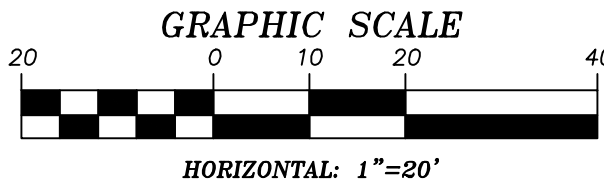
DRAWING NO. 15 / 27



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 LOCATION.



8/2/19



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 0000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE _____

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

DS#XXX-0000

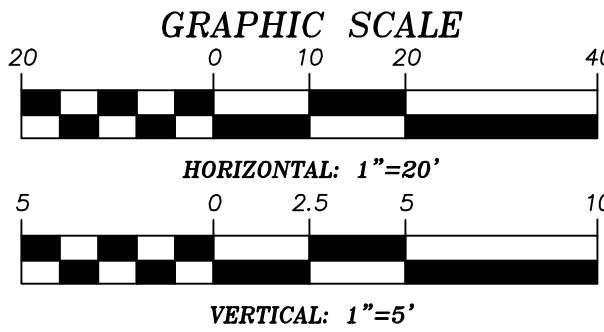
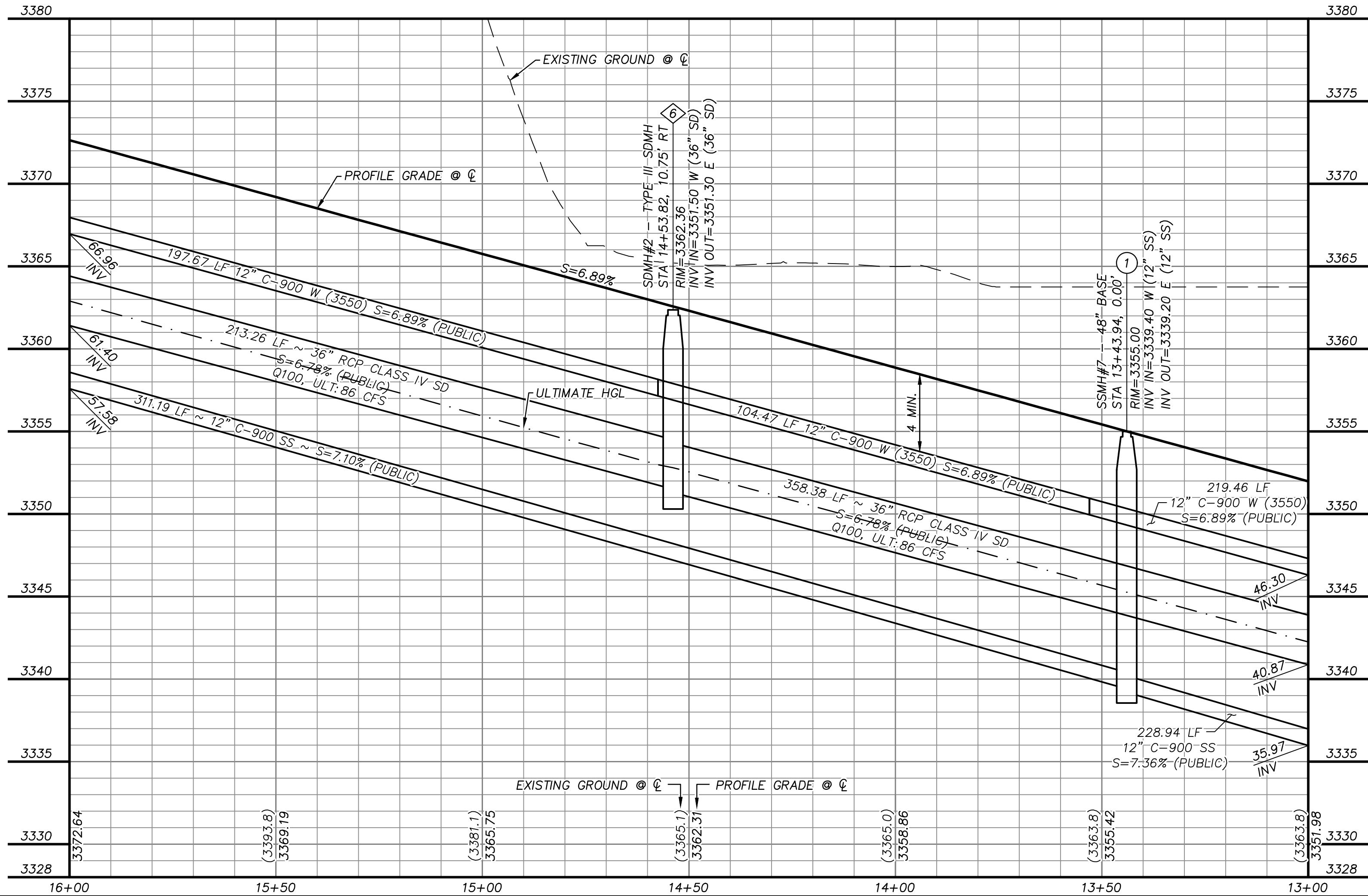
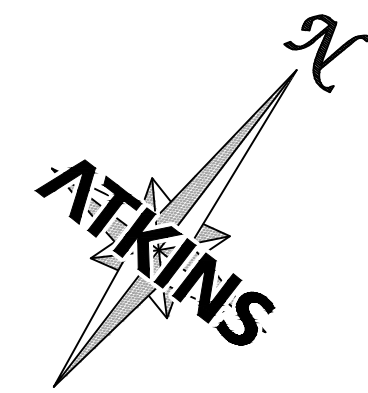
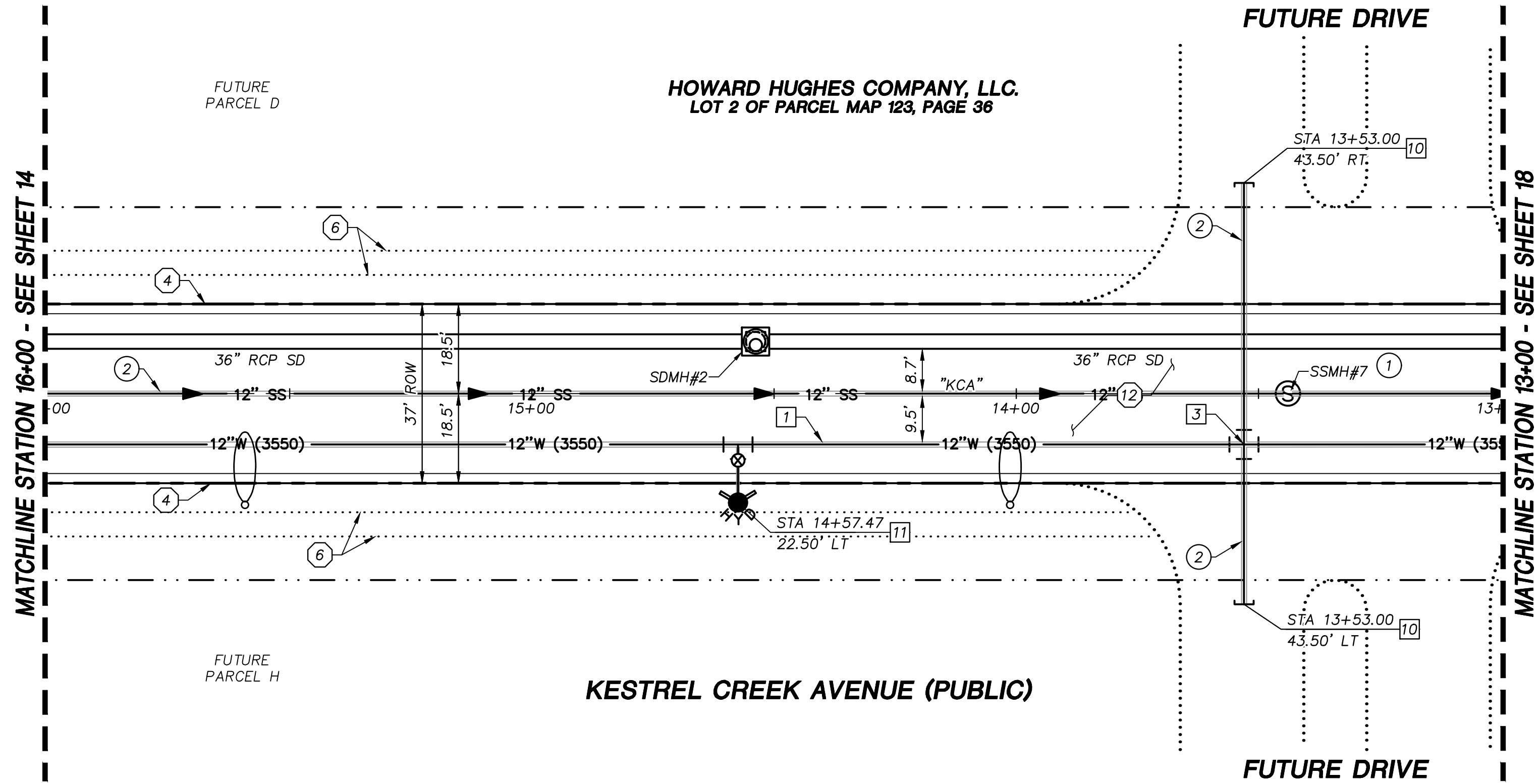
BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03





APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 00000000 FIRST APPROVED DATE: _____

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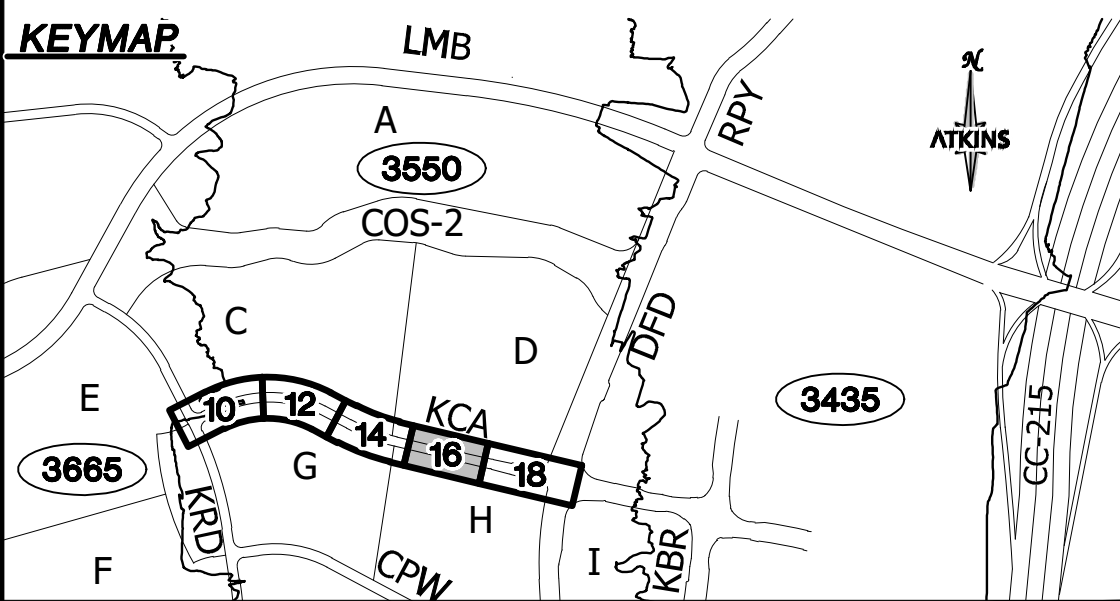
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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
before you UnderGround
1-702-432-5300

Call before you Dig
before you UnderGround
1-800-642-2444

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

- STORM DRAIN CONSTRUCTION NOTES**
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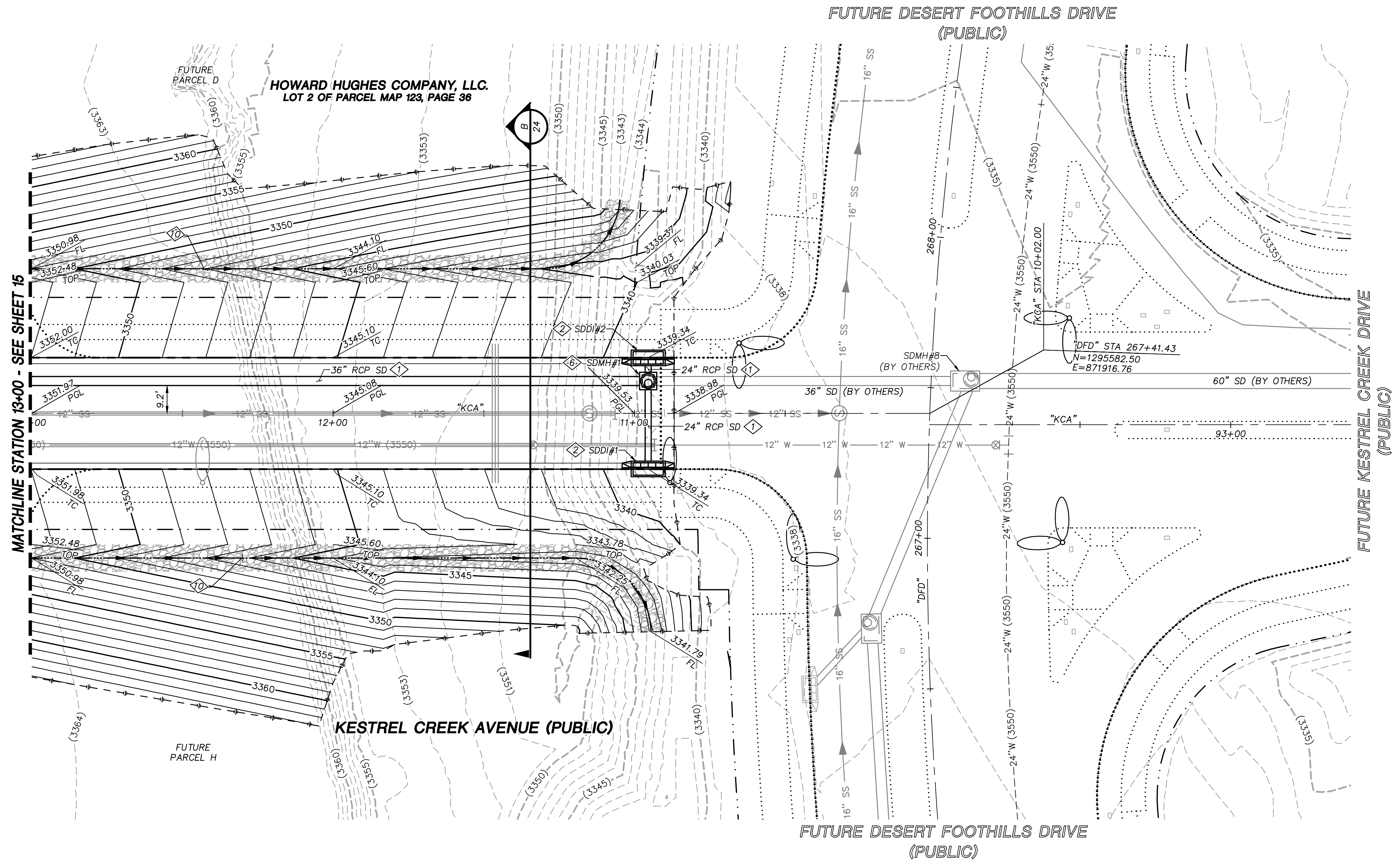
DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
DRAWING NO. 16 / 27
CLV 00-000000

2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200

SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET J)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

ROADWAY PLAN AND PROFILE
STA 13+00 TO STA 16+00

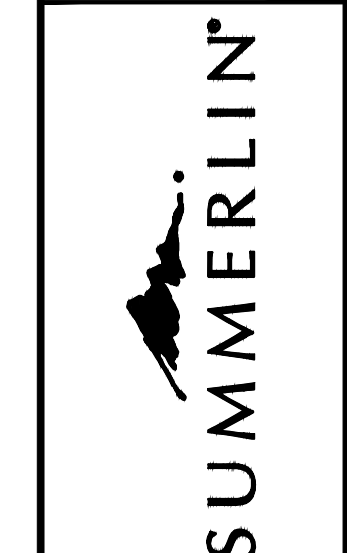
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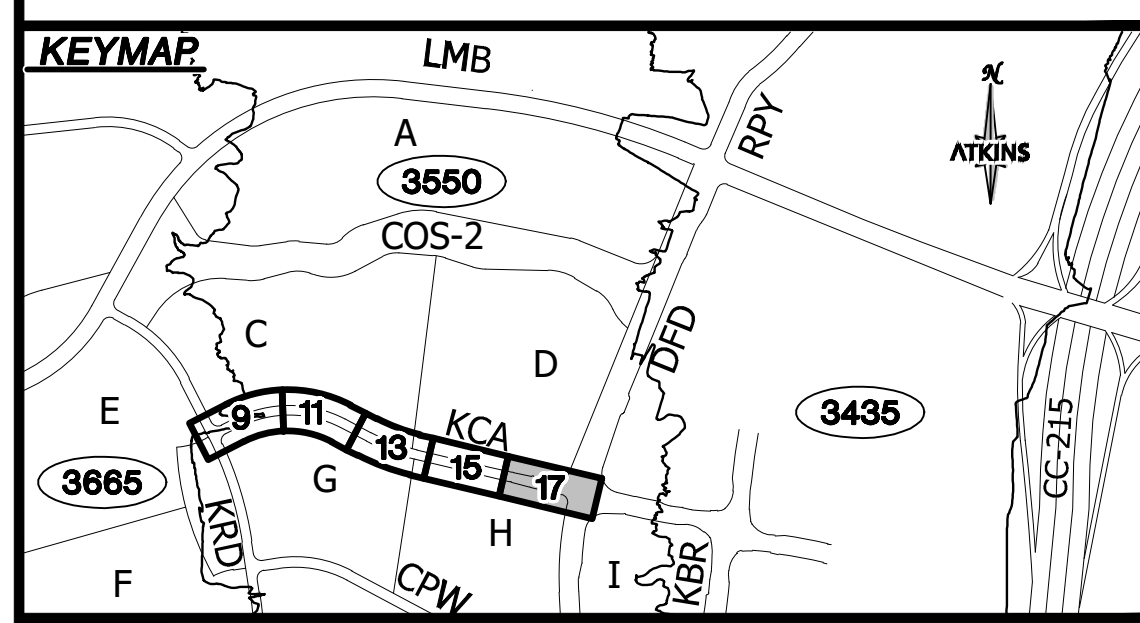
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REVISIONS	
REV.	DESCRIPTION

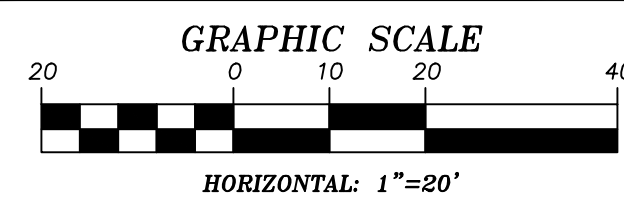
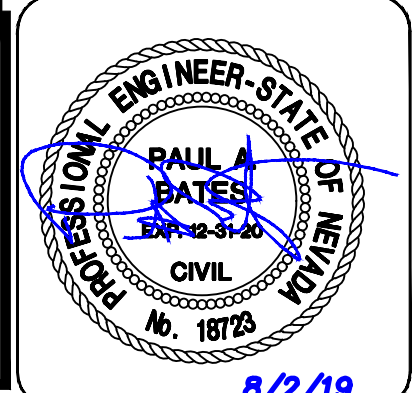
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200



SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET 1)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
ROADWAY GRADING PLAN
BEGIN TO STA 13+00



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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
PROJECT NO. 00000000 FIRST APPROVED DATE: _____

GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE _____

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

DS#XXX-0000

BASIS OF BEARING
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

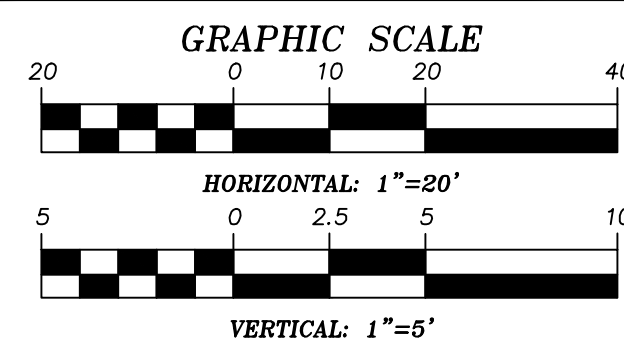
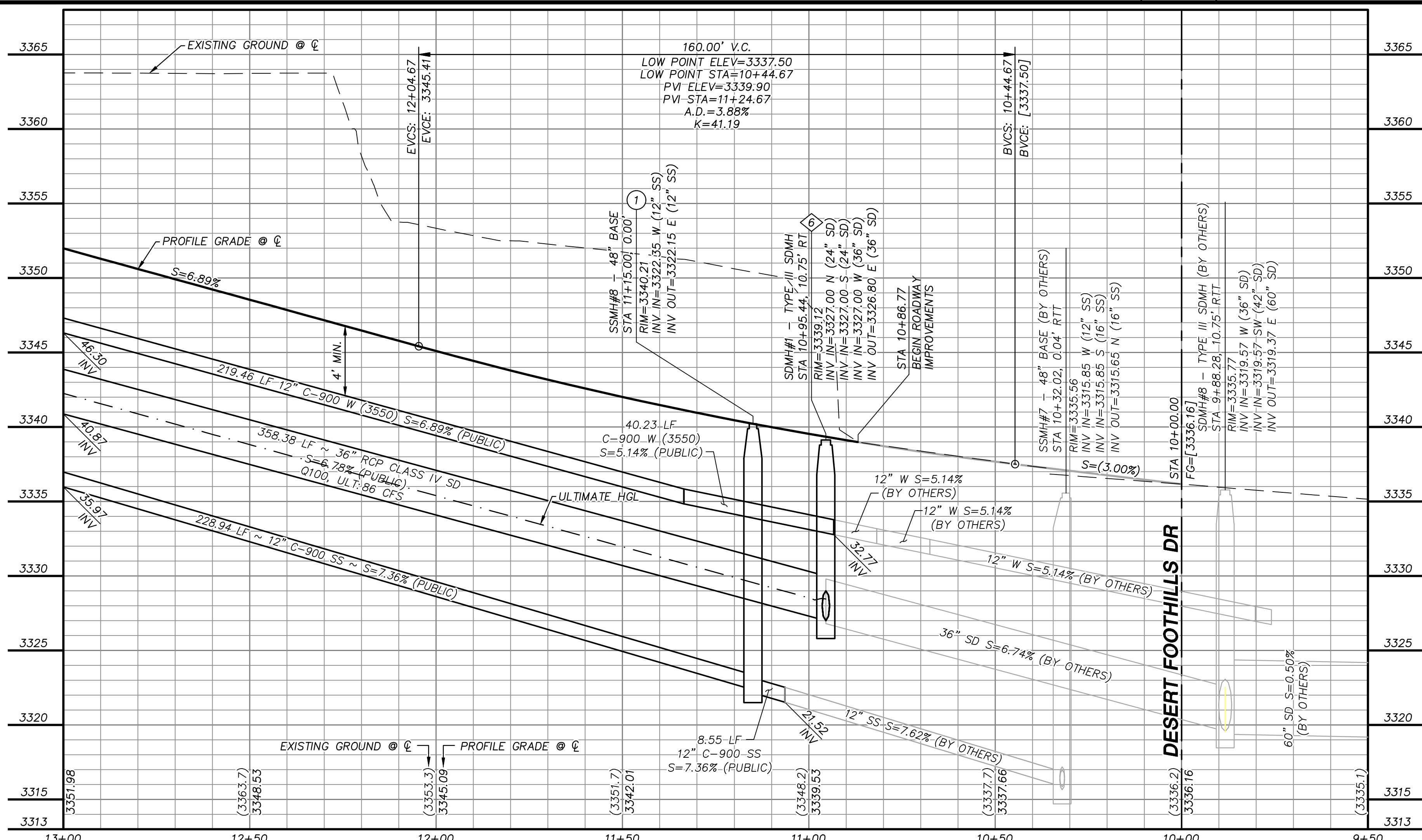
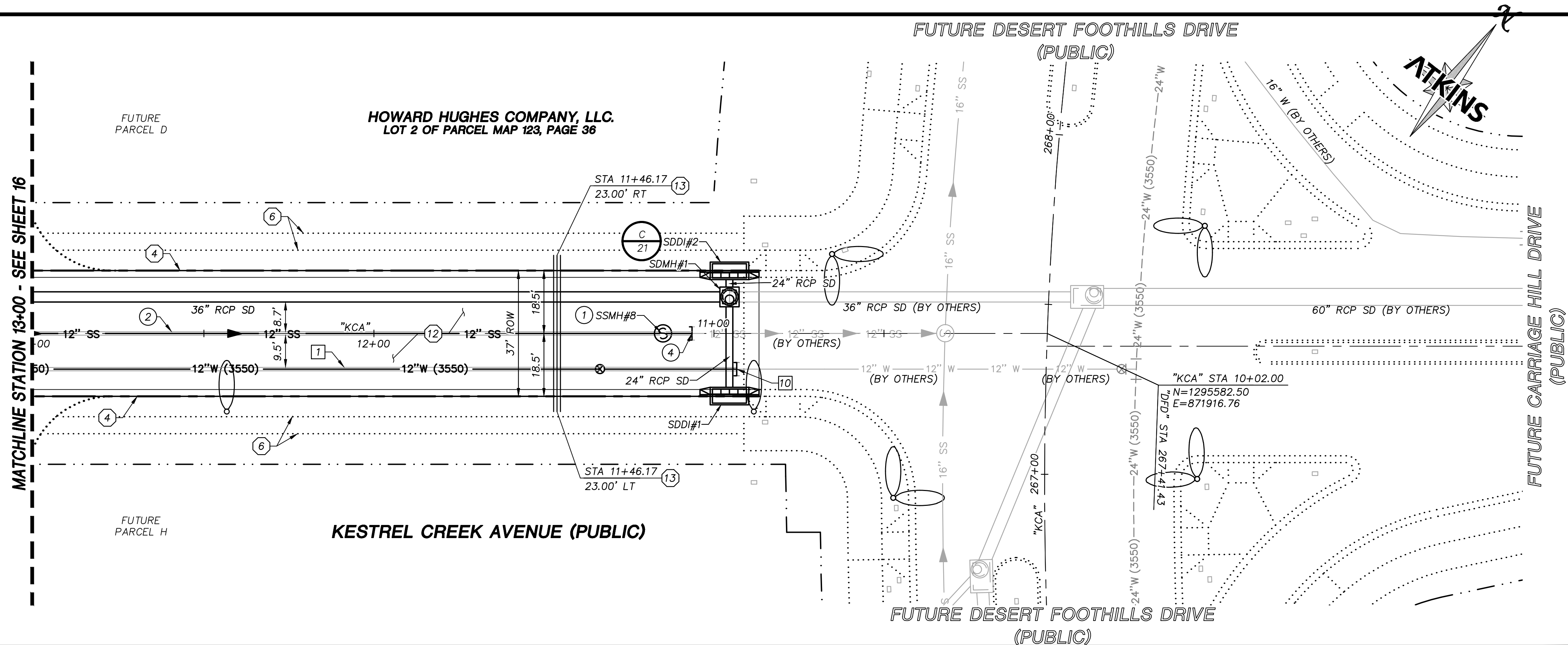
BENCHMARK
CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

FAST
Call before you Dig
1-702-432-5300
UnderGround
1-800-642-2444

Call before you Dig
Call 811
1-800-642-2444

CALL BEFORE YOU DIG
1-702-227-2929

DESIGNED BY: N. BARCOS	DATE: AUGUST, 2019	DRAWING NO. 17 / 27
DRAWN BY: L. MAMACLAY	CHECKED BY: L. MAMACLAY	CLV 00-00000
NO. 100060654	DATE: 8/2/19	



APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT

PROJECT NO. 00000000 FIRST APPROVED DATE: _____

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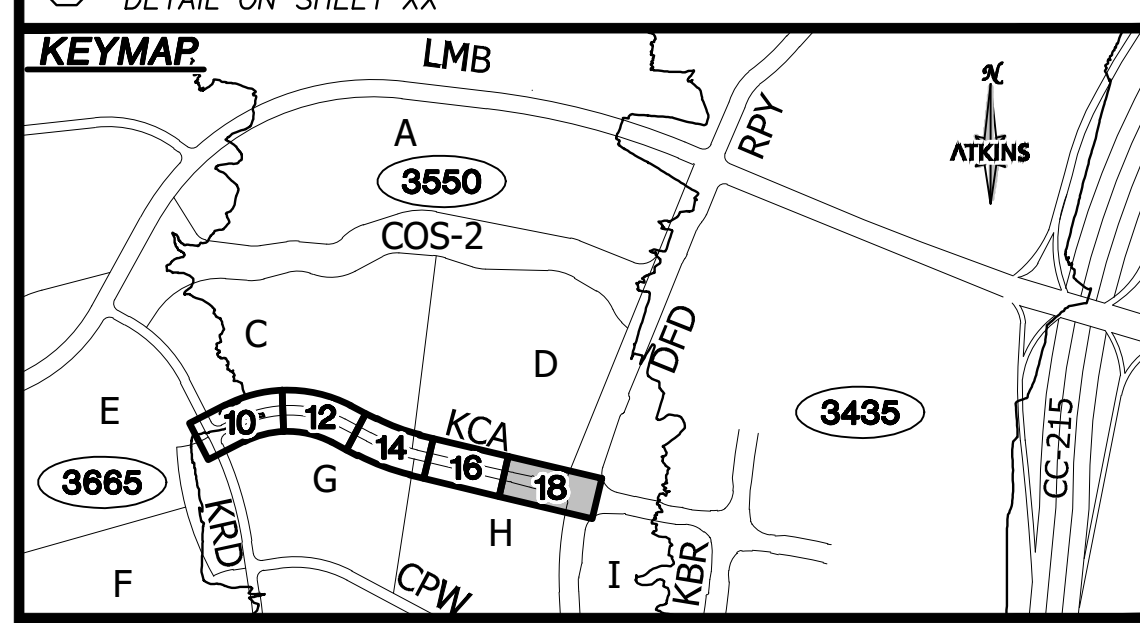
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 5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
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DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
HORIZ.: 1"=20'
VERT.: 1"=5'

100060654
CLV 00-00000

18 / 27

8/2/19

2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7755
Fax: +1702.263.7200

SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET J)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

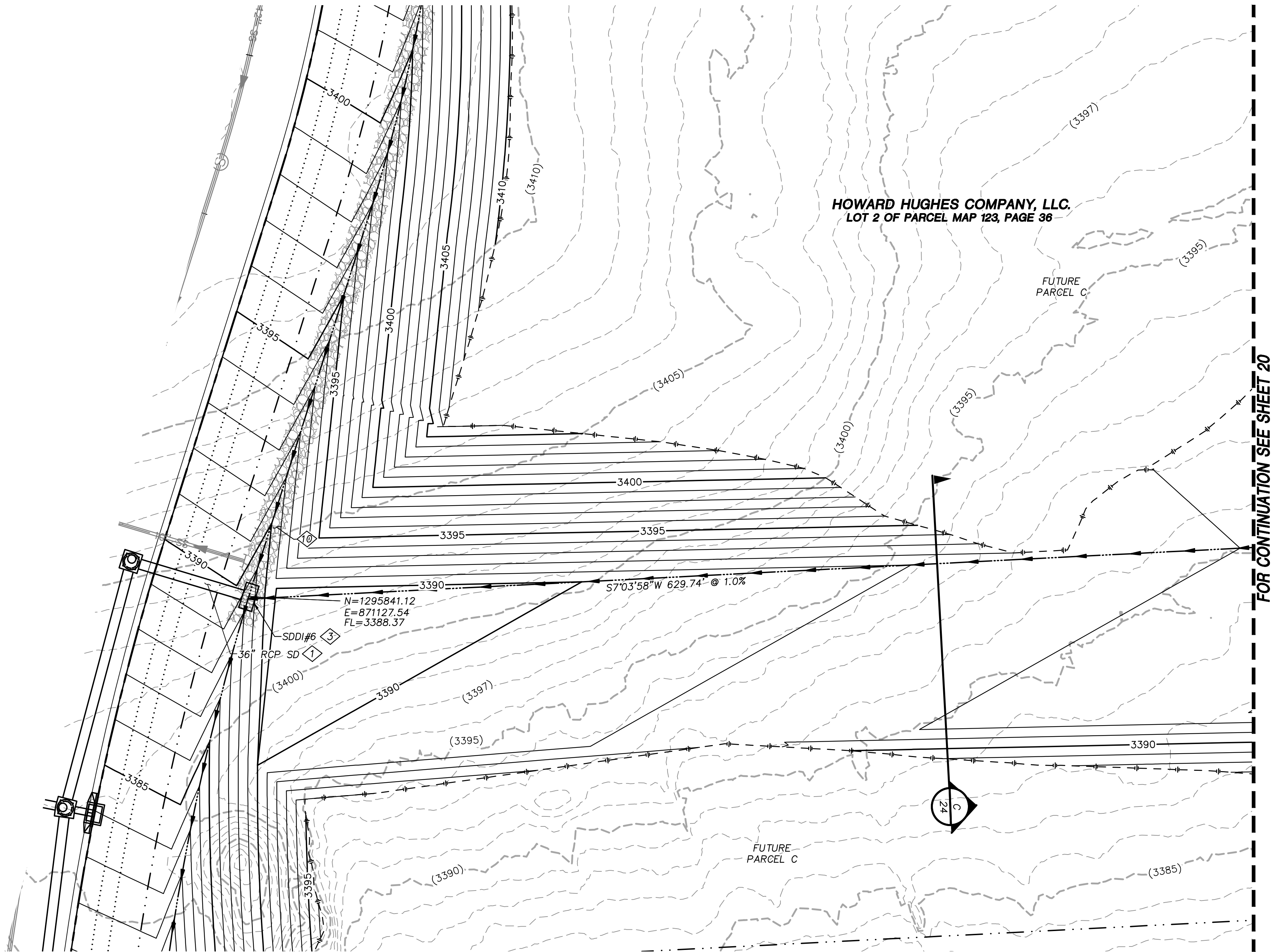
ROADWAY PLAN AND PROFILE
BEGIN TO STA 13+00

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18 / 27

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REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7775
Fax: +1702.263.7200

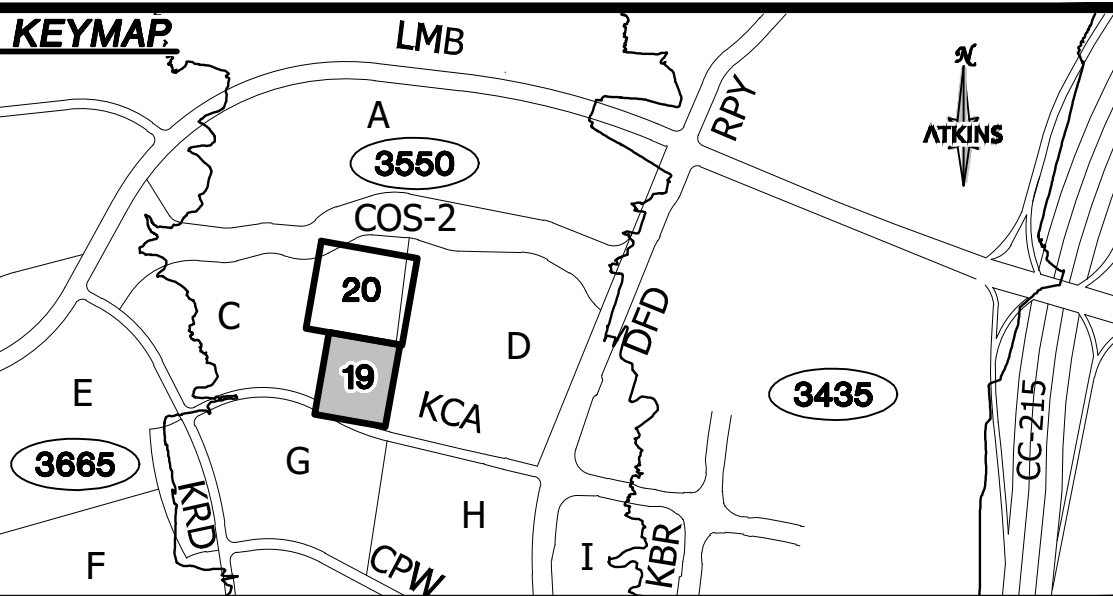
SUMMERLIN

SUMMERLIN VILLAGE 22
KESTREL CREEK AVENUE (STREET I)
DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)
BERM GRADING PLAN

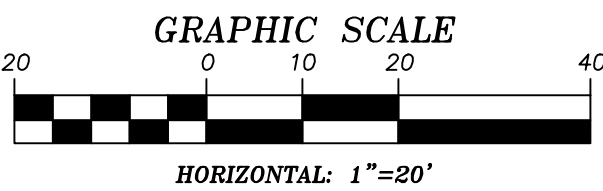
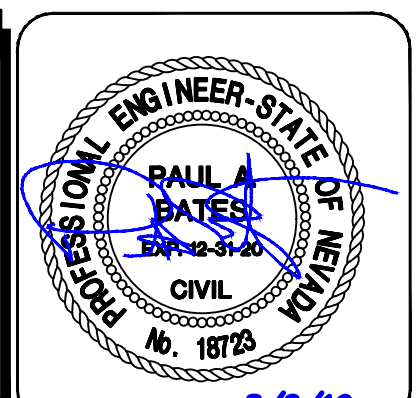
DESIGNED BY: N. BARCOS
DRAWN BY: L. MAMACLAY
CHECKED BY: L. MAMACLAY
DATE: AUGUST, 2019
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100060654
CLV 00-00000

DRAWING NO. 19 / 27



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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT
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GRADING PLAN CERTIFICATION

PAUL BATES PE#18723 DATE _____

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DS#XXX-0000

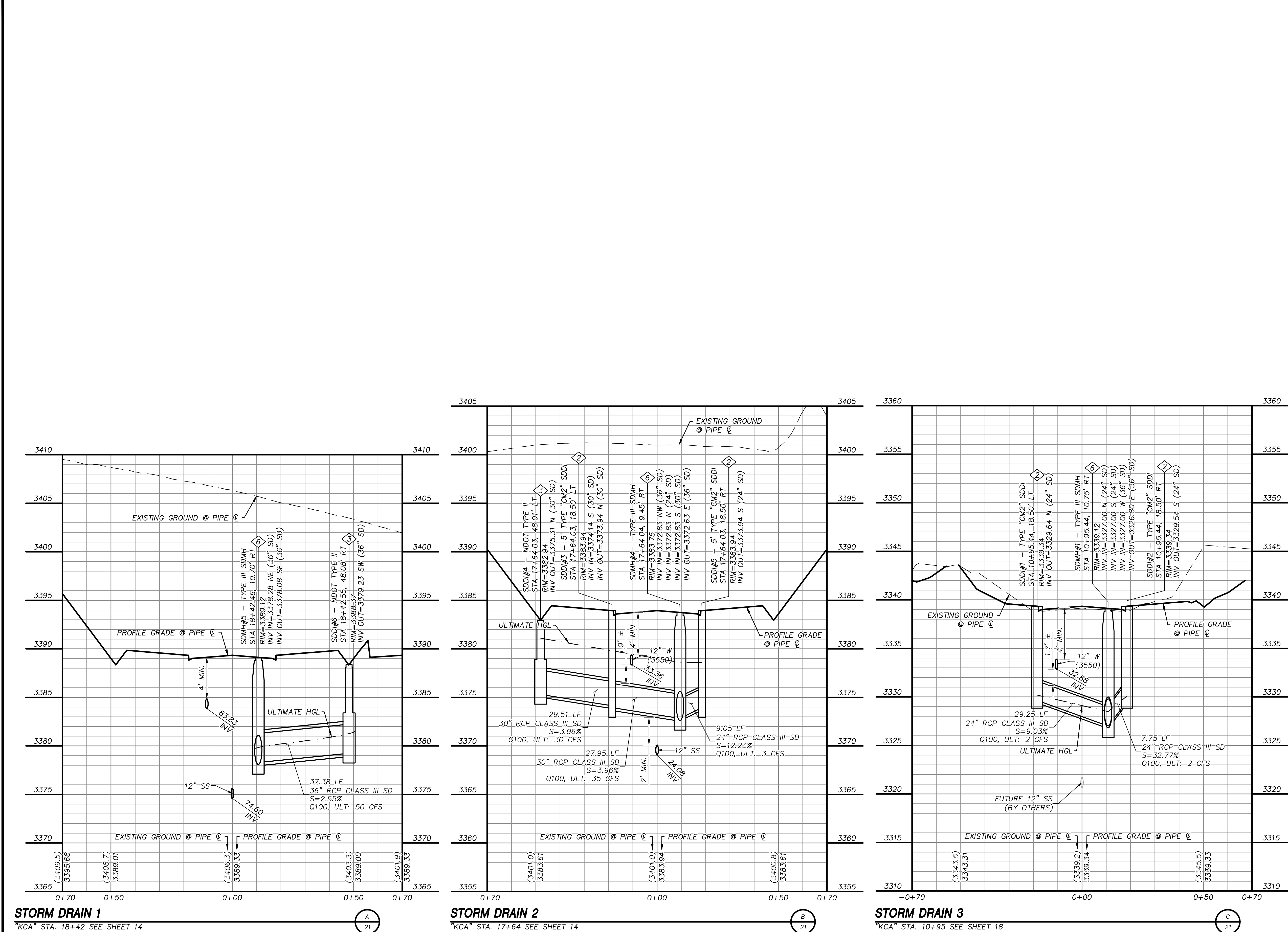
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T21S,R59E,S03





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ATKINS

SUMMERLIN

SUMMERLIN VILLAGE 22

KESTREL CREEK AVENUE (STREET I)

DESERT FOOTHILLS DRIVE TO KETTLE RIDGE DRIVE (STREET J)

DESIGNED BY:
N. BARCOS

DRAWN BY:
L. MAMACLAY

CHECKED BY:
L. MAMACLAY

DATE:
AUGUST, 2019

CLV NO. 100060654

DATE: AUGUST, 2019

DRAWING NO. 21/27

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00-00000

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2270 Corporate Circle
Suite 200
Henderson NV 89074-7755
Tel: 702.263.7275
www.atkinsglobal.com/northamerica